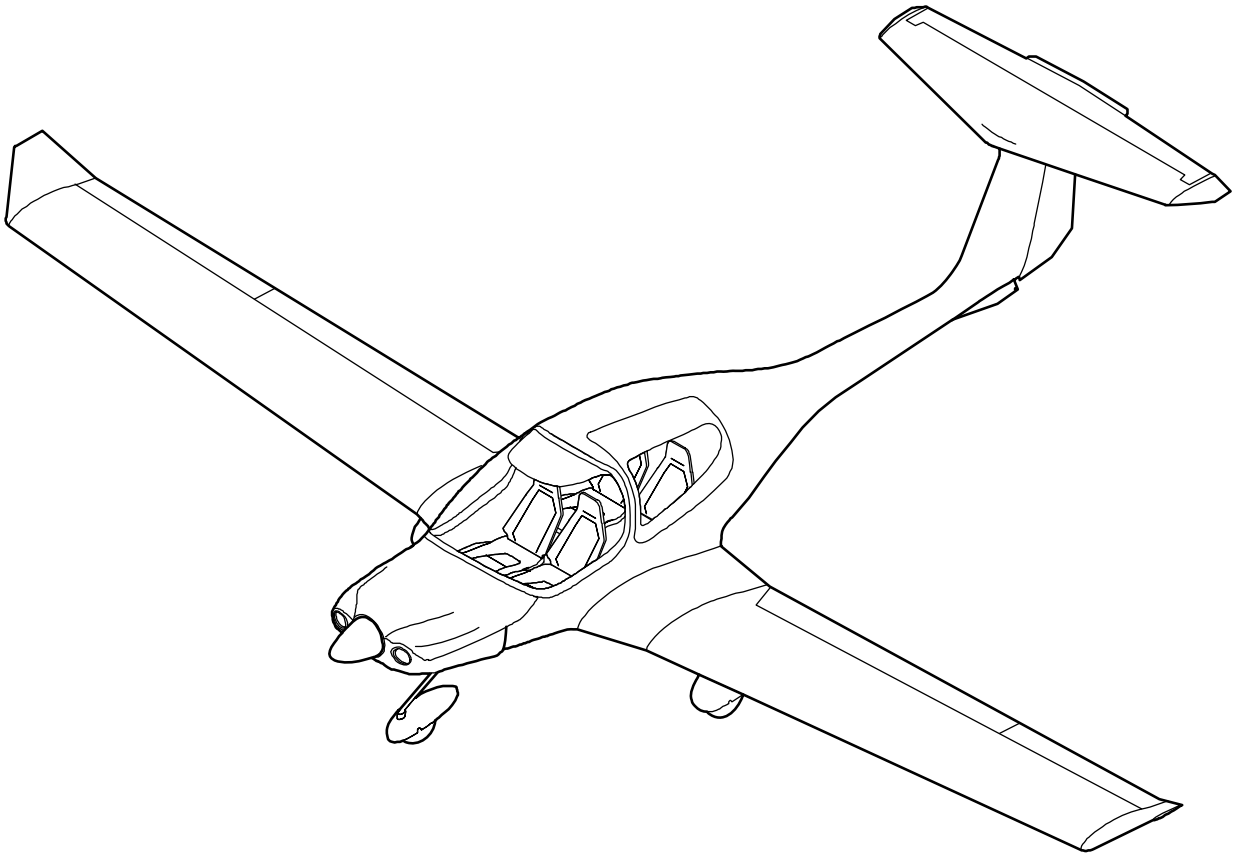
Diamond AIRCRAFT

DA 40 SERIES

AIRPLANE MAINTENANCE MANUAL



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Record of Revisions

Use this check list to record and control all of the revisions which you put in this Airplane Maintenance Manual (AMM). Put the affected pages of the revision into the AMM as soon as you get them. Remove and destroy the pages which are superseded. Complete the table below when you have put the revision in the AMM.

A vertical bar in the left margin of the page shows the changes.

Rev. No.	Reason	Date Issued	Inserted On	Inserted By
0	Initial Issue.	26 Jun 2000	Obsolete with Rev. 7, which is a complete re-issue.	
1	Corrections.	10 Nov 2000		
2	FAA certification.	15 May 2001		
3	Night VFR, IFR, autopilot; corrections.	26 Jun 2001		
4	1. Inclusion of DA 40 D (TAE 125 engine). 2. Inclusion of Temporary Revisions: AMM-TR-MÄM-40-046 AMM-TR-MÄM-40-047 AMM-TR-MÄM-40-056 AMM-TR-MÄM-40-057 AMM-TR-MÄM-40-065/66 AMM-TR-OÄM-40-071 AMM-TR-OÄM-40-077 AMM-TR-OÄM-40-086 AMM-TR-OÄM-40-090 AMM-TR-OÄM-40-091 AMM-TR-OÄM-40-097 AMM-TR-OÄM-40-098 AMM-TR-OÄM-40-099 AMM-TR-OÄM-40-101/102 AMM-TR-OÄM-40-103 AMM-TR-OÄM-40-104 AMM-TR-OÄM-40-112 AMM-TR-OÄM-40-117	09 Jan 2003 (re-issue)	Obsolete with Rev. 7, which is a complete re-issue.	

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4	AMM-TR-OÄM-40-119 AMM-TR-OÄM-40-120 AMM-TR-OÄM-40-121 AMM-TR-OÄM-40-122 AMM-TR-OÄM-40-127 AMM-TR-OÄM-40-128 AMM-TR-OÄM-40-138 3. Corrections.	09 Jan 2003 (re-issue)	Obsolete with Rev. 7, which is a complete re-issue.	
5	1. Inclusion of Temporary Revisions: AMM-TR-MÄM-40-075 AMM-TR-MÄM-40-089 AMM-TR-MÄM-40-093 AMM-TR-MÄM-40-098 AMM-TR-MÄM-40-099 AMM-TR-MÄM-40-102 AMM-TR-MÄM-40-107 AMM-TR-MÄM-40-113/a AMM-TR-MÄM-40-116 AMM-TR-MÄM-40-119 AMM-TR-MÄM-40-121 AMM-TR-MÄM-40-124 AMM-TR-MÄM-40-126 AMM-TR-MÄM-40-128 AMM.TR-MÄM-40-129 AMM-TR-MÄM-40-136/b AMM-TR-MÄM-40-138 AMM-TR-MÄM-40-142/a AMM-TR-MÄM-40-149 AMM-TR-MÄM-40-151 AMM-TR-MÄM-40-156 AMM-TR-MÄM-40-161 AMM-TR-MÄM-40-169 AMM-TR-MÄM-40-172 AMM-TR-MÄM-40-203 AMM-TR-MÄM-40-215	20 Sep 2007 (re-issue)	Obsolete with Rev. 7, which is a complete re-issue.	

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5	AMM-TR-MÄM-40-222 AMM-TR-MÄM-40-225 AMM-TR-MÄM-40-227 AMM-TR-MÄM-40-258 AMM-TR-MÄM-40-262/a AMM-TR-MÄM-40-280 AMM-TR-OÄM-40-118 AMM-TR-OÄM-40-137 AMM-TR-OÄM-40-179 AMM-TR-OÄM-40-205 AMM-TR-OÄM-40-244 AMM-TR-OÄM-40-247 & 40-284 AMM-TR-OÄM-40-251 AMM-TR-OÄM-40-259 AMM-TR-OÄM-40-267 2. Corrections	20 Sep 2007 (re-issue)	Obsolete with Rev. 7, which is a complete re-issue.	
6	1. Inclusion of Temporary Revisions: AMM-TR-MÄM-40-256 AMM-TR-MÄM-40-303 AMM-TR-MÄM-40-312 AMM-TR-MÄM-40-338 AMM-TR-MÄM-40-377 AMM-TR-MÄM-40-392 AMM-TR-MÄM-40-405 AMM-TR-MÄM-40-415 AMM-TR-MÄM-40-440	01 Jun 2010 (re-issue)	Obsolete with Rev. 7, which is a complete re-issue.	

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6	AMM-TR-OÄM-40-096 AMM-TR-OÄM-40-130 AMM-TR-OÄM-40-136 AMM-TR-OÄM-40-151 AMM-TR-OÄM-40-163&164 AMM-TR-OÄM-40-193c & 224c & 268a & 278 & MÄM-40-291 AMM-TR-OÄM-40-198 AMM-TR-OÄM-40-232 AMM-TR-OÄM-40-258 AMM-TR-OÄM-40-279 AMM-TR-OÄM-40-283a AMM-TR-OÄM-40-289 AMM-TR-OÄM-40-293 AMM-TR-OÄM-40-294 AMM-TR-OÄM-40-326 AMM-TR-OÄM-40-327 AMM-TR-VÄM-40-002a 2. Corrections.	01 Jun 2010 (re-issue)	Obsolete with Rev. 7, which is a complete re-issue.	
7	1. Inclusion of Temporary Revisions: AMM-TR-MÄM-40-385 AMM-TR-MÄM-40-474/a & 479/a AMM-TR-MÄM-40-477 AMM-TR-MÄM-40-486 AMM-TR-MÄM-40-534 AMM-TR-MÄM-40-537 AMM-TR-MÄM-40-580 AMM-TR-MÄM-40-629 AMM-TR-MÄM-40-634 AMM-TR-MÄM-40-636 AMM-TR-OÄM-40-317 2. Corrections.	01 Apr 2013 (re-issue)		

LIST OF EFFECTIVE PAGES

1. General

The list of effective pages uses these abbreviations:

– TOC = Table of Contents.

– ROR = Record of Revisions

– LOEP = List of Effective Pages

All Sections have a Title Page and a Table of Contents. The TOC can have one page or it can have many pages.

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Wiring Diagrams as listed in Chapter 92.		

CHAPTER 01

INTRODUCTION

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CHAPTER 01

INTRODUCTION

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CHAPTER 01
INTRODUCTION

1. General

This Airplane Maintenance Manual contains the data necessary to do the maintenance of the DA 40. It contains a full description of the systems, trouble shooting procedures, removal and installation procedures and maintenance instructions. It does not contain maintenance data for components removed from the airplane (maintenance shop data).

The Airplane Maintenance Manual contains wiring diagrams for the electrical system.

Use the DA 40 Airplane Flight Manual, latest revision with the Airplane Maintenance Manual, and the related Service Bulletins. Additional maintenance data is referenced in Chapter 05-00.

2. Revision Service

The manufacturer provides a revision service for the Airplane Maintenance Manual. The revision shows design changes to the airplane or changes in procedures. Each page of the manual shows the date of first issue. If the page has changed, it shows the date of the revision.

3. Warnings, Cautions and Notes

Obey all the usual safety precautions and maintenance instructions when doing maintenance.

This Airplane Maintenance Manual also contains warnings, cautions and notes before applicable instructions:

WARNING: **A WARNING TELLS THE PERSON DOING THE MAINTENANCE THAT INJURY OR DEATH IS POSSIBLE IF THEY DO NOT FOLLOW THE INSTRUCTIONS.**

CAUTION: A CAUTION TELLS THE PERSON DOING THE MAINTENANCE THAT DAMAGE TO EQUIPMENT IS POSSIBLE IF THEY DO NOT FOLLOW THE INSTRUCTIONS.

Note: A Note tells the person doing the maintenance how to make the task easier.

4. Manual Configuration

This manual is written using the regulations of the Air Transport Association of America Specification 100 (ATA 100). Each system is given a chapter number from the ATA 100. Where applicable, a chapter contains sections for each sub-system.

The Specification AECMA Simplified English has been used to write this Airplane Maintenance Manual. This is a mandatory requirement of the Air Transport Association of America Specification 100 (ATA 100).

There are only 3 sources of words available to use in Simplified English (SE).

– Approved words from the SE Guide. These have defined meanings and selected parts of speech.

– Technical names as defined in the SE Guide. Used only as Adjectives or Nouns.

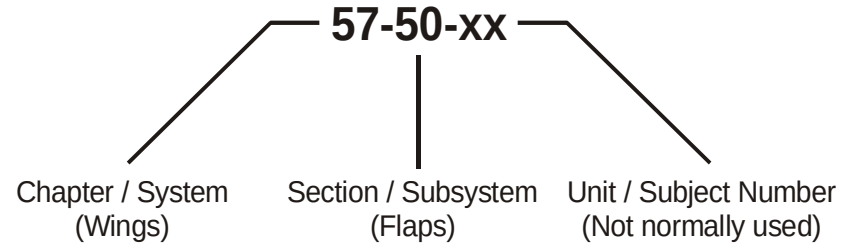
– Manufacturing processes as defined in the SE Guide. Always used as Verbs.

To obtain a copy of the SE Guide contact ASD-STAN, Avenue de Tervuren, B-1150 Brussels, Belgium. Tel: +32-2775-81-26, Fax:+32-2763-35-65, Email: contact@asd-stan.org.

This manual does not use the ATA 100 Aircraft Maintenance Task Oriented Support System (AMTOSS) or the ATA 100 Production Management Data Base (PMDB).

A. The ATA100 Numbering System

The ATA100 numbering system uses 3 pairs of numbers, for example:



The first pair of numbers show the system. System 57 is the Wings. Chapter 57 contains the data for the wings.

The second pair of numbers show the subsystem. Subsystem 50 is Flaps. Chapter 57, section 50 contains the data for the flaps installation.

The third pair of numbers show a unit. A unit could be the flap itself. Only complex systems use unit numbers.

For simple systems, the main chapter has all of the data and there are no section/subsystem break-downs.

B. Groups of Chapters

The chapters are put together in these groups:

Group A	Introduction	Chapters 01 - 02
Group B	Airplane General	Chapters 03 - 12
Group C	Airframe Systems	Chapters 20 - 37
Group D	Structure	Chapters 51 - 57
Group E	Propeller	Chapter 61
Group F	Power Plant	Chapters 71 - 81

A separation sheet divides each chapter. The separation sheet shows the number of the chapter and the title.

The main contents of each group of chapters is given below:

(1) Group A - Introduction

Chapter 1 tells you about the Airplane Maintenance Manual, and Chapter 2 tells you how to use the Airplane Maintenance Manual.

(2) Group B - Airplane General

Chapter 05 contains the Scheduled Maintenance Checklist. Some tasks require a maintenance procedure. The Scheduled Maintenance Checklist identifies the chapter in the manual that gives the maintenance procedure for the task. It also tells you where to find general information.

Chapters 06 to 10 tell you about general procedures such as towing, parking and weighing.

Chapter 11 tells you about the placards and markings which are important for operating the airplane.

Chapter 12 contains servicing tasks such as refueling and lubrication. It also contains data about cleaning.

(3) Group C - Airframe Systems

Chapter 20 contains the standard practices for airframe maintenance.

Chapters 21 to 37 tells you about the airframe systems. They include the avionics systems (such as communications (23)) and the mechanical systems (such as flight controls (27)).

Chapter 31 shows the *location* of the instruments. The chapter which is applicable to the system gives the details. For example, Chapter 27 gives the details for the flap position indicator.

(4) Group D - Structure

Chapter 51 contains data about the design of the airframe. It also gives instructions for minor repairs to the structure.

Chapters 52 to 57 tell you about each part of the structure.

(5) Group E - Propeller

Chapter 61 contains the maintenance procedures for the propeller. Refer to the propeller manufacturer's manual for other data.

(6) Group F - Power Plant

This group of chapters describes the engine and its systems which make the Power Plant. It contains the maintenance procedures for maintenance on the airplane. Refer to the engine manufacturer's manual for other data.

C. Chapter Configuration

The first page of each Chapter shows the number of the chapter and the title. The second page shows the contents. Where applicable, each chapter and section contains the topics that follow:

– Description and Operation.

– Trouble Shooting.

– Maintenance Practices. Where applicable the Maintenance Practices give data on these procedures:

Servicing.

Removal and Installation.

Adjustment/Tests.

Checking/Testing.

Cleaning/Painting.

Repairs.

5. Page Numbering System

This manual uses the ATA 100 page block-numbering system. The page number is at the bottom on the outer edge. It is adjacent to the chapter/section number.

Each topic in a section has numbers from these page blocks:

– Description and Operation - Pages 1 to 99.

– Trouble-Shooting - Pages 101 to 199.

– Maintenance Practices - Pages 201 to 299.

6. Figures

Figures are given numbers in sequence. The first Figure in a chapter or section is Figure 1.

7. Record of Revisions

This Airplane Maintenance Manual has a Record of Revisions. Use the Record of Revisions to show when changes were included in the Airplane Maintenance Manual.

8. List of Effective Pages

This Airplane Maintenance Manual has a List of Effective Pages. The List of Effective Pages shows you the number and effective date of each page contained in the Airplane Maintenance Manual.

CHAPTER 02

ORGANIZATION AND HANDLING OF THE MANUAL

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CHAPTER 02
ORGANIZATION AND HANDLING OF THE MANUAL

1. General

This Airplane Maintenance Manual covers the Maintenance Procedures for the DA 40, DA 40 D, and DA 40 F airplanes.

For data about a system, look in the list of chapters and find the chapter number. The first page of each chapter after the title page shows the contents.

2. Applicability

Data applicable to a series of airplane is marked with an applicability note. For example:

Valid for S/N 10067 thru 10090.

This shows that you can use this data for airplane with serial numbers 10067 through 10090 inclusive.

NOTE: There are different models of Lycoming engines used for the DA 40 series airplanes.

Instructions given for the 'Lycoming version' in the AMM are applicable to all DA 40 airplanes powered by a Lycoming engine. Specific changes apply to the Lycoming O-360-A4M (DA 40 F) or the Lycoming IO-360-M1A (DA 40) engine model and are listed referring to the engine model number.

3. Revisions

The manufacturer makes changes to the Airplane Maintenance Manual to show design changes, maintenance procedure changes or other changes. Each group of changes is called a ‘Revision’.

A manual revision contains these items:

– The changed pages.

– The reason for the revision.

– Instructions for putting the revision into the Airplane Maintenance Manual.

– A new List of Effective Pages.

A vertical bar in the left margin of the page shows the changes. Where a figure is changed, a small hand points to the change if necessary.

4. Temporary Revisions

Temporary revisions correct errors, or they give temporary instructions. The manufacturer sends them to the airplane owners quickly. The manufacturer uses yellow paper for temporary revisions. The manufacturer usually puts the contents of a temporary revision in the next approved revision.

5. Service Bulletins

Service Bulletins get issued when necessary. They give the operator more information on inspections, maintenance, repairs or modifications.

Service Bulletins have 4 categories:

A. Alert Service Bulletins

Alert Service Bulletins are issued if there is an immediate danger (risk of damage or total loss). They are sent immediately by the fastest means to all known addresses of operators and service stations which are affected.

B. Mandatory Service Bulletins

Mandatory Service Bulletins include the description of a problem and the solution. If you do not follow a mandatory Service Bulletin, failures or malfunctions can result during further operation.

You must do the work given in a Mandatory Service Bulletin.

C. Recommended Service Bulletins

Recommended Service Bulletins give data about:

– A minor problem and its correction.

– A better technical design.

If you do not follow a Recommended Service Bulletin, it will not cause a failure. But it may cause increased maintenance work.

If you do follow a Recommended Service Bulletin:

– The maintenance work may be reduced (for example, reduced wear, increased life).

– The operational behavior will be improved (for example, easier engine starting).

D. Optional Service Bulletins

Optional Service Bulletins give data about optional equipment that you can install in an airplane (for example, sailplane towing device).

The airplane owner makes the decision to follow an Optional Service Bulletin.

6. Service Instructions

A Service Instruction tells the operator about permitted installations or additional equipment. It also gives the applicable technical data.

7. Abbreviations

Where possible, the abbreviations used correspond with the related regulations.

ACL	Anti-Collision Light
ADF	Automatic Direction Finder
A.M.E.	Aircraft Maintenance Engineer
A&P	Aircraft and Power Plant Mechanic
ASI	Airspeed Indicator
CAN	Controller Area Network
CFRP	Carbon Fiber Reinforced Plastic
DME	Distance Measuring Equipment
ELT	Emergency Locator Transmitter
FADEC	Full Authority Digital Engine Control
FRP	Fiber Reinforced Plastic
GFRP	Glass Fiber Reinforced Plastic
GPS	Global Positioning System
G/S	Glide Slope
IFR	Instrument Flight Rules
HSI	Horizontal Situation Indicator
LOC	Localizer
OAT	Outside Air Temperature
SB	Service Bulletin
S/N	Serial Number
TBO	Time Between Overhaul

TSMOH	Time Since Major Overhaul
UHF	Ultra High Frequency
TTSN	Total Time Since New
VFR	Visual Flight Rules
VHF	Very High Frequency
VOR	VHF Omni-directional Ranging
VSI	Vertical Speed Indicator

8. Conversion Factors and Abbreviations

Dimension Unit [Abbreviation]	Conversion Factor SI to US/Imperial	Conversion Factor US/Imperial to SI
Length		
Meter [m]	[m] / 0.3048 = [ft]	
Millimeter [mm]	[mm] / 25.4 = [in]	
Kilometer [km]	[km] / 1.852 = [nm]	
	[km] / 1.609 = [sm]	
Inch [in]		[in] x 25.4 = [mm]
Foot [ft]		[ft] x 0.3048 = [m]
Nautical mile [nm]		[nm] x 1.852 = [km]
Statute mile [sm]		[sm] x 1.609 = [km]
Velocity		
Kilometers per hour [km/h]	[km/h] / 1.852 = [kts]	
	[km/h] / 1.609 = [mph]	
Meters per second [m/s]	[m/s] x 196.85 = [fpm]	
Miles per hour [mph]		[mph] x 1.609 = [km/h]
Knots [kts]		[kts] x 1.852 = [km/h]
Feet per minute [fpm]		[fpm] / 196.85 = [m/s]
Rotational Speed		
Revolutions per minute [RPM]		[RPM] = [min^{-1}]
Pressure		
Bar [bar]	[bar] x 14.5038 = [psi]	
Hectopascal [hPa] = Millibar [mbar]	[hPa] / 33.864 = [inHg]	
	[mbar] / 33.864 = [inHg]	
Pounds per square inch [psi]		[psi] / 14.5038 = [bar]
Inches of mercury column [inHg]		[inHg] x 33.864 = [hPa]
		[inHg] x 33.864 = [mbar]

Dimension **Unit [Abbreviation]**	**Conversion Factor** **SI to US/Imperial**	**Conversion Factor** **US/Imperial to SI**
Force or Weight		
Newton [N]	[N] / 4.448 = [lb]	
Decanewton [daN]	[daN] / 0.4448 = [lb]	
Pound [lb]		[lb] x 4.448 = [N] [lb] x 0.4448 = [daN]
Mass ('Weight')		
Kilogram [kg]	[kg] / 0.45359 = [lb]	
Pound [lb]		[lb] x 0.45359 = [kg]
Volume		
Liter [l]	[l] / 3.7854 = [US gal] [l] / 0.9464 = [US qts] [l] / 4.5459 = [Imp gal] [l] / 61.024 = [in^3]	
US gallon [US gal]		[US gal] x 3.7854 = [l]
US quart [US qt]		[US qt] x 0.9464 = [l]
Imperial gallon [Imp gal]		[Imp gal] x 4.5459 = [l]
Cubic inch [in^3]		[in^3] x 61.024 = [l]
Torque		
Newton meter [Nm]	[Nm] / 1.3558 = [lbf.ft.] [Nm] x 8.851 = [lbf.in.]	
Foot pound [lbf.ft.]		[lbf.ft.] x 1.3558 = [Nm]
Inch pound [lbf.in.]		[lbf.in.] / 8.851 = [Nm]
Temperature		
Degree Celsius [°C]	[°C] x 1.8 + 32 = [°F]	
Degree Fahrenheit [°F]		([°F] - 32) / 1.8 = [°C]

Note: In this Airplane Maintenance Manual masses are referred to as weights. The authors accept that this is technically incorrect but have used the expression for simplicity and convenience.

9. Torque Conversion Graphs

Use Figure 1 for conversion of torque values Nm - lbf.ft. Use Figure 2 for conversion of Nm - lbf.in.

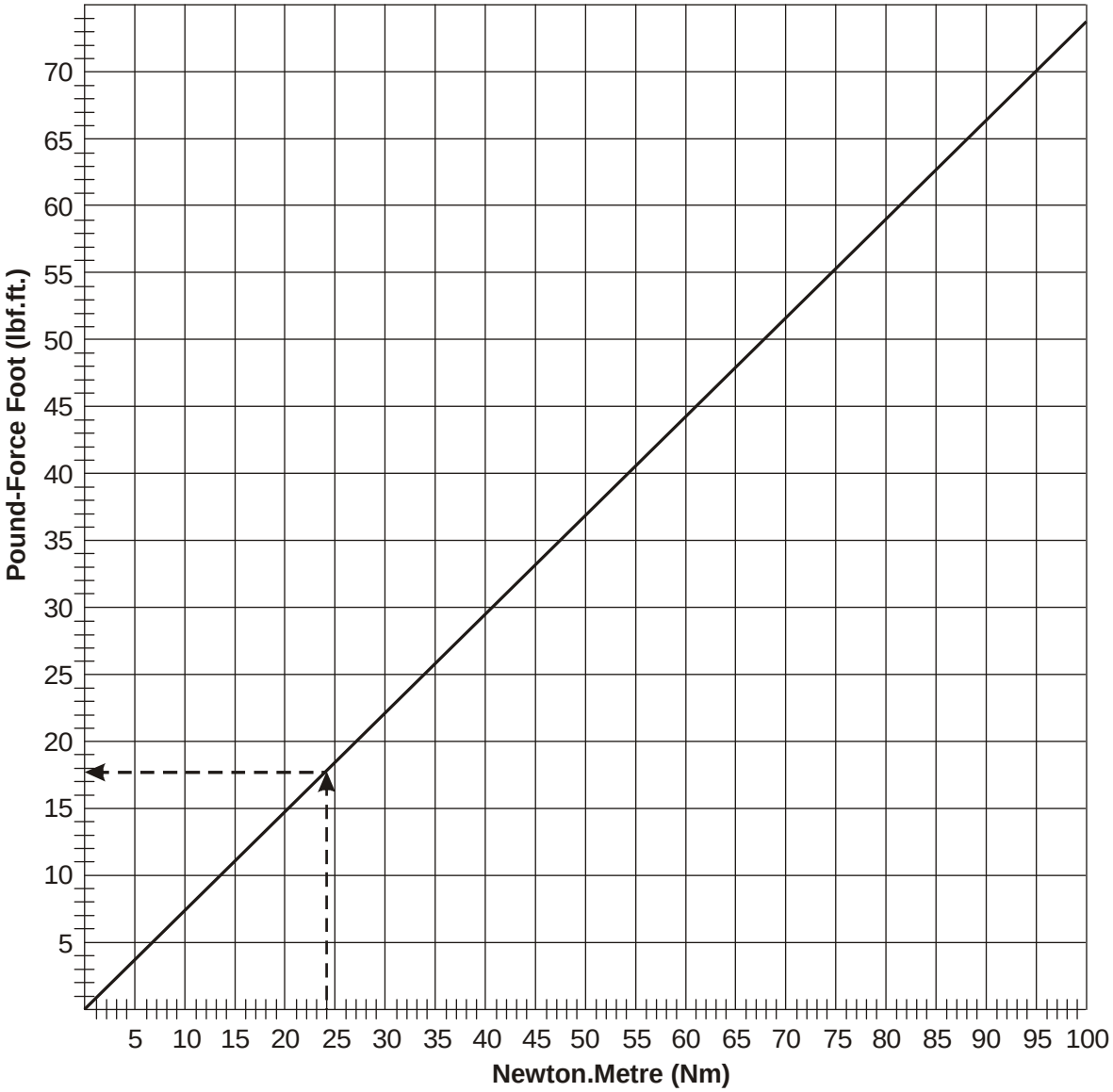


Figure 1: Nm - lbf.ft.

Find the Nm value on the horizontal axis. Move vertically to the solid black diagonal line. Then move horizontally to the vertical axis. Read the value in lbf.ft.

Example: To convert 24 Nm to lbf.ft., find 24 Nm on the horizontal axis (see the dashed line). Follow the dashed line vertically to the solid black diagonal line. Then follow the dashed line horizontally to the vertical axis. Read the value of 17.7 lbf.ft.

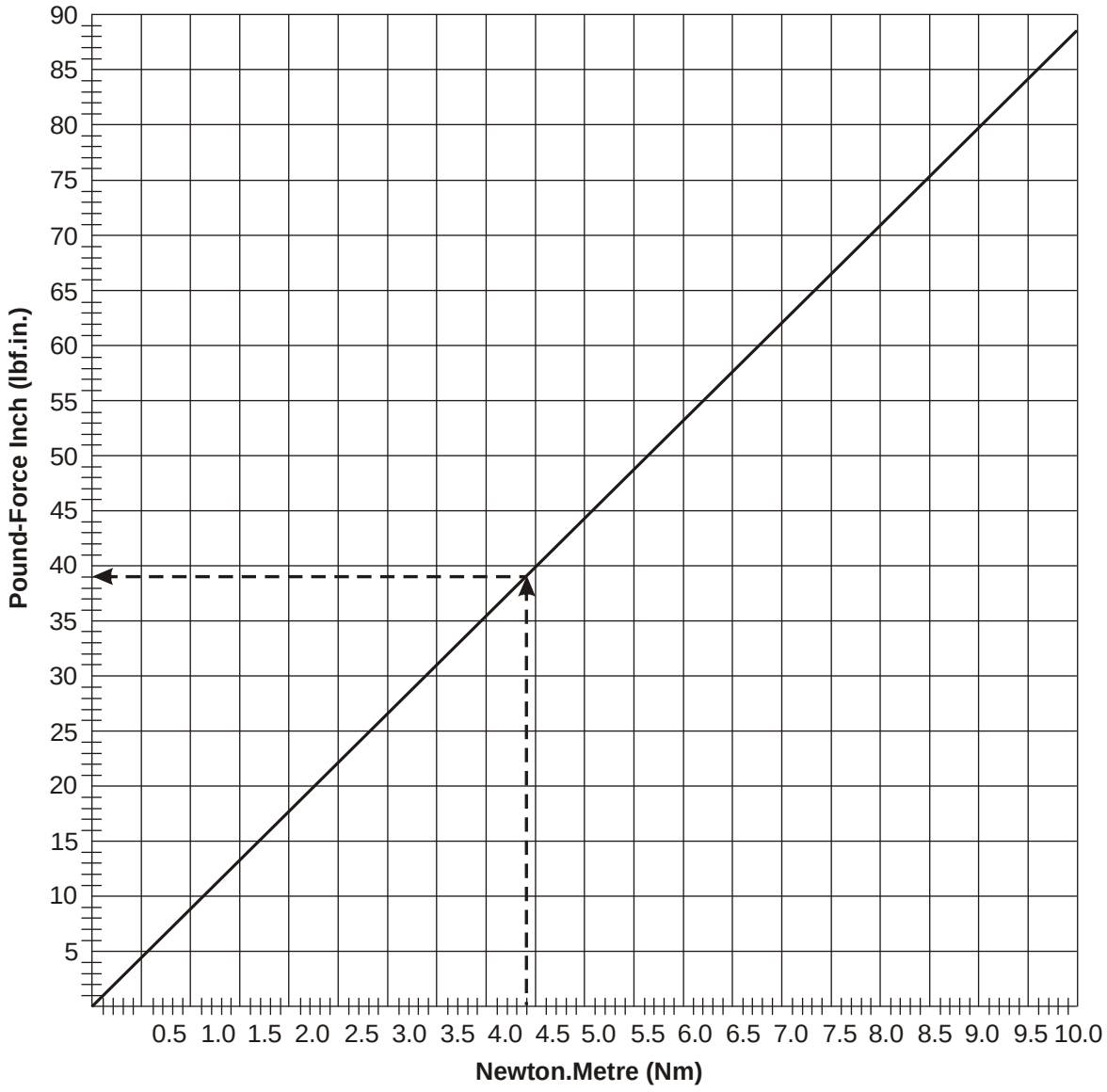


Figure 2: Nm - lbf.in.

Find the Nm value on the horizontal axis. Move vertically to the solid black diagonal line. Then move horizontally to the vertical axis. Read the value in lbf.in.

Example: To convert 4.4 Nm to lbf.in., find 4.4 Nm on the horizontal axis (see the dashed line). Follow the dashed line vertically to the solid black diagonal line. Then follow the dashed line horizontally to the vertical axis. Read the value of 39 lbf.in.

CHAPTER 03

GENERAL DESCRIPTION OF THE AIRPLANE

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CHAPTER 03
GENERAL DESCRIPTION OF THE AIRPLANE

1. General

Diamond Aircraft Industries GmbH, N. A. Otto-Straße 5, A-2700 Wiener Neustadt, Austria, is the manufacturer of the DA 40 airplane.

2. Description

The DA 40 is a single-engine, four seat, low-wing monoplane. It has a cantilever wing and a 'T' tail. The airplane structure is fiber-reinforced plastic composite. This gives a very strong but light structure.

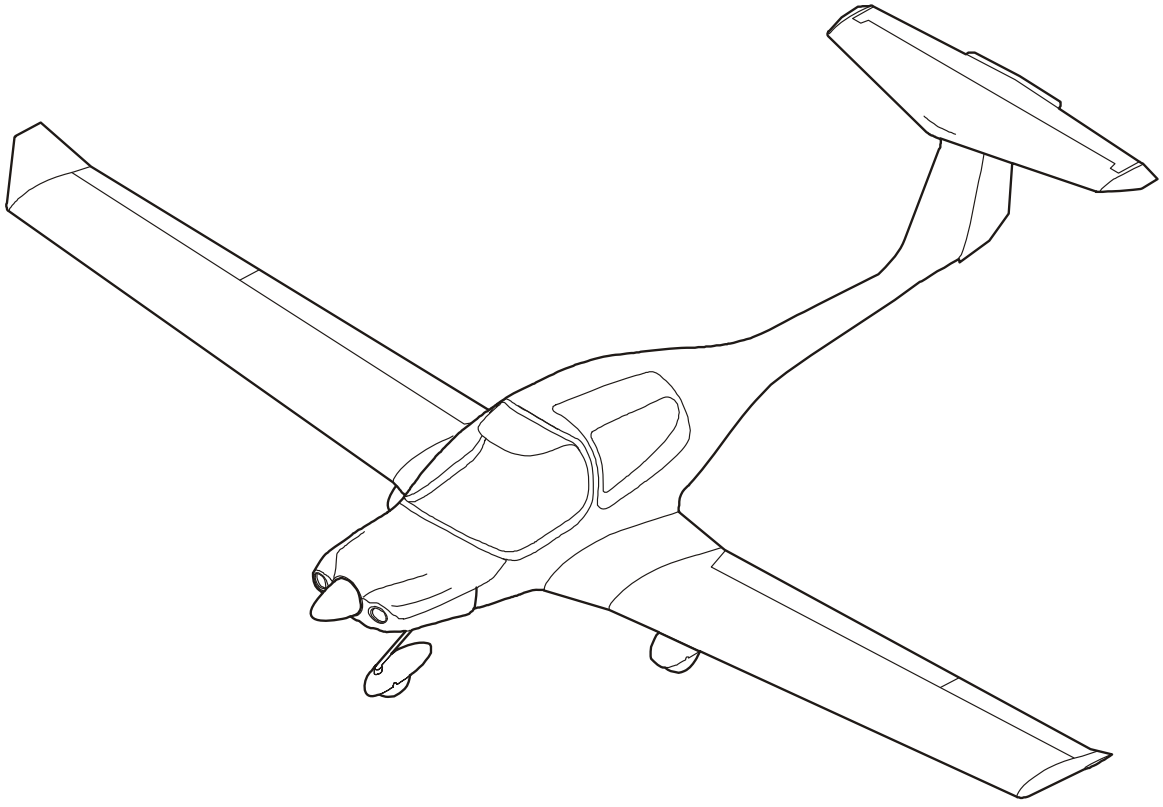


Figure 1: DA 40 Airplane

The semi-monocoque fuselage is a glass-fiber reinforced-plastic (GFRP) shell with GFRP bulkheads and stiffeners. Uni-directional carbon fiber bands give extra strength and stiffness in many areas. Left and right half-shells bond together with a center section to make the fuselage. The center section makes the bottom of the cockpit. It has the main bulkheads which connect to the spars in each wing. The vertical stabilizer has two GFRP half-shells that are part of the fuselage shells.

The cantilever wing is a semi-monocoque structure. Each wing has two I-shaped spars with webs made form GFRP/rigid foam sandwich and caps made from CFRP bands. Each wing has top and bottom shells made of CFRP/GFRP/rigid foam sandwich which bond to the spars. GFRP ribs and webs bond to the spars and shells to complete the structure.

The wings attach to the fuselage center section. Each wing has two stump-spars. Four large bolts attach each wing to the fuselage main bulkheads. Standard ailerons and electrically operated flaps attach to the trailing edge of the wing.

The horizontal stabilizer is a semi-monocoque structure. It has top and bottom shells made of GFRP. The shells bond to GFRP spars and ribs. The trailing edge has a conventional elevator and a trim tab.

The one-piece canopy has a large quantity of wrap-around glazing. This gives a good all-round view from the cockpit. A glazed rear passenger door gives access to the rear seats from the left side of the airplane.

A polyurethane paint finish protects the outside skin from ultraviolet rays and humidity.

The fixed tricycle landing gear has fairings attached to each leg. The main legs attach to the fuselage center-section. The nose leg attaches to the forward fuselage. Each main wheel has a disc brake on the inside. Hydraulic pressure operates each disc brake.

The flight control system uses conventional ailerons, elevator and rudder. The DA 40 has 2 control sticks and 2 rudder pedal assemblies to operate the primary flight-controls. Push-pull rods operate the ailerons and elevator. Cables operate the rudder. An electric motor operates the wing flaps. A hand wheel and Bowden cable operate the elevator trim.

The DA 40 is powered by one of the following engines:

– Lycoming IO-360-M1A - a four cylinder, direct drive, horizontally-opposed engine. The engine has a fuel injection system and a conventional wet-sump oil system. This version of the DA 40 has a hydraulic constant-speed propeller with three blades.

– Thielert Aircraft Engines TAE 125 - a four valve, four cylinder Diesel cycle engine with cylinders in line. The engine has a turbo-charger and intercooler, a common rail high-pressure direct injection system, and a wet oil system. It drives the hydraulic constant-speed propeller with three blades through a reduction gear.

– Lycoming O-360-A4M - a four cylinder, direct drive, horizontally-opposed engine. The engine has a carburetor and a conventional wet-sump oil system. The Lycoming O-360-A4M engine version of the DA 40 has a Sensenich propeller or an MT-propeller with two blades.

The airplane has an aluminum fuel tank in each wing. Each tank consists of several chambers. The fuel tanks are inboard between the spars. The tank assemblies have fuel fillers at or near the outboard end. Flexible hoses connect the tanks to a fuel selector and shut-off valve under the cockpit floor. An electrical boost pump (Lycoming version only) and an engine driven pump supply fuel to the engine. The tanks have fuel quantity probes which operate the cockpit indicating systems.

The airplane has two sources of electrical power. A 28 Volt (Lycoming version) or 14 Volt (TAE version) battery supplies power when the engine is not running. An alternator provides power when the engine is running. Switches and circuit breakers control all electrical devices. A starter key controls the engine starter motor. It also controls the magnetos (Lycoming version) or serves as electric master switch (TAE version).

The DA 40 has a full range of flight instruments. These include Pitot/static instruments to show airspeed and altitude, as well as electrically driven instruments and vacuum driven instruments (TAE version only) to show direction. As an option, a Garmin G1000 system may be installed in the TAE version. In this case most indications are shown on the G1000 and only the backup instruments are installed on the instrument panel.

The airplane has all the usual engine instruments, except that the TAE version has a load indication instead of a manifold pressure indication.

The airplane also has radio and navigation aids installed.

3. Equipment Data

The table below gives you the name and address of the manufacturers who supply systems and/or equipment for the DA 40. This will help you get more data on a system and/or equipment.

Equipment/System	Address
Lycoming IO-360-M1A Engine, Lycoming O-360-A4M Engine:	Textron Lycoming 652 Oliver Street Williamsport, PA 17701 USA Homepage: www.lycoming.textron.com
TAE 125 Engine:	Thielert Aircraft Engines Platanenstr. 14 D-09350 Lichtenstein Germany Tel.: +49-37204/696-90 Fax: +49-37204/696-50 Homepage: www.tae-engines.com E-mail: info@tae-engines.com
Propeller:	MT-Propeller Entwicklung GmbH Flugplatzstr. 1 D-94348 Atting Germany Tel.: +49-9429-94090 Fax: +49-9429-8432 Homepage: www.mt-propeller.de MT-Propeller USA, Inc. 1180 Airport Terminal Drive DeLand, FL 32724 Tel.: (386) 736-7762 Fax: (386) 736-7696 E-mail: mtprop@bellsouth.net
Main Wheels and Brakes: Cleveland:	Parker Hannifin Corporation Aircraft Wheel and Brake Division P.O. Box 158 Avon, Ohio 44011 USA Tel: (216) 934-5221

Equipment/System	Address
Navigation and Communication Equipment:	Bendix/King 400 North Rogers Road Olathe, Kansas 66062-1212 USA Tel: (913) 782-0400 (USA and Canada) (913) 782-0700 (other countries)
Airspeed Indicator, Vertical Speed Indicator, Altimeter:	United Instruments Inc. 3625 Comotara Avenue Wichita, Kansas 67226 USA Tel: (316) 636-9203 Fax: (316) 636-9243
Emergency Locator Transmitter (ELT):	Ack Technologies Inc. 440 W. Julian Street San Jose, California 95110 Tel: (408) 287-8021 Fax: (408) 971-6879
	Artex Aircraft Supplies 14405 Keil Road NE Aurora, Oregon 97002 USA Tel: (503) 678-7929 Fax: (503) 678-7930 Website: www.artex.net
Battery:	Concorde Battery Corp. 2009 San Bernardino Road West Covina, California 91790 USA Tel: (626) 813-1234 Teledyne Battery Products 840 West Brockton Avenue Redlands, California 92375 USA Tel: (909) 793-3131

Equipment/System	Address
Attitude Gyro, Directional Gyro:	BF Goodrich Avionics Systems P.O. Box 71970 Chicago, Illinois 60694-1970 USA
Turn Coordinator:	Mid-Continent Instrument Co., Inc. 7706 E, Osie, Wichita, Kansas 67207 USA Tel: (316) 683-5619 Fax: (316) 683-1861
Altitude Encoder:	Trans-Cal Industries, Inc. 16141 Cohasset Street Van Nuys, California 91406-2908 USA Tel: (818) 787-1221, (800) 423-2913 Fax: (818) 787-8916
Intercom:	PS Engineering, Inc. 9800 Martel Road Lenoir City, Tennessee 37772 Tel: (865) 988-9800 Fax: (865) 988-6619
Garmin G1000 System:	Garmin International Inc. 1200 E. 151st Street Olathe, KS 66062 U.S.A. Phone: +1 (913) 397-8200 Fax. +1 (913) 397-8282 Homepage: www.garmin.com
Position / Strobe Lights:	Whelen Engineering Company, Inc. Route 145, Winthrop Rd. Chester, CT 06412-0684 USA Tel: (860) 526-9504 Fax: (860) 526-2009 Website: www.whelen.com

4. Handling of Identification Data

No person shall remove, change, or place identification information on any airplane, engine, propeller, propeller blade, or propeller hub, without the approval of the competent national Airworthiness Authority.

If a deviation from the procedure above is necessary, any person performing maintenance work may in consultation with the competent national Airworthiness Authority:

– Remove, change, or place the identification plate on any airplane, engine, propeller, propeller blade, or propeller hub.

– Remove an identification plate, when necessary during maintenance operations.

– No person shall install an identification plate, removed in accordance with the procedures above, on any aircraft, engine, propeller, propeller blade, or propeller hub other than the one from which it was removed.

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CHAPTER 04

AIRWORTHINESS LIMITATIONS

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AIRWORTHINESS LIMITATIONS

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CHAPTER 04
AIRWORTHINESS LIMITATIONS

THIS AIRWORTHINESS LIMITATIONS SECTION IS APPROVED BY EUROPEAN AVIATION SAFETY AGENCY (EASA) IN ACCORDANCE WITH THE APPLICABLE CERTIFICATION PROCEDURES AND THE TYPE CERTIFICATION BASIS. IT SPECIFIES THE AIRWORTHINESS LIMITATIONS REQUIRED BY JAR 23.

THIS AIRPLANE MAINTENANCE MANUAL CHAPTER 04 (AIRWORTHINESS LIMITATIONS) IS APPROVED WITH EASA APPROVAL NO. 10044960.

THE AIRWORTHINESS LIMITATIONS SECTION IS FAA APPROVED AND SPECIFIES MAINTENANCE REQUIRED UNDER SECS. 43.16 AND 91.403 OF THE FEDERAL AVIATION REGULATIONS UNLESS AN ALTERNATIVE PROGRAM HAS BEEN FAA APPROVED.

SERVICE BULLETINS OR OTHER DOCUMENTS REVISING THIS SECTION WHICH CONTAIN A STATEMENT THAT THE DOCUMENT IS AUSTRO CONTROL GMBH (ACG) / EUROPEAN AVIATION SAFETY AGENCY (EASA) APPROVED ARE CONSIDERED FAA APPROVED.

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1. Airworthiness Limitations

This Chapter is approved and shows the mandatory limitations which were established as a result of the certification process.

The time limits given in Chapter 04 must be applied to ensure Continued Airworthiness of the DA 40.

Note: Regular inspections of the airplane including replacement and overhaul of certain components are required to ensure Continued Airworthiness of the DA 40.

For possible airworthiness limitations of engine, propeller, components and vendor equipment refer to the applicable Maintenance data as listed in Section 05-00.

A. Certification Maintenance Requirements

(1) Component and System Checks

The component and system checks under this paragraph are also included in Section 05-10.

The following table lists airplane components and systems which require monitoring through scheduled maintenance.

Where an interval is given in both flight time and calendar years, the limit which is reached first must be applied.

VFR in the "Kind of Operation" column means that this limit applies to day VFR, night VFR and IFR operation. NVFR in the "Kind of Operation" column means that this limit applies to night VFR and IFR operation. IFR in the "Kind of Operation" column means that this limit applies to IFR operation.

ATA Ch.	Component	Maintenance Requirement	Interval		Kind of Ope.
			hrs.	yrs.	
24	Essential bus.	Check both ends of each wire connected to the battery relay for insecure connection. Check essential bus copper bar (behind circuit breakers) for looseness. Verify proper function.	1000 ± 50	-	NVFR
51	Bonding system and static discharging system.	Resistance measurements (refer to Section 51-80).	1000 ± 50	-	NVFR

(2) Life Time Limit / Structure Checks

There is no structural life limit.

Note: The DA 40 has been designed and tested under a 'damage tolerant structure' philosophy. Therefore the structural inspections given in Chapter 05 cover all required structure checks.

B. Replacement Requirements

The following table lists life limited airplane components which must be replaced at a specific time.

Where an interval is given in both flight time and calendar years, the limit which is reached first must be applied.

Note: The replacement requirements under this paragraph are also included in Section 05-10.

VFR in the "Kind of Operation" column means that this limit applies to day VFR, night VFR and IFR operation. NVFR in the "Kind of Operation" column means that this limit applies to night VFR and IFR operation. IFR in the "Kind of Operation" column means that this limit applies to IFR operation.

ATA Ch.	Component	Replacement Time		Kind of Ope.
		hrs.	yrs.	
24	Emergency battery. Replace all cells at the same time. All cells must have the same expiration date, or replace the battery package.	2 years, or upon reaching the date marked on each cell or package, or after use.		IFR
24	ECU backup battery (TAE version only).	-	2 ± 30 days	VFR
28	Fuel filter element (TAE version only).	100 ± 10	1 ± 30 days	VFR

C. Colour of Airframe

It is mandatory to paint the DA 40 white as described in Chapter 51 of this manual. This will prevent the temperature of the structure from becoming too high. Examples of approves shades are:

– RAL 9016.

– Mercedes DB 147.

– BMW 218.

– Volvo XG28.

– Volvo BC76.

– Saab 5AC6.

– Alfa Romeo 230.

Before painting the DA 40 in a different shade the manufacturer must be contacted.

Only certain areas which are defined in Chapter 51 of this manual (for example, registration markings, placards and warning markings) may have a different color.

D. Repairs

Repairs which are not described in Chapter 51 of this manual may only be carried out in accordance with a repair scheme which has been approved by the manufacturer or the competent National Airworthiness Authority.

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CHAPTER 05

TIME LIMITS AND MAINTENANCE CHECKS

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CHAPTER 05
TIME LIMITS AND MAINTENANCE CHECKS

1. General

This Chapter will help you to do the maintenance of the DA 40 correctly. Refer to Sections 04-00 and 05-00 for maintenance and inspections.

The times given in this Chapter are times recommended by the airplane manufacturer. Do the scheduled maintenance at the given times, because they are the minimum required to keep the airplane in a good technical condition.

Time limits and maintenance checks were established for operation in a moderate climate and on paved runways. For operation under rough conditions (extreme temperatures, saline air, wind-borne sand, operation on grass runways, etc.) it may be necessary to make changes to the maintenance requirements given in this Chapter. You can decrease the time between scheduled maintenance checks if the airplane's operation makes it necessary. You must not extend the time between scheduled maintenance checks without the Airworthiness Authority's approval.

These checks do not over-ride the requirements of the Airworthiness Authority of the country where the airplane is registered. You must make sure that all Airworthiness Directives, Service Bulletins and any other requirements of the Airworthiness Authority are completed as required.

The airplane manufacturer can change the time between checks. If this happens, the airplane manufacturer will publish the change as a revision to the Airplane Maintenance Manual.

2. Chapter Configuration

A. Section 05-10

Section 05-10 contains the recommended time limits for maintenance checks. It also contains the recommended time between overhaul for components. Use the data in Section 05-10 to find when to do the maintenance.

B. Section 05-20

Section 05-20 contains information about the maintenance checklist structure.

C. Section 05-21

Section 05-21 contains information about the Flight Line Checks.

D. Section 05-22

Section 05-22 contains information about the 25 hour check of the Lycoming engines and 5 hour check of the TAE engines.

E. Section 05-25

Section 05-25 contains the Drain Holes Inspection Checklist.

F. Section 05-28

Section 05-28 contains the Maintenance Checklist for the DA 40, DA 40 D and DA 40 F airplanes. The Section is subdivided into engine and airframe Sections and provides checklists for the engines, the airframe and the corresponding reports.

(1) Section 05-28-00

DA 40 airplane equipped with a Lycoming IO-360-M1A engine with a constant speed propeller with three blades: Maintenance checks schedule for 50, 100, 200, 1000, and 2000 hour checks on the engine.

(2) Section 05-28-01

DA 40 D airplane equipped with a TAE 125-01 or a TAE 125-02 engine with a constant speed propeller with three blades: Maintenance checks schedule for 100, 200, 1000, and 2000 hour checks on the engine.

(3) Section 05-28-02

DA 40 F airplane equipped with a Lycoming O-360-A4M engine with a fixed pitch propeller with two blades: Maintenance checks schedule for 50, 100, 200, 1000, and 2000 hour checks on the engine.

(4) Section 05-28-50

DA 40 Maintenance Checklist for the airframe: Maintenance checks schedule for 100, 200, 1000, and 2000 hour checks on the airframe.

(5) Section 05-28-90

DA 40, DA 40 D and DA 40 F Maintenance Report.

(6) Section 05-28-91

DA 40, DA 40 D and DA 40 F Engine Ground Test Reports.

(7) Section 05-28-92

DA 40, DA 40 D, DA 40 F Check Flight Report.

(8) Section 05-28-93

Major Structural Inspection (MSI) Check Findings Report.

G. Section 05-50

Section 05-50 contains the unscheduled maintenance checks. Do these checks after hard landings, propeller damage, engine fire and lightning strike.

H. Referenced Maintenance Data

Use latest revision of referenced maintenance data.

Supplier	Document Name	Document No.
ACK	Model E-01 ELT Installation and Operation Manual	E-01-M
Artex	Installation and Maintenance Manual for the ME406 ELT	570-1600
Cleveland/Parker	Cleveland/Parker Maintenance Manual	AWBCMM0001
Cleveland/Parker	Cleveland/Parker Product Catalog	AWBPC0001
Cleveland/Parker	Cleveland/Parker Technician's Service Guide	AWBTSG0001
Concorde	ICA and Supplement for Valve Regulated Lead-Acid Main Battery	5-0171
Garmin	Garmin G1000 System Maintenance Manual	190-00907-00
Garmin	Garmin G1000 Line Maintenance and Configuration Manual	190-00303-04
Gill	Dry Charges Lead Acid Aircraft Battery Service Manual	Q01-1120
Goodyear	Aircraft Tire Care & Maintenance	-
Honeywell	Honeywell Flightline Maintenance Manual Bendix/King KAP 140 Flight Control System	006-15574-0002
L-3	Stormscope WX-500 Installation Manual	009-11500-001
Lycoming	Maintenance and Overhaul Manual (for DA 40)	LMO-(L)IO-360-M1A (P/N 60297-36)
Lycoming	Operator's Manual O-360, HO-360, IO-360, AIO-360, HIO-360, TIO-360 Series (for DA 40 F)	P/N 60297-12

Supplier	Document Name	Document No.
mt-Propeller	mt-Propeller Operation and Installation Manual	E-124, ATA 61-01-24
mt-Propeller	mt-Propeller Operation and Installation Manual for the Hydraulic Constant Speed Governor	E-1048, ATA 61-20-48
mt-Propeller	mt-Propeller Operation and Installation Manual MT-Wood-Composite Fixed Pitch Propellers	E-112, ATA 61-01-12
Slick	Slick Maintenance and Overhaul Manual	L-1503
Slick	SlickSTART Installation, Operation, Maintenance and Troubleshooting Manual	L-1492
TAE	TAE 125-01 Operation and Maintenance Manual	OM-02-01
TAE	TAE 125-02-99 Operation and Maintenance Manual	OM-02-02
TAE	TAE 125-01 Repair Manual	RM-02-01
TAE	TAE 125-02-99 Repair Manual	RM-02-02
Woodward/Ontic	Governor Manual/SB	
Sensenich	Sensenich SB No. R-17	SB No. R-17

3. Definitions

In this Airplane Maintenance Manual, the words that follow have special meanings:

Adjust. To put to a specified position or condition. For example, adjust the clearance to 1 mm.

Check. A technical name for a group of maintenance tasks. For example, the 100 hour check.

Examine. To look carefully at an item. It includes steps such as these:

- Make sure that the item:

  Is complete.
  Is correctly attached.
  Has no loose parts.
  Shows no signs of leaks.
  Is not cracked or damaged.
  Is not worn.

- Make sure that:

  The surface protection is not damaged.
  All locking devices are installed correctly.

- Make sure that items such as pipes and cables:

  Look serviceable.
  Do not rub against other items.

- For log books and other technical records:

  To find outstanding faults.
  To make sure they are up-to-date and correctly maintained.

Inspection. The procedure which compares an object with its standard or specification.

Measure. To find out the dimensions, capacity or quantity of something.

Monitor. To look at something during a time. For example, monitor the engine speed indicator.

Record. (1) Technical name for something that shows what was done. For example, write the result of the test in the engine record.

(2) The act of making a record. For example, record the result of the test in the Airplane Maintenance Log.

Replace. To remove an unserviceable item and install a serviceable item in the same location.

Set. To put equipment into a given adjustment, condition or mode. For example, set the altimeter scale to 1013 mbar (= 1013 hPa).

Task. An assigned work or a procedure. For example, each step of the task has an identification letter.

Test. That which you do when you operate or examine an item to make sure that it agrees with the applicable specifications. For example, disconnect the systems which are not necessary for the test. Or do an engine test.

Section 05-10
Time Limits

1. General

This Section lists time limits for scheduled Maintenance on airframe and components, and replacement or overhaul of components directly or by reference.

Obey the time limits in this Section to keep the airplane in a technical good condition.

Note: National Regulatory Authorities can have different requirements. You must make sure that you meet the requirements of the Regulatory Authority of the country where the airplane is registered.

2. Scheduled Maintenance Time Limits

(Refer to Sections 05-20 through 05-28).

The following recommended hourly and calendar time limits apply to the scheduled maintenance checks which are necessary to maintain the airplane in a good technical condition. Do the scheduled maintenance at the intervals and within the tolerances shown below:

Scheduled Maintenance Check (Hourly).	Do At These Times	Maximum Tolerance
5 Hour Engine Check (TAE engines only).	At 5 hours since new do a 5 hour engine check of the TAE engine and re-torque engine mount attachment bolts on the firewall.	- 2 hours + 1 hour
25 Hour Engine Check (Lycoming engines only).	At 25 hours since new do a 50 hours engine check of the Lycoming engine and re-torque engine mount attachment bolts on the firewall.	± 10 %
50 Hour Engine Check (Lycoming engines only).	At 50 hours since new and every 50 hour intervals.	± 10 %
100 Hour Check.	At 100 hours since new and every 100 hour intervals.	± 10 %
200 Hour Check.	At 200 hours since new and every 200 hour intervals.	± 5 %
1000 Hour Check.	At 1000 hours since new and every 1000 hour intervals or 12 years, that which comes first.	± 5 %
2000 Hour Check	At 2000 hours since new and every 2000 hour intervals or 12 years, whichever comes first.	± 5 %
Major Structural Inspection (MSI).	At 2000 hours since new and every 2000 hour intervals or 12 years, that which comes first.	± 2.5 %

The intervals between the inspections must be adhered to within the tolerances shown. These tolerances must not be added up. For example: if the 100 hour inspection was done at 110 hours, the next inspection must be done at 200 ±10 hours, not 210 ±10 hours.

If an inspection is carried out earlier than allowed by the specified tolerance, all subsequent inspection intervals are counted from that inspection. For example: If the 100 hour inspection was done at 83 hours, the next inspection must be done at 183 hours.

If the airplane was flown less than 200 hours:

Scheduled Maintenance Check (Calendar)	Do At These Times	Maximum Tolerance
Annual Inspection (for airplanes registered in the USA).	At 12 months since new and every 12 month interval do a 100 Hour Check.	
Annual Inspection (for airplanes registered in other countries).	At 12 months since new and every 12 month interval do a 200 Hour Check, if no 200 Hour Check was performed during the last 12 months due to flight time.	30 days

Note: For maintenance of airplanes registered in the USA, do the items marked X and the items marked X* in the Maintenance Checklist.
For maintenance of airplanes registered in other countries, do only the items marked X in the Maintenance Checklist.

Note: At this time, the DA 40 D with the TAE engine is not type certified in the USA.

3. Component Time Limits

Note: Those component time limits which are airworthiness limitations are also listed in Chapter 04.

A. Maintenance Requirements

The following table lists airplane components and systems which require overhaul or specific checks.

Where an interval is given in both flight time and calendar years, the limit which is reached first must be applied.

VFR in the "Kind of Operation" column means that this limit applies to day VFR, night VFR and IFR operation. NVFR in the "Kind of Operation" column means that this limit applies to night VFR and IFR operation. IFR in the "Kind of Operation" column means that this limit applies to IFR operation.

Note: In the following lists the components marked with an asterisk (*) are Airworthiness Limitation items. The Airworthiness Limitation items are listed in Chapter 4 and Chapter 5 of the AMM.

ATA Ch.	Component	Maintenance Requirement	Interval		Kind of Ope.
			hrs.	yrs.	
22	Autopilot system.	Mechanical check (refer to Section 22-10).	1000 ± 50	1 ± 30 days	VFR
24	Essential bus.*	Check both ends of each wire connected to the battery relay for insecure connection. Check essential bus copper bar (behind circuit breakers) for looseness. Verify proper function.	1000 ± 50	-	NVFR
26	Fire extinguisher.	Overhaul.	-	10 ± 60 days	VFR

ATA Ch.	Component	Maintenance Requirement	Interval		Kind of Ope.
			hrs.	yrs.	
28	Electrical fuel pump DA 40 with Lycoming engine only.	Overhaul (date marked on pump).	on cond.	10 ± 60 days	VFR
			2000 ± 50	10 ± 60 days	NVFR
31	Carbon monoxide detector, if installed (Lycoming O-360-A4M version only).	CO sensor replacement and calibration. (Refer to Section 31-20).	-	7 ± 60 days	VFR
34	Pitot-static system.	Clean system, perform Leakage test (refer to Section 34-10).	1000 ± 50	2 ± 30 days	NVFR
34	Airspeed indicator (including airspeed indicator on G1000).	Check for correct indication.	-	4 ± 60 days	IFR
			-	2 ± 30 days [1]	IFR
34	Vertical speed indicator (including vertical speed indicator on G1000).	Check for correct indication.	-	4 ± 60 days	IFR
			-	2 ± 30 days [1]	IFR
[1] Only required of airplanes for which 14 CFR §91.411 and 14 CFR §91.411 part 43 Appendix E is applicable.					
34	Altimeter(s) (including altimeter on G1000).	Check for correct indication.	-	4 ± 60 days	VFR
			-	2 ± 30 days	NVFR
34	Magnetic compass.	Compensate.	-	1 ± 30 days	IFR

ATA Ch.	Component	Maintenance Requirement	Interval		Kind of Ope.
			hrs.	yrs.	
34	Transponder (separate or on G1000) and blind altitude encoder (altitude digitizer).	System check (refer to Section 34-56).	1000 ± 50	2 ± 30 days	IFR
51	Bonding system and static discharging system.*	Resistance measurements (refer to Section 51-80).	1000 ± 50	-	NVFR
74	Ignition switch, ACS (Lycoming version only).	Overhaul, lubricate the ignition switch: See FAA AD 93-05-06 reference ACS/Gerdes Service Bulletin SB92-01-ACS, ignition switch lubrication/inspection.	2000 ± 50	-	VFR
79	Oil radiator.	Proof-test at 250 PSI (or replace).	2000 ± 50	12 ± 90 days	IFR

A. Airplane Life-Limited Components

The following table lists life limited airplane components which must be replaced at a specific time.

Where an interval is given in both flight time and calendar years, the limit which is reached first must be applied.

VFR in the "Kind of Operation" column means that this limit applies to day VFR, night VFR and IFR operation. NVFR in the "Kind of Operation" column means that this limit applies to night VFR and IFR operation. IFR in the "Kind of Operation" column means that this limit applies to IFR operation.

ATA Ch.	Component	Replacement Time		Kind of Operation
		hrs.	yrs.	
24	Emergency battery.* Replace all cells at the same time. All cells must have the same expiration date, or replace the battery package.	2 years, or upon reaching the date marked on each cell or package, or after use.		IFR
24	ECU backup battery (TAE version only).*	-	2 ± 30 days	VFR
24	Alternator excitation battery (TAE version only).	-	1 ± 30 days	VFR
25	Safety harnesses, front and rear.	-	12 ± 90 days	VFR
25	ELT battery. Replace all cells at the same time. All cells must have the same expiration date.	1 hour of cumulative operation, after use in an emergency, after an inadvertent activation of unknown duration, or upon reaching the date marked on the ELT.		VFR
25	First aid kit. Replace aseptic items.	Upon reaching the date marked on the kit.		VFR
27	Rudder cables, non-stainless steel, 3.2 mm (1/8 in) diameter.	3000 ± 50	5 ± 60 days	VFR
27	Rudder cables, stainless steel, 3.2 mm (1/8 in) diameter.	On condition.		VFR
Note: If material of rudder cables is unknown, assume non-stainless steel.				
28	Fuel filter element (TAE version only).*	100	1 ± 30 days	VFR
28	Fuel tank vent hoses.	-	8 ± 60 days	IFR

ATA Ch.	Component	Replacement Time		Kind of Operation
		hrs.	yrs.	
28	Fuel hoses interconnecting the individual fuel tank chambers, and fuel hoses connecting fuel tank chambers to filler assemblies.	-	8 ± 60 days	VFR
32	Brake fluid, Fluid 4.	-	3 ± 60 days	VFR
71	Engine shock mounts (Lycoming version only).	2000 ± 50	12 ± 90 days	VFR
77	DPU battery memory pack for VM 1000 engine instrument unit (Lycoming version only).	-	8 ± 60 days	VFR

4. Component Time Tracking

To make sure that components overhaul/replacement is done at the correct time you must record the data that follows in the Airplane Maintenance Log for each component requiring overhaul/replacement:

– Serial Number.

– Flight hours and date at installation.

– Flight hours and date at removal.

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Section 05-20
Scheduled Maintenance Checks

1. General

Do the scheduled maintenance checks at the intervals (flight hours and calendar time) stated in Section 05-10, Paragraph 3.

Note: Only persons authorized by national regulatory authorities of the country where the airplane is registered, (or a JAR-145 approved maintenance organization in Europe), may do these checks. The inspection level for each item is a general visual inspection unless differently specified.

Note: Only TAE authorized maintenance organizations may carry out maintenance and inspection work on the TAE engine. Refer to TAE Service Bulletin No. 125-0003. Any engine malfunction must be reported to TAE.

2. Maintenance Checklist Organization

Do the scheduled maintenance checks with reference to the Maintenance Checklist. Before starting a check, complete the requirements of Paragraphs 2 and 3 of the appropriate engine checklist.

Do all the applicable tasks on the checklist.

Note: For maintenance of airplanes registered in the USA, do the items marked X and the items marked X* in the Maintenance Checklist.
For maintenance of airplanes registered in other countries, do only the items marked X in the Maintenance Checklist.

Note: The interval columns "50", "100", "200", "1000", and “2000" are used for maintenance items which must be done at intervals of 50, 100, 200, 1000 or 2000 flight hours. The interval column "time" is used for maintenance items which must be done at certain calendar time intervals, or during a Major Structural Inspection (MSI).

Note: Where an interval is given in both flight time and calendar years, the limit which is reached first must be applied.

Note: Some inspection items must be done at other intervals than the standard intervals (50, 100, 200, 1000, or 2000 hrs.). In these cases, the maintenance interval is shown in the column for the next shorter interval instead of an X. For example, an item which must be done every 400 hours is identified by the words "400 hrs." in the 200 hrs. column.

All of the applicable items must be signed by authorized maintenance personnel. Record the completion of the check in the airplane log book. Complete a copy of the Maintenance Report (refer to Section 05-28-90).

The Maintenance Checklist is divided into the following Sections:

A. Section 05-28-00: Engine Compartment DA 40 with a Lycoming IO-360-M1A engine with a constant speed propeller with three blades:

All items forward of the firewall. It includes the cowlings and the propeller.

B. Section 05-28-01: DA 40 D airplane equipped with a TAE 125-01 or a TAE 125-02 engine with a constant speed propeller with three blades:

All items forward of the firewall. It includes the cowlings and the propeller.

C. Section 05-28-02: Engine Compartment DA 40 F with a Lycoming O-360-A4M engine with a fixed pitch propeller with two blades:

All items forward of the firewall. It includes the cowlings and the propeller.

D. Section 05-28-50 - Airframe:

(1) Front Fuselage

All items on the outside of the front fuselage from the firewall to the trailing edge of the wing. It includes the nose landing gear, the main landing gear, the canopy and rear door.

(2) Cockpit

All items inside the fuselage shell from the aft face of the firewall to the aft face of the rear main bulkhead. It also includes the internal parts of the brake system.

(3) Center Fuselage, Internal

All items inside the fuselage shell below the rear seats from the aft face of the rear main bulkhead to the baggage compartment. It includes the control systems on the aft main bulkhead and the baggage compartment.

(4) Rear Fuselage

All items on the outside of the fuselage from the trailing edge of the wing to the front of the vertical stabilizer.

(5) Tail

All items of the fuselage aft of the rear fuselage, vertical stabilizer and horizontal stabilizer.

(6) Wings

All items on the left and right wings. It includes the ailerons, flaps and Pitot head.

(7) General

Those items which include more than one zone at the same time. It includes items such as control checks which need one person in the cockpit and another person at the control surface.

3. Major Structural Inspection

The Major Structural Inspection (MSI) is an important part of the infinite lifetime concept of the DA 40. It is required to prove the structural integrity of the airframe. It must be carried out at the intervals shown in Section 05-20.

Since the MSI is intended to coincide with a 2000 hour inspection, the inspection items are included in the maintenance checklist, and are identified by the term ‘MSI' in the ‘time' column.

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Section 05-21
Flight Line Checks

1. General

These checks include the pre-flight and post-flight checks. Do these checks each day the airplane is used.

2. Flight-Line Checks

The Pre-Flight Check must be done before the first flight of the day. It shows the pilot the general condition of the airplane and the engine. It is important for flight safety. Look in the airplane log-book for problems before doing the pre-flight check.

WARNING: DO ALL THE STEPS OF THE PRE-FLIGHT CHECK CAREFULLY. ACCIDENTS CAN OCCUR IF THE PRE-FLIGHT CHECK IS NOT DONE CORRECTLY.

The schedule for the pilot's pre-flight check is furnished in the related Flight Manual for the DA 40, DA 40 D or DA 40 F.

3. Post-Flight Check

Do the post-flight check after the last flight of the day. The post-flight check includes all the steps of the pre-flight check.

You must also:

– Refuel the airplane (Section 12-10).

– Record in the log book each problem found in flight and during the post-flight check.

– Park the airplane (Sections 10-00 and 10-10).

– If necessary, moor the airplane (Section 10-20).

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Section 05-22-00

25 Hour Engine Check for Lycoming Engines

1. General

This check must only be done on new Lycoming engines after 25 hours of operation.

Enter the applicable data in the blocks below:

Registration : _____	Date : _____
Airplane S/N: _____	Airplane Operating Hours : _____
Engine S/N : _____	Engine Operating Hours : _____

2. Checklist for the 25 Hour Engine Check

Do a 50 hours check in accordance with the Lycoming Operator's Manual, latest effective issue.

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Section 05-22-01

5 Hour Engine Check for TAE Engines

1. General

The 5 hour engine check must only be done on the TAE 125 Diesel engine at 5 hours since new.

Do all the tasks on the checklist. All items must be signed by TAE authorized maintenance personnel. Record the completion of the 5 hour engine check in the engine log book and in the airplane log book.

Enter the applicable data in the blocks below:

Registration : _____	Date : _____
Airplane S/N: _____	Airplane Operating Hours : _____
Engine S/N : _____	Engine Operating Hours : _____

2. Checklist for the 5 Hour Engine Check

Do a 3 to 6 hours check in accordance with the TAE Operation and Maintenance Manual, latest revision.

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Section 05-25
Drain Holes Inspection Checklist and Report

1. General

Do a check of the drain holes. The drain holes must not be blocked by dirt or other residues. Make sure to remove all foreign objects and clean the drain holes to their full diameter. Otherwise the drain capacity may not be sufficient under certain conditions like heavy rain etc.

All drain holes should be drilled with a diameter of 5 mm (+0.5 mm / -0 mm) or 0.2 in (+0.02 in / -0.00 in). The holes should be circular, deburred, not frayed and cleaned.

At drain holes marked with an asterisk (*) the adhesive bonding is recessed.

Refer to the corresponding indication on the figures to identify the locations of the drain holes listed below.

2. Drain Holes Inspection Checklist

Drain Holes Inspection Checklist			
Ref.	**Drain Hole Location**	**Hours**	**Initials**
1	**FUSELAGE**		
1.01	Flange top hat section, LH & RH	100	
1.02	Lower fuselage shell in the wing nose area, outboard of top hat section, LH & RH	100	
1.03	Lower fuselage shell, in front of front spar flange, center position	100	
1.04	Lower fuselage shell, next to front spar, LH & RH	100	
1.05	Lower fuselage shell, aft of front spar flange, center position	100	
1.06	Lower fuselage shell, next to rear spar, LH & RH	100	
1.07	Lower fuselage shell, aft of rear spar flange, center position	100	
1.08	Lower fuselage shell, in front of flaps torsion rod, center position	100	
1.09	Lower fuselage shell, fuselage rib reinforcement section, LH & RH	100	
1.10	Lower fuselage shell, inner corner of fuel duct flange, LH & RH	100	
1.11	Footwell cockpit to the clearance, LH & RH	100	
1.12	Lower fuselage shell, aft of baggage compartment frame base	100	
1.13	Lower fuselage shell, in front of baggage compartment frame base, LH & RH	100	
1.14	On lowest point of the fin	100	
1.15	On lowest point of the EPC connector	100	
1.16	In rudder bolt mounting shell (on top of the rudder)	100	
1.17	In rib of vertical stabilizer, in front of rear web	200	
1.18	In rib of vertical stabilizer, in front of front web	200	
1.19	On bottom of the vertical stabilizer front web	200	
1.20	Lower fuselage shell, aft of vertical stabilizer rear web	200	
1.21	On nose wheel strut, LH & RH	200	
1.22	Through roll over bar duct and baggage compartment frame	200	
1.23	Through lower end of ring frame 1	200	
1.24	Through baggage compartment frame, center position above lower fuselage shell	200	
1.25	Through lower end of ring frame 2	200	

Drain Holes Inspection Checklist			
Ref.	**Drain Hole Location**	**Hours**	**Initials**
1.26	Through lower end of ring frame 3	200	
2	**CANOPY AND DOOR**		
2.01	Lower canopy frame, in front of Bowden cable guide, LH & RH	100	
2.02	Lower canopy frame, aft of the canopy locking mechanism, LH & RH	100	
2.03	Inner door shell, below the front locking bolt	100	
3	**HORIZONTAL STABILIZER**		
3.01	Lower shell, next to the mid inspection hole, LH & RH	200	
3.02	Lower shell, next to the front inspection hole, LH & RH	200	
3.03	On the lowest point of the horizontal stabilizer tips, LH & RH	100	
3.04	Elevator end rib, next to the rear spar, next to lower shell, LH & RH	200	
3.05	LH & RH rib, in front of the rear spar, above the lower shell	200	
3.06	LH & RH rib, behind the front spar, above the lower shell	200	
3.07	LH & RH rib, in front of the front spar, above the lower shell	200	
3.08	Mid, LH & RH rib, behind the rear spar, above the lower shell	2000	
3.09	Mid, LH & RH rib, behind the front spar, above the lower shell	2000	
4	**ELEVATOR**		
4.01	Lower shell, leading edge section, LH & RH	100	
4.02	Lower shell, in front of trailing edge, LH & RH	100	
5	**ELEVATOR TRIM TAB**		
5.01	Lower shell, leading edge section, LH & RH	100	
5.02	Lower shell, in front of trailing edge bonding, LH & RH	100	
6	**RUDDER**		
6.01	Lower edge, at the left and right shell of the rudder	100	
7	**WINGS**		
7.01	In outer wing end rib at aileron mass balance cut out	100	
7.02	Wing tip in front of rear bonding (LH & RH wing)	100	
7.03	First fuel tank rib, next to front and rear spar and lower shell (LH & RH wing)*	100	
7.04	In flap rib rear spar next to lower shell (LH & RH wing)	200	
7.05	In rear root rib next to rear spar and lower shell (LH & RH wing)*	200	
7.06	In aileron rib next to rear spar and lower shell (LH & RH wing)	200	

Drain Holes Inspection Checklist			
Ref.	**Drain Hole Location**	**Hours**	**Initials**
7.07	Second fuel tank rib, next to front and rear spar and lower shell (LH & RH wing)*	200	
7.08	Third fuel tank rib, next to front and rear spar and lower shell (LH & RH wing)*	200	
7.09	Fourth fuel tank rib, next to front and rear spar and lower shell (LH & RH wing)*	200	
7.10	Fifth fuel tank rib, next to frond and rear spar and lower shell (LH & RH wing)*	200	
7.11	In front root rib, next to front spar and lower shell (LH & RH wing)	2000	
7.12	Vent hole on face side of wing spar (LH & RH wing)	2000	
8	**FLAPS**		
8.01	Root rib, next to trailing edge bonding, LH & RH	100	
9	**AILERONS**		
9.01	Inner root rib, next to the trailing edge bonding, LH & RH	100	
9.02	Lower shell, aft of mass balance weight, LH & RH	100	
9.03	Lower shell, in front of mass balance hinge line, LH & RH	100	
9.04	Outer root rib, at the leading edge, LH & RH	100	

At drain holes marked with an asterisk (*) the bonding is recessed.

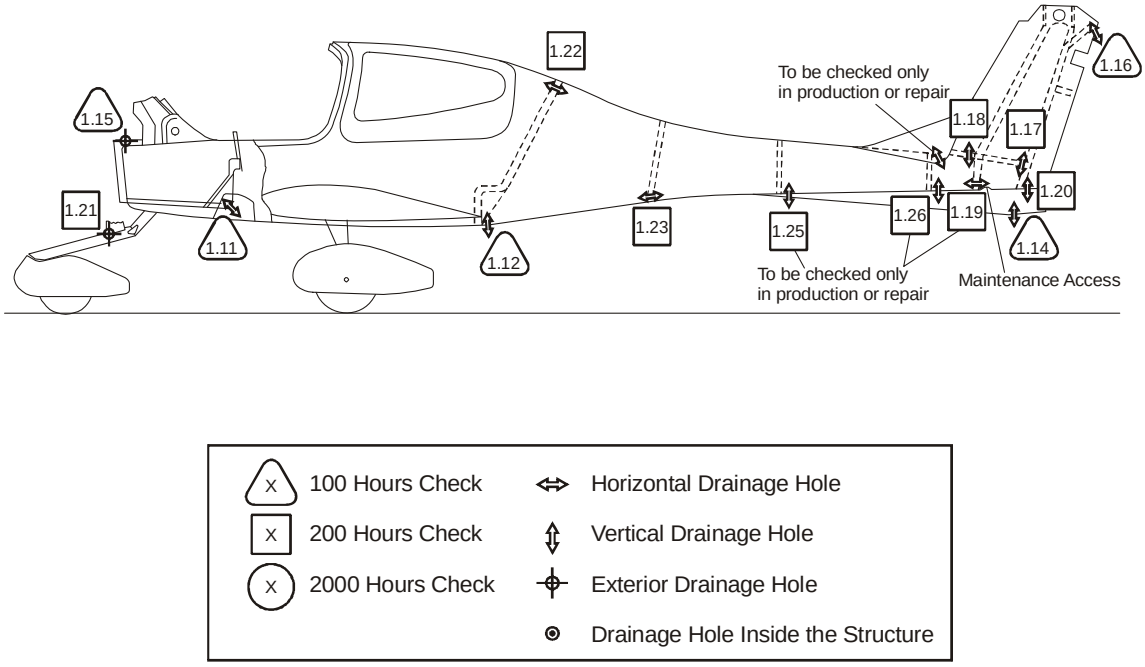


Figure 1: Drain Holes Fuselage (Part 1)

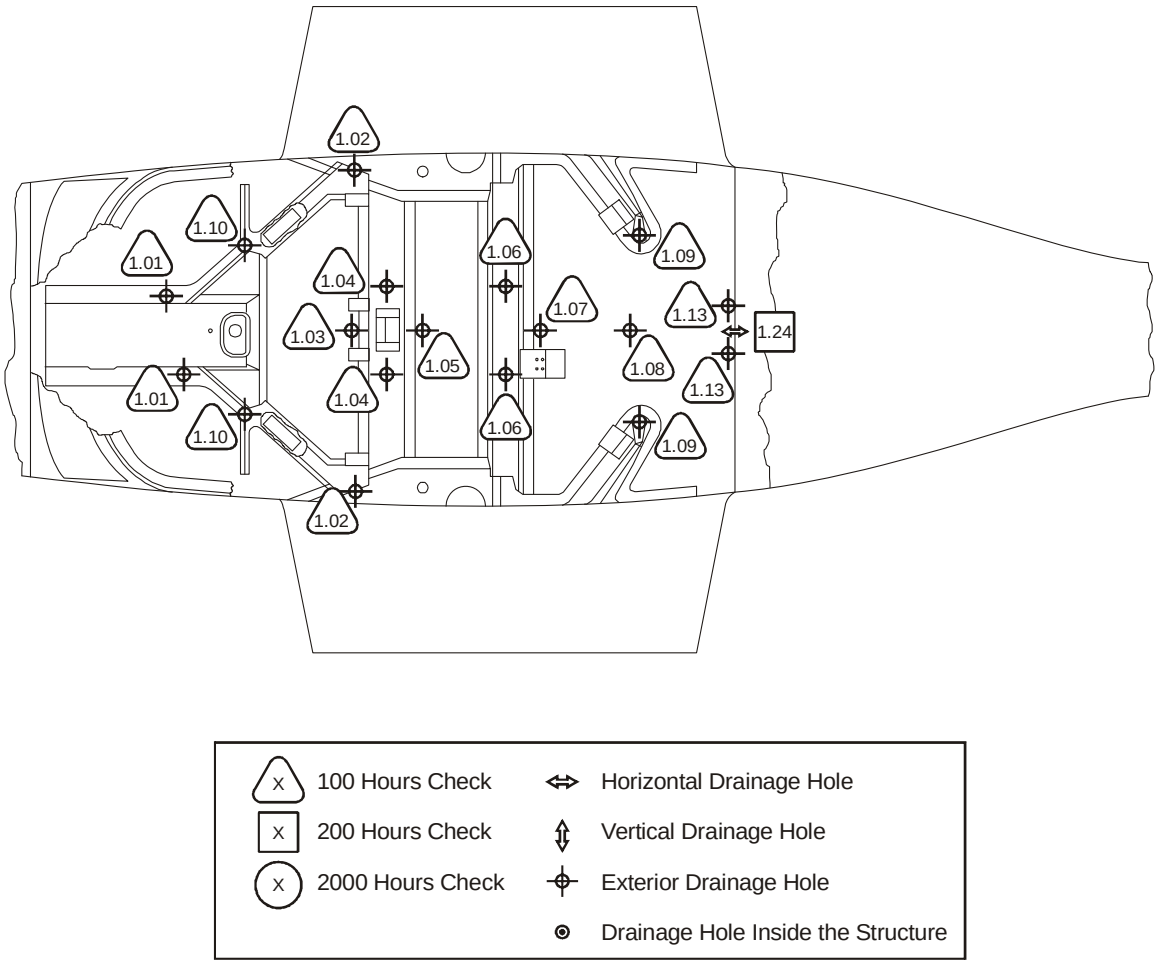


Figure 2: Drain Holes Fuselage (Part 2)

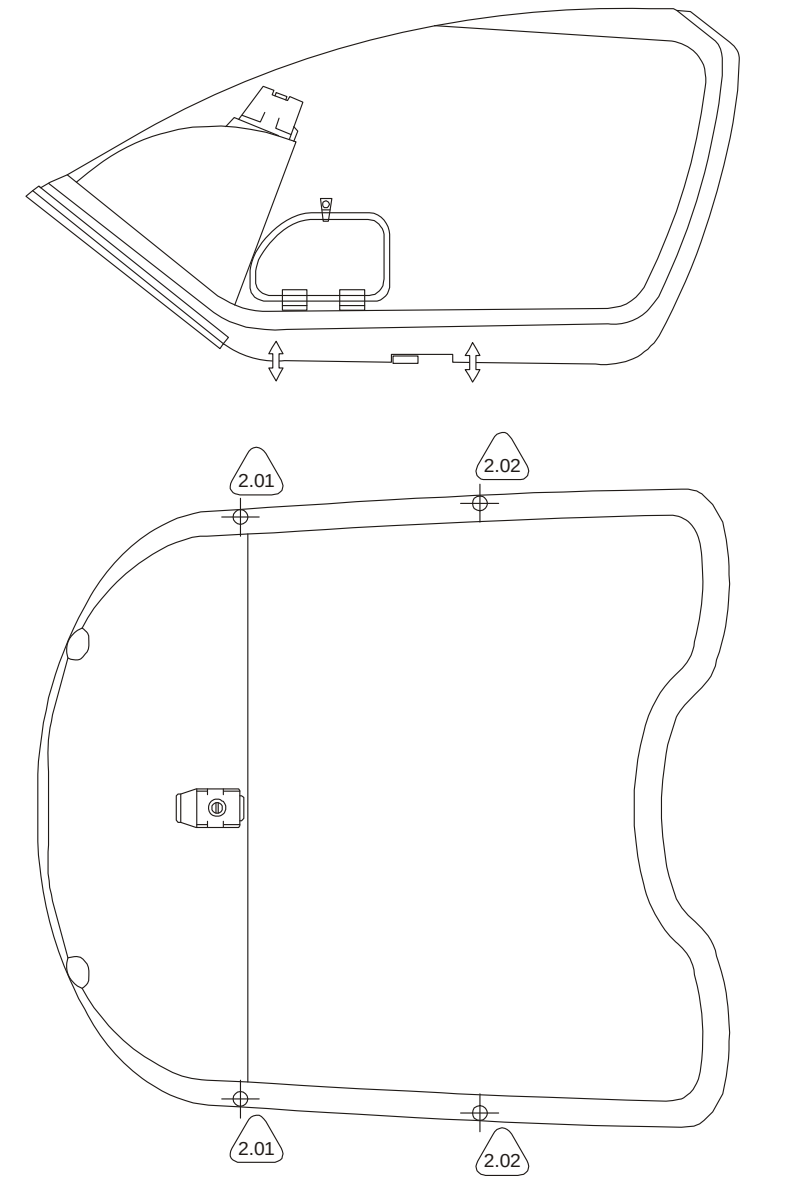


Figure 3: Drain Holes Canopy

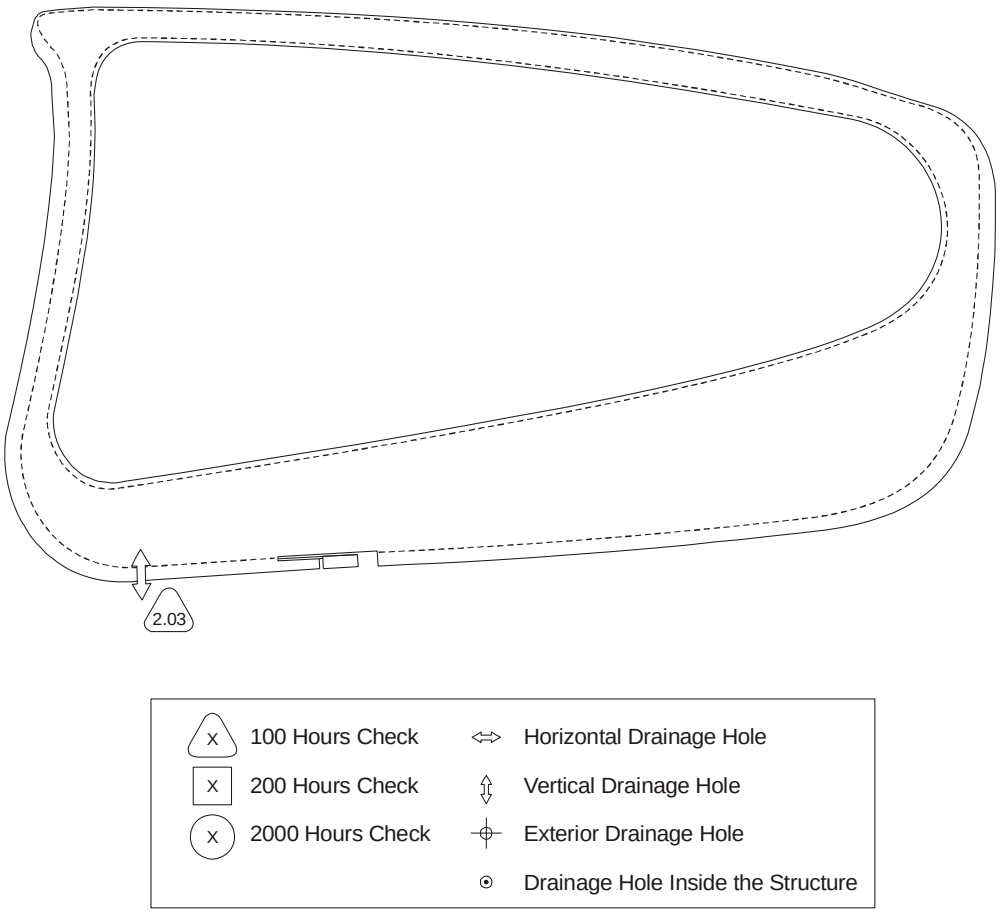


Figure 4: Drain Holes Passenger Door

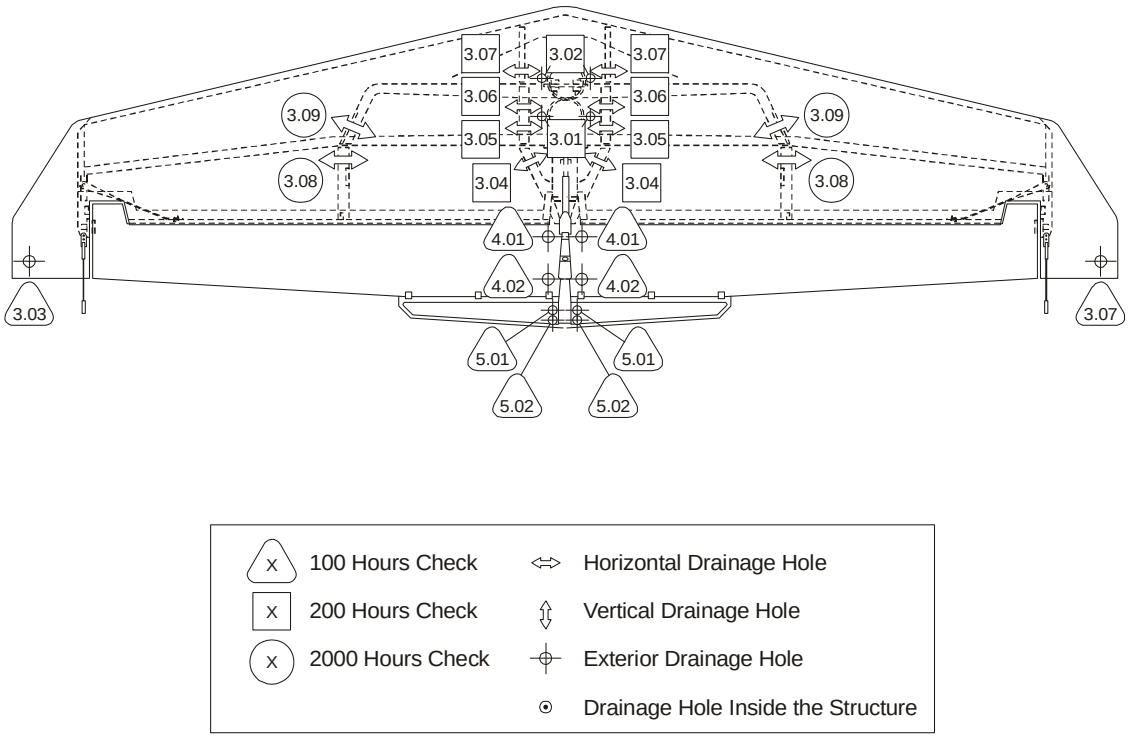


Figure 5: Drain Holes Horizontal Stabilizer, Elevator and Elevator Trim Tab

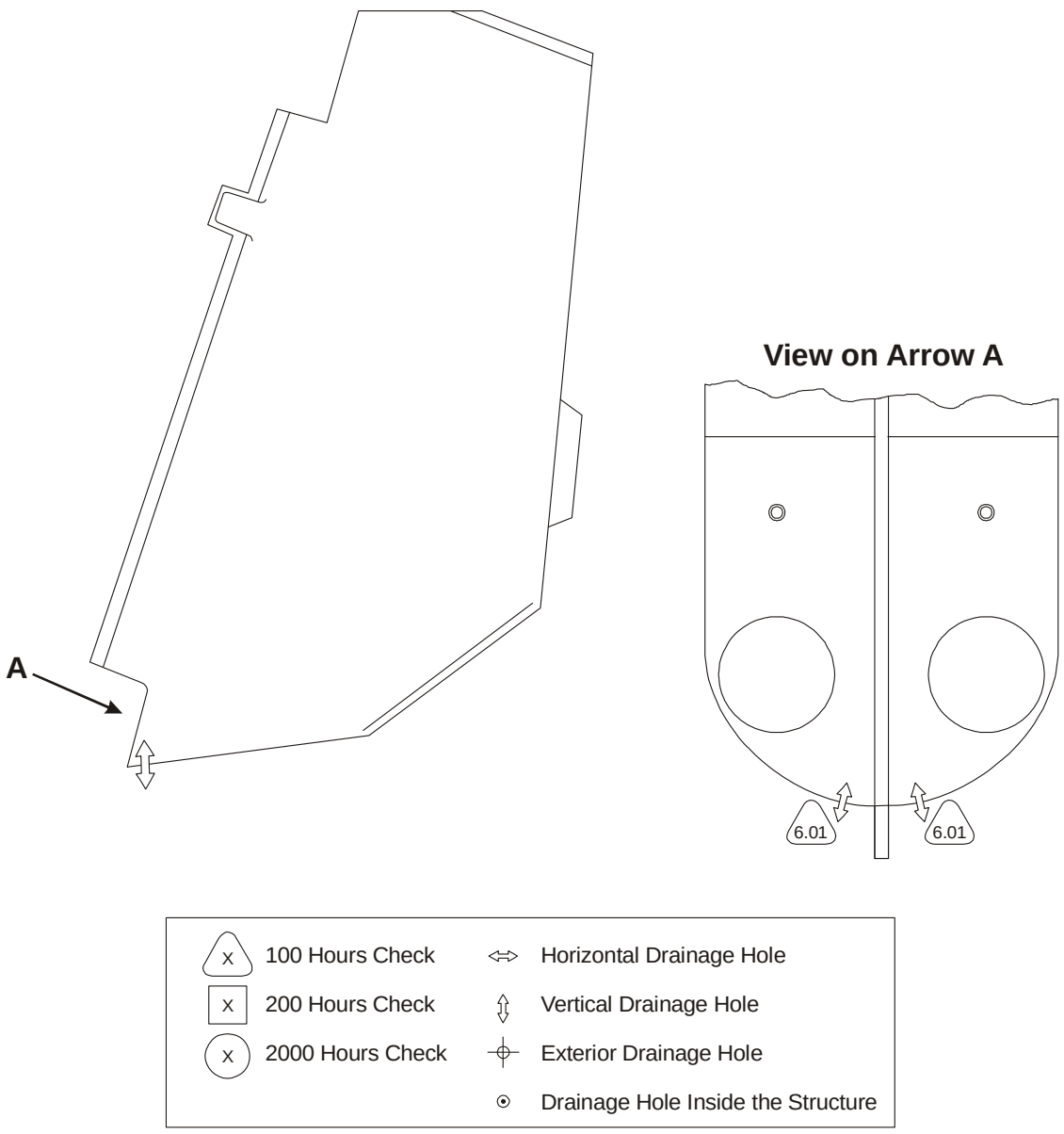
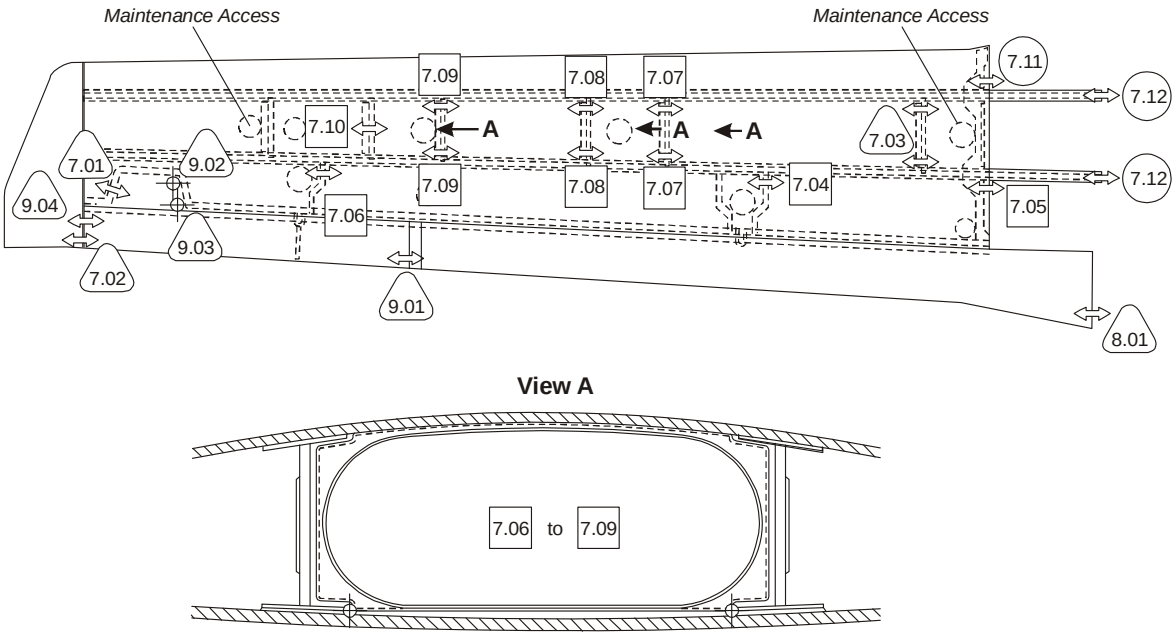


Figure 6: Drain Holes Rudder



View A

X 100 Hours Check	Horizontal Drainage Hole
X 200 Hours Check	Vertical Drainage Hole
X 2000 Hours Check	Exterior Drainage Hole
	Drainage Hole Inside the Structure

Figure 7: Drain Holes Wings, Flaps and Ailerons

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Section 05-28-00

Maintenance Checklist DA 40 with Lycoming IO-360 M1A Engine

1. General

Enter the applicable data in the blocks below:

Registration : _____	Date : _____
Airplane S/N : _____	Engine Type : Lycoming IO-360 M1-A Engine S/N : _____
Airplane Operating Hours : _____	Engine hours, TTSN/TSMOH : _____
Check : _____ (50, 100, 200, 1000 hr, Annual Inspection)	

2. Preparation

CAUTION: OBSERVE THE COMPONENT TIME LIMITS STATED IN SECTIONS 04-00-00 AND 05-10-00 OF THIS AIRPLANE MAINTENANCE MANUAL.

Do the following items before you start the applicable check:

		Interval (Flight Hours)				
	Inspection Items	**50**	**100**	**200**	**1000**	**Initials**
1.	Before you do the inspection: – Read the applicable Airworthiness Directives. – Read the applicable Service Bulletins.	X	X	X	X	
2.	Examine the Log Books. Look specially for: – Life limited parts. – Reported problems.	X	X	X	X	
3.	Clean the airplane fully. (Refer to Section 12-30).		X	X	X	

3. Engine Ground Test

Do an engine ground test as follows (complete a copy of the Engine Ground Test Record as part of the engine ground test (refer to Section 05-28-91):

100 hr items marked X apply to US registered airplanes only*		Interval					
	Inspection Items	**50**	**100**	**200**	**1000**	**Time**	**Initials**
	WARNING: DO NOT LET PERSONS GO INTO THE DANGER AREA OF THE PROPELLER. PROPELLERS CAN CAUSE INJURY OR DEATH. **WARNING: SET THE PARKING BRAKE TO ON. IF YOU DO NOT DO THIS, THE AIRPLANE CAN MOVE. THIS CAN CAUSE INJURY OR DEATH.**						
1.	Do an operational test of the parking brake.		X	X	X		
2.	Set the parking brake to ON.	X	X	X	X		
3.	Put the chocks against the airplane main wheels.	X	X	X	X		
4.	Do an engine operational test. For the engine run procedures refer to the DA 40 Airplane Flight Manual. Record the data in the Engine Ground Test Report in Section 05-28-91.	X	X	X	X		
5.	Check for carbon monoxide contamination in the cabin: – Switch cabin heat ON. – Use a carbon monoxide tester ('CO-tester').		X	X	X		
6.	Do an operational test of the fuel shut-off valve for correct operation. (Refer to Section 28-20).	X	X	X	X		
7.	When the propeller stops rotating, set the ignition switch to the OFF position. Set the ALT/BAT switch to the OFF position. And set the fuel selector to the OFF position.	X	X	X	X		

4. Engine Maintenance Checklist Lycoming IO-360 M1-A

100 hr items marked X apply to US registered airplanes only*		Interval					
	Inspection Items	**50**	**100**	**200**	**1000**	**Time**	**Initials**
	WARNING: MAKE SURE THE EXHAUST SYSTEM IS COOL BEFORE YOU DO MAINTENANCE ON THE ENGINE. THE EXHAUST SYSTEM CAN BE HOT. THIS CAN CAUSE INJURY TO PERSONS. **WARNING: DO NOT GET OIL ON YOU. OIL CAN CAUSE SKIN DISEASE.** **WARNING: DO NOT GET FUEL ON YOU. FUEL CAN CAUSE SKIN DISEASE. DO NOT ALLOW FIRE NEAR FUEL. FUEL BURNS AND CAN CAUSE INJURY TO PEOPLE AND DAMAGE TO EQUIPMENT.**						
1.	Remove the top and bottom cowlings. Examine the cowlings. Make sure that the fasteners are serviceable. Look for cracks and areas that have got too hot.	X	X	X	X		
2.	Examine the engine for oil/fuel leaks.	X	X	X	X		
3.	Clean the engine and engine compartment. (Refer to Section 12-30).		X	X	X		
4.	Cut open the used oil filter. Look for particles of metal. If the filter contains particles of metal, refer to the Lycoming Maintenance Manual.	X	X	X	X		
5.	Examine the ignition harness and cables. Examine the sleeve nut on each spark-plug connector for cracks.	X	X	X	X		

100 hr items marked X apply to US registered airplanes only*		Interval					
	Inspection Items	**50**	**100**	**200**	**1000**	**Time**	**Initials**
	WARNING: MAKE SURE THE EXHAUST SYSTEM IS COOL BEFORE YOU DO MAINTENANCE ON THE EXHAUST SYSTEM. THE EXHAUST SYSTEM CAN BE HOT. THIS CAN CAUSE INJURY TO PERSONS.						
6.	Examine the exhaust system. Look specially for cracks and heat damage: – Remove the flexible hoses from the heat exchanger. – If installed disconnect the muffler brace from the support bracket. – If installed remove the muffler brace. – Remove the heat exchanger shroud. – Do a check of the muffler. Look specially for cracks and leakage. – Install the heat exchanger shroud. – If furnished install the muffler brace. – If furnished connect the muffler brace to the support bracket. – Install the flexible hoses to the heat exchanger. (Refer to Section 78-00).		X	X	X		

100 hr items marked X apply to US registered airplanes only*		Interval					
	Inspection Items	**50**	**100**	**200**	**1000**	**Time**	**Initials**
7.	Examine the cabin heat system: – Remove the worm drive clamp from the flexible hose at the cabin-heat selector-valve. – Disconnect the flexible hose from the cabin-heat selector-valve. – Examine the flexible hose for damage. – Examine the cabin-heat selector-valve. – Connect the flexible hose to the cabin-heat selector-valve. – Install the worm drive clamp.		X*	X	X		
8.	Examine the engine baffles. Look specially for cracks and incorrect attachment.	X	X	X	X		
9.	Examine the alternator mounting bracket and electrical connections.	X	X	X	X		
10.	Examine the alternator belt. (Refer to Section 24-30): – Look for abnormal wear. – Do a test for correct adjustment.	X	X	X	X		
11.	Examine the alternator bearing and brushes. Look specially for abnormal wear.			500 hrs.			
12.	Do a battery check (Refer to Section 24-31). Look specially for: – Charge and capacity. – Incorrect acid level. – Incorrect mounting.		X	X	X		
13.	Examine the battery area. Clean the area.		X*	X	X		
14.	Examine the air hoses. Look specially for signs of leakage and damage. Make sure the air hoses are correctly attached.		X	X	X		

100 hr items marked X apply to US registered airplanes only*		Interval					
	Inspection Items	**50**	**100**	**200**	**1000**	**Time**	**Initials**
15.	Examine the cable ties and all electrical connectors. Look specially for rub marks and damage. Pull lightly to make sure they are not loose.	X	X	X	X		
16.	Examine the fuel and oil hoses. Look specially for signs of leakage and damage. Make sure the fuel and oil hoses are correctly attached.		X	X	X		
17.	Examine the oil breather line. Look specially for blockage.		X	X	X		
18.	Examine the oil cooler. Look specially for leakage and damage. Make sure the cooling fins are not blocked.		X	X	X		
19.	Examine the air filter. (Refer to Section 71-60).	X	X	X	X		
20.	Examine the alternate air valve assembly. (Refer to Section 71-60).	X	X	X	X		
21.	Examine the throttle and mixture controls. – Make sure that the connection to the control lever is tight. – Make sure that the end fitting can turn in the control lever. – Examine the outer cables. Look specially for wear and for kinks.		X	X	X		
22.	Examine the engine mounts. Look specially for: – Cracks or corrosion. – Incorrect attachment and poor condition of the mounting bolts. – Deterioration of the shock mounts. – Incorrect torque value. (Refer to Section 71-20).		X	X	X		

100 hr items marked X apply to US registered airplanes only*		Interval					
	Inspection Items	**50**	**100**	**200**	**1000**	**Time**	**Initials**
23.	Remove the lower left or right hand engine mount to firewall attachment bolt and inspect for corrosion. If corrosion is found replace bolt and repeat inspection on remaining 4 attachment bolts. (Refer to Section 71-20.)					5 yrs.	

5. Propeller

100 hr items marked X apply to US registered airplanes only*		Interval					
	Inspection Items	**50**	**100**	**200**	**1000**	**Time**	**Initials**
	WARNING: DO NOT LET PERSONS GO INTO THE DANGER AREA OF THE PROPELLER. PROPELLERS CAN CAUSE INJURY OR DEATH. **WARNING: MAKE SURE THAT THE ENGINE IS SAFE BEFORE YOU TURN THE PROPELLER.**						
1.	Do propeller maintenance in accordance with mt-Propeller Maintenance Manual, latest revision.		X*	X	X		

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Section 05-28-01

Maintenance Checklist DA 40 D with TAE Engines

1. General

Enter the applicable data in the blocks below:

Registration : _____	Date : _____
Airplane S/N : _____	Engine Type : TAE 125- _____ Engine S/N : _____
Airplane Operating Hours : _____	Engine hours, TTSN/TSMOH : _____
Check : _____ (100, 200, 1000 hr, Annual Inspection)	

2. Preparation

CAUTION: OBSERVE THE COMPONENT TIME LIMITS STATED IN SECTIONS 04-00-00 AND 05-10-00 OF THIS AIRPLANE MAINTENANCE MANUAL.

Do the following items before you start the applicable check:

100 hr items marked X apply to US registered airplanes only*		Interval			
	Inspection Items	**100**	**200**	**1000**	**Initials**
1.	Before you do the inspection: – Read the applicable Airworthiness Directives. – Read the applicable Service Bulletins.	X	X	X	
2.	Examine the Log Books. Look specially for: – Life limited parts. – Reported problems.	X	X	X	
3.	Read the engine event-log. (Refer to Section 72-01).	X	X	X	
4.	Clean the airplane fully. (Refer to Section 12-30).	X	X	X	

3. Engine Ground Test

Do an engine ground test as follows (complete a copy of the Engine Ground Test Record as part of the engine ground test (refer to Section 05-28-91)):

		Interval (Flight Hours)				
	Inspection Items (TAE Version only)	**100**	**200**	**1000**	**Time**	**Initials**
	WARNING: DO NOT LET PERSONS GO INTO THE DANGER AREA OF THE PROPELLER. PROPELLERS CAN CAUSE INJURY OR DEATH. **WARNING: SET THE PARKING BRAKE TO ON. IF YOU DO NOT DO THIS, THE AIRPLANE CAN MOVE. THIS CAN CAUSE INJURY OR DEATH.**					
1.	Do an operational test of the parking brake.		X	X		
2.	Set the parking brake to ON.	X	X	X		
3.	Put the chocks against the airplane main wheels.	X	X	X		
4.	Do an engine run. (Refer to the AFM).	X	X	X		
5.	Check suction (if installed).	X	X	X		
6.	Check engine instruments.	X	X	X		
7.	Shut engine down.	X	X	X		
8.	Read FADEC values. (Refer to Section 72-01).	X	X	X		

4. Engine Maintenance Checklist Engines

	Inspection Items	Interval (Flight Hours) 100	200	1000	Time	Initials
	WARNING: MAKE SURE THE EXHAUST SYSTEM IS COOL BEFORE YOU DO MAINTENANCE ON THE ENGINE. THE EXHAUST SYSTEM CAN BE HOT. THIS CAN CAUSE INJURY TO PERSONS. **WARNING: DO NOT GET OIL ON YOU. OIL CAN CAUSE SKIN DISEASE.** **WARNING: DO NOT GET FUEL ON YOU. FUEL CAN CAUSE SKIN DISEASE. DO NOT ALLOW FIRE NEAR FUEL. FUEL BURNS AND CAN CAUSE INJURY TO PEOPLE AND DAMAGE TO EQUIPMENT.**					
1.	Remove the top and bottom cowlings. Examine the cowlings. Make sure that the fasteners are serviceable. Look for cracks and areas that have got too hot. Check rubber seals.	X	X	X		
2.	Examine the engine for oil/fuel/coolant leaks.	X	X	X		
3.	Clean the engine and engine compartment. Refer to Section 12-30 and the TAE Operation and Maintenance Manual, latest revision.	X	X	X		
4.	Cut open the used oil filter. – Look for particles of metal. – If the filter contains particles of metal, refer to the engine manufacturer.	X	X	X		
5.	Check suction hoses of the vacuum system (if installed). – Look for rub marks and damage.	X	X	X		
6.	Replace fuel filter element and check for contamination. (Refer to Section 73-01).	X	X	X		

		Interval (Flight Hours)				
	Inspection Items	**100**	**200**	**1000**	**Time**	**Initials**
7.	While the fuel lines are disconnected from the fuel filter, do a test of the emergency fuel valve and the check valve in the fuel return line. (Refer to Section 28-21).		X	X		
8.	Bleed the fuel distribution system. (Refer to Section 28-21).	X	X	X		
9.	Examine the exhaust system. Look specially for cracks and heat damage. Do a check of the ball-joints. Do a check of the exhaust muffler (if installed). (Refer to Section 78-01).	X	X	X		
10.	Examine the cabin heat system. – Examine the flexible hose for damage. – Examine the cabin-heat selector-valve for damage. – Move the CABIN HEAT control lever in the cockpit up and down. Examine for interference and incorrect bounce.	X	X	X		
11.	Examine the ring terminal of the cable which is attached to the alternator for signs of cracks.	X	X	X		
12.	Do a check of the airplane battery (Refer to Section 24-34). Look specially for: – Charge and capacity. – Incorrect acid level. – Incorrect mounting.		X	X		
13.	Examine the battery area. Clean the area.		X	X		

		Interval (Flight Hours)				
	Inspection Items	**100**	**200**	**1000**	**Time**	**Initials**
14.	Examine the fuel, oil and coolant system and hoses. – Look specially for signs of leakage and damage. – Make sure the hoses are correctly attached.	X	X	X		
15.	Examine the oil breather line and overboard vent. Look specially for blockage.		X	X		
16.	Examine the oil radiator. – Look specially for leakage and damage. – Make sure the cooling fins are not blocked.		X	X		
17.	Examine the air intake and turbo-charging system. Look specially at these items: – Air filter (Refer to Section 71-61). – Hose from air filter to turbo-charger. – Turbo-charger. On the pressure side of the turbo-charger: – Hoses and hose clamps. – Aluminum pipes. – Wiggins clamp and O-rings. – Intercooler. TAE 125-01 engine installed: Check turbo-charger air restrictor of tight fitting. Refer to TAE Operation and Maintenance Manual OM-02-01, latest revision.	X X	X X	X X		

		Interval (Flight Hours)				
	Inspection Items	**100**	**200**	**1000**	**Time**	**Initials**
18.	Check cooling system for leaks. Look specially at these items: – Hoses and hose clamps. – Aluminum pipes. – 2 radiators.	X	X	X		
19.	Examine the alternate air valve assembly. (Refer to Section 71-61).	X	X	X		
20.	Examine the engine mount. Look specially for: – Cracks or corrosion. – Incorrect attachment and poor condition of the mounting bolts. – Deterioration of the shock mounts. – Chafe marks. – Incorrect torque value. (Refer to Section 71-21).	X	X	X		
21.	Remove the lower left or right hand engine mount to firewall attachment bolt and inspect for corrosion. If corrosion is found replace bolt and repeat inspection on remaining 4 attachment bolts. (Refer to Section 71-21.)				5 yrs.	

5. Propeller

100 hr items marked X apply to US registered airplanes only*						
	Inspection Items	**100**	**200**	**1000**	**Time**	**Initials**
	WARNING: DO NOT LET PERSONS GO INTO THE DANGER AREA OF THE PROPELLER. PROPELLERS CAN CAUSE INJURY OR DEATH. **WARNING: MAKE SURE THAT THE ENGINE IS SAFE BEFORE YOU TURN THE PROPELLER.**					
1.	Do propeller maintenance in accordance with mt-Propeller Maintenance Manual, latest revision.	X*	X	X		

Section 05-28-02

Maintenance Checklist DA 40 F with Lycoming O-360-A4M Engine

1. General

Enter the applicable data in the blocks below:

Registration : _____	Date : _____
Airplane S/N : _____	Engine Type : Lycoming O-360-A4M Engine S/N : _____
Airplane Operating Hours : _____	Engine hours, TTSN/TSMOH : _____
Check : _____ (50, 100, 200, 1000 hr, Annual Inspection)	

2. Preparation

CAUTION: OBSERVE THE COMPONENT TIME LIMITS STATED IN SECTIONS 04-00-00 AND 05-10-00 OF THIS AIRPLANE MAINTENANCE MANUAL.

Do the following items before you start the applicable check:

		Interval (Flight Hours)				
	Inspection Items	**50**	**100**	**200**	**1000**	**Initials**
1.	Before you do the inspection: – Read the applicable Airworthiness Directives. – Read the applicable Service Bulletins.	X	X	X	X	
2.	Examine the Log Books. Look specially for: – Life limited parts. – Reported problems.	X	X	X	X	
3.	Clean the airplane fully. (Refer to Section 12-30).		X	X	X	

3. Engine Ground Test

Do an engine ground test as follows (complete a copy of the Engine Ground Test Record as part of the engine ground test (refer to Section 05-28-91)):

100 hr items marked X apply to US registered airplanes only*		Interval					
	Inspection Items	**50**	**100**	**200**	**1000**	**Time**	**Initials**
	WARNING: DO NOT LET PERSONS GO INTO THE DANGER AREA OF THE PROPELLER. PROPELLERS CAN CAUSE INJURY OR DEATH. **WARNING: SET THE PARKING BRAKE TO ON. IF YOU DO NOT DO THIS, THE AIRPLANE CAN MOVE. THIS CAN CAUSE INJURY OR DEATH.**						
1.	Do an operational test of the parking brake.		X	X	X		
2.	Set the parking brake to ON.	X	X	X	X		
3.	Put the chocks against the airplane main wheels.	X	X	X	X		
4.	Do an engine operational test. For the engine run procedures refer to the DA 40 F Airplane Flight Manual. Record the data in the Engine Ground Test Report in Section 05-28-91.	X	X	X	X		
5.	Check for carbon monoxide contamination in the cabin. – Switch cabin heat ON. – Use a carbon monoxide tester ('CO-tester').		X	X	X		
6.	Do an operational test of the fuel shut-off valve for correct operation. (Refer to Section 28-20).	X	X	X	X		
7.	When the propeller stops rotating, set the ignition switch to the OFF position. Set the ALT/BAT switch to the OFF position. And set the fuel selector to the OFF position.	X	X	X	X		

4. Engine Maintenance Checklist Lycoming O-360-A4M

100 hr items marked X apply to US registered airplanes only*		Interval					
	Inspection Items	**50**	**100**	**200**	**1000**	**Time**	**Initials**
	WARNING: MAKE SURE THE EXHAUST SYSTEM IS COOL BEFORE YOU DO MAINTENANCE ON THE ENGINE. THE EXHAUST SYSTEM CAN BE HOT. THIS CAN CAUSE INJURY TO PERSONS. **WARNING: DO NOT GET OIL ON YOU. OIL CAN CAUSE SKIN DISEASE.** **WARNING: DO NOT GET FUEL ON YOU. FUEL CAN CAUSE SKIN DISEASE. DO NOT ALLOW FIRE NEAR FUEL. FUEL BURNS AND CAN CAUSE INJURY TO PEOPLE AND DAMAGE TO EQUIPMENT.**						
1.	Remove the top and bottom cowlings. Examine the cowlings. Make sure that the fasteners are serviceable. Look for cracks and areas that have got too hot.	X	X	X	X		
2.	Examine the engine for oil/fuel leaks.	X	X	X	X		
3.	Clean the engine and engine compartment. (Refer to Section 12-30).		X	X	X		
4.	Cut open the used oil filter. Look for particles of metal. If the filter contains particles of metal, refer to the Lycoming Maintenance Manual.	X	X	X	X		
5.	Examine the fuel pump drain pipe.		X	X	X		
6.	Examine the exhaust system. Look specially for cracks and heat damage. – Remove the flexible hoses from the heat exchanger. – Remove the heat exchanger shroud. – Do a check of the muffler. Look specially for cracks and leakage. – Install the heat exchanger shroud. – Install the flexible hoses to the heat exchanger. (Refer to Section 78-02).		X	X	X		

100 hr items marked X apply to US registered airplanes only*		Interval					
	Inspection Items	**50**	**100**	**200**	**1000**	**Time**	**Initials**
7.	Examine the cabin heat system. – Remove the worm drive clamp from the flexible hose at the cabin-heat selector-valve. – Disconnect the flexible hose from the cabin-heat selector-valve. – Examine the flexible hose for damage. – Examine the cabin-heat selector-valve. – Connect the flexible hose to the cabin-heat selector-valve. – Install the worm drive clamp.		X	X	X		
8.	Examine the engine baffles. Look specially for cracks and incorrect attachment.	X	X	X	X		
9.	Examine the alternator mounting bracket and electrical connections.	X	X	X	X		
10.	Examine the alternator belt. (Refer to Section 24-30): – Look for abnormal wear. – Do a test for correct adjustment.	X	X	X	X		
11.	Examine the alternator bearing and brushes. Look specially for abnormal wear.			500 hrs.			
12.	Do a battery check (Refer to Section 24-31). Look specially for: – Charge and capacity. – Incorrect acid level. – Incorrect mounting.		X	X	X		
13.	Examine the battery area. Clean the area.		X*	X	X		
14.	Examine the air hoses. Look specially for signs of leakage and damage. Make sure the air hoses are correctly attached.		X	X	X		

100 hr items marked X apply to US registered airplanes only*		Interval					
	Inspection Items	**50**	**100**	**200**	**1000**	**Time**	**Initials**
15.	Examine the cable ties and all electrical connectors. Look specially for rub marks and damage. Pull lightly to make sure they are not loose.	X	X	X	X		
16.	Examine the fuel and oil hoses. Look specially for signs of leakage and damage. Make sure the fuel and oil hoses are correctly attached.		X	X	X		
17.	Examine the oil breather line. Look specially for blockage.		X	X	X		
18.	Examine the oil cooler. Look specially for leakage and damage. Make sure the cooling fins are not blocked.		X	X	X		
19.	Examine the air filter. (Refer to Section 71-62).	X	X	X	X		
20.	Examine the carburetor heat system assembly. (Refer to Section 71-62).	X	X	X	X		
21.	Examine the throttle and mixture controls: – Make sure that the connection to the control lever is tight. – Make sure that the end fitting can turn in the control lever. – Examine the outer cables. Look specially for wear and for kinks. – Lubricate the mixture control inner cable with a small amount of oil. (Refer to Section 12-20).		X	X	X		
22.	Examine the engine mounts. Look specially for: – Cracks or corrosion. – Incorrect attachment and poor condition of the mounting bolts. – Deterioration of the shock mounts. – Incorrect torque value. (Refer to Section 71-20).		X	X	X		

100 hr items marked X apply to US registered airplanes only*		Interval					
	Inspection Items	**50**	**100**	**200**	**1000**	**Time**	**Initials**
23.	Remove the lower left or right hand engine mount to firewall attachment bolt and inspect for corrosion. If corrosion is found replace bolt and repeat inspection on remaining 4 attachment bolts. (Refer to Section 71-20.)					5 yrs.	

5. Propeller

NOTE: The Sensenich 76EM8S10-0-63 and mt-Propeller MT188R135-4G are only approved for installation on the Lycoming O-360-A4M engine.

100 hr items marked X apply to US registered airplanes only*		Interval					
	Inspection Items (Fixed Pitch Propeller only)	**50**	**100**	**200**	**1000**	**Time**	**Initials**
	WARNING: DO NOT LET PERSONS GO INTO THE DANGER AREA OF THE PROPELLER. PROPELLERS CAN CAUSE INJURY OR DEATH. **WARNING: MAKE SURE THAT THE ENGINE IS SAFE BEFORE YOU TURN THE PROPELLER.**						
1.	Do propeller maintenance in accordance with mt-Propeller or Sensenich Maintenance Manual, latest revision.		X*	X	X		

Section 05-28-50
Maintenance Checklist Airframe

Note: The items of the Major Structural Inspection (MSI) are included in the maintenance checklist of the airframe and identified by the term 'MSI' in the 'Time' column.

1. Front Fuselage

100 hr items marked X apply to US registered airplanes only*							
	Inspection Items	**100**	**200**	**1000**	**2000**	**Time**	**Initials**
1.	Examine the complete surface of the front fuselage. Look specially for damage (dents, cracks, holes and delamination). Examine the paint coat.	X	X	X	X		
2.	Examine these NACA air inlets for blockage: – One in the left stub wing. – Two in the forward fuselage, LH and RH (optional, OÄM 40-099).	X	X	X	X		
3.	Examine the canopy. – Make sure the canopy lock mechanism operates correctly. (Refer to Section 52-10). – Examine the acrylic glass window for damage. Look specially for cracks. – Examine the bonding between the window and the canopy frame. (Refer to Section 56-10). – Examine the emergency windows and their hinges for damage. – Examine the 'pop out' windows and their hinges for damage, if installed. Check hinges for improper friction, correct if necessary.	X*	X	X	X		
4.	Do a function test of the door unlocked warning light system. (Refer to Section 52-10).	X	X	X	X		
5.	Examine the safety hook mechanism. (Refer to Section 52-10).	X	X	X	X		

100 hr items marked X apply to US registered airplanes only*							
	Inspection Items	**100**	**200**	**1000**	**2000**	**Time**	**Initials**
6.	Examine the carbon hinges for cracks. (Refer to Section 52-10).	X	X	X	X		
7.	Examine the rear passenger door: – Make sure the door lock mechanism operates correctly. (Refer to Section 52-10). – Examine the acrylic glass window for damage. Look specially for cracks. – Examine the bonding between the window and the door frame. (Refer to Section 56-10).	X*	X	X	X		
8.	Examine the rear window on the RH side: – Examine the acrylic glass window for damage. Look specially for cracks. – Examine the bonding between the window and the frame. (Refer to Section 56-10).	X*	X	X	X		
9.	Examine all antennas. Look specially for damage and incorrect attachment.	X	X	X	X		
10.	Remove the wheel fairings. Look for cracks on the fairing mounts. (Refer to Section 32-40).	X*	X	X	X		
11.	Lift the airplane on jacks. (Refer to Section 07-10).	X*	X	X	X		
12.	Examine the tires. Look specially for cuts and wear. Measure the tire pressure. (Refer to Section 12-10).	X	X	X	X		
13.	Examine the rims of the main and the nose wheels. Look specially for cracks.	X*	X	X	X		
14.	Examine the wheel bearings. Look specially for play, corrosion and irregular operation.	X*	X	X	X		
15.	Remove the main and nose wheels. – Clean and lubricate the bearings (Refer to Section 12-20). Install the main and nose wheels (Refer to Section 32-40).	X*	X	X	X		
16.	Examine the brake lining. Look specially for wear. Minimum thickness according to Cleveland/Parker Maintenance Manual, latest revision.	X	X	X	X		

	100 hr items marked X apply to US registered airplanes only*						
	Inspection Items	**100**	**200**	**1000**	**2000**	**Time**	**Initials**
17.	Examine the brake disks. Look specially for wear. Minimum thickness according to Cleveland/Parker Maintenance Manual, latest revision.	X*	X	X	X		
18.	Remove the access panels for the main landing gear legs. (Refer to Section 52-40).	X*	X	X	X		
19.	Examine the mounting for the landing gear. Look specially for: – Incorrect attachment. – Loose or missing lock devices.	X*	X	X	X		
20.	Examine the main landing gear. Look specially for cracks and deformation.	X*	X	X	X		
21.	Do a test for toe-in and camber. (Refer to Section 32-10).			X	X		
22.	Examine the wing main bolts. Look specially for incorrect locking.	X*	X	X	X		
23.	Examine these components on LH and RH sides for dis-bonding, delamination and damage: – The center section top and bottom shells. – The outer faces of the front and rear main bulkheads. Look specially in the area of the bushes for the main pins. – The front, middle and rear outer ribs. – The main landing gear rib. – The front and rear closing ribs. – The rear web.				X		
24.	Examine the inner faces of the front and rear main bulkheads with the wings removed. Look specially in the area of the bushes for the main bolts. (See also Paragraph 6).				X		
25.	Install the access panels for the main landing gear legs. (Refer to Section 52-40).	X*	X	X	X		
26.	Install the wheel fairings.	X*	X	X	X		

100 hr items marked X apply to US registered airplanes only*							
	Inspection Items	**100**	**200**	**1000**	**2000**	**Time**	**Initials**
27.	Remove the access panel for the nose landing gear leg. (Refer to Section 52-40).	X*	X	X	X		
28.	Examine the nose-wheel assembly. Look specially for incorrect attachment, cracks and deformation.	X*	X	X	X		
29.	Examine the nose-gear journal-bearings in the bottom of the fuselage. Look specially for play.	X*	X	X	X		
30.	Examine the journals in the elastomeric spring. Look specially for play.	X	X	X	X		
31.	Examine the spherical bearing at the top of the elastomeric spring. Look specially for play.	X	X	X	X		
32.	Examine the elastomeric spring. Look specially for: – Looseness. Tighten if necessary. (Refer to Section 32-20). – Damage. Replace elastomer donuts if necessary. (Refer to Section 32-20).	X	X	X	X		
33.	Examine the nose-wheel fork. Do a test for play and caster friction (refer to Section 32-20). – The friction force should be 30 - 50 N (6.75 - 11.25 lb) at the axle.		X	X	X		
34.	Examine the gascolator: – Remove and clean the fuel filter bowl. – Install the filter bowl. (Refer to Section 28-20 for the Lycoming version or Section 28-21 for the TAE version). – Do a check for fuel leakage.	X	X	X	X		
35.	Examine the fuel pump electrical cables. Look specially for rub marks.	X*	X	X	X		
36.	Examine the top hat profile. Look specially for dis-bonding, delamination and damage.			X	X		
37.	Install the access panel for the nose landing gear leg. (Refer to Section 52-40).	X*	X	X	X		

100 hr items marked X apply to US registered airplanes only*							
	Inspection Items	**100**	**200**	**1000**	**2000**	**Time**	**Initials**
38.	If canopy jettison system (OÄM 40-232) is installed: Perform release test of canopy jettison system. (Refer to Section 52-10).			X	X	2 yrs.	
39.	If canopy jettison system (OÄM 40-232) is installed: 100h maintenance check of canopy jettison system. (Refer to Section 52-10).	X	X	X	X		

2. Cockpit

100 hr items marked X apply to US registered airplanes only*							
	Inspection Items	**100**	**200**	**1000**	**2000**	**Time**	**Initials**
1.	Remove the front seats and the access panels in rear seat (if installed). (Refer to Section 25-10).	X*	X	X			
2.	Remove the rear seat shells. (Refer to Section 25-10)			X			
3.	Examine the seats for damage.	X*	X	X			
4.	Examine the safety belts. Make sure the lock mechanism operates correctly. – Insert the tongue into the buckle. – Pull on the strap. Make sure the ratchet holds the tongue in the buckle. – Operate the release button. The tongue must pull freely from buckle.	X	X	X			
5.	Examine the cable ties and electrical connectors. Pull lightly to make sure they are not loose.	X*	X	X			
6.	Examine the control sticks. Make sure that the control stick attachments are not loose and do not catch.	X*	X	X			
7.	Examine the control stick stops.	X*	X	X			

100 hr items marked X apply to US registered airplanes only*							
	Inspection Items	**100**	**200**	**1000**	**2000**	**Time**	**Initials**
8.	Examine the aileron and elevator control system. Look specially for incorrect attachment and loose or missing lock devices. (Refer to Sections 27-10 and 27-30).	X*	X	X	X		
9.	Examine the Pitot-static system water traps.	X*	X	X	X		
10.	If water separators in MAP lines (MÄM 40-474 or MÄM 40-479) are installed in a DA 40 D airplane: Examine the ECU water separator: – Disconnect the water separator from the manifold pressure tube. – Remove the lock wire of the water separator. – Unscrew lower part of the water separator. – Check drain hole for blockage. – Check ball and sealing ring for damage or contamination. – Tighten lower part of water separator approx. 270° against O-ring seal. – Secure with lock wire. – Connect the water separator to the manifold pressure tube.		400 hrs.			1 yr.	
11.	Examine the stall-warning hose. Look specially for contamination by water. (Refer to Section 34-20).	X*	X	X	X		
12.	Examine the rudder pedals. Look specially for: – Incorrect attachment and function. – Corrosion and damaged surface protection. – Damaged adjustment mechanism. – Improper function of adjustable mechanism. (Refer to Section 27-20).	X*	X	X	X		

100 hr items marked X apply to US registered airplanes only*							
	Inspection Items	**100**	**200**	**1000**	**2000**	**Time**	**Initials**
13.	Examine the rudder pedals S-tube. Look specially for: – Wear on cable inlets and outlets. – Wear in inner radius of tube (no deformation visible or tactile). (Refer to Section 27-20).	X*	X	X	X		
14.	Examine the rudder cables and pulleys. Look specially for: – Incorrect attachment and function. (Refer to Section 27-20). – Rub marks. – Defective safety plates. – Worn out pulleys.	X*	X	X	X		
15.	Examine the brake pipes/hoses and components. Look specially for leakage.	X	X	X	X		
16.	Examine the brake fluid reservoirs on the co-pilot's side. Make sure the fluid level is correct. – The fluid level must be 12 mm to 25 mm (½ to 1 in) below the top face of the reservoir filler hole.	X*	X	X	X		
17.	Examine the instruments. Make sure that: – The markings are clear. – The function is correct. – Switches are correctly attached. – The instrument lights operate correctly.	X*	X	X	X		
18.	Examine the placards. Make sure that: – They are not damaged. – None are missing. (Refer to Chapter 11).	X*	X	X	X		

100 hr items marked X apply to US registered airplanes only*							
	Inspection Items	**100**	**200**	**1000**	**2000**	**Time**	**Initials**
19.	Remove the instrument panel cover.	X*	X	X	X		
20.	Examine the instrument panel. Make sure that: – The wiring is correctly attached. – The instruments are correctly attached. – The hoses are correctly attached. – The circuit breakers are correctly attached. – The cooling fan is operative and correctly attached.	X*	X	X	X		
21.	Examine the emergency battery system, if installed: – Measure the voltage of the emergency battery on the EMERGENCY switch. Replace emergency battery (all cells) or the battery pack if the voltage is: – Below 42 V for the Lycoming version. – Below 36 V for the Lycoming version with OÄM 40-179 carried out. – Below 21 V for the TAE version. – Below 18 V for the TAE version with G1000.	X*	X	X	X		
22.	Make sure that the seal on the EMERGENCY switch is intact.	X	X	X	X		
23.	TAE version only: Examine the ECU backup battery: – Check for leakage, damage, insecure mounting, and loose connectors. – Measure voltage (minimum: 12.5 volts).	X	X	X	X		

100 hr items marked X apply to US registered airplanes only*							
	Inspection Items	**100**	**200**	**1000**	**2000**	**Time**	**Initials**
24.	Examine the alternate static valve, if installed. Make sure that: – The valve is correctly attached. – The valve is not blocked. – The hoses are correctly attached.	X*	X	X	X		
25.	Examine the compass. Make sure that: – The compass is correctly attached. – The fluid level is correct.		X	X	X		
26.	Examine the controls in the center console. Make sure that for each control lever: – There is full and free movement. – There is no unusual play. – The friction is correct. – The mixture lock-out operates correctly (Lycoming version only).	X	X	X	X		
27.	Inspect universal joints in fuel selector shaft (upper and lower) very carefully for: – Excessive wear. – Uneven movement. – Pins not completely pressed in. – Loose pins.			X	X		

100 hr items marked X apply to US registered airplanes only*							
	Inspection Items	**100**	**200**	**1000**	**2000**	**Time**	**Initials**
28.	Examine the control cables in the center console: – Remove the retaining screws for the center console cover plate. – Lift the center console cover plate and visually examine the cables. Look specially for wear and kinks in the cables. – Lower the center console cover plate into the correct position, install the retaining screws.	X*	X	X	X		
29.	Examine the trim control in the center console. Make sure that: – There is full and free movement. – There is no unusual play.	X*	X	X	X		
30.	If the autopilot system is installed, then examine the trim servo assembly. Look specially for: – Wear and corrosion. – Insecure attachment of servo. – Damaged, deformed, or worn out cardan shaft and chain gears. (Refer to Section 22-10).	X*	X	X	X		

100 hr items marked X apply to US registered airplanes only*							
	Inspection Items	**100**	**200**	**1000**	**2000**	**Time**	**Initials**
31.	Examine the front cockpit structure. Look for dis-bonding, delamination and damage, specially to these components: – The fuselage shells. – The firewall. – The floor. – The control bulkhead. – The fuel pipe channels. – The front main bulkhead. – The rear main bulkhead. – The inner faces of the front and rear closing ribs.				X		
32.	Examine the front cockpit structure. Look for dis-bonding, delamination and damage of the front and rear seat crash elements.			X	X		
33.	If the emergency axe (OÄM 40-326) is installed: – Check attachments for looseness. – Check release mechanism for interference or improper function.		X	X	X		
34.	If the sun visors (OÄM 40-327) are installed: – Check for obvious damage. – Check press-studs for lack of retention force.		X	X	X		

3. Center Fuselage, Internal

100 hr items marked X apply to US registered airplanes only*							
	Inspection Items	**100**	**200**	**1000**	**2000**	**Time**	**Initials**
1.	Examine the fire extinguisher. Make sure that: – The fire extinguisher will release from the mounting bracket. – The fire extinguisher contents are full.	X*	X	X	X		
2.	Examine the baggage net. Make sure the spring clips operate correctly.	X	X	X	X		
3.	If the autopilot system is installed, then examine the pitch servo assembly. Look specially for: – Wear and corrosion. – Insecure attachment of servo. – Defective bridle cable assembly. – Loose bridle cables or clamps on the elevator push-rod. (Refer to Section 22-10).	X*	X	X	X		
4.	Examine the cable ties and electrical connectors. Pull lightly to make sure they are not loose.	X*	X	X	X		
5.	Examine the push rod guides for the elevator push-rod. Look specially for incorrect attachment and interference.	X*	X	X	X		
6.	Examine the flap control mechanism on the aft main bulkhead. Look specially for: – Damage and corrosion. – Incorrect attachment and loose or missing lock devices.	X*	X	X	X		
7.	Examine the flap-actuator indicator and position switches. Look specially for incorrect attachment and operation.	X*	X	X	X		

100 hr items marked X apply to US registered airplanes only*							
	Inspection Items	**100**	**200**	**1000**	**2000**	**Time**	**Initials**
8.	Examine the aileron control system on the aft main bulkhead. Look specially for: – Damage and corrosion. – Incorrect attachment and loose or missing lock devices.	X*	X	X	X		
9.	If the autopilot system is installed, then examine the roll servo assembly. Look specially for: – Wear and corrosion. – Insecure attachment of servo. – Defective bridle cable assembly. – Loose bridle cables or clamps on the aileron push-rod. (Refer to Section 22-10).	X*	X	X	X		
10.	If the KCS 55A compass system is installed, then examine the directional gyro below the passenger seats. Make sure that it is attached correctly.	X*	X	X	X		
11.	Do a cable tension test of the rudder control cable. (Refer to Section 27-20).	X*	X	X	X		
12.	If the G1000 system is installed: Examine the Garmin G1000 unit behind the baggage compartment frame. Look specially for: – Insecure cable ties and connections. – Insecure attachment.	X*	X	X	X		
13.	Examine the center fuselage structure. Look for dis-bonding, delamination and damage, specially to the fuselage shells.				X		
14.	Examine the baggage compartment frame. Look for dis-bonding, delamination and damage.			X	X		

100 hr items marked X apply to US registered airplanes only*							
	Inspection Items	**100**	**200**	**1000**	**2000**	**Time**	**Initials**
15.	Do a coin-tap test for delamination of the fuselage center section top and bottom shells.					MSI	

4. Rear Fuselage

100 hr items marked X apply to US registered airplanes only*							
	Inspection Items	**100**	**200**	**1000**	**2000**	**Time**	**Initials**
1.	Examine the complete surface of the rear fuselage. Look specially for damage (dents, cracks, holes and delamination). Examine the paint coat.	X*	X	X	X		
2.	Do a coin-tap test for delamination of the fuselage shell.					MSI	
3.	Examine the push rod guides for the elevator push-rod. Look specially for: – Incorrect attachment. – Interference.	X*	X	X	X		
4.	Examine the rudder-control cables and turnbuckles. Look specially for: – Corrosion and wear. – Incorrect lock devices.	X*	X	X	X		
5.	Examine the rear fuselage structure. Look for disbonding, delamination and damage specially to these components: – The fuselage shells. – Ring frames 1, 2 and 3.				X		
6.	If the autopilot static source (OÄM 40-267) is installed: – Check static source holes for blockage.	X	X	X	X		

5. Tail

100 hr items marked X apply to US registered airplanes only*							
	Inspection Items	**100**	**200**	**1000**	**2000**	**Time**	**Initials**
1.	Examine the complete surface of the aft part of the fuselage, vertical stabilizer, and horizontal stabilizer. Look specially for damage (dents, cracks, holes and delamination). Examine the paint coat.	X*	X	X	X		
2.	Examine the lower fin. Look specially for: – Damage to the bottom of the fin. – Incorrect attachment.	X*	X	X	X		
3.	Remove the rudder. Lubricate the hinge bushes. (Refer to Section 55-40).	X*	X	X	X		
4.	Examine the inside of the vertical stabilizer.		X	X	X		
5.	Inspect the inner skin of the vertical stabilizer through all access holes with mirror and flashlight. Check for damage, cracks and delamination. Refer to Section 53-10.					MSI	
6.	Inspect the interior structure of the vertical stabilizer through all access holes with mirror and flashlight. Check for damage, cracks, delamination and disbonding from the vertical stabilizer skin. Look specially at these components: – Front web. – Rear web. – Lower rib (front and rear). – Structure next to holes for mounting brackets. Refer to Section 53-10.					MSI	
7.	Examine the rudder mounting and control cable connections.	X*	X	X	X		
8.	Examine the rudder support bracket.	X*	X	X	X		

	100 hr items marked X apply to US registered airplanes only*						
	Inspection Items	**100**	**200**	**1000**	**2000**	**Time**	**Initials**
9.	Examine the bottom edge of the rudder. Look specially for cracks and deformation.	X*	X	X	X		
10.	Examine the rudder-stop reinforcement bars. Look specially for cracks and corrosion.	X*	X	X	X		
11.	Examine the trim mechanism. Look specially for: – Incorrect attachment. – Wear.	X*	X	X	X		
12.	Examine the trim tab for damage. Look specially for incorrect attachment and loose or missing lock devices. (Refer to Section 55-20).	X*	X	X	X		
13.	Adjust the friction of the trim mechanism.	X*	X	X	X		
14.	Examine the horizontal stabilizer: – Remove the fairing for the horizontal stabilizer. – Examine the mounting brackets. Look specially at the attachment bolts for corrosion. (Refer to Section 55-10).	X*	X	X	X		
15.	Remove the tips from the horizontal stabilizer. – Examine the interior of the horizontal stabilizer. Look specially for dis-bonding, delamination and damage to the shells, spars and ribs. (Refer to Section 55-10).				X		
16.	Remove the horizontal stabilizer. Refer to Section 55-10.					MSI	
17.	Inspect the inner skin of the horizontal stabilizer through all access holes with mirror and flashlight. Check for damage, cracks, and delamination. Refer to Section 55-10.					MSI	

100 hr items marked X apply to US registered airplanes only*							
	Inspection Items	**100**	**200**	**1000**	**2000**	**Time**	**Initials**
18.	Inspect the interior structure of the horizontal stabilizer through all access holes with mirror and flashlight. Check for damage, cracks, delamination and disbonding from the horizontal stabilizer skin. Look specially at these components: – Front spar. – Rear spar. – Trailing edge web. – All interior ribs and stiffeners. – Structure next to holes for mounting brackets. Refer to Section 55-10.					MSI	
19.	Examine the elevator for damage. Look specially for incorrect attachment and loose or missing lock devices. (Refer to Section 55-20).	X*	X	X	X		
20.	Examine the elevator hinges and control horn. Look specially for too much play. Play allowed: – Axial ± 1.00 mm (± 0.04 in). – Radial ± 0.25 mm (± 0.01 in).	X*	X	X	X		
21.	Examine the elevator push-rod: – Remove the elevator push-rod which goes through the rear fuselage. – Look specially for rub marks. – Install the push-rod. (Refer to Section 27-30).				X		
22.	Examine the structure of the vertical stabilizer. Look specially for dis-bonding, delamination and damage to the shells, spars and ribs.				X		

100 hr items marked X apply to US registered airplanes only*							
	Inspection Items	**100**	**200**	**1000**	**2000**	**Time**	**Initials**
23.	Inspect the inner skin of the rear fuselage through all access holes with mirror and flashlight. Check for damage, cracks, delamination and disbonding from the sandwich foam. Refer to Section 53-10.					MSI	
24.	Inspect the interior structure of the rear fuselage through all access holes with mirror and flashlight. Check for damage, cracks, delamination and disbonding from the fuselage skin. Look specially at these components: – Ring frames 1, 2 and 3. Refer to Section 53-10.					MSI	
25.	Install the horizontal stabilizer. Refer to Section 55-10.					MSI	
26.	Install the HT tips.				X		
27.	Install the fairing for the horizontal stabilizer. (Refer to Section 55-10).	X*	X	X	X		
28.	Install the rudder. (Refer to Section 55-40).	X*	X	X	X		

6. Wings

100 hr items marked X apply to US registered airplanes only*							
	Inspection Items	**100**	**200**	**1000**	**2000**	**Time**	**Initials**
1.	Examine the complete surface of the wings. Look specially for damage (dents, cracks, holes and delamination). Examine the paint coat.	X*	X	X	X		
2.	Examine the ailerons. Look specially for damage (dents, cracks, holes and delamination).	X*	X	X	X		
3.	Examine the aileron hinges and horn. Look specially for too much play. Play allowed: – Axial ± 1.00 mm (± 0.04 in). – Radial ± 0.25 mm (± 0.01 in).	X*	X	X	X		
4.	Examine the aileron mass balance.	X*	X	X	X		
5.	Examine the flaps. Look specially for damage (dents, cracks, holes and delamination).	X*	X	X	X		
6.	Examine the flap hinges and horn. Look specially for too much play. Play allowed: – Axial ± 1.00 mm (± 0.04 in). – Radial ± 0.25 mm (± 0.01 in).	X*	X	X	X		
7.	Examine the flap mass balance.	X*	X	X	X		

100 hr items marked X apply to US registered airplanes only*							
	Inspection Items	**100**	**200**	**1000**	**2000**	**Time**	**Initials**
8.	Remove the flap and aileron bellcrank access panels in the wing (Refer to Section 52-40). – Examine the aileron and flap control system. Look specially for incorrect attachment and loose or missing lock devices (Refer to Sections 27-10 and 27-50). – Visually check fuel tank bonding system through access panels for improper connections and damaged strips. – Install the access panels.	X*	X	X	X		
9.	Examine the Pitot head. Look specially for: – Incorrect attachment. – Damage. – Foreign objects.	X	X	X	X		
10.	Remove the wing tips. (Refer to Section 57-10).				X		
11.	Remove the wings. (Refer to Section 57-10). – Examine the main bolts. – Grease the main bolts. – Examine the A-bolts. – Grease the A-bolts. – Examine the B-bolts. – Grease the B-bolts. (Refer to Section 12-20).				X		

100 hr items marked X apply to US registered airplanes only*							
	Inspection Items	**100**	**200**	**1000**	**2000**	**Time**	**Initials**
12.	Inspect the wing shells: – Look carefully for signs of damage. – Look for dis-bonding between the shells and each spar, rib and web. – Do a coin-tap test for delamination of the shells. (Refer to Section 51-10 and 57-10).				X		
13.	Examine the aileron push-rods: – Remove the aileron push-rods from the wings. – Look specially for rub marks. – Install the aileron push-rods. (Refer to Section 27-10).				X		
14.	Examine the flap push-rods: – Remove the flap push-rods from the wings. – Look specially for rub marks. – Install the flap push-rods. (Refer to Section 27-50).				X		
	WARNING: DO NOT GET FUEL ON YOU. FUEL CAN CAUSE SKIN DISEASE. DO NOT ALLOW FIRE NEAR FUEL. FUEL BURNS AND CAN CAUSE INJURY TO PEOPLE AND DAMAGE TO EQUIPMENT.						
15.	Examine the fuel tank outlets: – Clean the finger filters. – Look for foreign matter. – Look for defective lock wire.				X		
16.	Remove the access covers.		X	X	X		
17.	Check condition of tank interconnecting hoses.		X	X	X		
18.	Check for leaks.	X	X	X	X		

100 hr items marked X apply to US registered airplanes only*							
	Inspection Items	**100**	**200**	**1000**	**2000**	**Time**	**Initials**
19.	Collect a drain sample: – If sample is contaminated flush tank with removed drain valve.	X	X	X	X		
20.	Flush the tank: – Remove the drain valve. – Flush the fuel tank. – Check for debris and foreign objects. – Install the drain valve.			X	X		
21.	Install the access covers.		X	X	X		
22.	Examine the fuel tank vents for blockage. – Open fuel filler cap and carefully blow through the LH-forward and RH-aft vent lines from outside into the tank with compressed air.	X	X	X	X		
23.	Defuel the airplane (refer to Section 12-10) and remove the fuel tanks:: – Defuel the airplane. (Refer to Section 12-10). – Remove the fuel tanks.				X		
24.	Examine the fuel tanks: – Look specially for corrosion, leaks and other damage. – Look for foreign objects in the tanks. – Look for material deterioration or damage of the flexible fuel hoses connecting the fuel tank chambers.				X		

100 hr items marked X apply to US registered airplanes only*							
	Inspection Items	**100**	**200**	**1000**	**2000**	**Time**	**Initials**
25.	Inspect the inner wing skin through all access holes with mirror and flashlight. Check for damage, cracks, delamination and disbonding from the sandwich foam. Refer to Section 57-10.					MSI	
26.	Inspect the interior structure of the wing through all access holes with mirror and flashlight. Check for damage, cracks, delamination and disbonding from the wing skin. Look specially at these components: – Front spar. – Rear spar. – Rear web. – Root rib (front, middle and rear). – End rib. – All interior ribs and stiffeners. Refer to Section 57-10.					MSI	
27.	Install the fuel tanks. (Refer to Section 28-10 for the Lycoming version or Section 28-11 for the TAE version).				X		
28.	Install the wings. (Refer to Section 57-10).				X		
29.	Install the wing tips. (Refer to Section 57-10).				X		
30.	If the G1000 system is installed: Do a function test of the fuel low-level switches: – Set the ELECTRIC MASTER key switch to ON. – The FUEL LOW caution message must appear on the G1000 PFD. – Set the ELECTRIC MASTER key switch to OFF.			X	X		

7. General

50 hour inspection items apply to airplanes with Lycoming engine only.

100 hr items marked X apply to US registered airplanes only*		Interval						
	Inspection Items	**50**	**100**	**200**	**1000**	**2000**	**Time**	**Initials**
1.	If necessary, inspect optional equipment. Refer to Chapter 9 of the Airplane Flight Manual (Supplements).		X	X	X	X		
2.	If necessary, inspect Additional Equipment (equipment which is installed but is not listed in Section 6.5 of the Airplane Flight Manual).		X	X	X	X		
3.	Lubricate the airplane. (Refer to Section 12-20).		X	X	X	X		
4.	Measure the play in the aileron and elevator controls with the control surfaces locked (Refer to Section 27-30). Look specially for too much play. Do the test at the top of the control stick. – Maximum play allowed ± 2.5 mm (± 0.1 in). (Refer to Section 27-10).		X*	X	X	X		
5.	Check flight controls and engine controls for improper operation and installation.		X*	X	X	X		
6.	Do a function test of the aileron control system. (Refer to Section 27-10).					X		
7.	Do a function test of the rudder control system. (Refer to Section 27-20).					X		
8.	Do a function test of the elevator control system. (Refer to Section 27-30).					X		
9.	Do an function test of the trim-system. Look specially for incorrect operation and indication. (Refer to Section 27-38).					X		
10.	Do a function test of the flap system. (Refer to Section 27-50). Look specially at the pre-load. With the flaps set to UP: – Correct pre-load 3 - 5 daN (6.7 - 11.2 lb).					X		

100 hr items marked X apply to US registered airplanes only*		Interval						
	Inspection Items	**50**	**100**	**200**	**1000**	**2000**	**Time**	**Initials**
11.	Lower the airplane off jacks. (Refer to Section 07-10).		X*	X	X	X		
12.	Do an operational test of the external lights.		X	X	X	X		
13.	Do an operational test of the Pitot heat.		X	X	X	X		
14.	Examine the airplane. Look specially for loose items and tools. Close all access panels. Install these items: – Engine cowlings. – The instrument panel cover. – The seat shells. – The control-stick boots. – The engine cowlings.	X	X	X	X	X		
	WARNING: DO NOT LET PERSONS INTO THE DANGER AREA OF THE PROPELLER. PROPELLERS CAN CAUSE INJURY OR DEATH. **WARNING: SET THE PARKING BRAKE TO ON. IF YOU DO NOT DO THIS THE AIRPLANE CAN MOVE. THIS CAN CAUSE INJURY OR DEATH.**							
15.	Put the chocks against the main airplane wheels.	X	X	X	X	X		
16.	Do the post maintenance engine test. – For the engine run procedures refer to the Airplane Flight Manual. – Record the data (Refer to Paragraph 7, Engine Ground Test Record).	X	X	X	X	X		
17.	Examine the engine for leakage.	X	X	X	X	X		
18.	Make sure the engine oil filter is tight. (Refer to Section 79-00 for the Lycoming version or Section 79-01 for the TAE version).	X	X	X	X	X		

100 hr items marked X apply to US registered airplanes only*		Interval						
	Inspection Items	**50**	**100**	**200**	**1000**	**2000**	**Time**	**Initials**
19.	Do a test flight. Put the engine ground test and the flight test reports in the Airplane Maintenance Log.		X*	X	X	X		

Note: If a Major Structural Inspection (MSI) was done, you must complete the Findings Report for the Major Structural Inspection (MSI). Refer to Section 05-28-93.

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Section 05-28-90
Maintenance Report

Complete a copy of the Maintenance Report after all of the applicable maintenance tasks in the Maintenance Checklist have been initialed.

☐ DA 40 ☐ DA 40 D ☐ DA 40 F	
Airplane Serial Number:	Registration Number:
Check: _____ (100 hr., 200 hr., 1000 hr., 2000 hr., Annual)	
REMARKS:	
The airplane is airworthy with respect to its maintenance condition. _____ _____ _____ Place Date Authorized	

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Section 05-28-91
Engine Ground Test Record

1. Engine Ground Test Record - Lycoming Version

WARNING: DO NOT STAND WITHIN THE DANGER AREA OF THE PROPELLER. THE PROPELLER CAN CAUSE DEATH OR INJURY TO PERSONS.

WARNING: YOU MUST MAKE SURE THAT THE ENGINE IS SAFE BEFORE YOU TURN THE PROPELLER. DISCONNECT THE SPARK PLUG LEADS. MAKE SURE THAT:
- THE IGNITION SWITCH IS SET TO "OFF".
- THE THROTTLE LEVER IS SET TO "IDLE".
- THE MIXTURE CONTROL IS SET TO "LEAN CUT-OFF".

WARNING: DO NOT GET OIL ON YOU. OIL CAN CAUSE SKIN DISEASE.

WARNING: DO NOT GET FUEL ON YOU. FUEL CAN CAUSE SKIN DISEASE. DO NOT ALLOW FIRE NEAR FUEL. FUEL BURNS AND CAN CAUSE INJURY TO PEOPLE AND DAMAGE TO EQUIPMENT.

WARNING: WHEN YOU COMPLETE AN INSPECTION, MAKE SURE THAT YOU REMOVE ALL LOOSE ITEMS/TOOLS FROM THAT AREA. LOOSE ITEMS/TOOLS CAN PREVENT FULL MOVEMENT OF THE AIRPLANE CONTROLS. THIS CAN CAUSE DEATH OR INJURY TO PERSONS.

CAUTION: YOU MUST ATTACH BLANKS/CAPS TO HOLES/PIPES WHEN YOU REMOVE COMPONENTS. IF YOU DO NOT DO THIS, UNWANTED DEBRIS CAN ENTER THE HOLES/PIPES. THIS CAN CAUSE BLOCKAGE TO THE AIRPLANE SYSTEMS.

System Check (Lycoming Engine)	Result
Note: Set the engine mixture control to full RICH to do the engine checks unless you are told differently.	
CAUTION: BEFORE YOU RUN THE ENGINE AT MORE THAN 1800 RPM MAKE SURE THE OIL TEMPERATURE HAS RISEN TO 75 ºF, AND THE CHT HAS RISEN TO 200 °F. THIS WILL PREVENT POSSIBLE DAMAGE/TOO MUCH WEAR TO THE ENGINE.	
Start the engine.	
Set the propeller to fine pitch. Set engine manifold pressure to 50-65 % power for sufficient time to do these checks:	
– Record fuel pressure.	
– Record RPM drop for left magneto.	
– Record RPM drop for right magneto.	
(Limit: Not more than 50 RPM difference, with a maximum drop of 175 RPM for each magneto).	
Set engine RPM to full power for sufficient time to do these checks:	
– Record fuel pressure.	
– Record oil pressure.	
– Record oil temperature.	
– Record cylinder head temperature (CHT).	
– Record alternator output.	
– Record full power RPM.	

System Check (Lycoming Engine)	Result
CAUTION: THE MAGNETO OFF CHECK MUST BE DONE AT IDLE RPM. THIS WILL PREVENT DAMAGE TO THE ENGINE. CAUTION: DO NOT SHUT THE ENGINE DOWN UNTIL THE CHT GOES BELOW 300 ºF.	
Set engine RPM to IDLE.	
Record IDLE RPM.	
Record fuel pressure.	
Record oil pressure.	
Record oil temperature.	
Set the ignition switch to OFF for a short time. Then set the ignition switch to BOTH. If the engine continues to run when the ignition switch is set to OFF, refer to Section 74-00 of the AMM.	
Do a mixture setting check. (Limit: 25 - 50 RPM)	
– Do a function test of the fuel tank selector. Set the fuel tank selector to LEFT for a minimum of 3 minutes, the engine must continue to run. Set the fuel tank selector to RIGHT for a minimum of 3 minutes, the engine must continue to run.	
– Do a positive fuel cut-off check.	
Set the engine mixture control to LEAN/CUT OFF.	
When the propeller stops rotating:	
– Set the ignition switch to OFF.	
– Set the ALT/BAT switch to OFF.	

2. Engine Ground Test Record - TAE Version

Do the engine test in accordance with Section 71-01, Paragraph 3. Take photocopies of Sub-Paragraphs C to E of that Paragraph into the cockpit and enter results and comments.

WARNING: DO NOT STAND WITHIN THE DANGER AREA OF THE PROPELLER. THE PROPELLER CAN CAUSE DEATH OR INJURY TO PERSONS.

WARNING: YOU MUST MAKE SURE THAT THE ENGINE IS SAFE BEFORE YOU TURN THE PROPELLER. MAKE SURE THAT:
- THE ELECTRIC MASTER KEY SWITCH IS SET TO "OFF".
- THE ENGINE MASTER SWITCH IS SET TO "OFF".
- THE POWER LEVER IS SET TO "IDLE".

WARNING: DO NOT GET OIL ON YOU. OIL CAN CAUSE SKIN DISEASE.

WARNING: DO NOT GET FUEL ON YOU. FUEL CAN CAUSE SKIN DISEASE. DO NOT ALLOW FIRE NEAR FUEL. FUEL BURNS AND CAN CAUSE INJURY TO PEOPLE AND DAMAGE TO EQUIPMENT.

WARNING: WHEN YOU COMPLETE AN INSPECTION, MAKE SURE THAT YOU REMOVE ALL LOOSE ITEMS/TOOLS FROM THAT AREA. LOOSE ITEMS/TOOLS CAN PREVENT FULL MOVEMENT OF THE AIRPLANE CONTROLS. THIS CAN CAUSE DEATH OR INJURY TO PERSONS.

CAUTION: YOU MUST ATTACH BLANKS/CAPS TO HOLES/PIPES WHEN YOU REMOVE COMPONENTS. IF YOU DO NOT DO THIS, UNWANTED DEBRIS CAN ENTER THE HOLES/PIPES. THIS CAN CAUSE BLOCKAGE TO THE AIRPLANE SYSTEMS.

Section 05-28-92
Check Flight Report

Diamond AIRCRAFT	CHECK FLIGHT (See Maintenance Checklist for Applicability)	DA 40 / DA 40 D / DA 40 F Page 1 of 4

Registration:	Pilot:	Airdrome:
Date:	Take-Off:	Landing:

Functional Check, Flight Behavior	Findings		
	N/A	NO	YES
Fuel quantity indicators			
Strobe lights (ACL), navigation lights			
Warning, caution and status lights			
Altimeter(s) (including G1000, if installed), QNH adjustment			
Airspeed indicators (including G1000, if installed)			
Vertical speed indicators (including G1000, if installed)			
Attitude, Bank indicator (including G1000, if installed)			
Compass (on G1000, if installed: slaved directional gyro; magnetic compass)			
Radio, radio check			
Audio panel, intercom			
Navigational instruments			
G1000 reversionary mode (if installed)			
Electrical fuel pump (Lycoming) or fuel transfer pump (TAE)			
Starter behavior			
Engine starting behavior, cold			
Oil pressure indicator			
Fuel pressure indicator (Lycoming version only)			
Fuel temperature indicator (TAE version only)			
Fuel flow indication			
Voltmeter			

Diamond AIRCRAFT	CHECK FLIGHT (See Maintenance Checklist for Applicability)	DA 40 Page 2 of 4		
Functional Check, Flight Behavior		Findings		
		N/A	NO	YES
Ammeter, alternator				
Essential bus				
Manifold pressure indicator (Lycoming) or load indicator (TAE)				
RPM indicator				
Exhaust gas temperature (EGT) indicators (Lycoming version only)				
Cylinder head temperature (CHT) indicators (Lycoming version only)				
Oil temperature indicator				
Coolant temperature indicator (TAE version only)				
Gearbox temperature indicator (TAE version only)				
Instrument lighting				
Flood light				
Map light, overhead				
G1000 manual dim (if installed)				
Parking brake				
Wing flaps				
Throttle, RPM and mixture levers (Lycoming) or power lever (TAE)				
Ignition circuits (Lycoming version only)				
Taxiing behavior, take-off behavior				
Behavior during climb				
Airspeed indicator (including G1000, if installed)				
Vertical speed indicator (including G1000, if installed)				
Alternate static valve				
Compass (on G1000, if installed: slaved directional gyro; magnetic compass)				
Attitude gyro (horizon) (including G1000, if installed)				
Directional gyro				
Turn indicator				

Diamond AIRCRAFT	CHECK FLIGHT (See Maintenance Checklist for Applicability)	DA 40 Page 3 of 4		
Functional Check, Flight Behavior		Findings		
		N/A	NO	YES
OAT indicator				
Chronometer (clock)				
Transponder, modes A and C				
VOR, CDI				
HSI, slaving meter				
ADF				
DME				
GPS, GPS annunciation control unit				
Autopilot				
Cylinder head temperature (Lycoming) or coolant temperature (TAE)				
Oil temperature				
Cabin heat / cabin air				
Behavior during high-speed flight				
Longitudinal trim / trim range				
Directional trim				
Lateral trim				
Behavior during slow-speed flight				
Pitot heat				
Stall warning				
Localizer, glideslope				
Marker beacon receiver				
Landing behavior				
Fuel selector valve (Lycoming version only)				
Engine starting behavior, warm				
Engine shut-down behavior				

Diamond AIRCRAFT	CHECK FLIGHT (See Maintenance Checklist for Applicability)	DA 40 Page 4 of 4		
Functional Check, Flight Behavior		Findings N/A	NO	YES

Remarks:

(Pilot)

Section 05-28-93

Major Structural Inspection Check Findings Report

1. General

Complete the Findings Report and report the following:

– Defects found during the Major Structural Inspection (MSI).

– Structural defects found during the associated 1000 hour inspection.

– All structural defects that were detected and repaired since new or since the last Major Structural Inspection (MSI).

Send a copy of the completed Findings Report to the manufacturer:

Diamond Aircraft Industries

Office of Airworthiness

N.A.Otto-Str. 5

A-2700 Wr. Neustadt

Austria

by mail, fax (+43-2622-26780) or e-mail (airworthiness@diamond-air.at).

Note: The manufacturer will use the completed Findings Reports for the continuous improvement of the checklist for the Major Structural Inspection (MSI).

Enter the applicable data in the blocks below:

FINDINGS REPORT DA 40 AT MAJOR STRUCTURAL INSPECTION (MSI)			
Registration : _____		Date : _____	
Airplane S/N : _____		Airplane Operating Hours : _____	
Maintenance Organization:		AMM Rev. used for check : _____ Signature : _____	
no.	**defect/finding**	**repair method, remarks**	**at TSN**

no.	defect/finding	repair method, remarks	at TSN

All defects have been repaired. The airplane is airworthy with respect to its maintenance condition.

Place: _____

Date: _____

Authorized: _____

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Section 05-50
Unscheduled Maintenance Checks

1. General

Unscheduled maintenance checks are necessary after any incident that could cause damage to the airplane.

2. Hard Landing Check

Figure 1 shows the hard landing check areas. You must do a hard landing check when the pilot makes a report of a hard landing. Or when ground handling applies unusual loads.

A. Equipment

Item	Quantity	Part No.
Slide sheets.	4	Commercial

B. Procedure

	Detail Steps/Work Items	Key Items
1.	Remove the access panels for the main and nose landing gear.	Refer to Section 52-40.
2.	Examine the landing gear fittings. Look specially for cracks.	Use a mirror and a flashlight.
3.	Examine the fuselage structure where the landing gear attaches. Look specially for: – Delamination of the GFRP structure. – Damage to the mounting brackets.	Refer to Section 32-10.
4.	Examine the landing gear struts. Look specially for: – Bending. – Cracks.	Refer to Section 32-10.
5.	Do a test of the wheel tracking.	Refer to Section 32-10.
6.	Examine the tires. Look specially for cuts in the side walls.	Refer to Section 32-40.

	Detail Steps/Work Items	Key Items
7.	Examine the wheel rims. Look specially for deformation of the flanges.	
8.	Examine the brake discs. Look specially for damage. Turn the wheel and make sure the disc is not bent.	
9.	Examine the nose-gear assembly. Look specially for: – Deformation of the upper cross bar of the engine mount. – Nose wheel strut axle area.	
	CAUTION: IF YOU THINK THE AIRPLANE HAS DAMAGE TO AN AREA THAT TRANSMITS A LOAD, YOU MUST ASK THE AIRPLANE MANUFACTURER FOR ADVICE.	
10.	Examine the top hat profile in the bottom of the fuselage for delamination and disbonding. Look specially in the area of the bearings for the nose-gear assembly.	
11.	Remove the load from the nose-gear and examine it. Look specially for more than the usual play.	
12.	Examine the control surfaces. Look specially for: – Correct attachment of the hinges. – Correct attachment of the mass balance to the structure.	
13.	Examine the leading edge of the wing for damage.	
14.	Examine the area of the spar attachments to the wing shells. Look specially for cracks.	
15.	Examine the leading edge of the horizontal and vertical stabilizers for damage.	
16.	Examine the engine mount.	

	Detail Steps/Work Items	Key Items
17.	Examine the engine mount points on the firewall.	
18.	Examine the propeller. Look specially to see if the propeller has touched the ground.	

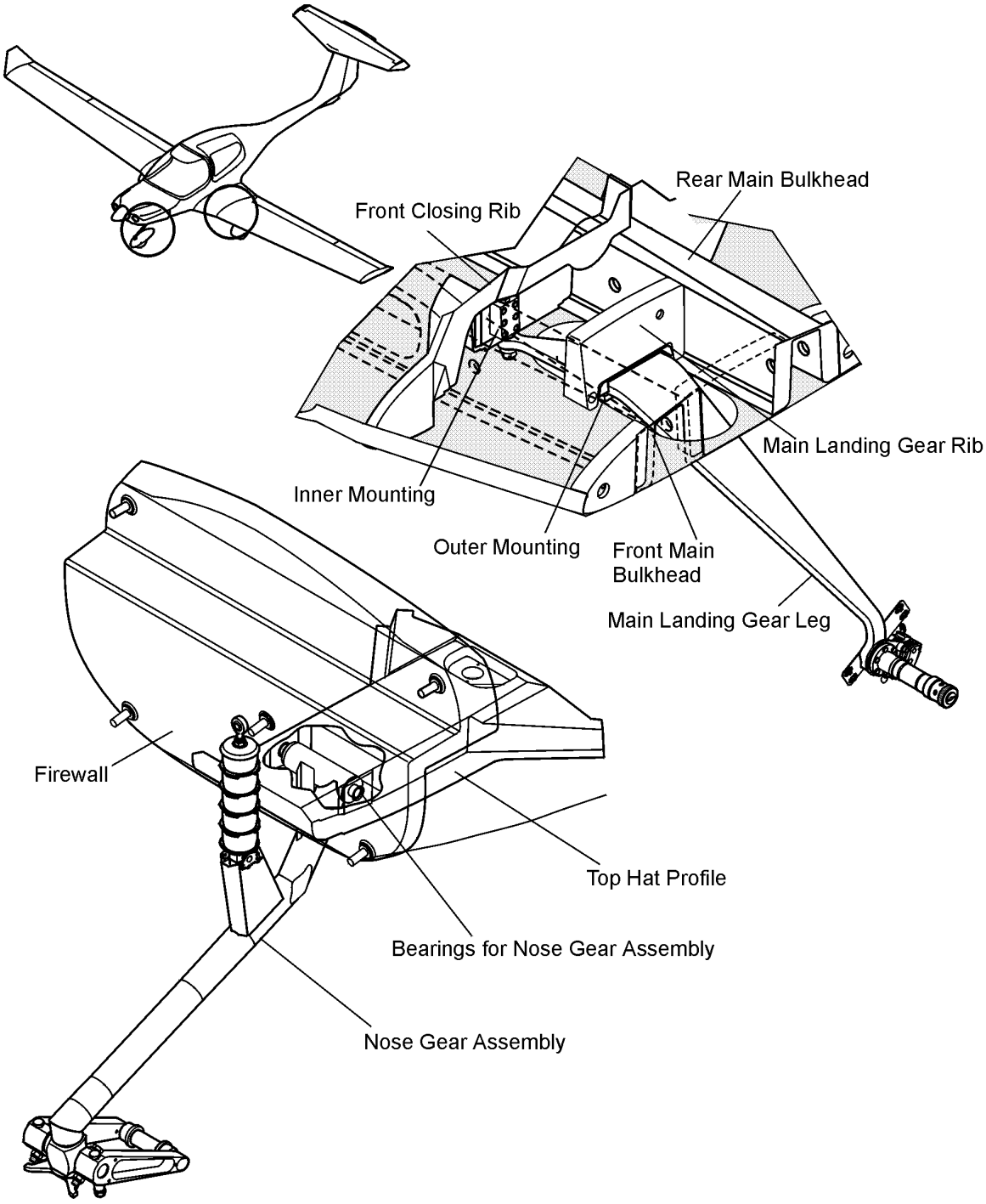


Figure 1: Hard Landing Check Areas

3. Propeller Strike

A propeller strike can be a moving propeller (engine running) which has hit a solid object. Or it can be a moving object that hits a propeller that is not moving.

If the propeller has hit a solid object while the engine was running:

– Remove the propeller.

– If a TAE 125-01 or TAE 125-02 engine is installed:

  – Perform a shock loading inspection according to the applicable TAE repair manual, latest revision.

– If a Lycoming engine is installed:

  – Remove the engine (Refer to Section 71-00 for the Lycoming IO-360-M1A engine or Section 71-02 for the Lycoming O-360-A4M engine).

  – Send the engine to an authorized repair shop for disassembly and inspection. (Refer to Lycoming Service Bulletin 533).

– Do an inspection of the engine mount (Refer to Section 71-20 for the Lycoming engine or Section 71-21 for the TAE engine).

– Do an inspection of the propeller (Refer to the propeller Owner's Manual).

If a propeller which is not moving is hit by a moving object:

– Do an inspection of the propeller (Refer to the propeller Owner's Manual).

– If the propeller must be removed to do a repair other than minor dressing of the blades, you must do the inspection procedure specified for a moving propeller strike.

– Inspect the airplane for damage.

4. Engine Fire

A. Lycoming Engine

WARNING: BEFORE YOU DO WORK ON THE AIRPLANE MAKE SURE THE FIRE HAS BEEN EXTINGUISHED. LET THE ENGINE COOL AND DISCONNECT THE BATTERY.

WARNING: FIRE CAN SERIOUSLY WEAKEN GFRP. IF YOU FIND ANY DAMAGE TO GFRP, DO NOT OPERATE THE AIRPLANE. ASK THE MANUFACTURER FOR ADVICE.

	Detail Steps/Work Items	Key Items
1.	Remove the engine cowlings.	Refer to Section 71-10 or 71-12.
2.	Disconnect the airplane battery.	Refer to Section 24-31.
3.	Examine the engine cowlings. Look specially for signs of fire damage.	
4.	Examine the electrical cables. Look specially for signs of fire damage.	Replace damaged cables.
5.	Examine the fuel lines. Look specially for signs of fire damage to the fire-protection sleeves.	Replace damaged fuel lines.
6.	Examine the engine oil lines. Look specially for signs of fire damage to the fire-protection sleeves.	Replace damaged oil lines.
7.	Examine the engine. Look specially for: – Damage to the engine air filter. – Damage to gaskets and seals. – Damage to the engine shock mounts. – Damage to the engine mount. – Damage to pipes/hoses. Replace damaged items.	

	Detail Steps/Work Items	Key Items
8.	Examine the fuselage. Look specially for: – Blisters on the paint or burn marks. – Disbonding of the fuselage skin from the firewall. If you find any damage, ask the airplane manufacturer for advice.	
	WARNING: DO NOT GET FIRE EXTINGUISHER PARTICLES ON YOU. THE CHEMICALS USED TO EXTINGUISH A FIRE CAN BE CAUSTIC/POISONOUS. WHEN YOU CLEAN THE ENGINE REFER TO THE FIRE EXTINGUISHER MANUFACTURER'S SAFETY INSTRUCTIONS. USE SAFETY MASKS AND GLOVES AS RECOMMENDED.	
9.	Clean the engine. Make sure you clean all the fire extinguisher particles from the engine.	Refer to the manufacturer of the fire extinguisher.
10.	Connect the airplane battery.	Refer to Section 24-31.
11.	Troubleshoot the engine. Find the cause of the engine fire. – Repair the defect.	Refer to the Lycoming Operator's Manual.
12.	Install the engine cowlings.	Refer to Section 71-10 or 71-12.
13.	Do an engine test.	Refer to the Airplane Flight Manual.

B. TAE 125 Diesel Engine

Refer to the engine manufacturer.

5. Lightning Strike

A lightning strike usually enters the airplane at one point and leaves the airplane at another point. These points are called "attachment points". You usually find these points at the extremities of the airplane. You will often find the most damage to the airplane occurs at the attachment points. There can be more than two attachment points.

When a lightning strike is reported you must do the inspection procedure at Sub-Paragraph D before the next flight.

A. Group 1 Damage

Group 1 damage is the direct damage caused by the lightning strike. To find this damage you must carefully examine all the external surface of the airplane. Look specially for burn marks, holes, discoloration or other physical damage. If you find this damage you must remove panels or equipment to look for damage on the inside of the airplane. Look specially around the area of the external damage.

You must also examine the airplane lightning protection system. Look specially for signs of heat damage or distortion to the conduction tubes and bonding strips. Also look for heat damage in the structures around the conduction tubes and bonding strips. Refer to Section 51-80 for data about the lightning protection system.

B. Group 2 Damage

Group 2 damage is the indirect damage caused by the lightning strike. It is mostly caused by the electromagnetic fields associated with lightning strikes. The electromagnetic fields can induce temporary voltages into the wiring system. These temporary voltages can cause damage to the electrical and electronic components of the airplane. Refer to the Wiring Diagrams for data about the electrical wiring.

Note: If you find any lightning damage you must make a record of the damage and ask Diamond Aircraft for advice before you repair or operate the airplane.

C. Equipment

Item	Quantity	Part No.
Bonding tester.	1	Commercial.

D. Lightning Strike Inspection

	Detail Steps/Work Items	Key Items
1.	Examine the surface of the complete fuselage assembly. Look specially in these areas: – Propeller and spinner. – Exhaust pipes. – Engine breather. – Canopy handles. – Antennas. – Static discharge wicks. – Vertical fin tip. – Rudder. – Lower fin.	If you find any damage you must examine the airplane internally, specially in the area of the external damage. Make a record of the damage you find and ask Diamond Aircraft for advice before you repair or operate the airplane.

	Detail Steps/Work Items	Key Items
2.	Examine the surface of the left wing for lightning damage. Look specially in these areas: – Pitot head. – Static discharge wicks. – Wing tip. – Strobe lights. – Wing tip light assembly. – Wing trailing edge. – Aileron trailing edge. – Flap trailing edge. – Aileron horn. – Flap horn.	If you find any damage you must examine the airplane internally, specially in the area of the external damage. Make a record of the damage you find and ask Diamond Aircraft for advice before you repair or operate the airplane.

	Detail Steps/Work Items	Key Items
3.	Examine the surface of the right wing for lightning damage. Look specially in these areas: – Wing tip. – Static discharge wicks. – Strobe lights. – Wing tip light assembly. – Wing trailing edge. – Aileron trailing edge. – Flap trailing edge. – Aileron horn. – Flap horn.	If you find any damage you must examine the airplane internally, specially in the area of the external damage. Make a record of the damage you find and ask Diamond Aircraft for advice before you repair or operate the airplane.
4.	Examine the surface of the horizontal stabilizer for lightning damage. Look specially in these areas: – Horizontal stabilizer tip. – Static discharge wicks. – Trailing edge. – Elevator trailing edge. – Trim tab.	If you find any damage you must examine the airplane internally, specially in the area of the external damage. Make a record of the damage you find and ask Diamond Aircraft for advice before you repair or operate the airplane.
5.	Examine the main landing gear. Look specially in these areas: – Wheel fairings. – Main gear leg attachment points.	Refer to Section 32-10.
6.	Examine the nose landing gear. Look specially in these areas: – Wheel fairing. – Nose gear attachment points.	Refer to Section 32-20.

	Detail Steps/Work Items	Key Items
7.	Operate the flight controls through their complete range of movement. Look specially for: – Stiff or unusual feel during movement. – Restriction of movement. – Noisy operation.	Refer Section 27-00.
8.	Examine the metal conduction tubes and bonding strips in the fuselage and in the wings. Look specially for: – Heat damage or discoloration. – Fusion of bonding joints. – Burn or scorch marks to the structure around the conduction tubes. Use the bonding tester when you are not able to see the whole length of a tube or bonding strip.	Make a record of any damage you find and ask Diamond Aircraft for advice before you repair or operate the airplane Refer to Section 51-80. Follow the instructions of the tester manufacturer. The resistance must be in accordance with Section 51-80.
9.	Do a test of these lighting systems: – External lights: – Navigation lights. – Strobe lights. – Landing light. – Taxi light. – Internal lights: – Instrument panel lights. – Instrument flood lights. – Dome lights.	Refer to Section 33-40. Refer to Section 33-10.

	Detail Steps/Work Items	Key Items
10.	Do a test of the Pitot heat system.	Refer to Section 34-10.
11.	Do a test of the Garmin G1000 system (if installed): – Check all functions on the G1000 system.	Refer to the Garmin G1000 Line Maintenance Manual.
12.	Do a test of these communications systems: – Com 1 VHF. – Com 2 VHF if installed. – Intercom.	 Refer to Section 23-10. Refer to Section 23-50.
13.	Do a test of these attitude and direction systems: – Magnetic compass. – Gyro-compass system if installed. – Electric horizon/attitude gyro if installed. – Turn & slip indicator.	Refer to Section 34-20.
14.	Do a test of these dependent position determining systems: – Global positioning system (GPS) if installed. – VOR if installed. – Distance measuring equipment (DME) if installed. – Transponder and altitude encoder if installed. – Marker beacon receiver if installed. – ADF, if installed.	Refer to Section 34-50.

	Detail Steps/Work Items	Key Items
15.	Operate the engine power controls through their range of movement. Look specially for: – Stiff or unusual feel during movement. – Restriction of movement. – Noisy operation.	Refer to Section 76-00 (Lycoming IO-360-M1A version) or 76-01 (TAE version) or 76-02 (Lycoming O-360-A4M version).
16.	Do a visual check of engine bondings and wirings.	TAE version only.
17.	Operate the cockpit heating controls through their range of movement. Look specially for: – Stiff or unusual feel during movement. – Restriction of movement. – Noisy operation.	Refer to Section 21-40.
18.	Operate the parking brake control through its range of movement. Look specially for: – Stiff or unusual feel during movement. – Restriction of movement. – Noisy operation.	Refer to Section 32-40.
19.	Do an engine run-up. Look specially for abnormal operation of the following systems: – Engine indicating systems. – DC generation.	Refer to Section 71-00 (Lycoming IO-360-M1A version) or 71-01 (TAE version) or 71-02 (Lycoming O-360-A4M version). Refer to Section 31-00. Refer to Section 24-30 (Lycoming version) or 24-33 (TAE version).
20.	Do an ECU test.	TAE version only. Refer to Section 05-20, Paragraph 7.B.
21.	Do an ECU swap test.	TAE version only. Refer to Section 05-20, Paragraph 7.B.
22.	Contact the engine manufacturer.	TAE version only.

	Detail Steps/Work Items	Key Items
23.	Do a compass check swing.	

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CHAPTER 06

DIMENSIONS AND AREAS

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CHAPTER 06

DIMENSIONS AND AREAS

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CHAPTER 06
DIMENSIONS AND AREAS

1. General

The DA 40 uses the Système international d'unités (SI) for dimensions and areas. Imperial dimensions are also given in brackets. For example: Wing span 11.94 m (39.2 ft).

Conversions between SI units and imperial units are given in Chapter 02.

2. Dimensions

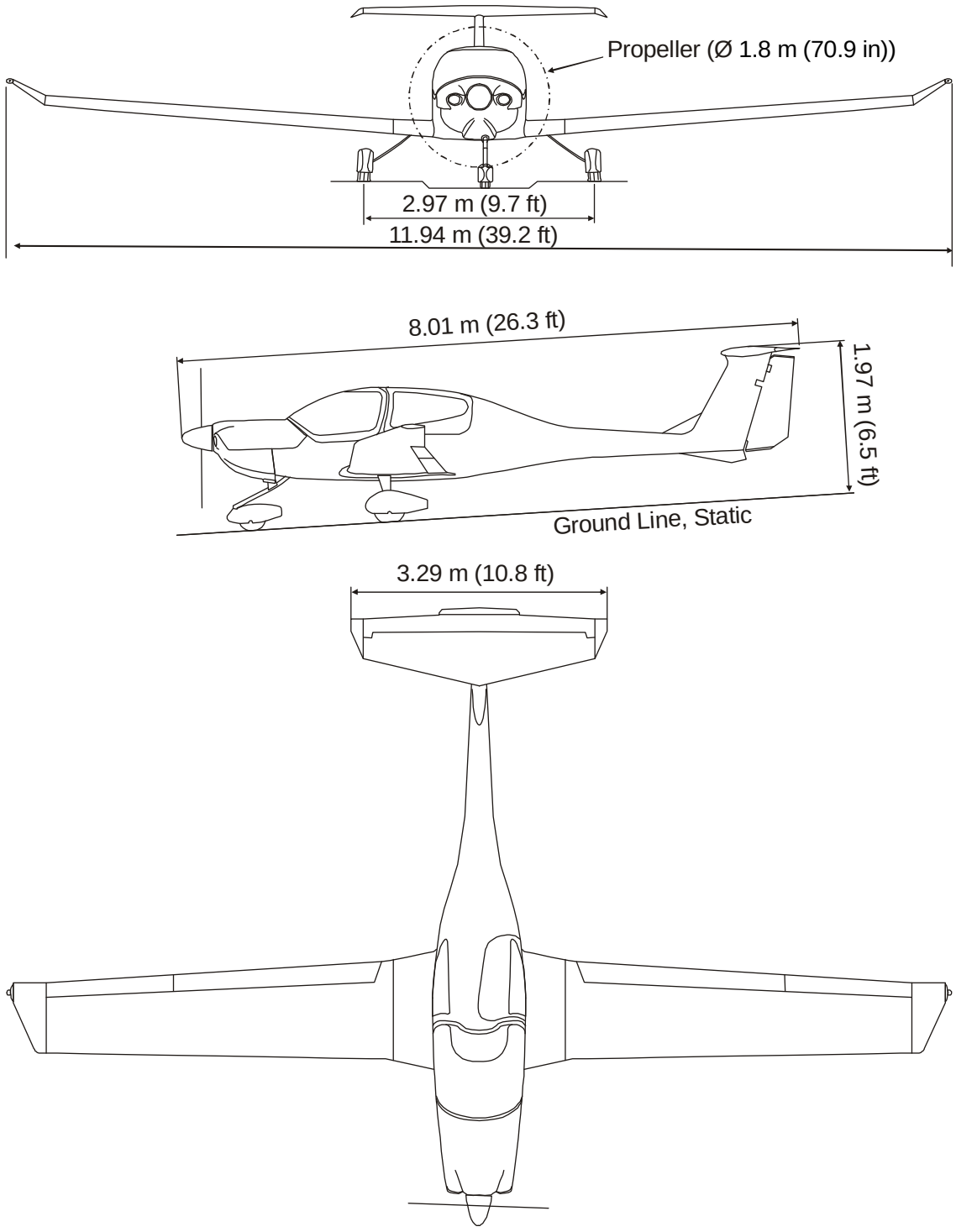


Figure 1: DA 40 with Lycoming Engine, Overall Dimensions (Approximate Values)

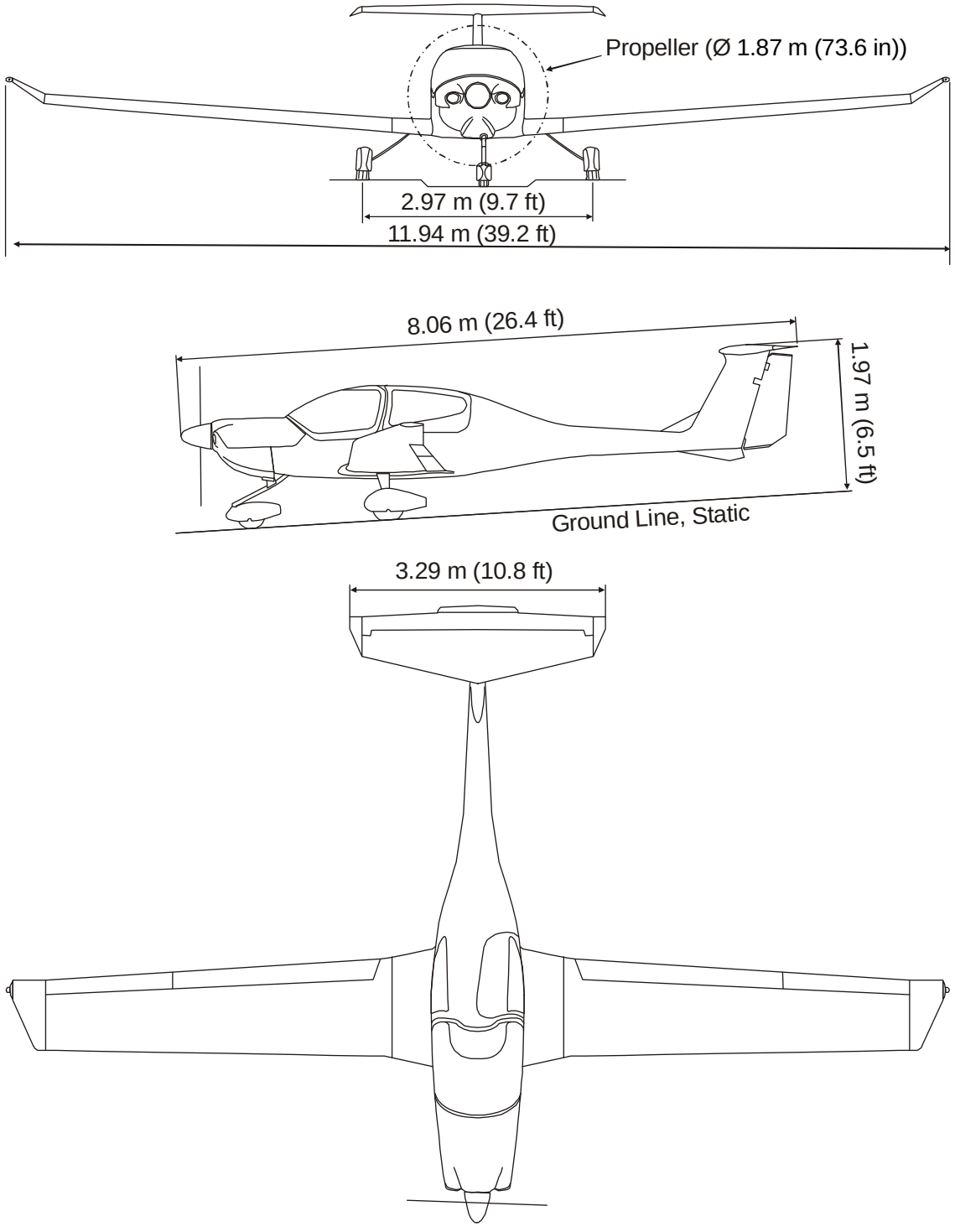


Figure 2: DA 40 D with TAE Engine, Overall Dimensions (Approximate Values)

DA 40		
Overall Dimensions		
Wing span		11.94 m (39.2 ft)
Length	Lycoming version (DA 40, DA 40 F)	8.01 m (26.3 ft)
	TAE version (DA 40 D)	8.06 m (26.4 ft)
Height (Nominal)		1.97 m (6.5 ft)
Wing		
Airfoil		Wortmann FX 63-137/20-W4
Wing area		13.54 m² (145.7 ft²)
Dihedral (nominal)		5°
Angle of incidence (nominal)		3º
Horizontal Tail Surfaces		
Span		3.29 m (10.8 ft)
Angle of incidence		-3.0º
Landing Gear (Typical Static, Normal Load)		
Wheel track		2.97 m (9.74 ft)
Wheel base		1.68 m (5.51 ft)
Nose wheel		5.00-5; 6 PR, 120 mph
Main wheel		(a) 6.00-6; 6PR, 120 mph In combination with any MLG strut (b) 6.00-6; 8PR; 120 mph In combination with any MLG strut (c) 15x6.0-6; 6PR; 160 mph (OÄM 40-124) only in combination with the "thin"/"18 mm" (MÄM 40-123) or the "tall" (OÄM 40-283) MLG strut

3. Adjustment Values

The measurements of the DA 40 are recorded on an Adjustment Report at the factory when the airplane is built. See Figures 6 through 8 (depends on DA 40 version) and 9. This Report becomes part of the airplane records.

When you measure the dimensions, use the Adjustment Report as a reference for deviations.

Control Surface Deflections and Adjustment Reports:

DA 40 with Lycoming IO-360-M1A		
	Control Surface Deflections	**Adjustment Report**
Standard Version	see Figure 3	see Figure 6
if MÄM 40-113 (LRT Rudder for Standard Version) is installed	see Figure 4	see Figure 7
if OÄM 40-071 (Long Range Tank) is installed	see Figure 4	see Figure 7

DA 40 D with TAE 125		
	Control Surface Deflections	**Adjustment Report**
Standard Version (OÄM 40-100)	see Figure 3	see Figure 6
if MÄM 40-113 (LRT Rudder for Standard Version) is installed	see Figure 4	see Figure 7
if OÄM 40-130 (Long Range Tank) is installed	see Figure 4	see Figure 7

DA 40 F with Lycoming O-360-A4M		
	Control Surface Deflections	**Adjustment Report**
Standard Version	see Figure 5	see Figure 8

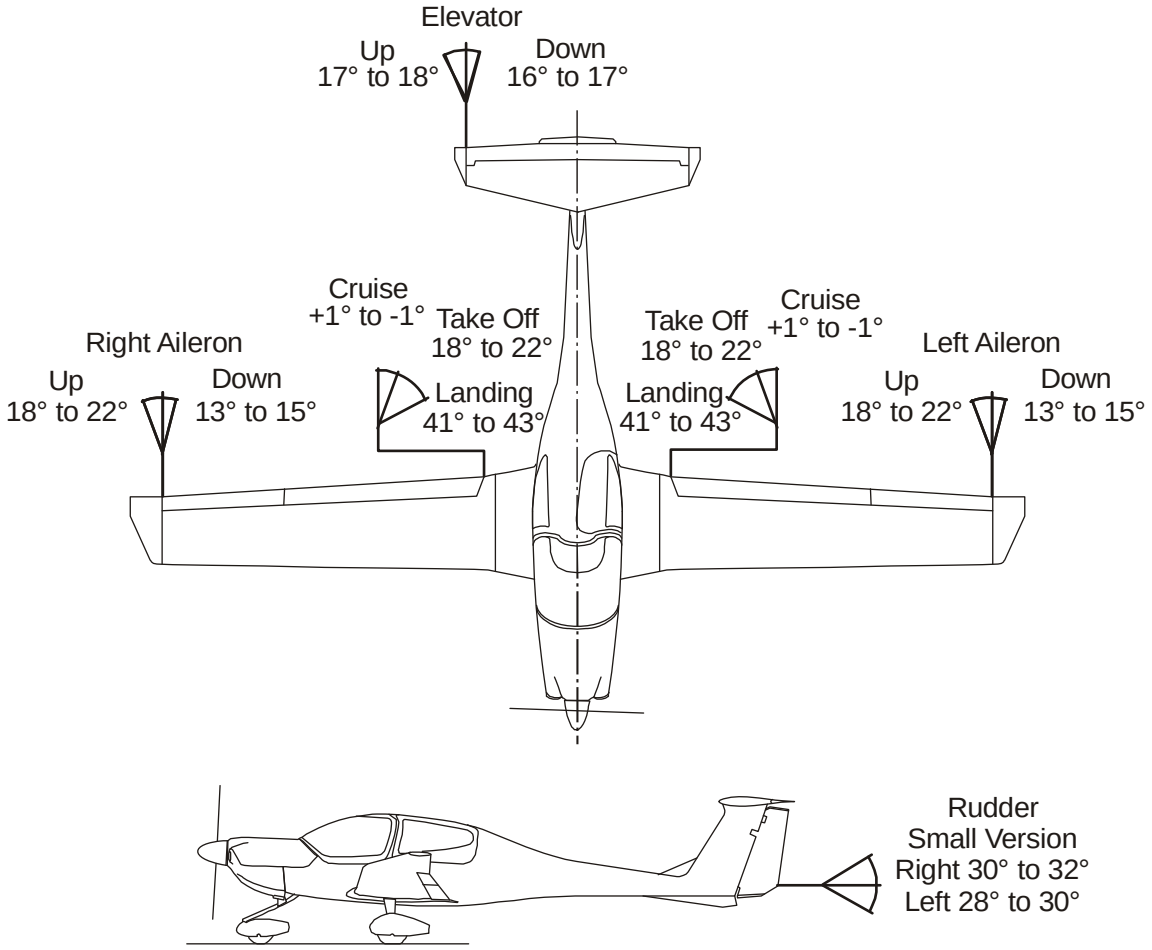


Figure 3: Control Surface Deflections (Valid for DA 40 and DA 40 D with Small Rudder; Rudder Deflections: See Notes Below)

Note: The DA 40 and the DA 40 D may be equipped with a ‘small’ or a ‘large’ rudder. The ‘small’ version has a depth of approx. 375 mm (measured perpendicular to the hinge line on the upper hinge), the ‘large’ version of approx. 477 mm. For the ‘large’ version OÄM 40-071 or MÄM 40-113 must be installed. Make sure to use the applicable deflection values.

Note: You may use either the Control Surfaces Adjustment Reports shown in Figure 6 or 7, or the one that was used when the airplane was delivered (stored in the maintenance log of your airplane).

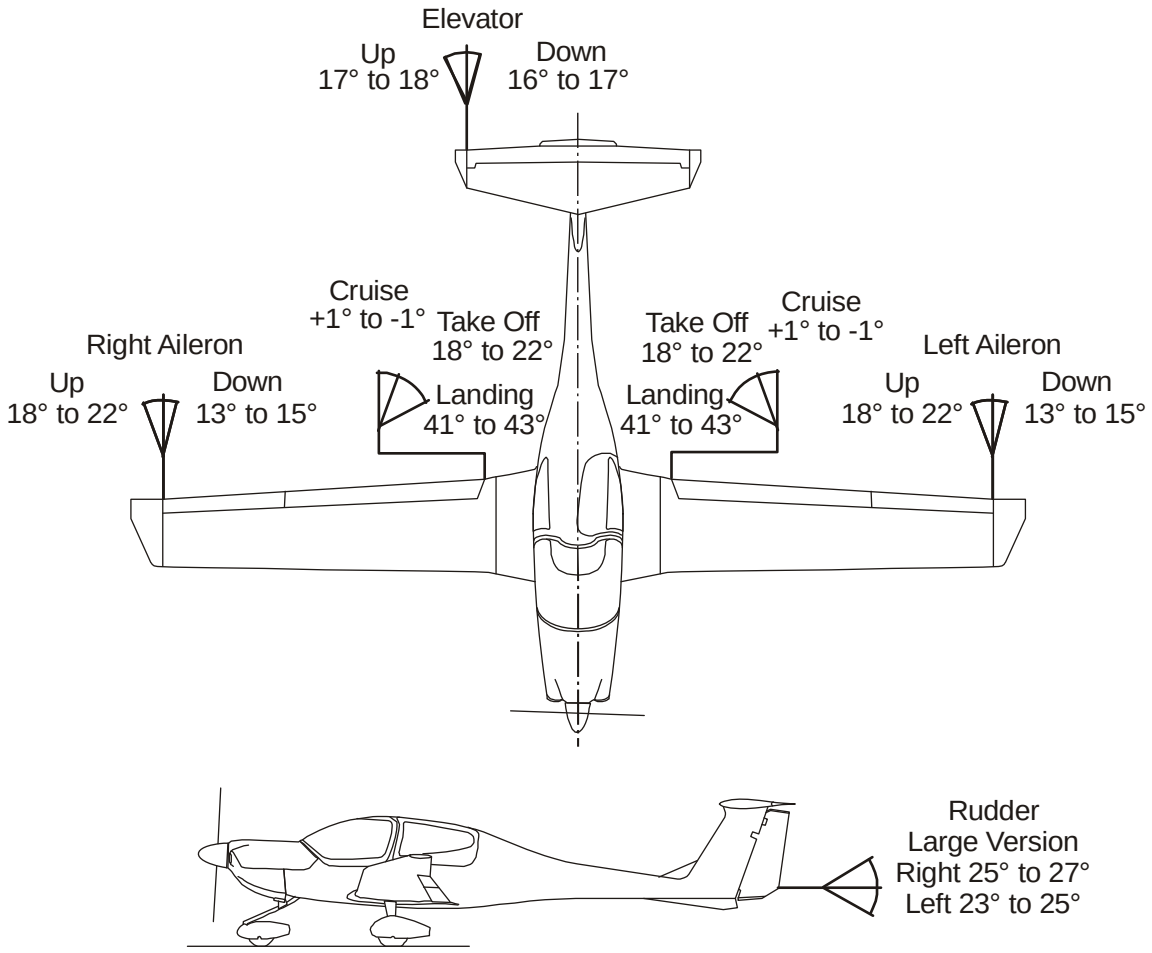


Figure 4: Control Surface Deflections (Valid for DA 40 and DA 40 D with Large Rudder; Rudder Deflections: See Notes Above)

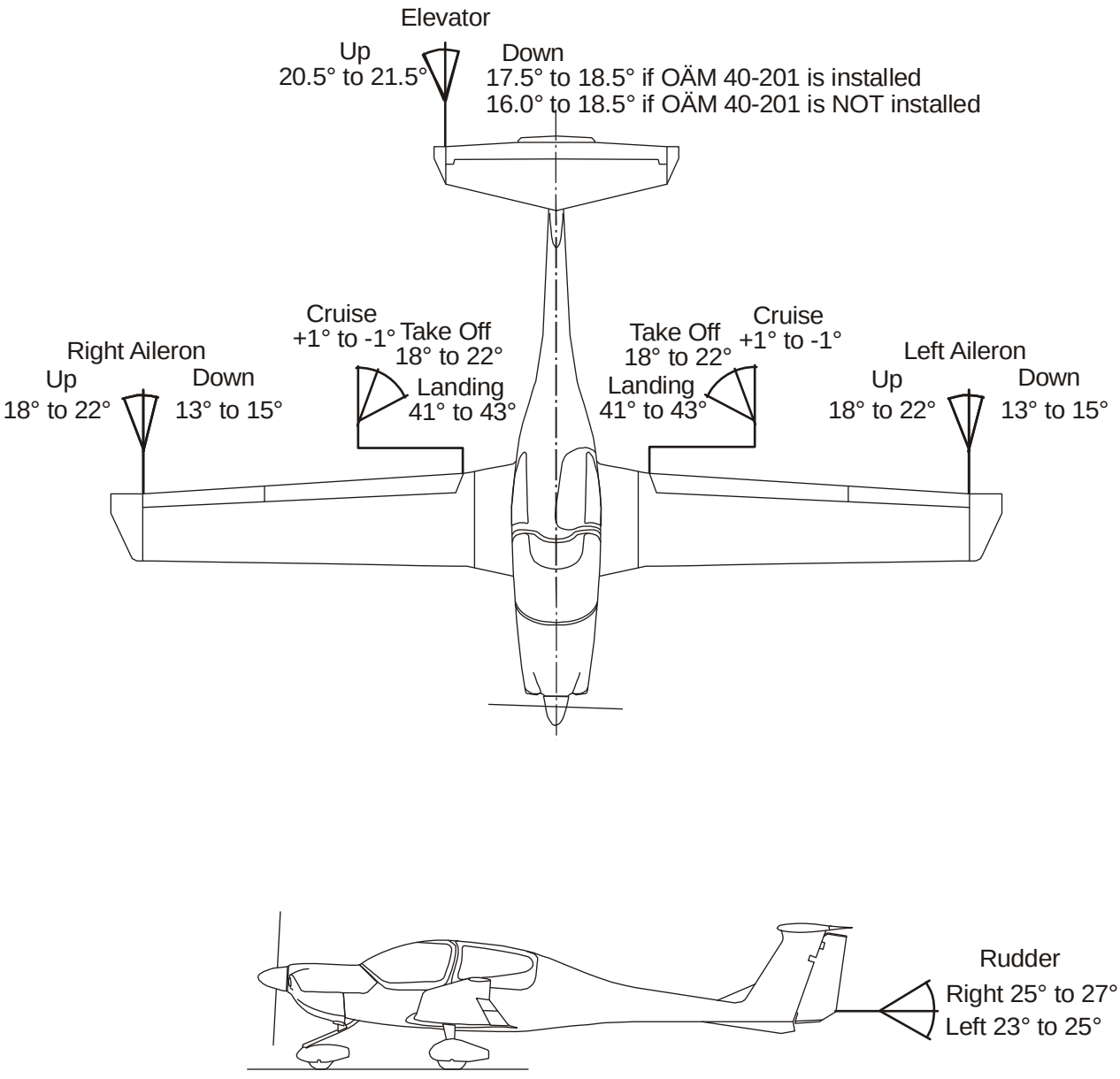


Figure 5: Control Surface Deflections (Valid for DA 40 F)

Control Surfaces Adjustment Report
DA 40, DA 40 D with small rudder

Date | Prepared by | Signature | Serial Number | Registration

Flap Position		Left Flap	Right Flap	Left Aileron			Right Aileron			Rudder		Elevator	
				Up	Neutral	Down	Up	Neutral	Down	Left	Right	Up	Down
	Radius (mm)	233	233	200	200	200	200	200	200	375	375	240	240
Cruise (UP)	Nominal (mm)	0 ±4	0 ±4	69 ±7	0 ±3.5	45 +7 / -0	69 ±7	0 ±3.5	45 +7 / -0	188 ±6	200 ±6	75 +0/-4	71 +0/-4
	Actual (mm)												
	Nominal (°)	0° ±1°	0° ±1°	20° ±2°	0° ±1°	13° +2°/-0°	20° ±2°	0° ±1°	13° +2°/-0°	29° ±1°	31° ±1°	18° +0°/-1°	17° +0°/-1°
	Actual (°)												
Take-Off (T/O)	Nominal (mm)	81 ±8	81 ±8										
	Actual (mm)												
	Nominal (°)	+20° ±2°	+20° ±2°										
	Actual (°)												
Landing (LDG)	Nominal (mm)	167 ±4	167 ±4										
	Actual (mm)												
	Nominal (°)	+42° ±1°	+42° ±1°										
	Actual (°)												
Pre-Load	Nominal	3 - 5 kp 6.6 - 11 lbf	3 - 5 kp 6.6 - 11 lbf										
	Actual												

Elevator 10° Up				Elevator Neutral				Elevator 10° Down			
Position	Nose Down	Neutral	Nose Up	Position	Nose Down	Neutral	Nose Up	Position	Nose Down	Neutral	Nose Up
Nominal (mm)	74 ±6.0	44 ±3.0	5 ±6.5	Nominal (mm)	63.5 ±3.5	33 ±3.5	20 ±3.5	Nominal (mm)	52 ±6.5	21.5 ±3.5	38 ±6.5
Actual (mm)				Actual (mm)				Actual (mm)			
Nominal (°)	-46° ±4°	-27° ±2°	+3° ±4°	Nominal (°)	-39° ±2°	-20° ±2°	+12° ±2°	Nominal (°)	-32° ±4°	-13° ±2°	+23° ±4°
Actual (°)				Actual (°)				Actual (°)			

Figure 6: Control Surface Adjustment Report
(Valid for DA 40 and DA 40 D With Small Rudder)

Diamond AIRCRAFT

Control Surfaces Adjustment Report
DA 40, DA 40 D with large rudder
(OÄM 40-071 or MÄM 40-113 carried out)

Registration

Date | Prepared by | Signature | Serial Number

Flap Position		Left Flap	Right Flap	Left Aileron			Right Aileron			Rudder		Elevator	
				Up	Neutral	Down	Up	Neutral	Down	Left	Right	Up	Down
	Radius (mm)	233	233	200	200	200	200	200	200	477	477	240	240
Cruise (UP)	Nominal (mm)	0 ±4	0 ±4	69 ±7	0 ±3.5	45 +7 / -0	69 ±7	0 ±3.5	45 +7 / -0	198 ±8	215 ±8	75 +0/-4	71 +0/-4
	Actual (mm)												
	Nominal (°)	0° ±1°	0° ±1°	20° ±2°	0° ±1°	13° +2°/-0°	20° ±2°	0° ±1°	13° +2°/-0°	24° ±1°	26° ±1°	18° +0°/-1°	17° +0°/-1°
	Actual (°)												
Take-Off (T/O)	Nominal (mm)	81 ±8	81 ±8										
	Actual (mm)												
	Nominal (°)	+20° ±2°	+20° ±2°										
	Actual (°)												
Landing (LDG)	Nominal (mm)	167 ±4	167 ±4										
	Actual (mm)												
	Nominal (°)	+42° ±1°	+42° ±1°										
	Actual (°)												
Pre-Load	Nominal	3 - 5 kp 6.6 - 11 lbf	3 - 5 kp 6.6 - 11 lbf										
	Actual												

Elevator 10° Up					Elevator Neutral				Elevator 10° Down			
Position	Nose Down	Neutral	Nose Up	Position	Nose Down	Neutral	Nose Up	Position	Nose Down	Neutral	Nose Up
Nominal (mm)	74 ±6.0	44 ±3.0	5 ±6.5	Nominal (mm)	63.5 ±3.5	33 ±3.5	20 ±3.5	Nominal (mm)	52 ±6.5	21.5 ±3.5	38 ±6.5
Actual (mm)				Actual (mm)				Actual (mm)			
Nominal (°)	-46° ±4°	-27° ±2°	+3° ±4°	Nominal (°)	-39° ±2°	-20° ±2°	+12° ±2°	Nominal (°)	-32° ±4°	-13° ±2°	+23° ±4°
Actual (°)				Actual (°)				Actual (°)			

Figure 7: Control Surface Adjustment Report
(Valid for DA 40 and DA 40 D With Large Rudder)

Control Surfaces Adjustment Report
DA 40 F

Registration

Date | Prepared by | Signature | Serial Number

Flap Position		Left Flap	Right Flap	Left Aileron			Right Aileron			Rudder		Elevator	
				Up	Neutral	Down	Up	Neutral	Down	Left	Right	Up	Down [1]
	Radius (mm)	233	233	200	200	200	200	200	200	477	477	240	240
Cruise (UP)	Nominal (mm)	0 ±4	0 ±4	69 ±7	0 ±3.5	45 +7 / -0	69 ±7	0 ±3.5	45 +7 / -0	198 ±8	215 ±8	87 ±2	75 ±2
	Actual (mm)												
	Nominal (°)	0° ±1°	0° ±1°	20° ±2°	0° ±1°	13° +2°/-0°	20° ±2°	0° ±1°	13° +2°/-0°	24° ±1°	26° ±1°	21° ±0.5°	18° ±0.5°
	Actual (°)												
Take-Off (T/O)	Nominal (mm)	81 ±8	81 ±8										
	Actual (mm)												
	Nominal (°)	+20° ±2°	+20° ±2°										
	Actual (°)												
Landing (LDG)	Nominal (mm)	167 ±4	167 ±4										
	Actual (mm)												
	Nominal (°)	+42° ±1°	+42° ±1°										
	Actual (°)												
Pre-Load	Nominal	3 - 5 kp 6.6 - 11 lbf	3 - 5 kp 6.6 - 11 lbf										
	Actual												

Position	Elevator 10° Up			Elevator Neutral			Elevator 10° Down		
	Nose Down	Neutral	Nose Up	Nose Down	Neutral	Nose Up	Nose Down	Neutral	Nose Up
Nominal (mm)	74 ±6.0	44 ±3.0	5 ±6.5	63 ±3.0	33 ±3.5	20 ±3.5	52 ±6.5	22 ±3.5	38 ±6.5
Actual (mm)									
Nominal (°)	-46° ±4°	-27° ±2°	+3° ±4°	-39° ±2°	-20° ±2°	+12° ±2°	-32° ±4°	-13° ±2°	+23° ±4°
Actual (°)									

1) Elevator Down limits for S/N's not approved for spinning (OÄM 40-201 NOT carried out):
18° +0.5° / -2° or 75 mm +2 mm / -8 mm

Figure 8: Control Surface Adjustment Report (Valid for DA 40 F)

Diamond AIRCRAFT	**Adjustment Report DA 40**	Registration
Date	Prepared by Signature	Serial Number

	Wings				Horizontal Stabilizer	Main Landing Gear (at Empty Weight, on Glide Sheets)					Rudder Controls
	Leading Edge Sweep Back		Dihedral (Wing Supported)		Angle of Incidence	Camber		Toe			Cable Tension
	Left	Right	Left	Right		Left	Right	Left	Right	Differ-ence	
Nominal	1.0° ± 0.2°	1.0° ± 0.2°	5.0 ° ± 0.25°	5.0° ± 0.25°	3.0° + 0.0° / - 0.2°	1° to 4°	1° to 4°	0° to ±1°	0° to ±1°	max. 1°	15 daN (33.7 lb) ± 2 daN (± 4.5 lb)
Actual											

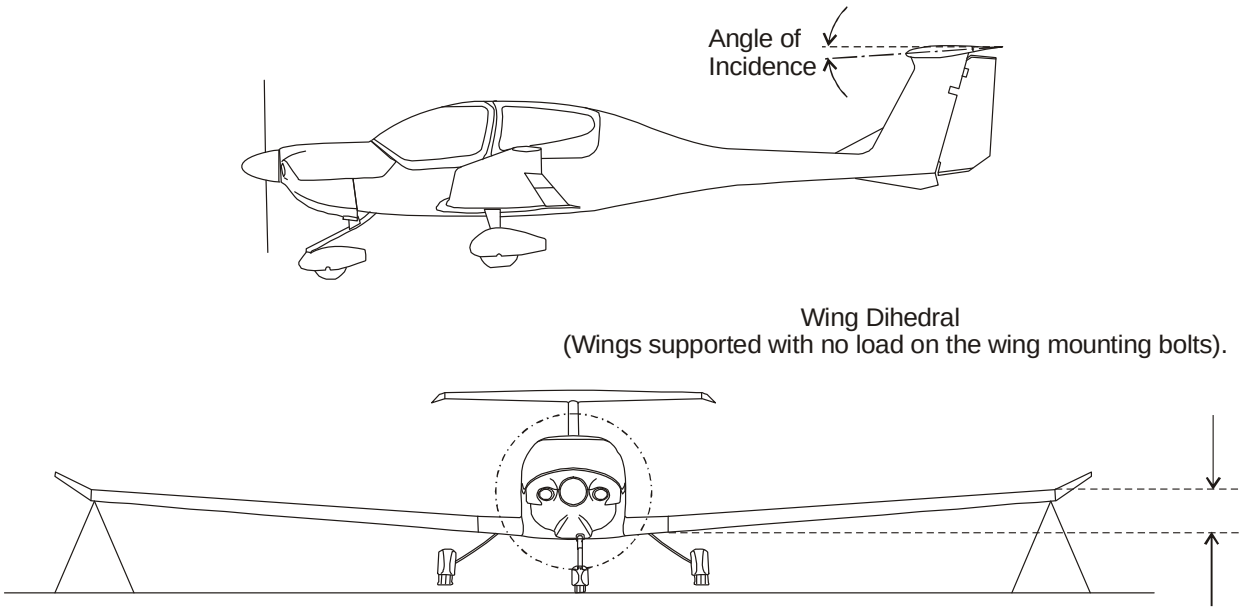


Figure 9: Adjustment Report, General Items
(Valid for DA 40, DA 40 D and DA 40 F)

4. Weight and Static Moments of Control Surfaces

WARNING: IF YOU REPAINT (OR DO REPAIRS TO) THE CONTROL SURFACES, YOU MUST MAKE SURE THAT THE WEIGHTS AND STATIC MOMENTS OF THE CONTROL SURFACES ARE IN THE LIMITS IN THE CONTROL SURFACE BALANCING REPORT. THIS WILL PREVENT CONTROL SURFACE FLUTTER.

To measure the static moments you must remove the control surface from the airplane. Refer to Section 51-60 for the measuring procedures.

If the values are not within the limits in the Control Surface Balancing Report, you must ask the manufacturer for advice before you adjust the balancing weight.

CHAPTER 07

LIFTING AND SHORING

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LIFTING AND SHORING

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CHAPTER 07
LIFTING AND SHORING

1. General

The DA 40 has no hoisting points. Use straps to lift the airplane.

You can use your hands to lift the wings and the horizontal stabilizer.

Section 07-10 tells you how to lift the airplane with jacks.

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Section 07-10
Jacking

1. General

The DA 40 has three jacking points. There are main jacking points under each stub-wing. The tie-down hole in the lower fin makes the tail jacking point. For maintenance lift the fuselage with the 3 hydraulic jacks. Use a trestle with a special former to hold the front of the fuselage. Use standard trestles under the wings at the position where the tips connect to the wing. Refer to Figure 1.

WARNING: IF THE WIND SPEED IS MORE THAN 10 KM/H (6 KNOTS), DO NOT LIFT THE AIRPLANE ON JACKS IN THE OPEN.

2. Lifting the Airplane on Jacks

A. Equipment

Item	Quantity	Part Number
Airplane jacks (600 kg / 1320 lb minimum lifting capacity).	3	Commercial.
Nose trestle.	1	Commercial.
Wing trestles.	2	Commercial.

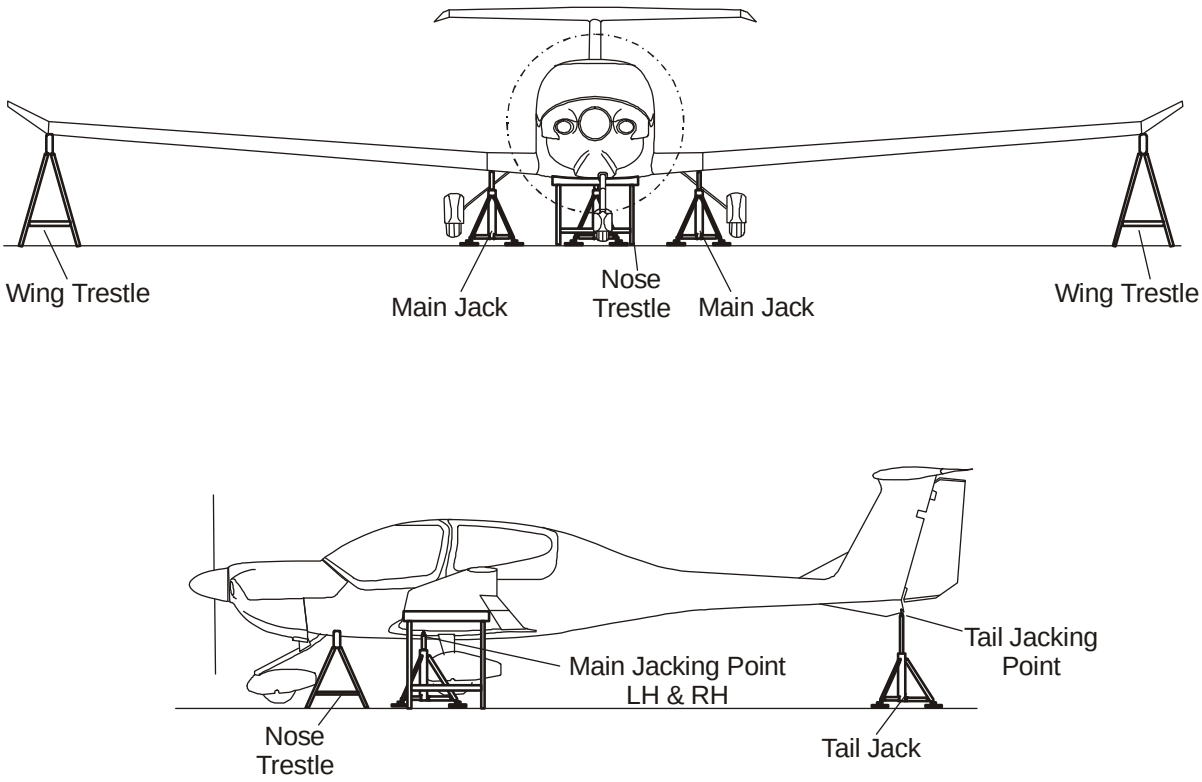


Figure 1: Lifting the Airplane on Jacks

B. Lifting the Airplane

	Detail Steps/Work Items	Key Items/References
	CAUTION: IF THE AIRPLANE IS IN THE OPEN THEN ALIGN IT INTO THE WIND. MAXIMUM WIND SPEED: 10 KM/H (6 KTS).	
(1)	Apply the parking brake. Put chocks under the main wheels.	
(2)	Put the 2 jacks in position under the main jacking points. Extend the jacks to engage with the jacking plates. Ensure proper alignment.	Refer to Figure 1. The jacking plates are bonded to the bottom surface of the stub wing, forward of the front main spar.
	CAUTION: IMPROPER ALIGNMENT OF JACKS WITH THE JACKING POINTS CAN CAUSE DAMAGE TO JACKING PLATES.	
(3)	Put the a jack in position under the tail jacking point. Ensure proper alignment. Extend the jack to engage with the lower fin skid plate.	
(4)	Extend the jacks until the wheels are clear of the ground.	Operate the jacks together to keep the airplane level.
(5)	If necessary, level the airplane.	Refer to Section 08-20.
	CAUTION: DO NOT PUT TRESTLES UNDER THE MIDDLE OF THE WING. YOU MUST ONLY PUT TRESTLES UNDER THE OUTBOARD RIB OF THE WINGS.	
(6)	Put the wing trestles in position under each wing at the tip.	Refer to Figure 1.
(7)	Put the nose trestle in position under the front fuselage.	Just aft of the access panel for the nose gear leg.

C. Lowering the Airplane

	Detail Steps/Work Items	Key Items/References
	WARNING: MAKE SURE THAT THE AREA UNDER THE AIRPLANE IS CLEAR BEFORE YOU LOWER THE AIRPLANE.	
(1)	Remove the nose trestle from under the fuselage.	
(2)	Remove the wing trestles from under the wings.	
(3)	Retract the jacks until the wheels are on the ground.	Retract the three jacks equally to keep the airplane level.
(4)	Apply the parking brake. Put chocks under the wheels.	
(5)	Retract the 3 jacks fully. Move the jacks clear of the airplane.	

CHAPTER 08

WEIGHING AND LEVELLING

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CHAPTER 08
WEIGHING AND LEVELLING

1. General

This Chapter tells you how to weigh the airplane. It also tells you how to level the airplane. Use the procedures in Section 08-10 to weigh the airplane and to calculate the airplane moment. Use the procedures in Section 08-20 to level the airplane.

Note: In this Airplane Maintenance Manual masses are referred to as weights. The authors accept that this is technically incorrect but have used the expression for simplicity and convenience.

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Section 08-10
Weighing

1. General

Only operate the airplane within the permitted range of weight and center of gravity limits. This will give good flight performance and good handling qualities. It is also necessary for safety.

If you make any changes to the airplane that will alter the weight (or the center of gravity), then you must calculate the new weight of the airplane. You must also calculate its center of gravity.

Only an approved person can weigh the airplane. The national airworthiness authority of the country where the airplane is registered gives approval for persons to weigh the airplane. It also gives the time limits.

Use the Weighing Report when you do the weight and balance calculations (Refer to Figure 4 or Figure 6).

The reference plane for the DA 40 is a transverse, vertical plane in front of the airplane. It is at right angles to the horizontal reference line. The reference plane lies 2194 mm (86.38 in) in front of the stub-wing leading edge at the wing joint on each side.

If MÄM-40-103 is carried out, the fin may house heavy metal to balance the airplane to the correct CG.

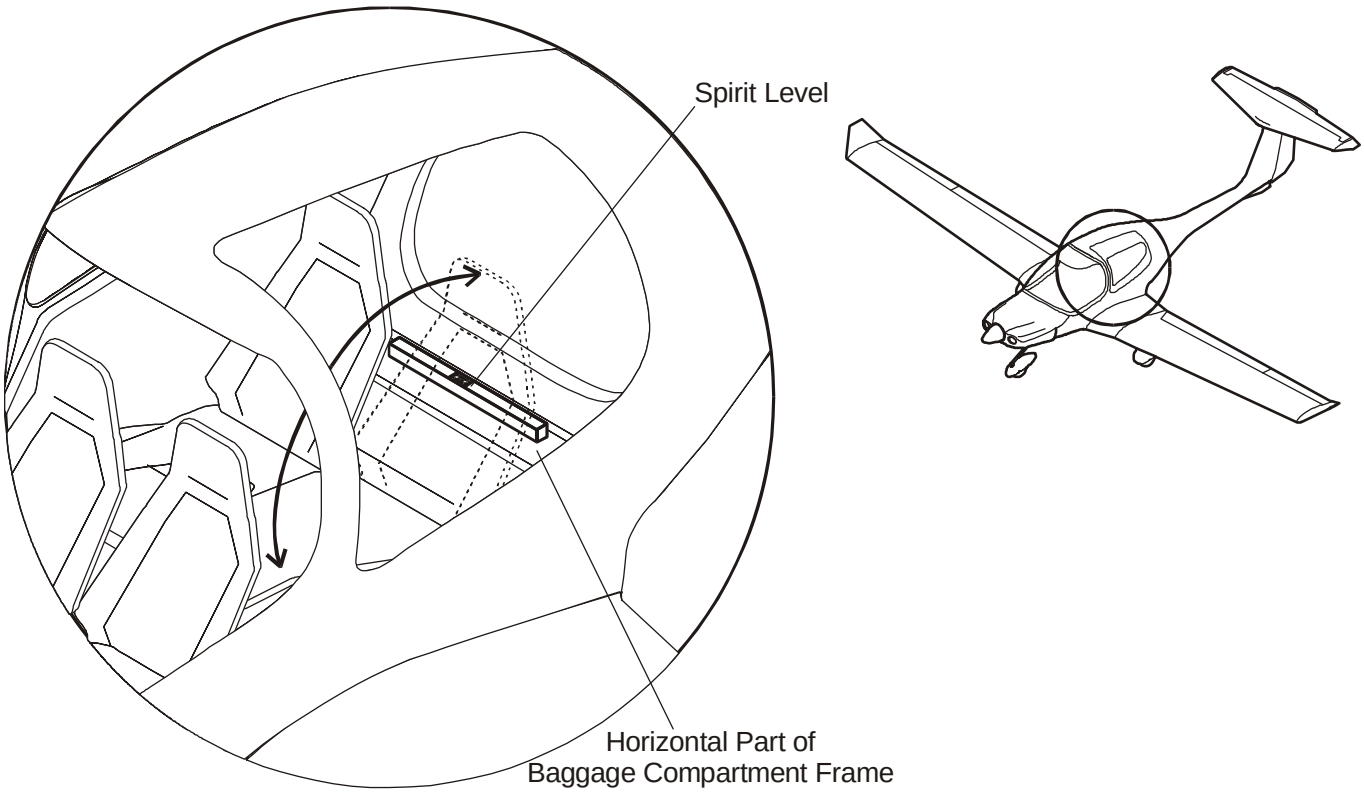


Figure 1: Level the Airplane Laterally for Weighing

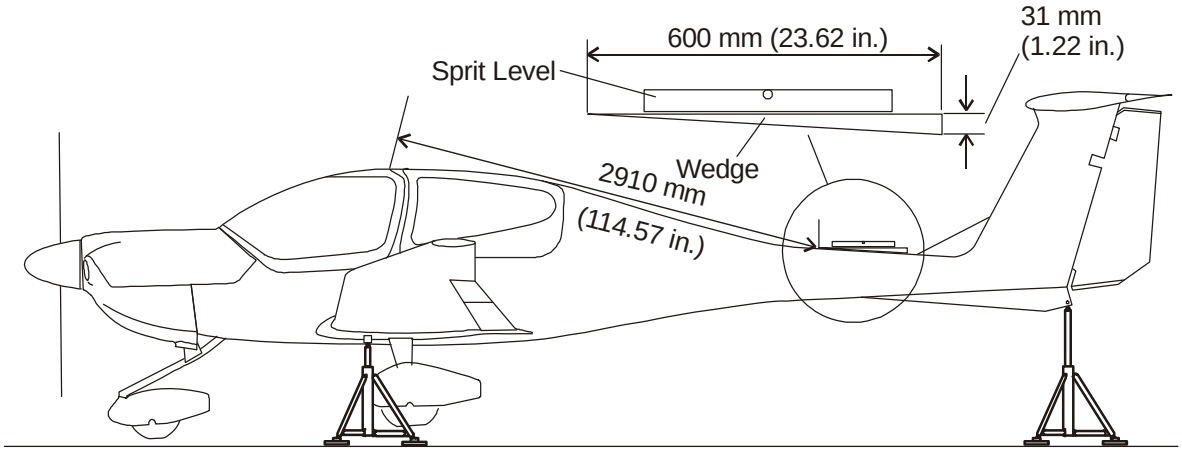


Figure 2: Level the Airplane Longitudinally for Weighing

2. Weighing with Electronic Weighing Units at the Jacking Points

If you can use electronic weighing units to weigh the airplane, you can use the jacks to make the airplane level. You must obey the manufacturers' instructions on the weighing units.

A. Equipment

Items	Quantity	Part Number
Airplane jacks (600 kg / 1320 lb minimum lifting capacity).	3	Commercial.
Electronic weighing units.	3	Commercial.
Spirit level.	1	Commercial.
Wedge, slope 600:31.	1	Local Manufacture.

Before you weigh the airplane do these items:

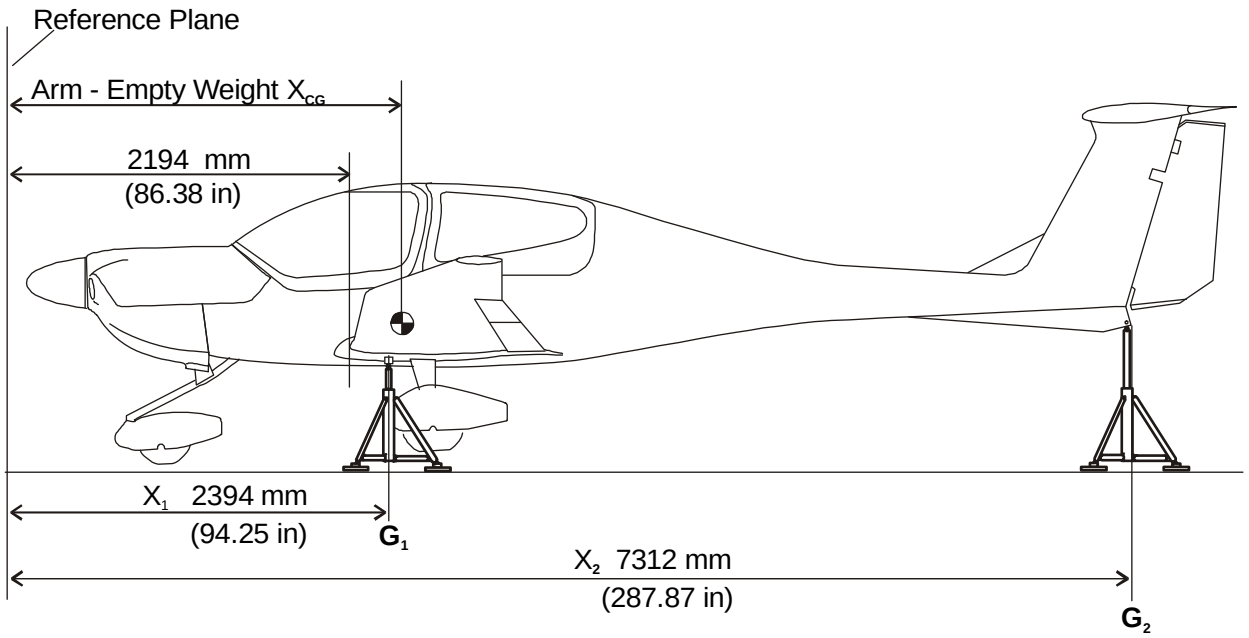
– Make sure the airplane has all its equipment. The equipment must be in the location shown in the Equipment Inventory. The Equipment Inventory is included in Section 6.5 of the Airplane Flight Manual.

– Defuel the airplane to the unusable fuel level. The unusable fuel level is 0.5 US gal (approx. 1.9 liter) per wing tank (Lycoming version) or 1 US gal (approx. 3.8 liter) per wing tank (TAE version). Refer to Section 12-10.

– Add engine oil and operating fluids up to the maximum level. Refer to Section 12-10.

– Clean the airplane and dry it.

– Remove all objects which are not part of the Equipment Inventory (for example tools, baggage, etc.). The Equipment Inventory is included in Section 6.5 of the Airplane Flight Manual.



Legend:

X_1 = Arm, Reference Plane to Center Line of Main Jacking Points.

X_2 = Arm, Reference Plane to Center Line of Tail Jacking Point.

G_1 = $G_{1LH} + G_{1RH}$ = Net Weight, main jacks LH and RH.

G_2 = Net Weight, Tail Jack.

G = $G_{1LH} + G_{1RH} + G_2$ = Empty Weight.

X_{CG} = Arm - Empty Weight Center-of-Gravity (calculated).

Figure 3: Weighing Dimensions for Electronic Weighing Units at the Jacking Points

B. Weighing Procedure with Electronic Weighing Units at the Jacking Points

	Detail Steps/Work Items	Key Items/References
	Note: Weigh the airplane in a closed room. This will avoid any wind causing weighing errors.	
(1)	Make a copy of the Weighing Report form.	Refer to Figure 4.
(2)	Put the electrical weighing units in position on the jacks.	Refer to the weighing unit manufacturer‘s instructions.
(3)	Zero the electrical weighing units.	Refer to the weighing unit manufacturer‘s instructions.
(4)	Lift the airplane on jacks.	Refer to Section 07-10.
(5)	Make the airplane level laterally: – Put a spirit level on the horizontal surface of the baggage compartment frame. – Adjust the main jacks to bring the sprit level horizontal.	Refer to Figure 1. Behind the back seats. Make sure that you do not touch the airplane when you read the spirit level.
(6)	Make the airplane level longitudinally: – Place a wedge on the rear fuselage with the thin end forward. – Place a spirit level on the wedge. – Adjust the tail jack to bring the spirit level horizontal.	Refer to Figure 2.
(7)	Remove the levelling equipment from the airplane.	
(8)	Put the rear passenger seats in the upright position.	
(9)	Close the canopy and the passenger door.	
(10)	Read the value from the left main jack weighing unit. Enter the value on the Weighing Report under MAIN G_{1LH} Gross.	

WEIGHING REPORT

Model: DA 40 Serial Number:_____ Registration:_____

Data with reference to the Type Certificate Data Sheet and the Airplane Flight Manual.

Reference Plane: Vertical plane 2194 mm (86.38 in) in front of the leading edge of wing at the root rib.

Horizontal reference line: Wedge 600:31 (2.96°), 2910 mm (114.57 in) aft of the step in the cockpit rim.

Equipment Inventory - dated:_____ Cause for Weighing:_____

Weight and Balance Calculations (Weighing at the jacking points)

Weight Condition: Including brake fluid, engine oil (MAX level), coolant (TAE version only), and unusable fuel (Lycoming: 2 x 0.5 US gal / 2 x 1.9 liters; TAE: 2 x 1 US gal / 2 x 3.8 liters).

Support	Gross	Tare	Net
MAIN G_{1LH}			
MAIN G_{1RH}			
TAIL G_2			
		Empty Weight	

Lever Arm
X_1 = 2394 mm (94.25 in)
X_2 = 7312 mm (287.87 in)

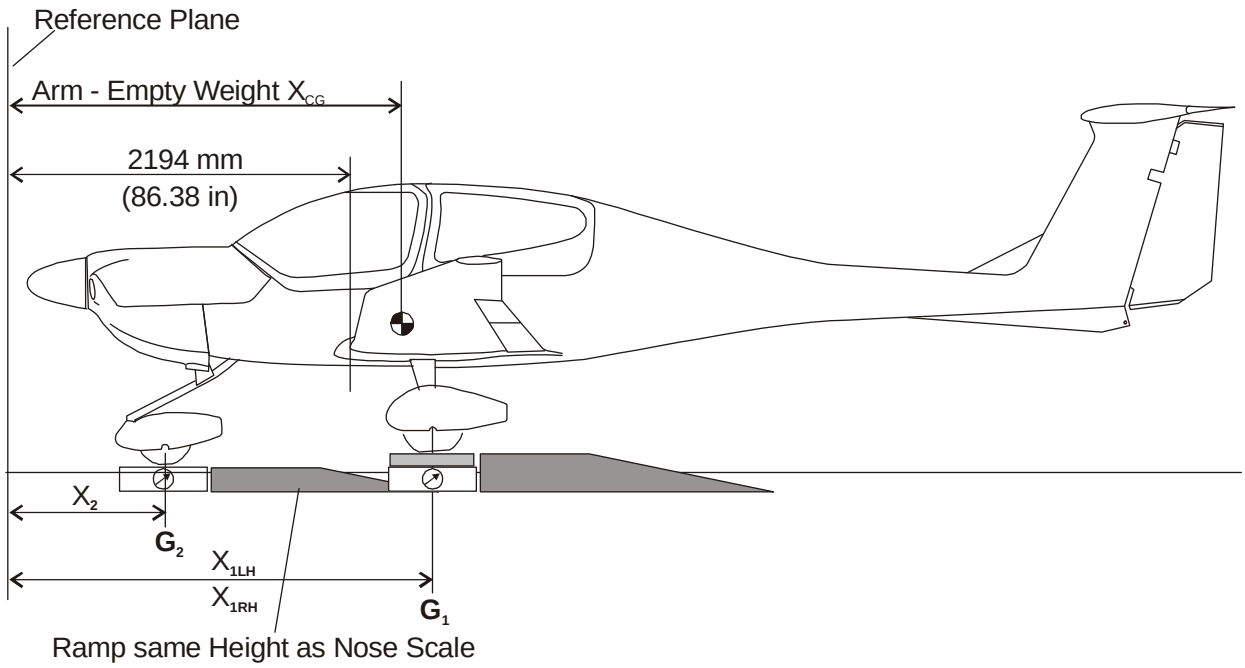
Calculate the Empty Weight, G = MAIN G_{1LH} + MAIN G_{1RH} + TAIL G_2.	G =
Calculate the Empty Weight Moment, M = ((G_{1LH} + G_{1RH}) * X_1) + (G_2 * X_2).	M =
Calculate the Empty Weight Center-of-Gravity position, X_{CG} = M/G.	X_{CG} =
Maximum permitted all-up-weight: Max AUW (see AFM)	
Maximum useful load = Max AUW - G.	

Record the Empty Weight (G) and the Empty-Weight Moment (M) in the Airplane Flight Manual.

Place/Date	Authorizing Stamp	Authorizing Signature

Figure 4: Weighing Report for Electronic Weighing Units at the Jacking Points

	Detail Steps/Work Items	Key Items/References
(11)	Read the value from the right main jack weighing unit. Enter the value on the Weighing Report under MAIN G_{1RH} Gross.	
(12)	Read the value from the tail jack weighing unit. Enter the value on the Weighing Report under TAIL G_2 Gross.	
(13)	Refer to the calibration records for the electrical weighing units. If necessary, correct the Gross values of MAIN G_{1LH}, MAIN G_{1RH}, and TAIL G_2.	
(14)	Lower the airplane with the jacks.	Refer to Section 07-10.
(15)	If you have used adaptors between the weighing units and the jacking points, and these adaptors were not placed on the weighing units during zeroing (step 3), then record the weight of them under Tare in the related column.	
(16)	Subtract each Tare value from the related Gross value. Record the result under Net in the Weighing Report.	
(17)	Calculate the Empty Weight, G.	G = Net G_{1LH} + Net G_{1RH} + Net G_2
(18)	Calculate the Empty Weight Moment, M.	M = ((G_{1LH} + G_{1RH}) * X_1) + (G_2 * X_2)
(19)	Calculate the position of the Empty Weight Center-of-Gravity, X_{CG}.	X_{CG} = M/G
(20)	Record the Empty Weight (G) and the Empty Weight Moment (M) in the Airplane Flight Manual.	



Legend:

X_1 = Arm, Reference Plane to center line of main wheels.

X_2 = Arm, Reference Plane to center line of nose wheel.

G_1 = G_{1LH} + G_{1RH} = Net weight, main wheel scales LH and RH.

G_2 = Net weight, Nose wheel scale.

G = G_{1LH} + G_{1RH} + G_2 = Empty Weight.

X_{CG} = Arm - Empty Weight center-of-gravity (calculated).

Figure 5: Weighing Dimensions for Mechanical Scales Under the Wheels

3. Weighing with Mechanical Scales Under the Wheels

If you use mechanical scales to weigh the airplane, you must also use wooden blocks under the wheels to level the airplane. You must obey the manufacturers' instructions on the scales.

A. Equipment

Items	Quantity	Part Number
Mechanical scales (The scales used for the main wheels must be the same).	3	Commercial.
Spirit level.	1	Commercial.
Plumb line.	1	Commercial.
Wedge, slope 600:31 (2.96°).	1	Local Manufacture.
Wooden blocks (various thicknesses).	A/R	Local Manufacture.
Ramps.	3	Local Manufacture.
Optional: Airplane jacks (600 kg / 1320 lb. minimum lifting capacity).	3	Commercial.

Note: If you use airplane jacks to lift the airplane onto the ramps, you must move the airplane a small distance back and forward to allow the landing gear to spread. This will prevent side loads on the scales causing errors.

This procedure uses jacks because the main wheel scales need approximately 52 mm (2 in) of blocks to bring the airplane level.

Before you weigh the airplane do these items:

– Make sure the airplane has all its equipment. The equipment must be in the location shown in the Equipment Inventory. The Equipment Inventory is included in Section 6.5 of the Airplane Flight Manual.

Defuel the airplane to the unusable fuel level. The unusable fuel level is 0.5 US gal (approx. 1.9 liter) per wing tank (Lycoming version) or 1 US gal (approx. 3.8 liter) per wing tank (TAE version). Refer to Section 12-10.

– Add engine oil and operating fluids up to the maximum level. Refer to Section 12-10.

– Clean the airplane and dry it.

– Remove all objects which are not part of the Equipment Inventory (for example tools, baggage, etc.). The Equipment Inventory is included in Section 6.5 of the Airplane Flight Manual.

B. Weighing Procedure with Mechanical Scales Under the Wheels

	Detail Steps/Work Items	Key Items/References
	Note: Weigh the airplane in a closed room. This will avoid any wind causing weighing errors.	
(1)	Make a copy of the Weighing Report form.	Figure 6.
(2)	Put the weighing scales in position on the floor in front of each wheel.	
(3)	Zero the scales.	Refer to the scale manufacturer‘s instructions.
(4)	Close the canopy.	
(5)	Lift the airplane on jacks.	Refer to Section 07-10.
(6)	Put the flat part of the ramps under each wheel.	
(7)	Lower the airplane onto the ramps with the jacks. Remove the jacks.	Refer to Section 07-10.
(8)	Move the airplane a small distance backwards and forwards on the flat top of the ramps.	To allow the landing gear legs to spread.
(9)	If necessary, put a wooden block on the scale in front of each main wheel.	To ensure horizontal alignment of the airplane.
	CAUTION: DO NOT ALLOW THE AIRPLANE TO RUN OFF THE SCALES. THIS WILL CAUSE DAMAGE TO THE WHEEL FAIRINGS.	
(10)	Push the airplane forward onto the scales.	Make sure that the wheels are above the center of the scales.
(11)	Engage parking brake or use wheel chocks.	
(12)	Make the airplane level laterally: – Put a spirit level on the horizontal surface of the baggage compartment frame. – If necessary, use additional thin blocks between the scale and the main wheel on the low side to bring the sprit level horizontal.	Refer to Figure 1. Behind the back seats. Push the airplane on and off the scales as necessary. Make sure that you do not touch the airplane when you read the spirit level.

	Detail Steps/Work Items	Key Items/References
(13)	Make the airplane level longitudinally: – Place the wedge on the rear fuselage with the thin end forward. – Place a spirit level on the wedge. – Put thin blocks between the nose wheel and the scale to bring the spirit level horizontal. – Or, if necessary, reduce the air pressure in the nose wheel tire to bring the spirit level horizontal.	Refer to Figure 2.
(14)	Remove the levelling equipment from the airplane.	
(15)	Put the rear passenger seats in the upright position.	
(16)	Close the passenger door.	
(17)	Read the value from the left main wheel scale. Enter the value on the weighing form under MAIN G_{1LH} Gross.	
(18)	Read the value from the right main wheel scale. Enter the value on the weighing form under MAIN G_{1RH} Gross.	
(19)	Read the value from the nose wheel scale. Enter the value on the weighing form under NOSE G_2 Gross.	

WEIGHING REPORT

Model: DA 40 Serial Number:_____ Registration:_____

Data with reference to the Type Certificate Data Sheet and the Airplane Flight Manual.

Reference Plane: Vertical plane 2194 mm (86.38 in) in front of the leading edge of wing at the root rib.

Horizontal reference line: Wedge 600:31 (2.96°), 2910 mm (114.57 in) aft of the step in the cockpit rim.

Equipment Inventory - dated:_____ Cause for Weighing:_____

Weight and Balance Calculations (Weighing at the wheels)

Weight Condition: Including brake fluid, engine oil (MAX level), coolant (TAE version only), and unusable fuel (Lycoming: 2 x 0.5 US gal / 2 x 1.9 liters; TAE: 2 x 1 US gal / 2 x 3.8 liters).

Support	Gross	Tare	Net
MAIN G_{1LH}			
MAIN G_{1RH}			
NOSE G_2			
		Empty Weight	

Lever Arm
X_{1LH} =
X_{1RH} =
X_2 =

Calculate the Empty Weight, G = MAIN G_{1LH} + MAIN G_{1RH} + NOSE G_2.	G =
Calculate the Empty Weight Moment, M = (G_{1LH} * X_{1LH})+(G_{1RH} * X_{1RH}) + (G_2 * X_2).	M =
Calculate the Empty Weight Center-of-Gravity position, X_{CG} = M/G.	X_{CG} =
Maximum permitted all-up-weight: Max AUW (see AFM).	
Maximum useful load = Max AUW - G.	

Record the Empty Weight (G) and the Empty-Weight Moment (M) in the Airplane Flight Manual.

Place/Date	Authorizing Stamp	Authorizing Signature

Figure 6: Weighing Report for Mechanical Scales Under the Wheels

	Detail Steps/Work Items	Key Items/Reference
(20)	Use the plumb line to mark the position of the reference plane on the floor: – Hold the plumb line against the leading edge of the wing where the wing joins the stub-wing. – Mark this position on the floor. – Draw a straight line between the 2 points you marked on the floor. – Draw a second line 2194 mm (86.38 in) forward of the first line.	Do this on each side.
(21)	Use the plumb line to mark the position of the nose wheel center line on the floor.	
(22)	Use the plumb line to mark the position of each main wheel center line on the floor.	
(23)	Lift the airplane off the scales with the jacks.	Refer to Section 07-10.
(24)	Read the weight of the wooden blocks on each of the scales. Record the values in the column headed TARE in the Weighing Report.	
(25)	Remove the scales and the ramps.	
(26)	Measure the distance X_{1LH}. Record the value in the Weighing Report.	
(27)	Measure the distance X_{1RH}. Record the value in the Weighing Report.	
(28)	Measure the distance X_2. Record the value in the Weighing Report.	
(29)	Refer to the calibration records for the weighing scales. If necessary, correct the Gross and Tare values of MAIN G_{1LH}, MAIN G_{1RH}, and NOSE G_2.	
(30)	Subtract each Tare value from the related Gross value. Record the result under Net in the Weighing Report.	
(31)	Lower the airplane with the jacks.	

	Detail Steps/Work Items	Key Items/Reference
(32)	Calculate the Empty Weight, G, from the Net values.	G = Net G_{1LH} + Net G_{1RH} + Net G_2
(33)	Calculate the Empty Weight Moment, M.	M = $(G_{1LH} * X_{1LH})+(G_{1RH} * X_{1RH}) + (G_2 * X_2)$
(34)	Calculate the position of the Empty Weight Center-of-Gravity, X_{CG}.	X_{CG} = M/G
(35)	Record the Empty Weight (G) and the Empty Weight Moment (M) in the Airplane Flight Manual.	

Section 08-20
Levelling

1. General

These procedures tell you how to make the airplane level. See Section 07-10 for lifting the airplane with jacks.

Make the airplane level with jacks unless you are weighing the airplane. If you weigh the airplane, change the airplane tire pressures or use blocks to make the airplane level (see Section 08-10).

2. Make the Airplane Level with Jacks

A. Equipment

Items	Quantity	Part Number
Airplane jacks (600 kg / 1320 lb minimum lifting capacity).	3	Commercial.
Wing trestle.	2	Commercial.
Nose trestle.	1	Commercial.
Spirit level.	1	Commercial.
Wedge, slope 600:31 (2.96°).	1	Local Manufacture.

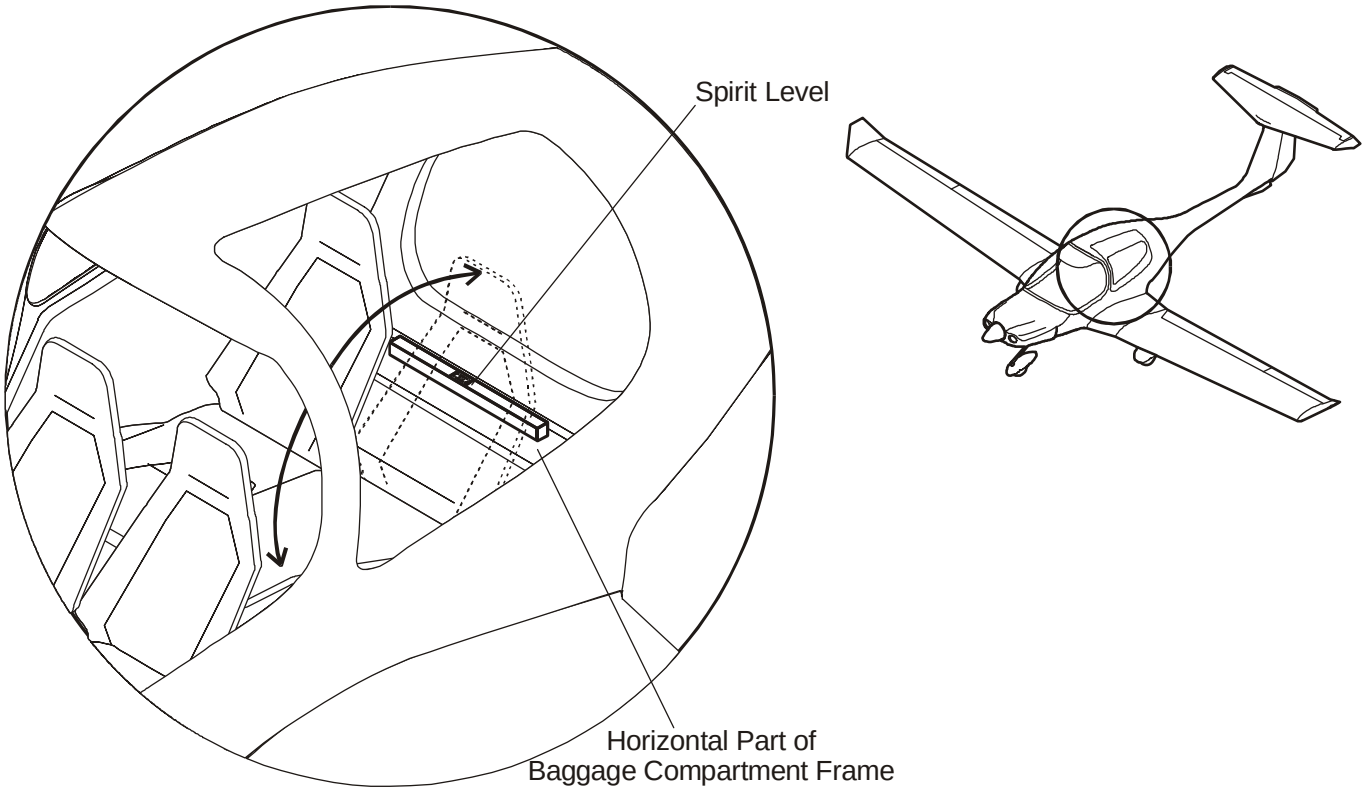


Figure 1: Level the Airplane Laterally

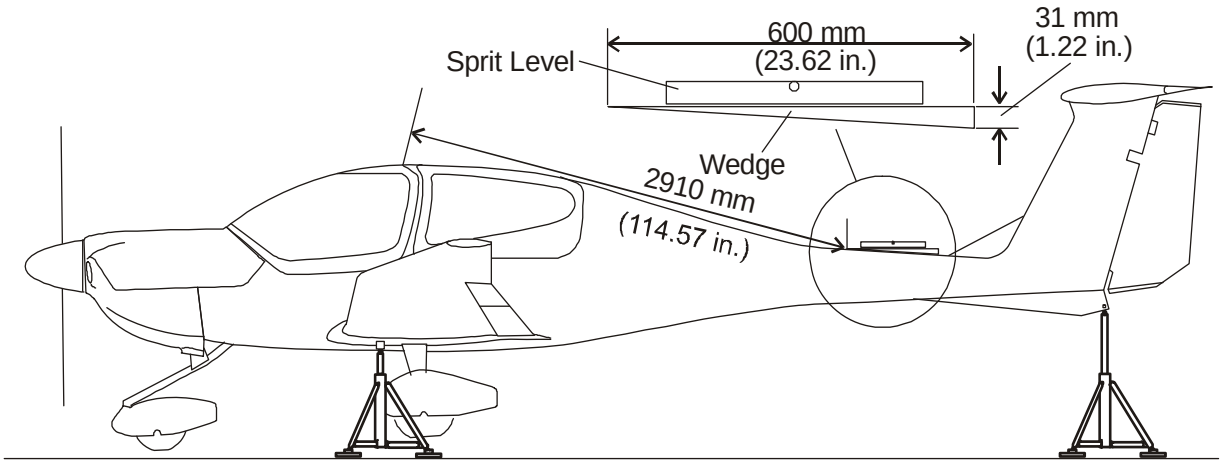


Figure 2: Level the Airplane Longitudinally

B. Level the Airplane with Jacks Procedure

	Detail Steps/Work Items	Key Items/References
	Note: Level the airplane in a closed room. This will avoid any wind causing levelling errors.	
(1)	Lift the airplane on jacks.	Refer to Section 07-10.
(2)	Make the airplane level laterally: – Put a spirit level on the horizontal surface of the baggage compartment frame. – Adjust the main jacks to bring the sprit level horizontal.	Refer to Figure 1. Behind the back seats.
(3)	Make the airplane level longitudinally: – Place a wedge on the rear fuselage with the thin end forward. – Place a spirit level on the wedge. – Adjust the tail jack to bring the spirit level horizontal.	Refer to Figure 2.
(4)	Put trestles under each wing and the front fuselage.	Refer to Section 07-10.
(5)	Remove the levelling equipment from the airplane.	

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CHAPTER 09

TOWING AND TAXIING

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CHAPTER 09
TOWING AND TAXIING

1. General

You can move the airplane on the ground by hand or by taxiing it. Use the procedures in Section 09-10 and Section 09-20 to move the airplane safely. Section 09-10 tells you how to tow the airplane. Section 09-20 tells you how to taxi the airplane.

WARNING: YOU MUST NOT TAXI THE AIRPLANE UNLESS YOU HAVE BEEN TRAINED TO TAXI AND HAVE BEEN AUTHORIZED BY YOUR AIRWORTHINESS AUTHORITY.

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Section 09-10
Towing

1. General

For moving the airplane on the ground it is recommended to use the towing fork. You can push or pull the DA 40 at the wing tip, at the wing nose, and at the propeller blades near the spinner.

2. Ground Handling with Tow Bar

WARNING: THE TOW BAR MUST BE REMOVED BEFORE STARTING THE ENGINE.

CAUTION: THE TOW BAR MAY ONLY BE USED FOR MOVING THE AIRPLANE ON THE GROUND BY HAND. AFTER MOVING THE AIRPLANE THE TOW BAR MUST BE REMOVED.

Note: When moving the airplane rearward, the tow bar must be held firmly to prevent abrupt sideward deflection of the nose wheel.

For pushing or pulling the airplane on the ground, it is recommended to use the tow bar which is available from the manufacturer. The tow bar is bent apart and engaged in the appropriate holes in the nose wheel fairing as shown in Figure 1. The arresting knob must be fully engaged.

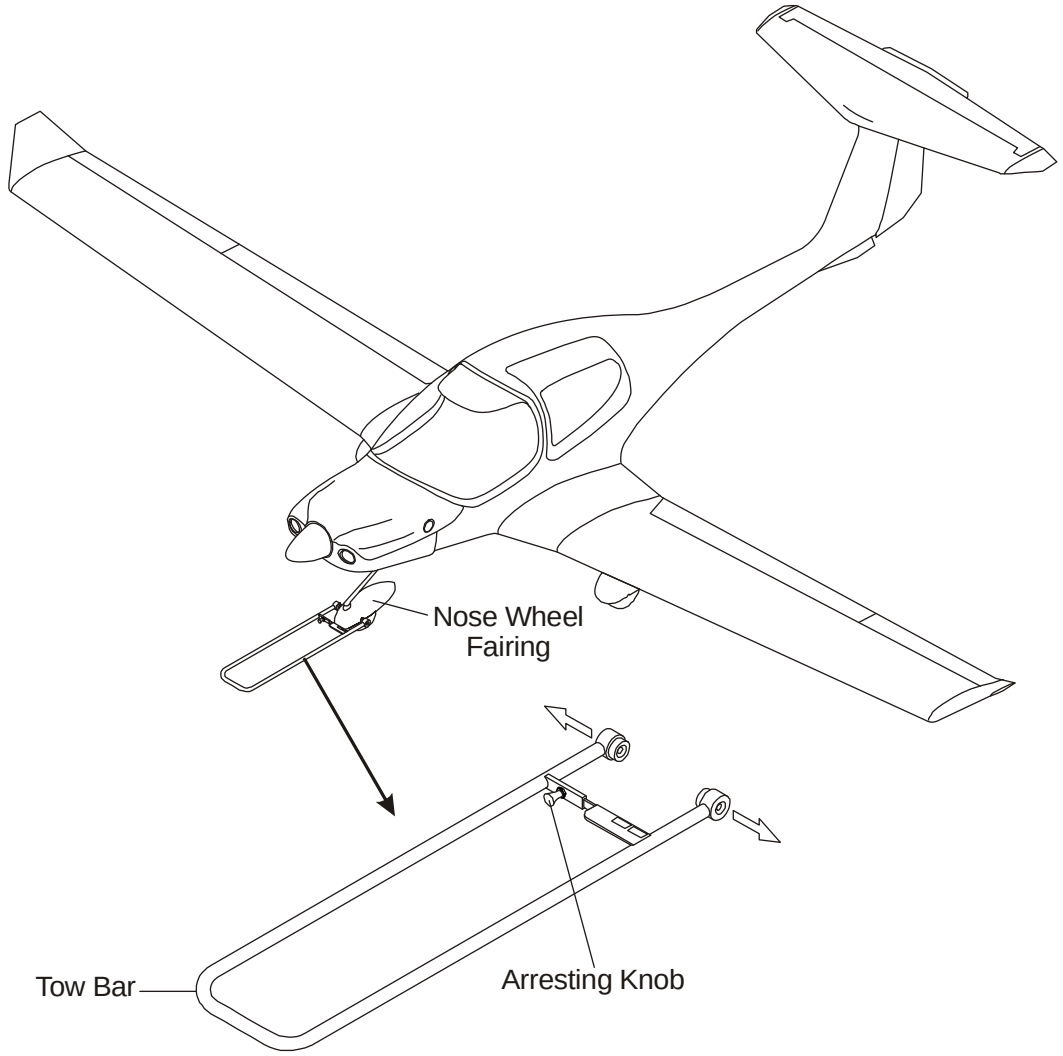


Figure 1: Tow Bar

3. Ground Handling without Tow Bar

WARNING: DO NOT PUSH ON THE SPINNER. IF YOU PUSH ON THE SPINNER YOU CAN DAMAGE THE SPINNER WHICH CAN CAUSE VIBRATION.

CAUTION: NEVER USE FORCE ON THE PROPELLER TIPS OR ON THE CONTROL SURFACES. YOU CAN DAMAGE THE PROPELLER AND THE CONTROL SURFACES.

CAUTION: NEVER APPLY WEIGHTS TO THE TAILPLANE TO LIFT THE NOSE WHEEL. YOU CAN DAMAGE THE TAILPLANE.

CAUTION: NEVER TOW THE AIRPLANE IF THE WHEELS ARE BLOCKED BY SNOW OR MUD. YOU CAN DAMAGE THE LANDING GEAR.

CAUTION: THE NOSE WHEEL STEERING ANGLE IS 30º TO THE LEFT AND RIGHT. IF YOU TURN THE WHEEL MORE THAN 30º YOU WILL CAUSE DAMAGE TO THE NOSE GEAR.

A. Forward Movement

Pull the airplane forward on the propeller blades near the spinner. The nose wheel will follow the movement of the airplane. You can change direction by pulling on the appropriate propeller blade near the spinner.

B. Rearward Movement

Push down the fuselage in front of the vertical stabilizer until the nose wheel is clear of the ground while pushing the airplane in rearward direction.

C. Turn the Airplane on the Ground

If you have a limited area to maneuver the airplane, you can use 2 people to turn the airplane around the main wheels. One person must push down in front of the vertical stabilizer until the nose wheel is clear of the ground. The other person must push on the wing tip.

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Section 09-20
Taxiing

1. General

When you taxi the DA 40 you use the toe operated brakes to steer the airplane. To make the airplane turn operate the left or the right toe brake.

WARNING: YOU MUST NOT TAXI THE AIRPLANE UNLESS YOU HAVE BEEN TRAINED TO TAXI AND HAVE BEEN AUTHORIZED BY YOUR AIRWORTHINESS AUTHORITY.

CAUTION: THIS SECTION GIVES GENERAL DATA ON TAXIING ONLY. YOU MUST USE THE DA 40 AIRPLANE FLIGHT MANUAL WHEN YOU TAXI THE AIRPLANE.

	Key Items/References	Detail Steps/Work Items
(1)	Make sure the area around the airplane is clear of objects.	For example: ground equipment and tools.
(2)	Operate the parking brake.	
(3)	If necessary remove: – The wheel chocks. – The tow bar. – The mooring ropes.	
	WARNING: MAKE SURE THAT THERE ARE NO PERSONS OR OBJECTS NEAR THE AIRPLANE. THE AIRPLANE CAN INJURE PERSONS. OBJECTS CAN DAMAGE THE AIRPLANE.	
(4)	Start the engine.	Refer to the Airplane Flight Manual.
(5)	Release the parking brake.	

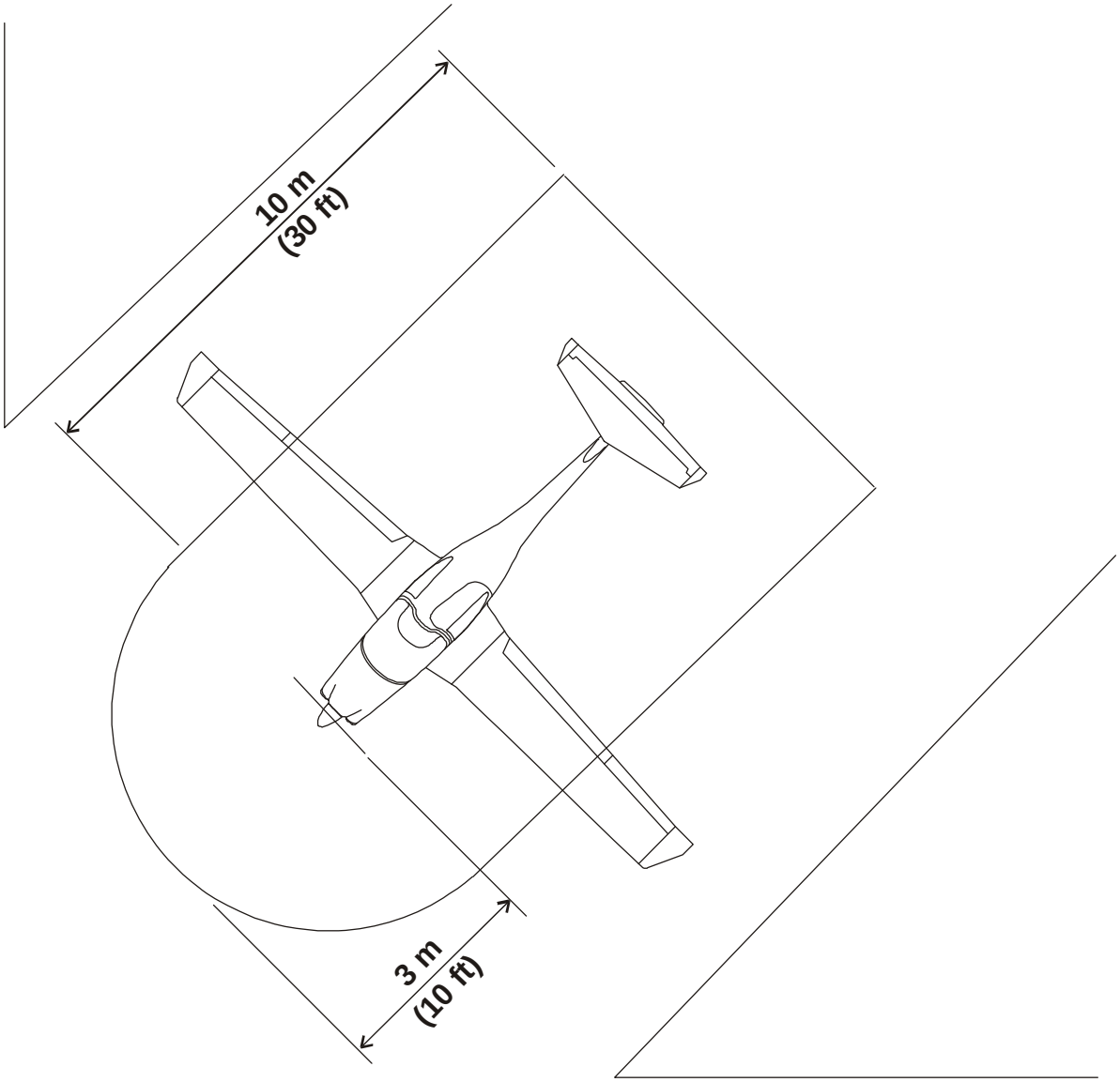


Figure 1: The Safety Range for Taxiing the DA 40 Airplane

	Key Items/References	Detail Steps/Work Items
	WARNING: MAKE SURE THE BRAKES OPERATE CORRECTLY WHEN YOU TAXI THE AIRPLANE. IF THE BRAKES SHOULD FAIL, YOU MUST BE ABLE TO STOP THE AIRPLANE BEFORE YOU HIT PERSONS OR EQUIPMENT. CAUTION: OBEY THE SAFETY RANGE FOR TAXIING SHOWN IN FIGURE 1. CAUTION: TAKE CARE IF YOU TAXI ON UNEVEN GROUND. THE PROPELLER MUST NOT TOUCH THE GROUND. LOOSE STONES AND GRAVEL CAN DAMAGE THE PROPELLER.	
(6)	Taxi the airplane to its new position.	
(7)	Shut down the engine.	Refer to the Airplane Flight Manual.
(8)	Park the airplane. If necessary, moor the airplane.	Refer to Chapter 10.

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CHAPTER 10

PARKING, MOORING, STORAGE AND RETURN TO SERVICE

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PARKING, MOORING, STORAGE AND RETURN TO SERVICE

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CHAPTER 10
PARKING, MOORING, STORAGE AND RETURN TO SERVICE

1. General

Always park or moor the DA 40 when it is not in use. Use the procedures in Section 10-10 for parking the airplane. Use the procedure in Section 10-20 to moor the airplane. If the airplane is parked over-night, we recommend that you moor the airplane. If strong winds are forecast, you must always moor the airplane.

Refer to the Lycoming Operator's Manual for detailed information about engine storage.

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Section 10-10
Parking and Storage

1. General

Use these procedures to protect the airplane when it is parked. Use the short-term parking procedure when the airplane will be parked for less than 5 days. Use the long term parking procedure when the airplane will be parked for 5 to 30 days. Use the storage procedure if the airplane will be parked for more than 30 days.

All pilots and persons who do maintenance must know the procedures in this Section.

CAUTION: MAKE SURE THAT THE AIRPLANE IS CORRECTLY MOORED AND PROTECTED IF STRONG WINDS ARE FORECAST. STRONG WINDS CAN CAUSE DAMAGE TO AN UNPROTECTED AIRPLANE.

A. Equipment

Item	Quantity	Part Number
Wheel chocks.	4	Commercial

B. Short-Term Parking

	Detail Steps/Work Items	Key Items/References
(1)	Taxi or tow the airplane to the parking position.	Refer to Chapter 09.
(2)	Align the airplane into wind.	
	CAUTION: MAKE SURE THAT THE NOSE WHEEL IS ALIGNED STRAIGHT AHEAD WHEN THE AIRPLANE STOPS. THIS WILL PREVENT SIDE LOADS WHICH CAN DAMAGE THE NOSE LANDING GEAR.	
(3)	If the wind is gusty (or the weather is stormy) moor the airplane.	Refer to Section 10-20.
(4)	If there is packed snow or ice on the parking area, spread about 5 mm (0.2 in) of sand under the wheels.	
	CAUTION: DO NOT APPLY THE PARKING BRAKE WHEN THE BRAKES ARE OVER-HEATED. THE BRAKES CAN SEIZE ON.	
(5)	Set the parking brake ON. Pull the knob fully aft, and push the brake pedals.	

	Detail Steps/Work Items	Key Items/References
(6)	Put chocks in front of and behind the main wheels.	
(7)	RELEASE the parking brake.	Lever down.
(8)	Set the controls to neutral. Install the control lock.	
(9)	Set the flaps to CRUISE.	Fully up.
(10)	Close and lock the canopy.	

C. Long-Term Parking

CAUTION: MAKE SURE THAT YOU DO THE LONG TERM PARKING PROCEDURE WHEN YOU PARK THE AIRPLANE FOR A LONG TIME. IF YOU DO NOT DO THE LONG TERM PARKING PROCEDURE CORRECTLY, THE ENGINE CYLINDERS AND WHEEL BEARINGS CAN CORRODE. ALSO THE TIRES CAN DEFORM.

	Key Items/References	Detail Steps/Work Items
(1)	Do the procedure for short-term parking.	Refer to Paragraph 1.B.
(2)	If the airplane can be moved, remove the chocks. Move the airplane to turn the wheels 3 or 4 revolutions. Put the chocks back. If the airplane is on jacks, turn each wheel 3 or 4 revolutions by hand.	You can push or tow the airplane. Make sure that a different part of the tire touches the ground when you stop.
	Note: Do item 2 every day in cold weather, every 7 days in warm weather.	
(3)	Do the procedure for corrosion prevention on engines installed in inactive airplanes.	Refer to the Lycoming Operator's Manual, Section 7-3.

2. Storage

If the airplane must be parked (or not operated) for more than 30 days, you must do this storage procedure.

A. Equipment and Material

Item	Quantity	Part Number
Wheel chocks.	4	Commercial.
Tire protector spray.	A/R	Commercial.

B. Preparation

	Key Items/References	Detail Steps/Work Items
(1)	If possible, ventilate the airplane in a dry atmosphere.	
(2)	Do the procedure for long-term parking.	Refer to Paragraph 1.C.
(3)	Remove the airplane battery.	Refer to Chapter 24.
(4)	If the airplane will be stored for up to 90 days, do the procedure for Temporary Storage for the engine.	Refer to the Lycoming Operator's Manual.
(5)	Do the procedure for storage of the engine.	Refer to Lycoming Service Letter.
(6)	Completely fill the fuel tanks with fuel.	
(7)	Wipe the tires with a dry cloth. Apply tire protector spray.	
(8)	Lubricate the airplane.	Refer to Section 12-20.
(9)	Remove loose equipment from the airplane.	

C. Weekly Routine Check

Do these items each week while the airplane is stored:

	Key Items/References	Detail Steps/Work Items
(1)	Do a test for water contamination of the fuel.	Refer to Section 12-10.
(2)	If the airplane can be moved, move it to turn the wheels 3 or 4 revolutions. If the airplane is on jacks, turn each wheel 3 or 4 revolutions by hand.	You can push or tow the airplane. Make sure that a different part of the tire touches the ground. Mark the position and date on the tire with chalk.
	Note: Do item 2 every day in cold weather, every 7 days in warm weather.	
(3)	Do a test for correct air pressure in each tire. If necessary, inflate the tires.	

Section 10-20
Mooring

1. General

CAUTION: IF THE AIRPLANE MUST BE STORED OUTSIDE FOR A LONG TIME, THEN YOU MUST MOOR IT. STRONG WINDS OR GUSTS CAN CAUSE DAMAGE TO AN AIRPLANE WHICH IS NOT MOORED.

2. Mooring

Figure 1 shows the location of the mooring points on the airplane. There are 3 mooring points: One below each wing and one on the skid plate at the tail.

A. Equipment

Item	Quantity	Part Number
Wheel chocks.	4	Commercial.
Rope, (nylon preferred, or hemp).	A/R	Commercial.

B. Mooring Procedure

	Key Items/References	Detail Steps/Work Items
(1)	Park the airplane.	Refer to Section 10-10.
(2)	Make sure that the flaps are set to CRUISE.	Fully up.
	CAUTION: MOOR THE AIRPLANE AT THE MOORING POINTS ONLY. CAUTION: WHEN USING HEMP ROPES, DO NOT MAKE THEM TIGHT. IF THE ROPES GET WET THEY WILL TIGHTEN AND DAMAGE THE AIRPLANE. THIS IS MOST IMPORTANT WHEN YOU USE SECURE GROUND ANCHOR-POINTS.	
(3)	Attach a rope to each mooring point and to the ground anchor point. Do not make the ropes tight.	
(4)	Remove all items from the area that may damage the airplane.	
(5)	If snow is forecast you must put a trestle under the lower fin.	

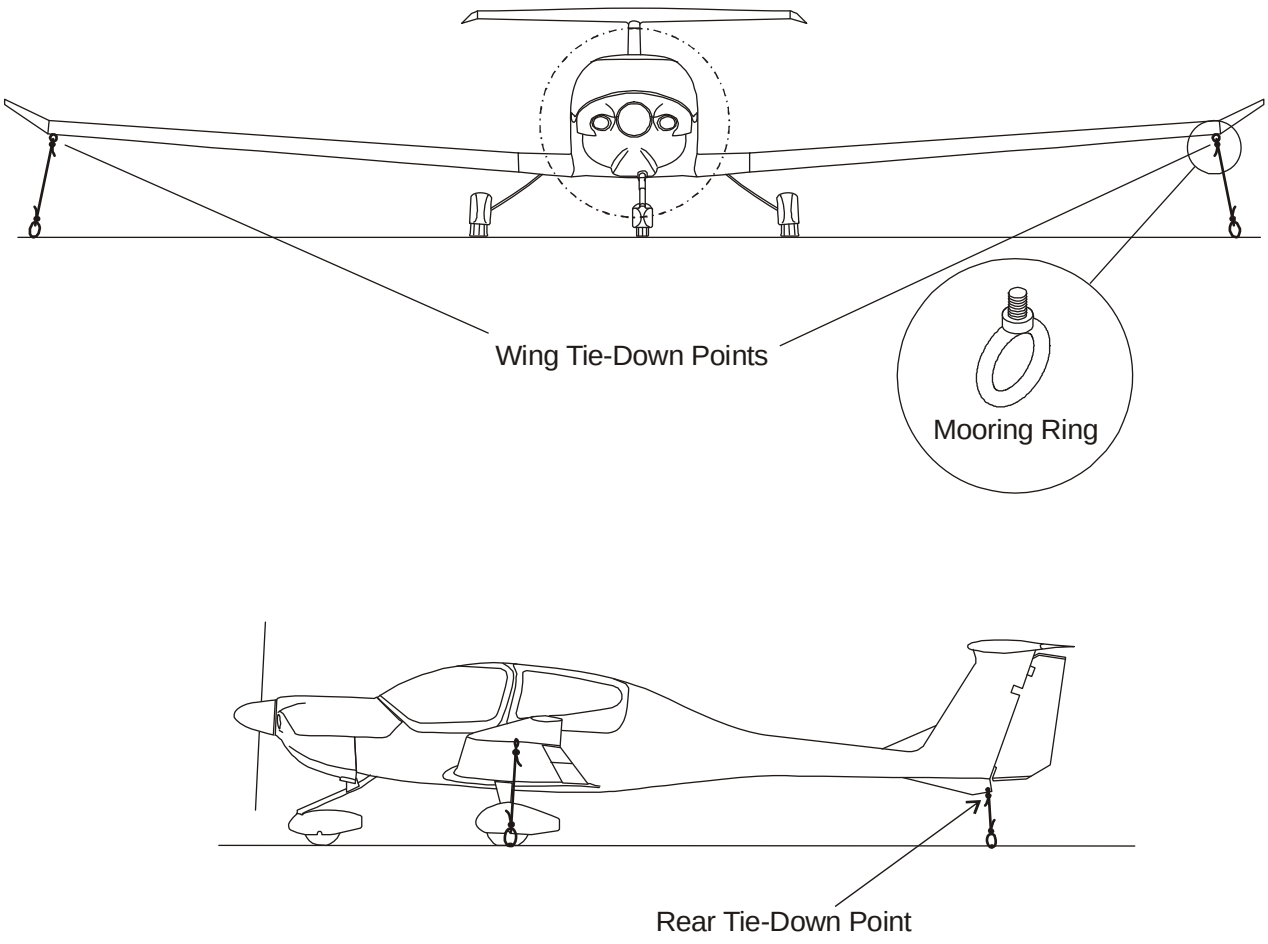


Figure 1: Location of Mooring Points on the Airplane

Section 10-30
Return to Service

1. General

Do this procedure when the airplane has been parked (or stored) for more than 5 days.

2. Return to Service Procedure

	Key Items/References	Detail Steps/Work Items
(1)	Do the procedure for Returning Engine to Service.	Refer to Lycoming Service Letter.
(2)	If necessary, install loose equipment which was removed for storage.	
(3)	If the battery has been removed: – Install the airplane battery.	Refer to Chapter 24.

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CHAPTER 11

PLACARDS AND MARKINGS

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Interior Placards and Markings - Lycoming O-360-A4M Engine

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CHAPTER 11
PLACARDS AND MARKINGS

1. General

Placards are used for identification and indication. They show the function, operation and operating limitations of systems and equipment.

Note: Placards must not be removed, exchanged or altered unless approved by the national airworthiness authority.

This Chapter shows you the location of these placards and markings:

– Exterior placards.

– Exterior markings.

– Interior placards.

Self-adhesive plastic foil is used for all placards except for the manufacturer's placard. Metal makes the manufacturer's placard which is located on the vertical stabilizer, lower left side.

Replace damaged placards.

2. Replace Plastic Foil Placards

A. Material

Item	Quantity	Part Number
Solvent.	A/R	Commercial.

B. Replace a Placard

	Detail Steps/Work Items	Key Items/References
(1)	Remove the old placard: – Heat the placard with a hot air blower. – Lift one corner of the placard. – Pull the placard off.	Do not over-heat the composite structure.
WARNING:	**DO NOT GET SOLVENT ON YOUR SKIN. DO NOT BREATH SOLVENT VAPOR. SOLVENT CAN CAUSE OR ILLNESS.**	
(2)	Clean the surface where the new placard will go.	Use a commercial solvent. There must be no dirt or grease on the surface. Obey the solvent manufacturer's instructions.
(3)	Remove the protective backing from the new placard.	
(4)	Put the new placard in the correct position. Make the placard smooth with a clean cloth.	

Section 11-20
Exterior Placards and Markings - Lycoming Engine

1. General

Figure 1 shows the exterior markings and placards for the DA 40 with the Lycoming engine installed.

If OÄM 40-317 is installed the safety walk is a coated safety walk instead of safety walk with adhesive strips. Refer to Section 51-20 for coated safety walk repair procedures.

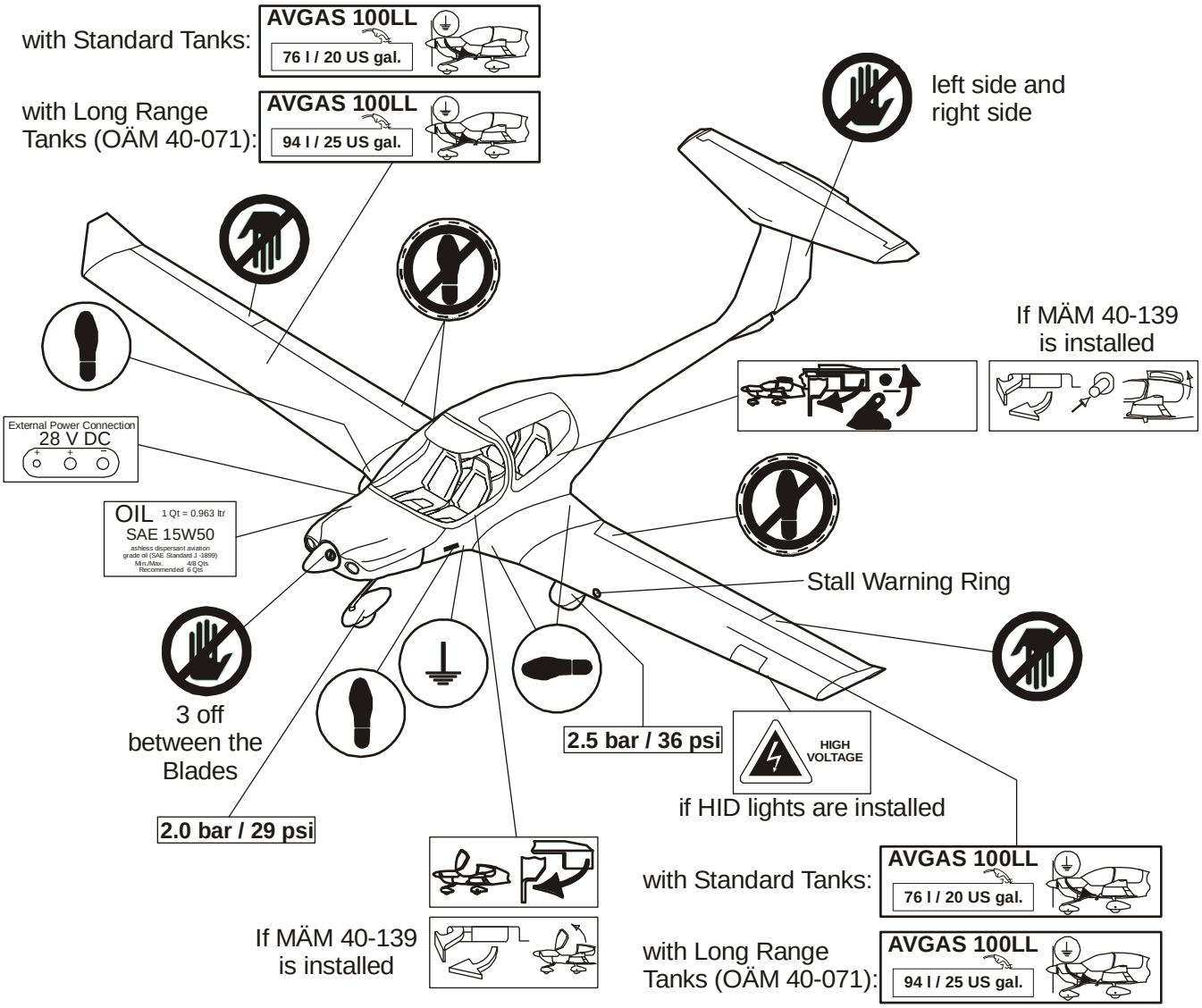


Figure 1: Exterior Placards - Airplanes with the Lycoming Engine Installed

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Section 11-21

Exterior Placards and Markings - TAE 125 Diesel Engine

1. General

Figure 1 shows the exterior placards and markings for airplanes with the TAE 125 Diesel engine installed.

If OÄM 40-317 is installed the safety walk is a coated safety walk instead of safety walk with adhesive strips. Refer to Section 51-20 for coated safety walk repair procedures.

In case of Diesel Fuel operation (MÄM 40-129) the fuel grade placard is located next to each of the two fuel filler necks.

WARNING

APPROVED FUEL:

JET A-1

or see Airplane Flight Manual

On Airplanes with early serial numbers the placard may include „Diesel EN 590".

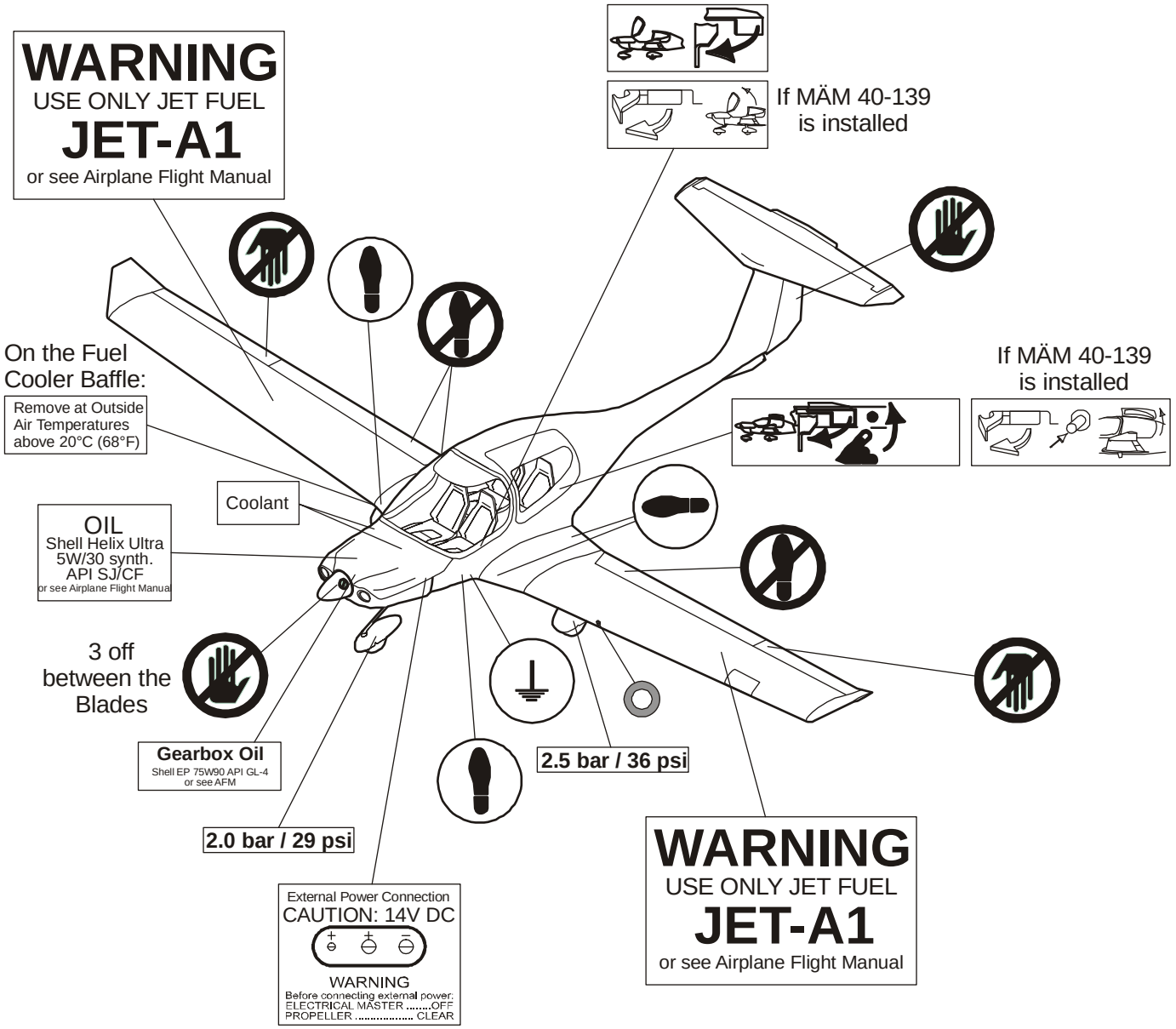


Figure 1: Exterior Placards and Markings - Airplanes with the TAE 125 Diesel Engine Installed

Section 11-30
Interior Placards and Markings - Lycoming Engine

1. General

Figure 1 shows the interior placards and markings.

Figures 2 and 3 show the instrument panel placards.

Figures 4 and the following show additional or alternate placards required by design changes.

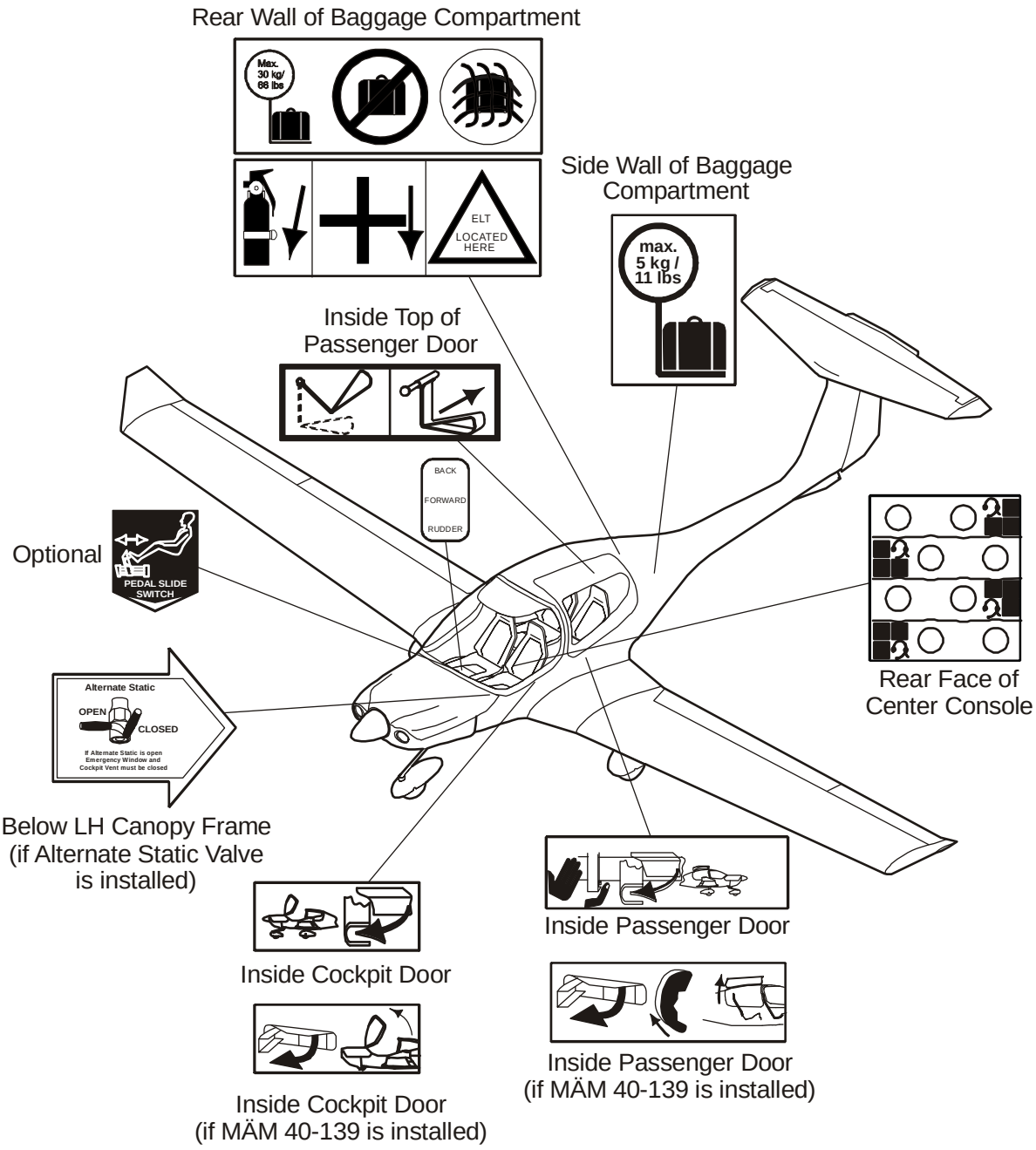


Figure 1: Interior Placards and Markings

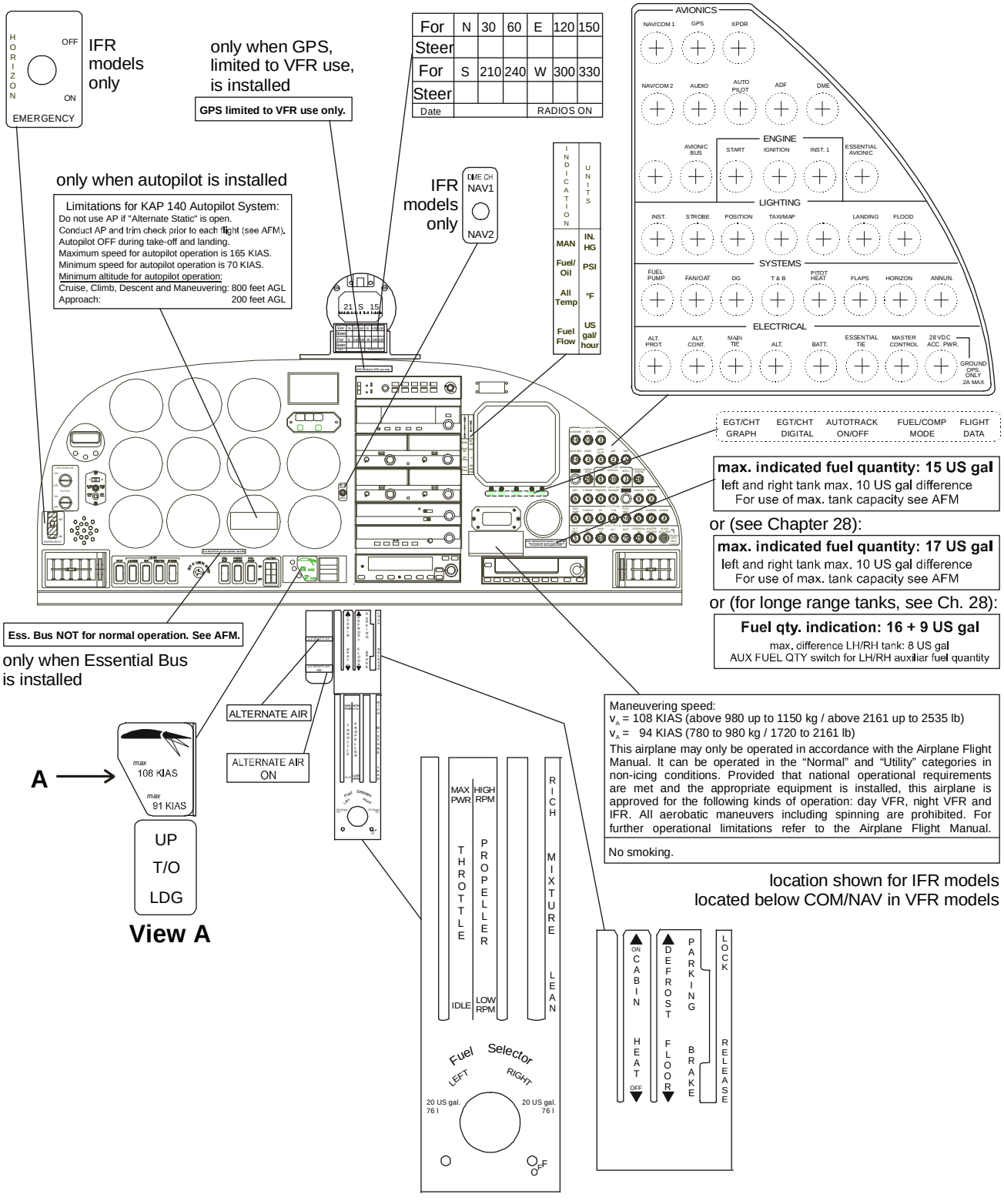


Figure 2: Instrument Panel Placards for Larger Instrument Panels

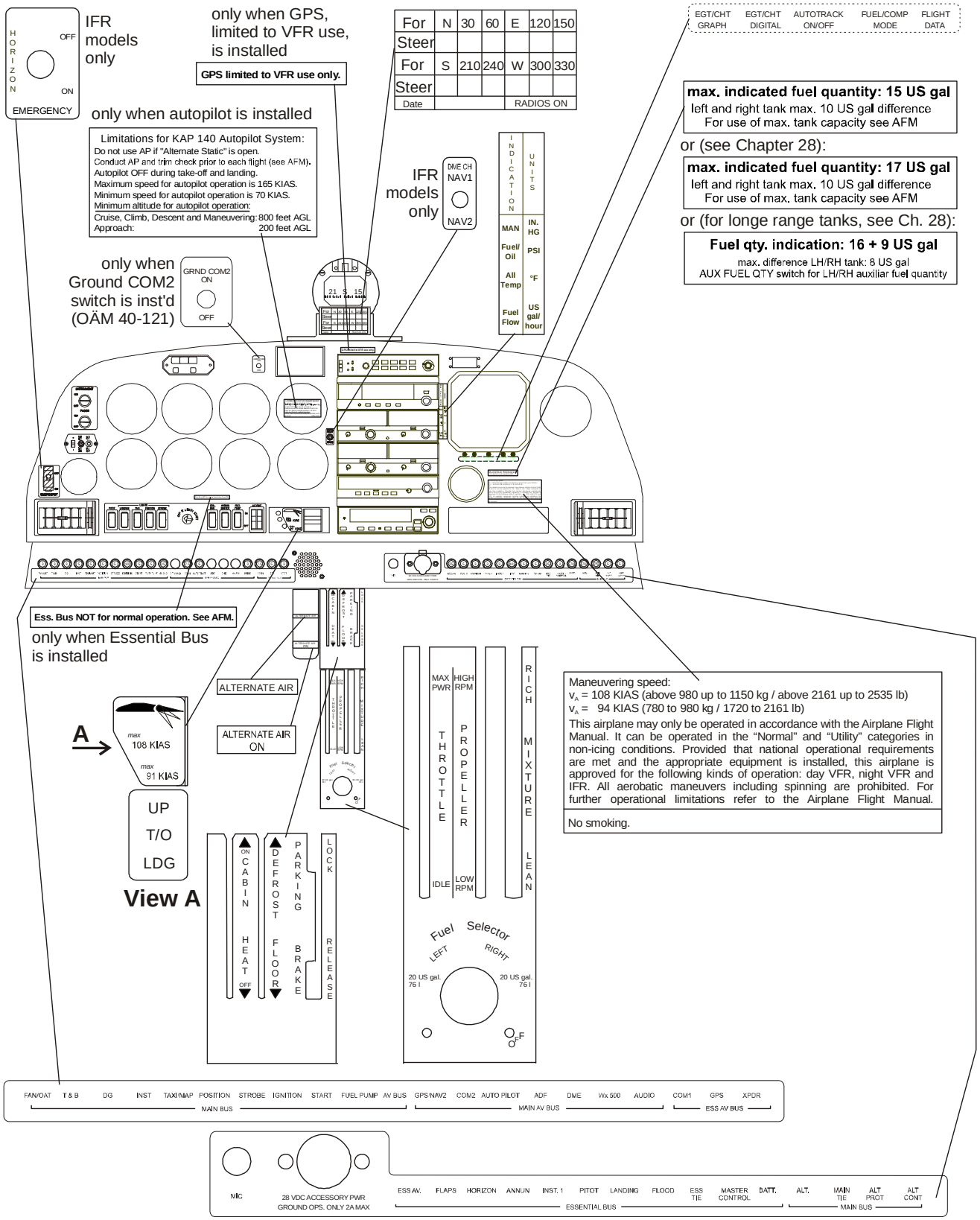


Figure 3: Instrument Panel Placards for Smaller Instrument Panels

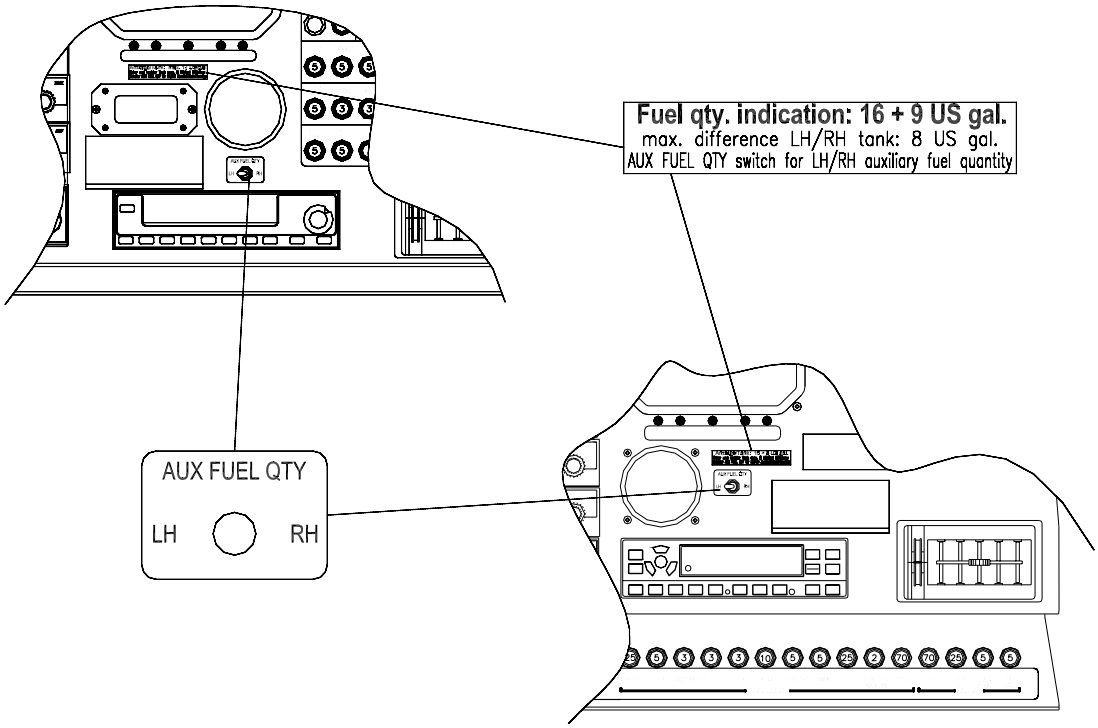


Figure 4: Additional Instrument Panel Placards for Long Range Tank (optional, see OÄM 40-071)

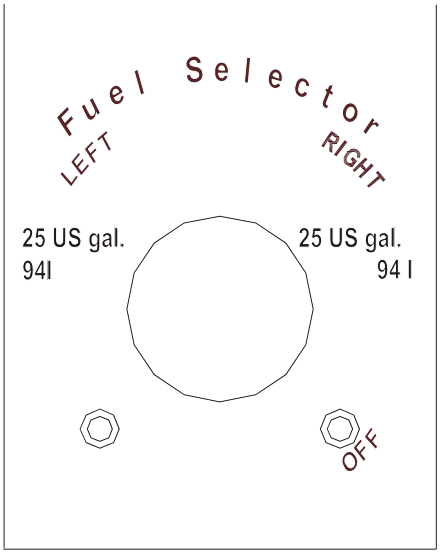


Figure 5: Fuel Selector Placard for Long Range Tank (optional, see OÄM 40-071)

Maneuvering Speed: v_A = 111 KIAS (above 1036 up to 1200 kg, above 2284 up to 2646 lb) v_A = 94 KIAS (780 to 1036 kg, 1720 to 2284 lb) The airplane may only be operated in accordance with the Airplane Flight Manual. It can be operated in the „Normal“ and the „Utility“ categories in non-icing conditions. Provided that national operational requirements are met and the appropriate equipment is installed, this airplane is approved for the following kinds of operation: day VFR, night VFR and IFR. All aerobatic maneuvers including spinning are prohibited. For further operational limitations refer to the Airplane Flight Manual.
No smoking.

Figure 6: Alternate Limitations Placard for 1200 kg MTOM (if MÄM 40-227 is installed)

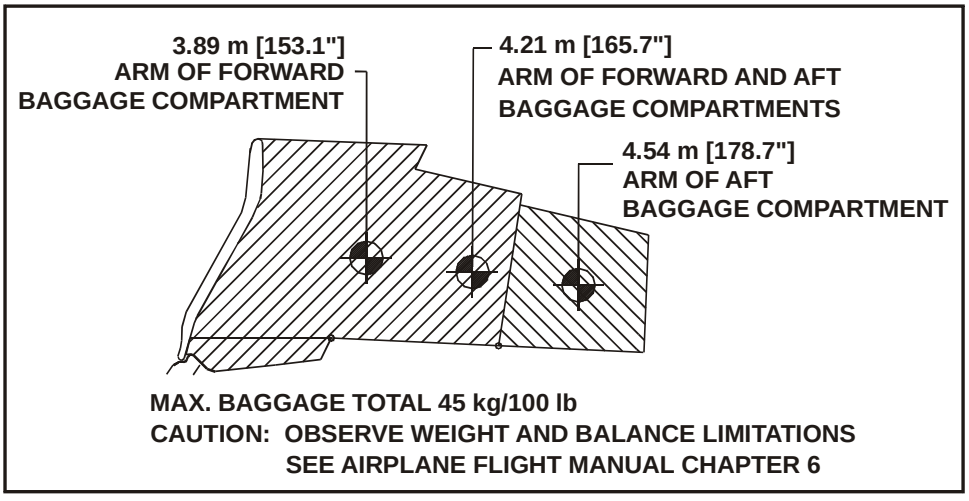


Figure 7: Placard on Baggage Extension (if OÄM 40-163&164 is installed)

Section 11-31
Interior Placards and Markings - TAE 125 Diesel Engine

1. General

Figure 1 shows the interior placards and markings for airplanes with the TAE 125 Diesel engine installed.

Figure 2 through 6 show the instrument panel placards.

In case of Diesel Fuel operation (MÄM 40-129) the fuel temp limitation placard (D4D-1131-20-29) is located beside the AED.

Diesel Fuel or Unknown Fuel Blend:	
Yellow blinking:	No engine start permitted
Yellow steady on (LH fuel tank):	No take-off permitted

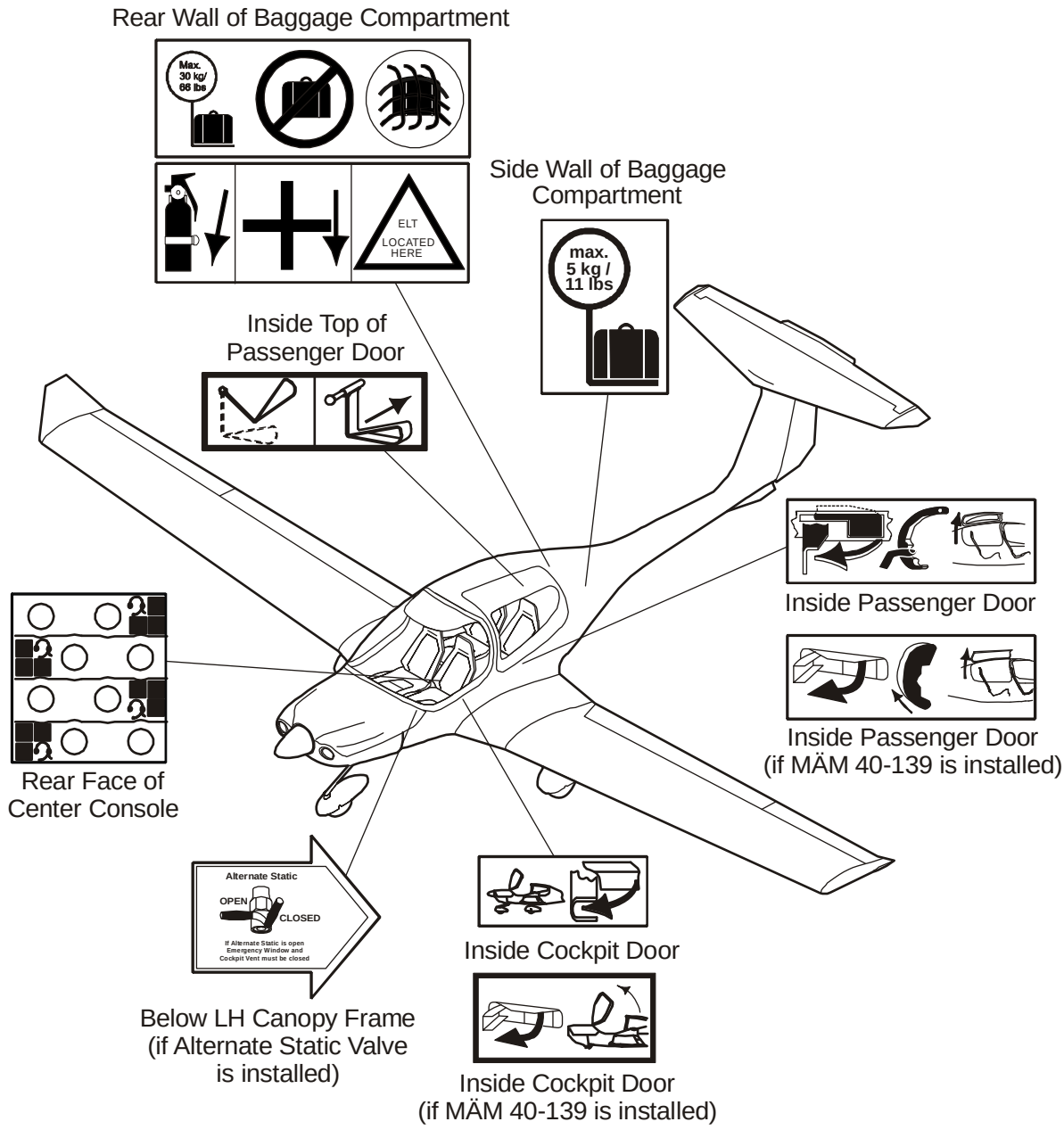


Figure 1: Interior Placards and Markings - Airplanes with the TAE 125 Diesel Engine Installed

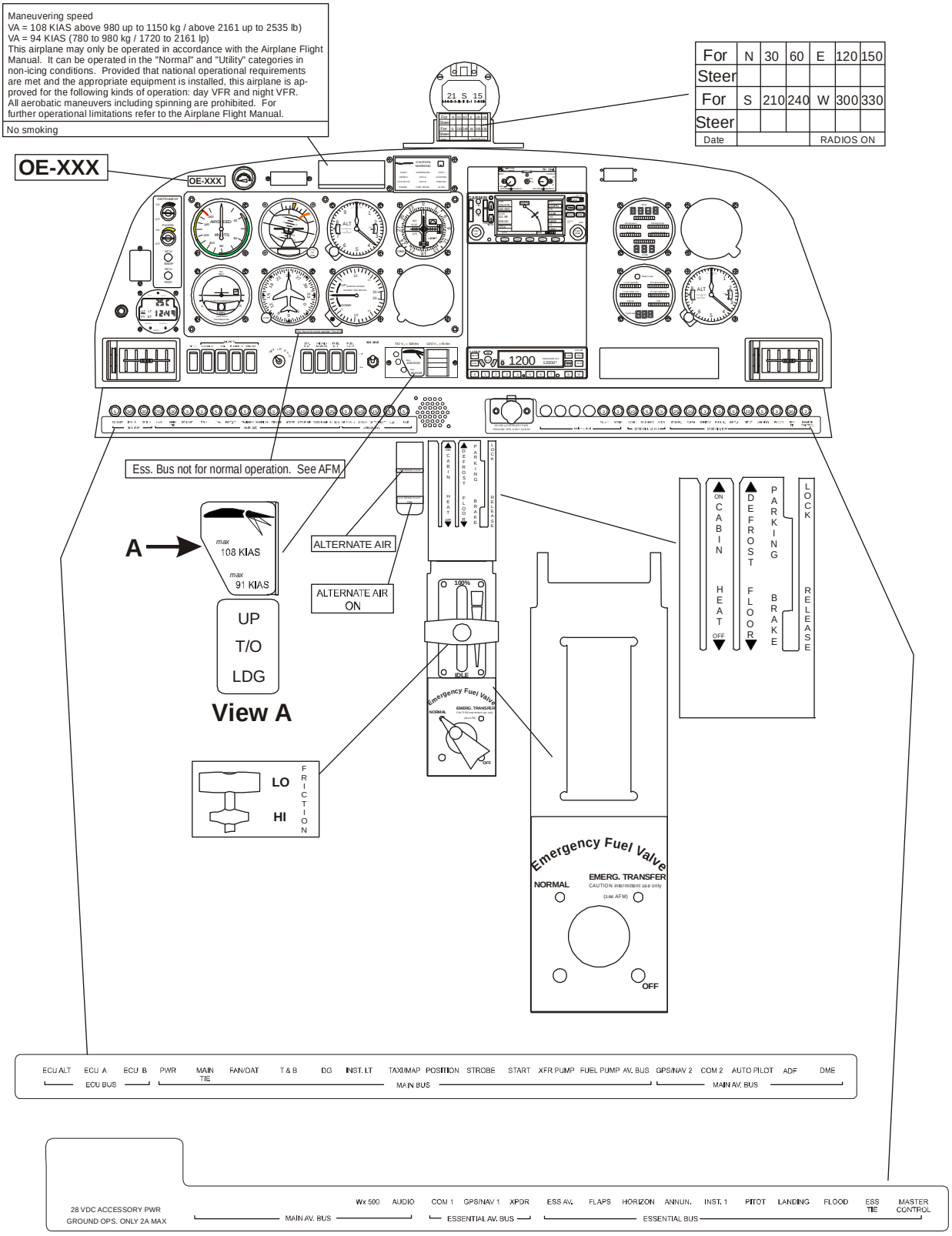


Figure 2: Instrument Panel Placards and Markings - Airplanes with the TAE 125 Diesel Engine Installed

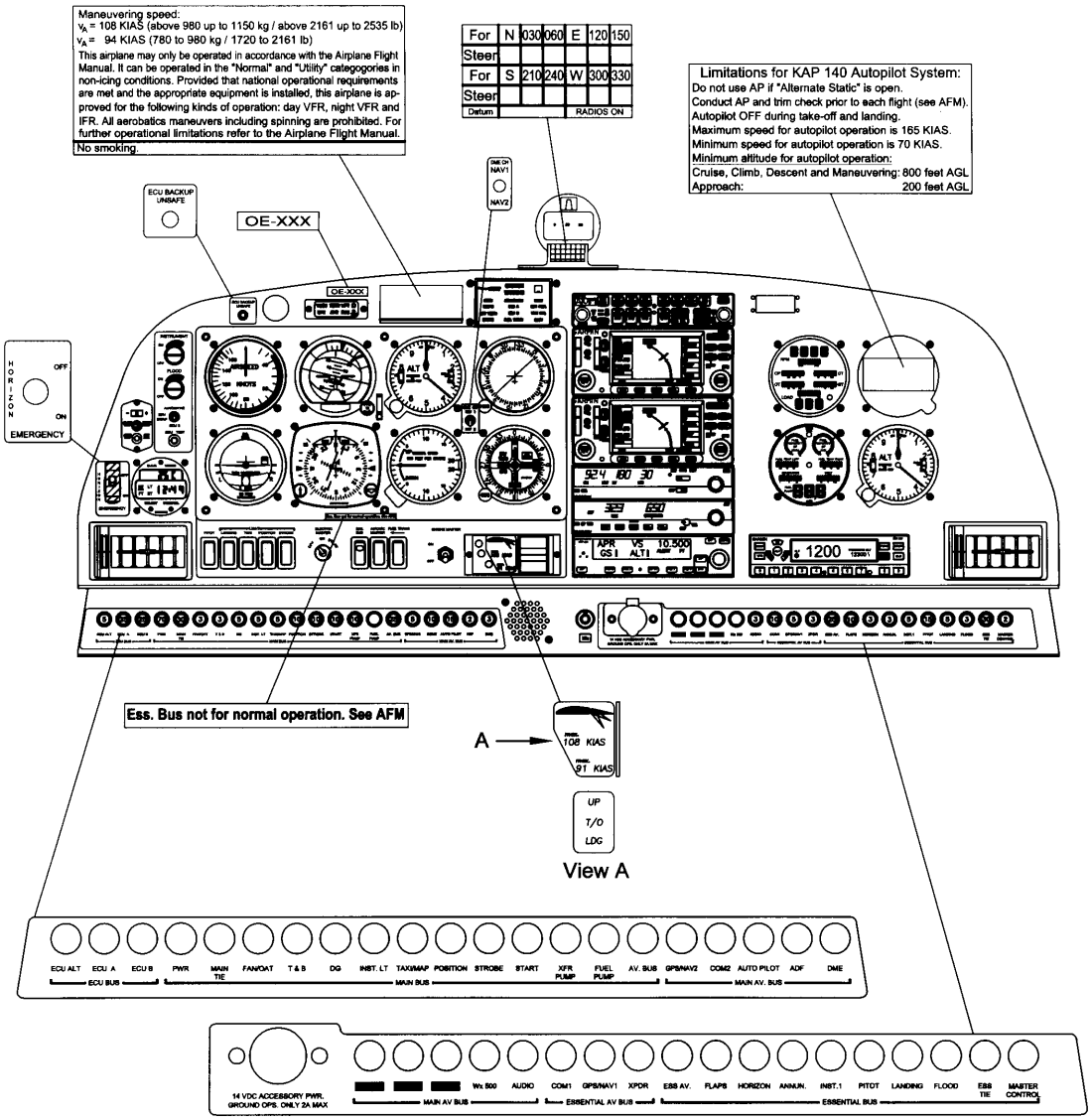


Figure 3: Instrument Panel Placards, IFR Version (OÄM 40-136)- Airplanes with the TAE 125 Diesel Engine Installed

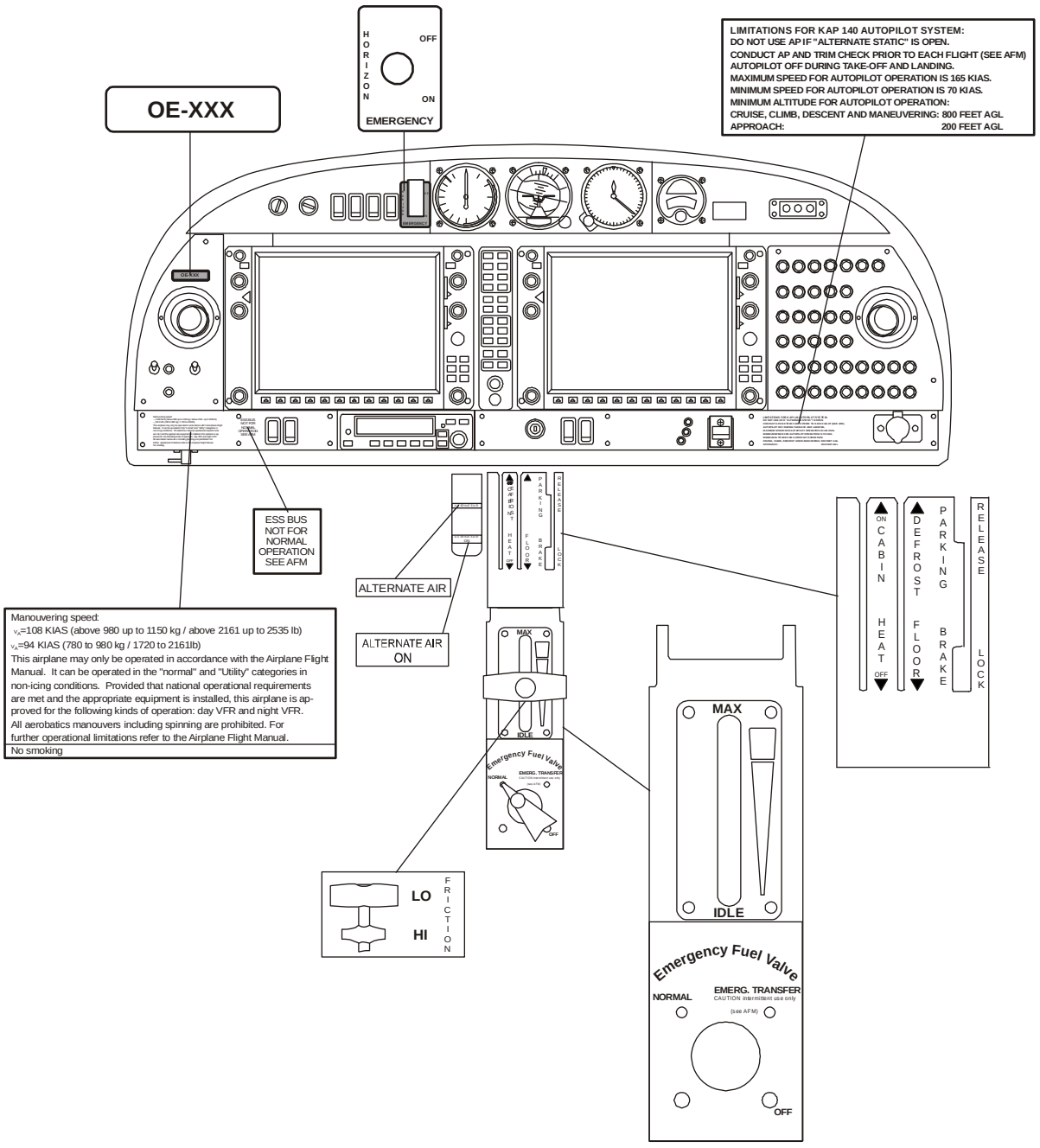


Figure 4: Instrument Panel Placards and Markings
Airplanes with the TAE 125 Diesel Engine and G1000 System Installed

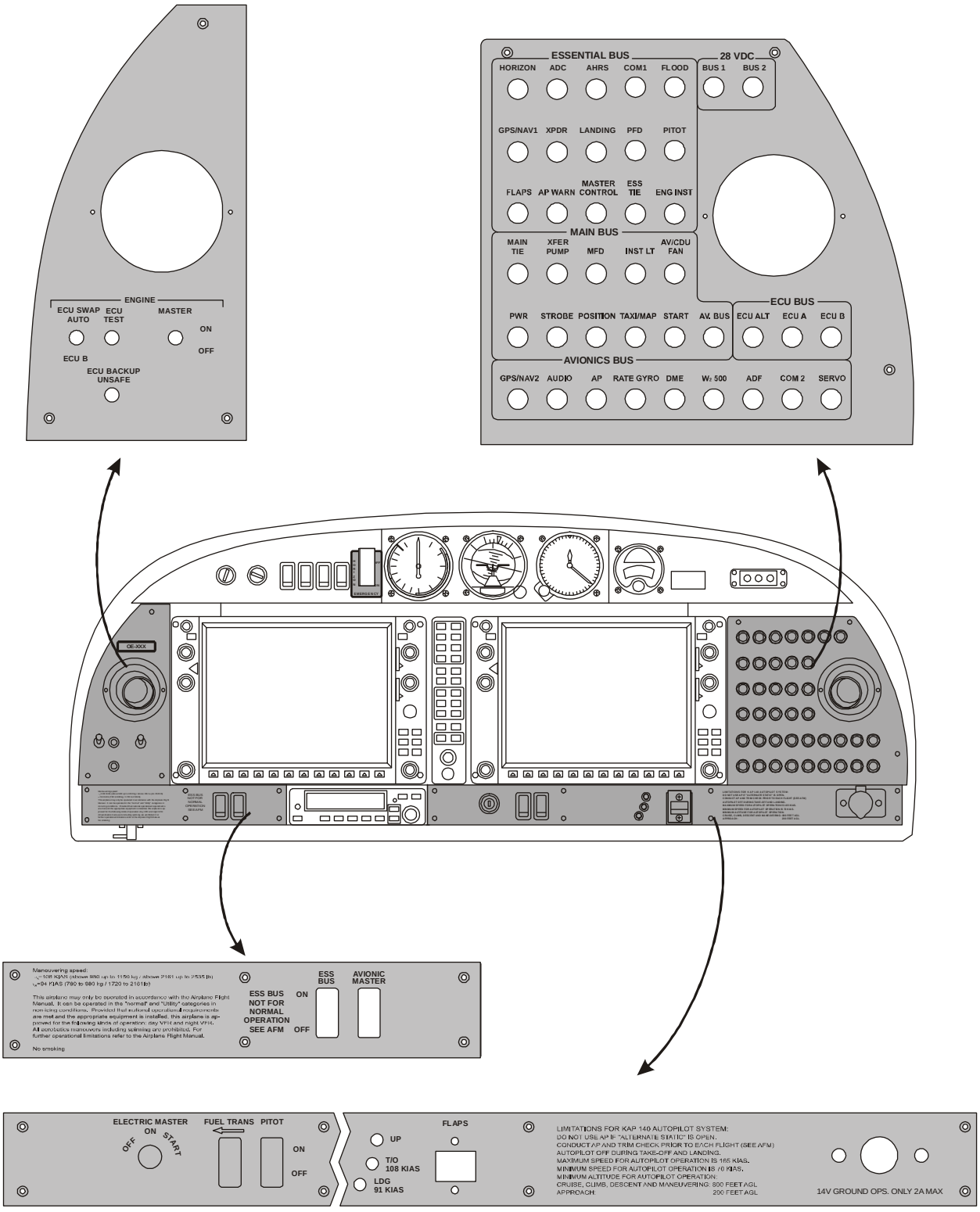


Figure 5: Placard Panels Sheet 1 (DA 40 D with G1000)

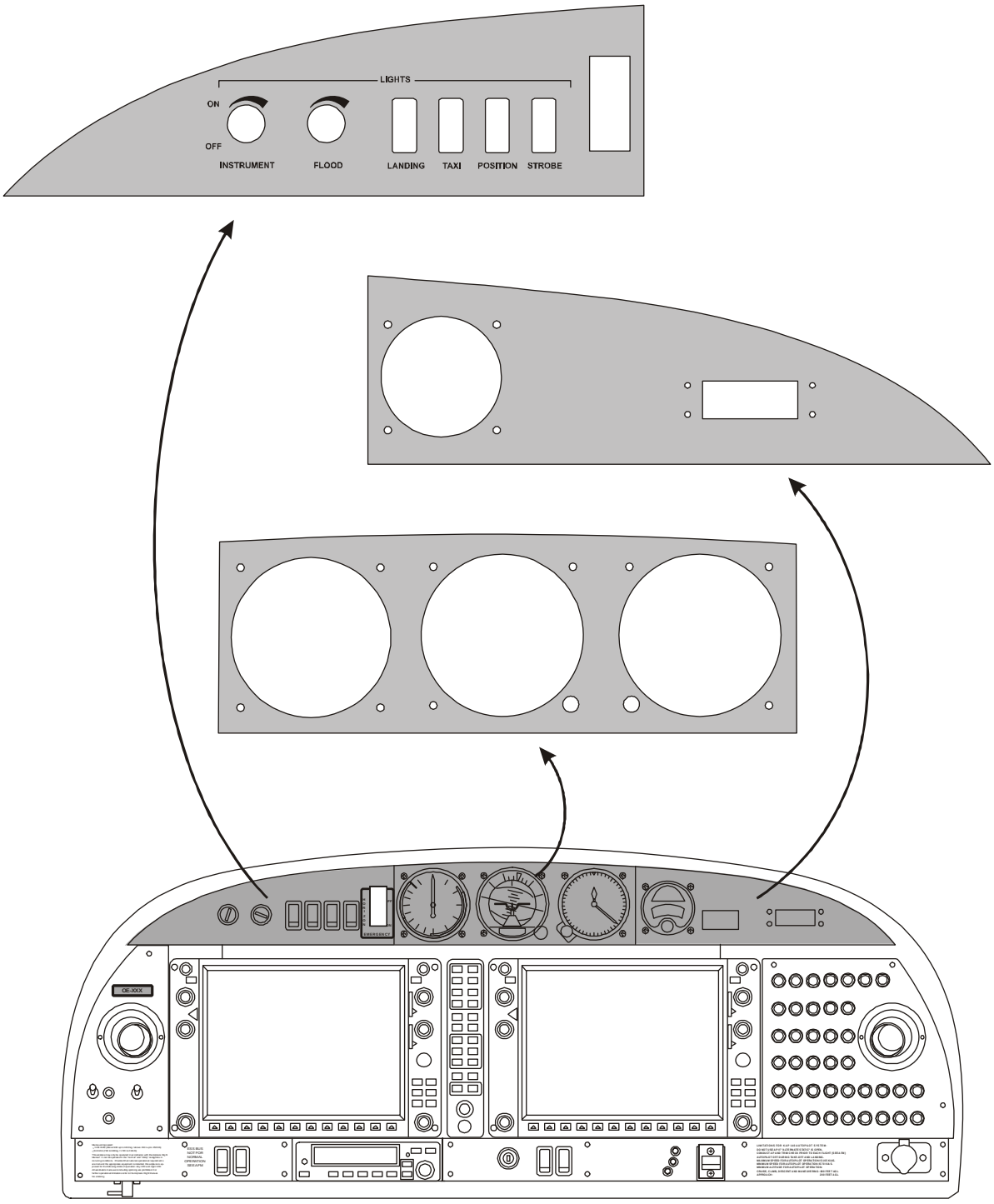


Figure 6: Placard Panels Sheet 1 (DA 40 D with G1000)

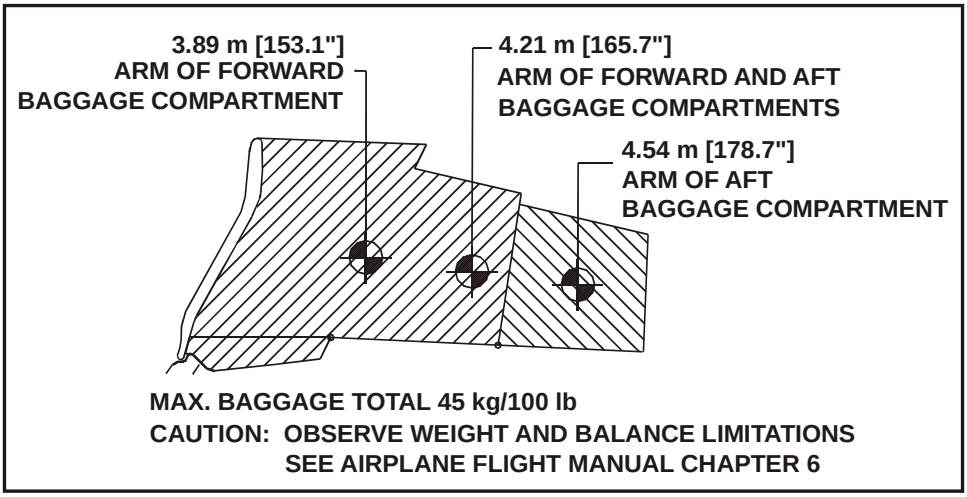


Figure 7: Placard on Baggage Extension (if OÄM 40-163&164 is installed)

Section 11-32
Interior Placards and Markings - Lycoming O-360-A4M Engine

1. General

Figure 1 shows the additional interior placards and markings for airplanes with the Lycoming O-360-A4M engine installed.

Next to the Fuel Prime Button:



Next to the CO Test/Reset Switch and Alert Indicator:



Next to the CO-Detector:



Figure 1: Placards for the Fuel Priming System and CO Detecting System of the DA 40 F

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CHAPTER 12

SERVICING

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CHAPTER 12
SERVICING

1. General

This Chapter gives these servicing tasks which apply to the whole airplane:

– Section 12-10. Replenishing procedures for fluid systems.

– Section 12-20. Lubrication data.

– Section 12-30. Cleaning and snow and ice removal.

The procedures for preventive and corrective maintenance of systems are given in the related Chapter of this manual. Refer to Chapter 05 for time limits and schedules.

Note: The designation of "left" and "right" as well as "forward" and "aft" is based on the airplanes direction of flight.

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Section 12-10
Replenishing

1. General

Use the procedures in this Section to replenish the fluid systems on the airplane. Figures 1 and 2 show the location of the servicing points.

2. Fuel System

A fuel tank is located inboard in each wing between the main spars. It consists of two or three interconnected chambers. Number of chambers and usable capacity are shown in the following table:

Engine Installed	Fuel Tank Version	Chambers per Tank	Usable Capacity per Tank	
			[US gal]	[liter]
Lycoming	Standard	2	20	76
Lycoming	Long Range (OÄM 40-071)	3	25	94
TAE	Standard	2	14	53
TAE	Long Range (OÄM 40-130)	2	19.5	74

Each wing has a fuel filler cap located on the top surface midway between the root and the tip. The filler cap is at the outboard end of the tank. A fuel tank drain is located below the wing just outboard of the wing root. Another drain is located below the front fuselage.

WARNING: DO NOT ALLOW FIRE, SPARKS OR HEAT NEAR FUEL. FUEL BURNS VIOLENTLY AND CAN CAUSE INJURY TO PERSONS AND DAMAGE TO THE AIRPLANE.

WARNING: DO NOT GET FUEL ON YOUR SKIN. FUEL CAN CAUSE SKIN DISEASE.

WARNING: CONNECT THE AIRPLANE AND THE FUEL SUPPLY VEHICLE TO ELECTRICAL GROUND BEFORE REFUELING. IF YOU DO NOT GROUND THE AIRPLANE, STATIC ELECTRICITY CAN CAUSE FIRE DURING REFUELING.

WARNING: MAKE SURE THAT A FIRE EXTINGUISHER IS AVAILABLE.

WARNING: TURN OFF ALL GROUND EQUIPMENT IN THE REFUELING AREA.

WARNING: DO NOT OPERATE ELECTRICAL SWITCHES IN THE AIRPLANE.

CAUTION: USE ONLY FUEL TYPES GIVEN IN CHAPTER 2 OF THE AIRPLANE FLIGHT MANUAL.

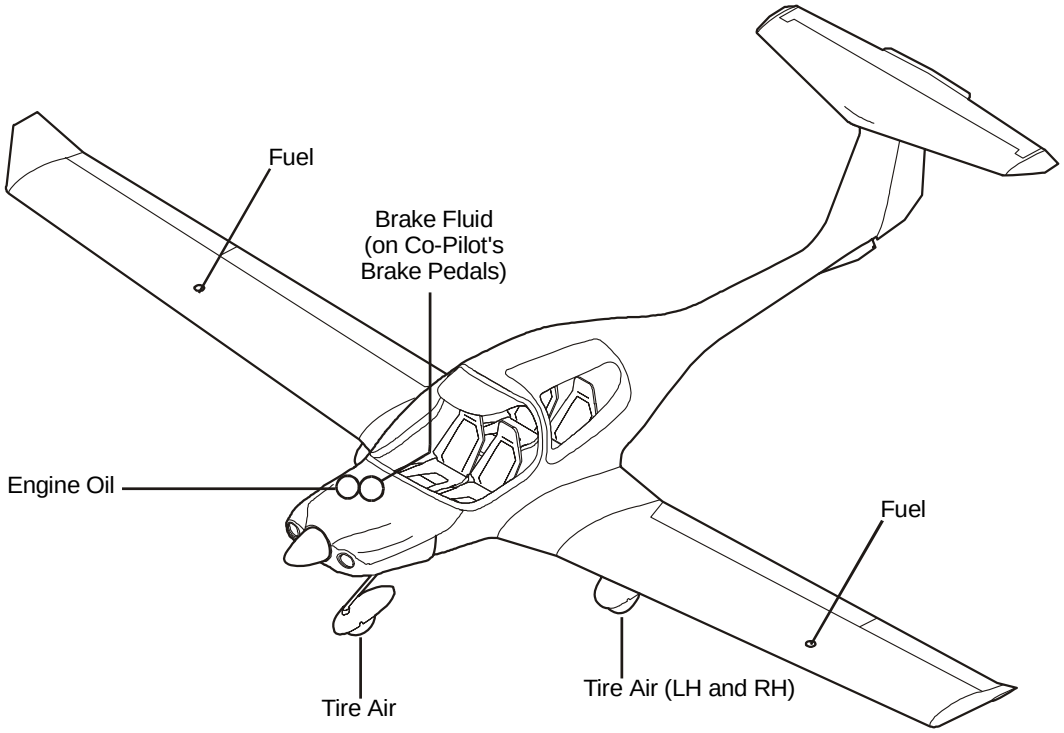


Figure 1: Replenishment Points, Lycoming Version

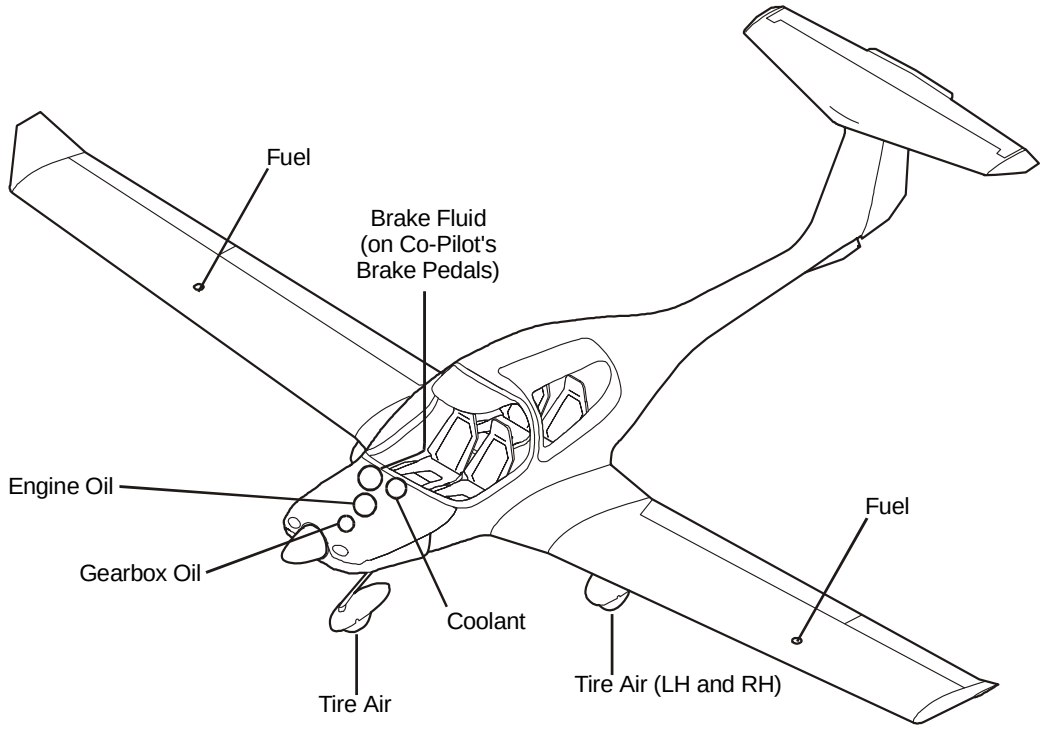


Figure 2: Replenishment Points, TAE Version

A. Refueling

	Detail Steps/Work Items	Key Items/References
(1)	Turn the engine off.	
(2)	Ground the airplane electrically.	At the unpainted area on the step, left or right.
(3)	Ground the refueling vehicle electrically.	
(4)	Remove the fuel filler cap.	
(5)	Refuel the airplane.	
(6)	Install the fuel filler cap.	Make sure that the fuel filler cap is locked.
(7)	Do items 4 to 6 for the other wing.	
(8)	Remove the ground cable from the airplane.	
(9)	Remove the ground cable from the refueling vehicle.	

B. Defueling

	Detail Steps/Work Items	Key Items/References
(1)	Ground the airplane electrically.	At the unpainted area on the step, left or right.
(2)	Put a container below the drain valve.	Make sure you have enough containers to hold the fuel.
(3)	Open the drain valve.	
(4)	When the fuel stops draining, close the drain valve.	
(5)	If necessary, do items 2 to 4 for the other wing.	
(6)	Remove the ground cable from the airplane.	

3. Fuel Contamination Test

Do this test each day you operate the airplane. Test fuel from both the wing tanks.

A. Equipment

Item	Quantity	Part Number
Sampling container.	1	Commercial.

B. Fuel Contamination Test Procedure

	Detail Steps/Work Items	Key Items/References
(1)	Put the sampling container under the drain valve in one wing.	
(2)	Open the drain valve.	
(3)	When the container is half full, close the drain valve.	
(4)	Wait for 1 minute.	
(5)	Examine the fuel: – It must be pale-blue or green (AVGAS). – It must be clear (JET A1 or Diesel Fuel). – Look specially for small drops of water at the bottom of the sampling container. – Look for small particles of solid material.	If you find any contamination of the fuel you must do the test again. If you still find contamination after three tests, you must drain the tank. Flush the tank and fill it with clean fuel.
(6)	Repeat steps (1) to (5) for the drain valve in the other wing.	
(7)	Repeat steps (1) to (5) for the drain valve at the gascolator.	Below the front fuselage.

4. Engine Oil System

WARNING: ENGINE OPERATION WITH NO ENGINE OIL (OR VERY LOW OIL LEVEL) WILL CAUSE ENGINE MALFUNCTION OR FAILURE.

The engines installed in the DA 40 have a wet-sump oil system. The oil capacities are given in the following table:

Engine installed	Oil Sump Capacity		Minimum Safe Quantity	
	[liter]	[US qts]	[liter]	[US qts]
Lycoming	7.6	8.0	3.8	4.0
TAE	6.0	6.3	4.5	4.8

A panel in the top cowling gives access to the filler (Figures 1 and 2).

The oil filler cap has a dip-stick attached. The Lycoming dip-stick is marked in US Quarts. The TAE dip-stick has only minimum and maximum markings.

Some oil consumption is normal. Measure the oil contents before each flight (or engine ground run-up). If necessary, fill the sump to the correct level.

A. Replenish the Engine Oil System

	Detail Steps/Work Items	Key Items/References
(1)	Open the access panel in the top cowling.	
(2)	Release the oil filler cap.	
(3)	Measure the oil contents: – Remove the filler cap with the dip-stick. – Clean the oil dip-stick. – Install the filler cap. – Remove the filler cap again. – Read the oil contents from the dip-stick.	The dip-stick is part of the filler cap.
	CAUTION: USE ONLY APPROVED ENGINE OIL. REFER TO CHAPTER 2 OF THE AIRPLANE FLIGHT MANUAL FOR APPROVED ENGINE OIL SPECIFICATIONS. IF YOU DO NOT USE APPROVED ENGINE OIL, THE ENGINE CAN BE DAMAGED.	
(4)	If necessary, fill the oil system to the correct level.	
(5)	Install the filler cap.	
(6)	Close the access panel in the cowling.	

5. Gearbox Oil (TAE Version only)

WARNING: ENGINE OPERATION WITH NO GEARBOX OIL (OR VERY LOW OIL LEVEL) WILL CAUSE ENGINE MALFUNCTION OR FAILURE.

The gearbox oil quantity is 1 liter (1.06 US qts). The gearbox oil level can be checked through an oil level window at the front side of the engine.

A. Replenish the Gearbox Oil System

CAUTION: IF THE GEARBOX OIL LEVEL IS LOW THE REASON MUST BE DETERMINED AND THE PROBLEM MUST BE CORRECTED BY AUTHORIZED PERSONNEL. REFER TO TAE SERVICE BULLETIN NO. 125-0003.

	Detail Steps/Work Items	Key Items/References
(1)	Remove the engine top cowling.	Refer to Section 71-11.
(2)	Remove the gearbox oil filler plug.	At the top of the gearbox. Remove the lock-wire.
CAUTION: USE ONLY APPROVED GEARBOX OIL. REFER TO CHAPTER 2 OF THE AIRPLANE FLIGHT MANUAL FOR APPROVED GEARBOX OIL SPECIFICATIONS. IF YOU DO NOT USE APPROVED GEARBOX OIL, THE ENGINE CAN BE DAMAGED.		
(3)	Refill gearbox oil.	Check level through oil level window.
(4)	Install the gearbox oil filler plug: – Tighten the plug. – Lock the plug with lock-wire.	Use a new seal washer.
(5)	Install the engine top cowling.	Refer to Section 71-11.

6. Coolant (TAE Version only)

WARNING: ENGINE OPERATION WITH NO COOLANT (OR VERY LOW COOLANT LEVEL) WILL CAUSE ENGINE MALFUNCTION OR FAILURE.

The coolant capacity is 6 liter (6.3 US qts). A coolant level sensor is installed in the coolant tank at the top rear of the engine. It operates the WATER LEVEL caution light in the Auxiliary Engine Display (AED). Refer to Section 75-01 for more details about the coolant system.

A. Replenish the Coolant System

CAUTION: IF THE COOLANT LEVEL IS LOW THE REASON MUST BE DETERMINED AND THE PROBLEM MUST BE CORRECTED BY AUTHORIZED PERSONNEL. REFER TO TAE SERVICE BULLETIN NO. 125-0003.

	Detail Steps/Work Items	Key Items/References
(1)	Remove the engine top cowling.	Refer to Section 71-11.
	WARNING: DO NOT REMOVE THE PRESSURE CAP FROM THE COOLANT TANK IF THE ENGINE IS HOT. THE PRESSURE IN THE SYSTEM CAN FORCE HOT COOLANT TO COME OUT AND BURN YOU.	
(2)	Remove the pressure cap from the coolant tank: – Turn the cap counter-clockwise a small distance to release the pressure. – When the pressure has fully released, turn the cap fully counter-clockwise.	

	Detail Steps/Work Items	Key Items/References
	CAUTION: USE ONLY APPROVED COOLANT. REFER TO CHAPTER 2 OF THE AIRPLANE FLIGHT MANUAL FOR APPROVED COOLANT SPECIFICATIONS. IF YOU DO NOT USE APPROVED COOLANT, THE ENGINE CAN BE DAMAGED.	
(3)	Fill the cooling system: – Open the bleed points on the cabin heat pipes. – Add coolant to the coolant tank. – When coolant comes from the bleed points without air bubbles, close the bleed points. – Install the cap to the coolant tank.	Allow time for the coolant to move through the system. Fill coolant tank to the top.
(4)	Do a ground run-up: – Let the coolant temperature rise up to the point where the coolant flows from the thermostat valve through the main circuit. – After shut-down, check for leaks.	To circulate and remove air. Repair any leaks.
(5)	Let the engine cool down.	
	WARNING: DO NOT REMOVE THE PRESSURE CAP FROM THE COOLANT TANK IF THE ENGINE IS HOT. THE PRESSURE IN THE SYSTEM CAN FORCE HOT COOLANT TO COME OUT AND BURN YOU.	
(6)	Remove the pressure cap from the coolant tank: – Turn the cap counter-clockwise a small distance to release the pressure. – When the pressure has fully released, turn the cap fully counter-clockwise.	
(7)	Check coolant level. Repeat items (5) to (8) until the system is completely de-aerated and full.	

	Detail Steps/Work Items	Key Items/References
(8)	Install the cap to the coolant tank.	
(9)	Install the engine top cowling.	Refer to Section 71-11.

7. Brake System

The brake fluid reservoirs are located on the brake master cylinders on the co-pilot's side. You get access in the cockpit below the instrument panel.

WARNING: DO NOT GET BRAKE FLUID ON YOUR SKIN OR IN YOUR MOUTH. BRAKE FLUID CAN CAUSE DISEASE.

CAUTION: REMOVE SPILLED BRAKE FLUID IMMEDIATELY. BRAKE FLUID CAN CAUSE DAMAGE TO PAINT AND OTHER MATERIALS.

A. Fill the Brake System Reservoirs

	Detail Steps/Work Items	Key Items/References
(1)	Clean the top of the brake fluid reservoir and filler cap.	
(2)	Remove the filler cap.	
(3)	Fill the reservoir to the correct level.	Use only MIL-H-5606A hydraulic fluid. 12 to 25 mm (0.5 to 1 in) below the top of the filler hole.
(4)	Install the filler cap.	

8. Tires

The DA 40 has these tires:

Main tires: (a) 6.00-6; 6PR, 120 mph
In combination with any MLG strut

(b) 6.00-6; 8PR, 120 mph

In combination with any MLG strut

(c) 15 x 6.0-6; 6PR;160 mph (OÄM 40-124)
Only in combination with the “thin”/”18 mm” (MÄM 40-123) or the “tall” (OÄM 40-283) MLG strut

Pressure: 2.5 bar (36 PSI)

Nose tire: 5.00-5: 6PR; 120 mph; pressure 2.0 bar (29 PSI)

A. Examine the Tires and Measure the Pressure

	Detail Steps/Work Items	Key Items/References
(1)	Examine the tires. Look specially for: – Cuts and friction damage. – Correct alignment of the slippage markers.	Move the airplane as necessary so that each part of each tire can be seen. If the slippage markers do not align, remove the wheel for shop maintenance.
(2)	Measure the tire pressure. If necessary, inflate the tires to the correct pressure.	Main tire: 2.5 bar (36 PSI). Nose tire: 2.0 bar (29 PSI).

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Section 12-20
Scheduled Servicing

1. General

This Section gives lubrication data. It tells you where components are located. It gives a list of approved lubricants. It also gives the components which MUST NOT be lubricated.

Most systems and components have maintenance-free bearings. These can be sealed ball/roller bearings or Teflon bushes. These bearings MUST NOT be lubricated. Table 1 shows the bearings which MUST NOT be lubricated.

Table 1 - Items which MUST NOT be Lubricated	
Rudder pedal sled.	DO NOT LUBRICATE
Flap rod-end bearings.	DO NOT LUBRICATE
Aileron rod-end bearings.	DO NOT LUBRICATE
Elevator rod-end bearings.	DO NOT LUBRICATE
Throttle control cable, propeller control cable and mixture control cable (Lycoming version only). (See Note 7).	DO NOT LUBRICATE
Elastomeric spring. (See Note 8).	DO NOT LUBRICATE

2. Lubrication Schedule

Table 2 shows the lubrication schedule. Clean each lubrication point before lubrication.

See Figures 1 and 2 for the location of lubrication points listed on the left side of the table. The center columns show the type of lubricant. The right column shows the lubrication interval.

Table 2 - Lubrication Schedule

Location		Type of Lubricant						Interval
No.	**See Figures 1 and 2**	**1**	**2**	**3**	**4**	**5**	**6**	**(Hours)** see Notes (1), (2)
1.	Brake pedal pivot		●					200
2.	Rudder cable S-tubes			●				200
3.	Flap actuator extension rod			●				200
4.	Passenger door safety button (red)				●			200
5.	Upper rudder pivot bearing	●						200
6.	Nose wheel bearing (See Notes 3, 5 and 6)	●						200
7.	Wing main bolts	●						1000
8.	Battery terminals				●			1000
9.	B-bolts	●						1000
10.	B-bolt spherical bearings	●						1000
11.	A-bolts	●						1000
12.	A-bolt spherical bearings	●						1000
13.	Brake pedal pivot shaft interior					●		1000
14.	Flap actuator universal pivot block	●						1000
15.	Brake caliper locating pins						●	1000
16.	Stick support pivot pins	●						1000
17.	Main wheel bearings (See Notes 3, 5 and 6)	●						200
18.	Cable eyes on rudder	●						200

Notes:

(1) Lubricate at the time shown or at every disassembly/assembly.

(2) Lubricate more frequently in severe climates or operating conditions.

(3) Lubricate at the time shown and at Annual Inspection.

(4) Do not get grease on the threads. It will reduce the friction of the lock-nut.

CAUTION: DO NOT MIX AVIATION WHEEL BEARING GREASES WITH EACH OTHER. IF USING OTHER APPROVED GREASES, COMPLETE REMOVAL OF CONTAINED GREASE AND BEARING CLEANING IS REQUIRED. REPLACEMENT OF PREVIOUSLY LUBRICATED FELT GREASE SEALS IS ALSO REQUIRED.

(5) The wheel manufacturer lubricates the main wheel bearings with Mobil Aviation Grease SHC 100.

(6) On airplanes registered in the USA, lubricate the wheel bearings at every annual/100 hour inspection (see FAR 43, Appendix D).

(7) The throttle control cable is sealed and maintenance free.

(8) The elastomeric spring is maintenance free.

Table 3 - Lubricant Specifications		
Specification	**Product**	**Manufacturer**
TYPE 1		
MIL-G-3545 (obsolete)	AeroShell Grease 5 (Warm climates only)	Shell Oil Company
GOST 6267-74	Grease CIATIM 201	RUSMA LLC Company
GOST 9433-80	Grease CIATIM 221	RUSMA LLC Company
	Mobil Aviation Grease SHC100	Exxon Mobil Company
MIL-PRF-81322F Grade 2	AeroShell Grease 22	Shell Oil Company
TYPE 2		
MIL-L-7870	Royco 363	Royal Lubricants Co. Inc.
	Brayco 363	Bray Oil Co.
	LPS 2 (Warm climates only)	LPS
TYPE 3		
Greaseless Lubricant	LPS 1	
TYPE 4		
VV-P-236 (Petrolatum)	Royco 1	Royal Lubricants Co. Inc.
	DC 4	Dow Corning
TYPE 5		
MIL-C-16173 (Gade 2)	LPS 3	LPS
TYPE 6		
MIL-A-907	Loctite Antiseize 767	Loctite

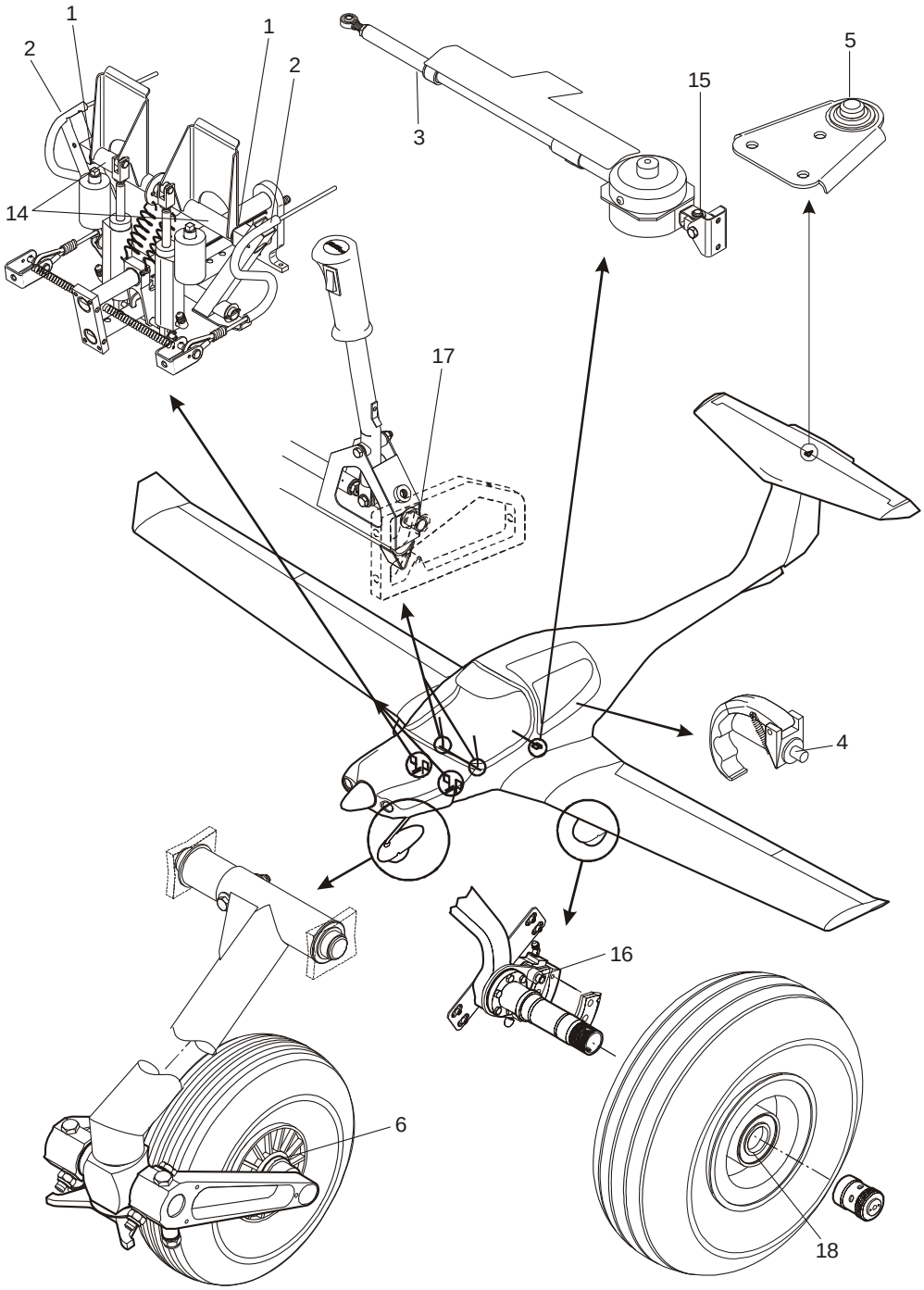


Figure 1: Lubrication Points Sheet 1

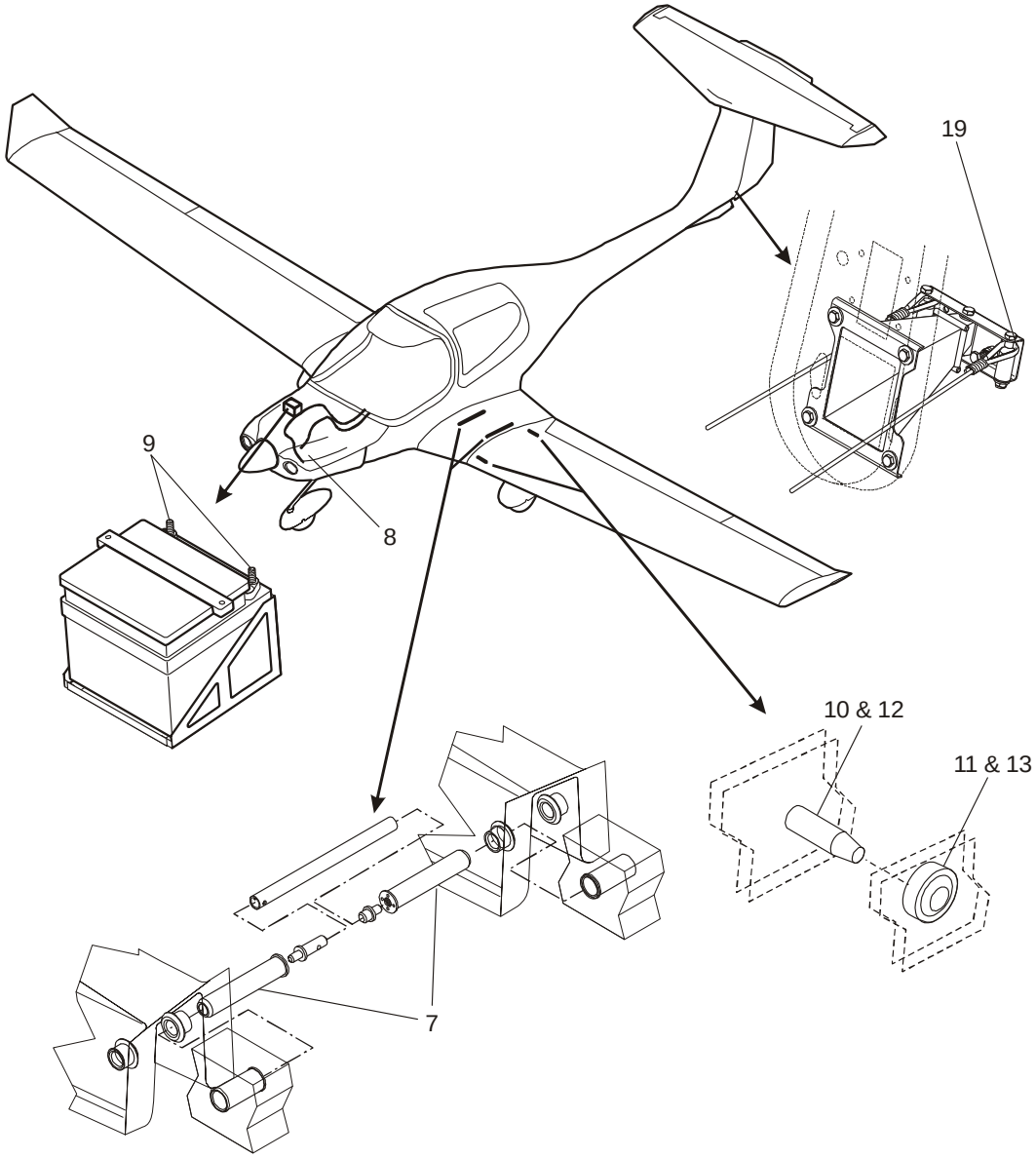


Figure 2: Lubrication Points Sheet 2

Section 12-30
Unscheduled Servicing

1. General

This Section tells you how to clean the airplane. It also tells you how to remove snow and ice from the airplane.

2. Exterior Cleaning

The outer surfaces of the DA 40 must be kept clean to keep the good performance characteristics of the airplane. The leading edges of the wings are specially important.

Protect all control surface bearings and other lubricated components before cleaning the airplane.

Use large quantities of water to clean the airplane. If necessary, add a mild cleaning agent to the water. Remove excess dirt or dead insects immediately after flight. Dried-on dirt is difficult to remove.

CAUTION: DO NOT USE CLEANING OR POLISHING AGENTS WHICH CONTAIN SILICONE. IF THE AIRPLANE NEEDS REPAIR, SILICONE CAN PREVENT REPAIR MATERIALS FROM BONDING CORRECTLY.

Approximately once a year, apply a silicone-free automotive polish to the outer surface.

3. Canopy Cleaning

CAUTION: DO NOT RUB THE CANOPY WHILE IT IS DRY. DO NOT USE DIRTY CLOTHS OR SPONGES. THE ACRYLIC CANOPY SCRATCHES VERY EASILY WITH EVEN THE SMALLEST PARTICLES OF DUST.

Clean the canopy with large quantities of water. Use clean sponges and a good chamois leather which is not used for any other purpose.

Polish dull or scratched areas using a special acrylic cleaner. Remove scratches with special polishing emery cloth (e.g. Micro-mesh).

4. Interior Cleaning

Clean the interior with a flame-proof vacuum cleaner.

All instruments can be cleaned using a soft dry cloth, plastic surfaces should be wiped clean using a damp cloth without any cleaning agents.

CAUTION: The PFD and MFD displays of the Garmin G1000 (optional equipment) use a lens coated with a special anti-reflective coating that is very sensitive to skin oils, waxes, and abrasive cleaners. CLEANERS CONTAINING AMMONIA WILL HARM THE ANTI-REFLECTIVE COATING. It is very important to clean the lens using a clean, lint-free cloth and an eyeglass lens cleaner that is specified as safe for anti-reflective coatings.

5. Engine Cleaning

Use a cold cleaning agent to clean the engine.

CAUTION: DO NOT LET THE CLEANING AGENT GET INTO ELECTRICAL COMPONENTS AND ENGINE INTAKES.

CAUTION: DO NOT START THE ENGINE UNTIL ALL OF THE CLEANING AGENT HAS EVAPORATED.

Protect all electrical components and engine intakes with polythene bags or other means. Obey the cleaning agent manufacturer's instructions. Refer to the engine manufacturer's Maintenance Instruction Manual for more data.

6. Ice and Snow Removal

Remove snow and ice as soon as possible to prevent melted water from freezing later and causing damage.

CAUTION: DO NOT USE SHARP OBJECTS TO REMOVE SNOW OR ICE. YOU CAN DAMAGE THE AIRPLANE STRUCTURE.

CAUTION: ONLY USE APPROVED DE-ICING FLUIDS. SEE AIRPLANE FLIGHT MANUAL, LATEST REVISION.

Use soft brushes to remove snow from the surfaces.

Put the airplane in a heated hangar to remove ice or spray de-icing fluid onto ice-covered surfaces using a suitable spray bottle. For approved de-icing fluids refer to AFM, Section 8.6.

Use a soft piece of cloth to wipe the airplane dry.

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CHAPTER 20

STANDARD PRACTICES

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CHAPTER 20

STANDARD PRACTICES

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CHAPTER 20
STANDARD PRACTICES

Section 20-00
Standard Practices - Airframe

1. General

There are no Maintenance Practices which apply to the DA 40 airframe and its systems in general. This Chapter only has data about standard threaded fasteners.

Always tighten the nut or bolt to the torque shown in the tables below. Always use the correct locking device with the nut or bolt.

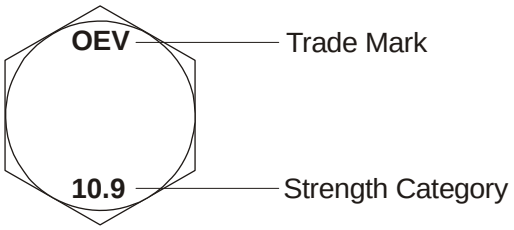
CAUTION: DISCARD SELF-LOCKING NUTS AFTER REMOVAL. THE FRICTION TORQUE REDUCES WITH USE.

2. Bolt and Nut Types Used in the Airplane

The DA 40 uses three types of standard bolts: DIN 931 and LN9037 metric specifications and AN3 through AN20 American specifications. You can identify the bolt type by the marking on the head and the surface treatment.

A. DIN Bolt

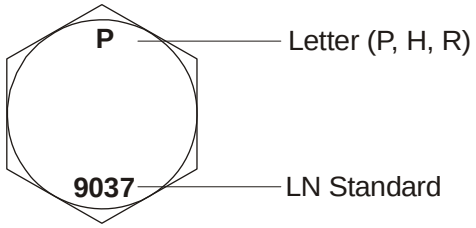
Bolt Head Identification



Surface Treatment - Galvanized

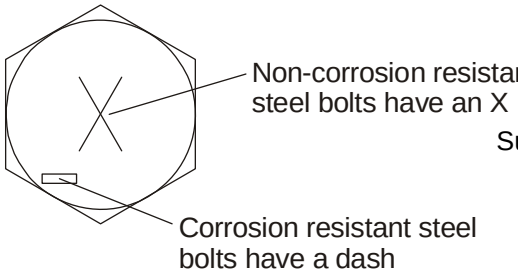
B. LN Bolts

Bolt Head Identification



C. AN Bolts

Bolt Head Identification



The DA 40 uses these types of standard nuts: DIN 934, DIN 985, AN364, AN365, MS21042, MS21044.

3. Standard Torque Values

These tables show the correct torque values for bolts and nuts to AN and DIN specifications. Use the following torque values for all bolts, nuts and screws which meet the specifications unless they are in the list of special torque values below.

A. AN Fine Thread Series

Bolt Size	Torque (Nm)	Torque (lbf.ft.)
10 - 32	1.6	1.2
1/4 - 28	6.2	4.6
5/16 - 24	13.6	10
3/8 - 24	20.7	15.3
7/16 - 20	37.7	27.8
1/2 - 20	54.2	40
9/16 - 18	90.4	66.7
5/8 - 18	124.3	91.7

B. AN Coarse Thread Series

Bolt Size	Torque (Nm)	Torque (lbf.ft.)
10 - 24	1.6	1.2
1/4 - 20	5.7	4.2
5/16 - 18	10.2	7.5
3/8 - 16	20.9	15.4
7/16 - 14	28.9	21.3
1/2 - 13	54.2	40
9/16 - 12	79	58.3
5/8 - 11	101.6	75

C. DIN and LN Specifications

Metric Thread	Torque (Nm)	Torque (lbf.ft.)
M4	1.8	1.3
M5	3.6	2.7
M6	6.4	4.7
M8	16	11.8
M10	32	23.6
M12	60	44.3

4. Special Torque Values

Part		Torque (Nm)	Torque (lbf.ft.)
Propeller to engine bolts.	Lycoming version	85 - 90	62.7 - 66.4
	TAE version	45 - 47	33.2 - 34.6
Spark plugs (Lycoming version only).		47	34.6
Bolts attaching the engine to the shock mount.	Lycoming version	55	40.6
Bolts attaching the engine mount to the firewall.		40	29.5
Nose wheel fork pivot nut.		Refer to the procedure given in Section 32-40.	
Main landing gear outer attaching bolts.	unloaded	20	14.8
	at static load	18	13.3
Main landing gear inner attaching bolt.	height of spring washers	4 mm (+0.5 mm / -0 mm)	0.16 in (+0.02 in / -0 in)
Main wheel.		Refer to the procedure given in Section 32-10.	
Nose wheel.		Refer to the procedure given in Section 32-40.	
Horizontal stabilizer attaching bolts.		45	33.2
Fuel drain valve.		1 - 3	0.7 - 2.2

5. Torque Measurement

For self-locking nuts, add the torque value of the locking device (friction or brake torque) to the value in the table. Read the friction value from the torque wrench before the nut seats.

Where a bolt is tightened from the bolt-head, add the value of the shaft friction (the friction of the bolt in the attached part) to the value in the table. Read the friction value from the torque wrench before the bolt seats.

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Section 20-30
Standard Practices - Electrical

1. General

This Section gives you the standard practices for the electrical system. Modern airplanes reliability depends on proper function of the electric and electronic systems to a greater extent than previous certified airplanes. Maintenance carried out must be of good workmanship strictly considering the guidelines of AC 43-13.1B.

The satisfactory performance of a modern airplane, like the DA 40, depends to a great extent, on reliability of its electrical systems. Improperly or carelessly maintained wiring can be a source of potential danger, and many malfunctions and failures of an electrical system can be traced to this cause. The continued proper performance of the electrical systems depends on the knowledge of the personal who do the inspection and repair.

It is therefore important that maintenance is carried out in accordance with the best available techniques and properly trained maintenance personal, in order to eliminate possible failures.

2. Thread Locking

Many electrical terminals are locked with electrical varnish or lacquer. If you release a terminal that has been thread locked with lacquer or varnish then use Loctite 222 or equivalent to lock the thread when you re-assemble the terminal.

3. Repair and Maintenance

Repair and maintenance of the electrical system wiring, not covered in a separate document (e.g. Service Bulletin, Work Instruction) is limited to the extent of:

– Replacement of wires and cables.

– Replacement of ring terminals.

– Replacement of crimp contacts.

A. Crimp Tools

Following crimp tools are commonly used for crimp contacts in the DA 40. Refer to the equipment manufacturer for more details of the tools and their use.

– Tyco, P/N 69478-1

– Tyco CERTI-LOK, P/N 169400

– Tyco SUPER CHAMP FT, P/N 720781-3

– Tyco CERTI-CRIMP, P/N 91523-1

– Tyco CERTI-CRIMP, P/N 91512-1

– Commercial, M22520/1-01

– Commercial, M22520/2-01

– Commercial, M22520/37-01

B. Wires and Cables

(1) Wires

For the purpose of electric and electronic installation, an insulated wire consists of a metal conductor covered with a dielectric or insulating material. Wires used in the airplane contain stranded conductors for flexibility. The insulation may consist of several materials and layers to provide:

– Dielectric insulation.

– Thermal protection.

– Abrasion resistance.

– Moisture resistance.

– Fluid resistance.

Approved wires for the DA 40:

– M22759/16.

– M22759/34.

– M25038/3.

(2) Cables

The term “cable”, may refer to any of the following:

– Two conductors twisted together (twisted pair).

– A single center conductor with a metallic braided outer conductor (coaxial cable).

– Two or more insulated conductors contained in a common covering (multi conductor cable).

– One or more insulated conductors with an overall shield (shielded cable).

Approved cables for the DA 40 are:

– M27500.

– M17/60-RG142.

– M17/128-RG400.

(3) Wire Marking

Locating a specific wire within a large wiring loom would be extremely difficult without individual identification of each wire, or cable. To simplify maintenance, each interconnecting wire and cable installed in the airplane is marked with a combination of numbers and letters. If a wire or cable must be replaced, the wire must be marked according to the wiring diagrams in Chapter 92.

C. Testing

After a wire, cable or ring terminal has been replaced, testing must be done as listed below:

– Visual inspection of the crimp connection (all leads within the crimp, insulation not crimped etc.).

– Check for continuity between the two ends of the conductor.

– Check for NO continuity between the conductor and airplane electrical ground.

– The crimp contact is not damaged of bend.

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CHAPTER 21

AIR CONDITIONING

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CHAPTER 21
AIR CONDITIONING

Section 21-00
Air Conditioning - Lycoming Engine

1. General

This Section gives you the system description and operation of the air conditioning system for airplanes with the Lycoming engine installed. It also gives the trouble-shooting. Refer to Section 78-00 for more maintenance data on the exhaust muffler part of the heat-exchanger.

2. Description and Operation

The DA 40 with the Lycoming engine installed has two separate systems for heating and cooling/ventilating the cockpit. Figure 1 shows the heating system. Figure 2 shows the cooling and ventilation system.

A. Cabin Heating

Air enters the system through an intake at the front right of the engine cowling. A metal adaptor and flexible hose connects the intake to a heat-exchanger on the engine exhaust muffler. A small hose from the side of the adaptor connects to the back of the electric alternator at the front of the engine.

A shroud round the exhaust muffler and the outside wall of the muffler make the heat exchanger. You can remove the shroud to inspect the muffler for cracks. The shroud has connections for the inlet hose and an outlet hose.

The outlet hose connects to a heat valve on the firewall. A flap inside the heat valve can connect the heat valve outlet to atmosphere or to a distributor valve on the rear face of the firewall. A lever in the cockpit controls the flap. The lever is marked ‘CABIN HEAT, ON OFF’.

The distributor valve also has a flap. The flap can connect the valve inlet to the pilot and passenger floor areas or the front of the canopy. A lever in the cockpit controls the flap. The lever is marked ‘CABIN HEAT’ ▲▼.

Cold ambient air enters the air intake on the engine cowling. The air flows to the heat-exchanger on the exhaust muffler. The air goes between the shroud and the muffler. Heat from the outer face of muffler makes the air hot. The air flows to the heat valve.

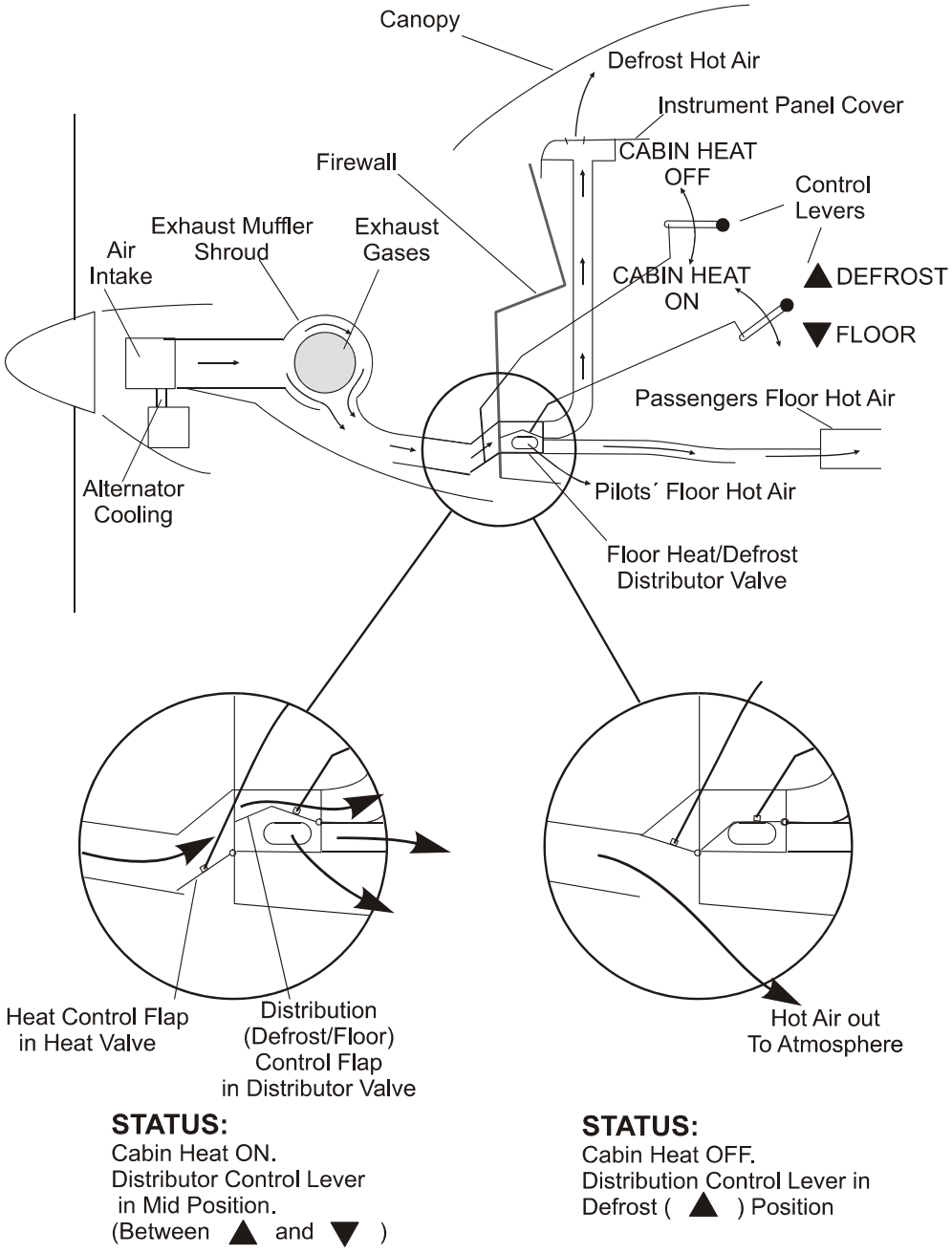


Figure 1: Cabin Heating System Schematic

If the heat valve is set to OFF, the flap sends the air overboard at the bottom of the engine cowling. If it is set to ON, the hot air goes through the firewall to the distributor valve. The valve can be set to any position between OFF and ON. If the valve is set to a middle position, only part of the airflow goes to the distributor valve.

If the distributor valve is set to ▼, air flows to the pilots' and passengers' footwells. If it is set to ▲, the air flows to the front of the canopy. This prevents mist or frost from forming on the canopy. The valve can be set to any position between ▼ and ▲. If the valve is set to a middle position, part of the airflow goes to the footwells and part to the canopy.

B. Cooling and Ventilation

(1) Standard Cooling and Ventilation System

Figure 2 shows the cooling and ventilation system. Air enters the system at a NACA air inlet below the leading edge of the left stub-wing. The front main bulkhead and the inner and outer closing ribs make a collector box. Air can only leave the area through an opening in the front closing rib.

The front of the rib connects to a pipe across the fuselage. The pipe also connects to the front closing rib of the right stub-wing.

The top part of the front closing rib on each side connects to the fuselage side ducts. The side ducts connect to the roll bar. The side ducts and roll bar have adjustable outlets.

Air enters the system through the NACA air inlet. It flows through the left front closing rib and across the fuselage. The pilots can control the floor panel outlets to give cool air as necessary. Some air also flows across to the right front closing panel.

Air from both front closing panels can flow up through the fuselage side ducts. Adjustable outlets in the cockpit allow the pilots or passengers to control cool air flow into the cockpit. Four adjustable outlets in the roll bar give cool air to the passengers.

Both hot and cold air leave the cockpit through holes in the baggage compartment frame. The air flows through the rear fuselage and leaves the airplane through the gap between the fuselage and the rudder.

(2) Additional Ventilation System (optional, OÄM 40-099)

Air enters the system at two NACA air inlets in the front fuselage on the left and right side. Hoses connect the air inlets to two adjustable outlets in the bottom instrument panel.

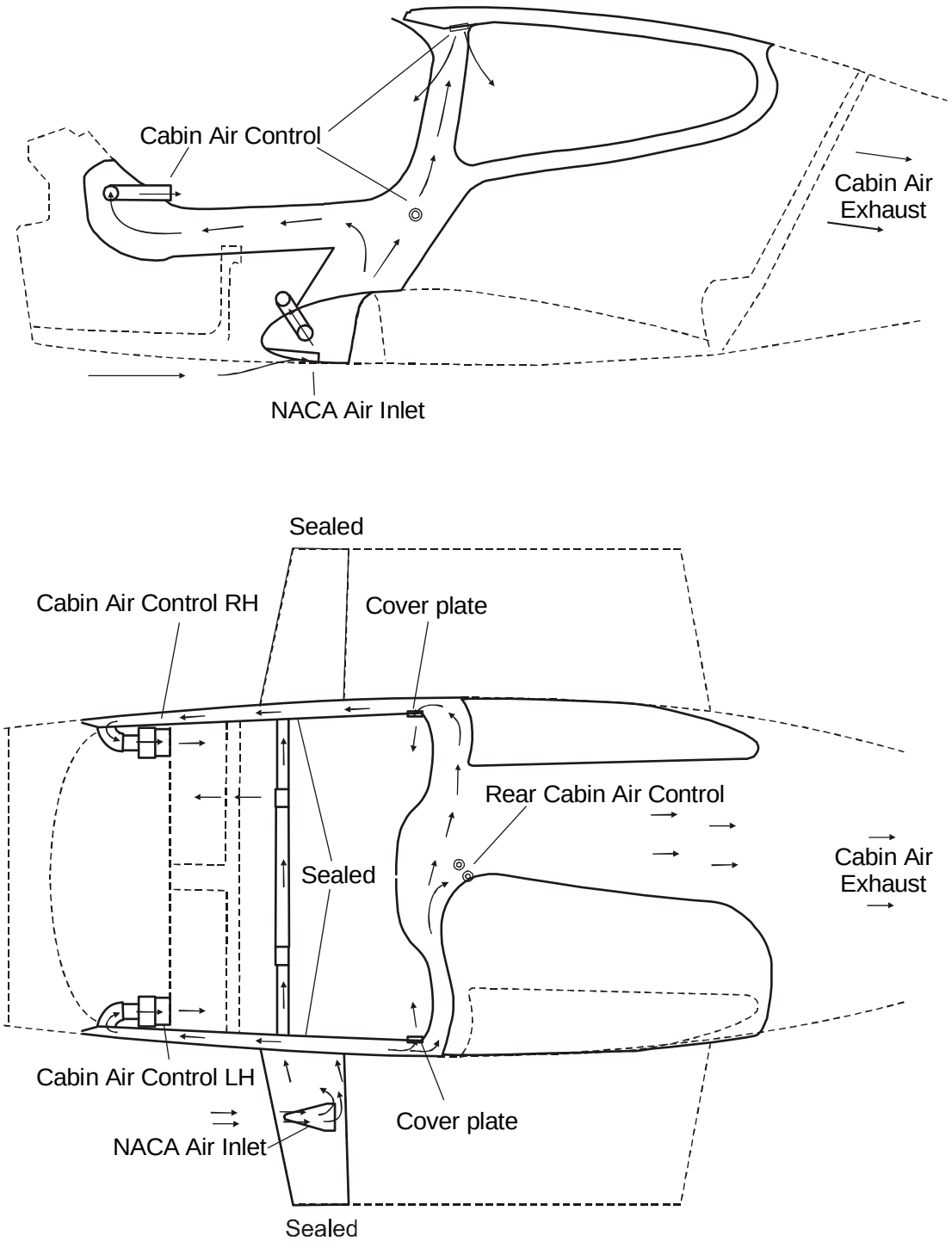


Figure 2: Cabin Ventilation System Schematic, Lycoming Version

Trouble-Shooting

1. General

This table tells you how to trouble-shoot the air conditioning system. If you have the trouble detailed in the Trouble column read across to the Possible Cause column. Then do the repair given in the Repair column.

Trouble	Possible Cause	Repair
Carbon Monoxide detector becomes dark.	Exhaust muffler cracked.	Replace or repair the exhaust muffler. (Refer to Chapter 78).
Carbon Monoxide detector visual alert. (DA 40 F only).	Exhaust muffler cracked.	Replace or repair the exhaust muffler. (Refer to Chapter 78).
Burning smell in the cockpit.	Exhaust muffler cracked.	Replace or repair the exhaust muffler. (Refer to Chapter 78).
Heating system supplies warm air when set to OFF.	Heat valve control cable out of adjustment. Heat valve control cable broken.	Adjust the heat valve control cable. Replace the heat valve control cable.
No hot air flows to the canopy.	Distributor valve control cable out of adjustment. Distributor valve control cable broken.	Adjust the distributor valve control cable. Replace the distributor valve control cable.
No hot air flows to the footwells.	Distributor valve control cable out of adjustment. Distributor valve control cable broken.	Adjust the distributor valve control cable. Replace the distributor valve control cable.
No cool air from 1 outlet. Other outlets operate correctly.	Outlet defective.	Replace the cool air outlet.

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Maintenance Practices

1. General

This Section gives you the Maintenance Practices for the cabin heating system and tells you how to replace outlets for the cooling system. Refer to Section 78-00 for maintenance data on the exhaust muffler part of the heat-exchanger.

2. Remove/Install the Heat Valve

Refer to Figure 3.

A. Remove the Heat Valve

	Detail Steps/Work Items	Key Items/References
(1)	Remove the engine cowlings.	Refer to Section 71-10 or 71-12.
WARNING:	**IF THE ENGINE HAS BEEN RUNNING, TAKE CARE WHEN YOU TOUCH THE HEAT VALVE. THE HEAT VALVE GETS HOT.**	
(2)	Release the worm drive clamp which holds the flexible hose to the heat valve. Then disconnect the hose from the valve.	
(3)	Set the CABIN HEAT control lever to ON.	
(4)	Loosen the screw which holds the control cable to the swivel fitting in the heat valve.	Access through the front of the valve.
(5)	Remove 5 bolts and washers which attach the heat valve to the firewall.	
(6)	Remove the heat valve from the firewall.	

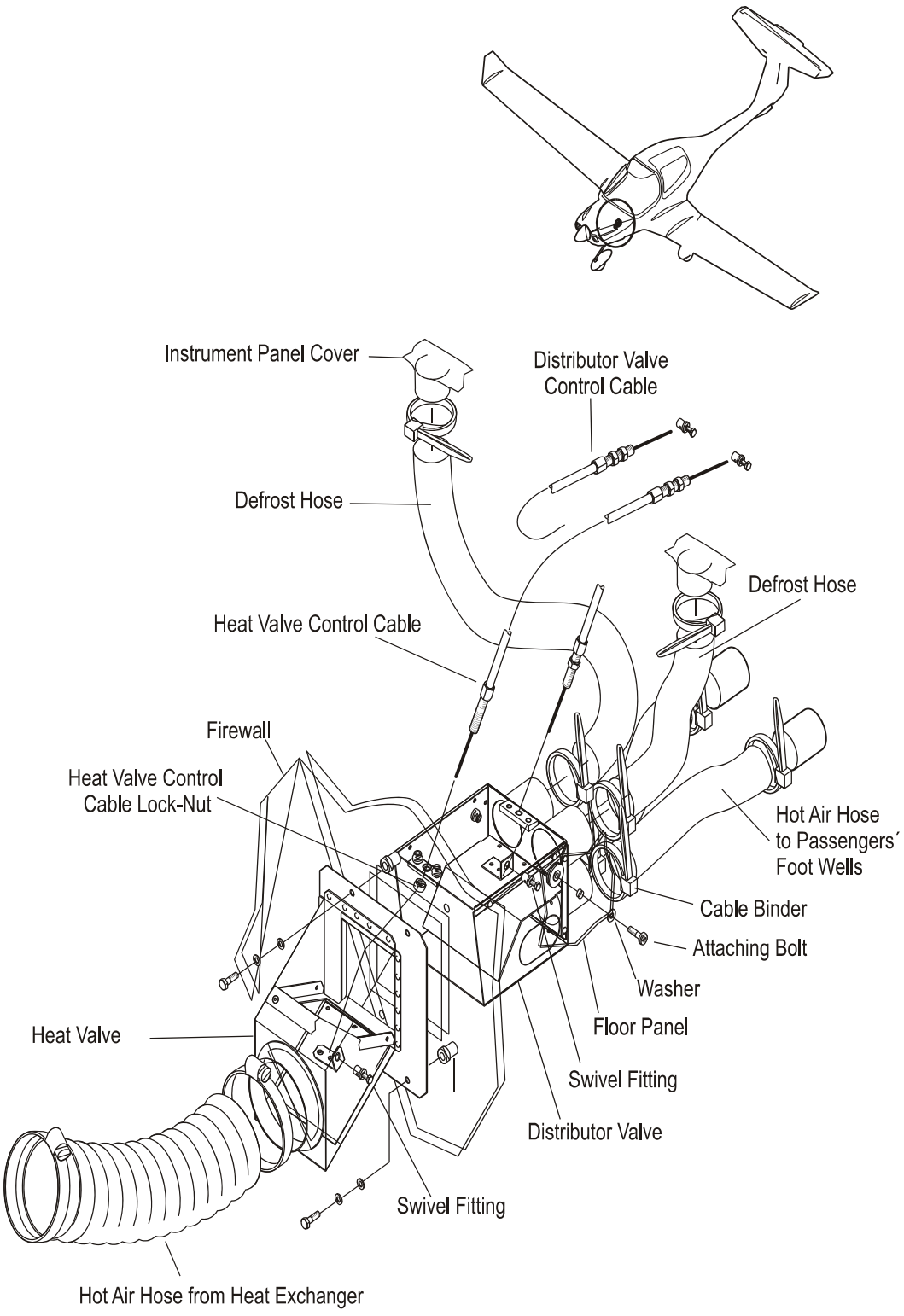


Figure 3: Heat Valve and Distributor Valve Installation

B. Install the Heat Valve

	Detail Steps/Work Items	Key Items/References
(1)	Put the heat valve in position on the firewall.	
(2)	Install the 5 washers and bolts which attach the valve to the firewall.	
(3)	Set the CABIN HEAT control lever to ON. Then move it up about 3 mm (0.1 in).	
(4)	Attach the control cable: – Put the control cable through the hole in the swivel fitting. – Make sure that the flap is hard against the bottom of the valve. – Tighten the screw in the swivel fitting.	
(5)	Do a test for correct operation of the heat valve.	Refer to Paragraph 3.
(6)	Connect the flexible hose to the heat valve. Tighten the worm drive clamp.	
(7)	Install the engine cowlings.	Refer to Section 71-10 or 71-12.

3. Test/Adjust the Heat Valve

WARNING: MAKE SURE THAT THE FLAP ON THE HEAT VALVE FULLY CLOSES THE FIREWALL OUTLET WHEN YOU SET THE CABIN HEAT CONTROL LEVER TO OFF. THIS IS TO STOP FIRE OR EXHAUST FUMES FROM GOING INTO THE COCKPIT IN AN EMERGENCY.

	Detail Steps/Work Items	Key Items/References
(1)	Remove the engine cowlings.	Refer to Section 71-10 or 71-12.
(2)	Set the CABIN HEAT control lever in the cockpit to OFF.	There must be 'bounce' of about 3 mm (0.1 in) between the back of the lever and the cockpit stop.
	WARNING: IF THE ENGINE HAS BEEN RUNNING, TAKE CARE WHEN YOU TOUCH THE HEAT VALVE. THE HEAT VALVE GETS HOT.	
(3)	Release the worm-drive-clamps which holds the flexible hose to the heat valve and then disconnect the hose from the heat valve.	Refer to Figure 3.
(4)	Make sure that the flap fully closes the outlet to the distributor valve.	Access through the front of the valve.
(5)	If necessary, adjust the control cable in the swivel fitting to give the correct bounce: – Set the CABIN HEAT control lever to ON. – Loosen the screw in the swivel fitting. – Move the flap a small distance. – Tighten the screw in the swivel fitting.	Access through the front of the valve. If there is no bounce, move the flap up. If there is too much bounce, move the flap down.
(6)	Set the CABIN HEAT control lever in the cockpit to OFF.	There must be 'bounce' of about 3 mm (0.1 in) between the back of the lever and the cockpit stop.
(7)	Do items 5 and 6 as necessary to get the correct adjustment.	
(8)	Connect the flexible hose to the heat valve and tighten the worm-drive-clamps.	
(9)	Install the engine cowlings.	Refer to Section 71-10 or 71-12.

4. Remove/Install the Distributor Valve

Refer to Figure 3.

A. Remove the Distributor Valve

	Detail Steps/Work Items	Key Items/References
(1)	Remove the engine cowlings.	Refer to Section 71-10 or 71-12.
(2)	Disconnect the battery.	Refer to Section 24-31.
(3)	Remove the instrument panel cover.	Refer to Section 25-10.
(4)	Remove the pilots' seats.	Refer to Section 25-10.
(5)	Disconnect the 2 hot air hoses from the passengers' footwells.	Cut the cable binders.
(6)	Remove the heat valve.	Refer to Paragraph 2.
(7)	Loosen the screw which holds the control cable to the swivel fitting in the distributor valve.	Access through the front of the valve.
(8)	Remove the 2 screws which attach the distributor valve to the side walls of the floor panel.	In the cockpit.
(9)	Move the distributor valve aft.	To give access to the control cables. Work through the hole in the firewall.
(10)	Remove the bottom locknut from each control cable.	Where the cable outer sheath attaches to the distributor valve.
(11)	Move the control cables clear of the valve.	
(12)	Move the valve forward through the firewall.	To give access to the rear of the valve.
(13)	Disconnect the 4 hoses from the valve.	
(14)	Remove the valve from the airplane.	

B. Install the Distributor Valve

	Detail Steps/Work Items	Key Items/References
(1)	Hold the distributor valve in front of the firewall.	
(2)	Attach the 2 defrost hoses which go to the instrument panel cover to the top outlets.	Use cable binders.
(3)	Attach the 2 hot air hoses which go from the passengers' footwells to the bottom outlets.	Use cable binders.
(4)	Move the distributor valve aft through the hole in the firewall.	To give access to the control cables. Make sure that the control cables and hoses do not catch.
(5)	Attach the outer sheath of the distributor valve control cable to the top rear of the distributor valve: – Put the cable through the hole. – Attach the locknut.	Work through the hole in the firewall. Turn the threaded adjuster into the hole.
(6)	Attach the outer sheath of the heat valve control cable to the top front of the distributor valve: – Put the cable through the hole. – Attach the locknut.	Where the cable outer sheath attaches to the distributor valve. Turn the threaded adjuster into the hole.
(7)	Move the valve into position in the firewall.	The hole in the firewall holds the front of the valve.
(8)	Install the 2 attaching bolts and washers.	In the side walls of the floor panel in the cockpit. Torque: 6.4 Nm (4.7 lbf.ft.).
(9)	Set the distribution control lever to ▲. Then move it down about 3 mm (0.1 in).	
(10)	Attach the distributor valve control cable: – Put the control cable through the hole in the swivel fitting. – Make sure that the flap is hard against the bottom of the valve. – Tighten the screw in the swivel fitting.	

	Detail Steps/Work Items	Key Items/References
(11)	Do a test for correct operation of the flap in the distributor valve.	Refer to Paragraph 5.
(12)	Install the heat valve.	Refer to Paragraph 2.
(13)	Connect the 2 flexible hot air hoses to the passengers' footwells.	Use cable binders.
(14)	Install the pilots' seats.	Refer to Section 25-10.
(15)	Install the instrument panel cover.	Refer to Section 25-10.
(16)	Connect the battery.	Refer to Section 24-31.
(17)	Install the engine cowlings.	Refer to Section 71-10 or 71-12.

5. Test/Adjust the Distributor Valve

	Detail Steps/Work Items	Key Items/References
(1)	Remove the engine cowlings.	Refer to Section 71-10 or 71-12.
(2)	Set the distribution control lever in the cockpit to ▲.	There must be 'bounce' of about 3 mm (0.1 in) between the back of the lever and the cockpit stop.
	WARNING: IF THE ENGINE HAS BEEN RUNNING, TAKE CARE WHEN YOU TOUCH THE DISTRIBUTOR VALVE. THE DISTRIBUTOR VALVE GETS HOT.	
(3)	Make sure that the flap is hard against the bottom of the of the distributor valve.	Reach through the outlet hole for the pilots' footwells in the floor panel. Push against the bottom of the flap. Then let it return.
(4)	Set the distribution control lever in the cockpit to ▼.	There should be 'bounce' of about 3 mm (0.1 in) between the back of the lever and the cockpit stop.
(5)	Make sure that the flap is hard against the top of the of the distributor valve.	Reach through the outlet hole for the pilots' footwells in the floor panel.
(6)	If the valve is not correctly adjusted, do the following items.	
(7)	Remove the heat valve.	Refer to Paragraph 2.
(8)	Adjust the control cable in the swivel fitting to give the correct bounce: – Set the distribution control lever close to ▲. – Loosen the screw in the swivel fitting. – Move the flap a small distance. – Tighten the screw in the swivel fitting.	Access through the front of the valve. If there was no bounce in the ▲ position, then move the flap down. If there was too much bounce in the ▲ position, then move the flap up.

	Detail Steps/Work Items	Key Items/References
(9)	Set the distribution control lever in the cockpit to ▲.	There must be 'bounce' of about 3 mm (0.1 in) between the back of the lever and the cockpit stop.
	Note: If you cannot get bounce at both ends of the range of movement, adjust the cable to give bounce at the ▲ (defrost) end.	
(10)	Do items 8 and 9 as necessary to get the correct adjustment.	
(11)	Install the heat valve.	

6. Remove/Install the Heat Exchanger Shroud

A. Remove the Heat Exchanger Shroud

	Detail Steps/Work Items	Key Items/References
(1)	Remove the engine cowlings.	Refer to Section 71-10 or 71-12.
	WARNING: IF THE ENGINE HAS BEEN RUNNING, TAKE CARE WHEN YOU TOUCH THE HEAT EXCHANGER. THE HEAT EXCHANGER GETS HOT.	
(2)	Release the 2 worm drive clamps which attach the inlet and outlet hoses to the heat exchanger. Disconnect the hoses.	Refer to Figure 4.
(3)	Release the screws which hold the flanges of the shroud together and remove the shroud from the muffler.	

B. Install the Heat Exchanger Shroud

	Detail Steps/Work Items	Key Items/References
(1)	Put the shroud in position on the muffler with the flanged joint at the top back.	Refer to Figure 4. The inlet connection points forward on the right. The outlet connection points aft near the middle at the back.
(2)	Install the screws which hold the flanges of the shroud together.	
(3)	Connect the inlet and outlet hoses to the heat exchanger.	
(4)	Tighten the 2 worm-drive-clamps which hold the hoses.	
(5)	Install the engine cowlings.	Refer to Section 71-10 or 71-12.

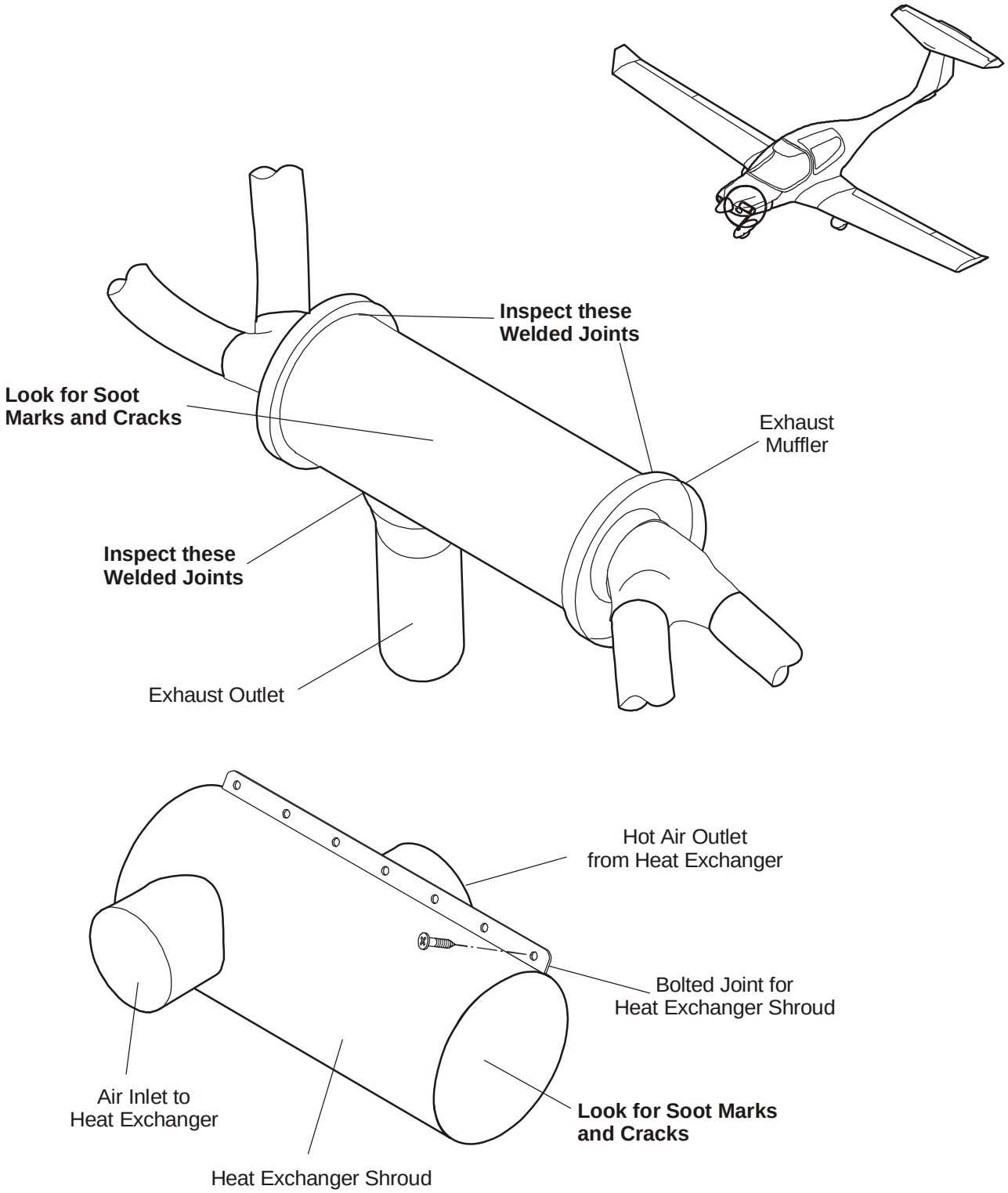


Figure 4: Heat Exchanger Installation and Inspection

7. Inspect the Heat Exchanger

WARNING: NO CRACKS ARE PERMITTED IN THE EXHAUST MUFFLER. CRACKS ALLOW CARBON MONOXIDE TO ENTER THE HEATING SYSTEM. CARBON MONOXIDE IS POISONOUS.

A. Equipment

Item	Quantity	Part Number
Magnifying glass.	1	Commercial.

B. Inspection Procedure

	Detail Steps/Work Items	Key Items/References
	WARNING: IF THE ENGINE HAS BEEN RUNNING, TAKE CARE WHEN YOU TOUCH THE HEAT EXCHANGER. THE HEAT EXCHANGER GETS HOT.	
(1)	Remove the heat-exchanger shroud.	Refer to Paragraph 6.
(2)	Examine the inside of the shroud. Look specially for soot marks and cracks.	If you find soot marks, the exhaust muffler is cracked. You must remove the muffler for repair, or replace it.
(3)	Examine the outer face of the exhaust muffler. Look specially for soot marks and cracks.	Use a magnifying glass and a strong light. If you find soot marks or cracks, you must remove the muffler for repair or replace it.
(4)	Install the heat exchanger shroud.	Refer to Paragraph 6.

Section 21-01
Air Conditioning - TAE 125 Diesel Engine

1. General

This Section gives you the system description and operation of the air conditioning system for airplanes with the TAE 125 Diesel engine installed. It also gives the trouble-shooting. Refer to Section 75-01 for more maintenance data on the coolant heat-exchanger.

2. Description and Operation

The DA 40 with the TAE engine installed has two separate systems for heating and cooling/ventilating the cockpit. Figure 1 shows the heating system. Figure 2 shows the cooling and ventilation system.

A. Cabin Heating

Cold ambient air enters the system through an intake at the front right of the engine cowling. The air flows through a duct to a heat-exchanger.

The heat exchanger attaches to the lower right part of the engine mount. Two pipes connect the heat exchanger to the engine cooling system. Hot coolant from the engine cooling system goes to and from the heat exchanger through these pipes.

Heat from the coolant makes the air hot. A glass-fiber shroud round the air outlet from the heat exchanger connects to an outlet hose. The hose connects to the heat valve on the forward face of the firewall.

A flap inside the heat valve can connect the heat valve outlet to atmosphere or to a distributor valve on the rear face of the firewall. A lever in the cockpit controls the flap. The lever is marked ‘CABIN HEAT, ON OFF’.

The distributor valve also has a flap. The flap can connect the valve inlet to the pilot and passenger floor areas or the front of the canopy. A lever in the cockpit controls the flap. The lever is marked ‘DEFROST - FLOOR'.

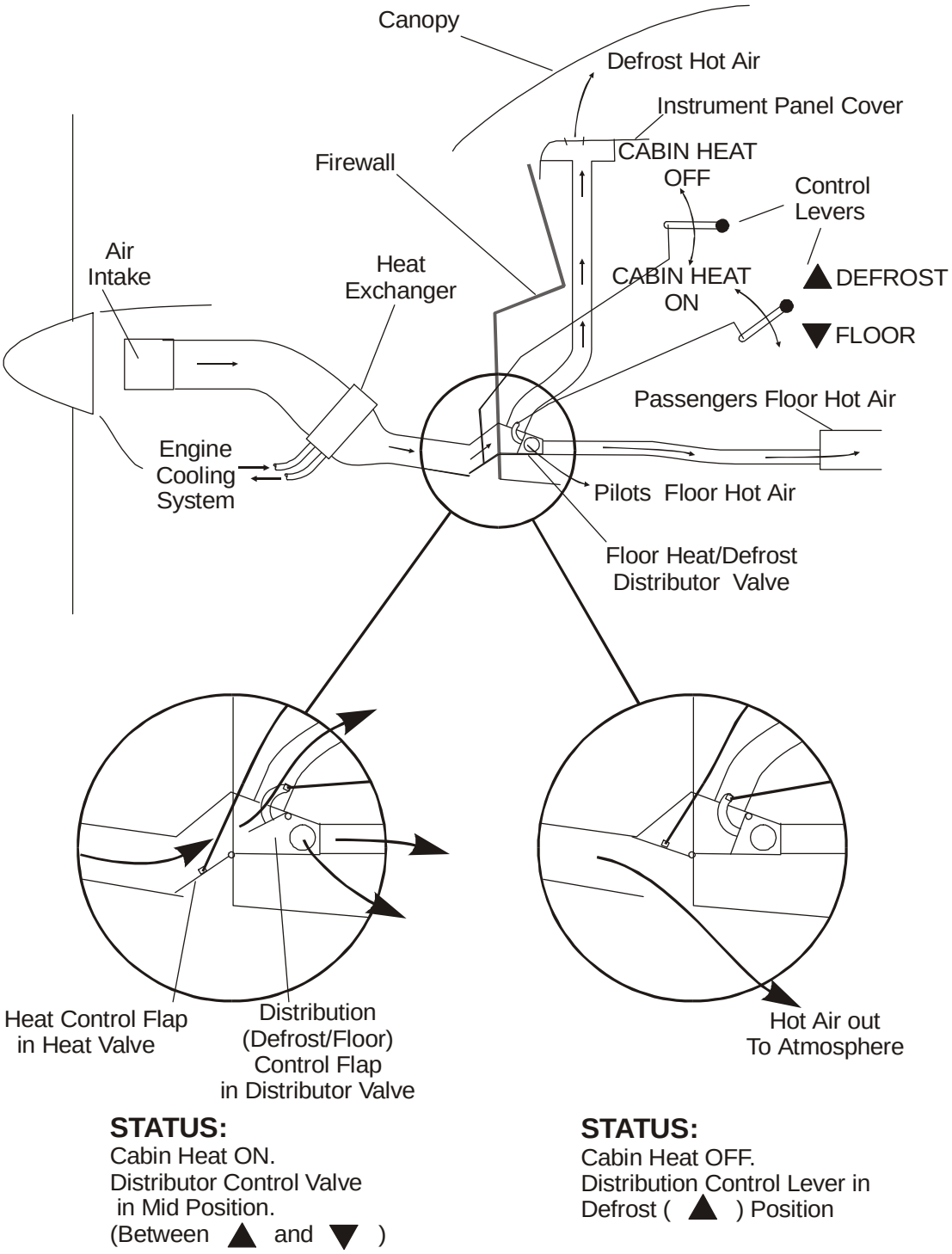


Figure 1: Cabin Heat Schematic Diagram

If the heat valve is set to OFF, the flap sends the air overboard at the bottom of the engine cowling. If it is set to ON, the hot air goes through the firewall to the distributor valve. The valve can be set to any position between OFF and ON. If the valve is set to a middle position, only part of the airflow goes to the distributor valve.

If the distributor valve is set to FLOOR, air flows to the pilots' and passengers' footwells. If it is set to DEFROST, the air flows to the front of the canopy. This prevents mist or frost from forming on the canopy. The valve can be set to any position between FLOOR and DEFROST. If the valve is set to a middle position, part of the airflow goes to the footwells and part to the canopy.

B. Cooling and Ventilation

Figure 2 shows the cooling and ventilation system.

(1) Pilots' Cabin Air

Air enters the system at two NACA air inlets in the front fuselage on the left and right side. Hoses connect the air inlets to two adjustable outlets in the bottom instrument panel.

(2) Passengers' Cabin Air

Air enters the system at a NACA air inlet below the leading edge of the left stub-wing. The front main bulkhead and the inner and outer closing ribs make a collector box. Air can only leave the area through an opening in the front closing rib.

The front of the rib connects to a hose across the fuselage. The pipe also connects to the front closing rib of the right stub-wing.

The top part of the front closing rib on each side connects to the fuselage side ducts. The side ducts connect to the roll bar. The side ducts and roll bar have adjustable outlets.

Air enters the system through the NACA air inlet. It flows through the left front closing rib and across the fuselage, to the right front closing rib.

Air from both front closing ribs can flow up through the fuselage side ducts. Four adjustable outlets in the roll bar give cool air to the passengers.

(3) Instrument Cooling

Cool air for instrument cooling goes forward through the left and right fuselage side ducts.

C. Air Exit

Both hot and cold air leave the cockpit through slots in the baggage compartment frame. The air flows through the rear fuselage and leaves the airplane through the gap between the fuselage and the rudder.

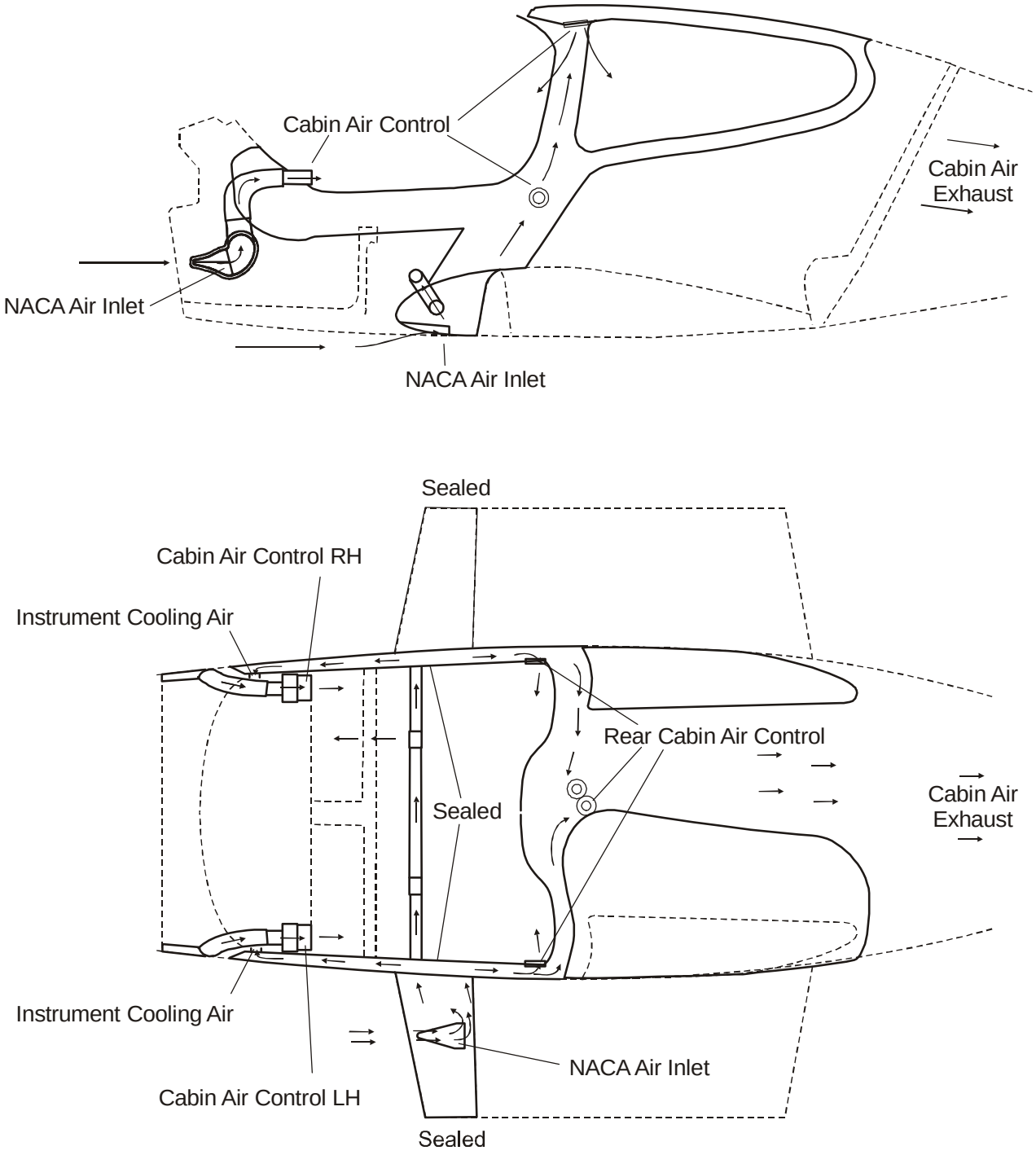


Figure 2: Cabin Ventilation System Schematic Diagram

Trouble-Shooting

1. General

The table below lists the defects you could have with the air conditioning system. If you have the trouble detailed in the Trouble column read across to the Possible Cause column. Then do the repair given in the Repair column.

Trouble	Possible Cause	Repair
No hot air flows to the system at any setting.	Heat valve control cable out of adjustment. Heat valve control cable broken. Defective heat exchanger. Defective engine cooling system.	Adjust the heat valve control cable. Replace the heat valve control cable. Trouble-shoot in accordance with Section 75-01. Trouble-shoot in accordance with Section 75-01.
Heating system supplies warm air when set to OFF.	Heat valve control cable out of adjustment. Heat valve control cable broken.	Adjust the heat valve control cable. Replace the heat valve control cable.
No hot air flows to the canopy.	Distributor valve control cable out of adjustment. Distributor valve control cable broken. Canopy defrost hose disconnected.	Adjust the distributor valve control cable. Replace the distributor valve control cable. Re-connect hose.
No hot air flows to the footwells.	Distributor valve control cable out of adjustment. Distributor valve control cable broken. Air hose to footwell disconnected.	Adjust the distributor valve control cable. Replace the distributor valve control cable. Re-connect hose.
No cool air from 1 outlet. Other outlets operate correctly.	Outlet defective. Air duct blocked.	Replace the cool air outlet. Remove blockage.

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Maintenance Practices

1. General

This Section gives you the Maintenance Practices for the cabin heating system and tells you how to replace outlets for the cooling system. Refer to Section 75-01 for maintenance data on the heat-exchanger.

2. Remove/Install the Heat Valve

Refer to Figure 3.

A. Remove the Heat Valve

	Detail Steps/Work Items	Key Items/References
(1)	Remove the engine cowlings.	Refer to Section 71-11.
	WARNING: IF THE ENGINE HAS BEEN RUNNING, TAKE CARE WHEN YOU TOUCH THE HEAT VALVE. THE HEAT VALVE GETS HOT.	
(2)	Release the worm drive clamp which holds the flexible hose to the heat valve. Then disconnect the hose from the valve.	
(3)	Set the CABIN HEAT control lever to ON.	
(4)	Loosen the screw which holds the control cable to the swivel fitting in the heat valve.	Access through the front of the valve.
(5)	Remove 4 nuts and washers which attach the heat valve to the firewall.	
(6)	Remove the heat valve from the firewall.	

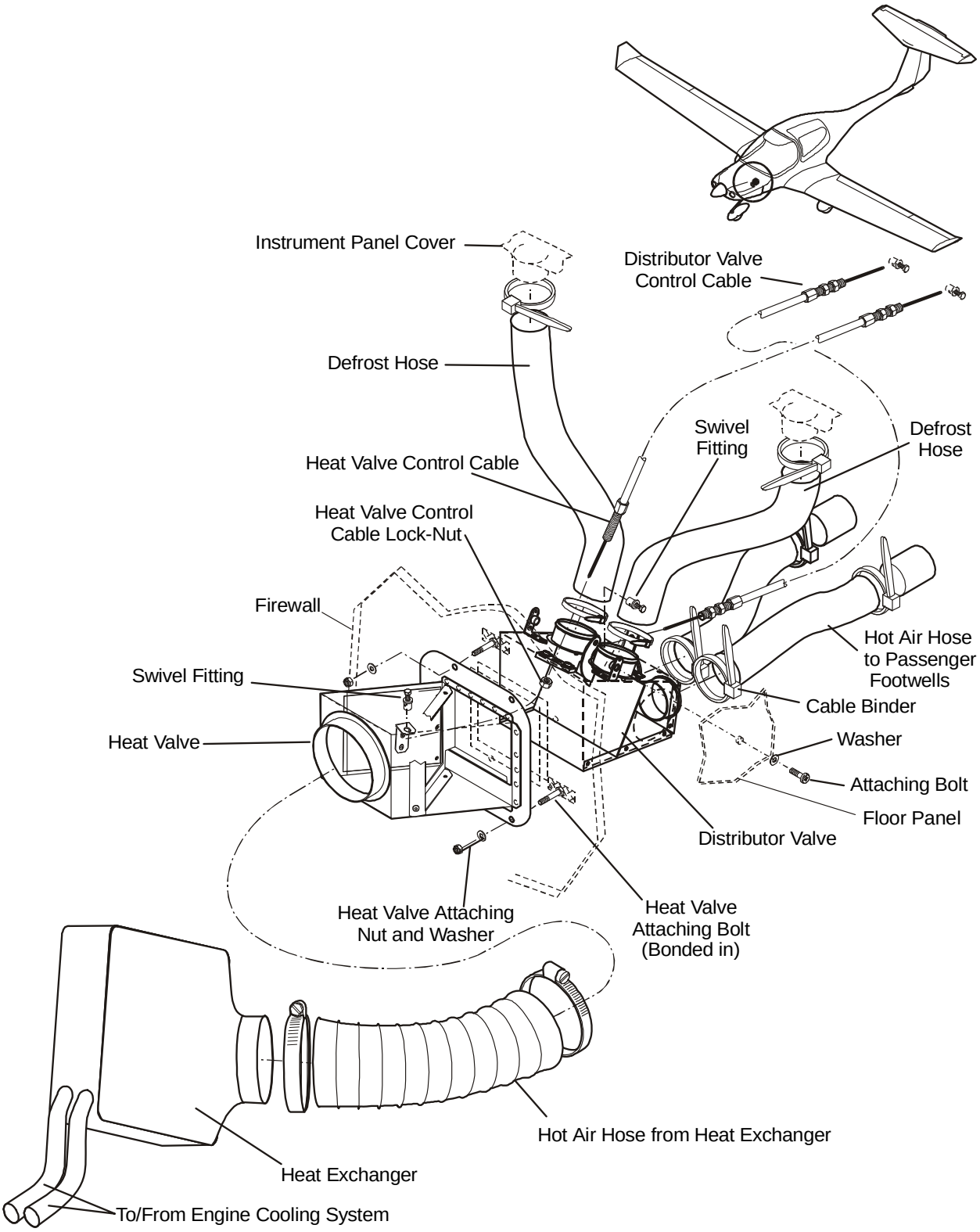


Figure 3: Heat Valve and Distributor Valve Installation.

B. Install the Heat Valve

	Detail Steps/Work Items	Key Items/References
(1)	Examine the copper seal between the distributor valve and the firewall.	Replace defective seal. Use self-adhesive copper tape.
(2)	Put the heat valve in position on the firewall.	Apply fire resistant sealant. Use PR 812 or equivalent.
(3)	Install the 4 washers and nuts which attach the heat valve to the firewall.	
(4)	Set the CABIN HEAT control lever to ON. Then move it up about 3 mm (1/8 in).	
(5)	Attach the control cable: – Put the control cable through the hole in the swivel fitting. – Make sure that the flap is hard against the right side of the valve. – Tighten the screw in the swivel fitting.	
(6)	Do a test for correct operation of the heat valve.	Refer to Paragraph 3.
(7)	Connect the flexible hose to the heat valve. Tighten the worm drive clamp.	
(8)	Install the engine cowlings.	Refer to Section 71-11.

3. Test/Adjust the Heat Valve

WARNING: MAKE SURE THAT THE FLAP ON THE HEAT VALVE FULLY CLOSES THE FIREWALL OUTLET WHEN YOU SET THE CABIN HEAT CONTROL LEVER TO 'OFF'. THIS IS TO STOP FIRE OR EXHAUST FUMES FROM GOING INTO THE COCKPIT IN AN EMERGENCY.

	Detail Steps/Work Items	Key Items/References
(1)	Remove the engine cowlings.	Refer to Section 71-11.
	WARNING: IF THE ENGINE HAS BEEN RUNNING, TAKE CARE WHEN YOU TOUCH THE HEAT VALVE. THE HEAT VALVE GETS HOT.	
(2)	Release the worm-drive-clamp which holds the flexible hose to the heat valve and then disconnect the hose from the heat valve.	Refer to Figure 3.
(3)	Set the CABIN HEAT control lever in the cockpit to ON.	The flap should be hard against the right wall of the valve.
(4)	Set the CABIN HEAT control lever in the cockpit to OFF.	There should be 'bounce' of about 3 mm (1/8 in) between the back of the lever and the cockpit stop.
(5)	Make sure that the flap fully closes the outlet to the distributor valve.	Access through the front of the valve.
(6)	If necessary, adjust the control cable in the swivel fitting to give the correct bounce: – Set the CABIN HEAT control lever to ON. – Loosen the screw in the swivel fitting. – Move the flap a small distance to adjust it. – Tighten the screw in the swivel fitting.	Access through the front of the valve. If there is no bounce, move the flap to the left. If there is too much bounce, move the flap to the right.
(7)	Set the CABIN HEAT control lever in the cockpit to OFF.	There should be 'bounce' of about 3 mm (1/8 in) between the back of the lever and the cockpit stop.
(8)	Do items 6 and 7 as necessary to get the correct adjustment.	

	Detail Steps/Work Items	Key Items/References
(9)	Connect the flexible hose to the heat valve and tighten the worm-drive-clamps.	
(10)	Install the engine cowlings.	Refer to Section 71-11.

4. Remove/Install the Distributor Valve

Refer to Figure 3.

A. Remove the Distributor Valve

	Detail Steps/Work Items	Key Items/References
(1)	Remove the engine cowlings.	Refer to Section 71-11.
(2)	Disconnect the battery.	Refer to Section 24-34.
(3)	Remove the instrument panel cover.	Refer to Section 25-10.
(4)	Remove the pilots' seats.	Refer to Section 25-10.
(5)	Disconnect the 2 hot air hoses from the passengers' footwells.	Cut the cable binders.
(6)	Remove the heat valve.	Refer to Paragraph 2.
(7)	Remove the 2 screws which attach the distributor valve to the side walls of the floor panel.	In the cockpit.
(8)	Remove the copper seal between the distributor valve and the firewall.	
(9)	Move the valve forward through the firewall.	To give access to the rear of the valve.
(10)	Remove the bottom locknut from the control cable for the heat valve.	Where the cable outer sheath attaches to the distributor valve.
(11)	Move the heat valve control cable clear of the distributor valve.	
(12)	Loosen the screw which holds the control cable to the swivel fitting in the distributor valve.	
(13)	Remove the front locknut from the control cable for the distributor valve.	
(14)	Move the control cable clear of the valve.	
(15)	Disconnect the 2 canopy defrost hoses from the valve.	
(16)	Disconnect the 2 hot air hoses to the passengers' footwells from the valve.	
(17)	Remove the valve from the airplane.	

B. Install the Distributor Valve

	Detail Steps/Work Items	Key Items/References
(1)	Hold the distributor valve in front of the firewall.	
(2)	Attach the 2 hot air hoses which go from the passengers' footwells to the bottom outlets.	Use cable binders.
(3)	Attach the 2 defrost hoses which go to the instrument panel cover to the top outlets.	Use cable binders.
(4)	Attach the outer sheath of the distributor valve control cable to the bracket at the top rear of the distributor valve: – Put the cable through the hole. – Attach the locknut.	
(5)	Set the distribution control lever to DEFROST. Then move it down about 3 mm (1/8 in).	
(6)	Attach the distributor valve control cable: – Put the control cable through the hole in the swivel fitting. – Make sure that the flap is hard against the bottom of the valve. – Tighten the screw in the swivel fitting.	
(7)	Do a test for correct operation of the flap in the distributor valve.	Refer to Paragraph 5.
(8)	Attach the outer sheath of the heat valve control cable to the top front of the distributor valve: – Put the cable through the hole. – Attach the locknut.	Where the cable outer sheath attaches to the distributor valve. Turn the threaded adjuster into the hole.
(9)	Move the distributor valve aft through the hole in the firewall.	Make sure that the control cables and hoses do not catch.
(10)	Move the valve into position on the cockpit side of the firewall.	The hole in the firewall holds the front of the valve.

	Detail Steps/Work Items	Key Items/References
(11)	Install the 2 attaching bolts and washers.	In the side walls of the floor panel in the cockpit. Torque: 6.4 Nm (4.7 lbf.ft.).
(12)	Install a new copper seal between the distributor valve and the firewall.	Use self-adhesive copper tape.
(13)	Install the heat valve.	Refer to Paragraph 2.
(14)	Connect the 2 flexible hot air hoses to the passengers' footwells.	Use cable binders.
(15)	Install the pilots' seats.	Refer to Section 25-10.
(16)	Install the instrument panel cover.	Refer to Section 25-10.
(17)	Connect the battery.	Refer to Section 24-34.
(18)	Install the engine cowlings.	Refer to Section 71-11.

5. Test/Adjust the Distributor Valve

	Detail Steps/Work Items	Key Items/References
(1)	Set the distribution control lever in the cockpit to DEFROST.	There should be 'bounce' of about 3 mm (1/8 in) between the back of the lever and the cockpit stop.
	WARNING: IF THE ENGINE HAS BEEN RUNNING, TAKE CARE WHEN YOU TOUCH THE DISTRIBUTOR VALVE. THE DISTRIBUTOR VALVE GETS HOT.	
(2)	Make sure that the flap is hard against the bottom of the of the distributor valve.	Reach through the outlet hole for the pilots' footwells in the floor panel. Push against the bottom of the flap. Then let it return.
(3)	Set the distribution control lever in the cockpit to FLOOR.	There should be 'bounce' of about 3 mm (1/8 in) between the back of the lever and the cockpit stop.
(4)	Make sure that the flap is hard against the top of the of the distributor valve.	Reach through the outlet hole for the pilots' footwells in the floor panel.
(5)	If the valve is not correctly adjusted, do the following items.	
(6)	Remove the top cover plate from the engine control assembly.	Refer to Section 31-11.
(7)	Adjust the control cable in the swivel fitting to give the correct bounce: – Set the distribution control lever close to DEFROST. – Loosen the screw in the swivel fitting. – Move the flap a small distance. – Tighten the screw in the swivel fitting.	 At the cockpit end of the control cable. If there was no bounce in the DEFROST position, then move the flap down. If there was too much bounce in the DEFROST position, then move the flap up.
(8)	Set the distribution control lever in the cockpit to DEFROST.	There should be 'bounce' of about 3 mm (1/8 in) between the back of the lever and the cockpit stop.

	Detail Steps/Work Items	Key Items/References
	Note: If you cannot get bounce at both ends of the range of movement, adjust the cable to give bounce at the DEFROST end.	
(9)	Do items 8 and 9 as necessary to get the correct adjustment.	
(10)	Install the top cover plate to the engine control assembly.	Refer to Section 31-11.

CHAPTER 22

AUTO FLIGHT

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CHAPTER 22
AUTO FLIGHT

1. General

This Chapter tells you about the components which enable the automatic control of the flight of the airplane.

Refer to these Sections for data about the systems:

Section 22-10 Autopilot.

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Section 22-10
Autopilot

1. General

This Section tells you about the autopilot system that can be installed in the DA 40.

2. Description

The KAP 140 autopilot system is a digital flight control system that provides roll, pitch, and pitch trim steering with optional altitude preselect. The system has the following components (refer to Figure 1):

– KC 140 flight control computer (FCC).

– KCM 100 configuration module.

– Turn and bank coordinator with autopilot pick-off.

– KCS 55A gyro compass system. Refer to Section 34-28 for details about the gyro compass system (optional).

– Voltage converter (TAE version only).

– Directional gyro with autopilot pick-off (TAE version only).

– KS 271C roll servo.

– KS 270C pitch servo.

– KS 272C pitch trim servo.

– KM 275 and KM 277 servo mounts.

Heading input must be supplied for the KAP 140 autopilot by the KCS 55A gyro compass system or by the directional gyro. Refer to Section 34-28 for details about the gyro compass system. Alternatively a directional gyro connected to the suction system (DA 40 D only) may be installed.

When the altitude preselect/vertical speed system option is installed, the airplane may be equipped with the KEA 130A encoding altimeter.

The KAP 140 roll axis features include wing leveler, heading select, and VOR/LOC intercept and tracking. The KAP 140 can also be coupled to the GPS and the RNAV receivers. Roll rate information is derived from the turn coordinator.

Pitch axis features include vertical speed, glideslope and altitude hold along with the optional altitude preselect. Pitch information is derived from a pressure sensor and accelerometer. The KAP 140 autopilot system operates independent of the airplanes´s attitude gyro (artificial horizon). Internal monitors keep constant track of the KAP 140's status and provide for automatic shutdown of the autopilot or trim system in the event of a malfunction.

A. Voltage Converter

The voltage converter transforms the 14 VDC of the airplane electrical system to 28 VDC which is used for the autopilot system. The flight control computer KC 140 and all three servos are connected to the output of the voltage converter. The voltage converter is installed in the DA 40 D only and it is located within the instrument panel in the center avionic rack.

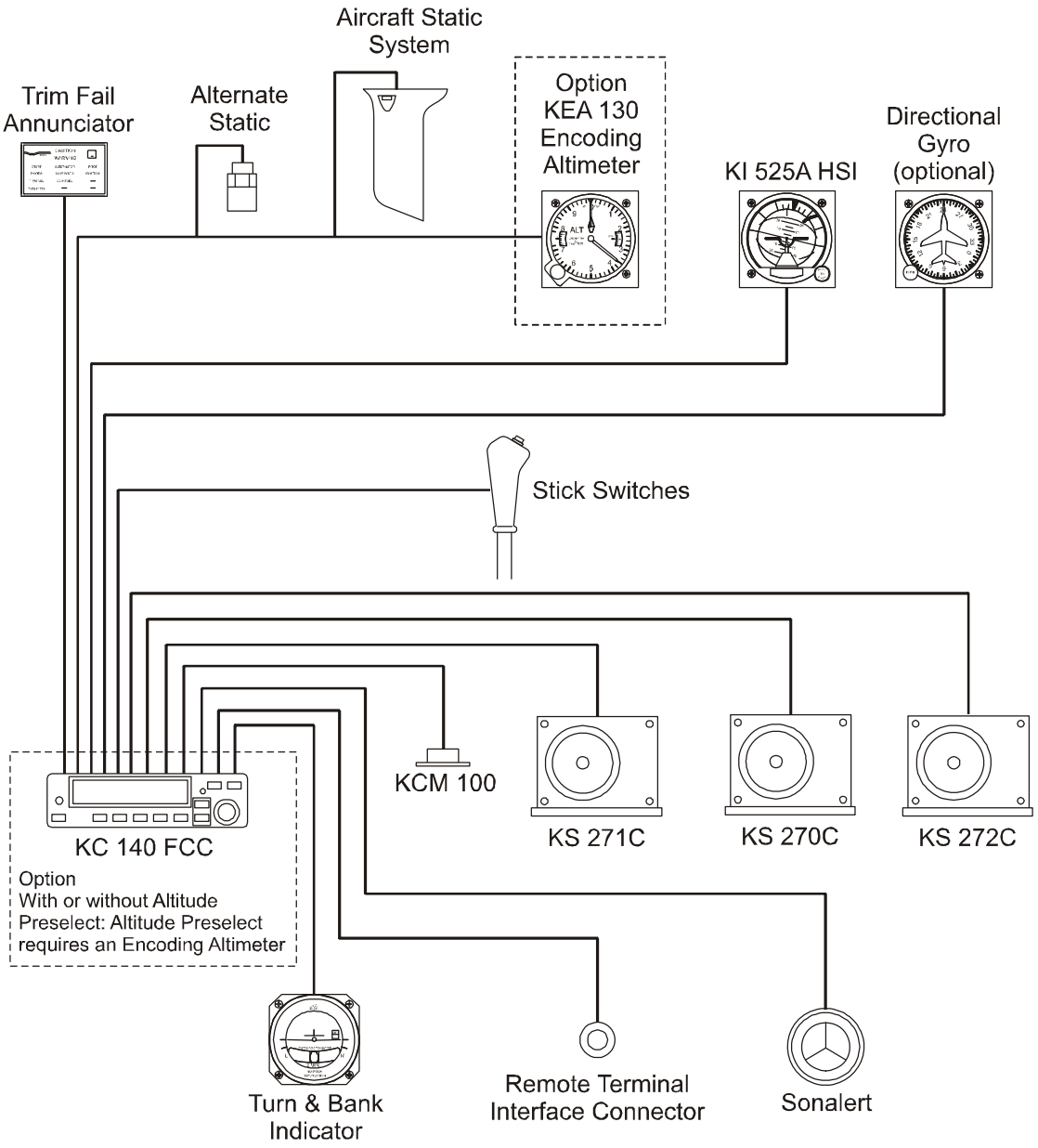


Figure 1: Autopilot System Schematic

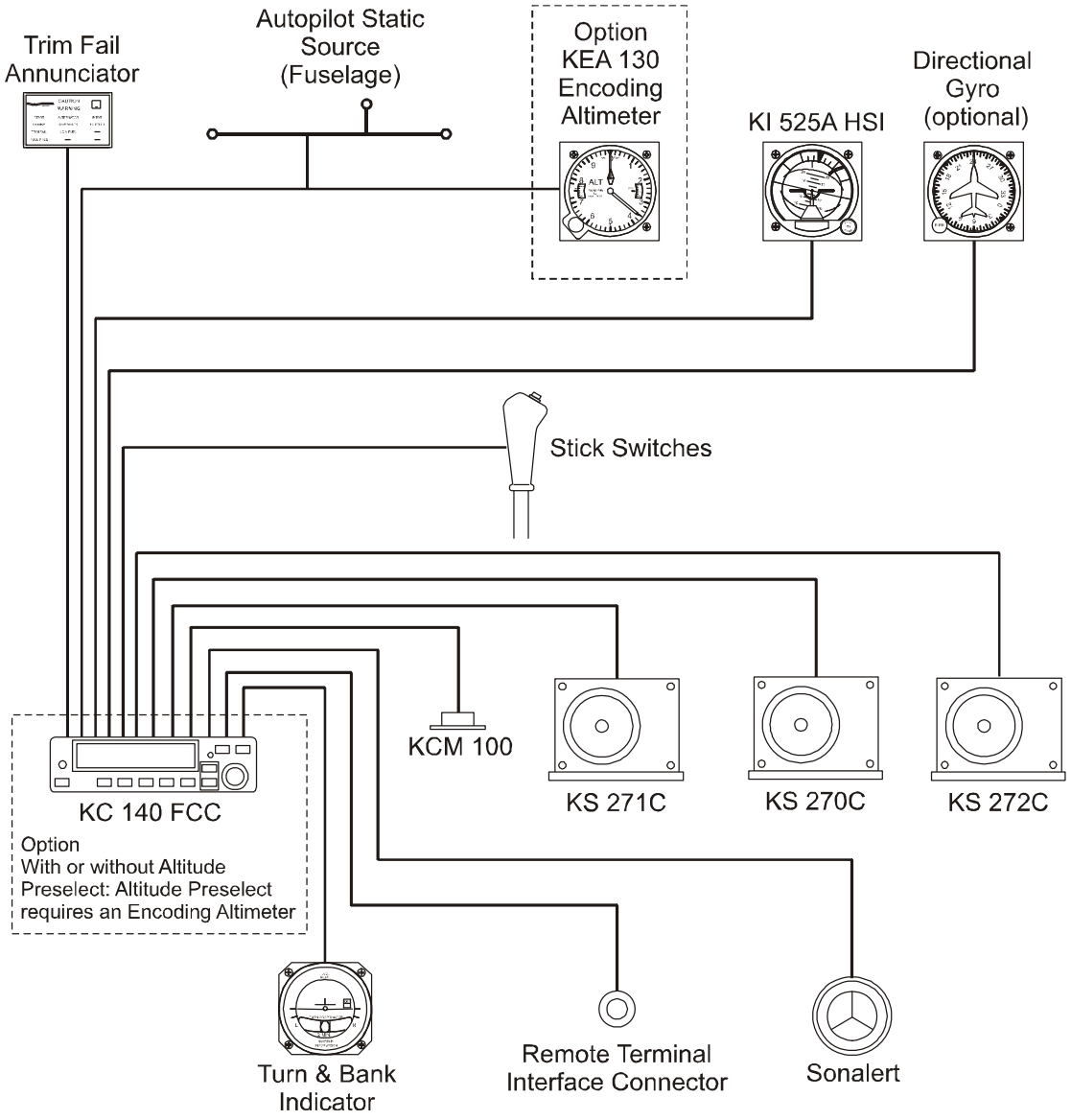


Figure 2: Autopilot System Schematic Diagram (if OÄM-40-267 is carried out)

B. Bendix/King KAP 140 Flight Control Computer

Figure 3 shows the Bendix/King KAP 140 flight control computer. It is located in the avionics rack in the instrument panel, see Section 31-10.

The Bendix/King KAP 140 has the following annunciators on the front panel, above the AP button:

– P (pitch axis) annunciator. It indicates failure of the pitch axis and will either disengage the autopilot or does not allow engagement of the pitch axis. The P annunciator may illuminate with the autopilot disengaged. This condition can occur during maneuvering flight when g thresholds are exceeded. The autopilot monitor will not allow engagement during illumination.

– R (roll axis) annunciator. It indicates failure of the roll axis and will disengage the autopilot or does not allow engagement.

The Bendix/King KAP 140 controls the following annunciator on the annunciator panel (also see Section 31-50):

– TRIM FAIL annunciator. It illuminates whenever the automated preflight self test detects a pitch trim fault or a continuous monitoring system detects a pitch trim fault in flight (located on the white wire annunciator panel).

– The Bendix/King KAP 140 has a display which shows the following:

– Pitch and roll mode displays. Displays the active pitch modes (VS, ALT, ARM, ALT, GS ARM, GS) and roll modes (ROL, HDG, NAV ARM, NAV, APR ARM, APR, REV ARM, REV). Also displayed will be a flashing AP annunciation (5 seconds) at each autopilot disconnect, accompanied by an aural alert (for 2 seconds).

– PT (pitch trim) annunciation. It indicates the direction of required pitch trim. With electric trim installed, the annunciation simply provides status to the autopilot request for auto trim. A solid indication represents the lowest demand level for trim, whereas a flashing annunciation implies a greater demand. A solid PT annunciation without an arrow head is an indication of a pitch trim fault. During MET operation, this annunciation can be caused by a stuck MET switch. If the stuck switch fault clears, trim operation will resume.

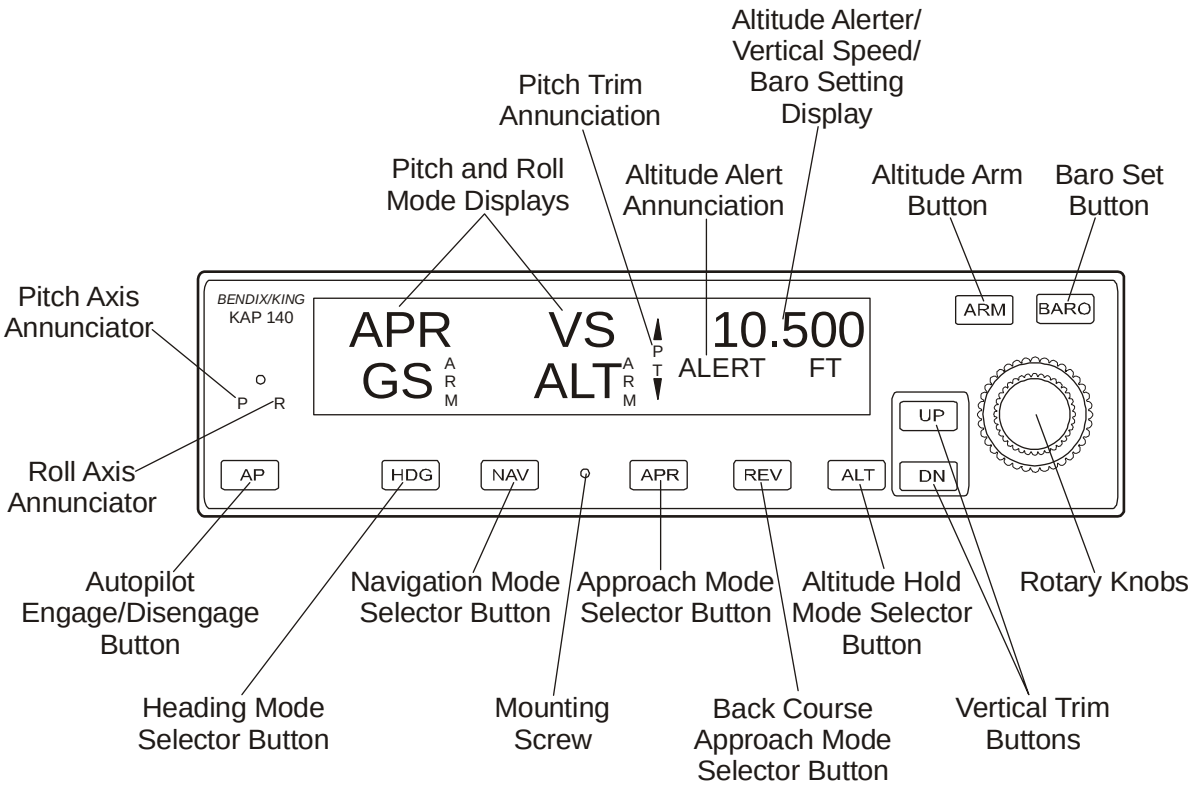


Figure 3: Bendix/King KAP 140 Flight Control Computer

– ALERT (altitude alert) annunciation. This annunciation is only used when the altitude preselect option is installed.

  – It illuminates continuously in the region of from 200 to 1000 feet from the selected altitude if the airplane was previously outside of this region.

  – It flashes for two seconds the first time the airplane crossed the selected altitude.

  – If flashes continuously in the 200 to 1000 feet region if the airplane was previously inside of this region (i.e., at the selected altitude). Associated with the visual alerting is an aural alert (5 short tones) which occurs 1000 feet from the selected altitude upon approaching the altitude and 200 feet from the selected altitude on leaving the altitude.

– Altitude alerter/vertical speed/baro setting display. This feature is used only if the altitude preselect option is installed. Normally the altitude alerter selected altitude is displayed. If the UP or DN button is pushed while in VS hold, the display changes to the command reference for the VS mode in FPM for 3 seconds. If the BARO button is pushed, the display changes to the autopilot baro setting in either IN HG or HPA for 3 seconds.

The flight control computer has these controls on the front panel:

– Rotary knobs (only if altitude preselect option is installed). These are used to set the altitude alerter reference altitude; or may be used immediately after pressing the BARO button, to adjust the autopilot baro setting to match that of the airplane´s altimeter when manual adjustment is required.

– AP (autopilot engage/disengage) button. When pushed, it engages the autopilot if all logic conditions are met. This button is the only button that can engage the autopilot (only for P/N´s 065-00176-5403 and 065-00176-7703). The autopilot will engage in the basic roll (ROL) mode which functions as a wing leveler and in the vertical speed (VS) hold mode. The commanded vertical speed may be displayed manually in the upper right corner of autopilot display area if either UP or DN button is pressed. The captured VS will be the vertical speed present at the moment of AP button press. When pressed again, it will disengage the autopilot.

– HDG (heading) mode selector button. When pushed, it will select the 'heading' mode, which commands the airplane to turn to and maintain the heading selected by the heading bug on the HSI. A new heading may be selected at any time and will result in the airplane turning to the new heading. The button can also be used to toggle between HDG and ROL modes. This button may be used to engage the autopilot (only for P/N´s 065-00176-5402 and 065-00176-7702).

– NAV (navigation) mode selector button. When pushed, will select the navigation mode. The mode provides automatic beam capture and tracking of VOR, LOC or GPS as selected for presentation on the HSI. NAV mode is recommended for enroute navigation tracking.

– APR (approach) mode selector button. When pushed, it will select the navigation mode. The mode provides automatic beam capture and tracking of VOR, GPS, LOC, and glideslope (GS) on an ILS, as selected for presentation on the HSI. APR mode tracking sensitivity is recommended for instrument approaches.

– REV (back course approach) mode selector button. When pushed, it will select the back course approach mode. This mode functions identically to the approach mode except that the autopilot response to LOC signals is reversed.

– ALT (altitude hold) mode select button. When pushed, it will select the altitude hold mode. This mode provides capture and tracking of the selected altitude. The selected altitude is the altitude at the moment the ALT button is pressed. If the ALT button is pressed with an established VS rate present, there will be approximately a 10% (of VS rate) overshoot, with the airplane returned positively to the selected altitude. This button may be used to engage the autopilot (only for P/N´s 065-00176-5402 and 065-00176-7702).

– UP/DN (vertical trim) buttons. The action of these buttons is dependent upon the vertical mode present when pressed. If VS mode is active, the initial button stroke will bring up the commanded vertical speed in the display. Subsequent immediate button strokes will increment the vertical commanded either up or down at the rate of 100 ft/min per button press, or at the rate of approximately 300 ft/min per second if pressed continuously. If the ALT mode is active, incremental button strokes will move the altitude hold reference altitude either up or down by 20 feet per press, or if held continuously will command the airplane up or down at the rate of 500 ft/min, synchronizing the altitude hold reference to the actual airplane altitude upon button release. (Note that the altitude hold reference is not displayed. The display will continue to show the altitude alerter reference.)

– ARM (altitude arm) button (only if altitude preselect option is installed). It toggles altitude arming on or off. When ALT ARM is annunciated, the autopilot will capture the altitude alerter displayed altitude (provided the airplane is climbing or descending in VS to the displayed altitude). ALT hold arming when the autopilot is engaged is automatic upon altitude alerter altitude selection via the rotary knobs. Note that the alerter functions are independent of the arming process, thus providing full time alerting, even when the autopilot is disengaged.

– BARO (baro set) button (only if altitude preselect option is installed). When pushed and released, it will change the display from the altitude alerter selected altitude to the baro setting display (either IN HG or HPA) for 3 seconds. If pushed and held for 2 seconds, it will change the baro setting display from IN HG to HPA or vice versa. Once the baro setting display is visible, the rotary knobs may be used to manually adjust the baro setting if the system configuration does not employ automatic correction.

The flight control computer is connected to these controls on the control sticks:

– AP DISC (autopilot disconnect) switch on pilot's and co-pilot's stick. When pressed, it will disengage the autopilot, and interrupt electric trim power.

– Manual electric trim switches on the pilot's stick. When both switches are pressed in the same direction, they will activate pitch trim in the selected direction. If only one switch is moved, the trim system will not operate. If one switch fails or is moved and held for 3 seconds, the trim monitoring system will detect a switch failure resulting in a PT annunciation on the autopilot display and the disabling of the electric trim system. Autopilot power will have to be cycled to clear the fault. Use of manual electric trim during autopilot operation will disengage the autopilot.

– CWS (control wheel steering) mode button on the pilot's stick. When pressed and held, it disengages the pitch, roll, and pitch trim clutches allowing the pilot to maneuver the airplane by hand. Pressing the CWS button will also sync the autopilot ALT or VS commands to the actual altitude or vertical speed present at the time the button is released.

The following controls on the HSI (refer to Section 34-28) are also used for autopilot operation:

– Omni bearing select knob. It selects the desired course to be tracked by the autopilot.

– Heading select knob. It positions the heading bug on the compass card.

C. KCM 100 Configuration Module

The data which is specific to the DA 40 (for example: gain settings) is stored in the KCM 100 configuration module. It is located on the instrument panel floor, between the instrument panel and the firewall.

D. KS 271C Roll Servo

The roll servo is located behind the rear main bulkhead on the right side. It is mounted on a mounting plate which is made from sheet aluminum. Two aluminum clamps connect a bridle cable to the aileron push-rod.

E. KS 270C Pitch Servo

The pitch servo is located aft of the baggage compartment frame. It is mounted on a mounting plate which is made from sheet aluminum. Two aluminum clamps connect a bridle cable to the elevator push-rod.

F. KS 272C Pitch Trim Servo

The pitch trim servo is located under the co-pilot's seat. It is mounted on a mounting plate which is made from sheet aluminum and mounting bracket which is made from GFRP. Servo movement is transmitted to the trim wheel through a chain gear on the servo, a cardan shaft, and a chain gear next to the trim wheel on the right side.

Maintenance Practices

1. General

These Maintenance Practices tell you how to install the components of the autopilot system. They also tell you how to test and adjust the autopilot system.

2. Remove/Install the Flight Control Computer

A. Remove the Flight Control Computer

	Detail Steps/Work Items	Key Items/References
(1)	Open the AUTO PILOT circuit-breaker.	
(2)	Put a 3/32 Allen wrench into the access hole for the locking screw. Engage the screw.	
(3)	Turn the screw counter-clockwise until the unit disengages from the mounting rack.	
	CAUTION: DO NOT PULL ON THE KNOBS. DO NOT PRY THE FACE-PLATE. IF YOU PULL ON THE KNOBS, OR PRY THE FACE- PLATE, YOU CAN DAMAGE THE UNIT. CAUTION: DO NOT TOUCH THE CONNECTOR CARD AT THE REAR OF THE UNIT. THE ELECTROSTATIC CHARGE ON YOUR BODY CAN DAMAGE THE UNIT.	
(4)	Pull gently on the sides of the unit to remove it from the mounting rack.	
(5)	Install the protective covers on the rear connectors of the flight control computer.	

B. Install the Flight Control Computer

	Detail Steps/Work Items	Key Items/References
(1)	Remove the protective covers from the connectors on the replacement unit.	
(2)	Slide the unit into the rack. Engage the locking screw so that the latch front-lobe touches the rack.	
(3)	Turn the locking screw clockwise so that the rear lobe engages the mounting rack.	
	CAUTION: DO NOT OVER-TIGHTEN THE LOCKING SCREW. YOU CAN DAMAGE THE LOCKING MECHANISM.	
(4)	Continue to turn the screw until the unit is fully installed in the mounting rack.	
(5)	Close the AUTO PILOT circuit-breaker.	
(6)	Do a test of the autopilot system: – Set ALT/BAT switch (Lycoming version) or ELECTRIC MASTER key switch (TAE version) to ON. – Set AVIONIC MASTER switch to ON. – Observe self-test of the flight control computer. – Set AVIONIC MASTER switch to OFF. – Set ALT/BAT switch (Lycoming version) or ELECTRIC MASTER key switch (TAE version) to OFF.	If no error message appears, then the system is operative.
(7)	Check the servo positions and adjust all servos to their null offset position.	
(8)	Perform Pitot and Static System Leak Tests.	Refer to Section 34-10.

3. Remove/Install the Roll Servo

A. Remove the Roll Servo

	Detail Steps/Work Items	Key Items/References
(1)	Remove the passengers' seat.	Refer to Section 25-10.
(2)	Dis-connect the connector from the servo.	
(3)	Remove the 2 screws which attach the servo to the mounting plate and the clutch.	Hold the servo.
(4)	Remove the servo from the airplane.	

B. Install the Roll Servo

	Detail Steps/Work Items	Key Items/References
(1)	Put the servo in place on the mounting plate.	
(2)	Install the 2 screws which attach the servo to the mounting plate and clutch.	
(3)	Connect the connector to the servo.	
(4)	Do a test of the autopilot system: – Set ALT/BAT switch (Lycoming version) or ELECTRIC MASTER key switch (TAE version) to ON. – Set AVIONIC MASTER switch to ON. – Observe self-test of the flight control computer. – Set AVIONIC MASTER switch to OFF. – Set ALT/BAT switch (Lycoming version) or ELECTRIC MASTER key switch (TAE version) to OFF.	If no error message appears, then the system is operative.
(5)	Install the passengers' seat.	Refer to Section 25-10.

4. Remove/Install the Roll Servo Clutch

A. Equipment

Item	Quantity	Part Number
Cable tension gauge.	1	Commercial.

B. Remove the Roll Servo Clutch

	Detail Steps/Work Items	Key Items/References
(1)	Remove the roll servo.	Refer to Paragraph 3.
(2)	Release the clamps which connect the bridle cable to the aileron push-rod.	
(3)	Remove the bridle cable.	
(4)	Remove the 2 screws which attach the clutch to the mounting plate.	Hold the clutch.
(5)	Remove the clutch from the airplane.	

C. Install the Roll Servo Clutch

	Detail Steps/Work Items	Key Items/References
(1)	Remove the pilot's seat or the co-pilot's seat.	Refer to Section 25-10. To give access for the rigging pin.
(2)	Put the clutch in place on the mounting plate.	
(3)	Install the 2 screws which attach the clutch to the mounting plate.	
(4)	Center the aileron control system with a rigging pin at one control stick.	Refer to Section 27-10.
(5)	Center the capstan.	The recess for the ball in the middle of the bridle cable must be in the uppermost position.
(6)	Install bridle cable to capstan.	The ball in the middle of the bridle cable must engage in the recess on the capstan. Wrap bridle cable around capstan one turn to each side.
(7)	Connect the ends of the bridle cable to the aileron push-rod with the clamps.	Tighten clamps lightly to allow adjustment (see next step).
(8)	Using a small plastic hammer, move the clamps along the push-rod to adjust the bridle cable tension.	Adjust tension to 89 ± 22 N (20 ± 5 lb). Measure cable tension with cable tension gauge.
(9)	Tighten the clamps.	
(10)	Remove the rigging pin from the control stick.	
(11)	Install the front seat which was removed.	Refer to Section 25-10.
(12)	Install the roll servo.	Refer to Paragraph 3.

5. Remove/Install the Pitch Servo

A. Remove the Pitch Servo

	Detail Steps/Work Items	Key Items/References
(1)	Remove the trim/cover from the front face of the baggage compartment.	
(2)	Dis-connect the connector from the servo.	
(3)	Remove the 2 screws which attach the servo to the mounting plate and the clutch.	Hold the servo.
(4)	Remove the servo from the airplane.	

B. Install the Pitch Servo

	Detail Steps/Work Items	Key Items/References
(1)	Put the servo in place on the mounting plate.	
(2)	Install the 2 screws which attach the servo to the mounting plate and clutch.	
(3)	Connect the connector to the servo.	
(4)	Do a test of the autopilot system: – Set ALT/BAT switch (Lycoming version) or ELECTRIC MASTER key switch (TAE version) to ON. – Set AVIONIC MASTER switch to ON. – Observe self-test of the flight control computer. – Set AVIONIC MASTER switch to OFF. – Set ALT/BAT switch (Lycoming version) or ELECTRIC MASTER key switch (TAE version) to OFF.	If no error message appears, then the system is operative.
(5)	Install the trim/cover to the front face of the baggage compartment.	

6. Remove/Install the Pitch Servo Clutch

A. Equipment

Item	Quantity	Part Number
Cable tension gauge.	1	Commercial.

B. Remove the Pitch Servo Clutch

	Detail Steps/Work Items	Key Items/References
(1)	Remove the pitch servo.	Refer to Paragraph 5.
(2)	Release the clamps which connect the bridle cable to the elevator push-rod.	
(3)	Remove the bridle cable.	
(4)	Remove the 2 screws which attach the clutch to the mounting plate.	Hold the clutch.
(5)	Remove the clutch from the airplane.	

C. Install the Pitch Servo Clutch

	Detail Steps/Work Items	Key Items/References
(1)	Remove the pilot's seat or the co-pilot's seat.	Refer to Section 25-10. To give access for the rigging pin.
(2)	Put the clutch in place on the mounting plate.	
(3)	Install the 2 screws which attach the clutch to the mounting plate.	
(4)	Center the elevator control system with a rigging pin at one control stick.	Refer to Section 27-30.
(5)	Center the capstan.	The recess for the ball in the middle of the bridle cable must be in the uppermost position.
(6)	Install bridle cable to capstan.	The ball in the middle of the bridle cable must engage in the recess on the capstan. Wrap bridle cable around capstan one turn to each side.
(7)	Connect the ends of the bridle cable to the elevator push-rod with the clamps.	Tighten clamps lightly to allow adjustment (see next step).
(8)	Using a small plastic hammer, move the clamps along the push-rod to adjust the bridle cable tension.	Adjust tension to 89 ± 22 N (20 ± 5 lb). Measure cable tension with cable tension gauge.
(9)	Tighten the clamps.	
(10)	Remove the rigging pin from the control stick.	
(11)	Install the front seat which was removed.	Refer to Section 25-10.
(12)	Install the pitch servo.	Refer to Paragraph 5.

7. Remove/Install the Pitch Trim Servo

A. Remove the Pitch Trim Servo

	Detail Steps/Work Items	Key Items/References
(1)	Remove the co-pilot's seat.	Refer to Section 25-10.
(2)	Dis-connect the connector from the servo.	
(3)	Remove the 2 screws which attach the servo to the mounting plate and the clutch.	Hold the servo.
(4)	Remove the servo from the airplane.	

B. Install the Pitch Trim Servo

	Detail Steps/Work Items	Key Items/References
(1)	Put the servo in place on the mounting plate.	
(2)	Install the 2 screws which attach the servo to the mounting plate and clutch.	The upper forward screw also holds the chain adjuster. Ensure proper chain tension.
(3)	Connect the connector to the servo.	
(4)	Do a test of the autopilot system: – Set ALT/BAT switch (Lycoming version) or ELECTRIC MASTER key switch (TAE version) to ON. – Set AVIONIC MASTER switch to ON. – Observe self-test of the flight control computer. – Set AVIONIC MASTER switch to OFF. – Set ALT/BAT switch (Lycoming version) or ELECTRIC MASTER key switch (TAE version) to OFF.	If no error message appears, then the system is operative.
(5)	Install the co-pilot's seat.	Refer to Section 25-10.

8. Remove/Install the Pitch Trim Servo Clutch

A. Remove the Pitch Trim Servo Clutch

	Detail Steps/Work Items	Key Items/References
	CAUTION: DO NOT APPLY STRONG FORCES TO THE CARDAN SHAFT. THE UPPER CARDAN JOINT CONNECTS TO A PART WHICH IS WEAK BY DESIGN TO GIVE OCCUPANT PROTECTION IN AN EMERGENCY LANDING.	
(1)	Remove the pitch trim servo.	Refer to Paragraph 7.
(2)	Remove the screw which holds the cap to the capstan.	
(3)	Remove the cap from the capstan.	
(4)	Release chain tension with chain adjuster.	On the chain gear next to the servo.
(5)	Remove the chain from the chain gear.	
(6)	Remove the 2 screws which attach the clutch and the chain adjuster to the mounting plate.	Hold the clutch and the chain adjuster.
(7)	Remove the clutch and the chain adjuster.	

B. Install the Pitch Trim Servo Clutch

	Detail Steps/Work Items	Key Items/References
(1)	Put the clutch and the chain adjuster in place on the mounting plate.	
(2)	Install the 2 screws which attach the clutch and the chain adjuster to the mounting plate.	
(3)	Install the chain to the chain gear.	
(4)	Put the cap in place on the capstan.	
(5)	Install the screw which holds the cap to the capstan.	
(6)	Install the pitch trim servo.	Refer to Paragraph 7.

9. Adjust the Bridle Cable Tension

A. Equipment

Item	Quantity	Part Number
Cable tension gauge.	1	Commercial.

B. Adjustment Procedure

	Detail Steps/Work Items	Key Items/References
(1)	Loosen the bolts in the clamps which connect the bridle cable to the push-rod.	Do not remove the bolts. Loosen just enough so that the next step can be done.
(2)	Using a small plastic hammer, move the clamps along the push-rod to adjust the bridle cable tension.	Adjust tension to 89 ± 22 N (20 ± 5 lb). Measure cable tension with cable tension gauge.
(3)	Tighten the bolts in the clamps which connect the bridle cable to the push-rod.	

10. Adjust the Clutch Torques

A. Equipment

Item	Quantity	Part Number
Goodrich slip clutch test stand.	1	Goodrich 20-9855-03.

B. Adjustment Procedure

	Detail Steps/Work Items	Key Items/References
(1)	Remove the clutch from the airplane.	Refer to this Section.
(2)	Install the clutch assembly on the slip clutch test stand.	Refer to the equipment manufacturers' documentation.
(3)	Measure clockwise (CW) and counter-clockwise (CCW) clutch torque, adjust if necessary.	Refer to the equipment manufacturers' documentation. The correct clutch torques are: Roll servo 2.03 ± 0.23 Nm (18 ± 2 lbf.in.) Pitch servo 3.39 ± 0.34 Nm (30 ± 3 lbf.in.) Pitch trim servo 4.07 ± 0.45 Nm (36 ± 4 lbf.in.)
(4)	Remove the clutch assembly from the slip clutch test stand.	
(5)	Install the clutch to the airplane.	Refer this Section.

11. Mechanical Check of the Autopilot System

Do this check at the intervals given in Section 05-10.

	Detail Steps/Work Items	Key Items/References
(1)	Check bridle cable tension for the roll servo, adjust if necessary.	Refer to this Section.
(2)	Check bridle cable tension for the pitch servo, adjust if necessary.	Refer to this Section.
(3)	Check the clutch torque settings for the roll servo, adjust if necessary.	Refer to this Section.
(4)	Check the clutch torque settings for the pitch servo, adjust if necessary.	Refer to this Section.
(5)	Check the clutch torque settings for the pitch trim servo, adjust if necessary.	Refer to this Section.
(6)	Perform Pitot and Static System Leak Tests.	Refer to Section 34-10.

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Section 22-11
Autopilot and Garmin G1000 (TAE Engine)

Note: The information contained in this section refers to airplanes with an optional autopilot installed.

1. General

This Section tells you about the autopilot system installed in conjunction with the Garmin G1000 system in the DA 40 D airplane.

2. Description

The KAP 140 autopilot system is a digital flight control system that provides roll, pitch, and pitch trim steering with altitude preselect. The system has the following components (refer to Figure 1):

– KC 140 flight control computer (FCC).

– KCM 100 configuration module.

– Turn co-ordinator with autopilot pick-off.

– KS 271C roll servo.

– KS 270C pitch servo.

– KS 272C pitch trim servo.

– KM 275 and KM 277 servo mounts.

– Coupling to the Garmin G1000 integrated cockpit system (ICS).

Heading input is supplied for the KAP 140 autopilot by the Garmin G1000 integrated cockpit system (ICS). Refer to Section 31-40 for more data about the ICS.

The KAP 140 roll axis features includes wing leveler, heading select, and VOR/LOC intercept and tracking. The KAP 140 is also coupled to the ICS for navigation information. Roll rate information is derived from the turn coordinator.

Pitch axis features include vertical speed, glideslope and altitude hold along with the optional altitude preselect. Pitch information is derived from a pressure sensor and accelerometer. Internal monitors keep constant track of the KAP 140's status and provide for automatic shutdown of the autopilot or trim system in the event of a malfunction.

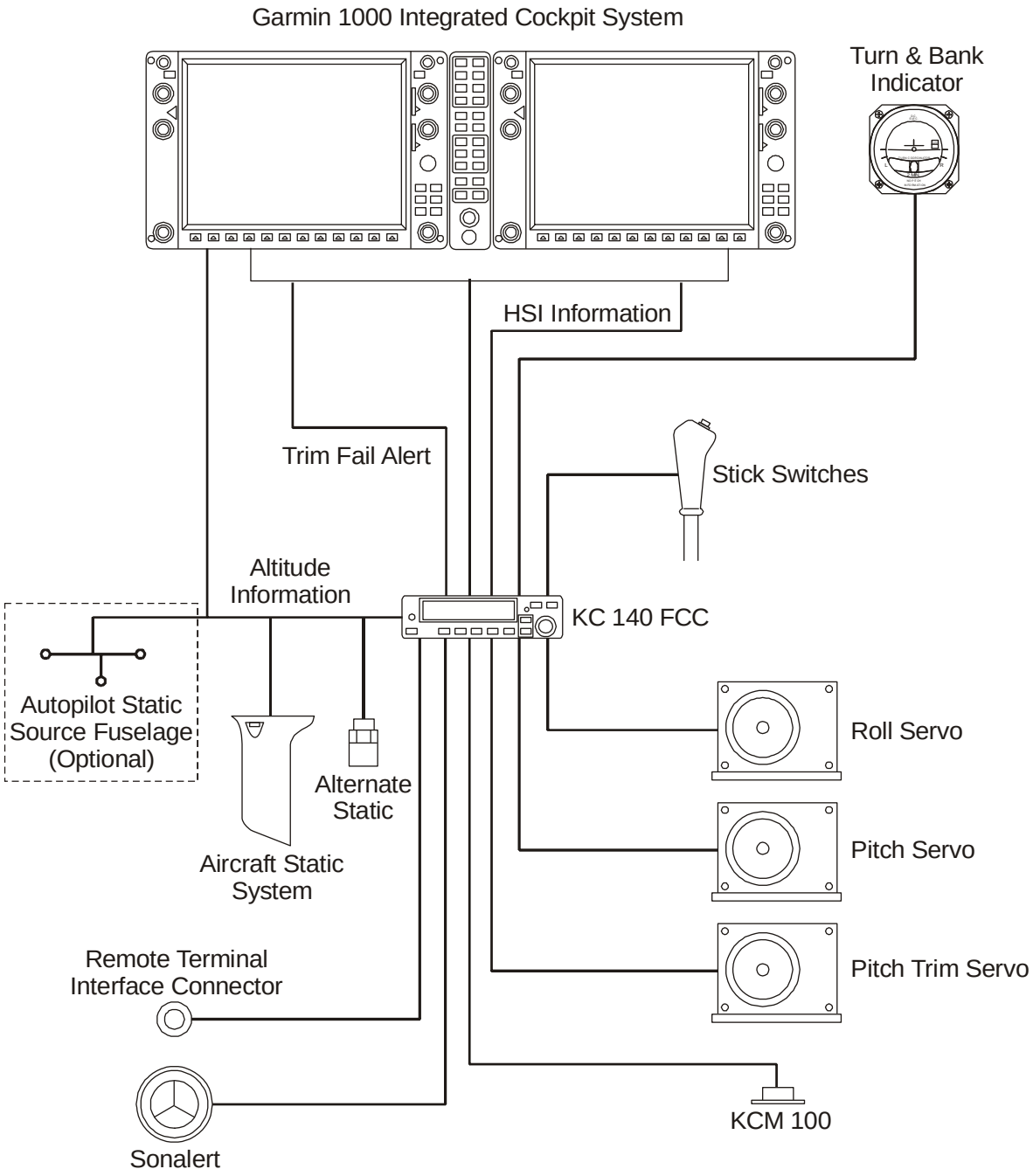


Figure 1: Autopilot System Schematic Diagram

A. Bendix/King KAP 140 Flight Control Computer

Figure 2 shows the Bendix/King KAP 140 flight control computer. It is located in the instrument panel, at the bottom.

The Bendix/King KAP 140 has the following annunciators on the front panel, above the AP button:

– P (pitch axis) annunciator. It indicates failure of the pitch axis and will either disengage the autopilot or does not allow engagement of the pitch axis. The P annunciator may illuminate with the autopilot disengaged. This condition can occur during maneuvering flight when g-thresholds are exceeded. The autopilot monitor will not allow engagement during illumination.

– R (roll axis) annunciator. It indicates failure of the roll axis and will disengage the autopilot or does not allow engagement.

The Bendix/King KAP 140 controls the following annunciator on the ICS alerts panel (also see Section 31-40):

TRIM FAIL annunciator. It illuminates whenever the automated pre-flight self test detects a pitch trim fault or a continuous monitoring system detects a pitch trim fault in flight.

The Bendix/King KAP 140 has a display which shows the following:

Pitch and roll mode displays. Displays the active pitch modes (VS, ALT, ARM, ALT, GS ARM, GS) and roll modes (ROL, HDG, NAV ARM, NAV, APR ARM, APR, REV ARM, REV). Also displayed will be a flashing AP annunciation (5 seconds) at each autopilot disconnect, accompanied by an aural alert (for 2 seconds).

PT (pitch trim) annunciation. It indicates the direction of required pitch trim. With electric trim installed, the annunciation simply provides status to the autopilot request for auto trim. A solid indication represents the lowest demand level for trim, whereas a flashing annunciation implies a greater demand. A solid PT annunciation without an arrow head is an indication of a pitch trim fault. During MET operation, this annunciation can be caused by a stuck MET switch. If the stuck switch fault clears, trim operation will resume.

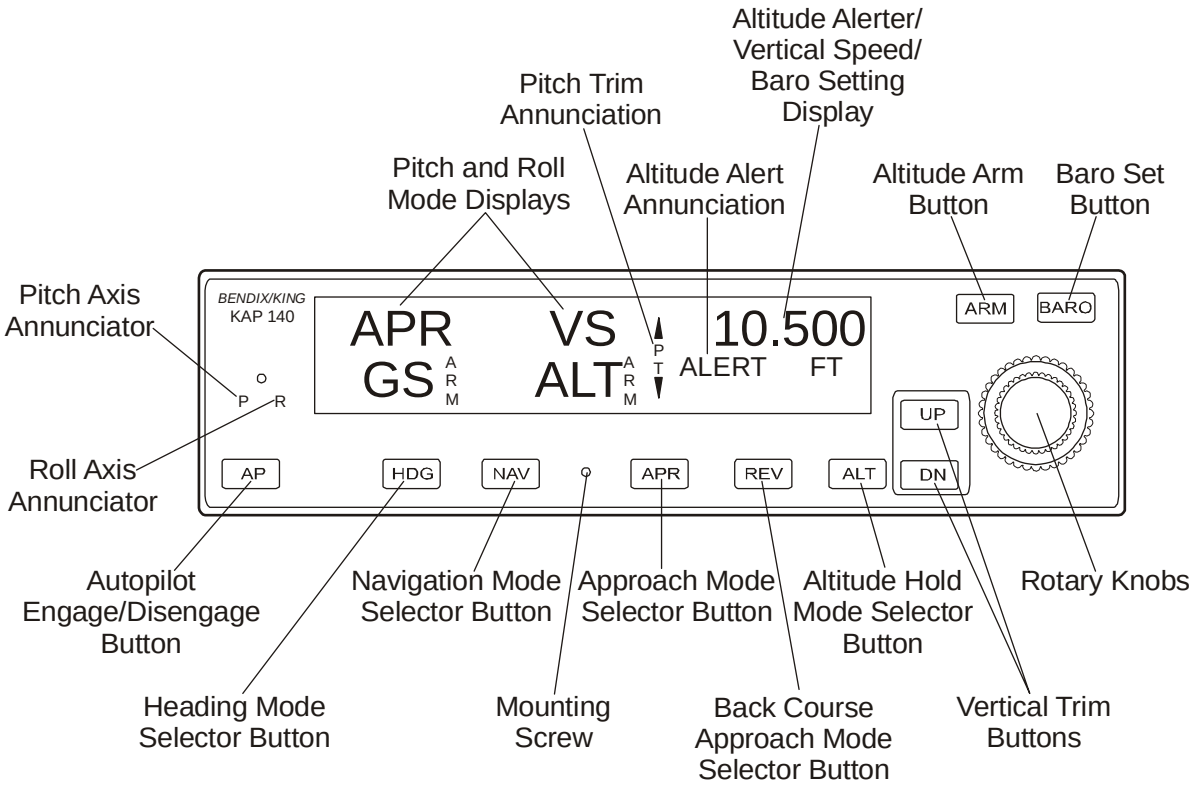


Figure 2: Bendix/King KAP 140 Flight Control Computer

ALERT (altitude alert) annunciation. This annunciation is used when the altitude preselect option is installed.

– It illuminates continuously in the region of from 200 to 1000 feet from the selected altitude if the airplane was previously outside of this region.

– It flashes for two seconds the first time the airplane crossed the selected altitude.

– If flashes continuously in the 200 to 1000 feet region if the airplane was previously inside of this region (i.e., at the selected altitude). Associated with the visual alerting is an aural alert (5 short tones) which occurs 1000 feet from the selected altitude upon approaching the altitude and 200 feet from the selected altitude on leaving the altitude.

– Altitude alert/vertical speed/baro setting display. This feature is used only if the altitude preselect option is installed. Normally the altitude alerter selected altitude is displayed. If the UP or DN button is pushed while in VS hold, the display changes to the command reference for the VS mode in FPM for 3 seconds. If the BARO button is pushed, the display changes to the autopilot baro setting in either IN HG or HPA for 3 seconds.

The flight control computer has these controls on the front panel:

– Rotary knobs. These are used to set the altitude alert reference altitude; or may be used immediately after pressing the BARO button, to adjust the autopilot baro setting to match that of the airplane's altimeter when manual adjustment is required.

– AP (autopilot engage/disengage) button. When pushed, it engages the autopilot if all logic conditions are met. The autopilot will engage in the basic roll (ROL) mode which functions as a wing leveler and in the vertical speed (VS) hold mode. The commanded vertical speed may be displayed manually in the upper right corner of autopilot display area if either UP or DN button is pressed. The captured VS will be the vertical speed present at the moment of AP button press. When pressed again, it will disengage the autopilot.

– HDG (heading) mode selector button. When pushed, it will select the 'heading' mode, which commands the airplane to turn to and maintain the heading selected by the heading bug on the HSI. A new heading may be selected at any time and will result in the airplane turning to the new heading. The button can also be used to toggle between HDG and ROL modes. This button may be used to engage the autopilot.

– NAV (navigation) mode selector button. When pushed, will select the navigation mode. The mode provides automatic beam capture and tracking of VOR, LOC or GPS as selected for presentation on the HSI. NAV mode is recommended for enroute navigation tracking.

– APR (approach) mode selector button. When pushed, it will select the navigation mode. The mode provides automatic beam capture and tracking of VOR, GPS, LOC, and glideslope (GS) on an ILS, as selected for presentation on the ICS. APR mode tracking sensitivity is recommended for instrument approaches.

– REV (back course approach) mode selector button. When pushed, it will select the back course approach mode. This mode functions identically to the approach mode except that the autopilot response to LOC signals is reversed.

– ALT (altitude hold) mode select button. When pushed, it will select the altitude hold mode. This mode provides capture and tracking of the selected altitude. The selected altitude is the altitude at the moment the ALT button is pressed. If the ALT button is pressed with an established VS rate present, there will be approximately a 10% (of VS rate) overshoot, with the airplane returned positively to the selected altitude. This button may be used to engage the autopilot.

– UP/DN (vertical trim) buttons. The action of these buttons is dependent upon the vertical mode present when pressed. If VS mode is active, the initial button stroke will bring up the commanded vertical speed in the display. Subsequent immediate button strokes will increment the vertical commanded either up or down at the rate of 100 ft/min per button press, or at the rate of approximately 300 ft/min per second if pressed continuously. If the ALT mode is active, incremental button strokes will move the altitude hold reference altitude either up or down by 20 feet per press, or if held continuously will command the airplane up or down at the rate of 500 ft/min, synchronizing the altitude hold reference to the actual airplane altitude upon button release. (Note that the altitude hold reference is not displayed. The display will continue to show the altitude alert reference.)

– ARM (altitude arm) button (only if altitude preselect option is installed). It toggles altitude arming on or off. When ALT ARM is annunciated, the autopilot will capture the altitude alert displayed altitude (provided the airplane is climbing or descending in VS to the displayed altitude). ALT hold arming when the autopilot is engaged is automatic upon altitude alert altitude selection via the rotary knobs. Note that the alert functions are independent of the arming process, thus providing full time alerting, even when the autopilot is disengaged.

– BARO (baro set) button. When pushed and released, it will change the display from the altitude alert selected altitude to the baro setting display (either IN HG or HPA) for 3 seconds. If pushed and held for 2 seconds, it will change the baro setting display from IN HG to HPA or vice versa. Once the baro setting display is visible, the rotary knobs may be used to manually adjust the baro setting if the system configuration does not employ automatic correction.

The flight control computer is connected to these controls on the control sticks:

– AP DISC (autopilot disconnect) switch on pilot's and co-pilot's stick. When pressed, it will disengage the autopilot, and interrupt electric trim power.

– Manual electric trim switches on the pilot's stick. When both switches are pressed in the same direction, they will activate pitch trim in the selected direction. If only one switch is moved, the trim system will not operate. If one switch fails or is moved and held for 3 seconds, the trim monitoring system will detect a switch failure resulting in a PT annunciation on the autopilot display and the disabling of the electric trim system. Autopilot power will have to be cycled to clear the fault. Use of manual electric trim during autopilot operation will disengage the autopilot.

– CWS (control wheel steering) mode button on the pilot´s stick. When pressed and held, it disengages the pitch, roll and pitch trim clutches allowing the pilot to maneuver the airplane by hand. Pressing the CWS button will also sync the autopilot ALT or VS commands to the actual altitude or vertical speed present at the time the button is released.

B. KCM 100 Configuration Module

The data which is specific to the DA 40 D (for example: gain settings) is stored in the KCM 100 configuration module. It is located on the instrument panel floor, between the instrument panel and the instrument panel frame.

C. KS 271C Roll Servo

The roll servo is located behind the rear main bulkhead on the right side. It is mounted on a mounting plate which is made from sheet aluminum. Two aluminum clamps connect a bridle cable to the aileron push-rod.

D. KS 270C Pitch Servo

The pitch servo is located aft of the baggage compartment frame. It is mounted on a mounting plate which is made from sheet aluminum. Two aluminum clamps connect a bridle cable to the elevator push-rod.

E. KS 272C Pitch Trim Servo

The pitch trim servo is located under the co-pilot's seat. It is mounted on a mounting plate which is made from sheet aluminum and mounting bracket which is made from GFRP. Servo movement is transmitted to the trim wheel through a chain gear on the servo, a cardanshaft, and a chain gear next to the trim wheel on the right side.

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Maintenance Practices

1. General

These Maintenance Practices tell you how to install the components of the autopilot system. They also tell you how to test and adjust the autopilot system.

2. Remove/Install the Flight Control Computer

A. Remove the Flight Control Computer

	Detail Steps/Work Items	Key Items/References
(1)	Open the AP circuit-breaker.	
(2)	Put a 3/32 Allen wrench into the access hole for the locking screw. Engage the screw.	
(3)	Turn the screw counter-clockwise until the unit disengages from the mounting rack.	
	CAUTION: DO NOT PULL ON THE KNOBS. DO NOT PRY THE FACE-PLATE. IF YOU PULL ON THE KNOBS, OR PRY THE FACE- PLATE, YOU CAN DAMAGE THE UNIT. CAUTION: DO NOT TOUCH THE CONNECTOR CARD AT THE REAR OF THE UNIT. THE ELECTROSTATIC CHARGE ON YOUR BODY CAN DAMAGE THE UNIT.	
(4)	Pull gently on the sides of the unit to remove it from the mounting rack.	
(5)	Install the protective covers on the rear connectors of the flight control computer.	

B. Install the Flight Control Computer

	Detail Steps/Work Items	Key Items/References
(1)	Remove the protective covers from the connectors on the replacement unit.	
(2)	Slide the unit into the rack. Engage the locking screw so that the latch front-lobe touches the rack.	
(3)	Turn the locking screw clockwise so that the rear lobe engages the mounting rack.	
	CAUTION: DO NOT OVER-TIGHTEN THE LOCKING SCREW. YOU CAN DAMAGE THE LOCKING MECHANISM.	
(4)	Continue to turn the screw until the unit is fully installed in the mounting rack.	
(5)	Close the AP circuit-breaker.	
(6)	Check and adjust the servo nulls.	Refer to the Installation Manual for the KAP 140 Flight Control System.
(7)	Do a test of the autopilot system: – Set the ELECTRIC MASTER key switch to ON. – Set AVIONIC MASTER switch to ON. – Observe self-test of the flight control computer. – Set AVIONIC MASTER to OFF. – Set ELECTRIC MASTER key switch to OFF.	If no error message appears, then the system is operative.

3. Remove/Install the KCM 100 Configuration Module

A. Remove the KCM 100 Configuration Module

	Detail Steps/Work Items	Key Items/References
(1)	Open the AP circuit-breaker.	Instrument panel, right side.
(2)	Remove the instrument panel cover.	Refer to Section 25-10.
(3)	Remove the KCM 100: – Remove the two screws that attach the KCM 100 to the instrument panel floor. – Disconnect the electric cable. – Move the configuration module free of the instrument panel.	

B. Install the KCM 100 Configuration Module

	Detail Steps/Work Items	Key Items/References
	CAUTION: WHEN A NEW CONFIGURATION MODULE IS INSTALLED, YOU MUST MAKE SURE THAT IT HAS THE PART NUMBER WHICH IS SHOWN IN THE EQUIPMENT LIST IN CHAPTER 6 OF THE AIRPLANE FLIGHT MANUAL. THE CONFIGURATION MODULE CONTAINS INFORMATION WHICH IS SPECIFIC FOR THE DA 40 D AIRPLANE.	
(1)	Slide the KCM 100 into position. Connect the electric cable and engage the two locking screws.	
(2)	Install the instrument panel cover.	Refer to Section 25-10.
(3)	Close the AP circuit-breaker.	Instrument panel, right side.
(4)	Upload the software.	
(5)	Check and adjust the servo nulls.	Refer to the Installation Manual for the KAP 140 Flight Control System.
(6)	Do a test of the autopilot system: – Set the ELECTRIC MASTER key switch to ON. – Set AVIONIC MASTER switch to ON. – Observe self-test of the flight control computer. – Set AVIONIC MASTER to OFF. – Set ELECTRIC MASTER key switch to OFF.	If no error message appears, then the system is operative.

4. Remove/Install the Roll Servo

A. Remove the Roll Servo

	Detail Steps/Work Items	Key Items/References
(1)	Remove the passengers' seat.	Refer to Section 25-10.
(2)	Dis-connect the connector from the servo.	
(3)	Remove the 2 screws which attach the servo to the mounting plate and the clutch.	Hold the servo.
(4)	Remove the servo clear of the airplane.	

B. Install the Roll Servo

	Detail Steps/Work Items	Key Items/References
(1)	Put the servo in place on the mounting plate.	
(2)	Install the 2 screws which attach the servo to the mounting plate and clutch.	
(3)	Connect the connector to the servo.	
(4)	Do a test of the autopilot system: – Set ELECTRIC MASTER key switch to ON. – Set AVIONIC MASTER switch to ON. – Observe self-test of the flight control computer. – Set AVIONIC MASTER switch to OFF. – Set ELECTRIC MASTER key switch to OFF.	If no error message appears, then the system is operative.
(5)	Install the passengers' seat.	Refer to Section 25-10.

5. Remove/Install the Roll Servo Clutch

A. Equipment

Item	Quantity	Part Number
Cable tension gauge.	1	Commercial.

B. Remove the Roll Servo Clutch

	Detail Steps/Work Items	Key Items/References
(1)	Remove the roll servo.	Refer to Paragraph 3.
(2)	Release the clamps which connect the bridle cable to the aileron push-rod.	
(3)	Remove the bridle cable.	
(4)	Remove the 2 screws which attach the clutch to the mounting plate.	Hold the clutch.
(5)	Remove the clutch clear of the airplane.	

C. Install the Roll Servo Clutch

	Detail Steps/Work Items	Key Items/References
(1)	Remove the pilot's seat or the co-pilot's seat.	Refer to Section 25-10. To give access for the rigging pin.
(2)	Put the clutch in place on the mounting plate.	
(3)	Install the 2 screws which attach the clutch to the mounting plate.	
(4)	Center the aileron control system with a rigging pin at one control stick.	Refer to Section 27-10.
(5)	Center the capstan.	The recess for the ball in the middle of the bridle cable must be in the uppermost position.
(6)	Install bridle cable to capstan.	The ball in the middle of the bridle cable must engage in the recess on the capstan. Wrap bridle cable around capstan one turn to each side.
(7)	Connect the ends of the bridle cable to the aileron push-rod with the clamps.	Tighten clamps lightly to allow adjustment (see next step).
(8)	Using a small plastic hammer, move the clamps along the push-rod to adjust the bridle cable tension.	Adjust tension to 89 ± 22 N (20 ± 5 lbf). Measure cable tension with cable tension gauge.
(9)	Tighten the clamps.	
(10)	Remove the rigging pin from the control stick.	
(11)	Install the front seat which was removed.	Refer to Section 25-10.
(12)	Install the roll servo.	Refer to Paragraph 3.

6. Remove/Install the Pitch Servo

A. Remove the Pitch Servo

	Detail Steps/Work Items	Key Items/References
(1)	Remove the trim/cover from the front face of the baggage compartment and remove the lower access panel from the baggage compartment insert.	
(2)	Dis-connect the connector from the servo.	
(3)	Remove the 2 screws which attach the servo to the mounting plate and the clutch.	Hold the servo.
(4)	Remove the servo clear of the airplane.	

B. Install the Pitch Servo

	Detail Steps/Work Items	Key Items/References
(1)	Put the servo in place on the mounting plate.	
(2)	Install the 2 screws which attach the servo to the mounting plate and clutch.	
(3)	Connect the connector to the servo.	
(4)	Do a test of the autopilot system: – Set ELECTRIC MASTER key switch to ON. – Set AVIONIC MASTER switch to ON. – Observe self-test of the flight control computer. – Set AVIONIC MASTER switch to OFF. – Set ELECTRIC MASTER key switch to OFF.	If no error message appears, then the system is operative.
(5)	Install the baggage compartment lower access panel and install the trim/cover to the front face of the baggage compartment.	

7. Remove/Install the Pitch Servo Clutch

A. Equipment

Item	Quantity	Part Number
Cable tension gauge.	1	Commercial.

B. Remove the Pitch Servo Clutch

	Detail Steps/Work Items	Key Items/References
(1)	Remove the pitch servo.	Refer to Paragraph 5.
(2)	Release the clamps which connect the bridle cable to the elevator push-rod.	
(3)	Remove the bridle cable.	
(4)	Remove the 2 screws which attach the clutch to the mounting plate.	Hold the clutch.
(5)	Remove the clutch clear of the airplane.	

C. Install the Pitch Servo Clutch

	Detail Steps/Work Items	Key Items/References
(1)	Remove the pilot's seat or the co-pilot's seat.	Refer to Section 25-10. To give access for the rigging pin.
(2)	Put the clutch in place on the mounting plate.	
(3)	Install the 2 screws which attach the clutch to the mounting plate.	
(4)	Center the elevator control system with a rigging pin at one control stick.	Refer to Section 27-30.
(5)	Center the capstan.	The recess for the ball in the middle of the bridle cable must be in the uppermost position.
(6)	Install bridle cable to capstan.	The ball in the middle of the bridle cable must engage in the recess on the capstan. Wrap bridle cable around capstan one turn to each side.
(7)	Connect the ends of the bridle cable to the elevator push-rod with the clamps.	Tighten clamps lightly to allow adjustment (see next step).
(8)	Using a small plastic hammer, move the clamps along the push-rod to adjust the bridle cable tension.	Adjust tension to 89 ± 22 N (20 ± 5 lbf). Measure cable tension with cable tension gauge.
(9)	Tighten the clamps.	
(10)	Remove the rigging pin from the control stick.	
(11)	Install the front seat which was removed.	Refer to Section 25-10.
(12)	Install the pitch servo.	Refer to Paragraph 5.

8. Remove/Install the Pitch Trim Servo

A. Remove the Pitch Trim Servo

	Detail Steps/Work Items	Key Items/References
(1)	Remove the co-pilot's seat.	Refer to Section 25-10.
(2)	Dis-connect the connector from the servo.	
(3)	Remove the 2 screws which attach the servo to the mounting plate and the clutch.	Hold the servo.
(4)	Remove the servo clear of the airplane.	

B. Install the Pitch Trim Servo

	Detail Steps/Work Items	Key Items/References
(1)	Put the servo in place on the mounting plate.	
(2)	Install the 2 screws which attach the servo to the mounting plate and clutch.	The upper forward screw also holds the chain adjuster. Ensure proper chain tension.
(3)	Connect the connector to the servo.	
(4)	Do a test of the autopilot system: – Set ELECTRIC MASTER key switch to ON. – Set AVIONIC MASTER switch to ON. – Observe self-test of the flight control computer. – Set AVIONIC MASTER switch to OFF. – Set ELECTRIC MASTER key switch to OFF.	If no error message appears, then the system is operative.
(5)	Install the co-pilot's seat.	Refer to Section 25-10.

9. Remove/Install the Pitch Trim Servo Clutch

A. Remove the Pitch Trim Servo Clutch

	Detail Steps/Work Items	Key Items/References
	CAUTION: DO NOT APPLY STRONG FORCES TO THE CARDAN SHAFT. THE UPPER CARDAN JOINT CONNECTS TO A PART WHICH IS WEAK BY DESIGN TO GIVE OCCUPANT PROTECTION IN AN EMERGENCY LANDING.	
(1)	Remove the pitch trim servo.	Refer to Paragraph 7.
(2)	Remove the screw which holds the cap to the capstan.	
(3)	Remove the cap from the capstan.	
(4)	Release chain tension with chain adjuster.	On the chain gear next to the servo.
(5)	Remove the chain from the chain gear.	
(6)	Remove the 2 screws which attach the clutch and the chain adjuster to the mounting plate.	Hold the clutch and the chain adjuster.

B. Install the Pitch Trim Servo Clutch

	Detail Steps/Work Items	Key Items/References
(1)	Put the clutch and the chain adjuster in place on the mounting plate.	
(2)	Install the 2 screws which attach the clutch and the chain adjuster to the mounting plate.	
(3)	Install the chain to the chain gear.	
(4)	Put the cap in place on the capstan.	
(5)	Install the screw which holds the cap to the capstan.	
(6)	Install the pitch trim servo.	Refer to Paragraph 7.

10. Adjust the Bridle Cable Tension

A. Equipment

Item	Quantity	Part Number
Cable tension gauge.	1	Commercial.

B. Adjustment Procedure

	Detail Steps/Work Items	Key Items/References
(1)	Loosen the bolts in the clamps which connect the bridle cable to the push-rod.	Do not remove the bolts. Loosen just enough so that the next step can be done.
(2)	Using a small plastic hammer, move the clamps along the push-rod to adjust the bridle cable tension.	Adjust tension to 89 ± 22 N (20 ± 5 lbf). Measure cable tension with cable tension gauge.
(3)	Tighten the bolts in the clamps which connect the bridle cable to the push-rod.	

11. Adjust the Servo Clutch Torques

A. Equipment

Item	Quantity	Part Number
Goodrich slip clutch test stand.	1	20-9855-03.

B. Adjustment Procedure

	Detail Steps/Work Items	Key Items/References
(1)	Remove the clutch from the airplane.	Refer to this Section.
(2)	Install the clutch assembly on the slip clutch test stand.	Refer to the equipment manufacturers' documentation.
(3)	Measure clockwise (CW) and counter-clockwise (CCW) clutch torque, adjust if necessary.	Refer to the equipment manufacturers' documentation. The correct clutch torques are: Roll servo 2.03 ± 0.23 Nm (18 ± 2 lbf.in.) Pitch servo 3.39 ± 0.34 Nm (30 ± 3 lbf.in.) Pitch trim servo 4.07 ± 0.45 Nm (36 ± 4 lbf.in.)
(4)	Remove the clutch assembly from the slip clutch test stand.	
(5)	Install the clutch to the airplane.	Refer to this Section.

12. Mechanical Test of the Autopilot

Do this check at the intervals given in Section 05-10.

	Detail Steps/Work Items	Key Items/References
(1)	Check bridle cable tension for the roll servo, adjust if necessary.	Refer to this Section.
(2)	Check bridle cable tension for the pitch servo, adjust if necessary.	Refer to this Section.
(3)	Check the clutch torque settings for the roll servo, adjust if necessary.	Refer to this Section.
(4)	Check the clutch torque settings for the pitch servo, adjust if necessary.	Refer to this Section.
(5)	Check the clutch torque settings for the pitch trim servo, adjust if necessary.	Refer to this Section.
(6)	Perform Pitot and Static System Leak Tests.	Refer to Section 34-10.

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CHAPTER 23

COMMUNICATIONS

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CHAPTER 23
COMMUNICATIONS

Section 23-00
Standard Equipment

1. General

This Chapter tells you about the communications system in the DA 40. It tells you about the intercom system which lets the pilots and passengers talk to each other. It also tells you about the radio system which lets the pilots talk to the ground.

This Chapter does not tell you about the communications equipment. Refer to the equipment manufacturers' manuals for data about the equipment. Refer to Chapter 92 for the wiring diagrams.

Many different instruments and avionics can be installed as options. There are avionics packages for Day-VFR, Night-VFR, and IFR.

Note: Equipment which is certified for installation in the DA 40 is listed in Section 6.5 of the Airplane Flight Manual. Such equipment may be installed in accordance with the Airplane Maintenance Manual.

Any equipment which is not listed in Section 6.5 of the Airplane Flight Manual is called "Additional Equipment". The installation of Additional Equipment is a modification which must be handled in accordance with national regulations or a Service Bulletin.

2. Description

The DA 40 communication system can have these components:

– NAV/COM transceiver No. 1.

– NAV/COM transceiver No. 2.

– Intercom system.

– COM VHF 1 antenna.

– COM VHF 2 antenna.

– NAV (VOR/LOC/GS) antenna.

– NAV antenna coupler.

– Marker beacon receiver antenna.

– Ground COM #2 switch.

– Press-to-transmit (PTT) switches. A PTT switch is located on each of the pilots' control sticks.

– Head-set-sockets. Head-set-sockets are located on the back of the center console for both the pilots and the passengers.

– Cabin speaker. The cabin speaker is located in the roof of the cockpit.

Section 23-01
Garmin G1000 Equipment

1. General

This Chapter tells you about the communications system in the DA 40 D airplane with the Garmin G1000 system installed. This section tells you about the intercom system which lets the pilots and passengers talk to each other. It also tells you about the radio system which lets the pilots talk to the ground and other airplane.

This Chapter does not tell you about the communications equipment. Refer to the equipment manufacturers' manual for data about the equipment. Refer to Chapter 92 for the wiring diagrams.

2. Description

The DA 40 D with the Garmin G1000 installed communication system has these components:

– GMA 1347 audio panel.

– NAV/COM transceivers (integral with the Garmin GIA 63 integrated avionics units).

– COM VHF antennas.

– NAV antenna (integral with the horizontal stabilizer).

– Push-to-talk (PTT) switches. A PTT switch is located in each of the pilots control sticks.

– Head-set sockets. Head-set sockets are located on the back of the center console for both the pilots and the passengers.

– Cabin speaker. A cabin speaker is mounted in the roof of the cockpit.

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Section 23-10
Speech Communication, Standard Equipment

1. General

This Section tells you about the speech communication system in the DA 40. It does not tell you about the speech communication equipment. Refer to the equipment manufacturers' manuals for more data about the equipment.

This Section also tells you about the NAV function of the NAV/COM receivers. Refer to Section 34-52 for more information about the VOR/LOC/GS system. Refer to Section 23-50 for information about the audio system. Refer to Section 34-58 for more information about the GPS system of the NAV/COM/GPS units.

The NAV/COM system can have the following components:

– NAV/COM 1 (Bendix/King KX 125, KX 155A, KX 165A; Garmin GNS 430, GNS 530).

– NAV/COM 2 (Bendix/King KX 155A; Garmin GNS 430).

– COM 1 antenna.

– COM 2 antenna.

– NAV (VOR/LOC/GS) antenna.

– NAV antenna coupler (Comant CI 505, CI 1125).

– Ground COM #2 switch.

Figure 1 shows the antenna locations.

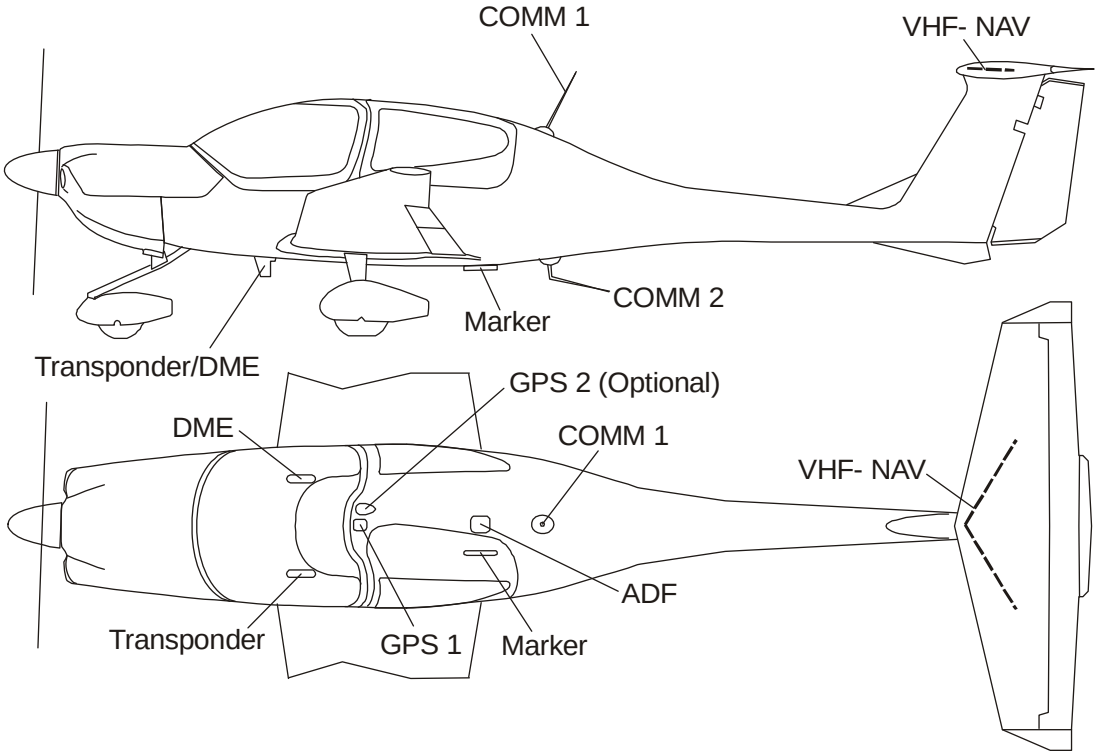


Figure 1: Antenna Locations

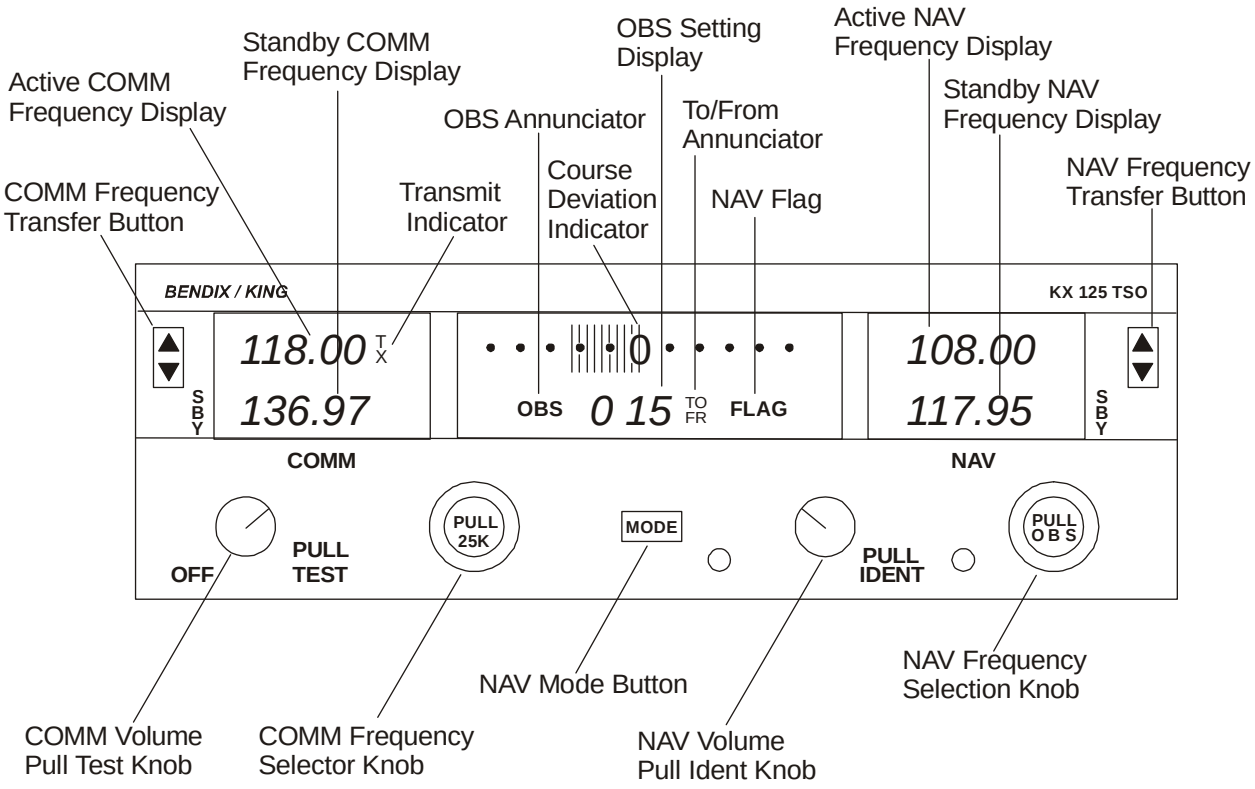


Figure 2: Bendix/King KX 125 NAV/COM

2. Description

A. KX 125 NAV/COM

Figure 2 shows the KX 125 NAV/COM. It is located in the avionics rack in the instrument panel, see Chapter 31.

The KX 125 is a communications transceiver and navigation receiver. The equipment can receive COM signals from 118 MHz to 136.975 MHz in 25 kHz increments. This gives 760 communication channel operation. The equipment can receive NAV signals from 108 MHz to 117.95 MHz in 50 kHz increments. This gives 200 navigation channel operation.

The left side display shows the COM frequency data. The top line shows the active COM and the bottom line shows the standby COM frequency. When the equipment transmits a TX annunciator comes on next to the active COM frequency.

The right side display shows the NAV frequency data. The top line shows the active NAV frequency and the bottom line shows the standby NAV frequency.

The center display shows this navigation information:

– CDI mode. The Course Deviation Indicator (CDI) is the top half of the center display. When the KX 125 receives valid navigation information and CDI mode is selected the CDI will operate. In CDI mode, a line of dots either side of a center “0" makes the course deviation indicator. Vertical bars appear to one side of the center “0" to tell the pilot how far the airplane is deviating from the selected course. Each dot shows 2° of deviation.

  In normal CDI operation the “OBS” annunciator appears under the CDI with the selected Omni-Bearing-Selector (OBS) bearing. A TO/FR annunciator tells the pilot if the bearing is to, or from, the selected station. The “FLAG” indicator shows in the bottom right of the display when no valid signals are being received in CDI mode.

– BEARING (BRG) mode. When bearing mode is selected and a valid signal is being received a three-digit bearing and the “TO” annunciator show in the bottom half of the center display. A row of dashes show when the receiver is not receiving a valid signal.

– RADIAL (RAD) mode. When radial mode is selected and a valid signal is being received a three-digit radial and the “FR” annunciator show in the bottom half of the center display. A row of dashes show when the receiver is not receiving a valid signal.

– AUTO-TO. Press and hold the NAV mode button for more than two seconds to set the receiver to Auto-to mode. In Auto-to mode, the CDI displays with the deviation bar in the center position and the OBS showing a direct course to the selected station. The “TO” annunciator will show. When the receiver stabilizes the CDI will go back to normal operation and show any course deviation.

– Localizer (LOC) mode. When a localizer frequency is the set as the active frequency and a valid navigation signal is being received the KX 125 shows localizer information. The CDI displays and LOC shows in the bottom half of the center display. The “FLAG” indicator shows in the bottom right of the display when no valid signals are being received in LOC mode.

The KX 125 has these controls:

– OFF/PULL TEST switch. Turn the switch fully counter-clockwise to set the receiver to OFF. Turn the switch clockwise to set the receiver on and to set the volume to the desired level. The KX 125 has automatic squelch. Pull the switch out to cancel the squelch and test the volume level. Push the knob in to set the automatic squelch.

– COM frequency selector. The COM frequency selector has an inner knob and an outer knob. Turn the outer knob clockwise to increase the frequency in 1 MHZ increments. Turn the outer knob counter-clockwise to decrease the frequency in 1 MHZ increments. Turn the inner knob clockwise to increase the frequency in 50 kHz increments. Turn the inner knob counter-clockwise to decrease the frequency in 50 kHz increments. Pull the inner knob out to set 25 kHz increments.

– MODE button. Momentarily press the mode selector button to change the NAV mode when a valid VOR frequency is set as the active frequency. The mode will rotate through CDI-BRG-RAD in order. Changing the active or standby frequency will not change the mode unless a localizer frequency is set as the active frequency.

  Press and hold the MODE button for at least two seconds when a valid VOR frequency is selected as the active frequency to set the NAV receiver to Auto-to mode. You can enter Auto-to mode directly from any mode.

– PULL IDENT switch. Pull the switch out to activate the NAV identification (ident). Turn the switch clockwise to increase voice and ident tone. Turn the switch counter-clockwise to decrease the volume. Push the switch in to mute the ident and voice tones.

– NAV frequency selector. The NAV frequency selector has an inner knob and an outer knob. Turn the outer knob clockwise to increase the frequency in 1 MHZ increments. Turn the outer knob counter-clockwise to decrease the frequency in 1 MHZ increments. Turn the inner knob clockwise to increase the frequency in 50 kHz increments. Turn the inner knob counter-clockwise to decrease the frequency in 50 kHz increments. Pull the inner knob out and rotate the switch to set the OBS bearing. Turn the switch clockwise to increase the bearing and turn the switch counter-clockwise to decrease the bearing.

– COM frequency transfer button. Momentarily pressing the COM frequency transfer button will move the standby frequency to the active frequency and the active frequency to standby. Press and hold the button for at least two seconds to set active entry mode. When the active entry mode is set, the active frequency is entered directly by using the COM frequency selector. The standby frequency is not displayed when active entry mode is set. Momentarily press the transfer button again to de-select active entry mode.

– NAV frequency transfer button. Momentarily pressing the NAV frequency transfer button will move the standby frequency to the active frequency and the active frequency to standby. Press and hold the button for at least two seconds to set active entry mode. When the active entry mode is set, the active frequency is entered directly by using the NAV frequency selector. The standby frequency is not displayed when active entry mode is set. Momentarily press the transfer button again to de-select active entry mode.

The KX 125 has an LCD display. You can adjust the contrast of the display with the adjustment screw located in the lower-right side of the front panel. Turn the adjustment screw to set the contrast to the correct level.

"T" indicates Mic Button is Being Depressed
"R" indicates Squelch Button is Open by Received Signal

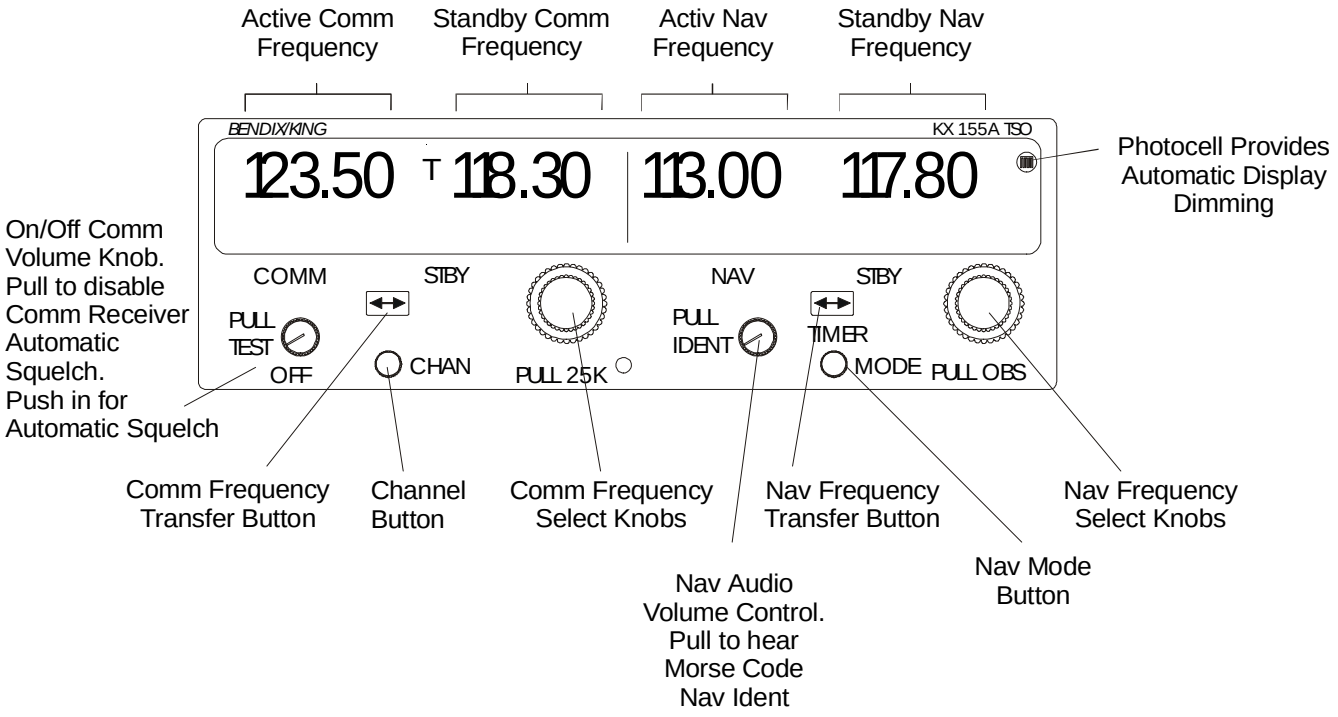


Figure 3: Bendix/King KX 155A NAV/COM
Bendix/King KX 165A looks similar

B. KX 155A and 165A NAV/COM

Figure 3 shows the KX 155A/165A NAV/COM unit. It is located in the avionics rack in the instrument panel, see Chapter 31.

The KX 155A/165A has these functions:

– Two-way voice communication in the frequency range 118 MHz to 136.975 MHz in 25 kHz increments. This gives 760 communication channel operation.

– Receiving navigation signals in the frequency range 108 MHz to 117.95 MHz in 50 kHz increments. This gives 200 navigation channel operation.

– Receiving glideslope signals in the frequency range 329.15 MHz to 335 MHz in 150 kHz increments (KX 165A only).

– VOR/LOC signal converter. The course deviation indicator (CDI) can show VOR headings.

The KX 155A/165A has the communications control on the left and it has the navigation controls on the right. It has these controls:

– OFF/PULL/TEST knob. Turn the knob fully counter-clockwise to switch the system OFF. Turn the knob clockwise to switch the unit ON and to set the volume. Pull the knob out to stop the operation of the automatic squelch and to set the volume. Push the knob in to set automatic squelch.

– COM FREQUENCY SELECT knobs. The outer knob controls the three digits to the left of the decimal point (1 MHz steps) and the inner knob controls the two digits to the right of the decimal point (50 kHz steps with the knob pushed in and 25 kHz steps with the knob pulled out).

– COM display. The COM display has four parts:

  – The top left part shows the in-use frequency (USE).

  – The top right part shows the standby frequency (STBY).

  – The top center part has an indicator. The indicator shows “T” when the transmit operates and “R” when the set is receiving a signal that is strong enough to open the squelch.

  – The lower right part shows the selected channel number (1 - 32), when the system is in the channel mode of operation.

– COM frequency transfer button. The transfer button moves the active frequency to standby and the standby frequency to active.

– CHAN button. Press the channel button for 2 seconds or more to enter channel programming mode of operation. Momentarily press the channel button to save the programming information and return to the normal mode of operation.

– NAV FREQUENCY SELECT knobs. The outer knob controls the three digits to the left of the decimal point (1 MHz steps), and the inner knob controls the two digits to the right of the decimal point (50 kHz steps).

– NAV display. The NAV display has these four parts:

  – The top left part shows the in-use frequency (ACTIVE).

  – The top right part shows this information:

    – Standby frequency (STBY), when in ACTIVE/STANDBY format.

    – A three-digit Omni Bearing Selector (OBS) course when in ACTIVE/CDI (Course Deviation Indicator) mode.

    – LOC when the active frequency is tuned to a localizer frequency.

    – A three-digit bearing, showing ‘Fr’, when in ACTIVE VOR/RADIAL mode.

    – A three-digit bearing, showing ‘To’, when in ACTIVE VOR/BEARING mode.

    – Elapsed time or countdown time when in TIMER mode.

  – The top center part has an indicator which shows ‘OBS’ when the system is in ACTIVE/CDI mode.

  – The lower part shows this information:

    – The course deviation indicator when in ACTIVE/CDI mode and the active frequency is tuned to a VOR or localizer frequency.

    – 'FLAG’ when the signal received is too weak for the system to display accurate information.

– NAV frequency transfer/TIMER button. Push this button to move the active frequency to standby and the standby frequency to active when in VOR mode. When in timer mode you push this button to set or reset the timer.

– PULL OBS switch. The PULL OBS switch is the inner FREQUENCY SELECT knob. If you pull this knob out you can use the inner FREQUENCY SELECT knob to select the OBS course. When this knob is pulled the OBS indicator in the top center of the NAV display flashes.

– PULL IDENT knob. Pull the PULL IDENT knob to hear the usual voice communications on the audio system and to hear the station IDENT tone on the audio system. Push the knob to hear the usual voice communications on the audio system but not hear the IDENT tone. Turn this knob to adjust the volume of the voice communications or IDENT tone.

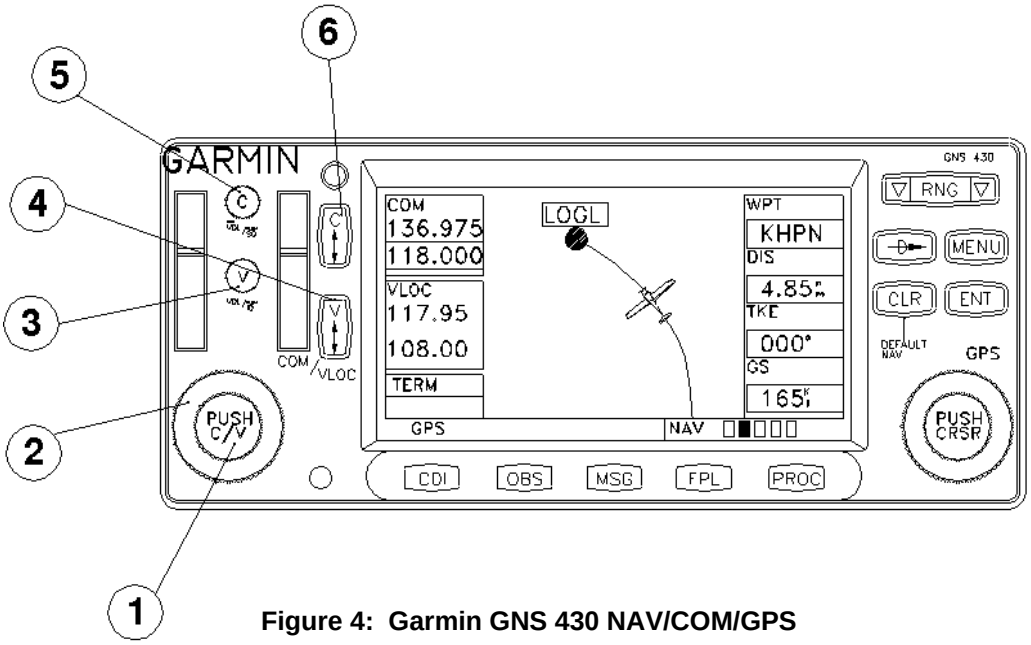


Figure 4: Garmin GNS 430 NAV/COM/GPS

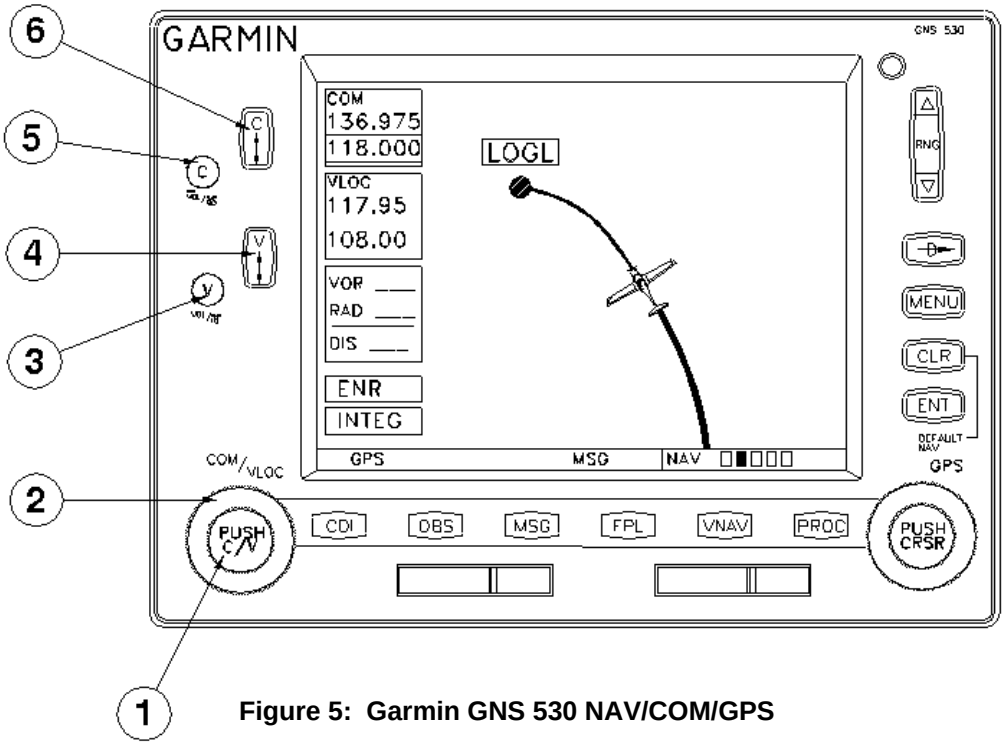


Figure 5: Garmin GNS 530 NAV/COM/GPS

C. GNS 430/530 NAV/COM

Figure 4 shows the GNS 430 NAV/COM/GPS system. Figure 5 shows the GNS 530 NAV/COM/GPS system. They are located in the avionics rack in the instrument panel, see Chapter 31.

The GNS 430/530 has these functions:

– Two-way voice communication in the frequency range from 118 MHz to 136.975 MHz in 25 kHz or 8.33 kHz increments (depends on setup). This gives 760 or 2278 communication channel operation.

– Receiving navigation signals in the frequency range from 108 MHz to 117.95 MHz in 50 kHz increments. This gives 200 navigation channel operation.

– Receiving glideslope signals in the frequency range from 329.15 MHz to 335 MHz in 150 kHz increments.

The GNS 430/530 has the communication and navigation controls on the left. They have these controls:

– The small left knob (PUSH C/V) (1) is used to tune the kilohertz (kHz) value of the standby frequency for the communications transceiver (COM) or the VLOC receiver, whichever is currently selected by the tuning cursor. Press this knob momentarily to toggle the tuning cursor between the COM and VLOC frequency fields.

– The large left knob (COM/VLOC) (2) is used to tune the megahertz (MHz) value of the standby frequency for the communications transceiver (COM) or the VLOC receiver, whichever is currently selected by the tuning cursor.

– The VLOC volume knob (3) controls audio volume for the selected VOR/Localizer frequency. Press momentarily to enable/disable the ident tone.

– The VLOC flip-flop key (4) is used to swap the active and standby VLOC frequencies (i.e., make the selected standby frequency active).

– The COM power/volume knob (5) controls unit power and communications radio volume. Press momentarily to disable automatic squelch control.

– The COM flip-flop key (6) is used to swap the active and standby COM frequencies. Press and hold to select emergency channel (121.500 MHz).

The GNS 430/530 display is divided into separate 'windows' (or screen areas), including a COM window, VLOC window and the GPS window (the right 3/4 of the display).

D. COM 1 Antenna

The COM 1 antenna (Comant DM C63-1/A) is mounted on the upper surface of the fuselage, aft of the cockpit.

E. COM 2 Antenna

The COM 2 antenna (Comant DM C63-2) is mounted on the lower surface of the fuselage, aft of the cockpit.

F. NAV Antenna

The NAV (VOR/LOC/GS) antenna (Comant CI 157P) is integrated in the horizontal stabilizer.

G. NAV Antenna Coupler

The NAV antenna coupler (Comant CI 505 or CI 1125) is located on the instrument panel floor on a connector mounting behind the avionics rack. It divides the signal which comes from the NAV antenna into individual signals for the NAV 1 receiver, the NAV 2 receiver, and the glideslope receiver.

H. Ground COM #2 Switch

The ground COM #2 switch is located on the instrument panel directly left of the annunciator panel, see Chapter 31.

The ground COM #2 switch is a toggle type switch. When it is set to ON, then the COM #2 transceiver can be used on the ground without switching the master switch ON. Refer to Chapter 92 for wiring diagrams.

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Trouble-Shooting

1. General

The table below lists the defects you could have with the speech communication system. Refer to Section 34-52 for Trouble-Shooting the VOR/LOC/GS system. Refer to Section 34-58 for Trouble-Shooting the GPS system.

If you have the trouble detailed in the Trouble column read across to the Possible Cause column. Then do the repair given in the Repair column.

Trouble	Possible Cause	Repair
LCD display hard to read.	Contrast adjustment not correct.	Adjust contrast.
Radio check reports readability good, strength poor due to low modulation.	Mic. output low. Faulty radio.	Replace the defective mic. Replace the radio.
Radio check reports readability poor, strength good.	Faulty radio. Faulty mic.	Replace the radio. Replace the mic.
Radio check reports readability poor, strength poor. Received audio is poor.	Co-ax connector faulty. Faulty radio. Faulty antenna.	Examine the co-ax and connections for condition and security. Replace the radio. Replace the antenna.
Short range in transmit mode, but reception is ok.	Faulty radio.	Replace the radio.
No voice modulation when transmitting from one pilot's side. The other pilots side OK.	Audio integrating fault. Head-set defective.	Refer to Section 23-50. Replace head-set.
Cannot transmit. Transmit annunciator not shown in COM display.	Faulty PTT switch. PTT wiring circuit defective. Faulty radio.	Replace PTT switch. Do a test of the PTT wiring circuit. Refer to Chapter 92 for the wiring diagrams. Replace the radio.

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Maintenance Practices

1. General

This Section tells you how to remove/install the main components of the speech communication system. Refer to the equipment manufacturer's manuals for more data about the equipment.

2. Remove/Install the NAV/COM Unit or NAV/COM/GPS Unit

A. Remove the NAV/COM Unit or NAV/COM/GPS Unit

	Detail Steps/Work Items	Key Items/References
(1)	Open the related circuit breaker(s).	NAV/COM circuit breaker for the NAV/COM unit. COM and NAV/GPS circuit breakers for the COM/NAV/GPS unit.
(2)	Put a 3/32 Allen wrench into the access hole for the locking screw. Engage the wrench into the screw.	Refer to Figure 2 (KX 125), Figure 3 (KX 155A/165A), Figure 4 (GNS 430) or Figure 5 (GNS 530).
(3)	Turn the screw counter-clockwise until the unit disengages from the mounting rack.	
	CAUTION: DO NOT PULL ON THE KNOBS. DO NOT PRY THE FACE-PLATE. YOU CAN DAMAGE THE UNIT. CAUTION: DO NOT TOUCH THE CONNECTOR CARD AT THE REAR OF THE UNIT. THE ELECTROSTATIC CHARGE OF YOUR BODY CAN DAMAGE THE UNIT.	
(4)	Pull gently on the side of the unit to remove it from the mounting rack.	
(5)	Install the protective covers on the rear connectors of the unit.	

B. Install the NAV/COM Unit or NAV/COM/GPS Unit

	Detail Steps/Work Items	Key Items/References
(1)	Remove the protective covers from the connectors on the rear of the unit.	
(2)	Slide the unit into the rack. Engage the locking screw so that the lobe of the front latch touches the rack.	
(3)	Turn the locking screw so that the rear lobe engages the mounting rack.	Refer to Figure 2 (KX 125), Figure 3 (KX 155A/165A), Figure 4 (GNS 430) or Figure 5 (GNS 530).
CAUTION: DO NOT OVER-TIGHTEN THE LOCKING SCREW. YOU CAN DAMAGE THE LOCKING MECHANISM.		
(4)	Continue to turn the locking screw until the unit is fully installed in the mounting rack.	
(5)	Close the related circuit breaker(s).	NAV/COM circuit breaker for the NAV/COM unit. COM and NAV/GPS circuit breakers for the COM/NAV/GPS unit.
(6)	Do a function test of the system.	Refer to Paragraph 8.

3. Configuration of the Garmin COM/NAV/GPS GNS 430

You must configure the unit after replacing it.

A. Configuration Mode Operation

With power applied to the avionic rack and the GNS 430 unit turned off, press and hold the ENT key and turn the unit on. Release the ENT key when the display activates. After the data base page, the first page displayed is the MAIN ARINC 429 CONFIG page. While in Configuration Mode, pages can be selected by ensuring the cursor is off and rotating the small right knob.

To change data on the displayed Configuration Page, press the small right knob (CRSR) to turn on the cursor. Turn the large right knob to change between data fields. Turn the large or small right knob to change a field that the cursor is on. Once you have made the desired selection, press the ENT key to accept the entry.

The Configuration Pages described on the following pages are in the order found when rotating the right small knob starting at the MAIN ARINC 429 CONFIG page.

	Detail Steps/Work Items	Key Items/References
(1)	Select the following configuration on the MAIN ARINC 429 page: SPEED DATA IN 1 Low Off IN 2 Low Off OUT Low Off SDI Common	
(2)	Select the following configuration on the MAIN RS232 CONFIG page: INPUT OUTPUT CHAN1 Icarus-alt Off CHAN2 Off Off CHAN3 Off Off CHAN4 Off Off FUEL TYPE AV gas	
(3)	No adjustments necessary on the MAIN INPUTS 1 and MAIN INPUTS 2 page.	

	Detail Steps/Work Items	Key Items/References
(4)	Select the following configuration on the MAIN LIGHTING page: DISPLAY KEY LIGHTING --- --- SOURCE PHOTO PHOTO RESPONSE TIME 3 4 SLOPE 40 50 MINIMUM 250 40 OFFSET 40 50	
(5)	On the DATE/TIME SETUP page, it may be desirable to set the date and time of the GNS 430 to aid in acquiring a GPS position.	Note that the time must be UTC time, and that the UTC date may be different from the date in the local time zone.
	CAUTION: CHANGING TO THE WRONG UTC DATE/TIME WILL DELAY SATELLITE ACQUISITION.	
(6)	No adjustments necessary on the MAIN DISCRETE INPUTS page.	
(7)	No adjustments necessary on the MAIN CDI/OBS CONFIG page except the SELECTED COURSE. Select 150° on the CDI that is connected to the GNS 430 MAIN OBS inputs. The SELECTED COURSE field should indicate near to 150° and a 'Calibrate to 150°?' field will appear. Selecting this field will calibrate the GNS 430 to match the input source.	Verify OBS operation by checking that the course displayed on the GNS 430 is within 2° of the selected course. Do this at 30° intervals around the OBS card.
(8)	Select the COM SETUP page. These values are set at the factory and seldom require calibration. FREQ 136.975 SQ 250 26 SPACING SQ 833 19 25.0 KHz SIDETN 63	FREQ For purpose of setting the squelch and sidetone levels, only the frequencies 118.000, 127.000, and 136.975 MHz can be used. SPACING 8.33 kHz channel spacing may be required in some areas of the world.
(9)	No adjustments necessary on the VOR DISCRETE INPUTS page.	

	Detail Steps/Work Items	Key Items/References
(10)	No adjustments necessary on the VOR/LOC/GS CDI page.	
(11)	Select the following configuration on the VOR/LOC/GS ARINC 429 CONFIG page: RX TX SPEED Low Low SDI VOR/ILS 1 DME MODE Directed freq 2	

4. Configuration of the Garmin COM/NAV/GPS GNS 530

You must configure the unit after replacing it.

A. Configuration Mode Operation

With power applied to the avionic rack and the GNS 530 unit turned off, press and hold the ENT key and turn the unit on. Release the ENT key when the display activates. After the data base page, the first page displayed is the MAIN ARINC 429 CONFIG page. While in Configuration Mode, pages can be selected by ensuring the cursor is off and rotating the small right knob.

To change data on the displayed Configuration Page, press the small right knob (CRSR) to turn on the cursor. Turn the large right knob to change between data fields. Turn the large or small right knob to change a field that the cursor is on. Once you have made the desired selection, press the ENT key to accept the entry.

The Configuration Pages described on the following pages are in the order found when rotating the right small knob starting at the MAIN ARINC 429 CONFIG page.

	Detail Steps/Work Items	Key Items/References
(1)	Select the following configuration on the MAIN ARINC 429 page: SPEED DATA IN 1 Low Off IN 2 Low Off OUT Low Off SDI Common	
(2)	Select the following configuration on the MAIN RS232 CONFIG page: INPUT OUTPUT CHAN1 Icarus-alt Off CHAN2 Off Off CHAN3 Off Off CHAN4 Off Off CHAN5 Off Off CHAN6 Off Off FUEL TYPE AV gas	When the BF Goodrich WX-500 Stormscope Option is installed in the airplane select following configuration for channel 4: INPUT OUTPUT CHAN4 WX-500 WX500
(3)	No adjustments necessary on the MAIN INPUTS page.	

	Detail Steps/Work Items	Key Items/References
(4)	Select the following configuration on the MAIN LIGHTING page: DISPLAY KEY LIGHTING --- --- SOURCE PHOTO PHOTO RESPONSE TIME 3 4 SLOPE 30 50 MINIMUM 250 40 OFFSET 25 50	
(5)	On the DATE/TIME SETUP page, it may be desirable to set the date and time of the GNS 430 to aid in acquiring a GPS position.	Note that the time must be UTC time, and that the UTC date may be different from the date in the local time zone.
	CAUTION: CHANGING TO THE WRONG UTC DATE/TIME WILL DELAY SATELLITE ACQUISITION.	
(6)	No adjustments necessary on the MAIN DISCRETE I/O page.	
(7)	No adjustments necessary on the MAIN CDI/OBS CONFIG Page except the SELECTED COURSE. Select 150° on the HSI that is connected to the GNS 530 MAIN OBS inputs. The SELECTED COURSE field should indicate near to 150° and a 'Calibrate to 150°?' field will appear. Selecting this field will calibrate the GNS 530 to match the input source.	Verify OBS operation by checking that the course displayed on the GNS 530 is within 2° of the selected course. Do this at 30° intervals around the OBS card.
(8)	Select the COM SETUP page. These values are set at the factory and seldom require calibration. FREQ 136.975 SQ 250 25 SPACING SQ 833 20 25.0 kHz SIDETN 34	FREQ For purpose of setting the squelch and sidetone levels, only the frequencies 118.000, 127.000, and 136.975 MHz can be used. SPACING 8.33 kHz channel spacing may be required in some areas of the world.
(9)	No adjustments necessary on the VOR DISCRETE INPUTS page.	

	Detail Steps/Work Items	Key Items/References
(10)	No adjustments necessary on the VOR/LOC/GS CDI page.	
(11)	Select the following configuration on the VOR/LOC/GS ARINC 429 CONFIG page: RX TX SPEED Low Low SDI VOR/ILS 1 DME MODE Directed freq 1	

5. Remove/Install a COM VHF Antenna

A. Remove a COM VHF Antenna

	Detail Steps/Work Items	Key Items/References
(1)	Remove the screws which attach the antenna to the fuselage.	
(2)	Carefully pull the antenna clear of the fuselage and hold it.	If necessary, carefully cut the sealant around the base of the antenna. You must not damage the fuselage skin.
(3)	Release the co-axial connector from the antenna.	
(4)	Release the bonding cable from the antenna.	
(5)	Move the antenna clear of the airplane.	

B. Install a COM VHF Antenna

	Detail Steps/Work Items	Key Items/References
(1)	Carefully remove any sealant from the area where the antenna attaches to the fuselage.	
(2)	Move the antenna close to where it attaches to the fuselage and: – Attach the co-axial connector to the antenna. – Attach the bonding cable to the antenna.	
(3)	Put the antenna in position on the fuselage and install the screws which attach the antenna to the fuselage.	
(4)	Seal the outer edge of the antenna to the fuselage skin with sealant.	Use Dow Corning 732 RTV or equivalent. Follow the sealant manufacturer's instructions.
(5)	Do a function test of the system.	Refer to Paragraph 8.

6. Remove/Install the NAV (VOR/LOC/GS) Antenna

The NAV (VOR/LOC/GS) antenna is integral to the horizontal stabilizer. Refer to Diamond for data on the NAV antenna.

7. Remove/Install the NAV Antenna Coupler

A. Remove the NAV Antenna Coupler

	Detail Steps/Work Items	Key Items/References
(1)	Remove the instrument panel cover.	Refer to Section 25-10.
(2)	Dis-connect the connectors from the unit.	
(3)	Remove the screws which attach the unit to the bracket on the instrument panel floor.	
(4)	Remove the unit from the airplane.	

B. Install the NAV Antenna Coupler

	Detail Steps/Work Items	Key Items/References
(1)	Put the unit in place on the bracket on the instrument panel floor.	
(2)	Install the screws which attach the unit to the bracket.	
(3)	Connect the connectors at the unit.	
(4)	Install the instrument panel cover.	Refer to Section 25-10.

8. NAV/COM Test

If possible, do an operational flight check after the radio has been replaced. Alternatively use a NAV/COM test set to make sure that the system operates correctly. Refer to the manufacturer's Installation Manual for performance specifications.

	Detail Steps/Work Items	Key Items/References
(1)	Do a test of each control function.	Refer to Section 23-10 and Section 34-52.
(2)	At a sufficient altitude, contact a ground station at least 50 NM away and another close by.	If possible, select stations with frequencies at both the high and low end of the NAV/COM band.
(3)	Test the VOR system at 4000 ft. Select a VOR frequency within a 40 NM range. Listen to the station identifier. Test the operation of the tone identifier filter. Fly inbound and outbound on a selected VOR radial. Look for the correct LEFT/RIGHT and TO/FROM indications. Monitor the VOR accuracy.	
(4)	Do a test of the DME remote channeling.	If installed.
(5)	Do a test of localizer (LOC) and glideslope (GS) operation and accuracy on a suitable runway.	
(6)	If necessary, adjust the viewing contrast of the LCD display.	Through the access hole in the front panel.

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Section 23-11
Speech Communication, Garmin G1000 Equipment

1. General

This Section tells you about the speech communication system in the DA 40 D with the Garmin G1000 system installed. It does not tell you about the speech communication equipment. Refer to the equipment manufacturers' manuals for more data about the equipment.

Figure 1 shows the antenna locations.

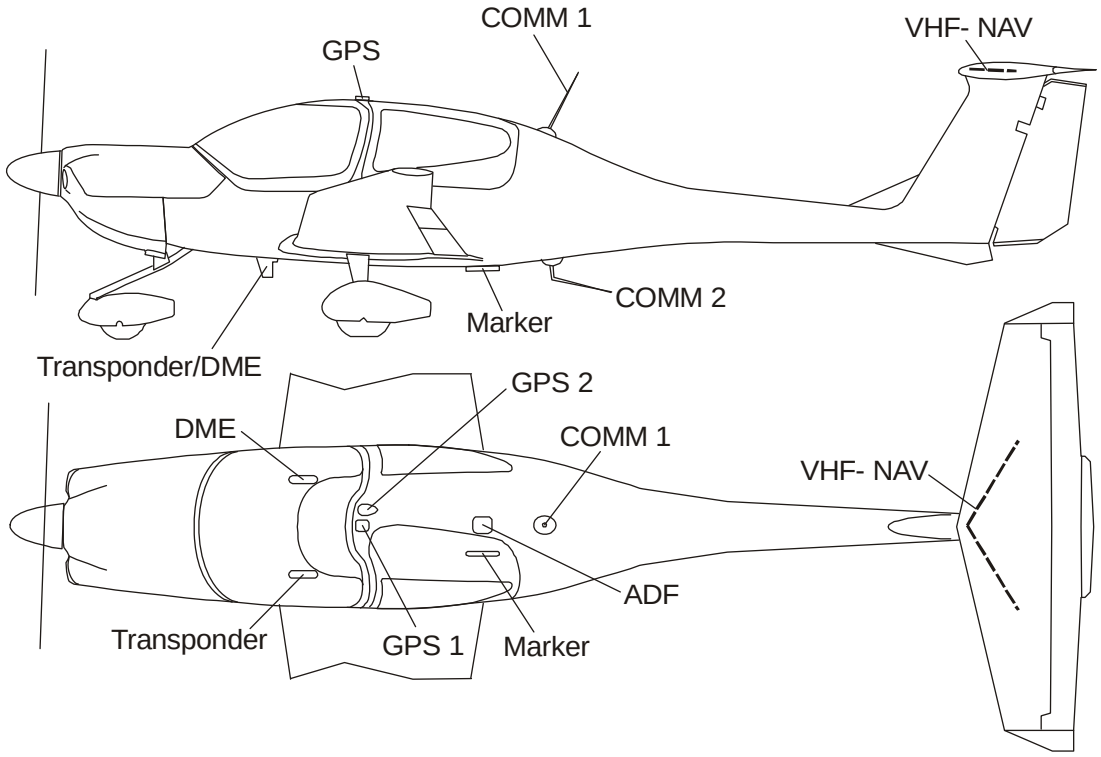
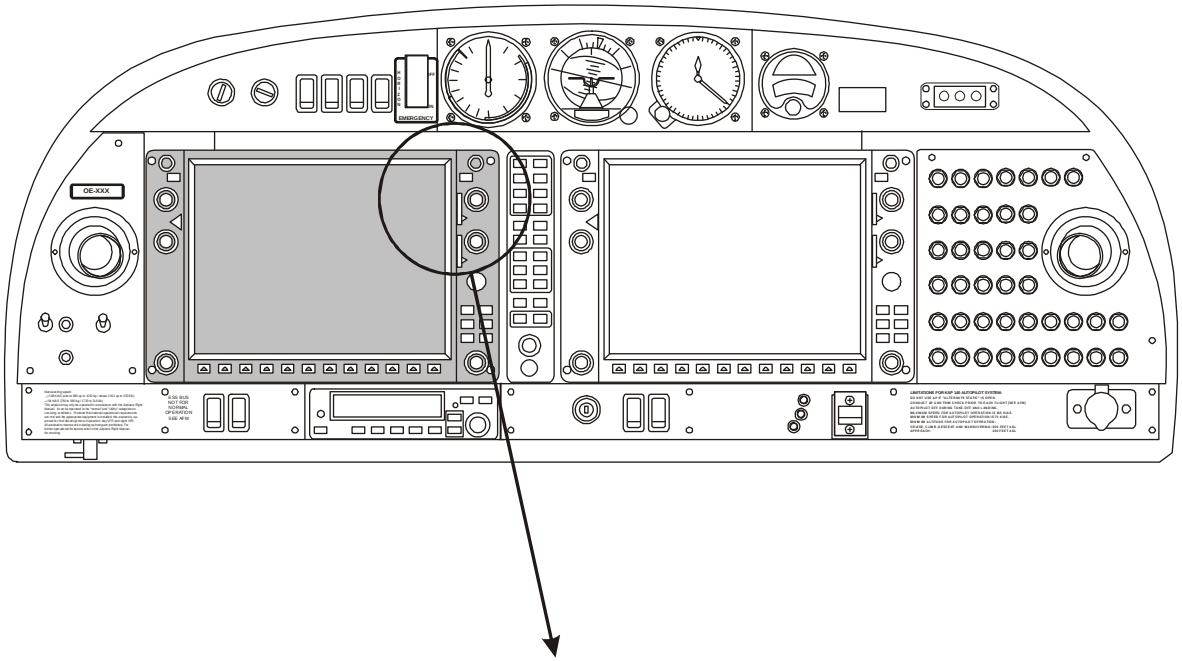


Figure 1: Antenna Locations



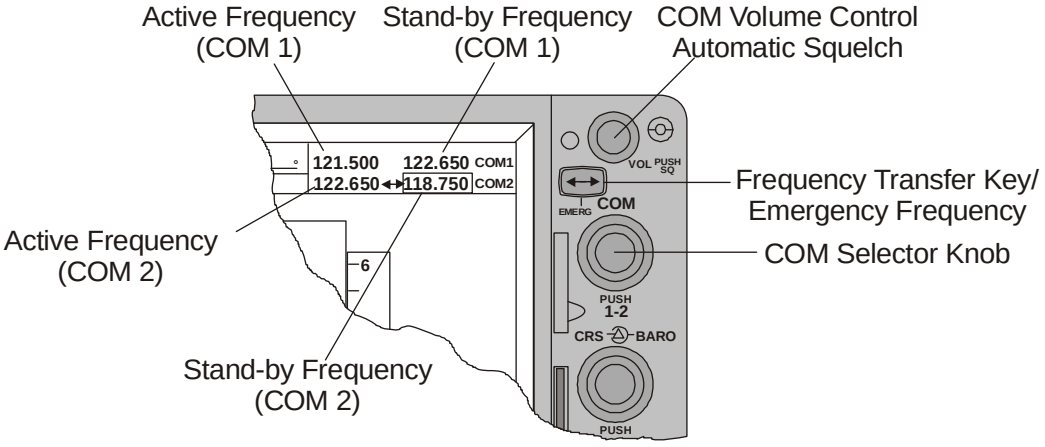


Figure 2: Garmin 1000 Primary Flight Display Panel

2. Description

The DA 40 D with the Garmin G1000 installed has dual VHF radio communications transceivers (COM 1 and COM 2) which are integral with the GIA 63 integrated avionics units. The No. 1 GIA 63 and No. 2 GIA 63 units are remotely located in the aft fuselage avionics rack. The COM 1 antenna is located on the upper surface of the fuselage, aft of the cockpit. The COM 2 antenna is located on the lower surface of the fuselage, aft of the cockpit. Refer to Section 31-40 for more data about the Garmin 1000 ICS.

Figure 2 shows the Garmin 1000 primary flight display (PFD). The speech communication system is integral with the Garmin 1000 integrated cockpit system (ICS). Power is supplied to the dual VHF communications transceivers when the ICS is switched on. The COM selector knob is located at the top-right corner of each ICS display panel. A digital display in the top right corner of the primary flight display (PFD) screen shows which COM system and frequency is in use.

Both the active and stand-by frequencies are shown for both COM 1 and COM 2 systems. Pushing the inner knob of the COM selector will toggle the active COM system between COM 1 and COM 2. Push the COM FREQUENCY TRANSFER key to toggle between the active and standby frequency of the selected communication system. A box is displayed around the stand by frequency.

Pressing and holding the COM FREQUENCY TRANSFER key for approximately 2 seconds will over-ride all previous selections and select the EMERGENCY COM frequency of 121.500 MHz.

You can only change the frequency that is currently selected as the stand by frequency. You must rotate the large outer COM selector knob to select the MHz value of the frequency and rotate the small inner knob of the COM selector to select the KHz value of the frequency.

Above the COM knob is the VOL knob. You control the volume level of the active radio receiver with the VOL knob. Press the knob to toggle the ON/OFF selection of the automatic squelch control.

The pilots use the audio control panel to control all the audio systems of the DA 40 D. Both speech and navigational audio can be sent to the pilots or passengers headphones. Or can be played on the cockpit loudspeaker. Refer to Section 23-50 for more data about the audio control unit.

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Trouble-Shooting

1. General

This table tells you how to trouble-shoot the speech communication system. See Section 23-51 for Trouble-Shooting the audio integrating system.

If you have the trouble detailed in the Trouble column read across to the Possible Cause column. Then do the repair given in the Repair column.

Trouble	Possible Cause	Repair
Radio check reports readability good, strength poor due to low modulation on COM 1/COM 2	Mic. output low. Faulty related GIA 63 IAU.	Replace the defective mic. Replace the related GIA 63 IAU.
Radio check reports readability poor, strength good.	Faulty related GIA 63 IAU. Faulty mic.	Replace the related GIA 63 IAU. Replace the mic.
Radio check reports readability poor, strength poor on COM 1/COM 2. Received audio is poor.	Co-ax connector faulty. Faulty related GIA 63 IAU. Faulty antenna.	Examine the co-ax and connections for condition and security. Replace the related GIA 63 IAU. Replace the antenna.
Short range in transmit mode, but reception is OK, COM 1/COM 2.	Faulty related GIA 63 IAU.	Replace the related GIA 63 IAU.
No voice modulation when transmitting from one pilots side. The other pilots side OK.	Audio integrating fault. Related head-set defective.	Refer to Section 23-50. Replace related head-set.
Cannot transmit. Transmit annunciator not shown in COM display.	Faulty PTT switch. PTT wiring circuit defective. Faulty related GIA 63 IAU. Faulty GMA 1347 audio panel.	Replace PTT switch. Do a test of the PTT wiring circuit. Refer to Chapter 92 for the wiring diagrams. Replace the related GIA 63 IAU. Replace the GMA 1347 audio panel.

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Maintenance Practices

1. General

This Section tells you how to replace the main components of the speech communication system. Refer to the equipment manufacturers' manuals for more data about the equipment. The communications transceivers are integral with the GIA 63 integrated avionics units (IAU). Refer to Section 31-41 for data about replacing the GIA 63 IAU's.

2. Remove/Install a COM VHF Antenna

Use this procedure for both COM 1 and COM 2 antennas. Access to both the antennas is through the rear baggage compartment.

A. Remove a COM VHF Antenna

	Detail Steps/Work Items	Key Items/References
(1)	Remove the aft baggage compartment.	Refer to Section 25-10.
(2)	Identify the antenna that you will replace.	Lower antenna COM 2, top antenna COM 1.
(3)	Disconnect the co-axial cable from the antenna.	At the bayonet connector.
(4)	Remove the antenna: – Remove the 3 nuts and washers that attach the antenna to the airplane structure. – Move the antenna clear of the airplane.	If necessary, cut the sealant around the base of the antenna. You must not damage the fuselage skin.

B. Install a COM VHF Antenna

	Detail Steps/Work Items	Key Items/References
(1)	Carefully remove any sealant from the area where the antenna attaches to the fuselage.	Take care not to damage the fuselage. If necessary, use a commercial solvent.
(2)	Install the antenna: – Move the antenna into position on the fuselage. – Make sure that the bonding strip for the antenna is correctly located. – Install the 3 washers and nuts that attach the antenna to the fuselage.	
(3)	Connect the co-axial cable to the antenna.	At the bayonet connector.
(4)	Do a test for the correct operation of the related speech communications system.	Refer to the Airplane Flight Manual.
(5)	Install the aft baggage compartment.	Refer to Section 25-10.
(6)	Seal the outer edge of the antenna to the fuselage skin with sealant.	Use Dow Corning 732 RTV or equivalent. Follow the sealant manufacturer's instructions.

3. Remove/Install a PTT Switch

Use this procedure for both pilot's and co-pilot's switches.

A. Remove a PTT Switch

	Detail Steps/Work Items	Key Items/References
(1)	Set the ELECTRIC MASTER switch to OFF.	Instrument panel, left side.
(2)	Open the AUDIO circuit breaker.	Instrument panel, right side.
(3)	Remove the PTT switch: – Leverage the switch with a small screwdriver out of the stick's bar end. – Disconnect the electrical cable from the switch and move the switch clear of the pilot's compartment.	Handle with care. You must not damage the bar end.
(4)	Remove the electrical cable, if necessary: – Remove the appropriate pilot's seat. – Unplug the cable. – Pull the cable downward out.	Refer to Section 25-10. At the connector behind the main bulkhead. Through the hole in the stick.

B. Install a PTT Switch

	Detail Steps/Work Items	Key Items/References
(1)	Install the electrical cable, if removed before: – Push the cable through the inside of the stick. – Connect the lower end of cable.	 Through the hole in the stick. At the connector behind the main bulkhead.
(2)	Install the PTT switch: – Connect the electrical cable to the switch and move the switch into position at the bar end of the stick. – Push the switch in to the cut-out of the bar end.	 Push carefully. You must not damage the switch.
(3)	Install the pilot's seat.	If removed. Refer to Section 25-10.
(4)	Close the AUDIO circuit breaker.	Instrument panel, right side.

Section 23-50
Audio Integration, Standard Equipment

1. General

The audio system in the DA 40 has the following components:

– Audio panel. One of the following audio panels can be installed in the DA 40:

  – PM 1000 II voice-activated (VOX) intercom, see Figure 1.

  – Bendix/King KMA 28 audio amplifier with voice-activated (VOX) intercom, see Figure 2. This unit also includes a marker beacon receiver.

  – Garmin GMA 340 audio amplifier with voice activated (VOX) intercom, see Figure 3. This unit also includes a marker beacon receiver.

– Sockets for four head-sets on the rear face of the center console.

– Press-to-transmit (PTT) switches in the handles of both control sticks.

– Cockpit speaker in the roof of the cockpit.

– Socket for hand-held microphone on the bottom left side, or bottom center of the instrument panel.

The voice-activated intercom gives full hands-free intercom when head-sets are used.

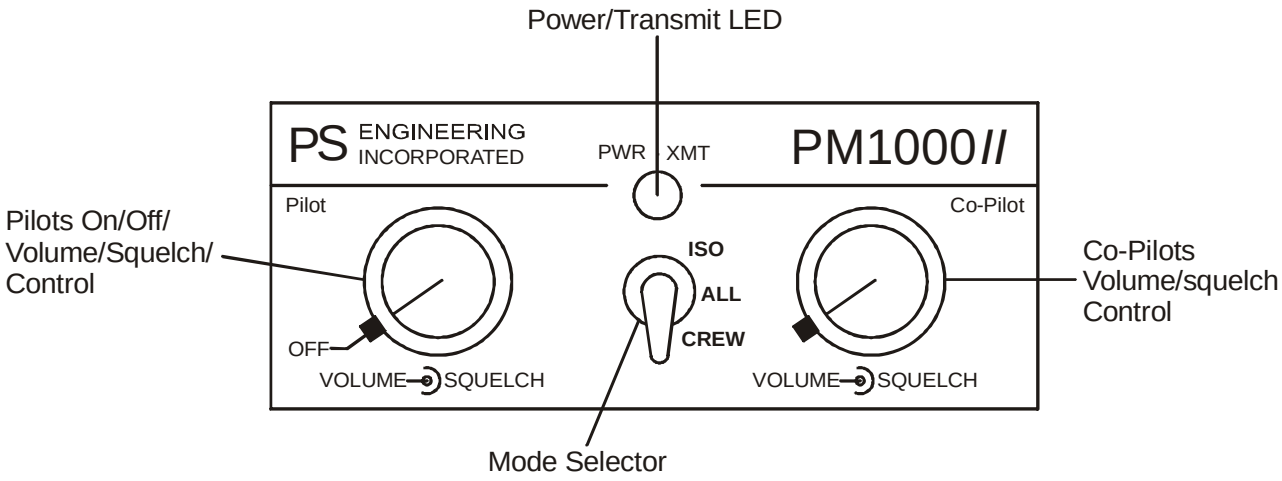


Figure 1: PM 1000 II Intercom

2. Description

A. PM 1000 II Intercom

Figure 1 shows the PM 1000 II Intercom. It is mounted above the NAV/COM 1 set in the avionics rack in the instrument panel, see Chapter 31.

The PM 1000 II is a four channel VOX intercom with individual amplifiers for each outlet. The head-set jack-plugs connect to the PM 1000 II. When the unit is set to OFF (or when the power fails), an internal relay connects the pilots head set to the airplane radio. This gives fail-safe operation. A two-color LED in the control panel shows green when the power is on and red during radio transmissions. The LED functions as stuck mic indicator.

The PM 1000 II has these controls:

– A pilot's ON/OFF/VOLUME/SQUELCH switch. Turn the inner knob clockwise to switch the intercom ON. Turn the knob to control the volume in the pilots headset. The outer (squelch) knob adjusts the level at which the mic operates the intercom. When the knob is set fully counter-clockwise the ambient noise will operate the intercom. This gives a “Hot mic” effect. Set the squelch to operate at a level that is correct for you. The VOX system has a one second delay, this prevents “choppy” speech.

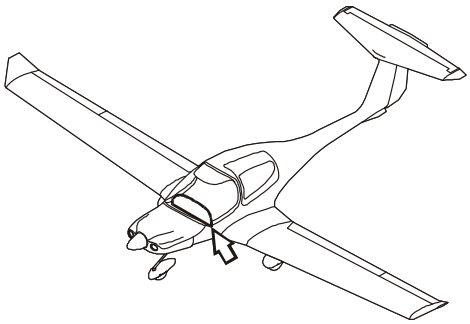
– A co-pilot's VOLUME/SQUELCH switch. Turn the inner knob to adjust the volume in the co-pilots headset. The outer (squelch) knob adjusts the level at which the co-pilots and passenger mics operate the intercom. When the knob is set fully counter-clockwise the ambient noise will operate the intercom. This gives a “Hot mic” effect. Set the squelch to operate at a level that is correct for you. The VOX system has a one second delay, this prevents “choppy” speech.

– An ISO/ALL/CREW switch. The PM 1000 II has three modes of operation:

  – ALL. The pilot, co-pilot and passengers can all hear the radio. Both the pilots and the passengers can communicate on the intercom.

  – ISO. The pilot is connected only to the airplane radio. He is isolated from the intercom. The co-pilot can communicate with the passengers but the co-pilot can not make or hear transmissions on the airplane radio.

  – CREW. The pilot and co-pilot are connected on one intercom channel while the passengers are on a separate and independent channel. The pilot and co-pilot are connected to the airplane radio. Passengers can continue to communicate with themselves without disturbing the pilot and co-pilot.



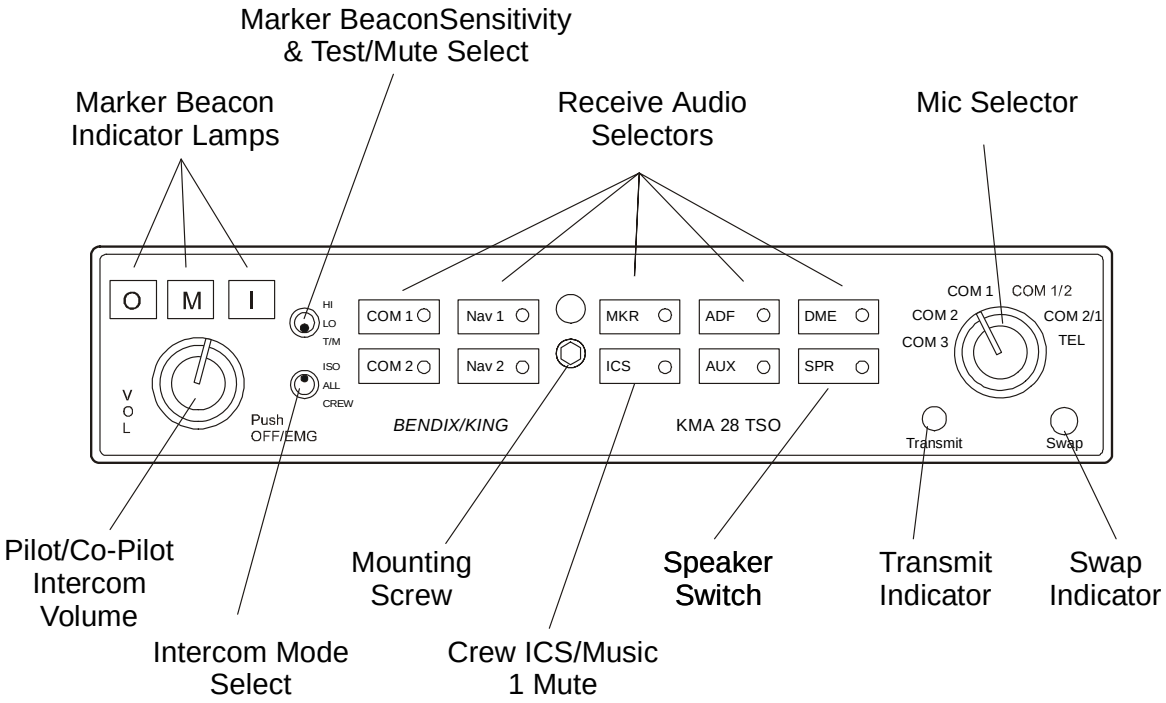


Figure 2: Bendix/King KMA 28 Audio Amplifier/Intercom/Marker Beacon Receiver

B. Bendix/King KMA 28 Audio Amplifier/Intercom/Marker Beacon Receiver

(1) KMA 28, General

Figure 2 shows the Bendix/King KMA 28 Audio Amplifier/Intercom/Marker Beacon Receiver. It is mounted above the NAV/COM 1 set in the avionics rack in the instrument panel, see Chapter 31.

The KMA 28 is a solid state audio isolation amplifier and audio selector with an automatic voice activated (VOX) intercom system. It can switch up to three transceivers (COM 1, COM 2, COM 3) and six receivers (NAV 1, NAV 2, ADF, DME, MKR and AUX). COM 3 and AUX are not used in this installation.

A rotary switch selects one of the communication transceivers for the pilot and co-pilot. Either the pilot or co-pilot can transmit on the selected transceiver. In Split mode, the pilot can operate one transceiver while the co-pilot operates the other.

If the power to the system fails, (or if the selector panel is turned off), an emergency mode connects the pilot's headset to COM 1.

The audio selector panel has a voice-activated (VOX) intercom system. The system has automatic adjustment. The system has a separate amplifier for each microphone. Only the microphone in use is selected. A VOL control knob sets the volume for both pilots. Intercom squelch is automatic.

The audio selector panel has a three-light marker beacon receiver. It gives the marker beacon lights and audio signals necessary for an ILS approach.

(2) KMA 28 Audio Selector Functions

The audio selector panel has these controls:

- Audio Selector Buttons. You can select the audio to be heard in the headsets by two momentary and six latched push-button switches (buttons).
  - COM 1 and COM 2 are the momentary switches. The rotary microphone switch controls which transceiver is heard. You will always hear the audio from the transceiver selected for transmit by the rotary microphone switch.
  - NAV 1, NAV 2, MKR (marker), ADF, AUX (auxiliary), and DME latch in to select the related audio when you press them. The button un-latches when you press it again.

– Speaker amplifier. The SPR (speaker) is a 'latched' type switch. When the button is 'latched', it will place all selected audio on the cockpit speaker. The button un-latches when you press it again.

– Key click. You can select a ‘click' to occur over the audio system when you press a button. Press and hold both the COM 1 and COM 2 buttons for 5 seconds to select the key click. Press and hold both the COM 1 and COM 2 buttons again for 5 seconds to de-select the key click.

Each button has a green LED. The green LED comes ON when you select the button.

(3) KMA 28 Intercom Functions

– VOX-squelch. The system has an automatic volume control for each microphone. The circuit only operates when the system detects speech in the microphone. The system blocks continuos tones.

– VOL control. The VOL control knob adjusts the loudness of the intercom for the pilot and co-pilot. It has no effect on the radio levels.

– Intercom modes. The lower switch on the left side is a three-position mode switch. It has the following positions:

  – ISO (up position). The pilot is connected only to the airplane radio. He is isolated from the intercom. The co-pilot can communicate with the passengers but the co-pilot can not make or hear transmissions on the airplane radio.

  – ALL (mid position). The pilot, co-pilot and passengers can all hear the radio. Both the pilots and the passengers can communicate on the intercom.

  – CREW (down position). The pilot and co-pilot are connected on one intercom channel while the passengers are on a separate and independent channel. The pilot and co-pilot are connected to the airplane radio. Passengers can continue to communicate with themselves without disturbing the pilot and co-pilot.

(4) KMA 28 Marker Beacon Receiver Operation

The marker beacon receiver has visual and audio indicators to show when the airplane passes over a beacon transmitter. Select the MKR push-button to hear the audio from the marker beacon receiver.

A three-position switch sets the receiver sensitivity. It also has a test function:

– HI (high sensitivity, up position). The receiver will detect the outer marker beacon approximately 1 mile out.

– LO (low sensitivity, middle position). The receiver will detect the marker beacon more accurately.

– T/M (test, momentary down position). The spring-loaded down position tests all three lights. If you push the switch down while receiving a beacon signal, it mutes the marker tone temporarily.

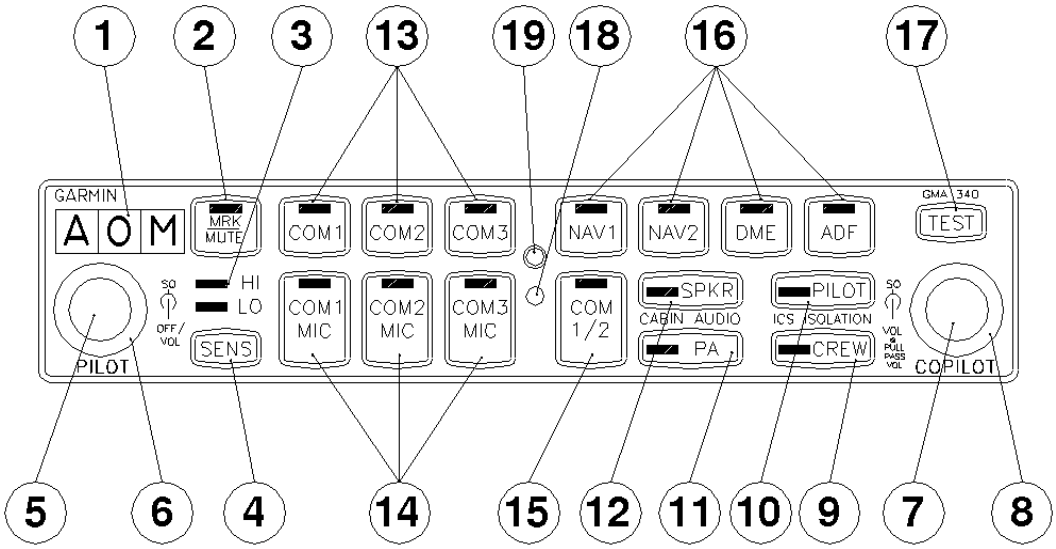


Figure 3: Garmin GMA 340 Audio Panel

C. Garmin GMA 340 Audio Panel

(1) GMA 340, General

Figure 3 shows the Garmin GMA 340 audio panel. It is mounted above the COM/NAV/GPS #1 set in the avionics rack in the instrument panel, see Chapter 31.

The GMA 340 provides flexibility in switching up to three microphone and audio transceiver communication inputs plus NAV 1, NAV 2, ADF, DME and marker audio. The GMA 340 includes a voice activated (VOX) intercom system and a three lamp marker beacon receiver and display.

The VOX intercom uses rotary knobs for volume and squelch adjustment while selection of all other functions is accomplished with the use of push-buttons.

If the power to the system fails, (or if the selector panel is turned off), an Emergency mode connects the pilot's headset to COM 1.

Marker HI and LO and button annunciation is accomplished with LED devices. Front panel backlighting of button function, squelch and volume control knobs is provided by LED's controlled by the airplane lighting bus.

(2) GMA 340 Audio Selector Functions

Audio level is controlled by the selected NAV radio volume control.

Selection of either COM 1, COM 2, or COM 3 (13) (COM 3 is not used in the DA 40 installation) for both MIC and audio source is accomplished by pressing either COM 1 MIC, COM 2 MIC, or COM 3 MIC (14) (COM 3 MIC is not used in the DA 40 installation). The active COM audio is always heard on the headphones.

Each audio source can be selected independently by pressing COM 1, COM 2, or COM 3 (13) (COM 3 is not used in the DA 40 installation). When selected in this way, they remain active as audio sources independently of which transceiver has been selected as the active microphone source.

When a microphone is keyed, the active transceiver's MIC button LED blinks approximately once per second to indicate the transmitter is active.

When no airplane radio activity is detected by the GMA 340, the amount of ambient background noise from the radios is further reduced by the ***MASQ™*** circuit. This processing is also applied to the NAV radios.

Pressing the COM 1/2 button (15) activates the split com function. While this mode is active, COM 2 is dedicated solely to the co-pilot as a MIC/audio source while COM 1 is dedicated to the pilot as a MIC/audio source. The pilot can still listen to COM 3 (COM 3 is not used in the DA 40 installation), NAV 1, NAV 2, DME, ADF, and MKR. The pilot and co-pilot can simultaneously transmit in this mode, the pilot transmitting over COM 1 and the co-pilot transmitting over COM 2. The SPLIT COM mode is canceled by pressing the COM 1/2 button a second time.

Pressing NAV 1, NAV 2, DME, ADF (16), or MKR (2) (see MKR beacon operation) selects that audio source. A second button press deselects the audio source.

(3) GMA 340 Intercom Functions

Intercom volume and squelch (VOX) are adjusted using the following front panel knobs:

– LEFT SMALL KNOB (5) - Unit on/off power control and pilot ICS volume. Full counter-clockwise DETENT position OFF.

– LEFT LARGE KNOB (6) - Pilot ICS mic VOX squelch level. Clockwise rotation increases the amount of mic audio (VOX level) required to break squelch. Full counter-clockwise is the 'hot mic' position.

– RIGHT SMALL KNOB (7) - IN position: co-pilot ICS volume. OUT position: passenger ICS volume.

– RIGHT LARGE KNOB (8) - Co-pilot and passenger mic VOX squelch level: clockwise rotation increases the amount of mic audio (VOX level) required to break squelch. Fully counter-clockwise is the 'hot mic' position.

Each microphone input has a dedicated VOX circuit to ensure that only the active microphone(s) is/are heard when squelch is broken. After the operator has stopped talking, the intercom channel remains momentarily open to avoid closure between words or normal pauses.

The GMA 340 provides three intercom modes: PILOT, CREW and ALL. The mode selection is accomplished using the PILOT (10) and CREW (9) buttons.

These modes allow different degrees of interaction between the crew and passengers:

– PILOT mode isolates the pilot from everyone else and dedicates the airplane radios to the pilot exclusively. The co-pilot and passengers share communication between themselves but cannot communicate with the pilot or hear the airplane radios.

– CREW mode places the pilot and co-pilot on a common ICS communication channel. The passengers are on their own intercom channel and can communicate with each other, but cannot communicate with the crew or hear the airplane radios.

– ALL mode allows full intercom communication between everyone plugged into the GMA 340. Airplane radios are heard by all.

(4) GMA 340 Marker Beacon Receiver Operation

The marker beacon receiver has visual and audio indicators to show when the airplane passes over a beacon transmitter.

The SENS button (4) selects either high or low sensitivity as indicated by the HI or LO LED being lit. Low sensitivity is used on ILS approaches while high sensitivity allows operation over airway markers or to get an earlier indication of nearing the outer marker during an approach.

The marker audio is selected initially by pressing the MKR/MUTE button (2). If no marker beacon signal is being received, then pressing again will deselect the marker audio.

D. Marker Beacon Receiver Antenna

The Comant CI 102 marker beacon receiver antenna is located on the lower side of the fuselage, under the passengers seats on the left side.

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Trouble-Shooting

1. General

The table below lists the defects you could have with the audio integrating system and the marker beacon receiver system. If you have the trouble detailed in the Trouble column read across to the Possible Cause column. Then do the repair given in the Repair column.

A. Intercom Functions

Trouble	Possible Cause	Repair
No voice modulation when transmitting from co-pilot's side on head-set. Pilot's side OK.	Faulty head-set. Open mic audio line. Faulty intercom or audio panel.	Replace head-set. Do a test of the mic audio wiring. Refer to Chapter 92 for the wiring diagrams. Replace the intercom or audio panel.
No voice modulation when transmitting from pilot's side on head-set. Co-pilot's side OK.	Faulty head-set. Open mic audio line. Faulty intercom or audio panel.	Replace head-set. Do a test of the mic audio wiring. Refer to Chapter 92 for the wiring diagrams. Replace the intercom or audio panel.
Cannot transmit. Transmit annunciator (if available) not showing on COM display.	Faulty mic PTT switch. PTT wiring circuit open. Faulty COM unit. Faulty audio panel.	Replace the defective PTT switch. Do a test of the PTT wiring. Refer to Chapter 92 for the wiring diagrams. Replace the COM unit. Replace the audio panel.
No intercom audio on pilot's head-set. Receives radio transmissions correctly.	ISO mode (PM 1000 II or KMA) or PILOT mode (GMA 340) selected. Faulty intercom or audio panel.	Select ALL mode. Replace the intercom or audio panel.

Trouble	Possible Cause	Repair
No audio on pilot's head-set with the intercom or audio panel switched OFF.	Faulty head-set. Open audio line.	Replace head-set. Do a test of the head-set audio wiring. Refer to Chapter 92 for the wiring diagrams.
No audio on co-pilot's or passenger headsets.	Open audio line. Faulty intercom or audio panel.	Do a test of the head-set audio wiring. Refer to Chapter 92 for the wiring diagrams. Replace the intercom or audio panel.

B. Audio Selector Functions

This Paragraph applies to the KMA 28 and GMA 340 audio panels.

Trouble	Possible Cause	Repair
Audio selector panel does not operate.	Audio panel switched OFF.	Switch audio panel ON.
	Circuit breaker pulled.	Re-set circuit breaker.
	Defective wiring.	Do a continuity test of the related wires. Replace defective wires.
	Faulty audio panel.	Repair or replace audio panel.
No audio signal in head-set.	Faulty head-set.	Replace head-set.
	Faulty head-set socket.	Replace head-set socket.
	Defective wiring between audio panel and head-set socket.	Do a continuity test of the related wires. Replace defective wires.
	Faulty audio panel.	Repair or replace audio panel.
No audio signal in cabin speaker.	SPR or SPKR button not pressed.	Press SPR or SPKR button.
	Defective cabin speaker.	Replace cabin speaker.
	Defective wiring between KMA 28 and cabin speaker.	Do a continuity test of the related wires. Replace defective wires.
	Faulty audio panel.	Repair or replace audio panel.
'Latched' type button on KMA 28 cannot be 'latched'.	Faulty KMA 28.	Repair or replace KMA 28.

C. Marker Beacon Receiver Functions

This Paragraph applies to the KMA 28 and GMA 340 audio panels.

Trouble	Possible Cause	Repair
Marker beacon receiver does not operate.	Circuit breaker pulled.	Re-set the circuit breaker.
	Defective wiring.	Do a continuity test of the related wires. Replace defective wires.
	Faulty audio panel.	Repair or replace audio panel.
No marker beacon reception.	Faulty audio panel.	Repair or replace audio panel.
	Faulty marker beacon antenna.	Do a test for correct impedance of the antenna. If necessary, repair or replace the antenna.
	Faulty connection between marker beacon antenna and audio panel.	Ensure proper cable connections. Do a test for correct impedance of the antenna co-axial cable. Do a test for continuity on each cable. Do a test for short circuit to ground and between cables. Replace defective cables.
No audio signal. Marker lights OK.	MKR/MUTE or MKR button not pressed.	Press the MKR/MUTE or MKR button.
	Faulty head-set.	Replace the head-set.
	Faulty head-set socket.	Replace the head-set socket.
	Faulty audio panel.	Repair or replace audio panel.

Maintenance Practices

1. General

This Section tells you how to remove/install the intercom, the audio panel, and the marker beacon receiver antenna. It also tells you how to test the intercom or the audio panel. Refer to the equipment manufacturers' manuals for more data about the audio integrating system.

2. Remove/Install the PM 1000 II Intercom

A. Remove the PM 1000 II Intercom

	Detail Steps/Work Items	Key Items/References
	WARNING: MAKE SURE THE ENGINE IS SAFE BEFORE YOU DO ANY WORK ON THE AIRPLANE. IF THE ENGINE STARTS THE PROPELLER CAN CAUSE INJURY OR DEATH.	
(1)	Make sure that the engine is safe. Lycoming engine: – Set the ignition switch to OFF. – Set the ALT/BAT switch to OFF. – Set the throttle to IDLE. – Set the mixture control to LEAN CUT-OFF. TAE engine: – Set the ELECTRIC MASTER key switch to OFF. – Set the ENGINE MASTER switch to OFF. – Set the power lever to IDLE.	
(2)	Remove the engine top cowling.	Refer to Section 71-10 (Lycoming IO-360-M1A version) or 71-11 (TAE version) or 71-12 (Lycoming O-360-A4M version).
(3)	Disconnect the airplane battery.	Refer to Section 24-31 (Lycoming version) or 24-34 (TAE version).
(4)	Remove the instrument panel cover.	Refer to Section 25-10.

	Detail Steps/Work Items	Key Items/References
(5)	Disconnect the connector from the PM 1000 II	
(6)	Remove the attaching screws and knobs from the PM 1000 II.	Hold the PM 1000 II!
(7)	Remove the unit from the instrument panel.	

B. Install the PM 1000 II Intercom

	Detail Steps/Work Items	Key Items/References
(1)	Put the PM 1000 II in position in the instrument panel.	
(2)	Install the attaching screws and knobs.	
(3)	Connect the connector to the PM 1000 II.	
(4)	Install the instrument panel cover.	Refer to Section 25-10.
(5)	Connect the airplane battery.	Refer to Section 24-31 (Lycoming version) or 24-34 (TAE version).
(6)	Install the engine top cowling.	Refer to Section 71-10 (Lycoming IO-360-M1A version) or 71-11 (TAE version) or 71-12 (Lycoming O-360-A4M version).
(7)	Do a function test of the PM 1000 II.	Refer to Paragraph 5.

3. Remove/Install the Audio Panel

A. Remove the Audio Panel

This Paragraph applies to the KMA 28 and GMA 340 audio panels.

	Detail Steps/Work Items	Key Items/References
(1)	Open the AUDIO circuit breaker.	
(2)	Put a 3/32 Allen wrench into the access hole for the locking screw. Engage the wrench into the screw.	Refer to Figure 2 (KMA 28) or Figure 3 (GMA 340).
(3)	Turn the screw counter-clockwise until the unit disengages from the mounting rack.	
	CAUTION: DO NOT PULL ON THE KNOBS. DO NOT PRY THE FACE-PLATE. YOU CAN DAMAGE THE UNIT. CAUTION: DO NOT TOUCH THE CONNECTOR CARD AT THE REAR OF THE UNIT. THE ELECTROSTATIC CHARGE OF YOUR BODY CAN DAMAGE THE UNIT.	
(4)	Pull gently on the side of the unit to remove it from the mounting rack.	
(5)	Install the protective covers on the rear connectors of the unit.	

B. Install the Audio Panel

This Paragraph applies to the KMA 28 and GMA 340 audio panels.

	Detail Steps/Work Items	Key Items/References
(1)	Remove the protective covers from the connectors on the rear of the unit.	
(2)	Slide the unit into the rack. Engage the locking screw so that the lobe of the front latch touches the rack.	Refer to Figure 2 (KMA 28) or Figure 3 (GMA 340).
(3)	Turn the locking screw so that the rear lobe engages the mounting rack.	
CAUTION: DO NOT OVER-TIGHTEN THE LOCKING SCREW. IF YOU OVER-TIGHTEN THE LOCKING SCREW YOU CAN DAMAGE THE LOCKING MECHANISM.		
(4)	Continue to turn the locking screw until the unit is fully installed in the mounting rack.	
(5)	Close the AUDIO circuit-breaker.	
(6)	Do a function test of the system.	Refer to Paragraph 6.

4. Remove/Install the Marker Beacon Receiver Antenna

A. Remove the Marker Beacon Receiver Antenna

	Detail Steps/Work Items	Key Items/References
(1)	Remove the passengers' seat.	Refer to Section 25-10.
(2)	Release the co-axial connector from the antenna.	
(3)	Release the screws and washers which hold the antenna.	
(4)	Carefully pull the antenna clear of the fuselage and hold it.	If necessary, carefully cut the sealant around the base of the antenna. You must not damage the fuselage skin.
(5)	Move the antenna clear of the airplane.	

B. Install the Marker Beacon Receiver Antenna

	Detail Steps/Work Items	Key Items/References
(1)	Carefully remove any sealant from the area where the antenna attaches to the fuselage.	
(2)	Clean the area where the antenna attaches to the fuselage.	
(3)	Put the antenna in position under the fuselage.	
(4)	Attach the antenna with the screws and washers.	
(5)	Connect the co-axial connector to the antenna.	
(6)	Seal the outer edge of the antenna to the fuselage skin with sealant.	Use Dow Corning 732 RTV or equivalent. Follow the sealant manufacturer’s instructions.
(7)	Install the passengers' seat.	Refer to Section 25-10.
(8)	Do a test of the marker beacon receiver functions.	Refer to Paragraph 6.B.

5. Test the PM 1000 II Intercom

	Detail Steps/Work Items	Key Items/References
(1)	Make sure all the head-sets are connected.	
(2)	Select the mode switch to ALL.	
(3)	Turn the VOLUME control to switch the unit ON.	
(4)	Do a test for communication between the pilot, co-pilot and passenger head-sets.	
(5)	Test the function of the VOLUME control.	
(6)	Test the function of the SQUELCH control.	
(7)	Set the mode switch to ISO.	Make sure that there is no intercom between the pilot, co-pilot and passenger head-sets.
(8)	Pull the AUDIO circuit-breaker.	Make sure that radio transmission and reception is possible from the pilot's head-set.
(9)	Set the mode switch to CREW.	Make sure that the pilot and co-pilot can communicate and transmit on the airplane radio. Make sure that the passengers can communicate with themselves but not to the pilot or co-pilot.

6. Test the Audio Panel

A. Intercom Functions

This Paragraph applies to the KMA 28 and GMA 340 audio panels.

	Detail Steps/Work Items	Key Items/References
(1)	Make sure that all the head-sets are connected.	
(2)	Switch the unit ON.	
(3)	Select the ALL mode.	
(4)	Do a test for communication between the pilot, co-pilot and passenger head-sets.	
(5)	Test the function of the VOLUME control.	
(6)	Test the function of the squelch control.	
(7)	Select the ISO mode (KMA 28) or PILOT mode (GMA 340).	Make sure that there is no intercom between the pilot, co-pilot and passenger head-sets.
(8)	Pull the AUDIO circuit-breaker.	Make sure that radio transmission and reception is possible from the pilot's head-set.
(9)	Select the CREW mode.	Make sure that the pilot and co-pilot can communicate and transmit on the airplane radio. Make sure that the passengers can communicate with themselves but not to the pilot or co-pilot.

B. KMA 28 Audio Selector and Marker Beacon Receiver Functions

	Detail Steps/Work Items	Key Items/References
(1)	Make sure that all the head-sets are connected.	
(2)	Set the ALT/BAT switch (Lycoming version) or ELECTRIC MASTER key switch (TAE version) to ON.	
(3)	Set AVIONIC MASTER switch to ON.	
(4)	Push the VOL knob to switch the unit ON.	
(5)	Set the mic selector rotary switch to COM 1.	Make sure that: – The green LED in the COM 1 button comes on. – The green TRANSMIT LED does not come on.
(6)	Do a test transmission on COM 1 from the co-pilot station.	Make sure that: – The PTT button gives proper transmission on COM 1.
(7)	Push the COM 2 button.	Make sure that: – The green LED in the COM 2 button comes on. – The COM 2 receiver can be heard.
(8)	Do a test transmission on COM 1 from the pilot station.	Make sure that: – The PTT button gives proper transmission on COM 1.
(9)	Push the COM 2 button.	Make sure that: – The green LED in the COM 2 button comes on. – The COM 2 receiver can be heard.
(10)	Set the mic selector rotary switch to COM 2.	Make sure that: – The green LED in the COM 2 button comes on. – The green TRANSMIT LED does not come on.

	Detail Steps/Work Items	Key Items/References
(11)	Do a test transmission on COM 2 from the co-pilot station.	Make sure that: – The PTT button gives proper transmission on COM 2.
(12)	Push the COM 1 button.	Make sure that: – The green LED in the COM 1 button comes on. – The COM 1 receiver can be heard.
(13)	Do a test transmission on COM 2 from the pilot station.	Make sure that: – The PTT button gives proper transmission on COM 2.
(14)	Push the COM 1 button.	Make sure that: – The green LED in the COM 1 button comes on. – The COM 1 receiver can be heard
(15)	Turn the mic selector switch to the COM 1/2 position.	Make sure that: – The pilot can communicate on COM 1. – The co-pilot can communicate on COM 2.
(16)	Turn the mic selector switch to the COM 2/1 position.	Make sure that: – The pilot can communicate on COM 2. – The co-pilot can communicate on COM 1.

	Detail Steps/Work Items	Key Items/References
(17)	Select each receiver in turn using the selector buttons.	Make sure that: – The button latches correctly. – The LED in the button comes on to show that it is in use. – Audio from each selected equipment connects to the head-sets.
(18)	Push the HI-LO-T/M button to the T/M position.	All 3 marker lights must come on.
(19)	Push the VOL knob to turn the unit OFF.	
(20)	Do a test transmission on COM 1 from the pilot station.	
(21)	Set AVIONIC MASTER switch to OFF.	
(22)	Set the ALT/BAT switch (Lycoming version) or ELECTRIC MASTER key switch (TAE version) to OFF.	
(23)	Disconnect the head-sets from the head-set sockets.	

C. GMA 340 Audio Selector and Marker Beacon Receiver Functions

	Detail Steps/Work Items	Key Items/References
(1)	Make sure that all the head-sets are connected.	
(2)	Set the ALT/BAT switch (Lycoming version) or ELECTRIC MASTER key switch (TAE version) to ON.	
(3)	Set AVIONIC MASTER switch to ON.	
(4)	Rotate the left small knob past the click to turn the unit ON.	
(5)	Push the TEST button.	All LED's and lights must come on.
(6)	Push the COM 1 MIC button.	Make sure that: – The green LED's in the COM 1 button and the COM 1 MIC button come on. – The COM 1 MIC button LED does not flash.
(7)	Do a test transmission on COM 1 from the pilot station.	Make sure that: – The PTT button gives proper transmission on COM 1. – The COM 1 receiver can be heard. – The volume and squelch can be adjusted.
(8)	Do a test transmission on COM 1 from the co-pilot station.	Make sure that: – The PTT button gives proper transmission on COM 1. – The COM 1 receiver can be heard. – The volume and squelch can be adjusted.

	Detail Steps/Work Items	Key Items/References
(9)	Push the COM 2 MIC button.	Make sure that: – The green LED's in the COM 2 button and the COM 2 MIC button come on. – The COM 2 MIC button LED does not flash.
(10)	Do a test transmission on COM 2 from the pilot station.	Make sure that: – The PTT button gives proper transmission on COM 2. – The COM 2 receiver can be heard. – The volume and squelch can be adjusted.
(11)	Do a test transmission on COM 2 from the co-pilot station.	Make sure that: – The PTT button gives proper transmission on COM 2. – The COM 2 receiver can be heard. – The volume and squelch can be adjusted.
(12)	Push the COM 1/2 button.	Make sure that: – The pilot can communicate on COM 1. – The co-pilot can communicate on COM 2.
(13)	Select each receiver in turn using the selector buttons.	Make sure that: – The LED in the button comes on to show that it is in use. – Audio from each selected equipment connects to the head-sets.

	Detail Steps/Work Items	Key Items/References
(14)	Push the SPKR button.	Make sure that: – The selected audio sources can be heard in the cabin speaker.
(15)	Push the SENS button.	Make sure that: – The marker beacon intensity LED changes from HI to LO and from LO to HI.
(16)	Rotate the left small knob fully counterclockwise.	
(17)	Do a test transmission on COM 1 from the pilot station.	
(18)	Set the AVIONIC MASTER switch to OFF.	
(19)	Set the ALT/BAT switch (Lycoming version) or ELECTRIC MASTER key switch (TAE version) to OFF.	
(20)	Disconnect the head-sets from the head-set sockets.	

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Section 23-51
Audio Integration, Garmin G1000 Equipment

1. General

The DA 40 D with the Garmin G1000 system installed has a voice-operated (VOX) intercom. This gives full hands-free intercom when head-sets are used. The pilot controls the intercom system with the audio control panel. The audio control panel is located in the instrument panel between the integrated cockpit system (ICS) display screens. Figure 1 shows the audio control panel.

Push to talk (PTT) switches are installed in the handles of both control sticks. The jack sockets for all the head-sets are located at the back of the center console.

An amplifier in the radio receiver system operates a loudspeaker located in the roof of the passenger cabin.

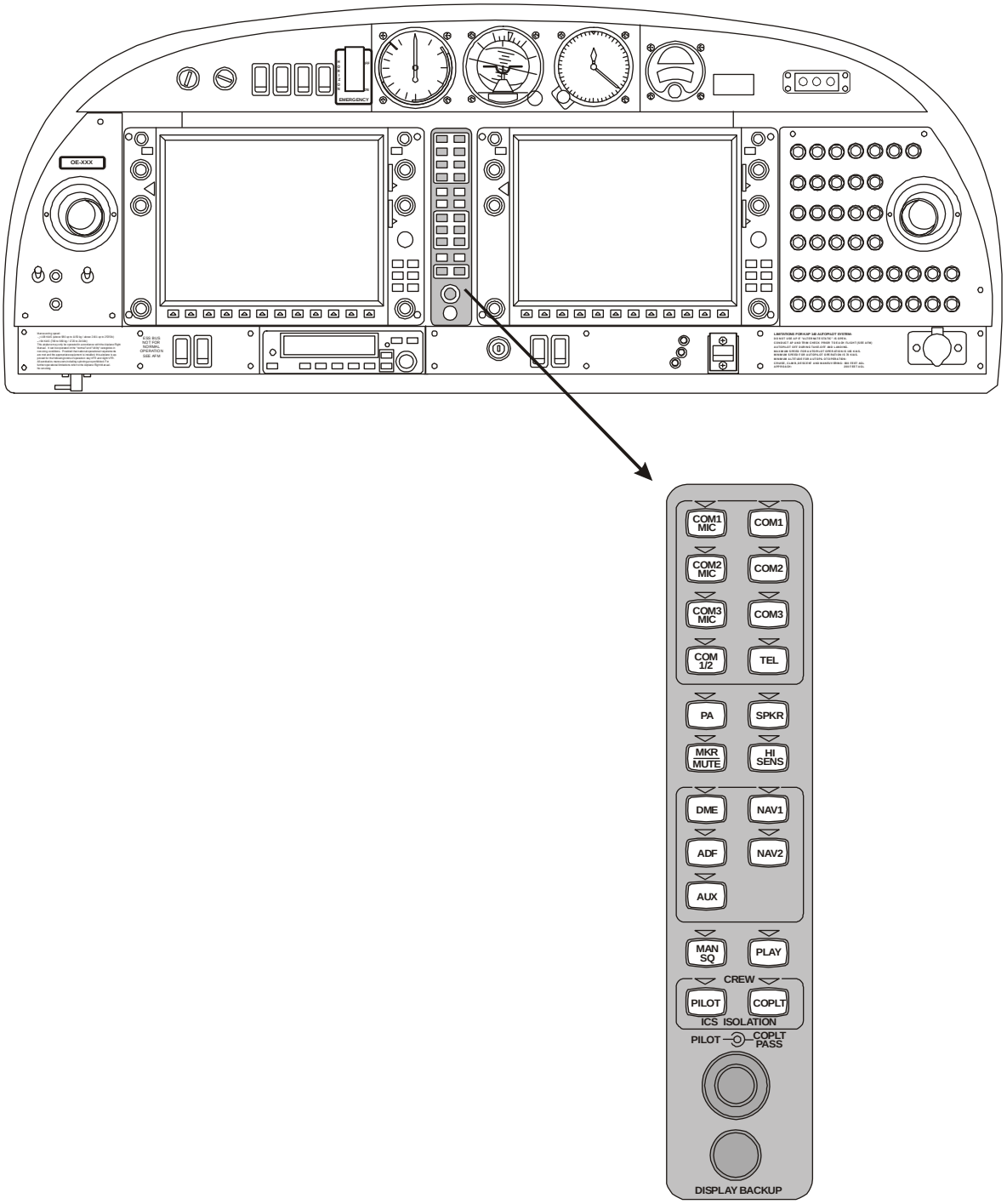


Figure 1: Audio Control Panel

2. Description and Operation

Figure 1 shows the GMA 1347 Audio Control Panel of the DA 40 D airplane. The audio control panel is powered with the Garmin 1000 ICS and is an integral component of the integrated cockpit system. The audio control panel makes an interface between the audio systems of the integrated cockpit system (ICS) and the pilots/crew headsets.

The audio control panel is located in the instrument panel between the ICS displays. The control panel keys have LED annunciator labels and has backlighting which is controlled by the ICS. When a key is active the annunciator is lit by the LED. The control panel performs a self-test when power is applied to the panel which then resets the panel to the operating condition that was set when the panel was last powered-off. If the control panel fails the self-test the panel switches to a fail-safe mode and all fail-safe audio output is directed to the pilot's headset.

The control panel has these keys and selectors:

– COM 1 MIC key. Press this key to select COM 1 as the active microphone source and to automatically de-select any COM MIC key that may have been previously selected. The COM 1 MIC key annunciator illuminates and the COM 1 caption on the ICS display screen is highlighted.

– COM 2 MIC key. Press this key to select COM 2 as the active microphone source and to automatically de-select any COM MIC key that may have been previously selected. The COM 2 MIC key annunciator illuminates and the COM 2 caption on the ICS display screen is highlighted.

– COM 3 MIC key. This key is not active in the DA 40 D installation.

– COM 1/2 key. Press this key to toggle the selection of the SPLIT COM function. When COM 1/2 is selected COM 1 becomes the dedicated COM system for the pilot's mic/audio and COM 2 becomes the dedicated COM system for the co-pilot's mic/audio. When the SPLIT COM function is selected both the pilot and co-pilot can transmit simultaneously using separate COM systems. The pilot can also monitor all the NAV audio as selected. The co-pilot can only monitor the COM 2 audio.

– COM 1 key. Press this key to select COM 1 as the active audio source. Selecting COM 1 audio using this key maintains COM 1 as an audio source independent of any other selection. The annunciator illuminates when the COM 1 key is activated.

– COM 2 key. Press this key to select COM 2 as the active audio source. Selecting COM 2 audio using this key maintains COM 2 as an audio source independent of any other selection. The annunciator illuminates when the COM 2 key is activated.

– COM 3 key. This key is not active in the DA 40 D installation.

– TEL key. This key is not active in the DA 40 D installation.

– PA key. This key is not active in the DA 40 D installation.

– SPKR key. Press this key to select the cabin speaker. When selected, the cabin speaker will broadcast all the selected audio channels and all unswitched/unmuted audio warnings. The speaker will be muted when a COM microphone is keyed. The annunciator illuminates when the SPKR key is activated.

– MKR/MUTE key. Press this key to select MKR audio. When selected the key annunciator is illuminated. When a marker beacon audio tone is generated it can be heard over the headsets and the related caption will show on the ICS primary flight display. Pressing the MKR/MUTE key while a marker beacon tone is being generated will cause the audio to be muted but the caption on the ICS display will remain. When the next marker beacon signal is generated the it will be heard over the headsets. Pressing the MKR/MUTE key while the marker beacon audio system is in the mute mode will cause the audio signal to be deactivated and the key annunciator will go out.

– Hi SENS key. Press this key to increase the sensitivity of the marker beacon receiver. The annunciator illuminates when the HI SENS key is activated.

– DME, ADF, NAV 1, NAV 2 keys. Press one of these keys to select the related audio source. The related annunciator illuminates when the key is activated.

– AUX key. This key is not active in the DA 40 D installation.

– MAN SQ key. Press this key to make the pilot/co-pilot/pass ICS volume control knob a push toggle switch for setting ICS squelch levels manually. The annunciator illuminates when the MAN SQ key is activated.

– PLAY key. Press this key to replay the digital recording made by the ICS. The digital recording of recent audio activity will be heard over the headsets. The annunciator illuminates when the PLAY key is activated.

– PILOT, COPLT keys. These keys control the intercom system (ICS) isolation system. The ICS isolation system has four modes of operation which can all be selected using a combination of the PILOT and COPLT keys. The system has these modes of operation:

  – Pilot mode. Pilot mode is selected when only the PILOT key is annunciated. In PILOT mode the pilot can hear the selected radios. The co-pilot and passengers can only communicate with each other.

– Co-Pilot mode. Co-Pilot mode is selected when only the COPLT key is annunciated. In Co-Pilot mode the co-pilot's headset is isolated. The pilot and passengers can hear the selected radios, and communicate with each other.

– Crew mode. Crew mode is selected when both the PILOT and COPLT keys are annunciated. In crew mode both the pilot and co-pilot can hear the selected radios and communicate with each other.

– All mode. All mode is selected when neither the PILOT or COPLT keys are annunciated. In All mode both the pilots and the passengers can hear the selected radios and are able to communicate with each other.

– VOLUME/SQ knob. This knob has two functions depending on the selection of the MAN SQ key.

– MAN SQ key deselected. When the MAN SQ key is deselected the ICS squelch levels are set automatically. The VOLUME/SQ knob acts as a volume control and the VOL caption to the lower left of the knob illuminates. Rotate the inner knob clockwise to increase the volume level of the pilot's ICS and rotate the inner knob counter-clockwise to reduce the volume of the pilot's ICS. Rotate the outer knob clockwise to increase the volume level of the co-pilot's and passengers' ICS. Rotate the outer knob counter-clockwise to reduce the volume level of the co-pilot's and passengers' ICS.

– MAN SQ key selected. When the MAN SQ is selected the ICS squelch levels can set manually and pressing the VOLUME/SQ knob toggles the manual squelch ON/OFF. Manual squelch is toggled ON when the SQ caption to the lower right of the knob illuminates. Rotate the inner knob clockwise to increase the squelch threshold of the pilot's ICS and rotate the inner knob counter-clockwise to reduce the squelch threshold of the pilot's ICS. Rotate the outer knob clockwise to increase the squelch threshold of the co-pilot's and passengers' ICS. Rotate the outer knob counter-clockwise to reduce the squelch threshold of the co-pilot's and passengers' ICS.

– DISPLAY BACKUP button. Pressing the red DISPLAY BACKUP button at the bottom of the audio control panel selects the backup mode for all the displays.

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Trouble-Shooting

1. General

This table tells you how to trouble-shoot the audio integrating system. See Section 23-11 for Trouble-Shooting the speech communication system.

If you have the trouble detailed in the Trouble column read across to the Possible Cause column. Then do the repair given in the Repair column.

Trouble	Possible Cause	Repair
No voice modulation when transmitting from co-pilot's side on head-set. Pilot's side OK.	Faulty head-set. Open mic audio line. Faulty GMA 1347.	Replace head-set. Do a test of the mic audio wiring. Refer to Chapter 92 for the wiring diagrams. Replace GMA 1347.
No voice modulation when transmitting from pilot's side on head-set. Co-pilot's side OK.	Faulty head-set. Open mic audio line. Faulty GMA 1347.	Replace head-set. Do a test of the mic audio wiring. Refer to Chapter 92 for the wiring diagrams. Replace GMA 1347.
No intercom audio on pilot's head-set. Receives radio transmissions correctly.	ICS mode set incorrectly Faulty GMA 1347.	Set mode to required position, refer to Section 23-50 Paragraph 2. Replace the GMA 1347.
No audio on pilot's head-set with the ICS set to OFF.	Faulty head-set. Open audio line.	Replace head-set. Do a test of the head-set audio wiring. Refer to Chapter 92 for the wiring diagrams.
No audio on co-pilot's or passenger headsets.	Open audio line. Faulty GMA 1347.	Do a test of the head-set audio wiring. Refer to Chapter 92 for the wiring diagrams. Replace the GMA 1347.

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Maintenance Practices

1. General

This Section tells you how to remove/install the GMA 1347 audio control panel. It also tells you how to adjust/test the ICS. Refer to the equipment manufacturers manuals for more data about the audio integrating system.

2. Remove/Install the GMA 1347 Audio Control Panel

A. Remove the GMA 1347 Audio Control Panel

	Detail Steps/Work Items	Key Items/References
(1)	Make sure that the ELECTRIC MASTER key switch is set to OFF.	Instrument panel, lower center.
(2)	Remove the audio control unit: – Insert a 3/32" hexagonal drive wrench into the access hole in the front of the panel. – Rotate the locking mechanism counter-clockwise to release the lock. – Pull the audio control panel towards you and clear of the instrument panel.	Refer to Figure 1.

B. Install the GMA 1347 Audio Control Panel

	Detail Steps/Work Items	Key Items/References
(1)	Examine the connectors at the rear of the audio control panel. Look specially for bent or damaged pins.	
(2)	Insert a 3/32" hexagonal drive wrench into the access hole in the front of the panel and rotate the locking mechanism 90° counter-clockwise to make sure that the locking mechanism is in the unlocked position.	
(3)	Install the audio control panel: – Move the audio control panel into position at the instrument panel. – Carefully slide the panel into position in the instrument panel. – Insert a 3/32" hexagonal drive wrench into the access hole in the front of the panel and rotate the locking mechanism clockwise to lock the panel into position.	Make sure that the audio control panel fully engages with the connectors at the rear of the panel. Make sure that you cannot pull the audio control panel towards you!
(4)	Do a test for the correct operation of the audio control panel. If you have installed a replacement audio control panel you may have to update the Garmin G1000 integrated cockpit system software.	Refer to the G1000 Line Maintenance Manual for data about installing software and testing the audio control panel.

Section 23-60
Static Discharging

1. General

The static discharging system has two main parts, the electrical bonding system and the surface static discharging system. Refer to Section 51-80 for the electrical bonding system. Section 51-80 also describes the resistance measurements for the static discharge wicks.

The build-up of static electricity can affect the quality of radio communications on all COM and NAV equipment. It can also affect the quality of all NAV indications.

2. Description and Operation

The static discharging system removes the electro-static charge which collects on the airplane surfaces. The composite structure of the DA 40 does not let electricity flow through it. The airplane surfaces are covered with a special conductive filler through which the electricity flows to the static discharge wick.

Location and quantity of the static discharge wicks are given in the following table.

Location	Quantity
LH wing tip, trailing edge.	2
RH wing tip, trailing edge.	2
LH horizontal tail tip, trailing edge.	1
RH horizontal tail tip, trailing edge.	1
Rudder, trailing edge, bottom.	1

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CHAPTER 24

ELECTRICAL POWER

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Chapter 24-00
Electrical Power - Lycoming Engine

1. General

This Section tells you about the electrical system on the airplane with the Lycoming engine installed. Refer to Section 24-01 for data about the electrical system with the TAE 125 Diesel engine installed.

This Chapter has only simplified schematic diagrams and location diagrams. Refer to Chapter 92 for the wiring diagrams. Refer to the related Chapter for data about systems. For example, refer to Chapter 80 for data about the starter system.

The DA 40 has a 28 volt direct current (DC) electrical system. The system has two integral sources of electrical power and a socket for connecting to an external power source. It has a 28 volt alternator and a 24 volt, 10 amp-hour battery (or optional a 24 volt, 11 amp-hour battery, or optional a 24 volt, 13.6 amp-hour battery). The battery supplies DC to the electrical system when the alternator is not operating. It also supplies power for engine starting. The battery can also supply power when the load is more than the alternator can supply. Refer to Section 24-40 for data on the external power system.

The alternator attaches to the front of the engine. A flexible belt turns the alternator. The alternator supplies power to the airplane. The power supplied by the alternator is controlled by the voltage regulator.

The battery is located on the front side of the firewall, on the right side.

An additional emergency battery system is installed in the IFR model (refer to Section 24-32).

An electrical system with essential bus is optional.

Note: Equipment which is certified for installation in the DA 40 is listed in Section 6.5 of the Airplane Flight Manual. Such equipment may be installed in accordance with the Airplane Maintenance Manual.

Any equipment which is not listed in Section 6.5 of the Airplane Flight Manual is called "Additional Equipment". The installation of Additional Equipment is a modification which must be handled in accordance with national regulations or a Service Bulletin.

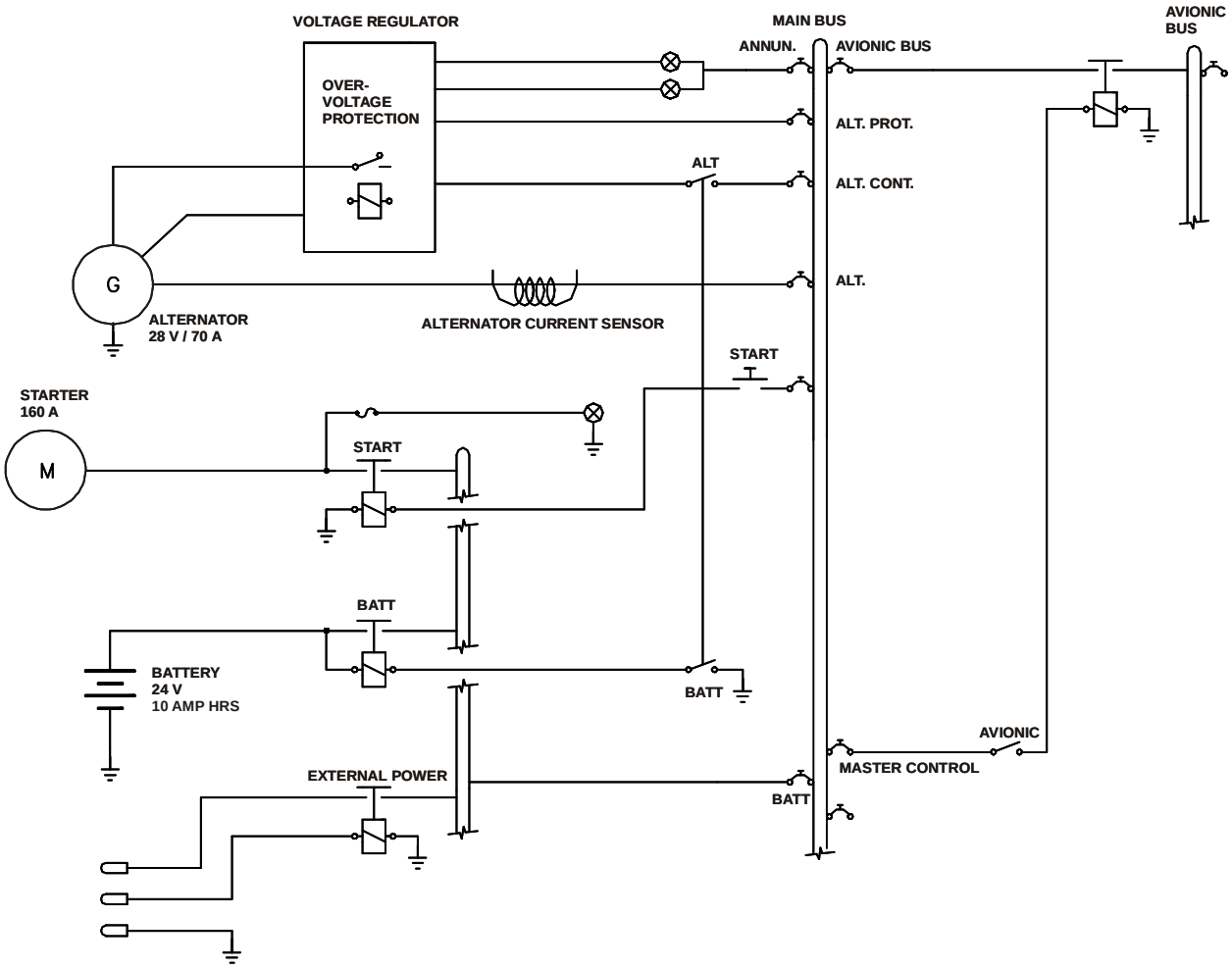


Figure 1: Simplified Schematic Diagram, Electrical System without Essential Bus

Figure 1 shows a simplified schematic diagram of the electrical power system without essential bus. Figure 2 shows a simplified schematic diagram of the electrical power system with essential bus.

The electrical system has a 24 volt, 10 amp-hour battery. The battery supplies DC to the electrical system when the alternator is not operating. It also supplies power for engine starting. The battery can also supply power when the load is more than the alternator can supply.

The battery supplies heavy current for starting through the battery relay and the starter relay. The circuit has no protection. Circuit-breakers or fuses protect all other circuits. The ALT/BAT switch controls all electrical power sources in the system. Electrical bus bars distribute the power to the consumer systems.

When the optional essential bus system is installed, then an ESS BUS switch is installed in the instrument panel. In the event of an electrical failure it can be set to ON. When it is set to ON, only those items of electrical equipment which are needed for the safe continuation of flight are supplied with power.

2. Component Location

Figure 3 shows the location of the main components in the electrical power system.

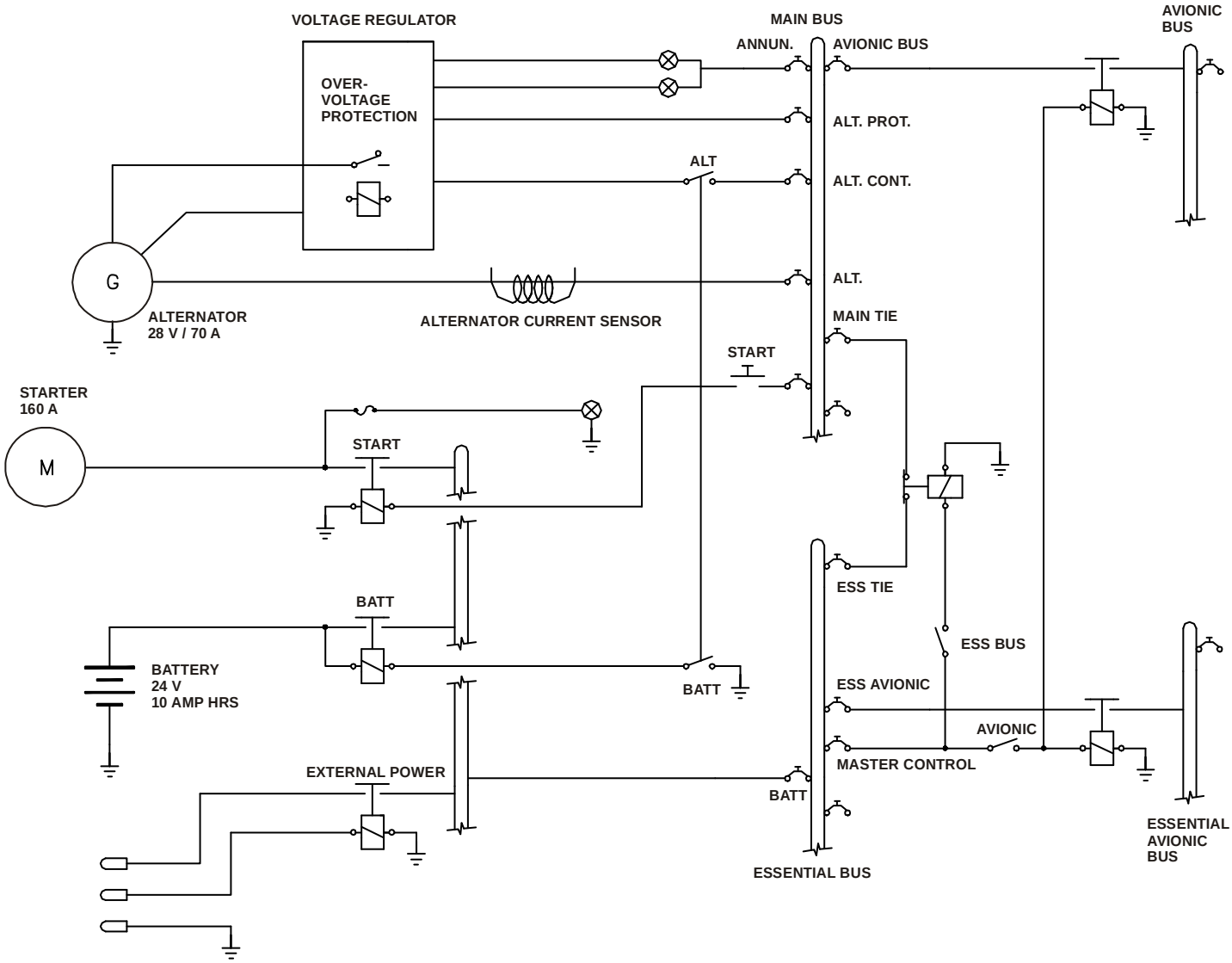


Figure 2: Simplified Schematic Diagram, Electrical System with Essential Bus

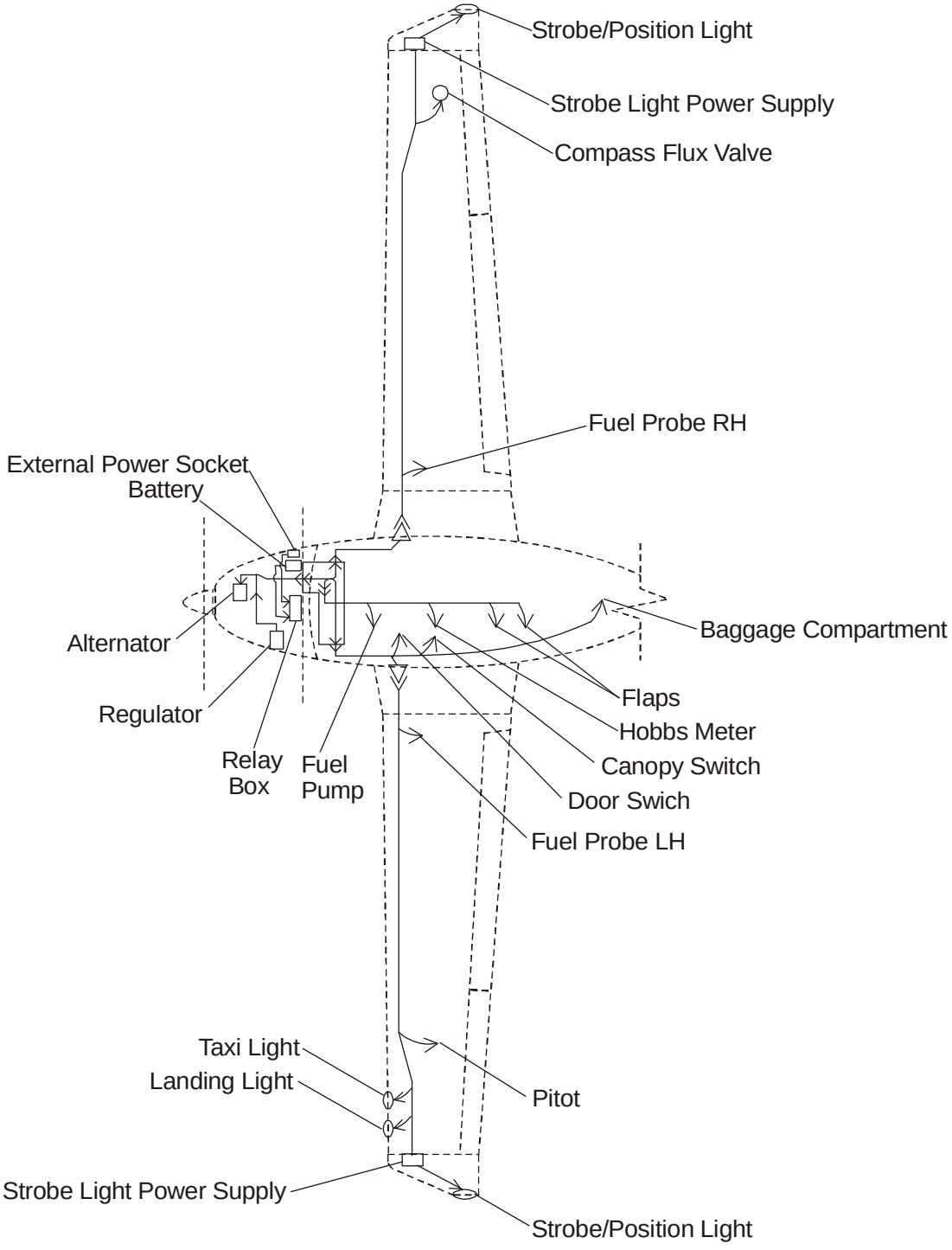


Figure 3: Component Location Diagram

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Section 24-01
Electrical Power - TAE 125 Diesel Engine

1. General

The DA 40 with the TAE 125 Diesel engine has a 14 VDC electrical system. This section describes the complete system from the power supplies to the circuit-breakers or other interface with the consumers.

This Chapter has only simplified schematic diagrams and location diagrams. Refer to Chapter 92 for the wiring diagrams. Refer to the related Chapter for data about systems. For example, refer to Chapter 80 for data about the starter system.

For Trouble-Shooting and Maintenance Practices for this system, refer to these Sections:

Section 24-33. Electrical Power Generation.

Section 24-34. Battery System.

Section 24-35. Emergency Battery System.

Section 24-41. External Power.

Section 24-61. Power Distribution.

Note: Equipment which is certified for installation in the DA 40 is listed in Section 6.5 of the Airplane Flight Manual. Such equipment may be installed in accordance with the Airplane Maintenance Manual.

Any equipment which is not listed in Section 6.5 of the Airplane Flight Manual is called "Additional Equipment". The installation of Additional Equipment is a modification which must be handled in accordance with national regulations or a Service Bulletin.

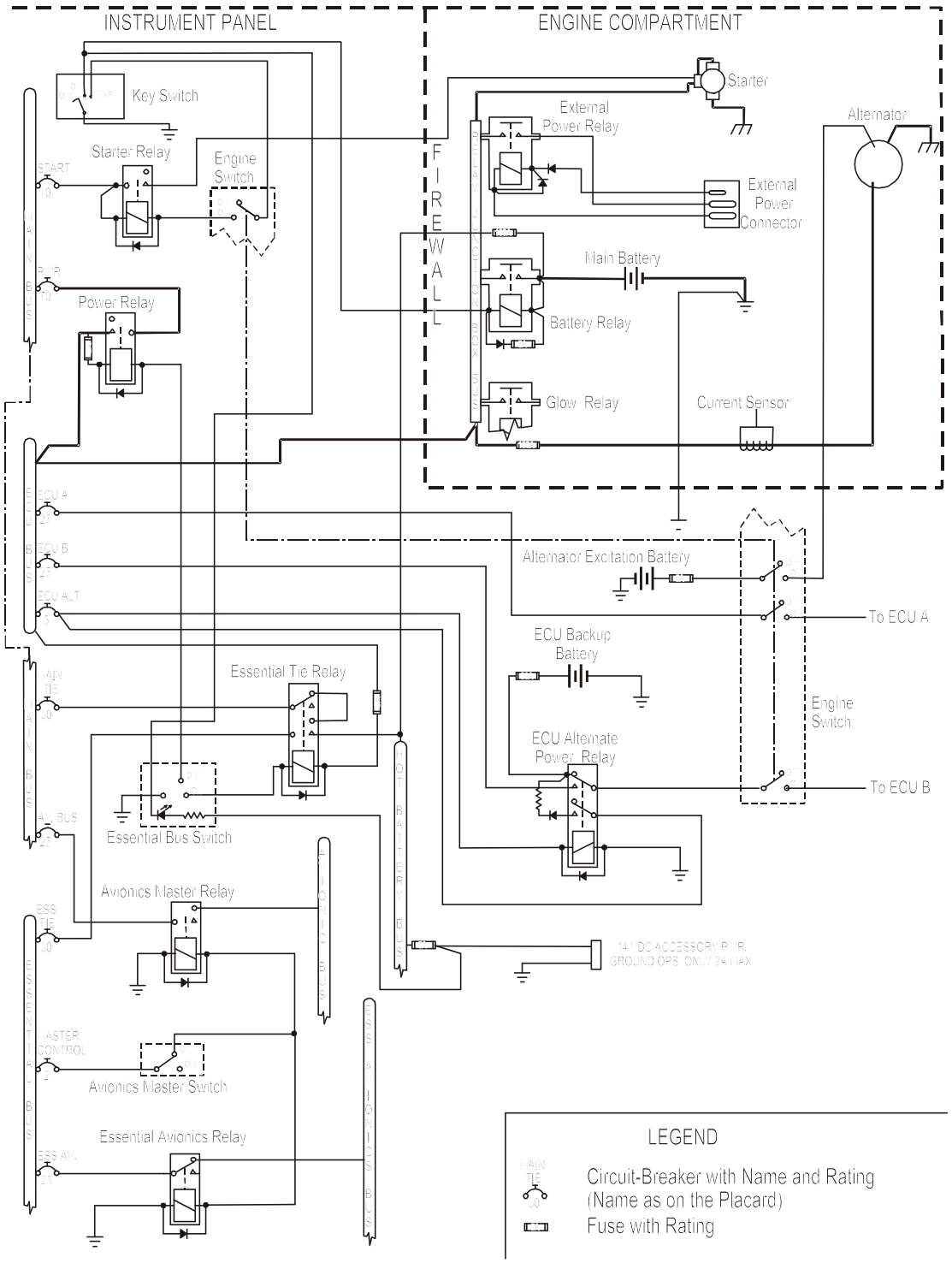


Figure 1: 14 VDC Electrical System Schematic Diagram

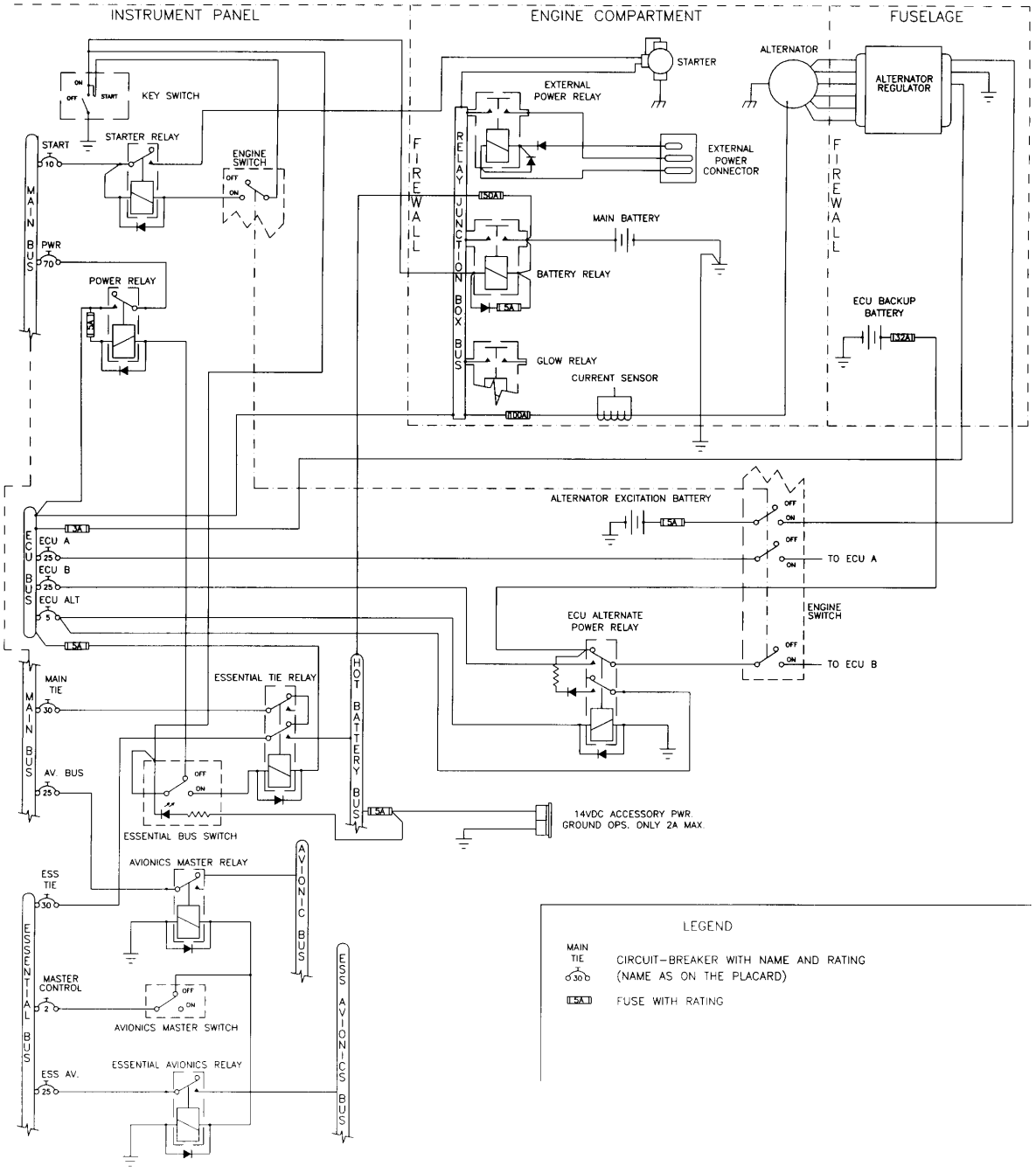


Figure 2: 14 VDC Electrical System Schematic Diagram (MÄM 40-151 carried out)

2. 14 VDC System Description and Operation

Figure 1 shows the electrical system schematic diagram.

Figure 2 shows the electrical system schematic diagram, if MÄM 40-151 is carried out.

A. Power Supplies

(1) Main Battery

The main battery is located in the engine compartment on the firewall on the RH side. It is a 12 V, 23 Ah sealed battery. It connects to the fire wall ground point, the hot battery bus and the battery relay.

(2) Alternator

The alternator is located at the bottom, left rear of the engine. A flat multi-vee belt with automatic tensioner turns the alternator. The alternator is a 12-14 VDC, 90 A machine with an integral regulator. If MÄM 40-151 is carried out, the alternator is connected to an external regulator, located under the pilot`s seat. The output connects to the junction box bus bar. The field can be energized directly by the alternator excitation battery if the main battery fails.

(3) Alternator Excitation Battery

The alternator excitation battery is located on the instrument panel shelf. It is a 12 V, 1.3 Ah sealed battery. It connects directly to the alternator field connection when the ENGINE MASTER switch is set to ON.

(4) Engine Control Unit (ECU) Backup Battery

The ECU backup battery is located under the rear passengers' seat on the RH side. It is a 12 V, 12 Ah sealed battery. The ECU backup battery connects directly to the ECU alternate power relay. In the IFR version the ECU backup battery connects directly to the ECU backup battery tester, which is only installed in the IFR version in the instrument panel. The battery tester connects directly to the ECU alternate power relay. Refer to Section 24-36 for more information about the battery tester.

(5) Emergency Battery

The emergency battery is located on the bottom of the instrument panel on the co-pilot's side. The emergency battery pack consists of 28 Alkaline dry batteries or of 12 Lithium Manganese batteries (G1000 only). Refer to Section 24-35 for more information about the emergency power pack.

(6) External Power Connector

The external power connector is located on the left side of the fuselage, near the relay junction box. The external power connector connects to the external power relay in the relay junction box on the firewall.

– The control pin connects to the relay coil through a diode to prevent reverse connection.

– The + pin connects to the relay main input connection.

– The - pin connects to ground.

B. Power Supply Control

(1) Battery Relay

The battery relay is located in the relay junction box on the firewall. The output connects directly to the relay junction box bus bar. The coil + of the battery relay is tied to the battery + connection to the relay. The ELECTRIC MASTER key switch provides the coil ground when set to the ON or START position.

(2) External Power Relay

The external power relay is located in the relay junction box on the firewall. The output connects directly to the relay junction box bus bar.

If 14 VDC external power is connected, the +14 VDC on the control pin energizes the relay. The relay connects the external power to the relay junction box bus bar.

(3) Bus Structure

All buses are flat metal strips connecting rows of circuit-breakers. The circuit-breakers are located immediately below the instrument panel in one row.

(4) Relay Junction Box Bus

The relay junction box bus is located in the relay junction box on the firewall. It is a flat metal strip connecting these relays:

– The external power relay.

– The battery relay.

– The glow relay.

The bus has two outputs:

– The ECU bus.

– The engine starter motor solenoid.

(5) ECU Bus

The ECU bus is located at the left end of the circuit breakers or on the right side in G1000 versions. The ECU bus has power when the any one of the following are connected to the relay junction box bus:

– The main battery.

– External power.

– The alternator.

The ECU bus provides power for Engine Control Unit A (ECU A) and ECU B. A 25 A circuit-breaker protects each circuit.

It also provides power for the ECU alternate power relay (ECU Alt Pwr relay), for the essential tie relay, and for the power relay.

During the usual operation, 12 V from the ECU bus energizes the ECU Alt Pwr relay. One set of contacts close to connect the ECU B supply through the ENGINE MASTER switch to the ECU. The second set of contacts close to provide charging current for the ECU backup battery. A resistor in the circuit limits the charging current. A diode prevents the battery from discharging through the circuit.

If power to the ECU bus fails, the ECU Alt Pwr relay de-energizes. The contacts open to break the supply from the ECU bus and connect the ECU backup battery. The second set of contacts open to break the charging circuit.

(6) Main Bus

The main bus provides power for the consumers. Each consumer has a circuit breaker to protect the circuit. The main bus also connects to the switch contacts of three relays:

– The starter relay.

– The avionics master relay.

– The essential tie relay.

A circuit-breaker protects the supply to each relay.

(7) Power Relay

The power relay connects the relay junction box bus and ECU bus to the main bus. The essential bus switch controls the power relay.

(8) Essential Tie Relay

In the usual (de-energized) condition, the essential tie relay connects the main bus to the essential bus.

In the emergency (energized) condition, the essential tie relay connects the hot battery bus to the essential bus.

The essential bus switch controls the essential tie relay.

(9) Essential Bus Switch (marked ESS BUS)

The ESS BUS switch is located in the switch panel at the bottom left of the instrument panel.

In the OFF position, the ESS BUS switch gives a ground to the power relay coil. The relay closes and connects the relay junction box bus to the main bus. This is the usual position when all systems are operating correctly.

In the ON position, the ESS BUS switch disconnects the ground from the power relay coil. The power relay opens and disconnects the main bus from the power supply (the relay junction box bus). It also gives a ground to the coil of the essential tie relay. The relay energizes to break the connection between the main bus and the essential bus. At the same time, it connects the hot battery bus to the essential bus.

There is a light emitting diode in the essential bus switch. If there is power on the hot battery bus, and the ELECTRIC MASTER key switch is set to ON or START, the light emitting diode comes ON.

(10) Starter Relay

The starter relay contacts and coil connect to the main bus. A 10 A circuit-breaker protects the circuit.

When the ENGINE MASTER switch set to ON and the ELECTRIC MASTER key switch is set to START, they give a ground to the relay coil. The relay connects the main bus to the starter solenoid (part of the starter). The solenoid engages the starter and operates a heavy-current contactor to connect the relay junction box bus to the starter.

(11) Avionics Master Relay

The avionics master relay connects the main bus to the avionics bus. The AVIONIC MASTER switch controls the relay.

(12) Essential Avionics Relay

The essential avionics relay connects the essential bus to the essential avionics bus. The AVIONIC MASTER switch controls the relay.

(13) AVIONIC MASTER Switch

With the AVIONIC MASTER switch set to OFF:

– The avionic master relay is energized to disconnect the avionics bus from the main bus.

– The essential avionics relay is energized to disconnect the essential avionic bus from the essential bus.

With the AVIONIC MASTER switch set to ON,

– The avionic master relay is de-energized to connect the avionics bus to the main bus.

– The essential avionics relay is de-energized to connect the essential avionic bus to the essential bus.

(14) ENGINE MASTER Switch

The ENGINE MASTER switch is located on the left, center of the instrument panel switch panel. It has four sets of contacts. When set to ON, each set of contacts connects one input to one output as follows:

– ECU Alt Pwr relay output to ECU B.

– ECU A power supply to ECU A.

– Alternator excitation battery to the alternator field connection.

– ELECTRIC MASTER key switch START connection to the Starter relay.

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Section 24-30
DC Generation - Lycoming Engine

1. General

The DC generation system for the DA 40 with the Lycoming engine has these components:

– Alternator.

– ALT/BAT switch.

– Alternator control circuit-breaker.

– Alternator circuit-breaker.

– Voltage regulator.

– Alternator protection circuit-breaker.

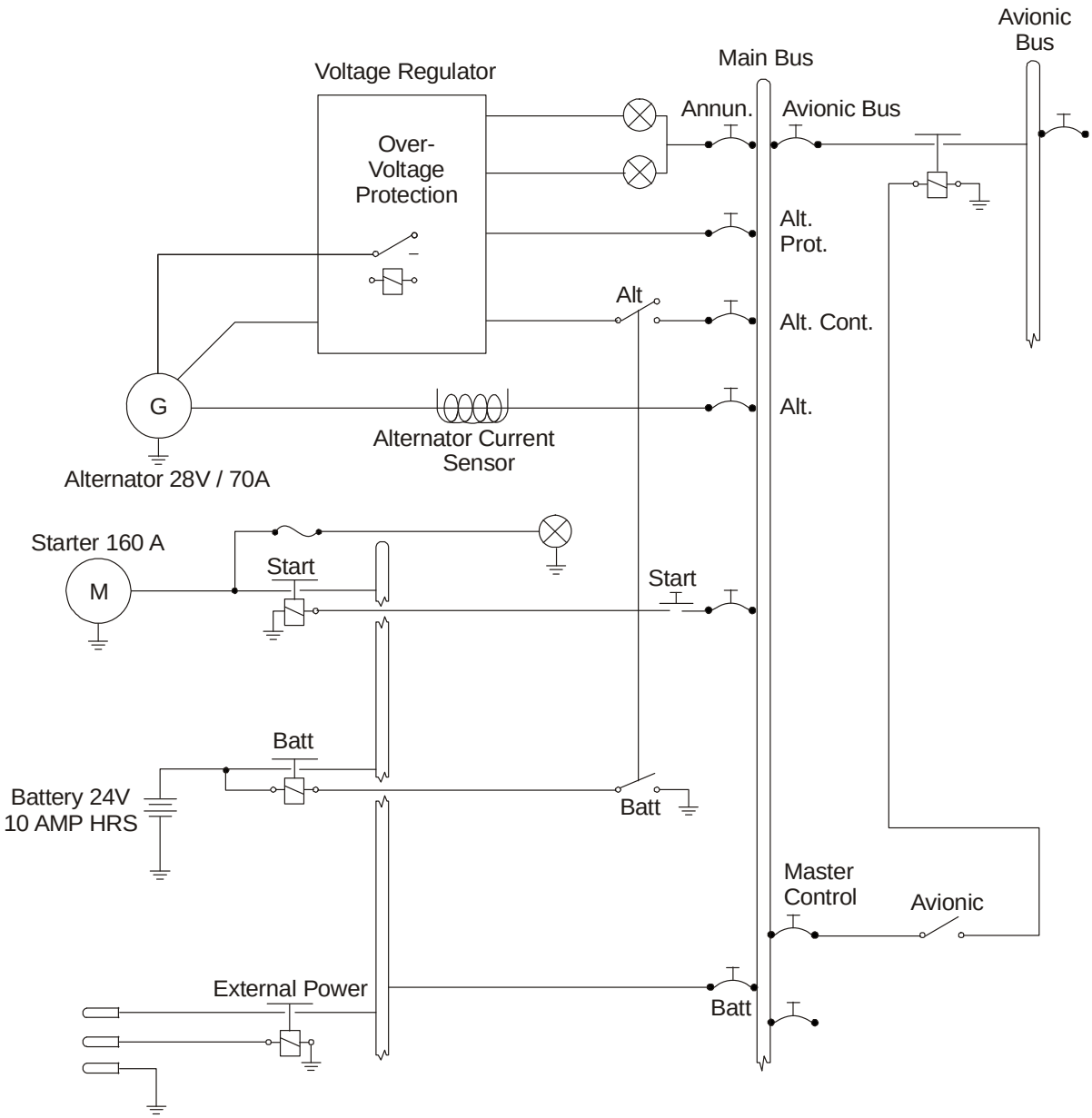


Figure 1: DC Generation (Simplified), Electrical System without Essential Bus

2. Description and Operation

Figures 1 and 2 show simplified DC electrical generation schematic diagrams.

A. Alternator

A 70 Ampère alternator attaches to the front of the engine. A flexible belt turns the alternator. A pulley on the engine crankshaft operates the flexible belt. The alternator is the usual source of power for the electrical system.

The output voltage from the alternator is controlled by the voltage regulator. The voltage regulator controls the output voltage at 28 V ± 2.5 %. The output from the alternator supplies the main electrical bus.

The alternator can supply 70 Ampères continuously at engine speeds above 2100 RPM. The graph at Figure 3 shows the alternator performance.

The alternator has these connections:

AUX Cable Ident. 24015A20.

F1 Cable Ident. 24014A20.

\+ Cable Ident. 24007A6.

F2 Cable Ident. 24018A20N.

The alternator will come on line when:

– The engine is operating.

– The battery, alternator control, alternator protection, alternator and voltage sense circuit-breakers are closed.

– The ALT/BAT switch is set to ON.

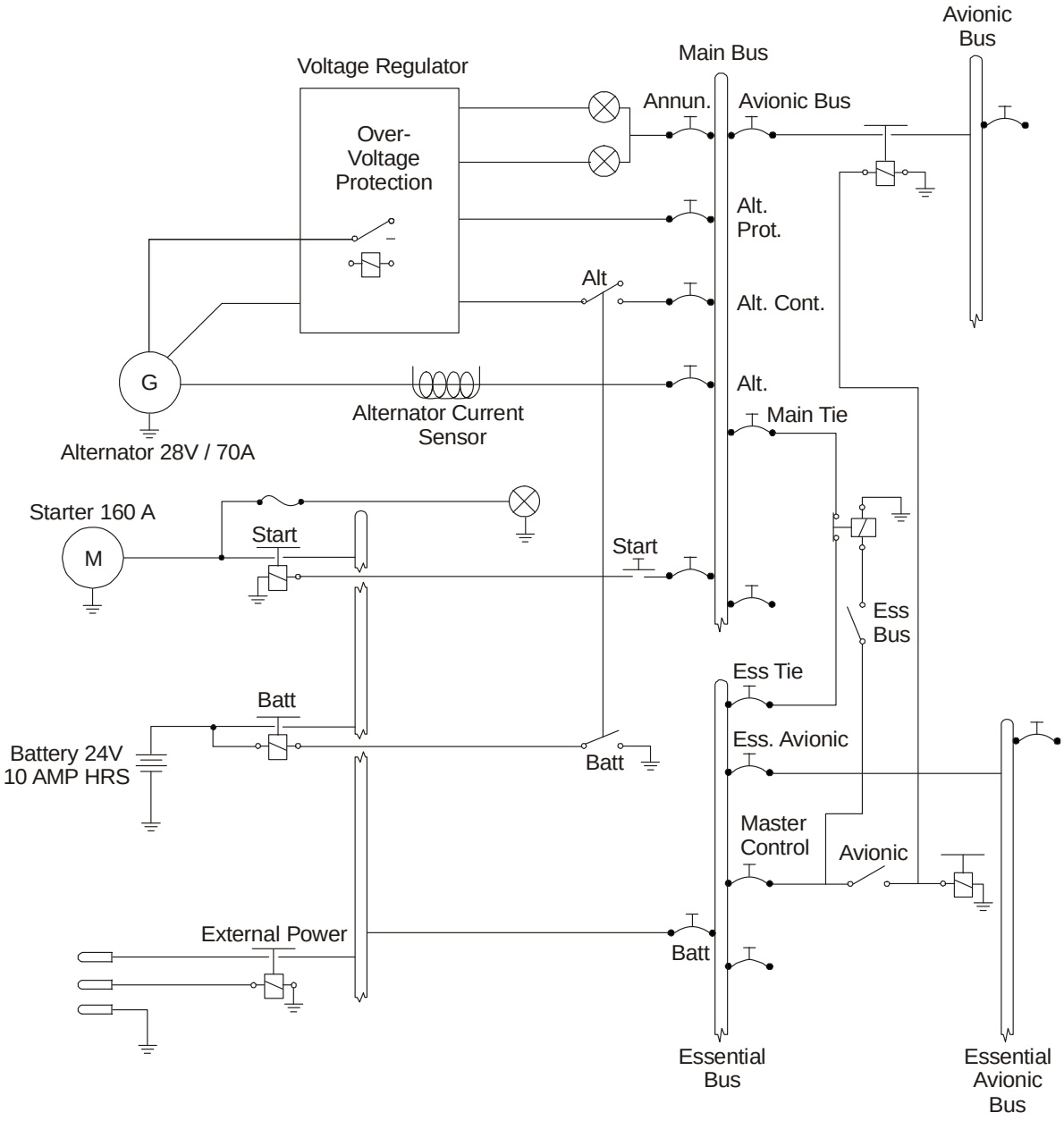


Figure 2: DC Generation (Simplified), Electrical System with Essential Bus

B. Voltage Regulator

The voltage regulator is located in the engine bay. An in-line connector connects the voltage regulator to the main cable harness.

The voltage regulator has these functions:

– Provides electrical protection for the alternator in the event of equipment failure.

– Operates a low voltage warning if the alternator voltage falls below 24 Volts.

– Operates a warning if the alternator fails or goes off line.

– Controls the output voltage of the alternator to the main electrical bus.

C. Alternator Control

These components make the alternator control system:

– ALT/BAT switch.

– Alternator control circuit-breaker.

– Voltage regulator.

Refer to Chapter 92 for the wiring diagrams.

When the ALT/BAT switch is set to ON, a ground is supplied to the battery relay circuit which closes the battery relay and supplies battery voltage to the main bus or, if installed, to the essential bus. The ALT/BAT switch also connects the main bus to pin 1 of the voltage regulator. The alternator comes on line.

The voltage regulator controls and protects the alternator. It also gives signals for the low voltage warning system, alternator out warning system and voltage sensing.

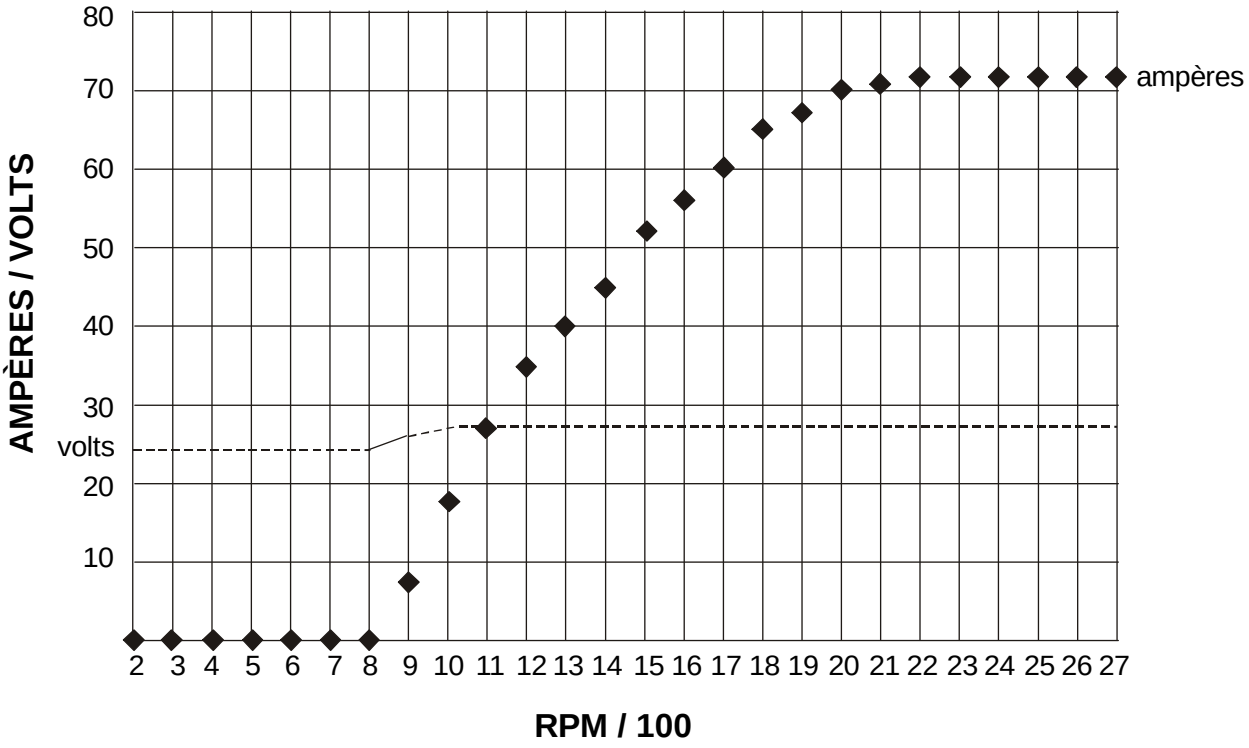


Figure 3: Alternator Performance Graph

D. Alternator Indication

These components make the alternator indicating system:

– Alternator load indicator (integral with the integrated engine instrument).

– Alternator voltage indicator (integral with the integrated engine instrument).

– Alternator out warning.

– Low voltage warning.

The alternator load indicator is integral with the integrated engine instrument. It shows the current flow from the alternator to the main bus both graphically and digitally. The graphic display has color range marks for quick visual reference of load levels. If the current flow is less than 2 amps, the graphic display will flash and the red alternator warning light (ALT or ALTERNATOR) will come on in the annunciator panel.

When the alternator is operating, the voltmeter shows the alternator voltage. When the alternator is off-line, the voltmeter shows the battery voltage. The voltage is displayed both graphically and digitally. The graphic display has colored range marks for quick visual reference of voltage levels. If the voltage level is outside of the normal operating range the graphic display will flash. If the voltage falls below 24 volts, the amber low voltage caution light (VOLT or LOW VOLTS) will come on in the annunciator panel. The caution light will go out when the voltage exceeds 25 volts.

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Trouble-Shooting

1. General

The table below lists the defects you could have with the DC generation system. If you have the trouble detailed in the Trouble column read across to the Possible Cause column. Then do the repair given in the Repair column.

Trouble	Possible Cause	Repair
Alternator warning light (ALT or ALTERNATOR) shows in the annunciator panel and the voltage/load meters in the engine integrated display flash with the engine running.	Alternator control circuit-beaker not set.	Set the alternator control circuit-breaker.
	Alternator circuit-breaker not set.	Set the alternator circuit-breaker.
	Alternator flexible drive belt loose/broken.	Adjust/replace the flexible drive belt. Refer to the Maintenance Practices in this Section.
	Voltage regulator defective.	Test/replace the voltage regulator. Refer to Chapter 92 for the wiring diagrams
	Alternator defective.	Test/replace the alternator. Refer to Chapter 92 for the wiring diagrams

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Maintenance Practices

1. General

This Section gives you the data to remove/install and adjust the components of the DC electrical generation system on the airplane. Refer to the component manufacturers' manuals for more data and shop data.

2. Electrical Safety

The DA 40 has a low voltage DC electrical system. When correctly maintained it is safe to work on. The battery can supply heavy current through low resistance circuits (for example, if you ground the positive output with a wrench by accident).

Always follow the usual safety practices for working on electrical equipment.

Maintenance carried out must be of good workmanship strictly considering the guidelines of AC 43-13.1B. It is important that maintenance is carried out in accordance with the best available techniques and properly trained maintenance personal, in order to eliminate possible failures.

CAUTION: DISCONNECT THE BATTERY BEFORE DOING MAINTENANCE ON THE ELECTRICAL SYSTEM. MAKE SURE THAT YOU DISCONNECT THE NEGATIVE LEAD FIRST.

CAUTION: AFTER DOING ELECTRICAL MAINTENANCE ALWAYS DO A CONFIDENCE TEST OF THE SYSTEM WITH A 24 VOLT POWER SUPPLY THAT HAS OVER-CURRENT PROTECTION. DO THIS BEFORE CONNECTING THE BATTERY.

CAUTION: USE ONLY DA 40 SPARE PARTS APPROVED BY THE MANUFACTURER.

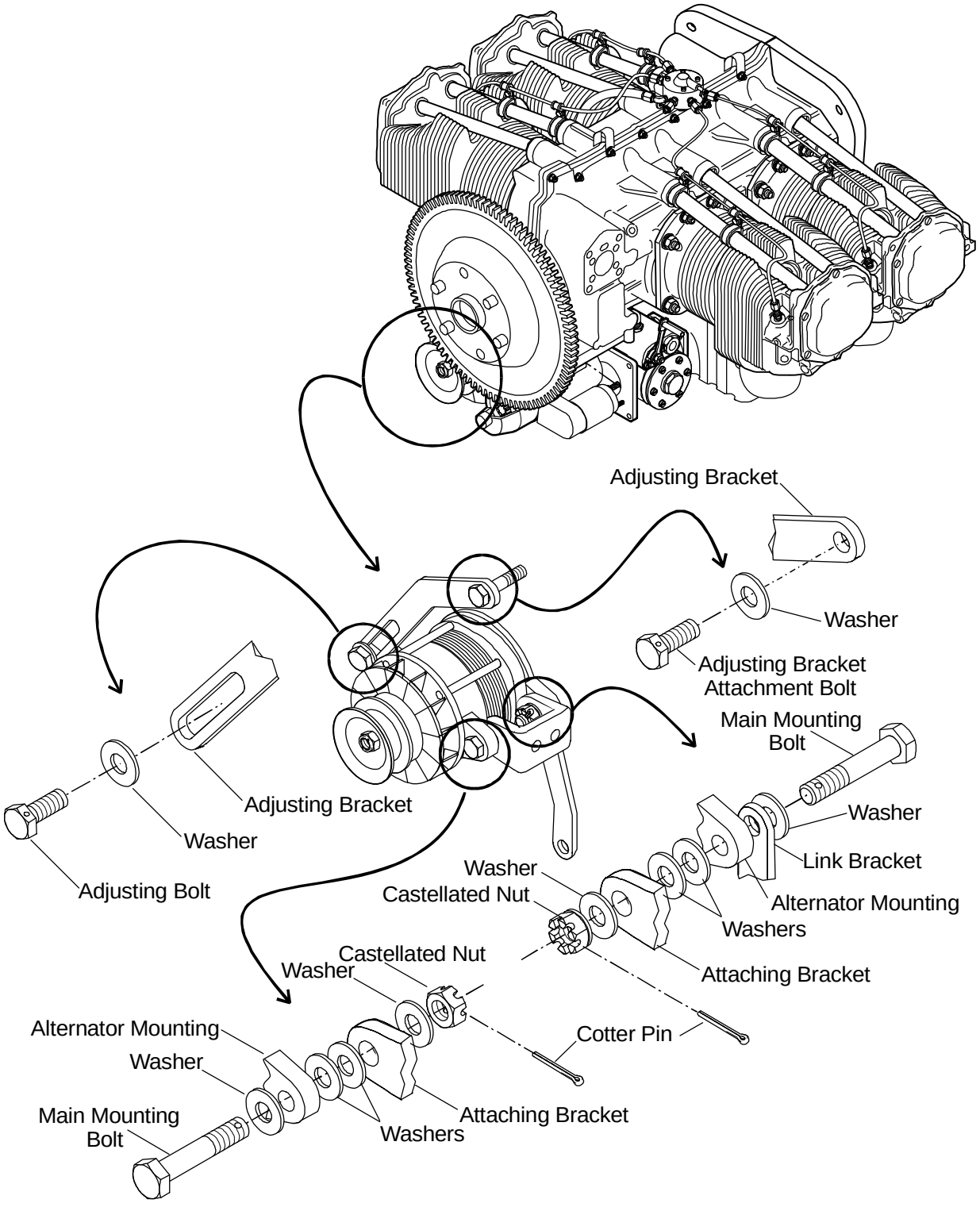


Figure 4: Alternator Installation

3. Adjust the Alternator Flexible Drive Belt

	Detail Steps/Work Items	Key Items/References
(1)	Remove the engine cowlings.	Refer to Section 71-10 or 71-12.
(2)	Disconnect the battery. Make sure that you disconnect the negative terminal first.	Refer to Section 24-31.
(3)	Loosen the main mounting bolts: – Remove the cotter pins from the nuts. – Loosen the mounting bolts.	Refer to Figure 4.
(4)	Loosen the adjusting bolt: – Cut the lock-wire. – Loosen the bolt.	
(5)	Loosen the adjusting bracket attachment bolt: – Cut the lock-wire. – Loosen the bolt.	
(6)	Move the alternator towards the engine and lift the flexible belt clear of the alternator pulley.	
(7)	Examine the flexible belt. Look specially for: – Wear or damage to the belt. – Stretching of the belt.	

	Detail Steps/Work Items	Key Items/References
(8)	Install the flexible belt: – Move the alternator up and towards the engine. – Put the flexible drive belt into position over the alternator pulley and the drive pulley. – Move the alternator down and away from the engine until the flexible belt tension is correct. – Then tighten the adjusting bolt and the adjusting bracket attachment bolt. – Lock the bolt heads to the adjusting bracket with lock-wire.	Make sure that the flexible belt is correctly seated in the Vee groove. Belt movement = 5 mm (0.2 in.) with 28.9 N (6.5 lbf.) load applied.
(9)	Tighten the 2 alternator mounting bolts and install the cotter pins.	
(10)	Connect the battery. Make sure that you connect the positive lead first.	Refer to Section 24-31.
(11)	Install the engine cowlings.	Refer to Section 71-10 or 71-12.
(12)	Do a function test of the alternator.	Refer to Paragraph 6.

4. Remove/Install the Alternator

A. Remove the Alternator

	Detail Steps/Work Items	Key Items/References
(1)	Remove the engine cowlings.	Refer to Section 71-10 or 71-12.
(2)	Disconnect the battery. Make sure that you disconnect the negative terminal first.	Refer to Section 24-31.
(3)	Disconnect the electrical connections to the alternator.	
(4)	Loosen the main mounting bolts: – Remove the cotter pins from the nuts. – Loosen the mounting bolts.	Refer to Figure 4.
(5)	Remove the adjusting bolt: – Cut the lock-wire. – Remove the bolt and the washer.	
(6)	Loosen the adjusting bracket attachment bolt: – Cut the lock-wire. – Loosen the bolt.	
(7)	Remove the flexible drive belt: – Move the alternator up and towards the engine. – Lift the flexible drive belt clear of the alternator pulley.	

	Detail Steps/Work Items	Key Items/References
(8)	Remove the alternator: – Remove the 2 nuts from the attachment bolts. – Remove the 2 washers. – Remove the 2 bolts, washers and spacers which attach the alternator to the mounting bracket. – Move the alternator clear of the engine.	Hold the alternator.

B. Install the Alternator

	Detail Steps/Work Items	Key Items/References
(1)	Put the alternator in position in the alternator mounting.	Hold the alternator in position.
(2)	Install the alternator mounting bolts: – Install the washer on the front mounting bolt. – Put the bolt through the link plate, alternator mounting bracket and the alternator. – Install the washer on the rear mounting bolt. – Put the bolt through the alternator, spacers and mounting bracket. – Install the washers on the bolts. – Install the 2 nuts on the attachment bolts but do not tighten the nuts.	From the front. From the rear.
(3)	Install the washer on the adjusting bolt and install the adjusting bolt through the adjusting bracket and into the alternator. Do not tighten the adjusting bolt.	
CAUTION: DO NOT MAKE THE FLEXIBLE BELT TOO TIGHT. TOO MUCH TENSION IN THE BELT CAN DAMAGE THE BEARINGS IN THE ALTERNATOR AND CAUSE ALTERNATOR FAILURE.		

	Detail Steps/Work Items	Key Items/References
(4)	Install the flexible belt: – Move the alternator up and towards the engine. – Put the flexible drive belt into position over the alternator pulley and the drive pulley. – Move the alternator down and away from the engine until the flexible belt tension is correct. – Then tighten the adjusting bolt and the adjusting bracket attachment bolt. – Lock the bolt heads to the adjusting bracket with lock-wire.	Make sure that the flexible belt is correctly seated in the Vee groove. Belt movement = 5 mm (0.2 in.) with 28.9 N (6.5 lbf.) load applied.
(5)	Tighten the 2 alternator mounting bolts and install the cotter pins.	
(6)	Connect the electrical cables to the alternator.	Refer to Chapter 92 for the wiring diagrams.
(7)	Connect the battery. Make sure that you connect the positive lead first.	Refer to Section 24-31.
(8)	Install the engine cowlings.	Refer to Section 71-10 or 71-12.
(9)	Do a function test of the alternator.	Refer to Paragraph 6.

5. Remove/Install the Voltage Regulator

A. Remove the Voltage Regulator

	Detail Steps/Work Items	Key Items/References
(1)	Set the ALT/BAT switch to OFF.	
(2)	Remove the engine cowlings.	Refer to Section 71-10 or 71-12.
(3)	Disconnect the battery. Make sure that you disconnect the negative terminal first.	Refer to Section 24-31.
(4)	Disconnect the electrical connections to the regulator.	At the in-line connector.
(5)	Remove the 4 screws, nuts and washers which attach the voltage regulator to the mounting bracket.	Hold the regulator!
(6)	Move the regulator clear of the airplane.	

B. Install the Voltage Regulator

	Detail Steps/Work Items	Key Items/References
(1)	Put the voltage regulator in position on the mounting bracket.	
(2)	Install the 4 screws, washers and nuts which attach the regulator to the mounting bracket.	
(3)	Connect the electrical connections at the in-line connector.	
(4)	Connect the battery. Make sure that you connect the positive lead first.	Refer to Section 24-31.
(5)	Install the engine cowlings.	Refer to Section 71-10 or 71-12.
(6)	Do a function test of the alternator.	Refer to Paragraph 6.

6. Test the Alternator

	Detail Steps/Work Items	Key Items/References
(1)	Set the ALT/BAT switch to ON.	The alternator warning light (ALT or ALTERNATOR) must come on. The amperage and voltage graphic displays in the integrated engine indicator must flash.
(2)	Start the engine.	Refer to the DA 40 Airplane Flight Manual.
(3)	Set the engine speed to 1720 RPM. Until the battery has charged and the load meter has stabilized.	Monitor the integrated engine indicator. The voltage must be 28 volts ± 2.5 %
(4)	Set all the electrical loads to ON.	The voltage must remain at 28 volts ± 2.5 % and the load meter should indicate an increase in load.
(5)	Operate intermittent loads throughout this part of the test, for example, flaps, Pitot heat.	The voltage must remain at 28 volts ± 2.5 %. The load meter should indicate the related loads.
(6)	Shut-down the engine.	Refer to the DA 40 Airplane Flight Manual. The alternator warning light (ALT or ALTERNATOR) must come on.
(7)	Set the ALT/BAT switch to OFF.	

7. Adjust/Test the Voltage Regulator

The voltage regulator can be adjusted in service. Refer to the equipment manufacturers manuals for data on adjusting the voltage of the voltage regulator.

Section 24-31
Battery System - Lycoming Engine

1. General

This Section tells you about the battery system for airplanes with the Lycoming engine installed. See Sections 24-00 and 24-30 for the description and operation of the battery in the electrical generation system.

The battery is located in the engine bay on the front of the fire-wall, on the right. When the alternator voltage is greater than the battery voltage, the alternator charges the battery.

When the alternator is operating, the voltmeter shows the alternator voltage. When the alternator is off-line, the voltmeter shows the battery voltage.

The battery supplies current to the main bus or, if installed, to the essential bus through the battery relay. The battery relay is in the relay box which is located on the firewall, inboard of the battery. A 70 amps circuit-breaker protects the battery system.

Regular maintenance of the battery system is necessary. Do not wait until a starting problem occurs.

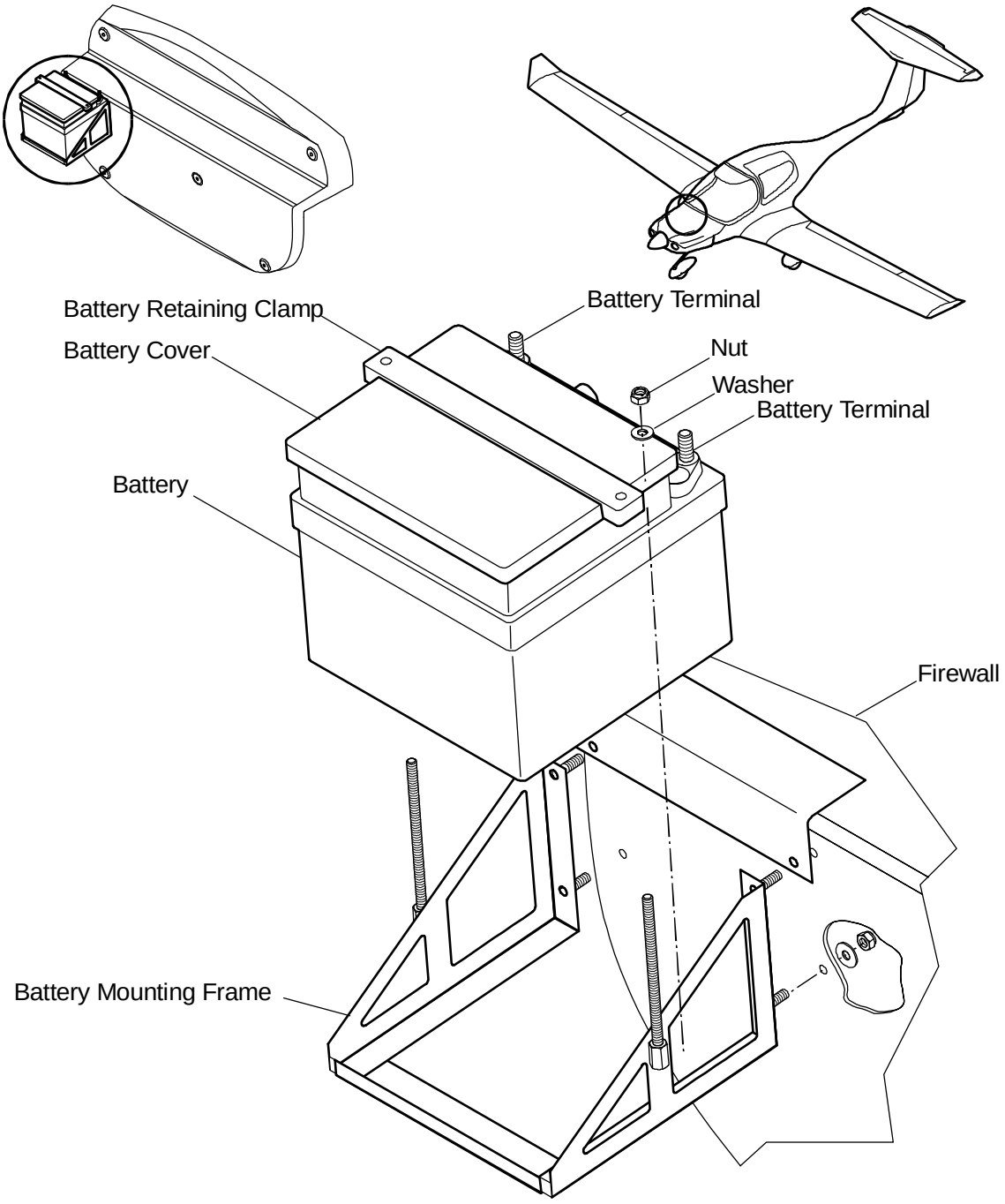


Figure 1: Battery Installation

Trouble-Shooting

1. General

The table below lists the defects you could have with the battery system. If you have the trouble detailed in the Trouble column read across to the Possible Cause column. Then do the repair given in the Repair column.

Trouble	Possible Cause	Repair
Battery voltage low.	Battery electrolyte level low (optional).	Fill to correct level (optional).
	Battery capacity low.	Do a capacity test. If necessary, replace the battery.
	Alternator output low.	Trouble-Shoot the alternator, refer to Section 24-30.
Battery will not connect to the main bus or essential bus.	Battery circuit-breaker open.	Close the circuit-breaker.
	Battery circuit-breaker defective.	Replace the circuit-breaker. Refer to Section 24-60.
	Battery relay defective.	Replace the battery relay.
	ALT/BAT switch defective.	Replace the ALT/BAT switch.
	Battery system wiring defective.	Do a test of the battery system wiring. Refer to Chapter 92 for the wiring diagrams.
Load meter shows zero at all times.	Defective ammeter indicator.	Refer to the VM1000 integrated engine indicator manual.
	Defective ammeter transducer.	Replace the transducer.
Voltmeter shows zero at all times.	Defective voltmeter.	Refer to the VM1000 integrated engine indicator manual.
	Defective wiring in the voltmeter system.	Do a test of the wiring. Refer to Chapter 92 for the wiring diagrams.

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Maintenance Practices

1. General

Keep the battery clean. Remove grease and other contaminants from the battery case. Remove dirt from the area of the terminals. Protect the terminals and cable lugs with Dow Corning compound 4 (DC4).

If you do not use the airplane regularly you must remove the battery for charging.

CAUTION: INSTALL ONLY A BATTERY WHICH IS APPROVED BY THE AIRPLANE MANUFACTURER.

2. Safety Precautions

Wear protective clothing when you work on the battery (rubber apron, rubber gloves and goggles).

If you get acid on you, apply a solution of sodium bicarbonate and water to the area. Then flush with large quantities of water. Get medical attention as soon as possible.

If you get acid in or near your eyes, flush with large quantities of water and an eye-wash solution. Get medical attention immediately.

Obey the maintenance instructions of the battery manufacturer.

Always disconnect the battery when you do work on the electrical system. Disconnect the negative cable first. Connect the negative cable last.

3. Remove/Install the Battery

A. Remove the Battery from the Airplane

	Detail Steps/Work Items	Key Items/References
(1)	Remove the engine cowlings.	Refer to Section 71-10 or 71-12.
(2)	Disconnect the negative cable from the battery.	
(3)	Disconnect the positive cable from the battery.	
(4)	Disconnect the vent hose from the battery.	
(5)	Remove the battery retaining clamp: – Remove the 2 nuts and washers from clamp. – Lift the clamp clear of the retaining studs.	
(6)	Remove the battery from the airplane.	

B. Install the Battery in the Airplane

	Detail Steps/Work Items	Key Items/References
(1)	Make sure that the battery is clean and dry.	
(2)	Move the battery into position in the battery mount.	
(3)	Install the battery retaining clamp: – Put the battery retaining clamp into position over the retaining studs and on the battery. – Install the 2 washers and nuts onto the retaining studs.	Make sure that the clamp is seated correctly. Tighten the nuts down evenly.
(4)	Tighten the 2 retaining nuts.	Torque 1.6 Nm (1.18 lbf.ft.)
(5)	Connect the vent hose to the battery.	
CAUTION: MAKE SURE THAT YOU CONNECT THE CABLES TO THE CORRECT TERMINALS. INCORRECT CONNECTION CAN DAMAGE THE ELECTRICAL AND AVIONIC SYSTEMS.		
(6)	Connect the positive cable to the battery.	Apply Dow Corning compound (DC4) to the battery terminal and the cable lug.
(7)	Connect the negative cable to the battery.	Apply Dow Corning compound (DC4) to the battery terminal and the cable lug.
(8)	Install the engine cowlings.	Refer to Section 71-10 or 71-12.

4. Fill the Battery with Distilled Water

Remove the battery from the airplane before you fill it with distilled water.

WARNING: WEAR PROTECTIVE GOGGLES, RUBBER GLOVES AND RUBBER APRON WHEN WORKING ON THE BATTERY. THE BATTERY CONTAINS DILUTE SULPHURIC ACID THAT CAN INJURE PERSONS AND DAMAGE EQUIPMENT.

Note: Only the lead-acid batteries G 243 and CB24-11M can be refilled. The valve regulated sealed lead-acid batteries RG24-11M and RG24-15M are maintenance-free batteries.

A. Procedure

	Detail Steps/Work Items	Key Items/References
(1)	Clean the outer surface of the battery with warm water. Wipe the battery dry.	
(2)	Remove the caps from the cells.	
(3)	Add water to the level marked on the battery.	Use only clean distilled water.
(4)	Replace the caps.	

5. Disconnect/Connect the Battery for Maintenance

A. Disconnect the Battery for Maintenance

	Detail Steps/Work Items	Key Items/References
(1)	Remove the engine cowlings.	Refer to Section 71-10 or 71-12.
(2)	Disconnect the negative cable from the battery.	
(3)	Disconnect the positive cable from the battery.	

B. Connect the Battery after Maintenance

	Detail Steps/Work Items	Key Items/References
	CAUTION: MAKE SURE THAT YOU CONNECT THE CABLES TO THE CORRECT TERMINALS. INCORRECT CONNECTION CAN DAMAGE THE ELECTRICAL AND AVIONIC SYSTEMS.	
(1)	Connect the positive cable to the battery.	Apply Dow Corning compound (DC4) to the battery terminal and the cable lug.
(2)	Connect the negative cable to the battery.	Apply Dow Corning compound (DC4) to the battery terminal and the cable lug.
(3)	Install the engine cowlings.	Refer to Section 71-10 or 71-12.

6. Remove/Install the Battery Relay

A. Remove the Battery Relay

	Detail Steps/Work Items	Key Items/References
(1)	Remove the engine cowlings.	Refer to Section 71-10 or 71-12.
(2)	Disconnect the battery: – Disconnect the negative cable from the battery. – Disconnect the positive cable from the battery.	
(3)	Remove the cover from the relay box.	
(4)	Disconnect the electrical cables from the battery relay.	
(5)	Remove the 2 bolts which attach the battery relay to the relay box.	
(6)	Move the relay clear of the airplane.	

B. Install the Battery Relay

	Detail Steps/Work Items	Key Items/References
(1)	Put the relay in position in the relay box.	
(2)	Install the 2 attaching bolts.	
(3)	Connect the power and control cables to the battery relay.	Refer to Chapter 92 for the wiring diagrams.
(4)	Install the cover to the relay box.	
(5)	Connect the positive cable to the battery.	Apply Dow Corning compound (DC4) to the battery terminal and the cable lug.
(6)	Connect the negative cable to the battery.	Apply Dow Corning compound (DC4) to the battery terminal and the cable lug.
(7)	Install the engine cowlings.	Refer to Section 71-10 or 71-12.
(8)	Do a test for correct operation of the battery relay.	Refer to Paragraph 7.

7. Battery Relay Functional Test

Do this test in an area where the engine can be run.

	Detail Steps/Work Items	Key Items/References
(1)	Make sure that the ALT/BAT switch is set to OFF.	There must be no indication on the voltmeter.
(2)	Set the ALT/BAT switch to ON.	The voltmeter must indicate battery voltage.
	WARNING: MAKE SURE THAT THE AREA OF THE PROPELLER IS CLEAR BEFORE YOU OPERATE THE STARTER MOTOR. PROPELLERS CAN CAUSE INJURY OR DEATH.	
(3)	Operate the starter motor.	You do not have to start the engine.

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Section 24-32
Emergency Battery System - Lycoming Engine

1. General

This Section tells you about the emergency battery system for airplanes with the Lycoming engine installed. The emergency battery system is only installed in the IFR model. Regular maintenance of the emergency battery system is necessary.

Refer to Chapter 92 for the wiring diagrams.

2. Description

The emergency battery system consists of:

– An emergency battery pack.

– A sealed EMERGENCY switch.

The emergency battery pack consists of 28 Alkaline dry batteries, 1.5 volt, size 'AA' (also known as 'Mignon') or of 12 Lithium Manganese batteries, 3 volt, 1300 mAh. Refer to the Equipment List in Section 6.5 of the Airplane Flight Manual for the approved battery type.

The GFRP tray which holds the 28 Alkaline batteries is mounted under the instrument panel, on the co-pilot's side. If the Lithium Manganese batteries are used, the package is mounted behind the instrument panel, on the co-pilot’s side.

When all other sources of electrical power fail during flight, the EMERGENCY switch on the left side of the instrument panel is set to ON to use the emergency battery. It supplies the attitude gyro (horizon) and the flood light with power for at least 1 hour and 30 minutes.

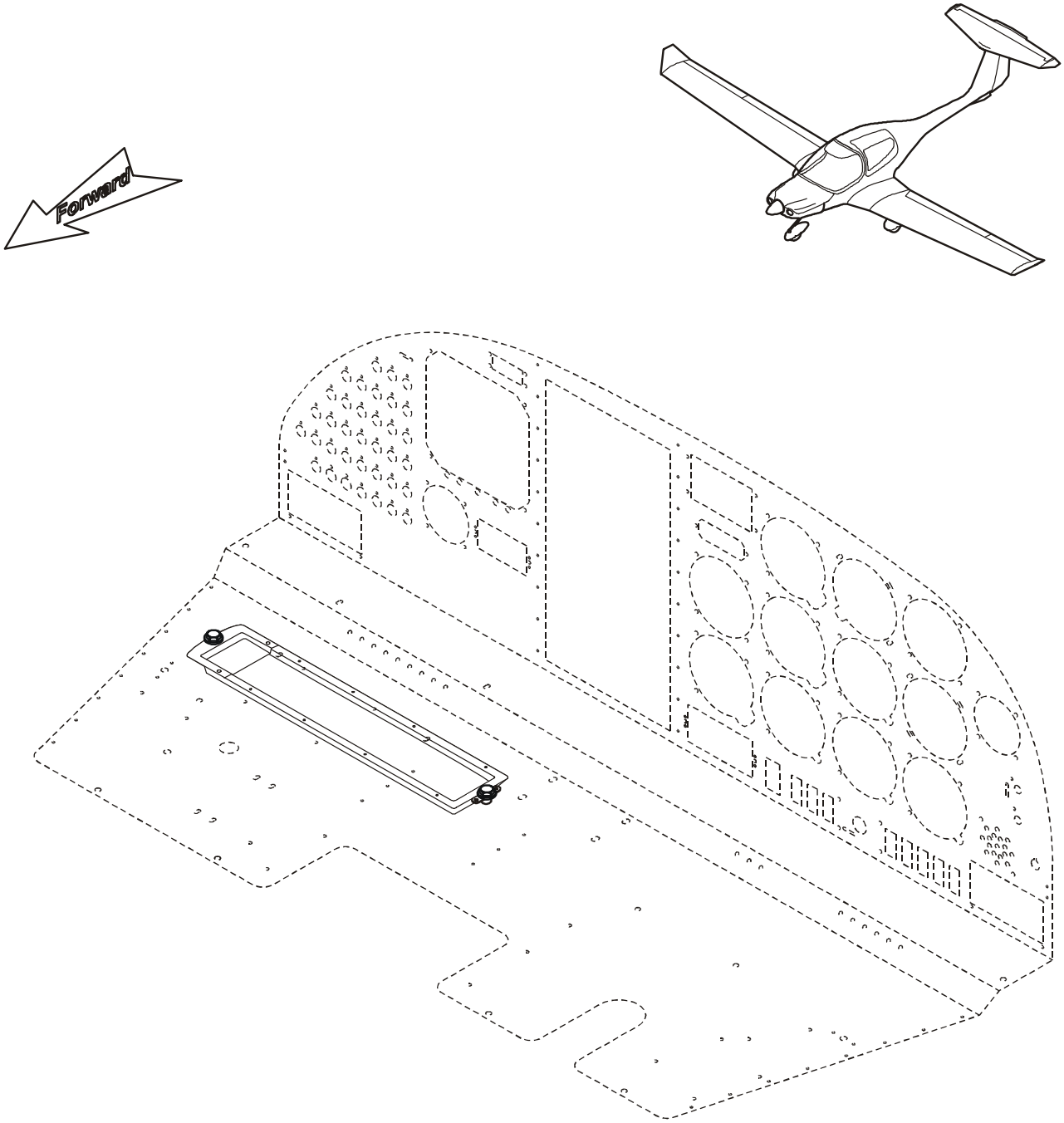


Figure 1: Emergency Battery Tray (Alkaline Batteries installed)

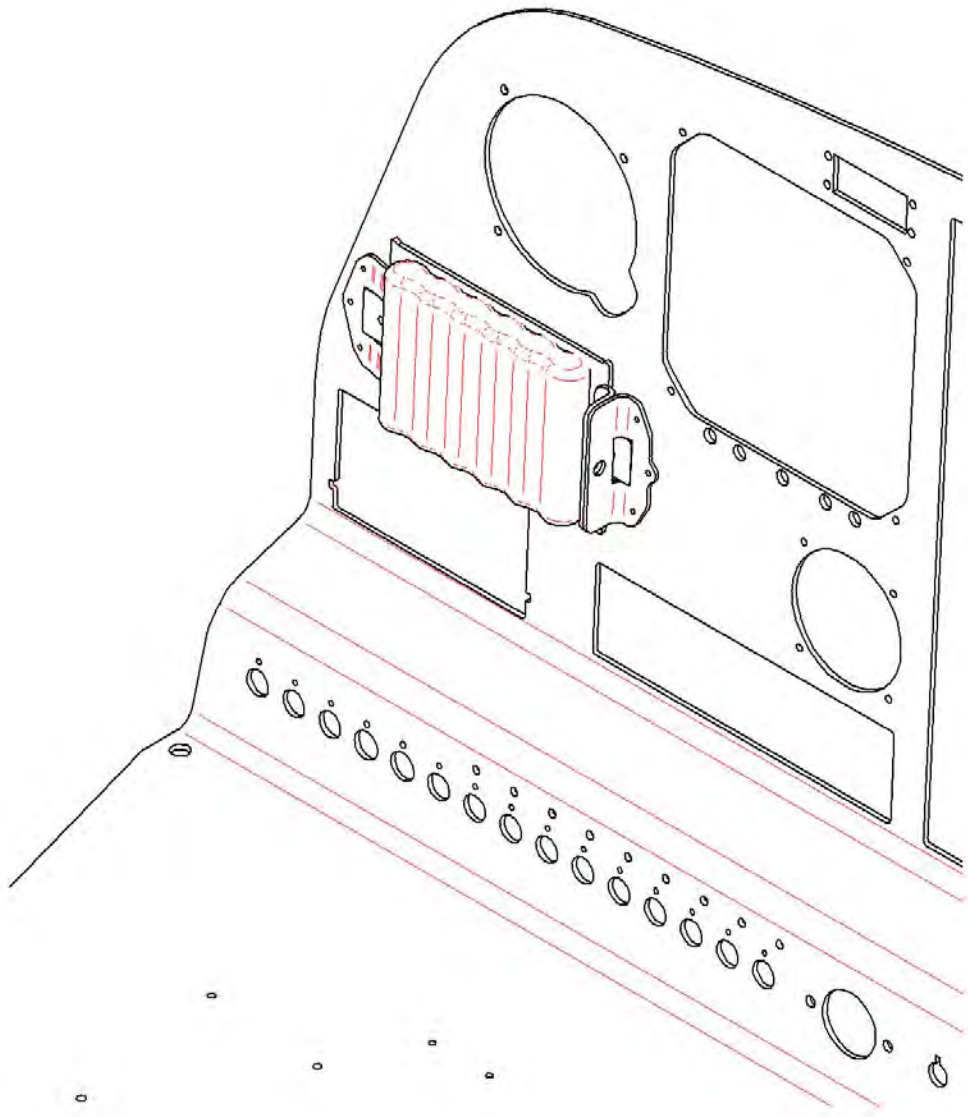


Figure 2: Emergency Power Package Installation (Lithium Manganese Batteries installed)

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Trouble-Shooting

1. General

The table below lists the defects you could have with the emergency battery system. If you have the trouble detailed in the Trouble column read across to the Possible Cause column. Then do the repair given in the Repair column.

Trouble	Possible Cause	Repair
Batteries leaking.	Batteries expired.	Replace batteries. Clean all items that are contaminated.
Voltage on the back side of the emergency switch less than 42 volts (Alkaline batteries installed).	Batteries expired. Batteries have been used. One or more batteries installed incorrectly. Emergency battery system wiring defective.	Replace batteries. Replace batteries. Ensure correct polarity of each battery. Repair the emergency battery system wiring.
Voltage on the back side of the emergency switch less than 36 Volts (Lithium Manganese batteries installed).	Batteries expired. Batteries have been used. Emergency battery system wiring defective.	Replace batteries. Replace batteries. Repair the emergency battery system wiring.

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Maintenance Practices

1. General

This Section tells you how to replace batteries in the emergency battery pack. It also tells you how to test the emergency battery system.

Refer to Chapter 92 for the wiring diagrams.

2. Remove/Install the Batteries in the Emergency Battery Pack (Alkaline Batteries installed)

A. Remove the Batteries in the Emergency Battery Pack (Alkaline Batteries installed)

	Detail Steps/Work Items	Key Items/References
(1)	Disconnect the electrical plug on the right side of the battery tray.	
(2)	Remove the screw on the right side of the battery tray.	Hold the battery tray.
(3)	Remove the battery tray clear of the airplane.	
(4)	Open the battery tray.	
(5)	Remove the batteries.	

CAUTION: THE BATTERIES CANNOT BE RE-CHARGED. DO NOT TRY TO RE-CHARGE THE BATTERIES. IF YOU TRY TO RE-CHARGE THE BATTERIES, THEY CAN EXPLODE OR LEAK.

CAUTION: DISPOSE OF THE BATTERIES PROPERLY (ASK YOUR BATTERY DEALER FOR ADVISE). BATTERIES CONTAIN POISONS WHICH HARM THE ENVIRONMENT. DO NOT THROW THE USED BATTERIES INTO THE GARBAGE. DO NOT EXPOSE BATTERIES TO FIRE. DO NOT DISMANTLE BATTERIES.

B. Install the Batteries in the Emergency Battery Pack (Alkaline Batteries installed)

CAUTION: USE ONLY NEW BATTERIES. REFER TO THE EQUIPMENT LIST IN THE AIRPLANE FLIGHT MANUAL, SECTION 6.5, FOR THE CORRECT BATTERY TYPE.

CAUTION: DO NOT SHORT-CIRCUIT THE BATTERIES. ENSURE CORRECT POLARITY OF ALL BATTERIES.

	Detail Steps/Work Items	Key Items/References
(1)	Place new batteries in the battery tray.	Ensure correct polarity. Apply Dow Corning compound (DC4) to both poles of each battery.
(2)	Close the battery tray.	
(3)	Measure the voltage of the battery pack.	On the connector for the electrical plug. If the voltage is less than 42 volts, then the batteries are used, or at least one battery was installed incorrectly. Use new batteries and ensure correct polarity of each battery.
(4)	Remove the instrument panel cover.	Refer to Section 25-10.
(5)	Put the battery tray in place under the instrument panel on the co-pilot's side.	Engage the appropriate bolt in the groove on the left side of the tray.
(6)	Install the screw on the right side of the battery tray.	
(7)	Connect the electrical plug on the right side of the battery tray.	Ensure correct polarity.
(8)	Measure the voltage on the back side of the EMERGENCY switch.	If the voltage is below 42 volts, it is probable that the wiring is defective. Repair wiring.
(9)	Install the instrument panel cover.	Refer to Section 25-10.

3. Remove/Install the Batteries in the Emergency Battery Pack (Lithium Manganese Batteries installed)

A. Remove the Batteries in the Emergency Battery Pack (Lithium Manganese Batteries installed)

	Detail Steps/Work Items	Key Items/References
(1)	Remove the instrument panel cover.	Refer to Section 25-10.
(2)	Disconnect the electrical plug of the battery package.	
(3)	Remove the screw on the left side which holds the battery package.	Hold the battery package and the mounting bracket.
(4)	Remove the battery package and the mounting bracket clear of the airplane.	

CAUTION: THE BATTERIES CANNOT BE RE-CHARGED. DO NOT TRY TO RE-CHARGE THE BATTERIES. IF YOU TRY TO RE-CHARGE THE BATTERIES, THEY CAN EXPLODE OR LEAK.

CAUTION: DISPOSE OF THE BATTERIES PROPERLY (ASK YOUR BATTERY DEALER FOR ADVISE). BATTERIES CONTAIN POISONS WHICH HARM THE ENVIRONMENT. DO NOT THROW THE USED BATTERIES INTO THE GARBAGE. DO NOT EXPOSE BATTERIES TO FIRE. DO NOT DISMANTLE BATTERIES.

B. Install the Batteries in the Emergency Battery Pack (Lithium Manganese Batteries installed)

CAUTION: USE ONLY A NEW BATTERY PACKAGE. REFER TO THE EQUIPMENT LIST IN THE AIRPLANE FLIGHT MANUAL, SECTION 6.5, FOR THE CORRECT BATTERY PACKAGE PART NUMBER.

CAUTION: DO NOT SHORT-CIRCUIT THE BATTERY PACKAGE.

	Detail Steps/Work Items	Key Items/References
(1)	Measure the voltage of the battery pack.	On the connector for the electrical plug. If the voltage is less than 36 volts, then the battery package is used. Use a new battery package.
(2)	Put the battery package in place behind the instrument panel on the co-pilot's side.	
(3)	Put the mounting bracket in place on the left side of the battery package.	
(4)	Install the screw on the left side of the battery package.	
(5)	Connect the electrical plug of the battery package.	Ensure correct polarity.
(6)	Measure the voltage on the back side of the EMERGENCY switch.	If the voltage is below 36 volts, it is probable that the wiring is defective. Repair wiring.
(7)	Install the instrument panel cover.	Refer to Section 25-10.

Section 24-33
DC Generation - TAE 125 Diesel Engine

1. General

The DC generation system for the DA 40 with the TAE 125 Diesel engine has these components:

– Alternator.

– Alternator current sensor.

– Alternator fuse.

– Voltage regulator (integral with the alternator. If MÄM 40-151 is carried out, an external regulator is used).

– Alternator excitation battery.

This Section gives you only the simplified description, Trouble-Shooting and Maintenance Practices for the generating system. Refer to Section 24-01 for the full system description and operation.

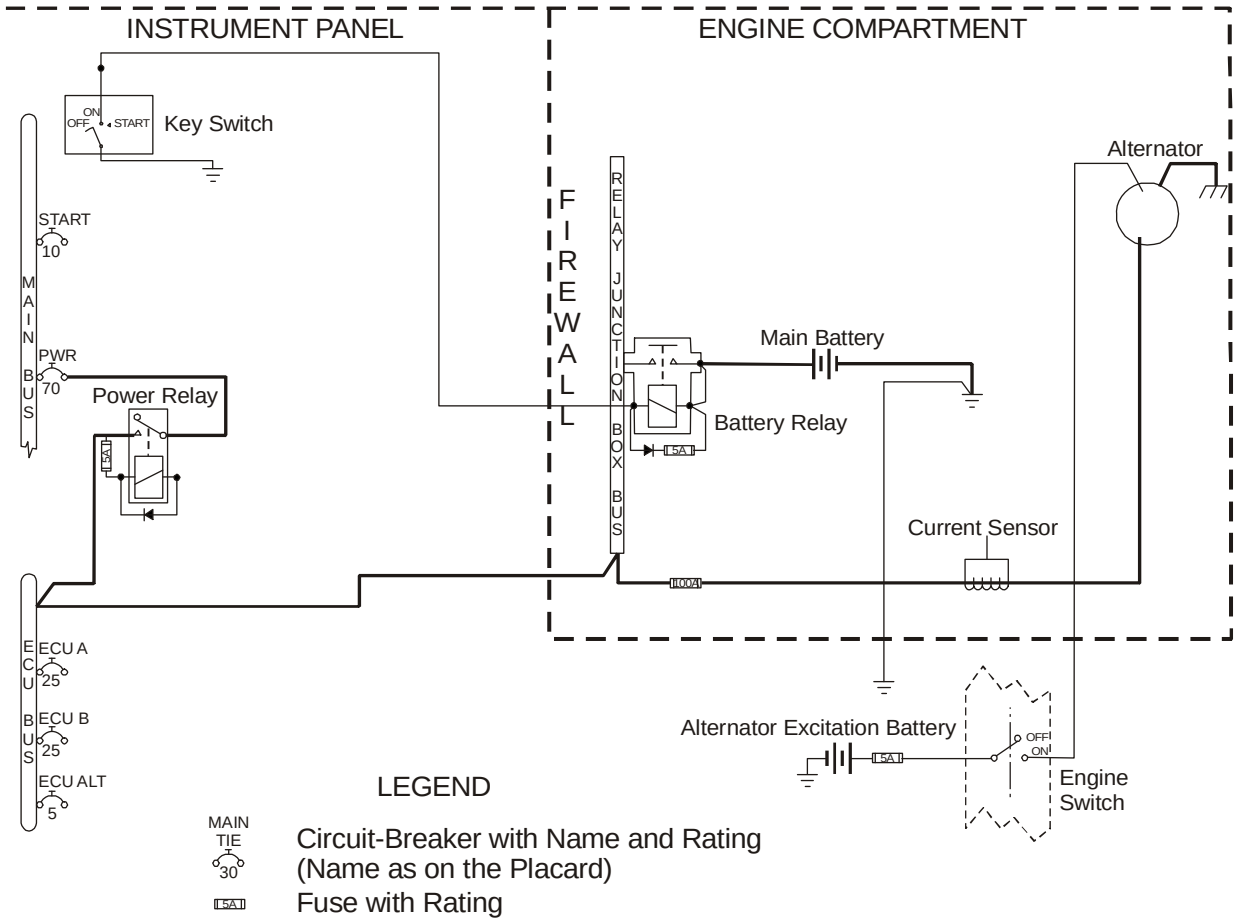


Figure 1: Electrical Generation System Simplified Schematic Diagram

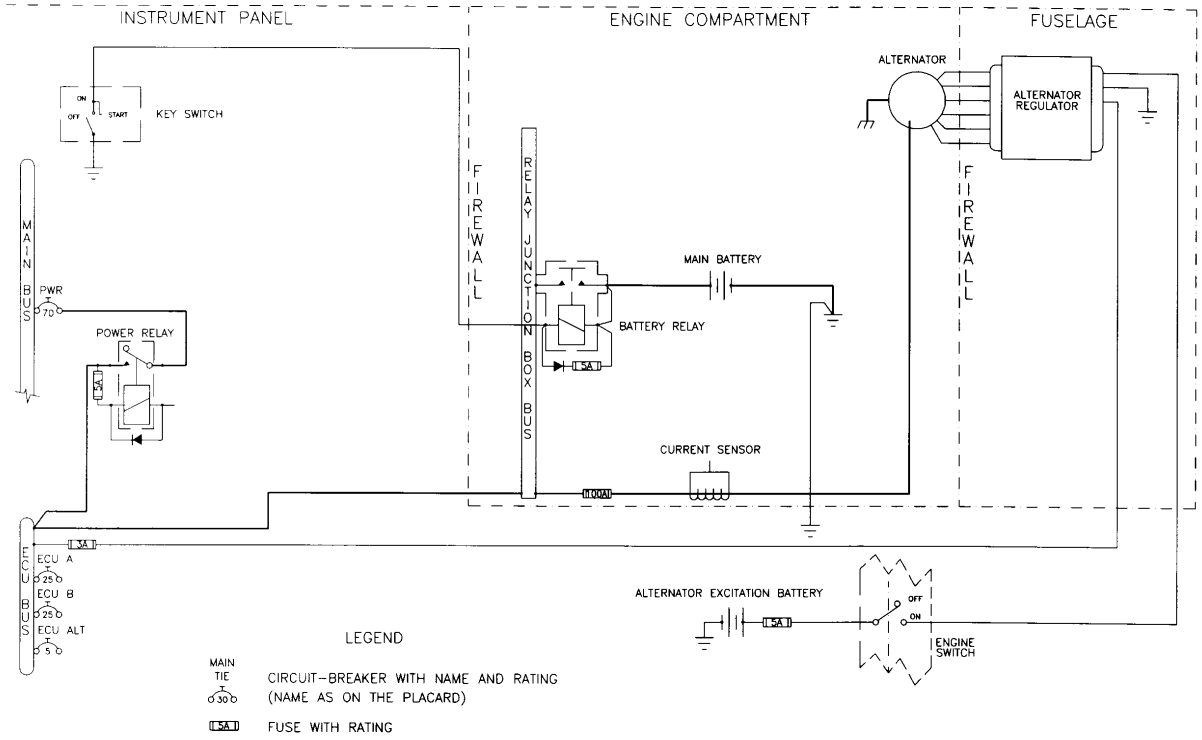


Figure 2: Electrical Generation System Simplified Schematic Diagram, if MÄM 40-151 is carried out

2. Description and Operation

Figure 1 shows the generation system simplified schematic diagram.

Figure 2 shows the generation system simplified schematic diagram, if MÄM 40-151 is carried out.

A. Alternator

The alternator is supplied as part of the engine. It is a14 VDC machine with a maximum output of 90 A. It attaches to the rear left of the engine. A multi-V flat belt turns the alternator. An automatic system adjusts the belt tension.

The alternator has an integral voltage regulator. If MÄM 40-151 is carried out, an external regulator is used, mounted under the pilot's seat.

There is no approved maintenance possible on the alternator.

B. Alternator Excitation Battery

The alternator excitation battery is a sealed unit. It is located on the instrument panel shelf on the right. A strap holds the battery in position.

The battery power to energize the alternator field during start-up. The alternator then becomes self-sustaining. The field voltage is sufficient to charge the excitation battery. If the field voltage fails, the excitation battery provides sufficient power to maintain the alternator output for emergencies. The ENGINE MASTER switch controls the circuit to the alternator field connection.

C. Alternator Current Sensor

An alternator current sensor is located inside the relay junction box.

D. Alternator Fuse

A 100 A fuse is located in the relay junction box between the alternator cable and the relay junction box bus.

E. Alternator Regulator

The alternator regulator is located under the pilot's seat (MÄM 40-151 carried out) or is part of the alternator. It measures the alternator output voltage and controls the current through the alternator field coils via a pulse-width modulated signal. To keep the output voltage stable in all load and speed situations, the alternator field signal is modulated accordingly.

The alternator regulator includes a comprehensive set of diagnostic functions that will warn the operator using a CAUTION message (ALTERNATOR) on the annunciator panel in case of over- or under-voltage as well as a couple of other internal warning levels.

There is no approved maintenance possible on the alternator regulator.

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Trouble Shooting

1. General

The table below lists the defects you could have with the generating system. If you have the trouble detailed in the Trouble column read across to the Possible Cause column. Then do the repair given in the Repair column.

Trouble	Possible Cause	Repair
Alternator warning light illuminated.	Alternator defective.	Refer to the engine manufacturer.
	Alternator regulator defective.	Refer to the engine manufacturer.

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Maintenance Practices

1. General

This Section gives you the data to remove/install and adjust the components of the 14 VDC electrical generation system on the airplane. Refer to the component manufacturers' manuals for more data and shop data.

2. Electrical Safety

The DA 40 has a low voltage DC electrical system. When correctly maintained it is safe to work on. The battery can supply heavy current through low resistance circuits (for example, if you ground the positive output with a wrench by accident).

Always follow the usual safety practices for working on electrical equipment.

Maintenance carried out must be of good workmanship strictly considering the guidelines of AC 43-13.1B. It is important that maintenance is carried out in accordance with the best available techniques and properly trained maintenance personal, in order to eliminate possible failures.

CAUTION: DISCONNECT THE BATTERY BEFORE DOING MAINTENANCE ON THE ELECTRICAL SYSTEM. MAKE SURE THAT YOU DISCONNECT THE NEGATIVE LEAD FIRST.

CAUTION: AFTER DOING ELECTRICAL MAINTENANCE ALWAYS DO A CONFIDENCE TEST OF THE SYSTEM WITH A 12 VOLT POWER SUPPLY THAT HAS OVER-CURRENT PROTECTION. DO THIS BEFORE CONNECTING THE BATTERY.

CAUTION: USE ONLY DA 40 SPARE PARTS APPROVED BY THE MANUFACTURER.

3. Remove/Install the Alternator Excitation Battery

A. Remove the Alternator Excitation Battery

	Detail Steps/Work Items	Key Items/References
(1)	Remove the engine cowlings.	Refer to Section 71-11.
(2)	Disconnect the airplane main battery: – Disconnect the negative cable from the battery. – Disconnect the positive cable from the battery.	
(3)	Remove the instrument panel cover.	Refer to Section 25-10.
(4)	Disconnect the alternator excitation battery: – Disconnect the negative cable from the battery. – Disconnect the positive cable from the battery.	
(5)	Release the battery hold-down clamp.	
(6)	Remove the battery.	

B. Install the Alternator Excitation Battery

	Detail Steps/Work Items	Key Items/References
(1)	Put the battery in position on the instrument panel shelf.	
(2)	Install the battery hold-down clamp.	
(3)	Connect the alternator excitation battery: – Connect the positive cable to the battery. – Connect the negative cable to the battery.	
(4)	Install the instrument panel cover.	Refer to Section 25-10.
(5)	Connect the airplane main battery: – Connect the positive cable to the battery. – Connect the negative cable to the battery.	
(6)	Install the engine cowlings.	Refer to Section 71-11.
(7)	Do an engine ground test.	The alternator warning light must go OFF.

4. Replace the Alternator Fuse

	Detail Steps/Work Items	Key Items/References
(1)	Remove the engine cowlings.	Refer to Section 71-11.
(2)	Disconnect the airplane main battery: – Disconnect the negative cable from the battery. – Disconnect the positive cable from the battery.	
(3)	Remove the cover from the relay box.	
(4)	Release the 100 A alternator fuse.	Dispose of the old fuse.
(5)	Install a new 100 A fuse.	
(6)	Install the cover to the relay box.	
(7)	Do an engine ground test.	The alternator warning light must go OFF.

Section 24-34
Battery System - TAE 125 Diesel Engine

1. General

This Section tells you about the battery systems for airplanes with the TAE 125 Diesel engine installed. See Sections 24-01 and 24-33 for the description and operation of the battery in the electrical generation system.

The airplane has three batteries:

– A main battery located on the top front face of the engine firewall. This battery provides the usual airplane electrical services.

– An ECU backup battery located below the rear passengers´ seat on the RH side. The ECU backup battery connects directly to the ECU alternate power relay. This battery provides power to the ECU if the all other power supplies fail.

– An alternator excitation battery located on the instrument panel shelf. It is a 12 V; 1.3 Ah battery. It connects directly to the alternator field connection when the ENGINE MASTER switch is set to ON. Refer to Section 24-33 for Maintenance Procedures for this battery.

2. Main Battery Description and Operation

The main battery is a 12 V, 23 Ah sealed battery. A tray on the top face of the firewall, near the center holds the base of the battery. A strap holds the battery and cover in place. The positive and negative cables attach to terminals at the top, front of the battery. The usual rubber caps protect the connections.

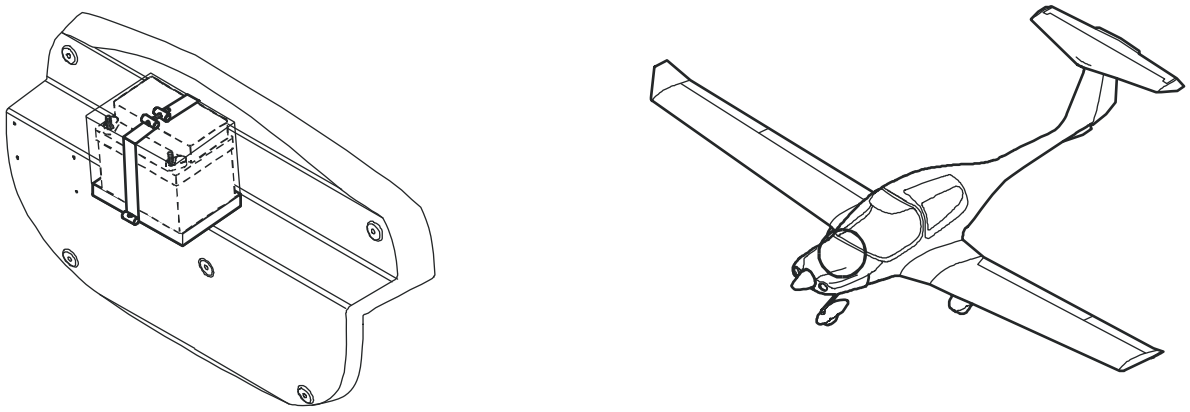
When the alternator voltage is greater than the battery voltage, the alternator charges the battery.

When the alternator is operating, the digital voltmeter shows the alternator voltage. When the alternator is off-line, the digital voltmeter shows the battery voltage.

The battery supplies current to the ECU bus through the battery relay. The battery relay is in the relay junction box which is located on the firewall, adjacent to the battery. There is no circuit-protection.

The battery also supplies the hot battery bus. A 50 Ampère fuse protects the hot battery system.

Regular maintenance of the battery system is necessary. Do not wait until a starting problem occurs.



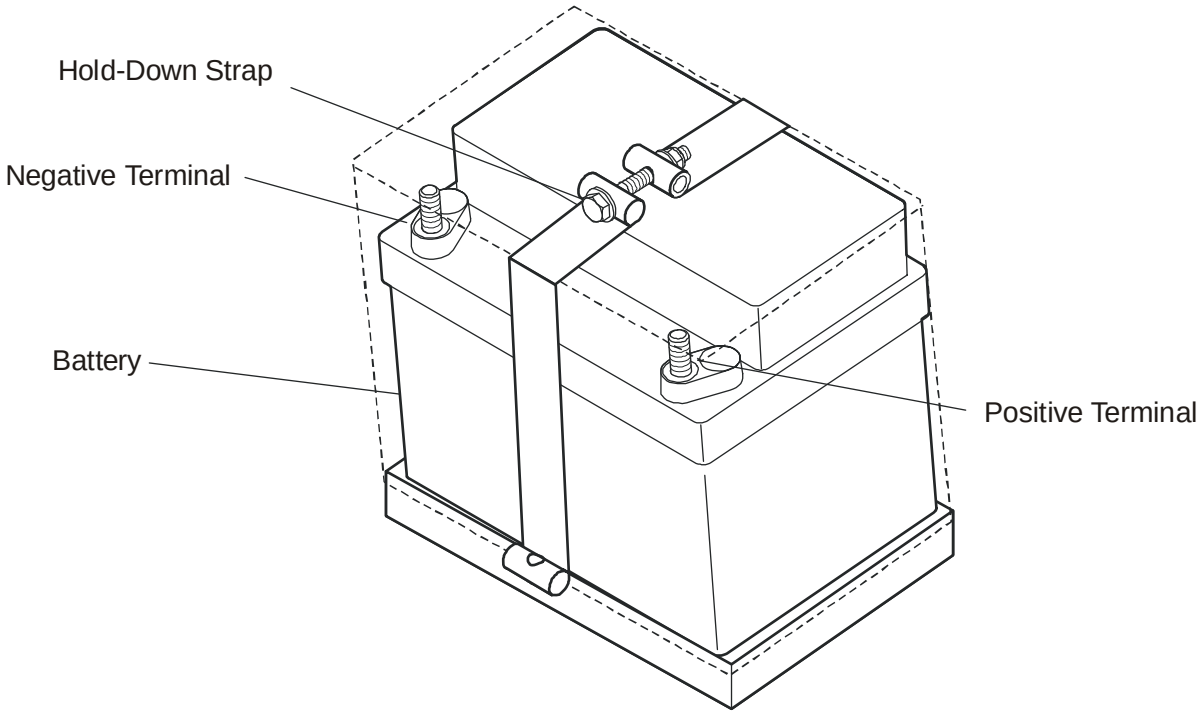


Figure 1: Main Battery Installation

3. ECU Backup Battery Description and Operation

The ECU backup battery is a 12 V, 12 Ah sealed unit. A tray below the right passenger's seat holds the base of the battery. A clamp holds the battery in place. The positive and negative cables attach to terminals at the top of the battery. The usual rubber caps protect the connections.

When the ECU bus voltage is greater than the battery voltage, the bus charges the battery.

The battery supplies current to the ECU B through the ECU alternate power relay. The relay is on the instrument panel shelf. A 32 A fuse protects the circuit.

In the usual operation, 14 V on the ECU bus closes the ECU alternate power relay. This connects the ECU bus to the battery through a diode and a resistor. The diode prevents the battery discharging back through the system. The resistor limits the charging current.

If the power fails on the ECU bus, the relay de-energizes and connects the battery to the ECU B. It also breaks the charging circuit.

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Trouble-Shooting

1. General

The table below lists the defects you could have with the battery system. If you have the trouble detailed in the Trouble column read across to the Possible Cause column. Then do the repair given in the Repair column.

Trouble	Possible Cause	Repair
Main battery voltage low.	Battery capacity low.	Do a capacity test. If necessary, replace the battery.
	Alternator output low.	Trouble-shoot the alternator, refer to Section 24-33.
Main battery will not connect to the ECU bus.	Battery relay defective.	Replace the battery relay.
	ELECTRIC MASTER key switch defective.	Replace the ELECTRIC MASTER key switch.
	Battery system wiring defective.	Do a test of the battery system wiring. Refer to Chapter 92 for the wiring diagrams.
Main battery will not connect to the hot battery bus.	50 A fuse failed.	Replace the 50 A fuse. If the fuse fails again, do a test for a short circuit between the hot battery bus and ground. Repair or replace the defective component.
Ammeter shows zero at all times.	Defective ammeter.	Replace the integrated engine display.
	Defective ammeter transducer.	Replace the transducer.
Voltmeter shows zero with ENGINE MASTER switch set to ON.	Defective voltmeter.	Replace the integrated engine display.
	Defective wiring in the voltmeter system.	Do a test of the wiring. Refer to Chapter 92 for the wiring diagrams.

Trouble	Possible Cause	Repair
ECU backup battery voltage low.	Battery capacity low.	Do a capacity test. If necessary, replace the battery.
	Alternator output low.	Trouble-shoot the alternator, refer to Section 24-33.
ECU backup battery will not connect to the ECU B during test.	ECU alternate power relay defective.	Replace the battery relay. Refer to Section 24-33.
	ENGINE MASTER switch defective.	Replace the ENGINE MASTER switch. Refer to Section 24-33.
	ECU backup battery system wiring defective.	Do a test of the battery system wiring. Refer to Chapter 92 for the wiring diagrams.

Maintenance Practices

1. General

Keep the battery clean. Remove grease and other contaminants from the battery case. Remove dirt from the area of the terminals. Protect the terminals and cable lugs with Dow Corning compound 4 (DC4).

If you do not use the airplane regularly you must remove the battery for charging.

CAUTION: INSTALL ONLY A BATTERY WHICH IS APPROVED BY THE AIRPLANE MANUFACTURER.

2. Safety Precautions

Obey the maintenance instructions of the battery manufacturer.

Always disconnect the battery when you do work on the electrical system. Disconnect the negative cable first. Connect the negative cable last.

3. Remove/Install the Main Battery

A. Remove the Main Battery from the Airplane

	Detail Steps/Work Items	Key Items/References
(1)	Remove the engine cowlings.	Refer to Section 71-11.
(2)	Open the two worm drive clamps that attach the silicone hose to the intake manifold.	
(3)	Remove the bolts, nuts, washers and shock mounts that attach the intercooler to the engine mount.	
(4)	Remove the silicone air hose from the intake manifold.	
	CAUTION: MAKE SURE THAT FOREIGN OBJECTS CANNOT ENTER THE INTAKE MANIFOLD OR THE SILICONE AIR HOSE.	
(5)	Seal the openings of the intake manifold and the silicone air hose.	e.g. with tape.
(6)	Move the intercooler with the silicone air hose forward, clear of the main battery.	Fix the disconnected silicone air hose and the intercooler to the forward area of the engine.
(7)	Open the battery hold-down straps: – Remove bolt, nut and 2 washers from straps.	Make sure that the 2 bolts with holes from the straps do not get lost.
(8)	Remove the battery box cover from the battery box.	
(9)	Disconnect the negative cable from the battery.	
(10)	Disconnect the positive cable from the battery.	
(11)	Remove the battery from the airplane.	

B. Install the Main Battery in the Airplane

	Detail Steps/Work Items	Key Items/References
(1)	Make sure that the battery is clean and dry.	
(2)	Move the battery into position in the battery mount.	
	CAUTION: MAKE SURE THAT YOU CONNECT THE CABLES TO THE CORRECT TERMINALS. INCORRECT CONNECTION CAN DAMAGE THE ELECTRICAL AND AVIONIC SYSTEMS.	
(3)	Connect the positive cable to the battery.	Apply Dow Corning compound (DC4) to the battery terminal and the cable lug.
(4)	Connect the negative cable to the battery.	Apply Dow Corning compound (DC4) to the battery terminal and the cable lug.
(5)	Put the battery box cover in place.	
(6)	Install the battery hold-down straps: – Put the battery hold-down straps into position over the battery box cover. – Install the bolt, 2 washers and the nut.	Make sure that the straps are seated correctly.
(7)	Move the intercooler into position on the engine mount.	
(8)	Remove the sealing tape from the openings of the intake manifold and the silicone air hose.	
(9)	Connect the silicone air hose to the intake manifold.	
(10)	Attach the intercooler to the engine mount with the bolts, nuts washers and shock mounts.	
(11)	Tighten the two worm drive clamps that attach the silicone air hose to the intake manifold.	
(12)	Perform an engine test run.	Refer to Section 71-01.
(13)	Check the intercooler, silicone air hose and battery straps for correct attachment.	
(14)	Install the engine cowlings.	Refer to Section 71-11.

4. Disconnect/Connect the Battery for Maintenance

A. Disconnect the Battery for Maintenance

	Detail Steps/Work Items	Key Items/References
(1)	Remove the engine cowlings.	Refer to Section 71-11.
(2)	Remove the battery retaining clamp: – Remove the 2 nuts and washers from clamp. – Lift the clamp clear of the retaining studs.	
(3)	Remove the cover from the battery box.	
(4)	Disconnect the negative cable from the battery.	
(5)	Disconnect the positive cable from the battery.	

B. Connect the Battery after Maintenance

	Detail Steps/Work Items	Key Items/References
	CAUTION: MAKE SURE THAT YOU CONNECT THE CABLES TO THE CORRECT TERMINALS. INCORRECT CONNECTION CAN DAMAGE THE ELECTRICAL AND AVIONIC SYSTEMS.	
(1)	Connect the positive cable to the battery.	Apply Dow Corning compound (DC4) to the battery terminal and the cable lug.
(2)	Connect the negative cable to the battery.	Apply Dow Corning compound (DC4) to the battery terminal and the cable lug.
(3)	Install the cover to the battery box.	
(4)	Install the battery retaining clamp: – Put the battery retaining clamp into position over the retaining studs and on the battery. – Install the 2 washers and nuts onto the retaining studs.	Make sure that the clamp is seated correctly. Tighten the nuts down evenly.
(5)	Tighten the 2 retaining nuts.	Torque 1.6 Nm (1.18 lbf.ft.)
(6)	Install the engine cowlings.	Refer to Section 71-11.

5. Remove/Install the Battery Relay

A. Remove the Battery Relay

	Detail Steps/Work Items	Key Items/References
(1)	Remove the engine cowlings.	Refer to Section 71-11.
(2)	Disconnect the main battery: – Disconnect the negative cable from the battery. – Disconnect the positive cable from the battery.	
(3)	Remove the rear passengers' seat for access.	Refer to Section 25-10.
(4)	Disconnect the ECU backup battery: – Disconnect the negative cable from the battery. – Disconnect the positive cable from the battery.	
(5)	Remove the cover from the relay junction box.	
(6)	Remove the nut and washer attaching the bus bar to the relay.	
(7)	Disconnect the electrical cables from the battery relay.	
(8)	Remove the 2 bolts which attach the battery relay to the relay box.	
(9)	Move the relay clear of the airplane.	

B. Install the Battery Relay

	Detail Steps/Work Items	Key Items/References
(1)	Put the relay in position in the relay box.	
(2)	Install the 2 attaching bolts.	
(3)	Connect the power and control cables to the battery relay.	Refer to Chapter 92 for the wiring diagrams.
(4)	Install the washer and nut to the bus bar connection.	
(5)	Install the cover to the relay box.	
(6)	Connect the cables to the main battery: – Connect the positive cable to the battery. – Connect the negative cable to the battery.	Apply Dow Corning compound (DC4) to the battery terminal and the cable lug.
(7)	Connect the cables to the ECU backup battery: – Connect the positive cable to the battery. – Connect the negative cable to the battery.	Apply Dow Corning compound (DC4) to the battery terminal and the cable lug.
(8)	Install the rear passengers' seat.	Refer to Section 25-10.
(9)	Install the engine cowlings.	Refer to Section 71-11.
(10)	Do a test for correct operation of the battery relay.	Refer to Paragraph 6.

6. Battery Relay Functional Test

Do this test in an area where the engine can be run.

	Detail Steps/Work Items	Key Items/References
(1)	Set the ELECTRIC MASTER key switch to ON.	
(2)	Set the ENGINE MASTER switch to ON.	The voltmeter must indicate the battery voltage.
	WARNING: MAKE SURE THAT THE AREA OF THE PROPELLER IS CLEAR BEFORE YOU OPERATE THE STARTER MOTOR. PROPELLERS CAN CAUSE INJURY OR DEATH.	
(3)	Operate the starter motor.	You do not have to start the engine.
(4)	Set the ENGINE MASTER switch to OFF.	
(5)	Set the ELECTRIC MASTER key switch to OFF.	

Section 24-35
Emergency Battery System - TAE Engine

1. General

This Section tells you about the emergency battery system for airplanes with the TAE engine installed. The emergency battery system is only installed in the IFR model. Regular maintenance of the emergency battery system is necessary.

Refer to Chapter 92 for the wiring diagrams.

2. Description

The emergency battery system consists of:

– An emergency battery pack.

– A sealed EMERGENCY switch.

The emergency battery pack consists of 28 Alkaline dry batteries, 1.5 volts, size 'AA' (also known as 'Mignon') or of 12 Lithium Manganese batteries, 3 volts, 1300 mAh (G1000 version). Refer to the Equipment List in Section 6.5 of the Airplane Flight Manual for the approved battery type.

The GFRP tray which holds the 28 batteries is mounted under the instrument panel, on the co-pilot's side.

When all other sources of electrical power fail during flight, the EMERGENCY switch on the left side of the instrument panel is set to ON to use the emergency battery. It supplies the attitude gyro (horizon) and the flood light with power for at least 1 hour and 30 minutes.

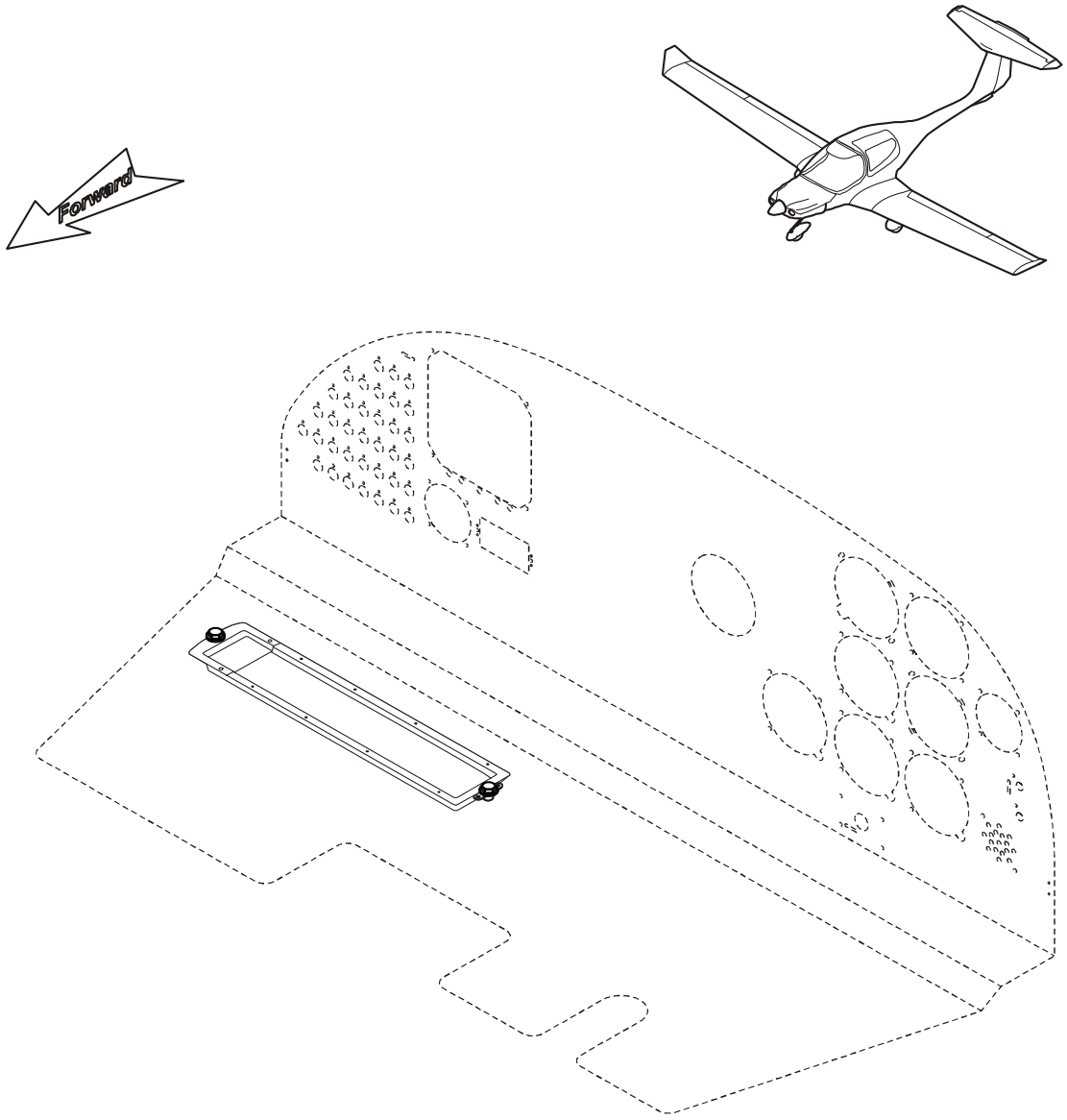


Figure 1: Emergency Battery Tray

Trouble-Shooting

1. General

The table below lists the defects you could have with the emergency battery system. If you have the trouble detailed in the Trouble column read across to the Possible Cause column. Then do the repair given in the Repair column.

Trouble	Possible Cause	Repair
Batteries leaking.	Batteries expired.	Replace batteries. Clean all items that are contaminated.
Voltage on the back side of the emergency switch less than 21 volts (Alkaline batteries installed).	Batteries expired. Batteries have been used. One or more batteries installed incorrectly. Emergency battery system wiring defective.	Replace batteries. Replace batteries. Ensure correct polarity of each battery. Repair the emergency battery system wiring.
Voltage on the back side of the emergency switch less than 18 volts (G1000 with Lithium Manganese batteries installed).	Batteries expired. Batteries have been used. Emergency battery system wiring defective.	Replace batteries. Replace batteries. Repair the emergency battery system wiring.

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Maintenance Practices

1. General

This Section tells you how to replace batteries in the emergency battery pack. It also tells you how to test the emergency battery system.

Refer to Chapter 92 for the wiring diagrams.

2. Remove/Install the Batteries in the Emergency Battery Pack (Alkaline Batteries installed)

A. Remove the Batteries in the Emergency Battery Pack

	Detail Steps/Work Items	Key Items/References
(1)	Disconnect the electrical plug on the right side of the battery tray.	
(2)	Remove the screw on the right side of the battery tray.	Hold the battery tray.
(3)	Remove the battery tray clear of the airplane.	
(4)	Open the battery tray.	
(5)	Remove the batteries.	

CAUTION: THE BATTERIES CANNOT BE RE-CHARGED. DO NOT TRY TO RE-CHARGE THE BATTERIES. IF YOU TRY TO RE-CHARGE THE BATTERIES, THEY CAN EXPLODE OR LEAK.

CAUTION: DISPOSE OF THE BATTERIES PROPERLY (ASK YOUR BATTERY DEALER FOR ADVISE). BATTERIES CONTAIN POISONS WHICH HARM THE ENVIRONMENT. DO NOT THROW THE USED BATTERIES INTO THE GARBAGE. DO NOT EXPOSE BATTERIES TO FIRE. DO NOT DISMANTLE BATTERIES.

B. Install the Batteries in the Emergency Battery Pack (Alkaline Batteries installed)

CAUTION: USE ONLY NEW BATTERIES. REFER TO THE EQUIPMENT LIST IN THE AIRPLANE FLIGHT MANUAL, SECTION 6.5, FOR THE CORRECT BATTERY TYPE.

CAUTION: DO NOT SHORT-CIRCUIT THE BATTERIES. ENSURE CORRECT POLARITY OF ALL BATTERIES.

	Detail Steps/Work Items	Key Items/References
(1)	Place new batteries in the battery tray.	Ensure correct polarity. Apply Dow Corning compound (DC4) to both poles of each battery.
(2)	Close the battery tray.	
(3)	Measure the voltage of the battery pack.	On the connector for the electrical plug. If the voltage is less than 21 volts, then the batteries are used, or at least one battery was installed incorrectly. Use new batteries and ensure correct polarity of each battery.
(4)	Remove the instrument panel cover.	Refer to Section 25-10.
(5)	Put the battery tray in place under the instrument panel on the co-pilot's side.	Engage the appropriate bolt in the groove on the left side of the tray.
(6)	Install the screw on the right side of the battery tray.	
(7)	Connect the electrical plug on the right side of the battery tray.	Ensure correct polarity.
(8)	Measure the voltage on the back side of the EMERGENCY switch.	If the voltage is below 21 volts, it is probable that the wiring is defective. Repair wiring.
(9)	Install the instrument panel cover.	Refer to Section 25-10.

3. Remove/Install the Batteries in the Emergency Battery Pack (Lithium Manganese Batteries installed)

A. Remove the Batteries in the Emergency Battery Pack (Lithium Manganese Batteries installed)

	Detail Steps/Work Items	Key Items/References
(1)	Remove the instrument panel cover.	Refer to Section 25-10.
(2)	Disconnect the electrical plug of the battery package.	
(3)	Remove the screws, washers and nuts which holds the battery package.	Hold the battery package and the mounting bracket.
(4)	Remove the battery package clear of the airplane.	

CAUTION: THE BATTERIES CANNOT BE RE-CHARGED. DO NOT TRY TO RE-CHARGE THE BATTERIES. IF YOU TRY TO RE-CHARGE THE BATTERIES, THEY CAN EXPLODE OR LEAK.

CAUTION: DISPOSE OF THE BATTERIES PROPERLY (ASK YOUR BATTERY DEALER FOR ADVISE). BATTERIES CONTAIN POISONS WHICH HARM THE ENVIRONMENT. DO NOT THROW THE USED BATTERIES INTO THE GARBAGE. DO NOT EXPOSE BATTERIES TO FIRE. DO NOT DISMANTLE BATTERIES.

B. Install the Batteries in the Emergency Battery Pack (Lithium Manganese Batteries installed)

CAUTION: USE ONLY A NEW BATTERY PACKAGE. REFER TO THE EQUIPMENT LIST IN THE AIRPLANE FLIGHT MANUAL, SECTION 6.5, FOR THE CORRECT BATTERY PACKAGE PART NUMBER.

CAUTION: DO NOT SHORT-CIRCUIT THE BATTERY PACKAGE.

	Detail Steps/Work Items	Key Items/References
(1)	Measure the voltage of the battery pack.	On the connector for the electrical plug. If the voltage is less than 18 volts, then the battery package is used. Use a new battery package.
(2)	Put the battery package in place behind the instrument panel on the co-pilot's side.	
(3)	Install the screws, washers and nuts which hold the emergency battery pack.	
(4)	Connect the electrical plug of the battery package.	Ensure correct polarity.
(5)	Measure the voltage on the back side of the EMERGENCY switch.	If the voltage is below 18 volts, it is probable that the wiring is defective. Repair wiring.
(6)	Install the instrument panel cover.	Refer to Section 25-10.

Section 24-36
ECU Backup Battery Tester - TAE 125 Diesel Engine

1. General

This Section tells you about the ECU backup battery tester for airplanes with the TAE engine installed. The battery tester is only installed in the IFR model.

Refer to Chapter 92 for the wiring diagrams.

2. Description

The ECU backup battery tester is installed on the instrument panel shelf, within the center radio stack or on the left side (G1000). The battery tester tests the ECU backup battery for proper charge. The test will be started by pressing the ECU Test button. The test is possible on ground as well as during flight, but only if the ECU backup battery is not in use. Otherwise the test will not start. During the test, the battery tester measures several parameters of the ECU backup battery. This will be indicated with a red LED flashing, installed on the left hand side of the instrument panel. If the capacity of the ECU backup battery has been found to be less than 70% of its rated capacity the ECU BACKUP UNSAFE light is on continuously. Refer to Section 31-11 for the location of the ECU BACKUP UNSAFE light.

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Section 24-40
External Power - Lycoming Engine

1. General

The DA 40 has an external power socket located on the right side of the fuselage, near the battery. It is a standard 28 volt DC power socket. When you connect external power to the external power socket, the external power control relay is energized and the external power comes on-line.

2. Description and Operation

Figure 1 shows a simple schematic diagram of the external power system. The external power system has these components:

A. 28 Volt Socket

The 28 VDC power socket is located on the right side of the fuselage, near the airplane battery. The socket has three pins:

– A large negative pin.

– A large positive pin.

– A small positive pin.

A diode connected between the small positive pin and the external power relay solenoid protects the system from reverse polarity.

B. External Power Relay

The external power relay is located in the relay box mounted on the firewall. Heavy duty cable connects the large positive pin to the input terminal of the relay. Another heavy duty cable connects the large negative pin to a ground point.

The small positive pin connects to the solenoid of the external power relay via the diode.

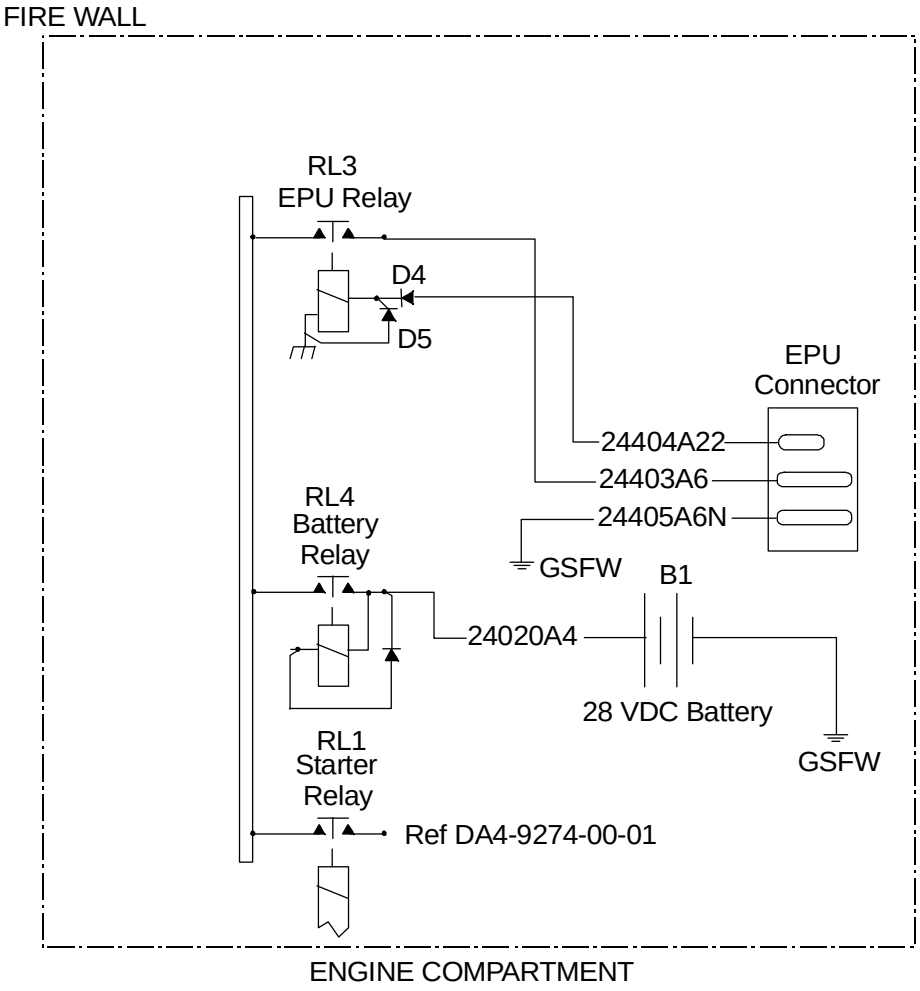


Figure 1: External Power System Schematic Diagram

3. Operation

When you connect a 28 V DC power supply to the external power socket these things happen:

– Current can flow from the small positive pin to the solenoid, the solenoid operates and closes the relay.

– Current can flow from the large positive pin through the external power relay to the main bus or, if installed, to the essential bus.

– The large negative pin is connected to ground.

If the polarity of the power supply is incorrect, then the diode will prevent current from flowing through the solenoid. The solenoid will not operate and current cannot flow through the external power relay to the main bus or the essential bus.

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Trouble-Shooting

1. General

The table below lists the defects you could have with the external power system. If you have the trouble detailed in the Trouble column read across to the Possible Cause column. Then do the repair given in the Repair column.

Trouble	Possible Cause	Repair
External power will not come on line.	No external power.	Make sure that the external power plug is securely in the socket. Make sure that the external power is operating correctly.
	External power relay is defective.	Do a test of the external power relay, if necessary, replace the external power relay.

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Maintenance Practices

1. General

This Section tells you how to remove/install the external power relay. Refer to the component manufacturers manuals for more data and shop data.

2. Electrical Safety

The DA 40 has a low voltage DC electrical system. When correctly maintained it is safe to work on. The battery can supply heavy current through low resistance circuits (for example, if you ground the positive output with a wrench by accident).

Always follow the usual safety practices for working on electrical equipment.

Maintenance carried out must be of good workmanship strictly considering the guidelines of AC 43-13.1B. It is important that maintenance is carried out in accordance with the best available techniques and properly trained maintenance personal, in order to eliminate possible failures.

CAUTION: DISCONNECT THE BATTERY BEFORE DOING MAINTENANCE ON THE ELECTRICAL SYSTEM. MAKE SURE THAT YOU DISCONNECT THE NEGATIVE LEAD FIRST.

CAUTION: AFTER DOING ELECTRICAL MAINTENANCE ALWAYS DO A CONFIDENCE TEST OF THE SYSTEM WITH A 24 VOLT POWER SUPPLY THAT HAS OVER-CURRENT PROTECTION. DO THIS BEFORE CONNECTING THE BATTERY.

CAUTION: USE ONLY DA 40 SPARE PARTS APPROVED BY THE MANUFACTURER.

3. Remove/Install the External Power Relay

A. Remove the External Power Relay

	Detail Steps/Work Items	Key Items/References
(1)	Remove the engine cowlings.	Refer to Section 71-10 or 71-12.
(2)	Disconnect the battery: – Disconnect the negative cable from the battery. – Disconnect the positive cable from the battery.	
(3)	Remove the cover from the relay box.	
(4)	Disconnect the electrical cables from the external power relay.	
(5)	Remove the 2 bolts which attach the external power relay to the relay box.	
(6)	Move the relay clear of the airplane.	

B. Install the External Power Relay

	Detail Steps/Work Items	Key Items/References
(1)	Put the relay in position in the relay box.	
(2)	Install the 2 attaching bolts.	
(3)	Connect the power and control cables to the external power relay.	Refer to Chapter 92 for the wiring diagrams.
(4)	Install the cover to the relay box.	
(5)	Connect the positive cable to the battery.	Apply Dow Corning compound (DC4) to the battery terminal and the cable lug.
(6)	Connect the negative cable to the battery.	Apply Dow Corning compound (DC4) to the battery terminal and the cable lug.
(7)	Install the engine cowlings.	Refer to Section 71-10 or 71-12.
(8)	Do a function test of the external power relay: – Connect an 28 V DC external power supply to the external power socket. – Set the ALT/BAT switch to ON. – The airplane voltmeter must show 28 V. – Remove the external power supply. – The airplane voltmeter must show 24 V. – Set the ALT/BAT switch to OFF.	

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Section 24-41
External Power - TAE 125 Diesel Engine

1. General

The DA 40 has an external power socket located on the left side of the fuselage, near the relay junction box. It is a standard 14 volt DC power socket. When you connect external power to the external power socket, the external power control relay is energized and the external power comes on-line.

2. Description and Operation

Figure 1 shows a simple schematic diagram of the external power system. The external power system has these components:

A. 14 Volt Socket

The 14 VDC power socket is located on the left side of the fuselage, near the relay junction box. The socket has three pins:

– A large negative pin.

– A large positive pin.

– A small positive pin.

A diode connected between the external power relay solenoid and the small positive pin (via a fuse) protects the system of reverse polarity.

An overvoltage suppressor connected between the large negative pin and the fuse protects the system from overvoltage.

B. External Power Relay

The external power relay is located in the relay junction box mounted on the firewall. Heavy duty cable connects the large positive pin to the input terminal of the relay. Another heavy duty cable connects the large negative pin to a ground point.

The small positive pin connects to the solenoid of the external power relay via the fuse and the diode.

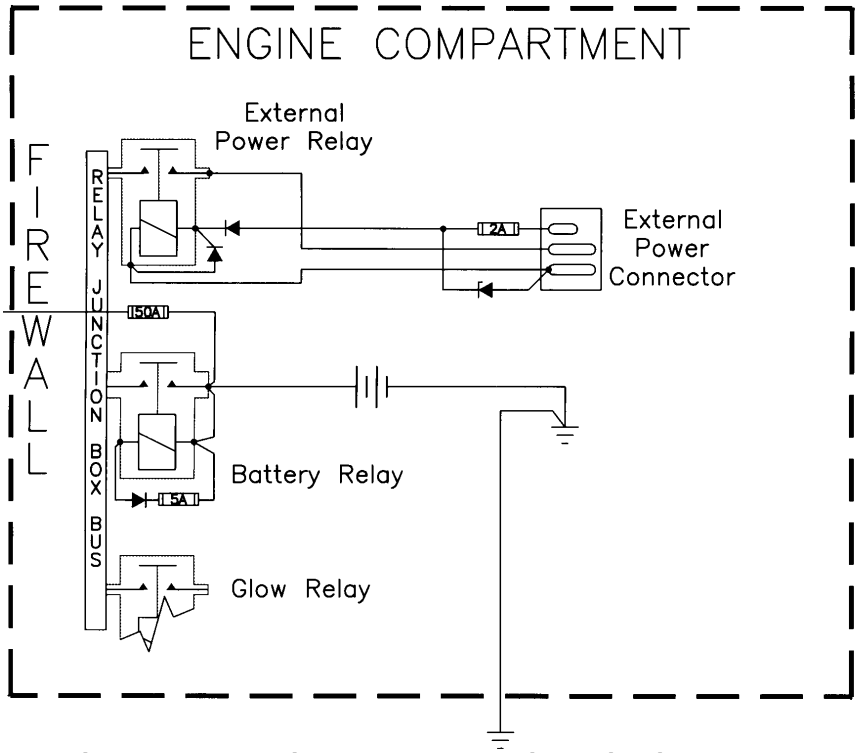


Figure 1: External Power System Schematic Diagram

3. Operation

When you connect a 12 to 14 V DC power supply to the external power socket these things happen:

– Current can flow from the small positive pin to the solenoid, the solenoid operates and closes the relay.

– Current can flow from the large positive pin through the external power relay to the main bus system.

– The large negative pin is connected to ground.

If the polarity of the power supply is incorrect, then the diode will prevent current from flowing through the solenoid. The solenoid will not operate and current cannot flow through the external power relay to the bus system.

If a power supply with more than 16 V DC is connected to the external power socket, then the overvoltage suppressor shorts and causes the fuse to blow. The current cannot flow to the external power relay solenoid.

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Trouble-Shooting

1. General

The table below lists the defects you could have with the external power system. If you have the trouble detailed in the Trouble column read across to the Possible Cause column. Then do the repair given in the Repair column.

Trouble	Possible Cause	Repair
External power will not come on line.	No external power.	Make sure that the external power plug is securely in the socket. Make sure that the external power is operating correctly.
	External power relay is defective.	Do a test of the external power relay, if necessary, replace the external power relay.
	Overvoltage protection has been activated.	Replace the in-line fuse (2A).

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Maintenance Practices

1. General

This Section tells you how to remove/install the external power relay. Refer to the component manufacturers manuals for more data and shop data.

2. Electrical Safety

The DA 40 has a low voltage DC electrical system. When correctly maintained it is safe to work on. The battery can supply heavy current through low resistance circuits (for example, if you ground the positive output with a wrench by accident).

Always follow the usual safety practices for working on electrical equipment.

Maintenance carried out must be of good workmanship strictly considering the guidelines of AC 43-13.1B. It is important that maintenance is carried out in accordance with the best available techniques and properly trained maintenance personal, in order to eliminate possible failures.

CAUTION: DISCONNECT THE BATTERY BEFORE DOING MAINTENANCE ON THE ELECTRICAL SYSTEM. MAKE SURE THAT YOU DISCONNECT THE NEGATIVE LEAD FIRST.

CAUTION: AFTER DOING ELECTRICAL MAINTENANCE ALWAYS DO A CONFIDENCE TEST OF THE SYSTEM WITH A 12 VOLT POWER SUPPLY THAT HAS OVER-CURRENT PROTECTION. DO THIS BEFORE CONNECTING THE BATTERY.

CAUTION: USE ONLY DA 40 SPARE PARTS APPROVED BY THE MANUFACTURER.

3. Remove/Install the External Power Relay

A. Remove the External Power Relay

	Detail Steps/Work Items	Key Items/References
(1)	Remove the engine cowlings.	Refer to Section 71-11.
(2)	Disconnect the battery: – Disconnect the negative cable from the battery. – Disconnect the positive cable from the battery.	
(3)	Remove the cover from the relay junction box.	
(4)	Disconnect the electrical cables from the external power relay.	
(5)	Remove the nut and washers which attach the bus bar to the external power relay.	
(6)	Remove the 2 bolts which attach the external power relay to the relay box.	
(7)	Move the relay clear of the airplane.	

B. Install the External Power Relay

	Detail Steps/Work Items	Key Items/References
(1)	Put the relay in position in the relay junction box.	
(2)	Install the 2 attaching bolts.	
(3)	Install the washers and nut that attach the bus bar to the relay.	
(4)	Connect the power and control cables to the external power relay.	Refer to Chapter 92 for the wiring diagrams.
(5)	Install the cover to the relay box.	
(6)	Connect the positive cable to the battery.	Apply Dow Corning compound (DC4) to the battery terminal and the cable lug.
(7)	Connect the negative cable to the battery.	Apply Dow Corning compound (DC4) to the battery terminal and the cable lug.
(8)	Install the engine cowlings.	Refer to Section 71-11.

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Section 24-60
DC Electrical Load Distribution - Lycoming Engine

1. General

This Section tells you about the system which supplies DC electrical power for other systems for airplanes with the Lycoming engine installed. The DC electrical load distribution system has these components:

– Main bus.

– Avionic bus.

– Essential bus (optional).

– Essential avionic bus (only when the electrical system has an essential bus).

– Battery bus.

– Hot bus.

– Battery relay.

– Avionic master relay.

– Essential avionics relay (only when the electrical system has an essential bus).

– Switches.

– Circuit-breakers.

Refer to Section 24-30 for the DC generation system.

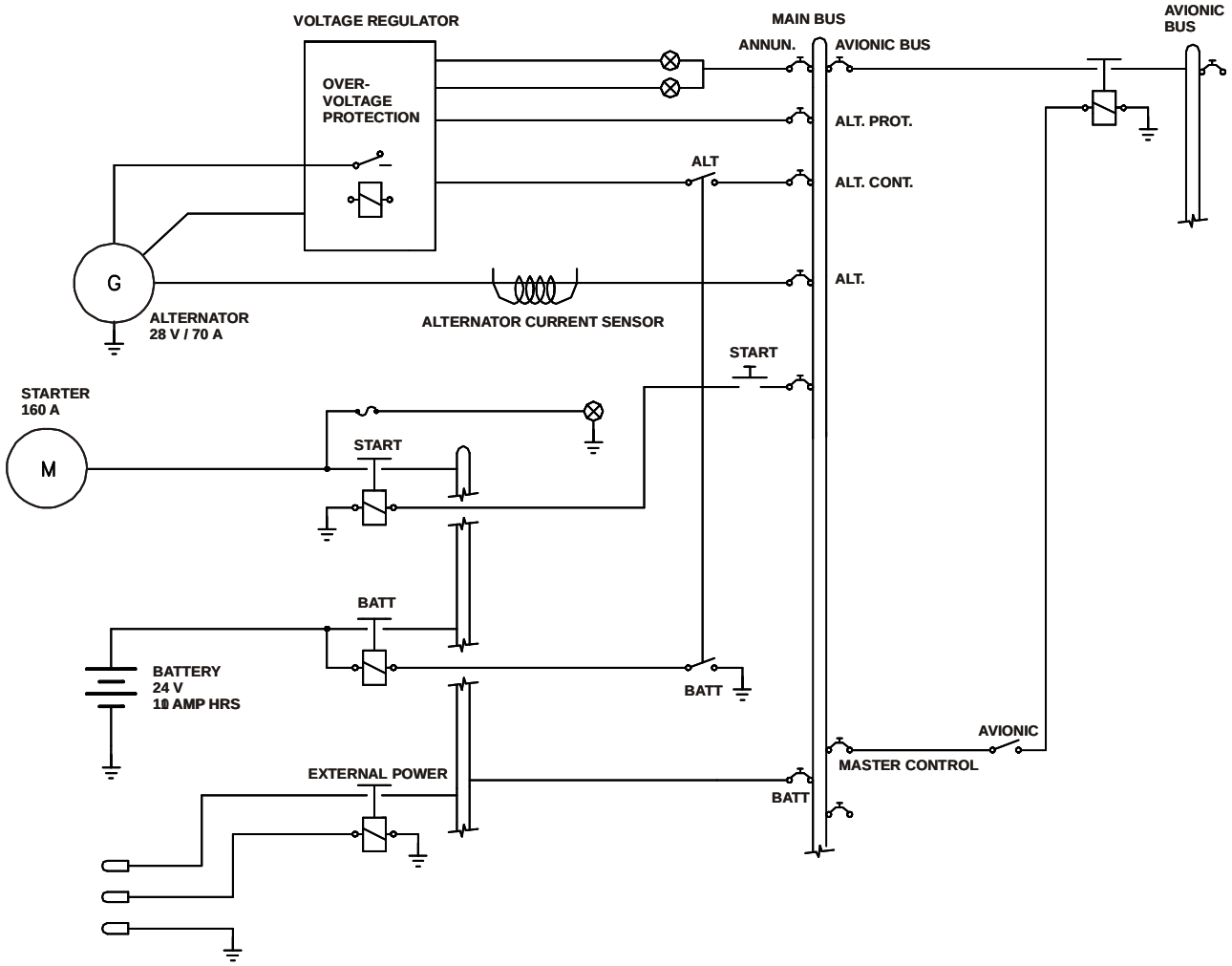


Figure 1: DC Electrical Load Distribution without Essential Bus (Simplified)

2. Description

A. Main Bus and Essential Bus

(1) Electrical System without Essential Bus

The alternator supplies the main bus through the alternator circuit-breaker. The battery supplies the main bus through the battery relay and the battery circuit-breaker. The battery supplies a positive voltage to the coil of the battery relay. The ALT/BAT switch connects the other side of the coil to ground.

The main bus supplies the airplane electrical systems through circuit-breakers.

(2) Electrical System with Essential Bus

The alternator supplies the main bus through the alternator circuit-breaker. The battery supplies the essential bus through the battery relay and the battery circuit-breaker. The battery supplies a positive voltage to the coil of the battery relay. The ALT/BAT switch connects the other side of the coil to ground.

The essential bus supplies the following electrical consumers through circuit-breakers:

– NAV/COM 1.

– Transponder (XPDR).

– Flood light.

– Attitude gyro (artificial horizon).

– VM 1000 engine instrument.

– Annunciator panel.

– GPS (if installed).

– Landing light.

– Pitot heating system.

– Flaps.

The main bus supplies the other electrical consumers through circuit-breakers.

Normally the main bus and the essential bus are connected via the MAIN TIE circuit-breaker, the tie relay, and the ESS TIE circuit-breaker. In the event of electrical failure during flight, the pilot can set the ESS BUS switch to ON to open the tie relay and separate the essential bus from the main bus. When the ESS BUS switch is set to ON, the only the electrical consumers which are listed above will be supplied with power.

B. Avionic Bus and Essential Avionic Bus

The normally-closed contacts of the avionics master relay connect the main bus to the avionic bus. A 25 amp circuit-breaker protects the system. A 2 amp circuit-breaker protects the control circuit for the relay. The control circuit of the avionics master relay connects to the AVIONIC MASTER switch.

When the electrical system has an essential bus, then it also has an essential avionic bus. The normally-closed contacts of the essential avionics relay connect the essential bus to the essential avionic bus. A 25 amp circuit-breaker protects the system. A 2 amp circuit-breaker protects the control circuit for the relay. The control circuit of the essential avionics relay connects to the AVIONIC MASTER switch.

C. Battery Bus

The external power unit relay, the starter relay and the battery relay connect to the battery bus. The battery supplies power to the battery bus through the battery relay. Power from an external power source can be supplied to the battery bus through the external power relay.

D. Hot Bus

The airplane battery supplies power to the hot bus from the battery side of the battery relay coil. Items of electrical equipment which are connected to the hot bus are protected by fuses.

E. Circuit-Breakers

Circuit-breakers protect the wiring in each circuit from too much current. The circuit-breakers are located on the instrument panel, see Figures 3, 4 and 5. You can open and close all the circuit-breakers manually. If too much current flows in a circuit, the related circuit-breaker opens automatically.

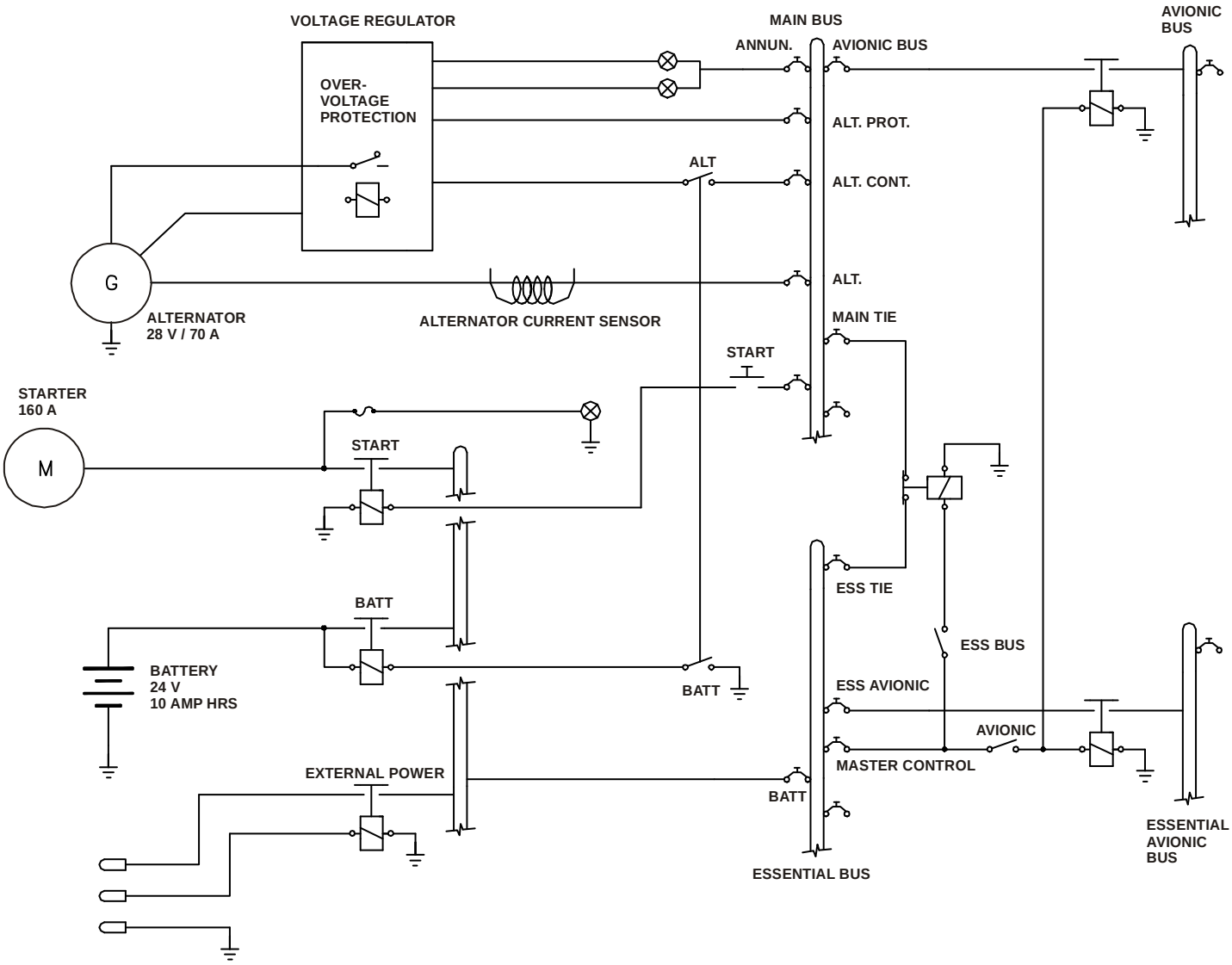


Figure 2: DC Electrical Load Distribution with Essential Bus (simplified)

3. Operation

When the ALT/BAT switch is set to ON, it gives a ground to the battery relay coil. The battery relay closes and connects the battery to the main bus through the battery bus and the battery circuit-breaker.

When the AVIONIC MASTER switch is set to OFF, the control circuit is closed. If there is power on the main bus, the avionics master relay energizes. The master relay contacts open. The avionics bus disconnects from the main bus.

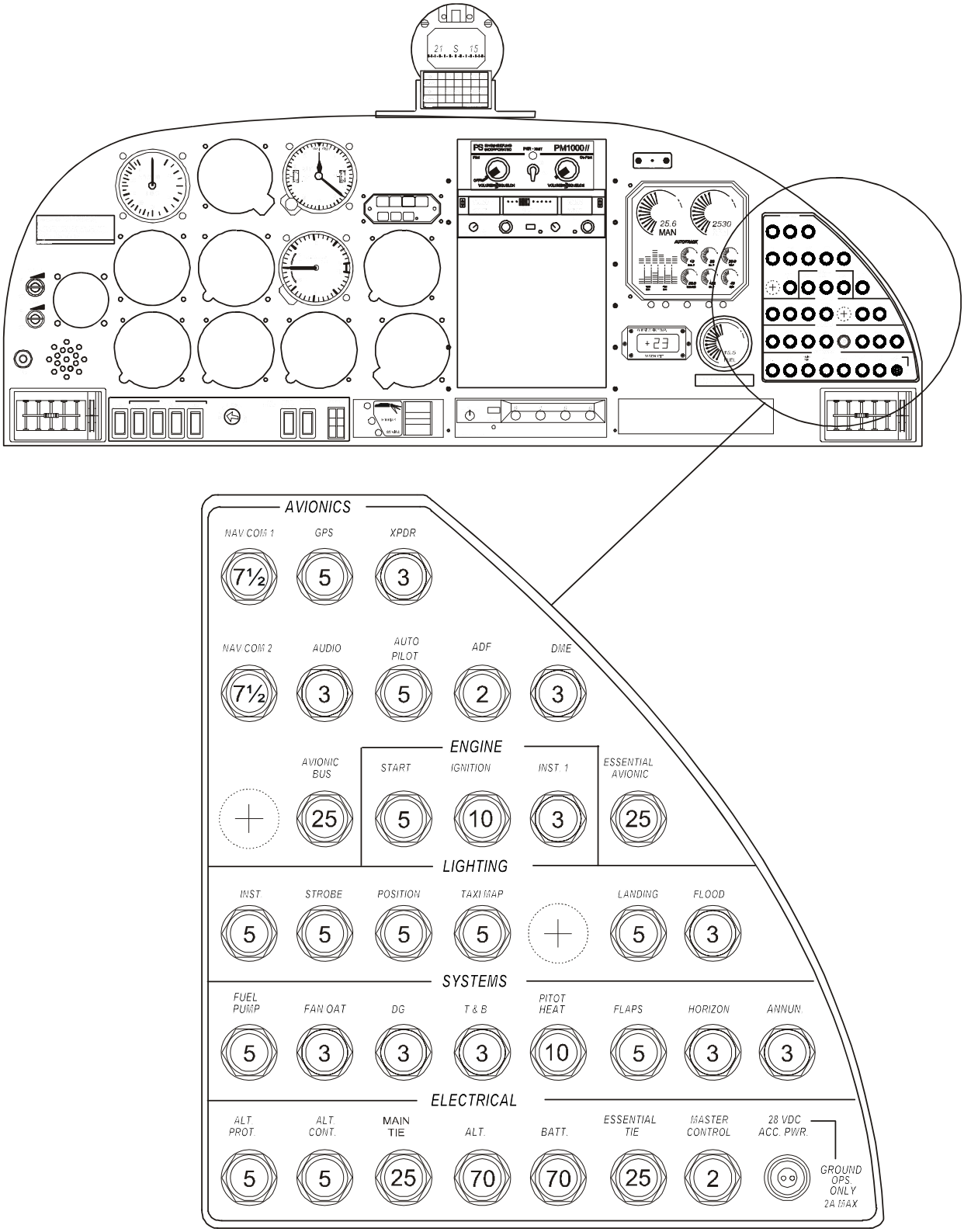


Figure 3: Circuit-Breaker Locations for Larger Instrument Panels

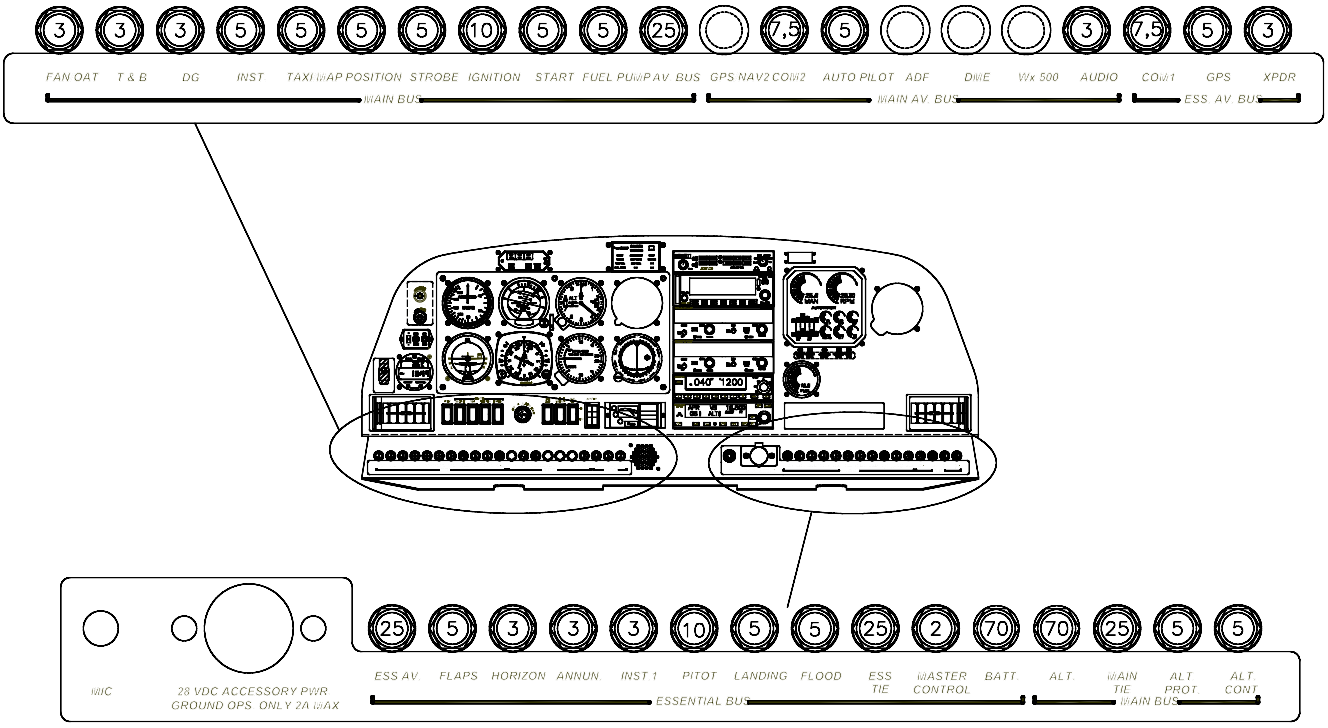


Figure 4: Circuit-Breaker Locations for Smaller Instrument Panels

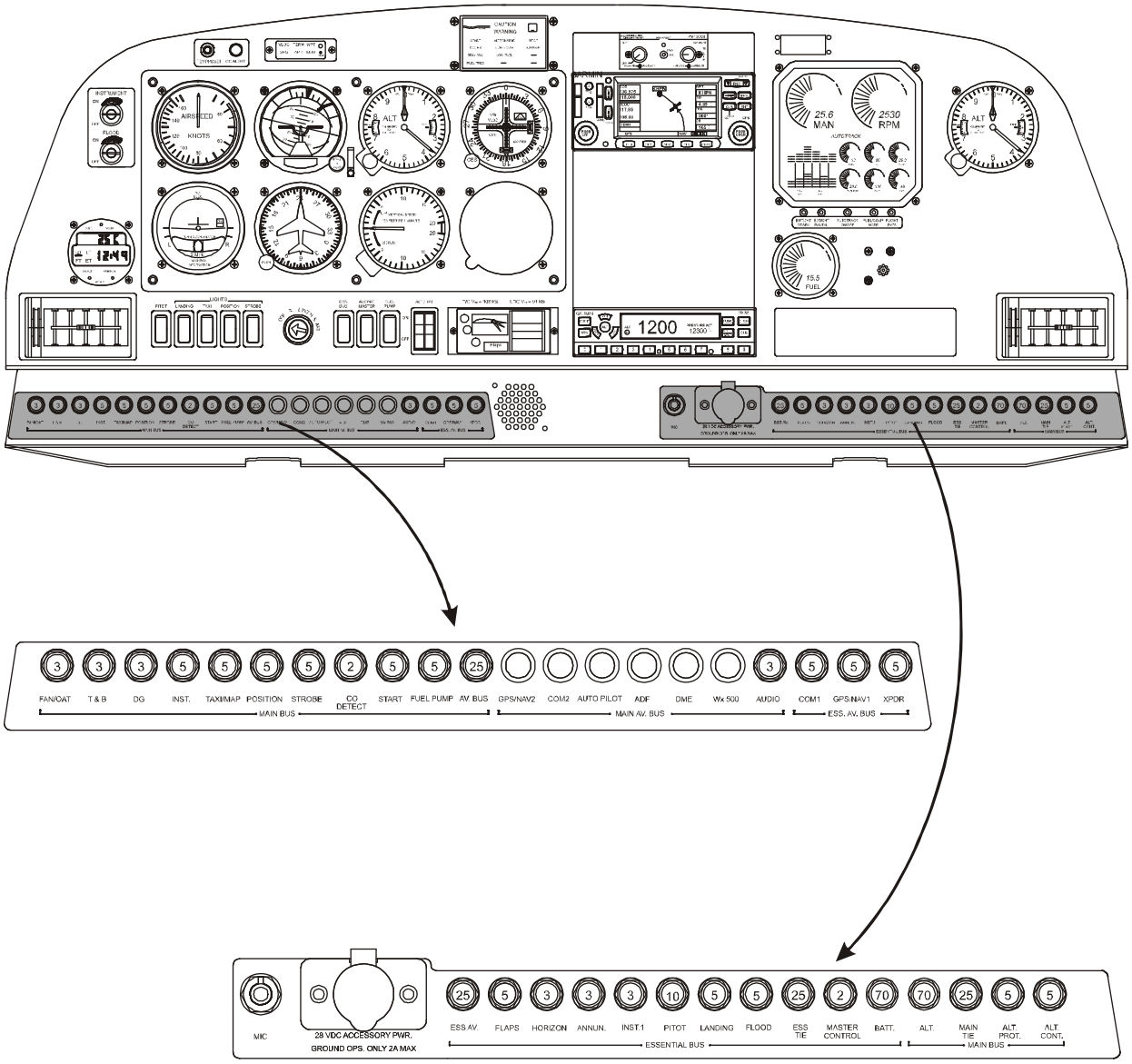


Figure 5: Circuit-Breaker Locations for Airplanes with CO-Detector

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Trouble-Shooting

1. General

Make sure that the alternator is supplying power and that there is 28 VDC on the main bus. Refer to Section 24-30. For faults on a piece of equipment, or a system, refer to the applicable Chapter. For example, for no oil pressure indication, see Chapter 77 Engine Indicating. The table below lists the defects you could have with the DC load distribution system. If you have the trouble detailed in the Trouble column, read across to the Possible Cause column. Then do the repair given in the Repair column.

Trouble	Possible Cause	Repair
There is 28 VDC on the main bus but not on the avionic bus.	AVIONIC MASTER switch set to OFF. AVIONIC BUS circuit-breaker not set. Avionics master relay defective. A failure of the cables which connect the main bus to the avionics bus.	Set the AVIONIC MASTER switch to ON. Set the AVIONIC BUS circuit breaker. Repair/replace the avionics master relay. Do a continuity test of the cables. Refer to Chapter 92 for the wiring diagrams. Repair/replace defective cables.
There is 28 VDC on the essential bus but not on the essential avionic bus.	AVIONIC MASTER switch set to OFF. ESSENTIAL AVIONIC circuit-breaker not set. Essential avionics relay defective. A failure of the cables which connect the essential bus to the essential avionic bus.	Set the AVIONIC MASTER switch to ON. Set the ESSENTIAL AVIONIC circuit-breaker. Repair/replace the essential avionics relay. Do a continuity test of the cables. Refer to Chapter 92 for the wiring diagrams. Repair/replace defective cables.

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Maintenance Practices

1. General

This Section tells you how to remove/install components of the DC load distribution system. Refer to the component manufacturers manuals for more data and shop data.

2. Electrical Safety

The DA 40 has a low voltage DC electrical system. When correctly maintained it is safe to work on. The battery can supply heavy current through low resistance circuits (for example, if you ground the positive output with a wrench by accident).

Always follow the usual safety practices for working on electrical equipment.

Maintenance carried out must be of good workmanship strictly considering the guidelines of AC 43-13.1B. It is important that maintenance is carried out in accordance with the best available techniques and properly trained maintenance personal, in order to eliminate possible failures.

CAUTION: DISCONNECT THE BATTERY BEFORE DOING MAINTENANCE ON THE ELECTRICAL SYSTEM. MAKE SURE THAT YOU DISCONNECT THE NEGATIVE LEAD FIRST.

CAUTION: AFTER DOING ELECTRICAL MAINTENANCE ALWAYS DO A CONFIDENCE TEST OF THE SYSTEM WITH A 24 VOLT POWER SUPPLY THAT HAS OVER-CURRENT PROTECTION. DO THIS BEFORE CONNECTING THE BATTERY.

CAUTION: USE ONLY DA 40 SPARE PARTS APPROVED BY THE MANUFACTURER.

3. Remove/Install the Avionics Master Relay or Essential Avionics Relay

A. Remove the Avionics Master Relay or Essential Avionics Relay

	Detail Steps/Work Items	Key Items/References
(1)	Remove the top engine cowling.	Refer to Section 71-10 or 71-12.
(2)	Disconnect the battery: – Disconnect the negative cable from the battery. – Disconnect the positive cable from the battery.	Refer to Section 24-31.
(3)	Remove the instrument panel cover.	Refer to Section 25-10
(4)	Disconnect the electrical cables from the relay.	
(5)	Remove the bolts which attaches the relay to the instrument panel floor.	
(6)	Move the relay clear of the airplane.	

B. Install the Avionic Master Relay

	Detail Steps/Work Items	Key Items/References
(1)	Put the relay in position on the instrument floor.	
(2)	Install the bolts which attach the relay to the instrument panel floor.	
(3)	Connect the cables to the relay.	Refer to Chapter 92 for the Wiring Diagrams.
(4)	Install the instrument panel cover.	Refer to Section 25-10.
(5)	Connect the battery.	Refer to Section 24-31. Connect the positive cable first.
(6)	Install the top engine cowling.	Refer to Section 71-10 or 71-12.
(7)	Do a test of the relay: – Set the ALT/BAT switch to ON. – Set the radio ON. – Set the AVIONIC MASTER switch to ON. – Set the AVIONIC MASTER switch to OFF. – Set the ALT/BAT switch to OFF.	All avionics must operate.

4. Remove/Install a Circuit-Breaker

A. Remove a Circuit-Breaker

	Detail Steps/Work Items	Key Items/References
(1)	Remove the top engine cowling.	Refer to Section 71-10 or 71-12.
(2)	Disconnect the battery: – Disconnect the negative cable from the battery. – Disconnect the positive cable from the battery.	Refer to Section 24-31.
(3)	Remove the instrument panel cover.	Refer to Section 25-10.
(4)	Remove the nuts and washers which attach the circuit-breakers to the instrument panel.	
(5)	Remove the screw which connects the circuit-breaker to the copper bus bar.	
(6)	Disconnect the wires from the circuit-breaker.	
(7)	Shift back the copper bus bar together with the remaining circuit-breakers.	
(8)	Remove the circuit-breaker from the instrument panel.	

B. Install a Circuit-Breaker

	Detail Steps/Work Items	Key Items/References
(1)	Put the circuit-breaker in position in the instrument panel.	
(2)	Move the copper bus bar forward together with the remaining circuit-breakers.	
(3)	Connect the wires to the circuit breaker.	Refer to Chapter 92 for the Wiring Diagrams.
(4)	Install the screw which attaches the circuit-breaker to the copper bus bar.	
(5)	Install the nuts and washers which attach the circuit-breakers to the instrument panel.	
(6)	Install the instrument panel cover.	Refer to Section 25-10.
(7)	Connect the battery.	Refer to Section 24-31. Connect the positive cable first.
(8)	Install the top engine cowling.	Refer to Section 71-10 or 71-12.
(9)	Do a functional test of the circuit-breaker: – Set the ALT/BAT switch to ON. – Operate the electrical system related to the circuit-breaker you will test. – Pull the circuit-breaker. – Close the circuit-breaker. – Set the ALT/BAT switch to OFF.	Apply the full electrical load to the system. The system must stop operating. Make sure there is no power to the system.

5. Remove /Install an Instrument Panel Switch

This procedure applies to the following switches:

– PITOT.

– LANDING, TAXI, POSITION and STROBE lights.

– AVIONIC MASTER.

– FUEL PUMP.

– ALT/BAT.

– ESS. BUS (optional).

A. Remove an Instrument Panel Switch

	Detail Steps/Work Items	Key Items/References
(1)	Remove the top engine cowling.	Refer to Section 71-10 or 71-12.
(2)	Disconnect the battery: – Disconnect the negative cable from the battery. – Disconnect the positive cable from the battery.	Refer to Section 24-31.
(3)	Remove the instrument panel cover.	Refer to Section 25-10.
(4)	Disconnect the electrical cables from the switch that you will remove.	
(5)	Remove the switch from the instrument panel: – Press the locking clips at the side of the switch to release the switch from the instrument panel. – Move the switch forward through the instrument panel and clear of the airplane.	With your fingers from the back of the instrument panel.

B. Install an Instrument Panel Switch

	Detail Steps/Work Items	Key Items/References
(1)	Hold the spring clips on the switch compressed and put the switch in position in the instrument panel.	From the front of the instrument panel. Make sure that the clips have expanded and that the switch is correctly located.
(2)	Connect the electrical cables to the switch.	Refer to Chapter 92 for the Wiring Diagrams.
(3)	Install the instrument panel cover.	Refer to Section 25-10.
(4)	Connect the battery.	Refer to Section 24-31. Connect the positive cable first.
(5)	Install the top engine cowling.	Refer to Section 71-10 or 71-12.
(6)	Do a functional test of the switch: – Set the ALT/BAT switch to ON. – Set the switch that you have installed to ON. – Set the switch that you have installed to OFF. – Set the ALT/BAT switch to OFF.	 The system must operate correctly. The system must switch off.

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Section 24-61
DC Electrical Load Distribution - TAE 125 Diesel Engine

1. General

This Section tells you about the system which supplies DC electrical power for other systems. The DC electrical load distribution system has these components:

– Main bus.

– Relay junction box bus.

– ECU bus.

– Avionic bus.

– Essential bus.

– Essential avionic bus.

– Hot battery bus.

– Battery relay.

– Power relay.

– Avionics master relay.

– Essential avionics relay.

– Essential tie relay.

– Switches.

– Circuit-breakers.

– Fuses.

Figure 1 shows the electrical system bus structure diagram of the electrical distribution system. Figure 2 shows the layout of the switches and circuit-breakers in the instrument panel with the standard instruments installed. Figure 3 shows the instrument panel layout with the Garmin G1000 system installed.

This Section gives you the Trouble-Shooting and Maintenance Practices for the electrical distribution system. Refer to Section 24-01 for the full system description and operation.

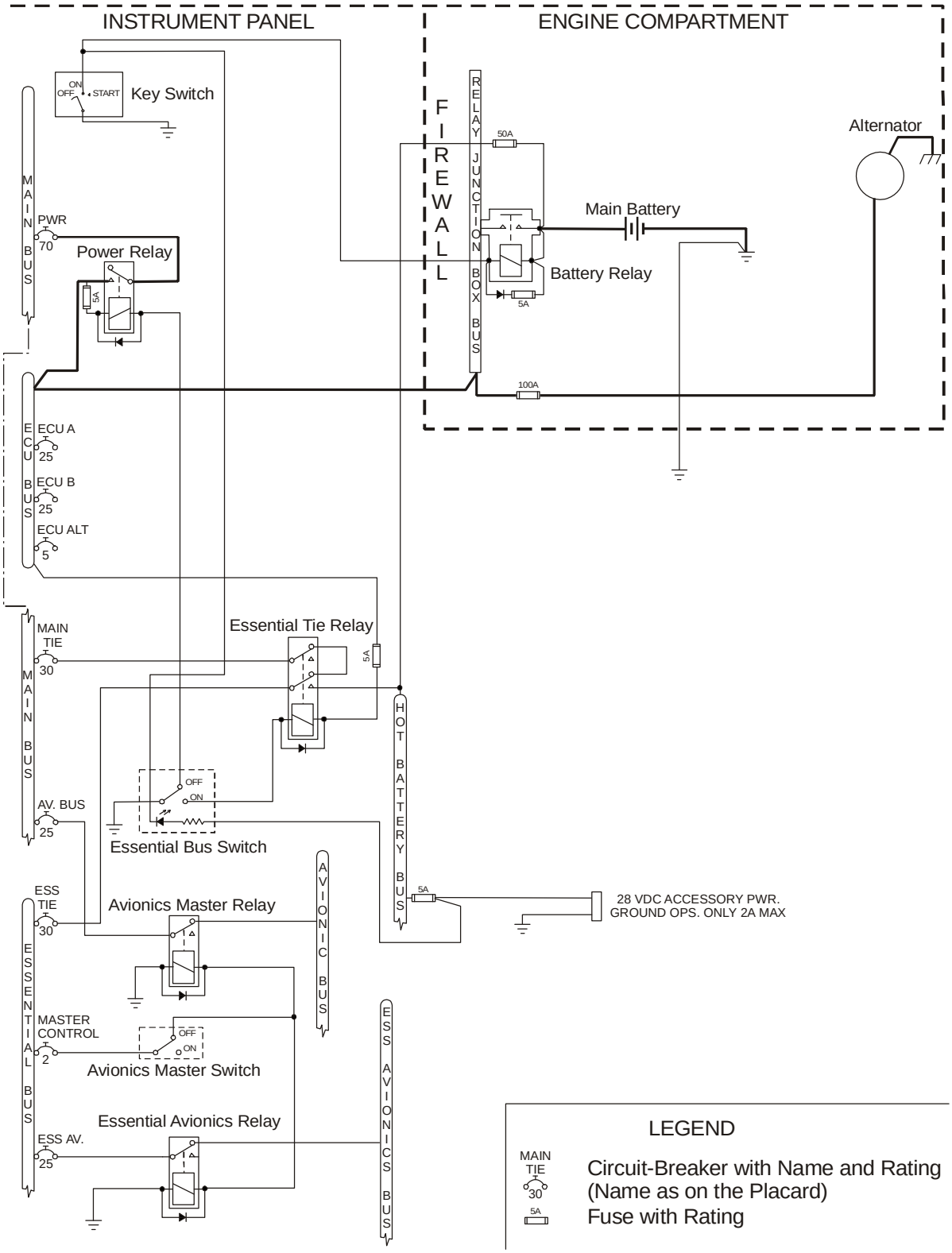


Figure 1: Electrical System Bus Structure Diagram

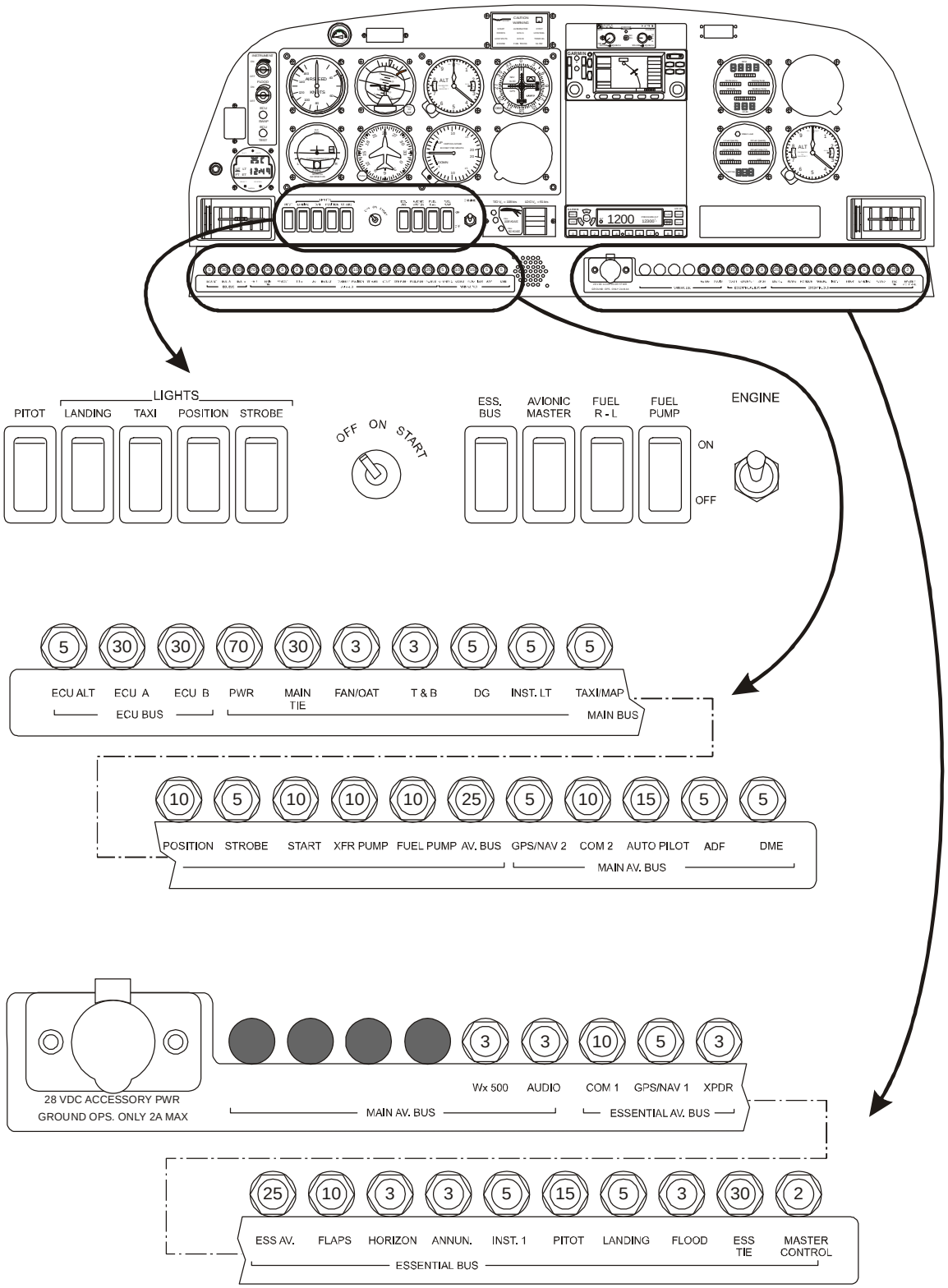


Figure 2: Electrical Switches and Circuit-Breakers

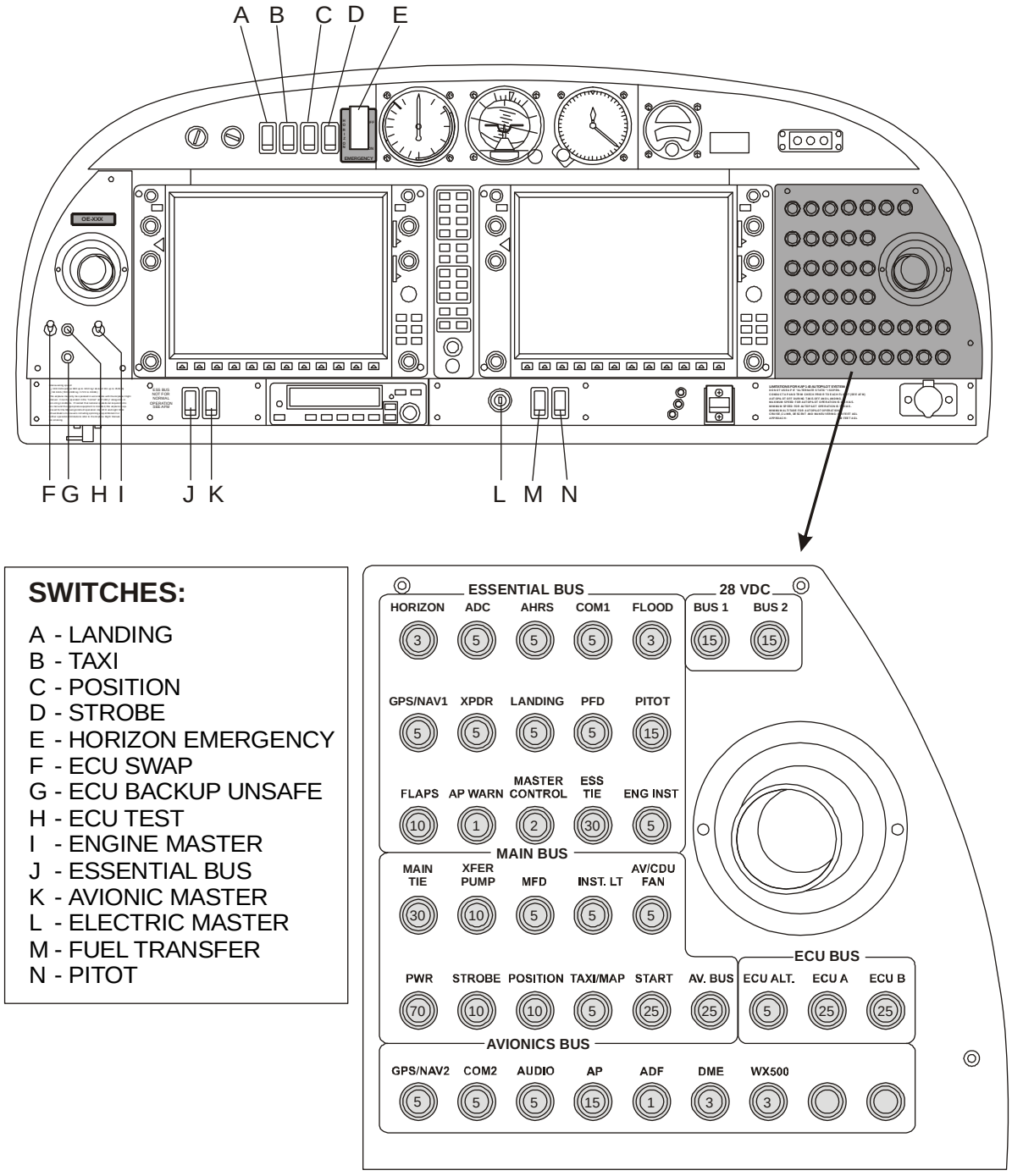


Figure 3: Electrical Switches and Circuit-Breakers - DA 40 D with G1000

Trouble-Shooting

1. General

Make sure that the alternator is supplying power and that there is 14 VDC on the main bus. Refer to Section 24-33. For faults on a piece of equipment, or a system, refer to the applicable Chapter. For example, for no oil pressure indication, see Chapter 77 Engine Indicating. The table below lists the defects you could have with the DC load distribution system. If you have the trouble detailed in the Trouble column, read across to the Possible Cause column. Then do the repair given in the Repair column.

Trouble	Possible Cause	Repair
There is 14 VDC on the main bus but not on the avionic bus.	AVIONIC MASTER switch set to OFF. AV. BUS circuit-breaker not set. Avionics master relay defective. A failure of the cables which connect the main bus to the avionics bus.	Set the AVIONIC MASTER switch to ON. Set the AV. BUS circuit breaker. Replace the avionics master relay. Do a continuity test of the cables. Refer to Chapter 92 for the wiring diagrams. Repair/replace defective cables.
There is 14 VDC on the essential bus but not on the essential avionic bus.	AVIONIC MASTER switch set to OFF. ESS AV. circuit-breaker not set. Essential avionics relay defective. A failure of the cables which connect the essential bus to the essential avionic bus.	Set the AVIONIC MASTER switch to ON. Set the ESS AV. circuit breaker. Replace the essential avionics relay. Do a continuity test of the cables. Refer to Chapter 92 for the wiring diagrams. Repair/replace defective cables.

Trouble	Possible Cause	Repair
There is 14 VDC on the main bus but not on the essential bus with the essential bus switch set to OFF.	MAIN TIE circuit-breaker not set.	Set the MAIN TIE circuit breaker.
	ESS TIE circuit-breaker not set.	Set the ESS TIE circuit breaker.
	Essential tie relay defective.	Replace the essential tie relay.
	A failure of the cables which connect the main bus to the essential tie relay and essential bus.	Do a continuity test of the cables. Refer to Chapter 92 for the wiring diagrams.
		Repair/replace defective cables.
There is 14 VDC on the ECU bus but not on the main bus with the essential bus switch set to OFF.	Power relay defective.	Replace the power relay.
	5 A power relay fuse failed.	Replace the power relay fuse.
	A failure of the cables which connect the ECU bus to the power relay and main bus.	Do a continuity test of the cables. Refer to Chapter 92 for the wiring diagrams.
		Repair/replace defective cables.
	A failure of the cables which connect the power relay coil to the essential bus switch.	Do a continuity test of the cables. Refer to Chapter 92 for the wiring diagrams.
		Repair/replace defective cables.
	Essential bus switch defective.	Replace the essential bus switch.

Maintenance Practices

1. General

This Section tells you how to remove/install components of the DC load distribution system. Refer to the component manufacturers' manuals for more data and shop data.

2. Electrical Safety

The DA 40 has a low voltage DC electrical system. When correctly maintained it is safe to work on. The battery can supply heavy current through low resistance circuits (for example, if you ground the positive output with a wrench by accident).

Always follow the usual safety practices for working on electrical equipment.

Maintenance carried out must be of good workmanship strictly considering the guidelines of AC 43-13.1B. It is important that maintenance is carried out in accordance with the best available techniques and properly trained maintenance personal, in order to eliminate possible failures.

CAUTION: DISCONNECT THE BATTERY BEFORE DOING MAINTENANCE ON THE ELECTRICAL SYSTEM. MAKE SURE THAT YOU DISCONNECT THE NEGATIVE LEAD FIRST.

CAUTION: AFTER DOING ELECTRICAL MAINTENANCE ALWAYS DO A CONFIDENCE TEST OF THE SYSTEM WITH A 12 VOLT POWER SUPPLY THAT HAS OVER-CURRENT PROTECTION. DO THIS BEFORE CONNECTING THE BATTERY.

CAUTION: USE ONLY DA 40 SPARE PARTS APPROVED BY THE MANUFACTURER.

3. Remove/Install the Avionics Master Relay or Essential Avionics Relay

A. Remove the Avionics Master Relay or Essential Avionics Relay

	Detail Steps/Work Items	Key Items/References
(1)	Remove the top engine cowling.	Refer to Section 71-11.
(2)	Disconnect the battery: – Disconnect the negative cable from the battery. – Disconnect the positive cable from the battery.	
(3)	Remove the instrument panel cover.	Refer to Section 25-10.
(4)	Disconnect the electrical cables from the relay.	
(5)	Remove the bolts which attach the relay to the instrument panel floor.	
(6)	Move the relay clear of the airplane.	

B. Install the Avionics Master Relay or Essential Avionics Relay

	Detail Steps/Work Items	Key Items/References
(1)	Put the relay in position on the instrument floor.	
(2)	Install the bolts which attach the relay to the instrument panel floor.	
(3)	Connect the cables to the relay.	Refer to Chapter 92 for the Wiring Diagrams.
(4)	Install the instrument panel cover.	Refer to Section 25-10.
(5)	Connect the battery.	Refer to Section 24-34. Connect the positive cable first.
(6)	Install the top engine cowling.	Refer to Section 71-11.
(7)	Do a test of the relay: – Set the ELECTRIC MASTER key switch to ON. – Set the AVIONIC MASTER switch to ON. – Set the COM 2 radio ON, if installed. (Avionics master relay only). – Set the COM 1 radio to ON. (Essential avionics relay only). – Set the AVIONIC MASTER switch to OFF. – Set the ELECTRIC MASTER key switch to OFF.	 The radio must operate. The radio must operate.

4. Remove/Install a Circuit-Breaker

A. Remove a Circuit-Breaker

	Detail Steps/Work Items	Key Items/References
(1)	Remove the top engine cowling.	Refer to Section 71-11.
(2)	Disconnect the main battery: – Disconnect the negative cable from the battery. – Disconnect the positive cable from the battery.	Refer to Section 24-34.
(3)	Disconnect the ECU backup battery: – Disconnect the negative cable from the battery. – Disconnect the positive cable from the battery.	Refer to Section 24-34.
(4)	Remove the instrument panel cover.	Refer to Section 25-10.
(5)	Remove the nuts and washers which attach the circuit-breakers to the instrument panel.	Do this for all circuit-breakers attached to the same bus bar.
(6)	Remove the screw which connects the circuit-breaker to the copper bus bar.	
(7)	Disconnect the wires from the circuit-breaker.	
(8)	Shift back the copper bus bar together with the remaining circuit-breakers.	
(9)	Remove the circuit-breaker from the instrument panel.	

B. Install a Circuit-Breaker

	Detail Steps/Work Items	Key Items/References
(1)	Put the circuit-breaker in position in the instrument panel.	
(2)	Move the copper bus bar forward together with the remaining circuit-breakers.	
(3)	Connect the wires to the circuit breaker.	Refer to Chapter 92 for the Wiring Diagrams.
(4)	Install the screw which attaches the circuit-breaker to the copper bus bar.	
(5)	Install the nuts and washers which attach the circuit-breakers to the instrument panel.	
(6)	Install the instrument panel cover.	Refer to Section 25-10.
(7)	Connect the main battery.	Refer to Section 24-34. Connect the positive cable first.
(8)	Connect the ECU backup battery.	Refer to Section 24-34. Connect the positive cable first.
(9)	Install the top engine cowling.	Refer to Section 71-11.
(10)	Do a functional test of the circuit-breaker: – Set the ELECTRIC MASTER key switch to ON. – Operate the electrical system related to the circuit-breaker you will test. – Pull the circuit-breaker. – Close the circuit-breaker. – Set the ELECTRIC MASTER key switch to OFF.	Apply the full electrical load to the system. The system must stop operating. Make sure there is no power to the system.

5. Remove /Install an Instrument Panel Switch

This procedure applies to the following switches:

– PITOT.

– LANDING, TAXI, POSITION and STROBE lights.

– ESS. BUS.

– AVIONIC MASTER.

– FUEL TRANS ⇐.

A. Remove an Instrument Panel Switch

	Detail Steps/Work Items	Key Items/References
(1)	Remove the top engine cowling.	Refer to Section 71-11.
(2)	Disconnect the battery: – Disconnect the negative cable from the battery. – Disconnect the positive cable from the battery.	Refer to Section 24-34.
(3)	Remove the instrument panel cover.	Refer to Section 25-10.
(4)	Disconnect the electrical cables from the switch that you will remove.	
(5)	Remove the switch from the instrument panel: – Press the locking clips at the side of the switch to release the switch from the instrument panel. – Move the switch forward through the instrument panel and clear of the airplane.	With your fingers from the back of the instrument panel.

B. Install an Instrument Panel Switch

	Detail Steps/Work Items	Key Items/References
(1)	Hold the spring clips on the switch compressed and put the switch in position in the instrument panel.	From the front of the instrument panel. Make sure that the clips have expanded and that the switch is correctly located.
(2)	Connect the electrical cables to the switch.	Refer to Chapter 92 for the Wiring Diagrams.
(3)	Install the instrument panel cover.	Refer to Section 25-10.
(4)	Connect the main battery.	Refer to Section 24-34. Connect the positive cable first.
(5)	Install the top engine cowling.	Refer to Section 71-11.
(6)	Do a functional test of the switch: – Set the ELECTRIC MASTER key switch to ON. – Set the switch that you have installed to ON. – Set the switch that you have installed to OFF. – Set the ELECTRIC MASTER key switch to OFF.	 The system must operate correctly. The system must switch off.

6. Remove /Install the ENGINE Switch

A. Remove the ENGINE Switch

	Detail Steps/Work Items	Key Items/References
(1)	Remove the top engine cowling.	Refer to Section 71-11.
(2)	Disconnect the battery: – Disconnect the negative cable from the battery. – Disconnect the positive cable from the battery.	Refer to Section 24-34.
(3)	Remove the passenger seats.	
(4)	Disconnect the ECU backup battery: – Disconnect the negative cable from the battery. – Disconnect the positive cable from the battery.	Refer to Section 24-34.
(5)	Remove the instrument panel cover.	Refer to Section 25-10.
(6)	Disconnect the alternator excitation battery: – Disconnect the negative cable from the battery. – Disconnect the positive cable from the battery.	Refer to Section 24-33.
(7)	Remove the nut and washers that attach the switch.	
(8)	Move the switch towards the firewall.	To give access to the electrical cable connection on the switch.
(9)	Disconnect the electrical cables from the ENGINE MASTER switch.	
(10)	Remove the switch from the instrument panel.	

B. Install the ENGINE Switch

	Detail Steps/Work Items	Key Items/References
(1)	Put the switch in position adjacent to the switch electrical cables.	
(2)	Connect the electrical cables to the switch.	Refer to Chapter 92 for the Wiring Diagrams.
(3)	Push the switch into position in the instrument panel.	
(4)	Install the washer and nut to the switch.	
(5)	Connect the alternator excitation battery: – Connect the positive cable to the battery. – Connect the negative cable to the battery.	Refer to Section 24-33.
(6)	Install the instrument panel cover.	Refer to Section 25-10.
(7)	Connect the main battery.	Refer to Section 24-34. Connect the positive cable first.
(8)	Connect the ECU backup battery.	Refer to Section 24-34. Connect the positive cable first.
(9)	Install the passenger seats.	
(10)	Install the top engine cowling.	Refer to Section 71-11.
(11)	Do an engine ground run-up.	All engine systems and the alternator must operate correctly.

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CHAPTER 25

EQUIPMENT/FURNISHINGS

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CHAPTER 25
EQUIPMENT/FURNISHINGS - GENERAL

1. General

This Chapter tells you about the equipment and furnishing in the flight compartment. Section 25-10 includes the cabin trim panels, pilots' seats, passenger seat and safety belts. Section 25-60 gives the data for the Emergency Location Transmitter (ELT).

Note: Equipment which is certified for installation in the DA 40 is listed in Section 6.5 of the Airplane Flight Manual. Such equipment may be installed in accordance with the Airplane Maintenance Manual.

Any equipment which is not listed in Section 6.5 of the Airplane Flight Manual is called "Additional Equipment". The installation of Additional Equipment is a modification which must be handled in accordance with national regulations or a Service Bulletin.

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Section 25-10
Flight Compartment

1. General

The flight compartment contains fixed seats for two pilots and two passengers. Each seat has a safety belt. The fuselage shell has fabric wall panels. Carpets cover the floor areas and baggage compartment floor. Map pockets are located on the cockpit side by each pilot.

The extended baggage compartment (optional, OÄM 40-163 & 164) consists of the standard baggage compartment behind the rear seats and the optional baggage extension mounted in the rear bulkhead.

GFRP moldings make the instrument panel cover and the center console. See Section 25-60 for data about the ELT.

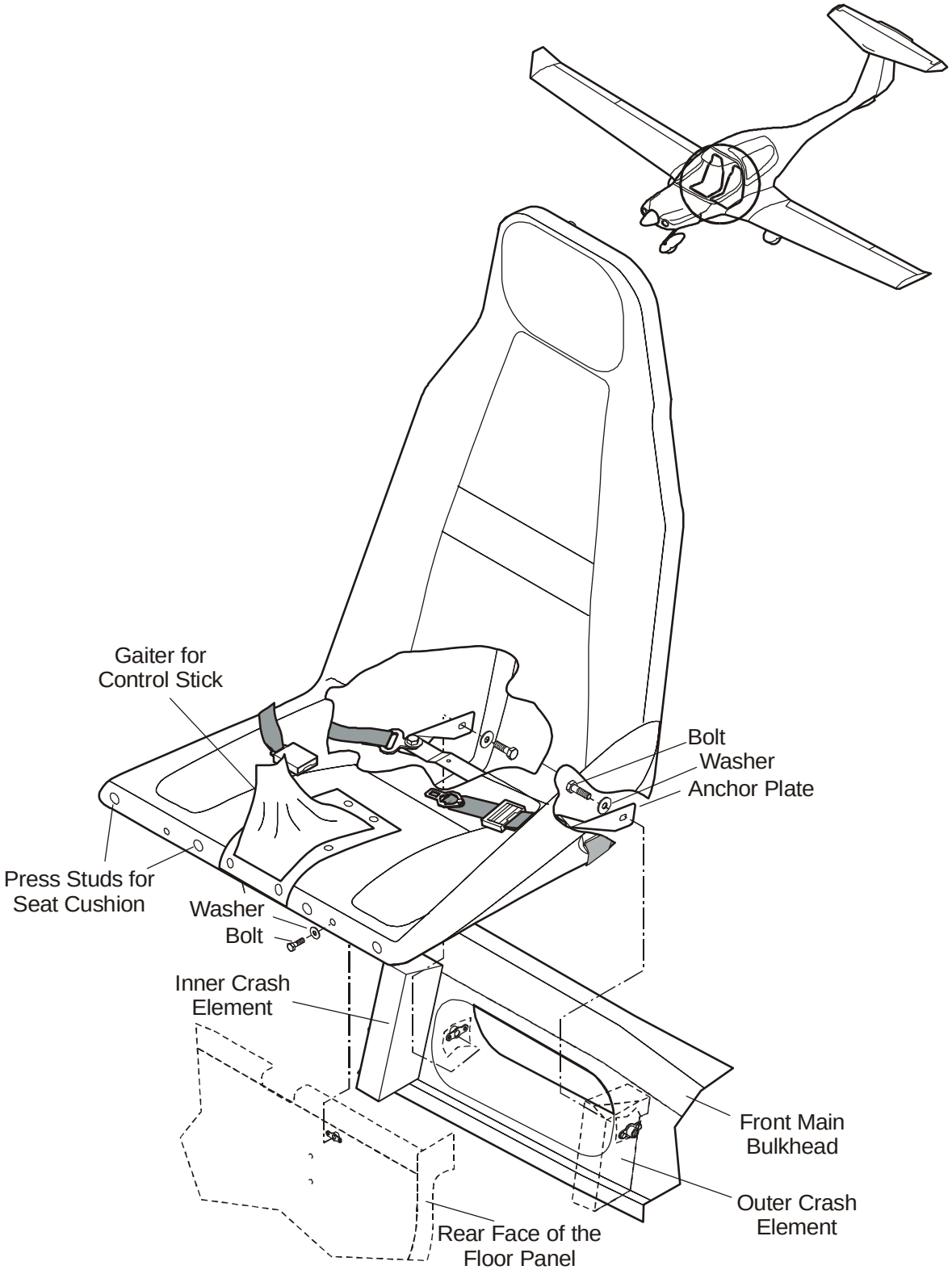


Figure 1: Pilot's Seat Installation

2. Description and Operation

A. Pilots' Seats

Figure 1 shows the pilot's seat installation. Each pilot's seat is a GFRP/Carbon/Kevlar molding. Rivets attach a metal plate to the bottom of the seat pan at the back. Two bolts go through the seat pan and the metal plate to hold the lap straps of the safety belt. These bolts also hold metal anchor plates which attach to anchor nuts in the large cut-out in the front main bulkhead.

The front of the seat pan curves down to locate over the rear wall of the floor panel. Two bolts with washer plates attach the front of the seat to the floor panel.

A padded seat cushion covers the GFRP/Carbon/Kevlar molding. Press-studs attach the forward part of the seat cushion to the seat pan. A flexible gaiter attaches to the seat pan with press-studs. The control stick passes through the gaiter. A velcro seals the top of the gaiter to the stick.

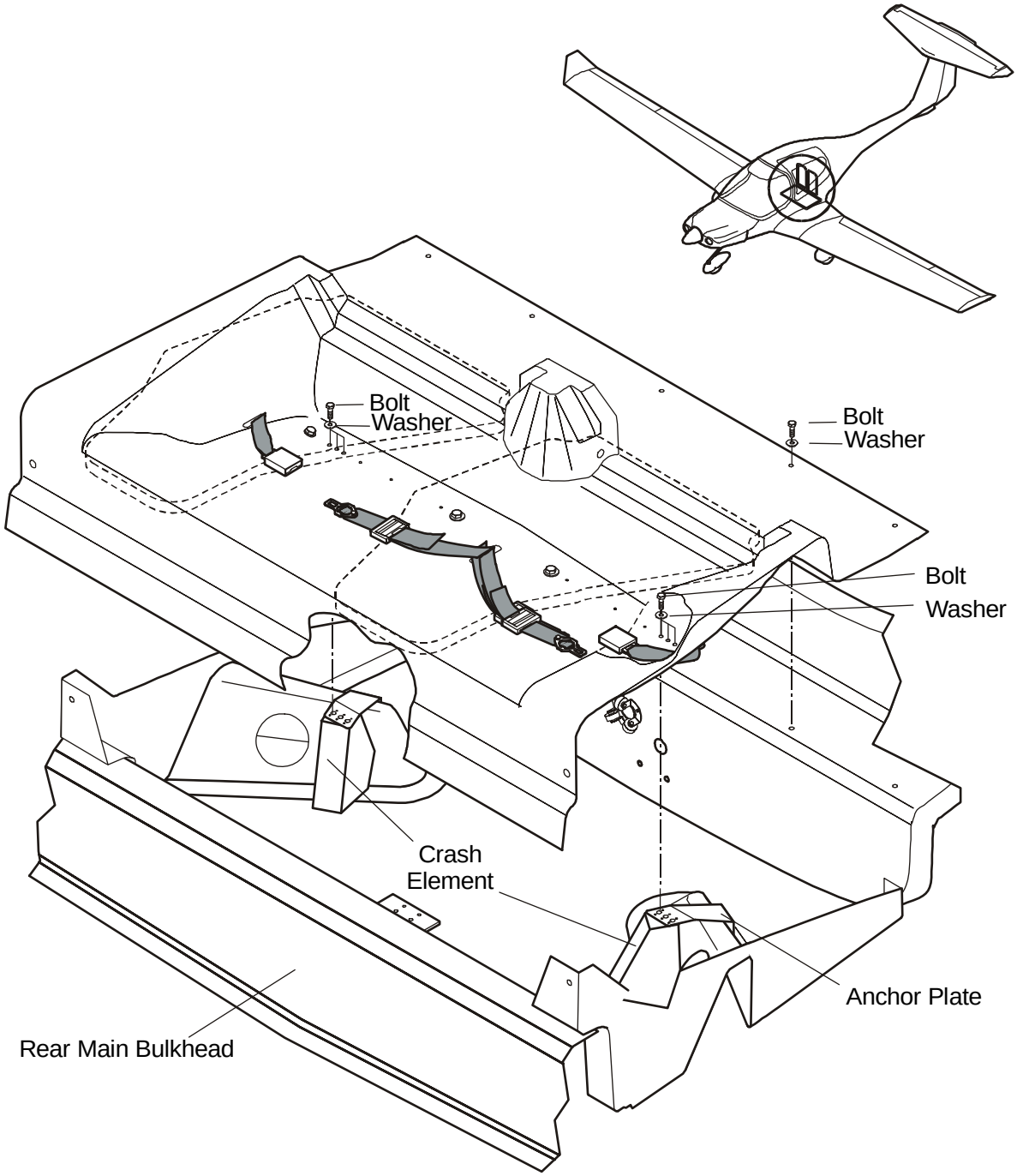


Figure 2: Passenger Seat Installation

B. Passenger Seat

Figure 2 shows the passenger seat installation. The passenger seat has three main parts. It has a double seat pan which is the full width of the cockpit. The rear part of the seat pan also makes the baggage compartment floor. The passenger seat also has two seat-backs which attach to the seat pan with hinges. A latch pin at the left side of each seat-back locks the seat-back in the upright position. You can lift the latch to fold the seat-back forward for access to the baggage compartment.

A padded seat cushion covers the GFRP/Carbon/Kevlar molding. Press-studs attach the forward part of the seat cushion to the seat pan. Padded cushions also cover the seat-backs.

Rivets attach a metal plate under each half of the seat pan at the back. Two bolts go through each half of the seat pan and the metal plate to hold the lap straps of the safety belt. Three bolts with washer plates on each side of the seat pan go through the seat pan and metal plate to anchor nuts in metal anchor plates. The anchor plates are bolted to the fuselage structure. Two bolts with washer plates attach the front of the seat pan to ribs on top of the rear main bulkhead. Five bolts with washer plates attach the rear of the seat pan to the top face of the baggage compartment frame.

C. Crash Elements

Each seat rests on crash elements. Each crash element has layers of carbon fiber composite and a special rigid foam bonded together. The crash elements compress under the high loads which occur in accidents. They reduce the injury to the pilot or passenger in an accident.

The rear of each pilot’s seat rests on two crash elements. They are located just outboard of the safety belt attachments. The passenger seat pan rests on two crash elements. They are located under the anchor plates on each side.

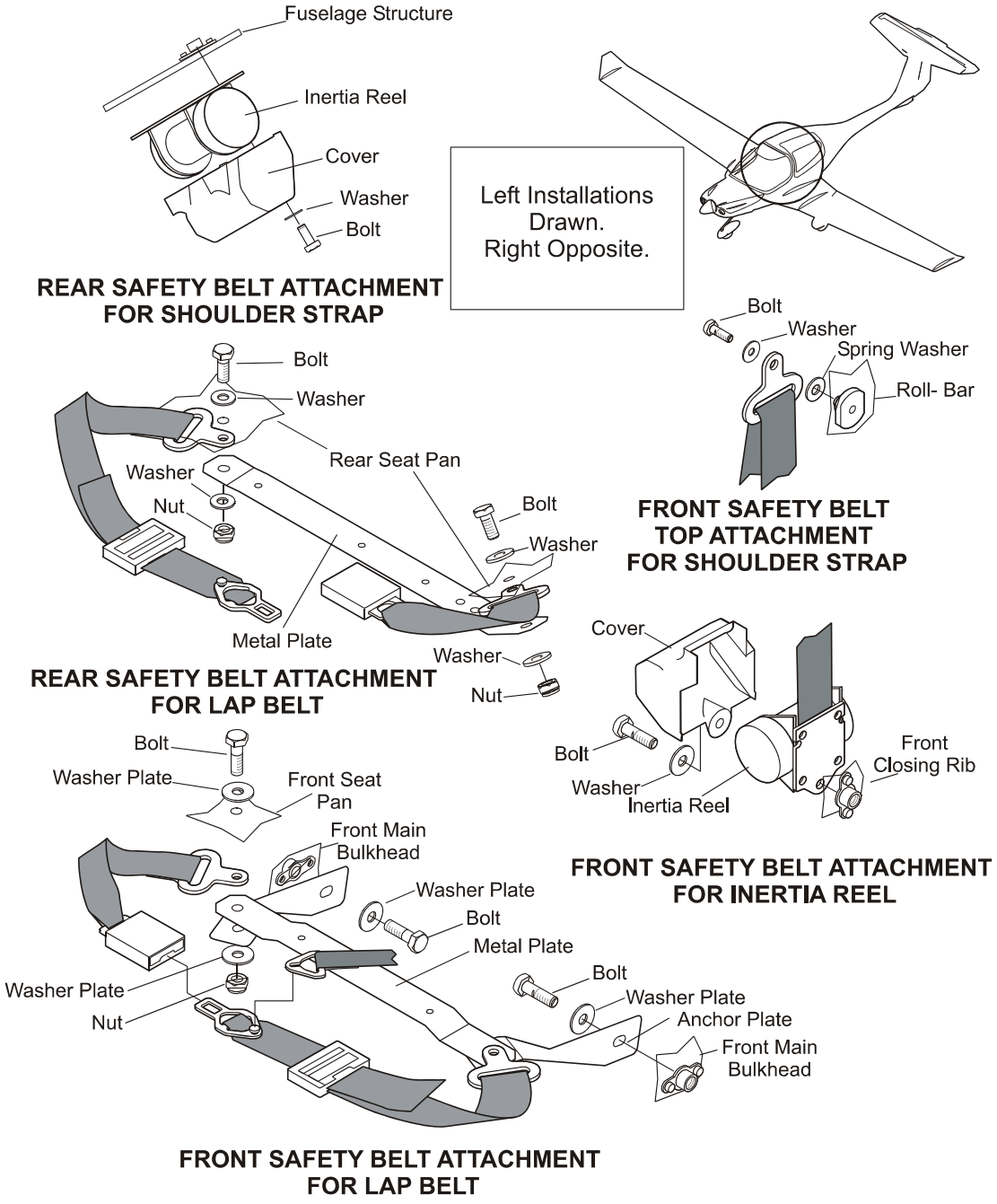


Figure 3: Safety Belt Installation

D. Safety Belts

Figure 3 shows the safety belt installation. Each seat has a fixed lap belt and an inertia sensitive shoulder strap. The lap belt has two straps. The outboard strap has an adjuster to tighten the belt in use. It also has a tongue to engage the buckle on the inboard belt. The inboard strap has a fixed length. The buckle has a button at the outboard end to release the tongue of the outboard lap strap. Push the tongue into the end of the buckle to lock them together.

Bolts with washer plates and self-locking nuts attach each lap strap to the seat pan. You must remove the seat to remove the lap belt.

The shoulder strap attaches to an inertia reel. The inertia reel has a latch which senses acceleration. With the airplane flying straight and level, the inertia reel lets the shoulder strap pull out against a light spring. If the airplane is accelerated (for example in turbulence), the latch stops the shoulder strap from pulling out.

The inertia reel for the pilot's safety belt is located on the fuselage wall behind the pilot's seat. The strap passes up through a guide attached to the roll-bar just above the pilot's shoulder and down to the tongue on the outboard lap strap. The end fitting on the shoulder strap hooks onto a stud on the tongue.

The inertia reel for the rear passengers' safety belts is located above and to the rear of the passengers. It is on the fuselage top-inner surface.

E. Fabric Wall Panels

Fabric wall panels bond to the inside of the fuselage shell. Each front panel has a map pocket.

F. Instrument Panel Cover

A GFRP cover goes over the instrument panel. Screws attach the cover to the instrument panel. The instrument panel cover has a defrost manifold. Two hoses connect the defrost manifold to the cabin heating system. The manifold supplies warm air to the front of the canopy to prevent misting.

G. Center Console Panel

A GFRP panel goes between the rear wall of the floor panel and the front face of the front main bulkhead. The center console panel covers the trim mechanism. It also seals the gap between the pilots' seats.

H. Baggage Extension and Baggage Tray

Baggage extension and baggage tray are optional equipment (OÄM 40-163 & 164).

The baggage extension has a door that may be hinged up to keep items from sliding aft or hinged down to carry long items. The baggage extension also has a removable panel in the bottom to allow access for inspection of the rear fuselage area.

The baggage tray may be installed in the bottom of the standard baggage compartment. The lid of the baggage tray and the bottom of the baggage extension form a flat loading surface. The lid has mounting provisions for the tow bar. The space under the lid may be used to carry small items such as the gust lock and the fuel quantity measuring device.

Maintenance Practices

1. General

These Maintenance Practices tell you how to remove/install the seats, the safety belts and other furnishings. See Section 25-60 for data about the ELT.

2. Remove/Install a Pilot's Seat

Note: Some maintenance procedures described in this AMM require the removal of a front seat. However, if the maintenance hole in the seat gives sufficient access to the system beneath it, it is acceptable to leave the seat in place and remove only the maintenance access panel. Refer to Paragraph 3.

A. Remove a Pilot's Seat

	Detail Steps/Work Items	Key Items/References
(1)	Release the velcro at the top of the gaiter for the control stick.	Refer to Figure 1.
(2)	Release the velcro at the front of the seat cushion.	Move the cushion back far enough to give access to the attaching bolts for the seat.
(3)	Remove the 2 bolts with washer plates which attach the anchor plates to the front main bulkhead.	From the passenger compartment behind the pilot's seat.
(4)	Loosen the 2 bolts which attach the seat to the anchor plates.	
(5)	Remove the 4 bolts with washer plates which attach the front of the seat to the rear wall of the floor panel.	
(6)	Remove the lap belt from the seat.	
(7)	Lift the seat forward and up out of the cockpit.	Take care that the stick gaiter does not catch on the top of the stick.

B. Install a Pilot's Seat

	Detail Steps/Work Items	Key Items/References
(1)	Examine the crash elements. Look specially for delamination and buckling.	Refer to Figure 1.
(2)	Do a check for unwanted items in the area below the seat.	For example: tools.
(3)	Put the seat in position so that the anchor plates go through the large hole in the front main bulkhead.	Make sure that the stick gaiter does not catch on the stick top.
(4)	Install the bolts with washer plates which attach the seat to the floor panel.	Torque: 6.4 Nm (4.7 lbf.ft.).
(5)	Tighten the 2 bolts which attach the seat to the anchor plates.	
(6)	Install the bolts with washer plates which attach the anchor plates to the front main bulkhead.	From the passenger compartment behind the pilot's seat. Torque: 16 Nm (11.8 lbf.ft.).
(7)	Fasten the velcro at the front of the seat cushion.	
(8)	Tighten the velcro at the top of the stick gaiter.	Make sure that the aileron and elevator controls are free to move throughout their range.

3. Remove/Install a Pilot's Seat Access Panel (if installed)

A. Remove a Pilot's Seat Access Panel

	Detail Steps/Work Items	Key Items/References
(1)	Remove the cloth coating from the seat.	
(2)	Remove the 12 (10) bolts which attach the access panel to the seat.	
(3)	Move the access panel clear of the airplane.	

B. Install a Pilot's Seat Access Panel

	Detail Steps/Work Items	Key Items/References
(1)	Move the access panel in place in the seat.	
(2)	Install the 12 (10) bolts which attach the access panel to the seat.	
(3)	Fasten the cloth coating on the seat.	

4. Remove/Install the Access Panel of the Passenger Seat (if installed)

A. Remove the Passenger Seat Access Panel

	Detail Steps/Work Items	Key Items/References
(1)	Remove the cloth coating from the passenger seat.	
(2)	Remove the 12 fixing bolts of the access panel.	
(3)	Remove the access panel.	

B. Install the Passenger Seat Access Panel

	Detail Steps/Work Items	Key Items/References
(1)	Put the access panel in place on the passenger seat.	
(2)	Install the access panel with the12 fixing bolts.	
(3)	Fasten the cloth coating on the passenger seat.	

5. Remove/Install the Passenger Seat

A. Remove the Passenger Seat

	Detail Steps/Work Items	Key Items/References
(1)	Release the press-studs at the front of the seat cushion.	Refer to Figure 2. Move the cushion back far enough to give access to the attaching bolts for the seat.
(2)	Remove the 6 bolts with washer plates which attach the seat pan to the anchor plates.	
(3)	Remove the 2 bolts with washer plates which attach the front of the seat pan to the rib on top of the rear main bulkhead.	
(4)	Fold the seat-backs forward.	Lift the release catch at the left side of each seat-back.
(5)	Remove the 5 bolts with washer plates which attach the rear of the seat pan to the baggage compartment frame.	
(6)	Remove the two seat belt attach points in center section of seat.	
(7)	Lift the seat forward and up out of the cockpit.	

B. Install the Passenger Seat

	Detail Steps/Work Items	Key Items/References
(1)	Examine the crash elements. Look specially for delamination and buckling.	Refer to Figure 2.
(2)	Do a check for unwanted items in the area below the seat.	For example: tools.
(3)	Put the seat in position in the fuselage with the seat-backs folded forward.	Lift the release catch at the left side of each seat-back.
(4)	Attach seat belt fastener to center section of seat.	
(5)	Install the 5 bolts with washer plates which attach the rear of the seat pan to the baggage compartment frame.	Torque: 6.4 Nm (4.7 lbf.ft.).
(6)	Install the 6 bolts with washer plates which attach the seat pan to the anchor plates.	Torque: 16 Nm (11.8 lbf.ft.).
(7)	Install the 2 bolts with washer plates which attach the front of the seat pan to the rib on top of the rear main bulkhead.	Torque: 6.4 Nm (4.7 lbf.ft.).
(8)	Fasten the press-studs which hold the seat cushion.	

6. Remove/Install a Safety Belt

This procedure applies to the pilots' seats and the passenger seat.

A. Remove a Safety Belt

	Detail Steps/Work Items	Key Items/References
(1)	Remove the seat.	Refer to Paragraph 2 or 3.
(2)	Remove the self-locking nuts, washer plates and bolts which attach the straps to the seat.	Refer to Figure 3. For the pilots' seats only: – Make a note of the position of the anchor plates which these bolts also hold.
(3)	Move the straps through the holes in the seat pan and remove them.	
(4)	Release the bolt and washer which attach the inertia reel and its cover to the structure.	
(5)	Release the bolt, washer plate and spring washer which attach the guide to the roll-bar.	For the pilots' seats only: – Make a note of the position of the washers.
(6)	Remove the shoulder strap.	

B. Install a Safety Belt

	Detail Steps/Work Items	Key Items/References
(1)	Install the bolt and washer which attach the inertia reel and its cover to the structure.	Refer to Figure 3.
(2)	Install the bolt, washer plate and spring washer which attach the guide to the roll-bar.	For the pilots' seats only.
(3)	Put the lap straps through the holes in the seat pan.	The buckle goes to the inboard side of the pilots' seats (front) and the outboard side of the passenger seat (rear).
(4)	Put the lap straps between the seat pan and the metal plate. Install the bolts with washer plates from the top of the seat pan.	
(5)	Put the anchor plates in position on the bolts.	For the pilots' seats only.
(6)	Install washer plates and self-locking nuts on the bolts.	Torque: 16 Nm (11.8 lbf.ft.).
(7)	Install the seat.	Refer to Paragraph 2 or 3.

7. Remove/Install the Access Panel in the Baggage Extension (if OÄM 40-163 & 164 installed)

A. Remove the Access Panel in the Baggage Extension

	Detail Steps/Work Items	Key Items/References
(1)	Fold rear seat-backs forward.	
(2)	Peel back each side of baggage extension carpet to expose 1/4-turn fasteners.	Carpet is held with velcro.
(3)	Release the four 1/4-turn fasteners holding the access panel to the baggage extension.	
(4)	Release latch holding baggage tray lid (if fitted).	
(5)	Remove access panel from baggage extension.	

B. Install the Access Panel in the Baggage Extension

	Detail Steps/Work Items	Key Items/References
(1)	Do a check for unwanted items in the area below the access panel.	For example: tools.
(2)	Put access panel in position in baggage extension.	Make sure that baggage tray lid latch fits to baggage tray, if fitted.
(3)	Engage latch which holds baggage tray lid (if fitted).	
(4)	Fasten the four 1/4-turn fasteners on the baggage extension.	Latch baggage tray lid, if fitted.
(5)	Fasten baggage extension carpet.	

8. Remove/Install the Baggage Extension and Baggage Tray (if OÄM 40-163 & 164 installed)

A. Remove the Baggage Extension and Baggage Tray

	Detail Steps/Work Items	Key Items/References
(1)	Remove access panel.	Refer to Paragraph 4A.
(2)	Release 4 screws with washers which attach the front of the baggage tray (if fitted) to the rear seats.	
(3)	Release the 2 screws with washers which attach the rear of the tray (if fitted) to the baggage bulkhead.	
(4)	Remove the upholstery pieces which cover the sides of the baggage bulkhead.	Attached with velcro.
(5)	Release the four 1/4-turn fasteners which attach the baggage extension to the baggage bulkhead.	
(6)	Remove the baggage extension from the airplane.	Do not damage the upholstery.

B. Install the Baggage Extension and Baggage Tray

	Detail Steps/Work Items	Key Items/References
(1)	Do a check for unwanted items in the area below the baggage extension.	For example: tools.
(2)	Put the baggage extension in place in the baggage bulkhead.	Do not damage the upholstery.
(3)	Fasten the four 1/4-turn fasteners which attach the baggage extension to the baggage bulkhead.	
(4)	Install the upholstery pieces which cover the sides of the baggage bulkhead.	Attached with velcro.
(5)	Put the baggage tray (if fitted) in place on the baggage floor.	
(6)	Fasten the 4 screws with washers that attach the front of the baggage tray to the rear seat base.	Torque: 3.6 Nm (2.7 lbf.ft.).
(7)	Fasten the 2 screws with washers that attach the rear of the baggage tray to the baggage bulkhead.	Torque: 3.6 Nm (2.7 lbf.ft.).
(8)	Install the access panel.	Refer to Paragraph 4B.

9. Remove/Install the Instrument Panel Cover

A. Remove the Instrument Panel Cover

	Detail Steps/Work Items	Key Items/References
(1)	Remove the screws which attach the instrument panel cover to the instrument panel and the fuselage.	
(2)	Lift the cover far enough to give access to the defrost hoses.	
(3)	Loosen the hose clamps on the defrost hoses. Remove the hoses from the cover.	
(4)	Lift the cover clear of the airplane.	

B. Install the Instrument Panel Cover

	Detail Steps/Work Items	Key Items/References
(1)	Do a check for unwanted items in the area between the firewall and the instrument panel.	For example: tools.
(2)	Put the instrument panel cover in position just above the instrument panel.	
(3)	Connect the defrost hoses to the cover.	
(4)	Tighten the hose clamps on the defrost hoses.	
(5)	Lower the cover into position on the instrument panel.	
(6)	Install the attaching screws.	

10. Cleaning

A. Seats

The seat cushions are made from a fire-resistant material. Clean the cushions with a vacuum cleaner. Use a mild soap solution to remove stains. Make sure that the area is well ventilated after cleaning to remove all moisture.

B. Safety Belts

Use a mild soap solution to remove stains from the safety belts.

Section 25-60
Emergency

1. General

This Section tells you about the optional emergency location transmitter (ELT). It also tells you about the remote control panel/indicator (RCPI) for the ACK E-01 ELT and the remote control switch (RCS) for the Jolliet JE2-NG ELT, ME 406, ME 406 ACE and C 406-1. Refer to the manufacturer's Operator's Manual for more data.

2. Description

A. ELT Equipment

(1) Location

The Jolliet JE2-NG and the ACK E-01 are located below the horizontal part of the baggage frame on the right. A bracket with one (Jolliet) or two (ACK) quick-release clamps holds the unit in place. A bracket to the rear of the baggage frame holds the ELT antenna. The RCPI or the RCS is located in the instrument panel, top right.

The ME 406 and the ME 406 ACE are located in the rear fuselage, below the aft baggage compartment. A velcro strap attached to a mounting bracket holds the ME 406 or the ME 406 ACE) in position. The ELT (ME 406 or ME 406 ACE) antenna is mounted on a bracket in the aft fuselage, above the ELT. If the ME 406 or ME 406 ACE are installed, a remote control switch (RCS) is mounted on the instrument panel, right side.

The C 406-1 is located below the horizontal part of the baggage frame on the right. A mounting tray, installed on a bracket holds the unit in place. A bracket aft of the ring frame holds the ELT antenna. The RCS is located in the instrument panel, top right. A buzzer is also installed next to the ELT unit which serves as a redundant warning indicator.

(2) Signal Transmission

The Jolliet JE2-NG and the ACK E-01 transmit a signal automatically after a crash on the emergency frequencies of 121.5 and 243.0 Megahertz (MHz). You can operate the Jolliet JE2-NG and the ACK E-01 manually for testing (see Maintenance Practices in this Section), or after an emergency landing. Maintenance on the airplane is only a visual examination of the installation (housing, mounting and antenna).

The ME 406 and ME 406 ACE transmit signals automatically after a crash on the emergency frequencies of 121.5 and 406.028 Megahertz (MHz). Every 50 seconds the transmitter transmits a signal on the 406.028 MHz frequency to a satellite. The signal to the satellite contains the serial number of the ELT transmitter or the airplane ID, a country code and a unique identity code. The satellite will also give the emergency services a more accurate location for the airplane.

The C 406-1 transmits a signal automatically after a crash on the emergency frequencies of 121.5 and 243.0 Megahertz (MHz). Additionally, the 406.025 MHz transmitter turns on every 50 seconds for 520 milliseconds. You can operate the C 406-1 manually for testing (see Maintenance Practices in this Section), or after an emergency landing. Maintenance on the airplane is only a visual examination of the installation (housing, mounting and antenna).

(3) Functional Test

Do regular functional tests (See the Maintenance Practices in this Section).

B. ELT Batteries

(1) ACK E-01

Monitor the battery expiry dates for both the transmitter and the RCPI. The expiry date for the transmitter is on the identification plate on the housing. Replace batteries when they expire or after 1 hour of cumulative use. We recommend to turn off the ELT when the airplane is not in use.

The battery expiry date for the RCPI is recorded on a self adhesive label attached to the transmitter housing.

(2) Jolliet JE2-NG

Monitor the battery expiry date of the transmitter. The expiry date for the transmitter is on the battery pack label. Replace batteries when they expire or after 1 hour of cumulative use. We recommend to turn off the ELT when the airplane is not in use.

(3) ME 406 ELT and ME 406 ACE

The ELT has its own battery pack to supply electrical power. When the ELT is ON and transmitting the batteries will keep the ELT transmitting until battery power is gone on the 121.5 MHz frequency and for up to 24 hours on the 406.028 MHz frequency.

It is important to monitor the battery expiry dates for the battery pack. The expiry date for the battery pack is shown on the identity plate for the transmitter. The battery pack must be replaced:

– After use in an emergency.

– After the transmitter has been accidentally switched ON for an unknown period of time.

– After 1 hour of accumulated use (testing).

– On or before the battery pack expiry date.

You must do regular functional tests. Refer to the Maintenance Practices in this Section.

(4) C 406-1

Monitor the battery pack expiry date of the transmitter. The expiry date for the transmitter is labeled on the end cap of the mounting tray of the ELT unit. Replace batteries when they expire or after 1 hour of cumulative use (including tests).

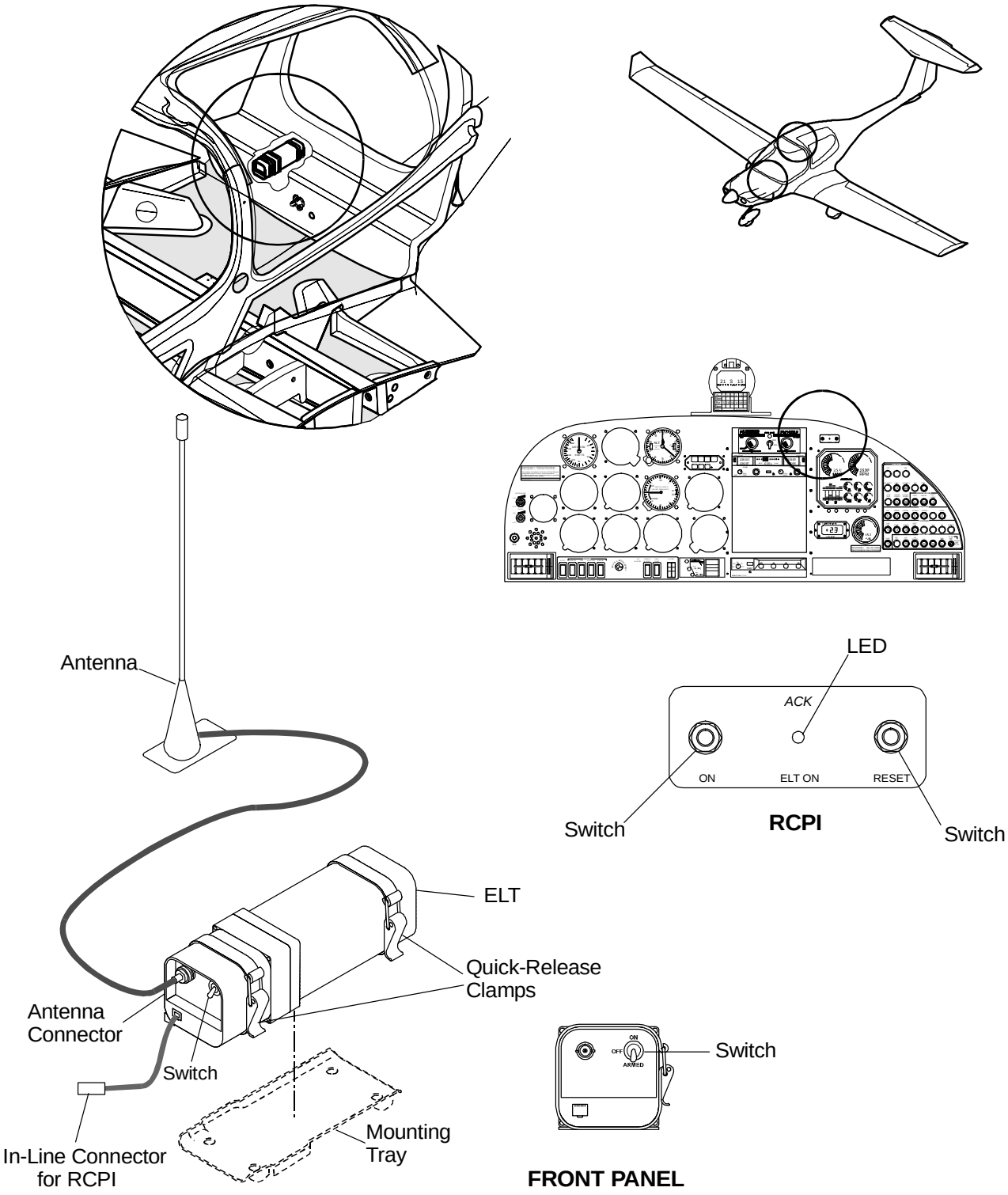


Figure 1: ELT Installation (ACK E-01)

3. Operation

A. ACK E-01

(1) ELT

The ELT has a switch with these three positions:

– ON.

– OFF.

– ARMED.

The ON position is for ground test. When the airplane is in use the switch must be in the ARMED position.

(a) Emergency Operation

If the airplane crashes, then the accelerometer senses the crash. The accelerometer sets the transmitter to ON. The transmitter transmits the international distress frequency. The battery in the ELT supplies power to the transmitter. The battery can operate the ELT for approximately 180 hours at +21 °C (70 °F) and for approximately 140 hours at -21 °C (-6 °F). The ELT will only transmit if set to ARMED before the crash.

(b) Test

If you press the ON switch, then the following occurs:

– An LED flashes in the RCPI.

– If you set the radio to 121.5 MHz, you can hear the audio sweep tone from the ELT.

(2) RCPI

The RCPI has two switches and a red LED. The left switch is labeled ON. When it is pressed it does a test of the ELT. The right switch is labeled RESET. When you press the RESET switch it stops the test of the ELT. The red LED flashes when you test the ELT.

B. Jolliet JE2-NG

(1) ELT

The ELT has a switch with these three positions:

– MANU.

– OFF/RST.

– AUTO.

The MANU position is for ground test or in case of emergency use out of the airplane. When the airplane is in use the switch must be in the AUTO position.

(a) Emergency Operation

If the airplane crashes, then the accelerometer senses the crash. The accelerometer sets the transmitter to ON. The transmitter transmits the international distress frequency. The battery in the ELT supplies power to the transmitter. The battery can operate the ELT for minimum of 50 hours. The ELT will only transmit if set to AUTO before the crash.

(b) Test

If you switch to MANU, then the ELT starts to transmit on the international distress frequencies 121.5 MHz and 243.0 MHz a typical modulated signal.

If you set the radio to 121.5 MHz, you can hear the audio sweep tone from the ELT.

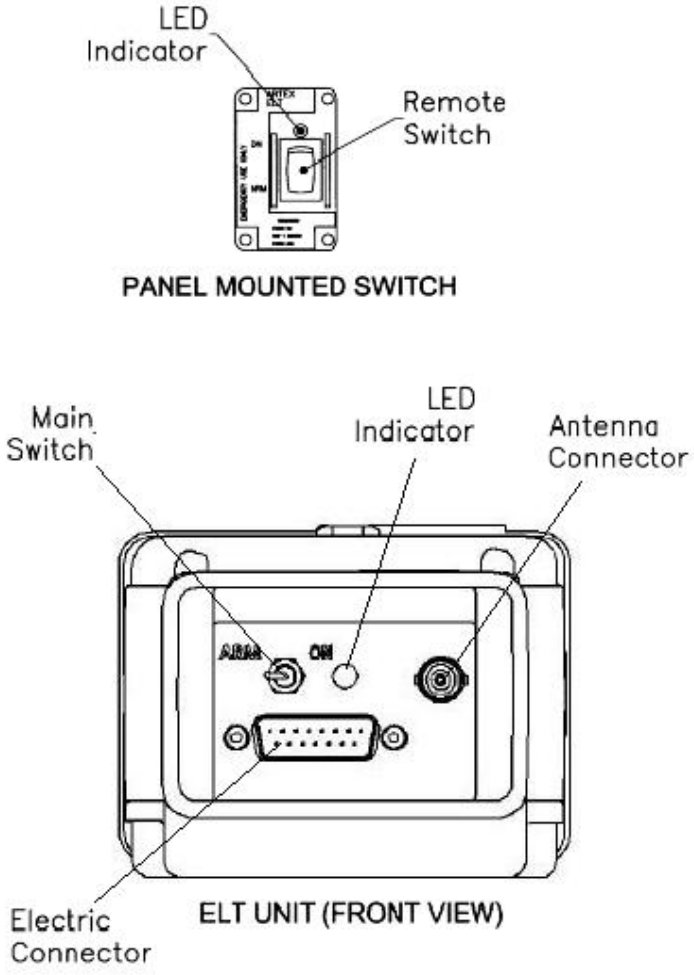


Figure 2: ELT (ME 406, ME 406 ACE)

C. ME 406, ME 406 ACE

(1) ELT

The ELT has a switch with these two positions:

– ON.

– OFF/ARM.

The ON position is for ground test. When the airplane is in use the switch must be in the ARM position.

(a) Emergency Operation

If the airplane crashes, then the accelerometer senses the crash. The accelerometer sets the transmitter to ON. The transmitter transmits the international distress frequency and on 406.028 MHz . The battery in the ELT supplies power to the transmitter. The battery can operate the ELT for at least 50 hours.

(b) Test

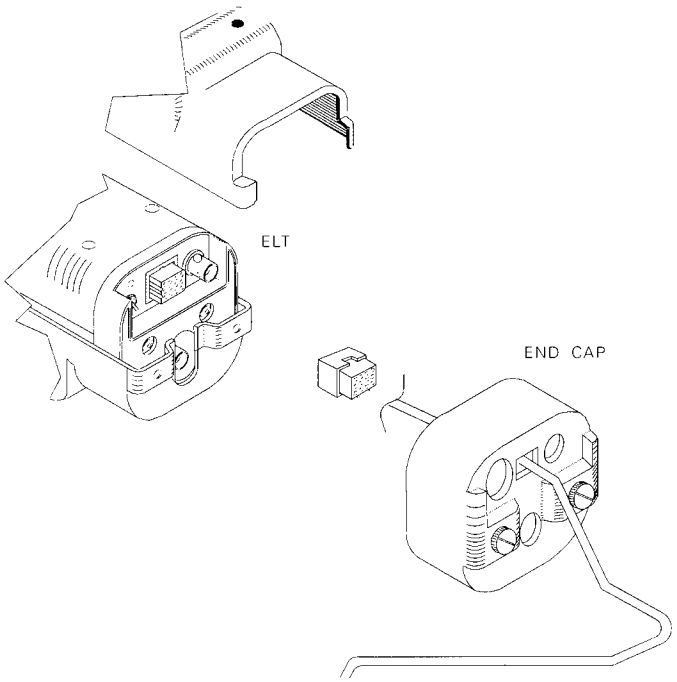
If you switch the RCS to ‘ON’, then the following occurs:

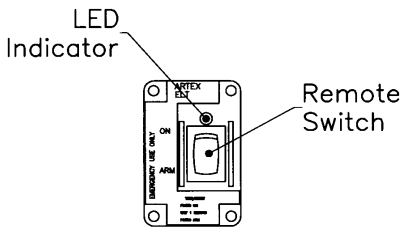
– A LED flashes in the RCS and the ELT unit.

– If you set the radio to 121.5 MHz, you can hear the audio sweep tone from the ELT.

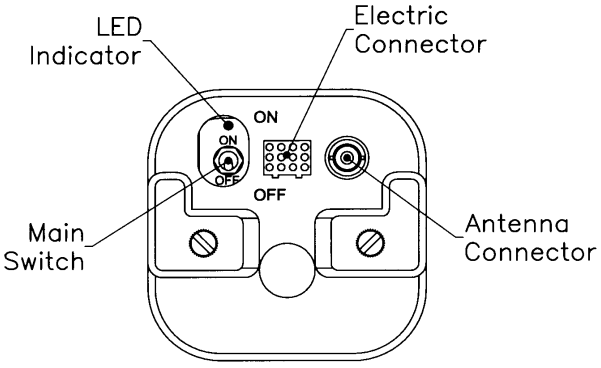
(2) Remote Control Switch (RCS)

The RCS is installed on the right side of the instrument panel and has a red LED to indicate the activation of the ELT. When it is switched to 'ON' it does a test of the ELT. When you switch it back to 'ARM' the switch stops the test of the ELT. The red LED flashes when you test the ELT. If a problem has been detected the LED provides a coded signal following the initial 1 second pulse.





PANEL MOUNTED SWITCH



ELT UNIT (FRONT VIEW)

Figure 3: ELT (C406-1)

D. C 406-1

(1) ELT

The ELT has a switch with these two positions:

– ON.

– OFF/ARMED.

The ON position is for ground test. When the airplane is in use the switch must be in the OFF position.

(a) Emergency Operation

If the airplane crashes, then the accelerometer senses the crash. The accelerometer sets the transmitter to ON. The transmitter transmits on the international distress frequencies and on 406.025 MHz every 50 seconds for 520 milliseconds. The 406.025 MHz transmitter will operate for 24 hours and then shuts down automatically. The 121.5/243.0 MHz transmitter will continue to operate until the unit has exhausted the battery power which typically will be at least 72 hours.

(b) Test

If you switch the RCS to 'ON', then the following occurs:

– An LED flashes in the RCS and in the ELT unit.

– If you set the radio to 121.5 MHz, you can hear the audio sweep tone from the ELT.

(2) Remote Control Switch (RCS)

The RCS is installed on the right side of the instrument panel and has a red LED to indicate the activation of the ELT. When it is switched to 'ON' it does a test of the ELT. When you switch it back to 'ARM' the switch stops the test of the ELT. The red LED flashes when you test the ELT. If a problem has been detected the LED provides a coded signal following the initial 1 second pulse.

Trouble-Shooting

1. General

If you find the trouble given in Column 1, then do the repair in Column 3.

Trouble	Possible Cause	Repair
ELT does not operate on test.	ELT batteries discharged.	Replace the ELT batteries.
	ELT defective.	If the ELT batteries are serviceable, then replace the ELT.
	RCPI battery discharged (ACK only).	Replace the RCPI battery.
	RCPI/cables defective (ACK only).	Do a continuity test of the cables between the RCPI and the ELT. Replace defective cables. If the cables are not defective then replace the RCPI.

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Maintenance Practices

1. General

This Section tells you how to remove and install the ELT and the RCPI or the RCS. It tells you how to test the ELT in the airplane. It also tells you how replace the batteries in the ELT and the RCPI. This Section also gives you the periodic maintenance necessary to maintain the ELT equipment in a serviceable condition.

See the ELT manufacturer's Operator's Manual for more data.

2. Remove/Install the ELT

A. Remove the ELT

	Detail Steps/Work Items	Key Items/References
(1)	Remove the trim/cover from the front face of the baggage compartment frame.	Pull the rear seat-backs forward.
(2)	ACK E-01: – Disconnect the cable for the RCPI at the in-line connector. Jolliet JE2-NG: – Disconnect the cable for the RCS at the connector screws. ME 406, ME 406 ACE, C 406-1: – Loosen the thumb screws on the end cap. – Pull the end cap away from the ELT unit. – Move the protective top cover up and backward and remove.	
(3)	Disconnect the co-axial cable for the antenna at the ELT BNC connector and all other cables.	At the ELT.
(4)	Release the clamps or the velcro strap which hold the ELT in its mounting and remove the ELT from the airplane.	ACK: 2 clamps. Jolliet: 1 clamp. ME 406, ME 406ACE, C 406-1: velcro strap.

	Detail Steps/Work Items	Key Items/References
	WARNING: IF THE ELT IS MOVED TO A DIFFERENT AIRPLANE THAN WHICH IT WAS ORIGINALLY REGISTERED WITH, THE ELT MUST BE RE-REGISTERED AND THE PRODUCT LABEL RE-MARKED TO INDICATE THE NEW PROGRAMMING AND/OR NEW COUNTRY OF REGISTRY.	

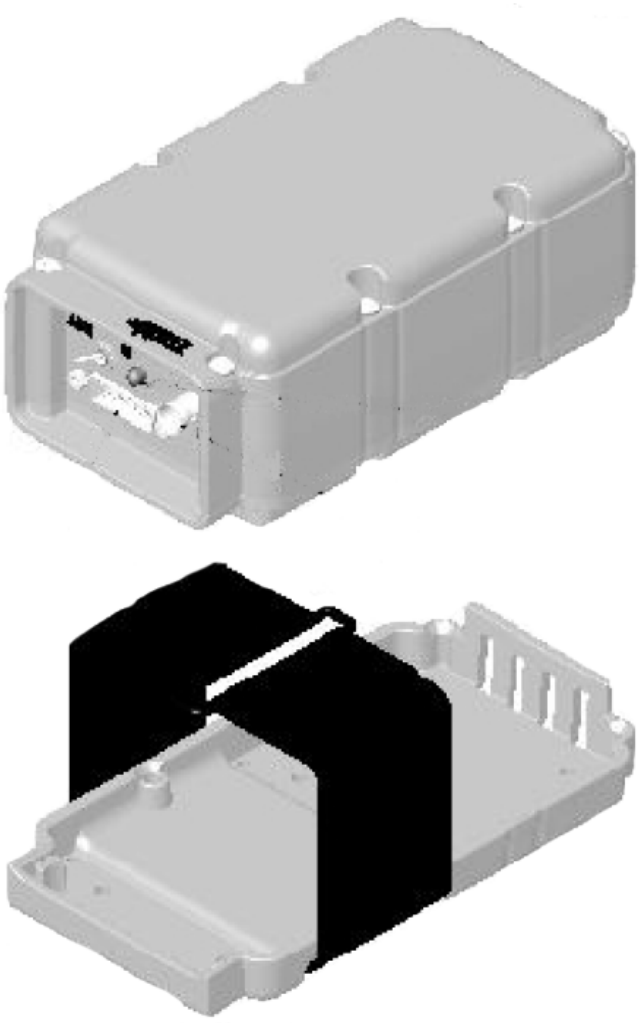


Figure 4: Artex ME 406 ELT Installation

B. Install the ELT

	Detail Steps/Work Items	Key Items/References
	WARNING: IF THE ELT IS MOVED TO A DIFFERENT AIRPLANE THAN WHICH IT WAS ORIGINALLY REGISTERED WITH, THE ELT MUST BE RE-REGISTERED AND THE PRODUCT LABEL RE-MARKED TO INDICATE THE NEW PROGRAMMING AND/OR NEW COUNTRY OF REGISTRY.	
(1)	Move the ELT into position into its mounting.	At an angle so that the locking ears at the end opposite the direction-of-flight arrow fit into the mounting tray locking slots.
(2)	Close and secure the clamps or the velcro straps which hold the ELT.	ACK: 2 clamps. Jolliet: 1 clamp. ME 406, ME 406ACE, C 406-1: velcro strap.
(3)	ACK E-01: – Connect the cable from the RCPI to the ELT at the in-line connector. – Connect the co-axial cable from the antenna to the BNC connector. Jolliet JE2-NG: – Connect the cable from the RCS to the ELT at the connector screws. – Connect the co-axial cable from the antenna to the BNC connector. ME 406, ME 406 ACE, C 406-1: – Feed the coax cable through the hole in the end cap and connect it to the ELT. – Fit the top cover onto the ELT unit. – Position the end cap and connector assembly onto the ELT and tighten the thumbscrews securely.	Ensure that the slots at the end of the cover fit over the locking ears on the ELT prior to fitting cover onto the connector end.

	Detail Steps/Work Items	Key Items/References
(4)	Do a test for the correct operation of the ELT.	Refer to Paragraph 3.
(5)	Install the trim/cover to the front face of the baggage compartment frame.	

3. ELT Functional Test

A. ACK and Jolliet

Note: Do this test only during the first 5 minutes of each hour. If you are at a location with a control tower or other monitoring facility, tell them before you do the test.

Note: For maintenance done to FAR 91 (airplanes registered in the USA) an additional functional test of the ELT is required. Refer to FAA Action Notice 8150.3 for more data.

	Detail Steps/Work Items	Key Items/References
(1)	Set the ALT/BAT switch (Lycoming version) or ELECTRIC MASTER key switch (TAE version) to ON.	
(2)	Set the AVIONIC MASTER switch to ON.	
(3)	Set the radio to receive on 121.5 MHz.	
(4)	Set the ELT to ON (ACK) or MANU (Jolliet). The test must not last longer than 3 audio sweeps.	
(5)	Monitor the radio for the ELT sweep tone.	
(6)	Set the ELT to OFF (ACK) or OFF/RST (Jolliet).	
(7)	Set the AVIONIC MASTER switch to OFF.	
(8)	Set the ALT/BAT switch (Lycoming version) or ELECTRIC MASTER key switch (TAE version) to OFF.	

B. ME 406, ME 406 ACE and C 406-1

Note: Do this test only during the first 5 minutes of each hour. If you are at a location with a control tower or other monitoring facility, tell them before you do the test.

Note: For maintenance done to FAR 91 (airplanes registered in the USA) an additional functional test of the ELT is required. Refer to FAA Action Notice 8150.3 for more data.

CAUTION: DO NOT ALLOW THE TEST DURATION TO EXCEED 5 SECONDS. THE ELT WILL TRANSMIT A 406.025 MHZ SIGNAL AFTER THE ELT IS ACTIVE FOR APPROXIMATELY 47 SECONDS. THE SATELLITE SYSTEM CONSIDERS THIS TRANSMISSION TO BE A VALID DISTRESS SIGNAL.

	Detail Steps/Work Items	Key Items/References
(1)	Set the ELECTRIC MASTER key switch (TAE version) to ON.	
(2)	Set the AVIONIC MASTER switch to ON.	
(3)	Set the radio to receive on 121.5 MHz.	
(4)	Set the remote control switch to ON.	
(5)	Monitor the radio for 3 ELT sweep tones.	
(6)	Set the remote control switch to ARM.	Pay special attention to the LED activity upon entering the 'ARM' (OFF) condition. If a problem is detected, the LED provides a coded signal following the initial 1 second pulse. Refer to the ELT manufacturer's Operator's Manual for coded signals.
(7)	Set the AVIONIC MASTER switch to OFF.	
(8)	Set the ELECTRIC MASTER key switch (TAE version) to OFF.	

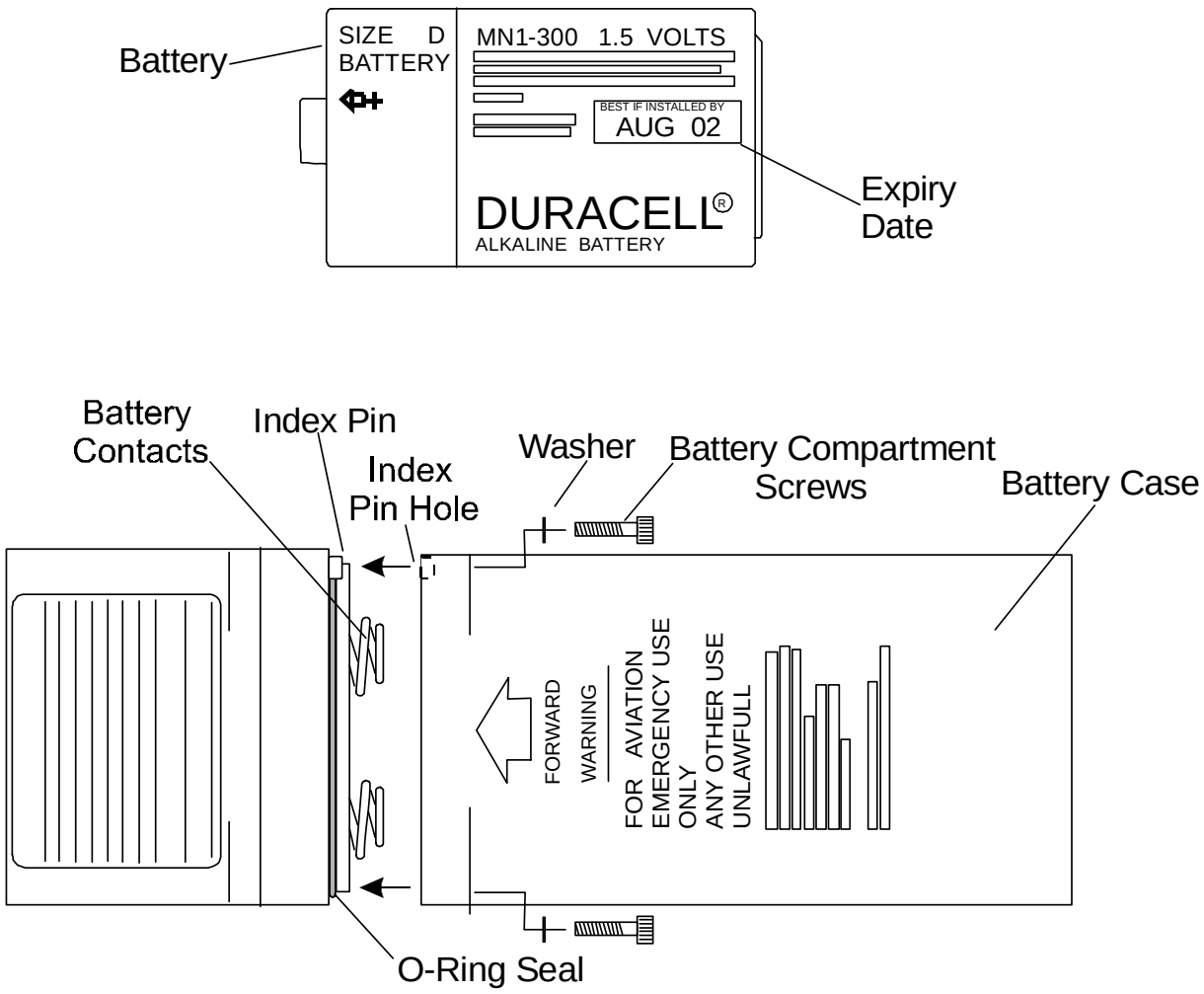


Figure 5: Battery Pack Installation - ACK E-01

4. Replace the ELT Batteries

A. ACK E-01

You must only use Duracell MN1300 alkaline batteries which are dated by the manufacturer. You must change the batteries on or before the date shown on the batteries. You must replace all of the batteries at the same time. Make sure that all the batteries are identified with the same date.

You must replace the batteries after a cumulative transmission time of one hour.

	Detail Steps/Work Items	Key Items/References
	CAUTION: DO NOT REMOVE THE SCREWS ON THE FRONT SIDE OF THE ELT UNIT.	
(1)	Use the 3/32" hex. driver which comes with the ELT. Remove the 4 retaining screws and split lock-washers which attach the battery case to the transmitter assembly.	Refer to Figure 1. Loosen the screws evenly a few turns at a time, until you relieve the battery contact spring pressure.
(2)	Remove the batteries from the battery case. Hit the open end of the battery case lightly on a flat surface.	To loosen the batteries.
(3)	Examine the battery contacts. Use a stiff brush and an electrical contact cleaner to carefully remove any dirt or corrosion.	
	CAUTION: DO NOT USE ABRASIVE CLEANERS. THE CONTACTS ARE NICKEL AND GOLD PLATED SPRING STEEL. AN ABRASIVE CLEANER WILL REMOVE THIS PLATING AND DAMAGE THE CONTACTS.	
(4)	If the contacts are badly corroded, replace them.	
(5)	Use one of the adhesive labels which come with the ELT to make a record of the new battery replacement date.	
	CAUTION: WHEN INSTALLING THE NEW STYLE DURACELL BATTERIES WHICH HAVE A BUILT IN TEST STRIP ON THE SIDE OF THE CELL, THESE TEST STRIPS MUST BE ORIENTED SO THAT THE TEST STRIP DOES NOT CONTACT THE PLASTIC CASE OR ANY OTHER CELL (SEE FIGURE 6).	

	Detail Steps/Work Items	Key Items/References
(6)	Install the new batteries correctly in the battery case.	There are battery installation placards inside each battery case.
(7)	Do a test of the battery voltage. The polarity of the battery nearest the index pin hole must be positive.	Refer to Figure 6. The voltage must be a minimum of 6 volts.
(8)	Install the battery case to the transmitter assembly: – Align the index pin hole in the battery case with the index pin of the transmitter assembly. – Make sure that the O-ring seal is seated correctly.	
(9)	Put the transmitter assembly face down on a clean bench. With the modular connector cable immediately past the edge of the bench.	
(10)	Push down on the battery case to compress the battery contact springs.	
(11)	Install the 4 battery case retaining screws and lock-washers.	
(12)	Equally tighten the screws until the battery case is flat against the transmitter assembly.	
Note: The O-ring can catch between the battery case and the transmitter assembly. Release the 4 battery case retaining screws slightly. Make the O-ring slightly wet and push the O-ring into its location with a thin screwdriver. Tighten the 4 battery case retaining screws.		
(13)	Remove the battery replacement date label from the battery case and discard it.	
(14)	Install the new battery replacement date label you prepared at step 5.	
(15)	Do a functional test of the ELT.	Refer to Paragraph 3.

B. Jolliet JE2-NG

You must only use the Jolliet battery pack P/N JE2-1978-3. You must change the batteries on or before the date shown on the batteries.

	Detail Steps/Work Items	Key Items/References
(1)	Position the MANU-OFF/RST-AUTO switch to OFF.	
(2)	Remove the ELT from its mounting tray.	Refer to Paragraph 2.
(3)	Extend the portable antenna by pulling the tab in "T", which is fixed at its extremity.	
(4)	Unscrew the two screws located inside the two holes, at each side of the front of the ELT, holding together the "head" and the battery pack.	
(5)	Disconnect the battery by unsnapping the two press-button type connectors.	
(6)	Connect the connector of the "head" on the one of the new battery pack.	
(7)	The upper part of the battery pack is sealed on the inner lip to ensure tightness. If necessary, complete with sealant provided with the new battery pack.	
(8)	Re-insert the control head on the new battery pack, and screw in the fixture screws.	
(9)	Re-install the portable antenna around the ELT unit as it was before.	
(10)	Install the ELT.	Refer to Paragraph 2.
(11)	Do a functional check of the ELT.	Refer to Paragraph 3.

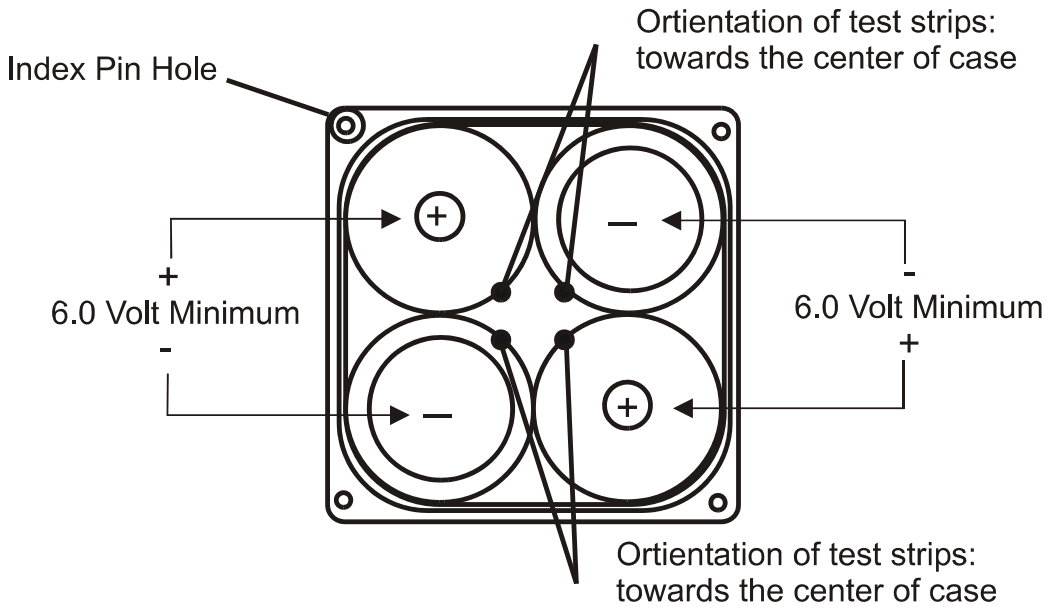


Figure 6: ELT Battery Voltage and Polarity Test (ACK E-01)

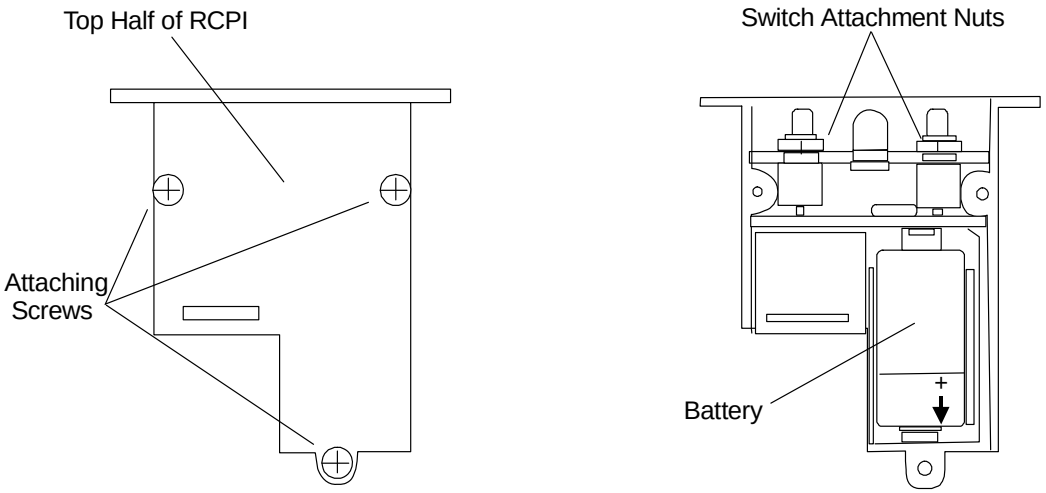


Figure 7: RCPI Battery Installation (ACK E-01)

C. Artex ME 406, ME 406 ACE

You must only use a battery pack that is supplied by the equipment manufacturer.

Note: The battery pack contains components that are sensitive to static electricity. You must take electro-static discharge precautions before doing work on the battery pack.

Note: The battery pack is connected to the ELT by a short electrical cable assembly. You must take care not to strain this cable when you separate the battery pack from the ELT.

	Detail Steps/Work Items	Key Items/References
(1)	Remove the ELT from the airplane ELT mounting.	Refer to Paragraph 2.
(2)	Remove the battery pack: – Remove the 8 screws from the battery-side cover. – Carefully move the battery pack a short distance clear of the ELT. – Disconnect the wiring harness. – Move the battery pack clear of the ELT.	Refer to Figure 8. Hold the battery pack to the ELT with your hand to prevent the battery pack separating from the ELT.
(3)	Do a visual inspection of the underside of the ELT (the battery pack side). Look specially for corrosion or other damage to the ELT casing.	
(4)	Prepare the new battery pack for installation.	
(5)	Lay the battery pack on the work surface with the batteries facing up.	
(6)	Install the replacement seal.	In the slot along the perimeter housing.
(7)	Position the ELT over the battery pack and plug the connector into the battery assembly.	Make sure that the cable is not twisted and that the connector is correctly attached.
(8)	Mate the ELT to the battery.	Make sure that the seal is positioned correctly.
(9)	Install the 8 screws that attach the battery pack to the ELT.	

	Detail Steps/Work Items	Key Items/References
(10)	Install the ELT in the airplane mounting and attach the Battery Pack Replacement Date label to the top surface of the ELT protective cover where it can be easily seen.	Refer to Paragraph 2.
(11)	Record the details of the ELT battery pack replacement date in the airplane log-book.	
(12)	Do a functional test of the ELT.	Refer to Paragraph 3.

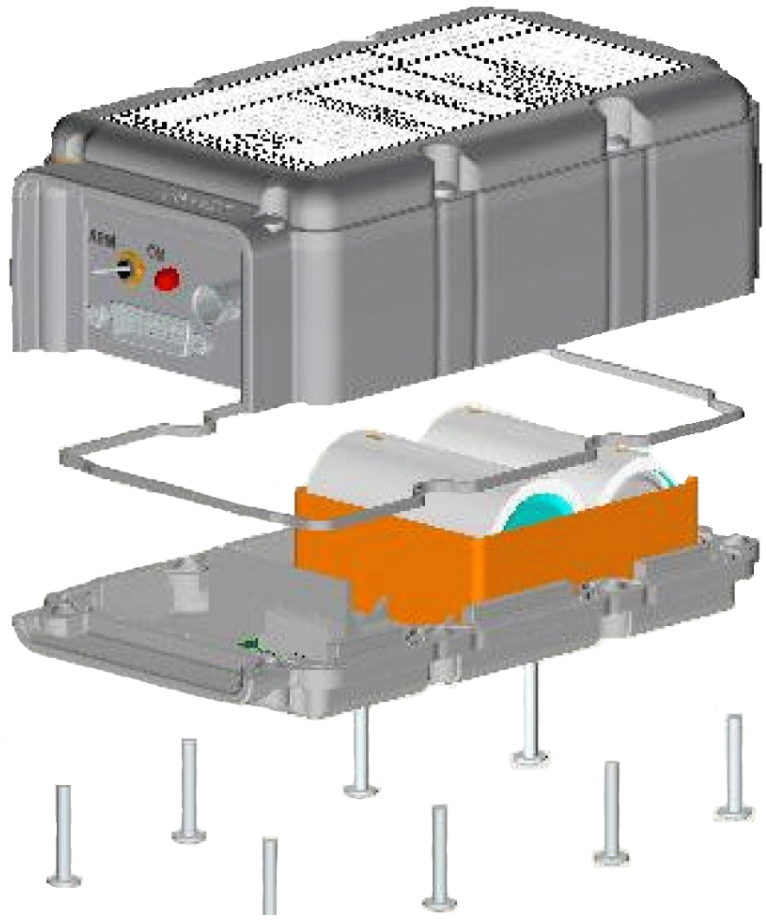


Figure 8: Battery Pack Installation - Artex ME 406 and ME 406 ACE

D. Artex C406-1

You must change the battery pack on or before the battery replacement (expiration) date. You must replace the battery pack after a cumulative transmission time of one hour. You must replace the battery pack after use in an emergency. You must replace the battery pack after an inadvertent activation of unknown duration.

	Detail Steps/Work Items	Key Items/References
	NOTE: THE BATTERY PACK CONTAINS STATIC SENSITIVE PARTS, TAKE ESD PRECAUTION BEFORE HANDLING.	
(1)	Remove the ELT from the airplane.	Refer to Paragraph 2.
(2)	Remove the 4 retaining screws from the battery pack.	Refer to Figure 9.
	WARNING: THE BATTERY PACK IS CONNECTED TO THE ELT VIA SHORT INTERCONNECT HARNESS WHICH LIMIT THE DISTANCE OF SEPARATION BETWEEN THE TWO COMPONENTS PRIOR TO DISCONNECTING THE HARNESSES.	
(3)	Lay the ELT on its side.	
(4)	Carefully lift the battery pack away from the ELT and lay alongside the ELT unit.	
(5)	Carefully disconnect the harness from the 8-pin connector on the small circuit board in the battery pack.	Do not short connector pins.
(6)	Disconnect the 2-pin harness from the ELT body.	
(7)	Inspect the battery pack and the underside of the ELT. The battery cells, components and connectors should be free of corrosion. The underside of the ELT should be corrosion free. Inspect for any broken wires or connections. Ensure the battery housing is free of cracks or other visible damage.	

	Detail Steps/Work Items	Key Items/References
(8)	When installing a new battery pack, remove the paper backing from the rubber seal at the connector end of the battery pack.	It is recommended that this seal be coated with a non-petroleum based silicon grease to provide a moisture resistant seal once the battery is installed.
(9)	To install the battery pack, connect the 8-pin connector to the header on the circuit board in the battery pack.	
(10)	Connect the 2-pin power harness to the ELT.	This step will cause the ELT to activate. Reset the ELT by toggling the 'ON/OFF' switch on the ELT from 'ON' to 'OFF'.
(11)	Fit the battery pack into place dressing wires away from the standoffs to avoid pinching wires between standoffs and battery pack.	
(12)	Reinstall the 4 screws and tighten securely.	Do not over torque the screws.
(13)	Apply the new battery expiration date label provided with the battery pack to the exterior of the ELT (i.e. on the end cap or other visible location).	
(14)	Reinstall the ELT into the mounting tray.	Refer to Paragraph 2.
(15)	Do a functional test of the ELT.	Refer to Paragraph 3.

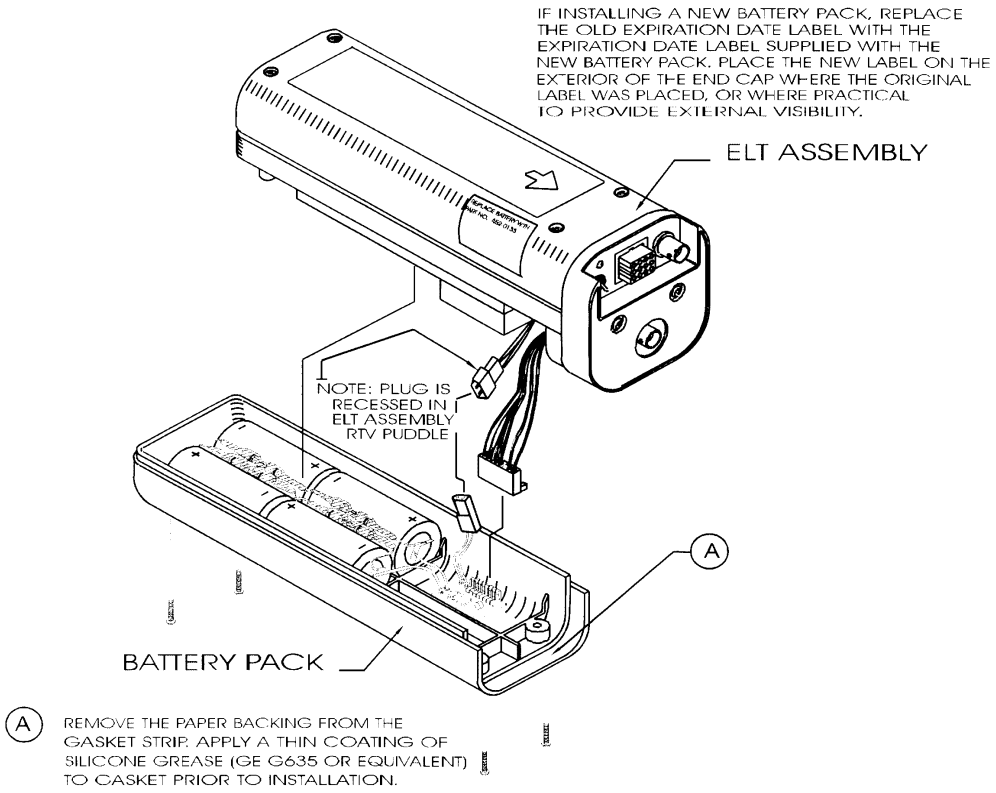


Figure 9: Battery Pack Installation - Artex C 406-1

5. Remove/Install the RCPI

This Paragraph is valid for the ACK E-01 ELT only.

A. Remove the RCPI

	Detail Steps/Work Items	Key Items/References
(1)	Remove the instrument panel cover.	Refer to Section 25-10.
(2)	Disconnect the electrical cable from the rear of the RCPI.	At the in-line connector.
(3)	Remove the 4 screws which attach the RCPI to the instrument panel.	
(4)	Move the RCPI forward and clear of the airplane.	

B. Install the RCPI

	Detail Steps/Work Items	Key Items/References
(1)	Move the RCPI into position in the instrument panel.	
(2)	Install the 4 screws which attach the RCPI to the instrument panel.	
(3)	Connect the electrical cable to the rear of the RCPI.	At the in-line connector.
(4)	Install the instrument panel cover.	Refer to Section 25-10.
(5)	Do a functional test of the ELT system.	Refer to Paragraph 3.

6. Replace the RCPI Battery

This Paragraph is valid for the ACK E-01 ELT only.

	Detail Steps/Work Items	Key Items/References
(1)	Remove the RCPI from the airplane.	Refer to Paragraph 5.
(2)	Remove the 3 screws which attach the top and bottom halves of the RCPI.	Refer to Figure 7.
(3)	Loosen the 2 switch attaching nuts from the front of the RCPI.	
(4)	Carefully remove the top half of the RCPI. You will see the battery compartment. Remove the battery.	
(5)	Examine the battery contacts. Use a stiff brush and an electrical contact cleaner to carefully remove ant dirt or corrosion from the contacts.	
	CAUTION: DO NOT USE ABRASIVE CLEANERS. THE CONTACTS ARE NICKEL AND GOLD PLATED SPRING STEEL. AN ABRASIVE CLEANER WILL REMOVE THIS PLATING AND DAMAGE THE CONTACTS.	
(6)	If the contacts are badly corroded, replace them.	
(7)	Insert the battery into the battery compartment.	
(8)	Install the top half of the RCPI onto the bottom half of the RCPI.	
(9)	Install the 3 retaining screws.	
(10)	Tighten the 2 switch retaining nuts.	
(11)	Install the RCPI into the airplane.	Refer to Paragraph 5.
(12)	Record the date when the RCPI battery is next due replacement on a self adhesive which is supplied with the ELT.	
(13)	Attach the self adhesive label to the ELT where it can easily seen.	
(14)	Do a functional test of the ELT.	Refer to Paragraph 3.

7. Remove/Install the RCS

A. Remove the RCS

	Detail Steps/Work Items	Key Items/References
(1)	Remove the instrument panel cover.	Refer to Section 25-10.
(2)	Disconnect the electrical cable from the rear of the RCS.	At the in-line connector.
(3)	Remove the 4 screws which attach the RCS to the instrument panel.	
(4)	Move the RCS forward and clear of the airplane.	

B. Install the RCS

	Detail Steps/Work Items	Key Items/References
(1)	Move the RCS into position in the instrument panel.	
(2)	Install the 4 screws which attach the RCS to the instrument panel.	
(3)	Connect the electrical cable to the rear of the RCS.	At the in-line connector.
(4)	Install the instrument panel cover.	Refer to Section 25-10.
(5)	Do a functional test of the ELT system.	Refer to Paragraph 3.

8. ELT Periodic Inspection

The ELT installation must be inspected at least once every 12 months to maintain serviceability.

A. ACK E-01

	Detail Steps/Work Items	Key Items/References
(1)	Examine the ELT and the ELT mounting tray, look specially for: – Security of the fasteners. – Security of all mechanical assemblies.	
(2)	Examine the Co-axial cable from the ELT to the antenna. Look specially for: – Cuts or abrasions to the outer sheath of the co-axial cable.	
(3)	Disconnect the co-axial cable from the antenna and the ELT. Examine the connectors at each end of the co-axial cable, the antenna and the ELT for corrosion or damage. Reconnect the co-axial cable.	
(4)	Examine the modular cable which connects the ELT to the RCPI. Look specially for: – Cuts or abrasions to the outer sheath of the cable.	
(5)	Disconnect the modular cable from both the ELT and the RCPI. Examine the electrical connections at each end of the modular cable for corrosion or damage. Reconnect the modular cable.	
(6)	Read the expiry dates of the system batteries and replace the batteries if necessary.	Refer to Paragraph 4.
(7)	Remove the battery case from the ELT.	Refer to Paragraph 4.

	Detail Steps/Work Items	Key Items/References
(8)	Examine the battery compartment. Look specially for: – Corrosion of the battery spring clips. – Battery leakage.	If one battery leaks, then you must replace all batteries.
(9)	Install the battery case to the ELT.	Refer to Paragraph 4.
(10)	Do a function test of the ELT system.	Refer to Paragraph 3.

B. Jolliet JE2-NG

	Detail Steps/Work Items	Key Items/References
(1)	Examine the ELT and the ELT mounting tray, look specially for: – Security of the fasteners. – Security of all mechanical assemblies.	
(2)	Examine the co-axial cable from the ELT to the antenna. Look specially for: – Cuts or abrasions to the outer sheath of the co-axial cable.	
(3)	Disconnect the co-axial cable from the antenna and the ELT. Examine the connectors at each end of the co-axial cable, the antenna and the ELT for corrosion or damage. Reconnect the co-axial cable.	
(4)	Examine the cable which connects the ELT to the RCS. Look specially for: – Cuts or abrasions to the outer sheath of the cable.	
(5)	Read the expiry date of the system battery and replace the battery if necessary.	Refer to Paragraph 4.
(6)	Do a function test of the ELT system.	Refer to Paragraph 3.

C. Artex ME 406, ME 406 ACE

	Detail Steps/Work Items	Key Items/References
(1)	Examine the ELT and the ELT mounting tray, look specially for: – Security of the fasteners. – Security of all mechanical assemblies.	
(2)	Examine the co-axial cable from the ELT to the antenna. Look specially for: – Cuts or abrasions to the outer sheath of the co-axial cable.	
(3)	Disconnect the co-axial cable from the antenna and the ELT. Examine the connectors at each end of the co-axial cable, the antenna and the ELT for corrosion or damage. Reconnect the co-axial cable.	
(4)	Examine the cable which connects the ELT to the RCS. Look specially for: – Cuts or abrasions to the outer sheath of the cable.	
(5)	Read the expiry date of the system battery and replace the battery if necessary.	Refer to Paragraph 4.

D. Artex C 406-1

	Detail Steps/Work Items	Key Items/References
(1)	Examine the ELT and the ELT mounting tray, look specially for: – Security of the fasteners. – Security of all mechanical assemblies.	
(2)	Examine the co-axial cable from the ELT to the antenna. Look specially for: – Cuts or abrasions to the outer sheath of the co-axial cable.	
(3)	Disconnect the co-axial cable from the antenna and the ELT. Examine the connectors at each end of the co-axial cable, the antenna and the ELT for corrosion or damage. Reconnect the co-axial cable.	
(4)	Examine the cable which connects the ELT to the RCS. Look specially for: – Cuts or abrasions to the outer sheath of the cable.	
(5)	Read the expiry date of the system battery and replace the battery if necessary.	Refer to Paragraph 4.

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CHAPTER 26

FIRE PROTECTION

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CHAPTER 26

FIRE PROTECTION - GENERAL

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2. Description 1

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CHAPTER 26
FIRE PROTECTION - GENERAL

1. General

This Chapter tells you only about the fire extinguisher installed in the airplane. See the fire extinguisher manufacturer's manual for more data about the extinguisher.

Note: Equipment which is certified for installation in the DA 40 is listed in Section 6.5 of the Airplane Flight Manual. Such equipment may be installed in accordance with the Airplane Maintenance Manual.

Any equipment which is not listed in Section 6.5 of the Airplane Flight Manual is called "Additional Equipment". The installation of Additional Equipment is a modification which must be handled in accordance with national regulations or a Service Bulletin.

2. Description

Figure 1 shows the installation of the fire extinguisher in the airplane. The fire extinguisher is located behind the co-pilot's seat. Screws attach the extinguisher mounting bracket to the closing rib between the front and the rear main bulkhead. The extinguisher uses a liquid gas which is non-toxic and does not have a residue.

The only on-airplane maintenance is:

– Monitor the pressure indicator. It must show in the green sector.

– Make sure that the seal wire is not broken.

– Make sure that the extinguisher is correctly held in the mounting.

If the seal wire is broken, remove the extinguisher for weighing. Weight data is given on the label attached to the extinguisher body.

You must replace the extinguisher (or return it to the manufacturer for repair):

– When the weight is incorrect.

– When the pressure is too low.

– When the extinguisher has been used.

– If the extinguisher is damaged.

– At the ‘Next Overhaul Date’ that is given on the label attached to the extinguisher body.

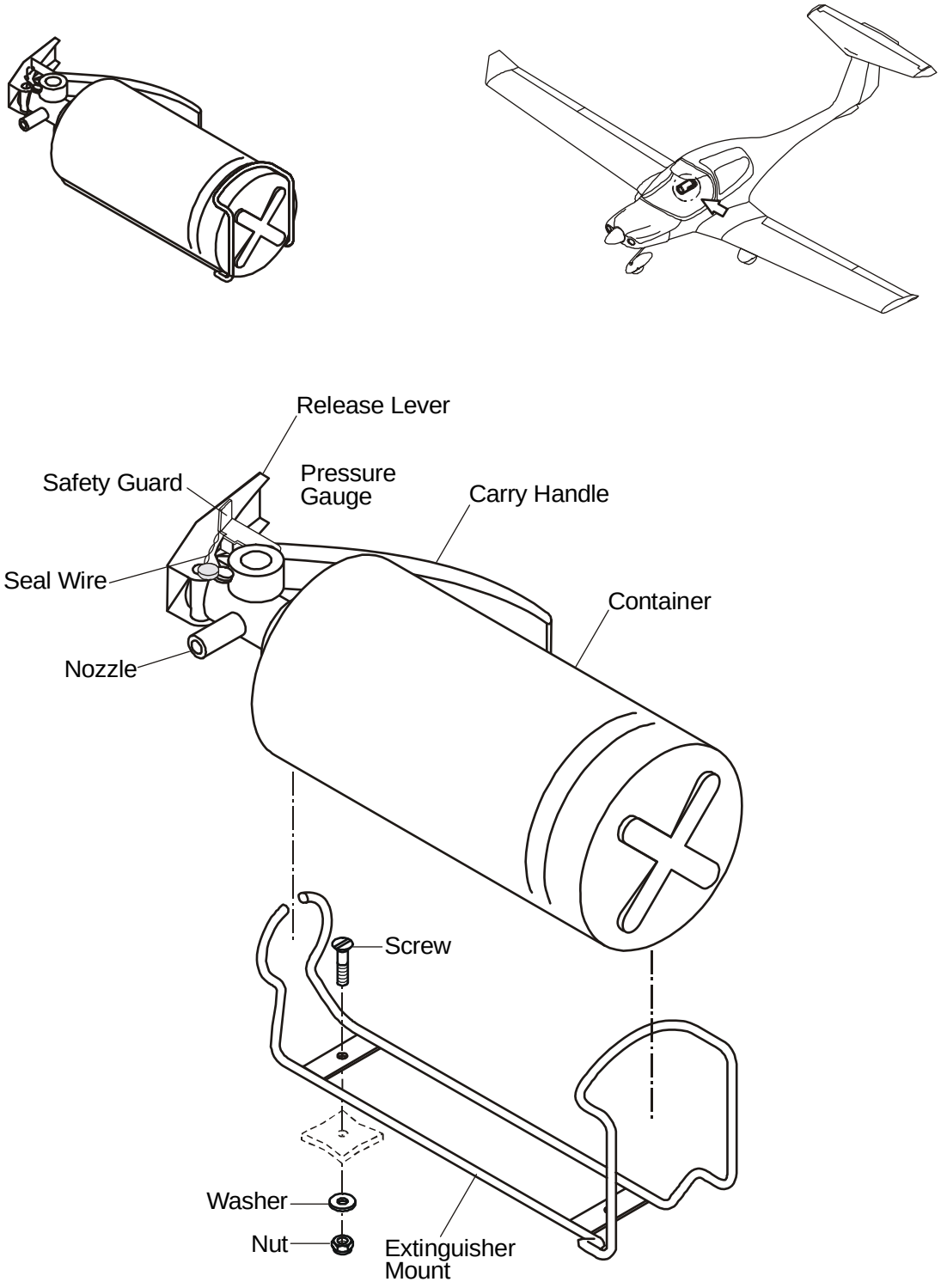


Figure 1: Fire Extinguisher Installation

CHAPTER 27

FLIGHT CONTROLS

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CHAPTER 27
FLIGHT CONTROLS

1. General

This Section tells you about the operation and the adjustment of the flight controls. It also tells you about the assembly of the flight controls. Refer to the related Section for the data on a specified system.

This Section tells you how standard parts are used to make the flight controls for each system.

Note: Equipment which is certified for installation in the DA 40 is listed in Section 6.5 of the Airplane Flight Manual. Such equipment may be installed in accordance with the Airplane Maintenance Manual.

Any equipment which is not listed in Section 6.5 of the Airplane Flight Manual is called "Additional Equipment". The installation of Additional Equipment is a modification which must be handled in accordance with national regulations or a Service Bulletin.

2. Description

The DA 40 has the usual flight controls. An elevator attached to the horizontal stabilizer gives longitudinal control. Ailerons attached to the trailing edge of each wing give lateral control. The rudder attached to the vertical stabilizer gives yaw control. Flaps attached to the trailing edge of each wing give extra lift for landing and for take-off.

The DA 40 has a control stick for each pilot. The pilot can set the elevator trim with a control wheel in the center console.

Each pilot has a rudder pedal assembly. The assembly attaches to the cockpit floor. The pilot can adjust the position of the rudder pedals with an adjuster handle on the rudder pedal assembly.

The pilot moves each primary control through a system of push-rods and bellcranks. Cables operate the rudder. An electric actuator operates the flaps.

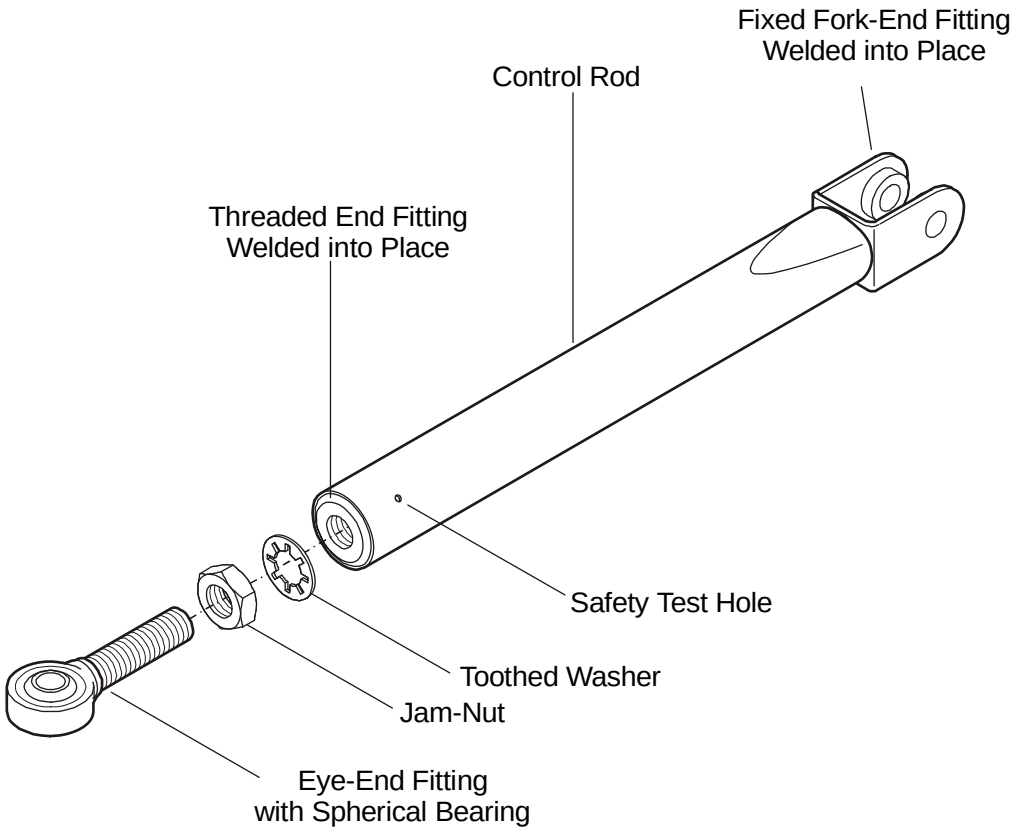


Figure 1: Standard Push-Rod

3. Push-Rods

The push-rods used in the DA 40 have standard end fittings. Also most rods use a standard diameter tube. Only the length of the rods is special. Some rods have one fixed fork end and one adjustable eye-end fitting. Other rods have two adjustable eye-end fittings.

Figure 1 shows an example of a standard push-rod. The rod has one adjustable end fitting. The end fitting has an eye-end with a threaded shaft. The eye-end has a spherical bearing. A jam-nut on the threaded shaft locks the eye-end in position. A toothed washer locks the nut. You can turn the eye-end to adjust the length of the rod.

A steel tube connects the end fittings. A threaded insert is welded into the steel tube to take the eye-end. A safety hole is drilled in the end of the steel tube with the adjustable end fitting. The safety hole shows you if the installation of the eye-end to the insert in the steel tube is correct. If you can push the safety wire through the hole to the other side, the eye-end installation is not correct. But, if you cannot push the safety wire through the hole, the eye-end installation is correct.

A fixed fork-end is welded to the steel tube.

Refer to Maintenance Practices in this Section for the procedures for adjusting push-rods.

4. Control Rigging

The flight controls of the DA 40 have been designed to make correct rigging as easy as possible. All levers and bellcranks have holes for rigging pins. The rigging pins lock the levers in the neutral position.

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Maintenance Practices

1. General

These Maintenance Practices tell you how to do procedures (such as push-rod adjustment) which apply to all of the control systems.

2. Push-Rod Adjustment

WARNING: IF YOU DO AN ADJUSTMENT OF A PUSH-ROD, YOU MUST MAKE SURE THAT THE PUSH-ROD IS STILL IN SAFETY. IF YOU DO NOT DO THIS, THE PUSH-ROD CAN DISCONNECT. THIS CAN CAUSE DEATH OR INJURY TO PERSONS.

	Detail Steps/Work Items	Key Items/References
(1)	Release the bolt attaching the push-rod to the lever or bellcrank.	At the end with an adjustable end fitting.
(2)	Loosen the jam-nut on the adjustable end fitting.	Refer to Figure 1.
(3)	Turn the eye-end to adjust the length of the rod.	Turn clockwise to make the rod shorter. Turn counter-clockwise to make the rod longer.
(4)	Do a test for safety of the eye-end. Push a piece of lock-wire through the safety test hole.	The wire must not go through the hole and out the other side.
(5)	Tighten the jam-nut.	Torque: 16 Nm (11.8 lbf.ft.).
(6)	Put the end-fitting in position in the lever or bellcrank.	
(7)	Install the bolt, washer and self-locking nut.	Torque: 6.4 Nm (4.7 lbf.ft.). You must always use a new self-locking nut.
(8)	Do an inspection of the control that you have adjusted. – If necessary for your Airworthiness Authority, do a second inspection of the control.	

3. Remove/Install Bellcranks and Levers

The DA 40 has standard attachments for bellcranks and levers in the flight control systems. Refer to the tables at the end of each Section for access data. Refer to the Figures in the related Section for the correct orientation.

A. Remove a Bellcrank or Lever

	Detail Steps/Work Items	Key Items/References
(1)	Release the bolts attaching the push-rods to the lever or bellcrank.	
(2)	Remove the pivot bolt from the lever or bellcrank.	
(3)	If necessary, remove the mounting bracket: – Remove the attaching bolts and washers.	Where you have access to both sides of the attachment, bolts with washers and nuts are used. In all other cases, anchor-nuts are used.

B. Install a Bellcrank or Lever

	Detail Steps/Work Items	Key Items/References
(1)	Put the mounting bracket in position.	If removed.
	Note: You must always use *new* self-locking nuts when installing control levers or bellcranks. Do not use a self-locking nut more than once.	
(2)	Install the attaching bolts, washers and nuts.	Torque: 6.4 Nm (4.7 lbf.ft.).
(3)	Put the bellcrank or lever in position in the mounting bracket.	Make sure that the bushes and spacer are in position.
(4)	Install the pivot bolt, washer and nut.	Torque: 6.4 Nm (4.7 lbf.ft.).
(5)	Install the bolts, washers and self-locking nuts which attach the push-rods.	Torque: 6.4 Nm (4.7 lbf.ft.).
(6)	Do a test of the control system.	Refer to the related Section.
(7)	Do an inspection of the control that you have installed or adjusted. – If necessary for your Airworthiness Authority, do a second inspection of the control.	

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Section 27-10
Flight Controls - Ailerons and Tabs

1. General

The DA 40 has two control sticks that operate the ailerons. The aileron control system uses push-rods and bellcranks.

Figure 1 shows the aileron controls in the fuselage. Figure 2 shows the aileron controls in the wing.

2. Description

The DA 40 has a control stick for each pilot for the aileron and elevator controls. Aileron push-rods connect to the bottom of the control sticks. The push-rods connect to the aileron front bellcrank at the control bulkhead. The front bellcrank at the control bulkhead connects to a short push-rod under the center console.

The push-rod under the center console connects to an idler lever attached to the front main bulkhead. A push-rod connects the idler lever to the rear aileron bellcrank on the rear face of the rear main bulkhead.

The rear bellcrank connects to the two push-rods in the center section. Each rod connects to a long push-rod in the wing.

Each long push-rod has three push-rod guides. The first push-rod guide attaches to the root rib. The second attaches to the flap-control rib. A small rib holds the third push-rod guide. The two long push-rods connect to the two aileron bellcranks, one in each wing.

Short push-rods connect the aileron bellcranks to the aileron horns. You can adjust the short push-rods to move the range up or down.

The aileron stop which limits the stick movement to the right side (right aileron up, left aileron down) is located left of the pilot's control stick (refer to Figure 1). The aileron stop which limits the stick movement to the left side (left aileron up, right aileron down) is located right of the co-pilot's control stick. Each aileron stop consists of a nut which is welded to the torque tube assembly, a bolt which is held by that nut, and a jam-nut which secures the bolt.

Additional, non-adjustable stops are located in front of the leading edge of the LH and RH aileron. Each stop consists of a GFRP block with rubber coating, bonded to the inside of the upper wing skin. When the aileron is deflected fully downward, the aileron paddle is deflected fully upward and contacts the stop.

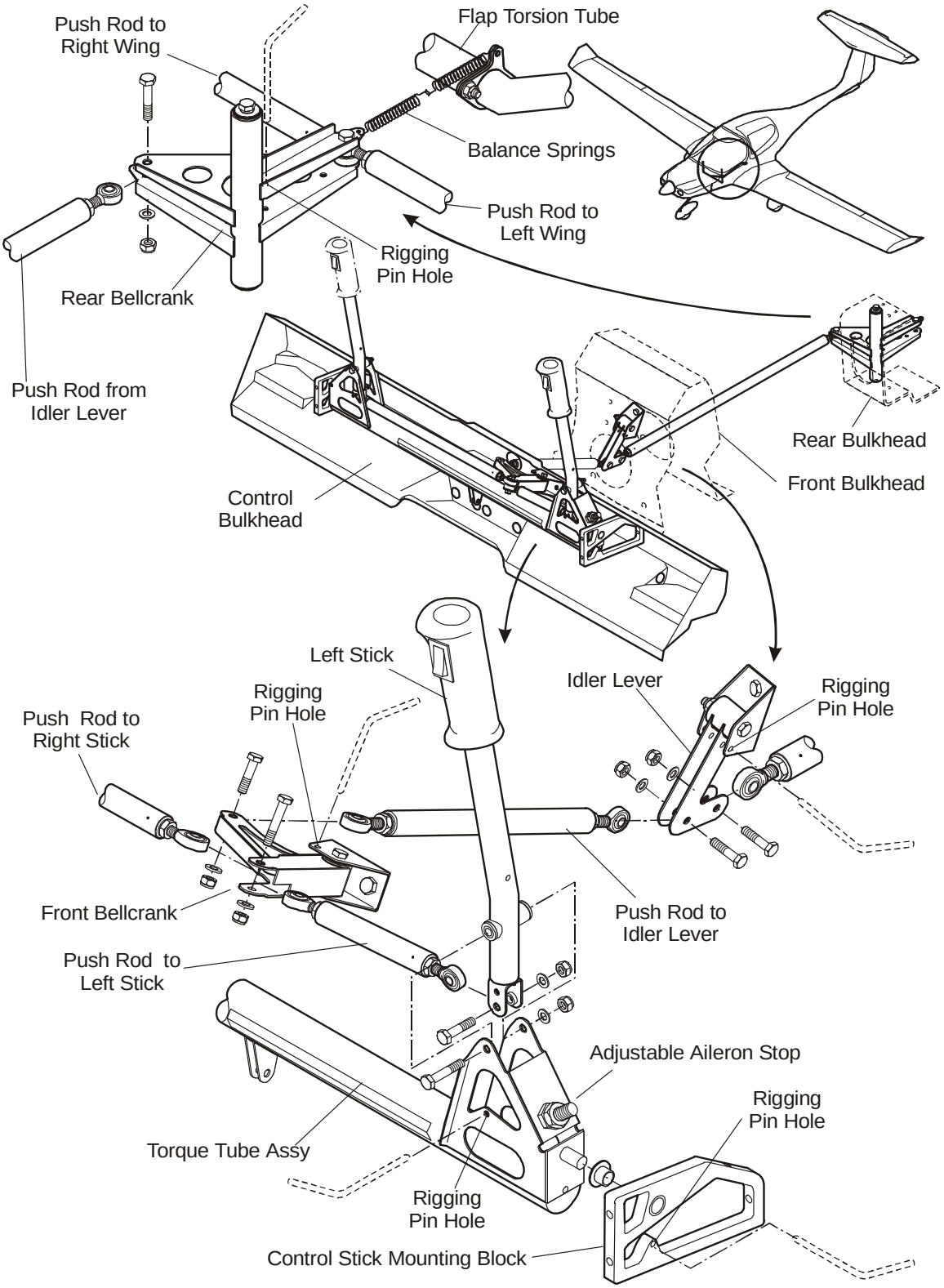


Figure 1: Aileron Controls in the Fuselage

3. Operation

If you move the control sticks to the left:

– The push-rods connected to the stick move to the right.

– The front bellcrank moves the push-rod below the center console to the rear.

– The push-rod below the center console moves the idler lever and second short push-rod to the rear.

– The second short push-rod moves the rear bellcrank so that the long push-rods in the wing move to the left.

– The left aileron bellcrank in the left wing moves the short push-rod attached to the left aileron horn to the rear.

– The left aileron moves up.

– The push-rod in the right wing also moves to the left. It pulls the aileron bellcrank in the wing which moves the push-rod attached to the right aileron horn forward.

– The right aileron moves down.

If you move the control sticks to the right:

– The left aileron moves down.

– The right aileron moves up.

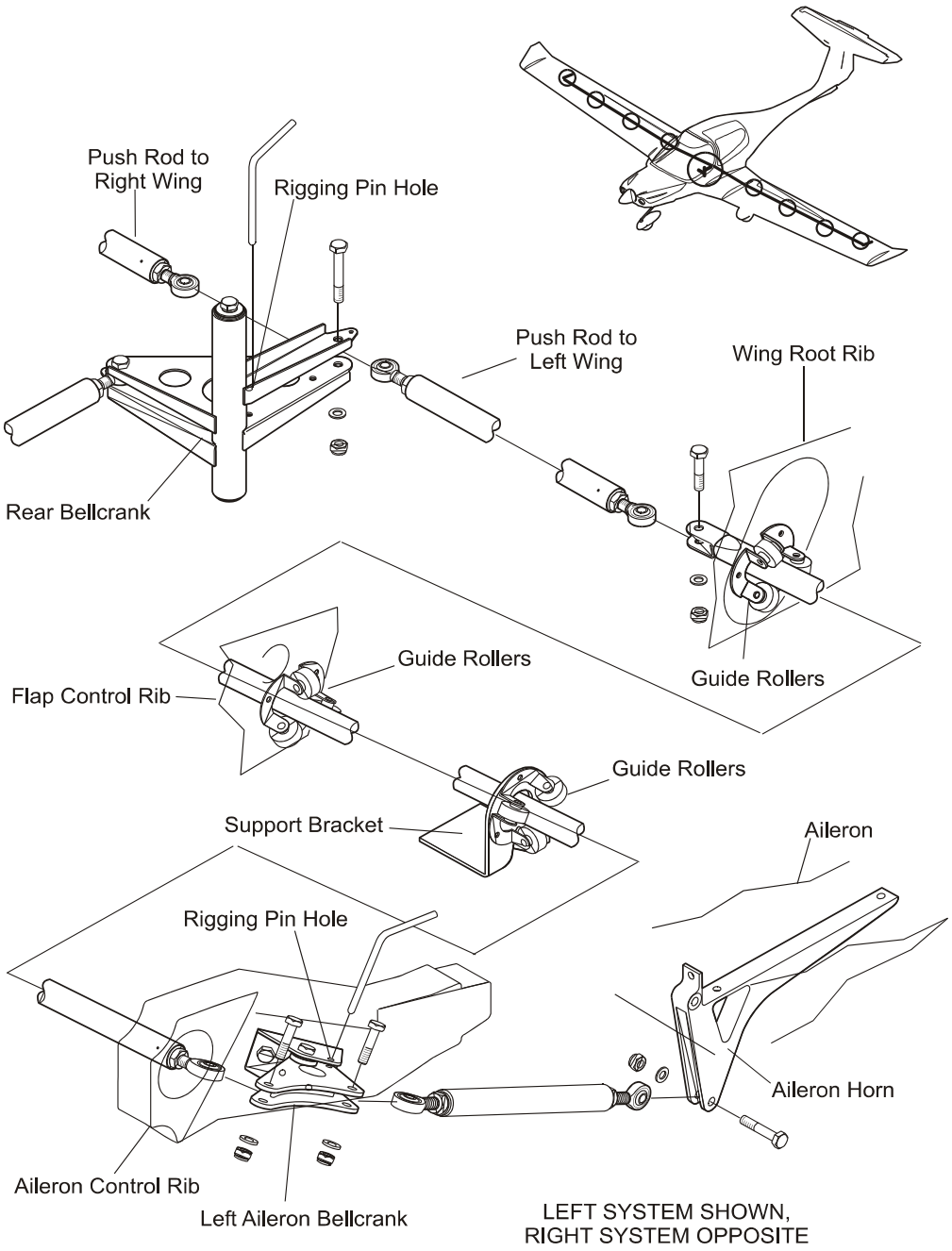


Figure 2: Aileron Controls in the Wings

Trouble-Shooting

1. General

The table below lists the defects you could have in the aileron control system. If you have the trouble detailed in the Trouble column read across to the Possible Cause column. Then do the repair in the Repair column.

Trouble	Possible Cause	Repair
Airplane moves about its longitudinal axis in flight.	Aileron push-rods need adjusting.	Adjust the aileron push-rods.
Aileron controls stiff/catch.	Bearings defective.	Replace the defective eye-end.
	Control rod guides defective.	Replace the guides.
	Push-rod bent.	Replace the push-rod.

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Maintenance Practices

1. General

These Maintenance Practices tell you how to do tests on the aileron control system. They also tell you how to adjust the aileron control system. Refer to Paragraphs 4 and 5 for removal, installation and access data on the push-rods and bellcranks. Refer to Section 57-60 to remove/install the ailerons.

WARNING: WHEN YOU DO WORK ON THE AIRPLANE CONTROLS, YOU MUST MAKE SURE THE AREA AROUND THE CONTROLS/CONTROL SURFACES ARE CLEAR OF PERSONNEL AND EQUIPMENT. IF YOU DO NOT DO THIS, INJURY TO PERSONNEL AND DAMAGE TO CONTROL SURFACES CAN OCCUR.

WARNING: WHEN YOU COMPLETE WORK ON THE CONTROLS, MAKE SURE THAT YOU REMOVE ALL LOOSE ITEMS OR TOOLS FROM THAT AREA. LOOSE ITEMS OR TOOLS CAN PREVENT FULL MOVEMENT OF THE AIRPLANE CONTROLS. THIS CAN CAUSE DEATH OR INJURY TO PERSONS.

2. Aileron Control System Test for Correct Range of Movement

A. Equipment

Item	Quantity	Part Number
Control stick rigging pins.	2	-
Ruler.	1	Commercial.

B. Aileron Control Test Procedure

Note: Use a ruler to make all measurements at the aileron control surfaces. Make the measurement between the top surface of the aileron, and the top surface of the wing tip.

	Detail Steps/Work Items	Key Items/References
(1)	Make a copy of the Control Surfaces Adjustment Report.	Refer to Section 06-00. Use it to record the measurements.
(2)	Remove the left pilot's seat.	Refer to Section 25-10.
(3)	Install the control stick rigging pins: – At the bottom of the left stick. – Through the left mounting bracket into the torque tube.	Refer to Figure 1. To lock aileron movement. To lock elevator movement.
(4)	Measure the distance between the trailing edge of each aileron and the trailing edge of the wing tip.	Record these measurements. The left aileron must align with the right aileron.
(5)	Remove the rigging pins from the following: – The bottom of each control stick. – The left stick mounting bracket.	
	WARNING: WHEN YOU DO WORK ON THE AIRPLANE CONTROLS, YOU MUST MAKE SURE THE AREAS AROUND THE CONTROLS/CONTROL SURFACES ARE CLEAR OF PERSONS/EQUIPMENT. IF YOU DO NOT DO THIS, INJURY TO PERSONNEL AND DAMAGE TO CONTROL SURFACES CAN OCCUR.	
(6)	Move the control stick fully to the left and hold it against the stop.	
(7)	Measure the distance between the trailing edge of the left aileron and the trailing edge of the wing tip.	Record the measurement. The distance must be as shown in the Control Surfaces Adjustment Report.

	Detail Steps/Work Items	Key Items/References
(8)	Measure the distance between the trailing edge of the right aileron and the trailing edge of the wing tip.	Record the measurement. The distance must be as shown in the Control Surfaces Adjustment Report.
(9)	Move the control stick fully to the right and hold it against the stop.	
(10)	Measure the angle between the trailing edge of the right aileron and the trailing edge of the wing tip.	Record the measurement. The distance must be as shown in the Control Surfaces Adjustment Report.
(11)	Measure the angle between the trailing edge of the left aileron and the trailing edge of the wing tip.	Record the measurement. The distance must be as shown in the Control Surfaces Adjustment Report.
(12)	Install the right pilot’s seat.	Refer to Section 25-10.

3. Aileron Control System Adjustments

If you cannot get the correct range of movement of the aileron control system, use this procedure to adjust the system. Gust travel refers to the amount of travel remaining at the control surface with the control stick held against the cockpit stop.

WARNING: IF YOU DO AN ADJUSTMENT OF A PUSH-ROD, YOU MUST MAKE SURE THAT THE PUSH-ROD IS STILL IN SAFETY. IF YOU DO NOT DO THIS, THE PUSH-ROD CAN DISCONNECT. THIS CAN CAUSE DEATH OR INJURY TO PERSONS.

Item	Quantity	Part Number
Rigging pins.	3	-
Ruler.	1	Commercial.

A. Aileron Adjustment Procedure

	Detail Steps/Work Items	Key Items/References
(1)	Remove these items for access: – Pilots' seats. – Passenger seat. – Push-rod access panels under the center section. – Aileron bellcrank access panels under each wing.	 Refer to Section 25-10. Refer to Section 52-40.
(2)	Install rigging pins in the following: – The bottom of each control stick. – The left stick mounting bracket. – The front bellcrank. – The idler lever. – The rear bellcrank. – The left aileron bellcrank. – The right aileron bellcrank.	Refer to Figures 1 and 2. To lock the stick to the torque tube. To lock the elevator movement. On the control bulkhead. On the front main bulkhead. On the rear main bulkhead. In the wing. In the wing.

	Detail Steps/Work Items	Key Items/References
	Note: Keep the aileron rigging pins in position until you have completed the adjustments. You can do the procedure with 3 rigging pins. Lock each lever or bellcrank in sequence.	
(3)	If you cannot put a rigging pin into a lever or bellcrank, adjust the push-rods as necessary.	Refer to Section 27-00 for the push-rod adjustment procedure.
(4)	Measure the distance between the trailing edge of each aileron and the trailing edge of the wing tip.	Record these measurements. The left aileron must align with the right aileron.
(5)	Remove the rigging pins from the following: – The bottom of each control stick. – The left stick mounting bracket. – The front bellcrank. – The idler lever. – The rear bellcrank. – The left aileron bellcrank. – The right aileron bellcrank.	Refer to Figures 1 and 2. On the control bulkhead. On the front main bulkhead. On the rear main bulkhead. In the wing. In the wing.
(6)	Do the Aileron Control Test Procedure.	Refer to Paragraph 2.
(7)	If necessary, adjust the push-rods between the aileron bellcranks in the wing and the ailerons.	Refer to Section 27-00. Adjust the rods to give the measurements in the original Control Surfaces Adjustment Report supplied with the airplane.
(8)	If necessary, adjust the aileron stop bolts in the torque tube assembly: – Release the jam-nut on the stop bolt. – Adjust the stop bolt to give the correct range of movement. – Tighten the jam-nut on the stop bolt.	Refer to Figure 1. The aileron positions must be the distances shown in the Control Surfaces Adjustment Report. (measured from the neutral position).

	Detail Steps/Work Items	Key Items/References
(9)	Do an inspection of the controls that you have adjusted. – If necessary for your Airworthiness Authority, do a second inspection of the controls.	
(10)	Install these items: – Pilots' seats. – Passenger seat. – Push-rod access panels under the center section. – Aileron bellcrank access panels under each wing.	 Refer to Section 25-10. Refer to Section 52-40.

4. Aileron Push-Rod Access

Aileron Push-Rod	Remove/Install Access	References
Between the control stick and the bellcrank at the control bulkhead.	Pilots' seats.	Refer to Section 25-10.
Between the bellcrank at the control bulkhead and the idler lever at the front main bulkhead.	Pilots' seats.	Refer to Section 25-10.
Between the idler lever at the front main bulkhead and the bellcrank at the rear main bulkhead.	Pilots' seats. Passenger seat.	Refer to Section 25-10.
Between the bellcrank at the rear main bulkhead. and the wing root rib.	Passenger seat. Center section access panels.	Refer to Section 25-10. Refer to Section 52-40.
Between the wing root rib and the bellcrank in the left/right wing.	Center section access panels. Aileron bellcrank access panels under each wing.	Refer to Section 52-40.
Between the bellcrank in the left/right wing and the aileron.	Aileron bellcrank access panels under each wing.	Refer to Section 52-40.

5. Aileron Bellcrank and Lever Access

Aileron Bellcrank/Lever	Remove/Install Access	References
Bellcrank at the control bulkhead.	Pilots' seats.	Refer to Section 25-10.
Idler lever at the front main bulkhead.	Pilots' seats.	Refer to Section 25-10.
Bellcrank at the rear main bulkhead.	Passenger seat.	Refer to Section 25-10.
Bellcrank in the wing.	Aileron bellcrank access panels under each wing.	Refer to Section 52-40.

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Section 27-20
Flight Controls - Rudder

1. General

The DA 40 has the usual rudder control system. Each pilot has a rudder pedal assembly. The pilot can adjust the pedal position. Control cables connect the pedal assembly to the rudder. A fixed trim tab gives a small amount of adjustment to the rudder trim. You can only adjust the fixed trim tab on the ground.

2. Description

The DA 40 has a set of rudder control pedals for each pilot. The pedal assembly can be adjusted. Figures 1, 3, and 4 show the rudder control system. Figure 2 shows the rudder pedal assembly. Figure 3 shows the rudder pedal assembly with electrical pedal adjustment (optional equipment; OÄM 40-251).

The system has these parts:

– A rudder pedal assembly for each pilot at the front of the cockpit. The forward part of each pedal connects to a brake master cylinder (refer to Section 32-40).

– An adjuster handle for each pilot, attached to the aft face of the rudder pedal assembly, or, as optional equipment (OÄM 40-251 incorporated), an adjuster switch for each pilot, located at the rear wall of the leg room.

– A yoke (a “T”-shaped lever) assembly in the fuselage below the center console. The yoke attaches to the bottom of the control bulkhead and to the fuselage shell.

– A rudder pedestal at the rear of the fuselage. The rudder lower mounting-bracket is attached to the rudder leading edge. It connects the rudder to the rudder pedestal.

– Cable assemblies.

Six bolts attach each rudder pedal assembly to the cockpit floor.

Each rudder pedal assembly has two pedals. Each pedal has a lever and a foot pad. The pedal has an "S" shaped tube. The lower part of the "S" shaped tube aligns with the pivot of the pedal. The upper part of the "S" shaped tube aligns with the foot pad of the pedal.

Four control cables ('cockpit cables') go from the firewall to enter the bottom of each "S" shaped tube. A multi-hole fitting at the firewall gives adjustment for each cable. Each cable goes through an “S” shaped tube and comes out at the top. Each cable goes from the pedal assembly to the yoke.

Each outboard control cable goes through a Teflon tube in the aft face of the floor panel. Each outboard control cable goes inboard through a guide pulley on the control bulkhead. The cables connect each outer pedal to the front arm of the yoke.

Each inboard control cable goes through a Teflon tube in the aft face of the floor panel. The cables connect each inner pedal to the side arms of the yoke.

Two cable assemblies ('fuselage cables') attach to the rear of the yoke. Each cable assembly has a short front cable and a long rear cable. All cables go through Teflon tubes. A turnbuckle connects the front and rear cables. The turnbuckle can adjust the tension in the fuselage cables and the neutral position of the rudder.

The two fuselage cables go through Teflon tubes in the rear fuselage. The cables attach to the rudder lower mounting-bracket. The cables cross over each other in the rear fuselage.

The rudder stop which limits the rudder deflection to the left side is located left of the rudder lower hinge (refer to Figure 4). The rudder stop which limits the rudder deflection to the right side is located right of the rudder lower hinge. Each rudder stop consists of a nut which is welded to the rudder lower mounting-bracket, a bolt which is held by that nut, and a jam-nut which secures the bolt.

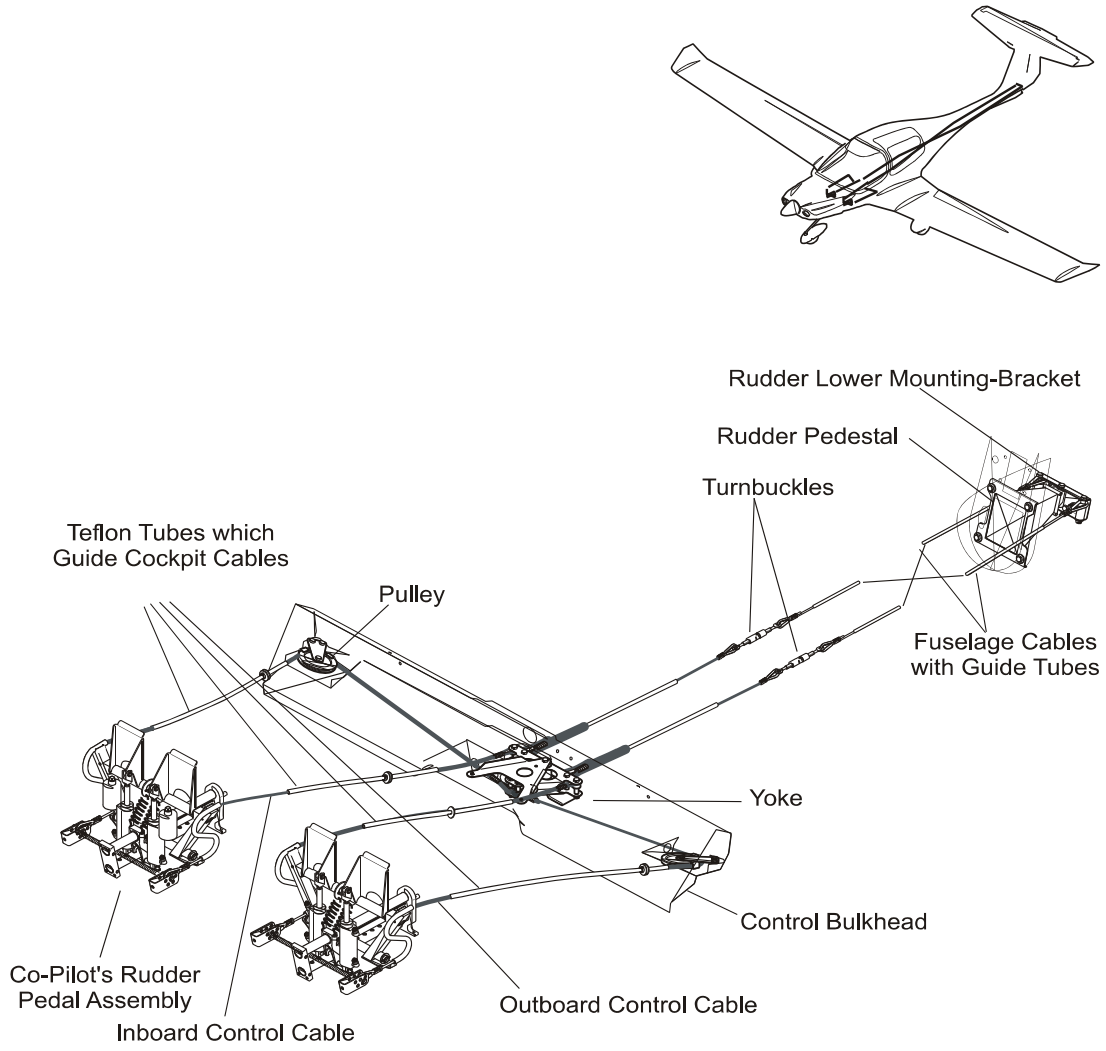


Figure 1: Rudder Control System

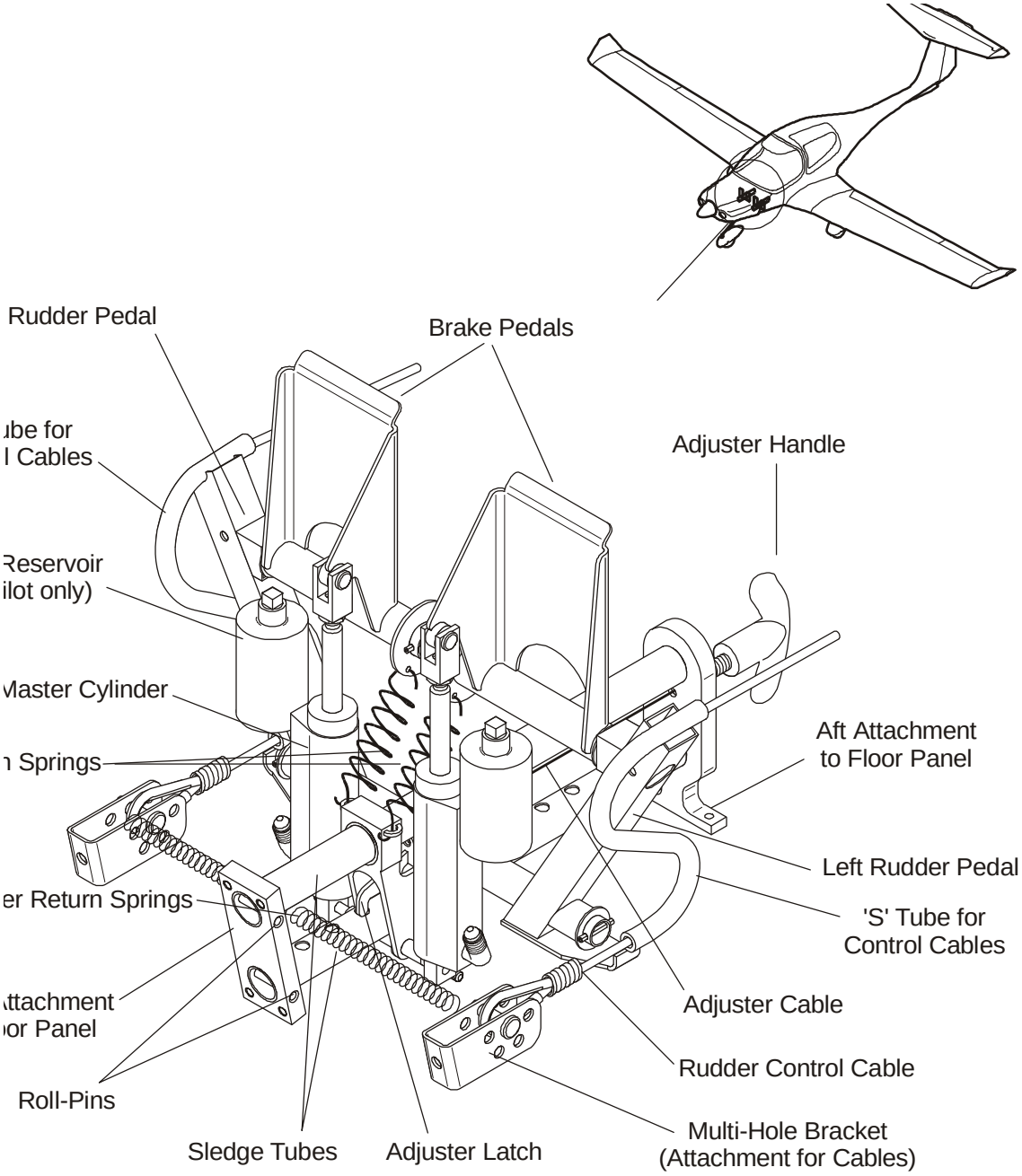


Figure 2: Rudder Pedal Assembly

3. Operation

A. Manual Adjustment

If you move the left rudder pedal forward:

– The top of the "S" shaped tube moves forward.

– The "S" shaped tube pulls the left cockpit cable.

– The left cockpit cable moves the yoke counter-clockwise (seen from above).

– The yoke pulls the fuselage cable attached to its right arm forward. This cable connects to the left of the rudder.

– The fuselage cable moves the rudder to the left.

– The rudder movement pulls the other fuselage cable aft. This cable connects to the left of the yoke.

– The fuselage cable moves aft with the left side of the yoke.

– The left side of the yoke pulls both of the right cockpit cables aft. And the cables pull the "S" shaped tubes on the right rudder pedals aft.

If you move the right rudder pedal forward each part moves in the opposite sense. The rudder moves to the right and pulls the left pedals aft.

You can adjust the position of the rudder pedals. When you pull on the adjuster handle, the latch disengages from the bottom sledge tube. If you pull further, the pedal assembly moves along the sledge tubes towards you. Release the handle, then push with your feet on both pedals. The latch will lock.

If you push with both feet while you pull the handle, the pedal assembly moves along the sledge tubes away from you. Release the handle, then push with your feet on both pedals. The latch will lock.

When you adjust the position of the pedals, the control cables move through the "S" shaped tubes.

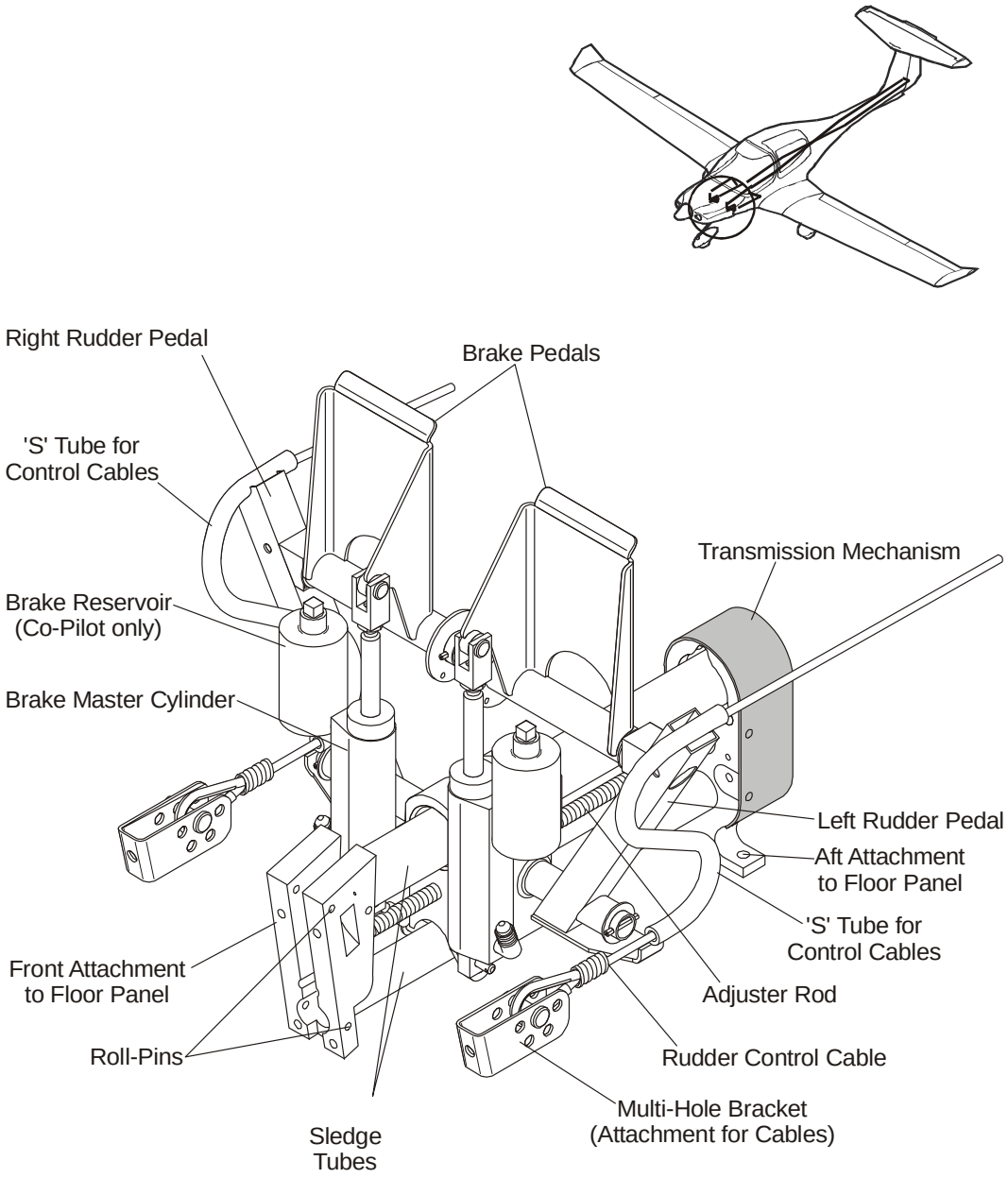


Figure 3: Rudder Pedal Assembly with Electrical Adjustment (OÄM 40-251 incorporated)

B. Electrical Adjustment (Optional Equipment, OÄM 40-251)

Positioning switches are located on the LH and RH side, at the rear wall of the leg room. The positioning switch causes the rudder pedals on the corresponding side to move along the guide rail.

To move the pedals towards you, press the upper side of the switch. Press the lower end of the switch and the pedals will move away from you.

Releasing switch will cause motor to be switched off and the pedals will remain in the current position.

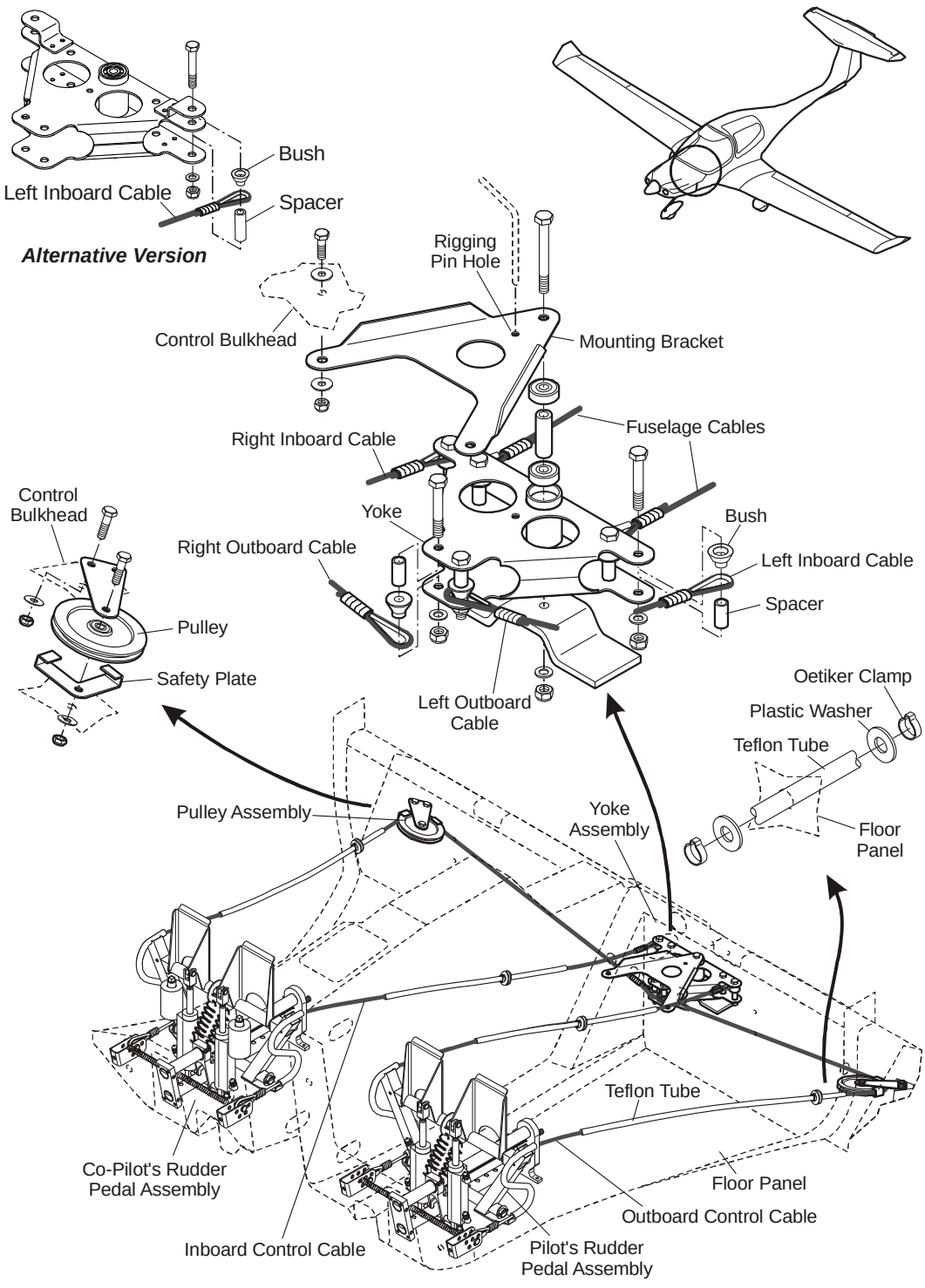


Figure 4: Rudder Controls Installation in the Cockpit

Trouble-Shooting

1. General

The table below lists the defects you could have in the rudder control system. If you have the trouble detailed in the Trouble column read across to the Possible Cause column. Then do the repair in the Repair column.

Trouble	Possible Cause	Repair
Airplane moves about its yaw axis in flight.	Rudder control cables need adjusting. Fixed trim tab needs adjusting.	Adjust the rudder control cables. Adjust the fixed trim tab.
Rudder controls stiff/catch.	Bearings defective. Cables chafing in guide tubes.	Replace the defective bearing. Replace the cables and guide tubes.

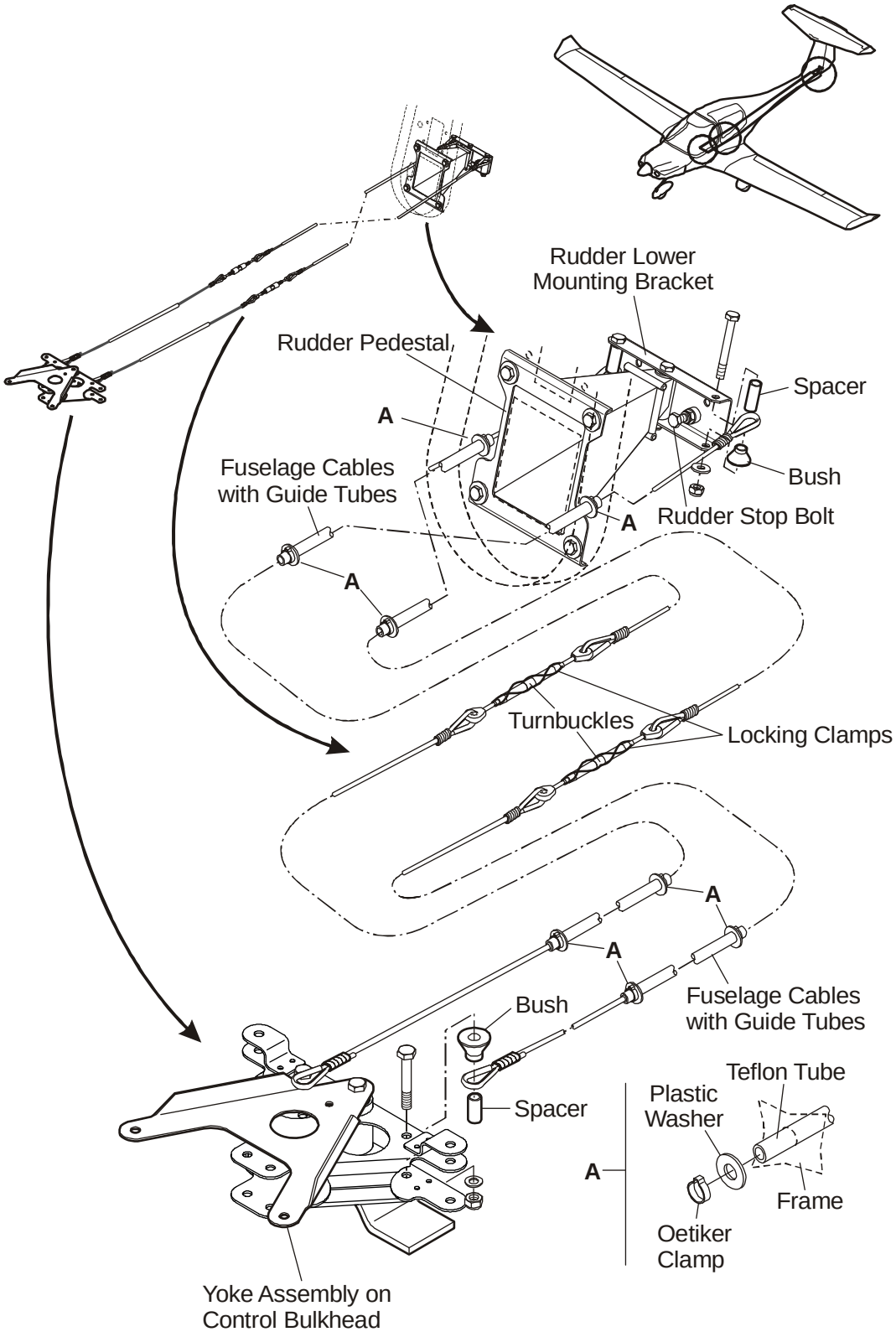


Figure 5: Rudder Controls Installation in the Rear Fuselage

Maintenance Practices

1. General

These Maintenance Practices tell you how to do test procedures on the rudder control system. They also tell you how to adjust the rudder control system. Refer to Section 55-40 to remove/install the rudder.

WARNING: WHEN YOU DO WORK ON THE AIRPLANE CONTROLS, YOU MUST MAKE SURE THAT THE AREAS AROUND THE CONTROLS/CONTROL SURFACES ARE CLEAR OF PERSONS/EQUIPMENT. IF YOU DO NOT DO THIS, INJURY TO PERSONS AND DAMAGE TO CONTROL SURFACES CAN OCCUR.

WARNING: WHEN YOU COMPLETE WORK ON THE CONTROLS, MAKE SURE THAT YOU REMOVE ALL LOOSE ITEMS/TOOLS FROM THAT AREA. LOOSE ITEMS/TOOLS CAN PREVENT FULL MOVEMENT OF THE AIRPLANE CONTROLS. THIS CAN CAUSE DEATH OR INJURY TO PERSONS.

2. Rudder Control System Test for Correct Range of Movement

A. Equipment

Item	Quantity	Part Number
Ruler or deflection gauge.	1	Commercial.

B. Rudder Control Test Procedure

Refer to Figure 1.

	Detail Steps/Work Items	Key Items/References
(1)	Make a copy of the Control Surfaces Adjustment Report.	Refer to Section 06-00. Use it to record the measurements.
(2)	Set both rudder pedals fully forward.	

	Detail Steps/Work Items	Key Items/References
	WARNING: WHEN YOU DO WORK ON THE AIRPLANE CONTROLS, YOU MUST MAKE SURE THE AREAS AROUND THE CONTROLS/CONTROL SURFACES ARE CLEAR OF PERSONS/EQUIPMENT. IF YOU DO NOT DO THIS, INJURY TO PERSONNEL AND DAMAGE TO CONTROL SURFACES CAN OCCUR.	
(3)	Set the rudder pedals central.	The left pedal must align with the right pedal. Make sure the rudder is in the neutral position shown in the Control Surfaces Adjustment Report for the airplane.
(4)	Set the rudder pedals to fully left.	The rudder must hit the stops at the rudder pedestal. The rudder position must be the distance to the left shown in the Control Surfaces Adjustment Report for the airplane. (Measured from the neutral position).
(5)	Set the rudder pedals to fully right.	The rudder must hit the stops at the rudder pedestal. The rudder position must be the distance to the right shown in the Control Surfaces Adjustment Report for the airplane. (Measured from the neutral position).
(6)	Make sure the left and right rudder pedals are free to move when they are set in all of the adjustable positions.	

3. Rudder Control System Adjustments

If you cannot get the correct range of movement of the rudder control system, use this procedure to adjust the system.

A. Equipment

Item	Quantity	Part Number
Cable tension gauge.	1	Commercial.
Ruler or deflection gauge.	1	Commercial.

B. Rudder Adjustment Procedure

	Detail Steps/Work Items	Key Items/References
(1)	Remove these items for access: – The pilots' seats. – The passenger seat.	Section 25-10.
(2)	Set both rudder pedals fully forward.	
(3)	Set the rudder pedals central.	Make sure the rudder is in the neutral position. The left pedal must align with the right pedal.
(4)	If necessary, adjust the length of the cables between the yoke and the rudder lower mounting bracket. – Remove the lock-wire from the turnbuckles. – Adjust the turnbuckles to set the rudder to neutral. – Do a test for correct cable tension. – Tighten the turnbuckles and install the lock-wire.	Refer to Figure 4. Below the passenger seat. Refer to the Adjustment Report.

	Detail Steps/Work Items	Key Items/References
(5)	Set the rudder pedals to fully left.	The rudder must hit the stops at the rudder pedestal. The rudder position must be the distance to the left shown in the Control Surfaces Adjustment Report. (Measured from the neutral position).
(6)	If necessary, adjust the rudder stop bolt on the left side of the rudder lower mounting-bracket: – Release the jam-nut on the left stop bolt. – Adjust the stop bolt to give the correct range of movement. – Tighten the jam-nut on the stop bolt.	The rudder position must be the distance to the left shown in the Control Surfaces Adjustment. (Measured from the neutral position).
(7)	Set the rudder pedals to fully right.	The rudder must hit the stops at the rudder pedestal. The rudder position must be the distance to the right shown in the Control Surfaces Adjustment Report. (Measured from the neutral position).
(8)	If necessary, adjust the rudder stop bolt on the right side of the rudder lower mounting-bracket: – Release the jam-nut on the right stop bolt. – Adjust the stop bolt to give the correct range of movement. – Tighten the jam-nut on the stop bolt.	The rudder position must be the distance to the right shown in the Control Surfaces Adjustment Report. (Measured from the neutral position).
(9)	Do a test for the correct range of rudder movement.	Refer to Paragraph 2.
(10)	Do an inspection of all the controls that you have adjusted. – If necessary for your Airworthiness Authority, do a second inspection of the controls.	

	Detail Steps/Work Items	Key Items/References
(11)	Install these items: – The pilots' seats. – The passenger seat.	Refer to Section 25-10.

4. Remove/Install Rudder Control Cables

A. Equipment

Item	Quantity	Part Number
Cable tension gauge.	1	Commercial.
Swaging tool.	1	Commercial.
Nicopress oval & stop sleeve gauge ('go-no-go gauge') for 1/8 inch sleeves.	1	

B. Remove the Cockpit Rudder Control Cables (from the Firewall to the Yoke)

	Detail Steps/Work Items	Key Items/References
(1)	Remove these items for access: – The pilots' seats.	Section 25-10.
(2)	Remove the cable between the firewall and the yoke: – Remove the nut, washer, bolt and spacer that attach the cable to the multi-hole bracket at the firewall. – Remove the nut, washer, bolt, bush and spacer that attach the cable to the yoke. – Cut the eye-end from the old cable at the firewall end. – Remove the old cable.	Refer to Figures 2 and 3.

C. Install the Rudder Control Cables (from the Firewall to the Yoke)

	Detail Steps/Work Items	Key Items/References
	WARNING: ONLY TRAINED AND AUTHORIZED PERSONS SHOULD INSTALL CABLE EYE-ENDS. IF THE EYE-ENDS ARE NOT INSTALLED CORRECTLY, THE RUDDER CONTROLS CAN FAIL. THIS CAN CAUSE DEATH OR INJURY TO PERSONNEL.	
	Note: Install eye-ends in accordance with FAA AC 43.13-1B, Chapter 7, Section 8.	
	Note: To make the work easier, install an eye-end on one end of the cable before you install it in the airplane.	
(1)	Install one new eye-end to the cable before you install it in the airplane. – Inspect the cable eye-end for correct assembly. – If necessary for your Airworthiness Authority, send a sample for proof test.	Use cables to specification LN9374 or ISO 2020 or MIL-DTL-83420. Use Locoloc thimbles and Nico-Press clamps appropriate to the installed 3.2 mm (1/8 inch) diameter steel cables. Inspect cable swage with go-no-go gauge for 1/8 inch Nicopress oval sleeve in accordance with FAA AC 43.13-1B, Chapter 7, Section 8.
(2)	Push the control cable through the Teflon tubes from the rear.	Refer to Figure 3.
(3)	Make sure the cable is in the correct position on the pulley (for the outer cables only).	
(4)	Push the cable position through the "S" tube on the rudder pedal assembly.	

	Detail Steps/Work Items	Key Items/References
(5)	Install a new eye-end to the cable at the firewall end: – Inspect the cable eye-end for correct assembly. – If necessary for your Airworthiness Authority, send a sample for proof test.	Use Locoloc thimbles and Nico-Press clamps appropriate to the installed 3.2 mm (1/8 inch) diameter steel cables. Inspect cable swage with go-no-go gauge for 1/8 inch Nicopress oval sleeve in accordance with FAA AC 43.13-1B, Chapter 7, Section 8.
(6)	Install the cable to the yoke: – Install the bolt, bush and spacer that attach the cable to the yoke. – Install a washer and self-locking nut.	Torque to 6.4 Nm (4.7 lbf.ft.). Use a new self-locking nut.
(7)	Install the cable to the bracket at the firewall: – Install the bolt and spacer that attach the cable to the bracket. – Install a washer and self-locking nut.	Adjust the position of the bolt in the multi-hole bracket to give the correct rudder pedal position. The rudder pedal lever must be vertical when the rudder is neutral. Torque to 6.4 Nm (4.7 lbf.ft.). Use a new self-locking nut.
(8)	Do a test for the correct range of rudder movement. If necessary, adjust the rudder controls.	Refer to Paragraph 2. Refer to Paragraph 3.
(9)	Do an inspection of all the controls that you have adjusted. – If necessary for your Airworthiness Authority, do a second inspection of the controls.	
(10)	Install these items: – The pilots' seats. – The passenger seat.	Refer to Section 25-10.

D. Remove the Fuselage Rudder Control Cables (from the Yoke to the Rudder)

	Detail Steps/Work Items	Key Items/References
(1)	Remove these items for access: – The pilots' seats. – The passenger seat.	Refer to Section 25-10.
(2)	Remove the cable between the yoke and the turnbuckle: – Remove the nut, washer, bolt, bush and spacer that attach the cable to the yoke. – Cut the eye-end from the old cable at the yoke. – Remove the old cable aft. – Cut the eye-end from the turnbuckle.	Refer to Figure 4.
(3)	Remove the cable between the turnbuckle and the rudder: – Remove the nut, washer, bolt, bush and spacer that attach the cable to the rudder lower mounting-bracket. – Cut the eye-end from the old cable at the rudder end. – Remove the old cable forward. – Cut the eye-end from the turnbuckle.	

E. Install the Fuselage Rudder Control Cables (from the Yoke to the Rudder)

	Detail Steps/Work Items	Key Items/References
	WARNING: ONLY TRAINED AND AUTHORIZED PERSONS SHOULD INSTALL CABLE EYE-ENDS. IF THE EYE-ENDS ARE NOT INSTALLED CORRECTLY, THE RUDDER CONTROLS CAN FAIL. THIS CAN CAUSE DEATH OR INJURY TO PERSONNEL.	
	Note: Install eye-ends in accordance with FAA AC 43.13-1B, Chapter 7, Section 8.	
	Note: To make the work easier, install an eye-end on one end of each cable before you install them in the airplane.	
(1)	Install a new eye-end to the front cable at the yoke end before you install it in the airplane. – Inspect the cable eye-end for correct assembly. – If necessary for your Airworthiness Authority, send a sample for proof test.	Use cables to specification LN9374 or ISO 2020 or MIL-DTL-83420. Use Locoloc thimbles and Nico-Press clamps appropriate to the installed 3.2 mm (1/8 inch) diameter steel cables. Inspect cable swage with go-no-go gauge for 1/8 inch Nicopress oval sleeve in accordance with FAA AC 43.13-1B, Chapter 7, Section 8.
(2)	Push the control cable through the Teflon tube from the front.	Refer to Figure 4. Through the front and rear main bulkheads.
(3)	Install a new eye-end to the cable at the turnbuckle end. – Inspect the cable eye-end for correct assembly. – If necessary for your Airworthiness Authority, send a sample for proof test.	 Use Locoloc thimbles and Nico-Press clamps appropriate to the installed 3.2 mm (1/8 inch) diameter steel cables. Inspect cable swage with go-no-go gauge for 1/8 inch Nicopress oval sleeve in accordance with FAA AC 43.13-1B, Chapter 7, Section 8.

	Detail Steps/Work Items	Key Items/References
(4)	Install a new eye-end to the rear cable before you install it in the airplane. – Inspect the cable eye-end for correct assembly. – If necessary for your Airworthiness Authority, send a sample for proof test.	Use cables to specification LN9374 or ISO 2020 or MIL-DTL-83420. Use Locoloc thimbles and Nico-Press clamps appropriate to the installed 3.2 mm (1/8 inch) diameter steel cables. Inspect cable swage with go-no-go gauge for 1/8 inch Nicopress oval sleeve in accordance with FAA AC 43.13-1B, Chapter 7, Section 8.
(5)	Push the control cable through the Teflon tubes from the front.	From the baggage frame to the rudder.
(6)	Install a new eye-end to the cable at the rudder end. – Inspect the cable eye-end for correct assembly. – If necessary for your Airworthiness Authority, send a sample for proof test.	Use cables to specification LN9374 or ISO 2020 or MIL-DTL-83420. Use Locoloc thimbles and Nico-Press clamps appropriate to the installed 3.2 mm (1/8 inch) diameter steel cables. Inspect cable swage with go-no-go gauge for 1/8 inch Nicopress oval sleeve in accordance with FAA AC 43.13-1B, Chapter 7, Section 8.
(7)	Install the cable to the rudder lower mounting-bracket: – Install the bolt, bush and spacer that attach the cable to the rudder. – Install a washer and self-locking nut.	Refer to Figure 4. Torque to 6.4 Nm (4.7 lbf.ft.). Use a new self-locking nut.
(8)	Install the cable to the yoke: – Install the bolt, bush and spacer that attach the cable to the yoke. – Install a washer and self-locking nut.	Refer to Figure 4. Torque to 6.4 Nm (4.7 lbf.ft.). Use a new self-locking nut.

	Detail Steps/Work Items	Key Items/References
(9)	Adjust both left and right rudder cable turnbuckles to give the correct tension.	Refer to Paragraph 3.
(10)	Do a test for the correct range of rudder movement.	Refer to Paragraph 2.
(11)	Do an inspection of all the controls that you have adjusted. – If necessary for your Airworthiness Authority, do a second inspection of the controls.	
(12)	Install these items: – The pilots' seats. – The passenger seat.	Refer to Section 25-10.

5. Rudder Control Cable and Yoke Access

Rudder Cable/Yoke	Remove/Install Access	References
Cockpit cables between the firewall and the yoke.	Pilots' seats.	Refer to Section 25-10.
Rear fuselage cables between the yoke and the rudder.	Pilots' seats. Passenger seat. Rudder.	Refer to Section 25-10. Refer to Section 55-40.
Yoke.	Pilots' seats.	Refer to Section 25-10.

Section 27-30
Flight Controls - Elevator

1. General

The DA 40 has the usual elevator control system. An elevator attached to the horizontal stabilizer gives longitudinal control. The two control sticks operate the elevator.

2. Description

Figure 1 shows the elevator controls in the cockpit. Figure 2 shows the elevator controls in the rear fuselage.

Each pilot has a control stick that attaches to a torque tube assembly. The torque tube assembly has a lever which attaches to a short push-rod. The short push-rod connects to an idler lever on the front main bulkhead. The idler lever connects to a long push-rod.

The long push-rod has three guide bearings. The baggage frame, ring frame 1 and ring frame 2 have push-rod guides. Each guide has three rollers.

The long push-rod attaches to a bellcrank at the bottom of the vertical stabilizer. The bellcrank attaches to a vertical push-rod in the vertical stabilizer. The vertical push-rod connects to the elevator horn.

The elevator stop for the downward movement consists of a GFRP block which is bonded to the inside of the upper skin of the horizontal stabilizer. When the elevator is deflected fully downward, the forward extension of the elevator horn is deflected fully upward and contacts the stop.

The elevator stop for the upward movement consists of a bolt/bush assembly which is installed in the trim actuator mounting bracket in transverse direction (see Section 27-38, Figure 2). When the elevator is deflected fully upward, the forward extension of the elevator horn is deflected fully downward and contacts the stop.

You cannot adjust the elevator stops.

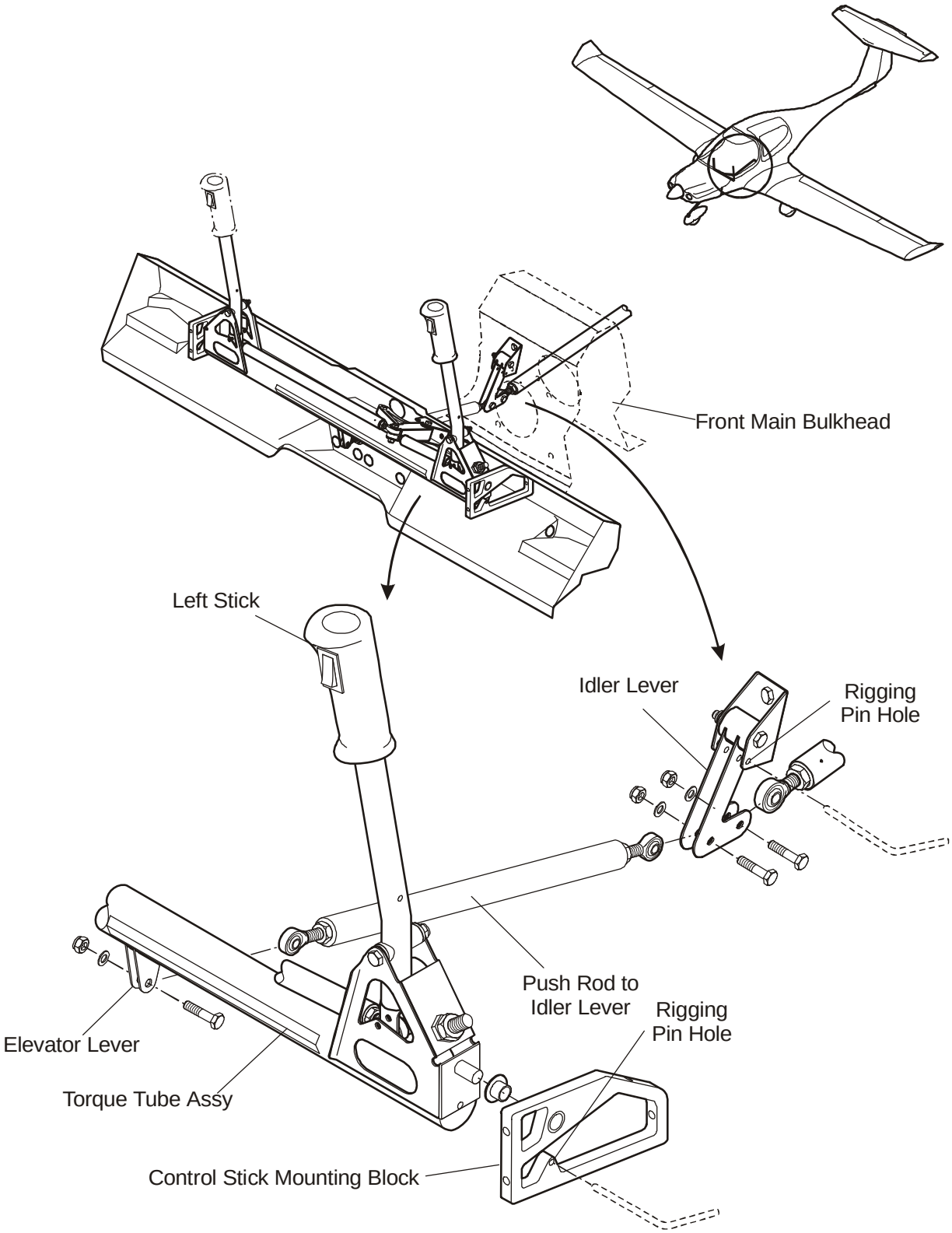


Figure 1: Elevator Control Installation in the Cockpit

3. Operation

If you move the control stick forward:

– The torque tube assembly turns.

– The lever below the torque tube assembly pushes the short push-rod aft.

– The short push-rod pushes the long push-rod aft.

– The long push-rod pushes the bellcrank rearward.

– The bellcrank pushes the vertical push-rod up.

– The vertical push-rod moves the elevator horn.

– The elevator moves down.

If you move the control stick aft:

– The torque tube assembly turns.

– The short and long push-rods move forward.

– The bellcrank pulls the vertical push-rod down.

– The elevator moves up.

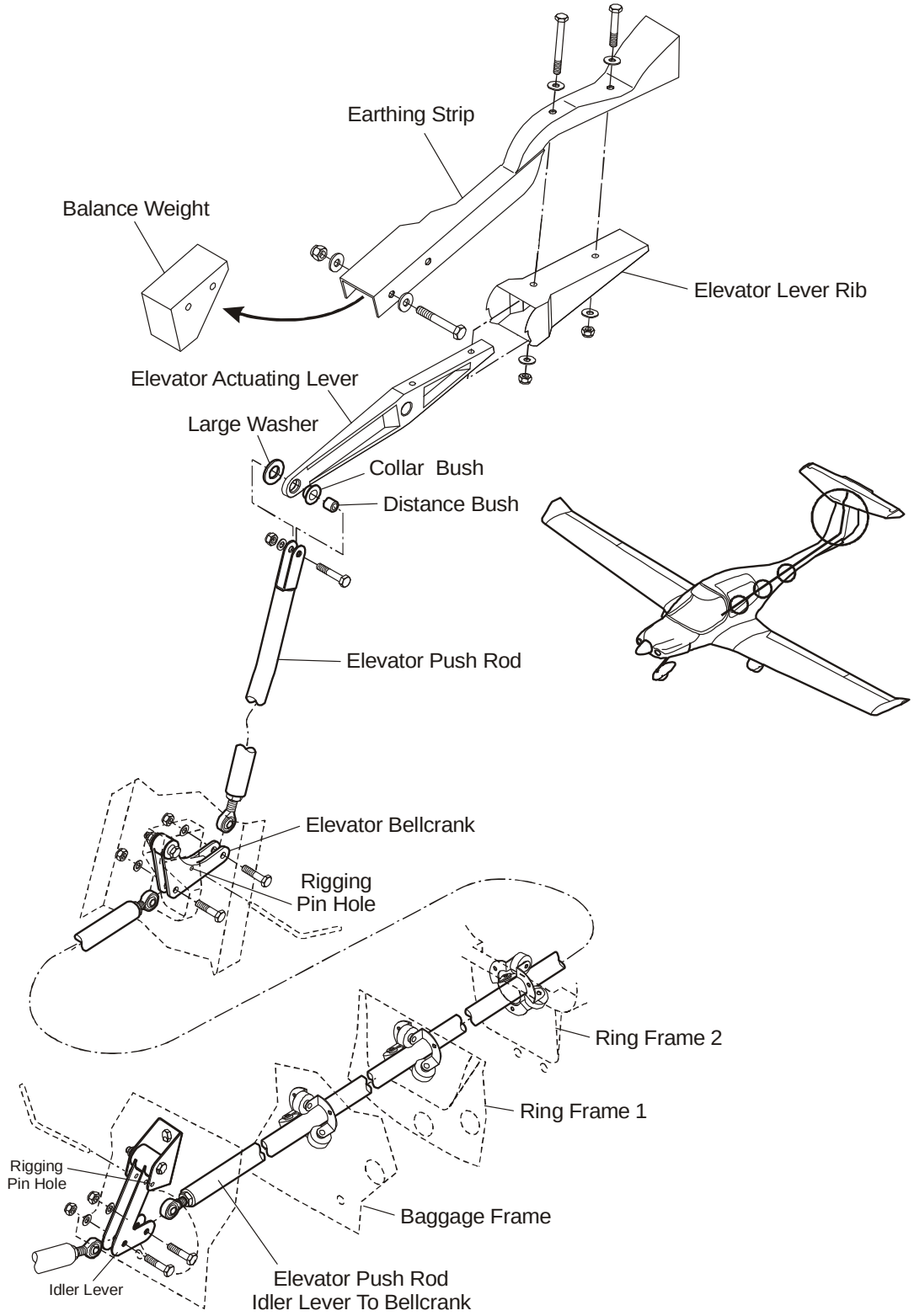


Figure 2: Elevator Controls Installation in the Rear Fuselage

Trouble-Shooting

1. General

The table below lists the defects you could have in the elevator control system. If you have the trouble detailed in the Trouble column read across to the Possible Cause column. Then do the repair in the Repair column.

Trouble	Possible Cause	Repair
Control vibration in the air.	Too much backlash in the flight controls.	Examine the system to isolate the problem. Replace the defective part.
Elevator controls stiff/catch.	Bearings defective. Push-rod bent.	Replace the defective eye-end. Replace the push-rod.

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Maintenance Practices

1. General

These Maintenance Practices tell you how to do test procedures on the elevator control system. And they tell you how to adjust the elevator control system. Refer to Section 55-20 to remove/install the elevator.

WARNING: WHEN YOU DO WORK ON THE AIRPLANE CONTROLS, YOU MUST MAKE SURE THE AREAS AROUND THE CONTROLS/CONTROL SURFACES ARE CLEAR OF PERSONS/EQUIPMENT. IF YOU DO NOT DO THIS, INJURY TO PERSONS AND DAMAGE TO CONTROL SURFACES CAN OCCUR.

WARNING: WHEN YOU COMPLETE WORK ON THE CONTROLS, MAKE SURE THAT YOU REMOVE ALL LOOSE ITEMS/TOOLS FROM THAT AREA. LOOSE ITEMS/TOOLS CAN PREVENT FULL MOVEMENT OF THE AIRPLANE CONTROLS. THIS CAN CAUSE DEATH OR INJURY TO PERSONS.

2. Elevator Control System Test for Correct Range of Movement

A. Equipment

Item	Quantity	Part Number
Rigging pin.	1	-
Ruler or deflection gauge.	1	Commercial.
Fuselage trestle.	1	Commercial.

B. Elevator Control Test Procedure

Note: If you use a deflection gauge, make sure that the airplane does not move in pitch during the procedure. It will cause errors in the test.

	Detail Steps/Work Items	Key Items/References
(1)	Make a copy of the Control Surfaces Adjustment Report.	Refer to Section 06-00. Use it to record the measurements.
(2)	If you will use a deflection gauge, put a trestle under the rear fuselage.	To prevent movement in pitch.
(3)	Remove the left pilot's seat.	Refer to Section 25-10.
(4)	Install the rigging pin through the stick mounting block and the torque tube.	Refer to Figure 1.
	Note: Use a ruler or deflection gauge to make all measurements at the elevator control surface. Make the measurement between the top surface of the trailing edge of the horizontal stabilizer and the top surface of the elevator.	
(5)	Make sure that the elevator aligns with the horizontal stabilizer.	At the stabilizer tips.
(6)	Measure the distance between the top surface of the trailing edge of the horizontal stabilizer and the top surface of the elevator.	Record the distance.
(7)	Remove the rigging pin from the stick mounting block.	
	WARNING: WHEN YOU DO WORK ON THE AIRPLANE CONTROLS, YOU MUST MAKE SURE THE AREAS AROUND THE CONTROLS/CONTROL SURFACES ARE CLEAR OF PERSONS/EQUIPMENT. IF YOU DO NOT DO THIS, INJURY TO PERSONNEL AND DAMAGE TO CONTROL SURFACES CAN OCCUR.	
(8)	Move the control stick fully forward and hold it against the stop.	
(9)	Measure the distance between the top surface of the trailing edge of the horizontal stabilizer and the top surface of the elevator.	Record the measurement. The distance must be as shown in the Control Surfaces Adjustment Report.

	Detail Steps/Work Items	Key Items/References
(10)	Move the control stick fully aft and hold it against the stop.	
(11)	Measure the distance between the top surface of the trailing edge of the horizontal stabilizer and the top surface of the elevator.	Record the measurement. The distance must be as shown in the Control Surfaces Adjustment Report.
(12)	Install the left pilot's seat.	Refer to Section 25-10.
(13)	Remove the trestle under the rear fuselage.	

3. Elevator Control System Adjustments

If you cannot get the correct range of movement of the elevator control system, use this procedure to adjust the system. Gust travel refers to the amount of travel remaining at the control surface with the control stick held against the cockpit stop.

WARNING: IF YOU DO AN ADJUSTMENT OF A PUSH-ROD, YOU MUST MAKE SURE THAT THE PUSH-ROD IS STILL IN SAFETY. IF YOU DO NOT DO THIS, THE PUSH-ROD CAN DISCONNECT. THIS CAN CAUSE DEATH OR INJURY TO PERSONNEL.

A. Equipment

Item	Quantity	Part Number
Ruler or deflection gauge.	1	Commercial.
Rigging pins.	3	-

B. Elevator Control Adjustment Procedure

Refer to Figure 1.

	Detail Steps/Work Items	Key Items/References
(1)	Remove these items for access: – The pilots' seats. – The rudder.	 Refer to Section 25-10. Refer to Section 55-40.
(2)	Install rigging pins in the following: – Through the stick mounting block and the torque tube. – The idler lever. – The rear bellcrank.	 On the control bulkhead. On the front main bulkhead. On the vertical stabilizer rear web.
(3)	If you cannot put a rigging pin into a lever or bellcrank, adjust the push-rods as necessary.	Refer to Section 27-00 for the push-rod adjustment procedure.
(4)	Make sure that the elevator aligns with the horizontal stabilizer.	At the stabilizer tips.

	Detail Steps/Work Items	Key Items/References
(5)	If the elevator does not align with the horizontal stabilizer, adjust the vertical push-rod at the rear bellcrank.	Refer to Section 27-00 for the push-rod adjustment procedure.
(6)	Remove rigging pins from the following: – The stick mounting block. – The idler lever. – The rear bellcrank.	 On the control bulkhead. On the front main bulkhead. On the vertical stabilizer rear web.
(7)	Do a test for the correct range of elevator movement.	Refer to Paragraph 2.
(8)	Do an inspection of all the controls that you have adjusted. – If necessary for your Airworthiness Authority, do a second inspection of the controls.	
(9)	Install these items: – The pilots' seats. – The rudder.	 Refer to Section 25-10. Refer to Section 55-40.

4. Elevator Push-Rod Access

Elevator Push-Rod	Remove/Install Access	References
Between the control torque tube and the idler lever at the front main bulkhead.	Pilots' seats.	Refer to Section 25-10.
Between the idler lever at the front main bulkhead and the bellcrank at the vertical stabilizer rear web.	Pilots' seats. Rudder.	Refer to Section 25-10. Refer to Section 55-40.
Between the bellcrank at the vertical stabilizer rear web and the elevator.	Rudder.	Refer to Section 55-40.

5. Elevator Bellcrank and Lever Access

Elevator Bellcrank/Lever	Remove/Install Access	References
Idler lever at the front main bulkhead.	Pilots' seats.	Refer to Section 25-10.
Bellcrank at the vertical stabilizer rear web.	Rudder.	Refer to Section 27-20.

Section 27-38
Flight Controls - Elevator Trim

1. General

The DA 40 has an elevator with a trim tab. The trim tab is mechanically operated. This lets you trim the airplane for different speeds and center-of-gravity positions.

A handwheel on the center console controls the elevator trim. An indicator tells the pilot the trim setting. A flexible cable moves the trim tab.

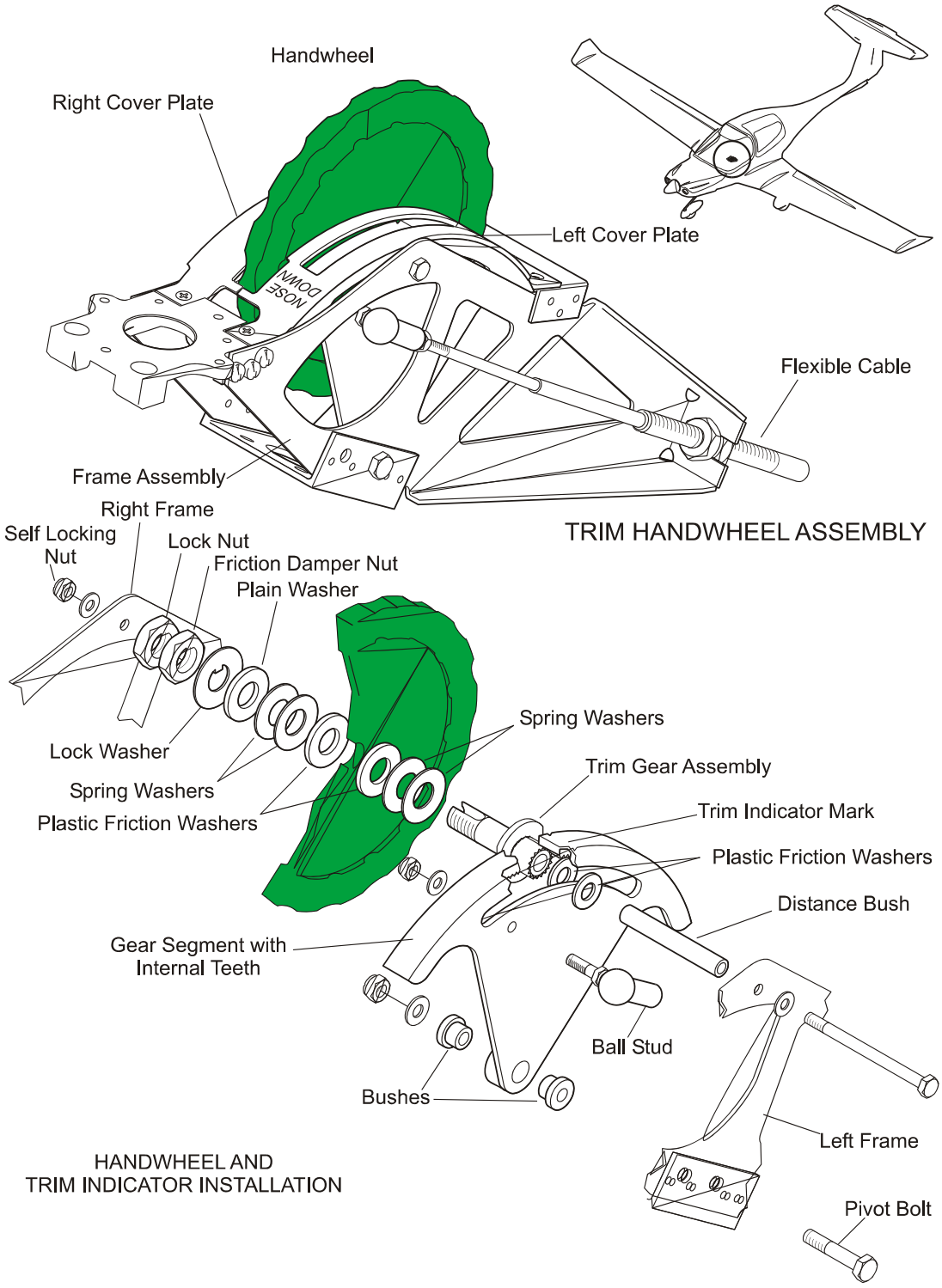


Figure 1: Elevator Trim Mechanism in the Cockpit

2. Description

The trim installation has three main parts:

– A handwheel assembly with a trim indicator.

– A flexible cable which connects the handwheel to the trim tab.

– The trim tab actuator assembly.

Figure 1 shows the elevator trim mechanism in the cockpit. Figure 2 shows the trim tab actuator assembly.

A. Trim Handwheel Assembly

A handwheel assembly on the center console controls the elevator trim system. The assembly has a metal mounting frame. The frame attaches to the rear of the engine control assembly and the top of the control bulkhead.

A long bolt through the mounting frame carries the handwheel. The bolt also holds friction disks, plain washers and spring washers against the handwheel. Two jam-nuts let you adjust the friction.

A small gear wheel attaches to the handwheel. The small gear wheel engages with a large gear segment with internal teeth. The gear segment has a pivot bolt at the bottom of the mounting frame. A ball-stud attaches the eye-end of a long flexible cable to the gear segment. An extension to the mounting frame to the rear makes the anchor point for the outer sheath of the cable.

The gear segment is also the trim indicator. The top face of the segment has a white line across it mid way between the front and back. The top face can be seen through a slot in the cover plate. The sides of the cover plate have markings to show the trim position.

B. Flexible Cable

A long flexible cable connects the trim handwheel assembly to the trim tab. The cable goes through holes in the front and rear main bulkheads, the baggage frame and each of the ring frames. It goes up the front face of the front web of the vertical stabilizer and through a slot near the top. It goes through a large hole at the top of the rear web of the vertical stabilizer to the trim tab actuator assembly.

The cable has an inner core with threaded end fittings. Spherical end fittings at each end connect to the gear segment and trim tab actuator assembly.

Clamp blocks hold the outer core to the mounting frame at the front and a bracket from the horizontal stabilizer at the back.

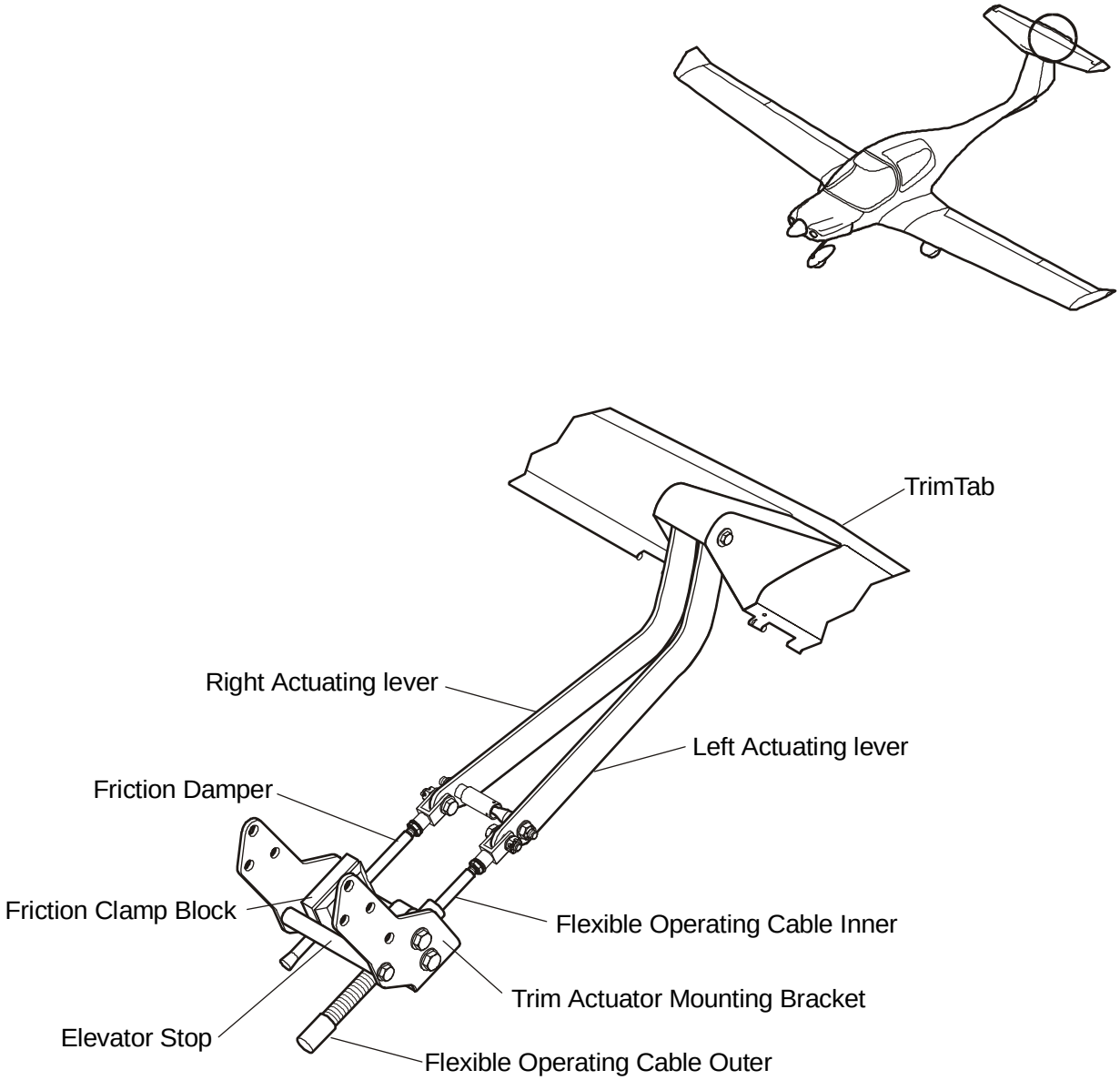


Figure 2: Trim Tab Actuator Assembly

C. Trim Tab Actuator Assembly

The trim tab is a one-piece GFRP molding. The tab has two integral levers. Two cranked actuating levers attach to the integral levers. The left cranked actuating lever connects to the long flexible cable. The right actuating lever connects to a friction damper.

The friction damper has a clamp-block with a hole for a rod. The rod connects to the right actuating lever on the trim tab. You can adjust the friction of the rod in the clamp block.

3. Operation

When you move the top of the trim handwheel forward, these things happen:

– The small gear wheel moves the top of the gear segment forward.

– The gear segment pulls the inner core of the flexible cable forward.

– The inner core of the flexible cable pulls the left cranked actuating lever forward.

– The left cranked actuating lever pulls the trim tab lever forward to move the tab up.

– The up movement of the trim tab pushes the elevator down in flight giving nose-down trim.

When you move the top of the handwheel aft, the gear segment moves aft, the cable moves aft and the trim tab moves down. This pushes the elevator up and gives nose-up trim.

In each case, the pilot can see the trim position from the white mark on the gear segment.

4. Emergency Operation

In the event of failure of the trim control system between the handwheel and the trim actuator lever, the friction damper will prevent trim tab flutter.

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Trouble-Shooting

1. General

The table below lists the defects you could have in the elevator trim control system. If you have the trouble detailed in the Trouble column read across to the Possible Cause column. Then do the repair in the Repair column.

Trouble	Possible Cause	Repair
Too much play in the trim system.	Worn bearings or joints.	Replace the defective items.
Trim handwheel stiff to move.	Flexible cable damaged. Trim damper incorrectly adjusted.	Replace the flexible cable. Adjust the trim damper.

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Maintenance Practices

1. General

These Maintenance Practices tell you how to test the elevator trim control system. They also tell you how to adjust the system. Refer to Section 55-20 for data on how to remove and install the elevator and trim tab.

2. Elevator Trim Control System Test for Correct Range of Movement

A. Equipment

Item	Quantity	Part Number
Control clamp.	1	Commercial.
Inclinometer.	1	Commercial.
Fuselage trestle.	1	Commercial.

B. Elevator Trim Control Test Procedure

Note: Make sure that the airplane does not move in pitch during the procedure. It will cause errors in the test.

	Detail Steps/Work Items	Key Items/References
(1)	Make a copy of the Control Surfaces Adjustment Report.	Refer to Section 06-00. Use it to record the measurements.
(2)	Put a trestle under the rear fuselage.	To prevent movement in pitch.
(3)	Hold the trailing edge of the elevator in line with the horizontal stabilizer	Use a clamp at the tips.
(4)	Set the trim handwheel to neutral.	
Note: Use an inclinometer to make all measurements at the trim tab surface. Make the measurement at the center.		
(5)	Put the inclinometer on the top surface of the trim tab. Set the inclinometer to zero.	
(6)	Set the trim handwheel to fully NOSE DOWN.	
(7)	Measure the angle of the top surface of the trim tab.	Record the angle of the top surface of the trim tab. The angle must be as shown in the Control Surfaces Adjustment Report.
(8)	Set the trim handwheel to fully NOSE UP.	
(9)	Measure the angle of the top surface of the trim tab.	Record the angle of the top surface of the trim tab. The angle must be as shown in the Control Surfaces Adjustment Report.
(10)	Remove the trestle under the rear fuselage.	

3. Elevator Trim Control System Adjustments

If you cannot get the correct range of movement of the elevator trim control system, use this procedure to adjust the system.

A. Equipment

Item	Quantity	Part Number
Inclinometer.	1	Commercial.
Control clamp.	1	Commercial.
Fuselage trestle.	1	Commercial.
Spring balance.	1	Commercial.

B. Elevator Trim Control Adjustment Procedure

	Detail Steps/Work Items	Key Items/References
(1)	Remove these items for access: – The pilots' seats. – The center console cover.	Refer to Section 25-10.
(2)	Put a trestle under the rear fuselage.	To prevent movement in pitch.
(3)	Hold the trailing edge of the elevator in line with the horizontal stabilizer.	Use a clamp at the tips.
(4)	Set the trim indicator to neutral.	
(5)	Adjust the flexible cable: – Loosen the nuts which hold the outer sheath of the flexible cable to the mounting frame for the trim handwheel. – Turn the nuts to move the outer sheath forward of aft as necessary. – Tighten the nuts.	Refer to Figure 1. Move the outer sheath forward to move the trim tab down. Move the outer sheath aft to move the trim tab up.
(6)	Do a test for the correct range of movement of the trim tab.	Refer to Paragraph 2.
(7)	Do an inspection of all the controls that you have adjusted. – If necessary for your Airworthiness Authority, do a second inspection of the controls.	
(8)	Install these items: – The pilots' seats. – The center console cover.	Refer to Section 25-10.

C. Elevator Trim Friction Damper Adjustment Procedure

	Detail Steps/Work Items	Key Items/References
(1)	Remove the horizontal stabilizer fairing.	Refer to Section 55-10.
(2)	Disconnect the right actuator lever from the friction rod: – Release the spring locking clip from the ball-stud. – Pull the end fitting away from the stud.	
(3)	Measure the force needed to move the damper rod.	Use a spring balance. The friction force must be 15 - 30 N (3.4 - 6.7 lb).
(4)	If necessary, adjust the friction force: – Tighten or loosen the clamping screw a small amount.	
(5)	Do items 3 and 4 again as necessary.	
(6)	Connect the right actuator lever to the friction rod: – Push the end fitting onto the stud. – Install the spring locking clip in the ball-stud.	
(7)	Do an inspection of all the controls that you have adjusted. – If necessary for your Airworthiness Authority, do a second inspection of the controls.	
(8)	Install the horizontal stabilizer fairing.	Refer to Section 55-10.

D. Elevator Trim Handwheel Friction Damper Adjustment Procedure

	Detail Steps/Work Items	Key Items/References
(1)	Remove these items for access: – The pilots' seats. – The center console cover.	Refer to Section 25-10.
(2)	Loosen the self-locking nut on the handwheel pivot bolt.	On the right of the mounting frame.
(3)	Loosen the locknut for the handwheel friction damper.	Against the right inner face of the mounting frame.
(4)	Adjust the friction damper nut.	Against the pack of washers and spring washers on the pivot bolt.
(5)	Measure the friction force (clamp a spring balance onto the handwheel and measure force).	The friction must be 3.2 - 4.4 Nm (2.3 - 3.2 ft.lb.) This corresponds to a force of 60 N ± 10 (13.5 lbf. ± 2.25) on the corded area of the trim handwheel.
(6)	Do items 4 and 5 as necessary.	
(7)	Tighten the locknut for the handwheel friction damper.	
(8)	Tighten the self-locking nut on the handwheel pivot bolt.	
(9)	Do an inspection of all the controls that you have adjusted. – If necessary for your Airworthiness Authority, do a second inspection of the controls.	
(10)	Install these items: – The pilots' seats. – The center console cover.	Refer to Section 25-10.

Section 27-39
Stall Warning System

1. General

The DA 40 has a simple mechanical stall warning system.

2. Description and Operation

Figures 1 and 2 show the stall warning system installations (without capillary).

Figures 3 and 4 show the stall warning assy (with capillary).

The stall warning horn is located in the instrument panel. A flexible hose connects the stall warning horn to a hole in the leading edge of the left wing. When the angle of attack of the wing is just less than the stall angle, the airflow through the hole operates the horn. A ball-valve in the tube stops air and water flowing from the outside into the cockpit through the stall warning system.

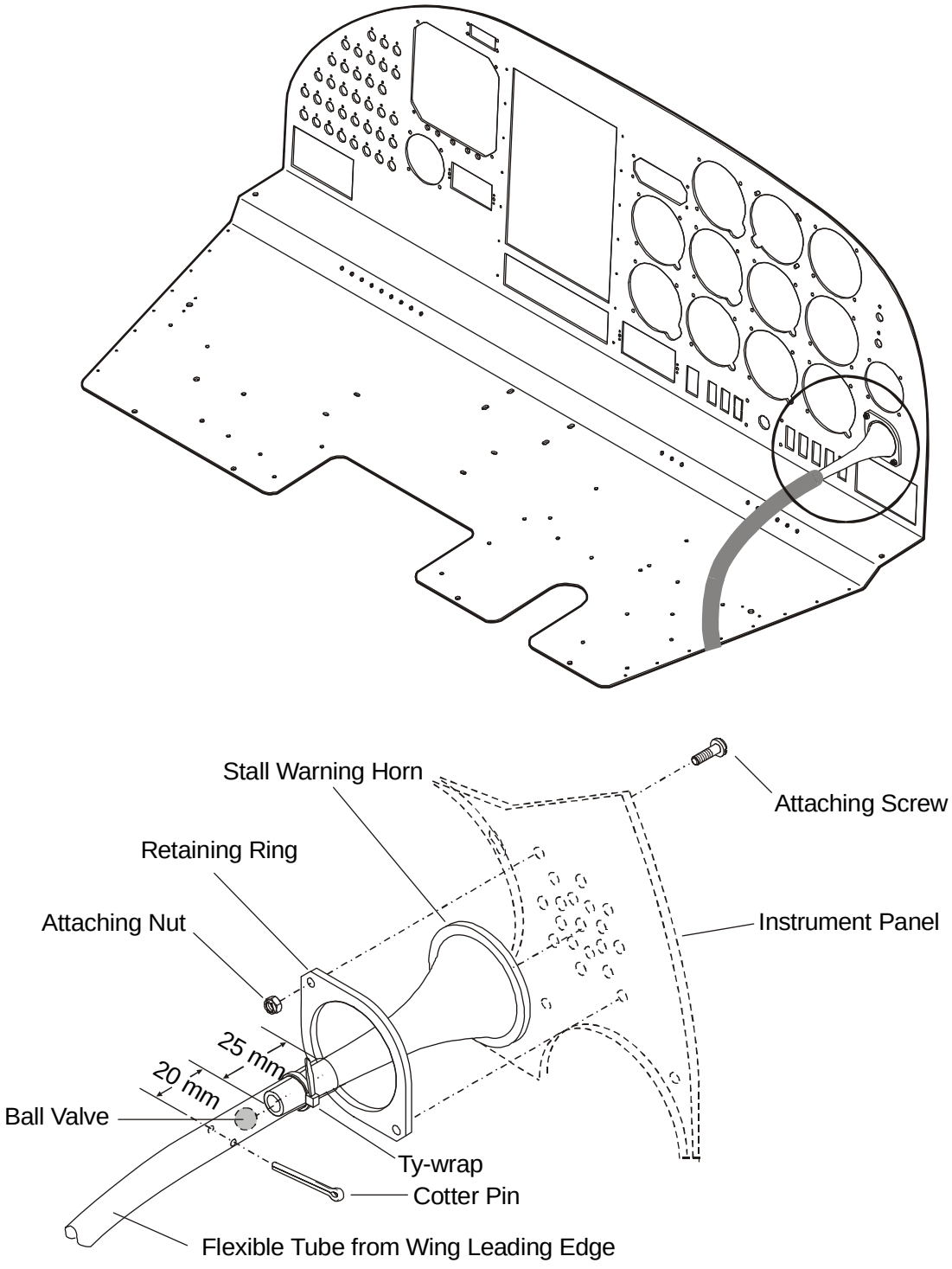


Figure 1: Stall Warning System, Installation in Larger Instrument Panels

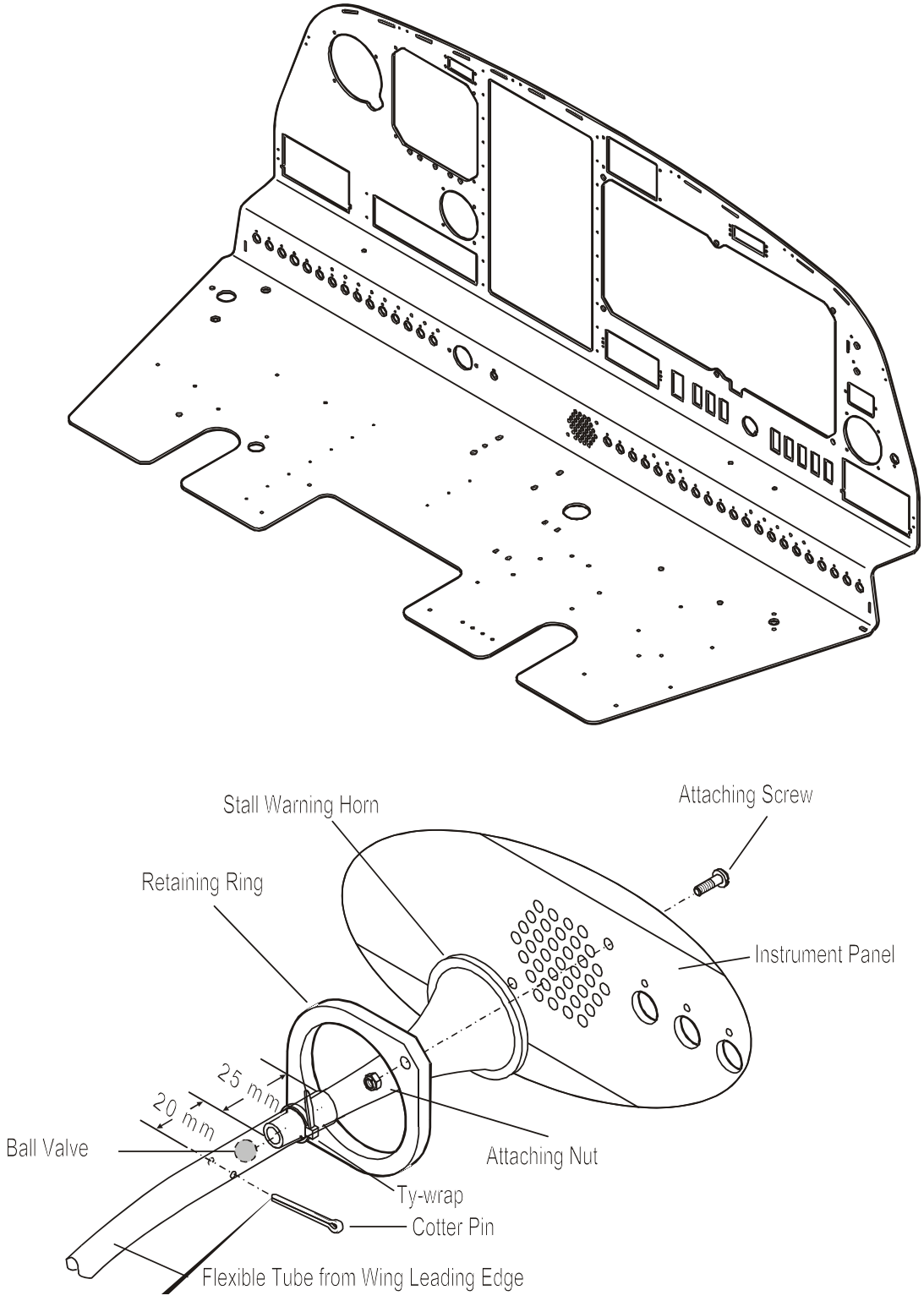


Figure 2: Stall Warning System, Installation in Smaller Instrument Panels

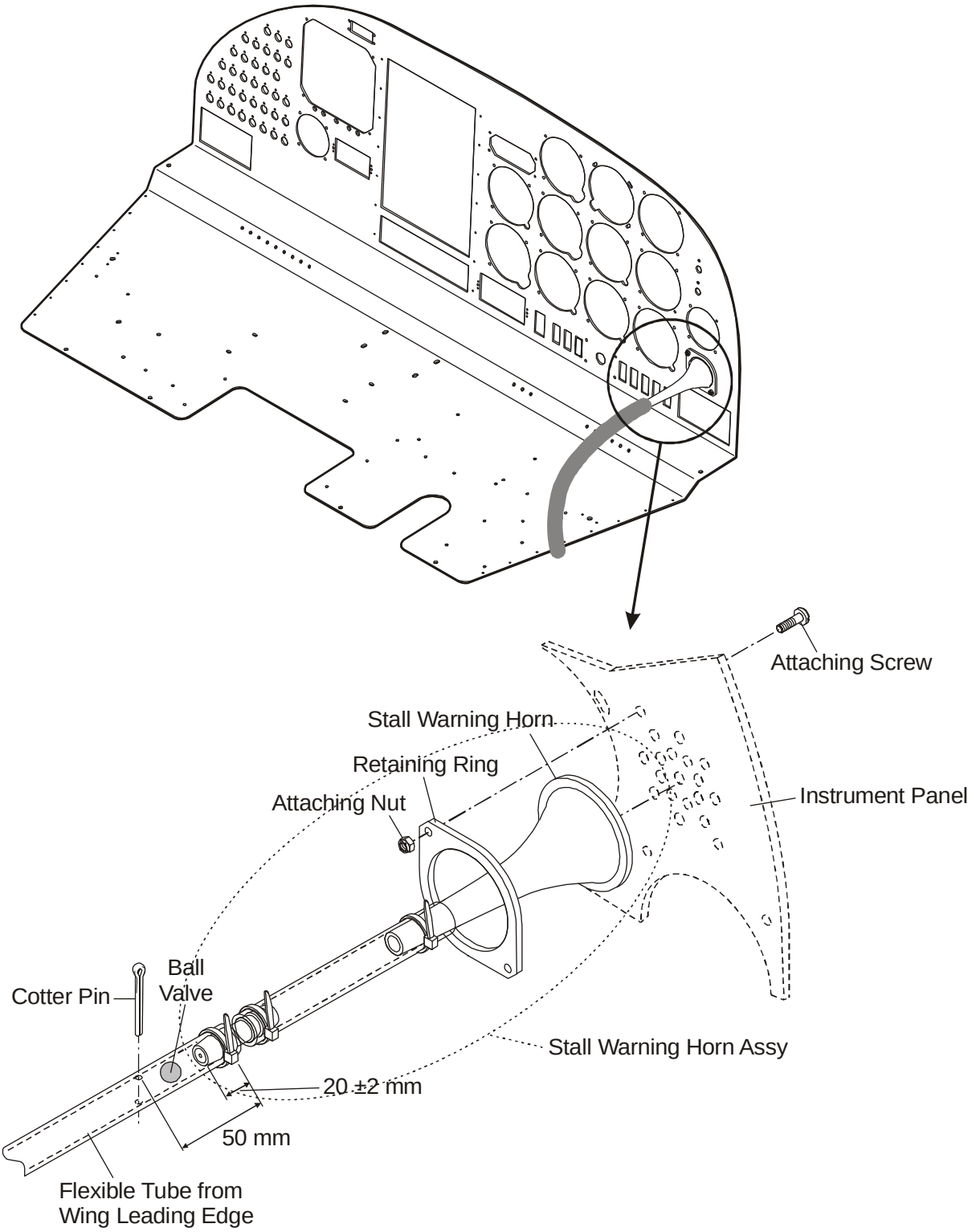


Figure 3: Stall Warning System Assy, Installation in Larger Instrument Panels

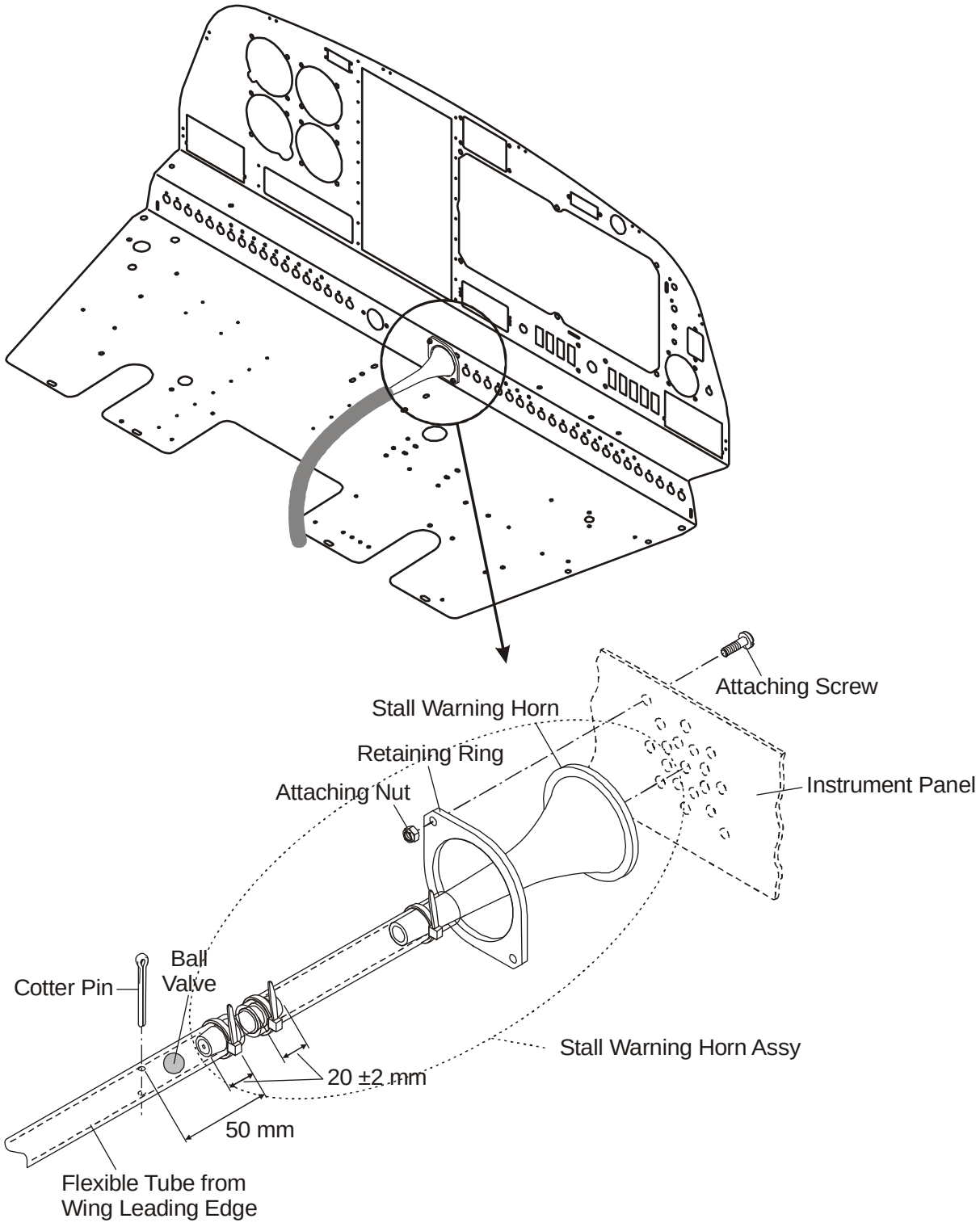


Figure 4: Stall Warning System Assy, Installation in Smaller Instrument Panels

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Trouble-Shooting

1. General

The table below lists the defects you could have with the stall warning system. If you have the trouble detailed in the Trouble column read across to the Possible Cause column. Then do the repair given in the Repair column.

Trouble	Possible Cause	Repair
Stall warning horn does not operate.	Stall warning horn defective. Water frozen in the stall warning system.	Replace the stall warning horn. Drain the water from the stall warning system.
Stall warning operates too early during stall.	Stall warning horn defective.	Replace the stall warning horn.

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Maintenance Practices

1. General

These Maintenance Practices tell you how to remove/install the stall warning horn. They also tell you how to drain water from the stall warning system.

2. Remove/Install the Stall Warning Horn (System Without Capillary)

A. Remove the Stall Warning Horn

	Detail Steps/Work Items	Key Items/References
(1)	Remove the instrument panel cover.	Refer to Section 25-10.
(2)	Disconnect the hose from the stall warning horn: – Cut the cable tie that connects the hose to the stall warning horn. – Carefully pull the hose from the stall warning horn. – Remove the ball-valve from the end of the hose.	
(3)	Remove the two screws and nuts that attach the horn to the instrument panel.	
(4)	Remove the stall warning horn from the panel.	

B. Install the Stall Warning Horn

	Detail Steps/Work Items	Key Items/References
(1)	Perform a stall warning horn classification check.	Refer to Section 27-39.
(2)	Make sure to install a stall warning horn with the same classification.	
(3)	Put the stall warning horn in position in the instrument panel.	
(4)	Install the two screws and nuts which attach the horn to the panel.	
(5)	Make sure that the hose has the cotter pin installed correctly.	Refer to Figure 1.
(6)	Connect the flexible hose to the horn: – Carefully push the ball-valve into the end of the hose. – Carefully push the hose onto the stall warning horn. – Make sure that there is a 20 mm (0.8 in.) clearance between the end of the horn and the cotter pin. – Install the cable tie which connects the hose to the stall warning horn.	
(7)	Install the instrument panel cover.	Refer to Section 25-10
(8)	Do a flight check of the stall warning system.	Refer to the DA 40 Airplane Flight Manual.

3. Remove/Install the Stall Warning Horn Assy (System With Capillary)

A. Remove the Stall Warning Horn Assy

	Detail Steps/Work Items	Key Items/References
(1)	Remove the instrument panel cover.	Refer to Section 25-10.
(2)	Disconnect the hose from the stall warning horn assy: – Cut the cable tie that connects the hose to the stall warning horn assy. – Carefully pull the hose from the stall warning horn assy. – Remove the ball-valve hose from the end of the stall warning horn assy.	
(3)	Remove the two screws and nuts that attach the horn to the instrument panel.	
(4)	Remove the stall warning horn from the panel.	

B. Install the Stall Warning Horn Assy

	Detail Steps/Work Items	Key Items/References
(1)	Perform a stall warning horn classification check.	Refer to Section 27-39.
(2)	Make sure to install a stall warning horn with the same classification.	
(3)	Put the stall warning horn in position in the instrument panel.	
(4)	Install the two screws and nuts which attach the horn to the panel.	
(5)	Make sure that the ball valve hose has the cotter pin installed correctly.	Refer to Figure 3.
(6)	Connect the flexible hose to the stall warning horn assy: – Carefully push the ball-valve into the end of the flexible hose. – Carefully push the hose onto the stall warning horn assy. – Make sure that there is a 20 mm (0.8 in.) clearance between the end of the horn assy and the cotter pin. – Install the cable tie which connects the hose to the stall warning horn assy.	
(7)	Install the instrument panel cover.	Refer to Section 25-10
(8)	Do a flight check of the stall warning system.	Refer to the DA 40 Airplane Flight Manual.

4. Procedure to Remove Water from the Stall Warning System

	Detail Steps/Work Items	Key Items/References
(1)	Remove the left hand pilot's seat.	Refer to Section 25-10.
(2)	Carefully pull the stall warning hose from the wing root connector.	
(3)	Lower the end of the hose and drain the water from the system.	
(4)	Reconnect then stall warning hose to the connector in the wing root.	
(5)	Do a flight check of the stall warning system.	Refer to the DA 40 Airplane Flight Manual.

5. Stall Warning Horn Classification Test

The stall warning horn or the stall warning horn assy is attached to a suction pump via an adjustable valve. The pressure is measured with an altitude indicator, indicating feet. The test starts with the suction pump operating and the adjustable valve in the closed position. The adjustable valve is opened slowly and as soon as the stall warning horn starts whistling, the indication on the altitude indicator is read.

The altitude indicator reading classifies the tested stall warning according to the table below:

Indicated Height at the Moment When it Begins Whistling	Classification
0 ft to 50 ft	reject
51 ft to 100 ft	A
101 ft to 150 ft	B
151 ft to 200 ft	C
201 ft to 250 ft	D
251 ft to 300 ft	E
301 ft to 351 ft	F
more than 351 ft	reject

Note: If the result of the classification test does not match the labeling on the stall warning horn (assy), the stall warning horn (assy) must be replaced by a stall warning horn (assy) classified in the same class.

Section 27-50
Flight Controls - Flaps

1. General

The DA 40 has flaps for landing and take-off. An electric flap actuator moves the flaps. See Section 57-50 for data about the flap structure.

A three-position toggle switch controls the flaps. The switch is in the center section of the instrument panel.

The flap position indicator has marks for UP, T/O and LDG positions.

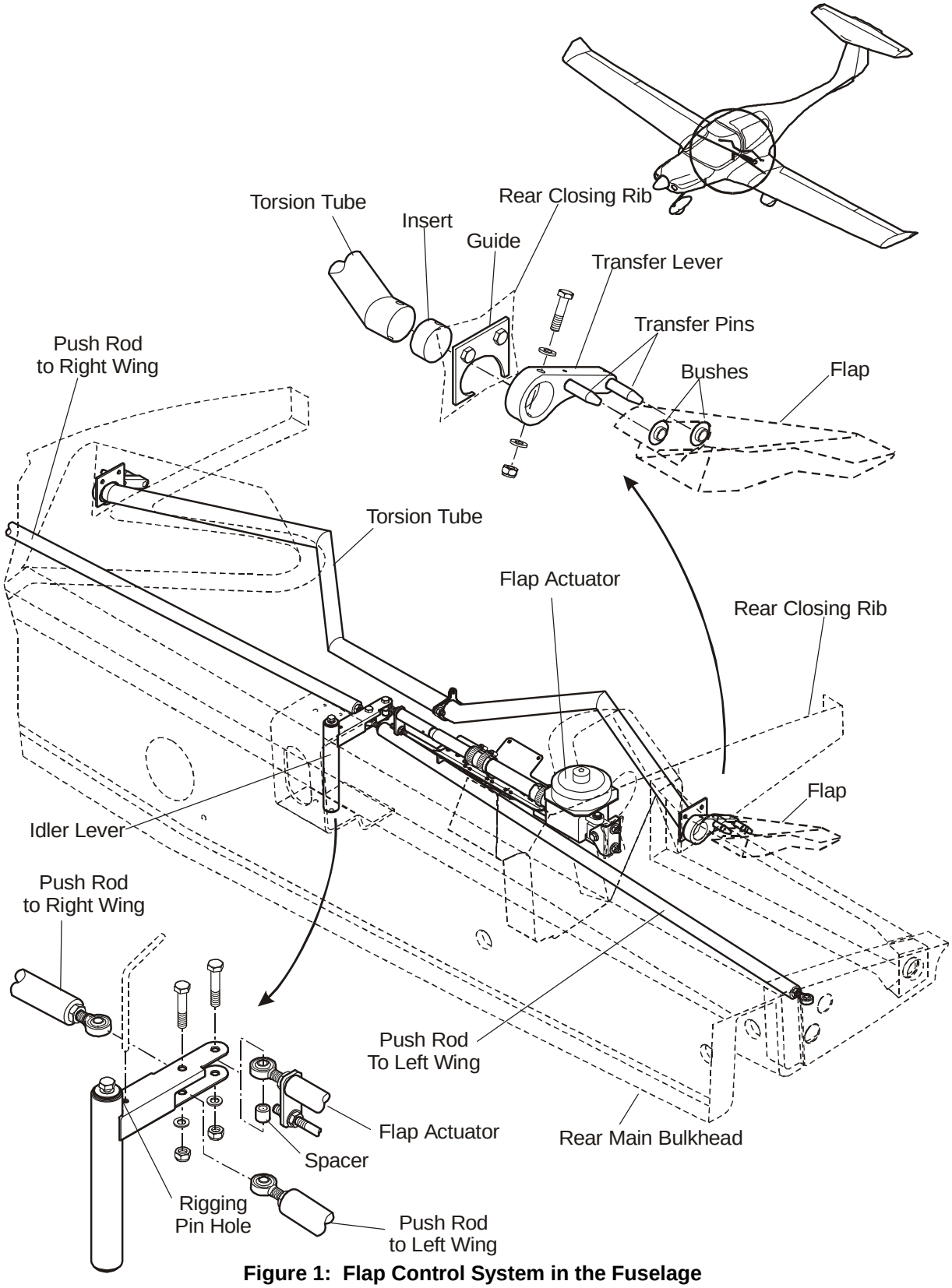


Figure 1: Flap Control System in the Fuselage

2. Description

Figure 1 shows the flap control system in the fuselage. Figure 2 shows the flap push-rods and bellcranks in the wing. Figure 3 shows the flap actuator installation.

A. Flap Actuator

An electric actuator operates the flaps. The electric actuator is under the left passenger seat. A mounting bracket on the left rear closing rib attaches the actuator to the structure.

The electric actuator has an electric motor. The motor has a reduction gear which turns a spindle. The spindle operates a push-rod. The push-rod connects to an idler lever attached to the rear main bulkhead.

A cam attached to the push-rod operates five micro-switches. The micro-switches are part of the flaps electronic control circuit.

B. Push-Rods and Bellcranks

The idler lever on the rear main bulkhead connects to two push-rods. The two push-rods connect to the inboard ends of long push-rods at the wing root ribs. The long push-rods connect to the flap bellcranks in the wings. A guide bearing holds each long rod at the root rib. Two short push-rods attach to the flap horns.

C. Torsion Tube

A cranked torsion tube connects to the inboard end of each flap. The torsion tube has two parts. Bolts attach the two parts of the torsion tube to each other in the fuselage.

A transfer lever attaches to the outboard end of each part of the torsion tube. The transfer lever has two transfer pins. The transfer pins engage with bushes in the root rib of the flap.

If there is a failure of the flap mechanical system, the torsion tube transfers movement from one flap to the other flap. It makes sure that the flaps are synchronized.

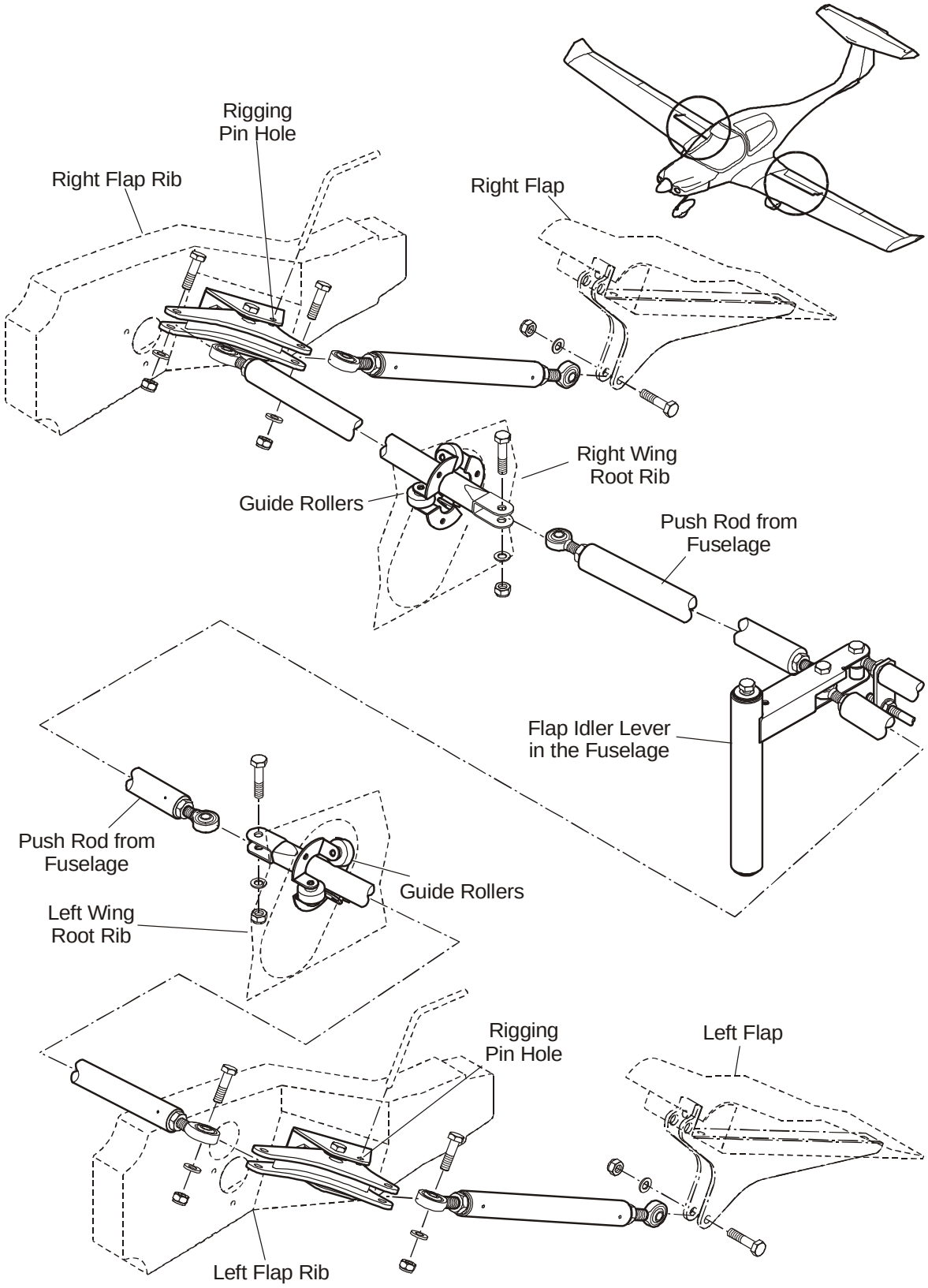


Figure 2: Flap Controls in the Wing

D. Flap Electrical Control

Figure 4 shows the flap electrical control system. The main bus or, if installed, the essential bus supplies power for the flaps. A circuit-breaker protects the circuit (Lycoming version: 5 amps, TAE version: 10 amps). See Chapter 92 for the wiring diagram.

The flap electrical control system uses solid-state electronics. It has an electronic control unit and a switchboard. The electronic control unit is located on the instrument panel. The switch board attaches to the flap actuator.

The electronic control unit has a 3-position selector switch and a flap position indicator. The selector switch can be set to:

– UP (fully up). 0º ± 1º

– T/O (take-off). 20º ± 2º

– LDG (landing). 42º ± 1º

The flap position indicator has three light-emitting diodes. The top diode lights when the flaps are in the UP position. The middle diode lights when the flaps are in the T/O position. The bottom diode lights when the flaps are in the LDG position.

The switch board attaches to the body of the flap actuator. The switch board has five micro switches. It also has a solid-state logic circuit board.

The logic circuits monitor the outputs from the selector switch and the micro-switches on the switch board. They control four power transistors. Two of the power transistors can connect the power supply to the flap motor. The other two can connect the motor to ground.

Two screws attach each micro-switch to the switch board. You can adjust the position of the switch board with three worm-drive clamps. The micro-switches have these functions:

– Micro-switch 1 - UP position.

– Micro-switch 2 - UP indication and T/O position moving down.

– Micro-switch 3 - T/O indication.

– Micro-switch 4 - LDG position.

– Micro-switch 5 - LDG indication T/O position moving up.

Cable harnesses with multi-pin connectors connect the components.

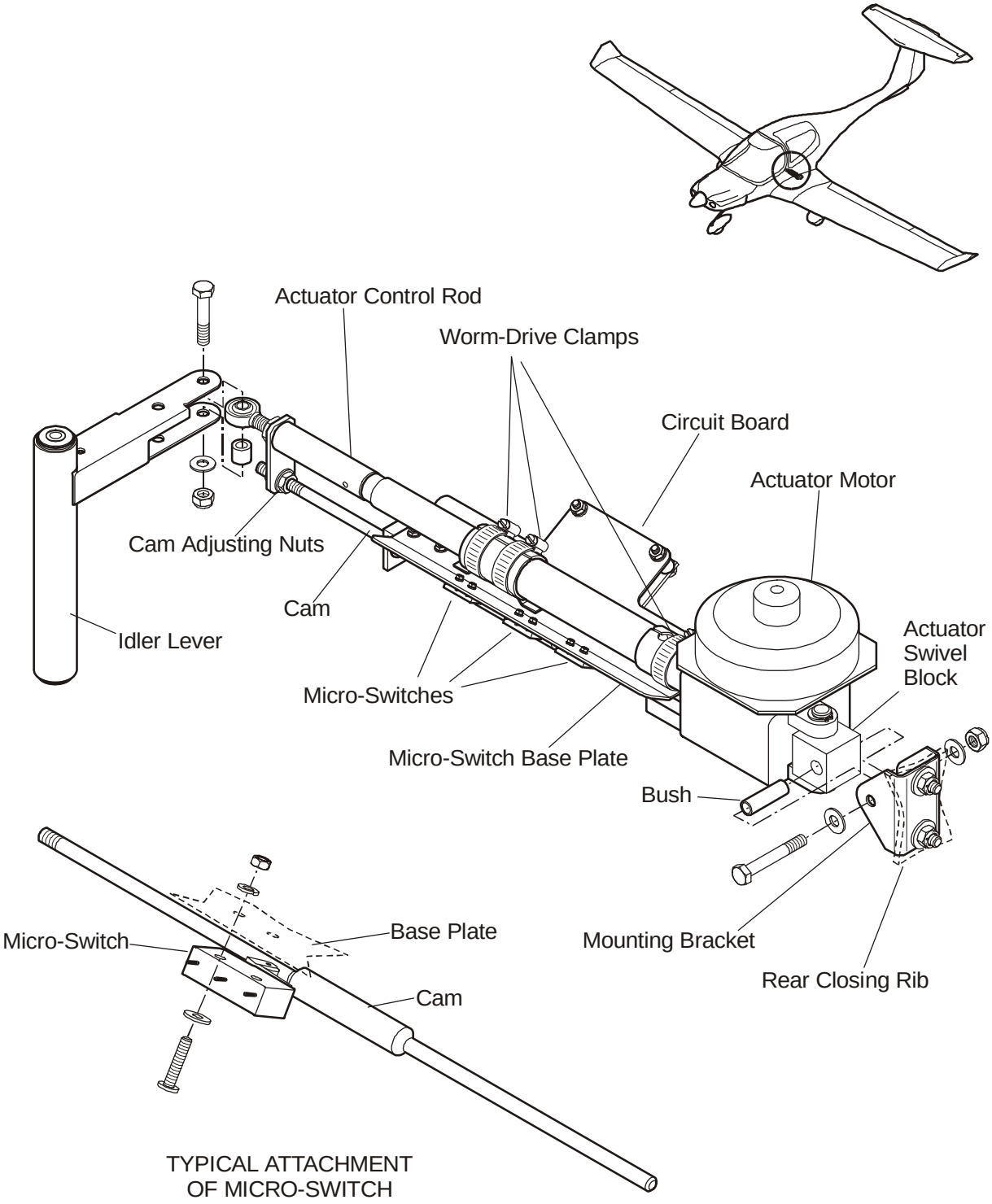


Figure 3: Flap Actuator Installation

3. Operation

If you operate the flap selector switch these things happen:

– The switch energizes the related logic circuit.

– The logic circuit switches on the related transistors to supply power/ground to the flap motor.

– The flap motor turns the reduction gear and spindle. This moves the push-rod towards the new set position.

– The push-rod turns the idler lever around its axis.

– The idler lever moves the push-rods in the fuselage and the wings.

– The push-rods move the bellcranks in the left and right wing.

– The two short push-rods move the flaps.

When the flaps come to the set position:

– The cam on the flap actuator operates the related position and indication micro-switches.

– The logic circuit switches off the related transistors to de-energize the motor.

– The flap position indicator shows the new flap position.

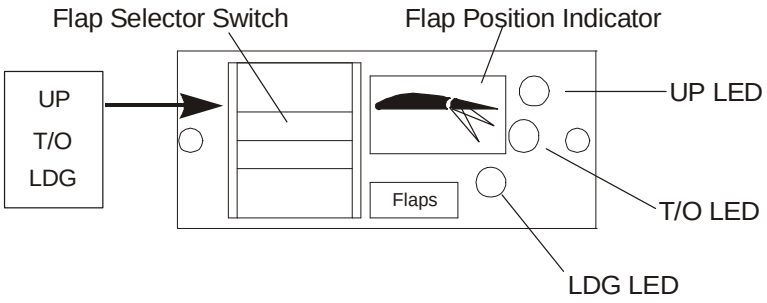
4. Fail-Safe Operation

The flap control system has these safety properties:

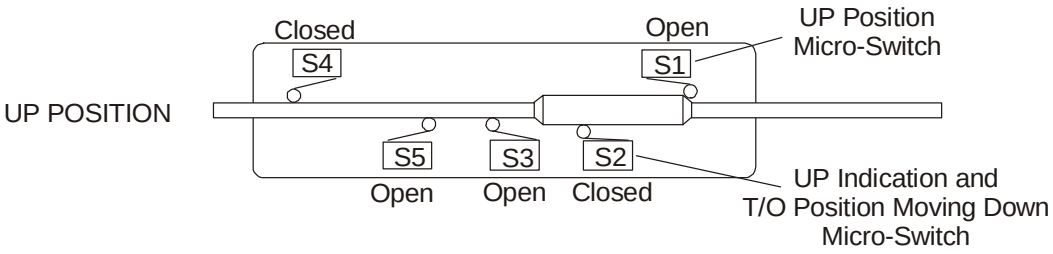
– If the LDG position micro-switch fails closed the flap actuator push-rod will continue to travel for about 5 mm (0.2 in) until it reaches an internal stop. This prevents damage to the flaps. The FLAP circuit-breaker opens.

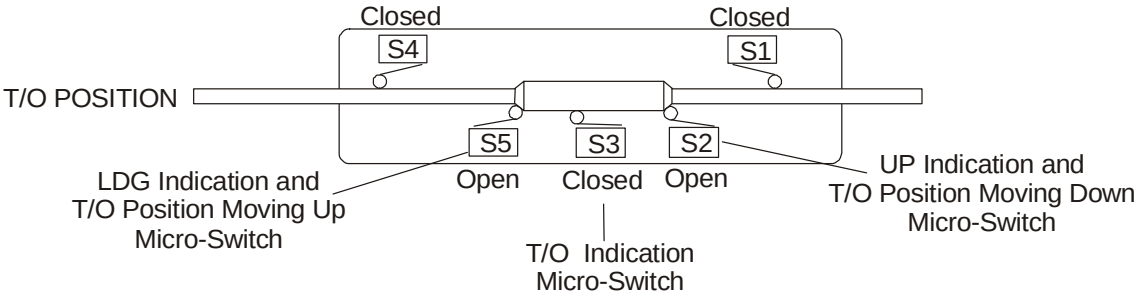
– If the UP position micro-switch fails closed, the actuator push-rod contacts the end of the actuator body after about 5 mm (0.2 in) of movement. This prevents damage to the flaps. The FLAP circuit-breaker opens.

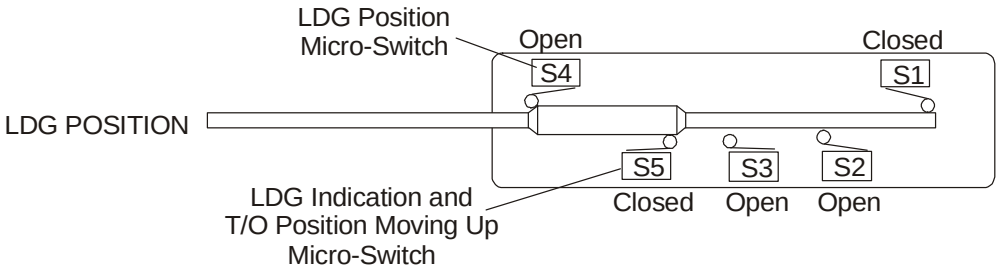
– If there is a mechanical failure in the controls to one flap, the torsion tube prevents asymmetric flap movement.



FLAP CONTROL UNIT IN THE INSTRUMENT PANEL
(View Looking Forward)







MICRO-SWITCH BOARD
(View Looking Down)

Figure 4: Flap Electrical Control System

Trouble-Shooting

1. General

The table below lists the defects you could have in the flap control system. If you have the trouble detailed in the Trouble column read across to the Possible Cause column. Then do the repair in the Repair column.

Trouble	Possible Cause	Repair
Flaps do not operate.	Circuit breaker not set. Airplane electrical system voltage low. Flap selector switch defective.	Set the flap circuit breaker. Do a test of the airplane electrical system voltage. Replace the flap electronic control unit.
Flap circuit-breaker will not stay closed.	Short to ground in the wires to the electrical control unit or the micro-switches. Short to ground in the electrical control unit. Short to ground in a micro-switch. Short to ground in a wire between a closed micro-switch and the control unit.	Do an insulation test between each wire and ground. Repair or replace defective wires. Replace the electrical control unit. Replace the micro-switch. Do an insulation test between each wire and ground. Repair or replace defective wires.
Flap circuit-breaker opens when flap selector switch moved to any down position.	Short to ground in a motor supply wire.	Do an insulation test between each wire and ground. Repair or replace defective wires.
Flap circuit-breaker opens when flap selector switch moved to any up position.	Short to ground in a motor supply wire.	Do an insulation test between each wire and ground. Repair or replace defective wires.
Flap circuit-breaker opens when the flaps stop at the chosen position.	Short to ground in the wires to the electrical control unit from the related indication micro-switch.	Do an insulation test between each wire and ground. Repair or replace defective wires.

Trouble	Possible Cause	Repair
Flap circuit-breaker opens when the flaps have moved only a short distance from the UP setting.	Short to ground in the wires to the electrical control unit from micro-switch 1.	Do an insulation test between each wire and ground. Repair or replace defective wires.
Flap circuit-breaker opens when the flaps have moved only a short distance from the LDG setting.	Short to ground in the wires to the electrical control unit from micro-switch 4.	Do an insulation test between each wire and ground. Repair or replace defective wires.
Flaps move slowly.	Airplane electrical system voltage low. Flap motor defective. Flap actuator defective.	Do a test of the airplane electrical system voltage. Do a test for 14 V at the motor with flaps selected. If there is 14 V at the motor, replace the actuator. Examine the actuator. If you find damage, then replace the flap actuator.
Flaps do no not align with the wing trailing edge.	Flaps extended at too high airspeed.	Examine the flap system. Replace damaged parts. Adjust the system.
Flaps will not move to LDG position. Flaps move to T/O and UP correctly.	Micro-switch 4 defective. Open circuit in the micro-switch 4 wiring.	Replace the micro-switch. Do a continuity test of the wiring. Repair or replace the defective wire.
Flaps will not move to UP position. Flaps move to T/O and LDG correctly.	Micro-switch 1 defective. Open circuit in the micro-switch 1 wiring.	Replace the micro-switch. Do a continuity test of the wiring. Repair or replace the defective wire.

Trouble	Possible Cause	Repair
No LDG indication when the flaps are in the LDG position. Flaps will not move from LDG to T/O. Flaps move from LDG to UP correctly.	Micro-switch 5 defective. Open circuit in the micro-switch 5 wiring.	Replace the micro-switch. Do a continuity test of the wiring. Repair or replace the defective wire.
No UP indication when the flaps are in the UP position. Flaps will not move from UP to T/O. Flaps move from UP to LDG correctly.	Micro-switch 2 defective. Open circuit in the micro-switch 2 wiring.	Replace the micro-switch. Do a continuity test of the wiring. Repair or replace the defective wire.
No T/O indication when the flaps are in the T/O position. Flaps move to all positions correctly.	Micro-switch 3 defective. Open circuit in the micro-switch 3 wiring.	Replace the micro-switch. Do a continuity test of the wiring. Repair or replace the defective wire.
Flap circuit-breaker opens at the end of down movement.	Micro-switch 4 defective.	Replace the micro-switch.
Flap circuit-breaker opens at the end of up movement.	Micro-switch 1 defective.	Replace the micro-switch.
LDG LED stays on when the flaps are not in the LDG position. The other indications operate correctly.	Micro-switch 5 defective.	Replace the micro-switch.
UP LED stays on when the flaps are not in the UP position. The other indications operate correctly.	Micro-switch 2 defective.	Replace the micro-switch.

Trouble	Possible Cause	Repair
T/O LED stays on when the flaps are not in the T/O position. The other indications operate correctly.	Micro-switch 3 defective.	Replace the micro-switch.
Flaps move to LDG when T/O set from UP.	Micro-switch 2 defective.	Replace the micro-switch.
Flaps move to UP when T/O set from LDG.	Micro-switch 5 defective.	Replace the micro-switch.

Maintenance Practices

1. General

These Maintenance Practices tell you how to remove and install the components of the flap control system. They also tell you how to test and adjust the system. See Section 57-50 for data about removing and installing the flaps.

WARNING: WHEN YOU DO WORK ON THE AIRPLANE CONTROLS, YOU MUST MAKE SURE THE AREAS AROUND THE CONTROLS/CONTROL SURFACES ARE CLEAR OF PERSONS/EQUIPMENT. IF YOU DO NOT DO THIS, INJURY TO PERSONS AND DAMAGE TO CONTROL SURFACES CAN OCCUR.

WARNING: WHEN YOU COMPLETE WORK ON THE CONTROLS, MAKE SURE THAT YOU REMOVE ALL LOOSE ITEMS/TOOLS FROM THAT AREA. LOOSE ITEMS/TOOLS CAN PREVENT FULL MOVEMENT OF THE AIRPLANE CONTROLS. THIS CAN CAUSE DEATH OR INJURY TO PERSONS.

2. Remove/Install the Flap Actuator

Refer to Figures 1 and 3.

A. Remove the Flap Actuator

	Detail Steps/Work Items	Key Items/References
(1)	If possible, set the flaps to the T/O position.	
(2)	Disconnect the airplane main battery.	Refer to Section 24-31 (Lycoming version) or 24-34 (TAE version).
(3)	Remove the passenger seat.	Refer to Section 25-10.
(4)	Disconnect the electrical supply connector to the flap motor.	
(5)	Disconnect the control harness plug from the switch-board.	
(6)	Remove the bolt which attaches the actuator push-rod to the idler lever.	At the rear main bulkhead. Hold the flaps.
(7)	Lower the flaps by hand until they stop.	

	Detail Steps/Work Items	Key Items/References
(8)	Remove the bolt which attaches the actuator body to the mounting bracket.	At the left rear closing rib.
(9)	Remove the actuator from the airplane.	

B. Install the Flap Actuator

	Detail Steps/Work Items	Key Items/References
(1)	Put the flap actuator in position in the fuselage.	
(2)	Install the bolt which attaches the actuator body to the mounting bracket.	At the left rear closing rib. Make sure that the bush is in position in the actuator swivel block. Torque: 6.4 Nm (4.7 lbf.ft.).
(3)	Install the bolt which attaches the actuator push-rod to the idle lever.	At the rear main bulkhead. Hold the flaps. Torque: 6.4 Nm (4.7 lbf.ft.).
(4)	Connect the control harness plug for the switch-board.	
(5)	Connect the electrical supply connector to the flap motor.	
(6)	Connect the airplane main battery.	Refer to Section 24-31 (Lycoming version) or 24-34 (TAE version).
(7)	Do the adjustment procedure.	See Paragraph 4.
(8)	Do an inspection of all the controls that you have connected. – If necessary for your Airworthiness Authority, do a second inspection of the controls.	
(9)	Install the passenger seat.	Refer to Section 25-10.

3. Test the Flap Control System

A. Equipment

Item	Quantity	Part Number
Inclinometer.	1	Commercial.
Spring balance.	1	Commercial.

B. Test the Flap Control System Procedure

	Detail Steps/Work Items	Key Items/References
(1)	Make a copy of the Control Surfaces Adjustment Report.	Refer to Section 06-00. Use it to record the measurements.
(2)	Make sure that the flaps are fully UP: – Set the ALT/BAT switch (Lycoming version) or ELECTRIC MASTER key switch (TAE version) to ON. – Set the flaps to T/O. – When the flaps stop moving, set the flaps to UP. – When the flaps stop moving, set the ALT/BAT switch (Lycoming version) or ELECTRIC MASTER key switch (TAE version) to OFF.	
(3)	Do a test for the correct pre-load in the flap UP position: – Put a loop of adhesive tape on the trailing edge of the left flap opposite the up-stop. – Pull down on the loop of tape with the spring balance until the flap just moves from the up-stop. – Record the value in the Control Surfaces Adjustment Report.	The value must be as shown in the Control Surfaces Adjustment Report.

	Detail Steps/Work Items	Key Items/References
(4)	If the pre-load is not correct, adjust the control rod between the bellcrank in the wing and the flap horn. Do items 3 and 4 again as necessary.	Refer to Section 27-00.
(5)	Do items 3 and 4 for the right flap.	
(6)	Zero the inclinometer to the left flap: – Put the inclinometer on the left flap close to the flap horn. – Zero the inclinometer. – Remove the inclinometer.	
(7)	Set the flaps to T/O: – Set the ALT/BAT switch (Lycoming version) or ELECTRIC MASTER key switch (TAE version) to ON. – Set the flaps to T/O. – When the flaps stop moving, set the ALT/BAT switch (Lycoming version) or ELECTRIC MASTER key switch (TAE version) to OFF.	
(8)	Measure the angle of the left flap. – Record the value in the Control Surfaces Adjustment Report.	Use the inclinometer. The value must be as shown in the Control Surfaces Adjustment Report.
(9)	Do item 8 for the right flap.	
(10)	Set the flaps to LDG: – Set the ALT/BAT switch (Lycoming version) or ELECTRIC MASTER key switch (TAE version) to ON. – Set the flaps to LDG. – When the flaps stop moving, set the ALT/BAT switch (Lycoming version) or ELECTRIC MASTER key switch (TAE version) to OFF.	

	Detail Steps/Work Items	Key Items/References
(11)	Measure the angle of the left flap. – Record the value in the Control Surfaces Adjustment Report.	Use the inclinometer. The value must be as shown in the Control Surfaces Adjustment Report.
(12)	Do item 11 for the right flap.	
(13)	Set the flaps to UP.	

4. Adjust the Flap Control System

If you cannot get the correct range of movement of the flap control system, use this procedure to adjust the system.

A. Equipment

Item	Quantity	Part Number
Rigging pins.	3	-
Inclinometer.	1	Commercial.

B. Adjust The Flap Control System Procedure

	Detail Steps/Work Items	Key Items/References
(1)	Make a copy of the Control Surfaces Adjustment Report.	Refer to Section 06-00. Use it to record the measurements.
(2)	Remove these items for access: – The passenger seat. – The flap bellcrank access panels.	 Refer to Section 25-10. Refer to Section 53-40.
(3)	Disconnect the airplane main battery.	Refer to Section 24-31 (Lycoming version) or 24-34 (TAE version).
(4)	Remove the bolt, spacer, washer and nut which attach the actuator push-rod to the idler lever.	At the rear main bulkhead. Hold the flaps.
(5)	Put a rigging pin in the idler lever.	Refer to Figure 3. At the rear main bulkhead.
(6)	Put rigging pins in the left and right flap bellcranks in the wings. If necessary, adjust the push-rods between the idler lever and the bellcranks.	Refer to Section 27-00.
(7)	Remove the rigging pins from these items: – The idler lever. – The left and right flap bellcranks in the wings.	
(8)	Connect the airplane main battery.	Refer to Section 24-31 (Lycoming version) or 24-34 (TAE version).

	Detail Steps/Work Items	Key Items/References
(9)	Hold the flaps hard against the up-stops.	
(10)	Make sure that both flaps hit the up stops at the same time. If necessary, adjust the rod between the bellcrank in the wing and the flap.	Refer to Section 27-00.
	WARNING: DO NOT TOUCH THE ACTUATOR WHEN YOU OPERATE IT. THE MOVING PARTS CAN CAUSE INJURY.	
(11)	Set the actuator to the T/O position: – Hold the actuator clear of the structure. – Set the ALT/BAT switch (Lycoming version) or ELECTRIC MASTER key switch (TAE version) to ON. – Set the FLAP switch to T/O. – When the actuator stops moving, set the flap switch to UP. – When the actuator stops moving, set the ALT/BAT switch (Lycoming version) or ELECTRIC MASTER key switch (TAE version) to OFF.	Use a piece of string through the eye end.
(12)	Measure the extension of the actuator push-rod.	The distance between the center of the eye-end of the actuator rod and the center of the actuator swivel block mounting must be 379.7 mm (14.87 in).
(13)	If the actuator push-rod extension is not correct, adjust the cam rod: – Loosen the nuts which attach the cam rod to the plate at the eye end. – Turn the nuts to move the cam rod. – Tighten the nuts.	Refer to Figure 3. One turn clockwise decreases the extension by 1 mm (0.04 in). Torque: 6.4 Nm (4.7 lbf.ft.).

	Detail Steps/Work Items	Key Items/References
(14)	Do items 12 and 13 as necessary to get the correct extension.	
(15)	Connect the flap actuator: – Hold the flaps hard against the up-stops. – If necessary, adjust the eye-end to align with the idler lever: – Loosen the jam-nut. – Turn the eye-end to align with the idler lever. – Tighten the jam-nut. – Install the bolt, spacer, washer and nut which attach the eye-end to the idler lever.	Torque: 16 Nm (11.8 lbf.ft.). Torque: 6.4 Nm (4.7 lbf.ft.).
(16)	Do a test for the correct pre-load in the flap UP position: – Put a loop of adhesive tape on the trailing edge of the left flap opposite the up-stop. – Pull down on the loop of tape with the spring balance until the flap just moves from the up-stop. – Record the value in the Control Surfaces Adjustment Report.	The value must be as shown in the Control Surfaces Adjustment Report.
(17)	If the pre-load is not correct, adjust the control rod between the bellcrank in the wing and the flap horn. Do items 16 and 17 again as necessary.	Refer to Section 27-00.
(18)	Do items 16 and 17 for the right flap.	
(19)	Do a test of the flap system.	Refer to Paragraph 3.
(20)	Do an inspection of all the controls that you have adjusted. – If necessary for your Airworthiness Authority, do a second inspection of the controls.	

	Detail Steps/Work Items	Key Items/References
(21)	Install these items: – The passenger seat. – The flap bellcrank access panels.	 Refer to Section 25-10. Refer to Section 53-40.

5. Flap Push-Rod Access

Flap Push-Rod	Remove/Install Access	References
Between the idler lever at the rear main bulkhead and the wing root rib.	Passenger seat. Center section access panels.	Refer to Section 25-10. Refer to Section 52-40.
Between the wing root rib and the bellcrank in the left/right wing.	Center section access panels. Flap bellcrank access panels under each wing.	Refer to Section 52-40.
Between the bellcrank in the left/right wing and the flap.	Flap bellcrank access panels under each wing.	Refer to Section 52-40.

6. Flap Bellcrank and Lever Access

Flap Bellcrank/Lever	Remove/Install Access	References
Idler lever at the rear main bulkhead.	Passenger seat.	Refer to Section 25-10.
Bellcrank in the wing.	Flap bellcrank access panels under each wing.	Refer to Section 52-40.

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CHAPTER 28

FUEL SYSTEM

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CHAPTER 28
FUEL SYSTEM

Section 28-00
Fuel System - Lycoming Engine

1. General

This Section tells you about the DA 40 airplane fuel system with the Lycoming engine installed. It does not tell you about the engine fuel system. For more data on the engine fuel system refer to the Lycoming Maintenance Manual.

The DA 40 has a fuel tank in each wing. Each wing tank is made of the following two or three chambers:

– The inboard fuel chamber,

– The outboard fuel chamber, and

– The long range chamber (only if the long range tank is installed, see OÄM 40-071).

All individual chambers are interconnected. The total usable fuel capacity of the fuel system is 152 liter (40 US gal) with the standard tank and 182 liter (48 US gal) with the optional long range tank installed. Two pumps supply fuel to the engine and a filter gives protection to sensitive components.

The pilot controls the fuel system with a selector valve and a switch for the electric fuel pump. A fuel quantity indicator shows the quantity of fuel in the left tanks and in the right tanks. Refer to these Sections for more data on these systems:

– Section 28-10. Fuel storage.

– Section 28-20. Fuel distribution.

– Section 28-40. Fuel indication.

Note: Equipment which is certified for installation in the DA 40 is listed in Section 6.5 of the Airplane Flight Manual. Such equipment may be installed in accordance with the Airplane Maintenance Manual.

Any equipment which is not listed in Section 6.5 of the Airplane Flight Manual is called "Additional Equipment". The installation of Additional Equipment is a modification which must be handled in accordance with national regulations or a Service Bulletin.

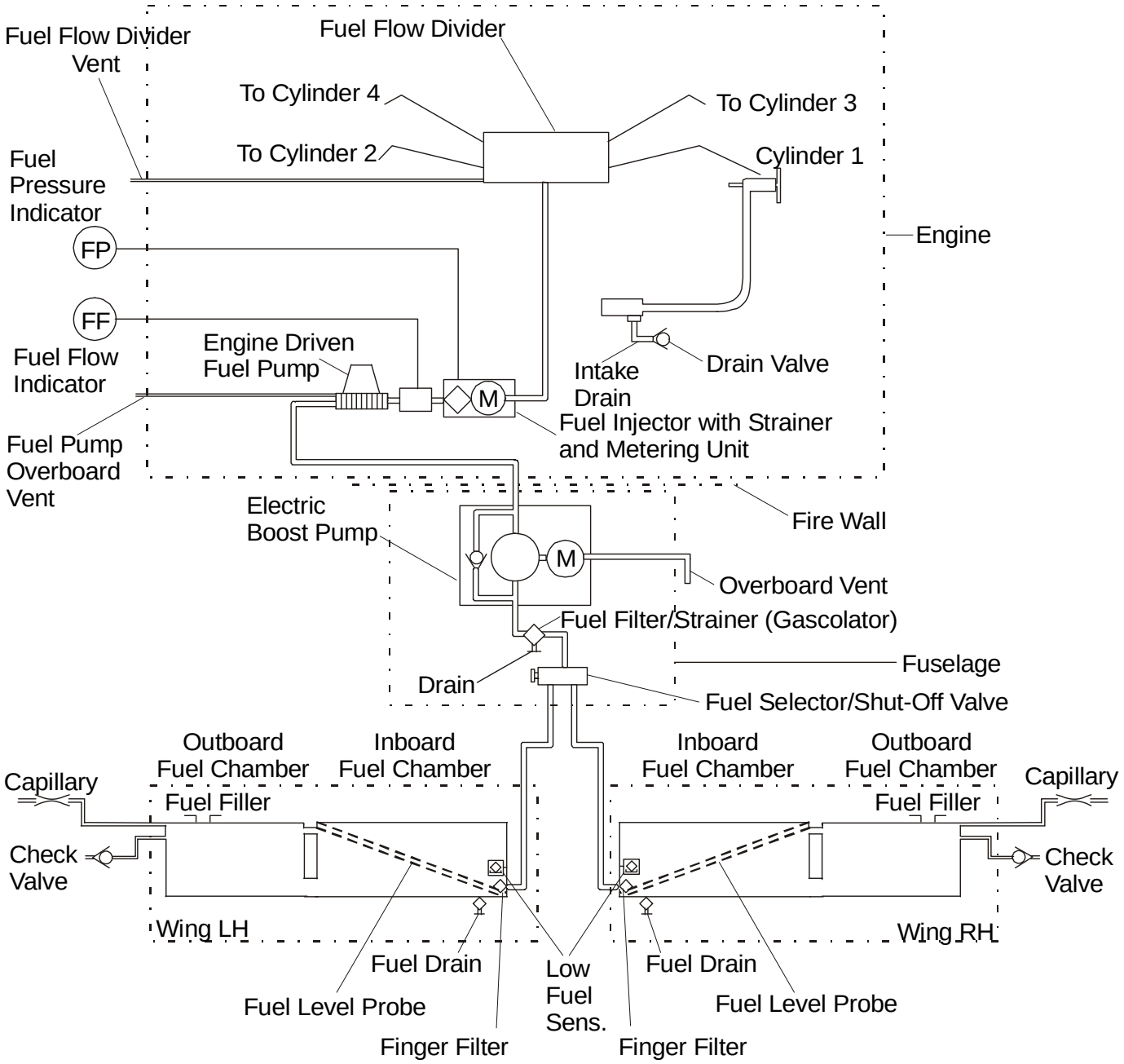


Figure 1: Fuel System Schematic Diagram Lycoming IO-360-M1A Engine, Standard Tanks Installed

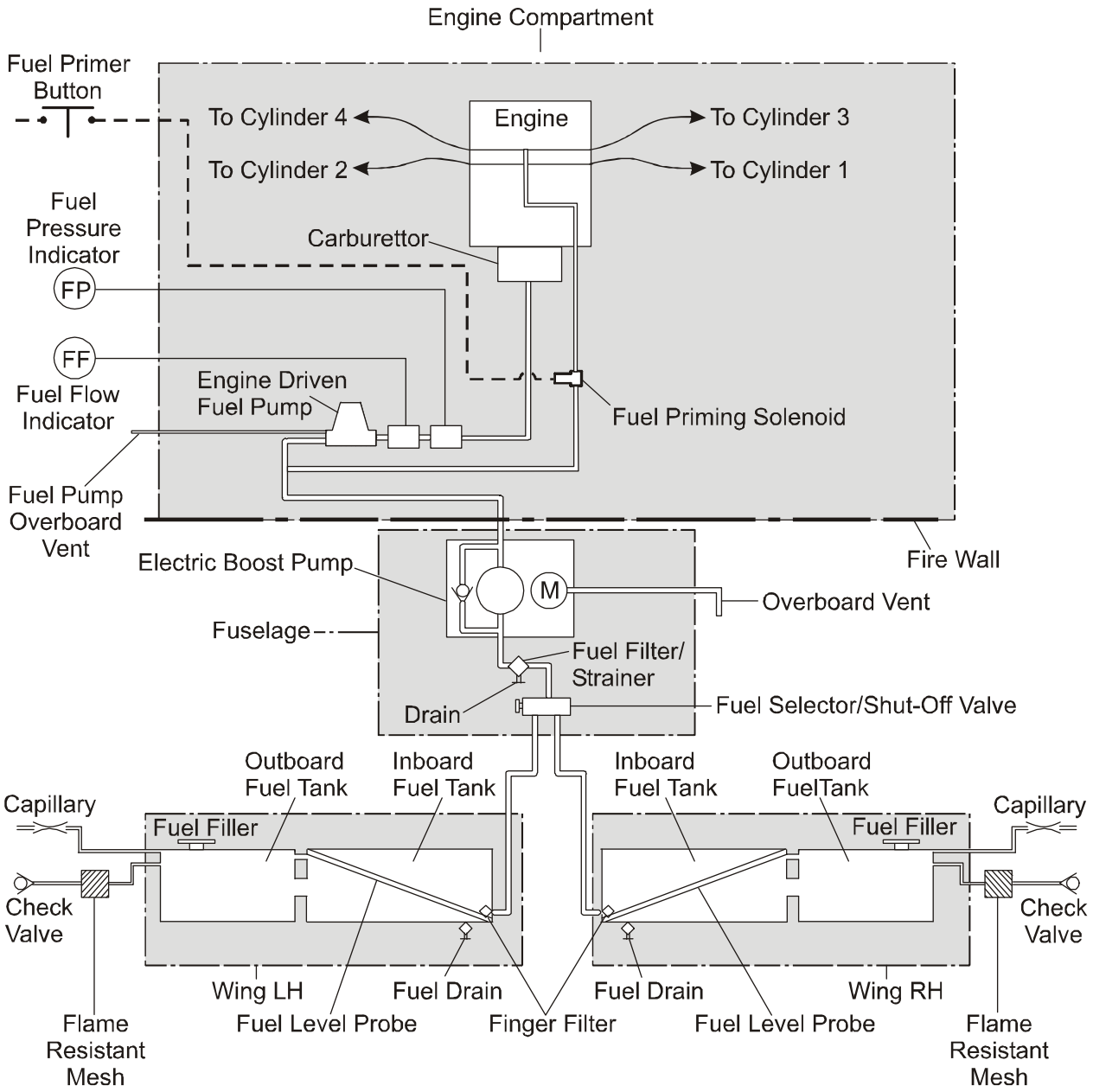


Figure 2: Fuel System Schematic Diagram Lycoming O-360-A4M Engine, Standard Tanks Installed

2. Description

A. Standard Tanks

Figure 1 shows the fuel system schematic diagram for the DA 40 with the Lycoming engine and the standard tanks installed.

An inboard chamber and an outboard chamber in each wing hold the fuel. A flexible coupling connects the inboard chamber to the outboard chamber. Each outboard chamber has a fuel filler assembly and a vent connection. Each inboard chamber has a fuel drain and a finger-filter at the connection to the main fuel feed pipe. Fuel level sensors and probes are installed in both the inboard fuel chambers.

Flexible hoses connect the fuel tanks in the wings to the fuel selector valve in the center fuselage. A gascolator attaches to the selector valve. The gascolator has a filter and a fuel drain valve. A flexible hose connects the gascolator to the electric fuel pump (booster pump). The electric fuel pump has an internal fuel bypass should the fuel pump become defective in flight.

A flexible hose connects the booster pump to a bulkhead fitting in the firewall and another flexible hose connects the bulkhead fitting to the engine driven fuel pump.

Vent pipes connect between the inboard chambers and the outboard chambers. The outboard chambers are vented to atmosphere. Check valves in the vent system prevent fuel from flowing out of the outboard chamber through the vent system.

The outboard chambers also have a small capillary tube which connects to atmosphere. These capillary tubes allow the air pressure within the tanks to equalize with the ambient pressure. The outlets for both the main vent system and the capillary vent system are on the fuel tank outer access panel in the lower surface of each wing.

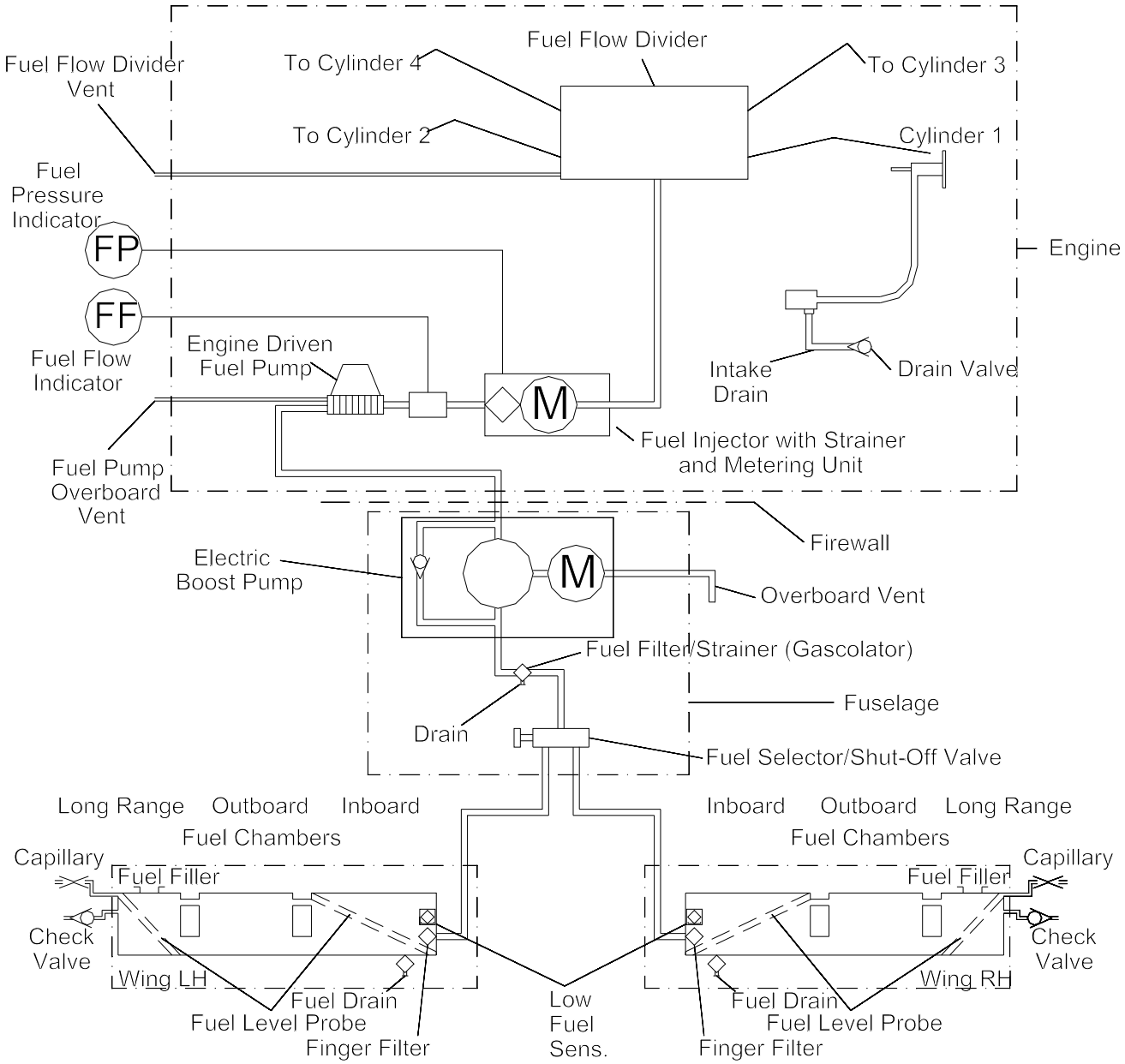


Figure 3: Fuel System Schematic Diagram, Long Range Tanks Installed (OÄM 40-071)

B. Long Range Tanks (OÄM 40-071)

Figure 3 shows the fuel system schematic diagram for the DA 40 with the Lycoming engine and the long range tanks installed.

An inboard chamber, an outboard chamber and a long rang chamber in each wing hold the fuel. Flexible couplings connect the individual chambers. Each long range chamber has a fuel filler assembly and a vent connection. Each inboard chamber has a fuel drain and a finger-filter at the connection to the main fuel feed pipe. Fuel level sensors and probes are installed in each inboard chamber. Additional fuel probes are installed in each long range fuel chamber.

Flexible hoses connect the fuel tanks in the wings to the fuel selector valve in the center fuselage. A gascolator attaches to the selector valve. The gascolator has a filter and a fuel drain valve. A flexible hose connects the gascolator to the electric fuel pump (booster pump). The electric fuel pump has an internal fuel by-pass should the fuel pump become defective in flight.

A flexible hose connects the booster pump to a bulkhead fitting in the firewall and another flexible hose connects the bulkhead fitting to the engine driven fuel pump.

Vent pipes connect between each individual fuel chamber. The long range fuel chambers are vented to atmosphere. Check valves in the vent system prevent fuel from flowing out of the long range fuel chamber through the vent system.

The long range fuel chambers also have a small capillary tube which connects to atmosphere. These capillary tubes allow the air pressure within the tanks to equalize with the ambient pressure. The outlets for both the main vent system and the capillary vent system are on the fuel tank outer access panel in the lower surface of each wing.

3. Operation

With the engine running and the fuel system controls set as follows:

– Electrical fuel pump (booster pump) set to ON.

– Fuel-selector valve set to LEFT or RIGHT.

Fuel flows from the left tank or from the right tank, through finger-filters to the fuel selector valve. The vents system allows air to flow into the tanks from atmosphere, check valves in the vent system prevent fuel from flowing out of the tanks through the vents.

The fuel flows from the fuel selector valve through the gascolator filter to the electric fuel pump. Fuel flows from the pump under pressure to the engine driven fuel pump.

If you set the electric fuel pump to OFF, then an internal by-pass will allow the fuel to flow through the electric fuel pump to the engine driven fuel pump. The engine can run.

If you set the fuel selector valve to RIGHT then fuel will only flow from the right tank.

If you set the fuel selector valve to LEFT then fuel will only flow from the left tank.

If you set the fuel selector valve to OFF then fuel will not flow from the left tank or the right tank. The engine will not run.

Both of the inboard fuel chambers and both of the long range fuel chambers (if the long range tanks are installed) have fuel probes. The signals from the fuel probes are used to set a value on an indicator. The indicator is located in the instrument panel, right side.

Both of the inboard fuel chambers have additional fuel sensors. The signals from the fuel sensors operate a low fuel caution light on the annunciator panel.

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Section 28-01
Fuel System - TAE 125 Diesel Engine

1. General

This Chapter tells you about the DA 40 airplane fuel system with the TAE 125 Diesel engine installed. It does not tell you about the engine fuel system. For more data on the engine fuel system refer to the TAE 125 Operation and Maintenance Manual.

The DA 40 has a fuel tank in each wing. Two different tank versions are provided. The total usable fuel capacity of the fuel system is 28 US gal (106 liter) in case of the standard tank and 39 US gal (156 liter) in case of the long range tank (OÄM 40-130). Two engine-mounted pumps supply fuel to the engine and a filter gives protection to sensitive components. An electric transfer pump moves fuel from the right wing to the left wing as necessary.

The pilot controls the fuel system with a switch for the electric fuel pump. An emergency fuel valve provides a backup system for fuel transfer. A fuel quantity indicator shows the quantity of fuel in the tanks. Refer to these Sections for more data on these systems:

Section 28-11. Fuel storage.

Section 28-21. Fuel distribution.

Section 28-41. Fuel indication.

Section 73-01. Engine fuel system.

Note: Equipment which is certified for installation in the DA 40 is listed in Section 6.5 of the Airplane Flight Manual. Such equipment may be installed in accordance with the Airplane Maintenance Manual.

Any equipment which is not listed in Section 6.5 of the Airplane Flight Manual is called "Additional Equipment". The installation of Additional Equipment is a modification which must be handled in accordance with national regulations or a Service Bulletin.

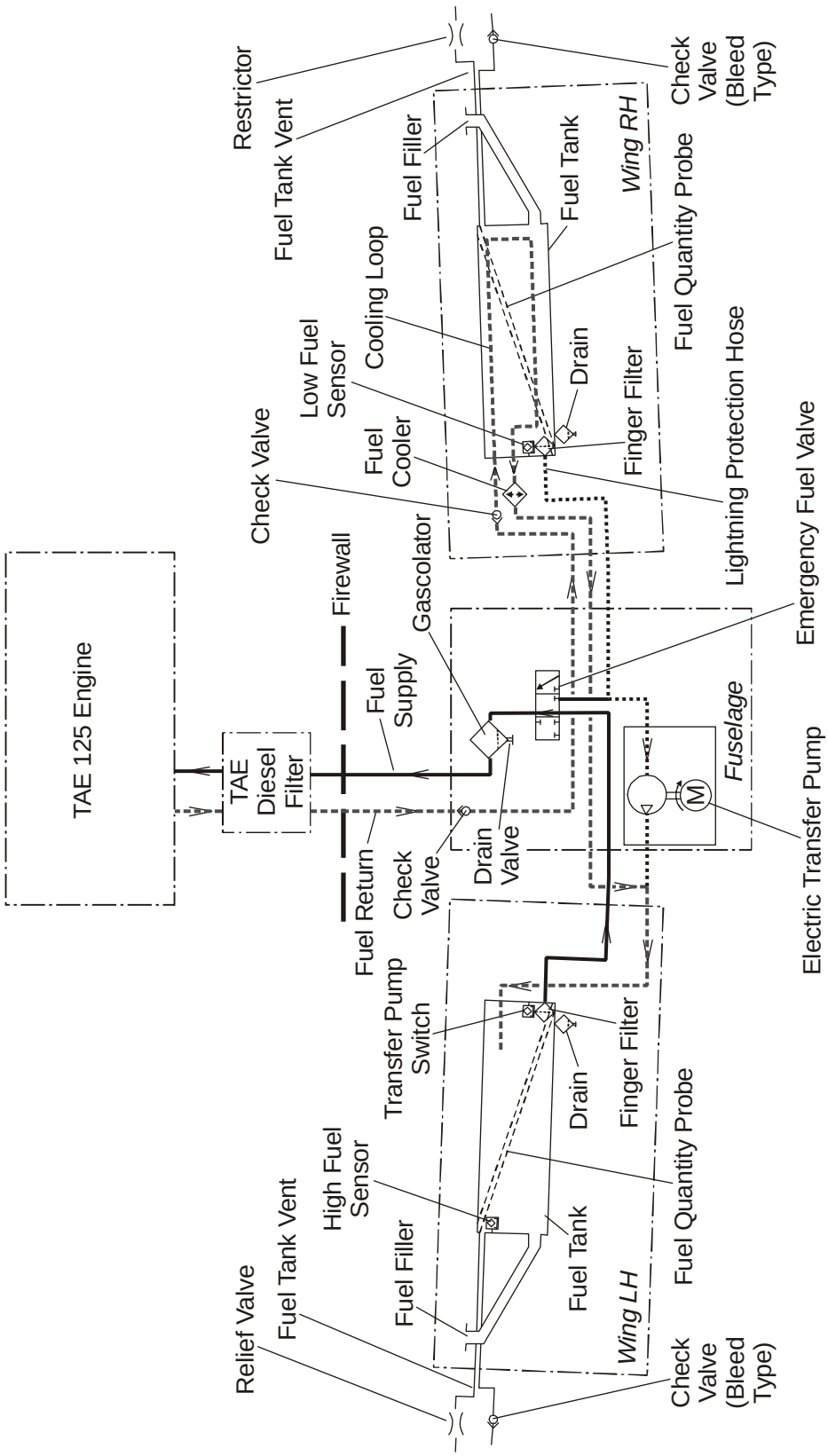


Figure 1: Fuel System Schematic Drawing

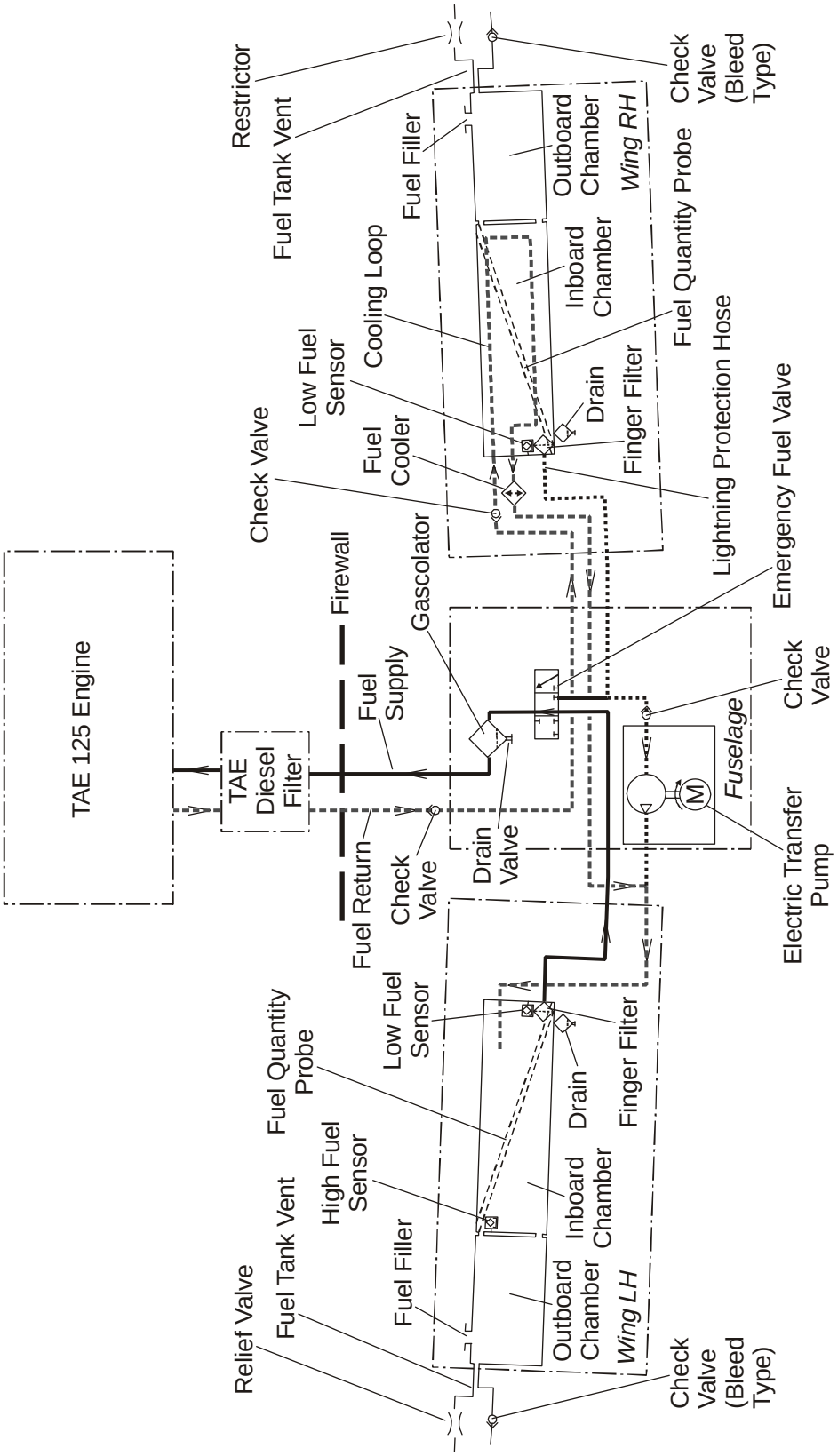


Figure 2: Long Range Tank Fuel System Schematic Drawing

2. Description

A. Standard Tank

Figure 1 shows the standard tank fuel system schematic diagram for the DA 40 with the TAE 125 Diesel engine installed.

A tank located inboard in each wing holds the fuel. Each tank has a fuel filler assembly and a vent connection at the outboard end. Small diameter flexible hoses connect the top outer corner of the tank to the top of the fuel filler just below the cap. Two short hoses connect to the fuel filler. One has a bleed type check valve. The other has a restrictor (RH tank) or a relief valve (LH tank).

Each tank has a fuel drain and a finger-filter at the connection to the main fuel feed pipe. The outlet from the finger filter in the right tank connects to the emergency fuel valve and the transfer pump. The outlet from the transfer pump connects to the left tank.

Fuel level sensors and fuel quantity probes are installed in both fuel tanks. The right tank has a transfer pump shut-off switch (low fuel sensor) located at the bottom inner corner. The left tank has a transfer pump shut-off switch (high fuel sensor) located at the top outer corner. The left tank also has a switch for the LOW FUEL caution light (low fuel sensor) located at the bottom inner corner.

The fuel quantity probes go from the bottom inner corner of each tank to the top outer corner. The fuel level changes the probe electrical properties. The fuel quantity system measures the probe capacitance. It uses the value as an analogue of fuel quantity. The value for each tank is shown on the Auxiliary Engine Display (AED) on the right of the instrument panel.

A fuel temperature sensor is installed in each fuel tank. The LH and RH fuel temperatures are indicated on the Auxiliary Engine Display (AED).

To cool down the hot return fuel a fuel cooler is installed in the return line from the right tank to the left tank direct at the right tank. A winterization kit is provided which has to be removed above hot outside air temperatures.

Flexible hoses connect the fuel tanks in the wings to the emergency fuel valve and transfer pump in the center fuselage. A gascolator attaches to the emergency fuel valve. The gascolator has a filter and a fuel drain valve. A flexible hose connects the gascolator to the engine fuel filter mounted forward of the firewall.

Two engine-mounted pumps supply fuel to the engine fuel injection system. A return line from the engine connects to the right wing tank. A loop of pipe inside the right tank makes a heat exchanger to cool the return fuel. A flexible hose connects the outlet of the loop to the left tank.

B. Long Range Tank (OÄM 40-130)

Figure 2 shows the long range tank fuel system schematic diagram for the DA 40 with the TAE 125 Diesel engine installed.

The airplane has two fuel tanks. Each tank is made of two fuel chambers: the inboard fuel chamber and the outboard fuel chamber. Both fuel chambers are interconnected. Aluminum makes the fuel chambers. Baffles in the tank prevent the fuel from moving quickly from one end of the chamber to the other during flight.

Each wing tank has an usable capacity of 19.5 US gal (156 liter).

Each tank chamber is a welded aluminum structure. Baffles in the tank prevent the fuel from moving quickly from one end of the tank to the other during flight. The tank has bosses welded in the inboard face for the fuel quantity probe, the low fuel sensor, and the fuel temperature sensor. Other bosses make connection points for hoses.

A finger filter at the tank outlet prevents debris from entering the fuel system. A drain valve is located in the lower surface of the tank. You can use the drain valve to defuel the fuel tank and for doing fuel contamination tests.

The outer face of the inboard fuel tank chamber is connected to the inner face of the outboard fuel tank chamber. The fuel filler opening is integrated into the outboard fuel tank chamber. A smaller adapter on the left tank inboard fuel tank chamber holds a 'high fuel' sensor.

There are also two small adapters at the top of the outer face of the outboard fuel tank chamber for vent hoses.

On the left side one vent hose includes a pressure relief vent to protect the tank against high pressure due to overfilling during the fuel transfer. The other hose includes a check valve to let the air enter the tank during high speed descent.

On the right side one hose includes the check valve and one hose includes a capillary.

The right tank has two adapters which connect to a loop of pipe inside the tank. This is the cooling loop.

A fuel quantity probe attaches to the inboard end of each fuel tank. Refer to Section 28-41 for more data on the fuel quantity indication system.

Two ribs hold each fuel tank chamber in position. Padded rubber strips go between the fuel tank chamber and each rib. The filler cap is attached to the upper skin of the wing with 8 screws. It holds the tank assembly in position in spanwise direction.

3. Operation

A. Normal Operation

The engine pumps take fuel from the left fuel tank. Fuel flows through the finger filter to the emergency fuel valve. From the valve it flows through the strainer in the gascolator. The gascolator is also a water separator. The fuel flows to the main filter and the engine fuel system.

The engine fuel pumps always supply more fuel than the fuel injection system can use. The unwanted fuel is hot. It flows back to the right fuel tank and though the cooling loop. Heat transfers from the return fuel to the cold fuel in the tank. The return fuel flows from the cooling loop to the left tank. The return fuel mixes with the fuel in the left tank.

This process keeps the Diesel fuel warm in both tanks when the airplane operates in cold conditions.

As the engine uses fuel, the fuel level in the left tank decreases. Air flows in through the vent system to fill the space left by the fuel. This prevents the tank pressure from decreasing to less than atmospheric pressure. It allows the engine pumps to continue to take fuel from the tank.

B. Fuel Transfer

As the engine uses fuel, the fuel level in the left tank decreases. The fuel level in the right tank does not change. To balance the tank contents, the electric transfer pump moves fuel from the right tank to the left tank. It is operated through a switch (marked FUEL TRANS ←) on the left of the instrument panel. A status light (FUEL TRANS) on the annunciator panel is illuminated as long as the fuel transfer pump is running.

The high fuel sensor in the left tank outer top corner automatically switches off the fuel transfer pump when the fuel level is high in the left tank. The low fuel sensor in the right tank inner bottom corner automatically switches off the fuel transfer pump when the fuel level is low in the right tank.

C. Emergency Operation

In an emergency (for example, the transfer pump fails) you can set the emergency fuel valve to connect the right tank transfer line to the fuel supply line. This is the EMERGENCY setting. The engine takes fuel from the right tank. However, the return fuel still flows through the cooling loop to the left tank. As fuel is used from the right tank, the level of fuel in the left tank will slowly increase.

D. Shut-off Valve Function

During the usual operation, the shut-off function of the emergency fuel valve is used only to isolate the fuel system when the engine is not operating. In an emergency, the shut-off valve function is used to stop all fuel flow to the engine.

E. Refueling

Add fuel to the system through the fuel fillers on top of each wing. Fuel flows down the large filler tube to the related tank. Air in the tank can escape back past the fuel. As the tank becomes full, the air can also escape through the hoses between the tank and the fuel filler.

F. Fuel Drains

You can use the fuel drain valve in each tank and the drain valve in the gascolator to defuel the airplane. Also use it to drain a small quantity of fuel to test for water or other contamination. Push the bottom part of the valve up to release fuel. A spring inside the valve closes it automatically.

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Section 28-10
Fuel Storage System - Lycoming Engine

1. General

This Section tells you about the fuel storage system for airplanes with the Lycoming engine installed. It tells you about these components:

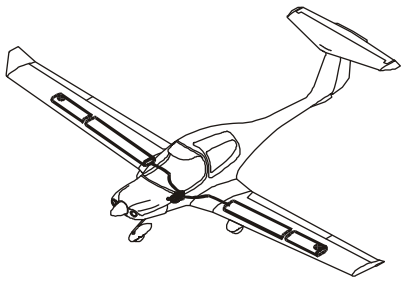
– Inboard fuel chambers.

– Outboard fuel chambers.

– Long range fuel chambers (only if the optional long range tanks are installed, see OÄM 40-071).

– Fuel tank vents.

Refer to Section 28-00 for a general description of the fuel system and a schematic diagram of the fuel system.



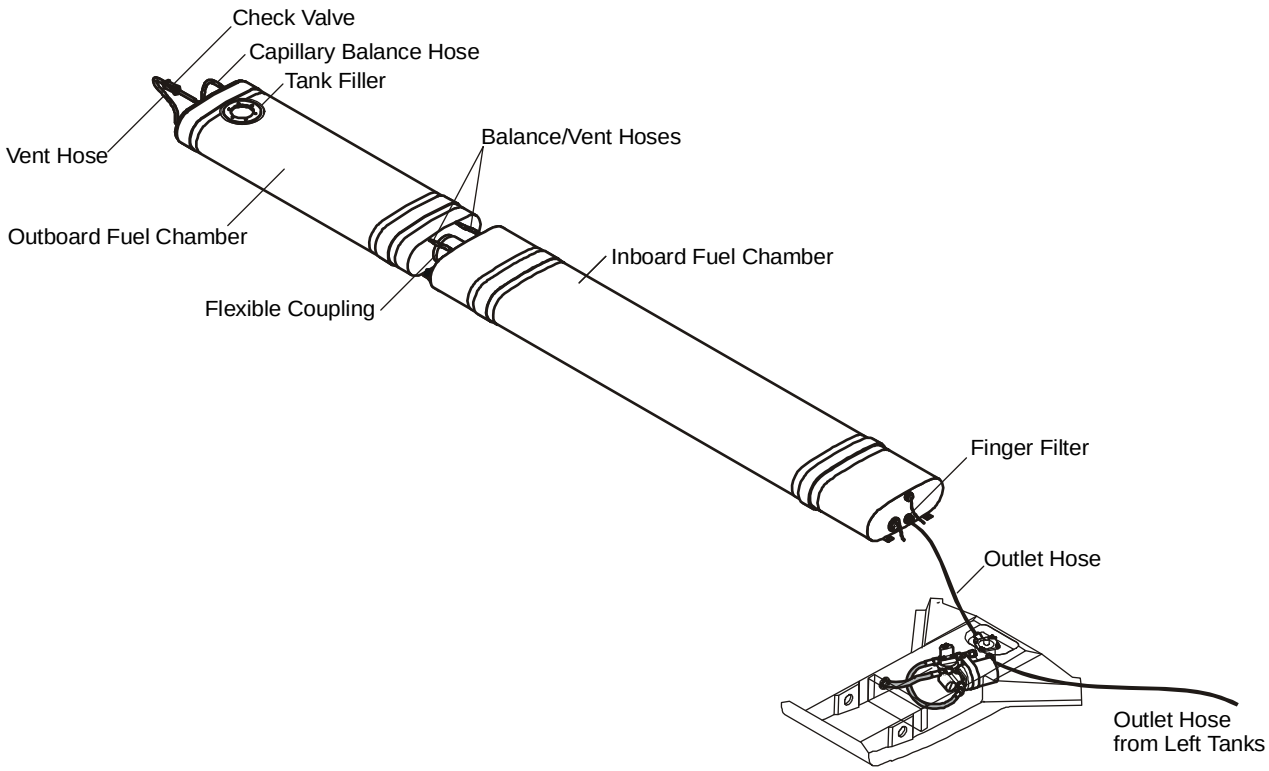


Figure 1: Fuel Tank System in the Right Wing, Standard Tanks Installed

2. Description

A. Standard Tanks

Figure 1 shows the fuel tank system in the right wing. The fuel tank system in the left wing is similar.

The DA 40 has a fuel tank in each wing. Each wing tank is made of two chambers: the inboard fuel chamber and the outboard fuel chamber. The inboard fuel chamber and the outboard fuel chamber are interconnected. Aluminum makes the fuel chambers. Baffles in the chambers prevent the fuel from moving quickly from one end of the tank to the other during flight.

There are two versions of the inboard fuel chamber. They look similar from outside, but can be identified by the version of the fuel quantity indicating system. Version A of the inboard fuel chamber is compatible with Version A of the fuel quantity indicating system (factory standard up to serial number 40.054). Version B of the inboard fuel chamber is compatible with Version B of the fuel quantity indicating system (factory standard from serial number 40.055 on and all DA 40 F airplanes with the Lycoming O-360-A4M engine installed). Refer to Section 28-40 for more data on the fuel quantity indication system.

Each inboard chamber has a capacity of 52.6 liter (13.9 US gal) and each outboard chamber has a capacity of 26.1 liter (6.9 US gal). The total fuel tank capacity of each wing is 78.7 liter (20.8 US gal).

A large flexible coupling connects the inboard fuel chamber to the outboard fuel chamber. A worm drive clamp holds the flexible coupling to the outboard chamber and another worm drive clamp holds the flexible coupling to the inboard chamber.

Smaller diameter flexible hoses connect the inboard and outboard chambers at the top of the chambers. Two vent connections are located at the outboard end of the outboard chamber. A flexible hose connects the aft vent connector to a check valve. Another flexible hose connects the check valve to a vent connector on the outer fuel tank access panel, on the lower surface of the wing.

A flexible hose with an internal capillary tube connects to the forward vent connector of the outboard chamber to maintain ambient pressure within the fuel tank. The flexible hose has an outlet on the outer fuel tank access panel, on the lower surface of the wing.

The outboard chamber has a fuel filler in the top surface. You fill both the outboard chamber and the inboard chamber through the fuel filler. The filler cap has a locking lever. You pull the locking lever up and turn the filler cap counter-clockwise to release it. You turn the cap clockwise to install it and push down the locking lever to lock it.

The inboard fuel chamber has the outlet for the fuel feed to the engine. A finger filter prevents debris from entering the fuel system. A drain valve is located in the lower surface of the inboard chamber. You can use this drain point for defueling the fuel tank and for doing fuel contamination tests.

A fuel sensor and a fuel probe attach to the inboard end of each of the inboard fuel chambers. Refer to Section 28-40 for more data on the fuel quantity indication system.

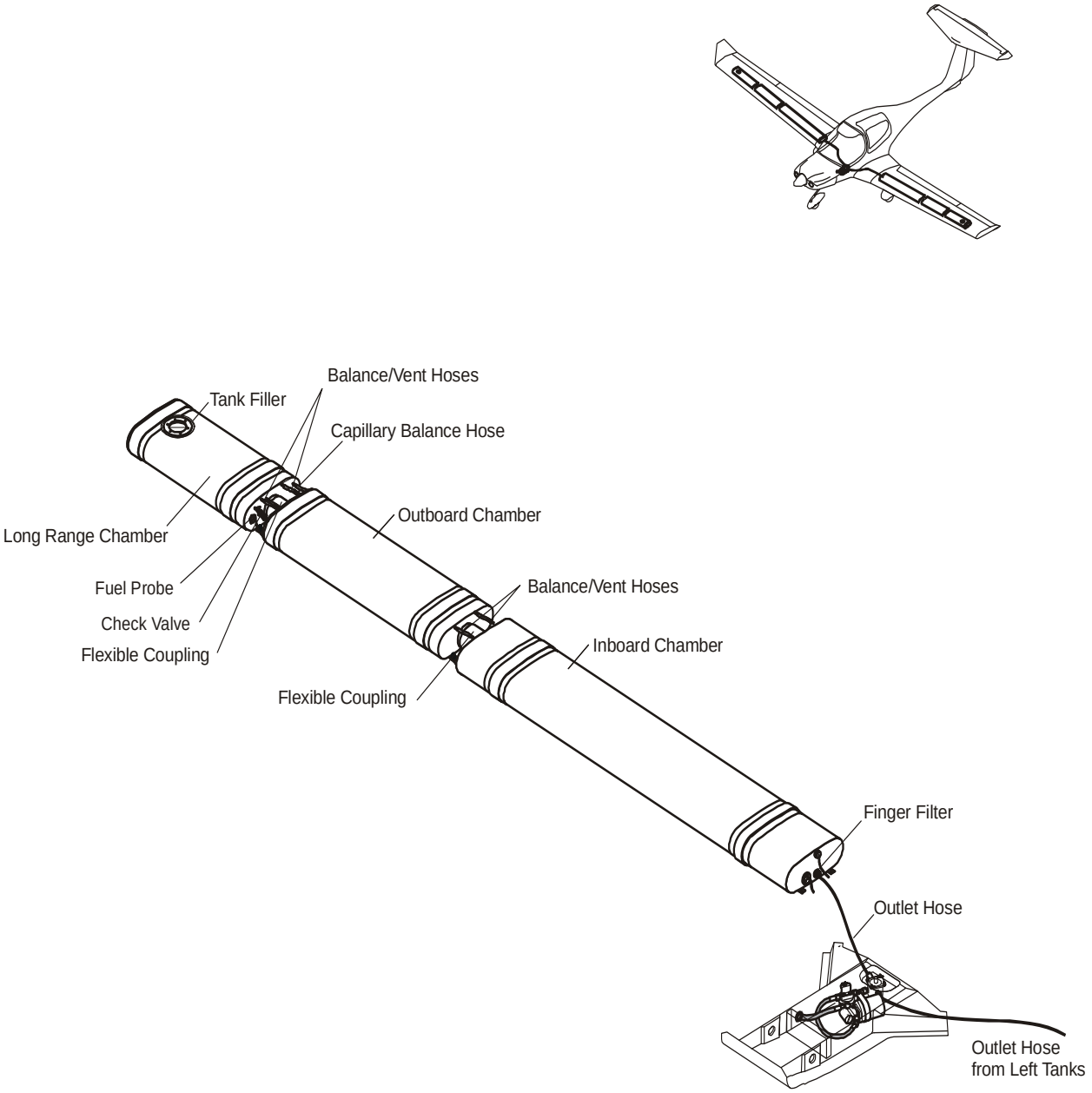


Figure 2: Fuel Tank System in the Right Wing, Long Range Tanks installed (OÄM 40-071)

B. Long Range Tanks (OÄM 40-071)

Figure 2 shows the fuel tank system in the right wing. The fuel tank system in the left wing is similar.

The DA 40 has a fuel tank in each wing. Each wing tank is made of three fuel chambers: the inboard fuel chamber, the outboard fuel chamber and the long range fuel chamber. All fuel chambers are interconnected. Aluminum makes the fuel chambers. Baffles in the tank prevent the fuel from moving quickly from one end of the chamber to the other during flight.

Each inboard fuel chamber has a capacity of 52.6 liter (13.9 US gal), each outboard fuel chamber has a capacity of 26.1 liter (6.9 US gal) and each long range fuel chamber has a capacity of 15.9 liter (4.2 US gal).The total fuel tank capacity of each wing is 94.6 liter (25 US gal).

Large flexible couplings interconnect the individual fuel chambers. Worm drive clamps hold the flexible couplings to the fuel chambers.

Smaller diameter flexible hoses interconnect the individual fuel chambers at the top of the fuel chambers. Two vent connections are located at the inboard end of the long range fuel chamber. A flexible hose connects the forward vent connector to a check valve. Another flexible hose connects the check valve to a vent connector on the outer fuel tank access panel, on the lower surface of the wing.

A flexible hose with an internal capillary tube connects to the forward vent connector of the long range fuel chamber to maintain ambient pressure within the fuel tank. The flexible hose has an outlet on the outer fuel tank access panel, on the lower surface of the wing.

The long range fuel chamber has a fuel filler in the top surface. You fill all fuel chambers through the fuel filler. The filler cap has a locking lever. You pull the locking lever up and turn the filler cap counter-clockwise to release it. You turn the cap clockwise to install it and push down the locking lever to lock it.

The inboard fuel chamber has the outlet for the fuel feed to the engine. A finger filter prevents debris from entering the fuel system. A drain valve is located in the lower surface of the inboard fuel chamber. You can use this drain point for defueling the fuel tank and for doing fuel contamination tests.

A fuel sensor and a fuel probe attach to the inboard end of each of the inboard fuel chambers. A fuel probe also attaches to the inboard end of each of the long range fuel chambers. Refer to Section 28-40 for more data on the fuel quantity indication system.

Trouble-Shooting

1. General

The table below lists the defects you could have with the fuel storage system. If you have the trouble detailed in the Trouble column read across to the Possible Cause column. Then do the repair given in the Repair column.

Trouble	Possible Cause	Repair
Filler cap leaking.	Filler cap gasket damaged.	Replace filler cap gasket.
Fuel drain valve leaking.	Drain valve damaged.	Replace fuel drain valve.
	Contamination in drain valve.	Open and close drain valve. Do this until the drain seals. If the drain does not seal then replace the drain valve.

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Maintenance Practices

1. General

These Maintenance Practices tell you how to remove/install the fuel tanks. Obey the safety precautions for fuel at all times.

WARNING: DO NOT GET FUEL ON YOU. FUEL CAN CAUSE SKIN DISEASE.

WARNING: DO NOT ALLOW FIRE NEAR FUEL. FUEL BURNS AND CAN CAUSE INJURY TO PERSONS AND DAMAGE TO EQUIPMENT.

WARNING: DO NOT BREATH FUEL VAPOR. FUEL VAPOR CAN MAKE YOU ILL.

2. Remove/Disassemble the Fuel Tank Assembly

A. Remove the Fuel Tank Assembly

	Detail Steps/Work Items	Key Items/References
(1)	Remove the wing which has the fuel tank that you will remove and support the wing on trestles.	Refer to Section 57-10.
(2)	Remove the access panel from the root rib of the wing: – Remove the 11 nuts and washers from the studs. – If access panel is made from aluminium (DA4-5741-26-00_2) remove bonding cable. – Pull the access panel of the studs and clear of the airplane.	
(3)	Remove the fuel drain valve: – Remove the access panel. – Cut the lock-wire. – Remove the drain valve from its mounting.	Refer to Figure 3 (standard tanks) or Figure 4 (long range tanks). Refer to Section 52-40.
(4)	Disconnect the electrical connector for the fuel probe in the inboard chamber.	At the in-line connector.

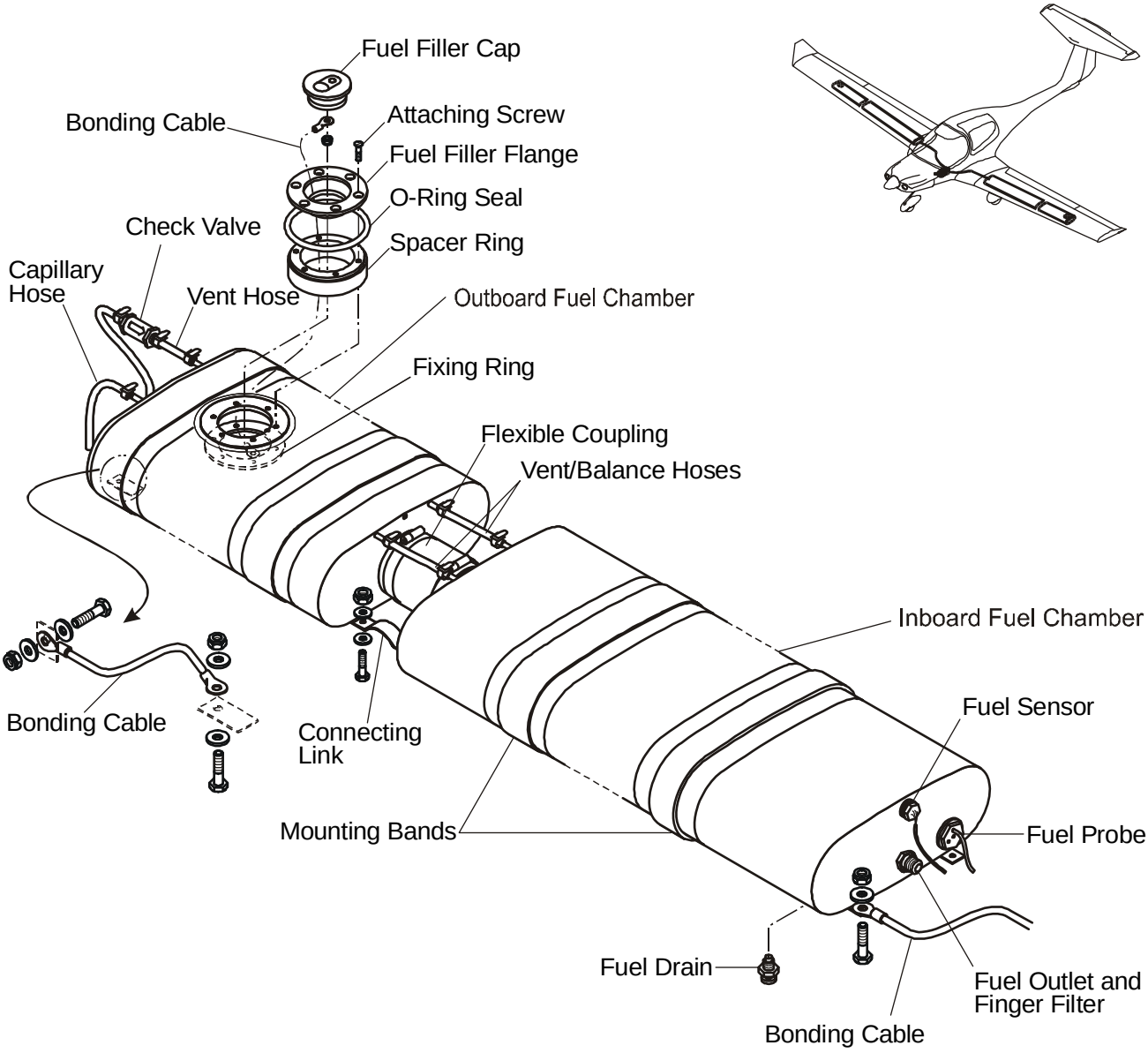


Figure 3: Remove/Install the Standard Fuel Tanks

	Detail Steps/Work Items	Key Items/References
(5)	Disconnect the electrical connector for the fuel sensor in the inboard chamber.	At the in-line connector.
(6)	Release the bonding cable from the inboard end of the inboard chamber: – Remove the nut and washer from the bolt. – Remove the bonding cable from the bolt and move it clear of the fuel chamber. – Remove the bolt.	
(7)	Disconnect the vent hose and the capillary hose from the outboard end of the outboard chamber (standard tank) or the inboard end of the long range chamber (long range tank): – Remove the access panel from the outer lower surface of the wing. – Remove the clip that holds the vent hose to the outlet pipe. – Disconnect the vent hose from the outlet pipe. – Remove the clip that holds the capillary hose to the vent outlet pipe. – Disconnect the capillary hose from the vent outlet pipe.	Refer to Section 52-40.
(8)	Disconnect the electrical connector for the fuel probe in the long range chamber.	Only if the long range tanks are installed. At the in-line connector.

	Detail Steps/Work Items	Key Items/References
(9)	Remove the fuel filler assembly: – Remove the fuel filler cap. – Remove the 6 screws which attach the filler flange to the fixing ring in the outboard chamber (standard tank) or long range chamber (long range tank). – Remove the filler flange, the O-ring seal, the spacer ring and the fixing ring.	Note the location of the bonding cable. Discard the O-ring seal.
(10)	Gently pull the tank out of the wing through the wing inboard rib. Move the tank clear of the wing and support it on a clean work bench.	Make sure that the tank does not catch on the wing ribs. Make sure that you do not damage the tank.

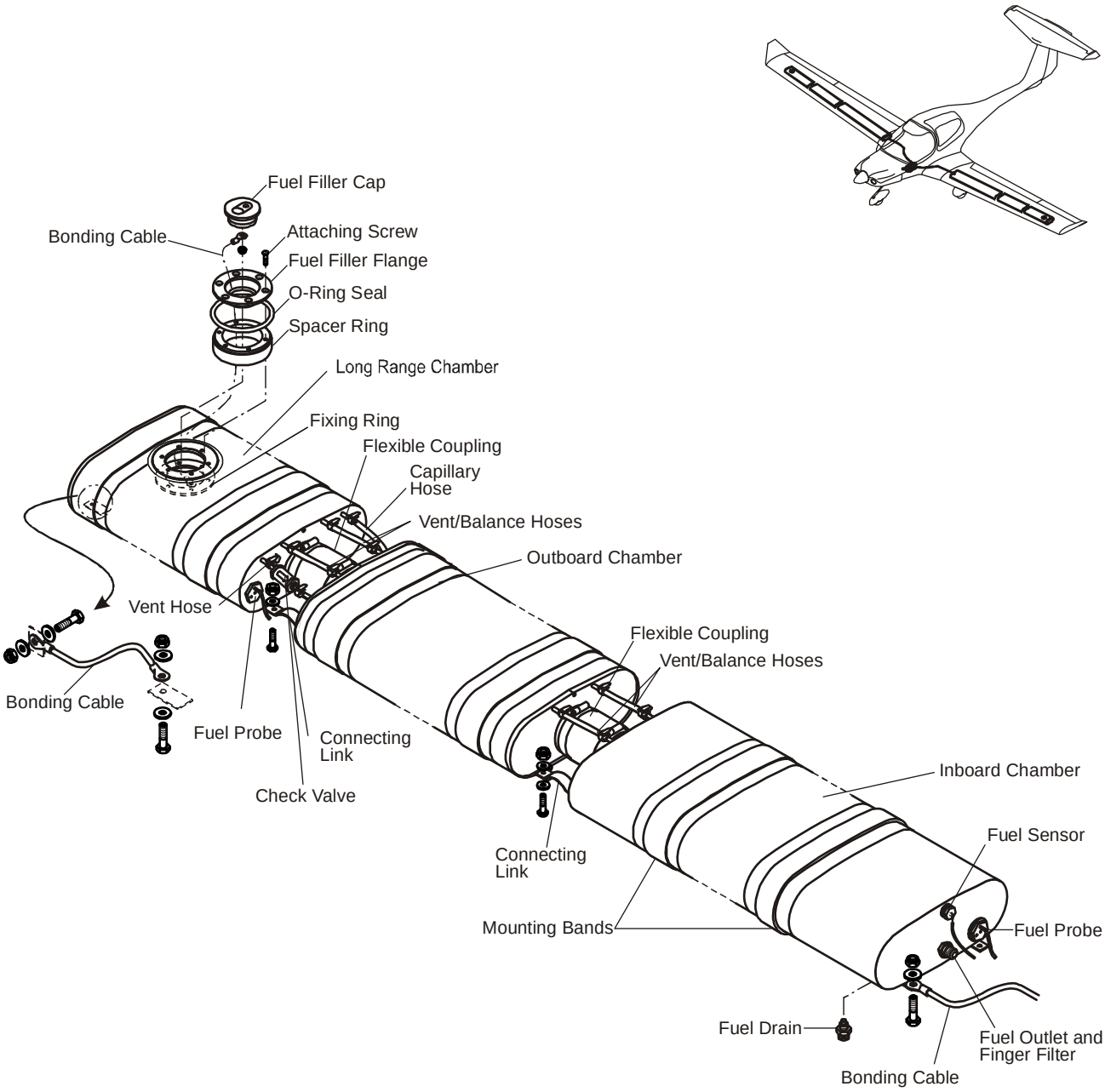


Figure 4: Remove/Install the Long Range Fuel Tanks (OÄM 40-071)

B. Disassemble the Fuel Tank Assembly

	Detail Steps/Work Items	Key Items/References
(1)	Remove the fuel tank assembly from the wing.	Refer to Paragraph 2.A.
(2)	Remove the connecting link that attaches the inboard chamber to the outboard chamber: – Remove the 2 nuts and washers from the bolts. – Remove the link plate. – Remove the 2 bolts.	Refer to Figure 3 (standard tanks) or Figure 4 (long range tanks).
(3)	Remove the clips which attach the vent hoses to the inboard chamber.	
(4)	Remove the worm drive clamp which attaches the flexible coupling to the inboard chamber.	
(5)	Pull the inboard chamber away from the outboard chamber until the vent hose and flexible coupling disconnect from the inboard chamber.	
(6)	If necessary, remove the clips which attach the vent hoses to the outboard chamber and pull the hoses from the connectors.	
(7)	If necessary, remove the worm drive clamp which attaches the flexible coupling to the outboard chamber and pull the coupling from the connector.	
(8)	Repeat steps 2 through 7 to remove the outboard chamber from the long range chamber.	Only if the long range tanks are installed.

3. Assemble/Install the Fuel Tank Assembly

Note: When a new inboard fuel chamber is installed, it must be ensured that it is compatible with the fuel quantity indicating system. Both inboard fuel chambers must be the same version (A or B). Refer to Section 28-10 and Section 28-40.

A. Preparation

	Detail Steps/Work Items	Key Items/References
(1)	Examine the fuel chambers. Look specially for: – Damage to the skins and welded seams of the chambers. – Corrosion. – Damage/wear to the rubber mounting bands which go around the outside of the chambers.	Use a strong light and a magnifying glass.
(2)	Examine the flexible hoses which connect the fuel chambers. Look specially for: – Cuts or damage, specially at the ends where the attaching clips locate. – Distortion or cracking.	
(3)	Examine the flexible couplings. Look specially for: – Cuts or damage, specially at the ends where the attaching clips locate. – Distortion or cracking.	
(4)	Examine the fuel filler flange in the outboard chamber (standard tanks) or long range chamber (long range tanks). Look specially for: – Corrosion on the mating faces. – Cracking around the flange.	Use a strong light and a magnifying glass.
(5)	Examine the insides of the chambers for dirt or foreign matter.	

B. Assemble the Tanks

	Detail Steps/Work Items	Key Items/References
(1)	Install the flexible coupling onto the outboard chamber: – Push the flexible coupling onto the connector of the outboard chamber. – Install the worm drive clamp onto the coupling and tighten the clamp.	Refer to Figure 2 (standard tanks) or Figure 3 (long range tanks). Make sure that the coupling is correctly positioned. Torque: 2.5 Nm (1.8 lbf.ft.)
(2)	Install the flexible vent/balance hoses onto the outboard chamber: – Push the hoses onto the connectors of the outboard chamber. – Install the attaching clips.	Make sure that the hoses are correctly positioned.
(3)	Connect the inboard fuel chamber to the outboard fuel chamber: – Move the inboard chamber into position by the outboard chamber. Engage the inboard chamber vent connectors and the flexible coupling connector into their related hoses/couplings on the outboard chamber. – Push the inboard chamber towards the outboard chamber until the vent hoses and the flexible coupling are correctly positioned on their related connectors. – Install the worm drive clamp which attaches the flexible coupling to the connector of the inboard chamber. – Tighten the worm drive clamp. – Install the clips which attach the vent connecting hoses to the connectors of the inboard chamber.	Torque: 6 Nm (4.4 lbf.ft.)

	Detail Steps/Work Items	Key Items/References
(4)	Install the connecting link which attaches the inboard chamber to the outboard chamber: – Move the link into position on the connecting brackets of the chambers. – Install the two bolts through the link and the connecting brackets. – Install the 2 washers and nuts onto the bolts. – Tighten the nuts and bolts.	
(5)	Repeat steps 1 through 4 to attach the outboard chamber to the long range chamber.	Only if the long range tanks are installed.

C. Install the Tank Assembly

	Detail Steps/Work Items	Key Items/References
(1)	Move the tank assembly into position in the wing.	Make sure that the tank assembly is correctly located.
(2)	Install the fuel filler assembly:	
	– Make sure that the mounting in the outboard chamber (standard tanks installed) or long range chamber (long range tanks installed) is correctly aligned with the hole in the top surface of the wing.	If necessary, move the tank assembly to give correct alignment.
	– Install the spacer ring onto the tank filler mounting.	Use a fuel resistant sealing compound (DP300).
	– Install a new O-ring seal in position over the spacer ring.	Make sure that the O-ring is correctly positioned.
	– Install the bonding cable.	At the position noted in Paragraph 2.A. step 9.
	– Install the 6 screws which attach the fuel filler to the outboard tank.	Finger tight only.
	– When all six screws are installed, then tighten the screws.	Tighten opposite screws.
(3)	Connect the electrical cable to the fuel probe in the long range chamber.	Only if the long range tanks are installed. At the in-line connector.

	Detail Steps/Work Items	Key Items/References
(4)	Connect the vent hose and the capillary hose to the vent outlets: – If necessary, remove the access panel from the lower surface of the wing. – Push the capillary hose onto the overboard vent pipe. – Install the clip which attaches the capillary hose to the pipe. – Push the vent hose onto the overboard vent pipe. – Install the clip which attaches the vent hose to the pipe. – Install the access panel.	Refer to Section 52-40. Refer to Section 52-40.
(5)	Attach the bonding cable to the inboard end of the inboard fuel chamber: – Put the bolt up through the bonding tag on the inboard chamber. – Move the bonding cable into position on the bolt. – Install the washer and nut onto the bolt. – Tighten the bolt.	
(6)	Connect the electrical cable to the fuel probe in the inboard chamber.	At the in-line connector.
(7)	Connect the electrical cable to the fuel level sensor in the inboard chamber.	At the in-line connector.

	Detail Steps/Work Items	Key Items/References
(8)	Install the access panel at the wing root rib: – Put the access panel into position on the studs. – If access panel is made from aluminium (DA4-5741-26-00_2) install bonding cable. – Install the 11 washers and nuts. – Tighten the nuts.	Install on 3rd bolt from bottom aft corner.
(9)	Install the drain valve: – Install a new O-ring onto the drain valve assembly. – Install the drain valve assembly into the mounting at the bottom of the inboard fuel chamber. – Secure the drain valve assembly with lock-wire. – Install the access panel.	Torque: 1 - 3 Nm (0.7 - 2.2 lbf.ft.). Refer to Section 52-40.
(10)	Install fuel tank finger filter: – Bond with Loctite 243.	
(11)	Install the wing onto the airplane.	Refer to Section 57-10.
(12)	Refuel the airplane.	Refer to Section 12-10. Look specially for fuel leaks from the tank assembly which you have installed.
(13)	Test the fuel storage system.	Refer to Paragraph 4.

4. Test the Fuel Storage and Distribution System

Do this test when you have removed/installed a major component of the fuel system, or if there is any trouble with the fuel supply to the engine.

A. Equipment

Item	Quantity	Part Number
25 liter (minimum) calibrated fuel container.	1	Commercial.
Stopwatch.	1	Commercial.

B. Procedure

You need two persons to do this test, one person in the airplane cockpit and one person at the engine bay.

	Detail Steps/Work Items	Key Items/References
(1)	Make sure that both the left and right fuel tanks are full. Refuel if necessary.	Refer to Section 12-10.
(2)	Select the fuel selector in the cockpit to OFF.	
	WARNING: MAKE SURE THAT THE ENGINE IS SAFE BEFORE YOU DO WORK ON THE FUEL SYSTEM. IF THE ENGINE IS TURNED, THE PROPELLER CAN CAUSE INJURY OR DEATH.	
(3)	Make sure that the engine is safe: – Set the ignition switch to OFF. – Set the throttle to IDLE. – Set the mixture control to LEAN/CUT-OFF.	
(4)	Remove the engine cowlings.	Refer to Section 71-10 or 71-12.
	WARNING: DO NOT GET FUEL ON YOU. FUEL CAN CAUSE SKIN DISEASE. **WARNING: DO NOT ALLOW FIRE NEAR FUEL. FUEL BURNS AND CAN CAUSE INJURY TO PERSONS AND DAMAGE TO EQUIPMENT.**	

	Detail Steps/Work Items	Key Items/References
(5)	Disconnect the fuel feed hose at the engine driven fuel pump (EDP).	Use a suitable container to catch the fuel.
(6)	Place the open end of the fuel hose that you have disconnected from the EDP, so that it will release fuel into the calibrated fuel container.	Electrically bond the airplane and calibrated container.
(7)	Set the ALT/BAT switch to ON and the electric fuel pump to ON.	
(8)	Set the fuel selector valve to LEFT for a few seconds until there is a steady flow of fuel from the fuel hose into the calibrated container. Then set the fuel selector valve to OFF.	
(9)	Read the quantity of fuel in the calibrated container and make a record of the quantity (x liter).	
(10)	Set the fuel selector valve to LEFT for 1 minute, then set the fuel selector valve to OFF.	Use the stopwatch.
(11)	Read the quantity of fuel in the calibrated container and make a record of the quantity (y liter).	
(12)	Calculate the fuel flow from the left tank: (y liter -x liter) = Fuel flow rate (liter/min.)	Record the result in the airplane documents.
(13)	Do steps 8 thru 12 for with the fuel selector valve set to RIGHT.	
(14)	Set the electric fuel pump to OFF and set the ALT/BAT switch to OFF.	
(15)	Connect the fuel feed hose to the EDP.	

	Detail Steps/Work Items	Key Items/References
(16)	Do a test for fuel leaks at the EDP connection: – Set the ALT/BAT switch to ON. – Set the electric fuel pump to ON. – Set the fuel selector valve to BOTH. – Examine the fuel connection at the EDP for leaks. – Set the fuel selector valve to OFF. – Set the electric fuel pump to OFF. – Set the ALT/BAT switch to OFF.	
(17)	Install the engine cowlings.	Refer to Section 71-10 or 71-12.

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Section 28-11
Fuel Storage System - TAE 125 Diesel Engine

1. General

This Section tells you about the fuel storage system for airplanes with the TAE 125 Diesel engine installed. It tells you about these components:

– Fuel tanks (inboard and outboard fuel tank chamber if the long range tank is installed).

– Fuel filler assembly.

– Fuel tank vents.

Refer to Section 28-01 for a general description of the fuel system and a schematic diagram of the fuel system.

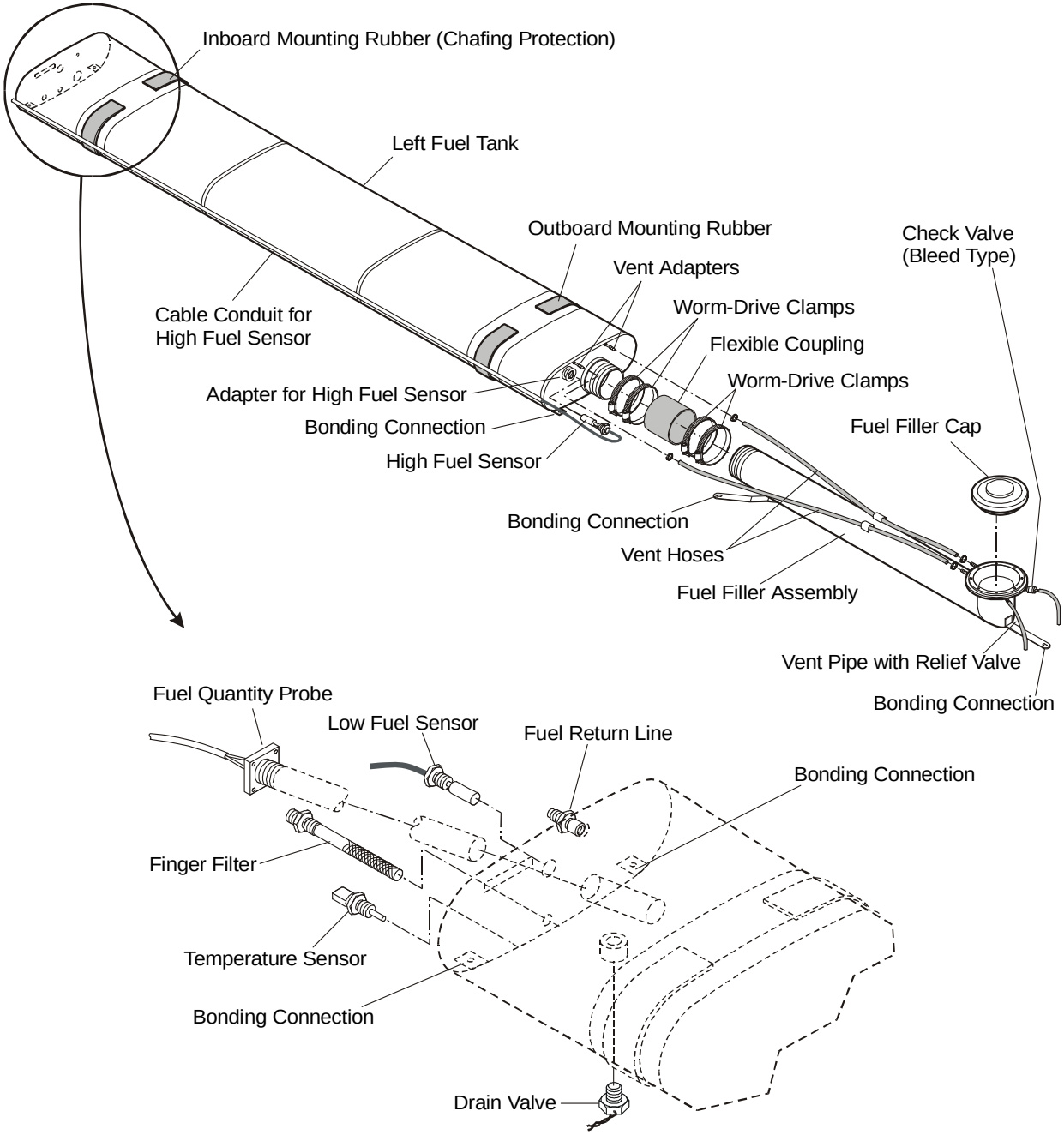


Figure 1: Left Fuel Tank Installation, Standard Tanks Installed

2. Fuel Tank Description

A. Standard Tanks

The airplane has two fuel tanks. Each tank has a usable capacity of 14 US gal (53 liter). One tank is located in the inner part of each wing. Figure 1 shows the left fuel tank assembly. Figure 3 shows the right fuel tank assembly.

Each tank is a welded aluminum structure. Baffles in the tank prevent the fuel from moving quickly from one end of the tank to the other during flight. The tank has bosses welded in the inboard face for the fuel quantity probe, the low fuel sensor, and the fuel temperature sensor. Other bosses make connection points for hoses.

A finger filter at the tank outlet prevents debris from entering the fuel system. A drain valve is located in the lower surface of the tank. You can use the drain valve to defuel the fuel tank and for doing fuel contamination tests.

The outer face of the tank has a large adapter for the fuel filler assembly. A smaller adapter on the left tank holds a 'high fuel' sensor. There are also two small adapters at the top of the outer face for vent hoses.

The right tank has two adapters which connect to a loop of pipe inside the tank. This is the cooling loop.

A fuel quantity probe attaches to the inboard end of each fuel tank. Refer to Section 28-41 for more data on the fuel quantity indication system.

Two ribs hold each fuel tank assembly in position. Padded rubber strips go between the tank and each rib. The filler cap is attached to the upper skin of the wing with 8 screws. It holds the tank assembly in position in spanwise direction.

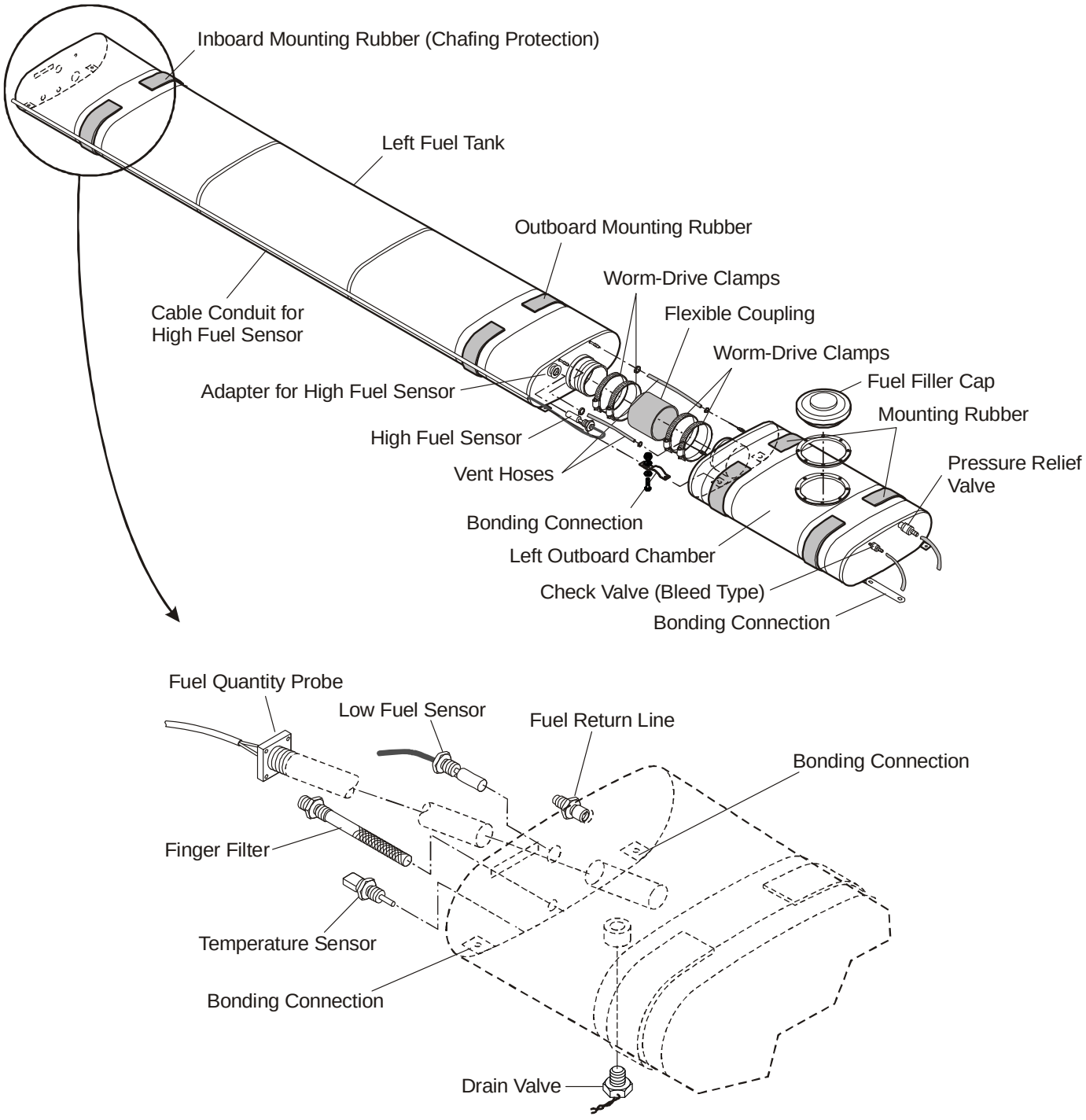


Figure 2: Left Fuel Tank Installation, Long Range Tanks Installed

B. Long Range Tanks (OÄM 40-130)

The airplane has two long range fuel tanks. Each tank has a usable capacity of 19.5 US gal (74 liter). Each wing tank consists of two tank chambers. Figure 2 shows the left long range tank assembly. Figure 4 shows the right long range tank assembly.

Each tank chamber is a welded aluminum structure. Baffles in the chamber prevent the fuel from moving quickly from one end of the tank to the other during flight. The inboard fuel tank chamber has bosses welded in the inboard face for the fuel quantity probe, the low fuel sensor, and the fuel temperature sensor. Other bosses make connection points for hoses.

A finger filter at the tank outlet prevents debris from entering the fuel system. A drain valve is located in the lower surface of the tank. You can use the drain valve to defuel the fuel tank and for doing fuel contamination tests.

The outer face of the inboard fuel tank chamber has a large adapter for the outboard fuel tank chamber. A smaller adapter on the left tank holds a 'high fuel' sensor. There are also two small adapters at the top of the outer face for vent hoses.

The right tank has two adapters which connect to a loop of pipe inside the tank. This is the cooling loop.

A fuel quantity probe attaches to the inboard end of each fuel tank. Refer to Section 28-41 for more data on the fuel quantity indication system.

Two ribs hold each fuel tank chamber in position. Padded rubber strips go between the fuel tank chamber and each rib. The filler cap is attached to the upper skin of the wing with 8 screws. It holds the tank assembly in position in spanwise direction.

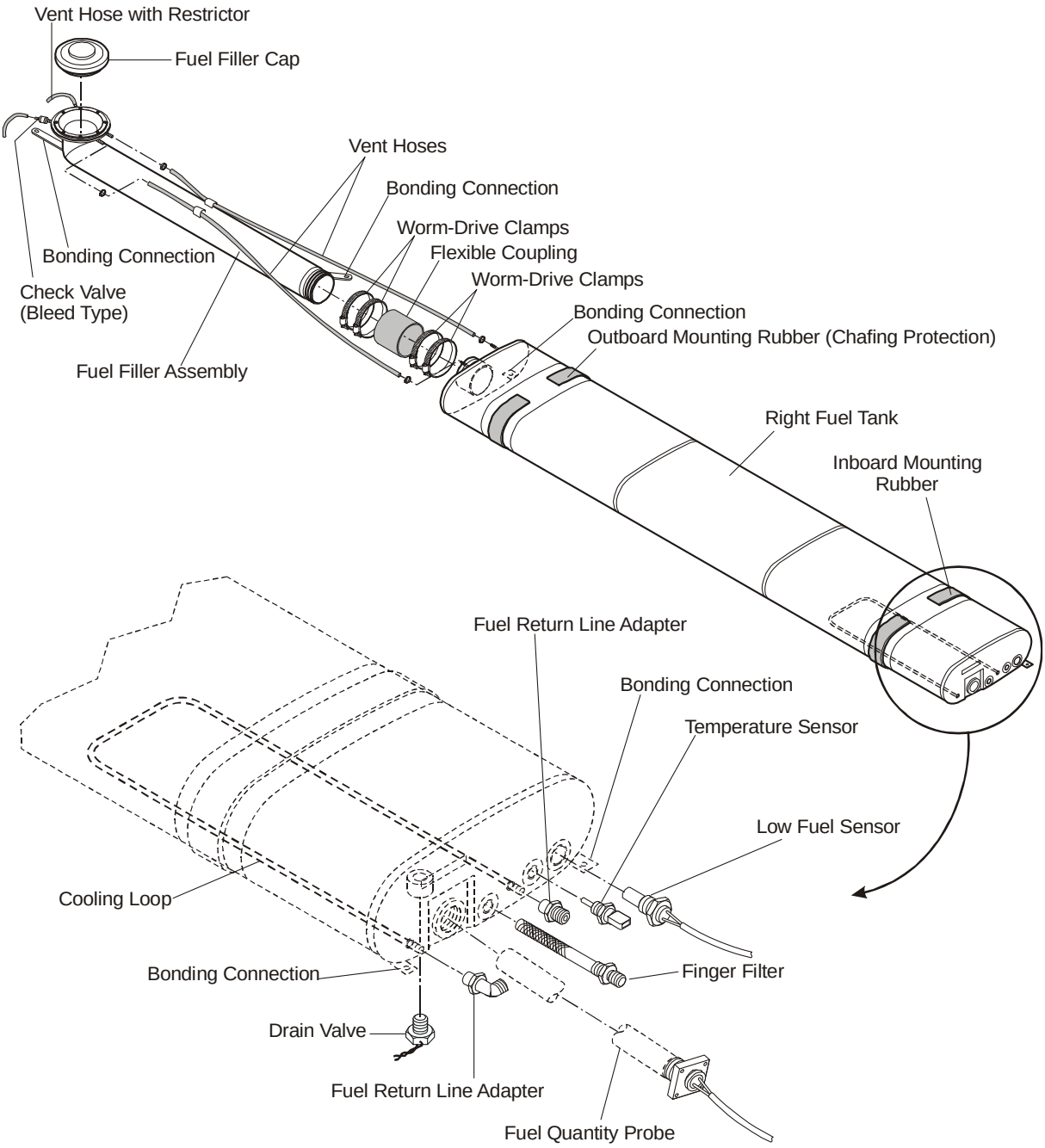


Figure 3: Right Fuel Tank Installation, Standard Tanks Installed

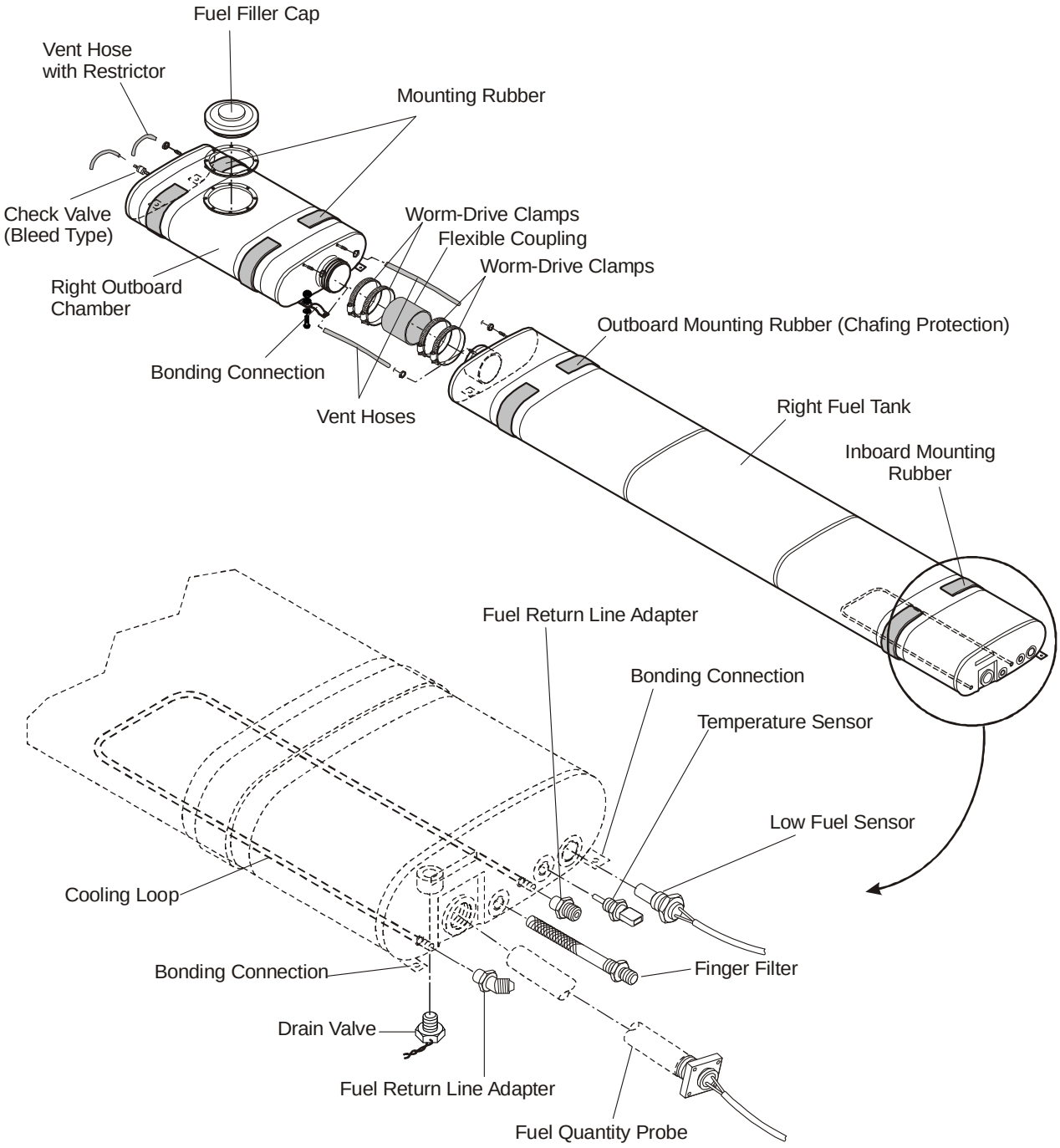


Figure 4: Right Fuel Tank Installation, Long Range Tanks Installed

3. Fuel Filler Assembly

Figures 1 and 3 also show the fuel filler assembly. It is a welded tubular aluminum component, approximately 75 mm (3 in) in diameter. The outboard end has a flange that attaches to the top skin of the wing. It also has slots that engage the fuel filler cap.

The filler cap has a locking lever. You pull the locking lever up and turn the filler cap counter-clockwise to release it. You turn the cap clockwise to install it and push down the locking lever to lock it. The area just below the flange has four adapters for the vent system hoses.

Note: If the filler cap operates too easily, then it can be leaky. Leaking fuel can cause the paint finish to become yellow.

A short flexible coupling attaches the fuel filler assembly to the outer face of the fuel tank. Two worm-drive clamps at each end hold the flexible coupling to the tank and the fuel filler assembly. Two small diameter flexible hoses connect the vent adapters at the top of the tank to the two inboard adapters on the fuel filler flange.

A bleed type check valve is screwed into one of the two outer adapters on the filler flange. A short flexible hose connects the bleed type check valve to an adapter in the outer fuel tank access panel in the bottom surface of the wing.

A second short flexible hose connects to the other outer adapter on the fuel filler flange. It has a restrictor (right wing) or relief valve (left wing) in it. It connects to an adapter in the outer fuel tank access panel in the bottom surface of the wing.

Bonding strips connect the tank to the fuel filler assembly and the airplane bonding system.

Trouble-Shooting

1. General

The table below lists the defects you could have with the fuel storage system. If you have the trouble detailed in the Trouble column read across to the Possible Cause column. Then do the repair given in the Repair column.

Trouble	Possible Cause	Repair
Filler cap leaking.	Filler cap gasket damaged. Filler cap does not have a tight fit.	Replace filler cap gasket. Tighten nut on lower side of cap.
Fuel drain valve leaking.	Drain valve damaged. Contamination in drain valve.	Replace fuel drain valve. Open and close drain valve. Do this until the drain seals. If the drain does not seal then replace the drain valve.

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Maintenance Practices

1. General

These Maintenance Practices tell you how to remove/install the fuel tanks. Obey the safety precautions for fuel at all times.

WARNING: DO NOT GET FUEL ON YOU. FUEL CAN CAUSE SKIN DISEASE.

WARNING: DO NOT ALLOW FIRE NEAR FUEL. FUEL BURNS AND CAN CAUSE INJURY TO PERSONS AND DAMAGE TO EQUIPMENT.

WARNING: DO NOT BREATH FUEL VAPOR. FUEL VAPOR CAN MAKE YOU ILL.

2. Remove/Disassemble the Fuel Tank Assembly (Standard Tank)

A. Remove the Fuel Tank Assembly

	Detail Steps/Work Items	Key Items/References
(1)	Remove the wing which has the fuel tanks that you will remove and support the wing on trestles.	Refer to Section 57-10.
(2)	Remove these access panels from the wing: – Remove the access panel from the root rib: – Remove the 11 nuts and washers from the studs. – If access panel is made from aluminum (DA4-5741-26-00_2) remove bonding cable. – Pull the access panel from the studs and clear of the airplane. – Remove the access panel for the fuel drain valve.	Refer to Section 52-40.
(3)	Remove the fuel drain valve: – Cut the lock-wire. – Remove the drain valve from its mounting.	Refer to Figure 1 and 3.

	Detail Steps/Work Items	Key Items/References
(4)	Disconnect these electrical connectors: – Fuel quantity probe. – Low fuel sensor. – High fuel sensor (left wing only). – Fuel temperature sensor.	At the inboard end of the tank. At the in-line connector.
(5)	Release the bonding strip from the inboard end of the tank: – Remove the nut and washer from the bolt. – Remove the bonding strip from the bolt and move it clear of the tank. – Remove the bolt.	
(6)	Disconnect the two vent hoses from the adapters on the access panel: – Remove the access panel from the outer lower surface of the wing. – Remove the clamps that hold the vent hoses to the adapters on the access panel. – Disconnect the vent hoses from the adapters on the access panel.	Near the outboard end of the filler assembly. Refer to Section 52-40.
(7)	Disconnect the bonding connection at the outboard end of the fuel filler assembly.	Through the access panel in the wing bottom skin.
(8)	Release the fuel filler assembly: – Remove the fuel filler cap and disconnect the bonding cable. – Remove the 8 screws which attach the filler flange. – Release the filler flange and the O-ring seal.	 Discard the O-ring seal.

	Detail Steps/Work Items	Key Items/References
(9)	Gently pull the tank and fuel filler assembly out of the wing through the wing inboard rib. Move the assembly clear of the wing and support it on a clean work bench.	Make sure that the tank does not catch on the wing ribs. Make sure that you do not damage the tanks.

B. Disassemble the Fuel Tank Assembly

	Detail Steps/Work Items	Key Items/References
(1)	Remove the fuel tank assembly from the wing.	Refer to Paragraph 2.A.
(2)	Remove the connecting link that attaches the tank to the fuel filler assembly: – Remove the 2 nuts and washers from the bolts. – Remove the link plate. – Remove the 2 bolts.	Refer to Figures 1 and 3.
(3)	Remove the clips which attach the vent hoses to the tank.	
(4)	Remove the worm drive clamps that attach the flexible coupling to the tank.	
(5)	Pull the fuel filler assembly away from the tank until the vent hoses and flexible coupling disconnect from the tank.	
(6)	If necessary, remove the clips which attach the vent hoses to the fuel filler assembly and pull the hoses from the connectors.	
(7)	If necessary, remove the worm drive clamp which attaches the flexible coupling to the fuel filler assembly and pull the coupling from the fuel filler assembly connector.	

3. Remove/Disassemble the Long Range Tank Assembly

A. Remove the Fuel Tank Assembly (Long Range Tank)

	Detail Steps/Work Items	Key Items/References
(1)	Remove the wing which has the fuel tank that you will remove and support the wing on trestles.	Refer to Section 57-10.
(2)	Remove these access panels from the wing: – Remove the access panel from the root rib: – Remove the 11 nuts and washers from the studs. – Pull the access panel from the studs and clear of the airplane. – Remove the access panel for the fuel drain valve.	Refer to Section 52-40.
(3)	Remove the fuel drain valve: – Cut the lock-wire. – Remove the drain valve from its mounting.	Refer to Figures 2 and 4.
(4)	Disconnect these electrical connectors: – Fuel quantity probe. – Low fuel sensor. – High fuel sensor (left wing only). – Fuel temperature sensor.	At the inboard end of the tank. At the in-line connector.
(5)	Release the bonding strip from the inboard end of the inboard fuel tank chamber: – Remove the nut and washer from the bolt. – Remove the bonding strip from the bolt and move it clear of the tank. – Remove the bolt.	

	Detail Steps/Work Items	Key Items/References
(6)	Disconnect the two vent hoses from the adapters on the access panel: – Remove the access panel from the outer lower surface of the wing. – Remove the clamps that hold the vent hoses to the adapters on the access panel. – Disconnect the vent hoses from the adapters on the access panel.	Near the outboard end of the outboard fuel tank chamber. Refer to Section 52-40.
(7)	Disconnect the bonding connection at the outboard end of the outboard fuel tank chamber.	Through the access panel in the wing bottom skin.
(8)	Release the fuel filler flange: – Remove the fuel filler cap and disconnect the bonding cable. – Remove the 8 screws which attach the filler flange. – Release the filler flange and the O-ring seal. – Remove the spacer ring.	Discard the O-ring seal.
(9)	Gently pull the inboard fuel tank chamber and the outboard fuel tank chamber out of the wing through the wing inboard rib. Move the assembly clear of the wing and support it on a clean work bench.	Make sure that the tank does not catch on the wing ribs. Make sure that you do not damage the tanks.

B. Disassemble the Fuel Tank Assembly (Long Range Tank)

	Detail Steps/Work Items	Key Items/References
(1)	Remove the fuel tank assembly from the wing.	Refer to Paragraph 3.A.
(2)	Remove the connecting link that attaches the inboard fuel tank chamber to the outboard fuel tank chamber: – Remove the 2 nuts and washers from the bolts. – Remove the link plate. – Remove the 2 bolts.	Refer to Figures 2 and 4.
(3)	Remove the clips which attach the vent hoses to the tank.	
(4)	Remove the worm drive clamps that attach the flexible coupling to the tank.	
(5)	Pull the outboard fuel tank chamber away from the inboard fuel tank chamber until the vent hoses and flexible coupling disconnect from the tank.	
(6)	If necessary, remove the clips which attach the vent hoses to the outboard fuel tank chamber and pull the hoses from the connectors.	
(7)	If necessary, remove the worm drive clamp which attaches the flexible coupling to the outboard fuel tank chamber and pull the coupling from the fuel tank chamber connector.	

4. Assemble/Install the Fuel Tank Assembly (Standard Tank)

A. Preparation

	Detail Steps/Work Items	Key Items/References
(1)	Examine the fuel tank. Look specially for: – Damage to the skins and welded seams of the tank. – Corrosion. – Damage/wear to the rubber mounting bands at the outside of the tanks.	Use a strong light and a magnifying glass.
(2)	Examine the vent hoses which connect the tank and fuel filler assembly. Look specially for: – Cuts or damage, specially at the ends where the attaching clips locate. – Distortion or cracking.	
(3)	Examine the flexible coupling. Look specially for: – Cuts or damage, specially at the ends where the attaching clips locate. – Distortion or cracking.	
(4)	Examine the fuel filler flange. Look specially for: – Corrosion on the mating faces. – Cracking around the flange.	Use a strong light and a magnifying glass.
(5)	Examine the insides of the tank for cleanliness.	

B. Assemble the Tank

	Detail Steps/Work Items	Key Items/References
(1)	Install the flexible coupling: – Push the flexible coupling onto the connector of the fuel filler assembly. – Install the worm drive clamps onto the coupling and tighten the clamps.	Refer to Figure 3. Make sure that the coupling is correctly positioned. Torque: 2.5 Nm (1.8 lbf.ft.)
(2)	Install the vent hoses onto the fuel filler assembly: – Push the hoses onto the connectors. – Install the attaching clips.	Make sure that the hose is correctly positioned.
(3)	Connect the tank to the fuel filler assembly: – Move the tank into position by the fuel filler assembly. Engage the tank vent connectors and the flexible coupling connector into their related hoses/couplings on the fuel filler assembly. – Push the tank towards the fuel filler assembly until the vent hoses and the flexible coupling are correctly positioned on their related connectors. – Install the worm drive clamps that attach the flexible coupling to the tank connector. – Tighten the worm drive clamps. – Install the clips which attach the vent connecting hoses to the inboard tank connectors.	The surface of the filler flange must be parallel with the upper surface of the fuel tank. Torque: 6 Nm (4.4 lbf.ft.)

	Detail Steps/Work Items	Key Items/References
(4)	Install the connecting link which attaches the tank to the fuel filler assembly: – Move the link into position on the connecting brackets. – Install the two bolts through the link and the connecting brackets. – Install the 2 washers and nuts onto the bolts. – Tighten the nuts and bolts.	

C. Install the Tank Assembly

	Detail Steps/Work Items	Key Items/References
(1)	Move the tank assembly into position in the wing.	Make sure that the tank assembly is correctly located.
(2)	Install the fuel filler assembly: – Install a new O-ring seal on the fuel filler flange. – Make sure that the mounting in the fuel filler assembly is correctly aligned with the hole in the top surface of the wing. – Install a new O-ring seal in position on the top surface of the wing. – Apply a thin layer of sealant to the contact area between the fuel filler flange and the ring for the filler cap. – Put the ring for the filler cap in position over the filler flange. – Install the 8 screws which attach the fuel filler and the ring for the filler cap to the wing. – When all of the screws are installed, then tighten the screws.	If necessary, move the tank assembly to give correct alignment. Make sure that the O-ring is correctly positioned. Use DP 300 or equivalent. Finger tight only. Tighten opposite screws.
(3)	Connect two the vent hoses to the adapters on the access panel: – Push the vent hoses onto the adapters on the access panel. – Install the clamps which hold the vent hoses to the adapters on the access panel.	Near the outboard end of the fuel filler assembly.
(4)	Connect the bonding cable to the fuel filler assembly.	
(5)	Install the access panel on the bottom surface of the wing.	Refer to Section 52-40.

	Detail Steps/Work Items	Key Items/References
(6)	Attach the bonding strip to the inboard end of the tank: – Put the bolt up through the bonding tag on the inboard tank. – Move the bonding cable into position on the bolt. – Install the washer and nut onto the bolt. – Tighten the bolt.	
(7)	Connect these electrical connectors: – Fuel quantity probe. – Low fuel sensor. – High fuel sensor (left wing only). – Fuel temperature sensor.	At the inboard end of the tank. At the in-line connector.
(8)	Install the access panel at the wing root rib: – Put the access panel into position on the studs. – If access panel is made from aluminium (DA4-5741-26-00_2) install bonding cable. – Install the 11 washers and nuts. – Tighten the nuts.	Install on 3rd bolt from bottom aft corner.
(9)	Install the drain valve: – Install a new O-ring onto the drain valve assembly. – Install the drain valve assembly into the mounting at the bottom of the inboard tank. – Secure the drain valve assembly with lock-wire. – Install the access panel.	Torque: 1 - 3 Nm (0.7 - 2.2 lbf.ft.). Refer to Section 52-40.

	Detail Steps/Work Items	Key Items/References
(10)	Install fuel tank finger filter: – Bond with Loctite 243.	
(11)	Install the wing onto the airplane.	Refer to Section 57-10.
(12)	Refuel the airplane.	Refer to Section 12-10. Look specially for fuel leaks from the tanks assembly which you have installed.
(13)	Do an engine ground test.	Refer to Section 71-01.

5. Assemble/Install the Fuel Tank Assembly (Long Range Tank)

A. Preparation (Long Range Tank)

	Detail Steps/Work Items	Key Items/References
(1)	Examine the fuel tank. Look specially for: – Damage to the skins and welded seams of the tank. – Corrosion. – Damage/wear to the rubber mounting bands at the outside of the tanks.	Use a strong light and a magnifying glass.
(2)	Examine the vent hoses which connect the inboard and the outboard fuel tank chamber. Look specially for: – Cuts or damage, specially at the ends where the attaching clips locate. – Distortion or cracking.	
(3)	Examine the flexible coupling. Look specially for: – Cuts or damage, specially at the ends where the attaching clips locate. – Distortion or cracking.	
(4)	Examine the fuel filler flange. Look specially for: – Corrosion on the mating faces. – Cracking around the flange. Examine spacer ring. Look specially for: – Corrosion on the mating faces. – Cracking around the flange.	Use a strong light and a magnifying glass. Use a strong light and a magnifying glass.
(5)	Examine the insides of the fuel tank chambers for cleanliness.	

B. Install the Long Range Tank Assembly

	Detail Steps/Work Items	Key Items/References
(1)	Install the flexible coupling: – Push the flexible coupling onto the connector of the outboard fuel tank chamber. – Install the worm drive clamps onto the coupling and tighten the clamps.	Refer to Figures 2 and 4. Make sure that the coupling is correctly positioned.
(2)	Install the vent hoses onto the outboard fuel tank chamber: – Push the hoses onto the connectors. – Install the attaching clips.	Make sure that the hose is correctly positioned.
(3)	Connect the inner to the outboard fuel tank chamber: – Move the inboard fuel tank chamber into position by the outboard fuel tank chamber. Engage the tank vent connectors and the flexible coupling connector into their related hoses/couplings on the outboard fuel tank chamber. – Push the inboard fuel tank chamber towards the outboard fuel tank chamber until the vent hoses and the flexible coupling are correctly positioned on their related connectors. – Install the worm drive clamps that attach the flexible coupling to the inboard tank chamber connector. – Tighten the worm drive clamps. – Install the clips which attach the vent connecting hoses to the inboard fuel tank chamber connectors.	The upper surface of both fuel tank chambers must be parallel.

	Detail Steps/Work Items	Key Items/References
(4)	Install the connecting link which attaches the inboard fuel tank chamber to the outboard tank chamber: – Move the link into position on the connecting brackets. – Install the two bolts through the link and the connecting brackets. – Install the 2 washers and nuts onto the bolts. – Tighten the nuts and bolts.	

C. Install the Long Range Tank Assembly

	Detail Steps/Work Items	Key Items/References
(1)	Move the tank assembly into position in the wing.	Make sure that the tank assembly is correctly located.
(2)	Install the fuel tank:	
	– Make sure that the fuel filler flange in the outboard tank chamber is correctly aligned with the hole in the top surface of the wing.	If necessary, move the tank assembly to give correct alignment.
	– Apply a thin layer of sealant to the contact area between spacer ring and fuel filler flange.	Use DP 300 or equivalent.
	– Install the spacer ring onto the tank filler flange.	
	– Install a new O-ring seal in position on the top surface of the wing.	Make sure that the O-ring is correctly positioned.
	– Apply a thin layer of sealant to the contact area between the spacer ring and the ring for the filler cap.	Use DP 300 or equivalent.
	– Put the ring for the filler cap in position over the filler flange.	
	– Install the 8 screws which attach the fuel filler and the ring for the filler cap to the wing.	Finger tight only.
	– When all of the screws are installed, then tighten the screws.	Tighten opposite screws.
(3)	Connect two the vent hoses to the adapters on the access panel:	Near the outboard end of the outboard fuel tank chamber.
	– Push the vent hoses onto the adapters on the access panel.	
	– Install the clamps which hold the vent hoses to the adapters on the access panel.	
(4)	Connect the bonding connection at the outboard end of the outboard fuel tank chamber.	

	Detail Steps/Work Items	Key Items/References
(5)	Install the access panel on the bottom surface of the wing.	Refer to Section 52-40.
(6)	Attach the bonding strip to the inboard end of the inboard fuel tank chamber: – Put the bolt up through the bonding tag on the inboard fuel tank chamber. – Move the bonding cable into position on the bolt. – Install the washer and nut onto the bolt. – Tighten the bolt.	
(7)	Connect these electrical connectors: – Fuel quantity probe. – Low fuel sensor. – High fuel sensor (left wing only). – Fuel temperature sensor.	At the inboard end of the tank. At the in-line connector.
(8)	Install the access panel at the wing root rib: – Put the access panel into position on the studs. – Install the 11 washers and nuts. – Tighten the nuts.	

	Detail Steps/Work Items	Key Items/References
(9)	Install the drain valve: – Install a new O-ring onto the drain valve assembly. – Install the drain valve assembly into the mounting at the bottom of the inboard fuel tank chamber. – Secure the drain valve assembly with lock-wire. – Install the access panel.	 Torque: 1 - 3 Nm (0.7 - 2.2 lbf.ft.). Refer to Section 52-40.
(10)	Install the wing onto the airplane.	Refer to Section 57-10.
(11)	Refuel the airplane.	Refer to Section 12-10. Look specially for fuel leaks from the tanks assembly which you have installed.
(12)	Do an engine ground test.	Refer to Section 71-01.

Section 28-20
Fuel Distribution System - Lycoming Engine

1. General

This Section tells you about the fuel distribution system for airplanes with the Lycoming engine installed. The fuel distribution system supplies fuel from the fuel tanks to the engine. This Section tells you about the components and equipment which make the fuel distribution system. These are the components of the fuel distribution system:

– Flexible fuel hoses.

– Fuel selector/shut-off valve.

– Fuel gascolator and filter.

– Electric fuel pump (booster pump).

Refer to Section 28-00 for a general description of the fuel system and for the schematic diagram of the fuel system.

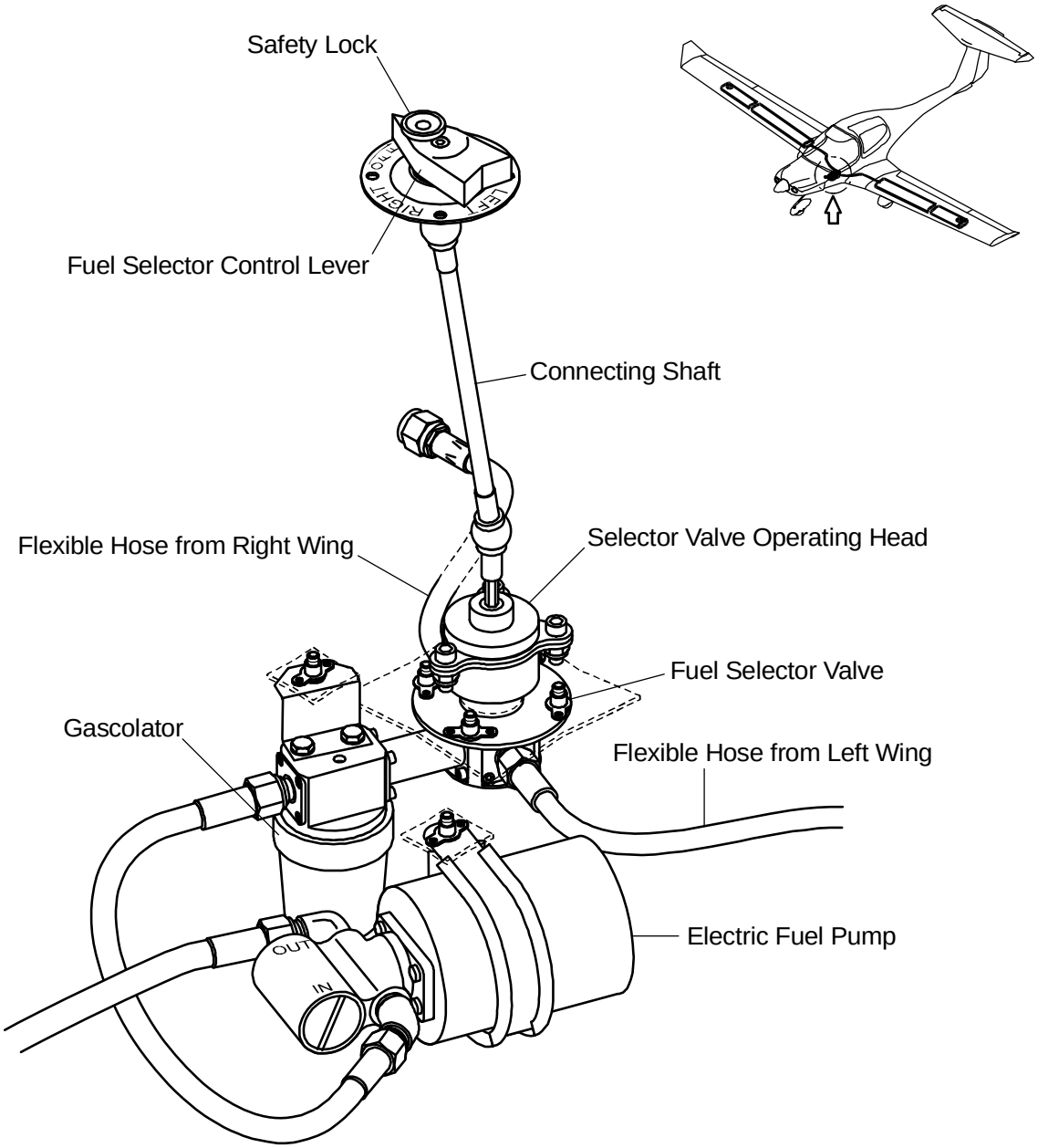


Figure 1: Fuel Distribution System Main Components

2. Description

Figure 1 shows the main components of the fuel distribution system for the DA 40.

Two flexible fuel hoses connect the left and right wing fuel tanks to the selector/shut-off valve. The selector/shut-off valve is located in the fuselage, under the cockpit floor. The fuel selector/cut-off valve connects to the gascolator.

A flexible hose connects the outlet from the gascolator to the inlet of the electric fuel pump. Another flexible hose connects the outlet of the electric fuel pump to a bulkhead connector at the engine firewall.

A flexible hose with an integral fire-sleeve connects the bulkhead connector to the engine driven fuel pump.

3. Fuel System Components

A. Flexible Hoses

The fuel system uses synthetic flexible hoses. The flexible hose in the engine bay have integral fire-protection sleeves.

You must only use approved hoses in the fuel system which have been pressure tested.

B. Fuel Selector/Shut-Off Valve

The fuel selector/shut-off valve is located below the cockpit floor. The selector valve is a three-way valve. A long shaft connects the valve to a selector control lever which is located in the cockpit. The selector control lever is mounted in the center console, aft of the engine control assembly.

If you set the control lever to LEFT then only the left wing tanks will supply fuel. If you set the control lever to RIGHT then only the right wing tanks will supply fuel. If you set the control lever to OFF then fuel will not be supplied from the tanks. To set the control lever to OFF you must lift a safety lock while you turn the control lever to the OFF position.

C. Fuel Gascolator and Filter

The gascolator connects to the selector valve. It has a filter and it has a fuel drain. You can remove the filter for cleaning/replacement. Use the fuel drain to drain the fuel distribution system and to drain fuel when you will do a test for fuel contamination.

D. Electric Fuel Pump (Booster Pump)

The electric fuel pump is located in the fuselage, below the cockpit floor. Electrical power is supplied from the main electrical bus. A switch in the lower left side of the instrument panel controls the fuel pump. A five Amp circuit-breaker protects the fuel pump electrical system.

The pump is a high-pressure rotary pump. It will supply fuel to the engine if the engine driven fuel pump fails.

Trouble-Shooting

1. General

The table below lists the defects you could have with the fuel distribution system. If you have the trouble detailed in the Trouble column read across to the Possible Cause column. Then do the repair given in the Repair column.

Trouble	Possible Cause	Repair
Airplane smells of fuel.	Hose/Pipe leaking.	Examine all hoses and pipes. Look specially for green stains. Replace defective components.
	Loose connection.	Examine all connections. Look specially for green stains. Tighten loose connections.
	Component leaking.	Examine all components. Look specially for green stains. Replace defective components.
Fuel pressure low.	Fuel pressure indicating system defective.	Do a test of the fuel pressure indicating system. Refer to Section 77-40.
	Filter blocked.	Examine the fuel filter in the gascolator. Clean or replace the filter element. If you find contamination, then flush the fuel system.
	Fuel pump defective.	Do a test of the electrical fuel pump with the engine shut down. Also do a test of the engine-driven-fuel-pump with the engine running and the electric fuel pump set to OFF. Replace defective components.

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Maintenance Practices

1. General

This Section gives you the Maintenance Practices for the fuel distribution system. The procedures are limited to the removal/installation of the main components of the system.

Obey the safety precautions for fuel at all times.

WARNING: DO NOT GET FUEL ON YOU. FUEL CAN CAUSE SKIN DISEASE.

WARNING: DO NOT ALLOW FIRE NEAR FUEL. FUEL BURNS AND CAN CAUSE INJURY TO PERSONS AND DAMAGE TO EQUIPMENT.

WARNING: DO NOT BREATH FUEL VAPOR. FUEL VAPOR CAN MAKE YOU ILL.

2. Remove/Install the Fuel Selector/Shut-Off Valve

A. Remove the Fuel Selector/Shut-Off Valve

Remove the fuel selector valve and gascolator as an assembly.

Obey the safety precautions for fuel at all times.

	Detail Steps/Work Items	Key Items/References
(1)	Defuel the airplane.	Refer to Section 12-10.
(2)	Drain the fuel from the distribution system.	Use a suitable container. Drain the fuel from the gascolator drain valve.
(3)	Remove the access panel from the bottom of the fuselage around the gascolator drain valve.	Refer to Section 52-40.
(4)	Disconnect the flexible hose which connects the left fuel tank to the selector valve, at the selector valve.	Put caps on the connections.
(5)	Disconnect the flexible hose which connects the right fuel tank to the selector valve, at the selector valve.	Put caps on the connections.
(6)	Disconnect the fuel pipe which connects the gascolator to the electric fuel pump at the gascolator.	Put caps on the connections.

	Detail Steps/Work Items	Key Items/References
(7)	Disconnect the connecting shaft from the selector valve: – Remove the left pilots seat. – Remove the 3 nuts and bolts which attach the operating head to the selector valve. – Move the connecting shaft and operating head clear of the selector valve.	 Refer to Section 25-10. Refer to Figure 1.
(8)	Remove the selector valve: – Remove the nut and washer which attach the gascolator mounting plate. – Remove the four bolts and washers which attach the selector valve to the mounting plate. – Lower the selector valve and fuel gascolator clear of the airplane.	 Hold the selector valve!

B. Install the Fuel Selector/Shut-Off Valve

	Detail Steps/Work Items	Key Items/References
(1)	Move the selector valve and fuel gascolator into position at the mounting plate.	Make sure that the gascolator mounting bracket is correctly located.
(2)	Install the fuel selector valve and fuel gascolator: – Install the 4 washers on the 4 bolts. – Put the bolts and washers into position through the selector valve into the anchor-nuts. – Install the nut and washer which attach the gascolator mounting bracket. – Tighten all the bolts hand tight. – Tighten the bolts.	
(3)	Connect the selector valve operating lever: – Move the connecting shaft and operating head into position on the selector valve. – Install the 3 bolts, washers and nuts which attach the operating head to the valve. – Tighten the 3 bolts.	Make sure that both the selector valve lever in the cockpit and the selector valve are set to OFF.
(4)	Connect the pipe from the gascolator valve to the selector valve.	
(5)	Connect the flexible hose from the right fuel tank to the selector valve.	
(6)	Connect the flexible hose from the left fuel tank to the selector valve.	
(7)	Set the selector valve control lever to OFF.	
(8)	Refuel the airplane.	Refer to Section 12-10.

	Detail Steps/Work Items	Key Items/References
(9)	Do a test for fuel leaks from the connections which you have made: – Set the airplane ALT/BAT switch to ON. – Set the electric fuel pump to ON. – Set the fuel selector valve to BOTH. – Examine the fuel selector valve and attaching equipment for fuel leaks. – Set the selector valve to OFF. – Set the electric fuel pump to OFF. – Set the airplane ALT/BAT switch to OFF.	
(10)	Install the access panel under the fuselage around the gascolator drain valve.	Refer to Section 52-40.
(11)	Do a test of the fuel storage and distribution system.	Refer to Section 28-10.

3. Remove/Install the Fuel Gascolator Filter

Obey the safety precautions for fuel at all times.

A. Remove the Gascolator Filter

	Detail Steps/Work Items	Key Items/References
(1)	Set the fuel selector valve to OFF.	
(2)	Drain the fuel from the gascolator drain valve.	Use a suitable container.
(3)	Remove the access panel under the fuselage around the gascolator drain valve.	Refer to Section 52-40.
(4)	Loosen the retaining ring which holds the gascolator filter bowl to the gascolator.	Hold the filter bowl!
(5)	Lower the filter bowl clear of the gascolator and remove the filter.	Discard the seal if it is damaged.

B. Install the Gascolator Filter

	Detail Steps/Work Items	Key Items/References
(1)	Put the filter into position in the filter bowl.	
(2)	Install a new seal onto the top of the filter bowl.	
(3)	Install the filter bowl: – Move the filter bowl into position onto the gascolator. – Align the arrow marks on the filter bowl with the marks on the gascolator. – Tighten the retaining ring which holds the filter bowl in position.	Make sure that the seal is correctly positioned.
(4)	Do a test for leaks of the gascolator filter bowl: – Set the airplane ALT/BAT switch to ON. – Set the electric fuel pump to ON. – Set the fuel selector valve to LEFT or RIGHT. – Examine the gascolator bowl for leaks. – Set the selector valve to OFF. – Set the electric fuel pump to OFF. – Set the airplane ALT/BAT switch to OFF.	Select tank with more fuel.
(5)	Install the access panel under the fuselage around the gascolator drain valve.	Refer to Section 52-40.

4. Remove/Install the Electric Fuel Pump (Booster Pump)

Obey the safety precautions for fuel at all times.

A. Remove the Electric Fuel Pump

	Detail Steps/Work Items	Key Items/References
(1)	Set the fuel selector valve to OFF.	
(2)	Pull the circuit-breaker for the electric fuel pump.	Instrument panel, right side.
(3)	Drain the fuel from the gascolator drain valve.	Use a suitable container.
(4)	Remove the access panel under the fuselage around the gascolator drain valve.	Refer to Section 52-40.
(5)	Disconnect the electrical cable for the electric fuel pump.	At the in-line connector.
(6)	Disconnect the flexible hose which connects the fuel pump to the gascolator.	At the fuel pump. Put caps on the connections.
(7)	Disconnect the flexible hose which connects the fuel pump to the firewall connector.	At the fuel pump. Put caps on the connections.
(8)	Remove the fuel pump: – Release the bolt and washer from the fuel pump clamp. – Open the clamp and move the pump clear of the clamp and away from the airplane.	Hold the fuel pump!

B. Install the Electric Fuel Pump

	Detail Steps/Work Items	Key Items/References
(1)	Move the fuel pump into position in the mounting clamp.	Hold the fuel pump.
(2)	Install the fuel pump: – Put the washer onto the attaching bolt. – Install the bolt through the clamp and into the mounting pump mounting. – Tighten the bolt.	
(3)	Install the flexible hose which connects the fuel pump to the firewall connector.	
(4)	Install the flexible hose which connects the fuel pump to the gascolator.	
(5)	Connect the electrical cable to the fuel pump.	At then in-line connector.
(6)	Set the circuit-breaker for the fuel pump.	Instrument panel, right side.
(7)	Do a test for leaks at the connections for the electric fuel pump and related equipment: – Set the airplane ALT/BAT switch to ON. – Set the electric fuel pump to ON. – Set the fuel selector valve to LEFT or RIGHT. – Examine the fuel pump and connections for fuel leaks. – Set the selector valve to OFF. – Set the electric fuel pump to OFF. – Set the airplane ALT/BAT switch to OFF.	Select tank with more fuel.
(8)	Install the access panel under the fuselage around the gascolator drain valve.	Refer to Section 52-40.
(9)	Do a test of the fuel storage and distribution system.	Refer to Section 28-10.

Section 28-21
Fuel Distribution System - TAE 125 Diesel Engine

1. General

This Section tells you about the fuel distribution system for airplanes with the TAE 125 Diesel engine installed. The fuel distribution system supplies fuel from the fuel tanks to the engine. This Section tells you about the components and equipment which make the fuel distribution system. These are the components of the fuel distribution system:

– Flexible fuel hoses.

– Emergency fuel valve.

– Fuel gascolator with filter.

– Electric fuel transfer pump.

Refer to Section 28-01 for a general description of the fuel system and for the schematic diagram of the fuel system.

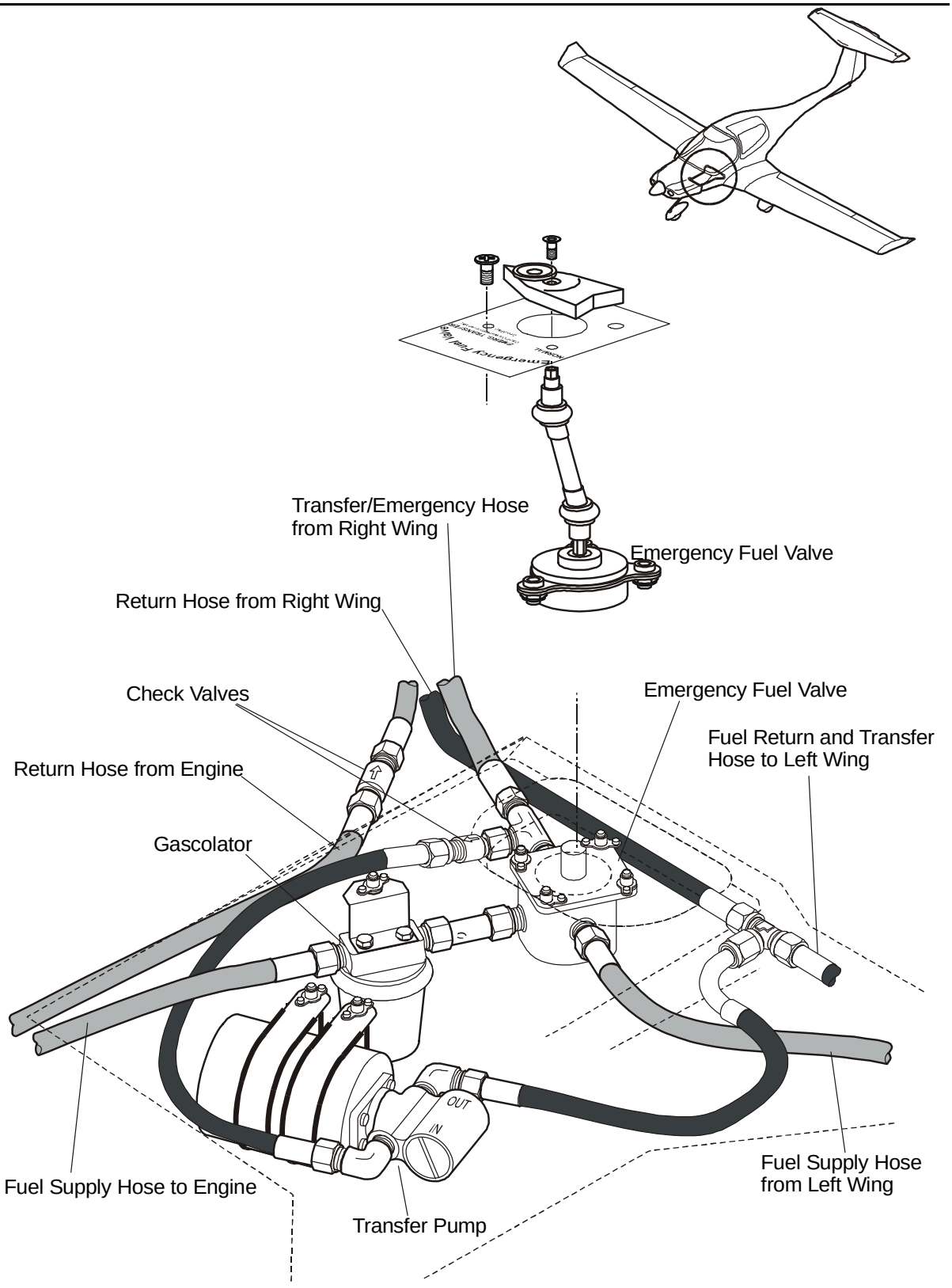


Figure 1: Fuel System Components in the Fuselage

2. Description

Figure 1 shows the main components of the fuel distribution system for the DA 40 with the TAE 125 Diesel engine installed.

A flexible fuel hose connects the left wing fuel tank to the emergency fuel valve. The emergency fuel valve is located in the fuselage, under the cockpit floor. The emergency fuel valve connects to the gascolator.

Flexible hoses connect the outlet from the gascolator to a bulkhead connector at the firewall. A flexible hose with an integral fire-sleeve connects the bulkhead connector to the inlet to the engine fuel filter.

A flexible hose connects the right wing tank to a T-piece attached to the emergency inlet of the emergency fuel valve. A flexible hose from the second outlet from the T-piece connects to a check valve and further to the inlet of the fuel transfer pump. Another flexible hose connects the outlet of the fuel transfer pump to a T-piece in the return line.

The return line from the engine filter goes through the fuselage to a check valve and further to the cooling loop inlet of the right wing tank. The cooling loop outlet from the right tank connects to the T-piece in the return line and further to the return inlet of the left fuel tank.

3. Fuel System Components

A. Flexible Hoses

The fuel system uses synthetic flexible hoses. The flexible hose in the engine bay have integral fire-protection sleeves.

You must only use approved hoses in the fuel system which have been pressure tested.

B. Emergency Fuel Valve

The emergency fuel valve is located below the cockpit floor. It is a three-way valve. A long shaft connects the valve to a control lever which is located in the cockpit. The control lever is mounted in the center console, aft of the engine control assembly.

To move the control lever you must lift a safety lock on top of the lever while you turn the control lever.

If you set the control lever to NORMAL then only the left wing tank will supply fuel. If you set the control lever to EMERG TRANSFER then only the right wing tank will supply fuel. If you set the control lever to OFF then fuel will not be supplied from the tanks.

C. Fuel Gascolator and Filter

The gascolator connects to the emergency fuel valve. It has a filter and it has a fuel drain. You can remove the filter for cleaning/replacement. Use the fuel drain to drain the fuel distribution system and to drain fuel when you will do a test for fuel contamination.

D. Fuel Transfer Pump

The fuel transfer pump is located in the fuselage, below the cockpit floor. Electrical power is supplied from the main electrical bus. The FUEL TRANS ← switch in the lower left side of the instrument panel controls the fuel transfer pump. A 10 Ampère circuit-breaker protects the fuel transfer pump electrical system.

The pump is a high-pressure rotary pump.

E. Fuel Cooler

The fuel cooler is located in the RH wing stub between the wing spars. It is accessible through the RH main landing gear cover on the bottom side of the RH wing stub.

4. Fuel Transfer System Operation

In the usual operation, fuel flows from the left tank, through the emergency fuel valve to the engine. Return fuel from the engine passes through the cooling loop in the right tank and then into the left tank.

If the FUEL TRANS ← switch is set to ON, the transfer pump moves fuel from the right tank to the left tank until either:

– The fuel transfer pump shut-off switch (high fuel sensor) in the left tank senses that the left tank is full. This shuts the pump OFF.

– The fuel transfer pump shut-off switch (low fuel sensor) in the right tank senses that the fuel tank is empty. This shuts the pump OFF.

Trouble-Shooting

1. General

The table below lists the defects you could have with the fuel distribution system. If you have the trouble detailed in the Trouble column read across to the Possible Cause column. Then do the repair given in the Repair column.

Trouble	Possible Cause	Repair
Airplane smells of fuel.	Hose/pipe leaking.	Examine all hoses and pipes. Replace defective components.
	Loose connection.	Examine all connections. Tighten loose connections.
	Component leaking.	Examine all components. Replace defective components.
Fuel does not transfer correctly.	Fuel transfer pump circuit-breaker not set.	Set the transfer pump circuit-breaker.
	Fuel transfer pump defective.	Replace the transfer pump.
	Low fuel sensor in right tank defective.	Replace the sensor.
	High fuel sensor in left tank defective	Replace the sensor.
	FUEL TRANS ← switch in instrument panel defective.	Replace the switch.
	Wiring defective.	Repair wiring.

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Maintenance Practices

1. General

This Section gives you the Maintenance Practices for the fuel distribution system. The procedures are limited to the removal/installation of the main components of the system.

Obey the safety precautions for fuel at all times.

WARNING: DO NOT GET FUEL ON YOU. FUEL CAN CAUSE SKIN DISEASE.

WARNING: DO NOT ALLOW FIRE NEAR FUEL. FUEL BURNS AND CAN CAUSE INJURY TO PERSONS AND DAMAGE TO EQUIPMENT.

WARNING: DO NOT BREATH FUEL VAPOR. FUEL VAPOR CAN MAKE YOU ILL.

2. Remove/Install the Emergency Fuel Valve and the Gascolator

A. Remove the Emergency Fuel Valve and the Gascolator

Remove the emergency fuel valve and the gascolator as an assembly.

Obey the safety precautions for fuel at all times.

	Detail Steps/Work Items	Key Items/References
(1)	Defuel the airplane.	Refer to Section 12-10.
(2)	Remove the access panel from the bottom of the fuselage around the gascolator drain valve.	Refer to Section 52-40.
(3)	Drain the fuel from the distribution system.	Use a suitable container. Drain the fuel from the gascolator drain valve.
(4)	Disconnect the flexible hose which connects the left fuel tank to the emergency fuel valve, at the valve.	Put caps on the connections.
(5)	Disconnect the union at the T-piece which connects the right fuel tank to the emergency fuel valve, at the valve.	Put caps on the connections.
(6)	Disconnect the fuel pipe which connects the gascolator to the firewall, at the gascolator.	Put caps on the connections.

	Detail Steps/Work Items	Key Items/References
(7)	Remove the emergency fuel valve and the gascolator: – Remove the bolt and washer which attach the gascolator mounting bracket. – Remove the four bolts and washers which attach the emergency fuel valve to the fuselage. – Lower the emergency fuel valve and the gascolator clear of the airplane.	Hold the emergency fuel valve!

B. Install the Emergency Fuel Valve and the Gascolator

	Detail Steps/Work Items	Key Items/References
(1)	Remove the left pilot's seat.	Refer to Section 25-10.
(2)	Move the emergency fuel valve and the gascolator into position in the fuselage.	Make sure that the gascolator mounting bracket is correctly located. Slide connecting shaft into the mating part of the emergency fuel valve. Make sure that both the control lever in the cockpit and the emergency fuel valve are at the same position.
(3)	Install the emergency fuel valve and the gascolator: – Install the 4 washers on the 4 bolts. – Put the bolts and washers into position through the emergency fuel valve into the anchor-nuts. – Install the bolt and washer which attach the gascolator mounting bracket. – Tighten the bolts.	
(4)	Connect the pipe from the gascolator to the firewall.	
(5)	Connect the T-piece to the selector valve.	
(6)	Connect the flexible hose from the left fuel tank to the selector valve.	
(7)	Refuel the airplane.	Refer to Section 12-10.
(8)	Do a test for fuel leaks from the connections which you have made.	
(9)	Install the access panel under the fuselage around the gascolator drain valve.	Refer to Section 52-40.
(10)	Install the left pilot's seat.	Refer to Section 25-10.
(11)	Do an engine ground run-up. Make sure that the fuel system operates correctly.	

3. Remove/Install the Gascolator Filter

Obey the safety precautions for fuel at all times.

A. Remove the Gascolator Filter

	Detail Steps/Work Items	Key Items/References
(1)	Set the emergency fuel valve to OFF.	
(2)	Remove the access panel under the fuselage around the gascolator drain valve.	Refer to Section 52-40.
(3)	Drain the fuel from the gascolator drain valve.	Use a suitable container.
(4)	Loosen the retaining ring which holds the gascolator filter bowl to the gascolator.	Remove the lock-wire from the retaining ring. Hold the filter bowl!
(5)	Lower the filter bowl clear of the gascolator and remove the filter.	Discard the seal if it is damaged.

B. Install the Gascolator Filter

	Detail Steps/Work Items	Key Items/References
(1)	Put the filter into position in the gascolator, tighten filter hand tight.	
(2)	Install a new seal in the filter bowl.	
(3)	Install the filter bowl: – Move the filter bowl into position onto the gascolator. – Align the arrow marks on the filter bowl with the marks on the gascolator. – Tighten the retaining ring which holds the filter bowl in position. – Secure retaining ring with lock-wire.	Make sure that the seal is correctly positioned.
(4)	Do a test for leaks of the gascolator filter bowl: – Make sure that there is fuel in the left tank. – Set the emergency fuel valve to NORMAL. – Examine the gascolator bowl for leaks. – Set the emergency fuel valve to OFF.	
(5)	Install the access panel under the fuselage around the gascolator drain valve.	Refer to Section 52-40.

4. Remove/Install the Fuel Transfer Pump

Obey the safety precautions for fuel at all times.

A. Remove the Fuel Transfer Pump

	Detail Steps/Work Items	Key Items/References
(1)	Defuel the airplane.	Refer to Section 12-10.
(2)	Pull the circuit-breaker for the transfer pump.	Instrument panel, left side.
(3)	Remove the nose landing gear strut fairing (if installed). – Remove the bolts, nuts and washers at the trailing edge. – Remove the bolts, nuts and washers from the support bracket at the forward bottom side of the cover. – Move the strut fairing clear of the airplane.	
(4)	Remove the access panel under the fuselage around the gascolator drain valve.	Refer to Section 52-40.
(5)	Drain the fuel from the gascolator drain valve.	Use a suitable container.
(6)	Disconnect the electrical cable for the transfer pump.	At the in-line connector.
(7)	Disconnect the flexible hose which connects the transfer pump to the check valve at the T-piece.	At the fuel pump. Put caps on the connections.
(8)	Disconnect the flexible hose which connects the fuel pump to the T-piece in the return line.	At the fuel pump. Put caps on the connections.
(9)	Remove the fuel pump: – Release the bolts and washers from the fuel pump clamps. – Open each clamp and move the bonding cable and the pump clear of the clamps and away from the airplane.	Hold the fuel pump! Hold the bonding cable that connects the clamps.

B. Install the Fuel Transfer Pump

	Detail Steps/Work Items	Key Items/References
(1)	Move the fuel transfer pump into position in the mounting clamps.	Hold the fuel transfer pump.
(2)	Install the fuel transfer pump: – Put a washer onto each attaching bolt. – Install the bolts through the clamps and into the pump mounting. – Position the bonding cable which connects the two clamps. – Tighten the bolts.	
(3)	Connect the electrical cable to the fuel transfer pump.	At the in-line connector.
(4)	Install the flexible hose which connects the fuel transfer pump to the T-piece in the return line.	
(5)	Install the flexible hose which connects the fuel transfer pump to the check valve at the T-piece.	
(6)	Set the circuit-breaker for the fuel transfer pump.	Instrument panel, left side.
(7)	Do a test for leaks at the connections for the fuel transfer pump and related equipment: – Make sure that there is fuel in the right tank. – Make sure that the left tank is not more than half full. – Set the ELECTRIC MASTER key switch to ON. – Set the FUEL TRANS ← switch to ON. – Examine the fuel pump and connections for fuel leaks. – Set the FUEL TRANS ← switch to OFF. – Set the ELECTRIC MASTER key switch to OFF.	

	Detail Steps/Work Items	Key Items/References
(8)	Install the access panel under the fuselage around the gascolator drain valve.	Refer to Section 52-40.
(9)	Install the strut fairing (optional equipment): – Put the strut fairing in position on the strut. – Install the bolts, nuts and washers to the support bracket at the forward bottom side of the cover. – Install the bolts, nuts and washers at the trailing edge.	Take care of the padding on the nose gear strut.
(10)	Refuel the airplane.	Refer to Section 12-10.

5. Disassemble/Assemble the Fuel Transfer Pump Assembly

A. Disassemble the Fuel Transfer Pump Assembly

	Detail Steps/Work Items	Key Items/References
(1)	Loosen jam nuts on 90° fittings and remove fittings from ”in” and ”out” port of the pump.	Note the installation direction of the fittings.
(2)	Remove O-rings from the fittings.	Discard O-rings.
(3)	Remove the drain fitting.	Hold the drain fitting.
(4)	Remove lock wire from bolt of pump housing which holds the bonding cable.	
(5)	Remove bolt and bonding cable.	Hold the bonding cable.
(6)	Re-install bolt.	
(7)	Put caps on the open connections.	

B. Assemble a New Fuel Transfer Pump Assembly

	Detail Steps/Work Items	Key Items/References
(1)	Cut electrical wires and crimp connectors onto the ends.	Length: 24 cm (9.4 in).
(2)	Fix pins in the housing and apply appropriate chafing protection on the wires.	There is no sensitivity to the polarity.
(3)	Examine the thread and the conical seats of the fittings.	
(4)	Install new O-rings on the fittings.	
(5)	Remove protective caps from the pump and install the fittings to the pump ”in” and ”out” ports.	Observe the installation direction of the fittings.
(6)	Tighten the jam nuts.	
(7)	Install the enclosed new screw on top of the pump housing.	"Top" means related to the installation in the airplane.
(8)	Install the drain fitting on the bottom side of the pump housing.	
(9)	Remove one of the top bolts from the pump housing.	Remove the lock wire. "Top" means related to the installation in the airplane.
(10)	Grind housing around the hole where the bolt is removed.	To get electrical conductivity.
(11)	Install bolt together with the bonding cable and tighten the bolt.	
(12)	Install new lock wire on the bolts.	
(13)	Seal the grinded area around bolt of the pump housing with paint.	To prevent corrosion.

6. Remove/Install the Fuel Cooler

A. Remove the Fuel Cooler

	Detail Steps/Work Items	Key Items/References
(1)	Remove the RH main landing gear cover.	On stub wing bottom side.
(2)	Remove the rubber gasket on the air duct.	
(3)	Remove the air duct.	
(4)	Dis-connect the fuel lines at the fuel cooler.	
(5)	Open the mounting bolts (4x).	
(6)	Remove the fuel cooler.	

B. Install the Fuel Cooler

	Detail Steps/Work Items	Key Items/References
(1)	Put the fuel cooler in place.	
(2)	Attach the fuel cooler with the four bolts.	
(3)	Connect the fuel lines to the fuel cooler.	
(4)	Put air duct to the fuel cooler.	
(5)	Install rubber gasket on air duct.	
(6)	Install RH main landing gear cover.	

7. Test the Emergency Fuel Valve

CAUTION: YOU MUST REPLACE THE EMERGENCY FUEL VALVE IF THE TEST FAILS.

	Detail Steps/Work Items	Key Items/References
(1)	Make sure that there is fuel in both wing tanks.	
(2)	Disconnect the fuel hose from the emergency fuel valve to the fuel filter.	Cut the lock wire at the fuel filter, 'tank' port. Put a cap on the open fuel filter port.
(3)	Connect an external fuel pump to the open hose.	
(4)	Make sure that the emergency fuel valve is in the NORMAL position.	
(5)	Switch the external fuel pump ON.	The external fuel pump must draw fuel from the left tank (main tank). Catch fuel in a suitable container.
(6)	Set the emergency fuel valve to EMERG. TRANSFER.	Break the seal. The external fuel pump must draw fuel from the right tank (auxiliary tank).
(7)	Set the emergency fuel valve to OFF.	The external fuel pump must NOT draw any fuel.
(8)	Switch the external fuel pump OFF.	
(9)	Disconnect the hose from the external fuel pump.	
(10)	Re-connect hose from emergency fuel valve to fuel filter.	
(11)	Secure the fuel hose with new lock wire.	
(12)	Set the emergency fuel valve to NORMAL.	
(13)	Replace the seal on the emergency fuel valve handle.	Use two strands of locking wire. Use tinned annealed copper, RS components P/N 390-555 or equivalent.
(14)	Bleed the fuel distribution system.	Refer to Paragraph 8.

8. Test the Check Valve in the Fuel Return Line

CAUTION: YOU MUST REPLACE THE CHECK VALVE IF THE TEST FAILS.

	Detail Steps/Work Items	Key Items/References
(1)	Make sure that the left fuel tank (main tank) is full. (Refer to Section 12-10).	
(2)	Disconnect the fuel return line from the fuel filter.	Cut the lock wire at the fuel filter.
(3)	Connect an external fuel pump to the open hose.	
(4)	Switch the external fuel pump ON.	The external fuel pump must NOT draw any fuel.
(5)	Switch the external fuel pump OFF.	
(6)	Disconnect the hose from the external fuel pump.	
(7)	Secure the fuel hose with new lock wire.	
(8)	Re-connect return line to fuel filter.	
(9)	Bleed the fuel distribution system	Refer to Paragraph 8.

9. Bleed the Fuel Distribution System

	Detail Steps/Work Items	Key Items/References
(1)	Disconnect the fuel hose from the intake side of the low-pressure fuel pump.	At the upper right side of the engine. Cut the lock wire. Put a cap on the pump intake.
(2)	Connect the open fuel hose to an external fuel pump.	Use a transparent hose in between fuel system and pump.
(3)	Switch the external fuel pump ON until fuel with no air is pumped.	Collect the fuel in a suitable container. Check for air in the transparent hose.
(4)	Disconnect the fuel hose from the external fuel pump.	
(5)	Connect the fuel hose to the intake side of the low-pressure fuel pump.	At the upper right side of the engine. Torque: 17 - 22 Nm (12.5 - 16.2 lbf.ft.).
	CAUTION: MAKE SURE TO TIGHTEN THE FUEL HOSE TO THE LOW-PRESSURE FUEL PUMP WITH THE CORRECT TORQUE. SINCE THE PRESSURE IN THE FUEL HOSE IS LOWER THAN THE AMBIENT AIR PRESSURE, A LEAK WILL ALLOW AIR TO ENTER THE FUEL SYSTEM. THIS LEADS TO A REDUCTION OF ENGINE POWER AND MAY CAUSE AN ENGINE FAILURE. NOTE: DUE TO THE DIFFERENTIAL PRESSURE A POSSIBLE LEAK IS NOT DETECTABLE THROUGH FUEL LEAKAGE NEXT TO THE CONNECTOR.	
(6)	Secure the fuel hose with new lock wire.	

Section 28-40
Fuel Quantity Indicating - Lycoming Engine

1. General

This Section tells you about the fuel quantity indicating system of the DA 40 with the Lycoming engine installed. Refer to Section 28-00 for the general data on the fuel system and refer to Section 31-10 for data on replacing the fuel quantity indicator.

2. Description

A. Standard Tanks

Figure 1 shows the fuel quantity indication system main components for the standard tanks. The fuel quantity indicator is part of the integrated engine indicating system. The inboard fuel tank in each wing has a fuel probe and a fuel sensor. The fuel quantity indicating system cannot be calibrated in service.

Electric cables connect the fuel probes to the I/O board of the integrated engine indicating system. The system displays the fuel quantity on an indicator located in the instrument panel, below the integrated engine indicating display.

Electric cables also connect the fuel sensors to a low fuel caution light in the annunciator panel. Refer to Section 31-50 for more data on the annunciator panel.

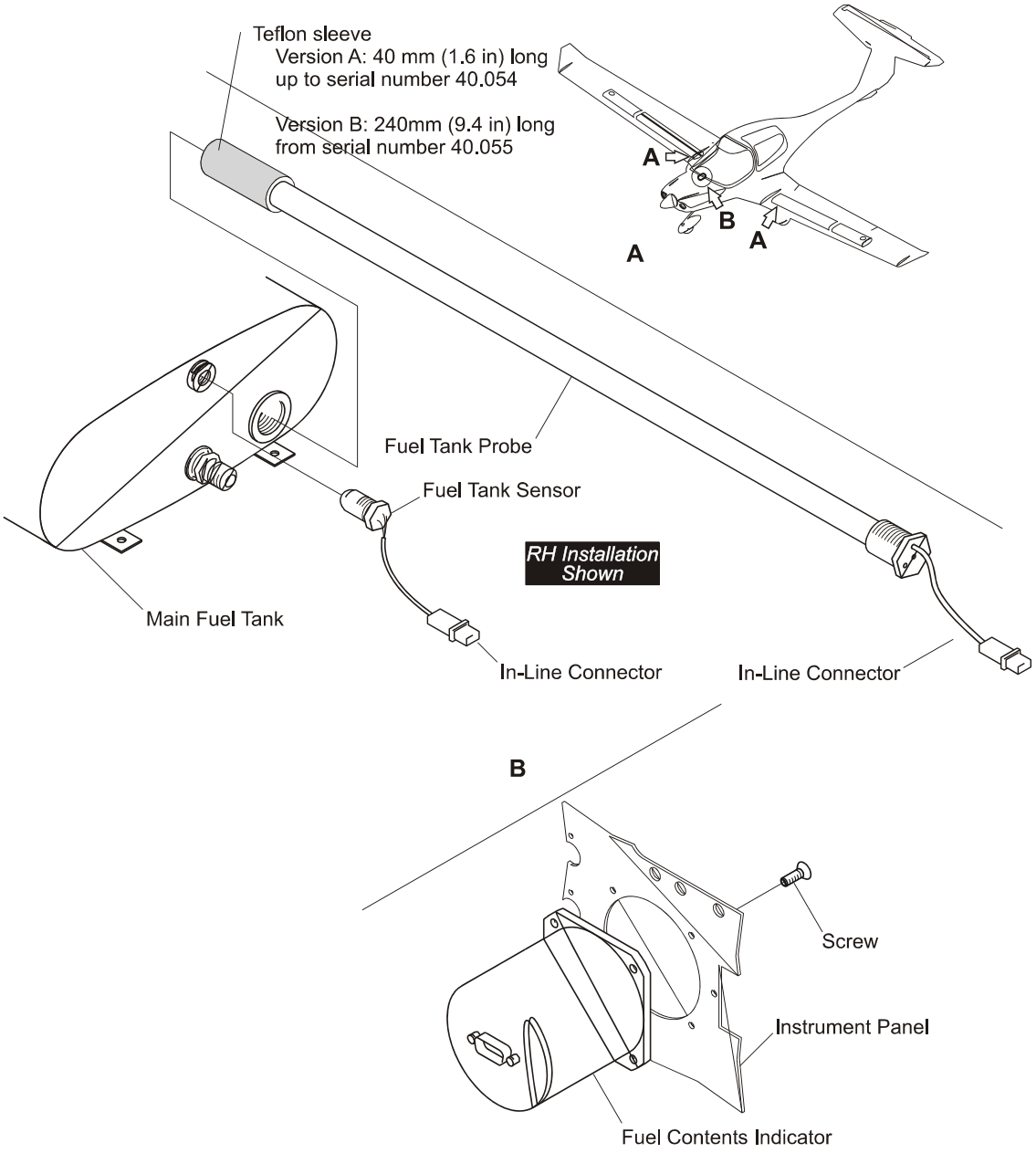


Figure 1: Fuel Quantity Indication System Components, Standard Tanks Installed

There are two versions of the fuel quantity indicating system for the standard tanks. Version A is compatible with Version A of the inboard fuel chamber. Version B is compatible with Version B of the inboard fuel chamber. Refer to Section 28-10 for more data on the fuel storage system.

Both versions use the same fuel tank probes and fuel quantity indicators. The fuel tank probes are however installed differently, thus requiring a different Revision Level of the EPROM in the Data Processing Unit (DPU).

(1) Version A

Version A has

– A short (40 mm = 1.6 in) Teflon sleeve over the fuel tank probes near the outboard end,

– The EPROM, Part No. 3034219, Revision Level 1.002 (marked on EPROM) in the DPU, and

– A placard below the fuel quantity indicator stating that the maximum indicated fuel quantity is 15 US gal (refer to Section 11-30).

Version A is factory standard up to serial number 40.054.

(2) Version B (MÄM 40-047)

Version B has

– A long (240 mm = 9.4 in) Teflon sleeve over the fuel tank probes on the outboard end,

– The EPROM, Part No. 3034219, Revision Level above 1.002 (marked on EPROM) in the DPU, and

– A placard below the fuel quantity indicator stating that the maximum indicated fuel quantity is 17 US gal (refer to Section 11-30).

Version B is factory standard from serial number 40.055 on (MÄM 40-047 installed) and all DA 40 F airplanes with the Lycoming O-360-A4M engine installed.

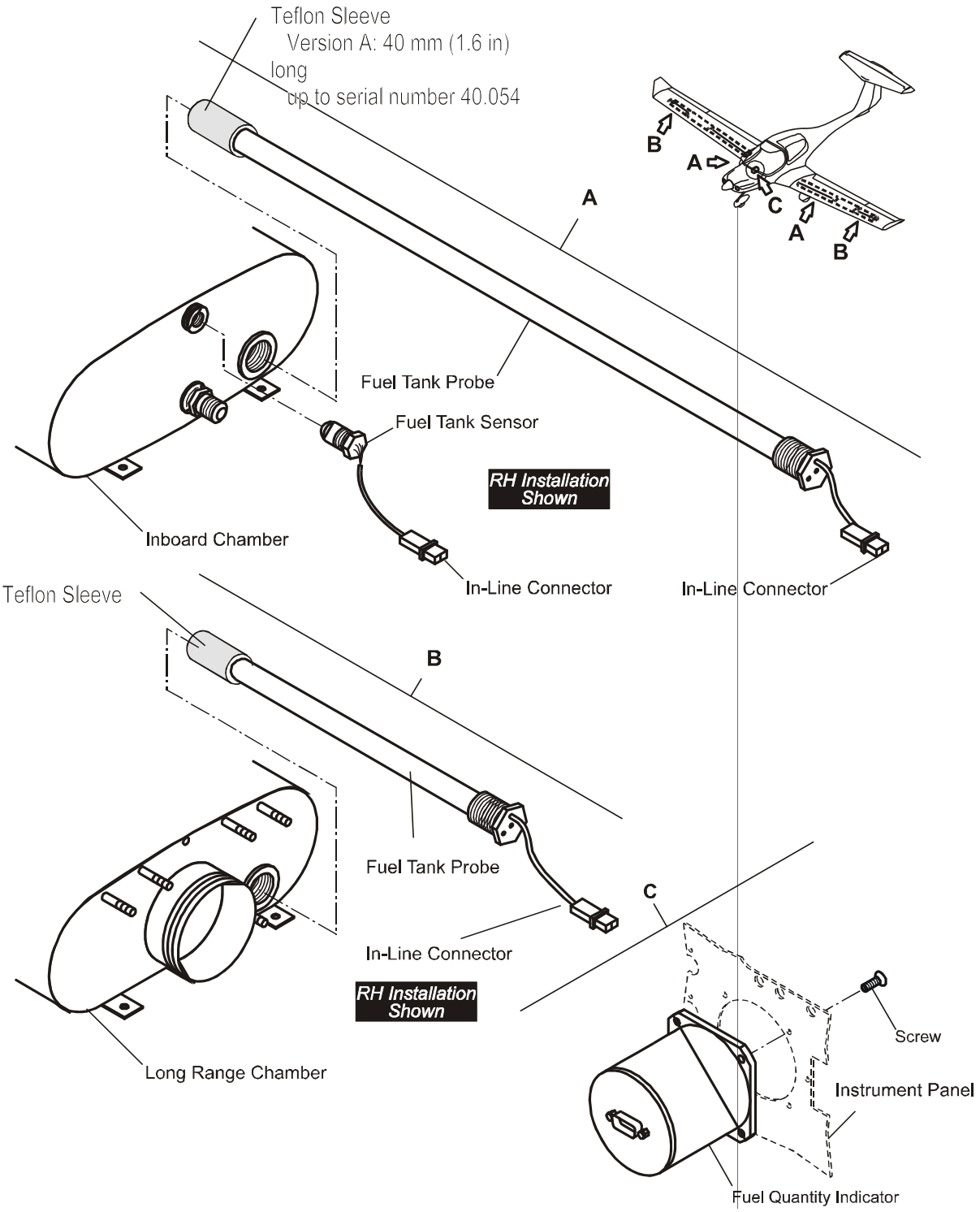


Figure 2: Fuel Quantity Indication System Components, Long Range Tanks Installed

B. Long Range Tanks (OÄM 40-071)

Figure 2 shows the fuel quantity indication system main components for the long range tanks. The fuel quantity indication system indicator is part of the integrated engine indicating system. The inboard fuel chamber in each wing has a fuel probe and a fuel sensor. The long range fuel chamber in each wing has also a fuel probe. The fuel quantity indicating system cannot be calibrated in service.

Electric cables connect the fuel probes to the I/O board of the integrated engine indicating system. The system displays the fuel quantity on an indicator located in the instrument panel, below the integrated engine indicating display.

Electric cables also connect the fuel sensors to a low fuel caution light in the annunciator panel. Refer to Section 31-50 for more data on the annunciator panel.

3. Operation

As the fuel level in the fuel tanks decreases, the area of the fuel probes which are “wetted” with fuel will also decrease. The amount of "wetted" area is converted into an electrical signal which sets the fuel quantity reading at the fuel quantity indicator. The fuel quantity indicator displays the quantity of fuel in the left fuel tank and the right fuel tank.

The fuel quantity indicator shows the fuel quantity both digitally and graphically. The digital display shows the fuel quantity in US Gallons. The digital display will be replaced by a “Lo” caption if the remaining fuel in one of the two fuel tanks falls below 5 US gal (19 liter). The graphic display shows the fuel quantity in the tanks as a percentage of the maximum quantity.

If the optional long range tanks (OÄM 40-071) are installed, the fuel quantity indicator also displays the fuel quantity in one of the two long range fuel chambers. When the AUX FUEL QTY switch (next to the fuel quantity indicator) is set to LH, the fuel quantity in the left outboard chamber is displayed. When the switch is set to RH, the fuel quantity in the right outboard chamber is displayed. The fuel quantity indicator shows the fuel quantity of the long range chamber only digitally, in US gallons.

The fuel sensor operates a caution light on the annunciator panel. When the fuel level in the left tank or the right tank falls below 3 US gal (±1 US gal) the caution light comes on. Refer to Section 31-50 for more data on the low fuel caution light.

Trouble-Shooting

1. General

The table below lists the defects you could have with the fuel quantity indicating system. If you have the trouble detailed in the Trouble column read across to the Possible Cause column. Then do the repair given in the Repair column.

Trouble	Possible Cause	Repair
Fuel quantity indication for one tank incorrect/blank, other tank reads correctly.	Fuel probe unit in fuel tank defective/contaminated.	Defuel/refuel the related tank to flush the fuel probe. If the indication is still incorrect then replace the fuel probe.
	Fuel quantity indication system wiring defective.	Do a test of the indication system wiring. Refer to Chapter 92-00 for the wiring diagrams.
Fuel quantity indication on both tanks incorrect/blank.	Fuel quantity indicator defective.	Replace the fuel quantity indicator.
	Fuel quantity indication system wiring defective.	Do a test of the indication system wiring. Refer to Chapter 92-00 for the wiring diagrams.
	Engine integrated indicating system defective.	Refer to the system manufacturer's manuals.

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Maintenance Practices

1. General

The Maintenance Practices in this Section tell you how to replace a fuel tank probe and a fuel tank sensor.

Refer to Section 31-10 for data on removing/installing a fuel quantity indicator.

Obey the safety precautions for fuel at all times.

WARNING: DO NOT GET FUEL ON YOU. FUEL CAN CAUSE SKIN DISEASE.

WARNING: DO NOT ALLOW FIRE NEAR FUEL. FUEL BURNS AND CAN CAUSE INJURY TO PERSONS AND DAMAGE TO EQUIPMENT.

WARNING: DO NOT BREATH FUEL VAPOR. FUEL VAPOR CAN MAKE YOU ILL.

2. Remove/Install a Fuel Tank Sensor

Obey the safety precautions for fuel at all times.

A. Remove a Fuel Tank Sensor

	Detail Steps/Work Items	Key Items/References
(1)	Defuel the wing that has the fuel tank sensor that you will remove.	Refer to Section 12-10.
(2)	Remove the inboard access panel for the fuel tank.	Refer to Section 52-40.
(3)	Disconnect the electrical cables for the sensor.	At the in-line connector.
(4)	Remove the sensor from the tank.	
(5)	Remove and discard the O-ring seal from the sensor.	

B. Install a Fuel Tank Sensor

	Detail Steps/Work Items	Key Items/References
(1)	Install a new O-ring seal onto the sensor.	
(2)	Install the sensor in the fuel tank: – Apply sealant to the thread of the sensor. – Move the sensor into position in the fuel tank mount. – Screw the sensor fully home into the mount. – Tighten the sensor.	 Use 'seal-lube' or 'fuel-lube'. Make sure that the O-ring is correctly positioned.
(3)	Connect the electrical cables to the sensor.	At the in-line connector.
(4)	Do a test for the correct operation of the fuel sensor: – Set the airplane ALT/BAT switch to ON. – Monitor the low fuel caution light on the annunciator panel. – Put 4 US gallons of fuel into the fuel tank that has the fuel sensor that you will test. – Set the airplane ALT/BAT switch to OFF.	 The low fuel caution message must be activated. The low fuel caution message must disappear.
(5)	Refuel the airplane.	Refer to Section 12-10.
(6)	Do a check for leaks at the fuel sensor installation.	
(7)	Install the inboard access panel for the fuel tank.	Refer to Section 52-40.

3. Remove/Install a Fuel Tank Probe

Obey the safety precautions for fuel at all times.

A. Remove the Fuel Tank Probe from the Inboard Fuel Chamber

	Detail Steps/Work Items	Key Items/References
(1)	Defuel the wing that has the fuel tank sensor that you will remove.	Refer to Section 12-10.
(2)	Remove the wing that has the fuel tank probe that you will remove, and support the wing on trestles.	Refer to Section 57-10.
(3)	Remove the fuel tank assembly from the wing.	Refer to Section 28-10.
(4)	Remove the probe from the threaded mounting.	

B. Install the Fuel Tank Probe to the Inboard Fuel Chamber

	Detail Steps/Work Items	Key Items/References
(1)	Split inboard fuel chamber from outboard fuel chamber.	Refer to Section 28-10.
(2)	Install the probe into the inboard fuel chamber: – Apply sealant to the thread of the probe. – Install the Teflon sleeve to the probe. – Carefully move the probe into position in the inboard chamber. Engage the thread. – Turn the probe clockwise, by hand, until the probe is fully engaged in its mount. – Tighten the probe.	 Use 'seal-lube' or 'fuel-lube'. Ensure that the probe goes into the guide at the outboard end of the fuel chamber. Torque 26 Nm (19.2 lbf.ft.).
(3)	Re-connect inboard fuel chamber to outboard fuel chamber.	Refer to Section 28-10.
(4)	Install the fuel tank assembly into the wing.	Refer to Section 28-10.
(5)	Install the wing to the airplane.	Refer to Section 57-10.
(6)	Refuel the airplane.	Refer to Section 12-10.
(7)	Examine the fuel probe installation for fuel leaks.	
(8)	Install the access panel for the fuel tank.	Refer to Section 52-40.

C. Remove the Fuel Tank Probe from the Long Range Fuel Chamber

The long range fuel chamber is part of the long range tank (OÄM 40-071).

	Detail Steps/Work Items	Key Items/References
(1)	Defuel the wing that has the fuel tank probe that you will remove.	Refer to Section 12-10.
(2)	Remove the wing that has the fuel tank probe that you will remove, and support the wing on trestles.	Refer to Section 57-10.
(3)	Remove the fuel tank assembly.	Refer to Section 28-10.
(4)	Disassemble the fuel tank assembly.	Refer to Section 28-10.
(5)	Remove the long range fuel probe from the threaded mounting.	

D. Install the Fuel Tank Probe to the Long Range Fuel Chamber

The long range fuel chamber is part of the long range tank (OÄM 40-071).

	Detail Steps/Work Items	Key Items/References
(1)	Install the probe into the long range fuel chamber: – Apply sealant to the thread of the probe. – Install the Teflon sleeve to the fuel probe. – Carefully move the probe into position in the long range fuel chamber. Engage the thread. – Turn the probe clockwise, by hand, until the probe is fully engaged in its mount. – Tighten the probe.	Use 'seal-lube' or 'fuel-lube'. Ensure that the probe goes into the guide at the outboard end of the fuel chamber.
(2)	Assemble the fuel tank assembly.	Refer to Section 28-10.
(3)	Install the fuel tank assembly.	Refer to Section 28-10.
(4)	Install the wing to the airplane.	Refer to Section 57-10.
(5)	Refuel the airplane.	Refer to Section 12-10.
(6)	Examine the fuel probe installation for leaks.	
(7)	Install the access panel for the fuel tank.	Refer to Section 52-40.

Section 28-41
Fuel Quantity Indicating - TAE 125 Diesel Engine

1. General

This Section tells you about the fuel quantity indicating system of the DA 40 with the TAE 125 Diesel engine installed. Refer to Section 28-01 for the general data on the fuel system. Refer to Section 31-11 for data on replacing the fuel quantity indicator.

2. Description

Figure 1 shows the fuel quantity indication system main components. The fuel quantity indication system is part of the engine indicating system. The fuel tank in each wing has a fuel probe with a Teflon sleeve on the outboard end. The fuel quantity indicating system cannot be calibrated in service.

Electric cables connect the fuel probes to the engine indicating system. The system displays the fuel quantity on the Auxiliary Engine Display (AED) located in the right instrument panel.

Electric cables also connect the low fuel sensor in the left tank to a low fuel caution light in the annunciator panel. Refer to Section 31-51 for more data on the annunciator panel.

Long Range Tank

In the DA40 D long range tank the fuel quantity indication is the same as in the standard tank.

The fuel probe is installed in the inboard fuel tank chamber. This fuel probe measures a fuel quantity of maximum 15 US gal, which is the maximum quantity of indicated fuel.

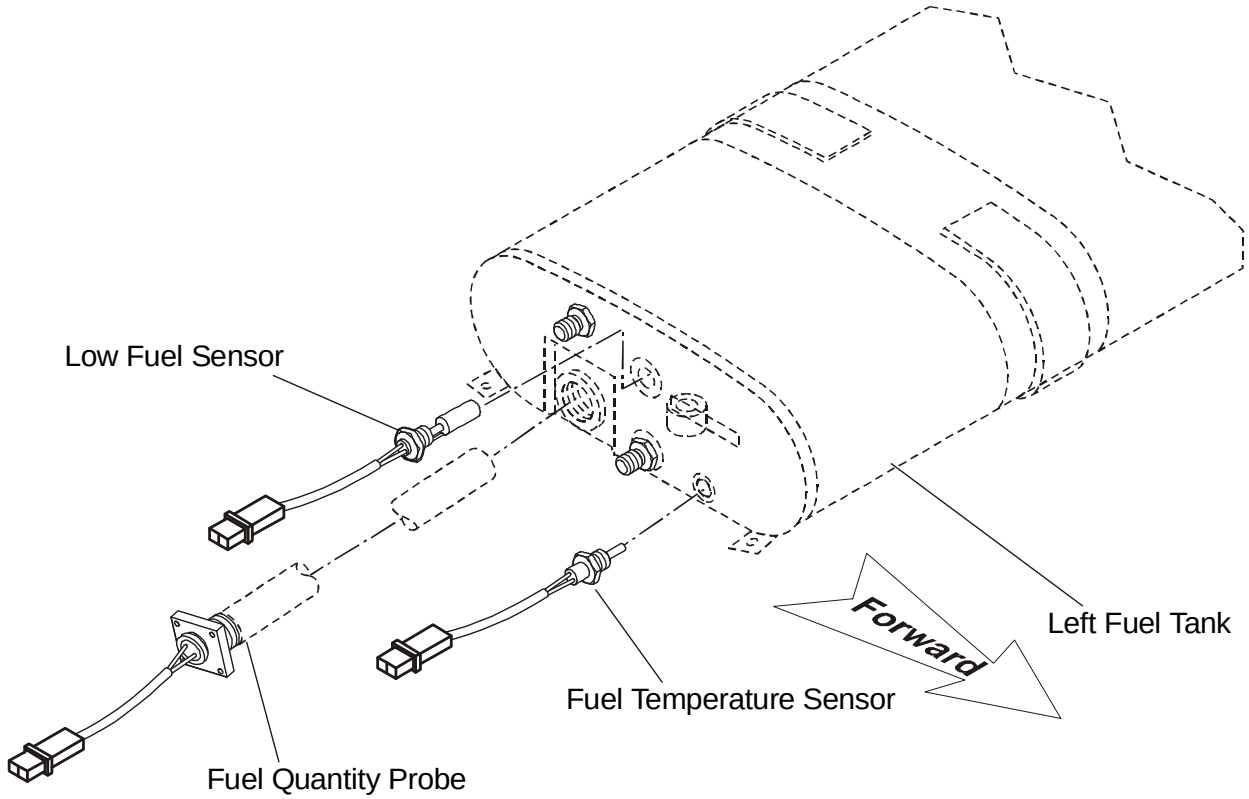
3. Operation

As the fuel level in the fuel tanks decreases, the area of the fuel probe which is “wetted” with fuel will also decrease. The amount of "wetted" area is converted into an electrical signal which sets the fuel quantity reading at the fuel quantity indicator. The fuel quantity indicator displays the quantity of fuel in the left fuel tank and the right fuel tank. The fuel quantity indicator shows the fuel quantity with a chain of LED's. The display shows the fuel quantity in US gallons. The maximum indicated fuel quantity is 14 US gal per tank.

The low fuel sensor in the left tank operates a caution light on the annunciator panel. When the fuel level in the left tank falls below 3 US gal (+2/-1 US gal) the caution light comes on. Refer to Section 31-51 for more data on the LOW FUEL caution light.

Long Range Tank

The total useable fuel quantity with the long range tank installed is 19.5 US gal per tank. The indicated fuel quantity is 15 US gal per tank so that a rest of 4.5 US gal per tank is not indicated by the AED.



VIEW ON INBOARD END OF LEFT FUEL TANK

Figure 1: Fuel Quantity Indication Components in the Left Fuel Tank

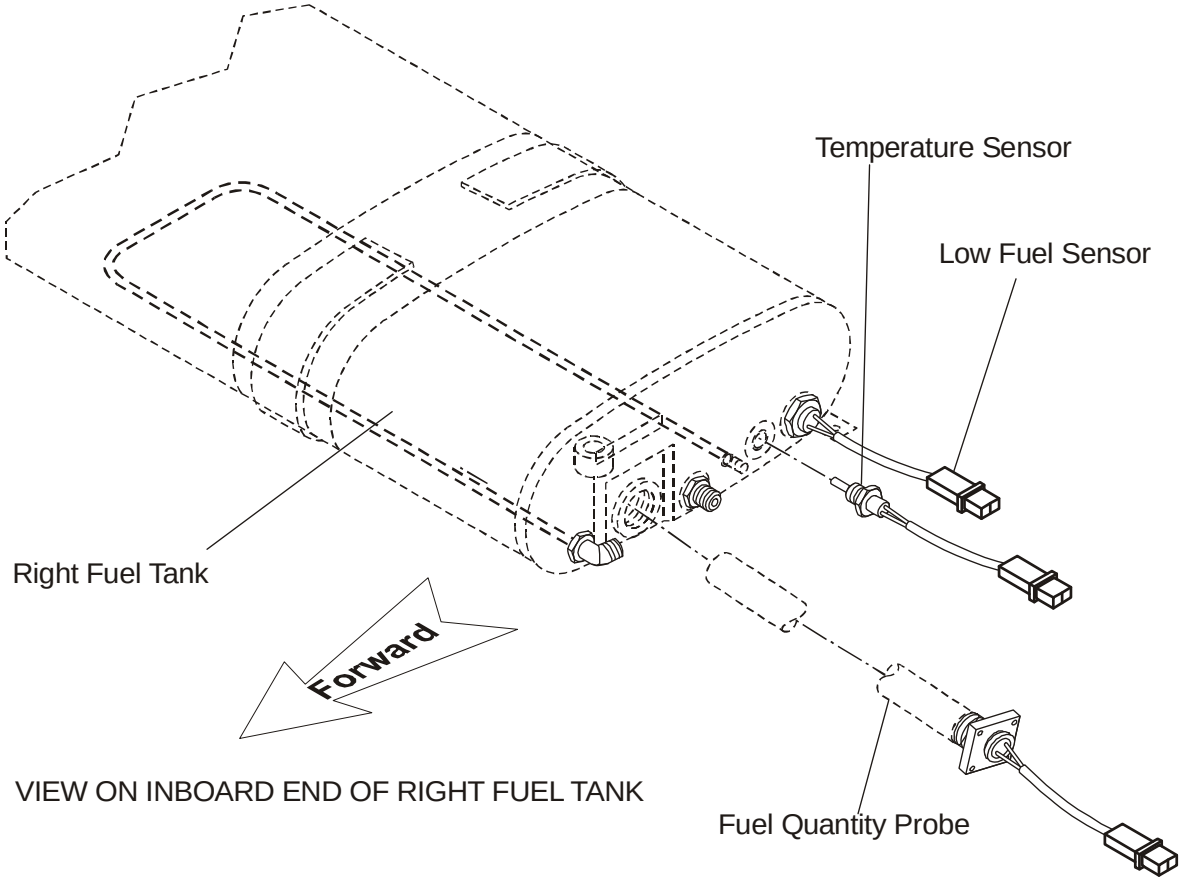


Figure 2: Fuel Quantity Indication Components in the Right Fuel Tank

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Trouble-Shooting

1. General

The table below lists the defects you could have with the fuel quantity indicating system. If you have the trouble detailed in the Trouble column read across to the Possible Cause column. Then do the repair given in the Repair column.

Trouble	Possible Cause	Repair
Fuel quantity indication for one tank incorrect, or first and last LED on fuel quantity indicator illuminated. Other tank reads correctly.	Fuel probe unit in fuel tank defective/contaminated.	Defuel/refuel the related tank to flush the fuel probe. If the indication is still incorrect then replace the fuel probe.
	Fuel quantity indication system wiring defective.	Do a test of the indication system wiring. Refer to Chapter 92-00 for the wiring diagrams.
Fuel quantity indication on both tanks incorrect/blank.	Fuel quantity indicator defective.	Replace the fuel quantity indicator.
	Fuel quantity indication system wiring defective.	Do a test of the indication system wiring. Refer to Chapter 92-00 for the wiring diagrams.
Fuel low level caution shows on the annunciator panel when the left tank has more than 5 US gal of fuel.	Fuel low level sensor defective.	Replace the fuel low level sensor.

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Maintenance Practices

1. General

The Maintenance Practices in this Section tell you how to replace a fuel tank probe and a fuel tank sensor.

Refer to Section 31-11 for data on removing/installing a fuel quantity indicator.

Obey the safety precautions for fuel at all times.

WARNING: DO NOT GET FUEL ON YOU. FUEL CAN CAUSE SKIN DISEASE.

WARNING: DO NOT ALLOW FIRE NEAR FUEL. FUEL BURNS AND CAN CAUSE INJURY TO PERSONS AND DAMAGE TO EQUIPMENT.

WARNING: DO NOT BREATH FUEL VAPOR. FUEL VAPOR CAN MAKE YOU ILL.

2. Remove/Install a 'Low Fuel' Sensor

Each tank has a low fuel sensor.

Obey the safety precautions for fuel at all times.

A. Remove a 'Low Fuel' Sensor

	Detail Steps/Work Items	Key Items/References
(1)	Remove the wing that has the low fuel sensor that you will remove.	Refer to Section 57-10.
(2)	Remove the access panel from the root rib of the wing: – Remove the 11 nuts and washers from the studs. – Pull the access panel off the studs and clear of the airplane.	
(3)	Disconnect the electrical cables for the low fuel sensor.	At the in-line connector.
(4)	Remove the low fuel sensor from the tank.	

B. Install a 'Low Fuel' Sensor

	Detail Steps/Work Items	Key Items/References
(1)	Install the low fuel sensor in the fuel tank: – Apply sealant to the thread of the low fuel sensor. – Move the low fuel sensor into position in the fuel tank mount. – Screw the low fuel sensor fully home into the mount. – Tighten the low fuel sensor.	 Use Loctite 243 or 'seal-lube' or 'fuel-lube'. The arrow must point down.
(2)	Connect the electrical cables to the low fuel switch.	At the in-line connector.
(3)	Install the access panel at the wing root rib: – Put the access panel into position on the studs. – Install the 11 washers and nuts. – Tighten the nuts.	
(4)	Install the wing, but do not refuel the airplane.	Refer to Section 57-10.
(5)	Do a test for the correct operation of the low fuel sensor.	Right tank: Make sure that it switches off the fuel transfer pump when the fuel level is low. Left tank: Make sure that it switches on the LOW FUEL caution light when the fuel level is at 3 US gal (+2/-1 US gal).
(6)	Refuel the airplane.	Refer to Section 12-10.
(7)	Do a check for leaks.	

3. Remove/Install the 'High Fuel' Sensor

Only the left tank has a high fuel sensor.

Obey the safety precautions for fuel at all times.

A. Remove the 'High Fuel' Sensor

	Detail Steps/Work Items	Key Items/References
(1)	Remove the left wing.	Refer to Section 57-10.
(2)	Remove the left fuel tank assembly.	Refer to Section 28-11.
(3)	Disconnect the electrical cables for the high fuel sensor.	At the in-line connector near the high fuel sensor.
(4)	Remove the high fuel sensor from the tank.	

B. Install the 'High Fuel' Sensor

	Detail Steps/Work Items	Key Items/References
(1)	Install the high fuel sensor in the fuel tank: – Apply sealant to the thread of the high fuel sensor. – Move the high fuel sensor into position in the fuel tank mount. – Screw the high fuel sensor fully home into the mount. – Tighten the high fuel sensor.	 Use 'seal-lube' or 'fuel-lube'. The arrow must point up.
(2)	Connect the electrical cables to the high fuel sensor.	At the in-line connector.
(3)	Install the left fuel tank assembly.	Refer to Section 28-11.
(4)	Install the left wing, but do not refuel the airplane.	Refer to Section 57-10.
(5)	Do a test for the correct operation of the high fuel sensor.	Make sure that it switches off the fuel transfer pump when the fuel level in the left tank is high.
(6)	Refuel the airplane.	Refer to Section 12-10.
(7)	Do a check for leaks.	

4. Remove/Install a Fuel Quantity Probe

Obey the safety precautions for fuel at all times.

A. Remove a Fuel Quantity Probe

	Detail Steps/Work Items	Key Items/References
(1)	Remove the wing that has the fuel quantity probe that you will remove, and support the wing on trestles.	Refer to Section 57-10.
(2)	Remove fuel tank assembly from the wing.	Refer to Section 28-11.
(3)	Remove the fuel quantity probe from the threaded mounting.	

B. Install a Fuel Quantity Probe

	Detail Steps/Work Items	Key Items/References
(1)	Separate the fuel filler assembly from the fuel tank.	Refer to Section 28-11. To gain access to the guide at the outboard end of the fuel tank.
(2)	Install the fuel quantity probe into the fuel tank: – Apply sealant to the thread of the fuel quantity probe. – Install a new O-ring seal. – Install the Teflon sleeve to the fuel probe. – Carefully move the fuel quantity probe into position in the inboard tank. Engage the thread. – Turn the probe clockwise, by hand, until the fuel quantity probe is fully engaged in its mount. – Tighten the fuel quantity probe until the O-ring seals.	Use 'seal-lube' or 'fuel-lube'. Make sure that the fuel quantity probe goes into the guide at the outboard end of the fuel tank.
(3)	Re-connect the fuel filler assembly to the fuel tank.	Refer to Section 28-11.
(4)	Install fuel tank assembly into wing.	Refer to Section 28-11.
(5)	Install the wing to the airplane.	Refer to Section 57-10.
(6)	Examine the fuel quantity probe installation for fuel leaks.	
(7)	Install the access panel for the fuel tank.	Refer to Section 52-40.

CHAPTER 31

INDICATING SYSTEMS

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CHAPTER 31
INDICATING SYSTEMS

1. General

This Chapter tells you about the indicating systems installed in the airplane. Refer to these Sections for the related data:

– Section 31-10. The instrument and control panels for the DA 40 with the Lycoming engine installed.

– Section 31-11. The instrument and control panels for the DA 40 with the TAE 125 Diesel engine and standard equipment installed.

– Section 31-12. The instrument and control panels for the DA 40 D with the TAE 125 Diesel engine and the Garmin G1000 system installed.

– Section 31-20. Independent instrument s for all DA 40 variants.

– Section 31-42. The central computers for the DA 40 D with the Garmin G1000 system installed.

– Section 31-50. The central warning system for the DA 40 with the Lycoming engine installed.

– Section 31-51. The central warning system for the DA 40 with the TAE 125 Diesel engine and standard equipment installed.

The DA 40 has these indicating systems:

– An instrument panel. The instrument panel is made in one piece with a shelf. The shelf goes between the panel and the firewall.

– A control panel in the center console. This panel has the engine controls, fuel controls, cabin heat control levers, parking brake and trim. It has a forward part and an aft part.

– Independent instruments. The airplane has an integrated electronic indicating system which covers the engine instruments and fuel quantities. The airplane also has a digital chronometer (optional), an optional engine operated hours meter and an outside air temperature (OAT) indicator. If the Garmin G1000 system is installed, most indications are shown on the G1000.

– Warning lights (red), caution lights (amber), and status lights (white).

This Section does not tell you about the indicators that belong to systems. See the related system for data. For example, see Section 27-31 for data about the trim indicator.

Note: Equipment which is certified for installation in the DA 40 is listed in Section 6.5 of the Airplane Flight Manual. Such equipment may be installed in accordance with the Airplane Maintenance Manual.

Any equipment which is not listed in Section 6.5 of the Airplane Flight Manual is called "Additional Equipment". The installation of Additional Equipment is a modification which must be handled in accordance with national regulations or a Service Bulletin.

Section 31-10
Instrument and Control Panels - Lycoming Engine

1. General

The DA 40 with the Lycoming engine installed has these instrument and control panels:

– An instrument panel. The instrument panel is made in one piece with a shelf. The shelf goes between the panel and the firewall.

– A control panel in the center console. This panel has a forward cover and an aft cover. The forward cover has the cabin heat control levers and parking brake lever. The aft cover has the engine controls and fuel shut-off valve.

See the related Chapter or Section for data about the controls. For example, see Section 76-00 for data on the engine controls.

The instrument and avionic equipment installed in the airplane can be chosen by the customer. The following Figures show three examples of instrument panel assemblies:

– DA4-3110-00-00 (Basic certification, VFR, Figure 1).

– DA4-3135-00-00 (OÄM 40-121, IFR, Figure 2).

– D4F-3142-00-00 (VÄM 40-002, DA 40 F variant, Figure 3).

Note: The instruments and avionic equipment cannot be installed in any arbitrary combination. The airplane manufacturer must be contacted before removing or installing equipment, with the exception of replacing a unit by an identical unit.

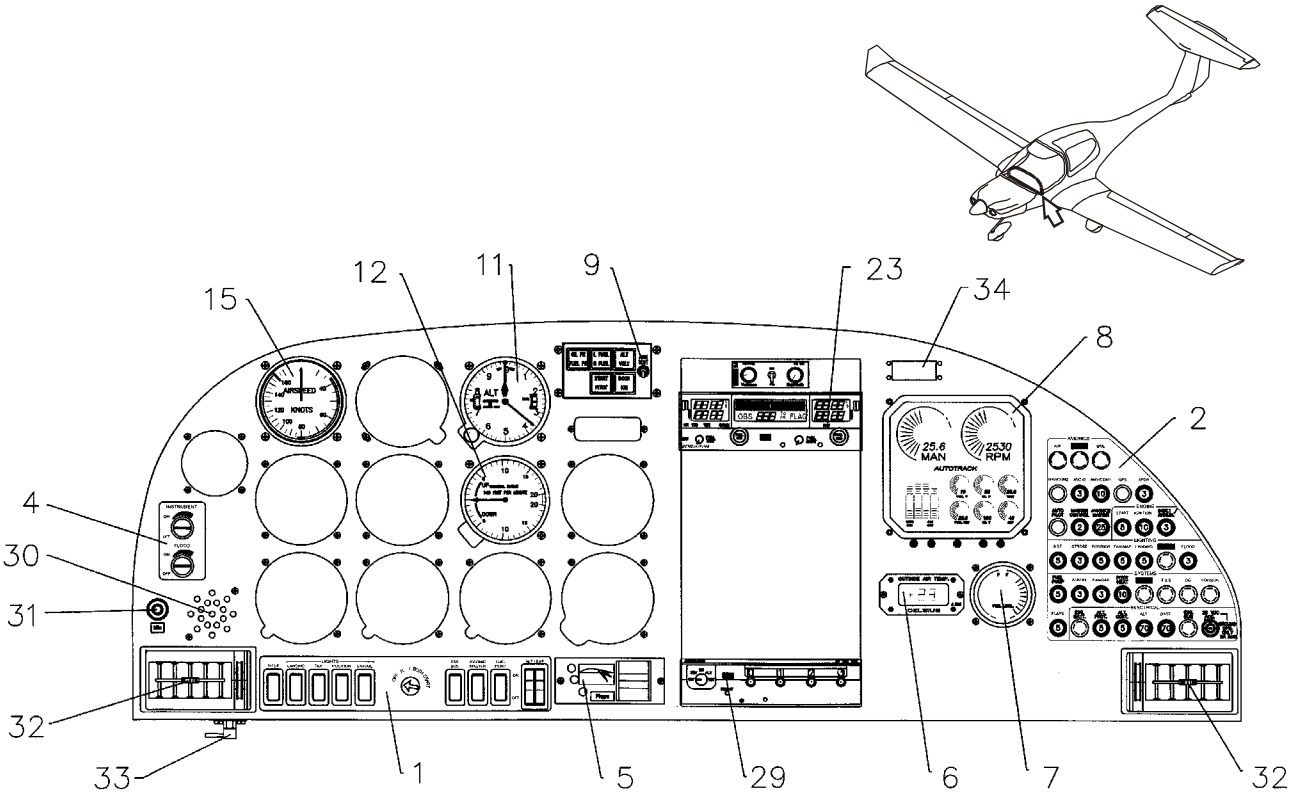


Figure 1: DA4-3110-00-00

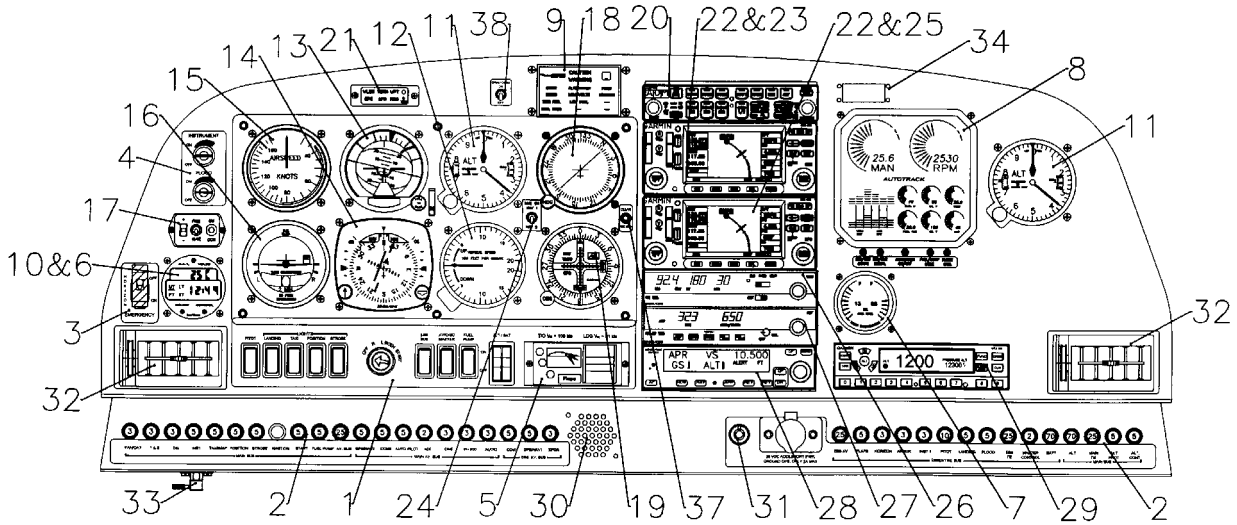


Figure 2: DA4-3135-00-00

LEGEND		
1 Electrical switches, ignition switch	16 Turn & bank indicator	31 Microphone socket
2 Circuit-breakers	17 Slaving meter	32 Ventilation nozzles
3 Emergency switch	18 ADF indicator	33 Alternate static valve
4 Instrument lighting and flood light rotary buttons	19 Course deviation indicator (CDI)	34 ELT operating unit (RCPI)
5 Flap selector switch	20 Audio amplifier / intercom / marker beacon receiver	35 Directional Gyro
6 OAT indicator	21 GPS annunciation control unit	36 Strike finder display
7 Fuel quantity indicator	22 GPS	37 Clear WX 500 button
8 Engine instruments	23 Radio / VOR, No. 1	38 Ground COM 2 switch
9 Lights (Annunciator Panel)	24 Remote DME switch	39 AUX FUEL QTY switch
10 Chronometer	25 Radio / VOR, No. 2	
11 Altimeter	26 DME	
12 Vertical speed indicator	27 ADF receiver	
13 Attitude gyro (horizon)	28 Autopilot control unit	
14 Horizontal situation indicator (HSI)	29 Transponder	
15 Airspeed indicator	30 Stall warning horn	

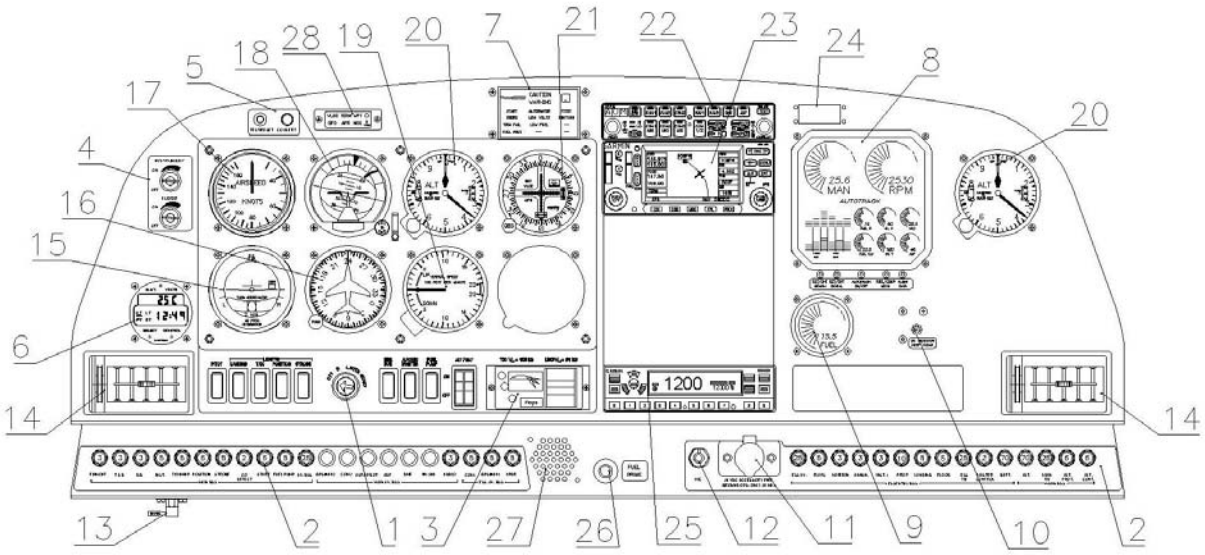


Figure 3: D4F-3142-00-00

LEGEND	
1 Electrical switches, ignition switch	15 Turn & bank indicator
2 Circuit-breakers*	16 Directional gyro
3 Flap selector switch	17 Airspeed indicator (ASI)
4 Rotary buttons for instrument lighting and flood light	18 Attitude gyro (artificial horizon)
5 Test button for CO-detector	19 Vertical speed indicator (VSI)
6 Chronometer with OAT indicator	20 Altimeter
7 Annunciator panel	21 Course deviation indicator (CDI)
8 Engine instruments	22 Intercom
9 Fuel quantity indicator	23 COM / NAV / GPS
10 Carbon-Monoxide detector	24 ELT control unit
11 Accessory power socket	25 Transponder
12 Microphone socket	26 Fuel prime button
13 Alternate static valve	27 Stall warning horn
14 Ventilation nozzles	28 GPS Annunciation Unit

2. Description

A. Instrument Panel

The Figures in Paragraph 1 show the instrument panels which are available for the DA 40 with the Lycoming engine installed. The airplane has an aluminum alloy instrument panel. The panel has cut-outs for instruments and switches. A large cut-out in the middle of the panel has the avionic equipment. Brackets between the shelf and the avionic equipment rack make the installation rigid.

The bottom of the panel bends up at 87º to make a shelf. The shelf has mountings for electrical equipment such as relays and multi-pin connectors. Each side of the shelf has a row of ground terminals. Large cut-out areas in the shelf allow cooling air to move past the instruments and out through holes in the instrument panel cover.

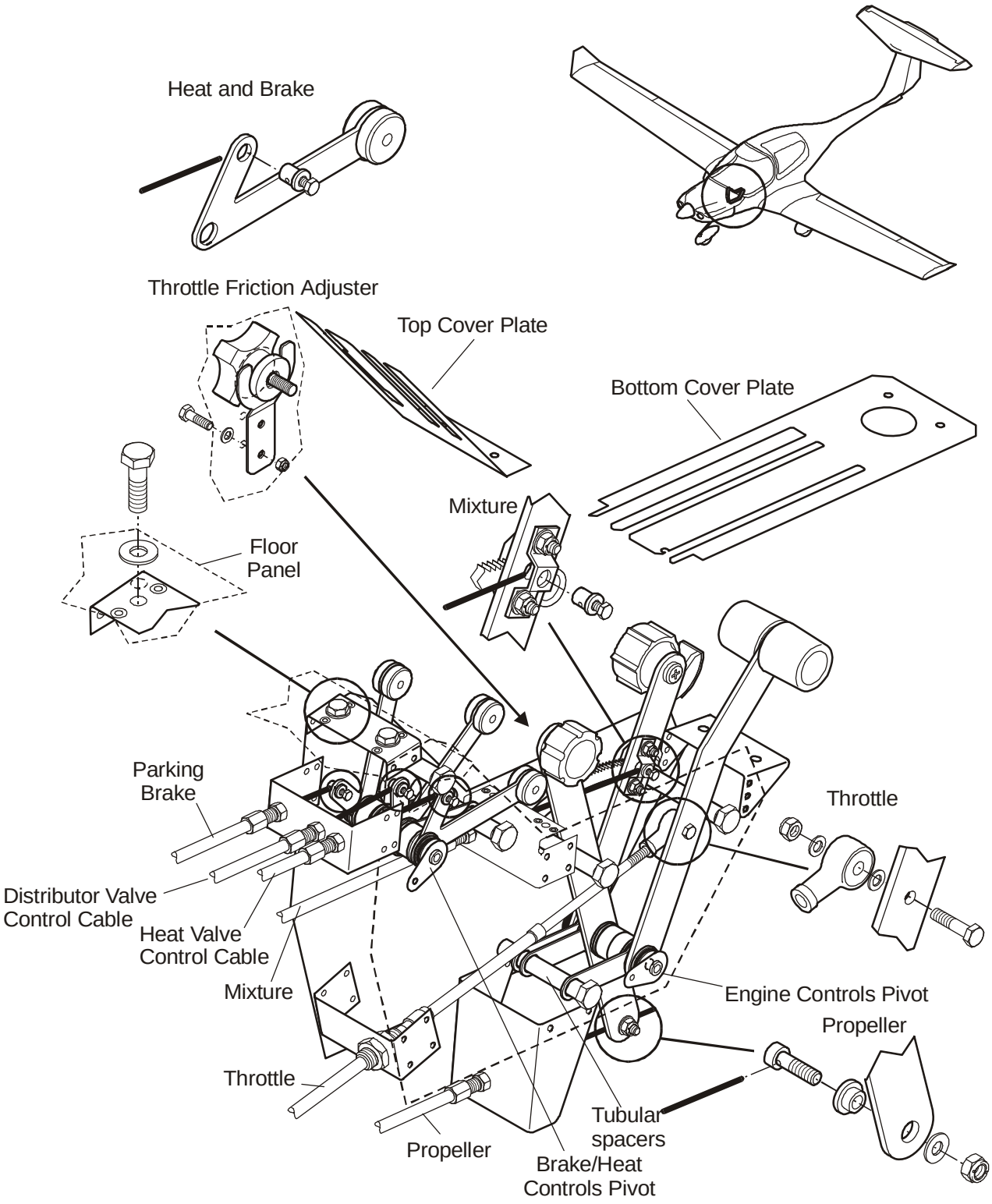


Figure 4: Engine Control Assembly in the Center Console

B. Engine Control Assembly

The engine control assembly in the center console has these controls:

– Throttle.

– Propeller (not for the DA 40 F variant).

– Carburetor heat (DA 40 F variant only).

– Mixture.

– Parking brake.

– Cabin heat control lever.

– Distribution control lever for cabin air.

The three engine control levers are on one pivot shaft at the rear of the assembly. A knob on the right side of the assembly adjusts throttle (mixture and propeller) friction. The parking brake and cabin heat control levers are also on one shaft at the top front of the assembly. Friction discs, stators and spring washers hold both groups of levers in position on the shafts.

The assembly has two aluminum-alloy side-plates. Four sheet-metal brackets hold the outer sheaths of the control cables. A metal bracket at the front top attaches to the bottom of the instrument panel. A metal bracket at the back attaches to the elevator trim mounting. Rivets attach all of the metal brackets to the side plates.

Bolts hold five tubular spacers between the side plates. The spacers make fixed stops for the control levers. Two of the spacers also hold one end of the friction stators for each group of levers.

Two bolts attach the engine control assembly to the bottom of the instrument panel. Bolts attach the assembly to the side walls of the floor panel.

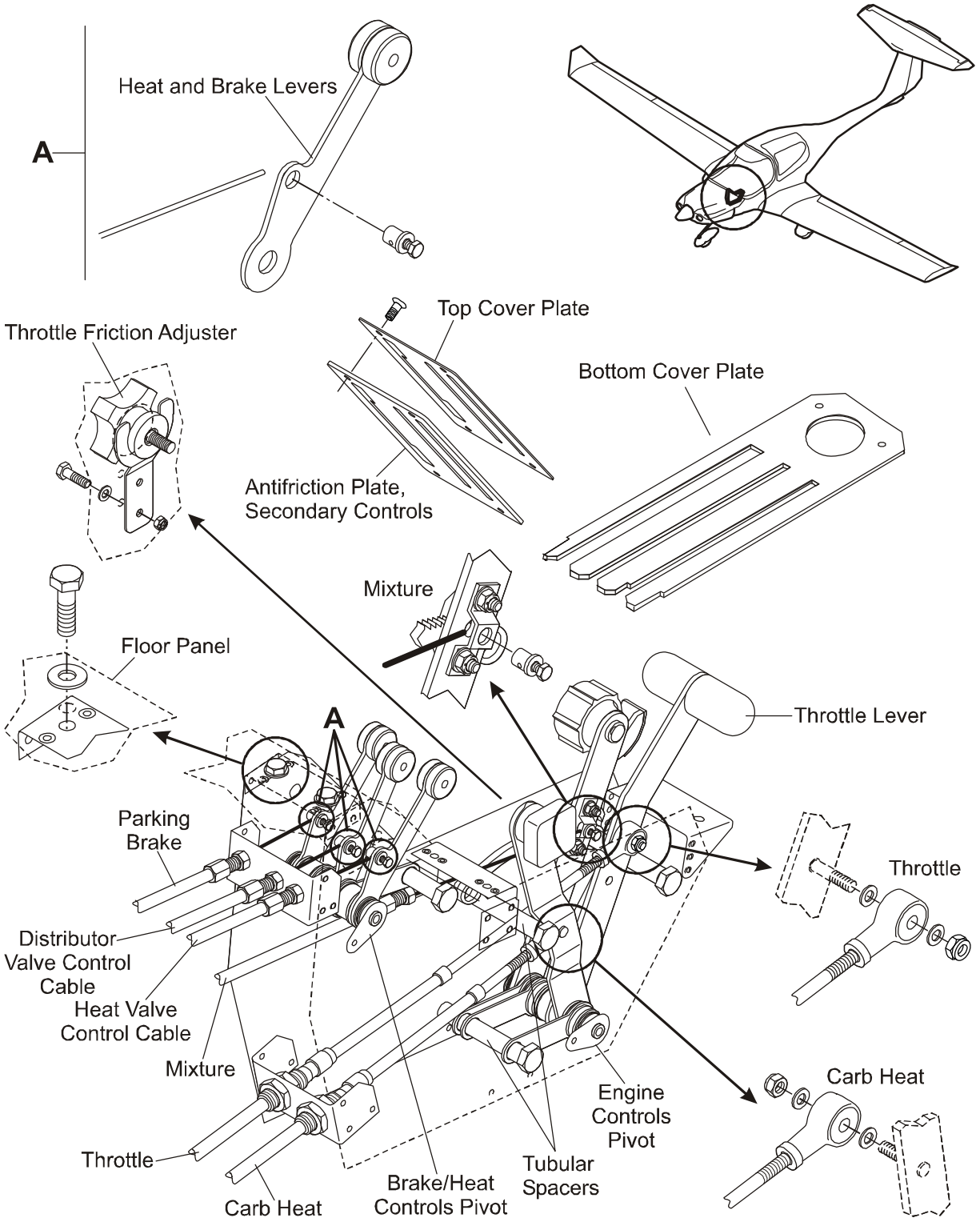


Figure 5: Engine Control Assembly in the Center Console for the DA 40 F Variant

Trouble-Shooting

1. General

Trouble	Possible Cause	Repair
Engine control levers do not stay in the set position.	Too much wear in the friction washers. Friction tension too low.	Replace the friction washers. Adjust the friction.
Parking brake or cabin heat control levers do not stay in the set position.	Friction tension too low. Too much wear in the friction washers.	Adjust the friction. Replace the friction washers.

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Maintenance Practices

1. General

These Maintenance Practices tell you how to remove/install the engine control assembly. See the related Chapter for data about indicators in other systems.

2. Remove/Install the Central Control Panels

A. Remove the Engine Control Assembly

	Detail Steps/Work Items	Key Items/References
(1)	Remove the knob from the fuel selector valve: – Remove the cross-head screw from the center of the control-knob and pull the knob up and off the fuel selector valve. – Remove the mounting plate.	
(2)	Remove the engine control assembly rear cover plate: – Remove the 4 cross-head screws which attach the cover plate. – Lift the rear of the cover plate a small amount and pull the cover plate backwards and clear of the control assembly.	
(3)	Remove the front cover plate: – Remove the 2 hex-headed bolts which attach the cover plate to the control assembly. – Move the cover plate down and clear of the control assembly.	
(4)	Loosen the throttle friction adjuster until the knob releases from the threaded shaft.	
(5)	Lift the engine control assembly clear of the center console and support it.	Hold the friction adjuster knob clear. Make sure that you do not pull on the control cables.

	Detail Steps/Work Items	Key Items/References
(6)	Disconnect the following control cables from the engine control assembly:	
	– Throttle control cable.	Refer to Section 76-00.
	– Propeller control cable.	Refer to Section 61-20.
	– Mixture control cable.	Refer to Section 76-00.
	– Cabin heat control cable.	Refer to Section 21-00.
	– Cabin heat distribution control cable.	Refer to Section 21-00.
	– Parking brake control cable.	Refer to Section 32-40.
(7)	Move the engine control assembly clear of the airplane.	

B. Install the Engine Control Assembly

	Detail Steps/Work Items	Key Items/References
(1)	Make sure that there are no loose items, specially in the center console.	
(2)	Move the engine control assembly onto the center console and support it in a position where you can install the control cables.	
(3)	Connect these control cables to the engine control assembly: – Propeller control cable. – Throttle control cable. – Mixture control cable. – Parking brake control cable. – Cabin heat distribution control cable. – Cabin heat control cable.	 Refer to Section 61-20. Refer to Section 76-00. Refer to Section 76-00. Refer to Section 32-40. Refer to Section 21-00. Refer to Section 21-00.
(4)	Pull the throttle friction control knob clear and lower the engine control assembly into the center console.	
(5)	Align the throttle friction control knob to screw onto the friction shaft in the engine control assembly.	Do not tighten.
(6)	Install the engine control assembly front cover plate: – Move the cover plate into position on the engine control assembly. – Install the 2 hex-headed bolts which attach the cover plate and engine control assembly.	 Do not tighten.

	Detail Steps/Work Items	Key Items/References
(7)	Install the engine control assembly rear cover plate: – Move the cover plate into position on the engine control assembly. – Install the 4 cross-head screws which attach the rear cover plate to the control assembly. – Tighten the screws.	
(8)	Tighten the 2 hex-headed bolts in the front cover plate.	
(9)	Adjust the throttle friction adjuster to the required friction.	
(10)	Do a test for correct range, full and free movement of the throttle control system.	Refer to the Throttle Control Range of Movement Test in Section 76-00.
(11)	Do a test for correct range, full and free movement of the mixture control system.	Refer to the Throttle Control Range of Movement Test in Section 76-00.
(12)	Do a test for correct range, full and free movement of the propeller control system.	Refer to the Throttle Control Range of Movement Test in Section 61-00.
(13)	Do an inspection of the control connections which you disconnected. If necessary, for your Airworthiness Authority, do a second inspection of the controls.	
(14)	Do a test for correct range, full and free movement of the cabin heat control system.	Refer to Section 21-00.
(15)	Do a test for correct range, full and free movement of the cabin heat distribution system.	Refer to Section 21-00.
(16)	Install the knob on the fuel selector valve: – Install the mounting plate. – Push the knob onto the fuel valve selector shaft. – Install the cross-head screw which attaches the knob to the shaft.	

Section 31-11
Instrument and Control Panels - TAE 125 Diesel Engine with Standard Equipment Installed

1. General

The DA 40 with the TAE 125 Diesel engine installed has these instrument and control panels:

– An instrument panel. The instrument panel is made in one piece with a shelf. The shelf goes between the panel and the firewall.

– A control panel in the center console. This panel has a forward cover and an aft cover. The forward cover has the cabin heat control levers and parking brake lever. The aft cover has the engine control and emergency fuel valve.

See the related Chapter or Section for data about the controls. For example, see Section 76-01 for data on the engine controls.

The instrument and avionic equipment installed in the airplane can be chosen by the customer. The following Figures show two examples of instrument panel assemblies:

– D4D-3110-00-00 (Basic certification, VFR, Figure 1)

– D4D-3112-00-00 (OÄM 40-136, IFR, Figure 2)

Note: The instruments and avionic equipment cannot be installed in any arbitrary combination. The airplane manufacturer must be contacted before removing or installing equipment, with the exception of replacing a unit by an identical unit.

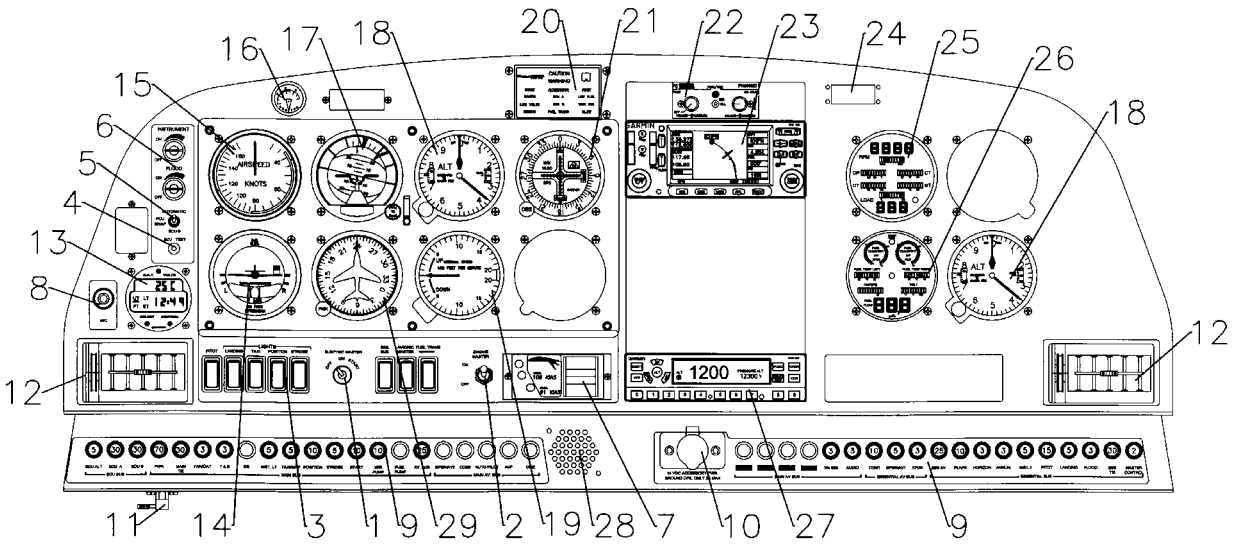


Figure 1: D4D-3110-00-00

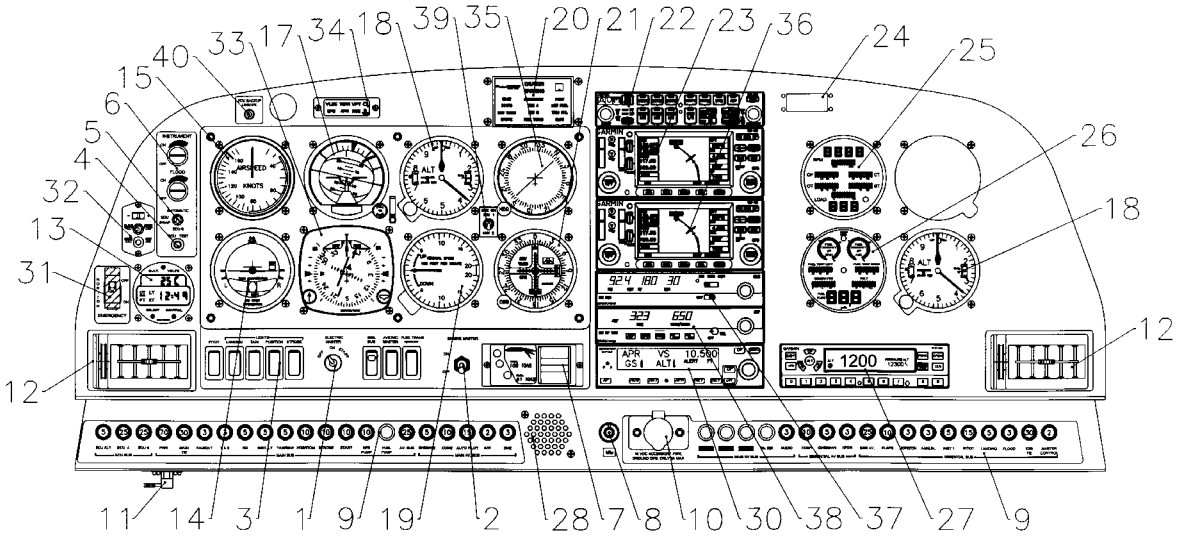


Figure 2: D4D-3112-00-00

LEGEND	
1 Electric Master key switch	22 Intercom
2 Engine Master switch	23 COM / NAV / GPS
3 Electrical switches	24 ELT control unit
4 ECU Test button	25 Compact Engine Display (CED)
5 ECU Swap switch	26 Auxiliary Engine Display (AED)
6 Rotary buttons for instrument lighting and flood light	27 Transponder
7 Flap selector switch	28 Stall warning horn
8 Microphone socket	29 not used
9 Circuit-breakers	30 Autopilot control unit
10 Accessory power socket	31 Emergency switch
11 Alternate static valve	32 Slaving meter
12 Ventilation nozzles	33 Horizontal situation indicator (HSI)
13 Chronometer with OAT indicator	34 GPS Annunciation Unit
14 Turn & bank indicator	35 ADF indicator
15 Airspeed indicator	36 COM / NAV / GPS No. 2
16 not used	37 DME
17 Attitude gyro (artificial horizon)	38 ADF receiver
18 Altimeter	39 Remote DME switch
19 Vertical speed indicator (VSI)	40 'ECU Backup Unsafe'-light
20 Annunciator panel	41 'Clear WX 500'-button
21 Course deviation indicator (CDI)	

2. Instrument Panel Description

A single piece of aluminum alloy makes the instrument panel. The panel has a vertical face with instruments and a horizontal 'shelf' with electrical components. The shelf goes between the firewall and the vertical face of the panel.

The left side of the panel has the usual flight instruments and some navigation indicators. This part can be removed separately. The actual instruments installed depends on customer options. Refer to Chapter 34 for data on these instruments.

The center part of the panel has the standard-size avionic equipment. It holds the trays for the GPS, transponder, radios and other optional navigation avionics. Refer to Chapters 23 and 34 for data on this equipment.

The right side of the panel contains the engine instruments. The engine data shows on two digital instruments. Refer to Chapter 77 for data on these instruments.

The bottom left of the panel has the switch panel. The ELECTRIC MASTER key switch is a master switch and starter switch (as in motor vehicles). Setting it to the ON position applies power to the bus system. Refer to Chapter 24-01 for data on the electrical system.

The far left of the panel has the rheostat switches for lighting control. There is also a digital OAT indicator and clock that can also show voltage.

The bottom part of the panel has the circuit-breakers. The circuit-breakers are grouped in bus order. Refer to Section 24-61 for more data about the circuit-breakers and bus system.

The shelf part of the instrument panel holds relays, junction blocks, connectors and ground studs.

The instrument panel has a cover attached by screws.

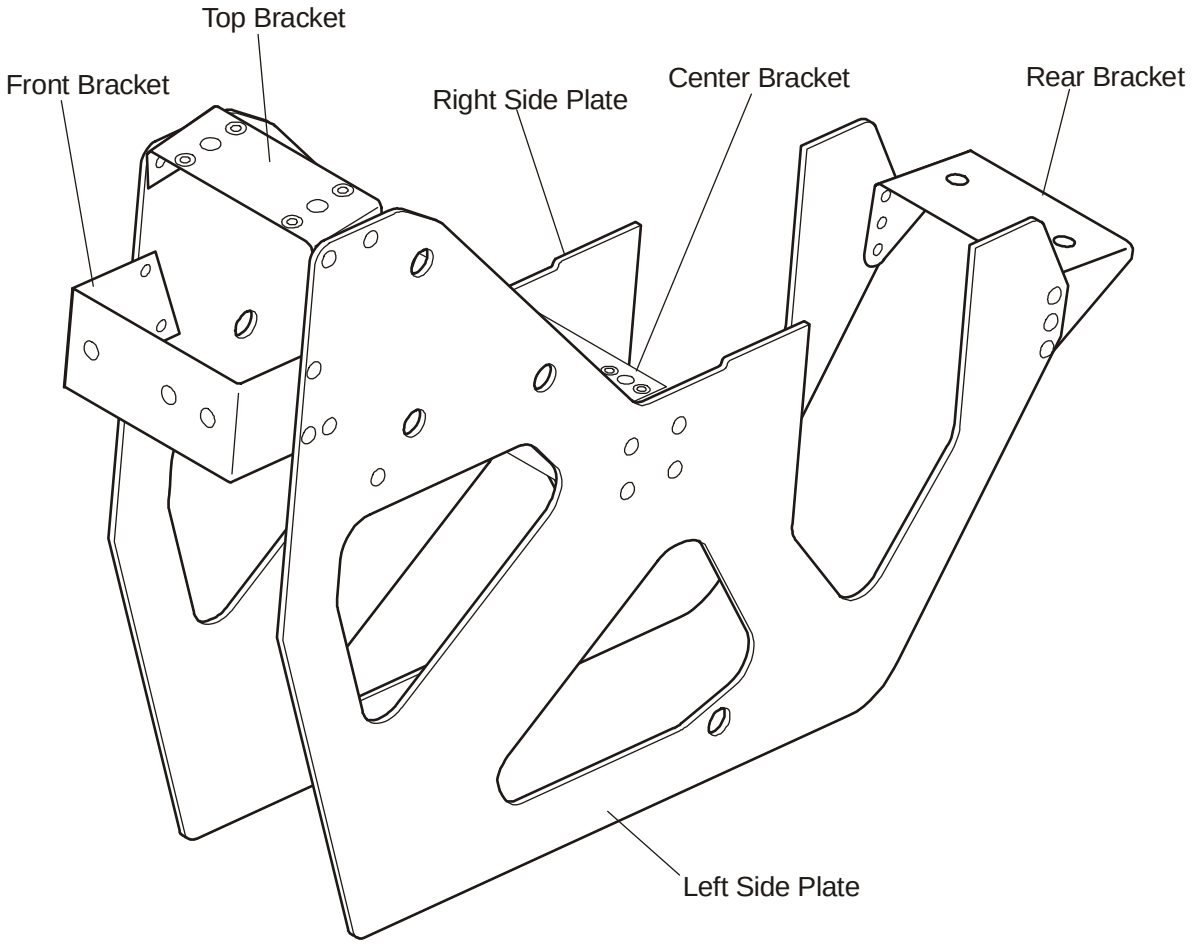


Figure 2: Engine Control Assembly Structure

3. Center Console Description

The engine control assembly holds the parking brake and heating controls. It also holds the engine power lever.

Figure 2 shows the center console structure. Refer to the related Chapters for the data on the controls.

The engine control assembly has two aluminum alloy side plates. Four brackets attach to the side plates with rivets. The front bracket has holes to anchor the outer sheaths of the brake and heat control cables. The top bracket has two anchor-nuts. Bolts engage the anchor nuts to attach the engine control assembly to the top of the floor panel.

The center bracket has two anchor nuts for the control cover plates. The rear bracket attaches to the elevator trim control assembly.

There are no user-maintainable parts in the engine control assembly structure.

Trouble-Shooting

1. General

The table below lists the defects you could have with the control panel in the center console. If you have the trouble detailed in the Trouble column read across to the Possible Cause column. Then do the repair given in the Repair column.

Trouble	Possible Cause	Repair
Parking brake or cabin heat control levers do not stay in the set position.	Friction tension too low. Too much wear in the friction washers.	Adjust the friction. Replace the friction washers.

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Maintenance Practices

1. General

These Maintenance Practices tell you how to remove/install the engine control assembly. See the related Chapter for data about indicators in other systems.

2. Remove/Install the Engine Control Assembly

A. Remove the Engine Control Assembly

	Detail Steps/Work Items	Key Items/References
(1)	Remove the knob from the emergency fuel valve: – Remove the cross-head screw from the center of the control-knob and pull the knob up and off the fuel selector valve. – Remove the mounting plate.	
(2)	Remove the engine power control lever assembly.	Refer to Section 76-11.
(3)	Remove the bolts that attach the engine control assembly to the floor panel at the front and at the rear.	
(4)	Remove the front cover plate.	
(5)	Move the engine control assembly to a position where you can reach the control cables.	
(6)	Disconnect the following control cables from the center console: – Cabin heat control cable. – Cabin heat distribution control cable. – Parking brake control cable.	 Refer to Section 21-01. Refer to Section 21-01. Refer to Section 32-40.
(7)	Move the engine control assembly clear of the airplane.	

B. Install the Engine Control Assembly

	Detail Steps/Work Items	Key Items/References
(1)	Make sure that there are no loose items, specially in the center console.	
(2)	Move the engine control assembly onto the center console and support it in a position where you can install the control cables.	
(3)	Connect these control cables to the engine control assembly: – Parking brake control cable. – Cabin heat distribution control cable. – Cabin heat control cable.	 Refer to Section 32-40. Refer to Section 21-01. Refer to Section 21-01.
(4)	Move the engine control assembly fully into position in the floor panel.	
(5)	Install the engine control assembly front cover plate: – Move the cover plate into position on the engine control assembly. – Install the 2 hex-headed bolts which attach the cover plate and engine control assembly to the floor panel.	 Do not tighten.
(6)	Install the engine power control lever.	Refer to Section 76-11.
(7)	Tighten the 2 hex-headed bolts in the front cover plate.	
(8)	Do a test for correct range, full and free movement of the cabin heat control system.	Refer to Section 21-01.
(9)	Do a test for correct range, full and free movement of the cabin heat distribution system.	Refer to Section 21-01.

	Detail Steps/Work Items	Key Items/References
(10)	Install the knob on the emergency fuel valve: – Install the mounting plate. – Push the knob onto the fuel valve selector shaft. – Install the cross-head screw which attaches the knob to the shaft.	

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Section 31-12
Instrument and Control Panels - TAE 125 Diesel Engine with the Garmin G1000 System Installed

1. General

The DA 40 D with Garmin G1000 installed has these instrument and control panels:

– An instrument panel with a shelf. The shelf goes between the panel and the instrument panel frame.

– A control panel in the center console. This panel has a forward cover and an aft cover. The forward cover has the cabin heat control levers, parking brake lever and rudder trim control. The aft cover has the engine controls and fuel transfer/shut-off valve.

See the related Chapter or Section for data about the controls. For example, see Section 76-00 for data on the engine controls.

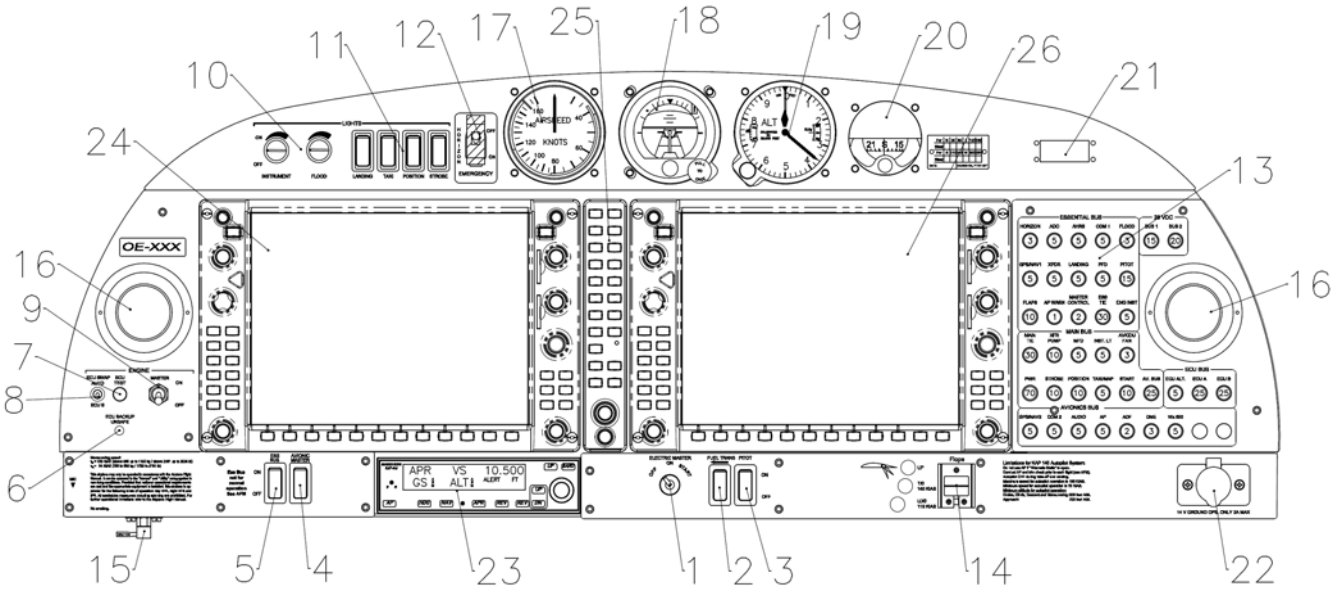


Figure 1: Instrument Panel, DA 40 D with Garmin G1000

Major Instruments and Controls	
1 Electric Master key switch	14 Flap selector switch
2 Fuel Transfer switch	15 Alternate static valve
3 Pitot Heat switch	16 Ventilation nozzles
4 Avionic Master switch	17 Backup airspeed indicator
5 Essential Bus switch	18 Backup artificial horizon
6 ECU Backup Unsafe light	19 Backup altimeter
7 ECU Test button	20 Emergency compass
8 ECU Swap switch	21 ELT control unit
9 Engine Master switch	22 Accessory power socket
10 Rotary buttons for instrument lighting and flood light	23 Autopilot control unit (if installed)
11 Light switches	24 Primary Flight Display (PFD)
12 Emergency switch	25 Audio amplifier / Intercom / Marker beacon receiver
13 Circuit-breakers	26 Multi Function Display (MFD)

2. Instrument Panel Description

Several pieces of aluminum alloy makes the instrument panel. The panel has a vertical face with instruments and a horizontal 'shelf' with electrical components. The shelf goes between the forward bulkhead of the cockpit and the vertical face of the panel.

The DA 40 D with the Garmin G 1000 system installed has an integrated cockpit system (ICS). The ICS has two large LCD display screens which are located in the instrument panel. These two display screens can digitally display all of the flight, navigation and airplane system data. An audio control panel is located between the display screens. The audio control panel integrates with the ICS and is used to control all of the airplane radio and navigation audio systems. Refer to section 31-42 for more data about the ICS.

An airspeed indicator, artificial horizon, altimeter and magnetic compass are located along the top of the instrument panel. These instrument provide the basic data required to fly the airplane in the event of a power failure and the loss of the ICS. The artificial horizon is a gyroscopic instrument that can be powered from an emergency power pack. An emergency switch is located near the artificial horizon and has a guard installed to prevent accidental selection.

The circuit-breakers for the electrical systems are all located on the right side of the instrument panel. The electrical system bus-bars are directly connected to the rear of the circuit-breakers.

The shelf part of the instrument panel holds relays, junction blocks, connectors and ground studs.

The instrument panel has a cover attached by screws.

Refer to Chapter 24 for more data about the electrical system and Chapter 34 for more data about the autopilot system.

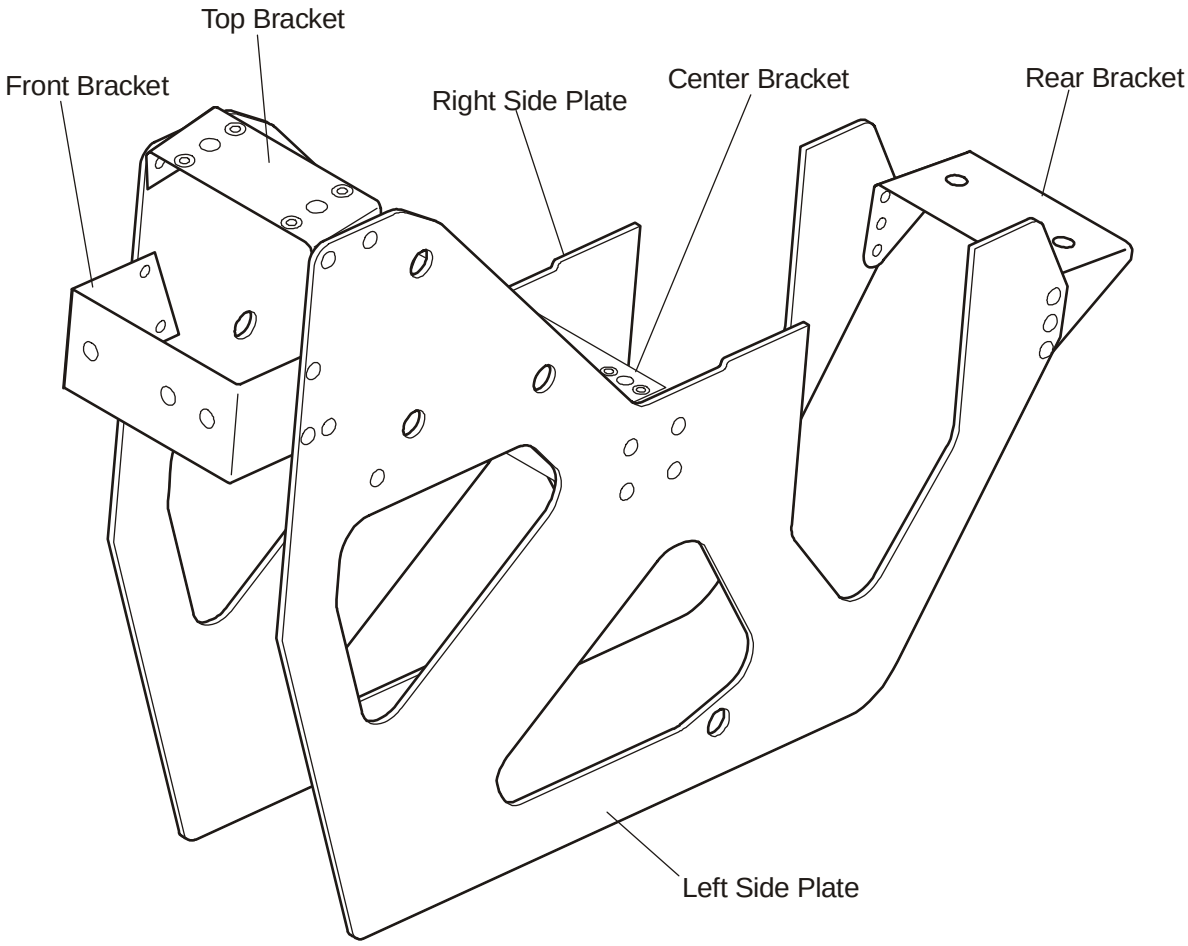


Figure 2: Engine Control Assembly Structure

3. Center Console Description

The engine control assembly holds the parking brake and heating controls. It also holds the engine power lever.

Figure 2 shows the center console structure. Refer to the related Chapters for the data on the controls.

The engine control assembly has two aluminum alloy side plates. Four brackets attach to the side plates with rivets. The front bracket has holes to anchor the outer sheaths of the brake and heat control cables. The top bracket has two anchor-nuts. Bolts engage the anchor nuts to attach the engine control assembly to the top of the floor panel.

The center bracket has two anchor nuts for the control cover plates. The rear bracket attaches to the elevator trim control assembly.

There are no user-maintainable parts in the engine control assembly structure.

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Trouble-Shooting

The table below lists the defects you could have with the control panel in the center console. If you have the trouble detailed in the Trouble column read across to the Possible Cause column. Then do the repair given in the Repair column.

Trouble	Possible Cause	Repair
Parking brake or cabin heat control levers do not stay in the set position.	Friction tension too low. Too much wear in the friction washers.	Adjust the friction. Replace the friction washers.

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Maintenance Practices

1. General

These Maintenance Practices tell you how to remove/install the engine control assembly. See the related Chapter for data about indicators in other systems.

2. Remove/Install the Engine Control Assembly

A. Remove the Engine Control Assembly

	Detail Steps/Work Items	Key Items/References
(1)	Remove the knob from the emergency fuel valve: – Remove the cross-head screw from the center of the control-knob and pull the knob up and off the fuel selector valve. – Remove the mounting plate.	
(2)	Remove the engine power control lever assembly.	Refer to Section 76-11.
(3)	Remove the bolts that attach the engine control assembly to the floor panel at the front and at the rear.	
(4)	Remove the front cover plate.	
(5)	Move the engine control assembly to a position where you can reach the control cables.	
(6)	Disconnect the following control cables from the center console: – Cabin heat control cable. – Cabin heat distribution control cable. – Parking brake control cable.	 Refer to Section 21-01. Refer to Section 21-01. Refer to Section 32-40.
(7)	Move the engine control assembly clear of the airplane.	

B. Install the Engine Control Assembly

	Detail Steps/Work Items	Key Items/References
(1)	Make sure that there are no loose items, specially in the center console.	
(2)	Move the engine control assembly onto the center console and support it in a position where you can install the control cables.	
(3)	Connect these control cables to the engine control assembly: – Parking brake control cable. – Cabin heat distribution control cable. – Cabin heat control cable.	 Refer to Section 32-40. Refer to Section 21-01. Refer to Section 21-01.
(4)	Move the engine control assembly fully into position in the floor panel.	
(5)	Install the engine control assembly front cover plate: – Move the cover plate into position on the engine control assembly. – Install the 2 hex-headed bolts which attach the cover plate and engine control assembly to the floor panel.	 Do not tighten.
(6)	Install the engine power control lever.	Refer to Section 76-11.
(7)	Tighten the 2 hex-headed bolts in the front cover plate.	
(8)	Do a test for correct range, full and free movement of the cabin heat control system.	Refer to Section 21-01.

	Detail Steps/Work Items	Key Items/References
(9)	Do a test for correct range, full and free movement of the cabin heat distribution system.	Refer to Section 21-01.
(10)	Install the knob on the emergency fuel valve: – Install the mounting plate. – Push the knob onto the fuel valve selector shaft. – Install the cross-head screw which attaches the knob to the shaft.	

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Section 31-20
Independent Instruments

1. General

This Section tells you about the digital chronometer which can be installed in the DA 40. Refer to the equipment manufacturers' manuals for more data about the equipment.

The Astrotech LC-2 digital chronometer or the Davtron M803 digital chronometer can be installed in the instrument panel of the DA 40.

2. Description

A. Astrotech LC-2 Digital Chronometer

Figure 1 shows the Astrotech LC-2 digital chronometer. It is located in the instrument panel, see Section 31-10.

The front of the Astrotech LC-2 digital chronometer consists of 3 buttons and an LCD with 4 digits. The background of the LCD is illuminated.

The chronometer has two functions:

– Clock function (time and date). The hours can be displayed in 12 hour format or 24 hour format.

– Chronometer function (stop watch, 24-hour capacity). The unit displays the minutes and seconds during the first hour, then the hours and minutes until 24 hours.

The chronometer is supplied with power by an internal 1.5 V AA battery. The lighting is supplied with power by the main bus.

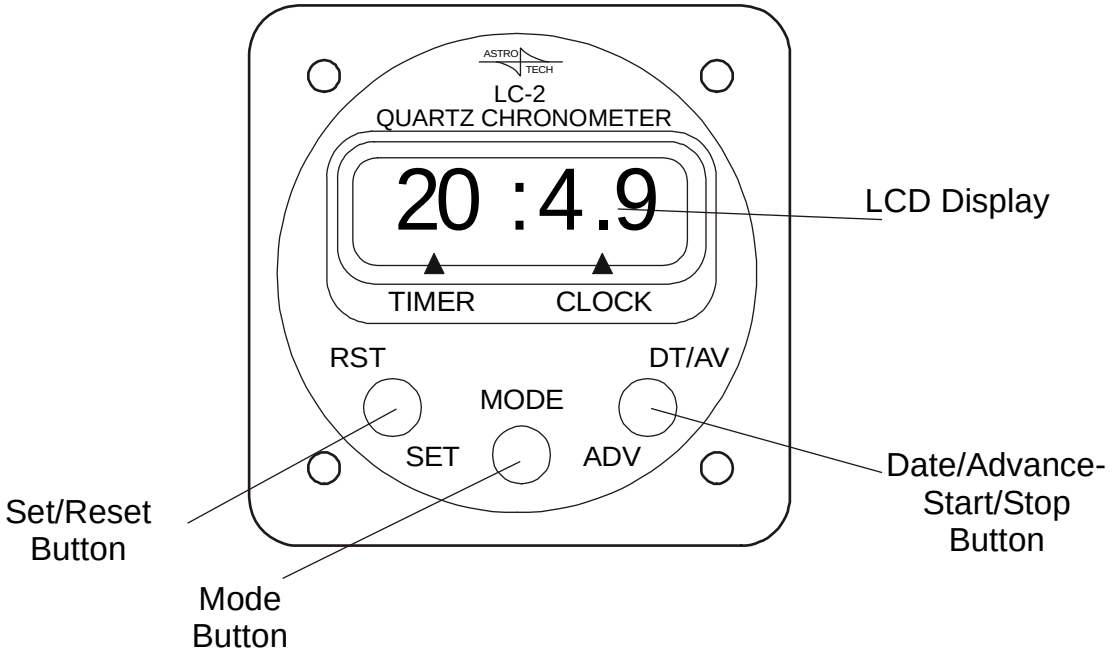


Figure 1: Astrotech LC-2 Digital Chronometer

B. Davtron M803 Digital Chronometer

Figure 2 shows the Davtron M803 digital chronometer. It is located in the instrument panel, see Section 31-10 or 31-11. Refer to Section 34-10 for more information about the OAT indication functions of the unit.

The front of the Davtron M803 digital chronometer consists of three buttons and an LCD. The background of the LCD is illuminated.

The chronometer has the following functions:

– Clock function. The time can be displayed in 'Universal Time' format or 'Local Time' format.

– Elapsed Timer Count Up. The unit displays the minutes and seconds during the first hour, then the hours and minutes until 99 hours and 50 minutes.

– Elapsed Timer Count Down. A count down from any time, a maximum of 59 minutes and 59 seconds can be set.

– Flight Time Alarm. The display will flash when the Flight Time equals the previous set alarm time.

– OAT/Volts. One button control steps sequentially through E, F, C. (E-Voltage (EMF), F-OAT Fahrenheit, C-OAT Centigrade).

The chronometer and lighting are supplied with power by the main bus. The chronometer has an internally back-up 1.5 V AA battery.

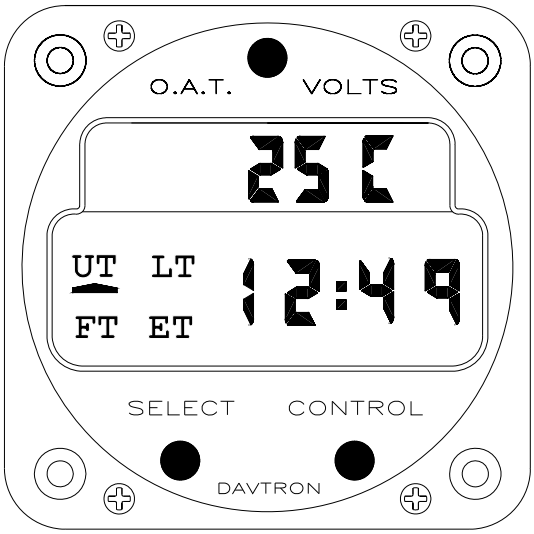


Figure 2: Davtron M803 Digital Chronometer

C. Carbon Monoxide Detector (DA 40 F variant only)

The DA 40 F variant with fixed pitch propeller and the Lycoming O-360-A4M engine has an additional Carbon Monoxide (CO) detector installed.

The CO detector consists of the CO-sensor, a test/ reset button and an red alert annunciator light next to the test button. The CO detector is connected to the airplane's electrical system via a circuit-breaker. In case of a carbon monoxide alert, the pilot will receive an red alert annunciator light. This visual alert will remain until the carbon monoxide level has dropped below the alert level. The indicator is automatically reset when the CO level drops below 50 ppm.

When power is applied to the CO detector, a self test routine begins. The red alert annunciator light flashes twice and remains OFF until a CO alert or a failure of the unit occurs.

When starting up the CO detector, there is a delay of approximately three minutes until the indication is accurate.

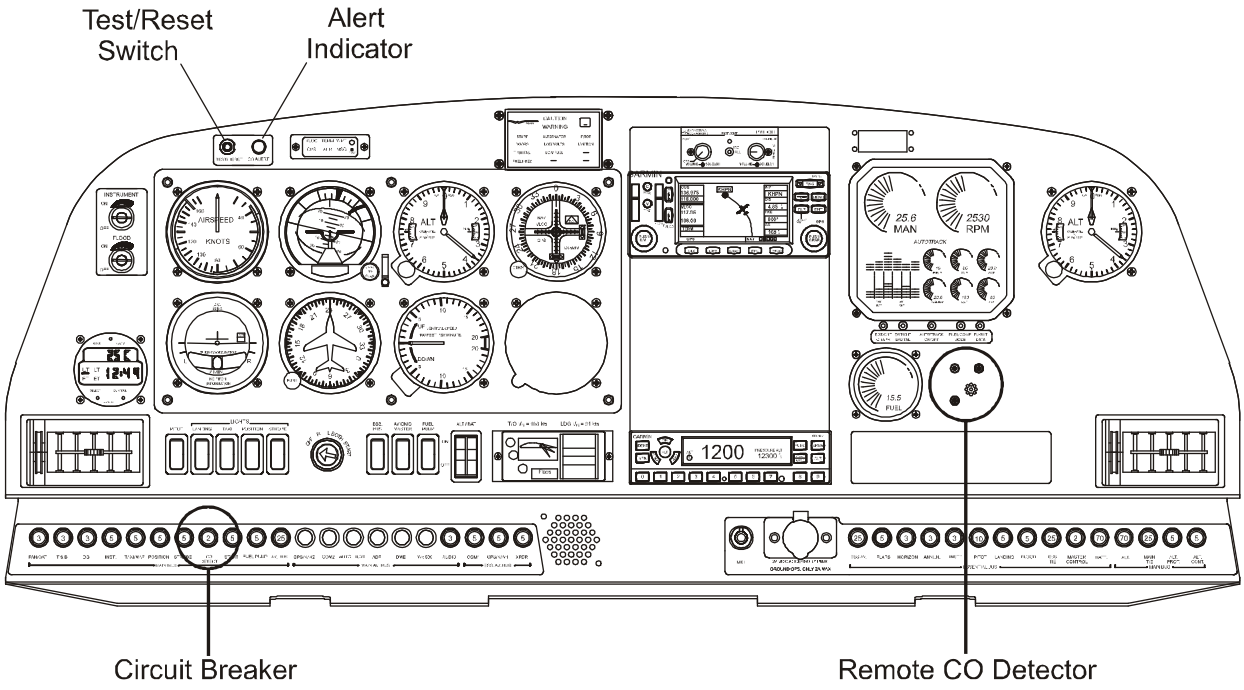


Figure 3: Instrument Panel with CO Detector Installed (DA 40 F only)

Maintenance Practices

1. General

This Section tells you how to replace the digital chronometer and the CO detector. Refer to the equipment manufacturer's manuals for more data on the digital chronometer.

2. Remove/Install the Digital Chronometer

A. Remove the Digital Chronometer

	Detail Steps/Work Items	Key Items/References
(1)	Open the OAT circuit-breaker.	Only for the Davtron M803.
(2)	Remove the instrument panel cover.	Refer to Section 25-10.
(3)	Disconnect the electrical cable from the chronometer.	
(4)	Remove the screws which attach the chronometer to the instrument panel.	Hold the chronometer.
(5)	Move the chronometer out of the instrument panel and lift clear of the airplane.	

B. Install the Digital Chronometer

	Detail Steps/Work Items	Key Items/References
(1)	Move the chronometer into its position in the instrument panel.	
(2)	Install the screws which attach the chronometer to the instrument panel.	
(3)	Connect the electrical cable to the rear of the chronometer.	
(4)	Do a test for correct OAT indication. – Close the OAT circuit-breaker. – Set the ALT/BAT switch (Lycoming version) or the ELECTRIC MASTER key switch (TAE version) to ON. – Read OAT indication. – Set the ALT/BAT switch (Lycoming version) or the ELECTRIC MASTER key switch (TAE version) to OFF.	Davtron M803 only. The OAT indicator must indicate the ambient temperature ±2°.
(5)	Astrotech LC2: – If necessary, set time and date. Davtron M803: – If necessary, set the time.	 Refer to equipment manufacturer's manuals, or to Supplement E1 to the Airplane Flight Manual. Refer to equipment manufacturer's manuals, or to Supplement E4 to the Airplane Flight Manual.
(6)	Install the instrument panel cover.	Refer to Section 25-10.

3. Remove/Install the CO Detector (DA 40 F only)

A. Remove the CO Detector

	Detail Steps/Work Items	Key Items/References
(1)	Open the CO DETECT circuit-breaker.	
(2)	Remove the instrument panel cover.	Refer to Section 25-10.
(3)	Disconnect the electrical cable from the CO detector.	
(4)	Remove the screws which attach the CO detector to the instrument panel.	Hold the CO detector.
(5)	Move the CO detector out of the instrument panel and lift clear of the airplane.	

B. Install the CO Detector

	Detail Steps/Work Items	Key Items/References
(1)	Move the CO detector into its position in the instrument panel.	
(2)	Install the screws which attach the CO detector to the instrument panel.	
(3)	Connect the electrical cable to the rear of the CO detector .	
(4)	CO detector: – Close the CO DETECT circuit-breaker. – Set the ALT/BAT switch to ON. – Do an operational check by depressing the CO test/reset switch. – Verify the unit can be shut off with the circuit-breaker.	
(5)	Install the instrument panel cover.	Refer to Section 25-10.

4. Calibrate the CO Detector (DA 40 F only)

The CO-detector must be sent to the manufacturer for calibration.

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Section 31-42
Central Computers - TAE 125 Diesel Engine with the Garmin G1000 System Installed

1. General

As an option, the DA 40 D has a Garmin G1000 Integrated Cockpit System (ICS). The ICS integrates all the usual flight, avionic and airframe system indications into one system. The system displays the data on two display screens located in the instrument panel. An audio control panel is located between the two display screens. The audio control panel integrates and controls the airplane radio, navigation and intercom systems.

Refer to Section 23-51 for more data about the audio control panel.

Electrical power is supplied to the ICS control and display screens when the ELECTRIC MASTER key switch is set to ON. Power is supplied to the audio control panel when the AVIONIC MASTER switch is set to ON.

During normal operation the left display screen is referred to as the Primary Flight Display (PFD) and the right display screen as the Multi Function display (MFD). Either display can be used as PFD or MFD. If one display fails the remaining screen can be switched to the reversionary mode. Reversionary mode is a mode of operation in which both the PFD and MFD are identically configured to display all of the important flight parameters in the event of display failure.

For more detailed data about the ICS refer to the G1000 Cockpit Reference Guide for the DA 40 Airplane.

Figure 1 shows the ICS system schematic.

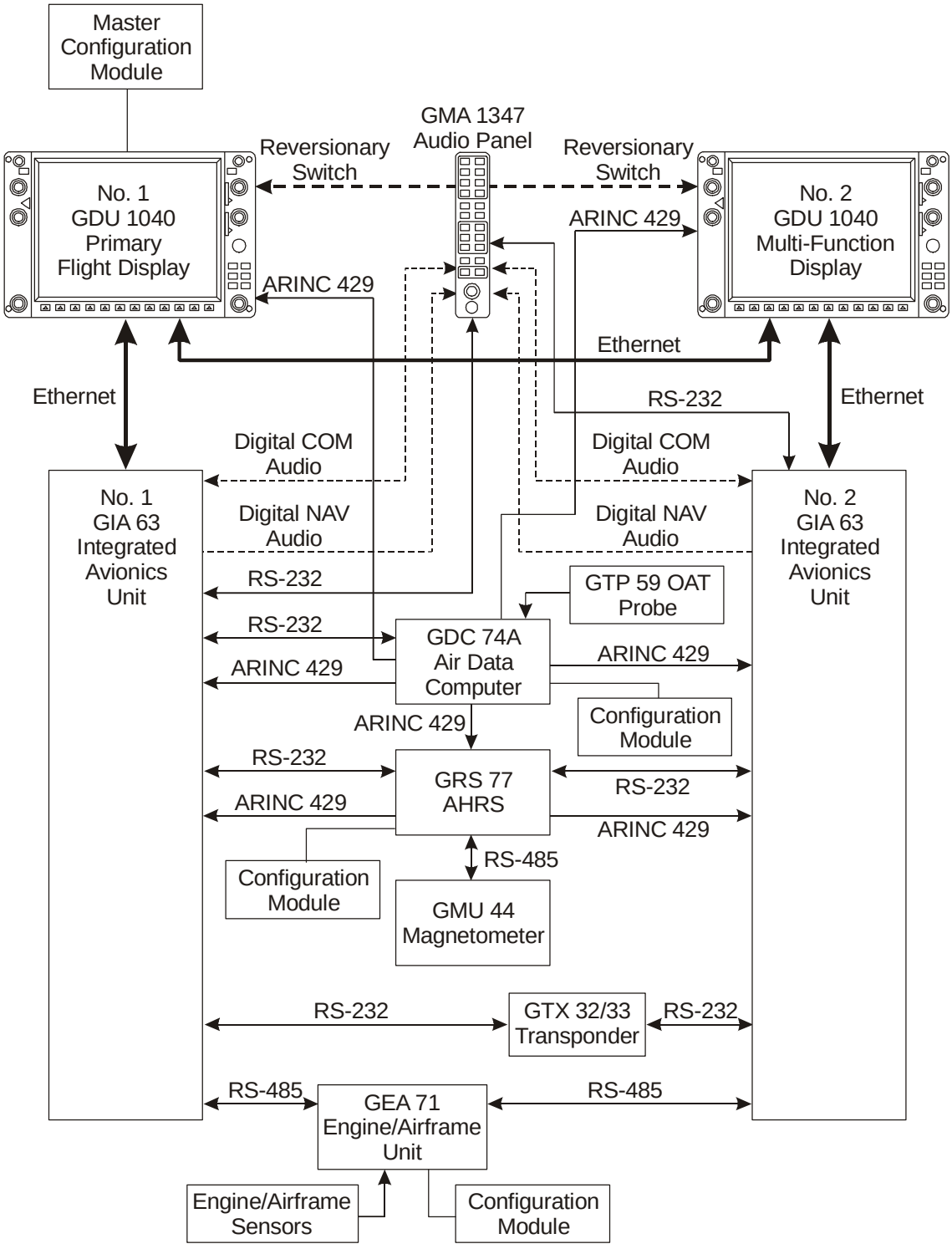


Figure 1: Integrated Cockpit System Schematic Diagram

2. Description

Figure 2 shows the schematic diagram for the ICS. The ICS has these main components:

A. Primary Flight Display (PFD)

The PFD is a 10.4" liquid crystal display. Bezels on the left and right side of the PFD have the controls for the ICS. The lower edge of the PFD has 'softkeys'. The function of the softkeys relates to the on-screen display and the display will show the function of the key.

The PFD shows the basic primary flight display plus a number of additional options that can selected manually. Some other indications will be generated automatically for example, alert captions.

The left side bezel has these controls:

– NAV Vol/Sq knob. This controls the NAV audio level. Press the knob to toggle the ident filter OFF /ON.

– NAV frequency transfer key. Press this key to make the standby NAV frequency the active frequency.

– NAV knob. This control has a large outer knob and a smaller inner knob. Rotate these knobs to select the NAV frequency. Rotate the large outer knob to select the MHz and the inner knob to select the KHz. Pressing the smaller inner knob will toggle the tuning cursor between the NAV1 and NAV2 frequency display.

– HDG knob. You can manually select the heading with this control. Pressing this knob will cause a heading window to momentarily appear to the left of the heading indicator. This window will show the airplane heading in a digital display and the heading bug will align with the compass lubber line.

– ALT SEL knob. Sets the selected altitude in the window over the altimeter tape display. The large outer knob sets the thousands indication and the inner knob sets the hundreds indication.

The right side bezel has these controls:

– COM VOL/SQ knob. Controls the COM audio level. Press the knob to toggle the COM automatic squelch ON/OFF.

– COM frequency transfer key. Press this key momentarily to make the standby COM frequency active. Press and hold this key to automatically make the emergency frequency (121.5 MHz) the standby frequency.

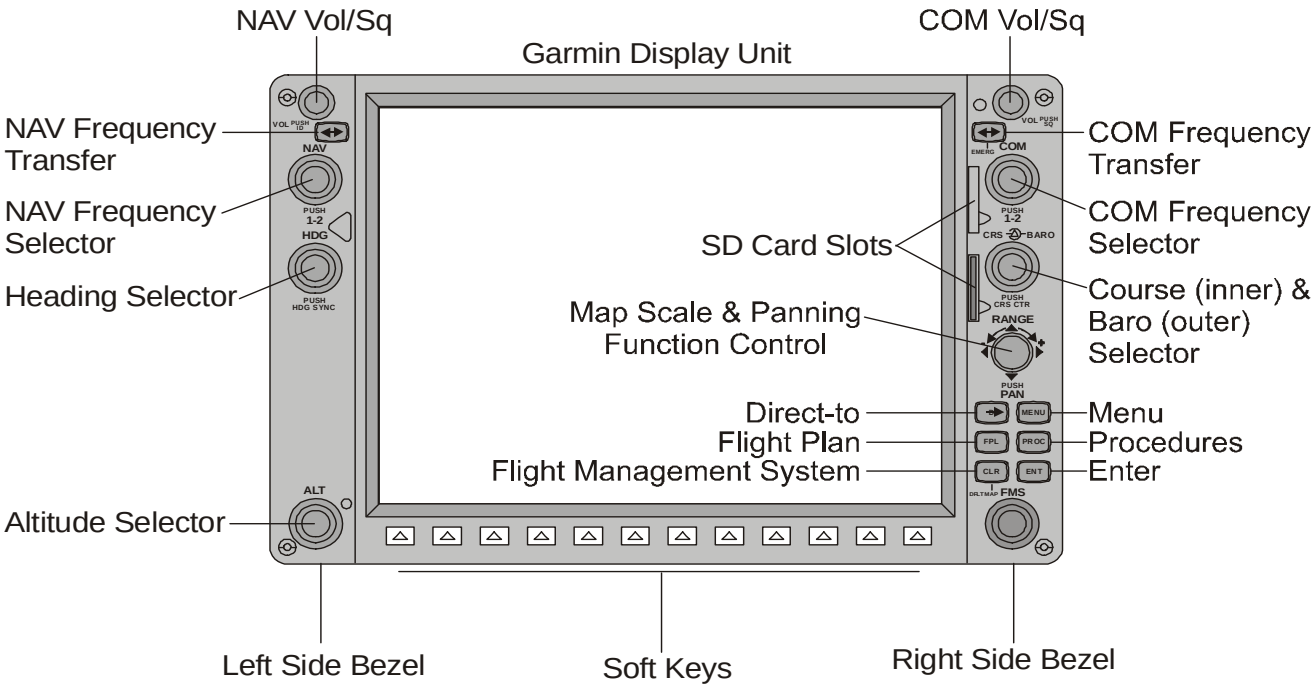


Figure 2: Garmin G1000 Display Screens and Audio Integrating Unit

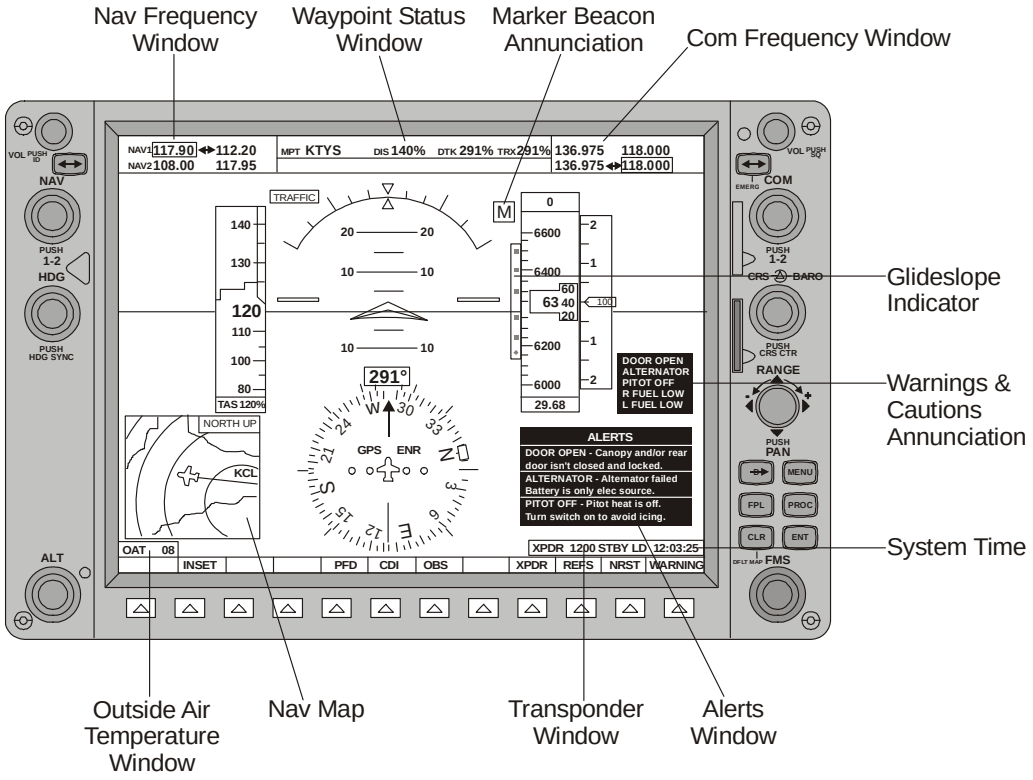


Figure 3: Primary Flight Display

– COM knob. This control has a large outer knob and a smaller inner knob. Rotate these knobs to select the COM frequency. Rotate the large outer knob to select the MHz and the inner knob to select the KHz. Pressing the smaller inner knob will toggle the tuning cursor between the COM 1 and COM 2 frequency display. CRS/BARO knob. This control has a large outer knob and a small inner knob. The outer knob sets the barometric pressure. The inner knob sets the airplane course.

– RANGE/PAN JOYSTICK knob. Rotate the knob to increase/decrease the map scale. Use the knob as a joystick to pan the map display.

– DIRECT TO key. Press this key to activate the direct-to function. This will give the direct course to a waypoint selected from the active route or to a position indicated by the map cursor.

– MENU key. Press the key to display the menu. The menu displays the options associated with the currently displayed page.

– FPL key. Press this key to display the active flight plan page. You can create or edit an existing flight plan using the bezel controls and soft keys when this page is displayed.

– PROC key. Press this key to display the procedures page. If this page is used with a selected flight plan then the procedures page will display the data associated with the flight plan. If the page is not used with a flight plan then an airfield and its related procedures can be selected from a database.

– CLR key. Press this key to cancel an entry or delete information. Press and hold this key to immediately display the Default Navigation Map Page.

– ENT key. Press to accept a menu selection or data entry. Use this key to approve an operation or to complete a data entry.

– FMS knobs. Use these concentric knobs select the page to be displayed. The outer large knob selects a page group and the inner knob selects a specific page from within the selected page group. Press the inner knob to activates an on-screen cursor. When the cursor is activated the outer knob can be used to move the cursor on the page and the small inner knob can used to scroll the cursor through an item or menu selected by the outer knob.

– Secure Digital (SD) Cards. Secure digital cards can be inserted into the slots in the right side bezel. These cards can contain data such as updated GPS navigation charts or special-to-type airplane check-lists.

– ENT key. Press to accept a menu selection or data entry. Use this key to approve an operation or to complete a data entry.

– FMS knobs. Use these concentric knobs select the page to be displayed. The outer large knob selects a page group and the inner knob selects a specific page from within the selected page group. Press the inner knob to activates an on-screen cursor. When the cursor is activated the outer knob can be used to move the cursor on the page and the small inner knob can used to scroll the cursor through an item or menu selected by the outer knob.

– Secure Digital (SD) Cards. Secure digital cards can be inserted into the slots in the right side bezel. These cards can contain data such as updated GPS navigation charts or special-to-type airplane check-lists.The PFD window displays the usual primary flight instruments in a standard 'T' configuration. The basic flight instruments are:

– Airspeed Indicator (ASI). The airspeed indicator is on the left side of the display and indicates the airspeed on a rolling number gauge using a moving tape. The airspeed indicator also displays speed ranges for different airplane configurations, airspeed trends and 'V' speeds. If the airspeed indicator fails the display marks the airspeed display area with a red 'X' and yellow text spelling out 'AIRSPEED FAIL'.

– TAS. True airspeed is digitally displayed in a small window below the airspeed indicator.

– Attitude indicator (Artificial Horizon). The attitude indicator is located in the center of the PFD, at the top. The attitude indicator shows the pitch, roll and yaw situation of the airplane. If the attitude indicator fails the display marks the pitch attitude display area with a red 'X' and yellow text spelling out 'ATTITUDE FAIL'.

– Altimeter. The altimeter is located at the top right of the PFD. The altimeter displays the airplane altitude in feet on a rolling number gauge using a moving tape. The altimeter also shows a altitude 'bug' at the selected altitude or the edge of the tape, whichever is closest to the current altitude. If the altitude indicator fails the display marks the tape display area with a red 'X' and yellow text spelling out 'ALTITUDE FAIL'.

– Barometric pressure indicator. The barometric pressure indicator is located immediately below the altitude indicator. The indicator shows the barometric pressure that has been set in either inches of mercury (Hg) or hectopascal number (hPa)

– Vertical speed indicator (VSI). The vertical speed indicator is located to the right of the altitude indicator. The indicator displays the airplane vertical speed in feet/min. A numeric pointer moves vertically up/down a fixed tape. The vertical speed indication is also shown digitally on the pointer. A negative sign is shown on the pointer to indicate negative vertical speeds (airplane descending). If the VSI fails the display marks the tape display area with a red 'X' and yellow text spelling out 'VERT SPEED FAIL'.

– Horizontal situation indicator (HSI). The HSI s located in the center of the PFD at the bottom. The HSI displays a rotating circular compass with heading markings. The HSI shows the following information:

– Heading information. The heading is shown digitally in a window at the top of the rotating compass.

– Turn rate indicator. A turn rate indicator is located between the digital heading window and the rotating compass.

– Course deviation indicator (CDI). The CDI is a line with an arrowhead that points to the airplane heading on the rotating compass. The line can slide left or right of the center marking to show the deviation of the actual course being flown to the required course. Course data can be supplied from the airplane VOR, LOC or GPS system. If the heading data is invalid the digital heading display window is marked with a red cross and yellow text spelling 'HDG'.

– Vertical deviation (glidescope) indicator. The glidescope indicator is located to the left of the vertical speed indicator.

– Alerts window. The alerts window is located on the lower right side of the PFD. This window opens when an alert is activated or when the WARNINGS softkey is operated.

– Warnings and cautions window. The warnings and cautions window is located above the alerts window. This window opens when a warning or caution is activated or if the WARNING softkey is operated.

– NAV MAP. The NAV MAP window is located in the lower left of the PFD. The window is activated by pressing the INSET softkey and when activated shows a pictorial view of the airplane on a moving map.

Small windows in the top left corner of the PFD show active and standby NAV frequencies. Small windows in the top right of the PFD show active and standby COM frequencies. A larger window in the top of the PFD flight planning data when activated.

A small window in the bottom left of the PFD shows the outside air temperature (OAT). A small windows on the bottom right of the PFD shows the transponder settings and operational state. Another small window in the right bottom corner of the PFD shows a digital clock.

A set of labels along the very bottom of the PFD identify the function of the softkeys for the current page being displayed on the PFD.

The PFD has a self-monitoring system. If the self-monitoring system detects a fault the PDF enters reversionary mode. In the reversionary mode the PDF is configured to display the flight instrument symbology and the basic engine parameter monitoring indications. The PFD reversionary mode can also be entered by pressing the DISPLAY BACKUP selector. The DISPLAY BACKUP selector is located on the bottom of the audio control panel.

B. Multi-Function Display (MFD)

The MFD is a 10.4" liquid crystal display. Bezels on the left and right side of the MFD have the controls for the ICS. The lower edge of the MFD has 'softkeys'. The function of the soft keys relates to the on-screen display and if a key has a function related to the current display the display will show the function of the key.

The MFD displays engine and airplane pages on the left slide of the screen. The remainder of the screen is used to display navigational pages. The bezels on the left and right side of the MFD have the same controls and function as the bezels on the PFD.

The MFD has these displays:

– Engine Instrumentation System Window (EIS). The engine indication system window is on the left side of the MFD displays a full-time dedicated display of these engine parameters:

  – Engine Load. The engine load indicator is at the top of the EIS window. The engine loads are displayed as a percentage. Pointers on each side of a vertical scale move to show the engine load. If the system fails the display shows a red cross to the left or right of the load indicator to show which engine system has failed.

  – Engine RPM. The engine RPM indicator is located below the engine load indicator. Pointers on each side of a vertical scale move to show the engine rpm. If the system fails the display shows a red cross to the left or right of the rpm indicator to show which engine system has failed.

  – Volts. The essential bus voltage is displayed below the RPM indicator. A pointer above a horizontal range bar shows the essential bus voltage. The horizontal range bar is color coded. The green central section of the bar indicates that the voltage is within limits. The red section at the left end of the range bar indicates too low a voltage. The red section at the right end of the range bar indicates too high a voltage. Above the range bar is a window displaying the essential bus voltage digitally.

– Amps. The generator load is shown by an indicator located below the Volts indicator. A pointer above a horizontal range bar shows the generator load. The range bar is color coded, green in the normal load range and then red at the high end of the range. The range bar is also marked numerically at the 0 and 90 Amp indications. The pointer moves from left to right to show the load on the generator. A small window above the range bar shows the generator load digitally.

– Engine gearbox temperature. Below the Amps indication is the engine gearbox temperature indication. A pointer above a horizontal range bar shows the gearbox temperature. The range bar is color coded, green in the normal temperature range, yellow in the caution range and then red at the high end of the range. The pointer moves from left to right to show the temperature of the gearbox. A small window above the range bar shows the gearbox temperature digitally. If the system fails the display shows red crosses in place of the indications for the failed system(s).

– Coolant temperature. Below the engine gearbox temperature indication is the engine coolant temperature indication. A small window shows the engine coolant temperature digitally. If the system fails a red cross is displayed in place of the digital indication for the failed system(s).

– Oil temperature. Below the engine coolant temperature indication is the engine oil temperature indication. A small window shows the engine oil temperature digitally. If the system fails a red cross is displayed in place of the digital indication for the failed system(s).

– Oil pressure. Below the engine oil temperature indication is the engine oil pressure indication. A small window shows the engine oil pressure digitally. If the system fails a red cross is displayed in place of the digital indication for the failed system(s).

Pressing the FUEL softkey at the bottom of the MFD will change the display to the FUEL page in the EIS panel. The display will now give the following indications:

– Engine load and RPM. These indications are in the same location and format as in the SYSTEM page.

– Fuel flow. Below the engine load and RPM indications is the fuel flow indication. A small window shows the engine fuel flow digitally. If the system fails a red cross is displayed in place of the digital indication for the failed system(s).

– Oil temperature. The engine oil temperature is shown below the fuel flow indication. A pointer above a horizontal range bar shows the engine oil temperature. The range bar is color coded yellow at the cool end of the range bar, then green to show the normal operating range and yellow in the high range. The pointer moves from left to right to indicate the temperature of the engine oil.

– Oil pressure. The engine oil pressure indication is shown below the engine oil temperature indication. A pointer above a range bar indicates the oil pressure. The range bar is color coded yellow at the low pressure (left) end of the range bar, green to show the normal operating range, yellow in the cautionary range and red in the high range. The pointer moves from left to right to indicate the oil pressure.

– Coolant temperature. The coolant temperature indication is shown below the engine oil pressure indication. A pointer above a range bar indicates the coolant temperature. The range bar is color coded yellow at the low temperature (left) end of the range bar, green to show the normal operating range, yellow in the cautionary range and red in the high range. The pointer moves from left to right to indicate the coolant temperature.

– Fuel temperature. The fuel temperature indication is located below the coolant temperature indication. Pointers above and below a range bar indicate the fuel temperature. The range bar is color coded yellow at the low temperature (left) end of the range bar, green to show the normal operating range, yellow in the cautionary range and red in the high range. The pointers move from left to right to indicate the fuel temperature. The pointer above the range bar indicates the temperature of the fuel in the left fuel tank and the pointer below the range bar indicates the temperature of the fuel in the right fuel tank.

– Fuel quantity. The fuel quantity indication is located at the bottom of the EIS. Pointers above and below a range bar indicate the fuel quantities. The pointers move from left (low) to right (full) to indicate the fuel quantity. The pointer above the range bar indicates the quantity of fuel in the left fuel tank and the pointer below the range bar indicates the quantity of fuel in the right fuel tank.

From this page you can use softkeys to enter data for the fuel system. Refer to the Garmin G1000 Cockpit Reference Guide for more data about entering data into the ICS.

C. GMA 1347 Audio Control Panel

The GMA 1347 audio control panel is located in the airplane instrument panel between the two display screens. The audio control panel integrates the NAV/COM digital audio, intercom system and marker beacon controls. Manual display reversion is also controlled from the GMA 1347. The GMA 1347 communicates with both IAUs using RS-232 digital interface. For more data about the audio control panel refer to Section 23-50.

D. GIA 63 Integrated Avionics Unit (IAU)

The ICS has two GIA 63 IAUs. The two IAUs are identical and independent. They are both installed in the avionics rack in the rear fuselage, just aft of the rear baggage frame. The IAU processes all the data that is displayed on the cockpit display. Either IAU can supply data to either cockpit display. You cannot service the IAU.

E. GTX 33 Transponder

The GTX 33 transponder is a solid state Mode-S transponder. The transponder provides modes A, C and S functions. The unit is operated directly through the PFD in the cockpit. The transponder is linked to both IAUs via RS-232 digital interface. The transponder is installed in the in the avionics rack in the rear fuselage, just aft of the rear baggage frame.

F. GRS 77 Attitude, Heading and Reference Unit (AHRS)

The GRS 77 provides airplane attitude and related flight data to the cockpit displays. The GRS 77 receives data from the air data computer, the GMU 44 magnetometer and GPS signals from the GIA 63. The GRS communicates with both the GIA 63s and the cockpit dispays via ARINC 429 digital inetrface. The GRS 77 is located next to the avionics rack in the rear fuselage, just aft of the rear baggage frame.

G. GDC 74A Air data Computer (ADC)

The ADC receives data from the Pitot/static system and an OAT sensor. The ADC uses this data to provide pressure altitude, airspeed, vertical speed and outside air temperature data to the G1000 system. The ADC communicates with the GIA 63s, GDU 1040 display screens and the GRS 77 using ARINC 429 digital interface. Software and configuration data is received through RS-232 digital interface with the GIA 63s. The ADC is located on the instrument panel shelf.

H. GEA 71

The GEA 71 is a microprocessor based unit that receives and processes signals from airframe and engine sensors. The GEA 71 communicates directly with both IAUs using RS 485 digital interface. The GEA 71 is located on the instrument panel shelf.

I. GMU 44 Magnetometer

The magnetometer senses magnetic field information. Data is sent to the GRS77 ARHS for processing. The magnetometer receives power form the GRS 77 and communicates with the GRS 77 using RS-485 digital interface. The magnetometer is located in the right outer wing and can accessed through a panel in the lower surface of the wing.

Trouble-Shooting

1. General

The Garmin ICS has a built-in test and trouble-shooting facility. For more data about troubleshooting the ICS refer to the G1000 Cockpit Reference Guide for the DA 40 D airplane.

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Maintenance Practices

1. General

These Maintenance Procedures tell you how to replace the main components of the ICS. They do not tell you how to maintain the components. For data about removing/installing the GMA 1347 Audio Control Unit refer to Section 23-50. For more data about maintaining the equipment refer to the G1000 Line Maintenance Manual. The G1000 Line Maintenance Manual gives you particular information on:

– Unit Related Alerts and Problems.

– Equipment Removal and Installation.

– Uploading Software, Configuring and Testing.

– Final System Checkout.

– Periodic Maintenance.

– G1000 System Software and Configuration.

– GDU Lighting Setup.

Refer to the DAI service documentation for data about the approved software configurations (available for download at www.diamond-air.at).

The specific DA 40 D values as to the equipment basic setting are given in the table below:

Item	Basic Setting
Main Lighting – Display (GDU 1040 P/N: 011-00972-02)	Source . . . . . photo Response Time . . . . . 3 Minimum . . . . . 1.75 Edit Curve Vertex . . . . . none GMA Annunciator Gain . . . . . 1.00 GMA Annunciator Offset 0
Main Lighting – Key (GDU 1040 P/N: 011-00972-02)	Source . . . . . photo Response Time . . . . . 1 Minimum . . . . . 2.72 Edit Curve Vertex . . . . . none GMA Key Gain . . . . . 2.00 GMA Key Offset 2

Item	Basic Setting
Main Lighting - Display (GDU 1040 P/N: 011-00972-03 & P/N 011-00972-10)	Source . . . . . 14 VDC Response Time . . . . . 3 Minimum . . . . . 3.50 Edit Curve Vertex . . . . . none Photo Transition . . . . . 20 % Edit Photo Vertex . . . . . none GMA Annunciator Gain . . . . . 1.00 GMA Annunciator Offset 0
Main Lighting - Key (GDU 1040 P/N: 011-00972-03 & P/N 011-00972-10)	Source . . . . . 14 VDC Response Time . . . . . 1 Minimum . . . . . 1.75 GMA Key Gain . . . . . 2.00 GMA Key Offset 2
Audio Alert Configuration	Volume . . . . . 45 Voice . . . . . male
Transponder Configuration	VFR Code . . . . . Europe: 7000 USA: 1200 Aircraft Weight . . . . . < 15,500 lbs Max Airspeed . . . . . <= 150 kts Address Type . . . . . Europe: hex id USA: us tail Flight ID Type . . . . . Europe: PFD entry USA: same as tail
GMA Configuration – Headset Volume	Music #1: . . . . . -20 Music #2 . . . . . -20 Unswitched in #1 . . . . . -20 Unswitched in #2 . . . . . -20 Unswitched in #3 . . . . . -20 Altitude Warning . . . . . -20
GMA Configuration – Speaker Volume	Crew Audio 5
GMA Configuration – Master Squelch	Threshold Value . . . . . -16
GMA Configuration – Marker Beacon	HI SENSE THRESHOLD: specific to airplane LO SENSE THRESHOLD: specific to airplane

Item	Basic Setting	
GMA Configuration – KEYPAD Annunciators	Disable COM3:	set
	Disable TEL:	set
	Disable DME:	specific to airplane
	Disable ADF:	specific to airplane
	Disable AUX:	set
	Disable SPEAKER:	blank
	Disable PA:	set
	Disable PLAY:	blank
	Disable MUSIC:	set
	Disable REC:	set
	Disable CABIN:	set

Note: Unlisted items are preset. You cannot change their values.

2. Remove/Install a GDU 1040 Display

A. Remove a GDU 1040 Display

	Detail Steps/Work Items	Key Items/References
(1)	Make sure that the ELECTRIC MASTER key switch is set to OFF.	
(2)	Set the PFD and MFD circuit-breakers open.	Right side of instrument panel.
(3)	Remove the display unit: – Rotate the 4 locking studs that attach the display to the instrument panel 90° counterclockwise. – Move the instrument panel aft and disconnect the electrical cables. – Move the display unit clear of the instrument panel.	Refer to Figure 4. At the in-line connector.

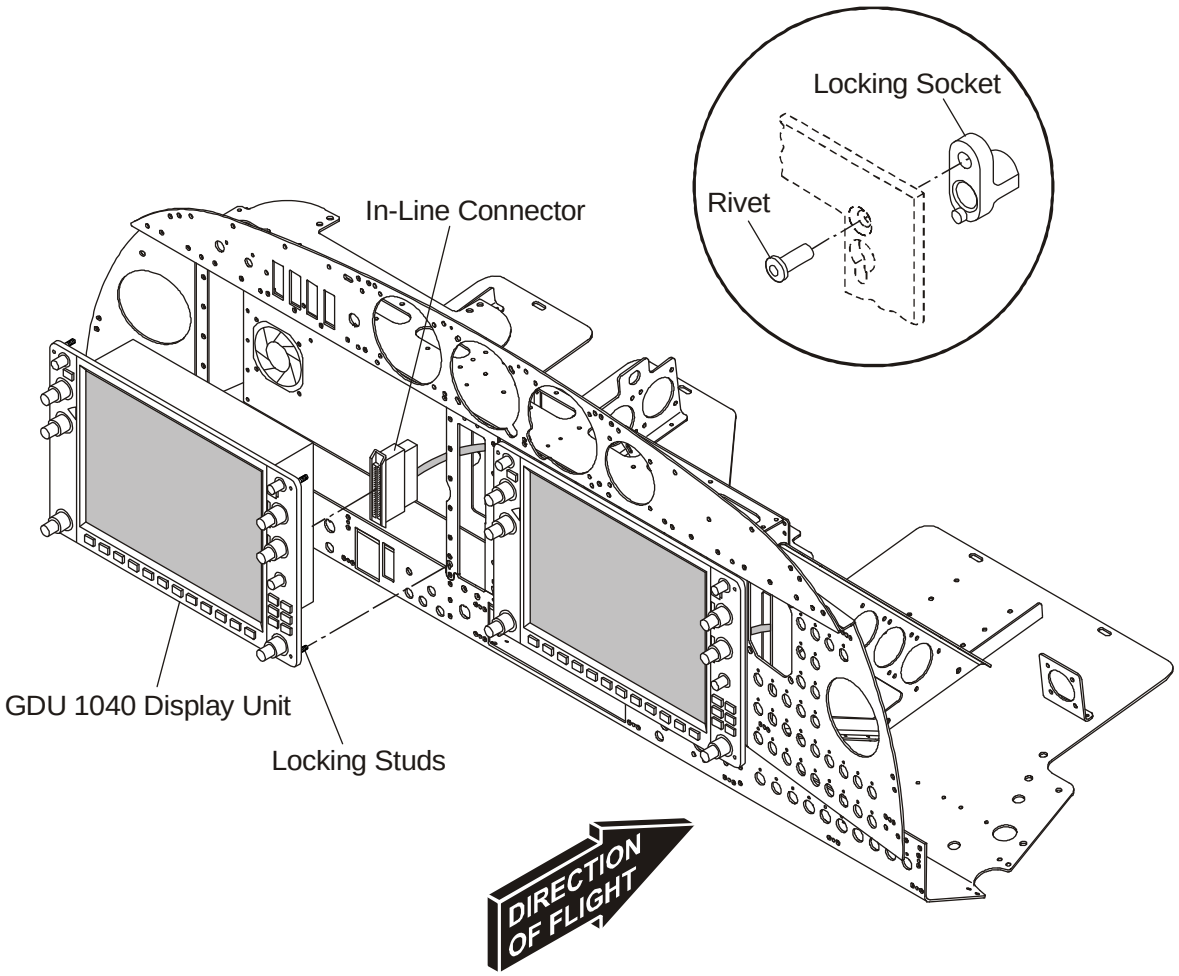


Figure 4: GDU 1040 Display Unit Installation

B. Install a GDU 1040 Display

	Detail Steps/Work Items	Key Items/References
(1)	If necessary, set the PFD and MFD circuit-breakers open.	Right side of instrument panel.
(2)	Install the display unit: – Move the display unit into position at the instrument panel. – Connect the electrical cables to the display unit – Move the display unit fully forward into position n the instrument panel. – Rotate the 4 locking studs that attach the display unit to the instrument panel 90° clockwise.	 At the in-line connector. Make sure that you do not trap the electrical cables. The locking studs should be oriented with the alignment marks in the vertical position for installation. When locked, the alignment marks are in the horizontal position.
(3)	Re-set the PFD and MFD circuit-breakers.	Right side of instrument panel.
(4)	Do a test for the correct operation of the integrated cockpit system (ICS): – Set the ELECTRIC MASTER key switch to ON. – Set the ELECTRIC MASTER key switch to OFF.	 The ICS must power-up and successfully complete its self-test procedure.

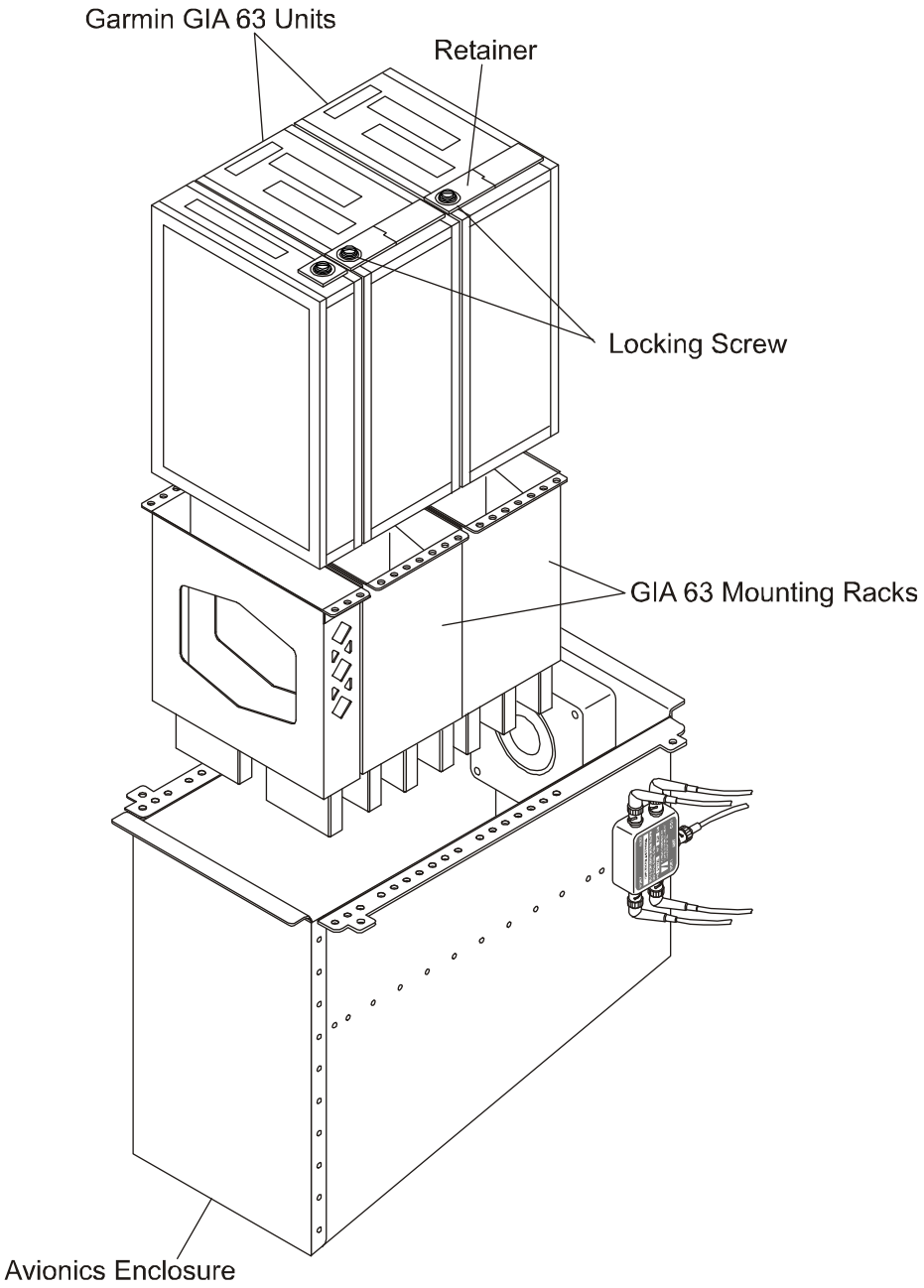


Figure 5: GIA 63 Integrated Avionics Unit (IAU) Installation

3. Remove/Install a GIA 63 Integrated Avionics Unit (IAU)

A. Remove a GIA 63 Integrated Avionics Unit (IAU)

	Detail Steps/Work Items	Key Items/References
(1)	Make sure that the ELECTRIC MASTER key switch is set to OFF.	
(2)	Remove the lower access panel from the rear baggage compartment.	Refer to Section 25-50.
(3)	Remove the GIA IAU: – Identify the unit that you will remove. – Release the locking screw from the retainer. – Lift the retainer clear of the unit. – Lift the IAU clear of the mounting rack and the airplane.	Refer to Figure 5.

B. Install a GIA 63 Integrated Avionics Unit (IAU)

	Detail Steps/Work Items	Key Items/References
(1)	Install the IAU: – Move the GIA IAU into position at the mounting and lower the unit into position in the rack. – Move the retainer into position and secure with the locking screw.	Make sure that the unit is seated correctly. Do not force the unit into position!
(2)	Install the lower access panel in the rear baggage compartment.	Refer to Section 25-50.
(3)	Do a test for the correct operation of the integrated cockpit system (ICS): – Set the ELECTRIC MASTER key switch to ON. – Set the ELECTRIC MASTER key switch to OFF.	The ICS must power-up and successfully complete its self-test procedure.

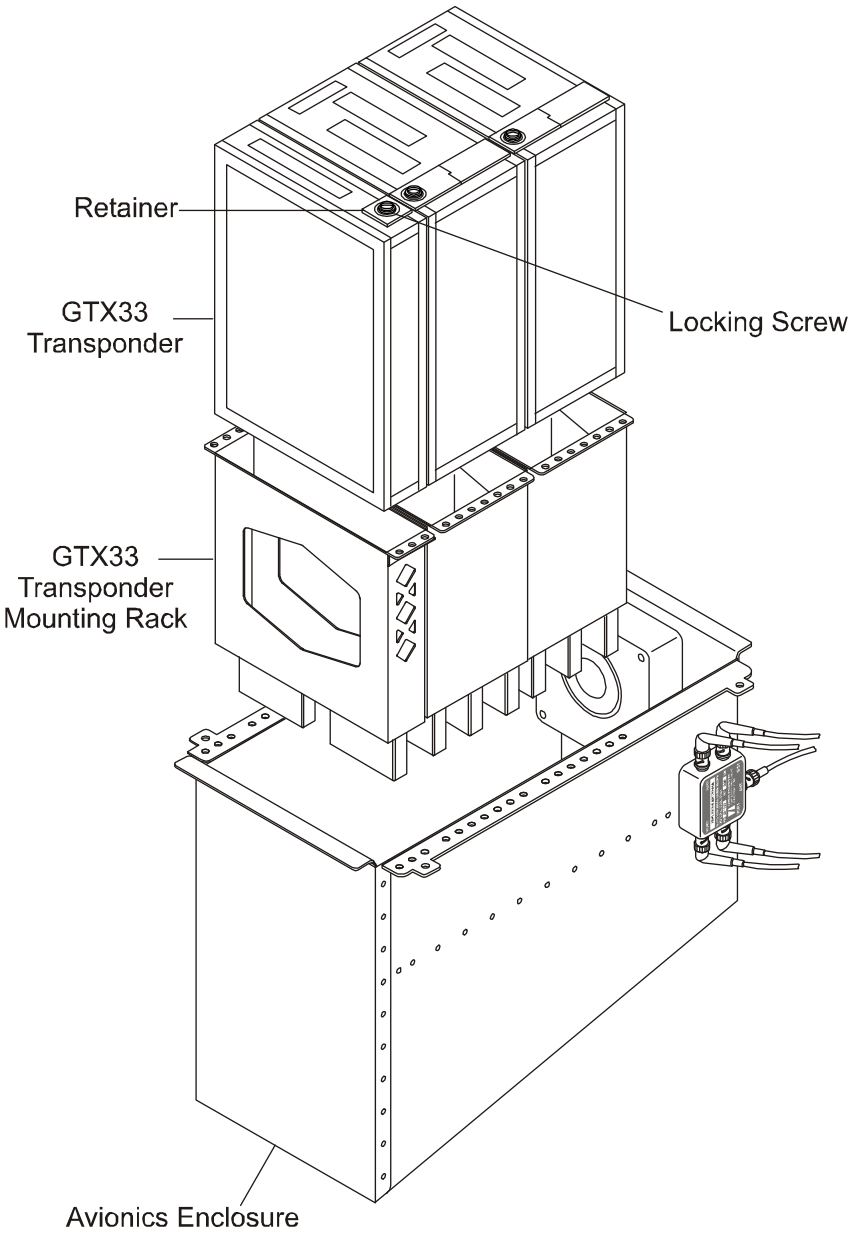


Figure 6: GTX33 Transponder Installation

4. Remove/Install the GTX33 Transponder

A. Remove the GTX33 Transponder

	Detail Steps/Work Items	Key Items/References
(1)	Make sure that the ELECTRIC MASTER key switch is set to OFF.	
(2)	Remove the lower access panel from the rear baggage compartment.	Refer to section 25-50.
(3)	Remove the GTX33: – Identify the unit that you will remove. – Release the locking screw from the retainer. – Lift the retainer clear of the unit. – Lift the GTX33 clear of the mounting rack and the airplane.	Refer to Figure 5.

B. Install the GTX33 Transponder

	Detail Steps/Work Items	Key Items/References
(1)	Install the GTX33: – Move the GTX33 into position at the mounting and lower the unit into position in the rack. – Move the retainer into position and secure with the locking screw.	Make sure that the unit is seated correctly. Do not force the unit into position!
(2)	Install the lower access panel in the rear baggage compartment.	Refer to Section 25-50.
(3)	Do a test for the correct operation of the integrated cockpit system (ICS): – Set the ELECTRIC MASTER key switch to ON. – Set the ELECTRIC MASTER key switch to OFF.	The ICS must power-up and successfully complete its self-test procedure.

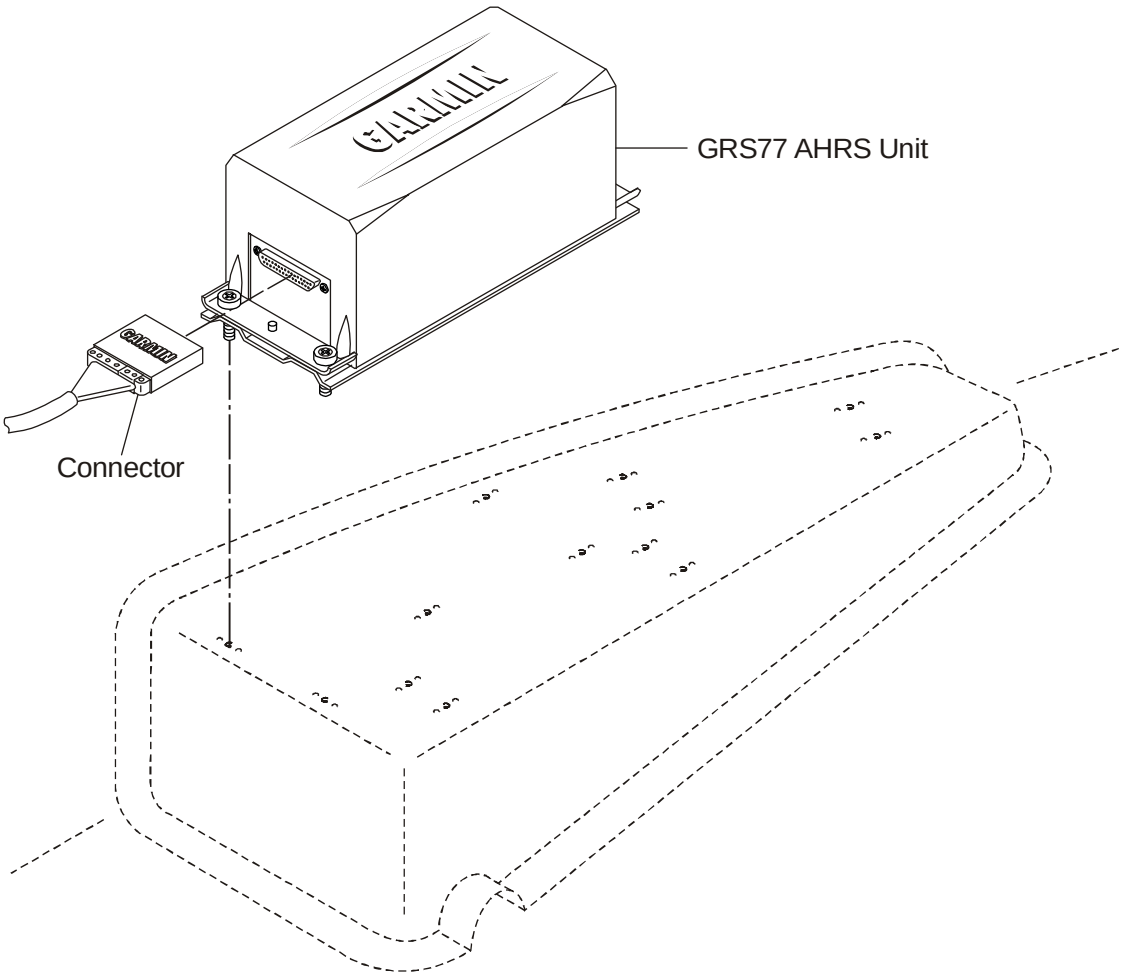


Figure 7: GRS77 Attitude, Heading and Reference Unit (AHRS) Installation

5. Remove/Install the GRS77 Attitude, Heading and Reference Unit (AHRS)

A. Remove the GRS77 Attitude, Heading and Reference Unit (AHRS)

	Detail Steps/Work Items	Key Items/References
(1)	Make sure that the ELECTRIC MASTER key switch is set to OFF.	
(2)	Remove the lower access panel from the rear baggage compartment.	Refer to Section 25-50.
(3)	Remove the GRS77: – Disconnect the electrical cables. – Remove the 4 screws that attach the GRS77 to the mounting. – Move the GRS77 clear of the airplane.	Refer to Figure 7.

B. Install the GRS77 Attitude, Heading and Reference Unit (AHRS)

	Detail Steps/Work Items	Key Items/References
(1)	Install the GRS77 unit: – Move the unit into position next to the avionics rack. – Install the 4 screws that attach the unit to the mount. – Connect the electrical cables.	 At the in-line connector.
(2)	Install the lower access panel in the rear baggage compartment.	Refer to Section 25-50.
(3)	Do a test for the correct operation of the integrated cockpit system (ICS): – Set the ELECTRIC MASTER key switch to ON. – Set the ELECTRIC MASTER key switch to OFF.	 The ICS must power-up and successfully complete its self-test procedure.

6. Remove/Install the GDC 74A Air Data Computer (ADC)

A. Remove the GDC 74A Air Data Computer (ADC)

	Detail Steps/Work Items	Key Items/References
(1)	Disconnect the airplane main battery.	Refer to Section 24-32.
(2)	Remove the instrument panel cover.	Refer to Section 25-10.
(3)	Remove the GDC 74A: – Locate the GDC 74A on the instrument panel shelf. – Disconnect the electrical cables. – Disconnect the Pitot/static tubes from the unit. – Remove the 2 screws that attach the GDC 74A to its mounting rack. – Move the GDC 74A clear of the airplane.	Note the connections!

B. Install the GDC 74A Air Data Computer (ADC)

	Detail Steps/Work Items	Key Items/References
(1)	Install the GDC 74A: – Move the GDC 74A into position on the mounting rack. – Install the 2 screws that attach the GDC 74A to the mounting rack. – Install the Pitot/static tubes to the unit. – Connect the electrical cables.	 As noted in 6A. At the in-line connector.
(2)	Install the instrument panel cover.	Refer to Section 25-10.
(3)	Connect the airplane main battery.	Refer to Section 24-31.
(4)	Do a test for the correct operation of the integrated cockpit system (ICS): – Set the ELECTRIC MASTER key switch to ON. – Set the ELECTRIC MASTER key switch to OFF.	 The ICS must power-up and successfully complete its self-test procedure.
(5)	Do a Pitot/static leak test.	Refer to Section 34-10.

7. Remove/Install the GEA 71 Processor

A. Remove the GEA 71 Processor

	Detail Steps/Work Items	Key Items/References
(1)	Disconnect the airplane main battery.	Refer to Section 24-31.
(2)	Remove the instrument panel cover.	Refer to Section 25-10.
(3)	Remove the GEA 71: – Locate the GEA 71 on the instrument panel shelf. – Release the screw that secures the retainer. – Move the retainer clear and lift the GEA 71 clear of the mounting.	Refer to Figure 8. If necessary, remove the standby altimeter. Refer to Section 34-10.

B. Install the GEA 71 Processor

	Detail Steps/Work Items	Key Items/References
(1)	Install the GEA 71: – Move the GEA 71 into position at its mounting. – Lower the GEA 71 into its mounting. – Install the retainer and secure the retainer with the retaining screw.	 If removed, install the standby altimeter. Refer to Section 34-10.
(2)	Install the instrument panel cover.	Refer to Section 25-50.
(3)	Connect the airplane main battery.	Refer to Section 24-31.
(4)	Do a test for the correct operation of the integrated cockpit system (ICS): – Set the ELECTRIC MASTER key switch to ON. – Set the ELECTRIC MASTER key switch to OFF.	 The ICS must power-up and successfully complete its self-test procedure.

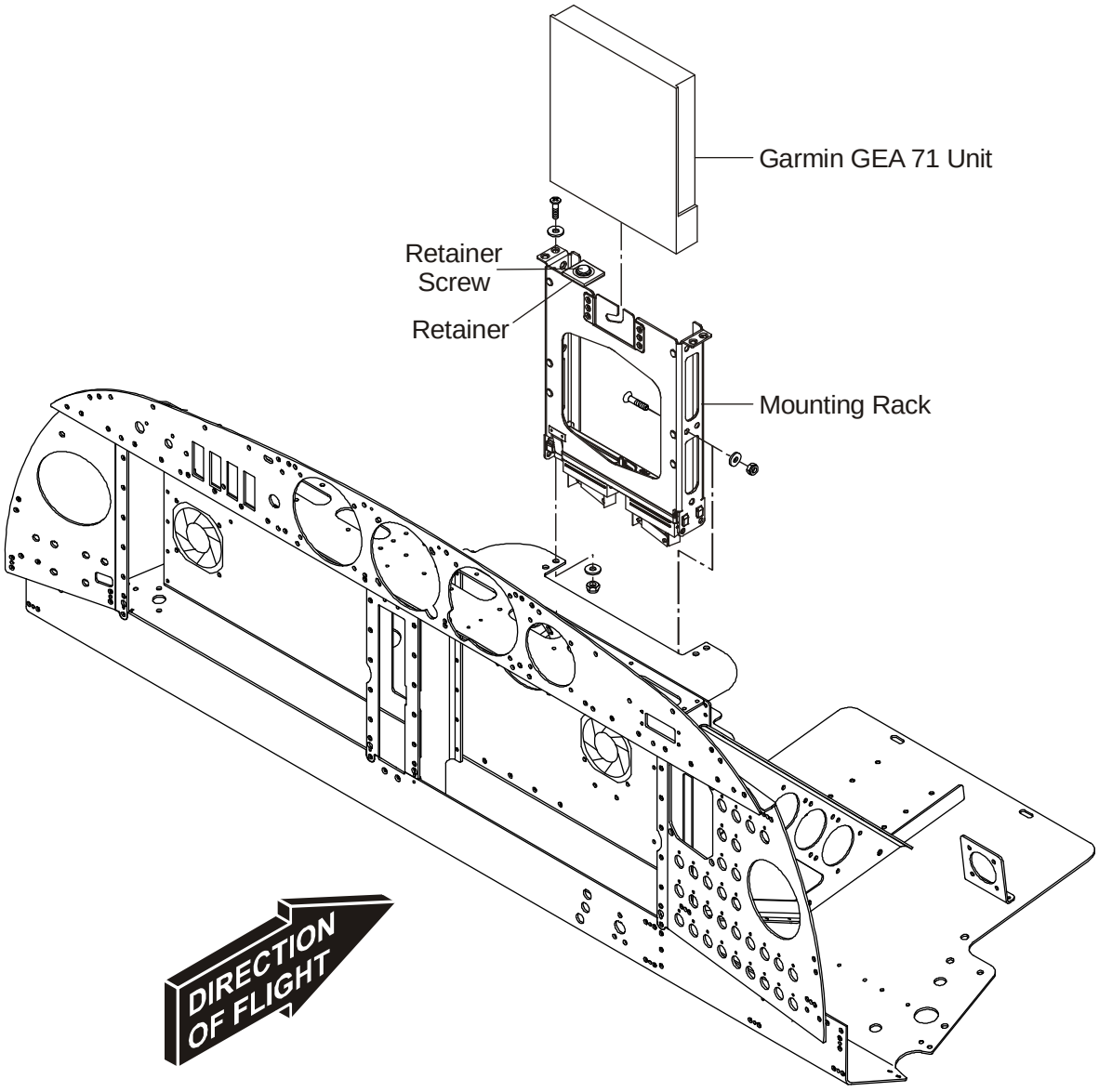


Figure 8: GEA 71 Processor Installation

8. GMU 44 Magnetometer

A. Remove the GMU 44 Magnetometer

	Detail Steps/Work Items	Key Items/References
(1)	Make sure that the ELECTRIC MASTER key switch is set to OFF.	
(2)	Remove the magnetometer assembly: – Remove the 3 screws that attach the magnetometer assembly to the lower surface of the right wing. – Lower the magnetometer assembly clear of the structure and disconnect the electrical cables. – Move the magnetometer assembly clear of the airplane.	Support the assembly.
(3)	If necessary, remove the magnetometer from the panel.	

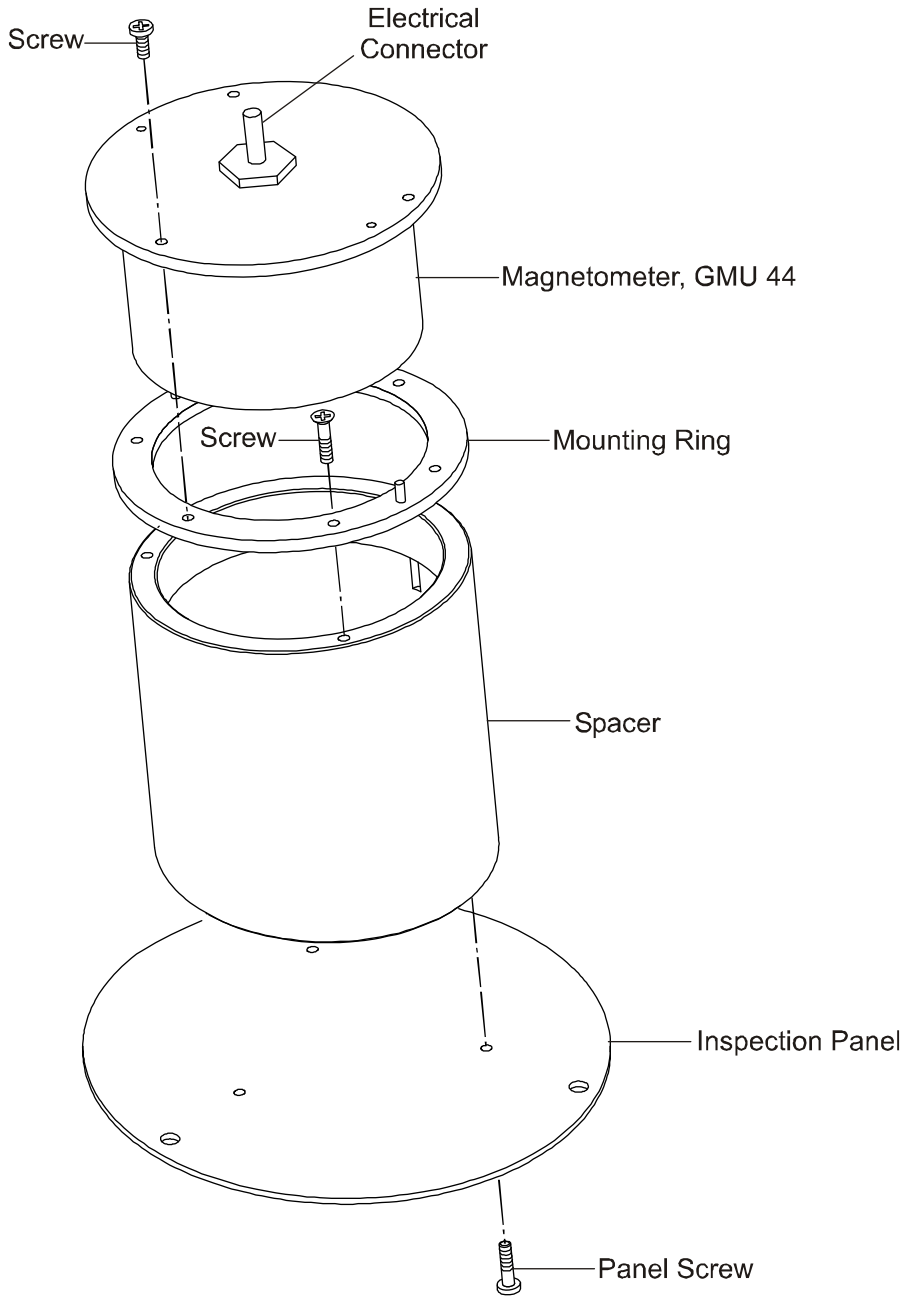


Figure 9: Magnetometer Assembly Installation

B. Install the GMU 44 Magnetometer

	Detail Steps/Work Items	Key Items/References
(1)	Install the magnetometer assembly: – Move the magnetometer assembly into position at the right wing. – Connect the electrical cables to the magnetometer assembly. – Move the magnetometer assembly fully into position in the lower surface of the right wing. – Install the 3 screws that attach the magnetometer assembly to the wing.	Pay attention on the dedicated mounting direction marked by an arrow! At the in-line connector.
(2)	Do a test for the correct operation of the integrated cockpit system (ICS): – Set the ELECTRIC MASTER key switch to ON.	The ICS must power-up and successfully complete its self-test procedure.
(3)	Do a magnetometer calibration.	Refer to the G1000 Line Maintenance Manual.

Section 31-50
Central Warning System - Lycoming Engine

1. General

The DA 40 with the Lycoming engine installed has warning, caution and status lights combined in a single annunciator panel. There are two variants of the annunciator panel ('DAI' and 'White Wire'). Only one variant is installed.

2. Description and Operation

A. DAI Annunciator Panel

(1) Warning, Caution and Status Lights

– OIL PR. Red warning light indicating low oil pressure. An oil pressure transducer installed in the engine accessory housing operates the warning light when the oil pressure is less than 25 PSI.

– FUEL PR. Red warning light indicating low fuel pressure. A fuel pressure transducer installed in the fuel line between the engine driven fuel pump and the injector operates the warning light when the fuel pressure is less than 14 PSI.

– L FUEL. Amber caution light indicating low fuel level in the left fuel tank. A fuel level switch in the left fuel tank operates the caution light. The caution light starts to flash when the fuel level in the left fuel tank is low. It illuminates permanently when the fuel level (usable) in the left fuel tank falls below 3 US gal (±1 US gal).

– R FUEL. Amber caution light indicating low fuel level in the right fuel tank. A fuel level switch in the right fuel tank operates the caution light. The caution light starts to flash when the fuel level in the right fuel tank is low. It illuminates permanently when the fuel level (usable) in the right fuel tank falls below 3 US gal (±1 US gal).

– START. Red warning light indicating that the starter solenoid is energized. The warning light receives an electrical current from the starter side of the starter solenoid. It illuminates when the starter is being operated or when the connection between the starter motor and the engine has not been broken. This occurs when the pinion of the starter motor remains engaged with the propeller flywheel.

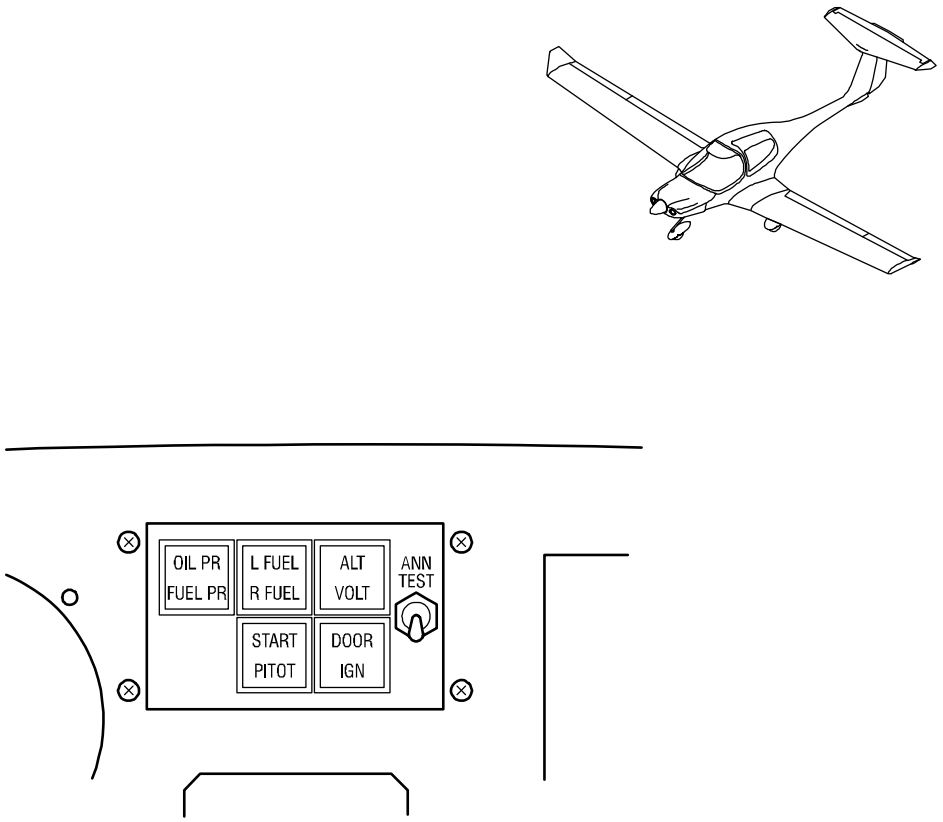


Figure 1: Central Warning System: DAI Annunciator Panel

– PITOT. Amber caution light indicating that the Pitot heating system is OFF. The caution light receives an electrical current from the heater side of the Pitot heat relay. The Pitot heating caution light is illuminated when the Pitot heating is not switched ON, or when there is a failure of the Pitot heating system. Prolonged operation of the Pitot heating on the ground can also cause the Pitot heating caution light to illuminate. In this case it indicates the activation of the thermal switch, which prevents overheating of the Pitot heating system on the ground. This is a normal function of the system. After a cooling period, the heating system will be switched on again automatically.

– ALT. Red warning light indicating alternator failure. The warning light is operated by the voltage regulator.

– VOLT. Amber caution light indicating low voltage at main bus. The caution light is operated when the voltage falls below 24 volts. It goes out again when the voltage exceeds 25 volts.

– DOOR. Red warning light indicating the canopy/door is unlocked. Micro-switches connected in series operate the warning light when either the door or canopy is unlocked.

– IGN. This light is only used when the LASAR ignition system is installed.

White status light indicating that the LASAR ignition system is in back-up mode. The LASAR control unit operates the status light when the LASAR system is in back-up (manual) mode. Refer to the equipment manufacturer's manuals for more data on the LASAR system.

(2) Test Switch

Select and hold the test switch to ANN TEST position to test the warning lamp filaments.

(3) Wiring Diagrams

Refer to Chapter 92 for the wiring diagrams for the central warning systems.

B. White Wire Annunciator Panel

(1) Warning Messages

A warning is indicated by a continuous aural alert (sounded in the airplane's intercomm system), flashing of the red WARNING light, and flashing of the red warning light associated with the affected system.

By pressing the 'acknowledge' button, which is now illuminated green, the aural alert will be terminated, and the WARNING light will be extinguished. The warning light associated with the affected system will change from flashing to solid illumination.

(2) Caution Messages

A caution is indicated by a short aural alert (sounded in the airplane's intercomm system), flashing of the amber CAUTION light, and flashing of the amber caution light associated with the affected system.

By pressing the 'acknowledge' button, which is now illuminated green, the CAUTION light will be extinguished. The caution light associated with the affected system will change from flashing to solid illumination.

The LOW FUEL caution message is displayed in a slightly different manner (extended functionality), which is described below.

(3) Warning, Caution and Status Lights

– OIL PRESS.

Red warning light indicating low oil pressure. An oil pressure transducer installed in the engine accessory housing activates the oil pressure warning message when the oil pressure is less than 25 PSI.

– FUEL PRESS.

Red warning light indicating low fuel pressure. A fuel pressure transducer installed in the fuel line between the engine driven fuel pump and the injector activates the fuel pressure warning message when the fuel pressure is less than 14 PSI.

– LOW FUEL.

Amber caution light indicating low fuel level in the left or right fuel tank. Fuel level switches in each fuel tank activate the low fuel caution message.

As soon as the amount of usable fuel *in one tank* is less than 3 US gal (±1 US gal), a caution message is displayed in the usual manner (momentary aural alert, flashing CAUTION light, flashing LOW FUEL caution light). Termination of the message is also done as usual ('acknowledge', CAUTION light is extinguished, LOW FUEL caution light changes to solid illumination).

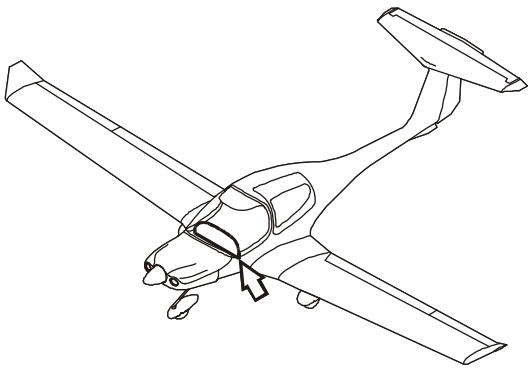
As soon as the amount of usable fuel *in the second tank* is also less than 3 US gal (±1 US gal), a caution message is displayed in a different manner. A continuous aural alert is sounded in the airplane's intercomm system, the amber CAUTION light is flashed, and the amber LOW FUEL caution light is flashed.

By pressing the 'acknowledge' button, which is now illuminated green, the aural alert will be terminated, and the CAUTION light will be extinguished. The LOW FUEL caution light will continue to be flashed.

– START. Red warning light indicating that the starter solenoid is energized. The warning light receives an electrical current from the starter side of the starter solenoid. The starter warning message is displayed when the connection between the starter motor and the engine has not been broken. This occurs when the pinion of the starter motor remains engaged with the propeller flywheel.

The warning light is illuminated continuously as long as the starter is being operated. In this case the WARNING light and the aural alert will not be activated.

– PITOT. Amber caution light indicating that the Pitot heating system is OFF. The caution light receives an electrical current from the heater side of the Pitot heat relay. The Pitot heating caution message is displayed when the Pitot heating is not switched ON, or when there is a failure of the Pitot heating system. Prolonged operation of the Pitot heating on the ground can also cause the Pitot heating caution message to be displayed. In this case it indicates the activation of the thermal switch, which prevents overheating of the Pitot heating system on the ground. This is a normal function of the system. After a cooling period, the heating system will be switched on again automatically.



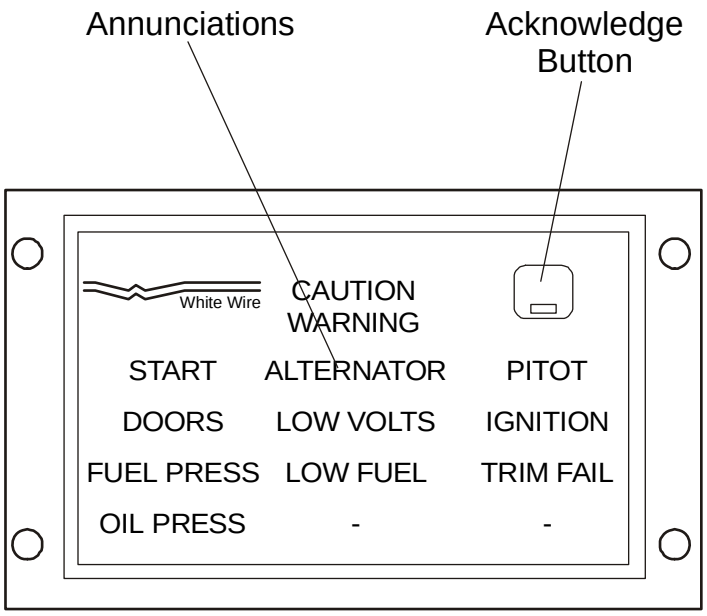


Figure 2: Central Warning System: White Wire Annunciator Panel

– ALTERNATOR.

Red warning light indicating alternator failure. The alternator warning message is activated by the voltage regulator.

– LOW VOLTS.

Amber caution light indicating low voltage at main bus. The low voltage caution message is displayed when the voltage falls below 24 volts. It is terminated when the voltage exceeds 25 volts.

– DOORS.

Red warning light indicating the canopy/door is unlocked. Micro-switches connected in series activate the doors warning message when either the door or canopy is unlocked.

– IGNITION.

This light is only used when the LASAR ignition system is installed.

White status light indicating that the LASAR ignition system is in back-up mode. The LASAR control unit operates the status light when the LASAR system is in back-up (manual) mode. The WARNING light, the CAUTION light, and the aural alert will *not* be activated. Refer to the equipment manufacturer's manuals for more data on the LASAR system.

– TRIM FAIL.

This light is only used when the autopilot system is installed.

Red warning light indicating a failure of the automatic trim system of the autopilot. The autopilot control unit activates the trim fail warning message when there is a failure of the automatic trim system of the autopilot.

– Unused Lights.

The White Wire annunciator panel has two lights for possible future use. These lights are currently unused.

(4) Functional Check

The functional check is automatically started after switching the battery master switch ON. All lights are flashed, and the aural alert is muted. By pressing the 'acknowledge' button, the lights are extinguished, and a short aural alert is sounded. This test verifies functionality of the microprocessor, the lights, and the aural signal.

You may do additional system tests by holding the 'acknowledge' button for 2 seconds. All lights will begin flashing, and the aural alert will sound continuously.

(5) Wiring Diagrams

Refer to Chapter 92 for the wiring diagrams for the central warning systems.

Trouble-Shooting

1. General

The table below lists the defects you could have with the central warning system. If you have the trouble detailed in the Trouble column read across to the Possible Cause column. Then do the repair given in the Repair column.

Trouble	Possible Cause	Repair
Warning/Caution/Status indication incorrect.	Bulb or diode in Warning/Status/Caution lamp failed.	DAI annunciator panel: replace the bulb. White wire annunciator panel: Replace the annunciator panel.
	Sensor defective.	Replace the sensor.
	Annunciator unit defective.	Replace the annunciator unit.
	High resistance or open connection in the electrical wiring from the sensor.	Do resistance and continuity tests between the indicator and the sensor. Repair the defective connection or wire.

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Maintenance Practices

1. General

This Section tells you how to replace the main components of the central warning system. Refer to the equipment manufacturer's manuals for more data on the annunciator panel. Refer to the relevant Chapter for data on the warning sensors.

Refer to Chapter 92 for the Wiring Diagrams.

2. Remove/Install the Annunciator Panel

A. Remove the Annunciator Panel

	Detail Steps/Work Items	Key Items/References
(1)	Remove the instrument panel cover.	Refer to Section 25-10.
(2)	Disconnect the electrical cable from the annunciator panel.	At the in-line connector.
(3)	Remove the 4 cross-head screws which attach the annunciator panel to the instrument panel.	Hold the annunciator panel.
(4)	Move the annunciator panel out of the instrument panel and lift clear of the airplane.	

B. Install the Annunciator Panel

	Detail Steps/Work Items	Key Items/References
(1)	Move the annunciator panel into its position in the instrument panel.	
(2)	Install the 4 cross-head screws which attach the annunciator panel to the instrument panel.	
(3)	Connect the electrical cable to the rear of the annunciator panel.	At the in-line connector.
(4)	Install the instrument panel cover.	Refer to Section 25-10.
(5)	Do a test of the annunciator panel.	Refer to Paragraph 3.

3. Test the Annunciator Panel

A. Test the DAI Annunciator Panel

	Detail Steps/Work Items	Key Items/References
(1)	Close front canopy and rear door.	
(2)	Set the ALT/BAT switch to ON.	
(3)	Set and hold the annunciator test switch to ANN TEST.	All lights on the annunciator panel must be on.
(4)	Release the annunciator test switch.	All lights on the annunciator panel must be off.
(5)	Set the ALT/BAT switch to OFF.	

B. Test the White Wire Annunciator Panel

	Detail Steps/Work Items	Key Items/References
(1)	Close front canopy and rear door.	
(2)	Put on a head-set.	To hear the aural alert.
(3)	Set the ALT/BAT switch to ON.	All lights on the annunciator panel must be flashed. The aural alert must be muted.
(4)	Switch the intercom ON.	To hear the aural alert.
(5)	Press the 'acknowledge' button.	The lights on the annunciator panel must be extinguished, and a short aural alert must be sounded.
(6)	Set the ALT/BAT switch to OFF.	

Section 31-51
Central Warning System - TAE 125 Diesel Engine with Standard Equipment Installed

1. General

The DA 40 with the TAE 125 Diesel engine has warning, caution and status lights combined in one 'White Wire' annunciator panel. Figure 1 shows the annunciator panel.

2. Description and Operation - White Wire Annunciator Panel

A. Warning Messages

A warning gives these indications:

– A continuous aural alert sounded in the airplane's intercomm system.

– The red master WARNING light flashes.

– The red warning light for the related system flashes.

– The green acknowledge button lights.

Push the 'acknowledge' button to cancel the aural alert. The red master WARNING light will go off. The red warning light for the related system will change from flashing to a continuous light.

B. Caution Messages

A caution gives these indications:

– A short aural alert sounded in the airplane's intercomm system.

– The amber master CAUTION light flashes.

– The amber caution light for the related system flashes.

– The green acknowledge button lights.

Push the 'acknowledge' button, to cancel the aural alert. The amber master CAUTION light will go off. The amber caution light for the related system will change from flashing to a continuous light.

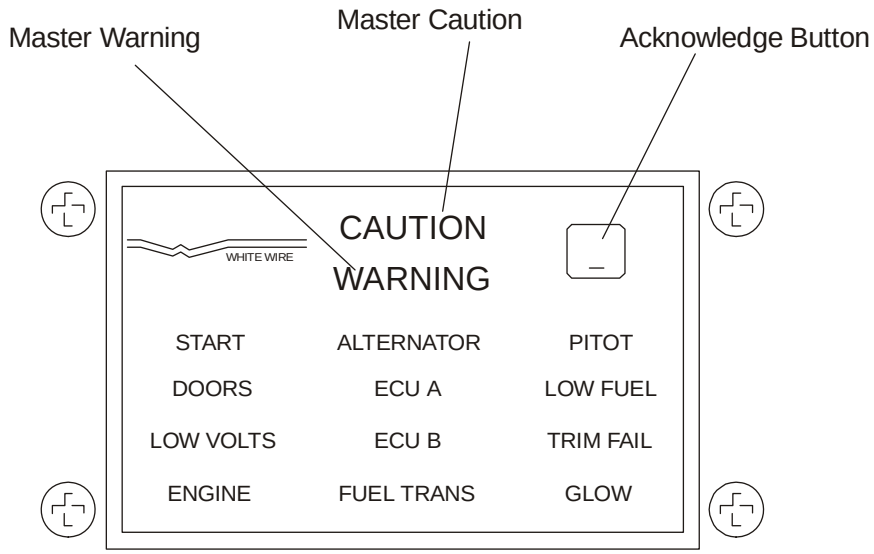


Figure 1: Central Warning System: White Wire Annunciator Panel

C. Warning, Caution and Status Lights

– START. A red warning light shows that the starter solenoid is energized. The warning light receives an electrical current from the starter side of the starter solenoid. The starter warning message shows when the connection between the starter motor and the engine has not been broken. This occurs when the pinion of the starter motor remains engaged with the engine flywheel.

When the starter is operated, the starter warning light is ON continuously. In this case the master WARNING light and the aural alert do not operate.

– DOORS. A red warning light shows that the canopy or door is unlocked. Micro-switches connected parallel operate the doors warning message when either the door or canopy is unlocked.

– LOW VOLTS.

An amber caution light shows low voltage. The low voltage caution message shows when the voltage falls below 12.6 volts.

– ENGINE. An amber caution light shows when any indication on an engine instrument (CED-125 or AED-125) changes from the green to the yellow range.

– ALTERNATOR.

An amber caution light shows alternator failure. The internal regulator of the alternator operates the ALTERNATOR caution message.

– ECU A. An amber caution light shows when the ECU A fails. The engine control system changes to the ECU B automatically.

– ECU B. An amber caution light shows when the ECU B fails.

– FUEL TRANS.

A white status light shows when the fuel transfer pump is ON.

– PITOT. An amber caution light shows that the Pitot heating system is OFF. The caution light receives an electrical current from the heater side of the Pitot heat relay. The Pitot heating caution message shows when the Pitot heating is not switched ON, or when there is a failure of the Pitot heating system.

Prolonged operation of the Pitot heating on the ground can also cause the Pitot heating caution message to show. This happens when the thermal switch operates. (The switch prevents overheating of the Pitot heating system on the ground). This is a normal function of the system. After a cooling period, the heating system will come on again automatically.

– LOW FUEL. An amber caution light shows low fuel level is less than 3 US gal (+2/-1 US gal) in the left fuel tank. The fuel level switch in the left fuel tank operates the low fuel caution message.

– TRIM FAIL. This light is only ued when the autopilot system is installed.

Red warning light indicating a failure of the automatic trim system of the autopilot. The autopilot control unit activates the trim fail warning message when there is a failure of the automatic trim system of the autopilot.

– GLOW. A status message shows when the glow relay is energized. This is usually only before or during start.

3. Functional Check

The functional check is automatically started after switching the ELECTRIC MASTER key switch ON. All lights are flashed, and the aural alert is muted. By pressing the 'acknowledge' button, the lights are extinguished, and a short aural alert is sounded. This test verifies functionality of the microprocessor, the lights, and the aural signal.

You may do additional system tests by holding the 'acknowledge' button for 2 seconds. All lights will begin flashing, and the aural alert will sound continuously.

4. Wiring Diagrams

Refer to Chapter 92 for the wiring diagram for the central warning system.

Trouble-Shooting

1. General

The table below lists the defects you could have with the central warning system. If you have the trouble detailed in the Trouble column read across to the Possible Cause column. Then do the repair given in the Repair column.

Trouble	Possible Cause	Repair
Warning/Caution/Status indication incorrect.	Sensor defective.	Replace the sensor.
	Annunciator panel defective.	Replace the annunciator panel.
	High resistance or open connection in the electrical wiring from the sensor.	Do resistance and continuity tests between the indicator and the sensor. Repair the defective connection or wire.

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Maintenance Practices

1. General

This Section tells you how to replace the main components of the central warning system. Refer to the equipment manufacturer's manuals for more data on the annunciator panel. Refer to the related Chapter for data on the warning sensors.

Refer to Chapter 92 for the Wiring Diagrams.

2. Remove/Install the Annunciator Panel

A. Remove the Annunciator Panel

	Detail Steps/Work Items	Key Items/References
(1)	Remove the instrument panel cover.	Refer to Section 25-10.
(2)	Disconnect the electrical connector from the annunciator panel.	
(3)	Remove the 4 cross-head screws which attach the annunciator panel to the instrument panel.	Hold the annunciator panel.
(4)	Move the annunciator panel out of the instrument panel and lift it clear of the airplane.	

B. Install the Annunciator Panel

	Detail Steps/Work Items	Key Items/References
(1)	Move the annunciator panel into its position in the instrument panel.	
(2)	Install the 4 cross-head screws which attach the annunciator panel to the instrument panel.	
(3)	Connect the electrical connector to the rear of the annunciator panel.	
(4)	Install the instrument panel cover.	Refer to Section 25-10.
(5)	Do a test of the annunciator panel.	Refer to Paragraph 3.

3. Test the Annunciator Panel

	Detail Steps/Work Items	Key Items/References
(1)	Close front canopy and rear door.	
(2)	Put on a head-set.	To hear the aural alert.
(3)	Set the ELECTRIC MASTER key switch to ON.	All lights on the annunciator panel must be flashed. The aural alert must be muted.
(4)	Set the AVIONIC MASTER switch to ON.	
(5)	Switch the intercom ON.	To hear the aural alert.
(6)	Press the 'acknowledge' button.	The PITOT, ECU A and ECU B caution lights must be on. The ALTERNATOR caution light must be on if the engine is not running. The LOW VOLTS caution light can be on or off. All other lights on the annunciator panel must be extinguished, and a short aural alert must be sounded.
(7)	Set the AVIONIC MASTER switch to OFF.	
(8)	Set the ELECTRIC MASTER key switch to OFF.	

CHAPTER 32

LANDING GEAR

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CHAPTER 32
LANDING GEAR

1. General

The DA 40 has a fixed tricycle landing gear and a castering nose wheel. This Section gives you the general description and operation of the landing gear. See Section 32-10 for Trouble-Shooting and Maintenance Practices for the main gear. See Section 32-20 for Trouble-Shooting and Maintenance Practices for the nose gear. See Section 32-40 for Trouble-Shooting and Maintenance Practices for the for the wheels and brakes.

Note: Equipment which is certified for installation in the DA 40 is listed in Section 6.5 of the Airplane Flight Manual. Such equipment may be installed in accordance with the Airplane Maintenance Manual.

Any equipment which is not listed in Section 6.5 of the Airplane Flight Manual is called "Additional Equipment". The installation of Additional Equipment is a modification which must be handled in accordance with national regulations or a Service Bulletin.

2. Description and Operation

Flat section steel leaf-springs make the main gear struts. Two mountings attach each main gear strut to the center section of the fuselage. The bottom of each strut has an axle, a brake torque plate and a mounting plate for the GFRP/CFRP wheel fairing.

The nose gear is a tubular strut. A strong pivot attaches it to the forward fuselage. An elastomer spring pack (elastomer pack) attaches the strut to the engine mount. A pivot at the bottom of the strut has a trailing fork for the wheel. It also holds the GFRP/CFRP wheel fairing.

Both nose and main gear have single wheels with low pressure tires. Each main gear strut has a disk brake. Toe-brake pedals on the rudder pedals operate the disk brakes. A parking brake valve allows the brakes to be set ON for parking.

The landing gear absorbs vertical loads (for example, landing loads). Each main gear strut is a leaf-spring which deflects upwards as the load increases. The elastomer pack in the nose gear compresses as the load increases. In each case, the spring returns to the original position when the load is removed.

Push on both toe-brake pedals at the same time to apply both disk brakes. The airplane will stop in a straight line. Push on one toe-brake pedal to apply the disk brake on that side only. The airplane will steer to that side.

Move the parking brake lever fully up. Then push on both toe-brake pedals a few times to apply the parking brake. Move the parking brake lever fully down to release the parking brake.

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Section 32-10
Main Landing Gear

1. General

This Section gives you the data for the main landing gear. It gives you the Trouble-Shooting and Maintenance Practices. Refer to Section 32-40 for data for the main wheels and the brakes.

2. Description and Operation

Figure 1 shows the main gear strut mounting. Each main gear strut is a steel alloy leaf spring. Two strong mounts attach each spring to the center section of the fuselage. Small panels with flexible centers seal the gaps where each strut goes through the fuselage shell.

The inner mount is a large vertical bolt. The bolt goes through a metal block which attaches to the center closing rib of the fuselage center section. Spring washers separate the top face of the spring from the block. A convex and a concave washer separate the bottom face of the spring from a castle nut. The castle-nut pre-loads the spring washers.

The outer mount has two parts. The upper part locates on top of the main strut and the lower retaining bar locates below the main strut. Two bolts attach the assembly to the main landing gear rib. The main landing gear rib is bonded into the fuselage center section. Reinforced synthetic rubber inserts go between the leaf spring and the retaining bar to prevent chafing damage and allow angular movement of the leaf spring in the mount.

Figure 2 shows the main landing gear axle installation. Six bolts at the outer end of each strut attach these components:

– An axle, made from steel or aluminum.

– A brake torque-plate.

– A mounting plate for the GFRP/CFRP wheel fairing.

When the airplane is on the ground, the inner end of the leaf spring pulls down on the inner mounting. The outer end pushes up against the outer mounting. When the airplane is flying, the inner end of the leaf spring pushes up on the inner mounting. And the outer end pulls down against the retaining bar of the outer mounting.

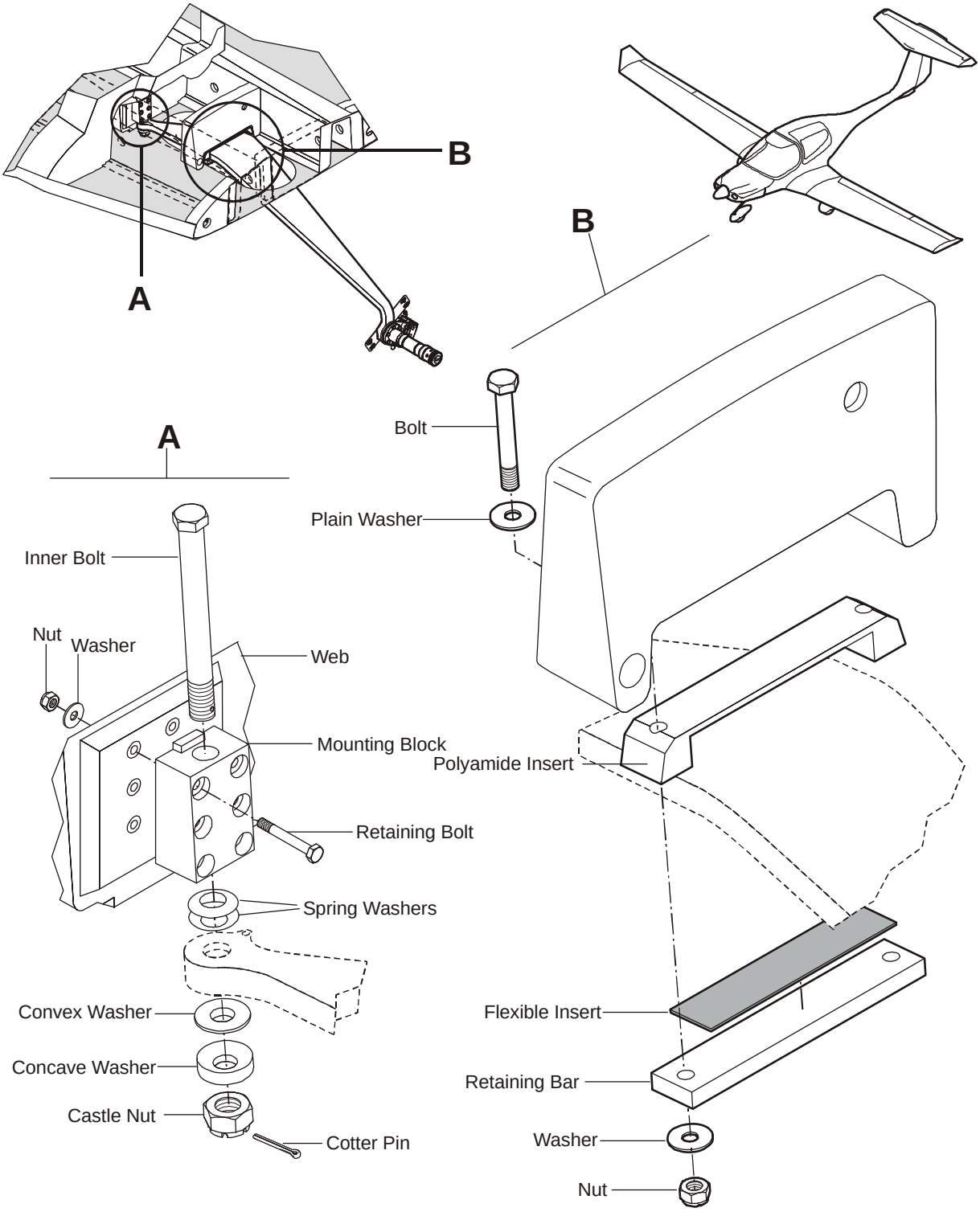


Figure 1: Main Landing Gear Strut Mounting

Trouble-Shooting

1. General

Use the data below to trouble-shoot the main landing gear.

WARNING: DO A HARD LANDING CHECK AFTER A HARD LANDING. HARD LANDINGS CAN CAUSE DAMAGE TO THE STRUCTURE AND THE LANDING GEAR.

Trouble	Possible Cause	Repair
Strut bent.	Hard landing.	Do a hard landing check. Refer to Section 05-50. Replace the strut.
Negative camber.	Strut bent, hard landing.	Do a hard landing check. Refer to Section 05-50. Replace the strut.
Too much tire wear.	Incorrect toe-in.	Adjust the toe-in. Refer to Test/Adjust the Main Landing Gear procedure in this Section.

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Maintenance Practices

1. General

These Maintenance Practices tell you how to remove, install and adjust the main landing gear. Refer to the manufacturer for further data.

2. Remove/Install a Main Landing Gear Strut

A. Equipment

Item	Quantity	Part Number
Airplane jacks.	3	Commercial.
Nose trestle.	1	Commercial.
Wing trestles.	2	Commercial.

B. Remove a Main Landing Gear Strut

	Detail Steps/Work Items	Key Items/References
(1)	Lift the airplane on jacks.	Refer to Section 07-10.
(2)	Remove the strut fairing, if installed: – Remove brake cover. – Remove stub wing cover. – Remove strut fairing.	If OÄM 40-106 is installed. Remove bolts and washers. Remove bolts and washers. Remove bolts and washers at the rear.
(3)	Remove the wheel fairing: – Remove the outer bolt. – Remove 4 screws from the inner side.	
(4)	Remove the back-plate from the brake caliper.	Refer to Section 32-40.
(5)	Remove the wheel.	Refer to Section 32-40.
(6)	Release the brake caliper.	
(7)	Remove the 6 bolts which attach the axle. Remove the axle, torque-plate and mounting plate for the wheel fairing.	Refer to Figure 2. Only if you will install a different strut.
(8)	Disconnect the bonding cable from the strut.	

	Detail Steps/Work Items	Key Items/References
(9)	Remove the 6 bolts, washers and nuts which hold the mounting block to the web.	Refer to Figure 1.
(10)	Remove the nuts which hold the retaining bar to the outer mounting bracket.	Hold the strut!
(11)	Remove the strut.	Move the strut outboard.
(12)	If necessary remove the nut and bolt at the inner attachment mount.	Refer to Figure 1.

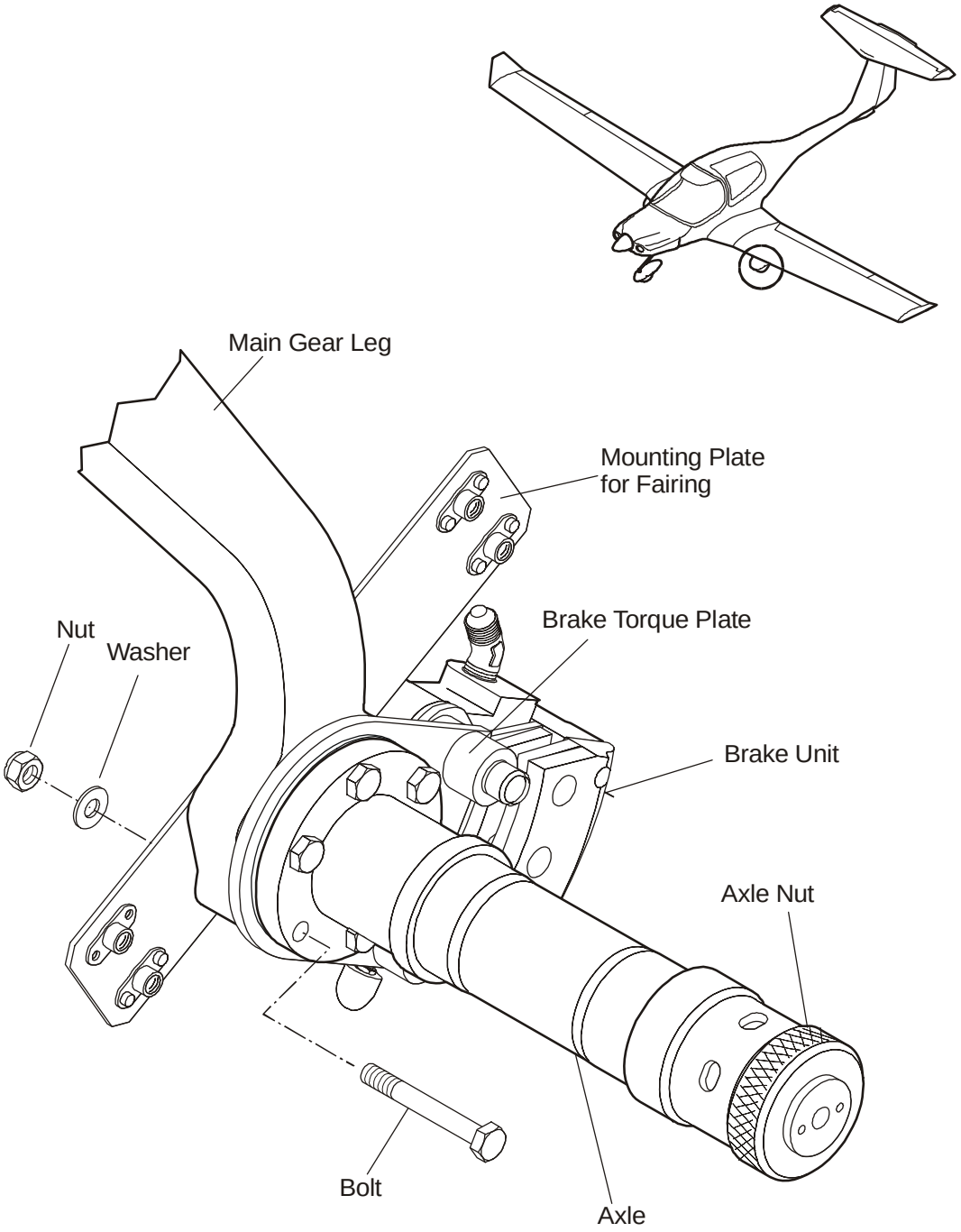


Figure 2: Main Landing Gear Axle Installation

C. Install a Main Landing Gear Strut

	Detail Steps/Work Items	Key Items/References
(1)	Examine the center section in the area of the main landing gear mountings. Look specially for damage to the GFRP structure.	Refer to Section 51-10 for GFRP inspection procedures.
(2)	If necessary install the nut and the bolt at the inner attachment mount.	Refer to Figure 1.
(3)	Put the strut in position.	Move it inboard through the center section access panel.
(4)	Put the inserts in position above and below the strut at the outer mounting.	Hold the strut!
(5)	Install the retaining bar.	Torque 20 Nm (14.8 lbf.ft.). Make sure that the flexible insert is glued in position. Use Loctite Superglue.
(6)	If necessary install the mounting block to the web by use of the 6 bolts, washers and nuts.	Refer to Figure 1. Torque the six bolts with 6.4 Nm (4.7 lbf.ft.). Make sure that the spring washers are between the top of the strut and the mounting block (concave sides facing). Make sure that the convex and concave washers are between the nut and the strut.
(7)	Tighten the nut on the inner bolt and install a cotter pin.	To give a height of the spring washers of 4 mm (+0.5 mm / -0 mm) or 0.16 in (+0.02 in / -0 in).
(8)	Connect the bonding cable to the strut.	Install the nut and bolt near the inner mounting block.
(9)	Install the axle, brake torque-plate and the mounting plate for the wheel fairing. Install the 6 bolts which attach the axle.	Refer to Figure 2. Torque: 6.4 Nm (4.7 lbf. ft.).
(10)	Install the brake caliper.	Refer to Section 32-40.
(11)	Install the wheel.	Refer to Section 32-40.
(12)	Install the back-plate to the brake caliper.	Refer to Section 32-40.
(13)	Lower the airplane with jacks.	Refer to Section 07-10.
(14)	Do a test for correct adjustment of the landing gear.	See Paragraph 3.

	Detail Steps/Work Items	Key Items/References
(15)	Do a function test of the wheel brake system.	
(16)	Install the wheel fairing: – Install the outer bolt. – Install 4 screws on the inner side.	
(17)	Install the strut fairing: – Install strut fairing. – Install stub wing cover. – Install brake cover.	If OÄM 40-106 is installed. Take care of padding on strut. Take care of padding on strut cover.

3. Test/Adjust the Main Landing Gear

Do this work at the following times:

– When required by the maintenance checklist (Chapter 05).

– After a hard landing.

– After any reinstallation or repair to the main landing gear strut.

A. Equipment

Item	Quantity	Part Number
Slide sheets - 2 per side.	4	Commercial.

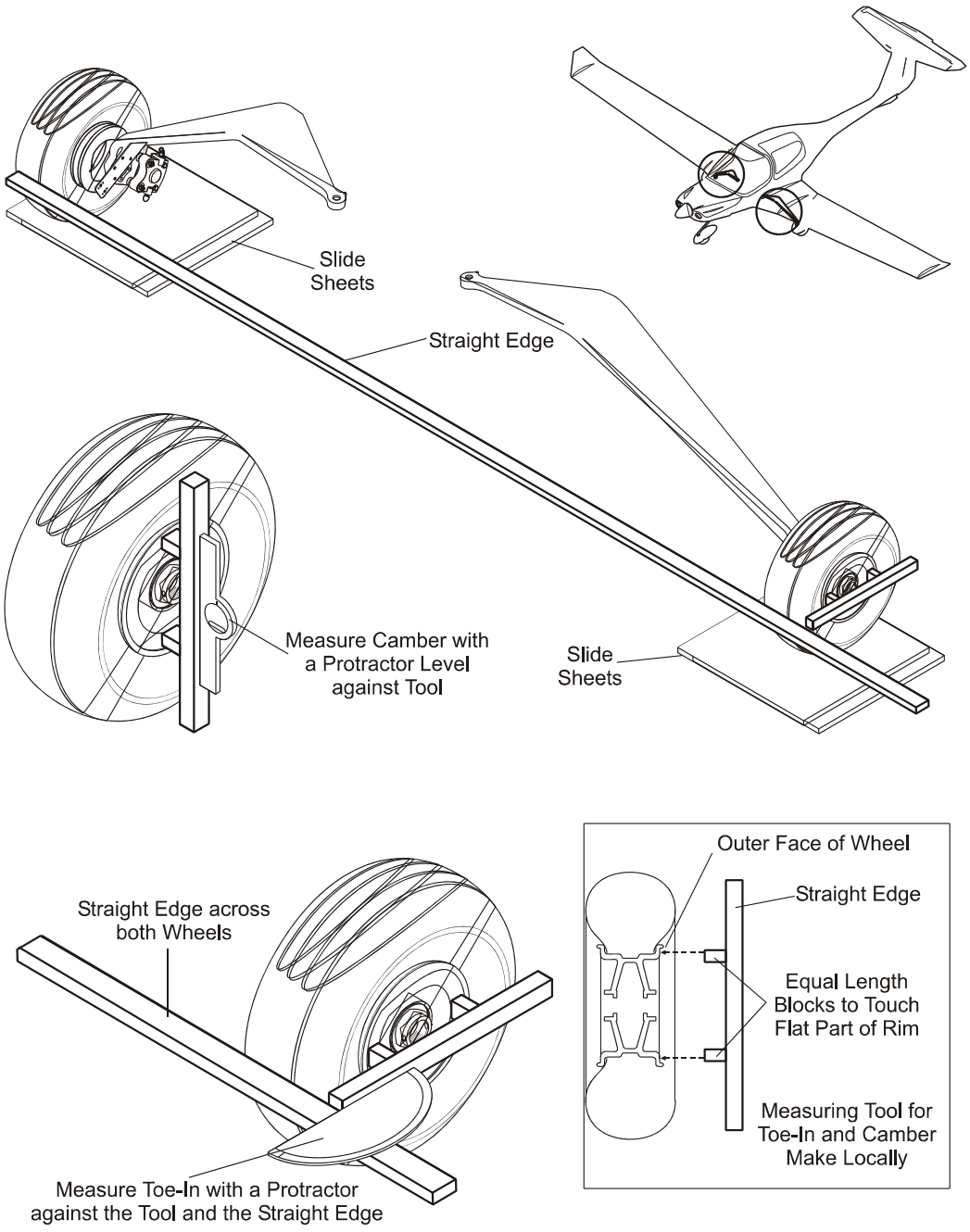


Figure 3: Measure Toe-In and Camber

B. Procedure

	Detail Steps/Work Items	Key Items/References
(1)	Make sure that the airplane is at the empty weight.	See the Adjustment Report for the airplane.
(2)	Remove the strut fairings, if installed: – Remove brake cover. – Remove stub wing cover. – Remove strut fairing.	Optional, see OÄM 40-106. Remove bolts and washers. Remove bolts and washers. Remove bolts and washers at the rear.
(3)	Remove the wheel fairings: – Remove the outer bolt. – Remove 4 screws from the inner side.	For each wheel.
(4)	Move the airplane to put the main wheels on the slide sheets.	
(5)	Measure the toe-in.	Refer to Figure 3.
(6)	Measure the camber.	Refer to Figure 3.
	WARNING: USE ONLY THE SHIMS LISTED FOR THE PURPOSE IN THE ILLUSTRATED PARTS CATALOGUE. OTHER SHIMS COULD CAUSE LANDING GEAR FAILURE.	
(7)	If necessary, adjust the toe-in and/or camber.	Refer to Chapter 06-00 for limits. Maximum 2° shim per side (camber and toe). See the Illustrated Parts Catalogue for the correct shims. Put shims between the strut and the axle. These change the angle between the axle and the airplane longitudinal or vertical axis.
(8)	Measure the wheel track.	Across the airplane from the outermost point on one axle to the outermost point on the other axle.

	Detail Steps/Work Items	Key Items/References
(9)	Move the airplane off the slide sheets.	
(10)	Install the wheel fairings: – Install the outer bolt. – Install 4 screws on the inner side.	
(11)	Install the strut fairings: – Install strut fairing. – Install stub wing cover. – Install brake cover.	If OÄM 40-106 is installed. Take care of padding on strut. Take care of padding on strut cover.

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Section 32-20
Nose Landing Gear

1. General

This Section gives you the data for the nose landing gear. It gives you the Trouble-Shooting and Maintenance Practices. Refer to Section 32-40 for the data for the nose wheel.

2. Description and Operation

Figure 1 shows the nose landing gear installation. The DA 40 has a fixed nose landing gear with a castering wheel. The nose landing gear strut is a welded tubular-steel component. The aft upper end has a transverse tube which holds the main attachment journal bearings. These journal bearings allow the strut to move only up and down.

Forward and below the attachment bearing is a welded bracket which holds the bottom of an elastomeric spring pack (elastomer pack). The upper end of the elastomer pack attaches to the engine mount.

The forward bottom end of the nose landing gear strut has a near vertical pivot for the nose-wheel fork. This lets the nose wheel castor. Stops limit the castor movement to ±30°.

When the airplane is on the ground, the elastomer pack pushes up against the engine mount. The journal bearings pull down against the front fuselage. When the airplane is flying, the elastomer pack pulls down against the engine mount. And the journal bearing pushes up against the front fuselage.

The journal bearings in the fuselage keep the nose landing gear strut aligned fore and aft. A side load on the nose wheel causes it to castor. The stiffness (steering friction) of the nose-wheel fork pivot can be adjusted with the nose wheel fork mounting screw. This prevents nose wheel shimmy.

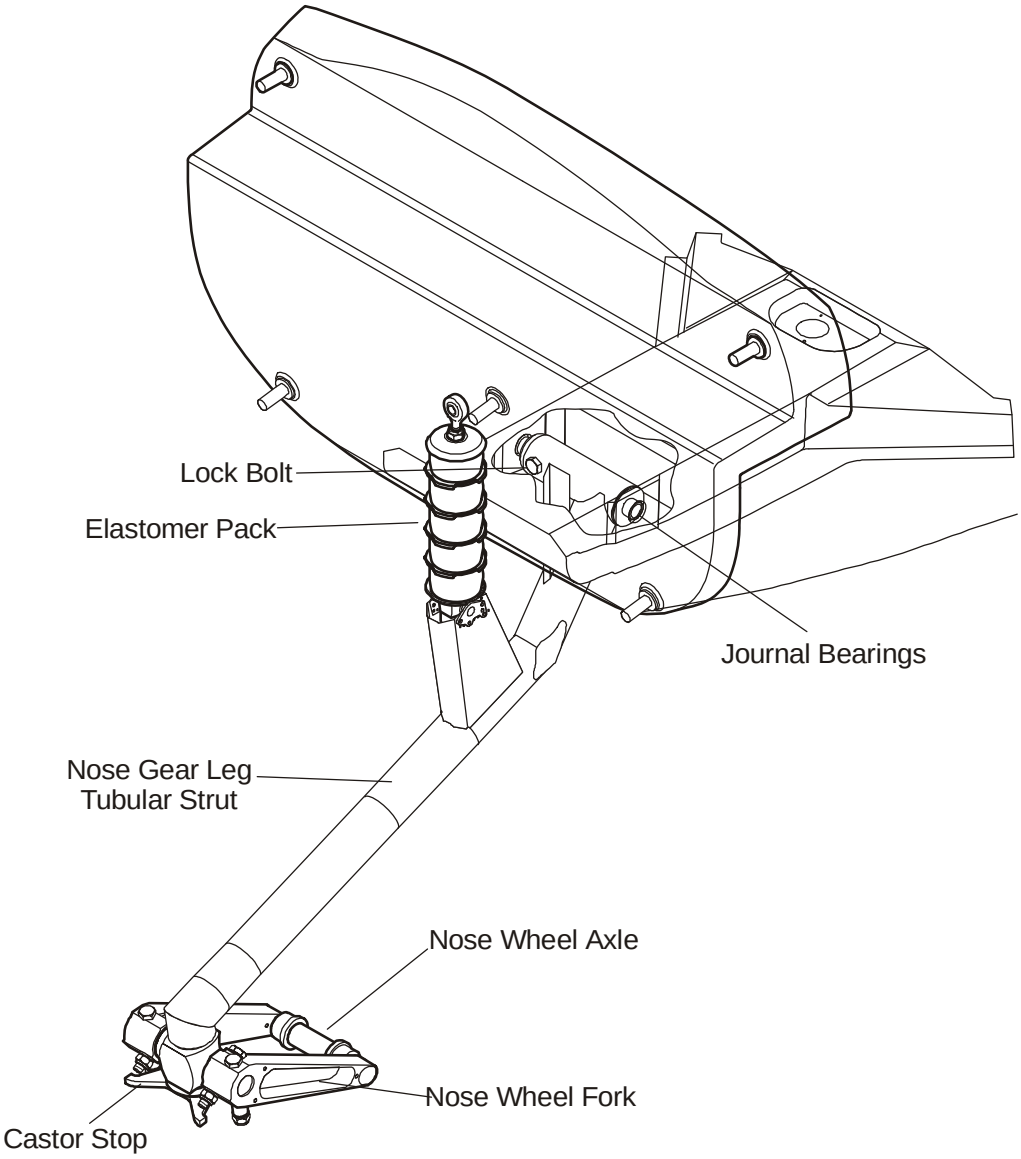


Figure 1: Nose Landing Gear

Trouble-Shooting

1. General

Use the data below to trouble-shoot the nose landing gear.

WARNING: YOU MUST DO A HARD LANDING CHECK AFTER A HARD LANDING. HARD LANDINGS CAN CAUSE DAMAGE TO THE STRUCTURE AS WELL AS THE LANDING GEAR.

Trouble	Possible Cause	Repair
Strut bent.	Hard landing.	Do a hard landing check. Refer to Section 05-50. Replace the strut.
Nose wheel shimmy.	Steering friction too low.	Adjust the nose wheel fork mounting screw.

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Maintenance Practices

1. General

These Maintenance Practices tell you how to remove, install and adjust the nose landing gear. Refer to the manufacturer for further data.

2. Remove/Install the Nose Landing Gear Strut

A. Equipment

Item	Quantity	Part Number
Padded trestles.	1	Commercial.
Weight and strap.	1	Commercial.

B. Remove the Nose Landing Gear Strut

	Detail Steps/Work Items	Key Items
(1)	Use weights to hold the rear fuselage down with the nose wheel clear of the ground.	Use a strap around the fuselage.
(2)	Put a padded trestle under the front fuselage just aft of the nose gear mounting.	
(3)	Remove the engine cowling.	Refer to Section 71-10, 71-11 or 71-12.
(4)	Remove the strut fairing (if installed): – Remove the bolts, nuts and washers at the trailing edge. – Remove the bolts, nuts and washers from the support bracket at the forward bottom side of the cover. – Move the strut fairing clear of the airplane.	If OÄM 40-105 is installed.
(5)	Disconnect the elastomer pack from the engine mount.	Refer to Figure 1.
(6)	Remove the lock bolt from the journal bearing.	Refer to Figure 1.
(7)	Compress the journal bearing unit inwards.	
(8)	Release the journal bearing unit from the fuselage bearings.	

	Detail Steps/Work Items	Key Items
(9)	Remove the nose gear strut from the airplane in a downward direction.	

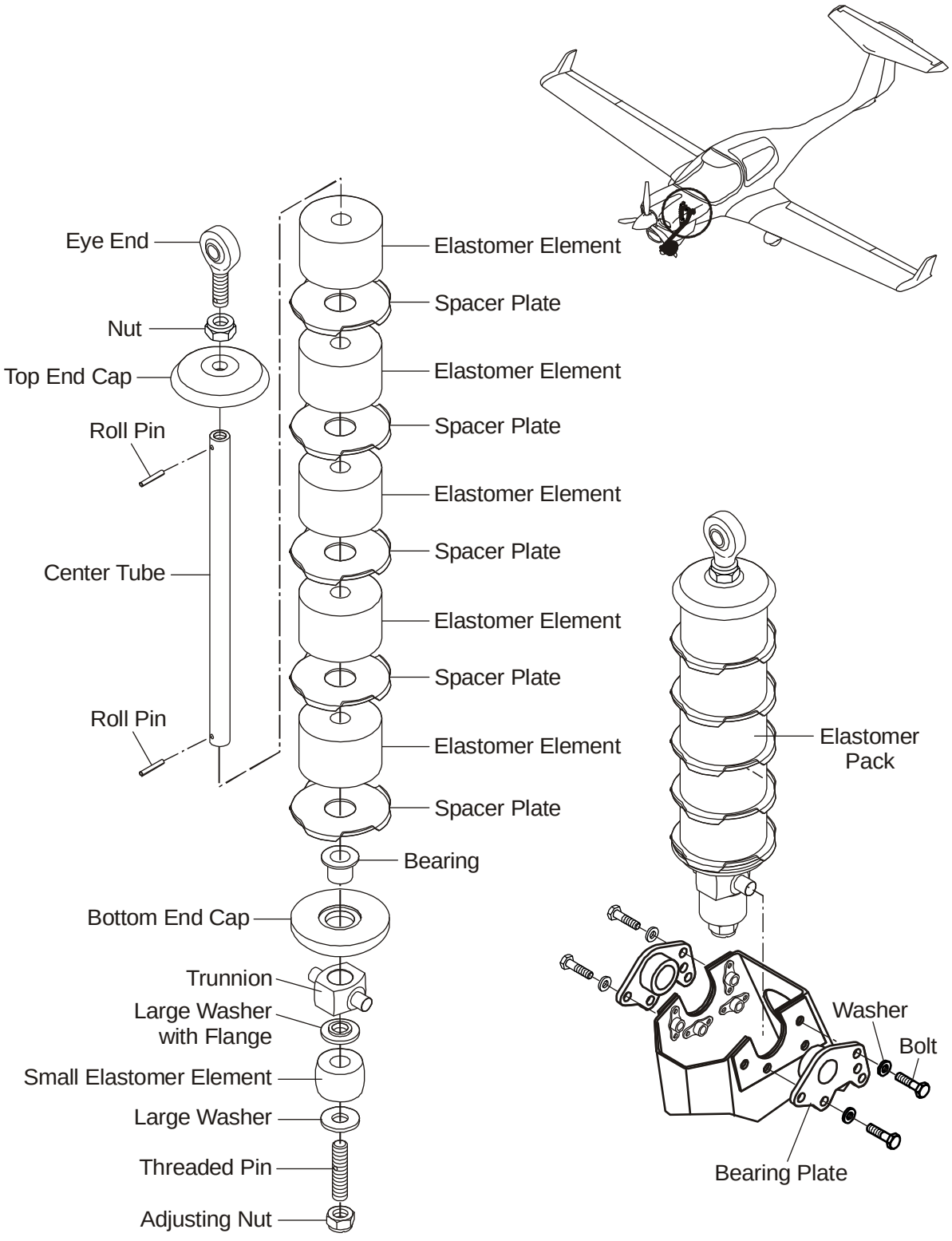


Figure 2: Elastomer Pack and Journal Assembly (Lycoming Version)

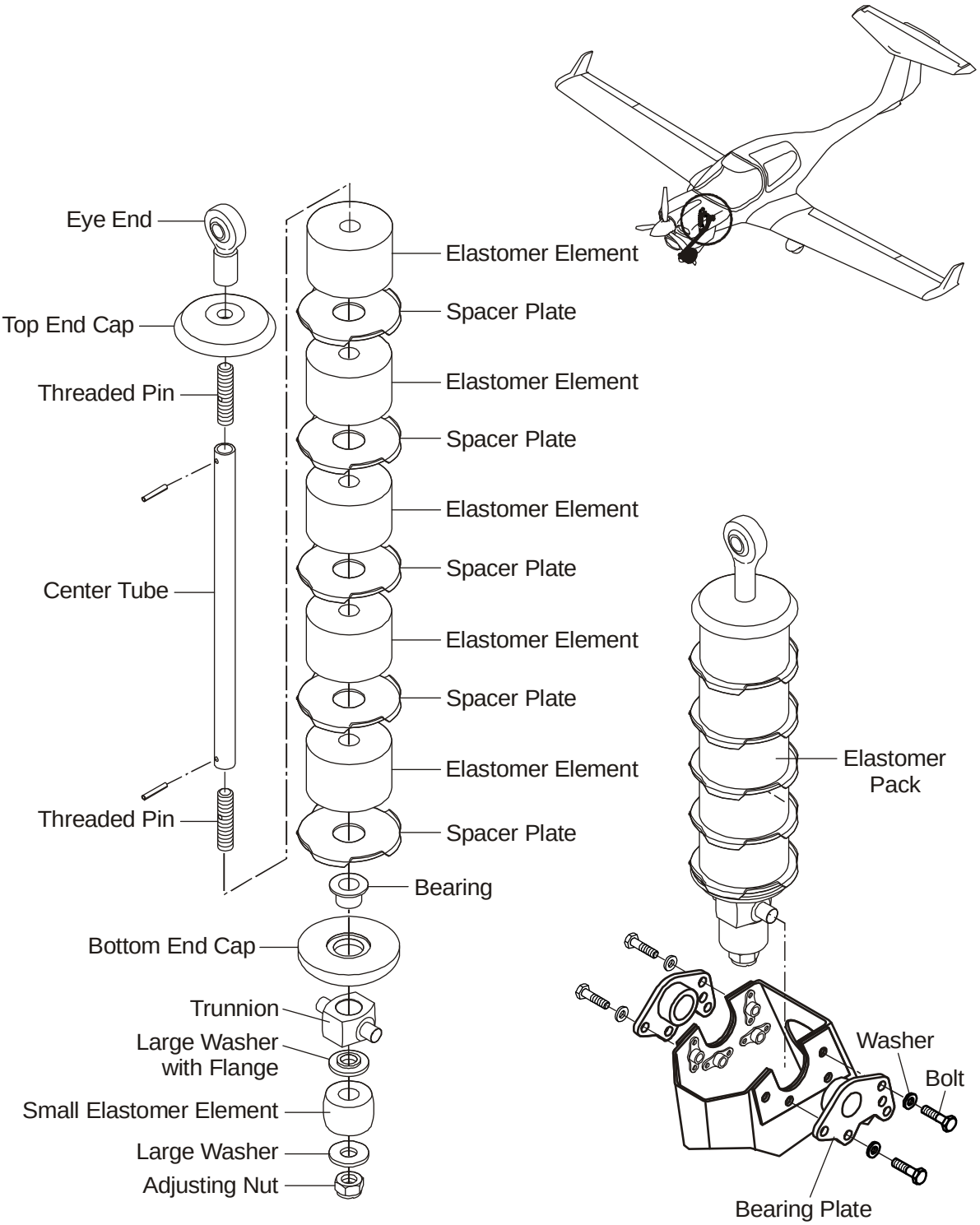


Figure 3: Elastomer Pack and Journal Assembly (TAE Version)

C. Install the Nose Landing Gear Strut

	Detail Steps/Work Items	Key Items/References
(1)	Preparation: – Liberally apply corrosion protection to these items: – The inside of the journal assembly. – The shank of the lock bolt. – The shank of the bolt which attaches the elastomer pack to the engine mount.	Refer to Figure 1. Use LPS.
(2)	Put the nose gear strut in position in the airplane from below.	
(3)	Expand the journals of the unit to engage the bearings in the fuselage.	Refer to Figure 1.
(4)	Install the lock bolt in the journal bearing unit.	
(5)	Connect the elastomer pack to the engine mount.	Refer to Section 71-20 for Lycoming version or Section 71-21 for TAE version.
(6)	Adjust the nose wheel steering friction.	Refer to Paragraph 5.
(7)	Remove the trestle from the front fuselage.	
(8)	Lower the nose wheel to the floor.	Remove the weights from the rear fuselage.
(9)	Install the strut fairing: – Put the strut fairing in position on the strut. – Install the bolts, nuts and washers to the support bracket at the forward bottom side of the cover. – Install the bolts, nuts and washers at the trailing edge.	If OÄM 40-105 I installed. Take care of the padding on the nose gear strut.
(10)	Install the engine cowling.	Refer to Section 71-10, 71-11 or 71-12.

3. Remove/Install the Elastomer Pack

A. Equipment

Item	Quantity	Part Number
Padded trestles.	1	Commercial.
Weight and strap.	1	Commercial.

B. Remove the Elastomer Pack

	Detail Steps/Work Items	Key Items/References
(1)	Use weights to hold the rear fuselage down with the nose wheel clear of the ground.	Use a strap around the fuselage.
(2)	Put a padded trestle under the front fuselage just aft of the nose mounting.	
(3)	Remove the engine cowling.	Refer to Section 71-10, 71-11 or 71-12.
(4)	Remove the strut fairing (if installed): – Remove the bolts, nuts and washers at the trailing edge. – Remove the bolts, nuts and washers from the support bracket at the forward bottom side of the cover. – Move the strut fairing clear of the airplane.	Optional, see OÄM 40-105.
(5)	Disconnect the elastomer pack from the engine mount.	Hold the nose-gear strut. Refer to Figure 2.
(6)	Remove the 4 bolts on each side attaching the left hand and right hand bearing plates.	
(7)	Remove the assembly from the airplane.	

C. Install the Elastomer Pack

	Detail Steps/Work Items	Key Items/References
(1)	Install the bearing plates on the lower bearing.	Refer to Figure 2. Bearing plates must be installed on journals of trunnions. Cover the plates with Mastinox 6856K.
(2)	Install the 4 washers and bolts for the left hand and 4 washers and bolts for the right hand safety plates.	
(3)	Connect the elastomer pack to the engine mount.	Put LPS 3 on the shank of the bolt. Clean corrosion inhibitor from the threads.
(4)	Remove the trestle from the front fuselage.	
(5)	Lower the nose wheel to the floor.	Remove the weights from the rear fuselage.
(6)	Install the strut fairing: – Put the strut fairing in position on the strut. – Install the bolts, nuts and washers to the support bracket at the forward bottom side of the cover. – Install the bolts, nuts and washers at the trailing edge.	If OÄM 40-105 is installed. Take care of the padding on the nose gear strut.
(7)	Install the engine cowling.	Refer to Section 71-10, 71-11 or 71-12.

4. Replace the Elastomer Elements

CAUTION: YOU MUST ALWAYS REPLACE CRACKED OR WORN ELASTOMER ELEMENTS. IF YOU DO NOT REPLACE CRACKED OR WORN ELASTOMER ELEMENTS, THE PROPELLER CAN HIT AN OBJECT.

	Detail Steps/Work Items	Key Items/References
(1)	Remove the elastomer pack from the airplane.	Refer to Paragraph 3.
	WARNING: DO NOT STAND IN THE LINE OF THE ELASTOMER PACK WHEN YOU REMOVE THE NUT. THE ASSEMBLY CAN EXPAND WITH A LOT OF FORCE.	
(2)	Remove the adjusting nut from the elastomer pack.	
(3)	Replace the defective elements.	
(4)	Install the adjusting nut.	Refer to Figure 2. The distance between the center of the eye-end bearing and the center of the lower journal bearing must be: – 306.0 + 1 mm (12.05 + 0.04 in) for Lycoming version. – 322.0 + 1 mm (12.68 + 0.04 in) for TAE version.
(5)	Install the elastomer pack in the airplane.	Refer to Paragraph 3.

5. Adjust the Nose Wheel Steering Friction

Steering friction prevents nose wheel shimmy.

A. Equipment

Item	Quantity	Reference
Padded trestle.	1	Commercial.
Weight and strap.	1	Commercial.
Spring balance	1	Commercial.

B. Procedure

	Detail Steps/Work Items	Key Items/References
(1)	Use weights to hold the rear fuselage down with the nose wheel clear of the ground.	Use a strap around the fuselage.
(2)	Put a padded trestle under the front fuselage just aft of the nose wheel mounting.	
(3)	Remove the nose wheel fairing.	
(4)	Adjust the nose wheel fork pivot nut.	The nose-wheel must just castor when you apply a force of 30-50 N (6.75 - 11.25 lb) acting in the direction of the nose wheel axle. Refer to Figure 4.
(5)	Apply corrosion protection to the nut, stud and washers only.	Use CRC corrosion shell. Do not get CRC corrosion shell on the tire or the fiberglass.
(6)	Install the nose-wheel fairing.	
(7)	Remove the trestle from the front fuselage.	
(8)	Lower the nose-wheel to the floor.	Remove the weights from the rear fuselage.

6. Nose Wheel Balancing

Always have the nose-wheel balanced before installation.

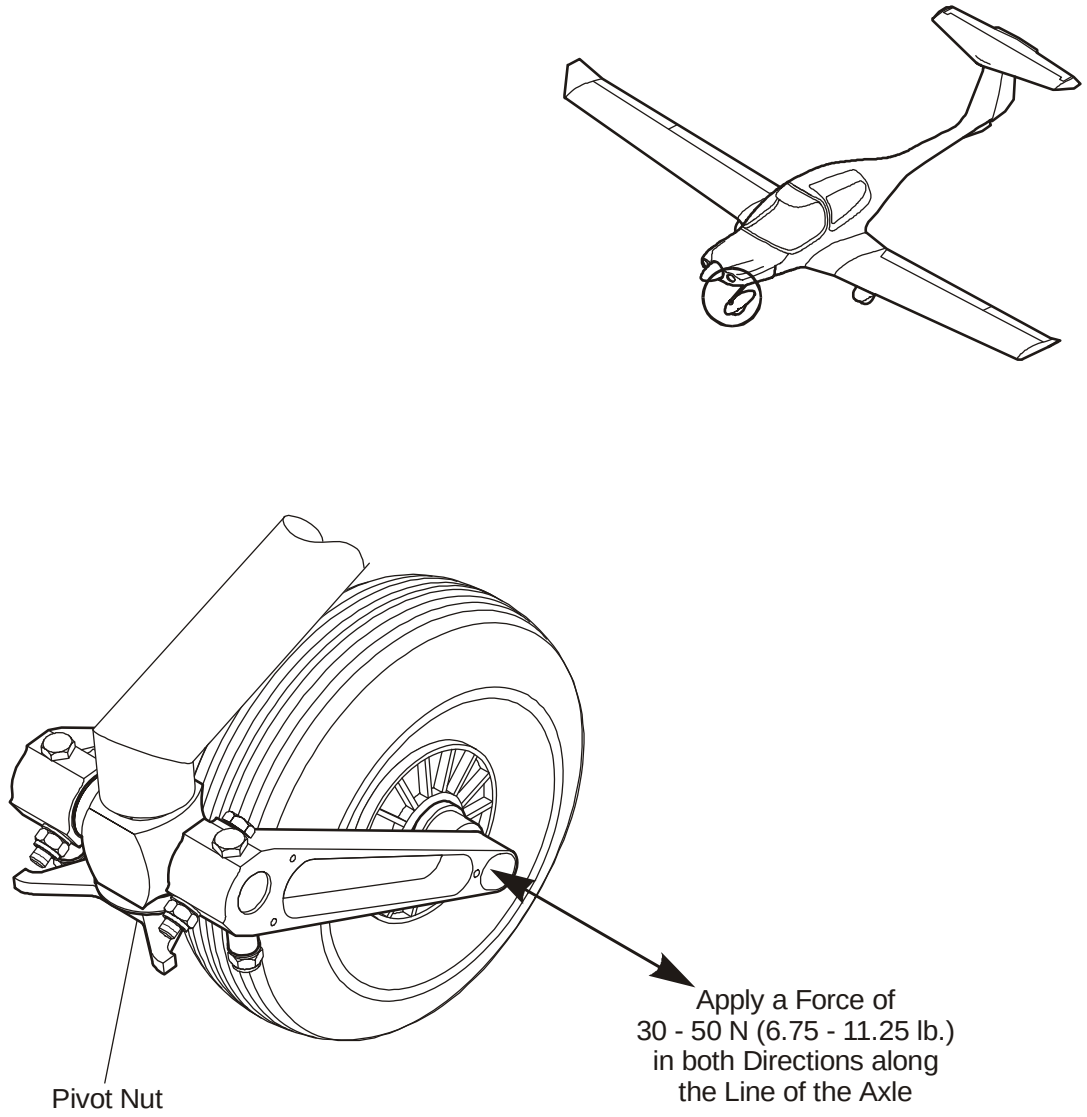


Figure 4: Adjust the Nose Wheel Steering Friction

Section 32-40
Wheels and Brakes

1. General

This Section gives you the data for the main and nose wheels. It also gives you the data for the brake system. And it gives you the Trouble-Shooting and Maintenance Practices.

2. Description and Operation

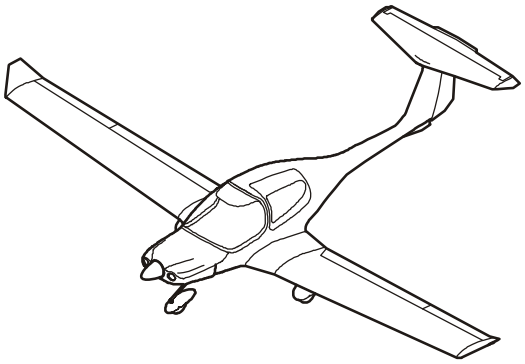
A. Main Wheel

Figure 1 shows the wheels. The main wheel hub has two aluminum alloy halves. Three bolts hold the two halves together. The bolts also hold a brake disk to the inner half of the hub.

The wheel has a tire with an inner tube. Snap rings hold taper roller bearings and grease seals in each half of the hub. You can remove the bearings for maintenance. The outer half of the hub has a hole for the valve stem.

B. Nose Wheel

The nose wheel has a similar construction to the main wheel with tapered bearings.



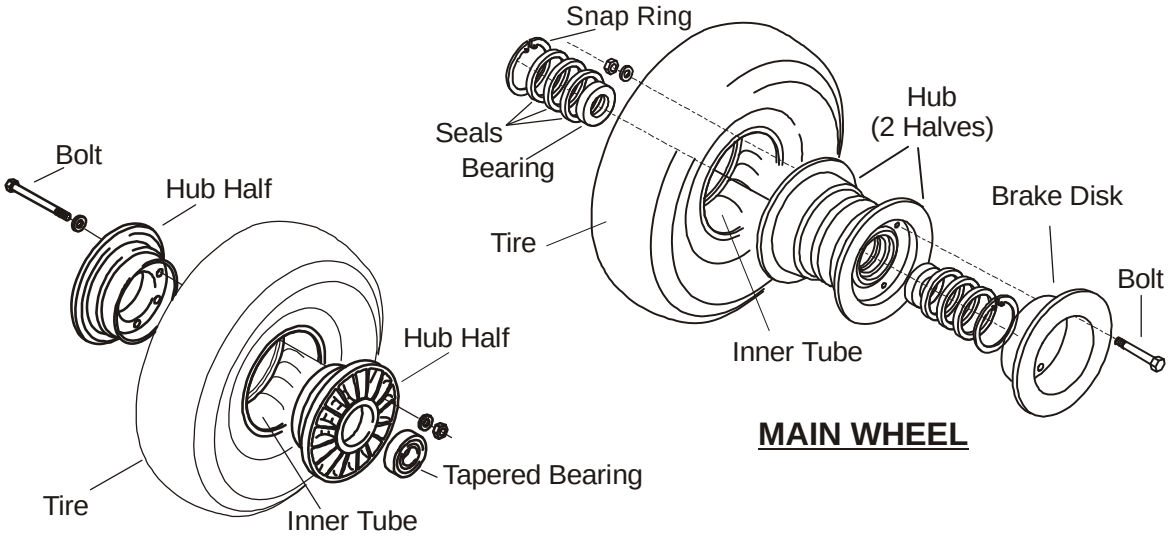


Figure 1: Main and Nose Wheels

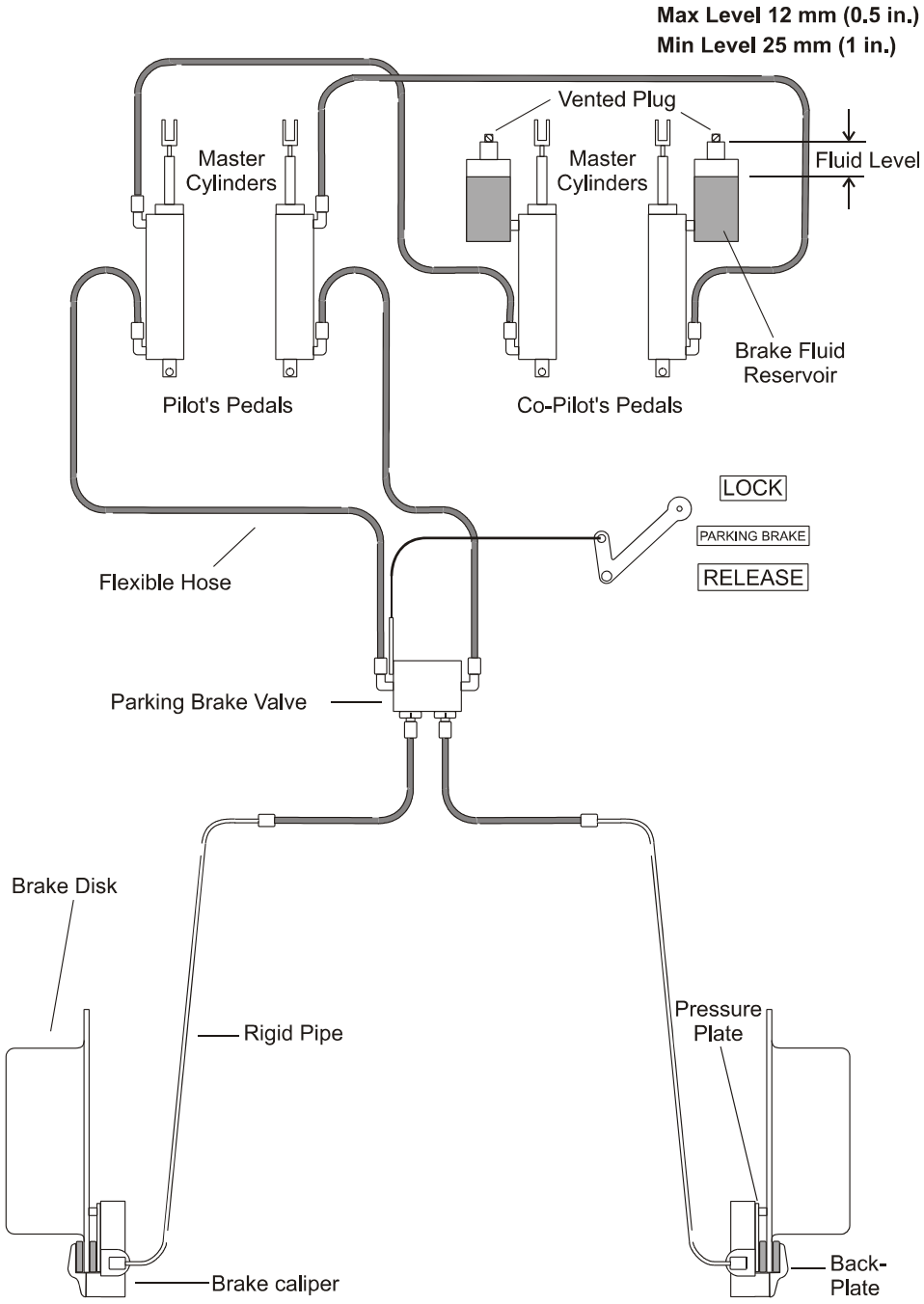


Figure 2: Brake System Schematic

C. Brake System

Figure 2 shows the brake system schematic diagram. The DA 40 has two separate brake systems. The pilot's and co-pilot's left toe brake pedals operate the left system. They supply pressure to the left brake caliper. The right toe brake pedals operate the right brake system and supply pressure to the right caliper.

Figure 3 shows the brake master cylinder and reservoir installation. Each system has a brake fluid reservoir. The reservoir attaches to the master cylinder on the co-pilot's rudder pedal. The outlet from the master cylinder on the co-pilot's rudder pedal connects to the inlet of the master cylinder on the pilot's pedals. The outlet from the master cylinder on the pilot's rudder pedal connects to the parking brake valve. The parking brake valve connects to the brake caliper.

Figure 4 shows the wheel brake assembly.

Figure 5 shows the parking brake valve installation. The parking brake valve is located on the bottom flange of the control bulkhead. It contains two valves which can seal the brake pressure into the calipers. This keeps the brakes ON. The pressure will reduce in time and the brakes will slowly release. A serviceable parking-brake valve will keep the brakes on for more than 1 day.

(1) Co-Pilot's Brake Operation

When you press on the co-pilot's right brake pedal these things happen:

– The connection to the reservoir is cut off by the initial movement.

– Further movement pushes fluid past the piston on the pilot's master cylinder.

– The fluid flows through the parking-brake valve to the right brake caliper.

– The fluid pushes the piston and the pressure plate against the brake disk.

– The reaction force on the caliper pulls the back-plate against the brake disk.

– The right brake is applied.

In the same way, when you press on the co-pilot's left brake pedal, the left brake is applied.

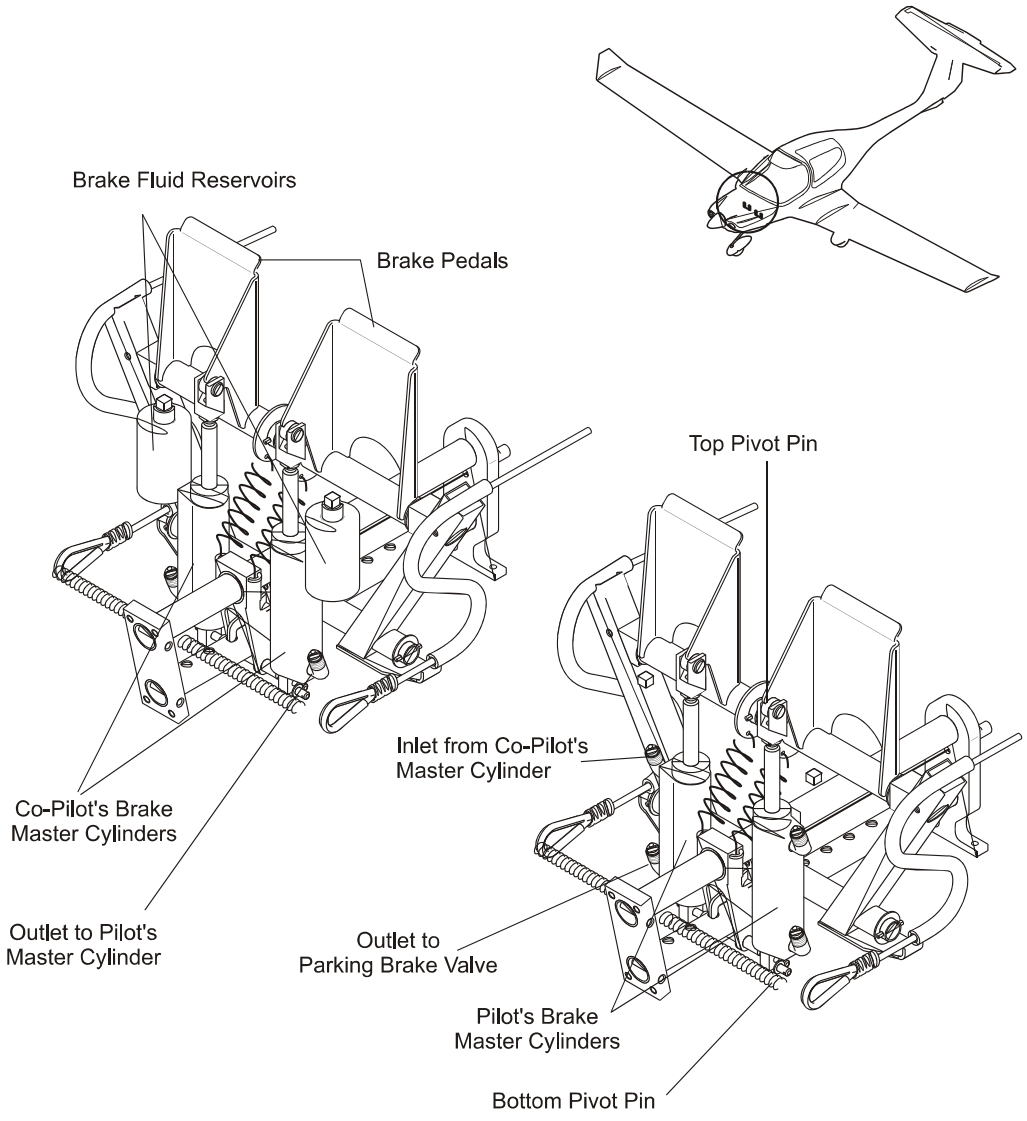


Figure 3: Brake Master Cylinder and Reservoir Installation

(2) Pilot's Brake Operation

When you press on the pilot's right brake pedal, these things happen:

– The connection from the co-pilot's master cylinder is cut off by the initial movement. (Note: Any hydraulic pressure from the co-pilot's master cylinder pushes on the back of the piston in the pilot's master cylinder. This increases the brake pressure).

– The fluid flows through the parking brake valve to the right brake caliper.

– The fluid pushes the piston and the pressure plate against the brake disk.

– The reaction force on the caliper pulls the back plate against the brake disk.

– The right brake is applied.

In the same way, when you press on the pilot's left brake pedal, the left brake is applied.

Note: If one side of the system fails, one or both pilots can loose braking on that side. For example, a leak in the pipe between the co-pilot's and the pilot's right master cylinder will cause a right brake failure for the co-pilot. The pilot's right brake will operate correctly. If the leak is between the pilot's right master cylinder and the right brake caliper, both pilots will have right brake failure.

(3) Parking Brake Operation

To apply the parking brake:

– Press on both pedals.

– Move the parking brake lever to LOCK (fully up).

– Release your foot pressure on the pedals.

– If necessary, pump the brake pedals.

To release the parking brake, move the lever to RELEASE (fully up).

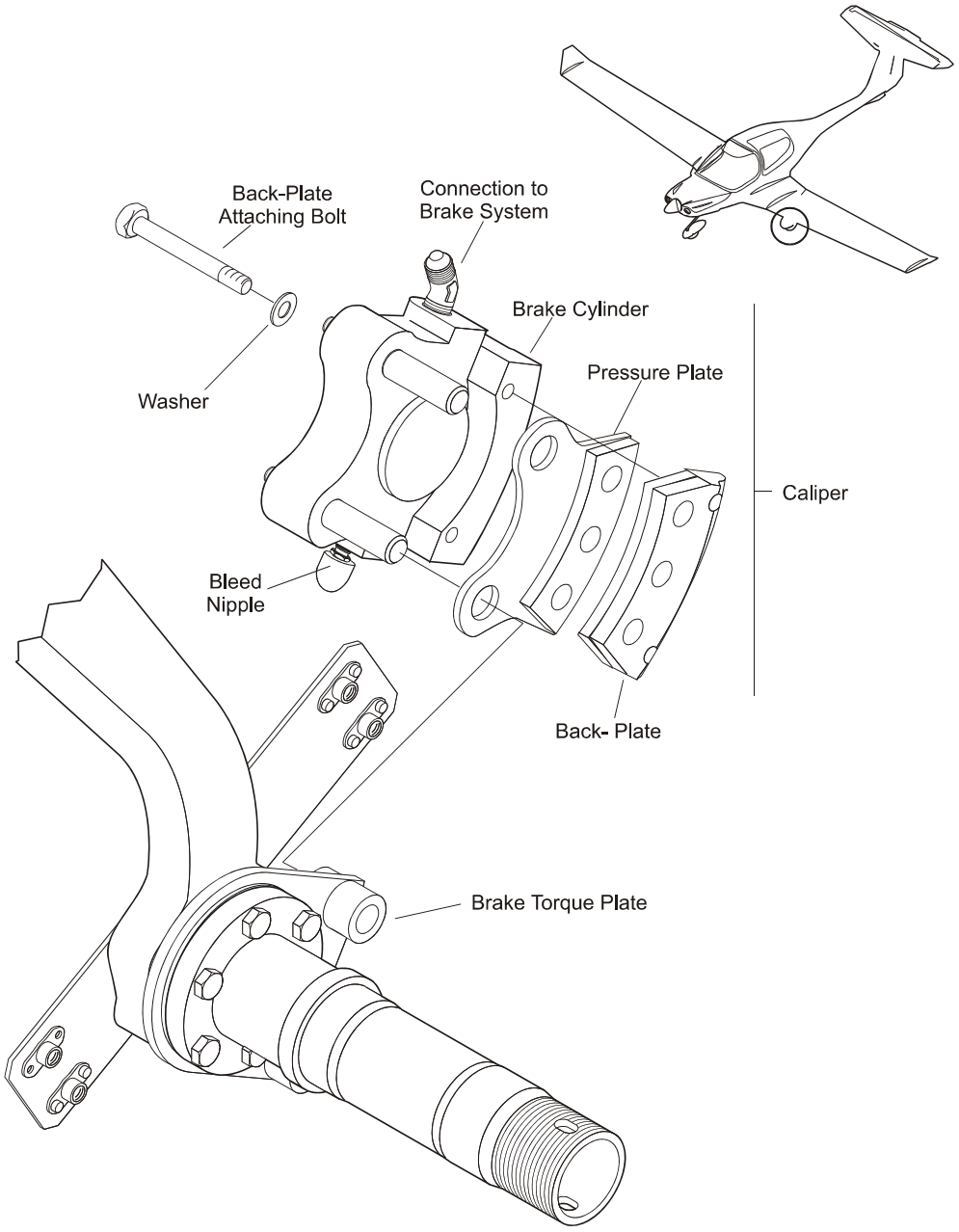


Figure 4: Wheel Brake Assembly

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Trouble-Shooting

1. General

Use the data below to trouble-shoot the wheel and brake system.

Complaint	Possible Cause	Remedy
Too much tire wear.	Incorrect toe-in.	Adjust the toe-in. Refer to Section 32-10.
	Incorrect inflation pressure.	Correct inflation pressure.
Too much axial play in a wheel.	Main wheel incorrectly adjusted.	Adjust the main wheel.
	Defective wheel bearing.	Replace the wheel bearing.
Brake disk distorted.	Brakes applied too hard.	Replace the brake disk.
	Hard landing.	
Brakes do not hold static engine run-up with the usual pedal force.	Brake fluid level low.	Fill the system with brake fluid.
	Air in the brake system.	Bleed the brake system.
	Defective master cylinder.	Replace the master cylinder and then bleed the brake system.
	Defective caliper.	Replace the caliper and then bleed the brake system.
	Worn brake linings.	Replace the brake linings and then bleed the brake system.
	Leaking connector.	Tighten (or replace) the connector and bleed the brake system.

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Maintenance Practices

1. General

These Maintenance Practices tell you how to remove/install components. They also give the conditioning procedure for the brake linings. Refer to the manufacturer's data (Cleveland/Parker Hannifin Corporation) for other shop work.

2. Remove/Install a Main Wheel

A. Equipment

Item	Quantity	Reference
Airplane jacks.	3	Commercial.

B. Remove a Main Wheel

	Detail Steps/Work Items	Key Items/References
(1)	Remove the wheel fairing: – Remove the brake cover. – Remove the outer bolt. – Remove 4 screws from the inner side.	Only if the optional strut fairing (OÄM 40-106) is installed.
(2)	Lift the airplane on jacks.	Refer to Section 07-10.
(3)	Remove the back-plate from the brake caliper.	Cut the locking wire.
(4)	Remove the lock-bolt from the axle nut.	
(5)	Remove the axle nut.	
(6)	Pull the wheel from the axle.	

C. Install a Main Wheel

	Detail Steps/Work Items	Key Items/References
(1)	Apply a light coating of grease to the axle where the wheel bearings go.	Use grease MIL-G-3545.
(2)	Put the wheel in position on the axle.	Make sure that the brake caliper is correctly engaged on the torque plate.
	Note: Turn the wheel by hand while you tighten the axle nut. This will remove grease (which can separate the bearings) or burrs. Both can cause too much wheel bearing play later.	
(3)	Install the axle-nut.	Hand tight.
(4)	Loosen the axle nut until it is just loose.	
(5)	Tighten the axle nut.	Hand tight.
(6)	Loosen the axle nut until one of the 2 holes in the axle aligns with the nut.	
(7)	Install the lock-bolt, washer and self-locking nut.	Do not loosen the nut more than 30° (half of a flat).
(8)	Measure the end play in the hub assembly.	There should be 0.025 to 0.125 mm (0.001 to 0.005 in) of end play when correctly adjusted.
(9)	Lower the airplane with the jacks.	Refer to Section 07-10.
(10)	Install the wheel fairing: – Install 4 screws on the inner side. – Install the outer bolt. – Install the brake cover.	Only if the optional strut fairing (OÄM 40-106) is installed.

3. Remove/Install the Nose Wheel

A. Equipment

Item	Quantity	Reference
Padded trestle.	1	Commercial.
Weight and strap.	1	Commercial.

B. Remove the Nose Wheel

	Detail Steps/Work Items	Key Items/References
(1)	Remove the wheel fairing: – Remove 6 screws attaching the left half of the fairing to the right half. – Remove the 3 left and 3 right attaching screws. – Remove the fairing.	
(2)	Use weights to hold the rear fuselage down with the nose wheel clear of the ground.	Use a strap around the rear fuselage.
(3)	Put a padded trestle under the fuselage just aft of the nose gear mounting.	
(4)	Remove the axle bolt: – Remove the cotter pin from the axle nut. – Remove the axle nut and washer. – Remove the axle bolt and washer.	
(5)	Remove the wheel from the fork.	

C. Install the Nose Wheel

	Detail Steps/Work Items	Key Items/References
(1)	Put the wheel in position in the fork.	
(2)	Install the axle bolt – Install the washer onto the axle bolt. – Push the axle bolt into position through the axle. – Install a second washer onto the axle bolt. – Install the axle nut hand tight only! – Slowly rotate the wheel while tightening the axle nut, hand tight only! – Turn the axle nut counter-clockwise until the next cotter pin hole aligns with the axle nut. – Install the cotter pin.	Put Mastinox 6856K corrosion inhibitor or LPS-3 on the shank of the bolt. Clean corrosion inhibitor from the threads. To settle the tapered wheel bearing.
(3)	Turn the nose wheel. Make sure that the valve cap does not touch the fork.	Clearance 2 mm (0.08 in) minimum.
(4)	Remove the trestle from the front fuselage.	
(5)	Lower the nose wheel to the ground.	Remove the weights from the rear fuselage.
(6)	Install the wheel fairing: – Put the 2 halves in position. – Install the 3 LH and 3 RH mounting screws. – Install the 6 screws which hold the fairing halves together.	Put Loctite 243 onto the threads of the mounting screws.

4. Remove/Install a Brake Master Cylinder

A. Remove a Brake Master Cylinder

	Detail Steps/Work Items	Key Items/References
	WARNING: DO NOT GET BRAKE FLUID ON YOU. BRAKE FLUID CAN CAUSE DISEASE. CAUTION: CLEAN UP SPILT BRAKE FLUID IMMEDIATELY. BRAKE FLUID CAN DAMAGE PAINT AND OTHER MATERIAL.	
(1)	Disconnect the brake pipe(s) from the brake master cylinder.	Catch the brake fluid. Put caps on all connections. Refer to Figure 3.
(2)	Remove the top pivot pin: – Remove the cotter pin. – Remove the washer. – Remove the pivot pin.	
(3)	Release the bottom pivot pin: – Remove the cotter pin. – Remove the washer. – Move the master cylinder sideways off the pivot pin.	
(4)	Lift the master cylinder from the rudder pedal assembly.	

B. Install a Brake Master Cylinder

	Detail Steps/Work Items	Key Items/References
	WARNING: DO NOT GET BRAKE FLUID ON YOU. BRAKE FLUID CAN CAUSE DISEASE. CAUTION: CLEAN UP SPILT BRAKE FLUID IMMEDIATELY. BRAKE FLUID CAN DAMAGE PAINT AND OTHER MATERIAL.	
(1)	Put the master cylinder in position on the bottom pivot pin.	Refer to Figure 3.
(2)	Attach the master cylinder to the bottom pivot pin: – Install the washer. – Install the cotter pin.	 Use a new cotter pin.
(3)	Install the top pivot pin: – Install the pivot pin. – Install the washer. – Install the cotter pin.	 Use a new cotter pin.
(4)	Connect the brake pipe(s) to the master cylinder.	
(5)	Bleed the brake system.	Refer to Paragraph 7.
(6)	Do a function test of the brake system.	

5. Remove/Install a Brake Cylinder

A. Remove a Brake Cylinder

	Detail Steps/Work Items	Key Items/References
(1)	Remove the 2 bolts which hold the back-plate. Remove the back-plate.	Refer to Figure 4. Cut the locking wire.
	WARNING: DO NOT GET BRAKE FLUID ON YOU. BRAKE FLUID CAN CAUSE DISEASE. CAUTION: CLEAN UP SPILT BRAKE FLUID IMMEDIATELY. BRAKE FLUID CAN DAMAGE PAINT AND OTHER MATERIAL.	
(2)	Disconnect the brake pipe from the brake cylinder.	Catch the brake fluid! Put caps on all connections.
(3)	Remove the pressure plate and the brake cylinder from the torque plate.	

B. Install a Brake Cylinder

	Detail Steps/Work Items	Key Items/References
(1)	Put the brake cylinder and pressure plate in position on the torque plate.	Use Loctite anti-seize compound 767, Loctite 8009 or equivalent on the locating pins.
(2)	Connect the brake pipe to the brake cylinder.	
(3)	Put the back-plate in position on the brake cylinder.	
(4)	Install the 2 bolts which attach the back-plate.	Torque: 8.5 to 9 Nm (75 to 80 lbf.in.).
(5)	Lock the bolts with wire.	
(6)	Bleed the brake system.	Refer to Paragraph 7.
(7)	Do a function test of the brake system.	

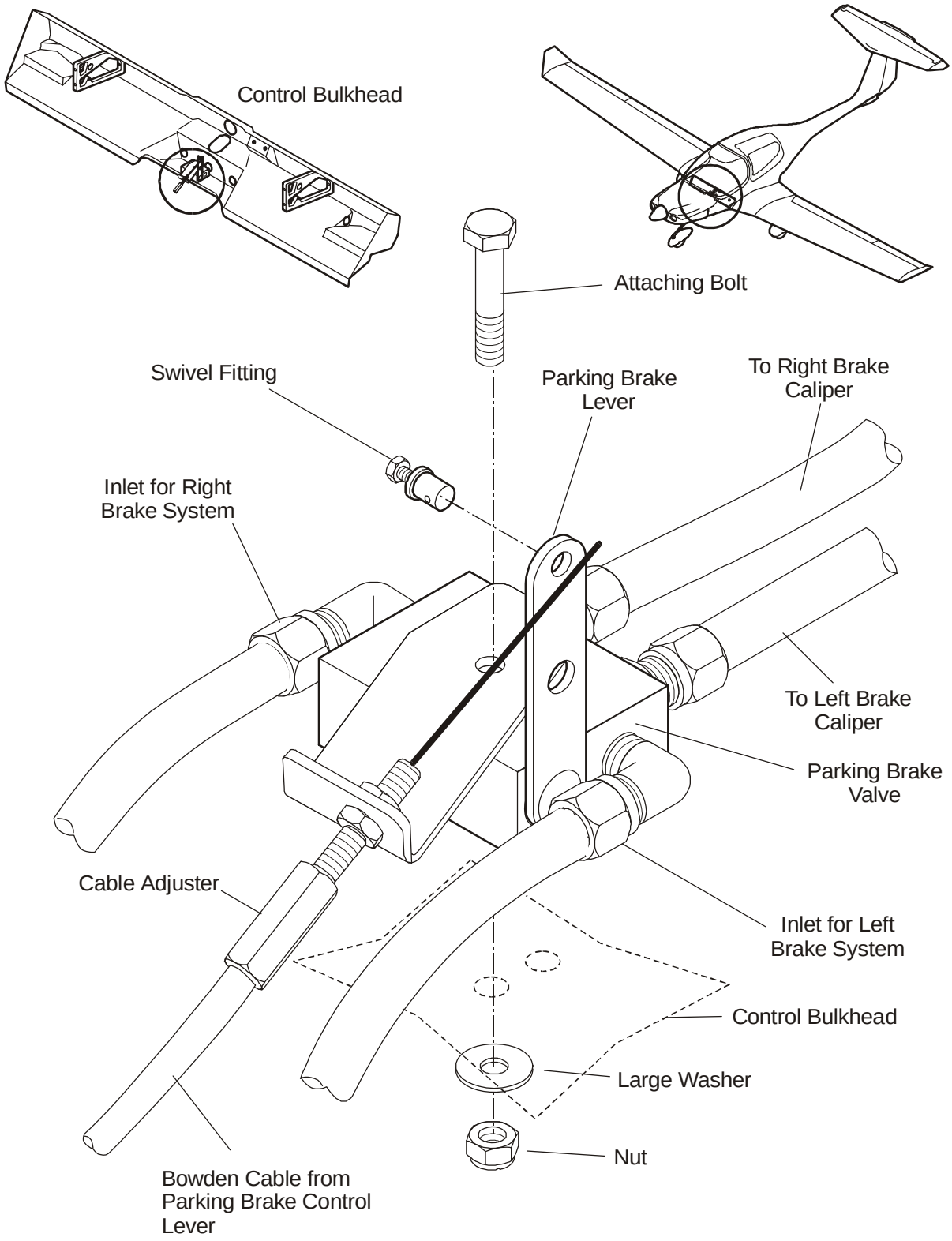


Figure 5: Parking Brake Valve Installation

6. Remove/Install the Parking Brake Valve

A. Remove the Parking Brake Valve

	Detail Steps/Work Items	Key Items/References
(1)	Remove the pilots' seats.	Refer to Section 25-10.
	WARNING: DO NOT GET BRAKE FLUID ON YOU. BRAKE FLUID CAN CAUSE DISEASE. CAUTION: CLEAN UP SPILT BRAKE FLUID IMMEDIATELY. BRAKE FLUID CAN DAMAGE PAINT AND OTHER MATERIAL.	
(2)	Disconnect the Bowden cable: – Loosen the screw in the swivel fitting. – Pull the center wire from the swivel fitting.	Refer to Figure 5. At the bottom of the control bulkhead.
(3)	Disconnect the 4 brake pipes from the parking brake valve.	Catch the brake fluid! Put caps on all connections.
(4)	Remove the 2 nuts, bolts and washers which attach the valve and bracket.	
(5)	Move the Bowden cable and bracket clear of the valve.	
(6)	Remove the valve from the airplane.	

B. Install the Parking Brake Valve

	Detail Steps/Work Items	Key Items/References
(1)	Put the parking brake valve in position.	At the bottom of the control bulkhead. Refer to Figure 5.
(2)	Install the 2 nuts, bolts and washers which attach the valve.	Make sure that the bracket for the Bowden cable is in position.
(3)	Connect the 4 brake pipes to the parking brake valve.	
(4)	Put the center wire of the Bowden cable through the swivel fitting on the brake valve lever. Tighten the screw.	
(5)	Bleed the brake system.	Refer to Paragraph 7.
(6)	Do a function test of the parking brake system: – Set the parking brake to LOCK. – Pump the foot brake pedals. – The brakes must stay on. – Set the parking brake to RELEASE. – The brakes must release.	
(7)	Install the pilots' seats.	Refer to Section 25-10.

7. Bleed the Brake System

A. Equipment

Item	Quantity	Reference
Pressure bleed equipment with MIL-H-5606A brake fluid.	1	Commercial.
Transparent overflow pipe and container.	1	Commercial.

B. Bleeding Procedure

This procedure bleeds the air from the braking system on one side of the airplane (left or right). If necessary, perform this procedure on both braking systems (left and right).

	Detail Steps/Work Items	Key Items/References
(1)	Clean the area of the brake fluid reservoir cap.	On the co-pilot's rudder pedal assembly. Refer to Figure 3.
(2)	Remove the cap.	
	WARNING: DO NOT GET BRAKE FLUID ON YOU. BRAKE FLUID CAN CAUSE DISEASE. CAUTION: CLEAN UP SPILT BRAKE FLUID IMMEDIATELY. BRAKE FLUID CAN DAMAGE PAINT AND OTHER MATERIAL.	
(3)	Connect the transparent overflow pipe to the reservoir.	Put the free end of the pipe in a container.
(4)	Clean the area around the bleed nipple below the brake cylinder.	Refer to Figure 4.
(5)	Connect the pressure bleed equipment to the bleed nipple below the brake cylinder.	Use only MIL-H-5606A brake fluid.
(6)	Open the bleed nipple about 1/2 to 1 turn.	
(7)	Use the pressure bleed equipment to fill the brake system.	Monitor the fluid coming from the reservoir for air bubbles.
(8)	Operate the parking brake ON and OFF 10 to 20 times to remove air from the system.	Continue bleeding the system until the fluid has no bubbles.

	Detail Steps/Work Items	Key Items/References
(9)	Operate the pilot's brake pedals many times to remove air from the system.	Continue bleeding the system until the fluid has no bubbles.
(10)	Operate the co-pilot's brake pedals many times to remove air from the system.	Continue bleeding the system until the fluid has no bubbles.
(11)	Remove the pressure bleed equipment. Close the bleed nipple and install the protective cap.	
(12)	Remove the overflow pipe and container.	
(13)	Measure the fluid level in the reservoir. If necessary, add or remove fluid.	The correct level is 12 mm (0.5 in) below the top of the filler hole. When the level is 25 mm (1 in) below the top of the filler hole you must add fluid to the correct level. Refer to Figure 2.
(14)	Install the reservoir cap.	
(15)	Do a function test of the brake system.	

8. Condition the Brake Linings

The brake linings are a non-asbestos organic material. You must condition new brake linings. Conditioning gives a thin layer of glaze at the friction surface. Usual brake usage keeps the layer of glaze for the life of the brake lining.

Light brake use can wear off the glaze. This reduces brake performance. If the glaze wears off, do the conditioning procedure.

	Detail Steps/Work Items	Key Items/References
	WARNING: DO NOT TAXI THE AIRPLANE UNLESS YOU HAVE BEEN TRAINED TO TAXI AND YOU ARE AUTHORIZED BY YOUR AIRWORTHINESS AUTHORITY. CAUTION: MAKE SURE THAT THE BRAKES OPERATE CORRECTLY WHILE YOU TAXI THE AIRPLANE, IF THE BRAKES FAIL, YOU MUST BE ABLE TO STOP THE AIRPLANE WITHOUT HITTING ANY PERSONS, EQUIPMENT OR OTHER OBSTACLES.	
(1)	Taxi the airplane for 1500 ft with 1700 RPM.	Use the brakes to keep the speed at 5 to 10 mph (8 to 16 km/h).
(2)	Let the brakes cool for 10 to 15 minutes.	
(3)	Apply the brakes. Do a high throttle run-up.	The brakes must hold with the usual pedal force.
(4)	If the brakes do not hold the static run-up, do steps 1 to 3 again as necessary.	

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CHAPTER 33

LIGHTS

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CHAPTER 33
LIGHTS

1. General

This Chapter tells you about the cockpit and the exterior lighting of the DA 40. Section 33-10 tells you about the flight compartment lighting and Section 33-40 tells you about the exterior lighting.

Note: Equipment which is certified for installation in the DA 40 is listed in Section 6.5 of the Airplane Flight Manual. Such equipment may be installed in accordance with the Airplane Maintenance Manual.

Any equipment which is not listed in Section 6.5 of the Airplane Flight Manual is called "Additional Equipment". The installation of Additional Equipment is a modification which must be handled in accordance with national regulations or a Service Bulletin.

2. Description

Figure 1 shows you the location of the lights. The DA 40 has these flight compartment lights:

– Reading lights.

– Instrument lights.

– Instrument panel flood light.

Some avionics equipment has internal lighting. Refer to the related Section and the equipment manufacturers handbooks for the equipment in your airplane. Combined ON/OFF and dimmer switches for the instrument panel flood lights and the internal instrument lights are located in the instrument panel, top left.

The DA 40 has these exterior lights in one light unit at each wing-tip:

– Left and right position lights. The front part of the light unit has a red (left) or green (right) lens. The light can be seen from the front and the side.

– Rear position lights. The aft part of each wing-tip light unit has a clear lens. The lights can be seen from the rear only.

– Strobe light. The middle part of each wing-tip light unit has a clear lens. The filament gives a high-intensity flash. The strobe light can be seen from all directions. A separate power unit for each strobe light is mounted in the wing-tip.

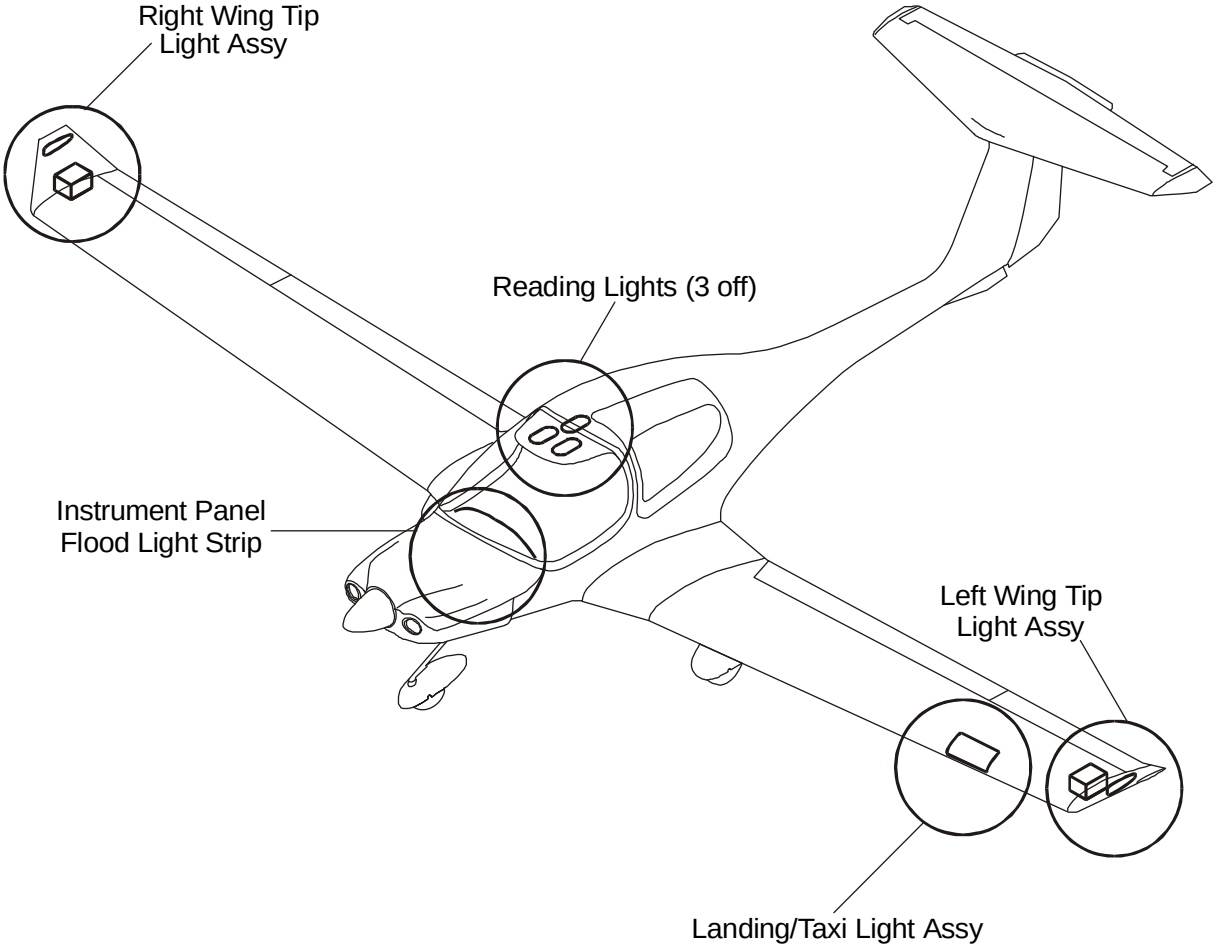


Figure 1: Flight Compartment and Exterior Lights

The DA 40 has these exterior lights in one housing in the outer leading edge of the left wing:

– Landing light. The landing light has a clear lens and a 35 watt filament. It is located inboard in the housing. If OÄM 40-258 is carried out, a HID lamp with a ballast assembly is installed.

– Taxi light. The taxi light has an optic lens and a 35 watt filament. It is located outboard in the housing. If OÄM 40-258 is carried out, a HID lamp with a ballast assembly is installed.

The switches for all the exterior lights are located in the instrument panel, lower left.

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Section 33-10
Lights - Flight Compartment

1. General

This Section tells you about the flight compartment lighting on the DA 40. Refer to Chapter 92 for the wiring diagrams.

2. Description

The DA 40 has these flight compartment lighting systems:

– Reading lights.

– Instrument panel flood lighting.

– Instrument lights.

Some avionics equipment has internal lighting. Refer to the related Section and the equipment manufacturers handbooks for the equipment in your airplane. Combined ON/OFF and dimmer switches for the instrument panel flood lights and the internal instrument lights are located in the instrument panel, top left.

A. Reading Lights

Reading lights are located in the roof of the cockpit. The two lights at the front are directed towards the pilots' seats and the light at the rear is directed towards the passenger seat. Each reading light assembly has an integral switch and a directional beam. The system is protected by a circuit-breaker located on the right side of the instrument panel.

B. Instrument Panel Flood Lighting

A 115 V AC foil type light strip makes the instrument flood light. The intensity of the light is controlled by a dimmer switch located on the left side of the instrument panel. Turn the dimmer switch fully counter-clockwise to turn the flood light off. Turn the dimmer switch clockwise to turn the flood light on and to set the level of lighting that you require. The light strip is held in place under the anti-glare panel with double sided tape. A solid state inverter supplies the 115 V AC current and the system is protected by a circuit-breaker located on the right side of the instrument panel.

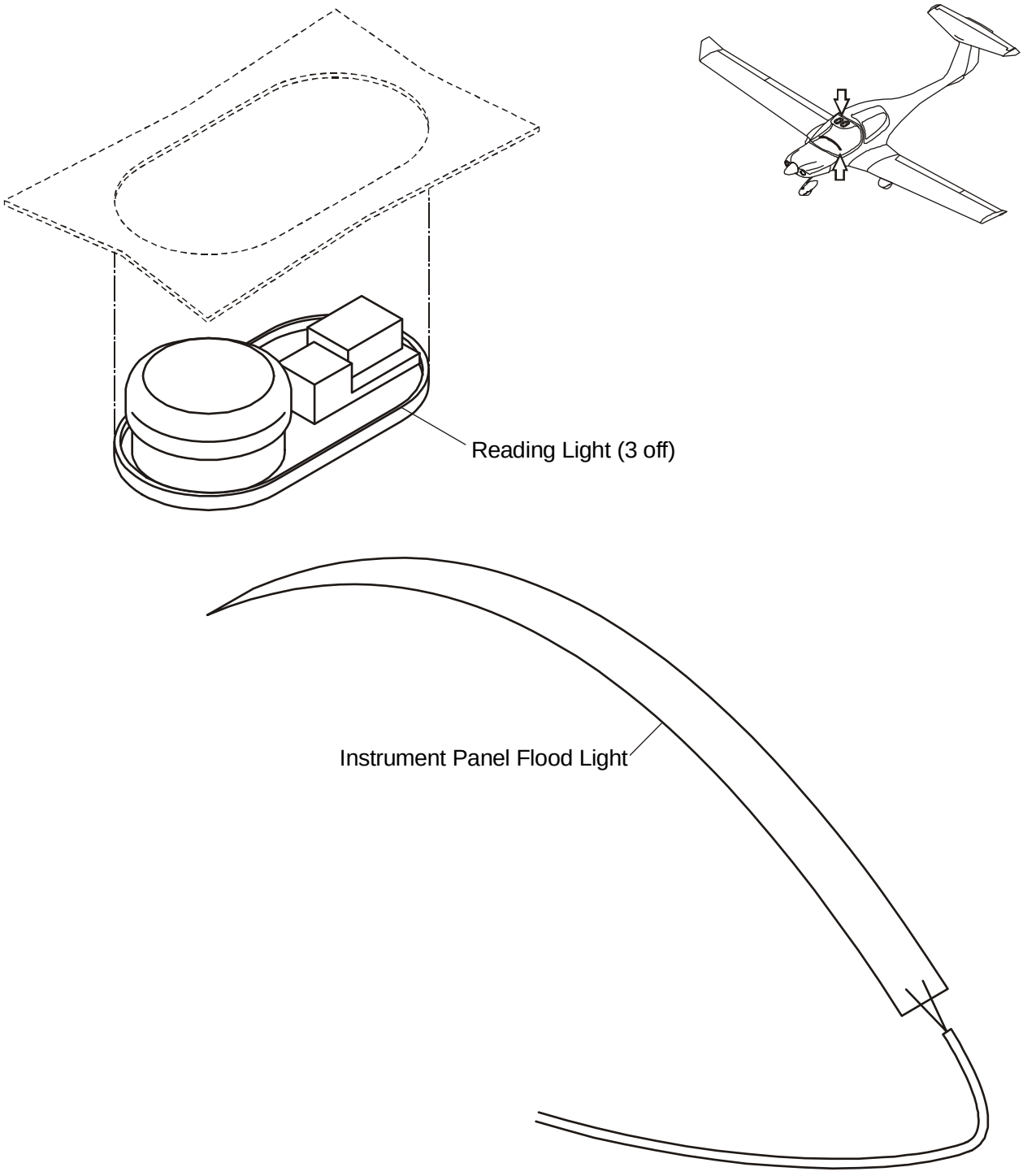


Figure 1: Flight Compartment Lights

C. Instrument Lighting

The instrument lighting is controlled by a dimmer switch mounted on the left side of the instrument panel. Turn the dimmer switch fully counter-clockwise to turn the instrument lights off. Turn the dimmer switch clockwise to turn the instrument lights on and to set the level of lighting that you require. The system is protected by a circuit-breaker located on the right side of the instrument panel.

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Trouble-Shooting

1. General

The table below lists the defects you could have with the flight compartment lighting system. If you have the trouble detailed in the Trouble column read across to the Possible Cause column. Then do the repair given in the Repair column.

Trouble	Possible Cause	Repair
One of the reading lights does not operate.	Defective filament. Defective light unit.	Replace the filament. Replace the light unit.
The instrument panel flood light does not operate correctly.	Circuit-breaker not set. Dimmer switch defective. Solid state inverter defective. Light strip defective. Defective wiring.	Set the circuit-breaker. Replace the dimmer switch. Replace the solid state inverter. Replace the light strip. Do a continuity check of the wiring. Repair/replace defective wiring. Refer to Chapter 92 for the wiring diagrams.
The instrument lights do not operate correctly.	Filament(s) defective. Circuit-breaker not set. Dimmer switch defective. Defective wiring.	Replace the filament(s). Set the circuit-breaker. Replace the dimmer switch. Do a continuity check of the wiring. Repair/replace defective wiring. Refer to Chapter 92 for the wiring diagrams.

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Maintenance Practices

1. General

These Maintenance Practices tell you how to remove/install the main components of the flight compartment lighting systems. Refer to the Chapter 92 for the wiring diagrams.

2. Remove/Install a Cabin Light Assembly

A. Remove a Reading Light Assembly

	Detail Steps/Work Items	Key Items/References
(1)	Pull the circuit-breaker for the reading light.	Instrument panel, right side.
(2)	Remove the reading light assembly: – Release the spring clip which holds the light assembly in position. – Lower the light assembly from cockpit roof and disconnect the electrical cable. – Move the light assembly clear of the airplane.	Hold the reading light assembly. At the switch end of the assembly. At the in-line connector.

B. Install a Reading Light Assembly

	Detail Steps/Work Items	Key Items/References
(1)	Move the reading light assembly into position in the cockpit.	Hold the reading light assembly.
(2)	Connect the electrical cable to the light assembly.	At the in-line connector.
(3)	Move the light assembly into position, lamp end first, then push the switch end up into position until the spring clip engages.	Make sure that the light assembly is correctly installed and that the spring clip is fully engaged.

3. Replace a Filament in a Reading Light Assembly

	Detail Steps/Work Items	Key Items/References
(1)	Remove the reading light assembly.	Refer to Paragraph 2.A.
(2)	Remove the filament holder from the rear of the light assembly.	
(3)	Replace the filament.	
(4)	Install the filament holder at the rear of the light assembly.	
(5)	Install the reading light assembly.	Refer to Paragraph 2.B.

4. Remove/Install a Dimmer Switch

A. Remove a Dimmer Switch

	Detail Steps/Work Items	Key Items/References
(1)	Remove the top engine cowling.	Refer to Section 71-10 (Lycoming version) or 71-11 (TAE version).
(2)	Disconnect the battery.	Refer to Section 24-31 (Lycoming version) or 24-34 (TAE version).
(3)	Remove the instrument panel cover.	Refer to Section 25-10.
(4)	Remove the knob from the dimmer switch that you will remove.	
(5)	Disconnect the electrical wiring from the rear of the dimmer switch.	
(6)	Remove the nut and washer from the front of the dimmer switch.	
(7)	Move the dimmer switch forward and move it clear of the instrument panel.	

B. Install a Dimmer Switch

	Detail Steps/Work Items	Key Items/References
(1)	Put the dimmer switch into position in the instrument panel.	
(2)	Install the washer and nut which attaches the dimmer switch to the instrument panel.	Make sure that the dimmer switch is orientated correctly.
(3)	Connect the electrical wiring to the rear of the dimmer switch.	Refer to Chapter 92 for the wiring diagrams.
(4)	Install the knob to the front of the dimmer switch.	
(5)	Install the instrument panel cover.	Refer to Section 25-10.
(6)	Connect the airplane battery.	Refer to Section 24-31 (Lycoming version) or 24-34 (TAE version).
(7)	Do an operational test of the dimmer switch: – Set the ALT/BAT switch (Lycoming version) or ELECTRIC MASTER key switch (TAE version) to ON. – Rotate the dimmer switch clockwise. – Rotate the dimmer switch fully clockwise. – Rotate the dimmer switch fully counter-clockwise to the OFF position. – Set the ALT/BAT switch (Lycoming version) or ELECTRIC MASTER key switch (TAE version) to OFF.	The system light(s) must come on. The intensity of the light(s) must increase. The light(s) must go off.
(8)	Install the top engine cowling.	Refer to Section 71-10 (Lycoming version) or 71-11 (TAE version).

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Section 33-40
Exterior Lights

1. General

This Section tells you about the exterior lights on the DA 40.

2. Description

The DA 40 has three exterior lights in one light unit at each wing-tip. It also has landing and taxi lights in a housing in the leading edge of the left wing. Figure 1 shows a wing-tip light unit.

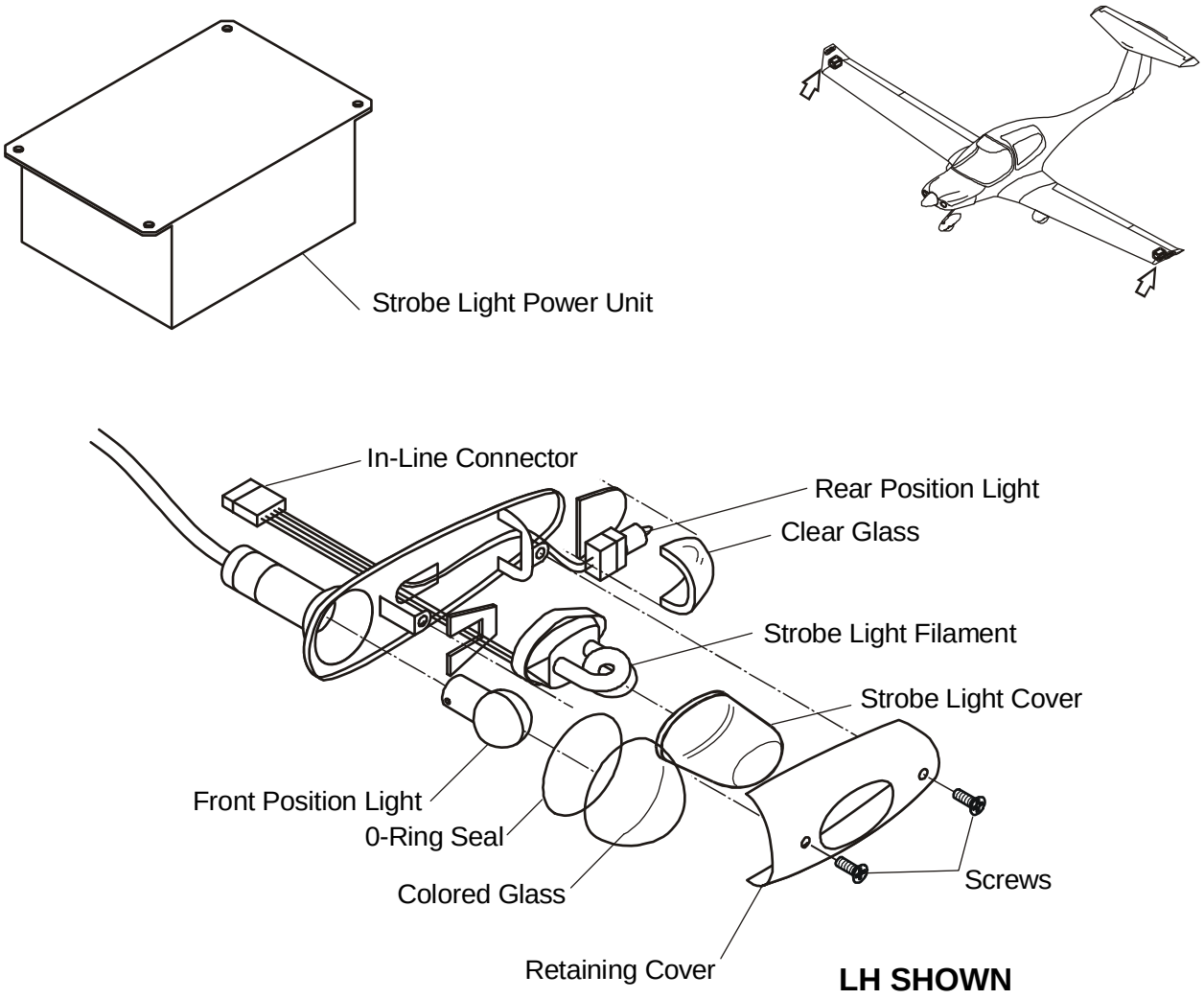


Figure 1: Wing-Tip Light Unit and Strobe Power Unit

A. Position Lights

The DA 40 has left and right position lights. The front part of the light unit has a red (left) lens or green (right) lens. The light can be seen from the front or the side of the airplane.

The light unit also has rear position lights. The aft part of each light unit has a clear lens. The light can be seen from the rear of the airplane only.

A switch on the left instrument panel controls the position lights and the system is protected by a circuit-breaker.

B. Strobe Light (Anti Collision Light - ACL)

The middle part of each light unit has a clear lens for a strobe light. The filament gives a high intensity flash. This is followed immediately by a less-bright flash. The double flashes occur about 50 times per minute. The strobe lights can be seen from all round the airplane.

A separate power unit for each strobe light is mounted in the wing tip. A switch on the left instrument panel controls both the strobe lights and the system is protected by a circuit-breaker.

The power unit generates an electrical impulse of about 600 volts. The pulse ionizes the gas in the strobe light filament which causes a bright flash. A second less powerful flash occurs immediately after the main pulse.

C. Landing Light

The landing light is located in a housing in the leading edge of the left wing. The landing light has a clear lens and a 35 watt filament or a HID lamp with a ballast assembly (if OÄM 40-258 is incorporated). It is located inboard in the housing. A switch on the left instrument panel controls the light and a circuit-breaker protects the system.

D. Taxi Light

The taxi light is located in a housing in the leading edge of the left wing. The taxi light has an optic lens and a 35 watt filament or a HID lamp with a ballast assembly (if OÄM 40-258 is incorporated). It is located outboard in the housing. A switch in the left instrument panel controls the light and a circuit-breaker protects the system.

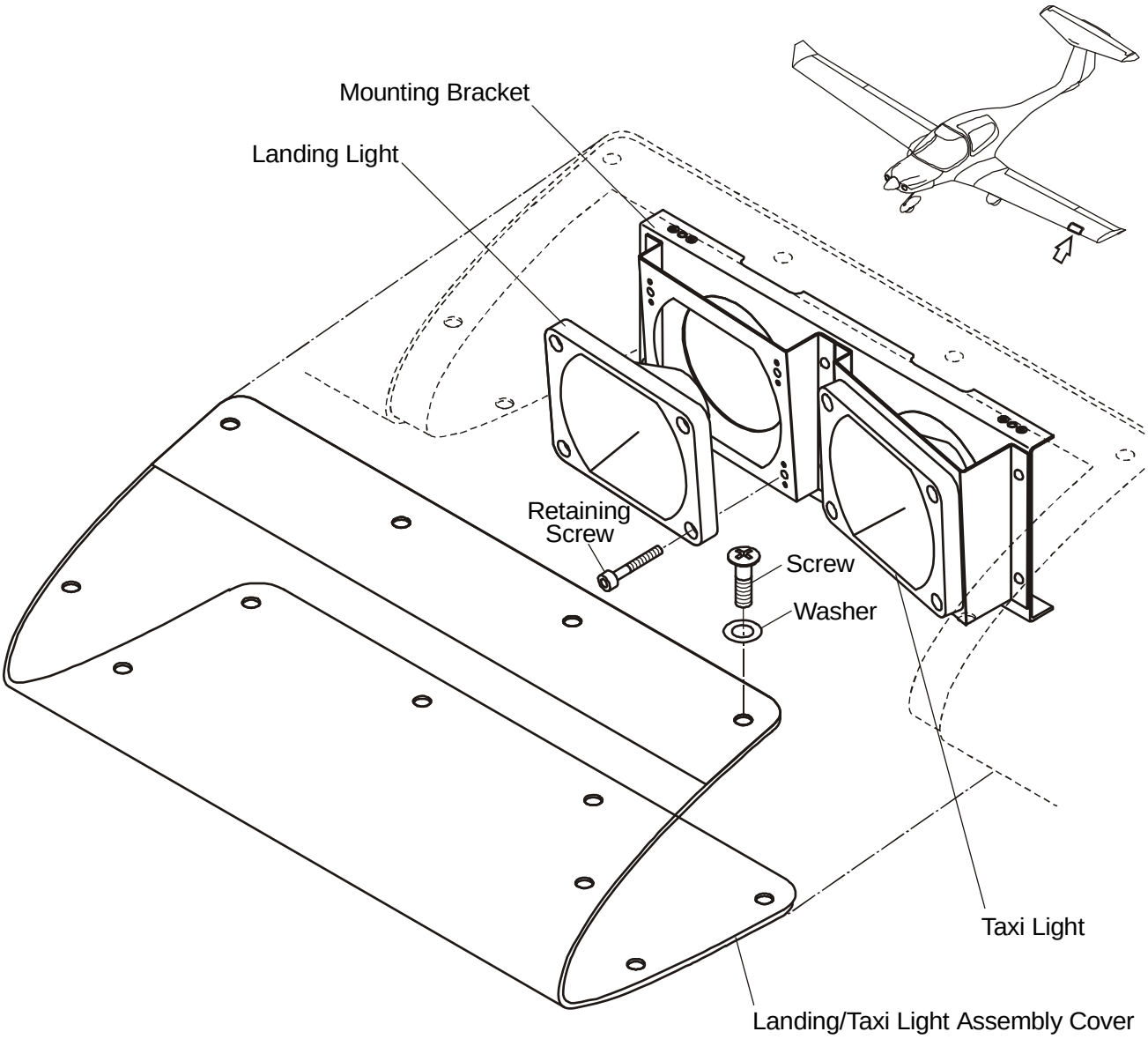


Figure 2: Landing and Taxi Light Installation (Standard Equipment)

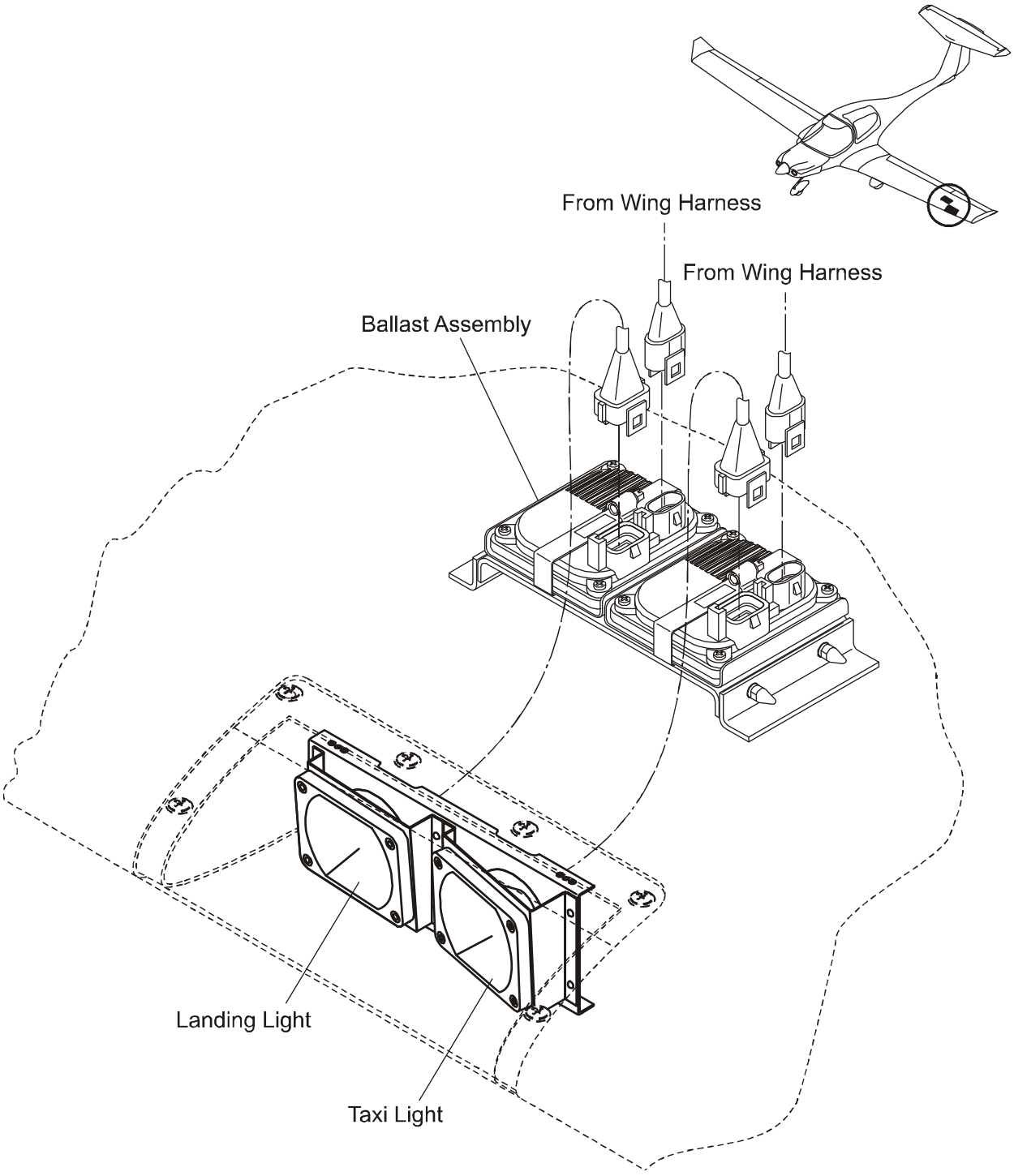


Figure 3: Landing and Taxi Light Installation (HID Lamps, OÄM 40-258 carried out)

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Trouble-Shooting

1. General

The table below lists the defects you could have with the exterior light system. If you have the trouble detailed in the Trouble column read across to the Possible Cause column. Then do the repair given in the Repair column.

WARNING: DO NOT OPERATE THE LANDING/TAXI LIGHTS WHEN PERSONS ARE CLOSE TO THE AIRPLANE AND DO NOT LOOK AT THE LIGHT WHEN IT OPERATES. STROBE, TAXI AND LANDING LIGHTS CAN CAUSE EYE DAMAGE.

WARNING: AFTER YOU SET THE POWER TO OFF, MAKE SURE THAT YOU WAIT A MINIMUM OF FIVE MINUTES BEFORE YOU REMOVE THE LANDING/TAXI LIGHT COVER OR ATTEMPT TO WORK ON ANY PART OF THE LIGHTING SYSTEM. THE POWER SUPPLIES TO THESE COMPONENTS GENERATE HIGH VOLTAGE. HIGH VOLTAGE CAN CAUSE DEATH OR INJURY TO PERSONS.

Trouble	Possible Cause	Repair
Both position lights do not operate.	Circuit-breaker not set or defective. Defective position light switch. Defective wiring.	Set/Replace the circuit-breaker. Replace the switch. Repair/Replace the wiring. Refer to Chapter 92 for the wiring diagrams.
One position light does not operate.	Defective filament. Defective wiring.	Replace the filament. Repair/Replace the wiring. Refer to Chapter 92 for the wiring diagrams.
Both strobe lights do not operate.	Circuit-breaker not set or defective. Defective switch. Defective wiring.	Set/Replace the circuit-breaker. Replace the switch. Repair/Replace the wiring. Refer to Chapter 92 for the wiring diagrams.

Trouble	Possible Cause	Repair
One strobe light does not operate.	Defective power supply unit.	Replace the power supply unit.
	Defective strobe unit.	Replace the strobe unit.
	Defective wiring.	Repair/Replace the wiring. Refer to Chapter 92 for the wiring diagrams.
Strobe and position light does not operate on one side.	Connector at wing root disconnected.	Connect the connector.
Landing light or taxi light does not operate.	Defective light unit.	Replace the light unit.
	Circuit-breaker not set or defective.	Set/Replace the circuit-breaker.
	Defective landing light or taxi light switch.	Replace the related switch.
	Loose connector at the light unit (standard installation) or ballast (HID version).	Connect the connector correctly.
	Ballast defective (HID version only).	Replace ballast.
	Loose connector between ballast and HID lamp. (HID version only).	Repair / replace the wire harness between ballast and HID lamp.
	Defective wiring.	Repair/Replace the wiring. Refer to Chapter 92 for the wiring diagrams.

Maintenance Practices

1. General

These Maintenance Practices tell you how to remove/install defective filaments and light units. They tell you how to adjust the landing light and the taxi light. They also tell you how to remove/install components in the system. Refer to Chapter 92 for the wiring diagrams.

WARNING: DO NOT OPERATE THE LANDING/TAXI LIGHTS WHEN PERSONS ARE CLOSE TO THE AIRPLANE AND DO NOT LOOK AT THE LIGHT WHEN IT OPERATES. STROBE, TAXI AND LANDING LIGHTS CAN CAUSE EYE DAMAGE.

WARNING: AFTER YOU SET THE POWER TO OFF, MAKE SURE THAT YOU WAIT A MINIMUM OF FIVE MINUTES BEFORE YOU REMOVE THE LANDING/TAXI LIGHT COVER OR ATTEMPT TO WORK ON ANY PART OF THE LIGHTING SYSTEM. THE POWER SUPPLIES TO THESE COMPONENTS GENERATE HIGH VOLTAGE. HIGH VOLTAGE CAN CAUSE DEATH OR INJURY TO PERSONS.

2. Remove/Install the Taxi Light

A. Remove the Taxi Light

	Detail Steps/Work Items	Key Items/References
(1)	Set the ALT/BAT switch (Lycoming version) or ELECTRIC MASTER key switch (TAE version) to OFF.	
(2)	Set the TAXI light switch to OFF.	
(3)	Set the TAXI/MAP circuit-breaker open.	
(4)	Remove the taxi/landing light cover from the wing: – Remove the 12 screws which attach the light cover to the wing. – Pull the light cover clear of the wing.	
(5)	Remove the screws which attach the taxi light to the wing.	The taxi light is the outboard assembly. Refer to Figure 2.

	Detail Steps/Work Items	Key Items/References
(6)	Hold the taxi light and carefully move it out from the wing: – Disconnect the electrical connector from the rear of the taxi light. – Remove the taxi light.	
	Note: Do not touch the glass part of a HID lamp. This will damage the lamp.	
(7)	If HID lamps are installed (OÄM 40-258 carried out): Remove the HID lamp from the reflector assembly: – Remove the 3 screws securing the retaining ring to the mounting plate. Hold both the retaining ring and the HID lamp together to avoid dropping the HID lamp. – Slide the retaining ring out. – Remove the lamp from the reflector assembly.	Refer to Figure 4.

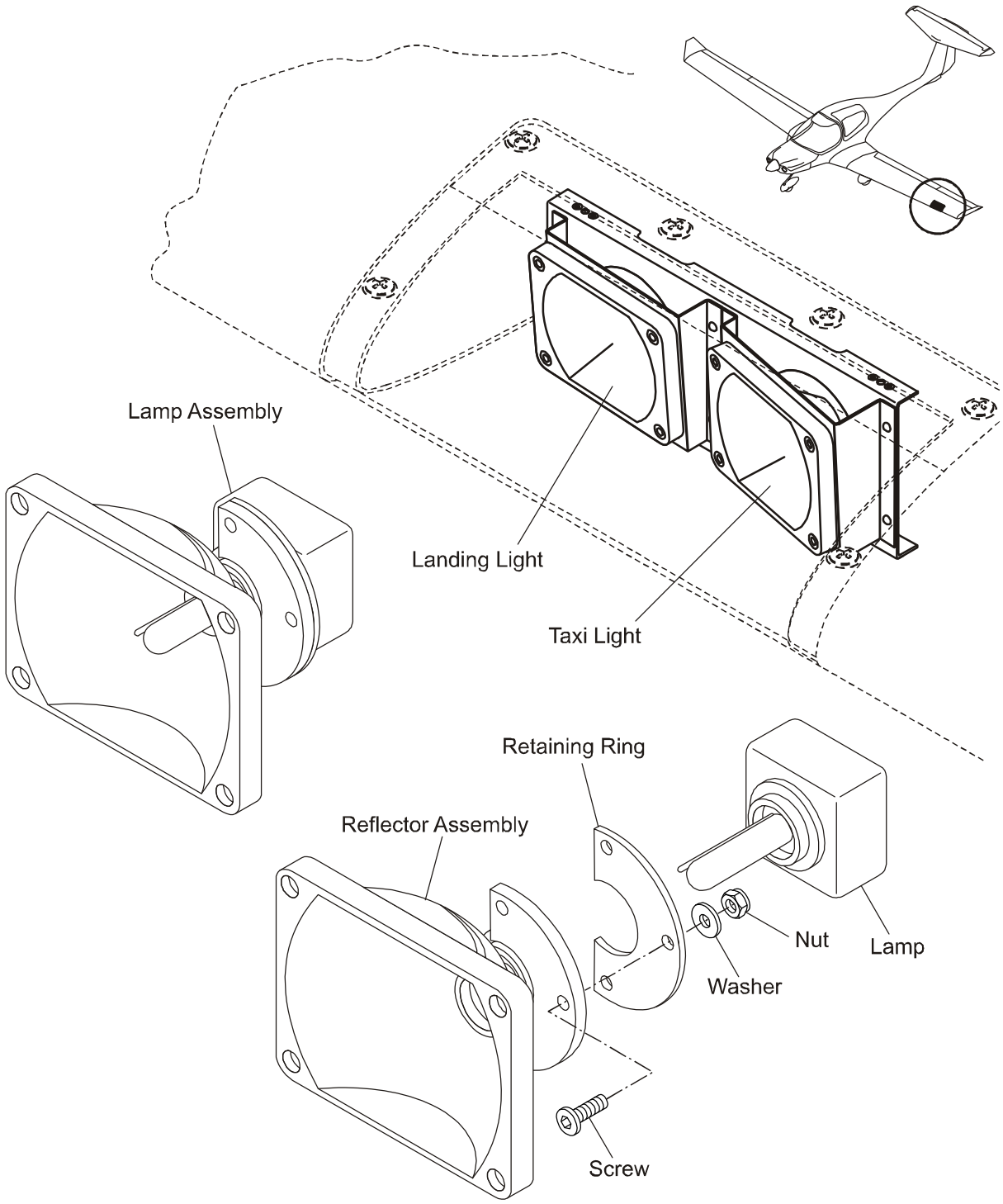


Figure 4 : Reflector and HID Lamp Assembly (OÄM 40-258 carried out)

B. Install the Taxi Light

	Detail Steps/Work Items	Key Items/References
	Note: Do not touch the glass part of a HID lamp. This will damage the lamp.	
(1)	If HID lamps are installed (OÄM 40-258 carried out): Assemble the HID lamp assembly: – Insert the HID lamp into the mounting plate and the reflector carefully. – Slide the retaining ring into the slot on the HID lamp. – Align the retaining ring with the mounting plate. – Install the 3 assembly screws and washers and secure using Loctite 222 or 243 or equivalent.	Refer to Figure 4.
(2)	Hold the taxi light in position in the leading edge of the left wing. – Connect the electrical connector to the rear of the taxi light.	
(3)	Install the screws which attach the taxi light assembly to the wing.	
(4)	Set the ALT/BAT switch (Lycoming version) or ELECTRIC MASTER key switch (TAE version) to ON.	
(5)	Set the TAXI/MAP circuit-breaker closed	
(6)	Set the TAXI light switch to ON.	
(7)	Set the TAXI light switch to OFF.	
(8)	Set the ALT/BAT switch (Lycoming version) or ELECTRIC MASTER key switch (TAE version) to OFF.	
(9)	Install the taxi/landing light cover to the wing: – Put the light cover in position on the wing. – Install the 12 screws which attach the light cover to the wing.	

3. Remove/Install the Landing Light

A. Remove the Landing Light

	Detail Steps/Work Items	Key Items/References
(1)	Set the ALT/BAT switch (Lycoming version) or ELECTRIC MASTER key switch (TAE version) to OFF.	
(2)	Set the LANDING light switch to OFF.	
(3)	Set the LANDING circuit-breaker open.	
(4)	Remove the taxi/landing light cover from the wing: – Remove the 12 screws which attach the light cover to the wing. – Pull the light cover clear of the wing.	
(5)	Remove the screws which attach the landing light to the wing.	The landing light is the inboard assembly. Refer Figure 2.
(6)	Hold the landing light and carefully move the light out from the wing: – Disconnect the electrical connector from the rear of the landing light. – Remove the landing light.	
	Note: Do not touch the glass part of a HID lamp. This will damage the lamp.	
(7)	If HID lamps are installed (OÄM 40-258 carried out): Remove the HID lamp from the reflector assembly: – Remove the 3 screws securing the retaining ring to the mounting plate. Hold both the retaining ring and the HID lamp together to avoid dropping the HID lamp. – Slide the retaining ring out. – Remove the lamp from the reflector assembly.	Refer to Figure 4.

B. Install the Landing Light

	Detail Steps/Work Items	Key Items/References
	Note: Do not touch the glass part of a HID lamp. This will damage the lamp.	
(1)	If HID lamps are installed (OÄM 40-258 carried out): Assemble the HID lamp assembly: – Insert the HID lamp into the mounting plate and the reflector carefully. – Slide the retaining ring into the slot on the HID lamp. – Align the retaining ring with the mounting plate. – Install the 3 assembly screws and washers and secure using Loctite 222 or 243 or equivalent.	Refer to Figure 4.
(2)	Hold the taxi light in position in the leading edge of the left wing. – Connect the electrical connector to the rear of the taxi light.	
(3)	Install the screws which attach the taxi light assembly to the wing.	
(4)	Set the ALT/BAT switch (Lycoming version) or ELECTRIC MASTER key switch (TAE version) to ON.	
(5)	Set the LANDING circuit-breaker closed	
(6)	Set the LANDING switch to ON.	
(7)	Set the LANDING light switch to OFF.	
(8)	Set the ALT/BAT switch (Lycoming version) or ELECTRIC MASTER key switch (TAE version) to OFF.	
(9)	Install the taxi/landing light cover to the wing: – Put the light cover in position on the wing. – Install the 12 screws which attach the light cover to the wing.	

4. Remove/Install the HID Ballast Assembly for the Landing and the Taxi Lights (if installed)

A. Remove the HID Ballast Assembly for the Landing and the Taxi Lights (if installed)

	Detail Steps/Work Items	Key Items/References
(1)	Set the ALT/BAT switch to OFF and set the LANDING/TAXI/MAP circuit-breakers open.	
	WARNING: AFTER YOU SET THE POWER TO OFF, MAKE SURE THAT YOU WAIT A MINIMUM OF FIVE MINUTES BEFORE YOU REMOVE THE LANDING/TAXI LIGHT COVER OR ATTEMPT TO WORK ON ANY PART OF THE LIGHTING SYSTEM. THE POWER SUPPLIES TO THESE COMPONENTS GENERATE HIGH VOLTAGE. HIGH VOLTAGE CAN CAUSE DEATH OR INJURY TO PERSONS.	
(2)	Remove the service cover next to the light assembly from the lower surface of the left wing.	
(3)	Unplug the cables connecting the ballast assembly to the wing harness.	
(4)	Unplug the high voltage cables connecting the ballast assembly to the landing and the taxi light assemblies.	
(5)	Remove 2 screws fixing the ballast assembly to the inboard angle bracket.	
(6)	Carefully lift the ballast assembly and move it through the service opening off the airplane.	

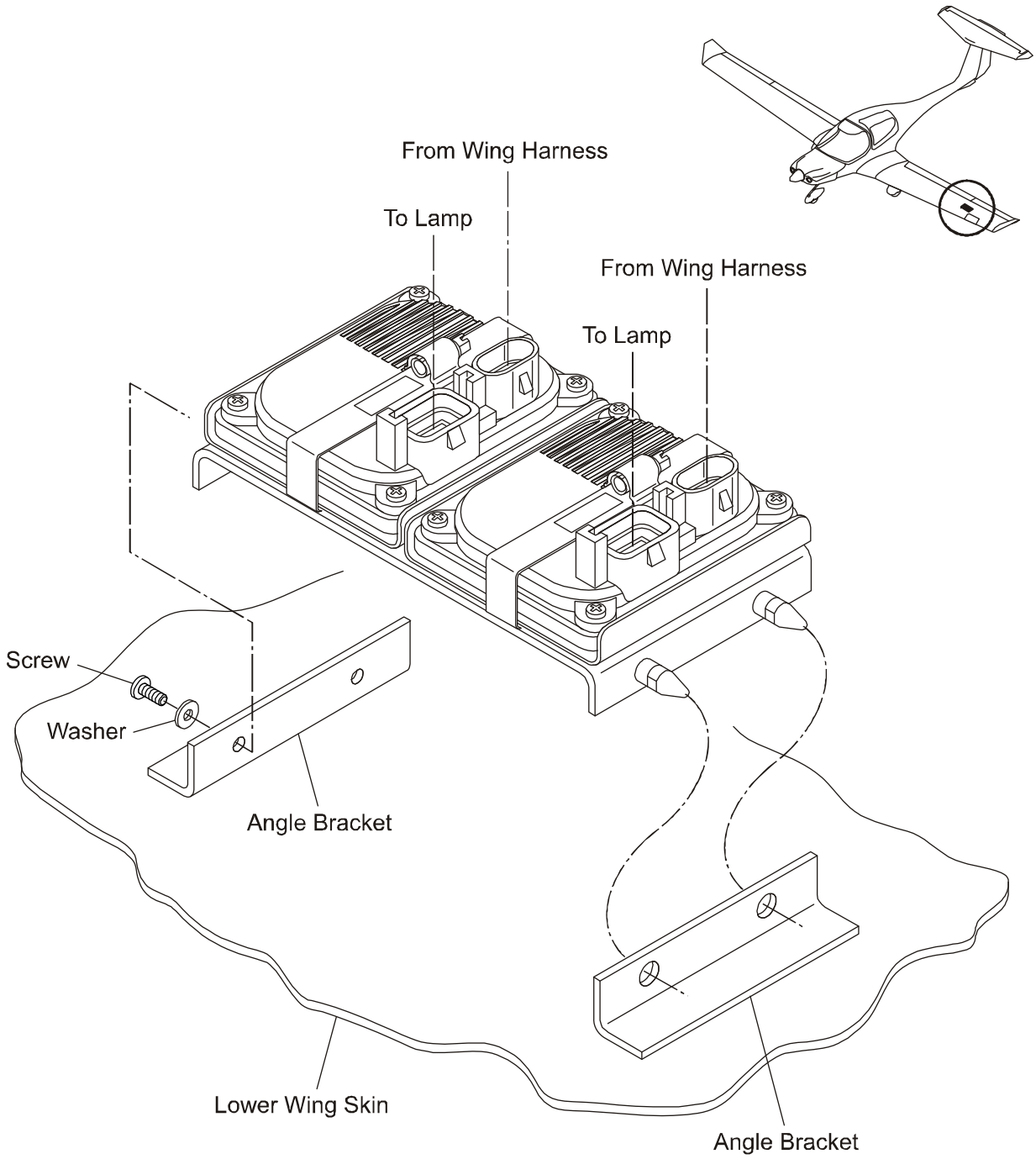


Figure 5: Ballast Assembly (HID Lamps, OÄM 40-258 carried out)

B. Install the HID Ballast Assembly for the Landing and the Taxi Lights (if installed)

	Detail Steps/Work Items	Key Items/References
(1)	Set the ALT/BAT switch to OFF and set the LANDING/TAXI/MAP circuit-breakers open.	
(2)	Carefully move the ballast assembly through the service opening into the left wing. Lift the ballast assembly over the inboard angle bracket and slide the pins into the holes of the outboard angle bracket.	
(3)	Align the holes of the inboard angle bracket with the threaded holes of the ballast assembly.	
(4)	Mount the ballast assembly to the inboard angle bracket using Loctite 222 or 243 or equivalent to secure the screws.	
(5)	Plug the high voltage lines for the taxi and the landing lights into the related plugs of the ballast assembly.	
(6)	Plug the cables from the wing harness to the related plugs on the ballast assembly.	
(7)	Mount the service cover to the lower surface of the wing.	

WARNING: DO NOT OPERATE THE LANDING/TAXI LIGHTS WHEN PERSONS ARE CLOSE TO THE AIRPLANE AND DO NOT LOOK AT THE LIGHT WHEN IT OPERATES. STROBE, TAXI AND LANDING LIGHTS CAN CAUSE EYE DAMAGE.

	Detail Steps/Work Items	Key Items/References
(8)	Do an operational test of the taxi and the landing lights: – Set the LANDING/TAXI/ MAP circuit-breaker closed. – Set the ALT/BAT switch to ON. – Set the TAXI and LANDING switches to ON. – Verify proper function of both the taxi and landing lights. – Set the TAXI and LANDING switches to OFF. – Set the ALT/BAT switch to OFF.	

5. Replace a Filament in the Wing-Tip Light Unit

A. Replace a Position Light Filament in the Wing-Tip

	Detail Steps/Work Items	Key Items/References
(1)	Set the ALT/BAT switch (Lycoming version) or ELECTRIC MASTER key switch (TAE version) to OFF.	
	WARNING: AFTER YOU SET THE POWER TO OFF, MAKE SURE THAT YOU WAIT A MINIMUM OF FIVE MINUTES BEFORE YOU DO WORK ON THE STROBE LIGHTS. THE POWER SUPPLIES TO THE STROBE LIGHTS GENERATE HIGH VOLTAGE. HIGH VOLTAGE CAN CAUSE DEATH OR INJURY TO PERSONS.	
(2)	Remove the light unit cover from the wing-tip and the lamp glasses.	Refer to Figure 1.
(3)	Replace the filament.	
(4)	Install the lamp glass and the light unit cover.	
(5)	Do an operational test of the position light.	

B. Replace a Strobe Light Filament in the Wing-Tip

	Detail Steps/Work Items	Key Items/References
(1)	Set the ALT/BAT switch (Lycoming version) or ELECTRIC MASTER key switch (TAE version) to OFF.	
	WARNING: AFTER YOU SET THE POWER TO OFF, MAKE SURE THAT YOU WAIT A MINIMUM OF FIVE MINUTES BEFORE YOU DO WORK ON THE STROBE LIGHTS. THE POWER SUPPLIES TO THE STROBE LIGHTS GENERATE HIGH VOLTAGE. HIGH VOLTAGE CAN CAUSE DEATH OR INJURY TO PERSONS.	
(2)	Remove the light unit cover from the wing-tip and the lamp glasses.	Refer to Figure 1.
(3)	Replace the strobe light filament.	
(4)	Install the lamp glasses and the light unit cover.	
	WARNING: DO NOT OPERATE THE STROBE LIGHTS WHEN PERSONS ARE CLOSE TO THE AIRPLANE AND DO NOT LOOK AT THE LIGHT WHEN IT OPERATES. STROBE LIGHTS CAN CAUSE EYE DAMAGE.	
(5)	Do an operational test of the strobe light.	

6. Remove/Install the Light Unit in the Wing-Tip

A. Remove the Light Unit in the Wing-Tip

	Detail Steps/Work Items	Key Items/References
(1)	Set the ALT/BAT switch (Lycoming version) or ELECTRIC MASTER key switch (TAE version) to OFF and set the LANDING/TAXI/MAP circuit-breakers open.	
	WARNING: AFTER YOU SET THE POWER TO OFF, MAKE SURE THAT YOU WAIT A MINIMUM OF FIVE MINUTES BEFORE YOU DO WORK ON THE STROBE LIGHTS. THE POWER SUPPLIES TO THE STROBE LIGHTS GENERATE HIGH VOLTAGE. HIGH VOLTAGE CAN CAUSE DEATH OR INJURY TO PERSONS.	
(2)	Remove the light unit cover from the wing-tip and the lamp glasses.	Refer to Figure 1.
(3)	Remove the 3 light filaments.	
(4)	Remove the light unit from the wing-tip: – Remove the screws which attach the light unit to the wing-tip. – Carefully move the light unit out from the wing tip. – Disconnect the 2 connectors from the rear of the light unit. – Move the light unit clear from the airplane.	

B. Install the Light Unit in the Wing-Tip

	Detail Steps/Work Items	Key Items/References
(1)	Put the light unit in position in the wing-tip and connect the 2 electrical connectors to the rear of the light unit.	
(2)	Install the screws that attach the light unit to the wing-tip.	
(3)	Install the 3 filaments to the light unit.	
	WARNING: DO NOT OPERATE THE STROBE LIGHTS WHEN PERSONS ARE CLOSE TO THE AIRPLANE AND DO NOT LOOK AT THE LIGHT WHEN IT OPERATES. STROBE LIGHTS CAN CAUSE EYE DAMAGE.	
(4)	Do an operational test of the position and strobe lights: – Set the ALT/BAT switch (Lycoming version) or ELECTRIC MASTER key switch (TAE version) to ON. – Set the LANDING, TAXI/MAP and STROBE circuit-breakers closed. – Set the POSITION and STROBE switches to ON.	
(5)	Set the POSITION and STROBE switches to OFF.	
(6)	Set the ALT/BAT switch (Lycoming version) or ELECTRIC MASTER key switch (TAE version) to OFF.	
	WARNING: AFTER YOU SET THE POWER TO OFF, MAKE SURE THAT YOU WAIT A MINIMUM OF FIVE MINUTES BEFORE YOU DO WORK ON THE STROBE LIGHTS. THE POWER SUPPLIES TO THE STROBE LIGHTS GENERATE HIGH VOLTAGE. HIGH VOLTAGE CAN CAUSE DEATH OR INJURY TO PERSONS.	

	Detail Steps/Work Items	Key Items/References
(7)	Wait for a minimum of 3 minutes and install the lamp glasses and the light unit cover.	

7. Remove/Install a Strobe Power Unit in the Wing-Tip

A. Remove a Strobe Power Unit in the Wing-Tip

	Detail Steps/Work Items	Key Items/References
(1)	Set the ALT/BAT switch (Lycoming version) or ELECTRIC MASTER key switch (TAE version) to OFF.	
(2)	Set the STROBE switch to OFF and set the STROBE circuit-breaker open.	
	WARNING: AFTER YOU SET THE POWER TO OFF, MAKE SURE THAT YOU WAIT A MINIMUM OF FIVE MINUTES BEFORE YOU DO WORK ON THE STROBE LIGHTS. THE POWER SUPPLIES TO THE STROBE LIGHTS GENERATE HIGH VOLTAGE. HIGH VOLTAGE CAN CAUSE DEATH OR INJURY TO PERSONS.	
(3)	Remove the wing tip from the wing: – Remove the screws which attach the wing tip to the wing. – Move the wing tip just clear of the wing and disconnect the electrical connectors. – Move the wing tip clear of the airplane.	
(4)	Remove the power unit from the inside of the wing tip assembly.	

B. Install a Strobe Power Unit in the Wing-Tip

	Detail Steps/Work Items	Key Items/References
(1)	Install the power unit in the wing tip.	
(2)	Move the wing tip close to the wing and connect the electrical connectors.	
(3)	Install the wing tip onto the wing: – Put the wing tip into position on the wing. – Install the screws which attach the wing tip to the wing.	
	WARNING: DO NOT OPERATE THE STROBE LIGHTS WHEN PERSONS ARE CLOSE TO THE AIRPLANE AND DO NOT LOOK AT THE LIGHT WHEN IT OPERATES. STROBE LIGHTS CAN CAUSE EYE DAMAGE.	
(4)	Do an operational test of the position and strobe lights: – Set the ALT/BAT switch (Lycoming version) or ELECTRIC MASTER key switch (TAE version) to ON. – Set the LANDING, TAXI/MAP and STROBE circuit-breakers closed. – Set the POSITION and STROBE switches to ON.	
(5)	Set the POSITION and STROBE switches to OFF.	
(6)	Set the ALT/BAT switch (Lycoming version) or ELECTRIC MASTER key switch (TAE version) to OFF.	

CHAPTER 34

NAVIGATION

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1. General 201
2. Remove/Install the Magnetic Compass 201
3. Test/Adjust the Magnetic Compass (Compass Swing) 202

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1. Electrical Gyro Instruments 101
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Attitude and Direction with the Garmin G1000 System Installed

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2. Description and Operation 1

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Maintenance Practices

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2. Remove/Install the Magnetic Compass 201
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2. Description 1

Section 34-39

Landing and Taxiing Aids with the Garmin G1000 System Installed

1. General 1
2. Description 1

Section 34-40

Independent Position Determining

1. General 1

Section 34-42

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2. Description and Operation 1

Trouble-Shooting

1. General 101

Maintenance Practices

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2. Description and Operation 1

Trouble-Shooting

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Maintenance Practices

1. General 201
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1. General 1
2. Description and Operation 1

Trouble-Shooting

1. General 101

Maintenance Practices

1. General 201
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4. Remove/Install a TAS Antenna 203

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Dependent Position Determining

1. General 1

Section 34-52

VOR/Localizer/Glideslope (VOR/LOC/GS)

1. General 1
2. Description and Operation 1

Trouble-Shooting

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Maintenance Practices

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2. Description and Operation 1

Trouble-Shooting

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2. Remove/Install the ADF Receiver 201
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2. Description and Operation 1

Trouble-Shooting

1. General 101

Maintenance Practices

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2. Description and Operation 1

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Trouble-Shooting

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CHAPTER 34
NAVIGATION

1. General

This Chapter tells you about the navigation systems in the airplane. It only tells you about the installation in the airplane. Refer to the equipment manufacturers' manuals for more data about the equipment and refer to the Wiring Diagrams in Chapter 92 for more data about the electrical wiring for the navigation system.

Refer to Section 23-10 for more data about the NAV system which is part of the speech communication system.

The DA 40 can have these navigation systems. Refer to these Sections for data about the systems:

Section 34-10. Flight environment data (Pitot-static, OAT, flight instruments).

Section 34-20. Attitude and direction (magnetic compass, turn & bank indicator, attitude gyro, directional gyro, gyro-compass system).

Section 34-30. Landing and taxiing aids (localizer, glideslope, marker beacon receiver).

Section 34-40. Independent position determining (strike finder, stormscope, TAS).

Section 34-50. Dependent positioning determining (VOR/LOC/GS, ADF, DME, transponder, GPS).

Note: Equipment which is certified for installation in the DA 40 is listed in Section 6.5 of the Airplane Flight Manual. Such equipment may be installed in accordance with the Airplane Maintenance Manual.

Any equipment which is not listed in Section 6.5 of the Airplane Flight Manual is called "Additional Equipment". The installation of Additional Equipment is a modification which must be handled in accordance with national regulations or a Service Bulletin.

2. Description

A. Flight Environment Data

The DA 40 has the usual flight environmental data systems. It has a Pitot-static system. The Pitot-static system has a Pitot-static probe located under the left wing. The Pitot-static probe has an electric heater. A switch on the instrument panel, left side, controls the Pitot heater. Flexible plastic hoses connect the Pitot-static probe to the airplane instruments.

If OÄM 40-267 is installed, the autopilot system is connected to a separate Static source system in the rear part of the fuselage. Refer to Section 22-10 for more information on the static pressure supplied to the autopilot system.

The airplane has a static system. The static vents are integral with the Pitot probe.

Flexible plastic hoses connect the static vents to the airplane instruments.

The Pitot-static system connects to these flight instruments:

– Altimeter.

– Airspeed indicator (ASI).

– Vertical speed indicator (VSI).

– Blind altitude encoder.

– Garmin G1000 integrated cockpit system (if installed).

The airplane has an electronic outside air temperature (OAT) indicator. The probe for the OAT indicator is located on the right side of the fuselage aft of the co-pilot's step.

B. Attitude and Direction

The DA 40 can have the following systems:

– Magnetic compass.

– Turn & bank indicator.

– Attitude gyro (horizon).

– Directional gyro.

– Gyro compass system, consisting of:

  – Slaved directional gyro.

  – Magnetic azimuth transmitter.

  – Slaving control unit.

  – Horizontal situation indicator (HSI).

If the Garmin G1000 system is installed, the indications are shown on the PFD and MFD. Refer to Section 31-42 for more details about the indications of the Garmin G1000 system.

C. Landing and Taxiing Aids

The DA 40 can have the following systems:

– A localizer system which is part of the VOR/LOC/GS system. Refer to Section 34-52 for more data about the VOR/LOC/GS system.

– A glideslope system which is part of the VOR/LOC/GS system. Refer to Section 34-52 for more data about the VOR/LOC/GS system.

– A marker beacon receiver which is part of the audio integrating system. Refer to Section 23-50 for more data about the marker beacon receiver functions of the audio integrating system.

With the Garmin G1000 system installed the localizer system is part of the ICS. Refer to Section 31-42 for more data about the landing and taxiing aids which are part of the ICS.

D. Independent Positioning Determining

The DA 40 can have the following systems:

– A strike finder system, consisting of strike finder display and strike finder sensor. Refer to Section 34-42 for more data about the strike finder system.

– A stormscope system, consisting of stormscope processor and stormscope antenna. Refer to Section 34-45 for more data about the stormscope system.

– A traffic advisory system (if OÄM 40-279 installed), consisting of a processor, two antennas and a transponder coupler. Refer to Section 34-46 for more data about the traffic advisory system.

E. Dependent Positioning Determining

The DA 40 can have the following systems:

– A VOR/LOC/GS system, consisting of NAV receiver, course deviation indicator (CDI), horizontal situation indicator (HSI), and NAV antenna.

– An automatic direction finder (ADF) system, consisting of ADF receiver, ADF indicator and ADF antenna.

– Distance measuring equipment (DME), consisting of DME receiver, remote DME switch, and DME antenna.

– A transponder (XPDR) system, consisting of transponder, blind altitude encoder, and transponder antenna.

– A global positioning system (GPS), consisting of GPS receiver, GPS annunciation control unit, and GPS antenna.

With the Garmin G1000 system installed the following dependent position determining systems are integral with the ICS:

– VOR/LOC.

– Global positioning system (GPS).

– Transponder.

– DME.

– ADF.

– Marker beacon receiver.

Refer to Section 31-42 for more data about the integrated cockpit system.

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Section 34-10
Flight Environment Data

1. General

This Section tells you about the Pitot-static system and the OAT indicating system in the airplane. Refer to the manufacturers' manuals for more data about the equipment.

2. Description

Figure 1 shows the Pitot-static system schematic diagram. Figures 2 and 3 show the OAT indicators. Figure 4 shows the equipment locations in the airplane.

If OÄM 40-267 is installed, the autopilot system is connected to a separate static source system in the rear part of the fuselage. Refer to Section 22-10 for more information on the static pressure supplied to the autopilot system.

A. Pitot-Static System

The Pitot-static system supplies Pitot pressure and static pressure to the air data instruments.

A Pitot-static probe mounted below the left wing senses Pitot and static pressure. The probe has a heater element to prevent icing. A switch on the instrument panel controls the Pitot heat. A circuit-breaker protects the system.

Optionally, an alternate static valve is installed below the instrument panel on the pilot's side. It is a back-up source for static pressure when the Pitot-static probe fails.

Flexible hoses connect the Pitot-static probe to the air data instruments. Pitot hoses are green and static hoses are blue/purple. Push-fit plastic connectors make the connections in the flexible hoses. T-pieces make junctions in the hoses.

Both Pitot and static hoses have a water trap at the lowest part of the hose-run. T-pieces divide the hose into two-runs. The top run goes directly to the instruments. The bottom run forms a sump before re-joining the top-run at a tee-piece. The water traps are located below the pilot's seat and can be accessed through the foot well in the passenger compartment.

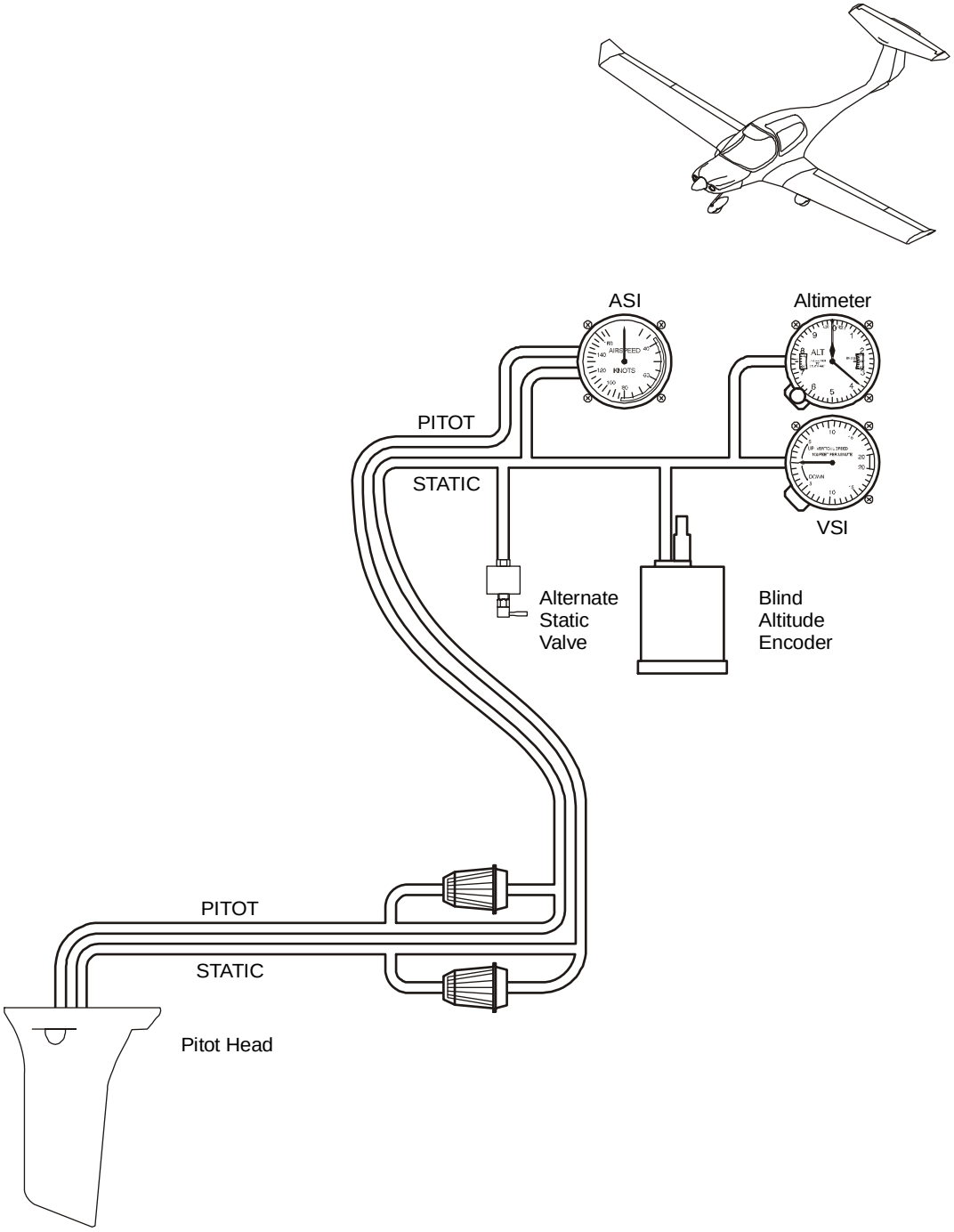


Figure 1: Pitot-Static System Schematic Diagram

B. Davtron 301F (C) OAT Indicating System

Figure 2 shows the Davtron 301F (C) OAT indicator. It is located in the instrument panel, see Chapter 31.

The OAT indicator is a digital instrument. The indicator and sensor are one unit. The indicator operates when the ALT/BAT switch is set to ON. The probe for the OAT indicator is located on the right side of the fuselage aft of the co-pilot's step.

C. Davtron M803 Digital Chronometer with OAT Indication

Figure 3 shows the Davtron M803 digital chronometer with OAT indication. It is located in the instrument panel, see Chapter 31. Refer to Section 31-20 for the chronometer functions of the unit.

The OAT indicator is a digital instrument, and is included in the Davtron M803 digital chronometer. The indicator operates when the ALT/BAT switch (Lycoming version) or ELECTRIC MASTER key switch (TAE version) is set to ON. The probe for the OAT indicator is located on the right side of the fuselage aft of the co-pilot's step.

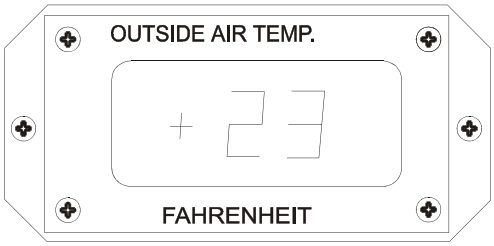


Figure 2: Davtron 301F OAT Indicator
(Davtron 301C: Indicates Degrees Centigrade, Otherwise Identical)

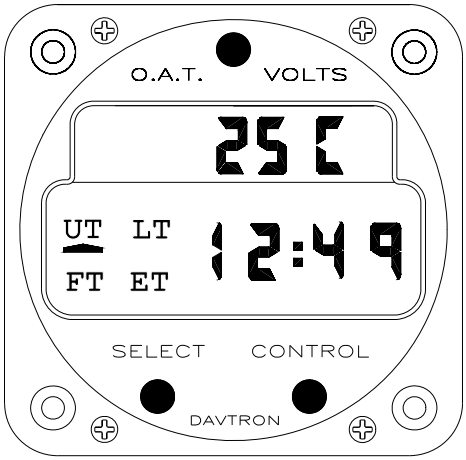


Figure 3: Davtron M803 Digital Chronometer with OAT Indication

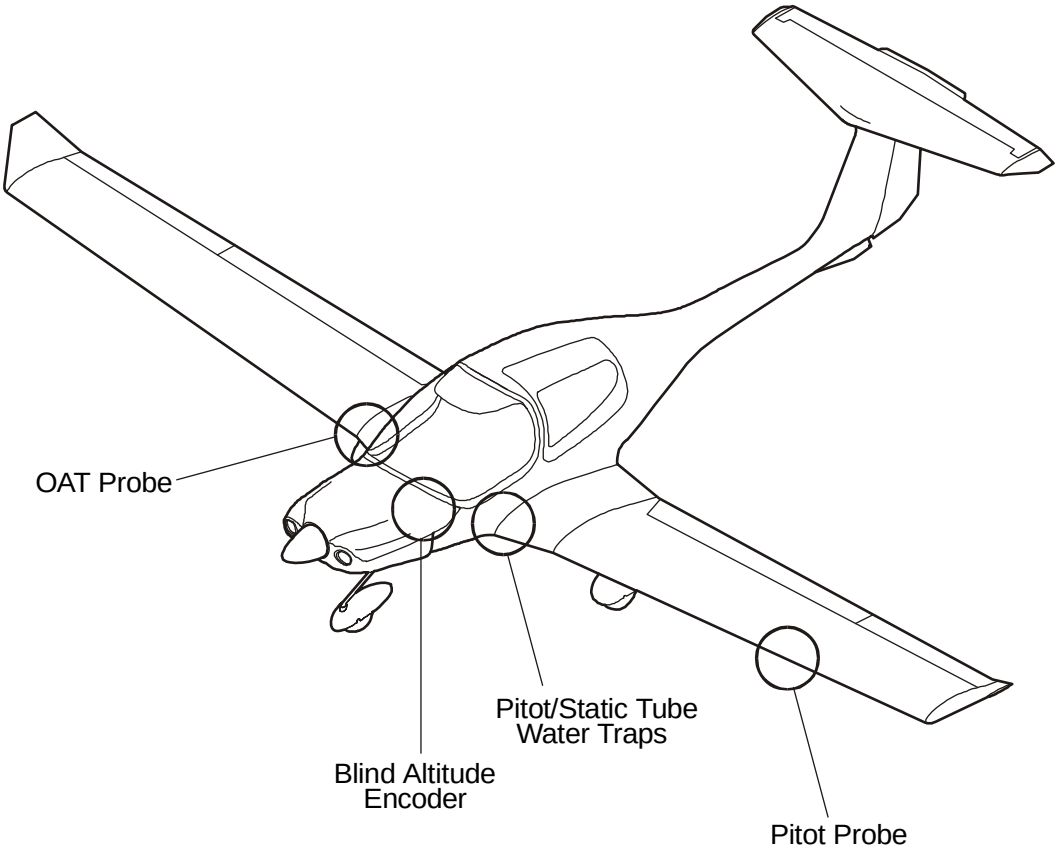


Figure 4: Component Locations

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Trouble-Shooting

1. General

The table below lists the defects you could have with the flight environment data system. If you have the trouble detailed in the Trouble column read across to the Possible Cause column. Then do the repair given in the Repair column.

Trouble	Possible Cause	Repair
Altimeter lags or reads incorrectly. VSI reads incorrectly.	Faulty indicator.	Replace the indicator.
	Blocked or kinked static hose.	Clear the hose.
	Water in the system.	Drain the water.
Airspeed indicator reads low.	Faulty indicator.	Replace the indicator.
	Blocked or kinked Pitot hose.	Clear the hose.
	Water in the system.	Drain the water.
Pitot heat does not operate.	Pitot heat circuit-breaker open.	Close the circuit-breaker. If the circuit-breaker opens again, do a test for a short circuit in the Pitot heat wiring.
	Pitot heat circuit-breaker defective.	Replace the circuit-breaker.
	Pitot heat wiring open-circuit	Do a continuity test of the wiring. Repair or replace defective wiring.
	Pitot probe defective.	Replace the Pitot probe.
OAT indicator gives incorrect indication.	OAT circuit-breaker open or defective.	Close the circuit-breaker. Or replace the circuit-breaker.
	Defective power supply cable.	Repair the cable.

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Maintenance Practices

1. General

These Maintenance Practices tell you how to replace components of the environmental data system. It also tells you how to test the Pitot-static system. Refer to the equipment manufacturers' manuals for more data about the equipment.

2. Remove/Install a Pitot-Static Instrument

A. Remove a Pitot-Static Instrument

	Detail Steps/Work Items	Key Items/References
(1)	Remove the instrument panel cover.	Refer to Section 25-10.
(2)	Disconnect the Pitot-static hose(s) from the rear of the instrument.	
(3)	Remove the screws which attach the instrument to the panel.	Hold the instrument!
(4)	Remove the instrument from the panel.	

B. Install a Pitot-Static Instrument

	Detail Steps/Work Items	Key Items/References
(1)	Remove the port cover(s) from the new instrument and fit to the removed instrument.	
(2)	If necessary, transfer the Pitot-static fittings to the new instrument.	
(3)	Put the instrument in position in the panel.	
(4)	Install the screws which attach the instrument to the panel.	
(5)	Connect the Pitot-static hoses to the rear of the instrument.	
(6)	Do a low-range static leak check.	Refer to Paragraph 5.
(7)	For the ASI only: – Do a Pitot-static leak check.	Refer to Paragraph 5.
(8)	Install the instrument panel cover.	Refer to Section 25-10.

3. Remove/Install the Pitot-Static Probe

A. Remove the Pitot-Static Probe

	Detail Steps/Work Items	Key Items/References
(1)	Open the PITOT HEAT circuit-breaker.	Lower left instrument panel.
(2)	Remove the Pitot access panel from the lower surface of the wing.	Refer to Section 52-40.
(3)	Move the probe down to give access to the connections.	
(4)	Disconnect the electrical connector.	
(5)	Disconnect the Pitot and static hose connections.	Identify the connections and put caps on the hoses.
(6)	Disconnect the bonding cable.	
(7)	Move the Pitot-static probe clear of the airplane.	

B. Install the Pitot-Static Probe

	Detail Steps/Work Items	Key Items/References
(1)	Put the Pitot probe in position on the wing.	
(2)	Connect the bonding cable.	
(3)	Connect the Pitot and static hoses.	Remove the caps from the hoses. Make sure that you connect the hoses to the correct locations.
(4)	Connect the electrical connector.	
(5)	Install the Pitot access panel to the lower surface of the wing.	
(6)	Do a test of the Pitot heat system.	
(7)	Do a low-range static leak test,	Refer to Paragraph 5.
(8)	Do a Pitot-static leak test.	Refer to Paragraph 5.
(9)	Install a cap with a red pennant on the Pitot-static probe.	

4. Remove/Install the OAT Indicator

A. Remove the Davtron 301F (C) OAT Indicator

	Detail Steps/Work Items	Key Items/References
(1)	Open the circuit-breaker for the OAT.	
(2)	Remove the instrument panel cover.	Refer to Section 25-10.
(3)	Remove the nut which attaches the OAT sensor to the fuselage.	
(4)	Remove the temperature sensor cable from the cable harness and disconnect the electrical cable for the power supply.	
(5)	Remove the OAT indicator and sensor from the airplane.	

B. Install the Davtron 301F (C) OAT Indicator

	Detail Steps/Work Items	Key Items/References
(1)	Put OAT indicator in position in instrument panel.	
(2)	Connect electrical connector for power supply.	
(3)	Put temperature sensor in position in fuselage and install nut which holds sensor in position.	
(4)	Use cable-ties to hold temperature sensor cable in position in wiring harness.	
(5)	Close OAT circuit-breaker.	
(6)	Set ALT/BAT switch to ON.	The OAT indicator must indicate the ambient temperature ±1 °C or ±2 °F.
(7)	Set ALT/BAT switch to OFF.	
(8)	Install instrument panel cover.	Refer to Section 25-10.

C. Remove/Install the Davtron M803 Digital Chronometer with OAT Indication

Refer to Section 31-20.

5. Pitot and Static System Leak Tests

Always do a Pitot leak-test after you do maintenance on the Pitot system. And always do a low-range static leak-test after you do maintenance on the static system.

CAUTION: OBEY THE FOLLOWING PRECAUTIONS WHEN YOU DO A PITOT OR STATIC LEAK-TEST. IF YOU DO NOT OBEY THE PRECAUTIONS YOU DAMAGE THE AIR DATA INSTRUMENTS.

A. Test Precautions

– The pressure in the Pitot system must always be equal to (or greater than) the pressure in the static system.

– Reversal of the Pitot and static pipes can cause damage to the air data instruments.

– The applied pressure (and rate of change of pressure) must not be greater than the design limits of the equipment which you will test.

– After doing the test, you must always return the system to its usual operating conditions.

B. Equipment

Item	Quantity	Part Number
Pitot-static probe adaptor.	1	P556620-4-4.
Pitot-static leak tester.	1	Commercial.

C. Low Range Static Leak Test

Follow the test equipment manufacturer's instructions for the use of the test-set. Obey the safety precautions for Pitot-static leak-testing at all times!

	Detail Steps/Work Items	Key Items/References
(1)	Connect the Pitot-static leak-tester to the Pitot-static probe.	
	CAUTION: The G1000 (if installed) Configuration mode contains certain pages and settings that are critical to airplane operation and safety. These pages are protected and cannot be modified, unless the technician is properly authorized and equipped. However, most protected pages are viewable to allow system awareness for troubleshooting.	
(2)	Prepare the G1000 system (if installed) for the test: – Allow the unit to warm up for 15 minutes before performing the following tests. – Start the G1000 system in Normal mode. – Remove power to the PFD. – Turn the PFD on in Configuration mode by pressing and holding the ENT key on the PFD while applying power. – Release the ENT key after 'INITIALIZING SYSTEM' appears on the upper left corner of the PFD. – Using the outer FMS knob on the PFD turn to the GRS page group, use the B ALT field for all CFR Part 43 Appendix E tests for G1000 altitude. – Place the MFD in Reversionary mode by pressing the red 'DISPLAY BACKUP' button on the GMA 1347 Audio Panel. Baro settings can then be read from the MFD for the CFR Part 43 Appendix E tests.	Only required for airplanes for which 14 CFR §91.411 and 14 CFR §91.411 part 43 Appendix E is applicable.

	Detail Steps/Work Items	Key Items/References
(3)	Apply a partial vacuum to the static port until you get a pressure altitude of 1000 ft above the ambient pressure altitude.	Note the altitude.
(4)	Let the pressure stabilize.	
(5)	Stop the Pitot-static leak-tester.	
(6)	Monitor the system pressure.	The system pressure loss must not be more than 100 ft/min.
(7)	Return both the MFD and PFD to Normal mode.	Only required for airplanes for which 14 CFR §91.411 and 14 CFR §91.411 part 43 Appendix E is applicable.
(8)	Compare the test equipment altimeter and the airplane altimeter.	The indication error must be less than shown in Table 1 below.

Table 1: Altimeter Indication Error

Altitude	Allowable Error
-1000 ft	±20 ft*
Sea Level	±20 ft
4,000 ft	±35 ft
8,000 ft	±60 ft
12,000 ft	±90 ft
16,000 ft	±110 ft
20,000 ft	±130 ft

* Only required for airplanes for which 14 CFR §91.411 and 14 CFR §91.411 part 43 Appendix E is applicable.

D. Pitot Test

Follow the test equipment manufacturers' instructions for the use of the test-set. Obey the safety precautions for Pitot-static leak-testing at all times!

	Detail Steps/Work Items	Key Items/References
(1)	Connect the Pitot-static leak-tester to the Pitot-static probe.	
(2)	Apply a pressure to the Pitot port equal to 150 kts.	
(3)	Let the pressure stabilize.	
(4)	Stop the Pitot-static leak-tester.	
(5)	Monitor the system pressure.	The leak rate must not be more than 10 kts/min.
(6)	Compare the test-equipment ASI and the airplane ASI.	The indication error must be less than shown in table 2 below.

Table 2: ASI Indication Error

Airspeed	Allowable Error
160 kts	±4 kts
100 kts	±4 kts
40 kts	±1.7 kts

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Section 34-20
Attitude and Direction

1. General

This Section tells you about the equipment which shows attitude and flight direction.

Refer to these Sections for data about the systems:

Section 34-22. Magnetic compass.

Section 34-25. Integrated gyro instruments (turn & bank indicator, attitude gyro (artificial horizon), directional gyro).

Section 34-28. Gyro-compass system, consisting of slaved directional gyro, magnetic azimuth transmitter, slaving control unit, and horizontal situation indicator (HSI).

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Section 34-22
Magnetic Compass

1. General

This Section tells you about the magnetic compass which is used to show airplane direction. Refer to the manufacturer's manuals for more data about the magnetic compass.

2. Description and Operation

The magnetic compass shows the heading of the airplane related to magnetic north. Fluid in the compass bowl gives damping. Each graduation of the compass is 5°.

A compass deviation card attaches to the compass. Compensating magnets for compass adjustment are located behind the deviation card holder. The compass lighting comes on when the instrument light potentiometer is switched on.

You must do a test for correct operation of the compass (compass swing):

– After replacing a major component.

– After replacing the compass.

– After modification to the airplane.

– After a lightning strike has been reported.

– If the airplane has been parked for more than 90 days.

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Trouble-Shooting

1. General

The table below lists the defects you could have with the magnetic compass. If you have the trouble detailed in the Trouble column read across to the Possible Cause column. Then do the repair given in the Repair column.

Trouble	Possible Cause	Repair
Magnetic compass leaking fluid.	Defective compass housing.	Replace the compass.
Compass deviation more than 10°.	Residual magnetism of a metal component in the airplane.	Do a test for residual magnetism using a hand-held compass. If necessary, degauss the component.
	Defective compass.	Replace the compass.
	Compass out of calibration.	Do a compass swing. Refer to the Maintenance Practices in this Section.

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Maintenance Practices

1. General

This Section tells you how to remove/install the magnetic compass. It also tells you how to test and adjust the magnetic compass (compass swing).

2. Remove/Install the Magnetic Compass

A. Remove the Magnetic Compass

	Detail Steps/Work Items	Key Items/References
(1)	Disconnect the electrical plug for the compass light.	
(2)	Remove the screws which attach the compass to the glare shield.	Hold the compass!
(3)	Remove the compass from the airplane.	

B. Install the Magnetic Compass

	Detail Steps/Work Items	Key Items/References
(1)	Put the compass in position on the glare shield.	
(2)	Install the screws which attach the compass to the glare shield.	
(3)	Connect the electrical plug for the compass light.	
(4)	Do a compass swing.	Refer to Paragraph 3.

3. Test/Adjust the Magnetic Compass (Compass Swing)

You must do a test for correct operation of the compass (compass swing):

– After replacing a major component.

– After replacing the compass.

– After modification to the airplane.

– After a lightning strike has been reported.

– If the airplane has been parked for more than 90 days.

CAUTION: USE ONLY NON-MAGNETIC TOOLS TO ADJUST THE COMPASS.

CAUTION: DO NOT WEAR OR CARRY METALLIC MATERIAL(WATCHES, BRACELETS ETC) WHEN YOU ADJUST THE COMPASS COMPENSATING MAGNETS OR OPERATE THE LAND COMPASS. METALLIC MATERIALS CAN CAUSE ERRORS.

Note: If possible, use a compass swing area that has been tested for magnetic interference. In any case, use a level area which is away from steel structure, underground pipes, cables, reinforced concrete, other airplanes and ground equipment.

A. Equipment

Item	Quantity	Part Number
Calibrated land compass.	1	Commercial.

B. Compass Swing

	Detail Steps/Work Items	Key Items/References
(1)	Adjust the compensating magnets in the compass to a neutral position.	
(2)	Start the engine. Set all electrical loads to ON.	Refer to the Airplane Flight Manual.
(3)	Use a calibrated and reliable land compass to make sure of the airplane heading.	
(4)	Align the airplane to magnetic north.	Adjust the N-S compensator magnet so that the compass indicates an airplane heading of 0°.
(5)	Align the airplane to magnetic east.	Adjust the E-W compensator magnet so that the compass indicates an airplane heading of 90°.
(6)	Align the airplane to magnetic south.	Adjust the N-S compensator magnet to remove half of the error between what is indicated and 180°.
(7)	Align the airplane to magnetic west.	Adjust the E-W compensator magnet to remove half of the error between what is indicated and 270°.
(8)	Turn the airplane through 360°, record the deviation at each 30° radial. Prepare a deviation table that shows the corrections that must be applied to each heading.	If large deviation occur when you operate electrical equipment/systems, the deviation table must also show the corrections to apply to each 30° radial when the that particular equipment/system is operated.
(9)	Install the deviation table in the compass card holder next to the compass.	

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Section 34-25
Integrated Gyro Instruments

1. General

This Section tells you about the instruments which show attitude and flight direction and which have integrated gyros. These are:

– Turn coordinator.

– Attitude gyro (horizon).

– Directional gyro.

Refer to Section 34-28 for the remote-gyro compass system. Refer to the manufacturer's manuals for more data about the integrated gyro instruments.

2. Description and Operation

A. Turn Coordinator

Figure 1 shows the turn coordinator Electric Gyro Corp. 1394T100-(3Z) without autopilot pickup. Alternatively the 1394T100-(12RZ), 1394T100-(12RA) or the 1394T100-(12RB) turn coordinator (with autopilot pickup) may be installed. It is located in the left-hand section of the instrument panel, see Chapter 31.

The turn coordinator is an electrically-powered gyroscopic instrument. It operates when the main bus is powered and the T&B circuit-breaker is closed. A warning flag shows when there is no power to the unit. The warning flag goes out of view when the turn coordinator has the correct power.

The turn and bank coordinator shows the rate of rotation of the airplane about the vertical axis. The turn coordinator has markings for rate 2 turns.

The turn coordinator has a slip indicator. A ball in a curved tube filled with fluid shows when the airplane is slipping or skidding. When the ball is in the center, the turn is correctly coordinated.

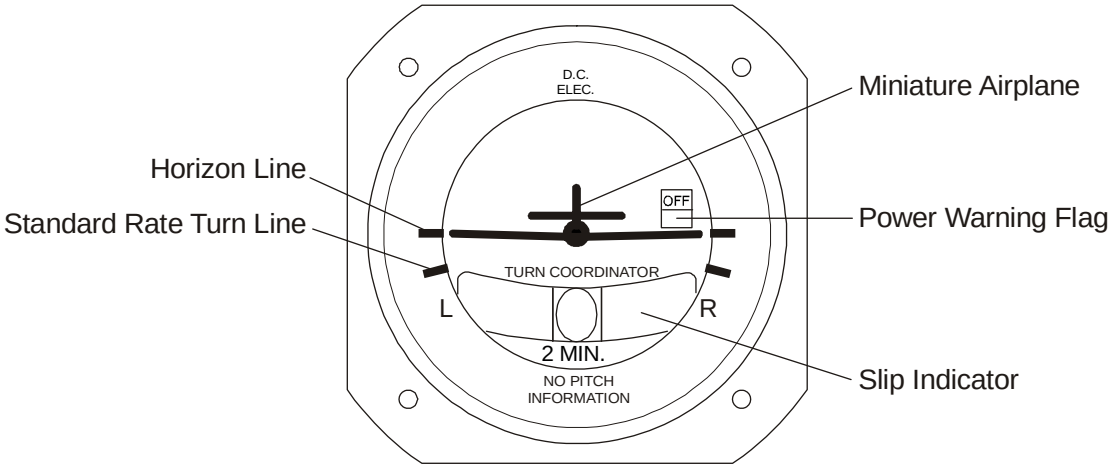


Figure 1: Electric Gyro Corp. 1394T100-(R.) Turn Coordinator

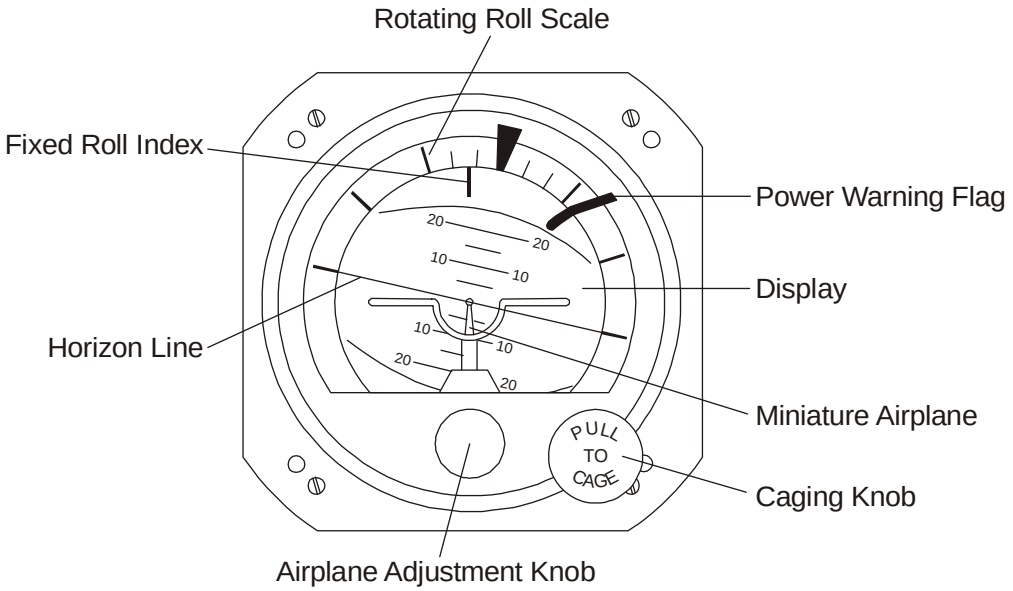


Figure 2: BF-Goodrich AIM 1100-28L(0F) DIA Attitude Gyro

B. Attitude Gyro (Artificial Horizon)

Figure 2 shows the BF-Goodrich AIM 1100-28L(0F) DIA attitude gyro. It is only approved for VFR operation.

Figure 3 shows the BF-Goodrich AIM 1100-28LK(0F) DIA attitude gyro. It is approved for VFR and IFR operation. The BF-Goodrich AIM 1100-14(5) DIA attitude gyro is identical to the AIM 1100-28LK(0F) DIA (Figure 3), except that it operates on 14 V.

The attitude gyro is located in the left-hand section of the instrument panel, see Chapter 31.

The attitude gyro is an electrically-powered gyroscopic instrument. It operates when the essential bus is powered and the HORIZON circuit-breaker is closed. It can also receive power from the emergency battery, see Section 24-32. A warning flag shows when there is no power to the unit. The warning flag goes out of view when the attitude gyro has the correct power.

The indicator shows pitch and roll data. The display shows a blue area for the sky and a brown area for the ground. A miniature airplane represents the airplane's nose and wings. Horizontal markings above and below the horizon show pitch up and down. Each graduation is 5°.

The roll display has markings around the circumference of the instrument. The markings are at 10, 20, 30, 60 and 90 degrees of roll.

The attitude gyro has these controls:

– PULL TO CAGE knob (manual erection). When pulled, rotated and released in the detent position, it locks roll and pitch gimbals in caged position.

Note: The AIM 1100-28LK(0F) DIA or AIM 1100-14(5) DIA attitude gyro has a guard to prevent unintended caging of the attitude indicator (see Figure 3). This guard is not part of the attitude indicator unit.

CAUTION: THE INDICATOR MAY BE DAMAGED IF THE 'PULL TO CAGE' KNOB IS RELEASED WITH A 'SNAP'. RELEASE 'PULL TO CAGE' KNOB AVOIDING A 'SNAP' RELEASE.

– Airplane adjustment knob. Only the AIM 1100-28L(0F) DIA has this knob, see Figure 2. Turning the knob moves the miniature airplane up and down a minimum of ± 4° relative to the middle position.

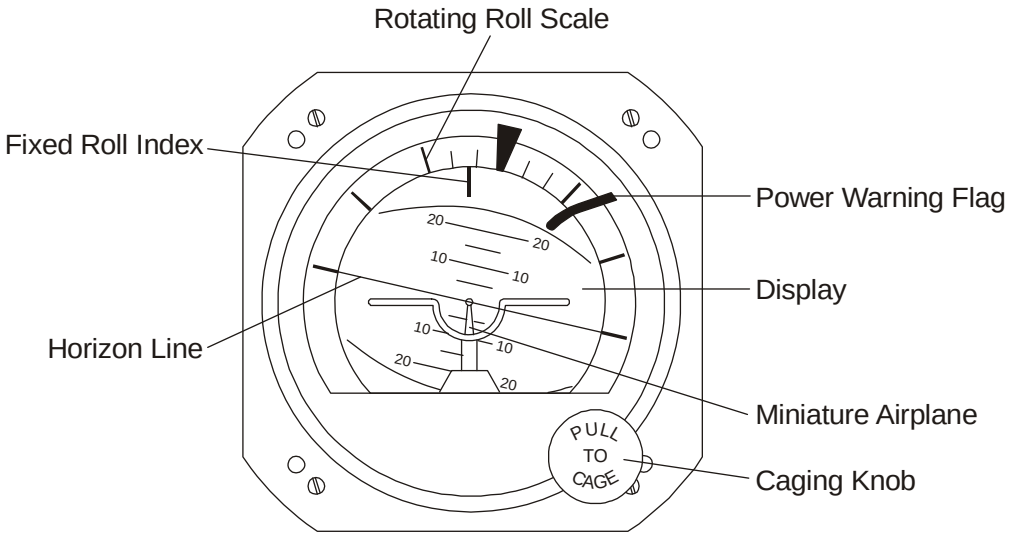


Figure 3: BF-Goodrich AIM 1100-28LK(0F) DIA Attitude Gyro (28 Volts)
BF-Goodrich AIM 1100-14(5) DIA Attitude Gyro (14 Volts)

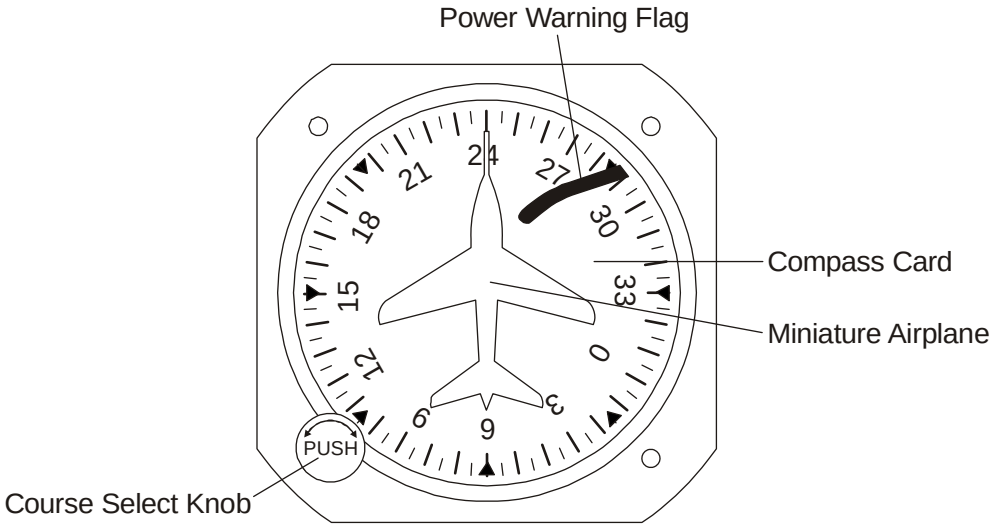


Figure 4: BF-Goodrich AIM2051BLD Directional Gyro

C. Directional Gyro

(1) BF-Goodrich AIM2051BLD

Figure 4 shows the BF-Goodrich AIM2051BLD directional gyro. It is located in the left-hand section of the instrument panel, see Chapter 31.

The directional gyro (DG) is an electrically-powered gyroscopic instrument. It operates when the main bus is powered and the DG circuit-breaker is closed. A warning flag shows when there is no power to the unit. The warning flag goes out of view when the DG has the correct power.

The directional gyro shows the direction of the airplane related to a preset heading. You set the heading by pushing and turning the knob on the face of the directional gyro. The display has a 360° compass card with 5° graduations.

(2) Sigma-Tek 4000B-31

Figure 5 shows the Sigma-Tek 4000B-31 directional gyro. It is located in the left-hand section of the instrument panel, see Chapter 31.

The Sigma-Tek directional gyro (DG) is only installed in the TAE version and is a vacuum driven gyroscopic instrument. It operates when the engine is running. A suction gauge (refer to Chapter 37) indicates when vacuum is applied to the unit. The suction gauge shows zero when there is no vacuum to the unit.

The directional gyro shows the direction of the airplane related to a preset heading. You set the heading by pushing and turning the knob on the face of the directional gyro. The display has a 360° compass card with 5° graduations.

(3) Sigma-Tek 4000C-17

Figure 6 shows the Sigma-Tek 4000C-17 directional gyro, It is located in the left-hand section of the instrument panel, see Section 31-11.

The Sigma-Tek directional gyro (DG) is only installed in the TAE version and is a vacuum driven gyroscopic instrument. It operates when the engine is running. A suction gauge (refer to Chapter 37) indicates when vacuum is applied to the unit. The suction gauge shows an indication outside of the green and white arc when there is no vacuum applied to the unit.

The directional gyro shows the direction of the airplane related to a preset heading. You set the heading by pushing and turning the knob on the face of the directional gyro. The display has a 360° compass card with 5° graduations. The directional gyro additionally provides heading information for the autopilot system.

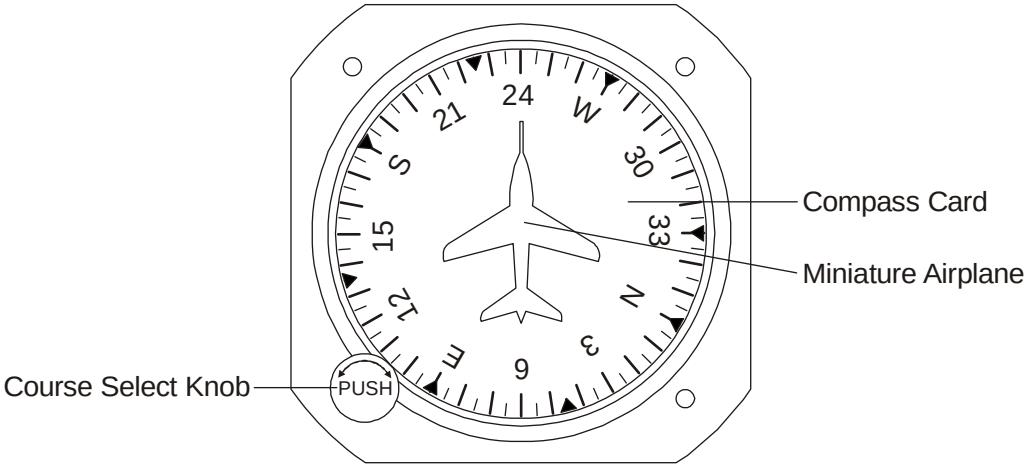


Figure 5: Sigma-Tek 4000B-31 Directional Gyro

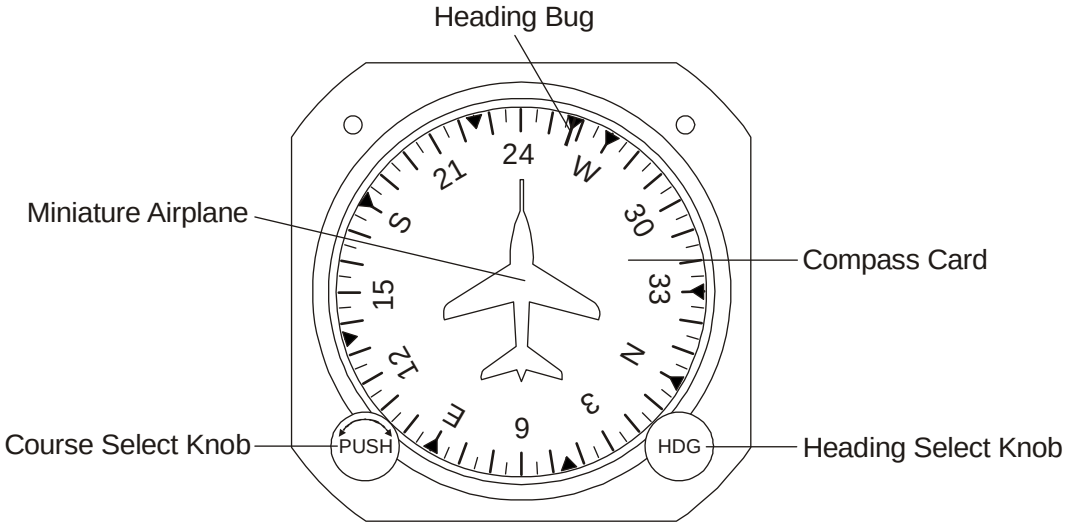


Figure 6: Sigma-Tek 4000C-17 Directional Gyro

Trouble-Shooting

1. Electrical Gyro Instruments

The table below lists the defects you could have with the integrated electrical gyro instruments. If you have the trouble detailed in the Trouble column read across to the Possible Cause column. Then do the repair given in the Repair column.

Trouble	Possible Cause	Repair
Warning flag in view. Indication of instrument not reliable.	Related circuit-breaker (T&B or HORIZON or DG) open or defective.	Close or replace the circuit-breaker.
	Power supply wiring defective.	Do a test for the correct voltage at the instrument. Repair the power supply wiring/connector.
	Ground connection defective.	Do a test for correct ground connection. Repair the ground wiring/connector.
	Instrument defective.	Replace the instrument.
Instrument is sluggish.	Mechanism worn or dirty.	Replace the instrument.

2. Vacuum Driven Directional Gyro

The table below lists the defects you could have with the integrated vacuum driven directional gyro. If you have the trouble detailed in the Trouble column read across to the Possible Cause column. Then do the repair given in the Repair column.

Trouble	Possible Cause	Repair
Indication of instrument not reliable.	Components of the vacuum system dirty or defective. Instrument defective.	Refer to Chapter 37. Replace the instrument.
Instrument is sluggish.	Mechanism worn or dirty.	Replace the instrument.

Maintenance Practices

1. General

This Section tells you how to remove/install the integrated gyro instruments.

CAUTION: Be specially careful when you work on or move gyroscopic instruments. Make sure that the gyro stops turning before you start to remove the instrument. Use only the correct shock-proof container for shipping. Mark the container 'VERY FRAGILE' 'HANDLE LIKE EGGS'.

2. Remove/Install an Integrated Gyro Instrument

A. Remove an Integrated Electrical Gyro Instrument

	Detail Steps/Work Items	Key Items/References
(1)	Pull the related circuit-breaker.	T&B for the turn & bank indicator. HORIZON for the attitude gyro. DG for the directional gyro.
(2)	Remove the instrument panel cover.	Refer to Section 25-10.
(3)	Dis-connect the connector at the rear of the instrument.	
(4)	Remove the screws which attach the instrument to the instrument panel.	Hold the instrument!
(5)	Remove the instrument from the instrument panel.	

B. Install an Integrated Electrical Gyro Instrument

	Detail Steps/Work Items	Key Items/References
(1)	Put the instrument in position in the instrument panel.	
(2)	Install the screws which attach the instrument to the instrument panel.	
(3)	Connect the connector at the rear of the instrument.	
(4)	Install the instrument panel cover.	Refer to Section 25-10.
(5)	Set the related circuit-breaker.	T&B for the turn & bank indicator. HORIZON for the attitude gyro. DG for the directional gyro.

C. Remove an Integrated Vacuum Gyro Instrument

	Detail Steps/Work Items	Key Items/References
(1)	Remove the instrument panel cover.	Refer to Section 25-10.
(2)	Disconnect the vacuum hoses at the rear of the instrument.	
(3)	Disconnect the electrical connector for the instrument light.	
(4)	Remove the screws which attach the instrument to the instrument panel.	Hold the instrument!
(5)	Remove the instrument from the instrument panel.	

D. Install an Integrated Vacuum Gyro Instrument

	Detail Steps/Work Items	Key Items/References
(1)	Put the instrument in position in the instrument panel.	
(2)	Install the screws which attach the instrument to the instrument panel.	
(3)	Connect the electrical connector for the instrument light.	
(4)	Connect the vacuum hoses at the rear of the instrument.	
(5)	Install the instrument panel cover.	Refer to Section 25-10.

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Section 34-28
Gyro-Compass System

1. General

This Section tells you about the gyro-compass system which can be installed in the DA 40. Refer to the manufacturer's manuals for more data about the equipment.

2. Description and Operation

The Bendix/King KCS 55A slaved remote-gyro-compass system (gyro-compass system) can be installed in the DA 40. The data from the gyro compass is supplied to the horizontal situation indicator (HSI). The gyro-compass system has these components:

– Slaved directional gyro KG 102A.

– Magnetic azimuth transmitter ('flux valve') KMT 112.

– Slaving control unit KA 51B.

– Horizontal situation indicator (HSI) KI 525A.

A. Slaved Directional Gyro

The slaved directional gyro is located under the passenger seats on the right side. The gyro supplies heading information to the HSI. The gyro has an internal power supply which gives excitation voltages to the magnetic azimuth transmitter. It also gives positive and negative voltages to the HSI and slaving control unit. The gyro can be set to operate in SLAVE mode or FREE mode.

If you set the gyro to SLAVE mode, then the gyro aligns with the magnetic direction reference signal from the magnetic azimuth transmitter. At first the alignment occurs at a slew rate of 180 degrees per minute. After this time it will align at the ‘usual' rate of 3 degrees per minute. The alignment continues at this rate while in SLAVE mode.

The pilot can select FREE mode to disengage the magnetic reference direction signal. The pilot can change the heading information by operating the clockwise/counter-clockwise toggle-switch on the slaving control unit.

B. Magnetic Azimuth Transmitter

The magnetic azimuth transmitter (also known as the 'flux valve') senses the direction of the earth's magnetic field and sends the data to the slaved directional gyro. The transmitter is located in the right wing.

C. Slaving Control Unit

Figure 1 shows the slaving control unit. It is located in the right-hand section of the instrument panel, see Chapter 31.

The control unit contains the circuitry that compensates for the local magnetic disturbances which may effect the azimuth transmitter.

The control unit has a toggle switch that can be set to SLAVE or FREE and a sprung toggle switch that can be set momentarily to clockwise (CW) or counter-clockwise (CCW). It also has an indicator that shows the amount of error between the sensed reference signal from the azimuth transmitter and the alignment of the slaved directional gyro.

The SLAVE/FREE toggle switch puts the slaved directional gyro into either SLAVE or FREE mode.

When the directional gyro is in FREE mode, the pilot can use the CW/CCW sprung toggle switch to manually set heading information in the pilot's display.

D. Horizontal Situation Indicator

Figure 2 shows the horizontal situation indicator (HSI). The HSI is located in the left-hand section of the instrument panel, see Chapter 31. It has the following features:

– Compass card. This rotating card shows gyro-stabilized magnetic compass data below the lubber line.

– Heading select knob. This sets the heading select marker relative to the compass card.

– Symbolic airplane. This shows the relationship of the airplane to the display.

– Reciprocal course pointer. This shows the reciprocal of the selected course.

– Course select knob. This sets the selected course pointer in relation to the compass card.

– Lateral deviation bar. This shows VOR radial or LOC course. When related to the symbolic airplane, the position of the deviation bar is the same as the position of the chosen VOR radial or LOC course to the airplane.

Note: The lateral deviation bar normally shows information which it receives from the NAV 1 receiver. When the GPS annunciation control unit is installed, the lateral deviation bar can also show information which it receives from the GPS receiver. Refer to Section 34-58 for details about the GPS annunciation control unit.

– Glideslope pointer. Represents the actual airplane deviation from the glideslope path. When unusable glideslope data is present, the glideslope pointer moves out of view. When there is a valid glideslope signal, the pointers come into view after a 2 to 12 second delay.

– Heading select. This indicates the selected airplane heading.

– NAV warning flag. The warning flag is in view when the VOR/LOC data is unusable.

– Lubber line. Read the airplane magnetic heading under this line.

– Heading warning flag. The warning flag is in view when low power, manual slave, fast auto slave or the spin motor runs at less than 50 % usual speed.

– Selected course pointer. This shows the selected VOR radial or LOC course.

– To-from indicator. This shows the direction to the VOR station along the selected radial.

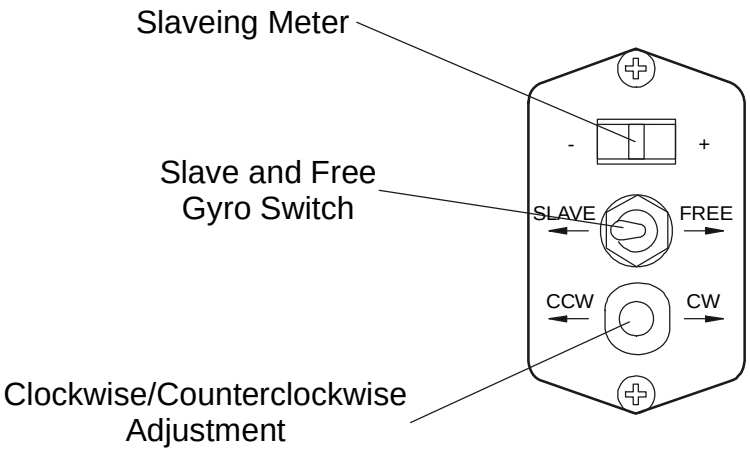


Figure 1: Bendix/King KA 51B Slaving Control Unit

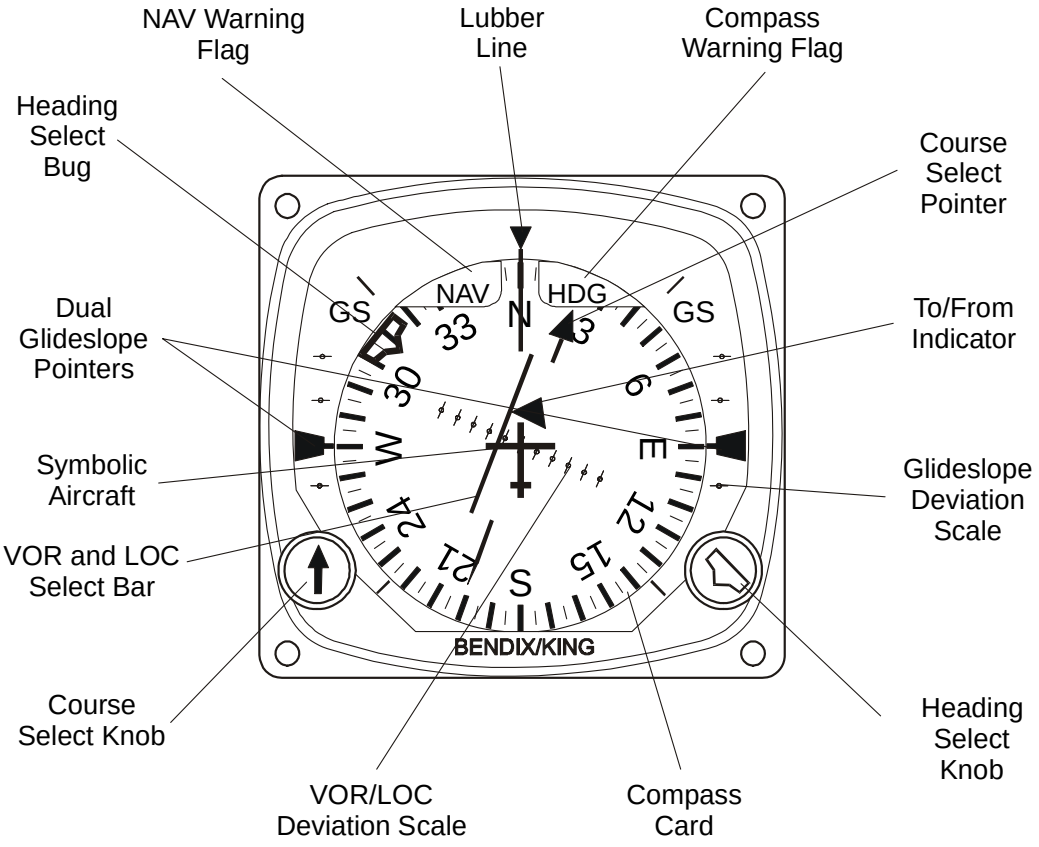


Figure 2: Bendix/King KI 525A Horizontal Situation Indicator

Trouble-Shooting

1. General

The table below lists the defects you could have with the compass system. Refer to Section 34-52 for Trouble-Shooting the localizer (LOC) and glideslope (GS) functions of the HSI.

If you have the trouble detailed in the Trouble column read across to the Possible Cause column. Then do the repair given in the Repair column.

Trouble	Possible Cause	Repair
Gyro compass does not operate.	Circuit-breaker not set. Indicator defective. Cables/connectors defective.	Set the circuit-breaker. Replace the indicator. Do a test for continuity on each cable. Do a test for short circuit to ground and between cables. Replace defective cables.
HSI heading flag appears during normal operation (or stays in view after start-up).	The gyro on the KG 102A is running at less than 50 % of the usual speed. The power supply in the KG 102A is defective.	Do a test for the correct voltage at the KG 102A. If the input voltage is correct, replace the KG 102A. Replace the KG 102A.
Continuous large deflection of the slaving meter. System operates correctly in FREE mode.	Slaving system failed.	Replace the magnetic azimuth transmitter KMT 112. If this does not clear the fault, do a test for continuity on each cable between the KMT 112 and the KG 102A. Do a test for short circuit to ground and between cables. Replace defective cables.

Trouble	Possible Cause	Repair
Large differences between the magnetic compass and the gyro compass.	Slaving system failed.	Replace the magnetic azimuth transmitter KMT 112. If this does not clear the fault, do a test for continuity on each cable between the KMT 112 and the KG 102A. Do a test for short circuit to ground and between cables. Replace defective cables.

Maintenance Practices

1. General

This Section tells you how to remove/install the components of the compass system. It also tells you how to adjust the compass system.

2. Remove/Install the Slaved Directional Gyro

A. Remove the Slaved Directional Gyro

	Detail Steps/Work Items	Key Items/References
(1)	Remove the passenger's seat.	Refer to Section 25-10.
(2)	Release the connector from the gyro.	
(3)	Remove the screws that attach the gyro to the mounting plate.	Release the bonding cable from the gyro.
(4)	Remove the gyro from the airplane.	

B. Install the Slaved Directional Gyro

	Detail Steps/Work Items	Key Items/References
(1)	Put the gyro in position on the mounting plate.	
(2)	Install the screws that attach the gyro to the mounting plate.	Attach the bonding cable to one of the screws.
(3)	Attach the connector to the gyro.	
(4)	Install the passenger's seat.	Refer to Section 25-10.
(5)	Do a functional test of the gyro compass system in FREE and SLAVE mode.	

3. Remove/Install the Slaving Control Unit

A. Remove the Slaving Control Unit

	Detail Steps/Work Items	Key Items/References
(1)	Remove the instrument panel cover.	Refer to Section 25-10.
(2)	Disconnect the 2 connectors from the slaving control unit.	
(3)	Remove 2 screws that attach the slaving control unit to the instrument panel.	Hold the slaving control unit.
(4)	Remove the unit from the instrument panel.	

B. Install the Slaving Control Unit

	Detail Steps/Work Items	Key Items/References
(1)	Put the slaving control unit in position in the instrument panel.	
(2)	Install the 2 attaching screws.	
(3)	Connect the 2 connectors to the slaving control unit.	
(4)	Install the instrument panel cover.	Refer to Section 25-10.
(5)	Adjust the compass system.	Refer to Paragraph 6.

4. Remove/Install the Magnetic Azimuth Transmitter

A. Remove the Magnetic Azimuth Transmitter

	Detail Steps/Work Items	Key Items/References
(1)	Open the access panel for the magnetic azimuth transmitter, hold it near the wing.	Hold the panel! The magnetic azimuth transmitter is attached to the panel.
(2)	Disconnect the connector from the magnetic azimuth transmitter.	
(3)	Move the access panel with the magnetic azimuth transmitter clear of the airplane.	
(4)	Remove the screws that attach the magnetic azimuth transmitter to the panel.	
(5)	Remove the magnetic azimuth transmitter from the panel.	

B. Install the Magnetic Azimuth Transmitter

	Detail Steps/Work Items	Key Items/References
(1)	Install the screws that attach the magnetic azimuth transmitter to the access panel.	Use only the correct (non-magnetic) screws.
(2)	Put the access panel with the magnetic azimuth transmitter in position.	
(3)	Connect the connector to the magnetic azimuth transmitter.	
(4)	Install the access panel with the magnetic azimuth transmitter to the wing.	Make sure that the mounting slot marked FORE TOP is at the front.
(5)	Adjust the compass system.	Refer to Paragraph 6.

5. Remove/Install the HSI

A. Remove the HSI

	Detail Steps/Work Items	Key Items/References
(1)	Remove the instrument panel cover.	Refer to Section 25-10.
(2)	Dis-connect the connectors at the rear of the HSI.	
(3)	Remove the screws which attach the HSI to the instrument panel.	Hold the HSI!
(4)	Remove the HSI from the instrument panel.	

B. Install the HSI

	Detail Steps/Work Items	Key Items/References
(1)	Put the HSI in position in the instrument panel.	
(2)	Install the screws which attach the HSI to the instrument panel.	
(3)	Connect the connectors at the rear of the HSI.	
(4)	Install the instrument panel cover.	Refer to Section 25-10.

6. Adjust the Compass System

A. Adjust the Magnetic Azimuth Detector

Do this part of the procedure after the magnetic azimuth detector has been installed for any reason.

	Detail Steps/Work Items	Key Items/References
(1)	Put the airplane on an approved compass swing base.	
(2)	Set the gyro compass system ON. Allow it to complete the start-up sequence.	
(3)	Align the airplane north.	Use an approved external reference compass.
(4)	Set the slaving control to FREE.	
(5)	Use the CW/CCW switch to zero the slave meter.	Record the algebraic error between the HSI compass card and the actual alignment.
(6)	Do items 3 to 5 for the other 3 cardinal headings.	
(7)	Add the algebraic errors and divide by 4. This is the 'index error.'	
(8)	Adjust the magnetic azimuth detector: – Loosen the 3 attaching screws of the access panel to which the magnetic azimuth detector is installed. – Turn the access panel with the magnetic azimuth detector by the amount of the index error. – Tighten the attaching screws.	
(9)	Do the procedure again as necessary to minimize the error.	

B. Adjust the Slaving Control Unit

Do this procedure after the magnetic azimuth transmitter or the slaving control unit has been replaced.

	Detail Steps/Work Items	Key Items/References
(1)	Release the slaving control unit from the left-hand section of the instrument panel: – Release 2 screws. – Pull the unit aft through the instrument panel.	To give access to the screws and the digital meter jack sockets.
(2)	Put the airplane on an approved compass swing base.	
(3)	Connect a digital millivolt meter to the slaving control unit.	Connect the positive jack to the red jack socket. Connect the common jack to the black jack socket.
(4)	Set all airplane electrical systems to ON.	
(5)	Set the gyro compass system ON. Allow it to complete the start-up sequence.	
(6)	Align the airplane north.	Use an approved external reference compass.
(7)	Set the slaving control to FREE.	
(8)	Use the CW/CCW switch to set the HSI compass card to NORTH under the lubberline.	
(9)	Adjust the N/S potentiometer on the slaving control unit to zero the external digital millivolt meter.	Use a non-magnetic blade screwdriver. (0 volts DC ± 50 millivolts).
(10)	Align the airplane east.	Use an approved external reference compass.
(11)	Use the CW/CCW switch to set the HSI compass card to EAST under the lubberline.	
(12)	Adjust the E/W potentiometer on the slaving control unit to zero the external digital millivolt meter.	Use a non-magnetic blade screwdriver. (0 volts DC ± 50 millivolts).

	Detail Steps/Work Items	Key Items/References
(13)	Align the airplane south.	Use an approved external reference compass.
(14)	Use the CW/CCW switch to set the HSI compass card to SOUTH under the lubberline.	
(15)	Adjust the N/S potentiometer on the slaving control unit to zero the external digital millivolt meter.	Use a non-magnetic blade screwdriver. (0 volts DC ± 50 millivolts).
(16)	Align the airplane west.	Use an approved external reference compass.
(17)	Use the CW/CCW switch to set the HSI compass card to WEST under the lubberline.	
(18)	Adjust the E/W potentiometer on the slaving control unit to zero the external digital millivolt meter.	Use a non-magnetic blade screwdriver. (0 volts DC ± 50 millivolts).
(19)	Set the slaving control to SLAVE.	
(20)	Align the airplane on each of the cardinal headings in turn.	The error between the compass card on the HSI and the external reference compass must be less than ±2º.
(21)	Set all airplane electrical systems to OFF.	
(22)	Remove the digital millivolt meter.	
(23)	Install the slaving control unit in the instrument panel: – Push the slaving control unit into position in the panel. – Install 2 attaching screws.	

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Section 34-29
Attitude and Direction with the Garmin G1000 System Installed

1. General

This Section tells you about the attitude and direction systems with the Garmin G1000 system installed. The main attitude and direction systems are integral with the Integrated Cockpit System (ICS). Refer to Section 31-42 for more data about the ICS.

The DA 40 has the usual magnetic compass. The magnetic compass is installed in the instrument panel at the top, on the right-hand side. There is also an artificial horizon installed in the instrument panel at the top, arranged centrally.

2. Description and Operation

A. Magnetic Compass

The magnetic compass shows the heading of the airplane related to magnetic north. Fluid in the compass bowl gives damping. Each graduation of the compass is 5°.

A compass deviation card is located next to the compass on the instrument panel. You must do a test for the correct operation of the compass (compass swing).

– After replacing a major component.

– After replacing the compass.

– After a major modification to the airplane.

– After a lightning strike has been reported.

– If the airplane has been parked for more than 90 days.

B. Attitude Gyro (Artificial Horizon)

The artificial horizon is an electrically-powered gyroscopic instrument. It operates when the essential bus is powered and the HORIZON circuit-breaker is closed. It can also receive power from the emergency battery, see Section 24-32. A warning flag drops into view to indicate that the gyro motor is not receiving sufficient power to operate.

The artificial horizon incorporates a moving display that simulates the earth's horizon and provides the pilot with a real time visual indication of the airplane pitch and roll attitude relative to the indicator symbolic airplane. The instrument can function as a primary or standby indicator.

The attitude gyro incorporates pitch and roll displays that are mechanically linked to a spinning mass gyroscope. The horizon bar moves behind the symbolic airplane. Precession error is corrected by the internal erection system or by pulling the PULL TO CAGE knob.

The artificial horizon employs an efficient electrically driven internal vertical gyroscope assembly incorporating a special air erection mechanism. This mechanism simultaneously erects the pitch and roll axes of the gyroscope. Movement of the airplane generates a reaction of the display that simulates the visual reference seen by the pilot when looking outside at the earth's true horizon line.

Trouble-Shooting

1. Magnetic Compass

The table below lists the defects you could have with the magnetic compass. If you have the trouble detailed in the Trouble column read across to the Possible Cause column. Then do the repair given in the Repair column.

Trouble	Possible Cause	Repair
Magnetic compass damping fluid leaking.	Defective compass housing.	Replace the compass.
Compass deviation more than 10°.	Residual magnetism of a metal component in the airplane.	Do a test for residual magnetism using a hand-held compass. If necessary, degauss the component.
	Defective compass.	Replace the compass.
	Compass out of calibration.	Do a compass swing.

2. Attitude Gyro (Artificial Horizon)

The table below lists the defects you could have with the artificial horizon. If you have the trouble detailed in the Trouble column read across to the Possible Cause column. Then do the repair given in the Repair column.

Trouble	Possible Cause	Repair
Warning flag in view. Indication of instrument not reliable.	HORIZON circuit-breaker open or defective.	Close or replace the circuit-breaker.
	Power supply wiring defective.	Do a test for the correct voltage at the instrument. Repair the power supply wiring/connector.
	Ground connection defective.	Do a test for correct ground connection. Repair the ground wiring/connector.
	Instrument defective.	Replace the instrument.
Instrument is sluggish.	Mechanism worn or dirty.	Replace the instrument.

Maintenance Practices

1. General

This Section tells you how to remove/install the magnetic compass as well as the attitude gyro (artificial horizon). It also tells you how to test and adjust the magnetic compass (compass swing).

2. Remove/Install the Magnetic Compass

A. Remove the Magnetic Compass

	Detail Steps/Work Items	Key Items/References
(1)	Make sure that the ELECTRIC MASTER key switch is set to OFF.	Instrument panel, center.
(2)	Remove the instrument panel cover.	Refer to Section 25-10.
(3)	Disconnect the electrical cables.	
(4)	Remove the 4 screws that attach the compass to the instrument panel.	Hold the compass!
(5)	Move the compass forward and clear of the instrument panel.	Remove and discard the compass deviation table.

B. Install the Magnetic Compass

	Detail Steps/Work Items	Key Items/References
(1)	Make sure that the ELECTRIC MASTER key switch is set to OFF.	Instrument panel, center.
(2)	Move the magnetic compass into position at the instrument panel.	Hold the compass in position.
(3)	Install the 4 screws that attach the compass to the instrument panel.	
(4)	Connect the electrical cables.	
(5)	Install the instrument panel cover.	Refer to Section 25-10.
(6)	Do a compass swing.	Refer to Paragraph 3.

3. Test/Adjust the Magnetic Compass (Compass Swing)

You must do a test for correct operation of the compass (compass swing):

– After replacing a major component.

– After replacing the compass.

– After a major modification to the airplane.

– After a lightning strike has been reported.

– If the airplane has been parked for more than 90 days.

CAUTION: USE ONLY NON-MAGNETIC TOOLS TO ADJUST THE COMPASS.

CAUTION: DO NOT WEAR OR CARRY METALLIC OBJECTS (WATCHES, BRACELETS ETC) WHEN YOU ADJUST THE COMPASS COMPENSATING MAGNETS OR OPERATE THE LAND COMPASS. METALLIC OBJECTS NEAR THE COMPASS CAN CAUSE ERRORS.

Note: If possible, use a compass swing area that has been tested for magnetic interference. In any case, you must use a level area that is away from metal structures, underground pipes, reinforced concrete, other airplane and ground servicing equipment.

A. Equipment

Item	Quantity	Part Number
Calibrated land compass.	1	Commercial.

B. Compass Swing

	Detail Steps/Work Items	Key Items/References
(1)	Adjust the compensating magnets in the compass to a neutral position.	Refer to the compass manufacturer's instructions.
(2)	Start the engine and set all electrical loads to ON.	Refer to the Airplane Flight Manual.
(3)	Use the land compass to align the airplane to magnetic north.	Adjust the N-S compensator magnet so that the airplane compass indicates a heading of 0°.
(4)	Use the land compass to align the airplane to magnetic east.	Adjust the E-W compensator magnet so that the airplane compass indicates a heading of 90°.
(5)	Use the land compass to align the airplane to magnetic south.	Adjust the N-S compensator magnet to remove half of the error between the indicated heading and 180°.
(6)	Use the land compass to align the airplane to magnetic west.	Adjust the E-W compensator magnet to remove half of the error between the indicated heading and 270°.
(7)	Turn the airplane through 360°, record the deviation at each 30° radial. Prepare a deviation table that shows the corrections that must be applied to each of the 30° radials.	If large deviations occur when you operate electrical equipment/systems, the deviation table must also show the corrections to apply to each 30° radial when that particular equipment/system is operating.
(8)	Install the new deviation table in the compass card holder next to the compass.	

4. Remove/Install the Attitude Gyro (Artificial Horizon)

CAUTION: GYROS ARE DELICATE AND CAN NOT WITHSTAND THE SHOCK OF BEING DROPPED, JARRED OR STRUCK BY PIECES OF EQUIPMENT. DO NOT PLACE GYROS ON ANY HARD SURFACE. PAD WITH GENEROUS FOAM.

A. Precautions

– To prevent damage to a gyro, the instrument should be transported to and from the airplane in its original shipping container. If this is impractical, the gyro should be hand carried carefully in an upright position.

– A gyro should never be removed while it is spinning or running down. The instrument normally operates at high RPM and may take 10 minutes or longer to run down. If it is removed while running and tilted more than 20 degrees, the gyro can develop a gimbal lock. The gimbal will tumble and start to spin. If gimbal lock occurs while the rotor is turning, the gimbal may spin fast enough to damage the gimbal bearings, requiring overhaul.

– A malfunctioning gyro should be handled with the same care given a new instrument. Most malfunctioning instruments can be repaired and returned to service. Using proper handling procedures during removal prevents additional damage and helps ensure possible reuse.

B. Remove the Attitude Gyro

	Detail Steps/Work Items	Key Items/References
(1)	Pull the HORIZON circuit-breaker.	Instrument panel, right side.
(2)	Remove the instrument panel cover.	Refer to Section 25-10.
(3)	Dis-connect the connector at the rear of the instrument.	
(4)	Remove the screws which attach the instrument to the instrument panel.	Hold the instrument!
(5)	Remove the instrument from the instrument panel.	Handle with care.

C. Install the Attitude Gyro

	Detail Steps/Work Items	Key Items/References
(1)	Insert the indicator into the instrument panel cutout.	Upper instrument panel, arranged centrally.
(2)	Install the screws which attach the instrument to the instrument panel.	
(3)	Connect the connector at the rear of the instrument.	
(4)	Install the instrument panel cover.	Refer to Section 25-10.
(5)	Set the HORIZON circuit-breaker.	Instrument panel, right side.

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Section 34-30
Landing and Taxiing Aids

1. General

This Section tells you about the landing and taxiing aids that can be installed in the DA 40.

Refer to the equipment manufacturers' manuals for more data about other options of landing and taxiing aids.

2. Description

The DA 40 can have the following landing and taxiing aids:

– A localizer system which is part of the VOR/LOC/GS system. Refer to Section 34-52 for more data about the VOR/LOC/GS system.

– A glideslope system which is part of the VOR/LOC/GS system. Refer to Section 34-52 for more data about the VOR/LOC/GS system.

– A marker beacon receiver which is part of the audio integrating system. Refer to Section 23-50 for more data about the marker beacon receiver functions of the audio integrating system.

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Section 34-39
Landing and Taxiing Aids with the Garmin G1000 System Installed

1. General

This Section tells you about the landing and taxiing aids of the DA 40 D if the Garmin G1000 system is installed.

Refer to the equipment manufacturers' manuals for more data about other options of landing and taxiing aids.

2. Description

The DA 40 D has the following landing and taxiing aids:

– A localizer system which is part of the G1000 integrated avionics system. Refer to Section 31-42 for more data about the G1000 integrated avionics system.

– A glideslope system which is part of the G1000 integrated avionics system. Refer to Section 31-42 for more data about the G1000 integrated avionics system.

– A marker beacon receiver which is part of the G1000 integrated avionics system. Refer to Section 31-42 for more data about the G1000 integrated avionics system.

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Section 34-40
Independent Position Determining

1. General

This Section tells you about the independent position determining systems that can be installed in the DA 40. Refer to these Sections for data about the systems:

Section 34-42. Strike finder system.

Section 34-45. Stormscope system.

Section 34-46. Traffic advisory system.

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Section 34-42
Strike Finder System

1. General

This Section tells you about the strike finder system that can be installed in the DA 40. Refer to the manufacturer´s manual for more data about the equipment. Refer to Chapter 92 for the wiring diagrams.

The strike finder system consists of the following items:

– Strike finder display.

– Strike finder sensor.

2. Description and Operation

The strike finder detects and analyzes the electrical activity emanating from thunderstorms within a 200 nautical mile (nm) radius of the airplane.

The insight strike finder SF 2000 consists of a display and a sensor. The display employs a digital signal processor which, among other components, processes and displays the signal detected by the sensor.

A. Strike Finder Display

Figure 1 shows the Insight strike finder display. It is located on the left side of the avionics rack in the instrument panel, see Chapter 31.

The avionics bus supplies power to the strike finder display. The ALT/BAT switch and the AVIONIC MASTER switch must be set to ON to supply power through the STRIKE circuit-breaker to the strike finder display. Refer to Chapter 92 for the wiring diagrams.

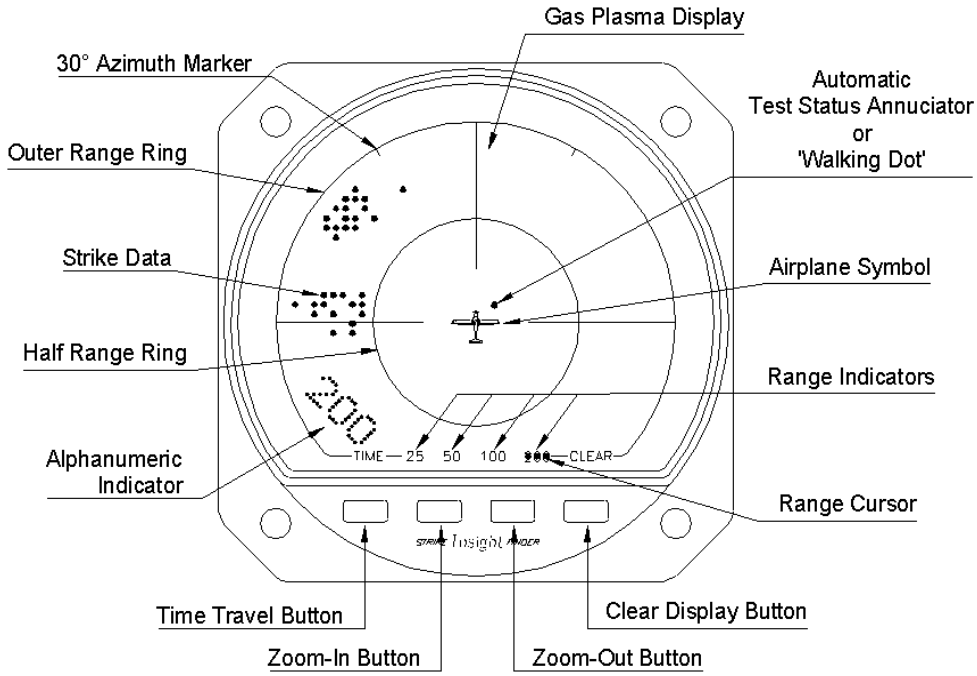


Figure 1: Insight Strike Finder, SF 2000

The strike finder display has these controls and displays:

– 30-degree azimuth marker. Helps to identify the location of thunderstorms relative to the airplane's intended track.

– Outer range ring. Is the outer boundary of viewable strike data within the selected range. (for example: 200 nm, 100 nm, 50 nm, 25 nm)

– Half range ring. Is half the distance from the airplane to the outer range ring, for the selected range.

– Strike data. Is plotted on the display as bright orange dots to indicate the location, range and severity of detected lightning activity.

– Range indicators. Are used to show the current viewing range selected. They indicate the distance from the airplane to the outer range ring.

– Range cursor. Highlights one of the four range indicators to show selected range view (defaults to 200 nm).

– Alphanumeric indicator. Appears as large digits in the lower left quadrant of the display. Provides readout of range selection, Time Travel function and troubleshooting codes.

– Airplane symbol. Represents your airplane.

– Ultra bright LED or gas plasma display. Consists of a 2.5 inch diameter viewable area. It displays strike data and status messages with bright orange dots against a black background.

– Automatic test status annunciator. Appears in the center of the display as a 'Walking Dot', which moves in a clockwise direction. The presence of this dot means the strike finder has successfully passed all automatic diagnostic tests.

– Zoom-in/zoom-out buttons. Permit the operator to step through the range selections (25-50-100 and 200 nm), smoothly altering the distances viewed on the display.

– Time travel button. Allows the pilot to display recent strike data history - compressing about one hour of storm activity into a one minute presentation.

– Clear display button. Clears the display of all dots but does not erase the strike data history employed by the time travel function.

B. Strike Finder Sensor

The insight strike finder sensor is located behind the COM 2 antenna. The sensor contains sensitive circuit to detect magnetic energy and convey the direction and magnitude of such energy to the display for actual depiction to the pilot.

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Trouble-Shooting

1. General

The table below lists the defects you could have with the strike finder system. If you have the trouble detailed in the Trouble column read across to the Possible Cause column. Then do the repair given in the Repair column.

Trouble	Possible Cause	Repair
Strike finder display does not operate.	Circuit-breaker not set.	Set the circuit-breaker.
	Faulty strike finder display.	Repair or replace the strike finder display.
	Faulty cables/connectors.	Do a test for continuity on each cable. Do a test for short circuit to ground and between cables. Replace defective cables.
Note: The display is reverse-polarity protected, and contains a self-resetting fuse. If the fuse trips from overload or reverse polarity, it will require several seconds to reset itself.		
Display 'Sunburst Test' shows blank lines or blank pixels.	The display has a driver or connection fault.	Repair or replace the strike finder display.

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Maintenance Practices

1. General

This Section tells you how to remove/install the components of the strike finder system. It also tells you how to test the strike finder system.

2. Remove/Install the Strike Finder Display

A. Remove the Strike Finder Display

	Detail Steps/Work Items	Key Items/References
(1)	Remove the instrument panel cover.	Refer to Section 25-10.
(2)	Open the STRIKE circuit-breaker.	
(3)	Disconnect the connector from the rear of the strike finder display.	
(4)	Remove the screws which attach the strike finder display to the panel.	Hold the instrument!
(5)	Remove the strike finder display from the panel.	

B. Install the Strike Finder Display

	Detail Steps/Work Items	Key Items/References
(1)	Put the strike finder display in position in the panel.	
(2)	Install the screws which attach the strike finder display to the panel.	
(3)	Connect the connector to the rear of the strike finder display.	
(4)	Install the instrument panel cover.	Refer to Section 25-10.
(5)	Close the STRIKE circuit-breaker.	
(6)	Do a test of the strike finder system.	Refer to Paragraph 4.

3. Remove/Install the Strike Finder Sensor

A. Remove the Strike Finder Sensor

	Detail Steps/Work Items	Key Items/References
(1)	Remove the trim/cover from the front face of the baggage compartment frame.	Pull the rear seat-backs forward.
(2)	Open the STRIKE circuit-breaker.	
(3)	Disconnect the connector of the strike finder sensor.	
(4)	Remove the screws which attach the strike finder sensor to the fuselage.	Hold the sensor!
(5)	Remove the strike finder sensor from the fuselage.	

B. Install the Strike Finder Sensor

	Detail Steps/Work Items	Key Items/References
(1)	Put the strike finder sensor in position on the fuselage.	
(2)	Install the screws which attach the strike finder sensor to the fuselage.	
(3)	Connect the connector of the strike finder sensor.	
(4)	Close the STRIKE circuit-breaker.	
(5)	Install the trim/cover to the front face of the baggage compartment frame.	
(6)	Do a test of the strike finder system.	Refer to Paragraph 4.

4. Test the Strike Finder System

	Detail Steps/Work Items	Key Items/References
(1)	Switch the strike finder ON: – Set the ALT/BAT switch ON. – Set the AVIONIC MASTER switch ON.	
(2)	Observe three sunburst display test sequences.	All display pixels must be visible.
(3)	The software revision number must appear in the lower left corner for a few seconds.	
(4)	The test status indicator or 'walking dot' must appear at this time.	
(5)	Switch the strike finder OFF: – Set the AVIONIC MASTER switch OFF. – Set the ALT/BAT switch OFF.	

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Section 34-45
Stormscope System

1. General

This Section tells you about the stormscope system that can be installed in the DA 40. Refer to the manufacturer´s manual for more data about the equipment.

The stormscope system consists of the following items:

– Stormscope processor.

– Stormscope antenna.

– DC-AC Inverter

2. Description and Operation

The WX-500 is a passive sensor that listens for electromagnetic signals with a receiving antenna. The antenna detects intra-cloud, inter-cloud, or cloud-to-ground electrical discharges within a 200 nm radius of the airplane and sends the resulting 'discharge signals' to the processor. The processor digitizes, analyzes, and converts the discharge signals into range and bearing data. This information is stored in the storm buffer.

A. Stormscope Processor

The stormscope processor is tray mounted and is located under the passengers' seat.

The avionics bus supplies power to the stormscope system. The ALT/BAT (Lycoming version) switch, the ELECTRIC MASTER key switch (TAE version) and the AVIONIC MASTER switch must be set to ON to supply power through the WX-500 circuit-breaker to the stormscope system.

The processor houses the lightning data acquisition circuitry as well as the circuitry necessary to process heading information and communicate with the host MFD (Bendix/King KMD 150 or Garmin GNS 430/530 or G1000, refer to Section 34-58). All WX-500 functions are controlled through the MFD or the GNS 430.

B. Stormscope Antenna

The Goodrich NY-163 stormscope antenna is located behind the COM 2 antenna (Lycoming version) or within the vertical stabilizer (TAE version). The antenna is a combined cross-loop and sense antenna. The antenna is sealed against environmental extremes. You cannot repair the antenna.

C. DC/AC Inverter

The Mid Continent MD 24-28 (Lycoming version) respective MD 26-14 (TAE version) provides, in conjunction with the KCS 55A Compass system synchro heading to the WX-500 stormscope system.

Trouble-Shooting

1. General

The table below lists the defects you could have with the stormscope system. If you have the trouble detailed in the Trouble column read across to the Possible Cause column. Then do the repair given in the Repair column.

Trouble	Possible Cause	Repair
Stormscope does not operate.	Circuit-breaker not set.	Set the circuit-breaker.
	Faulty cables/connectors.	Do a test for continuity on each cable. Do a test for short circuit to ground and between cables. Replace defective cables.

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Maintenance Practices

1. General

This Section tells you how to remove/install the components of the stormscope system. It also tells you how to test the stormscope system.

2. Remove/Install the Stormscope Processor

A. Remove the Stormscope Processor

	Detail Steps/Work Items	Key Items/References
(1)	Remove the passengers' seat.	Refer to Section 25-10.
(2)	Open the WX-500 circuit-breaker.	
(3)	Loosen the screw that attaches the processor to its mounting tray.	
(4)	Remove the stormscope processor from the mounting tray.	

B. Install the Stormscope Processor

	Detail Steps/Work Items	Key Items/References
(1)	Put the stormscope processor in position in the mounting tray.	
(2)	Tighten the screw that attaches the processor to its mounting tray.	
(3)	Install the passengers' seat.	Refer to Section 25-10.
(4)	Close the WX-500 circuit-breaker.	
(5)	Do a test of the stormscope system.	Refer to Paragraph 6.

3. Remove/Install the Stormscope Antenna (Lycoming version)

A. Remove the Stormscope Antenna

	Detail Steps/Work Items	Key Items/References
(1)	Remove the trim/cover from the front face of the baggage compartment frame.	Pull the rear seat-backs forward.
(2)	Open the WX-500 circuit-breaker.	
(3)	Disconnect the connector of the stormscope antenna.	
(4)	Remove the screws which attach the stormscope antenna to the fuselage.	Hold the antenna!
(5)	Remove the stormscope antenna from the fuselage.	

B. Install the Stormscope Antenna

	Detail Steps/Work Items	Key Items/References
(1)	Put the stormscope antenna in position on the fuselage.	
(2)	Install the screws which attach the stormscope antenna to the fuselage.	
(3)	Connect the connector of the stormscope antenna.	
(4)	Close the WX-500 circuit-breaker.	
(5)	Install the trim/cover to the front face of the baggage compartment frame.	
(6)	Do a test of the stormscope system.	Refer to Paragraph 6.

4. Remove/Install the Stormscope Antenna (TAE Version)

A. Remove the Stormscope Antenna

	Detail Steps/Work Items	Key Items/References
(1)	Remove the rudder.	Refer to Section 55-40.
(2)	Open the WX-500 circuit-breaker.	
(3)	Disconnect the connector of the stormscope antenna.	
(4)	Remove the screws which attach the stormscope antenna to the mounting bracket.	Hold the antenna!
(5)	Remove the stormscope antenna from the vertical stabilizer.	

B. Install the Stormscope Antenna

	Detail Steps/Work Items	Key Items/References
(1)	Put the stormscope antenna in position in the vertical stabilizer.	
(2)	Install the screws which attach the stormscope antenna to the mounting bracket.	
(3)	Connect the connector of the stormscope antenna.	
(4)	Close the WX-500 circuit-breaker.	
(5)	Install the rudder.	Refer to Section 55-40.
(6)	Do a test of the stormscope system.	Refer to Paragraph 6.

5. Remove/Install the DC-AC Inverter

A. Remove the DC-AC Inverter

	Detail Steps/Work Items	Key Items/References
(1)	Remove the passengers' seat.	Refer to Section 25-10.
(2)	Open the WX-500 and DG circuit-breakers.	
(3)	Disconnect the electrical cables from the inverter.	
(4)	Remove the screws which attach the inverter to the baggage compartment frame.	
(5)	Remove the inverter from the airplane.	

B. Install the DC-AC Inverter

	Detail Steps/Work Items	Key Items/References
(1)	Put the inverter in position on the baggage compartment frame.	
(2)	Tighten the screws which attach the inverter to the baggage compartment frame.	
(3)	Connect the electrical cables of the inverter.	Refer to Chapter 92 Wiring Diagrams.
(4)	Install the passengers' seat.	Refer to Section 25-10.
(5)	Close the WX-500 and DG circuit-breakers.	
(6)	Do a test of the stormscope system.	Refer to Paragraph 6.

6. Test the Stormscope System

Do the installation checkout as outlined in Goodrich Stormscope WX-500 Installation Manual P/N 009-11500-001, Chapter 3 'Installation Checkout'.

Section 34-46
Traffic Advisory System (TAS)

1. General

This Section tells you about the traffic advisory system that can be installed in the DA 40 (OÄM 40–279). Refer to the manufacturer's manual for more data about the equipment.

The TAS consists of the following items:

– Processor.

– Transponder coupler.

– Top antenna.

– Bottom antenna.

2. Description and Operation

The Ryan/Avidyne Traffic Advisory Systems (collectively know as TASs) are actively interrogating on-board air traffic detection systems used to identify potential collision threats. The TAS computes relative altitude and range of threats from nearby transponder-equipped airplanes. Airplanes with non-Mode C transponders can provide range information. The TAS does not detect airplanes without an operating transponder.

A. Processor

The TAS processor is tray mounted and is located behind the first ring frame.

The avionics bus supplies power to the traffic advisory system. The ELECTRIC MASTER key switch and the AVIONIC MASTER switch must be set to ON to supply power through the TAS circuit-breaker to the traffic advisory system.

The TAS processor communicates to the Garmin G1000 system which indicates nearby traffic on the MFD. All functions of the TAS are controlled through the MFD.

B. Transponder Coupler

The transponder coupler is mounted on the remote avionic box of the Garmin G1000 system. The transponder coupler supplies the processor with a signal indicating the on-board transponder is transmitting a reply.

C. Antennas

The TAS has two directional antennas. The top antenna is located on top of the fuselage behind the cabin between the COM 1 antenna, and the bottom antenna is located on the fuselage bottom between the feet of passenger 1 and passenger 2.

Trouble-Shooting

1. General

The table below lists the defects you could have with the traffic advisory system. If you have the trouble detailed in the Trouble column read across to the Possible Cause column. Then do the repair given in the Repair column.

Trouble	Possible Cause	Repair
TAS does not operate.	Circuit-breaker not set. Faulty cables/connectors.	Set the circuit-breaker. Do a test for continuity on each cable. Do a test for short circuit to ground and between cables. Replace defective cables.
The TAS bearing shows opposite to the traffic forward and aft, and it shows correctly left and right.	The antenna coaxes for the top antenna are backwards.	Check antenna connections.
The TAS bearing shows opposite to the traffic left and right, and it shows correctly forward and aft.	The antenna coaxes for the bottom antenna are backwards.	Check antenna connections.

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Maintenance Practices

1. General

This Section tells you how to remove/install the components of the traffic advisory system.

2. Remove/Install TAS Processor

A. Remove TAS Processor

	Detail Steps/Work Items	Key Items/References
(1)	Make sure that the battery switch is set to OFF.	Instrument panel, left side.
(2)	Remove the aft baggage compartment.	Refer to Section 25-50.
(3)	Open the TAS circuit-breaker.	Instrument panel, right side.
(4)	Disconnect the connectors and antenna cables from the TAS processor.	
(5)	Loosen the diagonal retaining screws that attaches the processor to its mounting tray.	
(6)	Slide the TAS processor out of its mounting tray and clear of the airplane.	Along the rails.

B. Install TAS Processor

	Detail Steps/Work Items	Key Items/References
(1)	Slide the TAS processor into its mounting tray.	Along the rails.
(2)	Tighten the diagonal retaining screws that attaches the processor to its mounting tray.	
CAUTION: WRONG CONNECTION OF THE ANTENNA CABLES WILL LEAD TO A WRONG INDICATION.		
(3)	Connect the connectors and antenna cables to the TAS processor.	
(4)	Close the TAS circuit-breaker.	
(5)	Install the aft baggage compartment.	
(6)	Do a test of the traffic advisory system.	Refer to the TAS Installation Manual.

3. Remove/Install Transponder Coupler

A. Remove Transponder Coupler

	Detail Steps/Work Items	Key Items/References
(1)	Make sure that the battery switch is set to OFF.	Instrument panel, left side.
(2)	Remove the aft baggage compartment.	Refer to Section 25-50.
(3)	Open the TAS circuit-breaker.	Instrument panel, right side.
(4)	Disconnect the antenna cables from the transponder coupler.	
(5)	Remove the screws that attach the transponder coupler to the remote avionics box.	Hold the transponder coupler!
(6)	Remove the transponder coupler from the remote avionics box and clear of the airplane.	Fit dust caps to all connections.

B. Install Transponder Coupler

	Detail Steps/Work Items	Key Items/References
(1)	Remove the dust-cover(s) from all connections.	If necessary, install the dust covers from the new transponder coupler onto the transponder coupler that you removed.
(2)	Move the transponder coupler into position on the remote avionics box.	Hold the transponder coupler!
(3)	Install the screws that attach the transponder coupler to the remote avionics box.	
(4)	Connect the antenna cables to the transponder coupler.	
(5)	Close the TAS circuit-breaker.	
(6)	Install the aft baggage compartment.	Refer to Section 25-50.
(7)	Do a test of the traffic advisory system.	Refer to the TAS Installation Manual.

4. Remove/Install a TAS Antenna

A. Remove a TAS Antenna

	Detail Steps/Work Items	Key Items/References
(1)	Make sure that the battery switch is set to OFF.	Instrument panel, left side.
(2)	Open the TAS circuit-breaker.	Instrument panel, right side.
(3)	Remove the aft baggage compartment if you will replace the top mounted antenna. Remove the pilot's seat if you will replace the bottom mounted antenna.	Refer to Section 25-50. Refer to Section 25-10.
(4)	Disconnect the co-axial cable from the antenna that you will replace.	At the antenna.
(5)	Remove the antenna: – Remove the 4 screws that attach the antenna to the structure. – If necessary, use a knife to carefully remove the sealant that seals the antenna to the airplane outer surface. – Move the antenna clear of the airplane.	 Hold the antenna. Take care not to damage the airplane surface!

B. Install a TAS Antenna

	Detail Steps/Work Items	Key Items/References
(1)	Make sure that the contact surfaces of the antenna and the ground plane where the antenna will be installed are clean and free of grease.	
(2)	Move the antenna into position.	
(3)	Install the 4 screws that attach the antenna to the airplane.	
(4)	Seal the outer edge of the antenna where it contacts the airplane surface with sealant.	Refer to the AMM for an approved sealant.
(5)	Remove the excess sealant that has been forced out of the joint between the antenna and the airplanes surface.	
	CAUTION: WRONG CONNECTION OF THE ANTENNA CABLES WILL LEAD TO A WRONG INDICATION.	
(6)	Connect the co-axial cable to the antenna.	At the antenna.
(7)	Install the aft baggage compartment or seat that you removed in Paragraph A.	Refer to Section 25-10 or 25-50.
(8)	Reset the TAS circuit-breaker.	Instrument panel, right side.
(9)	Do a test of the traffic advisory system.	Refer to the TAS Installation Manual.

Section 34-50
Dependent Position Determining

1. General

This Section tells you about the equipment which shows dependent position determining.

Refer to these Sections for data about the systems:

Section 34-52. VHF omnidirectional range (VOR), Localizer (LOC), and Glideslope (GS).

Section 34-53. Automatic direction finder (ADF).

Section 34-54. Distance measuring equipment (DME).

Section 34-56. Transponder (XPDR).

Section 34-58. Global positioning system (GPS).

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Section 34-52
VOR/Localizer/Glideslope (VOR/LOC/GS)

1. General

This Section tells you about the VOR/LOC/GS (VHF omnidirectional range/localizer/glideslope) system that can be installed in the DA 40. Refer to the manufacturer's manuals for more data about the equipment.

The VOR/LOC/GS system consists of the following items:

– NAV receiver. The NAV receiver is part of the NAV/COM system. Refer to Section 23-10 for more data about the NAV/COM system.

– Display or instrument:

  – VOR and LOC information is displayed by the NAV/COM receiver. Refer to Section 23-10 for more data about the NAV/COM receiver.

  – VOR, LOC, and GS information can also be displayed by the course deviation indicator (CDI). The CDI is optional equipment. It is described in this Section.

  – VOR, LOC, and GS information can also be displayed by the horizontal situation indicator (HSI). The HSI is optional equipment. Refer to Section 34-28 for more data about the HSI.

– NAV (VOR/LOC/GS) antenna. Refer to Section 23-10 for more data about the NAV antenna.

– NAV antenna coupler. Refer to Section 23-10 for more data about the NAV antenna coupler.

The audio panel controls the audio input from the NAV receiver (refer to Section 23-50).

2. Description and Operation

The VHF omnidirectional range (VOR) gives bearing information, ground station identification, and reception of FSS reports in the VHF band.

Localizer (LOC) circuits are automatically energized when an ILS frequency is selected on the NAV. Station identification and ATIS information can be received.

Glideslope (GS) circuits are automatically energized when an ILS frequency is selected on the NAV.

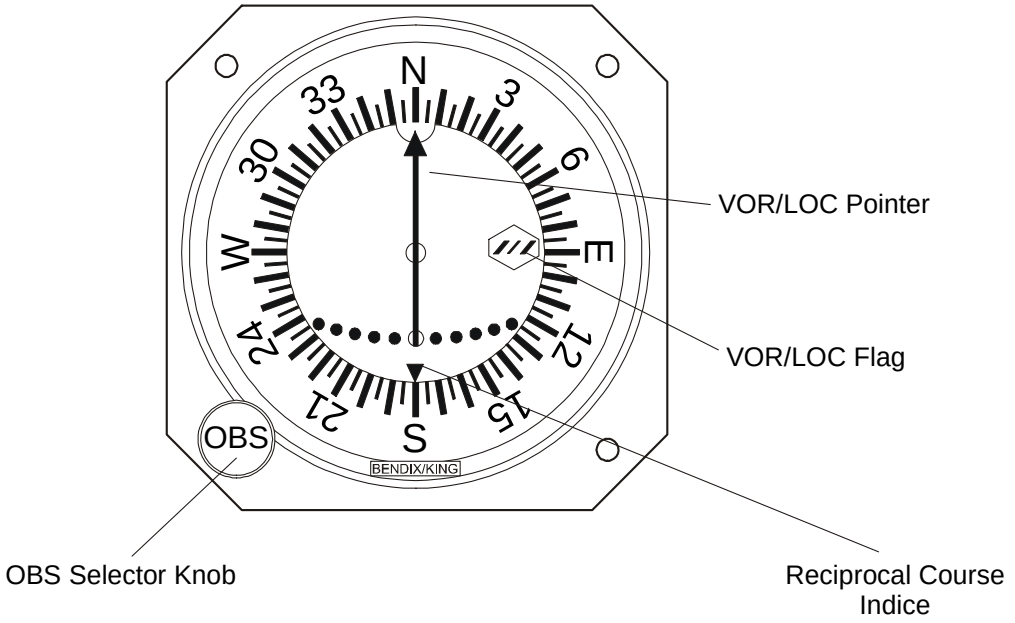


Figure 1: Bendix/King KI 208 Course Deviation Indicator

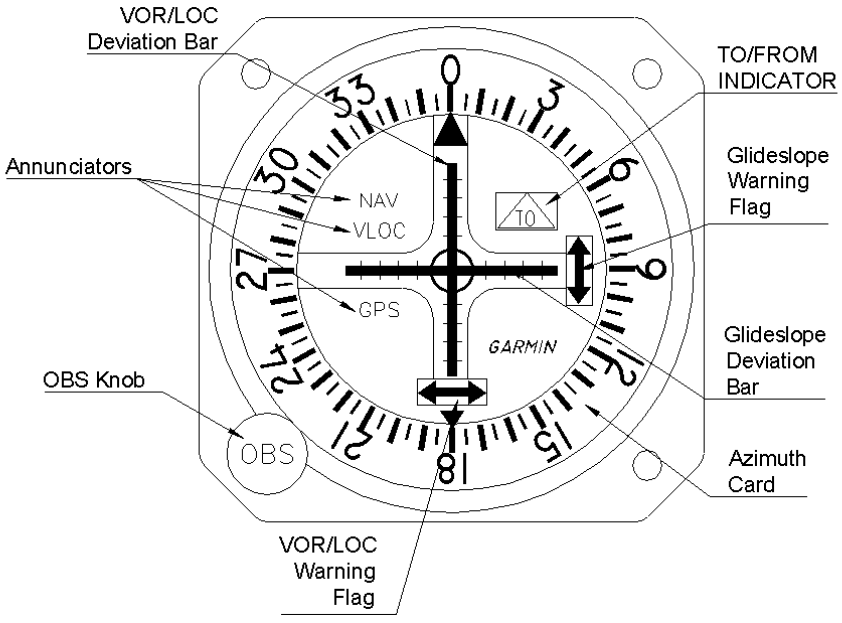


Figure 2: Garmin GI 106A Course Deviation Indicator

A. Bendix/King KI 208 CDI

Figure 1 shows the Bendix/King KI 208 course deviation indicator. It is located in the left-hand section of the instrument panel, see Chapter 31.

The KI 208 receives electrical power from the NAV/COM unit.

The KI 208 indicator receives a composite signal from the navigation receiver which is part of the NAV/COM unit. The KI 208 converts the composite signal into DC signals that operate the CDI and TO-OFF-FROM meters.

The CDI has these features:

– VOR/LOC/LNAV deviation bar. The VOR/LOC/LNAV needle deflection indicates the amount of deviation from the selected VOR/LNAV course or localizer path. The indicated deviation is toward the proper flight path in normal operation. Crosstrack deviation is linear during LNAV operation, and angular in VOR operation.

– TO/FROM flag. It indicates the direction 'To' or 'From' the VOR station or LNAV waypoint.

– Warning flag. It shows when the VOR or LOC signal is not reliable. It also shows if the NAV/COM unit has malfunctioned.

– OBS knob. The OBS (omni bearing selector) knob turns the azimuth card. You set the azimuth card to a bearing that the VOR course can be compared with. The reciprocal course is shown below the bottom course index marker.

Localizer circuits are automatically energized when an ILS frequency is selected on the NAV. By adjusting the NAV volume level, the localizer station can be identified and in some cases, ATIS information received. The localizer flag should disappear from view into the 'To' condition, indicating the signal is reliable.

B. Garmin GI 106A CDI

Figure 2 shows the Garmin GI 106A course deviation indicator. It is located in the left-hand section of the instrument panel, see Chapter 31.

The GI 106A receives electrical power from the NAV/COM/GPS 2 unit.

The GI 106A accepts DC Left-Right, To-From and Left-Right (VOR/LOC) warning flag signals from a remote mounted VOR converter or GPS receiver. Additionally, the GI 106A accepts DC signals from a glideslope receiver which will drive the Up-Down needle along with an Up-Down (glideslope) warning flag. The unit incorporates NAV, GPS and VLOC (VOR/LOC as displayed on the Garmin GNS 430) annunciation with photocell dimming.

The CDI has these features:

– VOR/LOC deviation bar. The VOR/LOC needle deflection indicates the amount of deviation from the selected VOR course or localizer path. The indicated deviation is toward the proper flight path in normal operation.

– VOR/LOC (Left-Right) warning flag. The warning flag is in view when the VOR/LOC data is unusable.

– Glideslope deviation bar. Represents the actual airplane deviation from the glideslope path. The indicated deviation is toward the proper glideslope path.

– Glideslope warning flag. The warning flag is in view when the glideslope data is unusable.

– TO/FROM indicator. It indicates the direction 'To' or 'From' the VOR station.

– OBS knob. The OBS (omni bearing selector) knob turns the azimuth card. You set the azimuth card to a bearing that the VOR course can be compared with.

– Annunciators. To aid the pilot in determining the source of displayed navigation data, the GI 106A includes three annunciators on its face: GPS, VLOC and NAV. The navigation source is selected on the front panel of NAV/COM/GPS unit. When GPS is selected, the GPS annunciator should also light on the GI 106A. Likewise, if VLOC (VOR/localizer/glideslope) is selected, the VLOC annunciator should also light on the GI 106A. The NAV annunciator is not connected in the DA 40 installation.

Trouble-Shooting

1. General

The table below lists the defects you could have with the VOR/LOC/GS system. If you have the trouble detailed in the Trouble column read across to the Possible Cause column. Then do the repair given in the Repair column.

Note: In the table below, 'VOR/LOC instrument' can mean the CDI or HSI, depending on which instrument is installed.

Note: In the table below, 'GS instrument' can mean the CDI or HSI, depending on which instrument is installed.

Trouble	Possible Cause	Repair
NAV flag on both NAV receiver display and VOR/LOC instrument.	Faulty NAV receiver.	Repair or replace the NAV receiver.
	Transmitting station is off the air.	Tune to a new station.
	Poor co-ax connections.	Examine co-ax connections for condition and security.
	Faulty NAV antenna.	Replace the horizontal stabilizer.
	Faulty NAV antenna coupler.	Replace the NAV antenna coupler.
NAV flag on VOR/LOC instrument only.	Faulty VOR/LOC instrument.	Repair or replace the VOR/LOC instrument.
	Faulty wiring.	Repair the wiring.
LOC indication not accurate on NAV receiver display. VOR/LOC instrument correct.	Faulty NAV receiver.	Repair or replace the NAV receiver.
LOC indication not accurate on VOR/LOC instrument. NAV receiver display correct.	LOC centering adjustment needed.	Adjust LOC centering. Refer to manufacturer's documentation.
	Faulty VOR/LOC instrument.	Repair or replace the VOR/LOC instrument.

Trouble	Possible Cause	Repair
VOR indication not accurate on NAV receiver display. VOR/LOC instrument correct.	Faulty NAV receiver.	Repair or replace the NAV receiver.
VOR indication not accurate on VOR/LOC instrument. NAV receiver display correct.	VOR centering adjustment needed.	Adjust VOR centering. Refer to manufacturer's documentation.
	Faulty VOR/LOC instrument.	Repair or replace the VOR/LOC instrument.
GS indication not accurate on GS instrument.	GS centering adjustment needed.	Adjust GS centering. Refer to manufacturer's documentation.
	Faulty NAV/GS receiver.	Repair or replace the NAV/GS receiver.
	Faulty GS instrument.	Repair or replace the GS instrument.
	Poor co-ax connections.	Examine co-ax connections for condition and security.
	Faulty NAV antenna.	Replace the horizontal stabilizer.
	Faulty NAV antenna coupler.	Replace the NAV antenna coupler.

Maintenance Practices

1. General

This Section tells you how to remove/install components of the VOR/LOC/GS system.

Refer to Section 23-10 for Maintenance Practices for the NAV/COM receivers and antennas. Refer to Section 34-28 for Maintenance Practices for the HSI.

2. Remove/Install the CDI

A. Remove the CDI

	Detail Steps/Work Items	Key Items/References
(1)	Remove the instrument panel cover.	Refer to Section 25-10.
(2)	Dis-connect the connector from the rear of the CDI.	
(3)	Remove the screws which attach the CDI to the panel.	Hold the CDI!
(4)	Remove the CDI from the panel.	

B. Install the CDI

	Detail Steps/Work Items	Key Items/References
(1)	Put the CDI in position in the panel.	
(2)	Install the screws which attach the CDI to the panel.	
(3)	Connect the connector to the rear of the CDI.	
(4)	Install the instrument panel cover.	Refer to Section 25-10.
(5)	Do a NAV/COM test.	Refer to Section 23-10.

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Section 34-53
Automatic Direction Finder (ADF)

1. General

This Section tells you about the automatic direction finder (ADF) system that can be installed in the DA 40. Refer to the manufacturer's manuals for more data about the equipment. Refer to Chapter 92 for the wiring diagrams.

The ADF system consists of the following items:

– ADF receiver.

– ADF indicator (slaved or non-slaved).

– ADF antenna.

The audio panel controls the audio input from the ADF (refer to Section 23-50).

2. Description and Operation

The ADF gives bearing information, ground station identification, and reception of weather broadcasts in the AM band.

A. ADF Receiver

Figure 1 shows the Bendix/King KR 87 ADF receiver. It is located in the avionics rack in the instrument panel, see Chapter 31.

The avionics bus supplies power to the ADF receiver. The ALT/BAT switch (Lycoming version) or ELECTRIC MASTER key switch (TAE version) and the AVIONIC MASTER switch must be set to ON to supply power through the ADF circuit-breaker to the ADF receiver. Refer to Chapter 92 for the wiring diagrams.

The Bendix/King KR 87 is a compact, digitally-tuned, solid-state ADF receiver with built-in electronics timer. It gives bearing information to stations in the 200 kHz to 1799 kHz frequency band. It also gives audio reception so that the pilot can identify stations and listen to weather broadcasts in the AM broadcast band.

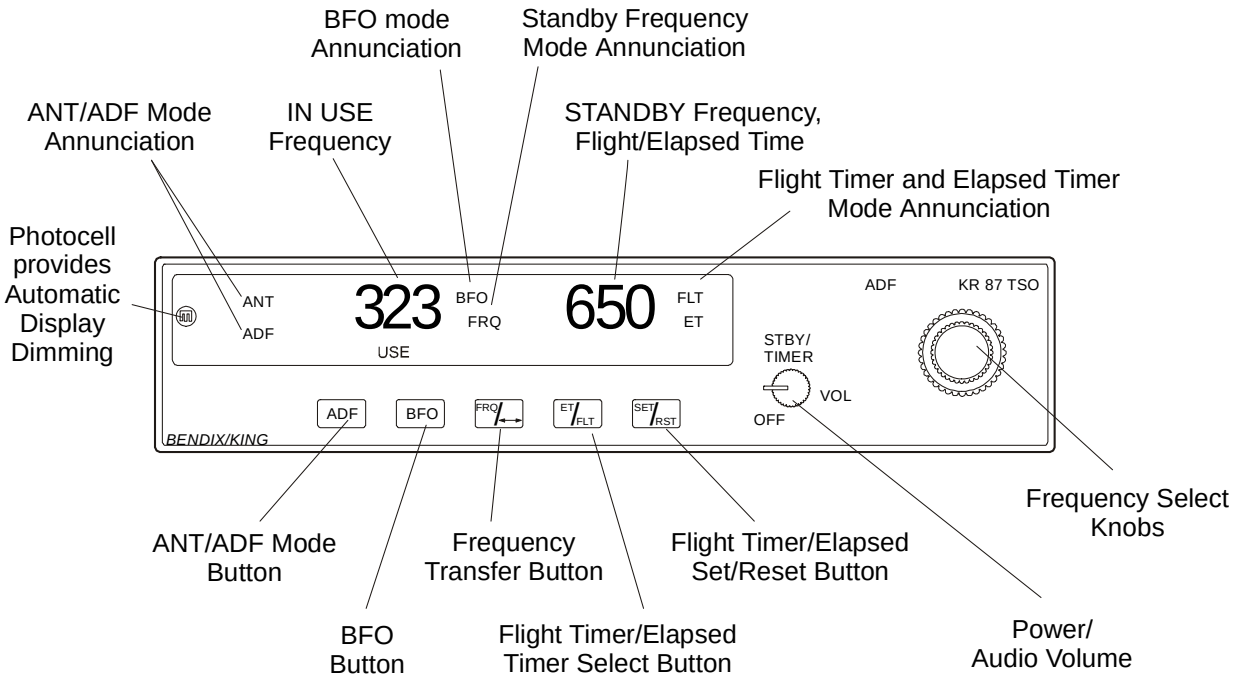


Figure 1: Bendix/King KR 87 ADF Receiver

The ADF receiver has a gas-discharge display with automatic dimming that shows the following:

– The left window shows the 'active' frequency.

– The right window shows the 'standby' frequency or the selected readout from the built-in electronic timer (flight time or elapsed time).

– FRQ/FLT/ET indicators. These indicate which information is being shown in the right window (see above).

– ANT/ADF mode indicator. It indicates 'antenna' mode (ANT) or ADF mode that is selected with the ADF button.

– BFO indicator. It indicates that the BFO mode is selected with the BFO button.

The ADF receiver has these controls:

– ON/OFF/VOL rotary switch. This switch controls power to the ADF. It also sets the audio volume.

– Frequency select knobs. The small knob is pulled out to tune the 1's. The small knob is pushed in to tune the 10's. The outer knob tunes the 100's with rollover into the 1000's up to 1799. When the right window is set to standby frequency (FRQ) mode, then the knobs change the 'standby' frequency. When a timer mode (FLT or ET) is selected, then the knobs change the 'active' frequency.

– ADF button. When the button is in, the ADF mode is selected. When the button is out, the 'antenna' (ANT) mode is selected. The loop antenna is disabled, and the unit simply acts as a receiver. The bearing pointer is deactivated and will park in the 90° relative position.

– BFO (beat frequency oscillator) button. It permits the carrier wave and associated morse code identifier broadcast on the carrier wave to be heard.

– FRQ (frequency transfer) button. It switches the right window to the FRQ mode and exchanges the 'active' and 'standby' frequencies.

– FLT/ET (flight timer/elapsed timer mode selector) button. It alternatively selects either Flight Timer mode or Elapsed Timer mode.

– SET/RST (set/reset elapsed timer) button. When pressed, this button resets the elapsed timer (whether it is being displayed or not).

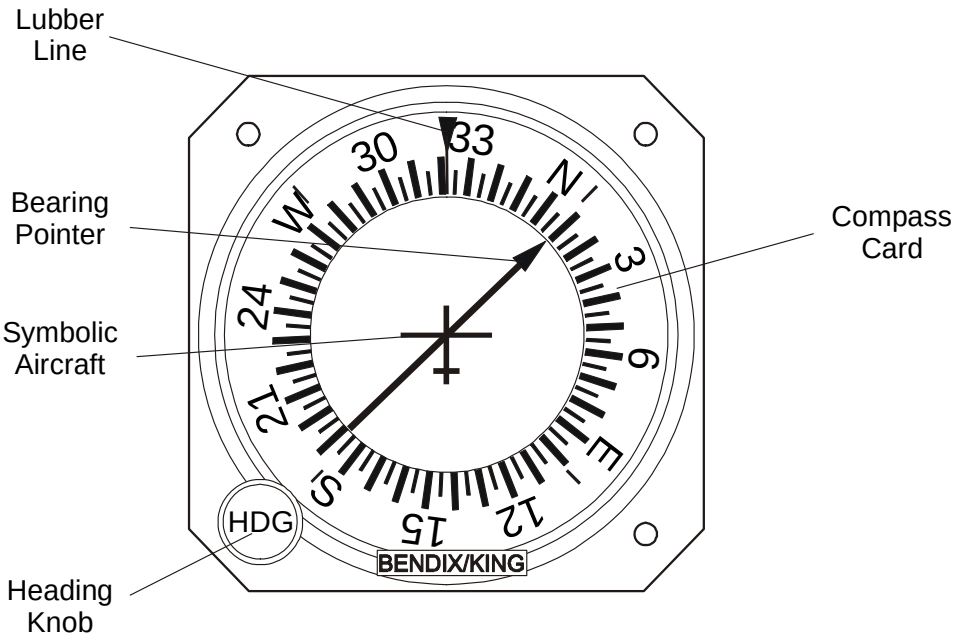


Figure 2: Bendix/King KI 227 ADF Indicator

B. ADF Indicator

Figure 2 shows the Bendix/King KI 227 ADF indicator. It is located in the left-hand section of the instrument panel.

The non-slaved ADF indicator has the following features:

– Lubber line. It indicates magnetic heading of the airplane.

– Bearing pointer. It indicates magnetic bearing to the station.

– HDG knob. This knob rotates the compass card.

The slaved ADF indicator has the following additional features:

– Slaved compass card. It derives its heading input from the gyro compass system. Refer to Section 34-28 for details about the gyro compass system.

– SYNC knob instead of HDG knob. The compass card is synchronized to the HSI compass card by rotating the SYNC knob until the heading matches that of the HSI.

C. ADF Antenna

The Bendix/King KA 44B ADF antenna is located on the lower side of the fuselage, under the passenger seats. It has both loop and sense amplifiers, pre-amplifiers, and modulators. They combine the loop and sense antenna signals into a single RF signal.

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Trouble-Shooting

1. General

The table below lists the defects you could have with the ADF system. If you have the trouble detailed in the Trouble column read across to the Possible Cause column. Then do the repair given in the Repair column.

Trouble	Possible Cause	Repair
ADF receiver does not operate.	Circuit-breaker not set.	Set the circuit-breaker.
	Faulty ADF receiver.	Repair or replace the ADF receiver.
	Faulty cables/connectors.	Do a test for continuity on each cable. Do a test for short circuit to ground and between cables. Replace defective cables.
ADF indicator does not operate.	Faulty ADF indicator.	Repair or replace the ADF indicator.
	Faulty cables/connectors.	Do a test for continuity on each cable. Do a test for short circuit to ground and between cables. Replace defective cables.
ADF receiver unable to tune to an AM broadcast station.	Faulty ADF receiver.	Repair or replace the ADF receiver.
	Faulty ADF antenna.	Do a test for correct impedance of the antenna. If necessary, repair or replace the antenna.
	Faulty connection between ADF antenna and ADF receiver.	Ensure proper cable connections. Do a test for correct impedance of the antenna co-axial cable. Do a test for continuity on each cable. Do a test for short circuit to ground and between cables. Replace defective cables.

Trouble	Possible Cause	Repair
No audio from ADF.	Faulty ADF receiver.	Repair or replace the ADF receiver.
	Faulty audio system.	Trouble-shoot the audio system. Refer to Section 23-50.

Maintenance Practices

1. General

This Section tells you how to remove/install the components of the ADF system. It also tells you how to test the ADF system.

2. Remove/Install the ADF Receiver

A. Remove the ADF Receiver

	Detail Steps/Work Items	Key Items/References
(1)	Open the ADF circuit-breaker.	
(2)	Put a 3/32 Allen wrench into the access hole for the locking screw. Engage the screw.	Refer to Figure 1.
(3)	Turn the screw counter-clockwise until the unit disengages from the mounting rack.	
	CAUTION: DO NOT PULL ON THE KNOBS. DO NOT PRY THE FACE-PLATE. IF YOU PULL ON THE KNOBS, OR PRY THE FACE- PLATE, YOU CAN DAMAGE THE UNIT. CAUTION; DO NOT TOUCH THE CONNECTOR CARD AT THE REAR OF THE UNIT. THE ELECTROSTATIC CHARGE ON YOUR BODY CAN DAMAGE THE UNIT.	
(4)	Pull gently on the sides of the unit to remove it from the mounting rack.	
(5)	Install the protective covers on the rear connectors of the ADF receiver.	

B. Install the ADF Receiver

	Detail Steps/Work Items	Key Items/References
(1)	Remove the protective covers from the connectors on the replacement unit.	
(2)	Slide the unit into the rack. Engage the locking screw so that the latch front-lobe touches the rack.	
(3)	Turn the locking screw clockwise so that the rear lobe engages the mounting rack.	Refer to Figure 1.
	CAUTION: DO NOT OVER-TIGHTEN THE LOCKING SCREW. YOU CAN DAMAGE THE LOCKING MECHANISM.	
(4)	Continue to turn the screw until the unit is fully installed in the mounting rack.	
(5)	Close the ADF circuit-breaker.	
(6)	Do a test of the ADF system.	Refer to Paragraph 5.

3. Remove/Install the ADF Indicator

A. Remove the ADF Indicator

	Detail Steps/Work Items	Key Items/References
(1)	Remove the instrument panel cover.	Refer to Section 25-10.
(2)	Dis-connect the connector from the rear of the ADF indicator.	
(3)	Remove the screws which attach the ADF indicator to the panel.	Hold the instrument!
(4)	Remove the ADF indicator from the panel.	

B. Install the ADF Indicator

	Detail Steps/Work Items	Key Items/References
(1)	Put the ADF indicator in position in the panel.	
(2)	Install the screws which attach the ADF indicator to the panel.	
(3)	Connect the connector to the rear of the ADF indicator.	
(4)	Install the instrument panel cover.	Refer to Section 25-10.
(5)	Do a test of the ADF system.	Refer to Paragraph 5.

4. Remove/Install the ADF Antenna

A. Remove the ADF Antenna

	Detail Steps/Work Items	Key Items/References
(1)	Remove the passengers' seat.	Refer to Section 25-10.
(2)	Release the co-axial connector from the antenna.	
(3)	Release the screws, nuts and washers which hold the antenna.	Release the bonding cable from the antenna.
(4)	Carefully pull the antenna clear of the fuselage and hold it.	If necessary, carefully cut the sealant around the base of the antenna. You must not damage the fuselage skin.
(5)	Move the antenna clear of the airplane.	

B. Install the ADF Antenna

	Detail Steps/Work Items	Key Items/References
(1)	Carefully remove any sealant from the area where the antenna attaches to the fuselage.	
(2)	Clean the area where the antenna attaches to the fuselage.	
(3)	Put the antenna in position under the fuselage.	
(4)	Attach the antenna with the screws, washers and nuts.	Attach the bonding cable to one of the screws.
(5)	Connect the co-axial connector to the antenna.	
(6)	Seal the outer edge of the antenna to the fuselage skin with sealant.	Use Dow Corning 732 RTV.
(7)	Install the passengers' seat.	Refer to Section 25-10.
(8)	Do a test of the ADF system.	Refer to Paragraph 5.

5. Test the ADF System

	Detail Steps/Work Items	Key Items/References
(1)	Switch the ADF ON: – Set the ALT/BAT switch (Lycoming version) or ELECTRIC MASTER key switch (TAE version) ON. – Set the AVIONIC MASTER switch ON. – Turn the ADF ON/OFF/VOL knob clockwise.	The ADF display must light. The ADF indicator must operate.
(2)	Make sure that the ADF receiver is tuned to a useable ADF frequency.	
(3)	Push the ADF push button to select ANT mode.	The pointer on the ADF indicator must move to the parked position (90º).
(4)	Push the ADF push button to select ADF mode.	The pointer on the ADF indicator must move to the station bearing without hesitation.
(5)	Switch the ADF OFF: – Turn the ADF ON/OFF/VOL knob counter-clockwise. – Set the AVIONIC MASTER switch OFF. – Set the ALT/BAT switch (Lycoming version) or ELECTRIC MASTER key switch (TAE version) OFF.	

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Section 34-54
Distance Measuring Equipment (DME)

1. General

This Section tells you about the distance measuring equipment (DME) system that can be installed in the DA 40. Refer to the manufacturer's manuals for more data about the equipment. Refer to Chapter 92 for the wiring diagrams.

The DME system consists of the following items:

– DME receiver.

– Remote DME switch.

– DME antenna.

The audio panel controls the audio input from the DME (refer to Section 23-50).

2. Description and Operation

The DME gives the following information:

– Distance to DME ground stations.

– Ground speed.

– Time-to-station.

– Ground station identification by means of audio reception.

The DME measures the time required for signals to travel from the airplane to the ground station and back to the airplane. The distance to the ground station is calculated from that time.

This distance, known as 'slant range distance', should not be confused with actual along-the-ground distance. The difference between actual ground distance and slant range is least at low altitude and/or long range. If the range is three times the altitude or greater, error is negligible.

The system determines the ground speed by measuring the rate of change in slant range distance with time.

To obtain accurate ground speed, the airplane must be tracking directly to or from the station. To obtain accurate time to station, the airplane must be tracking directly to the station.

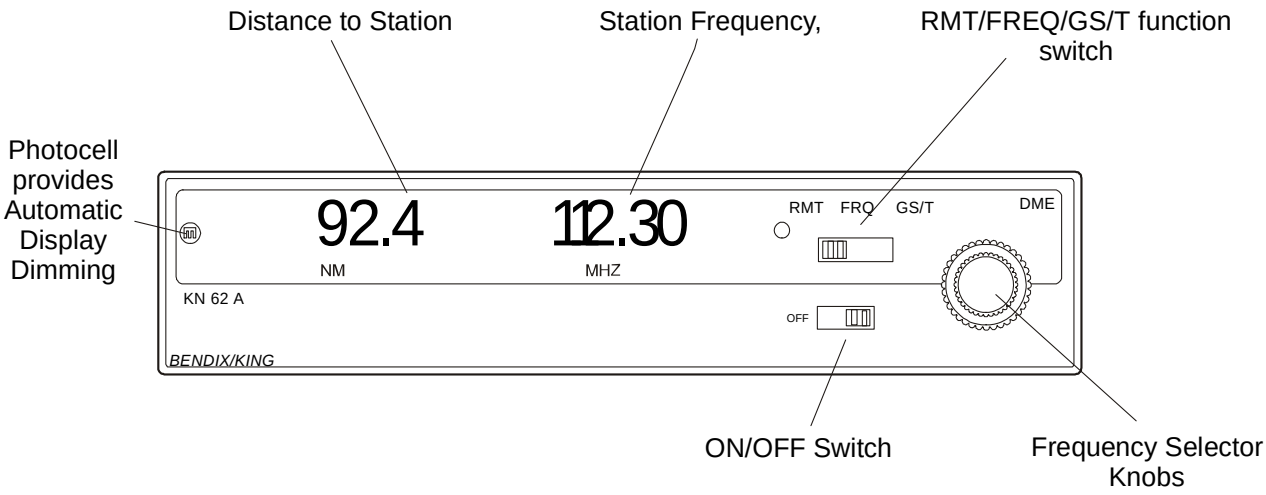


Figure 1: Bendix/King KN 62A DME Receiver

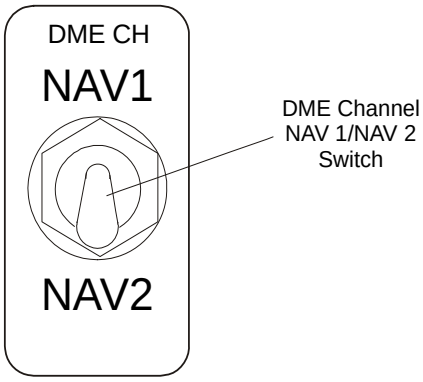


Figure 2: Remote DME Switch

A. Bendix/King KN 62A DME Receiver

Figure 1 shows the Bendix/King KN 62A digitally-tuned, solid-state DME receiver. It is located in the avionics rack in the instrument panel, see Chapter 31.

The avionics bus supplies power to the DME receiver. The ALT/BAT switch (Lycoming version) or ELECTRIC MASTER key switch (TAE version) and the AVIONIC MASTER switch must be set to ON to supply power through the DME circuit-breaker to the DME receiver. Refer to Chapter 92 for the wiring diagrams.

The DME receiver has a gas-discharge display with automatic dimming which shows the following:

- Range, speed, and time-to station when the unit is in RMT or GS/T mode.
- Range and frequency when the unit is in FREQ mode.
- When the KN 62A is in search mode, dashes are displayed instead of range, speed and time-to-station.

The DME receiver has these controls:

- ON-OFF switch. It gives power to the unit.
- RMT-FREQ-GS/T switch. It determines both the information displayed and the channeling source for the KN 62A.
  - In 'remote' (RMT) mode, the KN 62A is remote-channeled by the NAV receiver that is selected with the remote DME switch (see Paragraph B). The display shows range, speed, and time-to-station.
  - In 'frequency' (FREQ) mode, the KN 62A is channeled from its own frequency selection knobs. The display shows range and frequency.
  - In 'ground speed/time-to-station' (GS/T) mode, the KN 62A holds the last internally selected frequency. The display shows range, speed, and time-to-station.
- Frequency select knobs. The smaller of the two knobs has an 'in' and an 'out' position. When in the 'in' position, this smaller knob changes the 0.1 MHz digit (0.0, 0.1, 0.2, etc.). When pulled 'out', it adds 0.05 MHz to the frequency and tunes in 0.1 MHz steps (0.05, 0.15, 0.25, etc.). Pushing the smaller knob 'in' subtracts 0.05 MHz from the displayed frequency. The outer, larger knob changes the larger digits (1 MHz, 10 MHz). In FREQ mode, the unit will display distance and the selected frequency.

B. Remote DME Switch

Figure 2 shows the remote DME switch. It is installed in the left-hand section of the instrument panel, see Chapter 31.

When the DME receiver is in 'remote' (RMT) mode, it is channeled by that NAV receiver which is selected with the remote DME switch (NAV 1 or NAV 2).

C. DME Antenna

The Bendix/King KA 60 or KA 61 DME antenna is located on the bottom surface of the fuselage, under the cockpit on the right side.

Trouble-Shooting

1. General

The table below lists the defects you could have with the DME. If you have the trouble detailed in the Trouble column read across to the Possible Cause column. Then do the repair given in the Repair column.

Trouble	Possible Cause	Repair
DME does not operate.	DME circuit-breaker not set.	Set the DME circuit-breaker.
	Faulty DME receiver.	Repair or replace the DME receiver.
	Faulty cables/connectors.	Do a test for continuity on each cable. Do a test for short circuit to ground and between cables. Replace defective cables.
DME unable to tune to a DME station.	Faulty DME receiver.	Repair or replace the DME receiver.
	Faulty DME antenna.	Do a test for correct impedance of the antenna. If necessary, repair or replace the antenna.
	Faulty connection between DME antenna and DME receiver.	Ensure proper cable connections. Do a test for correct impedance of the antenna co-axial cable. Do a test for continuity on each cable. Do a test for short circuit to ground and between cables. Replace defective cables.
No audio from DME.	Faulty DME receiver.	Repair or replace the DME receiver.
	Faulty audio system.	Trouble-shoot the audio system. Refer to Section 23-50.

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Maintenance Practices

1. General

This Section tells you how to remove/install the components of the DME system. It also tells you how to test the DME system.

2. Remove/Install the DME Receiver

A. Remove the DME Receiver

	Detail Steps/Work Items	Key Items/References
(1)	Open the DME circuit-breaker.	
(2)	Put a 3/32 Allen wrench into the access hole for the locking screw. Engage the screw.	Refer to Figure 1.
(3)	Turn the screw counter-clockwise until the unit disengages from the mounting rack.	
	CAUTION: DO NOT PULL ON THE KNOBS. DO NOT PRY THE FACE-PLATE. IF YOU PULL ON THE KNOBS, OR PRY THE FACE- PLATE, YOU CAN DAMAGE THE UNIT. CAUTION: DO NOT TOUCH THE CONNECTOR CARD AT THE REAR OF THE UNIT. THE ELECTROSTATIC CHARGE ON YOUR BODY CAN DAMAGE THE UNIT.	
(4)	Pull gently on the sides of the unit to remove it from the mounting rack.	
(5)	Install the protective covers on the rear connectors of the DME receiver.	

B. Install the DME Receiver

	Detail Steps/Work Items	Key Items/References
(1)	Remove the protective covers from the connectors on the replacement unit.	
(2)	Slide the unit into the rack. Engage the locking screw so that the latch front-lobe touches the rack.	
(3)	Turn the locking screw clockwise so that the rear lobe engages the mounting rack.	Refer to Figure 1.
	CAUTION: DO NOT OVER-TIGHTEN THE LOCKING SCREW. YOU CAN DAMAGE THE LOCKING MECHANISM.	
(4)	Continue to turn the screw until the unit is fully installed in the mounting rack.	
(5)	Close the DME circuit-breaker.	
(6)	Do a test of the DME.	Refer to Paragraph 5.

3. Remove/Install the Remote DME Switch

A. Remove the Remote DME Switch

	Detail Steps/Work Items	Key Items/References
(1)	Remove the instrument panel cover.	Refer to Section 25-10.
(2)	Open soldered connections on the rear of the remote DME switch.	
(3)	Remove the screws which attach the remote DME switch to the panel.	Hold the switch!
(4)	Remove the remote DME switch from the panel.	

B. Install the Remote DME Switch

	Detail Steps/Work Items	Key Items/References
(1)	Put the remote DME switch in position in the panel.	
(2)	Install the screws which attach the remote DME switch to the panel.	
(3)	Establish the soldered connections on the rear of the remote DME switch.	
(4)	Install the instrument panel cover.	Refer to Section 25-10.
(5)	Do a test of the DME.	Refer to Paragraph 5.

4. Remove/Install the DME Antenna

A. Remove the DME Antenna

	Detail Steps/Work Items	Key Items/References
(1)	Remove the co-pilot's seat.	Refer to Section 25-10.
(2)	Release the co-axial connector from the antenna.	
(3)	Release the screws which hold the antenna.	
(4)	Carefully pull the antenna clear of the fuselage and hold it.	If necessary, carefully cut the sealant around the base of the antenna. You must not damage the fuselage skin.
(5)	Move the antenna clear of the airplane.	

B. Install the DME Antenna

	Detail Steps/Work Items	Key Items/References
(1)	Carefully remove any sealant from the area where the antenna attaches to the fuselage.	
(2)	Clean the area where the antenna attaches to the fuselage.	
(3)	Put the antenna in position under the fuselage.	
(4)	Attach the antenna with the screws.	
(5)	Connect the co-axial connector to the antenna.	
(6)	Seal the outer edge of the antenna to the fuselage skin with sealant.	Use Dow Corning 732 RTV.
(7)	Install the co-pilot's seat.	Refer to Section 25-10.
(8)	Do a test of the DME.	Refer to Paragraph 5.

5. Test the DME

	Detail Steps/Work Items	Key Items/References
(1)	Switch the DME ON: – Set the ALT/BAT switch (Lycoming version) or ELECTRIC MASTER key switch (TAE version) ON. – Set the AVIONIC MASTER switch ON. – Set the ON-OFF switch on the DME receiver to ON.	The DME display must light.
(2)	Make sure that the DME receiver is tuned to a useable DME station.	
(3)	Do a test of each control function.	Refer to this Section.
(4)	Do a test of the DME remote channeling.	
(5)	Switch the DME OFF: – Set the ON-OFF switch on the DME receiver to OFF. – Set the AVIONIC MASTER switch OFF. – Set the ALT/BAT switch (Lycoming version) or ELECTRIC MASTER key switch (TAE version) OFF.	

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Section 34-56
Transponder (XPDR)

1. General

This Section tells you about the transponder system which can be installed in the DA 40. Refer to the manufacturer's manuals for more data about the equipment. Refer to Chapter 92 for the wiring diagrams.

The transponder system consists of the following items:

- Transponder. One of the following transponders can be installed in the DA 40:
  - Bendix/King KT 76A.
  - Bendix/King KT 76C.
  - Garmin GTX 327.
  - Garmin GTX 328 (TAE version only).
  - Garmin GTX 330 (TAE version only).
- Blind Altitude Encoder. One of the following blind altitude encoders can be installed in the DA 40:
  - TCI Altitude Digitizer D120-P2-T.
  - Sandia Aerospace Altitude Data System SAE5-35.
- Transponder antenna.

2. Description and Operation

A. Transponders, General

The transponder is a receiver/transmitter which operates at radar frequencies. It transmits transponder code and altitude data to the Air Traffic Control Radar Beacon System (ATCRBS).

The transponder replies to interrogation signals from the ATCRBS Mode A secondary surveillance radar (SSR) at 1030 MHz. The reply signal at 1090 MHz gives the code which can be set on the cockpit display. A REPLY indication comes on when the equipment is transmitting.

The transponder can also give altitude data in reply to Mode C interrogation. The transponder transmits data from the blind encoding altimeter to the ATCRBS.

The transponder has an ident button (IDENT or IDT). Push the ident button to transmit a special identification pulse. The ident pulse identifies the airplane to the air traffic controller.

The Garmin GTX 328 and GTX 330 panel mounted Mode S transponder are receiver/transmitter which operate at radar frequencies, receiving ground radar or TCAS interrogations at 1030 MHz and transmitting a coded response of pulses to ground-based radar on a frequency of 1090 MHz.

The GTX 328 and GTX 330 are equipped with IDENT capability that activates the Special Position Identification (SPI) pulse for 18 seconds.

Mode S transmit/receive capability also requires 1090 MHz transmitting and 1030 MHz receiving for Mode S functions. It transmits transponder code and altitude data to the Air Traffic Control Radar Beacon System (ATCRBS). In addition to 4096 code and pressure altitude (Mode A/C), the GTX 328 and are capable of transmitting airplane registration number or flight ID, transponder capability and maximum speed range.

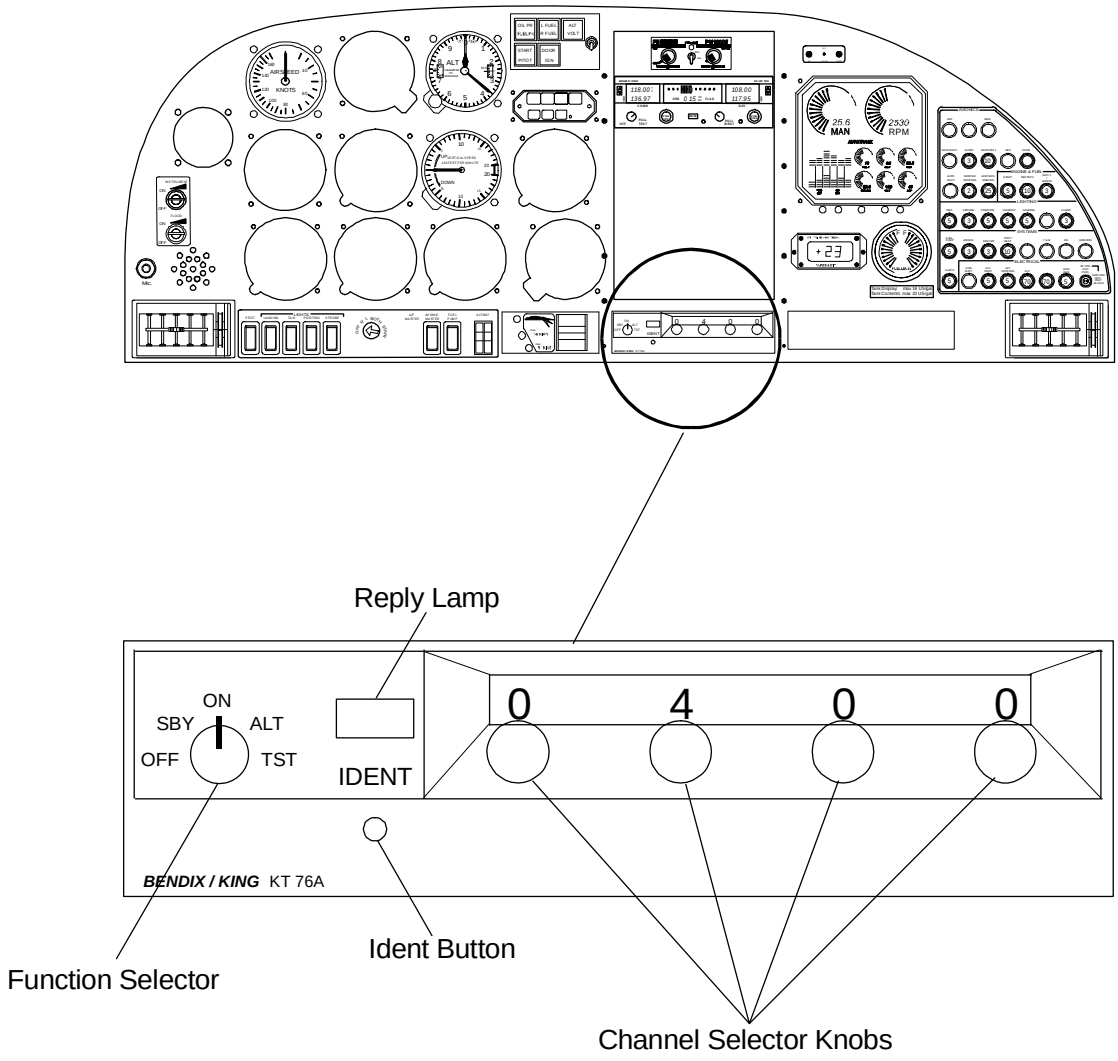


Figure 1: Bendix/King KT 76A Transponder

B. Bendix/King KT 76A Transponder

Figure 1 shows the Bendix/King KT 76A transponder. It is located in the instrument panel at the bottom, see Chapter 31.

The avionics bus or, if installed, the essential avionics bus supplies power to the transponder. The ALT/BAT switch and the AVIONIC MASTER switch must be set to ON to supply power through the XPDR circuit-breaker to the transponder. Refer to Chapter 92 for the wiring diagrams.

Turn the function selector switch clockwise from the OFF position to set the transponder on. There is a 45 second delay after setting the unit ON from OFF to let the transmitter tube warm-up. The function selector switch has these positions:

– SBY. Sets the transponder to the standby position. The transponder receives signals but does not transmit.

– ON. If the transponder receives a Mode A interrogation, it transmits the Mode A code set by the code selector knobs. You can set any code between 0000 and 7777.

– ALT. If the transponder receives a Mode C interrogation, it transmits the altitude data from the blind encoder.

– TST. This uses a momentary contact switch to operate the transmitter. The reply lamp comes on. The reply lamp shows the operator that the unit is transmitting.

The reply lamp also shows when the IDENT button has been pressed. If you press the IDENT button once, the unit transmits a special identification pulse for each interrogation over the next 15 to 30 seconds.

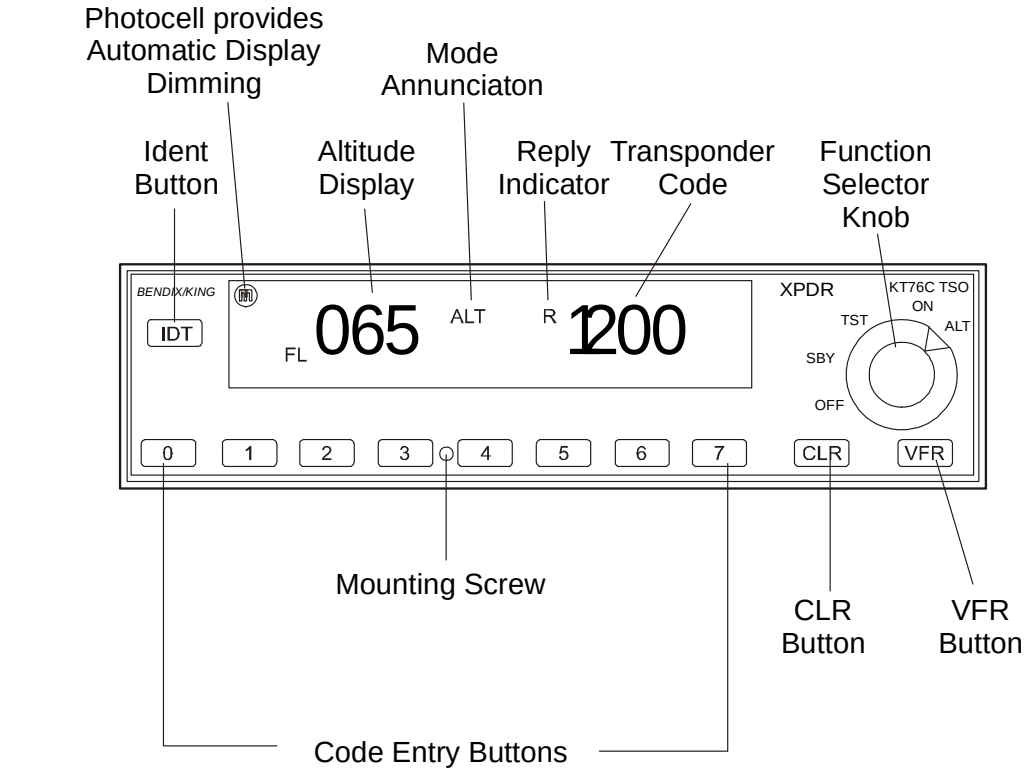


Figure 2: Bendix/King KT 76C Transponder

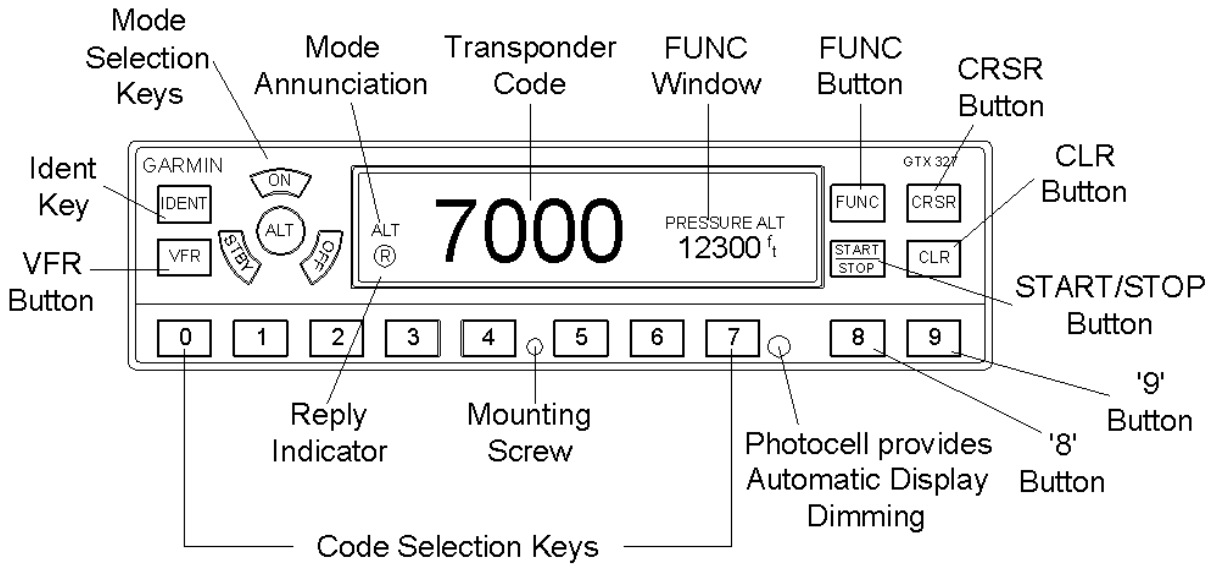


Figure 3: Garmin GTX 327 Transponder

C. Bendix/King KT 76C Transponder

Figure 2 shows the Bendix/King KT 76C transponder. It is located in the instrument panel on the right side at the bottom, see Chapter 31.

The avionics bus or, if installed, the essential avionics bus supplies power to the transponder. The ALT/BAT switch and the AVIONIC MASTER switch must be set to ON to supply power through the XPDR circuit-breaker to the transponder. Refer to Chapter 92 for the wiring diagrams.

The transponder has a display which shows the following:

– Altitude window. The flight level altitude, marked by the letters 'FL' and a number in hundreds of feet, is shown on the left side of the display.

– Code window. The Mode A code set by the code selector knobs is shown on the right side of the display.

– Reply indicator. The reply indicator blinks to indicate that the KT 76C is functioning properly and replying to interrogations.

The transponder has these controls:

– OFF/SBY/ON/ALT/TST function selector. Turn fully counter-clockwise to turn the transponder OFF. Turn the function selector switch clockwise to set the transponder ON. There is a 45 second delay after setting the unit ON from OFF to let the transmitter tube warm-up. The function selector switch has these positions:

  – SBY. Sets the transponder to the standby position. The transponder receives signals but does not transmit.

  – ON. If the transponder receives a Mode A interrogation, it transmits the Mode A code set by the code selector knobs. You can set any code between 0000 and 7777.

  – ALT. If the transponder receives a Mode C interrogation, it transmits the altitude data from the blind encoder.

  – TST. Use this position to test the equipment.

– IDT (ident) button. Push this button momentarily to transmit a coded signal to Air Traffic Control. The unit will transmit a special identification pulse for each interrogation over the next 18 seconds. The 'reply' indicator will be displayed continuously during this time. You must only press this button at the request of Air Traffic Control.

– CODE selector knobs. Use these knobs to enter the Mode A code.

– CLR button. Code entry mistakes are corrected, one digit at a time by pressing the CLR button and re-entering the correct code. The last active code will be displayed if a complete four-digit code has not been entered and there is no activity on any of the code entry buttons, the VFR button, or the CLR button for four seconds.

– VFR button. Momentarily pressing the VFR button will enter a pre-programmed VFR code, typically 7000, in the code window. Pressing and holding the VFR button for two seconds will cause the last active code to be displayed.

D. Garmin GTX 327 Transponder

Figure 3 shows the Garmin GTX 327 transponder. It is located in the instrument panel on the right side at the bottom, see Chapter 31.

The avionics bus or, if installed, the essential avionics bus supplies power to the transponder. The ALT/BAT switch (Lycoming version) or ELECTRIC MASTER key switch (TAE version) and the AVIONIC MASTER switch must be set to ON to supply power through the XPDR circuit-breaker to the transponder.

The transponder has a display which shows the following:

– FUNC window. The FUNC button changes the FUNC window shown on the right side of the display. Displayed data includes pressure altitude, flight time, count up timer, count down timer, and may include contrast, and display brightness, depending on configuration.

– Code window. The transponder code, set by the code selection keys, is shown in the center of the display.

– Reply indicator. The reply indicator blinks to indicate that the GTX 327 is functioning properly and replying to interrogations.

– Mode annunciation. The mode annunciation indicates which mode is selected.

The transponder has these controls:

- Mode selection keys. The mode selection keys consist of:
  - STBY. Sets the transponder to the standby mode. The transponder receives signals but does not reply.
  - ON. If the transponder receives an interrogation, it transmits the code set by the code selection keys. You can set any code between 0000 and 7777.
  - ALT. If the transponder receives an interrogation, it transmits the code set by the code selection keys and altitude data from the blind encoder.
  - OFF. Turns the unit off when depressed for approximately 2 seconds.
- IDENT key. Pressing the IDENT key activates the Special Position Identification (SPI) pulse for 18 seconds, identifying your transponder return from others on the air traffic controller's screen. The word 'IDENT' will appear in the upper left corner of the display while the IDENT mode is active.
- Code selection keys. Use these keys (0-7) to enter the transponder code.
- VFR button. Sets the transponder code to the pre-programmed VFR code selected in Configuration mode. Pressing the VFR button again will restore the previous identification code.
- FUNC button. Changes the page shown on the right side of the display. Displayed data includes pressure altitude, flight time, count up timer, count down timer, and may include contrast, and display brightness, depending on configuration.
- START/STOP button. Starts and stops the count up and count down timers.
- CRSR button. Initiates entry of the starting time for the count down timer and cancels transponder code entry.
- CLR button. Resets the count up and count down timers and cancels the previous keypress during code selection.
- 8 button. Reduces contrast and display brightness when the respective pages are displayed. Also enters the number eight into the count down timer.
- 9 button. Increases contrast and display brightness when the respective pages are displayed. Also enters the number nine into the count down timer.

E. Garmin GTX 328 Mode S Transponder

Figure 4 shows the Garmin GTX 328 transponder. It is located in the instrument panel on the bottom side, see Chapter 31.

The essential avionics bus supplies power to the transponder. The ELECTRIC MASTER key switch (TAE version) and the AVIONIC MASTER switch must be set to ON to supply power through the XPDR circuit-breaker to the transponder.

The transponder has a display which shows the following:

– FUNC window. The FUNC button changes the FUNC window shown on the right side of the display. Displayed data includes pressure altitude, flight time, count up timer, count down timer, and may include contrast, and display brightness, depending on configuration.

– Code window. The transponder code, set by the code selection keys, is shown in the center of the display.

– Reply indicator. The reply indicator blinks to indicate that the GTX 328 is functioning properly and replying to interrogations.

– Mode annunciation. The mode annunciation indicates which mode is selected.



Figure 4: Garmin GTX 328 Mode S Transponder

The transponder has these controls:

– Mode selection keys. The mode selection keys consist of:

  – STBY. Sets the transponder to the standby mode. The transponder receives signals but does not reply.

  – ON. If the transponder receives an interrogation, it transmits the code set by the code selection keys.

  – ALT. If the transponder receives an interrogation, it transmits the code set by the code selection keys and altitude data from the blind encoder.

  – OFF. Turns the unit off when depressed for approximately 2 seconds.

– IDENT key. Pressing the IDENT key activates the Special Position Identification (SPI) pulse for 18 seconds, identifying your transponder return from others on the air traffic controller's screen. The word 'IDENT' will appear in the upper left corner of the display while the IDENT mode is active.

– Code selection keys. Use these keys (0-7) to enter the transponder code.

– VFR button. Sets the transponder code to the pre-programmed VFR code selected in Configuration mode. Pressing the VFR button again will restore the previous identification code.

– FUNC button. Changes the page shown on the right side of the display. Displayed data includes pressure altitude, flight time, count up timer, count down timer, and may include contrast, and display brightness, depending on configuration.

– START/STOP button. Starts and stops the altitude monitor, count up, count down, and flight timers.

– CRSR button. Initiates entry of the starting time for the count down timer and cancels transponder code entry.

– CLR button. Resets the count up and count down timers and cancels the previous keypress during code selection.

– 8 button. Reduces contrast and display brightness when the respective pages are displayed. Also enters the number eight into the count down timer.

– 9 button. Increases contrast and display brightness when the respective pages are displayed. Also enters the number nine into the count down timer.

F. Garmin GTX 330 Mode S Transponder

Figure 5 shows the Garmin GTX 330 transponder. It is located in the instrument panel on the bottom side, see Chapter 31.

The essential avionics bus supplies power to the transponder. The ELECTRIC MASTER key switch (TAE version) and the AVIONIC MASTER switch must be set to ON to supply power through the XPDR circuit-breaker to the transponder.

The transponder has a display which shows the following:

– FUNC window. The FUNC button changes the FUNC window shown on the right side of the display. Displayed data includes pressure altitude, flight time, count up timer, count down timer, and may include contrast, and display brightness, depending on configuration.

– Code window. The transponder code, set by the code selection keys, is shown in the center of the display.

– Reply indicator. The reply indicator blinks to indicate that the GTX 330 is functioning properly and replying to interrogations.

– Mode annunciation. The mode annunciation indicates which mode is selected.

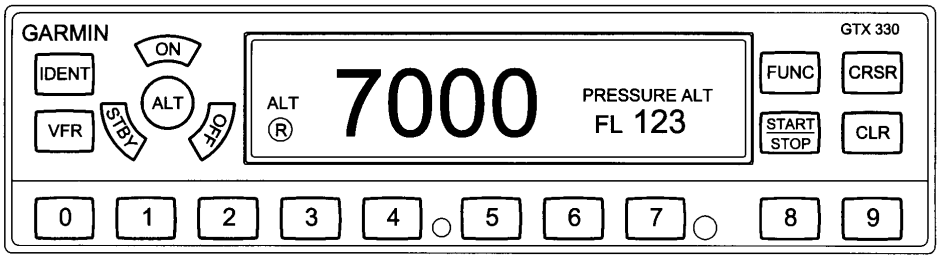


Figure 5: Garmin GTX 330 Mode S Transponder

The transponder has these controls:

– Mode selection keys. The mode selection keys consist of:

  – STBY. Sets the transponder to the standby mode. The transponder receives signals but does not reply.

  – ON. If the transponder receives an interrogation, it transmits the code set by the code selection keys.

  – ALT. If the transponder receives an interrogation, it transmits the code set by the code selection keys and altitude data from the blind encoder.

  – OFF. Turns the unit off when depressed for approximately 2 seconds.

– IDENT key. Pressing the IDENT key activates the Special Position Identification (SPI) pulse for 18 seconds, identifying your transponder return from others on the air traffic controller's screen. The word 'IDENT' will appear in the upper left corner of the display while the IDENT mode is active.

– Code selection keys. Use these keys (0-7) to enter the transponder code.

– VFR button. Sets the transponder code to the pre-programmed VFR code selected in Configuration mode. Pressing the VFR button again will restore the previous identification code.

– FUNC button. Changes the page shown on the right side of the display. Displayed data includes pressure altitude, flight time, count up timer, count down timer, and may include contrast, and display brightness, depending on configuration.

– START/STOP button. Starts and stops the altitude monitor, count up, count down, and flight timers.

– CRSR button. Initiates entry of the starting time for the count down timer and cancels transponder code entry.

– CLR button. Resets the count up and count down timers and cancels the previous keypress during code selection.

– 8 button. Reduces contrast and display brightness when the respective pages are displayed. Also enters the number eight into the count down timer.

– 9 button. Increases contrast and display brightness when the respective pages are displayed. Also enters the number nine into the count down timer.

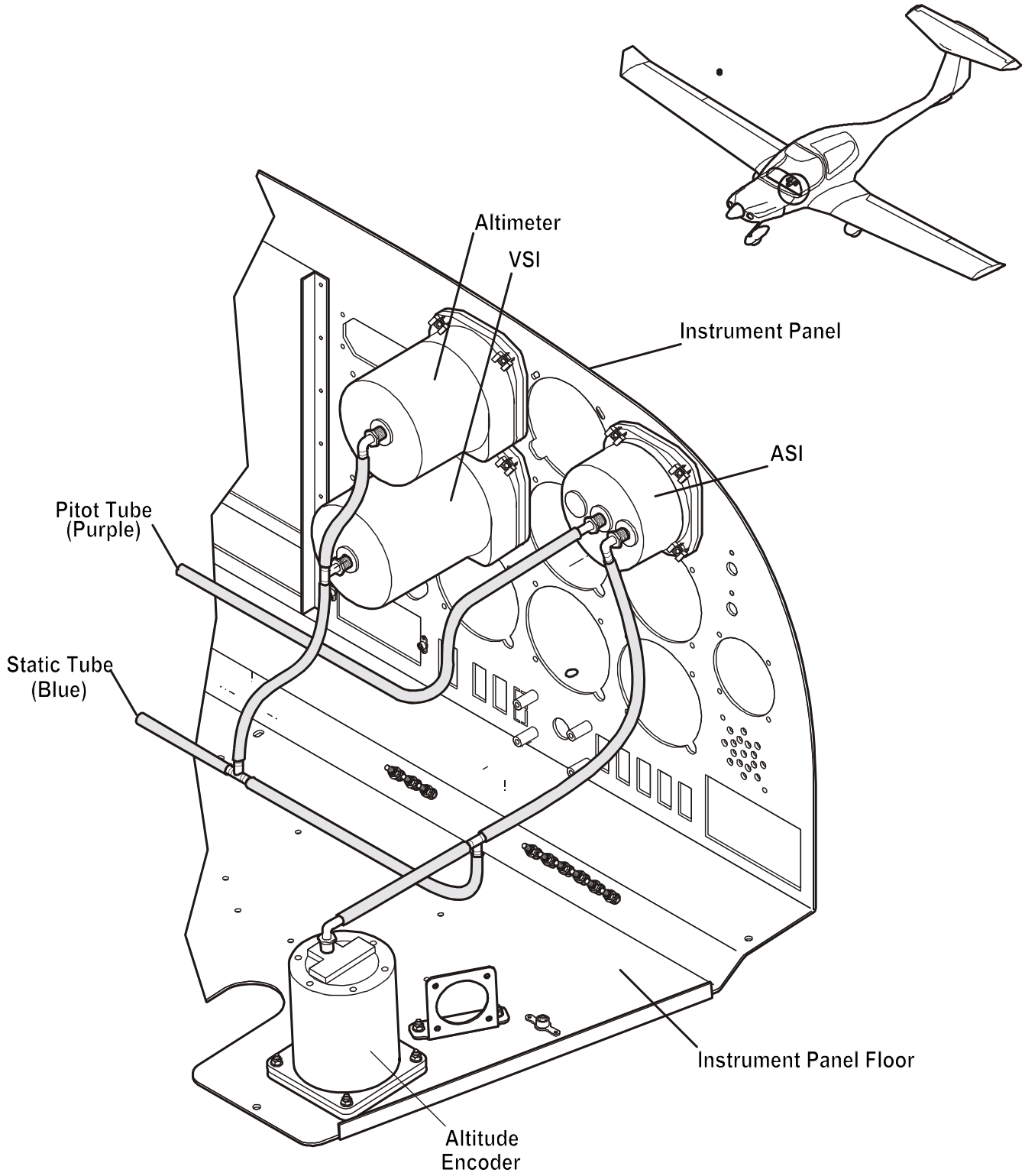


Figure 6: D120-P2-T Blind Altitude Encoder Installation

G. TCI D120-P2-T Blind Altitude Encoder

Figure 6 shows the installation of the TCI D120-P2-T blind altitude encoder.

The TCI D120-P2-T blind altitude encoder is located on the instrument panel floor, on the left side. The encoder connects to the static hose of the Pitot-static system. The encoder also connects to the transponder for Mode C operation.

You can calibrate the output of the encoder to align with the airplane altimeter indication. Calibration potentiometers are next to the static port. Refer to the equipment manufacturer's manual for more data about the encoder.

H. Sandia Aerospace Altitude Data System SAE5-35

The Sandia Aerospace Altitude Data System SAE5-35 is located on the instrument panel floor, on the left side, as shown in Figure 7 (Lycoming engine) and alternatively as shown in Figure 8 (TAE engine). The encoder connects to the transponder for Mode C operation and to the one or two GPS unit(s).

You can calibrate the output of the encoder to align with the airplane altimeter indication. Calibration buttons are located inside the case on the opposite side of the electrical connectors behind slot A and slot B. Refer to the equipment manufacturer's manual for more data about the encoder.

I. Transponder Antenna

The Bendix/King KA 60 or KA 61 transponder antenna is located on the bottom surface of the fuselage, under the cockpit on the left side.

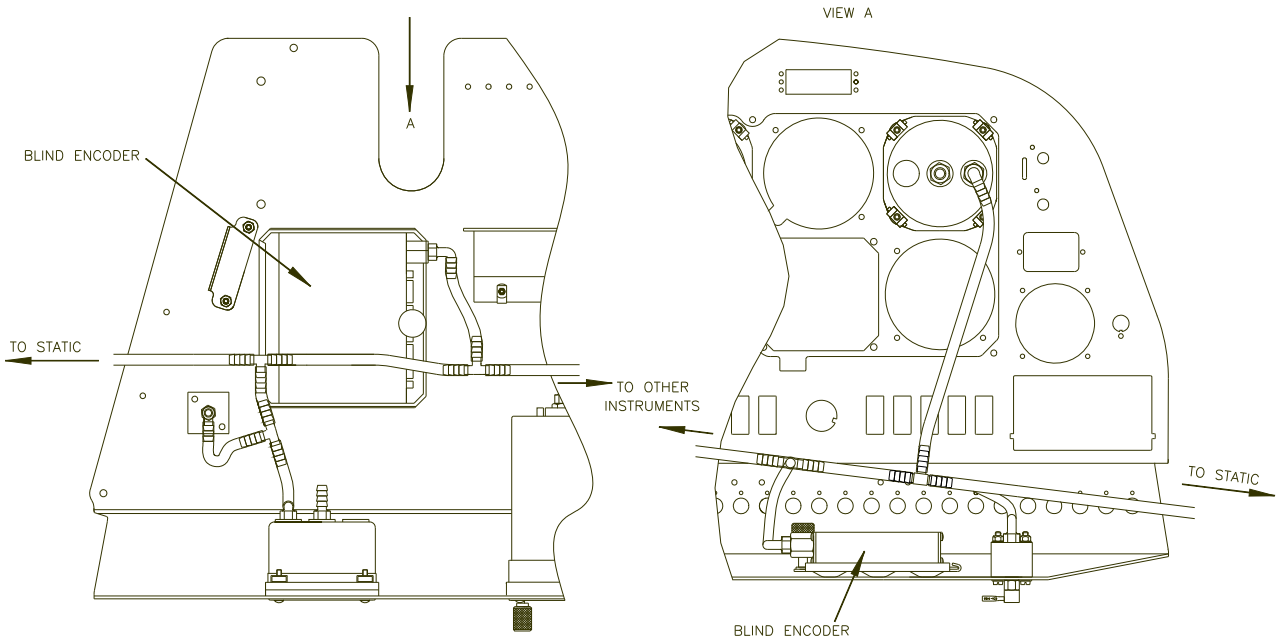


Figure 7: Sandia Aerospace Altitude Data System SAE5-35 Installation (Lycoming Engine)

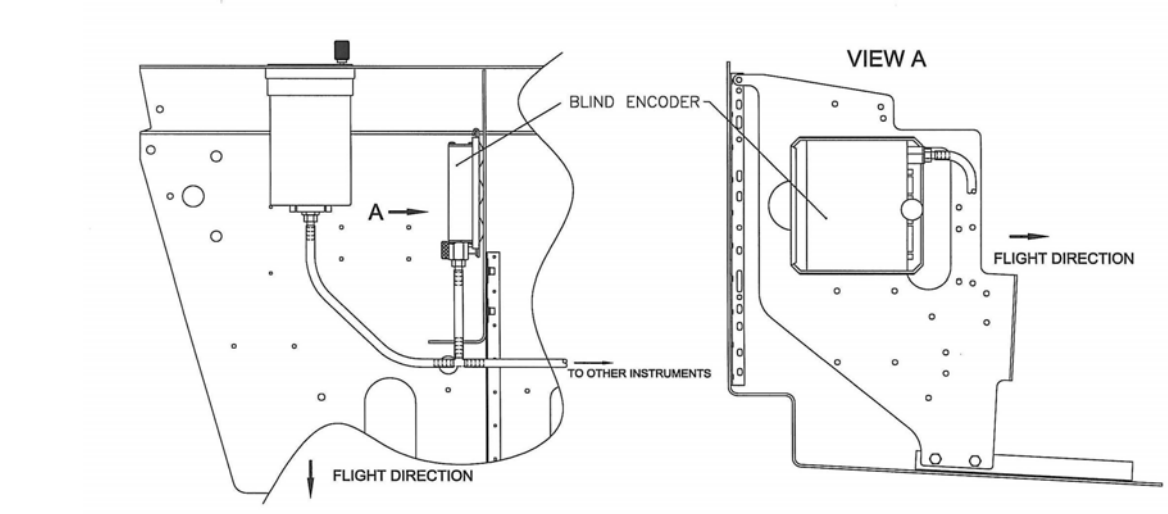


Figure 8: Sandia Aerospace Altitude Data System SAE5-35 Installation (TAE Engine)

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Trouble-Shooting

1. General

The table below lists the defects you could have with the transponder system. If you have the trouble detailed in the Trouble column read across to the Possible Cause column. Then do the repair given in the Repair column.

Trouble	Possible Cause	Repair
Transponder does not operate. Reply indicator does not come on when TST selected.	Faulty transponder. No power. Poor ground connection.	Replace the transponder. Repair faulty wiring, circuit-breaker etc. Do a test of the ground connection.
ATC reports no reply. Transponder reply indicator flashes.	Low output power.	Examine the antenna connections. Replace the transponder.
ATC reports no reply. Transponder reply indicator does not flash.	Airplane out of radar range. Poor received signal. Faulty transponder.	Do a test at higher altitude. Examine the antenna connections. Replace the transponder.
ATC reports Mode A does not operate. Mode C operates correctly.	Faulty transponder.	Replace the transponder.
Encoded altitude is wrong at one or more altitudes but is correct at most other altitudes.	Data code-bit missing. Faulty encoder. Faulty Mode C part of the transponder. Wiring open-circuit between encoder and transponder.	Do a Mode C fault analysis. Replace the encoder. Replace the transponder. Repair/replace the wiring. Refer to the wiring diagrams in Chapter 92.

Trouble	Possible Cause	Repair
Encoded altitude output is too high or too low over a steady range of altitudes. The airplane altimeter reads correctly.	Faulty encoder. Encoder requires calibration.	Replace the encoder. Calibrate the encoder. Refer to the manufacturers manuals.
Altitude read-out is -800 ft.	Encoder not warmed-up.	Let the encoder warm-up (Refer to the blind encoder fault analysis in this Section).

Maintenance Practices

1. General

These Maintenance Practices tell you how to remove/install the transponder and the blind altitude encoder. They also tell you how to adjust/test the transponder and do fault analysis on the blind encoder.

2. Remove/Install the Transponder

A. Remove the Transponder

	Detail Steps/Work Items	Key Items/References
(1)	Open the transponder circuit-breaker.	
(2)	Put a 3/32 Allen wrench into the access hole for the locking screw. Engage the screw.	Refer to Figure 1 (KT 76A) or Figure 2 (KT 76C) or Figure 3 (GTX 327).
(3)	Turn the screw counter-clockwise until the unit disengages from the mounting rack.	
	CAUTION: DO NOT PULL ON THE KNOBS. DO NOT PRY THE FACE-PLATE. IF YOU PULL ON THE KNOBS, OR PRY THE FACE-PLATE, YOU CAN DAMAGE THE UNIT. CAUTION: DO NOT TOUCH THE CONNECTOR CARD AT THE REAR OF THE UNIT. THE ELECTROSTATIC CHARGE ON YOUR BODY CAN DAMAGE THE UNIT.	
(4)	Pull gently on the sides of the unit to remove it from the mounting rack.	
(5)	Install the protective covers on the rear connectors of the transponder.	

B. Install the Transponder

	Detail Steps/Work Items	Key Items/References
(1)	Remove the protective covers from the connectors on the replacement unit.	
(2)	Slide the unit into the rack. Engage the locking screw so that the latch front-lobe touches the rack.	
(3)	Turn the locking screw clockwise so that the rear lobe engages the mounting rack.	Refer to Figure 1 (KT 76A) or Figure 2 (KT 76C) or Figure 3 (GTX 327).
	CAUTION: DO NOT OVER-TIGHTEN THE LOCKING SCREW. YOU CAN DAMAGE THE LOCKING MECHANISM.	
(4)	Continue to turn the screw until the unit is fully installed in the mounting rack.	
(5)	Close the transponder circuit-breaker.	
(6)	Do an operational test.	Refer to Paragraph 4.

3. Remove/Install the Blind Altitude Encoder

A. Remove the Blind Altitude Encoder

	Detail Steps/Work Items	Key Items/References
(1)	Open the XPDR circuit-breaker.	
(2)	Remove the instrument panel cover.	Refer to Section 25-10.
(3)	Disconnect the static hose from the encoder.	Put a cap on the static hose!
(4)	Disconnect the electrical connector(s).	
(5)	Release the knurled mounting screw for the encoder.	
(6)	Remove the encoder.	Remove the SAE5-35 from the mounting rack.
(7)	Install a cover over the static port.	

B. Install the Blind Altitude Encoder

	Detail Steps/Work Items	Key Items/References
(1)	Remove the cover from the static port on the encoder.	
(2)	If you install a new encoder, install the static fitting from the old encoder on the new encoder.	
(3)	Put the encoder in position on the mounting. Install the knurled mounting screw.	Slide the SAE5-35 in the mounting rack.
(4)	Connect the electrical connector(s).	
(5)	Connect the static hose to the encoder.	
(6)	Close the XPDR circuit-breaker.	
(7)	Do a low-range static leak check.	Refer to Section 34-10.
(8)	Do the adjustment/test procedure.	Refer to Paragraph 5.
(9)	Install the instrument panel cover.	Refer to Section 25-10.

4. Test the Transponder

Use a transponder test set to make sure that the system operates correctly.

	Detail Steps/Work Items	Key Items/References or Limit Values
(1)	Connect the test equipment.	Refer to the equipment manufacturers' manuals.
(2)	Measure TX power.	125 W to 500 W.
(3)	Measure MTL Mode A.	-69 dBm to -77 dBm.
(4)	Measure MTL Mode C.	-69 dBm to -77 dBm.
(5)	Determine MTL A & C difference.	Max. 1 dB.
(6)	Measure SLS P2 P1.	Less than 1 % reply.
(7)	Measure SLS P2 -9 dB < P1.	More than 90 % reply.
(8)	Measure 'ident' time.	15 sec to 30 sec.
(9)	Measure interrogation Mode A retard/advance P3.	Less than 10 % at max. 1.0 µs.
(10)	Measure interrogation Mode C retard/advance P3.	Less than 10 % at max. 1.0 µs.
(11)	Measure framing: – Retard/advance (F2 light just on). – Difference between F2 retard and advance. – Calculate center of F2.	 0.45 ± 0.07 µs. Max. ± 0.1 µs. from 0.
(12)	Check if 'reply' indicator and dimer are OK.	
(13)	Check if Mode A coding is OK.	
(14)	Measure transmitter frequency deviation (from 1090 MHz).	± 1.5 MHz.
(15)	If necessary, do a test of the blind altitude encoder.	Refer to Paragraph 5.
(16)	Dis-connect the test equipment.	

	Detail Steps/Work Items	Key Items/References or Limit Values
(17)	Do an operation flight test: – Do a test of each control function. – Contact ATC, ask for a transponder check.	 Refer to this Section. Note warm-up period of blind encoding altimeter (see Paragraph 5).

5. Adjust/Test the Blind Altitude Encoder

A. Adjust/Test the D120-P2-T

The encoder will not give an output until it has reached the correct operating temperature. If the power goes off and then on again, a delay of 6 minutes occurs. The approximate warm-up times are:

– From 70 °F (21 °C) 4 to 6 minutes.

– From 0 °F (-18 °C) up to 10 minutes.

– From -55 °F (-48 °C) 30 to 45 minutes.

The adjusters are next to the static port on the encoder. The LO adjuster is towards the outside. The HI adjuster is towards the center.

	Detail Steps/Work Items	Key Items/References
(1)	Connect the test equipment.	Refer to the equipment manufacturers' manuals.
(2)	Set the airplane altimeter to 1013.25 hPa (29.92 inHg).	
(3)	Monitor the altitude code. Decrease the pressure until the output code just changes to 20,000 ft.	
(4)	Make sure that the altimeter reading is within ± 125 ft of the encoder reading. If not, adjust the HI adjuster until the change occurs within 30 ft of the altimeter reading.	Lightly tap the panel next to the altimeter to prevent errors due to friction.
(5)	Increase the pressure until the output code just changes to 0 ft.	
(6)	Make sure that the altimeter reading is within ± 125 ft of the encoder reading. If not, adjust the LO adjuster until the change occurs within 30 ft. of the altimeter reading.	Lightly tap the panel next to the altimeter to prevent errors due to friction.
(7)	Do steps 2 to 5 again until both 20,000 ft and 0 ft. values are within the ± 125 ft tolerance.	
(8)	Operate the system through the range -1000 ft to 20,000 ft. Make sure that the altimeter and the encoder are within the ± 125 ft tolerance.	Lightly tap the panel next to the altimeter to prevent errors due to friction.

	Detail Steps/Work Items	Key Items/References
(9)	Disconnect the test equipment and remove it from the airplane.	

B. Adjust/Test the SAE5-35

This adjustment ensures that the altitude code generated from the SAE5-35 is within 125 feet of the altitude displayed to the pilot.

	Detail Steps/Work Items	Key Items/References
(1)	Connect the test equipment.	Refer to the equipment manufacturers' manuals.
(2)	Set the airplane altimeter to 1013.25 hPa (29.92 inHg).	
(3)	Monitor the altitude code. Decrease the pressure until the output code just changes to 20,000 ft.	
(4)	Make sure that the altimeter reading is within ± 125 ft of the encoder reading. If not, press the increase button (behind slot A) or decrease button (behind slot B) until the encoder reading is within 30 ft of the altimeter reading.	Lightly tap the panel next to the altimeter to prevent errors due to friction.
(5)	Increase the pressure until the output code just changes to 0 ft.	
(6)	Make sure that the altimeter reading is within ± 125 ft of the encoder reading. If not, press the increase button (behind slot A) or decrease button (behind slot B) until the encoder reading is within 30 ft of the altimeter reading.	Lightly tap the panel next to the altimeter to prevent errors due to friction.
(7)	Do steps 2 to 5 again until both 20,000 ft and 0 ft values are within the ± 125 ft tolerance.	
(8)	Operate the system through the range -1000 ft to 20,000 ft. Make sure that the altimeter and the encoder are within the ± 125 ft tolerance.	Lightly tap the panel next to the altimeter to prevent errors due to friction.
(9)	Disconnect the test equipment and remove it from the airplane.	

Section 34-58
Global Positioning System (GPS)

1. General

This Section tells you about the global positioning system (GPS) equipment that can be installed in the DA 40. Refer to the manufacturer's manuals for more data about the equipment. Refer to Chapter 92 for the wiring diagrams.

Refer to Section 23-10 for more information about the NAV/COM system of the NAV/COM/GPS units.

The GPS equipment consists of the following items:

– GPS #1 receiver. One of the following GPS #1 receivers can be installed:

  – Bendix/King KLN 89B.

  – Bendix/King KLN 94.

  – Bendix/King KMD 150.

  – Garmin GNS 430.

  – Garmin GNS 530.

– GPS #2 receiver. One of the following GPS #2 receivers can be installed:

  – Garmin GNS 430.

– GPS annunciation control unit (optional).

– GPS annunciation unit (optional).

– GPS antenna(s).

2. Description and Operation

The GPS is a satellite-based long range navigation system. The GPS receiver provides exact latitude and longitude position information. With its internal processing, the unit also provides ground speed, altitude, track and bearing, and other navigation information.

The internal database of the GPS receiver contains information about airports, VOR's, NDB's, intersections, DP/STAR's and outer markers throughout the world. It also contains information about land data (roads, bodies of water, cities, obstacles, railroad tracks), and other items of value to the pilot.

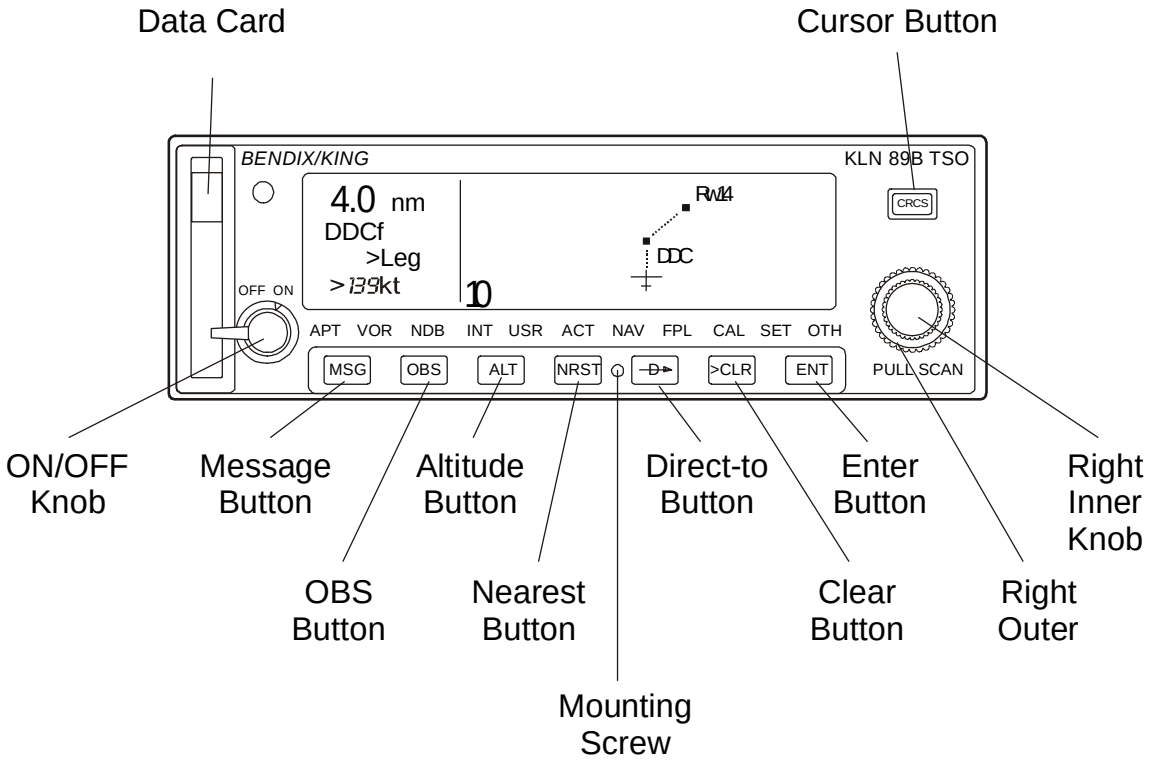


Figure 1: Bendix/King KLN 89B GPS Receiver

A. Bendix/King KLN 89B GPS Receiver

Figure 1 shows the Bendix/King KLN 89B GPS receiver. It is located in the avionics rack in the instrument panel, see Chapter 31.

The avionics bus or, if installed, the essential avionics bus supplies power to the GPS receiver. The ALT/BAT switch and the AVIONIC MASTER switch must be set to ON to supply power through the GPS circuit-breaker to the GPS receiver. Refer to Chapter 92 for the wiring diagrams.

Every 28 days, Bendix/King receives new data base information. This information is downloaded onto data base cards. The data base card is inserted in the slot on the left side of the GPS receiver.

There are three data base coverage areas available for the KLN 89B. They are known as the 'Americans' data base, the 'Atlantic' data base, and the 'Pacific' data base.

The KLN 89B GPS receiver has these controls:

– ON-OFF knob. It is used to turn the unit on and off.

– Right outer knob. When the cursor is off, it is used to select the page type (for example, APT, NAV, FPL, etc.). When the cursor is on, it is used to move the cursor on the display.

– Right inner knob - When the cursor is off, it is used to select the specific page number for a page type (for example, APT 1, APT 2, APT 3, etc.). When the cursor is on, it is used to select alphanumerics or other applicable data for the field the cursor is on.

– CRSR (cursor) button. It is used to turn the cursor on and off.

– MSG (message) button. It is used to view messages.

– OBS button. It is used to select between LEG mode and OBS modes.

– ALT (altitude) button. It is used to select the two Altitude Pages where baro settings are made and VNAV operation is set up.

– NRST (nearest) button. It is used to bring up a menu of nearest functions (Airports, VOR's, NDB's, intersections, etc.) that may be selected.

– ⇻ (direct-to) button. It is used to initiate 'direct-to' operation (navigation from the present position direct to the destination).

– CLR (clear) button. It is used to delete data from a data field.

– ENT (enter) button. It is used to approve or acknowledge data.

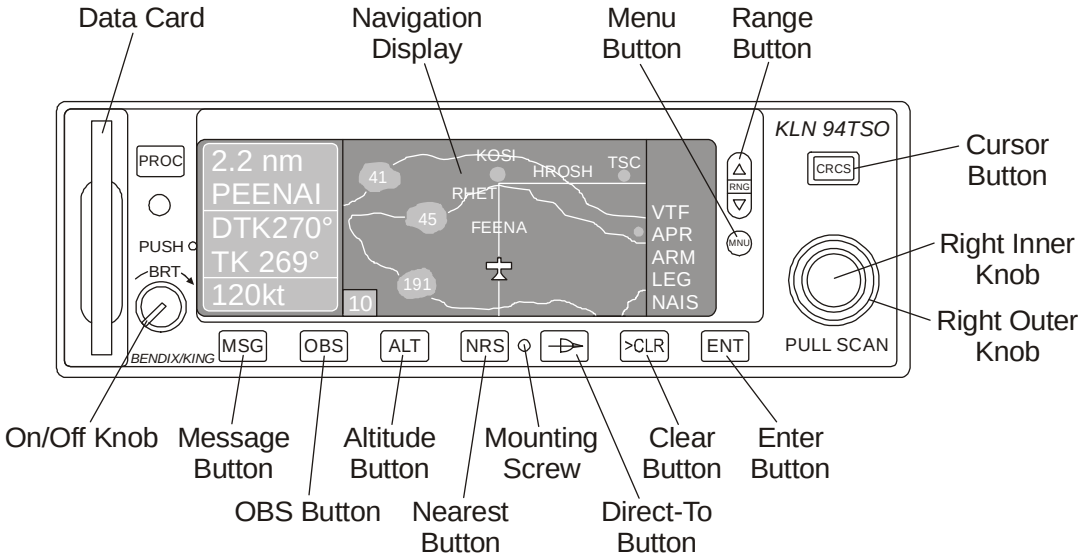


Figure 2: Bendix/King KLN 94 GPS Receiver

B. Bendix/King KLN 94 GPS Receiver

Figure 2 shows the Bendix/King KLN 94 GPS receiver. It is located in the avionics rack in the instrument panel, see Chapter 31.

The avionics bus or, if installed, the essential avionics bus supplies power to the GPS receiver. The ALT/BAT switch and the AVIONIC MASTER switch must be set to ON to supply power through the GPS circuit-breaker to the GPS receiver. Refer to Chapter 92 for the wiring diagrams.

Every 28 days, Bendix/King receives new data base information. This information is downloaded onto data base cards. The data base card is inserted in the slot on the left side of the GPS receiver.

There are three data base coverage areas available for the KLN 94. They are known as the 'Americans' data base, the 'Atlantic' data base, and the 'Pacific' data base.

The KLN 94 GPS receiver has these controls:

– ON/OFF/brightness knob. It is used to turn the unit on and off and adjust display brightness.

– Right outer knob. When the cursor is off, it is used to select the page type (for example, APT, NAV, FPL, etc.). When the cursor is on, it is used to move the cursor on the display.

– Right inner knob. When the cursor is off, it is used to select the specific page number for a page type (for example, APT 1, APT 2, APT 3, etc.). When the cursor is on, it is used to select alphanumerics or other applicable data for the field the cursor is on.

– PROC (procedure) button. It is used to initiate the loading of approaches, arrival procedures, and departure procedures. Also used to activate vector-to-final (VTF) for approaches when an approach with 'Vectors' has been loaded into the active flight plan.

– RNG (range) button. It is used to change the map scale if the map page (Nav 4) page is being displayed. It is used to select the map page if it is not already on the map page.

– MEN (menu) button. It is used to display the map menu if the map page (Nav 4) page is being displayed. The map menu is used to initiate changing what is displayed on the map as well as select the map orientation. It is used to select the map page if it is not already on the map page.

– CRSR (cursor) button. It is used to turn the cursor on and off.

– MSG (message) button. It is used to view messages.

– OBS button. It is used to select between LEG mode and OBS modes.

– ALT (altitude) button. It is used to select the two Altitude Pages where baro settings are made and VNAV operation is set up.

– NRST (nearest) button. It is used to bring up a menu of nearest functions (Airports, VOR's, NDB's, intersections, etc.) that may be selected.

– Ð (direct-to) button. It is used to initiate 'direct-to' operation (navigation from the present position direct to the destination).

– CLR (clear) button. It is used to delete data from a data field. It is also used to back up to a previous step in some instances such as selecting approaches/STAR's/DP's.

– ENT (enter) button. It is used to approve or acknowledge data.

C. Bendix/King KMD 150 Multifunction Display/GPS

Figure 3 shows the Bendix/King KMD 150 multifunction display with an internal GPS receiver. It is located in the avionics rack in the instrument panel, see Chapter 31.

The avionics bus, or if installed, the essential avionics bus supplies power to the multifunction display/GPS. The ALT/BAT switch and the AVIONIC MASTER switch must be set to ON to supply power through the GPS circuit-breaker to the multifunction display/GPS. Refer to Chapter 92 for the wiring diagrams.

Every 28 days, Bendix/King receives new data base information. This information is downloaded onto data base cards. The data base card is inserted in the slot on the bottom side of the multifunction display/GPS.

The KMD 150 multifunction display/GPS has the following controls:

– ON/OFF/brightness control. It is used to turn the unit on and off and adjust display brightness.

– Joystick. The joystick allows movement of the pointer in MAP mode and is used for all forms of data entry or selection.

– 5 function keys (soft keys). A label is drawn alongside each valid key. Whenever a new function is selected, by pressing a valid key, a new screen is displayed along with its new key labels. This capability of drawing key labels that are only applicable to a particular screen is referred to as 'soft keying', and allows one key to perform multiple functions without the complications of multiple key presses on an conventional keypad. Refer to the manufacturer's manuals for mor information about the function keys.

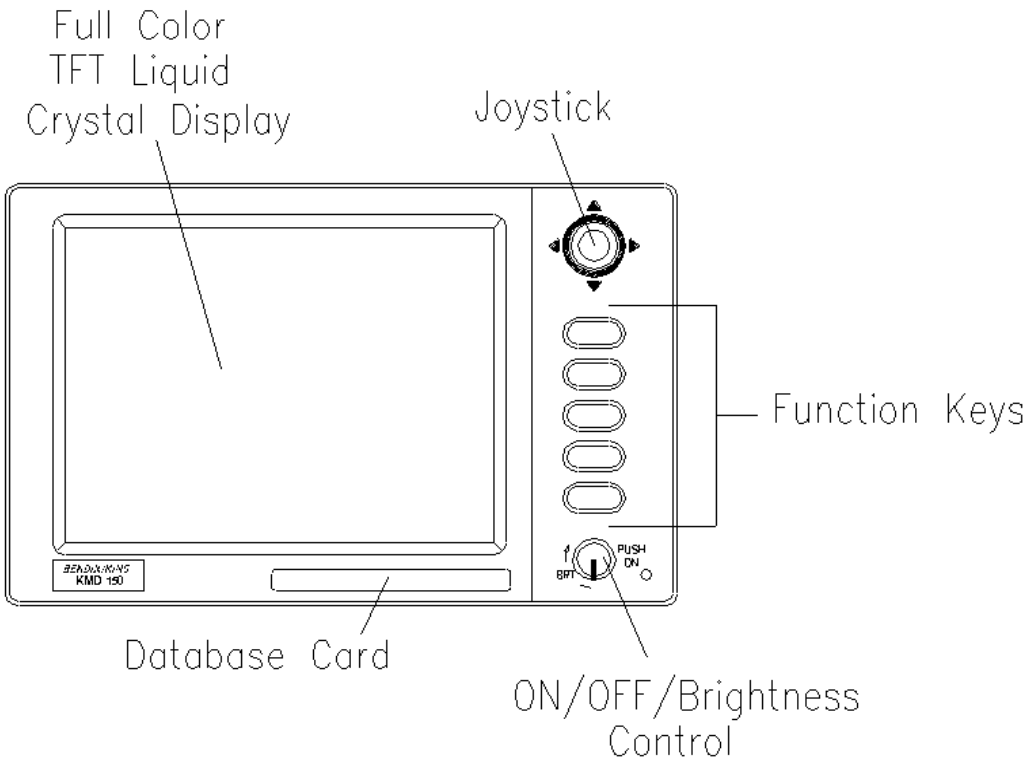


Figure 3: Bendix/King KMD 150 Multifunction Display/GPS

D. Garmin GNS 430/530 GPS Receiver

Figure 4 shows the Garmin GNS 430 NAV/COM/GPS system. Figure 5 shows the Garmin GNS 530 NAV/COM/GPS system. They are located in the avionics rack in the instrument panel, see Chapter 31.

The avionics bus or, if installed, the essential avionics bus supplies power to the GPS #1 receiver. The avionics bus supplies power to the GPS #2 receiver. The ALT/BAT switch (Lycoming version) or ELECTRIC MASTER key switch (TAE version) and the AVIONIC MASTER switch must be set to ON to supply power through the GPS/NAV circuit-breakers to the GPS receivers.

The GNS 430/530 GPS receivers have these controls:

– The RNG (range) key (1) allows you to select the desired map scale. Use the up arrow side of the key to zoom out to a larger area, or the down arrow side to zoom in to a smaller area.

– The ⇻ (direct-to) key (2) provides access to the direct-to function, which allows you to enter a destination waypoint and establishes a direct course to the selected destination.

– The MENU key (3) displays a context-sensitive list of options. This options list allows you to access additional features or make settings changes which relate to the currently displayed page.

– The CLR (clear) key (4) is used to erase information or cancel an entry. Press and hold this key to immediately display the Default Navigation Page, regardless of which page is currently being displayed.

– The ENT (enter) key (5) is used to approve an operation or complete data entry. It is also used to confirm information, such as the Database Page during power on.

– The small right knob (PUSH CRSR) (6) is used to select between the various pages within one of the groups listed below. Press this knob momentarily to display the on-screen cursor. The cursor allows you to enter data and/or make a selection from a list of options.

– The large right knob (GPS) (7) is used to select between the various page groups: NAV, WPT, AUX, or NRST. With the on-screen cursor enabled, the large right knob allows you to move the cursor about the page.

– The PROC (procedures) key (8) allows you to select approaches, departures and arrivals from your flight plan. When using a flight plan, available procedures for your departure and/or arrival airport are offered automatically. Otherwise, you may select the desired airport, then the desired procedure.

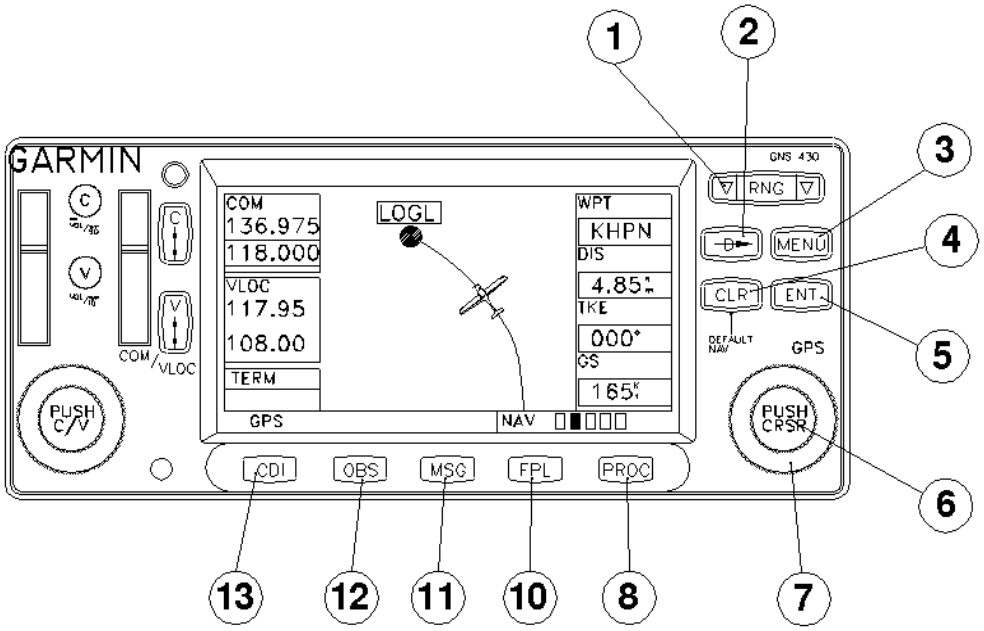


Figure 4: Garmin GNS 430 NAV/COM/GPS

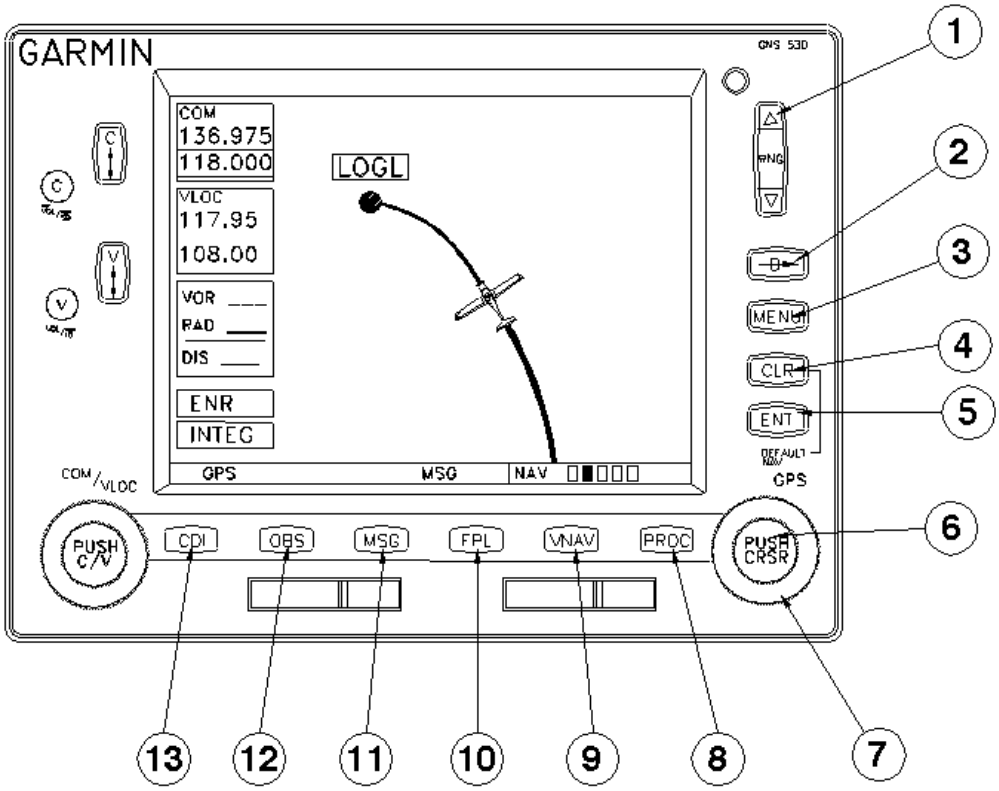


Figure 5: Garmin GNS 530 NAV/COM/GPS

– The VNAV (vertical navigation) key (9) (GNS 530 only) allows you to create a three-dimensional profile which guides you to a final (target) altitude at a specific location.

– The FPL (flight plan) key (10) allows you to create, edit, activate and invert flight plans, as well as access approaches, departures and arrivals. A closest point to flight plan feature is also available from the flight plan key.

– The MSG (message) key (11) is used to view system messages and to alert you to important warnings and requirements.

– The OBS key (12) is used to select manual or automatic sequencing of waypoints. Pressing the OBS key selects OBS mode, which will retain the current 'active to' waypoint as your navigation reference even after passing the waypoint (i.e., prevents sequencing to the next waypoint). Pressing the OBS key again will return to normal operation, with automatic sequencing of waypoints. Whenever OBS mode is selected, you may set the desired course to/from a waypoint using the OBS Page, or an external OBS selector on your HSI.

– The CDI key (13) is used to toggle which navigation source (GPS or VLOC) provides output to the HSI or CDI.

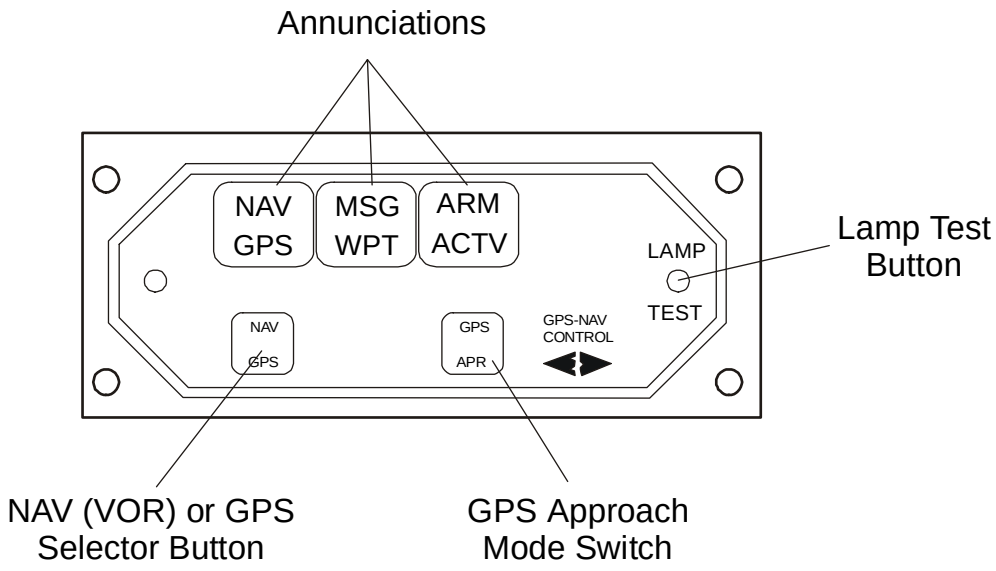


Figure 6: Mid Continent MD 41 GPS Annunciation Control Unit

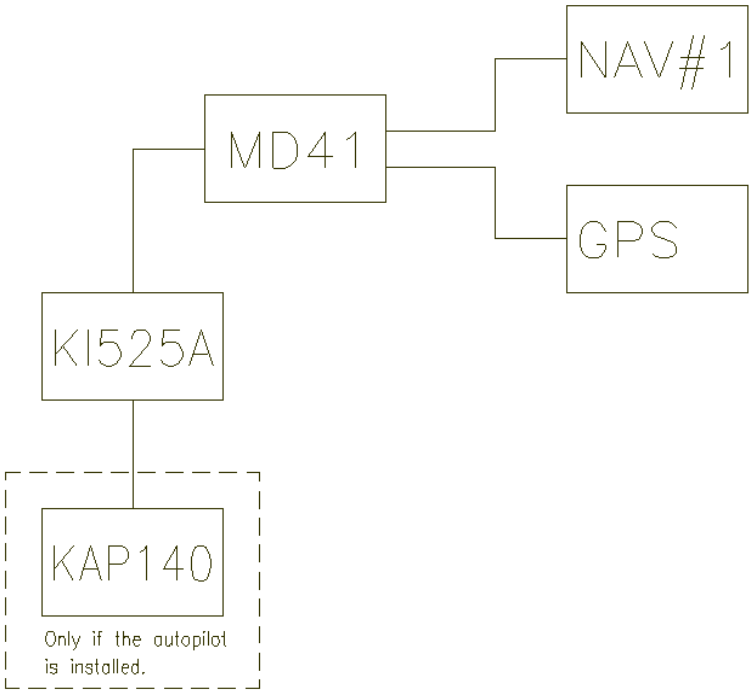


Figure 7: Block Diagram

E. MD 41 GPS Annunciation Control Unit

Figure 6 shows the Mid Continent MD 41 GPS annunciation control unit. It is installed in the left-hand section of the instrument panel, see Chapter 31.

The MD 41 is a self-contained GPS annunciation and control unit. Figure 4 shows how the MD 41 works. The information from either the NAV 1 (VOR) receiver or the GPS receiver can be switched to the data inputs of the HSI (refer to Section 34-28). In addition, this navigation information is also used for the KAP 140 autopilot, if the autopilot is installed (refer to Chapter 22).

An ILS override feature automatically switches to the NAV mode when the NAV 1 receiver is tuned to an ILS frequency.

The MD 41 contains several GPS status annunciations used to indicate modes selected by the front panel switches and various inputs from the GPS receiver.

Any time power is removed or turned off, or in the event off a power failure of the MD 41, the MD 41 turns automatically to the 'Emergency mode'. In this mode the HSI (see Section 34-28) is connected directly to NAV 1.

The GPS annunciation control unit has the following annunciations:

– NAV. It indicates that NAV 1 (VOR) information is being presented on the HSI.

– GPS. It indicates that GPS information is being presented on the HSI.

– ARM. It indicates that the GPS is armed for automatic transition to Approach mode.

– ACTV. It indicates that the GPS is actively engaged in the Approach mode.

– MSG. It indicates that there is a GPS message alert from the GPS receiver.

– WPT. It indicates that there is a GPS waypoint alert from the GPS receiver.

The GPS annunciation control unit has these controls:

– NAV/GPS button. It switches between NAV 1 (VOR) or GPS presentation on the HSI.

– GPS/APR button. It arms the GPS Approach mode.

– LAMP TEST button. It is used for testing the annunciation lamps.

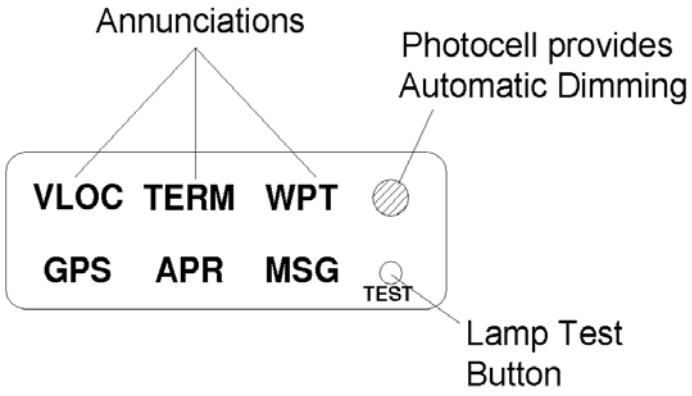


Figure 8: Mid Continent MD 41-1488/1484 GPS Annunciation Unit

F. MD 41-1488/1484 GPS Annunciation Unit

Figure 8 shows the Mid Continent MD 41-1488/1484 GPS annunciation unit. The MD 41-1488 operates on 28 volts, the MD 41-1484 operates on 14 volts. The GPS annunciation unit is installed in the left-hand section of the instrument panel, see Chapter 31.

The MD 41-1488/1484 is a self-contained GPS annunciation unit. It displays status annunciation received from the Garmin GNS 430/530 GPS receiver.

The GPS annunciation unit has the following annunciations:

– VLOC. NAV or ILS information presented on the HSI.

– GPS. GPS information presented on the HSI.

– MSG. ON indicates message(s) active.

– WPT. ON indicates reaching the arrival waypoint.

– TERM. ON indicates airplane is within 30 miles of departure or arrival airport.

– APR. ON indicates the approach is active.

The GPS annunciation unit has these controls:

– TEST button. It is used for testing the annunciation lamps.

G. GPS Antennas

The DA 40 can be equipped with the following GPS antennas:

– Bendix/King KA 92.

– Garmin GA 56 (one or two).

They are located on the top surface of the fuselage, behind the aft edge of the canopy frame.

Trouble-Shooting

1. General

The table below lists the defects you could have with the GPS and the GPS annunciation control unit. If you have the trouble detailed in the Trouble column read across to the Possible Cause column. Then do the repair given in the Repair column.

Trouble	Possible Cause	Repair
Error message on GPS receiver.	Internal error.	Refer to GPS manufacturer's documentation.
GPS does not operate.	GPS circuit-breaker not set.	Set the GPS circuit-breaker.
	Faulty GPS receiver.	Repair or replace the GPS receiver.
	Faulty cables/connectors.	Do a test for continuity on each cable. Do a test for short circuit to ground and between cables. Replace defective cables.
GPS unable to acquire satellites.	Faulty GPS receiver.	Repair or replace the GPS receiver.
	Faulty GPS antenna.	Do a test for correct impedance of the antenna. If necessary, repair or replace the antenna.
	Faulty connection between GPS antenna and GPS receiver.	Ensure proper cable connections. Do a test for correct impedance of the antenna co-axial cable. Do a test for continuity on each cable. Do a test for short circuit to ground and between cables. Replace defective cables.
GPS annunciation control unit does not operate.	Faulty GPS annunciation control unit.	Repair or replace the GPS annunciation control unit.
	Faulty cables/connectors.	Do a test for continuity on each cable. Do a test for short circuit to ground and between cables. Replace defective cables.

Trouble	Possible Cause	Repair
No correct GPS information on HSI.	GPS annunciation control unit switched to NAV. Faulty GPS annunciation control unit. Faulty HSI. Faulty cables/connectors.	Switch GPS annunciation control unit to GPS. Repair or replace the GPS annunciation control unit. Repair or replace the HSI. Do a test for continuity on each cable. Do a test for short circuit to ground and between cables. Replace defective cables.
No correct NAV information on HSI.	GPS annunciation control unit switched to GPS. Faulty GPS annunciation control unit. Faulty HSI. Faulty cables/connectors.	Switch GPS annunciation control unit to NAV. Repair or replace the GPS annunciation control unit. Repair or replace the HSI. Do a test for continuity on each cable. Do a test for short circuit to ground and between cables. Replace defective cables.

Maintenance Practices

1. General

This Section tells you how to remove/install the items of the GPS equipment.

2. Remove/Install the GPS Receiver

A. Remove the GPS Receiver

	Detail Steps/Work Items	Key Items/References
(1)	Open the related circuit-breaker(s).	GPS circuit-breaker for KLN 89B, KLN 94, and MFD 150. COM and NAV/GPS circuit-breakers for Garmin GNS 430/530.
(2)	Put a 3/32 Allen wrench into the access hole for the locking screw. Engage the wrench into the screw.	Refer to Figure 1 (KLN 89B), Figure 2 (KLN 94), Figure 3 (MFD 150), Figure 4 (GNS 430), or Figure 5 (GNS 530).
(3)	Turn the screw counter-clockwise until the unit disengages from the mounting rack.	
	CAUTION: DO NOT PULL ON THE KNOBS. DO NOT PRY THE FACE-PLATE. YOU CAN DAMAGE THE UNIT. CAUTION: DO NOT TOUCH THE CONNECTOR CARD AT THE REAR OF THE UNIT. THE ELECTROSTATIC CHARGE ON YOUR BODY CAN DAMAGE THE UNIT.	
(4)	Pull gently on the sides of the unit to remove it from the mounting rack.	
(5)	Install the protective covers on the rear connectors of the unit.	

B. Install the GPS Receiver

	Detail Steps/Work Items	Key Items/References
(1)	Remove the protective covers from the connectors on the replacement unit.	
(2)	Slide the unit into the rack. Engage the locking screw so that the latch front-lobe touches the rack.	
(3)	Turn the locking screw clockwise so that the rear lobe engages the mounting rack.	Refer to Figure 1 (KLN 89B), Figure 2 (KLN 94), Figure 3 (MFD 150), Figure 4 (GNS 430), or Figure 5 (GNS 530).
CAUTION: DO NOT OVER-TIGHTEN THE LOCKING SCREW. YOU CAN DAMAGE THE LOCKING MECHANISM.		
(4)	Continue to turn the screw until the unit is fully installed in the mounting rack.	
(5)	Close the related circuit-breaker(s).	GPS circuit-breaker for KLN 89B, KLN 94, and MFD 150. COM and NAV/GPS circuit-breakers for Garmin GNS 430/530.
(6)	Do a test of the GPS.	Refer to Paragraph 6.

3. Remove/Install the GPS Annunciation Control Unit

A. Remove the GPS Annunciation Control Unit

	Detail Steps/Work Items	Key Items/References
(1)	Remove the instrument panel cover.	Refer to Section 25-10.
(2)	Dis-connect the connector from the rear of the remote GPS annunciation control unit.	
(3)	Remove the screws which attach the GPS annunciation control unit to the panel.	Hold the GPS annunciation control unit!
(4)	Remove the GPS annunciation control unit from the panel.	

B. Install the GPS Annunciation Control Unit

	Detail Steps/Work Items	Key Items/References
(1)	Put the GPS annunciation control unit in position in the panel.	
(2)	Install the screws which attach the GPS annunciation control unit to the panel.	
(3)	Connect the connector to the rear of the GPS annunciation control unit.	
(4)	Install the instrument panel cover.	Refer to Section 25-10.
(5)	Do a test of the GPS.	Refer to Paragraph 6.

4. Remove/Install the GPS Annunciation Unit

A. Remove the GPS Annunciation Unit

	Detail Steps/Work Items	Key Items/References
(1)	Remove the instrument panel cover.	Refer to Section 25-10.
(2)	Dis-connect the connector from the rear of the remote GPS annunciation unit.	
(3)	Remove the screws which attach the GPS annunciation unit to the panel.	Hold the GPS annunciation unit!
(4)	Remove the GPS annunciation unit from the panel.	

B. Install the GPS Annunciation Unit

	Detail Steps/Work Items	Key Items/References
(1)	Put the GPS annunciation unit in position in the panel.	
(2)	Install the screws which attach the GPS annunciation unit to the panel.	
(3)	Connect the connector to the rear of the GPS annunciation unit.	
(4)	Install the instrument panel cover.	Refer to Section 25-10.
(5)	Do a test of the GPS.	Refer to Paragraph 6.

5. Remove/Install a GPS Antenna

A. Remove a GPS Antenna

	Detail Steps/Work Items	Key Items/References
(1)	Remove the co-pilot's map light.	Refer to Section 33-10.
(2)	Release the co-axial connector from the antenna.	
(3)	Release the screws which hold the antenna.	
(4)	Carefully pull the antenna clear of the fuselage and hold it.	If necessary, carefully cut the sealant around the base of the antenna. You must not damage the fuselage skin.
(5)	Move the antenna clear of the airplane.	

B. Install a GPS Antenna

	Detail Steps/Work Items	Key Items/References
(1)	Carefully remove any sealant from the area where the antenna attaches to the fuselage.	
(2)	Clean the area where the antenna attaches to the fuselage.	
(3)	Put the antenna in position on the fuselage.	
(4)	Attach the antenna with the screws.	
(5)	Connect the co-axial connector to the antenna.	
(6)	Seal the outer edge of the antenna to the fuselage skin with sealant.	Use Dow Corning 732 RTV.
(7)	Install the co-pilot's map light.	Refer to Section 33-10.
(8)	Do a test of the GPS.	Refer to Paragraph 6.

6. Test the GPS

	Detail Steps/Work Items	Key Items/References
(1)	Switch the GPS ON: – Set the ALT/BAT switch (Lycoming version) or ELECTRIC MASTER key switch (TAE version) ON. – Set the AVIONIC MASTER switch ON. – Set the ON-OFF knob on the GPS receiver to ON.	The GPS display must light.
(2)	Observe the self-test of the GPS receiver.	Bendix/King KLN 89B and KLN 94: – The displayed altitude must be correct. – The display must show "Pass". Bendix/King KMD 150: – There must be no warning. Garmin GNS 430/530: – The displayed database information must be correct. – The display must show "OK?".
(3)	Do a test of each control function.	Refer to this Section and to the GPS manufacturer's manual.
(4)	Switch the GPS OFF: – Set the ON-OFF knob on the GPS receiver to OFF. – Set the AVIONIC MASTER switch OFF. – Set the ALT/BAT switch (Lycoming version) or ELECTRIC MASTER key switch (TAE version) OFF.	

Section 34-59
Dependent Positioning Determining with the Garmin G1000 System Installed

1. General

The DA 40 D with the Garmin G1000 system installed has an Integrated Cockpit System (ICS). The ICS has all the usual dependent position determining systems. Refer to Section 31-42 for more data about the dependent positioning determining systems that are integral with the ICS.

This Section tells you how to replace the antennas for the dependent position determining systems.

2. Description

The DA 40 D has these dependent position determining systems and antennas:

– Transponder.

– DME.

– GPS (x2).

– ADF.

– Marker.

– VOR.

Flexible co-axial cables connect the antennas to their related equipment. You can replace the co-axial cables. The VOR antenna is integral with the horizontal stabilizer and you can not replace the VOR antenna. The other antennas are all attached to the surface of the airplane and can be replaced.

Refer to Section 31-42 for more data about the dependent position determining systems and their related displays.

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Trouble-Shooting

1. General

The table below lists the defects you could have with the dependent positioning determining system antennas. Refer to Section 31-40 for Trouble-Shooting data for the dependent positioning determining systems.

If you have the trouble listed in the Trouble column read across to the Possible Cause column. Then do the repair given in the Repair column.

Trouble	Possible Cause	Repair
ATC reports no transponder reply. Transponder reply symbol operates.	Low output power.	Examine and repair/replace defective antenna connections. Replace antenna.
ATC reports no transponder reply. Transponder reply symbol not operating.	Poor received signal.	Examine and repair/replace defective antenna connections. Replace antenna.
DME/GPS/ADF/MARKER systems give poor performance.	Poor received signal.	Examine and repair/replace related defective antenna connections. Replace related antenna.

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Maintenance Practices

1. General

The Maintenance Procedures in this Section tell you how to replace the antennas of the dependent position determining systems. Refer to Section 31-42 for more data about the dependent position determining systems. Refer to Paragraph 3 for more information on the used types of co-axial cables. Further particulars on the antenna sealant are given in Paragraph 4.

2. Replace a Dependent Position Determining System Antenna

A. Replace the Transponder or DME Antenna

	Detail Steps/Work Items	Key Items/References
(1)	Make sure that the ELECTRIC MASTER key switch is set to OFF.	Instrument panel, center.
(2)	Open the XPDR/DME circuit-breaker.	Instrument panel, right side.
(3)	Remove the pilot's seat if you will replace the transponder antenna. Remove only the co-pilot's seat if you will replace the DME antenna.	Refer to Section 25-10.
(4)	Disconnect the co-axial cable from the antenna that you will replace.	At the antenna.
(5)	Remove the antenna: – Remove the 2 nuts and washers that attach the antenna to the structure. – If necessary, use a knife to carefully remove the sealant that seals the antenna to the airplane outer surface. – Move the antenna clear of the airplane.	 Hold the antenna. Take care not to damage the airplane surface!

	Detail Steps/Work Items	Key Items/References
(6)	Install the antenna: – Make sure that the contact surfaces of the antenna and the airplane surface where the antenna will be installed are clean and free of grease. – Move the antenna into position under the fuselage. – Seal the outer edge of the antenna where it contacts the airplane surface with sealant. – Install the 2 washers and nuts that attach the antenna to the airplane structure. – Remove the excess sealant that has been forced out of the joint between the antenna and the airplane surface.	Use sealant. Refer to Paragraph 4.
(7)	Connect the co-axial cable to the antenna.	At the antenna.
(8)	Install the seat(s) that you removed at step 3.	Refer to Section 25-10.
(9)	Reset the XPDR/DME circuit-breaker.	Instrument panel, right side.
(10)	Do a test of the transponder.	Only if you replaced the transponder antenna.
(11)	Do an operational test of the DME on the next flight.	Only if you replaced the DME antenna.

B. Replace a GPS Antenna

	Detail Steps/Work Items	Key Items/References
(1)	Make sure that the ELECTRIC MASTER key switch is set to OFF.	Instrument panel, center.
(2)	Open the GPS/NAV1 and/or GPS/NAV2 circuit-breaker.	Instrument panel, right side.
(3)	Remove the reading/map light(s) as necessary to gain access to the antenna that you will replace.	Refer to Section 33-10.
(4)	Disconnect the co-axial cable from the antenna that you will replace.	At the antenna.
(5)	Remove the antenna: – Remove the 4 nuts and washers that attach the antenna to the airplane. – Remove the ground-plate. – If necessary, use a knife to carefully remove the sealant that seals the antenna to the airplane outer surface. – Move the antenna clear of the airplane.	 Hold the antenna. Take care not to damage the airplane surface! From the outside.
(6)	Install the antenna: – Make sure that the contact surfaces of the antenna and the airplane surface where the antenna will be installed are clean and free of grease. – Move the antenna into position on the top of the fuselage. – Seal the outer edge of the antenna where it contacts the airplane surface with sealant. – Install the ground-plate. – Install the 4 washers and nuts that attach the antenna to the airplane.	 Use sealant. Refer to Paragraph 4.

	Detail Steps/Work Items	Key Items/References
(7)	Connect the co-axial cable to the antenna.	At the antenna.
(8)	Install the reading/map light(s) that you removed at step 3.	
(9)	Set the GPS/NAV1 and/or GPS/NAV2 circuit-breaker.	Instrument panel, right side.
(10)	Do a test of the GPS system(s).	Refer to Section 31-40.

C. Replace a Marker or ADF Antenna

	Detail Steps/Work Items	Key Items/References
(1)	Make sure that the ELECTRIC MASTER key switch is set to OFF.	Instrument panel, center.
(2)	Remove the rear passengers' seats.	Refer to Section 25-10.
(3)	Disconnect the co-axial cable from the antenna that you will replace.	At the antenna.
(4)	Remove the antenna: – Remove the 2 or 3 nuts and washers that attach the antenna to the airplane. – Remove the ground-plate. – If necessary, use a knife to carefully remove the sealant that seals the antenna to the airplane outer surface. – Move the antenna clear of the airplane.	 Hold the antenna. Take care not to damage the airplane surface! From the outside.
(5)	Install the antenna: – Make sure that the contact surfaces of the antenna and the airplane surface where the antenna will be installed are clean and free of grease. – Move the antenna into position on the bottom of the fuselage. – Seal the outer edge of the antenna where it contacts the airplane surface with sealant. – Install the ground-plate. – Install the 2 or 3 washers and nuts that attach the antenna to the airplane.	 Use sealant. Refer to Paragraph 4.
(6)	Connect the co-axial cable to the antenna.	At the antenna.
(7)	Install the rear passengers' seats.	Refer to Section 25-10.
(8)	Do a post-installation operational test of the ADF system.	Only if you replaced the ADF antenna. Refer to Paragraph 5.

	Detail Steps/Work Items	Key Items/References
(9)	Do an operational test of the Marker system on the next flight.	Only if you replaced the marker antenna.

3. Used Types of Flexible Co-Axial Cables

	Antenna/Receiver	Co-Axial Cable
(1)	Transponder	RG 142
(2)	DME	RG 142
(3)	GPS	RG 400
(4)	ADF	RG 142
(5)	Marker	RG 400

4. Sealant Specification

Use an adhesive bonding compound on the basis of polyurethane or acrylic to seal the antennas to the airplane outer surface. Make sure the sealant is free of silicone and it is temperature resistant from -40 °C (-40 °F) to + 60 °C (+140 °F).

5. Post-Installation Check of the ADF System

A. General

After installing the equipment, check the indicator reading is correct and determine whether or not quadrantal error correction is necessary. If so, correction should be first carried out on the ground, then in the air. It is also necessary to establish whether any equipment in the airplane electrical system is generating interference.

B. Operational Check

	Detail Steps/Work Items	Key Items/References
(1)	Locate the airplane on the correction platform and using the bearing compass point the nose of the airplane to a radio beacon in boundary range.	
(2)	Switch on the ADF, adjust to the correct frequency and observe the indication in the ADF operating mode.	The indicator should read 0 relative bearing.
(3)	Turn the airplane about its vertical axis to a larger heading.	The indicator should move to the left.
(4)	Turn the airplane about its vertical axis to a smaller heading.	The indicator should move to the right.

Note: If the reading is incorrect or should the indicator move in the wrong direction, check the wiring of the equipment for agreement with the wiring diagram and correct if necessary.

Note: If the airplane is accurately aligned with the NBD beacon, but a relative bearing reading of 0° is not indicated, this is an indication that the antenna has been wrongly installed. Recheck the antenna for agreement with the centerline of the airplane and correct if necessary.

Refer to the manufacturer's manual for detailed information on the quadrantal error correction.

Note: It is recommended to proceed in accordance with FAA AC 43-13-1A and FAA AC 43.13-2A requirements.

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CHAPTER 37

VACUUM SYSTEM

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CHAPTER 37
VACUUM SYSTEM

1. General

The DA 40 with the TAE 125 Diesel engine has a vacuum system. The system uses the vacuum pump that is part of the TAE 125 Diesel engine. You cannot replace the vacuum pump. If you have trouble with the pump, refer to the engine manufacturer.

The directional gyro which is part of the optional Garmin G1000 installation is powered electrically.

2. Description

Figure 1 shows the vacuum system schematic diagram. Figure 2 shows the installation and locations. A vacuum pump that is integral with the engine powers the system. A flexible hose connects the pump to a vacuum regulating valve located on the aft face of the firewall. A small orifice in the pipe restricts the airflow to the correct level for the system.

The inlet pipe of the valve goes through the firewall. Nuts on the inlet pipe attach the valve to the firewall. The regulator valve has an adjuster at the bottom. You can adjust the valve to give the correct suction, usually between 4.8 and 5.4 inHg.

A flexible hose goes from the regulator valve to a directional gyro located on the left of the instrument panel. A flexible hose goes from the directional gyro to an inlet filter located on the instrument panel floor. A small flexible hose goes from the directional gyro to a suction gauge located at the top of the instrument panel.

3. Operation

The vacuum pump reduces the air pressure in the system. Air flows into the air filter. It flows to the directional gyro. In the directional gyro it passes through a nozzle and operates a small turbine. The outlet from the turbine flows to the vacuum pump.

The suction gauge connects to the main flow in the directional gyro. The gauge shows the vacuum (suction) at the inlet to the gyro.

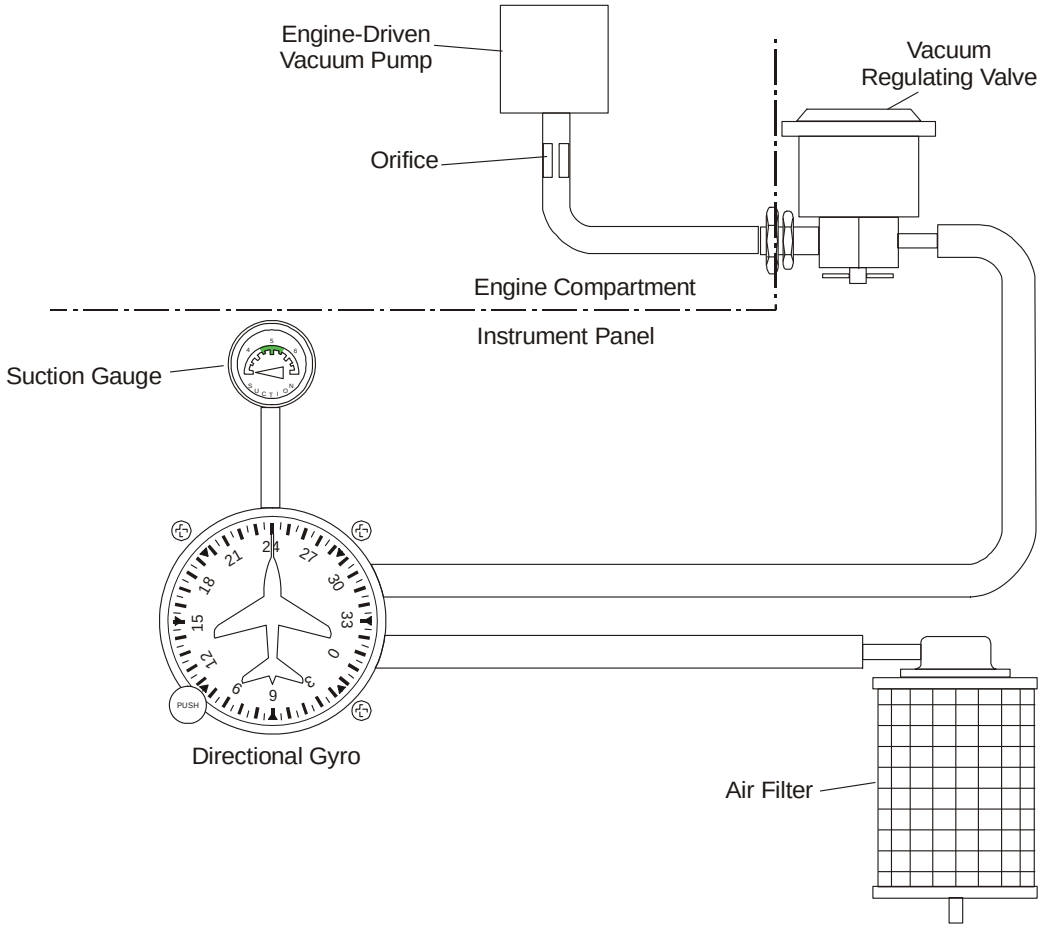


Figure 1: Vacuum System Schematic Diagram

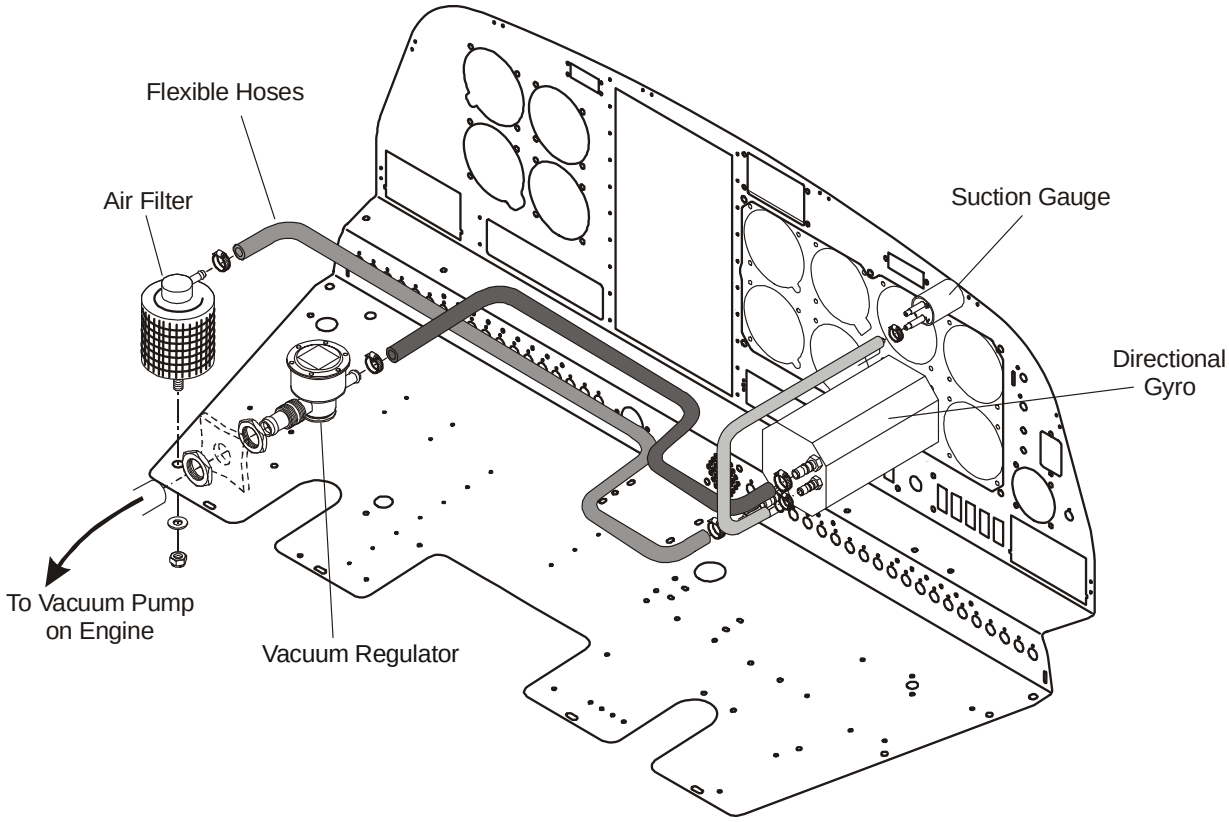


Figure 2: Vacuum System Installation

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Trouble-Shooting

1. General

The table below lists the defects you could have with the vacuum system. If you have the trouble detailed in the Trouble column read across to the Possible Cause column. Then do the repair given in the Repair column.

Trouble	Possible Cause	Repair
Vacuum gauge shows no vacuum. Vacuum operated instruments do not operate	Vacuum pump defective.	Refer to the engine manufacturer.
	Vacuum regulator defective.	Replace the vacuum regulator.
	Vacuum system leaking.	Do a test for leakage. Repair the leak.
Vacuum gauge shows no vacuum. Vacuum operated instruments operate correctly.	Vacuum gauge defective.	Replace the vacuum gauge.
Vacuum gauge shows a low value.	Vacuum regulator out of adjustment.	Adjust the vacuum regulator.
	Vacuum system leaking.	Do a test for leakage. Repair the leak.
Vacuum gauge shows a high value.	Vacuum regulator out of adjustment.	Adjust the vacuum regulator.
	Vacuum inlet filter blocked.	Replace the vacuum inlet filter.
	Vacuum regulator filter blocked.	Replace the vacuum regulator filter.

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Maintenance Practices

1. General

The Maintenance Practices for the vacuum system tell you how to remove/install the components of the vacuum system. They also tell you how to adjust the vacuum regulator.

2. Remove/Install the Vacuum Regulator

A. Remove the Vacuum Regulator

	Detail Steps/Work Items	Key Items/References
(1)	Remove the engine cowlings.	Refer to Section 71-11.
(2)	Disconnect the airplane main battery.	Refer to Section 24-34.
(3)	Clean the area around the regulator outlet.	
(4)	Release the pipe to the vacuum regulator.	At the firewall. Put a cap on the regulator outlet.
(5)	Remove the instrument panel cover.	Refer to Section 25-10.
(6)	Release the flexible hose from the vacuum regulator.	Refer to Figure 2. Put a cap on the regulator inlet. Put caps on the hose ends.
(7)	Remove the nut that attaches the regulator to the firewall.	In the engine compartment.
(8)	Remove the regulator from the airplane.	

B. Install the Vacuum Regulator

	Detail Steps/Work Items	Key Items/References
(1)	Put the regulator in position on the firewall.	On the aft face of the firewall.
(2)	Install the nut that attaches the regulator to the firewall.	In the engine compartment.
(3)	Connect the pipe from the pump to the regulator.	
(4)	Connect the flexible hose from the directional gyro to the vacuum regulator.	On the aft face of the firewall.
(5)	Connect the airplane main battery.	Refer to Section 24-34.
(6)	Install the engine cowlings.	Refer to Section 71-11.
(7)	Do an engine idle run. Check suction gauge.	The gauge should indicate 4.7 ± 0.1 inHg. If necessary, adjust the system.
(8)	Install the instrument panel cover.	Refer to Section 25-10.

3. Replace the Vacuum System Air Filter

	Detail Steps/Work Items	Key Items/References
(1)	Remove the instrument panel cover.	Refer to Section 25-10.
(2)	Release the flexible hose from the filter.	Refer to Figure 2.
(3)	Remove the nut and washer that attach the filter to the instrument panel floor.	
(4)	Remove the filter.	
(5)	Put the new filter in position on the instrument panel floor.	
(6)	Install the washer and nut that attach the filter.	
(7)	Connect the flexible hose to the filter.	
(8)	Do an engine idle run. Check suction gauge.	The gauge should indicate 4.7 ± 0.1 inHg. If necessary, adjust the system.
(9)	Install the instrument panel cover.	Refer to Section 25-10.

4. Adjust the Vacuum Regulator

WARNING: DO NOT USE METAL TOOLS THAT CAN TOUCH THE ELECTRICAL CONNECTIONS ON THE INSTRUMENT PANEL FLOOR.

	Detail Steps/Work Items	Key Items/References
(1)	Remove the instrument panel cover.	Refer to Section 25-10.
(2)	Do an engine run-up.	Refer to Section 71-01.
(3)	Make a note of the vacuum value.	
(4)	If necessary, adjust the vacuum regulator: – Bend the lock-tabs away from the T-bar. – Turn the T-bar to adjust the vacuum. – Bend the lock-tabs to lock the T-bar.	The vacuum must be 4.8 - 5.4 inHg at 1800 RPM. On the bottom of the regulator. Monitor the vacuum value.
(5)	Shut down the engine.	
(6)	Install the instrument panel cover.	Refer to Section 25-10.

5. Remove/Install the Suction Gauge

A. Remove the Suction Gauge

	Detail Steps/Work Items	Key Items/References
(1)	Remove the instrument panel cover.	Refer to Section 25-10.
(2)	Release the flexible hose to the vacuum gauge.	Refer to Figure 2. Put a cap on the hose end.
(3)	Remove the bezel nut that attaches the gauge to the instrument panel.	
(4)	Remove the gauge from the instrument panel.	

B. Install the Suction Gauge

	Detail Steps/Work Items	Key Items/References
(1)	Put the vacuum gauge in position in the instrument panel.	Refer to Figure 2.
(2)	Install the bezel nut that attaches the gauge.	
(3)	Connect the flexible hose to the vacuum gauge.	
(4)	Install the instrument panel cover.	Refer to Section 25-10.
(5)	Do an engine run-up.	Refer to Section 71-01. Do a test for correct operation of the vacuum system. If necessary, adjust the system.

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CHAPTER 51

STANDARD PRACTICES AND STRUCTURES

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CHAPTER 51
STANDARD PRACTICES AND STRUCTURE

1. General

The DA 40 is a single-engine, low-wing monoplane of composite construction. It has a 'T' tail and a fixed tricycle landing gear with a nose wheel that can caster.

The DA 40 fuselage has a semi-monocoque structure. Two glass fiber reinforced plastic (GFRP) half-shells make the fuselage skin. The fuselage shells have many layers of glass cloth. Rigid foam inserts give stiffness to the fuselage shells where necessary. All of the main structural components are GFRP rigid moldings. Many layers of glass cloth bond together to make each molding. Some components have layers of carbon fiber cloth to give more strength and stiffness.

The DA 40 has a cantilever wing. The wing has top and bottom shells. It has front and rear spars and a root rib made in three parts. Each shell has a carbon fiber reinforced plastic (CFRP) outer skin, a rigid foam core and a GFRP inner skin.

The vertical stabilizer is part of the fuselage. The aft part of the left and right fuselage shells make the left and right shells of the vertical stabilizer.

Each wing has two I-section spars. The front spar on one side is the same as the rear spar on the opposite side. Many layers of uni-directional carbon fiber make the spar caps. The number of layers in the spar caps decreases from root to tip. Each spar has a shear web. The shear web has GFRP skins and a rigid foam core. Glass cloth fillets attach the spar caps to the shear web.

A rear web closes the trailing edge of the wing. An end rib closes the outboard end of the wing. A removable GFRP tip attaches to the wing shells and outer rib with screws.

The flaps and ailerons have top and bottom shells. Each shell has mixture of CFRP and GFRP cloth. The shells have rigid foam cores and bond together.

The horizontal stabilizer has top and bottom shells. Each shell has GFRP skins. The horizontal stabilizer has a front spar and a rear spar. Three pairs of ribs give strength to the center area. The elevator has top and bottom shells. Each shell has GFRP skins with a rigid foam core.

The rudder has left and right shells. Each shell has GFRP skins with a rigid foam core. The shells bond together at a flange.

The canopy is a CFRP molding with inner and outer frames which bond together. The canopy has a large one-piece acrylic glass window. The passenger door is a CFRP molding with inner and outer frames. The frames bond together. The door has an acrylic glass window.

A polyurethane paint finish protects the outside skin of the airplane from ultraviolet rays and humidity.

2. Types of Structure

The DA 40 is constructed from two main types of composite structure.

A. Glass Fiber Reinforced Plastic (GFRP)

GFRP is very thin glass fibers bonded together by resin. The glass fibers give most of the strength and the resin maintains the shape. The resin also bonds to other structural components such as metal attachment brackets or metal bushings.

The glass fibers are woven to make glass cloth. The orientation and weave of the glass in the cloth affects the structural strength of the cloth. A component can have many layers of cloth bonded together with resin. This is called lamination.

GFRP has very good properties. It is strong and flexible. It is very resistant to chemical attack and very little maintenance is necessary.

B. Carbon Fiber Reinforced Plastic (CFRP)

CFRP is very thin carbon fibers bonded together by resin. The carbon gives most of the strength and the resin maintains the shape. The resin also bonds to other structural components such as metal attachment brackets or metal bushings.

CFRP is very similar to GFRP. The main advantage of CFRP is that it is stronger and more rigid than GFRP.

3. Laminated Components

A laminated component has two or more layers of glass/carbon cloth. The direction of the fibers in the cloth give the properties for each layer. Extra layers are bonded to areas to give more strength.

4. Sandwich Structure

Many of the components in the DA 40 have a sandwich of two skins and a core. GFRP or CFRP make the skins and rigid plastic foam makes the core.

The skins must bond to the core of a sandwich structure completely. If the skins do not bond to the core the component can fail.

5. Bonded Components

A number of components can bond together to make a larger component. Special thick resin bonds these components together and fills the gap in a joint.

6. Repair Limitations

Repairs which are categorized as 'Class 1' in accordance with Section 51-10, Paragraph 2, may only be carried out in accordance with a repair scheme which has been approved by the manufacturer. Such repairs are not described in this Airplane Maintenance Manual.

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Section 51-10
Investigation

1. General

This Section tells you how to assess the class of the damage. It also tells you how to inspect glass fiber reinforced plastic (GFRP) and carbon fiber reinforced plastic (CFRP) composite structures. Damage assessment and repairs must be carried out by approved persons.

Refer to Section 51-00 for the types of structure used in the DA 40 and for repair limitations. Refer to Section 51-20 for general repair procedures.

2. Damage Classification

Damage is divided into the classes described below. In doubtful cases (i.e., if you are not sure about the classification of a damage), you must contact the airplane manufacturer.

A. Class 1

– Major structural damage that requires the partial replacing of a structural component, or

– Damage to a large area, or

– Damage to a highly stressed component or part.

This type of damage restricts or voids airworthiness.

B. Class 2

Holes and cracks passing through both skins of a sandwich construction component. The core damage must be able to be covered by a 75 mm (3 inches) diameter circle.

This type of damage restricts or voids airworthiness.

C. Class 3

Small holes or cracks in the outer skin where there is no internal damage to the component, the sandwich material, or the inner skin.

This type of damage restricts or voids airworthiness.

D. Class 4

Minor scratches, abrasions or similar damage which is not a crack or a puncture in the skin.

This type of damage may restrict airworthiness.

3. Types of Damage

There are two basic types of hidden failure in composite structures:

– Disbonding.

– Delamination.

Disbonding is the failure of a bond between two components. For example between the fuselage skin and a fuselage frame. Or between a composite component and a metal component. Or between a composite skin and a sandwich core material.

Delamination is the failure of the bond between layers of glass/carbon cloth in a component.

There are also two main types of cracks:

– Micro cracks which occur in the surface of the resin.

– Major cracks with broken fibers. Major cracks do not occur with normal flight loads or normal landing loads. You must repair major cracks.

4. Inspection Techniques

A. Examine Visually

Use this method to find all types of damage to composites. Use a bright light to examine visually the inside of a component. GFRP must be green or brown. If the GFRP has white areas, then it may be damaged. Look specially at areas where components bond to the GFRP.

CFRP must be black or black/brown. If the CFRP has white areas, then it may be damaged. Look specially at areas where components bond to the CFRP.

Look carefully at the outer surface of a component. If the paint has cracks or bubbles, then the composite may be damaged. Refer to Paragraph 5.

Also look for dents. Look specially in areas where stones can hit the airplane below the fuselage and the wings. Look specially in the areas of the walkways.

B. Light Test

Use the light test to find delamination. Use this test on components which do not have rigid foam inside.

CAUTION: DO NOT LET THE COMPOSITE GET HOT. HEAT CAN CAUSE DAMAGE TO THE COMPOSITE.

Point a very bright light at the surface and look at the other side of the surface. Damage shows as a dark area. You can point the light from the inside of a component or from the outside of a component.

Note: You can use the light test on thick GFRP but it is difficult to use on CFRP.

C. Coin Tap Test

Use the coin tap test to find delamination and disbonding. Tap a coin on the laminate surface in the area you will test. The sound of the coin tapping on the surface of the laminate will change as you move the coin over damaged laminate.

Look specially at the area around the damage for secondary damage, which can remain undetected.

5. Further Inspection

If you find paint damage when you examine a composite structure then do this further inspection.

Find a way to see the inside of a structure or a component. If necessary, remove panels (or other components), or you can use remote viewing equipment. For example, remove the wing tip assembly to see inside the wing. If you can see damage inside the component or structure you must do a repair.

Remove the paint coat in the area that you think is damaged. Remove the paint coat carefully, you must not damage the cloth under the paint coat.

Look carefully at the surface. If you find cracks in the composite you must repair the structure.

If you do not find cracks in the composite then do this test. Push the middle of the area to be tested with your thumb. If you can feel the skin hitting the core of a sandwich (or other layer/component), then the skin is disbonded and you must repair the structure.

In some cases you must cut inspection holes in the structure to do the test correctly. If you must cut inspection holes you must seek advice from Diamond Aircraft Industries.

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Section 51-20
Repair Processes

1. General

This Section tells you how to repair composite structures. Repairs must be carried out by approved persons. Refer to Section 51-00 for data about the types of structures. Refer to Section 51-10 for data about the classification of damage and inspection techniques. Refer to Section 51-30 for data about approved repair materials.

2. Center of Gravity Limits

When you repair an airplane, you can change the weight of the airplane. If you change the weight of an airplane, you can change the center of gravity. The further the distance of a repair from the center of gravity, the greater the effect will be on the center of gravity. You must always weigh the airplane after a large repair and calculate the center of gravity. Refer to Section 08-10 for data about weighing the airplane.

3. Control Surface Balancing

When you repair a control surface it becomes heavier. Make an estimate of the new weight of the control surface after before you do a repair. If the control surface will be too heavy then do not repair it. You must install a new item.

When you repair a control surface and/or apply a new paint coat you must weigh and balance the control surface. Refer to Section 06-00 for data about weights and balance. Section 51-60 tells you how to balance a control surface.

WARNING: YOU MUST WEIGH AND BALANCE A CONTROL SURFACE AFTER REPAIR OR PAINTING. FAILURE TO BALANCE A CONTROL SURFACE MAY CAUSE THE AIRPLANE TO FAIL IN FLIGHT.

4. Drain/Vent Holes

You must keep all drain and vent holes in the structure of the DA 40 open. If you close a drain or vent hole doing a repair you must make a new hole in the same position.

5. Fixing the Component

You must fix a component in the correct position when you do a repair. If you do not fix a component correctly it may move when you do the repair and cause further damage. It can also change the airplane alignment.

Hold the component in a special device (jig/fixture) before you cut the repair area. If necessary, lift the airplane on jacks and level the airplane. Refer to Section 07-10 for data about jacking and Section 08-20 for data about levelling the airplane.

6. Safety Precautions

Most resins can cause skin disease. When you use resin/hardener use a protective barrier cream on your hands and exposed skin. You must always wear plastic gloves.

WARNING: DO NOT GET RESIN ON YOUR SKIN. RESIN CAN CAUSE SKIN DISEASE.

The resins, hardeners and solvents used for composite repairs are poisonous. You must not take food into the work area. Use a mask to protect your face and use eye-protection.

WARNING: DO NOT GET RESINS, HARDENERS OR SOLVENTS IN YOUR MOUTH OR IN YOUR EYES. THESE CHEMICALS CAN CAUSE DISEASE.

When you grind composites you make small particles of composite dust. These particles can irritate the skin and eyes. If you breathe these composite particles, they can cause lung disease.

When you grind composite you must always use a protective cream on your hands and on all exposed skin. Wear overalls which seal at the wrists, neck and ankles. You must always wear gloves and if necessary, change them often. Use a suitable mask to protect you face and lungs. Always wear safety goggles to protect your eyes.

If your skin comes into contact with composite dust, then wash it off with flowing water. Do not rub your skin while it has dust on it.

WARNING: DO NOT GET COMPOSITE DUST PARTICLES IN YOUR EYES, OR IN YOUR MOUTH, OR ON YOUR SKIN. THESE PARTICLES CAN CAUSE DISEASE.

7. Workshop Conditions

Keep the workshop clean and free from dust. Remove grinding dust as it occurs. The working area must not be affected by draughts.

The temperature of the workshop should be maintained between 18 °C (65 °F) and 27 °C (77 °F) and must not fall below 15 °C (59 °F). The relative humidity during mixing, applying or curing or resins must not be allowed to rise above 80 %.

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Maintenance Practices

1. General

These Maintenance Practices tell you about composite repair processes and how to repair Class 2, 3 and 4 damage to the composite structure. Refer to Section 51-10 for data about damage classification. Class 1 damage may only be repaired in accordance with a repair scheme approved by the manufacturer. All repairs must be carried out by approved persons.

You must only use the materials approved by the manufacturer when repairing the airplane. Refer to Section 51-30 for data about approved materials.

Inspect the damaged area. Look specially at the adjacent structure. Damage can go a long way under the surface. Use the techniques given in Section 51-10.

You must take care to do the repair correctly. The outer shell of a composite structure is stressed. Failure of the structure can cause an accident.

2. Resin

You must use the correct quantity of mixed resin for the repair. Weigh all the cut cloth patches that you will use for the repair. The ratio for glass cloth to mixed resin is 100 : 70. For example, 100 grams of dry glass cloth require 70 grams of mixed resin. The ratio for carbon cloth to mixed resin is 100 : 100. For example, 100 grams of dry carbon cloth require 85 grams of mixed resin.

Measure the quantities of resin and hardener accurately (± 2 % by weight). Mix the resin and hardener thoroughly before laminating, or adding fillers or other additives.

Always use clean containers for mixing resin and only mix as much resin as you can use within its “working life”.

When using a large quantity of resin put it into a shallow container. This will increase the ratio of surface area to volume which will reduce the risk of an exothermic reaction.

For parts made from self extinguishing resin use the same resin system for repair (refer to Section 51-30).

3. Glass and Carbon Cloth

You must always use the correct cloth for the repair. Refer to the lay-up drawing of the repair area for data about the type of cloths you must use. The lay-up drawing will tell you:

– The correct type of cloth.

– The fiber direction.

– The dimensions of the layer.

If uncertain about the actual lay-up, perform a burn test on a removed piece of laminate.

Make sure that the fibers in each layer of cloth point in the direction given in the lay-up drawing. This gives the correct strength to the laminate. Only use sharp shears or scissors to cut the cloth to size. Make sure that the fibers in the cut cloth point in the correct relative direction. Make sure that the fiber strands are not broken or damaged. The cloth must be free of any damage or contamination.

4. Core Material

You must always use the correct sandwich core for the repair. Refer to the lay-up drawing of the repair area for data about the type of core you must use.

Make sure that the core material is not damaged or contaminated.

Use a sharp knife to cut the core to the exact size for the repair. The edges of the cut must be clean so that the core will bond correctly. You can profile the core by cutting or sanding.

5. Laminating

A prescribed stack of resin impregnated cloth makes a laminate. A laminate which is used to repair an airplane becomes an integral part of the airplane structure once the laminate is hardened and fully cured.

You can make the laminate in place directly on the repair or you can make the laminate on a work table and then apply the wet laminate to the repair. When you make the laminate on a table:

– It is easier to do.

– It is easier to control and correct the laminating process.

– You can make sure that the cloth layers in the stack are correct before you apply the resin.

– You can make the repair neater.

– You do not have to work upside down.

A. Laminating in Place

	Detail Steps/Work Items	Key Items/References
(1)	Prepare the damaged area for laminating. Make sure that the repair is clean and free contamination.	Refer to the relevant repair procedure in this Section.
(2)	Prepare the layers of cloth that you will use.	Refer to the lay-up drawing.
(3)	Protect the area of the structure around the repair from contamination by the repair materials.	Use plastic/polythene sheet material held in place by self adhesive tape.
	WARNING: DO NOT GET RESIN ON YOUR SKIN. RESIN CAN CAUSE SKIN DISEASE. **WARNING: DO NOT GET RESINS, HARDENERS OR SOLVENTS IN YOUR MOUTH OR IN YOUR EYES. THESE CHEMICALS CAN CAUSE DISEASE.**	
(4)	Apply a thin coat of resin to the repair.	
(5)	Apply the first layer of cloth to the repair and trim to the correct size.	Make sure that the fibers in the cloth point in the correct direction.
(6)	Use a roller, squeegee and a stipple brush to remove all trapped air. Make sure that the cloth is completely impregnated with resin. If necessary, add more resin.	
(7)	When the excess resin has been brought to the surface with the rolling and stippling process, apply the next layer of cloth. Trim the cloth to the correct size.	Make sure that the fibers in the cloth point in the correct direction.
(8)	Do steps 6 and 7 as necessary until all the layers of cloth are in place.	
(9)	Use the roller and squeegee to remove the excess resin.	
(10)	Put a layer of peel ply over the laminate.	
(11)	If necessary, apply a vacuum bag to the laminate.	Refer to the lay-up drawing and/or repair drawing.

B. Laminating on a Table

	Detail Steps/Work Items	Key Items/References
(1)	Prepare the damaged area for laminating. Make sure that the repair is clean and free from contamination.	Refer to the relevant repair procedure in this Section.
(2)	Protect the area of the structure around the repair from contamination by the repair materials.	Use plastic/polythene sheet material held in place by self adhesive tape.
(3)	Put a layer of clean transparent plastic/polythene sheet over the repair and hold it in place with self adhesive tape.	
(4)	Use an indelible felt marker to: – Trace onto the plastic sheet the extreme outline of the repair. – Trace onto the plastic sheet the contour lines of each layer of cloth in the structure.	The outer layer of the structure must be tapered to avoid stress risers and to give a good finish.
(5)	Remove the transparent sheet from the structure and place it upside down on a work table.	
	Note: The cloth layers are laid in reverse order when you laminate on a table. You must take care to put the cut cloth layers in the correct order and that the fibers in each cloth layer point in the correct direction.	
(6)	Cut the layers of cloth to fit the contour lines that you traced onto the transparent sheet.	
	WARNING: DO NOT GET RESIN ON YOUR SKIN. RESIN CAN CAUSE SKIN DISEASE. **WARNING: DO NOT GET RESINS, HARDENERS OR SOLVENTS IN YOUR MOUTH OR IN YOUR EYES. THESE CHEMICALS CAN CAUSE DISEASE.**	
(7)	Apply a thin coat of resin to the transparent sheet.	

	Detail Steps/Work Items	Key Items/References
(8)	Apply the first inner layer of cloth to the transparent sheet and trim to the correct size.	Make sure that the fibers in the cloth point in the correct direction.
(9)	Use a roller, squeegee and a stipple brush to remove all trapped air. Make sure that the cloth is completely impregnated with resin. If necessary, add more resin.	
(10)	When the excess resin has been brought to the surface with the rolling and stippling process, apply the next layer of cloth. Trim the cloth to the correct size.	Make sure that the fibers in the cloth point in the correct direction.
(11)	Do steps 9 and 10 as necessary until all the layers of cloth are in place.	
(12)	Apply a thin coat of resin to the area of the repair on the structure where you will attach the laminate patch.	
(13)	Put the laminate patch carefully into position on the structure using the transparent sheet.	Make sure that the fibers in the cloths point in the correct direction.
(14)	Carefully remove the transparent sheet from the laminate patch.	
(15)	Use a roller to make sure that the laminate patch is firmly in position and that any excess resin is removed from the repair laminate.	
(16)	Put a layer of peel ply over the laminate.	
(17)	If necessary, apply a vacuum bag to the laminate.	Refer to the lay-up drawing and/or repair drawing.

Table 1 - Bonding Paste Mixing Table

Material	Weight in Grams								
Mixed Resin	50	100	150	200	250	300	350	400	450
Cotton Flocks	6	11.5	17	23	29	34.5	40	46	52
Aerosil	1.4	2.8	4.2	5.5	6.9	8.3	9.7	11.1	12.5

6. Bonding Paste (Thickened Resin)

CAUTION: TO BOND PARTS MADE OR REPAIRED WITH SELF EXTINGUISHING RESIN, YOU MUST USE SELF EXTINGUISHING RESIN TO MIX THE BONDING PASTE (REFER TO SECTION 51-30).

Use bonding paste to bond GFRP/CFRP components together and in the repair of sandwich cores. Resin and thickening fillers make bonding paste. Table 1 gives you the proportions by weight of resin to thickening fillers. You can change the proportions of Aerosil and Microballoons relative to each other but you must keep the total weight of the Aerosil/Microballoon mix constant.

7. Curing

You must cure a composite structure to make it strong. If you do not cure a composite structure correctly it may fail. Curing is a two part process, pre-curing and post-curing. The following procedure gives a typical curing process.

	Detail Steps/Work Items	Key Items/References
(1)	Maintain the temperature of the repair at 20 to 25 °C (68 to 77 °F) for at least 24 hours to pre-cure the repair.	If you do not have an oven or a warming room you can make a temporary enclosure around the repair to trap the heat from a flame proof air heater.
	CAUTION: DO NOT ALLOW A TOO HIGH TEMPERATURE DURING THE CURE. A TOO HIGH TEMPERATURE CAN DAMAGE THE COMPOSITE STRUCTURE.	
(2)	After 24 hours raise the temperature of the repair to at least 65 °C (149 °F) for a minimum of 6 hours to complete the first stage of the post-cure.	Monitor the temperature every 15 minutes for the first hour and then hourly.
(3)	After a minimum of 6 hours raise the temperature of the repair to at least 80 °C (176 °F). Maintain this temperature for a minimum of 14 hours to complete the final post-cure.	The final stage post-cure time can be divided into sections but you must make sure that the repair has a minimum total of 14 hours at post-cure temperature.

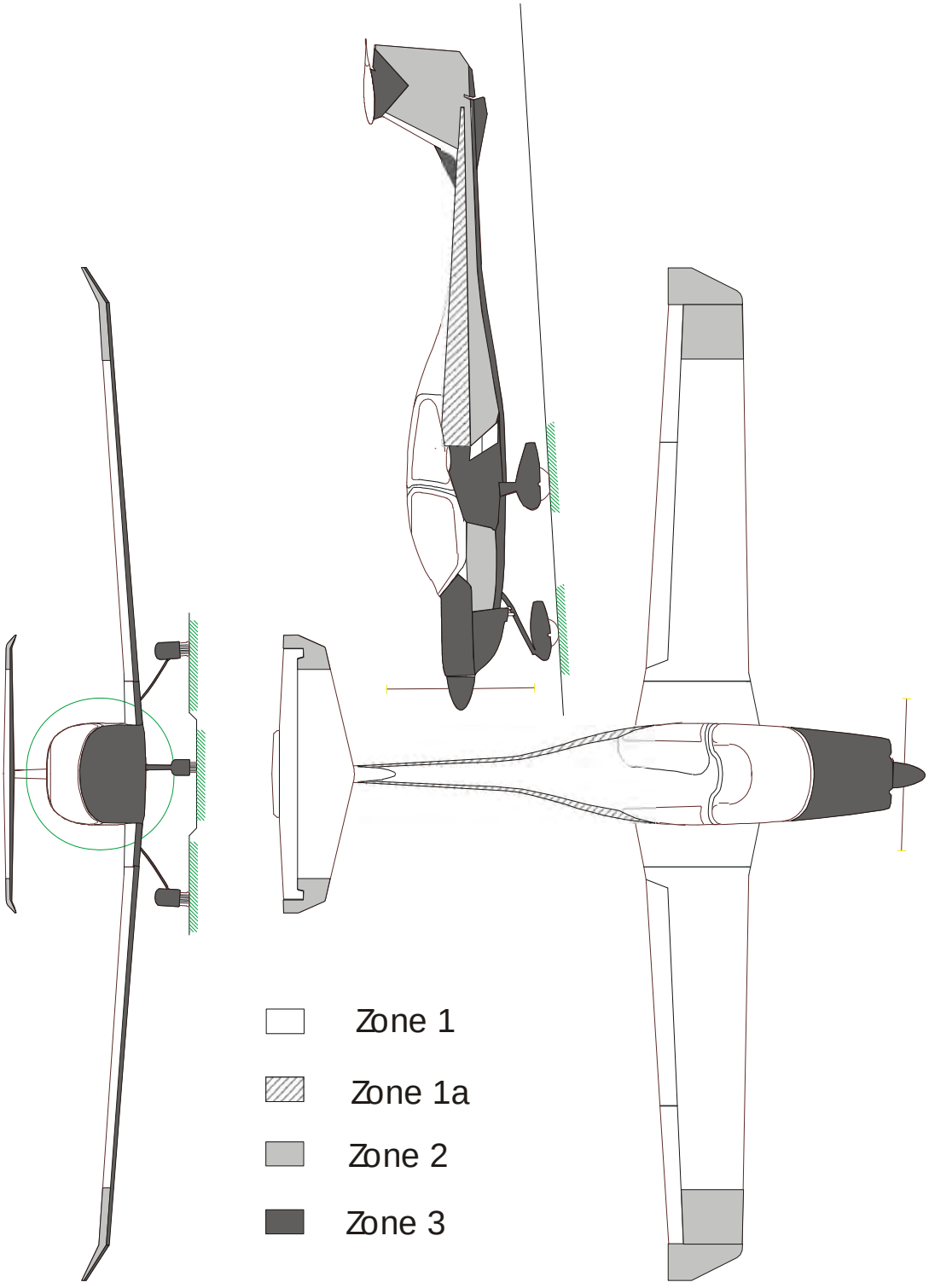


Figure 1: Paint Color Scheme

8. Exterior Paint Finish

A. Paint Color Scheme

CAUTION: YOU MUST PAINT THE AIRPLANE TO THE PAINT COLOR SCHEME. IF YOU DO NOT PAINT THE AIRPLANE TO THE PAINT COLOR SCHEME, YOU MAY CAUSE DAMAGE TO THE AIRPLANE STRUCTURE.

Since full strength of the fiber composite structure has only been shown up to a temperature of 54 °C (129 °F), the outer surface of the airplane must be painted white in accordance with Chapter 04 of this manual.

Exceptions are registration markings and warning marks, which are subject to the following restrictions (refer to Figure 1):

– Zone 1. No registration markings or warning markings may be applied here, except for the placards in accordance with Section 11-20.

– Zone 1a. This zone has the same restrictions as Zone 1, except that registration marks may be applied here which comply with the restrictions of Zone 2.

– Zone 2. Registration markings and warning markings may be applied here. They may be any shape and color, provided that the average absorption coefficient of each area measuring 200 mm by 200 mm (8" by 8") does not exceed 0.5. Examples which meet this criterion are:

  – Registration markings and warning markings of any shape, provided that colors with a solar absorptivity not exceeding 0.5 (e.g. light yellow or light green) are used.

  – Registration markings and warning markings of any color, provided that no area measuring 200 mm by 200 mm (8" by 8") is covered by more than 50%. One consequence is that the width of decoration stripes must not exceed 100 mm (4").

– Zone 3. Registration markings and warning markings of any shape and color may be applied here without restrictions.

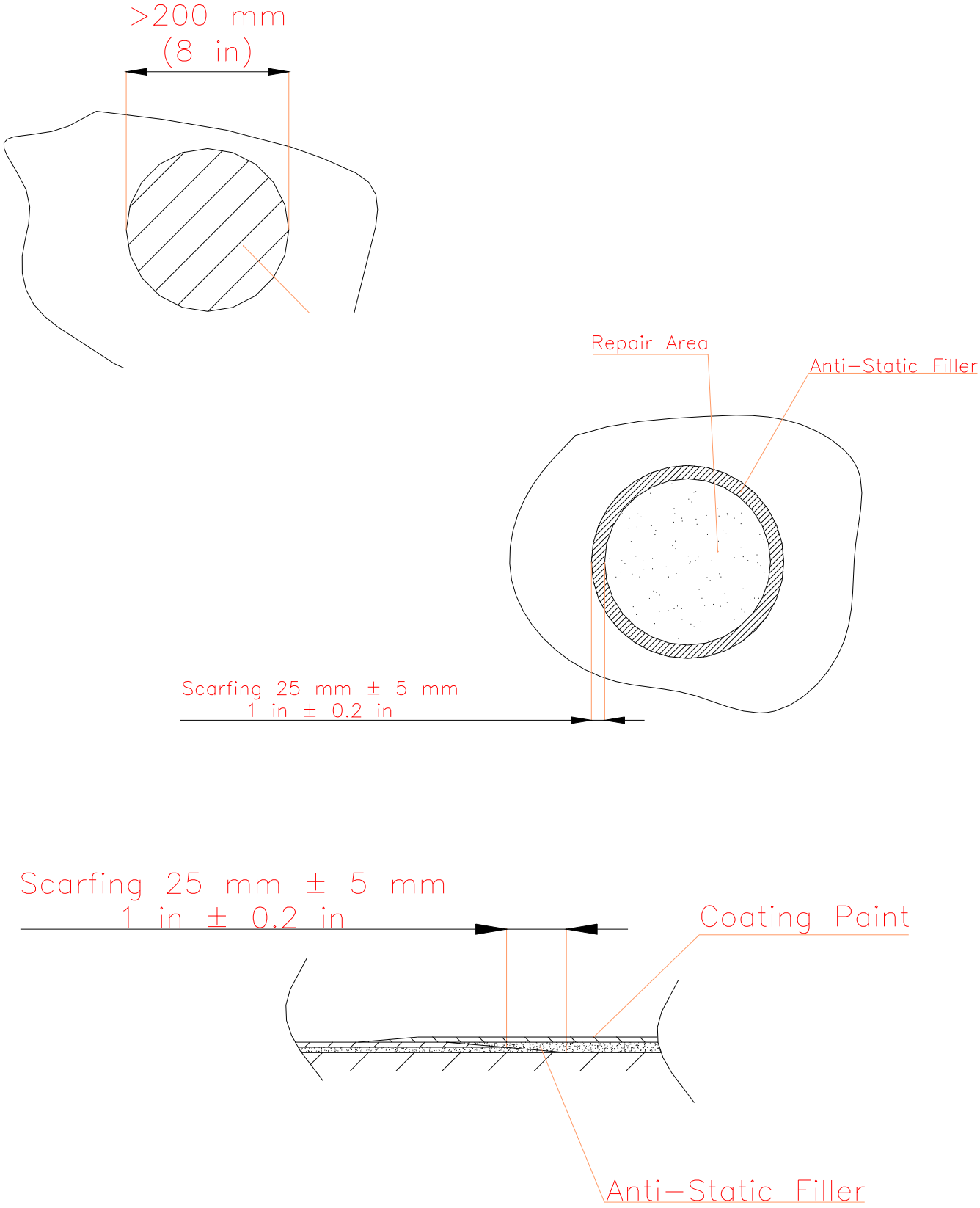


Figure 2: Scarfing the Paint Coat

B. Painting a Large Repair Area

Refer to Figure 2. This procedure must be followed when the diameter of the area which must be painted is larger than 200 mm (8 inches).

	Detail Steps/Work Items	Key Items/References
(1)	Carefully scarf the edges of the existing paint finish.	Do not sand through the existing anti-static filler. Minimum scarf length: 25 mm (1 inch). To ensure that the anti-static filler of the existing paint is electrically connected to the anti-static filler of the new paint.
	WARNING: DO NOT GET ACETONE, FILLER, OR PAINT ON YOUR SKIN. ACETONE, FILLER, AND PAINT CAN CAUSE SKIN DISEASE. **WARNING: DO NOT BREATHE ACETONE, FILLER, OR PAINT FUMES. ACETONE, FILLER, AND PAINT FUMES CAN CAUSE DISEASE.** CAUTION: THERE MUST BE NO GREASE OR DUST ON THE REPAIR AREA. GREASE AND DUST PREVENT A GOOD BOND.	
(2)	Make sure that the area to be repaired is clean and free from any contaminants.	If necessary, use acetone and re-sand the area.
(3)	Apply HS filler to the repair area.	Obey the filler manufacturer's instructions.
(4)	Allow the HS filler to cure.	2 hours at 45 °C (113 °F).
(5)	Lightly sand the HS filler with 320 grit sanding paper.	
(6)	Make sure that the area to be repaired is clean and free from any contaminants.	If necessary, use acetone and re-sand the area.
(7)	Apply two layers of anti-static spray filler to the repair area.	Obey the filler manufacturer's instructions.
(8)	Allow the anti-static filler to dry.	At 20 to 25 °C (68 to 77 °F), 60 to 75 % relative humidity.
(9)	Carefully sand the anti-static filler with 320 grit sanding paper.	Remove as little anti-static filler as possible. Do not sand through the edges.

	Detail Steps/Work Items	Key Items/References
(10)	Make sure that the area to be repaired is clean and free from any contaminants.	If necessary, use acetone and re-sand the area.
(11)	Apply the coating paint.	Obey the paint manufacturer's instructions.
(12)	Allow the coating paint to dry.	90 minutes at 45 °C (113 °F), then 2 days at 20 °C (68 °F).

C. Painting a Small Repair Area

This procedure must be followed when the diameter of the area which must be painted is 200 mm (8 inches) or less.

	Detail Steps/Work Items	Key Items/References
	WARNING: DO NOT GET ACETONE, FILLER, OR PAINT ON YOUR SKIN. ACETONE, FILLER, AND PAINT CAN CAUSE SKIN DISEASE. **WARNING: DO NOT BREATHE ACETONE, FILLER, OR PAINT FUMES. ACETONE, FILLER, AND PAINT FUMES CAN CAUSE DISEASE.** CAUTION: THERE MUST BE NO GREASE OR DUST ON THE REPAIR AREA. GREASE AND DUST PREVENT A GOOD BOND.	
(1)	Make sure that the area to be repaired is clean and free from any contaminants.	If necessary, use acetone and re-sand the area.
(2)	Apply 2 layers of HS filler to the repair area.	Obey the filler manufacturer's instructions.
(3)	Allow the HS filler to cure.	2 hours at 45 °C (113 °F).
(4)	Lightly sand the HS filler with 320 grit sanding paper.	
(5)	Make sure that the area to be repaired is clean and free from any contaminants.	If necessary, use acetone and re-sand the area.
(6)	Apply the coating paint.	Obey the paint manufacturer's instructions.
(7)	Allow the coating paint to dry.	90 minutes at 45 °C (113 °F), then 2 days at 20 °C (68 °F).

D. Coated Safety Walk Repair (if OÄM 40-317 installed)

(1) Equipment

Item	Quantity	Part Number
Safety walk substrate sprinkler.	1	DAI-9011-20-03_LV.
Plastic spattle.	1	Commercial.

(2) Material

Item	Quantity	Part Number
Safety walk cover LH.	1	D41-1120-20-01_LV.
Safety walk cover RH.	1	D41-1120-20-02_LV.
Fill-in 2 K 400 ml RAL 7038.	3	22101980.
Safety walk substrate.	0.5 kg	DAI-9011-20-03.

(3) Repair Procedure

	Detail Steps/Work Items	Key Items/References
	WARNING: WHEN HANDLING CHEMICALS ALWAYS OBSERVE HEALTH AND SAFETY REGULATIONS GIVEN BY THE MANUFACTURER OF THE CHEMICALS.	
(1)	Clean the entire area between fuselage and nacelle (LH and RH sides). Use water to remove dirt from the surface. If necessary, add a mild cleaning agent.	Refer to Section 12-30.
(2)	Use a commercial solvent to remove grease from the surface. The surface must be totally clean from grease or dirt.	
(3)	Place the safety walk covers (LH and RH sides) on the center wing and mark the position with a pencil on the middle wing surface.	Refer to Figure 3.
(4)	Make sure that the safety walk cover orientation is parallel to flight direction.	
(5)	Remove the protective layer from the safety walk cover .	
(6)	Place the safety walk cover corresponding to the marks on center wing (do not use soap water) and remove the transfer foil smoothly.	
(7)	Remove air bubbles from the edges of the cutouts with a plastic spattle.	
(8)	Prepare the surface at the cutouts of the safety walk cover: – Carefully roughen the paint with sandpaper (Grit 320), for the ends of strips use red Scotch-Brite or equivalent.	
(9)	Clean the surface at the safety walk cutouts with a vacuum cleaner and silicon remover.	

	Detail Steps/Work Items	Key Items/References
(10)	Cover the airplane's surface around the safety walk cover.	
(11)	Prepare lacquer P/N 22101980 in acc. with the technical information sheet. Shake 2 minutes before and after operating the red button. Press red button with the ball of your hand until stop is reached.	
(12)	Spray a thick film at the cutouts of the safety walk cover.	
(13)	Use safety walk substrate sprinkler to apply safety walk substrate evenly over cutouts.	
(14)	Apply a second layer of lacquer: – Make sure the whole substrate is evenly covered with a sufficient amount of paint.	
(15)	Carefully pull off the safety walk cover starting from one edge. Remove the cover in direction of the strips within 15 minutes.	
(16)	Let the system dry for 12h in a dry and weather protected area at temperatures from 20 to 30°C (68 to 86 °F).	
(17)	Remove the cover from the airplane surface.	

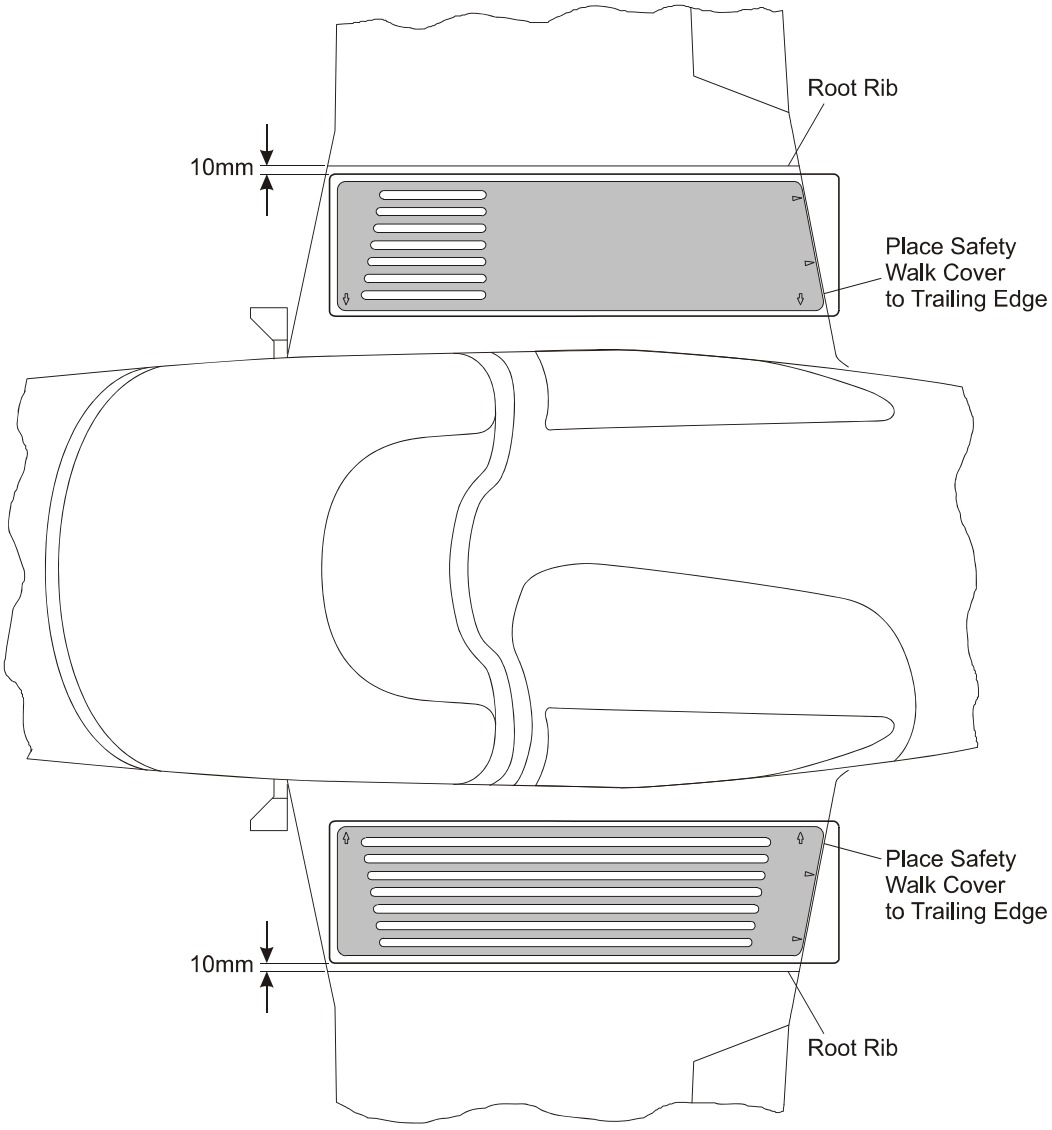


Figure 3: Safety Walk Cover Positioning

9. Repairs

A. Class 4 Repairs

The repair of minor scratches, abrasions or similar damage which is not a crack or a puncture in the skin.

	Detail Steps/Work Items	Key Items/References
	WARNING: DO NOT GET ACETONE ON YOUR SKIN. ACETONE CAN CAUSE SKIN DISEASE. **WARNING: DO NOT BREATHE ACETONE FUMES. ACETONE FUMES CAN CAUSE DISEASE.**	
(1)	Sand the repair area with 150 grit sanding paper.	
(2)	Make sure that the area to be repaired is clean and free from any contaminants.	If necessary, use acetone.
(3)	Apply putty to the repair area to fill any damage.	Obey the putty manufacturer's instructions. Fill to the original contour of the structure.
(4)	Allow the putty to cure.	5 to 20 minutes.
(5)	Lightly sand the putty with 150 grit sanding paper.	
(6)	Apply filler(s) and paint coat.	Refer to Paragraph 8.

Table 2 - Material Specifications

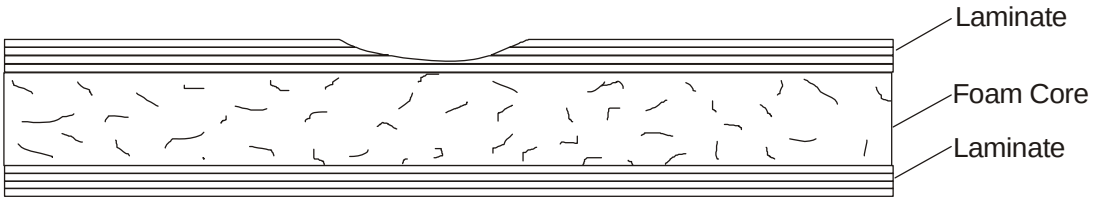
WLB No. (German Aviation Standard)	Manufacturer and Type	Material	Weave	Weight per unit area [g/m^2]	Thick-ness [mm]	Scarf [mm]
8.4548.60	Interglas 92110	glass	2/2 twill	163	0.17	7
8.4551.60	Interglas 92125	glass	2/2 twill	280	0.30	12
8.4554.60	Interglas 92140	glass	2/2 twill	390	0.43	18
8.4520.6	Interglas 92145	glass	uni-directional	220	0.23	19
8.4525.60	Interglas 92146	glass	uni-directional	425	0.43	35
8.3520.80	Interglas 98141, Cramer CCC 452	carbon	2/2 twill	200	0.30	18
	Cramer CCC 459 Al	carbon with aluminum	2/2 twill	220	0.32	20
	SGL Sigratex KDU 1034	carbon	uni-directional tape	380	0.40	80

B. Class 3 Repairs

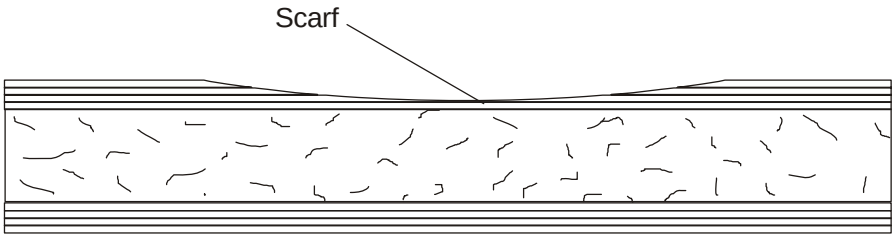
Small holes or cracks in the outer skin where there is no internal damage to the component, the sandwich material, or the inner skin.

	Detail Steps/Work Items	Key Items/References
(1)	Make sure that the area around the damage is clean.	
(2)	Carefully examine the area around the damage. Look specially for disbonding between the inner laminate layers and any core material.	Do a coin tap test to find the extent of any disbonding or delamination.
(3)	Remove damaged/loose laminate until the edges of the laminates bond together and to any core material.	Refer to Figure 4. Use a sharp knife or grinding disk.
(4)	Scarf the edges of the repair area with a grinding disk or block.	Refer to Table 2 for data about the scarf size.
(5)	Count the layers of fabric that you will need to replace.	Refer to the lay-up drawing for the related structure for data about the cloth type and orientation.
	WARNING: DO NOT GET ACETONE ON YOUR SKIN. ACETONE CAN CAUSE SKIN DISEASE. **WARNING: DO NOT BREATHE ACETONE FUMES. ACETONE FUMES CAN CAUSE DISEASE.** CAUTION: THERE MUST BE NO GREASE OR DUST ON THE REPAIR AREA. GREASE AND DUST PREVENT A GOOD BOND.	
(6)	Clean the area of the repair.	If you use acetone to remove any grease or dirt then you must re-sand the repair area.
	WARNING: DO NOT GET RESIN ON YOUR SKIN. RESIN CAN CAUSE SKIN DISEASE. **WARNING: DO NOT GET RESINS, HARDENERS OR SOLVENTS IN YOUR MOUTH OR IN YOUR EYES. THESE CHEMICALS CAN CAUSE DISEASE.**	

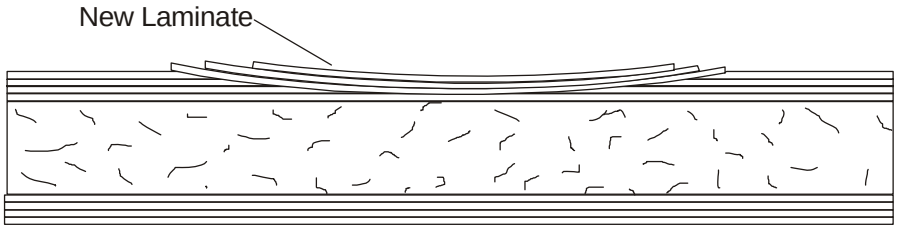
	Detail Steps/Work Items	Key Items/References
(7)	Repair the laminate.	Use one of the 2 methods given in Paragraph 5.
(8)	Pre-cure the repair.	Refer to Paragraph 7.
(9)	Post-cure the repair.	Refer to Paragraph 7.
(10)	When the repair is fully post cured, remove the peel ply and sand smooth the surface of the repair.	
(11)	Contour the repair so that the final surface level of the repair is slightly lower than the original surrounding area.	Use 150 grit sanding paper. To allow for the paint coat.
(12)	Apply filler(s) and paint coat.	Refer to Paragraph 8.



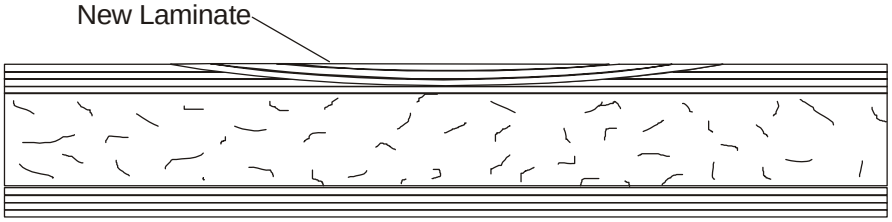
Remove Damaged /Loose Laminate



Scarf the Edges of the Repair Area

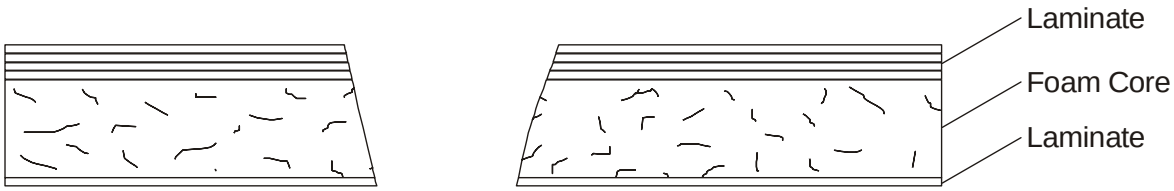


Repair the Laminate

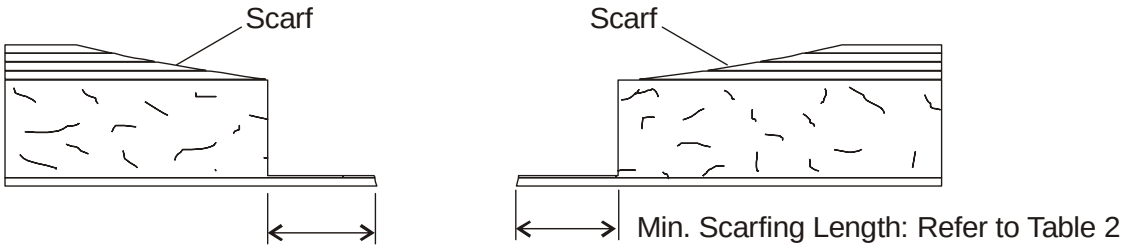


Contour the Laminate

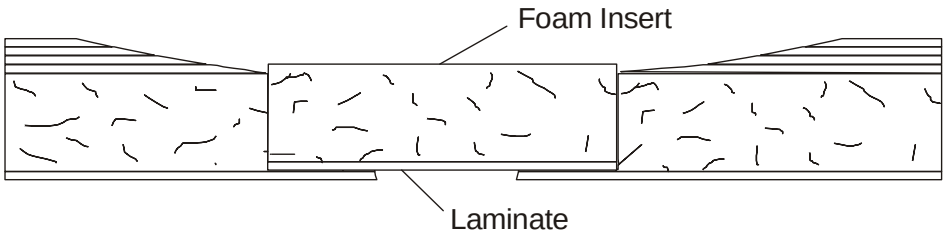
Figure 4: Typical Class 3 Repair



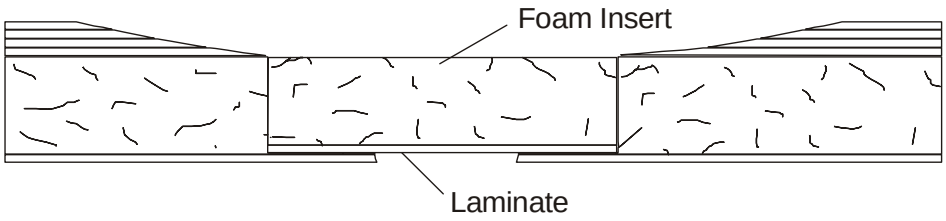
Remove Damaged/Loose Laminate



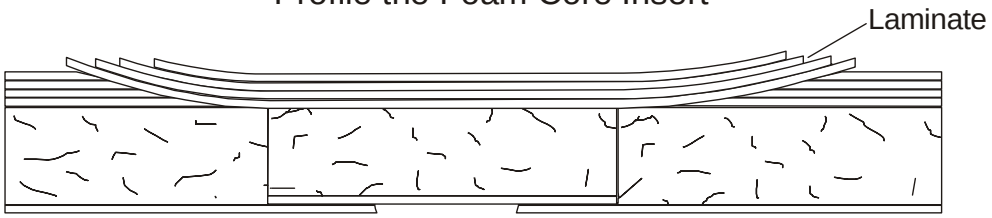
Remove Damaged Foam Core and Scarf Laminate



Insert the Laminate and Foam Core Into the Repair



Profile the Foam Core Insert



Repair the Laminate



Contour the Laminate

Figure 5: Typical Class 2 Repair

C. Class 2 Repairs

Holes and cracks passing through both skins of a sandwich construction component. The core damage must be able to be covered by a 75 mm (3 inches) diameter circle.

	Detail Steps/Work Items	Key Items/References
(1)	Make sure that the area around the damage is clean.	
(2)	Carefully examine the area around the damage. Look specially for disbonding between the inner laminate layers and the foam core.	Do a coin tap test to find the extent of any disbonding or delamination.
(3)	Remove exterior laminate which is damaged or has become disbonded from the foam core. The edge of the laminate must bond to the foam core.	Refer to Figure 5.
(4)	Remove the damaged foam core.	Remove sufficient foam core to give a minimum of a 20 mm (0.8 inches) edge around the outside of the damaged area. Refer to Figure 5.
(5)	Scarf the edges of the external laminate repair area with a grinding disk or block.	Refer to Table 2 for data about the scarf size.
	WARNING: DO NOT GET ACETONE ON YOUR SKIN. ACETONE CAN CAUSE SKIN DISEASE. **WARNING: DO NOT BREATHE ACETONE FUMES. ACETONE FUMES CAN CAUSE DISEASE.** CAUTION: THERE MUST BE NO GREASE OR DUST ON THE REPAIR AREA. GREASE AND DUST PREVENT A GOOD BOND.	
(6)	Clean the area of the repair.	Use acetone only if any grease or dirt comes to the surface of the repair.
(7)	Cut and shape a piece of foam core to replace the damaged foam core that you removed in step 4.	Use a sharp knife to cut the foam.
(8)	Prepare the layers of cloth that you will need to laminate on the inner surface of the foam core.	Refer to the lay-up drawing for the related structure for data about the cloth type and orientation.

	Detail Steps/Work Items	Key Items/References
	WARNING: DO NOT GET RESIN ON YOUR SKIN. RESIN CAN CAUSE SKIN DISEASE. **WARNING: DO NOT GET RESINS, HARDENERS OR SOLVENTS IN YOUR MOUTH OR IN YOUR EYES. THESE CHEMICALS CAN CAUSE DISEASE.**	
(9)	Prepare the foam core for inserting in the repair: – Apply a thin coat of resin to the foam core. – Apply a coat of thickened resin to the foam core. – Laminate the inner layers of cloth onto the inner surface of the foam core. Make sure that the fibers in the cloth point in the correct direction.	Refer to Paragraph 6. Use one of the 2 methods given in Paragraph 5.
(10)	Apply a thin coat of resin to the area to be repaired.	
(11)	Put the foam core and inner laminate into position in the repair.	
(12)	Pre-cure the repair.	Refer to Paragraph 7.
(13)	Use a sanding disk or block to contour the foam core to the correct shape.	Refer to Figure 5.
(14)	Clean the repair.	
(15)	Apply a coat of thickened resin to the foam core of the repair.	
(16)	Apply a thin coat of resin to the scarfed edges of the outer laminate of the repair.	
(17)	Repair the outer laminate.	Use one of the 2 methods given in Paragraph 5.
(18)	Pre-cure the repair.	Refer to Paragraph 7.
(19)	Post-cure the repair.	Refer to Paragraph 7.

	Detail Steps/Work Items	Key Items/References
(20)	When the repair is fully post cured, remove any peel ply and sand smooth the surface of the repair.	
(21)	Contour the repair so that the final surface level of the repair is slightly lower than the original surrounding area.	Use 150 grit sanding paper. To allow for the paint coat.
(22)	Apply filler(s) and paint coat.	Refer to Paragraph 8.

Section 51-30
Materials

1. General

You must only use approved materials from approved sources to repair the DA 40 airplane.

Note: If the approved material for the repair work is not available please contact Diamond Aircraft Industries for information about alternative materials.

2. Approved Materials

A. Resin System

Resin : L 285
Hardener : H 286 (alternatively H 285 or H 287)
Mixture : 100 parts resin and 40 ± 2 parts hardener (by weight)

CAUTION: THE RESIN SYSTEM L940/ H286 IS A SELF EXTINGUISHING SYSTEM AND IS APPROVED FOR COWLING PARTS ONLY.

Resin : L 940 (self extinguishing)
Hardener : H 286
Mixture : 100 parts resin and 21 ± 2 parts hardener (by weight)

Supplier : Hexion Speciality Chemicals Stuttgart GmbH
Am Ostkai 21/22
D-70327 Stuttgart, Germany
Phone : +49-711-323081
Fax : +49-711-3280041

B. Glass Fiber Cloth

WLB No. (German Aviation Standard)	Weave	Weight per Unit Area [g/m²]	Interglas Type	Porcher Type
8.4548.60	2/2 twill	163	92110	917
8.4551.60	2/2 twill	280	92125	3063
8.4554.60	2/2 twill	390	92140	1989
8.4520.6	UD	220	92145	
8.4525.60	UD	425	92146	

All cloth types consist of alkali free E-glass with I 550 or PT 55 finish and comply with LN 9169 (German Aviation Standard).

Supplier for Interglas fabric : Rudolf Usner GmbH
Am Ausferngenufer 4
A-5400 Hallein, Austria
Phone : +43-6245-81516
Fax : +43-6245-81516-40

Supplier for Porcher fabric : Porcher Industrietextilien GmbH
Holzgraben 13/15
D-52062 Aachen, Germany
Phone : +49-241-48225
Fax : +49-241-48229

C. Carbon Fiber Cloth

WLB No. (German Aviation Standard)	Weave	Mass per Unit Area [g/m²]	Interglas Type	Cramer Type	SGL Type
8.3520.80	2/2 twill	200	98141	CCC 452	
	2/2 twill with aluminum fibers	220		CCC 459 Al	
	UD tape	380			Sigratex KDU 1034

The cloth complies with LN 9169 (German Aviation Standard).

Supplier for Interglas fabric : Rudolf Usner GmbH (see above)

Supplier for Cramer fabric : CCC C. Cramer & Co
Postfach 2163
D-48616 Heek-Nienborg, Germany
Phone : +49-2568-9315-34
Fax : +49-2568-9315-93

Supplier for SGL tape : SGL Technik GmbH
Wernen von Siemens-Str. 8
D-86405 Meitingen, Germany
Phone: +49-8271-832152
Fax: +49-8271-831427

D. Peel Ply

Type : PA 20-63, compliant with LN 98690

Supplier : Strübel Vertriebs GbR
Herrlingerstr. 36/1
D-89081 Ulm, Germany
Phone : +49-731-388577-1, -2
Fax : +49-731-9387353

E. Sandwich Core Material

Sandwich core material : PVC rigid foam Divinycell H 60

Thickness : 3 mm, 6 mm, 8 mm

Supplier : Conti Tech Kautschuk- und Kunststoffvertriebsgesmbh
Industriestr. 31
A-2353 Guntramsdorf, Austria
Phone : +43-2236-49101-0
Fax : +43-2236-49101-49

F. Fillers for Resin

(1) Cotton Flakes FB1/035

Supplier : Rudolf Usner GmbH (see above)

(2) Silcell 300

Supplier : Joh. Klinglhuber & Söhne Handelsgesellschaft mbH
Wallgasse 21
A-1060 Vienna, Austria
Phone : +43-1-5974712-0
Fax : +43-1-5974712-16

(3) Aerosil 380

Supplier : Polychem HandelsgesmbH
Markt Allhau Nr. 463
A-7411 Markt Allhau, Austria
Phone : +43-3356-20444
Fax : +43-3356-20445
E-Mail : chemie@polychem.at

G. Exterior Paint

(1) Putty

(a)

Putty : Sikkens Polysoft or
Manufacturer : Akzo Nobel
Supplier : Akzo Nobel Coatings GesmbH
Baudißg. 10
A-1110 Vienna, Austria
Phone : +43-1-7674488
Fax : +43-1-7674488-33

or (b)

Putty : ICI P551-1052
Manufacturer : ICI Paints, Berkshire, Great Britain
Supplier : ICI Autocolor der PPG (Austria) Handels GmbH
Rautenweg 15
A-1220 Vienna, Austria
Phone : +43-1-2562704-53
Fax : +43-1-2562700-47

(2) HS Filler

Filler : HS Filler ICI P565-889

Manufacturer : ICI Paints, Berkshire, Great Britain

Supplier : ICI Autocolor (see above)

(3) Anstistatic Filler

Antistatic filler : Durodur spray filler 2923-011P

Manufacturer : Morton International GmbH, Strullendorf, Germany

Supplier : Lorenz Industrielacke
Wiener Str. 22
A-3002 Purkersdorf, Austria
Phone : +43-2231-633499
Fax : +43-2231-61503

(4) Coating Paint

(a) Durodur

Coating paint	: Durodur 3067-R916g; color: RAL 9016 (white) or DB 147 (white)
Manufacturer	: Morton International GmbH, Strullendorf, Germany
Supplier	: Lorenz Industrielacke (see above)

or

(b) ICI

Coating Paint	: ICI Turbo Plus P488-1111; color RAL 9016 (white) or DB 147 (white)
Manufacturer	: ICI Paints, Berkshire, Great Britain
Supplier	: ICI Autocolor Bachstr. 75 A-5020 Salzburg, Austria Phone : +43-662-643681 Fax : +43-662-643686

H. Interior Paint

(1) Putty

(a) Putty	: Sikkens Polysoft
Manufacturer	: Akzo Nobel
Supplier	: Akzo Nobel Coatings GesmbH (see above)

or (b) Putty	: ICI P551-1052
Manufacturer	: ICI Paints, Berkshire, Great Britain
Supplier	: ICI Autocolor (see above)

(2) Coating Paint

Glare shield	: Nuvovern DS 10/1 + Nuvovern ACR
Instr. panel cover	: Nuvovern DS 10/1 + Nuvovern ACR
Other interior parts	: Nuvovern DS 10/1
Manufacturer	: Mäder Lacke AG, Killwangen, Switzerland
Supplier	: Walter Mäder GmbH Wiener Str. 99 A-2514 Traiskirchen, Austria Phone : +43-2252-53038 Fax : +43-2252-52297

I. Fire Retardant Paint

(1) Courtaulds

Fire retardant paint	: Courtaulds Aerospace N 56582/T508 (white)
Finishing varnish	: Courtaulds Aerospace 4232-0303
Hardener	: Courtaulds Aerospace N 39/1327 (4:1)
Supplier	: PRO-DeSoto Deutschland GmbH Aerospace Coatings Lauenburger Landstr. 11 D-21039 Börnsen, Germany Phone : +49-40-742193-10 Fax : +49-40-742139-69

(2) Hensel

Fire retardant paint	: Hensotherm 2 KS (white)
Coating paint	: Hensotop 84 f
Supplier	: Rudolf Hensel GmbH Lack- und Farbenfabrik Süderstraße 235 D-20537 Hamburg, Germany Phone :+49-40-214093 Fax :+49-40-214783

J. Acrylic Glass Cement

Acrylic glass cement	: Polymerization cement Acrifix 92
Manufacturer	: Röhm, Darmstadt, Germany
Supplier	: Röhm Austria GmbH (see above)

Section 51-40
Fasteners

1. General

This Section tells you about the fasteners used to attach panels and cowlings.

2. Description

The DA 40 has two main types of fastener. It has quick release cam-lock fasteners for panels which you remove often, for example, engine cowlings, and screws for all the other access panels.

Figure 1 shows the quick-release cam-lock fastener. The fastener has three parts, a receptacle with a cam track, a grommet and a stud. Rivets attach the receptacle to the airplane structure. A spring ring attaches the stud assembly to the access panel and a compression spring holds the stud in the stud assembly.

The T-shaped end of the stud locates in a slot in the receptacle. When you turn the stud clockwise through 90° it engages the cam track in the receptacle and pulls the access panel into position. When the stud is turned fully 90° clockwise the T-shaped end of the stud engages a small detent in the cam track. The compression spring in the stud assembly holds the stud in position in the detent.

There are different length studs. Short studs for thin panels and longer studs for thicker panels. Not all airplanes have the same length studs in the same position. This is because composite components can vary in thickness.

If you replace a fastener, make sure that the new fastener has the correct length stud.

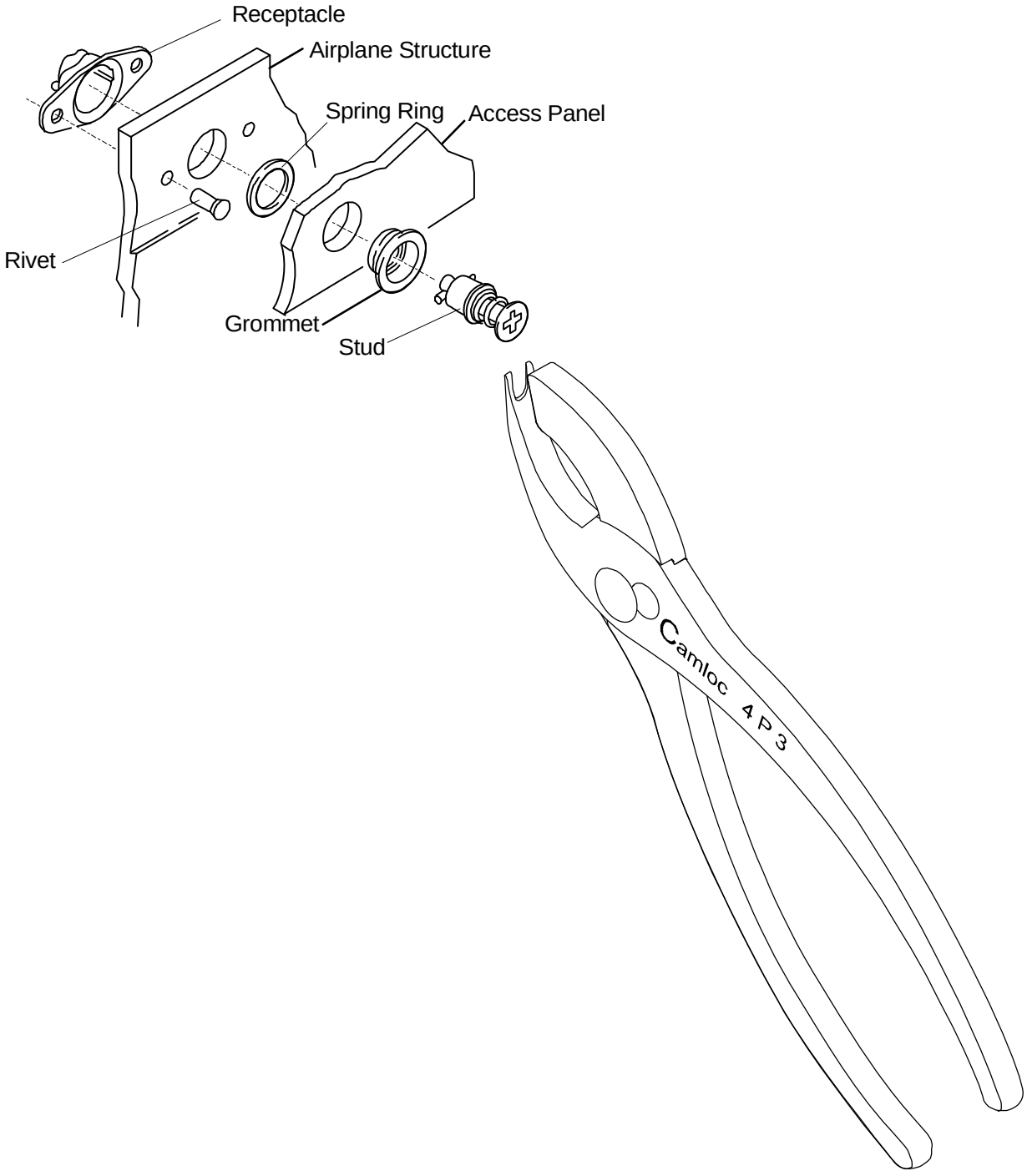


Figure 1: Quick Release Fastener

Maintenance Practices

1. General

This Section tells you how to replace a quick release fastener stud in an access panel.

2. Replace a Quick Release Fastener Stud

A. Equipment

Item	Quantity	Part Number
Stud pliers.	1	Camloc 4 P 3.

B. Procedure

	Detail Steps/Work Items	Key Items/References
(1)	Remove the damaged stud assembly: – Turn the stud 90° counter-clockwise to release it from the receptacle. – Place the U-jaw of the Camloc pliers under the rim of the stud assembly. – Compress the stud assembly and remove it from the grommet.	If fitted. Refer to Figure 1. Turn the stud assembly approximately 30° off axis.
(2)	Install the new stud assembly: – Select the correct length stud assembly. – Put the stud assembly into the U jaw of the Camloc pliers. – Compress the stud assembly with the Camloc pliers and install into the grommet. – Engage the stud in the receptacle and turn 90° clockwise to lock the stud.	 Turn the stud assembly approximately 30° off axis.

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Section 51-60
Control Surface Balancing

1. General

This Section tells you how to weigh and measure the residual moment of the control surfaces.

WARNING: YOU MUST WEIGH AND BALANCE A CONTROL SURFACE AFTER ANY WORK WHICH COULD AFFECT ITS WEIGHT OR ITS BALANCE. OUT OF BALANCE CONTROL SURFACES CAN FLUTTER AND CAUSE STRUCTURAL FAILURE.

Correct control surface balance is critical to flight safety. You must remove a control surface to weigh and balance it after:

– Any repair to the control surface.

– Painting the control surface.

– Any report of control vibration or flutter in flight.

You can use any convenient method to weigh a control surface. If you use anything to connect the control surface to the weighing device, (for example, a sling) you must weigh it separately. Then subtract its weight from the total value. For example, you use a rope sling to lift an aileron with a spring balance:

– Weight of the aileron and the rope sling = 3.8 kg

– Weight of the rope sling = 0.7 kg

– Weight of the aileron = 3.8 kg - 0.7 kg = 3.1 kg

When you balance a control surface, the pivot angle of the control must be as shown in the Weights and Residual Moments Report.

We recommend that for balancing the flaps, aileron, elevator and elevator trim tab, you put a suitable size rod through the hinge bearings. Support the rod at 2 points to keep it horizontal.

To balance the rudder it must be supported at the top pivot pin and the bottom mounting bracket. The center line of the rudder must be horizontal.

A. SN's 40.363 and Subsequent, D4.110 and Subsequent

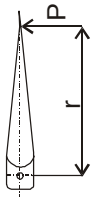
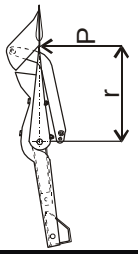
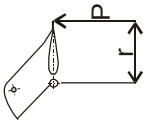
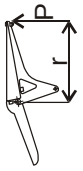
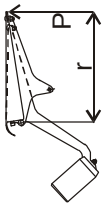
From serial number 40.363 (DA 40 with Lycoming engine) and D4.110 (DA 40 D with TAE 125 engine) and subsequent (MÄM 40-113/a incorporated) the Weights and Residual Moments Report shown in Figure 1 is applicable for the following Versions of the DA 40:

– DA 40 with Lycoming Engine.

– DA 40 with Lycoming Engine and Long Range Tank (OÄM 40-071).

– DA 40 D with Thielert Engine - DA40 D (OÄM 40-100).

– DA 40 D with Thielert Engine and Long Range Tank (OÄM 40-130).

	Rudder	Elevator	Trim Tab	Aileron		Wing Flap	
				LH	RH	LH	RH
weight incl. BW — nominal	3.5 to 4.4 kg *(7.72 to 9.7 lb)*	5.7 to 6.9 kg *(12.57 to 15.21 lb)*	0.28 to 0.39 kg *(0.617 to 0.860 lb)*	2.6 to 3.15 kg *(5.73 to 6.94 lb)*		4.0 to 4.8 kg *(8.82 to 10.58 lb)*	
weight incl. BW — actual							
balancing weight [kg] or [lb]		Center: LH: / RH:					
P							
r							
residual moment — nominal	35.6 to 45.8 kg.cm *(30.9 to 39.75 in.lb)*	-5.0 to 0.0 kg.cm *(-4.34 to 0.00 in.lb)*	1.0 to 1.5 kg.cm *(0.868 to 1.302 in.lb)*	-5.1 to -2.0 kg.cm *(-4.43 to +1.74 in.lb)*		23.4 to 31.1 kg.cm *(20.31 to 26.99 in.lb)*	
residual moment — actual							
M = P * r P ...[kg] or [lb] r ...[cm] or [in]	center line horizontal 	center line horizontal 	center line horizontal 	upper surface horizontal 		upper surface horizontal 	

Calculation. M = P * r Where M is the residual moment, r (cm or inches) is the distance between the hinge line and the point where the force P (kg or lb) acts.

Notes. Positive moments are tail heavy, negative moments are nose heavy.
Rudder - weight and residual moment include lower hinge and trim plate.
Elevator - weight and residual moment include trim tab, horn, and trim tab control rods.
Aileron - weight and residual moment include horn, trim plate and hinges.
Wing flaps - Weight and residual moment include horn and hinges.

Figure 1: Weights and Residual Moments Report (refer to Table 1 or 2) MÄM 40-113 or LRT (OÄM 40-071, OÄM 40-071a, OÄM 40-071b, OÄM 40-071c, OÄM 40-130a, OÄM 40-130b) incorporated.

B. Earlier S/N's

For earlier serial numbers (MÄM 40-113a NOT incorporated) Table 1 shows the Weights and Residual Moments Reports for different versions of the DA 40 with the Lycoming engine installed.

Table 2 shows the Weights and Residual Moments Reports for different versions of the DA 40 D with the TAE 125 engine installed.

DA 40 with Lycoming IO360 M1A	
	Weights and Residual Moments Report
Standard Version.	see Figure 2.
OÄM 40-071[1)] (Long Range Tank) incorporated.	see Figure 1.
MÄM 40-089[2)] (Aileron Mass Balance) incorporated.	see Figure 2a.
MÄM 40-113 [3)] (LRT Rudder for Standard Version) incorporated.	see Figure 2b.

Table 1

1) OÄM 40-071, OÄM 40-071/a, OÄM 40-071/b, OÄM 40-071/c

2) MÄM 40-089/b, MÄM 40-089/c

3) MÄM 40-113

DA 40 with TAE 125	
	Weights and Residual Moments Report
Standard Version [4)] (OÄM 40-100).	see Figure 2.
OÄM 40-130 [5)] (Long Range Tank) incorporated.	see Figure 3a or 1. [5)]
MÄM 40-089 [6)] (Aileron Mass Balance) incorporated.	see Figure 2a.
MÄM 40-113 (LRT Rudder for Standard Version) incorporated.	see Figure 3b.

Table 2

4) OÄM 40-100, OÄM 40-100/a, OÄM 40-100/b, OÄM 40-100/c

5) OÄM 40-130 (figure 3a); OÄM 40-130/a, OÄM 40-130/b (Figure 1)

6) MÄM 40-089, MÄM 40-089/a, MÄM 40-089/b, MÄM 40-089/c

	Rudder	Elevator	Trim Tab	Aileron		Wing Flap	
				LH	RH	LH	RH
weight incl. BW nominal	3.7 to 4.65 kg *(8.16 to 10.25 lb)*	5.7 to 6.9 kg *(12.57 to 15.21 lb)*	0.28 to 0.39 kg *(0.62 to 0.860 lb)*	2.6 to 3.3 kg *(5.73 to 7.28 lb)*		4.2 to 5.15 kg *(9.26 to 11.35 lb)*	
weight incl. BW actual							
balancing weight [kg] or [lb]		Center: LH: RH:					
P							
r							
residual moment nominal	16.3 to 21.4 kg.cm *(14.15 to 18.57 in.lb)*	-5.0 to 0.0 kg.cm *(-4.34 to 0.00 in.lb)*	1.0 to 1.5 kg.cm *(0.868 to 1.302 in.lb)*	-2.5 to +0.3 kg.cm *(-2.17 to +0.26 in.lb)*		25.5 to 33.1 kg.cm *(22.13 to 28.73 in.lb)*	
residual moment actual							
M = P * r P ...[kg] or [lb] r ...[cm] or [in]	center line horizontal	center line horizontal	center line horizontal	upper surface horizontal		upper surface horizontal	

Calculation. M = P * r Where M is the residual moment, r (cm or inches) is the distance between the hinge line and the point where the force P (kg or lb) acts.

Notes. Positive moments are tail heavy, negative moments are nose heavy.
Rudder - weight and residual moment include lower hinge and trim plate.
Elevator - weight and residual moment include trim tab, horn, and trim tab control rods.
Aileron - weight and residual moment include horn, trim plate and hinges.
Wing flaps - Weight and residual moment include horn and hinges.

Figure 2: Weights and Residual Moments Report
(valid for Lycoming Standard Version and TAE Standard Version)

	Rudder	Elevator	Trim Tab	Aileron		Wing Flap	
				LH	RH	LH	RH
weight incl. BW nominal	3.7 to 4.65 kg *(8.16 to 10.25 lb)*	5.7 to 6.9 kg *(12.57 to 15.21 lb)*	0.28 to 0.39 kg *(0.617 to 0.860 lb)*	2.6 to 3.15 kg *(5.73 to 6.94 lb)*		4.2 to 5.15 kg *(9.26 to 11.35 lb)*	
weight incl. BW actual							
balancing weight [kg] or [lb]		Center: LH: RH:					
P							
r							
residual moment nominal	16.3 to 21.4 kg.cm *(14.15 to 18.57 in.lb)*	-5.0 to 0.0 kg.cm *(-4.34 to 0.00 in.lb)*	1.0 to 1.5 kg.cm *(0.868 to 1.302 in.lb)*	-5.1 to -2.0 kg.cm *(-4.43 to -1.74 in.lb)*		25.5 to 33.1 kg.cm *(22.13 to 28.73 in.lb)*	
residual moment actual							
M = P * r	center line horizontal	center line horizontal	center line horizontal	upper surface horizontal		upper surface horizontal	
P ...[kg] or [lb]							
r ...[cm] or [in]							

Calculation. M = P * r Where M is the residual moment, r (cm or inches) is the distance between the hinge line and the point where the force P (kg or lb) acts.

Notes. Positive moments are tail heavy, negative moments are nose heavy.
Rudder - weight and residual moment include lower hinge and trim plate.
Elevator - weight and residual moment include trim tab, horn, and trim tab control rods.
Aileron - weight and residual moment include horn, trim plate and hinges.
Wing flaps - Weight and residual moment include horn and hinges.

Figure 2a: Weights and Residual Moments Report
(valid for Lycoming and TAE version with 'Aileron Mass Balance',
MÄM 40-089, MÄM 40-089a, MÄM 40-089 /b, MÄM 40-089 /c installed)

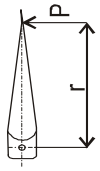
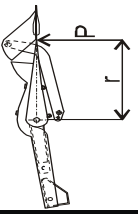
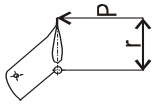
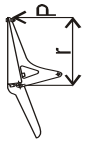
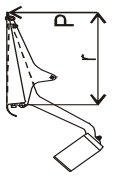
	Rudder	Elevator	Trim Tab	Aileron		Wing Flap	
				LH	RH	LH	RH
weight incl. BW nominal	3.5 to 4.4 kg *(7.72 to 9.7 lb)*	5.7 to 6.9 kg *(12.57 to 15.21 lb)*	0.28 to 0.39 kg *(0.617 to 0.860 lb)*	2.6 to 3.15 kg *(5.73 to 6.94 lb)*		4.2 to 5.15 kg *(9.26 to 11.35 lb)*	
weight incl. BW actual							
balancing weight [kg] or [lb]		Center: LH: RH:					
P							
r							
residual moment nominal	35.6 to 45.8 kg.cm *(30.9 to 39.75 in.lb)*	-5.0 to 0.0 kg.cm *(-4.34 to 0.00 in.lb)*	1.0 to 1.5 kg.cm *(0.868 to 1.302 in.lb)*	-5.1 to -2.0 kg.cm *(-4.43 to -1.74 in.lb)*		25.5 to 33.1 kg.cm *(22.13 to 28.73 in.lb)*	
residual moment actual							
M = P * r P ...[kg] or [lb] r ...[cm] or [in]	center line horizontal	center line horizontal	center line horizontal	upper surface horizontal		upper surface horizontal	

Calculation. M = P * r Where M is the residual moment, r (cm or inches) is the distance between the hinge line and the point where the force P (kg or lb) acts.

Notes. Positive moments are tail heavy, negative moments are nose heavy.
Rudder - weight and residual moment include lower hinge and trim plate.
Elevator - weight and residual moment include trim tab, horn, and trim tab control rods.
Aileron - weight and residual moment include horn, trim plate and hinges.
Wing flaps - Weight and residual moment include horn and hinges.

Figure 2b: Weights and Residual Moments Report

(valid for Lycoming version with 'LRT-Rudder', MÄM 40-113 installed)

	Rudder	Elevator	Trim Tab	Aileron		Wing Flap	
				LH	RH	LH	RH
weight incl. BW — nominal	3.5 to 4.9 kg *(7.72 to 10.8 lb)*	5.7 to 6.9 kg *(12.57 to 15.21 lb)*	0.28 to 0.39 kg *(0.617 to 0.860 lb)*	2.6 to 3.15 kg *(5.73 to 6.94 lb)*		4.2 to 5.15 kg *(9.26 to 11.35 lb)*	
weight incl. BW — actual							
balancing weight [kg] or [lb]		Center: LH: RH:					
P							
r							
residual moment — nominal	35.6 to 44.8 kg.cm *(30.9 to 38.89 in.lb)*	-5.0 to 0.0 kg.cm *(-4.34 to 0.00 in.lb)*	1.0 to 1.5 kg.cm *(0.868 to 1.302 in.lb)*	-5.1 to -2.0 kg.cm *(-4.43 to -1.74 in.lb)*		25.5 to 33.1 kg.cm *(22.13 to 28.73 in.lb)*	
residual moment — actual							
M = P * r	center line horizontal	center line horizontal	center line horizontal	upper surface horizontal		upper surface horizontal	
P ...[kg] or [lb]							
r ...[cm] or [in]							

Calculation. M = P * r Where M is the residual moment, r (cm or inches) is the distance between the hinge line and the point where the force P (kg or lb) acts.

Notes. Positive moments are tail heavy, negative moments are nose heavy.
Rudder - weight and residual moment include lower hinge and trim plate.
Elevator - weight and residual moment include trim tab, horn, and trim tab control rods.
Aileron - weight and residual moment include horn, trim plate and hinges.
Wing flaps - Weight and residual moment include horn and hinges.

Figure 3a: Weights and Residual Moments Report

(Valid for TAE Version with 'LRT', OÄM 40-130, installed)

	Rudder	Elevator	Trim Tab	Aileron		Wing Flap	
				LH	RH	LH	RH
weight incl. BW nominal	3.5 to 4.9 kg *(7.72 to 10.8 lb)*	5.7 to 6.9 kg *(12.57 to 15.21 lb)*	0.28 to 0.39 kg *(0.617 to 0.860 lb)*	2.6 to 3.15 kg *(5.73 to 6.94 lb)*		4.0 to 4.8 kg *(8.82 to 10.58 lb)*	
weight incl. BW actual							
balancing weight [kg] or [lb]		Center: LH: RH:					
P							
r							
residual moment nominal	35.6 to 44.8 kg.cm *(30.90 to 38.89 in.lb)*	-5.0 to 0.0 kg.cm *(-4.34 to 0.00 in.lb)*	1.0 to 1.5 kg.cm *(0.868 to 1.302 in.lb)*	-5.1 to -2.0 kg.cm *(-4.43 to -1.74 in.lb)*		23.4 to 31.1 kg.cm *(20.31 to 26.99 in.lb)*	
residual moment actual							
M = P * r P ...[kg] or [lb] r ...[cm] or [in]	center line horizontal	center line horizontal	center line horizontal	upper surface horizontal		upper surface horizontal	

Calculation. M = P * r Where M is the residual moment, r (cm or inches) is the distance between the hinge line and the point where the force P (kg or lb) acts.

Notes. Positive moments are tail heavy, negative moments are nose heavy.
Rudder - weight and residual moment include lower hinge and trim plate.
Elevator - weight and residual moment include trim tab, horn, and trim tab control rods.
Aileron - weight and residual moment include horn, trim plate and hinges.
Wing flaps - Weight and residual moment include horn and hinges.

Figure 3b: Weights and Residual Moments Report

(Valid for TAE Version with 'LRT-Rudder', MÄM 40-113, installed)

Refer to Figure 1 (Standard Tanks) or Figure 2 (Long Range Tanks) for the weight and residual moment for the DA 40. Refer to Figure 3 for the weight and residual moment for the DA 40 D.

Use any suitable method to support the rudder horizontally at the pivot axis.

The rudder must be able to rotate freely around the pivot axis.

Remove the stop bolts from the lower mounting bracket before weighing and balancing.

The residual moment is tail heavy.

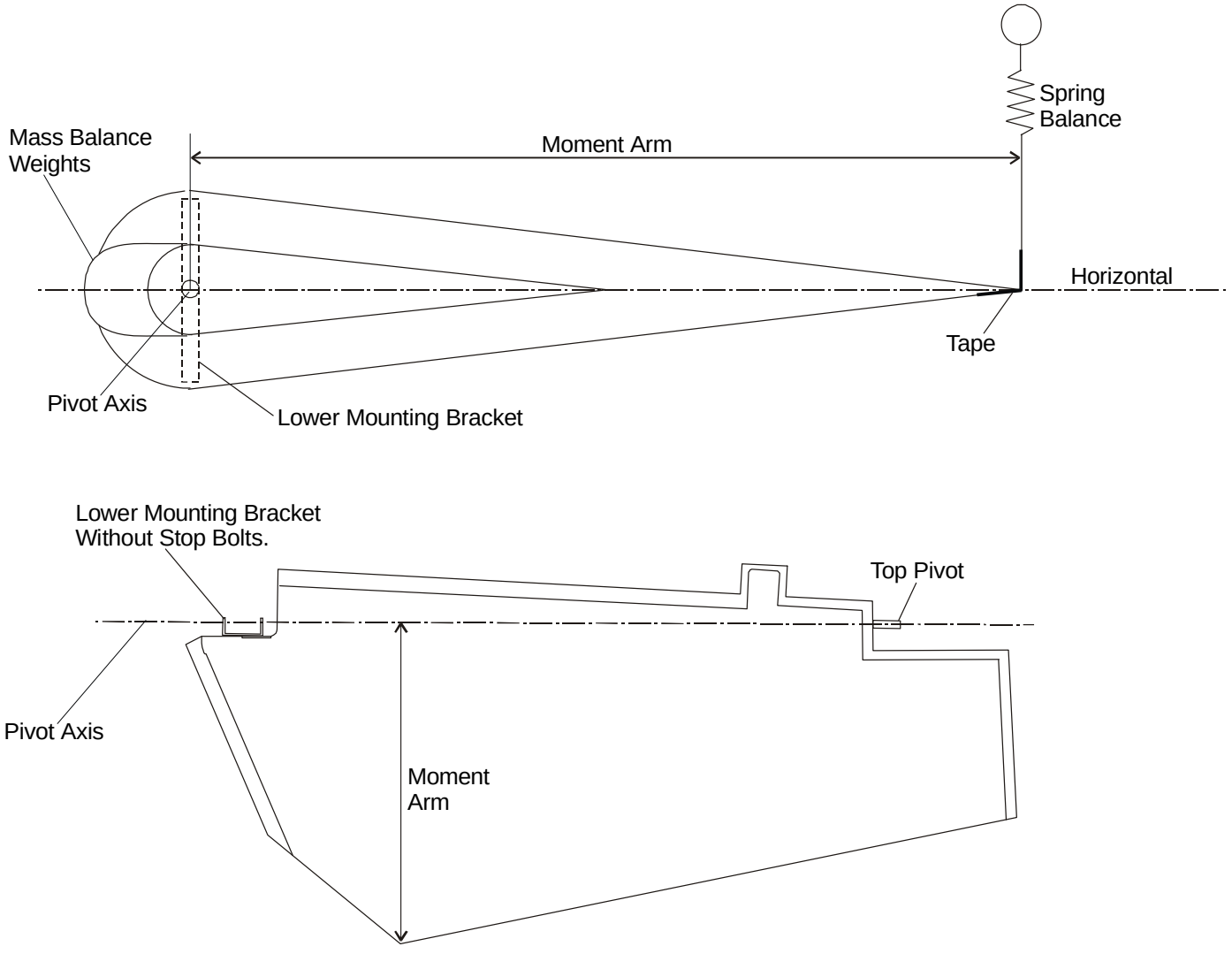


Figure 4: Rudder Static Balance. Refer to Figure 1 (Standard Tanks) or Figure 2 (Long Range Tanks) for the Weight and Residual Moment for the DA 40. Refer to Figure 3 for the Weight and Residual Moment for the DA 40 D.

Use any suitable method to support the elevator horizontally at the pivot axis.

The elevator must be able to rotate freely around the pivot axis.

The balance includes the trim tab, trim tab control rod and horn.

Note: The residual moment is zero or nose heavy.

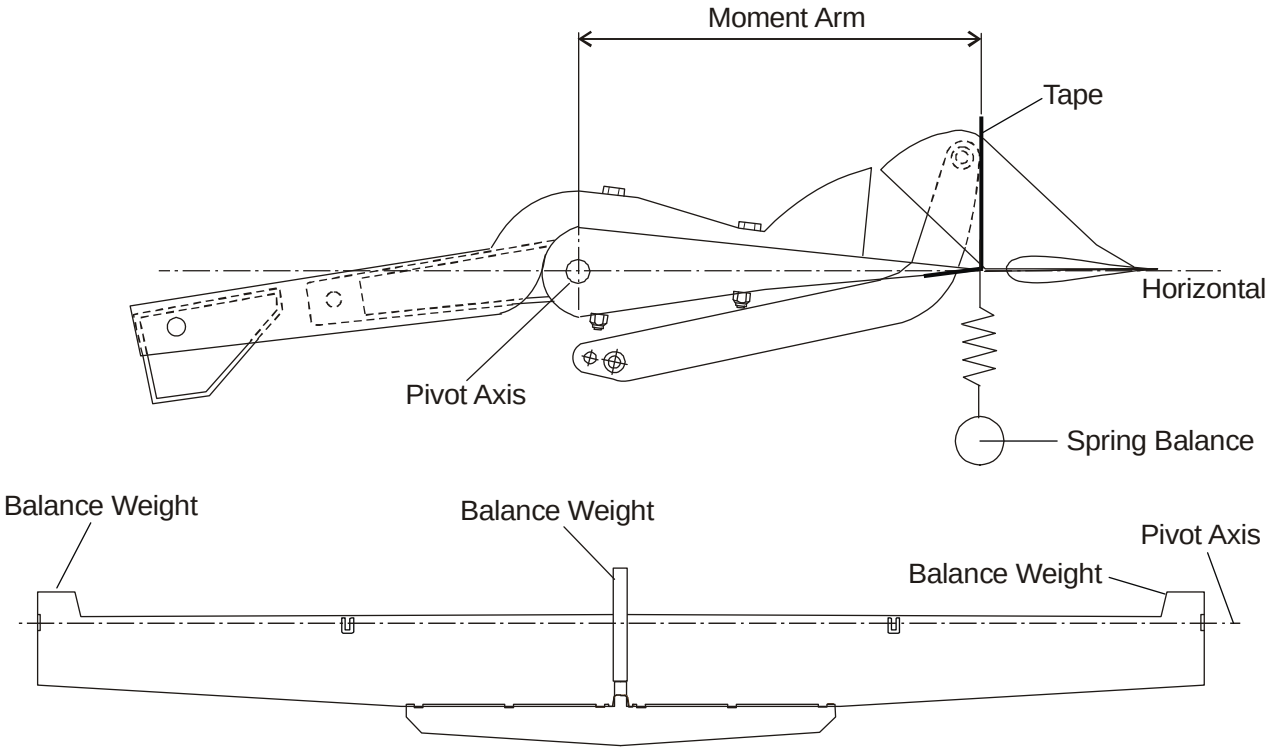


Figure 5: Elevator Static Balance

Refer to Figure 1 (Standard Tanks) or Figure 2 (Long Range Tanks) for the weight and residual moment for the DA 40. Refer to Figure 3 for the weight and residual moment for the DA 40 D.

Use any suitable method to support the trim tab horizontally at the pivot axis.

The trim tab must be able to rotate freely around the pivot axis.

The residual moment is tail heavy.

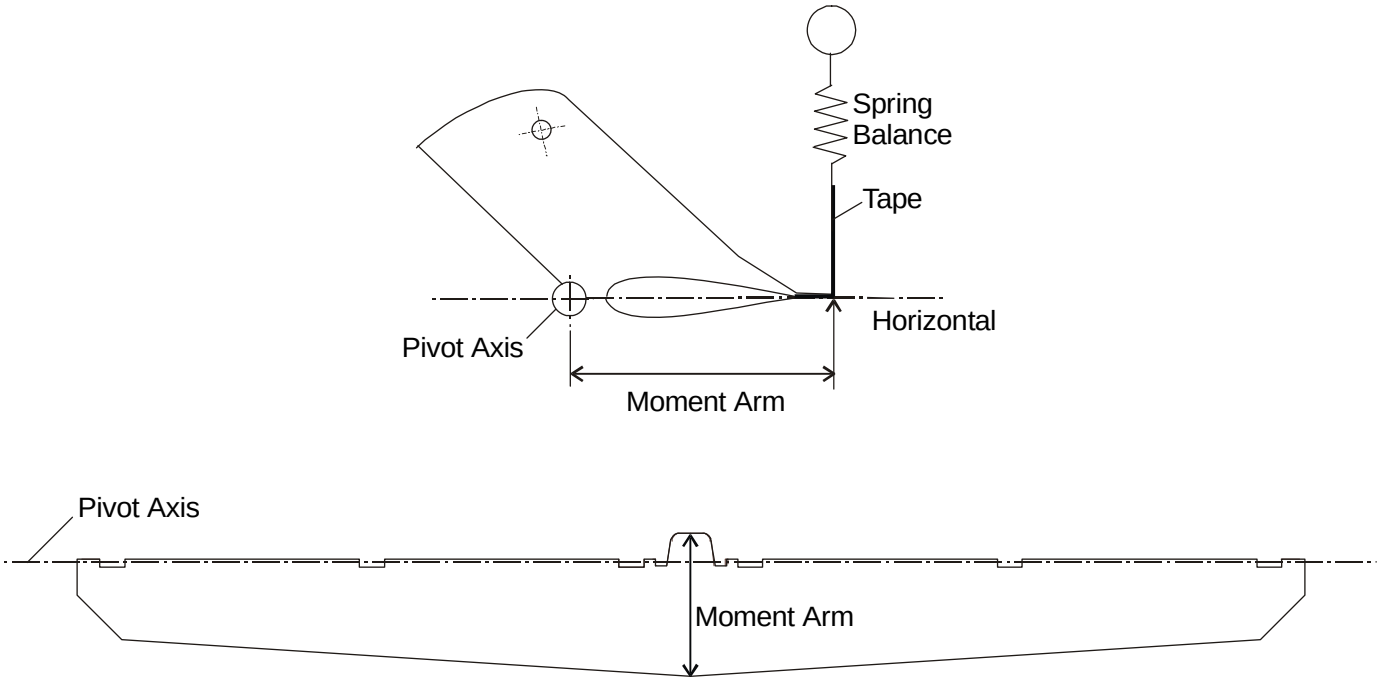


Figure 6: Trim Tab Static Balance

Refer to Figure 1 (Standard Tanks) or Figure 2 (Long Range Tanks) for the weight and residual moment for the DA 40. Refer to Figure 3 for the weight and residual moment for the DA 40 D.

Use any suitable method to support the aileron horizontally at the pivot axis.

The aileron must be able to rotate freely around the pivot axis.

The balance includes the horn, trim plate and hinges.

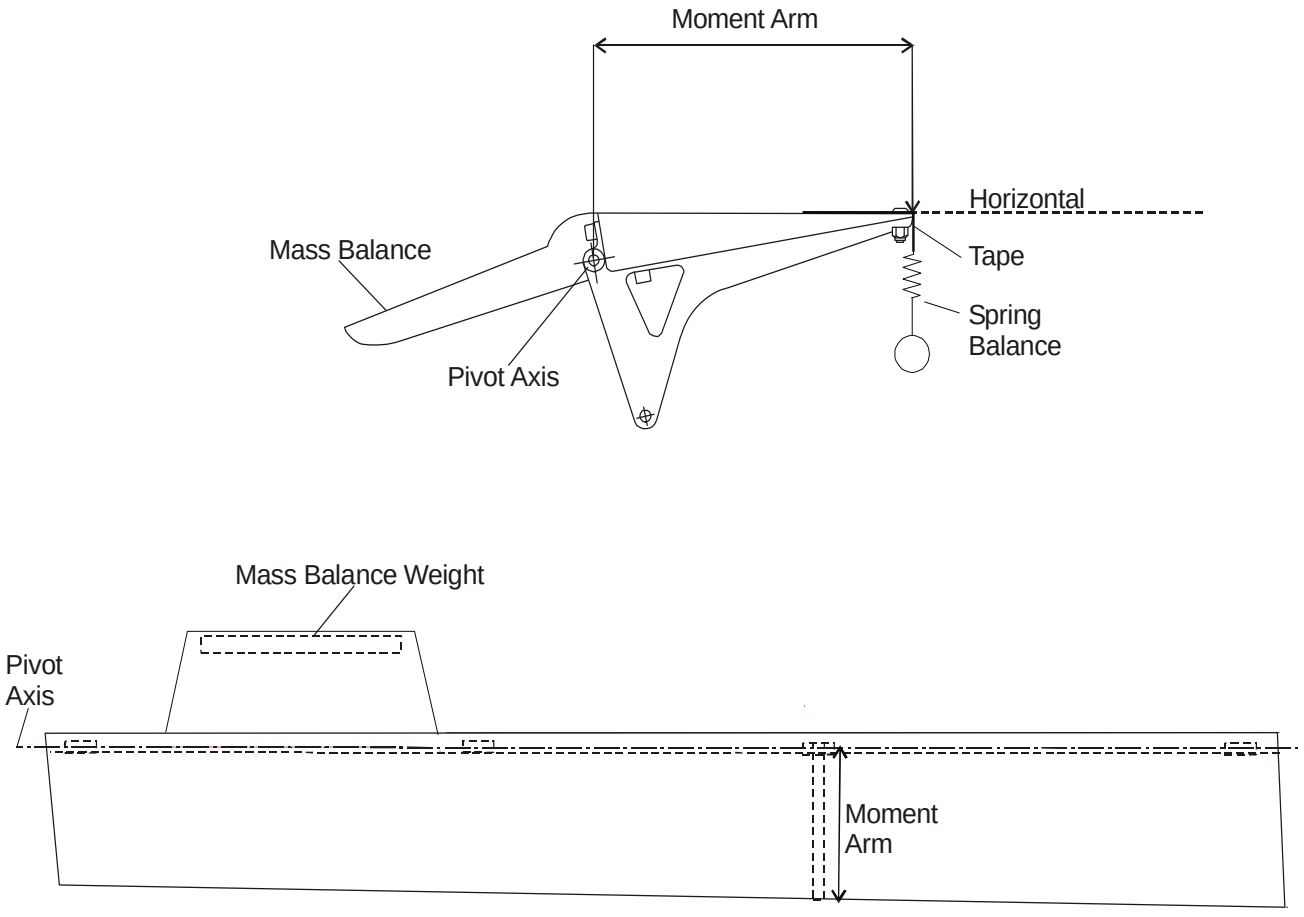


Figure 7: Aileron Static Balance

Refer to Figure 1 (Standard Tanks) or Figure 2 (Long Range Tanks) for the weight and residual moment for the DA 40. Refer to Figure 3 for the weight and residual moment for the DA 40 D.

Use any suitable method to support the wing flap horizontally at the pivot axis.

The wing flap must be able to rotate freely around the pivot axis.

The balance includes the horn and hinges.

The residual moment is tail heavy.

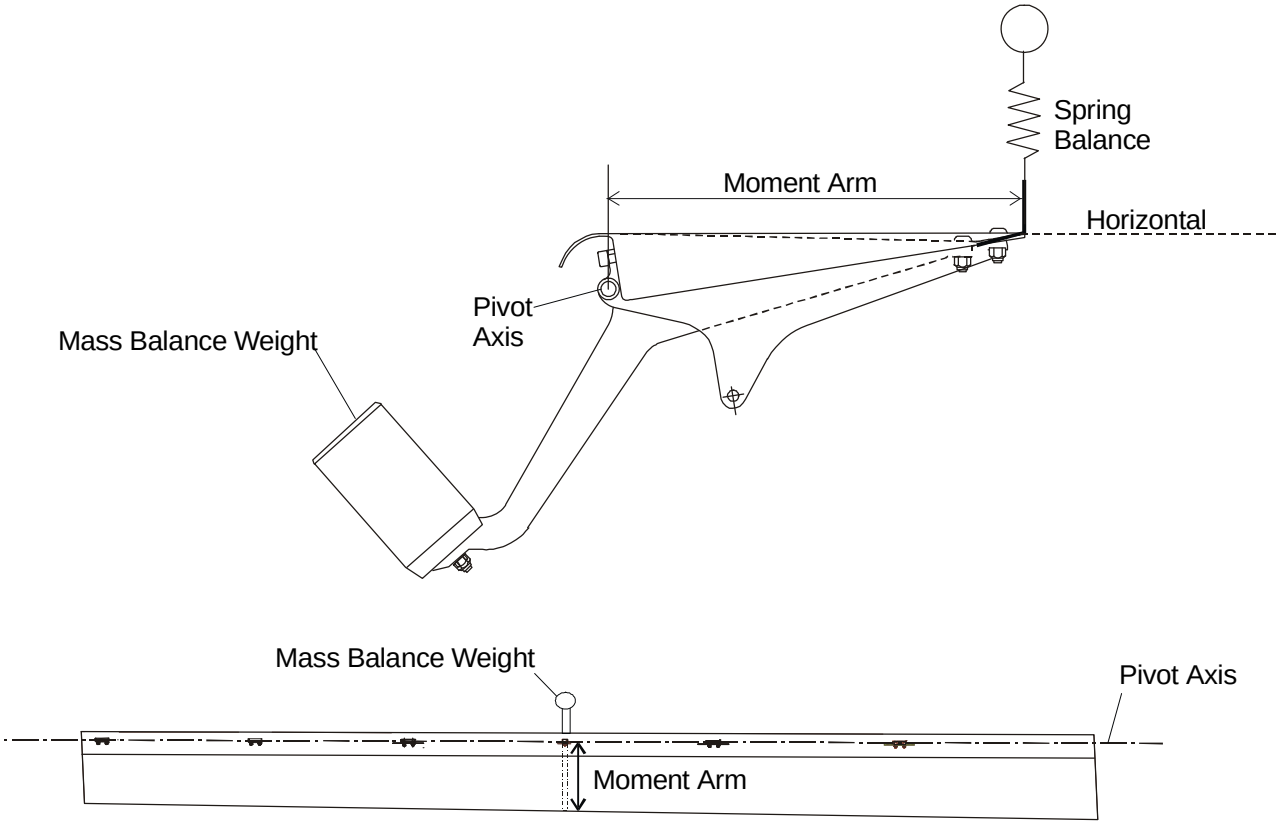


Figure 8: Wing Flap Static Balance

Section 51-80
Electrical Bonding

1. General

The bonding system gives the airplane good lightning protection. A special bonding system is necessary for the composite structure of the DA 40. Without this special system, the composite structure would not sufficiently conduct electricity.

Refer to Section 23-60 for details about the static discharge wicks.

2. Description

Figure 1 shows a simplified bonding system schematic.

The lightning conductor system is the main part of the bonding system. High capacity aluminum alloy tubes and strips make the lightning conductor system.

The lightning conductor system has a longitudinal branch and a lateral branch. The longitudinal branch runs from the engine block via engine truss, firewall, cabin, aft fuselage and empennage to the elevator. The horizontal branch connects the left wing tip with the right wing tip. It is connected with the longitudinal branch at the cabin floor under the forward seats.

Metal braiding and strips connect all conductive components (for example: wing skin, fuel tanks, control systems, landing gear, engine, etc.) and antenna ground plates to the lightning conductor system.

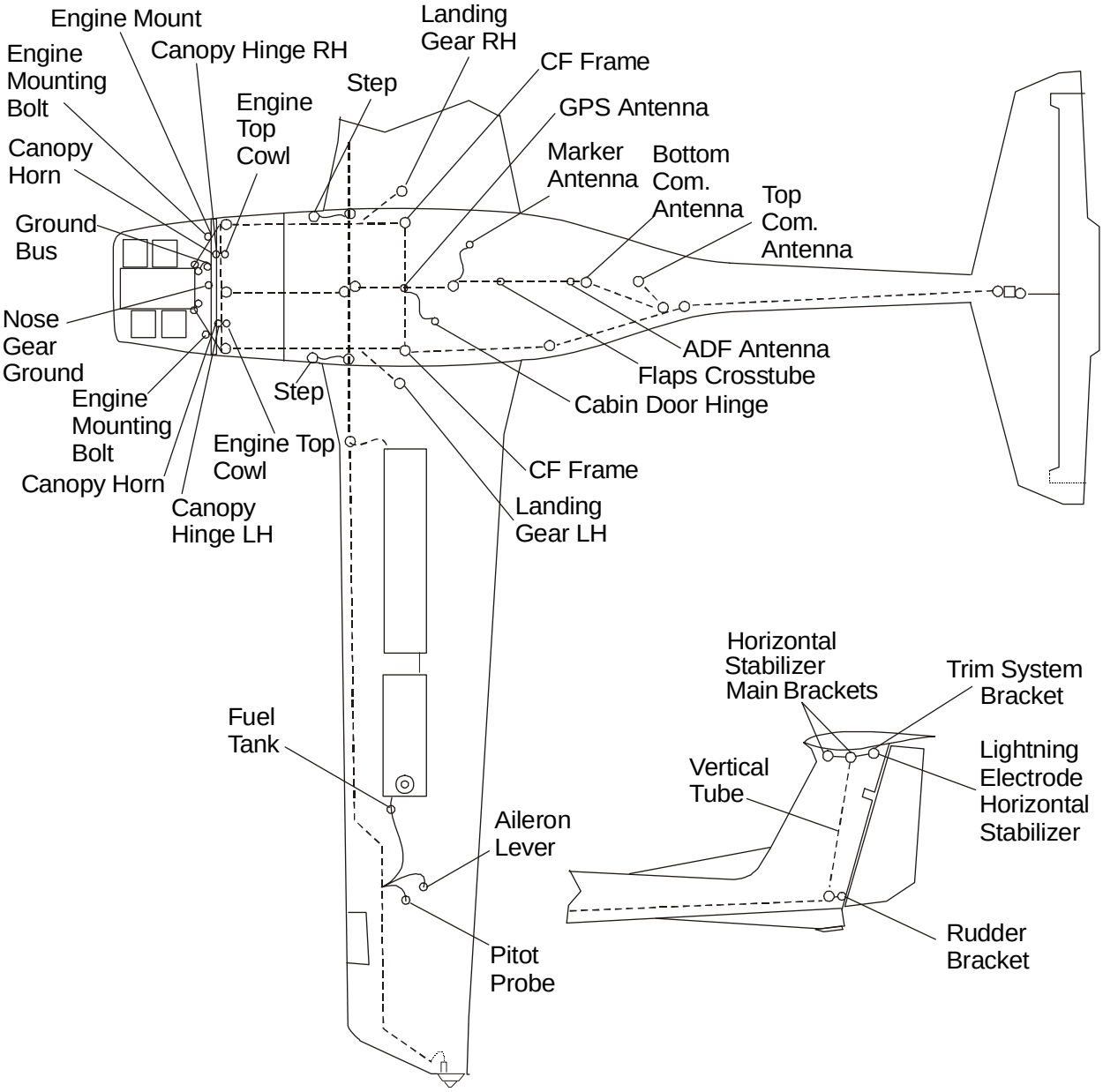


Figure 1: Airplane Lightning Protection and Bonding System Schematic

The following design features also give lightning protection:

– The aluminum tubes of the lightning conductor system are also used as conduits for electric wires.

– Carbon fiber material is used for the lower wing skin and parts of the fuselage skin, canopy frame and rear door frame. Carbon fiber material is conductive.

– Carbon fiber material with interwoven aluminum fibers is used for the upper wing skin and the engine cowlings. Carbon fiber material with interwoven aluminum fibers is conductive.

– The forward wing spar separates the lightning conductor system from the fuel tanks.

– A lightning conductor strip is integrated in the horizontal stabilizer.

– The tail skid has an aluminum bar on the lower edge.

– The propeller is non-conductive (except for the erosion sheath), therefore currents cannot flow in structural parts of the propeller.

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Maintenance Practices

1. General

This Section tells you how to do a test of the electrical bonding system.

2. Test the Electrical Bonding System

The resistance measurements on the DA 40 are divided into three categories:

– Very low resistance measurements for conduits in the direct lightning path and electrical power grounds.

– Low resistance measurements for bondings of controls.

– High resistance measurements for the static discharge wicks.

Do the low resistance bonding measurements with a milliohmmeter and Kelvin probes. The test current must be approximately 2 amps.

Do the high resistance measurements with a high voltage megaohmmeter. Measure the static discharge wicks and the precautions against static charge of the airplane.

All measurements are referenced to the negative pole of the main battery (Lycoming versions) and to the negative pole connection of the battery on the firewall (TAE-versions). The airplane must be in a serviceable condition during the tests, except that the engine cowlings must be removed.

A. Very Low Resistance Measurements (Lycoming Version)

Item	Attachment Point	Max. Allowable [mΩ]	Measured [mΩ]	Passed
Engine	flat area above alternator	0.3		
Starter	case	0.5		
Alternator	case	0.5		
Oil Cooler	case	2.0		
External power connector	outer large pin	1.2		
Nose landing gear	tube	10.0		
Instrument panel	above co-pilot's left knee	2.0		
Engine breather	tube	6.0		
Voltage regulator	baseplate	3.0		

Item	Attachment Point	Max. Allowable [mΩ]	Measured [mΩ]	Passed
FUEL SYSTEM				
Fuel flow sensor	case	3.0		
Fuel drain/gascolator	case	10.0		
Fuel pump	case	8.0		
Fuel selector	case	6.0		
Fuel drain protector	sheet metal	6.0		
LH tank refill	ring	5.0		
LH tank vent	plate	10.0		
LH fuel tank drain	drain	5.0		
RH tank refill	ring	5.0		
RH tank vent	plate	10.0		
RH fuel tank drain	drain	5.0		
EXTERNAL CONDUCTIVE PARTS				
LH step		5.0		
RH step		5.0		
OAT sensor		5.0		
LH landing gear	lower bend, inner side	10.0		
RH landing gear	lower bend, inner side	10.0		
RH canopy hinge	tube tip	100		
LH canopy hinge	tube tip	100		
ANTENNAS				
COM 1 antenna (top)	mounting screws	6.0		
COM 2 antenna (bottom)	mounting screws	6.0		

Item	Attachment Point	Max. Allowable [mΩ]	Measured [mΩ]	Passed
STABILIZER				
Vertical lightning protection tube	upper end	7.0		
LH horizontal stabilizer lightning strap	tip	15.0		
RH horizontal stabilizer lightning strap	tip	15.0		
Tail fin	aluminum bar	15.0		
Rudder hinge	rudder side	10.0		
Vertical stabilizer fairing	FWD LH side screw	12.0		
Vertical stabilizer fairing	FWD RH side screw	12.0		
Horizontal stabilizer	front bracket	10.0		
Horizontal stabilizer	rear bracket	10.0		
LH WING				
Aileron push-rod attachment	bracket, aileron	50.0		
Flap asymmetrical tube	bonding strap connection	10.0		
Flaps push-rod attachment	bracket, flap	50.0		
Landing/taxi light	bracket (screws)	10.0		
Pitot head	base	6.0		
Tip light assembly	base plate	8.0		
RH WING				
Aileron push-rod attachment	bracket, aileron	50.0		
Flap asymmetrical tube	bonding strap connection	10.0		
Flaps push-rod attachment	bracket, flap	50.0		
Tip light assembly	base plate	8.0		

B. Low Resistance Measurements in Control System (Lycoming Version)

Item	Attachment Point	Max. Allowable [mΩ]	Measured [mΩ]	Passed
Pilot stick	tube	50.0		
Co-pilot stick	tube	50.0		
Trim wheel assembly	frame	5.0		
Levers	frame	10.0		
Pilot pedal assembly		150.0		
Co-pilot pedal assembly		150.0		

C. High Resistance Measurements (Lycoming Version)

Use a wet sponge to obtain a constant electrical connection to the static dischargers.

Item	Attachment point	Max. Allowable [MΩ]	Measured at 250 V [MΩ]	Passed
STATIC DISCHARGE WICKS				
LH wing, outer		100		
LH wing, inner		100		
RH wing, outer		100		
RH wing, inner		100		
Rudder		100		
Horizontal stabilizer, LH		100		
Horizontal stabilizer, RH		100		
TIRES				
Nose wheel		100		
LH main wheel		100		
RH main wheel		100		

D. Very Low Resistance Measurements (TAE Version)

Item	Attachment Point	Max. Allowable [mΩ]	Measured [mΩ]	Passed
Engine	propeller bearing, front	2.0		
Heat exchanger	case	4.0		
Oil Cooler	case	4.0		
Water Cooler	case	4.0		
Intercooler	case	4.0		
External power connector	outer large pin	3.0		
Nose landing gear	tube	10.0		
Instrument panel	above co-pilot's left knee	2.0		
Engine breather (optional)	tube	6.0		
Remote avionics box (optional)	case	5.0		
FUEL SYSTEM				
Fuel gascolator	case	15.0		
Fuel pump	case	15.0		
Fuel drain protector	sheet metal	15.0		
EXTERNAL CONDUCTIVE PARTS				
LH step		5.0		
RH step		5.0		
OAT sensor		5.0		
LH landing gear	lower bend, inner side	10.0		
RH landing gear	lower bend, inner side	10.0		
Flap asymmetrical tube LH	bond. strap connection	10.0		
Flap asymmetrical tube RH	bond. strap connection	10.0		
ANTENNAS				
Top COM antenna	mounting screws	6.0		
Bottom COM antenna	mounting screws	6.0		

Item	Attachment Point	Max. Allowable [mΩ]	Measured [mΩ]	Passed
STABILIZER				
Vertical lightning protection tube	upper end	7.0		
LH horizontal stabilizer lightning strap	tip	15.0		
RH horizontal stabilizer lightning strap	tip	15.0		
Grindspur	aluminum strap	15.0		
Rudder hinge	rudder side	10.0		
Vertical stabilizer fairing	FWD LH side screw	12.0		
Vertical stabilizer fairing	FWD RH side screw	12.0		
Horizontal stabilizer	front bracket	10.0		
Horizontal stabilizer	rear bracket	10.0		
LH WING				
Fuel tank drain	drain	5.0		
Tank refill	ring	5.0		
Tank vent	plate	10.0		
Pitot tube base	tube base	6.0		
Landing/taxi light	bracket (screws)	10.0		
Tip light assembly	base plate	8.0		
Aileron pushrod attachment	bracket, aileron	50.0		
Flaps pushrod attachment	bracket, flap	50.0		
RH WING				
Fuel tank drain	drain	5.0		
Tank refill	ring	5.0		
Tank vent	plate	10.0		
Tip light assembly	base plate	8.0		
Aileron push-rod attachment	bracket, aileron	50.0		
Flaps push-rod attachment	bracket, flap	50.0		

E. Low Resistance Measurements in Control System (TAE Version)

Item	Attachment Point	Max. Allowable [mΩ]	Measured [mΩ]	Passed
Pilot stick	tube	50.0		
Co-pilot stick	tube	50.0		
Trim wheel assembly	frame	5.0		
Levers	frame	10.0		
Pilot pedal assembly		150		
Co-pilot pedal assembly		150		
Canopy hinge RH	tube tip	100		
Canopy hinge RH	tube tip	100		

F. High Resistance Measurements (TAE Version)

Use a wet sponge to obtain a constant electrical connection to the static dischargers.

Item	Attachment point	Max. Allowable [MΩ]	Measured at 250 V [MΩ]	Passed
STATIC DISCHARGE WICKS				
LH wing, outer		100		
LH wing, inner		100		
RH wing, outer		100		
RH wing, inner		100		
Rudder		100		
Horizontal stabilizer, LH		100		
Horizontal stabilizer, RH		100		
TIRES				
Nose wheel		100		
LH main wheel		100		
RH main wheel		100		

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CHAPTER 52

DOORS

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CHAPTER 52
DOORS

1. General

The DA 40 has two types of doors. Section 52-10 tells you about the canopy and the passenger access door. Section 52-40 tells you about the maintenance access panels.

2. Description

The canopy is a CFRP molding with inner and outer frames. The frames bond together. The canopy has a large one-piece acrylic glass window. The window has an emergency window on the left side. Some airplanes also have an emergency window on the right side. You can open the emergency windows in flight. Refer to Chapter 56 for data about the window.

The canopy attaches to a tubular steel frame at the front. The frame attaches to two hinges on the rear face of the firewall. The canopy moves up and forward to open.

A handle on the left of the canopy operates two locking bolts. The handle is black on the inside of the canopy and red on the outside. The locking bolts are at the bottom rear corners of the canopy.

The passenger door is a CFRP molding with inner and outer frames. The frames bond together. The door has a acrylic glass window.

Two hinges attach the door to the top of the fuselage near the center-line. A gas strut attaches to the rear of the door and the fuselage. The gas strut holds the door open.

A handle on the left of the door operates two locking bolts. The handle is black on the inside of the door and red on the outside. The locking bolts are at the bottom front and rear corners of the door.

The DA 40 has a small number of access panels. Panels which must be used often (for example the oil filler panel) have quick-release fasteners. Other panels have the usual screws.

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Section 52-10
Canopy and Passenger Door

1. General

This Section tells you about the structure, operation and maintenance of the canopy and the passenger door. Refer to Chapter 56 for data about the windows in the canopy and door.

An optional canopy jettison system can be installed (OÄM 40-232).

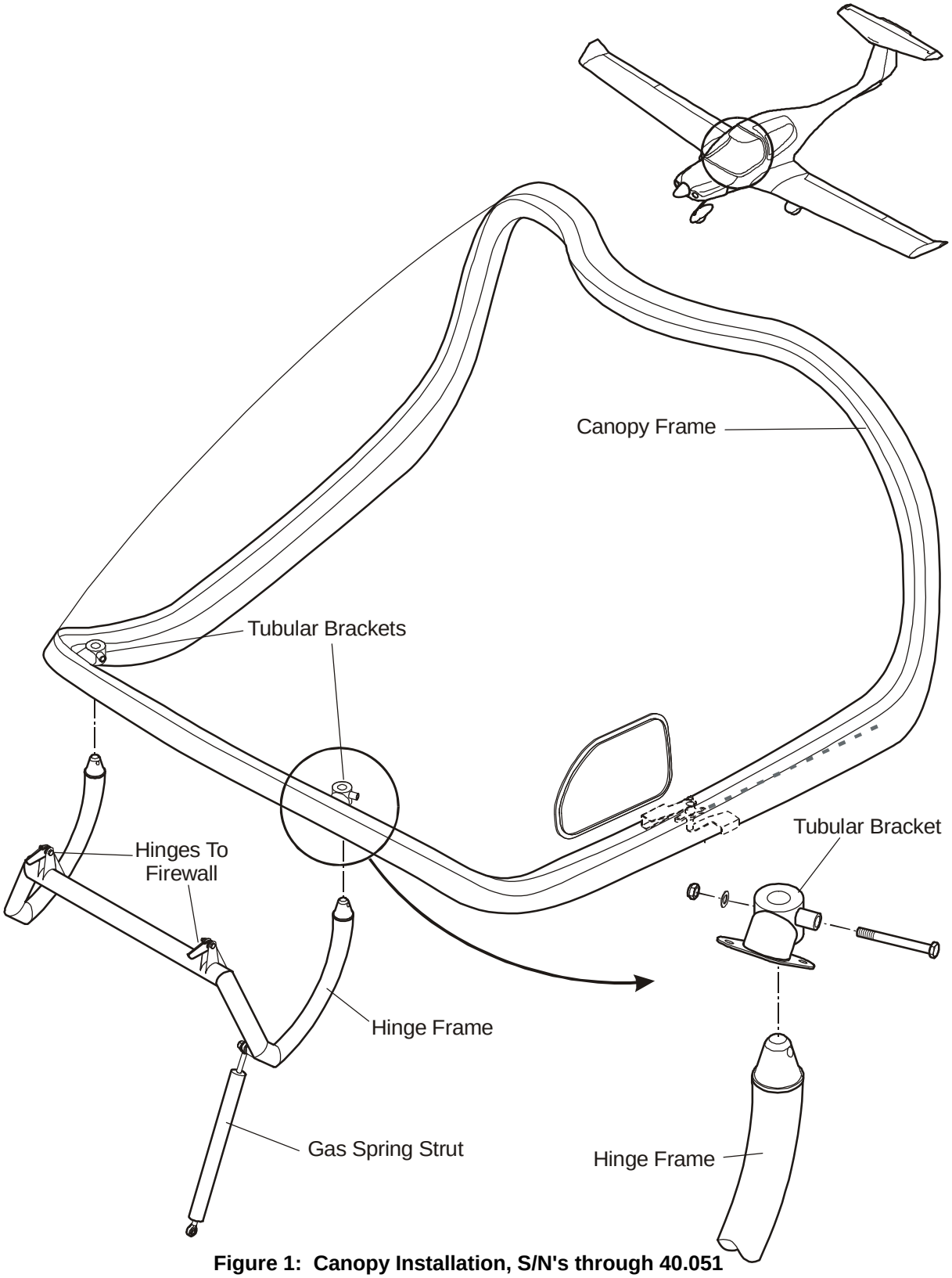


Figure 1: Canopy Installation, S/N's through 40.051

2. Canopy Description and Operation

Figures 1 and 2 show the canopy installation.

A. Canopy Description

The canopy is a CFRP molding with inner and outer frames. The frames bond together with thickened resin. Each part of the frame has layers of carbon cloth and one layer of glass cloth. Areas of high stress have extra layers of carbon cloth. Mounting bushes for the handle and locking bolts bond to the inside of the frame with thickened resin.

The canopy has a large one-piece acrylic glass window. A special flexible adhesive bonds the window to the canopy frame. A flexible filler seals the small gap between the edge of the window and the frame.

The window has a an emergency window on the left side. Some airplanes also have an emergency window on the right side. You can open the emergency windows in flight. Refer to Chapter 56 for data about the window.

B. Canopy Hinge Frame

The canopy attaches to a tubular steel frame at the front (the hinge frame). The frame attaches to two hinges on the rear face of the firewall. A gas spring strut attaches to the hinge frame and the bottom of the firewall. The canopy moves up and forward to open. The gas spring strut holds the canopy open. A door unlocked warning light (DOOR or DOORS) on the annunciator panel operates when the canopy is unlocked (not all S/N).

C. Canopy Attachment

(1) S/N's through 40.051

Refer to Figure 1. The canopy has two tubular brackets on the front edge of the canopy frame. Two bolts attach each bracket to the canopy frame. One bolt attaches each bracket to the hinge frame. You can remove the canopy by removing these two bolts.

(2) S/N's 40.052 and subsequent

Refer to Figure 2. The canopy has two attachment plates on the front edge of the canopy hinge frame. Two bolts attach each plate to the canopy frame. You can remove the canopy by removing these four bolts.

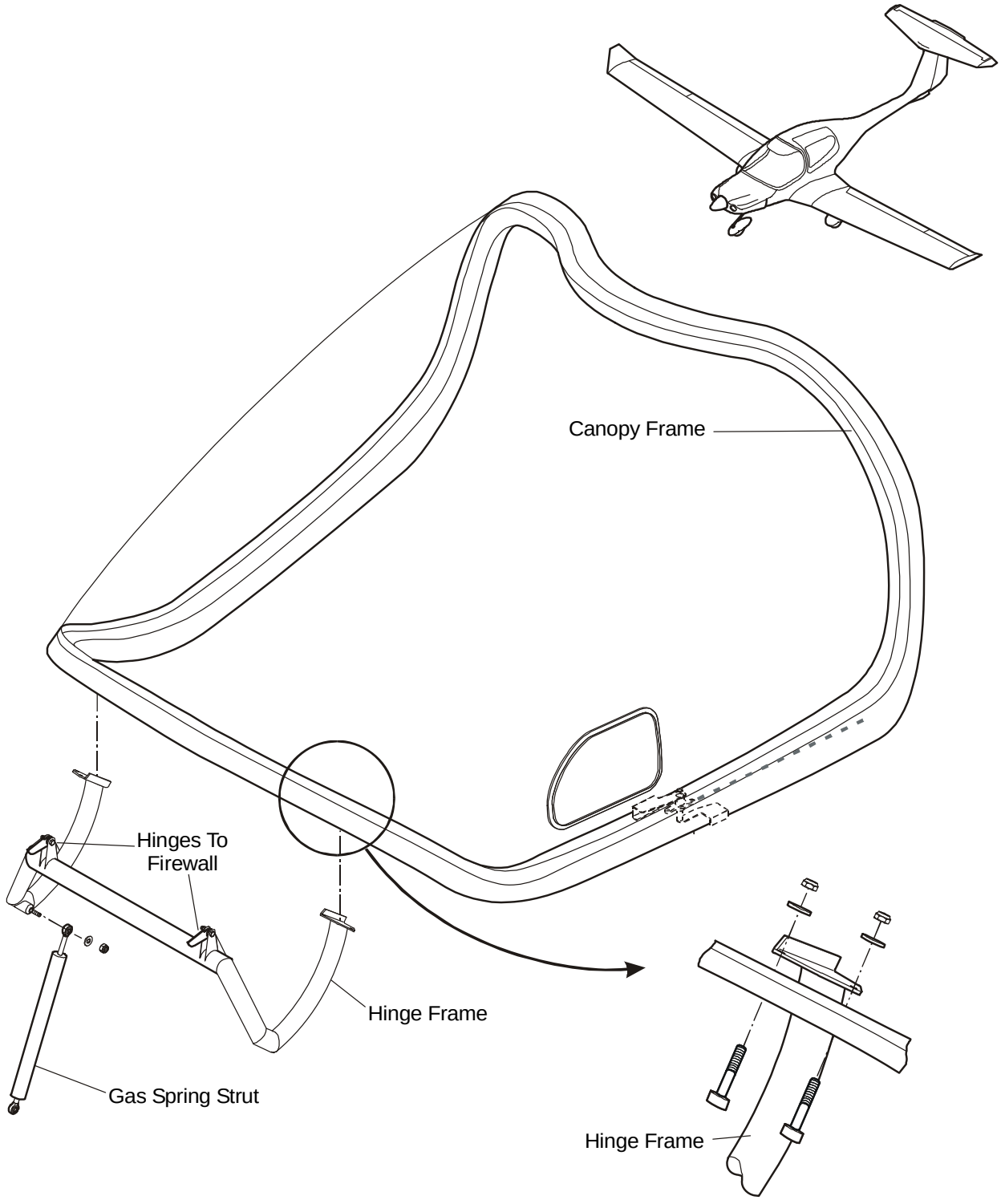


Figure 2: Canopy Installation, S/N's 40.052 and Subsequent

D. Canopy Locking Mechanism

(1) If MÄM 40-139 Is Not Installed

Figure 3 shows the canopy locking mechanism.

A handle on the left of the canopy operates two locking bolts. The handle has a spring assisted over-center lock which holds the handle in the closed position. The locking bolts are at the bottom rear corners of the canopy.

The handle has two parts. The inner handle is black and has a double lever. The outer handle is red and attaches to the inner handle with two roll pins. A connecting rod attaches to the rear of the double lever. The other end of the connecting rod attaches to the inside of the left locking bolt.

A teleflex cable attaches to the front of the double lever. The teleflex cable goes inside the front of the canopy frame to the right locking bolt. If you pull the canopy handle away from the canopy frame, these things happen:

– The double lever turns to pull the connecting rod and the teleflex cable.

– The connecting rod pulls the left locking bolt forward.

– The teleflex cable pulls the right locking bolt forward. The forward movement of the locking bolt operates the door unlocked warning micro-switch (not all S/N) in the right side fuselage shell.

The canopy can be pushed up and forward to open.

With the canopy fully closed, push the canopy handle towards the canopy frame. This engages the locking bolts in the fuselage holes. The spring assisted over-center lock holds the handle in the closed position. The right locking bolt operates the micro-switch (not all S/N) for the door unlocked warning light (DOOR or DOORS). When the handle is flush with the canopy frame, the canopy is locked. Push up on the rear of the canopy frame to make sure that it is locked.

(2) If MÄM 40-139 Is Installed

Figure 4 shows the canopy locking mechanism when the design change MÄM 40-139 is installed.

A handle on the left of the canopy operates two locking bolts. The handle has a spring assisted over-center lock which holds the handle in the closed position. The locking bolts are at the bottom rear corners of the canopy.

The handle has two parts. The inner handle is red and has a double lever. The outer handle is red and attaches to the inner handle with a roll pin. A connecting rod attaches to the rear of the double lever. The other end of the connecting rod attaches to the inside of the left locking bolt.

A teleflex cable attaches to the front of the double lever. The teleflex cable goes inside the front of the canopy frame to the right locking bolt. It can be removed for servicing. If you pull the canopy handle away from the canopy frame, these things happen:

The double lever turns to pull the connecting rod and the teleflex cable.

The connecting rod pulls the left locking bolt forward. The forward movement of the locking bolt operates the door unlocked warning micro-switch in the left side fuselage shell.

The teleflex cable pulls the right locking bolt forward. The forward movement of the locking bolt operates the door unlocked warning micro-switch in the right side fuselage shell.

The canopy can be pushed up and forward to open.

With the canopy fully closed, push the canopy handle towards the canopy frame. This engages the locking bolts in the fuselage holes. The spring assisted over-center lock holds the handle in the closed position. The left locking bolt operates the micro-switch for the door unlocked warning light (DOOR OPEN or DOORS). When the handle is flush with the canopy frame, the canopy is locked. Push up on the rear of the canopy frame to make sure that it is locked.

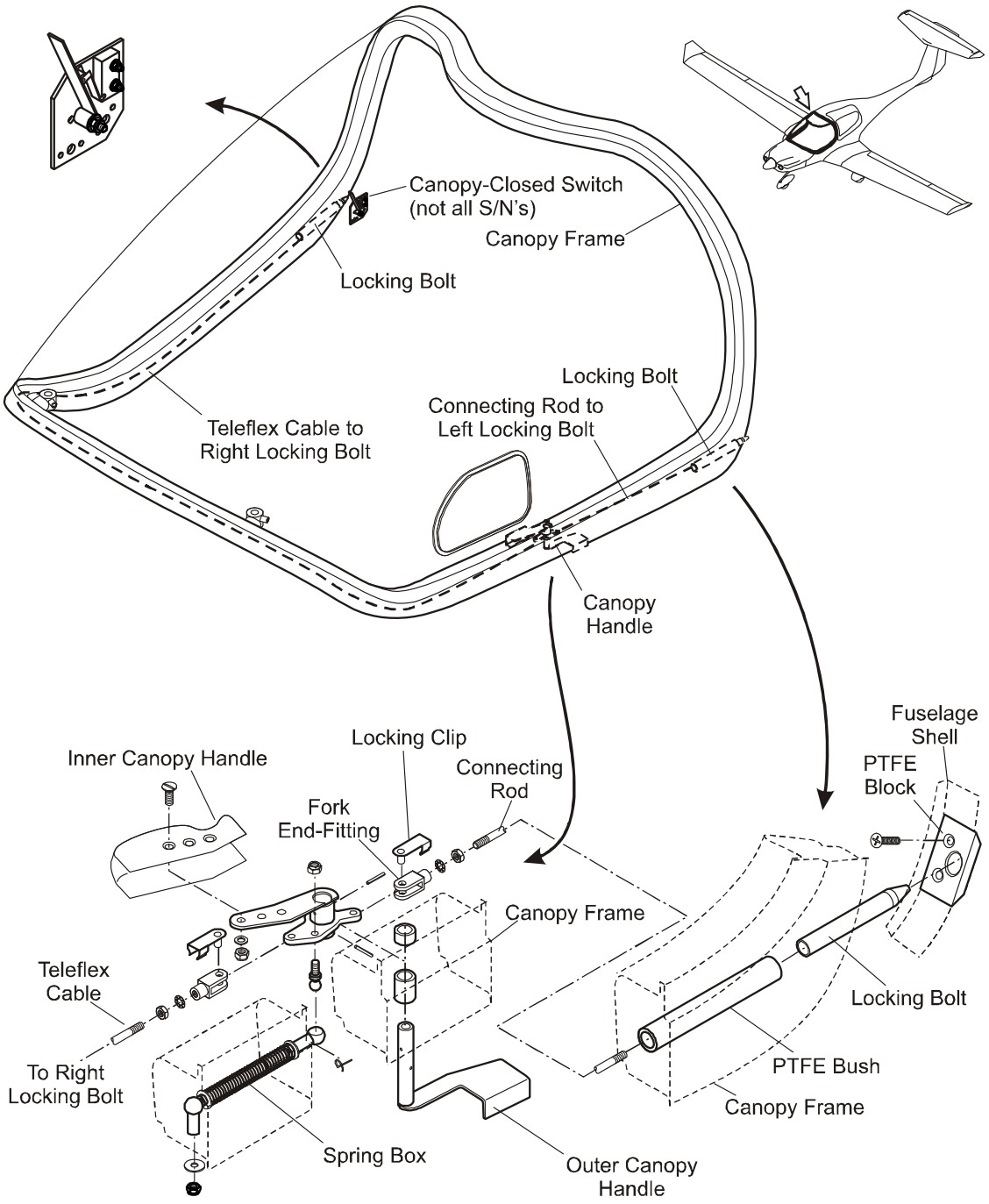


Figure 3: Canopy Locking Mechanism (if MÄM 40-139 is not installed)

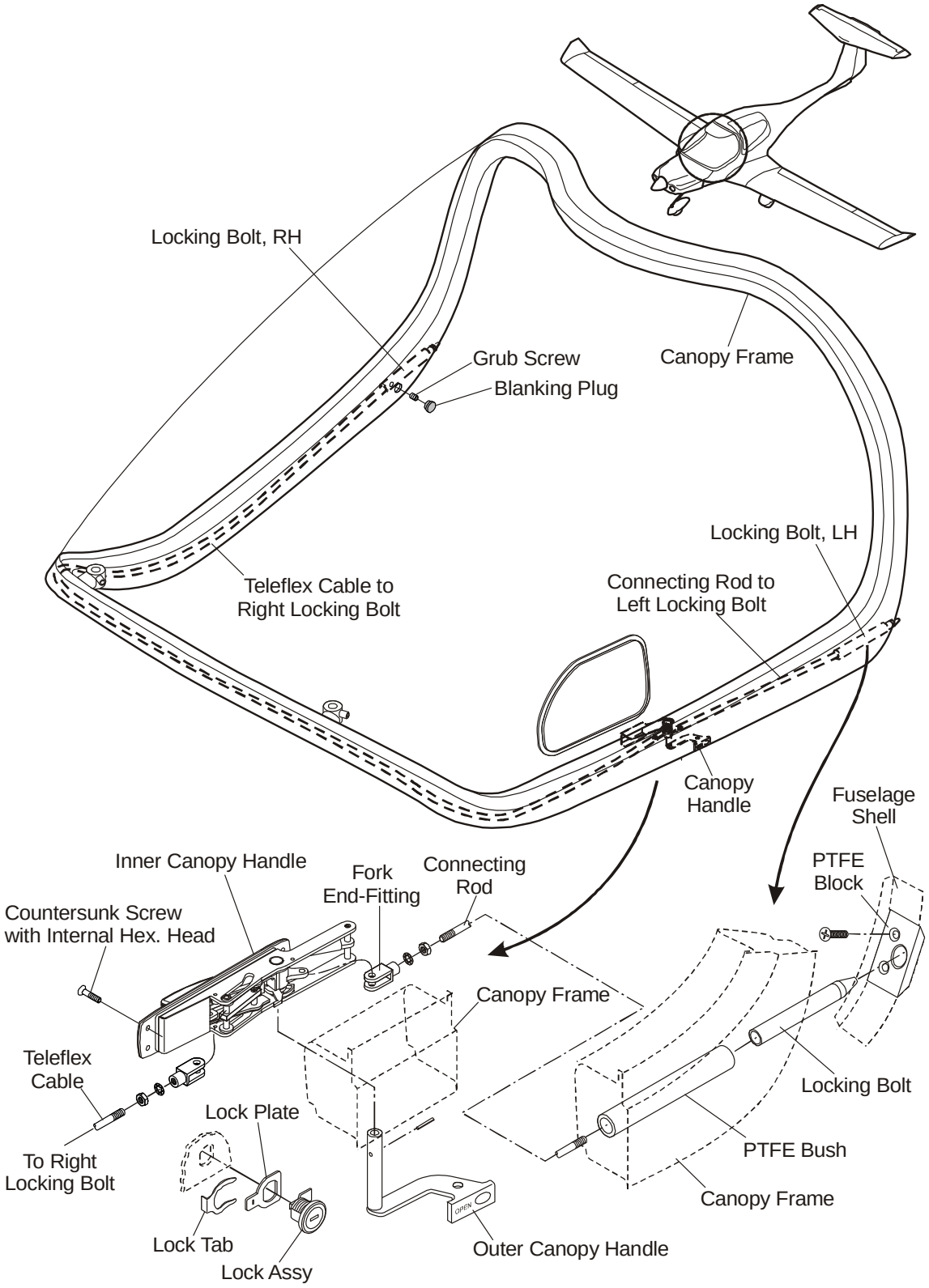


Figure 4: Canopy Locking Mechanism (if MÄM 40-139 is installed)

E. Canopy Jettison System

The canopy jettison system consists of:

– Special canopy hinge to which the canopy jettison mechanism is attached.

– Canopy jettison mechanism with the LH and RH Bowden cables.

– Canopy jettison lever assembly.

– Canopy and Roeger type hooks.

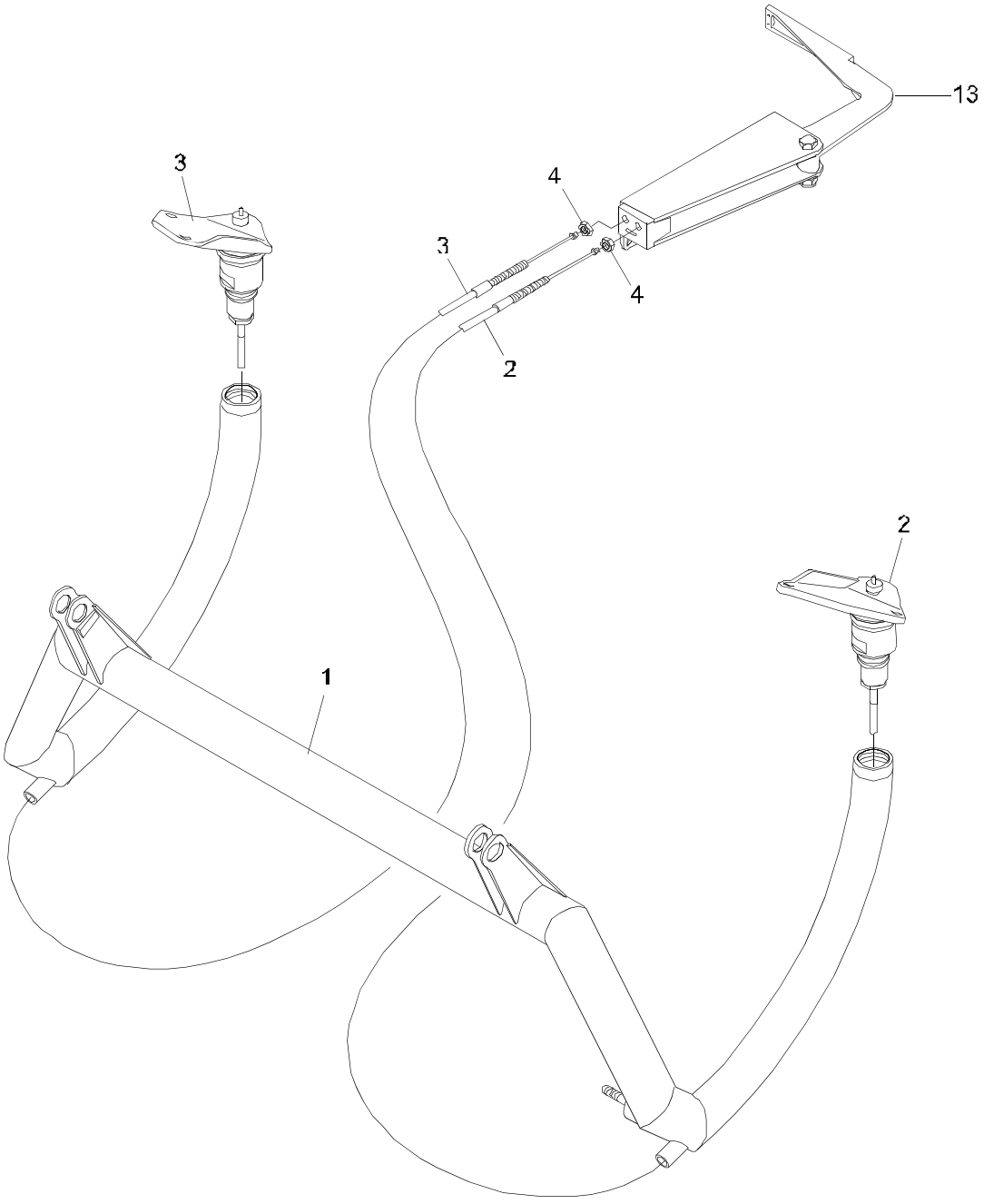


Figure 5: The Canopy Jettison System Consists of the Canopy Hinge (1), the LH and RH Canopy Jettison Mechanism (2, 3) and the Canopy Jettison Lever (13)

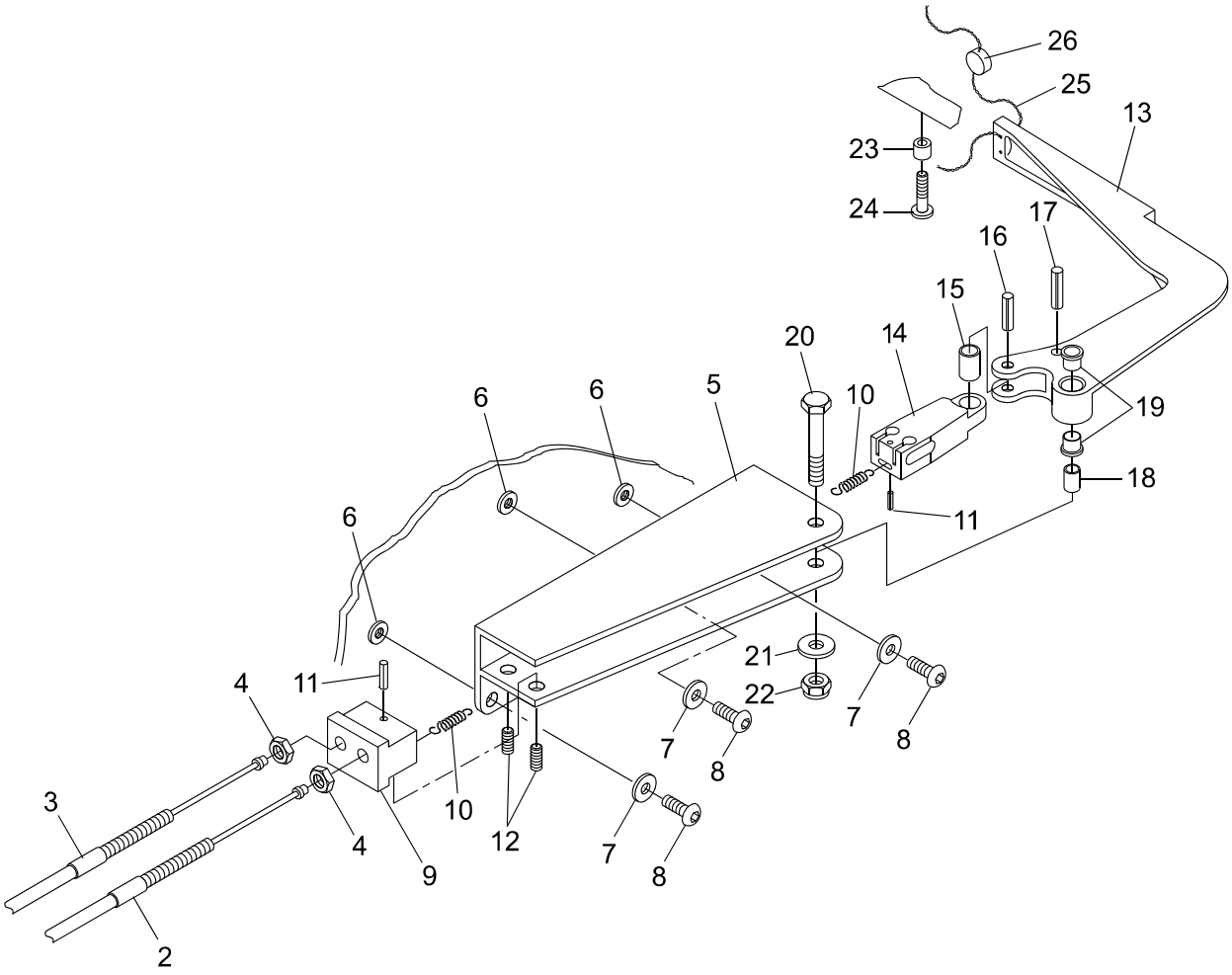


Figure 6: Canopy Jettison Lever Assembly (5-26)

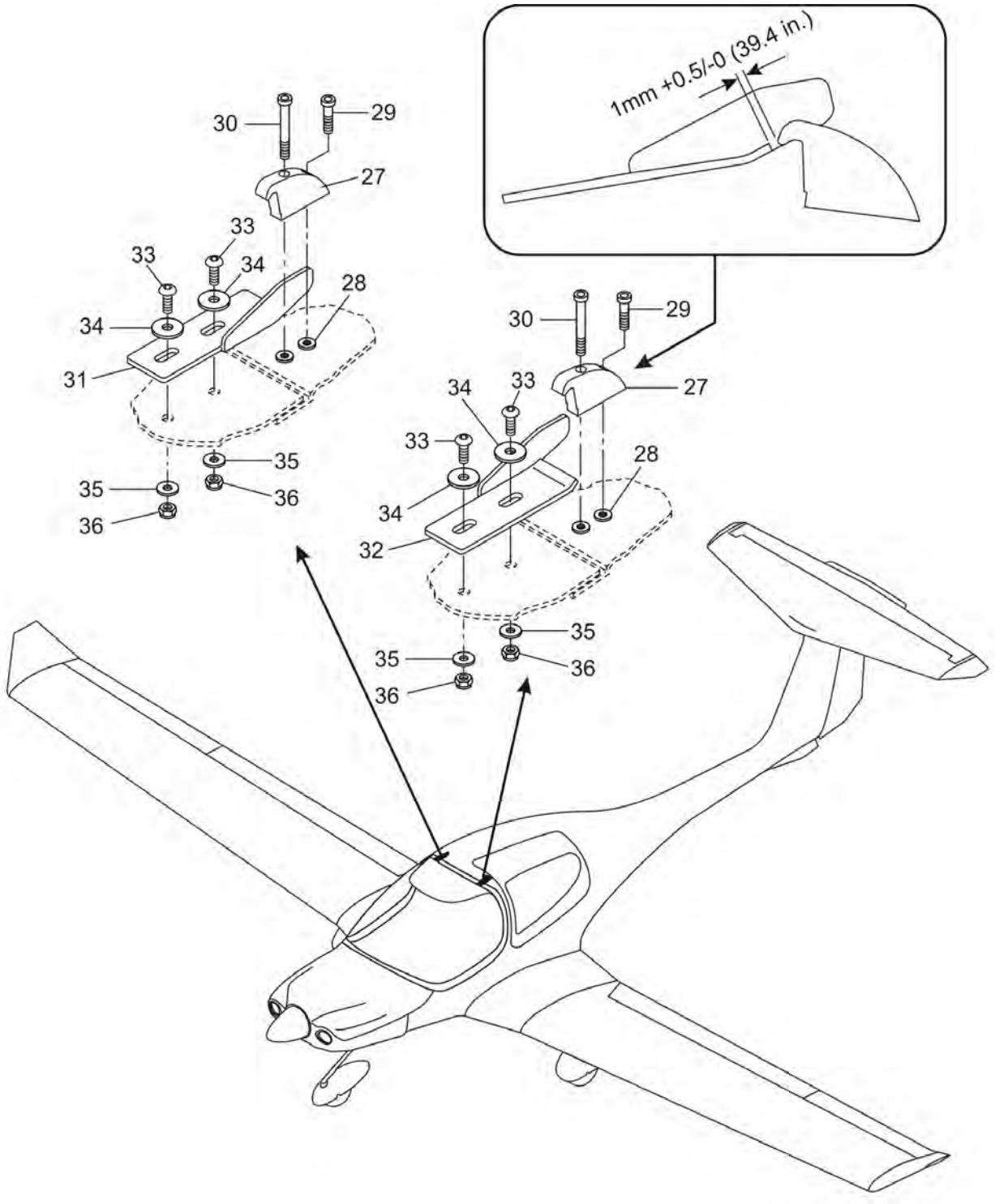


Figure 7: Configuration of the Canopy and Roeger Type Hooks (27-36)

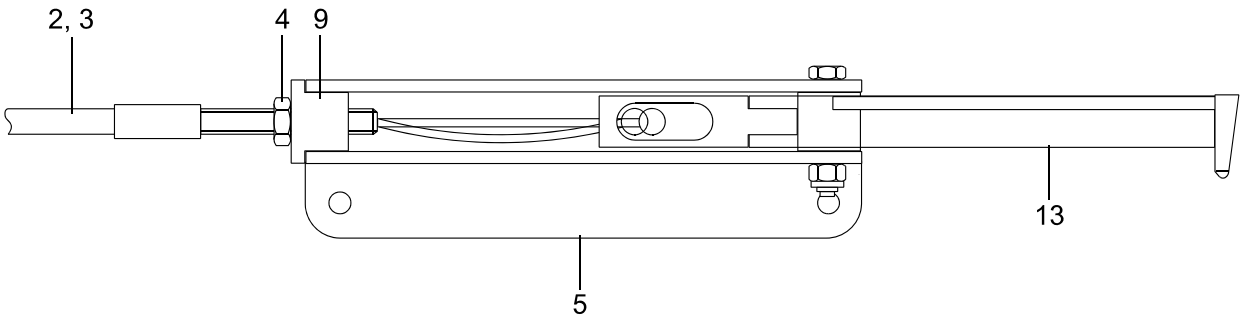


Figure 8: Adjustment of the Bowden Cable Play

3. Passenger Door Description and Operation

A. If MÄM 40-139 Is Not Installed

Figure 9 shows the passenger door installation and locking mechanism.

The passenger door is a CFRP molding with inner and outer frames. The frames bond together with thickened resin. Each part of the frame has layers of carbon cloth and one layer of glass cloth. Areas of high stress have extra layers of carbon cloth. Mounting bushes for the handle and locking bolts bond to the inside of the frame with thickened resin.

The door has a acrylic glass window. A special flexible adhesive bonds the window to the door frame. A flexible filler seals the small gap between the edge of the window and the frame.

Two hinges attach the door to the top of the fuselage near the center-line. The hinges bolt to the door frame. The front hinge can be removed from inside of the cabin in an emergency. With the front hinge removed, the passenger door can be forced open from the top. A gas strut attaches to a bracket at the rear of the door and to the fuselage. The gas strut holds the door open. A door unlocked warning light (DOOR or DOORS) on the annunciator panel operates when the door is unlocked.

A handle on the left of the door operates two locking bolts. The locking bolts are at the bottom front and rear corners of the door.

The handle has two parts. The inner handle is black and has a double lever. The outer handle is red and attaches to the inner handle with two roll pins. A long connecting rod attaches to the rear of the double lever. The other end of the long connecting rod attaches to the inside of the rear locking bolt. A safety lock is fitted to prevent accidental movement of the handle.

You must lift the safety handle before you can operate the black handle from inside the passenger compartment. To operate the red handle from the outside you must push the button next to the red handle to lift the inner safety lock.

A short connecting rod attaches to the front of the double lever. The short connecting rod goes to the front locking bolt. If you pull the canopy handle away from the canopy frame, these things happen:

– The double lever turns to pull the both of the connecting rods.

– The long connecting rod pulls the rear locking bolt forward.

– The short connecting bolt pulls the front locking bolt aft. The aft movement of the locking bolt operates a micro switch for the door unlocked warning light (DOOR or DOORS) located on the annunciator panel.

The door can be pushed up and out to open.

With the door fully closed, push the door handle towards the door frame. This engages the locking bolts in the fuselage holes. The forward locking bolt operates the door unlocked micro switch. When the handle is flush with the door frame, the door is locked. Push outwards on the bottom of the door frame to make sure that it is locked.

B. If MÄM 40-139 Is Installed

Figure 10 shows the passenger door installation and locking mechanism when the design change MÄM 40-139 is installed.

The passenger door is a CFRP molding with inner and outer frames. The frames bond together with thickened resin. Each part of the frame has layers of carbon cloth and one layer of glass cloth. Areas of high stress have extra layers of carbon cloth. Mounting bushes for the locking bolts bond to the inside of the frame with thickened resin.

The door has an acrylic glass window. A special flexible adhesive bonds the window to the door frame. A flexible filler seals the small gap between the edge of the window and the frame.

Two hinges attach the door to the top of the fuselage near the center-line. The hinges bolt to the door frame. The front hinge can be removed from inside of the cabin in an emergency. With the front hinge removed, the passenger door can be forced open from the top. A gas strut attaches to a bracket at the rear of the door and to the fuselage. The gas strut holds the door open. A door unlocked warning light (DOOR OPEN or DOORS) on the G1000 or on the annunciator panel operates when the door is unlocked.

A handle on the left of the door operates two locking bolts. The locking bolts are at the bottom front and rear corners of the door.

The handle has two parts. The inner handle is red and has a double lever. The outer handle is red and attaches to the inner handle with two roll pins. A long connecting rod attaches to the rear of the double lever. The other end of the long connecting rod attaches to the inside of the rear locking bolt. A safety lock is fitted to prevent accidental movement of the handle.

You must lift the safety handle before you can operate the red handle from inside the passenger compartment. To operate the red handle from the outside you must push the button next to the red handle to lift the inner safety lock.

A short connecting rod attaches to the front of the double lever. The short connecting rod goes to the front locking bolt. If you pull the canopy handle away from the canopy frame, these things happen:

– The double lever turns to pull the both of the connecting rods.

– The long connecting rod pulls the rear locking bolt forward.

– The short connecting bolt pulls the front locking bolt aft. The aft movement of the locking bolt operates a micro switch for the door unlocked warning light (DOOR OPEN or DOORS) located on the G1000 or on the annunciator panel.

The door can be pushed up and out to open.

With the door fully closed, push the door handle towards the door frame. This engages the locking bolts in the fuselage holes. The forward locking bolt operates the door unlocked micro switch. When the handle is flush with the door frame, the door is locked. Push outwards on the bottom of the door frame to make sure that it is locked.

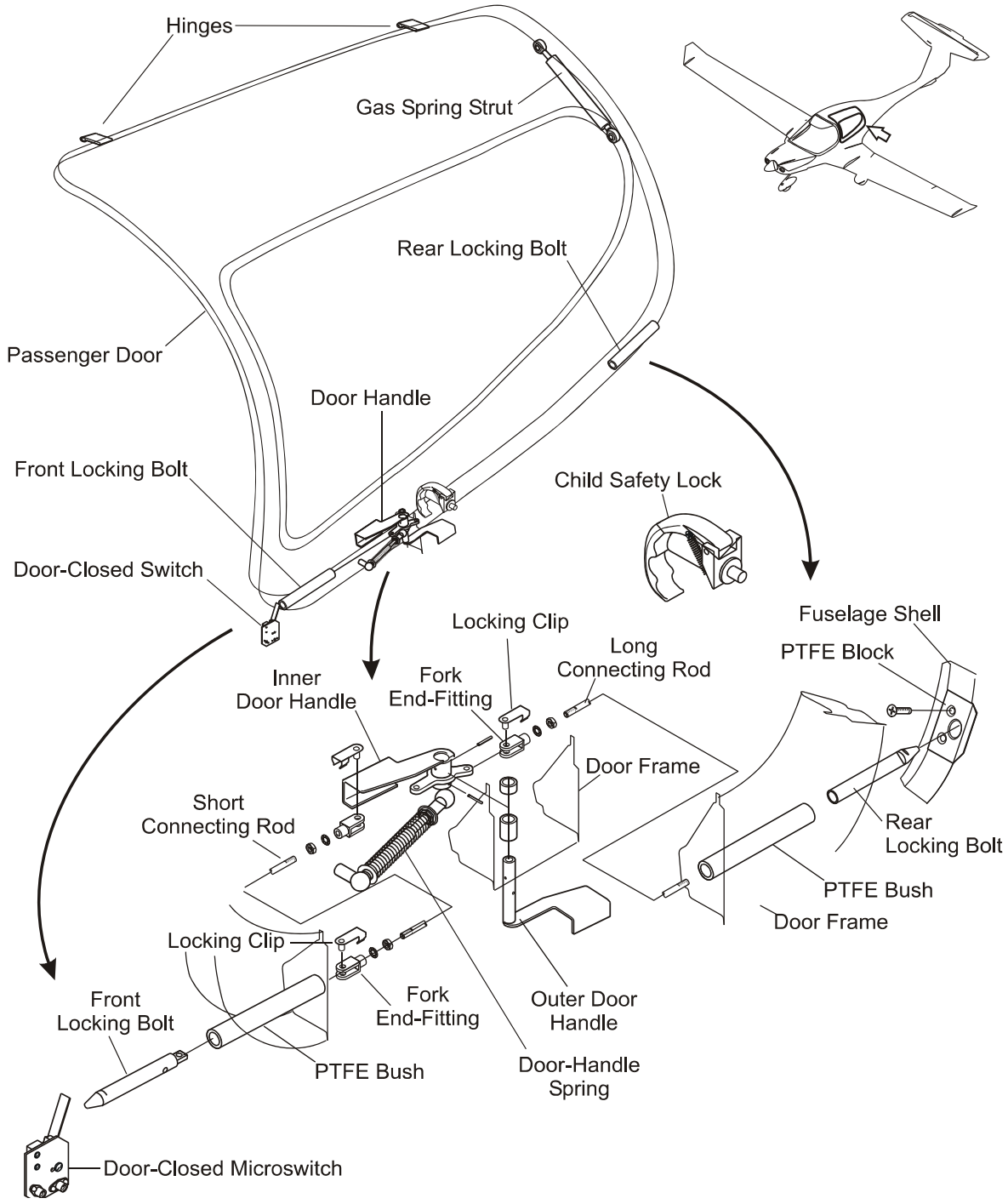


Figure 9: Passenger Door (if MÄM 40-139 is not installed)

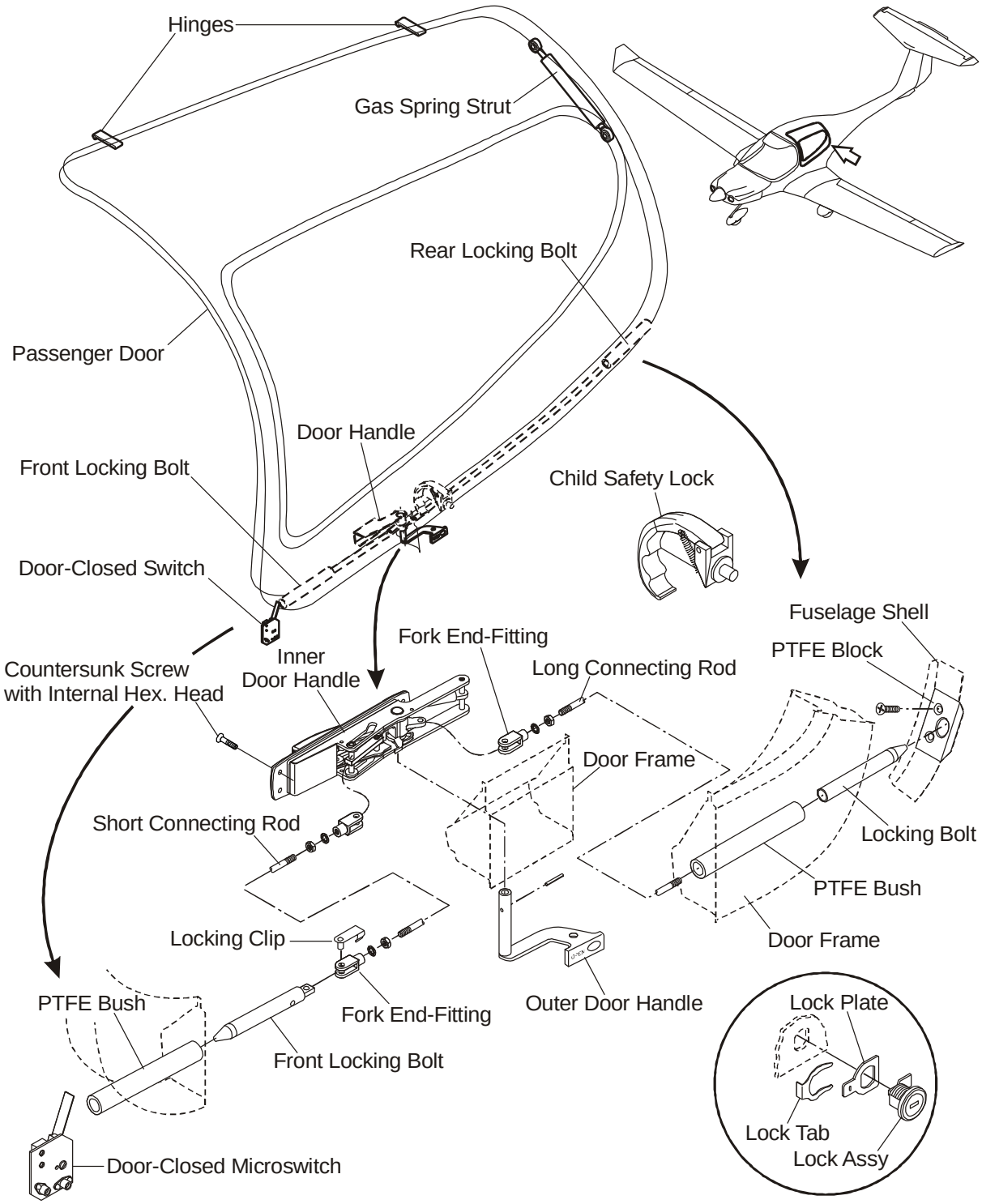


Figure 10: Passenger Door (MÄM 40-139 implemented)

Trouble-Shooting

1. General

This table below lists the defects you could have with the canopy and passenger door. If you have the trouble detailed in the Trouble column, read across to the Possible Cause column. Then do the repair in the Repair column.

Trouble	Possible Cause	Repair
Canopy/door is difficult to move.	Canopy/door frame damaged. Canopy/door hinges damaged. Gas spring strut defective.	Replace the canopy/door. Replace the damaged parts. Replace the gas spring strut.
Canopy/door handle is difficult to move.	Locking bolts damaged. Handle bushes damaged.	Replace the damaged bolt. Replace the canopy/door.
Canopy handle is difficult to move.	Teleflex cable defective.	Replace the teleflex cable.
Incorrect operation of door unlocked warning on the annunciator panel.	Canopy/door micro-switch incorrectly adjusted. Canopy/door micro-switch defective. Defective wiring.	Adjust Canopy/door micro switch. Replace defective micro switch. Do a continuity test of the wiring. Refer to Chapter 92 for the wiring diagrams.
Red button operating the safety hook mechanism is stuck in pushed position.	Poor lubrication.	Lubricate. Refer to Section 12-20.

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Maintenance Practices

1. General

These Maintenance Practices tell you how to install and remove the canopy and passenger door. They also tell you how to test and adjust the locking mechanism. The standard remove/install procedure is valid for the standard canopy and the canopy with the jettison system installed (OÄM 40-232 installed).

2. Remove/Install the Canopy

A. Remove the Canopy

	Detail Steps/Work Items	Key Items/References
(1)	Open the canopy: – Pull the canopy handle away from the canopy frame. – Lift the canopy open.	Refer to Figure 3 and 4.
(2)	Disconnect the plug for the flood light.	
(3)	S/N's through 40.051: – Remove the two nuts, washers and bolts which attach the canopy to the hinge frame. S/N's 40.052 and subsequent: – Remove the four nuts, washers and bolts which attach the canopy to the hinge frame bracket.	Refer to Figure 1. Hold the canopy! Refer to Figure 2. Hold the canopy!
(4)	Lift the canopy clear of the airplane.	Use two persons.

B. Install the Canopy

	Detail Steps/Work Items	Key Items/References
(1)	Lift the canopy into position on the airplane.	Use two persons.
(2)	Engage the tapered ends of the hinge frame in the tubular brackets on the canopy frame.	Refer to Figure 3 and 4.
(3)	S/N's through 40.051: – Install the two bolts, washers and nuts which attach the canopy to the hinge frame. S/N's 40.052 and subsequent: – Install the four bolts, washers and nuts which attach the canopy to the hinge frame bracket.	
(4)	Connect the plug for the flood light.	
(5)	Close the canopy.	
(6)	Operate the canopy lock: – Hold the canopy closed. – Push the canopy handle towards the canopy frame. – Push up on the rear of the canopy frame.	When the canopy is locked, the canopy handle must be flush with the canopy frame. To make sure that the canopy is locked.
(7)	Do a test for correct operation of the door unlocked warning light (DOOR or DOORS).	Refer to Paragraph 6.

3. Remove/Install the Gas Spring Strut for the Canopy

A. Remove the Gas Spring Strut for the Canopy

	Detail Steps/Work Items	Key Items/References
(1)	Remove the canopy.	Refer to Paragraph 2.
(2)	Remove the nut and washer that attach the strut to the hinge frame.	Refer to Figure 1 (S/N's through 40.051) or Figure 2 (S/N's 40.052 and subsequent).
	WARNING: MAKE SURE THAT THE STRUT IS FULLY EXTENDED BEFORE YOU DISCONNECT IT FROM THE HINGE FRAME.	
(3)	Pull the top of the strut away from the hinge frame.	Catch the bush and second washer.
(4)	Remove these items that attach the bottom of the strut: – Nut, washer and bolt. – Bush. – Two polyamide spacers.	
(5)	Remove the strut from the airplane.	

B. Install the Gas Spring Strut for the Canopy

	Detail Steps/Work Items	Key Items/References
(1)	Put the strut in position in the airplane.	The cylinder goes to the top.
(2)	Install the bolt, washer and self-locking nut at the bottom attachment to the firewall.	Torque 6.4 Nm (4.7 lbf.ft.). Use a new self-locking nut.
(3)	Put the washer and bush in position on the hinge frame.	
(4)	Move the top eye-end of the strut over the bush on the hinge frame.	
(5)	Install the washer and self-locking nut to the hinge frame.	Torque 6.4 Nm (4.7 lbf.ft.). Use a new self-locking nut.
(6)	Install the canopy.	Refer to Paragraph 2.

4. Remove/Install the Passenger Door

A. Remove the Passenger Door

	Detail Steps/Work Items	Key Items/References
(1)	Open the passenger door: – Push and hold the safety button next to the door handle. – Pull the door handle away from the door frame. – Lift the door open.	Refer to Figure 9 or 10.
(2)	Remove the gas strut: – Remove the locking clips from the gas strut top and bottom ball-end fittings. – Pull the gas strut off the ball end fittings on the fuselage and clear of the airplane.	Hold the door!
(3)	Remove the passenger reading light assembly from the top of the cockpit.	For access to the front door hinge. Refer to Section 33-10.
(4)	Remove the bolts and washers which attach the front and rear door hinges to the fuselage.	Hold the door!
(5)	Lift the door clear of the airplane.	

B. Install the Passenger Door

	Detail Steps/Work Items	Key Items/References
(1)	Put the door in position in the fuselage.	
(2)	Install the bolts and washers which attach the front and rear door hinges to the fuselage.	
(3)	Install the passenger reading light assembly.	Refer to Section 33-10.
(4)	Install the gas strut: – Push the gas strut ball end fittings onto the fuselage gas strut mounts. – Install the locking clips which lock the ball end fittings in place.	
(5)	Close the door.	
(6)	Operate the door lock: – Hold the door closed. – Press the safety button next to the door handle and push the door handle towards the door frame. – Push outwards on the bottom of the door frame.	When the door is locked, the door handle must be flush with the door frame.
(7)	Do a test for correct operation of the door unlocked warning light (DOOR or DOORS).	Refer to Paragraph 6.

5. Remove/Install the Gas Spring Strut for the Door

A. Remove the Gas Spring Strut for the Door

	Detail Steps/Work Items	Key Items/References
(1)	Open the passenger door: – Push and hold the button next to the door handle. – Pull the door handle away from the door frame. – Lift the door open.	Refer to Figure 9 or 10.
(2)	Remove the gas strut: – Remove the locking clips from the gas strut top and bottom ball-end fittings. – Pull the gas strut off the ball end fittings on the fuselage and clear of the airplane.	Hold the door!

B. Install the Gas Spring Strut for the Door

	Detail Steps/Work Items	Key Items/References
(1)	Open the passenger door: – Pull the door handle away from the door frame. – Lift the door open.	Refer to Figure 9 or 10. Hold the door!
(2)	Install the gas strut: – Push the gas strut ball end fittings onto the fuselage gas strut mounts. – Install the locking clips which lock the ball end fittings in place.	
(3)	Close the door.	

6. Test the Door Unlocked Warning Light

	Detail Steps/Work Items	Key Items/References
(1)	Make sure that both the front canopy and the passenger door are fully closed.	Operating handles flush against the canopy/door frame.
(2)	Test the operation of the door unlocked warning light (DOOR or DOORS) on the annunciator panel:	Monitor the door unlocked warning light (DOOR or DOORS) on the annunciator panel.
	– Set the ALT/BAT switch to ON.	The warning light must be off.
	– Move the passenger door operating handle towards the open position.	The warning light must come on when the operating handle has moved away from the door frame.
	– Move the door operating handle to the fully closed position.	The warning light must go off.
	For S/N with the Canopy-Closed switch installed:	
	– Move the canopy operating handle towards the open position.	The warning light must come on when the operating handle has moved away from the door frame.
	– Move the canopy operating handle to the fully closed position.	The warning light must go off.
	– Set the ALT/BAT switch to OFF.	

7. Examine the Carbon Hinges on the Passenger Door

	Detail Steps/Work Items	Key Items/References
(1)	Open the passenger door to carry out the carbon hinge inspection.	
(2)	Examine the carbon hinges for cracks and delamination on the side faces: – Hold the passenger door frame with one hand to the left and one hand to the right of the hinge. – Apply torsional test force to the hinge by alternately pulling with one hand and pushing with the other hand. – If cracks become visible on the side faces of the hinges when test force is applied, the hinge is structurally damaged due to delamination. Contact Diamond Aircraft for repair instructions.	Refer to Figure 11. Apply test force of approx. 8 kg (18 lb) with each hand.

	Detail Steps/Work Items	Key Items/References
(3)	Cracks at the outer face of the hinges where they meet the door frame may be visible. If cracks in this area are visible, perform the following checks: Hold the passenger door frame with one hand to the left and one hand to the right of the hinge. – Apply torsional test force to the hinge by alternately pulling with one hand and pushing with the other hand, check the cracks on the outer face of the hinge. – Push the passenger door open against the mechanical stop of the damper with care, do not use undue force. Check the cracks on the outer face of the hinge. If cracks expand extensively when applying test force, the hinges are structurally damaged. Contact Diamond Aircraft for repair instructions. If the cracks do not expand extensively when applying test force, they are limited to the painting and do not affect the serviceability of the door.	Refer to Figure 12. Apply test force of approx. 8 kg (18 lb) with each hand.

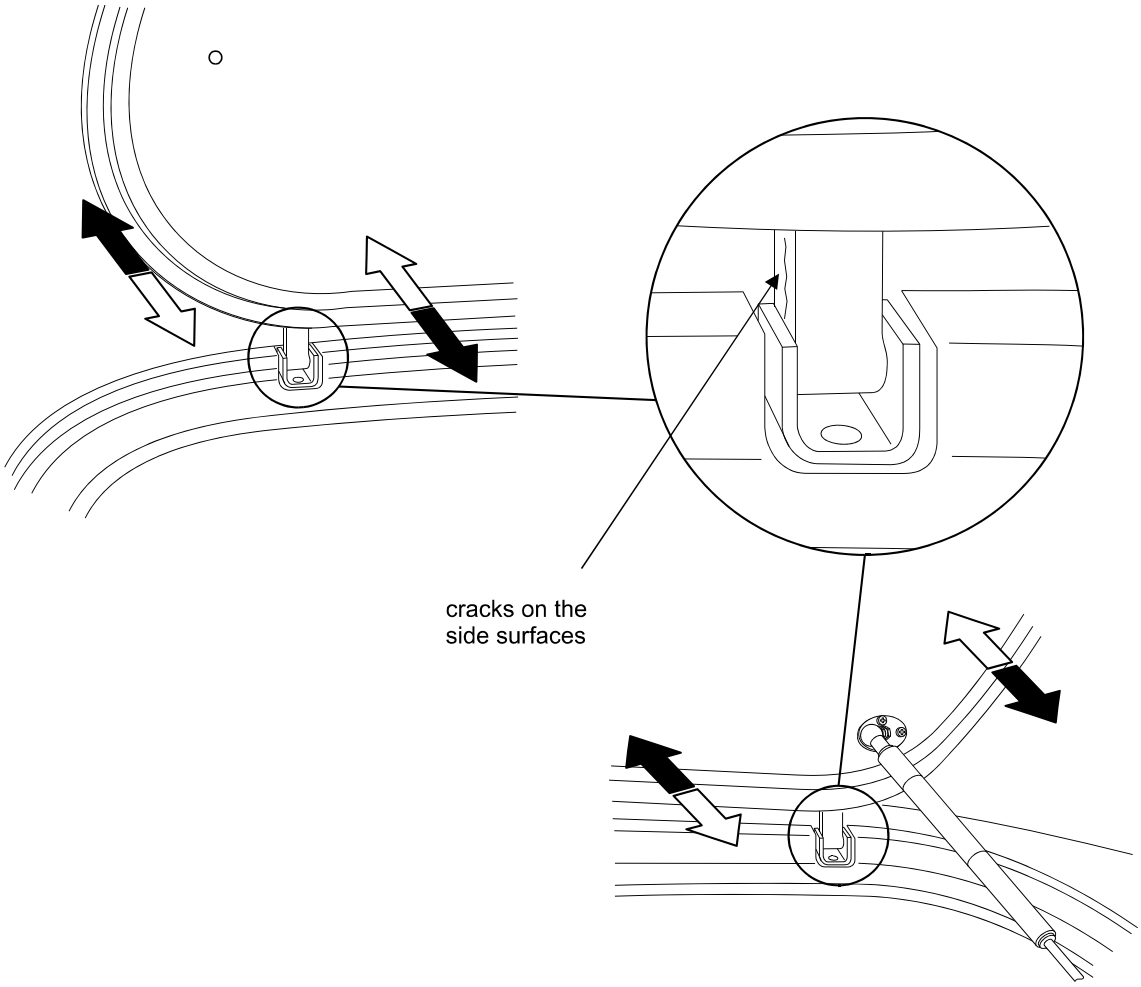


Figure 11: Passenger Door Torsional Hinge Test

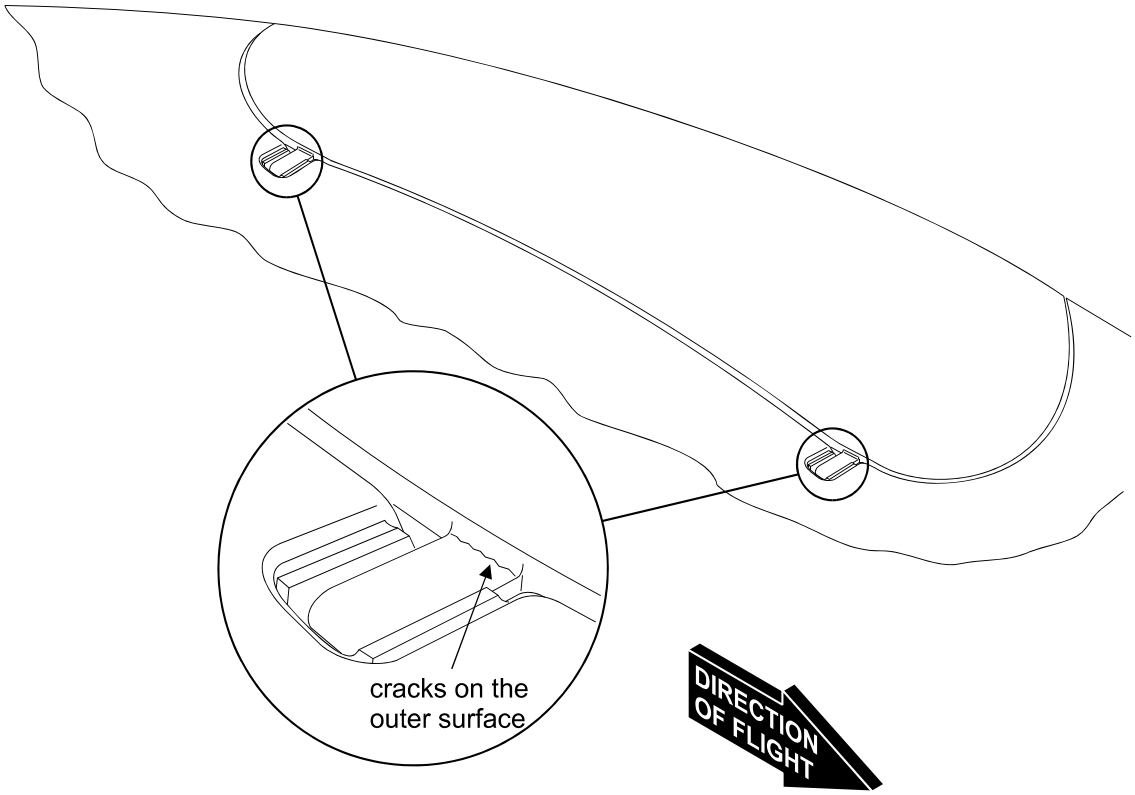


Figure 12: Passenger Door Outer Face Hinge Test

8. Inspection of the Door Locking and Safety Mechanisms

	Detail Steps/Work Items	Key Items/References
(1)	Make sure the door lock mechanism works correctly: – The pins must engage in the guarding plates of the door frame correctly.	
(2)	Make sure the safety hook mechanism works correctly: – Lubricate the red button of the safety hook mechanism from outside, where it enters the door frame. – Operate the button several times. Repeat lubrication procedure until button moves smoothly. – Make sure the safety hook engages correctly into the retaining block on the fuselage when the door is closed but unlatched.	Refer to Section 12-20.

9. Canopy Jettison System (if OÄM 40-232 installed)

A. 100h Maintenance Check

	Detail Steps/Work Items	Key Items/References
(1)	Check if the lead seal (26) with the lead wire (25) is applied.	Refer to Figure 6.
(2)	Check if the Bowden cables (2, 3) come out of the Teflon cylinders 6 mm (0.24 in) on each side.	Refer to Figure 5.
(3)	Check if the torque seal is applied where the Bowden cable comes out of the Teflon cylinder.	
(4)	Check clearance between canopy hooks and Roeger Type hooks: 1mm +0.5/-0 (0.04 in).	Refer to Figure 7.

B. Release Test

	Detail Steps/Work Items	Key Items/References
(1)	Position two people on each side of the canopy, who hold the canopy in an almost closed position.	
(2)	A third person sitting inside the airplane releases the canopy jettison system.	
(3)	Remove the canopy.	
(4)	Report test result to the manufacturer, Diamond Aircraft Industries GmbH Office of Airworthiness N.A. Otto-Str. 5 A-2700 Wiener Neustadt Austria by mail, fax (+43-2622-26780) or e-mail (airworthiness@diamond-air.at).	

C. Replace the Canopy Jettison Assembles

	Detail Steps/Work Items	Key Items/References
(1)	Remove the mounting plates with the spring elements from the canopy.	
(2)	Loosen the headless screws (12).	Refer to Figure 6.
(3)	Screw back the hexagon nuts (4) as far as possible.	Refer to Figure 6.
(4)	Pull out the Bowden wire clamp (11).	Refer to Figure 6.
(5)	Unhook the Bowden wires (2, 3).	Refer to Figure 6.
(6)	Unscrew the canopy jettison assemblies (2, 3) from the hinge (1) and remove it.	Refer to Figure 5.
(7)	Install the new canopy jettison mechanism - Bowden wire assemblies (2, 3).	Refer to Figure 5.
(8)	Screw the new canopy jettison mechanism - Bowden wire assemblies (2,3) into the hinge (1), secure it with Loctite screw locking 243 and tighten it with 25 Nm (18.4 lbf.ft).	Refer to Figure 5.
(9)	Turn the mounting plates of the canopy jettison mechanism (2, 3) in a position so that the two holes coincide with the mounting holes of the canopy.	Refer to Figure 5.
(10)	Screw back the hexagon nuts (4) of the new canopy jettison mechanism - Bowden wire assemblies.	Refer to Figure 5.
(11)	Hook the Bowden wire of the RH canopy jettison mechanism (3) into the Bowden wire clamp (14).	Refer to Figure 6.
(12)	Adjust the hexagon nut (4) in a way so that the Bowden wire (3) is **NOT pretensioned**. The play must be adjusted so that the Bowden cable can be pushed down with a small screwdriver about two diameters of the Bowden cable. The play must not be as big that the cable can touch the bracket.	Refer to Figure 5. Refer to Figure 8.

	Detail Steps/Work Items	Key Items/References
(13)	When the play is adjusted correctly, fix the position of the Bowden cable (3) with the headless screws (12). Apply Loctite screw locking 243.	Refer to Figure 6.
(14)	Tighten the hexagon screw (4) on the collet. Apply Loctite screw locking 243.	Refer to Figure 5.
(15)	Repeat steps 14 to 17 with the LH Bowden cable mechanism (2).	Refer to Figure 5.
(16)	Secure the jettison lever (13) with a lead wire (25) and a lead seal (26). Make sure that NO fuse wire is used. Secure screw (24) with Loctite screw locking 243.	Refer to Figure 6.
(17)	Fix the canopy on the mounting plates of the canopy jettison mechanism.	
(18)	Check if the Bowden cables (2, 3) come out of the Teflon cylinders, 6 mm (0.24 in.) on each side.	Refer to Figure 5.
(19)	Check if the torque seal is applied where the Bowden cable comes out of the Teflon cylinder.	

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Section 52-40
Access Panels

1. General

The DA 40 has a small number of access panels. Panels which must be used often (for example the oil filler panel), have quick-release fasteners. Other panels have the usual screws. Refer to Section 71-10 (Lycoming version) or 71-11 (TAE version) for data about the engine cowlings.

2. Description

Figure 1 shows the location of the access panels on the airplane.

Most panels are GFRP moldings. Screws hold the panels in position. There are no special procedures for removing or installing access panels.

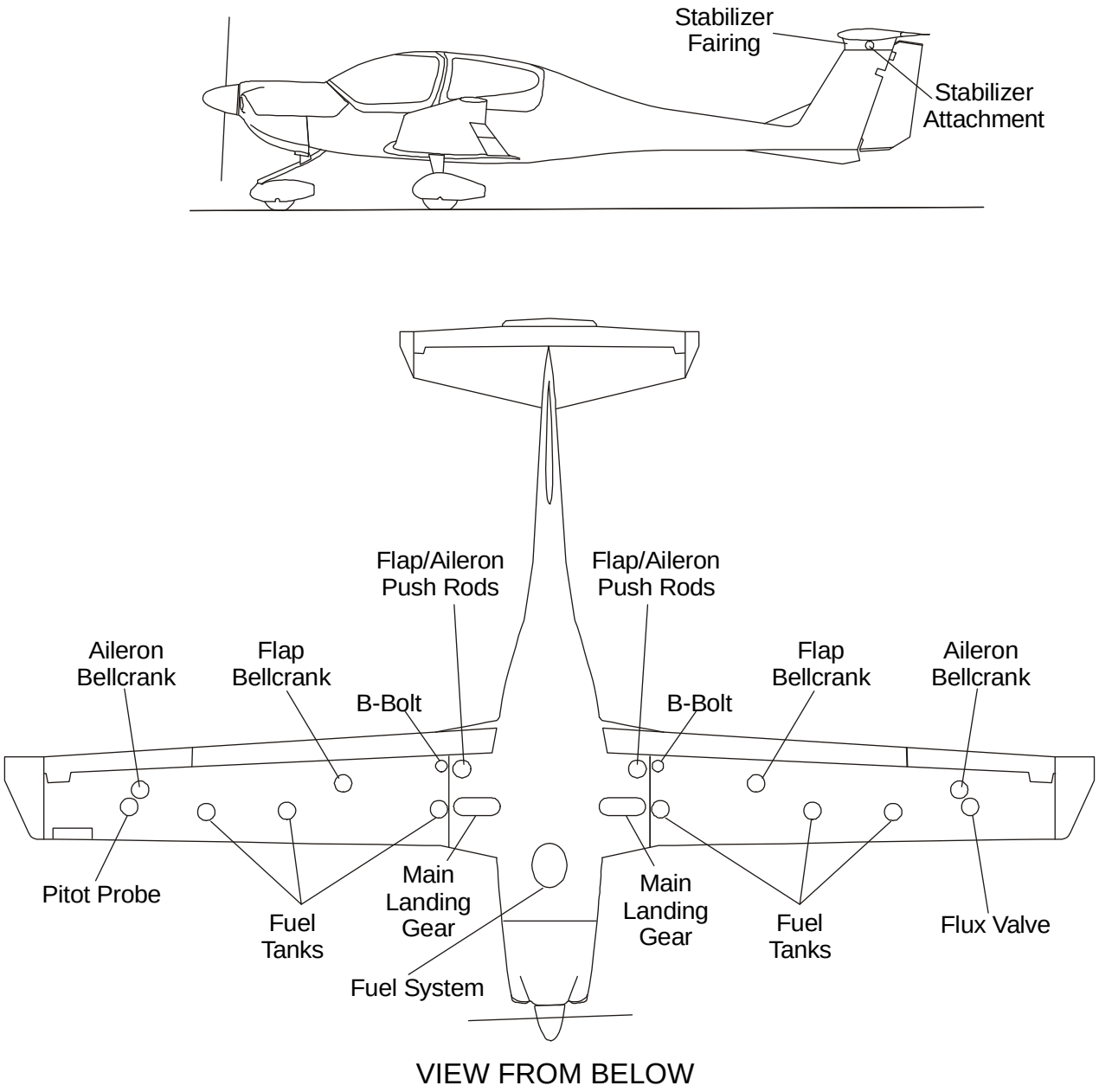


Figure 1: Access Panel Locations

CHAPTER 53

FUSELAGE

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CHAPTER 53
FUSELAGE

1. General

The DA 40 fuselage has a semi-monocoque structure. Two GFRP half-shells make the fuselage skin. GFRP frames and webs give the fuselage strength and stiffness. The vertical stabilizer is an integral part of the fuselage.

The fuselage shells have many layers of glass cloth. Some areas have more layers of glass cloth than other areas. This gives more strength and stiffness where it is needed. Rigid foam inserts give stiffness where necessary.

The frames and webs also have many layers of glass cloth. Some areas have layers of carbon fiber cloth or tape to give extra strength. Some components also have rigid inserts of GFRP for attaching brackets or other components.

Section 53-10 gives the data for the fuselage structure.

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Section 53-10
Fuselage Structure

1. General

This Section provides information on the fuselage structure. It also includes the vertical stabilizer. See Chapter 51-00 for structural repair procedures.

All of the main structural components are GFRP rigid moldings. Many layers of glass cloth bond together to make each molding. Some components have layers of carbon fiber cloth. This gives more strength and stiffness.

Most components have rigid GFRP inserts. The inserts give strength and stiffness for attaching other components such as brackets for controls.

Bonding paste (thickened resin) bonds components to other components. Most of the components in the fuselage also bond to the fuselage shell.

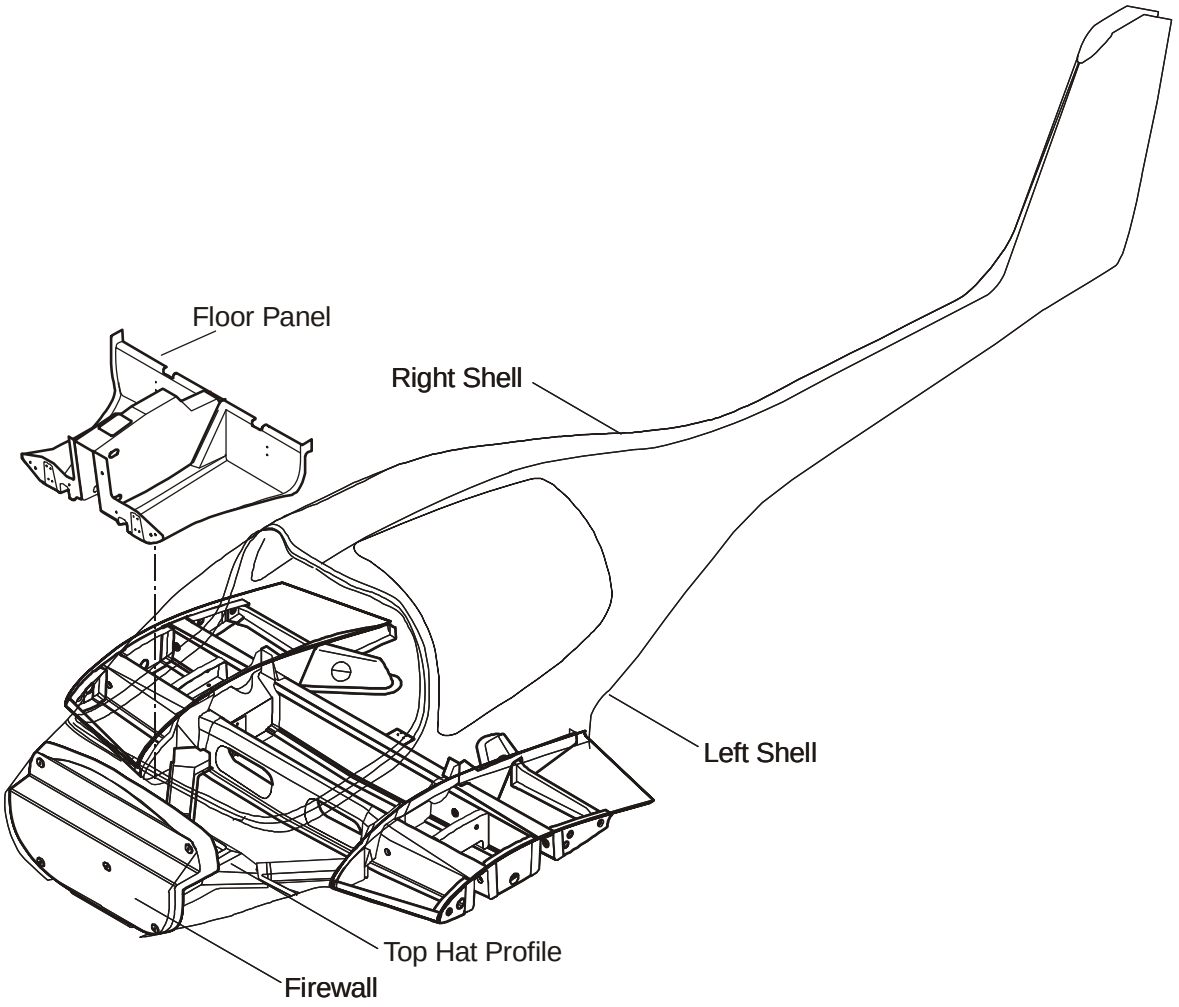


Figure 1: Fuselage Shells and Front Fuselage Structure

2. Description

Figures 1 to 4 show the fuselage structure.

A. Fuselage Shells

Two GFRP shells make the outer skin of the fuselage. The shells transmit structural loads. The shells bond to each other at the top and bottom of the fuselage. Each shell has many layers of glass cloth. Some areas have of the shell have more layers to give more strength and stiffness. Some areas have rigid foam inserts to give more stiffness.

Thickened resin bonds all other structural components to the fuselage shells. Many small components bond to the fuselage shells, these include:

– Air inlet and outlet ducts.

– Conduits for electrical wires, antenna cables and fuel pipes.

B. Firewall

The firewall closes the front of the fuselage. It also holds the attachments for the engine mount. It has holes for the different systems that attach to the engine.

The firewall is a rigid GFRP molding. A special adhesive bonds a fire-resistant ceramic blanket to the front face of the firewall. The adhesive also bonds a stainless-steel sheet to the front of the blanket. Components which go through the firewall also hold the stainless-steel sheet and blanket to the GFRP molding.

C. Top Hat Profile

The top hat profile bonds to the inner bottom skin of the fuselage, behind the firewall. It gives strength and stiffness to the front fuselage. It has the mounting for the nose landing gear and channels for fuel pipes.

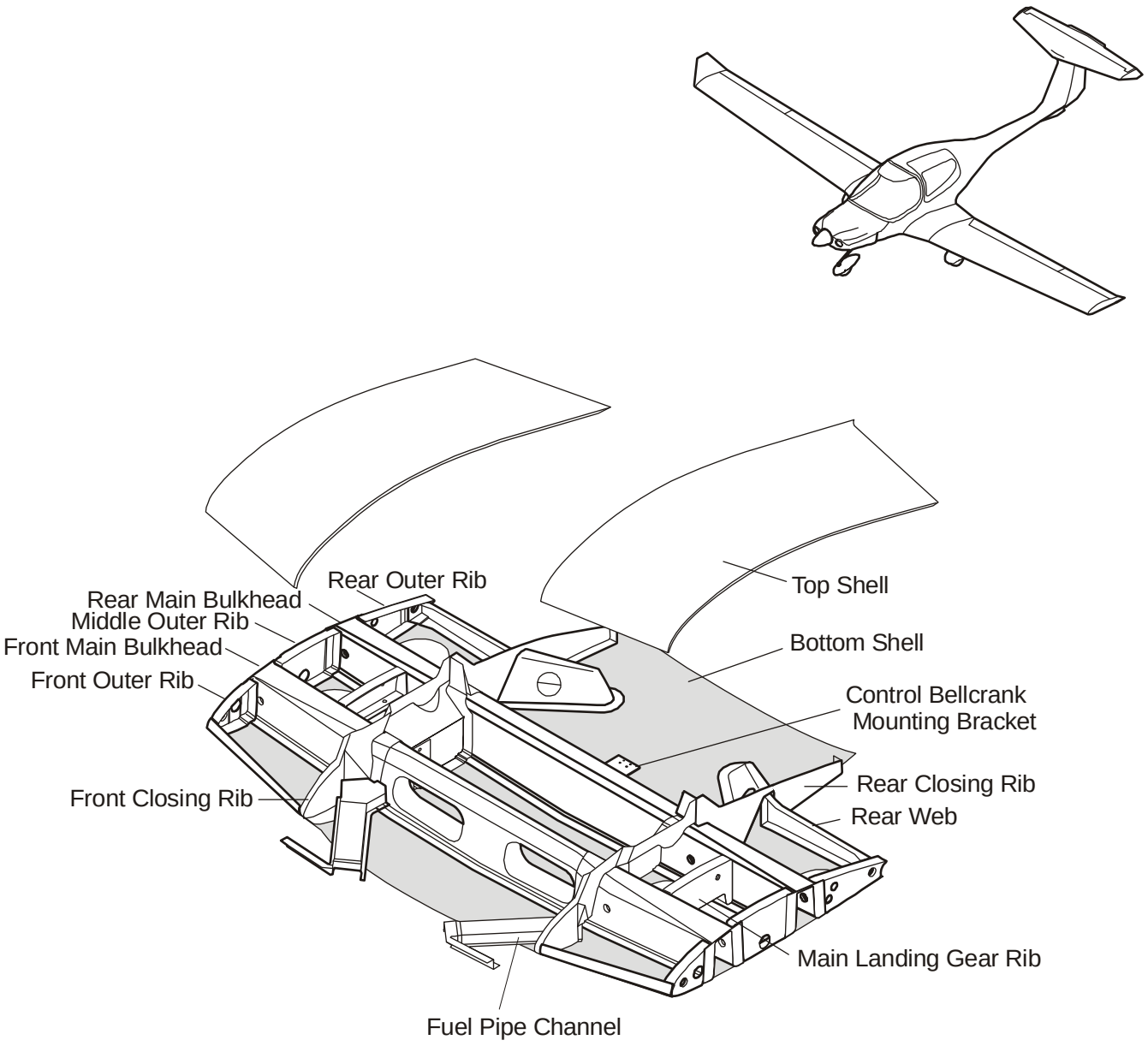


Figure 2: Fuselage Structure - Center Section

D. Floor Panel

The floor is a rigid GFRP molding. It bonds to the inner bottom skin of the fuselage shell and the firewall. It goes over the top of the top hat profile. The center part of the floor panel makes the center console.

The rear part of the floor makes the front support for the pilots' seats. It also holds the front of the control stick support brackets. The rudder pedal assembly for each pilot attaches to the floor panel.

E. Center Section

Figure 2 shows the center section. The center section has the mountings for the wings and the main landing gear. It has a front main bulkhead and it has a rear main bulkhead.

The front main bulkhead is a rigid GFRP box-section molding. It has layers of UD carbon tape on the top and bottom faces. The carbon gives cloth gives strength and stiffness to the bulkhead.

The rear main bulkhead has a similar structure. The control bellcrank mounting-bracket is bonded to the rear face of the rear main bulkhead, in the center.

Front, middle and rear outer ribs bond to the outboard ends of the main bulkheads. The ribs are rigid GFRP moldings which make the outer face of the wing stub.

Main landing gear ribs bond to the main bulkheads inboard of the middle outer rib. The main landing gear rib has the outer mounting for the main gear strut.

Front and rear closing ribs bond to the main bulkheads. They are inboard of the main landing gear ribs. The ribs are rigid GFRP moldings. The middle part of the front closing rib has the inner mounting for the main landing gear. The rear channels of the top hat profile bond to the front closing ribs and the front main bulkhead. The rear channels also carry fuel pipes.

A rigid GFRP bottom shell bonds to the lower surface of the center section and makes the bottom surface of the wing stubs and fuselage. Rigid GFRP top shells bond to the top-outer surface of the center section and makes the top surface of the wing stubs.

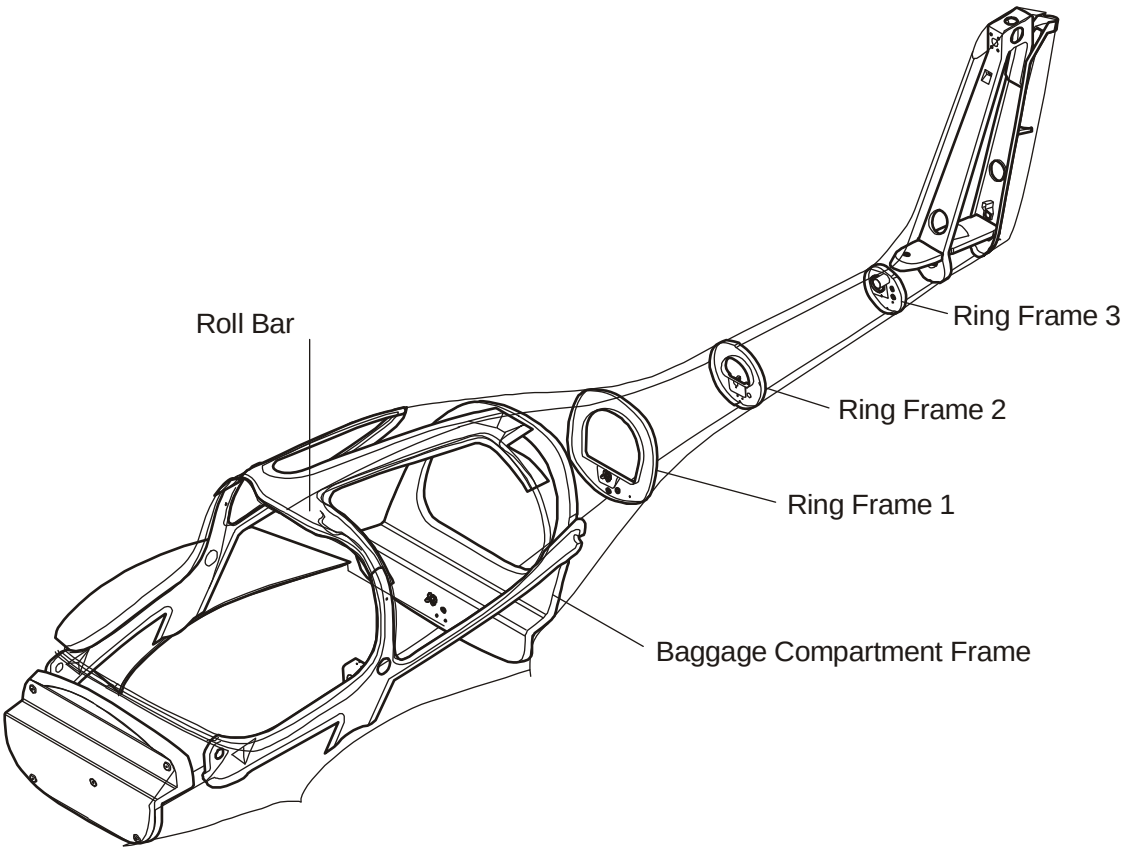


Figure 3: Fuselage Structure - Rear Fuselage

F. Roll Bar

The roll bar is an integral part of the LH and RH fuselage shells. It also acts as a frame around the canopy, window and passenger door cut-outs. UD carbon tape provides adequate strength and stiffness; overlapping layers are used to interconnect LH and RH part of the roll bar after the joining of the fuselage shells.

G. Baggage Compartment Frame

The baggage compartment frame is a rigid GFRP molding. It closes the rear of the cockpit and makes a support for the passenger seat (rear seat pan). The frame bonds to the inner fuselage shells and the center section lower shell.

The lower part of the frame has holes for the rudder cables and trim control. It also has a control rod guide for the elevator control rod.

H. Ring Frame 1

The ring frame 1 is a rigid GFRP molding. It bonds to the fuselage shells just aft of the baggage compartment frame. It has holes for the rudder control cables and trim control. It also has a control rod guide for the elevator control rod.

I. Ring Frame 2

The ring frame 2 is a rigid GFRP molding. It bonds to the fuselage shells aft of ring frame 1. It has holes for the rudder control cables and trim control. It also has a control rod guide for the elevator control.

J. Ring Frame 3

The ring frame 3 is a rigid GFRP molding. It bonds to the fuselage shells just forward of the vertical stabilizer. It has holes for the rudder control cables and trim control.

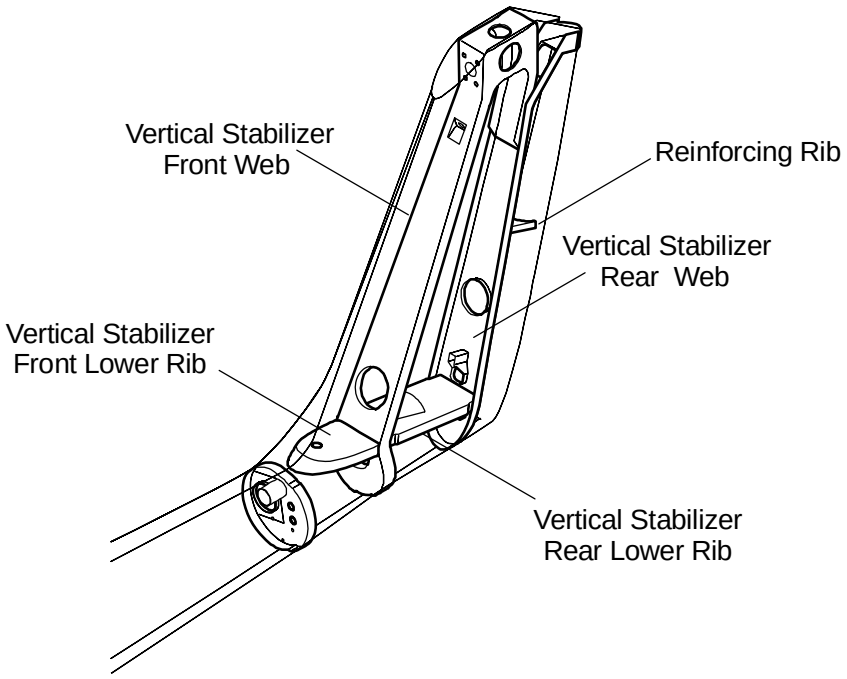


Figure 4: Fuselage Structure - Vertical Stabilizer

K. Vertical Stabilizer Front Lower Rib

The vertical stabilizer front lower rib is a rigid GFRP molding. It bonds to the fuselage shell at the bottom of the vertical stabilizer. It also bonds to the vertical stabilizer front web. It has a hole for the flexible control cable for the elevator trim-tab.

L. Vertical Stabilizer Rear Lower Rib

The vertical stabilizer rear lower rib is a rigid GFRP molding. It bonds to the fuselage shell at the bottom of the vertical stabilizer. It also bonds to the vertical stabilizer front and rear webs. It has a large slot for the elevator control push-rod.

M. Vertical Stabilizer Front Web

The vertical stabilizer front web is a rigid GFRP molding. It bonds to the fuselage shell. It also bonds to the vertical stabilizer lower ribs and to the top of the rear web.

The top of the front web is a rigid channel section. GFRP inserts give strength to the area where the horizontal stabilizer mounts attach.

N. Vertical Stabilizer Rear Web

The vertical stabilizer rear web is a rigid GFRP molding. It bonds to the fuselage shell and it bonds to the vertical stabilizer front web. The top of the rear web has the top mounting for the rudder. It also has a reinforcing rib bonded to the rear face.

The vertical stabilizer rear web closes the rear of the vertical stabilizer.

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Maintenance Practices

1. General

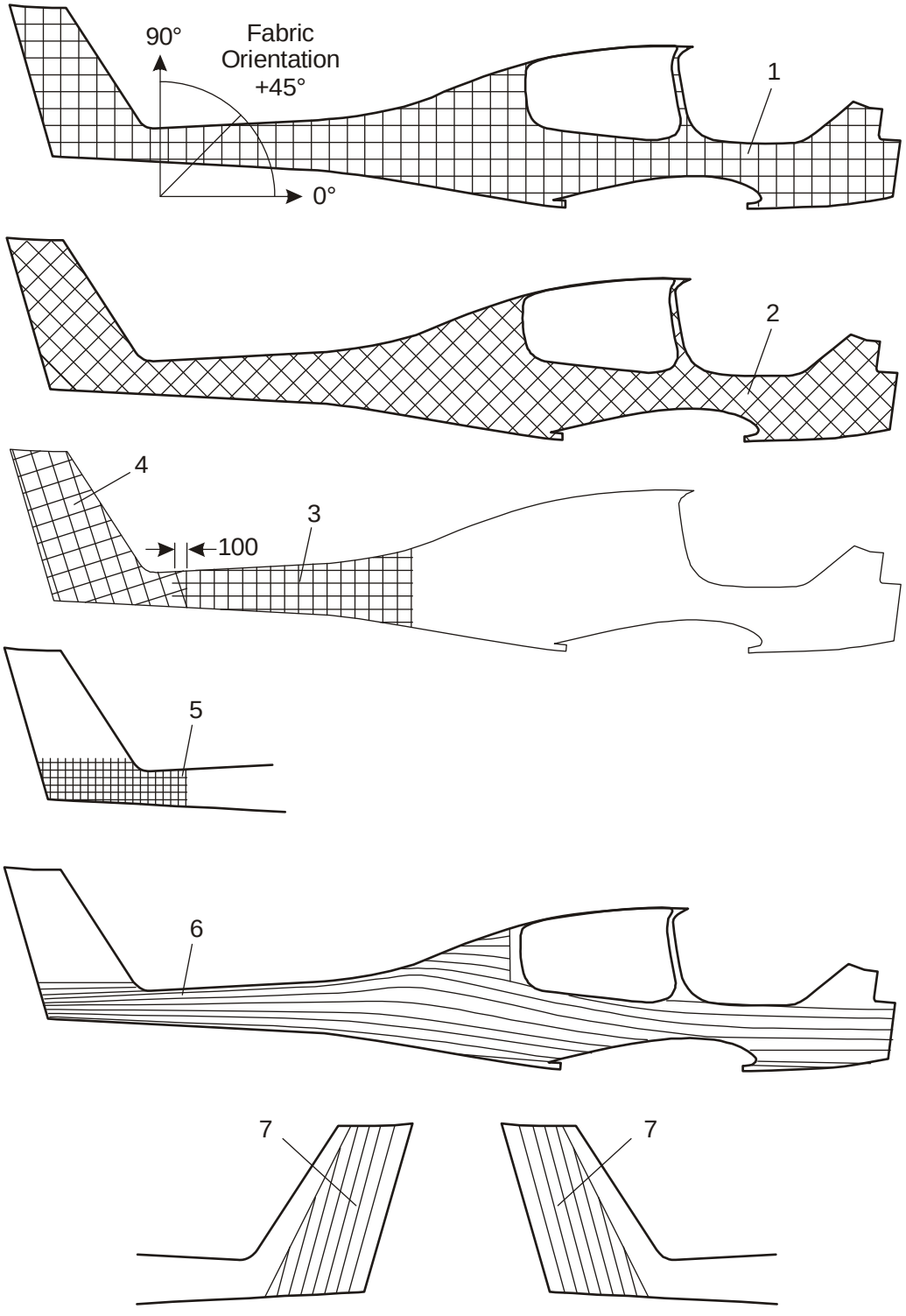
This Section provides information on the lay-up of the major fuselage components. Use this data when you need to repair the fuselage. Refer to Chapter 51 for standard repair procedures.

2. Repair Data for the Fuselage Shells

Figures 5 to 8 show only the basic lay-up of glass fiber cloth and rigid foam in the fuselage shells. Additional layers of glass and carbon fiber cloth reinforcing specially loaded areas are not shown. Contact Diamond Aircraft customer support department if more detailed information (such as further lay-up plans) is needed.

The Figures show the main layers of cloth. The cross-hatching on the figure shows the orientation of the fibers. The orientation is also given in the related table. When you repair the fuselage, you must use the same type of cloth with the same fiber orientation.

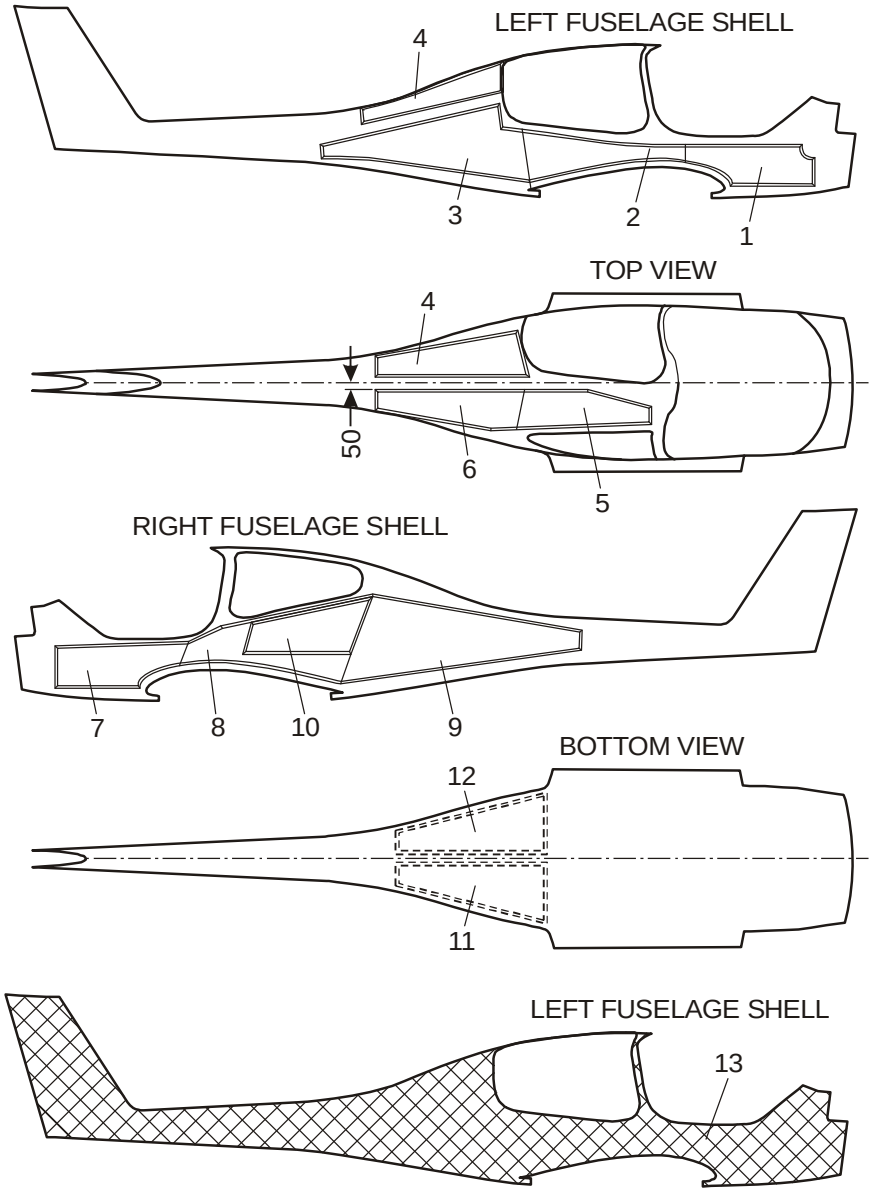
Where dimensions of layers are given in millimeters (mm), divide by 25.4 to obtain the dimension in inches (in).



RIGHT FUSELAGE SHELL LEFT FUSELAGE SHELL

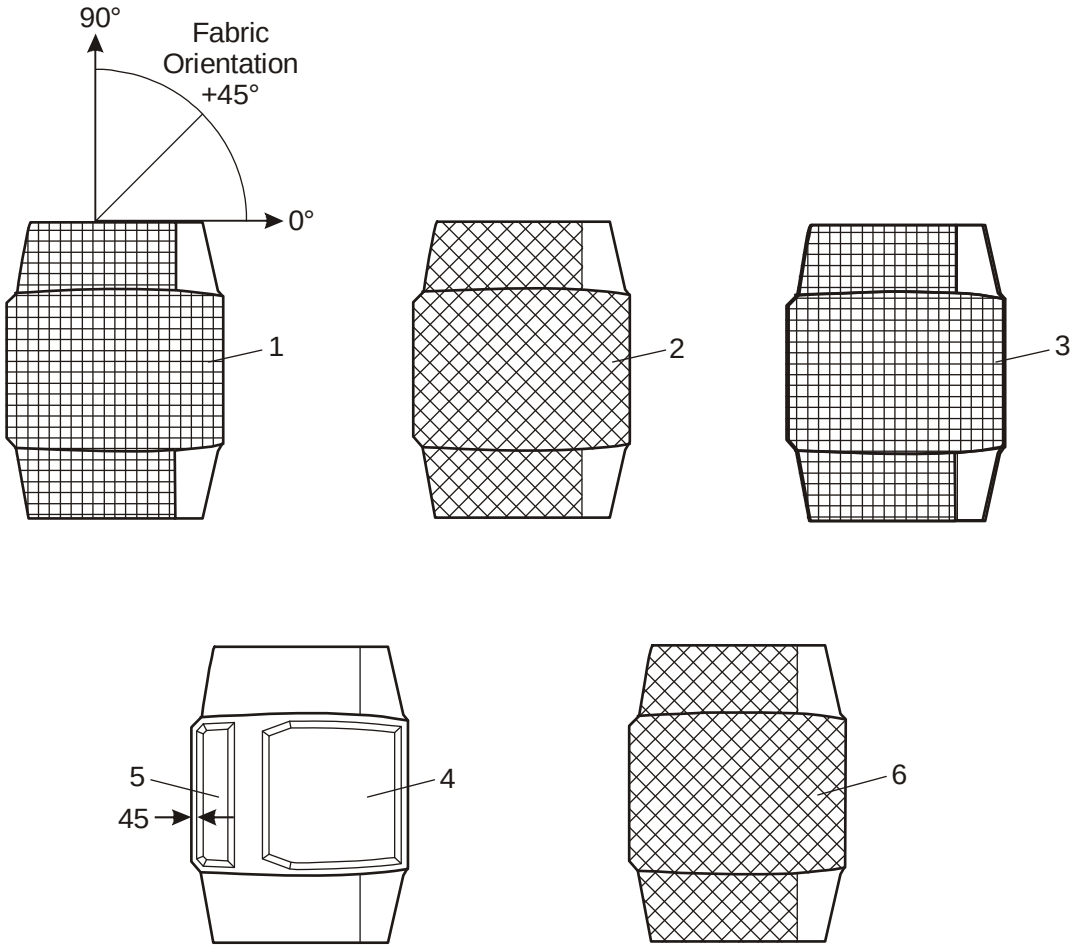
Item No.	Layers	Reference No.	Interglas No.	Type	Remarks
1	1	8.4548.60 Glass	92110	Twill 2/2	0º/90º
2	2	8.4551.60 Glass	92125	Twill 2/2	±45º
3	1	8.4551.60 Glass	92125	Twill 2/2	0°/90º
4	2	8.4551.60 Glass	92125	Twill 2/2	15°/105°
5	2	8.4551.60 Glass	92125	Twill 2/2	0°/90º
6	2	8.4525.60 UD Glass	92146	Twill 2/2	0º
7	2	8.4525.60 UD Glass	92146	Twill 2/2	105°

Figure 5: Main Layers of Cloth in the Fuselage Shells



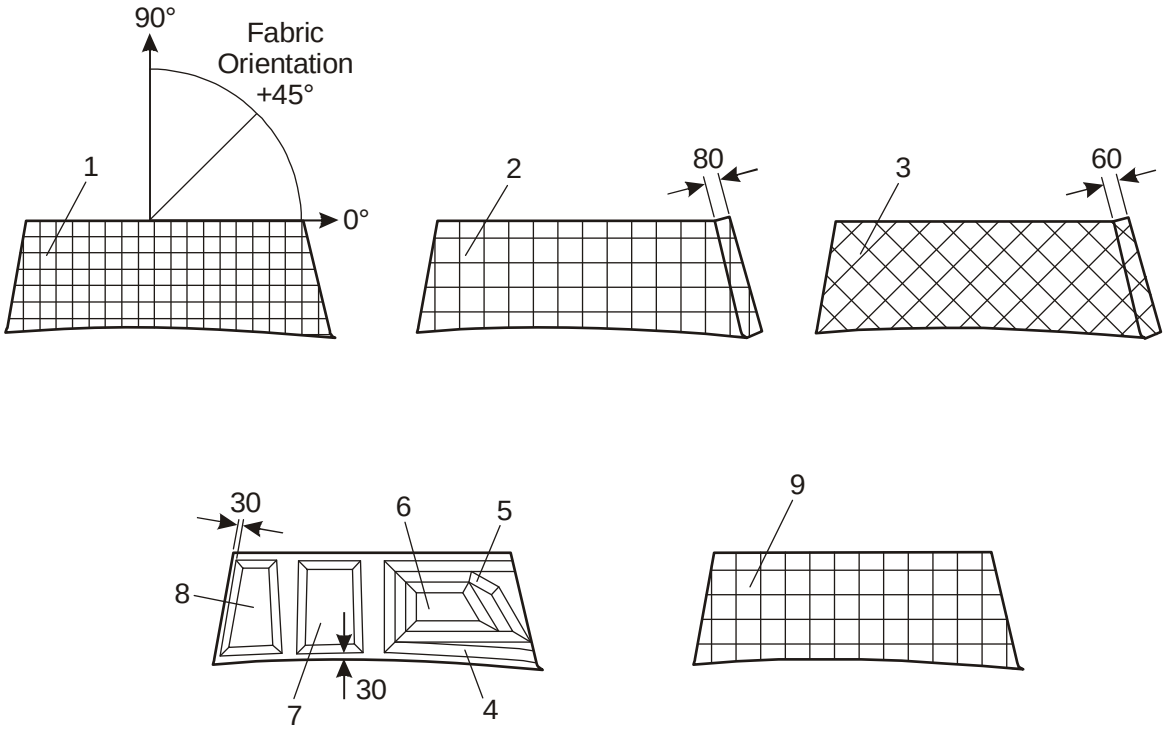
Item No.	Layers	Reference No.	Interglas No.	Type	Remarks
1 - 3		H 60 or Airex C71.55		8 mm rigid foam	
4 - 6		H 60 or Airex C71.55		3 mm rigid foam	
7- 12		H 60 or Airex C71.55		8 mm rigid foam	
13	2	8.4551.60 Glass	92125	Twill 2/2	45º overall

Figure 6: Rigid Foam Inserts in the Fuselage Shells



Item No.	Layers	Reference No.	Interglas No.	Type	Remarks
1	1	8.4548.60 Glass	92110	Twill 2/2	0°/90º overall
2	1	8.4551.60 Glass	92125	Twill 2/2	±45º overall
3	2	8.4551.60 Glass	92125	Twill 2/2	0°/90º overall
4, 5		H 60 or Airex C71.55		8 mm rigid foam	
6	3	8.4551.60 Glass	92125	Twill 2/2	±45º overall

Figure 7: Main Layers of Cloth in the Center Section Bottom Shell



Item No.	Layers	Reference No.	Interglas No.	Type	Remarks
1	1	8.4548.60 Glass	92110	Twill 2/2	0°/90º overall
2	2	8.4551.60 Glass	92125	Twill 2/2	0°/90º overall
3	2	8.4551.60 Glass	92125	Twill 2/2	±45º overall
4 - 8		H 60 or Airex C71.55		8 mm rigid foam	
9	2	8.4551.60 Glass	92125	Twill 2/2	0°/90º overall

Figure 8: Main Layers of Cloth in the Center Section Top Shells

CHAPTER 55

STABILIZERS

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CHAPTER 55
STABILIZERS

1. General

The DA 40 has the usual stabilizers. The vertical stabilizer is part of the fuselage. The aft part of the left and right fuselage shells make the left and right shells of the vertical stabilizer. See Section 53-10 for data on the fuselage structure.

The horizontal stabilizer has top and bottom shells. Each shell has GFRP skins. The horizontal stabilizer has a front spar and a rear spar. Both spars have mounting brackets. Three pairs of ribs give strength to the center area. Two trailing edge webs hold the hinges for the elevator.

The elevator has top and bottom shells. Each shell has GFRP skins with a rigid foam core. The bottom shell also makes the leading edge spar. The hinges attach to the bottom shell. A large horn with the mass balance weight attaches to the bottom shell at the center. The trailing edge carries a trim tab.

The lower fin is a GFRP molding. Bolts attach the lower fin to the bottom of the fuselage.

The rudder has left and right shells. Each shell has GFRP skins with a rigid foam core. The shells bond together at a flange. The hinges attach to the top face of the rudder and a flat face near the bottom of the leading edge. The horn near the top makes the rudder mass balance.

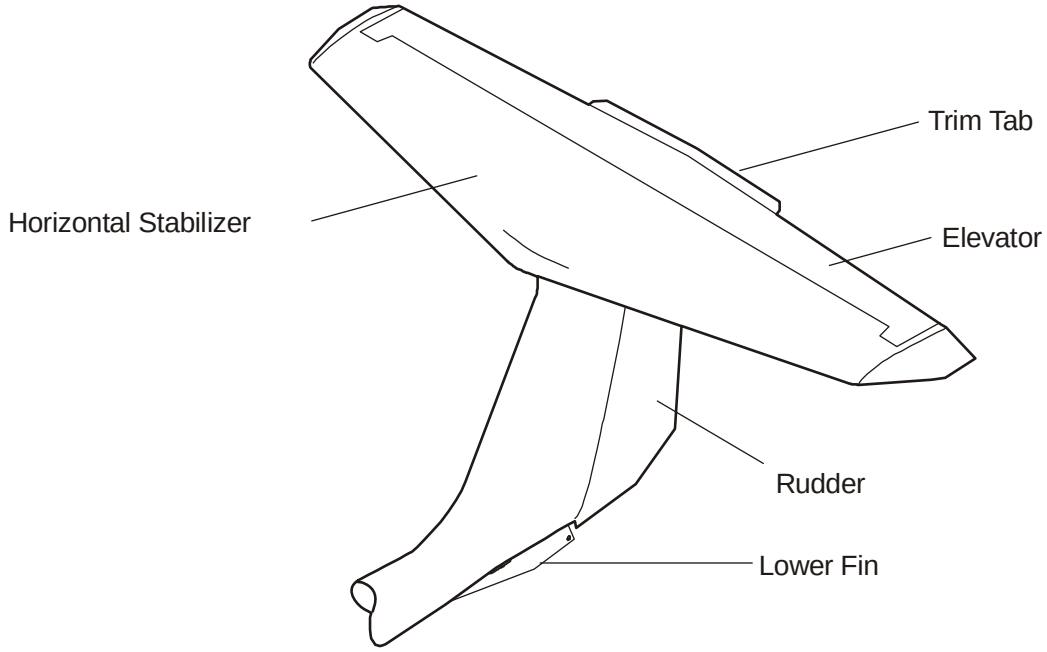


Figure 1: Stabilizers

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Section 55-10
Horizontal Stabilizer

1. General

The DA 40 has the usual horizontal stabilizer. The horizontal stabilizer attaches to the top of the vertical stabilizer. The elevator attaches to the trailing edge of the horizontal stabilizer. See Section 55-20 for data about the elevator structure.

2. Description

Figure 1 shows the horizontal stabilizer structure.

The horizontal stabilizer has top and bottom shells. Each shell has GFRP skins. The top shell has no cut-outs. The bottom shell has a large cut-out at the rear for the elevator horn and mass balance. It also has two smaller holes forward and aft of the front spar.

The horizontal stabilizer has two spars. The spars have GFRP skins with rigid GFRP inserts at the main mounting points. They also have top and bottom caps. The ends of the front spar turn back to join the aft spar at mid span. The rear spar goes almost to the tip of the horizontal stabilizer. The spars bond to the top and bottom shells with resin.

Each spar has four holes for a mounting bracket. You can get access to the attachment bolts from below. The mounting brackets go down through the cut-outs in the bottom shell. Four more holes in the bottom part of each mounting bracket attach to the vertical stabilizer front web.

Three pairs of ribs give strength to the center area on each side of the access holes. All are rigid GFRP moldings. They bond to the other components with resin. The rear 'box' ribs make a box round the large cut-out in the bottom skin. A short rear rib at mid-span gives strength to the area between the rear spar and the trailing edge web.

The rear box rib has sides with bends and a top face which joins the sides. It closes the sides of the large cut-out in the bottom shell. The aft part has three holes on each side for the anchor bracket for the trim-tab mechanism.

Two trailing edge webs close the trailing edges of the top and bottom shells. The outboard end of each web is a 'J' shape which goes round the outboard balance weight of the elevator. It extends aft at the outer side to close the elevator cut-out. The webs also holds the hinges for the elevator. The webs bond to the top and bottom shells and the rear and rear 'box' ribs with resin.

A rigid GFRP fairing goes around the joint between the horizontal stabilizer and the vertical stabilizer. Four screws attach the fairing to the vertical stabilizer.

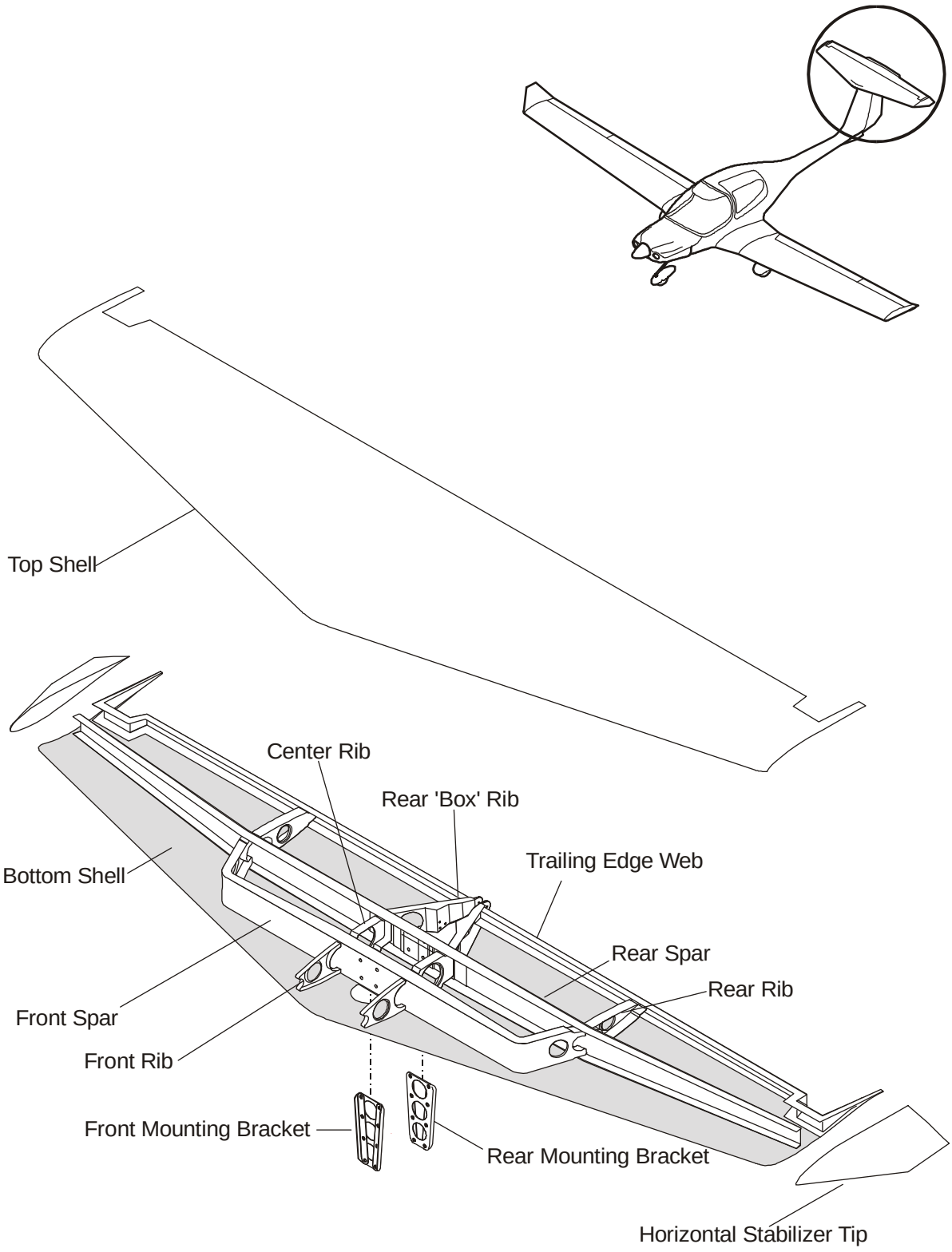


Figure 1: Horizontal Stabilizer Structure

Maintenance Practices

1. General

These Maintenance Practices tell you how to remove and install the horizontal stabilizer.

2. Remove/Install the Horizontal Stabilizer

A. Remove the Horizontal Stabilizer

Note: Use two persons to remove/install the horizontal stabilizer.

	Detail Steps/Work Items	Key Items
(1)	Remove the horizontal stabilizer fairing. – Remove 4 screws.	
(2)	Release the 2 ball-end fittings from the trim-tab operating links.	Under the elevator.
(3)	Release the trim-tab mechanism from its mounting bracket.	Refer to Section 27-31.
(4)	Move the trim-tab mechanism forward through the hole in the vertical stabilizer web, clear of the mounting bracket.	
(5)	Remove the bolt which connects the elevator vertical push rod to the elevator horn.	
(6)	Remove the 8 bolts which attach the front and rear HT mounting brackets to the vertical stabilizer.	Hold the horizontal stabilizer.
(7)	Disconnect the VOR antenna.	
(8)	Lift the horizontal stabilizer clear of the airplane.	

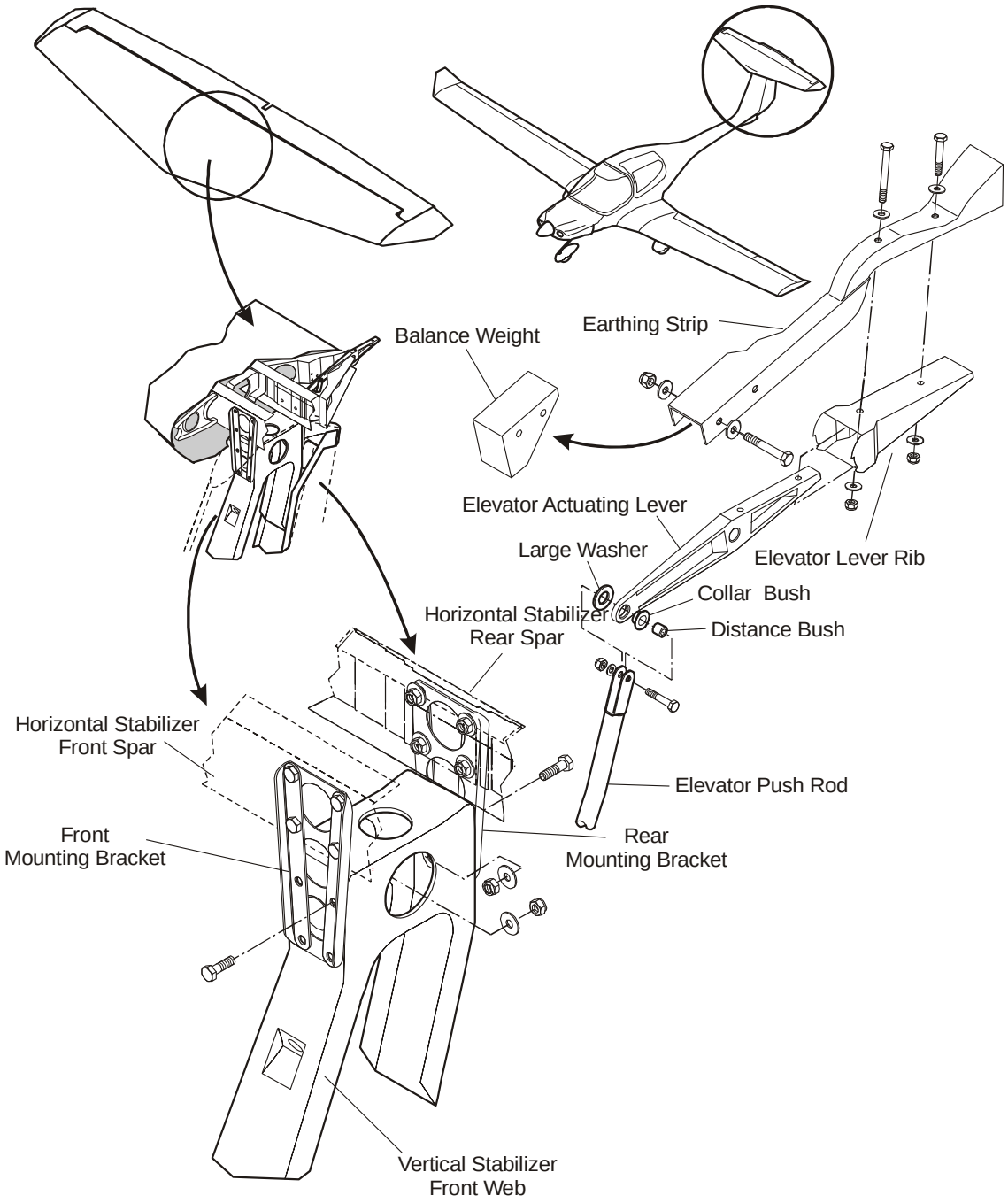


Figure 2: Horizontal Stabilizer Installation

B. Install the Horizontal Stabilizer

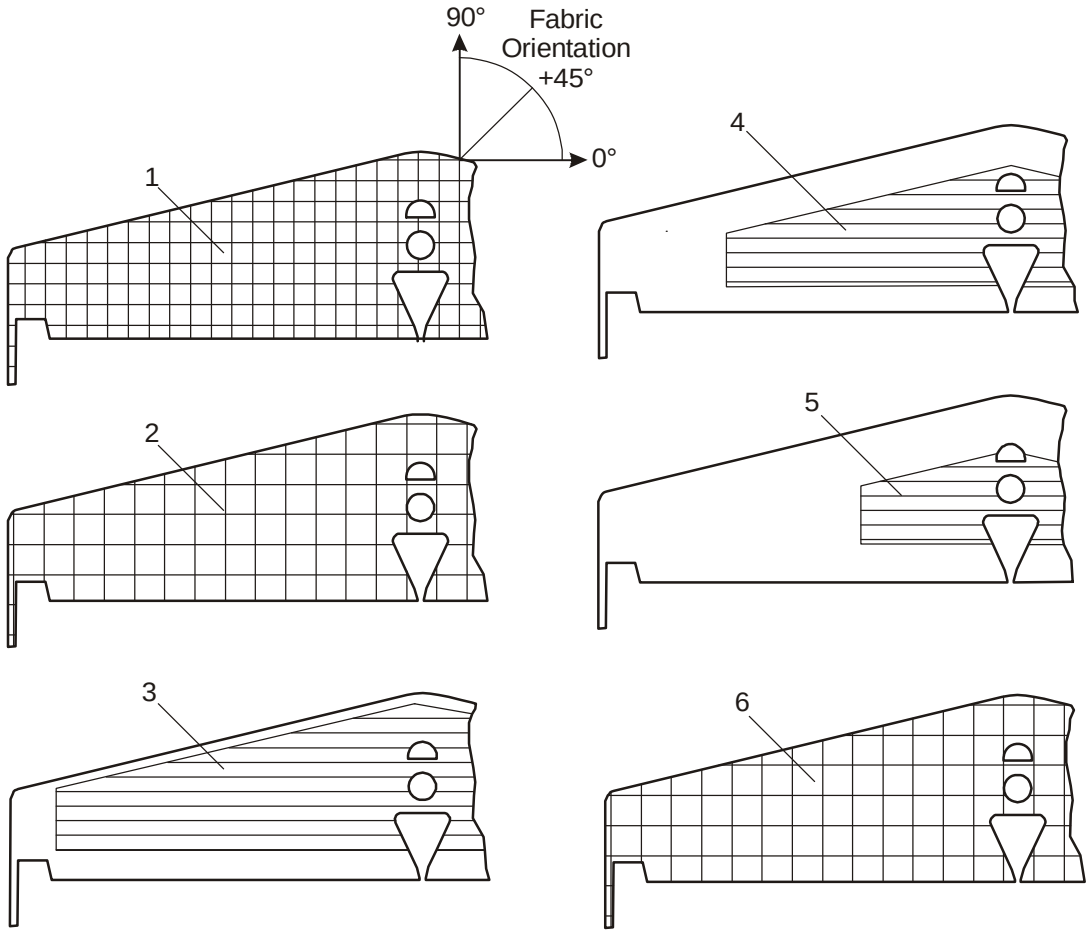
	Detail Steps/Work Items	Key Items
(1)	Examine the horizontal stabilizer attachments. Look specially for: – Corrosion or wear of the bolts. – Distortion of the mounting brackets – Cracks in the mounting brackets. – Damage to the mounting holes and adjacent structure. – Check torque on bolts attaching forward and aft mounting bracket to horizontal stabilizer.	
(2)	Put the horizontal stabilizer in position on the vertical stabilizer.	Hold the horizontal stabilizer.
(3)	Connect the VOR antenna.	
(4)	Install the 8 bolts which attach the horizontal stabilizer to the vertical stabilizer front and rear mounting brackets.	Use new self-locking nuts.
(5)	Install the bolt which connects the elevator vertical push rod to the elevator horn.	Use a new self-locking nut. Torque: 1.7 Nm (1.2 lbf.ft.).
(6)	Move the trim-tab mechanism aft through the hole in the vertical stabilizer web, through the mounting bracket for the trim mechanism.	
(7)	Attach the trim-tab mechanism to its mounting bracket. – Install 2 bolts.	Use a new self-locking nut.
(8)	Connect the 2 ball-end fittings to the trim-tab operating links.	Under the elevator.
(9)	Do a test for correct, full and free movement of the elevator control. If necessary, adjust the elevator control.	Refer to Section 27-30.

	Detail Steps/Work Items	Key Items
(10)	Do a test for correct, full and free movement of the trim control. If necessary, adjust the trim control.	Refer to Section 27-31.
(11)	Install the horizontal stabilizer fairing. – Install 4 screws.	

3. Repair Data for the Horizontal Stabilizer Shells

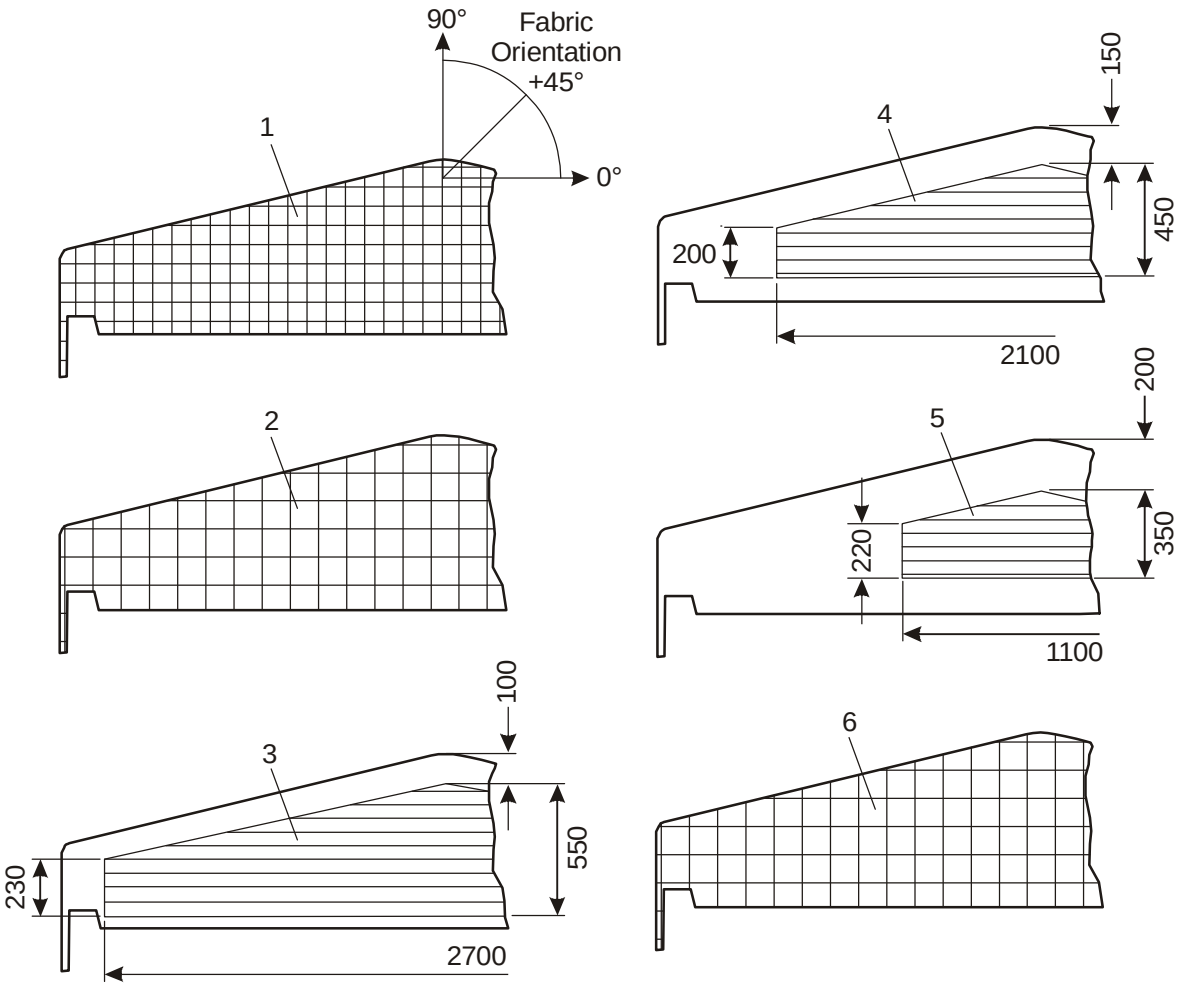
Figures 3 and 4 show only the basic lay-up of glass fiber cloth in the horizontal stabilizer shells. Additional layers of glass fiber cloth reinforcing specially loaded areas are not shown. Contact Diamond Aircraft customer support department if more detailed information (such as further lay-up plans) is needed.

The Figures show the main layers of cloth. The cross-hatching on the Figure shows the orientation of the fibers. The orientation is also given in the related table. When you repair the horizontal stabilizer, you must use the same type of cloth with the same fiber orientation.



Item No.	Layers	Reference No.	Interglas No.	Type	Remarks
1	1	8.4548.60 Glass	92110	Twill 2/2	0º/90º overall
2	2	8.4551.60 Glass	92125	Twill 2/2	0º/90º overall
3	1	8.4525.60 UD Glass	92146	Twill 2/2	0º/180°
4	1	8.4525.60 UD Glass	92146	Twill 2/2	0º/180°
5	1	8.4525.60 UD Glass	92146	Twill 2/2	0º/180°
6	2	8.4551.60 Glass	92125	Twill 2/2	0º/90º overall

Figure 3: Main Layers of Cloth in the Horizontal Stabilizer Bottom Shell



Item No.	Layers	Reference No.	Interglas No.	Type	Remarks
1	1	8.4548.60 Glass	92110	Twill 2/2	0º/90º overall
2	2	8.4551.60 Glass	92125	Twill 2/2	0º/90º overall
3	1	8.4525.60 UD Glass	92146	Twill 2/2	0º/180°
4	1	8.4525.60 UD Glass	92146	Twill 2/2	0º/180°
5	1	8.4525.60 UD Glass	92146	Twill 2/2	0º/180°
6	2	8.4551.60 Glass	92125	Twill 2/2	0º/90º overall

Figure 4: Main Layers of Cloth in the Horizontal Stabilizer Top Shell

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Section 55-20
Elevator

1. General

The DA 40 has the usual elevator. The elevator attaches to the rear web of the horizontal stabilizer. See Section 27-30 for data about the elevator controls.

2. Description

Figure 1 shows the elevator structure. Figure 2 shows the installation of the elevator on the horizontal stabilizer. Figure 3 shows the trim tab installation.

The elevator has top and bottom shells. Each shell has GFRP skins with a rigid foam core. The leading edge of each shell has a curve. The shells bond together where the curves overlap. The shells also bond together at the ends and at the trailing edge.

The elevator has a horn rib in the middle. It is a strong box with an open front. The elevator horn goes into the horn rib. Two bolts attach the horn to the elevator.

The horn has a hole with a bush for the elevator push rod. The front of the horn has elevator mass balance weight. More mass balance weight is attached at the front of the elevator tips.

Five bearings hold the elevator. The elevator horn has a plain bearing. A bolt and spacer attach the elevator horn to the trailing edge webs of the horizontal stabilizer.

A small bearing rib at mid-span on each side holds an elevator hinge assembly. The hinge assembly has an eye-end with a plain shank. The eye-end has a spherical bearing. The shank engages in a bush in the trailing edge web.

The outer end of the elevator on each side has an end bearing. A reinforcing block holds a bonded bush. The bush aligns with a bonded bush in the horizontal stabilizer trailing edge web. A pivot pin goes through both bushes to make the outer bearing. A roll pin locks the pivot pin in the bonded bush.

A GFRP trim tab attaches to the trailing edge of the elevator. The trim tab has six GFRP hinges. The front half of each hinge bonds to the trailing edge of the elevator. The rear half of each hinge bonds to the leading edge of the trim tab. Two hinge rods go through the hinges. Lock wires hold the hinge rods in place.

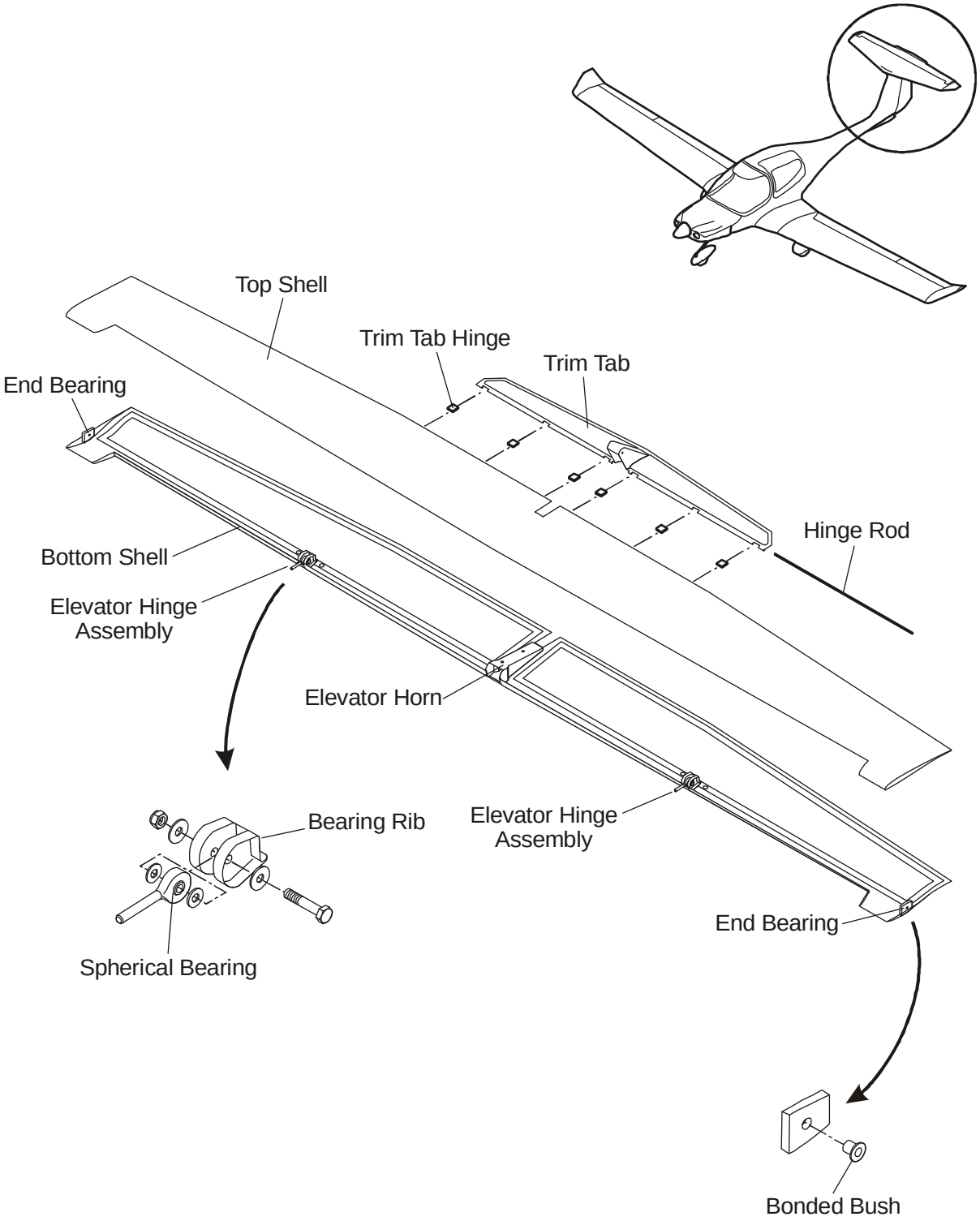


Figure 1: Elevator Structure

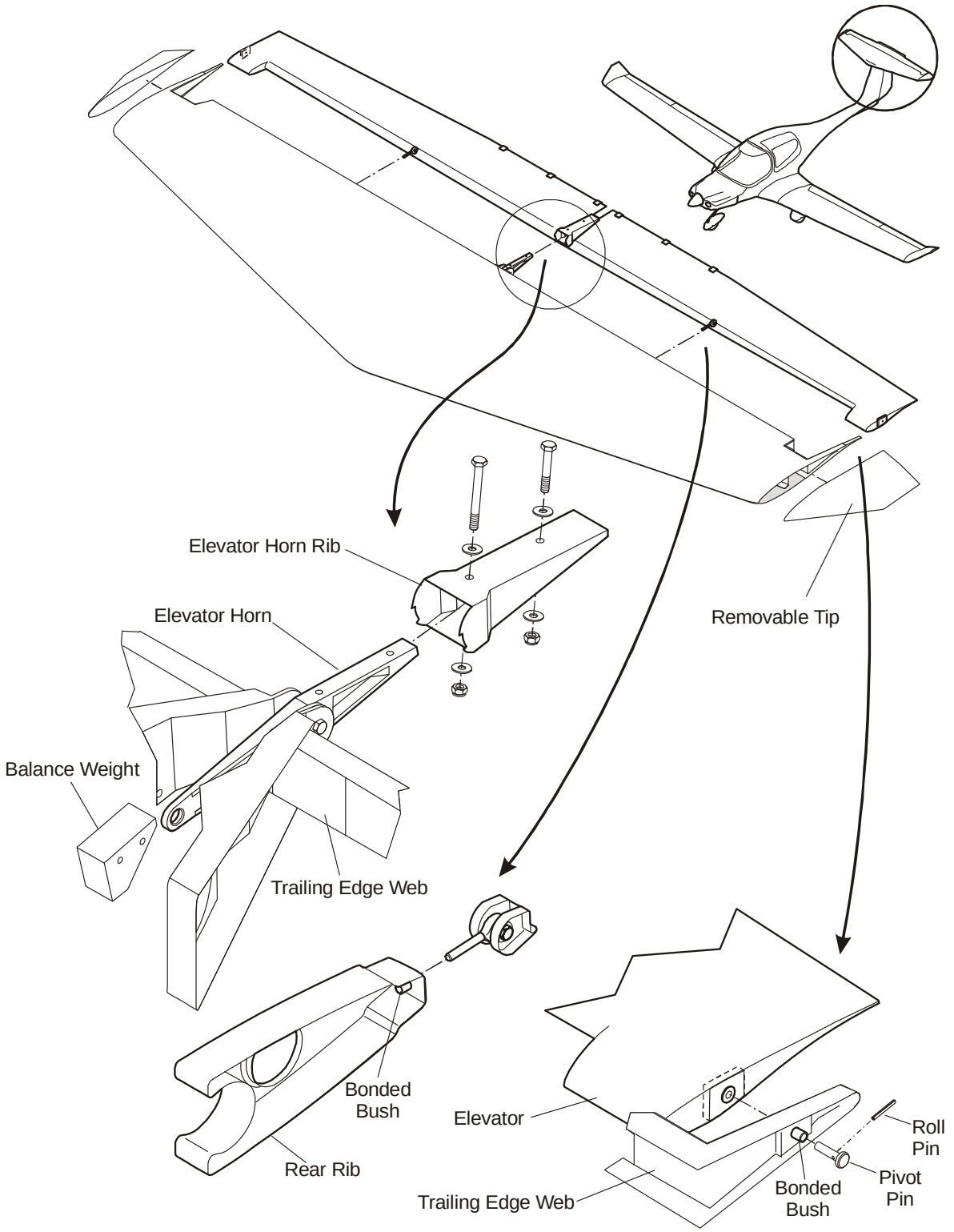


Figure 2: Elevator Installation on the Horizontal Stabilizer

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Maintenance Practices

1. General

These Maintenance Practices tell you how to remove and install the elevator and trim tab. Refer to Sections 27-30 and 27-31 for data on the elevator and trim tab control setting.

2. Remove/Install the Elevator

A. Remove the Elevator

	Detail Steps/Work Items	Key Items
(1)	Remove the horizontal stabilizer fairing. – Remove 4 screws.	
(2)	Release the 2 ball-end fittings from the trim-tab operating links.	Under the elevator.
(3)	Remove the horizontal stabilizer tips.	
(4)	Remove 2 bolts, nuts and washers which attach the elevator horn rib to the elevator.	Refer to Figure 2.
(5)	Remove the pivot pins from the end bearings: – Remove the roll pin. – Pull the pivot pin out of the end bearing.	Hold the elevator.
(6)	Pull the elevator aft to release the elevator horn and hinge assemblies.	
(7)	Put the elevator in a stand or on a padded surface.	

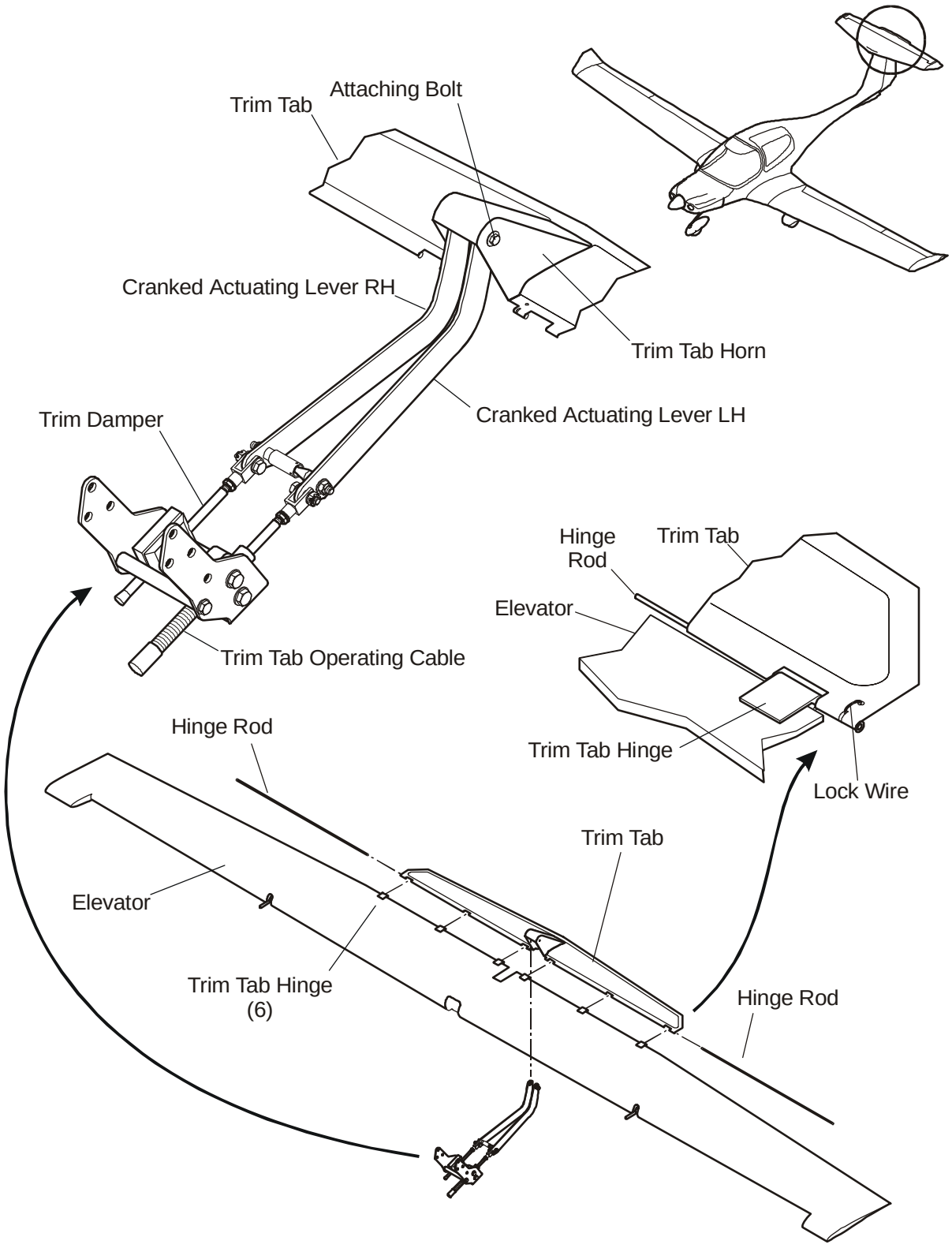


Figure 3: Trim Tab Installation

B. Install the Elevator

	Detail Steps/Work Items	Key Items
(1)	Put the elevator in position aft of the horizontal stabilizer: – Align the elevator with the horn. – Move the elevator forward over the horn. – Align the shanks of the hinge assemblies at mid-span with the bushes in the trailing edge web of the horizontal stabilizer. – Push the elevator forward to engage the shanks in the bushes. – Align the end bearings with the bushes in the trailing edge spar of the horizontal stabilizer.	Refer to Figure 2.
(2)	Install the pivot pins in the end bearings and lock the pivot pins in position with a roll pin.	
(3)	Install the bolts, washers and nuts which attach the elevator to the elevator horn.	Torque: 6.4 Nm (4.7 lbf.ft.). Use new lock nuts.
(4)	Install the 2 ball-end fittings for the trim-tab operating links.	Under the elevator.
(5)	Install the horizontal stabilizer tips.	
(6)	Install the horizontal stabilizer fairing: – Install 4 screws.	
(7)	Do a test for correct range of movement of the elevator control.	Refer to Section 27-30.
(8)	Do a test for correct range of movement of the elevator trim control.	Refer to Section 27-31.

3. Remove/Install the Elevator Trim Tab

A. Remove the Elevator Trim Tab

	Detail Steps/Work Items	Key Items
(1)	Remove the bolt which attaches the cranked actuating levers to the trim tab.	Refer to Figure 3.
	CAUTION: DO NOT USE FORCE TO REMOVE THE LOCK WIRE FROM THE TRIM TAB HINGE. YOU CAN DAMAGE THE GFRP HINGE.	
(2)	Remove the lock wire at the outer hinge on each side of the trim tab.	
(3)	Move the hinge rods out of the hinges.	Hold the trim tab.
(4)	Remove the trim tab from the elevator.	

B. Install the Elevator Trim Tab

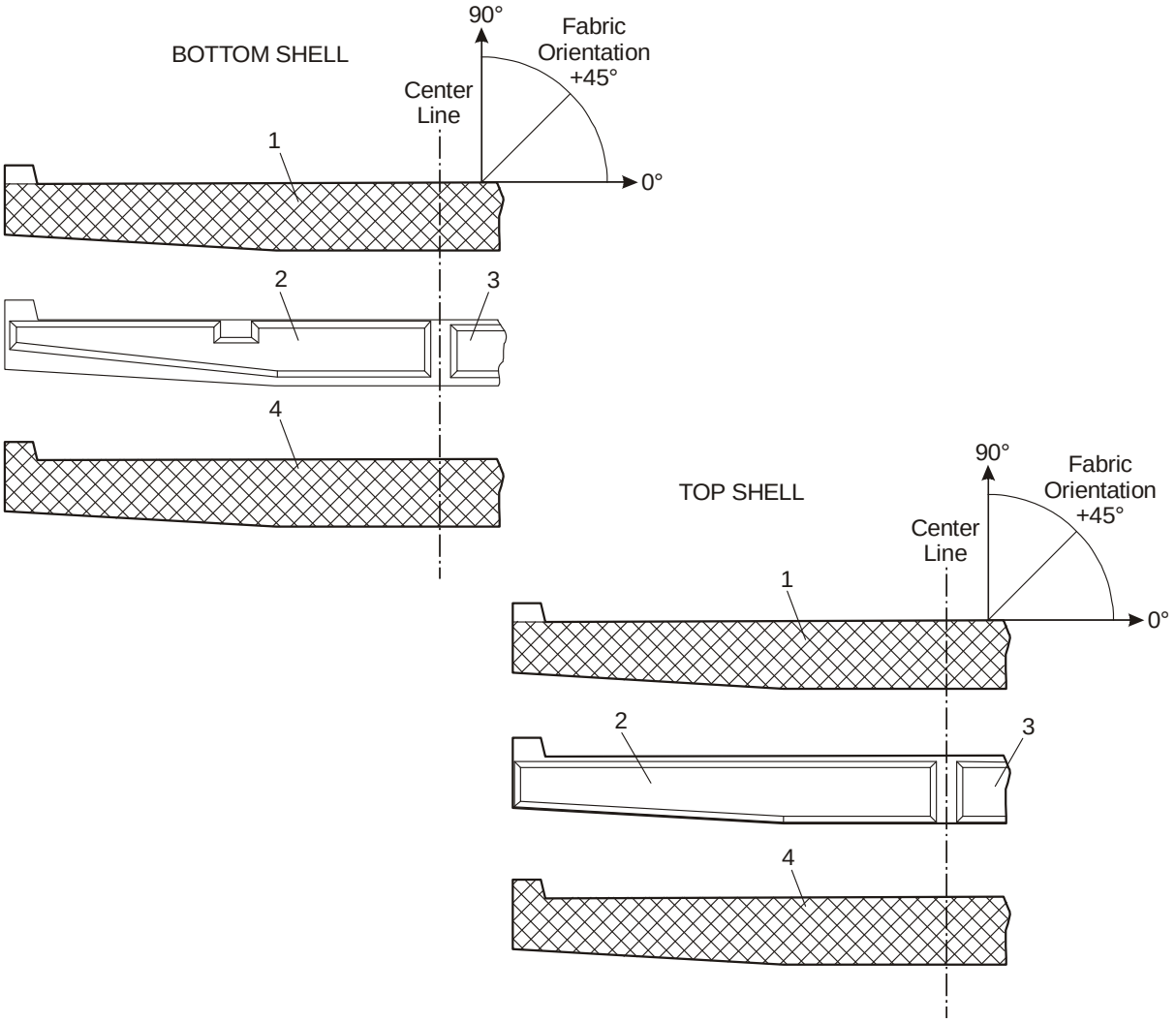
	Detail Steps/Work Items	Key Items
(1)	Put the trim tab in position on the elevator.	Refer to Figure 3.
(2)	Align the hinges.	
(3)	Install the hinge rods in each side.	
	CAUTION: DO NOT USE FORCE TO INSTALL THE LOCK WIRE IN THE TRIM TAB HINGE. YOU CAN DAMAGE THE GFRP HINGE.	
(4)	Lock the hinge rods in position with wire.	Use new lock wire.
(5)	Align the cranked actuating levers with the trim tab.	
(6)	Install the bolt which attaches the cranked actuating levers to the trim tab.	
(7)	Do a test for correct range of movement of the elevator trim control.	Refer to Section 27-31.

4. Repair Data for the Elevator Shells

Figure 4 shows only the basic lay-up of glass fiber cloth and rigid foam in the elevator shells. Additional layers of glass fiber cloth reinforcing specially loaded areas are not shown. Contact Diamond Aircraft customer support department if more detailed information (such as further lay-up plans) is needed.

The Figures show the main layers of cloth. The cross-hatching on the Figure shows the orientation of the fibers. The orientation is also given in the related table. When you repair the elevator, you must use the same type of cloth with the same fiber orientation.

After repair weigh and ensure that mass and moment are within the approved limits.



Item No.	Layers	Reference No.	Interglas No.	Type	Remarks
1	2	8.4548.60 Glass	92110	Twill 2/2	±45º overall
2, 3		H 60 or Airex C71.55		3 mm rigid foam	
4	1	8.4548.60 Glass	92110	Twill 2/2	±45º overall

Figure 4: Main Layers of Cloth in the Top and Bottom Elevator Shells

Section 55-30
Lower Fin

1. General

The DA 40 has a removable lower fin. The lower fin is a GFRP molding. Screws attach the lower fin to the bottom of the rear fuselage.

2. Description

The lower fin is a GFRP molding. It has a left shell and a right shell. The shells bond together with resin.

The lower fin has a hole at the rear for a tie down rope. It also has a flat area at the bottom for a tail skid.

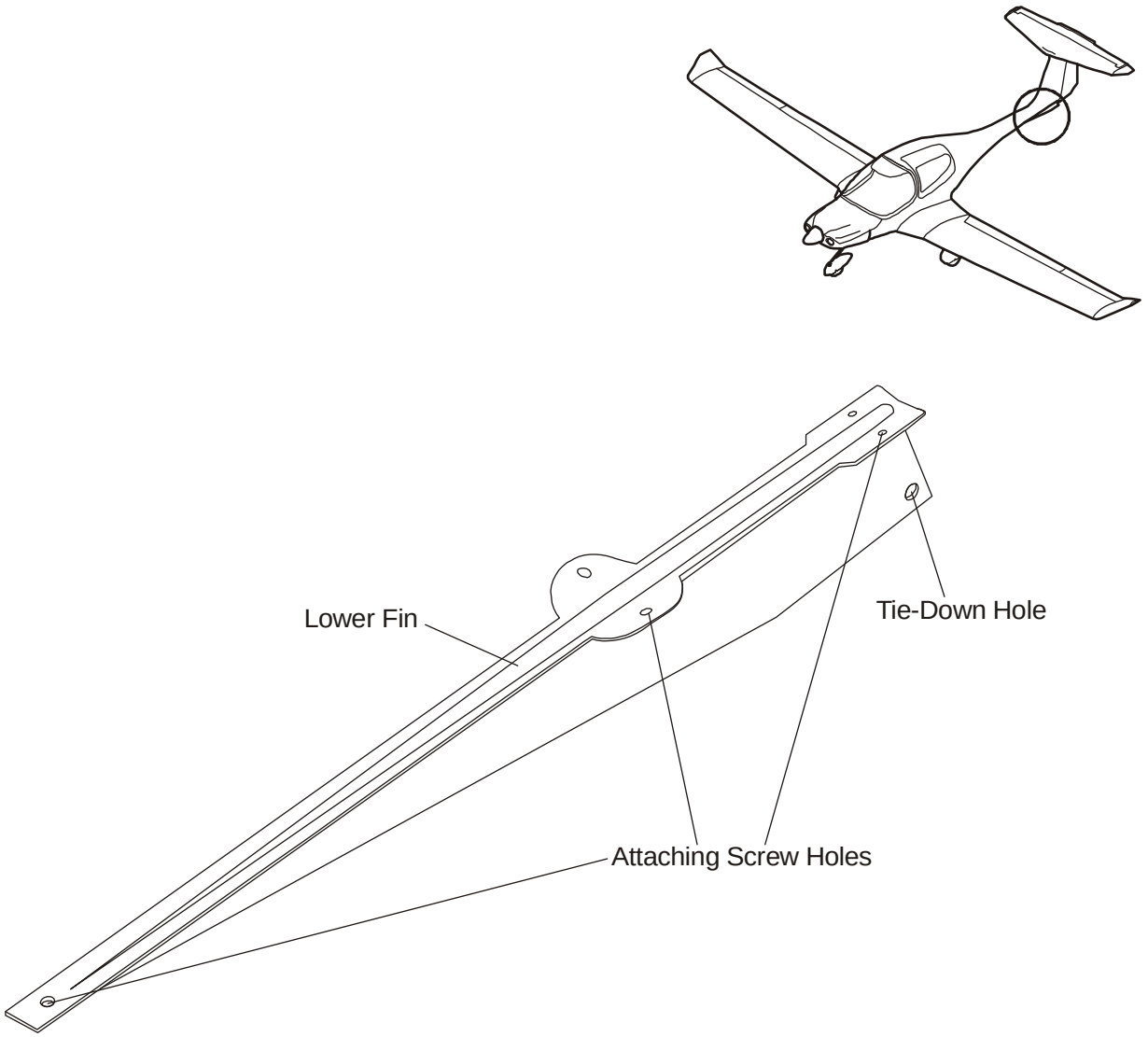


Figure 1: Lower Fin

Maintenance Practices

1. General

These Maintenance Practices tell you how to remove and install the lower fin.

2. Remove/Install the Lower Fin

A. Remove the Lower Fin

	Detail Steps/Work Items	Key Items
(1)	Remove the sealing tape from the joint between the lower fin and the fuselage.	
(2)	Remove 7 screws which attach the lower fin to the rear fuselage and cut sealant.	Refer to Figure 1. Hold the fin.
(3)	Remove the lower fin from the airplane.	

B. Install the Lower Fin

	Detail Steps/Work Items	Key Items
(1)	Clean the area of the fuselage where the lower fin attaches.	
(2)	Put the lower fin in position below the fuselage.	Hold the lower fin.
(3)	Install the 7 screws with washers which attach the lower fin. Seal with PU-based sealant.	
(4)	Apply sealing tape to the joint between the lower fin and the fuselage.	

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Section 55-40
Rudder

1. General

The DA 40 has the usual rudder. The rudder attaches to the rear web of the vertical stabilizer. See Section 27-20 for data about the rudder controls.

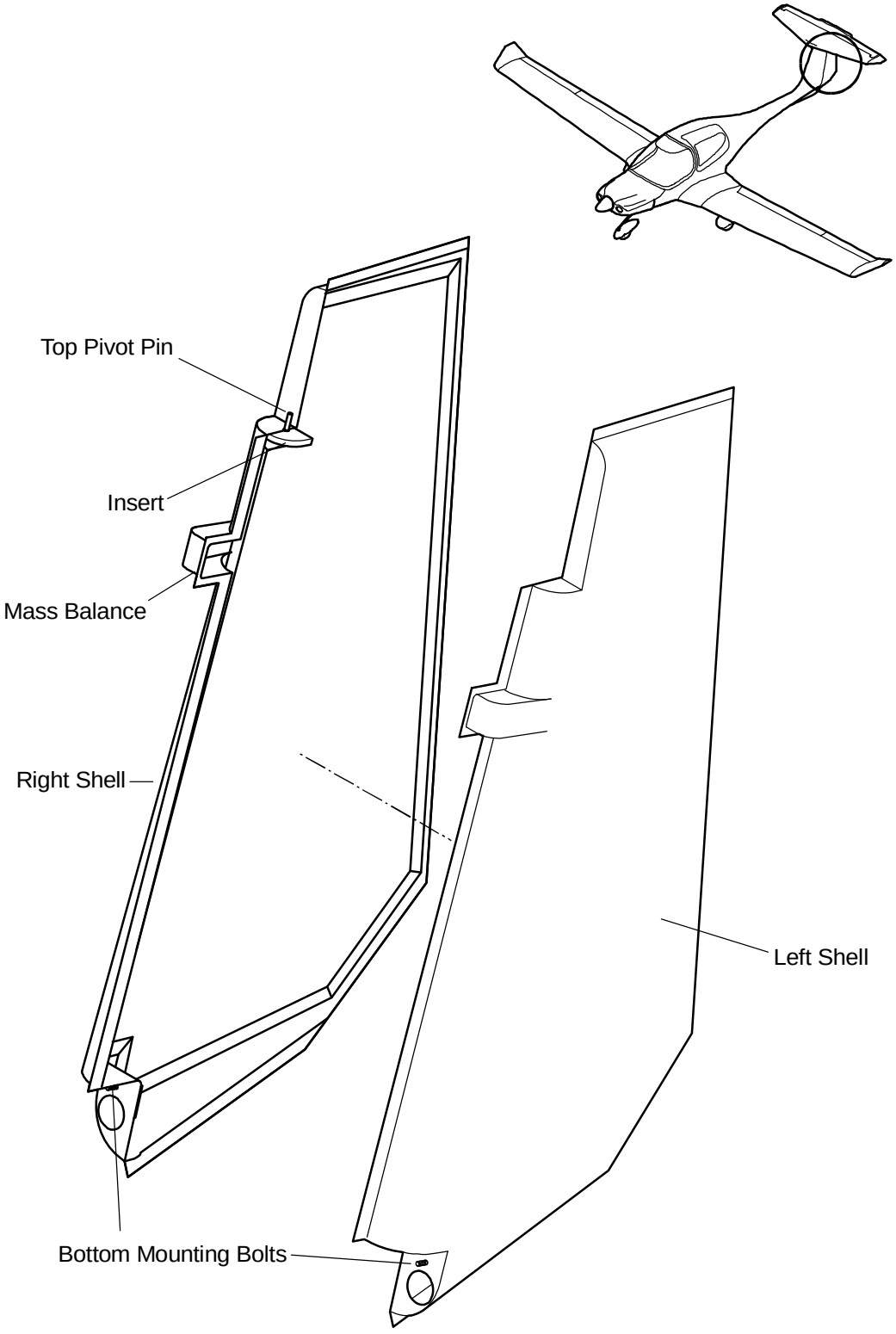


Figure 1: Rudder Assembly

2. Description

Figure 1 shows the rudder structure. Figure 2 shows the installation of the rudder on the vertical stabilizer.

The rudder has left and right shells. Each shell has GFRP skins with a rigid foam core. The leading edge of each shell has a curve and a flange. The shells bond together at the flanges. The shells also bond together at the top, bottom and at the trailing edge.

The rudder has a flat face at the bottom of the leading edge. The flat face has two bonded bolts. The bolts attach the rudder to the rudder lower mounting bracket. Refer to Section 27-20 for data about the rudder lower mounting bracket.

The rudder has a mass balance weight bonded into the leading edge near the top. You cannot adjust the mass balance.

Two bearings hold the rudder. A pivot pin bonds into the leading edge near the top. It engages with a bearing installed in a bearing sleeve attached to the rear web of the vertical stabilizer. On the pivot pin a bushing and if necessary for adjustment a washer is bonded with Loctite 680. This bushing is installed to adjust the clearance between rudder and bearing.

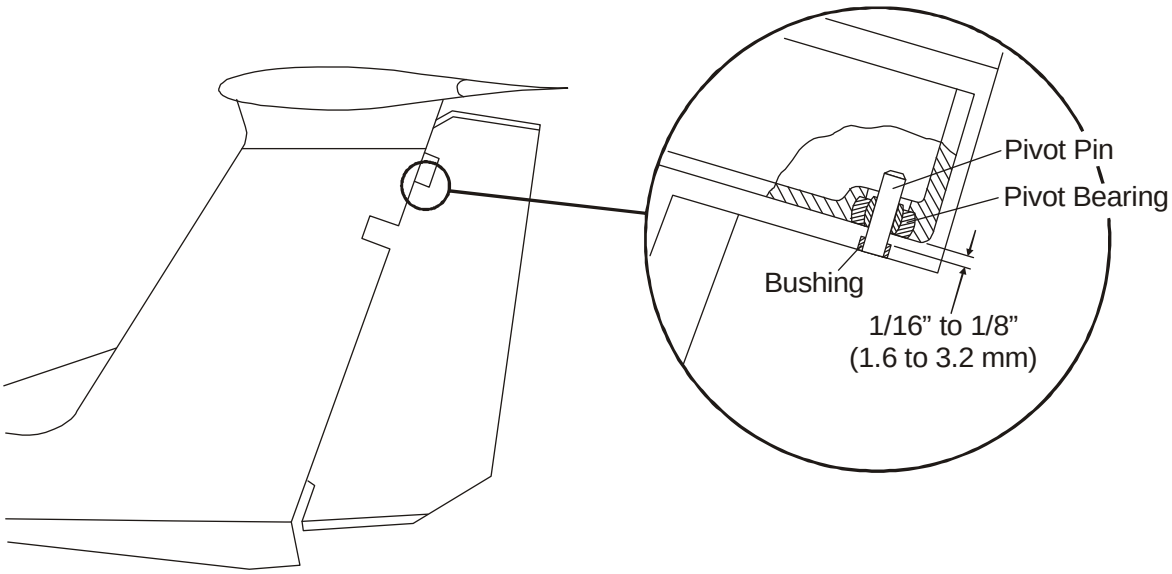


Figure 2: Clearance Bushing between Rudder and Rudder Bearing

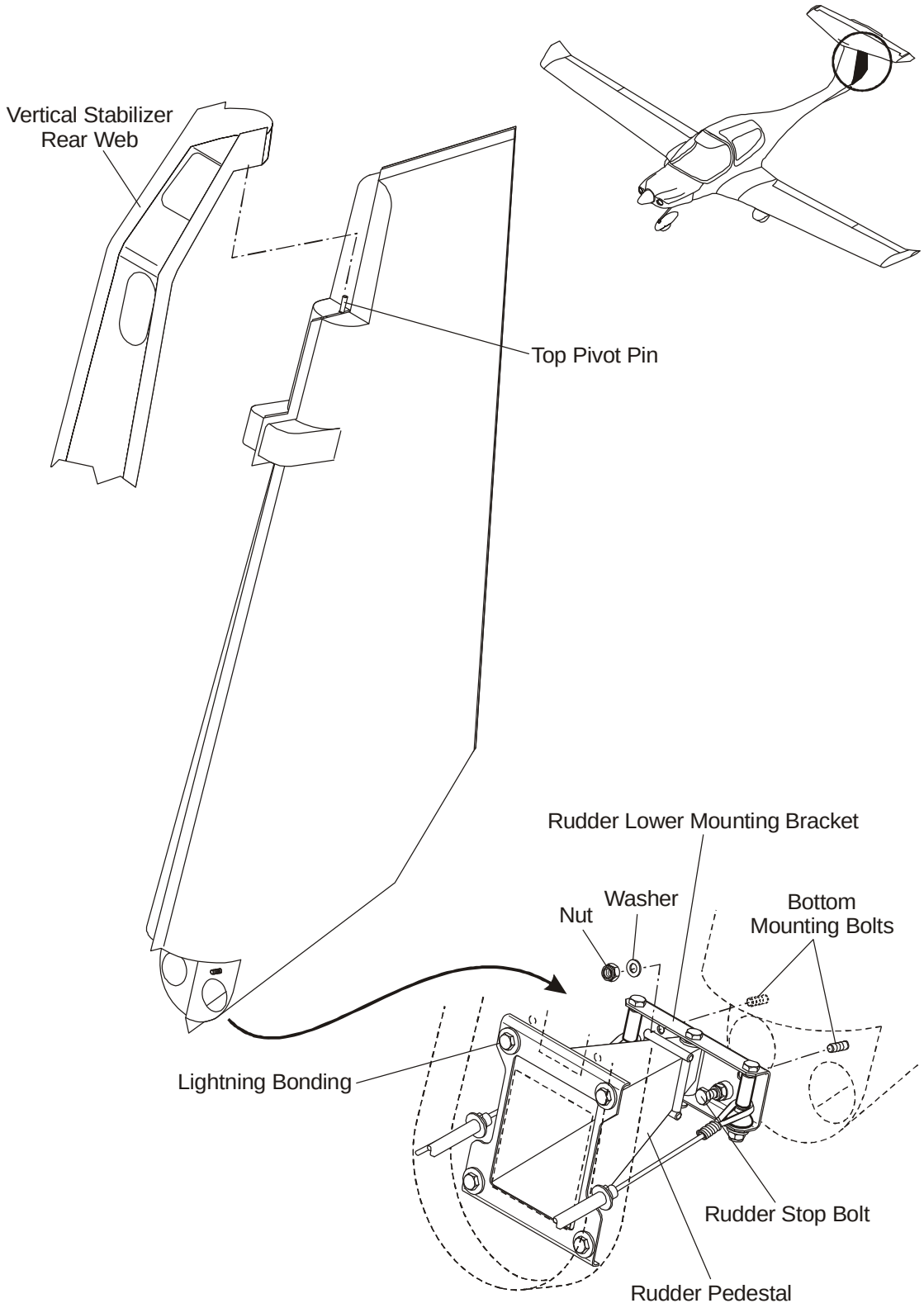


Figure 3: Rudder Installation

Maintenance Practices

1. General

These Maintenance Practices tell you how to remove and install the rudder. Refer to Section 27-20 for data on the rudder control setting.

2. Remove/Install the Rudder and the Upper Bearing

A. Remove the Rudder

	Detail Steps/Work Items	Key Items
(1)	Remove 2 nuts and washers which attach the rudder to the rudder lower mounting bracket.	Refer to Figure 3. Hold the rudder.
(2)	Pull the bottom of the rudder aft to disengage the bottom bolts.	
(3)	Lower the rudder to disengage the top pivot.	
(4)	Put the rudder in a stand or on a padded surface.	

B. Remove the Upper Bearing

	Detail Steps/Work Items	Key Items
(1)	Remove circlip and spacer of the bearing sleeve from the top side.	
(2)	Remove the bearing in an upward direction by pushing from the bottom side.	

C. Install the Upper Bearing

	Detail Steps/Work Items	Key Items
(1)	Press bearing into bearing sleeve from the top side.	
(2)	Install spacer and circlip into bearing sleeve from the top side.	

D. Install the Rudder

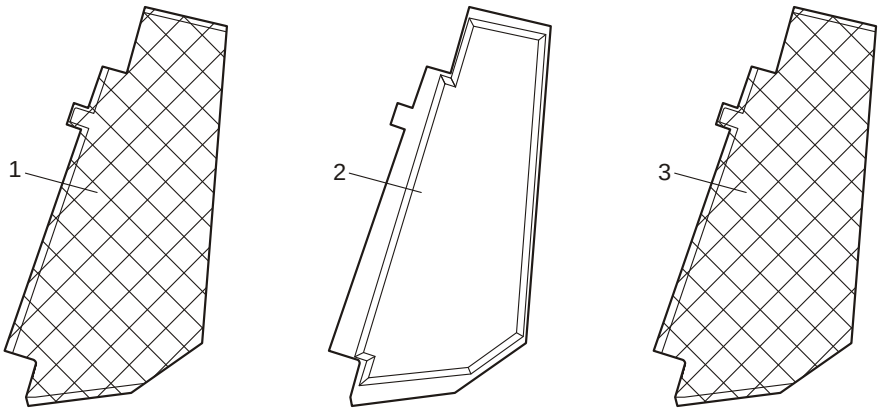
	Detail Steps/Work Items	Key Items
(1)	Put the rudder in position aft of the vertical stabilizer rear web.	
(2)	Check the bushing is installed and bonded on pivot.	
(3)	Align the top pivot pin with the bearing in the top face of the rear web. Lift the rudder to engage the top pivot pin.	
(4)	Move the bottom of the rudder forward to engage the bottom mounting bolts in the holes in the rudder lower mounting bracket.	
(5)	Check clearance between top of bushing and the bottom of the bearing. Adjust if necessary.	1.6 mm to 3.2 mm (1/16" to 1/8")
(6)	Install the washers and nuts on the bottom mounting bolts.	Torque: 6.4 Nm (4.7 lbf.ft.).
(7)	Do a test for correct range of movement of the rudder control.	Refer to Section 27-20.

3. Repair Data for the Rudder Shells

Figures 4 shows only the basic lay-up of glass fiber cloth and rigid foam in the rudder shells. Additional layers of glass fiber cloth reinforcing specially loaded areas are not shown. Contact Diamond Aircraft customer support department if more detailed information (such as further lay-up plans) is needed.

The Figures show the main layers of cloth. The cross-hatching on the Figure shows the orientation of the fibers. The orientation is also given in the related table. When you repair the rudder, you must use the same type of cloth with the same fiber orientation.

After repair weigh and ensure that mass and moment are within the approved limits.



Item No.	Layers	Reference No.	Interglas No.	Type	Remarks
1	2	8.4548.60 Glass	92110	Twill 2/2	±45º overall
2		H 60 or Airex C71.55		3 mm rigid foam	
3	1	8.4548.60 Glass	92110	Twill 2/2	±45º overall

Figure 4: Main Layers of Cloth in the Rudder Shells

CHAPTER 56

WINDOWS

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CHAPTER 56
WINDOWS

1. General

The DA 40 has three windows. All of the windows are molded acrylic glass (plexiglass). The one-piece canopy window covers the pilots' cockpit. It is also the windscreen. The passenger door has a window. The right side of the fuselage has a window for the passenger compartment.

A high-performance elastic adhesive bonds each window to the structure.

Section 56-10 gives the data for all of the windows. Refer to Section 52-10 for data about the canopy and door structure.

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Section 56-10
Flight Compartment Windows

1. General

This Section tells you about the windows in the canopy, passenger door and fuselage. Refer to Section 52-10 for data about the canopy and door structure.

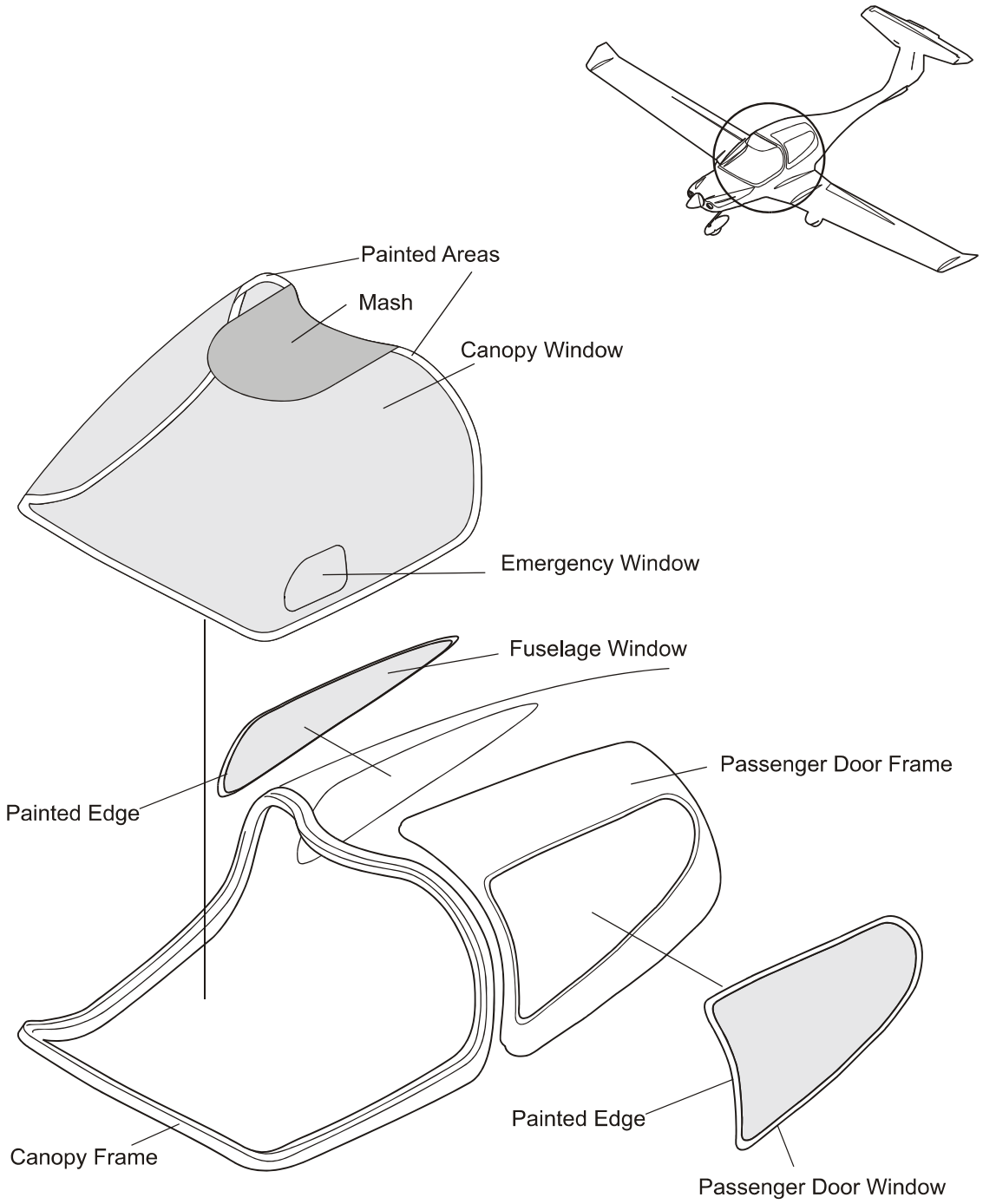


Figure 1: Windows

2. Description and Operation

Figure 1 shows the windows.

A. General

The DA 40 has three windows. Each window is polycast molded acrylic glass (plexiglass). This material gives good optical characteristics. It is also strong. It can be accurately formed into 3-dimensional shapes. A high-performance elastic adhesive bonds each window to the structure. A flexible white sealant fills the small gap between the edge of the window and the structure.

Each window has a band of white paint over the area where it bonds to the structure. The canopy window also has a screened area above the pilots' heads. This is a sun-shade. New windows are painted by the manufacturer.

B. Front Canopy and Emergency Windows

The one-piece canopy window covers the pilots' cockpit. It is also the windscreen. It has a small emergency window (direct-vision panel) on the left side. Some airplanes also have an emergency window on the right side. The emergency windows have a hinge. You can open the emergency windows in flight.

C. 'Pop out' Windows (OÄM 40-086)

The emergency windows can be furnished with optional small 'pop out' windows for ventilation (OÄM 40-086).

D. Rear Windows

The passenger door has a window for the left side of the passenger compartment. The right side of the fuselage also has a window for the passenger compartment.

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Maintenance Practices

1. General

This Section tells you how to replace or repair damaged windows. See Section 12-30 for data on cleaning windows.

2. Replace a Window

You must cut the window to replace it!

A. Equipment.

Item	Quantity	Part Number
High-speed rotary grinder.	1	Commercial.
Terostat adhesive.	A/R	9280.
White sealant.	A/R	

B. Procedure

	Detail Steps/Work Items	Key Items/References
(1)	Remove the canopy or door. Put the canopy or door on a firm working surface.	Only if you will replace the canopy or door window. Refer to Section 52-10.
(2)	Put protective covers over the inside of the cockpit.	Only if you will replace the right fuselage window.
(3)	Cut the damaged window from the frame.	Use the high-speed rotary grinder.
(4)	Grind the frame to remove the remaining window material and adhesive.	
(5)	Put the window in position in the frame. Align the 2 holes in the window (center front and back) with the holes in the canopy frame.	
(6)	Carefully remove the protective coating from the new window only where it will bond to the frame.	
(7)	Grind the bonding surface of the window.	Use 120 grade abrasive paper.
(8)	Make sure that the viewing area of the window is protected.	Use masking tape with paper.
(9)	Apply adhesive to the frame.	Use Terostat 9380.

	Detail Steps/Work Items	Key Items/References
(10)	Put the window in position in the frame. Hold the window with 3 mm pins through the 2 holes in the canopy.	
(11)	Removed unwanted adhesive.	
(12)	Allow the adhesive to cure for 24 hours.	
(13)	Remove the 2 pins.	
(14)	Apply a bead of white sealant to the gap between the edge of the window and the frame.	Use Terostat 9380.
(15)	Allow the sealant to cure.	Follow the manufacturer's instructions.
(16)	Remove the protective covering from the window.	
(17)	Install the canopy or door.	Only if you have replaced the canopy or door window. Refer to Section 52-10.

3. Window Repairs

A. Damage Limits

Maximum crack length: 150 mm (6 in).

Do not repair cracks which are more than 150 mm (6 in) from the edge of the window.

B. Equipment

Item	Quantity	Part Number
Small high-speed rotary grinder.	1	Commercial.
Filler: Acryfix 92 or Tensol cement No. 70.	A/R	Commercial.
Masking tape.	A/R	Commercial.
Plastic adhesive tape.	A/R	Commercial.
Cold ultra-violet light source (only for Acryfix 92).	A/R	Commercial.

Note: Fillers become smaller when they cure. Apply enough filler to be above the level of the window surface. Cut the filler back when it has cured.

If you repair a vertical crack, keep the filler in place with plastic adhesive tape. Apply a second coat of filler after the first coat has cured.

C. Temporary Repairs to Windows

Stop-drill the ends of short cracks. Use a 2.5 mm (3/32 in) drill. Refer to Figure 2.

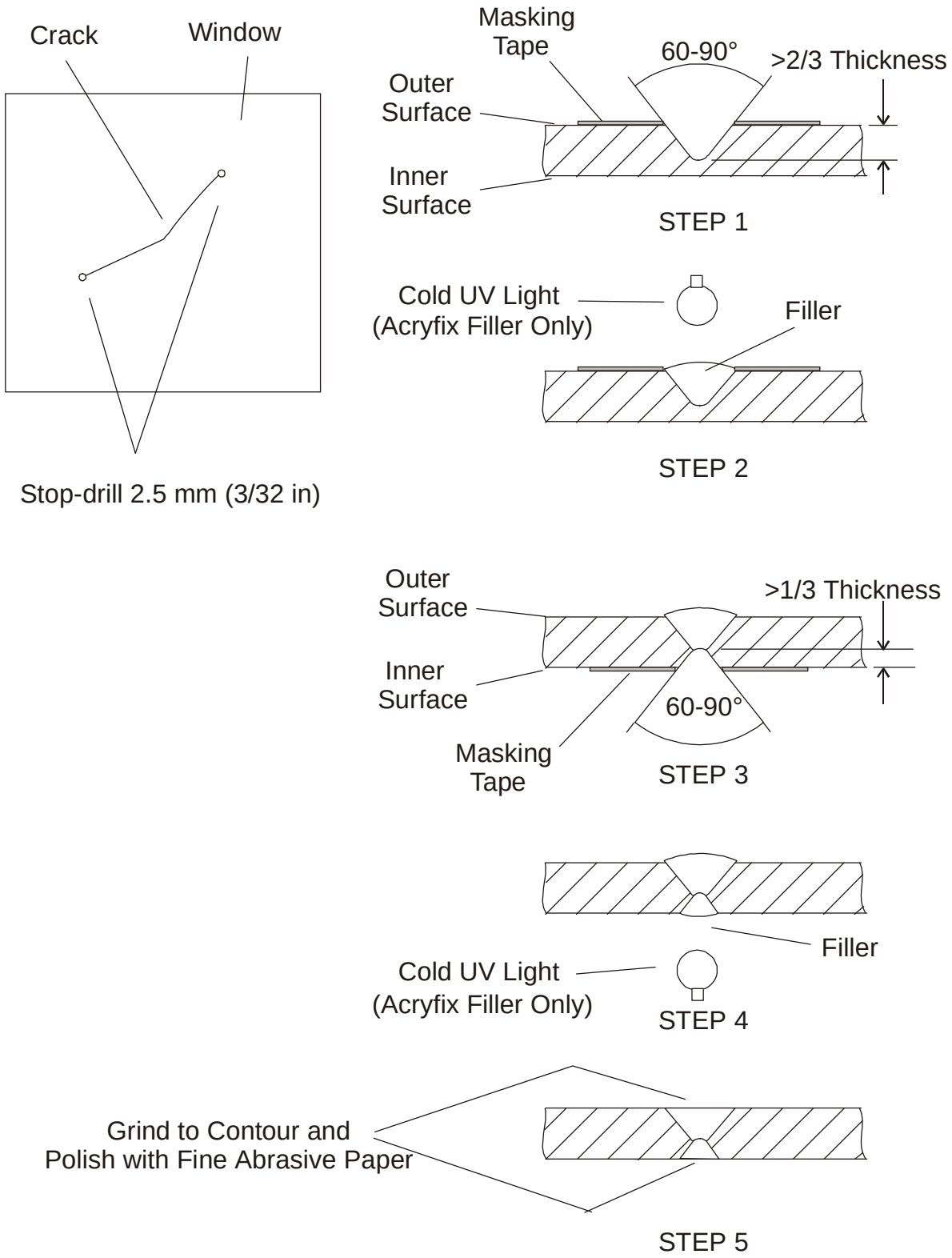


Figure 2: Window Repairs

D. Permanent Repairs to Windows

	Detail Steps/Work Items	Key Items/References
(1)	Remove the canopy or door. Put the canopy or door on a firm working surface with the crack horizontal.	Only if you will repair the canopy or door window. Refer to Section 52-10.
(2)	Put protective covers over the inside of the cockpit.	Only if you will repair the right fuselage window.
(3)	Mask the area around the crack on both inner and outer surfaces.	
(4)	Cut a groove along the crack in the outer surface of the window.	Refer to Figure 2, step 1.
(5)	Countersink temporary stop-drill holes.	
(6)	Seal the stop-drill holes on the inner surface.	Use plastic adhesive tape.
(7)	Apply filler to the groove and the stop-drill holes.	Step 2. Use Acryfix 92 or Tensol cement No. 70.
(8)	Let the filler cure.	Refer to the manufacturer's data.
(9)	If possible, turn the window so that the inner surface is up. Remove any plastic adhesive tape.	
(10)	Cut a groove along the crack in the inner surface of the window.	Refer to Figure 2, step 3.
Note: This groove is less deep than the outer surface groove. It must cut into the outer layer of filler. This prevents holes in the filler.		
(11)	Countersink the filler in the stop-drill holes on the inner surface to 1 mm (0.04 in).	
(12)	Apply filler to the groove and the stop-drill holes.	Step 4.
(13)	Let the filler cure.	Refer to the manufacturer's data.
(14)	Remove the masking materials.	
(15)	Grind the filler to the profile of the surface.	Grind both sides. Step 5.
(16)	Polish the repair area with fine abrasive paper.	

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CHAPTER 57

WINGS

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CHAPTER 57
WINGS

1. General

The DA 40 has cantilever wings. The wings are set low on the fuselage. Each wing has a flap attached to the inboard trailing edge. An aileron attaches to the outboard trailing edge.

The wings have a monocoque structure. Each wing has top and bottom shells. The shells have CFRP outer skins, a rigid foam core and GFRP inner skins. Each wing has two I-section spars. Uni-directional carbon fiber cloth makes the spar caps. Each wing also has GFRP ribs and webs.

The flaps and ailerons have a mixture of CFRP and GFRP cloth in the shells. The shells have rigid foam cores.

This Chapter gives the repair data about the layers of cloth used in the structure of the wings flaps and ailerons. Refer to Chapter 51 for general composite repair instructions. Refer to Chapter 27 for information about the control systems which operate the flaps and ailerons.

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Section 57-10
Wing Structure

1. General

This Section gives you the data about the structure of the wings. Refer to Section 57-50 for data about the structure of the flaps. Refer to Section 57-60 for data about the structure of the ailerons.

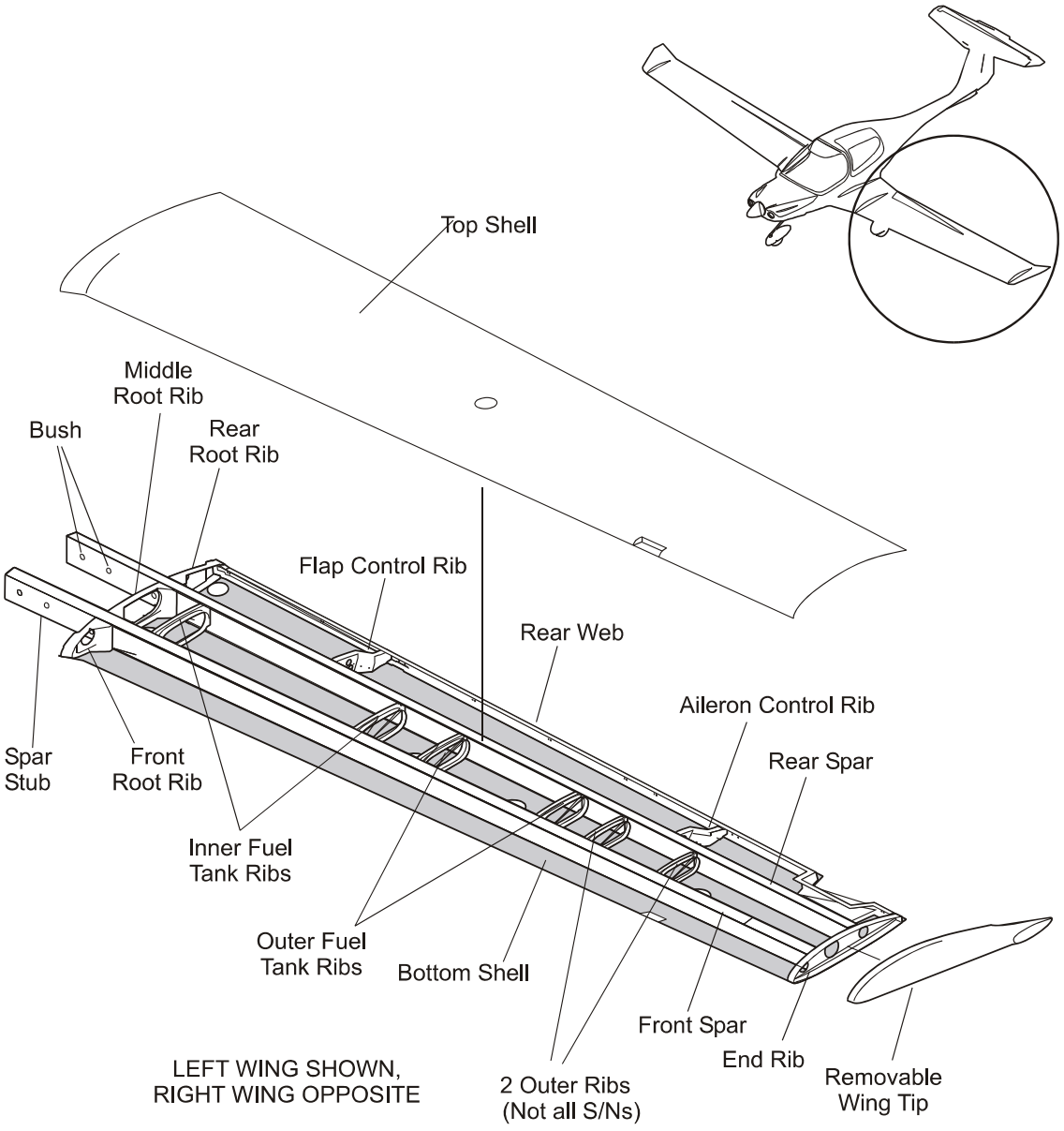


Figure 1: Wing Structure

2. Description

Figure 1 shows the wing structure. The wing has top and bottom shells. It has front and rear spars and a root rib made in three parts. Four ribs hold the fuel tanks between the spars. Flap and aileron control ribs hold the bellcranks for the control systems.

A rear web closes the trailing edge of the wing. An end rib closes the outboard end of the wing. A removable GFRP tip attaches to the wing shells and outer rib with screws.

Bonding paste (thickened resin) bonds the wing components to each other. The following section gives more data about the main parts:

A. Wing Shells

Each wing has top and bottom shells. Each shell has a CFRP outer skin, a rigid foam core and a GFRP inner skin. The fibers in the layers of cloth which cover the whole wing run at ± 45° to the lateral axis of the wing. The outer layer is carbon fiber. The inner layer is glass fiber.

Some areas have more layers of cloth to give more strength. For example, the area around each access hole has extra layers of carbon fiber cloth.

The bottom shell of each wing has seven access holes. These give access to the flap and aileron bellcranks and fuel tanks. The top shell has a hole for the fuel cap of the outer fuel tank.

B. Spars

Each wing has two I-section spars. The front spar on one side is the same as the rear spar on the opposite side.

Many layers of uni-directional carbon fiber make the spar caps. The number of layers in the spar caps decreases from root to tip.

Each spar has a shear web. The shear web has GFRP skins and a rigid foam core. Glass cloth fillets attach the spar caps to the shear web.

The inboard end of each spar (the ‘stub’) goes past the root rib. The spar stub is a box-section with many layers of glass cloth wrapped round the spar caps. Two large bushes bond into the spar stub. The wing main bolts engage these bushes and attach the wing to the fuselage center section. The bushes and bolts transmit the wing bending loads into the center section. Figure 3 shows the main bolt installation.

C. Root Rib

Each wing has a three-piece root rib. Each piece is a GFRP molding with many layers of glass fiber cloth. The front root rib bonds to the top and bottom shells and the front face of the front spar. It has a housing for the A-bolt. The A-bolt transmits lift loads into the center section.

The middle part of the root rib bonds to the top and bottom shells, the aft face of the front spar and the front face of the rear spar. It has a large oval access panel for removing the fuel tanks.

The rear root rib bonds to the top and bottom shells, the aft face of the rear spar and the rear web. It has a housing for the B-bolt. The B-bolt transmits lift loads into the center section. It also has guide rollers for the flap and aileron push rods.

D. Fuel Tank Ribs

Four ribs hold the fuel tanks in each wing. Each rib is a GFRP molding with a large oval hole. The hole has a flat inner flange to hold the tank. The ribs bond to the top and bottom shells, the aft face of the front spar and the front face of the rear spar.

E. Flap and Aileron Control Ribs

Each wing has two flap and one aileron control rib. The ribs are GFRP moldings. Each rib has a bend with a solid insert. The insert gives extra strength where the control bellcrank attaches. The ribs bond to the top and bottom shells, the aft face of the rear spar and the rear web.

F. Rear Web

Each wing has a rear web. The web closes the trailing edge of the wing. The web bonds to the top and bottom shells. It also bonds to the rear faces of the rear root rib, the flap control ribs and the aileron control rib. The rear web has extra layers where the flap and aileron hinges attach. Rivets hold anchor-nut plates to the forward face of the rear web where the hinges attach.

G. Wing End Rib

Each wing has an end rib. The end rib is a GFRP molding. The end rib has eight anchor-nuts which attach the wing tip. It also has a threaded strong-point for a tie-down ring.

H. Wing Tip

The wing tip is a GFRP molding with top and bottom shells. The wing tip holds the external lights.

Maintenance Practices

1. General

These Maintenance Practices tell you how to remove and install the wings. They also tell you how to remove and install the wing tips and other small components.

2. Remove/Install the Wings

A. Equipment

Item	Quantity	Part Number
Padded wing trestles.	4	Commercial.
Main bolt removal tool.	1	-
Wing stand (not essential).	1 per wing	Commercial.

B. Remove the Wings

Use this procedure to remove the left wing or the right wing. Where a part of the procedure applies to only one wing it will tell you so.

	Detail Steps/Work Items	Key Items/References
	WARNING: MAKE SURE THAT THE AREA AROUND THE FLAPS IS CLEAR OF PERSONS AND EQUIPMENT BEFORE YOU LOWER THE FLAPS. IF NOT, THE FLAPS CAN INJURE PERSONS OR BE DAMAGED BY EQUIPMENT.	
(1)	Lower the flaps.	
(2)	Disconnect the battery.	Refer to Section 24-31 (Lycoming version) or 24-34 (TAE version).
(3)	Defuel the airplane.	Refer to Section 12-10.
(4)	Remove these items for access: – The left/right pilots' seats. – Main landing gear access panel. – Center section rear access panel. – Inboard fuel tank access panel.	As necessary. Refer to Section 25-10.
(5)	Put trestles under both wing tips.	Under the end rib.
(6)	Disconnect the flap push-rod: – Remove the nut, washer and bolt.	At the wing root. Through the center section rear panel.
(7)	Disconnect the aileron push-rod: – Remove the nut, washer and bolt.	At the wing root. Through the center section rear panel.
(8)	Disconnect the electrical connector in the wing harness.	Left wing: connector P2400, under the pilot's seat. Right wing: connector P2401, under the co-pilot's seat.

	Detail Steps/Work Items	Key Items/References
(9)	Disconnect these items under the left pilot's seat: – The Pitot hose. – The static hose. – The stall warning hose. – Plug hoses to avoid contamination.	For left wing only. The hose is 8 mm (5/16 in) diameter. (Green color). The hose is 8 mm (5/16 in) diameter. (Purple color). The hose is 10 mm (3/8 in) diameter. (Transparent).
	WARNING: DO NOT GET FUEL ON YOU. FUEL CAN CAUSE DISEASE. **WARNING: DO NOT ALLOW FIRE NEAR FUEL. FUEL BURNS AND CAN CAUSE INJURY TO PERSONS AND DAMAGE TO EQUIPMENT.**	
(10)	Disconnect the fuel hose(s) in the stub wing.	Put a container to catch a small quantity of fuel. Remove spilt fuel.
(11)	Remove the locking tube from the inboard and outboard main bolts: – Remove the nut, washer and bolt. – Move the tube over the long end piece. – Remove the short end piece. – Remove the tube and the long end piece.	
	WARNING: USE 3 PERSONS TO LIFT THE WING. IF YOU DO NOT, YOU CAN CAUSE INJURY. CAUTION: DO NOT LIFT ON THE FLAP. YOU CAN DAMAGE THE FLAP.	
	Note: For the rest of this procedure, one person must lift the wing tip. One person must lift the leading edge at the root rib. One person must lift the trailing edge at the root rib.	

	Detail Steps/Work Items	Key Items/References
(12)	Remove the main bolts: – Take the weight off the wing. – For each bolt: – Install the main bolt removal tool. – Extract the bolt.	If necessary, move the wing tip a small amount up and down to help release the main bolts.
(13)	Lift the wing away from the center section.	Make sure that the electrical cables do not catch on the center section conduit.
(14)	Put the wing on trestles or a wing stand.	
	Note: If you use trestles, put one trestle under the spar stubs. Put the second trestle under the wing end rib.	

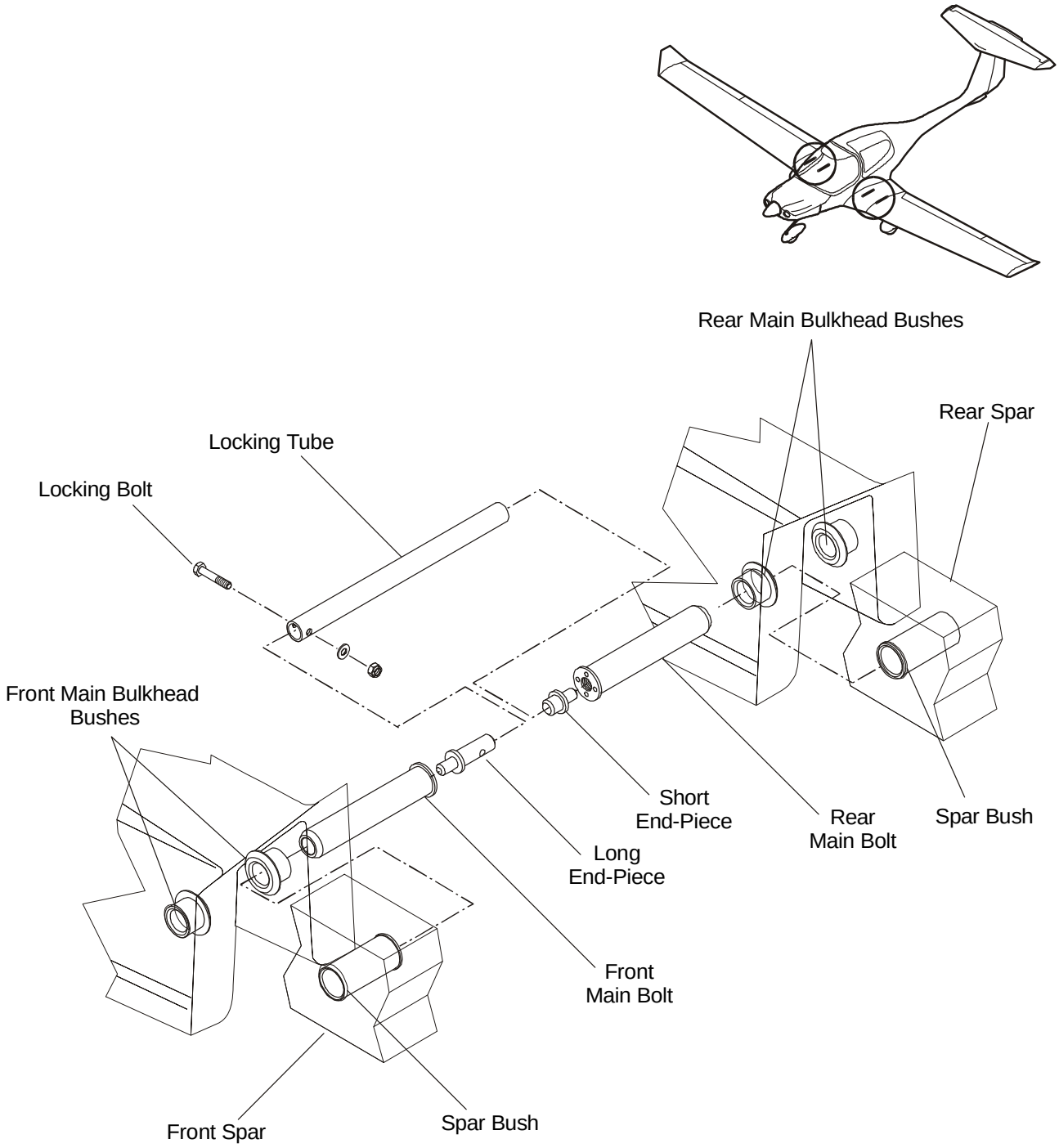


Figure 3: Wing Main Bolt Installation

C. Pre-Installation Check

Do this check before you install the wings.

	Detail Steps/Work Items	Key Items/References
(1)	Examine the inner faces of the front and rear main bulkheads. Look especially for: – Damage to the main bolt bushes. – Damage to the structure round the bushes. – Looseness between the bushes and the main bulkhead. – Damage to the top and bottom shells of the center section (where the spar stubs can touch the shells during wing removal). – Disbonds between the main bulkheads and the shells. – Delaminations.	Refer to the manufacturer if you find damage in any of these areas. Clean the bushes.
(2)	Examine the front, middle and rear end ribs in the center section. Look specially for: – Damage to the A- and B-bolt bushes. – Looseness between the A- and B-bolt bushes and the end ribs. – Disbonds between the end ribs, the main bulkheads and the shells. – Delaminations.	Refer to the manufacturer if you find damage in any of these areas. Clean the bushes.

	Detail Steps/Work Items	Key Items/References
(3)	Examine the wing spar stubs. Look specially for: – Damage to the main bolt bushes. – Damage to the spar stub around the bushes. – Looseness between the bushes and the spar stub. – Disbonds between the spars and the shells. – Delaminations.	Refer to the manufacturer if you find damage in any of these areas. Clean the bushes.
(4)	Examine the wing root ribs. Look specially for: – Damage to the A- and B-bolts and bushes. – Damage to the front and rear root ribs around the bushes. – Looseness between the bushes and the root ribs. – Disbonds between the root ribs, the spars and the shells. – Delaminations.	Refer to the manufacturer if you find damage in any of these areas. Clean the bolts and bushes.
(5)	Examine the main bolt assemblies. Look specially for: – Corrosion of the end-pieces or tube. – Corrosion of the main bolts. – Scratches on the bearing surfaces. – Deformation. – Damage to the threads for the removal tool.	Clean the main bolt assembly. Remove corrosion. Repair the surface finish. Refer to Section 51-20. No corrosion permitted. Maximum depth 0.1 mm (0.004 in). No deformation permitted. Replace the bolt if you cannot attach the removal tool correctly.
(6)	Measure the radial play of each main bolt in the related main bulkhead bushes.	Maximum radial play 0.2 mm (0.008 in).
(7)	Measure the radial play of each main bolt in the related spar stub bush.	Maximum radial play 0.2 mm (0.008 in).

	Detail Steps/Work Items	Key Items/References
(8)	Lubricate these items: – Main bolts. – Front and rear main bulkhead bushes. – Spar bushes. – A- and B-bolt bushes in the end ribs. – A- and B-bolts in the wing root ribs.	Refer to Section 12-20.
(9)	Examine the flap torsion tube and transfer lever in the center section. Look especially for damage to the transfer pins.	
(10)	Examine the flap. Look specially for damage to the inner end rib.	
(11)	Examine aileron: cracks, dents, mechanical attachments.	
(12)	Examine wing tips.	

D. Install the Wings

Use this procedure to install the left wing or the right wing. Where a part of the procedure applies to only one wing it will tell you so.

	Detail Steps/Work Items	Key Items/References
(1)	Do the pre-installation check.	Refer to Paragraph C.
	WARNING: USE 3 PERSONS TO LIFT THE WING. IF YOU DO NOT, YOU CAN CAUSE INJURY. CAUTION: DO NOT LIFT ON THE FLAP. YOU CAN DAMAGE THE FLAP. CAUTION: DO NOT LET THE SPAR STUBS TOUCH THE CENTER SECTION SHELLS. YOU CAN DAMAGE THE SHELLS.	
	Note: Until you install the main bolts, one person must lift the wing tip. One person must lift the leading edge at the root rib. One person must lift the trailing edge at the root rib.	
(2)	Lift the wing into position: – Move the spar stubs part way into the front and rear main bulkheads. – Put the electrical cable, Pitot, static and stall warning tubes through the conduit in the leading edge of the center section. – Align the flap inner rib with the transfer pins on the transfer lever. – Move the wing fully into the center section to engage the A- and B-bolts and the flap transfer pins.	 Hold the wing in position. Hold the wing in position. Hold the wing in position.
(3)	Install the main bolts: – Hold the weight of the wing. – Install each bolt.	If necessary, move the wing tip a small amount up and down to help install the main bolts.

	Detail Steps/Work Items	Key Items/References
(4)	Install the locking tubes on the inboard and outboard main bolts: – Install the long end piece in one main bolt. – Move the tube over the long end piece. – Install the short end piece in the other main bolt. – Move the tube over the short end piece. – Install the bolt, washer and self-locking nut through the tube and the long end piece.	Refer to Figure 3. Torque: hand tight.
(5)	Connect these items under the left pilot's seat: – The Pitot hose. – The static hose. – The stall warning hose.	For left wing only. The hose is 8 mm (5/16 in) diameter. (Green color). The hose is 8 mm (5/16 in) diameter. (Purple color). The hose is 10 mm (3/8 in) diameter. (Transparent).
(6)	Connect the electrical connector in the wing harness.	Left wing: connector P2400, under the pilot's seat. Right wing: connector P2401, under the co-pilot's seat.
(7)	Connect the fuel hose(s) in the stub-wing.	
(8)	Connect the flap push-rod: – Install the bolt, washer and self-locking nut.	Through the center section rear panel. Torque: 6.4 Nm (4.7 lbf.ft.).
(9)	Connect the aileron push-rod: – Install the bolt, washer and self-locking nut.	Through the center section rear panel. Torque: 6.4 Nm (4.7 lbf.ft.).
(10)	If you must also install the other wing, do items 1 to 9 again for that wing.	
(11)	Connect the battery.	Refer to Section 24-31 (Lycoming version) or 24-34 (TAE version).

	Detail Steps/Work Items	Key Items/References
(12)	Do a test for correct operation and range of movement of the flap system. If necessary, adjust the flap system.	Refer to Section 27-50.
(13)	Do an inspection of the flap controls which you have connected or adjusted. – If necessary for your Airworthiness Authority, do a second inspection of the controls.	
(14)	Do a test for correct operation and range of movement of the aileron system. If necessary, adjust the aileron system.	Refer to Section 27-10.
(15)	Do an inspection of the aileron controls which you have connected or adjusted. – If necessary for your Airworthiness Authority, do a second inspection of the controls.	
(16)	Do a functional check of these lights: – Navigation lights. – Strobe lights (ACLs). – Taxi light. – Landing light.	Refer to Section 33-40. Left wing only. Left wing only.
(17)	Do a functional check of the Pitot heating system.	Left wing only. Refer to Section 34-10.
(18)	Do a Pitot and static system leak test.	Left wing only. Refer to Section 34-10.
(19)	Refuel the airplane to the unusable fuel level.	Refer to Section 12-10.
(20)	Do a fuel quantity indication calibration check.	Lycoming version only. Refer to Section 28-40.

	Detail Steps/Work Items	Key Items/References
(21)	Install these items after access: – The left/right pilots' seats. – Main landing gear access panel. – Center section rear access panel. – Inboard fuel tank access panel.	As necessary. Refer to Section 25-10.
(22)	Do an air test.	Refer to the DA 40 Airplane Flight Manual.

3. Remove/Install the A- or B-Bolts

A. Remove the A- or B-Bolts

	Detail Steps/Work Items	Key Items/References
(1)	Remove the wing	Refer to Paragraph 2.
(2)	Remove the A- or B-bolt: – Hold the flats on the flange of the bolt with a wrench. – Remove the self-locking nut from the A- or B-bolt. – Remove the A- or B-bolt.	Refer to Figure 4. Access for the A-bolt through the hole in the front root rib. Access for the B-bolt through the access panel in the bottom shell.

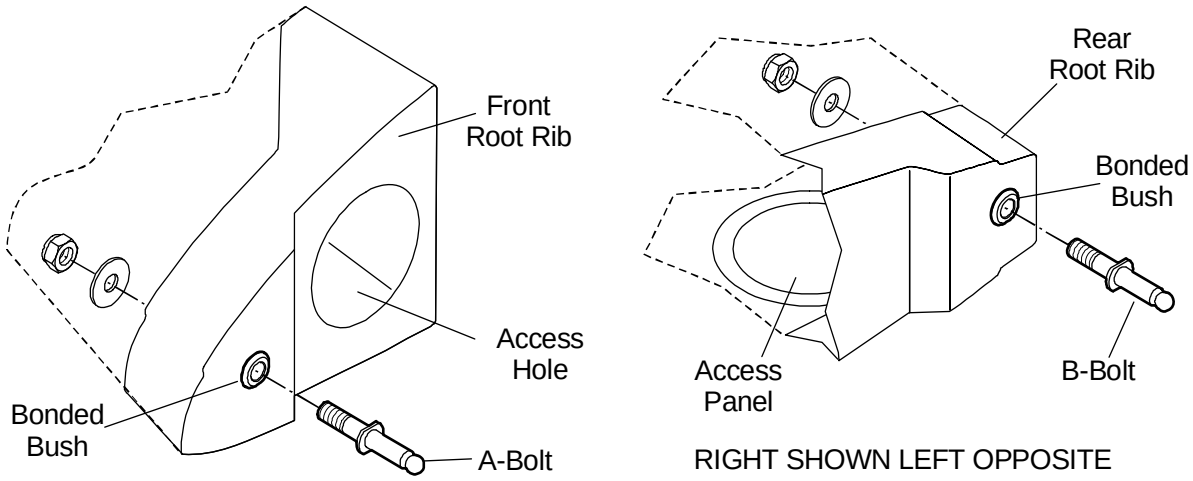


Figure 4: A- and B-Bolt Installation

B. Install the A- or B-Bolts

	Detail Steps/Work Items	Key Items/References
(1)	Examine the A- or B-bolt. Look specially for:	
	– Corrosion.	No corrosion permitted.
	– Scratches on the bearing surfaces.	Maximum depth 0.1 mm (0.004 in).
	– Deformation.	No deformation permitted.
	– Damage to the threads.	No damage permitted.
(2)	Examine the A- or B-bolt bush. Look specially for:	
	– Looseness between the A- or B-bolt bush and the root rib.	
	– Damage to the root rib where the bush attaches.	
	– Damage to the bush.	
(3)	Install the A- or B-bolt:	Refer to Figure 4.
	– Install the bolt in the bush.	Access for the A-bolt through the hole in the front root rib.
	– Hold the flats on the flange of the bolt with a wrench.	Access for the B-bolt through the access panel in the bottom shell.
	– Install the washer and self-locking nut.	Torque: 32 Nm (23.6 lbf.ft.).
(4)	Install the wing.	Refer to Paragraph 2.

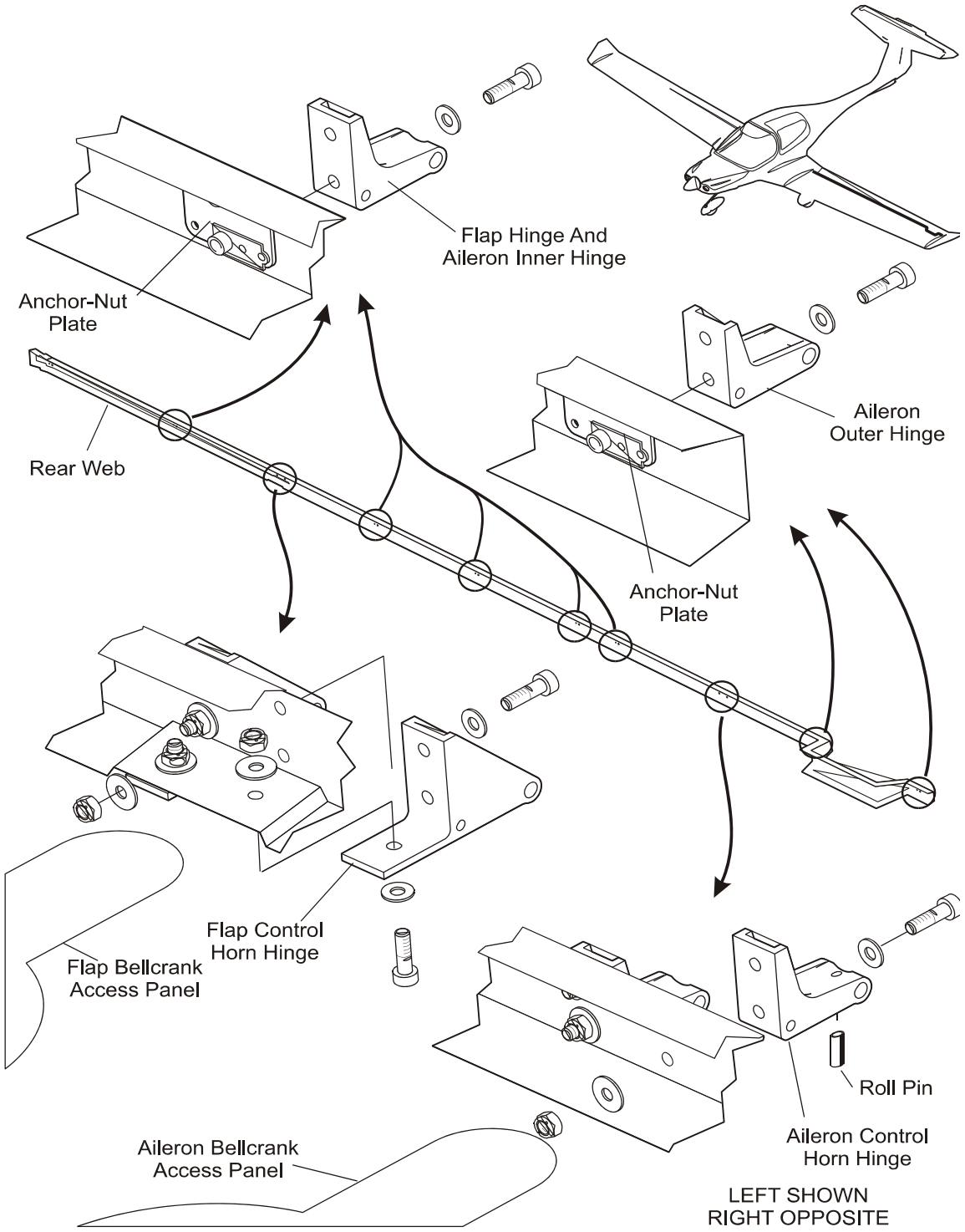


Figure 5: Control Surface Hinge Bracket Installation

4. Remove/Install Control Surface Hinge Brackets

A. Remove Control Surface Hinge Brackets

	Detail Steps/Work Items	Key Items/References
(1)	Remove the control surface.	Refer to Sections 57-50 and 57-60.
(2)	For brackets at the control horn hinge: – Remove the control bell-crank access panel under the wing. – Remove the attaching nuts and large washers. – Remove the bolts and small washers. – Remove the bracket.	The flap brackets have 3 bolts. The aileron brackets have 2 bolts. From inside of the wing.
(3)	For brackets not at the control horn hinge: – Remove the bolts and small washers. – Remove the bracket.	All brackets have 2 bolts.

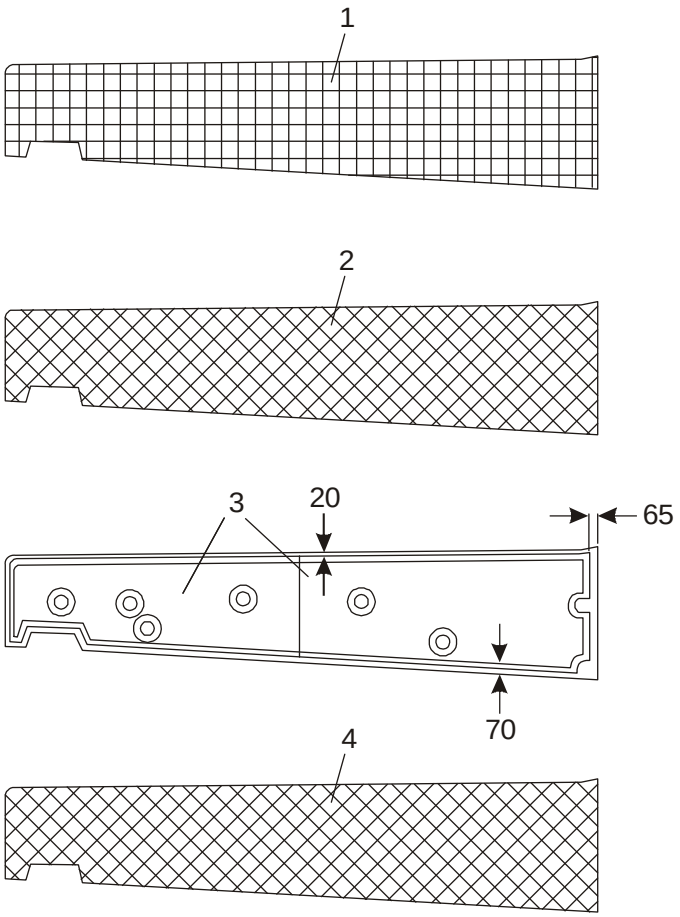
B. Install Control Surface Hinge Brackets

	Detail Steps/Work Items	Key Items/References
(1)	For brackets at the control horn hinge: – Put the bracket in position on the rear web. – Install the bolts with small washers. – Install the large washers and self-locking nuts. – Install the control bellcrank access panel under the wing.	The flap brackets have 3 bolts. The aileron brackets have 2 bolts. From inside of the wing. Torque: 3.6 Nm (2.7 lbf.ft.).
(2)	For brackets not at the control horn hinge: – Put the bracket in position on the rear web. – Install the bolts and small washers.	All brackets have 2 bolts. Torque: 3.6 Nm (2.7 lbf.ft.).
(3)	Install the control surface.	Refer to Sections 57-50 and 57-60.

5. Repair Data for the Wing Shells

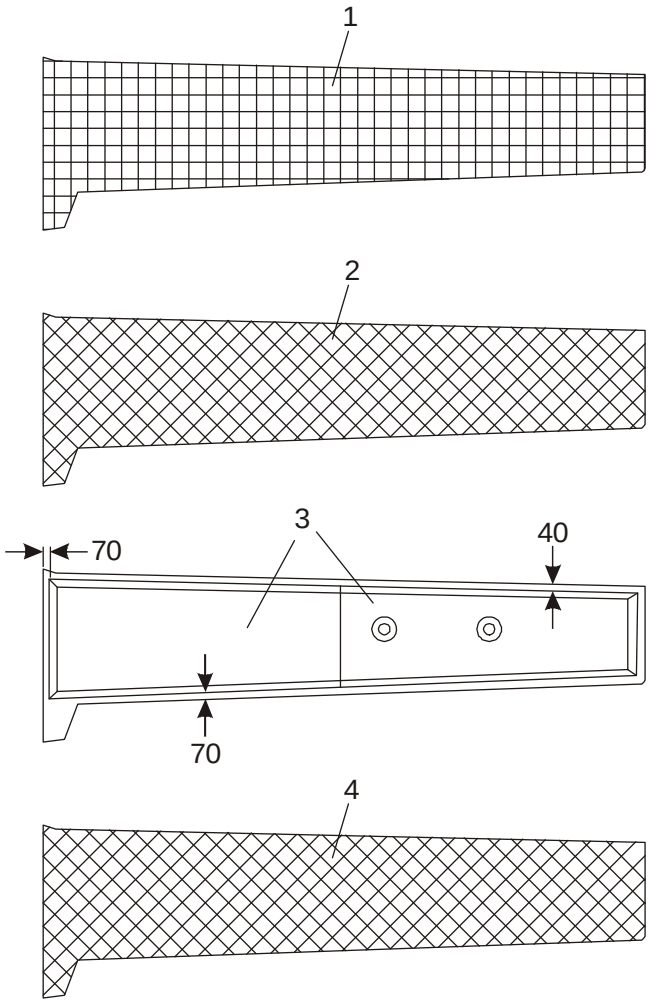
Figures 6 through 7 show only the basic lay-up of carbon and glass fiber cloth and rigid foam in the wing shells. Additional layers of glass and carbon fiber cloth reinforcing specially loaded areas are not shown. Contact Diamond Aircraft customer support department if more detailed information (such as further lay-up plans) is needed.

The figures show the main layers of cloth. The cross-hatching on the figure shows the orientation of the fibers. The orientation is also given in the related table. When you repair the wing, you must use the same type of cloth with the same fiber orientation.



Item No.	Layers	Reference No.	Interglas No.	Type	Remarks
1	1	8.4503.60 Glass	02037		0°/90° overall
2	1	8.3520.80 Carbon	98141	Carbon cloth	±45º overall
3		H 60 or Airex C71.55		6 mm rigid foam	
4	1	8.4551.60 Glass	92125	Twill 2/2	±45º overall

Figure 6: Main Layers of Cloth in the Wing Bottom Shell



Item No.	Layers	Reference No.	Interglas No.	Type	Remarks
1	1	8.4503.60 Glass	02037		0°/90° overall
2	2	8.3520.80 Carbon	98141	Carbon cloth	±45º overall
3		H 60 or Airex C71.55		6 mm rigid foam	
4	1	8.4551.60 Glass	92125	Twill 2/2	±45º overall

Figure 7: Main Layers of Cloth in the Wing Top Shell

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Section 57-50
Flaps

1. General

This Section tells you about the flap structure. Refer to Section 27-50 for data about the flap control system.

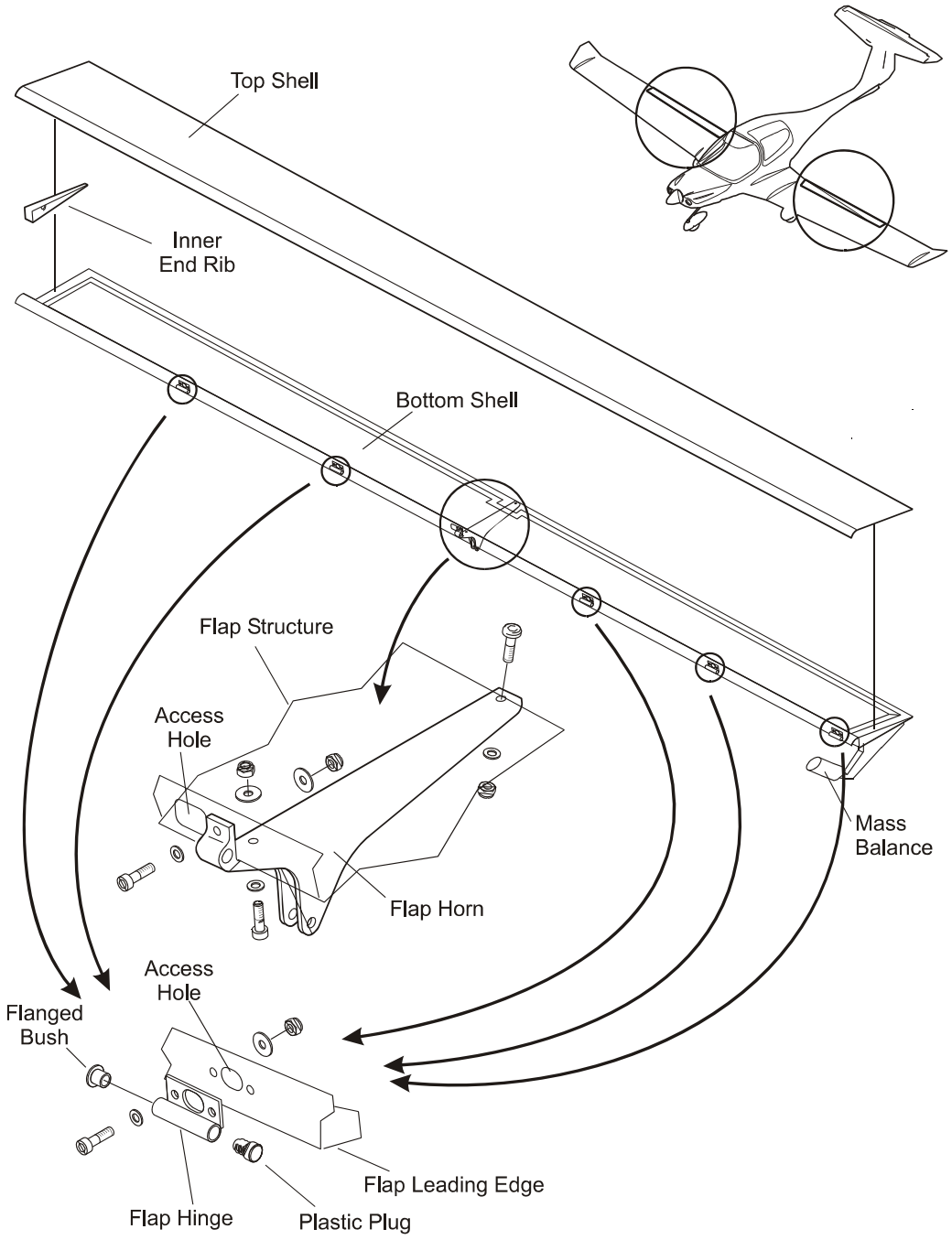


Figure 1: Flap Structure and Assembly

2. Description

Figure 1 shows the flap structure. Each flap has these components:

A. Bottom Shell

The bottom shell has inner and outer GFRP skins. It also has one layer of carbon fiber cloth in the outer skin. The skins bond to a rigid plastic foam core. The leading edge of the shell bends up to form a web. It then curves forward to form a shroud which seals the gap between flap and wing when the flap is down.

The outboard end of the bottom shell also bends up to close the end of the flap. The leading edge, the ends, and the area where the horn attaches have more carbon fiber cloth to give more strength and stiffness.

B. Top Shell

The top shell has inner and outer GFRP skins. It also has one layer of carbon cloth in the outer skin. The skins bond to a rigid plastic foam core. The top shell bonds to the bottom shell and the inner end rib.

C. Inner End Rib

The inner end rib is a CFRP molding. The rib has two holes with flanged bushes. The bushes engage with the transfer pins on the transfer levers of the flap control system. The end rib bonds to the top and bottom shells.

D. Flap Horn

The flap horn is an aluminum alloy component. Three bolts attach the horn to the bottom surface of the flap. A small hole in the leading edge of the flap gives access to the front attaching nuts and washers. The horn also makes one of the flap hinges. Two flanged bushes in the front of the horn make the hinge.

E. Flap Hinges

Each flap has five hinges (as well as the flap horn). Two bolts attach each hinge to the leading edge of the flap. A small hole in the middle of the hinge gives access to the attaching nuts and washers. Each hinge has a flanged bush at the inboard end. A plastic plug seals the outboard end.

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Maintenance Practices

1. General

These Maintenance Practices tell you how to remove and install the flaps. Refer to Section 27-50 for the flap setting procedure.

2. Remove/Install a Flap

A. Remove a Flap

	Detail Steps/Work Items	Key Items/References
	WARNING: MAKE SURE THAT THE AREA AROUND THE FLAPS IS CLEAR OF PERSONS AND EQUIPMENT BEFORE YOU LOWER THE FLAPS. IF NOT, THE FLAPS CAN INJURE PERSONS OR BE DAMAGED BY EQUIPMENT.	
(1)	Lower the flaps: – Set the ALT/BAT switch (Lycoming version) or ELECTRIC MASTER key switch (TAE version) to ON. – Set the flap selector to LDG. – When the flaps stop moving. – Set the ALT/BAT switch (Lycoming version) or ELECTRIC MASTER key switch (TAE version) to OFF.	
(2)	Open the circuit-breaker for the flap control.	Instrument panel. Right side.
(3)	Disconnect the flap push rod from the flap horn: – Remove the nut and washer from the bolt which attaches the push rod to the horn. – Remove the attachment bolt and washer from the horn.	Hold the flap.

	Detail Steps/Work Items	Key Items/References
(4)	Remove the 6 hinge pins from the flap hinges and the flap horn: – Remove the roll pins which locate the flap hinge pins. – Move the hinge pins inboard, and clear of the hinges.	Support the flap assembly!
(5)	Carefully move the flap aft, and clear of the airplane.	

B. Install a Flap

	Detail Steps/Work Items	Key Items/References
(1)	Make sure that the hinge pins are clean and not damaged.	
(2)	Put the flap into position on the airplane.	
(3)	Install the 6 hinge pins in the hinges and flap horn: – Push the hinge pins into position from the inboard side. – Align the holes in the hinges with the holes in the hinge pins and install the roll pins.	Make sure that there is a gap of 0.5 - 2.5 mm (0.002 - 0.010 in) between the faces of the hinge at the horn and a gap of 1 - 3 mm (0.004 - 0.012 in) between the faces at the other hinges.
(4)	Install the bolt which attaches the flap push rod to the flap horn: – Install a washer on the bolt. – Push the bolt through the horn and the push rod. – Install the washer and the nut on the bolt.	
(5)	Do a test for correct adjustment of the flaps.	Refer to Section 27-50.
(6)	If necessary for your Airworthiness Authority, do a second inspection of the flap controls.	

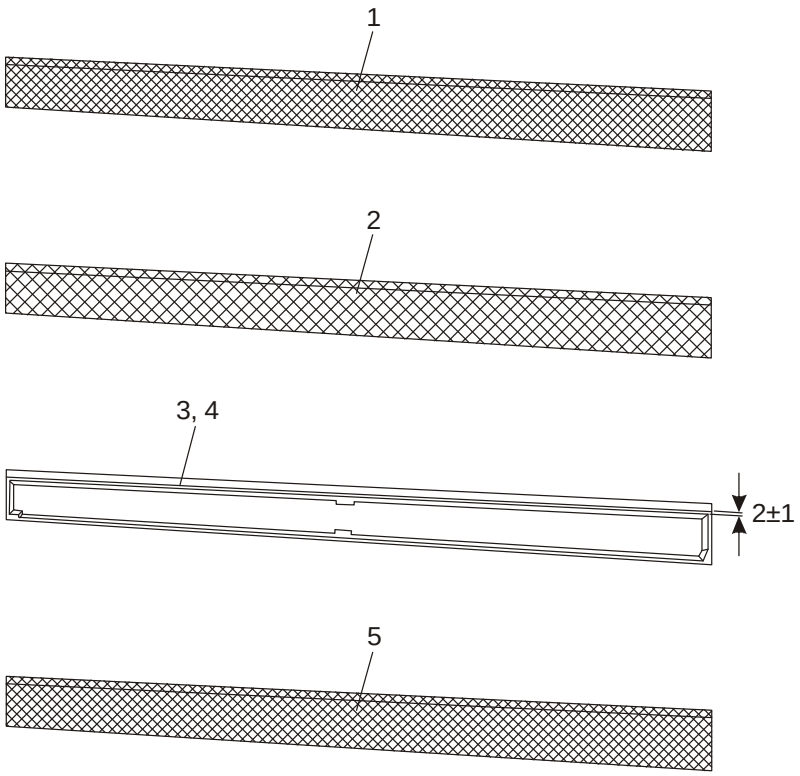
3. Repair Data for the Flap Shells.

Figures 2 and 3 show only the basic lay-up of carbon and glass fiber cloth and rigid foam in the flap shells. Additional layers of glass and carbon fiber cloth reinforcing specially loaded areas are not shown. Contact Diamond Aircraft customer support department if more detailed information (such as further lay-up plans) is needed.

The Figures show the main layers of cloth. The cross-hatching on the figure shows the orientation of the fibers. The orientation is also given in the related table. When you repair the flap, you must use the same type of cloth with the same fiber orientation.

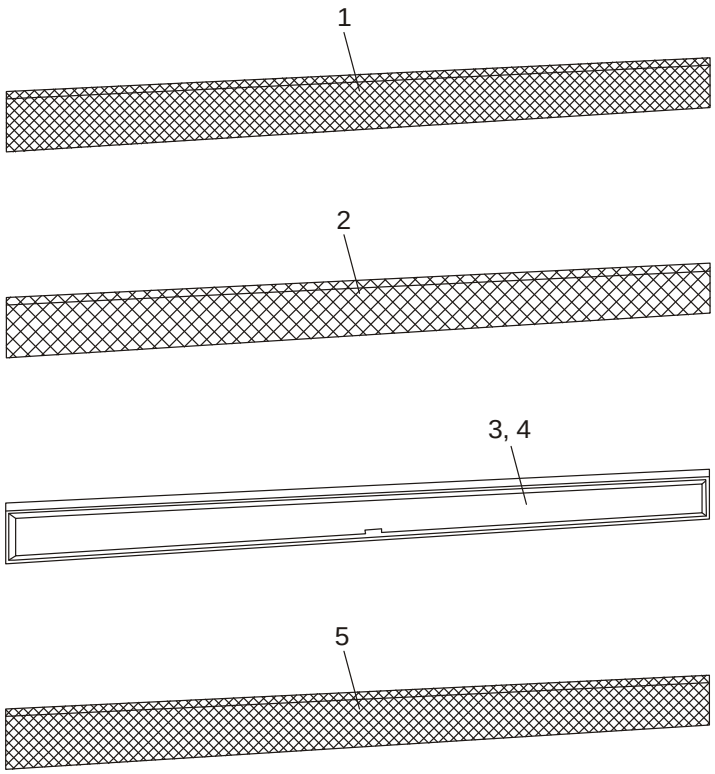
Always do a burn test on a piece of composite from the damaged area before you do a repair. Refer to Section 51-20 for the burn test.

After repair weigh and ensure that mass and moment are within the approved limits.



Item No.	Layers	Reference No.	Interglas No.	Type	Remarks
1	1	8.4548.60 Glass	92110	Twill 2/2	±45º, overall
2	1	8.3520.8 Carbon	98141	Carbon cloth	±45º, overall
3, 4		H 60 or Airex C71.55		3 mm rigid foam	
5	1	8.4548.60 Glass	92110	Twill 2/2	±45º overall

Figure 2: Main Layers of Cloth in the Flap Bottom Shell



Item No.	Layers	Reference No.	Interglas No.	Type	Remarks
1	1	8.4548.60 Glass	92110	Twill 2/2	±45º, overall
2	1	8.3520.8 Carbon	98141	Carbon cloth	±45º, overall
3, 4		H 60 or Airex C71.55		3 mm rigid foam	
5	1	8.4548.60 Glass	92110	Twill 2/2	±45º, overall

Figure 3: Main Layers of Cloth in the Flap Top Shell

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Section 57-60
Aileron

1. General

This Section tells you about the aileron structure. Refer to Section 27-10 for data about the aileron control system.

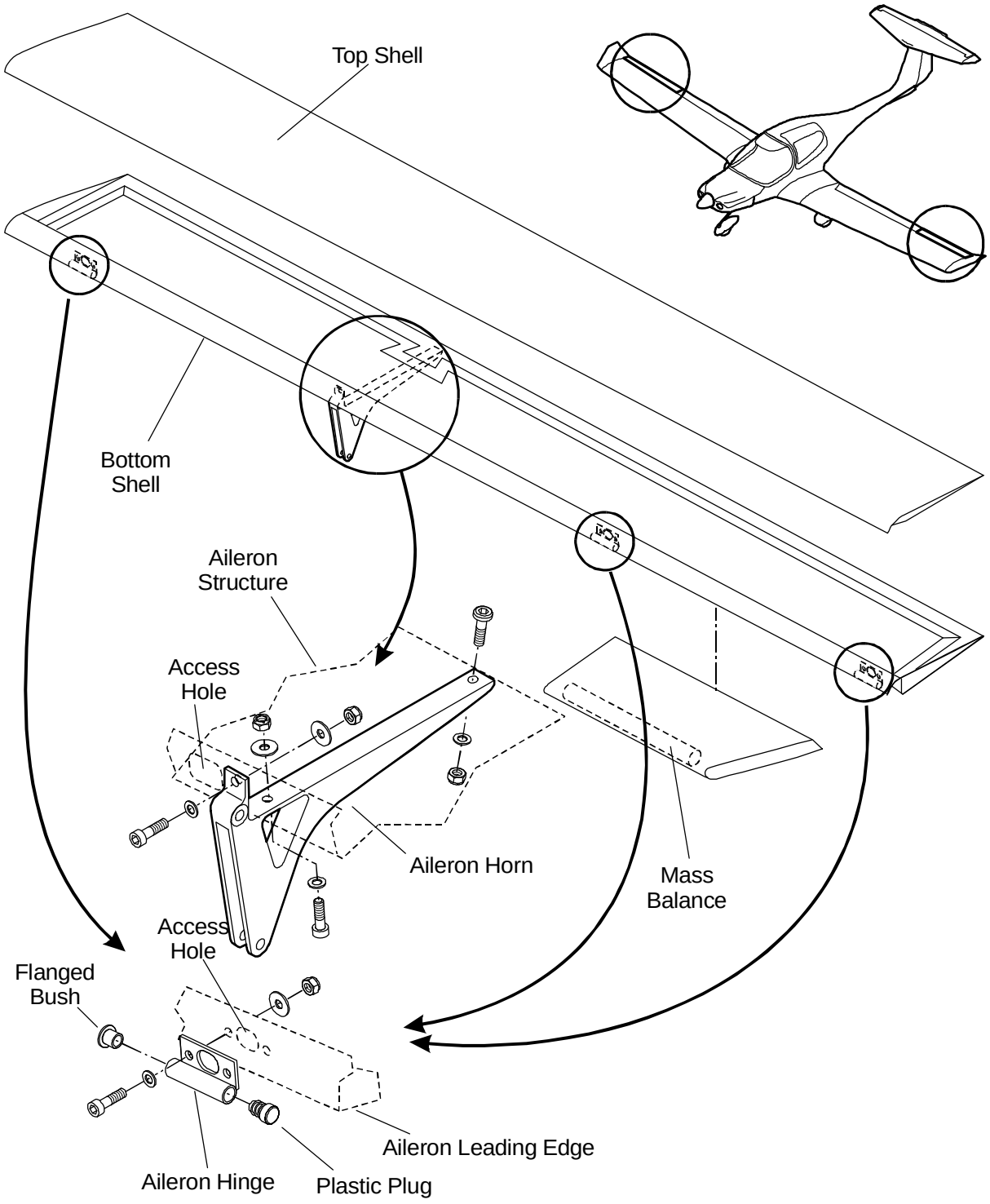


Figure 1: Aileron Structure and Assembly

2. Description

Figure 1 shows the aileron structure. Each aileron has these components:

A. Bottom Shell

The bottom shell has inner and outer GFRP skins. A layer of carbon fiber cloth covers a large part of the inboard area of the outer skin. The skins bond to a rigid plastic foam core. The leading edge of the shell bends up to form a web. It then curves forward to form a shroud which seals the gap between aileron and wing when the aileron moves down.

The ends of the bottom shell also bend up to close the ends of the aileron. The leading edge, the ends and the area where the horn attaches have more carbon fiber cloth to give more strength and stiffness.

B. Top Shell

The top shell has inner and outer GFRP skins. A layer of carbon fiber cloth covers a large part of the inboard area of the outer skin. The skins bond to a rigid plastic foam core. The top shell bonds to the bottom shell.

C. Aileron Horn

The aileron horn is an aluminum alloy component. Three bolts attach the horn to the bottom surface of the aileron. A small hole in the leading edge of the aileron gives access to the front attaching nuts and washers. The horn also makes one of the aileron hinges.

D. Aileron Hinges

Each aileron has three hinges (as well as the aileron horn). Two bolts attach each hinge to the leading edge of the aileron. A small hole in the middle of the hinge gives access to the attaching nuts and washers. Each hinge has a flanged bush at the inboard end. A plastic plug seals the outboard end.

E. Aileron Mass Balance

Each aileron has a paddle on the outboard end. To balance the mass of the aileron behind the hinge line, the leading edge of the paddle is made from heavy metal.

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Maintenance Practices

1. General

These Maintenance Practices tell you how to remove and install the ailerons. Refer to Section 27-10 for the aileron control setting procedure.

2. Remove/Install an Aileron

A. Remove an Aileron

	Detail Steps/Work Items	Key Items/References
(1)	Disconnect the aileron push rod from the aileron horn: – Remove the nut and washer from the bolt which attaches the push rod to the horn. – Remove the attachment bolt and washer from the horn.	Hold the aileron.
(2)	Remove the 4 hinge pins from the aileron hinges and the aileron horn: – Remove the roll pins which locate the aileron hinge pins. – Move the hinge pins inboard, and clear of the hinges.	Support the aileron assembly!
(3)	Carefully move the aileron aft, and clear of the airplane.	

B. Install an Aileron

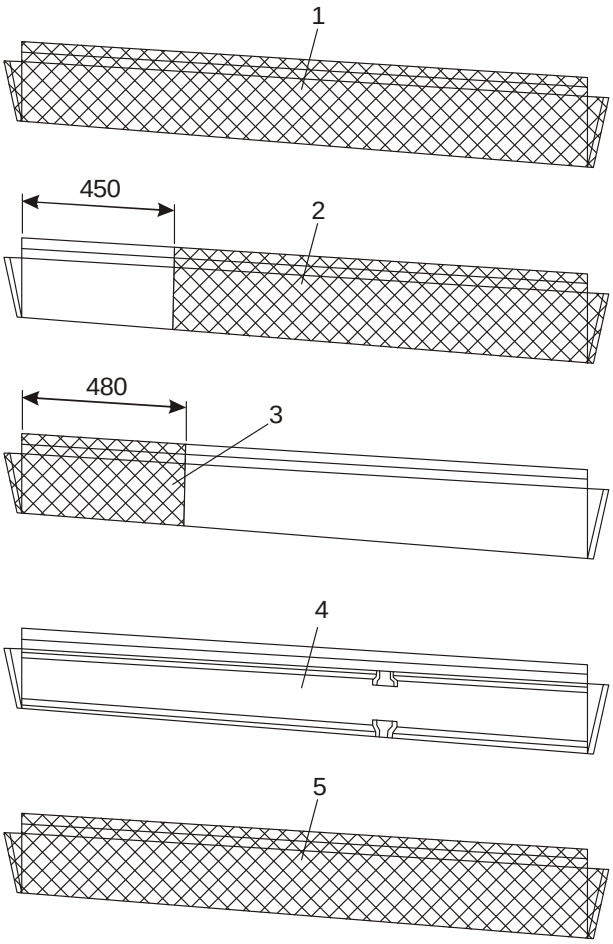
	Detail Steps/Work Items	Key Items/References
(1)	Make sure that the hinge pins are clean and not damaged.	
(2)	Put the aileron into position on the airplane.	
(3)	Install the 4 hinge pins in the hinges and aileron horn: – Push the hinge pins into position from the inboard side. – Align the holes in the hinges with the holes in the hinge pins and install the roll pins.	Make sure that there is a gap of 0.5 - 2.5 mm (0.002 - 0.010 in) between the faces of the hinge at the horn and a gap of 1 - 3mm (0.004 - 0.012 in) between the faces at the other hinges. hinges.
(4)	Install the bolt which attaches the aileron push rod to the aileron horn: – Install a washer on the bolt. – Push the bolt through the horn and the push rod. – Install the washer and the nut on the bolt.	
(5)	Do a test for correct adjustment of the aileron.	Refer to Section 27-60.
(6)	If necessary for your Airworthiness Authority, do a second inspection of the aileron controls.	

3. Repair Data for the Aileron Shells

Figures 2 and 3 show only the basic lay-up of carbon and glass fiber cloth and rigid foam in the aileron shells. Additional layers of glass and carbon fiber cloth reinforcing specially loaded areas are not shown. Contact Diamond Aircraft customer support department if more detailed information (such as further lay-up plans) is needed.

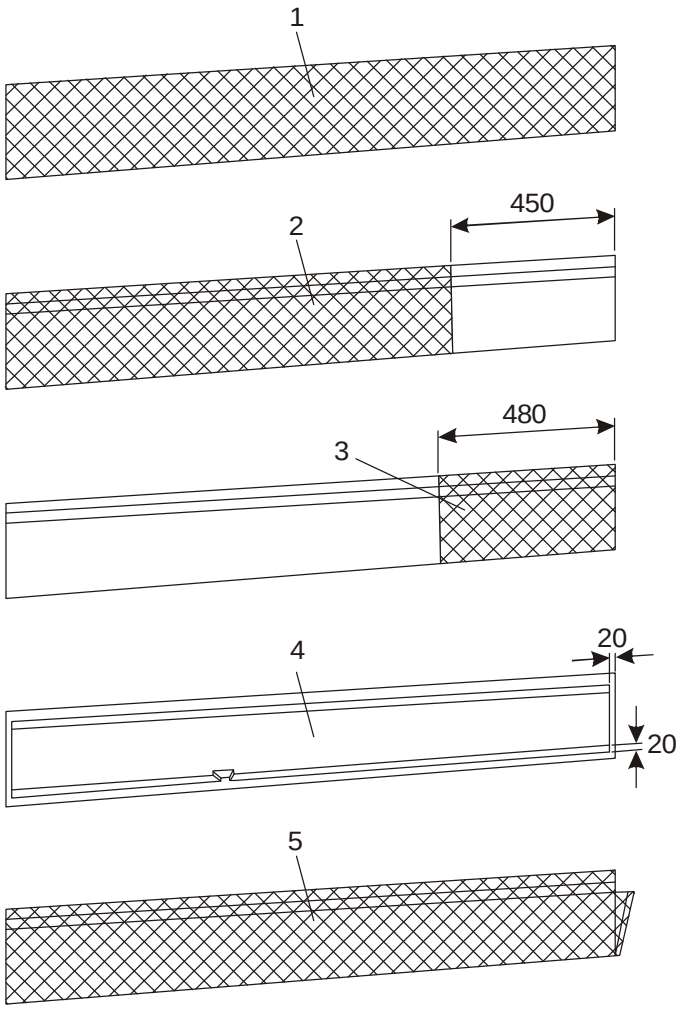
The Figures show the main layers of cloth. The cross-hatching on the figure shows the orientation of the fibers. The orientation is also given in the related table. When you repair the aileron, you must use the same type of cloth with the same fiber orientation.

After repair weigh and ensure that mass and moment are within the approved limits.



Item No.	Layers	Reference No.	Interglas No.	Type	Remarks
1	1	8.4548.60 Glass	92110	Twill 2/2	±45º, overall
2	1	8.3520.8 Carbon	98141	Carbon cloth	±45º, acc. to drawing
3	1	8.4548.60 Glass	92110	Twill 2/2	±45º, acc. to drawing
4		H 60 or Airex C71.55		3 mm rigid foam	
5	1	8.4548.60 Glass	92110	Twill 2/2	±45º, overall

Figure 2: Main Layers of Cloth in the Aileron Bottom Shell



Item No.	Layers	Reference No.	Interglas No.	Type	Remarks
1	1	8.4548.60 Glass	92110	Twill 2/2	±45º, overall
2	1	8.3520.8 Carbon	98141	Carbon cloth	±45º, acc. to drawing
3	1	8.4548.60 Glass	92110	Twill 2/2	±45º, acc. to drawing
4		H 60 or Airex C71.55		3 mm rigid foam	
5	1	8.4548.60 Glass	92110	Twill 2/2	±45º, overall

Figure 3: Main Layers of Cloth in the Aileron Top Shell

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CHAPTER 61

PROPELLER

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Propeller Control - TAE 125 Diesel Engine

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CHAPTER 61
PROPELLER

1. General

This Chapter tells you about the propeller installed on the DA 40.

– Section 61-10 tells you about the propeller assembly for airplanes with the Lycoming IO-360-M1A engine installed.

– Section 61-11 tells you about the propeller assembly installed for airplanes with the TAE 125 Diesel engine installed.

– Section 61-12 tells you about the propeller assembly for airplanes with the Lycoming O-360-A4M engine installed.

– Section 61-20 tells you about the propeller governor for airplanes with the Lycoming engine installed.

– Section 61-21 tells you about the propeller governor for airplanes with the TAE 125 Diesel engine installed.

For more data on the propeller refer to the propeller manufacturer's manuals.

Note: Equipment which is certified for installation in the DA 40 is listed in Section 6.5 of the Airplane Flight Manual. Such equipment may be installed in accordance with the Airplane Maintenance Manual.

Any equipment which is not listed in Section 6.5 of the Airplane Flight Manual is called "Additional Equipment". The installation of Additional Equipment is a modification which must be handled in accordance with national regulations or a Service Bulletin.

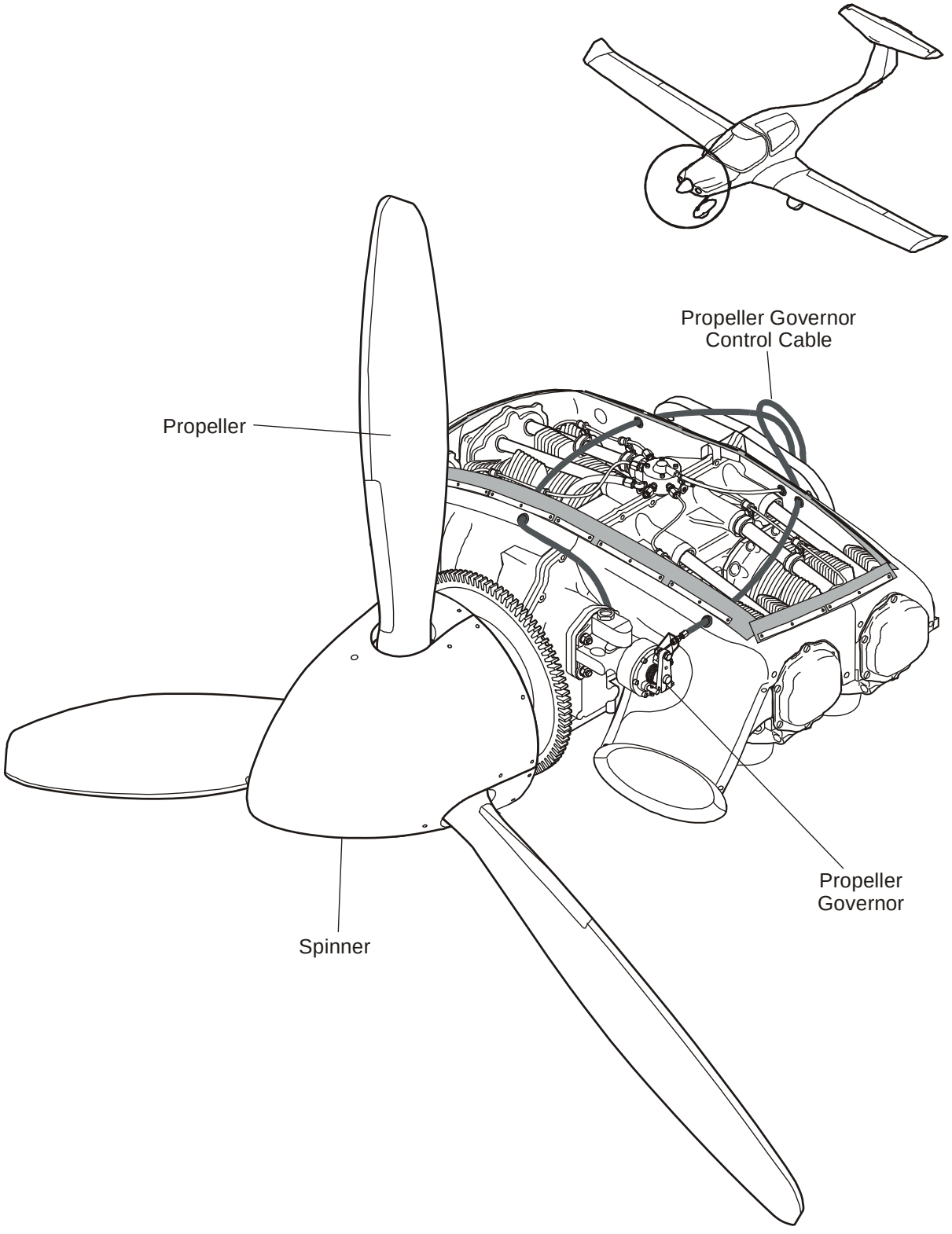


Figure 1: Typical Propeller Assembly for 3-Bladed Constant Speed Propeller

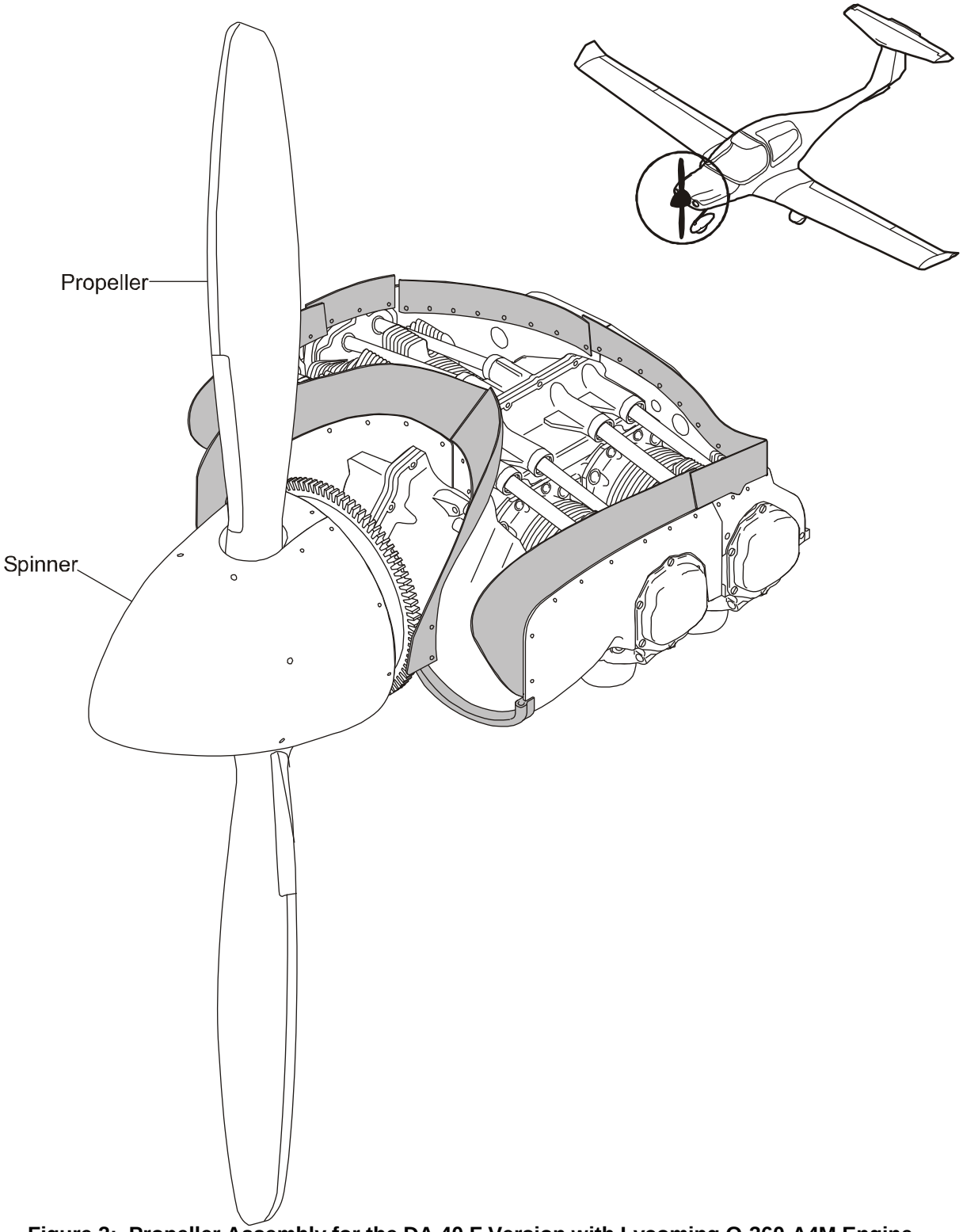


Figure 2: Propeller Assembly for the DA 40 F Version with Lycoming O-360-A4M Engine

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Section 61-10
Propeller Assembly - Lycoming IO-360-M1A Engine

1. General

The DA 40 with the Lycoming IO-360-M1A engine installed has a mt-Propeller MTV-12-B/180-17or a MTV-12-B/180-17f variable pitch propeller installed. These propeller types have three blades. The blades are made from wood and are covered with GFRP. The blades have an acryl lacquer painted finish. The outboard leading-edges of the blades are protected from erosion by a stainless-steel sheath. The stainless-steel sheath is bonded into position. The inboard section of the leading-edge is protected by a self-adhesive rubber strip (PU tape).

This Section tells you how to remove and install the propeller and how to do a test for blade tracking. Section 61-20 tells you about the propeller governor and how to remove/install the governor.

Refer to the propeller manufacturer's manuals for more data on the propeller.

2. Description

Figure 1 shows you the propeller. The propeller attaches to the engine crankshaft flange bushings with six special bolts (stud with a castle nut; castle nut attached to stud by means of a split pin). The bolts are locked with wire. The bolts are retained within the propeller hub.

A spinner bulkhead (spinner backplate) attaches to the rear of the hub with six bolts. The bolts are locked with wire. A front support plate attaches to the front of the hub with six screws. The screws are locked with wire. A spinner which is made from composite material attaches to the aft bulkhead with screws. The spinner is supported by the front support plate. Screws attach the spinner to the front support plate.

The propeller has a Woodward governor. The governor attaches to a drive pad on the left side of the engine at the front. The governor controls the propeller pitch hydraulically. Engine oil flows through internal oil galleries to the governor. The governor has a geared oil pump which increase the oil pressure. The oil flows from the governor to the propeller hub through the hollow crankshaft.

3. Operation

A pre-loaded spring (return spring) turns the propeller blades towards fine pitch. In addition, when the propeller is turning, centrifugal twisting moments also cause the blades to turn towards fine pitch. Hydraulic pressure in the cylinder acts on a piston and the piston moves the blades towards coarse pitch.

In normal flight the propeller governor will maintain the RPM set by the pilot and also control the engine maximum RPM.

If the hydraulic pressure from the governor fails, the blades turn towards fine pitch. An adjustable fine pitch stop limits the amount of blade movement towards fine pitch. The fine-pitch-stop is adjusted to give maximum static RPM. If the governor fails during flight it is possible to over-speed the propeller. Refer to the engine manufacturer for data on over-speeds.

Trouble-Shooting

1. General

The table below lists the defects you could have for the propeller. If you have the trouble detailed in the Trouble column read across to the Possible Cause column. Then do the repair in the Repair column.

Trouble	Possible Cause	Repair
Engine vibration.	Propeller out of balance.	Examine the propeller. If you find damage refer to the manufacturer's Owners Manual.
	Spinner out of balance.	Replace the spinner.
	Propeller mounting loose.	Tighten the mounting nuts to the correct torque. Refer to the manufacturer's Owners Manual.
	The spinner attaching screws loose.	Tighten the attaching screws. Refer to the manufacturer's Owners Manual.
	Blade tracking not correct.	Refer to the manufacturer's Owners Manual.
Cracks in the blades.	Over-speed.	Refer to the manufacturer's Owners Manual.
Holes/nicks/dents in the blade.	Stone damage.	Repair/replace the propeller. Refer to the manufacturer's Owners Manual.

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Maintenance Practices

1. General

These Maintenance Practices tell you how to remove and install the propeller. And they tell you how to do a propeller blade tracking test.

2. Remove/Install the MTV-12-B/180-17 or the MTV-12-B/180-17f Propeller

A. Remove the Propeller

	Detail Steps/Work Items	Key Items/References
	WARNING: MAKE SURE THAT THE ENGINE IS SAFE BEFORE YOU DO ANY WORK ON THE PROPELLER. IF THE ENGINE IS TURNED, THE PROPELLER CAN CAUSE INJURY OR DEATH.	
(1)	Make sure that the engine is safe: – Set the ignition switch to OFF. – Set the throttle to IDLE. – Set the mixture control to LEAN CUT-OFF.	
(2)	Remove the engine cowlings.	Refer to Section 71-10.
(3)	Disconnect the spark-plug-leads from the spark plugs.	
	Note: Mark the propeller, spinner, front support plate and spinner bulkhead, with an index mark. This will help you install these items in the correct position.	

	Detail Steps/Work Items	Key Items/References
(4)	Remove the spinner: – Mark the spinner and spinner bulkhead with index marks to aid installation. – Release the screws holding the spinner to the spinner bulkhead. – Release the screws holding the spinner to the front support plate and move the spinner clear of the airplane. – Mark the front support plate with an index mark to align with the other index marks.	Refer to Figure 1.
(5)	Cut the lock-wire on the attaching bolts.	
(6)	Remove the special bolts which attach the propeller to the crankshaft flange.	Hold the propeller!
(7)	Pull the propeller forward and clear of the crankshaft flange bushings.	

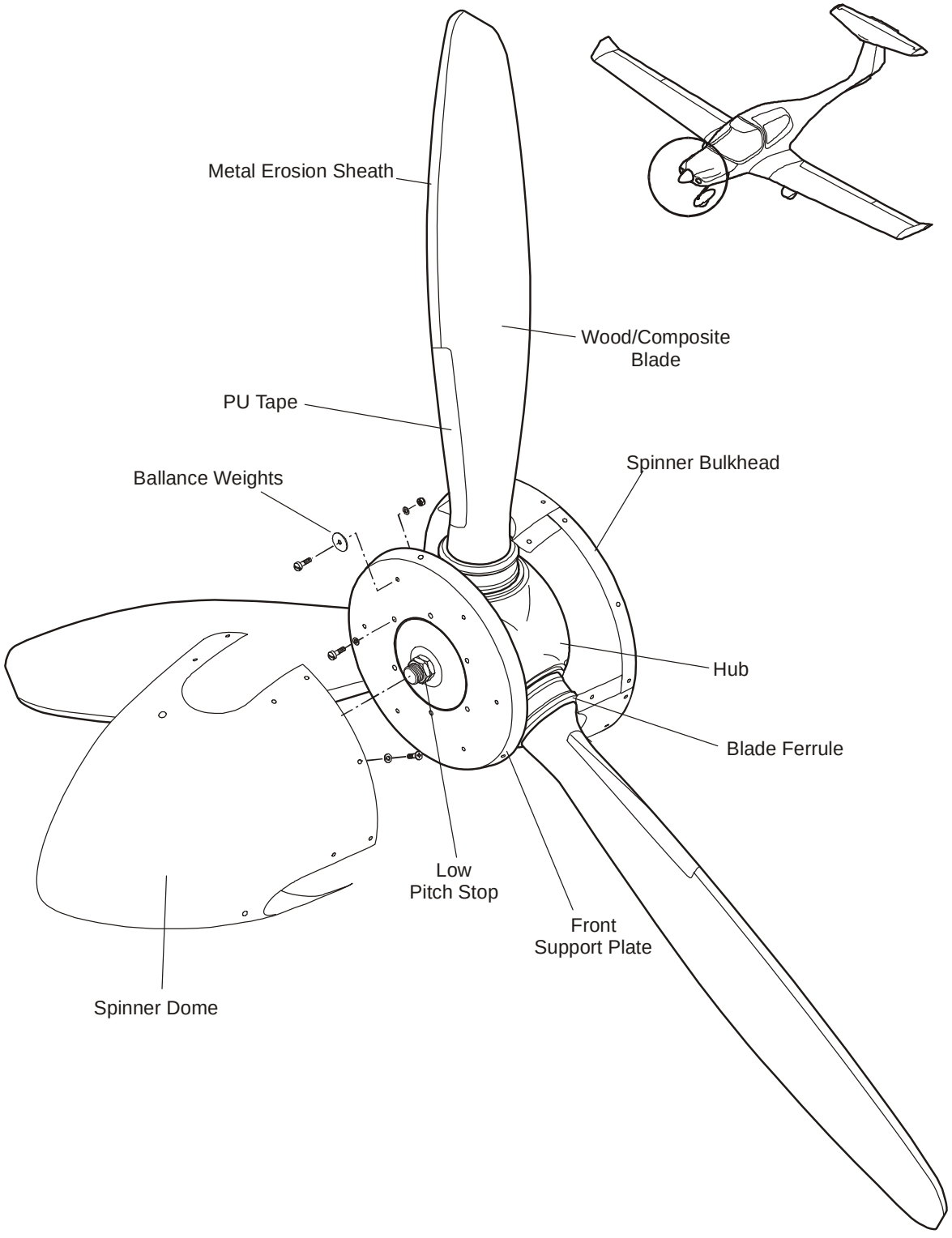


Figure 1: Propeller Installation

B. Install the Propeller

	Detail Steps/Work Items	Key Items/References
	WARNING: MAKE SURE THAT THE ENGINE IS SAFE BEFORE YOU DO ANY WORK ON THE PROPELLER. IF THE ENGINE IS TURNED, THE PROPELLER CAN CAUSE INJURY OR DEATH.	
(1)	Make sure that the engine is safe: – Set the ignition switch to OFF. – Set the throttle to IDLE. – Set the mixture control to LEAN CUT-OFF.	
(2)	Remove the engine cowlings.	Refer to Section 71-10.
(3)	Make sure that the spark-plug cables are disconnected from the spark-plugs.	
(4)	If necessary, install the spinner bulkhead onto the hub: – Ensure that the mating surfaces are clean and dry. – Install the six bolts and washers which attach the spinner bulkhead to the hub. – Lock the bolts in pairs with lock-wire.	Align the index marks.
(5)	Make sure that the engine flange, engine flywheel and the propeller flange are clean and dry.	
(6)	Make sure that the shipping plug is removed and check the inside of the propeller hub area for contamination.	
(7)	Make sure that a new O-ring seal is in place in the propeller hub. Lightly oil the seal.	Refer to Figure 2. Use clean engine oil.
(8)	If necessary, install the six special bolts which attach the propeller hub to the crankshaft flange.	

	Detail Steps/Work Items	Key Items/References
(9)	Move the propeller into position on the crankshaft bushings.	Take care not to damage the propeller O-ring seal.
(10)	Turn each bolt a small amount. Turn the bolts in opposing pairs until they are finger tight.	Make sure that the propeller is pushed into the correct position by hand. Do not use the bolts to pull the propeller into position.
(11)	When the propeller is in the correct position fully tighten the bolts in opposing pairs.	Torque 85 - 90 Nm (63 - 66 lbf.ft.).
(12)	Lock the bolts in pairs with lock-wire.	
(13)	If necessary, install the front support plate: – Ensure that the mating surfaces are clean and dry. – Install the six screws and washers which attach the support plate to the hub. – Lock the screws in pairs with lock-wire.	Align the index marks.
(14)	Do a test for correct blade track.	Refer to Paragraph 3.
(15)	Install the spinner: – Loosely install the screws and plastic washers which attach the spinner to the spinner bulkhead. – Loosely install the screws and plastic washers which attach the spinner to the front support plate. – Tighten all the attaching screws.	Align the index mark. Torque 4 - 5 Nm (35 - 44 lbf.in.).
(16)	Connect the spark-plug-leads to the spark plugs.	Refer to Section 74-20.
(17)	Install the engine cowlings.	Refer to Section 71-10.
(18)	Do an engine run-up. Do a test for correct operation of the propeller.	Refer to Section 71-00.

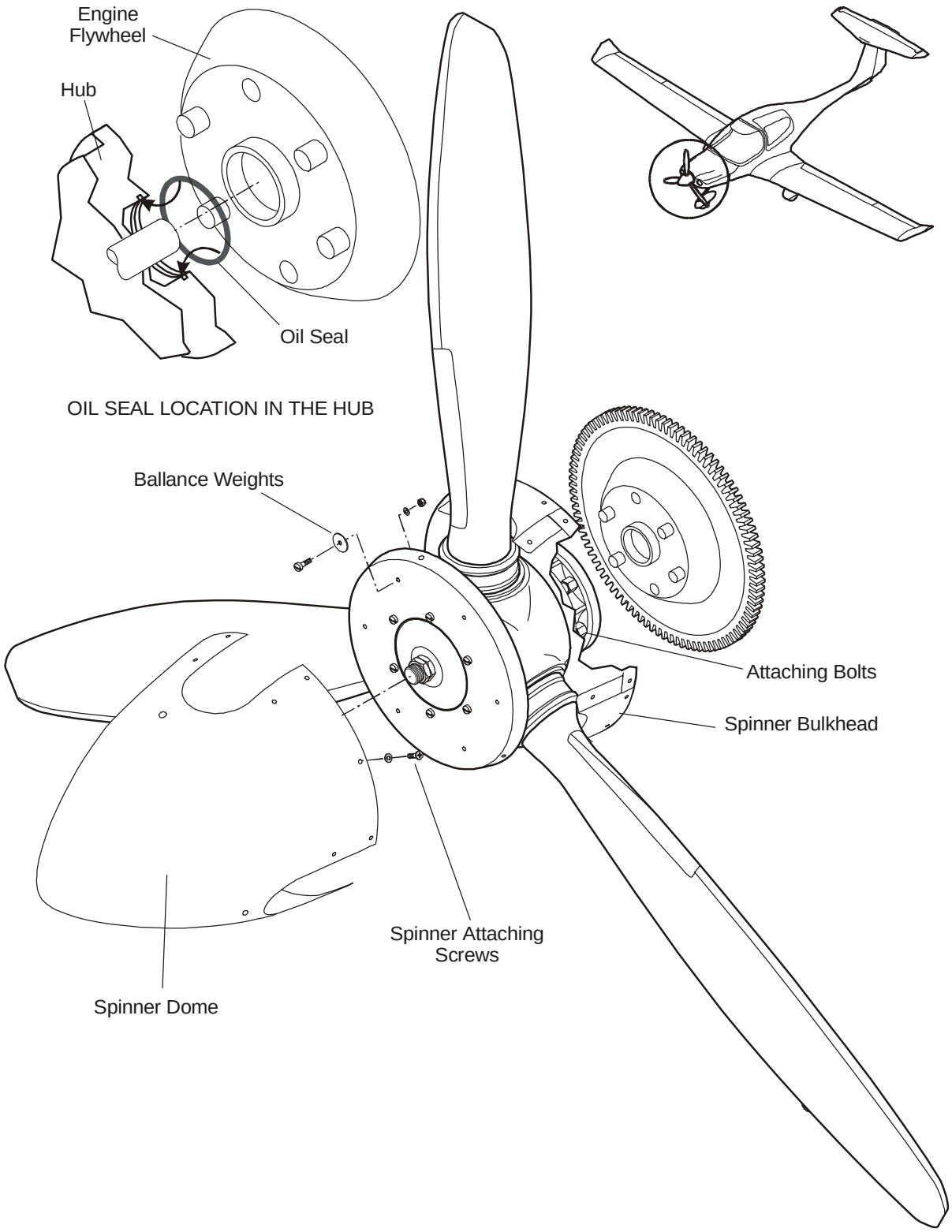


Figure 2: Remove/Install the Propeller

3. Propeller Blade Tracking Test

A. Equipment

Item	Quantity	Part Number
Tracking stand.	1	Commercial.

B. Procedure

	Detail Steps/Work Items	Key Items/References
	WARNING: MAKE SURE THAT THE ENGINE IS SAFE BEFORE YOU DO ANY WORK ON THE PROPELLER. IF THE ENGINE IS TURNED, THE PROPELLER CAN CAUSE INJURY OR DEATH.	
(1)	Make sure that the engine is safe: – Set the ignition switch to OFF. – Set the throttle to IDLE. – Set the mixture control to LEAN CUT-OFF.	
(2)	Remove the engine cowlings.	Refer to Section 71-10.
(3)	Disconnect the spark plug cables from the spark plugs.	
(4)	Put the tracking stand behind the propeller.	Do not move the tracking stand during the test.
(5)	Turn the propeller backwards to align a blade with the tracking stand.	
(6)	Measure the distance from the stand to the blade.	Measure from the stand to a point on the trailing edge 10 cm (4 in) from the blade tip.
(7)	Do items 5 and 6 for the other blades and record the values.	
(8)	The difference between any blades must not be more than 3 mm (1/8 inch).	

4. Blade Repairs

You can do minor repairs but you cannot do major repairs. Refer to the propeller manufacturer's manual for more data about assessing blade damage and doing blade repairs.

Section 61-11
Propeller Assembly - TAE 125 Diesel Engine

1. General

The DA 40 with the TAE 125 Diesel engine has a mt-Propeller MTV-6-A /187-129 variable pitch propeller. This propeller has three blades. The blades are made from wood and are covered with GFRP. The blades have an acryl lacquer painted finish. The outboard leading-edges of the blades are protected from erosion by a stainless-steel sheath. The stainless-steel sheath is bonded into position. The inboard section of the leading-edge is protected by a self-adhesive rubber strip (PU tape).

This Section tells you how to remove and install the propeller and how to do a test for blade tracking. Section 61-21 tells you about the propeller governor.

Refer to the propeller manufacturer's manuals for more data on the propeller.

2. Description

Figure 1 shows you the propeller. The propeller hub has six studs on the rear face. The propeller attaches to the engine crankshaft flange with six nuts and washers.

A spinner bulkhead (spinner backplate) attaches to the rear of the hub with six bolts. The bolts are locked with wire. A front support plate attaches to the front of the hub with six screws. The screws are locked with wire. A spinner which is made from composite material attaches to the aft bulkhead with screws.

The engine has an integral governor. The governor controls the propeller pitch hydraulically. Gearbox oil flows via the gearbox driven pump and a pressure limiter valve to the governor. The governor consists of an electrically controlled three-way valve to control the oil pressure in the propeller pitch change mechanism. The oil pressure is increased for higher pitch angles and reduced for lower pitch angles. The oil flows from the governor to the propeller hub through the hollow propeller shaft.

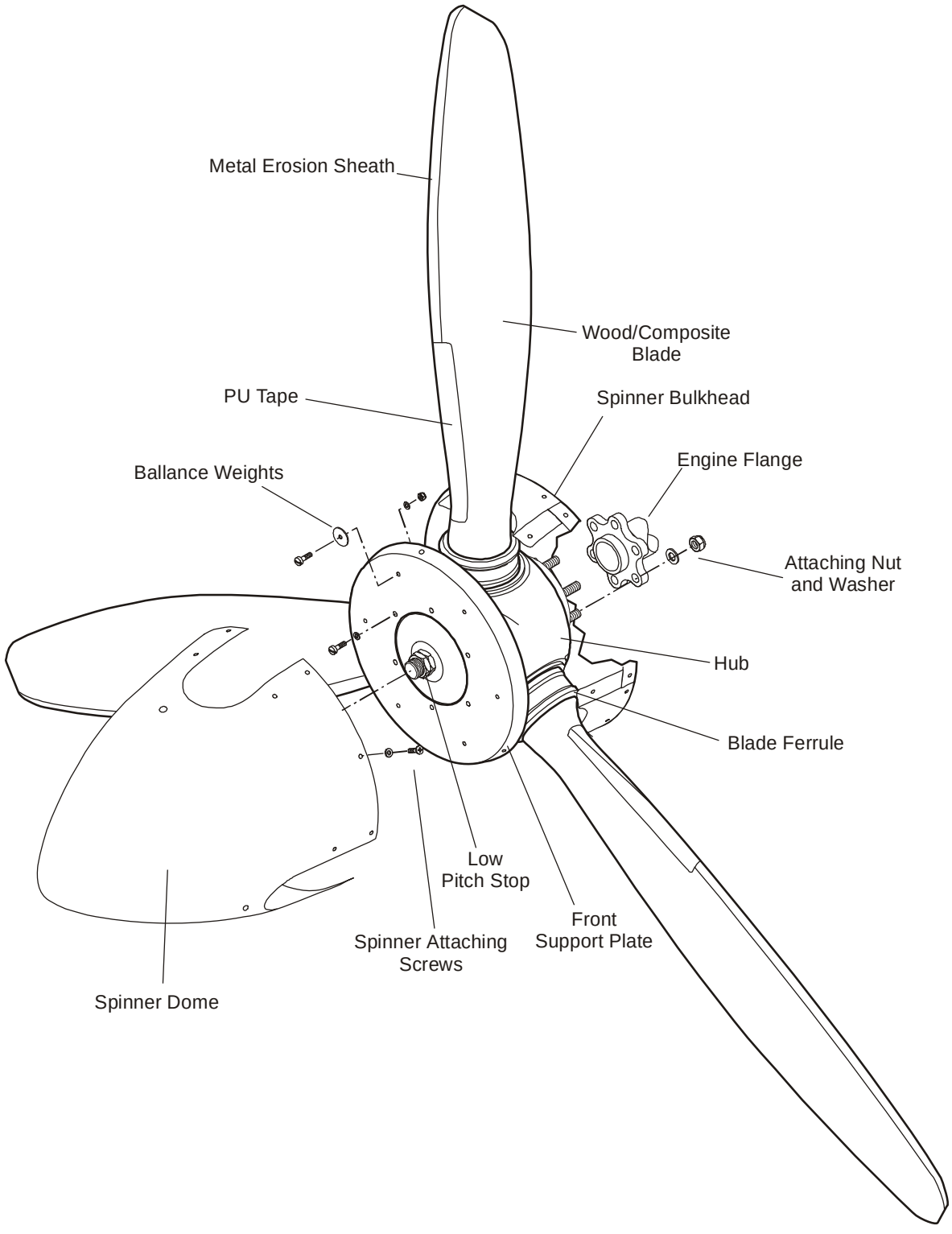


Figure 1: Propeller Assembly - TAE 125 Installation

3. Operation

A pre-loaded spring (return spring) turns the propeller blades towards fine pitch. In addition, when the propeller is turning, centrifugal twisting moments also cause the blades to turn towards fine pitch. Hydraulic pressure in the cylinder acts on a piston and the piston moves the blades towards coarse pitch.

The propeller pitch control system is integrated into the engine. The pitch is controlled automatically by the ECU. Depending on the power setting the propeller pitch is adjusted so that the required RPM will be obtained as shown in Figure 2.

If the hydraulic pressure from the governor fails, the blades turn towards fine pitch. An adjustable fine pitch stop limits the amount of blade movement towards fine pitch. The fine-pitch-stop is adjusted to give maximum static RPM. If the governor fails during flight it is possible to over-speed the propeller. Refer to Section 05-50 for data on over-speeds.

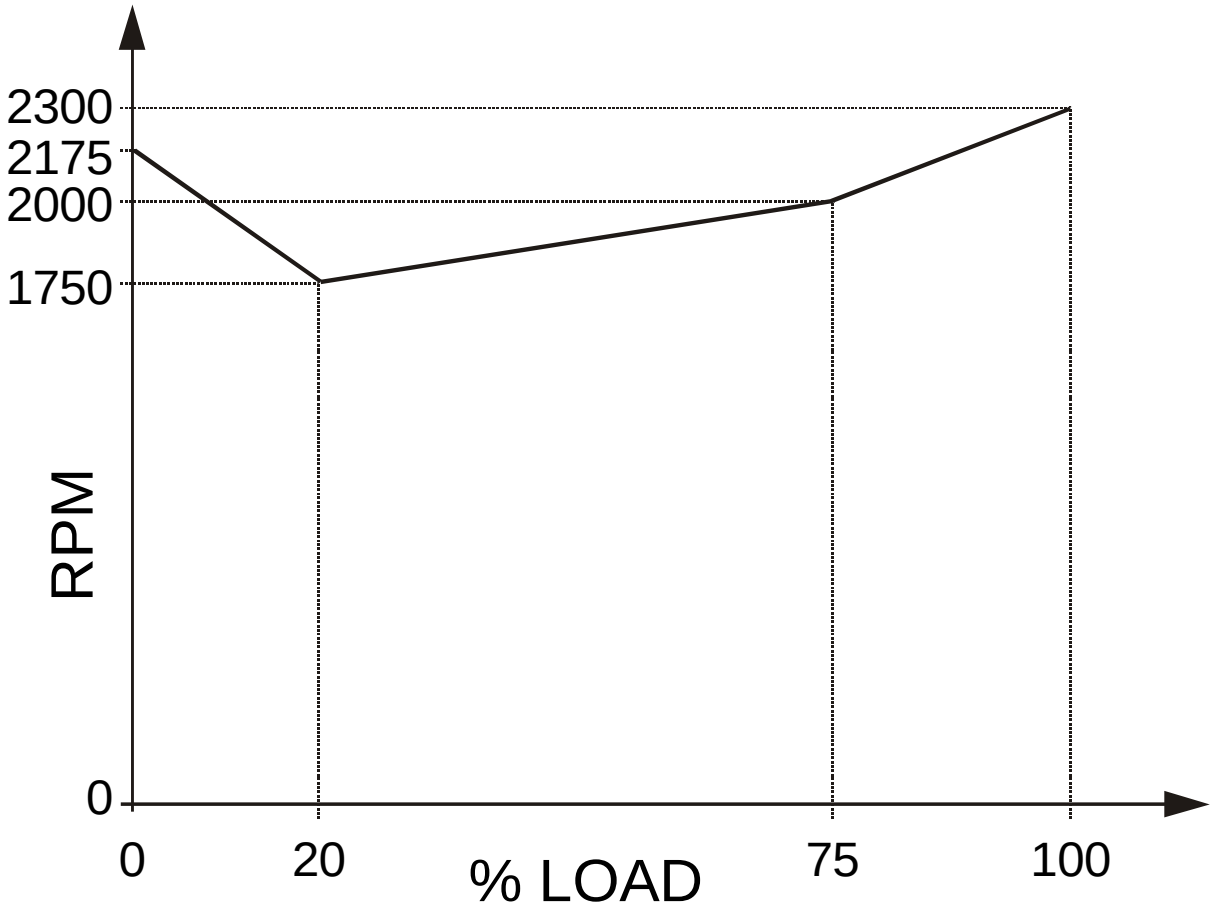


Figure 2: Propeller RPM Adjusted by the ECU

Trouble-Shooting

1. General

The table below lists the defects you could have for the propeller. If you have the trouble detailed in the Trouble column read across to the Possible Cause column. Then do the repair in the Repair column.

Trouble	Possible Cause	Repair
Engine vibration.	Propeller out of balance.	Examine the propeller. If you find damage refer to the manufacturer's Owners Manual.
	Spinner out of balance.	Replace the spinner.
	Propeller mounting loose.	Tighten the mounting nuts to the correct torque. Refer to the manufacturer's Owners Manual.
	Spinner attaching screws loose.	Tighten the attaching screws. Refer to the manufacturer's Owners Manual.
	Blade tracking not correct.	Refer to the manufacturer's Owners Manual.
Cracks in the blades.	Over-speed.	Refer to the manufacturer's Owners Manual.
Holes/nicks/dents in the blade.	Stone damage.	Repair/replace the propeller. Refer to the manufacturer's Owners Manual.

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Maintenance Practices

1. General

These Maintenance Practices tell you how to remove and install the propeller. And they tell you how to do a propeller blade tracking test.

2. Remove/Install the MTV-6-A Propeller

A. Remove the Propeller

	Detail Steps/Work Items	Key Items/References
	WARNING: MAKE SURE THAT THE ENGINE IS SAFE BEFORE YOU DO ANY WORK ON THE PROPELLER. IF THE ENGINE IS TURNED, THE PROPELLER CAN CAUSE INJURY OR DEATH.	
(1)	Make sure that the engine is safe: – Set the ELECTRIC MASTER key switch to OFF. – Set the ENGINE MASTER switch to OFF. – Set the power lever to IDLE.	
(2)	Remove the engine cowlings.	Refer to Section 71-11.
	Note: Mark the propeller, spinner, front support plate and spinner bulkhead, with an index mark. This will help you install these items in the correct position.	
(3)	Remove the spinner: – Mark the spinner and spinner bulkhead with index marks to aid installation. – Release the screws holding the spinner to the spinner bulkhead and move the spinner clear of the airplane.	Refer to Figure 1.
(4)	Remove the nuts and washers which attach the propeller to the propeller shaft flange.	Hold the propeller!

	Detail Steps/Work Items	Key Items/References
(5)	Pull the propeller forward and clear of the propeller shaft flange.	

B. Install the Propeller

	Detail Steps/Work Items	Key Items/References
	WARNING: MAKE SURE THAT THE ENGINE IS SAFE BEFORE YOU DO ANY WORK ON THE PROPELLER. IF THE ENGINE IS TURNED, THE PROPELLER CAN CAUSE INJURY OR DEATH.	
(1)	Make sure that the engine is safe: – Set the ELECTRIC MASTER key switch to OFF. – Set the ENGINE MASTER switch to OFF. – Set the power lever to IDLE.	
(2)	Make sure that the propeller shaft flange and the propeller flange are clean and dry.	
(3)	Make sure that the shipping plug is removed and check the inside of the propeller hub area for contamination.	
(4)	Make sure that a new O-ring oil seal is in place in the propeller hub. Lightly oil the seal.	Refer to Figure 3. Use clean engine oil.
(5)	Move the propeller into position on the propeller shaft flange.	Take care not to damage the propeller O-ring seal.
	Note: Make sure that the propeller is pushed into the correct position by hand. Do not use the nuts to pull the propeller into position.	
(6)	Install the 6 washers and nuts.	
(7)	When the propeller is in the correct position, fully tighten the nuts in opposing pairs.	Torque 45 - 47 Nm (33 - 35 lbf.ft.).

	Detail Steps/Work Items	Key Items/References
(8)	Do a test for correct blade track.	Refer to Paragraph 3.
(9)	Install the spinner: – Loosely install the screws and plastic washers which attach the spinner to the spinner bulkhead. – Tighten all the attaching screws.	Align the index mark. Torque 4 - 5 Nm (35 - 44 lbf.in.).
(10)	Install the engine cowlings.	Refer to Section 71-11.
(11)	Do an engine run-up. Do a test for correct operation of the propeller.	Refer to Section 71-01.

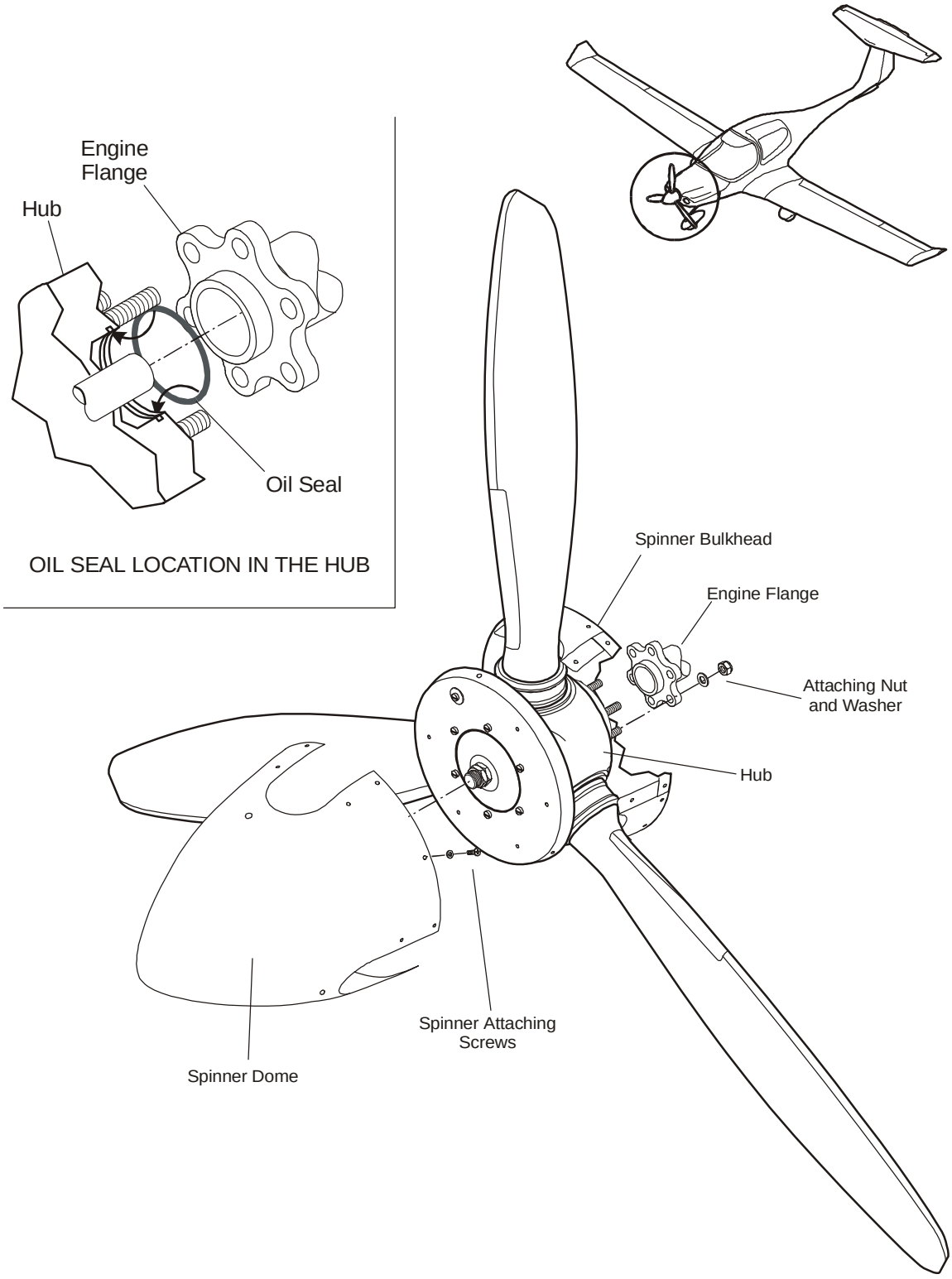


Figure 3: Propeller Oil Seal Installation

3. Propeller Blade Tracking Test

A. Equipment

Item	Quantity	Part Number
Tracking stand.	1	Commercial.

B. Procedure

	Detail Steps/Work Items	Key Items/References
	WARNING: MAKE SURE THAT THE ENGINE IS SAFE BEFORE YOU DO ANY WORK ON THE PROPELLER. IF THE ENGINE IS TURNED, THE PROPELLER CAN CAUSE INJURY OR DEATH.	
(1)	Make sure that the engine is safe: – Set the ELECTRIC MASTER key switch to OFF. – Set the ENGINE MASTER switch to OFF. – Set the power lever to IDLE.	
(2)	Put the tracking stand behind the propeller.	Do not move the tracking stand during the test.
(3)	Turn the propeller backwards to align a blade with the tracking stand.	
(4)	Measure the distance from the stand to the blade.	Measure from the stand to a point on the trailing edge 10 cm (4 in) from the blade tip.
(5)	Do items 3 and 4 for the other blades and record the values.	
(6)	The difference between any blades must not be more than 3 mm (1/8 inch).	

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Section 61-12
Propeller Assembly - Lycoming O-360-A4M Engine

1. General

The DA 40 F with the Lycoming O-360-A4M engine installed has a Sensenich 76EM8S10-0-63 or a mt-Propeller MT-188-R-135-4G fixed pitch propeller. This propeller has two blades. The blades of the Sensenich propeller are made from aluminum with an acryl lacquer painted finish. The blades of the mt-Propeller are made from natural composite. This propeller is plastic covered with stainless metal tipping bonded on.

This Section tells you how to remove and install the propeller.

Refer to the propeller manufacturer's manuals for more data on the propeller.

2. Description

Figure 1 shows the propeller. The spacer, the rear bulkhead (spinner backplate), the propeller hub and the front bulkhead are attached to the engine flywheel with six special attaching bolts. The bolts are locked with wire. A spinner which is made from composite material attaches to the aft bulkhead with screws. The spinner is supported by the front support (bulkhead) plate. Screws attach the spinner to the front support plate.

3. Operation

The Sensenich 76EM8S10-0-63 is a fixed pitch propeller with 2700 RPM maximum permissible speed. The mt-Propeller has no RPM limit. Refer to the manufacturer‘s manual for more details.

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Trouble-Shooting

1. General

The table below lists the defects you could have for the propeller. If you have the trouble detailed in the Trouble column read across to the Possible Cause column. Then do the repair in the Repair column.

Trouble	Possible Cause	Repair
Engine vibration.	Propeller out of balance.	Examine the propeller. If you find damage refer to the manufacturer's Owners Manual. For dynamic balancing of the mt-Propeller refer to the mt-Propeller Operation and Installation Manual.
	Spinner out of balance.	Replace the spinner.
	Propeller mounting loose.	Tighten the mounting nuts to the correct torque. Refer to the manufacturer's Owners Manual.
	Spinner attaching screws loose.	Tighten the attaching screws. Refer to the manufacturer's Owners Manual.
	Blade tracking not correct.	Refer to the manufacturer's Owners Manual.
Cracks in the blades.	Over-speed.	Refer to the manufacturer's Owners Manual.
Holes/nicks/dents in the blade.	Stone damage.	Repair/replace the propeller. Refer to the manufacturer's Owners Manual.

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Maintenance Practices

1. General

These Maintenance Practices tell you how to remove and install the propeller. And they tell you how to do a propeller blade tracking test.

2. Remove/Install the Propeller

NOTE: The checklists are valid for Sensenich 76EM8S10-0-63 and mt-Propeller MT188R135-4G. Those are only approved for installation on the Lycoming O-360-A4M engine.

A. Remove the Propeller

	Detail Steps/Work Items	Key Items/References
	WARNING: MAKE SURE THAT THE ENGINE IS SAFE BEFORE YOU DO ANY WORK ON THE PROPELLER. IF THE ENGINE IS TURNED, THE PROPELLER CAN CAUSE INJURY OR DEATH.	
(1)	Make sure that the engine is safe: – Set the ignition switch to OFF. – Set the throttle to IDLE. – Set the mixture control to LEAN CUT-OFF.	
(2)	Remove the engine cowlings.	Refer to Section 71-12.
(3)	Disconnect the spark-plug-leads from the spark plugs.	
	Note: Mark the propeller, spinner, front support plate and spinner bulkhead, with an index mark. This will help you install these items in the correct position.	

	Detail Steps/Work Items	Key Items/References
(4)	Remove the spinner: – Mark the spinner and spinner bulkhead with index marks to aid installation. – Release the screws holding the spinner to the spinner bulkhead. – Release the screws holding the spinner to the front support plate and move the spinner clear of the airplane. – Mark the front support plate with an index mark to align with the other index marks.	Refer to Figure 1.
(5)	Cut the lock-wire on the attaching bolts.	
(6)	Remove the bolts which attach the propeller to the engine flywheel.	Hold the propeller!
(7)	Pull the propeller forward and clear of the engine flywheel.	

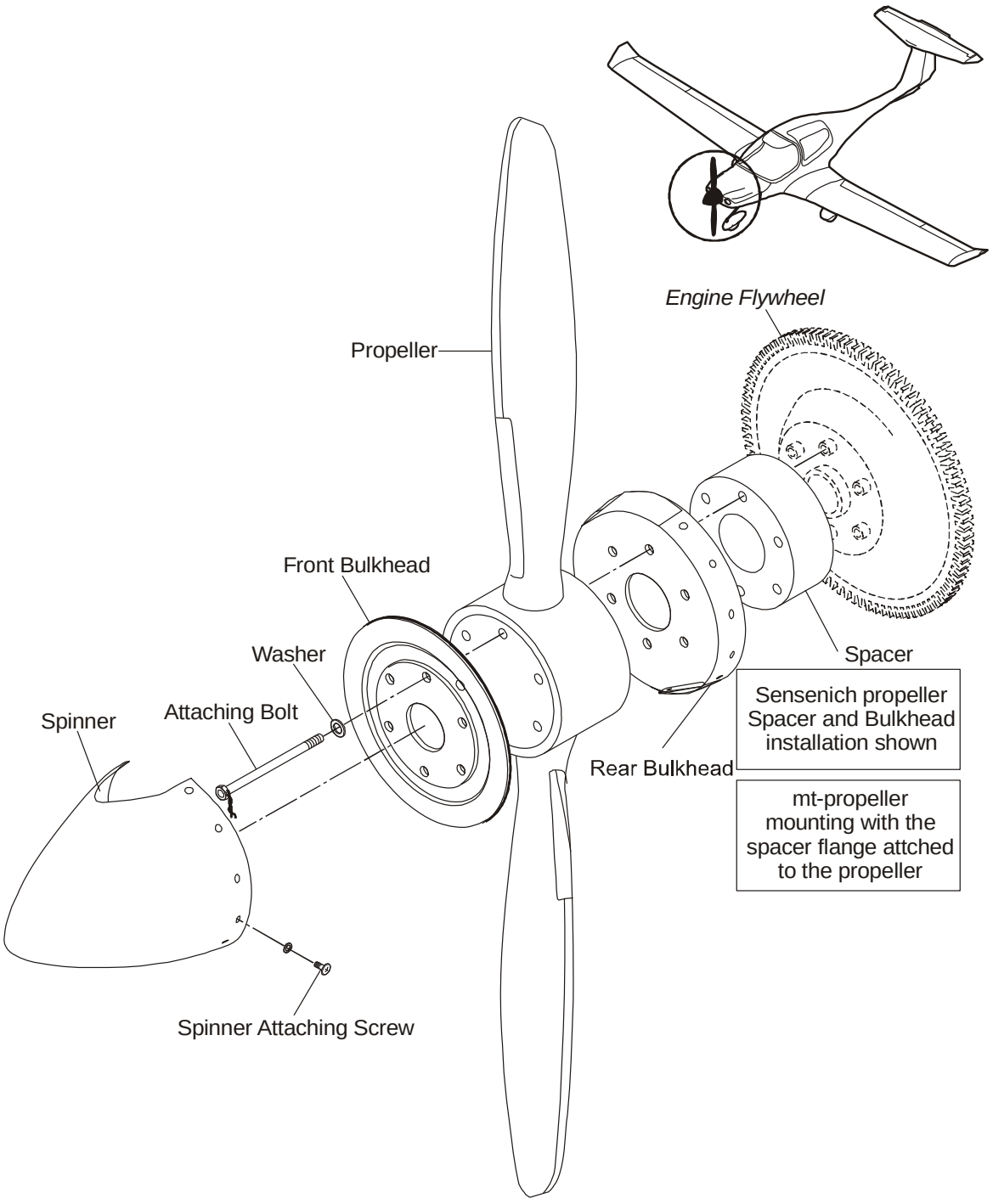


Figure 1: Propeller Installation

B. Install the Propeller

	Detail Steps/Work Items	Key Items/References
	WARNING: MAKE SURE THAT THE ENGINE IS SAFE BEFORE YOU DO ANY WORK ON THE PROPELLER. IF THE ENGINE IS TURNED, THE PROPELLER CAN CAUSE INJURY OR DEATH.	
(1)	Make sure that the engine is safe: – Set the ignition switch to OFF. – Set the throttle to IDLE. – Set the mixture control to LEAN CUT-OFF.	
(2)	Remove the engine cowlings.	Refer to Section 71-12.
(3)	Make sure that the spark-plug cables are disconnected from the spark-plugs.	
(4)	Make sure that the engine flywheel, the spacer, the spacer flange, the rear bulkhead, the propeller flange and the front bulkhead are clean and dry.	
(5)	Make sure that all shipping material is removed and check the inside of the propeller hub area for contamination.	
(6)	Move the propeller into position.	Align the index marks.
(7)	Sensenich Propeller: Install the six special bolts. Turn the bolts in opposing pairs until they are finger tight. mt-Propeller: Install the bolts which hold the propeller with the attached spacer flange to the engine flywheel. Turn the bolts in opposing pairs until they are finger tight.	Make sure that the propeller is pushed into the correct position by hand. Do not use the bolts to pull the propeller into position.
(8)	When the propeller is in the correct position fully tighten the bolts in opposing pairs.	Torque 85 - 90 Nm (63 - 66 lbf.ft.).

	Detail Steps/Work Items	Key Items/References
(9)	For mt-Propeller only: Check blade track 0.1m (4 in) from the blade tip on the trailing edge.	Maximum permissible difference is 3 mm (0.12 in). If the track test fails refer to the mt-Propeller Operation and Installation Manual.
(10)	Lock the bolts in pairs with lock-wire.	
(11)	Install the spinner: – Loosely install the screws and plastic washers which attach the spinner to the spinner bulkhead. – Loosely install the screws and plastic washers which attach the spinner to the front bulkhead. – Tighten all the attaching screws.	Align the index marks. Torque 4 - 5 Nm (35 - 44 lbf.in.).
(12)	Connect the spark-plug leads to the spark plugs	Refer to Section 74-20.
(13)	Install the engine cowlings.	Refer to Section 71-12.
(14)	Do an engine run-up. Do a test for correct operation of the propeller.	Refer to Section 71-02.

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Section 61-20
Propeller Control - Lycoming Engine

1. General

The DA 40 with the Lycoming engine installed has a constant speed propeller and a Woodward or mt-Propeller governor. The governor controls the engine speed by changing the propeller blade angle (pitch).

This Section gives the basic data about the propeller governor. For more data about the Woodward governor refer to the propeller manufacturer‘s manual or the Woodward governor manual. For more data about the MT-P420-10 governor or the MT-P-860-23 governor refer to the mt-Propeller governor manual.

2. Description and Operation

The DA 40 has a mt-Propeller constant speed propeller. The propeller uses oil pressure to increase the blade angle (pitch). In normal flight the centrifugal twisting moment (CTM) of the blade and the return spring cause the blade to move towards fine pitch.

Figure 1 shows a schematic diagram of the propeller governor. The propeller governor connects to the engine oil supply. The oil goes to a gear-pump in the governor. The gear pump increases the oil pressure to 270 - 340 PSI (19 - 23 bar). A relief-valve controls the maximum oil pressure.

The governor has a pilot-valve. The outlet from the pilot-valve connects to the propeller. The inlet to the pilot-valve can connect to the oil pump, or it can connect to an oil return line back to the engine sump, or it can be closed off.

The governor has a control lever. The control lever pushes against the speeder spring and the spring pushes against the pilot-valve. When the governor is turning, flyweights pull the pilot-valve upwards, against the force of the speeder spring.

In normal flight the governor will be in one of the following conditions:

A. On-Speed Condition

When the engine runs at the selected speed, the governor operates as follows:

– The propeller blades are at the correct pitch to absorb the power from the engine.

– The centrifugal force of the governor flyweights balances the speeder spring force.

– The pilot-valve closes the connection to the oil-pump and it closes the connection to the oil return line.

– Oil cannot flow out of the propeller and the propeller blades stay at the same pitch.

– Oil from the oil-pump flows through the relief valve and returns to the pump inlet.

B. Under-Speed Condition

When the engine speed is less than the selected speed, then the governor operates as follows:

– The speeder spring force is greater than the force from the flyweights and the spring pushes the pilot-valve down.

– The pilot-valve connects the propeller to the oil-return.

– The oil flows from the propeller and the centrifugal twisting moment of the blades turn the blades towards fine pitch. This decreases the load on the engine.

– The engine speed increases until the flyweights move the pilot-valve to close the oil return connection and the force from the governor flyweights balance the force from the spring.

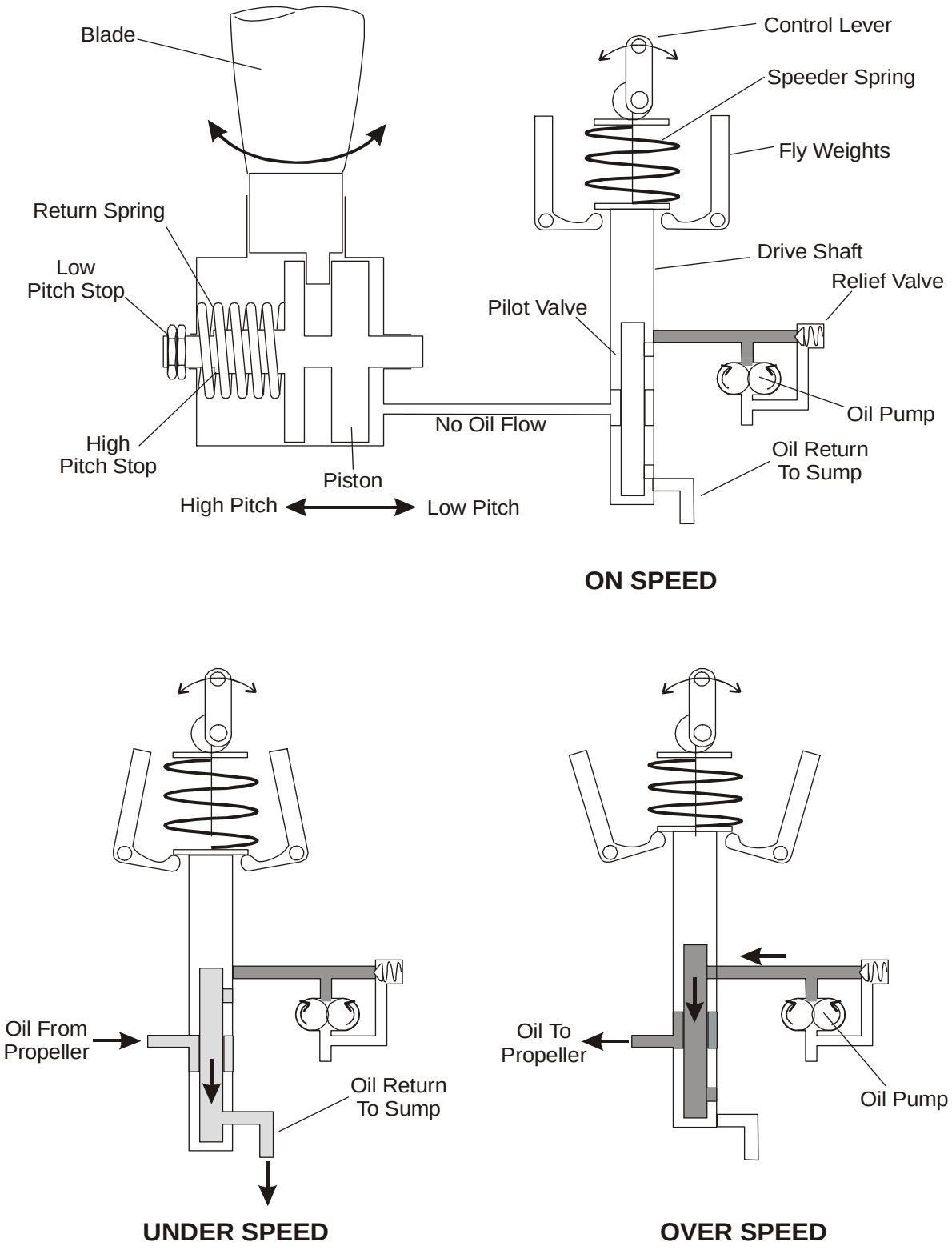


Figure 1: Propeller Governor Schematic Diagram

C. Over-Speed Condition

When the engine speed is more than the selected speed, then the governor operates as follows:

– The speeder spring force is less than the force from the flyweights, and the flyweights pull the pilot-valve up.

– The pilot-valve connects the propeller to the oil pump.

– Oil flows into the propeller from the oil pump.

– The propeller blades move towards coarse pitch. This increases the load on the engine.

– The engine speed decreases until the spring moves the pilot-valve to close the oil pump connection and the force from the governor flyweights balances the force from the speeder spring.

Trouble-Shooting

1. General

The table below lists the defects you could have in the propeller control system. If you have the trouble detailed in the Trouble column read across to the Possible Cause column. Then do the repair in the Repair column. Refer to the propeller manufacturers for more data.

Trouble	Possible Cause	Repair
Engine vibration.	Propeller out of balance.	Examine the propeller. If you find damage refer to the manufacturer's Owners Manual.
	Spinner out of balance.	Replace the spinner.
	Propeller mounting loose.	Tighten the mounting nuts to the correct torque. Refer to the manufacturer's Owners Manual.
	The spinner attaching screws loose.	Tighten the attaching screws. Refer to the manufacturer's Owners Manual.
	Blade tracking not correct.	Refer to the manufacturer's Owners Manual.
Surging RPM	Air in propeller control system.	Do a ground run-up. Move the propeller control lever from low rpm to high rpm. Do this at least 3 times to bleed the air.
	Oil sludge in the propeller control system.	Remove the governor and remove the propeller. A specialist propeller repair station must clean the propeller and the governor. Flush the engine oil system.
More than 50 RPM difference during climb/cruise/dive (up to 50 RPM is normal).	Friction in governor.	Replace the governor.

Trouble	Possible Cause	Repair
Decrease in rpm during normal operation without moving the rpm control lever.	Failure of governor spring.	Replace the governor.
Increase in rpm during normal operation without moving the rpm control lever.	Oil leak inside the propeller.	Replace the propeller.
	Faulty governor drive.	Remove the governor. Repair/replace defective components.
	Faulty governor relief valve.	Replace the governor.

Maintenance Practices

1. General

This Section tells you how to remove/install the governor and how to test/adjust the governor. It also tells you how to replace/adjust the propeller control cable.

2. Remove/Install the Propeller Governor

A. Remove the Propeller Governor

	Detail Steps/Work Items	Key Items/References
	WARNING: MAKE SURE THAT THE ENGINE IS SAFE BEFORE YOU DO ANY WORK ON THE PROPELLER CONTROLS. IF THE ENGINE IS TURNED, THE PROPELLER CAN CAUSE INJURY OR DEATH.	
(1)	Make sure that the engine is safe: – Set the ignition switch to OFF. – Set the throttle to IDLE. – Set the mixture control to LEAN CUT-OFF.	
(2)	Remove the engine cowlings.	Refer to Section 71-10.
(3)	Disconnect the spark plug cables from the spark plugs.	
(4)	Disconnect the cable wire-end from the governor control lever: – Loosen the nut of the attachment bolt. – Pull the cable wire-end clear.	Refer to Figure 2.
(5)	Remove the two screws which attach the cable support bracket to the propeller governor: – Remove the lock-wire. – Remove the screws and washers. – Move the propeller control cable and bracket clear of the governor.	

	Detail Steps/Work Items	Key Items/References
(6)	Release the four nuts and washers which attach the governor to the drive-pad and remove the governor from the engine.	Use a container to catch the small amount of oil from the governor.
(7)	Remove and discard the gasket.	
(8)	Put a blanking cover on the governor drive pad and put a cover over the governor mounting face.	

B. Install the Propeller Governor

	Detail Steps/Work Items	Key Items/References
(1)	Put the governor and gasket in position on the engine drive pad.	Refer to Figure 2. Use a new gasket.
(2)	Install the four washers and nuts which attach the governor to the drive pad.	Torque 23 Nm (17 lbf.ft.).
(3)	Put the propeller control cable support bracket in position on the governor.	Hold the bracket in position.
(4)	Install the two washers and screws which attach the bracket to the governor.	
(5)	Lock the screws with lock-wire.	
(6)	Connect the propeller control cable wire-end to the governor control lever: – Push the wire-end through the hole in the attachment bolt, between the governor input lever and the inboard washer. – Make sure that the wire-end is fully through the attachment bolt. – Tighten the lock-nut on the attachment bolt.	
(7)	Adjust the propeller control cable.	Refer to Paragraph 4.
(8)	Connect the spark-plug-leads to the spark plugs.	Refer to Section 74-00.
(9)	Install the engine cowlings.	Refer to Section 71-10.
(10)	Do an engine run-up.	Refer to Section 71-00.

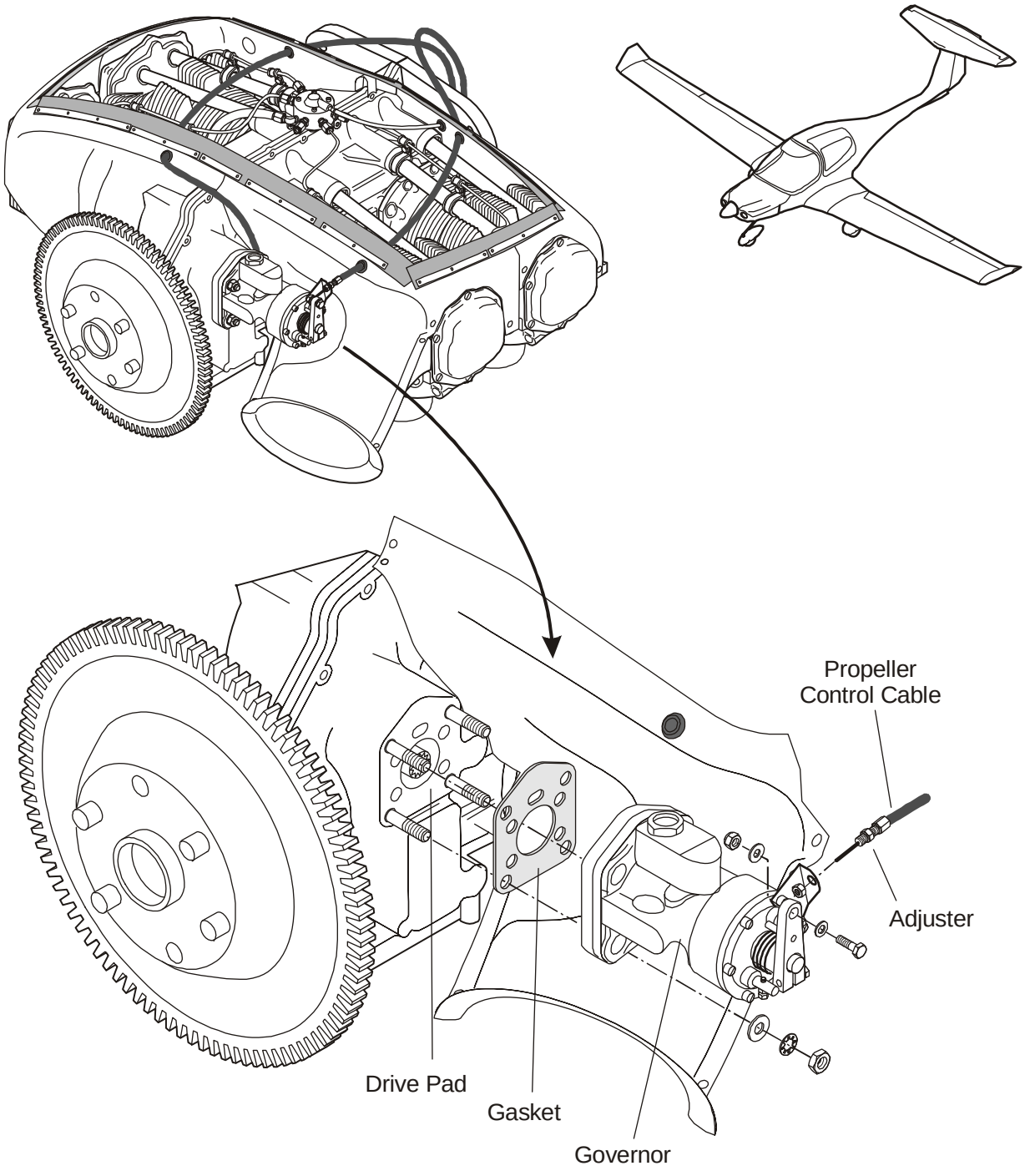


Figure 2: Propeller Governor Installation

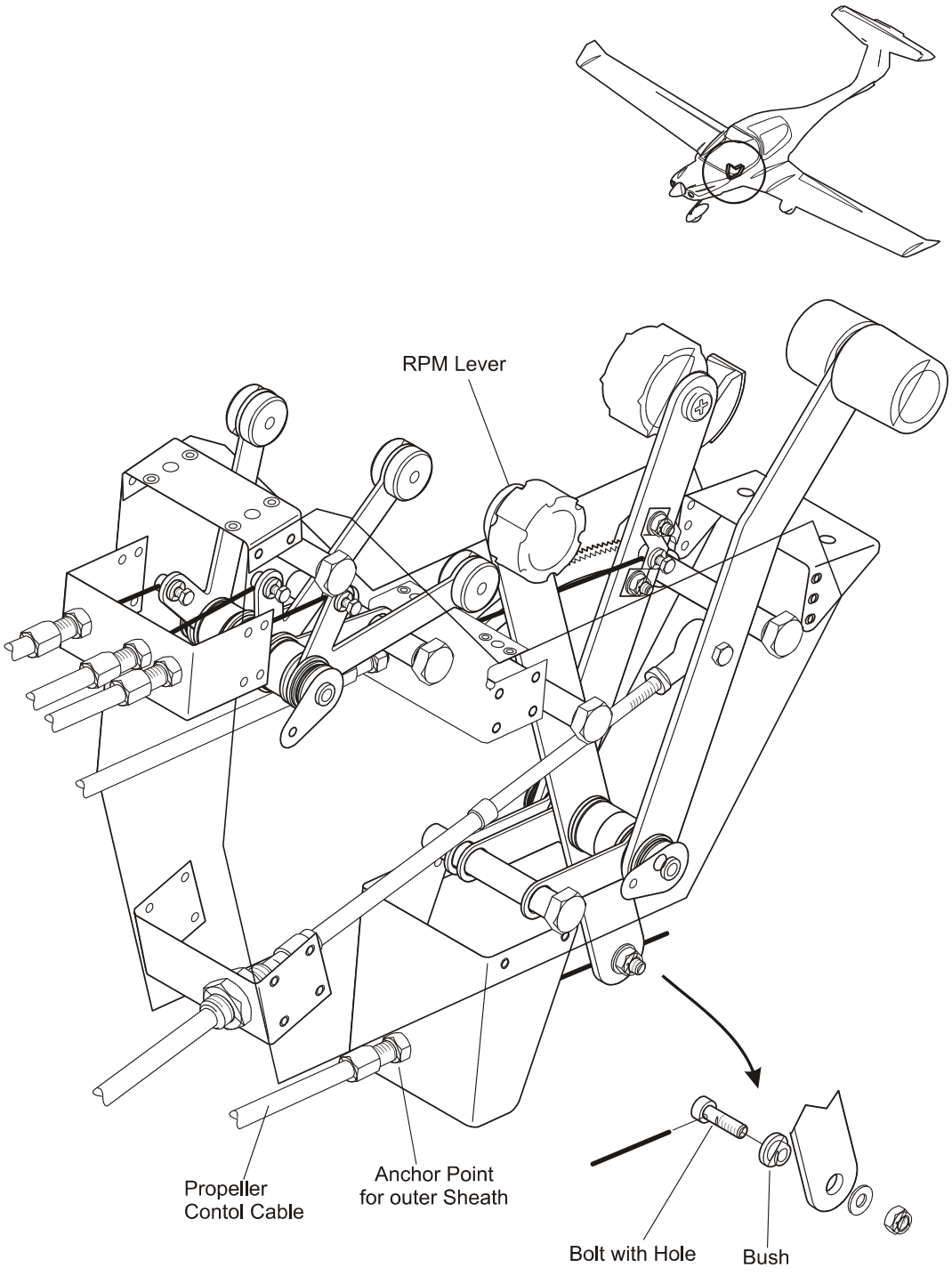


Figure 3: Replace the Propeller Control Cable

3. Remove/Install the Propeller Control Cable

A. Remove the Propeller Control Cable

	Detail Steps/Work Items	Key Items/References
	WARNING: MAKE SURE THAT THE ENGINE IS SAFE BEFORE YOU DO ANY WORK ON THE PROPELLER CONTROLS. IF THE ENGINE IS TURNED, THE PROPELLER CAN CAUSE INJURY OR DEATH.	
(1)	Make sure that the engine is safe: – Set the ignition switch to OFF. – Set the throttle to IDLE. – Set the mixture control to LEAN CUT-OFF.	
(2)	Remove the engine cowlings.	Refer to Section 71-10.
(3)	Disconnect the spark plug cables from the spark plugs.	
(4)	Disconnect the cable wire-end from the governor control lever: – Loosen the nut of the attachment bolt. – Pull the cable wire-end clear.	Refer to Figure 2.
(5)	Remove the cable from support bracket at the governor: – Remove the front adjuster-nut. – Remove the washer. – Move the cable aft and clear of the support bracket. – Remove the rear adjusting nut from the cable.	

	Detail Steps/Work Items	Key Items/References
(6)	Move the cable aft and through the rubber grommets in the engine cooling baffles.	
(7)	Remove the feed-thru from the engine side of the firewall: – Remove the fire resistant sealant from where the cable goes through the firewall. – Remove the two rivets that attach the split shields to the firewall. – Remove the split-shields. – Move the two halves of the split-bush forward and clear of the cable.	
(8)	Remove the knob from the fuel selector valve: – Remove the cross-head screw from the center of the control-knob and pull the knob up and off the fuel selector valve. – Remove the mounting plate.	
(9)	Release the engine control assembly: – Loosen the throttle friction adjuster until the adjuster is disconnected from the shaft. – Remove the four cross-head screws which attach the engine control lower-cover-plate to the engine control assembly. – Remove the two hex-headed bolts from the top of the upper-cover -plate. – Lift and support the engine control assembly clear of the center console.	Pull and hold the throttle friction adjuster clear. Make sure you do not pull on the control cables.

	Detail Steps/Work Items	Key Items/References
(10)	Disconnect the cable wire-end from the propeller control lever: – Loosen the nut of the attachment bolt. – Pull the cable clear.	
(11)	Release the control cable from the anchor point at the control assembly: – Remove the front-adjusting-nut from the cable adjuster. – Remove the washer and move the cable forward and clear of the anchor point. – Remove the rear adjusting nut and washer from the control-cable-adjuster.	Make a note of the cable adjustment!
(12)	Pull the control cable through the firewall, from the engine-bay side, and clear of the airplane.	

B. Install the Propeller Control Cable

	Detail Steps/Work Items	Key Items/References
(1)	Move the propeller control cable into position through the firewall from the engine-bay side.	
(2)	Install the rear adjusting nut and washer onto the cable adjuster and put the outer cable through the support bracket at the propeller control lever.	Refer to Figure 3.
(3)	Install the washer and front adjusting nut onto the cable.	Adjust the cable to the position noted at Paragraph 3.A, step 11.
(4)	Pass the cable wire-end through the hole in the attachment bolt at the propeller control lever and tighten the lock-nut.	Make sure that the wire-end is fully through the hole in the attachment bolt.
(5)	If necessary, for your Airworthiness Authority, do a second inspection of the engine control assembly.	
(6)	Install the engine control assembly: – Do a check for loose articles. – Move the engine control assembly into position in the center console. – Loosely attach the knob for the throttle friction adjuster. – Install the four cross head screws which attach the lower-cover-plate to the center console. – Install the two hex-headed bolts which attach the upper-cover-plate to the center console.	Specially in the center console. Make sure all the control cables take up the correct position.
(7)	Install the knob on the fuel selector valve: – Move the cover plate into position over the selector valve. – Push the selector knob onto the valve shaft. – Install the cross-head screw which attaches the knob to the shaft.	

	Detail Steps/Work Items	Key Items/References
(8)	Put the propeller control cable into position through the grommets in the engine-cooling-baffles.	
(9)	Install the rear adjusting nut and washer onto the cable adjuster at the propeller end of the cable.	
(10)	Pass the cable adjuster through the support bracket at the propeller governor.	
(11)	Install the washer and nut to the front of the adjuster.	
(12)	Install the cable wire-end to the propeller governor: – Push the wire-end through the hole in the attachment bolt, between the governor input lever and the inboard washer. – Make sure that the wire-end is fully through the attachment bolt. – Tighten the lock-nut on the attachment bolt.	
(13)	Install the firewall feed-thru for the propeller control cable: – Move the split bushes into position around the cable. – Push the split bushes aft into the firewall. – Install the split cover plates over the split bushes and attach to the firewall with pop-rivets.	Seal the firewall feed-thru with fire-proof sealant PRC 812.
(14)	Adjust the propeller control cable.	Refer to Paragraph 4.
(15)	If necessary, for your Airworthiness Authority, do a second inspection of the propeller control system and any other control system you disconnected.	
(16)	Connect the spark-plug-leads to the spark plugs.	Refer to Section 74-00.
(17)	Install the engine cowlings.	Refer to Section 71-10.

	Detail Steps/Work Items	Key Items/References
(18)	Do an engine run-up.	Refer to the Airplane Flight Manual.

4. Adjust the Propeller Control Cable

	Detail Steps/Work Items	Key Items/References
	WARNING: MAKE SURE THAT THE ENGINE IS SAFE BEFORE YOU DO ANY WORK ON THE PROPELLER CONTROLS. IF THE ENGINE IS TURNED, THE PROPELLER CAN CAUSE INJURY OR DEATH.	
(1)	Make sure that the engine is safe: – Set the ignition switch to OFF. – Set the throttle to IDLE. – Set the mixture control to LEAN CUT-OFF.	
(2)	Remove the engine cowlings.	Refer to Section 71-10.
(3)	Disconnect the spark plug cables from the spark plugs.	Refer to Section 74-00.
(4)	Move the propeller control lever in the cockpit between MIN RPM and MAX RPM. – Make sure that the lever moves freely with no restrictions.	
(5)	Set the propeller control lever to MAX RPM and hold it in position: – Make sure that the control lever at the propeller governor hits the MAX stop at the governor. If necessary, adjust the control cable outer sheath at the support bracket at propeller governor.	With the propeller control lever at the MAX stop at the governor, there must be at least 3 mm (0.125 in.) clearance (bounce) between the propeller control lever in the cockpit and the stop in the engine control assembly.

	Detail Steps/Work Items	Key Items/References
(6)	Set the propeller control lever to MIN RPM and hold it in position: – Make sure that the control lever at the propeller governor hits the MIN stop at the governor. If necessary, adjust the control cable outer sheath at the support bracket at propeller governor.	With the propeller control lever at the MIN stop at the governor, there must be at least 3 mm (0.125 in) clearance (bounce) between the propeller control lever and the stop in the engine control assembly.
(7)	Move the propeller control lever in the cockpit between MIN RPM and MAX RPM. – Make sure that the lever moves freely with no restrictions.	
(8)	Do items 5 and 6 again as necessary to get the correct values.	It may be necessary to move the cable wire-end in the cable attachment bolt.
(9)	If necessary, for your Airworthiness Authority, do a second inspection of the propeller control system.	
(10)	Connect the spark plug cables to the spark plugs.	Refer to Section 74-00.
(11)	Install the engine cowlings.	Refer to Section 71-10.
(12)	Do an engine run-up.	For RPM settings and engine run-up, refer to the Airplane Flight Manual.

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Section 61-21
Propeller Control - TAE 125 Diesel Engine

1. General

The DA 40 with the TAE 125 Diesel engine installed has a constant speed propeller. The engine has an integral constant speed unit (CSU). The CSU controls the engine speed by changing the propeller blade angle (pitch).

This Section gives background data about the propeller control system. In case of problems with the propeller control system, refer to the engine manufacturer.

2. Description and Operation

The DA 40 has a mt-Propeller constant speed propeller. The propeller uses oil pressure to increase the blade angle (pitch). In normal flight the centrifugal twisting moment (CTM) of the blade and the return spring cause the blade to move towards fine pitch.

The engine CSU is an integral part of the engine control system. The engine control system measures many engine parameters. It uses the values to set fuel flow and propeller blade angle for most efficient performance. The pilot has only one lever to control engine performance.

As with other constant speed propeller control systems, the CSU senses engine RPM and alters oil pressure to the propeller to change blade angle as necessary. The engine control system sets the RPM value for the CSU. Depending on the power setting the propeller pitch is adjusted so that the required RPM will be obtained as shown in Figure 1.

The inlet oil pressure at the CSU is 20 bar (290 PSI). If the engine speed is too high, the CSU connects the inlet oil pressure to the propeller piston. The piston moves to increase the blade angle. This reduces the RPM.

If the engine speed is too low, the CSU operates the governor three-way-valve so that the oil flows out of the propeller. The piston moves to reduce the blade angle. This increases engine RPM.

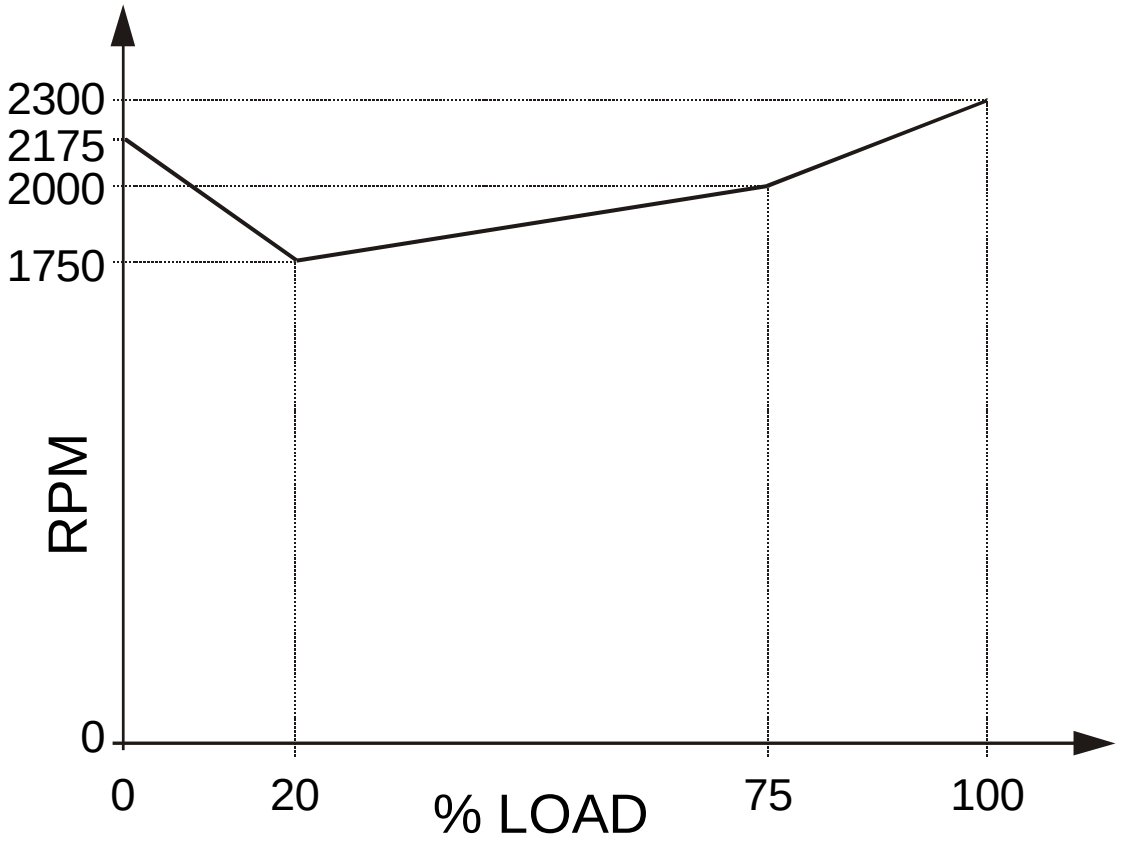


Figure 1: Propeller RPM Adjusted by the ECU

CHAPTER 71

POWER PLANT

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CHAPTER 71
POWER PLANT

Section 71-00
Power Plant - Lycoming IO-360-M1A Engine

1. General

This Chapter tells you about the power plant installed in the DA 40. It tells you about the components that make the power plant. It also tells you how to remove/install the power plant.

For data on the engine test after installation refer to the Lycoming Operator's Manual for the IO-360-M1A engine. Refer to the DA 40 Airplane Flight Manual for engine start/stop procedures.

Refer to these Chapters for data about other engine systems:

– Chapter 72. Refer to the Lycoming Operator's Manual for data on the engine.

– Chapter 73. Engine fuel and control. Refer to the Lycoming Operator's Manual for data on the fuel injection system.

– Chapter 74. Ignition system power supply and installation of high-tension cables. Refer to the Slick Maintenance Manual for more data on the magnetos. Refer to the Lycoming Operator's Manual for data on the spark plugs.

– Chapter 76. Engine controls.

– Chapter 77. Engine indicating.

– Chapter 78. Exhaust system.

– Chapter 79. Oil system components installed in the airframe. Refer to the Lycoming Operator's Manual for data on the engine oil system.

– Chapter 80. Starter system control and installation. Refer to the Lycoming Operator's Manual/Sky-Tec Manual for data on the lightweight geared starter.

Note: Equipment which is certified for installation in the DA 40 is listed in Section 6.5 of the Airplane Flight Manual. Such equipment may be installed in accordance with the Airplane Maintenance Manual.

Any equipment which is not listed in Section 6.5 of the Airplane Flight Manual is called "Additional Equipment". The installation of Additional Equipment is a modification which must be handled in accordance with national regulations or a Service Bulletin.

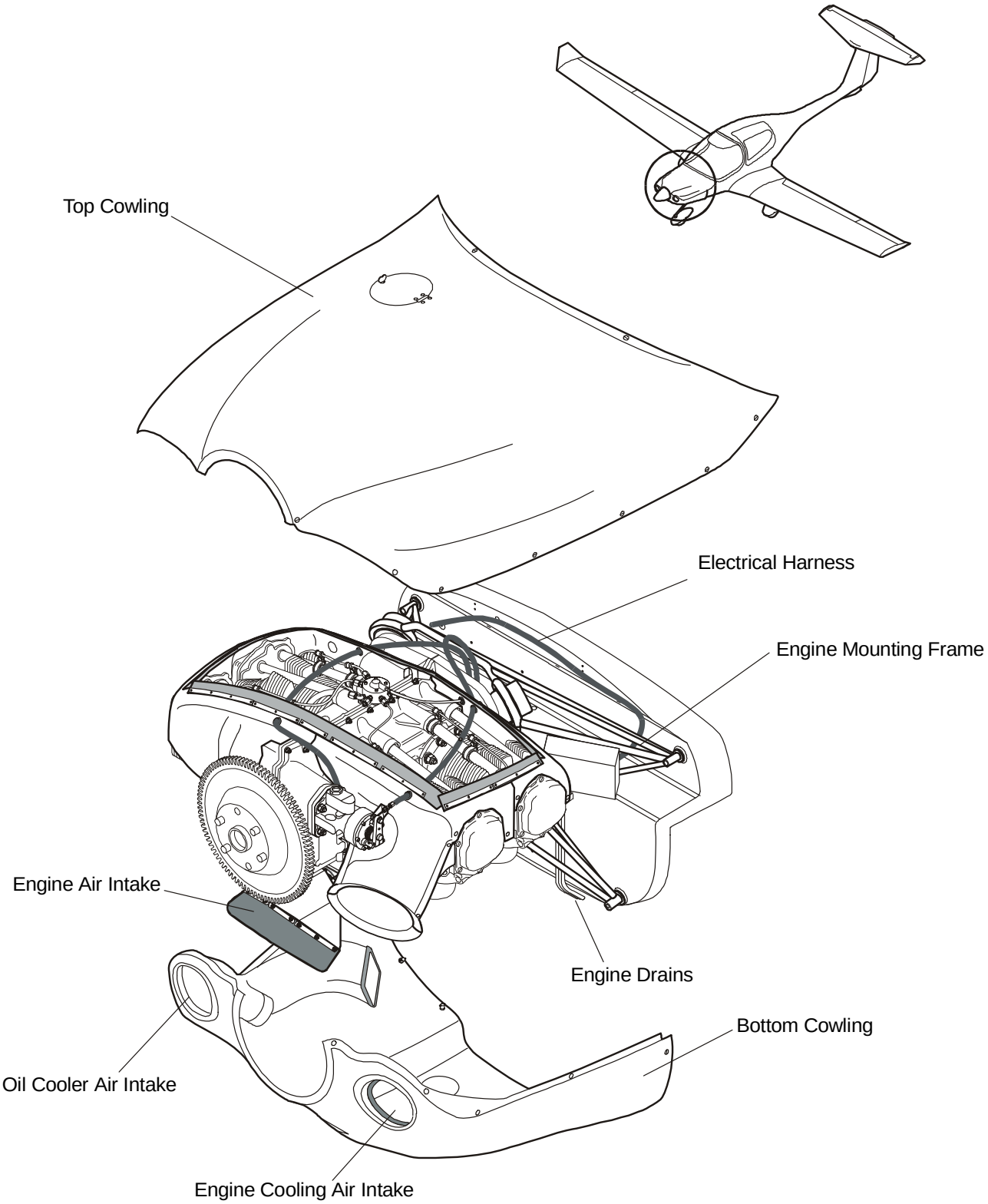


Figure 1: Power Plant

2. Description and Operation

The DA 40 has a Lycoming 4-cylinder, horizontally opposed, direct drive engine. The engine type is IO-360-M1A. The engine has a wet sump oil system. The IO-360-M1A is air cooled and has a fuel injector system. It has an electric starter and Slick magnetos. It also has either a SlickSTART magneto booster system or a Limited Authority Spark Advance ignition system (LASAR).

The IO-360-M1A engine has a hollow crankshaft which lets oil flow to the propeller from the propeller governor. The propeller flange is type SAE 2 Mod. with six mounting bushings. The propeller turns in a clockwise direction when viewed form the cockpit.

A. Power Plant Components

The power plant has these components installed:

– Cowling.

The power plant has a top and bottom engine cowling. The two halves attach to each other and to the airframe with camloc quick release fasteners. The top cowling has one small access panel for the engine oil filler and dipstick. The bottom cowling has two large cooling air intakes and one air intake for the engine air filter.

– Engine Mount.

The engine mount attaches to the firewall at five locations. Tubular steel makes the mounting frame. The engine attaches to the engine mount with shock-mounts. Rubber and metal bushings make the engine shock-mounts.

– Electrical Harness.

Electrical cables go through the firewall to connect to the engine. They give electrical supply to the engine starter motor, ignition system and engine sensors. Electrical cables from the generator supply electrical power to the airplane electrical system.

B. Air Intakes

The bottom cowling has these air intakes:

– The intake on the front left face of the bottom cowling supplies cooling air for the engine.

– The intake on the front right face of the bottom cowling has three outlets:

  – A small outlet which supplies additional cool air to the engine.

  – An outlet which supplies cooling air through integral ducting to the oil cooler.

  – An outlet which connects to a flexible hose which supplies cooling air to the cabin heat system, to the battery and to the alternator.

– Engine air intake. This intake is located in the lower center of the cowling and supplies air to the engine air filter.

C. Engine Drain Pipes

The engine has these drain pipes:

– Engine driven fuel pump drain.

– Fuel flow divider drain.

– Induction manifold drain.

Engine Specification

Lycoming IO-360-M1A Engine Specification	
Engine manufacturer.	Lycoming
Engine model.	IO-360-M1A
Engine operating limits: – Rated output power. – Rated output rotation speed during take-off and climb. – Max. continuous rotation speed.	 180 HP (134.2 kW) 2700 RPM 2400 RPM
Ground run-up limits: – Ground idle speed.	 740 ± 20 RPM
Oil pressure: – Minimum. – Normal. – Maximum.	 25 PSI 55 - 95 PSI 98 PSI
Fuel pressure: – Minimum. – Normal. – Maximum.	 14 PSI 14 - 35 PSI 35 PSI
Oil temperature: – Minimum (not for continuous operation). – Normal. – Maximum.	 149 °F (65 °C) 149 - 245 °F (65 - 118.3 °C) 245 °F

Lycoming IO-360-M1A Engine Specification	
Cylinder head temperature: – Minimum. – Normal. – Maximum.	 150 °F (65.6 °C) 150 - 475 °F (65.6 - 246 °C) 500 °F (260 °C)
Fuel grade:	AVGAS 100 or 100LL
Oil specification (see Section 12-10):	Refer to Lycoming Operator's Manual.

Trouble-Shooting

1. General

The table below lists the defects you could have with the power plant. It does not give trouble shooting data for the engine or the engine systems. Refer to the Lycoming Operator's Manual for engine and engine system trouble-shooting.

WARNING: YOU MUST BE CAREFUL WHEN YOU DO POWER PLANT TROUBLE SHOOTING. OPERATION OF A DAMAGED ENGINE CAN CAUSE MORE DAMAGE TO THE ENGINE. THIS CAN CAUSE INJURY TO PERSONNEL.

If you have the trouble detailed in the Trouble column read across to the Possible Cause column. Then do the repair given in the Repair column.

Trouble	Possible Cause	Repair
Engine vibration.	Damaged shock mounts.	Replace the shock mounts.
Engine does not produce full power.	Engine air inlet blocked.	Examine air inlet. Examine/Replace the air filter.

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Maintenance Practices

1. General

These Maintenance Practices tell you how to remove/install the engine. These Maintenance Practices also tell you how to remove/install the engine and engine mount together.

WARNING: DO NOT STAND WITHIN THE DANGER AREA OF THE PROPELLER. IF THE ENGINE STARTS, THE PROPELLER CAN CAUSE DEATH OR INJURY TO PERSONS.

WARNING: YOU MUST MAKE SURE THAT THE ENGINE IS SAFE BEFORE YOU TURN THE PROPELLER. MAKE SURE THAT THE IGNITION SWITCH IS SET TO "OFF" AND THAT THE SPARK-PLUG-CABLES ARE DISCONNECTED FROM THE SPARK PLUGS. SET THE THROTTLE TO "IDLE" AND THE MIXTURE CONTROL TO "LEAN CUT-OFF".

WARNING: DO NOT GO BELOW THE ENGINE WHEN YOU LIFT THE ENGINE WITH THE HOIST. THE HOIST CAN FAIL. THIS CAN CAUSE DEATH OR INJURY TO PERSONS.

WARNING: DO NOT GET OIL ON YOU. OIL CAN CAUSE SKIN DISEASE.

WARNING: DO NOT GET FUEL ON YOU. FUEL CAN CAUSE SKIN DISEASE. DO NOT ALLOW FIRE OR SPARKS NEAR FUEL. FUEL BURNS AND BURNING FUEL CAN CAUSE INJURY TO PEOPLE AND DAMAGE TO EQUIPMENT.

CAUTION: YOU MUST ATTACH CAPS TO HOLES/PIPES WHEN YOU REMOVE THE ENGINE. IF YOU DO NOT DO THIS, CONTAMINATION CAN ENTER THE HOLES/PIPES. THIS CAN CAUSE BLOCKAGE TO THE AIRPLANE SYSTEMS.

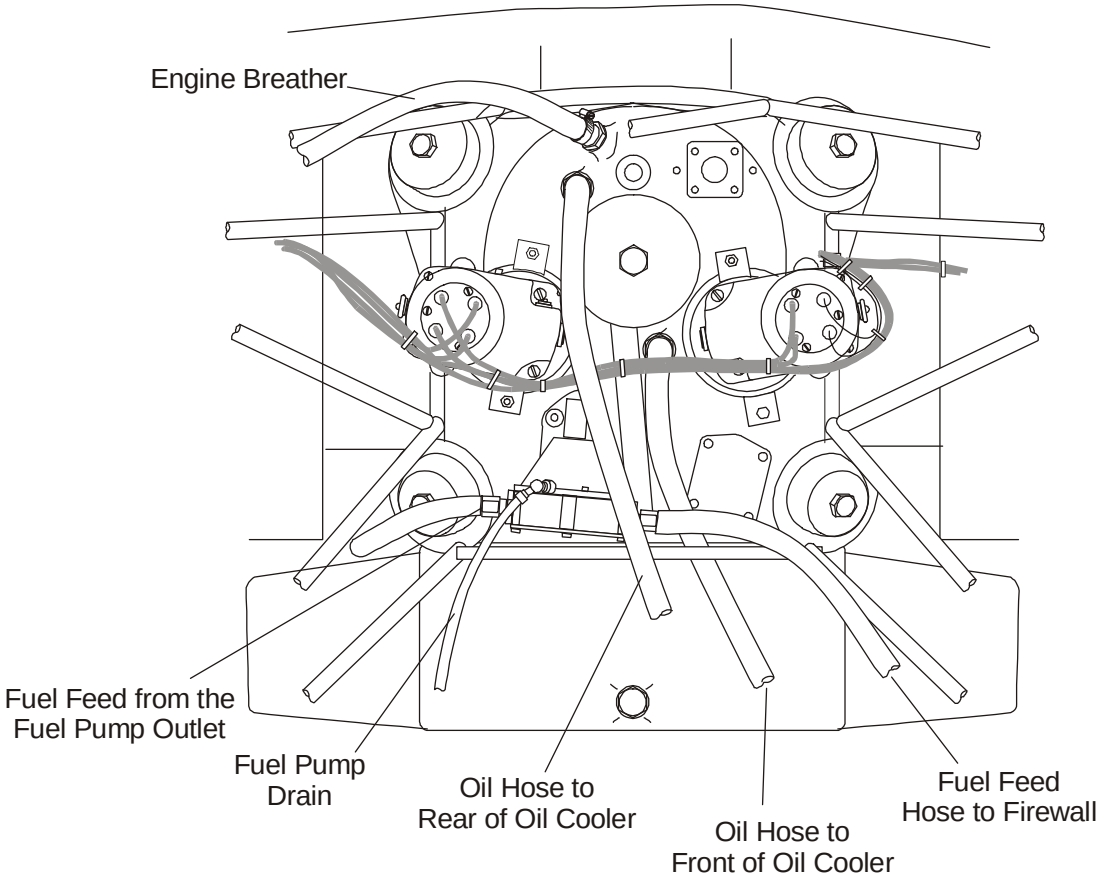


Figure 2: Connections at the Rear of the Engine

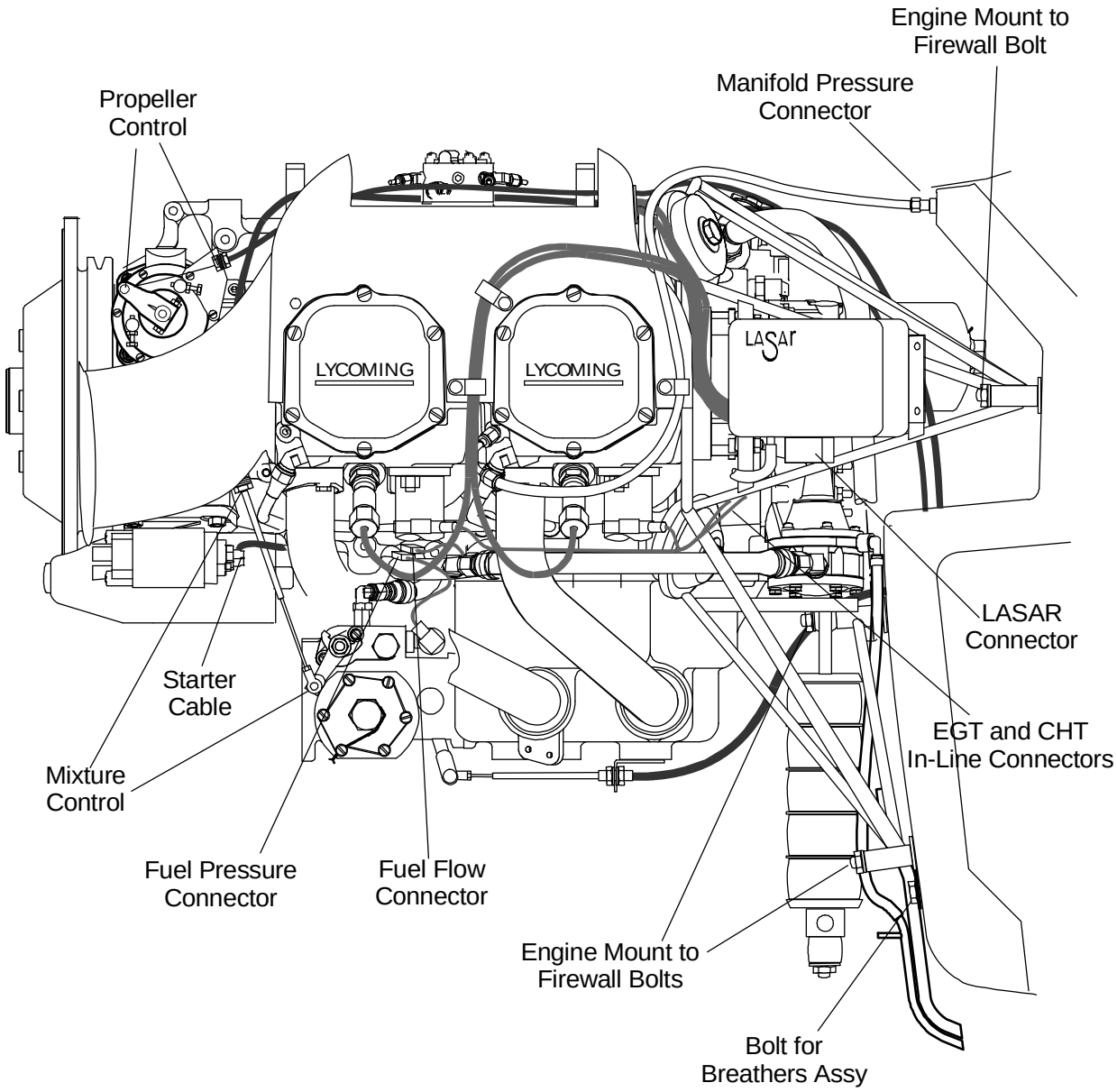


Figure 3: Left Side of the Engine

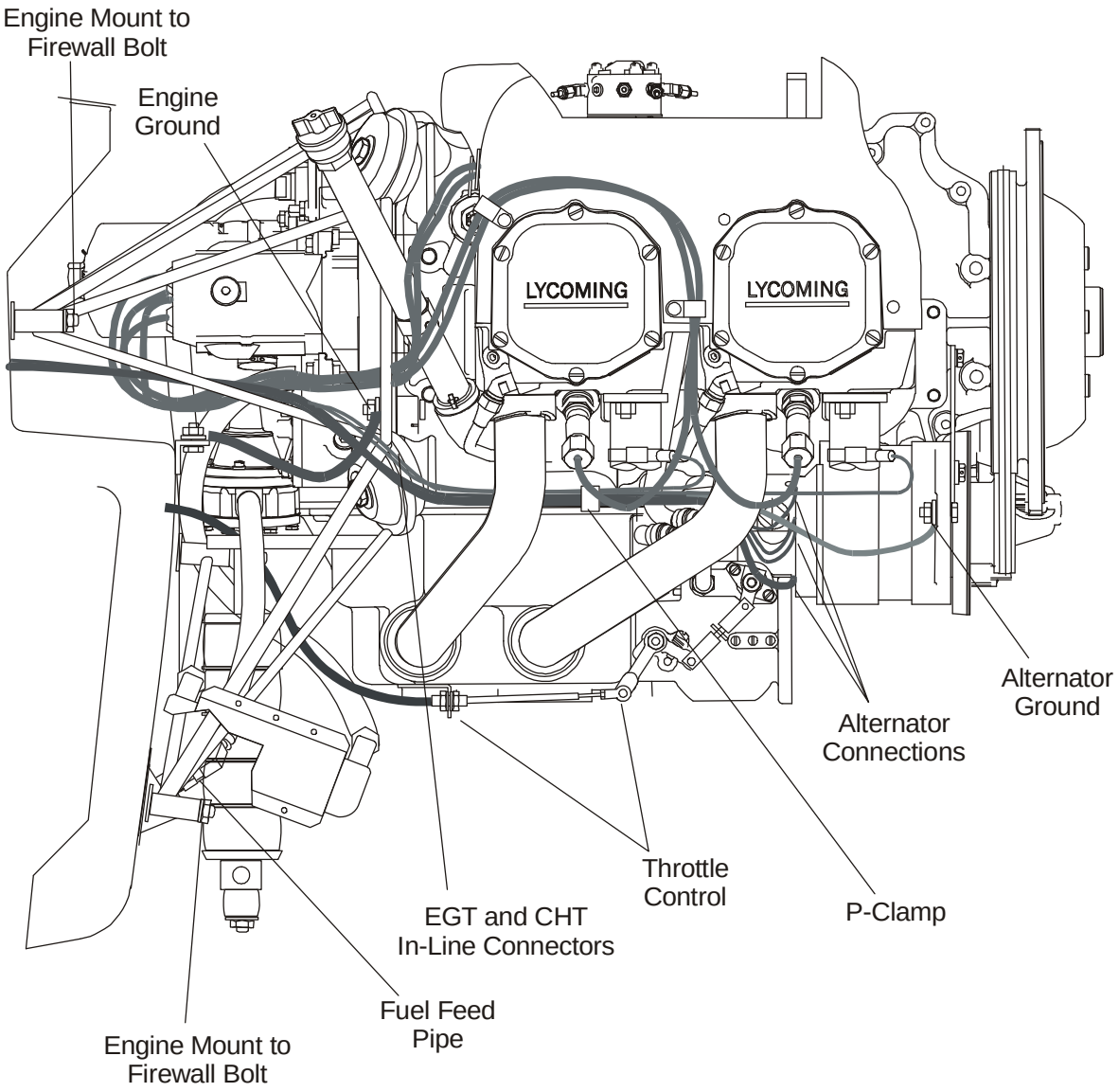


Figure 4: Right Side of the Engine

2. Remove/Install the Engine (Without the Engine Mount)

A. Equipment

Item	Quantity	Part Number
Hoist.	1	Commercial.
Engine sling.	1	Commercial.
Engine stand.	1	Commercial.
Airplane jacks.	3	Commercial.
Nose trestle.	1	Commercial.
Wing trestles.	2	Commercial.

B. Remove the Engine

	Detail Steps/Work Items	Key Items/References
(1)	Lift the airplane on jacks and make the airplane level.	Refer to Section 07-10.
(2)	Move the wing trestles into position.	Refer to Section 07-10.
	WARNING: MAKE SURE THAT THE ENGINE IS SAFE BEFORE YOU DO ANY WORK ON THE PROPELLER. IF THE ENGINE IS TURNED, THE PROPELLER CAN CAUSE INJURY OR DEATH.	
(3)	Set the fuel selector/shut-off valve to CLOSED.	
(4)	Make sure that the engine is safe: – Set the ignition switch to OFF. – Set the throttle to IDLE. – Set the mixture control to LEAN CUT-OFF.	
(5)	Remove the engine cowlings.	Refer to Section 71-10.
(6)	Remove the airplane battery.	Refer to Section 24-31.
(7)	Disconnect the spark plug cables from the spark plugs.	
(8)	Remove the spark plugs and put blanks in the spark plug holes in the cylinders.	This will stop contamination going into the engine cylinders.

	Detail Steps/Work Items	Key Items/References
(9)	Remove the cable ties that attach the top left-hand ignition cable to the propeller control cable. Remove the 2 nuts/washers/screws that hold the left-hand fairlead for the top ignition cables.	
(10)	Release the P-clamps holding the left ignition cables to the engine-cooling-baffles.	
(11)	Remove the 2 nuts/washers/screws that attach the right-hand fairlead for the top ignition cables.	
(12)	Remove the cable ties attaching the left-side ignition cables to the engine mount and move the cables to the rear of the engine.	Note the position of the cable ties.
(13)	Release the P-clamps holding the right ignition cables to the engine cooling baffles.	
(14)	Remove the cable ties attaching the right side ignition cables to the engine mount and move the cables to the rear of the engine.	Note the position of the cable ties.
(15)	Remove the cable ties attaching the left side ignition cables to the right side ignition cables.	Note the position of the cable ties.
(16)	Release the three screws which attach the ignition harness to the left magneto and move the harness assembly clear of the airplane.	
(17)	Release the three screws which attach the ignition harness to the right magneto and move the harness assembly clear of the airplane.	
(18)	Disconnect the electrical plugs from the left and right magnetos.	Move the plugs aft, clear of the engine.

	Detail Steps/Work Items	Key Items/References
(19)	Remove the exhaust gas temperature probe from the exhaust manifold: – Release the worm-drive-clamp which attaches the probe to the exhaust manifold. – Remove the probe. – Remove the cable ties attaching the cable for the probe to the engine mount. – Move the cable clear of the engine.	Do this item for each of the four probes. Note the location of the cable-ties.
(20)	Remove the worm-drive clamp which attaches the flexible hose to the generator cooling shroud and remove the flexible hose.	
(21)	Remove the worm-drive clamp which attaches the flexible hose to the exhaust-heat-exchanger. Remove the flexible hose and move the air inlet duct assembly clear of the airplane.	Hold the air cooling duct!
(22)	Remove the two worm-drive clamps from the flexible hose between the exhaust heat-exchanger and the cabin heat control valve. – Remove the flexible hose.	
(23)	Remove the engine exhaust system: – Remove the eight nuts and washers from the exhaust port flanges. Move the exhaust system clear of the airplane.	Only if you install a new engine. Hold the exhaust system! Discard the eight nuts and washers.
(24)	Disconnect the propeller control cable, at the propeller governor: – Loosen the nut of the attachment bolt. – Pull the cable clear.	

	Detail Steps/Work Items	Key Items/References
(25)	Release the propeller control cable from the support bracket at the propeller governor: – Remove the front adjusting nut and washer. – Move the cable clear of the support bracket. – Remove the rear adjusting nut and washer.	
(26)	Move the cable aft through the rubber grommets in the engine cooling baffles.	Move the propeller control cable clear of the engine.
(27)	Remove the propeller (if necessary).	Refer to Section 61-00.
(28)	Disconnect the mixture control eye end at the mixture control lever at the fuel injector: – Remove the nut and washer from the long bolt at the mixture lever. – Release the mixture cable eye end from the lever. – Remove the spacer and the long bolt.	
(29)	Remove the eye end from the mixture control cable: – Release the lock-nut. – Remove the eye end fitting and lock-nut from the cable.	
(30)	Release the mixture cable from the support bracket at the front of the engine: – Remove the bottom adjustment nut and washer from the control cable. – Move the control cable clear of the bracket. – Remove the top adjustment nut and washer from the control cable.	
(31)	Move the cable up through the rubber grommets in the engine baffles and clear of the engine.	

	Detail Steps/Work Items	Key Items/References
(32)	Disconnect the throttle control cable at the injector: – Remove the nut and washer from the attachment bolt. – Remove the eye end from the bolt. – Remove the bolt and washer from the throttle lever at the injector.	
(33)	Remove the eye end from the throttle control cable: – Release the lock nut. – Remove the eye end and the lock-nut.	
(34)	Remove the control cable from the support bracket at the bottom of the engine: – Remove the front adjustment nut and washer from the outer sheath. – Move the control cable clear of the bracket.	
(35)	Move the throttle cable clear of the engine.	
(36)	Disconnect the alternate air control cable: – Release the screw which attaches the wire end to the swivel in the alternate air assembly. – Remove the lock-nut which holds the control cable outer sheath in the support bracket at the alternate air assembly. – Move the control cable clear of the engine mount.	
(37)	Remove the air baffles.	Refer to Section 75-00.

	Detail Steps/Work Items	Key Items/References
	WARNING: DO NOT GET FUEL ON YOU. FUEL CAN CAUSE SKIN DISEASE. DO NOT ALLOW FIRE NEAR FUEL. FUEL BURNS AND CAN CAUSE INJURY TO PEOPLE AND DAMAGE TO EQUIPMENT.	
(38)	Disconnect the fuel feed hose at the firewall.	Use a suitable container to catch the fuel. Put caps on the hose and the firewall connection.
(39)	Disconnect the fuel feed hose at the outlet from the fuel pump.	Move the hose clear of the engine mount.
(40)	Disconnect the fuel drain hose from the engine-driven fuel pump and move the hose clear of the engine.	
(41)	Remove the cable ties that attach the fuel flow divider drain to the engine mount and the ignition harness.	Note the location of the ties!
(42)	Disconnect the engine breather hose from the accessory housing at the top of the engine.	Put caps on the breather hose and the engine connection.
	WARNING: DO NOT GET OIL ON YOU. OIL CAN CAUSE SKIN DISEASE.	
(43)	Disconnect the oil pipe at the top of the accessory-housing.	Use a suitable container to catch the oil. Put caps on the oil pipe and the accessory-housing connection.
(44)	Disconnect the oil pipe at the front of the oil cooler.	Use a suitable container to catch the oil. Put caps on the oil pipe and the oil cooler.
(45)	Disconnect the oil pipe for the oil pressure sensor at the engine crank-case.	Remove spilt oil.

	Detail Steps/Work Items	Key Items/References
(46)	Remove the cylinder-head temperature-probe from the bottom of the cylinder head: – Disconnect the electrical cables at the in-line connectors. – Remove the probe from its holder. – Remove the cable-ties/P-clamps which hold the cables for the cylinder-head temperature probe in position.	Do this item for each cylinder-head temperature-probe. Note the locations of the P-clamps and the cable-ties!
(47)	Disconnect the electrical cables from these components: – The generator (5 cables). – The starter motor (1 cable). – Fuel pressure sensors (2 cables). – Oil temperature sensor. – Fuel flow sensor. – RPM sensor. Remove the P-clamps and cable-ties from the right-hand side of the engine. Move the cables clear of the airplane.	 At the in-line connector. Note the locations of the P-clamps and the cable-ties!
(48)	Disconnect the manifold pressure pipe from the No. 4 cylinder inlet manifold. Release the P-clamp from the rear of the No. 4 cylinder head.	
(49)	Disconnect the earth cable from the engine: – Remove the bolt and washer which attaches the cable eye-end to the engine.	
	WARNING: DO NOT GO UNDER THE ENGINE WHILE IT IS HELD BY THE ENGINE HOIST. IF THE HOIST FAILS, THE ENGINE CAN FALL AND CAUSE INJURY TO PERSONS.	
(50)	Attach the engine hoist to the engine.	At the top of the engine. At the lifting shackles.

	Detail Steps/Work Items	Key Items/References
	Note: The hoist must hold the weight of the engine. The weight of the engine is 150 kg (330 lb). If the propeller and spinner are fitted the total weight is 172 kg (378 lb).	
(51)	Adjust the hoist to “take the weight” of the engine.	
(52)	Remove the engine-mounting-bolts: – Remove the nuts from the lower engine mounting bolts. – Pull the mounting bolts rearwards and clear of the engine mount and remove the rear shock mount rubber. – Remove the nuts from the upper engine mounting bolts. – Pull the mounting bolts rearwards and clear of the engine mount and remove the rear shock mount rubber. – Move the engine clear of the airplane. – Lower the engine into the engine stand.	Remove the front shock mount rubber. Make sure that when you move the engine clear of the airplane that you do not catch the engine on any of the equipment around the engine mount.
(53)	If necessary: – Remove the oil pipe from the accessory housing. – Remove the fuel pipe from the inlet to the engine driven fuel pump.	Note the orientation. Put caps on the open connections. Note the orientation.

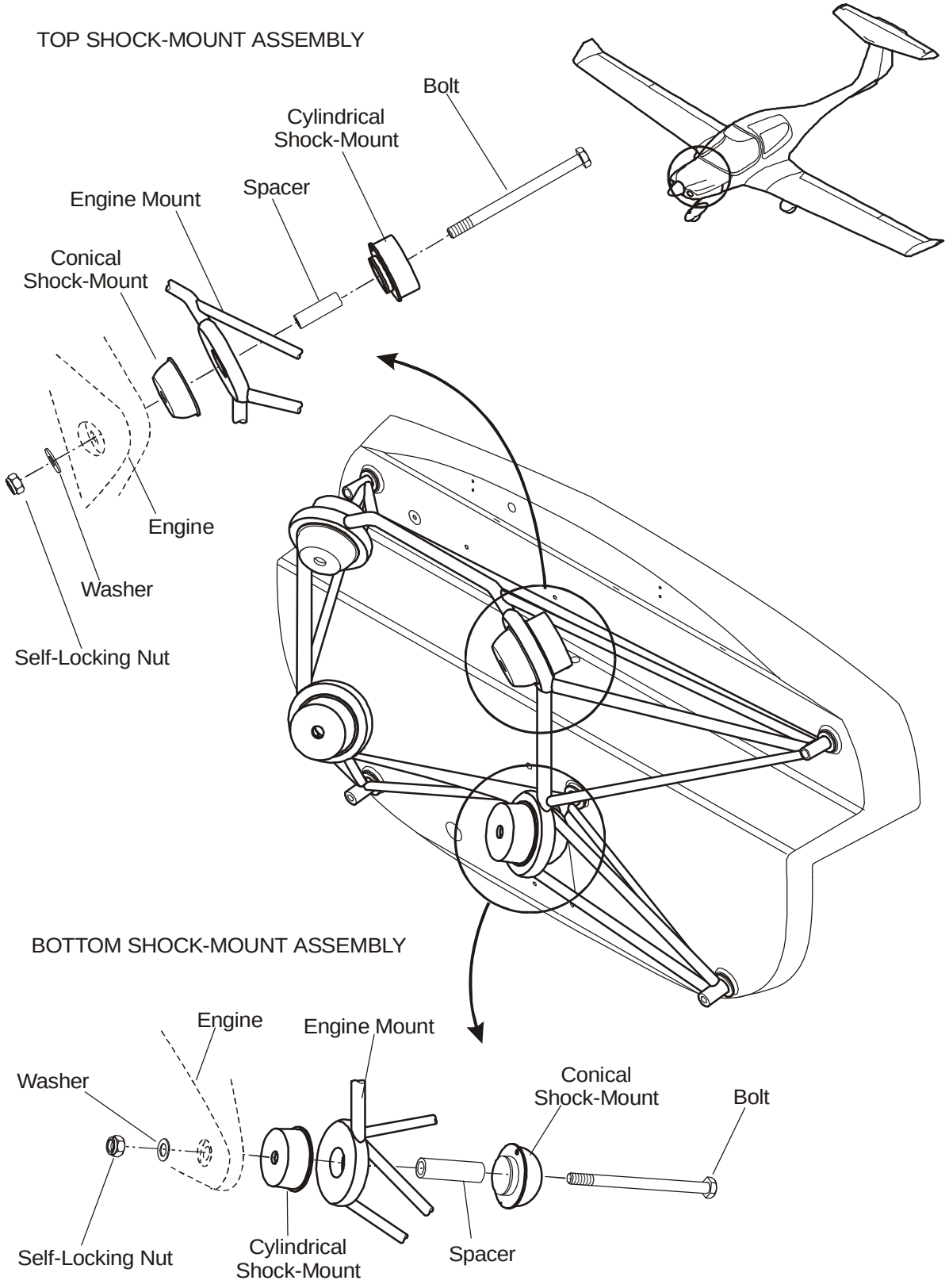


Figure 5: Engine Shock Mounts

3. Install the Engine (Without the Engine Mount)

Note: If you install a new engine, you must do the engine break-in procedure after installation. Refer to Paragraph 11.

A. Equipment

Item	Quantity	Part number
Hoist.	1	Commercial.
Engine sling.	1	Commercial.
Airplane jacks.	3	Commercial.
Nose trestle.	1	Commercial.
Torque wrench.	1	Commercial.

B. Preparation

	Detail Steps/Work Items	Key Items/References
(1)	If you have not already done so: – Raise the airplane on jacks and make the airplane level. – Move the nose trestle into position.	 Refer to Section 07-10. Refer to Section 07-10.
(2)	Examine the engine and propeller control cables. Move each cable through its range of movement several times.	
(3)	Make sure all the electrical cables are clean and not damaged.	
(4)	Make sure all the oil hoses are not damaged.	
(5)	Make sure all the fuel pipes/hoses are not damaged.	
(6)	Make sure that all drains and vents are not damaged or blocked.	
(7)	Make sure that all the flexible hoses are clean and not damaged.	

	Detail Steps/Work Items	Key Items/References
(8)	If you install a new engine:	
	– Install the fuel supply hose to the inlet to the fuel pump.	Set the pipe to the orientation recorded at Paragraph 2.B.(52).
	– Install the oil pipe to the connection below the oil filter.	Set the pipe to the orientation recorded at Paragraph 2.B.(52).

C. Install the Engine

	Detail Steps/Work Items	Key Items/References
(1)	Move the engine into position with the hoist.	Make sure that the engine does not catch on any cables or equipment. Move the fuel and oil hoses through the engine mount.
	Note: Top mountings have the cone-shaped shock-mount FORWARD, the cylindrical-shaped shock-mount AFT. Bottom mountings have the cylindrical-shaped shock-mount FORWARD, the cone-shaped shock-mount AFT.	
(2)	Assemble the 4 shock mounts: – Move the front shock mount rubber into position between the engine mount and the rear face of the engine mounting. – Move the rear shock mount rubber into position in the engine mount. – Install the washer under the head of the engine mounting bolt. – Push the engine mounting bolt through the shock mount assembly from aft. – Install the nuts and washers onto the engine mounting-bolts.	Do this item for each mount. Do the top mounts first and then the bottom mounts. Refer to Figure 5. Make sure that the rubbers are correctly seated. Make sure that the rubbers are correctly seated. Do not tighten the nuts.
(3)	When you have installed all the mounting bolts, then tighten all the engine mounting-bolts.	
(4)	Carefully lower the engine hoist to release the weight of the engine and move the hoist clear of the airplane.	
(5)	Install the engine air cooling baffles.	Refer to Section 75-00.
(6)	Put the electrical cables in position on the right hand side of the engine.	

	Detail Steps/Work Items	Key Items/References
(7)	Install the propeller, if necessary.	Refer to Section 61-00.
(8)	Install the cylinder-head temperature probes: – Put the cylinder probe into the cylinder mounting. – Connect the electrical cables at the in-line connectors. – Attach the probe cables to the main wiring loom with cable ties and P-clamps.	Do this item for each of the probes. White cable to white cable and red cable to red cable.
(9)	Connect the manifold pressure hose to the No. 4 cylinder inlet manifold.	
(10)	Connect the electrical cables to these components: – The engine earth point. – The generator (5 cables). – The starter motor (1 cable). – Fuel pressure sensors (2 cables). – Oil temperature sensor. – Fuel flow sensor. – RPM sensor. Install the P-clamps and cable-ties which hold the electrical cables in their correct positions.	Refer to drawing. At the in-line connector.
(11)	Connect the oil pipe to the top of the accessory-housing.	
(12)	Connect the oil pipe to the rear connection of the oil cooler.	
(13)	Install the P-clamps which attach the oil cooler pipes to the engine mount.	
(14)	Connect the engine breather hose to the breather connection at the top of the accessory housing.	

	Detail Steps/Work Items	Key Items/References
(15)	Attach the drain tube to the fuel flow divider: – Push one end of the tube onto the connector on the fuel flow divider and install the pipe clip. – Push the other end of the tube through the rubber grommet in the cooling baffles to the bottom rear of the engine compartment. – Connect the end to the tee piece in the fuel pump drain and install the pipe clip. – Hold the drain tube in its correct position with cable-ties.	
(16)	Connect the drain tube to the engine driven fuel pump and install the pipe clip. Hold the drain tube in its correct position with cable ties.	
(17)	Connect the main fuel feed hose to the firewall.	

	Detail Steps/Work Items	Key Items/References
(18)	Connect the alternate air control cable: – Put the control cable in position through the guide attached to the alternate air control assembly. – Install the lock-nut onto the control cable outer sheath and tighten the lock-nut. – Push the control cable wire end through the swivel in the operating ring. – Make sure that the alternate air control lever in the cockpit is set to OFF. – Make sure that the alternate air assembly is set to the OFF position. – Move the alternate air control lever in the cockpit 3 mm (0.125 in) aft from OFF. – Tighten the screw which attaches the wire end to the swivel. – Install the P-clamps and cable ties which hold the Bowden-cable in the correct position.	Fully forward. Inlet holes fully closed.
(19)	Do a test for the correct operation of the alternate air control system.	Refer to Section 76-00.
(20)	Connect the throttle cable to the fuel injector: – Move the cable into position through the bracket at the bottom of the engine. – Install the front adjustment nut and washer on the outer sheath. Tighten the nut.	
(21)	Install the cable eye end onto the throttle cable: – Install the lock-nut onto the cable end. – Install the eye-end onto the cable end. – Tighten the lock-nut.	Use a piece of lock-wire to make sure that the eye-end is installed correctly.

	Detail Steps/Work Items	Key Items/References
(22)	Connect the cable eye end to the throttle lever at the fuel injector: – Move the attachment bolt into position in the throttle lever at the fuel injector. – Install a washer on the attachment bolt. – Install the eye end on the attachment bolt. – Install a second washer and a nut on the attachment bolt. Tighten the nut.	From the engine side.
(23)	Move the throttle lever in the cockpit between FULL and IDLE. The throttle control must be smooth in operation with no restrictions.	
(24)	Do a test for the correct operation of the throttle control system.	Refer to Section 76-00.
(25)	Connect the mixture control cable at the fuel injector: – Move the cable into position through the rubber grommets in the engine cooling baffles. – Install the top adjustment nut and washer onto the control cable outer sheath. – Push the cable through the support bracket at the bottom of the engine. – Install the bottom adjustment nut and washer on to the control cable outer sheath. Tighten the nut.	
(26)	Install the cable eye end onto the mixture cable: – Install the lock-nut on the cable. – Install the eye end on the cable. – Tighten the lock-nut.	Use a piece of lock-wire to make sure that the eye end is installed correctly.

	Detail Steps/Work Items	Key Items/References
(27)	Connect the mixture control cable eye end to the mixture lever at the fuel injector: – Move the long bolt into position in the mixture lever. – Install the spacer on the long bolt. – Install the eye end on the long bolt. – Install the nut and washer on the long bolt. Tighten the nut.	From inboard.
(28)	Move the mixture control lever in the cockpit between RICH and LEAN CUT-OFF. The mixture control must be smooth in operation with no restrictions.	
(29)	Do a test for the correct operation of the mixture control.	Refer to Section 76-00.
(30)	Connect the propeller control cable to the propeller governor: – Move the propeller cable into position through the rubber grommets in the engine cooling baffles. – Install the rear adjustment nut and washer onto the control cable outer sheath. – Push the cable through the support bracket at the bottom of the engine. – Install the front adjustment nut and washer on to the control cable outer sheath. Tighten the nut.	

	Detail Steps/Work Items	Key Items/References
(31)	Attach the cable wire end to the propeller governor lever: – Push the cable wire end through the swivel. – Tighten the screw which attaches the wire end to the swivel. Make sure the cable wire end is in safety.	
(32)	Move the propeller control lever in the cockpit between MAX and MIN. The propeller control must be smooth in operation with no restrictions.	
(33)	Do a test for the correct operation of the propeller control.	Refer to Section 61-20.
(34)	Install the engine exhaust assembly: – Move the exhaust manifold into position on the cylinder head studs. – Install the eight washers and nuts on the cylinder head studs. – Tighten the nuts.	Use new gaskets! Use new washers and nuts.
(35)	Install the flexible hose between the cabin heat control valve and the exhaust heat exchanger: – Move the flexible hose into position. – Install and tighten the worm-drive clamps.	

	Detail Steps/Work Items	Key Items/References
(36)	Install the air inlet and cooling hoses for the oil cooler and generator: – Move the air inlet and hoses into position. – Attach the flexible hose to the generator cooling duct. – Install and tighten the worm-drive clamp at the generator cooling duct. – Attach the flexible hose to the oil cooler duct. – Install and tighten the worm-drive clamp at the oil cooler duct.	
(37)	Install the exhaust gas temperature probe: – Install the No. 1 cylinder sensor in the No. 1 exhaust manifold. – Install the worm-drive clamp. – Hold the cable in the correct position with cable ties and P-clamps.	Do this item for each probe.
(38)	Connect the electrical plugs to the left magneto and to the right magneto.	Make sure the ignition switch is set to OFF.
(39)	Install the spark plugs in the cylinder heads.	Torque: 47.5 Nm (35 lbf.ft.).
(40)	Install the left ignition harness: – Move the left ignition harness into position on the left magneto. – Install the three screws which attach the harness to the ignition. – Connect the ignition cables to the spark plugs.	 Make sure that the cap is seated correctly. Make sure that the ignition cables are connected to the correct plugs. Torque: Hand-tight then 1/16 to 1/8 turn with a wrench.

	Detail Steps/Work Items	Key Items/References
(41)	Install the fairlead which holds the top left ignition cables in the cooling baffle: – Assemble the fairlead around the cable and to baffle. – Install the 2 screws, washers and nuts which attach the fairlead to the baffle.	
(42)	Install the right ignition harness: – Move the right ignition harness into position on the right magneto. – Install the three screws which attach the harness to the ignition. – Connect the ignition cables to the spark plugs.	Make sure that the cap is seated correctly. Make sure that the ignition cables are connected to the correct plugs. Torque: Hand-tight, then 1/16 to 1/8 turn with a wrench.
(43)	Install the fairlead which holds the top right ignition cables in the cooling baffle: – Assemble the fairlead around the cable and to baffle. – Install the 2 screws, washers and nuts which attach the fairlead to the baffle.	
(44)	Install the P-clamps which attach the ignition cables to the left side of the engine cooling air baffles.	Make sure that the ignition cables can reach the spark plugs without strain.
(45)	Install the P-clamps which attach the ignition cables to the right side of the engine cooling air baffles.	Make sure that the ignition cables can reach the spark plugs without strain.
(46)	Install the cable ties that hold the ignition cables to the left side of the engine mount.	
(47)	Install the cable -ties that hold the ignition cables to the right side of the engine mount.	

	Detail Steps/Work Items	Key Items/References
(48)	Install the cable ties that attach the left ignition harness to the right ignition harness.	
(49)	Do an engine oil level check.	Refer to Section 12-10.
(50)	Install the airplane battery.	Refer to Section 24-31.
(51)	If necessary, for your Airworthiness Authority, do a second inspection of these control systems: – Throttle. – Mixture. – Propeller. – Alternate air.	
(52)	Install the engine cowlings.	Refer to Section 71-10.
(53)	Remove the wing trestles.	
(54)	Lower the airplane with the jacks.	Refer to Section 07-10.
(55)	Do a test of the engine.	Refer to Paragraph 4.

4. Remove the Engine with the Engine Mount

A. Equipment

Item	Quantity	Part Number
Hoist.	1	Commercial.
Engine sling.	1	Commercial.
Engine/engine mount stand.	1	Commercial.
Airplane jacks.	3	Commercial.
Nose trestle.	1	Commercial.
Wing trestles.	2	Commercial.

B. Remove the Engine with the Engine Mount

	Detail Steps/Work Items	Key Items/References
(1)	Lift the airplane on jacks and make the airplane level.	Refer to Section 07-10.
(2)	Move the wing trestles into position.	Refer to Section 07-10.
	WARNING: MAKE SURE THAT THE ENGINE IS SAFE BEFORE YOU DO ANY WORK ON THE PROPELLER. IF THE ENGINE IS TURNED, THE PROPELLER CAN CAUSE INJURY OR DEATH.	
(3)	Set the fuel selector/shut-off valve to CLOSED.	
(4)	Make sure that the engine is safe: – Set the ignition switch to OFF. – Set the throttle to IDLE. – Set the mixture control to LEAN CUT-OFF.	
(5)	Remove the engine cowlings.	Refer to Section 71-10.
(6)	Remove the battery.	Refer to Section 24-31.
(7)	Disconnect the spark plug cables from the spark plugs.	

	Detail Steps/Work Items	Key Items/References
(8)	Disconnect the cables for the exhaust gas temperature (EGT) probes: – Disconnect the cables at the in-line connectors. – Remove the cable ties attaching the cable for the probe to the engine mount. – Move the cable clear of the engine and the engine mount.	Do this item for each of the four probes. Note the location of the cable ties.
(9)	Disconnect the propeller control cable, at the propeller governor: – Loosen the nut and bolt which attaches the cable wire end to the governor. – Pull the cable wire end out of the bolt.	
(10)	Release the propeller control cable from the support bracket at the propeller governor: – Remove the front adjusting nut and washer. – Move the cable clear of the support bracket. – Remove the rear adjusting nut and washer.	
(11)	Move the propeller control cable aft through the rubber grommets in the engine cooling baffles.	Move the propeller control cable clear of the engine.
(12)	Remove the propeller (if necessary).	Refer to Section 61-00.
(13)	Disconnect the mixture control eye end at the engine mixture lever: – Remove the nut and washer from the long bolt at the mixture lever. – Remove the mixture cable eye end from the lever. – Remove the spacer and the long bolt.	

	Detail Steps/Work Items	Key Items/References
(14)	Remove the eye end from the control cable: – Release the lock-nut. – Remove the eye-end fitting and lock-nut from the cable.	
(15)	Release the mixture cable from the support bracket at the front of the engine: – Remove the bottom adjustment nut and washer from the control cable. – Move the control cable clear of the bracket. – Remove the top adjustment nut and washer from the control cable.	
(16)	Move the cable up and rearwards through the rubber grommets in the engine baffles.	Move the mixture cable clear of the engine.
(17)	Disconnect the throttle cable at the injector: – Remove the nut and washer from the attachment bolt. – Remove the eye end from the bolt. – Remove the bolt and washer from the throttle lever at the injector.	
(18)	Remove the eye end from the control cable: – Loosen the lock-nut. – Remove the eye end and lock-nut.	
(19)	Remove the control cable from the bracket at the bottom of the engine: – Remove the front adjustment nut and washer from the outer sheath. – Move the control cable clear of the bracket.	
(20)	Move the throttle cable clear of the engine.	

	Detail Steps/Work Items	Key Items/References
(21)	Disconnect the alternate air control cable: – Release the screw which attaches the cable wire end to the swivel in the alternate air assembly. – Remove the lock-nut which holds the Bowden cable outer sheath in the support bracket at the alternate air assembly. – Move the Bowden-cable clear of the engine mount.	
	WARNING: DO NOT GET FUEL ON YOU. FUEL CAN CAUSE SKIN DISEASE. DO NOT ALLOW FIRE NEAR FUEL. FUEL BURNS AND CAN CAUSE INJURY TO PEOPLE AND DAMAGE TO EQUIPMENT.	
(22)	Disconnect the fuel feed hose at the firewall.	Use a suitable container to catch the fuel. Put caps on the hose and the firewall connector.
(23)	Release the P-clamp which attaches the breather pipe to the firewall.	Put caps on the breather pipe.
	WARNING: DO NOT GET OIL ON YOU. OIL CAN CAUSE SKIN DISEASE.	
(24)	Disconnect the electrical connector for the oil pressure sensor and remove the cable ties which attach the electrical cable to the engine mount.	Note the position of the cable ties.
(25)	Disconnect the cylinder-head temperature probe: – Disconnect the electrical cables for the probe. – Remove the cable ties which attach the electrical cable for the probe to the engine mount.	Do this item for each cylinder-head temperature probe. At the in-line connector. Note the position of the cable-ties.

	Detail Steps/Work Items	Key Items/References
(26)	Disconnect the electrical cables from these components: – The generator (5 cables). – The starter motor (1 cable). – Fuel pressure sensors (2 cables). – Oil temperature sensor. – Fuel flow sensor. – RPM sensor. – The SlickSTART booster control unit or LASAR control unit. – The voltage regulator Remove the P-clamps and cable ties from the right hand side of the engine. Move the cables clear of the engine.	At the in-line connector. At the in-line connector. Note the locations of the P-clamps and the cable ties!
(27)	Disconnect the manifold pressure pipe from the bulkhead connector at the firewall.	Put caps on the open connections.
(28)	Disconnect the engine earth connection: – Remove the bolt and washer which attach the cable eye-end to the engine.	
	WARNING: DO NOT GO UNDER THE ENGINE WHILE IT IS HELD BY THE ENGINE HOIST. IF THE HOIST FAILS, THE ENGINE CAN FALL AND CAUSE INJURY TO PERSONS.	
(29)	Attach the engine hoist to the engine.	At the top of the engine. At the lifting shackles.
	Note: The hoist must hold the weight of the engine. The weight of the engine is 150 kg (330 lb). If the propeller and spinner are fitted the total weight is 172 kg (378 lb).	
(30)	Adjust the hoist to “take the weight” of the engine.	

	Detail Steps/Work Items	Key Items/References
(31)	Remove the engine mount attachments: – Remove the nut and washer which attaches the nose wheel strut and engine mount to the firewall. – Remove the nuts and washers which attach the bottom of the engine mount to the firewall. – Remove the nuts and washers which attach the top of the engine mount to the firewall. – Pull the engine and engine mount forward and clear of the airplane. Lower the engine and engine mount into a stand.	Make sure that all electrical cables, control cables and other items are clear of the engine and the engine mount.

5. Install the Engine with the Engine Mount

Note: If you install a new engine, you must do the engine break-in procedure after installation. Refer to Paragraph 11.

A. Preparation

	Detail Steps/Work Items	Key Items/References
(1)	If you have not already done so: – Raise the airplane on jacks and make the airplane level. – Move the nose trestle into position.	 Refer to Section 07-10. Refer to Section 07-10.
(2)	Examine the engine and propeller control cables. Move each cable through its range of movement several times.	
(3)	Make sure all the electrical cables are clean and not damaged.	
(4)	Make sure the oil hoses are not damaged.	
(5)	Make sure the fuel pipes/hoses are not damaged.	
(6)	Make sure that all drains and vents are not damaged or blocked.	
(7)	Make sure that all the flexible hoses are clean and not damaged.	

B. Equipment

Item	Quantity	Part Number
Hoist.	1	Commercial.
Engine sling.	1	Commercial.
Airplane jacks.	3	Commercial.
Nose trestle.	1	Commercial.
Wing trestles.	2	Commercial.
Torque wrench.	1	Commercial.

C. Install the Engine with the Engine Mount

	Detail Steps/Work Items	Key Items/References
	WARNING: DO NOT GO UNDER THE ENGINE WHILE IT IS HELD BY THE ENGINE HOIST. IF THE HOIST FAILS, THE ENGINE CAN FALL AND CAUSE INJURY TO PERSONS.	
(1)	Move the engine and engine mount into position with the hoist: – Locate the engine mount pads onto the mounting studs. – Gently move the engine mount aft until the mounting pads are correctly located against the firewall.	Make sure that all electrical cables, control cables and other items are correctly positioned.
(2)	Attach the engine mount to the fuselage: – Install the nuts and washers onto the top mounting studs. – Install the nuts and washers onto the bottom mounting studs. – Install the nose leg strut onto the center mounting stud. – Install the washer and nut onto the center mounting stud.	 Do not tighten the nuts. Do not tighten the nuts. Do not tighten the nuts.
(3)	Tighten the mounting nuts.	
(4)	Connect the manifold pressure pipe to the connector on the firewall.	

	Detail Steps/Work Items	Key Items/References
(5)	Move these cables into position and connect them to their related components: – The engine earth cable. – The generator (5 cables). – The starter motor (1 cable). – Fuel pressure sensor (1 cable). – Oil temperature sensor. – Fuel flow sensor. – RPM sensor. – The SlickSTART booster control unit or LASAR control unit. – The voltage regulator. Install the P-clamps and cable ties in the correct positions.	At the in-line connector. At the in-line connector.
(6)	Connect the cylinder-head temperature-probes: – Connect the in-line cable connector connectors. – Install the cable ties which hold the cable in the correct position.	Do this item for each cylinder head temperature-probe. Red cable to red cable and white cable to white cable.
(7)	Connect the electrical cable for the oil pressure sensor. Install the cable ties which hold the cable in the correct position.	
(8)	Install the P-clamp which attaches the breather pipe to the firewall.	Remove the caps.
(9)	Connect the fuel feed hose at the firewall.	Remove the caps.

	Detail Steps/Work Items	Key Items/References
(10)	Connect the alternate air control cable: – Put the control cable in position through the guide attached to the alternate air control assembly. – Install the lock-nut onto the control cable outer which attaches the cable to the guide and tighten the lock-nut. – Push the cable wire end through the swivel in the operating lever. – Make sure that the alternate air control lever in the cockpit is set to OFF. – Make sure that the alternate air assembly is set to the OFF position. – Move the alternate air control lever in the cockpit 3 mm (0.125 in) aft from OFF. – Tighten the screw in the swivel. – Install the P-clamps and cable ties which hold the control cable in the correct position. – Do a test for correct range, full and free movement of the alternate air control system.	Fully forward. Inlet holes fully closed. Refer to Section 76-00.
(11)	Connect the throttle cable to the fuel injector: – Move the cable into position and push the cable through the bracket at the bottom of the engine. – Install the front adjustment nut and washer on the outer sheath and tighten the nut.	

	Detail Steps/Work Items	Key Items/References
(12)	Install the cable eye end onto the throttle cable: – Install the lock-nut onto the cable end. – Install the eye end onto the cable end. – Tighten the lock-nut.	Use a piece of lock-wire to make sure that the eye end is installed correctly.
(13)	Connect the cable eye end to the throttle lever at the fuel injector: – Move the attachment bolt into position in the throttle lever at the fuel injector. – Install a washer on the attachment bolt. – Install the eye end on the attachment bolt. – Install a second washer and a nut on the attachment bolt. Tighten the nut.	From the engine side.
(14)	Move the throttle control lever in the cockpit between FULL and IDLE. The throttle control must be smooth in operation with no restrictions.	
(15)	Do a test for the correct operation of the throttle control system.	Refer to Section 76-00.
(16)	Connect the mixture control cable at the fuel injector: – Move the mixture cable into position through the rubber grommets in the engine cooling baffles. – Install the top adjustment nut and washer onto the control cable outer sheath. – Push the cable through the support bracket at the bottom of the engine. – Install the bottom adjustment nut and washer on to the control cable outer sheath. Tighten the nut.	

	Detail Steps/Work Items	Key Items/References
(17)	Install the cable eye end onto the mixture cable: – Install the lock-nut on the cable. – Install the eye end on the cable. – Tighten the lock-nut.	Use a piece of lock-wire to make sure that the eye end is installed correctly.
(18)	Connect the mixture cable eye end to the mixture lever at the fuel injector: – Move the long bolt into position in the mixture lever. – Install the spacer on the long bolt. – Install the eye end on the long bolt. – Install the nut and washer on the long bolt. Tighten the nut.	From inboard.
(19)	Move the mixture control lever in the cockpit between RICH and LEAN CUT-OFF. The mixture control must be smooth in operation with no restrictions.	
(20)	Do a test for correct operation of the mixture control.	Refer to Section 76-00.
(21)	Install the propeller (if necessary).	Refer to Section 61-00.

	Detail Steps/Work Items	Key Items/References
(22)	Connect the propeller control cable to the propeller governor: – Move the propeller cable into position through the rubber grommets in the engine cooling baffles. – Install the rear adjustment nut and washer onto the control cable outer sheath. – Push the cable through the support bracket at the bottom of the engine. – Install the front adjustment nut and washer on to the control cable outer sheath. Tighten the nut.	
(23)	Attach the cable wire end to the propeller governor lever: – Push the cable wire end through the hole in the bolt. – Tighten the nut on the adjustment bolt. Make sure the cable wire end is in safety.	Hold the bolt with a wrench.
(24)	Move the propeller control lever in the cockpit between MAX and MIN. The propeller control must be smooth in operation with no restrictions.	
(25)	Do a test for correct operation of the propeller control.	Refer to Section 61-20.
(26)	Connect the EGT probe electrical cables: – Connect the in-line connectors. – Install the cable ties which hold the cables in the correct position.	Do this item for each of the EGT probes. Yellow cable to yellow cable and red cable to red cable.
(27)	Do an oil level check.	Refer to Section 12-10.

	Detail Steps/Work Items	Key Items/References
(28)	Do an inspection of all the controls that you have disconnected. If necessary, for your Airworthiness Authority, do a second inspection of all the controls that you have disconnected.	
(29)	Connect the spark plug cables to the spark plugs.	Make sure that the spark plug cables are connected to the correct spark plugs. Torque hand tight, then 1/16 to 1/8 turn with a wrench.
(30)	Install the airplane battery.	Refer to Section 24-31.
(31)	Install the engine cowlings.	Refer to Section 71-10.
(32)	Remove the airplane trestles.	
(33)	Lower the airplane with the jacks.	Refer to Section 07-10.
(34)	Do an engine test.	Refer to Paragraph 5.

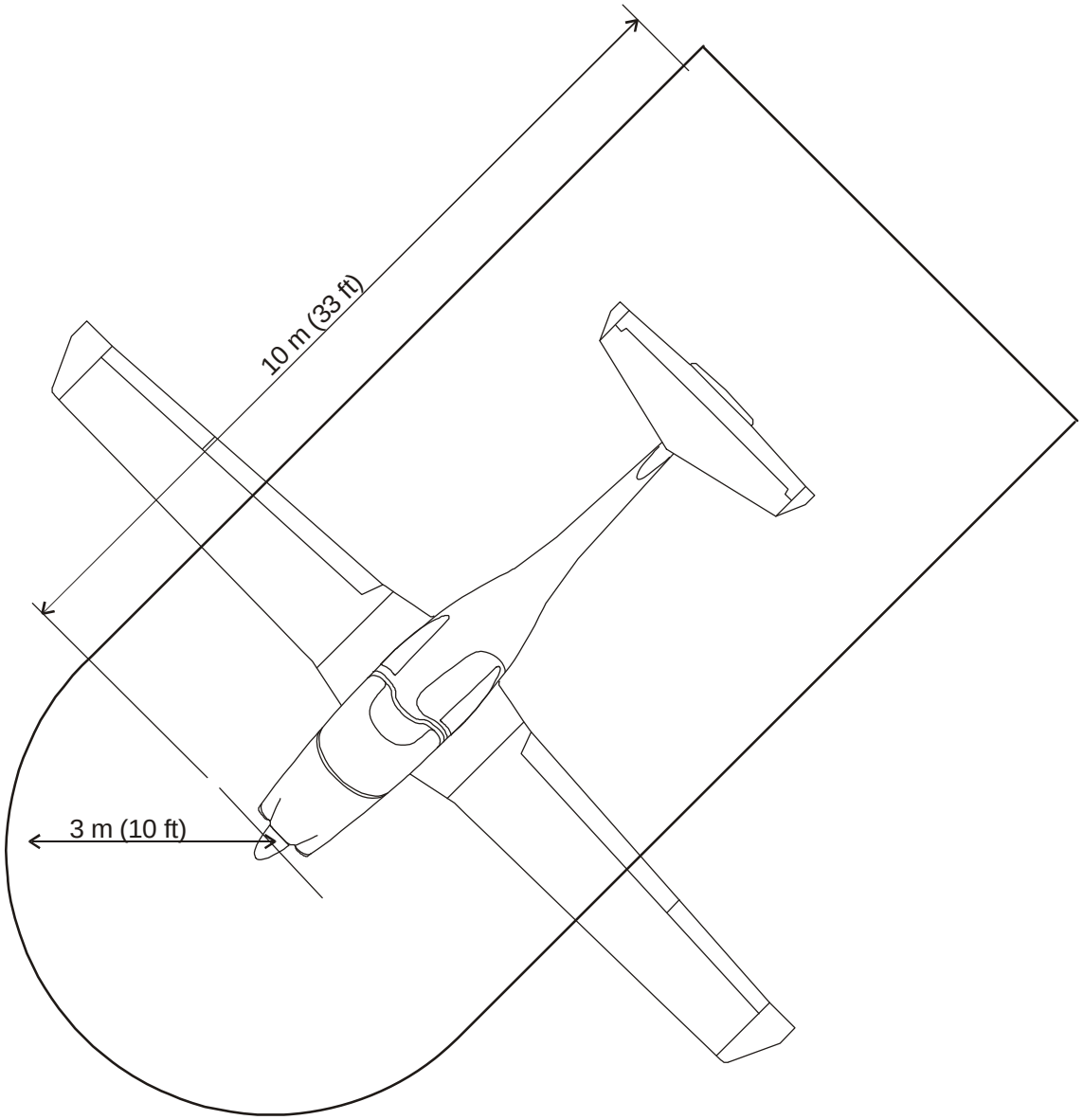


Figure 6: Safety Range for Engine Start and Test

6. Engine Test General

These procedures tell you how to do an engine test. For more data on the engine and engine performance testing, refer to the Lycoming Operator's Manual.

A. Equipment

Item	Quantity	Part Number
Airplane chocks.	2	Commercial.
Fuel sample kit.	1	Commercial.

B. Preparation

	Detail Steps/Work Items	Key Items/References
	WARNING: DO NOT LET PERSONS INTO THE SAFETY RANGE OF THE AIRPLANE. PROPELLERS CAN CAUSE INJURY OR DEATH.	
(1)	Look in the airplane records for reports of problems.	
(2)	Position the airplane on level ground. Make sure that: – There are no loose stones on the ground near the propeller. – The safety zone around the airplane is clear. – The airplane heads into the wind.	Refer to Figure 6.
(3)	Do a test of a sample of fuel for contamination.	Refer to Section 12-10
(4)	Put chocks in front of each main wheel.	
(5)	Remove the Pitot probe cover.	

	Detail Steps/Work Items	Key Items/References
(6)	Make sure that there is enough fuel for the engine test: – Set the ALT/BAT switch to ON. – Read the fuel quantity indicator. – Set the ALT/BAT switch to OFF. – Refuel the airplane if necessary.	
(7)	Read the engine oil contents. Add oil if necessary.	Refer to Section 12-10.

7. Engine Starting

See the Lycoming Operator's Manual for operating limits.

	Detail Steps/Work Items	Key Items/References
(1)	Enter the cockpit.	
(2)	Set the parking brake to ON.	
(3)	Make sure that the fuel selector/shut-off valve is set to LEFT or RIGHT.	
(4)	Set the fuel selector valve as required.	
(5)	Make sure that the passenger door is closed and locked. Close and lock the canopy.	
(6)	Make sure that: – The throttle lever is free to move. – The mixture lever is free to move. – The propeller control lever is free to move.	
(7)	Set the ALT/BAT switch to ON.	
(8)	Make sure that the engine indicator display panel reads correctly.	
(9)	Do a test of the annunciator panel.	Refer to Section 31-50.
(10)	Set the alternate air control to OFF.	
(11)	Set the propeller control to MAX RPM.	Fully forward.
(12)	Set the electrical fuel pump to ON. Listen for the fuel pump working, Make sure that: – The fuel pressure increases.	
(13)	Set the throttle to 1/4 open.	

	Detail Steps/Work Items	Key Items/References
(14)	Prime the engine: – If the engine is cold, set the mixture control to full RICH for 3 seconds. Then move the mixture control to IDLE CUT-OFF. – If the engine is warm, set the mixture control to full RICH for 1 second. Then move the mixture control to IDLE CUT-OFF.	
(15)	Press on both brake pedals together and hold the flying controls in neutral.	
(16)	Make sure the area of the propeller is clear.	
(17)	Turn the ignition switch to the START position.	Make sure that the engine start light comes on.
(18)	When the engine starts: – Release the ignition switch to the BOTH position. – Move the mixture control to RICH.	Make sure that the engine start light goes out. Fully forward.
(19)	Set the throttle to give 1000 - 1200 RPM.	Make sure that there are no warning lights on.
(20)	Monitor the oil pressure.	The oil pressure must rise to 25 PSI minimum, within 30 seconds of starting the engine. If it does not, then you must shut-down the engine.
(21)	Set the electrical fuel pump to OFF.	
(22)	Set the throttle to give 1500 RPM.	Warm up the engine until the oil temperature reaches 100 °F (37.8 °C). Monitor the instruments for unusual indications.

8. Measure/Adjust Engine Performance

A. Measure Engine Performance

	Detail Steps/Work Items	Key Items/References
(1)	Set the engine to 2000 RPM.	
(2)	Do a test of the LASAR system (if installed) and the left magneto: – Set the ignition switch to L. – Set the ignition switch to BOTH.	 The RPM must decrease by 50 - 175 RPM. If the LASAR system is installed, the ignition status light (IGN or IGNITION) must come on. The RPM must return to 2000 RPM. If the LASAR system is installed, the ignition status light (IGN or IGNITION) must go off after 20 seconds.
(3)	Do a test of the LASAR system (if installed) and the right magneto: – Set the ignition switch to R. – Set the ignition switch to BOTH.	 The RPM must decrease by 50 - 175 RPM. If the LASAR system is installed, the ignition status light (IGN or IGNITION) must come on. The RPM must return to 2000 RPM. If the LASAR system is installed, the ignition status light (IGN or IGNITION) must go off after 20 seconds. The maximum difference between the left and right magneto RPM drop is 50 RPM.
(4)	Do a test of the alternate air: – Set the alternate air control to ON for 10 - 15 seconds. – Set the alternate air control to OFF.	

	Detail Steps/Work Items	Key Items/References
(5)	Do a test of the propeller control:	
	– Move the propeller control smoothly to MIN RPM.	The RPM must decrease.
	– Move the propeller control smoothly to MAX RPM.	The RPM must return to 2000 RPM.
(6)	Do a test of engine static RPM:	
	– Set the propeller control to MAX RPM.	
	– Set the throttle control to FULL.	Note the engine RPM. It must be within the operating limits given in the Lycoming Operator's Manual.
	– Move the propeller control slowly towards min RPM until the RPM reduces by 25 RPM.	If you must move the propeller control a long way to get the 25 RPM decrease, then the pitch of the propeller will set the static RPM. Refer to the Propeller Owner's Manual to adjust the propeller pitch.
	– Set the propeller control to MAX RPM. – Set the throttle to IDLE.	If you must only move the propeller control a small way to get the 25 RPM decrease, then the propeller governor will set the static RPM. Refer to propeller governor manufacturer's manual to adjust the governor.
	Note: Operate the engine at up to 2000 RPM for 20 to 30 seconds before each measurement. This will allow the engine to stabilize between measurements.	

	Detail Steps/Work Items	Key Items/References
(7)	Measure the idle RPM.	
	– Make sure that the oil temperature is at least 175 °F (79.4 °C). If it is not, operate the engine at up to 2000 RPM until the oil temperature is 175 °F (79.4 °C).	Low oil temperature can change the idle RPM.
	– Make sure that the propeller control lever is set to MAX RPM.	Fully forward.
	– Make sure that the mixture control lever is set to full RICH.	Fully forward.
	– Set the throttle to IDLE. Make a note of the idle RPM.	Allow the RPM to become stable. See Paragraph 8.B for the idle RPM adjustment procedure.
	Note: Operate the engine at up to 2000 RPM for 20 to 30 seconds before each measurement. This will allow the engine to stabilize between measurements.	
(8)	Measure the idle control mixture setting:	
	– Make sure that the oil temperature is at least 175 °F (79.4 °C). If it is not, operate the engine at up to 2000 RPM until the oil temperature is 175 °F (79.4 °C).	
	– Make sure that the mixture control lever is set to full RICH.	Fully forward.
	– Set the throttle to IDLE.	Allow the idle RPM to become stable.
	– Move the mixture control lever smoothly towards the LEAN position.	If the idle RPM increases by more than 50 RPM before decreasing then the mixture is too rich. If the idle RPM decreases immediately, then the mixture is too lean.
	– Move the mixture control lever to the full RICH position before the engine stops.	See Paragraph 8.C for the idle mixture adjustment.

	Detail Steps/Work Items	Key Items/References
(9)	Do a test of the function of the fuel selector/shut-off valve: – Set the engine to 1000 - 1200 RPM. – Set the fuel shut-off valve to OFF. – Set the fuel shut-off valve to ON. – Set the ignition to OFF.	The engine must stop within 2 minutes.
(10)	Start the engine.	Refer to Paragraph 5.

B. Adjust the Engine Idle Speed

	Detail Steps/Work Items	Key Items/References
	Note: Do this work quickly. If the oil temperature is less than 175 °F (79.4 °C), it can change the idle RPM.	
(1)	Shut down the engine.	Refer to Paragraph 9.
(2)	Remove the engine cowlings.	Refer to Section 71-10.
(3)	Set the throttle lever to IDLE.	Make sure that the throttle lever at the injector is against the throttle stop screw. If the throttle lever at the injector is NOT against the idle stop screw, adjust the throttle control, see Section 76-00.
(4)	Start the engine.	Refer to Paragraph 7.
(5)	Set the propeller control to MAX RPM.	
(6)	Set the mixture control to full RICH.	
(7)	Operate the engine at 1500 RPM until it runs smoothly.	Obey the operating limits in the Lycoming Operator's Manual.
(8)	Set the throttle to IDLE.	Allow the idle RPM to become stable.
(9)	Make a note of the difference in idle RPM with the engine cowlings removed.	
(10)	Shut down the engine.	Refer to Paragraph 9.
	WARNING: DO NOT TOUCH THE EXHAUST SYSTEM. THE EXHAUST IS VERY HOT, IT CAN BURN SKIN AND IT CAN BURN CLOTHING.	
(11)	Adjust the idle-stop screw on the injector.	Turn the screw clockwise to increase idle RPM. Turn the screw counter-clockwise to decrease idle RPM.
(12)	Start the engine.	Refer to Paragraph 7.
(13)	Measure the idle RPM.	Refer to Paragraph 6.A. Make an allowance for the difference in idle RPM with the cowlings removed.
(14)	Repeat items 10 to 13 as necessary.	
(15)	Shut down the engine.	Refer to Paragraph 9.

	Detail Steps/Work Items	Key Items/References
(16)	Install the cowlings.	Refer to Section 71-10.

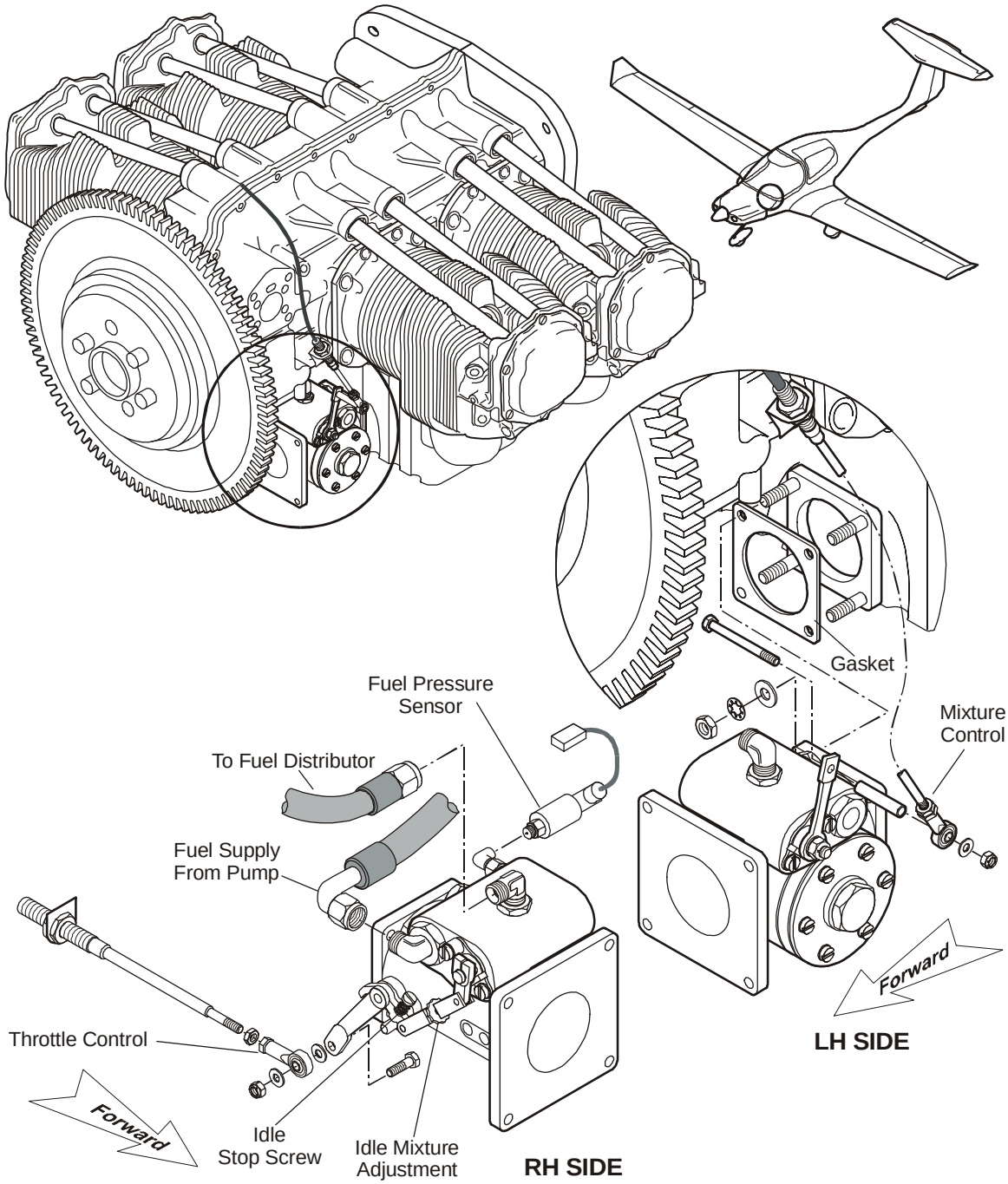


Figure 7: Adjust the Idle/Mixture at the Fuel Injector

C. Adjust the Engine Mixture Control

Do this item only if a test shows that the mixture is incorrect.

	Detail Steps/Work Items	Key Items/References
	Note: Do this work quickly. If the oil temperature is less than 80 °C (176 °F), it can change the idle RPM.	
(1)	Shut-down the engine.	Refer to Paragraph 9.
(2)	Remove the engine cowlings.	Refer to Section 71-10.
(3)	Start the engine.	Refer to Paragraph 7.
(4)	Set the propeller control to MAX RPM.	Fully forward.
(5)	Set the mixture control to fully RICH.	Fully forward.
(6)	Operate the engine at 1500 RPM until it runs smoothly.	Obey the operating limits in the Lycoming Operator's Manual.
(7)	Set the throttle to IDLE.	Allow the idle RPM to become stable.
(8)	Make a note of the difference in RPM with the engine cowlings removed.	
(9)	Shut-down the engine.	Refer to Paragraph 9.
	WARNING: DO NOT TOUCH THE EXHAUST SYSTEM. THE EXHAUST IS VERY HOT, IT CAN BURN SKIN AND IT CAN BURN CLOTHING.	
(10)	Adjust the mixture on the injector.	If you turn the thumb-screw to make the linkage shorter, you make the mixture more lean. If you turn the thumb-screw to make the linkage longer, you make the mixture more rich.
	Note: Make sure that the idle RPM is within limits. Make an allowance for the difference in idle RPM with the engine cowlings removed. The idle RPM can change when you adjust the mixture. If the idle RPM is not in limits, adjust the idle RPM. See Paragraph 8.B.	
(11)	Start the engine.	Refer to Paragraph 7.
(12)	Measure the mixture control setting.	Refer to Paragraph 8.A.
(13)	Repeat items 9 to 12 as necessary.	

	Detail Steps/Work Items	Key Items/References
(14)	Shut-down the engine.	Refer to Paragraph 9.
(15)	Install the cowlings.	Refer to Section 71-10.
(16)	Start the engine.	Refer to Paragraph 7.
(17)	Measure the mixture control setting.	Refer to Paragraph 8.A.
(18)	Shut-down the engine.	Refer to Paragraph 9.

9. Engine Shut-Down

	Detail Steps/Work Items	Key Items/References
(1)	Set the mixture control to fully RICH.	Fully forward.
(2)	Set the propeller control to MAX RPM.	Fully forward.
(3)	Set the throttle lever to IDLE.	Fully back. Let the engine idle until the cylinder head temperature decreases.
(4)	Set 1000 RPM with the throttle lever.	
(5)	Move the mixture control to fully LEAN.	The engine must stop within 5 seconds.
(6)	Set the ALT/BAT switch to OFF.	

10. After Engine Shut-Down

	Detail Steps/Work Items	Key Items/References
(1)	Read the engine oil level. Add oil if necessary.	Refer to Section 12-10.
(2)	Look under the bottom cowling for signs of oil leaks and signs of fuel leaks.	
(3)	Install the Pitot probe cover.	

11. Engine Break-In

You must do this procedure after a new engine has been installed. Refer to Lycoming Service Instruction No. 1427, latest issue.

	Detail Steps/Work Items	Key Items/References
(1)	Do a careful pre-flight inspection.	Refer to Airplane Flight Manual.
(2)	Do a normal take-off. – Mixture control lever . . . . . RICH – RPM lever . . . . . HIGH RPM – Throttle . . . . . MAX PWR	Reduce to 2400 RPM as soon as possible.
	CAUTION: CLIMB WITH A SMALL CLIMB ANGLE TO AVOID ENGINE OVER-HEATING.	
(3)	Climb to an altitude which is suitable for cruise.	Stay below 5000 ft.
	CAUTION: AVOID LOW MANIFOLD PRESSURE DURING HIGH ENGINE SPEEDS (DO NOT OPERATE BELOW 15 INCHES HG). IF YOU MUST REDUCE ENGINE POWER, FIRST REDUCE THE RPM.	
(4)	Cruise for 2 hours and 30 minutes. – Cruise at 75 % power during the first hour. – Change power setting a few times between 65 % and 75 % during the second hour. – Cruise with 2400 RPM and full throttle during the last 30 minutes.	
	CAUTION: DESCEND AT A MODERATE RATE AND LOW CRUISE POWER SETTINGS.	
(5)	Descend and land.	Refer to Airplane Flight Manual.

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Section 71-01
Power Plant - TAE 125 Diesel Engines

1. General

This Chapter tells you about the power plant with the TAE 125-01 and the TAE 125-02-99 (if MÄM 40-256 is installed) Diesel engine installed in the DA 40 D.

It tells you about the components that make the power plant. It also tells you how to remove/install the power plant.

For data on the engine test after installation refer to the Operator's Manual for the TAE 125-01 engine or the Operator‘s Manual for the TAE 125-02-99 engine. Refer to the DA 40 D Airplane Flight Manual for engine start/stop procedures.

Refer to these Chapters for data about other engine systems:

– Chapter 72. Refer to the TAE 125-01 or TAE 125-02-99 Operator's Manual for data on the engine.

– Chapter 73. Engine fuel and control. Refer to the TAE 125-01 or TAE 125-02-99 Operator's Manual for data on the fuel injection system.

– Chapter 76. Engine controls.

– Chapter 77. Engine indicating.

– Chapter 78. Exhaust system.

– Chapter 79. Oil system components installed in the airframe. Refer to the TAE 125-01 or TAE 125-02-99 Operator's Manual for data on the engine oil system.

– Chapter 80 Starter system control and installation. Refer to the TAE 125-01 or TAE 125-02-99 Operator's Manual for data on the starter.

Note: Equipment which is certified for installation in the DA 40 is listed in Section 6.5 of the Airplane Flight Manual. Such equipment may be installed in accordance with the Airplane Maintenance Manual.

Any equipment which is not listed in Section 6.5 of the Airplane Flight Manual is called "Additional Equipment". The installation of Additional Equipment is a modification which must be handled in accordance with national regulations or a Service Bulletin.

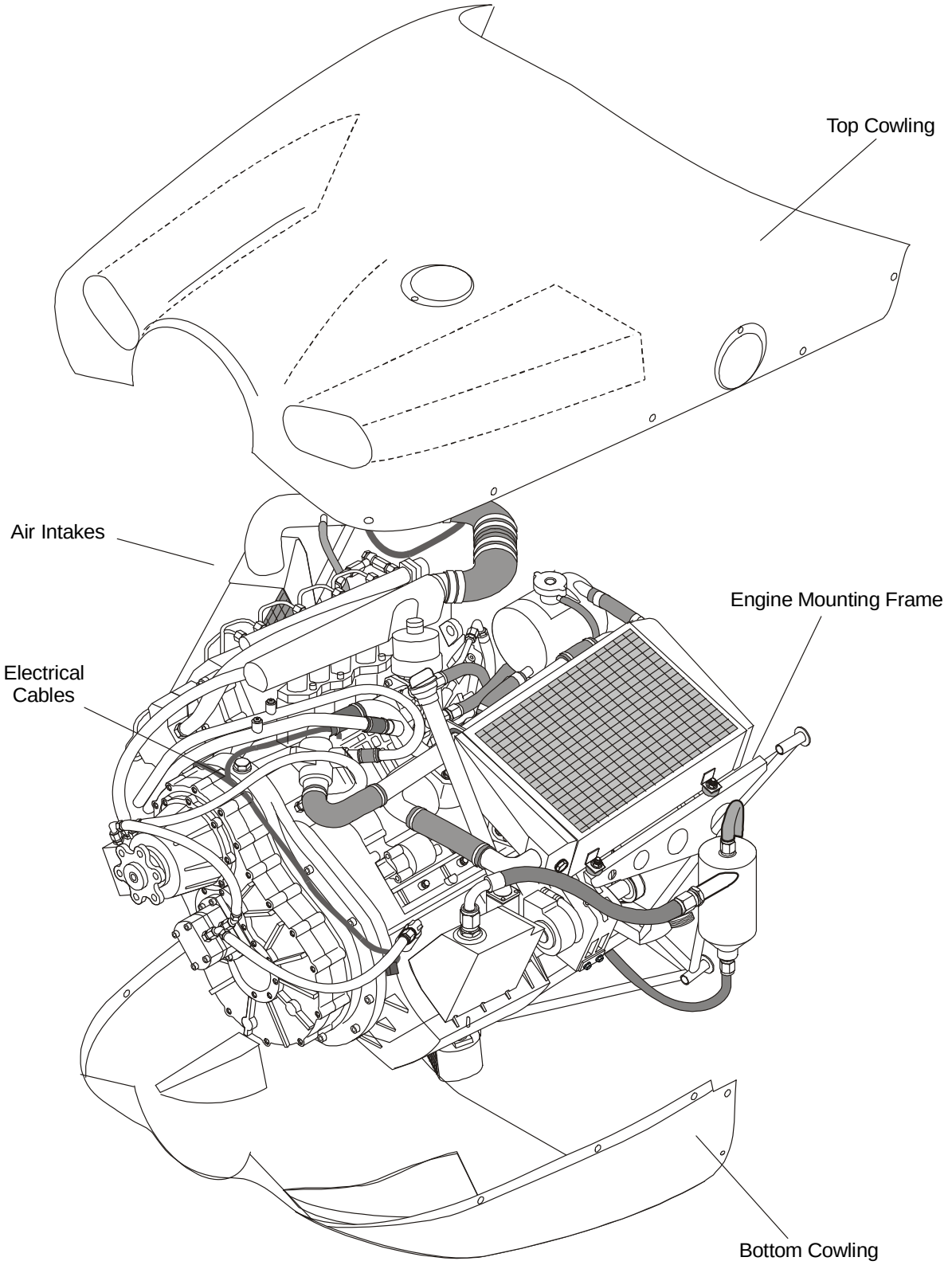


Figure 1: TAE 125-01 Diesel Engine Power Plant

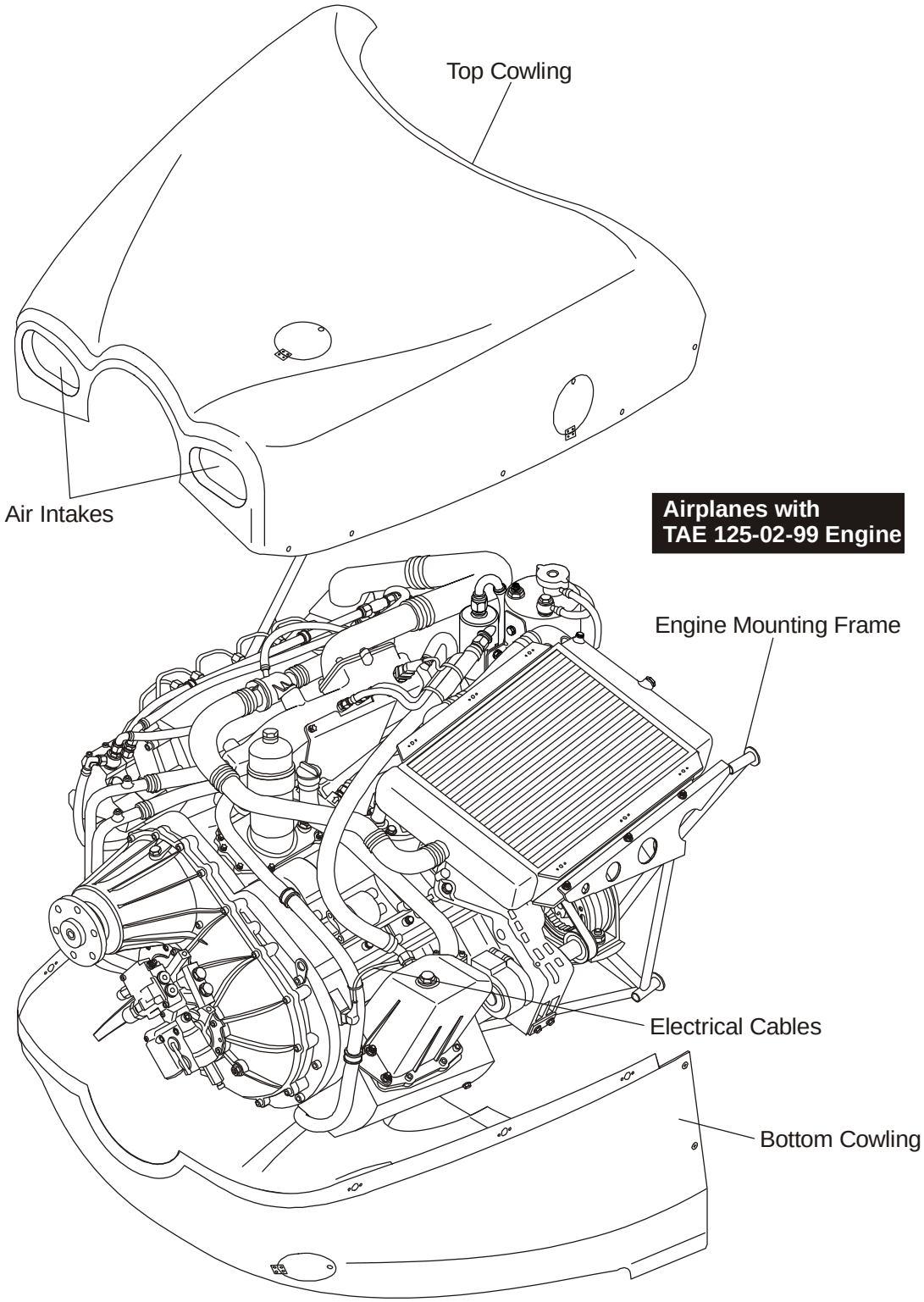


Figure 2: TAE 125-02-99 Diesel Engine Power Plant (if MÄM 40-256 installed)

2. Description and Operation

The DA 40 D has a TAE 125-01 or a TAE 125-02-99 (if MÄM 40-256 is installed) 4-cylinder, in line turbo-charged Diesel engine with double overhead camshafts. The engine have a reduction gear and a wet sump oil system. The TAE 125-01 and the TAE 125-02-99 engines are liquid cooled and have a high-pressure, common-rail fuel injector system. It has an electric starter.

The TAE 125-01 and the TAE 125-02-99 engines have a reduction gear. A hollow gear shaft lets oil flow to the propeller from the propeller governor. The propeller flange has six mounting holes. The propeller turns in a clockwise direction when viewed from the cockpit.

An electronic system (FADEC) monitors and controls engine and propeller performance.

The power plant has these components installed:

A. Cowling

The power plant has a top and bottom engine cowling. The two halves attach to each other and to the airframe with camloc quick release fasteners.

The top cowling has an access panel for the oil filler. It has air intakes for the coolant radiator and the intercooler.

The bottom cowling allows access to the oil level window in the reduction gear. It has air intakes for the oil radiator, the cabin heat heat-exchanger, and the engine air filter.

B. Engine Mount

The engine mount attaches to the firewall at five locations. Tubular steel makes the mounting frame. The engine attaches to the engine mount with three shock-mounts. Gel-filled rubber elements make the engine shock-mounts.

C. Electrical Harness

Electrical cables go through the firewall to connect to the engine. They give electrical supply to the engine sensors. Electrical cables from the main battery and from the generator supply electrical power to the airplane electrical system.

D. Air Intakes

The top cowling has these air intakes:

– The intake on the top left of the top cowling connects to the air duct which supplies air for the engine cooling system radiator.

– The intake on the top right of the top cowling supplies air to the intercooler.

The bottom cowling has these intakes:

– Combined engine air intake and cabin heating intake. This intake is located in the right side of the cowling and supplies air to the engine air filter and the cabin heat heat-exchanger.

– The intake at the bottom of the bottom cowling supplies air to the oil radiator.

3. Engine Specification

Note: The engine drives the propeller through a speed-reducing gear. All RPM's are shown as propeller RPM's.

A. TAE 125-01 Engine

TAE 125-01 Engine Specification	
Engine manufacturer.	Thielert Aircraft Engines.
Engine model.	TAE 125-01
Engine operating limits: – Maximum take-off power. – Maximum continuous power. – Maximum RPM.	 99 kW (135 DIN-hp) at 2300 ± 50 RPM 99 kW (135 DIN-hp) at 2300 ± 50 RPM 2500 RPM
Oil pressure (indicated values are corrected for pressure altitude): – Minimum. – Normal. – Maximum.	 1.0 bar (14.5 PSI) 2.3 to 5.2 bar (33.4 to 75.4 PSI) 6.5 bar (94.3 PSI)
Oil temperature: – Minimum for engine start. – Normal. – Maximum.	 -30 ºC (-22 °F) 60 to 125 °C (140 to 257 °F) 140 ºC (284 °F)
Oil consumption: – Maximum.	 0.1 liter/hr. (0.11 US qts/hr.)
Oil quantity: – Minimum. – Maximum.	 4.5 liter (4.8 US qts) 6 liter (6.3 US qts)

TAE 125-01 Engine Specification	
Coolant temperature: – Minimum for engine start. – Normal. – Maximum.	 -30 °C (-22 °F) 60 to 96 ºC (140 to 205 ºF) 105 ºC (221 ºF)
Fuel consumption: – Maximum.	 28 l/h (7.4 US gal/h)
Gearbox oil capacity:	1 liter (1.06 US qts)
Engine weight, bare:	134 kg (295.4 lb)
Fuel grade:	Refer to Airplane Flight Manual.
Oil specification:	Refer to Airplane Flight Manual.
Coolant:	Refer to Airplane Flight Manual.
Gearbox oil:	Refer to Airplane Flight Manual.

B. TAE 125-02-99 Engine (if MÄM 40-256 installed)

TAE 125-02-99 Engine Specification	
Engine manufacturer.	Thielert Aircraft Engines.
Engine model.	TAE 125-02-99-(0001)-(01)
Engine operating limits: – Maximum take-off power. – Maximum continuous power. – Maximum RPM (max. 20 sec).	 99 kW (135 DIN-hp) at 2300 ± 50 RPM 99 kW (135 DIN-hp) at 2300 ± 50 RPM 2500 RPM
Oil pressure	Refer to Airplane Flight Manual.
Oil temperature	Refer to Airplane Flight Manual.
Oil consumption: – Maximum.	 0.1 liter/hr. (0.11 US qts/hr.)
Oil quantity: – Minimum. – Maximum.	 4.5 liter (4.8 US qts) 6 liter (6.3 US qts)
Coolant temperature:	Refer to Airplane Flight Manual.
Fuel consumption: – Maximum.	 28 l/h (7.4 US gal/h)
Gearbox oil capacity:	1 liter (1.06 US qts)
Engine weight, bare:	134 kg (295.4 lb)
Fuel grade:	Refer to Airplane Flight Manual.
Oil specification:	Refer to Airplane Flight Manual.
Coolant:	Refer to Airplane Flight Manual.
Gearbox oil:	Refer to Airplane Flight Manual.

Trouble-Shooting

1. General

The table below lists the defects you could have with the power plant. It does not give trouble shooting data for the engine or the engine systems. Refer to the TAE 125-01 or TAE 125-02-99 Operator's Manual for engine and engine system trouble-shooting.

WARNING: YOU MUST BE CAREFUL WHEN YOU DO POWER PLANT TROUBLE SHOOTING. OPERATION OF A DAMAGED ENGINE CAN CAUSE MORE DAMAGE TO THE ENGINE. THIS CAN CAUSE INJURY TO PERSONNEL.

If you have the trouble detailed in the Trouble column read across to the Possible Cause column. Then do the repair given in the Repair column.

Trouble	Possible Cause	Repair
Engine vibration.	Damaged shock mounts.	Replace the shock mounts.
	Propeller unbalance.	Balance the propeller.
	Engine operates with only three fuel injectors.	Refer to the engine manufacturer.
Engine does not produce full power.	Engine air inlet blocked.	Examine the air inlet.
	Air filter blocked.	Examine/Replace the air filter.
	Sensor signal out of limits.	Read TAE engine data with laptop computer via CAN interface. Refer to Section 72-01.
	Defective sensor.	Read TAE engine data with laptop computer via CAN interface. Refer to Section 72-01.

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Maintenance Practices

1. General

These Maintenance Practices tell you how to remove/install the engine.

WARNING: DO NOT STAND WITHIN THE DANGER AREA OF THE PROPELLER. IF THE ENGINE STARTS, THE PROPELLER CAN CAUSE DEATH OR INJURY TO PERSONS.

WARNING: YOU MUST MAKE SURE THAT THE ENGINE IS SAFE BEFORE YOU TURN THE PROPELLER. DISCONNECT THE BATTERY.

WARNING: DO NOT GO BELOW THE ENGINE WHEN YOU LIFT THE ENGINE WITH THE HOIST. THE HOIST CAN FAIL. THIS CAN CAUSE DEATH OR INJURY TO PERSONS.

WARNING: DO NOT GET ENGINE OIL, GEAR OIL OR COOLANT ON YOU. THESE LIQUIDS CAN CAUSE SKIN DISEASE.

WARNING: DO NOT GET FUEL ON YOU. FUEL CAN CAUSE SKIN DISEASE. DO NOT ALLOW FIRE OR SPARKS NEAR FUEL. FUEL BURNS AND BURNING FUEL CAN CAUSE INJURY TO PEOPLE AND DAMAGE TO EQUIPMENT.

CAUTION: YOU MUST ATTACH CAPS TO HOLES/PIPES WHEN YOU REMOVE THE ENGINE. IF YOU DO NOT DO THIS, CONTAMINATION CAN ENTER THE HOLES/PIPES. THIS CAN CAUSE BLOCKAGE TO THE AIRPLANE SYSTEMS.

2. Remove/Install the Engine (Without the Engine Mount)

Note: If you remove an engine with a serial number which is not higher than 02-01-0309-SL01-004-0100, and replace it with an engine with serial number 02-01-0309-SL01-004-0101 or higher, then you must carry out Service Bulletin No. OSBD4-026 before you install the new engine.

A. Equipment

Item	Quantity	Part Number
Hoist.	1	Commercial.
Engine sling.	1	Commercial.
Engine stand.	1	Commercial.
Tail trestle.	1	Commercial.

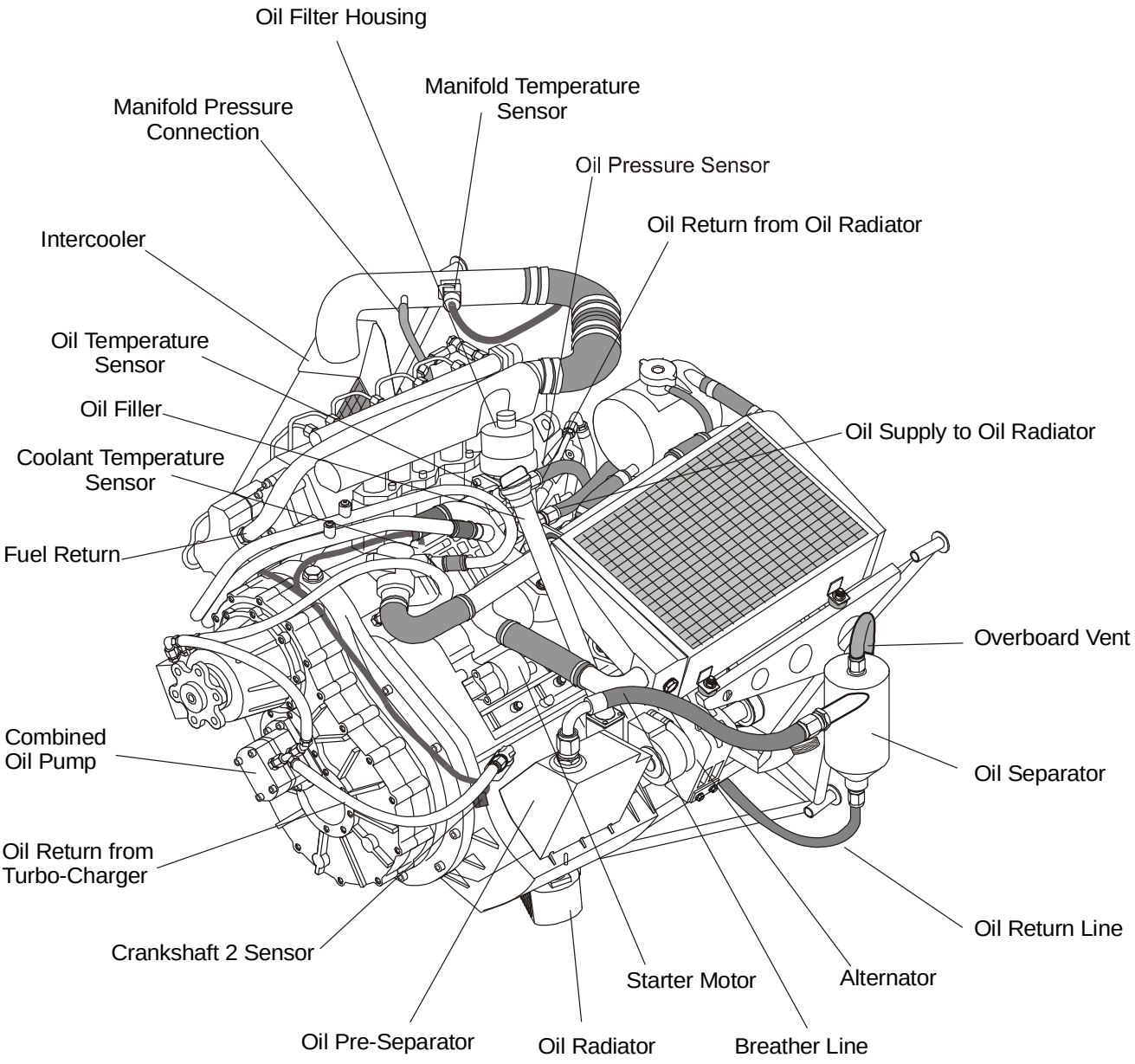


Figure 3: TAE 125-01 Diesel Engine Components, Engine S/N up to 02-01-0309-SL01-004-0100

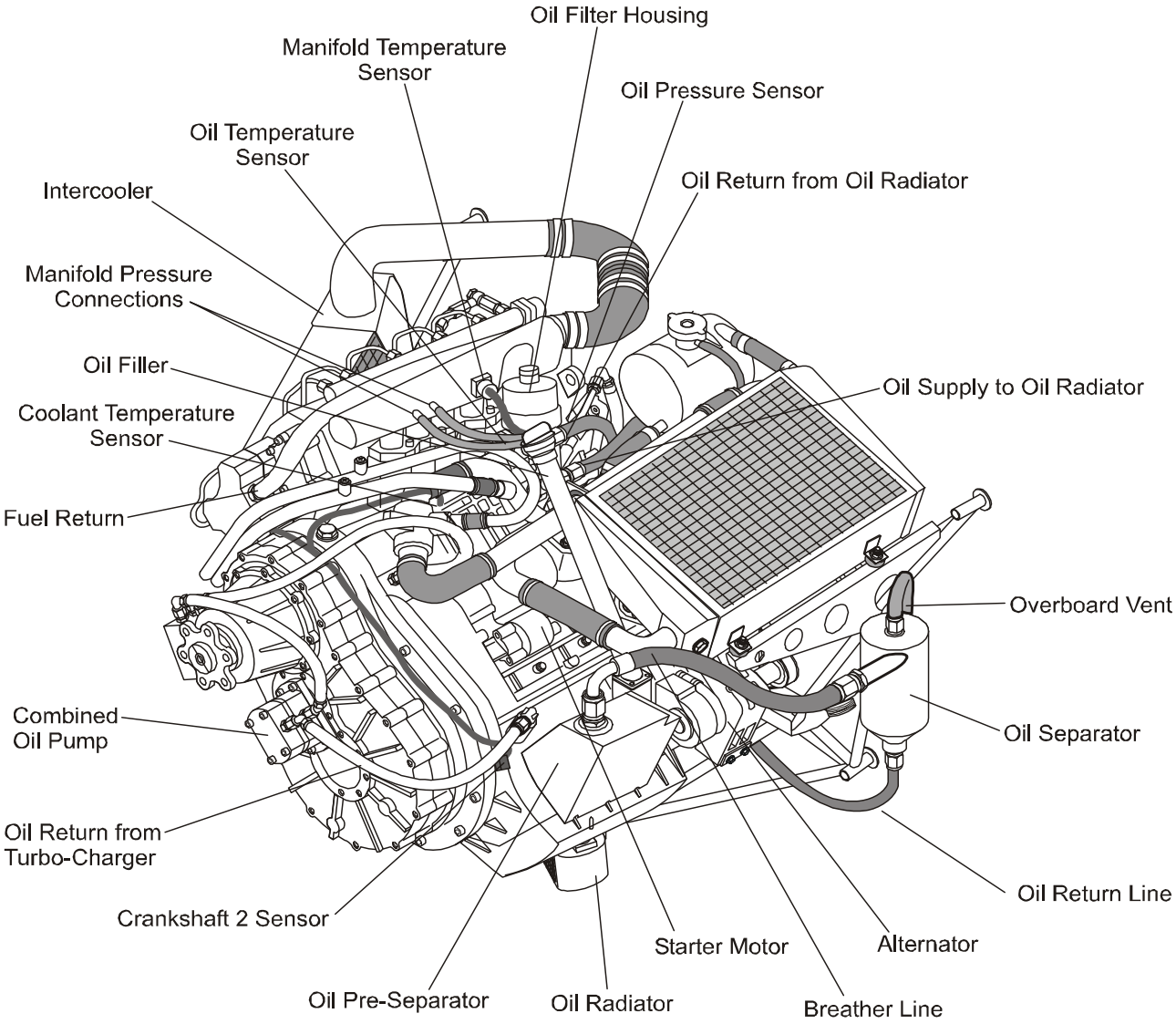


Figure 4: TAE 125-01 Diesel Engine Components,
Engine S/N 02-01-0309-SL01-004-0101 and Higher

Airplanes with TAE 125-02-99 Engine

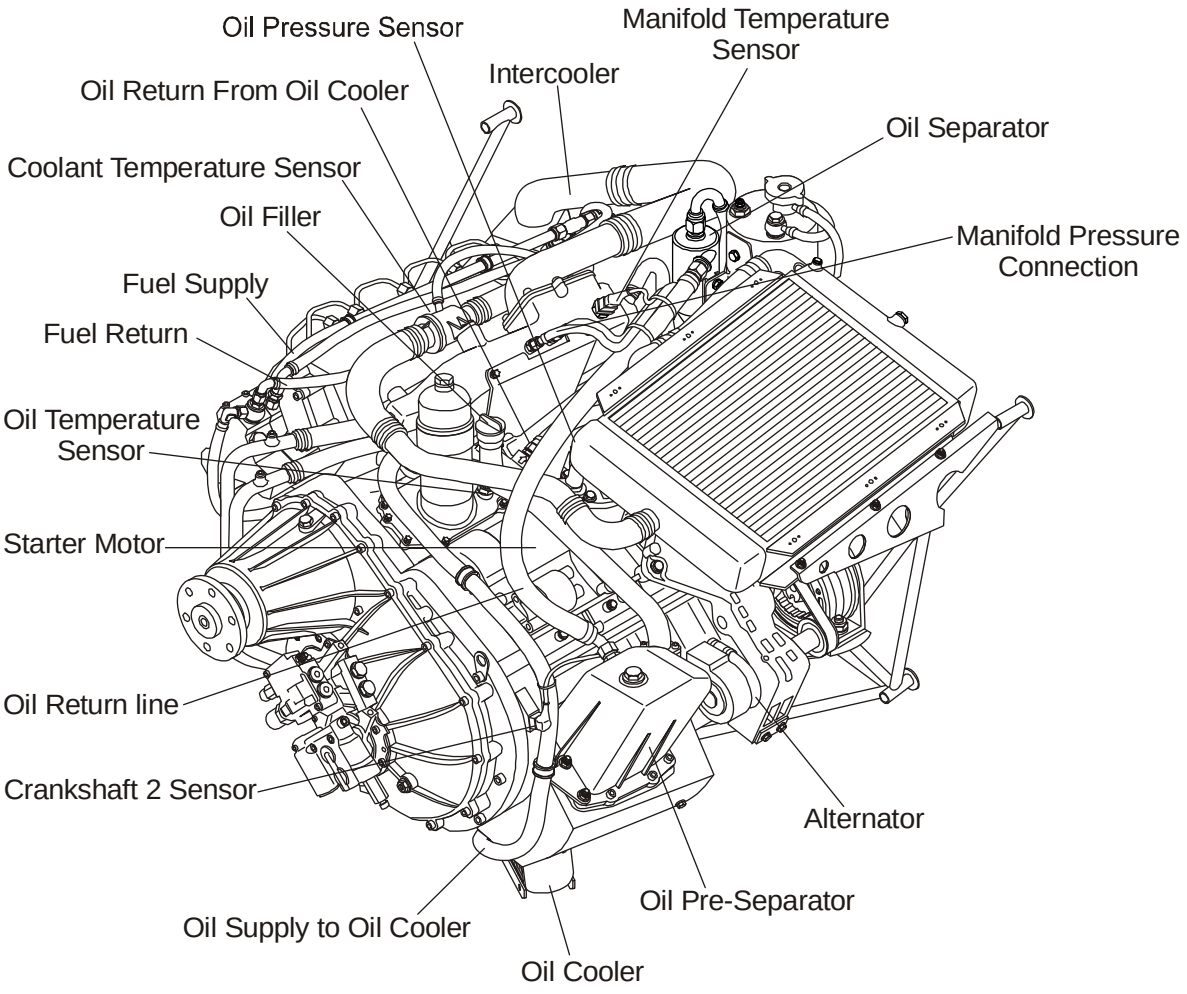


Figure 5: TAE 125-02-99 Diesel Engine Components (if MÄM 40-256 installed)

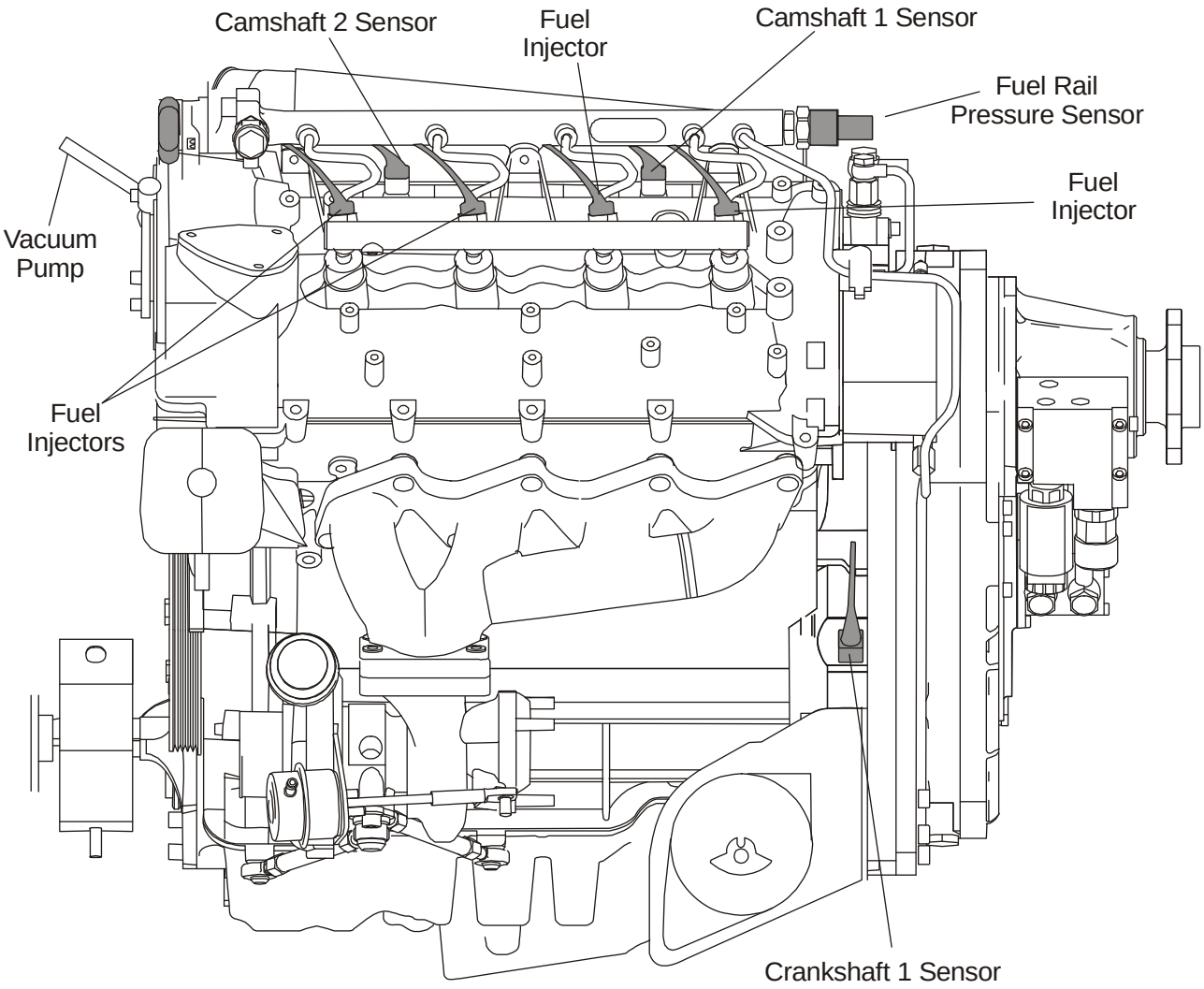


Figure 6: TAE 125-01 Diesel Engine Components

B. Remove the Engine

(1) TAE 125-01 Engine

	Detail Steps/Work Items	Key Items/References
(1)	Read the engine event log.	Refer to Section 72-01.
	WARNING: MAKE SURE THAT THE ENGINE IS SAFE BEFORE YOU DO ANY WORK ON THE PROPELLER. IF THE ENGINE IS TURNED, THE PROPELLER CAN CAUSE INJURY OR DEATH.	
(2)	Set the emergency fuel valve to OFF.	
(3)	Make sure that the engine is safe: – Set all switches to OFF. – Set the power lever to IDLE.	
(4)	Remove the engine cowlings.	Refer to Section 71-11.
(5)	Disconnect the airplane main battery.	Refer to Section 24-34.
(6)	Remove the propeller.	Refer to Section 61-11.
(7)	Drain the coolant system.	Refer to Section 75-01.
(8)	Drain the engine oil.	Refer to Section 72-01.
(9)	Remove the coolant radiator together with the coolant tank.	Refer to Section 75-01.
(10)	Disconnect the breather line.	At the oil pre-separator.
(11)	Disconnect the oil hoses between the oil radiator and the engine at the oil filter housing.	Use a suitable container to catch the oil in the tubes.

	Detail Steps/Work Items	Key Items/References
(12)	Disconnect the electrical cables from the starter motor. – Disconnect the two control cables at the solenoid. – Disconnect the main supply cable at the solenoid. – Release all clips and ties holding the cables to the engine.	Do not remove clips and ties on the engine mount.
(13)	Disconnect the electrical cables on the alternator. – Release all clips and ties holding the cables to the engine.	

	Detail Steps/Work Items	Key Items/References
(14)	Disconnect the engine wire harness and bonding cables from these electrical sensors:	
	– Crankshaft 1.	At the front right crank case.
	– Crankshaft 2.	At the front left crank case.
	– Camshaft 1.	On inlet valve cover between cyl. 3 & 4.
	– Camshaft 2.	On inlet valve cover between cyl. 1 & 2.
	– Coolant temperature.	At the thermostat valve.
	– Oil temperature.	At the bottom of the oil case.
	– Oil pressure.	At the rear side of the oil filter housing.
	– Manifold air temperature.	At the engine inlet manifold.
	– Fuel rail pressure regulator.	At the rear end of the fuel rail.
	– Fuel rail pressure sensor.	At the front side of the fuel rail.
	– Propeller governor.	At the right side of the reduction gear.
	– Gear temperature.	At top left of front bearing reduction gear.
	– Waste gate valve solenoid.	At the lower crankshaft cover.
	– Fuel injectors.	At each fuel injector.
	– Glow plugs.	At the lower crankshaft cover.
	– Waste gate control valve.	At the lower crankshaft cover.
(15)	Disconnect both manifold pressure connections.	At the engine inlet manifold.
(16)	Remove the intercooler.	Refer to Section 81.
(17)	Remove the exhaust.	Refer to Section 78-01.
(18)	Remove the cabin heat heat-exchanger.	Refer to Section 75-01.

	Detail Steps/Work Items	Key Items/References
(19)	Remove the cabin heat heat-exchanger shroud: – Remove bolt, nut and washer on top forward and bottom forward corners on the shroud. – Remove bolt, nut and washer on the bracket at the rear side. – Remove worm-drive clamp from the hose between the shroud and the heat valve. – Move the heat exchanger shroud clear of the engine.	At the heat valve.
(20)	Disconnect the hose from the alternate air valve to the turbo-charger inlet.	At the turbo-charger.
(21)	Release clips, ties and clamps holding the engine wire harness to the engine. Move the harness clear of the engine.	
(22)	Remove the support strut from the turbo-charger.	
(23)	Remove the oil hose from the turbo-charger cage tank to the oil return pump.	At the cage tank, front side. Use a suitable container to catch the remaining oil in the hose.
(24)	Remove the oil hose from the turbo-charger cage tank to the oil separator.	At the cage tank, rear side. Use a suitable container to catch the remaining oil in the hose.
(25)	Disconnect the fuel supply hose.	At the low-pressure pump. Secure the fuel supply hose with lock wire. Remove clamp at the front right hoist bracket.
(26)	Disconnect the fuel return hose.	Behind the rail pressure regulator.
(27)	Remove the fuel return hose from the injector fuel leak rail.	

	Detail Steps/Work Items	Key Items/References
(28)	Disconnect the vacuum hose at the engine driven vacuum pump.	Take care of the restrictor.
(29)	Remove the bonding cable at the engine near each engine shock-mount.	
(30)	Support the airplane at the tail.	Use the tail trestle. Refer to Section 07-10.
(31)	Attach the sling to the engine. Attach the sling to the hoist.	There are lifting points at: – Front right cylinder head. – Front left of the reduction gear housing. – Rear left of the cylinder head near coolant pump.
(32)	Take the weight of the engine with the hoist.	
(33)	Remove the nuts, bolts and washers that attach the engine to the engine mount.	
(34)	Lift the engine a small distance, turn it slightly to the right side and move it at the same time forward and clear of the engine mount.	Make sure that the engine does not hit the engine mount.
(35)	Attach the shipping stand to the engine.	
(36)	Install the turbo-charger support strut.	
(37)	Remove the coolant bypass pipe.	
(38)	Remove the oil filler tube: – Release the attaching bolts. – Remove the oil filler tube. – Put caps on the open pipes and connections.	
(39)	Put caps on the open-end pipes and connections.	
(40)	Prepare engine for shipping.	Note TT hours and reason for removal.
(41)	Clean firewall and engine mount.	

	Detail Steps/Work Items	Key Items/References
(42)	Examine the engine mount for cracks and corrosion.	
(43)	Check lifetime of the elastomer hoses and replace as necessary.	
(44)	If engine was removed because of oil system contamination: Remove and discard oil radiator and oil hoses.	Refer to Section 79-01.

(2) TAE 125-02-99 Engine (if MÄM 40-256 installed)

	Detail Steps/Work Items	Key Items/References
(1)	Read the engine event log.	Refer to Section 72-01.
	WARNING: MAKE SURE THAT THE ENGINE IS SAFE BEFORE YOU DO ANY WORK ON THE PROPELLER. IF THE ENGINE IS TURNED, THE PROPELLER CAN CAUSE INJURY OR DEATH.	
(2)	Set the emergency fuel valve to OFF.	
(3)	Make sure that the engine is safe: – Set all switches to OFF. – Set the power lever to IDLE.	
(4)	Remove the engine cowlings.	Refer to Section 71-11.
(5)	Disconnect the airplane main battery.	Refer to Section 24-34.
(6)	Remove the propeller.	Refer to Section 61-11.
(7)	Drain the coolant system.	Refer to Section 75-01.
(8)	Drain the engine oil.	Refer to Section 72-01.
(9)	Remove the coolant radiator	Refer to Section 75-01.
(10)	Disconnect the oil hoses between the oil radiator and the engine at the oil filter housing.	Use a suitable container to catch the oil in the tubes.
(11)	Disconnect the electrical cables from the starter motor. – Disconnect the two control cables at the solenoid. – Disconnect the main supply cable at the solenoid. – Release all clips and ties holding the cables to the engine.	Do not remove clips and ties on the engine mount.

	Detail Steps/Work Items	Key Items/References
(12)	Disconnect the electrical cables on the alternator. – Release all clips and ties holding the cables to the engine.	
(13)	Disconnect the engine wire harness and bonding cables from these electrical sensors: – Crankshaft 1. – Crankshaft 2. – Camshaft 1. – Camshaft 2. – Coolant temperature. – Oil temperature. – Oil pressure. – Manifold air temperature. – Fuel rail pressure regulator. – Fuel rail pressure sensor. – Propeller governor. – Gear temperature. – Waste gate valve solenoid. – Fuel injectors. – Glow plugs. – Waste gate control valve.	Refer to Ch. 6, Annex 7 of the TAE 125-02-99 Operator‘s Manual.
(14)	Remove the intercooler.	Refer to Section 73-01.
(15)	Remove the exhaust.	Refer to Section 78-01.
(16)	Remove the cabin heat heat-exchanger.	Refer to Section 75-01.
(17)	Disconnect the hose from the alternate air valve to the turbo-charger inlet.	At the turbo-charger.

	Detail Steps/Work Items	Key Items/References
(18)	Release clips, ties and clamps holding the engine wire harness to the engine. Move the harness clear of the engine.	
(19)	Remove the oil hose from the oil separator to the oil filler tube: – Remove the breather hose. – Disconnect the breather line. – Remove the oil separator.	Use a suitable container to catch the remaining oil in the hose. At the oil pre-separator. At the oil separator. Refer to Section 79-01.
(20)	Disconnect the fuel supply hose.	At the fuel supply hose adapter.
(21)	Disconnect the fuel return hose.	Behind the rail pressure regulator.
(22)	Disconnect the vacuum hose at the engine driven vacuum pump (if installed).	Take care of the restrictor.
(23)	Remove the bonding cable at the engine near each engine shock-mount.	
(24)	Support the airplane at the tail.	Use the tail trestle. Refer to Section 07-10.
(25)	Attach the sling to the engine. Attach the sling to the hoist.	There are lifting points at: – Front right cylinder head. – Front left of the reduction gear housing. – Rear left of the cylinder head near coolant pump.
(26)	Take the weight of the engine with the hoist.	
(27)	Remove the nuts, bolts and washers that attach the engine to the engine mount.	
(28)	Lift the engine a small distance, turn it slightly to the right side and move it at the same time forward and clear of the engine mount.	Make sure that the engine does not hit the engine mount.
(29)	Attach the shipping stand to the engine.	

	Detail Steps/Work Items	Key Items/References
(30)	Remove the oil filler tube: – Release the attaching bolts. – Remove the oil filler tube. – Put caps on the open pipes and connections.	
(31)	Put caps on the open-end pipes and connections.	
(32)	Prepare engine for shipping.	Note TT hours and reason for removal.
(33)	Clean firewall and engine mount.	
(34)	Examine the engine mount for cracks and corrosion.	
(35)	Check lifetime of the elastomer hoses and replace as necessary.	
(36)	If engine was removed because of oil system contamination: Remove and discard oil radiator and oil hoses.	Refer to Section 79-01.

C. Install the Engine

(1) TAE 125-01 Engine

	Detail Steps/Work Items	Key Items/References
(1)	Attach the sling to the engine. Attach the sling to the hoist.	There are lifting points at: – Front right cylinder head. – Front left of the reduction gear housing. – Rear left of the cylinder head near coolant pump.
(2)	Remove the support strut from the turbo-charger.	
(3)	Remove the oil hose from the turbo-charger cage tank to the oil return pump.	At the cage tank, front side.
(4)	Remove the shipping stand from the engine.	
(5)	Carefully mo ve the engine back into position in the engine mount.	Make sure that the engine does not hit the engine mount.
(6)	Install the bolts, nuts and washer that attach the engine shock-mounts to the engine mount.	Refer to Chapter 20 for torque values.
(7)	Install the bonding cable at the engine near each engine shock-mount.	
(8)	Install the turbo-charger support strut.	
(9)	Connect the oil hose from the turbo-charger cage tank to the oil separator.	At the cage tank, rear side.
(10)	Connect the oil hose from the turbo-charger cage tank to the oil return pump.	At the cage tank, front side.
(11)	Install the coolant bypass pipe.	
(12)	Connect the oil hoses between the oil radiator and the engine.	At the oil filter housing.

	Detail Steps/Work Items	Key Items/References
(13)	Connect the electrical cables to the starter motor. – Connect the two control cables at the solenoid. – Connect the main supply cable at the solenoid. – Attach all clips and ties holding the cables to the engine.	
(14)	Connect the hose from the alternate air valve to the turbo-charger inlet.	At the turbo-charger.
(15)	Install the cabin heat heat-exchanger shroud: – Move heat exchanger shroud in position at the engine mount. – Install bolts, nuts and washers on top forward and bottom forward corners on the shroud. – Install bolt, nut and washer on the bracket at the rear side together with the air filter housing. – Install worm-drive clamp to the hose between the shroud and the heat valve.	At the heat valve.
(16)	Install the cabin heat heat-exchanger.	Refer to Section 75-01.
(17)	Install the intercooler.	Refer to Section 81
(18)	Connect both manifold pressure connections.	At the engine inlet manifold.

	Detail Steps/Work Items	Key Items/References
(19)	Move the engine wire harness into position on the engine. Connect the engine wire harness and bonding cables to these electrical sensors:	
	– Crankshaft 1.	At the front right crank case.
	– Crankshaft 2.	At the front left crank case.
	– Camshaft 1.	On inlet valve cover between cyl. 3 & 4.
	– Camshaft 2.	On inlet valve cover between cyl. 1 & 2.
	– Coolant temperature.	At the thermostat valve.
	– Oil temperature.	At the bottom of the oil case.
	– Oil pressure.	At the rear side of the oil filter housing.
	– Manifold air temperature.	At the engine inlet manifold.
	– Fuel rail pressure regulator.	At the rear end of the fuel rail.
	– Fuel rail pressure sensor.	At the front side of the fuel rail.
	– Propeller governor.	At the right side of the reduction gear.
	– Gear temperature.	At top left of front bearing reduction gear.
	– Waste gate valve solenoid.	At the lower crankshaft cover.
	– Fuel injectors.	At each fuel injector.
	– Glow plugs.	At the lower crankshaft cover.
	– Waste gate control valve.	At the lower crankshaft cover.
(20)	Install clips and ties clamps holding the engine wire harness to the engine.	
(21)	Connect the fuel supply hose.	At the low-pressure pump. Install clamp at the front right hoist bracket.
(22)	Connect the fuel return hose.	Behind the rail pressure regulator.

	Detail Steps/Work Items	Key Items/References
(23)	Install the fuel return hose to the injector fuel leak rail.	
(24)	Connect the vacuum hose at the engine driven vacuum pump.	Restrictor is installed in the inlet pipe of the pump.
(25)	Install the coolant radiator together with the coolant tank.	Refer to Section 75-01.
(26)	Install the oil filler tube: – Put the oil filler tube in position on the engine. – Install the 4 attaching bolts.	 Torque: 10 - 12 Nm (7.4 - 8.9 lbf.ft.).
(27)	Connect the breather tube.	At the oil pre-separator.
(28)	Fill and bleed the cooling system.	Refer to Section 75-01.
(29)	Fill the engine with oil.	Refer to Section 12-10.
(30)	Fill the reduction gear with oil.	Refer to Section 12-10.
(31)	Connect the airplane main battery.	Refer to Section 24-34.
(32)	Install the cowlings.	Refer to Section 71-11.
(33)	Remove the tail trestle.	Refer to Section 07-10.
(34)	Do an engine test.	Refer to Paragraph 3.

(2) TAE 125-02-99 Engine (if MÄM 40-256 installed)

	Detail Steps/Work Items	Key Items/References
(1)	Attach the sling to the engine. Attach the sling to the hoist.	There are lifting points at: – Front right cylinder head. – Front left of the reduction gear housing. – Rear left of the cylinder head near coolant pump.
(2)	Remove the shipping stand from the engine.	
(3)	Carefully move the engine back into position in the engine mount.	Make sure that the engine does not hit the engine mount.
(4)	Install the bolts, nuts and washer that attach the engine shock-mounts to the engine mount.	Refer to Chapter 20 for torque values.
(5)	Install the bonding cable at the engine near each engine shock-mount.	
(6)	Connect the oil hoses between the oil radiator and the engine: – Install the oil separator. – Connect the oil hose from the oil separator to the oil filler tube. – Install the breather hose between engine and oil separator. – Connect the breather line to the oil separator.	At the oil filter housing. Refer to Section 79-01.
(7)	Connect the electrical cables to the starter motor: – Connect the two control cables at the solenoid. – Connect the main supply cable at the solenoid. – Attach all clips and ties holding the cables to the engine.	

	Detail Steps/Work Items	Key Items/References
(8)	Connect the hose from the alternate air valve to the turbo-charger inlet.	At the turbo-charger.
(9)	Install the cabin heat heat-exchanger.	Refer to Section 75-01.
(10)	Move the engine wire harness into position on the engine. Connect the engine wire harness and bonding cables to these electrical sensors: – Crankshaft 1. – Crankshaft 2. – Camshaft 1. – Camshaft 2. – Coolant temperature. – Oil temperature. – Oil pressure. – Manifold air temperature. – Fuel rail pressure regulator. – Fuel rail pressure sensor. – Propeller governor. – Gear temperature. – Waste gate valve solenoid. – Fuel injectors. – Glow plugs. – Waste gate control valve.	Refer to Ch. 6, Annex 7 of the TAE 125-02-99 Operation Manual.
(11)	Install clips and ties clamps holding the engine wire harness to the engine.	
(12)	Connect the fuel supply hose.	At the fuel supply hose adapter. Secure the fuel supply hose with lock wire.
(13)	Connect the fuel return hose.	Behind the rail pressure regulator.

	Detail Steps/Work Items	Key Items/References
(14)	Connect the vacuum hose at the engine driven vacuum pump (if installed).	Restrictor is installed in the inlet pipe of the pump.
(15)	Install the coolant radiator.	Refer to Section 75-01.
(16)	Install the coolant tank.	Refer to Section 75-01
(17)	Fill and bleed the cooling system.	Refer to Section 75-01.
(18)	Fill the engine with oil.	Refer to Section 12-10.
(19)	Fill the reduction gear with oil.	Refer to Section 12-10.
(20)	Connect the airplane main battery.	Refer to Section 24-34.
(21)	Install the cowlings.	Refer to Section 71-11.
(22)	Remove the tail trestle.	Refer to Section 07-10.
(23)	Do an engine test.	Refer to Paragraph 3.

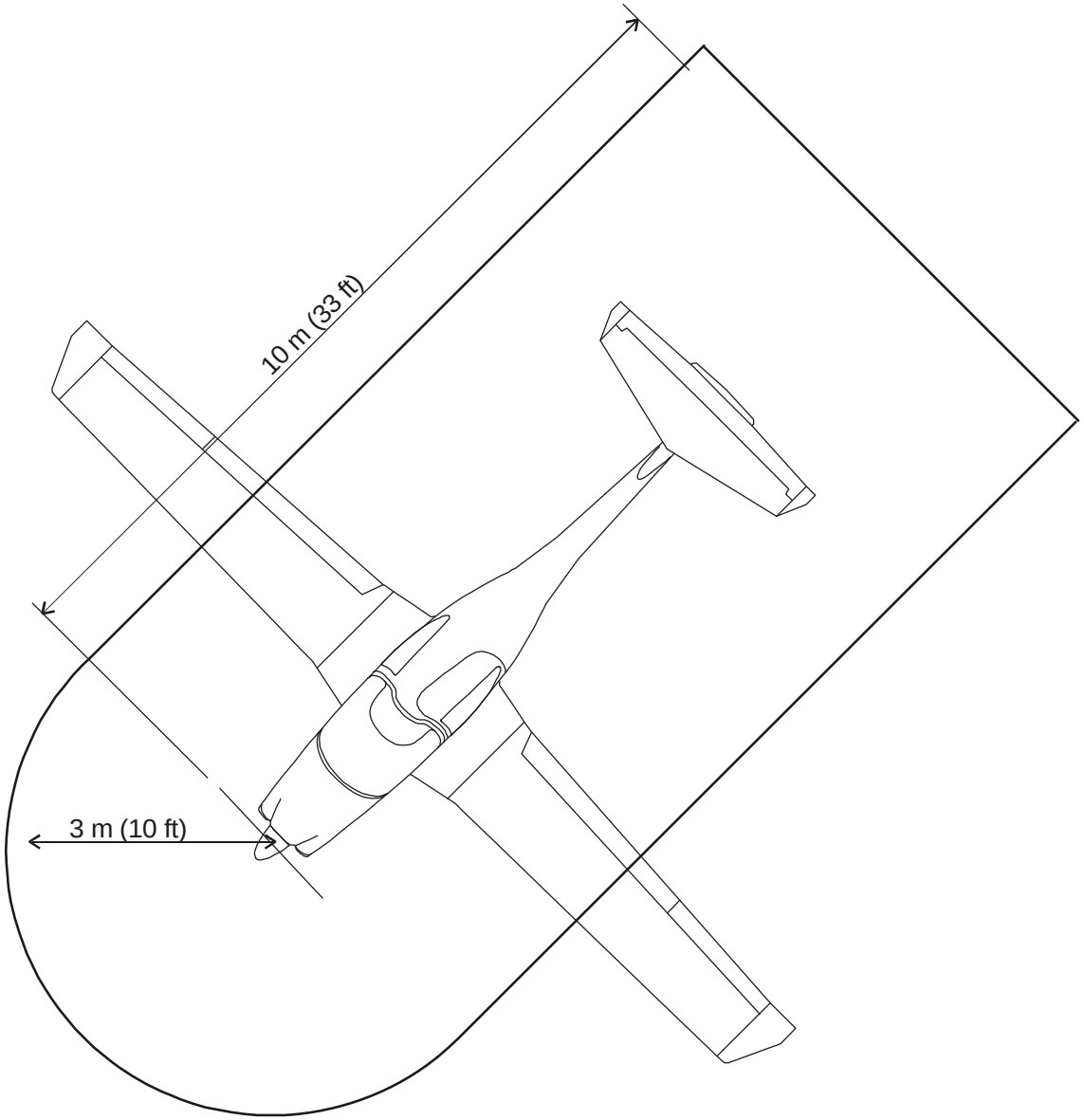


Figure 7: Safety Range for Engine Start and Test

3. Engine Test General

These procedures tell you how to do an engine test.

The tables in Paragraphs C (Engine Starting and Warm-Up), D (ECU Test, Propeller Control Test and ECU Swap Test) and E (Performance Check) have a 'Result/Comments' column. You can take photocopies of these pages into the cockpit and enter results and comments.

For more data on the engine and engine performance testing, refer to the Thielert TAE 125-01 Operator's Manual, latest revision or TAE 125-02-99 Operator's Manual, latest revision.

Note: The engine drives the propeller through a speed-reducing gear. All RPM's are shown as propeller RPM's.

CAUTION: ONLY TAE-AUTHORIZED PERSONNEL MAY READ ENGINE DATA WITH THE 'ECU OPERATOR' SOFTWARE. REFER TO TAE SERVICE BULLETIN NO. 125-0003.

A. Equipment

Item	Quantity	Part Number
Airplane chocks.	2	Commercial.
Fuel sample kit.	1	Commercial.
Laptop computer.	1	Commercial.
"ECU Operator" software, v 2.71 or later approved revision.	n/a	TAE 02-7610-55104R1.
CAN interface.	1	TAE 02-7610-55106R1.

B. Preparation

	Detail Steps/Work Items	Key Items/References
	WARNING: DO NOT LET PERSONS INTO THE SAFETY RANGE OF THE AIRPLANE. PROPELLERS CAN CAUSE INJURY OR DEATH.	
(1)	Look in the engine records for reports of problems.	
(2)	Make sure that all switches are OFF.	
(3)	Position the airplane on level ground. Make sure that: – There are no loose stones on the ground near the propeller. – The safety zone around the airplane is clear. – The airplane heads into the wind.	Refer to Figure 7.
(4)	Check engine oil level, gearbox oil level, and coolant level.	
(5)	Do a test of a sample of fuel for contamination.	Refer to Section 12-10.
(6)	Put chocks in front of each main wheel.	
(7)	Make sure that there is enough fuel for the engine test: – Set the ELECTRIC MASTER key switch to ON. – Read the fuel quantity indicator. – Set the ELECTRIC MASTER key switch to OFF. – Refuel the airplane if necessary.	

C. Engine Starting and Warm-Up

Refer to the TAE 125-01 Operator's Manual, latest revision or TAE 125-02-99 Operator's Manual, latest revision for operating limitations.

	Detail Steps/Work Items	Key Items/References	Results/Comments
(1)	Enter the cockpit.	Take the laptop computer and CAN interface with you.	
(2)	Set the parking brake to ON.		
(3)	Make sure that the emergency fuel valve is set to NORMAL.		
(4)	Make sure that the passenger door is closed and locked. Close and lock the canopy.		
(5)	Set the power lever to IDLE.	Make sure that the power lever is free to move.	
(6)	Connect laptop computer to service plug on TAE harness with CAN interface. Switch computer on and start the "ECU Operator" software.		
(7)	Set the ELECTRIC MASTER key switch to ON.		
(8)	Do a test of the annunciator panel.	Refer to Section 31-51.	
(9)	Set the alternate air control to OFF.		
(10)	Make sure the area of the propeller is clear.		

	Detail Steps/Work Items	Key Items/References	Results/Comments
(11)	Set the ENGINE MASTER switch to ON.		
(12)	Make sure that the engine instruments read correctly.	The RPM, LOAD and FUEL FLOW indications must be zero (0). Dashes (-) indicate a malfunction.	
(13)	Turn the ELECTRIC MASTER key switch to the START position.	Do not start the engine as long as the white GLOW status light is illuminated.	
(14)	When the engine starts: – Release the ELECTRIC MASTER key switch.		
(15)	Leave the power lever at IDLE.	Make sure that there are no warning lights on.	
(16)	Monitor the oil pressure.	The oil pressure must rise to 1 bar minimum, within 3 seconds of starting the engine. If it does not, then you must shut-down the engine.	
(17)	Let the engine idle at 890 RPM for 2 minutes.	Monitor the engine instruments for unusual indications.	
(18)	Set the power lever to give 1400 RPM.	Until the oil temperature rises to at least 50 ºC (122 °F) and the coolant temperature rises to at least 60 °C (140 °F).	

D. ECU Test, Propeller Control Test and ECU Swap Test

Do these tests with the engine warm (see Paragraph C, above).

Note: The engine drives the propeller through a speed-reducing gear. All RPM's are shown as propeller RPM's.

WARNING: DO NOT CONTINUE WITH THE TEST IF THE ECU CAUTION LIGHTS DO NOT GO ON AND OFF WHEN REQUIRED, OR IF A CAUTION LIGHT STARTS FLASHING. STOP THE GROUND TEST AND FIND THE FAULT.

WARNING: DO NOT OPERATE THE AIRPLANE IF THE ENGINE STOPS DURING THE TEST.

	Detail Steps/Work Items	Key Items/References	Results/Comments
(1)	Set the power lever to IDLE.	The RPM must be 890 ± 50. Both ECU caution lights must be off.	
Note: If the ECU TEST button is released before the test is over, then the ECU will immediately switch back to normal operation.			
(2)	Press and hold ECU TEST button.	Both ECU caution lights must go on.	
Note: During the change-over from one ECU to the other, a single light vibration of the engine may occur. This is normal. **WARNING: DO NOT OPERATE THE AIRPLANE IF THE VIBRATION CONTINUES. STOP THE GROUND TEST AND FIND THE FAULT.**			
(3)	After two seconds, the system changes over to ECU B.	The ECU A caution light must be off. The ECU B caution light must be on.	
(4)	The propeller control is activated.	The RPM increases to 1100 and then returns to 890.	

	Detail Steps/Work Items	Key Items/References	Results/Comments
(5)	The system changes back to ECU A.	The ECU A caution light must be on. The ECU B caution light must be off.	
(6)	The propeller control is activated.	The RPM increases to 1100 and then returns to 890.	
(7)	The system returns to normal operation.	Both ECU caution lights must be off.	
(8)	When both ECU caution lights are off and the power-plant has reached idle RPM: – Release the ECU TEST button.		
(9)	Do an ECU swap test: – Set the ECU SWAP switch from AUTOMATIC to ECU B and immediately back to AUTOMATIC. Re-activate ECU A: – Set the power lever to IDLE. – Push ECU TEST button until both ECU caution lights are off.		

E. Performance Check

CAUTION: THE ENGINE PARAMETERS MUST BE IN THE GREEN RANGE FOR THIS CHECK. DO THE PERFORMANCE CHECK IMMEDIATELY AFTER WARM-UP AND ECU TESTS (SEE PARAGRAPHS C AND D, ABOVE).

Note: The engine has a full authority digital engine control (FADEC) system. The performance check is therefore different from the usual aircraft engines. If the values are within the limits shown below, no caution or warning light is illuminated and the 'ECU Operator' software reports no failures, the engine works properly. If the performance check is not passed successfully, refer to the Trouble-Shooting Section of this Chapter or to the Engine Maintenance Manuals.

	Detail Steps/Work Items	Key Items/References	Results/Comments
(1)	Allow gearbox temperature to rise to at least 65 °C (140 °F).		
(2)	Engine performance check.	Refer to the TAE 125-01 Operation and Maintenance Manual, OM-02-01, latest revision for the TAE 125-01 engine and to TAE 125-02-99 Operation and Maintenance Manual, OM-02-02, latest revision for the TAE 125-02-99 engine.	
(3)	Disconnect laptop computer from service plug on TAE harness.		
(4)	If failures were displayed by the ECU operator software, correct them as described in this AMM or refer to the engine manufacturer.		

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Section 71-02
Power Plant - Lycoming O-360-A4M Engine

1. General

This Chapter tells you about the power plant installed in the DA 40 F. It tells you about the components that make the power plant. It also tells you how to remove/install the power plant.

For data on the engine test after installation refer to the Lycoming Operator's Manual for the O-360-A4M engine. Refer to the DA 40 F Airplane Flight Manual for engine start/stop procedures.

Refer to these Chapters for data about other engine systems:

- Chapter 72. Refer to the Lycoming Operator's Manual for data on the engine.
- Chapter 73. Engine fuel and control. Refer to the Lycoming Operator's Manual for data on the fuel carburetor system.
- Chapter 74. Ignition system power supply and installation of high-tension cables. Refer to the Slick Maintenance Manual for more data on the magnetos. Refer to the Lycoming Operator's Manual for data on the spark plugs.
- Chapter 76. Engine controls.
- Chapter 77. Engine indicating.
- Chapter 78. Exhaust system.
- Chapter 79. Oil system components installed in the airframe. Refer to the Lycoming Operator's Manual for data on the engine oil system.
- Chapter 80. Starter system control and installation. Refer to the Lycoming Operator's Manual/Sky-Tec Manual for data on the lightweight geared starter.

Note: Equipment which is certified for installation in the DA 40 F is listed in Section 6.5 of the Airplane Flight Manual. Such equipment may be installed in accordance with the Airplane Maintenance Manual.

Any equipment which is not listed in Section 6.5 of the Airplane Flight Manual is called "Additional Equipment". The installation of Additional Equipment is a modification which must be handled in accordance with national regulations or a Service Bulletin.

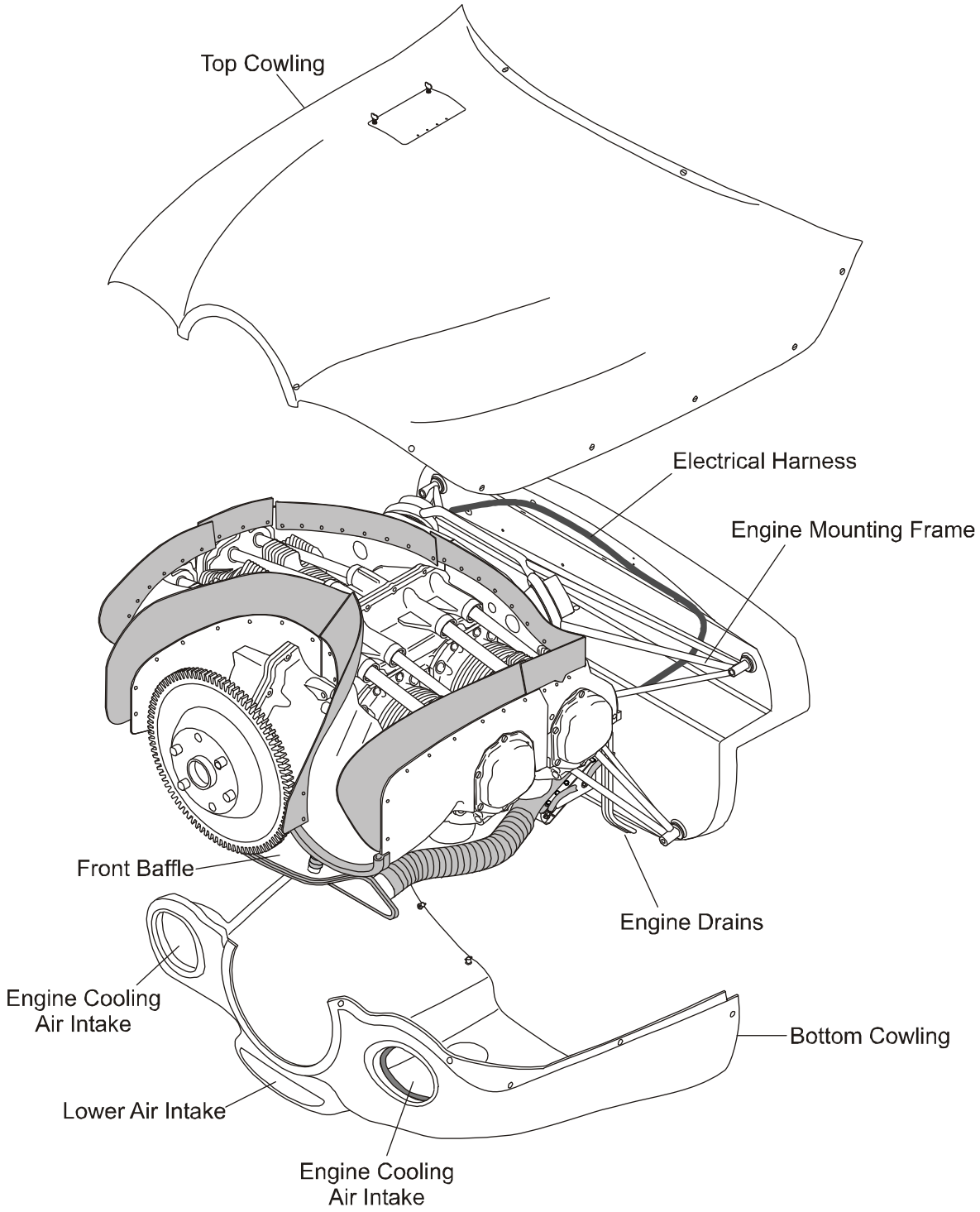


Figure 1: Power Plant

2. Description and Operation

The DA 40 F has a Lycoming 4-cylinder, horizontally opposed, direct drive engine. The engine type is O-360-A4M. The engine has a wet sump oil system. The O-360-A4M is air cooled and has a carburetor system. It has an electric starter and Slick magnetos. It also has a SlickSTART magneto booster system.

The propeller turns in a clockwise direction when viewed form the cockpit.

A. Power Plant Components

The power plant has these components installed:

– Cowling.

The power plant has a top and bottom engine cowling. The two halves attach to each other and to the airframe with camloc quick release fasteners. The top cowling has one small access panel for the engine oil filler and dipstick. The bottom cowling has two large cooling air intakes and one air intake for the engine air filter.

– Engine Mount.

The engine mount attaches to the firewall at five locations. Tubular steel makes the mounting frame. The engine attaches to the engine mount with shock-mounts. Rubber and metal bushings make the engine shock-mounts.

– Electrical Harness.

Electrical cables go through the firewall to connect to the engine. They give electrical supply to the engine starter motor, ignition system and engine sensors. Electrical cables from the generator supply electrical power to the airplane electrical system.

B. Air Intakes

The bottom cowling has these air intakes:

The intakes on the front left face and the front right face of the bottom cowling supply cooling air for the engine.

Engine air intake. This intake is located in the lower center of the cowling and supplies air to the engine air filter. It also supplies air to the following outlets:

An outlet which supplies cooling air through integral ducting to the oil cooler.

An outlet which connects to a flexible hose which supplies cooling air to the cabin heat system and to the battery.

C. Engine Drain Pipes

The engine has these drain pipes:

Engine driven fuel pump drain.

Induction manifold drain.

Engine Specification	
Engine manufacturer.	Lycoming
Engine model.	O-360-A4M
Engine operating limits: – Rated output power. – Rated output rotation speed during take-off and climb. – Max. continuous rotation speed.	 180 HP (134.2 kW) 2700 RPM 2700 RPM
Ground run-up limits: – Ground idle speed.	 740 ± 20 RPM
Oil pressure: – Minimum. – Normal. – Maximum.	 25 PSI 55 - 95 PSI 97 PSI
Fuel pressure: – Minimum. – Normal. – Maximum.	 1 PSI 2 - 7 PSI 8 PSI
Oil temperature: – Minimum (not for continuous operation). – Normal. – Maximum.	 149 °F (65 °C) 149 - 230 °F (65 - 110 °C) 245 °F (118 °C)
Cylinder head temperature: – Minimum. – Normal. – Maximum.	 150 °F (65.6 °C) 150 - 475 °F (65.6 - 246 °C) 500 °F (260 °C)

Engine Specification	
Fuel grade:	AVGAS 100 or 100LL
Oil specification (see Section 12-10):	Refer to Lycoming Operator's Manual.

Trouble-Shooting

1. General

The table below lists the defects you could have with the power plant. It does not give Trouble-Shooting data for the engine or the engine systems. Refer to the Lycoming Operator's Manual for engine and engine system trouble-shooting.

WARNING: YOU MUST BE CAREFUL WHEN YOU DO POWER PLANT TROUBLE SHOOTING. OPERATION OF A DAMAGED ENGINE CAN CAUSE MORE DAMAGE TO THE ENGINE. THIS CAN CAUSE INJURY TO PERSONNEL.

If you have the trouble detailed in the Trouble column read across to the Possible Cause column. Then do the repair given in the Repair column.

Trouble	Possible Cause	Repair
Engine vibration.	Damaged shock mounts.	Replace the shock mounts.
Engine does not produce full power.	Engine air inlet blocked.	Examine air inlet. Examine/Replace the air filter.

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Maintenance Practices

1. General

These Maintenance Practices tell you how to remove/install the engine. These Maintenance Practices also tell you how to remove/install the engine and engine mount together.

WARNING: DO NOT STAND WITHIN THE DANGER AREA OF THE PROPELLER. IF THE ENGINE STARTS, THE PROPELLER CAN CAUSE DEATH OR INJURY TO PERSONS.

WARNING: YOU MUST MAKE SURE THAT THE ENGINE IS SAFE BEFORE YOU TURN THE PROPELLER. MAKE SURE THAT THE IGNITION SWITCH IS SET TO "OFF" AND THAT THE SPARK-PLUG-CABLES ARE DISCONNECTED FROM THE SPARK PLUGS. SET THE THROTTLE TO "IDLE" AND THE MIXTURE CONTROL TO "LEAN CUT-OFF".

WARNING: DO NOT GO BELOW THE ENGINE WHEN YOU LIFT THE ENGINE WITH THE HOIST. THE HOIST CAN FAIL. THIS CAN CAUSE DEATH OR INJURY TO PERSONS.

WARNING: DO NOT GET OIL ON YOU. OIL CAN CAUSE SKIN DISEASE.

WARNING: DO NOT GET FUEL ON YOU. FUEL CAN CAUSE SKIN DISEASE. DO NOT ALLOW FIRE OR SPARKS NEAR FUEL. FUEL BURNS AND BURNING FUEL CAN CAUSE INJURY TO PEOPLE AND DAMAGE TO EQUIPMENT.

CAUTION: YOU MUST ATTACH CAPS TO HOLES/PIPES WHEN YOU REMOVE THE ENGINE. IF YOU DO NOT DO THIS, CONTAMINATION CAN ENTER THE HOLES/PIPES. THIS CAN CAUSE BLOCKAGE TO THE AIRPLANE SYSTEMS.

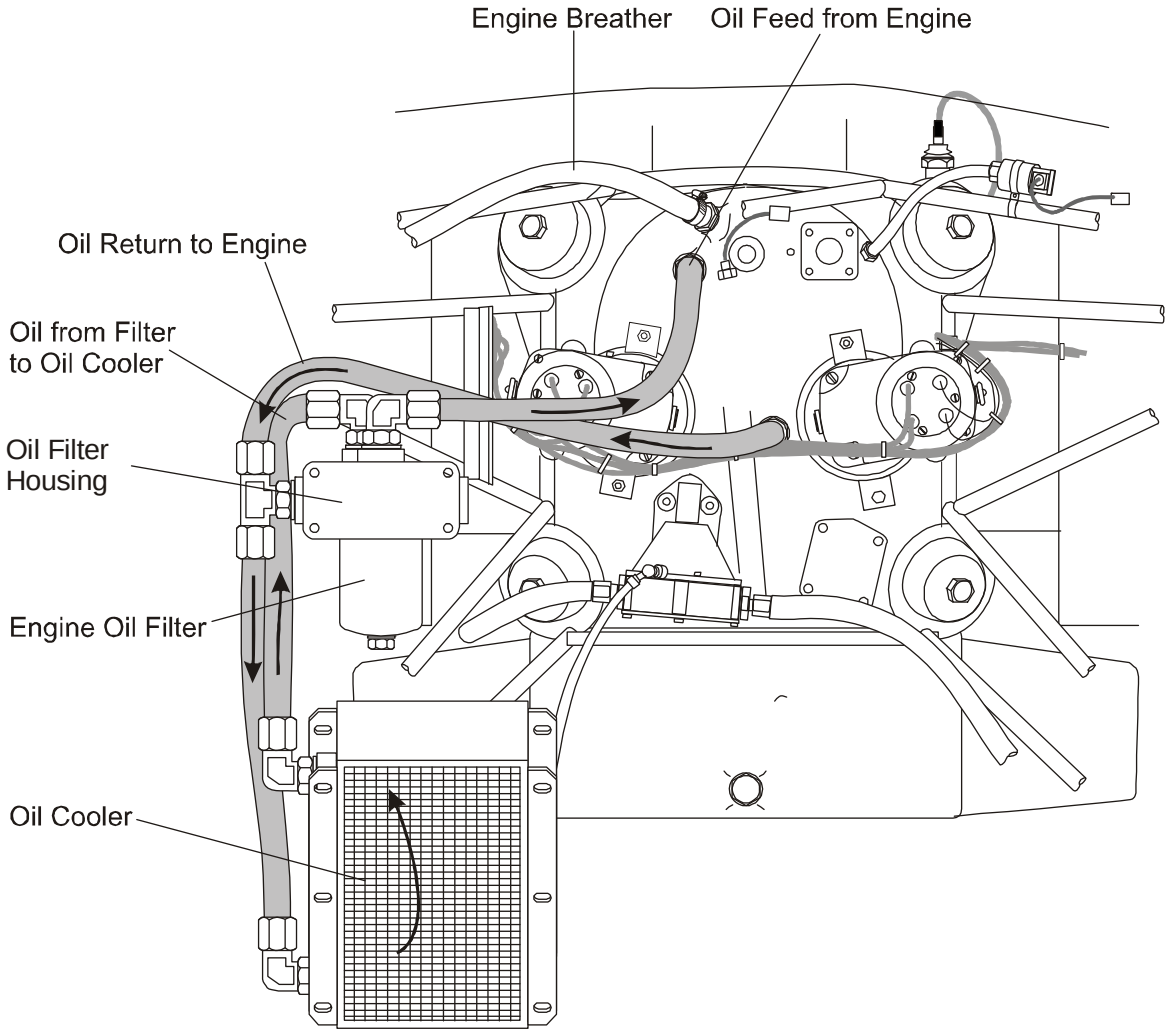


Figure 2: Connections at the Rear of the Engine

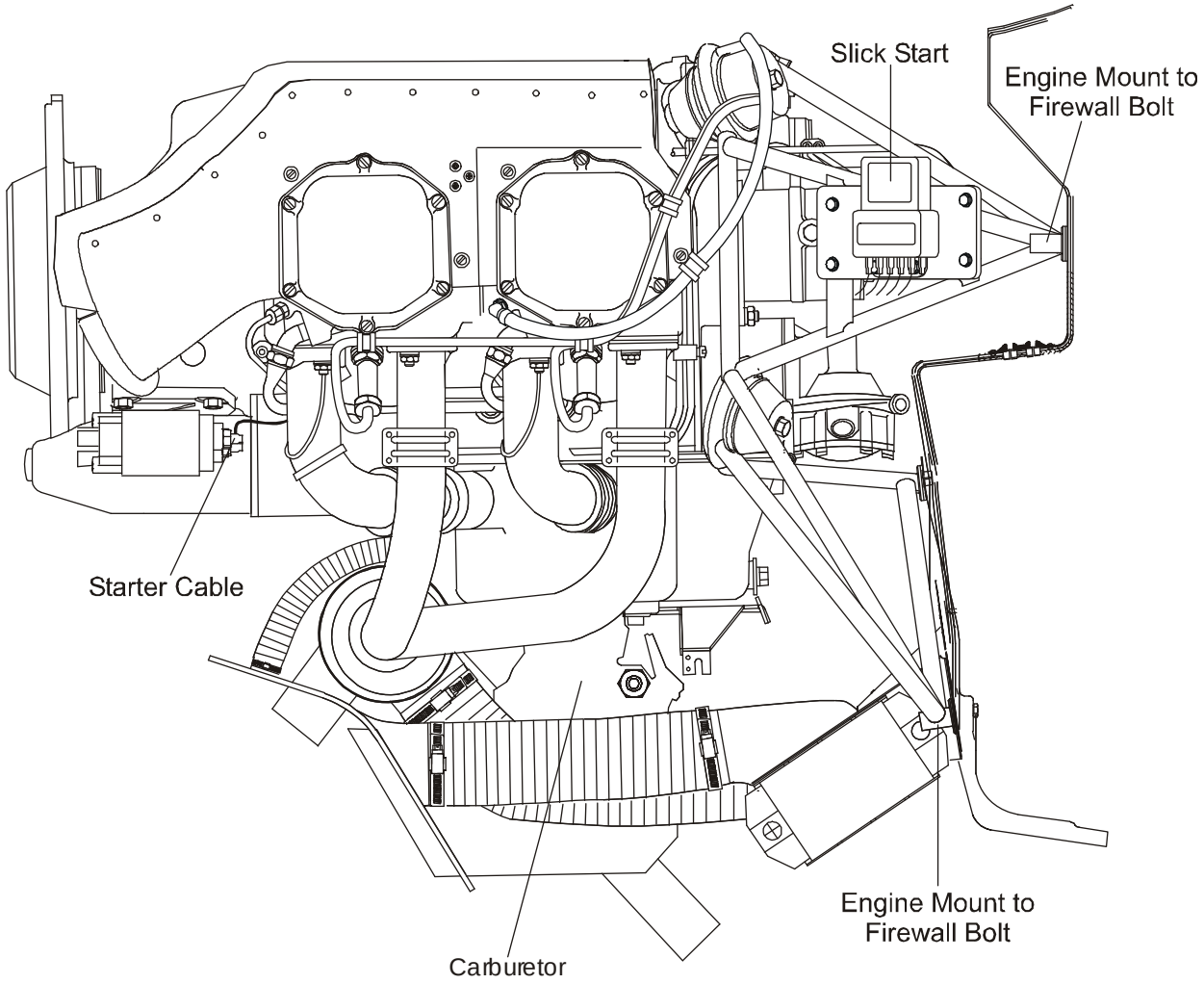


Figure 3: Left Side of the Engine

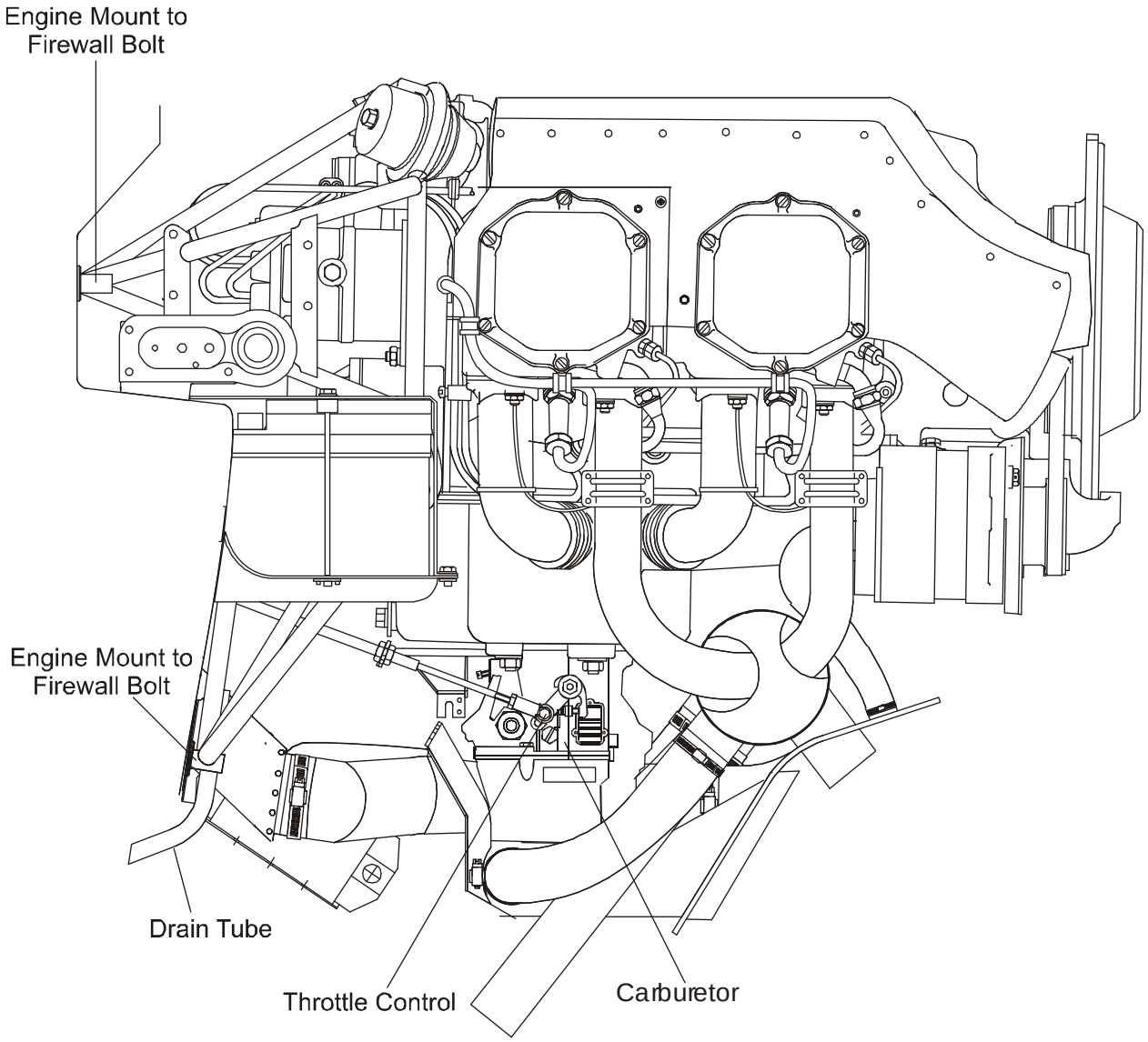


Figure 4: Right Side of the Engine

2. Remove/Install the Engine (without the Engine Mount)

A. Equipment

Item	Quantity	Part Number
Hoist.	1	Commercial.
Engine sling.	1	Commercial.
Engine stand.	1	Commercial.
Airplane jacks.	3	Commercial.
Nose trestle.	1	Commercial.
Wing trestles.	2	Commercial.

B. Remove the Engine

	Detail Steps/Work Items	Key Items/References
(1)	Lift the airplane on jacks and make the airplane level.	Refer to Section 07-10.
(2)	Move the wing trestles into position.	Refer to Section 07-10.
	WARNING: MAKE SURE THAT THE ENGINE IS SAFE BEFORE YOU DO ANY WORK ON THE PROPELLER. IF THE ENGINE IS TURNED, THE PROPELLER CAN CAUSE INJURY OR DEATH.	
(3)	Set the fuel selector/shut-off valve to CLOSED.	
(4)	Make sure that the engine is safe: – Set the ignition switch to OFF. – Set the throttle to IDLE. – Set the mixture control to LEAN CUT-OFF.	
(5)	Remove the engine cowlings.	Refer to Section 71-12.
(6)	Remove the airplane battery.	Refer to Section 24-31.
(7)	Disconnect the spark plug cables from the spark plugs.	
(8)	Remove the spark plugs and put blanks in the spark plug holes in the cylinders.	This will stop contamination going into the engine cylinders.

	Detail Steps/Work Items	Key Items/References
(9)	Remove the cable ties that attach the top left-hand ignition cable to the propeller control cable. Remove the 2 nuts/washers/screws that hold the left-hand fairlead for the top ignition cables.	
(10)	Release the P-clamps holding the left ignition cables to the engine-cooling-baffles.	
(11)	Remove the 2 nuts/washers/screws that attach the right-hand fairlead for the top ignition cables.	
(12)	Remove the cable ties attaching the left-side ignition cables to the engine mount and move the cables to the rear of the engine.	Note the position of the cable ties.
(13)	Release the P-clamps holding the right ignition cables to the engine cooling baffles.	
(14)	Remove the cable ties attaching the right side ignition cables to the engine mount and move the cables to the rear of the engine.	Note the position of the cable ties.
(15)	Remove the cable ties attaching the left side ignition cables to the right side ignition cables.	Note the position of the cable ties.
(16)	Release the three screws which attach the ignition harness to the left magneto and move the harness assembly clear of the airplane.	
(17)	Release the three screws which attach the ignition harness to the right magneto and move the harness assembly clear of the airplane.	
(18)	Disconnect the electrical plugs from the left and right magnetos.	Move the plugs aft, clear of the engine.

	Detail Steps/Work Items	Key Items/References
(19)	Remove the exhaust gas temperature probe from the exhaust manifold: – Release the worm-drive-clamp which attaches the probe to the exhaust manifold. – Remove the probe. – Remove the cable ties attaching the cable for the probe to the engine mount. – Move the cable clear of the engine.	Do this item for each of the four probes. Note the location of the cable-ties.
(20)	Remove the worm-drive clamp which attaches the flexible hose to the generator cooling shroud and remove the flexible hose.	
(21)	Remove the worm-drive clamp which attaches the flexible hose to the exhaust-heat-exchanger. Remove the flexible hose and move the air inlet duct assembly clear of the airplane.	Hold the air cooling duct!
(22)	Remove the two worm-drive clamps from the flexible hose between the exhaust heat-exchanger and the cabin heat control valve. – Remove the flexible hose.	
(23)	Remove the engine exhaust system: – Remove the eight nuts and washers from the exhaust port flanges. Move the exhaust system clear of the airplane.	Only if you install a new engine. Hold the exhaust system! Discard the eight nuts and washers.
(24)	Remove the propeller (if necessary).	Refer to Section 61-00.

	Detail Steps/Work Items	Key Items/References
(25)	Disconnect the mixture control eye end at the mixture control lever at the carburetor: – Remove the nut and washer from the long bolt at the mixture lever. – Release the mixture cable eye end from the lever. – Remove the spacer and the long bolt.	
(26)	Remove the eye end from the mixture control cable: – Release the lock-nut. – Remove the eye end fitting and lock-nut from the cable.	
(27)	Release the mixture cable from the support bracket at the front of the engine: – Remove the bottom adjustment nut and washer from the control cable. – Move the control cable clear of the bracket. – Remove the top adjustment nut and washer from the control cable.	
(28)	Move the cable up through the rubber grommets in the engine baffles and clear of the engine.	
(29)	Disconnect the throttle control cable at the carburetor: – Remove the nut and washer from the attachment bolt. – Remove the eye end from the bolt. – Remove the bolt and washer from the throttle lever at the injector.	

	Detail Steps/Work Items	Key Items/References
(30)	Remove the eye end from the throttle control cable: – Release the lock nut. – Remove the eye end and the lock-nut.	
(31)	Remove the control cable from the support bracket at the bottom of the engine: – Remove the front adjustment nut and washer from the outer sheath. – Move the control cable clear of the bracket.	
(32)	Move the throttle cable clear of the engine.	
(33)	Disconnect the carburetor heat control cable: – Release the screw which attaches the wire end to the swivel in the carburetor heat assembly. – Remove the lock-nut which holds the control cable outer sheath in the support bracket at the carburetor heat assembly. – Move the control cable clear of the engine mount.	
(34)	Remove the air baffles.	Refer to Section 75-00.
	WARNING: DO NOT GET FUEL ON YOU. FUEL CAN CAUSE SKIN DISEASE. DO NOT ALLOW FIRE NEAR FUEL. FUEL BURNS AND CAN CAUSE INJURY TO PEOPLE AND DAMAGE TO EQUIPMENT.	
(35)	Disconnect the fuel feed hose at the firewall.	Use a suitable container to catch the fuel. Put caps on the hose and the firewall connection.
(36)	Disconnect the fuel feed hose at the outlet from the fuel pump.	Move the hose clear of the engine mount.

	Detail Steps/Work Items	Key Items/References
(37)	Disconnect the fuel drain hose from the engine-driven fuel-pump and move the hose clear of the engine.	
(38)	Remove the cable ties that attach the fuel flow divider drain to the engine mount and the ignition harness.	Note the location of the ties!
(39)	Disconnect the engine breather hose from the accessory housing at the top of the engine.	Put caps on the breather hose and the engine connection.
	WARNING: DO NOT GET OIL ON YOU. OIL CAN CAUSE SKIN DISEASE.	
(40)	Disconnect the oil pipe at the top of the accessory-housing.	Use a suitable container to catch the oil. Put caps on the oil pipe and the accessory-housing connection.
(41)	Disconnect the two oil hoses which connect to the top of the oil filter housing.	Use a suitable container to catch the oil. Put caps on the oil pipes and the oil filter housing.
(42)	Disconnect the oil pipe for the oil pressure sensor at the engine crank-case.	Remove spilt oil.
(43)	Remove the cylinder-head temperature-probe from the bottom of the cylinder head: – Disconnect the electrical cables at the in-line connectors. – Remove the probe from its holder. – Remove the cable-ties/P-clamps which hold the cables for the cylinder-head temperature probe in position.	Do this item for each cylinder-head temperature-probe. Note the location of the cable-ties/P-clamps.

	Detail Steps/Work Items	Key Items/References
(44)	Disconnect the electrical cables from these components: – The generator (5 cables). – The starter motor (1 cable). – Fuel pressure sensors (2 cables). – Oil temperature sensor. – Fuel flow sensor. – RPM sensor. Remove the P-clamps and cable-ties from the right-hand side of the engine. Move the cables clear of	At the in-line connector. Note the locations of the P-clamps and the cable-ties!
(45)	Disconnect the manifold pressure pipe from the No. 4 cylinder inlet manifold. Release the P-clamp from the rear of the No. 4 cylinder head.	
(46)	Disconnect the earth cable from the engine: – Remove the bolt and washer which attaches the cable eye-end to the engine.	
	WARNING: DO NOT GO UNDER THE ENGINE WHILE IT IS HELD BY THE ENGINE HOIST. IF THE HOIST FAILS, THE ENGINE CAN FALL AND CAUSE INJURY TO PERSONS.	
(47)	Attach the engine hoist to the engine.	At the top of the engine. At the lifting shackles.
	Note: The hoist must hold the weight of the engine. The weight of the engine is 150 kg (330 lb). If the propeller and spinner are fitted the total weight is 172 kg (378 lb).	
(48)	Adjust the hoist to “take the weight” of the engine.	

	Detail Steps/Work Items	Key Items/References
(49)	Remove the engine-mounting-bolts: – Remove the nuts from the lower engine mounting bolts. – Pull the mounting bolts rearwards and clear of the engine mount and remove the rear shock mount rubber. – Remove the nuts from the upper engine mounting bolts. – Pull the mounting bolts rearwards and clear of the engine mount and remove the rear shock mount rubber. – Move the engine clear of the airplane. – Lower the engine into the engine stand.	Remove the front shock mount rubber. Make sure that when you move the engine clear of the airplane that you do not catch the engine on any of the equipment around the engine mount.
(50)	If necessary: – Remove the oil pipe from the accessory housing. – Remove the fuel pipe from the inlet to the engine driven fuel pump.	Note the orientation. Put caps on the open connections. Note the orientation.

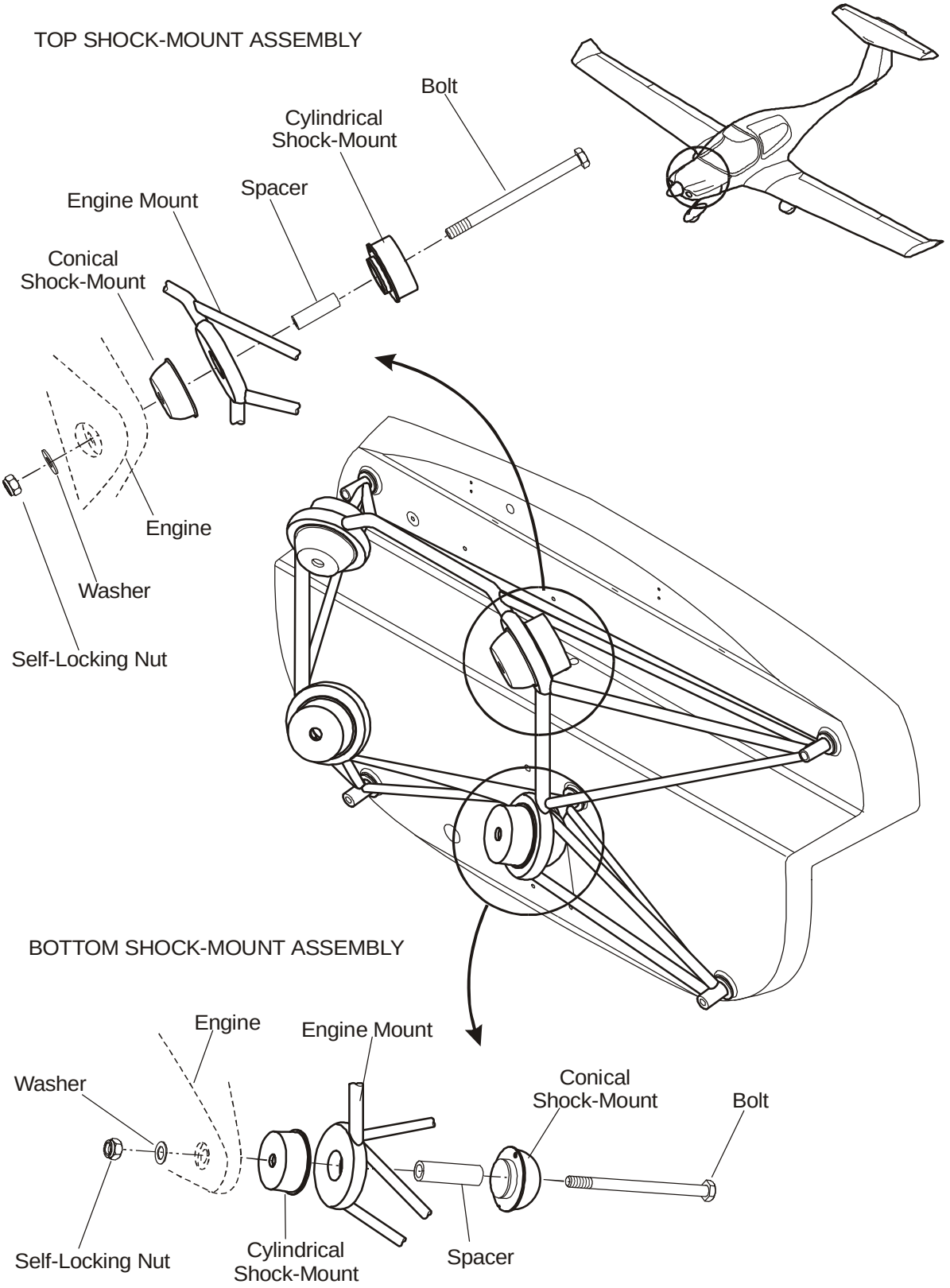


Figure 5: Engine Shock Mounts

3. Install the Engine (Without the Engine Mount)

Note: If you install a new engine, you must do the engine break-in procedure after installation. Refer to Paragraph 11.

A. Equipment

Item	Quantity	Part Number
Hoist.	1	Commercial.
Engine sling.	1	Commercial.
Airplane jacks.	3	Commercial.
Nose trestle.	1	Commercial.
Torque wrench.	1	Commercial.

B. Preparation

	Detail Steps/Work Items	Key Items/References
(1)	If you have not already done so: – Raise the airplane on jacks and make the airplane level. – Move the nose trestle into position.	 Refer to Section 07-10. Refer to Section 07-10.
(2)	Examine the engine control cables. Move each cable through its range of movement several times.	
(3)	Make sure all the electrical cables are clean and not damaged.	
(4)	Make sure all the oil hoses are not damaged.	
(5)	Make sure all the fuel pipes/hoses are not damaged.	
(6)	Make sure that all drains and vents are not damaged or blocked.	
(7)	Make sure that all the flexible hoses are clean and not damaged.	

	Detail Steps/Work Items	Key Items/References
(8)	If you install a new engine:	
	– Install the fuel supply hose to the inlet to the fuel pump.	Set the pipe to the orientation recorded at Paragraph 2.B.(50).
	– Install the two oil hoses at the rear of the engine which connect to the oil filter housing.	Set the pipe to the orientation recorded at Paragraph 2.B.(50).

C. Install the Engine

	Detail Steps/Work Items	Key Items/References
(1)	Move the engine into position with the hoist.	Make sure that the engine does not catch on any cables or equipment. Move the fuel and oil hoses through the engine mount.
	Note: Top mountings have the cone-shaped shock-mount FORWARD, the cylindrical-shaped shock-mount AFT. Bottom mountings have the cylindrical-shaped shock-mount FORWARD, the cone-shaped shock-mount AFT.	
(2)	Assemble the 4 shock mounts: – Move the front shock mount rubber into position between the engine mount and the rear face of the engine mounting. – Move the rear shock mount rubber into position in the engine mount. – Install the washer under the head of the engine mounting bolt. – Push the engine mounting bolt through the shock mount assembly from aft. – Install the nuts and washers onto the engine mounting-bolts.	Do this item for each mount. Do the top mounts first and then the bottom mounts. Refer to Figure 5. Make sure that the rubbers are correctly seated. Make sure that the rubbers are correctly seated. Do not tighten the nuts.
(3)	When you have installed all the mounting bolts, then tighten all the engine mounting-bolts.	
(4)	Carefully lower the engine hoist to release the weight of the engine and move the hoist clear of the airplane.	
(5)	Install the engine air cooling baffles.	Refer to Section 75-02.
(6)	Put the electrical cables in position on the right hand side of the engine.	

	Detail Steps/Work Items	Key Items/References
(7)	Install the propeller, if necessary.	Refer to Section 61-12.
(8)	Install the cylinder-head temperature probes: – Put the cylinder probe into the cylinder mounting. – Connect the electrical cables at the in-line connectors. – Attach the probe cables to the main wiring loom with cable ties and P-clamps.	Do this item for each of the probes. White cable to white cable and red cable to red cable.
(9)	Connect the manifold pressure hose to the No. 4 cylinder inlet manifold.	
(10)	Connect the electrical cables to these components: – The engine earth point. – The generator (5 cables). – The starter motor (1 cable). – Fuel pressure sensors (2 cables). – Oil temperature sensor. – Fuel flow sensor. – RPM sensor. Install the P-clamps and cable-ties which hold the electrical cables in their correct positions.	Refer to drawing. At the in-line connector.
(11)	Connect the oil pipe to the top of the accessory-housing.	
(12)	Connect the two oil hoses to the oil filter housing.	Refer to Figure 2.
(13)	Install the P-clamps which attach the oil cooler pipes to the engine mount.	
(14)	Connect the engine breather hose to the breather connection at the top of the accessory housing.	

	Detail Steps/Work Items	Key Items/References
(15)	Attach the drain tube to the fuel flow divider: – Push one end of the tube onto the connector on the fuel flow divider and install the pipe clip. – Push the other end of the tube through the rubber grommet in the cooling baffles to the bottom rear of the engine compartment. – Connect the end to the tee piece in the fuel pump drain and install the pipe clip. – Hold the drain tube in its correct position with cable-ties.	
(16)	Connect the drain tube to the engine driven fuel pump and install the pipe clip. Hold the drain tube in its correct position with cable ties.	
(17)	Connect the main fuel feed hose to the firewall.	

	Detail Steps/Work Items	Key Items/References
(18)	Connect the carburetor heat control cable: – Put the control cable in position through the guide attached to the carburetor heat control assembly. – Install the lock-nut onto the control cable outer sheath and tighten the lock-nut. – Push the control cable wire end through the swivel in the operating ring. – Make sure that the carburetor heat control lever in the cockpit is set to OFF. – Make sure that the carburetor heat assembly is set to the OFF position. – Move the carburetor heat control lever in the cockpit 3 mm (0.125 in) aft from OFF. – Tighten the screw which attaches the wire end to the swivel. – Install the P-clamps and cable ties which hold the Bowden-cable in the correct position.	Fully forward. Inlet holes fully closed.
(19)	Do a test for the correct operation of the carburetor heat control system.	Refer to Section 76-02.
(20)	Connect the throttle cable to the carburetor: – Move the cable into position through the bracket at the bottom of the engine. – Install the front adjustment nut and washer on the outer sheath. Tighten the nut.	

	Detail Steps/Work Items	Key Items/References
(21)	Install the cable eye end onto the throttle cable: – Install the lock-nut onto the cable end. – Install the eye-end onto the cable end. – Tighten the lock-nut.	Use a piece of lock-wire to make sure that the eye-end is installed correctly.
(22)	Connect the cable eye end to the throttle lever at the carburetor: – Move the attachment bolt into position in the throttle lever at the fuel injector. – Install a washer on the attachment bolt. – Install the eye end on the attachment bolt. – Install a second washer and a nut on the attachment bolt. Tighten the nut.	From the engine side.
(23)	Move the throttle lever in the cockpit between FULL and IDLE. The throttle control must be smooth in operation with no restrictions.	
(24)	Do a test for the correct operation of the throttle control system.	Refer to Section 76-02.
(25)	Connect the mixture control cable at the carburetor: – Move the cable into position through the rubber grommets in the engine cooling baffles. – Install the top adjustment nut and washer onto the control cable outer sheath. – Push the cable through the support bracket at the bottom of the engine. – Install the bottom adjustment nut and washer on to the control cable outer sheath. Tighten the nut.	

	Detail Steps/Work Items	Key Items/References
(26)	Install the cable eye end onto the mixture cable: – Install the lock-nut on the cable. – Install the eye end on the cable. – Tighten the lock-nut.	Use a piece of lock-wire to make sure that the eye end is installed correctly.
(27)	Connect the mixture control cable eye end to the mixture lever at the fuel injector: – Move the long bolt into position in the mixture lever. – Install the spacer on the long bolt. – Install the eye end on the long bolt. – Install the nut and washer on the long bolt. Tighten the nut.	From inboard.
(28)	Move the mixture control lever in the cockpit between RICH and LEAN CUT-OFF. The mixture control must be smooth in operation with no restrictions.	
(29)	Do a test for the correct operation of the mixture control.	Refer to Section 76-02.
(30)	Install the engine exhaust assembly: – Move the exhaust manifold into position on the cylinder head studs. – Install the eight washers and nuts on the cylinder head studs. – Tighten the nuts.	Use new gaskets! Use new washers and nuts.

	Detail Steps/Work Items	Key Items/References
(31)	Install the flexible hose between the cabin heat control valve and the exhaust heat exchanger: – Move the flexible hose into position. – Install and tighten the worm-drive clamps.	
(32)	Install the air inlet and cooling hoses for the oil cooler and generator: – Move the air inlet and hoses into position. – Attach the flexible hose to the generator cooling duct. – Install and tighten the worm-drive clamp at the generator cooling duct. – Attach the flexible hose to the oil cooler duct. – Install and tighten the worm-drive clamp at the oil cooler duct.	
(33)	Install the exhaust gas temperature probe: – Install the No. 1 cylinder sensor in the No. 1 exhaust manifold. – Install the worm-drive clamp. – Hold the cable in the correct position with cable ties and P-clamps.	Do this item for each probe.
(34)	Connect the electrical plugs to the left magneto and to the right magneto.	Make sure the ignition switch is set to OFF.
(35)	Install the spark plugs in the cylinder heads.	Torque: 47.5 Nm (35 lbf.ft.).

	Detail Steps/Work Items	Key Items/References
(36)	Install the left ignition harness: – Move the left ignition harness into position on the left magneto. – Install the three screws which attach the harness to the ignition. – Connect the ignition cables to the spark plugs.	 Make sure that the cap is seated correctly. Make sure that the ignition cables are connected to the correct plugs. Torque: Hand-tight then 1/16 to 1/8 turn with a wrench.
(37)	Install the fairlead which holds the top left ignition cables in the cooling baffle: – Assemble the fairlead around the cable and to baffle. – Install the 2 screws, washers and nuts which attach the fairlead to the baffle.	
(38)	Install the right ignition harness: – Move the right ignition harness into position on the right magneto. – Install the three screws which attach the harness to the ignition. – Connect the ignition cables to the spark plugs.	 Make sure that the cap is seated correctly. Make sure that the ignition cables are connected to the correct plugs. Torque: Hand-tight, then 1/16 to 1/8 turn with a wrench.
(39)	Install the fairlead which holds the top right ignition cables in the cooling baffle: – Assemble the fairlead around the cable and to baffle. – Install the 2 screws, washers and nuts which attach the fairlead to the baffle.	

	Detail Steps/Work Items	Key Items/References
(40)	Install the P-clamps which attach the ignition cables to the left side of the engine cooling air baffles.	Make sure that the ignition cables can reach the spark plugs without strain.
(41)	Install the P-clamps which attach the ignition cables to the right side of the engine cooling air baffles.	Make sure that the ignition cables can reach the spark plugs without strain.
(42)	Install the cable ties that hold the ignition cables to the left side of the engine mount.	
(43)	Install the cable -ties that hold the ignition cables to the right side of the engine mount.	
(44)	Install the cable ties that attach the left ignition harness to the right ignition harness.	
(45)	Do an engine oil level check.	Refer to Section 12-10.
(46)	Install the airplane battery.	Refer to Section 24-31.
(47)	If necessary, for your Airworthiness Authority, do a second inspection of these control systems: – Throttle. – Mixture. – Carburetor heat.	
(48)	Install the engine cowlings.	Refer to Section 71-12.
(49)	Remove the wing trestles.	
(50)	Lower the airplane with the jacks.	Refer to Section 07-10.
(51)	Do a test of the engine.	Refer to Paragraph 6.

4. Remove the Engine with the Engine Mount

A. Equipment

Item	Quantity	Part Number
Hoist.	1	Commercial.
Engine sling.	1	Commercial.
Engine/engine mount stand.	1	Commercial.
Airplane jacks.	3	Commercial.
Nose trestle.	1	Commercial.
Wing trestles.	2	Commercial.

B. Remove the Engine with the Engine Mount

	Detail Steps/Work Items	Key Items/References
(1)	Lift the airplane on jacks and make the airplane level.	Refer to Section 07-10.
(2)	Move the wing trestles into position.	Refer to Section 07-10.
	WARNING: MAKE SURE THAT THE ENGINE IS SAFE BEFORE YOU DO ANY WORK ON THE PROPELLER. IF THE ENGINE IS TURNED, THE PROPELLER CAN CAUSE INJURY OR DEATH.	
(3)	Set the fuel selector/shut-off valve to CLOSED.	
(4)	Make sure that the engine is safe: – Set the ignition switch to OFF. – Set the throttle to IDLE. – Set the mixture control to LEAN CUT-OFF.	
(5)	Remove the engine cowlings.	Refer to Section 71-12.
(6)	Remove the battery.	Refer to Section 24-31.
(7)	Disconnect the spark plug cables from the spark plugs.	

	Detail Steps/Work Items	Key Items/References
(8)	Disconnect the cables for the exhaust gas temperature (EGT) probes: – Disconnect the cables at the in-line connectors. – Remove the cable ties attaching the cable for the probe to the engine mount. – Move the cable clear of the engine and the engine mount.	Do this item for each of the four probes. Note the location of the cable ties.
(9)	Remove the propeller (if necessary).	Refer to Section 61-12.
(10)	Disconnect the mixture control eye end at the engine mixture lever: – Remove the nut and washer from the long bolt at the mixture lever. – Remove the mixture cable eye end from the lever. – Remove the spacer and the long bolt.	
(11)	Remove the eye end from the control cable: – Release the lock-nut. – Remove the eye-end fitting and lock-nut from the cable.	
(12)	Release the mixture cable from the support bracket at the front of the engine: – Remove the bottom adjustment nut and washer from the control cable. – Move the control cable clear of the bracket. – Remove the top adjustment nut and washer from the control cable.	
(13)	Move the cable up and rearwards through the rubber grommets in the engine baffles.	Move the mixture cable clear of the engine.

	Detail Steps/Work Items	Key Items/References
(14)	Disconnect the throttle cable at the carburetor: – Remove the nut and washer from the attachment bolt. – Remove the eye end from the bolt. – Remove the bolt and washer from the throttle lever at the carburetor.	
(15)	Remove the eye end from the control cable: – Loosen the lock-nut. – Remove the eye end and lock-nut.	
(16)	Remove the control cable from the bracket at the bottom of the engine: – Remove the front adjustment nut and washer from the outer sheath. – Move the control cable clear of the bracket.	
(17)	Move the throttle cable clear of the engine.	
(18)	Disconnect the carburetor heat control cable: – Release the screw which attaches the cable wire end to the swivel in the carburetor heat assembly. – Remove the lock-nut which holds the Bowden cable outer sheath in the support bracket at the carburetor heat assembly. – Move the Bowden-cable clear of the engine mount.	

WARNING: DO NOT GET FUEL ON YOU. FUEL CAN CAUSE SKIN DISEASE. DO NOT ALLOW FIRE NEAR FUEL. FUEL BURNS AND CAN CAUSE INJURY TO PEOPLE AND DAMAGE TO EQUIPMENT.

	Detail Steps/Work Items	Key Items/References
(19)	Disconnect the fuel feed hose at the firewall.	Use a suitable container to catch the fuel. Put caps on the hose and the firewall connector.
(20)	Release the P-clamp which attaches the breather pipe to the firewall.	Put caps on the breather pipe.
(21)	Disconnect the two oil hoses connecting the engine oil system to the oil filter housing.	Put caps on the oil filter housing and the oil hoses.
	WARNING: DO NOT GET OIL ON YOU. OIL CAN CAUSE SKIN DISEASE.	
(22)	Disconnect the electrical connector for the oil pressure sensor and remove the cable ties which attach the electrical cable to the engine mount.	Note the position of the cable ties.
(23)	Disconnect the cylinder-head temperature probe: – Disconnect the electrical cables for the probe. – Remove the cable ties which attach the electrical cable for the probe to the engine mount.	Do this item for each cylinder-head temperature probe. At the in-line connector. Note the position of the cable-ties.
(24)	Disconnect the electrical cables from these components: – The generator (5 cables). – The starter motor (1 cable). – Fuel pressure sensors (2 cables). – Oil temperature sensor. – Fuel flow sensor. – RPM sensor. – The SlickSTART booster control unit. – The voltage regulator Remove the P-clamps and cable ties from the right hand side of the engine. Move the cables clear of the engine.	At the in-line connector. At the in-line connector. Note the locations of the P-clamps and the cable ties!

	Detail Steps/Work Items	Key Items/References
(25)	Disconnect the manifold pressure pipe from the bulkhead connector at the firewall.	Put caps on the open connections.
(26)	Disconnect the engine earth connection: – Remove the bolt and washer which attach the cable eye-end to the engine.	
	WARNING: DO NOT GO UNDER THE ENGINE WHILE IT IS HELD BY THE ENGINE HOIST. IF THE HOIST FAILS, THE ENGINE CAN FALL AND CAUSE INJURY TO PERSONS.	
(27)	Attach the engine hoist to the engine.	At the top of the engine. At the lifting shackles.
	Note: The hoist must hold the weight of the engine. The weight of the engine is 150 kg (330 lb). If the propeller and spinner are fitted the total weight is 172 kg (378 lb).	
(28)	Adjust the hoist to “take the weight” of the engine.	
(29)	Remove the engine mount attachments: – Remove the nut and washer which attaches the nose wheel strut and engine mount to the firewall. – Remove the nuts and washers which attach the bottom of the engine mount to the firewall. – Remove the nuts and washers which attach the top of the engine mount to the firewall. – Pull the engine and engine mount forward and clear of the airplane. Lower the engine and engine mount into a stand.	Make sure that all electrical cables, control cables and other items are clear of the engine and the engine mount.

5. Install the Engine with the Engine Mount

Note: If you install a new engine, you must do the engine break-in procedure after installation. Refer to Paragraph 11.

A. Preparation

	Detail Steps/Work Items	Key Items/References
(1)	If you have not already done so: – Raise the airplane on jacks and make the airplane level. – Move the nose trestle into position.	 Refer to Section 07-10. Refer to Section 07-10.
(2)	Examine the engine control cables. Move each cable through its range of movement several times.	
(3)	Make sure all the electrical cables are clean and not damaged.	
(4)	Make sure the oil hoses are not damaged.	
(5)	Make sure the fuel pipes/hoses are not damaged.	
(6)	Make sure that all drains and vents are not damaged or blocked.	
(7)	Make sure that all the flexible hoses are clean and not damaged.	

B. Equipment

Item	Quantity	Part Number
Hoist.	1	Commercial.
Engine sling.	1	Commercial.
Airplane jacks.	3	Commercial.
Nose trestle.	1	Commercial.
Wing trestles.	2	Commercial.
Torque wrench.	1	Commercial.

C. Install the Engine with the Engine Mount

	Detail Steps/Work Items	Key Items/References
	WARNING: DO NOT GO UNDER THE ENGINE WHILE IT IS HELD BY THE ENGINE HOIST. IF THE HOIST FAILS, THE ENGINE CAN FALL AND CAUSE INJURY TO PERSONS.	
(1)	Move the engine and engine mount into position with the hoist: – Locate the engine mount pads onto the mounting studs. – Gently move the engine mount aft until the mounting pads are correctly located against the firewall.	Make sure that all electrical cables, control cables and other items are correctly positioned.

	Detail Steps/Work Items	Key Items/References
(2)	Attach the engine mount to the fuselage:	
	– Install the nuts and washers onto the top mounting studs.	Do not tighten the nuts.
	– Install the nuts and washers onto the bottom mounting studs.	Do not tighten the nuts.
	– Install the nose leg strut onto the center mounting stud.	
	– Install the washer and nut onto the center mounting stud.	Do not tighten the nuts.
(3)	Tighten the mounting nuts.	
(4)	Connect the manifold pressure pipe to the connector on the firewall.	
(5)	Move these cables into position and connect them to their related components:	
	– The engine earth cable.	At the in-line connector.
	– The generator (5 cables).	
	– The starter motor (1 cable).	At the in-line connector.
	– Fuel pressure sensor (1 cable).	
	– Oil temperature sensor.	
	– Fuel flow sensor.	
	– RPM sensor.	
	– The SlickSTART booster control unit.	
	– The voltage regulator.	
	Install the P-clamps and cable ties in the correct positions.	

	Detail Steps/Work Items	Key Items/References
(6)	Connect the cylinder-head temperature-probes: – Connect the in-line cable connector connectors. – Install the cable ties which hold the cable in the correct position.	Do this item for each cylinder head temperature-probe. Red cable to red cable and white cable to white cable.
(7)	Connect the electrical cable for the oil pressure sensor. Install the cable ties which hold the cable in the correct position.	
(8)	Install the P-clamp which attaches the breather pipe to the firewall.	Remove the caps.
(9)	Install the oil hoses from the engine to the oil filter housing.	Remove the caps. Refer to Figure 2.
(10)	Connect the fuel feed hose at the firewall.	Remove the caps.

	Detail Steps/Work Items	Key Items/References
(11)	Connect the carburetor heat control cable: – Put the control cable in position through the guide attached to the carburetor heat control assembly. – Install the lock-nut onto the control cable outer which attaches the cable to the guide and tighten the lock-nut. – Push the cable wire end through the swivel in the operating lever. – Make sure that the carburetor heat control lever in the cockpit is set to OFF. – Make sure that the carburetor heat assembly is set to the OFF position. – Move the carburetor heat control lever in the cockpit 3 mm (0.125 in) aft from OFF. – Tighten the screw in the swivel. – Install the P-clamps and cable ties which hold the control cable in the correct position. – Do a test for correct range, full and free movement of the carburetor heat control system.	Fully forward. Inlet holes fully closed. Refer to Section 76-00.
(12)	Connect the throttle cable to the carburetor: – Move the cable into position and push the cable through the bracket at the bottom of the engine. – Install the front adjustment nut and washer on the outer sheath and tighten the nut.	

	Detail Steps/Work Items	Key Items/References
(13)	Install the cable eye end onto the throttle cable: – Install the lock-nut onto the cable end. – Install the eye end onto the cable end. – Tighten the lock-nut.	Use a piece of lock-wire to make sure that the eye end is installed correctly.
(14)	Connect the cable eye end to the throttle lever at the fuel injector: – Move the attachment bolt into position in the throttle lever at the fuel injector. – Install a washer on the attachment bolt. – Install the eye end on the attachment bolt. – Install a second washer and a nut on the attachment bolt. Tighten the nut.	From the engine side.
(15)	Move the throttle control lever in the cockpit between FULL and IDLE. The throttle control must be smooth in operation with no restrictions.	
(16)	Do a test for the correct operation of the throttle control system.	Refer to Section 76-02.
(17)	Connect the mixture control cable at the fuel injector: – Move the mixture cable into position through the rubber grommets in the engine cooling baffles. – Install the top adjustment nut and washer onto the control cable outer sheath. – Push the cable through the support bracket at the bottom of the engine. – Install the bottom adjustment nut and washer on to the control cable outer sheath. Tighten the nut.	

	Detail Steps/Work Items	Key Items/References
(18)	Install the cable eye end onto the mixture cable: – Install the lock-nut on the cable. – Install the eye end on the cable. – Tighten the lock-nut.	Use a piece of lock-wire to make sure that the eye end is installed correctly.
(19)	Connect the mixture cable eye end to the mixture lever at the fuel injector: – Move the long bolt into position in the mixture lever. – Install the spacer on the long bolt. – Install the eye end on the long bolt. – Install the nut and washer on the long bolt. Tighten the nut.	From inboard.
(20)	Move the mixture control lever in the cockpit between RICH and LEAN CUT-OFF. The mixture control must be smooth in operation with no restrictions.	
(21)	Do a test for correct operation of the mixture control.	Refer to Section 76-02.
(22)	Install the propeller (if necessary).	Refer to Section 61-12.
(23)	Connect the EGT probe electrical cables: – Connect the in-line connectors. – Install the cable ties which hold the cables in the correct position.	Do this item for each of the EGT probes. Yellow cable to yellow cable and red cable to red cable.
(24)	Do an oil level check.	Refer to Section 12-10.
(25)	Do an inspection of all the controls that you have disconnected. If necessary, for your Airworthiness Authority, do a second inspection of all the controls that you have disconnected.	

	Detail Steps/Work Items	Key Items/References
(26)	Connect the spark plug cables to the spark plugs.	Make sure that the spark plug cables are connected to the correct spark plugs. Torque hand tight, then 1/16 to 1/8 turn with a wrench.
(27)	Install the airplane battery.	Refer to Section 24-31.
(28)	Install the engine cowlings.	Refer to Section 71-12.
(29)	Remove the airplane trestles.	
(30)	Lower the airplane with the jacks.	Refer to Section 07-10.
(31)	Do an engine test.	Refer to Paragraph 5.

6. Engine Test General

These procedures tell you how to do an engine test. For more data on the engine and engine performance testing, refer to the Lycoming Operator's Manual.

A. Equipment

Item	Quantity	Part Number
Airplane chocks.	2	Commercial.
Fuel sample kit.	1	Commercial.

B. Preparation

	Detail Steps/Work Items	Key Items/References
	WARNING: DO NOT LET PERSONS INTO THE SAFETY RANGE OF THE AIRPLANE. PROPELLERS CAN CAUSE INJURY OR DEATH.	
(1)	Look in the airplane records for reports of problems.	
(2)	Position the airplane on level ground. Make sure that: – There are no loose stones on the ground near the propeller. – The safety zone around the airplane is clear. – The airplane heads into the wind.	Refer to Figure 6.
(3)	Do a test of a sample of fuel for contamination.	Refer to Section 12-10
(4)	Put chocks in front of each main wheel.	
(5)	Remove the Pitot probe cover.	

	Detail Steps/Work Items	Key Items/References
(6)	Make sure that there is enough fuel for the engine test: – Set the ALT/BAT switch to ON. – Read the fuel quantity indicator. – Set the ALT/BAT switch to OFF. – Refuel the airplane if necessary.	
(7)	Read the engine oil contents. Add oil if necessary.	Refer to Section 12-10.

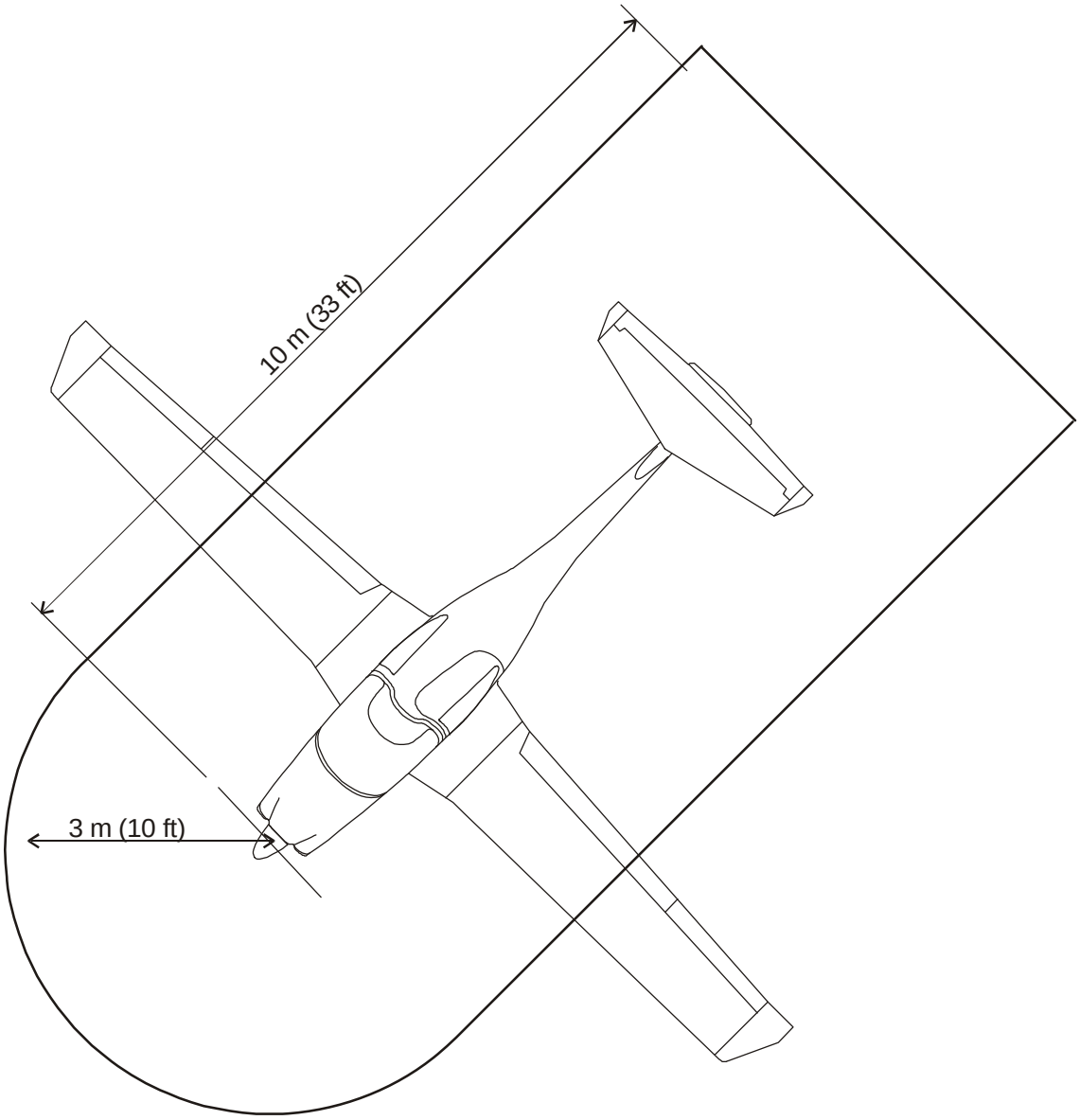


Figure 6: Safety Range for Engine Start and Test

7. Engine Starting

See the Lycoming Operator's Manual for operating limits.

	Detail Steps/Work Items	Key Items/References
(1)	Enter the cockpit.	
(2)	Set the parking brake to ON.	
(3)	Make sure that the fuel selector/shut-off valve is set to LEFT or RIGHT.	
(4)	Set the fuel selector valve as required.	
(5)	Make sure that the passenger door is closed and locked. Close and lock the canopy.	
(6)	Make sure that: – The throttle lever is free to move. – The mixture lever is free to move.	
(7)	Set the ALT/BAT switch to ON.	
(8)	Make sure that the engine indicator display panel reads correctly.	
(9)	Do a test of the annunciator panel.	Refer to Section 31-50.
(10)	Set the carburetor heat control to OFF.	
(11)	Set the electrical fuel pump to ON. Listen for the fuel pump working, Make sure that: – The fuel pressure increases.	
(12)	Set the throttle to 1/4 open.	
(13)	Prime the engine: – If the engine is cold, set the mixture control to full RICH and push the primer button for 1 to 4 seconds. – If the engine is warm, set the mixture control to full RICH.	
(14)	Press on both brake pedals together and hold the flying controls in neutral.	

	Detail Steps/Work Items	Key Items/References
(15)	Make sure the area of the propeller is clear.	
(16)	Turn the ignition switch to the START position.	Make sure that the engine start light comes on.
(17)	When the engine starts: – Release the ignition switch to the BOTH position.	Make sure that the engine start light goes out.
(18)	Set the throttle to give 1000 - 1200 RPM.	Make sure that there are no warning lights on.
(19)	Monitor the oil pressure.	The oil pressure must rise to 25 PSI minimum, within 30 seconds of starting the engine. If it does not, then you must shut-down the engine.
(20)	Set the electrical fuel pump to OFF.	
(21)	Set the throttle to give 1500 RPM.	Warm up the engine until the oil temperature reaches 100 °F (37.8 °C). Monitor the instruments for unusual indications.

8. Measure/Adjust Engine Performance

A. Measure Engine Performance

	Detail Steps/Work Items	Key Items/References
(1)	Set the engine to 1800 RPM.	
(2)	Do a test of the left magneto: – Set the ignition switch to L. – Set the ignition switch to BOTH.	 The RPM must decrease by 50 - 175 RPM. The RPM must return to 1800 RPM.
(3)	Do a test of the right magneto: – Set the ignition switch to R. – Set the ignition switch to BOTH.	 The RPM must decrease by 50 - 175 RPM. The RPM must return to 1800 RPM. The maximum difference between the left and right magneto RPM drop is 50 RPM.
(4)	Do a test of the carburetor heat: – Set the carburetor heat control to ON for 10 - 15 seconds. – Set the carburetor heat control to OFF.	 The RPM must decrease by 50 RPM. The RPM must return to 1800 RPM.
(5)	Do a test of engine static RPM: – Set the throttle control to FULL. – Set the throttle to IDLE.	 Note the engine RPM. It must reach a minimum of 2200 RPM, depending on environmental factors, e.g. Temperature, ambient air pressure and in particular head- or tailwind components. Headwind will cause a higher RPM than tailwind.

	Detail Steps/Work Items	Key Items/References
	Note: Operate the engine at up to 2000 RPM for 20 to 30 seconds before each measurement. This will allow the engine to stabilize between measurements.	
(6)	Measure the idle RPM.	
	– Make sure that the oil temperature is at least 175 °F (79.4 °C). If it is not, operate the engine at up to 2000 RPM until the oil temperature is 175 °F (79.4 °C).	Low oil temperature can change the idle RPM.
	– Make sure that the mixture control lever is set to full RICH.	Fully forward.
	– Set the throttle to IDLE. Make a note of the idle RPM.	Allow the RPM to become stable. See Paragraph 6.B for the idle RPM adjustment procedure.
	Note: Operate the engine at up to 2000 RPM for 20 to 30 seconds before each measurement. This will allow the engine to stabilize between measurements.	
(7)	Measure the idle control mixture setting:	
	– Make sure that the oil temperature is at least 175 °F (79.4 °C). If it is not, operate the engine at up to 2000 RPM until the oil temperature is 175 °F (79.4 °C).	
	– Make sure that the mixture control lever is set to full RICH.	Fully forward.
	– Set the throttle to IDLE.	Allow the idle RPM to become stable.
	– Move the mixture control lever smoothly towards the LEAN position.	If the idle RPM increases by more than 50 RPM before decreasing then the mixture is too rich. If the idle RPM decreases immediately, then the mixture is too lean.
	– Move the mixture control lever to the full RICH position before the engine stops.	See Paragraph 6.C for the idle mixture adjustment.

	Detail Steps/Work Items	Key Items/References
(8)	Do a test of the function of the fuel selector/shut-ff valve: – Set the engine to 1000 - 1200 RPM. – Set the fuel shut-off valve to OFF. – Set the fuel shut-off valve to ON. – Set the ignition to OFF.	The engine must stop within 2 minutes.
(9)	Start the engine.	Refer to Paragraph 7.

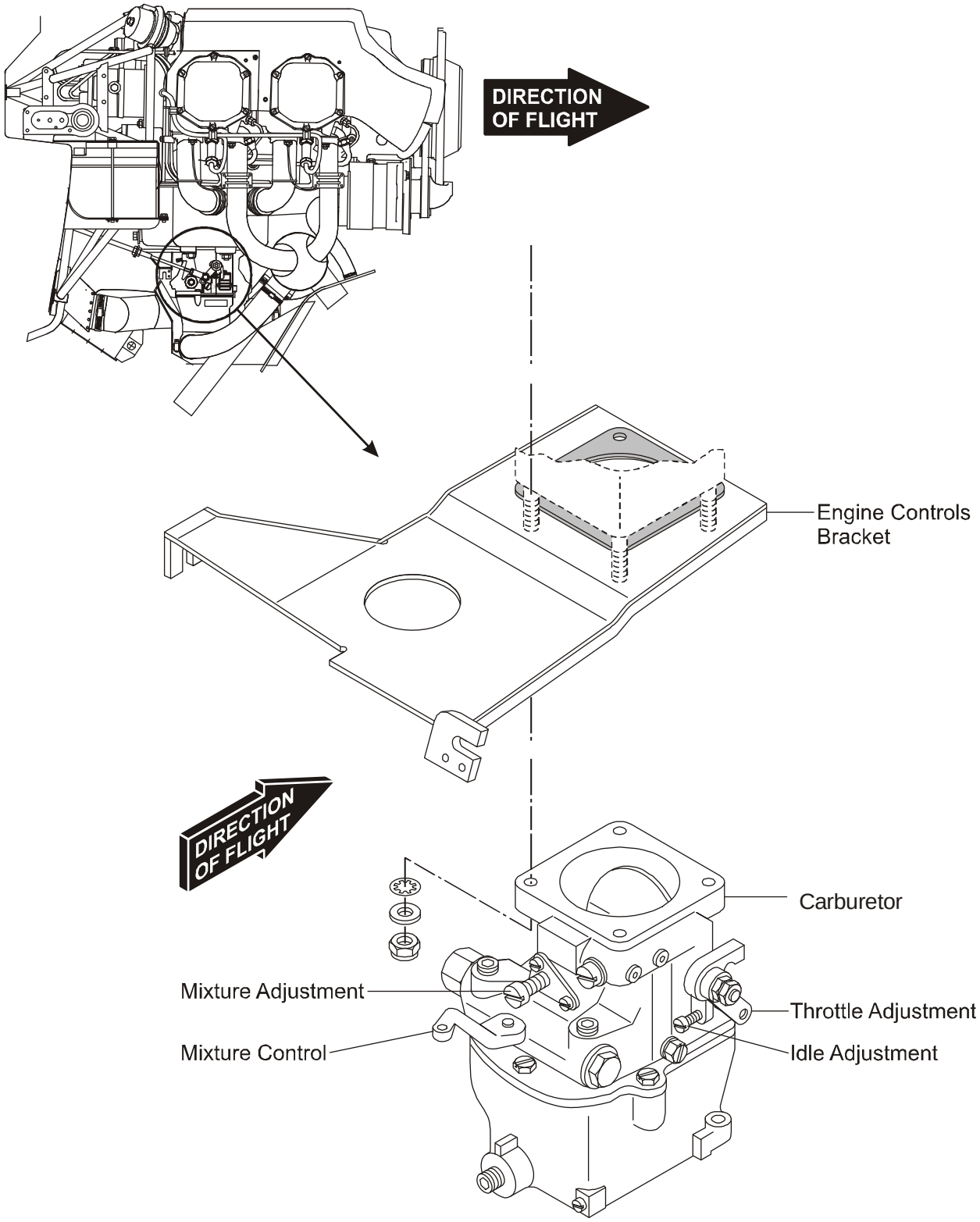


Figure 7: Adjust the Idle/Mixture at the Carburetor

B. Adjust the Engine Idle Speed

	Detail Steps/Work Items	Key Items/References
	Note: Do this work quickly. If the oil temperature is less than 175 °F (79.4 °C), it can change the idle RPM.	
(1)	Shut down the engine.	Refer to Paragraph 9.
(2)	Remove the engine cowlings.	Refer to Section 71-12.
(3)	Set the throttle lever to IDLE.	Make sure that the throttle lever at the carburetor is against the throttle stop screw. If the throttle lever at the carburetor is NOT against the idle stop screw, adjust the throttle control, see Section 76-02.
(4)	Start the engine.	Refer to Paragraph 7.
(5)	Set the mixture control to full RICH.	
(6)	Operate the engine at 1500 RPM until it runs smoothly.	Obey the operating limits in the Lycoming Operator's Manual.
(7)	Set the throttle to IDLE.	Allow the idle RPM to become stable.
(8)	Make a note of the difference in idle RPM with the engine cowlings removed.	
(9)	Shut down the engine.	Refer to Paragraph 9.
	WARNING: DO NOT TOUCH THE EXHAUST SYSTEM. THE EXHAUST IS VERY HOT, IT CAN BURN SKIN AND IT CAN BURN CLOTHING.	
(10)	Adjust the idle-stop screw on the carburetor.	Turn the screw clockwise to increase idle RPM. Turn the screw counter-clockwise to decrease idle RPM.
(11)	Start the engine.	Refer to Paragraph 7.
(12)	Measure the idle RPM.	Refer to Paragraph 8.A. Make an allowance for the difference in idle RPM with the cowlings removed.
(13)	Repeat items 9 to 12 as necessary.	
(14)	Shut down the engine.	Refer to Paragraph 9.
(15)	Install the cowlings.	Refer to Section 71-12.

C. Adjust the Engine Mixture Control

Do this item only if a test shows that the mixture is incorrect.

	Detail Steps/Work Items	Key Items/References
	Note: Do this work quickly. If the oil temperature is less than 80 °C (176 °F), it can change the idle RPM.	
(1)	Shut-down the engine.	Refer to Paragraph 9.
(2)	Remove the engine cowlings.	Refer to Section 71-12.
(3)	Start the engine.	Refer to Paragraph 7.
(4)	Set the mixture control to fully RICH.	Fully forward.
(5)	Operate the engine at 1500 RPM until it runs smoothly.	Obey the operating limits in the Lycoming Operator's Manual.
(6)	Set the throttle to IDLE.	Allow the idle RPM to become stable.
(7)	Make a note of the difference in RPM with the engine cowlings removed.	
(8)	Shut-down the engine.	Refer to Paragraph 9.
	WARNING: DO NOT TOUCH THE EXHAUST SYSTEM. THE EXHAUST IS VERY HOT, IT CAN BURN SKIN AND IT CAN BURN CLOTHING.	
(9)	Adjust the mixture on the carburetor.	If you turn the thumb-screw to make the linkage shorter, you make the mixture more lean. If you turn the thumb-screw to make the linkage longer, you make the mixture more rich.
	Note: Make sure that the idle RPM is within limits. Make an allowance for the difference in idle RPM with the engine cowlings removed. The idle RPM can change when you adjust the mixture. If the idle RPM is not in limits, adjust the idle RPM. See Paragraph 8.B.	
(10)	Start the engine.	Refer to Paragraph 7.
(11)	Measure the mixture control setting.	Refer to Paragraph 8.A.
(12)	Repeat items 8 to 11 as necessary.	
(13)	Shut-down the engine.	Refer to Paragraph 9.

	Detail Steps/Work Items	Key Items/References
(14)	Install the cowlings.	Refer to Section 71-12.
(15)	Start the engine.	Refer to Paragraph 7.
(16)	Measure the mixture control setting.	Refer to Paragraph 8.A.
(17)	Shut-down the engine.	Refer to Paragraph 9.

9. Engine Shut-Down

	Detail Steps/Work Items	Key Items/References
(1)	Set the mixture control to fully RICH.	Fully forward.
(2)	Set the throttle lever to IDLE.	Fully back. Let the engine idle until the cylinder head temperature decreases.
(3)	Set 1000 RPM with the throttle lever.	
(4)	Move the mixture control to fully LEAN.	The engine must stop within 5 seconds.
(5)	Set the ALT/BAT switch to OFF.	

10. After Engine Shut-Down

	Detail Steps/Work Items	Key Items/References
(1)	Read the engine oil level. Add oil if necessary.	Refer to Section 12-10.
(2)	Look under the bottom cowling for signs of oil leaks and signs of fuel leaks.	
(3)	Install the Pitot probe cover.	

11. Engine Break-In

You must do this procedure after a new engine has been installed. Refer to Lycoming Service Instruction No. 1427, latest issue.

	Detail Steps/Work Items	Key Items/References
(1)	Do a careful pre-flight inspection.	Refer to Airplane Flight Manual.
(2)	Do a normal take-off. – Mixture control lever . . . . . RICH – Throttle . . . . . MAX PWR	 Reduce to 2400 RPM as soon as possible.
	CAUTION: CLIMB WITH A SMALL CLIMB ANGLE TO AVOID ENGINE OVER-HEATING.	
(3)	Climb to an altitude which is suitable for cruise.	Stay below 5000 ft.
	CAUTION: AVOID LOW MANIFOLD PRESSURE DURING HIGH ENGINE SPEEDS.	
(4)	Cruise for 2 hours and 30 minutes. – Cruise at 75 % power during the first hour. – Change power setting a few times between 65 % and 75 % during the second hour. – Cruise with 2400 RPM and full throttle during the last 30 minutes.	
	CAUTION: DESCEND AT A MODERATE RATE AND LOW CRUISE POWER SETTINGS.	
(5)	Descend and land.	Refer to Airplane Flight Manual.

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Section 71-10
Engine Cowlings - Lycoming IO-360-M1A Engine

1. General

The DA 40 has two glass fiber reinforced plastic (GFRP) panels which make the engine cowlings. A top cowling and a bottom cowling. GFRP is very strong and is easy to maintain. The cowlings give a good aerodynamic shape to the nose of the airplane. They are very easy to remove and give good access to the engine.

Refer to Section 51-20 for repair data for the cowlings. Refer to Section 51-60 for data on the quick-release fasteners.

2. Description

Figure 1 shows the cowlings.

Quick-release fasteners attach the cowlings to each other and to the fuselage. Both the cowlings are very light and one person can hold them easily.

The top cowling has a small access panel for the engine oil filler and dipstick. The access panel attaches to the top cowling with a hinge.

The bottom cowling has the air intakes. The left intake gives cooling air for the engine. The right intake supplies air for the engine, the oil cooler, cabin heating, battery cooling, and alternator cooling. A special “Y” connector attaches to the inside of the cowling at the oil cooler air intake. The “Y” connector supplies cooling air for the alternator and it supplies air for the exhaust-heat-exchanger. A quick-release fastener attaches the “Y” connector to the bottom cowling. The cowling has an air intake at the bottom-center for the fuel injector.

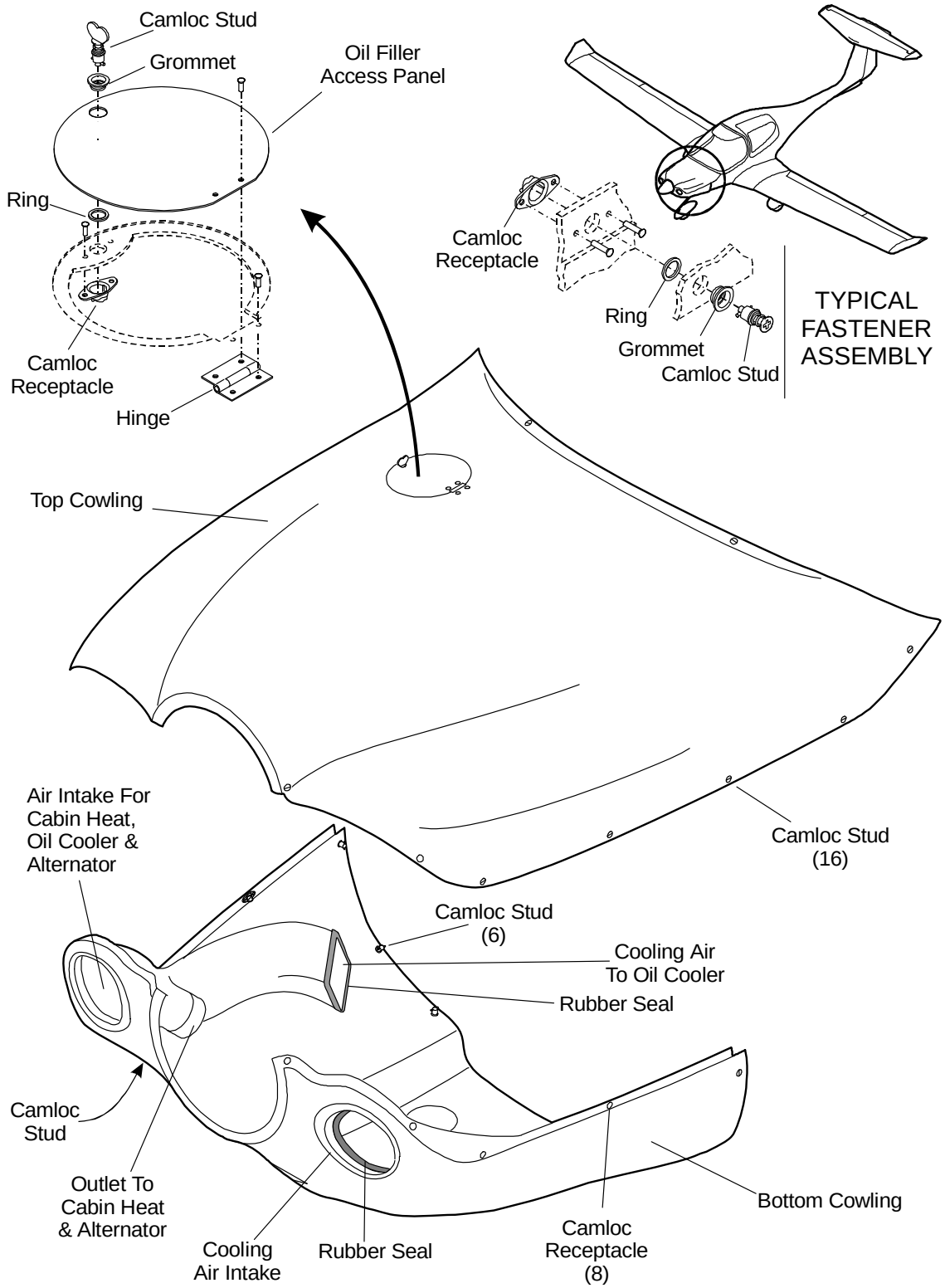


Figure 1: Engine Cowlings

Trouble-Shooting

1. General

The table below lists the defects you could have with the engine cowlings. If you have the trouble detailed in the Trouble column read across to the Possible Cause column. Then do the repair in the Repair column.

Trouble	Possible Cause	Repair
Outer surface of the cowling discoloured. Paint blistered. Black soot on the inner surface.	Engine overheating. Hot gas leak. Engine fire.	Examine the engine for hot gas leaks. Examine the exhaust for cracks and leaking gaskets. Replaced damage items. Repaint the cowlings.
Oil/fuel on the inner surface of the cowling.	Oil/fuel leak.	Examine the engine. Look specially for oil/fuel leaks. Correct problems which you have found. Clean the cowling.

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Maintenance Practices

1. General

This Section contains the Maintenance Practices for the cowlings. It tells you how to remove/install the cowlings. It also tells you how to clean and paint the cowlings.

2. Remove the Engine Cowlings

A. Remove the Top Cowling

	Detail Steps/Work Items	Key Items/References
(1)	Release the quick-release fasteners which hold the top cowling.	Refer to Figure 1.
(2)	Pull the side of the cowling gently outwards and upwards.	
(3)	Move the top cowling away from the airplane.	

B. Remove the Bottom Cowling

	Detail Steps/Work Items	Key Items/References
	WARNING: YOU MUST MAKE SURE THAT THE ENGINE IS SAFE BEFORE YOU TURN THE PROPELLER. MAKE SURE THAT THE IGNITION SWITCH IS SET TO "OFF". SET THE THROTTLE TO "IDLE" AND THE MIXTURE CONTROL TO "LEAN CUT-OFF".	
(1)	Turn the propeller backwards until the top blade is vertical.	
(2)	Release the quick-release fastener which holds the "Y" connector to the bottom cowling.	Refer to Figure 1.
(3)	Remove the "Y" connector from the intake: – Pull the "Y" connector aft and clear of the intake tube.	From the inside of the cowling.
(4)	Release the quick-release fasteners which hold the bottom cowling.	Hold the bottom cowling!
(5)	Remove the bottom cowling: – Lower the rear of the cowling. – Move the cowling down and aft. – Move the cowling clear of the exhaust and away from the airplane.	Take great care not to catch the cowling on the propeller! Take care not catch the cowling on the exhaust.

3. Install the Engine Cowlings

A. Install the Bottom Cowling

	Detail Steps/Work Items	Key Items/References
(1)	Examine the bottom cowling. Make sure that: – The cowling is clean. – The cowling is not damaged. – The quick-release fasteners are not missing/damaged.	 Repair any damage. Replace missing/damaged fasteners.
(2)	Lift the cowling into position: – Move the cowling into position around the exhaust outlet. – Move the cowling upwards. – Locate the front of the cowling over the injector air inlet. – Lift the back of the cowling into position. – Tighten the quick-release fasteners.	 Take care not to catch the cowling on the exhaust outlet. Take great care not to catch the cowling on the propeller!
(3)	Install the “Y” connector: – Move the “Y” connector into position over the air intake. – Engage and tighten the quick-release fastener which attaches the connector to the bottom cowling.	

B. Install the Top Cowling

	Detail Steps/Work Items	Key Items/References
(1)	Examine the top cowling. Make sure that: – The cowling is clean. – The cowling is not damaged. – The quick-release fasteners are not missing/damaged.	 Repair any damage. Replace missing/damaged fasteners.
(2)	Move the top cowling into position over the engine.	
(3)	Gently pull the edges of the cowling apart and lower the cowling into position.	
(4)	Tighten the quick-release fasteners.	

4. Cleaning and Painting

A. Clean the Cowling

	Detail Steps/Work Items	Key Items/References
(1)	Wash the outer surface with a mixture of water and a mild detergent.	Obey the detergent manufacturer's instructions.
(2)	Wash the inner surface with a mixture of water and a mild detergent.	Obey the detergent manufacturer's instructions.
	CAUTION: DO NOT USE POLISH CONTAINING SILICONE. SILICONE MAKES GFRP REPAIR DIFFICULT.	
(3)	Polish the outer surface with wax polish.	Obey the polish manufacturer's instructions. Do not use silicone polish.

B. Paint the Inside of the Cowling

This Paragraph gives the data for painting the inside of the engine cowlings with fire protection paint. Refer to Section 51-20 for repairs and painting the outside of the cowlings.

	Detail Steps/Work Items	Key Items/References
(1)	Clean the inside of the cowling.	
(2)	Make the area rough for painting.	Use 150-320 grade wet and dry paper.
	WARNING: DO NOT GET ACETONE ON YOUR SKIN. ACETONE CAN CAUSE SKIN DISEASE. **WARNING: DO NOT BREATHE ACETONE FUMES. ACETONE FUMES CAN CAUSE ILLNESS.** CAUTION: REMOVE ACETONE AS SOON AS POSSIBLE FROM GFRP. ACETONE CAN CAUSE THE RESIN TO SOFTEN AND FAIL.	
(3)	Clean the area for painting.	Use acetone.
(4)	Paint the inside of the cowling with fire protection paint.	Obey the paint manufacturer's instructions.

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Section 71-11
Engine Cowlings - TAE 125 Diesel Engines

1. General

The DA 40 has two carbon fiber reinforced plastic (CFRP) panels which make the engine cowlings. A top cowling and a bottom cowling. CFRP is very strong and is easy to maintain. The cowlings give a good aerodynamic shape to the nose of the airplane. They are very easy to remove and give good access to the engine.

Refer to Section 51-20 for repair data for the cowlings. Refer to Section 51-60 for data on the quick-release fasteners.

2. Description

The cowlings are shown in Figure 1 and 2.

Camloc quick-release fasteners attach the cowlings to each other and to the fuselage. Both the cowlings are very light and one person can hold them easily.

The top cowling has a small access panel for the engine oil filler. The access panel attaches to the top cowling with a hinge.

The top cowling also has two air intakes. The left intake gives cooling air for the engine cooling system radiator. The right intake supplies air for the engine intercooler.

The bottom cowling allows access to the oil level window in the reduction gear. It has an air intake for the oil radiator at the bottom. It also has air intakes for the cabin heat heat-exchanger and the engine air filter on the right side.

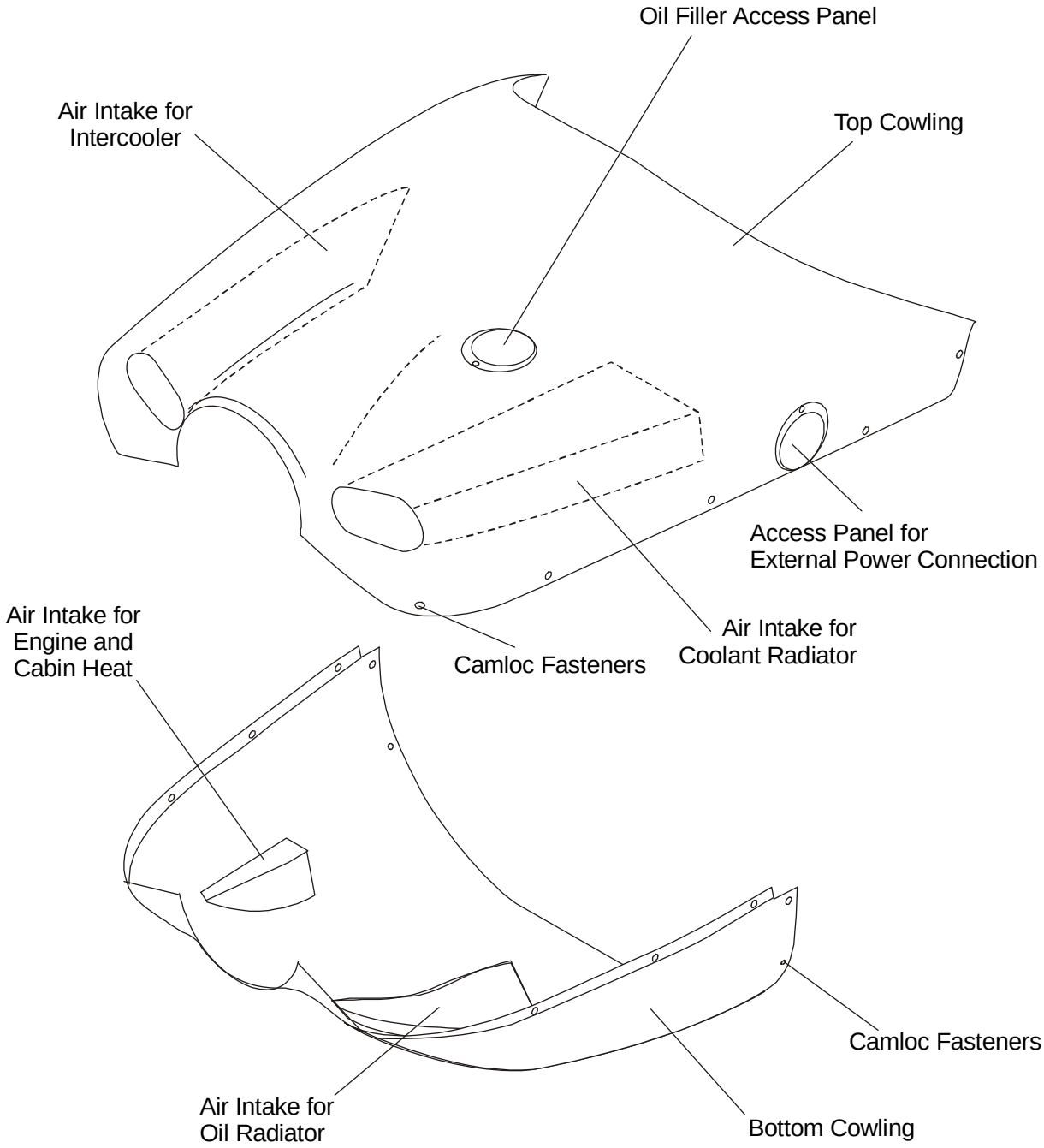


Figure 1: TAE 125-01 Engine Cowlings

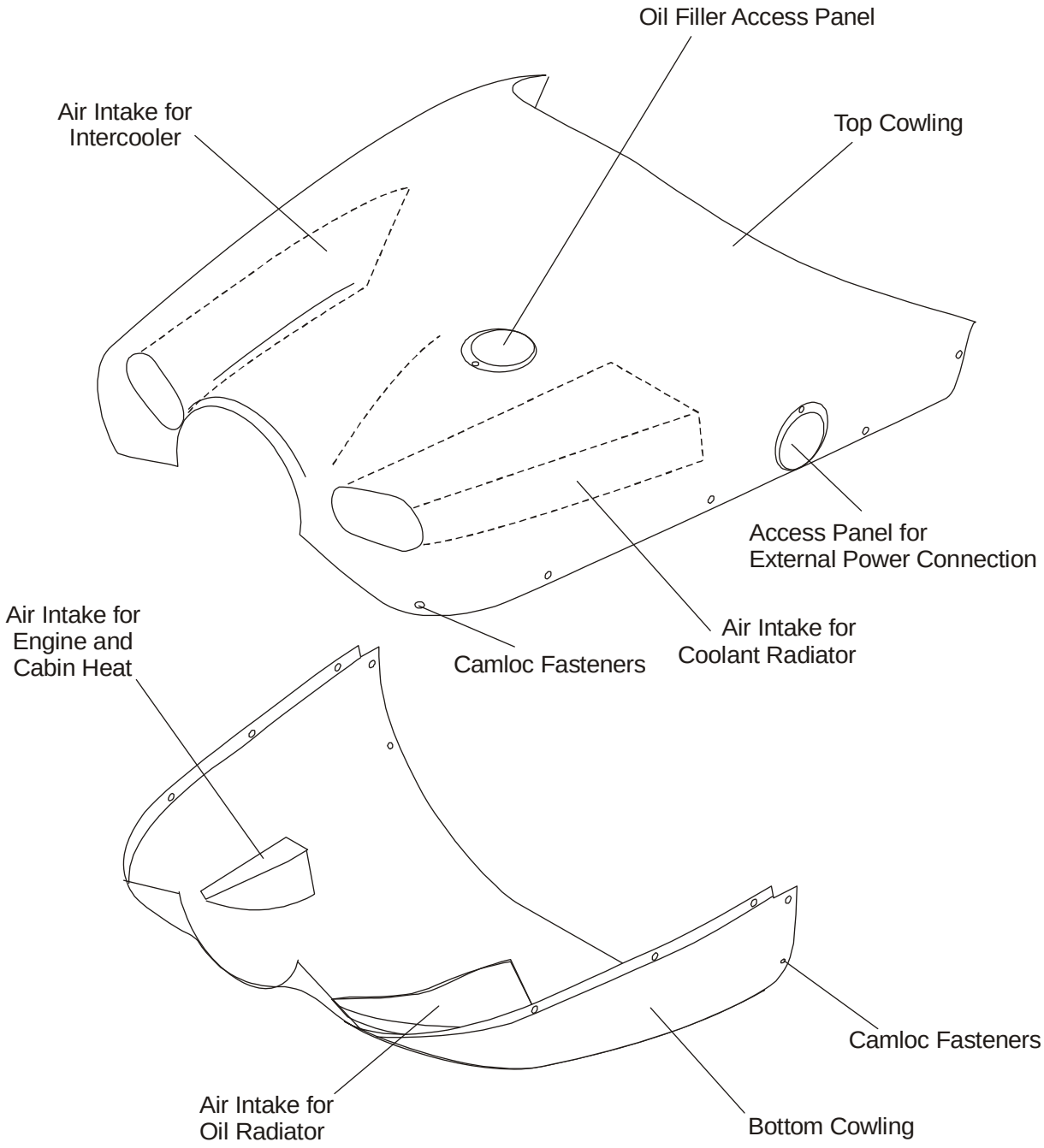


Figure 2: TAE 125-02-99 Engine Cowlings (if MÄM 40-256 installed)

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Trouble-Shooting

1. General

The table below lists the defects you could have with the engine cowlings. If you have the trouble detailed in the Trouble column read across to the Possible Cause column. Then do the repair in the Repair column.

Trouble	Possible Cause	Repair
Outer surface of the cowling discolored. Paint blistered. Black soot on the inner surface.	Engine overheating. Hot gas leak. Engine fire.	Examine the engine for hot gas leaks. Examine the exhaust for cracks and leaking gaskets. Replaced damage items. Repaint the cowlings.
Oil/fuel/coolant on the inner surface of the cowling.	Oil, fuel or coolant leak.	Examine the engine. Look specially for oil, fuel and coolant leaks. Correct problems which you have found. Clean the cowling.

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Maintenance Practices

1. General

This Section contains the Maintenance Practices for the cowlings. It tells you how to remove/install the cowlings. It also tells you how to clean and paint the cowlings.

2. Remove the Engine Cowlings

A. Remove the Top Cowling

WARNING: YOU MUST MAKE SURE THAT THE ENGINE IS SAFE BEFORE YOU WORK NEAR TO THE PROPELLER.
- SET THE ELECTRIC MASTER KEY SWITCH TO "OFF".
- SET THE ENGINE MASTER SWITCH TO "OFF".
- SET THE POWER LEVER TO "IDLE".

	Detail Steps/Work Items	Key Items/References
(1)	Release the quick-release fasteners which hold the top cowling.	Refer to Figure 1 and 2.
(2)	Pull the side of the cowling gently outwards and upwards.	
(3)	Move the top cowling away from the airplane.	

B. Remove the Bottom Cowling

	Detail Steps/Work Items	Key Items/References
(1)	Release the quick-release fasteners which hold the bottom cowling.	Hold the bottom cowling!
(2)	Remove the bottom cowling: – Lower the rear of the cowling. – Move the cowling down and forward. – Move the cowling clear of the airplane.	Take care not to catch the cowling on the propeller!

3. Install the Engine Cowlings

A. Install the Bottom Cowling

	Detail Steps/Work Items	Key Items/References
(1)	Examine the bottom cowling. Make sure that: – The cowling is clean. – The cowling is not damaged. – The quick-release fasteners are not missing/damaged.	 Repair any damage. Replace missing/damaged fasteners.
(2)	Lift the cowling into position: – Move the cowling upwards. – Lift the cowling fully into position. – Tighten the quick-release fasteners.	 Take care of the air inlets. Engage the respective shrouds

B. Install the Top Cowling

	Detail Steps/Work Items	Key Items/References
(1)	Examine the top cowling. Make sure that: – The cowling is clean. – The cowling is not damaged. – The quick-release fasteners are not missing/damaged.	 Repair any damage. Replace missing/damaged fasteners.
(2)	Move the top cowling into position.	
(3)	Gently pull the edges of the cowling apart and lower the cowling into position.	
(4)	Tighten the quick-release fasteners.	

4. Cleaning and Painting

A. Clean the Cowling

	Detail Steps/Work Items	Key Items/References
(1)	Wash the outer surface with a mixture of water and a mild detergent.	Obey the detergent manufacturer's instructions.
(2)	Wash the inner surface with a mixture of water and a mild detergent.	Obey the detergent manufacturer's instructions.
	CAUTION: DO NOT USE POLISH CONTAINING SILICONE. SILICONE MAKES GFRP REPAIR DIFFICULT.	
(3)	Polish the outer surface with wax polish.	Obey the polish manufacturer's instructions. Do not use silicone polish.

B. Paint the Inside of the Cowling

This Paragraph gives the data for painting the inside of the engine cowlings with fire protection paint. Refer to Section 51-20 for repairs and painting the outside of the cowlings.

	Detail Steps/Work Items	Key Items/References
(1)	Clean the inside of the cowling.	
(2)	Make the area rough for painting.	Use 150-320 grade wet and dry paper.
	WARNING: DO NOT GET ACETONE ON YOUR SKIN. ACETONE CAN CAUSE SKIN DISEASE. **WARNING: DO NOT BREATHE ACETONE FUMES. ACETONE FUMES CAN CAUSE ILLNESS.** CAUTION: REMOVE ACETONE AS SOON AS POSSIBLE FROM GFRP. ACETONE CAN CAUSE THE RESIN TO SOFTEN AND FAIL.	
(3)	Clean the area for painting.	Use acetone.
(4)	Paint the inside of the cowling with fire protection paint.	Obey the paint manufacturer's instructions.

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Section 71-12
Engine Cowlings - Lycoming O-360-A4M Engine

1. General

The DA 40 F has two glass fiber reinforced plastic (GFRP) panels which make the engine cowlings. A top cowling and a bottom cowling. GFRP is very strong and is easy to maintain. The cowlings give a good aerodynamic shape to the nose of the airplane. They are very easy to remove and give good access to the engine.

Refer to Section 51-20 for repair data for the cowlings. Refer to Section 51-60 for data on the quick-release fasteners.

2. Description

Figure 1 shows the cowlings.

Quick-release fasteners attach the cowlings to each other and to the fuselage. Both the cowlings are very light and one person can hold them easily.

The top cowling has two small access panels for the engine oil filler and dipstick. The access panels attach to the top cowling with hinges.

The bottom cowling has the air intakes. The upper intakes give cooling air for the engine. The intake on the bottom provides the air for the engine, the cooling air for the oil cooler and the cabin heating air.

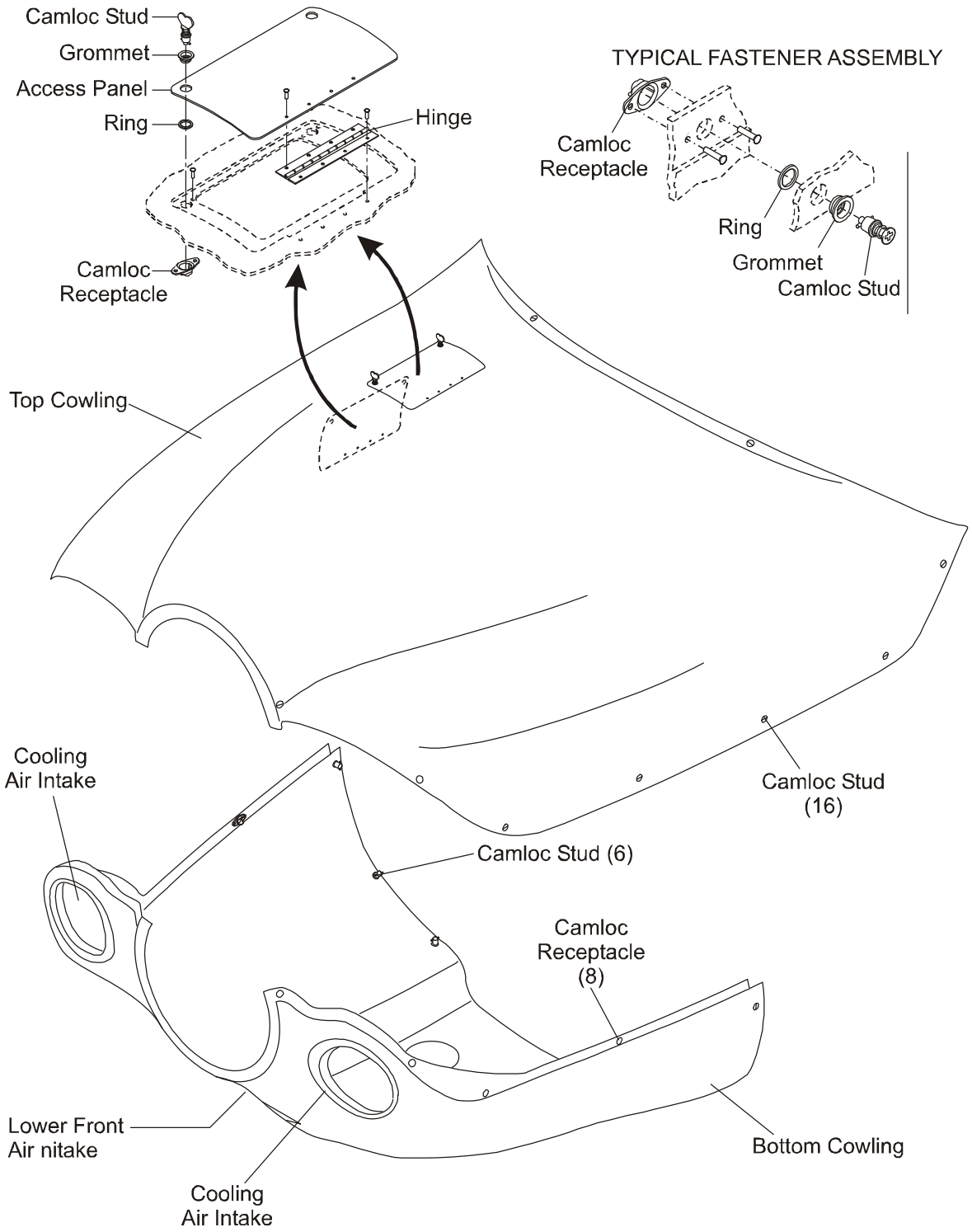


Figure 1: Engine Cowlings

Trouble-Shooting

1. General

The table below lists the defects you could have with the engine cowlings. If you have the trouble detailed in the Trouble column read across to the Possible Cause column. Then do the repair in the Repair column.

Trouble	Possible Cause	Repair
Outer surface of the cowling discoloured. Paint blistered. Black soot on the inner surface.	Engine overheating. Hot gas leak. Engine fire.	Examine the engine for hot gas leaks. Examine the exhaust for cracks and leaking gaskets. Replaced damage items. Repaint the cowlings.
Oil/fuel on the inner surface of the cowling.	Oil/fuel leak.	Examine the engine. Look specially for oil/fuel leaks. Correct problems which you have found. Clean the cowling.

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Maintenance Practices

1. General

This Section contains the Maintenance Practices for the cowlings. It tells you how to remove/install the cowlings. It also tells you how to clean and paint the cowlings.

2. Remove the Engine Cowlings

A. Remove the Top Cowling

	Detail Steps/Work Items	Key Items/References
(1)	Release the quick-release fasteners which hold the top cowling.	Refer to Figure 1.
(2)	Pull the side of the cowling gently outwards and upwards.	
(3)	Move the top cowling away from the airplane.	

B. Remove the Bottom Cowling

	Detail Steps/Work Items	Key Items/References
	WARNING: YOU MUST MAKE SURE THAT THE ENGINE IS SAFE BEFORE YOU TURN THE PROPELLER. MAKE SURE THAT THE IGNITION SWITCH IS SET TO "OFF". SET THE THROTTLE TO "IDLE" AND THE MIXTURE CONTROL TO "LEAN CUT-OFF".	
(1)	Turn the propeller backwards until the top blade is vertical.	
(2)	Release the quick-release fasteners which hold the bottom cowling.	Hold the bottom cowling!
(3)	Remove the bottom cowling: – Lower the rear of the cowling. – Move the cowling down and aft. – Move the cowling clear of the exhaust and away from the airplane.	 Take great care not to catch the cowling on the propeller! Take care not catch the cowling on the exhaust.

3. Install the Engine Cowlings

A. Install the Bottom Cowling

	Detail Steps/Work Items	Key Items/References
(1)	Examine the bottom cowling. Make sure that: – The cowling is clean. – The cowling is not damaged. – The quick-release fasteners are not missing/damaged.	 Repair any damage. Replace missing/damaged fasteners.
(2)	Lift the cowling into position: – Move the cowling into position around the exhaust outlet. – Move the cowling upwards. – Locate the front of the cowling over the injector air inlet. – Lift the back of the cowling into position. – Tighten the quick-release fasteners.	 Take care not to catch the cowling on the exhaust outlet. Take great care not to catch the cowling on the propeller!

B. Install the Top Cowling

	Detail Steps/Work Items	Key Items/References
(1)	Examine the top cowling. Make sure that: – The cowling is clean. – The cowling is not damaged. – The quick-release fasteners are not missing/damaged.	 Repair any damage. Replace missing/damaged fasteners.
(2)	Move the top cowling into position over the engine.	
(3)	Gently pull the edges of the cowling apart and lower the cowling into position.	
(4)	Tighten the quick-release fasteners.	

4. Cleaning and Painting

A. Clean the Cowling

	Detail Steps/Work Items	Key Items/References
(1)	Wash the outer surface with a mixture of water and a mild detergent.	Obey the detergent manufacturer's instructions.
(2)	Wash the inner surface with a mixture of water and a mild detergent.	Obey the detergent manufacturer's instructions.
	CAUTION: DO NOT USE POLISH CONTAINING SILICONE. SILICONE MAKES GFRP REPAIR DIFFICULT.	
(3)	Polish the outer surface with wax polish.	Obey the polish manufacturer's instructions. Do not use silicone polish.

B. Paint the Inside of the Cowling

This Paragraph gives the data for painting the inside of the engine cowlings with fire protection paint. Refer to Section 51-20 for repairs and painting the outside of the cowlings.

	Detail Steps/Work Items	Key Items/References
(1)	Clean the inside of the cowling.	
(2)	Make the area rough for painting.	Use 150-320 grade wet and dry paper.
	WARNING: DO NOT GET ACETONE ON YOUR SKIN. ACETONE CAN CAUSE SKIN DISEASE. **WARNING: DO NOT BREATHE ACETONE FUMES. ACETONE FUMES CAN CAUSE ILLNESS.** CAUTION: REMOVE ACETONE AS SOON AS POSSIBLE FROM GFRP. ACETONE CAN CAUSE THE RESIN TO SOFTEN AND FAIL.	
(3)	Clean the area for painting.	Use acetone.
(4)	Paint the inside of the cowling with fire protection paint.	Obey the paint manufacturer's instructions.

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Section 71-20
Engine Mounting - Lycoming Engine

1. General

Tubular steel makes the engine mount. The engine mount has welded joints. Paint protects the frame from corrosion. Rubber lined P-clamps and cable ties hold electrical cables and other items of equipment to the engine mount.

The engine mounting -frame has five small mounting pads at the rear of the frame. Bolts through the pads attach the engine mount to the fuselage. The center mounting also supports the elastomer pack for the nose gear leg.

The engine attaches to the engine mount at four mounting pads. Shock mounts go between the engine and the engine mount pads. These shock mounts isolate the airframe from engine vibrations.

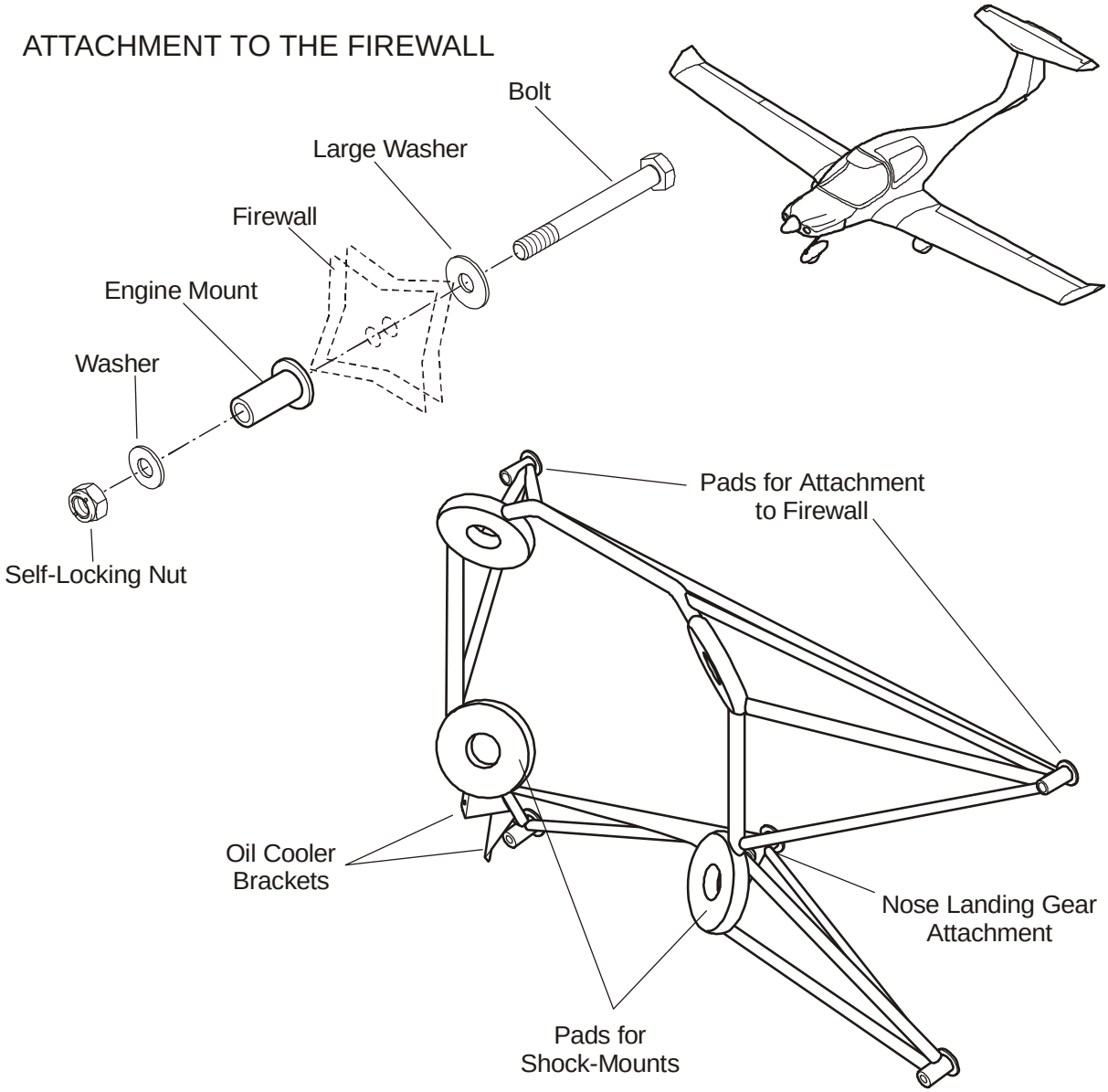


Figure 1: Engine Mount Assembly

Trouble-Shooting

1. General

The table below lists the defects you could have with the engine mounting. If you have the trouble detailed in the Trouble column read across to the Possible Cause column. Then do the repair in the Repair column.

Trouble	Possible Cause	Repair
Engine vibration.	Cracked engine mount.	Do a test for cracked tubes. Look specially at the welded joints.
	Defective shock mounts.	Install new shock mounts.

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Maintenance Practices

1. General

The Maintenance Practices for the engine mount are limited to removal/installation. If the engine mount is damaged it must be repaired by an authorized repair facility.

2. Remove/Install the Engine Mount

A. Equipment

Item	Quantity	Part Number
Hoist.	1	Commercial.
Engine sling.	1	Commercial.
Engine stand.	1	Commercial.
Airplane jacks.	3	Commercial.
Nose trestle.	1	Commercial.
Wing trestle.	2	Commercial.

B. Remove the Engine Mount.

	Detail Steps/Work Items	Key Items/References
(1)	Lift the airplane on jacks and make the airplane level.	Refer to Section 07-10.
(2)	Move the wing trestles into position.	Refer to Section 07-10.
	WARNING: MAKE SURE THAT THE ENGINE IS SAFE BEFORE YOU DO ANY WORK ON THE PROPELLER. IF THE ENGINE IS TURNED, THE PROPELLER CAN CAUSE INJURY OR DEATH.	
(3)	Set the fuel selector/shut-off valve to OFF.	
(4)	Make sure that the engine is safe: – Set the ignition switch to OFF. – Set the throttle to IDLE. – Set the mixture control to LEAN CUT-OFF.	

	Detail Steps/Work Items	Key Items/References
(5)	Remove the propeller (if necessary).	Refer to Section 61-00.
(6)	Remove the engine.	Refer to Section 71-00.
(7)	Disconnect the elastomer pack for the nose gear leg from the engine mount: – Support the weight of the nose gear leg. – Remove the bolt and washer from the elastomer pack eye end.	This bolt also holds the engine mount.
(8)	Remove the SlickSTART booster control unit or LASAR control unit from the engine mount: – Remove the two nuts, bolts and washers which attach the control unit. – If the LASAR system is installed, then remove the manifold pressure hose from the control unit.	Note the position of the earth cable.
(9)	Remove the voltage regulator from the engine mount: – Remove the 4 nuts and washers which attach the voltage regulator to the engine mount.	
(10)	Remove the four nuts and washers which attach the engine mount to the fuselage. Move the engine mount clear of the airplane.	Hold the engine mount.

C. Install the Engine Mount

	Detail Steps/Work Items	Key Items/References
(1)	Make sure that the engine mount is clean and not damaged.	
(2)	Move the engine mount into position on the firewall.	
(3)	Install the four outer bolts which attach the engine mount to the fuselage: – Install the washers on the bolts. – Push the bolts through the firewall and mounting pads. – Install the washers and new self-locking nuts on the bolts.	Torque: 40 Nm (29.5 lbf.ft.).
(4)	Attach the elastomer pack for the nose gear leg to the engine mount: – Move the eye end into position (in line with the center mounting pad for the engine mount). – Install the washer on the mounting bolt. – Push the center mounting bolt through the firewall, the mounting pad and the eye end. – Install the distance bushing and new self-locking nut onto the bolt.	Torque: 60 Nm (44.3 lbf.ft.).

	Detail Steps/Work Items	Key Items/References
(5)	Install the SlickSTART booster control unit or LASAR control unit: – Move the control unit into position on the engine mount. – Move the earth cable into position. – Install the washers onto the bolts – Push the bolts through the control unit and the mount. – Install the earth cable onto the top mounting bolt. – Install the washers and nuts onto the bolts. – If the LASAR system is installed, then connect the manifold pressure hose to the connector on the LASAR control unit.	
(6)	Install the voltage regulator onto the engine mount: – Put the voltage regulator into position on the engine mount. – Install the 4 washers and nuts which attach the voltage regulator to the engine mount. – Tighten the nuts.	

Section 71-21
Engine Mounting - TAE 125 Diesel Engines

1. General

Tubular steel makes the engine mount. The engine mount has welded joints. Powder coating protects the frame from corrosion. Welded brackets hold components such as the coolant radiator and the intercooler. Rubber lined P-clamps and cable ties hold electrical cables and other items of equipment to the engine mount.

The engine mounting-frame has five small mounting pads at the rear of the frame. Bolts through the pads attach the engine mount to the fuselage. The center mounting also supports the elastomer pack for the nose gear leg.

The engine attaches to the engine mount at three mounting pads. Large gel-filled rubber shock-mounts go between the engine and the engine mount pads. These shock-mounts isolate the airframe from engine vibrations.

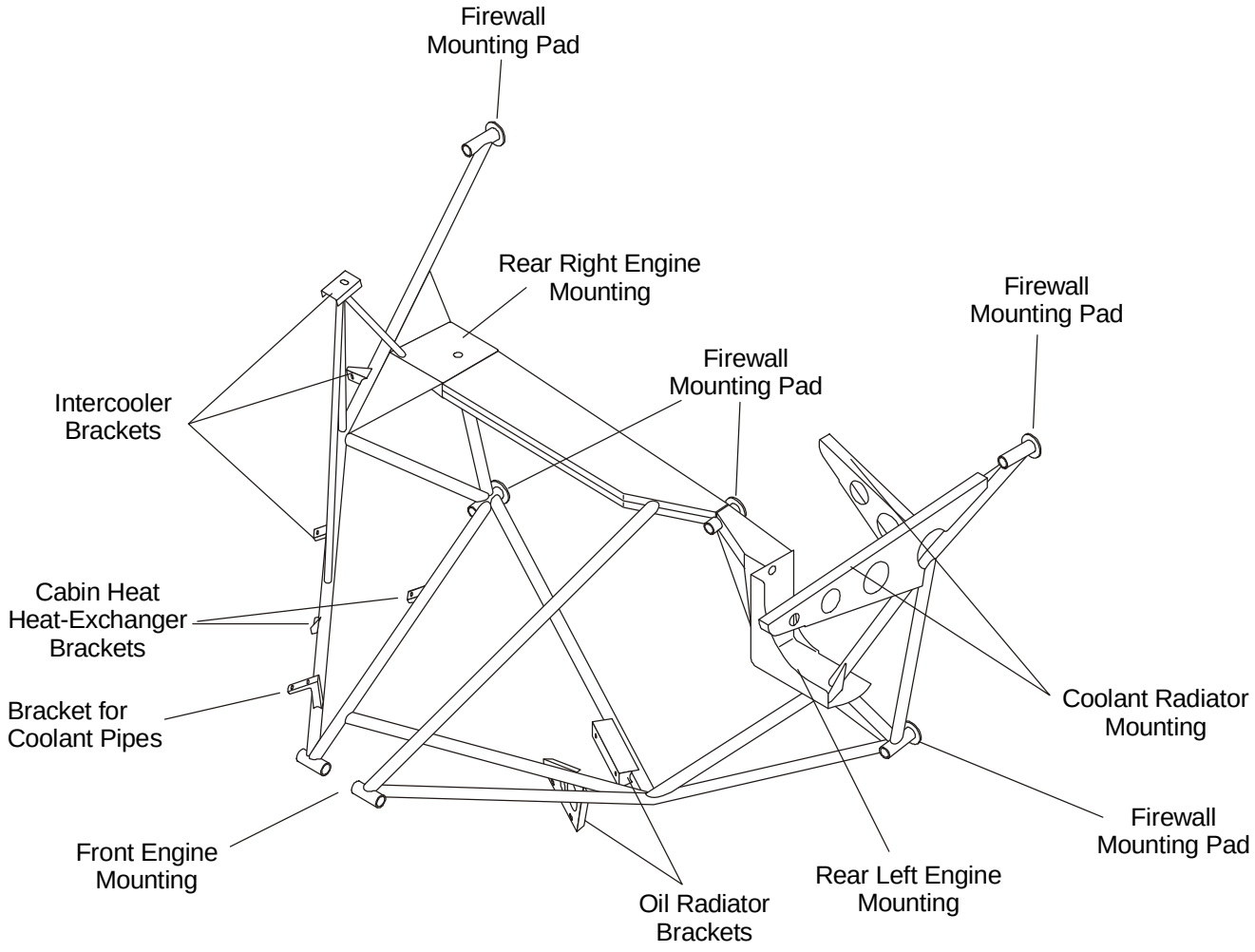


Figure 1: Engine Mount Assembly

Trouble-Shooting

1. General

The table below lists the defects you could have with the engine mounting. If you have the trouble detailed in the Trouble column read across to the Possible Cause column. Then do the repair in the Repair column.

Trouble	Possible Cause	Repair
Engine vibration.	Cracked engine mount.	Do a test for cracked tubes. Look specially at the welded joints.
	Defective shock mounts.	Refer to the engine manufacturer.

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Maintenance Practices

1. General

The Maintenance Practices for the engine mount are limited to removal/installation. If the engine mount is damaged it must be repaired by an authorized repair facility.

2. Remove/Install the Engine Mount

A. Equipment

Item	Quantity	Part Number
Hoist.	1	Commercial.
Engine sling.	1	Commercial.
Engine stand.	1	Commercial.
Tail trestle.	1	Commercial.

B. Remove the Engine Mount

(1) TAE 125-01 Engine

	Detail Steps/Work Items	Key Items/References
(1)	Remove the engine.	Refer to Section 71-01.
(2)	Release all clamps, clips and ties holding the electrical harness and hoses to the engine mount.	
(3)	Remove the oil radiator: – Disconnect the oil hoses at the oil radiator. – Remove the bolts, nuts and washers holding the oil radiator to the engine mount. – Move the oil radiator clear of the engine mount.	

	Detail Steps/Work Items	Key Items/References
(4)	Remove the fuel filter housing: – Disconnect the fuel lines on the rear side of the fuel filter housing. – Remove the worm-drive clamps on the fuel filter housing. – Move the filter housing clear of the engine mount.	Put caps on the open ends of the hoses.
(5)	Remove the air filter housing: – Disconnect the worm-drive clamp on the air filter and remove the air filter. – Remove the bolts, nuts and washers holding the alternate air valve to the filter housing. – Remove the bolts, nuts and washers holding the filter housing to the engine mount. – Move the filter housing clear of the engine mount.	Hold filter and worm-drive clamp.
(6)	Remove the oil separator: – Remove the bolts, nuts and washers holding the oil separator to the engine mount. – Move the oil separator clear of the engine mount together with the oil hoses.	
(7)	Remove the instrument panel cover.	To get access to the upper bolt of the engine mount. Refer to Section 25-10.
(8)	Remove the 5 nuts and washers which hold the engine mount to the fuselage. Push the bolts out of the mounting pads.	
(9)	Move the engine mount clear of the airplane.	

(2) TAE 125-02-99 Engine (if MÄM 40-256 installed)

	Detail Steps/Work Items	Key Items/References
(1)	Remove the engine.	Refer to Section 71-01.
(2)	Release all clamps, clips and ties holding the electrical harness and hoses to the engine mount.	
(3)	Remove the oil radiator: – Disconnect the oil hoses at the oil radiator. – Remove the bolts, nuts and washers holding the oil radiator to the engine mount. – Move the oil radiator clear of the engine mount.	
(4)	Remove the fuel filter housing: – Disconnect the fuel lines on the rear side of the fuel filter housing. – Remove the worm-drive clamps on the fuel filter housing. – Move the filter housing clear of the engine mount.	Put caps on the open ends of the hoses.
(5)	Remove the air filter housing: – Disconnect the worm-drive clamp on the air filter and remove the air filter. – Remove the bolts, nuts and washers holding the alternate air valve to the filter housing. – Remove the bolts, nuts and washers holding the filter housing to the engine mount. – Move the filter housing clear of the engine mount.	Hold filter and worm-drive clamp.
(6)	Remove the instrument panel cover.	To get access to the upper bolt of the engine mount. Refer to Section 25-10.

	Detail Steps/Work Items	Key Items/References
(7)	Remove the 5 nuts and washers which hold the engine mount to the fuselage. Push the bolts out of the mounting pads.	
(8)	Move the engine mount clear of the airplane.	

C. Install the Engine Mount

(1) TAE 125-01 Engine

	Detail Steps/Work Items	Key Items/References
(1)	Move the engine mount into position on the firewall.	
(2)	Install the 4 bolts which attach the engine mount to the corners of the firewall: – Install the washers on the bolts. – Push the bolts through the firewall and mounting pads. – Install the washers and self-locking nuts on the bolts.	Do not install the center mounting bolt. Use new bolts. Use new fire resistant self-locking nuts. Torque: 40 Nm (29.5 lbf.ft.).
(3)	Attach the elastomer pack for the nose landing gear leg to the engine mount: – Move the eye end into position (in line with the center mounting pad for the engine mount). – Install the washers on the bolts – Push the center mounting bolt through the firewall, the mounting pad, and the eye end. – Install the distance bushing and self-locking nut on the bolt.	 Use a new bolt. Use a new fire resistant self-locking nut. Torque: 60 Nm (44.3 lbf.ft.).

	Detail Steps/Work Items	Key Items/References
(4)	Install the air filter housing: – Move the filter housing into position on the engine mount. – Install the bolts, nuts and washers holding the filter housing to the engine mount. – Install the bolts, nuts and washers holding the alternate air valve to the filter housing. – Move the air filter into position at the alternate air valve. – Tighten worm-drive clamp on the air filter.	
(5)	Install the oil separator: – Move the oil separator into position on the engine mount. – Install the bolts, nuts and washers holding the oil separator to the engine mount.	Together with the oil hoses.
(6)	Install the instrument panel cover.	
(7)	Install the fuel filter housing: – Move the filter housing into position on the engine mount. – Install the worm-drive clamps on the fuel filter housing. – Connect the fuel lines on the rear side of the fuel filter housing.	Make sure that the feed line is connected to the 'tank' port on the filter housing.

	Detail Steps/Work Items	Key Items/References
(8)	Install the oil radiator: – Move the oil radiator into position on the engine mount. – Install the bolts, nuts and washers holding the oil radiator to the engine mount. – Connect the oil hoses at the oil radiator.	
(9)	Install the engine.	Refer to Section 71-01.

(2) TAE 125-02-99 Engine (if MÄM 40-256 installed)

	Detail Steps/Work Items	Key Items/References
(1)	Move the engine mount into position on the firewall.	
(2)	Install the 4 bolts which attach the engine mount to the corners of the firewall: – Install the washers on the bolts. – Push the bolts through the firewall and mounting pads. – Install the washers and self-locking nuts on the bolts.	Do not install the center mounting bolt. Use new bolts. Use new fire resistant self-locking nuts. Torque: 40 Nm (29.5 lbf.ft.).
(3)	Attach the elastomer pack for the nose landing gear leg to the engine mount: – Move the eye end into position (in line with the center mounting pad for the engine mount). – Install the washers on the bolts. – Push the center mounting bolt through the firewall, the mounting pad, and the eye end. – Install the distance bushing and self-locking nut on the bolt.	 Use a new bolt. Use a new fire resistant self-locking nut. Torque: 60 Nm (44.3 lbf.ft.).

	Detail Steps/Work Items	Key Items/References
(4)	Install the air filter housing: – Move the filter housing into position on the engine mount. – Install the bolts, nuts and washers holding the filter housing to the engine mount. – Install the bolts, nuts and washers holding the alternate air valve to the filter housing. – Move the air filter into position at the alternate air valve. – Tighten worm-drive clamp on the air filter.	
(5)	Install the instrument panel cover.	
(6)	Install the fuel filter housing: – Move the filter housing into position on the engine mount. – Install the worm-drive clamps on the fuel filter housing. – Connect the fuel lines on the rear side of the fuel filter housing.	Make sure that the feed line is connected to the 'tank' port on the filter housing.
(7)	Install the oil radiator: – Move the oil radiator into position on the engine mount. – Install the bolts, nuts and washers holding the oil radiator to the engine mount. – Connect the oil hoses at the oil radiator.	
(8)	Install the engine.	Refer to Section 71-01.

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Section 71-50
Electrical Cables in the Engine Compartment - Lycoming Engine

1. General

The engine compartment has a main electrical wiring harness. The harness has all of the low-power cables. There are no special Maintenance Practices for these cables. See Chapter 24 for data about the battery and alternator wiring. See Chapter 80 for more data about the starter cables. See Chapter 92 wiring diagrams for data about the cables in each system.

2. Description

Figure 1 shows the electrical cables in the rear of the engine compartment. Figure 2 shows the electrical cables on the left side of the engine and Figure 3 shows the electrical cables on the right side of the engine.

The main electrical harness comes through the firewall on the right side. P-clamps attach the main harness to the tubes of the engine mount. These electrical cables split from the harness at the rear of the engine:

– No. 2 and No. 4 cylinder CHT probe cables.

– No. 2 and No. 4 cylinder EGT probe cables.

– Power cables for the SlickSTART booster control unit or LASAR control unit.

– Cables for the voltage regulator.

– Manifold pressure sensor cable.

– Oil temperature sensor cable.

The main harness goes forward and down the right side of the engine. P-clamps attach the harness to brackets mounted on the engine sump bolts. These electrical cables split from the harness at the side of the engine:

– No. 1 and No. 3 cylinder CHT probe cables.

– No. 1 and No. 3 cylinder EGT probe cables.

– Oil pressure sensor cables (2 cables).

– Fuel pressure and fuel flow sensor cables (3 cables).

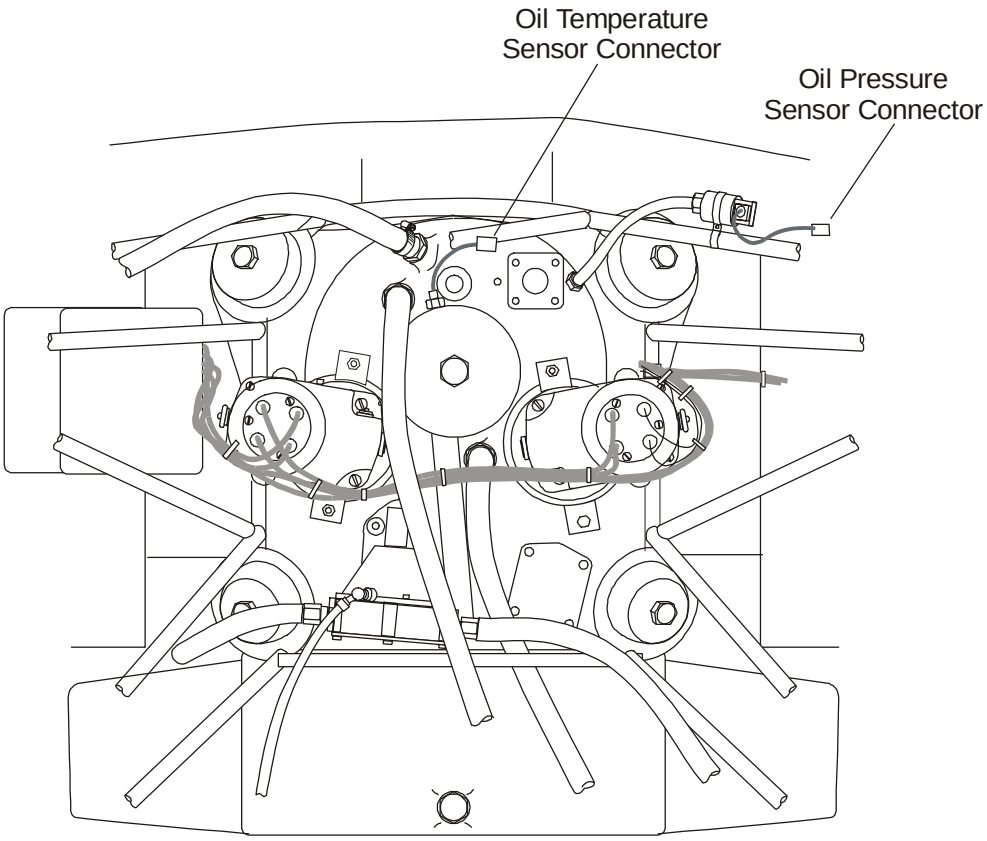


Figure 1: Electrical Cables at the Rear of the Engine Compartment

The main harness passes under and across the engine to these items:

– Alternator.

– Starter.

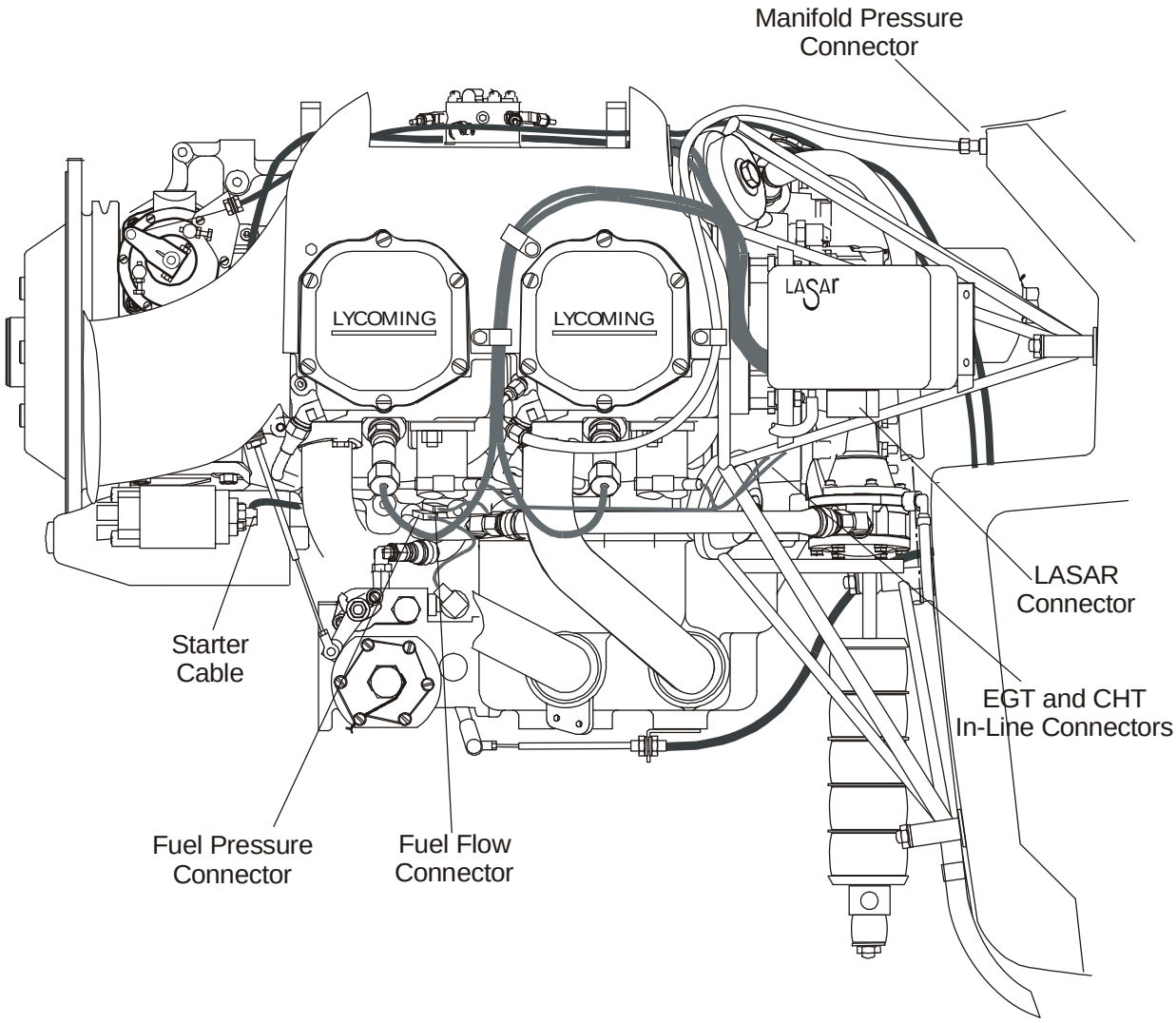


Figure 2: Electrical Cables on the Left Side of the Engine compartment

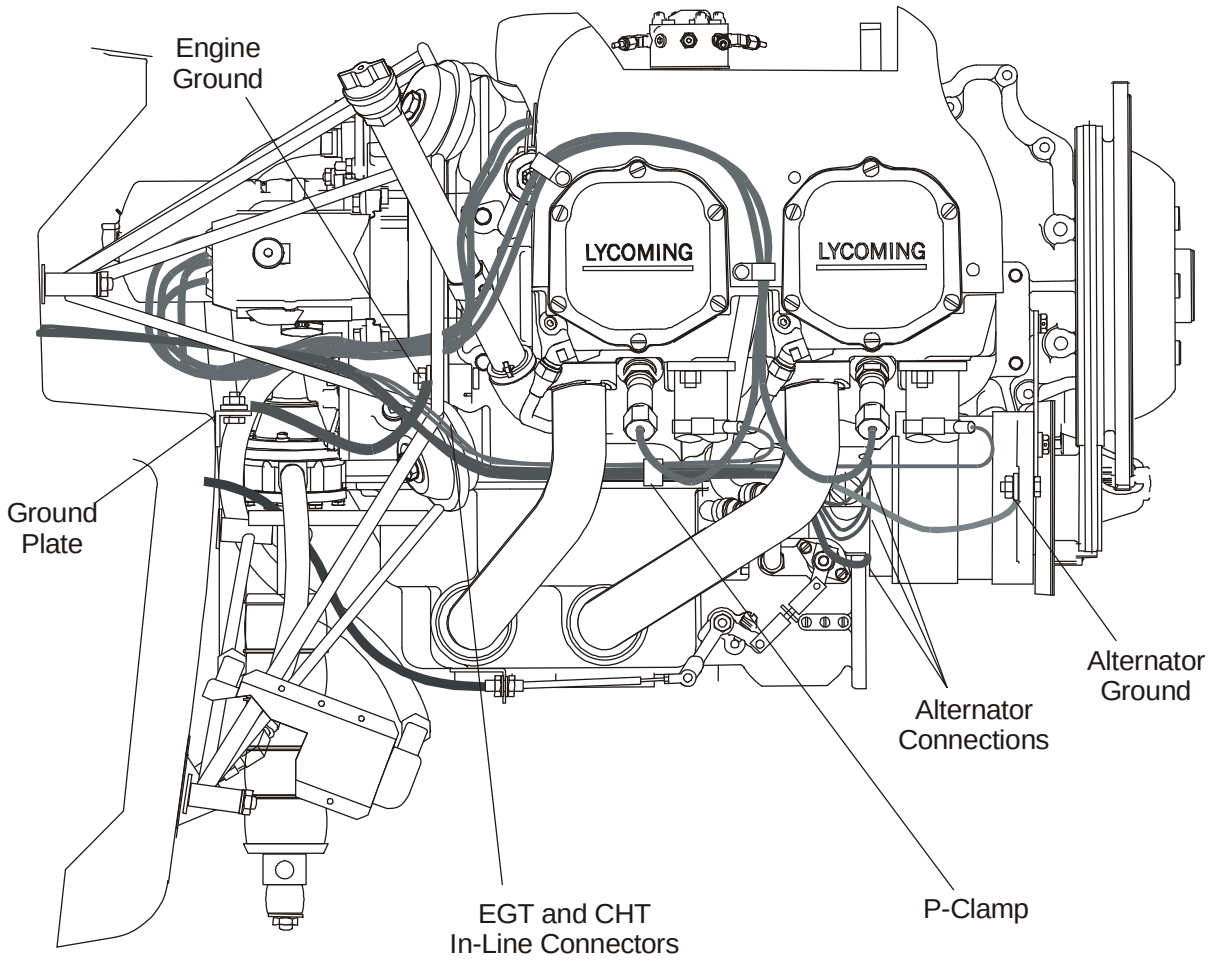


Figure 3: Electrical Cables on the Right Side of the Engine Compartment

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Section 71-51
Electrical Cables in the Engine Compartment - TAE 125 Diesel Engine

1. General

The engine compartment has a main electrical wiring harness. It is supplied as part of the engine installation. The harness has all of the low-power cables for the engine control system. It is integral with the engine control system. Refer to Section 76-01 for data about the main electrical wiring harness.

There are a small number of separate cables for the alternator and starter. See Chapter 24 for data about the battery and alternator wiring. See Chapter 80 for more data about the starter cables. See Chapter 92 wiring diagrams for data about the cables in each system.

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Section 71-60
Air Intakes - Lycoming IO-360-M1A Engine

1. General

An alternate air valve assembly, air filter housing and air filter make the engine air intake system for the DA 40 airplane. The engine bottom cowling has a molded air intake duct and a flexible seal attached to the air filter housing makes the joint between the engine cowling and the engine intake. Figure 1 shows the engine air filter and alternate air intake.

2. Description

The air intake has three main parts:

– Alternate air valve assembly.

– Air filter housing.

– Air filter.

A. Alternate Air Valve Assembly

The alternate air valve assembly has a valve body which has six air inlet holes around its circumference. A Bowden cable attaches to the valve body and rotates the valve body inside the valve flange. O-ring seals locates at each end of the valve body to make a seal between the valve body and the valve flange. A sealing compound between the fuel injector flange and the alternate air valve flange provides tight sealing and prevents the suction sleeve from vibration during engine operation.

The valve flange has six air inlet holes drilled around its circumference. A suction sleeve locates inside the valve flange and passes through the center of the alternate air valve assembly.

B. Air Filter Housing

The air filter housing has a flexible seal which makes a seal between the air intake assembly and the engine bottom cowling. The flexible seal attaches to the air filter housing with bolts. Bolts with spacers attach both the air filter housing and the alternate air valve to the fuel injector. One of the spacers has a support bracket for the Bowden cable.

C. Air Filter

The air filter has a paper type element. The air filter locates on the air filter housing and is held by a worm-drive clamp.

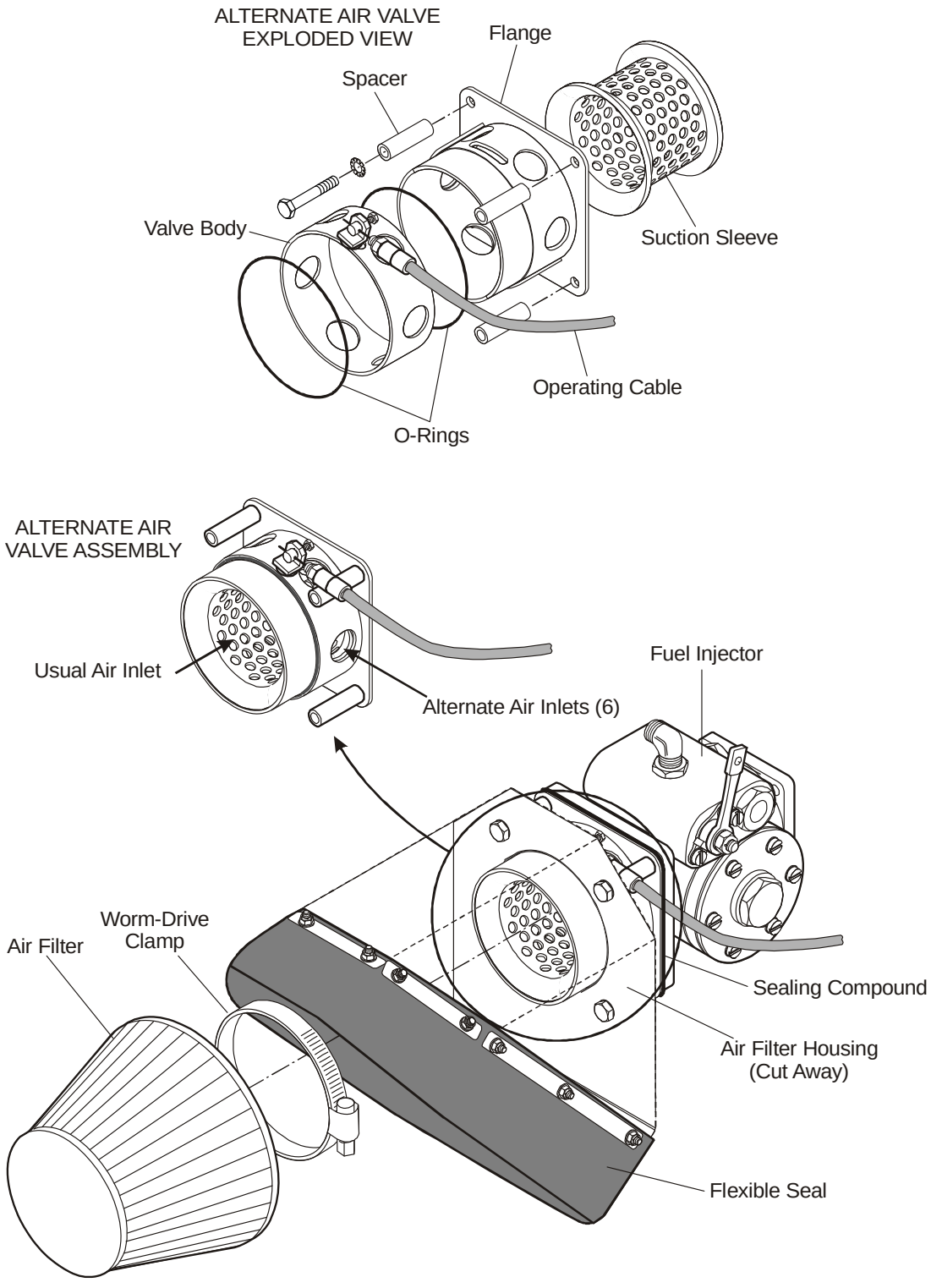


Figure 1: Engine Air Filter and Alternate Air Intake

3. Operation

Figure 2 shows the alternate air control lever in the cockpit. It is located on the left side of the center console under the instrument panel. A Bowden control cable connects the control lever in the cockpit to the alternate air valve assembly in the engine bay.

In normal operation the alternate air control lever is set to the OFF position. The holes in the alternate air valve body and the flanged housing do not align and ambient air flows through the air filter into the fuel injector.

When the alternate air control lever in the cockpit is moved to the alternate air position, the Bowden cable rotates the valve body to align the holes in the valve body with the holes in the flanged housing. Warm air from the engine bay will now flow through the alternate air valve into the fuel injector.

The alternate air valve can be selected to the alternate air position to supply warm air for anti-icing or to maintain the air supply should the air filter become blocked. The alternate air supply is not filtered.

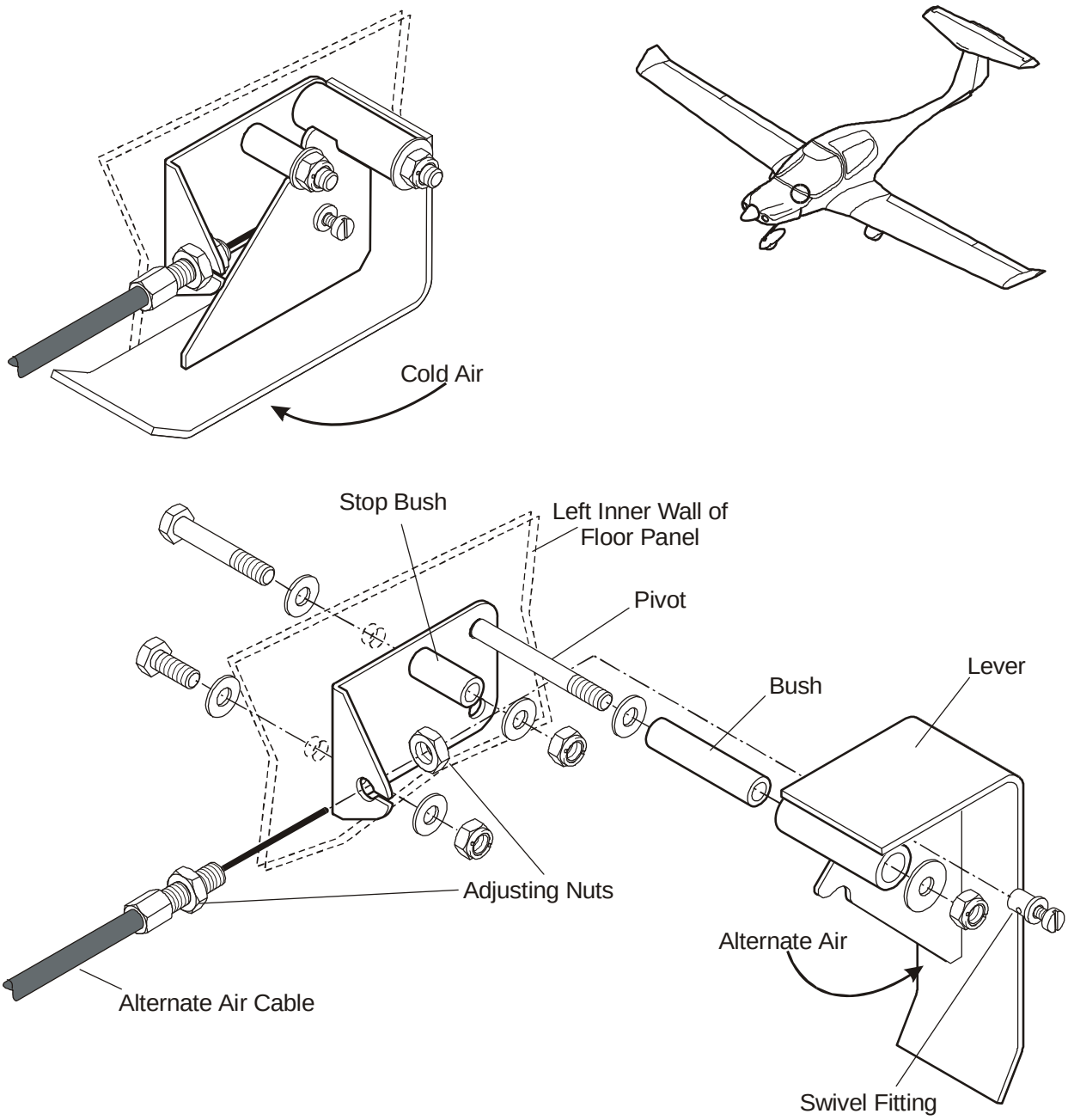


Figure 2: Alternate Air Control

Trouble-Shooting

1. General

The table below lists the defects you could have with the air intake system. If you have the trouble detailed in the Trouble column read across to the Possible Cause column. Then do the repair given in the Repair column.

Trouble	Possible Cause	Repair
Engine does not develop full power.	Air filter blocked/defective.	Replace air filter.
	Alternate air valve not closed.	Set alternate air control to OFF.
	Alternate air control incorrectly set.	Do a test of the alternate air control adjustment. Adjust the alternate air control.
	Alternate air control cable broken.	Replace alternate air control cable.
Fuel injector air intake throat is contaminated with fine aluminium particles.	Alternate air valve suction sleeve vibrates during engine operation, producing fine aluminium particles.	Replace the gasket or sealing compound between alternate air valve and the fuel injector with sealing compound.

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Maintenance Practices

1. General

These Maintenance Practices tell you how to remove and install the air filter and the alternate air valve assembly. They also tell you how to adjust, remove and install the alternate air control cable.

They do not tell you how to adjust the engine fuel injector.

Refer to the Lycoming Maintenance Manual for the data on the fuel injector.

2. Remove/Install the Air Filter

A. Remove the Air Filter

	Detail Steps/Work Items	Key Items/References
	WARNING: DO NOT STAND WITHIN THE DANGER AREA OF THE PROPELLER IF THE ENGINE STARTS, THE PROPELLER CAN CAUSE DEATH OR INJURY TO PERSONS. **WARNING: YOU MUST MAKE SURE THAT THE ENGINE IS SAFE BEFORE YOU DO WORK ON THE ENGINE CONTROLS. IF THE PROPELLER TURNS IT CAN CAUSE INJURY TO PERSONS.**	
(1)	Make sure that the engine is safe: – Set the ignition switch to OFF. – Set the throttle control to IDLE. – Set the mixture control lever to LEAN CUT-OFF.	
(2)	Remove the engine cowlings.	Refer to Section 71-10.
(3)	Disconnect the airplane battery.	Refer to Section 24-31.
(4)	Loosen the worm-drive clamp that holds the air filter to air filter housing.	
(5)	Pull the air filter forward and clear of the air filter housing.	

B. Install the Air Filter

	Detail Steps/Work Items	Key Items/References
(1)	Make sure that the worm-drive clamp is in position on the air filter.	
(2)	Put the air filter in position on the air filter housing.	
(3)	Tighten the worm-drive clamp which holds the air filter.	
(4)	Connect the airplane battery.	Refer to Section 24-31.
(5)	Install the engine cowlings.	Refer to Section 71-10.
(6)	Do an engine run-up.	Refer to the DA 40 Airplane Flight Manual.

3. Remove/Install the Alternate Air Valve

A. Remove the Alternate Air Valve

	Detail Steps/Work Items	Key Items/References
	WARNING: DO NOT STAND WITHIN THE DANGER AREA OF THE PROPELLER IF THE ENGINE STARTS, THE PROPELLER CAN CAUSE DEATH OR INJURY TO PERSONS. **WARNING: YOU MUST MAKE SURE THAT THE ENGINE IS SAFE BEFORE YOU DO WORK ON THE ENGINE CONTROLS. IF THE PROPELLER TURNS IT CAN CAUSE INJURY TO PERSONS.**	
(1)	Make sure that the engine is safe: – Set the ignition switch to OFF. – Set the throttle control to IDLE. – Set the mixture control lever to LEAN CUT-OFF.	
(2)	Remove the engine cowlings.	Refer to Section 71-10.
(3)	Disconnect the airplane battery.	Refer to Section 24-31.
(4)	Disconnect the spark plug cables from the spark plugs.	
(5)	Loosen the worm-drive clamp that holds the air filter to air filter housing.	
(6)	Pull the air filter forward and clear of the air filter housing.	

	Detail Steps/Work Items	Key Items/References
(7)	Release the alternate air control Bowden cable from the alternate air valve assembly: – Loosen the swivel fitting at the alternate air valve body. – Pull the Bowden cable wire end clear of the swivel fitting. – Remove and keep the swivel fitting. – Remove the retaining nut which holds the Bowden cable outer sheath in the support bracket at the alternate air valve spacer. – Move the Bowden cable clear of the alternate air valve.	
(8)	Remove the air filter housing and the alternate air valve: – Remove the 4 bolts which attach the air filter housing to the alternate air valve assembly. – Move the air filter housing and the alternate air valve assembly clear of the airplane.	Support the air filter housing and the alternate air valve assembly. Remove and keep the spacers as you remove the bolts.
(9)	Inspect the fuel injector inlet. If the fuel injector intake throat is contaminated with fine aluminium particles, replace the old gasket or sealing compound between the alternate air valve and the fuel injector: – Remove the old gasket or sealing compound. – Clean the alternate air valve. – Clean the fuel injector flange. – Clean the fuel injector air intake throat.	

B. Install the Alternate Air Valve

	Detail Steps/Work Items	Key Items/References
(1)	Assemble the alternate air valve: – Insert the suction sleeve into the alternative air valve housing. – Apply sealing compound onto the alternate air valve flange. The seal must be applied to both the suction sleeve flange and the alternate air valve flange. Make sure the inner 5 mm of the suction sleeve flange is free of the sealing compound.	Use Würth ‘saBesto DP 300'.
(2)	Install the air filter housing onto the alternate air valve: – Install 4 new lock-washers onto the attaching bolts. – Install the 4 bolts into air filter housing. – Install the spacers onto the 4 attaching bolts. – Put the air filter assembly in position on the alternate air valve.	Make sure that the spacer with the support bracket for the Bowden cable is correctly positioned Make sure that the bolts pass through the flange on the alternate air valve.
(3)	Move the air filter housing and alternate air valve assembly into position on the airplane so that the attaching bolts align with the threaded holes in the fuel injector.	
(4)	Tighten the 4 attaching bolts.	

	Detail Steps/Work Items	Key Items/References
(5)	Install the alternate air Bowden cable: – Install the swivel onto the alternate air valve body. – Move the Bowden cable outer sheath into position in the support bracket at the alternate air valve. – Install the retaining nut which holds the Bowden cable outer sheath in the support bracket. – Push the Bowden cable wire end through the swivel fitting. – Tighten the swivel fitting.	
(6)	Install the air filter: – Put the worm-drive clamp into position on the air filter. – Put the air filter in position on the air filter housing. – Tighten the worm-drive clamp.	
(7)	Do a test for correct range, full and free movement of the alternate air valve control system.	Refer to the Alternate Air Valve Control System Range of Movement Test in this Section.
(8)	Do an inspection of the control connections which you disconnected. If necessary, for your Airworthiness Authority, do a second inspection of the controls.	
(9)	Connect the spark plug leads to the spark plugs.	Torque to 12.4 to 13.6 Nm (110 - 120 lbf.in.).
(10)	Connect the airplane battery.	Refer to Section 24-31.
(11)	Install the engine cowlings.	Refer to Section 71-10.
(12)	Do an engine run-up.	Refer to the DA 40 Airplane Flight Manual.

4. Remove/Install the Alternate Air Valve Control Cable

A. Remove the Alternate Air Control Cable

	Detail Steps/Work Items	Key Items/References
	WARNING: DO NOT STAND WITHIN THE DANGER AREA OF THE PROPELLER IF THE ENGINE STARTS, THE PROPELLER CAN CAUSE DEATH OR INJURY TO PERSONS. **WARNING: YOU MUST MAKE SURE THAT THE ENGINE IS SAFE BEFORE YOU DO WORK ON THE ENGINE CONTROLS. IF THE PROPELLER TURNS IT CAN CAUSE INJURY TO PERSONS.**	
(1)	Make sure that the engine is safe: – Set the ignition switch to OFF. – Set the throttle control to IDLE. – Set the mixture control lever to LEAN CUT-OFF.	
(2)	Remove the engine cowlings.	Refer to Section 71-10.
(3)	Disconnect the airplane battery.	Refer to Section 24-31.
(4)	Disconnect the spark plug cables from the spark plugs.	

	Detail Steps/Work Items	Key Items/References
(5)	Release the alternate air control Bowden cable from the alternate air valve assembly: – Loosen the swivel fitting at the alternate air valve body. – Pull the Bowden cable wire end clear of the swivel fitting. – Remove and keep the swivel fitting. – Remove the retaining nut which holds the Bowden cable outer sheath in the support bracket at the alternate air valve spacer. – Move the Bowden cable clear of the alternate air valve.	Refer to Figure 1.
(6)	Remove the firewall feed-thru from the engine side of the firewall: – Remove the firewall sealant from the feed-thru. – Drill out the two rivets which hold the shields to the firewall. – Remove the shields. – Pull the 2 parts of the feed-thru clear of the firewall.	
(7)	Release the alternate air control Bowden cable from the alternate air control lever in the cockpit: – Release the screw in the swivel fitting and pull the Bowden cable wire end out from the swivel fitting. – Remove the front adjusting nut from the Bowden cable outer sheath at the control lever bracket. – Pull the Bowden cable clear from the control lever bracket.	Refer to Figure 2.

	Detail Steps/Work Items	Key Items/References
(8)	Pull the alternate air cable through the firewall from the engine bay side and clear of the airplane.	

B. Install the Alternate Air Control Cable

	Detail Steps/Work Items	Key Items/References
(1)	Put the alternate air cable through the firewall.	
(2)	Put the Bowden cable through the support bracket at the alternate air valve assembly.	Refer to Figure 1.
(3)	Install the retaining nut on the Bowden cable outer sheath.	
(4)	Put the Bowden cable wire end through the swivel fitting in the alternate air valve and tighten the swivel fitting screw.	
(5)	Put the Bowden cable through the support bracket at the alternate air control lever in the cockpit.	Refer to Figure 2.
(6)	Install the front adjusting nut to the Bowden cable outer sheath.	
(7)	Put the Bowden cable wire end through the swivel fitting on the lever and tighten the swivel fitting screw.	
(8)	Install the feed-thru to the engine side of the firewall with firewall sealant: – Put the 2 parts of the feed-thru round the Bowden cable. – Push the feed-thru in the firewall. – Put the 2 shields in position over the feed-thru. – Install 2 pop-rivets to attach the shields to the firewall.	Use PR 812 (MIL-S-38249 Type 1) firewall sealant.
(9)	Do a test for correct range, full and free movement of the alternate air control system.	Refer to the Alternate Air Valve Control Range of Movement Test in this Section.
(10)	Do an inspection of the control connections which you disconnected. If necessary, for your Airworthiness Authority, do a second inspection of the controls.	

	Detail Steps/Work Items	Key Items/References
(11)	Connect the spark plug cables to the spark plugs.	Torque to 12.4 - 13.6 Nm (110 - 120 lbf.in.).
(12)	Connect the airplane battery.	Refer to Section 24-31.
(13)	Install the engine cowlings.	Refer to Section 71-10.
(14)	Do an engine run-up.	Refer to the DA 40 Airplane Flight Manual.

5. Test/Adjust the Alternate Air Control Cable

	Detail Steps/Work Items	Key Items/References
	WARNING: DO NOT STAND WITHIN THE DANGER AREA OF THE PROPELLER IF THE ENGINE STARTS, THE PROPELLER CAN CAUSE DEATH OR INJURY TO PERSONS. **WARNING: YOU MUST MAKE SURE THAT THE ENGINE IS SAFE BEFORE YOU DO WORK ON THE ENGINE CONTROLS. IF THE PROPELLER TURNS IT CAN CAUSE INJURY TO PERSONS.**	
(1)	Make sure that the engine is safe: – Set the ignition switch to OFF. – Set the throttle control lever to IDLE. – Set the mixture control lever to LEAN CUT-OFF.	
(2)	Remove the engine cowlings.	Refer to Section 71-10.
(3)	Disconnect the battery.	Refer to Section 24-31.
(4)	Disconnect the spark plug cables from the spark plugs.	
(5)	Move the alternate air control lever from OFF to ON: – Make sure the lever moves freely with no restrictions.	
(6)	Set the alternate air control lever in the cockpit to OFF and hold it in position: – Make sure that the alternate air valve is fully closed and that the swivel fitting contacts the end of the cut-out in the alternate air flanged housing.	With the alternate air valve fully closed there must be at least 3 mm (0.125 in) clearance (bounce) between the alternate air control lever and the stop bush. Figure 2.

	Detail Steps/Work Items	Key Items/References
(7)	Set the alternate air control lever in the cockpit to ON and hold it in position: – Make sure that the alternate air control valve is in the fully open position and that the 2 rows of holes in the valve align.	
(8)	If the adjustment of the control is not correct then you must adjust the 2 adjusting nuts at the alternate air control lever in the cockpit.	
(9)	Do items 5 to 8 again as necessary to get the correct settings.	
(10)	Do an inspection of the control connections which you disconnected. If necessary for your Airworthiness Authority, do a second inspection of the controls.	
(11)	Install the cables to the spark plugs.	Torque to 12.4 - 13.6 Nm (110 - 120 lbf.in.).
(12)	Connect the airplane battery.	Refer to Section 24-31.
(13)	Install the engine cowlings.	Refer to Section 71-10.
(14)	Do an engine run-up.	Refer to the DA 40 Airplane Flight Manual.

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Section 71-61
Air Intakes - TAE 125 Diesel Engine

1. General

An air filter housing, air filter and alternate air valve assembly make the engine air intake system for the DA 40 airplane. The engine bottom cowling has a molded air intake duct and a flexible seal attached to the air filter housing. Figure 1 shows the engine air filter and alternate air valve.

2. Description

The air intake has three main parts:

– Alternate air valve assembly.

– Air filter housing.

– Air filter.

A. Alternate Air Valve Assembly

Refer to Figure 1. The alternate air valve is attached to the top face of the air filter housing. The air filter attaches to the bottom of the alternate air valve. The alternate air valve also has an inlet direct from the engine compartment. A flap in the valve can select either filtered air or warm, unfiltered air.

B. Air Filter Housing

The air filter housing is made of sheet aluminum. It has a flexible seal which makes a seal between the air intake assembly and the engine bottom cowling. Two bolts attach the air filter housing to the engine mount.

C. Air Filter

Refer to Figure 1. The air filter is a K&N RB-0700 or RD-0700 high-flow air filter. The air filter locates on the air filter housing, on the right of the engine compartment, just forward of the firewall. It is held to the bottom of an alternate air valve by a worm-drive clamp.

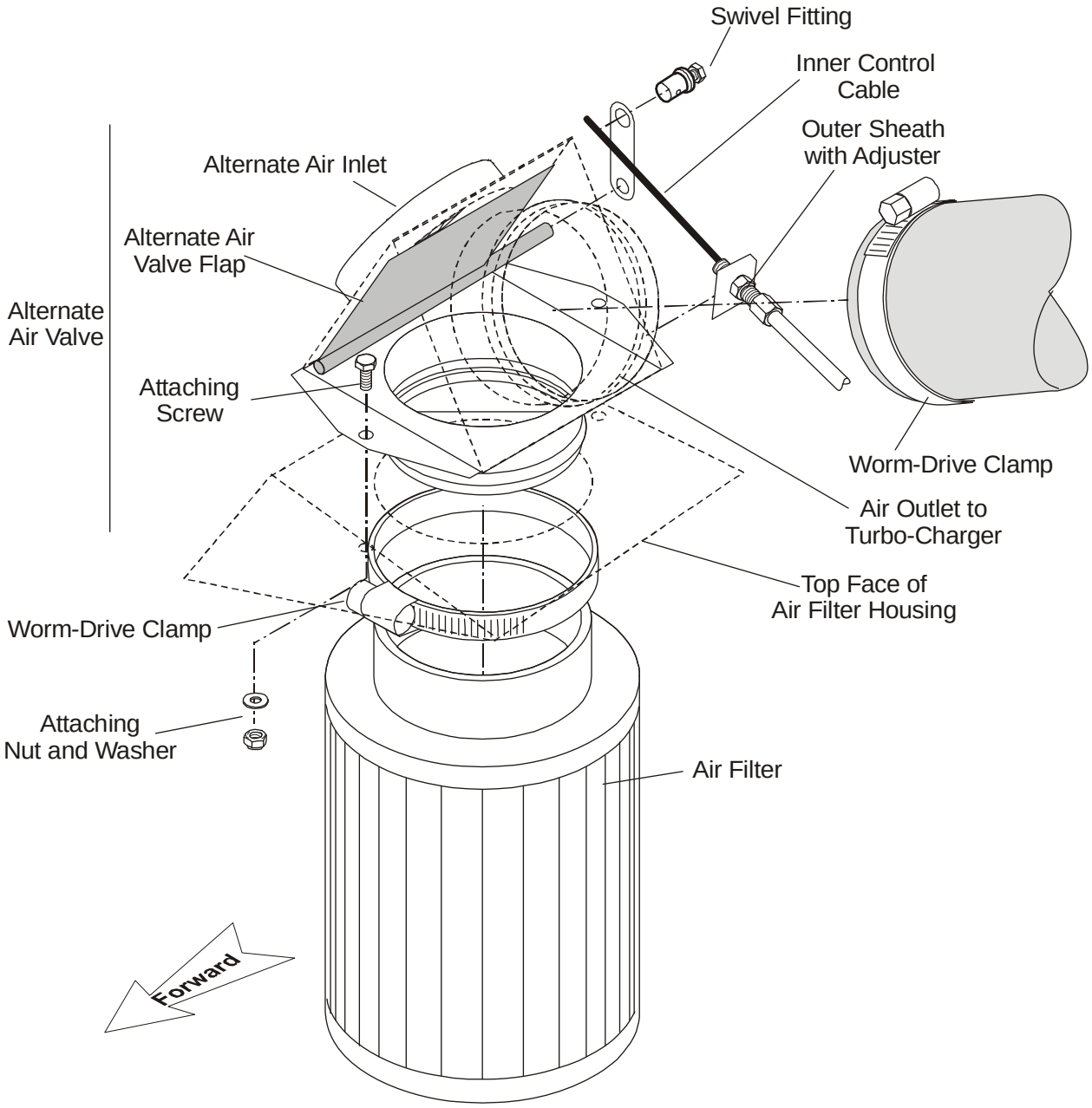


Figure 1: Engine Air Filter and Alternate Air Valve

Trouble-Shooting

1. General

The table below lists the defects you could have with the air intake system. If you have the trouble detailed in the Trouble column read across to the Possible Cause column. Then do the repair given in the Repair column.

Trouble	Possible Cause	Repair
Engine does not develop full power.	Air filter blocked/defective.	Replace air filter.

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Maintenance Practices

1. General

These Maintenance Practices tell you how to remove and install the air filter and the alternate air valve assembly. They also tell you how to adjust, remove and install the alternate air control cable.

Refer to the TAE 125-01 Operator's Manual, latest revision or TAE 125-02-99 Operator's Manual, latest revision for the data on the fuel injection system.

2. Remove/Install the Air Filter

A. Remove the Air Filter

	Detail Steps/Work Items	Key Items/References
	WARNING: DO NOT STAND WITHIN THE DANGER AREA OF THE PROPELLER. IF THE ENGINE STARTS, THE PROPELLER CAN CAUSE DEATH OR INJURY TO PERSONS. **WARNING: YOU MUST MAKE SURE THAT THE ENGINE IS SAFE BEFORE YOU DO WORK ON THE ENGINE CONTROLS. IF THE PROPELLER TURNS IT CAN CAUSE INJURY TO PERSONS.**	
(1)	Make sure that the engine is safe: – Set the ELECTRIC MASTER key switch to OFF. – Set the ENGINE MASTER switch to OFF. – Set the power lever to IDLE.	
(2)	Remove the engine cowlings.	Refer to Section 71-11.
(3)	Disconnect the airplane main battery.	Refer to Section 24-34.
(4)	Loosen the worm-drive clamp that holds the air filter to air filter housing.	Refer to Figure 1.
(5)	Pull the air filter down and clear of the air filter housing.	

B. Install the Air Filter

	Detail Steps/Work Items	Key Items/References
(1)	Make sure that the worm-drive clamp is in position on the air filter.	
(2)	Put the air filter in position on the air filter housing.	
(3)	Tighten the worm-drive clamp which holds the air filter.	Refer to Figure 1.
(4)	Connect the airplane main battery.	Refer to Section 24-34.
(5)	Install the engine cowlings.	Refer to Section 71-11.

3. Remove/Install the Alternate Air Valve

A. Remove the Alternate Air Valve

	Detail Steps/Work Items	Key Items/References
	WARNING: DO NOT STAND WITHIN THE DANGER AREA OF THE PROPELLER. IF THE ENGINE STARTS, THE PROPELLER CAN CAUSE DEATH OR INJURY TO PERSONS. **WARNING: YOU MUST MAKE SURE THAT THE ENGINE IS SAFE BEFORE YOU DO WORK ON THE ENGINE CONTROLS. IF THE PROPELLER TURNS IT CAN CAUSE INJURY TO PERSONS.**	
(1)	Make sure that the engine is safe: – Set the ELECTRIC MASTER key switch to OFF. – Set the ENGINE MASTER switch to OFF. – Set the power lever to IDLE.	
(2)	Remove the engine cowlings.	Refer to Section 71-11.
(3)	Disconnect the airplane main battery.	Refer to Section 24-34.
(4)	Loosen the worm-drive clamp that holds the air filter to the air filter housing.	Refer to Paragraph 2.
(5)	Remove the bolts, nuts and washers that hold the alternate air valve to the air filter housing.	
(6)	Disconnect the alternate air control cable.	
(7)	Disconnect the hose that connects the alternate air valve to the turbo-charger inlet: – Open the worm-drive-clamp. – Pull the hose off the valve.	At the alternate air valve.
(8)	Move the alternate air valve clear of the airplane.	

B. Install the Alternate Air Valve

	Detail Steps/Work Items	Key Items/References
(1)	Move the alternate air valve close to the engine and connect the alternate air control cable to the valve.	
(2)	Adjust the alternate air control cable.	Refer to Paragraph 5.
(3)	Install the alternate air valve on the air filter housing.	Apply fire resistant sealant (Dow Corning 736 or equivalent) between air filter housing and alternate air valve.
(4)	Connect the hose that connects the alternate air valve to the turbo-charger inlet: – Connect the hose to the valve. – Tighten the worm-drive clamp.	At the alternate air valve.
(5)	Install the air filter.	Refer to Paragraph 2.

4. Remove/Install the Alternate Air Control Cable

A. Remove the Alternate Air Control Cable

	Detail Steps/Work Items	Key Items/References
	WARNING: DO NOT STAND WITHIN THE DANGER AREA OF THE PROPELLER. IF THE ENGINE STARTS, THE PROPELLER CAN CAUSE DEATH OR INJURY TO PERSONS. **WARNING: YOU MUST MAKE SURE THAT THE ENGINE IS SAFE BEFORE YOU DO WORK ON THE ENGINE CONTROLS. IF THE PROPELLER TURNS IT CAN CAUSE INJURY TO PERSONS.**	
(1)	Make sure that the engine is safe: – Set the ELECTRIC MASTER key switch to OFF. – Set the ENGINE MASTER switch to OFF. – Set the power lever to IDLE.	
(2)	Remove the engine cowlings.	Refer to Section 71-11.
(3)	Disconnect the airplane main battery.	Refer to Section 24-34.
(4)	Remove the alternate air valve.	Refer to Paragraph 3.
(5)	Remove the firewall feed-thru from the engine side of the firewall: – Remove the firewall sealant from the feed-thru. – Drill out the two rivets which hold the shields to the firewall. – Remove the shields. – Pull the 2 parts of the feed-thru clear of the firewall.	Keep the 2 parts of the feed-thru.
(6)	Disconnect the control cable at the alternate air lever in the cockpit.	On the pilot's side under the instrument panel.

	Detail Steps/Work Items	Key Items/References
(7)	Move the control cable clear of the airplane.	

B. Install the Alternate Air Control Cable

	Detail Steps/Work Items	Key Items/References
(1)	Move the alternate air control cable in position in the airplane.	Through the hole in the firewall and the slot in the floor area near the alternate air lever.
(2)	Connect the alternate air control cable to the alternate air lever in the cockpit.	
(3)	Install the feed-thru to the engine side of the firewall with firewall sealant: – Put the 2 parts of the feed-thru round the control cable. – Push the feed-thru in the firewall. – Put the 2 shields in position over the feed-thru. Apply firewall sealant. – Install 2 pop-rivets to attach the shields to the firewall.	Use PR 812 (MIL-S-38249 Type 1) firewall sealant.
(4)	Install the alternate air valve.	Refer to Paragraph 3.
(5)	Adjust the alternate air control cable.	Refer to Paragraph 5.

5. Test/Adjust the Alternate Air Control Cable

	Detail Steps/Work Items	Key Items/References
	WARNING: DO NOT STAND WITHIN THE DANGER AREA OF THE PROPELLER. IF THE ENGINE STARTS, THE PROPELLER CAN CAUSE DEATH OR INJURY TO PERSONS. **WARNING: YOU MUST MAKE SURE THAT THE ENGINE IS SAFE BEFORE YOU DO WORK ON THE ENGINE CONTROLS. IF THE PROPELLER TURNS IT CAN CAUSE INJURY TO PERSONS.**	
(1)	Make sure that the engine is safe: – Set the ELECTRIC MASTER key switch to OFF. – Set the ENGINE MASTER switch to OFF. – Set the power lever to IDLE.	
(2)	Remove the engine cowlings.	Refer to Section 71-11.
(3)	Disconnect the airplane main battery.	Refer to Section 24-34.
(4)	Move the alternate air lever in the cockpit from OFF to ON: – Make sure the lever moves freely with no restrictions.	
(5)	Set the alternate air lever in the cockpit to OFF and hold it in position: – Make sure that the alternate air valve is fully closed.	With the alternate air valve fully closed there must be at least 3 mm (0.125 in) clearance (bounce) between the alternate air lever and the stop.
(6)	Set the alternate air lever in the cockpit to ON and hold it in position: – Make sure that the alternate air control valve is in the fully open position.	

	Detail Steps/Work Items	Key Items/References
(7)	If necessary, adjust the alternate air control cable.	At the alternate air lever.
(8)	Do items 5 to 7 again as necessary to get the correct settings.	
(9)	Connect the airplane battery.	Refer to Section 24-34.
(10)	Install the engine cowlings.	Refer to Section 71-11.

Section 71-62
Air Intakes - Lycoming O-360-A4M Engine

1. General

A front baffle, a carburetor heat valve assembly, air filter housing and air filter make the engine air intake system for the DA 40 F airplane. The engine bottom cowling has a molded air intake duct and a flexible seal attached to the front baffle makes the joint between the engine bottom cowling and the engine intake front baffle. Figure 1 shows the front baffle, engine air filter and carburetor heat valve assembly.

2. Description

The air intake has three main parts:

– Carburetor heat valve assembly.

– Engine intake front baffle.

– Air filter.

A. Carburetor Heat Valve Assembly

The carburetor heat valve assembly has a valve body with an air intake at the front, a carburetor heat intake on the rear side and the carburetor outlet on top. A Bowden cable attaches to a bracket on the valve body and rotates the flap inside the valve via a lever arm.

The carburetor heat intake shroud is attached to the valve body by a worm-drive clamp.

B. Engine Intake Front Baffle

The front baffle has a flexible seal which makes a seal between the air intake assembly and the engine bottom cowling. Oil cooler hose and alternator cooling hoses are attached to the front baffle by worm-drive clamps.

C. Air Filter

The air filter panel is attached to the front side of the engine intake front baffle and the carburetor heat valve assembly with four bolts.

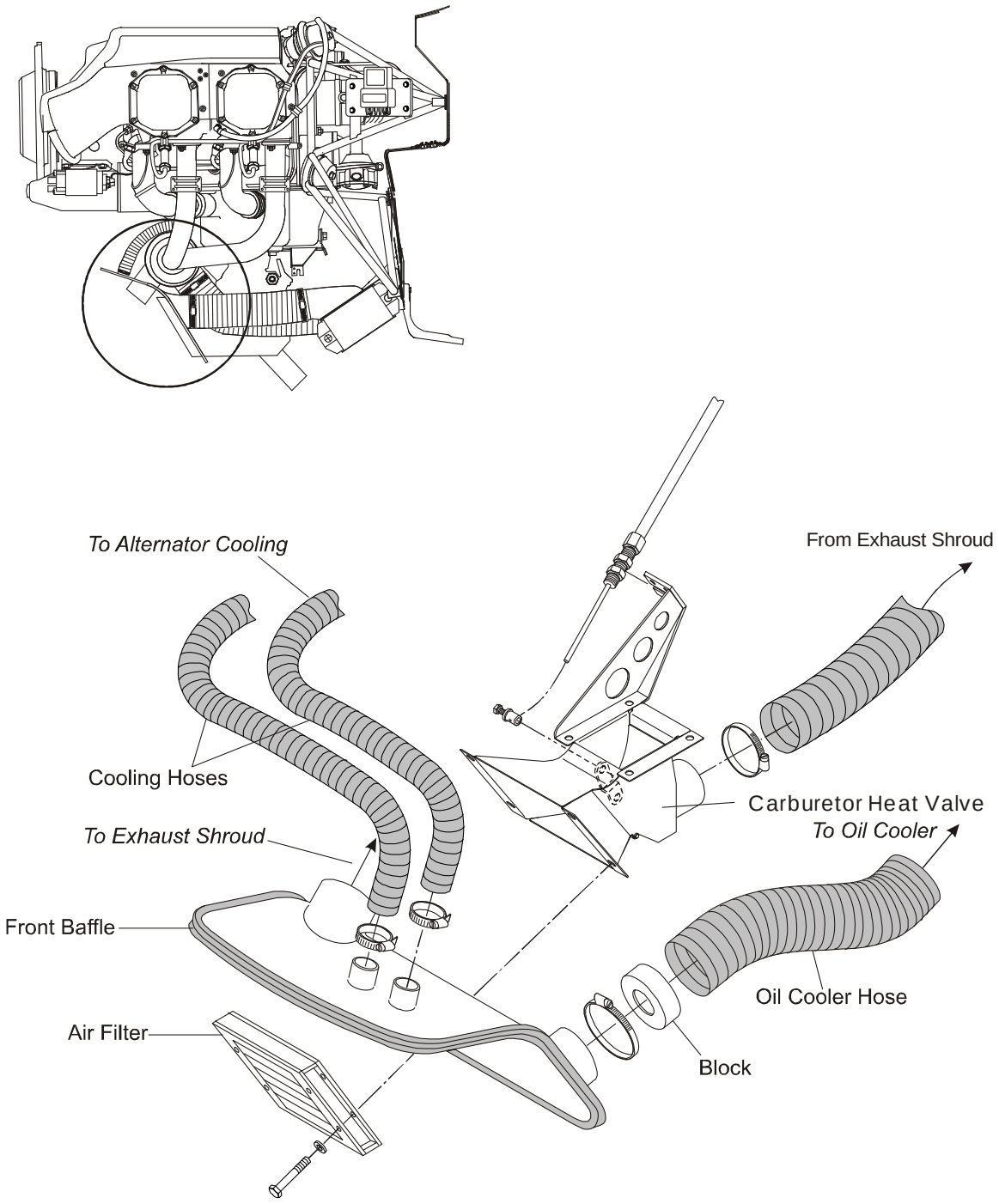


Figure 1: Engine Air Filter and Carburetor Heat Valve

3. Operation

Figure 2 shows the carburetor heat control lever in the cockpit. It is located on the left side of the center console. A Bowden control cable connects the control lever in the cockpit to the carburetor heat valve assembly in the engine bay.

In normal operation the carburetor heat control lever is set to the COLD position. The flap in the carburetor heat valve body guides ambient air to the carburetor.

When the carburetor heat control lever in the cockpit is moved to the HOT position, the Bowden cable turns the valve flap via the lever. Warm air from the engine bay will now flow through the carburetor heat valve into the carburetor.

The carburetor heat valve can be selected to the ON position to supply warm air for anti-icing or to maintain the air supply should the air filter become blocked. The air supply via the carburetor heat is not filtered.

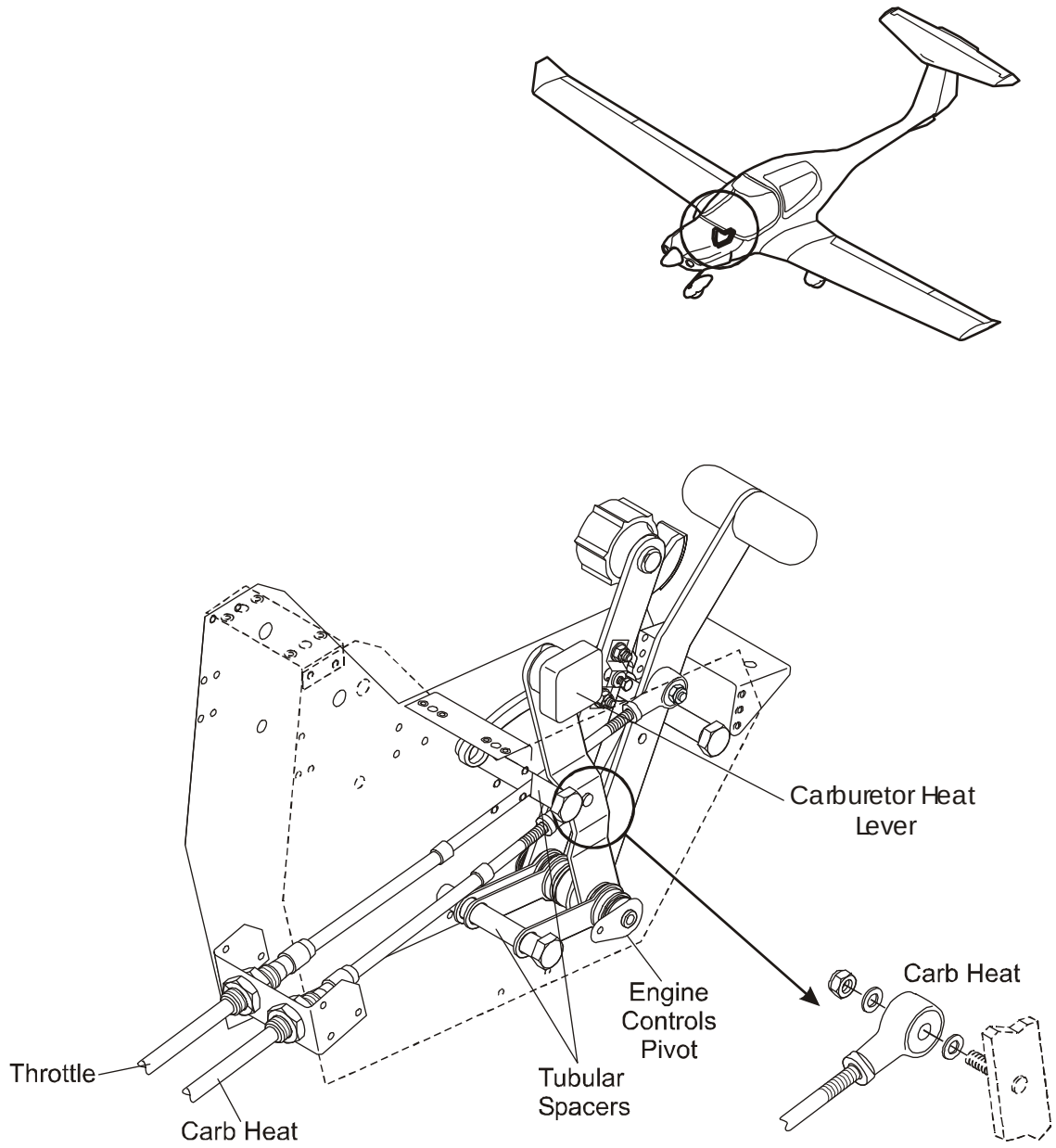


Figure 2: Carburetor Heat Control

Trouble-Shooting

1. General

The table below lists the defects you could have with the air intake system. If you have the trouble detailed in the Trouble column read across to the Possible Cause column. Then do the repair given in the Repair column.

Trouble	Possible Cause	Repair
Engine does not develop full power.	Air filter blocked/defective.	Replace air filter.
	Carburetor heat valve in HOT position.	Set carburetor heat control to COLD.
	Carburetor heat control incorrectly set.	Do a test of the carburetor heat control adjustment. Adjust the carburetor heat control.
	Carburetor heat control cable broken.	Replace carburetor heat control cable.

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Maintenance Practices

1. General

These Maintenance Practices tell you how to remove and install the air filter and the carburetor heat valve assembly. They also tell you how to adjust, remove and install the carburetor heat control cable.

They do not tell you how to adjust the engine carburetor.

Refer to the Lycoming Maintenance Manual for the data on the fuel injector.

2. Remove/Install the Air Filter

A. Remove the Air Filter

	Detail Steps/Work Items	Key Items/References
	WARNING: DO NOT STAND WITHIN THE DANGER AREA OF THE PROPELLER IF THE ENGINE STARTS, THE PROPELLER CAN CAUSE DEATH OR INJURY TO PERSONS. **WARNING: YOU MUST MAKE SURE THAT THE ENGINE IS SAFE BEFORE YOU DO WORK ON THE ENGINE CONTROLS. IF THE PROPELLER TURNS IT CAN CAUSE INJURY TO PERSONS.**	
(1)	Make sure that the engine is safe: – Set the ignition switch to OFF. – Set the throttle control to IDLE. – Set the mixture control lever to LEAN CUT-OFF.	
(2)	Remove the engine cowlings.	Refer to Section 71-12.
(3)	Disconnect the airplane battery.	Refer to Section 24-31.
(4)	Remove the 4 bolts which attach the air filter and the front baffle to the carburetor heat valve housing.	Hold the air filter.
(5)	Pull the air filter forward and clear of the airplane.	

B. Install the Air Filter

	Detail Steps/Work Items	Key Items/References
(1)	Put the air filter in position on the front baffle.	
(2)	Align the holes of the air filter and the front baffle.	
(3)	Tighten the 4 bolts which attach the air filter and the front baffle to the carburetor heat valve.	
(4)	Connect the airplane battery.	Refer to Section 24-31.
(5)	Install the engine cowlings.	Refer to Section 71-12.
(6)	Do an engine run-up.	Refer to the DA 40 F Airplane Flight Manual.

3. Remove/Install the Carburetor Heat Valve

A. Remove the Carburetor Heat Valve

	Detail Steps/Work Items	Key Items/References
	WARNING: DO NOT STAND WITHIN THE DANGER AREA OF THE PROPELLER IF THE ENGINE STARTS, THE PROPELLER CAN CAUSE DEATH OR INJURY TO PERSONS. **WARNING: YOU MUST MAKE SURE THAT THE ENGINE IS SAFE BEFORE YOU DO WORK ON THE ENGINE CONTROLS. IF THE PROPELLER TURNS IT CAN CAUSE INJURY TO PERSONS.**	
(1)	Make sure that the engine is safe: – Set the ignition switch to OFF. – Set the throttle control to IDLE. – Set the mixture control lever to LEAN CUT-OFF.	
(2)	Remove the engine cowlings.	Refer to Section 71-12.
(3)	Disconnect the airplane battery.	Refer to Section 24-31.
(4)	Disconnect the spark plug cables from the spark plugs.	
(5)	Loosen the worm-drive clamps and remove and detach the hoses: – The oil cooler hose – Two alternator cooling hoses.	
(6)	Remove the 4 bolts which attach the air filter and the front baffle to the carburetor heat valve housing.	Support the air filter.
(7)	Pull the air filter clear of the airplane.	
(8)	Remove the screws which attach the front baffle to the engine.	Support the front baffle.
(9)	Move the front baffle clear of the airplane.	

	Detail Steps/Work Items	Key Items/References
(10)	Release the carburetor heat control Bowden cable from the carburetor heat valve assembly: – Loosen the swivel fitting at the carburetor heat valve body. – Pull the Bowden cable wire end clear of the swivel fitting. – Remove and keep the swivel fitting. – Remove the retaining nut which holds the Bowden cable outer sheath in the support bracket at the carburetor heat valve spacer. – Move the Bowden cable clear of the carburetor heat valve.	
(11)	Loosen the worm- drive clamp that holds the carburetor heat hose.	
(12)	Remove the carburetor heat valve: – Remove the 4 bolts which attach the carburetor heat valve assembly to the carburetor. – Move the carburetor heat valve assembly clear of the airplane.	Support the carburetor heat valve assembly.

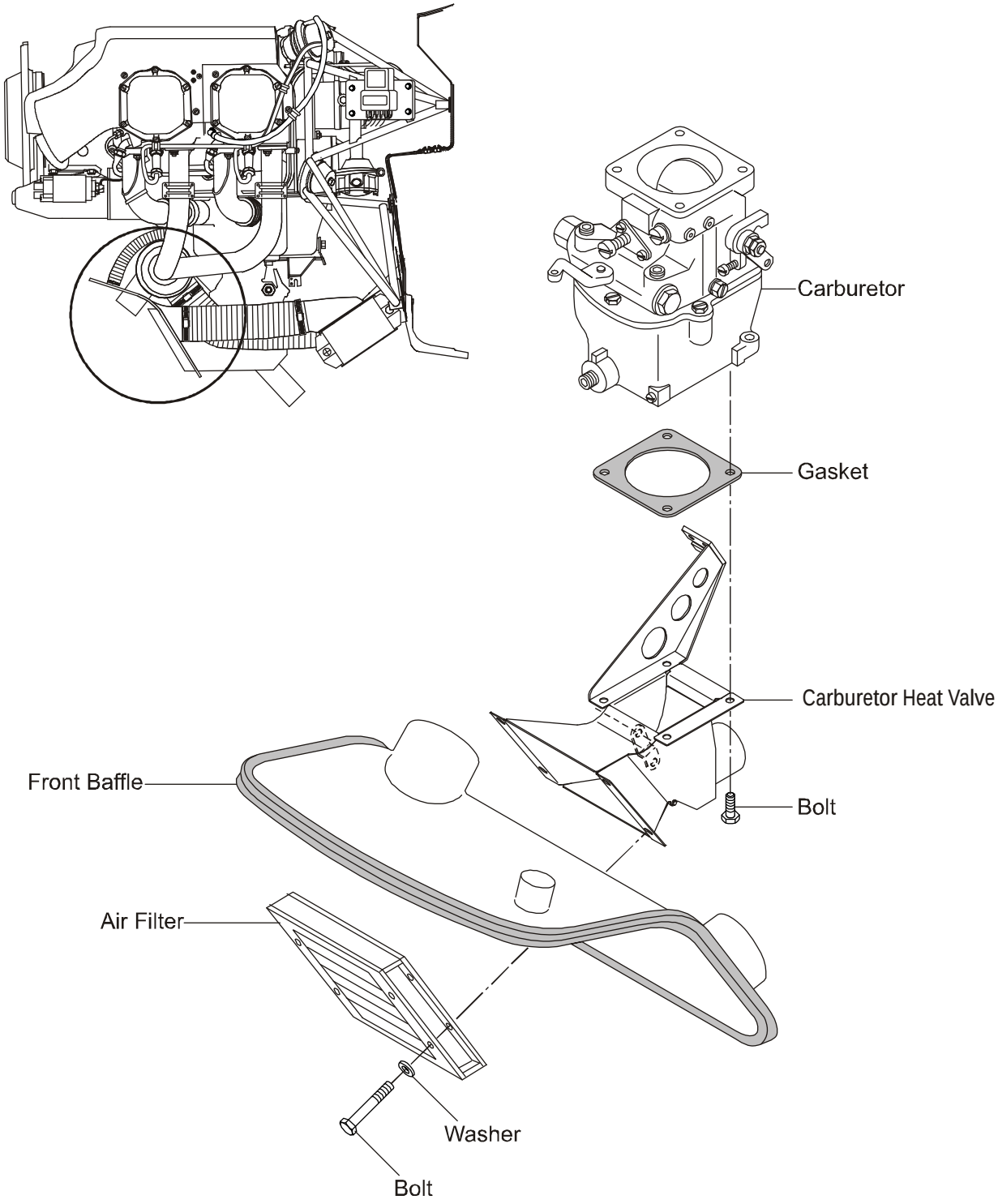


Figure 3: Air Filter Installation

B. Install the Carburetor Heat Valve

	Detail Steps/Work Items	Key Items/References
(1)	Move the carburetor heat valve assembly into position on the airplane so that the attaching bolts align with the holes in the carburetor.	
(2)	Tighten the 4 attaching bolts.	
(3)	Install the carburetor heat Bowden cable: – Install the swivel onto the carburetor heat valve body. – Move the Bowden cable outer sheath into position in the support bracket at the carburetor heat valve. – Install the retaining nut which holds the Bowden cable outer sheath in the support bracket. – Push the Bowden cable wire end through the swivel fitting. – Tighten the swivel fitting.	
(4)	Attach the carburetor heat hose to the carburetor heat valve housing and tighten the worm-drive clamp.	
(5)	Do a test for correct range, full and free movement of the carburetor heat valve control system.	Refer to Paragraph 5.
(6)	Do an inspection of the control connections which you disconnected. If necessary for your Airworthiness Authority do a second inspection of the controls.	
(7)	Move the front baffle into position on the airplane so that the holes align with the holes on the on the engine and the carburetor heat valve assembly.	
(8)	Mount the front baffle to the engine.	

	Detail Steps/Work Items	Key Items/References
(9)	Attach the cooling hoses and tighten the worm-drive clamps: – The oil cooler hose. – Two alternator cooling hoses.	
(10)	Put the air filter in position on the front baffle.	
(11)	Align the holes of the air filter and the front baffle.	
(12)	Tighten the 4 bolts which attach the air filter and the front baffle to the carburetor heat valve.	
(13)	Connect the spark plug leads to the spark plugs.	Torque to 12.4 to 13.6 Nm (110 - 120 lbf.in.).
(14)	Connect the airplane battery.	Refer to Section 24-31.
(15)	Install the engine cowlings.	Refer to Section 71-12.
(16)	Do an engine run-up.	Refer to DA 40 F Airplane Flight Manual.

4. Remove/Install the Carburetor Heat Valve Control Cable

A. Remove the Carburetor Heat Valve Control Cable

	Detail Steps/Work Items	Key Items/References
	WARNING: DO NOT STAND WITHIN THE DANGER AREA OF THE PROPELLER IF THE ENGINE STARTS, THE PROPELLER CAN CAUSE DEATH OR INJURY TO PERSONS. **WARNING: YOU MUST MAKE SURE THAT THE ENGINE IS SAFE BEFORE YOU DO WORK ON THE ENGINE CONTROLS. IF THE PROPELLER TURNS IT CAN CAUSE INJURY TO PERSONS.**	
(1)	Make sure that the engine is safe: – Set the ignition switch to OFF. – Set the throttle control to IDLE. – Set the mixture control lever to LEAN CUT-OFF.	
(2)	Remove the engine cowlings.	Refer to Section 71-12.
(3)	Disconnect the airplane battery.	Refer to Section 24-31.
(4)	Disconnect the spark plug cables from the spark plugs.	
(5)	Release the carburetor heat control Bowden cable from the carburetor heat valve assembly: – Loosen the swivel fitting at the carburetor heat valve body. – Pull the Bowden cable wire end clear of the swivel fitting. – Remove and keep the swivel fitting. – Remove the retaining nut which holds the Bowden cable outer sheath in the support bracket at the carburetor heat valve spacer. – Move the Bowden cable clear of the carburetor heat valve.	Refer to Figure 1.

	Detail Steps/Work Items	Key Items/References
(6)	Remove the firewall feed-thru from the engine side of the firewall: – Remove the firewall sealant from the feed-thru. – Drill out the two rivets which hold the shields to the firewall. – Remove the shields. – Pull the 2 parts of the feed-thru clear of the firewall.	
(7)	Release the carburetor heat control Bowden cable from the carburetor heat control lever in the cockpit: – Release the screw in the swivel fitting and pull the Bowden cable wire end out from the swivel fitting. – Remove the front adjusting nut from the Bowden cable outer sheath at the control lever bracket. – Pull the Bowden cable clear from the control lever bracket.	Refer to Figure 2.
(8)	Remove the knob from the fuel selector valve: – Remove the cross-head screw from the center of the control-knob and pull the knob up and off the fuel selector valve. – Remove the mounting plate.	

	Detail Steps/Work Items	Key Items/References
(9)	Release the engine control assembly: – Loosen the throttle friction adjuster until the adjuster is disconnected from the shaft. – Remove the four cross-head screws which attach the engine control lower cover-plate to the engine control assembly. – Remove the two hex-headed bolts from the top of the upper cover-plate. – Lift and support the engine control assembly clear of the center console.	
(10)	Disconnect the eye-end fitting from the throttle control lever: – Remove the nut and two washers that connect the eye-end to the lever.	
(11)	Remove the eye-end fitting from the carburetor heat cable: – Loosen the lock-nut for the eye-end. – Remove the eye-end from the cable.	
(12)	Release the control cable from the support bracket at the control assembly: – Remove the rear adjusting-nut and washer from the cable outer-sheath. – Move the cable forward and clear of the support bracket. – Remove the front adjusting-nut and washer from the cable outer-sheath.	
(13)	Pull the control cable through the firewall from the engine bay side and clear of the airplane.	

B. Install the Carburetor Heat Control Cable

	Detail Steps/Work Items	Key Items/References
(1)	Put the carburetor heat cable through the firewall.	
(2)	Put the carburetor heat Bowden cable through the bracket at the engine control assembly: – Install the 2 nuts which hold the Bowden cable to the bracket.	
	WARNING: IF YOU DO AN ADJUSTMENT OF A CONTROL CABLE YOU MUST MAKE SURE THAT THE CONTROL CABLE IS IN SAFETY. IF YOU DO NOT DO THIS, THE CONTROL CABLE CAN DISCONNECT. THIS CAN CAUSE DEATH OR INJURY TO PERSONS.	
(3)	Install the eye end onto the Bowden cable at the engine control assembly in the cockpit.	Use a piece of lock-wire to make sure that the eye-end has been installed correctly.
(4)	Install the eye end to the throttle control lever in the cockpit: – Install the bolt, two washers and the nut.	Refer to Figure 2. Torque to 1.6 Nm (1.2 lbf.ft.).
(5)	Install the engine control assembly: – Do a check for loose articles. – Move the engine control assembly into position in the center console. – Loosely attach the knob for the throttle friction adjuster. – Install the four cross head screws which attach the lower-cover-plate to the center console. – Install the two hex-headed bolts which attach the upper cover-plate to the center console.	Specially in the center console. Make sure all the control cables take up the correct position.

	Detail Steps/Work Items	Key Items/References
(6)	Install the knob on the fuel selector valve: – Move the cover plate into position over the selector valve. – Push the selector knob onto the valve shaft. – Install the cross-head screw which attaches the knob to the shaft.	
(7)	Put the Bowden cable through the support bracket at the carburetor heat valve assembly.	Refer to Figure 1.
(8)	Install the retaining nut on the Bowden cable outer sheath.	
(9)	Put the Bowden cable wire end through the swivel fitting in the carburetor heat valve and tighten the swivel fitting screw.	
(10)	Put the Bowden cable through the support bracket at the carburetor heat control lever in the cockpit.	Refer to Figure 2.
(11)	Install the front adjusting nut to the Bowden cable outer sheath.	
(12)	Put the Bowden cable wire end through the swivel fitting on the lever and tighten the swivel fitting screw.	
(13)	Install the feed-thru to the engine side of the firewall with firewall sealant: – Put the 2 parts of the feed-thru round the Bowden cable. – Push the feed-thru in the firewall. – Put the 2 shields in position over the feed-thru. – Install 2 pop-rivets to attach the shields to the firewall.	Use PR 812 (MIL-S-38249 Type 1) firewall sealant.
(14)	Do a test for correct range, full and free movement of the carburetor heat control system.	Refer to Paragraph 5.

	Detail Steps/Work Items	Key Items/References
(15)	Do an inspection of the control connections which you disconnected. If necessary, for your Airworthiness Authority, do a second inspection of the controls.	
(16)	Connect the spark plug cables to the spark plugs.	Torque to 12.4 - 13.6 Nm (110 - 120 lbf.in.).
(17)	Connect the airplane battery.	Refer to Section 24-31.
(18)	Install the engine cowlings.	Refer to Section 71-12.
(19)	Do an engine run-up.	Refer to the DA 40 F Airplane Flight Manual.

5. Test/Adjust the Carburetor Heat Control Cable

	Detail Steps/Work Items	Key Items/References
	WARNING: DO NOT STAND WITHIN THE DANGER AREA OF THE PROPELLER IF THE ENGINE STARTS, THE PROPELLER CAN CAUSE DEATH OR INJURY TO PERSONS. **WARNING: YOU MUST MAKE SURE THAT THE ENGINE IS SAFE BEFORE YOU DO WORK ON THE ENGINE CONTROLS. IF THE PROPELLER TURNS IT CAN CAUSE INJURY TO PERSONS.**	
(1)	Make sure that the engine is safe: – Set the ignition switch to OFF. – Set the throttle control lever to IDLE. – Set the mixture control lever to LEAN CUT-OFF.	
(2)	Remove the engine cowlings.	Refer to Section 71-10.
(3)	Disconnect the battery.	Refer to Section 24-31.
(4)	Disconnect the spark plug cables from the spark plugs.	
(5)	Remove the air filter.	Refer to Paragraph 2.
(6)	Move the carburetor heat control lever from COLD to HOT: – Make sure the lever moves freely with no restrictions.	
(7)	Set the carburetor heat control lever in the cockpit to COLD and hold it in position: – Make sure that the carburetor heat valve is fully closed.	With the carburetor heat valve fully closed there must be at least 3 mm (0.125 in) clearance (bounce) between the carburetor heat control lever and the stop bush. Refer to Figure 2.

	Detail Steps/Work Items	Key Items/References
(8)	Set the carburetor heat control lever in the cockpit to HOT and hold it in position: – Make sure that the carburetor heat control valve is in the fully open position.	
(9)	If the adjustment of the control is not correct then you must adjust the 2 adjusting nuts at the carburetor heat control lever in the cockpit or adjust the rod end bearing at the engine end.	
(10)	Do items 5 to 8 again as necessary to get the correct settings.	
(11)	Do an inspection of the control connections which you disconnected. If necessary for your Airworthiness Authority, do a second inspection of the controls.	
(12)	Install the air filter.	Refer to Paragraph 2.
(13)	Install the cables to the spark plugs.	Torque to 12.4 - 13.6 Nm (110 - 120 lbf.in.).
(14)	Connect the airplane battery.	Refer to Section 24-31.
(15)	Install the engine cowlings.	Refer to Section 71-12.
(16)	Do an engine run-up.	Refer to the DA 40 F Airplane Flight Manual.

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Section 71-70
Engine Drains - Lycoming IO-360-M1A Engine

1. General

The Lycoming IO-360-M1A engine installed in the DA 40 has these engine drains:

– Fuel/oil drain for the engine-driven fuel-pump.

– Fuel drain for the fuel-flow-divider.

– Fuel drain for the induction manifold.

Refer to the Lycoming Operator's Manual for more data on the engine drains.

2. Description

A. Engine Driven Fuel Pump Drain

A clear tube makes the fuel drain for the engine driven fuel pump. The fuel pump is mounted on the rear accessory housing. The tube attaches to a pipe connector at the rear of the pump. Cable ties attach the tube to the engine breather pipe. The drain connects to the main drain tube assembly at the rear of the engine compartment.

B. Fuel Distributor Drain

A clear tube makes the fuel drain for the fuel distributor. The fuel distributor is mounted centrally on top of the engine. A hose clip attaches the drain tube to the drain outlet which is on the left side of the fuel distributor. The tube goes back through a rubber grommet in the engine cooling baffle and down the main drain tube assembly at the rear of the engine compartment.

C. Induction Manifold Drain

An aluminum alloy pipe makes the induction manifold drain. The induction manifold drain connection is at the bottom of the engine below the engine sump. The drain goes left from the drain connection and then aft over the exhaust muffler to the main drain tube assembly at the rear of the engine compartment. A vent valve in the pipe at the induction manifold end closes automatically when the engine runs.

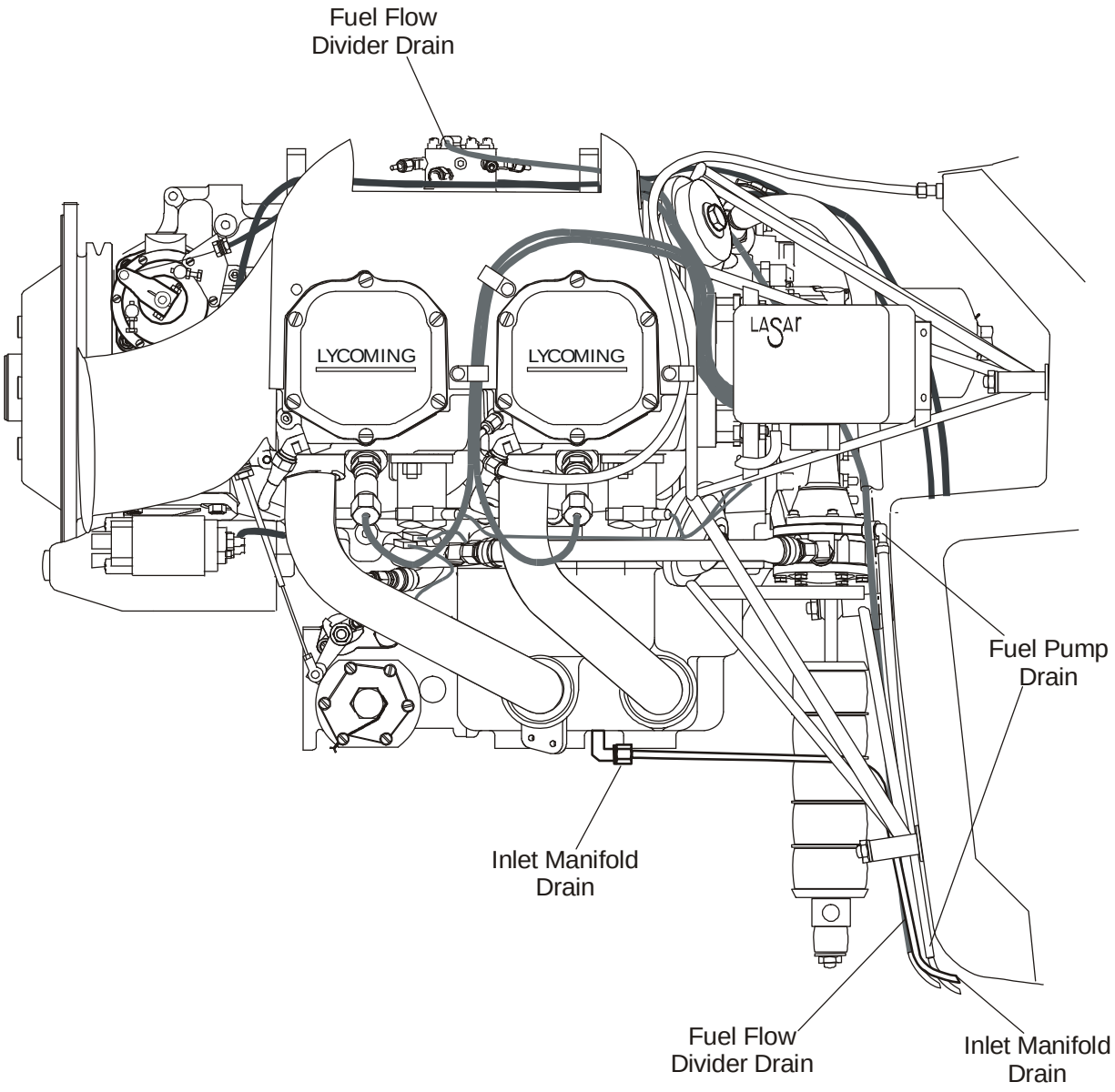


Figure 1: Engine Drains

3. Operation

A. Engine Driven Fuel Pump Drain

The fuel pump drain is connected the fuel pump above the diaphragm. If the diaphragm ruptures, fuel will flow from the fuel pump drain outlet.

B. Fuel Distributor Drain

The fuel injector supplies pressurized fuel to one side of a diaphragm in the fuel distributor. Atmospheric air pressure acts on the other side of the diaphragm, assisted by a spring under a compression load. The fuel distributor drain connects to the air side of the diaphragm. If the diaphragm fails, then fuel will flow from the fuel distributor drain outlet.

C. Induction Manifold Drain

All four induction manifolds connect to a check-valve at the bottom of the manifold. The manifold drain attaches to the check-valve. When the engine is stationary, the check valve is open and any residual fuel can drain from the induction manifolds. When the engine operates, the check valve closes to seal the induction manifold.

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Trouble-Shooting

1. General

The table below lists the defects you could have with the engine drains. If you have the trouble detailed in the Trouble column read across to the Possible Cause column. Then do the repair given in the Repair column.

Trouble	Possible Cause	Repair
Fuel flows from the engine driven fuel pump drain.	Ruptured diaphragm in the fuel pump.	Replace the engine driven fuel pump.
Fuel flows from the fuel distributor drain.	Ruptured diaphragm in the fuel distributor.	Replace the fuel distributor.

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Maintenance Practices

1. General

The Maintenance Practices in this Section tell you how to remove/install the engine drains.

2. Remove/Install the Engine Driven Fuel Pump Drain

A. Remove the Engine Driven Fuel Pump Drain

	Detail Steps/Work Items	Key Items/References
	WARNING: YOU MUST MAKE SURE THAT THE ENGINE IS SAFE BEFORE YOU DO WORK ON THE ENGINE DRAINS. MAKE SURE THAT THE IGNITION SWITCH IS SET TO "OFF". SET THE THROTTLE TO "IDLE" AND THE MIXTURE CONTROL TO "LEAN CUT-OFF".	
(1)	Remove the cowling from the top of the engine.	Refer to Section 71-10.
(2)	Release the drain pipe from the engine driven pump (EDP).	
(3)	Release the drain pipe from the main engine drain assembly at the rear of the engine compartment.	
(4)	Move the drain clear of the engine.	

B. Install the Engine Driven Fuel Pump Drain

	Detail Steps/Work Items	Key Items/References
(1)	Make sure that the drain tube is not damaged and that it is not blocked.	
(2)	Move the drain tube into position. Attach the end of the tube to the engine driven fuel pump with a hose clip.	
(3)	Attach the drain tube to the main engine drain assembly at the rear of the engine compartment with a hose clip.	
(4)	Install the top cowling on the engine.	Refer to Section 71-10.

3. Remove/Install the Fuel Flow Divider Drain

A. Remove the Fuel Flow Divider Drain

	Detail Steps/Work Items	Key Items/References
	WARNING: YOU MUST MAKE SURE THAT THE ENGINE IS SAFE BEFORE YOU DO WORK ON THE ENGINE DRAINS. MAKE SURE THAT THE IGNITION SWITCH IS SET TO "OFF". SET THE THROTTLE TO "IDLE" AND THE MIXTURE CONTROL TO "LEAN CUT-OFF".	
(1)	Remove the cowling from the top of the engine.	Refer to Section 71-10.
(2)	Remove the hose clip that attaches the drain tube to the connector at the distribution valve and release the drain tube.	
(3)	Move the drain tube to the rear, through the rubber grommet in the engine baffles, and clear of the engine.	
(4)	Remove the hose clip that attaches the drain tube to the main engine drain assembly at the rear of the engine compartment.	

B. Install the Fuel Flow Divider Drain

	Detail Steps/Work Items	Key Items/References
(1)	Make sure that the drain tube is not damaged and that it is not blocked.	
(2)	Move the drain tube into position through the rubber grommet in the engine baffle.	
(3)	Attach the end of the drain tube to the fuel flow divider with a hose clip.	
(4)	Attach the other end of the drain tube to the main engine drain assembly at the rear of the engine compartment with a hose clip.	

4. Remove/Install the Induction Manifold Drain

A. Remove the Induction Manifold Drain

	Detail Steps/Work Items	Key Items/References
	WARNING: YOU MUST MAKE SURE THAT THE ENGINE IS SAFE BEFORE YOU DO WORK ON THE ENGINE DRAINS. MAKE SURE THAT THE IGNITION SWITCH IS SET TO "OFF". SET THE THROTTLE TO "IDLE" AND THE MIXTURE CONTROL TO "LEAN CUT-OFF".	
(1)	Disconnect the drain pipe from the manifold drain connection at the bottom of the engine.	Hold the pipe.
(2)	Release the drain pipe from the main engine drain assembly at the rear of the engine compartment.	
(3)	Move the drain pipe clear of the engine.	

B. Install the Induction Manifold Drain

	Detail Steps/Work Items	Key Items/References
(1)	Make sure that the pipe is not damaged and that it is not blocked.	
(2)	Move the pipe into position below the engine.	
(3)	Connect the pipe to the drain connection at the bottom of the engine.	
(4)	Connect the pipe to the main engine drain assembly at the rear of the engine compartment.	

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Section 71-71
Engine Drains - TAE 125 Diesel Engine

1. General

The DA 40 D with a Diesel engine installed has a breather for the oil separator tank and an overflow for the liquid coolant system expansion tank.

Refer to Chapter 72 for more data about the engine oil system and refer to Chapter 75 for more data about the engine liquid cooling system.

2. Description

A. Breather Line

The breather line is a rubber hose which is protected with fire sleeve. The breather line is connected to the oil separator and discharges at the engine compartment outlet where it is guided through a separate duct.

B. Coolant Overflow Line

The coolant overflow line is small rubber hose which is connected to the coolant filler neck of the coolant tank. In case of overfilling of the coolant tank the excessive coolant is discharged through the coolant overflow line at the engine compartment outlet direct beside the breather line duct.

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Section 71-72
Engine Drains - Lycoming O-360-A4M Engine

1. General

The Lycoming O-360-A4M engine installed in the DA 40 F has one engine drain for the engine-driven fuel-pump.

2. Description

A clear tube makes the fuel drain for the engine driven fuel pump. The fuel pump is mounted on the rear accessory housing. The tube attaches to a pipe connector at the rear of the pump. Cable ties attach the tube to the engine breather pipe. The drain connects to the main drain tube assembly at the rear of the engine compartment.

Refer to the Lycoming Operator's Manual for more data on the engine drain.

3. Operation

The fuel pump drain is connected to the fuel pump above the diaphragm. If the diaphragm ruptures, fuel will flow from the fuel pump drain outlet.

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Trouble-Shooting

1. General

The table below lists the defects you could have with the engine drains. If you have the trouble detailed in the Trouble column read across to the Possible Cause column. Then do the repair given in the Repair column.

Trouble	Possible Cause	Repair
Fuel flows from the engine driven fuel pump drain.	Ruptured diaphragm in the fuel pump.	Replace the engine driven fuel pump.

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Maintenance Practices

1. General

The Maintenance Practices in this Section tell you how to remove/install the engine drains.

2. Remove/Install the Engine Driven Fuel Pump Drain

A. Remove the Engine Driven Fuel Pump Drain

	Detail Steps/Work Items	Key Items/References
	WARNING: YOU MUST MAKE SURE THAT THE ENGINE IS SAFE BEFORE YOU DO WORK ON THE ENGINE DRAINS. MAKE SURE THAT THE IGNITION SWITCH IS SET TO "OFF". SET THE THROTTLE TO "IDLE" AND THE MIXTURE CONTROL TO "LEAN CUT-OFF".	
(1)	Remove the cowling from the top of the engine.	Refer to Section 71-12.
(2)	Release the drain pipe from the engine driven pump (EDP).	
(3)	Release the drain pipe from the main engine drain assembly at the rear of the engine compartment.	
(4)	Move the drain clear of the engine.	

B. Install the Engine Driven Fuel Pump Drain

	Detail Steps/Work Items	Key Items/References
(1)	Make sure that the drain tube is not damaged and that it is not blocked.	
(2)	Move the drain tube into position. Attach the end of the tube to the engine driven fuel pump with a hose clip.	
(3)	Attach the drain tube to the main engine drain assembly at the rear of the engine compartment with a hose clip.	
(4)	Install the top cowling on the engine.	Refer to Section 71-12.

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CHAPTER 72

ENGINE

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CHAPTER 72
ENGINE

Section 72-00
Lycoming Engine

1. General

This Section tells you about the Lycoming IO-360-M1A (installed in the DA 40) and the Lycoming O-360-A4M (installed in the DA 40 F) engines. It tells you about the engine for background only. The data given in this Section will not be amended and you must always refer to the Lycoming manuals for data about the engine.

2. Description

A. Crankcase

Both, the Lycoming IO-360-M1A (DA 40) and the Lycoming O-360-A4M (DA 40 F) engines are four cylinder, horizontally opposed, direct drive engine. The engines have an aluminum alloy crankcase. The crankcase is in two halves, a left half and a right half. Bolts, studs nuts and washers attach the left half to the right half.

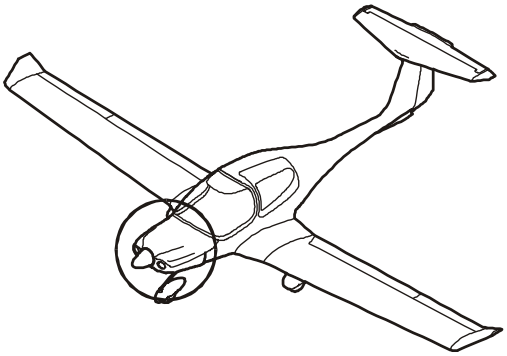
The oil sump bolts to the bottom of the crankcase. The fuel injector (for the Lycoming IO-360-M1A engine) attaches to a pad at the front of the sump with fours studs, washers and nuts. The carburetor (for the Lycoming O-360-A4M engine) attaches to a pad at the bottom of the sump. The first part of the induction manifold is integral with the sump.

The crankcase has the bearings for the crankshaft and the camshaft. The top of the crankcase has the mounting pads for the cylinders. The rear of the crankcase has the mounting for the accessories and the accessory housing.

B. Crankshaft

The engines has a hollow crankshaft with four main bearings. The crankshaft has four big-end bearings for the connecting rods. The front of the crankshaft has a drive flange for the propeller and flywheel.

The drive flange has six bolt holes. The bolt holes have special bushes. The bushes have a screw thread on the inside for the propeller bolts. Four of the bushes are long and two of the bushes are shorter. One of the shorter bushes is marked with an “o”, this is the index bush.



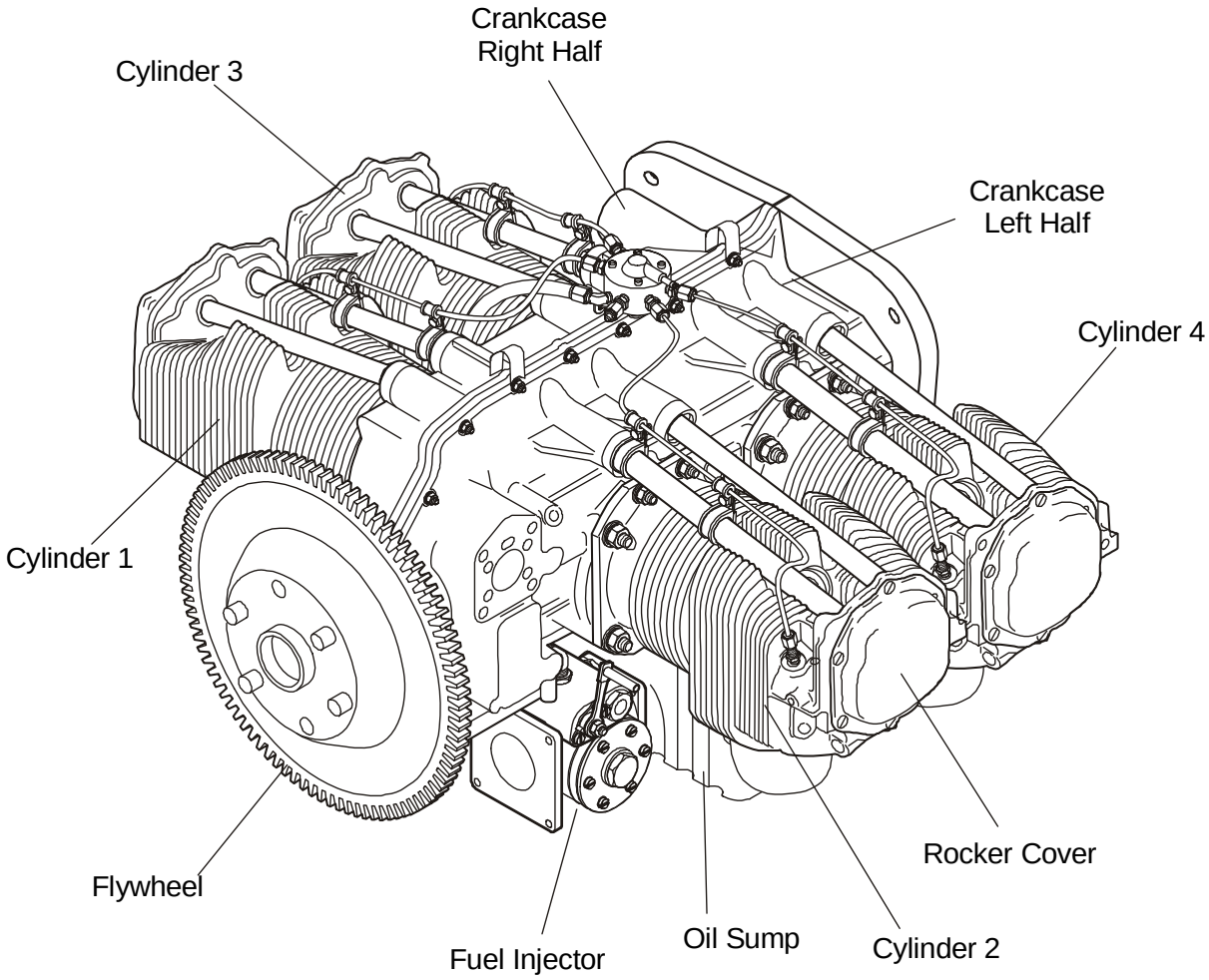


Figure 1: Engine Assembly (Lycoming IO-360-M1A Engine Shown)

C. Camshaft

The one-piece camshaft is mounted in the crankcase. The camshaft is driven by a gear on the rear of the crankshaft. Another gear at the front of the camshaft drives the propeller governor gear-train in the Lycoming IO-360-M1A engine. The camshaft has eccentric lobes which operate the push-rods for the valve-operating-gear.

D. Connecting Rods

The engine has the usual connecting rods. The “big-end” of the connecting rod attaches to the crankshaft journal and the “small-end” attaches to the piston.

Each rod has a split big-end bearing and it has a bearing cap. Two special bolts attach the bearing-cap to the connecting rod. The small-end has a plain bearing which is a sliding fit with the piston gudgeon-pin.

E. Flywheel

The flywheel attaches to the front of the crankshaft. The drive bushes hold the flywheel in place and a central spigot on the drive flange aligns the flywheel.

The flywheel has two Vee grooves machined in it. One Vee groove on the rear of flywheel moves a flexible belt for the generator.

The outside of the flywheel has the starter-ring -gear attached. A pinion gear on the electric starter turns the flywheel with the starter-ring-gear when the starter is operated.

F. Cylinder Assembly

The engine has four individual cylinders. The head of the cylinder is aluminum alloy and the barrel of the cylinder is steel. The cylinder heads is screwed onto the cylinder during production and cannot be removed.

The base of the cylinder has a flange which is used to attach the cylinder to the crankcase. A spigot below the flange aligns the cylinder in the crankcase. Studs, nuts and washers attach the cylinder to the crankcase. An O-ring seal makes an oil-tight seal between the base of the cylinder and the crankcase.

The intake and exhaust flanges are machined into the lower side of the cylinder head. The cylinder head has an upper and a lower hole for the spark plugs. The outboard end of the cylinder head has the intake and exhaust valves. It also has a housing for the valve operating gear.

The valve housing (rocker box) is closed with a cover plate. The cover plate attaches to the cylinder head with six screws and a cork gasket makes an oil-tight seal.

G. Accessory Housing

The rear accessory housing attaches to the rear of the crankcase. The rear part of the crankcase holds the gears which turn the accessories. The crankshaft has a gear on the rear end.

The crankshaft gear turns two idler gears. The left idler gear turns the camshaft gear and it turns a gear which attaches to the left magneto. The right idler gear turns the right magneto.

The accessory housing closes the rear of the crankcase. Bolts attach the accessory housing to the crankcase. The accessory housing has mounting pads for the magnetos.

The accessory housing holds the engine lubricating oil pump. The oil pump, is on the inside of the housing and an internal oil gallery connects the inlet of the oil pump to the sump. A shaft from the rear of the crankshaft turns the oil pump.

Maintenance Practices

1. General

The Maintenance Practices given in this Section are limited to the compression testing of the cylinders. For more data on the engine you must refer to the Lycoming Maintenance Manual and the Lycoming Overhaul Manual.

2. Cylinder Compression Test

Do this test with the engine warm, but not hot.

A. Equipment

Item	Quantity	Part Number
Differential compression test kit.	1	Commercial.
Dry air pressure supply. Minimum pressure 5.5 bar (80 PSI).		

B. Compression Test

	Detail Steps/Work Items	Key Items/References
	WARNING: DO NOT STAND WITHIN THE DANGER AREA OF THE PROPELLER. IF THE ENGINE STARTS, THE PROPELLER CAN CAUSE DEATH OR INJURY TO PERSONS. **WARNING: MAKE SURE THAT THE ENGINE IS SAFE BEFORE YOU TURN THE PROPELLER. MAKE SURE THAT THE IGNITION SWITCH IS SET TO "OFF" AND THAT THE SPARK-PLUG-CABLES ARE DISCONNECTED FROM THE SPARK PLUGS. SET THE THROTTLE TO "IDLE" AND THE MIXTURE CONTROL TO "LEAN CUT-OFF".**	
(1)	Set the fuel selector/shut-off valve to CLOSED.	
(2)	Make sure that the engine is safe: – The ignition switch is set to OFF. – The throttle is set to IDLE. – The mixture control is set to LEAN CUT-OFF.	

	Detail Steps/Work Items	Key Items/References
(3)	Remove the engine cowlings.	Refer to Section 71-10 (Lycoming IO-360-M1A engine). Refer to Section 71-12 (Lycoming O-360-A4M engine).
(4)	Disconnect the battery.	Refer to Section 24-31.
(5)	Disconnect the spark plug cables from the spark plugs.	
(6)	Remove one spark plug from each cylinder.	
(7)	Turn the propeller four complete turns by hand in the usual direction the propeller turns.	
(8)	Connect the hose of the differential-pressure-tester (DPT) to the number 1 cylinder spark plug hole.	
(9)	Turn the propeller by hand to set number 1 cylinder piston to top-dead-center (TDC) on the compression stroke.	Feel the open end of the DPT hose. The pressure in the hose will increase to a maximum when the piston is at TDC.
(10)	Turn the DPT reducing valve fully counter-clockwise (closed).	
(11)	Connect the air supply to the DPT.	Make sure that both gauges read zero.
	WARNING: HOLD THE PROPELLER FIRMLY. WHEN YOU SUPPLY AIR TO THE CYLINDER THE PROPELLER WILL WANT TO TURN. IF THE PROPELLER TURNS IT CAN CAUSE INJURY TO PERSONS.	
(12)	Hold the propeller firmly.	Use a second person.
(13)	Connect the DPT to the tester hose (which is connected to the cylinder to be tested).	

	Detail Steps/Work Items	Key Items/References
(14)	Turn the knob of the DPT reducing valve slowly clock-wise until the input gauge reads 5.5 bar (80 PSI).	The person holding the propeller must be ready to resist the propeller turning. If the force necessary to resist the turning of the propeller is high then the cylinder may not be at TDC. Gently rock the propeller backwards and forwards until the turning force is at a minimum. Monitor the gauge readings.
(15)	Read the DPT outlet gauge and make a note of the value.	
(16)	Turn the knob of the DPT reducing valve fully counter-clockwise (closed).	Make sure that both gauges read zero.
(17)	Disconnect the DPT from the tester hose and remove the tester hose from the cylinder.	
(18)	Repeat items 8 to 17 for the other cylinders.	
(19)	Install the spark plugs.	Torque 47 Nm (35 lbf.ft.).
(20)	Connect the spark plug cables to the spark plugs.	
(21)	Connect the battery.	Refer to Section 24-31.
(22)	Install the engine cowlings.	Refer to Section 71-10 (Lycoming IO-360-M1A engine). Refer to Section 71-12 (Lycoming O-360-A4M engine).
(23)	Write the compression test values in the airplane records.	

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Section 72-01
TAE 125 Diesel Engine

1. General

This Section gives you background data about the TAE 125 Diesel engine installed in the DA 40 airplane.

Note: Only TAE authorized maintenance organizations may do maintenance and inspection work on the TAE engine. Refer to TAE Service Bulletin No. 125-0003. Any engine malfunction must be reported to TAE.

2. Description

The TAE 125 is a liquid-cooled, 4-cylinder, 4-stroke in-line turbo-charged engine with double overhead camshafts. The engine has a direct-injection fuel system controlled by computers. A reduction gearbox with a ratio of 1.69:1 turns the propeller. The gearbox has an integral torsional vibration damper with an overload clutch. The engine has an electric starter and a generator.

The TAE 125 engine operates on the Diesel cycle. The engine has a crankcase, crankshaft, cylinders, pistons and valves like conventional piston aero-engines. However, there is no ignition system.

In the Diesel engine, air is drawn into the cylinders and compressed to a high pressure. A high pressure pump injects a metered quantity of fuel into the cylinder. The air is hot enough to ignite the fuel. The fuel burns and expands the air to force the piston down the cylinder. The air pumping cycle and valve operation is the same as in a conventional piston aero-engine.

A Full Authority Digital Engine Control (FADEC) system controls the fuel system, propeller and turbo-charger. The FADEC has two Engine Control Units (ECU's) located in a sealed unit under the pilot's seat. Sensors located on the engine measure the engine parameters for the system. An electrical harness connects the system components.

The fuel injection pump supplies four injectors connected to a common high-pressure rail. The active ECU controls the opening of each injector to inject the correct quantity of fuel for position of the cockpit power lever.

The TAE 125 has a turbo-charger to increase the efficiency and power output. Exhaust gases go through a turbine before flowing through a conventional exhaust to atmosphere. A ‘waste gate’ (bypass valve) in parallel with the turbine controls the volume of exhaust gas going through the turbine. The turbine turns a centrifugal compressor. The compressor supplies air to the engine through an intercooler.

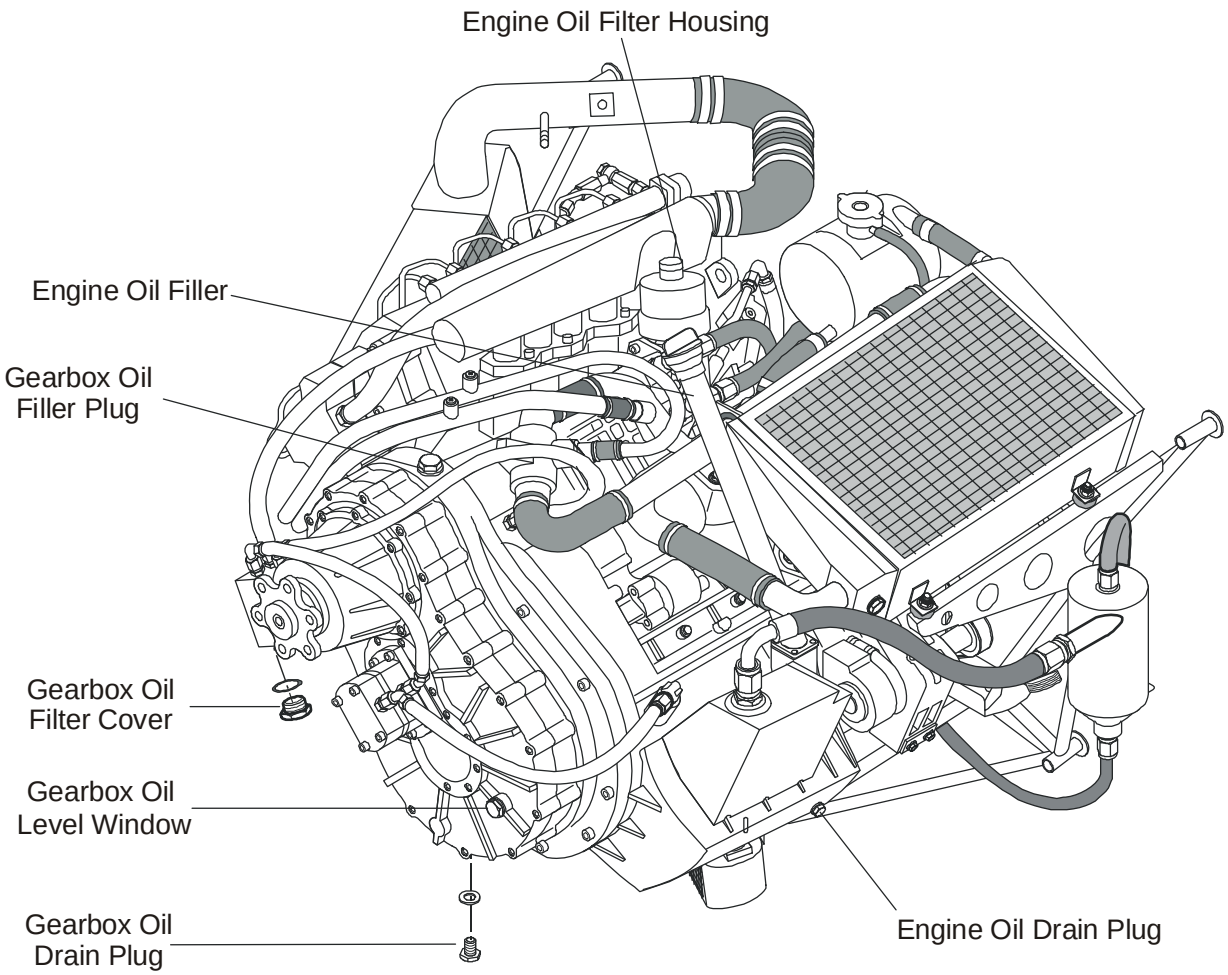


Figure 1: Oil System Maintenance Locations - TAE 125-01 Engine

Airplanes with TAE 125-02-99 Engine

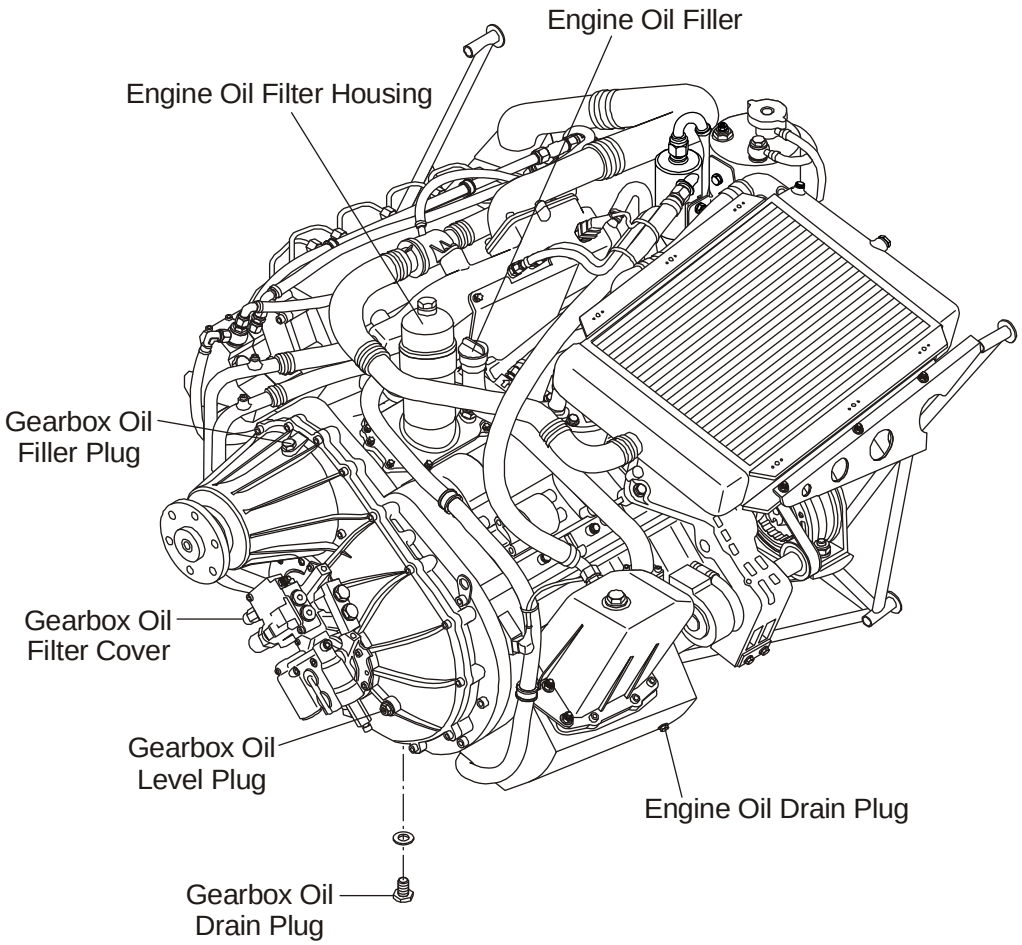


Figure 2: Oil System Maintenance Locations - TAE 125-02-99 Engine (if MÄM 40-256 is installed)

3. Engine Oil System

The engine has the usual wet sump oil system. The sump has a maximum capacity of 6 liter (6.3 US qts). Refer to the Airplane Flight Manual Chapter 2 for data about the oil types to use in the engine.

The oil pump supplies oil to all bearings and other components that require oil. Oil galleries inside the engine crankcase and cylinder head supply oil to the internal components.

Figure 1 and 2 shows the location of the items that you can maintain on the engine oil system. The engine has these maintenance locations:

– A full-flow oil filter located at the top left adjacent to the cylinder head. You must replace the filter at the times given in Chapter 05.

– An engine oil drain plug at the rear left of the engine sump.

– An oil filler located at the left of the crankcase.

– A gearbox oil filler plug located at the top of the gearbox.

– A gearbox oil level window located at the front left of the gearbox. When the oil covers half of the inspection window, the gearbox contains the correct quantity of oil.

– A gearbox oil drain plug located at the bottom of the gearbox.

Trouble-Shooting

1. General

The trouble-shooting given in this Section is limited to those items that you are allowed to do on the engine. For all other engine troubles, you must refer to an approved TAE 125 repair facility or the engine manufacturer.

Trouble	Possible Cause	Repair
Engine oil pressure low.	Not enough oil in the engine oil sump.	Fill the engine with oil.
	Oil pressure regulator valve does not operate correctly.	Refer to the engine manufacturer.
	Defective oil pump.	Refer to the engine manufacturer.
Gearbox oil temperature high.	Not enough oil in the gearbox.	Find the reason for the loss of gearbox oil and correct the problem. Fill the gearbox with oil.

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Maintenance Practices

1. General

These Maintenance Practices tell you how to service the oil system on the engine. For more data on the engine refer to the TAE Operation and Maintenance Manual OM-02-01, latest revision for the TAE 125-01 engine or OM-02-02, latest revision for the TAE 125-02-99 engine.

You must refer to an approved TAE 125 maintenance facility or the engine manufacturer for all other engine maintenance.

WARNING: DO NOT GET OIL ON YOU. OIL CAN CAUSE SKIN DISEASE.

CAUTION: ALWAYS PUT A CAP ON OPEN CONNECTIONS. IF YOU DO NOT PUT A CAP ON OPEN CONNECTIONS, THEN CONTAMINATION CAN GET INTO THE SYSTEM AND CAUSE DAMAGE.

CAUTION: DO NOT MIX OIL TYPES. IF YOU MIX OIL TYPES THE OIL CAN LOSE ITS PROPERTIES AND THE ENGINE WILL WEAR MORE QUICKLY.

2. Change the Engine Oil and Replace the Engine Oil Filter

	Detail Steps/Work Items	Key Items/References
(1)	Run the engine until it reaches the normal operating temperature. Then shut-down the engine.	Refer to Section 71-01.
	WARNING: MAKE THE ENGINE IS SAFE BEFORE YOU DO ANY WORK ON THE OIL SYSTEM. IF THE ENGINE STARTS THE PROPELLER CAN CAUSE INJURY OR DEATH.	
(2)	Make sure that the engine is safe: – Set the ELECTRIC MASTER key switch to OFF. – Set the ENGINE MASTER switch to OFF. – Set the power lever to IDLE.	
(3)	Remove the engine cowlings.	Refer to Section 71-11.
(4)	Disconnect the airplane main battery.	Refer to Section 24-34.

	Detail Steps/Work Items	Key Items/References
	CAUTION: USE ONLY APPROVED ENGINE OIL. REFER TO CHAPTER 2 OF THE AIRPLANE FLIGHT MANUAL FOR APPROVED ENGINE OIL SPECIFICATION. IF YOU DO NOT USE APPROVED ENGINE OIL, THE ENGINE CAN BE DAMAGED.	
(5)	Exchange the engine oil and the engine oil filter.	Refer to the TAE Operation and Maintenance Manual, latest revision.
(6)	Visually check engine oil for coolant.	No coolant allowed in oil.
(7)	Cut open the used oil filter. Look for particles of metal.	If the filter contains particles of metal, refer to the engine manufacturer.
(8)	Do an engine run.	
(9)	Check for oil leakage.	
(10)	Install the engine cowlings.	Refer to Section 71-11.

3. Change the Gearbox Oil and Replace the Gearbox Oil Filter

	Detail Steps/Work Items	Key Items/References
(1)	Run the engine until it reaches the normal operating temperature. Then shut-down the engine.	Refer to Section 71-01.
	WARNING: MAKE THE ENGINE IS SAFE BEFORE YOU DO ANY WORK ON THE OIL SYSTEM. IF THE ENGINE STARTS THE PROPELLER CAN CAUSE INJURY OR DEATH.	
(2)	Make sure that the engine is safe: – Set the ELECTRIC MASTER key switch to OFF. – Set the ENGINE MASTER switch to OFF. – Set the power lever to IDLE.	
(3)	Remove the engine cowlings.	Refer to Section 71-11.
(4)	Disconnect the airplane main battery.	Refer to Section 24-34.
	CAUTION: USE ONLY APPROVED GEARBOX OIL. REFER TO CHAPTER 2 OF THE AIRPLANE FLIGHT MANUAL FOR APPROVED GEARBOX OIL SPECIFICATION. IF YOU DO NOT USE APPROVED GEARBOX OIL, THE ENGINE CAN BE DAMAGED.	
(5)	Exchange the gearbox oil and the gearbox oil filter.	Refer to TAE Operation and Maintenance Manual, latest revision.
(6)	Remove the gearbox oil filter element.	Examine the filter for signs of metal particles. If you find metal particles, refer to the engine manufacturer.
(7)	Do an engine run.	
(8)	Do a propeller control test.	Refer to Section 71-01, Paragraph 3.
(9)	Check for oil leakage.	
(10)	Install the engine cowlings.	Refer to Section 71-11.

4. Read the Engine Event Log

CAUTION: ONLY TAE-AUTHORIZED PERSONNEL MAY DOWNLOAD DATA FROM THE ENGINE. REFER TO TAE SERVICE BULLETIN NO. 125-0003.

A. Equipment

Item	Quantity	Part Number
Laptop computer.	1	Commercial.
"ECU Operator" software, v 2.71 or later approved revision.	n/a	TAE 02-7610-55104R1.
CAN interface.	1	TAE 02-7610-55106R1.

B. Read the Engine Event Log

	Detail Steps/Work Items	Key Items/References
(1)	Set ELECTRIC MASTER key switch to ON.	
(2)	Connect laptop computer to CAN data connector on TAE harness with CAN interface.	
CAUTION: IF AN EVENT IS STORED, REFER TO THE ENGINE MANUFACTURER. FURTHER FLIGHT IS NOT PERMISSIBLE.		
(3)	Read event log of ECU.	Refer to TAE Operation and Maintenance Manual, latest revision.
(4)	Set ELECTRIC MASTER key switch to OFF.	
(5)	Disconnect laptop computer from CAN data connector on TAE harness.	

CHAPTER 73

ENGINE FUEL AND CONTROL

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CHAPTER 73
ENGINE FUEL AND CONTROL

Section 73-00
Engine Fuel and Control - Lycoming IO-360-M1A Engine

1. General

This Section tells you about the fuel system on the Lycoming IO-360-M1A engine. It gives you general data on the system and the trouble-shooting data on the system. Refer to the Lycoming Maintenance Manual for more data on the engine fuel system.

Refer to Section 28-00 for more data on the airplane fuel system and refer to Section 76-00 for more data on the controls which connect to the engine fuel system. Section 77-40 tells you more about the engine integrated display system.

2. Description/Operation

Figure 1 shows the schematic diagram for DA 40. The engine fuel system has these components:

A. Injector

The injector has a hollow body attached to the front of the engine sump. Air flows through the injector to the inlet manifold. A throttle valve in the body of the fuel injector controls the air flow.

The body has a venturi. When air flows through the venturi, the air pressure decreases. The injector uses the decrease in pressure as a measure of air flow to the inlet manifold. Venturi pressure goes to one side of an air diaphragm and air inlet pressure goes to the other side of the diaphragm.

Fuel goes into the injector under pressure. The fuel goes through a fuel strainer to a manual mixture control valve. The fuel flows from the manual mixture control valve through a metering jet to an idle valve. The fuel flows from the idle valve to a fuel diaphragm. This is metered fuel.

The fuel diaphragm is connected to the air diaphragm and to a ball valve. The ball valve controls the fuel flow to the engine. Fuel pressure at the fuel strainer goes to the other side of the fuel diaphragm.

The pressure difference across the air diaphragm causes a force which opens the ball valve. The pressure difference across the fuel diaphragm causes a force which closes the ball valve. The fuel flow out of the ball valve causes the metered fuel pressure to decrease. When the fuel pressure differential balances the air pressure differential, then the system is stable and the correct amount of fuel goes to the fuel-flow-divider.

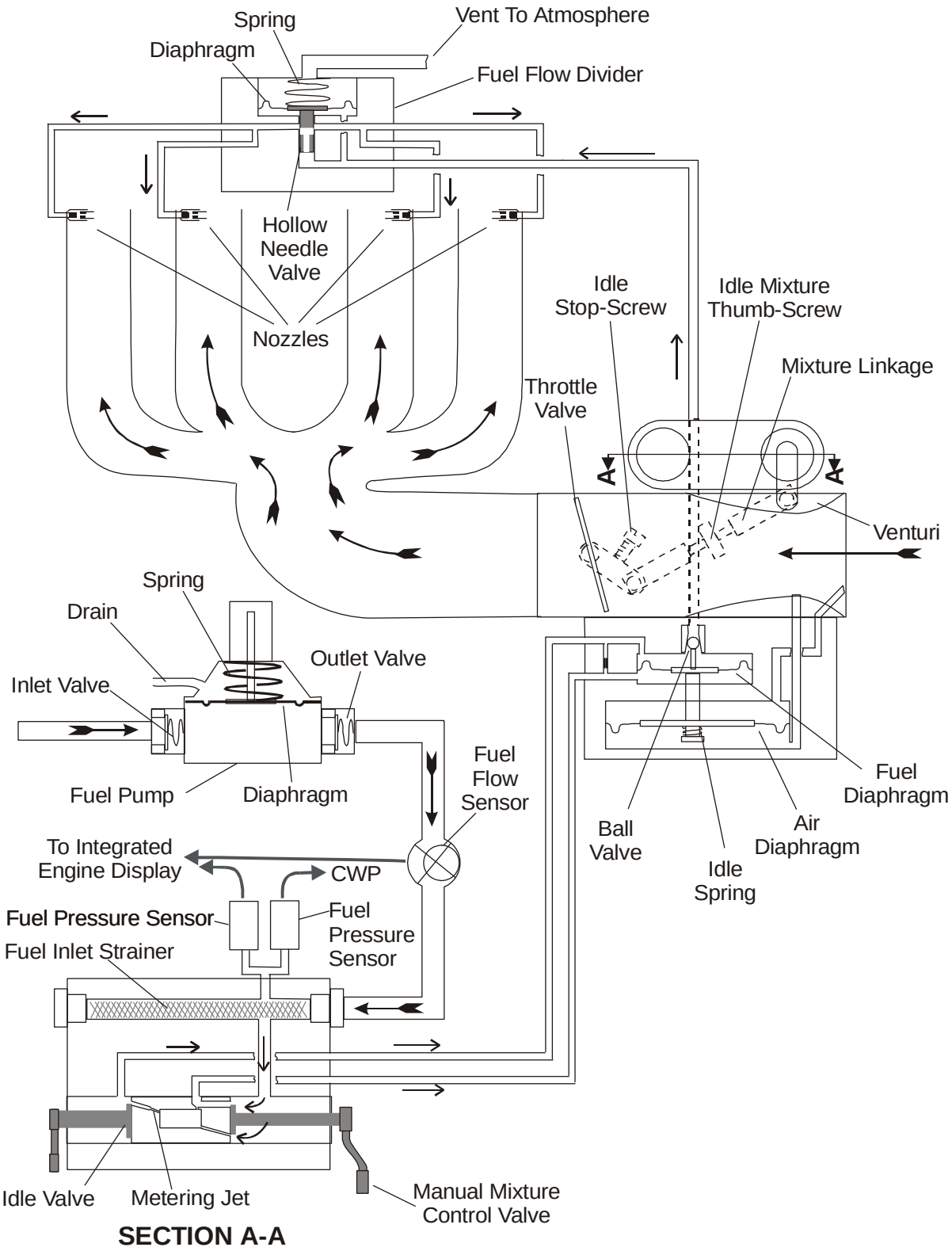


Figure 1: Engine Fuel System Schematic

Air density decreases as the airplane climbs. The air diaphragm does not measure the air density and the system gives a continuously rich mixture. The pilot can adjust the mixture strength with the manual mixture control.

If you move the mixture control lever aft, then the mixture becomes leaner. If you move the mixture control fully aft, then all fuel flow is cut off and the engine stops.

Different mixture strengths are necessary for different power settings. A linkage connects the throttle lever to the idle valve. It controls the fuel flow at idle to give a rich mixture. When the throttle is opened, the idle valve changes the outlet from the metering jet to give the correct mixture strength.

The pressures acting on the air diaphragm at idle are very small. A small spring in the air diaphragm makes sure that the ball valve stays open and the system supplies sufficient fuel for idle.

The injector has two adjustments:

– Idle speed. You can adjust the idle speed with the stop screw on the throttle lever. Turn the stop-screw clockwise to increase the idle speed.

– Idle mixture. You can adjust the idle mixture with the thumb-screw. The thumb-screw is in the link between the throttler lever and the idle mixture lever. The thumb-screw has right-hand threads on both ends. One thread is coarse and the other thread is fine.

  If you turn the thumb-screw so that the coarse thread is moves into its end-block, then the link becomes shorter and the idle mixture becomes leaner. If you turn the thumb-screw so that the coarse thread moves out of its end-block, then the link becomes longer and the idle mixture becomes richer. Section 71-00 tells you how to do an engine run-up to set the mixture strength.

B. Fuel Flow Divider

The fuel outlet of the injector connects to the fuel-flow-divider. The fuel-flow-divider is on top of the engine crankcase and has an outlet for each cylinder.

The fuel-flow-divider has a diaphragm. Fuel injector outlet pressure connects to the bottom of the diaphragm and atmospheric pressure connects to the top of the diaphragm. A hollow needle-valve attaches to the diaphragm and a spring above the diaphragm pushes the needle-valve downwards.

Fuel pressure from the fuel injector pushes the diaphragm up against the spring and opens a port in the needle-valve. The port connects to the outlet pipes for the cylinders. When fuel flows out the pressure drops and the needle-valve closes a small amount to keep up the injector pressure. At idle the needle-valve can close between each pulse of fuel. At the usual power settings the needle-valve stays open to keep up the fuel pressure.

C. Injector Nozzles

Rigid pipes from the fuel-flow-divider connect to a nozzle in each cylinder inlet port. The nozzle has a jet. Fuel from the jet flows out under pressure into an air-bleed chamber. The air and the fuel mix in the air-bleed chamber and then goes into the inlet port.

Each nozzle is calibrated ± 2%. Nozzles of the same part number are interchangeable between cylinders and they are interchangeable between engines.

D. Fuel Flow Indicator

The fuel flow indicator is part of the engine integrated display unit. The display unit is mounted in the instrument panel, right side. A transducer in the engine fuel system senses the fuel flow and the value is displayed in display unit.

E. Fuel Pressure Indicators

The fuel pressure indicator is part of the engine integrated display unit. A transducer in the engine fuel system senses the fuel pressure and the value is displayed in the display unit. Another transducer in the system operates a warning light in the central warning panel when the fuel pressure drops below the minimum permissible pressure.

F. Manifold Pressure Indicator

The manifold pressure indicator is part of the engine integrated display unit. A transducer attached to the manifold pressure hose senses the manifold pressure and the value is displayed in the display unit.

G. Air Intake

The air intake is part of the engine bottom-cowling. It is in the center of the bottom cowling and air flows from atmosphere directly into the air filter assembly.

H. Air Filter Assembly

The air filter is of the corrugated paper type and is located on the front of the alternate air assembly. You cannot clean the air filter. If the air filter becomes dirty or damaged you must replace it.

Trouble-Shooting

1. General

The table below lists the defects you could have with the engine fuel and control system. It only gives you the data for the air intake and filter assembly. For more data on trouble-shooting the engine fuel and control system refer to the Lycoming Maintenance Manual. If you have the trouble detailed in the Trouble column read across to the Possible Cause column. Then do the repair given in the Repair column.

Trouble	Possible Cause	Repair
Loss of engine power.	Blocked air intake.	Examine the air intake. Remove any obstructions.
	Dirty/Damaged air filter.	Replace the air filter.

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Maintenance Practices

1. General

This Section tells you how to remove/install the air filter and how to remove/install the fuel injector. For more data on the engine fuel and control system refer to the Lycoming Maintenance Manual.

2. Remove/Install the Engine Air Filter

A. Remove the Engine Air Filter

	Detail Steps/Work Items	Key Items/References
	WARNING: DO NOT STAND WITHIN THE DANGER AREA OF THE PROPELLER IF THE ENGINE STARTS, THE PROPELLER CAN CAUSE DEATH OR INJURY TO PERSONS. **WARNING: YOU MUST MAKE SURE THAT THE ENGINE IS SAFE BEFORE YOU DO WORK ON THE ENGINE. IF THE PROPELLER TURNS IT CAN CAUSE INJURY TO PERSONS.**	
(1)	Make sure that the engine is safe: – Set the ignition switch to OFF. – Set the throttle control to IDLE. – Set the mixture control lever to LEAN CUT-OFF.	
(2)	Remove the engine cowlings.	Refer to Section 71-10.
(3)	Disconnect the airplane battery.	Refer to Section 24-31.
(4)	Disconnect the spark plug cables from the spark plugs.	
(5)	Loosen the worm drive clamp that holds the air filter to air filter housing.	
(6)	Pull the air filter forward and clear of the air filter housing.	

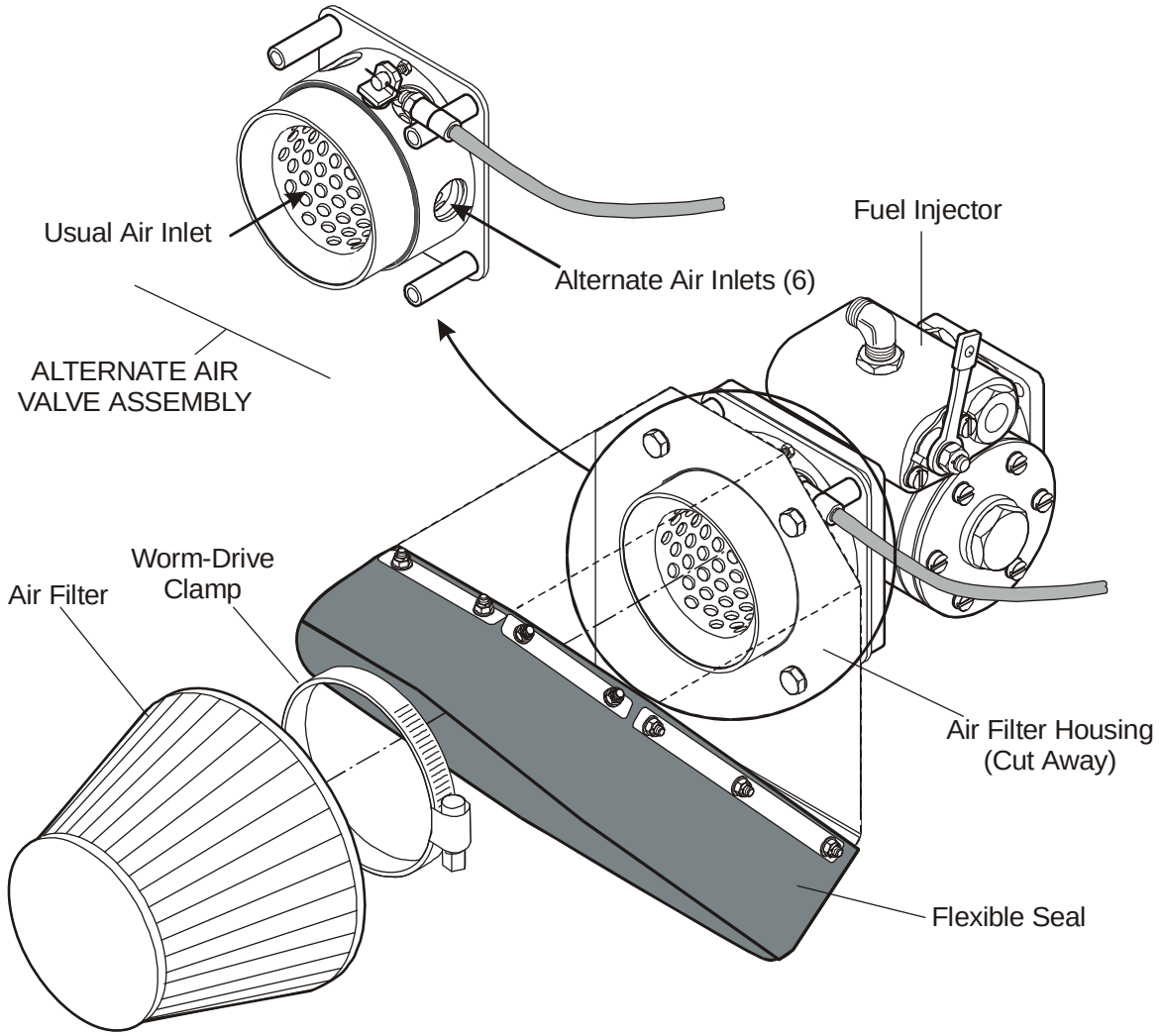


Figure 2: Air Filter Installation

B. Install the Engine Air Filter

	Detail Steps/Work Items	Key Items/References
(1)	Make sure that the worm drive clamp is in position on the air filter.	
(2)	Put the air filter in position on the air filter housing.	
(3)	Tighten the worm drive clamp which holds the air filter.	
(4)	Connect the spark plug leads to the spark plugs.	Torque: 12.4 - 13.6 Nm (110 - 120 lbf.in.).
(5)	Connect the airplane battery.	Refer to Section 24-31.
(6)	Install the engine cowlings.	Refer to Section 71-10.
(7)	Do an engine run-up.	Refer to the Airplane Flight Manual.

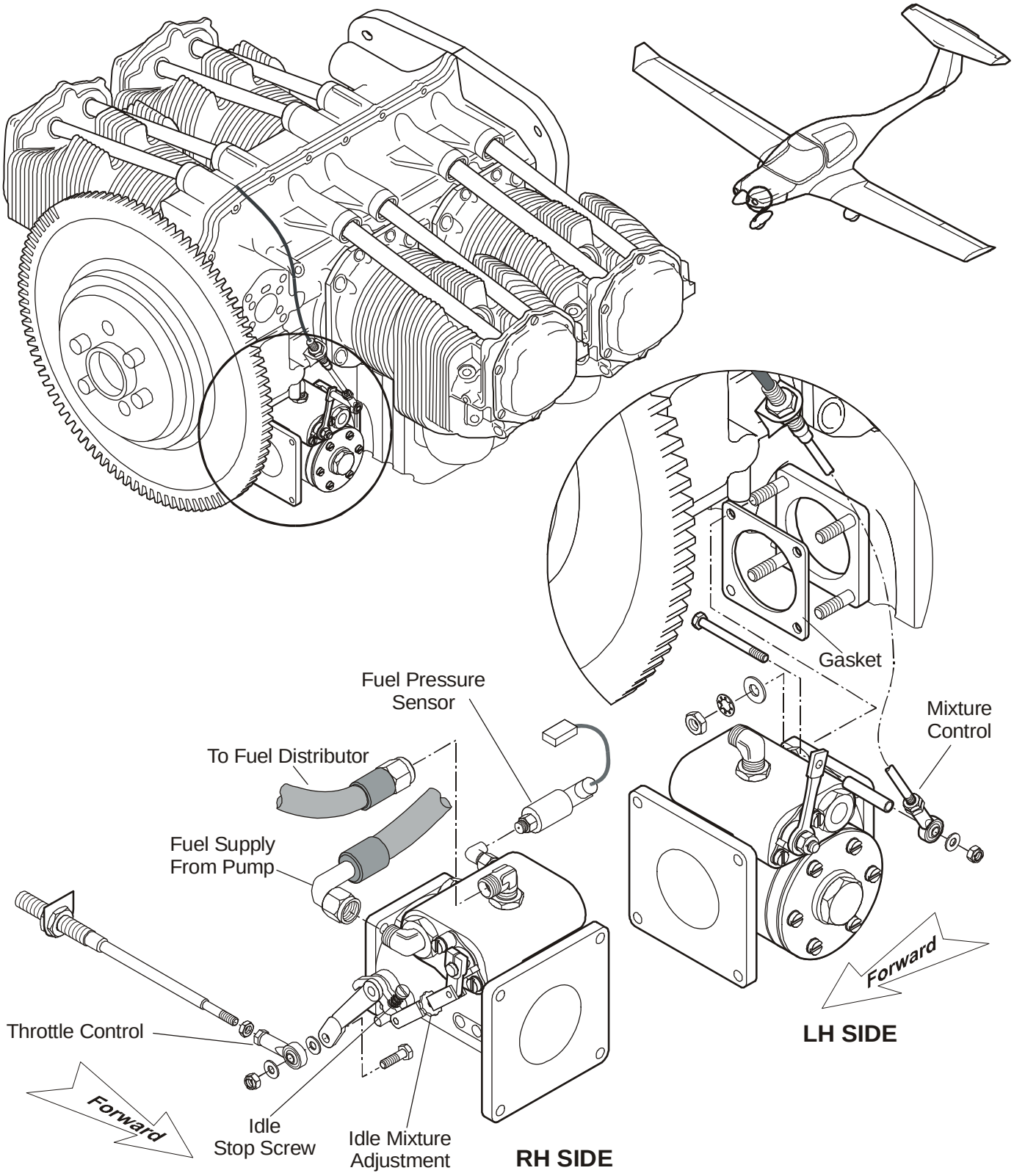


Figure 3: Fuel Injector Installation

3. Remove/Install the Fuel Injector

A. Remove the Fuel Injector

	Detail Steps/Work Items	Key Items/References
	WARNING: DO NOT STAND WITHIN THE DANGER AREA OF THE PROPELLER IF THE ENGINE STARTS, THE PROPELLER CAN CAUSE DEATH OR INJURY TO PERSONS. **WARNING: YOU MUST MAKE SURE THAT THE ENGINE IS SAFE BEFORE YOU DO WORK ON THE ENGINE CONTROLS. IF THE PROPELLER TURNS IT CAN CAUSE INJURY TO PERSONS.**	
(1)	Make sure that the engine is safe: – Set the ignition switch to OFF. – Set the throttle control to IDLE. – Set the mixture control lever to LEAN CUT-OFF.	
(2)	Remove the engine cowlings.	Refer to Section 71-10.
(3)	Disconnect the airplane battery.	Refer to Section 24-31.
(4)	Disconnect the spark plug cables from the spark plugs.	
(5)	Remove the air filter and the alternate air assembly.	Refer to Section 71-60.
(6)	Disconnect the throttle control: – Remove the nut and washer from the throttle lever. – Pull the eye-end from the lever. – Remove the second washer and bolt from the lever.	Refer to Figure 3.

	Detail Steps/Work Items	Key Items/References
(7)	Disconnect the mixture control: – Remove the nut and washer from the mixture lever. – Pull the eye-end from the lever. – Remove the spacer and the bolt from the lever.	
	WARNING: DO NOT GET FUEL ON YOU. FUEL CAN CAUSE SKIN DISEASE. DO NOT ALLOW FIRE NEAR FUEL. FUEL BURNS AND CAN INJURE PERSONS AND DAMAGE EQUIPMENT.	
(8)	Disconnect the fuel hose to the fuel distributor.	Put a container to catch the fuel. Put caps on the hose and the injector.
(9)	Disconnect the fuel supply hose to the injector.	Put a container to catch the fuel. Put caps on the hose and the injector.
(10)	Remove 4 nuts, serrated washers and plain washers that attach the fuel injector to the engine.	
(11)	Pull the injector forward off the studs and away from the engine.	Discard the gasket. Put caps on the injector and cover on the engine intake.

B. Install the Fuel Injector

	Detail Steps/Work Items	Key Items/References
	WARNING: DO NOT GET FUEL ON YOU. FUEL CAN CAUSE SKIN DISEASE. DO NOT ALLOW FIRE NEAR FUEL. FUEL BURNS AND CAN INJURE PERSONS AND DAMAGE EQUIPMENT.	
(1)	Prepare the new injector: – Remove the caps from the inlet and outlet connections of the new injector. – Clean the inlet fuel strainer. – Flush the injector with clean fuel until clean fuel flows from the outlets.	Use a syringe. Do not use more than 1 bar (15 PSI) pressure.
(2)	Remove the cover from the engine air intake and the caps from the injector.	
(3)	Put the injector in position on the engine sump.	Refer to Figure 3. Use a new gasket.
(4)	Install the 4 plain washers, serrated washers and nuts that attach the injector.	Torque 23 Nm (17 lbf.ft.).
(5)	Connect the fuel hose to the fuel distributor.	
(6)	Connect the fuel supply hose to the fuel injector.	
(7)	Install the alternate air assembly and the air filter.	Refer to Section 71-60.
(8)	Connect the mixture control cable: – Put the bolt and spacer in position on the mixture lever. – Put the eye-end on the bolt. – Install the washer and the self locking nut.	

	Detail Steps/Work Items	Key Items/References
(9)	Connect the throttle control cable: – Put the bolt and washer in position on the throttle lever. – Put the eye-end on the bolt. – Install the second washer and self locking nut.	
(10)	Do a test of the mixture control for freedom of movement and correct adjustment.	Refer to Section 76-10.
(11)	Do a test of the throttle control for freedom of movement and adjustment.	Refer to Section 76-10.
(12)	Connect the airplane battery.	Refer to Section 24-31.
(13)	Do a test for fuel leaks: – Set the fuel selector/shut-off valve ON. – Set the ALT/BAT switch to ON. – Set the electrical fuel pump to ON. – Make sure that there are no leaks from the injector. – Set the electrical fuel pump to OFF. – Se the ALT/BAT switch to OFF. – Set the fuel selector/shut-off valve to OFF.	
(14)	Connect the spark plug cables to the spark plugs.	Torque to 12.4 to 13.6 Nm (110 - 120 lbf.in.).
(15)	Install the engine cowlings.	Refer to Section 71-10.
(16)	Do an engine ground run-up test.	Refer to the Airplane Flight Manual.

Section 73-01
Engine Fuel and Control - TAE 125 Diesel Engine

1. General

This Section tells you about the fuel system on the TAE 125 Diesel engine. It gives you general data and the trouble-shooting data on the system. You cannot replace the components of the engine fuel system. You can replace components in the air intake system and the fuel filter. Refer to the engine manufacturer for data on the engine fuel system.

Refer to Section 28-01 for more data on the airplane fuel system. Refer to Section 71-61 for more data on the air filter and alternate air valve. Refer to Section 76-01 for more data on the control system for the engine fuel system. Refer to Chapter 81 for more data on the turbo-charger and intercooler.

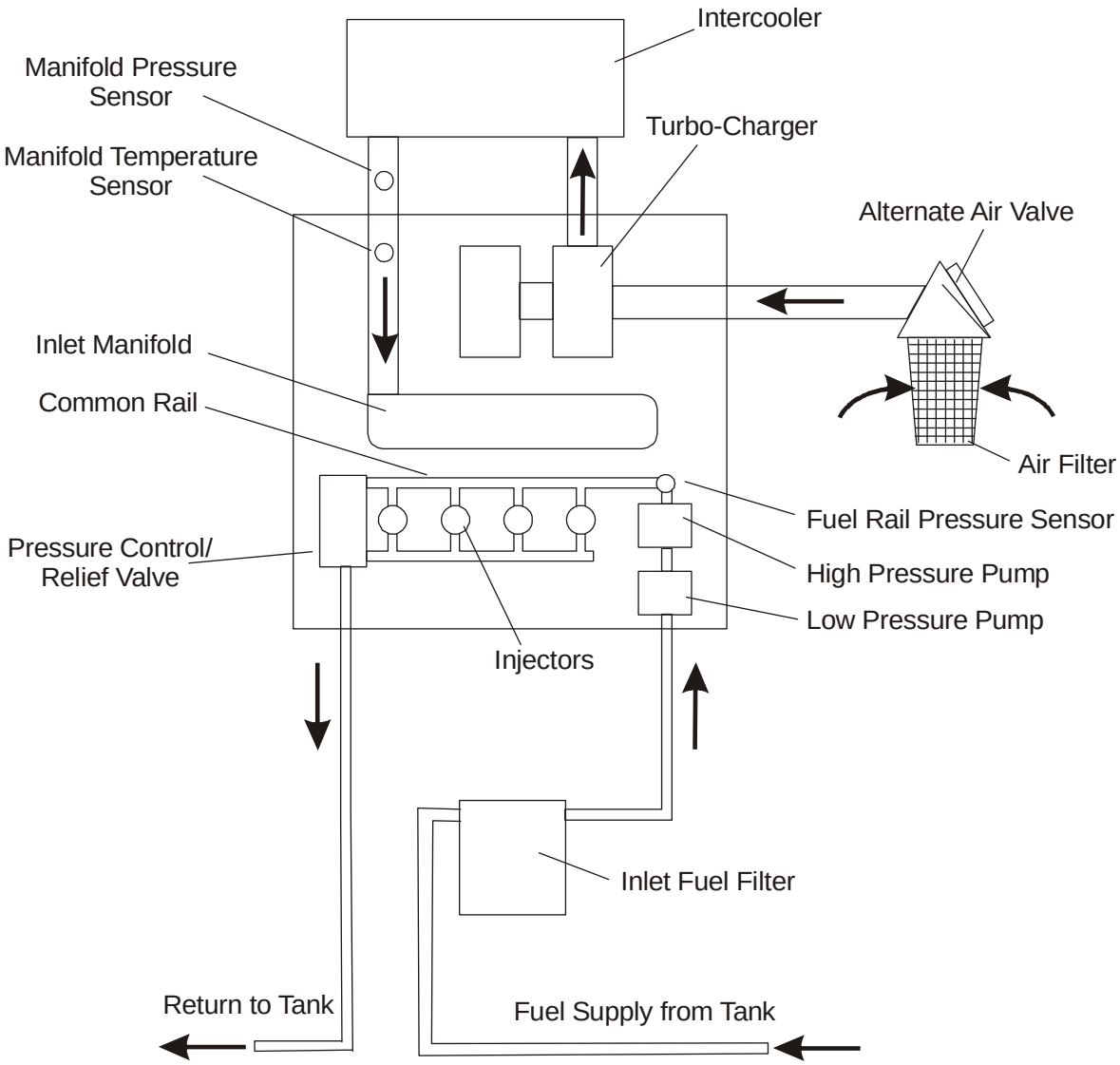


Figure 1: Engine Fuel System Schematic Diagram

2. Description and Operation

Figure 1 shows the schematic diagram for DA 40 with the TAE 125 Diesel engine. The engine fuel system has two main parts:

– An air intake system. This system supplies air from the inlet to the air filter to the engine inlet manifold.

– An engine fuel system. The engine fuel system takes fuel from the airplane fuel system and injects it into the cylinders.

A. Air Intake System

The air intake system has an air filter located on the right of the engine compartment, just forward of the firewall. The filter attaches to the bottom of an alternate air valve. The alternate air valve also has an inlet direct from the engine compartment. A flap in the valve can select either filtered air or warm, unfiltered air. Refer to Section 71-61 for more data on the air filter and alternate air valve.

The outlet from the alternate air valve connects to the turbo-charger. The outlet from the turbo-charger connects to an intercooler. The outlet from the intercooler connects to the engine inlet manifold. Refer to Chapter 81 for more data on the turbo-charger and intercooler.

B. Engine Fuel System

(1) General

Fuel from the airplane fuel system goes into the engine fuel filter. The fuel filter is located on the top right of the engine compartment, adjacent to the firewall.

The inlet fuel goes through the filter and out to the engine-driven low-pressure fuel pump. The low-pressure fuel pump supplies fuel to the engine high-pressure pump. The high-pressure pump supplies fuel to a common rail connected to the injectors. A combined pressure relief and regulator valve at the end of the common rail controls the fuel pressure. Surplus fuel from the valve returns to the fuel tank.

(2) Fuel Filter Heating

There is no fuel filter heating. The fuel filter has a thermostatic bypass.

If the return fuel is warm but not hot, then the thermostatic bypass guides the return fuel from the engine into the fuel filter. The return fuel mixes with the cold fuel from the tank and increases the fuel temperature in the fuel filter. This prevents the fuel filter from becoming blocked. No fuel returns to the airplane fuel system.

If the return fuel is hot, then the thermostatic bypass connects the return fuel from the engine to the return line of the airplane fuel system. Fuel will return to the left tank through the cooling loop in the right tank (refer to Chapter 28).

You must examine and replace the filter at the times given in Chapter 05.

Trouble-Shooting

1. General

The table below lists the defects you could have with the engine fuel and control system. It only gives you the data for the air intake, air filter and fuel filter. For more data on trouble-shooting the engine fuel and control system refer to the engine manufacturer.

If you have the trouble detailed in the Trouble column read across to the Possible Cause column. Then do the repair given in the Repair column.

Trouble	Possible Cause	Repair
Loss of engine power.	Blocked air intake.	Examine the air intake. Remove any obstructions. Refer to Section 71-61.
	Dirty/damaged air filter.	Replace the air filter. Refer to Section 71-61.
	Dirty/damaged fuel filter.	Replace the fuel filter.
		Look for contaminated fuel in the airplane fuel system. Refer to Section 28-21.
	Air in fuel distribution system.	Bleed the fuel distribution system. Refer to Section 28-21.
	Pressure control relief valve defective.	Replace the relief valve.
	Rail pump defective.	Replace the rail pump.
	Low pressure fuel pump.	Replace low pressure fuel pump.

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Maintenance Practices

1. General

This Section tells you how to remove/install the fuel filter. Only an approved TAE 125 repair shop can repair the engine fuel system. For more data on the engine fuel and control system refer to the engine manufacturer.

Refer to Section 71-61 for maintenance data on the air filter and alternate air valve. Refer to Chapter 81 for maintenance data on the turbo-charging system.

2. Remove/Install the Engine Fuel Filter and Replace the Element

A. Remove the Engine Fuel Filter

	Detail Steps/Work Items	Key Items/References
	WARNING: YOU MUST MAKE SURE THAT THE ENGINE IS SAFE BEFORE YOU DO WORK ON THE ENGINE. IF THE PROPELLER TURNS IT CAN CAUSE INJURY TO PERSONS.	
(1)	Make sure that the engine is safe: – Set the ELECTRIC MASTER key switch to OFF. – Set the ENGINE MASTER switch to OFF. – Set the power lever to IDLE.	
(2)	Remove the engine cowlings.	Refer to Section 71-11.
(3)	Release the 2 fuel hoses at the fuel filter.	Cut the lock wire at the fuel filter connections. Catch the fuel in a suitable container.
(4)	Release the 2 worm-drive clamps that attach the filter to the mounting bracket.	
(5)	Remove the filter from the airplane.	

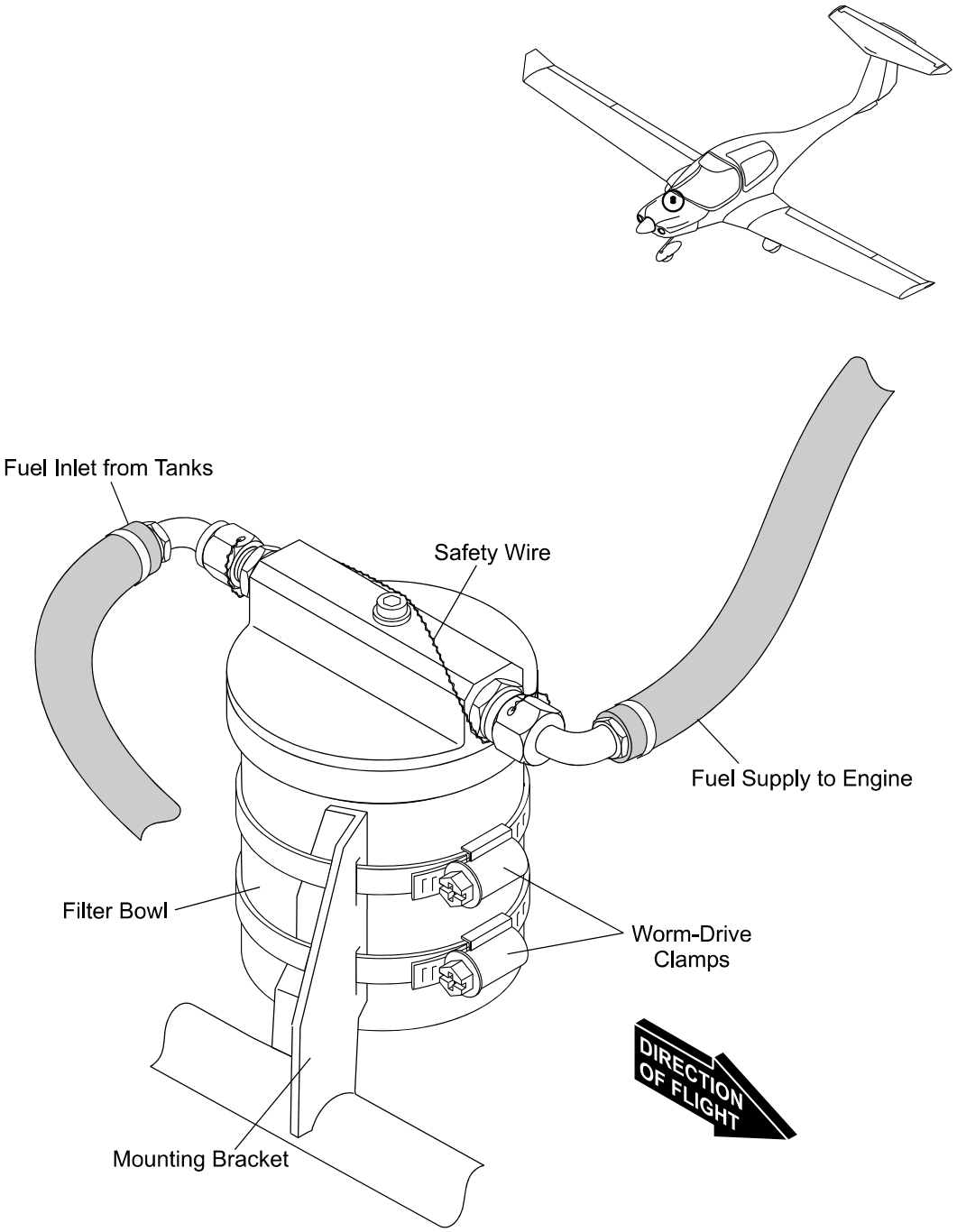


Figure 2: Engine Fuel Filter Installation

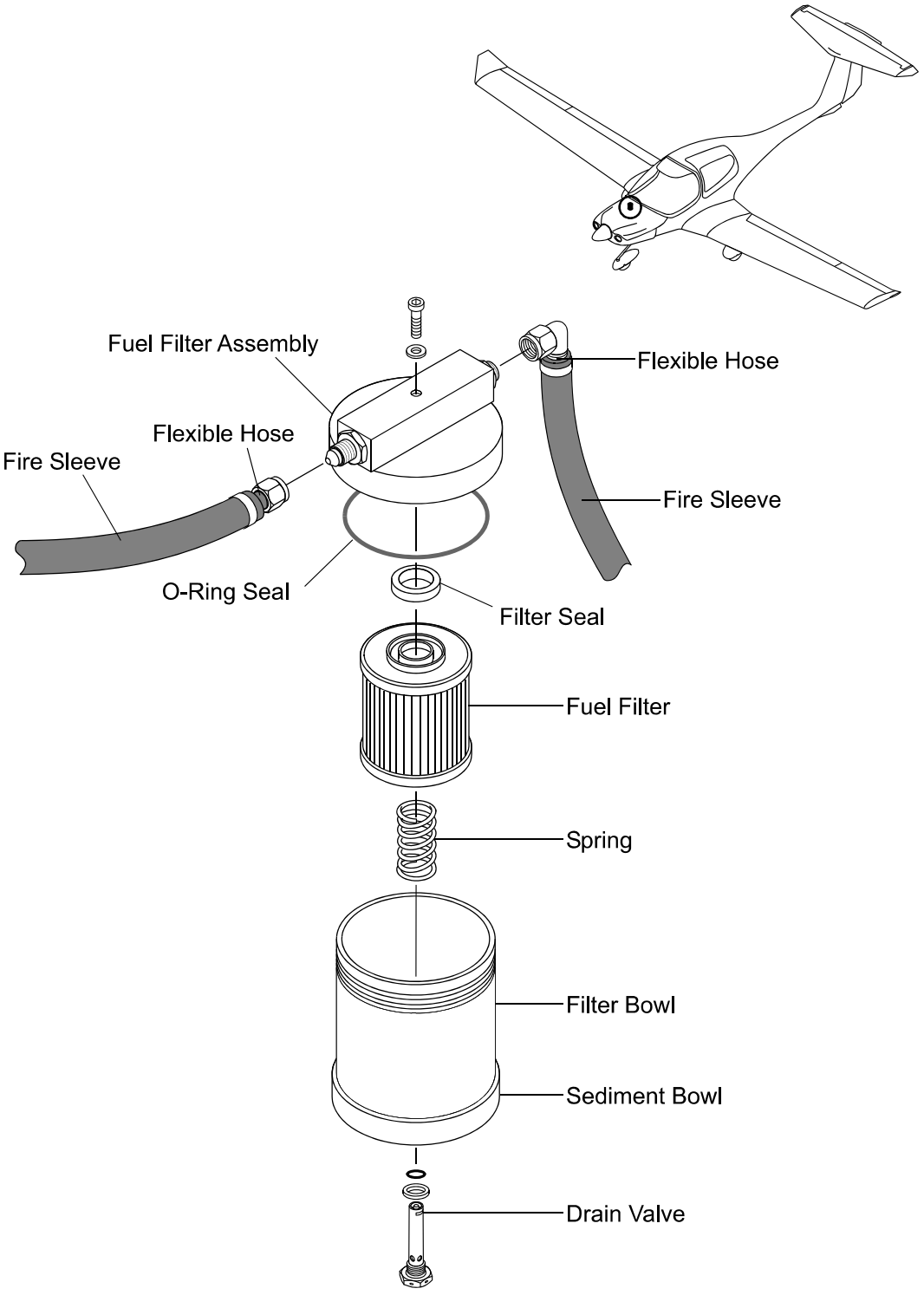


Figure 3: Fuel Filter Assembly

B. Replace the Fuel Filter Element

	Detail Steps/Work Items	Key Items/References
(1)	Release the fuel filter bowl from the filter assembly: – Unscrew from top cover of filter assembly.	
(2)	Remove the old filter element and the spring.	
(3)	Look for unwanted material and water in the fuel filter bowl and on the filter element. – If you find unwanted material, examine the airplane fuel system to find the source.	
(4)	Place the spring on the bottom of the fuel filter bowl in an upright position.	Refer to Figure 3.
(5)	Install a new filter element.	Use a new seal that comes with the new filter.
CAUTION:	THE OPENING ON TOP OF THE FUEL FILTER ELEMENT MUST FACE UP TOWARDS THE TOP COVER OF THE FUEL FILTER ASSEMBLY.	
(6)	Attach the fuel filter bowl to the top cover: – Screw onto the top cover of filter assembly.	Use new O-ring seal.

C. Install the Engine Fuel Filter

	Detail Steps/Work Items	Key Items/References
	WARNING: YOU MUST MAKE SURE THAT THE ENGINE IS SAFE BEFORE YOU DO WORK ON THE ENGINE. IF THE PROPELLER TURNS IT CAN CAUSE INJURY TO PERSONS.	
(1)	Make sure that the engine is safe: – Set the ELECTRIC MASTER key switch to OFF. – Set the ENGINE MASTER switch to OFF. – Set the power lever to IDLE.	
(2)	Put the fuel filter in position in the airplane.	
(3)	Tighten the 2 worm-drive clamps that attach the filter to the mounting bracket.	
(4)	Connect the 2 fuel hoses at the fuel filter. Tighten the hoses.	 Torque: 17 - 22 Nm (12.5 - 16.2 lbf.ft.).
(5)	Bleed the fuel distribution system.	Refer to Section 28-21.
(6)	Secure the fuel hoses with new lock wire.	
(7)	Do an engine run-up.	Refer to Section 71-01. Look for fuel leaks in the area of the fuel filter.
	Note: Starting may take longer than usual as the engine fuel system bleeds fully.	
(8)	Install the engine cowlings.	Refer to Section 71-11.

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Section 73-02
Engine Fuel and Control - Lycoming O-360-A4M Engine

1. General

This Section tells you about the fuel system on the Lycoming O-360-A4M engine. It gives you general data on the system and the trouble-shooting data on the system. Refer to the Lycoming Maintenance Manual for more data on the engine fuel system

Refer to Section 28-00 for more data on the airplane fuel system and refer to Section 76-00 for more data on the controls which connect to the engine fuel system. Section 77-40 tells you more about the engine integrated display system.

2. Description/Operation

Figure 1 shows the schematic diagram for the DA 40 F. The engine fuel system has these components:

A. Carburetor

The carburetor and the engine controls bracket are attached to the inlet manifold of the engine with studs, washers, serrated washers and nuts. Air flows through the carburetor heat valve and the carburetor to the inlet manifold. A throttle valve in the body of the carburetor controls the air flow.

The fuel goes into the carburetor under pressure. The fuel flows through the fuel inlet strainer to the manual mixture control valve. The fuel flows from the manual mixture control valve to the main jet, the idle jet and the accelerator pump. The carburetor body has an outer venturi and a main venturi. When air flows through a venturi, the air speed increases. Due to this effect the fuel is vaporized by the main jet in the main venturi and by the accelerator jet and idle jet in the outer venturi.

The mixture control lever in the cockpit is attached to the mixture control lever on the carburetor with a Bowden cable and controls the mixture valve. The throttle lever in the cockpit controls the throttle valve in the carburetor.

The carburetor has three adjustments:

- Idle speed. The idle RPM can be adjusted with the stop screw on the throttle lever.
- Idle mixture. The idle mixture adjustment screw is next to the mixture control lever.

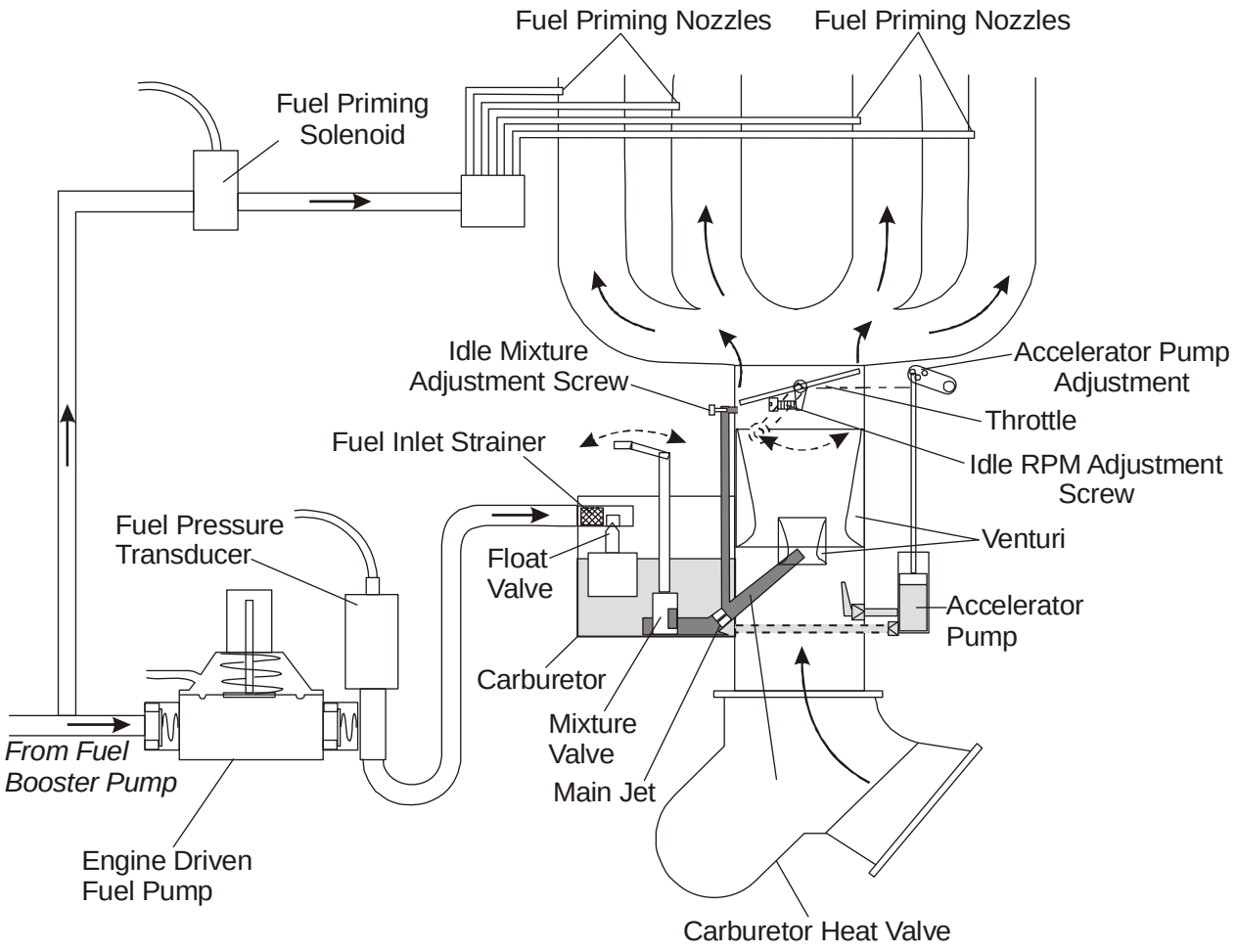


Figure 1: Engine Fuel System Schematic

B. Fuel Flow Indicator

The fuel flow indicator is part of the engine integrated display unit. A transducer in the engine fuel system senses the fuel flow and the value is displayed in the display unit.

C. Fuel Pressure Indicator

The fuel pressure indicator is part of the engine integrated display unit. A transducer in the engine fuel system senses the fuel pressure and the value is displayed in the display unit. The transducer operates a warning light in the central warning panel when the fuel pressure drops below the minimum permissible pressure.

D. Manifold Pressure Indicator

The manifold pressure indicator is part of the engine integrated display unit. A transducer attached to the manifold pressure hose senses the manifold pressure and the value is displayed in the display unit.

E. Air Intake

The air intake baffle is mounted to the carburetor heat valve. It is in the center of the bottom cowling and air flows from the atmosphere through the air filter and the carburetor heat valve to the carburetor.

F. Air Filter Assembly

The air filter is a metal framed panel with oil impregnated foam for the filter element. You cannot clean the air filter. If the air filter becomes dirty or damaged you must replace it.

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Trouble-Shooting

1. General

The table below lists the defects you could have with the engine fuel and control system. It only gives you the data for the air intake and filter assembly. For more data on trouble-shooting the engine fuel and control system refer to the Lycoming Maintenance Manual. If you have the trouble detailed in the Trouble column read across to the Possible Cause column. Then do the repair given in the Repair column.

Trouble	Possible Cause	Repair
Loss of engine power.	Blocked air intake.	Examine the air intake. Remove any obstructions.
	Dirty/Damaged air filter.	Replace the air filter.

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Maintenance Practices

1. General

This Section tells you how to remove/Install the air filter and how to remove/install the carburetor. For more data on the engine fuel and control system refer to the Lycoming Maintenance Manual.

Refer to Section 71-62 for maintenance information on the air filter and carburetor heat valve.

2. Remove/Install the Carburetor

A. Remove the Carburetor

	Detail Steps/Work Items	Key Items/References
	WARNING: DO NOT STAND WITHIN THE DANGER AREA OF THE PROPELLER IF THE ENGINE STARTS, THE PROPELLER CAN CAUSE DEATH OR INJURY TO PERSONS. **WARNING: YOU MUST MAKE SURE THAT THE ENGINE IS SAFE BEFORE YOU DO WORK ON THE ENGINE CONTROLS. IF THE PROPELLER TURNS IT CAN CAUSE INJURY TO PERSONS.**	
(1)	Make sure that the engine is safe: – Set the ignition switch to OFF. – Set the throttle control to IDLE. – Set the mixture control lever to LEAN CUT-OFF.	
(2)	Remove the engine cowlings.	Refer to Section 71-12.
(3)	Disconnect the airplane battery.	Refer to Section 24-31.
(4)	Disconnect the spark plug cables from the spark plugs.	
(5)	Remove the air filter and the carburetor heat valve assembly.	Refer to Section 71-62.

	Detail Steps/Work Items	Key Items/References
(6)	Disconnect the throttle control: – Remove the nut and washer from the throttle lever. – Pull the eye-end from the lever. – Remove the second washer and bolt from the lever.	Refer to Figure 3.
(7)	Remove the throttle control cable from the bracket: – Remove the front adjustment nut and washer from the outer sheath. – Move the control cable clear of the bracket.	
(8)	Disconnect the mixture control: – Disconnect the return spring from the bracket. – Remove the nut and washer from the mixture lever. – Pull the eye-end from the lever. – Remove the spacer and the bolt from the lever.	
(9)	Remove the mixture control cable from the bracket: – Remove the front adjustment nut and washer from the outer sheath. – Move the control cable clear of the bracket.	

WARNING: DO NOT GET FUEL ON YOU. FUEL CAN CAUSE SKIN DISEASE. DO NOT ALLOW FIRE NEAR FUEL. FUEL BURNS AND CAN INJURE PERSONS AND DAMAGE EQUIPMENT.

	Detail Steps/Work Items	Key Items/References
(10)	Disconnect the fuel supply hose to the carburetor.	Put a container to catch the fuel. Put caps on the hose and the carburetor.
(11)	Remove the 4 nuts, serrated washers and plain washers that attach the fuel engine controls bracket and the carburetor to the engine.	Support the carburetor and the bracket.
(12)	Pull the carburetor downward off the studs and away from the engine.	Discard the gaskets. Put caps on the carburetor and a cover on the engine intake.

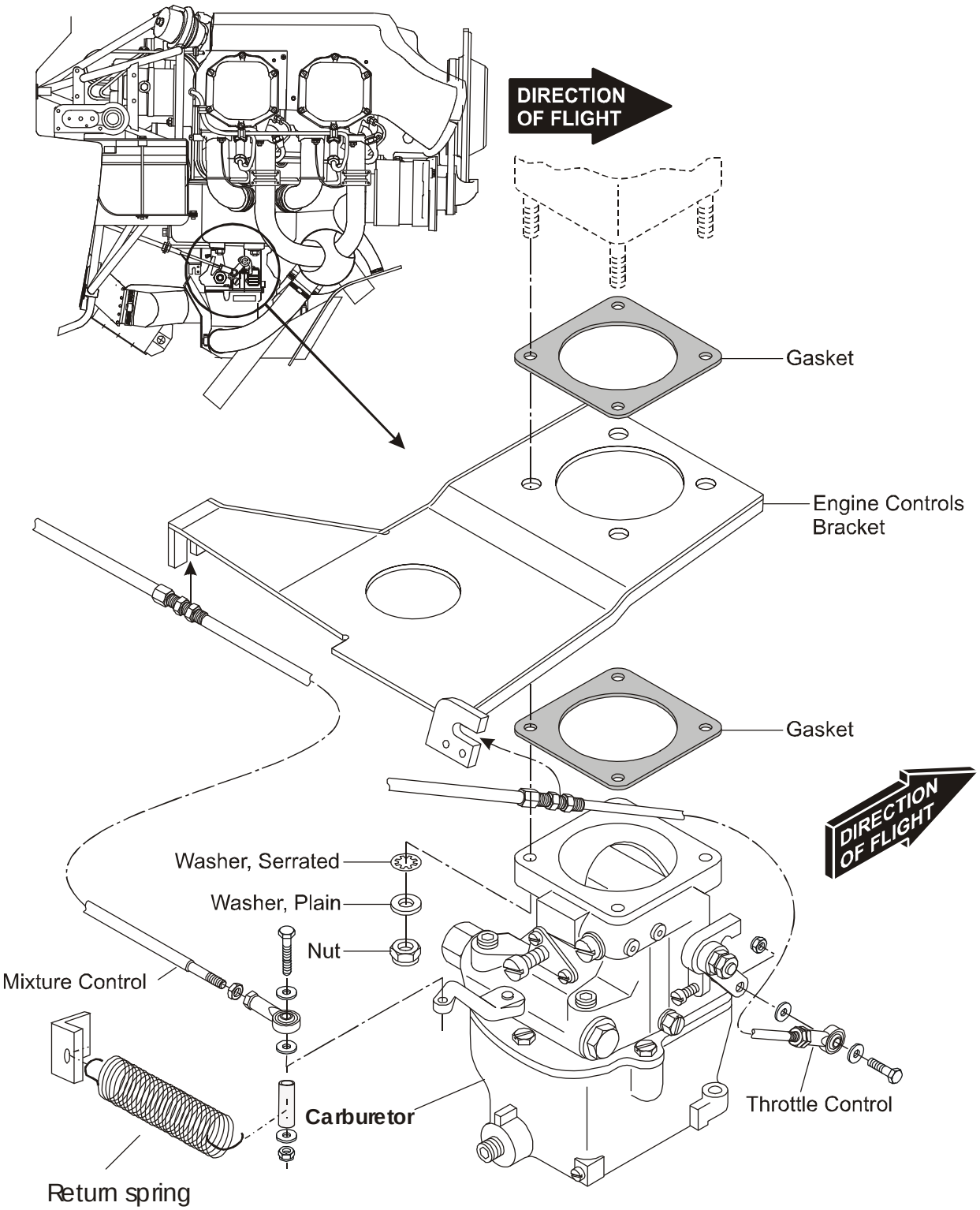


Figure 3: Carburetor Installation

B. Install the Carburetor

	Detail Steps/Work Items	Key Items/References
	WARNING: DO NOT GET FUEL ON YOU. FUEL CAN CAUSE SKIN DISEASE. DO NOT ALLOW FIRE NEAR FUEL. FUEL BURNS AND CAN INJURE PERSONS AND DAMAGE EQUIPMENT.	
(1)	Prepare the new carburetor: – Remove the caps from the inlet and outlet connections of the new carburetor. – Clean the inlet fuel strainer. – Flush the carburetor with clean fuel until clean fuel flows from the outlets.	Use a syringe. Do not use more than 1 bar (15 PSI) pressure.
(2)	Remove the cover from the engine intake.	
(3)	Put the carburetor and the engine controls bracket in position on the engine.	Refer to Figure 3. Use new gaskets.
(4)	Install the 4 serrated washers, plain washers and nuts that attach the carburetor.	Torque 23 Nm (17 lbf.ft.).
(5)	Connect the fuel supply hose to the carburetor.	
(6)	Install the mixture control cable: – Install the top adjustment nut and washer onto the control cable outer sheath. – Push the cable through the support bracket at the bottom of the engine. – Install the bottom adjustment nut and washer on to the control cable outer sheath. Tighten the nut.	

	Detail Steps/Work Items	Key Items/References
(7)	Connect the mixture control cable: – Put the bolt and spacer in position on the mixture lever. – Put the eye-end on the bolt. – Install the washer and the self locking nut. – Connect the return spring to the bracket.	
(8)	Install the throttle control cable: – Install the top adjustment nut and washer onto the control cable outer sheath. – Push the cable through the support bracket at the bottom of the engine. – Install the bottom adjustment nut and washer on to the control cable outer sheath. Tighten the nut.	
(9)	Connect the throttle control cable: – Put the bolt and spacer in position on the mixture lever. – Put the eye-end on the bolt. – Install the washer and the self locking nut.	
(10)	Install the carburetor heat valve assembly and the air filter.	Refer to Section 71-62.
(11)	Do a test of the mixture control for freedom of movement and correct adjustment.	Refer to Section 76-10.
(12)	Do a test of the throttle control for freedom of movement and adjustment.	Refer to Section 76-10.
(13)	Connect the airplane battery.	Refer to Section 24-31.

	Detail Steps/Work Items	Key Items/References
(14)	Do a test for fuel leaks: – Set the fuel selector/shut-off valve ON. – Set the ALT/BAT switch to ON. – Set the electrical fuel pump to ON. – Make sure that there are no leaks from the carburetor. – Set the electrical fuel pump to OFF. – Se the ALT/BAT switch to OFF. – Set the fuel selector/shut-off valve to OFF.	
(15)	Connect the spark plug cables to the spark plugs.	Torque to 12.4 to 13.6 Nm (110 - 120 lbf.in.).
(16)	Install the engine cowlings.	Refer to Section 71-12.
(17)	Do an engine ground run-up test.	Refer to the Airplane Flight Manual.

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CHAPTER 74

IGNITION

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2. Remove/Install the Ignition Switch 201

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CHAPTER 74
IGNITION

1. General

This Chapter tells you about the ignition system for the engine. It gives you the general data about the ignition system. It gives you the trouble-shooting data for the ignition system and it tells you how to remove/install the ignition switch.

For more data on the components of the ignition system refer to the Lycoming Maintenance Manual, the LASAR Operating Manual and the equipment manufacturers' manuals.

Note: Equipment which is certified for installation in the DA 40 is listed in Section 6.5 of the Airplane Flight Manual. Such equipment may be installed in accordance with the Airplane Maintenance Manual.

Any equipment which is not listed in Section 6.5 of the Airplane Flight Manual is called "Additional Equipment". The installation of Additional Equipment is a modification which must be handled in accordance with national regulations or a Service Bulletin.

2. Description

The DA 40 has dual ignition. The SlickSTART magneto booster system is standard equipment, the limited-authority-spark-advance-regulator (LASAR) system is optional. Two Slick magnetos supply the high voltage electrical impulses to the spark plugs. An ignition switch in the cockpit controls the magnetos and screened cables connect the magnetos to the spark-plugs. Two spark-plugs in each cylinder give ignition. The engine ignition firing order is 1-3-2-4.

A. SlickSTART Booster System

The SlickSTART booster receives power only when the starter is engaged. Therefore this system only affects the engine start-up process.

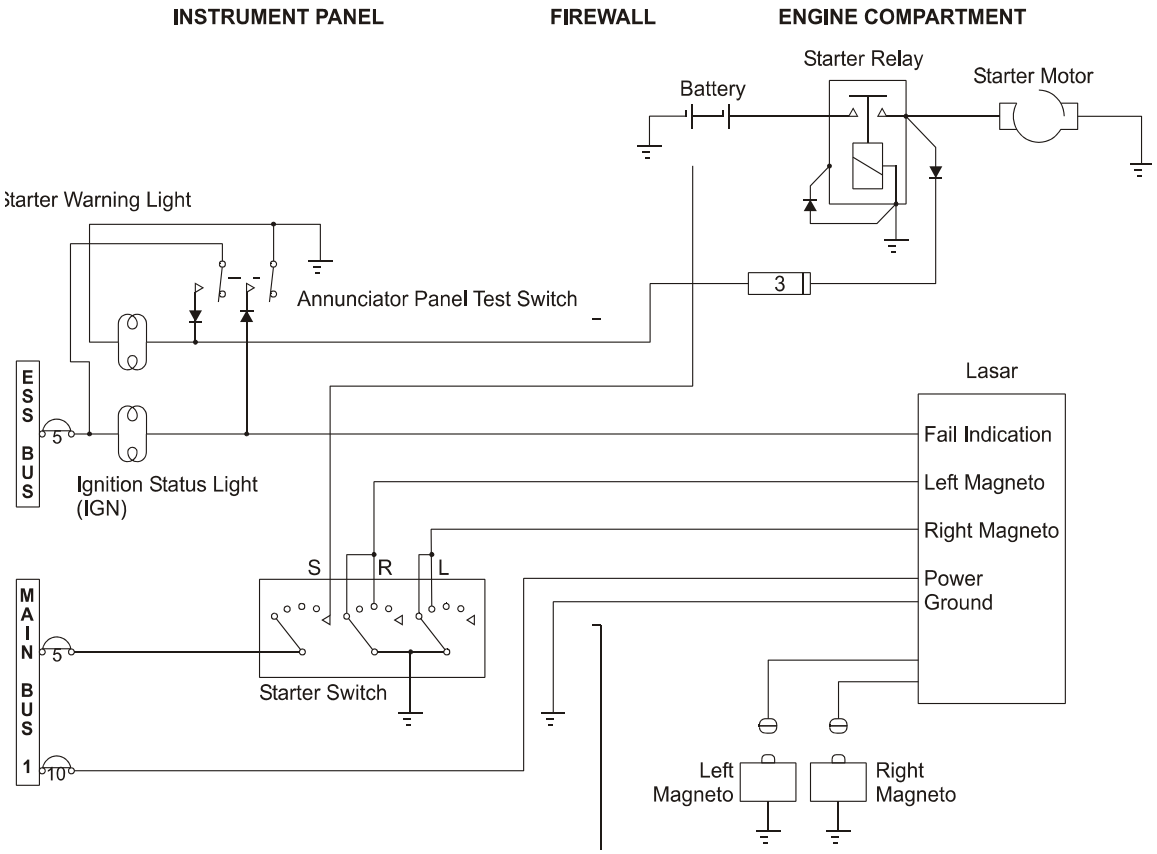


Figure 1: Engine Ignition Schematic Diagram

B. LASAR System

During engine start-up, the LASAR system sets the ignition timing to 0° before top-dead-center (BTDC) and boosts the power of the electrical impulse to the spark-plugs. As the engine RPM increases to 275 RPM the LASAR system advances the engine ignition timing according to the engine personality map (EPM). When the engine RPM increases to 700 RPM the LASAR system reduces the power of the electrical impulses to their usual value.

The LASAR system is an automatic system. If the ignition switch is set to the BOTH position or the START position, then the LASAR system is switched on. If the LASAR system fails or the ignition switch is set to any position other than BOTH or START, then the magnetos will operate in back-up mode. In back-up mode the timing of the magnetos is fixed at 25° BTDC. A white ignition status light (IGN or IGNITION) on the annunciator panel tells the pilot when the LASAR system is in back-up mode.

3. Ignition System Components

Figures 1 shows the schematic diagram of the ignition system. The ignition system has these components:

A. Ignition Switch

The ignition switch is at the lower face of the instrument panel, on the left half. You operate the ignition switch with a key. The ignition switch has these positions:

– OFF. Both magnetos grounded, LASAR system (if installed) in back-up mode.

– R. Right magneto live, left magneto grounded, LASAR system (if installed) in back-up mode.

– L. Left magneto live, right magneto grounded, LASAR system (if installed) in back-up mode.

– BOTH. Both magnetos live, LASAR system (if installed) in automatic mode if the engine is running. LASAR system in back-up mode if the engine is not running.

– START. Both magnetos live, LASAR system (if installed) in automatic mode and starter relay ON.

You cannot repair the ignition switch.

B. Ignition Switch Cables

Cables connect the ignition switch to the SlickSTART booster control unit or LASAR control unit. The control unit has special electrical cables which connect to the left magneto and connect to the right magneto.

C. SlickSTART Booster System

The SlickSTART booster system is the standard system in the DA 40. It is active only during the engine start-up process.

The ignition-switch-cables connect to the SlickSTART booster. Nuts and bolts attach the booster to a bracket on the left side of the engine mount. Electrical cables from the booster connect to the left magneto and connect to the right magneto. The starter supplies electrical power to the booster. A 5 amp in-line fuse protects the booster.

D. Limited Authority Spark Advance Regulator (LASAR)

The LASAR system is optional equipment.

The ignition-switch-cables connect to the LASAR control unit. Nuts and bolts attach the control unit to a bracket on the left side of the engine mount. Electrical cables from the control unit connect to the left magneto and connect to the right magneto. The main bus 1 supplies electrical power to the control unit. A 10 amp circuit-breaker protects the circuit.

The LASAR system has these modes of operation:

– Automatic Mode. The automatic mode is the usual operating mode when the system is operating correctly and the engine is running. The control unit energizes relays in the left magneto and in the right magneto. The relays operate switches in each magneto which electrically isolate the contact-breaker points from the low tension coils of the magneto. The LASAR control unit controls the ignition timing and the high-tension voltage to the spark-plugs.

– Back-Up Mode. In back-up mode the electrical power to operate the relays in the magnetos is removed. The switches close and the contact-breakers are re-connected in circuit with the magneto low-tension coils. The magnetos now operate in the same way as standard magnetos.

  The LASAR system goes into back-up mode when:

  (1) Power is supplied to the control unit and the engine is not running.

  (2) The engine is running and there is no power to the control unit.

  (3) The engine is running and the ignition switch is not set to BOTH.

  (4) The system malfunctions.

E. Ignition Status Light (IGN or IGNITION)

The white ignition status light (IGN or IGNITION) is located on the annunciator panel which is located on the instrument panel, at the top. It is only used when the LASAR ignition system is installed. The ignition status light comes on when the LASAR system is in the back-up mode (failure mode).

F. Magnetos

(1) SlickSTART Magneto Booster System Installed

The two Slick magnetos attach to the rear accessory housing and are driven directly by the engine. The contact breakers control the ignition timing. The ignition timing is fixed to 25° BTDC.

During the engine start-up process, the SlickSTART booster delivers energy to the retard breaker magneto.

(2) LASAR System Installed

The two Slick magnetos attach to the rear accessory housing and are driven directly by the engine. The left magneto has a position/speed sensor which gives a reference signal to the LASAR control unit. The right magneto does not have a sensor.

Each magneto has an electrical relay which is controlled by the LASAR control unit. In the automatic mode of operation the control unit sets the relay to electrically isolate the low tension circuit of the magneto. The engine ignition timing is then controlled by the LASAR control unit. If the LASAR system is in back-up mode, the electrical relays reconnect the contact-breakers into the low-tension circuit of the magneto. The contact breakers control the ignition timing. In back-up mode of operation the ignition timing is fixed to 25° BTDC. An electrical cable connects each magneto to the LASAR control unit.

G. High-Tension Cables (Ignition Harness)

Each magneto supplies high-tension pulses to one spark-plug in each cylinder. High tension cables connect the magneto to the spark-plugs. Each cable has a core which transmits the high tension electricity. The core has thick layer of insulation and the insulation is covered with a braided metal screen. The braided metal screen connects to the cable end-fittings and prevents radio interference.

Each high tension cable has special end-fittings. The end-fittings stop water going into the cable connections and electrically bonds the braided-screen.

You can test the high tension ignition cables with a high tension tester.

H. Spark Plugs

Each cylinder has two spark plugs. The left magneto connects to the top spark plugs on the left cylinders and it connects to the bottom spark plugs on the right cylinders.

The right magneto connects to the top spark plugs on the right cylinders and the bottom spark plugs on the left cylinders.

4. Operation

A. Ignition Switch Set to OFF

– The ignition switch gives a ground to both magnetos.

– The magnetos cannot make high tension pulses of electricity.

– The spark plugs cannot make sparks.

– The engine cannot run.

B. Ignition Switch Set to R

Use this setting to test the right magneto:

– The ignition switch gives a ground to the left magneto.

– The right magneto is live.

– If the engine turns the right magneto will make high tension pulses and the spark plugs will make sparks.

– The engine can run.

C. Ignition Switch Set to L

Use this setting to test the left magneto:

– The ignition switch gives a ground to the right magneto.

– The left magneto is live.

– If the engine turns the left magneto will make high tension pulses and the spark plugs will make sparks.

– The engine can run.

D. Ignition Switch Set to BOTH

This is the usual setting when the engine runs.

– Both magnetos are live.

– When the engine turns both magnetos make high tension pulses and the spark plugs make sparks.

– If the engine is running and power is supplied to the LASAR system, the LASAR system will operate in automatic mode (if installed).

E. Ignition Switch Set to START

Use this setting to start the engine.

(1) SlickSTART Magneto Booster System Installed

– Both magnetos are live.

– The ignition switch connects a 28 V positive supply from main bus 1 to the starter relay.

– The SlickSTART booster receives energy and supplies the retard breaker magneto with energy for an additional ignition spark.

(2) LASAR System Installed

– Both magnetos are live.

– The ignition switch connects a 28 V positive supply from main bus 1 to the starter relay.

– If electrical power is supplied to the LASAR system, then it is set to automatic mode.

– When the engine turns less than 275 RPM the LASAR control unit sets the ignition timing to TDC. The control unit gives a higher energy spark at the spark plugs.

– When the engine turns between 275 RPM and 700 RPM the LASAR control unit sets the ignition timing according to the engine personality map. The control unit gives a higher energy spark at the spark plugs.

– When the engine turns more than 700 RPM the LASAR control unit sets the ignition timing according to the engine personality map. The higher spark energy at the spark plug is reduced to the normal level.

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Trouble Shooting

1. General

This Section gives you the trouble-shooting data for the ignition switch. Refer to the Lycoming Maintenance Manual and the equipment manufacturer's manuals for more data on trouble-shooting the engine ignition system. If you have the trouble detailed in the Trouble column read across to the Possible Cause column. Then do the repair given in the Repair column.

Trouble	Possible Cause	Repair
Engine does not start or engine is not easy to start.	Ignition switch/switch cable defective.	Disconnect the battery. Disconnect the spark plugs. Disconnect the ignition switch cables from the LASAR control unit (if installed). Set the ignition switch to START. Do a test for an open circuit between the left switch-cable and ground. Do a test between the right switch-cable and ground. If you do not get an open circuit then repair the switch cable. Or replace the ignition switch.

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Maintenance Practices

1. General

The Maintenance Practices in this Section tell you how to remove/install the ignition switch. Refer to the Lycoming Maintenance Manual and the equipment manufacturer's manuals for more data on the engine ignition system.

2. Remove/Install the Ignition Switch

A. Remove the Ignition Switch

	Detail Steps/Work Items	Key Items/References
	WARNING: DO NOT WORK ON THE IGNITION SYSTEM UNTIL YOU HAVE MADE IT SAFE BY DISCONNECTING THE SPARK PLUGS. THE PROPELLER CAN TURN SUDDENLY AND CAUSE INJURY TO PERSONS.	
(1)	Make sure that the engine is safe: – The ignition switch is set to OFF. – The throttle is set to IDLE. – The mixture control is set to LEAN CUT-OFF.	
(2)	Remove the engine cowlings.	Refer to Section 71-10.
(3)	Disconnect the battery.	Refer to Section 24-31.
(4)	Disconnect the spark plug cables from the spark plugs.	
(5)	Remove the instrument panel cover.	Refer to Section 31-10. So that you can work at the rear of the ignition switch.
(6)	Remove the four pan-head screws which attach the switch-mounting-plate to the back of the instrument panel.	Hold the ignition switch and mounting plate!
(7)	Disconnect the electrical cables from the ignition switch.	Make a note of the cable connections.
(8)	Remove the switch and mounting plate from the airplane.	

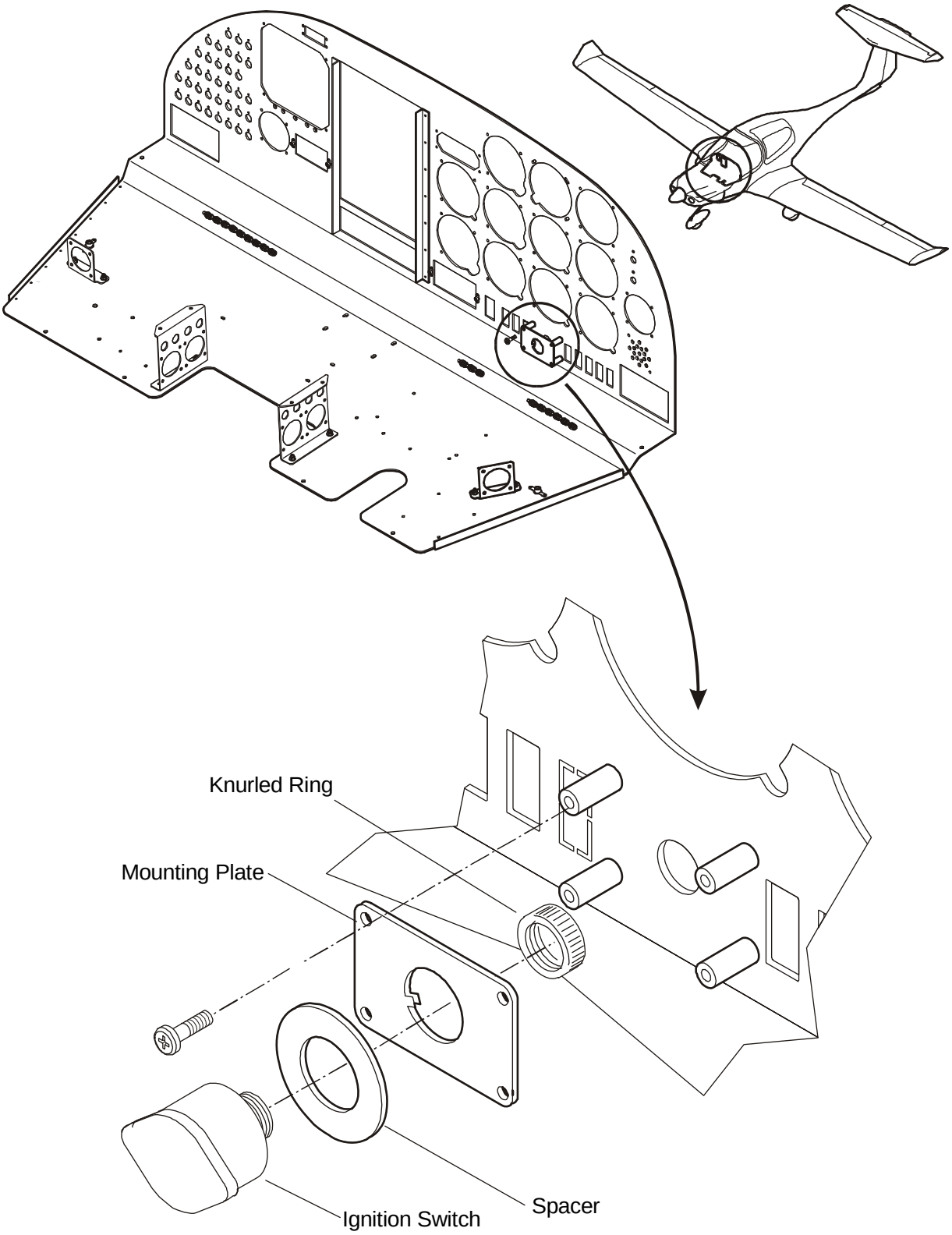


Figure 2: Ignition Switch Installation in Larger Instrument Panels

B. Install the Ignition Switch

	Detail Steps/Work Items	Key Items/References
(1)	Make sure that the spark plug cables are disconnected from the spark plugs.	
(2)	Make sure that the battery is disconnected.	
(3)	If necessary, install the switch in the switch mounting plate: – Move the switch into position in the mounting plate. – Install the knurled ring on the front of the switch to hold the switch in position in the mounting plate.	Make sure that the switch is correctly aligned!
(4)	Move the mounting plate and switch into position behind the instrument panel.	So that you can connect the cables.
(5)	Connect the electrical cables to the ignition switch.	Refer to Chapter 92 for the Wiring Diagrams.
(6)	Move the switch and mounting plate into position in the instrument panel.	
(7)	Install the four pan-head screws which attach the mounting plate to the instrument panel.	

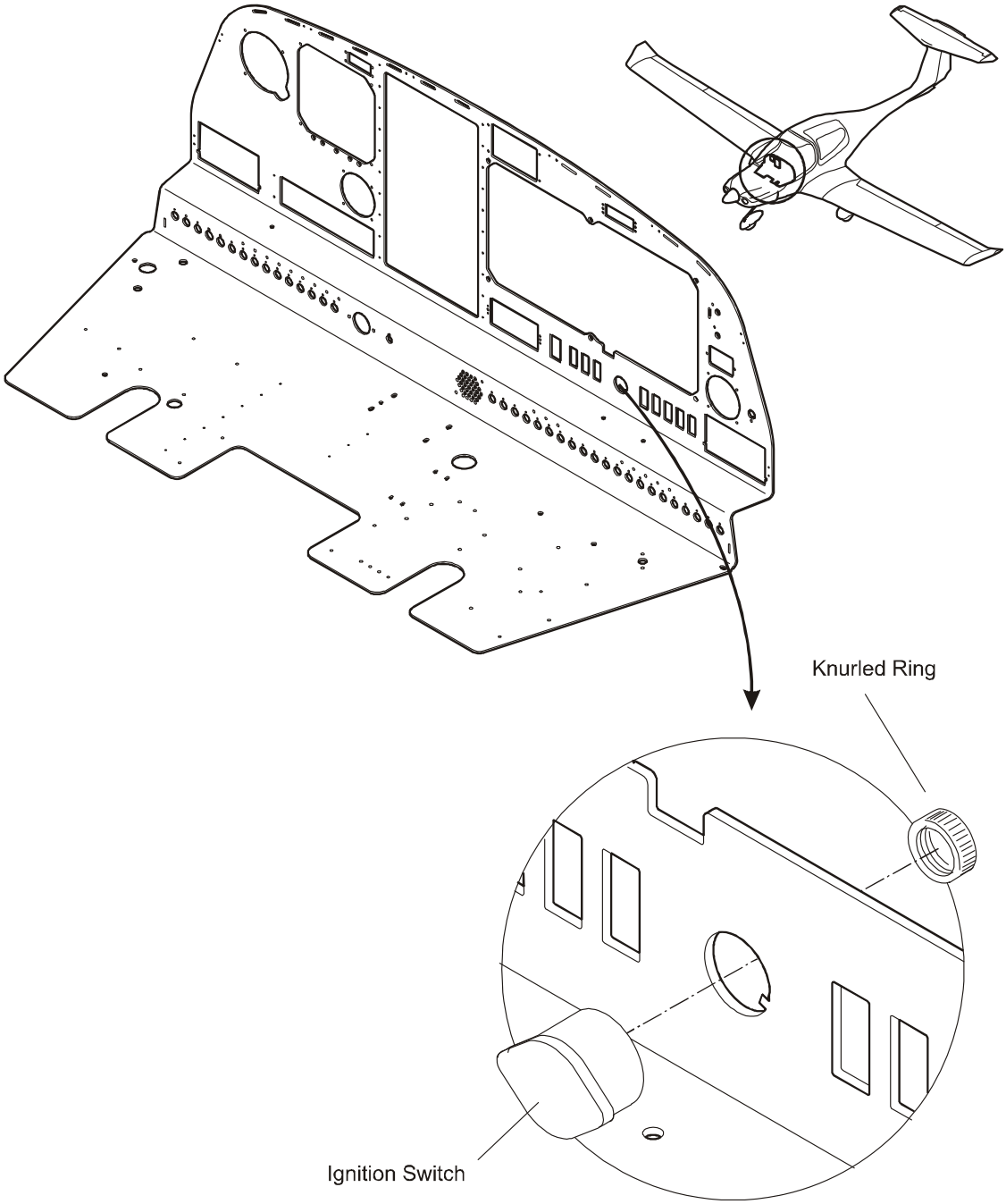


Figure 3: Ignition Switch Installation in Smaller Instrument Panels

	Detail Steps/Work Items	Key Items/References
(8)	Do a test for correct operation of the ignition switch: – Disconnect the instrument panel connector at the rear of the instrument panel. – Set the ignition switch to OFF. – Set the ignition switch to R. – Set the ignition switch to L. – Set the ignition switch to BOTH. – Set the ignition switch to START. – Set the ignition switch to OFF. – Reconnect the instrument panel connector at the rear of the panel.	Do a resistance test between each switch cable and ground for each switch setting. Connector 2410. Refer to Chapter 92 for the wiring diagrams. Both ignition switch cables zero ohms. Left zero ohms, right M ohms. Left M ohms, right zero ohms. Both cables M ohms. Both cables M ohms.
(9)	Install the instrument panel cover.	Refer to Section 31-10.
(10)	Connect the spark plug cables to the spark plugs.	Torque to 12.4 - 13.6 Nm (110 - 120 lbf.in.).
(11)	Connect the airplane battery.	Refer to Section 24-31.
(12)	Install the engine cowlings.	Refer to Section 71-00.
(13)	Do an engine run-up.	Refer to the DA 40 Airplane Flight Manual.

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CHAPTER 75

COOLING

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CHAPTER 75
COOLING

Section 75-00
Air Cooling - Lycoming IO-360-M1A Engine

1. General

This Section gives you the data for the air cooling system for airplanes with the Lycoming IO-360-M1A engine installed. It gives you the Maintenance Practices to remove/install the baffle. Refer to the Lycoming Maintenance Manual for data about the inter-cylinder cooling baffle. Figure 1 shows the air cooling baffle.

2. Description/Operation

The baffle controls the cooling air flow. Ram air enters the cooling baffle through the intake in the engine cowling. The front duct of the baffle sends the cooling air into the space over the top of the cylinders. Rivets attach a special rubber sealing strip to the top of the baffle. The rubber sealing strip makes a seal between the baffle and the inside of the top cowling. The air goes down between the cylinders and around the outside of the cylinders. The used air goes out from the bottom rear of the engine bay.

These items pass through rubber grommets in the cooling baffle:

– The propeller control cable.

– The mixture control cable.

– The fuel flow divider drain.

The cables for the top spark plugs of No. 1 and 3 cylinders, go through a cable feed-thru in the rear of the baffle, on the right side. The cables for the top spark plugs of No. 2 and 4 cylinder pass through holes in the left side of the baffle, at the top.

Screws attach the baffle to the cylinder head and tie-bars hold the baffle in position around the bottom of the cylinders.

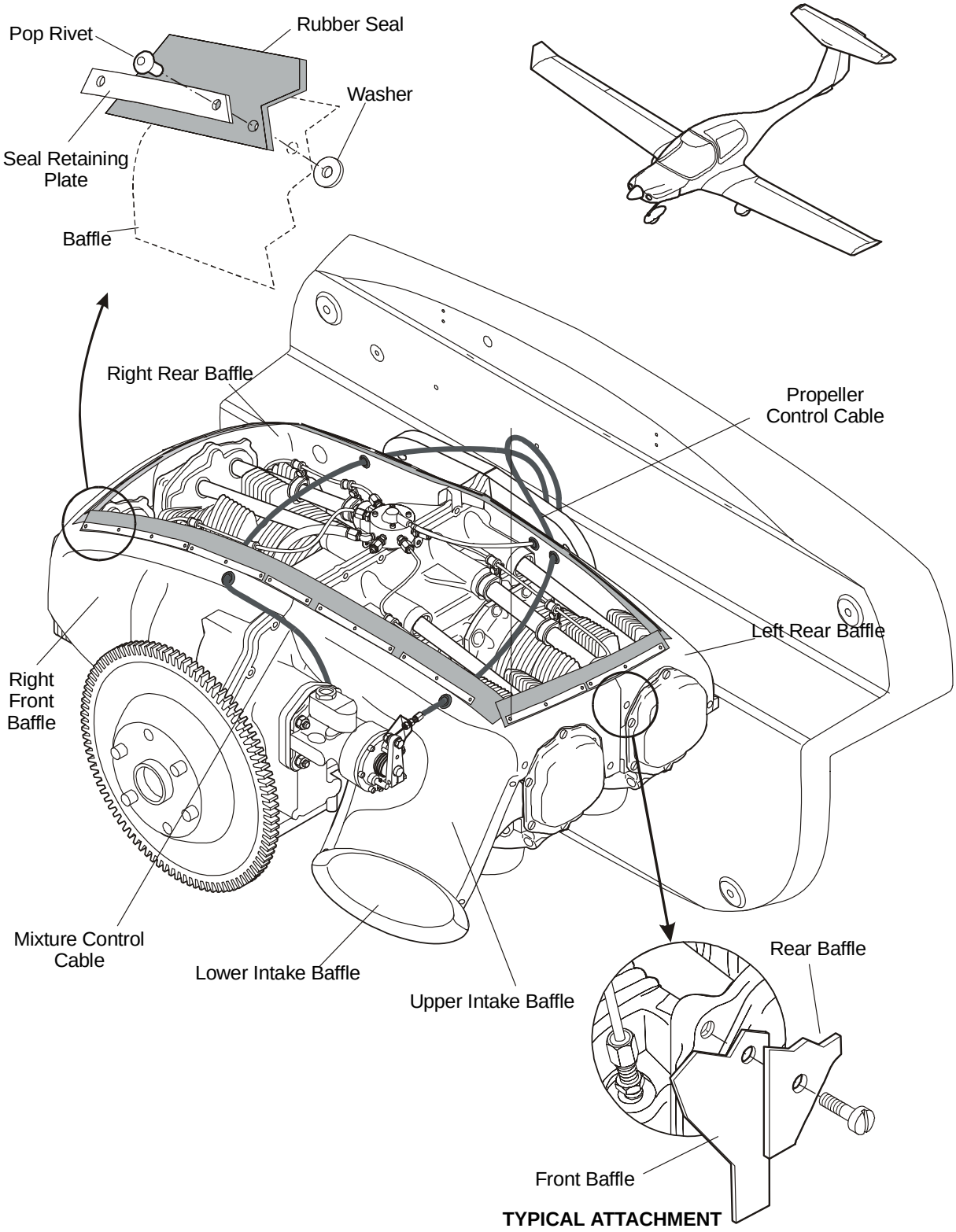


Figure 1: Cooling Air Baffle

Maintenance Practices

1. General

These Maintenance Practices tell you how to remove/install the cooling air baffle. See Figure 1 for location data.

Refer to the Lycoming Maintenance Manual for data on the inter-cylinder baffles.

2. Remove/Install the Cooling Air Baffle

A. Remove the Cooling Air Baffle

	Detail Steps/Work Items	Key Items/References
	WARNING: MAKE SURE THAT THE ENGINE IS SAFE BEFORE YOU DO ANY WORK ON THE BAFFLES. IF THE ENGINE IS TURNED, THE PROPELLER CAN CAUSE INJURY OR DEATH.	
(1)	Make sure that the engine is safe: – The ignition switch is set to OFF. – The throttle is set to IDLE. – The mixture control is set to LEAN CUT-OFF.	
(2)	Remove the engine cowlings.	Refer to Section 71-10.
(3)	Disconnect the battery.	Refer to Section 24-31.
(4)	Disconnect the cables from the top spark plugs on No. 2 and 4 cylinders. Move the spark plug cables clear of the baffle.	
(5)	Disconnect the cables from the top spark plugs on No. 1 and 3 cylinders.	
(6)	Remove the nuts and bolts which attach the spark plug cable feed-thru to the rear of the baffle.	
(7)	Move the spark plug cables aft through the hole in the baffle.	
(8)	Disconnect the mixture cable from the fuel injector. Move the cable aft, through the rubber grommets in the baffle.	Refer to Section 76-00.

	Detail Steps/Work Items	Key Items/References
(9)	Disconnect the propeller governor control cable. Move it aft through the rubber grommets in the baffle.	Refer to Section 61-20.
(10)	Disconnect the drain tube from the fuel flow divider. Move it aft through the rubber grommet in the baffle.	Refer to Section 71-70.
(11)	Release the tie-bars from the bottom of the baffle on the left side and on the right side.	
(12)	Remove the four screws which attach the cooling baffle to No. 2 and 4 cylinder heads.	Note the location of the P-clamps which hold the spark plug cables and which hold the manifold pressure pipe.
(13)	Remove the four screws which attach the cooling baffle to No. 1 and 3 cylinder heads.	Note the location of the P-clamps which hold the spark plug cables.
(14)	Remove the cooling air baffle.	

B. Install the Cooling Air Baffle

	Detail Steps/Work Items	Key Items/References
(1)	Make sure that: – The cooling baffle is clean. – The cooling baffle is not damaged. – That the rubber sealing strip is correctly attached and not damaged.	
(2)	Move the cooling baffle into position around the cylinders.	
(3)	Install the four screws which attach the baffle to No. 1 and 3 cylinder heads.	Make sure that the P-clamps holding the spark plug cables are in the correct position.
(4)	Install the four screws which attach the baffle to No. 2 and 4 cylinder heads.	Make sure that the P-clamps holding the spark-plug-cables and the manifold pressure hose are in the correct position.
(5)	Attach the tie-bars at the bottom of the baffle at the left side and at the right side.	
(6)	Install the fuel flow divider drain tube: – Move the tube into position through the rubber grommet in the baffle. – Connect the tube to the fuel flow divider drain.	Refer to Section 71-70.
(7)	Install the propeller governor control cable: – Move the cable into position through the rubber grommets in the baffle. – Connect the cable to the governor.	Refer to Section 61-20.
(8)	Do a test for freedom and range of movement, on the propeller control system.	Refer to Section 61-20.

	Detail Steps/Work Items	Key Items/References
(9)	Install the mixture control cable: – Move the cable into position through the rubber grommets in the baffle. – Connect the cable to the fuel injector.	Refer to Section 76-00.
(10)	Do a test for freedom and range of movement, on the mixture control system.	Refer to Section 76-00.
(11)	Install the cables for the top spark plugs of No. 1 and 3 cylinders: – Move the cables forward through the hole in the rear of the baffle. – Move the cable feed thru into the correct position. – Install the bolts, washers and nuts which attach the feed-thru to the baffle. – Connect the spark plug cables to the spark plugs.	Torque to 12.4 to 13.6 Nm (110 - 120 lbf.in.).
(12)	Install the cables for the top spark plugs of No. 2 and 4 cylinders: – Move the cables into position through the holes in the baffle. – Connect the spark plug cables to the spark plugs.	Torque to 12.4 to 13.6 Nm (110 - 120 lbf.in.).
(13)	Connect the airplane battery.	Refer to Section 24-31.
(14)	If necessary, for your airworthiness authority, do a second inspection of the mixture control system and the propeller control system.	
(15)	Install the engine cowlings.	Refer to Section 71-10.
(16)	Do an engine run-up.	Refer to the DA 40 Airplane Flight Manual.

Section 75-01
Liquid Cooling - TAE 125 Diesel Engine

1. General

This Section gives you the data for the liquid cooling system for airplanes with the TAE 125 Diesel engine installed. It gives you the Maintenance Practices to remove/install the system components.

Figure 1 shows the liquid cooling system schematic diagram. Figure 2 and 3 shows the installation in the airplane.

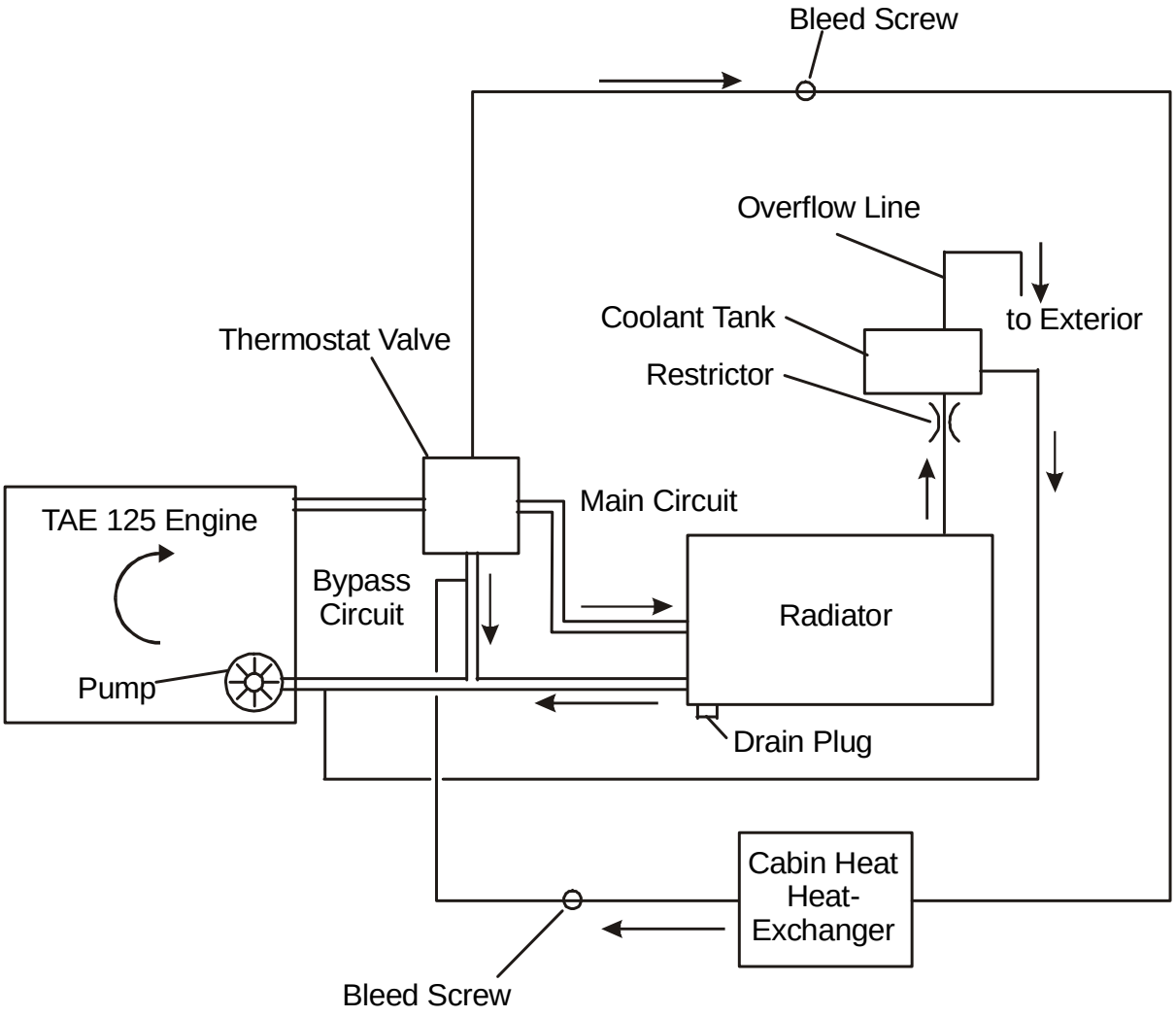


Figure 1: Liquid Cooling System Schematic Diagram

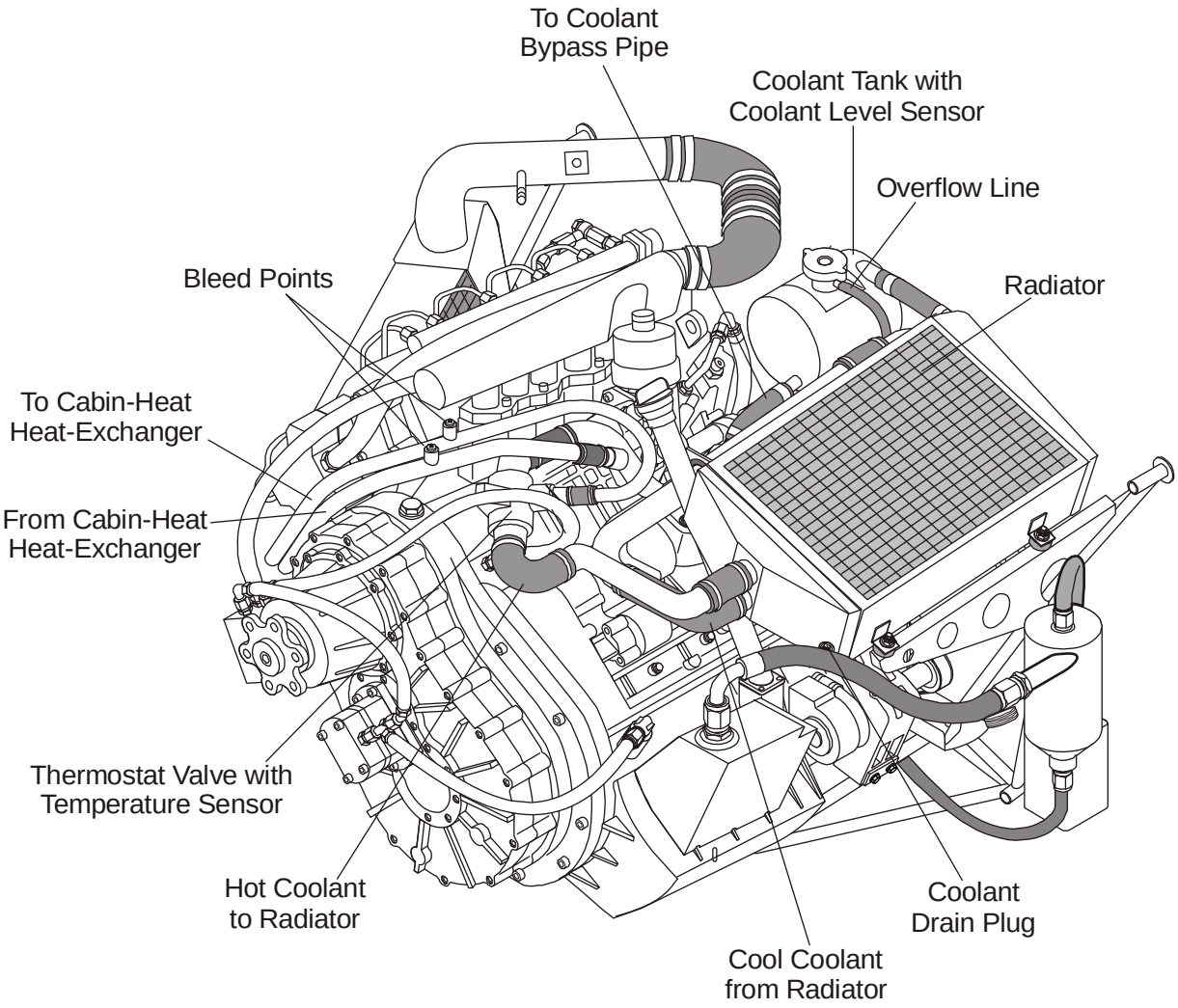


Figure 2: Liquid Cooling System Installation - TAE 125-01 Engine

Airplanes with TAE 125-02-99 Engine

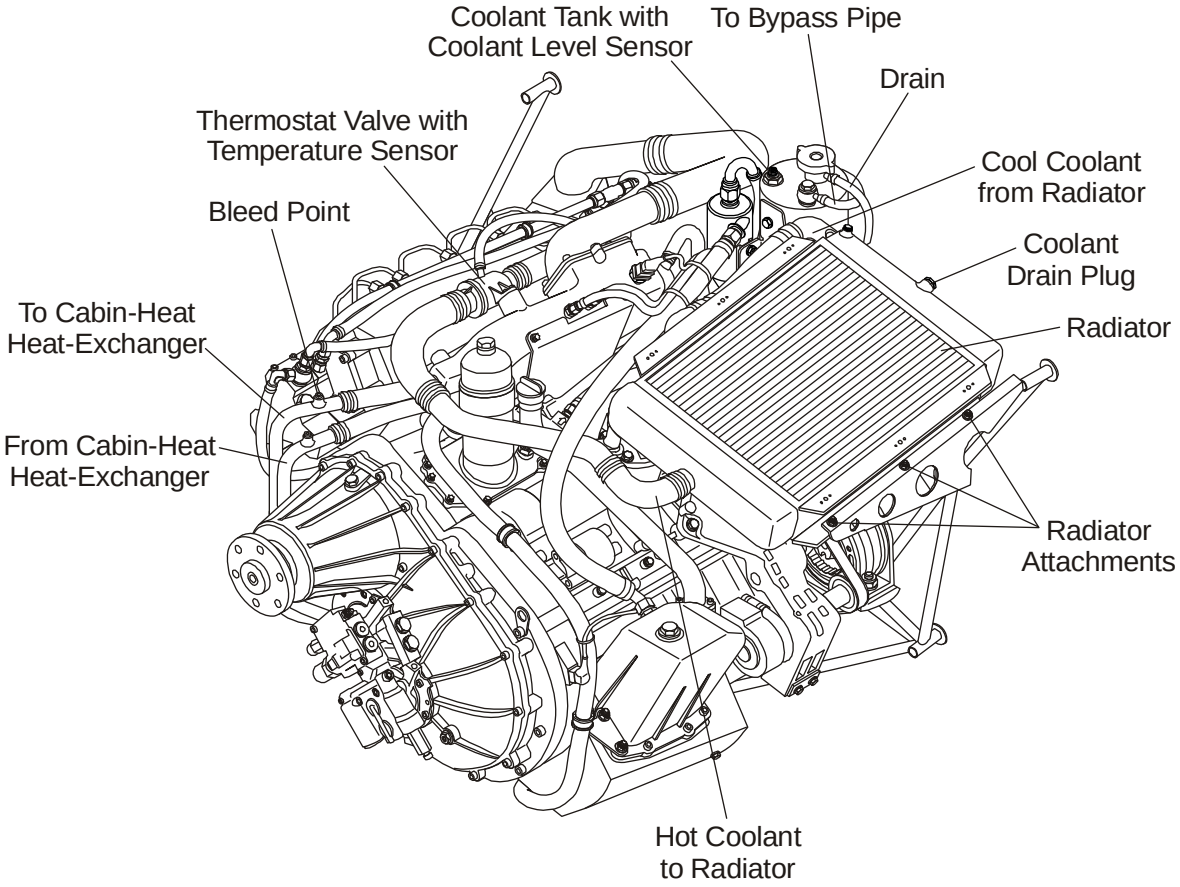


Figure 3: Liquid Cooling System Installation - TAE 125-02-99 Engine (if MÄM 40-256 installed)

2. Description

The engine has a water-based liquid cooling system. The liquid coolant is a mixture of distilled water and antifreeze. Refer to the Airplane Flight Manual for approved coolants.

The engine has an integral coolant pump. The coolant pump is located at the rear of the engine, below the coolant tank. The flat-belt (TAE 125-01 engine) or v-ribbed belt (TAE 125-02-99 engine) at the rear of the engine operates the coolant pump. An automatic tensioner keeps the belt tension at the correct value. The coolant flows through passages inside the crankcase and cylinder head and becomes hot. The coolant leaves the engine through a thermostat valve at the top, front left of the crankcase.

A temperature sensor at the rear of the thermostat valve (TAE 125-01 engine) or in front of the intake air box (TAE 125-02.99 engine) connects to the engine control system. The top engine indicator shows the coolant temperature (COOLING TEMPERATURE).

The cooling system has two circuits. There is a main circuit and a bypass circuit.

For the main circuit, large diameter hoses and pipes connect the thermostat valve to the inlet of a coolant radiator. The coolant radiator is located above and to the rear of the engine at the left. Large hoses and pipes connect the outlet from the coolant radiator to an inlet on the engine crankcase at the rear, left. This is the inlet to the engine coolant pump.

For the bypass circuit, large diameter hoses and pipes connect the bypass outlet from the thermostat valve to the inlet for the coolant pump.

An coolant tank is located inboard and slightly above the coolant radiator. This is the highest point in the system. A small diameter vent-hose connects the thermostatic valve to the top of the coolant tank. Another small diameter hose serves as overflow line to the exterior of the airplane.

A small diameter hose connects the bottom of the coolant tank to the inlet to the coolant pump. This hose has an orifice.

A coolant level sensor is installed in the coolant tank. It operates the WATER LEVEL caution light in the Auxiliary Engine Display (AED) or the Garmin G1000 system, if installed.

Pipes and hoses connect the thermostat valve to the inlet of the cabin heat heat-exchanger. The return flow from the heat-exchanger connects to a tapping on the bypass circuit pipes adjacent to the thermostat valve.

Both cabin-heat pipes have bleed points at the highest points of the cabin heat circuit.

3. Operation

When the engine is cold, the thermostat valve closes the main circulation. The coolant pump moves the coolant through the engine. The coolant becomes warm. The coolant flows out of the thermostat valve through the bypass circulation pipes directly to the inlet of the coolant pump.

As the engine becomes hot, the temperature of the coolant increases. The thermostat valve senses the increased temperature and starts to open. Some coolant goes through the bypass circulation directly to the coolant pump inlet. Some coolant goes through the main circulation through the coolant radiator. Air flowing through the coolant radiator cools the liquid coolant. The cool liquid returns to the inlet of the coolant pump and mixes with the hot coolant from the bypass circulation.

The thermostat valve adjusts the flow of coolant through the main and bypass circulations to give the correct temperature. It starts opening at 84 °C (183 °F) and opens fully at 94 °C (201 °F), allowing the coolant to flow through the coolant radiator.

The connection for the cabin heat system supplies coolant at the outlet temperature from the engine at all times.

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Trouble-Shooting

1. General

This table tells you how to trouble-shoot the liquid cooling system. If you have the trouble detailed in the Trouble column read across to the Possible Cause column. Then do the repair given in the Repair column. This Trouble-Shooting table gives only troubles to the airplane parts of the cooling system.

Trouble	Possible Cause	Repair
Engine over-heats (CT caution light illuminates).	Flat-belt worn or broken.	Refer to the engine manufacturer.
	Coolant level low.	Fill the cooling system. Refer to Section 12-10.
	Coolant leak.	Look for leaks at all system joints. Repair or replace defective components.
	Air in cooling system.	Bleed the cooling system.
	Radiator screen blocked by foreign objects.	Remove foreign objects and clean radiator screen.
	Radiator screen damaged by foreign objects.	Replace radiator.
	Thermostat valve does not work properly.	Refer to the engine manufacturer.
	Defective coolant pump.	Refer to the engine manufacturer.
	Defective cylinder head gasket.	Refer to the engine manufacturer.
Cabin heat does not give hot air.	Heat exchanger screen blocked by foreign objects.	Remove blockage.
	Heat exchanger screen damaged by foreign objects.	Replace heat exchanger.
	Defective cabin heat system.	Trouble-shoot in accordance with Section 21-01.

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Maintenance Practices

1. General

This Section tells you about the Maintenance Practices for the components in the liquid cooling system.

2. Remove/Install the Coolant Radiator

Refer to Figure 2 and 3.

A. Remove the Coolant Radiator

(1) TAE 125-01 Engine

	Detail Steps/Work Items	Key Items/References
(1)	Make sure that the engine is safe for maintenance: – Remove the key from the key switch.	
(2)	Remove the engine cowlings.	Refer to Section 71-11.
	WARNING: DO NOT REMOVE THE PRESSURE CAP FROM THE COOLANT TANK IF THE ENGINE IS HOT. THE PRESSURE IN THE SYSTEM CAN FORCE HOT COOLANT TO COME OUT AND BURN YOU.	
(3)	Remove the pressure cap from the coolant tank: – Turn the cap counter-clockwise a small distance to release the pressure. – When the pressure has fully released, turn the cap fully counter-clockwise.	
(4)	Drain the coolant: – Remove the drain plug from the left side of the coolant radiator near the bottom. – Open the drain plug on the engine RH lower side above the turbo-charger.	Use a suitable container to catch the coolant. You need not remove this drain plug. Use a suitable duct to guide the coolant into the container.

	Detail Steps/Work Items	Key Items/References
(5)	Disconnect the hose between the coolant tank and the bypass pipe.	At the coolant tank.
(6)	Disconnect the hose between the thermostat valve and the pipe to the coolant radiator.	At the thermostat valve.
(7)	Disconnect the hose between the coolant radiator outlet and the bypass pipe.	At the coolant radiator.
(8)	Disconnect the overflow line.	At the coolant tank near the pressure cap.
(9)	Remove the 3 nuts and washers from the coolant radiator mounting points.	The front outboard nut also attaches a bonding cable.
(10)	Disconnect the electric wires from the coolant level sensor.	
(11)	Lift the coolant radiator together with the coolant tank clear of the airplane.	
(12)	Disconnect the hose between the coolant tank and the coolant radiator.	
(13)	Remove the nuts and bolts from the coolant tank support bracket that attaches to the coolant radiator.	
(14)	Remove the pipe and the hose from the coolant radiator inlet port.	
(15)	Put caps on the open end pipes and connections.	
(16)	Close the coolant drain-plug above the turbo-charger.	
(17)	Install the drain plug to the coolant radiator.	Use a new copper gasket.

(2) TAE 125-02-99 Engine (if MÄM 40-256 installed)

	Detail Steps/Work Items	Key Items/References
(1)	Make sure that the engine is safe for maintenance: – Remove the key from the key switch.	
(2)	Remove the engine cowlings.	Refer to Section 71-11.
	WARNING: DO NOT REMOVE THE PRESSURE CAP FROM THE COOLANT TANK IF THE ENGINE IS HOT. THE PRESSURE IN THE SYSTEM CAN FORCE HOT COOLANT TO COME OUT AND BURN YOU.	
(3)	Remove the pressure cap from the coolant tank: – Turn the cap counter-clockwise a small distance to release the pressure. – When the pressure has fully released, turn the cap fully counter-clockwise.	
(4)	Drain the coolant: – Remove the drain plug from the left side of the coolant radiator near the bottom. – Open the drain plug on the engine RH lower side above the turbo-charger.	Use a suitable container to catch the coolant. You need not remove this drain plug. Use a suitable duct to guide the coolant into the container.
(5)	Disconnect the hose between the thermostat valve and the pipe to the coolant radiator.	At the thermostat valve.
(6)	Disconnect the hose between the coolant radiator outlet and the bypass pipe.	At the coolant radiator.
(7)	Remove the nuts and washers from the coolant radiator mounting points.	The front outboard nut also attaches a bonding cable.
(8)	Lift the coolant radiator clear of the airplane.	
(9)	Remove the pipe and the hose from the coolant radiator inlet port.	

	Detail Steps/Work Items	Key Items/References
(10)	Put caps on the open end pipes and connections.	
(11)	Close the coolant drain-plug above the turbo-charger.	
(12)	Install the drain plug to the coolant radiator.	Use a new copper gasket.

B. Install the Coolant Radiator

(1) TAE 125-01 Engine

	Detail Steps/Work Items	Key Items/References
(1)	Install the pipe and the hose to the coolant radiator inlet port.	
(2)	Attach the coolant tank to the coolant radiator with nuts and bolts.	
(3)	Install the hose between the coolant tank and the coolant radiator.	
(4)	Put the coolant radiator together with the coolant tank in position on the engine mount.	Engage the hoses on the related connections as you move the coolant radiator into position.
(5)	Connect the electric wires to the coolant level sensor.	
(6)	Install the nuts and washers attaching the coolant radiator to the engine mount.	The front outboard nut also attaches a bonding cable.
(7)	Connect the overflow line.	At the coolant tank near the pressure cap.
(8)	Connect the hose between the coolant radiator outlet and the bypass pipe.	At the coolant radiator.
(9)	Connect the hose between the thermostat valve and the pipe to the coolant radiator.	At the thermostat valve.
(10)	Connect the hose between the bypass pipe and the coolant tank.	At the coolant tank.
(11)	Fill and bleed the cooling system.	Refer to Paragraph 5.
(12)	Install the engine cowlings.	Refer to Section 71-11.

(2) TAE 125-02-99 Engine (if MÄM 40-256 installed)

	Detail Steps/Work Items	Key Items/References
(1)	Install the pipe and the hose to the coolant radiator inlet port.	
(2)	Install the nuts and washers attaching the coolant radiator to the engine mount.	The front outboard nut also attaches a bonding cable.
(3)	Connect the hose between the coolant radiator outlet and the bypass pipe.	At the coolant radiator.
(4)	Fill and bleed the cooling system.	Refer to Paragraph 7.
(5)	Install the engine cowlings.	Refer to Section 71-11.

3. Remove/Install the Coolant Tank

A. Remove the Coolant Tank

(1) TAE 125-01 Engine

	Detail Steps/Work Items	Key Items/References
(1)	Make sure that the engine is safe for maintenance: – Remove the key from the key switch.	
(2)	Remove the engine cowlings.	Refer to Section 71-11.
	WARNING: DO NOT REMOVE THE PRESSURE CAP FROM THE COOLANT TANK IF THE ENGINE IS HOT. THE PRESSURE IN THE SYSTEM CAN FORCE HOT COOLANT TO COME OUT AND BURN YOU.	
(3)	Remove the pressure cap from the coolant tank: – Turn the cap counter-clockwise a small distance to release the pressure. – When the pressure has fully released, turn the cap fully counter-clockwise.	
(4)	Drain the coolant: – Remove the drain plug from the left side of the coolant radiator near the bottom.	Use a suitable container to catch the coolant.
(5)	Disconnect the hose between the coolant tank and the coolant radiator.	At the coolant tank.
(6)	Disconnect the hose between the coolant tank and the bypass pipe.	At the coolant tank.
(7)	Disconnect the overflow line.	At the coolant tank near the pressure cap.
(8)	Disconnect the electric wires from the coolant level sensor.	

	Detail Steps/Work Items	Key Items/References
(9)	Remove the nuts and bolts from the coolant tank support bracket that attaches to the coolant radiator.	
(10)	Lift the coolant tank clear of the engine.	
(11)	Put caps on the open end pipes and connections.	
(12)	Install the coolant drain plug.	

(2) TAE 125-02–99 Engine (if MÄM 40-256 installed)

	Detail Steps/Work Items	Key Items/References
(1)	Make sure that the engine is safe for maintenance: – Remove the key from the key switch.	
(2)	Remove the engine cowlings.	Refer to Section 71-11.
	WARNING: DO NOT REMOVE THE PRESSURE CAP FROM THE COOLANT TANK IF THE ENGINE IS HOT. THE PRESSURE IN THE SYSTEM CAN FORCE HOT COOLANT TO COME OUT AND BURN YOU.	
(3)	Remove the pressure cap from the coolant tank: – Turn the cap counter-clockwise a small distance to release the pressure. – When the pressure has fully released, turn the cap fully counter-clockwise.	
(4)	Drain the coolant: – Remove the drain plug from the left side of the coolant radiator near the bottom.	Use a suitable container to catch the coolant.
(5)	Disconnect the vent-hose between the coolant tank and the coolant thermostat valve.	At the coolant tank.
(6)	Disconnect the overflow line.	At the coolant tank near the pressure cap.
(7)	Disconnect the electric wires from the coolant level sensor.	
(8)	Remove the nuts and bolts from the coolant tank support bracket.	
(9)	Lift the coolant tank.	
(10)	Disconnect the hose between the coolant tank and the bypass pipe.	At the coolant tank.

	Detail Steps/Work Items	Key Items/References
(11)	Lift the coolant tank clear of the engine.	
(12)	Put caps on the open end pipes and connections.	
(13)	Install the coolant drain plug.	

B. Install the Coolant Tank

(1) TAE 125-01 Engine

	Detail Steps/Work Items	Key Items/References
(1)	Put the coolant tank in position on the engine.	Engage the hoses on the related connections as you move the coolant tank into position.
(2)	Connect the hose between the coolant tank and the bypass pipe.	At the coolant tank.
(3)	Connect the hose between the coolant tank and the coolant radiator.	At the coolant tank.
(4)	Connect the overflow line.	At the coolant tank near the pressure cap.
(5)	Install the nuts and bolts to the coolant tank support bracket that attaches to the coolant radiator.	
(6)	Connect the electric wires to the coolant level sensor.	
(7)	Fill and bleed the cooling system.	Refer to Paragraph 5.
(8)	Install the engine cowlings.	Refer to Section 71-11.

(2) TAE 125-02-99 Engine (if MÄM 40-256 installed)

	Detail Steps/Work Items	Key Items/References
(1)	Put the coolant tank in position on the engine.	Engage the hoses on the related connections as you move the coolant tank into position.
(2)	Connect the hose between the coolant tank and the bypass pipe.	At the coolant tank.
(3)	Connect the hose between the coolant tank and the thermostat valve.	At the coolant tank.
(4)	Connect the overflow line.	At the coolant tank near the pressure cap.
(5)	Install the nuts and bolts to the coolant tank support bracket.	
(6)	Connect the electric wires to the coolant level sensor.	
(7)	Fill and bleed the cooling system.	Refer to Paragraph 7.
(8)	Install the engine cowlings.	Refer to Section 71-11.

4. Remove/Install the Cabin Heat Heat-Exchanger

A. Remove the Cabin Heat Heat-Exchanger

	Detail Steps/Work Items	Key Items/References
(1)	Make sure that the engine is safe for maintenance: – Remove the key from the key switch.	
(2)	Remove the engine cowlings.	Refer to Section 71-11.
	WARNING: DO NOT REMOVE THE PRESSURE CAP FROM THE COOLANT TANK IF THE ENGINE IS HOT. THE PRESSURE IN THE SYSTEM CAN FORCE HOT COOLANT TO COME OUT AND BURN YOU.	
(3)	Remove the pressure cap from the coolant tank: – Turn the cap counter-clockwise a small distance to release the pressure. – When the pressure has fully released, turn the cap fully counter-clockwise.	
(4)	Drain the coolant: – Remove the drain plug from the left side of the radiator near the bottom.	Use a suitable container to catch the coolant.
(5)	Disconnect the hose on the pipe between the thermostat valve and the heat exchanger.	At the heat exchanger.
(6)	Disconnect the hose on the pipe between the bypass pipe and the heat exchanger.	At the heat exchanger.
(7)	Disconnect the bonding cable from the heat exchanger pipe.	
(8)	Remove the Teflon brackets that attach the heat exchanger to the engine mount.	

	Detail Steps/Work Items	Key Items/References
(9)	Remove the exhaust pipe or exhaust muffler (if OÄM 40-096 is installed).	Refer to Section 78-01.
(10)	Remove pipe from turbo-charger to intercooler.	Refer to Chapter 81.
(11)	Slide the heat exchanger out of the heat exchanger box.	
(12)	Put caps on the open end pipes and connections.	
(13)	Install the coolant drain plug.	

B. Install the Cabin Heat Heat-Exchanger

	Detail Steps/Work Items	Key Items/References
(1)	Slide the heat exchanger in position in the heat exchanger box.	Engage the hoses on the related connections as you move the heat exchanger into position.
(2)	Install the Teflon brackets that attach the heat exchanger to the engine mount.	
(3)	Connect the hose on the pipe between the thermostat valve and the heat exchanger.	At the heat exchanger.
(4)	Connect the hose on the pipe between the bypass pipe and the heat exchanger.	At the heat exchanger.
(5)	Install the bonding cable to the heat exchanger pipe.	
(6)	Install the exhaust pipe or exhaust muffler (if OÄM 40-096 is installed).	Refer to Section 78-01.
(7)	Install the pipe from the turbo-charger to the intercooler.	Refer to Chapter 81.
(8)	Fill and bleed the cooling system.	Refer to Paragraph 7.
(9)	Install the engine cowlings.	Refer to Section 71-11.

5. Fill and Bleed the Cooling System

A. TAE 125-01 Engine

	Detail Steps/Work Items	Key Items/References
(1)	Fill the cooling system: – Open the bleed points on the cabin heat pipes. – Add coolant to the coolant tank. – When coolant comes from the bleed points without air bubbles, close the bleed points. – Install the cap to the coolant tank.	Allow time for the coolant to move through the system.
(2)	Do a ground run-up: – Let the coolant temperature rise up to the point where the coolant flows from the thermostat valve through the main circuit. – After shut-down, check for leaks.	To circulate and remove air. Repair any leaks.
(3)	Let the engine cool down.	
	WARNING: DO NOT REMOVE THE PRESSURE CAP FROM THE COOLANT TANK IF THE ENGINE IS HOT. THE PRESSURE IN THE SYSTEM CAN FORCE HOT COOLANT TO COME OUT AND BURN YOU.	
(4)	Remove the pressure cap from the coolant tank: – Turn the cap counter-clockwise a small distance to release the pressure. – When the pressure has fully released, turn the cap fully counter-clockwise.	
(5)	Check coolant level. Repeat items 1 to 4 until the system is completely de-aerated and full.	
(6)	Install the cap to the coolant tank.	

	Detail Steps/Work Items	Key Items/References
(7)	Install engine cowlings.	Refer to Section 71-11.

B. TAE 125-02-99 Engine (if MÄM 40-256 installed)

	Detail Steps/Work Items	Key Items/References
(1)	Fill the cooling system: – Open the bleed points on the cabin heat pipes. – Open the hose clamp of the hose between thermostat valve and the radiator next to the valve. – Add coolant to the coolant tank. – When coolant comes from the bleed points without air bubbles, close the bleed points and the hose clamp. – Install the cap to the coolant tank.	Allow time for the coolant to move through the system.
(2)	Do a ground run-up: – Let the coolant temperature rise up to the point where the coolant flows from the thermostat valve through the main circuit. – After shut-down, check for leaks.	 To circulate and remove air. Repair any leaks.
(3)	Let the engine cool down.	

WARNING: DO NOT REMOVE THE PRESSURE CAP FROM THE COOLANT TANK IF THE ENGINE IS HOT. THE PRESSURE IN THE SYSTEM CAN FORCE HOT COOLANT TO COME OUT AND BURN YOU.

	Detail Steps/Work Items	Key Items/References
(4)	Remove the pressure cap from the coolant tank: – Turn the cap counter-clockwise a small distance to release the pressure. – When the pressure has fully released, turn the cap fully counter-clockwise.	
(5)	Check coolant level. Repeat items 1 to 4 until the system is completely de-aerated and full.	
(6)	Install the cap to the coolant tank.	
(7)	Install engine cowlings.	Refer to Section 71-11.

C. Drain the Coolant

	Detail Steps/Work Items	Key Items/References
	WARNING: MAKE SURE THAT THE ENGINE IS SAFE BEFORE YOU DO ANY WORK ON THE BAFFLES. IF THE ENGINE IS TURNED, THE PROPELLER CAN CAUSE INJURY OR DEATH.	
(1)	Make sure that the engine is safe: – The ignition switch is set to OFF. – The throttle is set to IDLE. – The mixture control is set to LEAN CUT-OFF.	
(2)	Disconnect the airplane main battery.	Refer to Section 24-34.
(3)	Remove the engine cowlings.	Refer to Section 71-11.
	WARNING: DO NOT REMOVE THE PRESSURE CAP FROM THE COOLANT TANK IF THE ENGINE IS HOT. THE PRESSURE IN THE SYSTEM CAN FORCE HOT COOLANT TO COME OUT AND BURN YOU.	
(4)	Remove the pressure cap from the coolant tank: – Turn the cap counter-clockwise a small distance to release the pressure. – When the pressure has fully released, turn the cap fully counter-clockwise.	

	Detail Steps/Work Items	Key Items/References
(5)	Drain the coolant: – Remove the drain plug from the left side of the coolant radiator near the bottom. – Open the drain plug on the engine RH lower side above the turbo-charger. – Close the coolant drain plug above the turbo-charger. – Install the drain plug to the coolant radiator.	Use a suitable container to catch the coolant. You do not need to remove this drain plug. Use a suitable duct to guide the coolant into the container. Use a new copper gasket.
(6)	Visually check the coolant for oil.	No oil allowed in coolant.

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Section 75-02
Air Cooling - Lycoming O-360-A4M Engine

1. General

This Section gives you the data for the air cooling system for airplanes with the Lycoming O-360-A4M engine installed. It gives you the Maintenance Practices to remove/install the baffle. Refer to the Lycoming Maintenance Manual for data about the inter-cylinder cooling baffle. Figure 1 shows the air cooling baffle.

2. Description/Operation

The baffle controls the cooling air flow. Ram air enters the cooling baffle through the intake in the engine cowling. The front duct of the baffle sends the cooling air into the space over the top of the cylinders. A special rubber sealing strip is mounted at the top of the baffle. The rubber sealing strip makes a seal between the baffle and the inside of the top cowling. The air goes down between the cylinders and around the outside of the cylinders. The used air goes out from the bottom rear of the engine bay.

The cables for the top spark plugs of No. 1 and 3 cylinders, go through a cable feed-thru in the rear of the baffle, on the right side. The cables for the top spark plugs of No. 2 and 4 cylinder pass through holes in the left side of the baffle, at the top.

Screws attach the baffle to the cylinder heads and tie-bars hold the baffle in position around the bottom of the cylinders. The baffle cover is mounted to the baffles with screws and brackets.

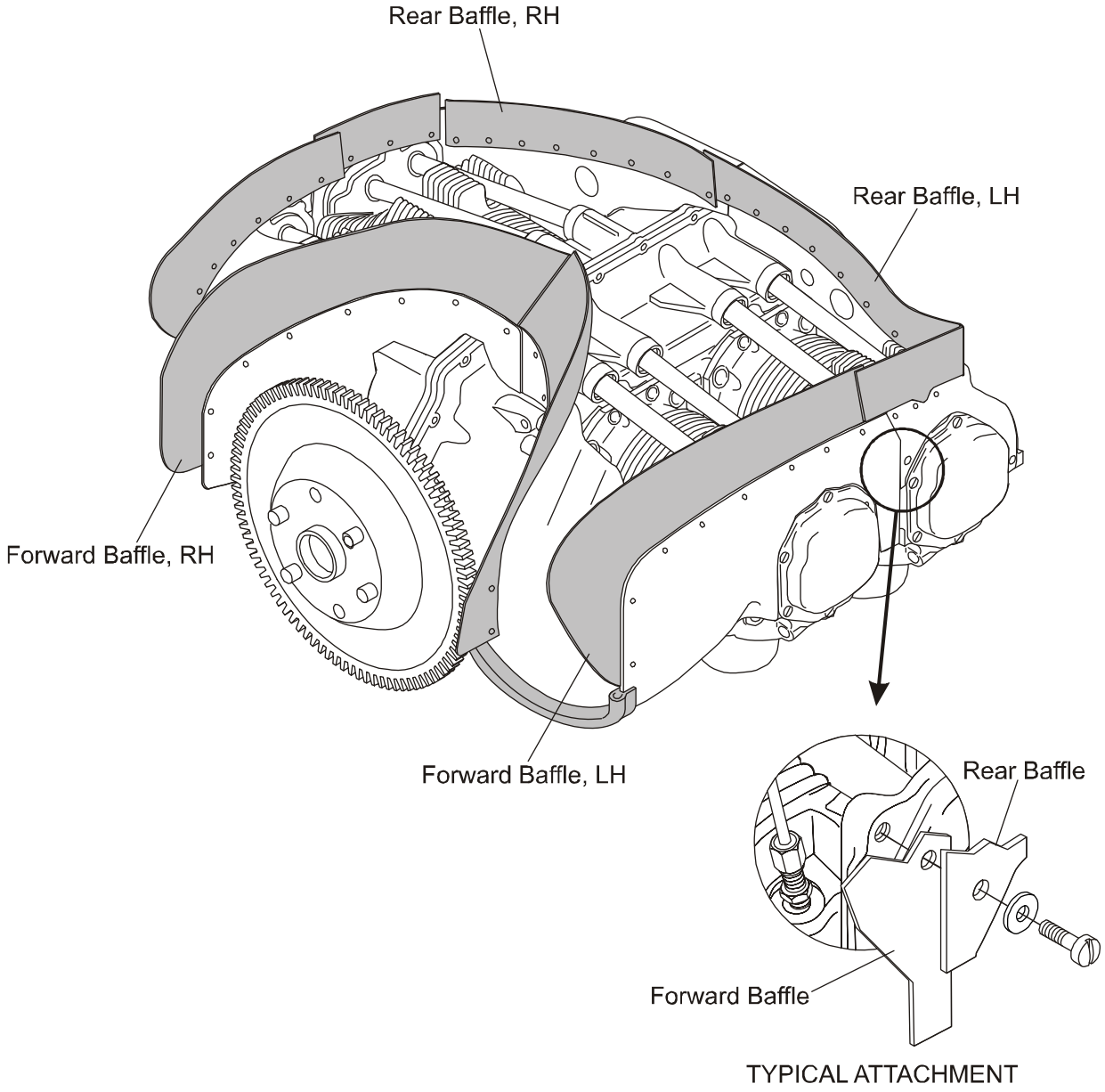


Figure 1: Cooling Air Baffle

Maintenance Practices

1. General

These Maintenance Practices tell you how to remove/install the cooling air baffle. See Figure 1 for location data.

Refer to the Lycoming Maintenance Manual for data on the inter-cylinder baffles.

2. Remove/Install the Cooling Air Baffle

A. Remove the Cooling Air Baffle

	Detail Steps/Work Items	Key Items/References
	WARNING: MAKE SURE THAT THE ENGINE IS SAFE BEFORE YOU DO ANY WORK ON THE BAFFLES. IF THE ENGINE IS TURNED, THE PROPELLER CAN CAUSE INJURY OR DEATH.	
(1)	Make sure that the engine is safe: – The ignition switch is set to OFF. – The throttle is set to IDLE. – The mixture control is set to LEAN CUT-OFF.	
(2)	Remove the engine cowlings.	Refer to Section 71-12.
(3)	Disconnect the battery.	Refer to Section 24-31.
(4)	Disconnect the cables from the top spark plugs on No. 2 and 4 cylinders. Move the spark plug cables clear of the baffle.	
(5)	Disconnect the cables from the top spark plugs on No. 1 and 3 cylinders.	
(6)	Remove the nuts and bolts which attach the spark plug cable feed-thru to the rear of the baffle.	
(7)	Move the spark plug cables aft through the hole in the baffle.	

	Detail Steps/Work Items	Key Items/References
(8)	Release the tie-bars from the bottom of the baffle on the left side and on the right side.	
(9)	Remove the four screws which attach the cooling baffle to No. 2 and 4 cylinder heads.	Note the location of the P-clamps which hold the spark plug cables.
(10)	Remove the four screws which attach the cooling baffle to No. 1 and 3 cylinder heads.	Note the location of the P-clamps which hold the spark plug cables.
(11)	Remove the cooling air baffle.	

B. Install the Cooling Air Baffle

	Detail Steps/Work Items	Key Items/References
(1)	Make sure that: – The cooling baffle is clean. – The cooling baffle is not damaged. – That the rubber sealing strip is correctly attached and not damaged.	
(2)	Move the cooling baffle into position around the cylinders.	
(3)	Install the four screws which attach the baffle to No. 1 and 3 cylinder heads.	Make sure that the P-clamps holding the spark plug cables are in the correct position.
(4)	Install the four screws which attach the baffle to No. 2 and 4 cylinder heads.	Make sure that the P-clamps holding the spark-plug-cables are in the correct position.
(5)	Attach the tie-bars at the bottom of the baffle at the left side and at the right side.	
(6)	Install the cables for the top spark plugs of No. 1 and 3 cylinders: – Move the cables forward through the hole in the rear of the baffle. – Move the cable feed thru into the correct position. – Install the bolts, washers and nuts which attach the feed-thru to the baffle. – Connect the spark plug cables to the spark plugs.	Torque to 12.4 to 13.6 Nm (110 - 120 lbf.in.).

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CHAPTER 76

ENGINE CONTROLS

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CHAPTER 76
ENGINE CONTROLS

Section 76-00
Engine Controls - Lycoming IO-360-M1A Engine

1. General

This Section tells you about the DA 40 engine controls for airplanes with the Lycoming IO-360-M1A engine installed. Bowden cables transmit the control inputs to the engine. For data on the propeller control system refer to Section 61-20.

Figure 1 shows the engine control assembly.

This Chapter gives you data on the linkages cables and levers. It does not include data on the fuel control units themselves. For data on the engine fuel-control unit refer to the Lycoming Maintenance Manual. For data on the alternate air unit refer to Section 71-60.

The DA 40 has these engine controls:

– Throttle control lever.

– Mixture control lever.

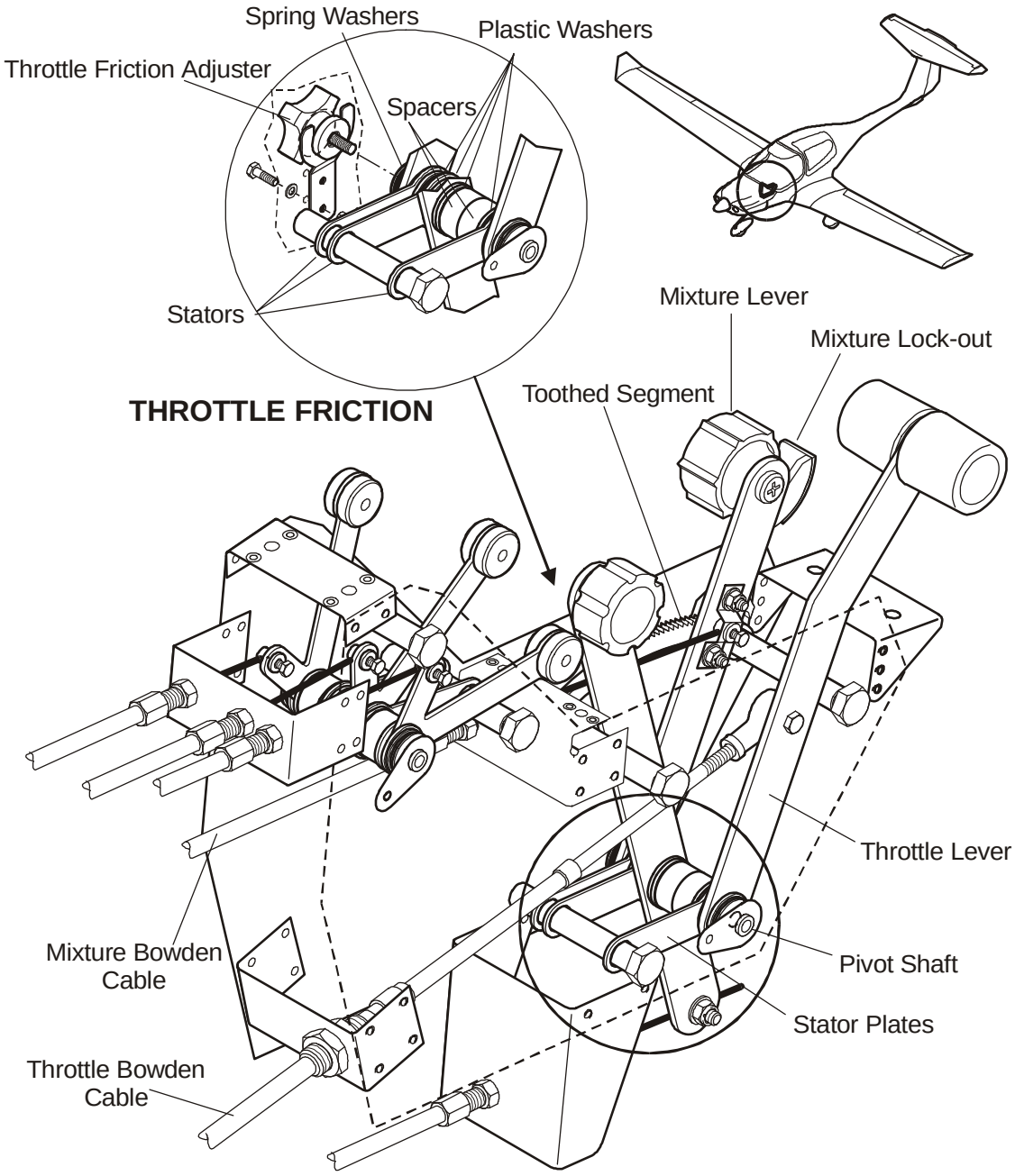


Figure 1: Engine Controls in the Cockpit

2. Description and Operation

Figure 1 shows the engine control assembly in the cockpit. Figures 2 and 3 show the details of each control. An engine control assembly in the center console holds the throttle, mixture and propeller control levers. The engine control assembly has a control lever friction-adjuster. Tubular spacers in the control assembly make the stops for the control levers.

A. Friction Adjuster

The friction adjuster adjusts the force necessary to move the control levers in the engine control assembly. The friction adjuster control knob is on the right side of the center console. The control levers attach to a pivot shaft in the engine control assembly. The pivot shaft also has stator plates, plastic washers and spacers. The other end of the stator plates attach to the control assembly with a bolt. The friction between the levers, plastic washers and stator plates increases when the friction adjuster control knob is tightened and decreases when the knob is released. Spring washers keep the friction adjuster control knob setting.

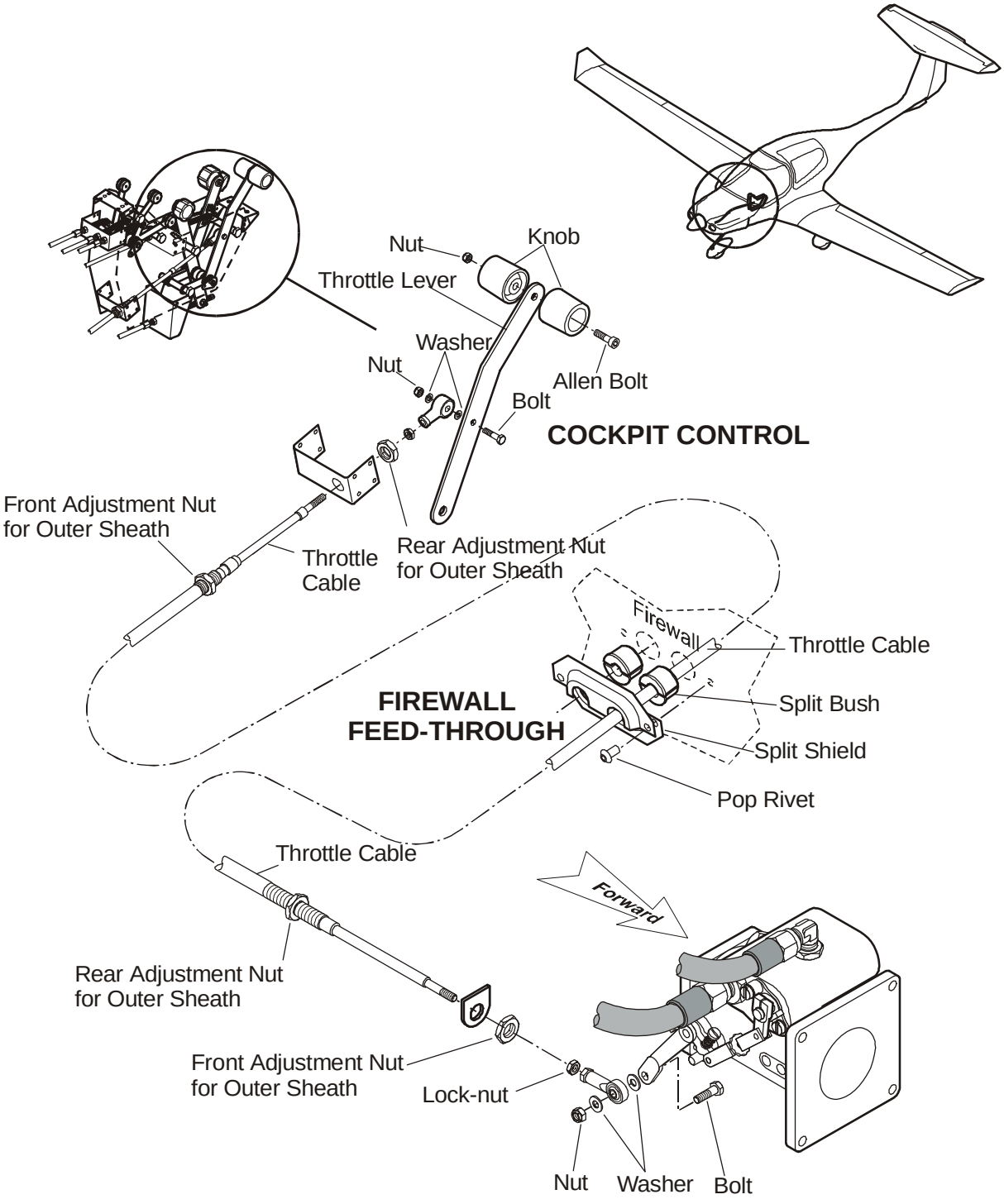


Figure 2: Throttle Control Installation

B. Throttle

Figure 2 shows the throttle control installation.

The throttle control lever sets the position of the throttle lever on the fuel injector. Move the throttle control lever fully forward to open the throttle on the injector and move it rearward to close the throttle on the injector. The lever on the injector touches its stop before the control lever in the cockpit touches the cockpit stop. The cockpit stops prevent the pilot from putting too much load on the control system.

A Bowden cable connects between the throttle control lever in the cockpit and the fuel injector at the engine. The Bowden cable eye end attaches to the throttle lever with a bolt. The outer sheath of the Bowden cable has a threaded end fitting. Two nuts attach the end fitting to a bracket attached to the sides of the engine control assembly.

The Bowden cable goes from the engine control assembly, up behind the instrument panel and through the firewall to the engine bay. A feed-thru fitting holds the cable in position at the firewall. A fire resistant compound seals the Bowden cable where it goes through the firewall.

From the firewall the Bowden cable goes down the right side of the engine and then under the engine to the fuel injector. The outer sheath of the Bowden cable attaches to a bracket on the bottom of the engine with two nuts. If you adjust these two nuts you adjust the range of movement of the throttle control lever. The control rod eye end attaches to the throttle lever at the injector with a nut, bolt and two washers. The eye end is adjustable. You can use it to set the correct range of movement of the throttle valve.

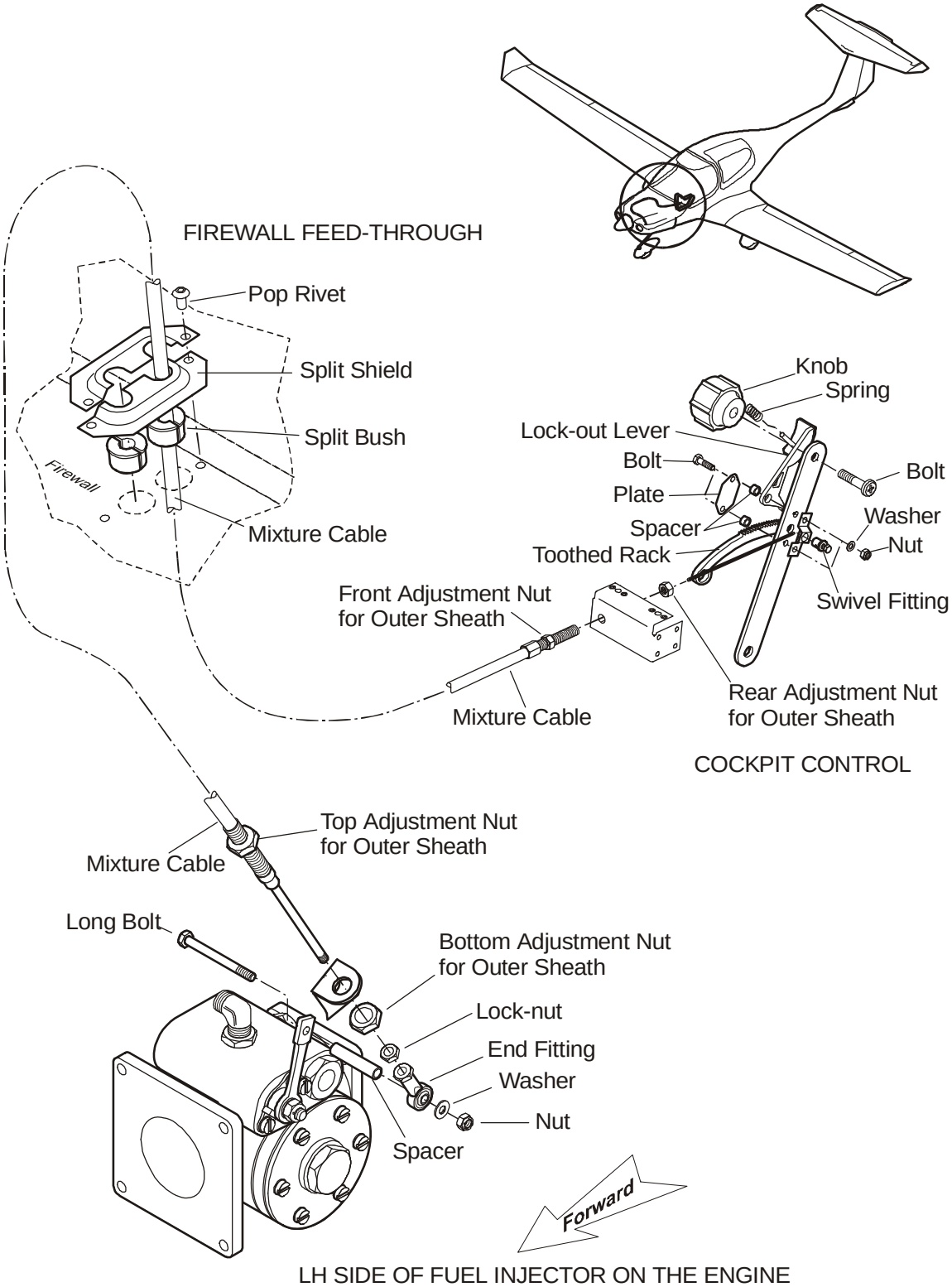


Figure 3: Mixture Control Installation

C. Mixture Control

Figure 3 shows the mixture control installation. The mixture control lever sets the mixture between RICH and LEAN. It also stops the fuel supply to the engine when set to CUT-OFF. The mixture control lever attaches to the engine control assembly.

The mixture control lever has a lock-out lever attached. The lock-out lever prevents accidental movement of the mixture control lever. The spring loaded lock-out lever engages in a toothed rack. The toothed rack attaches to the tubular spacers at the right side of the engine control assembly.

A Bowden cable connects between the mixture control lever in the cockpit and the mixture lever at the engine. The Bowden cable wire end attaches to the mixture control lever through a hole in a swivel fitting. A screw locks the wire end in position. A small bracket holds the inboard end of the swivel fitting. Two nuts, bolts and washers attach the bracket to the mixture control lever.

The outer sheath of the Bowden cable has a threaded end fitting. Two nuts attach the end fitting to a bracket attached between the sides of the engine control assembly. The Bowden cable goes from the center console up, in front of the instrument panel and through the firewall to the engine bay. A feed-thru fitting holds the cable in position at the firewall. A fire resistant compound seals the Bowden cable where it goes through the firewall.

From the firewall the Bowden cable goes up, over the right side of the engine through the rear air cooling baffle. It goes through the front air baffle and crosses to the left side of the engine. It goes down behind the propeller governor to the fuel mixture lever on the injector. The threaded end of the Bowden cable outer sheath then attaches to a bracket with two nuts. You can adjust the range of movement of the mixture control lever at this position. The Bowden cable eye end fitting attaches to the mixture lever with a long bolt, spacer, washer and nut.

The eye end is adjustable. You can use this adjustment to set the correct range of movement of the mixture lever.

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Trouble-Shooting

1. General

Use the data below to trouble-shoot the engine controls. See also the Lycoming Maintenance Manual for the engine.

Trouble	Possible Cause	Repair
Engine will not start.	Mixture controls not correctly adjusted.	Do a range of movement check. Adjust the mixture controls.
Engine will not cut-off.	Mixture controls not correctly adjusted.	Do a range of movement check. Adjust the mixture controls.
Cannot control the engine.	Broken throttle Bowden cable. Throttle control not set correctly. Bowden cable not free to move.	Replace the broken cable. Do a range of movement check. Adjust the throttle controls. Replace the Bowden cable.
Throttle lever hard to move.	Friction adjuster incorrectly set. Throttle control lever restriction.	Check/adjust friction adjuster. Remove the restriction.
Engine does not give full power.	Throttle lever touches the cockpit stop before the lever on the engine touches its stop.	Do a range of movement check. Adjust the throttle controls.
Idle RPM changes each time idle is set.	Throttle lever touches the cockpit stop before the lever on the engine touches its stop.	Do a range of movement check. Adjust the throttle controls.

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Maintenance Practices

1. General

These Maintenance Practices tell you how to remove, install and adjust the Bowden cables for the engine controls. They do not tell you how to adjust the engine fuel injector.

Refer to the Lycoming Maintenance Manual for the data on the fuel injector.

WARNING: DO ALL THE STEPS OF THE CONTROL INSTALLATION AND ADJUSTMENT CAREFULLY. ENGINE FAILURE CAN OCCUR IF THE CONTROL INSTALLATION AND ADJUSTMENT ARE NOT DONE CORRECTLY. THIS CAN CAUSE DEATH OR INJURY TO PERSONS.

2. Remove/Install the Throttle Bowden Cable

A. Remove the Throttle Bowden Cable

	Detail Steps/Work Items	Key Items
	WARNING: DO NOT STAND WITHIN THE DANGER AREA OF THE PROPELLER IF THE ENGINE STARTS, THE PROPELLER CAN CAUSE DEATH OR INJURY TO PERSONS. **WARNING: MAKE SURE THAT THE ENGINE IS SAFE BEFORE YOU DO WORK ON THE ENGINE CONTROLS. IF THE PROPELLER TURNS IT CAN CAUSE INJURY TO PERSONS.**	
(1)	Make sure that the engine is safe: – Set the ignition switch to OFF. – Set the throttle control lever to IDLE. – Set the mixture control lever to LEAN CUT-OFF.	
(2)	Remove the engine cowlings.	Refer to Section 71-10.
(3)	Disconnect the airplane battery.	Refer to Section 24-31.
(4)	Disconnect the spark plug cables from the spark plugs.	

	Detail Steps/Work Items	Key Items
(5)	Disconnect the throttle eye end at the throttle lever in the engine bay, at the injector: – Remove the nut, bolt and washers from the Bowden cable eye end.	Refer to Figure 2.
(6)	Remove the eye end from the Bowden cable: – Loosen the lock-nut and remove the eye end.	
(7)	Remove the Bowden cable from the bracket at the bottom of the engine: – Remove the front adjustment nut from the outer sheath. – Move the Bowden cable clear of the bracket. – Remove the rear adjustment nut from the outer sheath.	Make a note of the cable adjustment!
(8)	Remove the P-clamp which attaches the Bowden cable to the engine mount.	Note the position of the P-clamp.
(9)	Remove the feed-thru from the engine side of the firewall: – Remove the fire resistant sealant from where the cable goes through the firewall. – Remove the two rivets that attach the split shields to the firewall. – Remove the split-shields. – Move the two halves of the split-bush forward and clear of the cable.	

	Detail Steps/Work Items	Key Items
(10)	Remove the knob from the fuel selector valve: – Remove the cross-head screw from the center of the control-knob and pull the knob up and off the fuel selector valve. – Remove the mounting plate.	
(11)	Release the engine control assembly: – Loosen the throttle friction adjuster until the adjuster is disconnected from the shaft. – Remove the four cross-head screws which attach the engine control lower-cover-plate to the engine control assembly. – Remove the two hex-headed bolts from the top of the upper-cover -plate. – Lift and support the engine control assembly clear of the center console.	Pull and hold the throttle friction adjuster clear. Make sure you do not pull on the control cables.
(12)	Disconnect the eye-end fitting from the throttle control lever: – Remove the nut, two washers and bolt which attaches the eye-end to the lever.	
(13)	Remove the eye-end fitting from the throttle cable: – Loosen the lock-nut for the eye-end. – Remove the eye-end from the cable.	

	Detail Steps/Work Items	Key Items
(14)	Release the control cable from the support bracket at the control assembly: – Remove the rear adjusting-nut and washer from the cable outer-sheath. – Move the cable forward and clear of the support bracket. – Remove the front adjusting-nut and washer from the cable outer-sheath.	Make a note of the cable adjustment!
(15)	Pull the control cable through the firewall, from the engine-bay side, and clear of the airplane.	

B. Install the Throttle Bowden Cable

	Detail Steps/Work Items	Key Items
(1)	Put the throttle Bowden cable through the firewall.	Refer to Figure 2.
(2)	Put the throttle Bowden cable through the bracket at the engine control assembly: – Install the 2 nuts which hold the Bowden cable to the bracket.	
	WARNING: IF YOU DO AN ADJUSTMENT OF A CONTROL CABLE YOU MUST MAKE SURE THAT THE CONTROL CABLE IS IN SAFETY. IF YOU DO NOT DO THIS, THE CONTROL CABLE CAN DISCONNECT. THIS CAN CAUSE DEATH OR INJURY TO PERSONS.	
(3)	Install the eye end onto the Bowden cable at the engine control assembly in the cockpit.	Use a piece of lock-wire to make sure that the eye-end has been installed correctly.
(4)	Install the eye end to the throttle control lever in the cockpit: – Install the bolt, two washers and the nut.	Refer to Figure 2. Torque to 1.6 Nm (1.2 lbf.ft.).
(5)	Install the engine control assembly: – Do a check for loose articles. – Move the engine control assembly into position in the center console. – Loosely attach the knob for the throttle friction adjuster. – Install the four cross head screws which attach the lower-cover-plate to the center console. – Install the two hex-headed bolts which attach the upper-cover-plate to the center console.	Specially in the center console. Make sure all the control cables take up the correct position.

	Detail Steps/Work Items	Key Items
(6)	Install the knob on the fuel selector valve: – Move the cover plate into position over the selector valve. – Push the selector knob onto the valve shaft. – Install the cross-head screw which attaches the knob to the shaft.	
(7)	Put the Bowden cable through the bracket at the bottom of the engine: – Install the two nuts which hold the Bowden cable to the bracket.	
(8)	Install the eye end to the Bowden cable at the engine	Use a piece of lock-wire to make sure that the eye-end has been installed correctly.
(9)	Install the eye end to the injector throttle lever: – Put the bolt through the throttle lever form the injector side. – Install a washer on the bolt. – Put the eye end on the bolt. – Install a second washer on the bolt. – Attach the nut to the bolt. Tighten the assembly.	Torque 1.6 Nm (1.2 lbf.ft.).

	Detail Steps/Work Items	Key Items
(10)	Install the feed-thru to the engine side of the firewall with firewall sealant: – Put the 2 parts of the feed-thru round the Bowden cable. – Push the feed-thru in the firewall. – Put the 2 shields in position over the feed-thru. – Install 2 pop-rivets to attach the shields to the firewall.	Use PR 812 (MIL-S-38249 Type 1) firewall sealant.
(11)	Do a test for correct range, full and free movement of the throttle control system.	Refer to the Throttle Control Range of Movement Test in this Section.
(12)	Do an inspection of the control connections which you disconnected. If necessary, for your Airworthiness Authority, do a second inspection of the controls.	
(13)	Do a check for loose items in the cockpit.	For example: Tools. Look specially in the area of the engine control assembly.
(14)	Test all the engine control levers for freedom of movement.	
(15)	Connect the spark plug cables to the spark plugs.	Torque to 12.4 - 13.6 Nm (110 - 120 lbf.in.).
(16)	Connect the airplane battery.	Refer to Section 24-31.
(17)	Install the engine cowlings.	Refer to Section 71-10.
(18)	Do an engine run-up.	Refer to the DA 40 Airplane Flight Manual

3. Remove/Install the Mixture Bowden Cable

A. Remove the Mixture Bowden Cable

	Detail Steps/Work Items	Key Items/References
	WARNING: DO NOT STAND WITHIN THE DANGER AREA OF THE PROPELLER IF THE ENGINE STARTS, THE PROPELLER CAN CAUSE DEATH OR INJURY TO PERSONS. **WARNING: MAKE SURE THAT THE ENGINE IS SAFE BEFORE YOU DO WORK ON THE ENGINE CONTROLS. IF THE PROPELLER TURNS IT CAN CAUSE INJURY TO PERSONS.**	
(1)	Make sure that the engine is safe: – Set the ignition switch to OFF. – Set the throttle control lever to IDLE. – Set the mixture control lever to LEAN CUT-OFF.	
(2)	Remove the engine cowlings.	Refer to Section 71-10.
(3)	Disconnect the battery.	Refer to Section 24-31.
(4)	Disconnect the spark plug cables from the spark plugs.	
(5)	Disconnect the eye-end at the engine mixture control lever in the engine bay: – Remove the nut and washer from the long bolt at the mixture lever. – Remove the mixture Bowden cable eye end. – Remove the spacer and the long bolt.	Refer to Figure 3.
(6)	Remove the eye end from the Bowden cable: – Release the lock-nut. – Remove the eye end fitting and the lock-nut from the cable.	

	Detail Steps/Work Items	Key Items/References
(7)	Remove the Bowden cable from the support bracket at the bottom of the engine: – Remove the bottom adjustment nut from the Bowden cable. – Move the Bowden cable clear of the bracket. – Remove the top adjustment nut from the Bowden cable.	Make a note of the cable adjustment!
(8)	Pull the Bowden cable through the grommets in the front and back air baffles.	
(9)	Cut the cable binders which hold the cable to the engine mount.	
(10)	Remove the spiral wrap which protects the cable aft of the engine.	
(11)	Remove the feed-thru from the engine side of the firewall: – Remove the fire resistant sealant from where the cable goes through the firewall. – Remove the two rivets that attach the split shields to the firewall. – Remove the split-shields. – Move the two halves of the split-bush forward and clear of the cable.	
(12)	Remove the knob from the fuel selector valve: – Remove the cross-head screw from the center of the control-knob and pull the knob up and off the fuel selector valve. – Remove the mounting plate.	

	Detail Steps/Work Items	Key Items/References
(13)	Release the engine control assembly: – Loosen the throttle friction adjuster until the adjuster is disconnected from the shaft. – Remove the four cross-head screws which attach the engine control lower-cover-plate to the engine control assembly. – Remove the two hex-headed bolts from the top of the upper-cover plate. – Lift and support the engine control assembly clear of the center console.	Pull and hold the throttle friction adjuster clear. Make sure you do not pull on the control cables.
(14)	Disconnect the cable wire end of the mixture control cable from the mixture control lever in the cockpit: – Release the screw which holds the wire end in the swivel fitting.	
(15)	Release the mixture control cable from the support bracket at the engine control assembly in the cockpit: – Remove the rear adjustment nut from the Bowden cable outer sheath. – Pull the Bowden cable clear of the support bracket. – Remove the front adjusting nut from the Bowden cable.	
(16)	Pull the mixture cable through the firewall from the engine bay side and clear of the airplane.	

B. Install the Mixture Bowden Cable

	Detail Steps/Work Items	Key Items/References
(1)	Put the mixture Bowden cable through the firewall.	Refer to Figure 3.
(2)	Put the mixture Bowden cable through the support bracket at the engine control assembly in the cockpit: – Install the front adjusting nut to the Bowden cable outer-sheath. – Put the mixture Bowden cable in position through the support bracket. – Install the rear-adjusting nut onto the Bowden cable outer-sheath.	
(3)	Install the cable wire end into the swivel fitting at the mixture control lever in the cockpit: – Push the cable wire-end through the hole in the swivel fitting. – Tighten the attachment screw of the swivel fitting.	Make sure that the wire-end goes all the way through the swivel fitting.
(4)	Install the engine control assembly: – Do a check for loose articles. – Move the engine control assembly into position in the center console. – Loosely attach the knob for the throttle friction adjuster. – Install the four cross head screws which attach the lower-cover-plate to the center console. – Install the two hex-headed bolts which attach the upper-cover-plate to the center console.	Specially in the center console. Make sure all the control cables take up the correct position.

	Detail Steps/Work Items	Key Items/References
(5)	Install the knob on the fuel selector valve: – Move the cover plate into position over the selector valve. – Push the selector knob onto the valve shaft. – Install the cross-head screw which attaches the knob to the shaft.	
(6)	Push the cable through the grommets in the rear and front air baffles. Then move it to the left of the engine between the cooling air intake, the propeller governor and the crankcase.	
(7)	Install the Bowden cable to the support bracket at the bottom of the engine: – Install the top adjustment nut to the Bowden cable outer sheath. – Put the mixture Bowden cable in position in the bracket. – Install the bottom adjustment nut to the Bowden cable outer sheath.	
(8)	Install the eye end to the Bowden cable at the engine: – Install the lock-nut. – Install the eye end. – Tighten the lock-nut to the eye end.	Use a piece of lock-wire to make sure that the eye end has been installed correctly.

	Detail Steps/Work Items	Key Items/References
(9)	Install the eye end to the mixture lever at the at the fuel injector: – Put the long bolt through the control lever. – Put the spacer onto the long bolt. – Put the eye end onto the long bolt. – Put a washer onto the bolt. – Attach the nut to the bolt. – Tighten the assembly.	From the injector side.
(10)	Install the feed-thru to the engine side of the firewall with firewall sealant: – Put the 2 parts of the feed-thru round the Bowden cable. – Push the feed-thru in the firewall. – Put the 2 shields in position over the feed-thru. – Install 2 pop-rivets to attach the shields to the firewall.	Use PR 812 (MIL-S-38249 Type 1) firewall sealant.
(11)	Do a test for correct range, full and free movement of the mixture control system.	Refer to the Mixture Control Range of Movement Test in this Chapter.
(12)	Do an inspection of the control connections which you disconnected. If necessary, for your Airworthiness Authority, do a second inspection of the mixture control assembly.	
(13)	Do a check for loose items in the cockpit. Specially in the area of the engine control assembly.	
(14)	Do an engine controls freedom of movement check.	

	Detail Steps/Work Items	Key Items/References
(15)	Connect the spark plug cables to the spark plugs.	Torque to 12.4 - 13.6 Nm (110 - 120 lbf.in.).
(16)	Connect the airplane battery.	Refer to Section 24-31.
(17)	Install the engine cowlings.	Refer to Section 71-10.
(18)	Do an engine run-up.	Refer to the DA 40 Airplane Flight Manual.

4. Throttle/Mixture Control Range of Movement Test

These procedures tell you how to do a throttle and mixture control range of movement test. They do not tell you how to adjust the engine fuel control units. Refer to the Lycoming Maintenance Manual for data on the engine fuel control units.

Do the throttle/mixture control range of movement test using two persons. You must make sure that the throttle/mixture control levers hit the stops in the throttle/mixture valve before they hit their stops in the engine control assembly. This will make sure that the throttle/mixture controls have the correct range of movement. You should set the controls to 3 mm (0.125 in) clearance (bounce) at the engine control assembly cover plate.

A. Throttle Control Range of Movement Test

	Detail Steps/Work Items	Key Items/References
	WARNING: DO NOT STAND WITHIN THE DANGER AREA OF THE PROPELLER IF THE ENGINE STARTS, THE PROPELLER CAN CAUSE DEATH OR INJURY TO PERSONS. **WARNING: MAKE SURE THAT THE ENGINE IS SAFE BEFORE YOU DO WORK ON THE ENGINE CONTROLS. IF THE PROPELLER TURNS IT CAN CAUSE INJURY TO PERSONS.**	
(1)	Make sure that the engine is safe: – Set the ignition switch to OFF. – Set the throttle to IDLE. – Set the mixture control to LEAN CUT-OFF.	
(2)	Remove the engine cowlings.	Refer to Section 71-10.
(3)	Disconnect the airplane battery.	Refer to Section 24-31.
(4)	Disconnect the spark plug cables from the spark plugs.	
(5)	Move the throttle control lever between IDLE and FULL: – Make sure the lever moves freely with no restrictions.	

	Detail Steps/Work Items	Key Items/References
(6)	Set the throttle control lever to FULL and hold it in position: – Make sure that the throttle lever at the injector hits the stop. If necessary, adjust the Bowden cable outer sheath at the support bracket at the bottom of the engine.	With the throttle lever on the stop at the injector, there must be at least 3 mm (0.125 in) clearance (bounce) between the lever in the engine control assembly and the cover plate.
(7)	Set the throttle control lever to IDLE and hold it in position: – Make sure that the throttle lever at the injector hits the IDLE stop. If necessary, adjust the Bowden cable outer sheath at the support bracket at the bottom of the engine.	With the throttle lever on the IDLE stop at the injector, there must be at least 3 mm (0.125 in) clearance (bounce) between the lever in the engine control assembly and the cover plate.
(8)	Move the throttle control lever between IDLE and FULL: – Make sure that the lever moves freely with no restriction.	
(9)	Do items 6 to 8 again as necessary to get the correct values.	
(10)	Do an inspection of the control connections which you disconnected. If necessary for your Airworthiness Authority, do a second inspection of the controls.	
(11)	Install the cables to the spark plugs.	Torque to 12.4 to 13.6 Nm (110 - 120 lbf.in.).
(12)	Connect the airplane battery.	Refer to Section 24-31.
(13)	Install the engine cowlings.	Refer to Section 71-10.
(14)	Do an engine test.	Refer to the DA 40 Airplane Flight Manual.

B. Mixture Control Range of Movement Test

	Detail Steps/Work Items	Key Items/References
	WARNING: DO NOT STAND WITHIN THE DANGER AREA OF THE PROPELLER IF THE ENGINE STARTS, THE PROPELLER CAN CAUSE DEATH OR INJURY TO PERSONS. **WARNING: MAKE SURE THAT THE ENGINE IS SAFE BEFORE YOU DO WORK ON THE ENGINE CONTROLS. IF THE PROPELLER TURNS IT CAN CAUSE INJURY TO PERSONS.**	
(1)	Make sure that the engine is safe: – Set the ignition switch to OFF. – Set the throttle to IDLE. – Set the mixture control to LEAN CUT-OFF.	
(2)	Remove the engine cowlings.	Refer to Section 71-10.
(3)	Disconnect the airplane battery.	Refer to Section 24-31.
(4)	Disconnect the spark plug cables from the spark plugs.	
(5)	Move the mixture control lever between RICH and LEAN CUT-OFF. – Make sure the lever moves freely with no restrictions.	
(6)	Set the mixture control lever to RICH and hold it in position. – Make sure that the mixture lever at the injector hits the stop. If necessary, adjust the Bowden cable outer sheath at the support bracket at the bottom of the engine.	With the mixture lever on the stop at the injector, there must be at least 3 mm (0.125 in) clearance (bounce) between the lever in the engine control assembly and the cover plate.

	Detail Steps/Work Items	Key Items/References
(7)	Set the throttle control lever to LEAN CUT-OFF and hold it in position: – Make sure that the mixture lever at the injector hits the CUT-OFF stop. If necessary, adjust the Bowden cable outer sheath at the support bracket at the bottom of the engine.	With the mixture lever on the LEAN CUT-OFF stop at the injector, there must be at least 3 mm (0.125 in) clearance (bounce) between the lever in the engine control assembly and the cover plate.
(8)	Move the mixture control lever between RICH and LEAN CUT-OFF: – Make sure that the lever moves freely with no restriction.	
(9)	Do items 6 to 8 again as necessary to get the correct values.	
(10)	Do an inspection of the control connections which you disconnected. If necessary for your Airworthiness Authority, do a second inspection of the controls.	
(11)	Install the cables to the spark plugs.	Torque to 12.4 to 13.6 Nm (110 - 120 lbf.in.).
(12)	Connect the airplane battery.	Refer to Section 24-31.
(13)	Install the engine cowlings.	Refer to Section 71-10.
(14)	Do an engine test.	Refer to the DA 40 Airplane Flight Manual.

Section 76-01
Engine Controls - TAE 125 Diesel Engines

1. General

This Section tells you about the DA 40 with the TAE 125 Diesel engine installed. The system has only one control lever. An electrical cable connects the power lever to the engine control system.

This Section gives you data on the power lever installation. Refer to Section 73-01 for data on the engine control system. You cannot repair the engine control system except to replace the power lever.

2. Description and Operation

Figure 1 shows the schematic diagram of the engine control system for the TAE 125-01 engine. Figure 2 shows the schematic diagram of the engine control system for the TAE 125-02-99 engine. The system has a Full Authority Digital Engine Control (FADEC) System. In this AMM we call it the engine control system.

The system has two independent computers, either of which can provide all control functions for the engine and propeller. The system has these main parts:

– Two digital engine control units (ECU A and ECU B located in one box below the pilot's seat).

– An electrical harness that connects the ECUs to the engine, the power lever, the annunciator panel, control buttons and some instruments.

– Sensors that measure engine parameters.

– An electrical power lever located in the center console.

– Control buttons for setting the second ECU in an emergency and testing the control system.

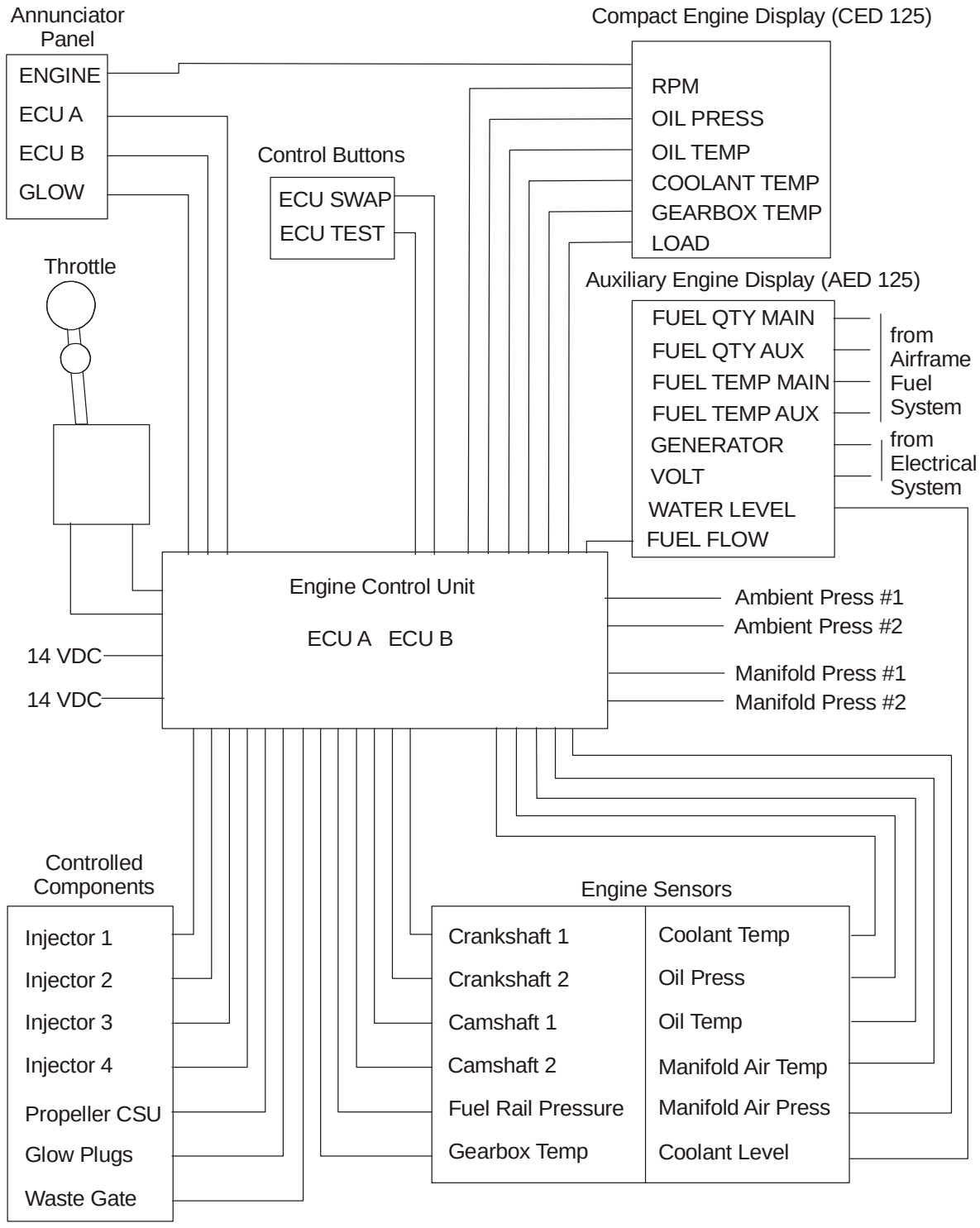


Figure 1: Engine Control System Schematic Diagram - TAE 125-01 Engine

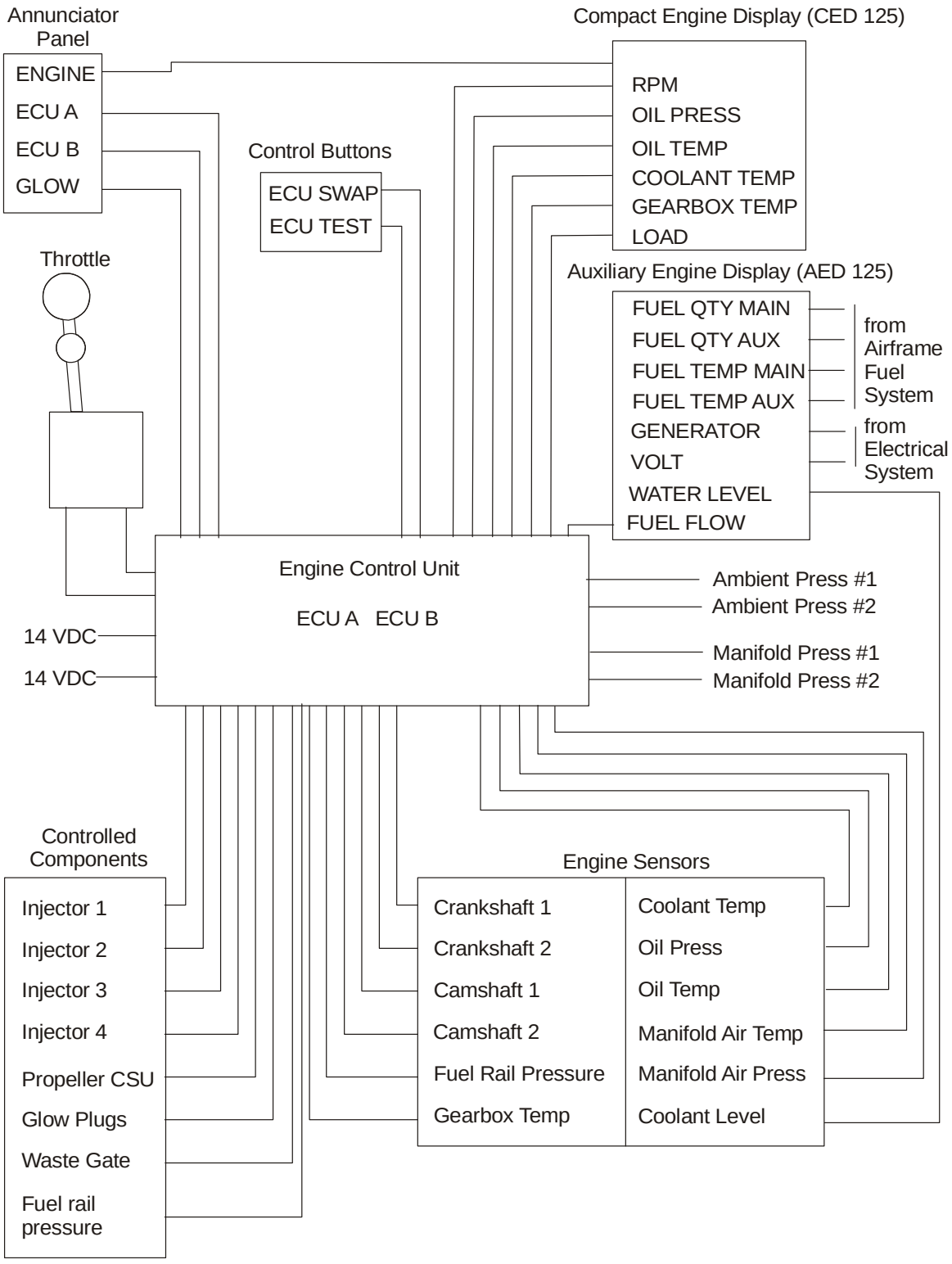


Figure 2: Engine Control System Schematic Diagram - TAE 125-02-99 Engine (if MÄM 40-256 is installed)

A. Engine Control Units

The ECU A and ECU B are contained in one box located under the pilot's seat in the cockpit. A harness connects the box to the engine, the power lever and some instruments. The manifold pressure is supplied to the ECU by a pressure tube. If MÄM 40-474 or MÄM 40-479 (or RSB D4-083) is installed, a water separator is installed in the manifold pressure tube.

The water separator has a horizontal inlet fitting to which the MAP-line is connected. If water droplets pass through the MAP-line, they will be collected in the separator bowl. The separator bowl has a small hole, which allows collected water droplets to leak out. The hole is closed by a valve provided by the pressure in the MAP-line. The valve is closed as long as the engine is running and as long as there is over-pressure in the MAP-line, so that the system has no influence on the manifold pressure measurement. If the engine is not operating, the hollow ball floats upwards and the water can leak out of the separator bowl.

In the usual operation, the alternator supplies power for the system. If the alternator fails, the ECU B automatically takes over and the ECU backup battery provides power. Refer to Section 24-33 for more data about the electrical supply for the engine control system.

The annunciator panel at the top of the instrument panel has two amber caution lights for the engine control system (marked ECU A and ECU B).

The ECU SWAP switch on the left of the instrument panel lets you toggle between ECU A and ECU B. For all normal operation, the switch is set to AUTOMATIC and the ECU A controls the engine. You should only set the system to ECU B for testing.

Note: The ECU SWAP switch only operates to change from ECU A to ECU B. If you toggle back to AUTOMATIC, then ECU B remains in control until:

- The power lever is set to IDLE, and
- You push and hold the ECU TEST button until both ECU caution lights on the annunciator panel go off.

The ECU TEST button on the left of the instrument panel lets you test the system. Refer to Section 71-01 for the ECU test procedure.

B. Electrical Harness

The electrical harness is an engine component. The harness connects the power lever and sensors to the ECU A and ECU B. It also provides connections for the ECU buttons, warnings and some engine instruments.

The electrical harness comes through the firewall on the left side. P-clamps and tie-wraps attach the electrical harness to the engine. The harness goes forward and divides to go down both sides of the engine.

The cables on the right side pass mainly along the cylinder head. They connect to the fuel pressure regulator, fuel pressure sensor, fuel injectors and camshaft position sensors. A cable goes to the intercooler outlet. Cables also go forward and down to the glow plugs, waste gate, right and left crankshaft position sensors, gearbox temperature sensor, coolant temperature sensor, and propeller governor.

The left side of the engine has cables to the sensors for oil pressure and oil temperature and cables for the starter and alternator.

The repair of the electrical harness is limited to damage that occurs near the ends of the cables, outside of the isolated section. If a cable fails within the isolated section, then you must replace the complete harness.

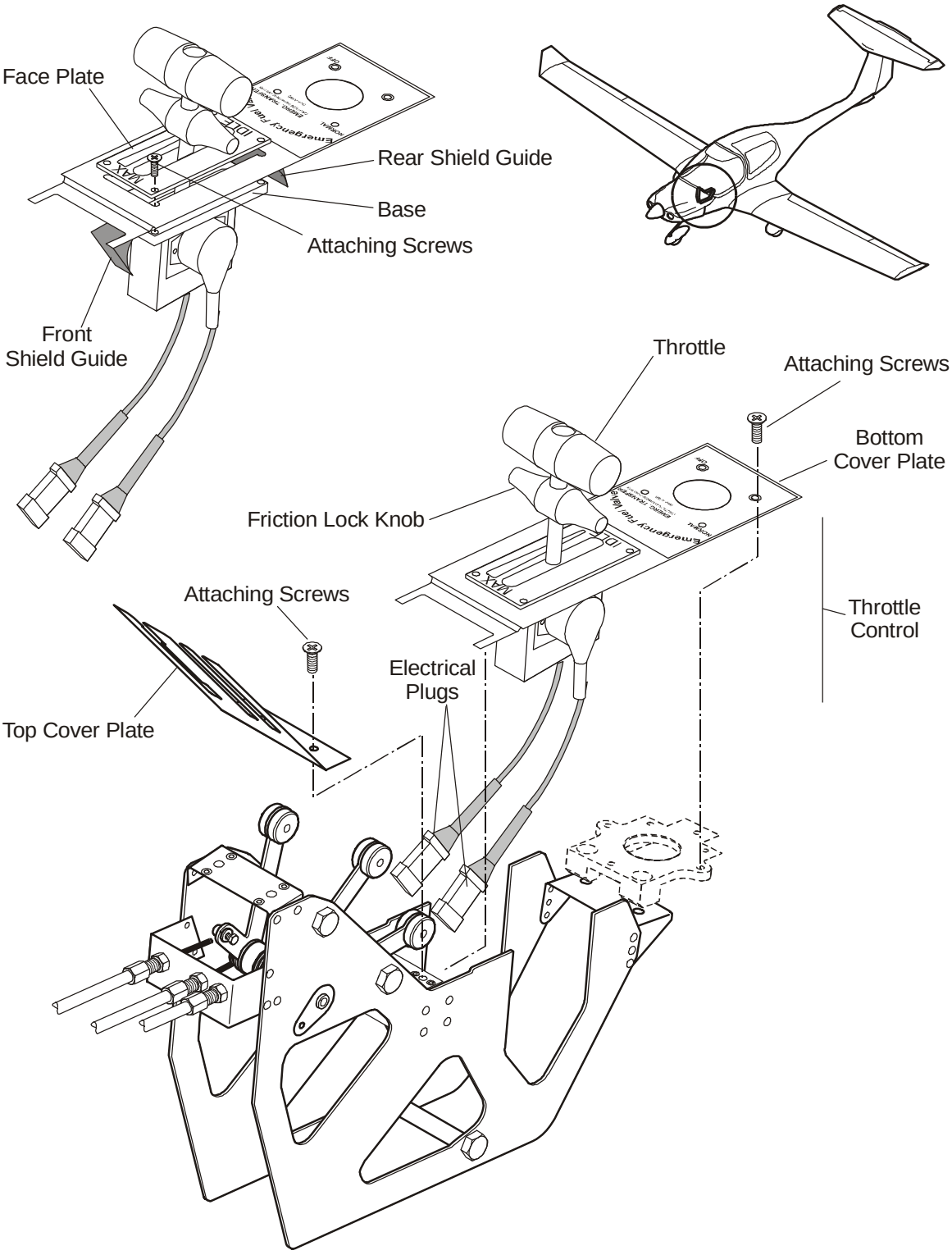


Figure 3: Engine Power Lever Installation

C. Power Lever

Figure 3 shows the engine power lever installation. The power lever is a large ‘T’-shaped lever. It is located in the center console. The power lever has a friction lock. The lock holds the power lever in the set position. A bar below the ‘T’ lets you set or release the friction. A button on top of the bar lets you release the friction. The power lever assembles as a unit to the bottom cover plate of the center console.

The power lever has two separate and independent electrical systems. One system provides signals to the ECU A. The other system provides signals to the ECU B. Either system can control the engine.

The lever operates electrical transducers that give signals in proportion to the power lever position. The signals are used by the engine control system to set the power output. The control system also sets the propeller constant speed unit to give best RPM for the power setting. Refer to Section 61-21 for more data on the propeller control function.

D. Sensors

(1) TAE 125-01 Engine

Each ECU gets data about the engine performance from the following sensors mounted on the engine:

Sensor	Location
Crankshaft 1.	Front, right of the crankcase.
Crankshaft 2.	Front, left of the crankcase.
Camshaft 1.	Front between camshafts.
Camshaft 2.	Aft between camshafts.
Coolant temperature.	Rear of the thermostat valve.
Oil temperature.	On the connection block for the oil cooler hoses.
Oil pressure.	Behind the oil filter.
Manifold air temperature.	On the intercooler outlet pipe.
Manifold air pressure.	On the intercooler outlet pipe.
Fuel rail pressure.	At the front of the fuel rail.
Gearbox temperature.	At the top left of the front bearing of the reduction gear.

(2) TAE 125-02-99 Engine (if MÄM 40-256 is installed)

Refer to TAE 125-02-99 Operation Manual OM 02-02, latest revision for more details about the sensors mounted on the TAE 125-02-99 engine.

Trouble-Shooting

1. General

The table below lists the defects you could have with the engine control system. If you have the trouble detailed in the Trouble column read across to the Possible Cause column. Then do the repair given in the Repair column.

For all other engine control trouble, refer to the engine manufacturer.

Trouble	Possible Cause	Repair
ECU caution light comes ON.	ECU defective.	Read engine event log (refer to Section 72-01). Refer to the engine manufacturer.
Engine does not respond correctly to power lever movement.		Run Diagnostic routine in ECU Operator software (refer to Section 72-01). Refer to the engine manufacturer.

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Maintenance Practices

1. General

These Maintenance Practices tell you how to remove and install the main components in the engine control system. All other work on the engine control system can only be done by a TAE approved maintenance shop or the manufacturer.

2. Remove/Install the Power Lever

A. Remove the Power Lever

	Detail Steps/Work Items	Key Items/References
(1)	Make sure that the engine is safe: – Set the ELECTRIC MASTER key switch to OFF. – Set the ENGINE MASTER switch to OFF. – Set the power lever to IDLE.	
(2)	Remove the top cover plate from the center console: – Remove 2 screws at the bottom of the plate.	Refer to Figure 3.
(3)	Remove the handle for the emergency fuel valve: – Remove the center screw. – Lift the handle from the shaft.	
(4)	Remove the 2 screws that attach the bottom cover plate to the emergency fuel valve mounting.	
(5)	Lift the bottom cover plate complete with the power lever to give access to the electrical connectors.	
(6)	Disconnect the 2 electrical in-line connectors for the power lever.	
(7)	Remove the power lever from the airplane.	

B. Replace the Power Lever in the Bottom Cover Plate

Note: Only do this part of the procedure if you will replace the power lever.

(1) Remove the Old Power Lever from the Bottom Cover Plate

	Detail Steps/Work Items	Key Items/References
(1)	Remove the 4 screws that attach the power lever to the bottom cover panel of the center console.	Refer to Figure 3.
(2)	Carefully lift the face plate as far as possible.	
(3)	Turn the face plate and move it through the hole in the bottom cover plate.	
(4)	Turn the bottom cover plate and lift it off the power lever.	
(5)	Assemble the face plate to the old power lever.	

(2) Install a New Power Lever to the Bottom Cover Plate

	Detail Steps/Work Items	Key Items/References
(1)	Remove the 4 screws that attach the face plate to the new power lever.	
(2)	Move the bottom cover panel over the power lever and face plate.	Make sure that the white plastic shield and the front and rear shield guides are in the correct position.
(3)	Install the 4 screws that attach the power lever to the bottom cover panel of the center console.	
(4)	Move the power lever through the full range.	The lever must move freely with the white plastic shield.

C. Install the Power Lever

	Detail Steps/Work Items	Key Items/References
(1)	Make sure that the engine is safe: – Set the ELECTRIC MASTER key switch to OFF. – Set the ENGINE MASTER switch to OFF.	
(2)	Put the bottom cover plate and power lever in position adjacent to the center console.	Refer to Figure 3.
(3)	Connect the 2 electrical in-line connectors for the power lever.	
(4)	Check for correct potentiometer signal with ECU Operator software (Overview page). – Left and right potentiometer signals should not differ by more than 20 units. – Power setting must be at 0 % with the power lever at IDLE and 99.9 % with the power lever at MAX.	Refer to Section 72-01.
(5)	Put the power lever and the bottom cover plate in position in the center console.	
(6)	Install the 2 screws that attach the cover plate at the rear.	
(7)	Install the top cover plate to the center console. – Install the 2 screws that hold the top cover plate on top of the bottom cover plate.	
(8)	Install the lever for the emergency fuel valve: – Put the lever in position on the shaft. – Install the screw.	

	Detail Steps/Work Items	Key Items/References
(9)	Do a test for correct operation of the emergency fuel valve lever: – Move the lever from OFF to NORMAL to EMERG. TRANSFER.	Make sure that the safety lock operates correctly.
(10)	Do a ground run-up.	Refer to Section 71-01.

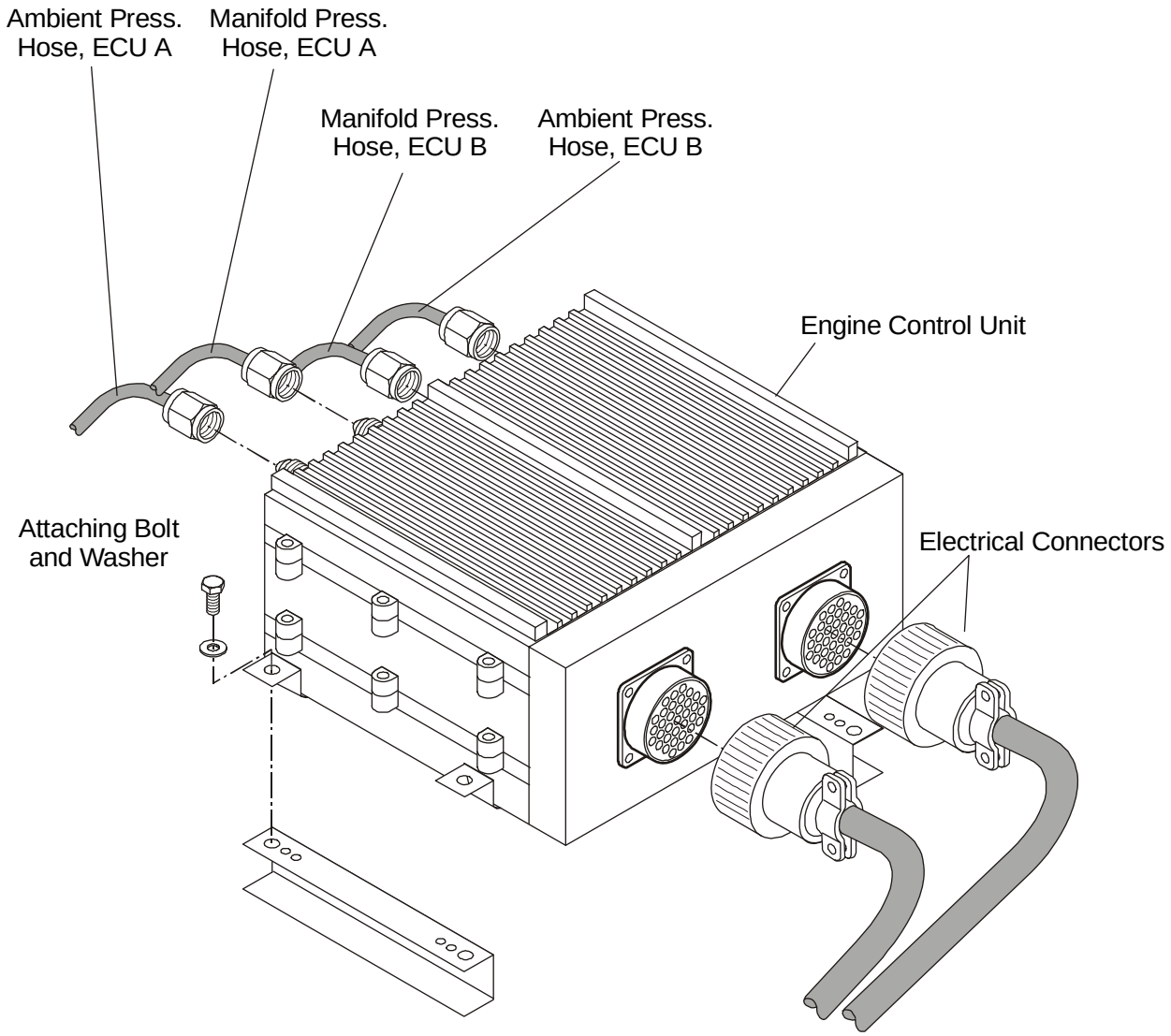


Figure 4: ECU Installation (Neither MÄM 40-474 nor MÄM 40-479 installed)

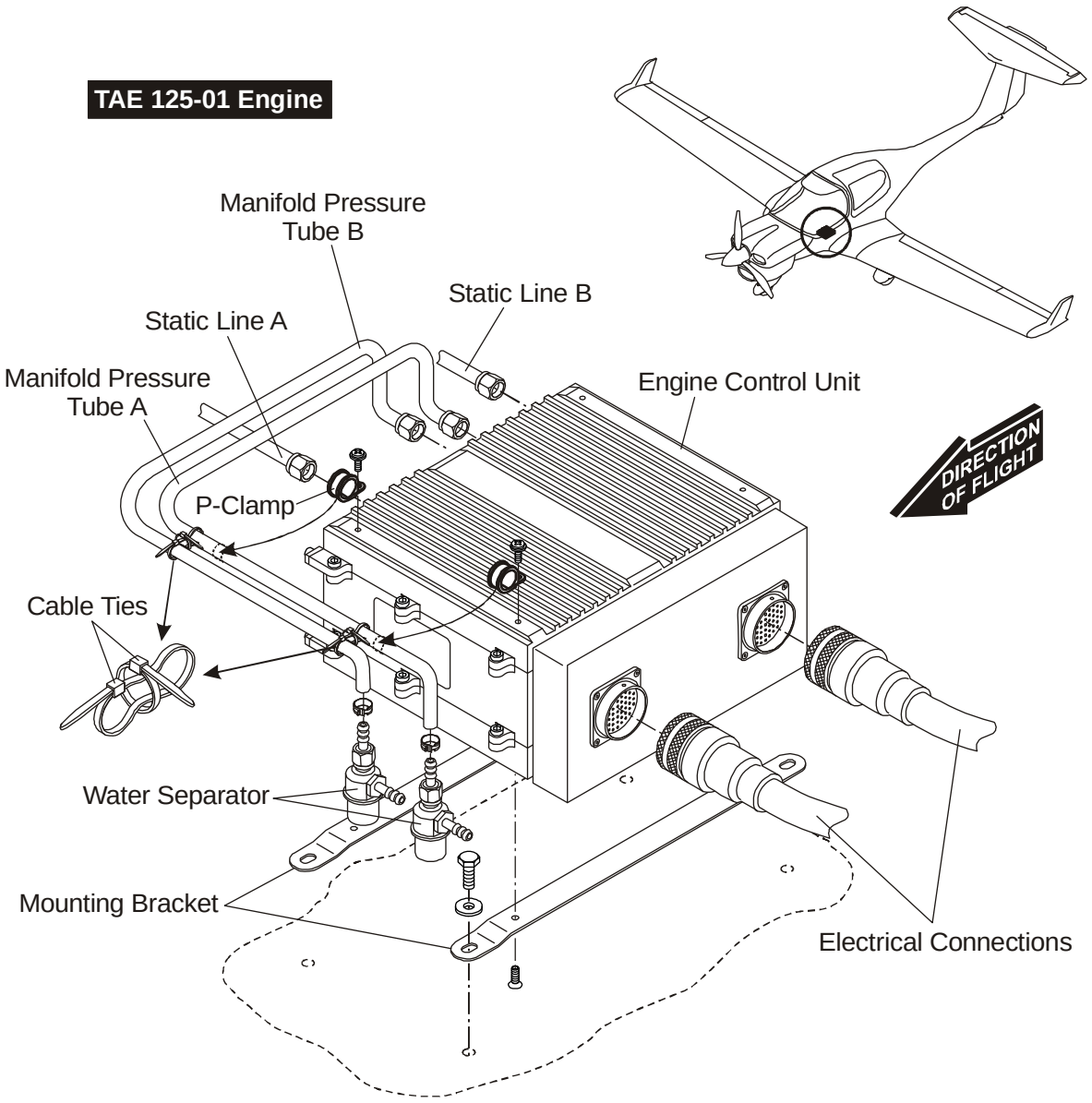


Figure 5: ECU Installation (TAE 125-01 Engine with MÄM 40-474 installed)

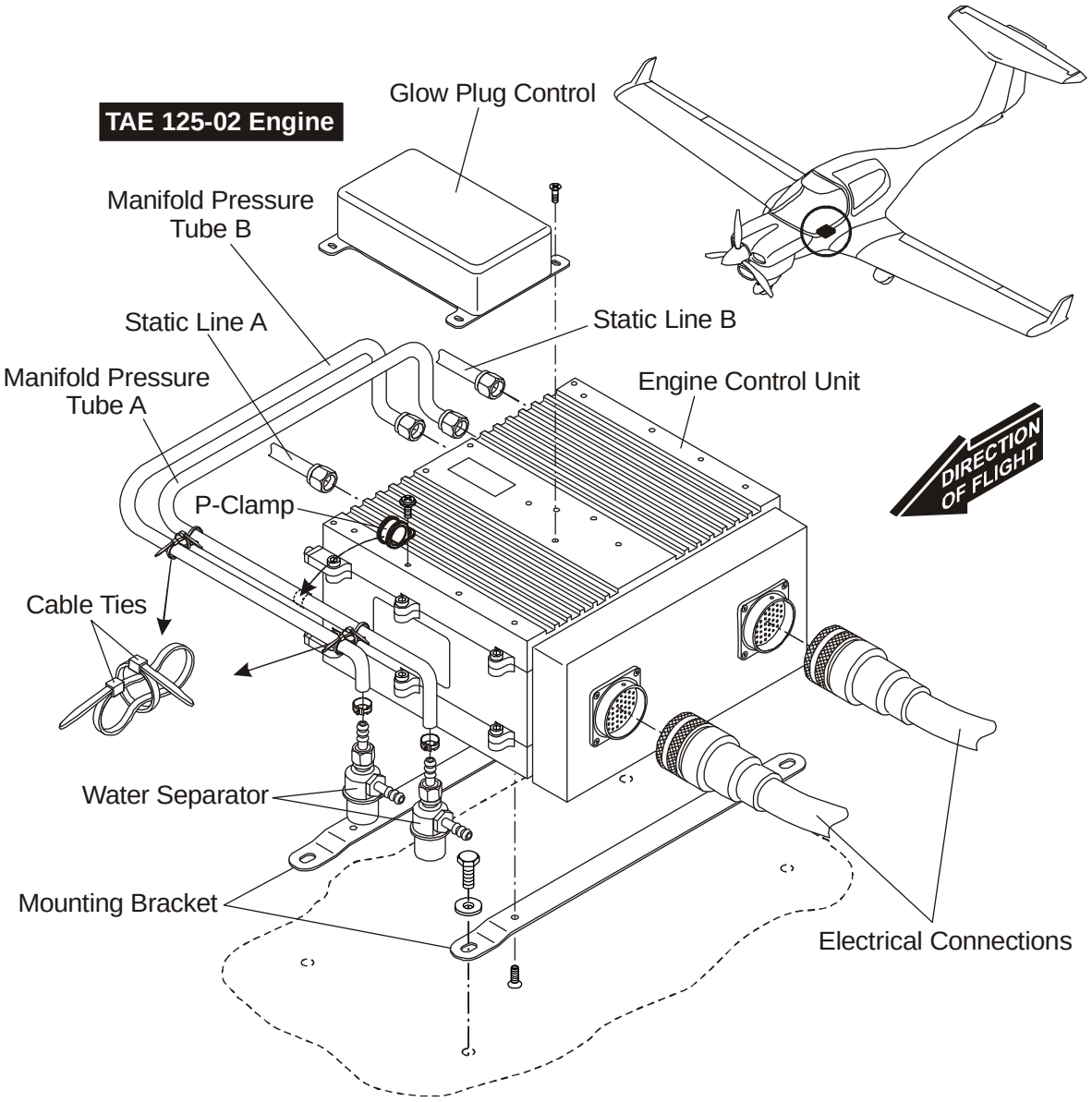


Figure 6: ECU Installation (TAE 125-02 Engine with MÄM 40-479 installed)

3. Remove/Install the ECU

A. Remove the ECU

	Detail Steps/Work Items	Key Items/References
(1)	Make sure that the engine is safe: – Set the ELECTRIC MASTER key switch to OFF. – Set the ENGINE MASTER switch to OFF. – Set the power lever to IDLE.	
(2)	Remove the left pilot's seat.	Refer to Section 25-10.
(3)	Release the 2 electrical connectors from the ECU.	Refer to Figure 4, 5 or 6.
(4)	Release the 4 hose connections from the ECU.	
(5)	Release the 4 bolts and washers that hold the ECU to the mounting brackets.	
(6)	Remove the ECU from the airplane.	

B. Install the ECU

CAUTION: YOU MUST CONTACT THE ENGINE MANUFACTURER BEFORE YOU INSTALL A NEW ECU.

	Detail Steps/Work Items	Key Items/References
(1)	Make sure that the engine is safe: – Set the ELECTRIC MASTER key switch to OFF. – Set the ENGINE MASTER switch to OFF. – Set the power lever to IDLE.	
(2)	Before installation of a new ECU: – Check the Part No. on the sticker. – Check the software revision and mapping on the sticker.	
(3)	Put the ECU in position below the pilot's seat.	Refer to Figure 4, 5 or 6.
(4)	Install the 4 bolts and washers that hold the ECU to the mounting brackets.	
(5)	Connect the 4 hoses to the ECU.	
(6)	Connect the 2 electrical connectors from the ECU.	Make sure that the bayonet lockings are engaged.
(7)	If a new ECU is installed: – Check the software revision and the mapping by use of a laptop computer.	Verify with the information given by the engine manufacturer.
(8)	Install the pilot's seat.	Refer to Section 25-10.
(9)	Do a ground run-up.	Refer to Section 71-01.

4. Remove/Install the Engine Control System Harness

A. Remove the Engine Control System Harness

(1) TAE 125-01 Engine

	Detail Steps/Work Items	Key Items/References
	WARNING: MAKE THE ENGINE IS SAFE BEFORE YOU DO ANY WORK ON HARNESS. IF THE ENGINE STARTS THE PROPELLER CAN CAUSE INJURY OR DEATH.	
(1)	Make sure that the engine is safe: – Set the ELECTRIC MASTER key switch to OFF. – Set the ENGINE MASTER switch to OFF. – Set the power lever to IDLE.	
(2)	Remove the engine cowlings.	Refer to Section 71-11.
(3)	Disconnect the airplane main battery.	Refer to Section 24-34.
(4)	Remove the coolant radiator.	Refer to Section 75-01.
(5)	Remove the left pilot's seat.	Refer to Section 25-10.
(6)	Remove the instrument panel cover.	Refer to Section 25-10.
(7)	Remove the power lever.	Refer to Paragraph 2.A.
(8)	Release the 2 electrical connectors from the ECU.	Refer to Figure 4, 5 or 6.
(9)	Release the connections at these terminal blocks: – Glow. – ECU bus. – Instruments and annunciator panel.	Behind the instrument panel.

	Detail Steps/Work Items	Key Items/References
(10)	Disconnect the engine wire harness and bonding cables from these electrical sensors:	
	– Crankshaft 1.	At the front right crank case.
	– Crankshaft 2.	At the front left crank case.
	– Camshaft 1.	On inlet valve cover between cyl. 3 & 4.
	– Camshaft 2.	On inlet valve cover between cyl. 1 & 2.
	– Coolant temperature.	At the thermostat valve.
	– Oil temperature.	At the bottom of the oil case.
	– Oil pressure.	At the rear side of the oil filter housing.
	– Manifold air temperature.	On the intercooler outlet pipe.
	– Fuel rail pressure regulator.	At the rear end of the fuel rail.
	– Fuel rail pressure sensor.	At the front side of the fuel rail.
	– Propeller governor.	At the right side of the reduction gear.
	– Gear temperature.	At top left of front bearing reduction gear.
	– Waste gate valve solenoid.	At the lower crankshaft cover.
	– Fuel injectors.	At each fuel injector.
	– Glow plugs.	At the lower crankshaft cover.
	– Waste gate control valve.	At the lower crankshaft cover.
(11)	Remove the cable-ties and clamps that attach the cable harness to the engine and structure.	Make a note of the type and location of each attachment.
(12)	Remove the shields for the feed-through at the firewall.	
(13)	Carefully move the harness aft through the firewall.	Take care not to damage the connectors.
(14)	Remove the harness from the airplane.	

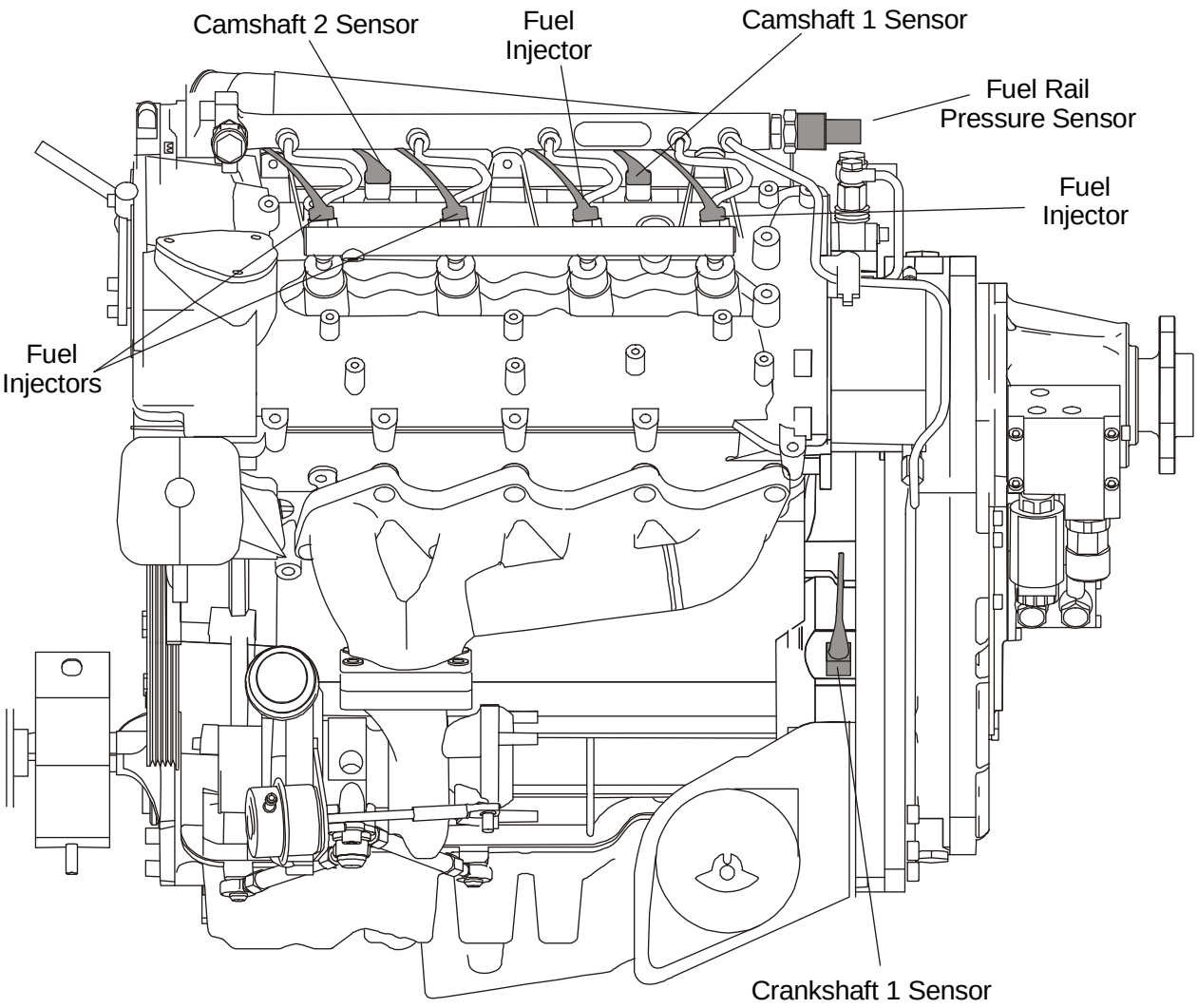


Figure 7: Sensors on the Right Side of the TAE 125-01 Engine

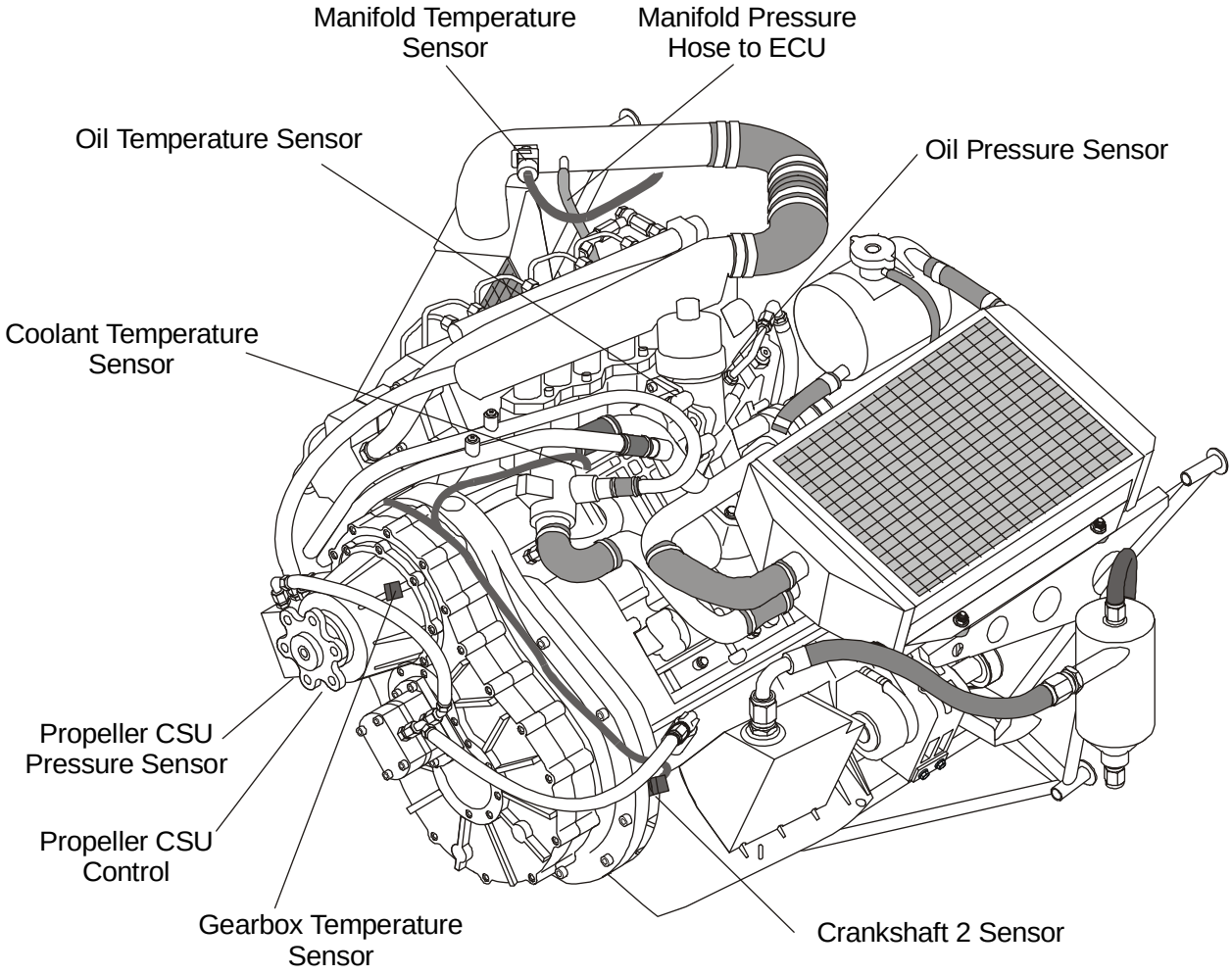


Figure 8: Sensors on the Left Side of the TAE 125-01 Engine

(2) TAE 125-02-99 Engine (if MÄM 40-256 is installed)

	Detail Steps/Work Items	Key Items/References
	WARNING: MAKE THE ENGINE IS SAFE BEFORE YOU DO ANY WORK ON HARNESS. IF THE ENGINE STARTS THE PROPELLER CAN CAUSE INJURY OR DEATH.	
(1)	Make sure that the engine is safe: – Set the ELECTRIC MASTER key switch to OFF. – Set the ENGINE MASTER switch to OFF. – Set the power lever to IDLE.	
(2)	Remove the engine cowlings.	Refer to Section 71-11.
(3)	Disconnect the airplane main battery.	Refer to Section 24-34.
(4)	Remove the coolant radiator.	Refer to Section 75-01.
(5)	Remove the left pilot's seat.	Refer to Section 25-10.
(6)	Remove the instrument panel cover.	Refer to Section 25-10.
(7)	Remove the power lever.	Refer to Paragraph 2.A.
(8)	Release the 2 electrical connectors from the ECU.	Refer to Figure 4, 5 or 6.
(9)	Release connections at these terminal blocks: – Glow. – ECU bus. – Instruments and annunciator panel.	Behind the instrument panel.

	Detail Steps/Work Items	Key Items/References
(10)	Disconnect the engine wire harness and bonding cables from these electrical sensors: – Crankshaft 1. – Crankshaft 2. – Camshaft 1. – Camshaft 2. – Coolant temperature. – Oil temperature. – Oil pressure. – Manifold air temperature. – Fuel rail pressure regulator. – Fuel rail pressure sensor. – Propeller governor. – Gear temperature. – Waste gate valve solenoid. – Fuel injectors. – Glow plugs. – Waste gate control valve.	At the right side of the reduction gear. At the lower crankshaft cover. At each fuel injector. At the lower crankshaft cover. At the lower crankshaft cover.
(11)	Remove the cable-ties and clamps that attach the cable harness to the engine and structure.	Make a note of the type and location of each attachment.
(12)	Remove the shields for the feed-through at the firewall.	
(13)	Carefully move the harness aft through the firewall.	Take care not to damage the connectors.
(14)	Remove the harness from the airplane.	

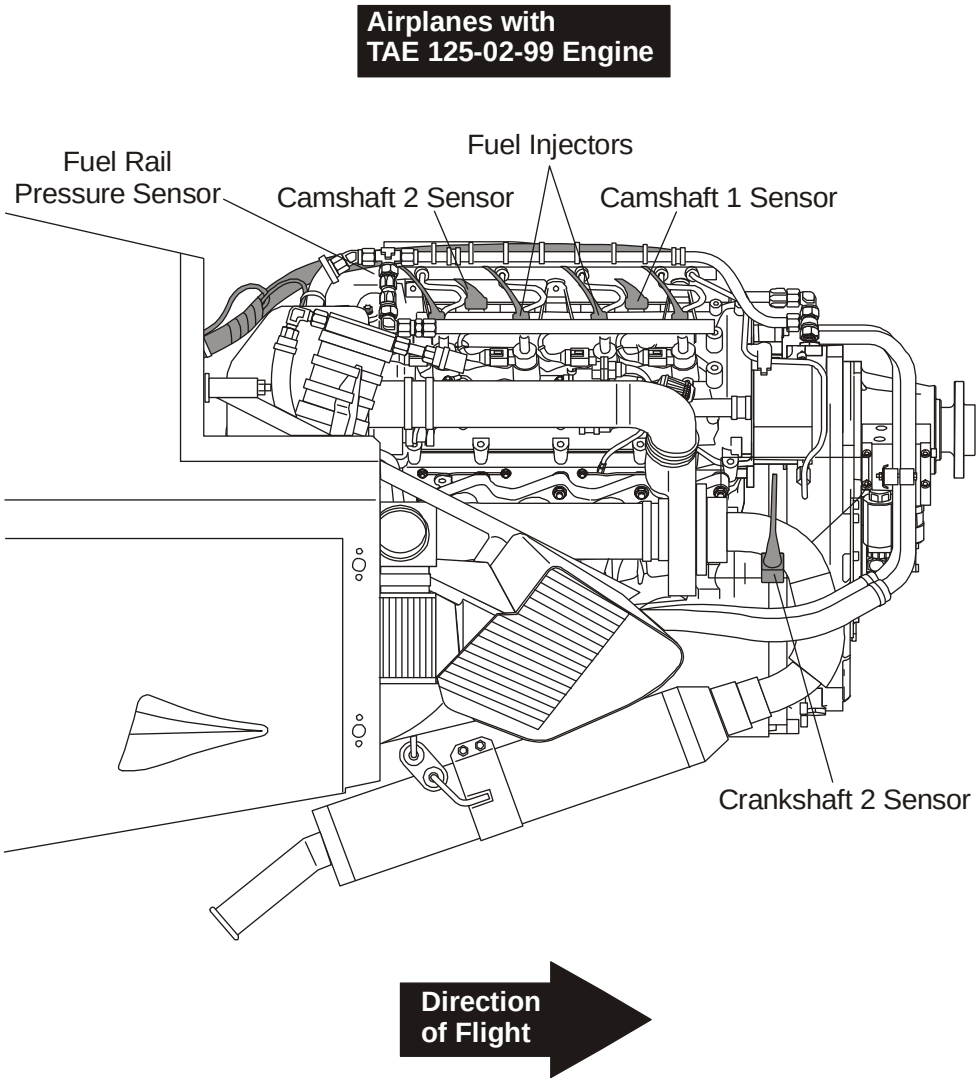


Figure 9: Sensors on the Right Side of the TAE 125-02-99 Engine (if MÄM 40-256 is installed)

Airplanes with TAE 125-02-99 Engine

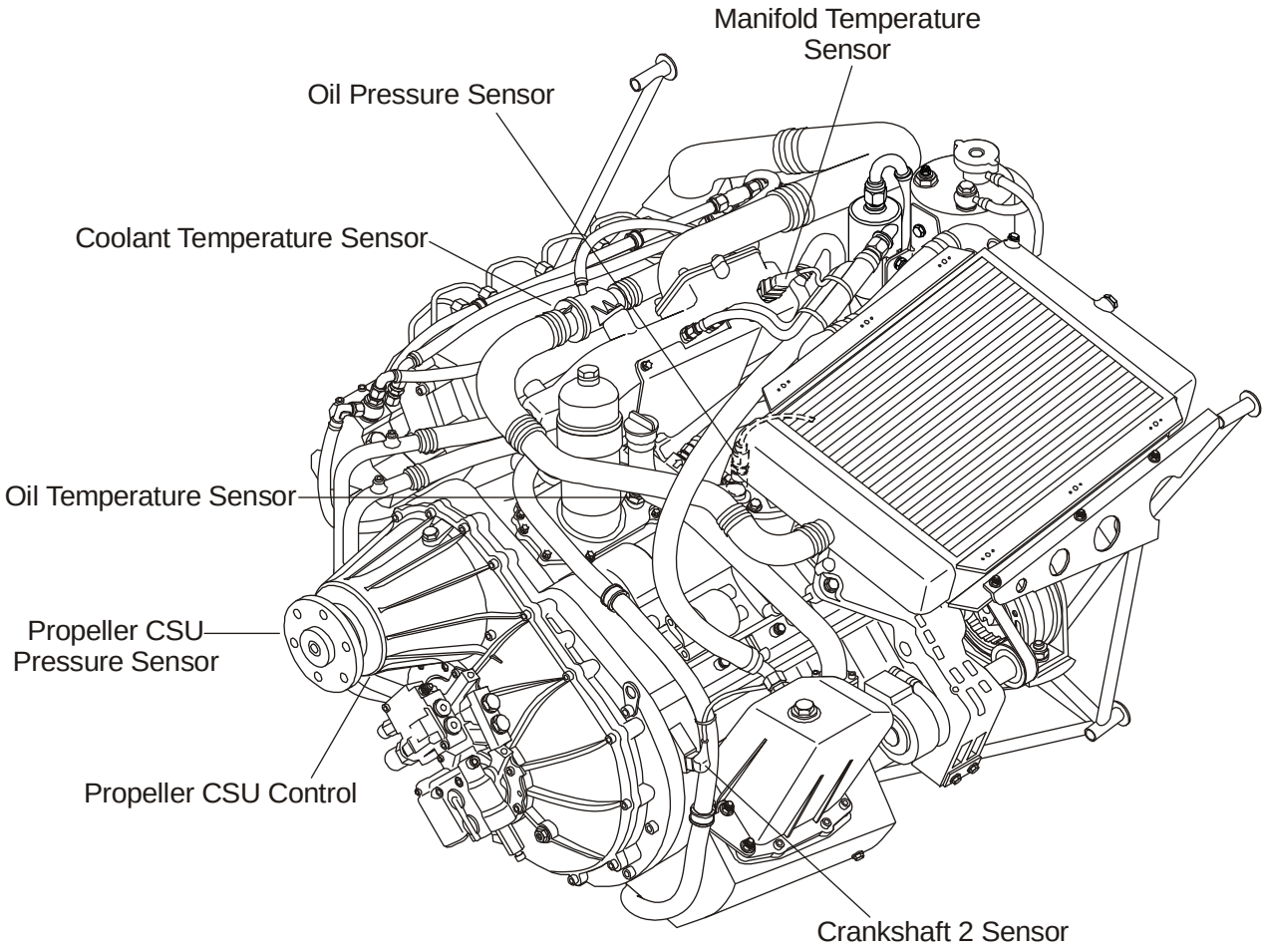


Figure 10: Sensors on the Left Side of the TAE 125-02-99 Engine (if MÄM 40-256 is installed)

B. Install the Engine Control System Harness

(1) TAE 125-01 Engine

	Detail Steps/Work Items	Key Items/References
	WARNING: MAKE THE ENGINE IS SAFE BEFORE YOU DO ANY WORK ON HARNESS. IF THE ENGINE STARTS THE PROPELLER CAN CAUSE INJURY OR DEATH.	
(1)	Make sure that the engine is safe: – Set the ELECTRIC MASTER key switch to OFF. – Set the ENGINE MASTER switch to OFF. – Set the power lever to IDLE.	
(2)	Put the harness in position in the cockpit.	
(3)	Carefully move the engine end of the harness forward through the firewall.	Take care not to damage the connectors. Adjust the harness position so that all connections can be made without stress.

	Detail Steps/Work Items	Key Items/References
(4)	Connect the engine wire harness and bonding cables to these electrical sensors:	
	– Crankshaft 1.	At the front right crank case.
	– Crankshaft 2.	At the front left crank case.
	– Camshaft 1.	On inlet valve cover between cyl. 3 & 4.
	– Camshaft 2.	On inlet valve cover between cyl. 1 & 2.
	– Coolant temperature.	At the thermostat valve.
	– Oil temperature.	At the bottom of the oil case.
	– Oil pressure.	At the rear side of the oil filter housing.
	– Manifold air temperature.	On the intercooler outlet pipe.
	– Fuel rail pressure regulator.	At the rear end of the fuel rail.
	– Fuel rail pressure sensor.	At the front side of the fuel rail.
	– Propeller governor.	At the right side of the reduction gear.
	– Gear temperature.	At top left of front bearing reduction gear.
	– Waste gate valve solenoid.	At the lower crankshaft cover.
	– Fuel injectors.	At each fuel injector.
	– Glow plugs.	At the lower crankshaft cover.
	– Waste gate control valve.	At the lower crankshaft cover.
(5)	Connect the harness at these terminal blocks: – Glow. – ECU bus. – Instruments and annunciator panel.	Behind the instrument panel.
(6)	Connect the 2 electrical connectors to the ECU.	Refer to Figure 4, 5 or 6. Under the left pilot's seat. Make sure that the bayonet lockings are engaged.

	Detail Steps/Work Items	Key Items/References
(7)	Install the cable-ties and clamps that attach the cable harness to the engine and structure.	Refer to the notes that you made during removal for the type and location of each attachment.
(8)	Install the shields for the feed-through at the firewall.	Seal with PR 812 or equivalent.
(9)	Install the coolant radiator.	Refer to Section 75-01.
(10)	Install the power lever.	Refer to Paragraph 2.C.
(11)	Install the instrument panel cover.	Refer to Section 25-10.
(12)	Install the left pilot's seat.	Refer to Section 25-10.
(13)	Connect the airplane main battery.	Refer to Section 24-34
(14)	Install the engine cowlings.	Refer to Section 71-11.
(15)	Do an engine run-up.	Refer to Section 71-01.

(2) TAE 125-02-99 Engine (if MÄM 40-256 is installed)

	Detail Steps/Work Items	Key Items/References
	WARNING: MAKE THE ENGINE IS SAFE BEFORE YOU DO ANY WORK ON HARNESS. IF THE ENGINE STARTS THE PROPELLER CAN CAUSE INJURY OR DEATH.	
(1)	Make sure that the engine is safe: – Set the ELECTRIC MASTER key switch to OFF. – Set the ENGINE MASTER switch to OFF. – Set the power lever to IDLE.	
(2)	Put the harness in position in the cockpit.	
(3)	Carefully move the engine end of the harness forward through the firewall.	Take care not to damage the connectors. Adjust the harness position so that all connections can be made without stress.

	Detail Steps/Work Items	Key Items/References
(4)	Connect the engine wire harness and bonding cables to these electrical sensors: – Crankshaft 1. – Crankshaft 2. – Camshaft 1. – Camshaft 2. – Coolant temperature. – Oil temperature. – Oil pressure. – Manifold air temperature. – Fuel rail pressure regulator. – Fuel rail pressure sensor. – Propeller governor. – Gear temperature. – Waste gate valve solenoid. – Fuel injectors. – Glow plugs. – Waste gate control valve.	
(5)	Connect the harness at these terminal blocks: – Glow. – ECU bus. – Instruments and annunciator panel.	Behind the instrument panel.
(6)	Connect the 2 electrical connectors to the ECU.	Refer to Figure 4, 5 or 6.. Under the left pilot's seat. Make sure that the bayonet lockings are engaged.
(7)	Install the cable-ties and clamps that attach the cable harness to the engine and structure.	Refer to the notes that you made during removal for the type and location of each attachment.

	Detail Steps/Work Items	Key Items/References
(8)	Install the shields for the feed-through at the firewall.	Seal with PR 812 or equivalent.
(9)	Install the coolant radiator.	Refer to Section 75-01.
(10)	Install the power lever.	Refer to Paragraph 2.C.
(11)	Install the instrument panel cover.	Refer to Section 25-10.
(12)	Install the left pilot's seat.	Refer to Section 25-10.
(13)	Connect the airplane main battery.	Refer to Section 24-34
(14)	Install the engine cowlings.	Refer to Section 71-11.
(15)	Do an engine run-up.	Refer to Section 71-01.

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Section 76-02
Engine Controls - Lycoming O-360-A4M Engine

1. General

This Section tells you about the DA 40 F engine controls for airplanes with the Lycoming O-360-A4M engine installed. Bowden cables transmit the control inputs to the engine.

Figure 1 shows the engine control assembly.

This Chapter gives you data on the linkages cables and levers. It does not include data on the fuel control units themselves. For data on the engine fuel-control unit refer to the Lycoming Maintenance Manual. For data on the carburetor heat unit refer to Section 71-62.

The DA 40 F has these engine controls:

– Throttle control lever.

– Mixture control lever.

– Carburetor heat control lever.

2. Description and Operation

Figure 1 shows the engine control assembly in the cockpit. Figures 2 and 3 show the details of each control. An engine control assembly in the center console holds the throttle, mixture and propeller control levers. The engine control assembly has a control lever friction-adjuster. Tubular spacers in the control assembly make the stops for the control levers.

A. Friction Adjuster

The friction adjuster adjusts the force necessary to move the control levers in the engine control assembly. The friction adjuster control knob is on the right side of the center console. The control levers attach to a pivot shaft in the engine control assembly. The pivot shaft also has stator plates, plastic washers and spacers. The other end of the stator plates attach to the control assembly with a bolt. The friction between the levers, plastic washers and stator plates increases when the friction adjuster control knob is tightened and decreases when the knob is released. Spring washers keep the friction adjuster control knob setting.

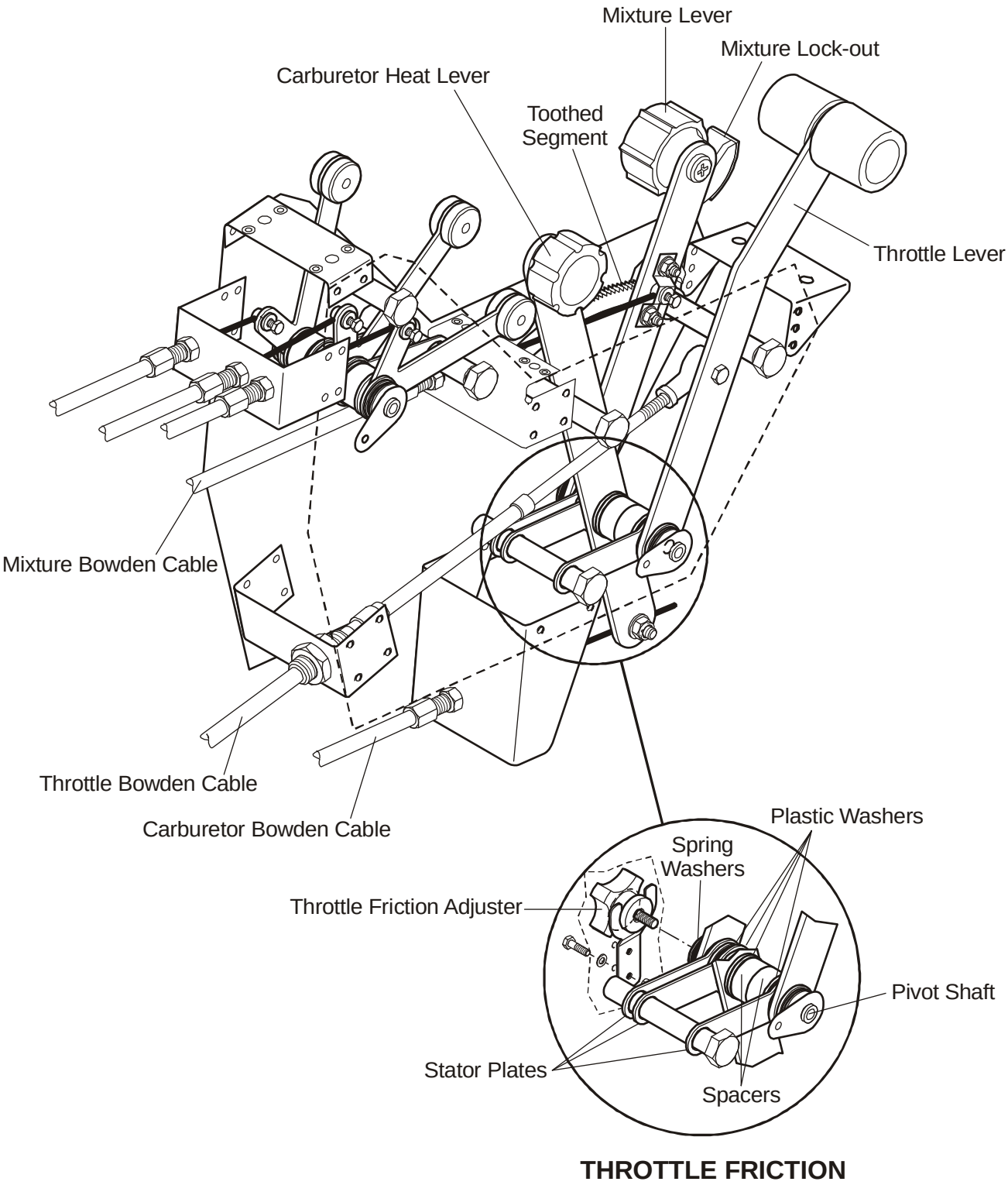


Figure 1: Engine Controls in the Cockpit

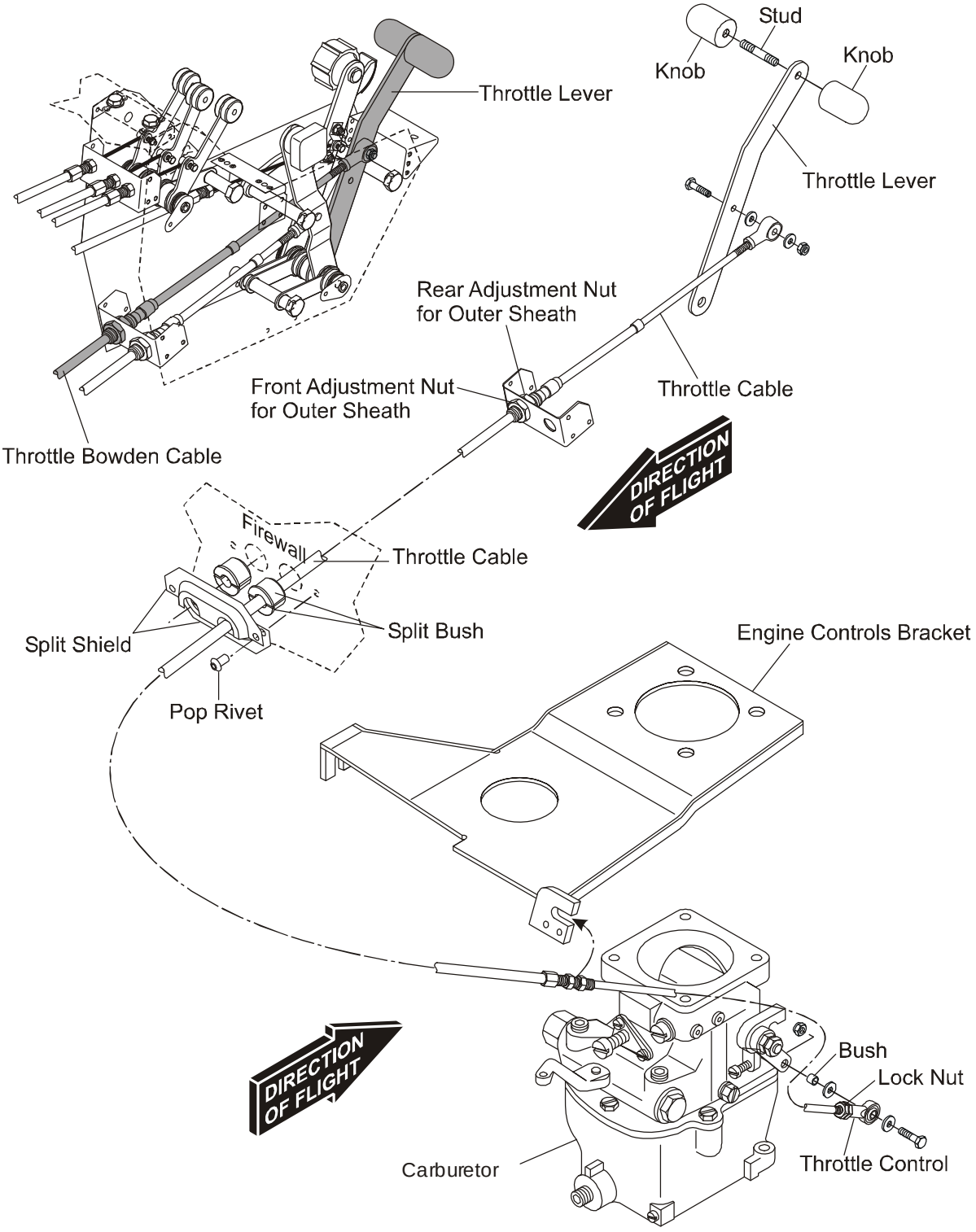


Figure 2: Throttle Control Installation

B. Throttle Control

Figure 2 shows the throttle control installation.

The throttle control lever sets the position of the throttle lever on the carburetor. Move the throttle control lever fully forward to open the throttle on the carburetor and move it rearward to close the throttle on the carburetor. The lever on the carburetor touches its stop before the control lever in the cockpit touches the cockpit stop. The cockpit stops prevent the pilot from putting too much load on the control system.

A Bowden cable connects between the throttle control lever in the cockpit and the carburetor at the engine. The Bowden cable eye end attaches to the throttle lever with a bolt. The outer sheath of the Bowden cable has a threaded end fitting. Two nuts attach the end fitting to a bracket attached to the sides of the engine control assembly.

The Bowden cable goes from the engine control assembly, up behind the instrument panel and through the firewall to the engine bay. A feed-thru fitting holds the cable in position at the firewall. A fire resistant compound seals the Bowden cable where it goes through the firewall.

From the firewall the Bowden cable goes down the right side of the engine and then under the engine to the carburetor. The outer sheath of the Bowden cable attaches to the engine controls bracket at the carburetor with two nuts. If you adjust these two nuts you adjust the range of movement of the throttle control lever. The control rod eye end attaches to the throttle lever at the carburetor with a nut, bolt and two washers. The eye end is adjustable. You can use it to set the correct range of movement of the throttle valve.

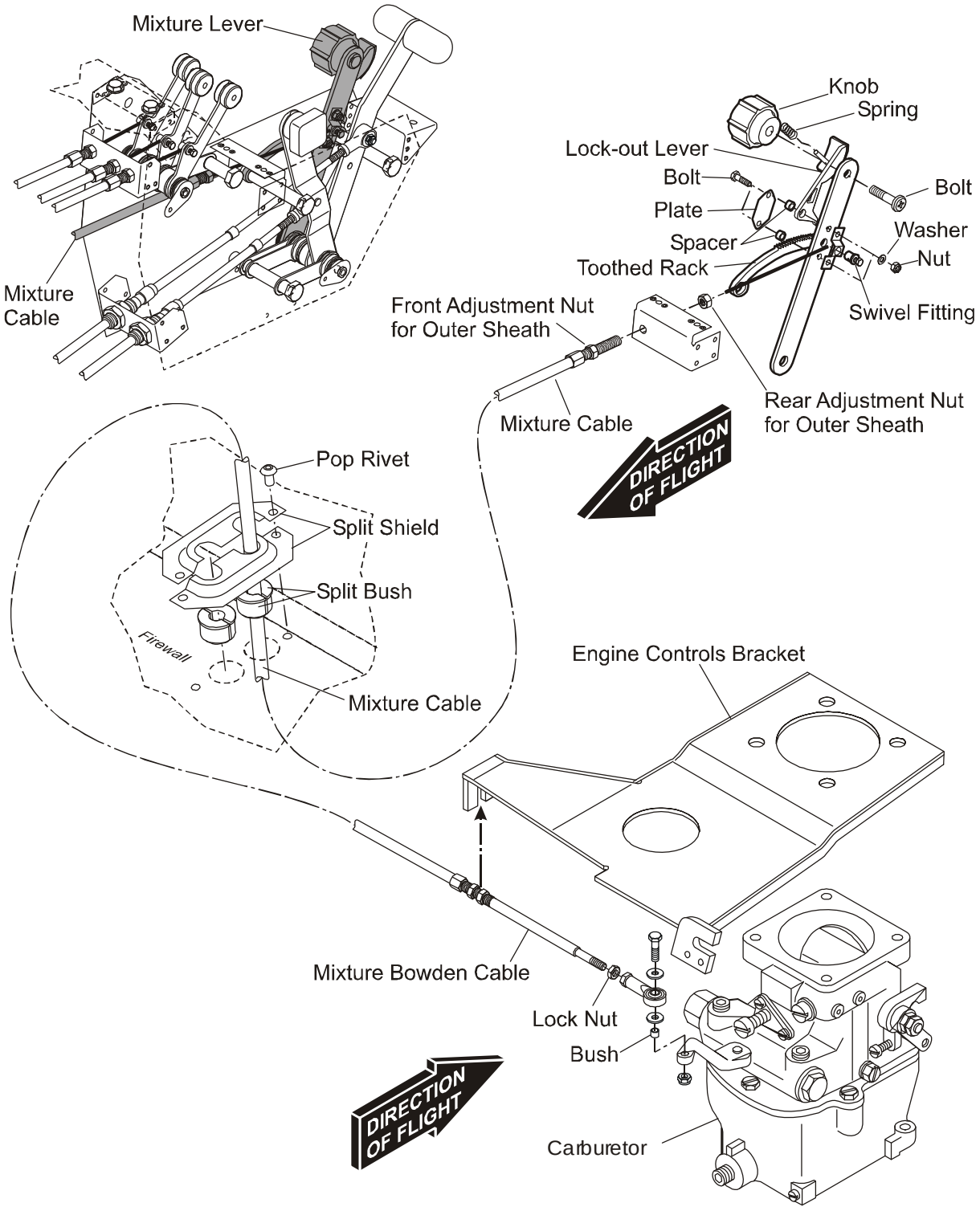


Figure 3: Mixture Control Installation

C. Mixture Control

Figure 3 shows the mixture control installation. The mixture control lever sets the mixture between RICH and LEAN. It also stops the fuel supply to the engine when set to CUT-OFF. The mixture control lever attaches to the engine control assembly.

The mixture control lever has a lock-out lever attached. The lock-out lever prevents accidental movement of the mixture control lever. The spring loaded lock-out lever engages in a toothed rack. The toothed rack attaches to the tubular spacers at the right side of the engine control assembly.

A Bowden cable connects between the mixture control lever in the cockpit and the mixture lever at the carburetor. The Bowden cable wire end attaches to the mixture control lever through a hole in a swivel fitting. A screw locks the wire end in position. A small bracket holds the inboard end of the swivel fitting. Two nuts, bolts and washers attach the bracket to the mixture control lever.

The outer sheath of the Bowden cable has a threaded end fitting. Two nuts attach the end fitting to a bracket attached between the sides of the engine control assembly. The Bowden cable goes from the center console up, in front of the instrument panel and through the firewall to the engine bay. A feed-thru fitting holds the cable in position at the firewall. A fire resistant compound seals the Bowden cable where it goes through the firewall.

From the firewall the Bowden cable goes down under the engine to the fuel mixture lever on the carburetor. The threaded end of the Bowden cable outer sheath is attached to the engine controls bracket with two nuts. You can adjust the range of movement of the mixture control lever at this position. The Bowden cable eye end fitting attaches to the mixture lever with a long bolt, spacer, washer and nut.

The eye end is adjustable. You can use this adjustment to set the correct range of movement of the mixture lever.

Trouble-Shooting

1. General

Use the data below to trouble-shoot the engine controls. See also the Lycoming Maintenance Manual for the engine.

Trouble	Possible Cause	Repair
Engine will not start.	Mixture controls not correctly adjusted.	Do a range of movement check. Adjust the mixture controls.
Engine will not cut-off.	Mixture controls not correctly adjusted.	Do a range of movement check. Adjust the mixture controls.
Cannot control the engine.	Broken throttle Bowden cable. Throttle control not set correctly. Bowden cable not free to move.	Replace the broken cable. Do a range of movement check. Adjust the throttle controls. Replace the Bowden cable.
Throttle lever hard to move.	Friction adjuster incorrectly set. Throttle control lever restriction.	Check/adjust friction adjuster. Remove the restriction.
Engine does not give full power.	Throttle lever touches the cockpit stop before the lever on the engine touches its stop.	Do a range of movement check. Adjust the throttle controls.
Idle RPM changes each time idle is set.	Throttle lever touches the cockpit stop before the lever on the engine touches its stop.	Do a range of movement check. Adjust the throttle controls.

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Maintenance Practices

1. General

These Maintenance Practices tell you how to remove, install and adjust the Bowden cables for the engine controls. They do not tell you how to adjust the carburetor.

Refer to the Lycoming Maintenance Manual for the data on the carburetor.

WARNING: DO ALL THE STEPS OF THE CONTROL INSTALLATION AND ADJUSTMENT CAREFULLY. ENGINE FAILURE CAN OCCUR IF THE CONTROL INSTALLATION AND ADJUSTMENT ARE NOT DONE CORRECTLY. THIS CAN CAUSE DEATH OR INJURY TO PERSONS.

2. Remove/Install the Throttle Bowden Cable

A. Remove the Throttle Bowden Cable

	Detail Steps/Work Items	Key Items/References
	WARNING: DO NOT STAND WITHIN THE DANGER AREA OF THE PROPELLER IF THE ENGINE STARTS, THE PROPELLER CAN CAUSE DEATH OR INJURY TO PERSONS. **WARNING: MAKE SURE THAT THE ENGINE IS SAFE BEFORE YOU DO WORK ON THE ENGINE CONTROLS. IF THE PROPELLER TURNS IT CAN CAUSE INJURY TO PERSONS.**	
(1)	Make sure that the engine is safe: – Set the ignition switch to OFF. – Set the throttle control lever to IDLE. – Set the mixture control lever to LEAN CUT-OFF.	
(2)	Remove the engine cowlings.	Refer to Section 71-12.
(3)	Disconnect the airplane battery.	Refer to Section 24-31.
(4)	Disconnect the spark plug cables from the spark plugs.	

	Detail Steps/Work Items	Key Items/References
(5)	Disconnect the throttle eye end at the throttle lever in the engine bay: – Remove the nut, bolt and washers from the Bowden cable eye end.	Refer to Figure 2.
(6)	Remove the eye end from the Bowden cable: – Loosen the lock-nut and remove the eye end.	
(7)	Remove the Bowden cable from the engine controls bracket at the carburetor: – Remove the front adjustment nut from the outer sheath. – Move the Bowden cable clear of the bracket. – Remove the rear adjustment nut from the outer sheath.	Make a note of the cable adjustment!
(8)	Remove the P-clamp which attaches the Bowden cable to the engine mount.	Note the position of the P-clamp.
(9)	Remove the feed-thru from the engine side of the firewall: – Remove the fire resistant sealant from where the cable goes through the firewall. – Remove the two rivets that attach the split shields to the firewall. – Remove the split-shields. – Move the two halves of the split-bush forward and clear of the cable.	

	Detail Steps/Work Items	Key Items/References
(10)	Remove the knob from the fuel selector valve: – Remove the cross-head screw from the center of the control-knob and pull the knob up and off the fuel selector valve. – Remove the mounting plate.	
(11)	Release the engine control assembly: – Loosen the throttle friction adjuster until the adjuster is disconnected from the shaft. – Remove the four cross-head screws which attach the engine control lower-cover-plate to the engine control assembly. – Remove the two hex-headed bolts from the top of the upper-cover-plate. – Lift and support the engine control assembly clear of the center console.	Pull and hold the throttle friction adjuster clear. Make sure you do not pull on the control cables.
(12)	Disconnect the eye-end fitting from the throttle control lever: – Remove the nut, two washers and bolt which attaches the eye-end to the lever.	
(13)	Remove the eye-end fitting from the throttle cable: – Loosen the lock-nut for the eye-end. – Remove the eye-end from the cable.	

	Detail Steps/Work Items	Key Items/References
(14)	Release the control cable from the support bracket at the control assembly: – Remove the rear adjusting-nut and washer from the cable outer-sheath. – Move the cable forward and clear of the support bracket. – Remove the front adjusting-nut and washer from the cable outer-sheath.	Make a note of the cable adjustment!
(15)	Pull the control cable through the firewall, from the engine-bay side, and clear of the airplane.	

B. Install the Throttle Bowden Cable

	Detail Steps/Work Items	Key Items/References
(1)	Put the throttle Bowden cable through the firewall.	Refer to Figure 2.
(2)	Put the throttle Bowden cable through the bracket at the engine control assembly: – Install the 2 nuts which hold the Bowden cable to the bracket.	
	WARNING: IF YOU DO AN ADJUSTMENT OF A CONTROL CABLE YOU MUST MAKE SURE THAT THE CONTROL CABLE IS IN SAFETY. IF YOU DO NOT DO THIS, THE CONTROL CABLE CAN DISCONNECT. THIS CAN CAUSE DEATH OR INJURY TO PERSONS.	
(3)	Install the eye end onto the Bowden cable at the engine control assembly in the cockpit.	Use a piece of lock-wire to make sure that the eye-end has been installed correctly.
(4)	Install the eye end to the throttle control lever in the cockpit: – Install the bolt, two washers and the nut.	Refer to Figure 2. Torque to 1.6 Nm (1.2 lbf.ft.).
(5)	Install the engine control assembly: – Do a check for loose articles. – Move the engine control assembly into position in the center console. – Loosely attach the knob for the throttle friction adjuster. – Install the four cross head screws which attach the lower-cover-plate to the center console. – Install the two hex-headed bolts which attach the upper-cover-plate to the center console.	Specially in the center console. Make sure all the control cables take up the correct position.

	Detail Steps/Work Items	Key Items/References
(6)	Install the knob on the fuel selector valve: – Move the cover plate into position over the selector valve. – Push the selector knob onto the valve shaft. – Install the cross-head screw which attaches the knob to the shaft.	
(7)	Put the Bowden cable through the bracket at the carburetor: – Install the two nuts which hold the Bowden cable to the bracket.	
(8)	Install the eye end to the Bowden cable at the engine.	Use a piece of lock-wire to make sure that the eye-end has been installed correctly.
(9)	Install the eye end to the carburetor throttle lever: – Put the bolt through the throttle lever form the injector side. – Install a washer on the bolt. – Put the eye end on the bolt. – Install a second washer on the bolt. – Attach the nut to the bolt. Tighten the assembly.	Torque 1.6 Nm (1.2 lbf.ft.).

	Detail Steps/Work Items	Key Items/References
(10)	Install the feed-thru to the engine side of the firewall with firewall sealant: – Put the 2 parts of the feed-thru round the Bowden cable. – Push the feed-thru in the firewall. – Put the 2 shields in position over the feed-thru. – Install 2 pop-rivets to attach the shields to the firewall.	Use PR 812 (MIL-S-38249 Type 1) firewall sealant.
(11)	Do a test for correct range, full and free movement of the throttle control system.	Refer to the Throttle Control Range of Movement Test in this Section.
(12)	Do an inspection of the control connections which you disconnected. If necessary for your Airworthiness Authority, do a second inspection of the controls.	
(13)	Do a check for loose items in the cockpit.	For example: Tools. Look specially in the area of the engine control assembly.
(14)	Test all the engine control levers for freedom of movement.	
(15)	Connect the spark plug cables to the spark plugs.	Torque to 12.4 - 13.6 Nm (110 - 120 lbf.in.).
(16)	Connect the airplane battery.	Refer to Section 24-31.
(17)	Install the engine cowlings.	Refer to Section 71-12.
(18)	Do an engine run-up.	Refer to the DA 40 F Airplane Flight Manual

3. Remove/Install the Mixture Bowden Cable

A. Remove the Mixture Bowden Cable

	Detail Steps/Work Items	Key Items/References
	WARNING: DO NOT STAND WITHIN THE DANGER AREA OF THE PROPELLER IF THE ENGINE STARTS, THE PROPELLER CAN CAUSE DEATH OR INJURY TO PERSONS. **WARNING: MAKE SURE THAT THE ENGINE IS SAFE BEFORE YOU DO WORK ON THE ENGINE CONTROLS. IF THE PROPELLER TURNS IT CAN CAUSE INJURY TO PERSONS.**	
(1)	Make sure that the engine is safe: – Set the ignition switch to OFF. – Set the throttle control lever to IDLE. – Set the mixture control lever to LEAN CUT-OFF.	
(2)	Remove the engine cowlings.	Refer to Section 71-12.
(3)	Disconnect the battery.	Refer to Section 24-31.
(4)	Disconnect the spark plug cables from the spark plugs.	
(5)	Disconnect the eye-end at the engine mixture control lever in the engine bay: – Remove the nut and washer from the long bolt at the mixture lever. – Remove the mixture Bowden cable eye end. – Remove the spacer and the long bolt.	Refer to Figure 3.
(6)	Remove the eye end from the Bowden cable: – Release the lock-nut. – Remove the eye end fitting and the lock-nut from the cable.	

	Detail Steps/Work Items	Key Items/References
(7)	Remove the Bowden cable from the engine controls bracket at the carburetor: – Remove the bottom adjustment nut from the Bowden cable. – Move the Bowden cable clear of the bracket. – Remove the top adjustment nut from the Bowden cable.	Make a note of the cable adjustment!
(8)	Cut the cable binders which hold the cable to the engine mount.	
(9)	Remove the spiral wrap which protects the cable aft of the engine.	
(10)	Remove the feed-thru from the engine side of the firewall: – Remove the fire resistant sealant from where the cable goes through the firewall. – Remove the two rivets that attach the split shields to the firewall. – Remove the split-shields. – Move the two halves of the split-bush forward and clear of the cable.	
(11)	Remove the knob from the fuel selector valve: – Remove the cross-head screw from the center of the control-knob and pull the knob up and off the fuel selector valve. – Remove the mounting plate.	

	Detail Steps/Work Items	Key Items/References
(12)	Release the engine control assembly: – Loosen the throttle friction adjuster until the adjuster is disconnected from the shaft. – Remove the four cross-head screws which attach the engine control lower-cover-plate to the engine control assembly. – Remove the two hex-headed bolts from the top of the upper-cover plate. – Lift and support the engine control assembly clear of the center console.	Pull and hold the throttle friction adjuster clear. Make sure you do not pull on the control cables.
(13)	Disconnect the cable wire end of the mixture control cable from the mixture control lever in the cockpit: – Release the screw which holds the wire end in the swivel fitting.	
(14)	Release the mixture control cable from the support bracket at the engine control assembly in the cockpit: – Remove the rear adjustment nut from the Bowden cable outer sheath. – Pull the Bowden cable clear of the support bracket. – Remove the front adjusting nut from the Bowden cable.	
(15)	Pull the mixture cable through the firewall from the engine bay side and clear of the airplane.	

B. Install the Mixture Bowden Cable

	Detail Steps/Work Items	Key Items/References
(1)	Put the mixture Bowden cable through the firewall.	Refer to Figure 3.
(2)	Put the mixture Bowden cable through the support bracket at the engine control assembly in the cockpit: – Install the front adjusting nut to the Bowden cable outer-sheath. – Put the mixture Bowden cable in position through the support bracket. – Install the rear-adjusting nut onto the Bowden cable outer-sheath.	
(3)	Install the cable wire end into the swivel fitting at the mixture control lever in the cockpit: – Push the cable wire-end through the hole in the swivel fitting. – Tighten the attachment screw of the swivel fitting.	Make sure that the wire-end goes all the way through the swivel fitting.
(4)	Install the engine control assembly: – Do a check for loose articles. – Move the engine control assembly into position in the center console. – Loosely attach the knob for the throttle friction adjuster. – Install the four cross head screws which attach the lower-cover-plate to the center console. – Install the two hex-headed bolts which attach the upper-cover-plate to the center console.	Specially in the center console. Make sure all the control cables take up the correct position.

	Detail Steps/Work Items	Key Items/References
(5)	Install the knob on the fuel selector valve: – Move the cover plate into position over the selector valve. – Push the selector knob onto the valve shaft. – Install the cross-head screw which attaches the knob to the shaft.	
(6)	Install the Bowden cable to the engine controls bracket at the carburetor: – Install the top adjustment nut to the Bowden cable outer sheath. – Put the mixture Bowden cable in position in the bracket. – Install the bottom adjustment nut to the Bowden cable outer sheath.	
(7)	Install the eye end to the Bowden cable at the engine: – Install the lock-nut. – Install the eye end. – Tighten the lock-nut to the eye end.	Use a piece of lock-wire to make sure that the eye end has been installed correctly.
(8)	Install the eye end to the mixture lever at the at the carburetor: – Put the long bolt through the control lever. – Put the spacer onto the long bolt. – Put the eye end onto the long bolt. – Put a washer onto the bolt. – Attach the nut to the bolt. Tighten the assembly.	From the carburetor side.

	Detail Steps/Work Items	Key Items/References
(9)	Install the feed-thru to the engine side of the firewall with firewall sealant: – Put the 2 parts of the feed-thru round the Bowden cable. – Push the feed-thru in the firewall. – Put the 2 shields in position over the feed-thru. – Install 2 pop-rivets to attach the shields to the firewall.	Use PR 812 (MIL-S-38249 Type 1) firewall sealant or equivalent.
(10)	Do a test for correct range, full and free movement of the mixture control system.	Refer to the Mixture Control Range of Movement Test in this Chapter.
(11)	Do an inspection of the control connections which you disconnected. If necessary for your Airworthiness Authority, do a second inspection of the mixture control assembly.	
(12)	Do a check for loose items in the cockpit. Specially in the area of the engine control assembly.	
(13)	Do an engine controls freedom of movement check.	
(14)	Connect the spark plug cables to the spark plugs.	Torque to 12.4 - 13.6 Nm (110 - 120 lbf.in.).
(15)	Connect the airplane battery.	Refer to Section 24-31.
(16)	Install the engine cowlings.	Refer to Section 71-12.
(17)	Do an engine run-up.	Refer to the DA 40 F Airplane Flight Manual.

4. Throttle/Mixture Control Range of Movement Test

These procedures tell you how to do a throttle and mixture control range of movement test. They do not tell you how to adjust the engine fuel control units. Refer to the Lycoming Maintenance Manual for data on the engine fuel control units.

Do the throttle/mixture control range of movement test using two persons. You must make sure that the throttle/mixture control levers hit the stops in the throttle/mixture valve before they hit their stops in the engine control assembly. This will make sure that the throttle/mixture controls have the correct range of movement. You should set the controls to 3 mm (0.125 in) clearance (bounce) at the engine control assembly cover plate.

A. Throttle Control Range of Movement Test

	Detail Steps/Work Items	Key Items/References
	WARNING: DO NOT STAND WITHIN THE DANGER AREA OF THE PROPELLER IF THE ENGINE STARTS, THE PROPELLER CAN CAUSE DEATH OR INJURY TO PERSONS. **WARNING: MAKE SURE THAT THE ENGINE IS SAFE BEFORE YOU DO WORK ON THE ENGINE CONTROLS. IF THE PROPELLER TURNS IT CAN CAUSE INJURY TO PERSONS.**	
(1)	Make sure that the engine is safe: – Set the ignition switch to OFF. – Set the throttle to IDLE. – Set the mixture control to LEAN CUT-OFF	
(2)	Remove the engine cowlings.	Refer to Section 71-12.
(3)	Disconnect the airplane battery.	Refer to Section 24-31.
(4)	Disconnect the spark plug cables from the spark plugs.	
(5)	Move the throttle control lever between IDLE and FULL: – Make sure the lever moves freely with no restrictions.	

	Detail Steps/Work Items	Key Items/References
(6)	Set the throttle control lever to FULL and hold it in position: – Make sure that the throttle lever at the carburetor hits the stop. If necessary, adjust the Bowden cable outer sheath at the support bracket at the bottom of the engine.	With the throttle lever on the stop at the carburetor, there must be at least 3 mm (0.125 in) clearance (bounce) between the lever in the engine control assembly and the cover plate.
(7)	Set the throttle control lever to IDLE and hold it in position: – Make sure that the throttle lever at the carburetor hits the IDLE stop. If necessary, adjust the Bowden cable outer sheath at the engine controls bracket at carburetor.	With the throttle lever on the IDLE stop at the carburetor, there must be at least 3 mm (0.125 in) clearance (bounce) between the lever in the engine control assembly and the cover plate.
(8)	Move the throttle control lever between IDLE and FULL: – Make sure that the lever moves freely with no restriction.	
(9)	Do items 6 to 8 again as necessary to get the correct values.	
(10)	Do an inspection of the control connections which you disconnected. If necessary for your Airworthiness Authority, do a second inspection of the controls.	
(11)	Install the cables to the spark plugs.	Torque to 12.4 to 13.6 Nm (110 - 120 lbf.in.).
(12)	Connect the airplane battery.	Refer to Section 24-31.
(13)	Install the engine cowlings.	Refer to Section 71-12.
(14)	Do an engine test.	Refer to the DA 40 F Airplane Flight Manual.

B. Mixture Control Range of Movement Test

	Detail Steps/Work Items	Key Items/References
	WARNING: DO NOT STAND WITHIN THE DANGER AREA OF THE PROPELLER IF THE ENGINE STARTS, THE PROPELLER CAN CAUSE DEATH OR INJURY TO PERSONS. **WARNING: MAKE SURE THAT THE ENGINE IS SAFE BEFORE YOU DO WORK ON THE ENGINE CONTROLS. IF THE PROPELLER TURNS IT CAN CAUSE INJURY TO PERSONS.**	
(1)	Make sure that the engine is safe: – Set the ignition switch to OFF. – Set the throttle to IDLE. – Set the mixture control to LEAN CUT-OFF	
(2)	Remove the engine cowlings.	Refer to Section 71-12.
(3)	Disconnect the airplane battery.	Refer to Section 24-31.
(4)	Disconnect the spark plug cables from the spark plugs.	
(5)	Move the mixture control lever between RICH and LEAN CUT-OFF. – Make sure the lever moves freely with no restrictions.	
(6)	Set the mixture control lever to RICH and hold it in position. – Make sure that the mixture lever at the carburetor hits the stop. If necessary, adjust the Bowden cable outer sheath at the support bracket at the bottom of the engine.	With the mixture lever on the stop at the carburetor, there must be at least 3 mm (0.125 in) clearance (bounce) between the lever in the engine control assembly and the cover plate.

	Detail Steps/Work Items	Key Items/References
(7)	Set the throttle control lever to LEAN CUT-OFF and hold it in position: – Make sure that the mixture lever at the injector hits the CUT-OFF stop. If necessary, adjust the Bowden cable outer sheath at the engine controls bracket at the carburetor.	With the mixture lever on the LEAN CUT-OFF stop at the injector, there must be at least 3 mm (0.125 in) clearance (bounce) between the lever in the engine control assembly and the cover plate.
(8)	Move the mixture control lever between RICH and LEAN CUT-OFF: – Make sure that the lever moves freely with no restriction.	
(9)	Do items 6 to 8 again as necessary to get the correct values.	
(10)	Do an inspection of the control connections which you disconnected. If necessary for your Airworthiness Authority, do a second inspection of the controls.	
(11)	Install the cables to the spark plugs.	Torque to 12.4 to 13.6 Nm (110 - 120 lbf.in.).
(12)	Connect the airplane battery.	Refer to Section 24-31.
(13)	Install the engine cowlings.	Refer to Section 71-12.
(14)	Do an engine test.	Refer to the DA 40 F Airplane Flight Manual.

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CHAPTER 77

ENGINE INDICATING

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CHAPTER 77
ENGINE INDICATING

Section 77-00
Engine Indicating - Lycoming Engine

1. General

This Section tells you about the engine indicating system for airplanes with the Lycoming engine installed. The DA 40 and DA 40 F have an integrated engine instrument which gives engine indications in a single display unit. The DA 40 and DA 40 F also have an annunciator panel which has warning lights for low oil pressure and low fuel pressure. The transducers that provide the signals for the warning lights on the annunciator panel are installed in parallel with the fuel pressure and oil pressure transducers of the integrated engine display system. The Maintenance Practices for the annunciator panel transducers are similar to those of the integrated engine instrument.

Refer to the VM 1000 Owner's Manual for more data on the detailed operation and setting of the VM 1000 Integrated Engine Instrument. Refer to Chapter 92 for the Wiring Diagrams for all the electrical transducers and to Section 77-40 for the related Maintenance Practices.

The display system also has these other indicators for non-engine airplane systems:

– Fuel quantity.

– Electrical ammeter.

– Voltmeter.

Section 77-40 (DA 40) and Section 77-42 (DA 40 F) tell you about the engine indications. For more data on the indicator system refer to the equipment manufacturer's manual.

Refer to Section 28-40 for more data on the fuel quantity indicating system and refer to Section 24-30 for more data on the electrical current indicating system.

Note: Equipment which is certified for installation in the DA 40 and DA 40 F is listed in Section 6.5 of the Airplane Flight Manual. Such equipment may be installed in accordance with the Airplane Maintenance Manual.

Any equipment which is not listed in Section 6.5 of the Airplane Flight Manual is called "Additional Equipment". The installation of Additional Equipment is a modification which must be handled in accordance with national regulations or a Service Bulletin.

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Section 77-01
Engine Instrumentation - TAE 125 Diesel Engine

1. General

This Section tells you about the engine indicating system for airplanes with the TAE 125 Diesel engine installed. Two instruments located in the right side of the instrument panel show all engine related indications.

The engine control unit (ECU) provides most of the indications for the engine. Refer to Section 76-01 for data about the engine fuel control system. The engine instrumentation also shows airframe fuel system data. Refer to Section 28-41 for data about the airframe parts of the system.

2. Description and Operation

Two instruments give all of the engine indications. The instruments are located in the right side of the instrument panel. Each instrument has a combination of digital and analogue displays.

The top instrument is the Compact Engine Display (CED). It shows RPM, oil pressure, temperatures and load.

The bottom instrument is the Auxiliary Engine Display (AED). It shows fuel quantity, flow and temperature. It also shows the electrical system current and voltage.

Refer to Section 77-41 for data about the system.

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Section 77-02
Engine Instrumentation - TAE 125 Diesel Engine with the Garmin G1000 System Installed

1. General

This Section tells you about the engine indicating system for airplanes with the TAE 125 Diesel engine and the Garmin G1000 system installed. An integrated cockpit system (ICS) with two large display screens located in the instrument panel show all engine related indications.

The engine control unit (ECU) provides most of the indications for the engine. Refer to Section 76-01 for data about the engine fuel control system. The Garmin G1000 system also shows airframe fuel system data. Refer to Section 28-41 for data about the airframe parts of the system.

2. Description and Operation

The ICS gives all engine indications. The ICS displays are located in the left and right sides of the instrument panel. Each display has a combination of digital and analogue displays.

Either display can show all the engine indications. Refer to Section 77-43 for more data about the system sensors. Refer to Section 31-42 for more data about the ICS.

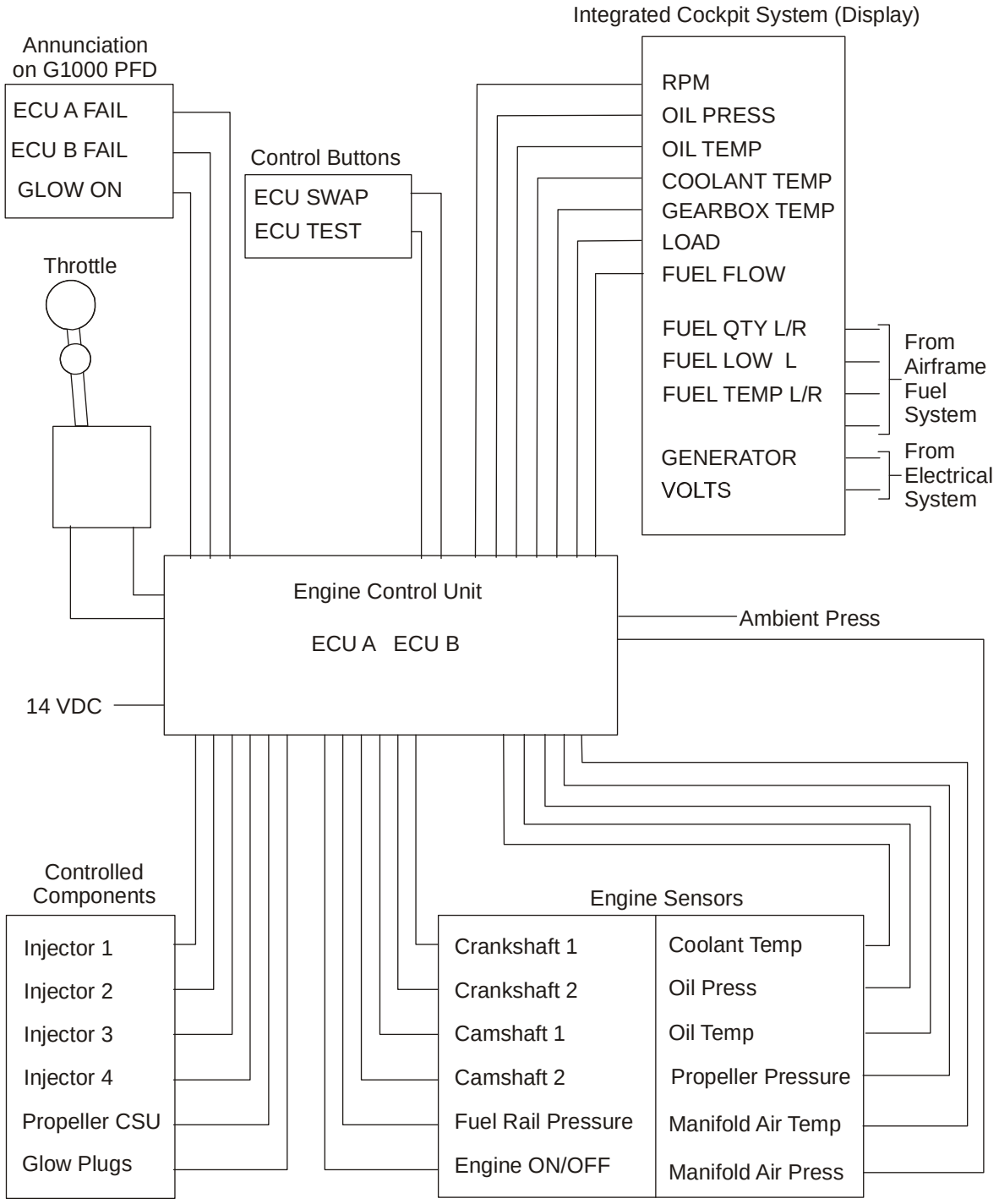


Figure 1: Engine Control and Indication Schematic Diagram

Section 77-40
Integrated Engine Indication - Lycoming IO-360-M1A Engine

1. General

The DA 40 has an integrated engine-indication system. The integrated engine instrument (VM 1000) shows all the engine indications on a single display screen.

Figure 1 shows the location of the integrated engine instrument.

2. Description/Operation

A. Integrated Engine Instrument

Figure 1 shows the VM 1000 integrated engine instrument. It is located in the instrument panel, see Section 31-10.

Sensors/probes and transducers send electrical signals to a data processing unit (DPU). The DPU sends the data to the VM 1000 to give a display. The VM 1000 display has these indications:

– RPM.

– Oil temperature.

– Fuel flow.

– Cylinder head temperature (CHT) for all four cylinders.

– Exhaust gas temperature (EGT) for all four exhaust down-pipes.

– Oil pressure.

– Fuel pressure.

– Manifold pressure.

– Main bus voltage.

– Alternator output amperage.

You cannot repair the integrated engine instrument.

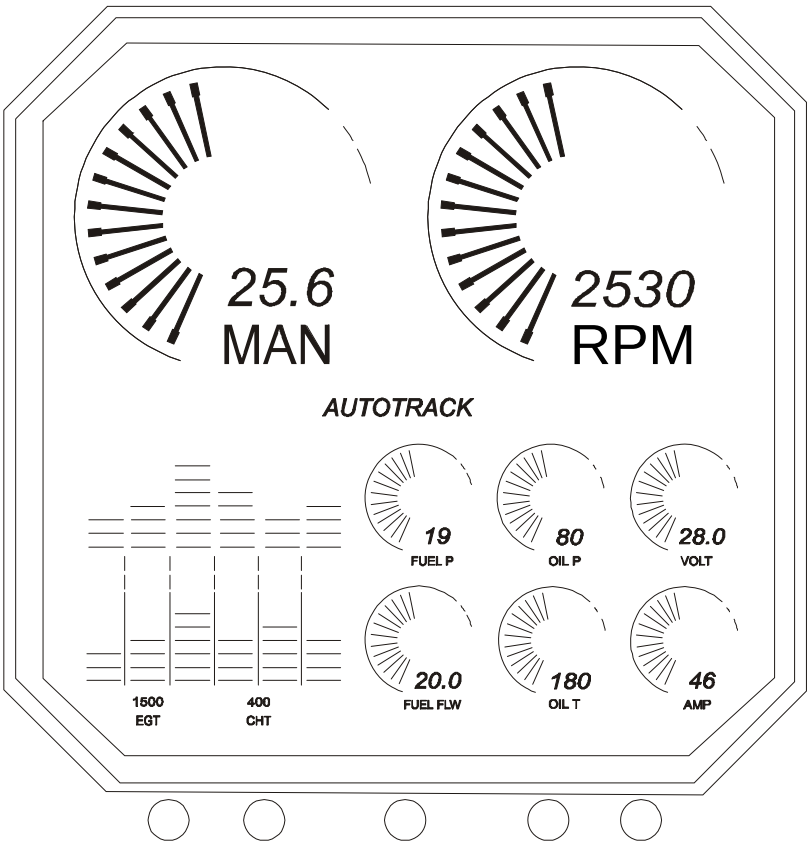


Figure 1: VM 1000 Integrated Engine Instrument

B. Transducers and Sensors

The engine indicating system uses these transducers/sensors:

– RPM sensor. The RPM sensor is mounted to the right magneto. You can replace the RPM sensor.

– Oil temperature sensor. The oil temperature sensor attaches to a special mounting on the rear accessory housing. You can replace the oil temperature sensor.

– Fuel flow sensor. The fuel flow sensor is located in the fuel supply hose to the fuel injector. You can replace the fuel flow sensor.

– Cylinder head temperature (CHT) sensor. The engine has a CHT probe attached to the bottom of each cylinder head. You can replace the CHT probe.

– Exhaust gas temperature (EGT) sensor. The engine has an EGT probe attached to the exhaust down-pipe from each cylinder head. You can replace the EGT probe.

– Oil pressure transducer. A P-clamp attaches the oil pressure transducer to the engine mounting frame on the right-top side. A flexible hose connects the transducer to a connection in the engine oil system near the oil-pressure-relief-valve. You can replace the oil pressure transducer.

– Fuel pressure transducer. The fuel pressure transducer is in the fuel supply hose to the fuel injector. You can replace the fuel pressure transducer.

– Manifold pressure transducer. A P-clamp attaches the manifold pressure transducer to the engine-mounting-frame, on the top-left side. A flexible hose connects cylinder No. 4 to the manifold pressure transducer. When the LASAR control unit is installed, then a Tee-piece is installed in the flexible hose. Another flexible hose connects the Tee-piece to the LASAR control unit. You can replace the manifold pressure transducer.

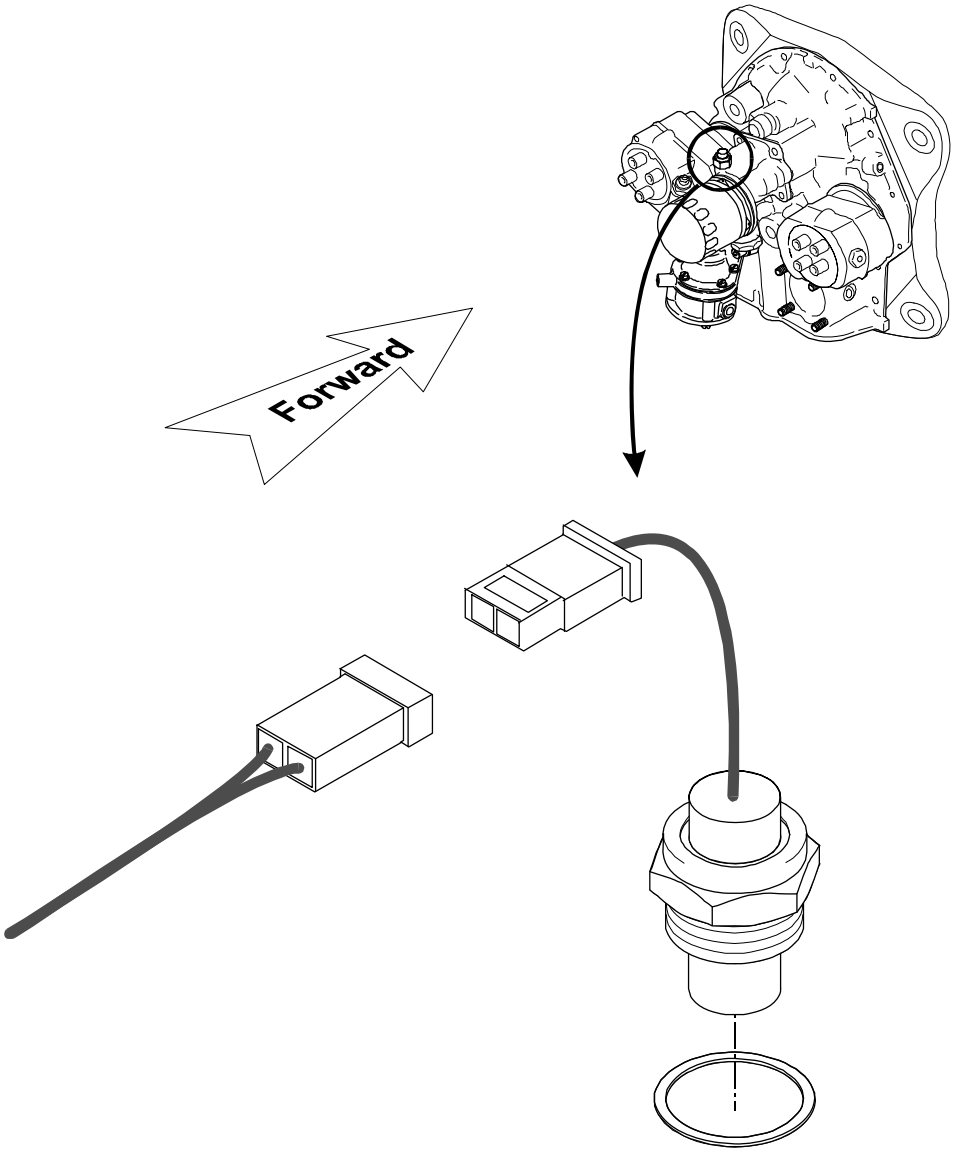


Figure 2: Replace the Oil Temperature Sensor

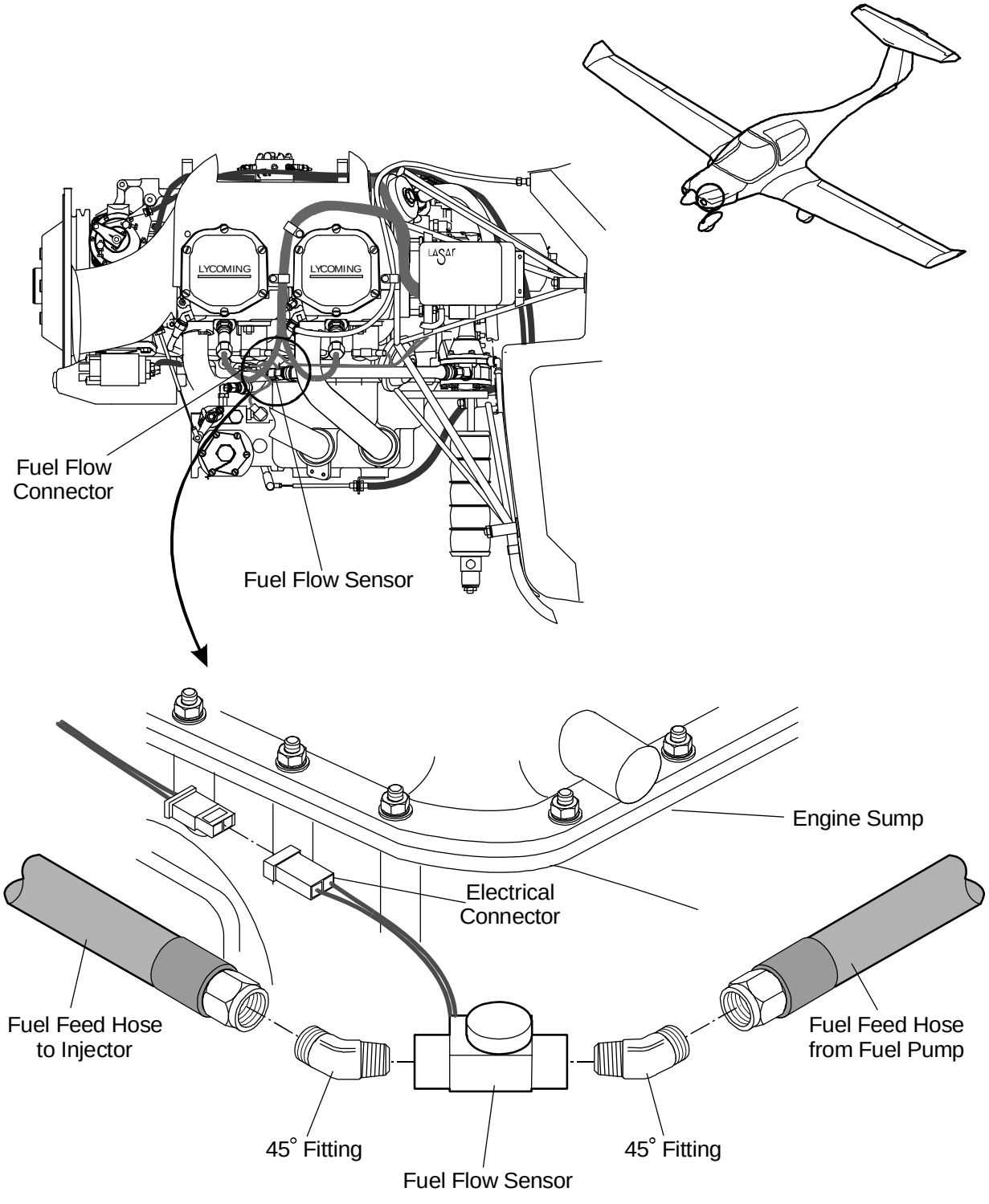


Figure 3: Fuel Flow Sensor Installation

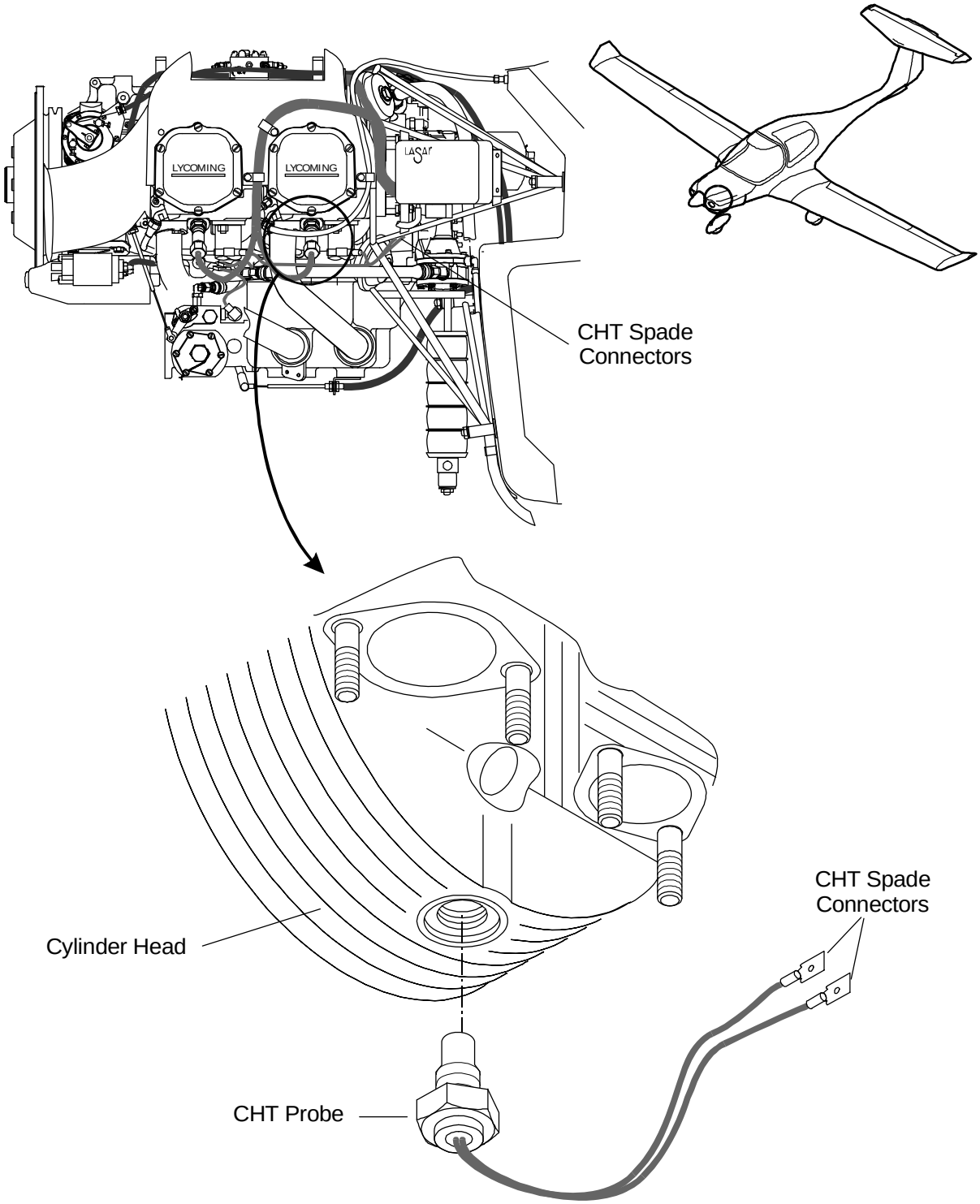


Figure 4: CHT Probe Installation

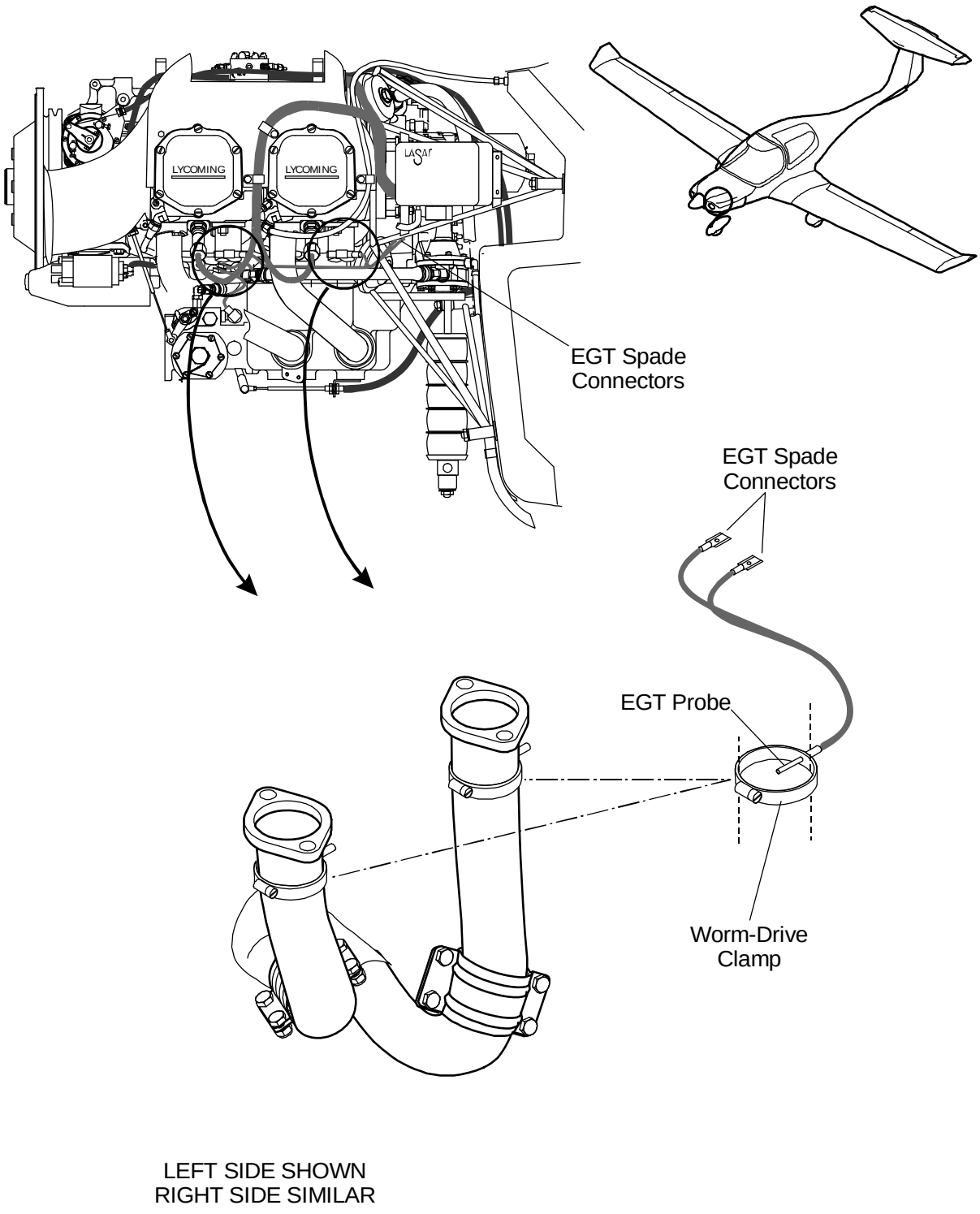


Figure 5: EGT Probe Installation

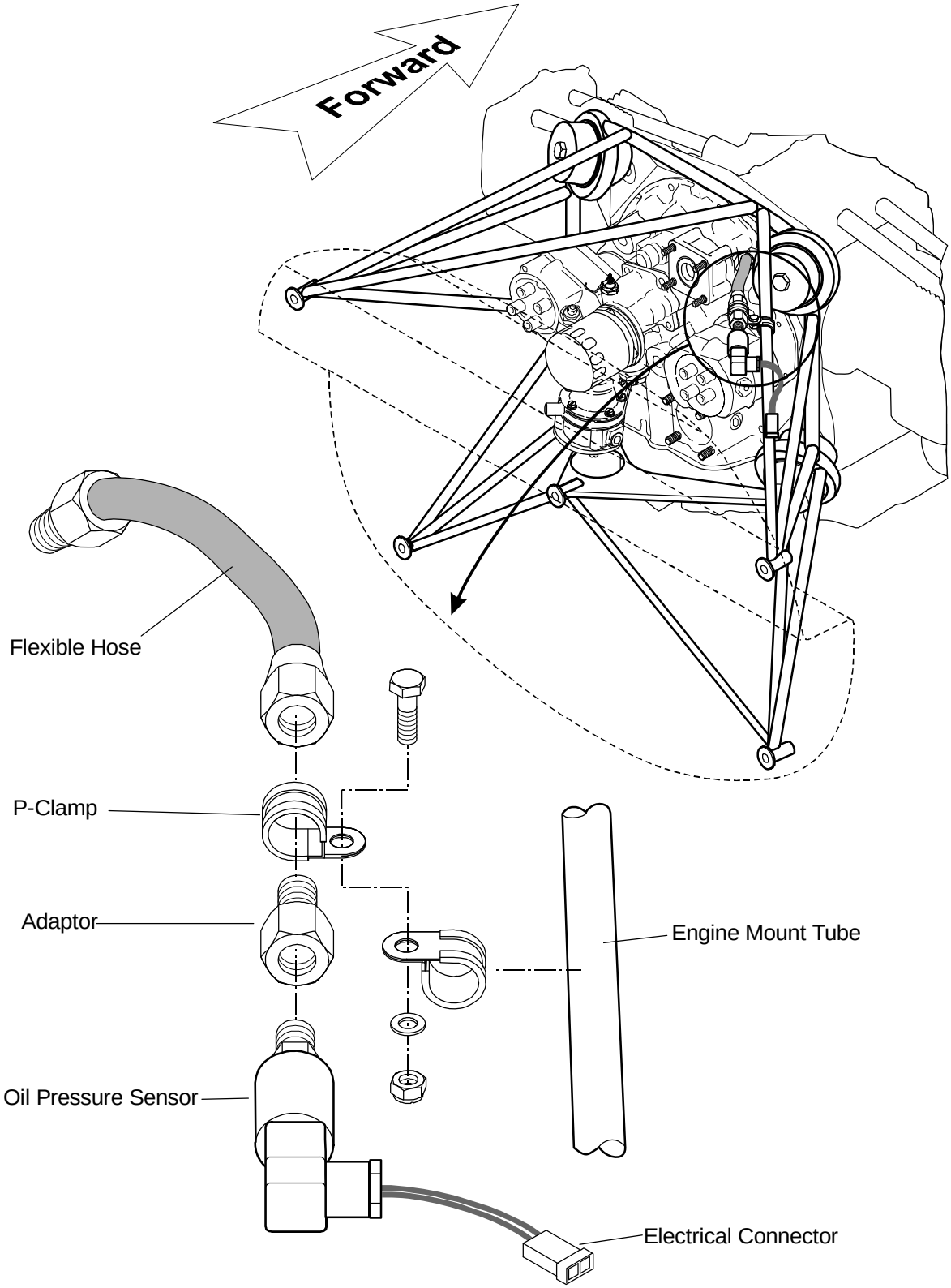


Figure 6: Oil Pressure Sensor Installation

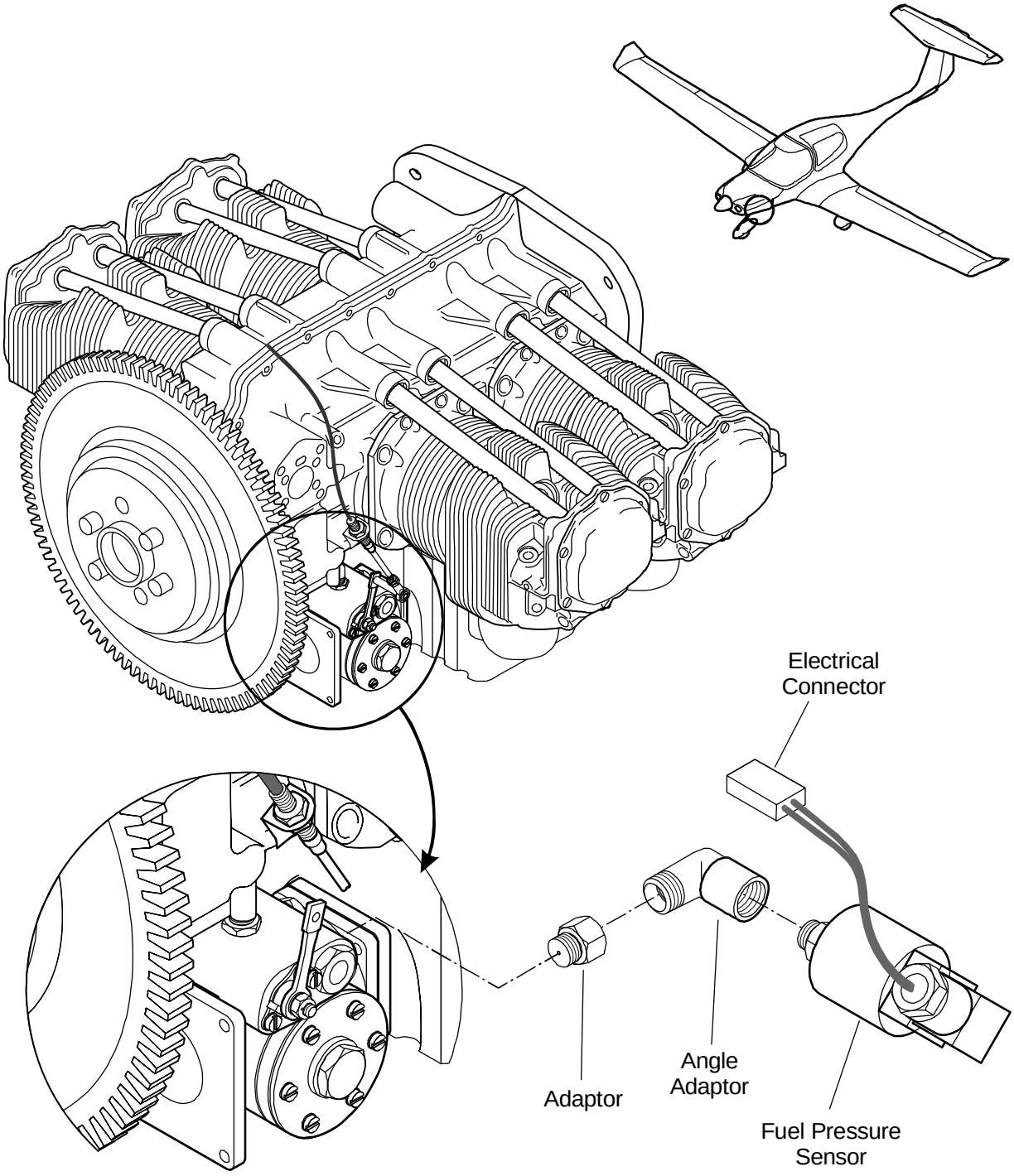


Figure 7: Fuel Pressure Probe Installation

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Trouble-Shooting

1. General

The table below lists the defects you could have with the integrated-engine-indication system. For more data on the system refer to the equipment manufacturer's manual.

If you have the trouble detailed in the Trouble column read across to the Possible Cause column. Then do the repair given in the Repair column.

Trouble	Possible Cause	Repair
No indication on any of the indicators with the engine operating or with the ALT/BAT switch set to ON.	No 24 volt supply to the integrated-engine-indication system.	Make sure that the circuit-breaker for the engine instruments is set. Do a voltage test for 24 volts at pin 13 of connector J4 or pin 20 and 23 of connector P1 at the system data processing unit.
	Integrated-engine-indicator system indicator-panel inoperative.	If there is a 24 volt supply to the system then replace the indicator panel.
One of the indicators does not indicate correctly.	Sensor/transducer defective.	Do a test for continuity of the cables for the relevant sensor. If the cables are serviceable, then replace the sensor. Refer to Chapter 92 for the Wiring Diagrams.

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Maintenance Practices

1. General

These Maintenance Practices tell you how to replace the integrated-engine-instrument panel. It also tells you how to replace the sensors and transducers for the engine indicators.

2. Remove/Install the Indicator Panel

A. Remove the Indicator Panel

	Detail Steps/Work Items	Key Items/References
	WARNING: MAKE SURE THE ENGINE IS SAFE BEFORE YOU DO ANY WORK ON IT. IF THE ENGINE STARTS THE PROPELLER CAN CAUSE INJURY OR DEATH.	
(1)	Make sure that the engine is safe: – The ignition switch is set to OFF. – The ALT/BAT switch is set to OFF. – The throttle is set to IDLE. – The mixture control is set to LEAN CUT-OFF.	
(2)	Remove the engine cowlings.	Refer to Section 71-10.
(3)	Disconnect the airplane battery.	Refer to Section 24-31.
(4)	Remove the instrument panel cover.	Refer to Section 25-10.
(5)	Disconnect the electrical connector from the display unit.	At the rear of the display unit.
(6)	Remove the 4 screws which attach the display unit to the instrument panel.	From the front of the instrument panel. Hold the display unit!
(7)	Move the display unit forward and clear of the instrument panel, then clear of the airplane.	

B. Install the Indicator Panel

	Detail Steps/Work Items	Key Items/References
(1)	Put the indicator panel in position in the instrument panel.	From the rear of the panel. Take care to correctly locate the mode buttons at the bottom of the indicator panel correctly.
(2)	Connect the electrical connector to the rear of the indicator panel.	
(3)	Install instrument panel cover.	Refer to Section 25-10.
(4)	Connect the airplane battery.	Refer to Section 24-31.
(5)	Install the engine cowlings.	Refer to Section 71-10.
(6)	Do a test of the indicator panel: – Set the ALT/BAT switch to ON. – Set the ALT/BAT switch to OFF.	The indicators must give the correct indications.
(7)	Do an engine ground run-up and monitor the engine indicator gauge indications.	Refer to the DA 40 Airplane Flight Manual. The indicators must give the relevant indications.

3. Replace an Engine Indicator Gauge Sensor/Transducer

A. Replace the Oil Temperature Sensor

	Detail Steps/Work Items	Key Items/References
	WARNING: MAKE SURE THE ENGINE IS SAFE BEFORE YOU DO ANY WORK ON IT. IF THE ENGINE STARTS THE PROPELLER CAN CAUSE INJURY OR DEATH.	
(1)	Make sure that the engine is safe: – The ignition switch is set to OFF. – Set the ALT/BAT switch to OFF. – The throttle is set to IDLE. – The mixture control is set to LEAN CUT-OFF.	
(2)	Remove the engine top-cowling.	Refer to Section 71-10.
(3)	Disconnect the airplane battery.	Refer to Section 24-31.
(4)	Disconnect the electrical cables from the temperature sensor: – Remove the nut and washer from the electrical connector. – Remove the cable eye-end from the connector.	
	WARNING: DO NOT GET OIL ON YOU. OIL CAN CAUSE SKIN DISEASE.	
(5)	Replace the oil temperature sensor: – Remove the sensor. – Remove and discard the O-ring seal. – Install a new O-ring seal. – Install a new sensor.	On the engine accessory housing.

	Detail Steps/Work Items	Key Items/References
(6)	Connect the electrical cable to the sensor: – Put the electrical cable eye-end in position on the connector. – Install the washer and nut onto the electrical connector.	
(7)	Connect the airplane battery.	Refer to Section 24-31.
(8)	Install the engine cowlings.	Refer to Section 71-10.
(9)	Do a test of the engine oil temperature indicating system: – Monitor the oil temperature indication. – Set the ALT/BAT switch to ON. – Do an engine ground run-up. – Shut the engine down.	The indicator must show the likely ambient temperature of the oil. Refer to the DA 40 Airplane Flight Manual. The oil temperature indicator must show the relevant temperature of the oil.
(10)	Look for oil leaks from the sensor: – Remove the engine top-cowling. – Look for oil leaks from the sensor. – Install the engine top-cowling.	

B. Replace the Fuel Flow Sensor

	Detail Steps/Work Items	Key Items/References
	WARNING: MAKE SURE THE ENGINE IS SAFE BEFORE YOU DO ANY WORK ON IT. IF THE ENGINE STARTS THE PROPELLER CAN CAUSE INJURY OR DEATH.	
(1)	Make sure that the engine is safe: – The ignition switch is set to OFF. – Set the ALT/BAT switch to OFF. – The throttle is set to IDLE. – The mixture control is set to LEAN CUT-OFF. – Set the fuel shut-off to SHUT-OFF.	
(2)	Remove the engine cowlings.	Refer to Section 71-10.
(3)	Disconnect the airplane battery.	Refer to Section 24-31.
(4)	Disconnect the electrical connector from the sensor.	Refer to Figure 3.
	WARNING: DO NOT GET FUEL ON YOU. FUEL CAN CAUSE SKIN DISEASE. **WARNING: DO NOT ALLOW FIRE NEAR FUEL. FUEL BURNS AND CAN CAUSE INJURY TO PERSONS AND DAMAGE TO EQUIPMENT.**	

	Detail Steps/Work Items	Key Items/References
(5)	Replace the fuel flow sensor: – Disconnect the fuel hose from the inlet side of the fuel flow sensor. – Disconnect the fuel hose from the outlet side of the fuel flow sensor. – Remove the 2 bolts and washers that attach the fuel flow sensor to the mounting bracket Move the fuel flow sensor clear of the airplane. – Put the new fuel flow sensor into position on the bracket and install the bolts and washers that attach the sensor to the bracket. – Connect the fuel hose to the outlet side of the fuel flow sensor. – Connect the fuel hose to the inlet side of the fuel flow sensor.	Use a suitable container to collect spilt fuel. Put a cap on open connections.
(6)	Connect the electrical cables to the fuel flow sensor: – Connect the plug.	
(7)	Connect the airplane battery.	Refer to Section 24-31.
(8)	Look for fuel leaks from the sensor: – Set the ALT/BAT switch to ON. – Set fuel pump switch to ON. – Look for fuel leaks, specially in the area of the fuel flow sensor. – Set fuel pump switch to OFF. – Set the ALT/BAT switch to OFF.	
(9)	Install the engine cowlings.	Refer to Section 71-10.

	Detail Steps/Work Items	Key Items/References
(10)	Do a test of the fuel flow indicating system:	
	– Monitor the fuel flow indicator.	
	– Set the ALT/BAT switch to ON.	The indicator must read zero.
	– Do an engine ground run-up.	Refer to the DA 40 Airplane Flight Manual. The indicator must show the relevant fuel flow.
	– Shut down the engine.	

C. Replace the Cylinder Head Temperature (CHT) Probe

	Detail Steps/Work Items	Key Items/References
	WARNING: MAKE SURE THE ENGINE IS SAFE BEFORE YOU DO ANY WORK ON IT. IF THE ENGINE STARTS THE PROPELLER CAN CAUSE INJURY OR DEATH.	
(1)	Make sure that the engine is safe: – The ignition switch is set to OFF. – Set the ALT/BAT switch to OFF. – The throttle is set to IDLE. – The mixture control is set to LEAN CUT-OFF.	
(2)	Remove the engine top-cowling.	Refer to Section 71-10.
(3)	Disconnect the airplane battery.	Refer to Section 24-31.
(4)	Disconnect the electrical cables from the temperature probe.	Refer to Figure 4. At the in-line connector.
(5)	Replace the CHT probe: – Unscrew the probe from the cylinder head. – Move the probe clear of the airplane. – Install the new probe.	
(6)	Connect the electrical cables to the probe.	At the in-line connector.
(7)	Connect the airplane battery.	Refer to Section 24-31.
(8)	Install the engine cowlings.	Refer to Section 71-10.
(9)	Do a test of the CHT indicating system: – Monitor the CHT indicator. – Set the ALT/BAT switch to ON. – Do a ground run-up of the engine.	 The indicator must show zero. The indicator must show the ambient temperature of the cylinder head. Refer to the DA 40 Airplane Flight Manual. The CHT indicator must show the relevant temperature.

D. Replace an Exhaust Gas Temperature (EGT) Probe

	Detail Steps/Work Items	Key Items/References
	WARNING: MAKE SURE THE ENGINE IS SAFE BEFORE YOU DO ANY WORK ON IT. IF THE ENGINE STARTS THE PROPELLER CAN CAUSE INJURY OR DEATH.	
(1)	Make sure that the engine is safe: – The ignition switch is set to OFF. – Set the ALT/BAT switch to OFF. – The throttle is set to IDLE. – The mixture control is set to LEAN CUT-OFF.	
(2)	Remove the engine cowlings.	Refer to Section 71-10.
(3)	Disconnect the airplane battery.	Refer to Section 24-31.
(4)	Disconnect the electrical cables from the EGT probe.	Refer to Figure 5. At the in-line connector.
(5)	Replace the EGT probe: – Release the worm drive clamp which holds the EGT probe in position. – Replace the EGT probe. – Install the worm drive clamp which holds the EGT probe.	
(6)	Connect the electrical cables to the EGT probe.	At the in-line connector.
(7)	Connect the airplane battery.	Refer to Section 24-31.
(8)	Install the engine cowlings.	Refer to Section 71-10.

	Detail Steps/Work Items	Key Items/References
(9)	Do a test of the EGT indicating system:	
	– Monitor the EGT indicator.	The indicator must show zero.
	– Set the ALT/BAT switch to ON.	The indicator must show the ambient temperature of the cylinder head.
	– Do an engine ground run-up.	Refer to the DA 40 Airplane Flight Manual. The EGT indicator must show the relevant temperature.

E. Replace the Oil Pressure Transducer

	Detail Steps/Work Items	Key Items/References
	WARNING: MAKE SURE THE ENGINE IS SAFE BEFORE YOU DO ANY WORK ON IT. IF THE ENGINE STARTS THE PROPELLER CAN CAUSE INJURY OR DEATH.	
(1)	Make sure that the engine is safe: – The ignition switch is set to OFF. – Set the ALT/BAT switch to OFF. – The throttle is set to IDLE. – The mixture control is set to LEAN CUT-OFF.	
(2)	Remove the engine top-cowling.	Refer to Section 71-10.
(3)	Disconnect the airplane battery.	Refer to Section 24-31.
(4)	Disconnect the cables from the transducer: – Pull back the protective boots from the cable eye-ends. – Remove the 2 nuts and washers which attach the eye-ends to the connectors. – Remove the eye-ends from the connectors.	Refer to Figure 6.
	WARNING: DO NOT GET OIL ON YOU. OIL CAN CAUSE SKIN DISEASE.	
(5)	Replace the transducer: – Remove the defective transducer from the mount and discard the O-ring seal. – Install a new O-ring seal on the new transducer. – Install the new transducer.	Use a suitable container to collect the spilt oil. Put caps on all open connections.

	Detail Steps/Work Items	Key Items/References
(6)	Connect the electrical cables to the transducer: – Install the electrical cable eye-ends onto the transducer connectors. – Install the 2 washers and nuts which attach the eye-ends. – Move the rubber protective boots back into position over the eye-ends.	Refer to Chapter 92 for the Wiring Diagrams.
(7)	Connect the airplane battery.	Refer to Section 24-31.
(8)	Install the engine cowlings.	Refer to Section 71-10.
(9)	Do a test of the engine oil pressure indicating system: – Monitor the oil pressure indicator. – Set the ALT/BAT switch to ON. – Do an engine ground run-up. – Shut the engine down.	The indicator must show zero. Refer to the DA 40 Airplane Flight Manual. The oil pressure indicator must show the relevant pressure of the oil.
(10)	Look for oil leaks from the transducer: – Remove the engine top-cowling. – Look for oil leaks from the transducer. – Install the engine top-cowling.	

F. Replace the Fuel Pressure Transducer

	Detail Steps/Work Items	Key Items/References
	WARNING: MAKE SURE THE ENGINE IS SAFE BEFORE YOU DO ANY WORK ON IT. IF THE ENGINE STARTS THE PROPELLER CAN CAUSE INJURY OR DEATH.	
(1)	Make sure that the engine is safe: – The ignition switch is set to OFF. – Set the ALT/BAT switch to OFF. – The throttle is set to IDLE. – The mixture control is set to LEAN CUT-OFF. – Set the fuel shut-off to SHUT-OFF.	
(2)	Remove the engine cowlings.	Refer to Section 71-10.
(3)	Disconnect the airplane battery.	Refer to Section 24-31.
(4)	Disconnect the electrical connector from the fuel pressure transducer: – Remove the screw which attaches the connector to the transducer. – Pull the connector off from the transducer.	Refer to Figure 7.
	WARNING: DO NOT GET FUEL ON YOU. FUEL CAN CAUSE SKIN DISEASE. **WARNING: DO NOT ALLOW FIRE NEAR FUEL. FUEL BURNS AND CAN CAUSE INJURY TO PERSONS AND DAMAGE TO EQUIPMENT.**	

	Detail Steps/Work Items	Key Items/References
(5)	Replace the fuel pressure transducer: – Remove the defective transducer from the mounting and discard the O-ring seal. – Install a new O-ring seal onto the replacement transducer. – Install the replacement transducer into the mounting.	Use a suitable container to collect spilt fuel. Put caps on all open connections.
(6)	Connect the electrical cables to the fuel pressure sensor: – Put the electrical connector into position on the transducer. – Install the screw which attaches the electrical connector to the transducer.	
(7)	Connect the airplane battery.	Refer to Section 24-31.
(8)	Look for fuel leaks from the sensor: – Set the ALT/BAT switch to ON. – Set fuel pump switch to ON. – Look for fuel leaks, specially in the area of the fuel pressure sensor. – Set fuel pump switch to OFF. – Set the ALT/BAT switch to OFF.	
(9)	Install the engine cowlings.	Refer to Section 71-10.

	Detail Steps/Work Items	Key Items/References
(10)	Do a test of the fuel pressure indicating system:	
	– Monitor the fuel pressure indicator.	
	– Set the ALT/BAT switch to ON.	The indicator must read zero.
	– Set the electric fuel pump to ON.	The indicator must read the relevant pressure.
	– Do an engine ground run-up.	Refer to the DA 40 Airplane Flight Manual. The indicator must show the relevant fuel pressure.
	– Shut the engine down.	

G. Replace the Manifold Pressure Transducer

	Detail Steps/Work Items	Key Items/References
	WARNING: MAKE SURE THE ENGINE IS SAFE BEFORE YOU DO ANY WORK ON IT. IF THE ENGINE STARTS THE PROPELLER CAN CAUSE INJURY OR DEATH.	
(1)	Make sure that the engine is safe: – The ignition switch is set to OFF. – Set the ALT/BAT switch to OFF. – The throttle is set to IDLE. – The mixture control is set to LEAN CUT-OFF. – Set the fuel shut-off to SHUT-OFF.	
(2)	Remove the engine top-cowling.	Refer to Section 71-10.
(3)	Disconnect the airplane battery.	Refer to Section 24-31.
(4)	Remove the instrument panel cover.	Refer to Section 25-10.
(5)	Disconnect the electrical connector from the manifold pressure transducer.	
(6)	Replace the manifold pressure transducer: – Remove the screws which attach the transducer to the firewall. – Remove the defective transducer – Install the replacement transducer onto the firewall.	
(7)	Connect the electrical cables to the manifold pressure sensor.	
(8)	Connect the airplane battery.	Refer to Section 24-31.
(9)	Install the engine top cowling.	Refer to Section 71-10.
(10)	Install the instrument panel cover.	Refer to Section 25-10.

	Detail Steps/Work Items	Key Items/References
(11)	Do a test of the manifold pressure indicating system: – Monitor the manifold pressure indicator. – Set the ALT/BAT switch to ON. – Do an engine ground run-up.	 The indicator must show the relevant indication. Refer to the DA 40 Airplane Flight Manual. The manifold pressure indicator must show the relevant indications.

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Section 77-41
Engine Integrated Instrument System - TAE 125 Diesel Engine

1. General

This Section tells you about the engine indicating system for airplanes with the TAE 125 Diesel engine installed. Two instruments located in the right side of the instrument panel show all engine related indications.

The engine control unit (ECU) provides most of the indications for the engine. Refer to Section 76-01 for data about the engine fuel control system. The engine instrumentation also shows airframe fuel system data. Refer to Section 28-41 for data about the airframe parts of the system.

2. Description and Operation

Two instruments give all of the engine indications. The instruments are located in the right side of the instrument panel. Each instrument has a combination of digital and analog (LED chain) displays.

Note: A TAE 125-01 or a TAE 125-02-99 engine may be installed. If the TAE 125-02-99 engine is installed (MÄM 40-256 carried out) the CED must have the P/N 02-7730-5501-(06)-(02).

The Compact Engine Display (CED; Figure 1, top) gives the following indications:

– Propeller RPM. This has a 4-character digital display and a linear analog display from 0 to 2500 RPM (with the TAE 125-01 engine installed) or 0 to 2300 RPM (with the TAE 125-02-99 engine and MÄM 40-256 carried out).

– Oil Pressure. This is a linear analog display from 2.6 to 6.5 bar.

– Oil Temperature. This is a linear analog display from 50 ºC to 140 ºC.

– Coolant Temperature. This is a linear analog display from 60 ºC to 105 ºC.

– Gearbox Temperature. This is a linear analog display from 0 ºC to 120 ºC.

– Load. This has a 4-character digital display and a linear analog display from 0 % to 100 %.

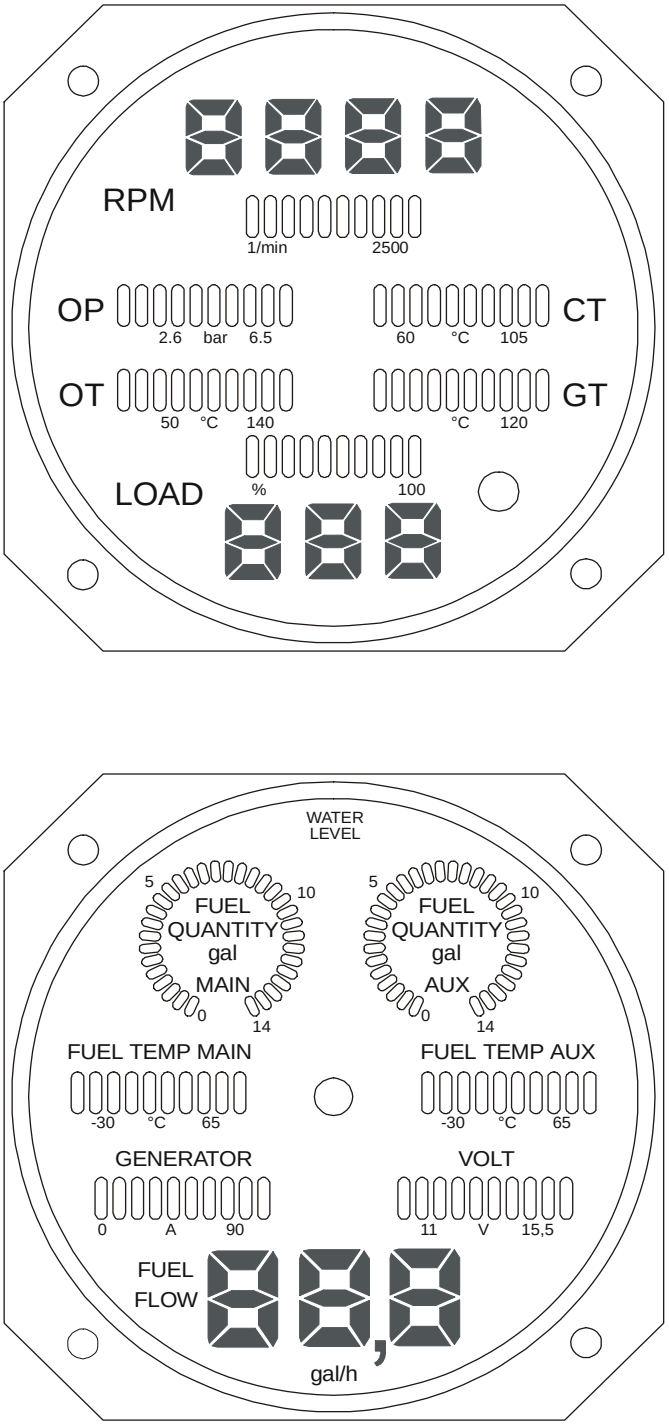


Figure 1: Engine Instruments

The Auxiliary Engine Display (AED; Figure 1, bottom) gives the following indications:

– Water Level (Coolant). This is a low coolant level caution light (color: amber).

– Fuel Quantity Main. This is a circular analog display from 0 to 14 gal.

– Fuel Quantity Aux. This is a circular analog display from 0 to 14 gal.

– Fuel Temp Main. This is a linear analog display from -30 ºC to 65 ºC.

– Fuel Temp Aux. This is a linear analog display from -30 ºC to 65 ºC.

– Generator. This is a linear analog display from 0 to 90 ampères.

– Volts. This is a linear analog display from 11 to 15.5 volts.

– Fuel Flow. This is a 4-character digital display.

– Both digital and analog displays use groups of light-emitting diodes (LEDs).

A. Digital Displays

The RPM, load and fuel flow displays use the usual 7-segment LEDs.

B. Fuel Quantity Analog Displays

Each fuel quantity analog display has a group of 32 LEDs arranged in an arc. All but one of the LEDs are green. The LED adjacent to the zero mark is red.

C. Linear Analog Displays

All of the linear analog displays use similar groups of 10 LEDs set in a horizontal line. Displays showing pressure, temperature, current and voltage use combinations of red, yellow and green LEDs. The colors have the usual meanings for instrument markings.

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Trouble-Shooting

1. General

The table below lists the defects you could have with the engine-indication system. For more data on the system refer to the equipment manufacturer's manual.

If you have the trouble detailed in the Trouble column read across to the Possible Cause column. Then do the repair given in the Repair column.

Trouble	Possible Cause	Repair
No indication on the engine indicators with the engine operating or with the ELECTRIC MASTER key switch set to ON.	INST 1 circuit-breaker not set.	Make sure that the circuit-breaker for the engine instruments is set.
One of the indicators in an integrated instrument does not indicate correctly.	Sensor/transducer defective.	Do a test for continuity of the cables for the relevant sensor. If the cables are serviceable, then refer to the engine manufacturer. Refer to Section 28-41 for the fuel quantity indicating system. Refer to Section 76-01 for the engine sensors.
	One instrument defective.	Replace the instrument.

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Maintenance Practices

1. General

These Maintenance Practices tell you how to replace an integrated-engine-instrument and a manifold temperature sensor. Refer to the related Chapter for maintenance data on the sensors.

Where the engine control system provides data for the engine indicating system, only the engine manufacturer or an TAE-approved maintenance shop can replace sensors.

2. Remove/Install an Engine Instrument

A. Remove an Engine Instrument

	Detail Steps/Work Items	Key Items/References
	WARNING: MAKE SURE THE ENGINE IS SAFE BEFORE YOU DO ANY WORK ON IT. IF THE ENGINE STARTS THE PROPELLER CAN CAUSE INJURY OR DEATH.	
(1)	Make sure that the engine is safe: – Set the ELECTRIC MASTER key switch to OFF. – Set the ENGINE MASTER switch to OFF. – Set the power lever to IDLE.	
(2)	Remove the engine cowlings.	Refer to Section 71-11.
(3)	Disconnect the airplane main battery.	Refer to Section 24-34.
(4)	Remove the instrument panel cover.	Refer to Section 25-10.
(5)	Disconnect the electrical connector from the instrument.	
(6)	Remove the 4 screws (including post light) which attach the instrument to the instrument panel.	From the front of the instrument panel. Hold the instrument!
(7)	Move the instrument towards the front of the airplane and clear of the instrument panel, then clear of the airplane.	

B. Install an Engine Instrument

	Detail Steps/Work Items	Key Items/References
	WARNING: MAKE SURE THE ENGINE IS SAFE BEFORE YOU DO ANY WORK ON IT. IF THE ENGINE STARTS THE PROPELLER CAN CAUSE INJURY OR DEATH.	
(1)	Make sure that the engine is safe: – Set the ELECTRIC MASTER key switch to OFF. – Set the ENGINE MASTER switch to OFF. – Set the power lever to IDLE.	
(2)	Put the instrument in position in the instrument panel.	From the front of the airplane.
(3)	Install the screws (including post light) which attach the instrument to the instrument panel.	
(4)	Connect the electrical connector to the instrument.	
(5)	Install the instrument panel cover.	Refer to Section 25-10.
(6)	Connect the airplane main battery.	Refer to Section 24-34.
(7)	Install the engine cowlings.	Refer to Section 71-11.
(8)	Do an engine ground run-up.	Refer to Section 71-01.

3. Replace a Manifold Temperature Sensor

	Detail Steps/Work Items	Key Items/References
	WARNING: MAKE SURE THE ENGINE IS SAFE BEFORE YOU DO ANY WORK ON IT. IF THE ENGINE STARTS THE PROPELLER CAN CAUSE INJURY OR DEATH.	
(1)	Make sure that the engine is safe: – Set the ELECTRIC MASTER key switch to OFF. – Set the ENGINE MASTER switch to OFF. – Set the power lever to IDLE.	
(2)	Remove the engine cowlings.	Refer to Section 71-11.
(3)	Disconnect the electrical connector from the manifold temperature sensor.	
(4)	Remove the old sensor from the intercooler outlet pipe.	Turn the sensor counter-clockwise. Discard the seal.
(5)	Install the new sensor to the intercooler outlet pipe.	Turn the sensor clockwise. Use a new seal.
(6)	Connect the electrical connector to the manifold temperature sensor.	
(7)	Install the engine cowlings.	Refer to Section 71-11.
(8)	Do a ground run-up.	Refer to Section 71-01.

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Section 77-42
Integrated Engine Indication - Lycoming O-360-A4M Engine

1. General

The DA 40 F has an integrated engine-indication system. The integrated engine instrument (VM 1000) shows all the engine indications on a single display screen.

Figure 1 shows the location of the integrated engine instrument.

2. Description/Operation

A. Integrated Engine Instrument

Figure 1 shows the VM 1000 integrated engine instrument. It is located in the instrument panel, see Section 31-10.

Sensors/probes and transducers send electrical signals to a data processing unit (DPU). The DPU sends the data to the VM 1000 to give a display. The VM 1000 display has these indications:

– RPM.

– Oil temperature.

– Fuel flow.

– Cylinder head temperature (CHT) for all four cylinders.

– Exhaust gas temperature (EGT) for all four exhaust down-pipes.

– Oil pressure.

– Fuel pressure.

– Manifold pressure.

– Main bus voltage.

– Alternator output amperage.

You cannot repair the integrated engine instrument.

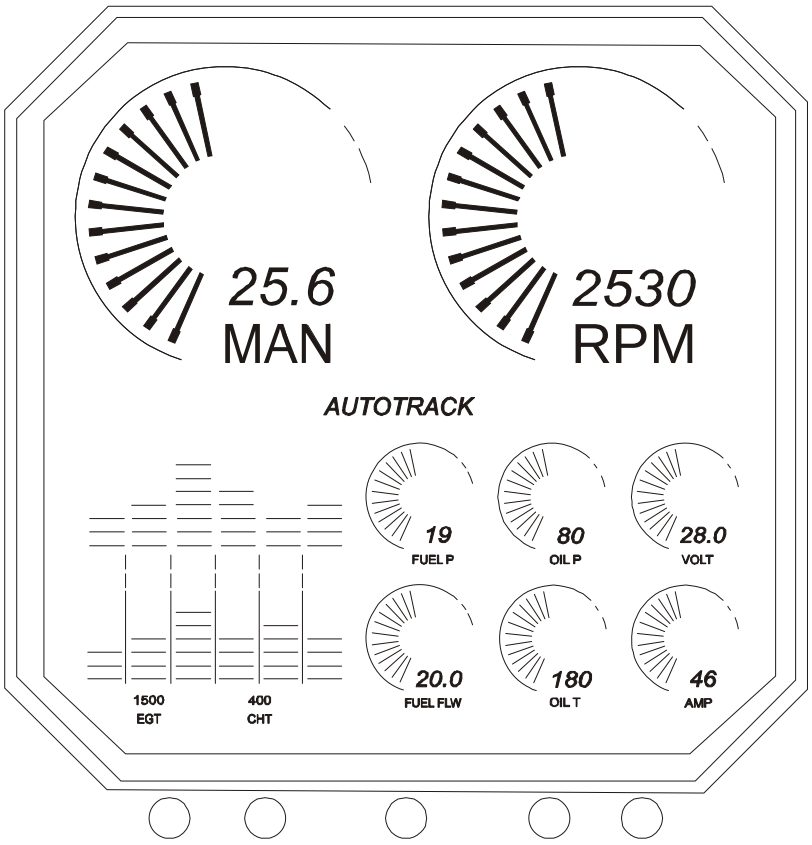


Figure 1: VM 1000 Integrated Engine Instrument

B. Transducers and Sensors

The engine indicating system uses these transducers/sensors:

– RPM sensor. The RPM sensor is mounted to the right magneto. You can replace the RPM sensor.

– Oil temperature sensor. The oil temperature sensor attaches to a special mounting on the rear accessory housing. You can replace the oil temperature sensor.

– Fuel flow sensor. The fuel flow sensor is located in the fuel supply hose to the carburetor. You can replace the fuel flow sensor.

– Cylinder head temperature (CHT) sensor. The engine has a CHT probe attached to the bottom of each cylinder head. You can replace the CHT probe.

– Exhaust gas temperature (EGT) sensor. The engine has an EGT probe attached to the exhaust down-pipe from each cylinder head. You can replace the EGT probe.

– Oil pressure transducer. A P-clamp attaches the oil pressure transducer to the engine-mounting-frame on the right-top side. A flexible hose connects the transducer to a connection in the engine oil system near the oil-pressure-relief-valve. You can replace the oil pressure transducer.

– Fuel pressure transducer. The fuel pressure transducer is in the fuel supply hose to the carburetor. You can replace the fuel pressure transducer.

– Manifold pressure transducer. A P-clamp attaches the manifold pressure transducer to the engine-mounting-frame, on the top-left side. A flexible hose connects cylinder No. 4 to the manifold pressure transducer.

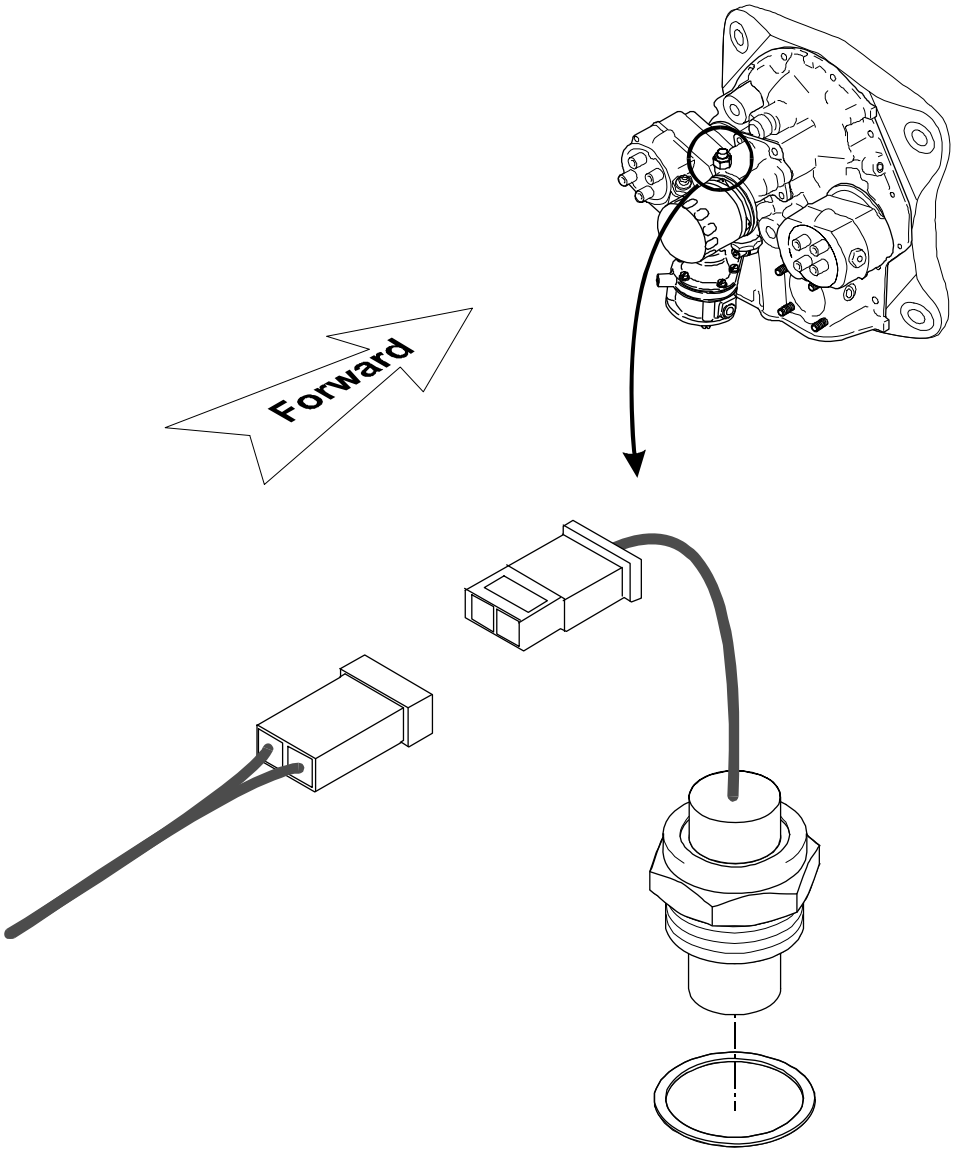


Figure 2: Oil Temperature Sensor Installation

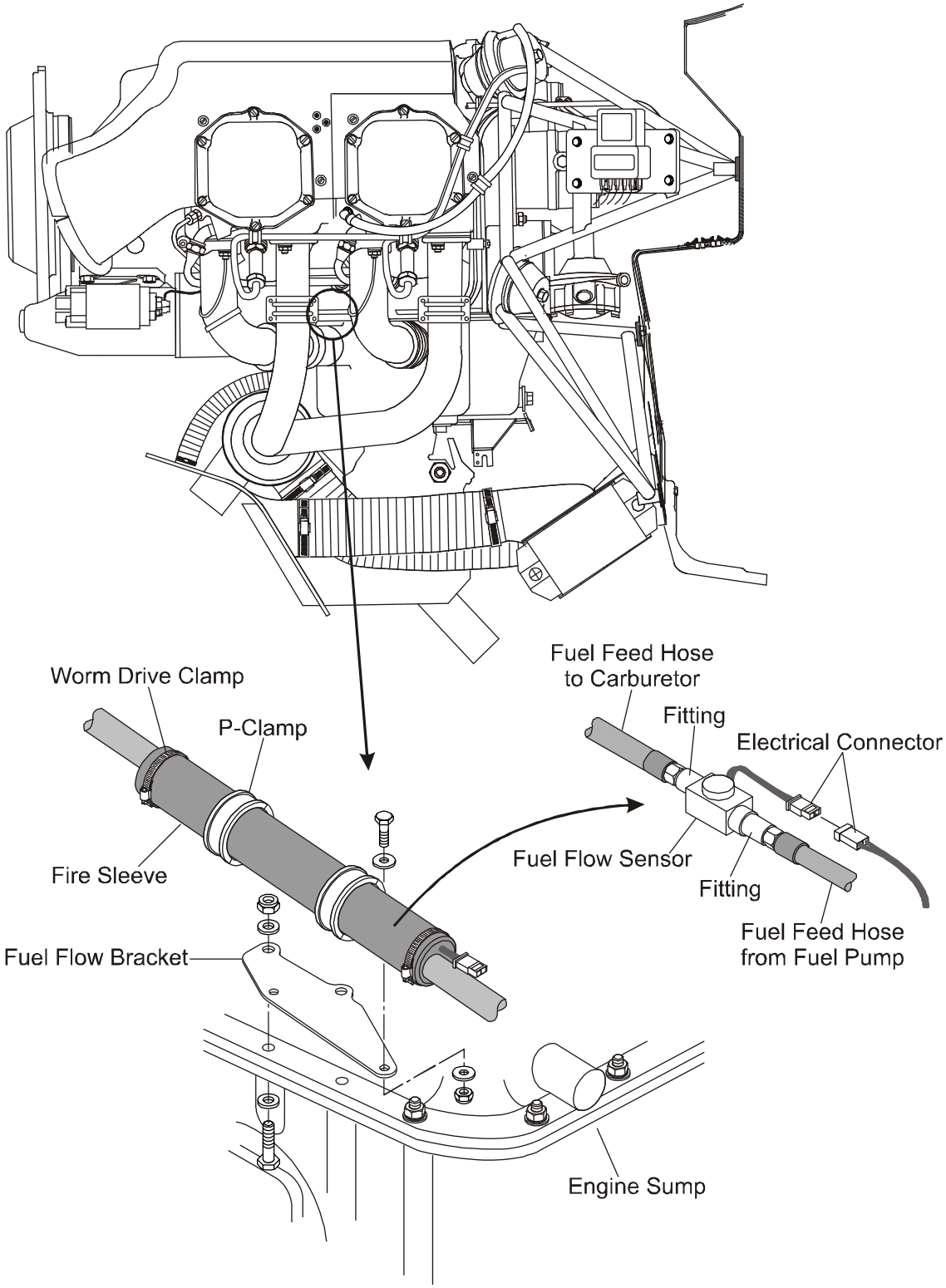


Figure 3: Fuel Flow Sensor Installation

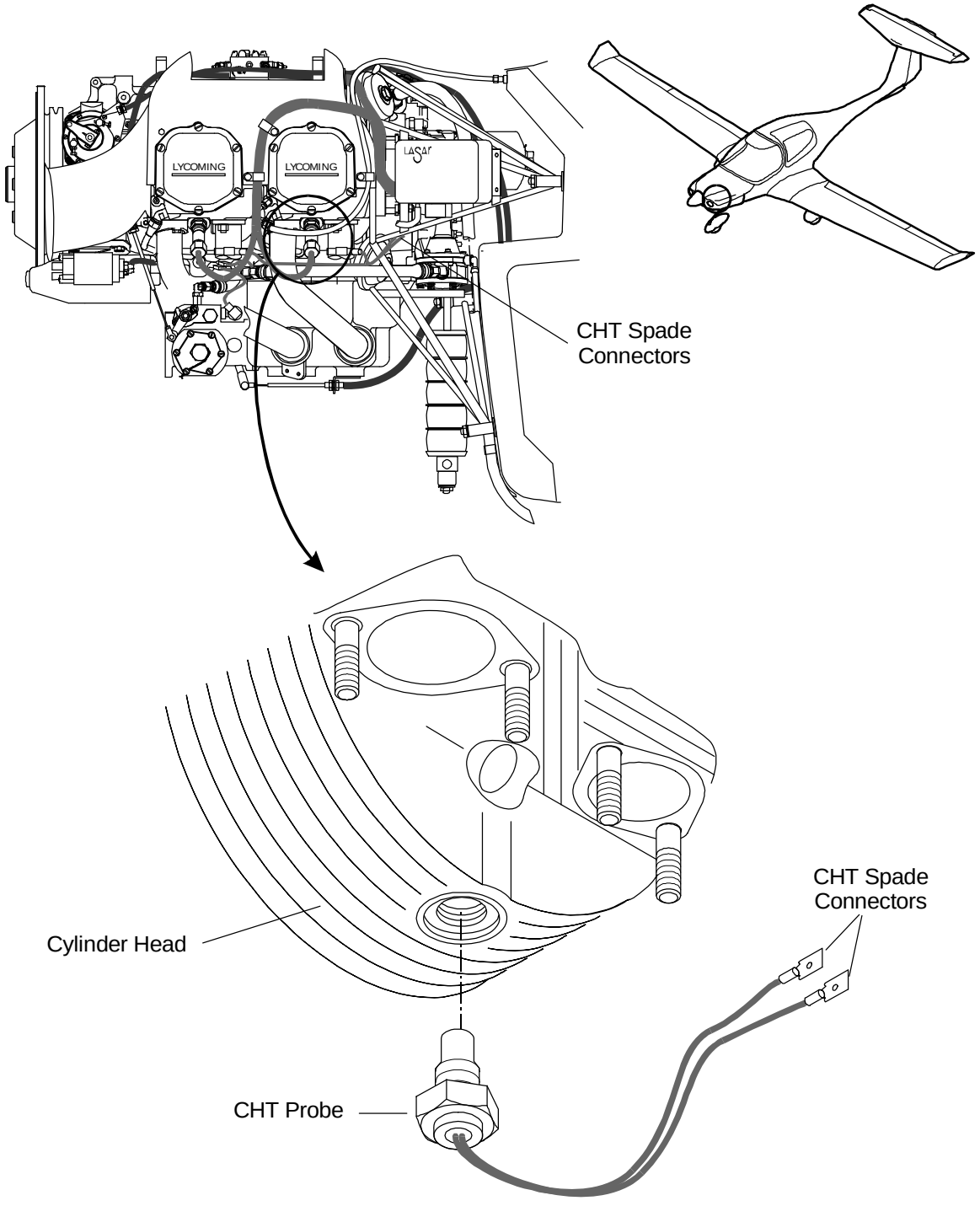


Figure 4: CHT Probe Installation

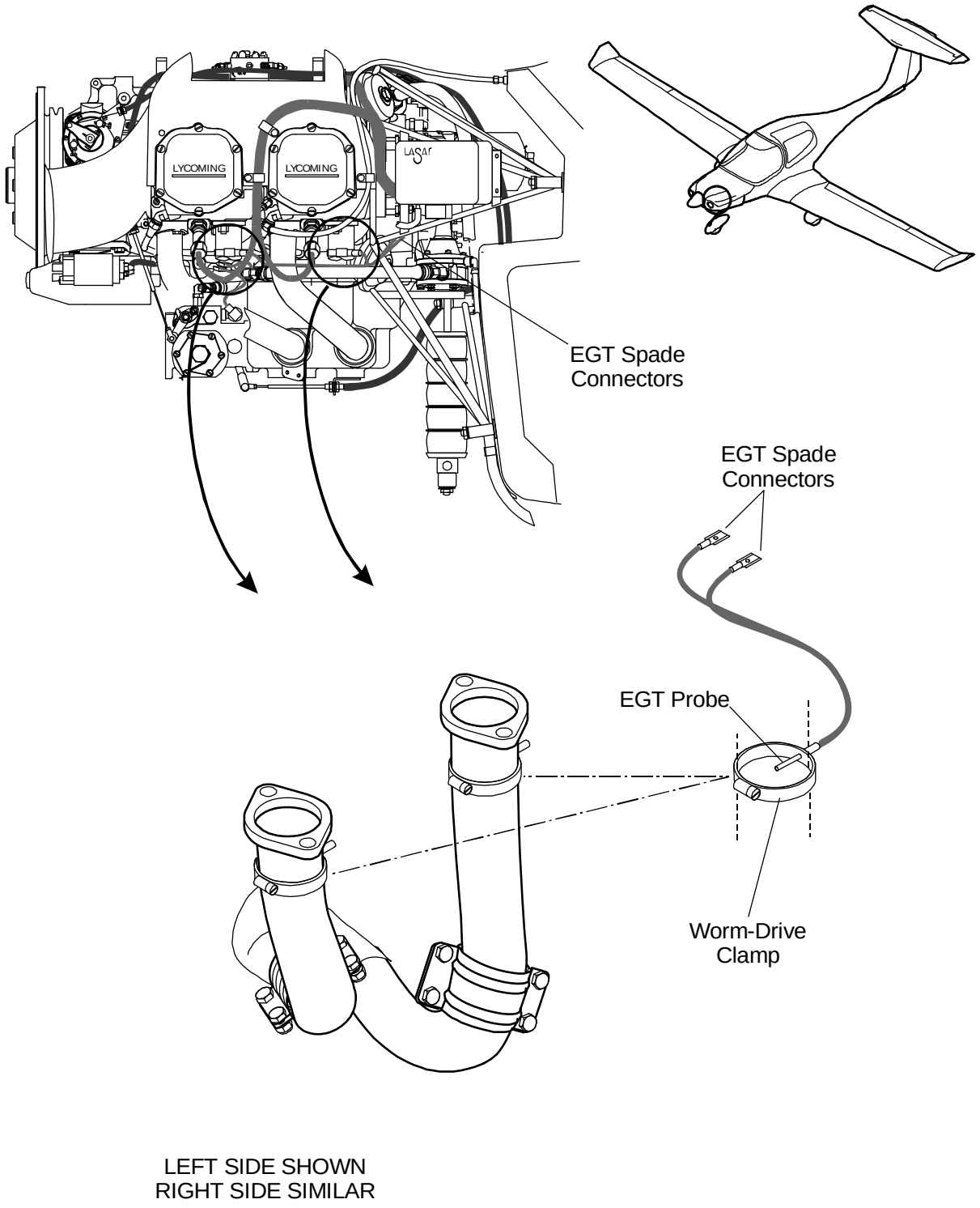


Figure 5: EGT Probe Installation

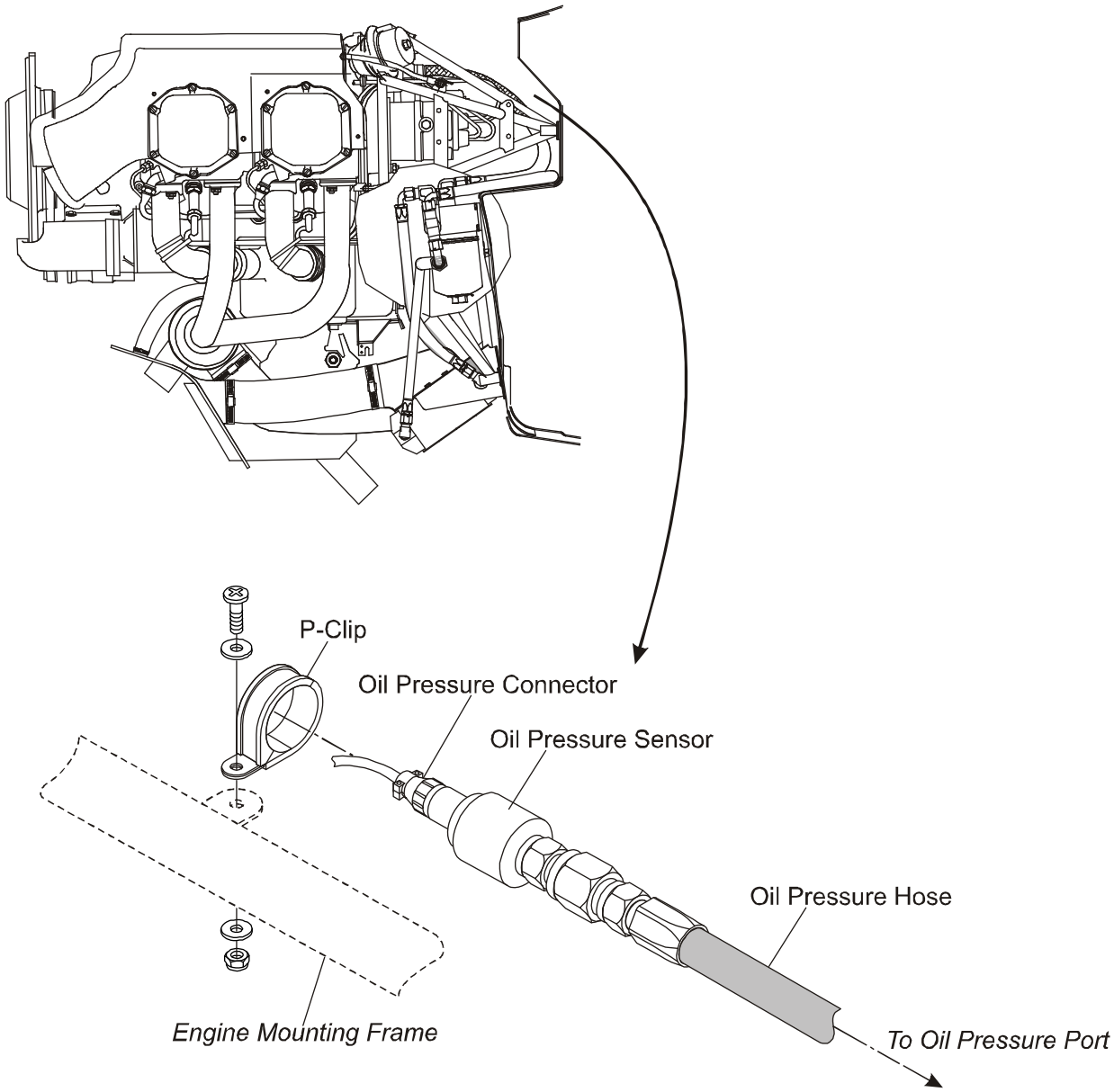


Figure 6: Oil Pressure Sensor Installation

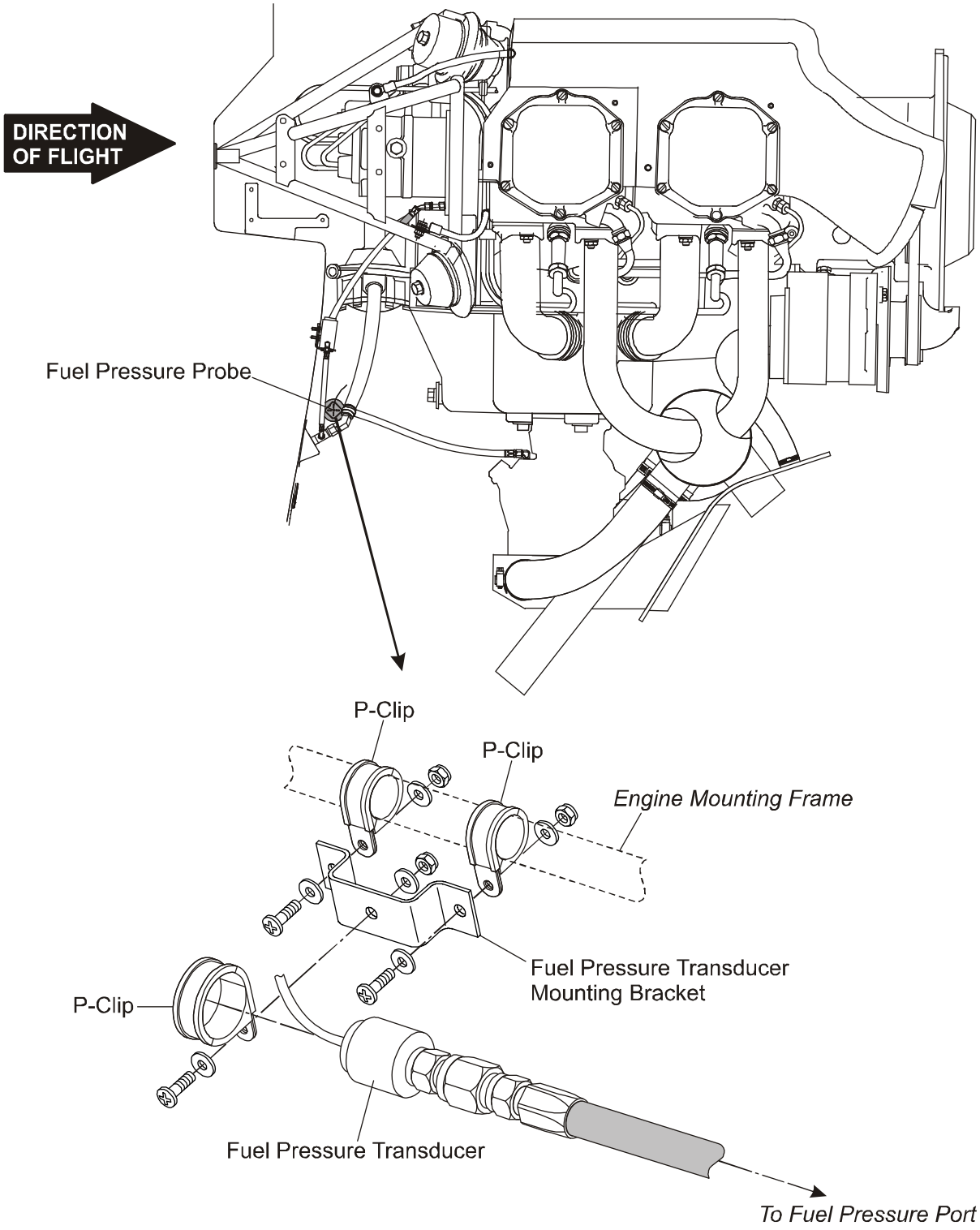


Figure 7: Fuel Pressure Probe Installation

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Trouble-Shooting

1. General

The table below lists the defects you could have with the integrated-engine-indication system. For more data on the system refer to the equipment manufacturer's manual.

If you have the trouble detailed in the Trouble column read across to the Possible Cause column. Then do the repair given in the Repair column.

Trouble	Possible Cause	Repair
No indication on any of the indicators with the engine operating or with the ALT/BAT switch set to ON.	No 24 volt supply to the integrated-engine-indication system. Integrated-engine-indicator system indicator-panel inoperative.	Make sure that the circuit-breaker for the engine instruments is set. Do a voltage test for 24 volts at pin 20 and 23 of connector P1 at the system data processing unit. If there is a 24 volt supply to the system then replace the indicator panel.
One of the indicators does not indicate correctly.	Sensor/transducer defective.	Do a test for continuity of the cables for the relevant sensor. If the cables are serviceable, then replace the sensor. Refer to Chapter 92 for the Wiring Diagrams.

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Maintenance Practices

1. General

These Maintenance Practices tell you how to replace the integrated-engine-instrument panel. It also tells you how to replace the sensors and transducers for the engine indicators.

2. Remove/Install the Indicator Panel

A. Remove the Indicator Panel

	Detail Steps/Work Items	Key Items/References
	WARNING: MAKE SURE THE ENGINE IS SAFE BEFORE YOU DO ANY WORK ON IT. IF THE ENGINE STARTS THE PROPELLER CAN CAUSE INJURY OR DEATH.	
(1)	Make sure that the engine is safe: – The ignition switch is set to OFF. – The ALT/BAT switch is set to OFF. – The throttle is set to IDLE. – The mixture control is set to LEAN CUT-OFF.	
(2)	Remove the engine cowlings.	Refer to Section 71-12.
(3)	Disconnect the airplane battery.	Refer to Section 24-31.
(4)	Remove the instrument panel cover.	Refer to Section 25-10.
(5)	Disconnect the electrical connector from the display unit.	At the rear of the display unit.
(6)	Remove the 4 screws which attach the display unit to the instrument panel.	From the front of the instrument panel. Hold the display unit!
(7)	Move the display unit forward and clear of the instrument panel, then clear of the airplane.	

B. Install the Indicator Panel

	Detail Steps/Work Items	Key Items/References
(1)	Put the indicator panel in position in the instrument panel.	From the rear of the panel. Take care to correctly locate the mode buttons at the bottom of the indicator panel correctly.
(2)	Connect the electrical connector to the rear of the indicator panel.	
(3)	Install instrument panel cover.	Refer to Section 25-10.
(4)	Connect the airplane battery.	Refer to Section 24-31.
(5)	Install the engine cowlings.	Refer to Section 71-12.
(6)	Do a test of the indicator panel: – Set the ALT/BAT switch to ON. – Set the ALT/BAT switch to OFF.	The indicators must give the correct indications.
(7)	Do an engine ground run-up and monitor the engine indicator gauge indications.	Refer to the DA 40 F Airplane Flight Manual. The indicators must give the relevant indications.

3. Replace an Engine Indicator Gauge Sensor/Transducer

A. Replace the Oil Temperature Sensor

	Detail Steps/Work Items	Key Items/References
	WARNING: MAKE SURE THE ENGINE IS SAFE BEFORE YOU DO ANY WORK ON IT. IF THE ENGINE STARTS THE PROPELLER CAN CAUSE INJURY OR DEATH.	
(1)	Make sure that the engine is safe: – The ignition switch is set to OFF. – Set the ALT/BAT switch to OFF. – The throttle is set to IDLE. – The mixture control is set to LEAN CUT-OFF.	
(2)	Remove the engine top-cowling.	Refer to Section 71-12.
(3)	Disconnect the airplane battery.	Refer to Section 24-31.
(4)	Disconnect the electrical cables from the temperature sensor: – Remove the nut and washer from the electrical connector. – Remove the cable eye-end from the connector.	
	WARNING: DO NOT GET OIL ON YOU. OIL CAN CAUSE SKIN DISEASE.	
(5)	Replace the oil temperature sensor: – Remove the sensor. – Remove and discard the O-ring seal. – Install a new O-ring seal. – Install a new sensor.	On the engine accessory housing.

	Detail Steps/Work Items	Key Items/References
(6)	Connect the electrical cable to the sensor: – Put the electrical cable eye-end in position on the connector. – Install the washer and nut onto the electrical connector.	
(7)	Connect the airplane battery.	Refer to Section 24-31.
(8)	Install the engine cowlings.	Refer to Section 71-12.
(9)	Do a test of the engine oil temperature indicating system: – Monitor the oil temperature indication. – Set the ALT/BAT switch to ON. Do an engine ground run-up. – Shut the engine down.	The indicator must show the likely ambient temperature of the oil. Refer to the DA 40 F Airplane Flight Manual. The oil temperature indicator must show the relevant temperature of the oil.
(10)	Look for oil leaks from the sensor: – Remove the engine top-cowling. – Look for oil leaks from the sensor. – Install the engine top-cowling.	

B. Replace the Fuel Flow Sensor

	Detail Steps/Work Items	Key Items/References
	WARNING: MAKE SURE THE ENGINE IS SAFE BEFORE YOU DO ANY WORK ON IT. IF THE ENGINE STARTS THE PROPELLER CAN CAUSE INJURY OR DEATH.	
(1)	Make sure that the engine is safe: – The ignition switch is set to OFF. – Set the ALT/BAT switch to OFF. – The throttle is set to IDLE. – The mixture control is set to LEAN CUT-OFF. – Set the fuel shut-off to SHUT-OFF.	
(2)	Remove the engine cowlings.	Refer to Section 71-12.
(3)	Disconnect the airplane battery.	Refer to Section 24-31.
(4)	Disconnect the electrical connector from the sensor.	Refer to Figure 3.
	WARNING: DO NOT GET FUEL ON YOU. FUEL CAN CAUSE SKIN DISEASE. **WARNING: DO NOT ALLOW FIRE NEAR FUEL. FUEL BURNS AND CAN CAUSE INJURY TO PERSONS AND DAMAGE TO EQUIPMENT.**	

	Detail Steps/Work Items	Key Items/References
(5)	Replace the fuel flow sensor: – Disconnect the fuel hose from the inlet side of the fuel flow sensor. – Disconnect the fuel hose from the outlet side of the fuel flow sensor. – Remove the 2 bolts and washers that attach the fuel flow sensor to the mounting bracket Move the fuel flow sensor clear of the airplane. – Put the new fuel flow sensor into position on the bracket and install the bolts and washers that attach the sensor to the bracket. – Connect the fuel hose to the outlet side of the fuel flow sensor. – Connect the fuel hose to the inlet side of the fuel flow sensor.	Use a suitable container to collect spilt fuel. Put a cap on open connections.
(6)	Connect the electrical cables to the fuel flow sensor: – Connect the plug.	
(7)	Connect the airplane battery.	Refer to Section 24-31.
(8)	Look for fuel leaks from the sensor: – Set the ALT/BAT switch to ON. – Set fuel pump switch to ON. – Look for fuel leaks, specially in the area of the fuel flow sensor. – Set fuel pump switch to OFF. – Set the ALT/BAT switch to OFF.	
(9)	Install the engine cowlings.	Refer to Section 71-12.

	Detail Steps/Work Items	Key Items/References
(10)	Do a test of the fuel flow indicating system: – Monitor the fuel flow indicator. – Set the ALT/BAT switch to ON. – Do an engine ground run-up. – Shut down the engine.	 The indicator must read zero. Refer to the DA 40 F Airplane Flight Manual. The indicator must show the relevant fuel flow.

C. Replace the Cylinder Head Temperature (CHT) Probe

	Detail Steps/Work Items	Key Items/References
	WARNING: MAKE SURE THE ENGINE IS SAFE BEFORE YOU DO ANY WORK ON IT. IF THE ENGINE STARTS THE PROPELLER CAN CAUSE INJURY OR DEATH.	
(1)	Make sure that the engine is safe: – The ignition switch is set to OFF. – Set the ALT/BAT switch to OFF. – The throttle is set to IDLE. – The mixture control is set to LEAN CUT-OFF.	
(2)	Remove the engine top-cowling.	Refer to Section 71-12.
(3)	Disconnect the airplane battery.	Refer to Section 24-31.
(4)	Disconnect the electrical cables from the temperature probe.	Refer to Figure 4. At the in-line connector.
(5)	Replace the CHT probe: – Unscrew the probe from the cylinder head. – Move the probe clear of the airplane. – Install the new probe.	
(6)	Connect the electrical cables to the probe.	At the in-line connector.
(7)	Connect the airplane battery.	Refer to Section 24-31.
(8)	Install the engine cowlings.	Refer to Section 71-12.
(9)	Do a test of the CHT indicating system: – Monitor the CHT indicator. – Set the ALT/BAT switch to ON. – Do a ground run-up of the engine.	 The indicator must show zero. The indicator must show the ambient temperature of the cylinder head. Refer to the DA 40 Airplane Flight Manual. The CHT indicator must show the relevant temperature.

D. Replace an Exhaust Gas Temperature (EGT) Probe

	Detail Steps/Work Items	Key Items/References
	WARNING: MAKE SURE THE ENGINE IS SAFE BEFORE YOU DO ANY WORK ON IT. IF THE ENGINE STARTS THE PROPELLER CAN CAUSE INJURY OR DEATH.	
(1)	Make sure that the engine is safe: – The ignition switch is set to OFF. – Set the ALT/BAT switch to OFF. – The throttle is set to IDLE. – The mixture control is set to LEAN CUT-OFF.	
(2)	Remove the engine cowlings.	Refer to Section 71-12.
(3)	Disconnect the airplane battery.	Refer to Section 24-31.
(4)	Disconnect the electrical cables from the EGT probe.	Refer to Figure 5. At the in-line connector.
(5)	Replace the EGT probe: – Release the worm drive clamp which holds the EGT probe in position. – Replace the EGT probe. – Install the worm drive clamp which holds the EGT probe.	
(6)	Connect the electrical cables to the EGT probe.	At the in-line connector.
(7)	Connect the airplane battery.	Refer to Section 24-31.
(8)	Install the engine cowlings.	Refer to Section 71-12.

	Detail Steps/Work Items	Key Items/References
(9)	Do a test of the EGT indicating system:	
	– Monitor the EGT indicator.	The indicator must show zero.
	– Set the ALT/BAT switch to ON.	The indicator must show the ambient temperature of the cylinder head.
	– Do an engine ground run-up.	Refer to the DA 40 F Airplane Flight Manual. The EGT indicator must show the relevant temperature.

E. Replace the Oil Pressure Transducer

	Detail Steps/Work Items	Key Items/References
	WARNING: MAKE SURE THE ENGINE IS SAFE BEFORE YOU DO ANY WORK ON IT. IF THE ENGINE STARTS THE PROPELLER CAN CAUSE INJURY OR DEATH.	
(1)	Make sure that the engine is safe: – The ignition switch is set to OFF. – Set the ALT/BAT switch to OFF. – The throttle is set to IDLE. – The mixture control is set to LEAN CUT-OFF.	
(2)	Remove the engine top-cowling.	Refer to Section 71-12.
(3)	Disconnect the airplane battery.	Refer to Section 24-31.
(4)	Disconnect the cables from the transducer: – Pull back the protective boots from the cable eye-ends. – Remove the 2 nuts and washers which attach the eye-ends to the connectors. – Remove the eye-ends from the connectors.	Refer to Figure 6.
	WARNING: DO NOT GET OIL ON YOU. OIL CAN CAUSE SKIN DISEASE.	
(5)	Replace the transducer: – Remove the defective transducer from the mount and discard the O-ring seal. – Install a new O-ring seal on the new transducer. – Install the new transducer.	Use a suitable container to collect the spilt oil. Put caps on all open connections.

	Detail Steps/Work Items	Key Items/References
(6)	Connect the electrical cables to the transducer: – Install the electrical cable eye-ends onto the transducer connectors. – Install the 2 washers and nuts which attach the eye-ends. – Move the rubber protective boots back into position over the eye-ends.	Refer to Chapter 92 for the Wiring Diagrams.
(7)	Connect the airplane battery.	Refer to Section 24-31.
(8)	Install the engine cowlings.	Refer to Section 71-12.
(9)	Do a test of the engine oil pressure indicating system: – Monitor the oil pressure indicator. – Set the ALT/BAT switch to ON. – Do an engine ground run-up. – Shut the engine down.	The indicator must show zero. Refer to the DA 40 F Airplane Flight Manual. The oil pressure indicator must show the relevant pressure of the oil.
(10)	Look for oil leaks from the transducer: – Remove the engine top-cowling. – Look for oil leaks from the transducer. – Install the engine top-cowling.	

F. Replace the Fuel Pressure Transducer

	Detail Steps/Work Items	Key Items/References
	WARNING: MAKE SURE THE ENGINE IS SAFE BEFORE YOU DO ANY WORK ON IT. IF THE ENGINE STARTS THE PROPELLER CAN CAUSE INJURY OR DEATH.	
(1)	Make sure that the engine is safe: – The ignition switch is set to OFF. – Set the ALT/BAT switch to OFF. – The throttle is set to IDLE. – The mixture control is set to LEAN CUT-OFF. – Set the fuel shut-off to SHUT-OFF.	
(2)	Remove the engine cowlings.	Refer to Section 71-12.
(3)	Disconnect the airplane battery.	Refer to Section 24-31.
(4)	Disconnect the electrical connector from the fuel pressure transducer: – Remove the screw which attaches the connector to the transducer. – Pull the connector off from the transducer.	Refer to Figure 7.
	WARNING: DO NOT GET FUEL ON YOU. FUEL CAN CAUSE SKIN DISEASE. **WARNING: DO NOT ALLOW FIRE NEAR FUEL. FUEL BURNS AND CAN CAUSE INJURY TO PERSONS AND DAMAGE TO EQUIPMENT.**	

	Detail Steps/Work Items	Key Items/References
(5)	Replace the fuel pressure transducer: – Remove the defective transducer from the mounting and discard the O-ring seal. – Install a new O-ring seal onto the replacement transducer. – Install the replacement transducer into the mounting.	Use a suitable container to collect spilt fuel. Put caps on all open connections.
(6)	Connect the electrical cables to the fuel pressure sensor: – Put the electrical connector into position on the transducer. – Install the screw which attaches the electrical connector to the transducer.	
(7)	Connect the airplane battery.	Refer to Section 24-31.
(8)	Look for fuel leaks from the sensor: – Set the ALT/BAT switch to ON. – Set fuel pump switch to ON. – Look for fuel leaks, specially in the area of the fuel pressure sensor. – Set fuel pump switch to OFF. – Set the ALT/BAT switch to OFF.	
(9)	Install the engine cowlings.	Refer to Section 71-10.

	Detail Steps/Work Items	Key Items/References
(10)	Do a test of the fuel pressure indicating system:	
	– Monitor the fuel pressure indicator.	
	– Set the ALT/BAT switch to ON.	The indicator must read zero.
	– Set the electric fuel pump to ON.	The indicator must read the relevant pressure.
	– Do an engine ground run-up.	Refer to the DA 40 Airplane Flight Manual. The indicator must show the relevant fuel pressure.
	– Shut the engine down.	

G. Replace the Manifold Pressure Transducer

	Detail Steps/Work Items	Key Items/References
	WARNING: MAKE SURE THE ENGINE IS SAFE BEFORE YOU DO ANY WORK ON IT. IF THE ENGINE STARTS THE PROPELLER CAN CAUSE INJURY OR DEATH.	
(1)	Make sure that the engine is safe: – The ignition switch is set to OFF. – Set the ALT/BAT switch to OFF. – The throttle is set to IDLE. – The mixture control is set to LEAN CUT-OFF. – Set the fuel shut-off to SHUT-OFF.	
(2)	Remove the engine top-cowling.	Refer to Section 71-12.
(3)	Disconnect the airplane battery.	Refer to Section 24-31.
(4)	Remove the instrument panel cover.	Refer to Section 25-10.
(5)	Disconnect the electrical connector from the manifold pressure transducer.	
(6)	Replace the manifold pressure transducer: – Remove the screws which attach the transducer to the firewall. – Remove the defective transducer – Install the replacement transducer onto the firewall.	
(7)	Connect the electrical cables to the manifold pressure sensor.	
(8)	Connect the airplane battery.	Refer to Section 24-31.
(9)	Install the engine top cowling.	Refer to Section 71-10.
(10)	Install the instrument panel cover.	Refer to Section 25-10.

	Detail Steps/Work Items	Key Items/References
(11)	Do a test of the manifold pressure indicating system: – Monitor the manifold pressure indicator. – Set the ALT/BAT switch to ON. – Do an engine ground run-up.	 The indicator must show the relevant indication. Refer to the DA 40 F Airplane Flight Manual. The manifold pressure indicator must show the relevant indications.

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Section 77-43
Engine Indication System - TAE 125 Diesel Engine with the Garmin G1000 System Installed

1. General

This Section tells you about the engine indicating system for the DA 40 airplane with the TAE 125 Diesel engine and the Garmin G1000 system installed. The integrated cockpit system (ICS) display screens which are located in the instrument panel give all engine and related airplane system indications. For normal operations the left display is the primary flight display (PFD) and the right is the multi-function display (MFD).

Refer to Section 31-42 for more data about the ICS.

The engine control unit (ECU) provides most of the indications for the engine. Refer to Section 76-01 for data about the engine control system. The ICS also shows fuel and systems data. Refer to Section 28-40 for data about the airframe parts of the system.

2. Description and Operation

The ICS displays the engine indications for the engine on the MFD screen. The MFD gives the following engine indications:

- Engine load. Indicates the engine load from 0 to 100%.
- Engine RPM.
- Engine gearbox temperature.
- Engine coolant temperature.
- Engine oil temperature.
- Engine oil pressure.

The MFD also gives these auxiliary displays with the engine displays:

– Voltage.

– Generator output, in AMPS.

– Outside air temperature (OAT).

The MFD can also display the following fuel system information:

– LH and RH main fuel tank quantity (Refer to Section 28-40).

– LH and RH main fuel tank temperature (Refer to Section 28-40).

– Engine fuel flow in US gal / hour (Refer to Section 28-40).

Engine alerts are given on the PFD screen. A flashing warning annunciator appears in the PFD when an alert is activated. Pressing the WARNING softkey at the bottom of the PFD opens an alert window in the PFD. The alerts window gives more details of the alert. The ICS alert system gives alerts and warning captions for both engine and airplane systems. Refer to section 31-42 for more data about the ICS.

Trouble–Shooting

1. General

The table below lists the defects you could have with the engine-indication system. For more data on the system refer to the equipment manufacturer's manual.

If you have the trouble detailed in the Trouble column read across to the Possible Cause column. Then do the repair given in the Repair column.

Trouble	Possible Cause	Repair
One of the indicators in an integrated instrument does not indicate correctly.	Sensor/transducer defective.	Do a test for continuity of the cables for the relevant sensor. If the cables are serviceable, then refer to the engine manufacturer. Refer to Section 28-40 for the fuel quantity indicating system. Refer to Section 76-00 for the location of engine sensors.

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Maintenance Practices

1. General

These Maintenance Practices tell you how to replace the following sensors:

– Crankshaft (RPM).

– Gearbox oil temperature.

– Liquid coolant temperature.

– Engine oil temperature.

– Engine oil pressure.

Refer to the related Chapter for maintenance data on the sensors.

Where the engine control system provides data for the engine indicating system, only the engine manufacturer or a TAE-approved maintenance shop can replace sensors.

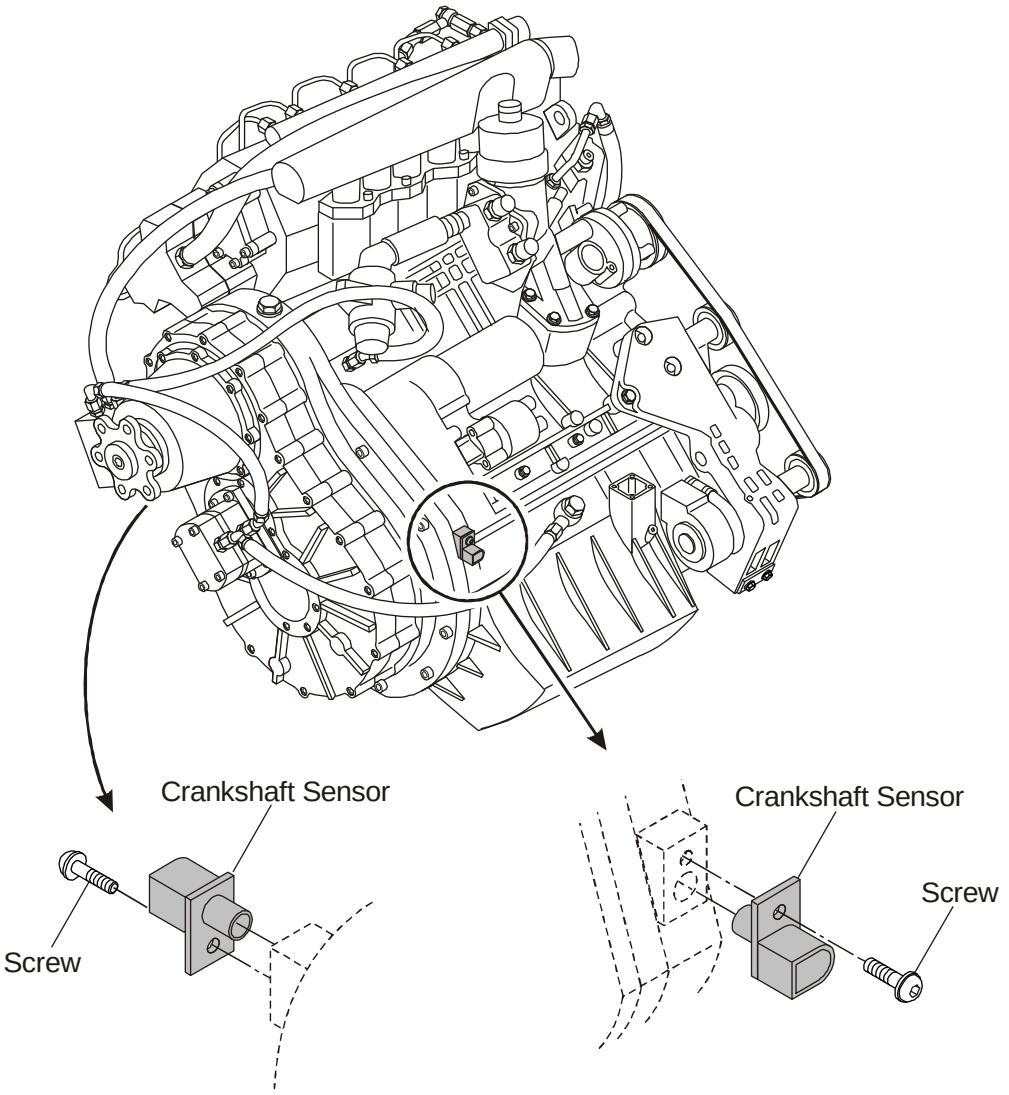


Figure 2: Crankshaft (RPM) Sensor Installation

2. Replace/Install a Sensor

Figures 2 thru 6 show the sensors for the engine indications.

Use the following general procedure for replacing all of the sensors on the engine. If any of the sensors has a different procedure then the procedure will be described.

A. Replace a Sensor

	Detail Steps/Work Items	Key Items/References
	WARNING: DO NOT STAND WITHIN THE DANGER AREA OF THE PROPELLER. IF THE ENGINE STARTS, THE PROPELLER CAN CAUSE DEATH OR INJURY TO PERSONS. **WARNING: MAKE SURE THAT THE ENGINE IS SAFE BEFORE YOU DO WORK ON THE ENGINE CONTROLS. IF THE PROPELLER TURNS IT CAN CAUSE INJURY TO PERSONS.**	
(1)	Make sure that the related engine is safe: – Set the ELECTRIC MASTER key switch to OFF. – Set the ENGINE MASTER switch to OFF. – Set the power lever to 0%.	
(2)	Disconnect the airplane main battery.	Refer to Chapter 24.
(3)	Remove the engine cowlings.	Refer to Chapter 71.
(4)	Locate the sensor that you will replace.	Refer to Figs 2 thru 6.
(5)	Disconnect the electrical cables for the sensor.	At the sensor or in-line connector.

	Detail Steps/Work Items	Key Items/References
(6)	Replace the sensor: – Remove the screw that attaches the sensor to the sensor mounting. – Unscrew the sensor from the sensor mounting. – Discard the O-ring seal or washer. – Install a new O-ring seal or washer. – Screw the sensor into the sensor mounting. – Move the sensor into position at the mounting and install the screw that attaches the sensor.	 Crankshaft sensor only. Use a wrench on the hexagonal section of the sensor. Crankshaft sensor only.
(7)	Connect the electrical cables to the sensor.	At the sensor or in-line connector.
(8)	Install the engine cowlings.	Refer to Section 71-10.
(9)	Connect the airplane main battery.	Refer to Section 24-31.
(10)	Do a ground test of the related engine and monitor the related engine indication.	Refer to Section 71-00.

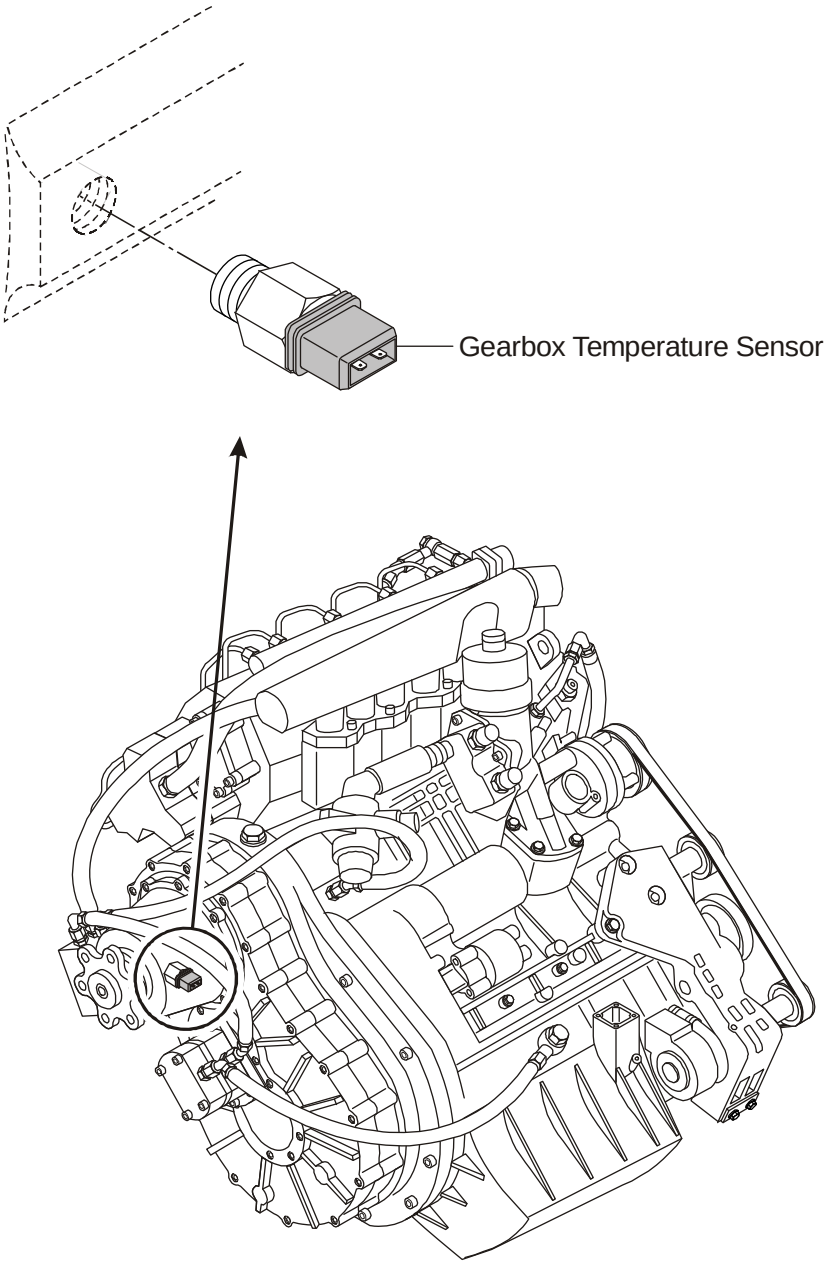


Figure 3: Gearbox Temperature Sensor Installation

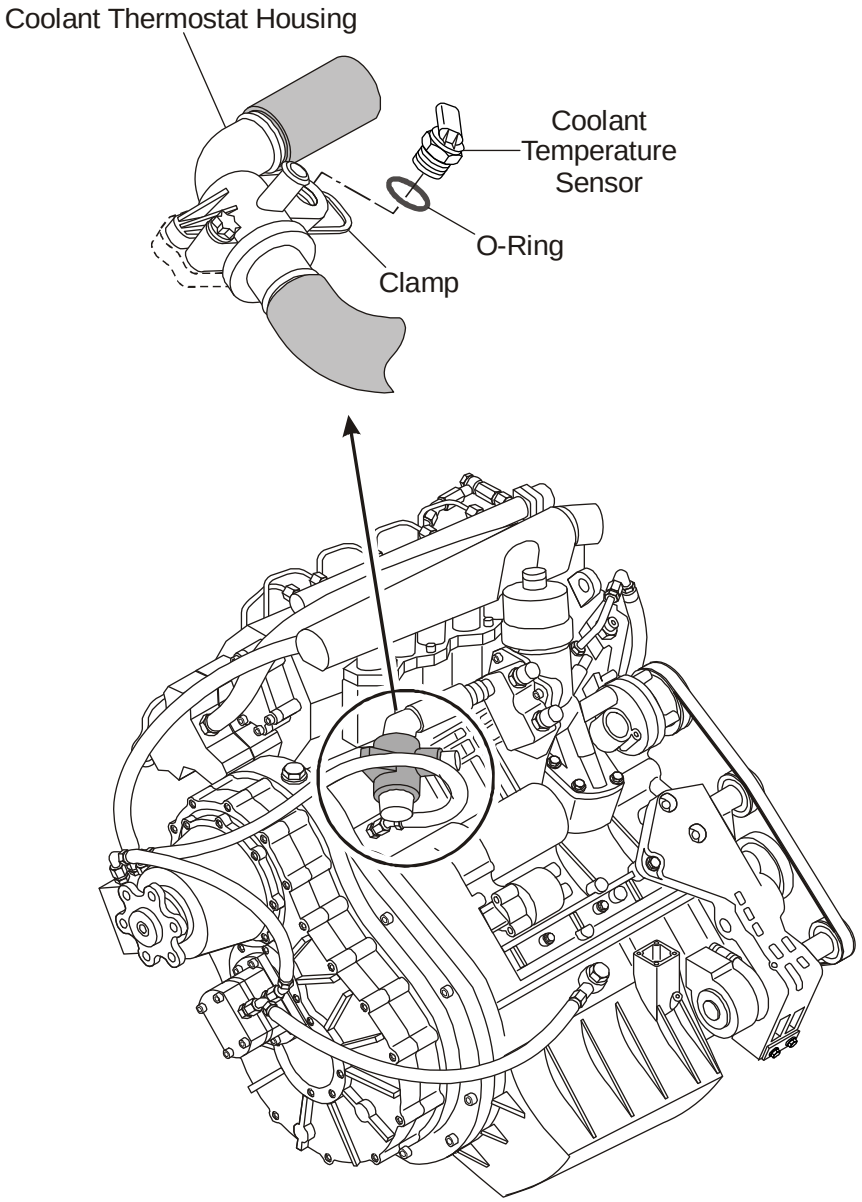


Figure 4: Engine Coolant Temperature Sensor Installation

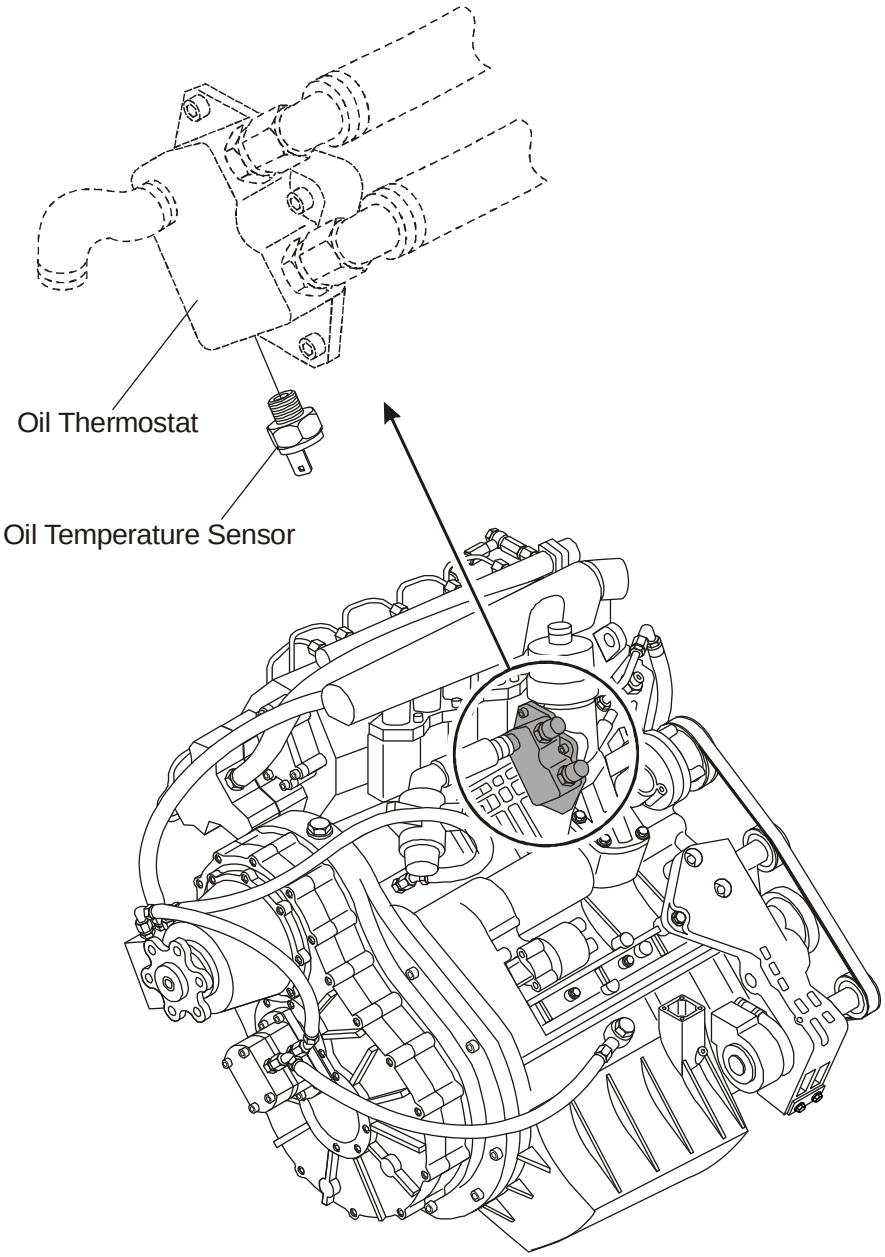


Figure 5: Oil Temperature Sensor Installation

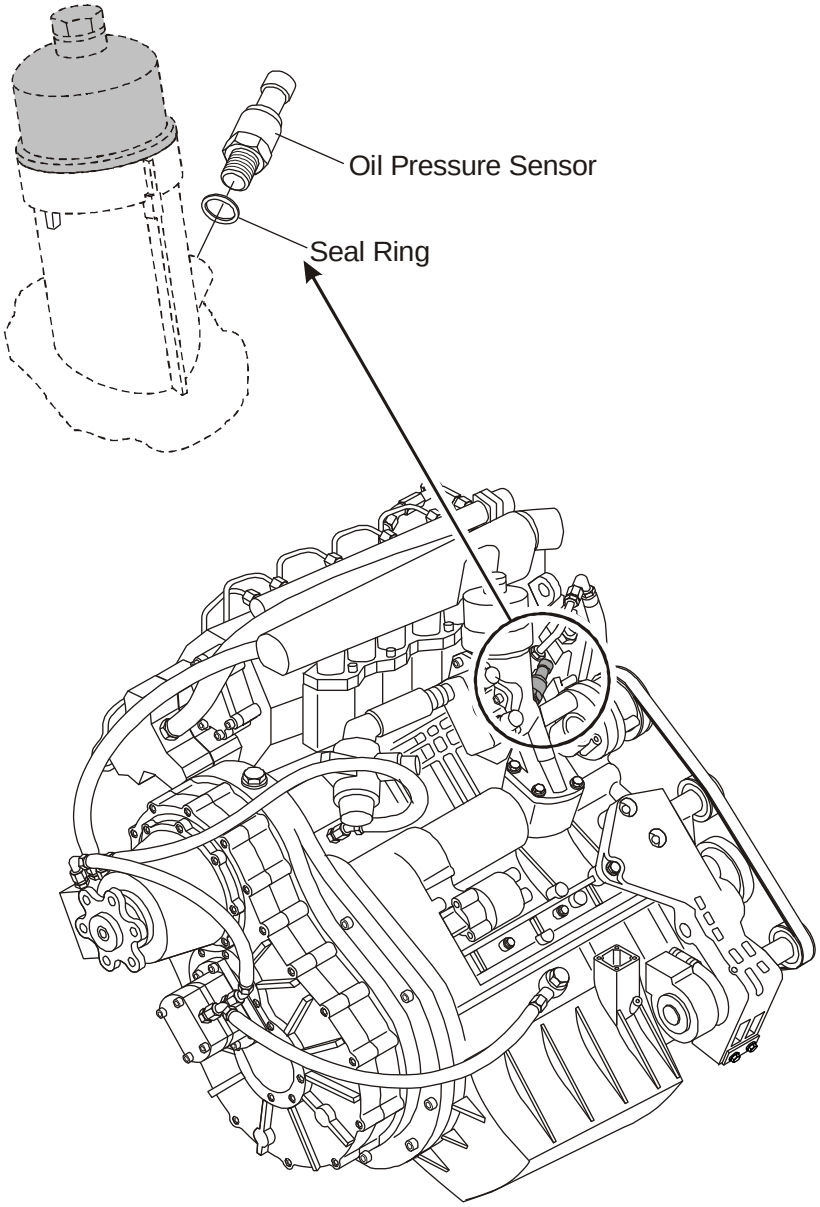


Figure 6: Engine Oil Pressure Sensor Installation

CHAPTER 78

EXHAUST

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CHAPTER 78
EXHAUST

Section 78-00
Exhaust - Lycoming IO-360-M1A Engine

1. General

The DA 40 with the Lycoming IO-360-M1A engine has a single exhaust system. Four exhaust down-pipes connect the exhaust ports on the cylinder heads to an exhaust muffler. The muffler has a shroud. The shroud makes a heat-exchanger system for supplying heated air for the cabin heating system.

Refer to Section 21-40 for data about the cabin heating.

2. Description

Welded stainless-steel makes the exhaust system. Four down-pipes attach to the cylinder exhaust ports with nuts and washers. A special gasket makes a gas-tight seal between the exhaust port and the flange of the down-pipe.

The bottom end of the down-pipe connects to the exhaust muffler with two expansion joints which are connected with a connection tube. The expansion joint allows the exhaust system to expand and move when it gets hot. Nuts, bolts and washers hold the expansion joint together.

A metal shroud and an inliner go around the outside of the muffler. Screws and thread plates clamp the muffler in position. The shroud has stub-pipes at the front and at the rear. The space between the inliner of the muffler and the shroud makes the heat exchanger for the cabin heat system.

If installed (MÄM 40-225) the shroud and the muffler are supported with a brace attached between the shroud and the throttle cable boss.

3. Operation

Exhaust gases from the cylinders flows through the down-pipes to the muffler. The muffler takes some of the energy from the gases. The gases then flow out of the muffler under the rear-right-side of the engine.

The shroud on the muffler has two functions. It makes a heat exchanger to give heat for the cabin heating system and it makes a heat shield for the very hot muffler.

Cold air flows into the shroud through the front stub pipe. The cold air goes around the muffler and gets hot. The hot air then flows out through the rear stub-pipe and into the cabin heating system.

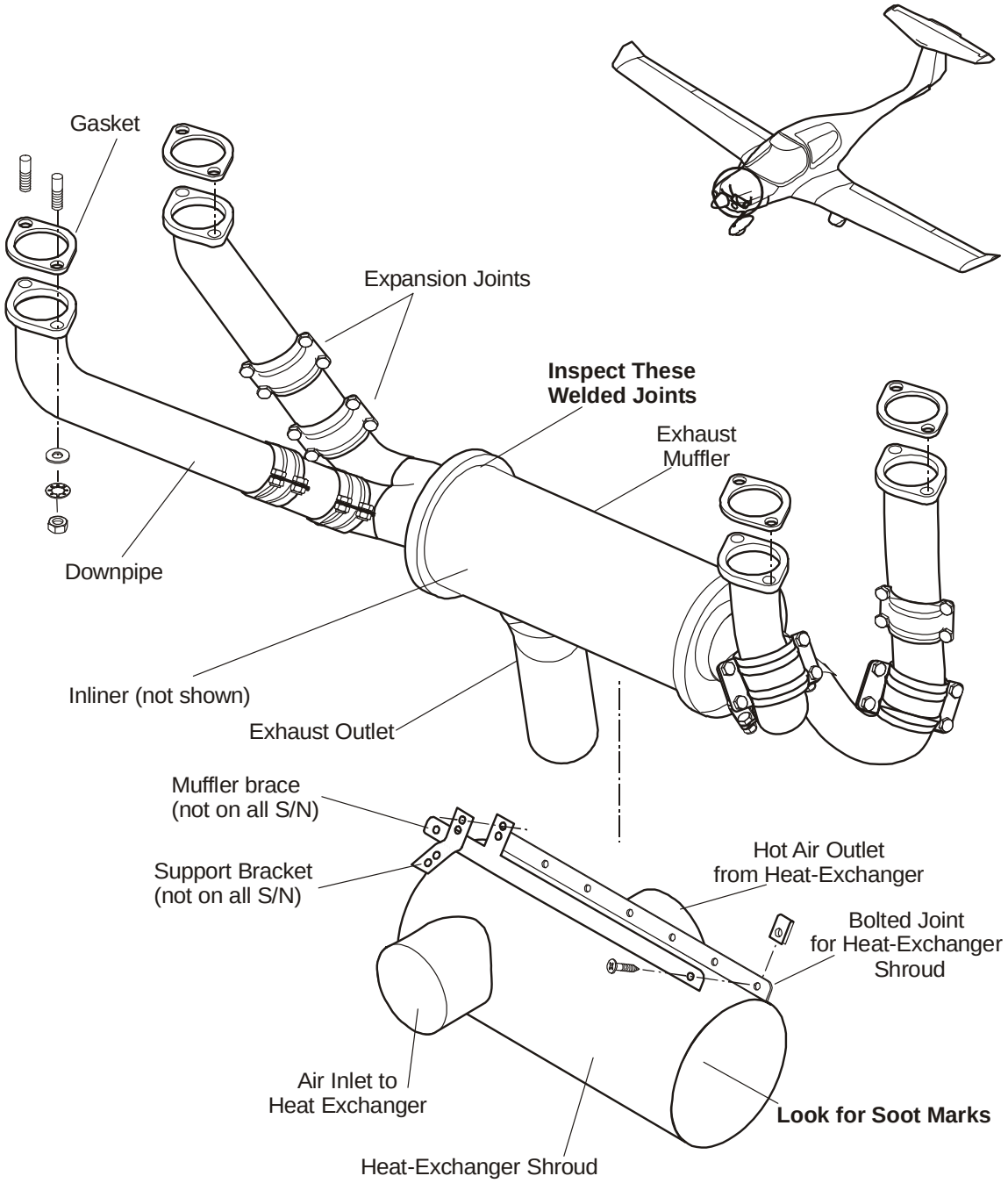


Figure 1: Exhaust Manifold and Muffler

Trouble-Shooting

1. General

The table below lists the defects you could have with the exhaust system. If you have the trouble detailed in the Trouble column read across to the Possible Cause column. Then do the repair given in the Repair column.

Trouble	Possible Cause	Repair
Exhaust gas fumes in the cabin.	Muffler cracked under the shroud.	Replace the muffler.
More noise than usual.	Exhaust muffler/pipe cracked.	Look for signs of exhaust gas leaks. Replace damaged gaskets. Repair or replace cracked pipes.
	Internal damage to muffler.	Replace muffler.

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Maintenance Practices

1. General

The Maintenance Practices for the exhaust system tell you how to remove/install the components of the exhaust system. They also tell you how to do an inspection of the muffler.

WARNING: MAKE SURE THAT THE EXHAUST SYSTEM IS COOL BEFORE YOU TOUCH IT. THE EXHAUST SYSTEM CAN BE VERY HOT, THIS CAN CAUSE INJURY TO PERSONS.

2. Remove/Install the Exhaust Muffler

A. Remove the Exhaust Muffler

	Detail Steps/Work Items	Key Items/References
	WARNING: MAKE SURE THE ENGINE IS SAFE BEFORE YOU DO ANY WORK ON THE EXHAUST SYSTEM. IF THE ENGINE STARTS THE PROPELLER CAN CAUSE INJURY OR DEATH.	
(1)	Make sure that the engine is safe: – The ignition switch is set to OFF. – The ALT/BAT switch is set to OFF. – The throttle is set to IDLE. – The mixture control is set to LEAN CUT-OFF.	
(2)	Remove the engine cowlings.	Refer to Section 71-10.
(3)	Release the worm drive clamp that holds the flexible hose to the front stub-pipe of the muffler. Move the flexible hose clear of the muffler.	
(4)	Release the worm drive clamp that holds the flexible hose to the rear stub-pipe of the muffler. Move the flexible hose clear of the muffler.	
(5)	If installed disconnect the muffler brace from the support bracket by removing the 2 AN4 bolts.	

	Detail Steps/Work Items	Key Items/References
(6)	Remove the lower of the two expansion-joints: – Remove the four nuts, washers and bolts which hold the expansion-joint-halves. – Move the expansion joint halves clear of the airplane.	Do this step for each of the cylinders. Hold the muffler!
(7)	If necessary, remove the second expansion-joint.	For easier maintenance.
(8)	Lower the exhaust muffler clear of the airplane.	

B. Install the Exhaust Muffler

	Detail Steps/Work Items	Key Items/References
(1)	Examine the muffler. Make sure that: – The muffler is not cracked. – The shroud is located correctly. – The muffler is clean.	
(2)	While holding the muffler in the correct position: – Move the expansion joint halves into position. – Install a washer on the bolt. – Push the bolt through the joint halves. – Install a second washer on the joint. – Install the nut.	Use a second person. Do these steps for each down-pipe.
(3)	Make sure that all the expansion joints are located correctly. Tighten the attachment bolts.	
(4)	If furnished connect the muffler brace to the support bracket by installing the 2 AN4 bolts.	
(5)	Install the rear flexible hose into position over the rear stub-pipe of the shroud and install the worm drive clamp.	
(6)	Install the front flexible hose over the front stub-pipe of the shroud and install the worm drive clamp.	
(7)	Install the engine cowlings.	Refer to Section 71-10.
(8)	Do an engine run-up. Listen for sounds of exhaust gas leakage.	Refer to the DA 40 Airplane Flight Manual.
(9)	Examine the inside of the engine cowlings for signs of exhaust gas leakage.	

3. Remove/Install an Exhaust Down-Pipe

A. Expendable Items

Item	Quantity	Part Number
Nut.	8	IPC.
Gasket.	4	IPC.

B. Remove an Exhaust Down-Pipe

	Detail Steps/Work Items	Key Items/References
	WARNING: MAKE SURE THE ENGINE IS SAFE BEFORE YOU DO ANY WORK ON THE EXHAUST SYSTEM. IF THE ENGINE STARTS THE PROPELLER CAN CAUSE INJURY OR DEATH.	
(1)	Make sure that the engine is safe: – The ignition switch is set to OFF. – The ALT/BAT switch is set to OFF. – The throttle is set to IDLE. – The mixture control is set to LEAN CUT-OFF.	
(2)	Remove the engine cowlings.	Refer to Section 71-10.
(3)	Remove the upper of the two expansion-joints: – Remove the four nuts, washers and bolts which hold the expansion-joint together. – Move the expansion joint halves clear of the airplane.	
(4)	Remove the exhaust gas temperature (EGT) probe.	

	Detail Steps/Work Items	Key Items/References
(5)	Remove the down-pipe: – Remove the two nuts and washers which attach the down-pipe to the cylinder head. – Move the down-pipe down and clear of the studs on the cylinder head. – Remove the gasket.	 Discard the nuts. Discard the gasket.

C. Install an Exhaust Down-Pipe

	Detail Steps/Work Items	Key Items/References
(1)	Install a new gasket onto the cylinder head studs.	
(2)	Put the down-pipe into position on the cylinder head studs.	Make sure that the gasket is correctly positioned.
(3)	Install the washers and the nuts which attach the down-pipe to the cylinder head.	Use new nuts!
(4)	Tighten the nuts.	
(5)	Install the exhaust gas temperature (EGT) probe.	
(6)	Install the down-pipe to muffler expansion-joint: – Install a washer on the bolt. – Push the bolt through the joint halves. – Install a second washer on the bolt. – Install the nut.	
(7)	Tighten the four nuts.	
(8)	Install the engine cowlings.	Refer to Section 71-10.
(9)	Do an engine run-up. Listen for sounds of exhaust gas leakage.	Refer to the DA 40 Airplane Flight Manual.
(10)	Examine the inside of the engine cowlings for signs of exhaust gas leakage.	

4. Inspect the Exhaust Muffler

WARNING: YOU MUST DO A THOROUGH EXAMINATION OF THE EXHAUST MUFFLER. A DEFECTIVE MUFFLER WILL LET EXHAUST GASES INTO THE COCKPIT. THIS CAN CAUSE DEATH OR INJURY.

	Detail Steps/Work Items	Key Items/References
(1)	Remove the exhaust muffler.	Refer to Paragraph 2.A.
(2)	Remove the muffler shroud: – Remove the screws which hold the shroud. – Carefully pull the shroud apart at the joint and move the shroud down the muffler-outlet-pipe. – Move the shroud clear of the muffler. – Carefully remove the inliner.	
(3)	Look carefully at the shroud and the inliner. Look specially at the inside for signs of gas leakage from the muffler.	Use a bright light and use a magnifying glass.
(4)	Look carefully at the muffler assembly. Look specially for: – Cracks in the welds, specially around the joints. – Cracks in the muffler skin. – Damage to surface of the muffler. – Corrosion.	Use a bright light and use a magnifying glass. NO CRACKS ARE PERMITTED ANYWHERE ON THE MUFFLER.
(5)	If you find a crack you must replace the muffler.	

	Detail Steps/Work Items	Key Items/References
(6)	Install the shroud on the muffler: – Put the inliner onto the muffler. – Move the shroud over the muffler-outlet-pipe. – Gently pull the shroud apart and over the muffler. – Install the screws which hold the shroud ends together.	Make sure that the shroud is positioned correctly.
(7)	Install the muffler on the airplane.	Refer to Paragraph 2.B.

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Section 78-01
Exhaust - TAE 125 Diesel Engines

1. General

The DA 40 D with the TAE 125-01 Diesel engine has a simple 2-piece standard exhaust system. If OÄM 40-096 is implemented an exhaust muffler system is installed.

If the TAE 125-02-99 engine is installed (MÄM 40-256 carried out) the DA 40 D is equipped with the exhaust muffler system.

This Section tells you only about the exhaust from the outlet of the turbo-charger. Refer to the engine manufacturer for data about the engine exhaust manifold and turbo-charger.

2. Description

A. TAE 125-01 Engine with Standard Exhaust System

Figure 1 shows the exhaust installation. The exhaust system has two large-diameter tubes connected by a spherical joint. A large flange attaches the front tube to the front of the turbo-charger. The tube goes round the engine mounting frame to the spherical joint below the engine. A bracket from the tube braces it to the bottom of the engine. This bracket has been removed with design change MÄM 40-138.

The front tube has the ball part of a spherical coupling welded to the end. The rear tube has the female fitting of the coupling welded to the end. Flanges with three lugs are welded to each tube adjacent to the spherical end fittings. Three strong springs attach to the lugs of the flanges to hold the coupling together.

The rear tube has two hooks that engage with rubber mountings. The top of the rubber mountings engage with two hooks welded to the engine mounting frame.

The system has no muffler.

B. TAE 125-01 Engine with Exhaust Muffler System (OÄM 40-096 installed) or TAE 125-02-99 Engine (MÄM 40-256 carried out)

Figure 2 shows the exhaust installation including the exhaust muffler. The exhaust system has a large-diameter tube connected to the exhaust muffler by a spherical joint. A large flange attaches the front tube to the front of the turbo-charger. The tube goes round the engine mounting frame to the spherical joint below the engine. A bracket from the tube braces it to the bottom of the engine.

The front tube has the ball part of a spherical coupling welded to the end. The female fitting of the coupling is inserted into an adapter ring which is inserted into the exhaust muffler. Two latches are welded on both the front pipe and the exhaust muffler. Two strong springs are fixed to these latches to hold the coupling together.

A clamp goes around the middle of the exhaust muffler. Two hooks, which are welded on the clamp, engage with rubber mountings. The top of the rubber mountings engage with two hooks welded to the engine mounting frame.

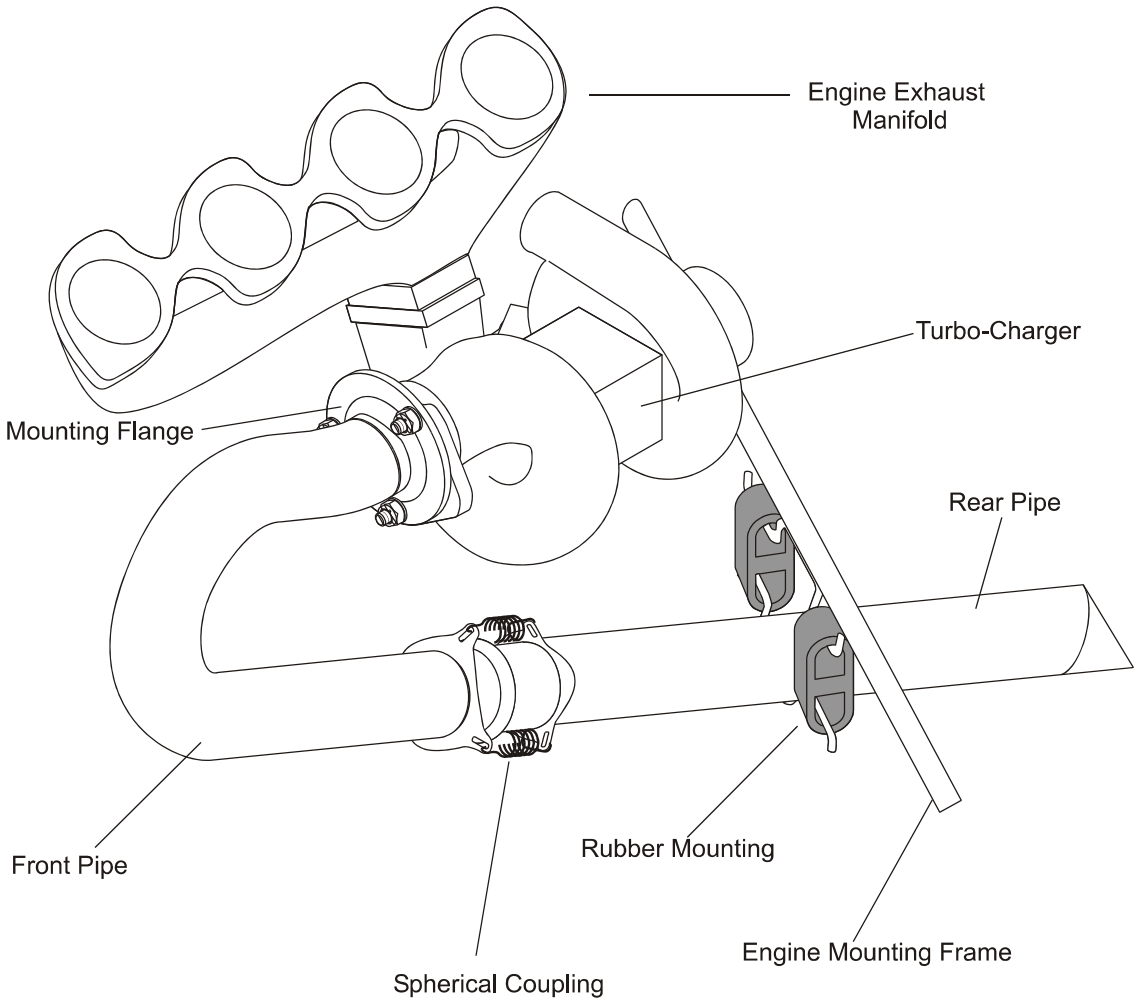


Figure 1: TAE 125-01 Engine - Standard Exhaust System Installation

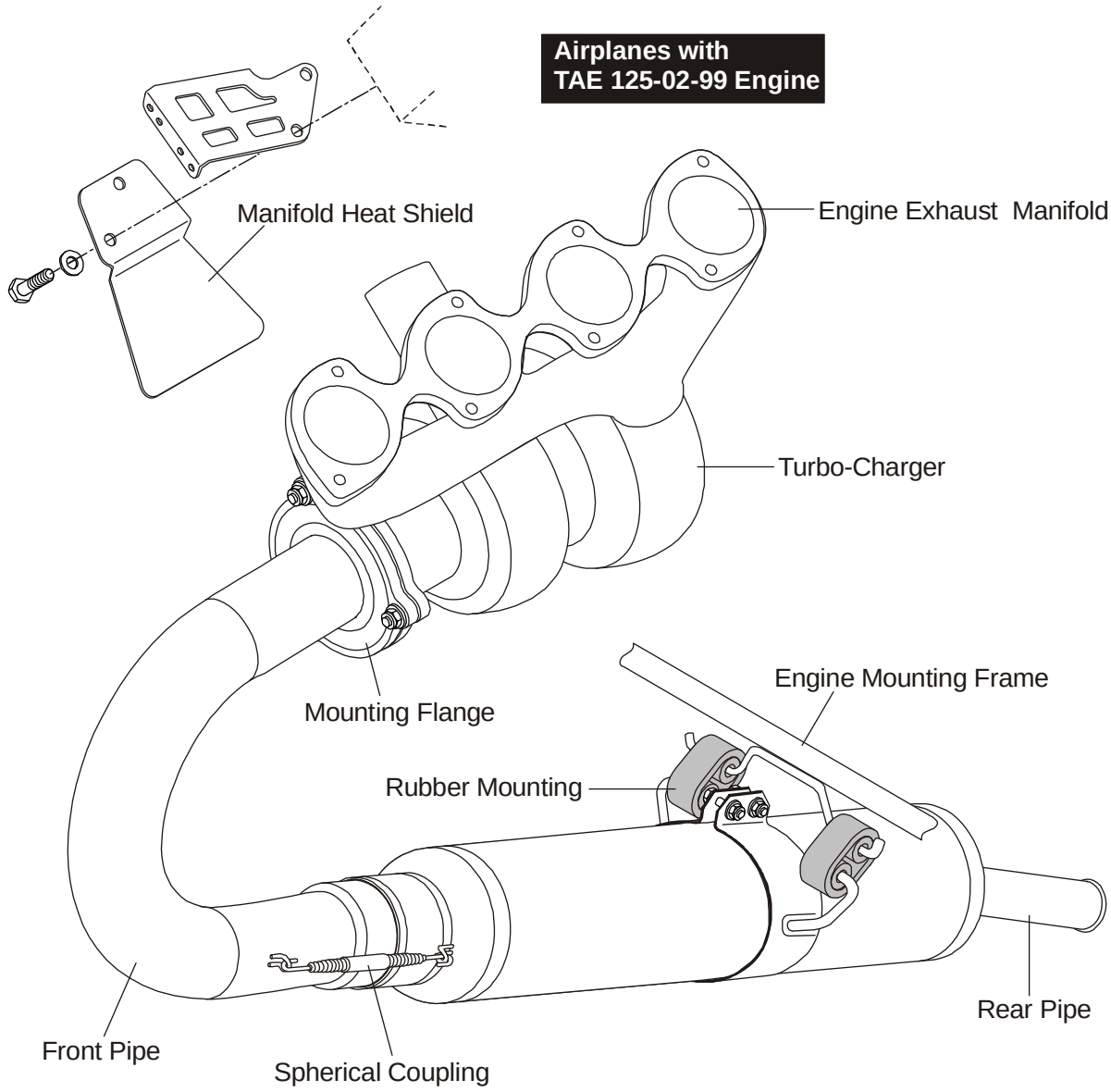


Figure 2: Exhaust Muffler System Installation for TAE 125-01 Engine (if OÄM 40-096 carried out) or TAE 125-02-99 Engine (if MÄM 40-256 carried out)

Trouble-Shooting

1. General

The tables below list the defects you could have with the exhaust systems. If you have the trouble detailed in the Trouble column read across to the Possible Cause column. Then do the repair given in the Repair column.

A. TAE 125-01 Engine with Standard Exhaust System

Trouble	Possible Cause	Repair
More noise than usual.	Exhaust pipe cracked.	Look for signs of exhaust gas leaks. Replace cracked pipes.
Signs of exhaust gas leaks in the engine compartment.	Exhaust pipe cracked.	Look for signs of exhaust gas leaks. Replace cracked pipes.
	Spherical coupling springs failed.	Replace the spherical coupling springs.
	Exhaust manifold gasket failed.	Refer to the engine manufacturer.
	Gasket between exhaust manifold and turbo-charger failed.	Refer to the engine manufacturer.
Rear exhaust pipe loose.	Rubber mountings failed.	Replace the rubber mountings.

B. TAE 125-01 Engine with Exhaust Muffler System installed (if OÄM 40-096 is installed) or TAE 125-02 Engine (if MÄM 40-256 is installed)

Trouble	Possible Cause	Repair
More noise than usual.	Exhaust pipe cracked.	Look for signs of exhaust gas leaks. Replace cracked pipes.
	Exhaust muffler damaged.	Look for damages in the exhaust muffler. Replace exhaust muffler.
Signs of exhaust gas leaks in the engine compartment.	Exhaust pipe cracked.	Look for signs of exhaust gas leaks. Replace cracked pipes.
	Spherical coupling springs failed.	Replace the spherical coupling springs.
	Exhaust manifold gasket failed.	Refer to the engine manufacturer.
	Gasket between exhaust manifold and turbo-charger failed.	Refer to the engine manufacturer.
Rear exhaust pipe or exhaust muffler loose.	Rubber mountings failed.	Replace the rubber mountings.

Maintenance Practices

1. General

These Maintenance Practices tell you how to remove and install the front and rear exhaust pipes. Only TAE approved repair shops or the manufacturer can do maintenance on the engine part of the exhaust system (manifold and turbo-charger).

2. Remove/Install the Rear Exhaust Pipe (TAE 125-01 Engine)

WARNING: MAKE SURE THAT THE EXHAUST SYSTEM IS COOL BEFORE YOU TOUCH IT. THE EXHAUST SYSTEM CAN BE VERY HOT, THIS CAN CAUSE INJURY TO PERSONS.

A. Remove the Rear Exhaust Pipe (TAE 125-01 Engine)

	Detail Steps/Work Items	Key Items/References
	WARNING: MAKE SURE THE ENGINE IS SAFE BEFORE YOU DO ANY WORK ON THE EXHAUST SYSTEM. IF THE ENGINE STARTS THE PROPELLER CAN CAUSE INJURY OR DEATH.	
(1)	Make sure that the engine is safe: – Set the ELECTRIC MASTER key switch to OFF. – Set the ENGINE MASTER switch to OFF. – Set the power lever to IDLE.	
(2)	Remove the engine cowlings.	Refer to Section 71-11.
(3)	Release the 3 springs at the spherical coupling.	Refer to Figure 1.
(4)	Release the 2 rubber mountings from the rear exhaust pipe.	
(5)	Remove the rear exhaust pipe from the airplane.	

B. Install the Rear Exhaust Pipe (TAE 125-01 Engine)

	Detail Steps/Work Items	Key Items/References
	WARNING: MAKE SURE THE ENGINE IS SAFE BEFORE YOU DO ANY WORK ON THE EXHAUST SYSTEM. IF THE ENGINE STARTS THE PROPELLER CAN CAUSE INJURY OR DEATH.	
(1)	Put the rear exhaust pipe in position below the engine.	Refer to Figure 1.
(2)	Attach the 2 rubber mountings at the rear exhaust pipe.	
(3)	Engage the rear pipe part of the spherical coupling with the ball of the front part.	Apply anti-seize compound (Loctite 8151 or equivalent) to the spherical coupling.
(4)	Install the 3 springs at the spherical coupling.	
(5)	Do a ground run-up. Look for leaks at the spherical joint.	Refer to Section 71-01.
(6)	Install the engine cowlings.	Refer to Section 71-11.

3. Remove/Install the Front Exhaust Pipe (TAE 125-01 Engine)

WARNING: MAKE SURE THAT THE EXHAUST SYSTEM IS COOL BEFORE YOU TOUCH IT. THE EXHAUST SYSTEM CAN BE VERY HOT, THIS CAN CAUSE INJURY TO PERSONS.

A. Remove the Front Exhaust Pipe (TAE 125-01 Engine)

	Detail Steps/Work Items	Key Items/References
	WARNING: MAKE SURE THE ENGINE IS SAFE BEFORE YOU DO ANY WORK ON THE EXHAUST SYSTEM. IF THE ENGINE STARTS THE PROPELLER CAN CAUSE INJURY OR DEATH.	
(1)	Make sure that the engine is safe: – Set the ELECTRIC MASTER key switch to OFF. – Set the ENGINE MASTER switch to OFF. – Set the power lever to IDLE.	
(2)	Remove the engine cowlings.	Refer to Section 71-11.
(3)	Release the 3 springs at the spherical coupling.	Refer to Figure 1.
(4)	Release the bolt attaching the front bracket.	Not installed if MÄM 40-138 conducted.
(5)	Release the 3 nuts and washers from the flange at the turbo-charger.	
(6)	Remove the front exhaust pipe from the airplane.	

B. Install the Front Exhaust Pipe (TAE 125-01 Engine)

	Detail Steps/Work Items	Key Items/References
	WARNING: MAKE SURE THE ENGINE IS SAFE BEFORE YOU DO ANY WORK ON THE EXHAUST SYSTEM. IF THE ENGINE STARTS THE PROPELLER CAN CAUSE INJURY OR DEATH.	
(1)	Put the front exhaust pipe in position on the turbo-charger.	Refer to Figure 1. Apply anti-seize compound (Loctite 8151 or equivalent) to the conical seat.
(2)	Install the 3 nuts and washers that attach the flange to the turbo-charger.	
(3)	Install the bolt for the front bracket.	Not installed if MÄM 40-138 conducted.
(4)	Engage the rear pipe part of the spherical coupling with the ball of the front part.	Apply anti-seize compound (Loctite 8151 or equivalent) to the spherical coupling.
(5)	Install the 3 springs at the spherical coupling.	
(6)	Do a ground run-up. Look for leaks at the spherical joint and turbo-charger joint.	Refer to Section 71-01.
(7)	Install the engine cowlings.	Refer to Section 71-11.

4. Remove/Install the Exhaust Muffler (if OÄM 40-096 or MÄM 40-256 is installed)

WARNING: MAKE SURE THAT THE EXHAUST SYSTEM IS COOL BEFORE YOU TOUCH IT. THE EXHAUST SYSTEM CAN BE VERY HOT, THIS CAN CAUSE INJURY TO PERSONS.

A. Remove the Exhaust Muffler

	Detail Steps/Work Items	Key Items/References
	WARNING: MAKE SURE THE ENGINE IS SAFE BEFORE YOU DO ANY WORK ON THE EXHAUST SYSTEM. IF THE ENGINE STARTS THE PROPELLER CAN CAUSE INJURY OR DEATH.	
(1)	Make sure that the engine is safe: – Set the ELECTRIC MASTER key switch to OFF. – Set the ENGINE MASTER switch to OFF. – Set the power lever to IDLE.	
(2)	Remove the engine cowlings.	Refer to Section 71-11.
(3)	Release the 2 springs at the spherical coupling.	Refer to Figure 2.
(4)	Release the 2 rubber mountings from the exhaust muffler.	
(5)	Remove the exhaust muffler including the muffler part of the spherical coupling and the adapter ring from the airplane.	

B. Install the Exhaust Muffler

	Detail Steps/Work Items	Key Items/References
	WARNING: MAKE SURE THE ENGINE IS SAFE BEFORE YOU DO ANY WORK ON THE EXHAUST SYSTEM. IF THE ENGINE STARTS THE PROPELLER CAN CAUSE INJURY OR DEATH.	
(1)	Insert the adapter ring into the exhaust muffler.	
(2)	Insert the muffler part of the spherical coupling into the adapter ring.	
(3)	Put the exhaust muffler in position below the engine.	Refer to Figure 2.
(4)	Attach the 2 rubber mountings at the exhaust muffler.	
(5)	Engage the exhaust muffler part of the spherical coupling with the ball of the front part.	Apply anti-seize compound (Loctite 8151 or equivalent) to the spherical coupling.
(6)	Install the 2 springs at the spherical coupling.	
(7)	Do a ground run-up. Look for leaks at the spherical joint.	Refer to Section 71-01.
(8)	Install the engine cowlings.	Refer to Section 71-11.

5. Remove/Install the Front Exhaust Pipe with the Muffler System Installed (if OÄM 40-096 or MÄM 40-256 is installed)

WARNING: MAKE SURE THAT THE EXHAUST SYSTEM IS COOL BEFORE YOU TOUCH IT. THE EXHAUST SYSTEM CAN BE VERY HOT, THIS CAN CAUSE INJURY TO PERSONS.

A. Remove the Front Exhaust Pipe

	Detail Steps/Work Items	Key Items/References
	WARNING: MAKE SURE THE ENGINE IS SAFE BEFORE YOU DO ANY WORK ON THE EXHAUST SYSTEM. IF THE ENGINE STARTS THE PROPELLER CAN CAUSE INJURY OR DEATH.	
(1)	Make sure that the engine is safe: – Set the ELECTRIC MASTER key switch to OFF. – Set the ENGINE MASTER switch to OFF. – Set the power lever to IDLE.	
(2)	Remove the engine cowlings.	Refer to Section 71-11.
(3)	Release the 2 springs at the spherical coupling.	Refer to Figure 2.
(4)	Remove the exhaust muffler.	Refer to Paragraph 4.
(5)	Release the bolt attaching the front bracket.	
(6)	Release the 3 nuts and washers from the flange at the turbo-charger.	
(7)	Remove the front exhaust pipe from the airplane.	

B. Install the Front Exhaust Pipe

	Detail Steps/Work Items	Key Items/References
	WARNING: MAKE SURE THE ENGINE IS SAFE BEFORE YOU DO ANY WORK ON THE EXHAUST SYSTEM. IF THE ENGINE STARTS THE PROPELLER CAN CAUSE INJURY OR DEATH.	
(1)	Put the front exhaust pipe in position on the turbo-charger.	Refer to Figure 2. Apply anti-seize compound (Loctite 8151 or equivalent) to the conical seat.
(2)	Install the 3 nuts and washers that attach the flange to the turbo-charger.	
(3)	Install the bolt for the front bracket.	
(4)	Install the 2 springs at the spherical coupling.	
(5)	Install the exhaust muffler.	Refer to Paragraph 4.
(6)	Do a ground run-up. Look for leaks at the spherical joint and turbo-charger joint.	Refer to Section 71-01.
(7)	Install the engine cowlings.	Refer to Section 71-11.

Section 78-02
Exhaust - Lycoming O-360-A4M Engine

1. General

The DA 40 with the Lycoming O-360-A4M engine has a single exhaust system. Four exhaust down-pipes connect the exhaust ports on the cylinder heads to an exhaust muffler. The muffler has a shroud. The shroud makes a heat-exchanger system for supplying heated air for the cabin heating system.

Refer to Section 21-40 for data about the cabin heating.

2. Description

Welded stainless-steel makes the exhaust system. Four down-pipes attach to the cylinder exhaust ports with nuts and washers. A special gasket makes a gas-tight seal between the exhaust port and the flange of the down-pipe.

The bottom end of the down-pipe connects to the exhaust muffler with an expansion joint. The expansion joint allows the exhaust system to expand and move when it gets hot. Nuts, bolts and washers hold the expansion joint together.

A metal shroud go around the outside of the muffler. Screws and thread plates clamp the muffler in position. The shroud has stub-pipes at the front and at the rear. The space between the muffler and the shroud makes the heat exchanger for the cabin heat system.

3. Operation

Exhaust gases from the cylinders flows through the down-pipes to the muffler. The muffler takes some of the energy from the gases. The gases then flow out of the muffler under the rear-right-side of the engine.

The shroud on the muffler has two functions. It makes a heat exchanger to give heat for the cabin heating system and it makes a heat shield for the very hot muffler.

Cold air flows into the shroud through the front stub pipe. The cold air goes around the muffler and gets hot. The hot air then flows out through the rear stub-pipe and into the cabin heating system.

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Trouble-Shooting

1. General

The table below lists the defects you could have with the exhaust system. If you have the trouble detailed in the Trouble column read across to the Possible Cause column. Then do the repair given in the Repair column.

Trouble	Possible Cause	Repair
Exhaust gas fumes in the cabin.	Muffler cracked under the shroud.	Replace the muffler.
More noise than usual.	Exhaust muffler/pipe cracked.	Look for signs of exhaust gas leaks. Replace damaged gaskets. Repair or replace cracked pipes.
	Internal damage to muffler.	Replace muffler.

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Maintenance Practices

1. General

The Maintenance Practices for the exhaust system tell you how to remove/install the components of the exhaust system. They also tell you how to do an inspection of the muffler.

WARNING: MAKE SURE THAT THE EXHAUST SYSTEM IS COOL BEFORE YOU TOUCH IT. THE EXHAUST SYSTEM CAN BE VERY HOT, THIS CAN CAUSE INJURY TO PERSONS.

2. Remove/Install the Exhaust Muffler

A. Remove the Exhaust Muffler

	Detail Steps/Work Items	Key Items/References
	WARNING: MAKE THE ENGINE IS SAFE BEFORE YOU DO ANY WORK ON THE EXHAUST SYSTEM. IF THE ENGINE STARTS THE PROPELLER CAN CAUSE INJURY OR DEATH.	
(1)	Make sure that the engine is safe: – The ignition switch is set to OFF. – The ALT/BAT switch is set to OFF. – The throttle is set to IDLE. – The mixture control is set to LEAN CUT-OFF.	
(2)	Remove the engine cowlings.	Refer to Section 71-12.
(3)	Remove air filter and intake baffle.	Refer to Section 73-02.
(4)	Release the worm drive clamp that holds the flexible hose to the rear stub-pipe of the heat exchanger shroud. Move the flexible hose clear of the muffler.	
(5)	Remove the exhaust tailpipe brace: – Remove the nut, washer and bolt, which hold the exhaust brace clamps to the exhaust brace.	

	Detail Steps/Work Items	Key Items/References
(6)	Remove the expansion-joints: – Remove the four nuts, washers and bolts which hold the expansion-joint-halves. – Move the expansion joint halves clear of the airplane.	Do this step for each of the cylinders. Hold the muffler!
(7)	If necessary, remove the second expansion-joint.	For easier maintenance.
(8)	Lower the exhaust muffler clear of the airplane.	

B. Install the Exhaust Muffler

	Detail Steps/Work Items	Key Items/References
(1)	Examine the muffler. Make sure that: – The muffler is not cracked. – The shroud is located correctly. – The muffler is clean.	
(2)	While holding the muffler in the correct position: – Move the expansion joint halves into position. – Install a washer on the bolt. – Push the bolt through the joint halves. – Install a second washer on the joint. – Install the nut.	Use a second person. Do these steps for each down-pipe.
(3)	Make sure that all the expansion joints are located correctly. Tighten the attachment bolts.	
(4)	Install the exhaust tailpipe brace: – Move the exhaust brace clamp into position. – Install the bolt, washers and nut.	
(5)	Install the rear flexible hose into position over the rear stub-pipe of the shroud and install the worm drive clamp.	
(6)	Install the intake baffle and the intake air filter.	Refer to Section 73-02.
(7)	Install the engine cowlings.	Refer to Section 71-12.
(8)	Do an engine run-up. Listen for sounds of exhaust gas leakage.	Refer to the DA 40 F Airplane Flight Manual.
(9)	Examine the inside of the engine cowlings for signs of exhaust gas leakage.	

3. Remove/Install an Exhaust Down-Pipe

A. Expendable Items

Item	Quantity	Part Number
Nut.	8	IPC.
Gasket.	4	IPC.

B. Remove an Exhaust Down-Pipe

	Detail Steps/Work Items	Key Items/References
	WARNING: MAKE THE ENGINE IS SAFE BEFORE YOU DO ANY WORK ON THE EXHAUST SYSTEM. IF THE ENGINE STARTS THE PROPELLER CAN CAUSE INJURY OR DEATH.	
(1)	Make sure that the engine is safe: – The ignition switch is set to OFF. – The ALT/BAT switch is set to OFF. – The throttle is set to IDLE. – The mixture control is set to LEAN CUT-OFF.	
(2)	Remove the engine cowlings.	Refer to Section 71-12.
(3)	Remove the expansion-joints: – Remove the four nuts, washers and bolts which hold the expansion-joint together. – Move the expansion joint halves clear of the airplane.	
(4)	Remove the exhaust gas temperature (EGT) probe (if fitted).	

	Detail Steps/Work Items	Key Items/References
(5)	Remove the down-pipe: – Remove the two nuts and washers which attach the down-pipe to the cylinder head. – Move the down-pipe down and clear of the studs on the cylinder head. – Remove the gasket.	Discard the nuts. Discard the gasket.

C. Install an Exhaust Down-Pipe

	Detail Steps/Work Items	Key Items/References
(1)	Install a new gasket onto the cylinder head studs.	
(2)	Put the down-pipe into position on the cylinder head studs.	Make sure that the gasket is correctly positioned.
(3)	Install the washers and the nuts which attach the down-pipe to the cylinder head.	Use new nuts!
(4)	Tighten the nuts.	
(5)	Install the exhaust gas temperature (EGT) probe.	
(6)	Install the down-pipe to muffler expansion-joint: – Install a washer on the bolt. – Push the bolt through the joint halves. – Install a second washer on the bolt. – Install the nut.	
(7)	Tighten the four nuts.	
(8)	Install the engine cowlings.	Refer to Section 71-12.
(9)	Do an engine run-up. Listen for sounds of exhaust gas leakage.	Refer to the DA 40 F Airplane Flight Manual.
(10)	Examine the inside of the engine cowlings for signs of exhaust gas leakage.	

4. Inspect the Exhaust Muffler

WARNING: YOU MUST DO A THOROUGH EXAMINATION OF THE EXHAUST MUFFLER. A DEFECTIVE MUFFLER WILL LET EXHAUST GASES INTO THE COCKPIT. THIS CAN CAUSE DEATH OR INJURY.

	Detail Steps/Work Items	Key Items/References
(1)	Remove the intake air filter and the intake baffle.	Refer to Section 71-62.
(2)	Remove the muffler shroud: – Remove the screws which hold the shroud. – Remove the upper section of the shroud. – Carefully pull the shroud apart at the joint and move the shroud down the muffler-outlet-pipe. – Move the lower section of the shroud clear of the muffler.	
(3)	Look carefully at the shroud and the inliner. Look specially at the inside for signs of gas leakage from the muffler.	Use a bright light and use a magnifying glass.
(4)	Look carefully at the muffler assembly. Look specially for: – Cracks in the welds, specially around the joints. – Cracks in the muffler skin. – Damage to surface of the muffler. – Corrosion.	Use a bright light and use a magnifying glass. NO CRACKS ARE PERMITTED ANYWHERE ON THE MUFFLER.
(5)	If you find a crack you must replace the muffler.	

	Detail Steps/Work Items	Key Items/References
(6)	Install the shroud on the muffler: – Move the shroud over the muffler-outlet-pipe. – Gently pull the shroud apart and over the muffler. – Install the upper shroud section. – Install the screws which hold the shroud ends together.	Make sure that the shroud is positioned correctly.
(7)	Install intake baffle and air intake filter.	Refer to Paragraph 2.B.

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CHAPTER 79

OIL SYSTEM

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CHAPTER 79
OIL SYSTEM

Section 79-00
Oil System - Lycoming IO-360-M1A Engine

1. General

The Lycoming IO-360-M1A installed in the DA 40 has the usual wet-sump oil system. The oil system has an oil cooler. The oil cooler attaches to brackets on the engine-mounting-frame. The oil system also has a temperature indicator. The indicator is part of the integrated-engine-instrument-display. For more data about the indication system refer to Section 77-40.

For more data on the oil system refer to the Lycoming Maintenance Manual.

2. Description/Operation

Figure 1 shows the schematic diagram for the oil system.

Oil is stored in the engine sump. Oil goes into the oil pump through an internal oil-way in the sump. The inlet to the oil-way has a strainer. The outlet of the oil pump flows to the thermostatic oil by-pass valve. When the oil is at normal operating temperature oil will flow through a flexible hose to the oil cooler. When the oil is cold the thermostatic by-pass valve sends the oil directly to the oil filter.

The oil filter has a by-pass valve. The by-pass valve is normally closed. If the oil filter becomes blocked the by-pass valve will open and oil will flow to the pressure regulating valve. From the oil pressure regulating valve the oil flows around the engine and back to the sump.

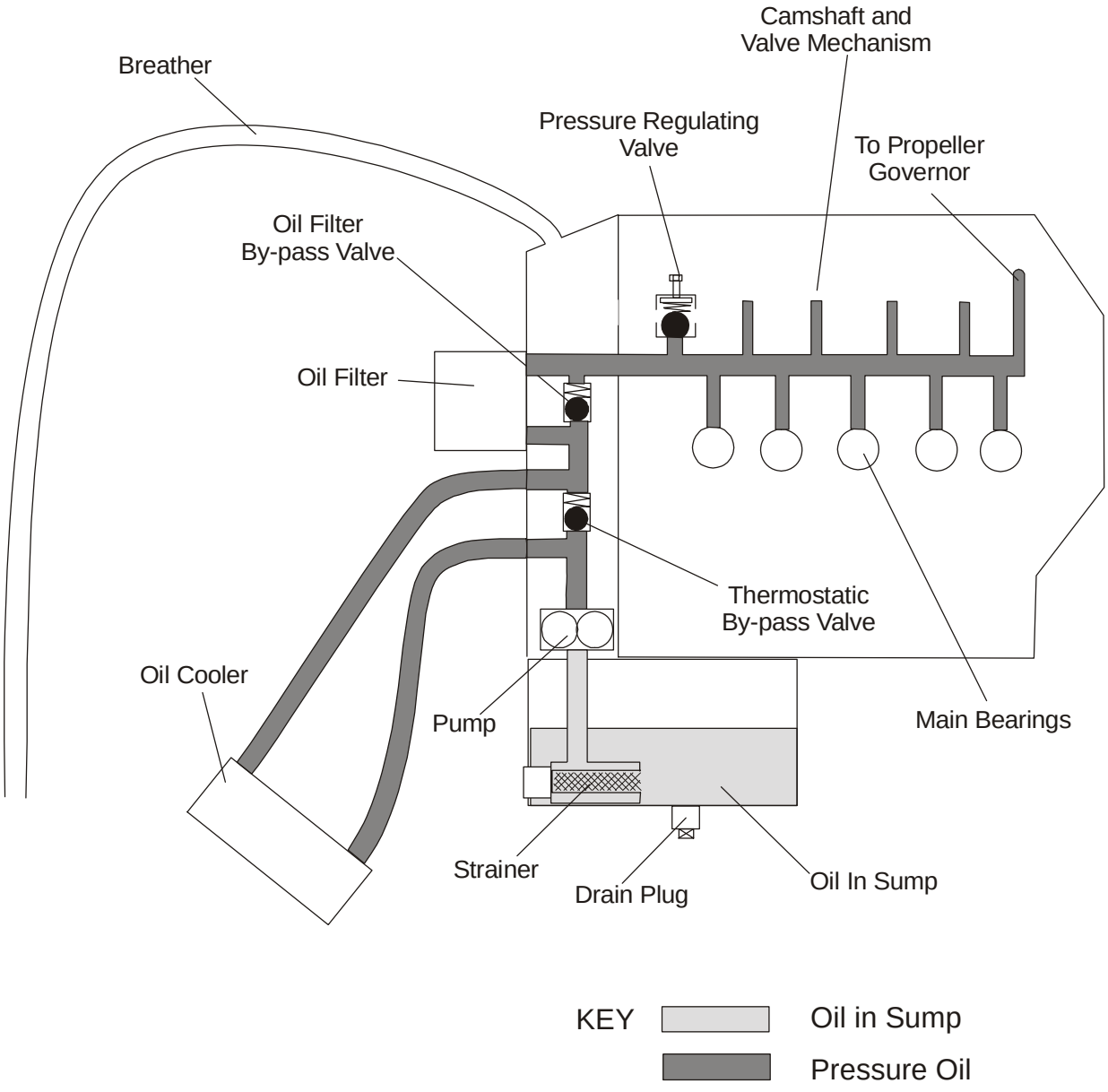


Figure 1: Oil System Schematic Diagram

Trouble-Shooting

1. General

The table below lists the defects you could have with the oil system. If you have the trouble detailed in the Trouble column read across to the Possible Cause column. Then do the repair given in the Repair column.

Trouble	Possible Cause	Repair
Engine oil temperature too high.	Air inlet/flexible hoses to oil cooler blocked.	Remove obstruction.
	Oil cooler matrix dirty/blocked.	Clean oil cooler matrix.
	Oil cooler blocked internally.	Remove oil cooler and flush with clean engine oil. Replace oil cooler.
Engine oil pressure too low.		Refer to Lycoming Maintenance Manual, latest revision.

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Maintenance Practices

1. General

These Maintenance Practices tell you how to remove/install the oil cooler. For more data on the oil system refer to the Lycoming Maintenance Manual.

2. Remove/Install the Oil Cooler

WARNING: DO NOT GET OIL ON YOU. OIL CAN CAUSE SKIN DISEASE.

CAUTION: ALWAYS PUT A CAP ON OPEN CONNECTIONS. IF YOU DO NOT PUT A CAP ON OPEN CONNECTIONS, THEN CONTAMINATION CAN GET INTO THE SYSTEM AND CAUSE DAMAGE.

CAUTION: DO NOT MIX OIL TYPES. IF YOU MIX OIL TYPES THE OIL CAN LOSE ITS PROPERTIES AND THE ENGINE WILL WEAR MORE QUICKLY.

A. Remove the Oil Cooler

	Detail Steps/Work Items	Key Items/References
	WARNING: MAKE SURE THE ENGINE IS SAFE BEFORE YOU DO ANY WORK ON THE OIL SYSTEM. IF THE ENGINE STARTS THE PROPELLER CAN CAUSE INJURY OR DEATH.	
(1)	Make sure that the engine is safe: – The ignition switch is set to OFF. – The ALT/BAT switch is set to OFF. – The throttle is set to IDLE. – The mixture control is set to LEAN CUT-OFF.	
(2)	Remove the engine cowlings.	Refer to Section 71-10.
(3)	Release the flexible hose from the connection at the inboard end of the oil cooler.	Use a suitable container to catch the oil. Put caps on the open connections.
(4)	Release the flexible hose from the connection at the outboard end of the oil cooler.	Use a suitable container to catch the oil. Put caps on the open connections.

	Detail Steps/Work Items	Key Items/References
(5)	Remove the oil cooler: – Release the nut, washer and bolt which attach the bottom of the oil cooler to the engine-mounting-frame. – Release the nuts, washers and bolts which attach the top of the oil cooler to the engine-mounting-frame. – Move the oil cooler clear of the airplane.	Hold the oil cooler!

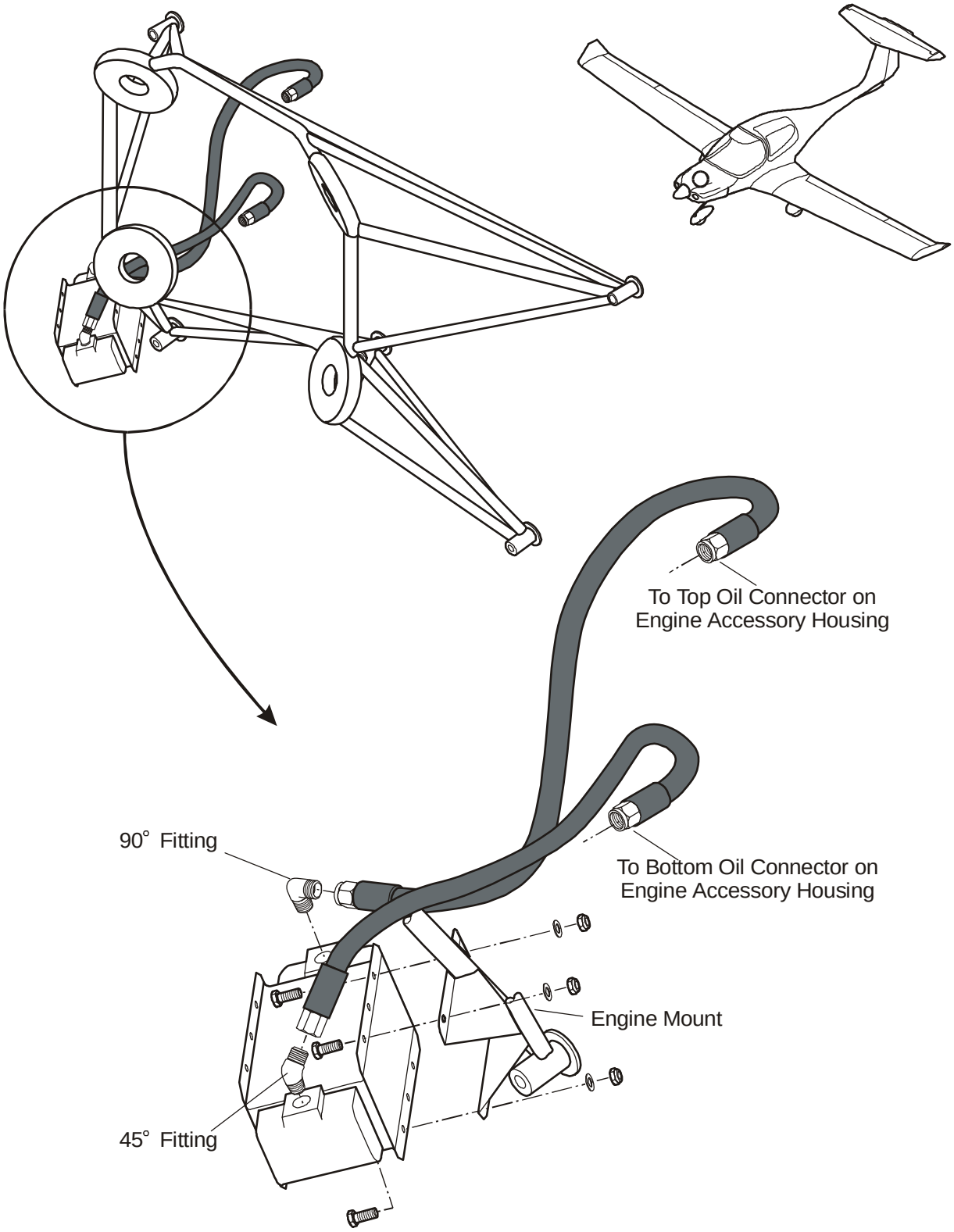


Figure 2: Oil Cooler Installation

B. Install the Oil Cooler

	Detail Steps/Work Items	Key Items/References
(1)	Put the oil cooler in position in the airplane.	
(2)	Install the bolts, washers and nuts which attach the oil cooler to the engine-mounting-frame.	
(3)	Connect the flexible hose to the connection at the inboard end of the oil cooler.	Remove the blanking caps.
(4)	Connect the flexible hose to the connection at the outboard end of the oil cooler.	Remove the blanking caps.
(5)	Install the engine cowlings.	Refer to Section 71-10.
(6)	Fill the engine with oil to the correct level.	Refer to Section 12-10.
(7)	Do an engine ground run-up. Monitor the oil temperature. Look specially for oil leaks.	The oil temperature indicator must show the relevant oil temperature. Refer to the DA 40 Airplane Flight Manual.
(8)	Stop the engine.	
(9)	Do a test for oil leaks: – Remove the engine cowlings. – Look for oil leaks, specially around the connections to the oil cooler. – Install the engine cowlings.	 Refer to Section 71-10. Refer to Section 71-10.

Section 79-01
Oil System - TAE 125 Diesel Engines

1. General

This Section tells you about the airframe parts of the engine oil system. These are the only parts that you can replace except the oil filter. Refer to Chapter 72 for data about the oil filter.

2. Engine Oil System

Figure 1 shows the oil system schematic diagram. Figure 2 and 3 show the component locations. The engine has the usual wet-sump lubrication system. The bottom part of the engine crankcase makes the sump. An oil filler tube with a screw cap connects to the crankcase on the left of the engine.

Two flexible hoses adjacent to the engine oil filter housing connect to the oil radiator. The oil radiator is located below the engine at the back.

The oil breather system has an oil pre-separator located on the engine crankcase adjacent to the oil filler. A flexible hose connects the oil pre-separator to the oil separator. The oil separator is located at the rear, left (TAE 125-01 engine) or on top (TAE 125-02-99 engine, MÄM 40-256 carried out) of the engine compartment. A flexible hose from the top of the oil separator vents blow-by gases and any remaining oil mist overboard. A flexible hose connects the bottom of the oil separator to the catch tank of the turbo-charger. From the catch tank a flexible hose connects to the engine oil sump via the auxiliary oil pump.

An oil pump in the engine takes oil from the sump. The oil flows through a filter and oil thermostat to the oil radiator. Air passing through the oil radiator cools the oil. The cool oil returns to the engine. Oil galleries in the engine take the oil to all bearings. If the oil is colder than 80 °C (176 °F), the oil thermostat sends the oil directly to the engine oil galleries.

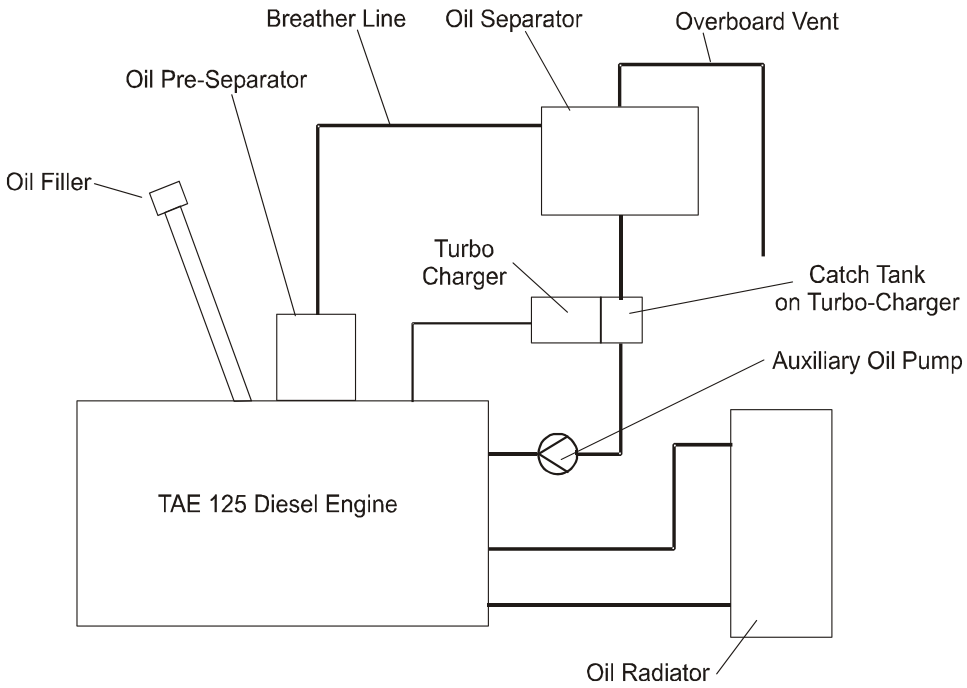


Figure 1: Oil System Schematic Diagram

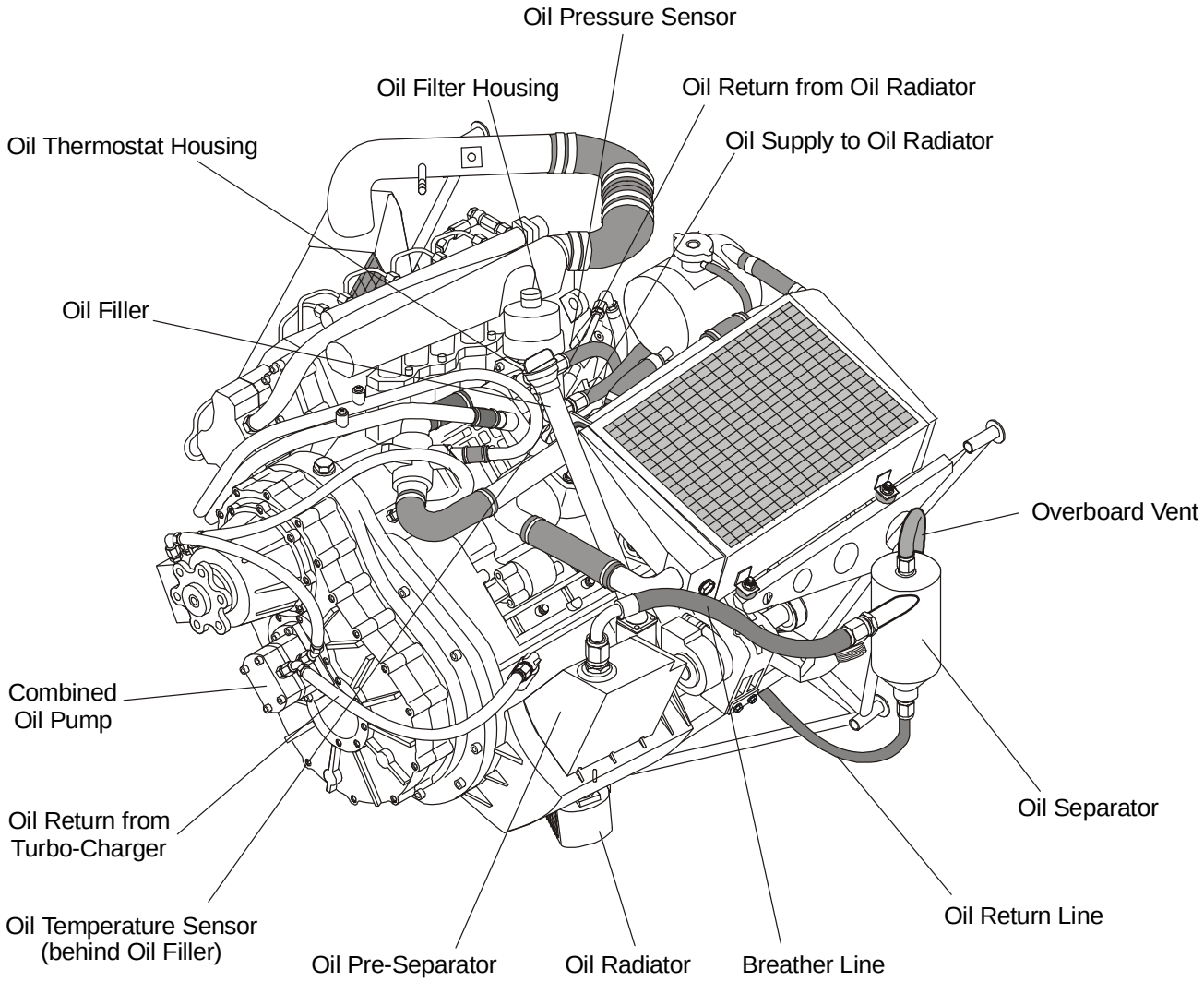


Figure 2: Oil System Component Locations - TAE 125-01 Engine

Airplanes with TAE 125-02-99 Engine

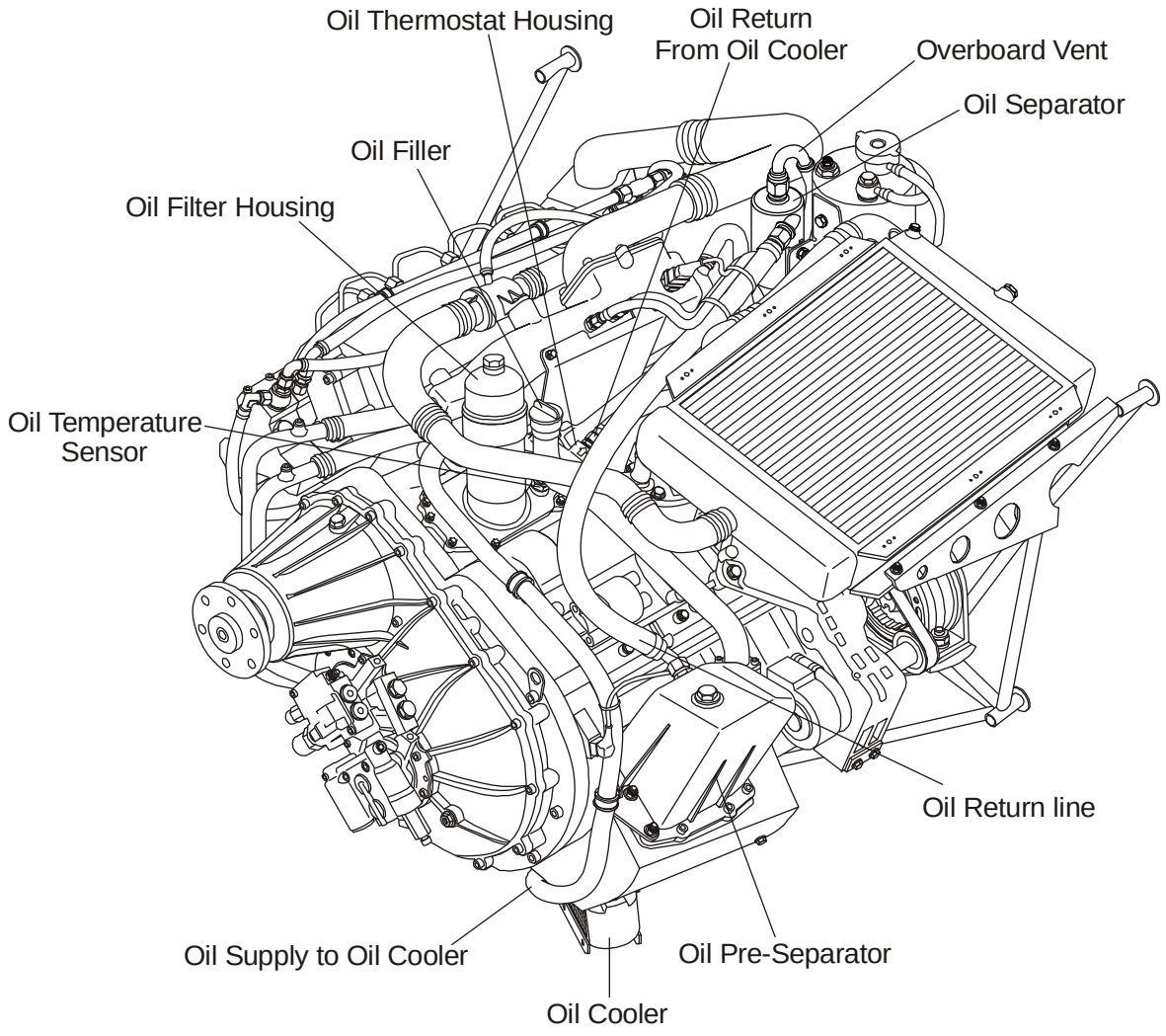


Figure 3: Oil System Components Locations - TAE 125-02-99 Engine (MÄM 40-256 carried out)

Trouble-Shooting

1. General

The table below lists the defects you could have with the oil system. If you have the trouble detailed in the Trouble column read across to the Possible Cause column. Then do the repair given in the Repair column.

Trouble	Possible Cause	Repair
Engine oil temperature too high.	Air inlet to oil radiator blocked.	Remove obstruction.
	Oil radiator matrix dirty/blocked.	Clean oil radiator matrix.
	Oil radiator blocked internally.	Remove oil radiator and flush with clean engine oil. Replace oil radiator.
	Low oil level.	Refill oil. Refer to Section 12-10.

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Maintenance Practices

1. General

These Maintenance Practices tell you how to remove/install the oil radiator.

2. Remove/Install the Oil Radiator

WARNING: DO NOT GET OIL ON YOU. OIL CAN CAUSE SKIN DISEASE.

CAUTION: ALWAYS PUT A CAP ON OPEN CONNECTIONS. IF YOU DO NOT PUT A CAP ON OPEN CONNECTIONS, THEN CONTAMINATION CAN GET INTO THE SYSTEM AND CAUSE DAMAGE.

CAUTION: DO NOT MIX OIL TYPES. IF YOU MIX OIL TYPES THE OIL CAN LOSE ITS PROPERTIES AND THE ENGINE WILL WEAR MORE QUICKLY.

A. Remove the Oil Radiator

	Detail Steps/Work Items	Key Items/References
	WARNING: MAKE THE ENGINE IS SAFE BEFORE YOU DO ANY WORK ON THE OIL SYSTEM. IF THE ENGINE STARTS THE PROPELLER CAN CAUSE INJURY OR DEATH.	
(1)	Make sure that the engine is safe: – Set the ELECTRIC MASTER key switch to OFF. – Set the ENGINE MASTER switch to OFF. – Set the power lever to IDLE.	
(2)	Remove the engine cowlings.	Refer to Section 71-11.
(3)	Release the flexible hose from the connection at the inboard end of the oil radiator.	Use a suitable container to catch the oil. Put caps on the open connections.
(4)	Release the flexible hose from the connection at the outboard end of the oil radiator.	Use a suitable container to catch the oil. Put caps on the open connections.

	Detail Steps/Work Items	Key Items/References
(5)	Remove the oil radiator: – Release the nuts, washers and bolts which attach the top of the oil radiator to the engine-mounting-frame. – Move the oil radiator clear of the airplane.	Hold the oil radiator!

B. Install the Oil Radiator

	Detail Steps/Work Items	Key Items/References
(1)	Install 90° fittings at the inlet and outlet ports of the radiator.	Only on a new oil radiator.
(2)	Put the oil radiator in position in the airplane.	
(3)	Install the bolts, washers and nuts which attach the oil radiator to the engine-mounting-frame.	
(4)	Connect the flexible hose to the connection at the inboard end of the oil radiator.	Remove the blanking caps.
(5)	Connect the flexible hose to the connection at the outboard end of the oil radiator.	Remove the blanking caps.
(6)	Install the engine cowlings.	Refer to Section 71-11.
(7)	Fill the engine with oil to the correct level.	Refer to Section 12-10.
(8)	Do an engine ground run-up. Monitor the oil temperature. Look specially for oil leaks.	The oil temperature indicator must show the relevant oil temperature. Refer to the DA 40 Airplane Flight Manual.
(9)	Stop the engine.	
(10)	Do a test for oil leaks: – Remove the engine cowlings. – Look for oil leaks, specially around the connections to the oil radiator. – Install the engine cowlings.	 Refer to Section 71-11. Refer to Section 71-11.

3. Remove/Install the Oil Separator

A. Remove the Oil Separator

	Detail Steps/Work Items	Key Items/References
(1)	Release the breather line between the engine and the oil separator.	Directly at the oil separator.
(2)	Release the breather line to the outboard.	Directly at the oil separator.
(3)	Disconnect the attaching bolts of the oil separator.	
(4)	Lift the oil separator: – Release the oil hose at the bottom of the oil separator.	
(5)	Move the oil separator clear of the airplane.	

B. Install the Oil Separator

	Detail Steps/Work Items	Key Items/References
(1)	Put the oil separator in position at the engine mount.	
(2)	Connect the oil hose to the bottom of the oil separator.	
(3)	Attach the oil separator to the engine mount.	
(4)	Connect the breather line to the oil separator.	
(5)	Connect the breather line between the engine and the oil separator to the oil separator.	

Section 79-02
Oil System - Lycoming O-360-A4M Engine

1. General

The Lycoming O-360-A4M engine installed in the DA 40 F has the usual wet-sump oil system. The oil system has an oil cooler. The oil cooler attaches to brackets on the engine-mounting-frame. The oil system also has a temperature indicator. The indicator is part of the integrated-engine-instrument-display. For more data about the indication system refer to Section 77-42.

For more data on the oil system refer to the Lycoming Maintenance Manual.

2. Description/Operation

Figure 1 shows the schematic diagram for the oil system.

Oil is stored in the engine sump. Oil goes into the oil pump through an internal oil-way in the sump. The inlet to the oil-way has a strainer. The outlet of the oil pump flows to the thermostatic oil by-pass valve. When the oil is at normal operating temperature oil will flow through a flexible hose to the oil cooler. When the oil is cold the thermostatic by-pass valve sends the oil directly to the oil filter.

The oil filter has a by-pass valve. The by-pass valve is normally closed. If the oil filter becomes blocked the by-pass valve will open and oil will flow to the pressure regulating valve. From the oil pressure regulating valve the oil flows around the engine and back to the sump.

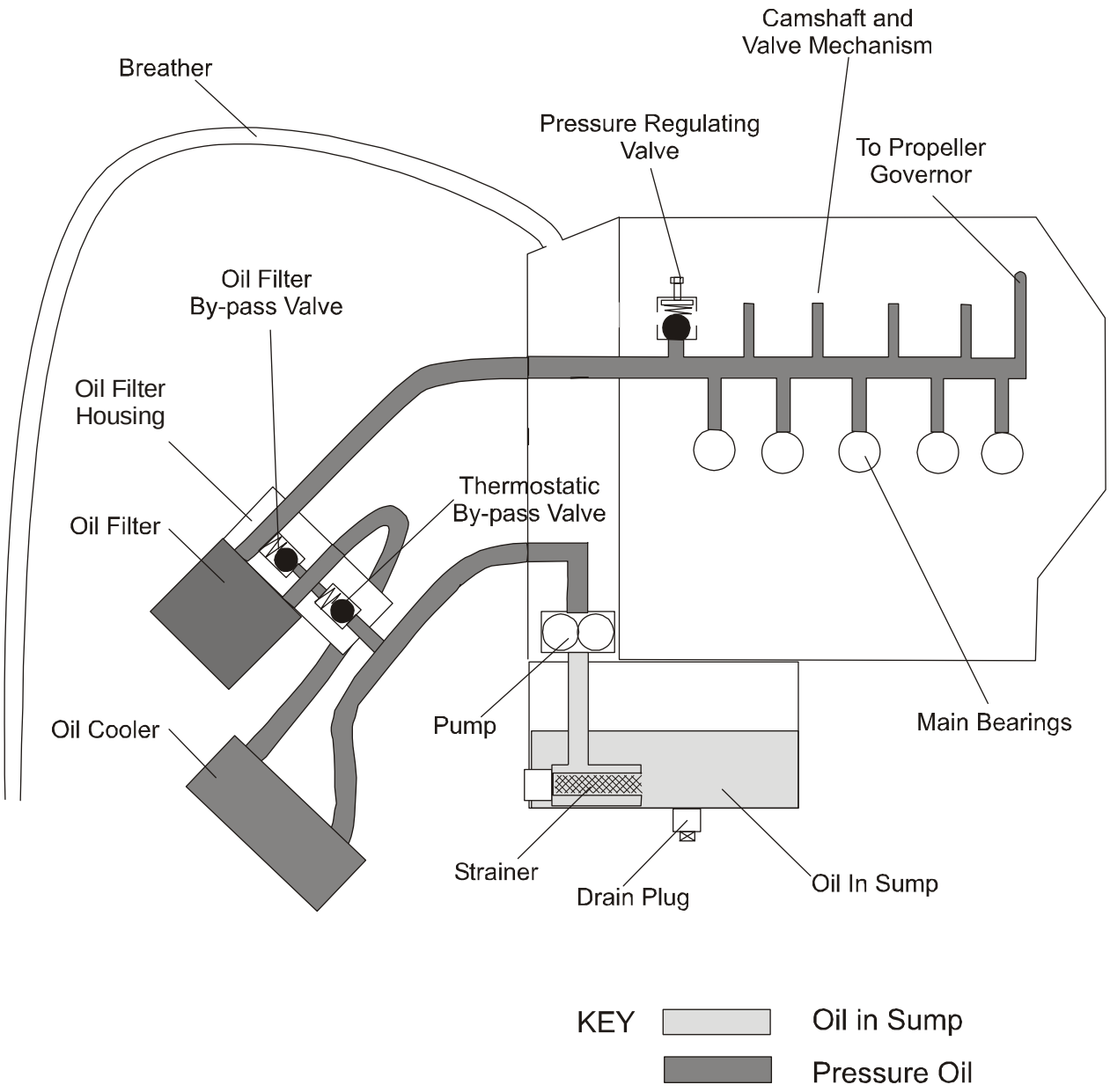


Figure 1: Oil System Schematic Diagram

Trouble-Shooting

1. General

The table below lists the defects you could have with the oil system. If you have the trouble detailed in the Trouble column read across to the Possible Cause column. Then do the repair given in the Repair column.

Trouble	Possible Cause	Repair
Engine oil temperature too high.	Air inlet/flexible hoses to oil cooler blocked.	Remove obstruction.
	Oil cooler matrix dirty/blocked.	Clean oil cooler matrix.
	Oil cooler blocked internally.	Remove oil cooler and flush with clean engine oil. Replace oil cooler.
Engine oil pressure too low.		Refer to Lycoming Maintenance Manual, latest revision.

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Maintenance Practices

1. General

These Maintenance Practices tell you how to remove/install the oil cooler. For more data on the oil system refer to the Lycoming Maintenance Manual.

2. Remove/Install the Oil Cooler

WARNING: DO NOT GET OIL ON YOU. OIL CAN CAUSE SKIN DISEASE.

CAUTION: ALWAYS PUT A CAP ON OPEN CONNECTIONS. IF YOU DO NOT PUT A CAP ON OPEN CONNECTIONS, THEN CONTAMINATION CAN GET INTO THE SYSTEM AND CAUSE DAMAGE.

CAUTION: DO NOT MIX OIL TYPES. IF YOU MIX OIL TYPES THE OIL CAN LOSE ITS PROPERTIES AND THE ENGINE WILL WEAR MORE QUICKLY.

A. Remove the Oil Cooler

	Detail Steps/Work Items	Key Items/References
	WARNING: MAKE SURE THE ENGINE IS SAFE BEFORE YOU DO ANY WORK ON THE OIL SYSTEM. IF THE ENGINE STARTS THE PROPELLER CAN CAUSE INJURY OR DEATH.	
(1)	Make sure that the engine is safe: – The ignition switch is set to OFF. – The ALT/BAT switch is set to OFF. – The throttle is set to IDLE. – The mixture control is set to LEAN CUT-OFF.	
(2)	Remove the engine cowlings.	Refer to Section 71-12.
(3)	Release the flexible hose from the connection at the inboard end of the oil cooler.	Use a suitable container to catch the oil. Put caps on the open connections.
(4)	Release the flexible hose from the connection at the outboard end of the oil cooler.	Use a suitable container to catch the oil. Put caps on the open connections.

	Detail Steps/Work Items	Key Items/References
(5)	Remove the oil cooler: – Release the nut, washer and bolt which attach the bottom of the oil cooler to the engine-mounting-frame. – Release the nuts, washers and bolts which attach the top of the oil cooler to the engine-mounting-frame. – Move the oil cooler clear of the airplane.	Hold the oil cooler!

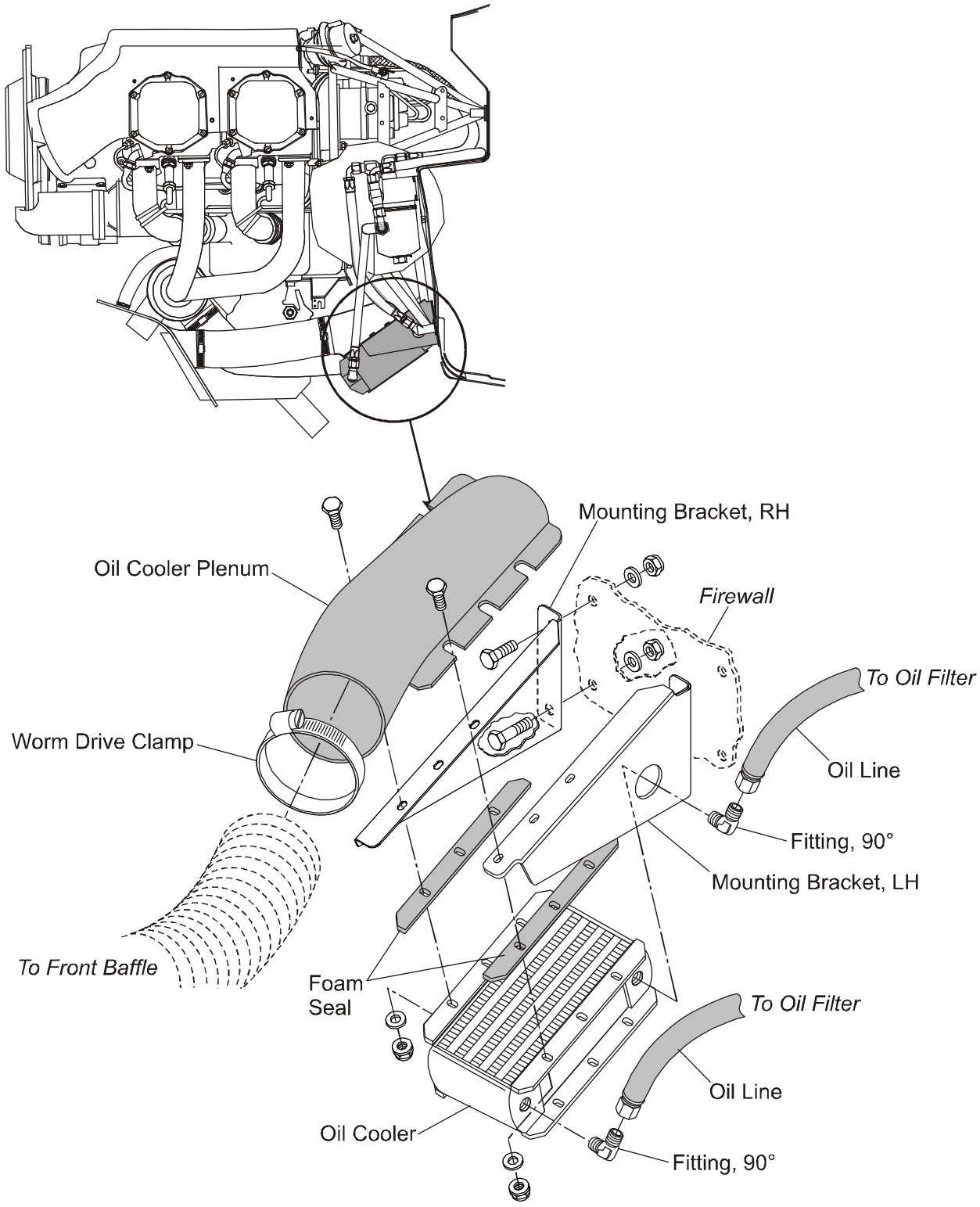


Figure 2: Oil Cooler Installation

B. Install the Oil Cooler

	Detail Steps/Work Items	Key Items/References
(1)	Put the oil cooler in position in the airplane.	
(2)	Install the bolts, washers and nuts which attach the oil cooler to the engine-mounting-frame.	
(3)	Connect the flexible hose to the connection at the inboard end of the oil cooler.	Remove the blanking caps.
(4)	Connect the flexible hose to the connection at the outboard end of the oil cooler.	Remove the blanking caps.
(5)	Install the engine cowlings.	Refer to Section 71-12.
(6)	Fill the engine with oil to the correct level.	Refer to Section 12-10.
(7)	Do an engine ground run-up. Monitor the oil temperature. Look specially for oil leaks.	The oil temperature indicator must show the relevant oil temperature. Refer to the DA 40 F Airplane Flight Manual.
(8)	Stop the engine	
(9)	Do a test for oil leaks: – Remove the engine cowlings. – Look for oil leaks, specially around the connections to the oil cooler. – Install the engine cowlings.	 Refer to Section 71-12. Refer to Section 71-12.

3. Remove/Install the Oil Filter

WARNING: DO NOT GET OIL ON YOU. OIL CAN CAUSE SKIN DISEASE.

CAUTION: ALWAYS PUT A CAP ON OPEN CONNECTIONS. IF YOU DO NOT PUT A CAP ON OPEN CONNECTIONS, THEN CONTAMINATION CAN GET INTO THE SYSTEM AND CAUSE DAMAGE.

CAUTION: DO NOT MIX OIL TYPES. IF YOU MIX OIL TYPES THE OIL CAN LOSE ITS PROPERTIES AND THE ENGINE WILL WEAR MORE QUICKLY.

A. Remove the Oil Filter

	Detail Steps/Work Items	Key Items/References
	WARNING: MAKE SURE THE ENGINE IS SAFE BEFORE YOU DO ANY WORK ON THE OIL SYSTEM. IF THE ENGINE STARTS THE PROPELLER CAN CAUSE INJURY OR DEATH.	
(1)	Make sure that the engine is safe: – The ignition switch is set to OFF. – The ALT/BAT switch is set to OFF. – The throttle is set to IDLE. – The mixture control is set to LEAN CUT-OFF.	
(2)	Remove the engine cowlings.	Refer to Section 71-12.
(3)	Remove the locking wire from the oil filter.	
(4)	Remove the oil filter.	Use a suitable container to catch the oil.
(5)	Move the oil filter clear of the airplane.	

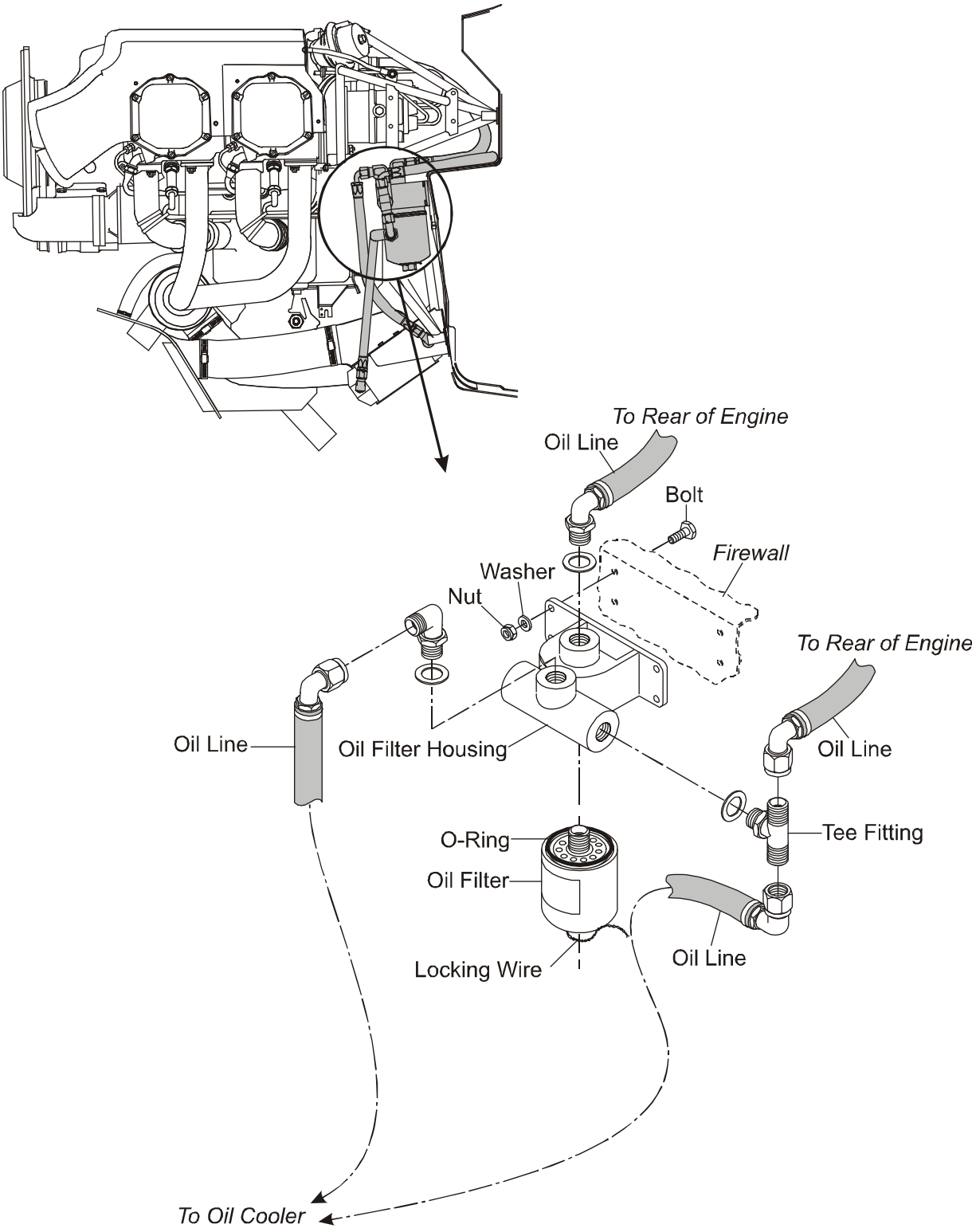


Figure 3: Oil Filter Installation

B. Install the Oil Filter

	Detail Steps/Work Items	Key Items/References
(1)	Clean the mating surface of the oil filter housing with a soft cloth.	
(2)	Install the oil filter. Use a lubricant approved by the oil filter manufacturer: – Lubricate the gasket on the oil filter. – Install the oil filter. – Torque to 23 Nm (17 lbf.ft.).	
(3)	Lock the oil filter to the oil filter housing using locking wire.	
(4)	Install the engine cowlings.	Refer to Section 71-12.
(5)	Fill the engine with oil to the correct level.	Refer to Section 12-10.
(6)	Do an engine ground run-up. Monitor the oil temperature. Look specially for oil leaks.	The oil temperature indicator must show the relevant oil temperature. Refer to the DA 40 F Airplane Flight Manual.
(7)	Stop the engine.	

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CHAPTER 80

STARTING

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STARTING

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Section 80-01

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CHAPTER 80
STARTING

Section 80-00
Starting - Lycoming Engine

1. General

This Section tells you about the system that cranks the Lycoming engine for starting.

Note: Equipment which is certified for installation in the DA 40 is listed in Section 6.5 of the Airplane Flight Manual. Such equipment may be installed in accordance with the Airplane Maintenance Manual.

Any equipment which is not listed in Section 6.5 of the Airplane Flight Manual is called "Additional Equipment". The installation of Additional Equipment is a modification which must be handled in accordance with national regulations or a Service Bulletin.

2. Description

Figure 1 shows a schematic diagram for the engine starter system. The system has these components:

A. Ignition Switch

The DA 40 has the usual ignition switch. The ignition switch is in the lower instrument panel, on the left. You operate the ignition switch with a key. You can set the ignition switch to any one of five positions. To set the START position you must hold the ignition key against a spring. If you release the key in the START position, the spring will turn the key counter-clockwise to the BOTH position. The switch has these positions:

– OFF. Both the magnetos are grounded. The starter is off.

– R. The right magneto is live, the left magneto is grounded. The starter is off.

– L. The left magneto is live, the right magneto is grounded. The starter is off.

– BOTH. Both the magnetos are live. The starter is off.

– START. Both magnetos are live. The starter is on.

You cannot repair the ignition switch. Refer to Section 74-00 for the procedure to replace the ignition switch.

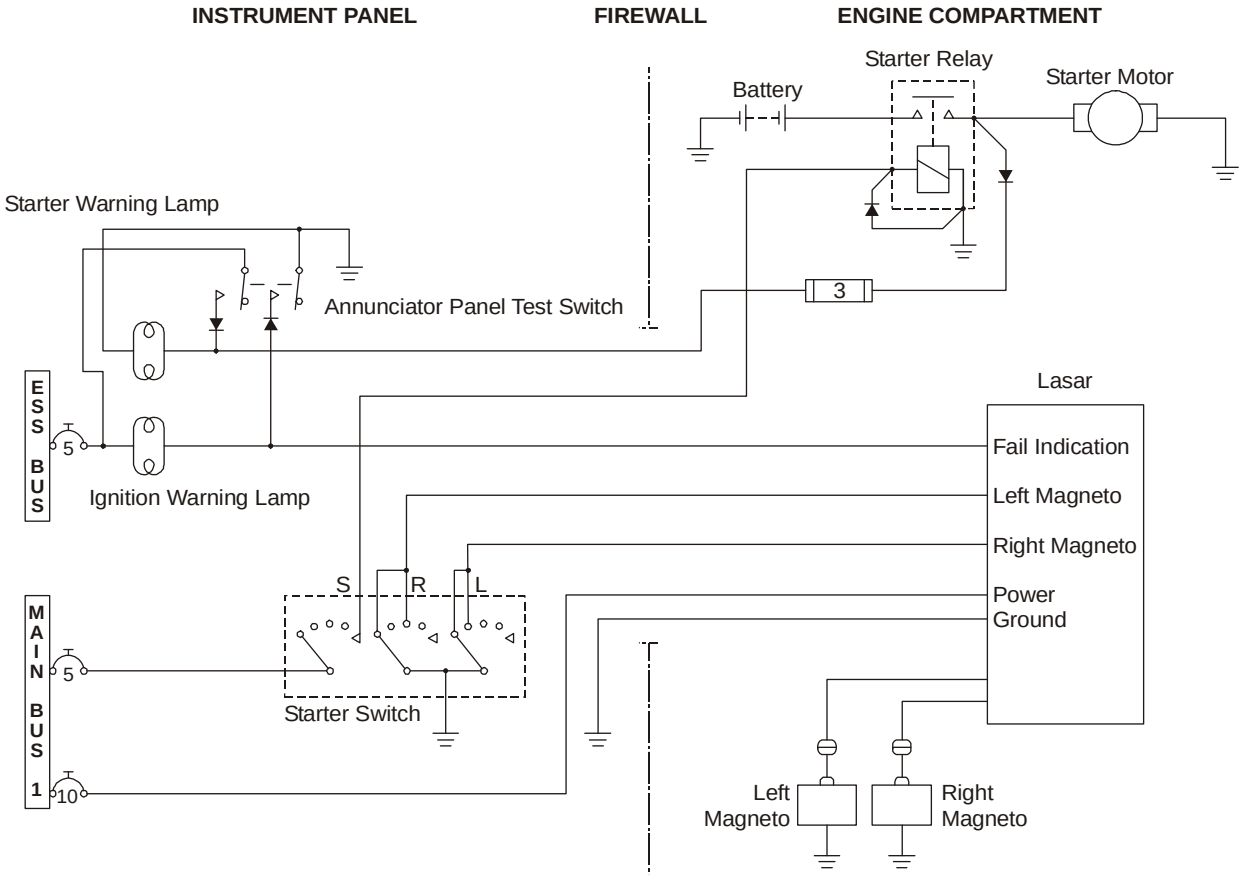


Figure 1: Starter System Schematic Diagram

B. Starter Relay

The DA 40 has a heavy-duty starter relay. The starter relay attaches to a mounting on the engine firewall in the relay mounting box. The relay has two small connectors for the control cables and two large connectors for the power cables. A cable for the starter-power-on-light also attaches to the starter relay. It connects to the same terminal as the power lead to the starter.

C. Starter Motor

The DA 40 has a lightweight starter motor. The motor attaches to the bottom of the engine crankcase at the front.

The starter has a pre-engage solenoid. The pre-engage solenoid moves the starter-pinion to engage with the engine-starter-gear. It also makes the electrical contacts for the starter motor. When the starter pinion is fully engaged with the engine-starter-gear, the electrical circuit for the starter motor is made and the starter turns.

The starter has a reduction gear. The reduction gear gives better performance from a smaller electric motor. Refer to the Lycoming Operators Manual/Sky-Tec Manual for more data about the starter motor.

D. Starter Power-On Light

The start system has an warning light. The light is located on the annunciator panel located on the instrument panel, at the top left. The light comes on when the starter relay is made and electrical power is going to the starter motor. A fuse protects the warning light system.

E. Cables

Heavy duty cables supply electrical power from the battery to the starter relay and from the starter relay to the starter solenoid.

3. Operation

The starter will not operate with the ignition switch in any of the first four positions. If you turn the ignition switch to the START position with the ALT/BAT switch set to ON, then these things occur:

– The current from the ignition switch energizes the starter relay.

– The starter relay connects the battery to the solenoid on the starter.

– The solenoid moves the starter pinion to engage with starter gear on the engine flywheel.

– The solenoid closes the contacts for the motor and the motor turns the engine.

– The starter power-on lights comes on.

When the engine turns faster than the starter motor, the starter motor gear disengages from the engine gear. The starter can turn until you turn the ignition key to one of the other positions.

Trouble-Shooting

1. General

The table below lists the defects you could have with the starting system. If you have the trouble detailed in the Trouble column read across to the Possible Cause column. Then do the repair given in the Repair column.

WARNING: DO NOT ALLOW PERSONS TO ENTER THE DANGER AREA OF THE PROPELLER. THE PROPELLER MAY TURN AND CAUSE INJURY TO PERSONS.

WARNING: DISCONNECT AND ISOLATE THE STARTER POWER CABLE BEFORE DOING TESTS IN THIS SECTION. THE ENGINE MAY START AND CAUSE INJURY TO PERSONS.

Trouble	Possible Cause	Repair
The starter does not operate when the ignition key is set to START with the ALT/BAT switch set to ON.	The battery is discharged. The ignition switch is defective. The starter relay is defective. Defective cable.	Replace/Recharge the battery. Replace the ignition switch. Replace the starter relay. Do a test of the electrical cables. Refer to Chapter 92 for the wiring diagrams. Repair/Replace the defective cable.
The starter does not operate when the ignition key is set to START with the ALT/BAT switch set to ON.	Starter defective. Cable defective.	Replace the starter. Do a test of the electrical cables. Refer to Chapter 92 for the wiring diagrams. Repair/Replace the defective cable.
The starter Power-On light stays on after the ignition key is released from the START position.	The starter relay is defective. Cable defective.	Replace the starter relay. Do a test of the electrical cables. Refer to Chapter 92 for the wiring diagrams. Repair/Replace the defective cable.

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Maintenance Practices

1. General

This Section tells you how to remove/install the starter relay and how to remove/install the starter motor. Refer to Section 74-00 for data on how to remove/install the ignition switch.

For more data on the starter motor refer to the Lycoming Operators Manual.

2. Remove/Install the Starter Relay

A. Remove the Starter Relay

	Detail Steps/Work Items	Key Items/References
	WARNING: MAKE THE ENGINE SAFE BEFORE YOU DO ANY WORK ON THE STARTER SYSTEM. IF THE ENGINE STARTS THE PROPELLER CAN CAUSE INJURY OR DEATH.	
(1)	Make sure that the engine is safe: – Set the ignition switch to OFF. – Set the ALT/BAT switch to OFF. – Set the throttle to IDLE. – Set the mixture control to LEAN CUT-OFF.	
(2)	Remove the engine top cowling.	Refer to Section 71-10 or 71-12.
(3)	Disconnect the airplane battery.	Refer to Section 24-31.
(4)	Remove the cover from the relay box: – Remove the 2 bolts which attach the relay box cover. – Remove the relay cover.	

	Detail Steps/Work Items	Key Items/References
(5)	Disconnect the cables from the starter relay.	Make a note of the position of the cables.
	Original design:	Refer to Figure 2.
	– Remove the 2 control cables and the 1 indicator cable.	
	– Remove the 2 power cables.	
	Modified design (MÄM 40-057):	Refer to Figure 3.
	– Remove the 1 ring terminal with the diode suppression cable and the control cable.	
	– Remove the 1 power cable.	
	– Remove the 1 nut and 1 washer of the bus bar connection.	
	Modified design (MÄM 40-072):	Refer to Figure 4.
	– Remove the 2 control cables and the 1 indicator cable.	
	– Remove the 2 power cables.	

	Detail Steps/Work Items	Key Items/References
(6)	Remove the starter relay.	
	Original design:	Refer to Figure 2.
	– Remove the 2 bolts and nuts which attach the relay to the bulkhead.	
	– Move the relay clear of the airplane.	
	Modified design (MÄM 40-057):	Refer to Figure 3.
	– Remove the 2 bolts, 3 washers, and 1 ring terminal which attach the relay to the relay panel.	
	– Move the relay clear of the airplane.	
	Modified design (MÄM 40-072):	Refer to Figure 4.
	– Remove the 2 bolts, 3 washers, and 1 ring terminal which attach the relay to the relay panel.	
	– Move the relay clear of the airplane.	

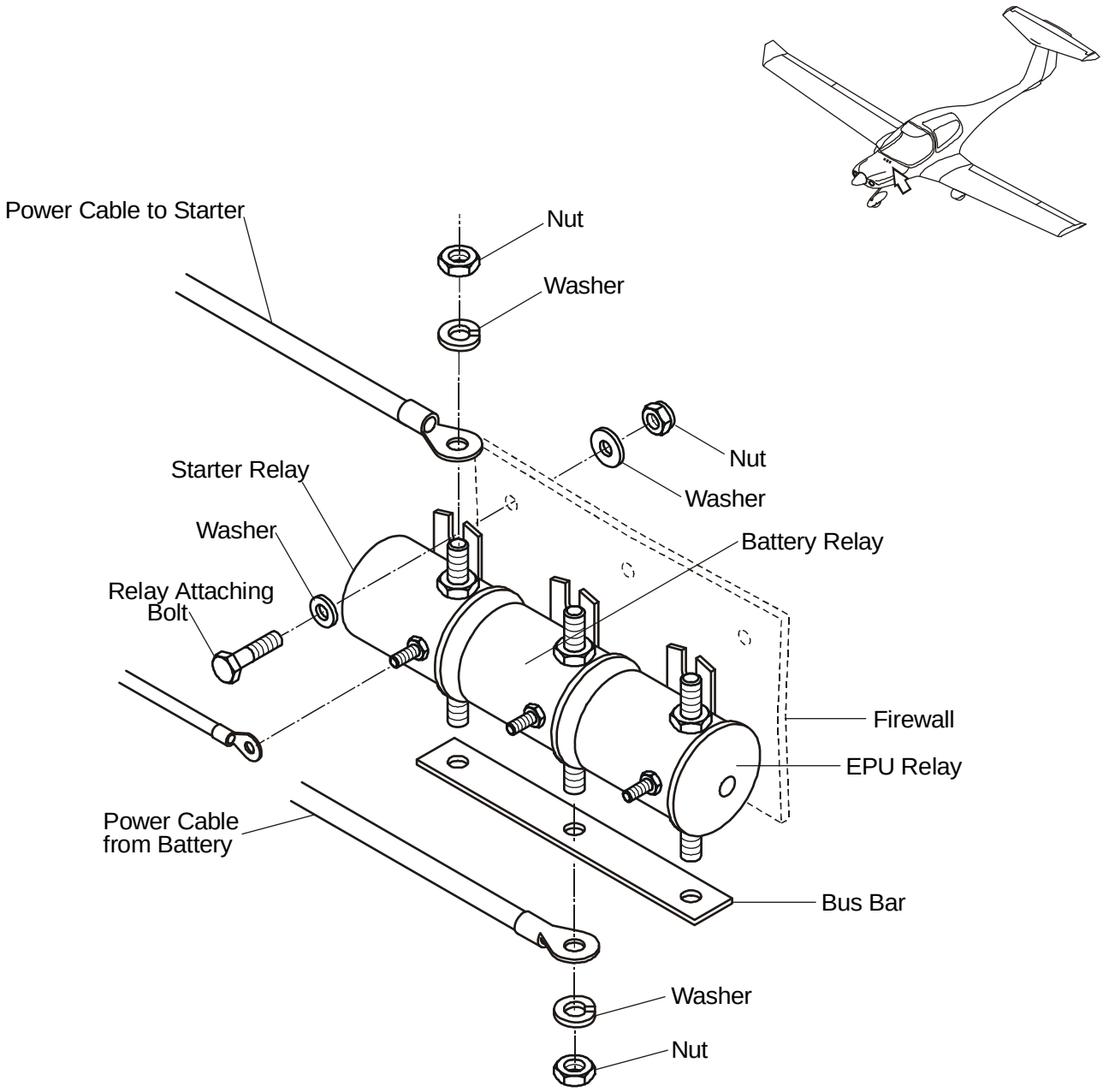


Figure 2: Starter Relay Installation, Original Design

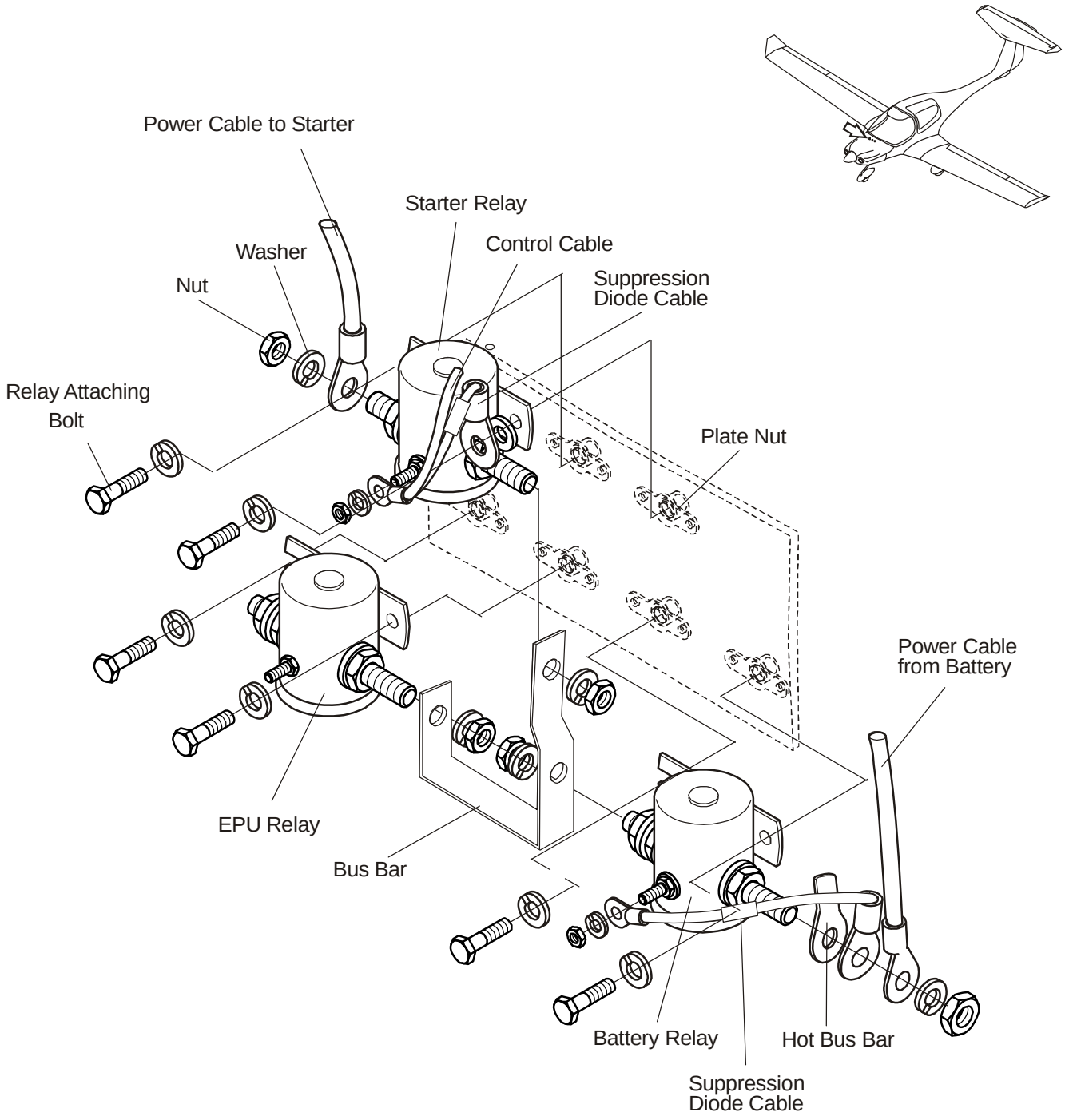


Figure 3: Starter Relay Installation, Modified Design (MÄM 40-057) (without Insulating Boots, etc.)

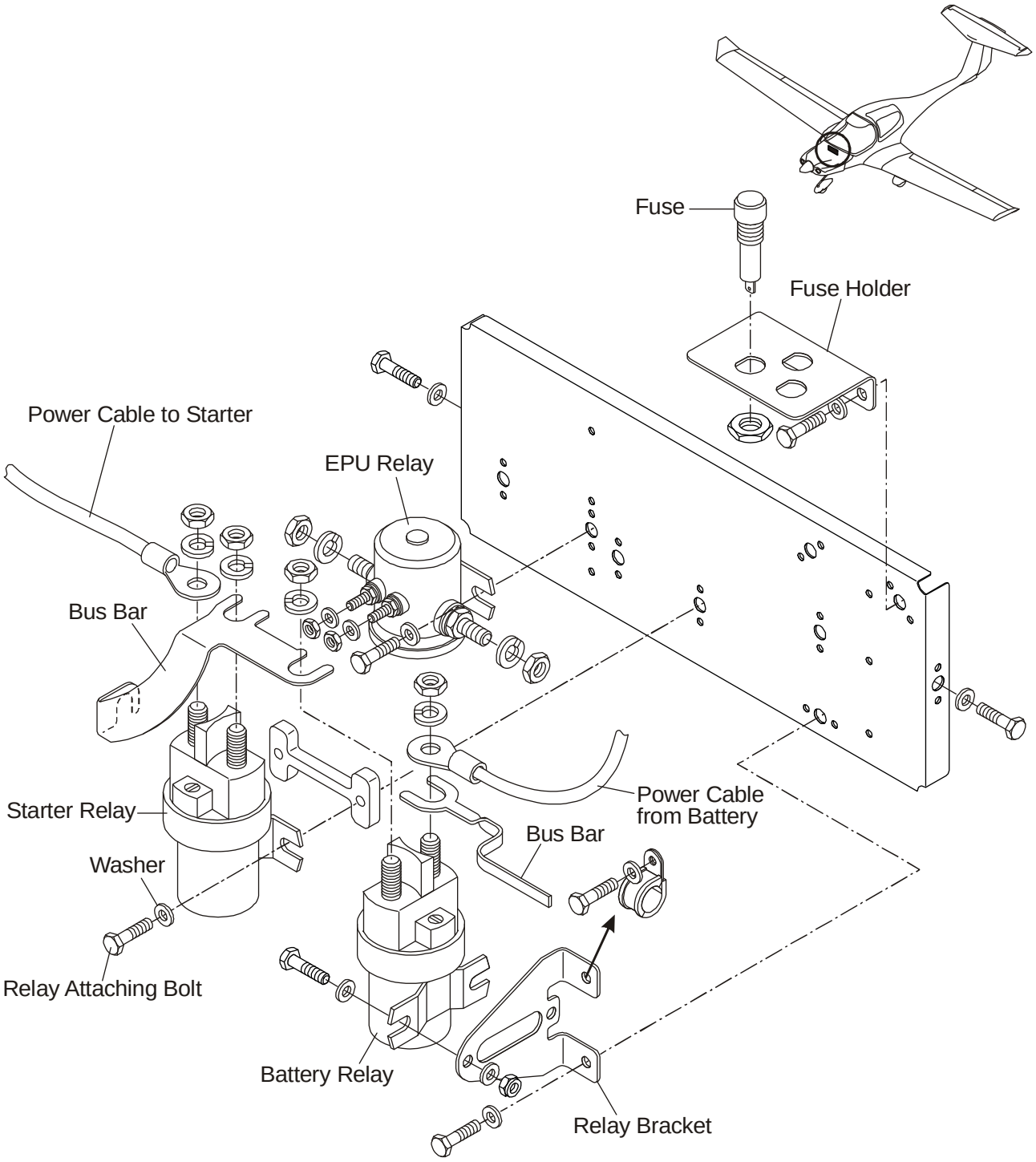


Figure 4: Starter Relay Installation, Modified Design (MÄM 40-072)

B. Install The Starter Relay

	Detail Steps/Work Items	Key Items/References
(1)	Install the relay.	
	Original design:	Refer to Figure 2.
	– Put the relay in position.	
	– Install the 2 washers and bolts which attach the relay to the bulkhead.	
	Modified design (MÄM 40-057):	Refer to Figure 3.
	– Put the relay in position.	
	– Install the 1 ring terminal, 3 washers, and 2 bolts which attach the relay to the relay panel.	
	Modified design (MÄM 40-072):	Refer to Figure 4.
	– Put the relay in position.	
	– Install the 1 ring terminal, 3 washers, and 2 bolts which attach the relay to the relay panel.	

	Detail Steps/Work Items	Key Items/References
(2)	Reconnect the cables to the starter relay. Original design: – Connect the 2 power cables. – Connect the 2 control cables and the 1 indicator cable. Modified design (MÄM 40-057): – Connect the bus bar with 1 washer and 1 nut. – Connect the 1 power cable. – Connect the 1 ring terminal with the diode suppression cable and the control cable. Modified design (MÄM 40-072): – Connect the bus bar with 1 washer and 1 nut. – Connect the 1 power cable. – Connect the 1 ring terminal with the diode suppression cable and the control cable.	Refer to Chapter 92 for the wiring diagrams. Refer to Figure 2. Refer to Figure 3. Refer to Figure 4.
(3)	Install the cover on the relay mounting: – Put the cover in position over the relay box. – Install the 2 washers and bolts which attach the relay box cover.	
(4)	Connect the airplane battery.	Refer to Section 24-31.
(5)	Install the engine top cowling.	Refer to Section 71-10 or 71-12.
(6)	Do an engine run-up.	Refer to the DA 40 Airplane Flight Manual.

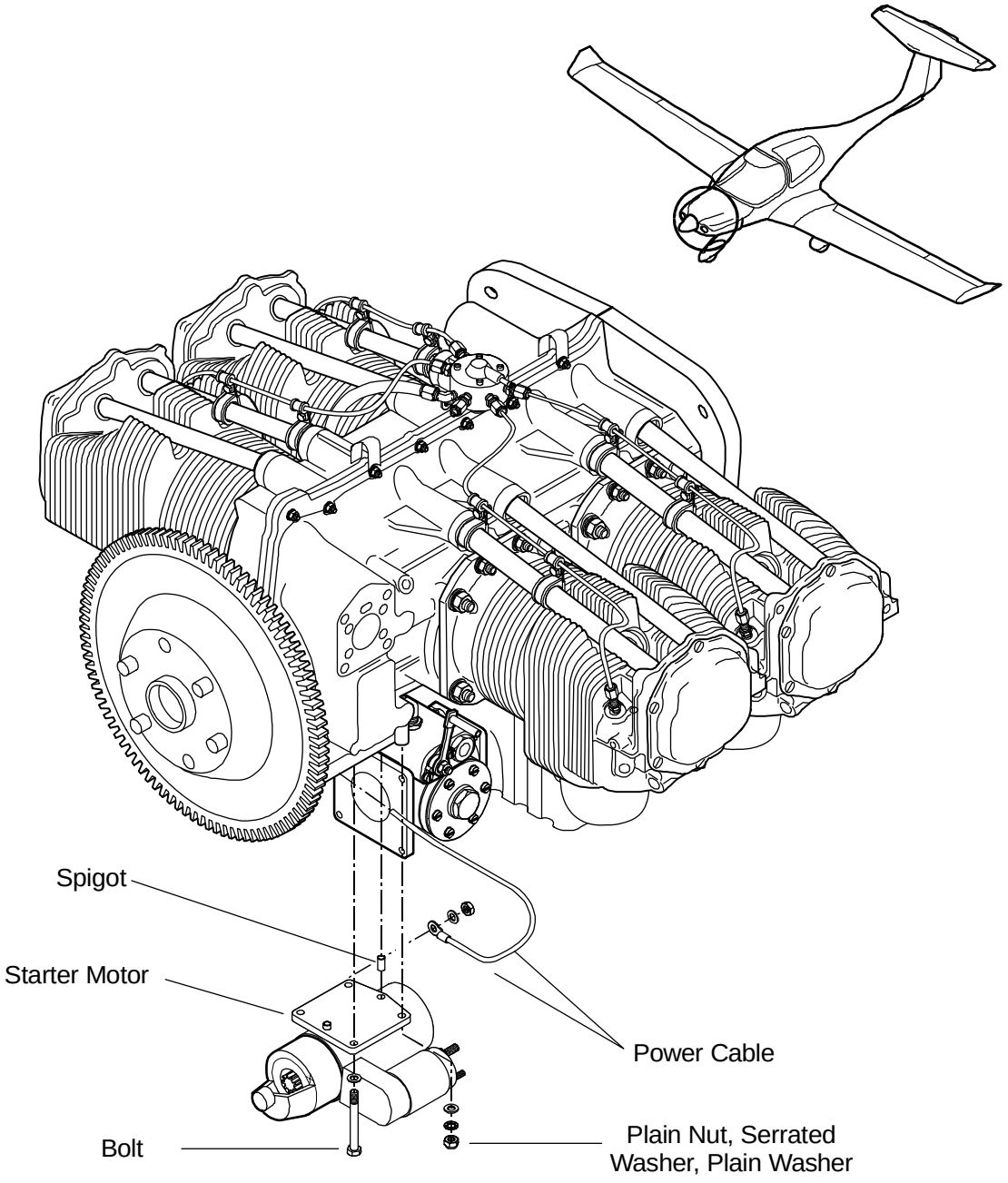


Figure 4: Remove/Install the Starter

3. Remove/Install the Starter

A. Remove the Starter

	Detail Steps/Work Items	Key Items/References
	WARNING: MAKE THE ENGINE IS SAFE BEFORE YOU DO ANY WORK ON THE STARTER SYSTEM. IF THE ENGINE IS TURNED, THE PROPELLER CAN CAUSE INJURY OR DEATH.	
(1)	Make sure that the engine is safe: – Set the ignition switch to OFF. – Set the ALT/BAT switch to OFF. – Set the throttle to IDLE. – Set the mixture control to LEAN CUT-OFF.	
(2)	Remove the engine cowlings.	Refer to Section 71-10 or 71-12.
(3)	Disconnect the airplane battery.	Refer to Section 24-31.
(4)	Disconnect the electrical cables from the starter: – Move the rubber boot clear of the power cable. – Remove the nut and washer that attaches the cable to the connector stud. – Remove the cables from the starter.	
(5)	Cut the lock-wire on the bolt which holds the link for the alternator. Remove the bolt.	
(6)	Release the three nuts and one bolt which attach the starter to the engine. Remove the starter from the airplane.	

B. Install the Starter

	Detail Steps/Work Items	Key Items/References
(1)	Put the starter into position on the engine.	
(2)	Install the washers, three nuts and one bolt which attach the starter to the engine.	Torque: 23 Nm (17 lbf.ft.).
(3)	Move the link for the alternator into position and install the bolt. Lock the bolt with lock-wire.	Torque: 23 Nm (17 lbf.ft.).
(4)	Connect the electrical cable to the starter: – Install the power cable on the stud. – Install the shake-proof washer. – Install the nut. – Move the rubber boot into position over the connector.	Torque: 2.7 Nm (2 lbf.ft.).
(5)	Connect the airplane battery.	Refer to Section 24-31.
(6)	Install the engine cowlings.	Refer to Section 71-10 or 71-12.
(7)	Do an engine run-up.	Refer to the DA 40 Airplane Flight Manual.

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Section 80-01
Starting - TAE 125 Diesel Engine

1. General

This Section tells you about the system that cranks the TAE 125 Diesel engine for starting.

Refer to Section 24-33 for more data on the electrical supplies to the system Refer to Section 76-01 for data about the engine control system.

2. Description and Operation

Figure 1 shows the simplified schematic diagram of the starter system. The system operates off a 12 VDC supply.

The TAE 125 Diesel engine has a small, high-powered electric starter. The starter motor is located on the left side of the engine near the front. It has an integral solenoid to connect the starter motor to the relay junction box bus. Either the airplane battery or the external power system can supply this bus for the starter.

The ELECTRIC MASTER key switch (marked OFF ON START) is located on the bottom left of the instrument panel. Turn the key clockwise against the spring to operate the starter. Release the key when the engine starts. The spring returns the key to the ON position.

A starter relay located on the instrument panel floor controls the current to the starter solenoid. An ENGINE MASTER switch located on the bottom left of the instrument panel controls the ground connection for the starter relay. This switch must be set to ON for the starter system to operate.

A START warning light on the annunciator panel comes ON when there is power to the starter. If this light stays on after the engine has started, set the ELECTRIC MASTER key switch and the ENGINE MASTER switch to OFF.

If necessary during starting, the engine control unit operates the glow plugs to heat intake air for the engine.

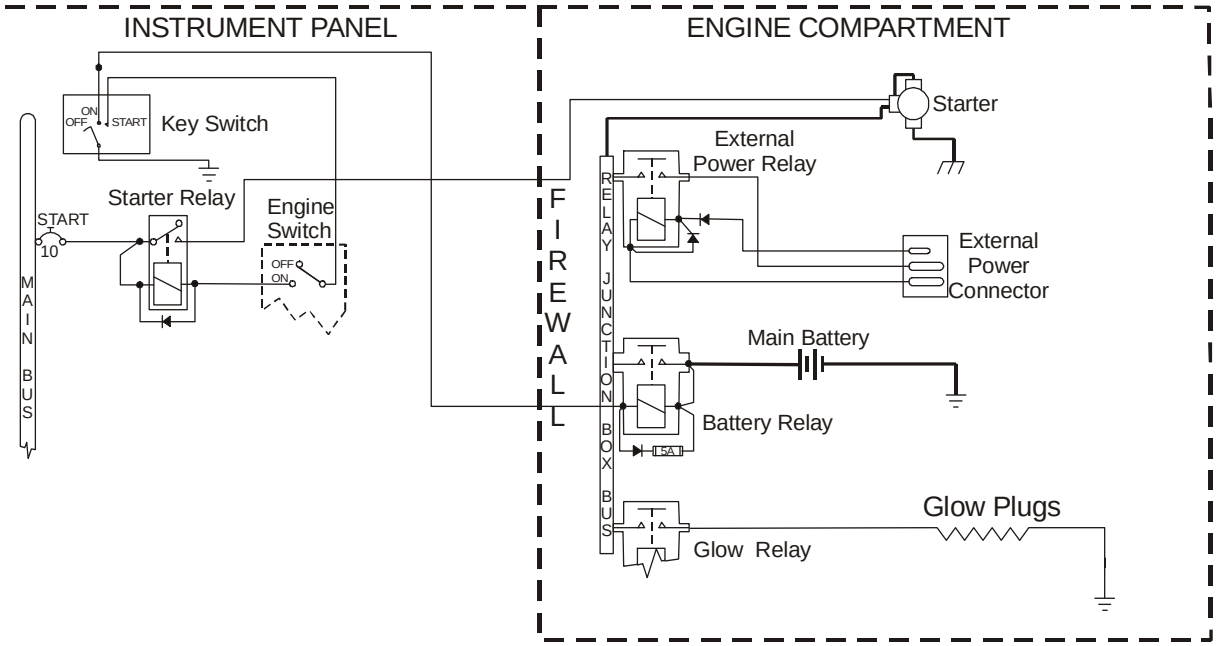


Figure 1: Starter System Schematic Diagram

Trouble-Shooting

1. General

The table below lists the defects you could have with the starting system. If you have the trouble detailed in the Trouble column read across to the Possible Cause column. Then do the repair given in the Repair column.

WARNING: DO NOT ALLOW PERSONS TO ENTER THE DANGER AREA OF THE PROPELLER. THE PROPELLER MAY TURN AND CAUSE INJURY TO PERSONS.

WARNING: DISCONNECT AND ISOLATE THE STARTER POWER CABLE BEFORE DOING TESTS IN THIS SECTION. THE ENGINE MAY START AND CAUSE INJURY TO PERSONS.

Trouble	Possible Cause	Repair
The starter does not operate when the ELECTRIC MASTER key switch is set to START and the ENGINE MASTER switch is set to ON.	The START circuit-breaker is not set.	Set the START circuit-breaker.
	The battery is discharged.	Replace/recharge the battery.
	The ELECTRIC MASTER key switch is defective.	Replace the ELECTRIC MASTER key switch.
	The ENGINE MASTER switch is defective.	Replace the ENGINE MASTER switch.
	The starter relay is defective.	Starter relay on starter motor: Refer to the engine manufacturer. Starter relay in instrument panel: Replace.
	Starter defective.	Refer to the engine manufacturer.
	Defective cable.	Do a test of the electrical cables. Refer to Chapter 92 for the wiring diagrams. Repair/Replace the defective cable. Refer to Section 71-51 for repair limits of the engine harness.

Trouble	Possible Cause	Repair
The starter “power-on” light stays on after the key is released from the START position.	The starter relay is defective.	Starter relay on starter motor: Refer to the engine manufacturer. Starter relay in instrument panel: Replace.
	The starter solenoid is defective.	Refer to the engine manufacturer.
Difficult cold starting.	Glow relay defective.	Replace the glow relay.
	Glow plugs worn.	Replace the glow plugs. Refer to the engine manufacturer.

Maintenance Practices

1. General

This Section gives you only Maintenance Practices for the airplane part of the starter system. No repairs are permitted on the TAE 125 Diesel engine. Only a TAE authorized repair shop or the manufacturer can repair the engine part of the system.

2. Remove/Install the ELECTRIC MASTER Key Switch

A. Remove the ELECTRIC MASTER Key Switch

	Detail Steps/Work Items	Key Items/References
	WARNING: MAKE SURE THAT THE ENGINE IS SAFE BEFORE YOU DO ANY WORK ON THE STARTER SYSTEM. IF THE ENGINE STARTS THE PROPELLER CAN CAUSE INJURY OR DEATH.	
(1)	Make sure that the engine is safe: – Set the ELECTRIC MASTER key switch to OFF. – Set the ENGINE MASTER switch to OFF. – Set the power lever to IDLE.	
(2)	Remove the engine top cowling.	Refer to Section 71-11.
(3)	Disconnect the airplane main battery.	Refer to Section 24-34.
(4)	Remove the instrument panel cover.	Refer to Section 25-10.
(5)	Release the retaining nut from the cockpit side of the ELECTRIC MASTER key switch.	
(6)	Move the ELECTRIC MASTER key switch towards the front of the airplane.	
(7)	Disconnect the cables from the ELECTRIC MASTER key switch.	Make a note of the position of the cables.
(8)	Remove the ELECTRIC MASTER key switch from the airplane.	

B. Install the ELECTRIC MASTER Key Switch

	Detail Steps/Work Items	Key Items/References
	WARNING: MAKE SURE THAT THE ENGINE IS SAFE BEFORE YOU DO ANY WORK ON THE STARTER SYSTEM. IF THE ENGINE STARTS THE PROPELLER CAN CAUSE INJURY OR DEATH.	
(1)	Make sure that the engine is safe: – Set the ELECTRIC MASTER key switch to OFF. – Set the ENGINE MASTER switch to OFF. – Set the power lever to IDLE.	
(2)	Put the ELECTRIC MASTER key switch in position between the instrument panel and the firewall.	
(3)	Connect the cables to the ELECTRIC MASTER key switch.	Refer to the wiring diagrams and the notes you made during removal.
(4)	Move the ELECTRIC MASTER key switch into position in the instrument panel.	
(5)	Install the retaining nut to the cockpit side of the ELECTRIC MASTER key switch.	
(6)	Install the instrument panel cover.	Refer to Section 25-10.
(7)	Connect the airplane main battery.	Refer to Section 24-34.
(8)	Install the engine top cowling.	Refer to Section 71-11.
(9)	Do an engine ground run-up.	Refer to Section 71-01.

3. Remove/Install the ENGINE MASTER Switch

A. Remove the ENGINE MASTER Switch

	Detail Steps/Work Items	Key Items/References
	WARNING: MAKE SURE THAT THE ENGINE IS SAFE BEFORE YOU DO ANY WORK ON THE STARTER SYSTEM. IF THE ENGINE STARTS THE PROPELLER CAN CAUSE INJURY OR DEATH.	
(1)	Make sure that the engine is safe: – Set the ELECTRIC MASTER key switch to OFF. – Set the ENGINE MASTER switch to OFF. – Set the power lever to IDLE.	
(2)	Remove the engine top cowling.	Refer to Section 71-11.
(3)	Remove the instrument panel cover.	Refer to Section 25-10.
(4)	Disconnect the airplane main battery, alternator excitation battery and ECU backup battery.	Refer to Section 24-34.
(5)	Release the retaining nut from the cockpit side of the ENGINE MASTER switch.	
(6)	Move the ENGINE MASTER switch towards the front of the airplane.	
(7)	Disconnect the cables from the ENGINE MASTER switch	Make a note of the position of the cables.
(8)	Remove the ENGINE MASTER switch from the airplane.	

B. Install the ENGINE MASTER Switch

	Detail Steps/Work Items	Key Items/References
	WARNING: MAKE SURE THAT THE ENGINE IS SAFE BEFORE YOU DO ANY WORK ON THE STARTER SYSTEM. IF THE ENGINE STARTS THE PROPELLER CAN CAUSE INJURY OR DEATH.	
(1)	Make sure that the engine is safe: – Set the ELECTRIC MASTER key switch to OFF. – Set the ENGINE MASTER switch to OFF. – Set the power lever to IDLE.	
(2)	Put the ENGINE MASTER switch in position in the instrument panel.	
(3)	Connect the cables to the ENGINE MASTER switch.	Refer to the wiring diagrams and the notes you made during removal.
(4)	Move the ENGINE MASTER switch into position in the instrument panel.	
(5)	Install the retaining nut to the cockpit side of the ENGINE MASTER switch.	
(6)	Install the instrument panel cover.	Refer to Section 25-10.
(7)	Connect the airplane main battery, alternator excitation battery and ECU backup battery.	Refer to Section 24-34.
(8)	Install the engine top cowling.	Refer to Section 71-11.
(9)	Do an engine ground run-up.	Refer to Section 71-01.

4. Remove/Install the Starter Relay

A. Remove the Starter Relay

	Detail Steps/Work Items	Key Items/References
	WARNING: MAKE SURE THAT THE ENGINE IS SAFE BEFORE YOU DO ANY WORK ON THE STARTER SYSTEM. IF THE ENGINE STARTS THE PROPELLER CAN CAUSE INJURY OR DEATH.	
(1)	Make sure that the engine is safe: – Set the ELECTRIC MASTER key switch to OFF. – Set the ENGINE MASTER switch to OFF. – Set the power lever to IDLE.	
(2)	Remove the engine top cowling.	Refer to Section 71-11.
(3)	Disconnect the airplane main battery.	Refer to Section 24-34.
(4)	Remove the instrument panel cover.	Refer to Section 25-10.
(5)	Disconnect the cables from the starter relay.	Make a note of the position of the cables.
(6)	Remove the screw, washer and nut that attach the relay.	
(7)	Remove the starter relay from the airplane.	

B. Install the Starter Relay

	Detail Steps/Work Items	Key Items/References
	WARNING: MAKE SURE THAT THE ENGINE IS SAFE BEFORE YOU DO ANY WORK ON THE STARTER SYSTEM. IF THE ENGINE STARTS THE PROPELLER CAN CAUSE INJURY OR DEATH.	
(1)	Make sure that the engine is safe: – Set the ELECTRIC MASTER key switch to OFF. – Set the ENGINE MASTER switch to OFF. – Set the power lever to IDLE.	
(2)	Put the starter relay in position on the instrument panel shelf.	
(3)	Install the screw, washer and nut that attach the relay.	
(4)	Connect the cables to the starter relay.	Refer to the wiring diagrams and the notes you made during removal.
(5)	Install the instrument panel cover.	Refer to Section 25-10.
(6)	Connect the airplane main battery.	Refer to Section 24-34.
(7)	Install the engine top cowling.	Refer to Section 71-11.
(8)	Do an engine ground run-up.	Refer to Section 71-01.

5. Remove/Install the Glow Relay

A. Remove the Glow Relay

	Detail Steps/Work Items	Key Items/References
	WARNING: MAKE SURE THAT THE ENGINE IS SAFE BEFORE YOU DO ANY WORK ON THE STARTER SYSTEM. IF THE ENGINE STARTS THE PROPELLER CAN CAUSE INJURY OR DEATH.	
(1)	Make sure that the engine is safe: – Set the ELECTRIC MASTER key switch to OFF. – Set the ENGINE MASTER switch to OFF. – Set the power lever to IDLE.	
(2)	Remove the engine top cowling.	Refer to Section 71-11.
(3)	Disconnect the airplane main battery.	Refer to Section 24-34.
(4)	Remove the cover from the relay junction box.	
(5)	Disconnect the cables and bus strip from the glow relay.	Make a note of the position of the cables.
(6)	Remove the screws, washers and nuts that attach the relay.	
(7)	Remove the glow relay from the airplane.	

B. Install the Glow Relay

	Detail Steps/Work Items	Key Items/References
	WARNING: MAKE SURE THAT THE ENGINE IS SAFE BEFORE YOU DO ANY WORK ON THE STARTER SYSTEM. IF THE ENGINE STARTS THE PROPELLER CAN CAUSE INJURY OR DEATH.	
(1)	Make sure that the engine is safe: – Set the ELECTRIC MASTER key switch to OFF. – Set the ENGINE MASTER switch to OFF. – Set the power lever to IDLE.	
(2)	Put the glow relay in position in the relay junction box.	
(3)	Install the screws, washers and nuts that attach the relay.	
(4)	Connect the cables and bus strip to the glow relay.	Refer to the wiring diagrams and the notes you made during removal.
(5)	Install the cover to the relay junction box.	
(6)	Connect the airplane main battery.	Refer to Section 24-34.
(7)	Install the engine top cowling.	Refer to Section 71-11.
(8)	Do an engine ground run-up.	Refer to Section 71-01.

CHAPTER 81

TURBINES

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TURBINES

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3. Remove/Install the Intercooler (TAE 125-02-99 Engine, if MÄM 40-256 is installed) 205

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CHAPTER 81
TURBINES

1. General

This Chapter tells you about the turbo-charging system of the TAE 125 Diesel engine.

2. Description

The air intake system has an air filter located on the right of the engine compartment, just forward of the firewall. The filter attaches to the bottom of an alternate air valve. The alternate air valve also has an inlet direct from the engine compartment. A flap in the valve can select either filtered air or warm, unfiltered air. Refer to Section 71-61 for more data on the air filter and alternate air valve.

The outlet from the alternate air valve connects to the turbo-charger. The turbo-charger compresses the air. This makes the air hot. The outlet from the turbo-charger connects to an intercooler.

The intercooler is located on the right of the engine. It attaches to the engine mounting frame.

The outlet from the intercooler connects to the engine inlet manifold. A manifold pressure sensor and a manifold temperature sensor attach to the outlet pipe of the intercooler (TAE 125-01 engine) or the intake air box (TAE 125-02-99 engine, if MÄM 40-256 is installed).

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Maintenance Practices

1. General

This Section tells you how to remove/install the intercooler.

CAUTION: YOU CANNOT DO MAINTENANCE ON THE TURBO-CHARGER.

CAUTION: DO NOT TRY TO ADJUST THE WASTE GATE CONTROL PUSH ROD. ANY ADJUSTMENT WILL AFFECT THE CHARACTERISTICS OF THE ELECTRONIC CONTROL SYSTEM.

Refer to Section 71-61 for maintenance data on the air filter and alternate air valve.

2. Remove/Install the Intercooler (TAE 125-01 Engine)

A. Remove the Intercooler

	Detail Steps/Work Items	Key Items/References
	WARNING: YOU MUST MAKE SURE THAT THE ENGINE IS SAFE BEFORE YOU DO WORK ON THE ENGINE. IF THE PROPELLER TURNS IT CAN CAUSE INJURY TO PERSONS.	
(1)	Make sure that the engine is safe: – Set the ELECTRIC MASTER key switch to OFF. – Set the ENGINE MASTER switch to OFF. – Set the power lever to IDLE.	
(2)	Remove the engine cowlings.	Refer to Section 71-11.
(3)	Release the worm-drive clamps that attach the hose from the turbo-charger.	At the intercooler.
(4)	Release the worm-drive clamps that attach the hose to the engine inlet manifold.	At the intercooler.
(5)	Remove the bolt, nuts and washers and vibration mount attaching the intercooler to the engine mounting frame.	
(6)	Remove the intercooler from the airplane.	

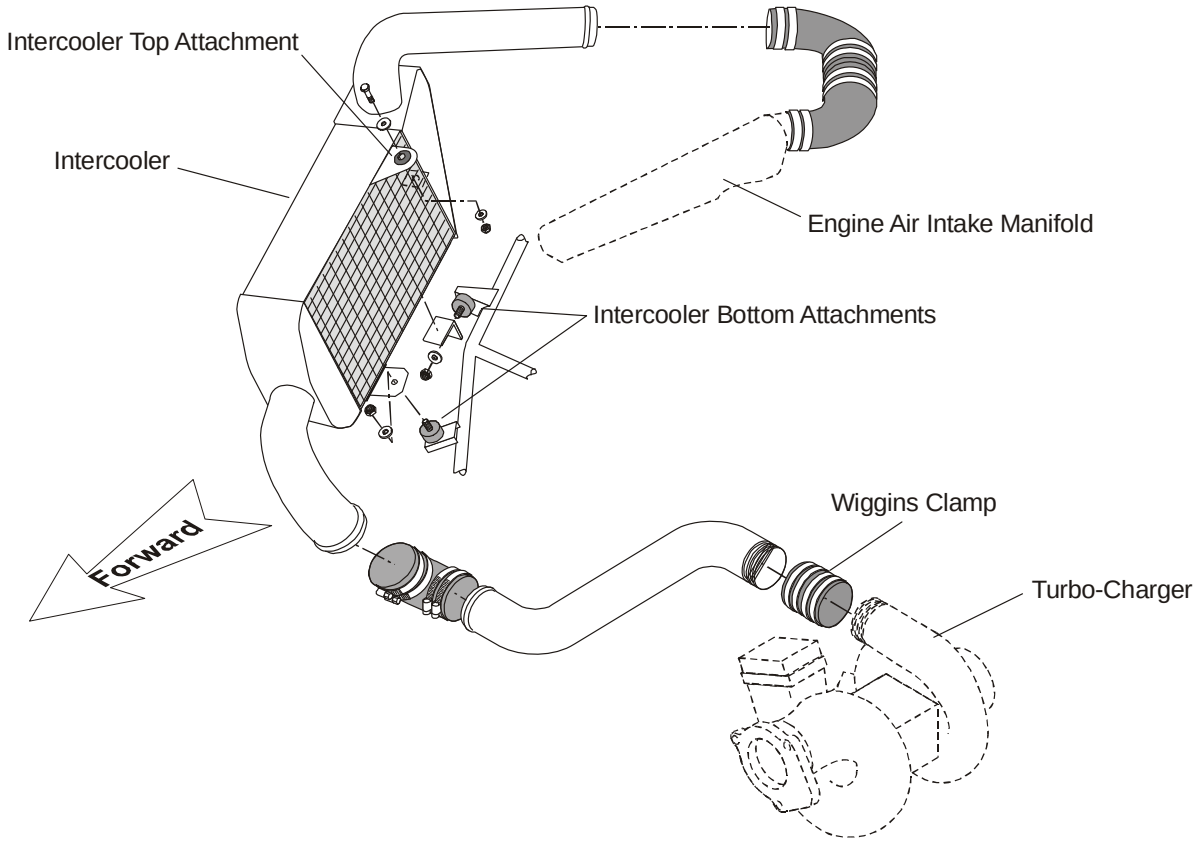


Figure 1: Intercooler Installation - TAE 125-01 Engine

B. Install the Intercooler

	Detail Steps/Work Items	Key Items/References
	WARNING: YOU MUST MAKE SURE THAT THE ENGINE IS SAFE BEFORE YOU DO WORK ON THE ENGINE. IF THE PROPELLER TURNS IT CAN CAUSE INJURY TO PERSONS.	
(1)	Make sure that the engine is safe: – Set the ELECTRIC MASTER key switch to OFF. – Set the ENGINE MASTER switch to OFF. – Set the power lever to IDLE.	
(2)	Put the intercooler in position on the engine mount. – Move the inlet and outlet pipes into position in the related flexible hoses.	Refer to Figure 1.
(3)	Install the attaching bolts, washers, nuts and vibration mount.	
(4)	Tighten the worm-drive clamps that attach the hose from the turbo-charger.	At the intercooler.
(5)	Tighten the worm-drive clamps that attach the hose to the engine inlet manifold.	At the intercooler.
(6)	Install the engine cowlings.	Refer to Section 71-11.
(7)	Do an engine run-up.	Refer to Section 71-01.

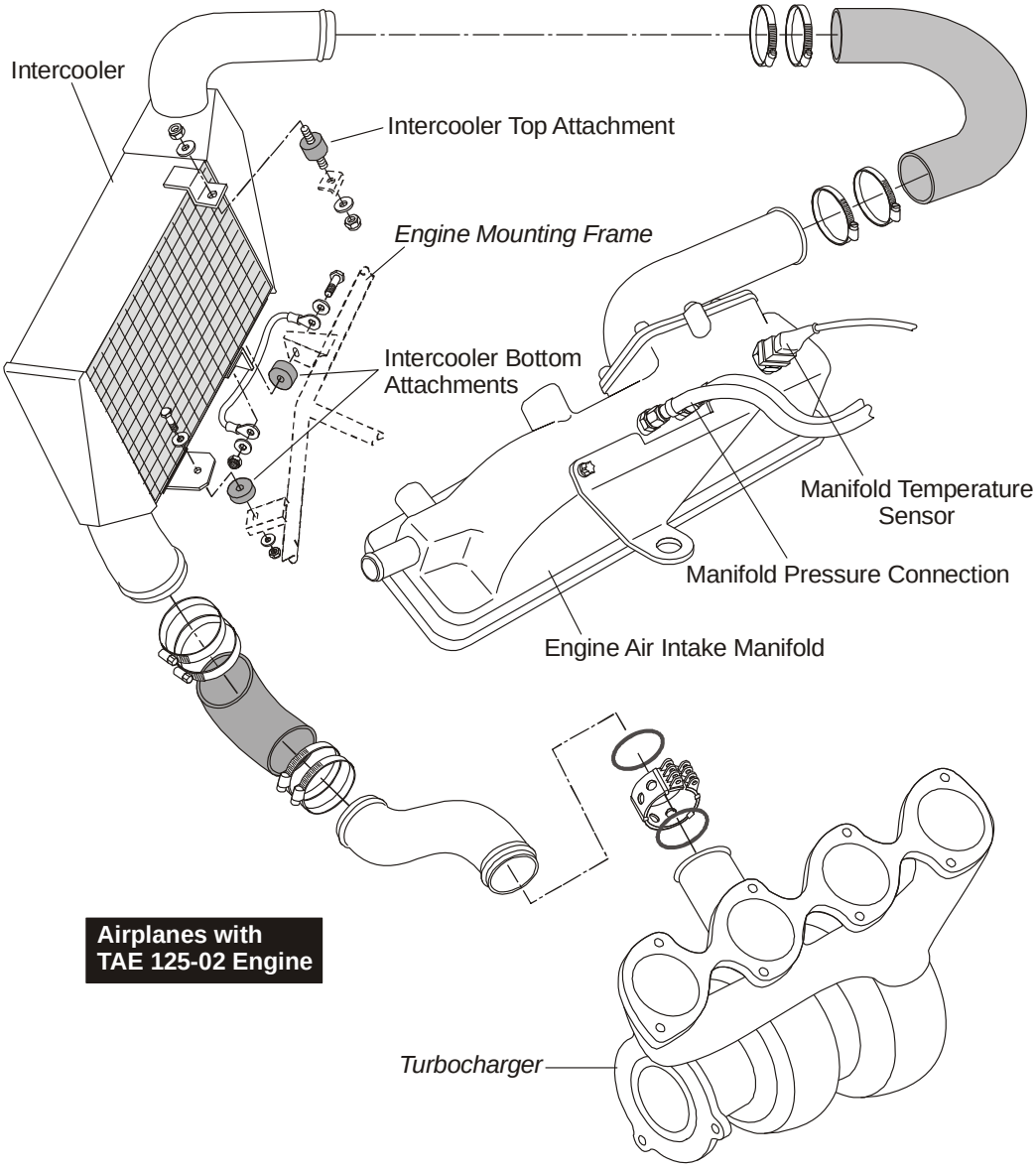


Figure 2: Intercooler Installation - TAE 125-02-99 Engine (if MÄM 40-256 is installed)

3. Remove/Install the Intercooler (TAE 125-02-99 Engine, if MÄM 40-256 is installed)

A. Remove the Intercooler

	Detail Steps/Work Items	Key Items/References
	WARNING: YOU MUST MAKE SURE THAT THE ENGINE IS SAFE BEFORE YOU DO WORK ON THE ENGINE. IF THE PROPELLER TURNS IT CAN CAUSE INJURY TO PERSONS.	
(1)	Make sure that the engine is safe: – Set the ELECTRIC MASTER key switch to OFF. – Set the ENGINE MASTER switch to OFF. – Set the power lever to IDLE.	
(2)	Remove the engine cowlings.	Refer to Section 71-11.
(3)	Disconnect the electrical connections at the manifold temperature sensor.	Refer to Figure 2. On the outlet pipe to the engine inlet manifold.
(4)	Remove 2 bolts, washers and nuts to release the coolant expansion tank from the intercooler.	Tie the expansion tank clear of the intercooler. Catch the coolant.
(5)	Release the worm-drive clamps that attach the hose from the turbo-charger.	At the intercooler.
(6)	Release the worm-drive clamps that attach the hose to the engine inlet manifold.	At the intercooler.
(7)	Remove the bolt, nuts and washers attaching the intercooler to the engine mounting frame.	
(8)	Remove the intercooler from the airplane.	

B. Install the Intercooler

	Detail Steps/Work Items	Key Items/References
	WARNING: YOU MUST MAKE SURE THAT THE ENGINE IS SAFE BEFORE YOU DO WORK ON THE ENGINE. IF THE PROPELLER TURNS IT CAN CAUSE INJURY TO PERSONS.	
(1)	Make sure that the engine is safe: – Set the ELECTRIC MASTER key switch to OFF. – Set the ENGINE MASTER switch to OFF. – Set the power lever to IDLE.	
(2)	Put the intercooler in position on the engine mount. – Move the inlet and outlet pipes into position in the related flexible hoses.	Refer to Figure 2.
(3)	Install the attaching bolts, washers and nuts.	
(4)	Tighten the worm-drive clamps that attach the hose from the turbo-charger.	At the intercooler.
(5)	Tighten the worm-drive clamps that attach the hose to the engine inlet manifold.	At the intercooler.
(6)	Attach the coolant expansion tank to the intercooler with 2 bolts, washers and nuts.	
(7)	Do an engine run-up.	Refer to Section 71-01.

CHAPTER 92

WIRING DIAGRAMS

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CHAPTER 92

WIRING DIAGRAMS

1. General 1

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CHAPTER 92
WIRING DIAGRAMS

1. General

This Chapter contains the wiring diagrams for each system. The wiring diagrams use the ATA Chapter/Section numbering system. Wiring diagrams that drawing numbers start with DA4- are for the DA 40 with Lycoming IO-360-M1A engine, wiring diagrams that drawing numbers that start with D4F- are for the DA 40 F with Lycoming O-360-A4M engine, and wiring diagrams that drawing numbers that start with D4D- are for the DA 40 with the Diesel engine and listed at the end of the table.

Title	Drawing No.	Rev. No.	No. of Sheets
Autopilot, KAP 140	DA4-9222-10-02	D	1
Autopilot, KAP 140, Garmin Interface	DA4-9222-10-03	D	1
PM 1000, KX 125 NAV/COM	DA4-9223-10-01	F	2
PM 1000, KX 125 NAV/COM, KI 208	DA4-9223-10-02	C	2
PM 1000, KX 155A NAV/COM	DA4-9223-10-03	B	2
KMA 28 Audio Panel	DA4-9223-50-01	E	2
GMA 340 Audio Panel	DA4-9223-50-02	F	2
GMA 340 Audio Panel, Ground COM 2 Switch	DA4-9223-50-02/1	-	2
KMA 28 Audio Panel, with ANR Power	DA4-9223-50-03	-	2
GMA 340 Audio Panel, Mic Audio Transfer	DA4-9223-50-05	-	2
Electrical System	DA4-9224-30-01	K	2
Electrical System, Ground COM 2	DA4-9224-30-01/1	-	2
Electrical System, Low Voltage	DA4-9224-30-03	-	2
Emergency Power Package	DA4-9225-60-01	C	1
Rudder Pedals	DA4-9227-20-01	A	1
Flaps	DA4-9227-50-01	G	1
Fuel System Pump	DA4-9228-20-01	E	1
Pitot Heat, S/N's through 40.039	DA4-9230-30-01	E	1
Pitot Heat, S/N's 40.040 & subsequent	DA4-9230-30-01	F	1
Hourmeter	DA4-9231-20-02	D	1
O.A.T.	DA4-9231-20-03	C	1
Caution & Warning (DAI Annunciator Panel)	DA4-9231-50-01	C	1

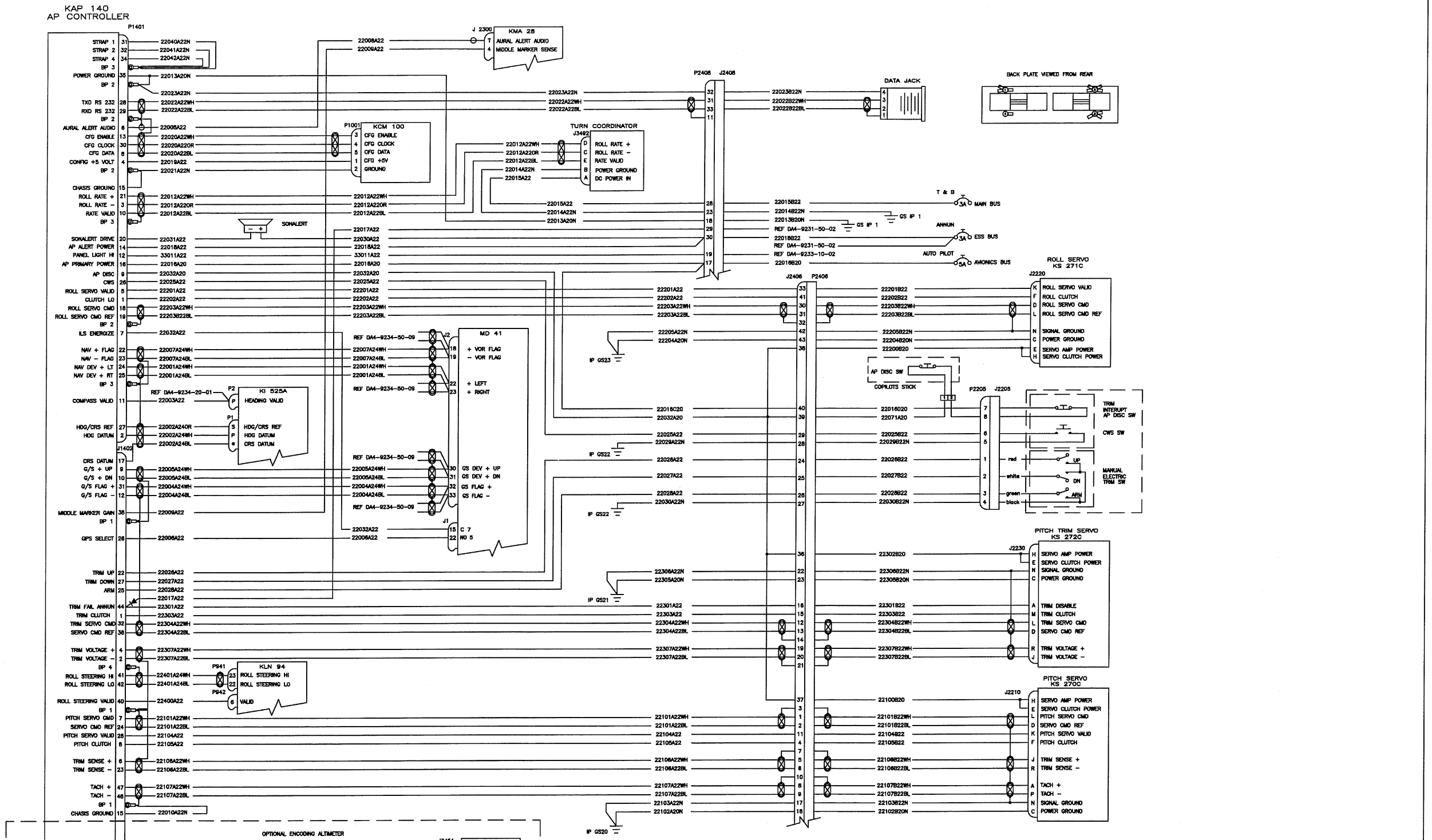
Title	Drawing No.	Rev. No.	No. of Sheets
Caution & Warning (White Wire Ann. Panel)	DA4-9231-50-02	E	1
G1000	DA4-9231-60-06	B	8
Instrument Flood Light, VFR	DA4-9233-10-01	F	1
Instrument Panel Light	DA4-9233-10-02	L	1
Instrument Flood Light, IFR	DA4-9233-10-03	-	1
Instrument Panel Light, Panel Type II	DA4-9233-10-05	A	1
Map/Reading Light	DA4-9233-20-01	A	1
Exterior Light	DA4-9233-40-01	H	1
Exterior Light Wiring	DA4-9233-40-01x01	-	1
Attitude Gyro (Artificial Horizon), VFR	DA4-9234-10-01	H	1
Directional Gyro	DA4-9234-10-02	D	1
Turn & Bank Indicator	DA4-9234-10-03	F	1
Attitude Gyro (Artificial Horizon), IFR	DA4-9234-10-04	-	1
Gyro Compass System	DA4-9234-20-01	G	1
Strike Finder	DA4-9234-40-02	-	1
Stormscope, WX 500, w/o Sync Heading	DA4-9234-40-03	A	1
Stormscope, WX 500, with Sync Heading	DA4-9234-40-03	C	1
Stormscope, WX 500, No Heading Input	DA4-9234-40-04	-	1
Transponder, KT 76A	DA4-9234-50-01	C	1
Transponder, KT 76C	DA4-9234-50-02	E	1
DME, KN 62A	DA4-9234-50-03	E	1
GPS, KLN 89B	DA4-9234-50-04	B	1
ADF, KR 87	DA4-9234-50-06	H	1
GPS, KLN 94 (IFR w/AP)	DA4-9234-50-07	E	1
NAV/COM 2, KX 155A	DA4-9234-50-08	C	1
NAV/COM 1, KX 165A, w/AP	DA4-9234-50-09	D	1
DME, KN 62A, Garmin Interface	DA4-9234-50-10	A	1
Transponder, GTX 327	DA4-9234-50-11	C	1

Title	Drawing No.	Rev. No.	No. of Sheets
NAV/COM/GPS 1, GNS 430/530	DA4-9234-50-12	D	1
NAV/COM/GPS 2, GNS 430	DA4-9234-50-13	C	1
MFD/GPS, KMD 150	DA4-9234-50-14	-	1
NAV/COM/GPS 1, GNS 430/530 & GI 106A	DA4-9234-50-15	A	1
NAV/COM/GPS 2, GNS 430, Ground COM #2	DA4-9234-50-16	B	1
ADF, KR 87, Non Slaved Indicator	DA4-9234-50-17	-	1
Transponder, GTX 330	DA4-9234-50-18	A	1
Lasar Ignition & Starting	DA4-9274-00-02	E	1
Slick Start Ignition & Starting	DA4-9274-00-03	B	1
Engine Indicating, S/N's through 40.029	DA4-9277-40-01	F	1
Engine Indicating, S/N 40.030 & subsequent	DA4-9277-40-02	C	1
Engine Indicating, with Long Range Tank	DA4-9277-40-02/1	-	1
Equipment Cooling	D4D-9221-20-01	-	1
G1000 Equipment Cooling	D4D-9221-20-02	A	1
Additional Equipment Cooling	D4D-9221-20-03	-	1
Autopilot, KAP 140, Directional Gyro	D4D-9222-10-02	B	1
Autopilot, KAP 140, Compass System	D4D-9222-10-03	A	1
Autopilot, KAP 140, G1000 Interface	D4D-9222-10-04	A	1
Intercom, PM 1000	D4D-9223-50-01	A	1
Audio Panel, GMA 340	D4D-9223-50-02	B	2
Electrical System, VFR	D4D-9224-30-01	K	2
Electrical System, TAE 125-02, VFR	D4D-9224-30-01_01	-	2
Electrical System, IFR	D4D-9224-30-02	E	2
Electrical System, TAE 125-02, IFR	D4D-9224-30-02_01	-	2
Battery Tester	D4D-9224-30-03	C	1
Battery Tester, TAE 125-02	D4D-9224-30-03_01	-	1
Electrical System, G1000	D4D-9224-30-04	D	2
Electrical System, G1000, TAE 125-02	D4D-9224-30-04_01	B	2
Electrical System, G1000, TAE 125-02	D4D-9224-30-04_02	B	2

Title	Drawing No.	Rev. No.	No. of Sheets
ECU Backup Battery Tester	D4D-9224-30-05	C	1
ECU Backup Battery Tester, TAE 125-02	D4D-9224-30-05_01	-	1
Emergency Power Package	D4D-9225-60-01	-	1
ELT, ME406	D4D-9225-60-02x01	-	1
Emergency Power Package Wiring, Diesel, G1000	D4D-9225-60-03	-	1
Artex 406 MHz ELT Wiring, G1000	D4D-9225-60-04	-	1
Artex ME 406 MHz ELT, Wiring, G1000	D4D-9225-60-04x01	A	1
Flaps	D4D-9227-50-01	B	1
Flaps Wiring	D4D-9227-50-02	B	1
Fuel Transfer Pump	D4D-9228-20-01	C	1
Fuel Transfer Pump, TAE 125/G1000	D4D-9228-20-03	B	1
Pitot Heat	D4D-9230-30-01	C	1
Pitot Heat Wiring	D4D-9230-30-02	-	1
Hourmeter	D4D-9231-20-02	-	1
OAT, S/N´s through D4.184	D4D-9231-20-03	-	1
OAT, S/N´s D4.185 & subsequent	D4D-9231-20-03_01	-	1
Hourmeter Wiring, G1000	D4D-9231-20-04	-	1
Caution & Warning	D4D-9231-50-01	D	1
Caution & Warning, TAE 125-02	D4D-9231-50-01_01	-	1
Schematic, G1000	D4D-9231-60-01	E	7
Schematic, G1000	D4D-9231-60-01_01	A	7
Schematic, G1000	D4D-9231-60-01x01	-	1
Instrument Flood Light, VFR	D4D-9233-10-01	A	1
Instrument Flood light, IFR	D4D-9233-10-03	A	1
Instrument Panel Light	D4D-9233-10-05	-	1
Schematic, Dimming, Regulator & Placards	D4D-9233-10-07	A	1
Map/Reading Light	D4D-9233-20-01	-	1
Exterior Light	D4D-9233-40-01	B	1

Title	Drawing No.	Rev. No.	No. of Sheets
Attitude Gyro (Artificial Horizon), IFR	D4D-9234-10-04	-	1
2nd Attitude Gyro (Artificial Horizon)	D4D-9234-10-05	A	1
Attitude Gyro Wiring, G1000	D4D-9234-10-06	A	1
Gyro Compass System	D4D-9234-20-01	B	1
Stormscope, WX-500	D4D-9234-40-03	B	1
ADF, KR 87	D4D-9234-50-06	A	1
DME, KN 62A	D4D-9234-50-10	A	1
Transponder, GTX 327	D4D-9234-50-11	C	1
NAV/COM/GPS 1, GNS 430/530	D4D-9234-50-12	B	1
NAV/COM/GPS 2, GNS 430	D4D-9234-50-13	A	1
NAV/COM/GPS 1, GNS 430/530 & GI 106A	D4D-9234-50-15	D	1
Transponder, GTX 330/GTX 328 Wiring	D4D-9234-50-18	C	1
DME, KN 62A, VFR	D4D-9234-50-19	-	1
Glow System, TAE 125-02	D4D-9274-00-01	A	1
Engine Indicating	D4D-9277-40-01	B	1
Fuel Pump System	D4F-9228-20-01	-	1
CO Sensor Conventional Panel	D4F-9231-20-02	-	1
Slickstart Ignition & Starting	D4F-9274-00-01	-	1

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QTY	QTY	ITEM	PART NUMBER	DESCRIPTION	MATERIAL TYPE	H.T.	MATERIAL SIZE	SPECIFICATION	SUPPLIER
REVISION		a	C	D					
AN#		MAM 40–080		MAM 40–090					
DATE		06.11–00	15.10.01	27.11.01					
DRAWN		P.STURGE	P.STURGE	P.STURGE					
CHECK			M. Volck						
CHECK DATE			16. JAN 2002						
STRESS									
STRESS DATE									
APPROVAL									
APPROVAL DATE									

Diamond Aircraft

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Do Not Scale Drawing

Size: C | Scale: 1:1 | First Angle

Dimensions in Millimetres | Tolerances are ISO 2768 m

TITLE: KAP 140, AUTO PILOT

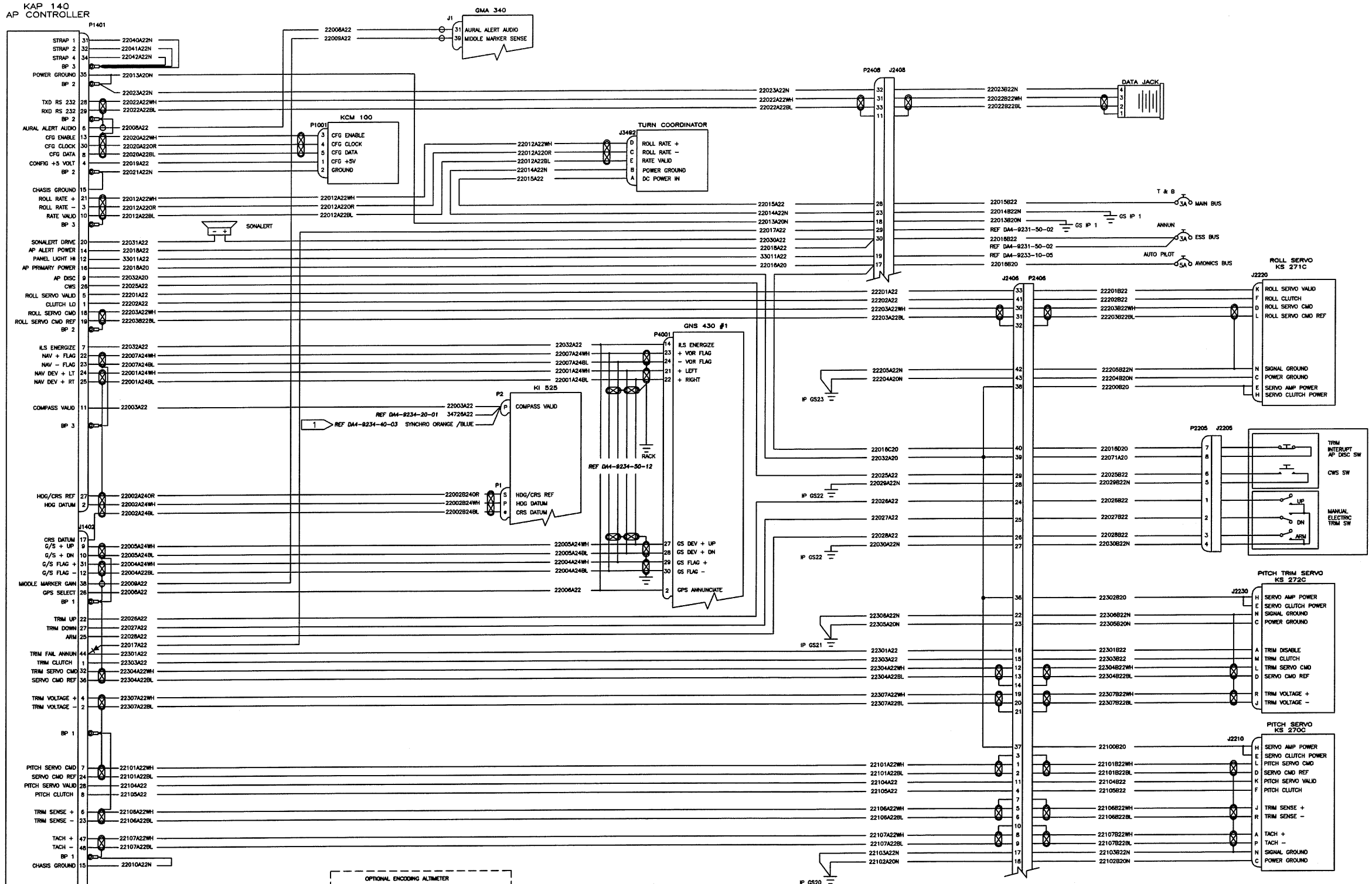
NEXT ASSEMBLY: DA4–9200–00–00

DRAWING NUMBER: DA4–9222–10–02 | SHEET: 1/1

REPLACES DWG.# N/A

NOTES:

1 WIRE INSTALLED WITH OPTIONAL WX500.

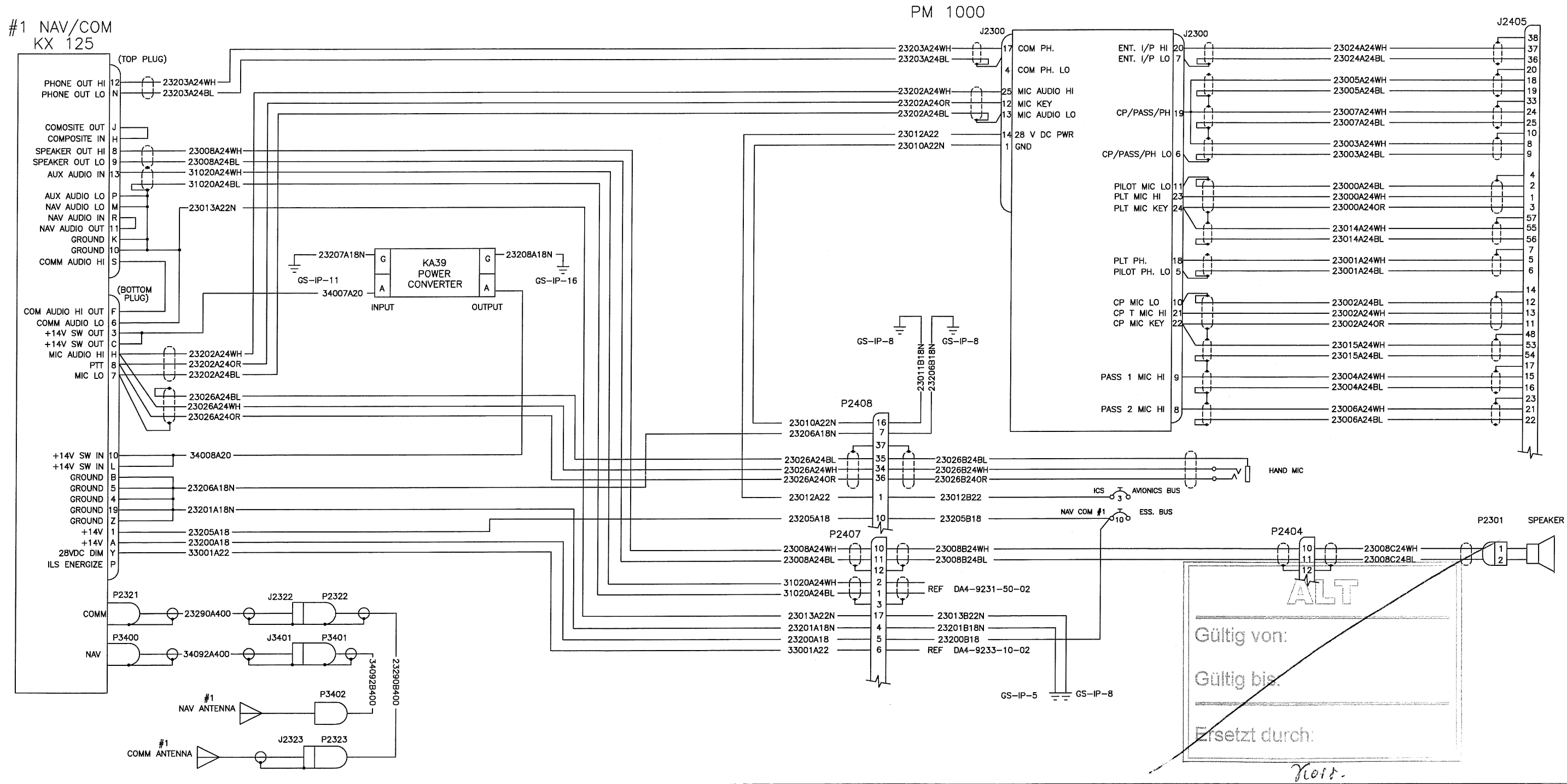


QTY	QTY	ITEM	PART NUMBER			DESCRIPTION	MATERIAL TYPE	H.T.	MATERIAL SIZE		SPECIFICATION	SUPPLIER
REVISION		a	b	c	d			Size:	Scale:	First Angle	TITLE: KAP 140, AUTO PILOT GARMIN INTERFACE	
AN#			ÖÄM 40-097	MÄM 40-090	MÄM 40-198			C	1:1			
DATE		06.11-00	27.09.01	27.11.01	06.10.03			Dimensions in Millimetres		Tolerances are ISO 2768 m		
DRAWN		P.STURGE	P.STURGE	P.STURGE	C.WOOD			NEXT ASSEMBLY: DA4-9200-00-00			DRAWING NUMBER: DA4-9222-10-03	SHEET: 1/1
CHECK					M. Reichel						REPLACES DWG.# N/A	
CHECK DATE					24 NOV 2003							
STRESS												
STRESS DATE												
APPROVAL												
APPROVAL DATE												

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Do Not Scale Drawing



QTY	QTY	ITEM	PART NUMBER		DESCRIPTION	MATERIAL TYPE	H.T.	MATERIAL SIZE	SPECIFICATION	SUPPLIER
REVISION		–	E	F						
AN#			MÄM 40-010	MÄM 40-080						
DATE		08.09.99	29.09.00	11.01.01						
DRAWN		P.KOPALA	Tatscher	STURGE						
CHECK				19. Nov 2001						
CHECK DATE										
STRESS										
STRESS DATE										
APPROVAL										
APPROVAL DATE										

Diamond Aircraft

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Do Not Scale Drawing

Size: B | Scale: N.T.S | First Angle

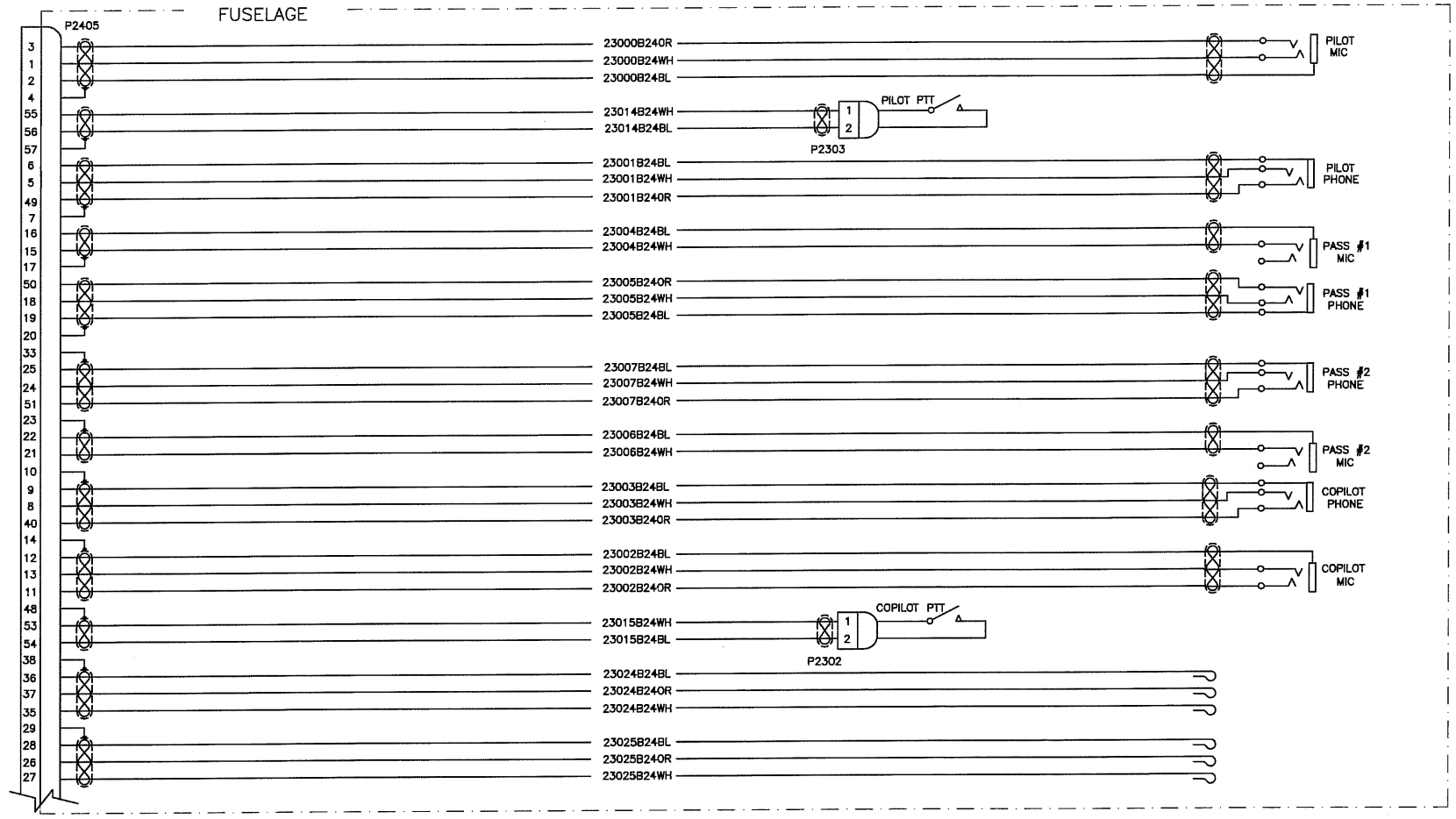
Dimensions in Millimetres | Tolerances are

NEXT ASSEMBLY: DA4-9200-00-00

TITLE: SCHEMATIC, PM 1000 KX 125 NAV/COM

DRAWING NUMBER: DA4-9223-10-01 | SHEET: 1/2

REPLACES DWG.#



QTY	QTY	ITEM	PART NUMBER		DESCRIPTION	MATERIAL TYPE	H.T.	MATERIAL SIZE	SPECIFICATION	SUPPLIER
REVISION		–	E	F						
AN#			MÄM 40-010	MÄM 40-080						
DATE		08.09.99	29.09.00	11.01.01						
DRAWN		P.KOPALA	Tatscher	STURGE						
CHECK				19. AUG. 2001						
CHECK DATE										
STRESS										
STRESS DATE										
APPROVAL										
APPROVAL DATE										

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Do Not Scale Drawing

Size:	Scale:	First Angle
B	N.T.S	

Dimensions in Millimetres | Tolerances are

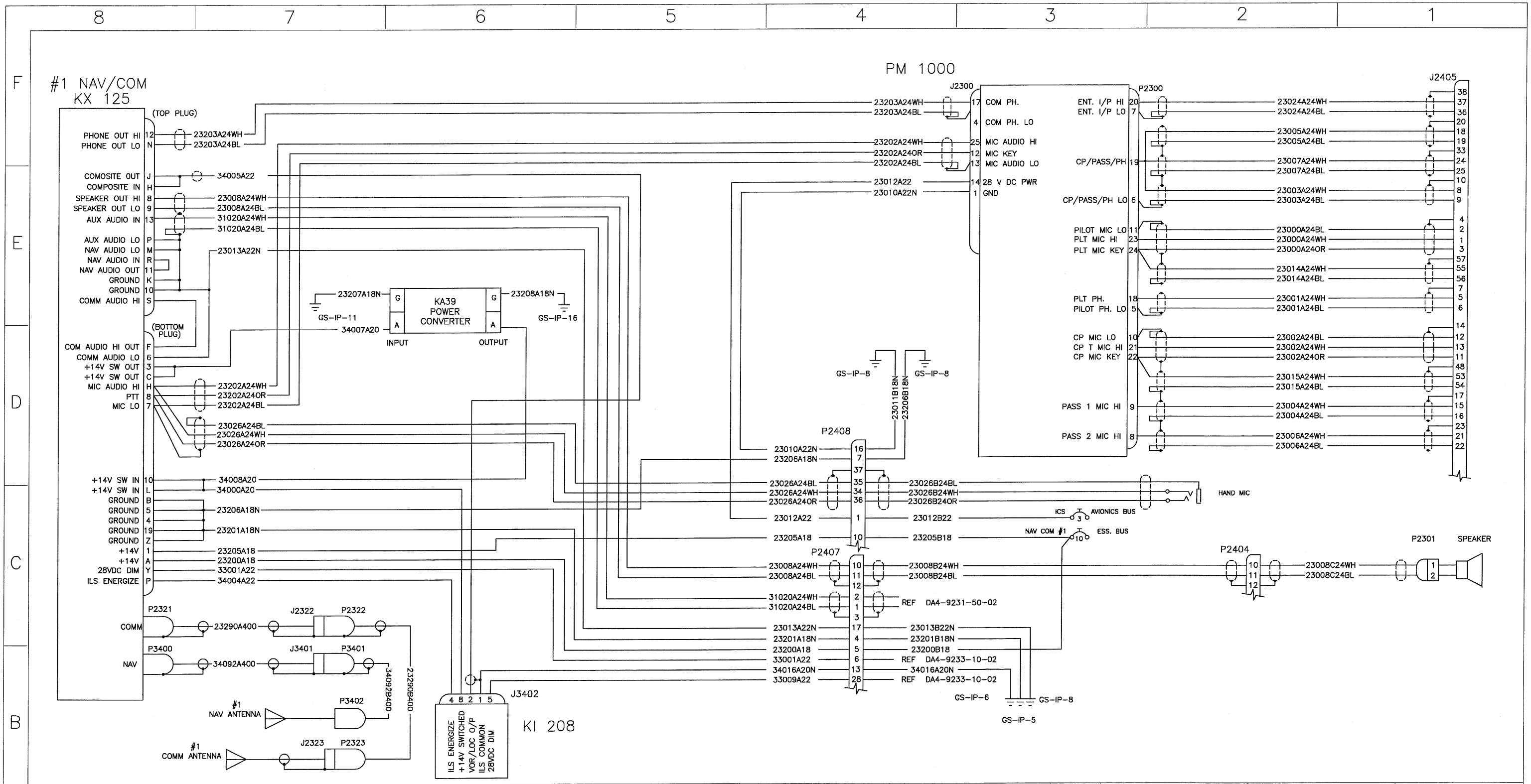
NEXT ASSEMBLY: DA4-9200-00-00

TITLE: SCHEMATIC, PM 1000 KX 125 NAV/COM

DRAWING NUMBER: DA4-9223-10-01

SHEET: 2/2

REPLACES DWG.#



QTY	QTY	ITEM	PART NUMBER	DESCRIPTION	MATERIAL TYPE	H.T.	MATERIAL SIZE	SPECIFICATION	SUPPLIER
REVISION			C						
AN#			MÄM 40-080						
DATE		08.09.99	11.01.01						
DRAWN		P.KOPALA	P.STURGE						
CHECK									
CHECK DATE									
STRESS									
STRESS DATE									
APPROVAL									
APPROVAL DATE									

Diamond Aircraft

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Do Not Scale Drawing

Size:	Scale:	First Angle
B	N.T.S	

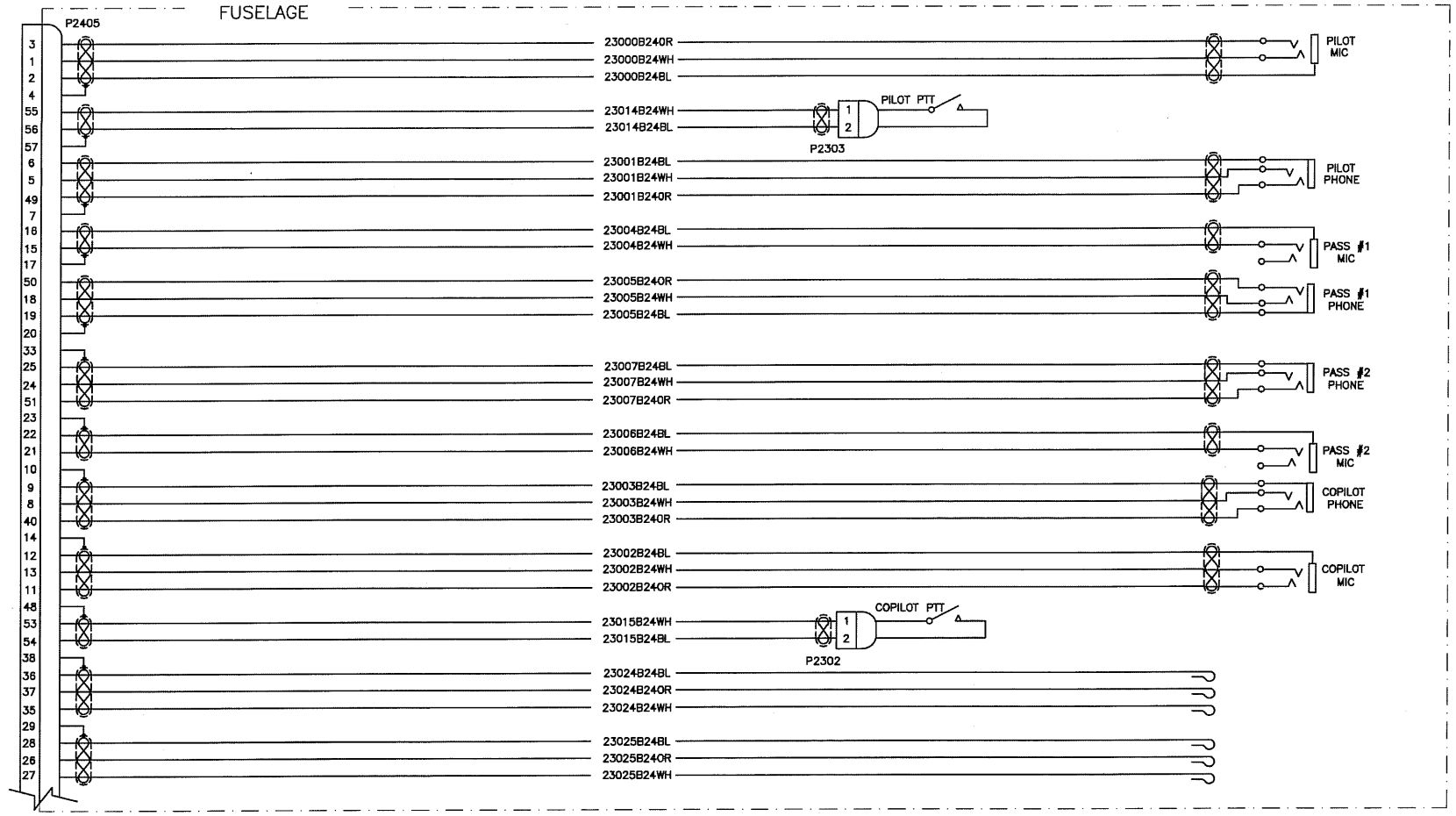
Dimensions in Millimetres | Tolerances are

TITLE: SCHEMATIC, PM 1000 KX 125 NAV/COM, KI 208

NEXT ASSEMBLY: DA4-9200-00-00

DRAWING NUMBER: DA4-9223-10-02 | SHEET: 1/2

REPLACES DWG.#



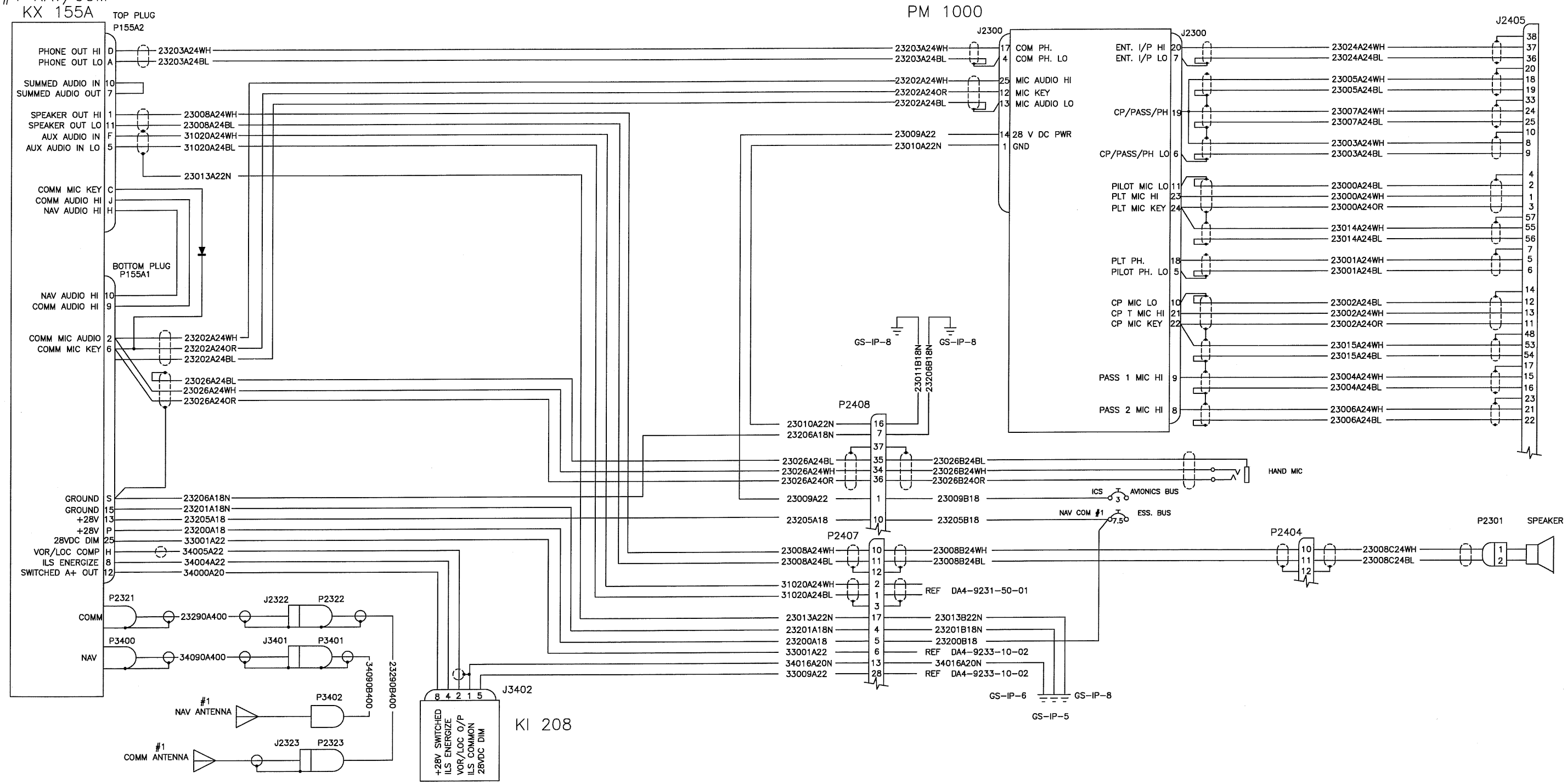
QTY	QTY	ITEM	PART NUMBER	DESCRIPTION	MATERIAL TYPE	H.T.	MATERIAL SIZE	SPECIFICATION	SUPPLIER
REVISION			C						
AN#			MÄM 40-080						
DATE		08.09.99	11.01.01						
DRAWN		P.KOPALA	P.STURGE						
CHECK			19. Nov. 2001						
CHECK DATE									
STRESS									
STRESS DATE									
APPROVAL									
APPROVAL DATE									

Diamond Aircraft

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Do Not Scale Drawing

Size: B	Scale: N.T.S	First Angle	TITLE: SCHEMATIC, PM 1000 KX 125 NAV/COM, KI 208
Dimensions in Millimetres	Tolerances are		
NEXT ASSEMBLY: DA4-9200-00-00			DRAWING NUMBER: DA4-9223-10-02
			SHEET: 2/2
			REPLACES DWG.#



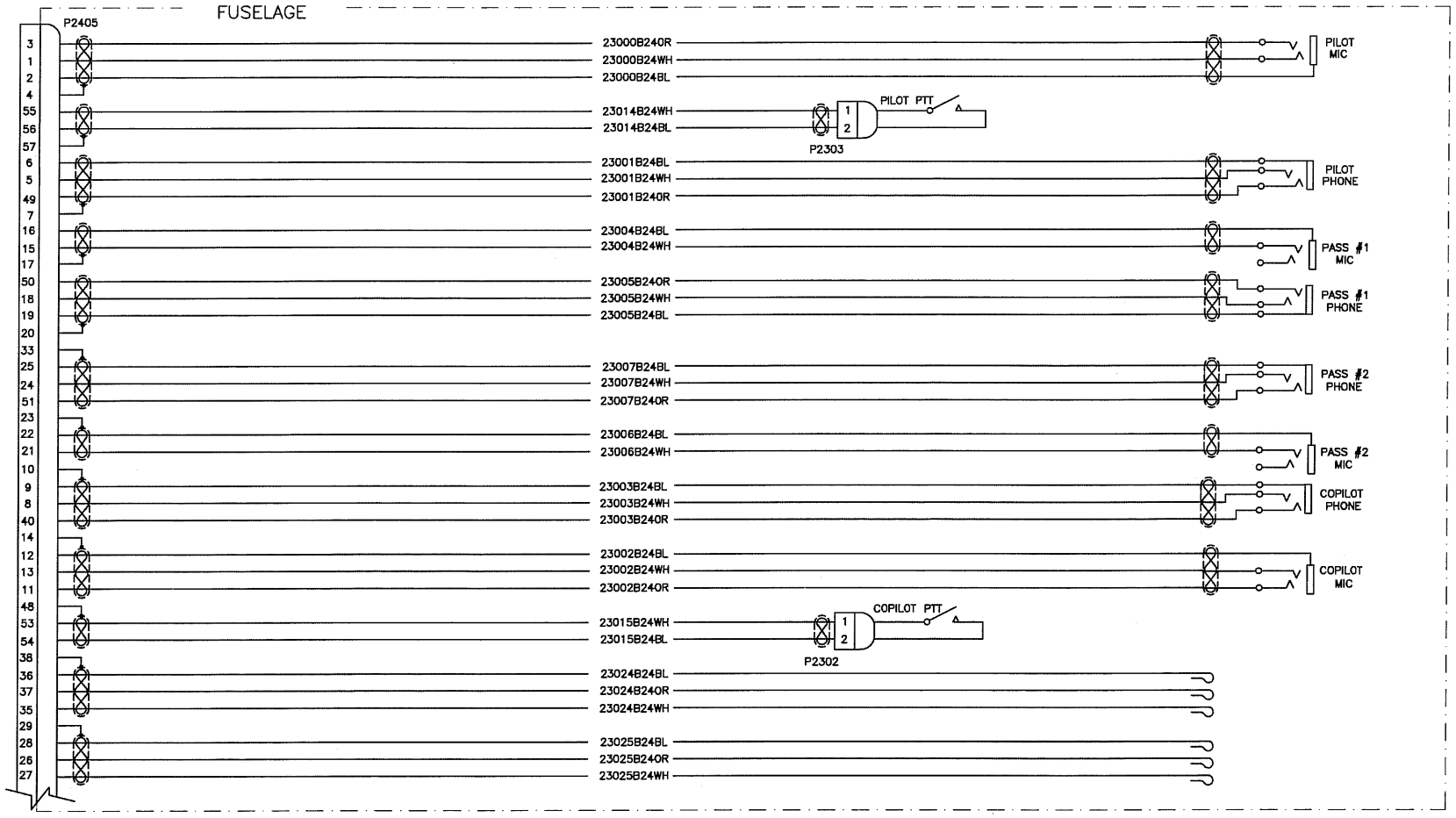
QTY	QTY	ITEM	PART NUMBER		DESCRIPTION	MATERIAL TYPE
REVISION		A	b			
AN#			MÄM 40-080			
DATE		17.04.01	~~21.09.01~~			
DRAWN		P.STURGE	TATSCHER			
CHECK			19 Nov 2001			
CHECK DATE						
STRESS						
STRESS DATE						
APPROVAL						
APPROVAL DATE						

Diamond Aircraft

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Do Not Scale Drawing

H.T.	MATERIAL SIZE		SPECIFICATION	SUPPLIER
Size: B	Scale: N.T.S	First Angle	TITLE: SCHEMATIC, PM 1000 KX 155A NAV/COM	
Dimensions in Millimetres	Tolerances are			
NEXT ASSEMBLY: DA4-9200-00-00			DRAWING NUMBER: DA4-9223-10-03	SHEET: 1/2
			REPLACES DWG.#	



QTY	QTY	ITEM	PART NUMBER	DESCRIPTION	MATERIAL TYPE	H.T.	MATERIAL SIZE	SPECIFICATION	SUPPLIER
REVISION		A	b						
AN#			MÄM 40-080						
DATE		17.04.01	21.09.01						
DRAWN		P.STURGE	TATSCHER						
CHECK			19. Nov. 2001						
CHECK DATE									
STRESS									
STRESS DATE									
APPROVAL									
APPROVAL DATE									

Diamond Aircraft

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Do Not Scale Drawing

Size:	Scale:	First Angle
B	N.T.S	

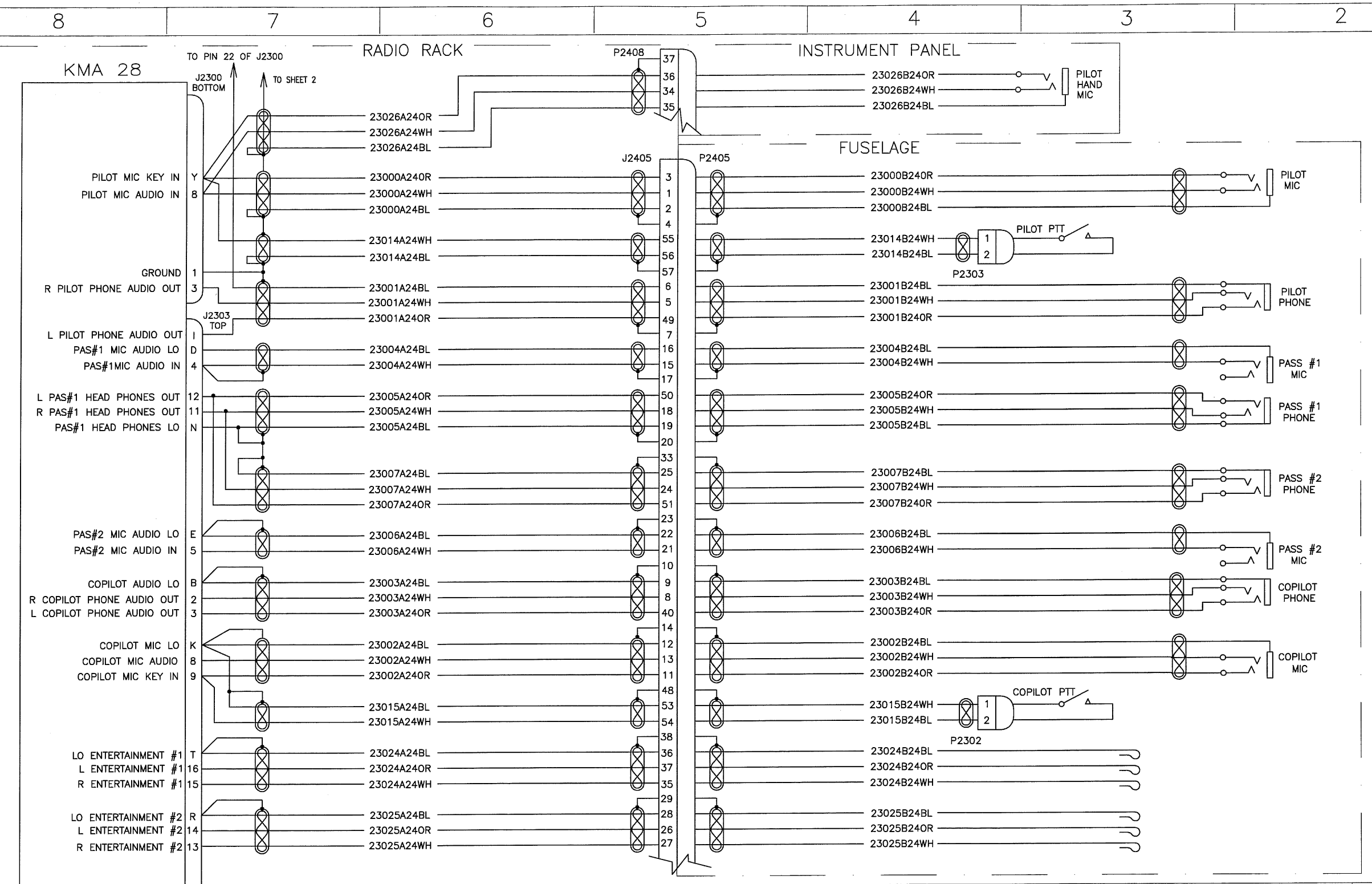
Dimensions in Millimetres | Tolerances are

NEXT ASSEMBLY: DA4-9200-00-00

TITLE: SCHEMATIC, PM 1000 KX 155A NAV/COM

DRAWING NUMBER: DA4-9223-10-03 | SHEET: 2/2

REPLACES DWG.#



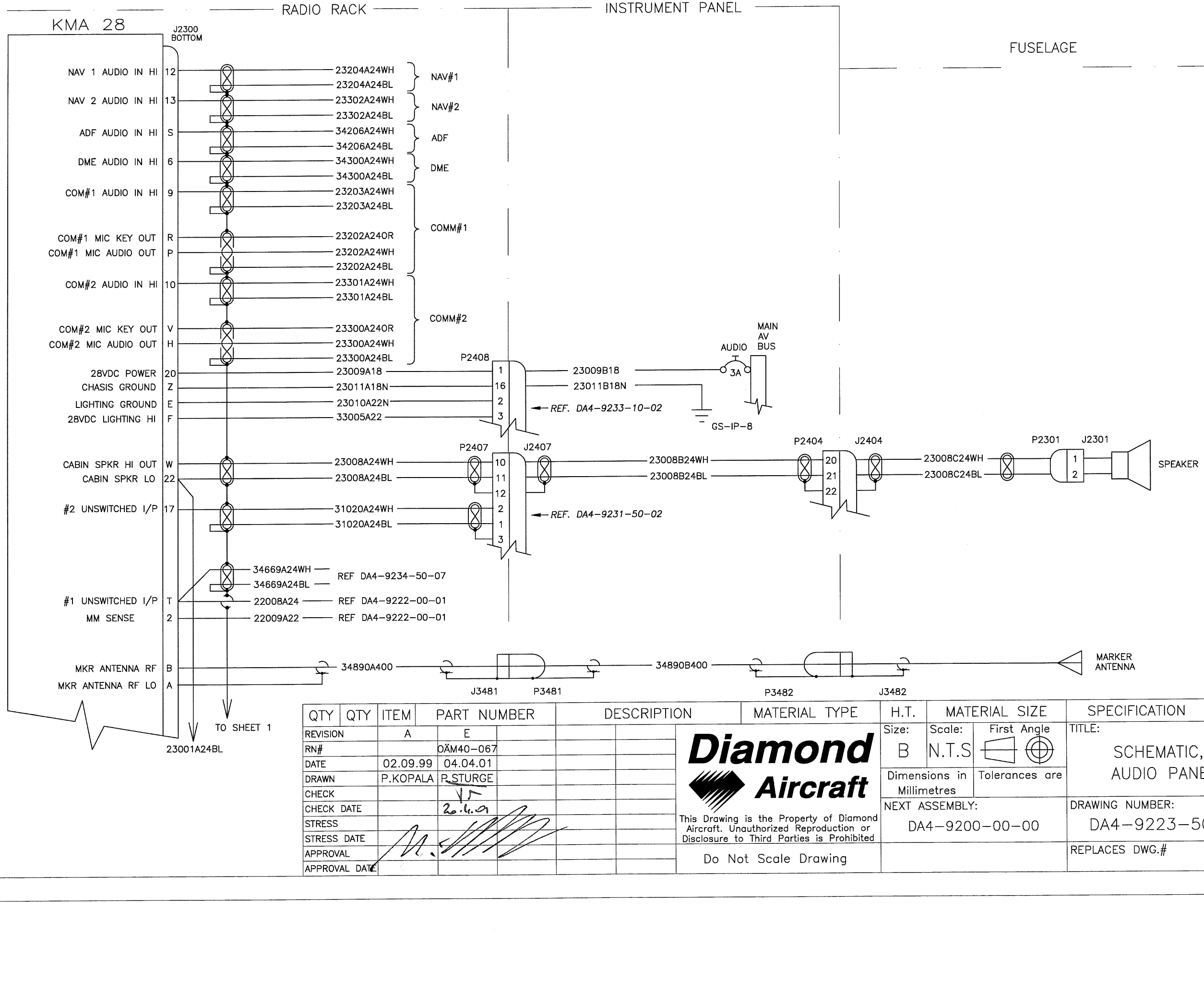
QTY	QTY	ITEM	PART NUMBER	DESCRIPTION	MATERIAL TYPE
REVISION		A	E		
RN#			OÄM40-067		
DATE		02.09.99	04.04.01		
DRAWN		P.KOPALA	R.STURGE		
CHECK			VF		
CHECK DATE			20.4.01		
STRESS					
STRESS DATE					
APPROVAL					
APPROVAL DATE					

Diamond Aircraft

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Do Not Scale Drawing

H.T.	MATERIAL SIZE		SPECIFICATION	SUPPLIER
Size: B	Scale: N.T.S	First Angle	TITLE: SCHEMATIC, KMA 28 AUDIO PANEL WIRING	
Dimensions in Millimetres	Tolerances are			
NEXT ASSEMBLY: DA4-9200-00-00			DRAWING NUMBER: DA4-9223-50-01	SHEET: 1/2
			REPLACES DWG.# N/A	



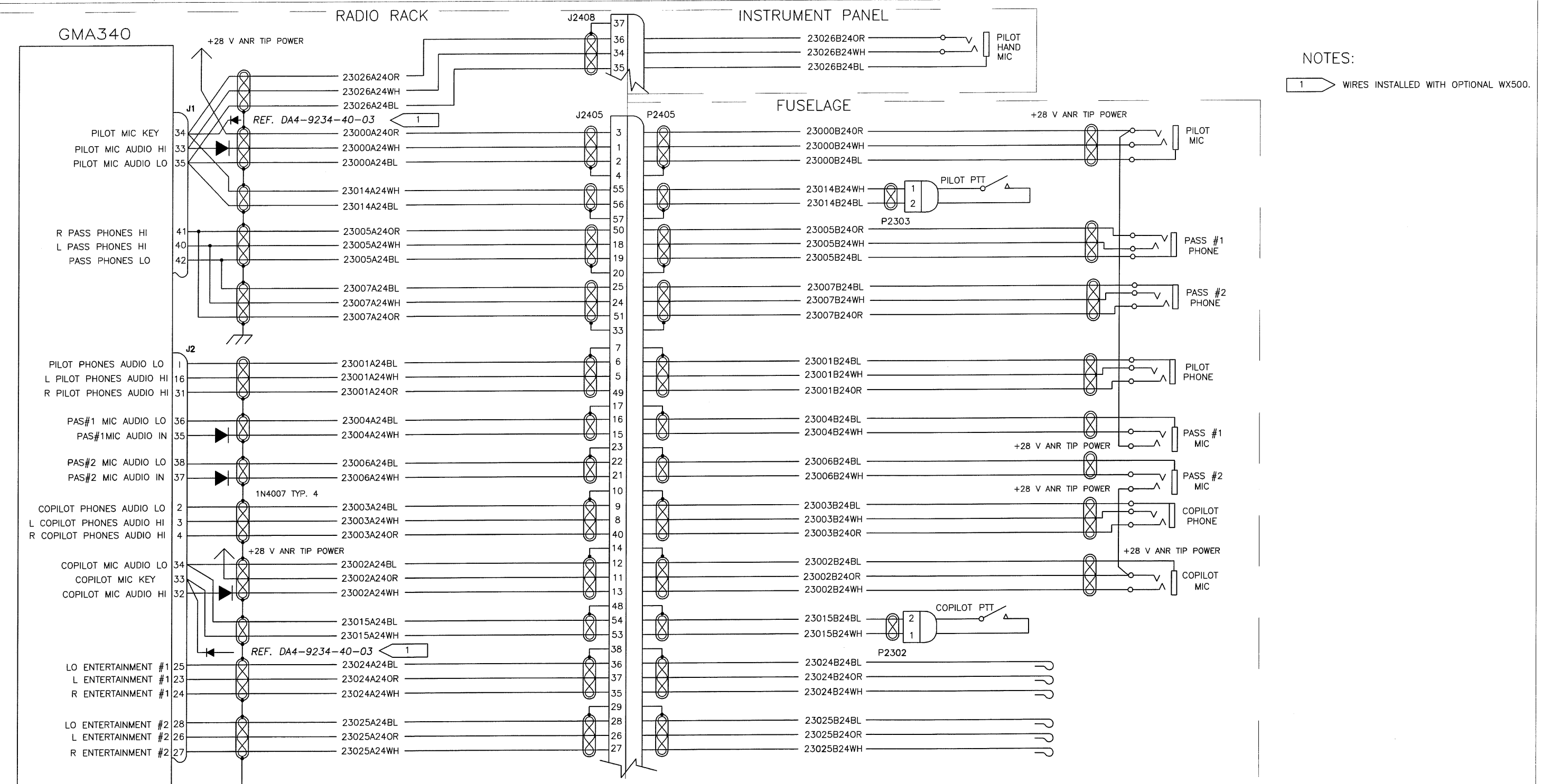
QTY	QTY	ITEM	PART NUMBER		DESCRIPTION	MATERIAL TYPE
REVISION		A	E			
RN#			OÄM40-067			
DATE		02.09.99	04.04.01			
DRAWN		P.KOPALA	P.STURGE			
CHECK						
CHECK DATE			20.6.01			
STRESS						
STRESS DATE						
APPROVAL						
APPROVAL DATE						

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Do Not Scale Drawing

H.T.	MATERIAL SIZE		SPECIFICATION	SUPPLIER
Size: B	Scale: N.T.S	First Angle	TITLE: SCHEMATIC, KMA 28 AUDIO PANEL WIRING	
Dimensions in Millimetres	Tolerances are			
NEXT ASSEMBLY: DA4-9200-00-00			DRAWING NUMBER: DA4-9223-50-01	SHEET: 2/2
			REPLACES DWG.# N/A	



NOTES:

1 WIRES INSTALLED WITH OPTIONAL WX500.

QTY	QTY	ITEM	PART NUMBER	DESCRIPTION	MATERIAL TYPE	H.T.	MATERIAL SIZE	SPECIFICATION	SUPPLIER

REVISION	C	D	E	F
RN#	MÄM 40-110	MÄM 40-180	MÄM 40-198	MÄM 40-149
DATE	05.02.02	26.09.02	07.10.03	20.04.04
DRAWN	P.STURGE	B.Bjelis	C.WOOD	P.STURGE
CHECK				
CHECK DATE				
STRESS	M. Reichel			
STRESS DATE	22 OKT 2004			
APPROVAL				
APPROVAL DATE				

Diamond Aircraft

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Do Not Scale Drawing

Size:	Scale:	First Angle
B	N.T.S	

Dimensions in Millimetres | Tolerances are

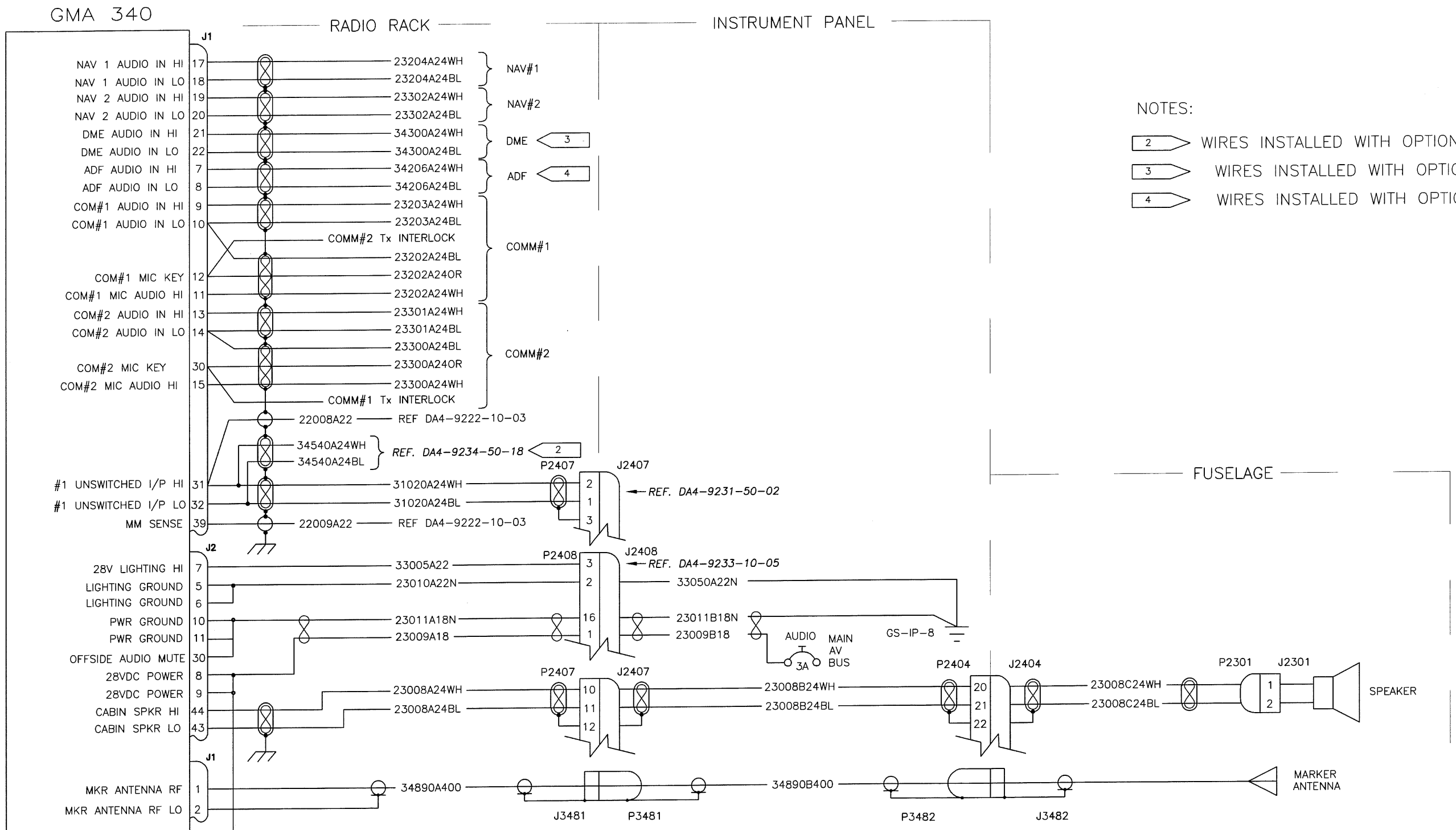
TITLE: SCHEMATIC, GMA 340 AUDIO PANEL WIRING

NEXT ASSEMBLY: DA4-9200-00-00

DRAWING NUMBER: DA4-9223-50-02

SHEET: 1/2

REPLACES DWG.# N/A



NOTES:

2 WIRES INSTALLED WITH OPTIONAL GTX330.

3 WIRES INSTALLED WITH OPTIONAL DME.

4 WIRES INSTALLED WITH OPTIONAL ADF.

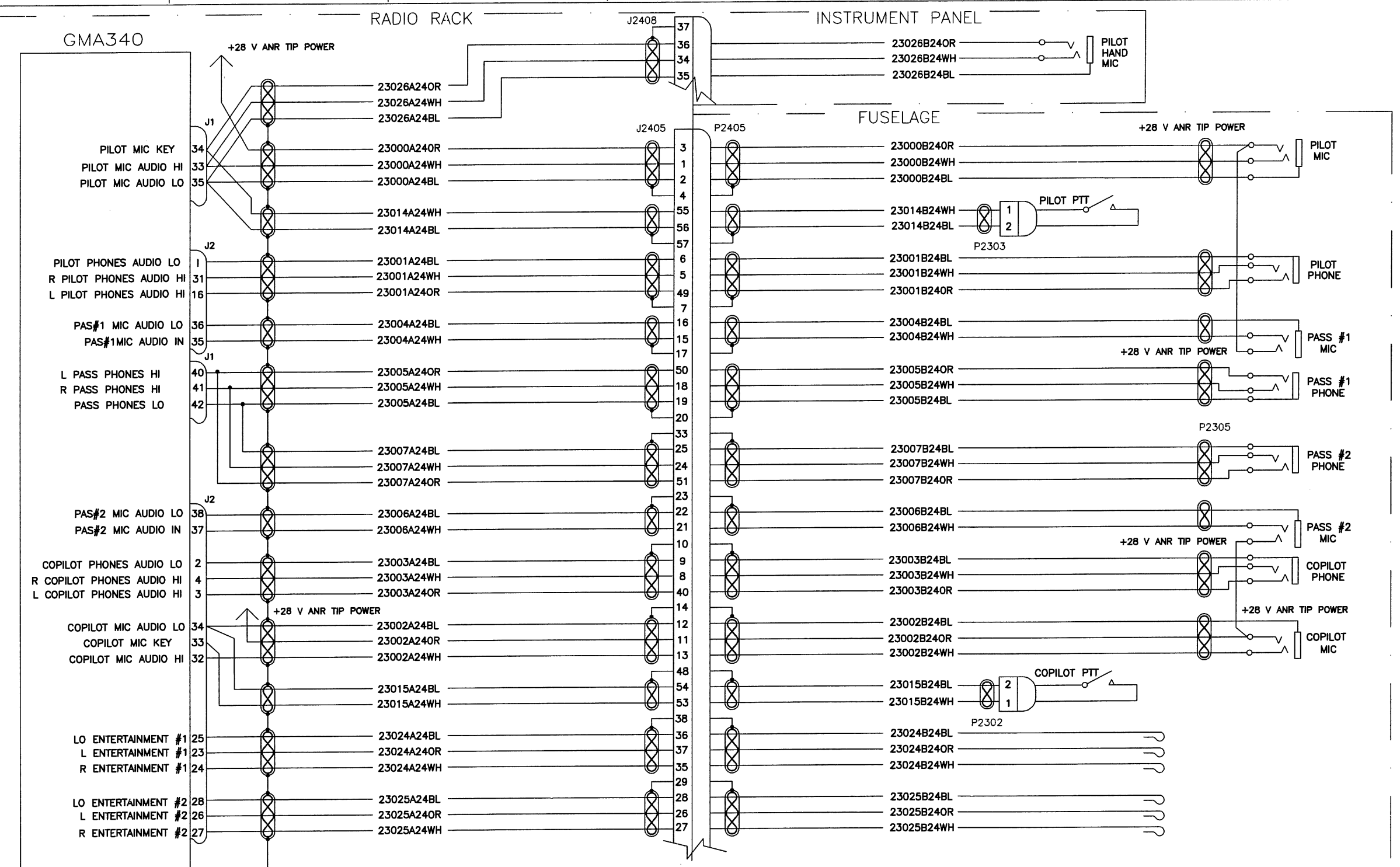
QTY	QTY	ITEM	PART NUMBER			DESCRIPTION	MATERIAL TYPE
REVISION		C	D	E	F		
RN#		MÄM 40-110	MÄM 40-180	MÄM 40-198	MÄM 40-149		
DATE		05.02.02	26.09.02	07.10.03	20.04.04		
DRAWN		P.STURGE	B.Bjelis	C.WOOD	P.STURGE		
CHECK							
CHECK DATE							
STRESS		M. Reichel					
STRESS DATE		22 OCT 2004					
APPROVAL							
APPROVAL DATE							

Diamond Aircraft

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Do Not Scale Drawing

H.T.	MATERIAL SIZE		SPECIFICATION	SUPPLIER
Size: B	Scale: N.T.S	First Angle	TITLE: SCHEMATIC, GMA 340 AUDIO PANEL WIRING	
Dimensions in Millimetres	Tolerances are			
NEXT ASSEMBLY: DA4-9200-00-00			DRAWING NUMBER: DA4-9223-50-02	SHEET: 2/2
			REPLACES DWG.# N/A	



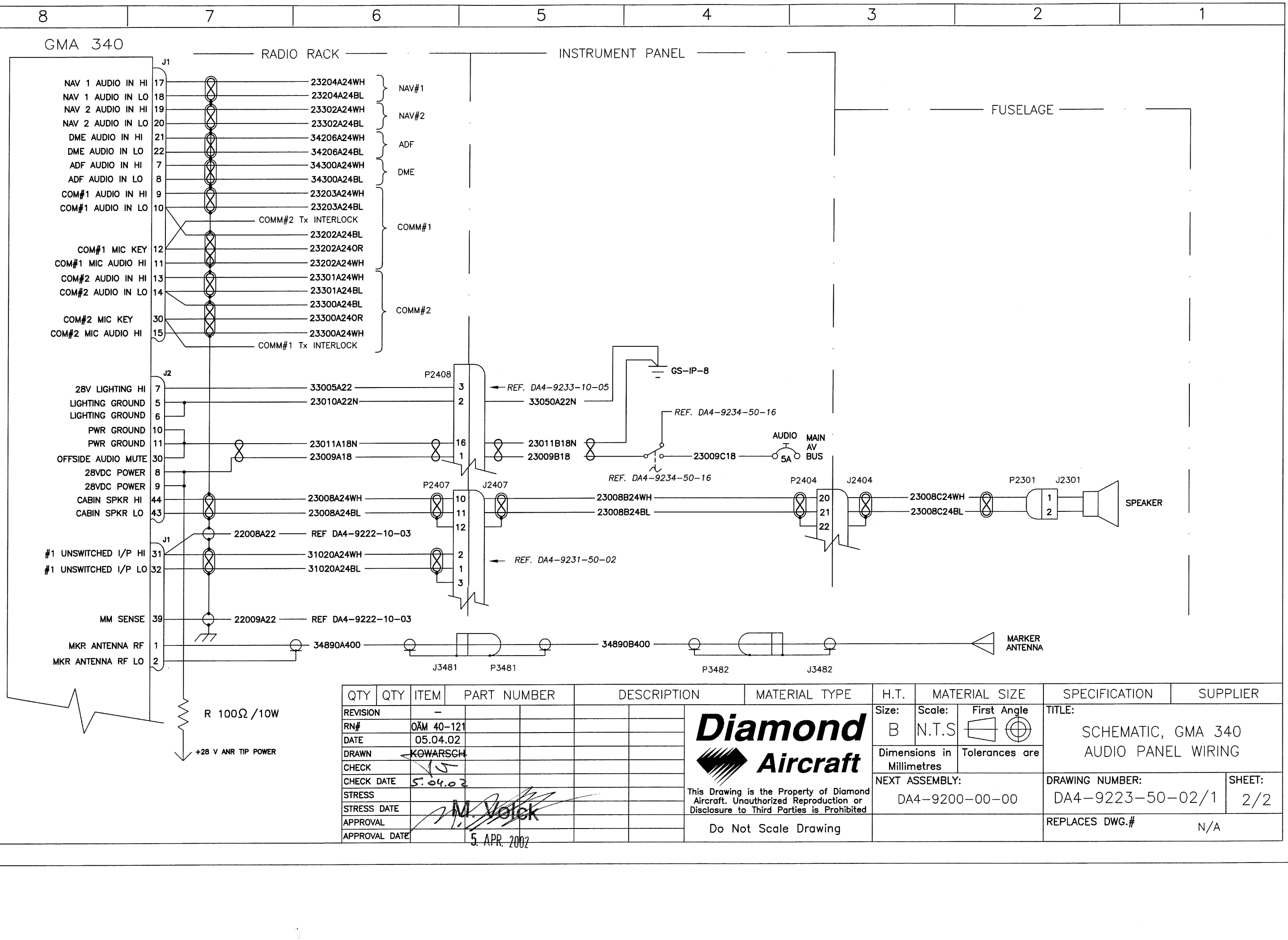
QTY	QTY	ITEM	PART NUMBER	DESCRIPTION	MATERIAL TYPE
REVISION		–			
RN#		0ÄM 40-121			
DATE		05.04.02			
DRAWN		~~KOWARSCH~~			
CHECK					
CHECK DATE		5.04.02			
STRESS					
STRESS DATE					
APPROVAL		M. Volck			
APPROVAL DATE		5. APR. 2002			

Diamond Aircraft

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Do Not Scale Drawing

H.T.	MATERIAL SIZE		SPECIFICATION	SUPPLIER
Size: B	Scale: N.T.S	First Angle	TITLE: SCHEMATIC, GMA 340 AUDIO PANEL WIRING	
Dimensions in Millimetres	Tolerances are			
NEXT ASSEMBLY: DA4-9200-00-00			DRAWING NUMBER: DA4-9223-50-02/1	SHEET: 1/2
			REPLACES DWG.# N/A	



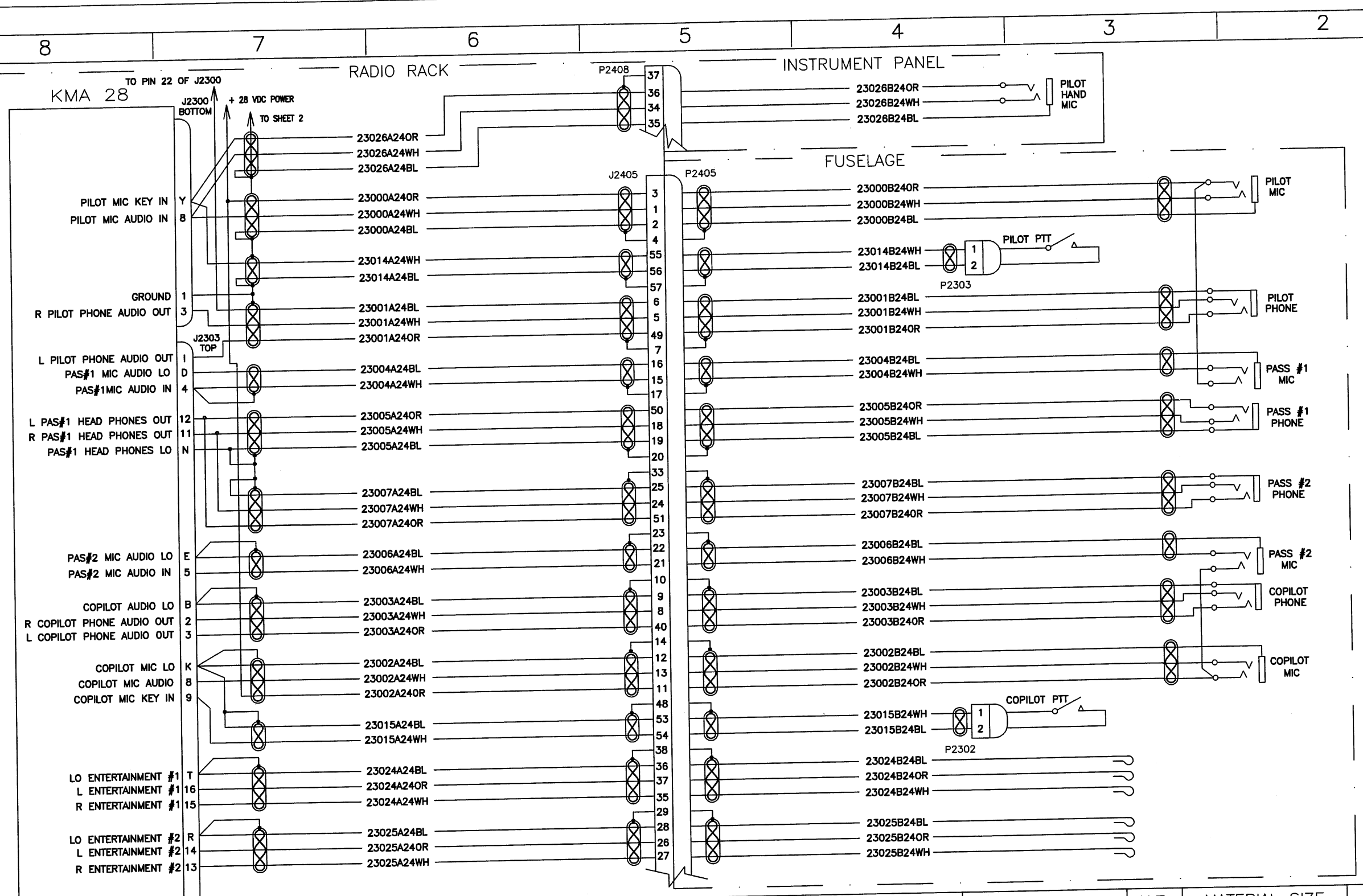
QTY	QTY	ITEM	PART NUMBER	DESCRIPTION	MATERIAL TYPE
REVISION		–			
RN#		OÄM 40-121			
DATE		05.04.02			
DRAWN		~~KOWARSCH~~			
CHECK					
CHECK DATE		5.04.02			
STRESS					
STRESS DATE					
APPROVAL		M. Volck			
APPROVAL DATE		5. APR. 2002			

Diamond Aircraft

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Do Not Scale Drawing

H.T.	MATERIAL SIZE		SPECIFICATION	SUPPLIER
Size: B	Scale: N.T.S	First Angle	TITLE: SCHEMATIC, GMA 340 AUDIO PANEL WIRING	
Dimensions in Millimetres	Tolerances are			
NEXT ASSEMBLY: DA4-9200-00-00			DRAWING NUMBER: DA4-9223-50-02/1	SHEET: 2/2
			REPLACES DWG.# N/A	



QTY	QTY	ITEM	PART NUMBER	DESCRIPTION	MATERIAL TYPE
REVISION		–			
RN#		MÄM 40-110			
DATE		06.02.02			
DRAWN		STURGE			
CHECK					
CHECK DATE		07.02.02			
STRESS					
STRESS DATE					
APPROVAL					
APPROVAL DATE					

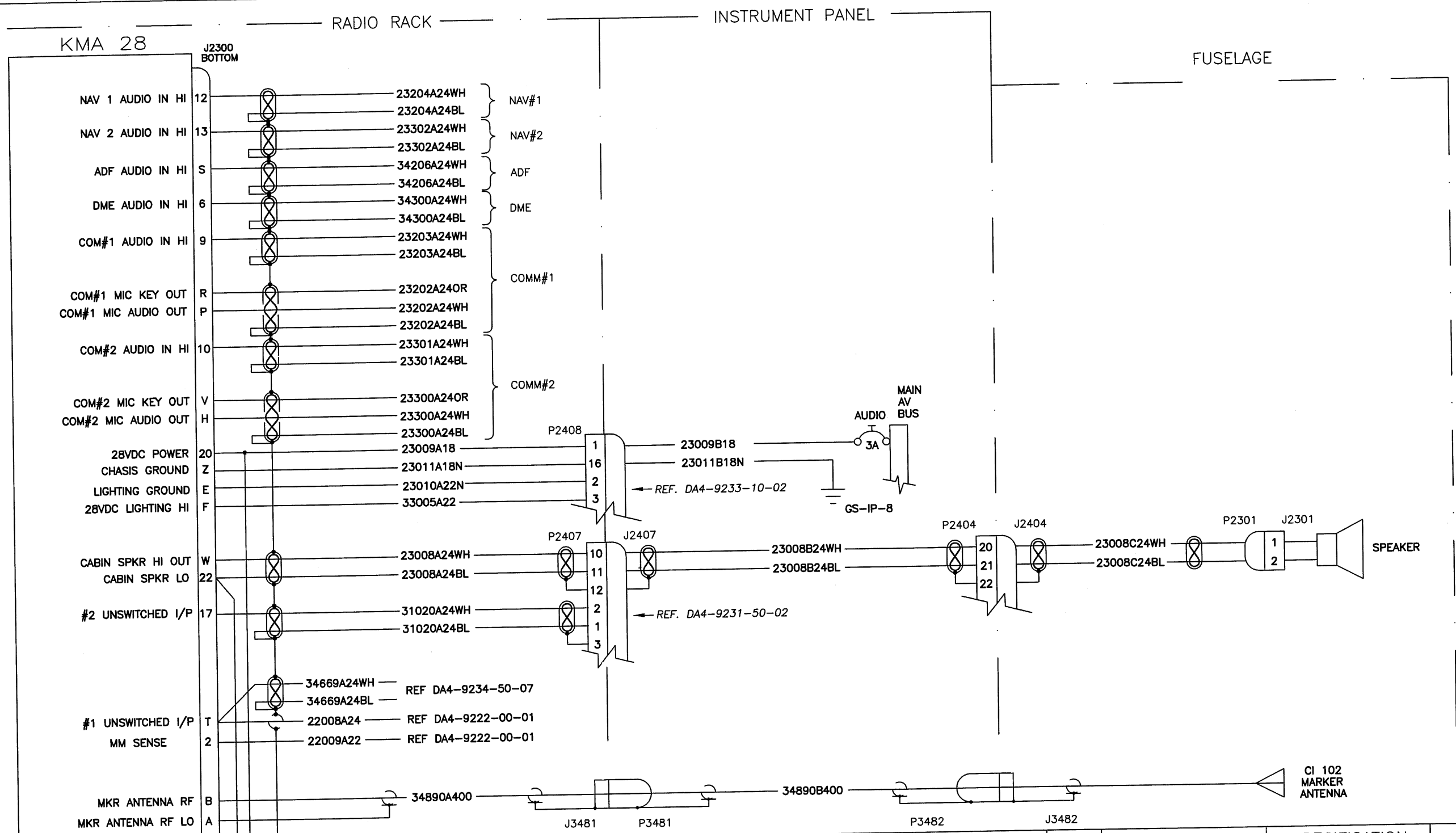
M. Volek
25 FEB 2002

Diamond Aircraft

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Do Not Scale Drawing

H.T.	MATERIAL SIZE		SPECIFICATION	SUPPLIER
Size: B	Scale: N.T.S	First Angle	TITLE: SCHEMATIC, KMA 28 AUDIO PANEL WIRING With ANR POWER	
Dimensions in Millimetres	Tolerances are			
NEXT ASSEMBLY: DA4-9200-00-00			DRAWING NUMBER: DA4-9223-50-03	SHEET: 1/2
			REPLACES DWG.# N/A	



QTY	QTY	ITEM	PART NUMBER	DESCRIPTION	MATERIAL TYPE
REVISION		–			
RN#		MÄM 40-110			
DATE		06.02.02			
DRAWN		STURGE			
CHECK					
CHECK DATE		07.02.02			
STRESS					
STRESS DATE					
APPROVAL					
APPROVAL DATE					

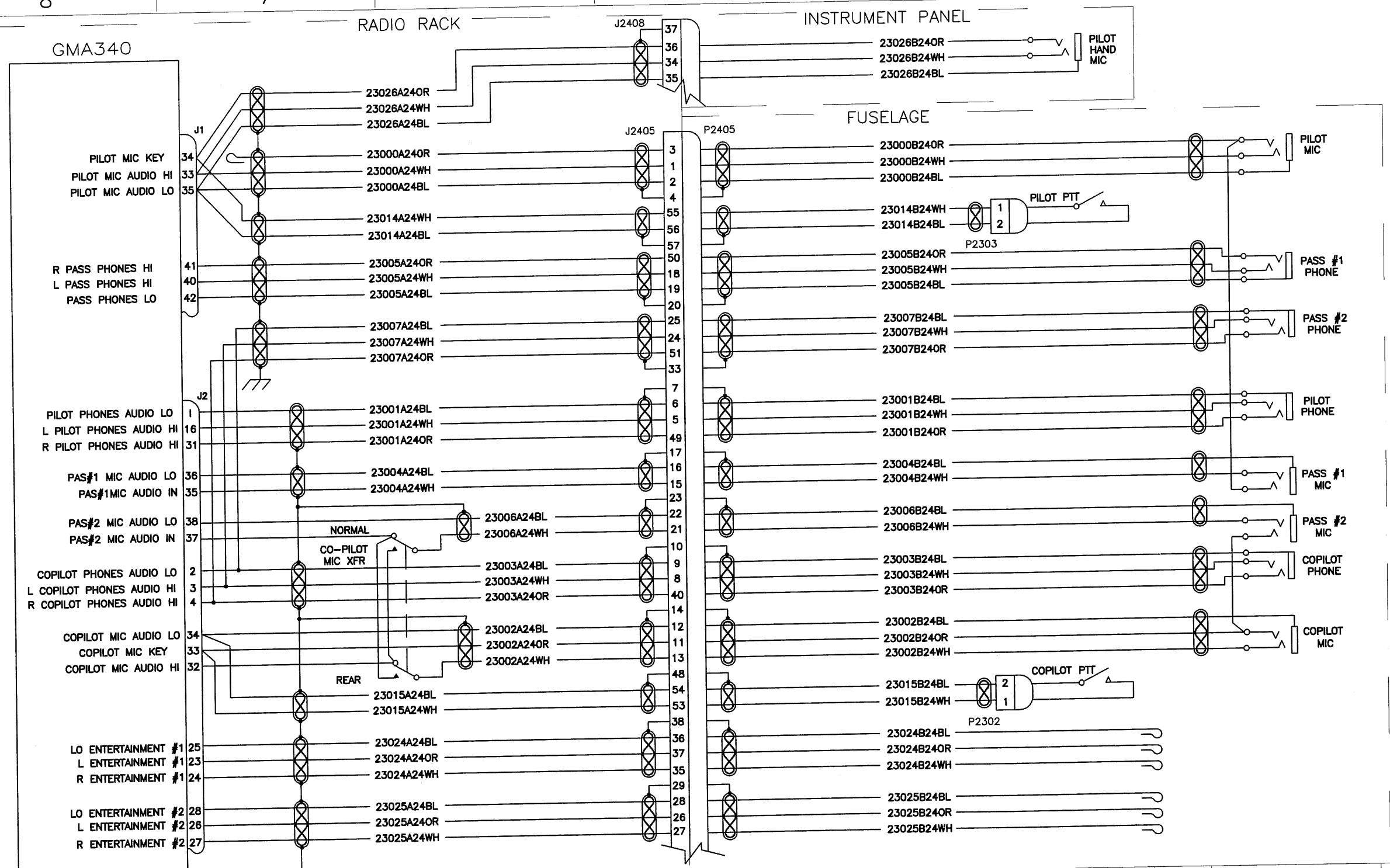
M. Volck
25 FEB 2002

Diamond Aircraft

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Do Not Scale Drawing

H.T.	MATERIAL SIZE		SPECIFICATION	SUPPLIER
Size: B	Scale: N.T.S	First Angle	TITLE: SCHEMATIC, KMA 28 AUDIO PANEL WIRING With ANR POWER	
Dimensions in Millimetres	Tolerances are			
NEXT ASSEMBLY: DA4-9200-00-00			DRAWING NUMBER: DA4-9223-50-03	SHEET: 2/2
			REPLACES DWG.# N/A	



QTY	QTY	ITEM	PART NUMBER	DESCRIPTION	MATERIAL TYPE
REVISION		'_'			
RN#		OAM 40-154			
DATE		02.06.03			
DRAWN		P.STURGE			
CHECK					
CHECK DATE					
STRESS					
STRESS DATE					
APPROVAL					
APPROVAL DATE					

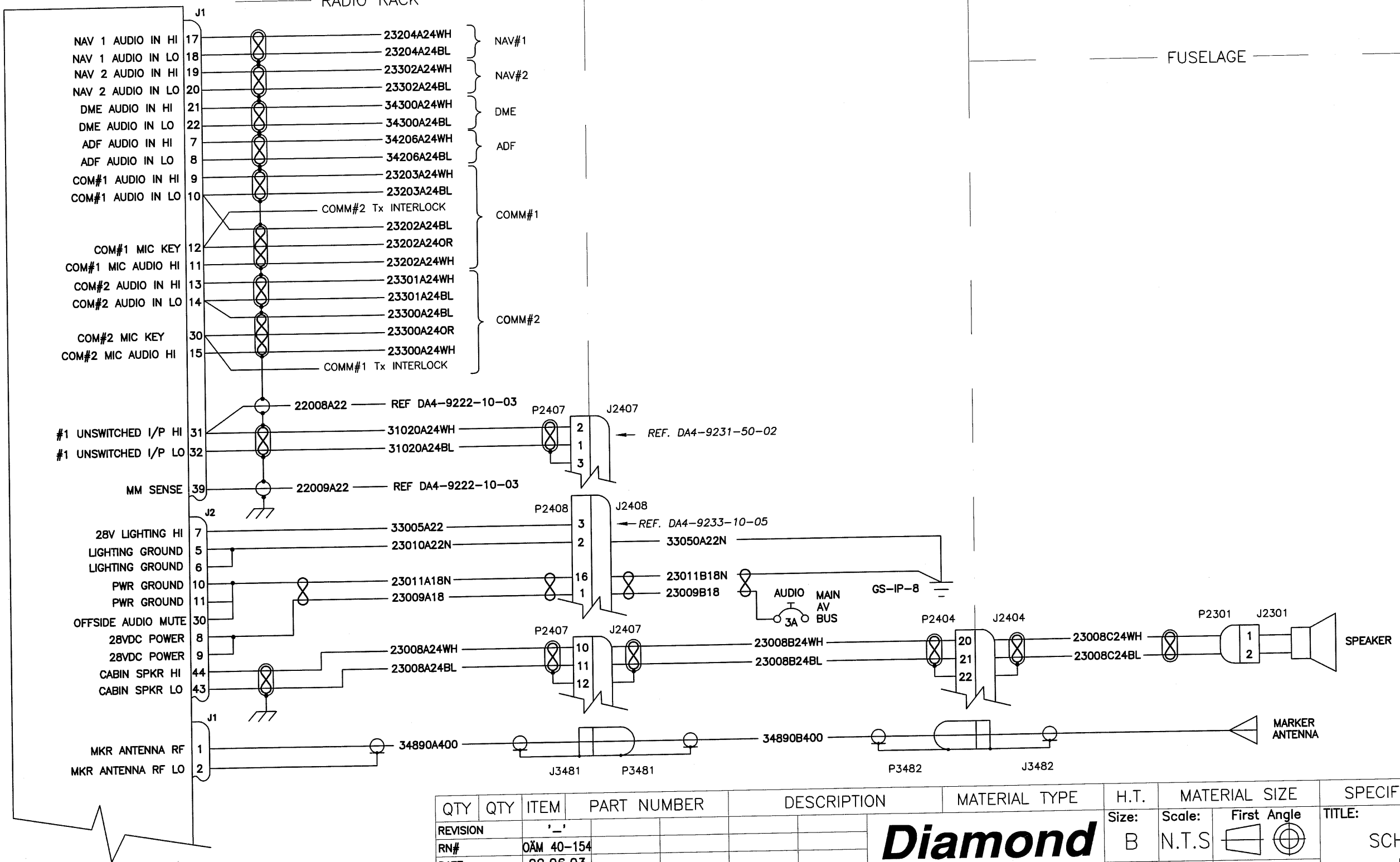
M. Reichel
04 JUIN 2003

Diamond Aircraft

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Do Not Scale Drawing

H.T.	MATERIAL SIZE		SPECIFICATION	SUPPLIER
Size: B	Scale: N.T.S	First Angle	TITLE: SCHEMATIC, GMA 340 MIC AUDIO XFR	
Dimensions in Millimetres	Tolerances are			
NEXT ASSEMBLY: DA4-9200-00-00			DRAWING NUMBER: DA4-9223-50-05	SHEET: 1/2
			REPLACES DWG.# N/A	



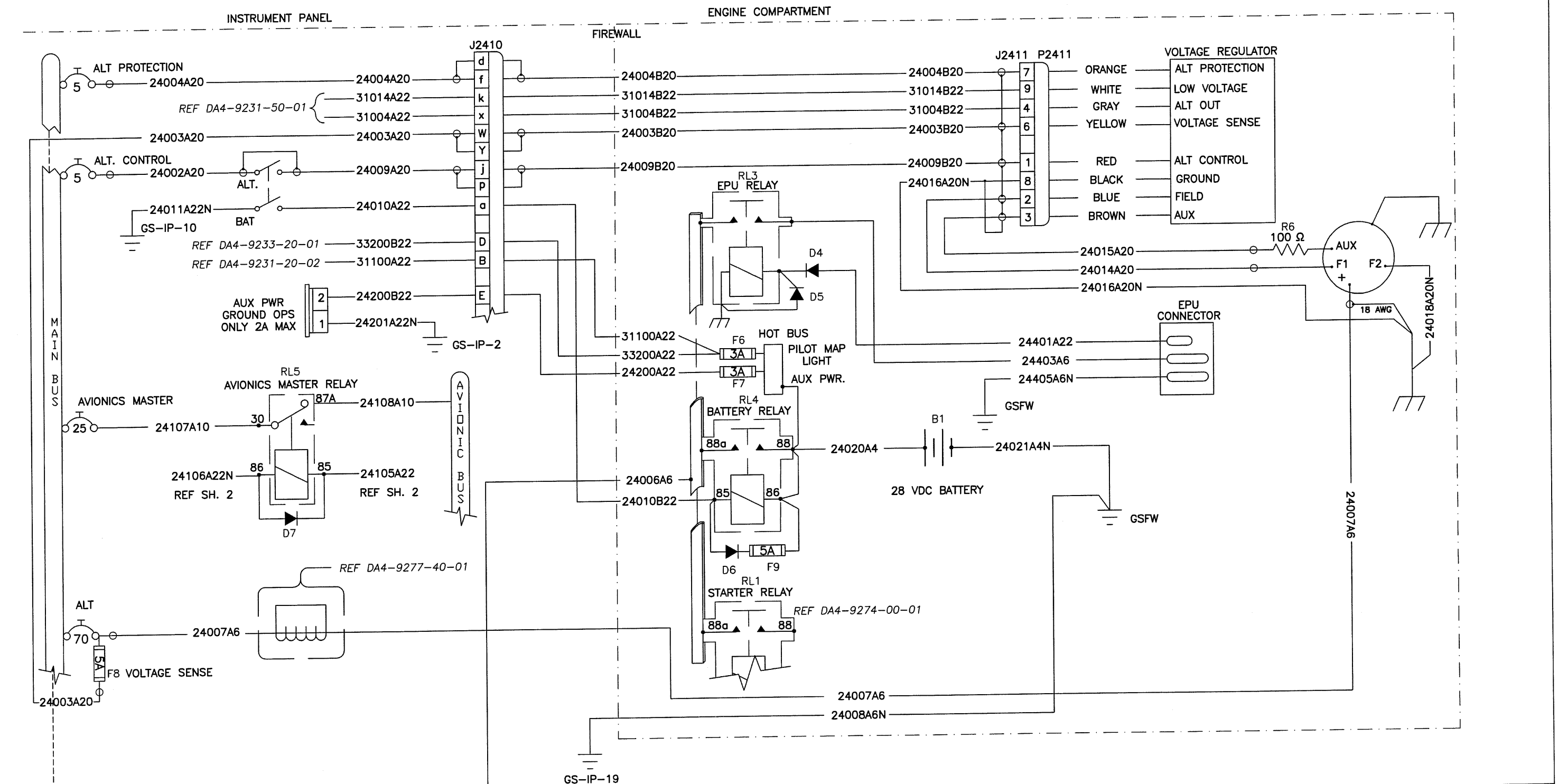
QTY	QTY	ITEM	PART NUMBER	DESCRIPTION	MATERIAL TYPE
REVISION		'_'			
RN#		OÄM 40-154			
DATE		02.06.03			
DRAWN		P.STURGE			
CHECK		26.06.03			
CHECK DATE					
STRESS		M. Reichel			
STRESS DATE		04 JUIN 2003			
APPROVAL					
APPROVAL DATE					

Diamond Aircraft

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Do Not Scale Drawing

H.T.	MATERIAL SIZE		SPECIFICATION	SUPPLIER
Size: B	Scale: N.T.S	First Angle	TITLE: SCHEMATIC, GMA 340 MIC AUDIO XFR	
Dimensions in Millimetres	Tolerances are			
NEXT ASSEMBLY: DA4-9200-00-00			DRAWING NUMBER: DA4-9223-50-05	SHEET: 2/2
			REPLACES DWG.# N/A	



QTY	QTY	ITEM	PART NUMBER		DESCRIPTION	MATERIAL TYPE	H.T.	MATERIAL SIZE	SPECIFICATION	SUPPLIER
REVISION		A	"I"	J	'k'					
RN#			OÄM 40-064	MÄM 40-080	OÄM 40-126					
DATE		13.09.99	05.10.00	16.08.01	25.07.02					
DRAWN		P.KOPALA	P.STURGE	P.STURGE	KOWARSCH					
CHECK										
CHECK DATE					23.0102					
STRESS			M. Vorck							
STRESS DATE										
APPROVAL										
APPROVAL DATE			23. SEP. 2002							

Diamond Aircraft

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Do Not Scale Drawing

Size:	Scale:	First Angle
B	N.T.S	

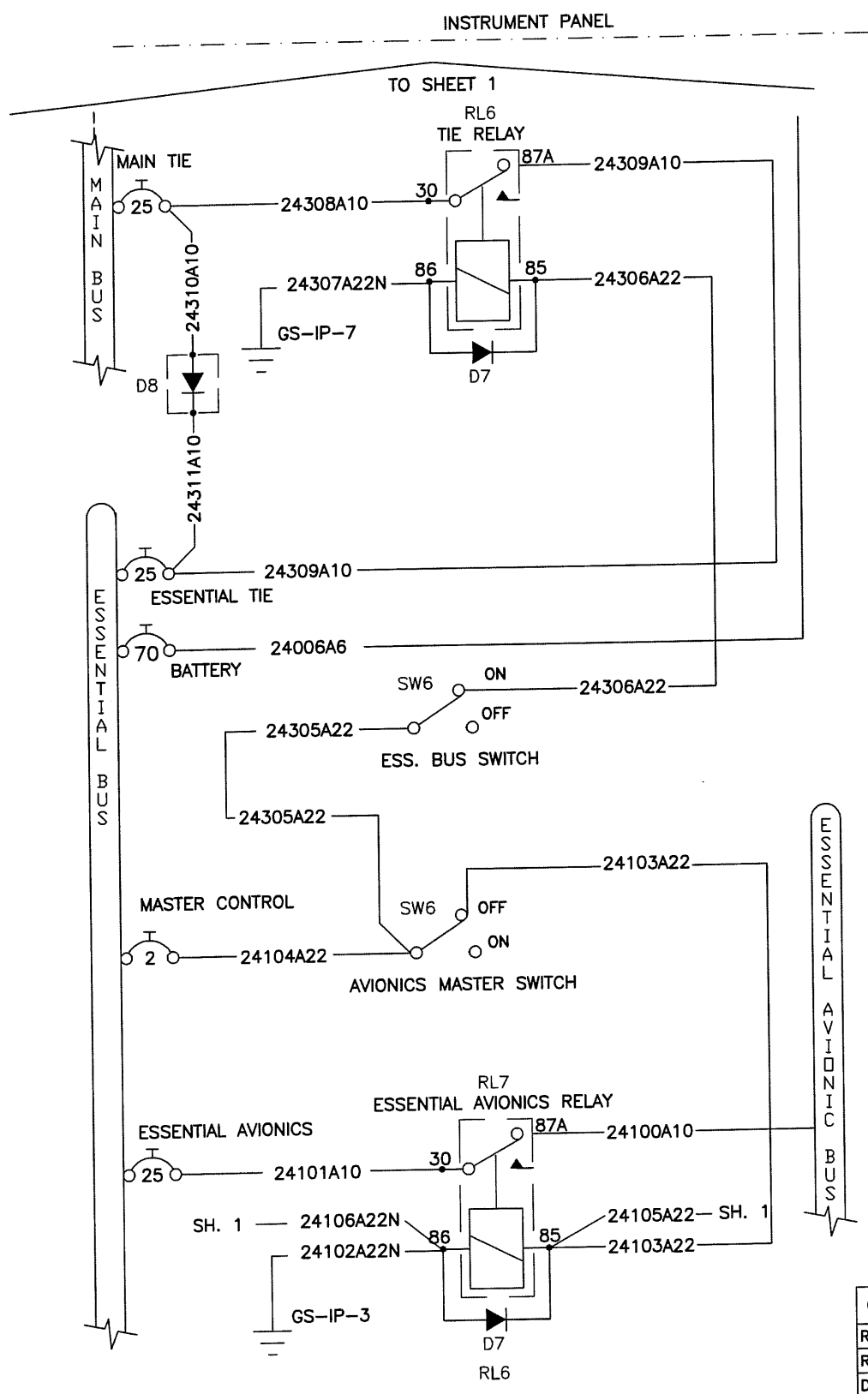
Dimensions in Millimetres | Tolerances are

NEXT ASSEMBLY: DA4-9200-00-00

TITLE: SCHEMATIC, ELECTRICAL SYSTEM

DRAWING NUMBER: DA4-9224-30-01 | SHEET: 1/2

REPLACES DWG.# N/A



QTY	QTY	ITEM	PART NUMBER		DESCRIPTION
REVISION		A	"I"	J	'K'
RN#			ÖÄM 40-064	MÄM 40-080	ÖÄM 40-126
DATE		13.09.99	05.10.00	16.08.01	25.07.02
DRAWN		P.KOPALA	P.STURGE	P.STURGE	~~KOWARSCH~~
CHECK					23.Sep.02
CHECK DATE					
STRESS					
STRESS DATE					
APPROVAL					M. Voick
APPROVAL DATE					23. SEP 2002

MATERIAL TYPE

H.T.

MATERIAL SIZE

SPECIFICATION

SUPPLIER

Diamond Aircraft

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Do Not Scale Drawing

Size:	Scale:	First Angle
B	N.T.S	

Dimensions in Millimetres | Tolerances are

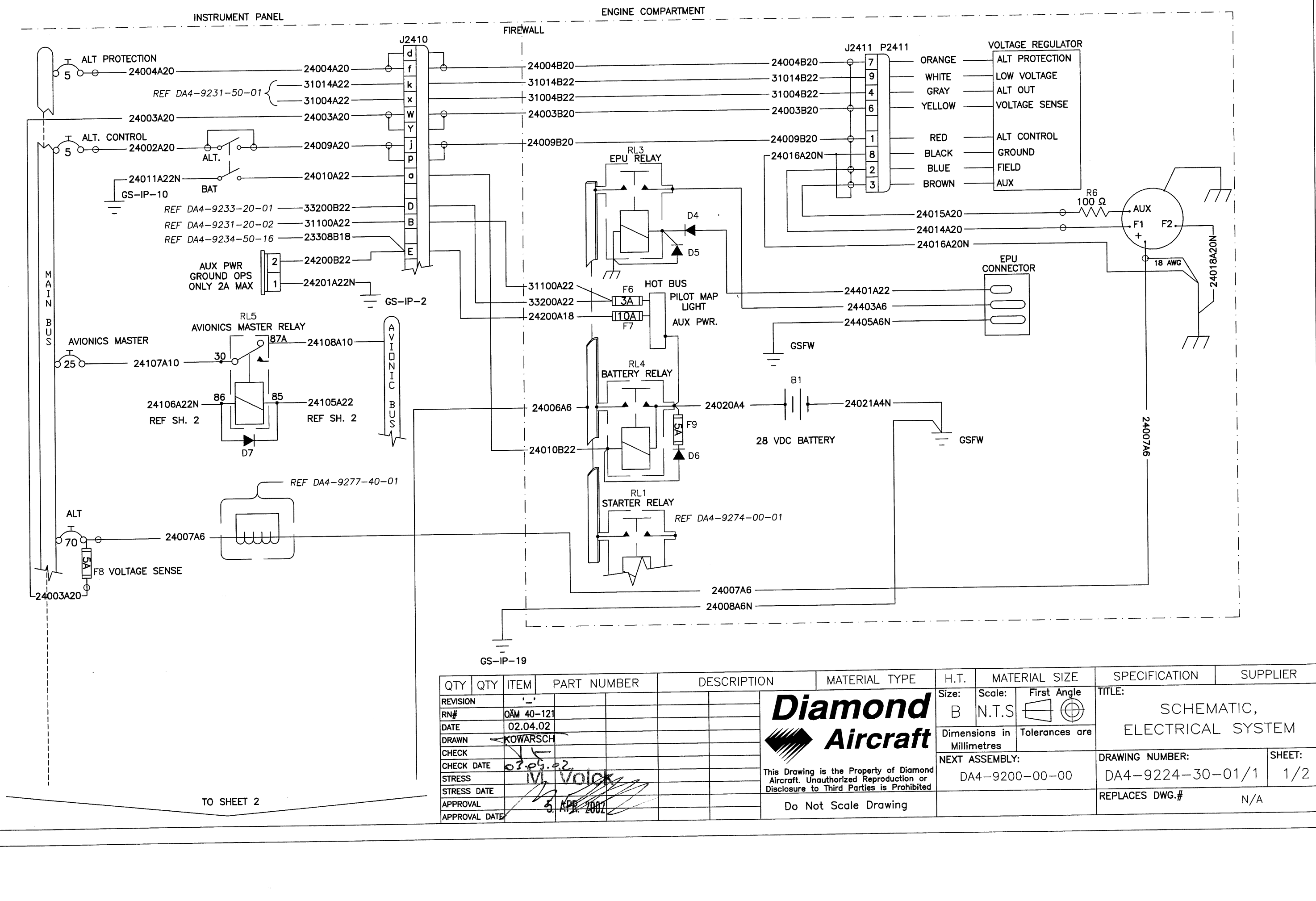
TITLE: SCHEMATIC, ELECTRICAL SYSTEM

NEXT ASSEMBLY: DA4-9200-00-00

DRAWING NUMBER: DA4-9224-30-01

SHEET: 2/2

REPLACES DWG.# N/A



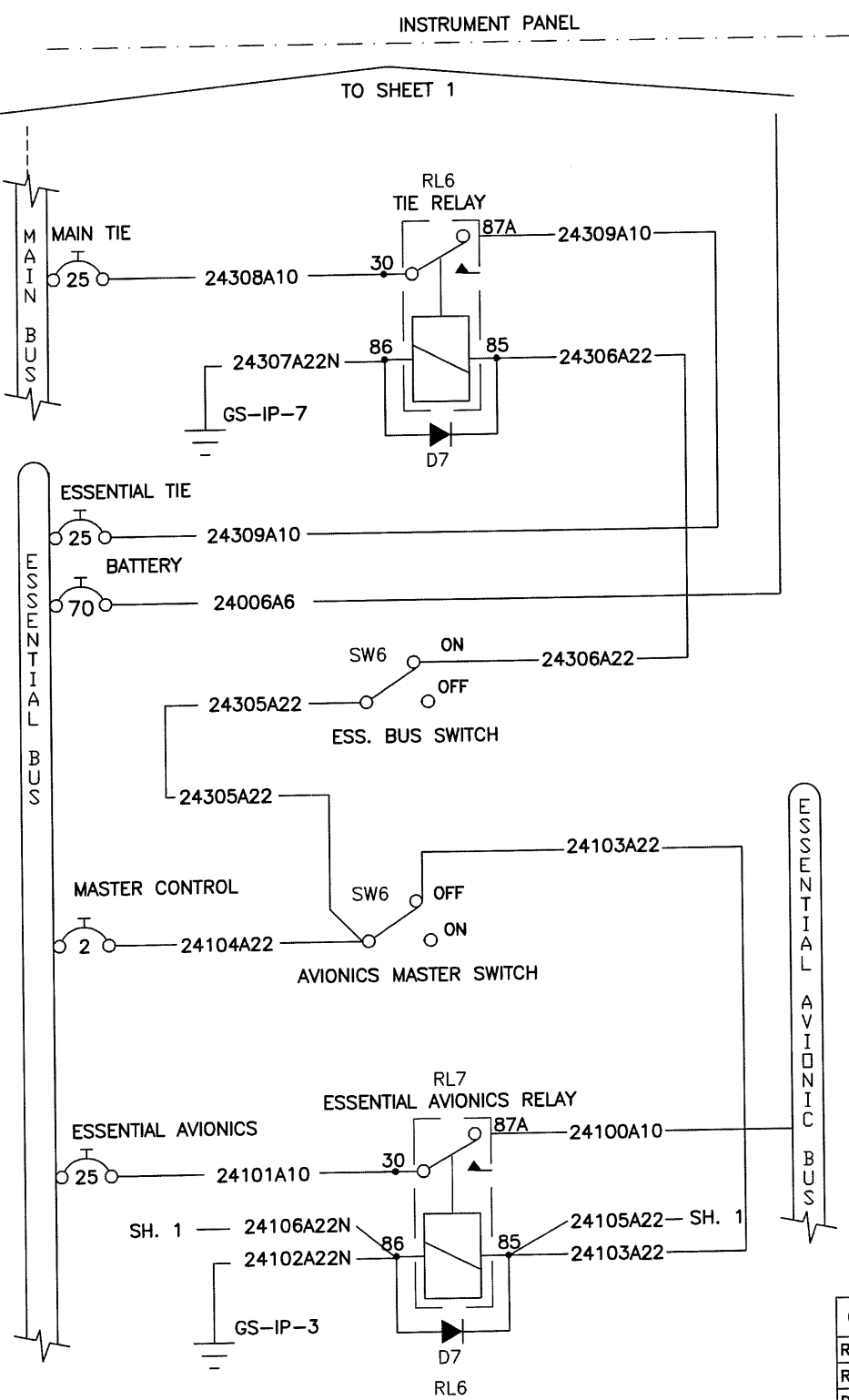
QTY	QTY	ITEM	PART NUMBER	DESCRIPTION	MATERIAL TYPE
REVISION		'_'			
RN#		OÄM 40-121			
DATE		02.04.02			
DRAWN		KOWARSCH			
CHECK					
CHECK DATE		03.04.02			
STRESS		M. VOICK			
STRESS DATE					
APPROVAL		5. APR. 2002			
APPROVAL DATE					

Diamond Aircraft

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Do Not Scale Drawing

H.T.	MATERIAL SIZE		SPECIFICATION	SUPPLIER
Size: B	Scale: N.T.S	First Angle	TITLE: SCHEMATIC, ELECTRICAL SYSTEM	
Dimensions in Millimetres	Tolerances are			
NEXT ASSEMBLY: DA4-9200-00-00			DRAWING NUMBER: DA4-9224-30-01/1	SHEET: 1/2
			REPLACES DWG.# N/A	

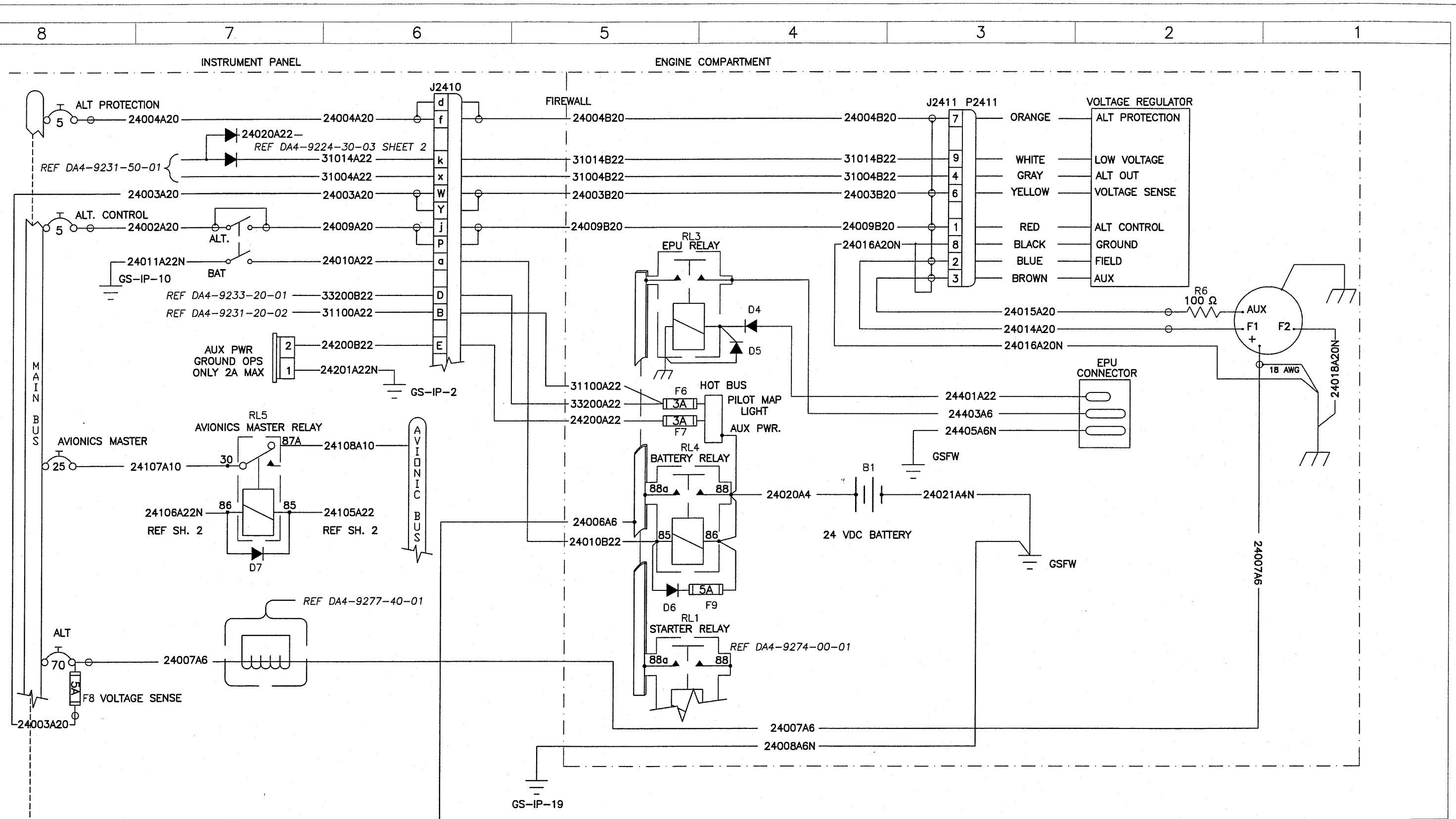


QTY	QTY	ITEM	PART NUMBER		DESCRIPTION		MATERIAL TYPE	H.T.	MATERIAL SIZE		SPECIFICATION	SUPPLIER
REVISION		'–'						Size: B	Scale: N.T.S	First Angle	TITLE: SCHEMATIC, ELECTRICAL SYSTEM	
RN#		OÄM 40-121						Dimensions in Millimetres		Tolerances are		
DATE		02.04.02						NEXT ASSEMBLY: DA4-9200-00-00			DRAWING NUMBER: DA4-9224-30-01/1	SHEET: 2/2
DRAWN		KOWARSCH									REPLACES DWG.# N/A	
CHECK												
CHECK DATE		02.04.02										
STRESS												
STRESS DATE												
APPROVAL												
APPROVAL DATE		5. APR. 2002										

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Do Not Scale Drawing



QTY	QTY	ITEM	PART NUMBER	DESCRIPTION	MATERIAL TYPE
REVISION		'_'			
RN#		OAM 40-189			
DATE		24.02.05			
DRAWN		C.WOOD			
CHECK					
CHECK DATE					
STRESS					
STRESS DATE					
APPROVAL					
APPROVAL DATE					

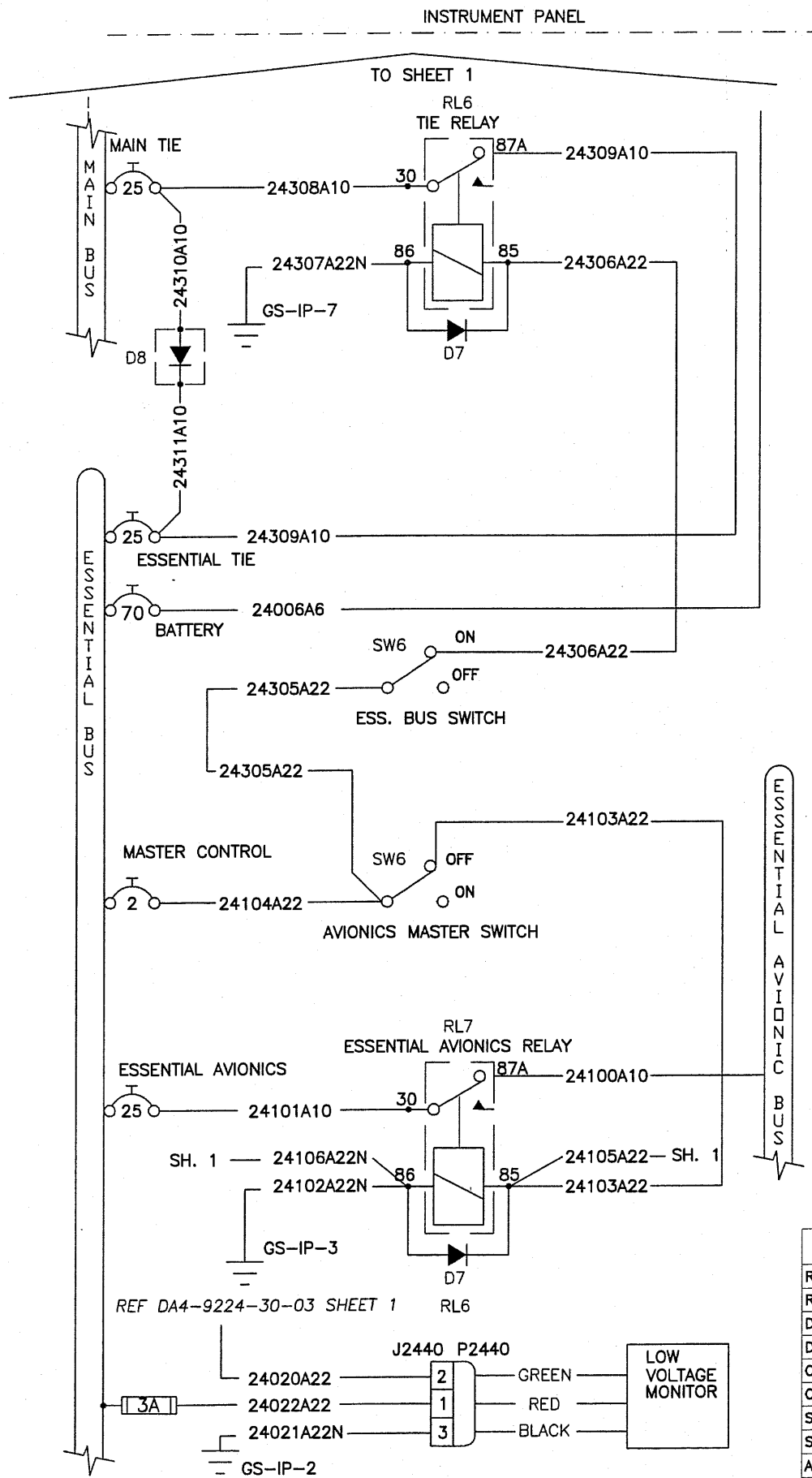
M. Reichel
26 APR 2005

Diamond Aircraft

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Do Not Scale Drawing

H.T.	MATERIAL SIZE		SPECIFICATION	SUPPLIER
Size: B	Scale: N.T.S	First Angle	TITLE: SCHEMATIC, ELECTRICAL SYSTEM	
Dimensions in Millimetres	Tolerances are			
NEXT ASSEMBLY: DA4-9200-00-00			DRAWING NUMBER: DA4-9224-30-03	SHEET: 1/2
			REPLACES DWG.# N/A	



QTY	QTY	ITEM	PART NUMBER	DESCRIPTION	MATERIAL TYPE	H.T.	MATERIAL SIZE	SPECIFICATION	SUPPLIER
REVISION		'_'							
RN#		OAM 40-189							
DATE		24.02.05							
DRAWN		C.WOOD							
CHECK									
CHECK DATE									
STRESS									
STRESS DATE									
APPROVAL									
APPROVAL DATE									

M. Reichel
26 APR 2005

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Do Not Scale Drawing

Size:	Scale:	First Angle
B	N.T.S	

Dimensions in Millimetres | Tolerances are

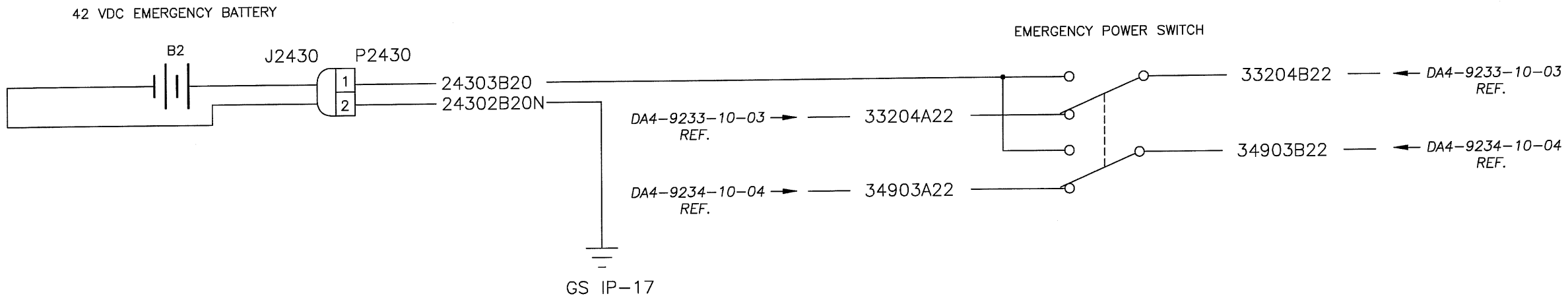
TITLE: SCHEMATIC, ELECTRICAL SYSTEM

NEXT ASSEMBLY: DA4-9200-00-00

DRAWING NUMBER: DA4-9224-30-03

SHEET: 2/2

REPLACES DWG.# N/A



QTY	QTY	ITEM	PART NUMBER			DESCRIPTION	MATERIAL TYPE	H.T.	MATERIAL SIZE	SPECIFICATION	SUPPLIER
REVISION		–	B	C							
RN#		ÖÄM 40-067		ÖÄM 40-067/a							
DATE		04.12.00	02.03.01	11.12.01							
DRAWN		KOWARSCH	STURGE	KOWARSCH							
CHECK											
CHECK DATE											
STRESS											
STRESS DATE											
APPROVAL											
APPROVAL DATE											

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Do Not Scale Drawing

Size: B | Scale: N.T.S | First Angle

Dimensions in Millimetres | Tolerances are

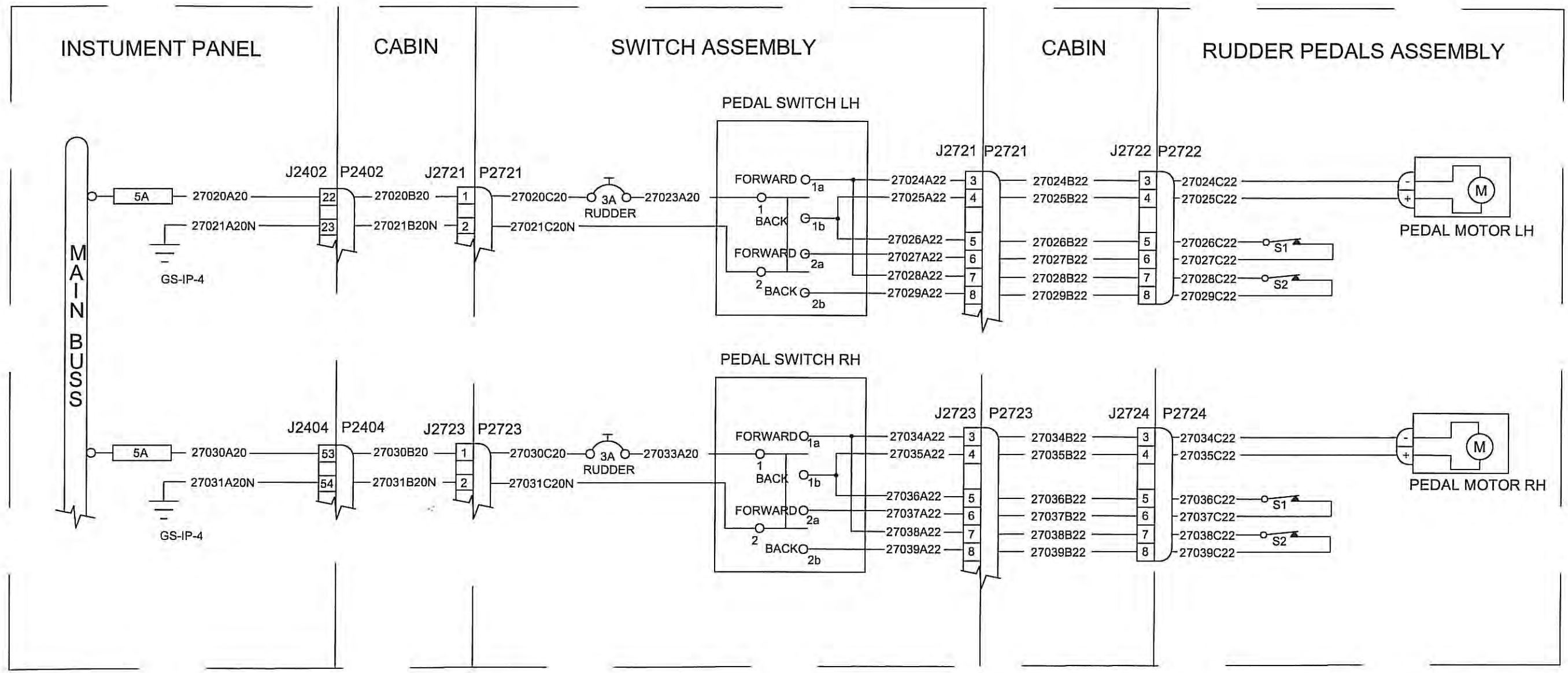
NEXT ASSEMBLY: DA4-9200-00-00

TITLE: EMERGENCY POWER PACKAGE

DRAWING NUMBER: DA4-9225-60-01

SHEET: 1/1

REPLACES DWG.#



QTY	QTY	ITEM	PART NUMBER	DESCRIPTION	MATERIAL TYPE	H.T.	MATERIAL SIZE	SPECIFICATION	SUPPLIER
REVISION		'_'	'a'						
AN#			OAM 40-251						
DATE		06.03.06	12.07.06						
DRAWN		C.WOOD	TG						
CHECK			M. Kowarsch		M. Volck				
CHECK DATE			19. SEP. 2006		19. SEP. 2006				
STRESS									
STRESS DATE									
APPROVAL									
APPROVAL DATE									

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Do Not Scale Drawing

Size:	Scale:	First Angle
B	NTS	

Dimensions in Millimetres | Tolerances are ISO 2768 m

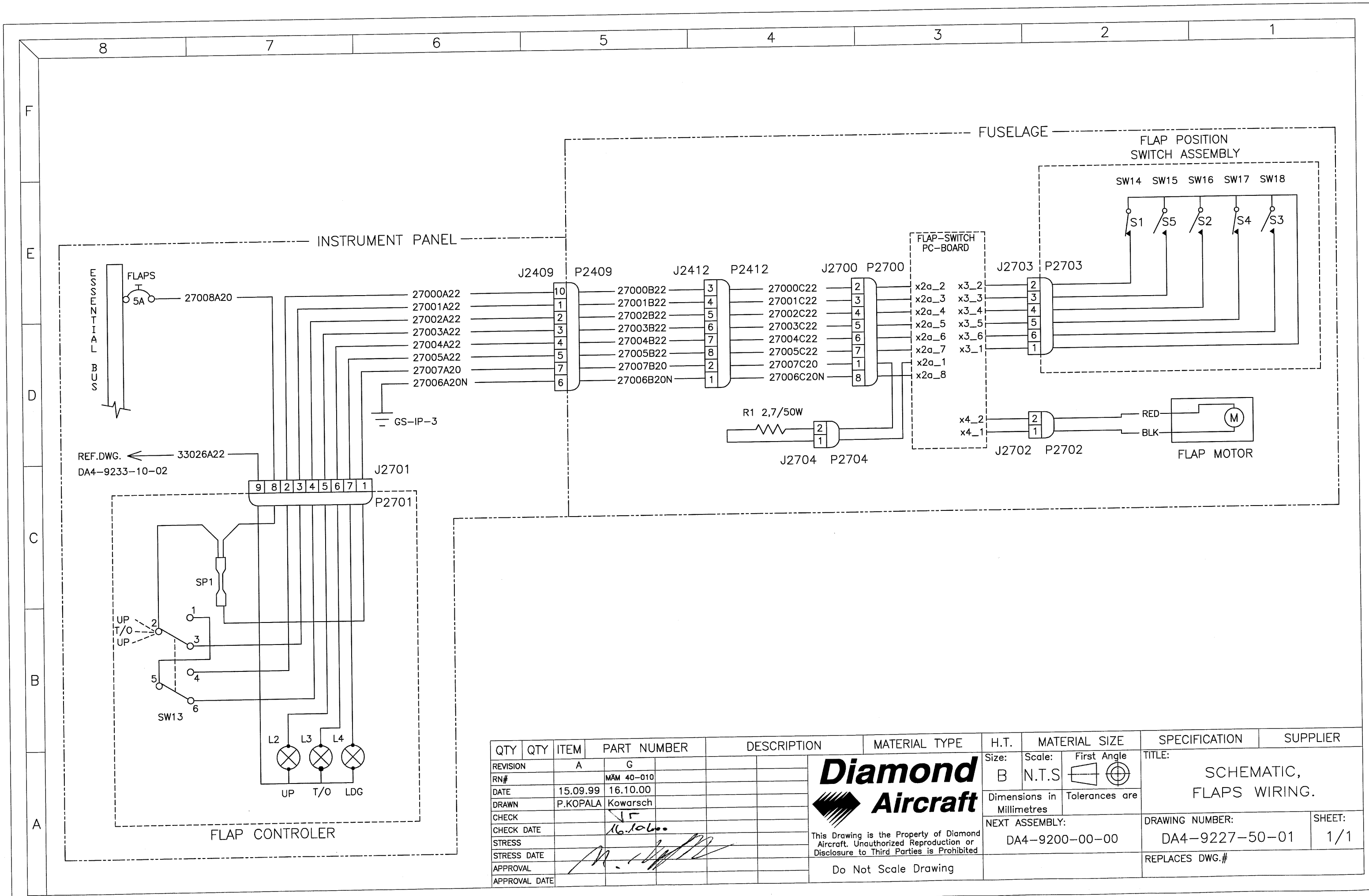
TITLE: SCHEMATIC, RUDDER PEDAL ADJ. WIRING

NEXT ASSEMBLY: DA4-9200-00-00

DRAWING NUMBER: DA4-9227-20-01

SHEET: 1/1

REPLACES DWG.#



QTY	QTY	ITEM	PART NUMBER		DESCRIPTION	MATERIAL TYPE	H.T.	MATERIAL SIZE	SPECIFICATION	SUPPLIER
REVISION		A	G							
RN#			MÄM 40-010							
DATE		15.09.99	16.10.00							
DRAWN		P.KOPALA	Kowarsch							
CHECK										
CHECK DATE			16.10.00							
STRESS										
STRESS DATE										
APPROVAL										
APPROVAL DATE										

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Do Not Scale Drawing

Size:	Scale:	First Angle
B	N.T.S	

Dimensions in Millimetres | Tolerances are

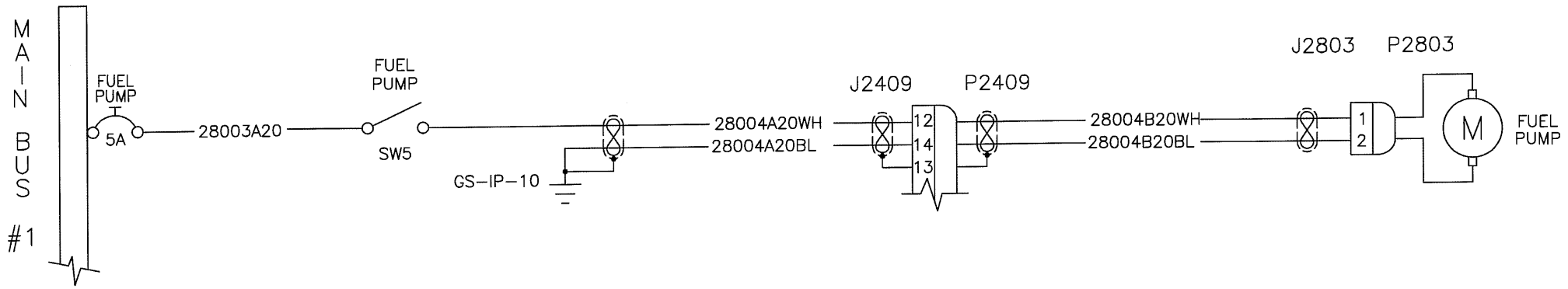
NEXT ASSEMBLY: DA4-9200-00-00

TITLE: SCHEMATIC, FLAPS WIRING.

DRAWING NUMBER: DA4-9227-50-01

SHEET: 1/1

REPLACES DWG.#



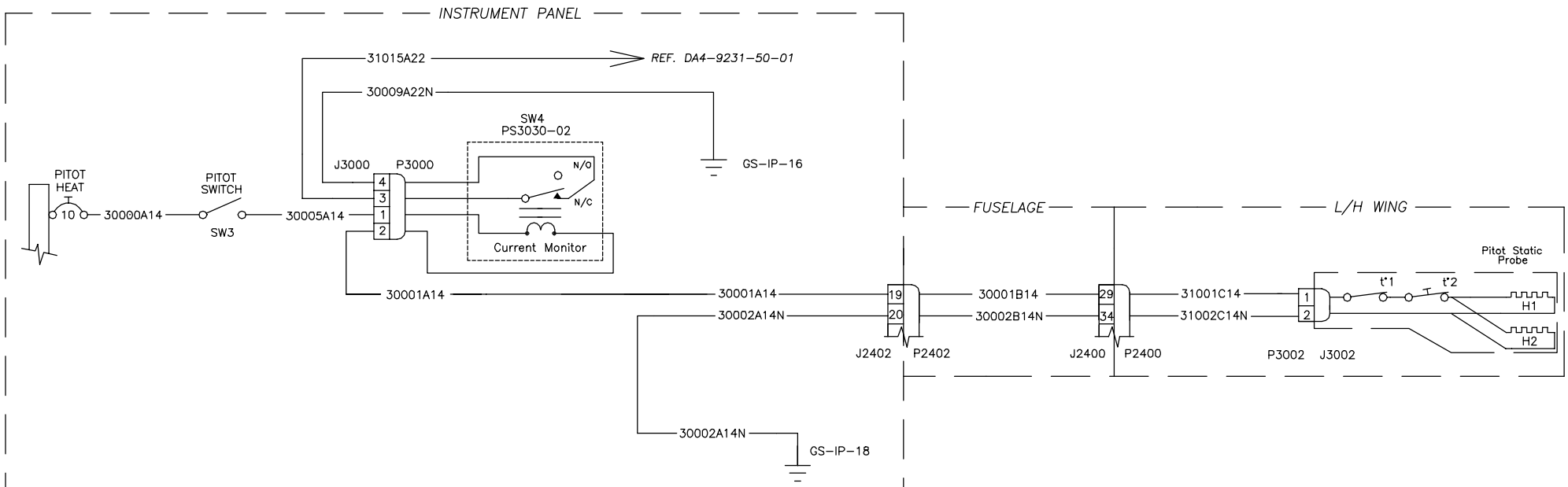
QTY	QTY	ITEM	PART NUMBER		DESCRIPTION	MATERIAL TYPE	H.T.	MATERIAL SIZE	SPECIFICATION	SUPPLIER
REVISION		A	E							
RN#			MÄM 40-080							
DATE		18.11.98	19.11.01							
DRAWN		P.STURGE	P.STURGE							
CHECK			19. Nov. 2001							
CHECK DATE										
STRESS										
STRESS DATE										
APPROVAL										
APPROVAL DATE										

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Do Not Scale Drawing

Size:	Scale:	First Angle	TITLE:
B	N.T.S		SCHEMATIC, FUEL SYSTEM PUMP
Dimensions in Millimetres	Tolerances are		
NEXT ASSEMBLY: DA4-9200-00-00			DRAWING NUMBER: DA4-9228-20-01
			SHEET: 1/1
			REPLACES DWG.#



QTY	QTY	ITEM	PART NUMBER		DESCRIPTION		MATERIAL TYPE	H.T.	MATERIAL SIZE		SPECIFICATION	SUPPLIER
REVISION			E									
RN#			MÄM 40-010									
DATE		13.09.99	26.09.00									
DRAWN		P.KOPALA	KOWARSCH									
CHECK												
CHECK DATE												
STRESS												
STRESS DATE												
APPROVAL												
APPROVAL DATE												

Diamond Aircraft

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Do Not Scale Drawing

Size:	Scale:	First Angle
B	NTS	

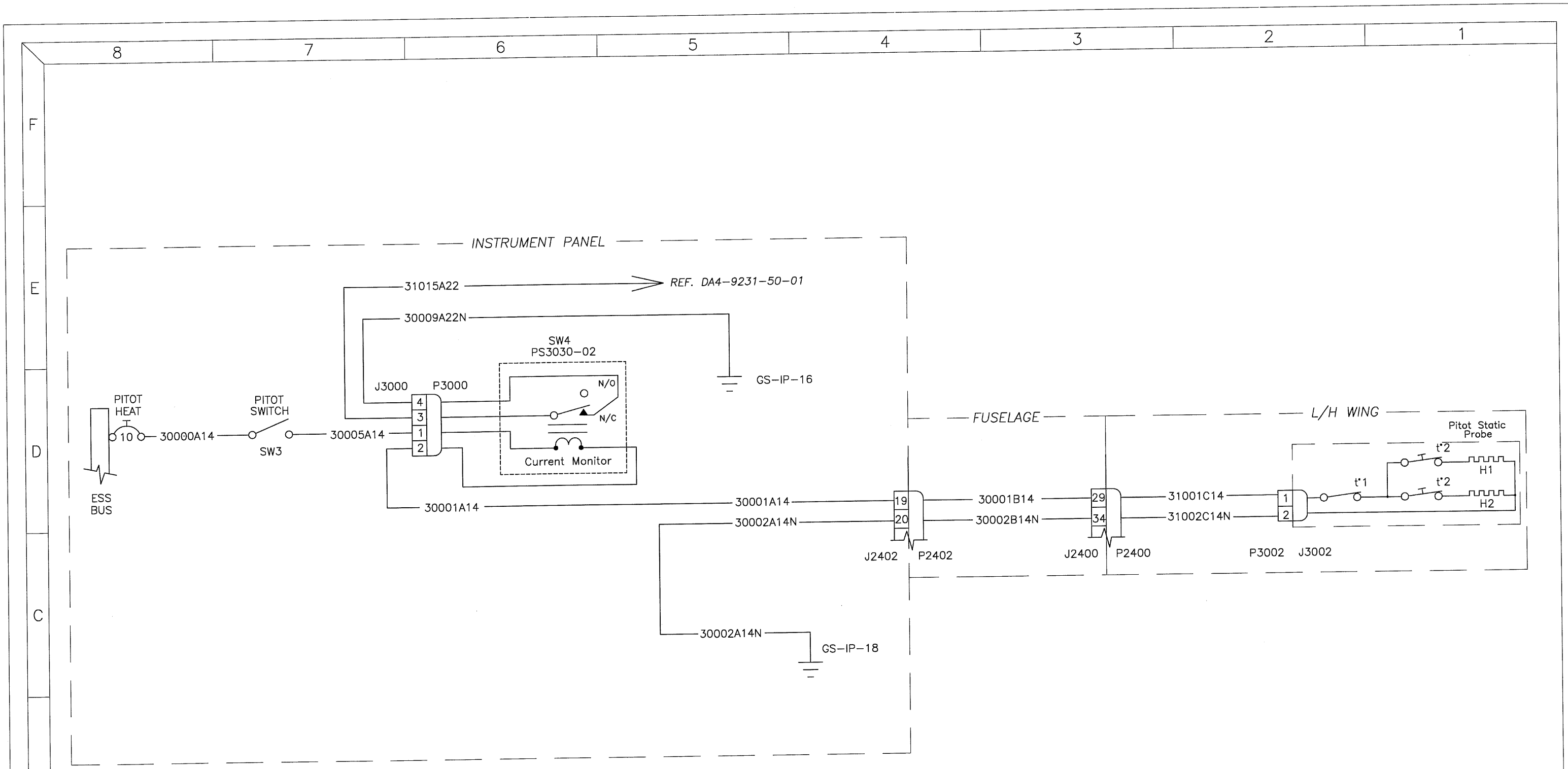
Dimensions in Millimetres | Tolerances are

NEXT ASSEMBLY: DA4-9200-00-00

TITLE: SCHEMATIC, PITOT HEAT WIRING

DRAWING NUMBER: DA4-9230-30-01 | SHEET: 1/1

REPLACES DWG.#



QTY	QTY	ITEM	PART NUMBER	DESCRIPTION	MATERIAL TYPE	H.T.	MATERIAL SIZE	SPECIFICATION	SUPPLIER
REVISION			f						
RN#			MÄM 40-037						
DATE		13.09.99	06.03.01						
DRAWN		P.KOPALA	KOWARSCH						
CHECK									
CHECK DATE			19.4.2001						
STRESS									
STRESS DATE									
APPROVAL									
APPROVAL DATE									

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Do Not Scale Drawing

Size:	Scale:	First Angle
B	NTS	

Dimensions in Millimetres | Tolerances are

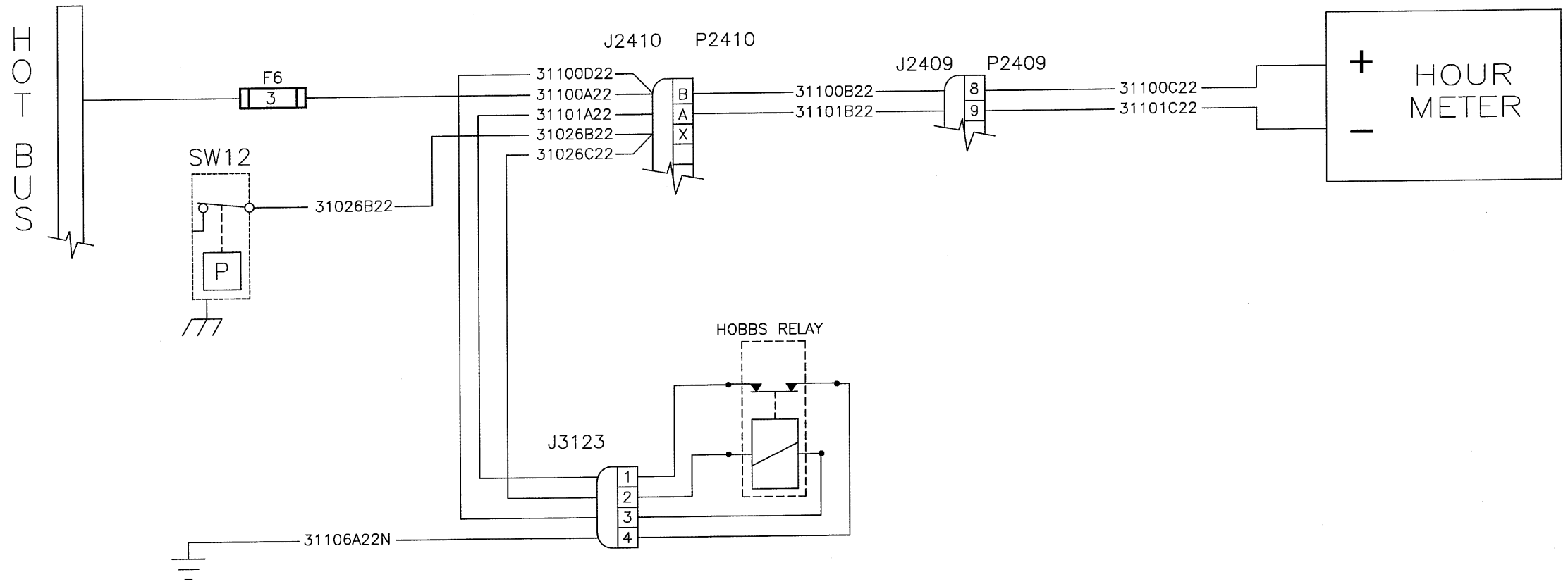
TITLE: SCHEMATIC, PITOT HEAT WIRING

NEXT ASSEMBLY: DA4-9200-00-00

DRAWING NUMBER: DA4-9230-30-01

SHEET: 1/1

REPLACES DWG.#



QTY	QTY	ITEM	PART NUMBER		DESCRIPTION	MATERIAL TYPE	H.T.	MATERIAL SIZE	SPECIFICATION	SUPPLIER
REVISION		A	C	D						
RN#			MÄM 40-010	MÄM 40-080						
DATE		14.09.99	25.09.00	25.06.01						
DRAWN		P.KOPALA	KOWARSCH	P.STURGE						
CHECK			19 Nov 2001							
CHECK DATE										
STRESS										
STRESS DATE										
APPROVAL										
APPROVAL DATE										

Diamond Aircraft

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Do Not Scale Drawing

Size:	Scale:	First Angle
B	N.T.S	

Dimensions in Millimetres | Tolerances are

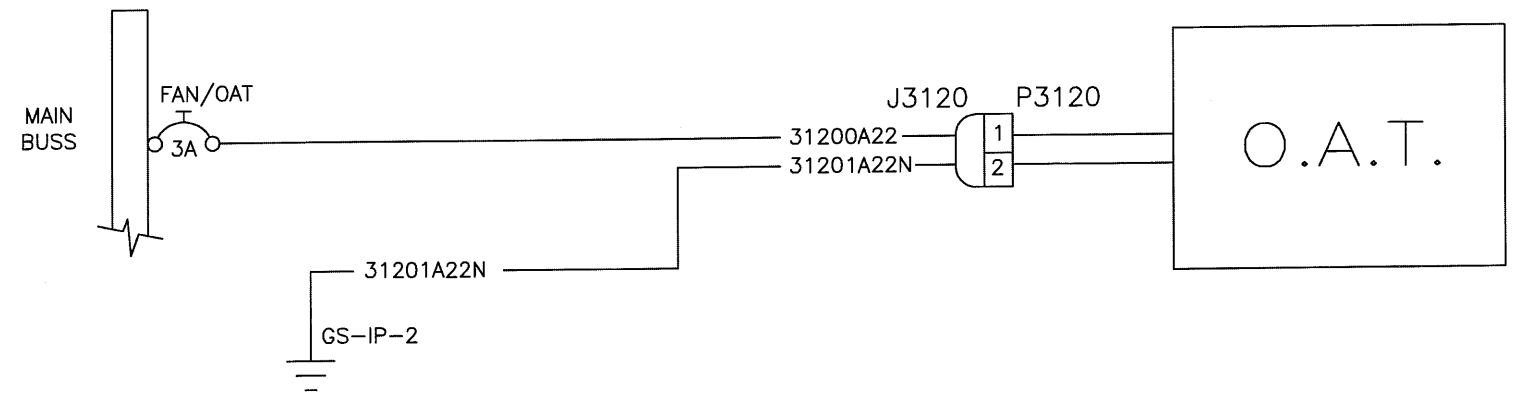
TITLE: SCHEMATIC, HOURMETER WIRING

NEXT ASSEMBLY: DA4-9200-00-00

DRAWING NUMBER: DA4-9231-20-02

SHEET: 1/1

REPLACES DWG.# N/A



QTY	QTY	ITEM	PART NUMBER		DESCRIPTION		MATERIAL TYPE	H.T.	MATERIAL SIZE	SPECIFICATION	SUPPLIER
REVISION		A	C								
RN#			OÄM 40-064								
DATE		26.01.00	26.09.00								
DRAWN		P.KOPALA	KQWARSCH								
CHECK			YP								
CHECK DATE			26.09.00								
STRESS											
STRESS DATE											
APPROVAL											
APPROVAL DATE											

Diamond Aircraft

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Do Not Scale Drawing

Size: B | Scale: N.T.S | First Angle

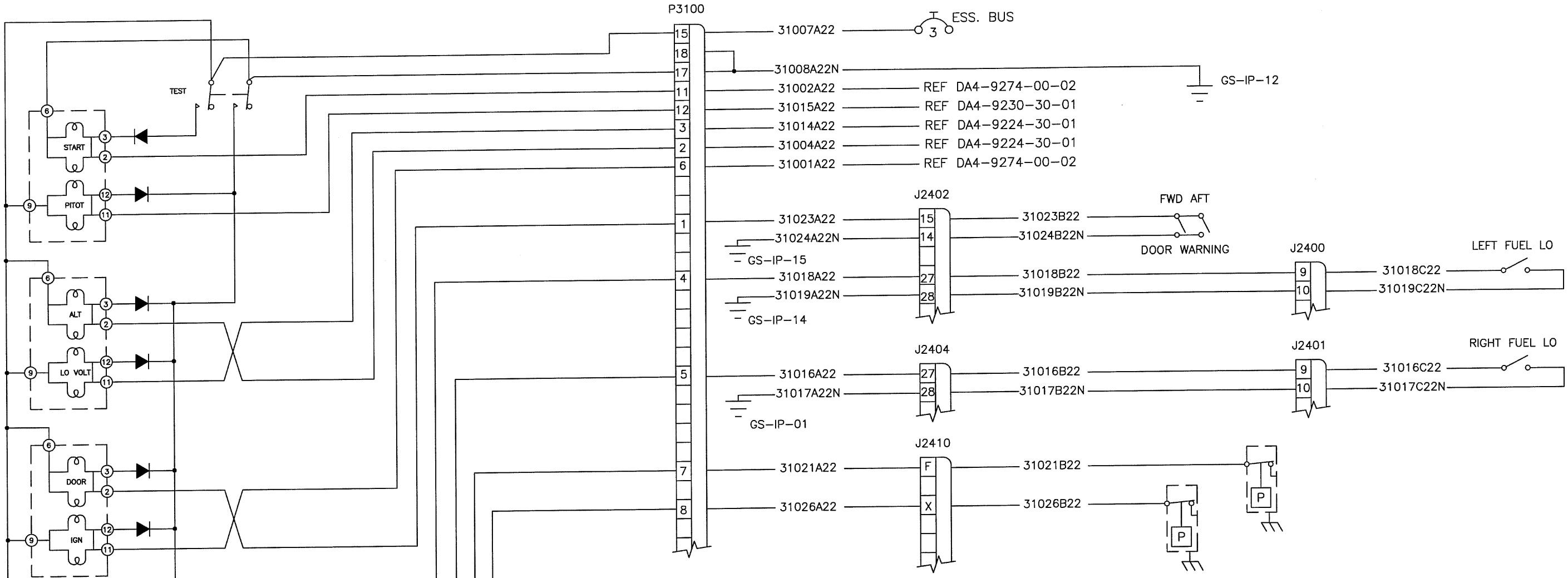
Dimensions in Millimetres | Tolerances are

NEXT ASSEMBLY: DA4-9200-00-00

TITLE: SCHEMATIC, O.A.T.

DRAWING NUMBER: DA4-9231-20-03 | SHEET: 1/1

REPLACES DWG.# N/A



QTY	QTY	ITEM	PART NUMBER	DESCRIPTION	MATERIAL TYPE	H.T.	MATERIAL SIZE	SPECIFICATION	SUPPLIER
REVISION		A	C						
RN#			MÄM 40.010						
DATE		15.05.00	06.10.00						
DRAWN		P.STURGE	KOWARSCH						
CHECK									
CHECK DATE			14.11.00						
STRESS									
STRESS DATE									
APPROVAL									
APPROVAL DATE									

Diamond Aircraft

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Do Not Scale Drawing

Size:	Scale:	First Angle
B	N.T.S	

Dimensions in Millimetres | Tolerances are

TITLE: SCHEMATIC CAUTION & WARNING

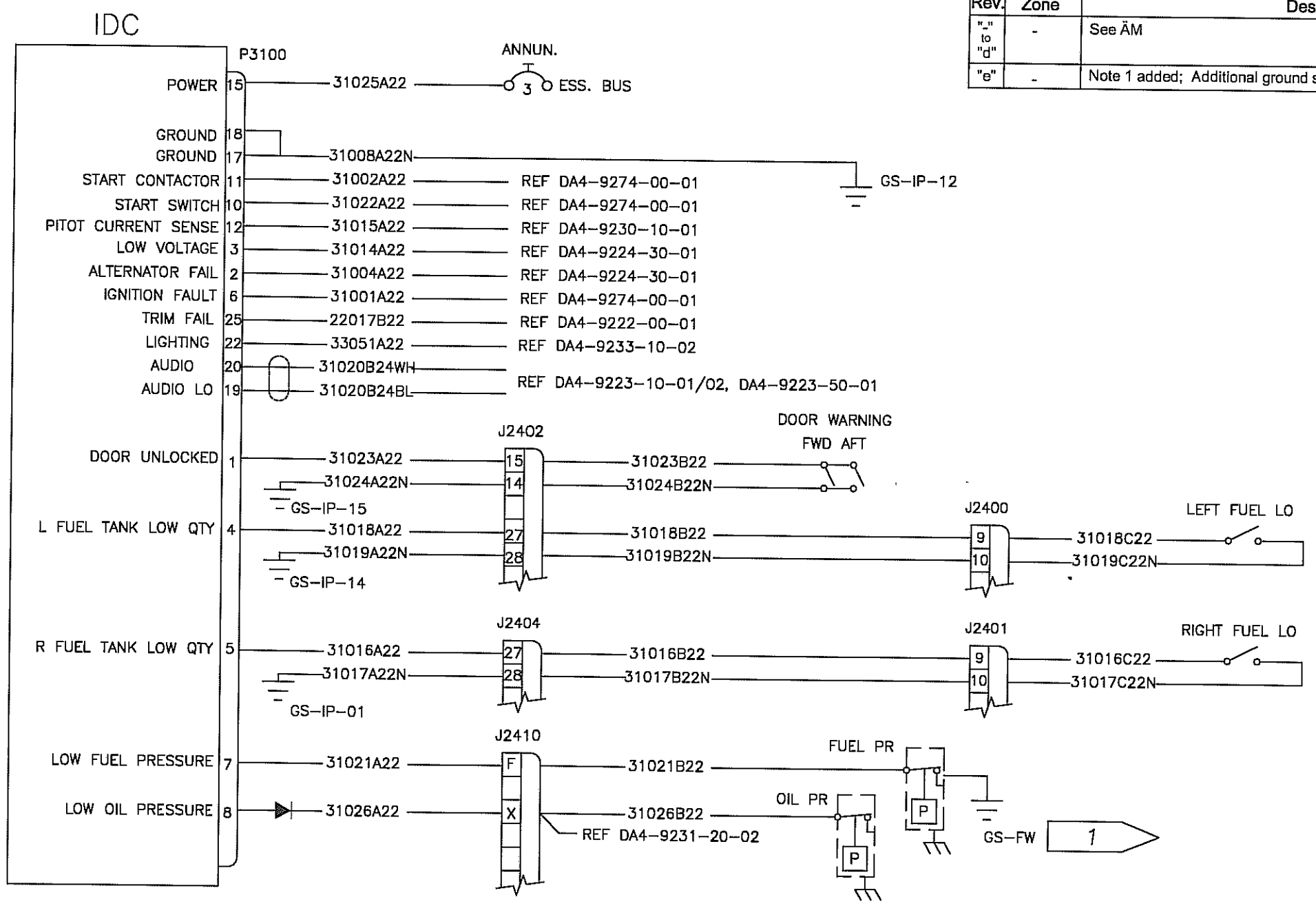
NEXT ASSEMBLY: DA4-9200-00-00

DRAWING NUMBER: DA4-9231-50-01

SHEET: 1/1

REPLACES DWG.# N/A

REVISIONS		
Rev.	Zone	Description
"_" to "d"	-	See ÄM
"e"	-	Note 1 added; Additional ground shown



1 *Ground wire added for DA40 F configuration only*

QTY	QTY	ITEM	PART NUMBER		DESCRIPTION	MATERIAL TYPE	H.T.	MATERIAL SIZE	SPECIFICATION	SUPPLIER
REVISION		A	C	D	E					
RN#			ÖÄM 40-060	MÄM 40-080	MÄM 40-332					
DATE			08.01.01	12.07.01	25.02.08					
DRAWN			P.STURGE	P.STURGE	A.Thompson					
CHECK					M. Kowarsch					
CHECK DATE					12.MRZ. 2008					
STRESS			C. Jütte							
STRESS DATE			20.MAI 2008							
APPROVAL										
APPROVAL DATE										

Diamond Aircraft

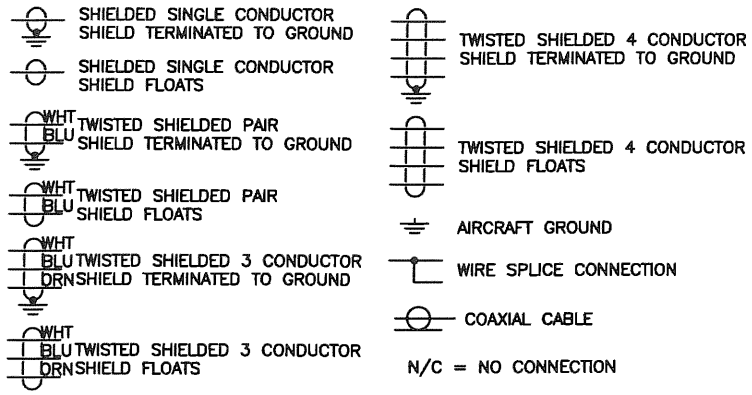
This Drawing is the Property of Diamond Aircraft. Unauthorized Reproduction or Disclosure to Third Parties is Prohibited

Do Not Scale Drowing

Size:	Scale:	First Angle	TITLE:
B	N.T.S		SCHEMATIC CAUTION & WARNING
Dimensions in Millimetres	Tolerances are		
NEXT ASSEMBLY: DA4-9200-00-00			DRAWING NUMBER: DA4-9231-50-02
			SHEET: 1/1
			REPLACES DWG.# N/A

NOTES:

1. SYMBOL DESIGNATIONS



2. N/A

3. ATTACH 16 AWG LEAD WIRE TO SOLDER SLEEVE, 76mm LONG. CONNECT TO BACKSHELL THROUGH APPROPRIATE RING TERMINAL.

4. TERMINATED AT GIA63 CONNECTORS

5. WIRES NOT TO EXCEED 6".

6. N/A

'b' 7. CAP AND STOW WIRES 23027B22 AND 23028B22 IF GFC700 NOT INSTALLED.

'b' 8. WIRE 23211A24 NOT INSTALLED IN GFC700 REMOTE ENCLOSURES.

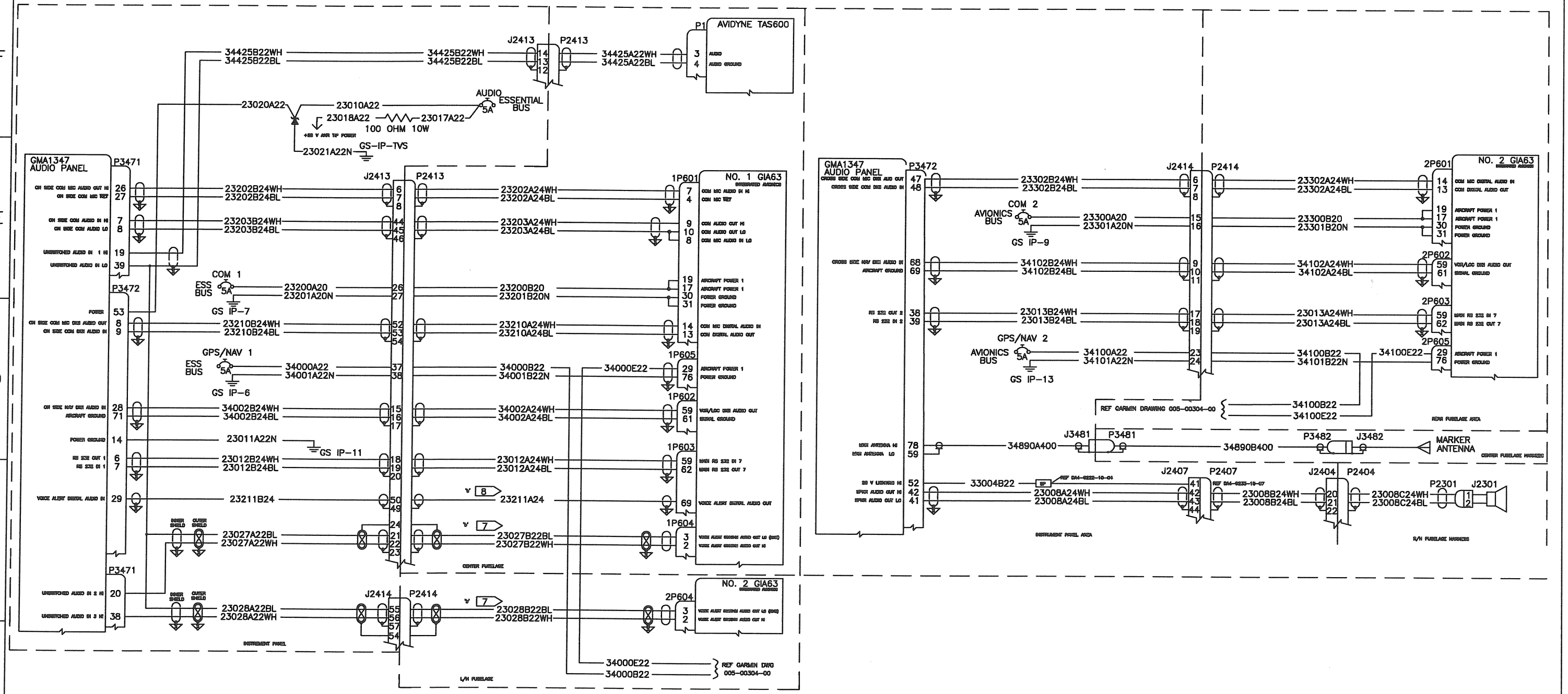
QTY	QTY	ITEM	PART NUMBER			DESCRIPTION	MATERIAL TYPE
REVISION		'–'	'A'	'B'			
AN#		OÄM 40-261	OÄM 40-261a	OÄM 40-261c			
DATE		23.06.06	26.08.06	29.10.08			
DRAWN		C.WOOD	C.WOOD	C.WOOD			
CHECK			M. Kowarsch	C. Jütte			
CHECK DATE			15. DEZ. 2008	15. DEZ. 2008			
STRESS							
STRESS DATE							
APPROVAL							
APPROVAL DATE							

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Do Not Scale Drawing

H.T.	MATERIAL SIZE		SPECIFICATION	SUPPLIER
Size: B	Scale: NTS	First Angle	TITLE: SCHEMATIC, G1000 GFC 700, TAS OPTION	
Dimensions in Millimetres	Tolerances are ISO 2768 m			
NEXT ASSEMBLY: DA4-9200-00-00			DRAWING NUMBER: DA4-9231-60-06	SHEET: 1/8
			REPLACES DWG.#	



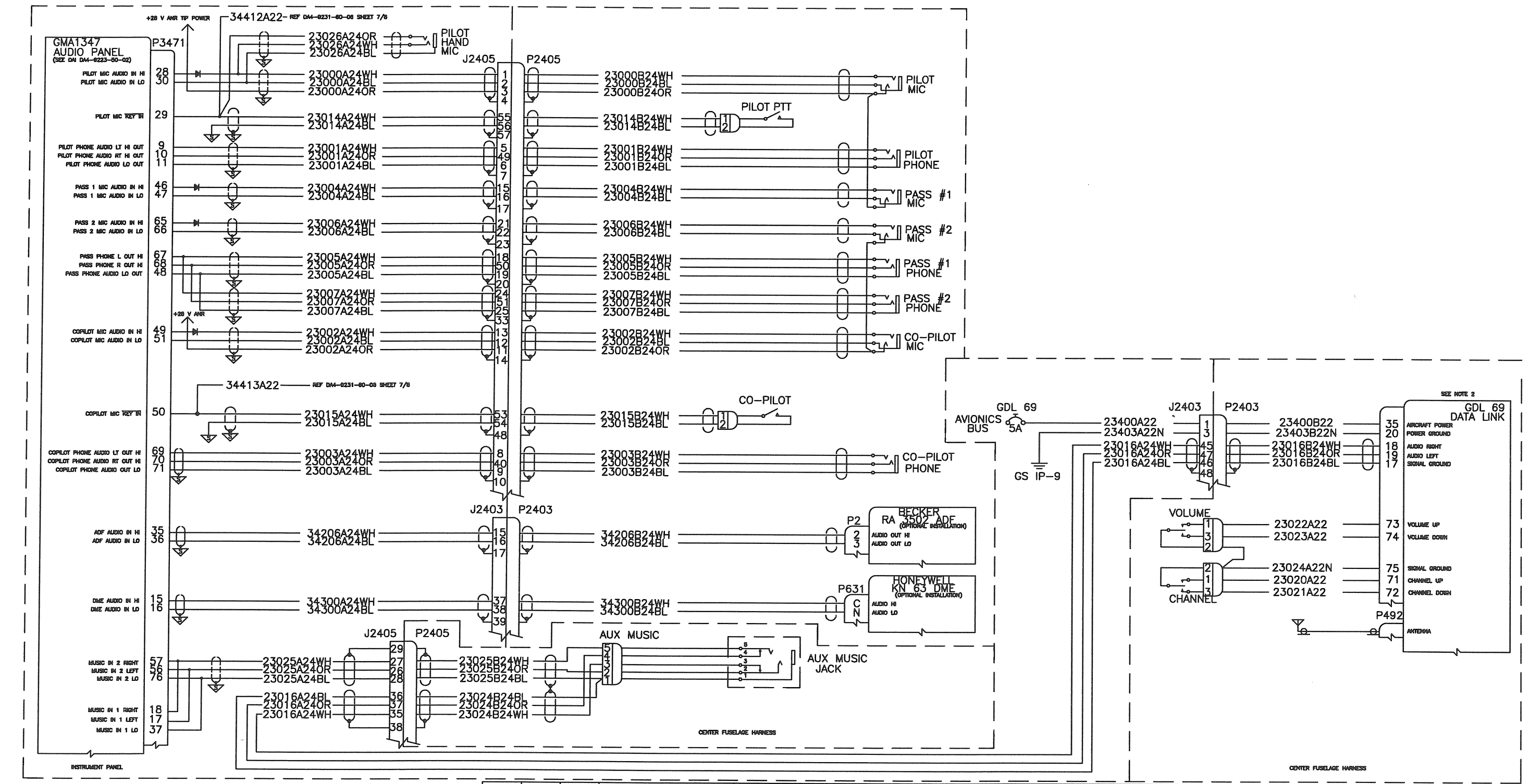
QTY	QTY	ITEM	PART NUMBER		DESCRIPTION	MATERIAL TYPE
REVISION		'–'	'A'	'B'		
AN#		OÄM 40-261	OÄM 40-261a	OÄM 40-261c		
DATE		23.06.06	26.08.06	29.10.08		
DRAWN		C.WOOD	C.WOOD	C.WOOD		
CHECK			M. Kovarsch	C. Jütte		
CHECK DATE				15 OCT 2008	15-OCT-2008	
STRESS						
STRESS DATE						
APPROVAL						
APPROVAL DATE						

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Do Not Scale Drawing

H.T.	MATERIAL SIZE		SPECIFICATION	SUPPLIER
Size: B	Scale: NTS	First Angle	TITLE: SCHEMATIC, G1000 GFC 700, TAS OPTION	
Dimensions in Millimetres	Tolerances are ISO 2768 m			
NEXT ASSEMBLY: DA4-9200-00-00			DRAWING NUMBER: DA4-9231-60-06	SHEET: 2/8
			REPLACES DWG.#	



QTY	QTY	ITEM	PART NUMBER		DESCRIPTION	MATERIAL TYPE	H.T.	MATERIAL SIZE	SPECIFICATION	SUPPLIER
REVISION		'–'	'A'	'B'						
AN#		OÄM 40-261	OÄM 40-261a	OÄM 40-261c						
DATE		23.06.06	26.08.06	29.10.08						
DRAWN		C.WOOD	C.WOOD	C.WOOD						
CHECK				M. Kowarsch	C. Rütte					
CHECK DATE				15. DEZ. 2008						
STRESS										
STRESS DATE										
APPROVAL										
APPROVAL DATE										

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Do Not Scale Drawing

Size: B | Scale: NTS | First Angle

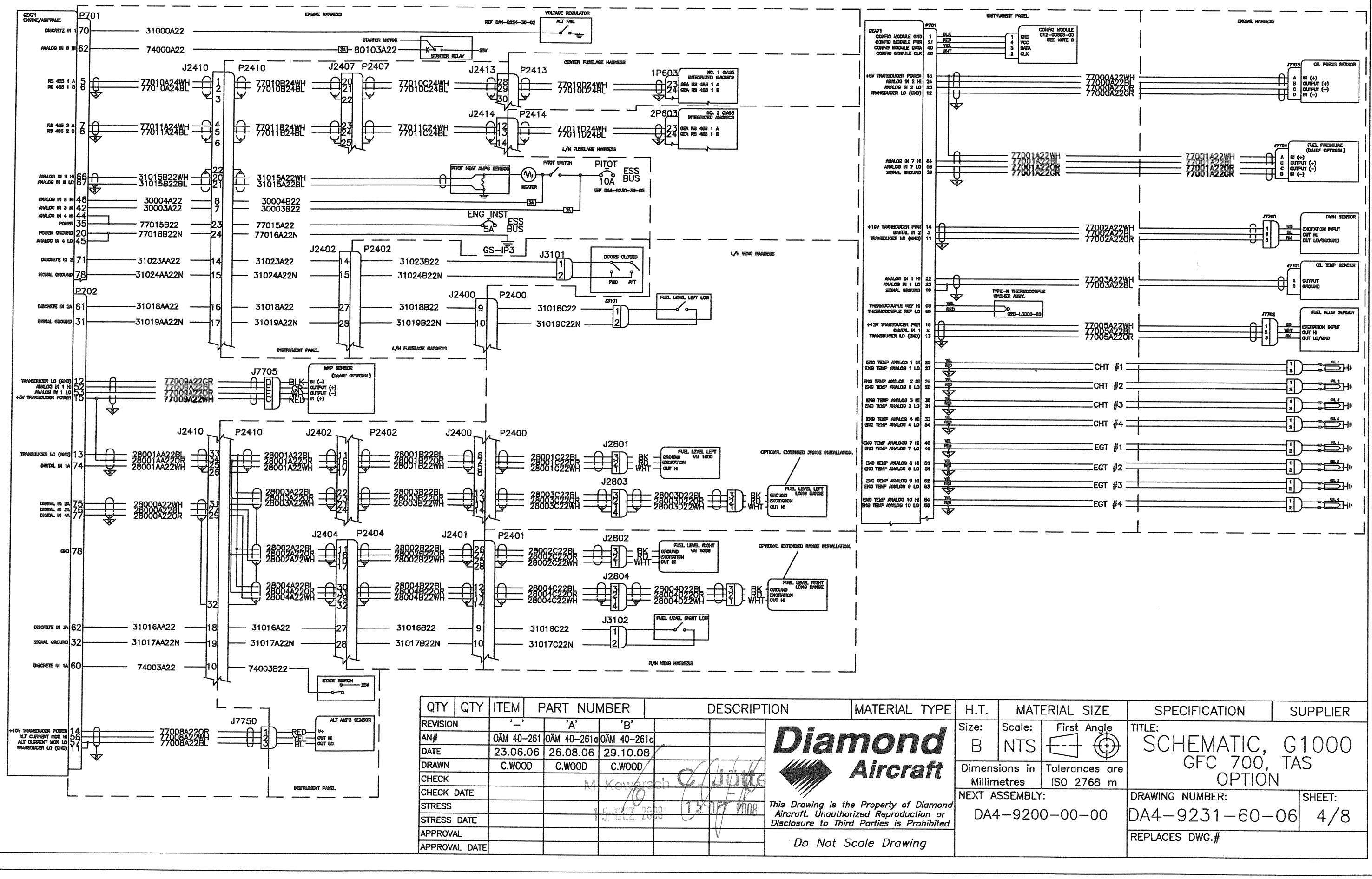
Dimensions in Millimetres | Tolerances are ISO 2768 m

NEXT ASSEMBLY: DA4-9200-00-00

TITLE: SCHEMATIC, G1000 GFC 700, TAS OPTION

DRAWING NUMBER: DA4-9231-60-06 | SHEET: 3/8

REPLACES DWG.#



QTY	QTY	ITEM	PART NUMBER	DESCRIPTION	MATERIAL TYPE	H.T.	MATERIAL SIZE	SPECIFICATION	SUPPLIER
REVISION		'–'	'A'	'B'					
AN#		OÄM 40-261	OÄM 40-261a	OÄM 40-261c					
DATE		23.06.06	26.08.06	29.10.08					
DRAWN		C.WOOD	C.WOOD	C.WOOD					
CHECK									
CHECK DATE									
STRESS									
STRESS DATE									
APPROVAL									
APPROVAL DATE									

M. Kowarsch 15. DEZ. 2008

C. Jütte 15 DEC 2008

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Do Not Scale Drawing

Size: B | Scale: NTS | First Angle

Dimensions in Millimetres | Tolerances are ISO 2768 m

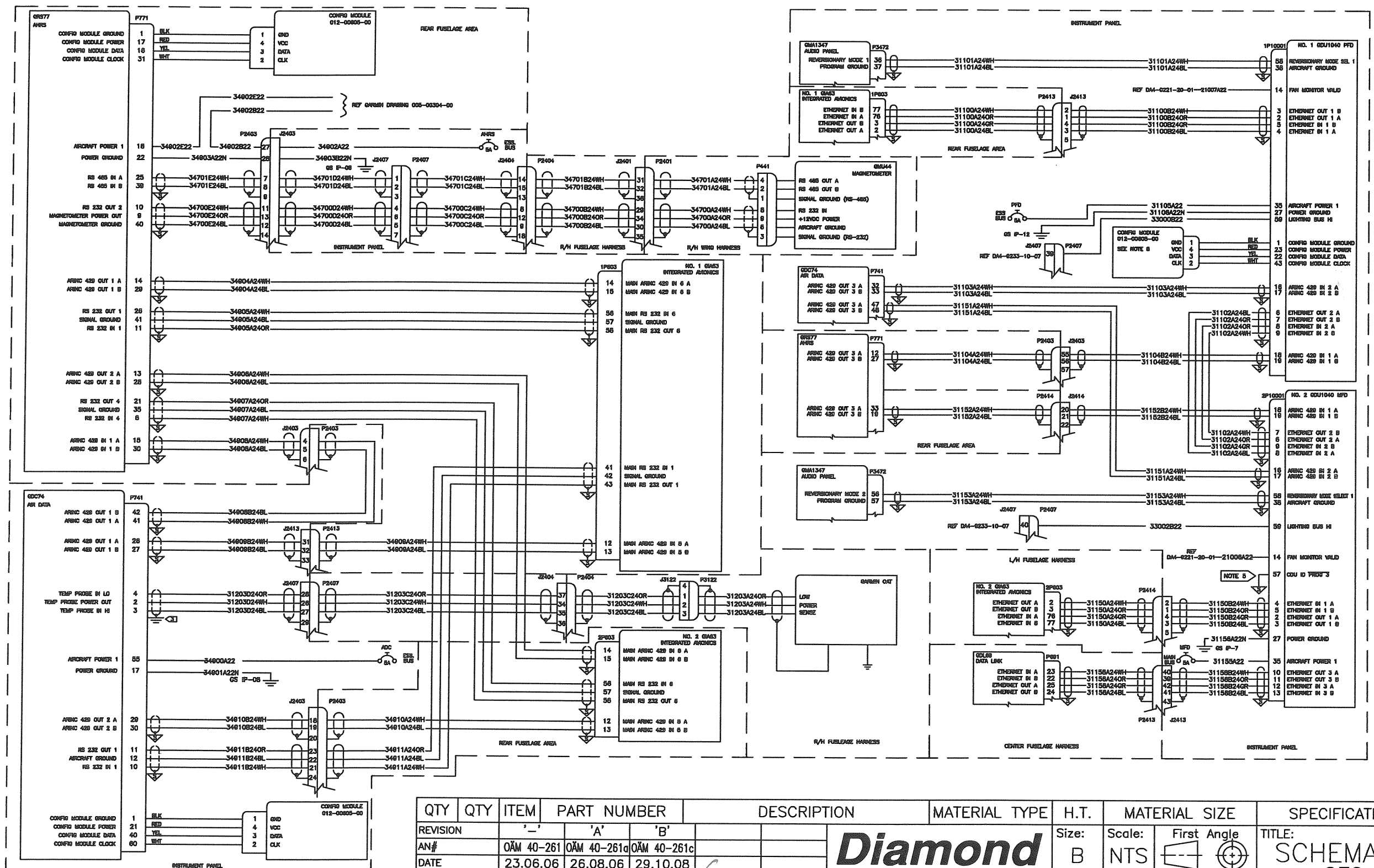
NEXT ASSEMBLY: DA4-9200-00-00

TITLE: SCHEMATIC, G1000 GFC 700, TAS OPTION

DRAWING NUMBER: DA4-9231-60-06

SHEET: 4/8

REPLACES DWG.#



QTY	QTY	ITEM	PART NUMBER		DESCRIPTION	MATERIAL TYPE
REVISION		'–'	'A'	'B'		
AN#		OÄM 40-261	OÄM 40-261a	OÄM 40-261c		
DATE		23.06.06	26.08.06	29.10.08		
DRAWN		C.WOOD	C.WOOD	C.WOOD		
CHECK				M. Kowalisch	C. Little	
CHECK DATE				15. DEZ. 2008	15 DEC 2008	
STRESS						
STRESS DATE						
APPROVAL						
APPROVAL DATE						

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Do Not Scale Drawing

H.T.	MATERIAL SIZE		SPECIFICATION	SUPPLIER
Size: B	Scale: NTS	First Angle		
Dimensions in Millimetres		Tolerances are ISO 2768 m		

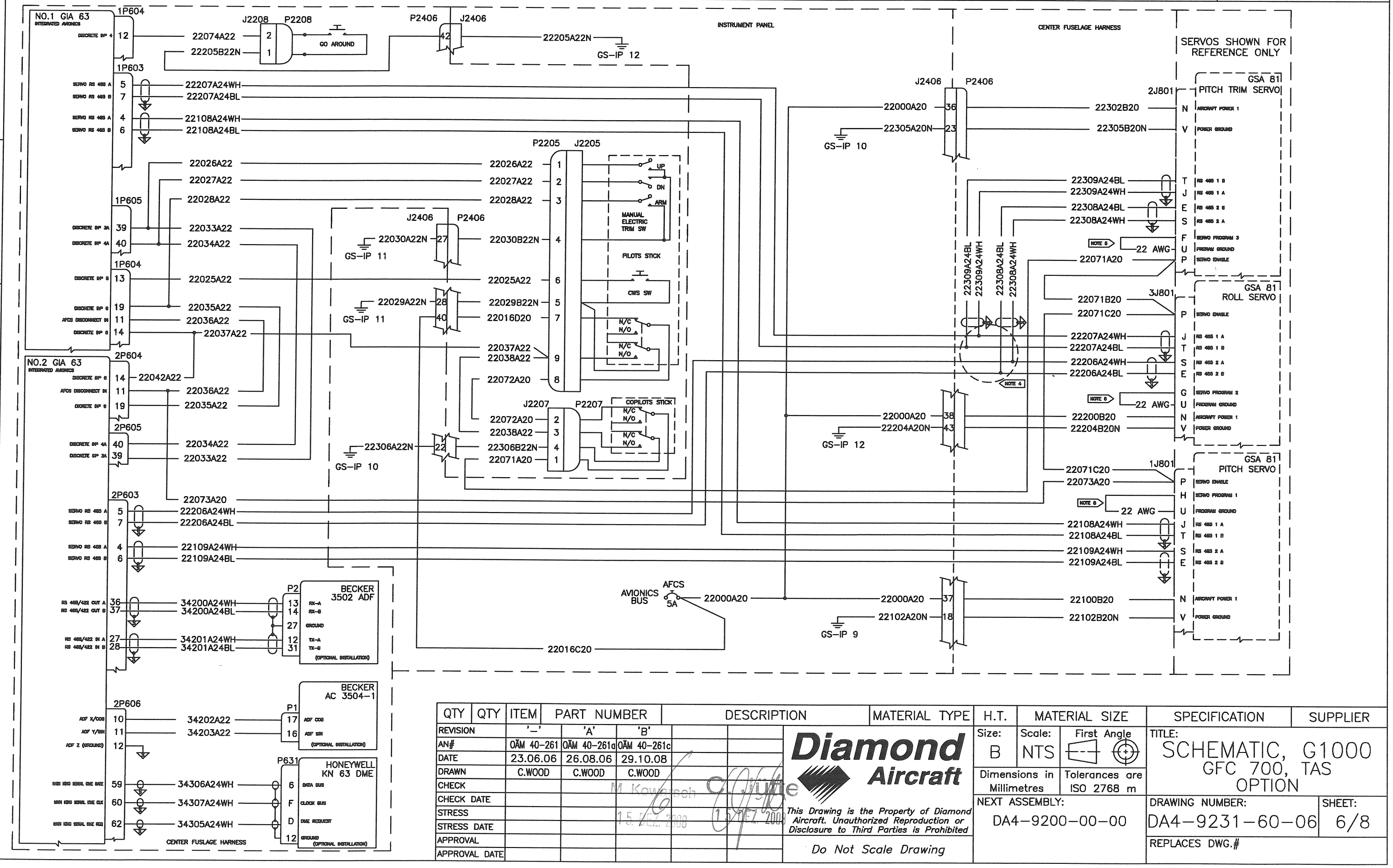
TITLE: SCHEMATIC, G1000 GFC 700, TAS OPTION

NEXT ASSEMBLY: DA4-9200-00-00

DRAWING NUMBER: DA4-9231-60-06

SHEET: 5/8

REPLACES DWG.#



QTY	QTY	ITEM	PART NUMBER	DESCRIPTION	MATERIAL TYPE	H.T.	MATERIAL SIZE	SPECIFICATION	SUPPLIER
REVISION		'–'	'A'	'B'					
AN#		OÄM 40-261	OÄM 40-261a	OÄM 40-261c					
DATE		23.06.06	26.08.06	29.10.08					
DRAWN		C.WOOD	C.WOOD	C.WOOD					
CHECK			M. Kowalsch	C. Wyttenbach					
CHECK DATE			15. DEZ. 2008	15. DEZ. 2008					
STRESS									
STRESS DATE									
APPROVAL									
APPROVAL DATE									

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Do Not Scale Drawing

Size: B | Scale: NTS | First Angle

Dimensions in Millimetres | Tolerances are ISO 2768 m

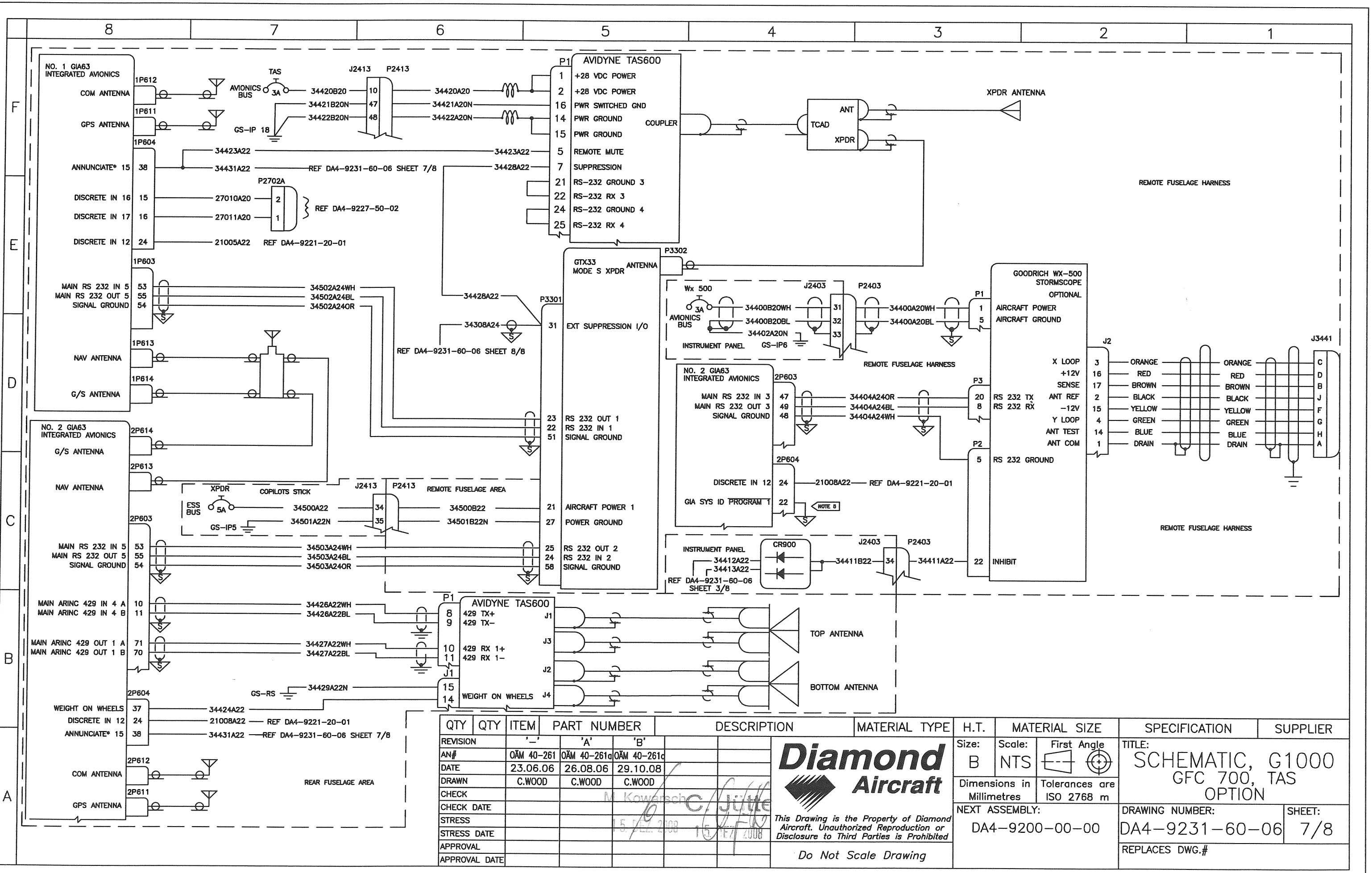
TITLE: SCHEMATIC, G1000 GFC 700, TAS OPTION

NEXT ASSEMBLY: DA4-9200-00-00

DRAWING NUMBER: DA4-9231-60-06

SHEET: 6/8

REPLACES DWG.#



QTY	QTY	ITEM	PART NUMBER	DESCRIPTION	MATERIAL TYPE	H.T.	MATERIAL SIZE	SPECIFICATION	SUPPLIER

REVISION	'–'	'A'	'B'		
AN#	OÄM 40-261	OÄM 40-261a	OÄM 40-261c		
DATE	23.06.06	26.08.06	29.10.08		
DRAWN	C.WOOD	C.WOOD	C.WOOD		
CHECK			M Kowarsch	C. Jütte	
CHECK DATE			15. DEZ. 2008	15. DEZ. 2008	
STRESS					
STRESS DATE					
APPROVAL					
APPROVAL DATE					

Diamond Aircraft

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Do Not Scale Drawing

Size:	Scale:	First Angle
B	NTS	

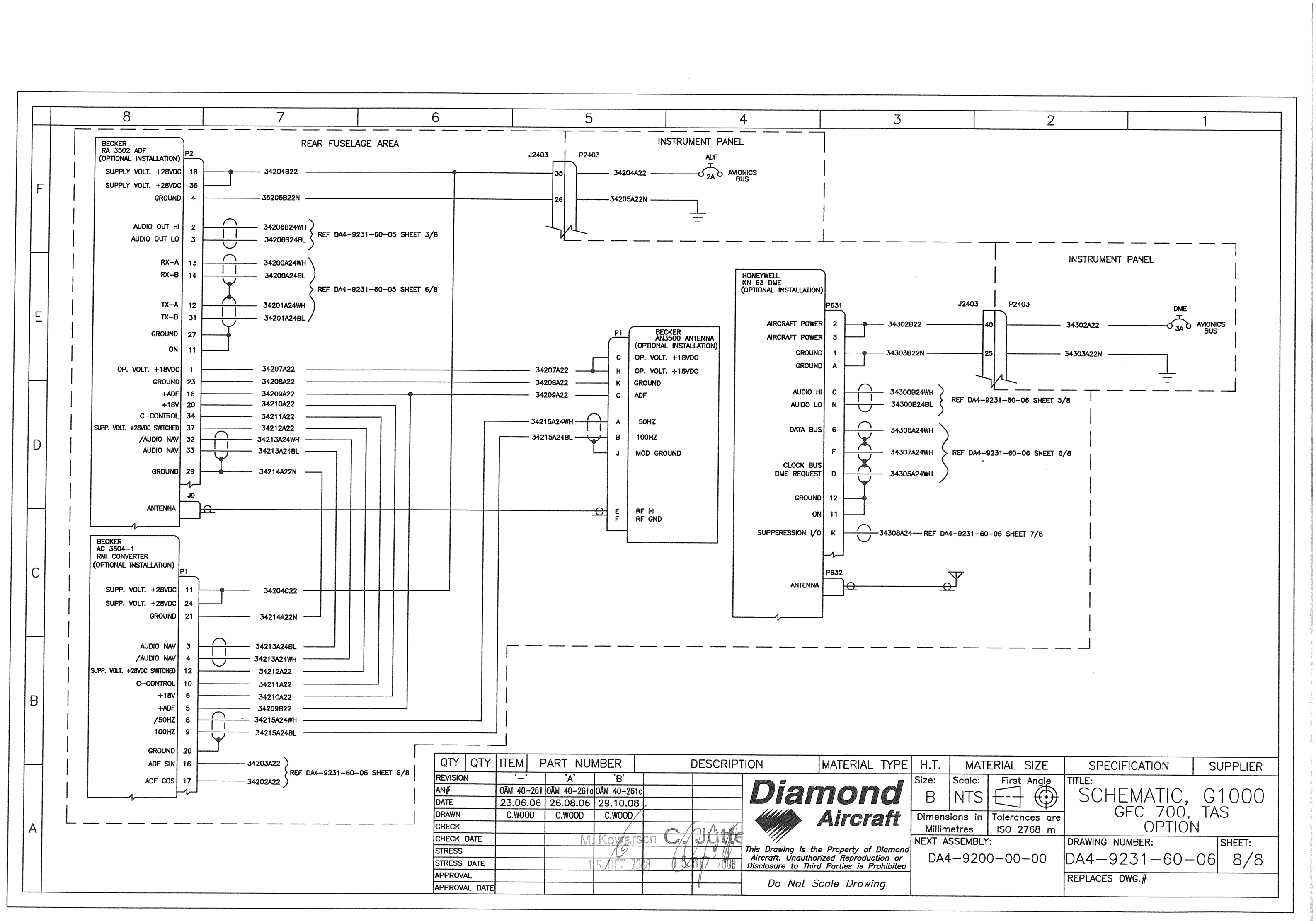
Dimensions in Millimetres | Tolerances are ISO 2768 m

NEXT ASSEMBLY: DA4-9200-00-00

TITLE: SCHEMATIC, G1000 GFC 700, TAS OPTION

DRAWING NUMBER: DA4-9231-60-06 | SHEET: 7/8

REPLACES DWG.#



QTY	QTY	ITEM	PART NUMBER		DESCRIPTION	MATERIAL TYPE	H.T.	MATERIAL SIZE	SPECIFICATION	SUPPLIER
REVISION		'–'	'A'	'B'						
AN#		OÄM 40–261	OÄM 40–261a	OÄM 40–261c						
DATE		23.06.06	26.08.06	29.10.08						
DRAWN		C.WOOD	C.WOOD	C.WOOD						
CHECK										
CHECK DATE										
STRESS										
STRESS DATE										
APPROVAL										
APPROVAL DATE										

M. Kovarsch 15 AUG 2008 — C. Jütte 15 AUG 2008

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Do Not Scale Drawing

Size: B | Scale: NTS | First Angle

Dimensions in Millimetres | Tolerances are ISO 2768 m

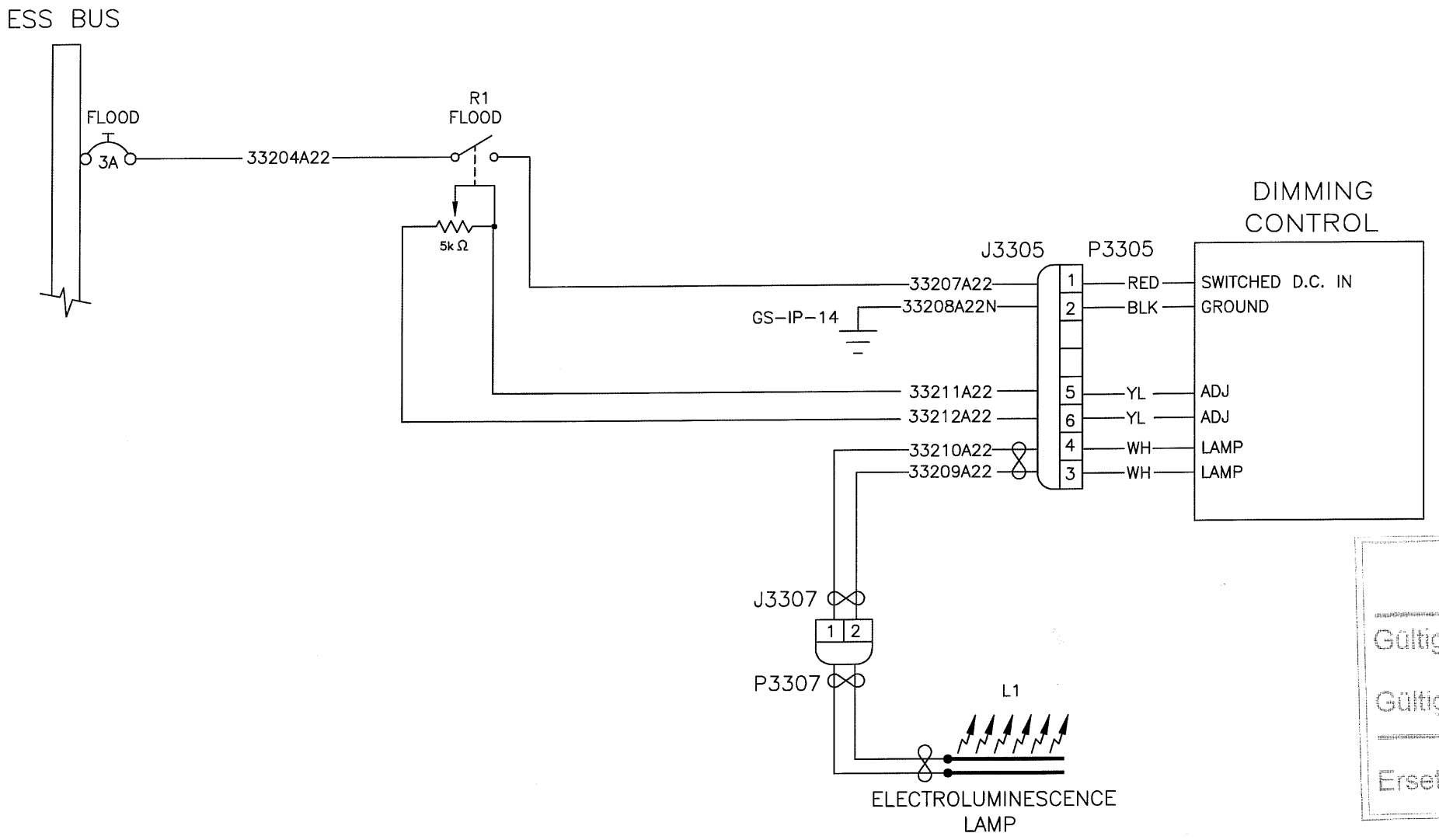
NEXT ASSEMBLY: DA4–9200–00–00

TITLE: SCHEMATIC, G1000 GFC 700, TAS OPTION

DRAWING NUMBER: DA4–9231–60–06

SHEET: 8/8

REPLACES DWG.#



ALT
Gültig von:
Gültig bis: 029
Ersetzt durch: h8

QTY	QTY	ITEM	PART NUMBER	DESCRIPTION	MATERIAL TYPE	H.T.	MATERIAL SIZE	SPECIFICATION	SUPPLIER
REVISION		A	F						
RN#			ÖÄM 40-064						
DATE		09.09.99	26.09.00						
DRAWN		P.KOPALA	KOWARSCH						
CHECK									
CHECK DATE			26.9.00						
STRESS									
STRESS DATE									
APPROVAL									
APPROVAL DATE									

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Do Not Scale Drawing

Size: B | Scale: N.T.S | First Angle

Dimensions in Millimetres | Tolerances are

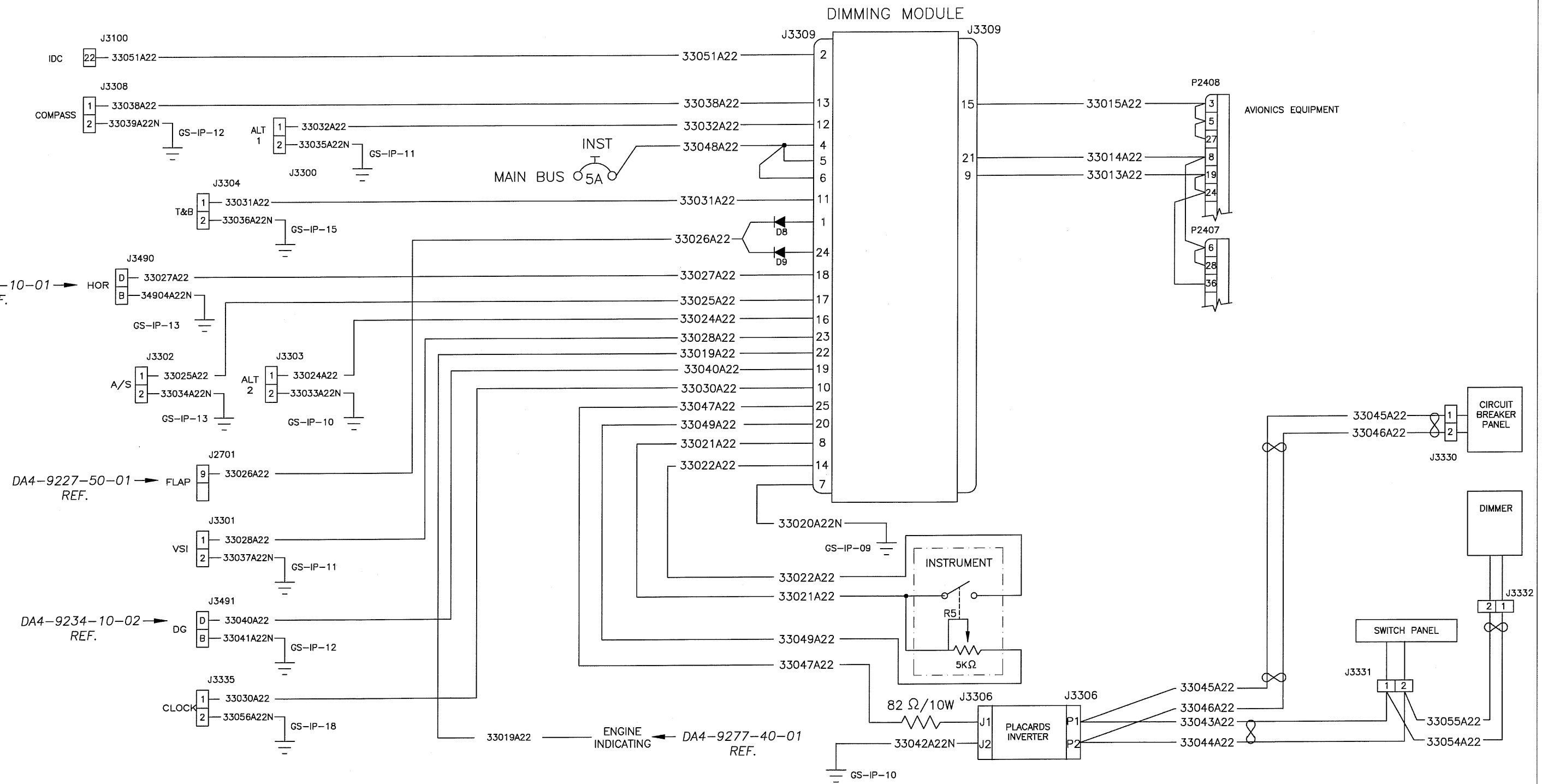
NEXT ASSEMBLY: DA4-9200-00-00

TITLE: SCHEMATIC, INSTRUMENT FLOOD LIGHT WIRING

DRAWING NUMBER: DA4-9233-10-01

SHEET: 1/1

REPLACES DWG.#



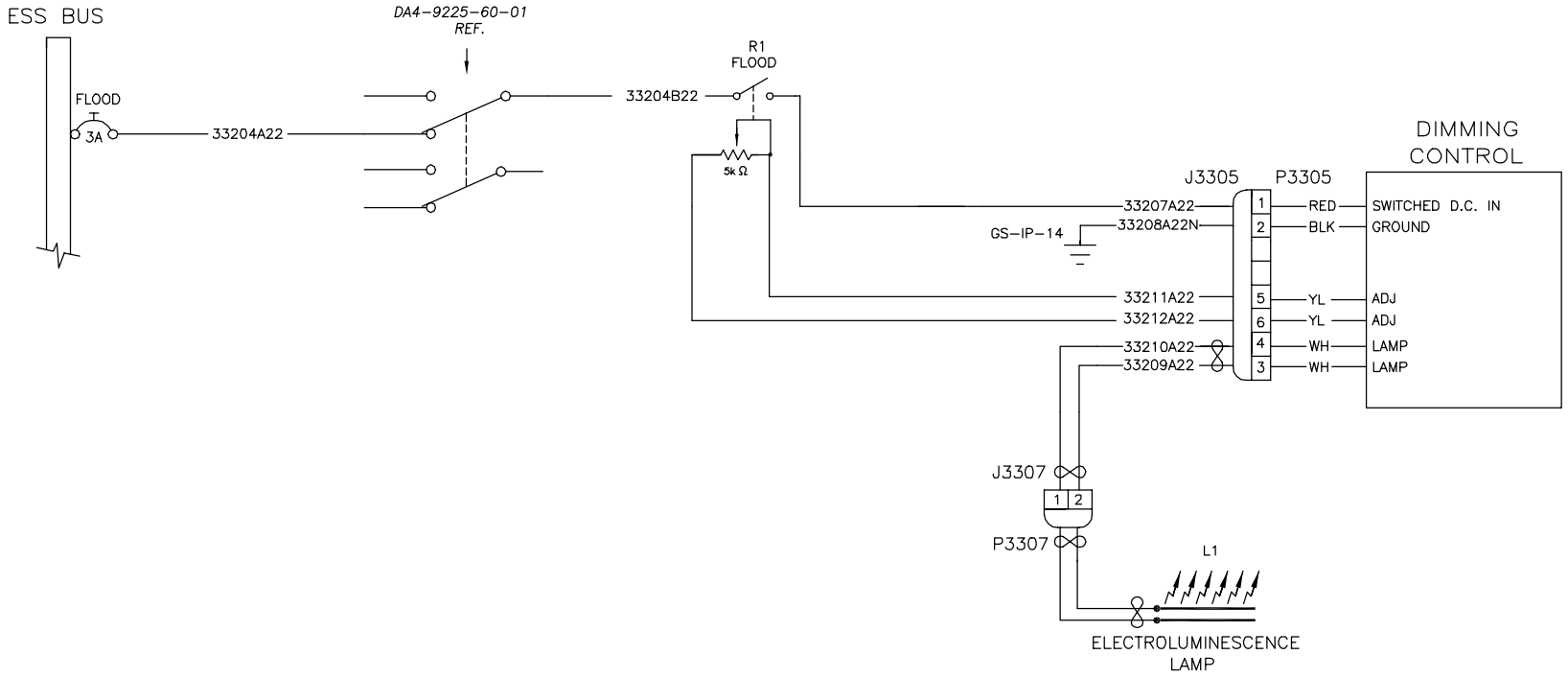
UNIT	QTY	ITEM	PART NUMBER			DESCRIPTION		MATERIAL TYPE	H.T.
REVISION			"i"	"k"	"l"				
RN#			MÄM 40-010	MÄM 40-060	MÄM 40-080				
DATE			25.09.00	12.04.01	21.09.01				
DRAWN			Tatscher	KOWARSCH	TATSCHER				
CHECK									
CHECK DATE									
STRESS									
STRESS DATE									
APPROVAL									
APPROVAL DATE									

Diamond Aircraft

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DO NOT SCALE DRAWING

MATERIAL SIZE			SPECIFICATION	SUPPLIER
SIZE: B	SCALE: NTS	FIRST ANGLE	TITLE: SCHEMATIC, INSTRUMENT PANEL LIGHT WIRING PANEL TYPE I	
DIMENSIONS IN MILLIMETRES				
NEXT ASSEMBLY			DRAWING NUMBER: DA4-9233-10-02	SHEET: 1/1
DA4-9200-00-00			REPLACES DRAWING:	



QTY	QTY	ITEM	PART NUMBER	DESCRIPTION	MATERIAL TYPE
REVISION		–			
RN#		OAM 40-067			
DATE		04.12.00			
DRAWN		KOWARSCH			
CHECK					
CHECK DATE					
STRESS					
STRESS DATE					
APPROVAL					
APPROVAL DATE					

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Do Not Scale Drawing

H.T.	MATERIAL SIZE	SPECIFICATION	SUPPLIER

Size: B | Scale: N.T.S | First Angle

Dimensions in Millimetres | Tolerances are

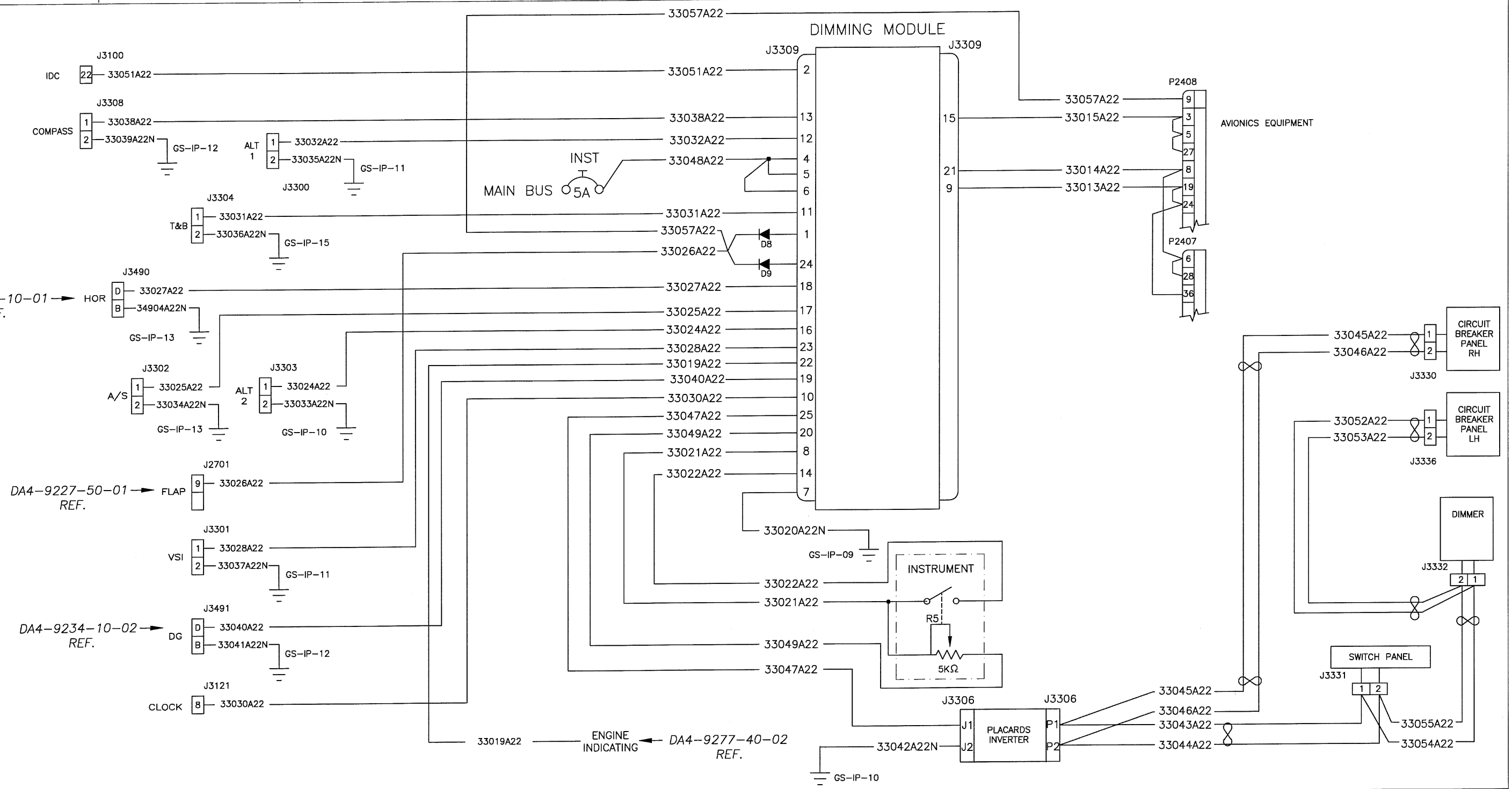
NEXT ASSEMBLY: DA4-9200-00-00

TITLE: SCHEMATIC, INSTRUMENT FLOOD LIGHT WIRING

DRAWING NUMBER: DA4-9233-10-03

SHEET: 1/1

REPLACES DWG.#



UNIT	QTY	ITEM	PART NUMBER	DESCRIPTION	MATERIAL TYPE	H.T.
REVISION		–	a			
RN#			OÄM 40-097			
DATE		21.09.01	31.10.01			
DRAWN		TATSCHER	KOWARSCH			
CHECK						
CHECK DATE						
STRESS						
STRESS DATE						
APPROVAL						
APPROVAL DATE						

Diamond Aircraft

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DO NOT SCALE DRAWING

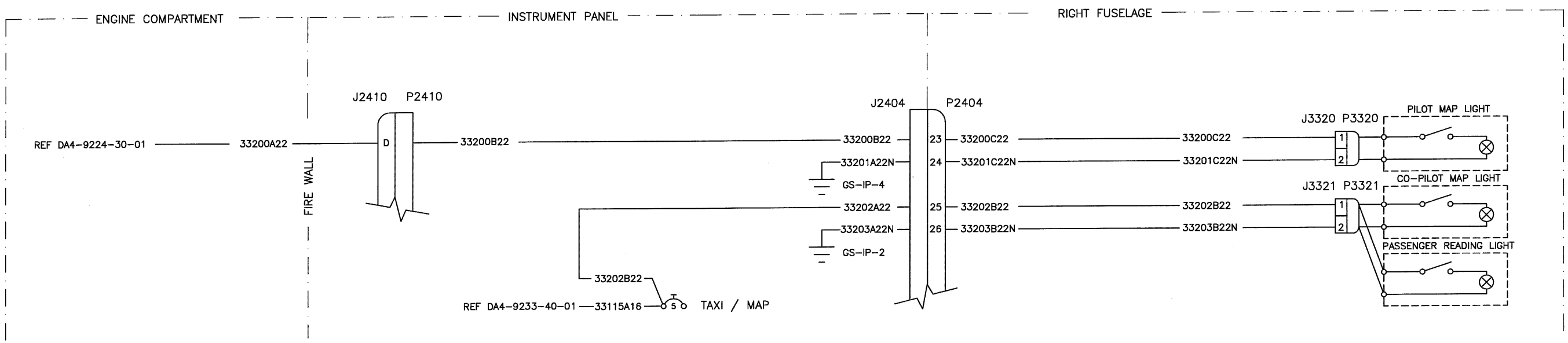
MATERIAL SIZE			SPECIFICATION	SUPPLIER
SIZE: B	SCALE: NTS	FIRST ANGLE		
DIMENSIONS IN MILLIMETRES				
NEXT ASSEMBLY: DA4-9200-00-00				

TITLE: SCHEMATIC, INSTRUMENT PANEL LIGHT WIRING PANEL TYPE II

DRAWING NUMBER: DA4-9233-10-05

SHEET: 1/1

REPLACES DRAWING:



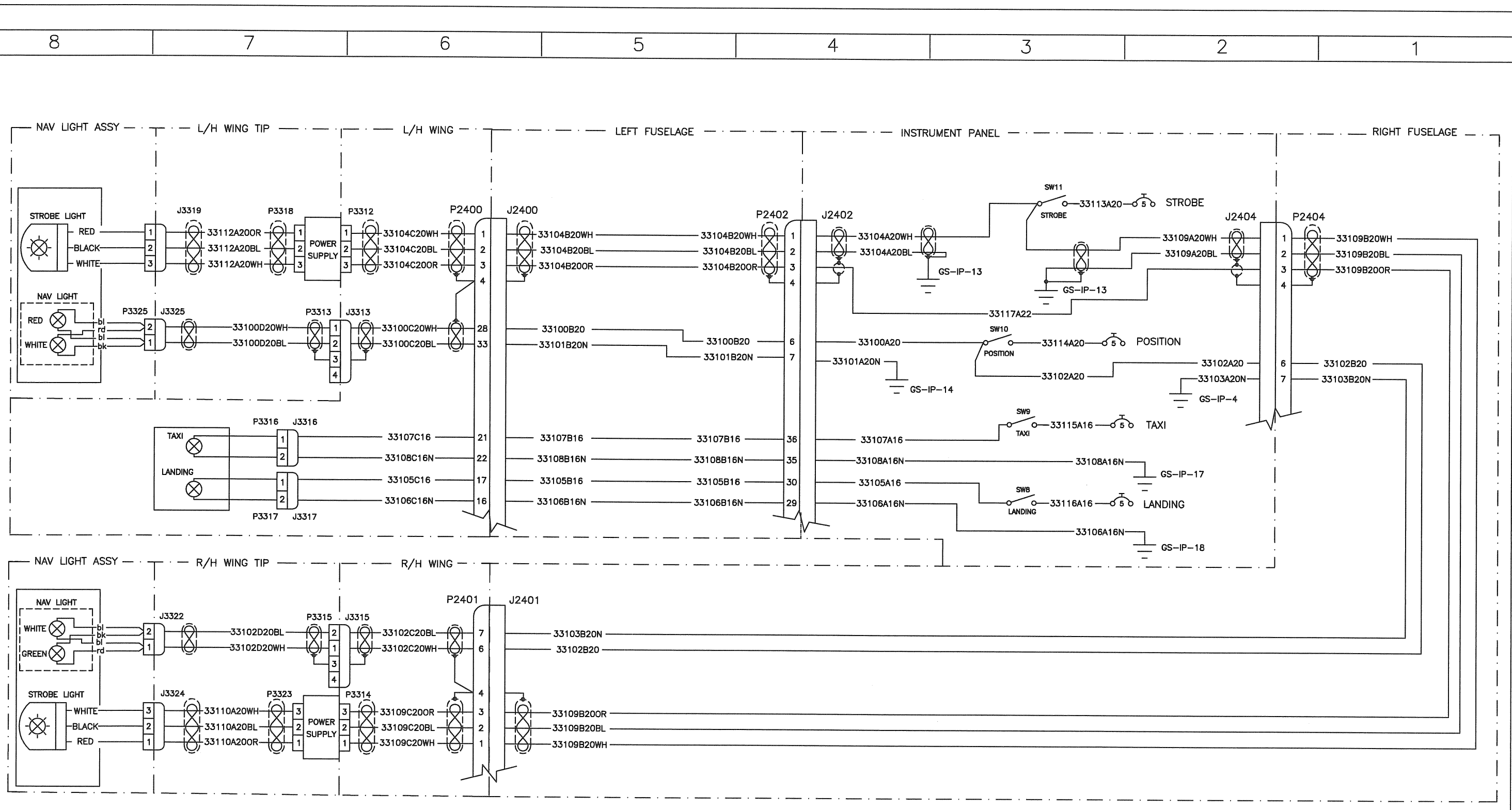
QTY	QTY	ITEM	PART NUMBER	DESCRIPTION	MATERIAL TYPE
REVISION		A	A		
RN#			MÄM 40-010		
DATE		10.10.00	10.10.00		
DRAWN		P.STURGE	KOWARSCH		
CHECK					
CHECK DATE			10.2000		
STRESS					
STRESS DATE					
APPROVAL					
APPROVAL DATE					

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Do Not Scale Drawing

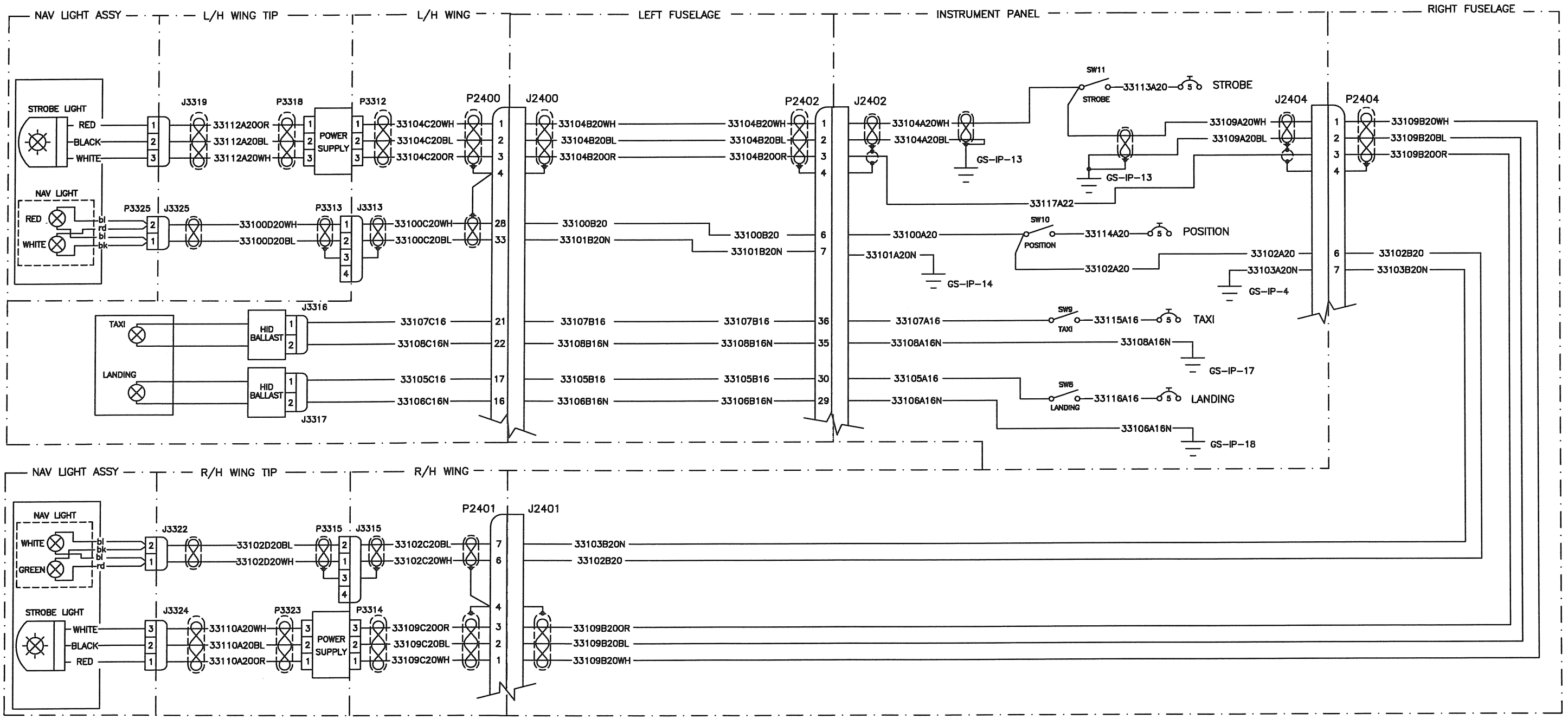
H.T.	MATERIAL SIZE		SPECIFICATION	SUPPLIER
Size: C	Scale: N.T.S	First Angle	TITLE: SCHEMATIC, MAP/READING LIGHT WIRING	
Dimensions in Millimetres		Tolerances are		
NEXT ASSEMBLY: DA4-9200-00-00			DRAWING NUMBER: DA4-9233-20-01	SHEET: 1/1
			REPLACES DWG.# N/A	



QTY	QTY	ITEM	PART NUMBER		DESCRIPTION		MATERIAL TYPE	H.T.	MATERIAL SIZE		SPECIFICATION	SUPPLIER
REVISION		D	E	F	G	H	Diamond Aircraft	Size: C	Scale: N.T.S	First Angle	TITLE: SCHEMATIC, EXTERIOR LIGHT WIRING	
RN#		MÄM 40-010	MÄM 40-080		MÄM 40-150	MÄM 40-271		Dimensions in Millimetres		Tolerances are		
DATE		05.10.00	06.03.01	20.02.02	11.07.02	20.09.06		NEXT ASSEMBLY: DA4-9200-00-00			DRAWING NUMBER: DA4-9233-40-01	SHEET: 1/1
DRAWN		KOWARSCH	STURGE	STURGE	KOWARSCH	WOOD						
CHECK					M. Kowarsch						REPLACES DWG.#: N/A	
CHECK DATE					03. OKT. 2006							
STRESS				C. Jäde								
STRESS DATE				18. JUNI 2007								
APPROVAL												
APPROVAL DATE												

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Do Not Scale Drawing



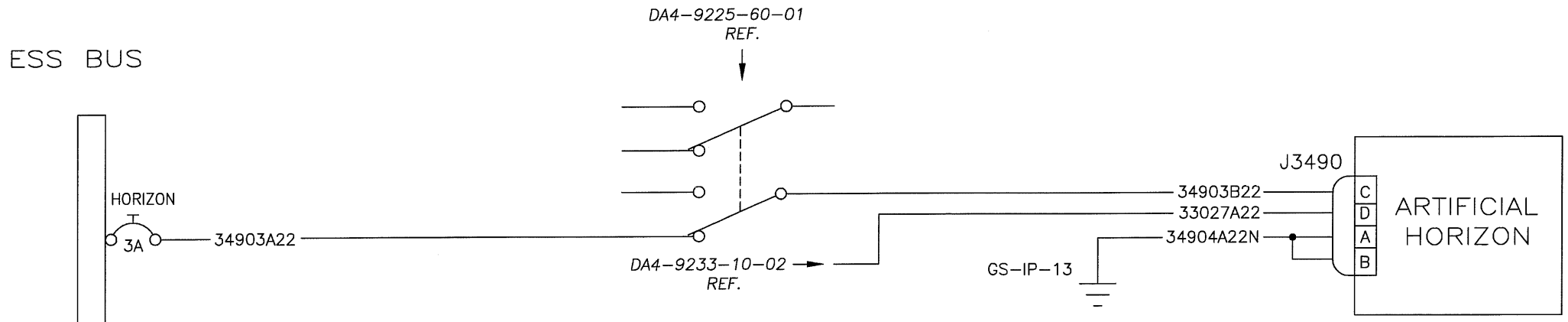
QTY	QTY	ITEM	PART NUMBER	DESCRIPTION	MATERIAL TYPE
REVISION		"–"			
RN#		ÖÄM 40-258/a			
DATE		29.01.08			
DRAWN		KOWARSCH			
CHECK					
CHECK DATE		M. Kowarsch 14. JAN. 2008			
STRESS				C. Jütte	
STRESS DATE				11. FEB. 2008	
APPROVAL					
APPROVAL DATE					

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Do Not Scale Drawing

H.T.	MATERIAL SIZE		SPECIFICATION	SUPPLIER
Size: C	Scale: N.T.S	First Angle	TITLE: SCHEMATIC, EXTERIOR LIGHT WIRING	
Dimensions in Millimetres	Tolerances are			
NEXT ASSEMBLY: DA4-9200-00-00			DRAWING NUMBER: DA4-9233-40-01x01	SHEET: 1/1
			REPLACES DWG.# N/A	



QTY	QTY	ITEM	PART NUMBER	DESCRIPTION	MATERIAL TYPE	H.T.	MATERIAL SIZE	SPECIFICATION	SUPPLIER

	G	H
REVISION		
RN#	OÄM 40-067	MÄM 40-080
DATE	04.12.00	02.03.01
DRAWN	Kowarsch	STURGE
CHECK	19. Nov. 2001	
CHECK DATE		
STRESS		
STRESS DATE		
APPROVAL		
APPROVAL DATE		

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Do Not Scale Drawing

Size:	Scale:	First Angle
B	N.T.S	

Dimensions in Millimetres | Tolerances are

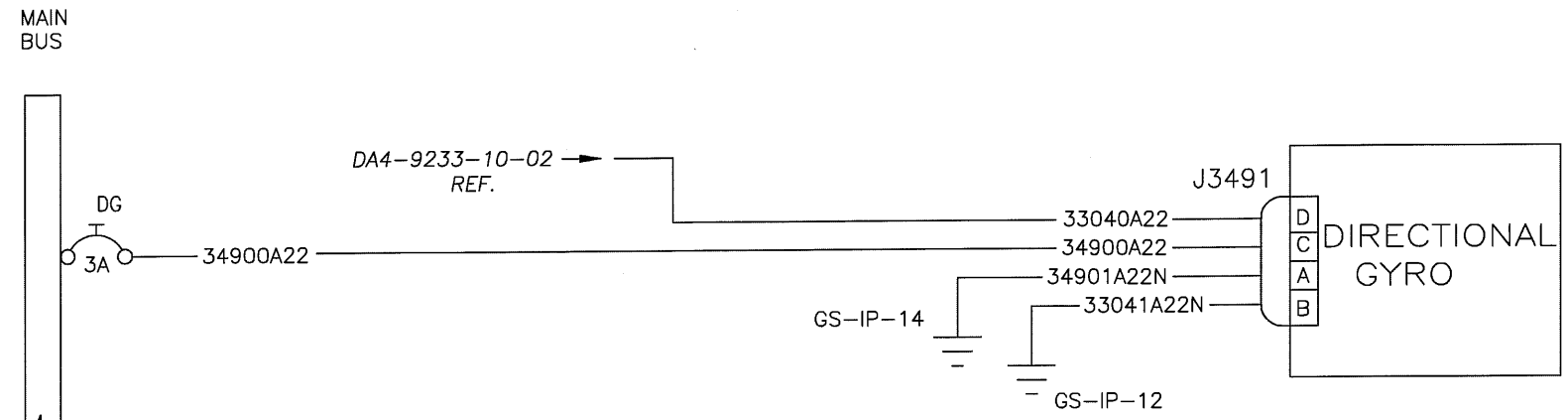
TITLE: SCHEMATIC, ATTITUDE GYRO WIRING

NEXT ASSEMBLY: DA4-9200-00-00

DRAWING NUMBER: DA4-9234-10-01

SHEET: 1/1

REPLACES DWG.#



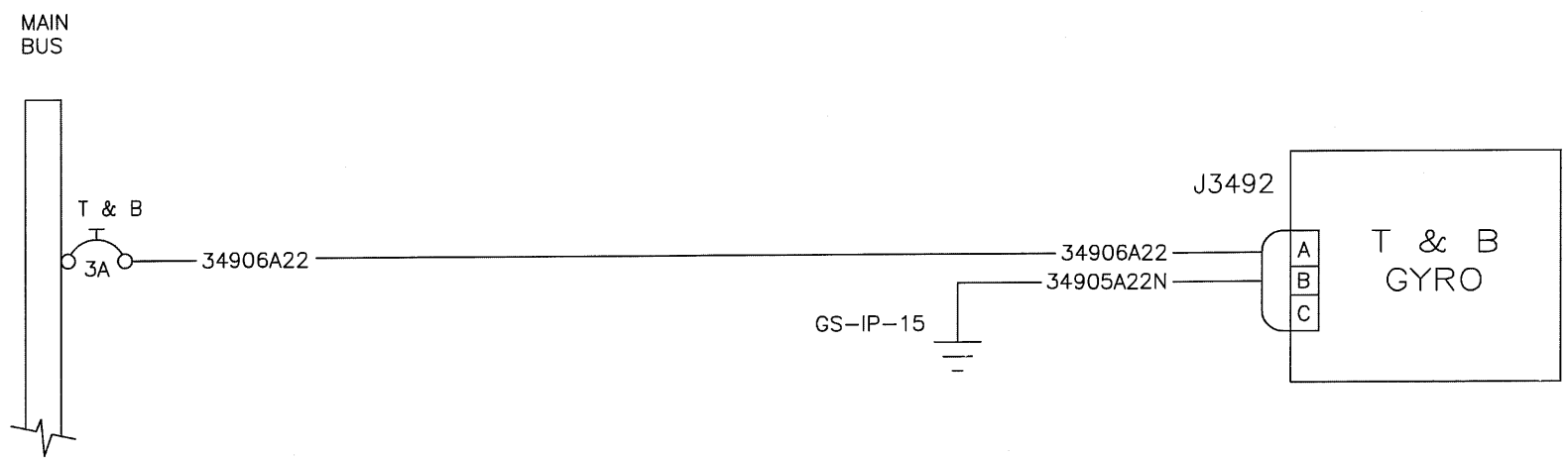
QTY	QTY	ITEM	PART NUMBER		DESCRIPTION	MATERIAL TYPE	H.T.	MATERIAL SIZE	SPECIFICATION	SUPPLIER
REVISION		A	C	D						
RN#			MÄM 40-010	MÄM 40-080						
DATE		09.08.99	25.09.00	21.09.01						
DRAWN		P.KOPALA	TATSCHER	TATSCHER						
CHECK										
CHECK DATE										
STRESS										
STRESS DATE										
APPROVAL										
APPROVAL DATE										

Diamond Aircraft

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Do Not Scale Drawing

Size:	Scale:	First Angle	TITLE:
B	N.T.S		SCHEMATIC, DIRECTIONAL GYRO
Dimensions in Millimetres	Tolerances are		
NEXT ASSEMBLY: DA4-9200-00-00			DRAWING NUMBER: DA4-9234-10-02 / SHEET: 1/1
			REPLACES DWG.#



QTY	QTY	ITEM	PART NUMBER		DESCRIPTION	MATERIAL TYPE	H.T.	MATERIAL SIZE	SPECIFICATION	SUPPLIER
REVISION		"e"	"f"							
RN#		MÄM 40-010	MÄM 40-080							
DATE		25.09.00	21.09.01							
DRAWN		Tatscher	TATSCHER							
CHECK			19. Nov. 2001							
CHECK DATE										
STRESS										
STRESS DATE										
APPROVAL										
APPROVAL DATE										

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Do Not Scale Drawing

Size:	Scale:	First Angle
B	N.T.S	

Dimensions in Millimetres | Tolerances are

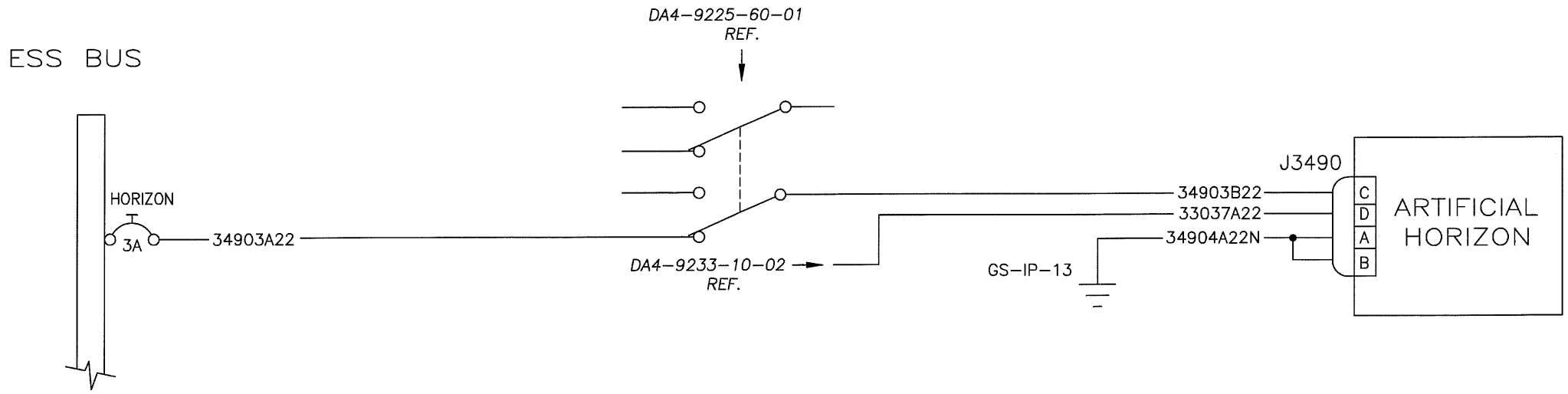
NEXT ASSEMBLY: DA4-9200-00-00

TITLE: SCHEMATIC, T & B

DRAWING NUMBER: DA4-9234-10-03

SHEET: 1/1

REPLACES DWG.#



QTY	QTY	ITEM	PART NUMBER	DESCRIPTION	MATERIAL TYPE	H.T.	MATERIAL SIZE	SPECIFICATION	SUPPLIER
REVISION		–							
RN#		OÄM 40–067							
DATE		04.12.00							
DRAWN		Kowarsch							
CHECK									
CHECK DATE		20.4.07							
STRESS									
STRESS DATE									
APPROVAL									
APPROVAL DATE									

Diamond Aircraft

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Do Not Scale Drawing

Size:	Scale:	First Angle
B	N.T.S	

Dimensions in Millimetres | Tolerances are

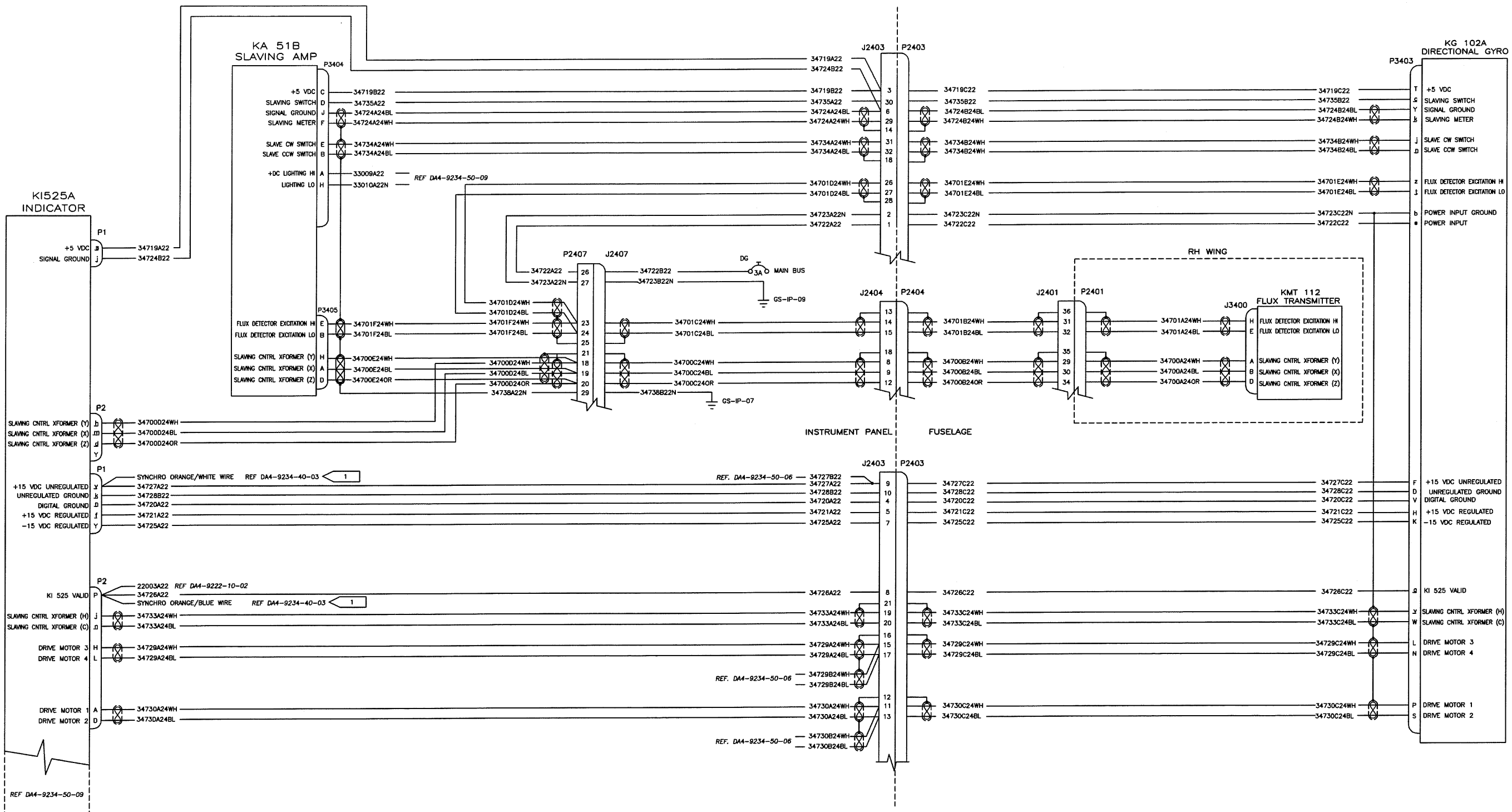
NEXT ASSEMBLY: DA4–9200–00–00

TITLE: SCHEMATIC, ATTITUDE GYRO WIRING

DRAWING NUMBER: DA4–9234–10–04

SHEET: 1/1

REPLACES DWG.#



NOTES:

1 WIRES INSTALLED WITH OPTIONAL WX500.

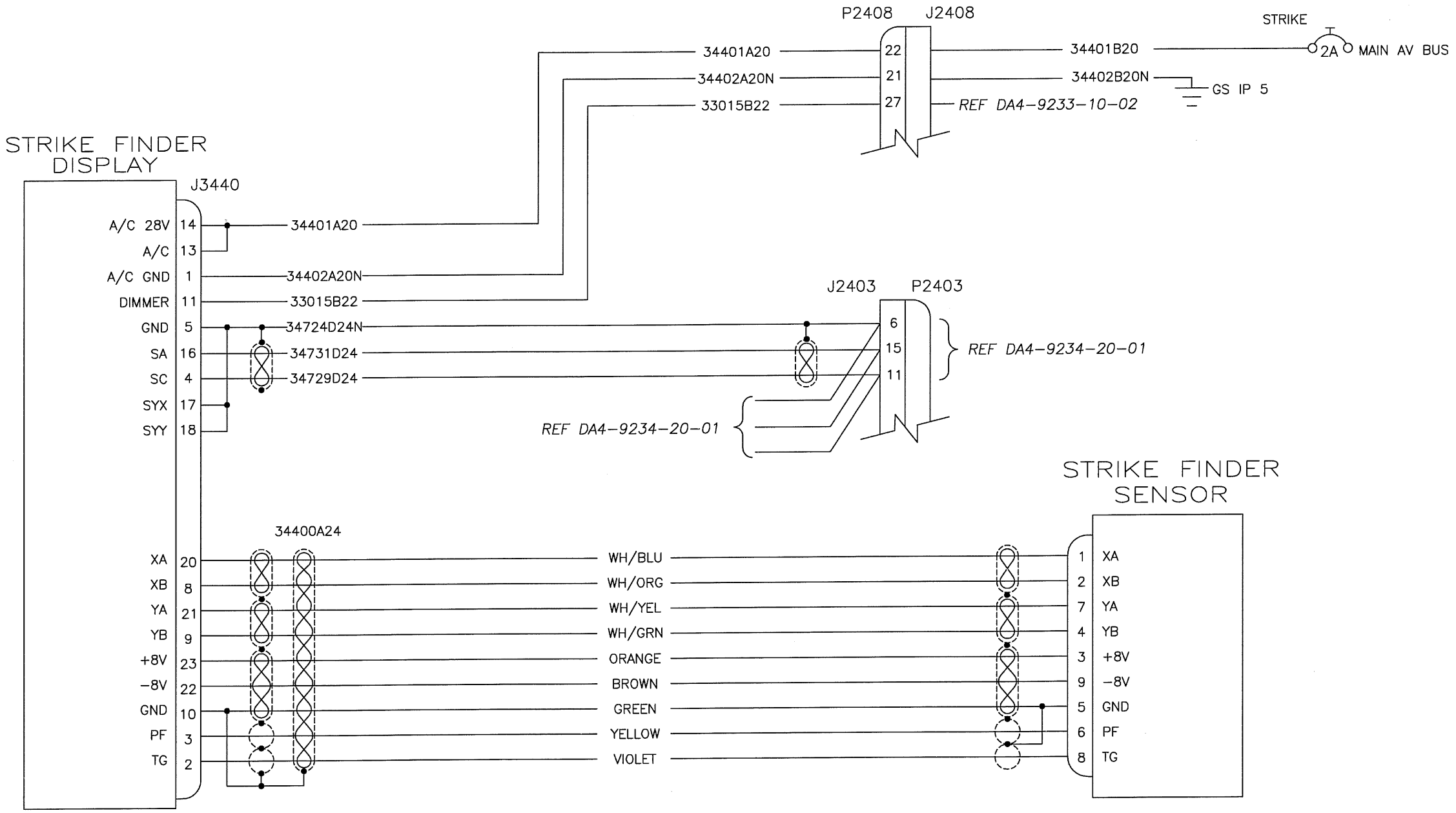
UNITS	QTY	ITEM	PART NUMBER		DESCRIPTION		MATERIAL TYPE	H.T.	MATERIAL SIZE		SPECIFICATION	SUPPLIER
REVISION		A	E	F	G			Size: B	Scale: NTS	First Angle	TITLE: SCHEMATIC, COMPASS SYSTEM, WIRING	
RN#				OÄM 40-067	MÄM 40-198							
DATE		24.02.99	06.02.01	05.04.01	06.10.03			Dimensions in Millimetres		Tolerances are N/A		
DRAWN		P.KOPALA	KOWARSCH	P.STURGE	C.WOOD			NEXT ASSEMBLY: DA4-9200-00-00			DRAWING NUMBER: DA4-9234-20-01	SHEET: 1/1
CHECK												
CHECK DATE												
STRESS												
STRESS DATE												
APPROVAL											REPLACES DWG.#	
APPROVAL DATE												

Diamond Aircraft

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Do Not Scale Drawing

M. Reichel 24 NOV. 2003



QTY	QTY	ITEM	PART NUMBER	DESCRIPTION	MATERIAL TYPE
REVISION		'_'			
RN#		ÖÄM 40-104			
DATE		24.10.01			
DRAWN		KOWARSCH			
CHECK					
CHECK DATE		12.11.01			
STRESS					
STRESS DATE					
APPROVAL					
APPROVAL DATE					

Diamond Aircraft

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Do Not Scale Drawing

H.T.	MATERIAL SIZE		SPECIFICATION	SUPPLIER
Size: B	Scale: N.T.S	First Angle		
Dimensions in Millimetres	Tolerances are			

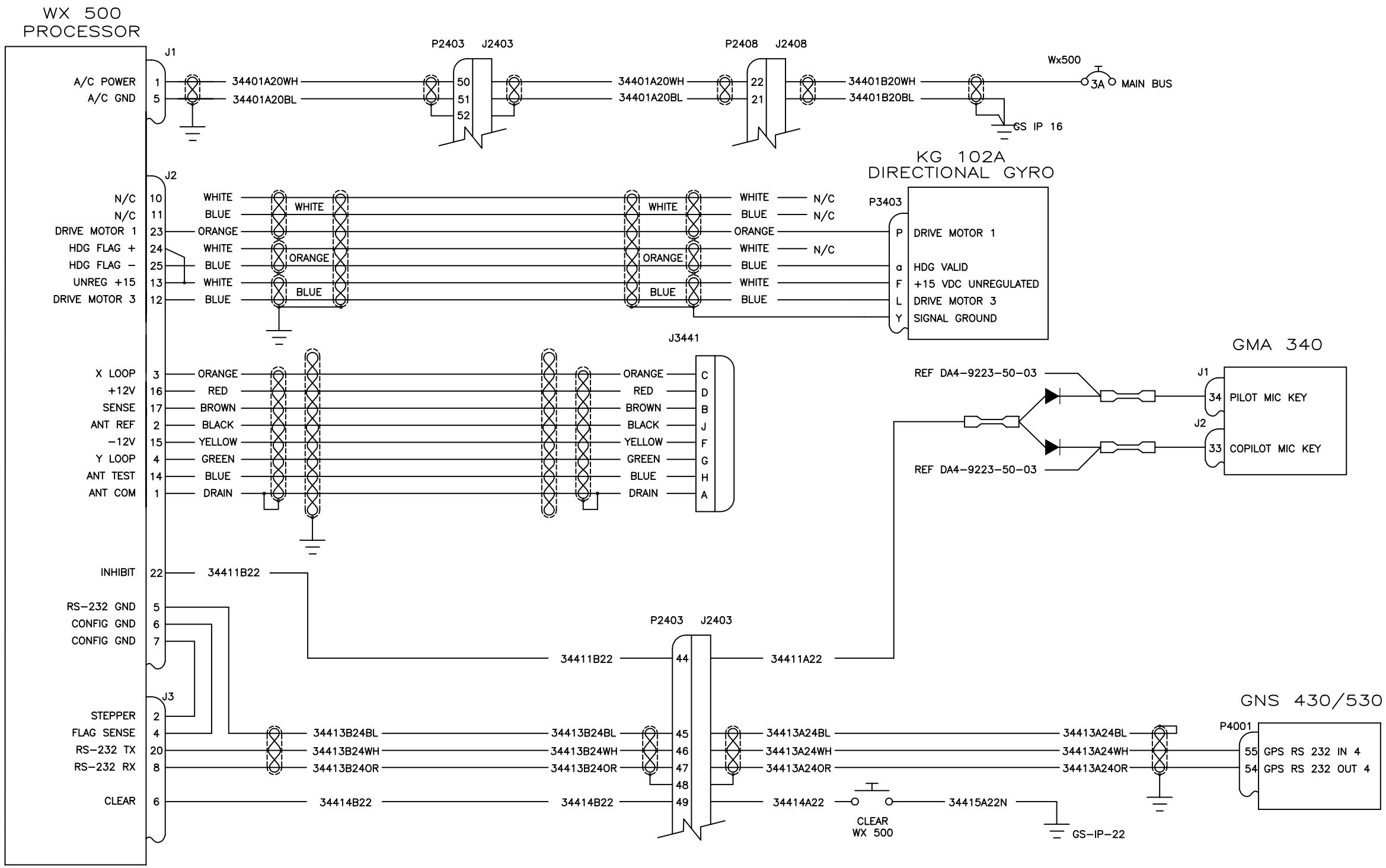
TITLE: SCHEMATIC, STRIKE FINDER WIRING.

NEXT ASSEMBLY: DA4-9200-00-00

DRAWING NUMBER: DA4-9234-40-02

SHEET: 1/1

REPLACES DWG.#



QTY	QTY	ITEM	PART NUMBER	DESCRIPTION	MATERIAL TYPE	H.T.	MATERIAL SIZE	SPECIFICATION	SUPPLIER

REVISION	–		'a'
AN#	OÄM 40–117		OÄM 40–117a
DATE	28.02.02		06.05.02
DRAWN	KOWARSCH		KOWARSCH
CHECK			
CHECK DATE			
STRESS			
STRESS DATE			
APPROVAL			
APPROVAL DATE			

Diamond Aircraft

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Do Not Scale Drawing

Size: B | Scale: NTS | First Angle

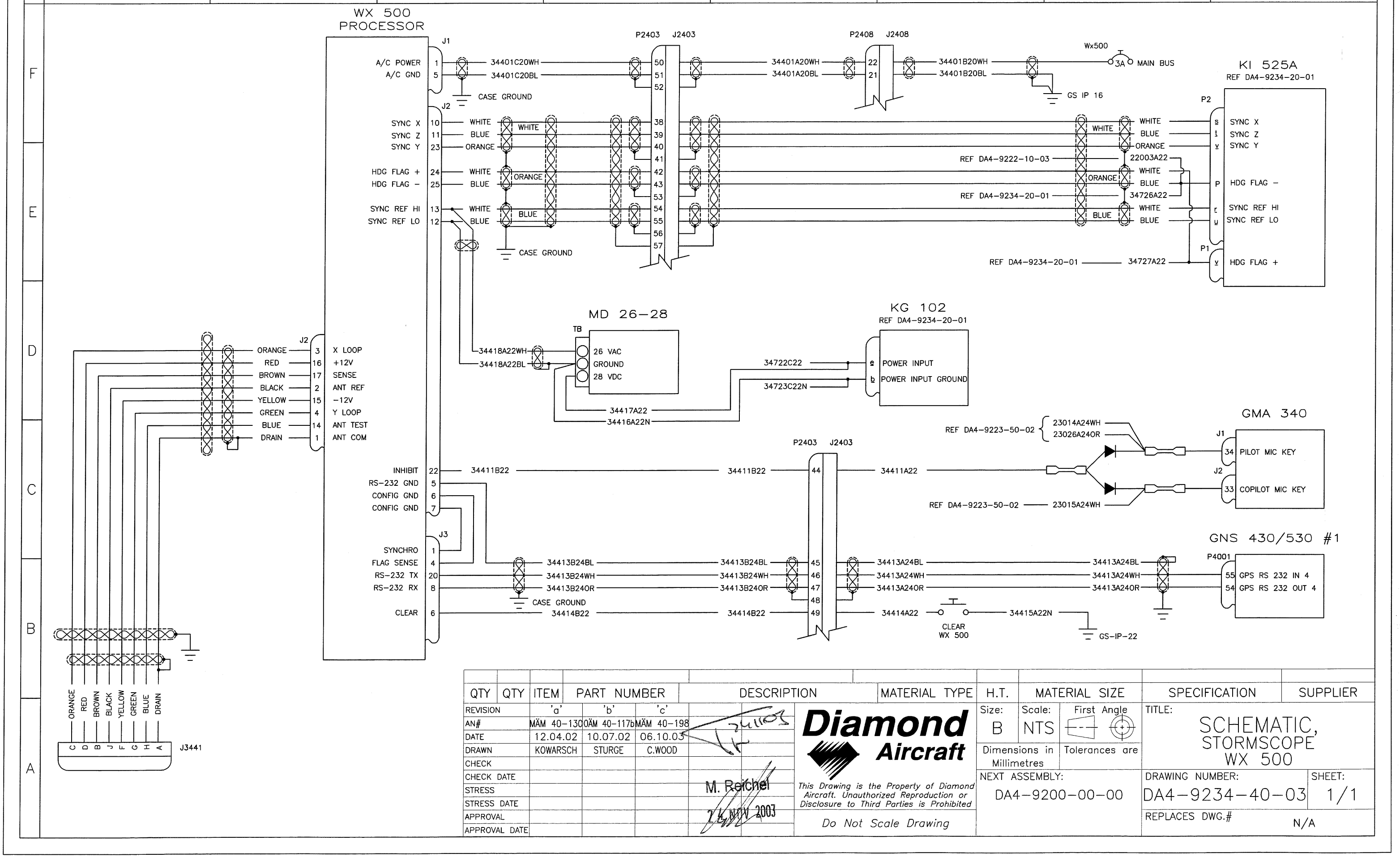
Dimensions in Millimetres | Tolerances are

TITLE: SCHEMATIC, STORMSCOPE WX 500

NEXT ASSEMBLY: DA4–9200–00–00

DRAWING NUMBER: DA4–9234–40–03 | SHEET: 1/1

REPLACES DWG.# N/A



QTY	QTY	ITEM	PART NUMBER		DESCRIPTION	MATERIAL TYPE	H.T.	MATERIAL SIZE	SPECIFICATION	SUPPLIER
REVISION		'a'	'b'	'c'						
AN#		MÄM 40-1300	ÖÄM 40-117b	MÄM 40-198						
DATE		12.04.02	10.07.02	06.10.03						
DRAWN		KOWARSCH	STURGE	C.WOOD						
CHECK										
CHECK DATE										
STRESS										
STRESS DATE										
APPROVAL										
APPROVAL DATE										

Diamond Aircraft

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Do Not Scale Drawing

Size: B | Scale: NTS | First Angle

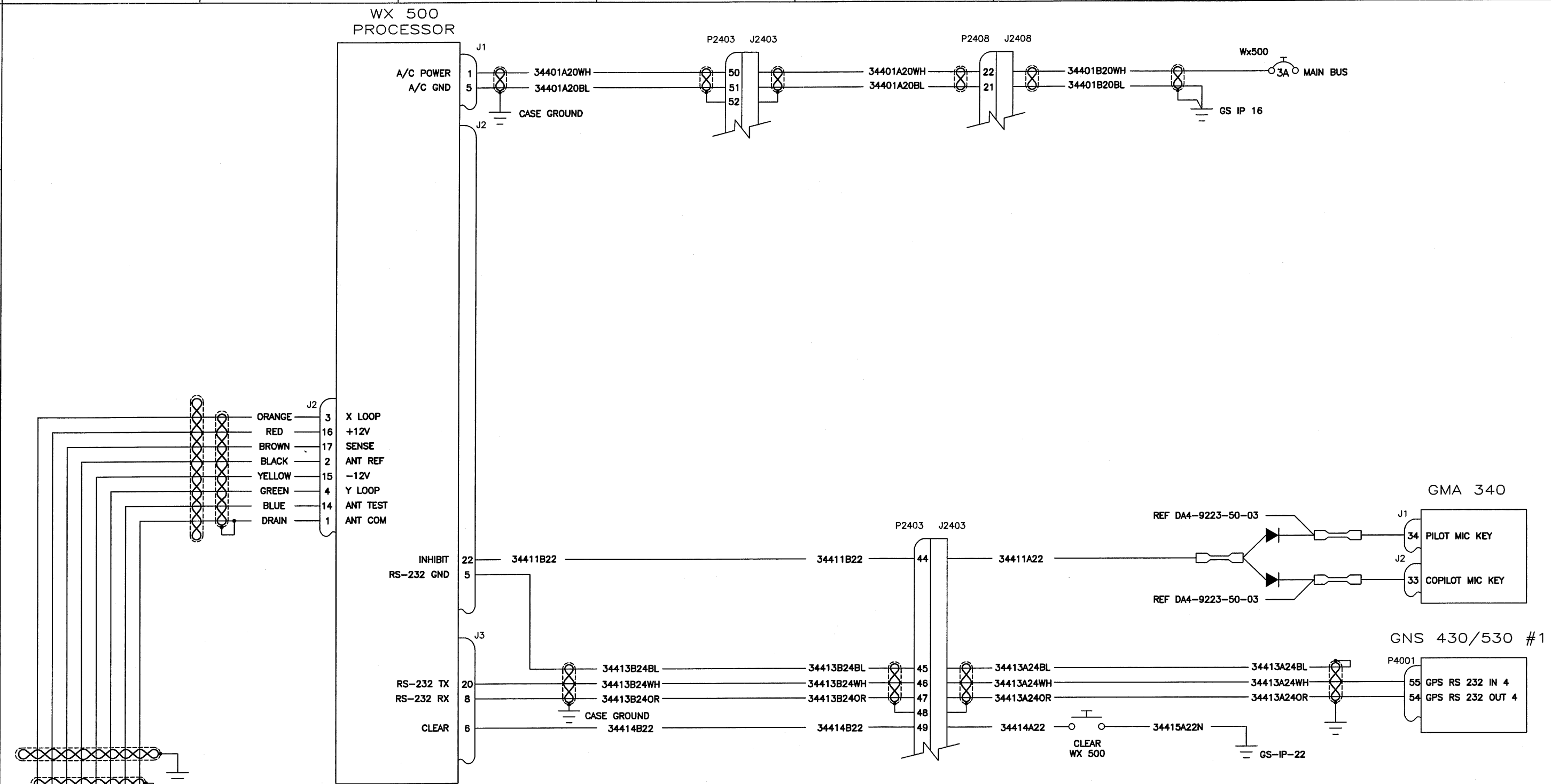
Dimensions in Millimetres | Tolerances are

TITLE: SCHEMATIC, STORMSCOPE WX 500

NEXT ASSEMBLY: DA4-9200-00-00

DRAWING NUMBER: DA4-9234-40-03 | SHEET: 1/1

REPLACES DWG.# N/A



QTY	QTY	ITEM	PART NUMBER	DESCRIPTION	MATERIAL TYPE	H.T.	MATERIAL SIZE	SPECIFICATION	SUPPLIER
REVISION		'−'							
AN#		OAM 40−128							
DATE		30.09.02							
DRAWN		STURGE							
CHECK									
CHECK DATE		02.10.02							
STRESS									
STRESS DATE									
APPROVAL									
APPROVAL DATE									

Diamond Aircraft

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Do Not Scale Drawing

Size:	Scale:	First Angle
B	NTS	

Dimensions in Millimetres | Tolerances are

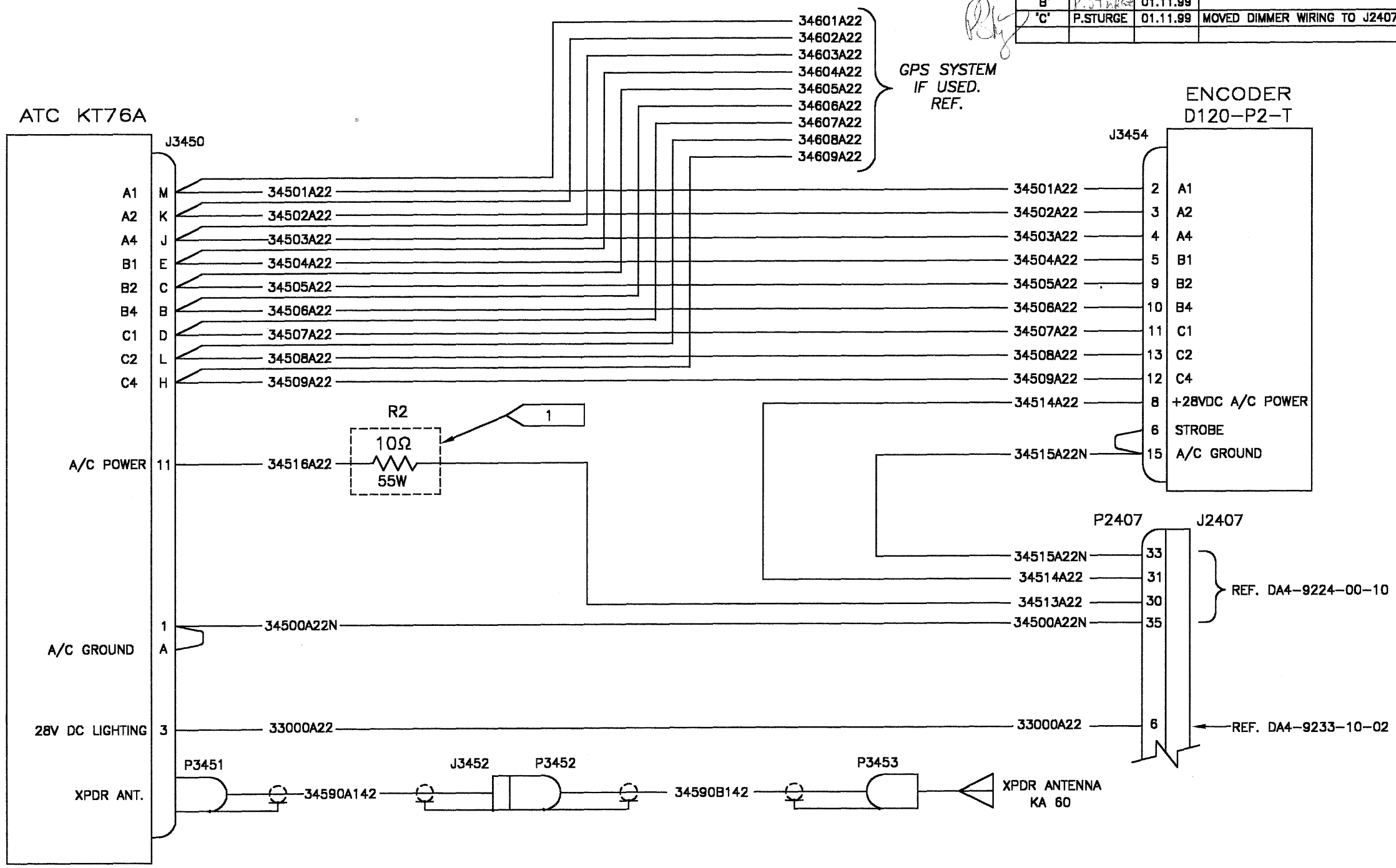
NEXT ASSEMBLY: DA4−9200−00−00

TITLE: SCHEMATIC, STORMSCOPE WX 500 NO HEADING INPUT

DRAWING NUMBER: DA4−9234−40−04 | SHEET: 1/1

REPLACES DWG.# N/A

PROTOTYPE RELEASE	APPROVED	DATE	COMMENT
'B'	P.STURGE	01.11.99	
'C'	P.STURGE	01.11.99	MOVED DIMMER WIRING TO J2407



QTY	QTY	ITEM	PART NUMBER	DESCRIPTION	MATERIAL TYPE
REVISION		A			
RN#					
DATE		08.09.99			
DRAWN		P.KOPALA			
CHECK		C.Treed			
CHECK DATE		20.5.00			
STRESS					
STRESS DATE					
APPROVAL					
APPROVAL DATE					

Diamond Aircraft

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Do Not Scale Drawing

H.T.	MATERIAL SIZE	SPECIFICATION	SUPPLIER

Size:	Scale:	First Angle
B	N.T.S	

Dimensions in Millimetres | Tolerances are

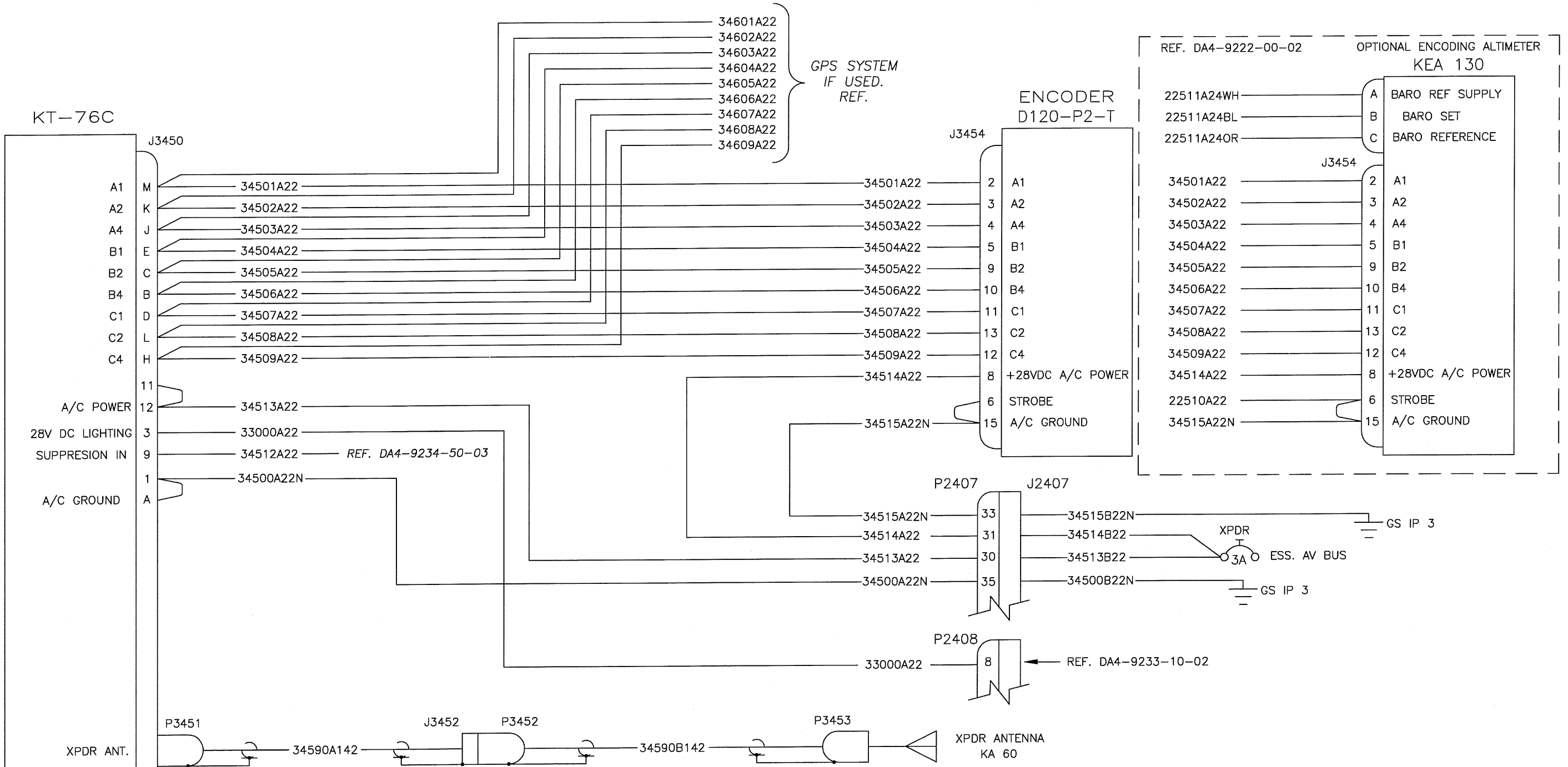
TITLE: SCHEMATIC, TRANSPONDER KT 76A

NEXT ASSEMBLY: DA4-9200-00-00

DRAWING NUMBER: DA4-9234-50-01

SHEET: 1/1

REPLACES DWG.#



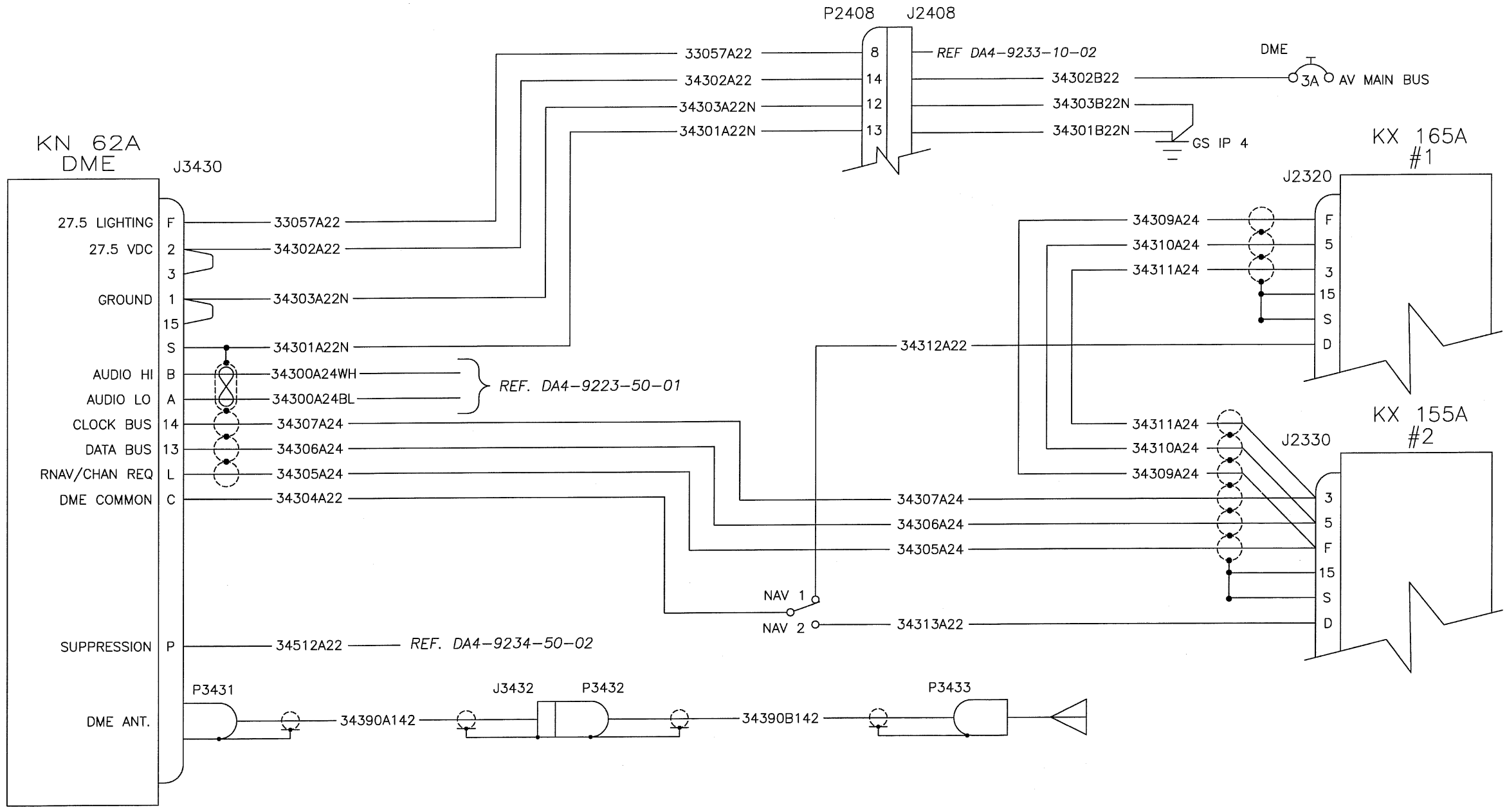
QTY	QTY	ITEM	PART NUMBER		DESCRIPTION	MATERIAL TYPE	H.T.	MATERIAL SIZE	SPECIFICATION	SUPPLIER
REVISION		A	D	E						
RN#			OÄM 40-067	MÄM 40-080						
DATE		08.09.99	02.03.01	21.09.01						
DRAWN		P.KOPALA	KOWARSCH	TATSCHER						
CHECK										
CHECK DATE										
STRESS										
STRESS DATE										
APPROVAL										
APPROVAL DATE										

Diamond Aircraft

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Do Not Scale Drawing

Size:	Scale:	First Angle	TITLE:
B	N.T.S		SCHEMATIC, TRANSPONDER KT 76C
Dimensions in Millimetres	Tolerances are		
NEXT ASSEMBLY: DA4-9200-00-00			DRAWING NUMBER: DA4-9234-50-02
			SHEET: 1/1
			REPLACES DWG.#



QTY	QTY	ITEM	PART NUMBER		DESCRIPTION	MATERIAL TYPE	H.T.	MATERIAL SIZE	SPECIFICATION	SUPPLIER
REVISION		A	D	E						
RN#			OÄM 40-083	MÄM 40-080						
DATE			06.04.01	15.10.01						
DRAWN			KOWARSCH	STURGE						
CHECK			19. Nov. 2001							
CHECK DATE										
STRESS										
STRESS DATE										
APPROVAL										
APPROVAL DATE										

Diamond Aircraft

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Do Not Scale Drawing

Size: B | Scale: N.T.S | First Angle

Dimensions in Millimetres | Tolerances are

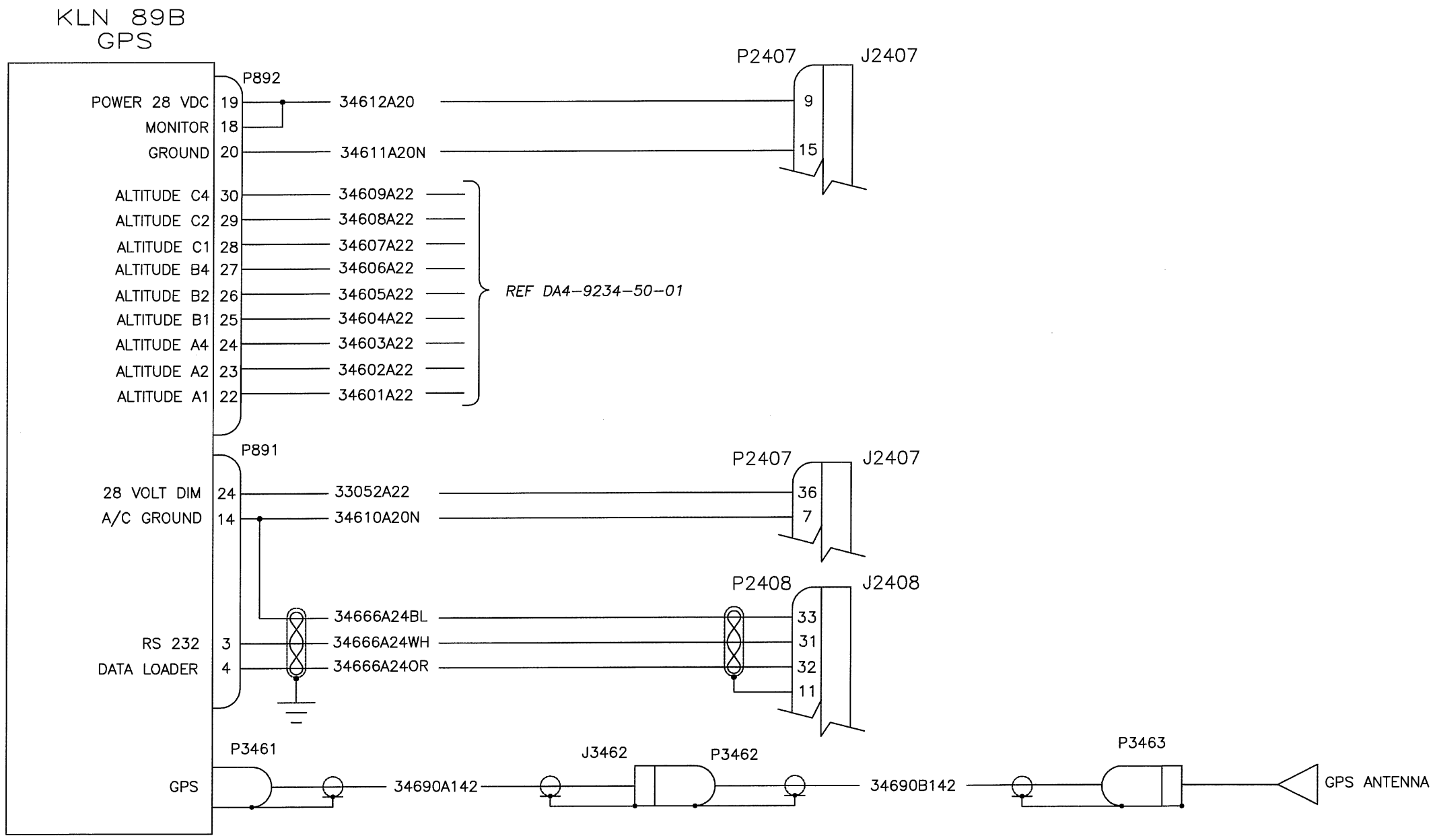
TITLE: SCHEMATIC, KN 62 WIRING.

NEXT ASSEMBLY: DA4-9200-00-00

DRAWING NUMBER: DA4-9234-50-03

SHEET: 1/1

REPLACES DWG.#



QTY	QTY	ITEM	PART NUMBER	DESCRIPTION	MATERIAL TYPE	H.T.	MATERIAL SIZE	SPECIFICATION	SUPPLIER

REVISION	A	B
AN#	CÄM 40-051	
DATE	01.02.00	18.10.00
DRAWN	P.KOPALA	Kowarsch
CHECK		19.10.00
CHECK DATE		
STRESS		
STRESS DATE		
APPROVAL		
APPROVAL DATE		

Diamond Aircraft

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Do Not Scale Drawing

Size:	Scale:	First Angle
B	NTS	

Dimensions in Millimetres | Tolerances are

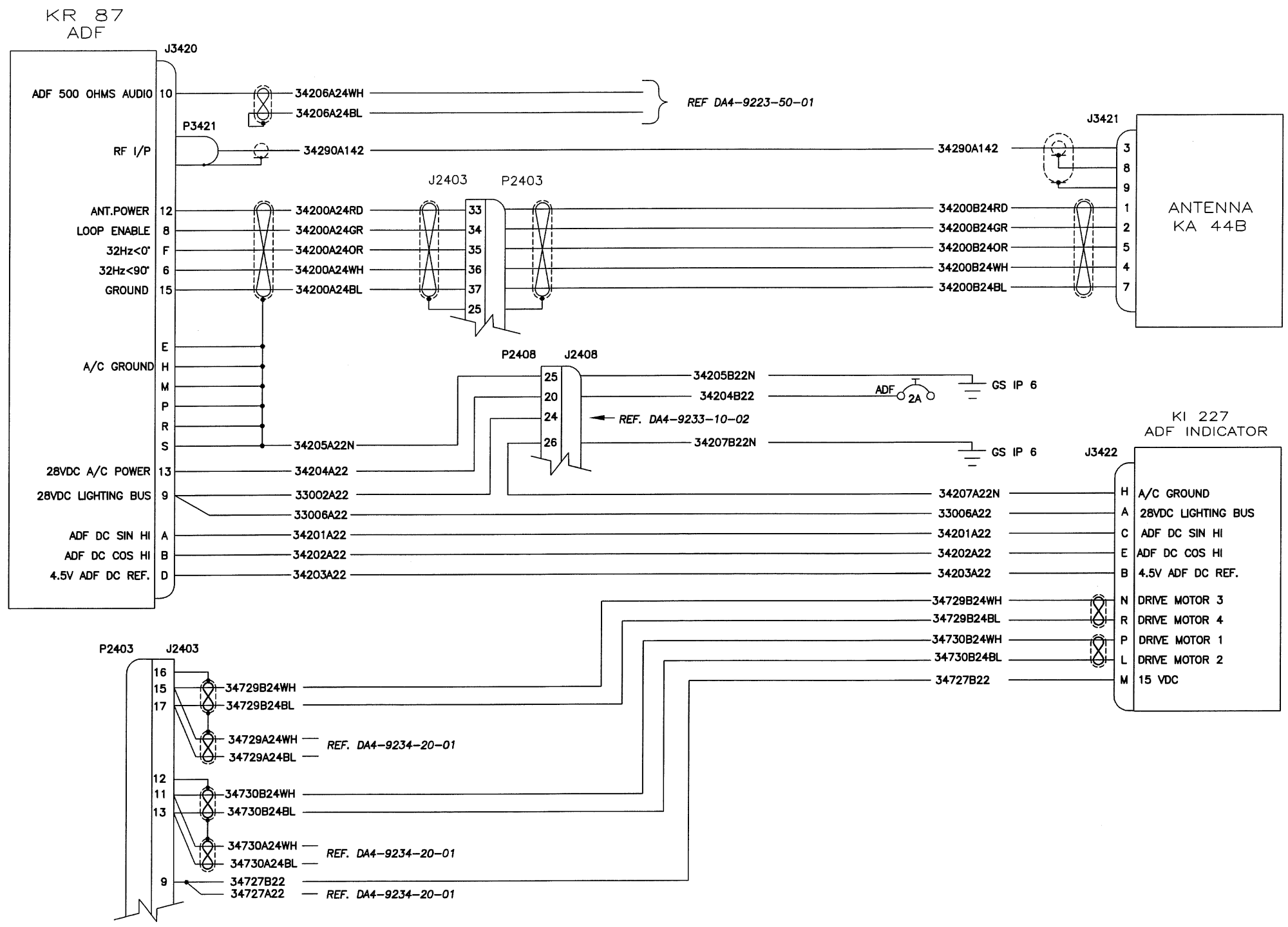
TITLE: SCHEMATIC, KLN 89, GPS

NEXT ASSEMBLY: DA4-9200-00-00

DRAWING NUMBER: DA4-9234-50-04

SHEET: 1/1

REPLACES DWG.# N/A



QTY	QTY	ITEM	PART NUMBER		DESCRIPTION	MATERIAL TYPE	H.T.	MATERIAL SIZE	SPECIFICATION	SUPPLIER
REVISION		A	F	G	H					
RN#			OÄM40-067	MÄM 40-110	MÄM 40-205					
DATE			05.04.01	19.02.02	03.11.03					
DRAWN			P.STURGE	KOWARSCH	C.WOOD					
CHECK					M. Reichel					
CHECK DATE					14 APR 2005					
STRESS										
STRESS DATE										
APPROVAL										
APPROVAL DATE										

Diamond Aircraft

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Do Not Scale Drawing

Size: B | Scale: N.T.S | First Angle

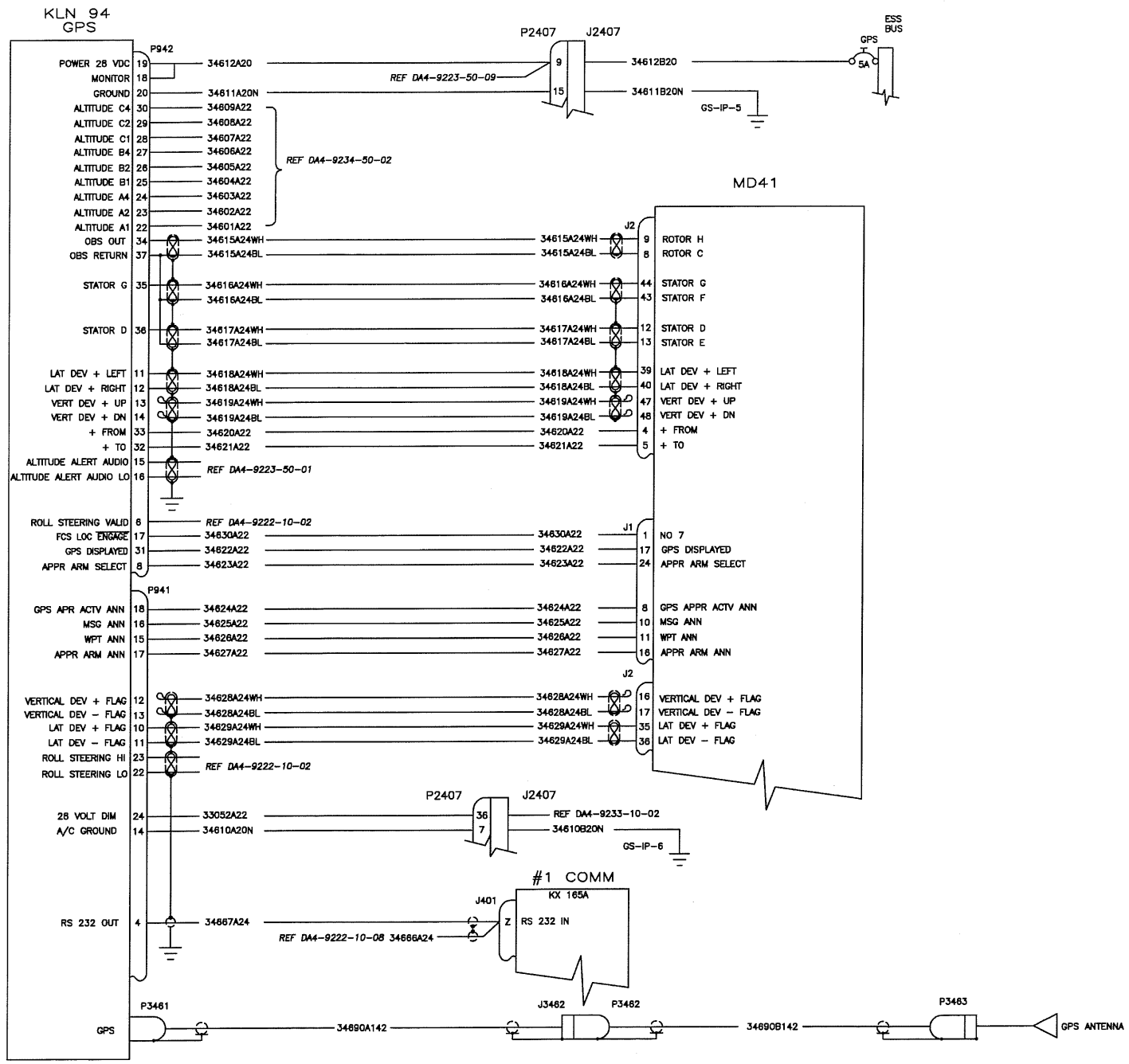
Dimensions in Millimetres | Tolerances are

TITLE: SCHEMATIC, KR 87 WIRING.

NEXT ASSEMBLY: DA4-9200-00-00

DRAWING NUMBER: DA4-9234-50-06 | SHEET: 1/1

REPLACES DWG.# N/A



QTY	QTY	ITEM	PART NUMBER	DESCRIPTION	MATERIAL TYPE	H.T.	MATERIAL SIZE	SPECIFICATION	SUPPLIER

		D	E
REVISION			
AN#		OÄM 40-083	MÄM 40-080
DATE	03.02.00	04.04.01	21.09.01
DRAWN	P.KOPALA	P.STURGE	TATSCHER
CHECK			
CHECK DATE			
STRESS			
STRESS DATE			
APPROVAL			
APPROVAL DATE			

Diamond Aircraft

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Do Not Scale Drawing

Size: B | Scale: NTS | First Angle

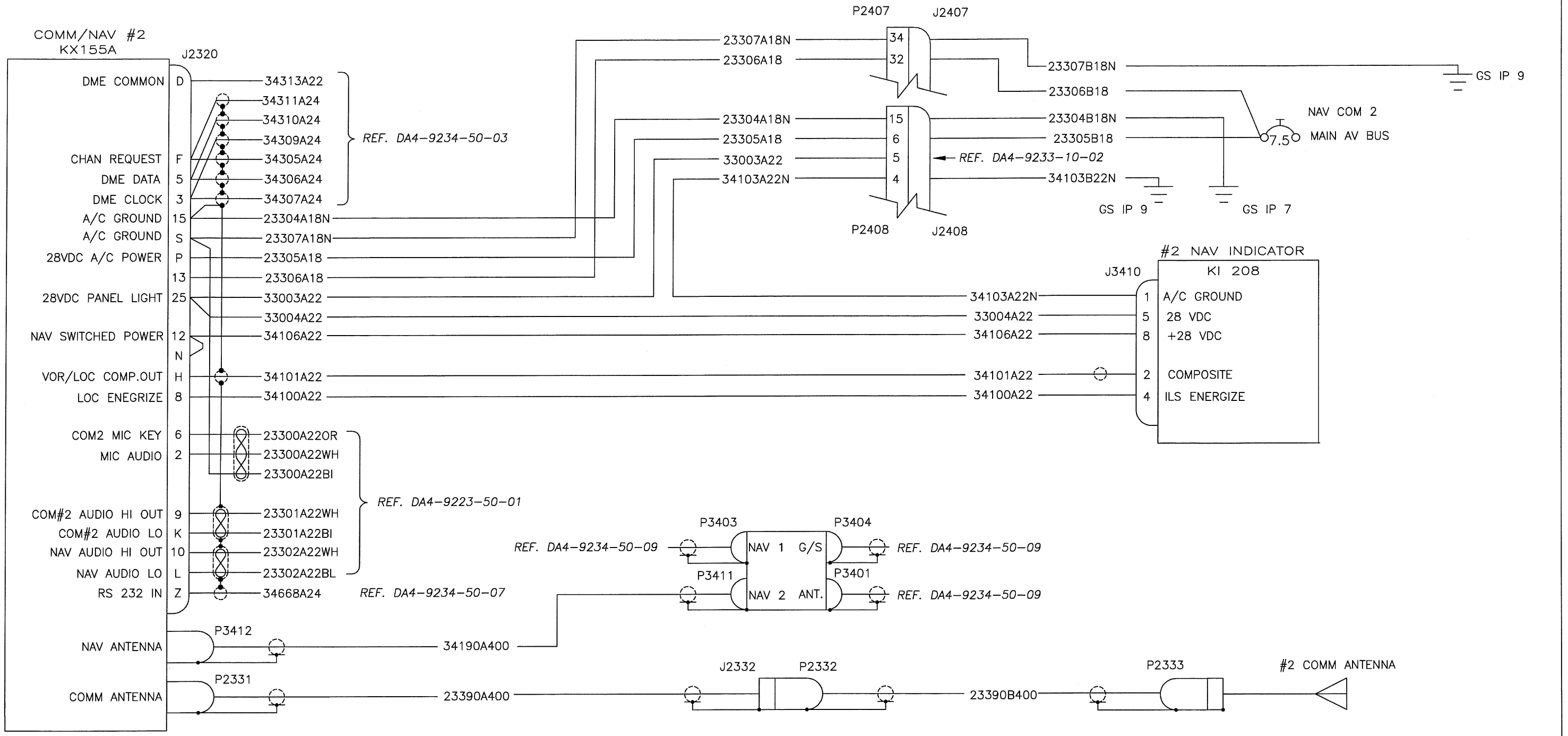
Dimensions in Millimetres | Tolerances are

TITLE: SCHEMATIC, KLN 94, GPS (IFR w/AP)

NEXT ASSEMBLY: DA4-9200-00-00

DRAWING NUMBER: DA4-9234-50-07 | SHEET: 1/1

REPLACES DWG.# N/A



QTY	QTY	ITEM	PART NUMBER	DESCRIPTION	MATERIAL TYPE	H.T.	MATERIAL SIZE	SPECIFICATION	SUPPLIER

REVISION		C
AN#		ØÄM40-067
DATE	01.02.00	04.04.01
DRAWN	P.KOPALA	~~P.STURGE~~
CHECK		VF
CHECK DATE		2.4.01
STRESS		
STRESS DATE		
APPROVAL		
APPROVAL DATE		

Diamond Aircraft

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Do Not Scale Drawing

Size:	Scale:	First Angle
B	NTS	

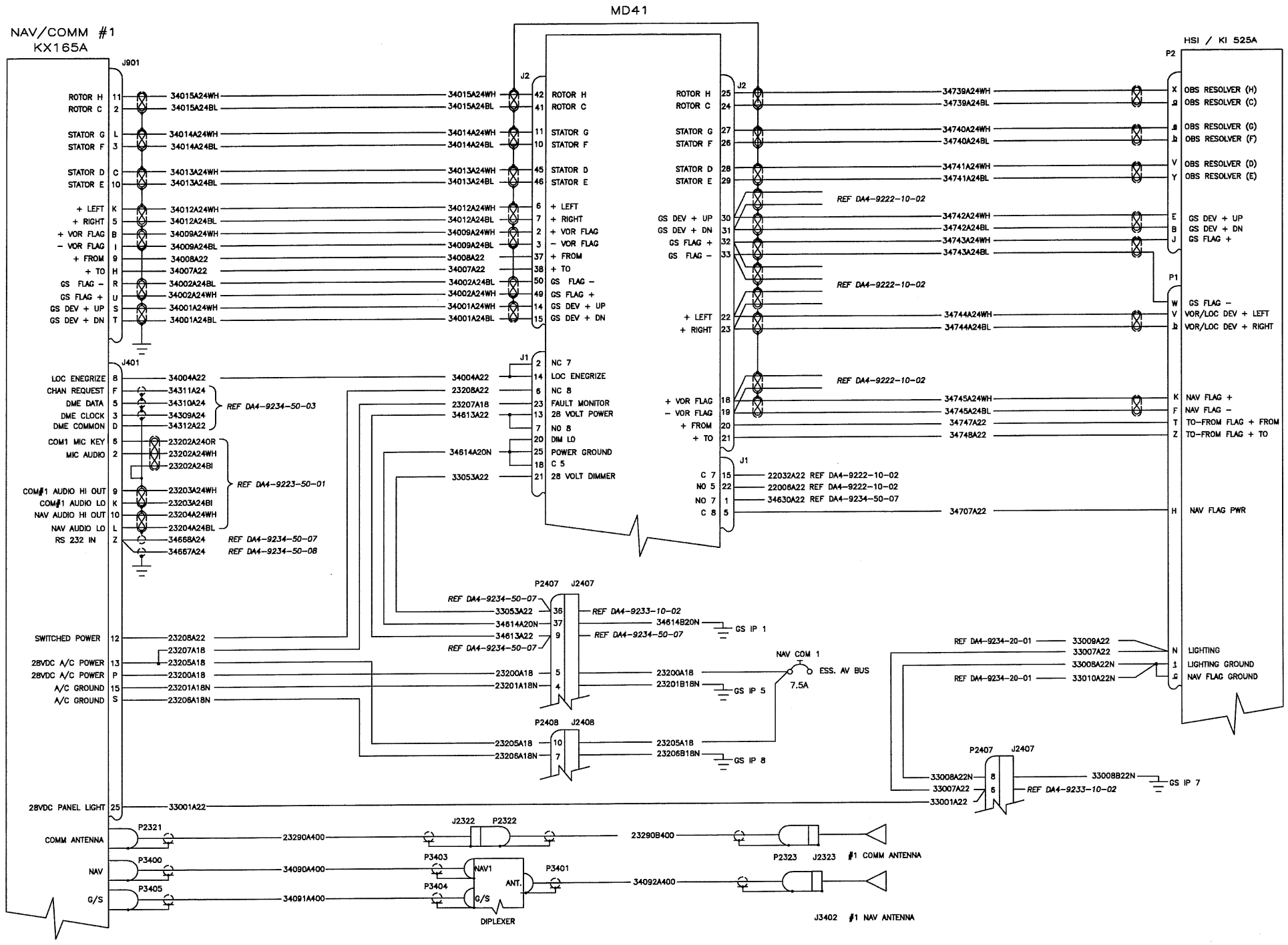
Dimensions in Millimetres | Tolerances are

NEXT ASSEMBLY: DA4-9200-00-00

TITLE: SCHEMATIC, KX 155A NAN/COMM #2

DRAWING NUMBER: DA4-9234-50-08 | SHEET: 1/1

REPLACES DWG.# DA4-3450-52-00



QTY	QTY	ITEM	PART NUMBER	DESCRIPTION	MATERIAL TYPE	H.T.	MATERIAL SIZE	SPECIFICATION	SUPPLIER
REVISION			D						
AN#			ØÄM40–083						
DATE		03.02.00	05.04.01						
DRAWN		P.KOPALA	P.STURGE						
CHECK			TG						
CHECK DATE			2.5.01						
STRESS									
STRESS DATE									
APPROVAL									
APPROVAL DATE									

Diamond Aircraft

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Do Not Scale Drawing

Size: B | Scale: NTS | First Angle

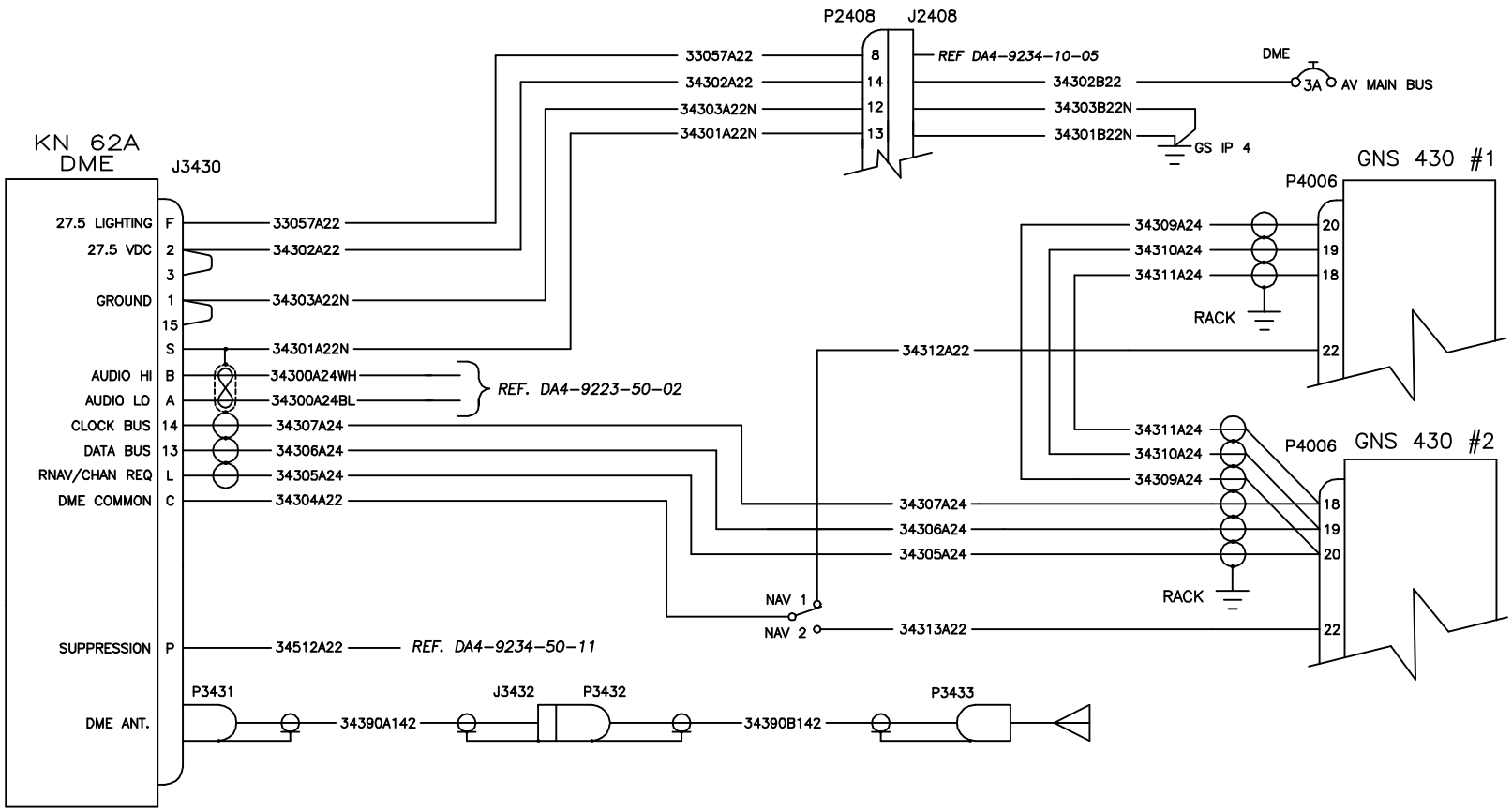
Dimensions in Millimetres | Tolerances are

TITLE: SCHEMATIC, KX 165A w/AP NAV/COMM #1

NEXT ASSEMBLY: DA4–9200–00–00

DRAWING NUMBER: DA4–9234–50–09 | SHEET: 1/1

REPLACES DWG.#: N/A



QTY	QTY	ITEM	PART NUMBER		DESCRIPTION		MATERIAL TYPE	H.T.	MATERIAL SIZE	SPECIFICATION	SUPPLIER
REVISION		A									
RN#		OÄM 40-097									
DATE		08.02.01									
DRAWN		P.STURGE									
CHECK											
CHECK DATE											
STRESS											
STRESS DATE											
APPROVAL											
APPROVAL DATE											

Diamond Aircraft

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Do Not Scale Drawing

Size: B | Scale: N.T.S | First Angle

Dimensions in Millimetres | Tolerances are

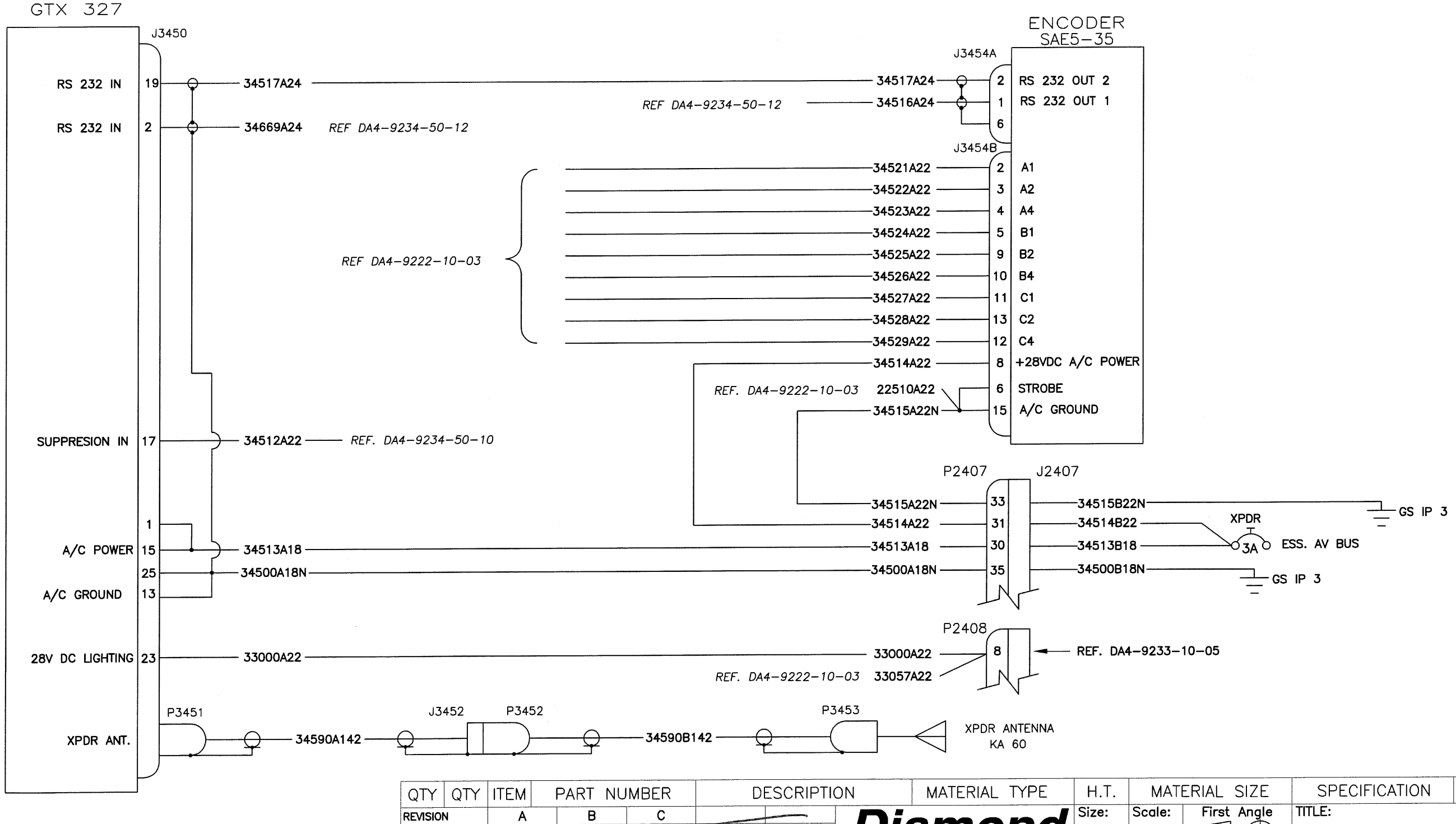
NEXT ASSEMBLY: DA4-9200-00-00

TITLE: SCHEMATIC, KN 62 WIRING. (GARMIN INTERFACE)

DRAWING NUMBER: DA4-9234-50-10

SHEET: 1/1

REPLACES DWG.#

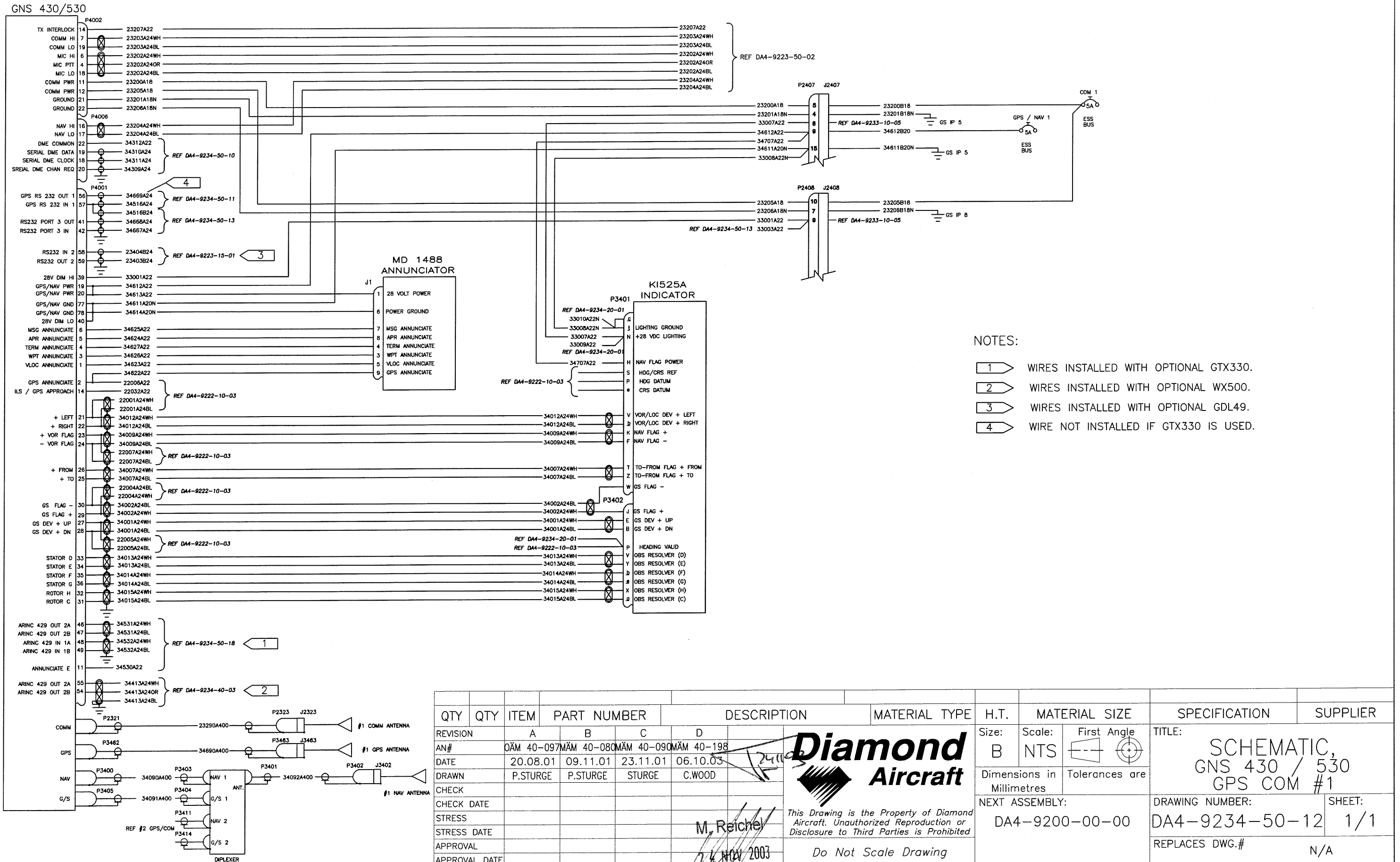


QTY	QTY	ITEM	PART NUMBER			DESCRIPTION	MATERIAL TYPE	H.T.	MATERIAL SIZE		SPECIFICATION	SUPPLIER
REVISION		A	B	C				Size:	Scale:	First Angle	TITLE:	
RN#		OÄM 40-097	MÄM 40-080	MÄM 40-198				B	N.T.S		SCHEMATIC, GTX 327	
DATE		07.06.01	17.11.01	07.10.03				Dimensions in Millimetres		Tolerances are		
DRAWN		P.STURGE	P.STURGE	C.WOOD				NEXT ASSEMBLY:			DRAWING NUMBER:	SHEET:
CHECK								DA4-9200-00-00			DA4-9234-50-11	1/1
CHECK DATE											REPLACES DWG.#	
STRESS												
STRESS DATE												
APPROVAL						M. Reichel						
APPROVAL DATE						24 JUN 2003						

Diamond Aircraft

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Do Not Scale Drawing



QTY	QTY	ITEM	PART NUMBER	DESCRIPTION	MATERIAL TYPE	H.T.	MATERIAL SIZE	SPECIFICATION	SUPPLIER

	A	B	C	D
REVISION				
AN#	OÄM 40-097	MÄM 40-080	MÄM 40-090	MÄM 40-198
DATE	20.08.01	09.11.01	23.11.01	06.10.03
DRAWN	P.STURGE	P.STURGE	STURGE	C.WOOD
CHECK				
CHECK DATE				
STRESS				
STRESS DATE				
APPROVAL				
APPROVAL DATE				

M. Reichel 24 NOV 2003

Diamond Aircraft

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Do Not Scale Drawing

Size:	Scale:	First Angle
B	NTS	

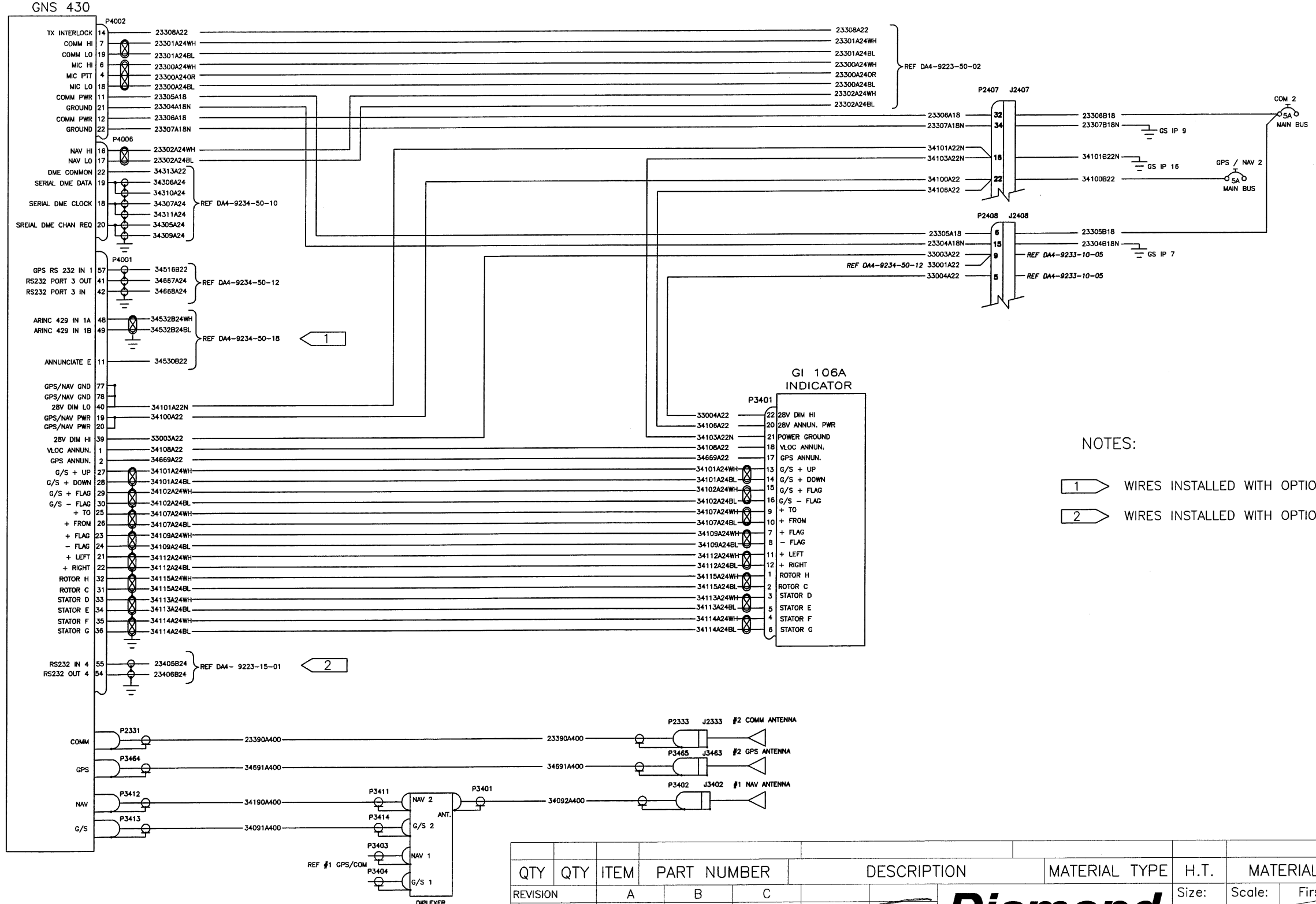
Dimensions in Millimetres | Tolerances are

TITLE: SCHEMATIC, GNS 430 / 530 GPS COM #1

NEXT ASSEMBLY: DA4-9200-00-00

DRAWING NUMBER: DA4-9234-50-12 | SHEET: 1/1

REPLACES DWG.# N/A



NOTES:

1. WIRES INSTALLED WITH OPTIONAL GTX330.
2. WIRES INSTALLED WITH OPTIONAL GDL49.

QTY	QTY	ITEM	PART NUMBER	DESCRIPTION	MATERIAL TYPE	H.T.	MATERIAL SIZE	SPECIFICATION	SUPPLIER

REVISION	A	B	C
AN#	OÄM 40-097	MÄM 40-090	MÄM 40-198
DATE	20.08.01	23.11.01	06.10.03
DRAWN	P.STURGE	STURGE	C.WOOD
CHECK			
CHECK DATE			
STRESS			
STRESS DATE			
APPROVAL			
APPROVAL DATE			

24 NOV 2003

M. Reichel

Diamond Aircraft

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Do Not Scale Drawing

Size:	Scale:	First Angle
B	NTS	

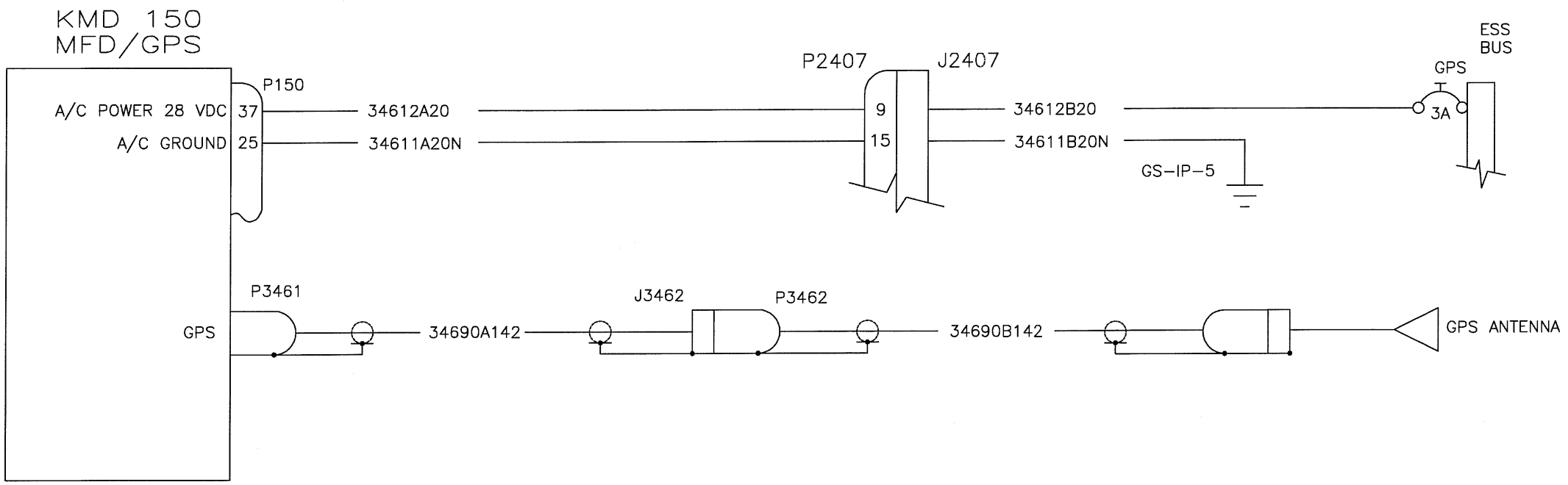
Dimensions in Millimetres | Tolerances are

TITLE: SCHEMATIC, GNS 430 GPS COM #2

NEXT ASSEMBLY: DA4-9200-00-00

DRAWING NUMBER: DA4-9234-50-13 | SHEET: 1/1

REPLACES DWG.# N/A



QTY	QTY	ITEM	PART NUMBER	DESCRIPTION	MATERIAL TYPE	H.T.	MATERIAL SIZE	SPECIFICATION	SUPPLIER

REVISION	'–'
AN#	OÄM 40-103
DATE	28.09.01
DRAWN	KOWARSCH
CHECK	
CHECK DATE	
STRESS	
STRESS DATE	
APPROVAL	
APPROVAL DATE	

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Do Not Scale Drawing

Size: B	Scale: NTS	First Angle
Dimensions in Millimetres	Tolerances are	

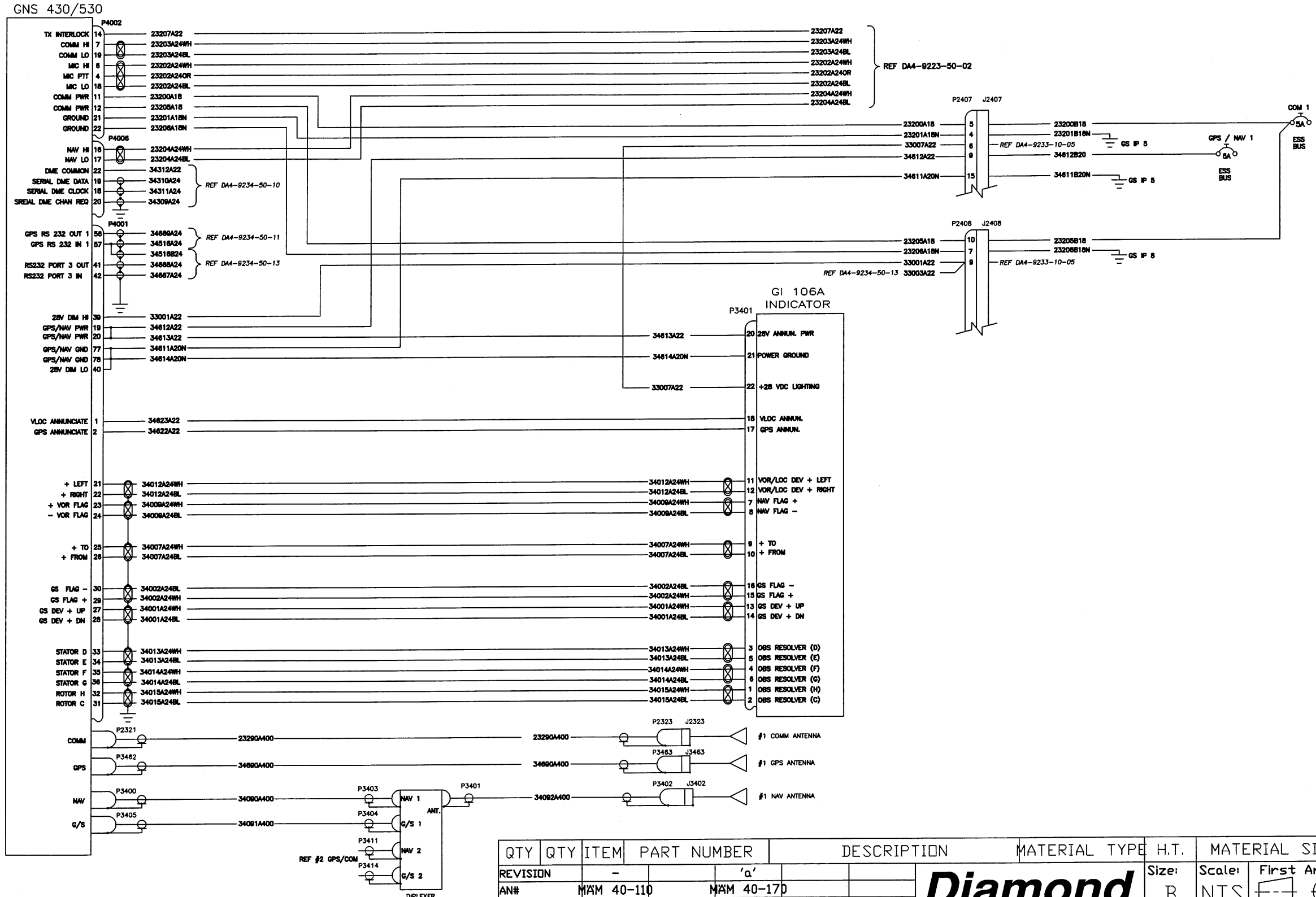
TITLE: SCHEMATIC, KMD 150, MFD/GPS

NEXT ASSEMBLY: DA4-9200-00-00

DRAWING NUMBER: DA4-9234-50-14

SHEET: 1/1

REPLACES DWG.#: N/A



QTY	QTY	ITEM	PART NUMBER	DESCRIPTION	MATERIAL TYPE	H.T.	MATERIAL SIZE	SPECIFICATION	SUPPLIER
REVISION		–		'a'					
AN#		MAM 40-110		MAM 40-170					
DATE		11.12.01		21.08.02					
DRAWN		P.STURGE		STURGE					
CHECK				M. Volck					
CHECK DATE				11 NOV 2002					
STRESS									
STRESS DATE									
APPROVAL									
APPROVAL DATE									

Diamond Aircraft

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Do Not Scale Drawing

Size: B | Scale: NTS | First Angle

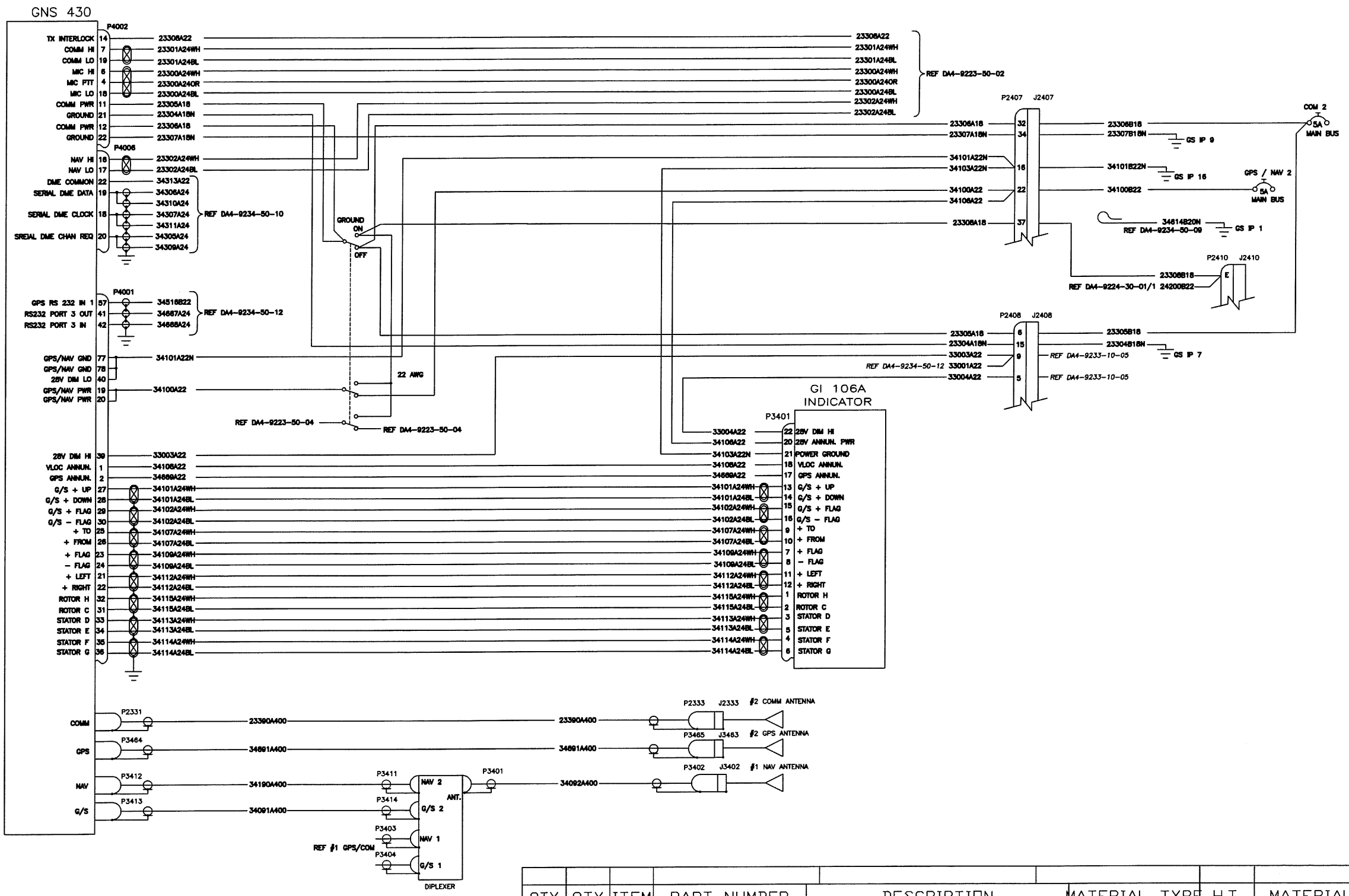
Dimensions in Millimetres | Tolerances are

TITLE: SCHEMATIC, GNS 430/530 & GI106A GPS COM #1

NEXT ASSEMBLY: DA4-9200-00-00

DRAWING NUMBER: DA4-9234-50-15 | SHEET: 1/1

REPLACES DWG.# N/A



QTY	QTY	ITEM	PART NUMBER	DESCRIPTION	MATERIAL TYPE	H.T.	MATERIAL SIZE	SPECIFICATION	SUPPLIER

REVISION	'–'	'a'	'b'
AN#		DAM 40-121	
DATE	13.03.02	29.03.02	02.04.02
DRAWN	P.STURGE	KOWARSCH	~~KOWARSCH~~
CHECK			
CHECK DATE			03.04.02
STRESS		M. Voick	
STRESS DATE			
APPROVAL			
APPROVAL DATE			

Diamond Aircraft

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Do Not Scale Drawing

Size: B | Scale: NTS | First Angle

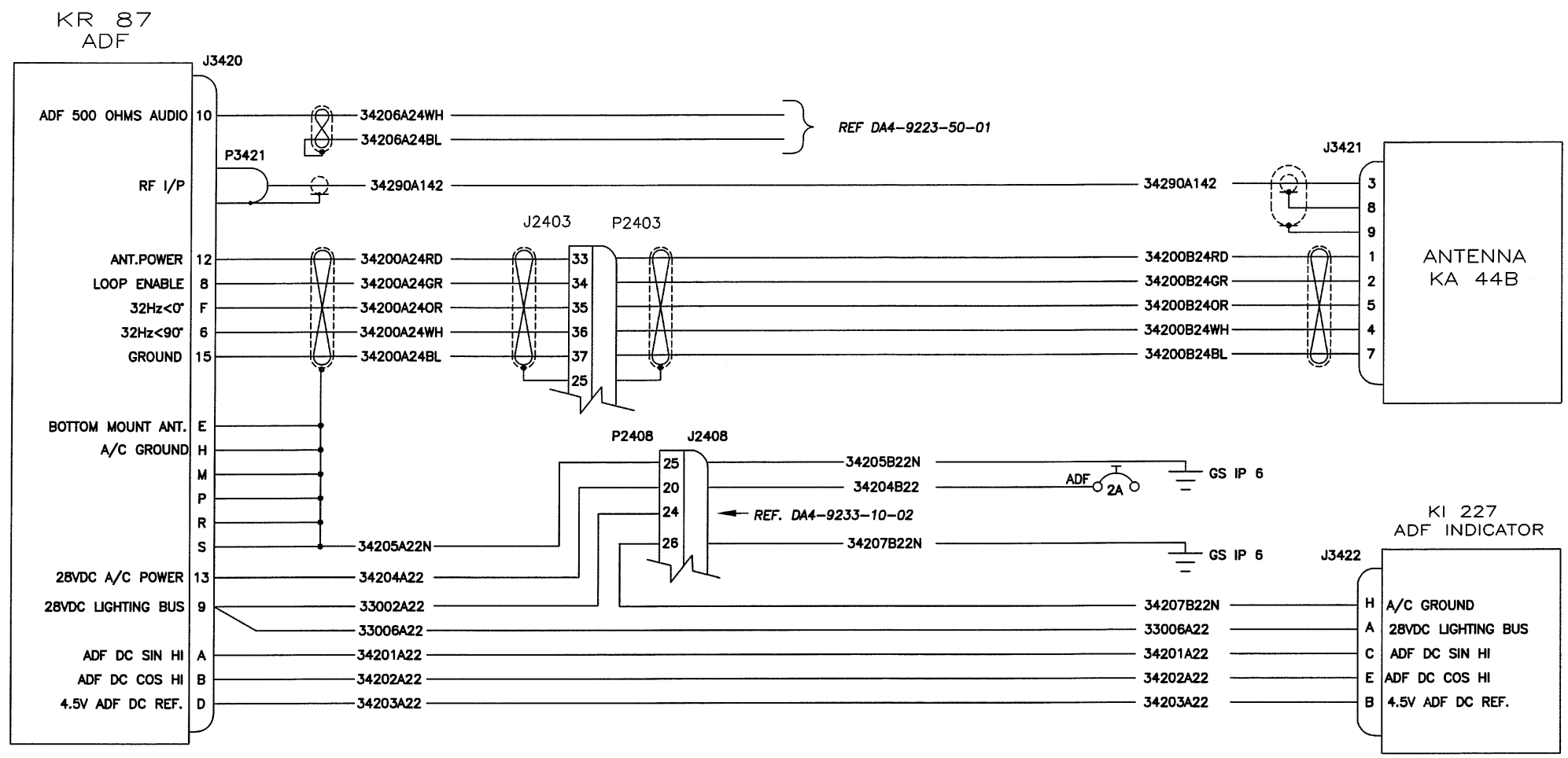
Dimensions in Millimetres | Tolerances are

NEXT ASSEMBLY: DA4-9200-00-00

TITLE: SCHEMATIC, GNS 430 COM #2 (GND SERVICE)

DRAWING NUMBER: DA4-9234-50-16 | SHEET: 1/1

REPLACES DWG.# N/A



QTY	QTY	ITEM	PART NUMBER	DESCRIPTION	MATERIAL TYPE
REVISION		'_'			
RN#		OÄM 40-122			
DATE		24.06.02			
DRAWN		~~P.STURGE~~			
CHECK					
CHECK DATE		27.06.02			
STRESS					
STRESS DATE					
APPROVAL					
APPROVAL DATE					

Diamond Aircraft

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Do Not Scale Drawing

H.T.	MATERIAL SIZE		SPECIFICATION	SUPPLIER
Size: B	Scale: N.T.S	First Angle		
Dimensions in Millimetres		Tolerances are		

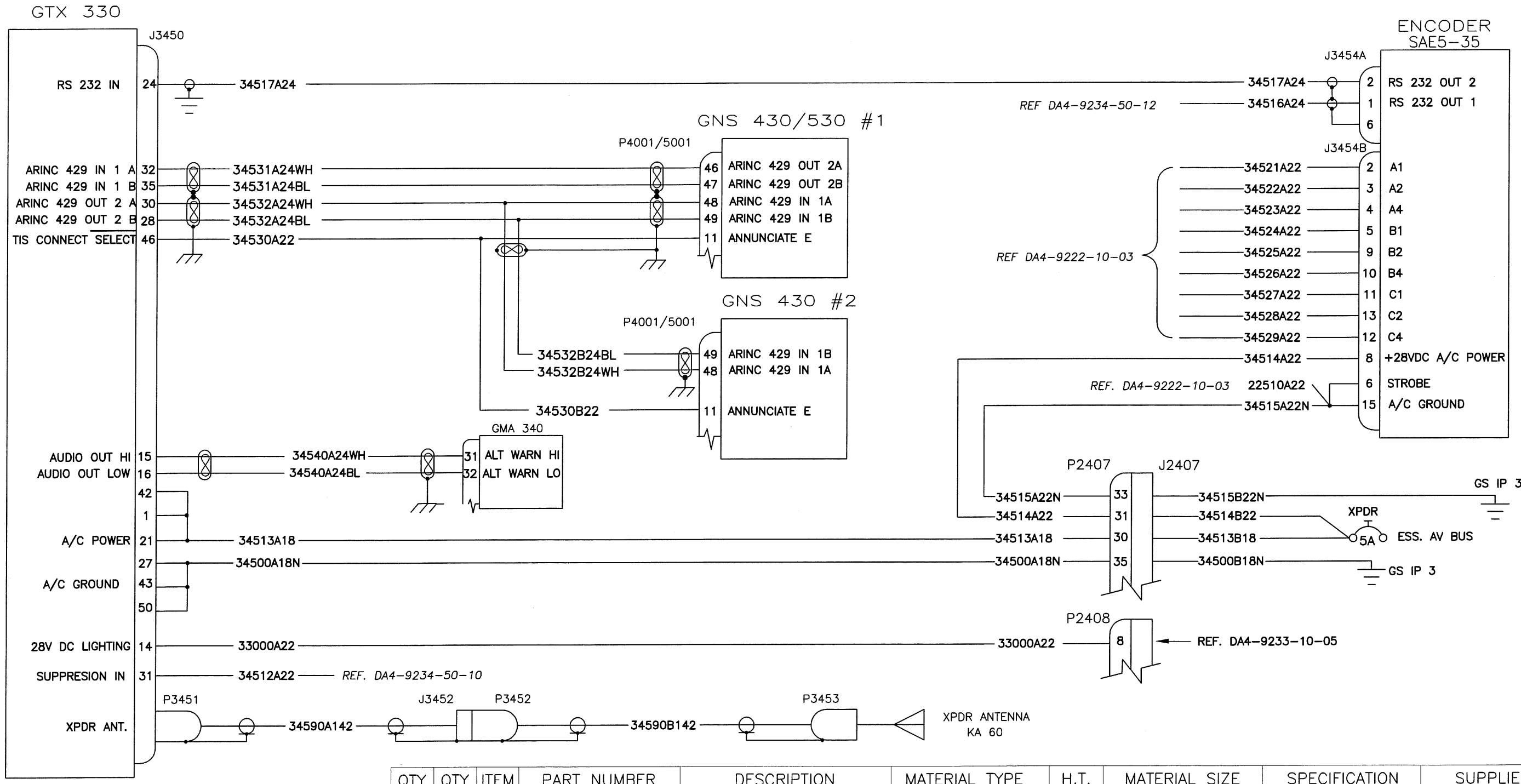
TITLE: SCHEMATIC, KR 87 WIRING. NON-SLAVED INDICATOR

NEXT ASSEMBLY: DA4-9200-00-00

DRAWING NUMBER: DA4-9234-50-17

SHEET: 1/1

REPLACES DWG.# N/A



QTY	QTY	ITEM	PART NUMBER		DESCRIPTION	MATERIAL TYPE	H.T.	MATERIAL SIZE	SPECIFICATION	SUPPLIER
REVISION		'–'	'A'							
RN#		OÄM 40-154	MÄM 40-198							
DATE		02.06.03	07.10.03							
DRAWN		P.STURGE	C.WOOD							
CHECK										
CHECK DATE										
STRESS										
STRESS DATE										
APPROVAL										
APPROVAL DATE										

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Do Not Scale Drawing

M. Reichel 24 NOV 2003

Size:	Scale:	First Angle
B	N.T.S	

Dimensions in Millimetres | Tolerances are

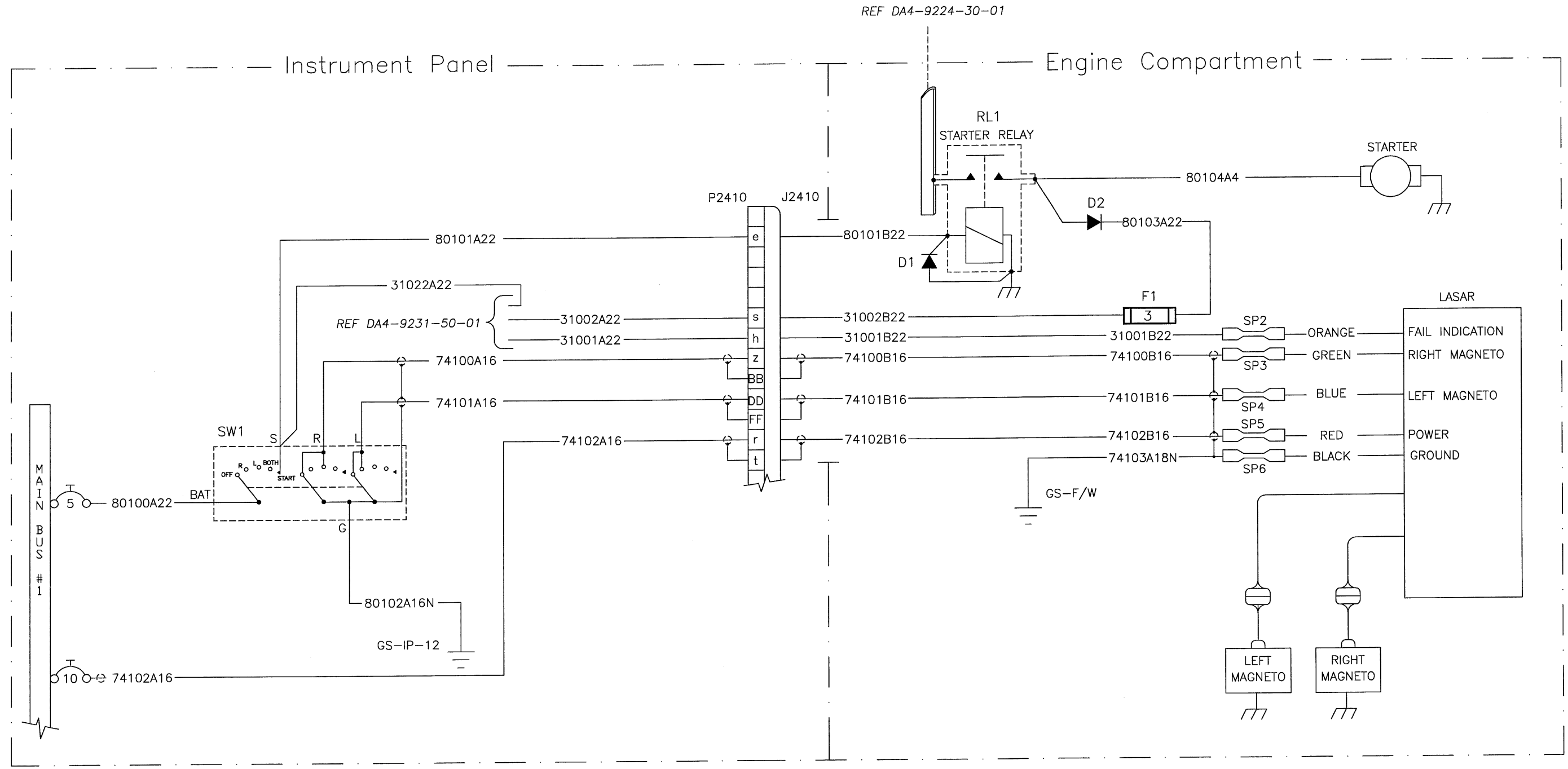
TITLE: SCHEMATIC, GTX 330

NEXT ASSEMBLY: DA4-9200-00-00

DRAWING NUMBER: DA4-9234-50-18

SHEET: 1/1

REPLACES DWG.#

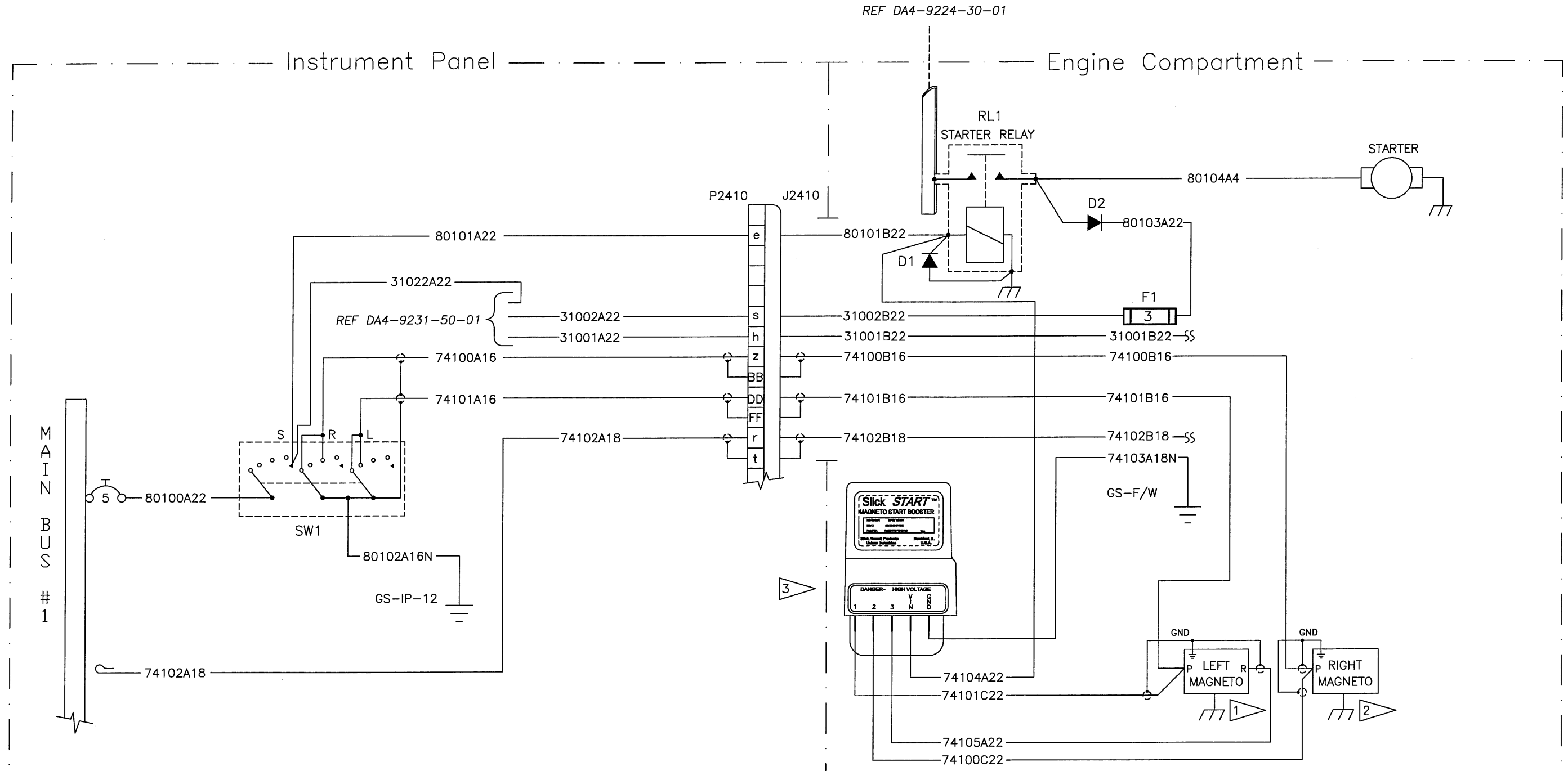


QTY	QTY	ITEM	PART NUMBER			DESCRIPTION	MATERIAL TYPE	H.T.	MATERIAL SIZE	SPECIFICATION	SUPPLIER
REVISION		A	D	E				Size: B	Scale: N.T.S First Angle	TITLE: SCHEMATIC, LASAR IGNITION & STARTING	
RN#			MÄM 40-0100	ÄM 40-082				Dimensions in Millimetres	Tolerances are		
DATE		13.09.99	25.09.00	02.03.01				NEXT ASSEMBLY: DA4-9200-00-00		DRAWING NUMBER: DA4-9274-00-02	SHEET: 1/1
DRAWN		P.KOPALA	KOWARSCH	STURGE						REPLACES DWG.# N/A	
CHECK											
CHECK DATE											
STRESS											
STRESS DATE											
APPROVAL											
APPROVAL DATE											

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Do Not Scale Drawing



SS – INDICATES LASAR WIRE CUT

1 LEFT MAGNETO W/ SLICKSTART – P/N 4347

2 RIGHT MAGNETO W/ SLICKSTART – P/N 4370

3 SS 1001 SLICK START, MAGNETO START BOOSTER

QTY	QTY	ITEM	PART NUMBER			DESCRIPTION	MATERIAL TYPE
REVISION		–	a	b			
RN#		OÄM 40-073	OÄM 40-073	OÄM 40-073a			
DATE		05.02.01	20.06.01	12.07.01			
DRAWN		KOWARSCH	KOWARSCH	KOWARSCH			
CHECK							
CHECK DATE				12.07.2001			
STRESS							
STRESS DATE							
APPROVAL							
APPROVAL DATE							

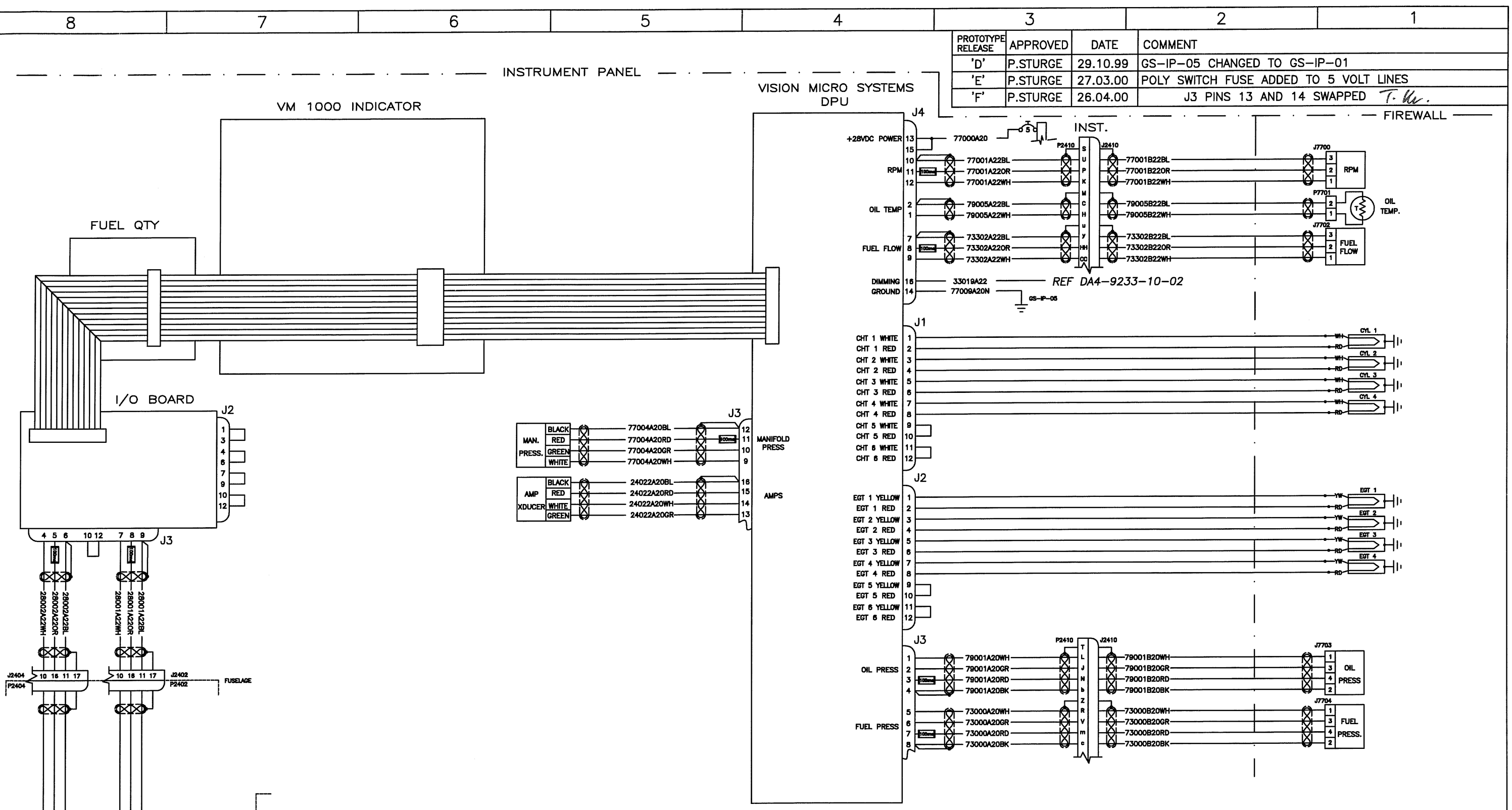
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H.T.	MATERIAL SIZE		SPECIFICATION	SUPPLIER
Size: B	Scale: N.T.S	First Angle	TITLE: SCHEMATIC SLICKSTART IGNITION & STARTING	
Dimensions in Millimetres		Tolerances are		
NEXT ASSEMBLY: DA4-9200-00-00			DRAWING NUMBER: DA4-9274-00-03	SHEET: 1/1
			REPLACES DWG.# N/A	

PROTOTYPE RELEASE	APPROVED	DATE	COMMENT
'D'	P.STURGE	29.10.99	GS-IP-05 CHANGED TO GS-IP-01
'E'	P.STURGE	27.03.00	POLY SWITCH FUSE ADDED TO 5 VOLT LINES
'F'	P.STURGE	26.04.00	J3 PINS 13 AND 14 SWAPPED T. W.



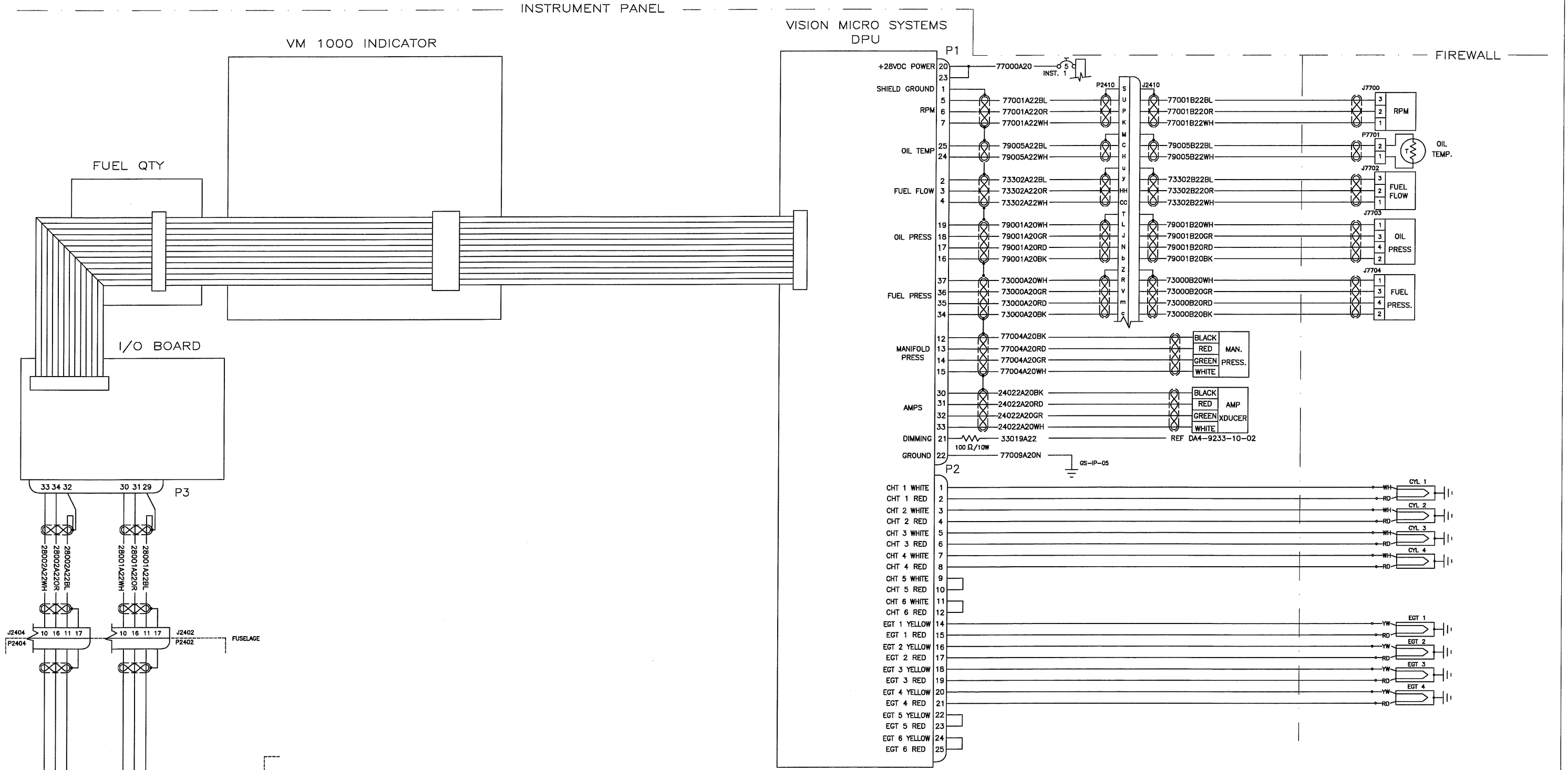
QTY	QTY	ITEM	PART NUMBER	DESCRIPTION	MATERIAL TYPE
REVISION		A			
RN#					
DATE		04.05.99			
DRAWN		KOPALA.P			
CHECK		C.TEIBE			
CHECK DATE		30.5.00			
STRESS					
STRESS DATE					
APPROVAL					
APPROVAL DATE					

Diamond Aircraft

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Do Not Scale Drawing

H.T.	MATERIAL SIZE		SPECIFICATION	SUPPLIER
Size: B	Scale: N.T.S	First Angle	TITLE: SCHEMATIC, ENGINE INDICATING	
Dimensions in Millimetres	Tolerances are			
NEXT ASSEMBLY: DA4-9200-00-00			DRAWING NUMBER: DA4-9277-40-01	SHEET: 1/1
			REPLACES DWG.# N/A	



QTY	QTY	ITEM	PART NUMBER		DESCRIPTION	MATERIAL TYPE	H.T.	MATERIAL SIZE	SPECIFICATION	SUPPLIER
REVISION		A	B	C						
RN#		MÄM 40-039	MÄM 40-060	MÄM 40-080						
DATE		28.02.01	12.04.01	21.09.01						
DRAWN		P.STURGE	KOWARSCH	TATSCHER						
CHECK			19. Nov 2001							
CHECK DATE										
STRESS										
STRESS DATE										
APPROVAL										
APPROVAL DATE										

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Do Not Scale Drawing

Size: B | Scale: N.T.S | First Angle

Dimensions in Millimetres | Tolerances are

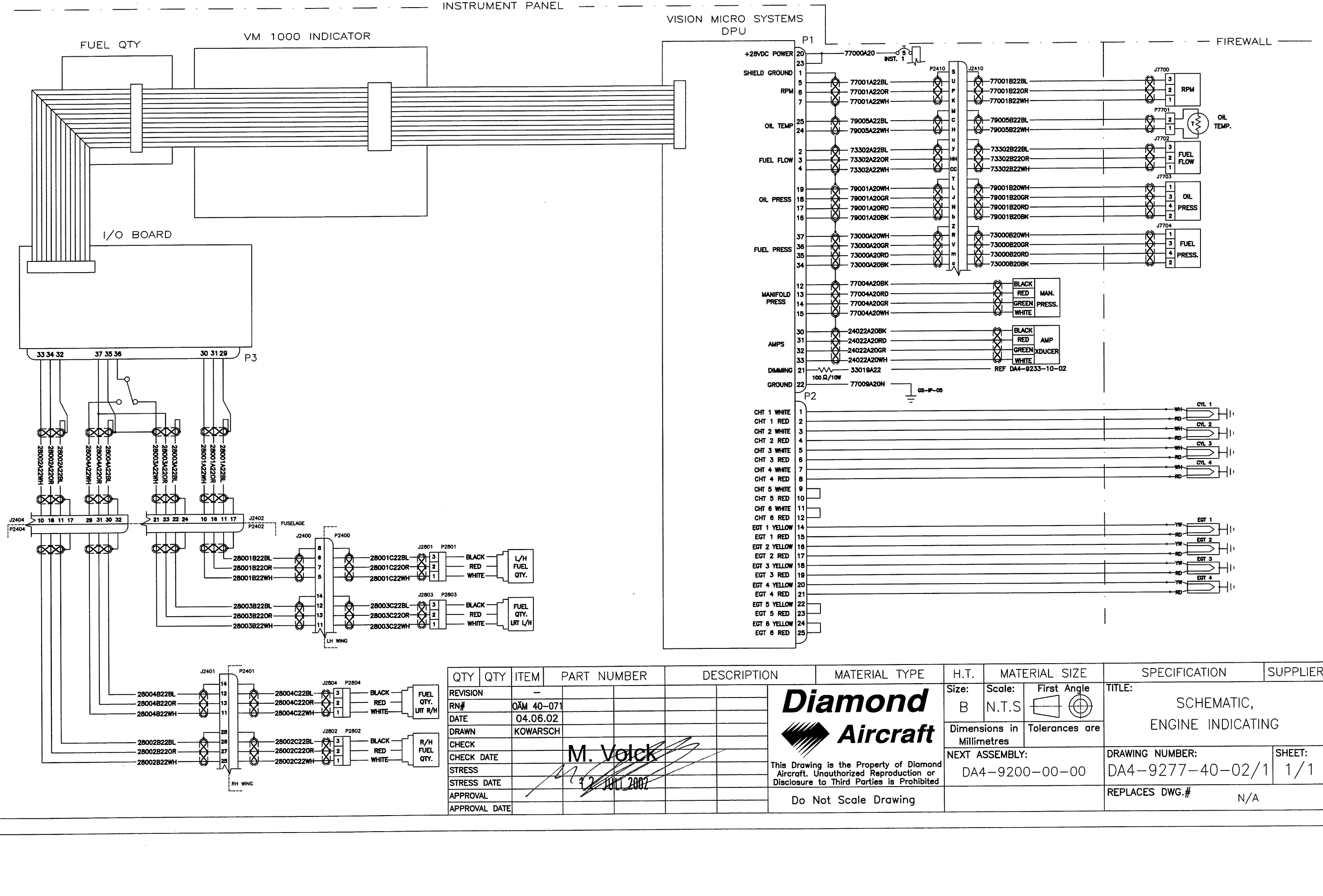
TITLE: SCHEMATIC, ENGINE INDICATING

NEXT ASSEMBLY: DA4-9200-00-00

DRAWING NUMBER: DA4-9277-40-02

SHEET: 1/1

REPLACES DWG.# N/A



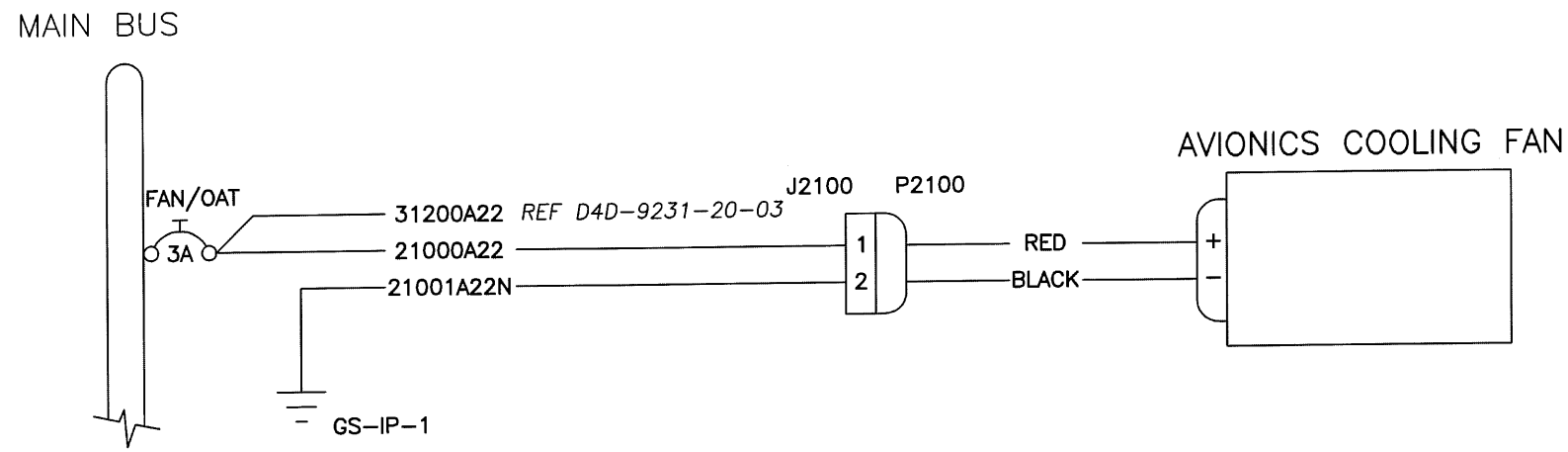
QTY	QTY	ITEM	PART NUMBER	DESCRIPTION	MATERIAL TYPE
REVISION		–			
RN#		0ÄM 40-071			
DATE		04.06.02			
DRAWN		KOWARSCH			
CHECK			M. Volck		
CHECK DATE			12 JUL 2002		
STRESS					
STRESS DATE					
APPROVAL					
APPROVAL DATE					

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Do Not Scale Drawing

H.T.	MATERIAL SIZE		SPECIFICATION	SUPPLIER
Size: B	Scale: N.T.S	First Angle	TITLE: SCHEMATIC, ENGINE INDICATING	
Dimensions in Millimetres	Tolerances are			
NEXT ASSEMBLY: DA4-9200-00-00			DRAWING NUMBER: DA4-9277-40-02/1	SHEET: 1/1
			REPLACES DWG.# N/A	



QTY	QTY	ITEM	PART NUMBER	DESCRIPTION	MATERIAL TYPE	H.T.	MATERIAL SIZE	SPECIFICATION	SUPPLIER
REVISION		'-'							
AN#		MAM 40-197							
DATE		06.10.03							
DRAWN		KOWARSCH							
CHECK									
CHECK DATE									
STRESS									
STRESS DATE									
APPROVAL									
APPROVAL DATE									

M. Reichel
27 OCT. 2003

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Do Not Scale Drawing

Size:	Scale:	First Angle
B	NTS	

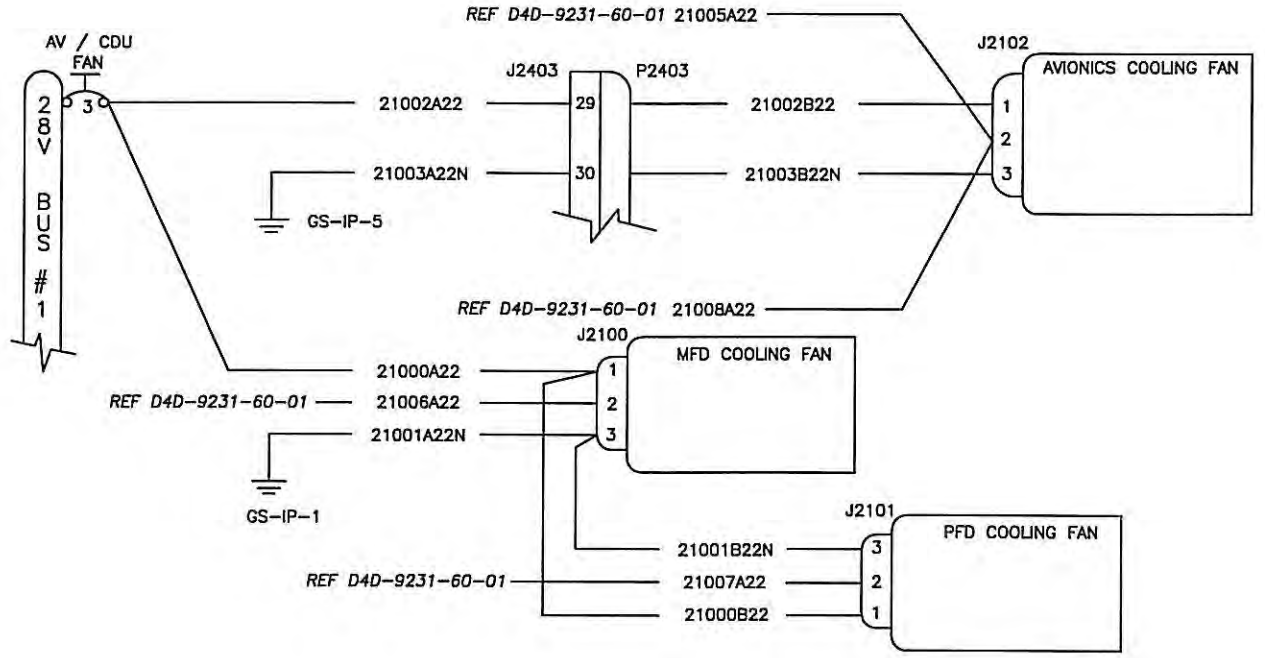
Dimensions in Millimetres | Tolerances are ISO 2768 m

NEXT ASSEMBLY: D4D-9200-00-00

TITLE: SCHEMATIC EQUIPMENT COOLING

DRAWING NUMBER: D4D-9221-20-01 | SHEET: 1/1

REPLACES DWG.#



QTY	QTY	ITEM	PART NUMBER	DESCRIPTION	MATERIAL TYPE	H.T.	MATERIAL SIZE	SPECIFICATION	SUPPLIER
REVISION		'–'	'a'						
AN#		OÄM40–224	OÄM 40–193a						
DATE		09.06.05	13.12.05						
DRAWN		MANDL	KOWARSCH						
CHECK									
CHECK DATE			M. Reichel 17. JAN. 2006						
STRESS									
STRESS DATE									
APPROVAL									
APPROVAL DATE									

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Do Not Scale Drawing

Size:	Scale:	First Angle
B	NTS	

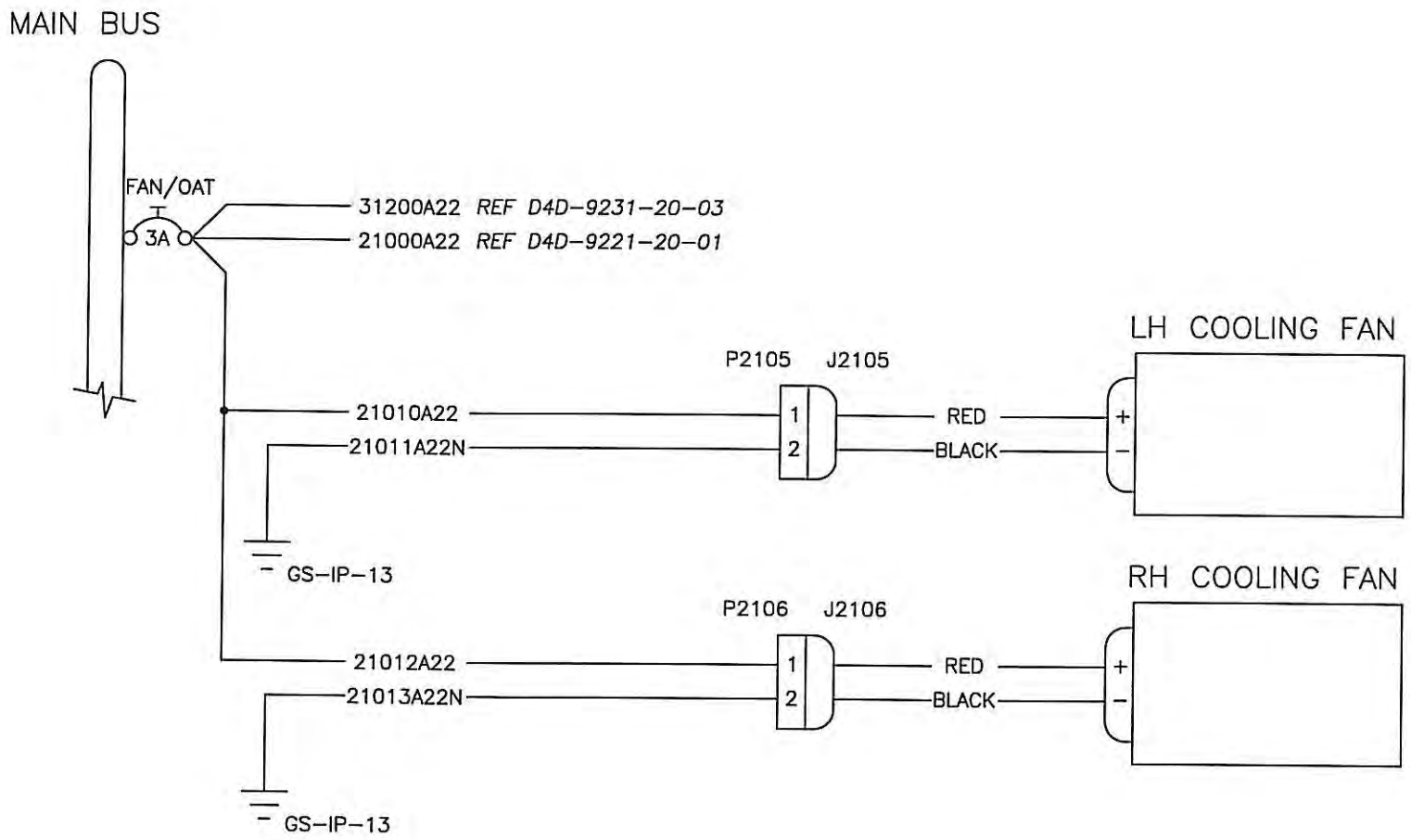
Dimensions in Millimetres | Tolerances are ISO 2768 m

NEXT ASSEMBLY: D4D–9200–00–00

TITLE: SCHEMATIC G1000 EQUIPMENT COOLING

DRAWING NUMBER: D4D–9221–20–02 | SHEET: 1/1

REPLACES DWG.#



QTY	QTY	ITEM	PART NUMBER	DESCRIPTION	MATERIAL TYPE	H.T.	MATERIAL SIZE	SPECIFICATION	SUPPLIER
		'-'							

REVISION	
AN#	OÄM 40-244
DATE	25.01.06
DRAWN	KOWARSCH
CHECK	
CHECK DATE	
STRESS	M. Reichel
STRESS DATE	07 Feb 2006
APPROVAL	
APPROVAL DATE	

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Do Not Scale Drawing

Size:	Scale:	First Angle
B	NTS	

Dimensions in Millimetres | Tolerances are ISO 2768 m

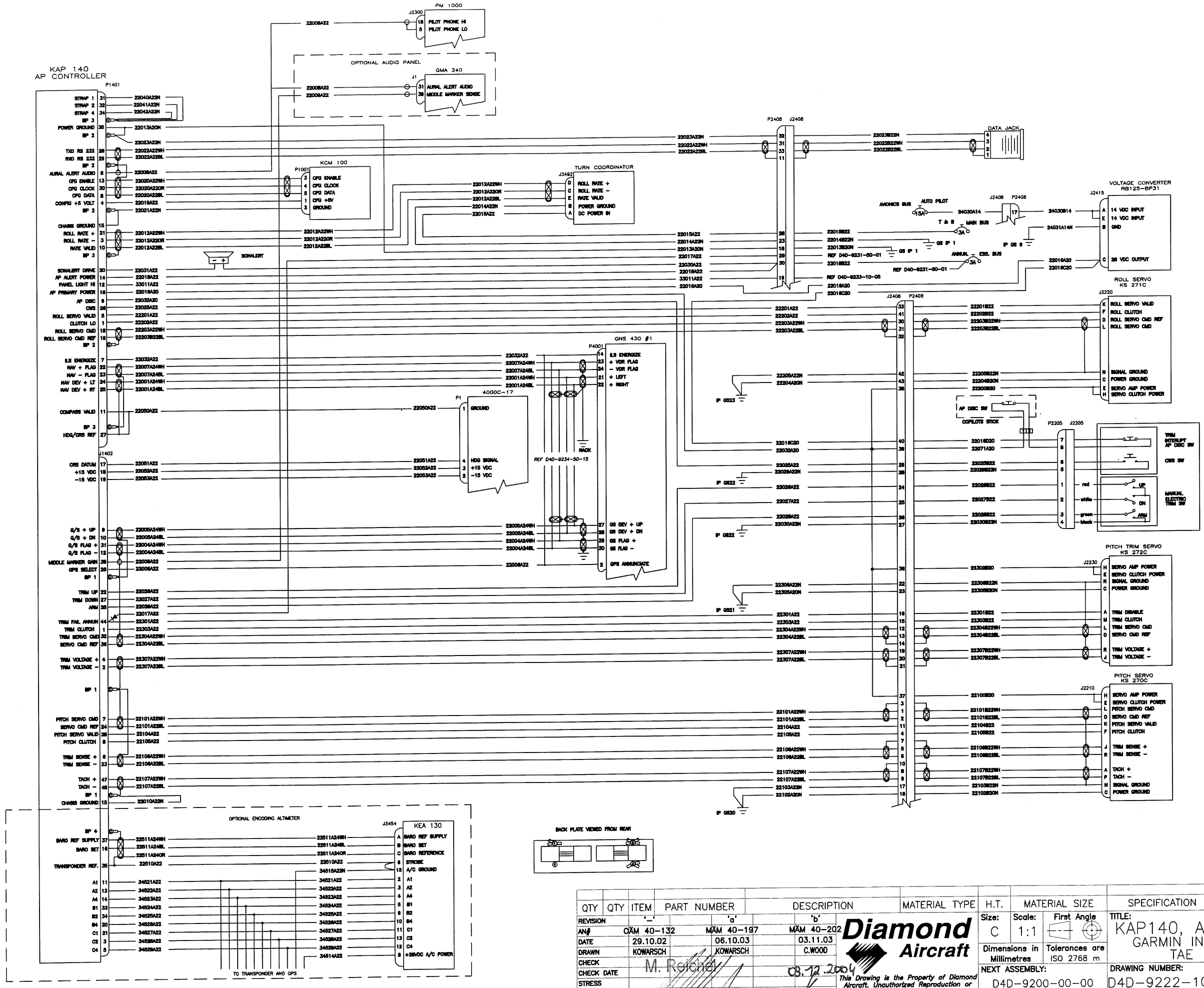
NEXT ASSEMBLY: D4D-9200-00-00

TITLE: SCHEMATIC ADDITIONAL EQUIPMENT COOLING

DRAWING NUMBER: D4D-9221-20-03

SHEET: 1/1

REPLACES DWG.#



QTY	QTY	ITEM	PART NUMBER	DESCRIPTION	MATERIAL TYPE	H.T.	MATERIAL SIZE	SPECIFICATION	SUPPLIER
REVISION			'–'	'a'	'b'				
AN#			OÄM 40-132	MÄM 40-197	MÄM 40-202				
DATE			29.10.02	06.10.03	03.11.03				
DRAWN			KOWARSCH	KOWARSCH	C.WOOD				
CHECK			M. Reichel		08.12.2004				
CHECK DATE									
STRESS									
STRESS DATE									
APPROVAL									
APPROVAL DATE									

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Do Not Scale Drawing

Size: C | Scale: 1:1 | First Angle

Dimensions in Millimetres | Tolerances are ISO 2768 m

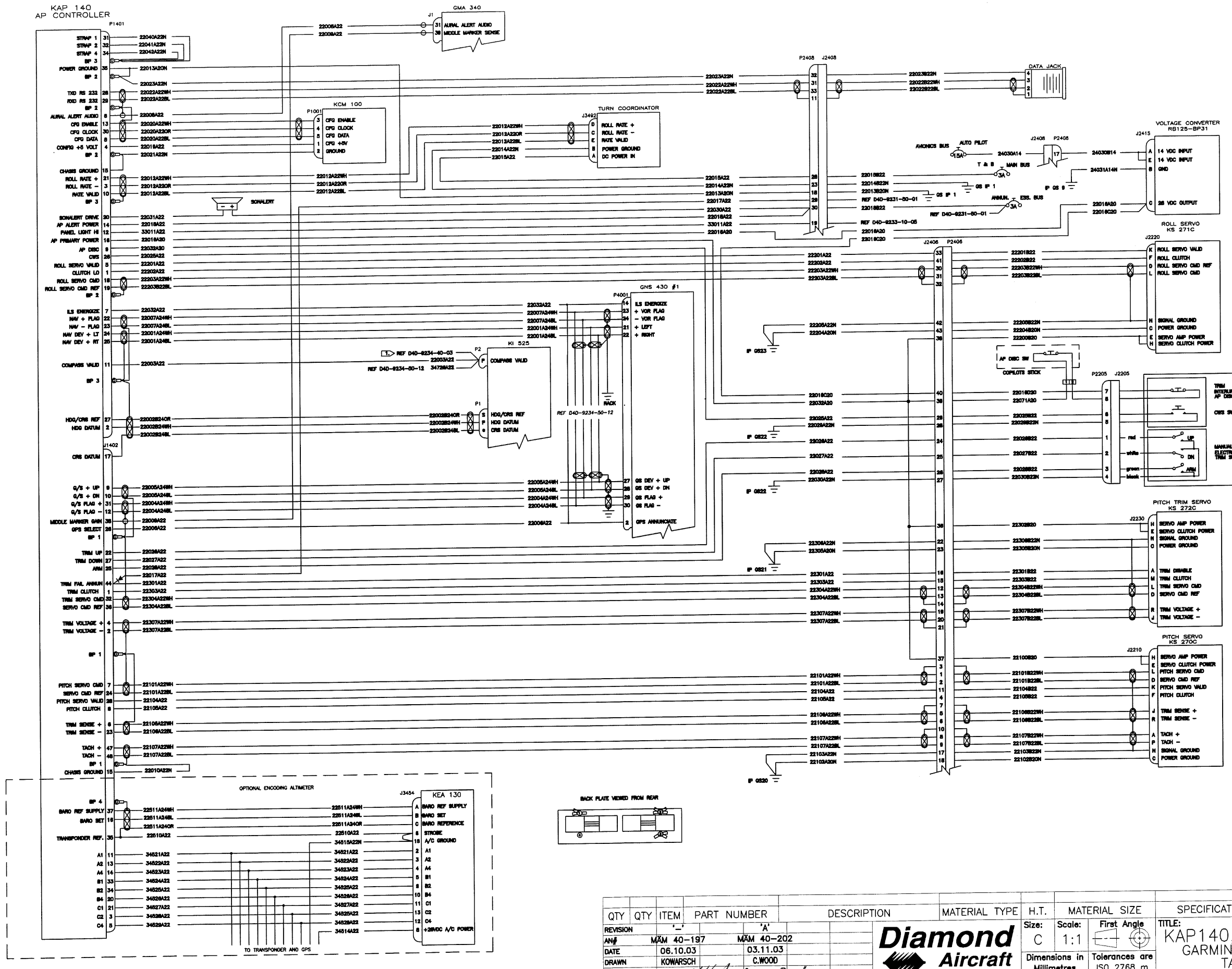
NEXT ASSEMBLY: D4D-9200-00-00

TITLE: KAP140, AUTOPILOT GARMIN INTERFACE, TAE 125

DRAWING NUMBER: D4D-9222-10-02

SHEET: 1/1

REPLACES DWG.#: N/A



NOTES:

1.> WIRE INSTALLED WITH WX 500.

QTY	QTY	ITEM	PART NUMBER	DESCRIPTION	MATERIAL TYPE	H.T.	MATERIAL SIZE	SPECIFICATION	SUPPLIER
REVISION		'–'	'A'						
AN#		MÄM 40-197	MÄM 40-202						
DATE		06.10.03	03.11.03						
DRAWN		KOWARSCH	C.WOOD						
CHECK			03.12.2004						
CHECK DATE		M. Reichow							
STRESS									
STRESS DATE									
APPROVAL									
APPROVAL DATE		12 JUL 2004							

Diamond Aircraft

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Do Not Scale Drawing

Size:	Scale:	First Angle
C	1:1	
Dimensions in Millimetres	Tolerances are ISO 2768 m	

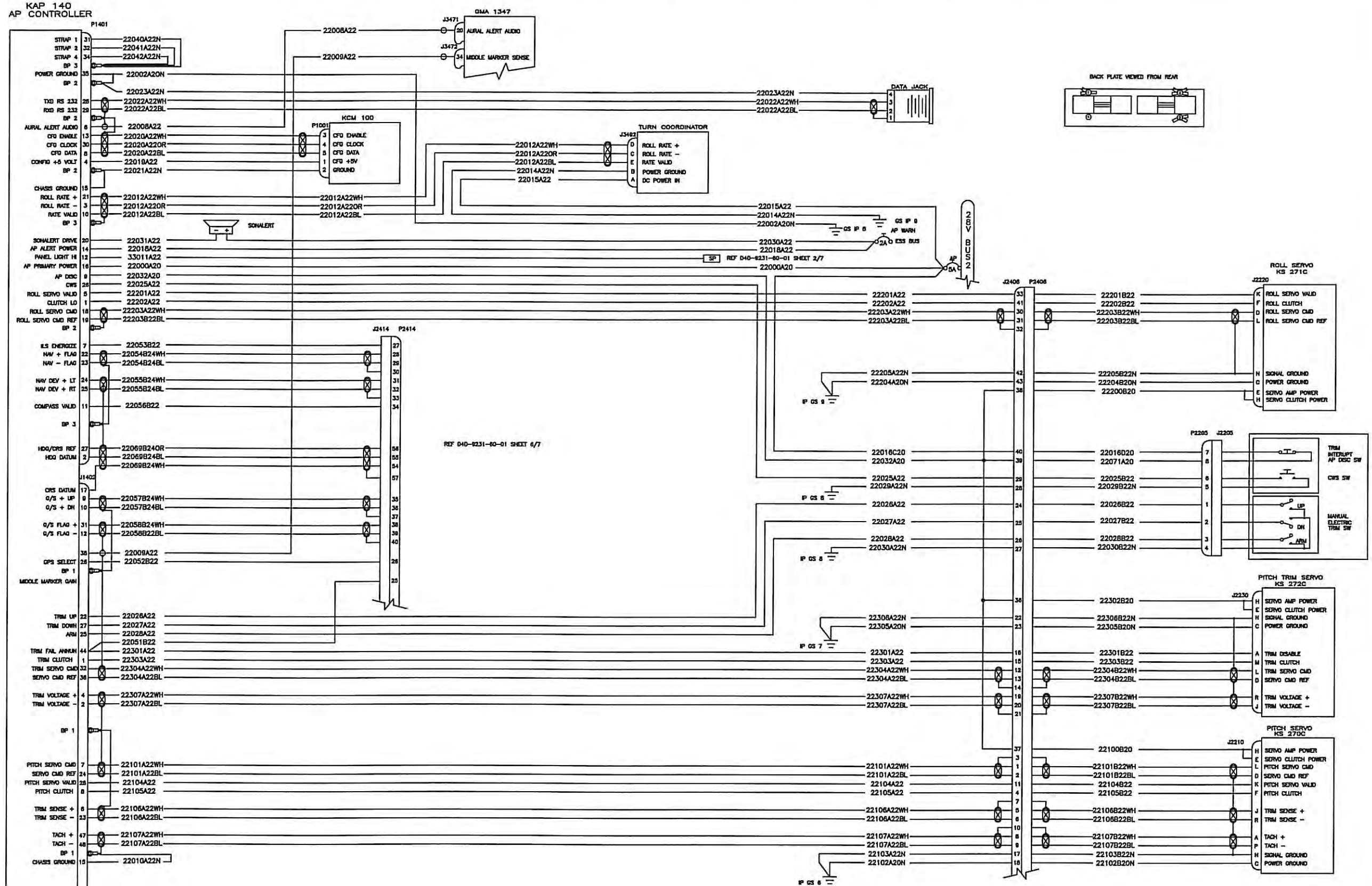
TITLE: KAP140, AUTOPILOT GARMIN INTERFACE, TAE 125

NEXT ASSEMBLY: D4D-9200-00-00

DRAWING NUMBER: D4D-9222-10-03

SHEET: 1/1

REPLACES DWG.#: N/A

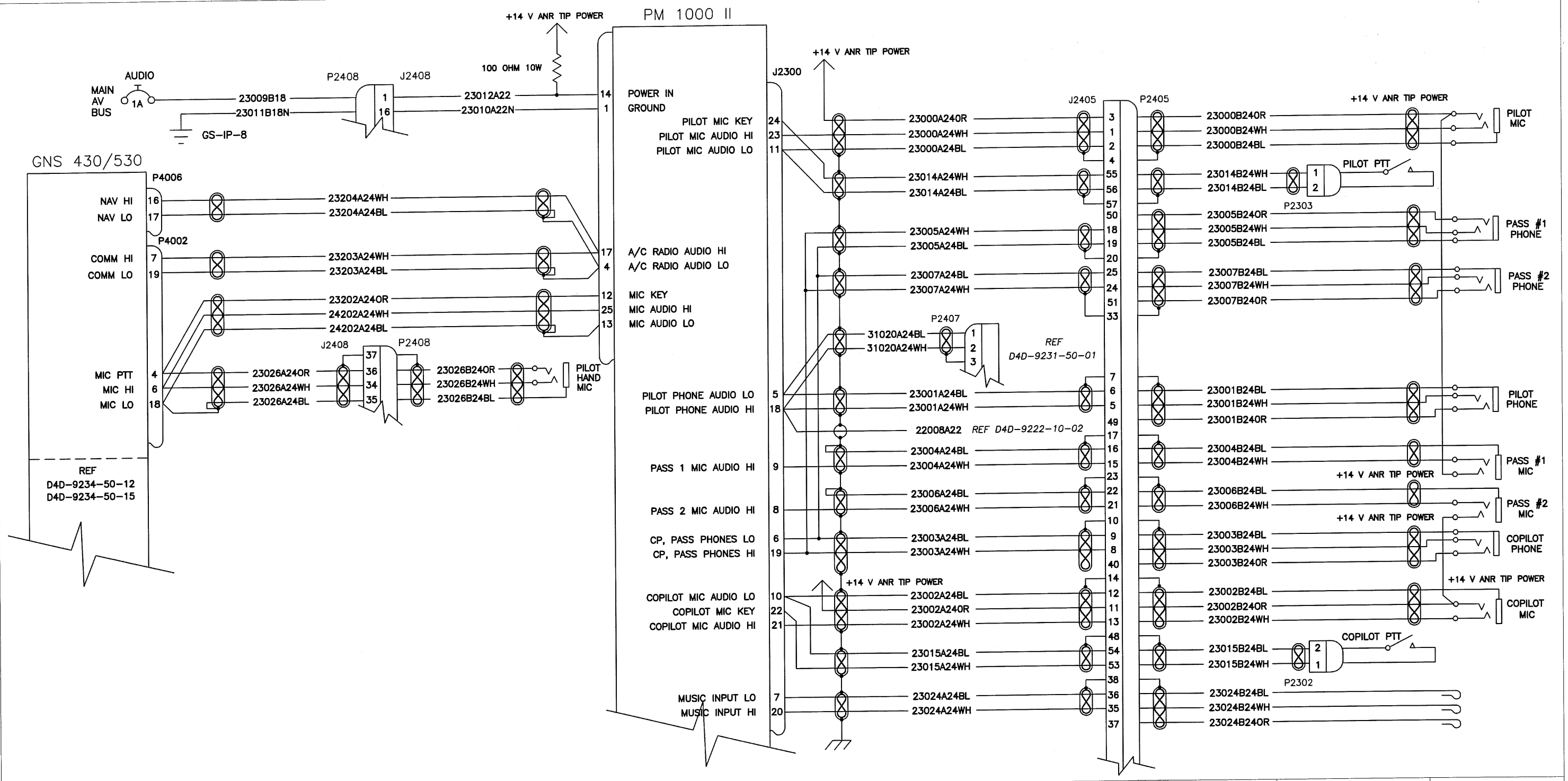


QTY	QTY	ITEM	PART NUMBER	DESCRIPTION	MATERIAL TYPE	H.T.	MATERIAL SIZE	SPECIFICATION	SUPPLIER
REVISION		'–'		'a'		Size: C	Scale: 1:1	First Angle	TITLE: KAP 140 AUTO PILOT G 1000 INTERFACE
AN#		ÖÄM40-224		ÖÄM 40-193a		Dimensions in Millimetres	Tolerances are ISO 2768 m		
DATE		09.06.05		13.12.05		NEXT ASSEMBLY: D4D-9200-00-00		DRAWING NUMBER: D4D-9222-10-04	SHEET: 1/1
DRAWN		MANDL		KOWARSCH				REPLACES DWG.#	N/A
CHECK									
CHECK DATE									
STRESS									
STRESS DATE									
APPROVAL									
APPROVAL DATE									

Diamond Aircraft

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Do Not Scale Drawing



QTY	QTY	ITEM	PART NUMBER	DESCRIPTION	MATERIAL TYPE	H.T.	MATERIAL SIZE	SPECIFICATION	SUPPLIER
REVISION		–	a						
RN#		OÄM 40-100	MÄM 40-197						
DATE		18.07.03	06.10.03						
DRAWN		KOWARSCH	KOWARSCH						
CHECK									
CHECK DATE									
STRESS									
STRESS DATE									
APPROVAL									
APPROVAL DATE									

22/10/03

M. Reichel

27 OKT 2003

Diamond Aircraft

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Do Not Scale Drawing

Size:	Scale:	First Angle
B	N.T.S	

Dimensions in Millimetres | Tolerances are

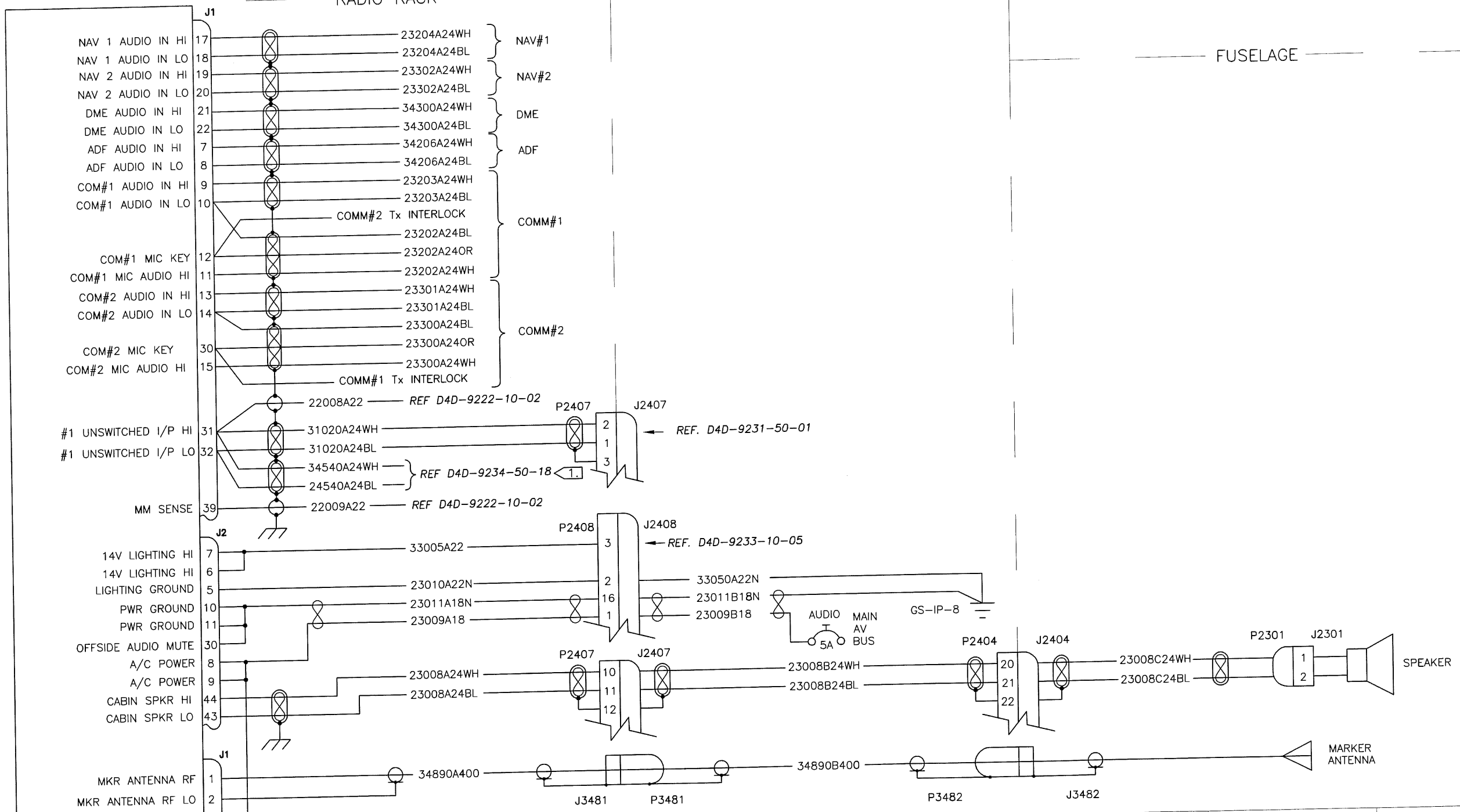
TITLE: SCHEMATIC, PM 1000 INTERCOM WIRING, DIESEL

NEXT ASSEMBLY: D4D-9200-00-00

DRAWING NUMBER: D4D-9223-50-01

SHEET: 1/1

REPLACES DWG.# N/A



NOTES:

1. INSTALLED ONLY WITH OPTIONAL GTX 330.
2. INSTALLED ONLY WITH OPTIONAL WX 500.

QTY	QTY	ITEM	PART NUMBER		DESCRIPTION	MATERIAL TYPE
REVISION		–	'a'	'b'		
RN#		OÄM 40-136	MÄM 40-197	MÄM 40-149		
DATE		27.02.03	30.09.03	23.07.04		
DRAWN		KOWARSCH	KOWARSCH	KOWARSCH		
CHECK						
CHECK DATE						
STRESS		M. Reichel				
STRESS DATE						
APPROVAL						
APPROVAL DATE						

Diamond Aircraft

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Do Not Scale Drawing

H.T.	MATERIAL SIZE		SPECIFICATION	SUPPLIER
Size: B	Scale: N.T.S	First Angle		
Dimensions in Millimetres	Tolerances are			

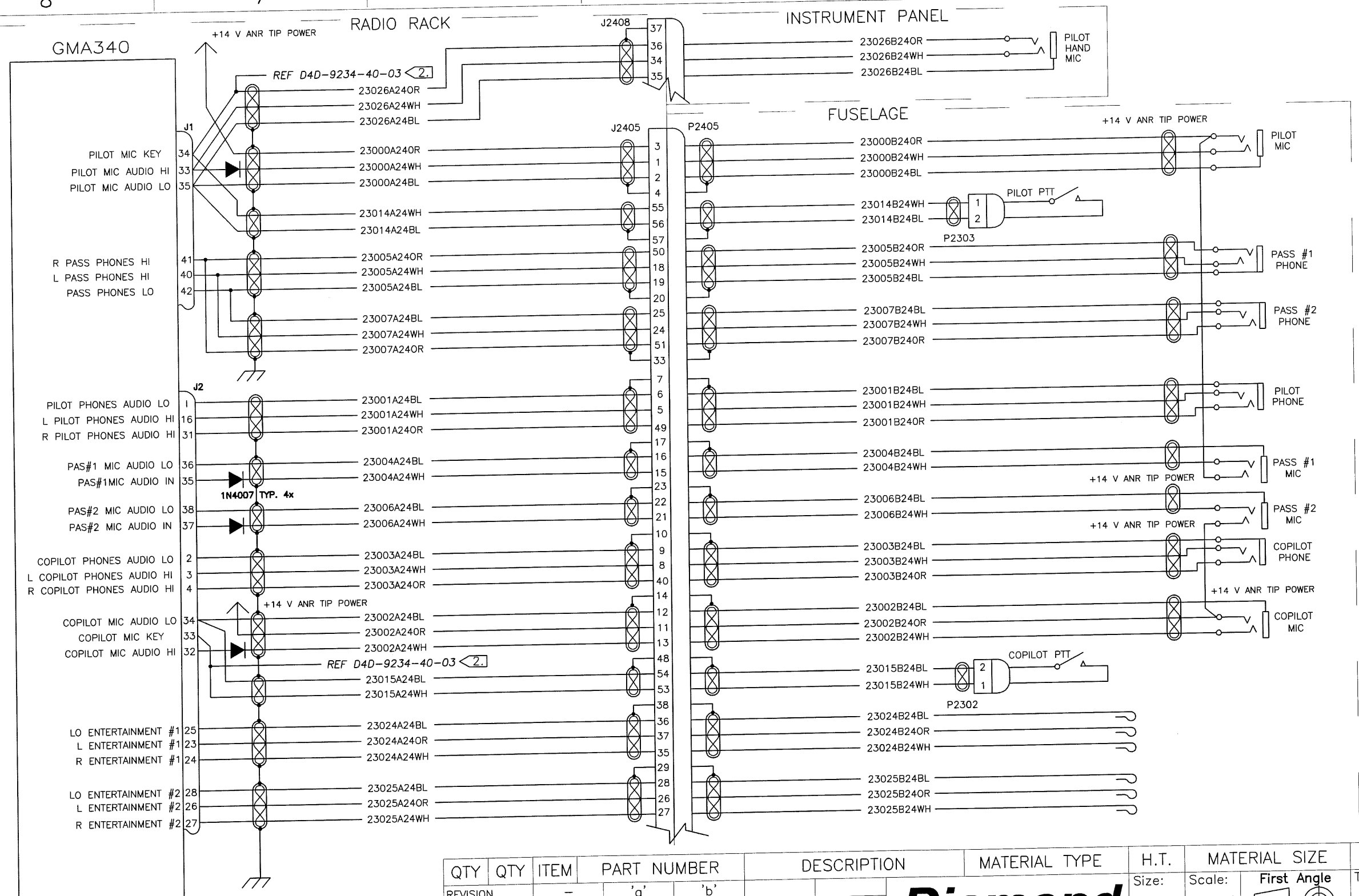
TITLE: SCHEMATIC, GMA 340 AUDIO PANEL WIRING, DIESEL

NEXT ASSEMBLY: D4D-9200-00-00

DRAWING NUMBER: D4D-9223-50-02

SHEET: 1/2

REPLACES DWG.# N/A



QTY	QTY	ITEM	PART NUMBER		DESCRIPTION	MATERIAL TYPE	H.T.	MATERIAL SIZE	SPECIFICATION	SUPPLIER
REVISION		–	'a'	'b'						
RN#		OÄM 40-136	MÄM 40-197	MÄM 40-149						
DATE		27.02.03	30.09.03	23.07.04						
DRAWN		KOWARSCH	KOWARSCH	KOWARSCH						
CHECK										
CHECK DATE										
STRESS										
STRESS DATE										
APPROVAL										
APPROVAL DATE										

M. Reichel 22 OKT 2004

2004

Diamond Aircraft

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Do Not Scale Drawing

Size: B | Scale: N.T.S | First Angle

Dimensions in Millimetres | Tolerances are

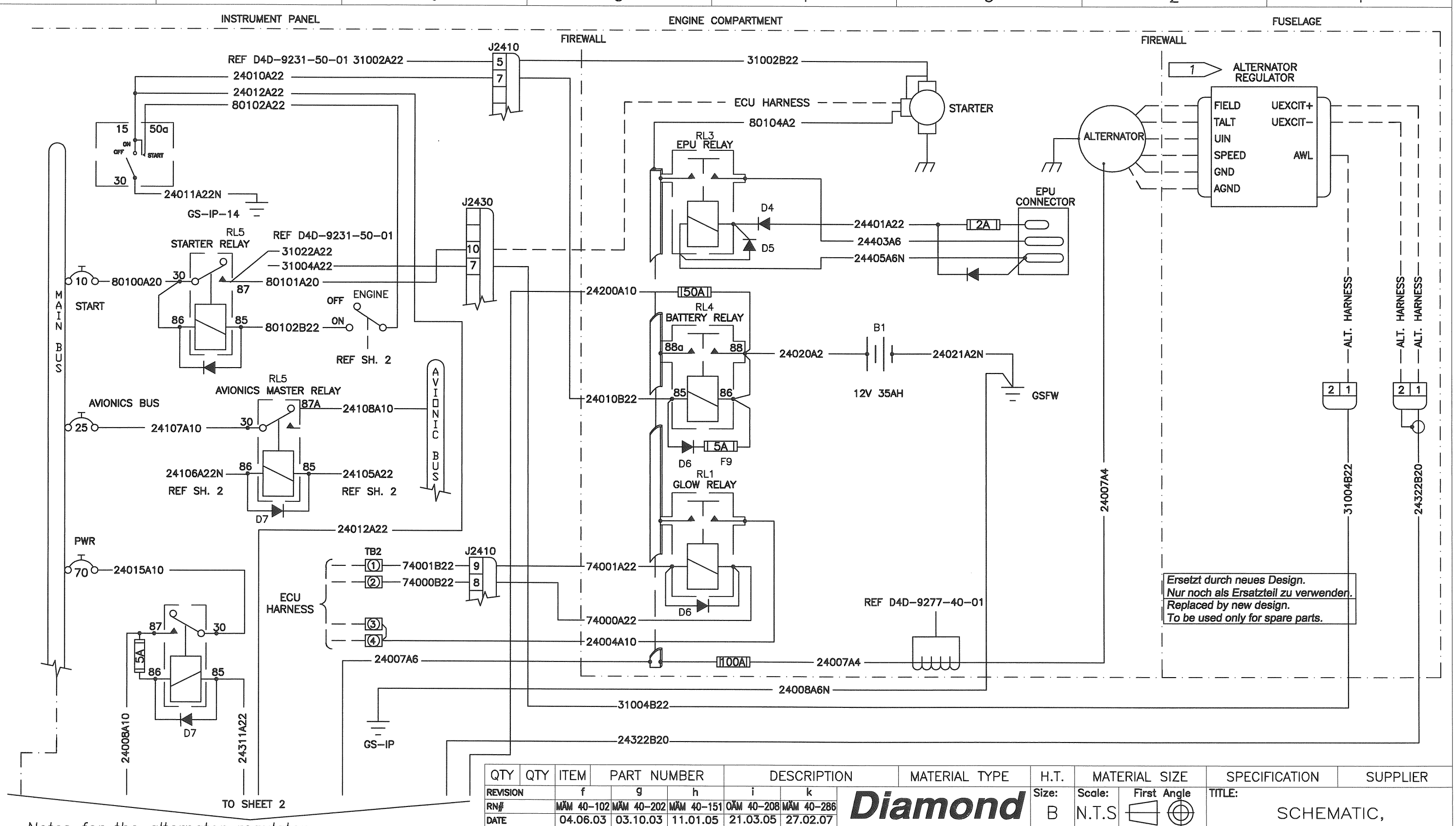
TITLE: SCHEMATIC, GMA 340 AUDIO PANEL WIRING, DIESEL

NEXT ASSEMBLY: D4D-9200-00-00

DRAWING NUMBER: D4D-9223-50-02

SHEET: 2/2

REPLACES DWG.# N/A



Notes for the alternator regulator

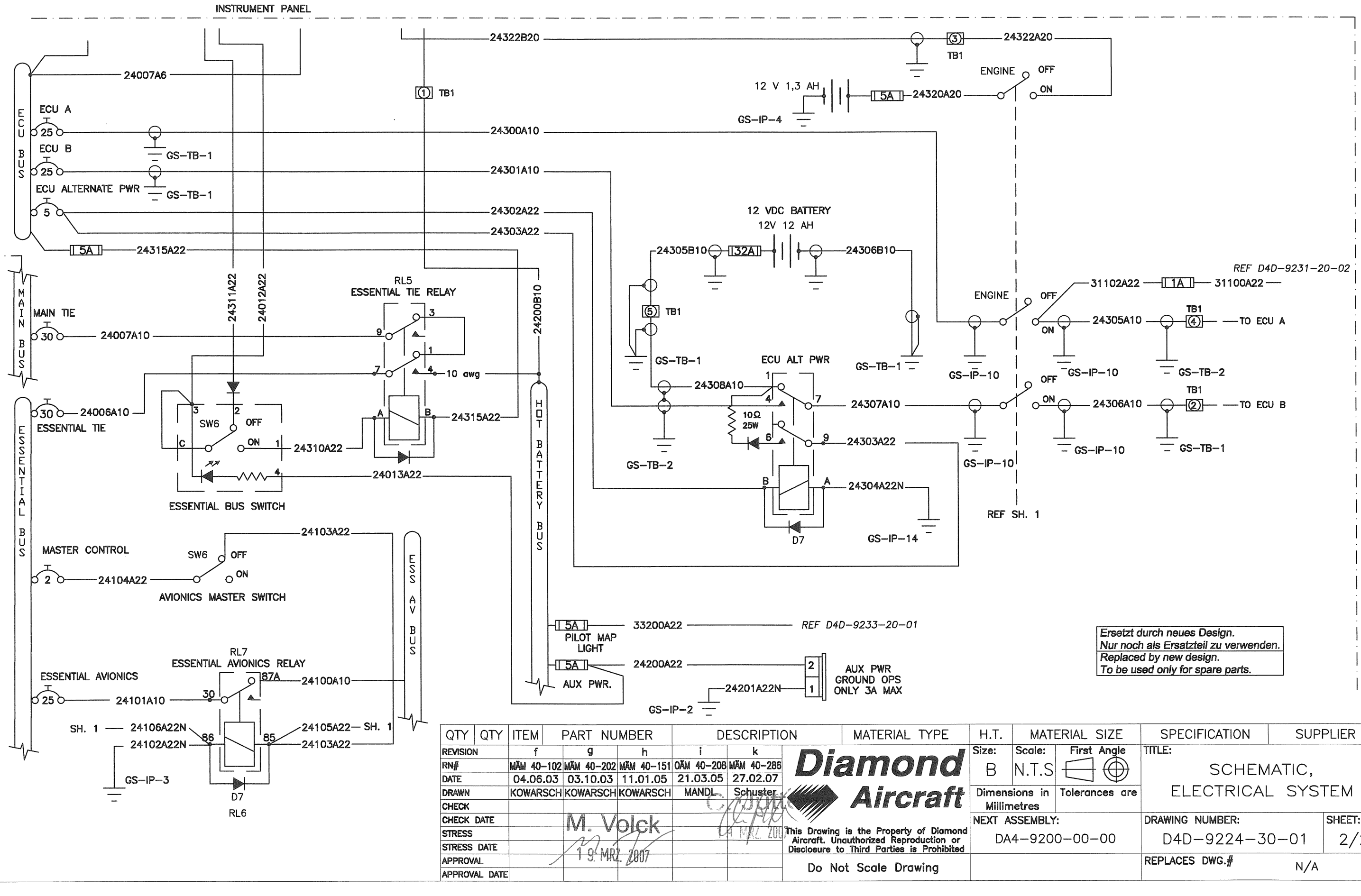
1 > *The optional installation of the alternator regulator in the engine compartment is possible.*

QTY	QTY	ITEM	PART NUMBER			DESCRIPTION		MATERIAL TYPE	H.T.	MATERIAL SIZE			SPECIFICATION	SUPPLIER
REVISION		f	g	h		i	k		Size:	Scale:	First Angle		TITLE:	
RN#		MÄM 40-102	MÄM 40-202	MÄM 40-151		OÄM 40-208	MÄM 40-286		B	N.T.S			SCHEMATIC, ELECTRICAL SYSTEM	
DATE		04.06.03	03.10.03	11.01.05		21.03.05	27.02.07		Dimensions in Millimetres		Tolerances are			
DRAWN		KOWARSCH	KOWARSCH	KOWARSCH		MANDL	Schuster		NEXT ASSEMBLY:				DRAWING NUMBER:	SHEET:
CHECK									DA4-9200-00-00				D4D-9224-30-01	1/2
CHECK DATE														
STRESS													REPLACES DWG.#	N/A
STRESS DATE														
APPROVAL		M. Voick 19. MRZ. 2007												
APPROVAL DATE														

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Do Not Scale Drawing



Ersetzt durch neues Design.
Nur noch als Ersatzteil zu verwenden.
Replaced by new design.
To be used only for spare parts.

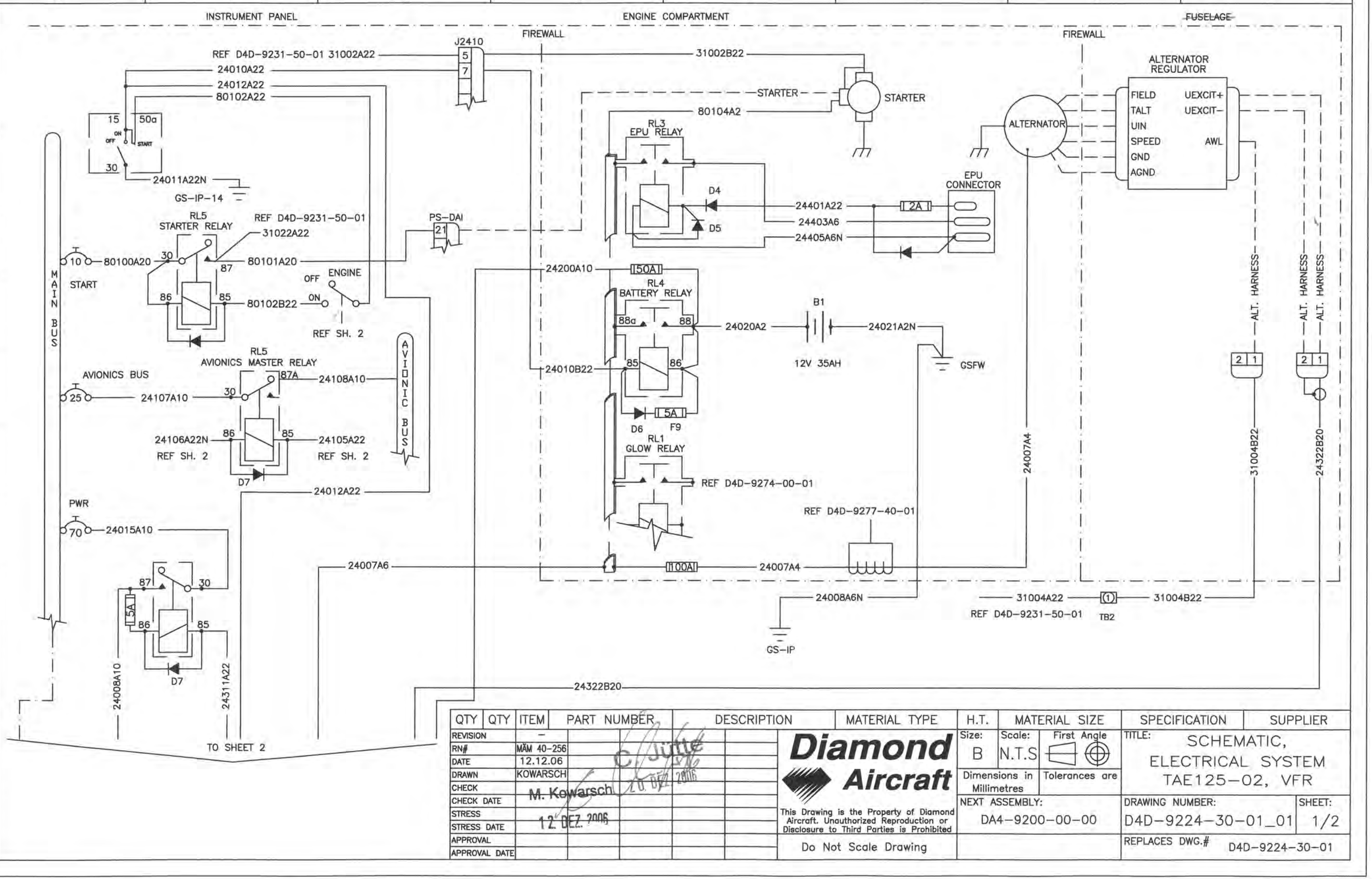
QTY	QTY	ITEM	PART NUMBER		DESCRIPTION		MATERIAL TYPE
REVISION			f	g	h	i	k
RN#			MÄM 40-102	MÄM 40-202	MÄM 40-151	OÄM 40-208	MÄM 40-286
DATE			04.06.03	03.10.03	11.01.05	21.03.05	27.02.07
DRAWN			KOWARSCH	KOWARSCH	KOWARSCH	MANDL	Schuster
CHECK							
CHECK DATE				M. Volck 19. MRZ. 2007			
STRESS							
STRESS DATE							
APPROVAL							
APPROVAL DATE							

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Do Not Scale Drawing

H.T.	MATERIAL SIZE		SPECIFICATION	SUPPLIER
Size: B	Scale: N.T.S	First Angle	TITLE: SCHEMATIC, ELECTRICAL SYSTEM	
Dimensions in Millimetres	Tolerances are			
NEXT ASSEMBLY: DA4-9200-00-00			DRAWING NUMBER: D4D-9224-30-01	SHEET: 2/2
			REPLACES DWG.#: N/A	



QTY	QTY	ITEM	PART NUMBER	DESCRIPTION	MATERIAL TYPE	H.T.	MATERIAL SIZE	SPECIFICATION	SUPPLIER
REVISION		–							
RN#		MÄM 40-256							
DATE		12.12.06							
DRAWN		KOWARSCH							
CHECK		M. Kowarsch							
CHECK DATE		12. DEZ. 2006							
STRESS									
STRESS DATE									
APPROVAL									
APPROVAL DATE									

Diamond Aircraft

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Do Not Scale Drawing

Size:	Scale:	First Angle
B	N.T.S	

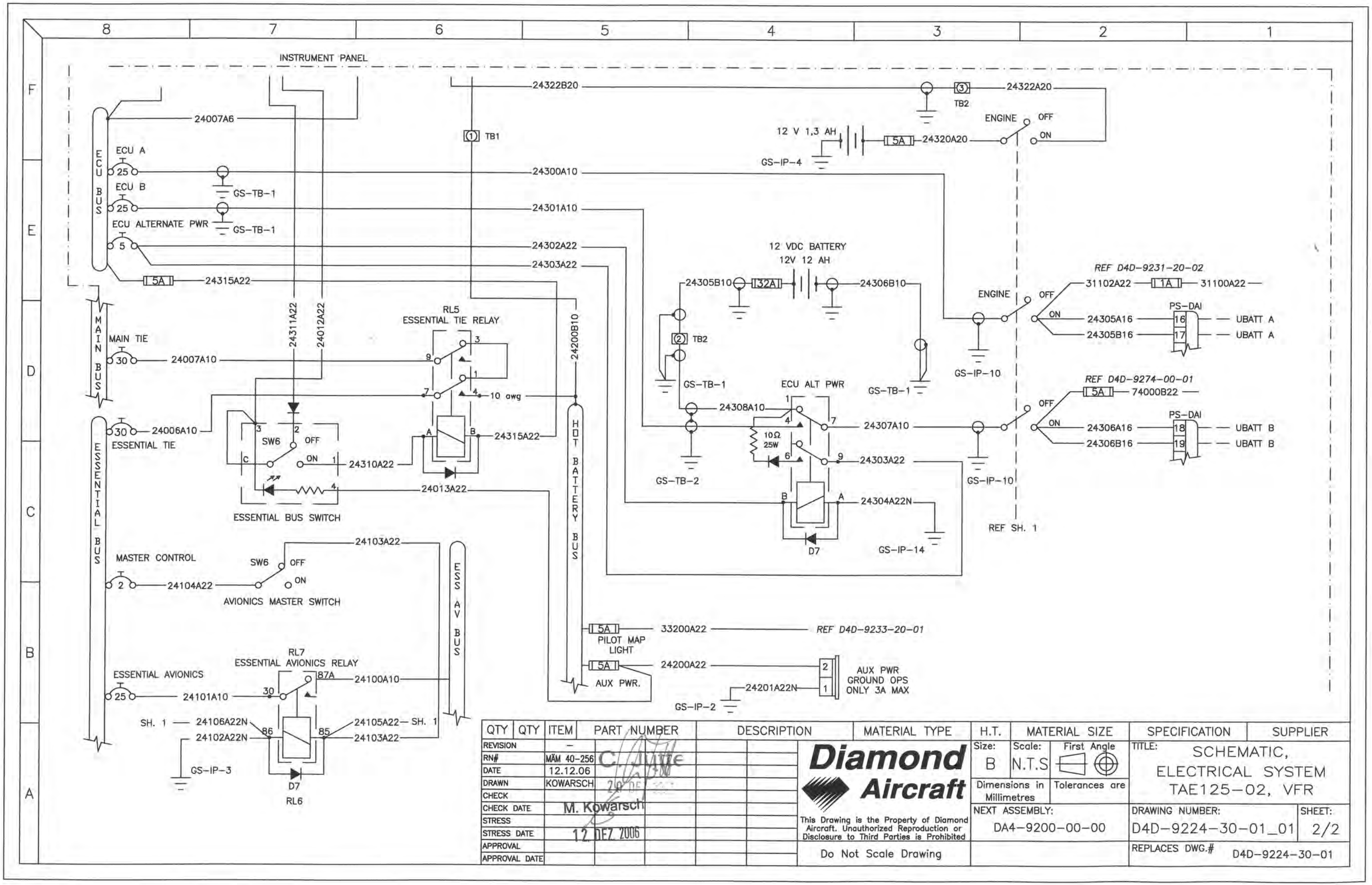
Dimensions in Millimetres | Tolerances are

NEXT ASSEMBLY: DA4-9200-00-00

TITLE: SCHEMATIC, ELECTRICAL SYSTEM TAE125-02, VFR

DRAWING NUMBER: D4D-9224-30-01_01 | SHEET: 1/2

REPLACES DWG.# D4D-9224-30-01



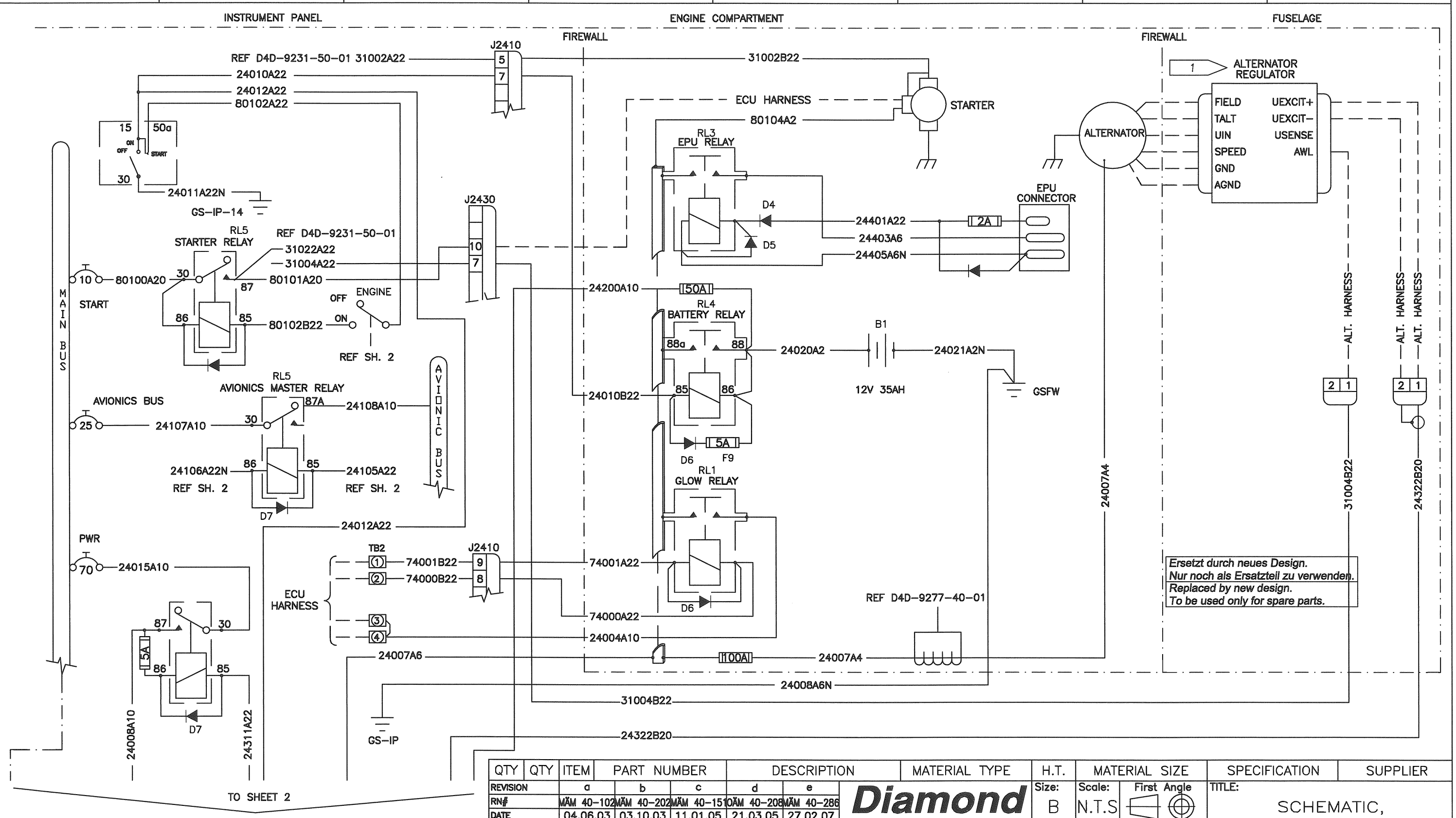
QTY	QTY	ITEM	PART NUMBER	DESCRIPTION	MATERIAL TYPE
REVISION		–			
RN#		MÄM 40-256			
DATE		12.12.06			
DRAWN		KOWARSCH			
CHECK					
CHECK DATE		M. Kowarsch			
STRESS					
STRESS DATE		12. DEZ. 2006			
APPROVAL					
APPROVAL DATE					

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Do Not Scale Drawing

H.T.	MATERIAL SIZE		SPECIFICATION	SUPPLIER
Size: B	Scale: N.T.S	First Angle	TITLE: SCHEMATIC, ELECTRICAL SYSTEM TAE125-02, VFR	
Dimensions in Millimetres	Tolerances are			
NEXT ASSEMBLY: DA4-9200-00-00			DRAWING NUMBER: D4D-9224-30-01_01	SHEET: 2/2
			REPLACES DWG.# D4D-9224-30-01	



Notes for the alternator regulator:

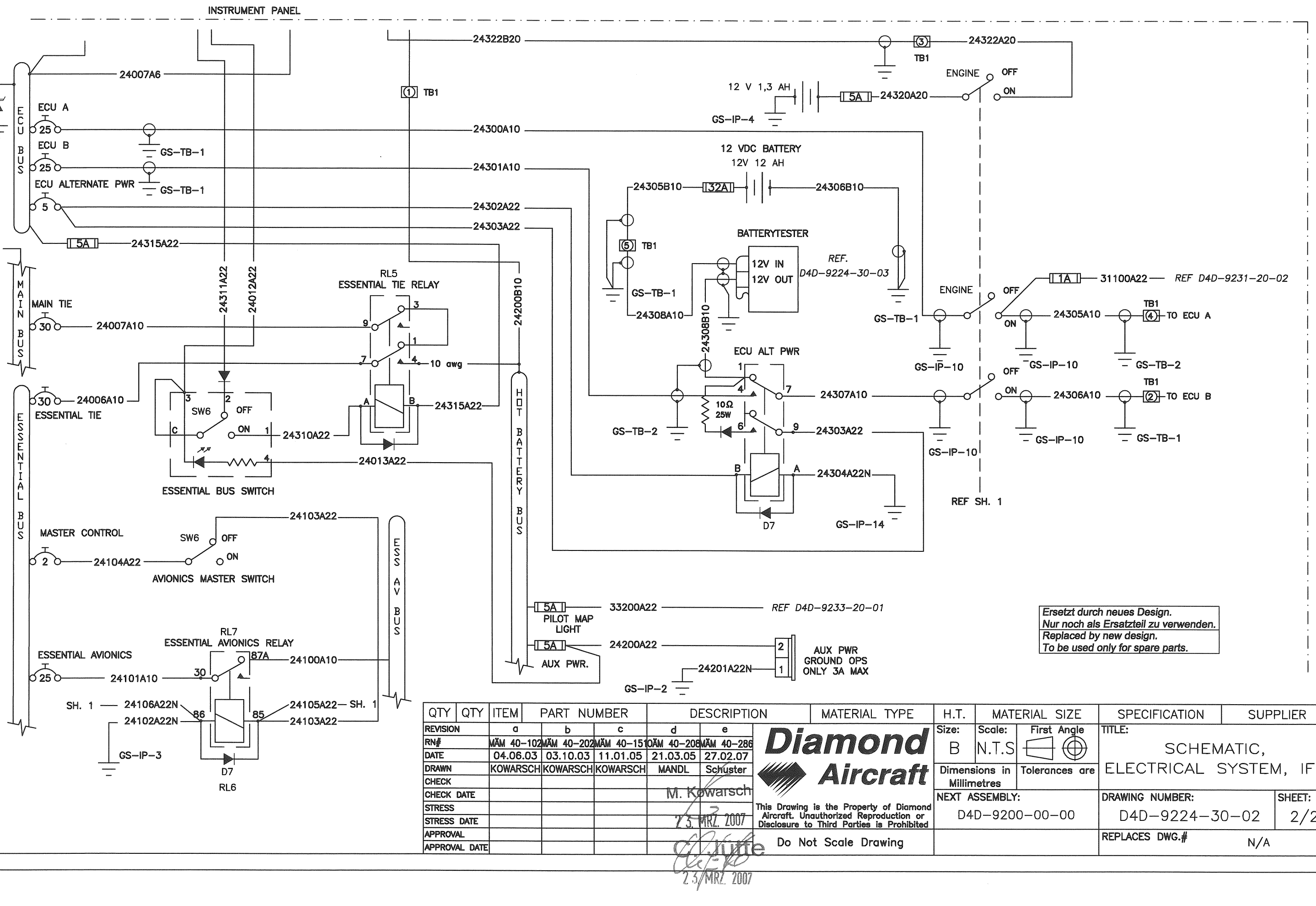
1 — *The optional installation of the alternator regulator in the engine compartment is possible.*

QTY	QTY	ITEM	PART NUMBER			DESCRIPTION		MATERIAL TYPE	H.T.	MATERIAL SIZE			SPECIFICATION	SUPPLIER
REVISION		a	b	c		d	e		Size:	Scale:	First Angle		TITLE:	
RN#		MÄM 40-102	MÄM 40-202	MÄM 40-151		ÖÄM 40-208	MÄM 40-286		B	N.T.S			SCHEMATIC, ELECTRICAL SYSTEM, IFR	
DATE		04.06.03	03.10.03	11.01.05		21.03.05	27.02.07		Dimensions in Millimetres		Tolerances are			
DRAWN		KOWARSCH	KOWARSCH	KOWARSCH		MANDL	Schuster		NEXT ASSEMBLY:				DRAWING NUMBER:	SHEET:
CHECK									D4D-9200-00-00				D4D-9224-30-02	1/2
CHECK DATE						M. Kowarsch 23. MRZ. 2007								
STRESS													REPLACES DWG.#	N/A
STRESS DATE														
APPROVAL						C. Jütte 23. MRZ. 2007								
APPROVAL DATE														

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Do Not Scale Drawing



Ersetzt durch neues Design.
Nur noch als Ersatzteil zu verwenden.
Replaced by new design.
To be used only for spare parts.

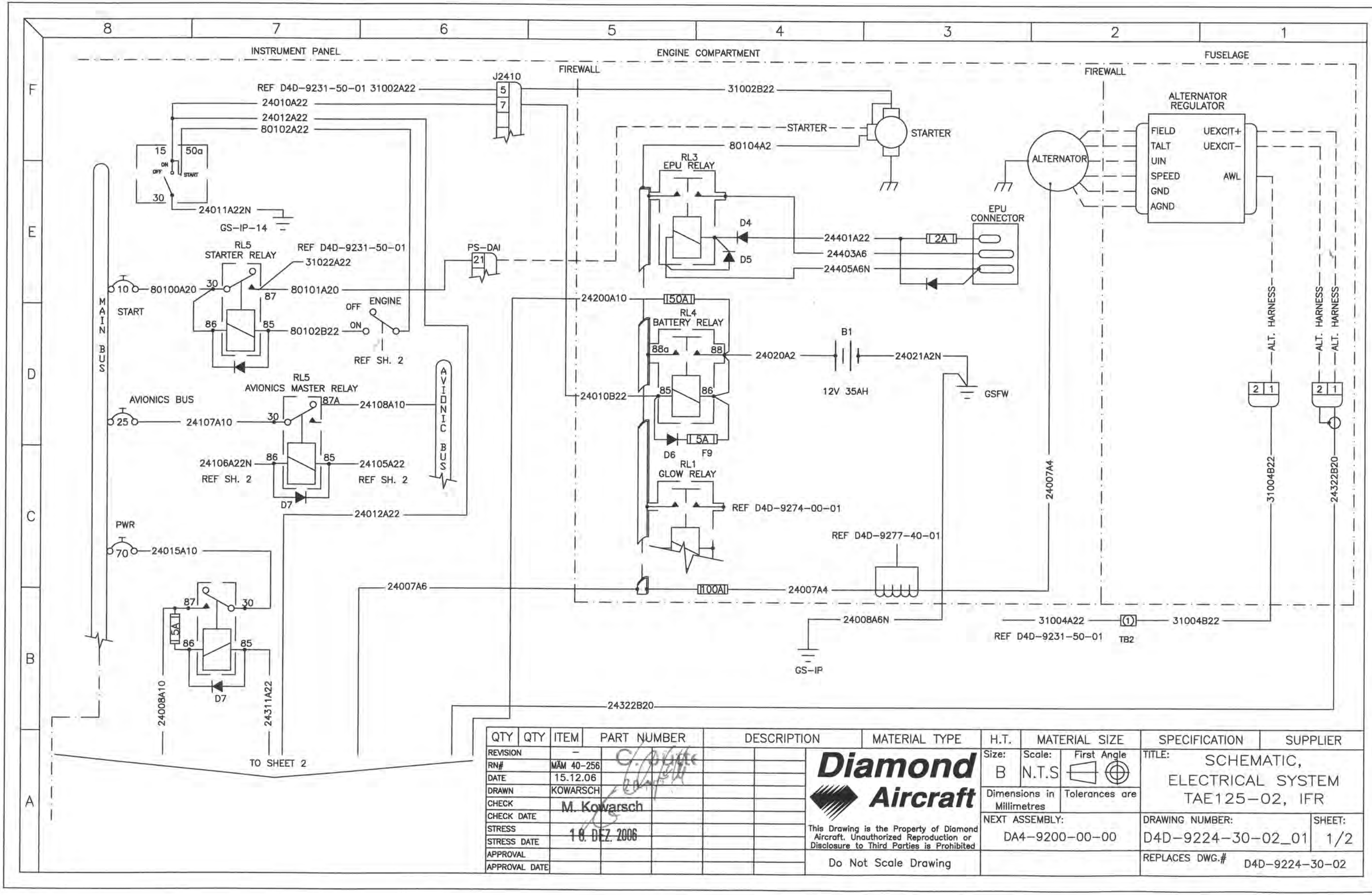
QTY	QTY	ITEM	PART NUMBER		DESCRIPTION		MATERIAL TYPE
REVISION		a	b	c	d	e	
RN#		MÄM 40-102	MÄM 40-202	MÄM 40-151	MÄM 40-208	MÄM 40-286	
DATE		04.06.03	03.10.03	11.01.05	21.03.05	27.02.07	
DRAWN		KOWARSCH	KOWARSCH	KOWARSCH	MANDL	Schuster	
CHECK					M. Kowarsch		
CHECK DATE					23. MRZ. 2007		
STRESS					C. Jutte		
STRESS DATE					23/MRZ. 2007		
APPROVAL							
APPROVAL DATE							

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Do Not Scale Drawing

H.T.	MATERIAL SIZE		SPECIFICATION	SUPPLIER
Size: B	Scale: N.T.S	First Angle	TITLE: SCHEMATIC, ELECTRICAL SYSTEM, IFR	
Dimensions in Millimetres	Tolerances are			
NEXT ASSEMBLY: D4D-9200-00-00			DRAWING NUMBER: D4D-9224-30-02	SHEET: 2/2
			REPLACES DWG.# N/A	



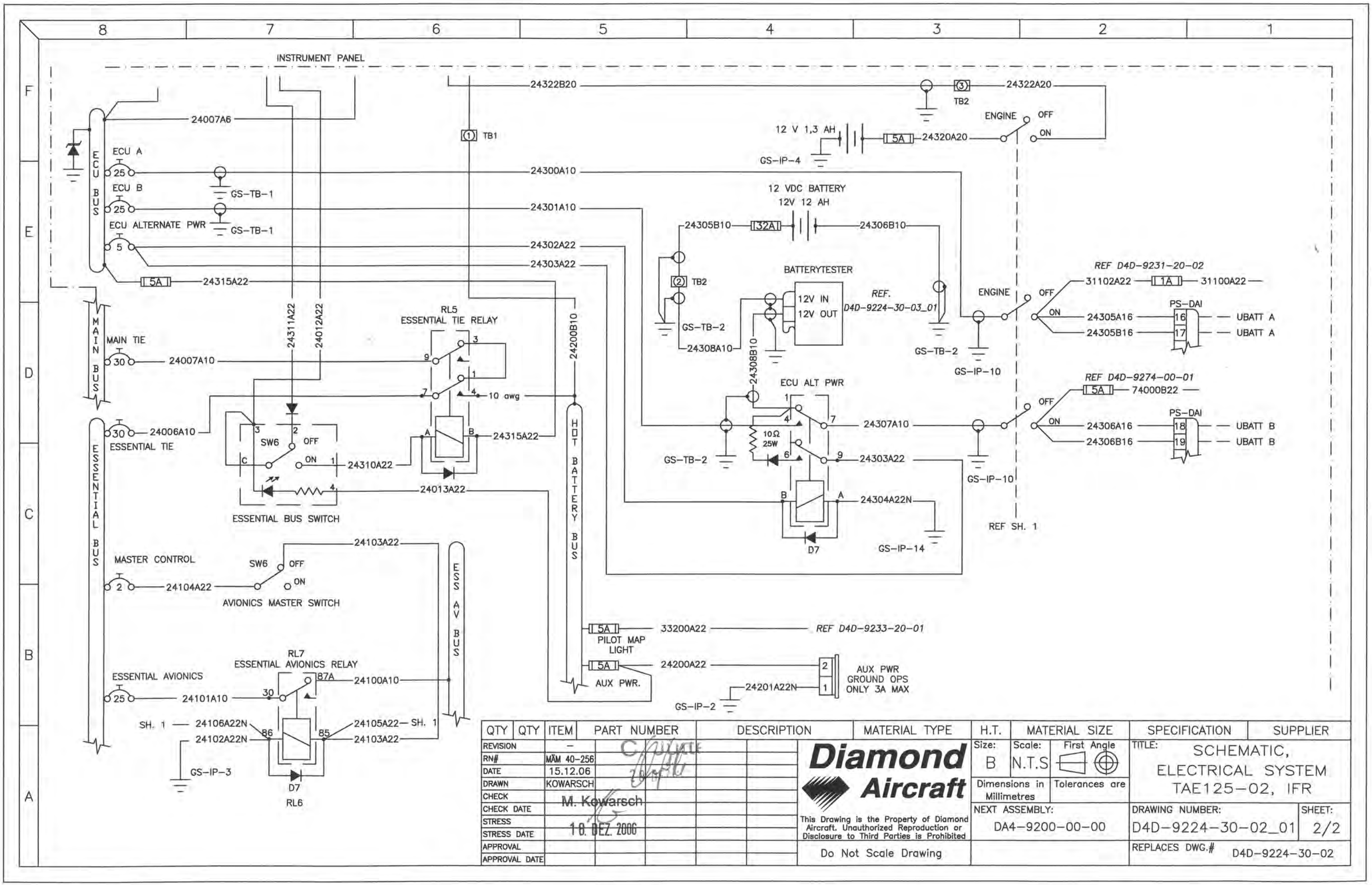
QTY	QTY	ITEM	PART NUMBER	DESCRIPTION	MATERIAL TYPE
REVISION		–			
RN#		MÄM 40-256			
DATE		15.12.06			
DRAWN		KOWARSCH			
CHECK		M. Kowarsch			
CHECK DATE					
STRESS		18. DEZ. 2006			
STRESS DATE					
APPROVAL					
APPROVAL DATE					

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H.T.	MATERIAL SIZE		SPECIFICATION	SUPPLIER
Size: B	Scale: N.T.S	First Angle	TITLE: SCHEMATIC, ELECTRICAL SYSTEM TAE125-02, IFR	
Dimensions in Millimetres	Tolerances are			
NEXT ASSEMBLY: DA4-9200-00-00			DRAWING NUMBER: D4D-9224-30-02_01	SHEET: 1/2
			REPLACES DWG.# D4D-9224-30-02	

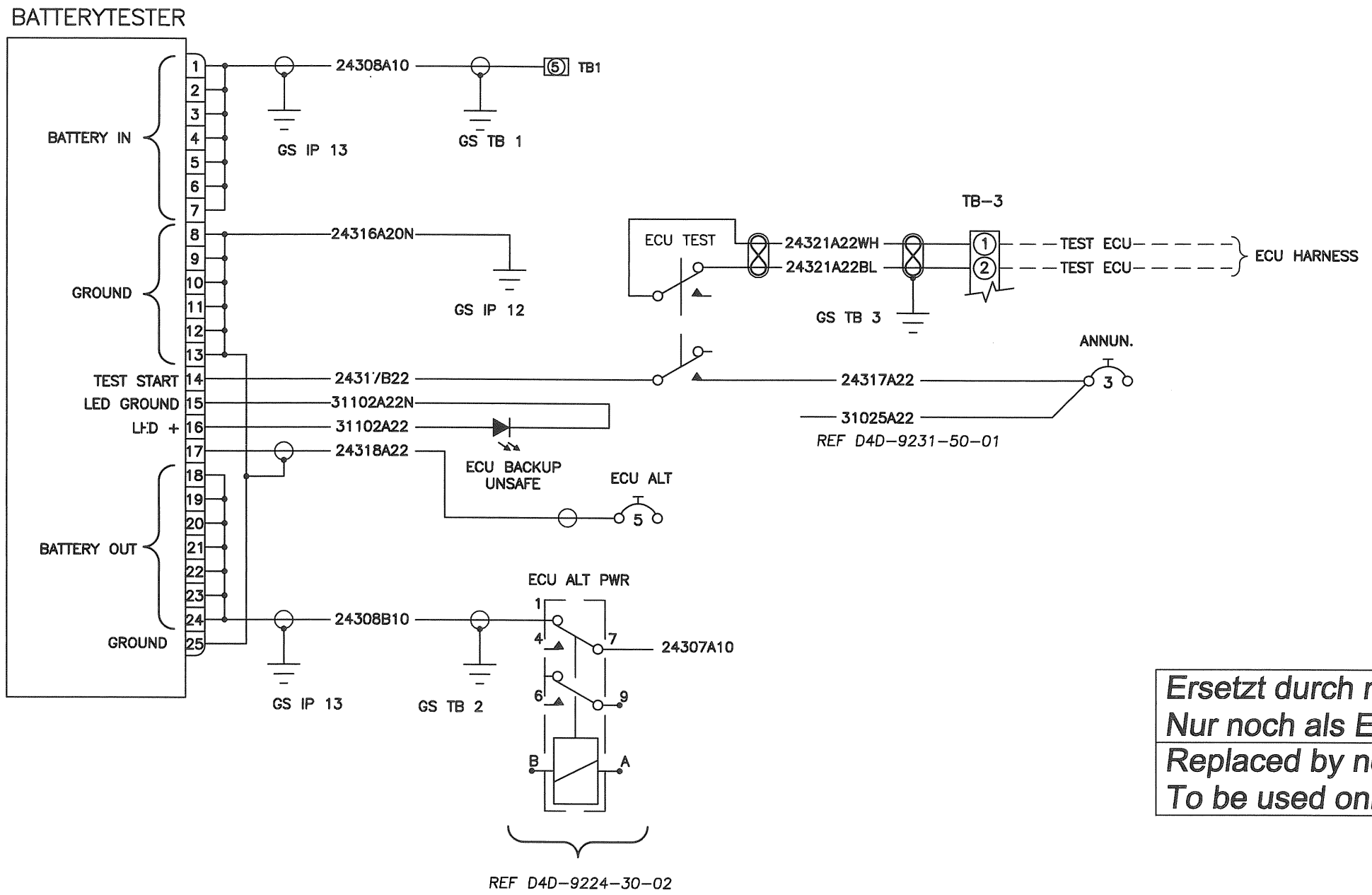


QTY	QTY	ITEM	PART NUMBER	DESCRIPTION	MATERIAL TYPE	H.T.	MATERIAL SIZE	SPECIFICATION	SUPPLIER
REVISION		–				Size: B	Scale: N.T.S, First Angle	TITLE: SCHEMATIC, ELECTRICAL SYSTEM TAE125-02, IFR	
RN#		MÄM 40-256				Dimensions in Millimetres	Tolerances are		
DATE		15.12.06				NEXT ASSEMBLY: DA4-9200-00-00		DRAWING NUMBER: D4D-9224-30-02_01	SHEET: 2/2
DRAWN		KOWARSCH						REPLACES DWG.# D4D-9224-30-02	
CHECK		M. Kowarsch							
CHECK DATE		18. DEZ. 2006							
STRESS									
STRESS DATE									
APPROVAL									
APPROVAL DATE									

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Do Not Scale Drawing



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Nur noch als Ersatzteil zu verwenden.
Replaced by new design.
To be used only for spare parts.

QTY	QTY	ITEM	PART NUMBER			DESCRIPTION	MATERIAL TYPE	H.T.	MATERIAL SIZE	SPECIFICATION	SUPPLIER
REVISION		–	a	b	c						
RN#		OÄM 40-136	MÄM 40-195	MÄM 40-248	MÄM 40-286						
DATE		12.05.03	21.07.03	20.03.06	27.02.07						
DRAWN		KOWARSCH	KOWARSCH	KOWARSCH	Schuster						
CHECK											
CHECK DATE											
STRESS											
STRESS DATE											
APPROVAL											
APPROVAL DATE											

M. Voick 19. MRZ. 2007

C. [illegible] 19.7.2007

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Do Not Scale Drawing

Size:	Scale:	First Angle
B	N.T.S	

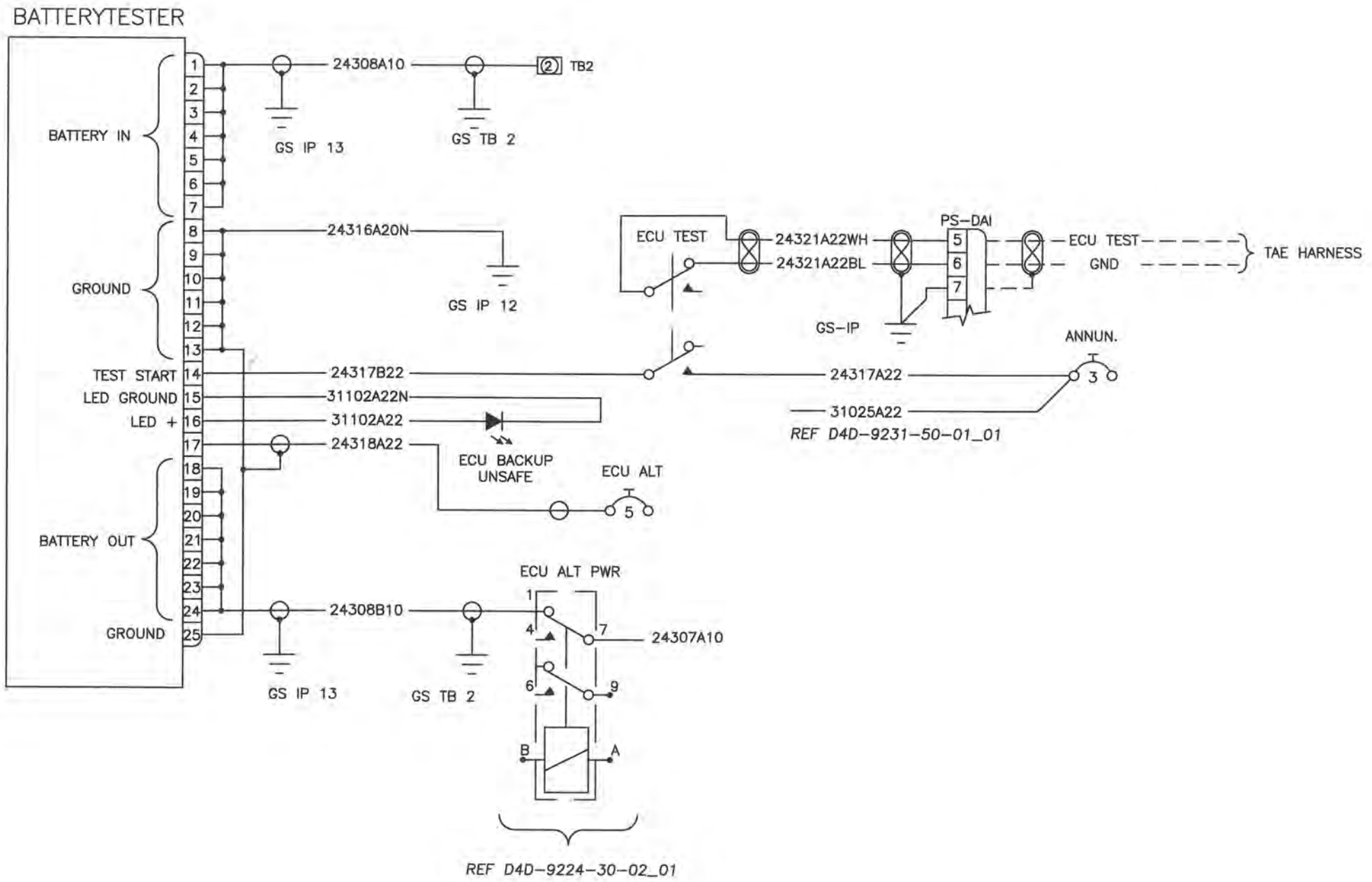
Dimensions in Millimetres | Tolerances are

NEXT ASSEMBLY: D4D-9224-30-02

TITLE: SCHEMATIC, ECU BACKUP BATTERYTESTER

DRAWING NUMBER: D4D-9224-30-03 | SHEET: 1/1

REPLACES DWG.# N/A



QTY	QTY	ITEM	PART NUMBER	DESCRIPTION	MATERIAL TYPE	H.T.	MATERIAL SIZE	SPECIFICATION	SUPPLIER
REVISION		–							
RN#		MÄM 40-256							
DATE		18.12.06							
DRAWN		KOWARSCH							
CHECK		M. Kowarsch							
CHECK DATE		16. DEZ. 2006							
STRESS									
STRESS DATE									
APPROVAL									
APPROVAL DATE									

Diamond Aircraft

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Do Not Scale Drawing

Size:	Scale:	First Angle
B	N.T.S	

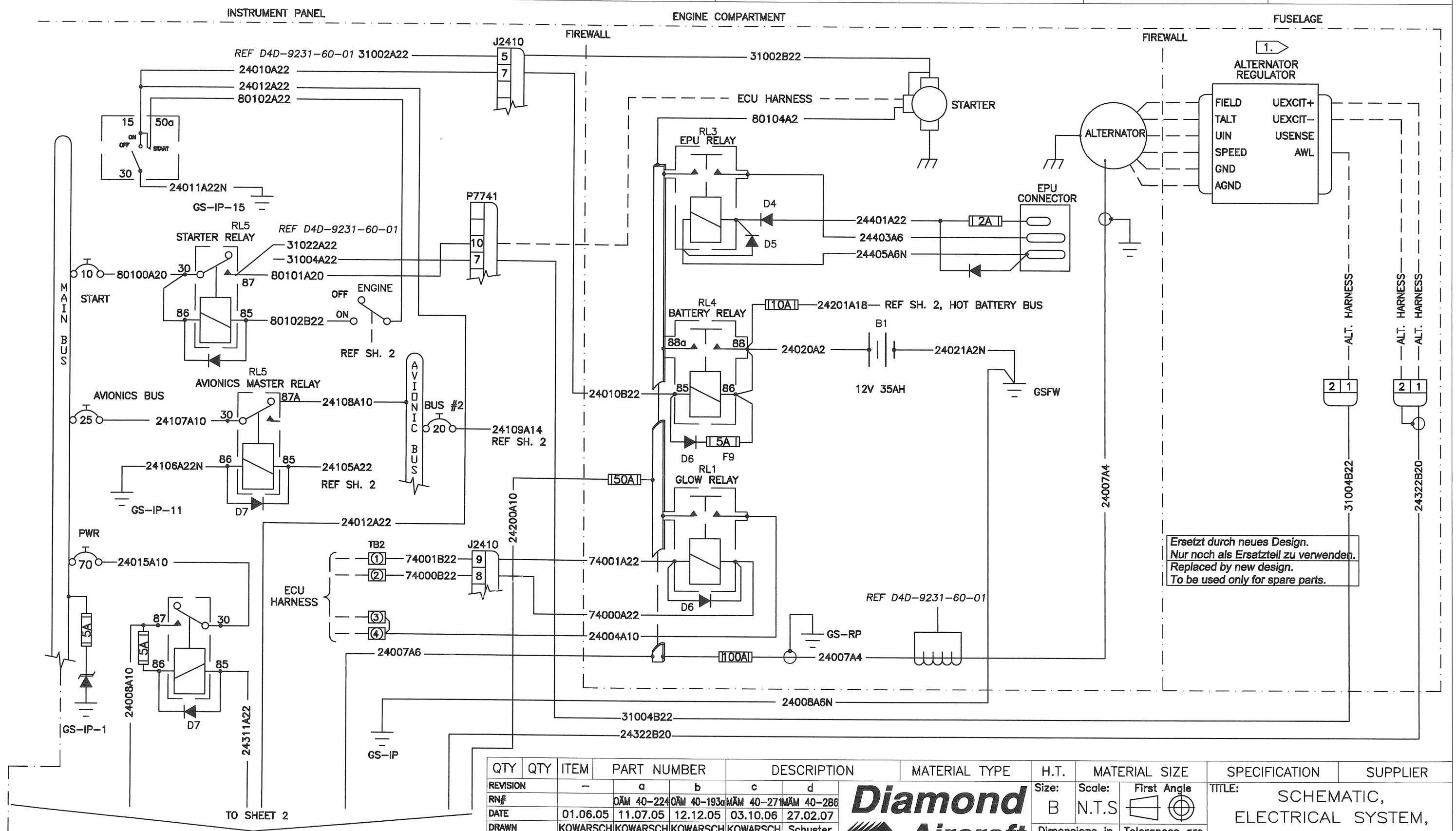
Dimensions in Millimetres | Tolerances are

TITLE: SCHEMATIC, ECU BACKUP BATTERYTESTER TAE 125-02

NEXT ASSEMBLY: D4D-9224-30-02_01

DRAWING NUMBER: D4D-9224-30-03_01 | SHEET: 1/1

REPLACES DWG.# D4D-9224-30-03



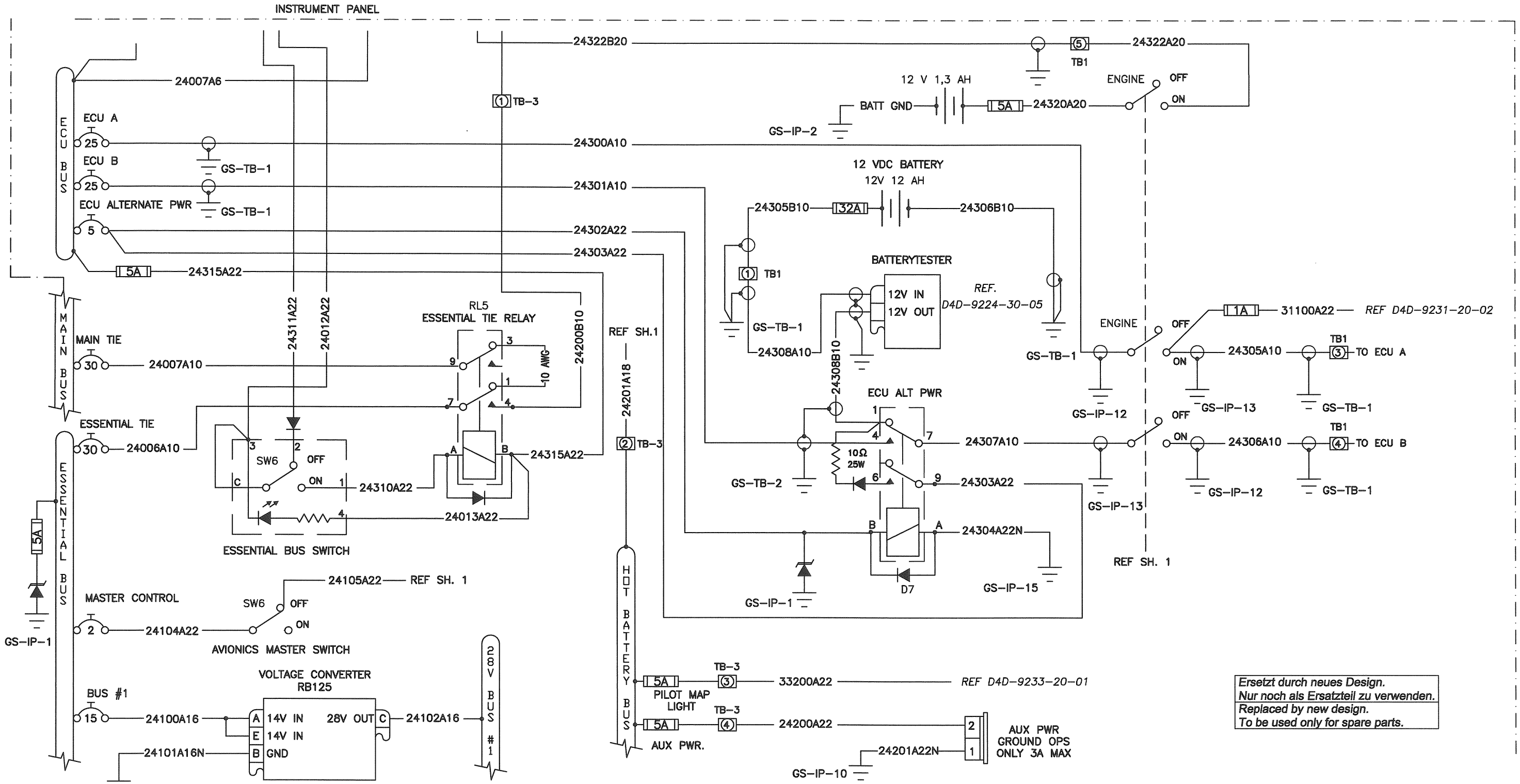
NOTES

1. THE ALTERNATOR REGULATOR MAY BE OPTIONAL INSTALLED IN THE ENGINE COMPARTMENT.

QTY	QTY	ITEM	PART NUMBER		DESCRIPTION		MATERIAL TYPE	H.T.	MATERIAL SIZE		SPECIFICATION	SUPPLIER
REVISION		–	a	b	c	d	Diamond Aircraft	Size: B	Scale: N.T.S	First Angle	TITLE: SCHEMATIC, ELECTRICAL SYSTEM, G1000	
RN#			ÖÄM 40-224	ÖÄM 40-193a	MÄM 40-271	MÄM 40-286		Dimensions in Millimetres	Tolerances are			
DATE		01.06.05	11.07.05	12.12.05	03.10.06	27.02.07		NEXT ASSEMBLY: D4D-9200-00-00			DRAWING NUMBER: D4D-9224-30-04	SHEET: 1/2
DRAWN		KOWARSCH	KOWARSCH	KOWARSCH	KOWARSCH	Schuster						
CHECK											REPLACES DWG.#: N/A	
CHECK DATE												
STRESS												
STRESS DATE												
APPROVAL												
APPROVAL DATE												

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Do Not Scale Drawing



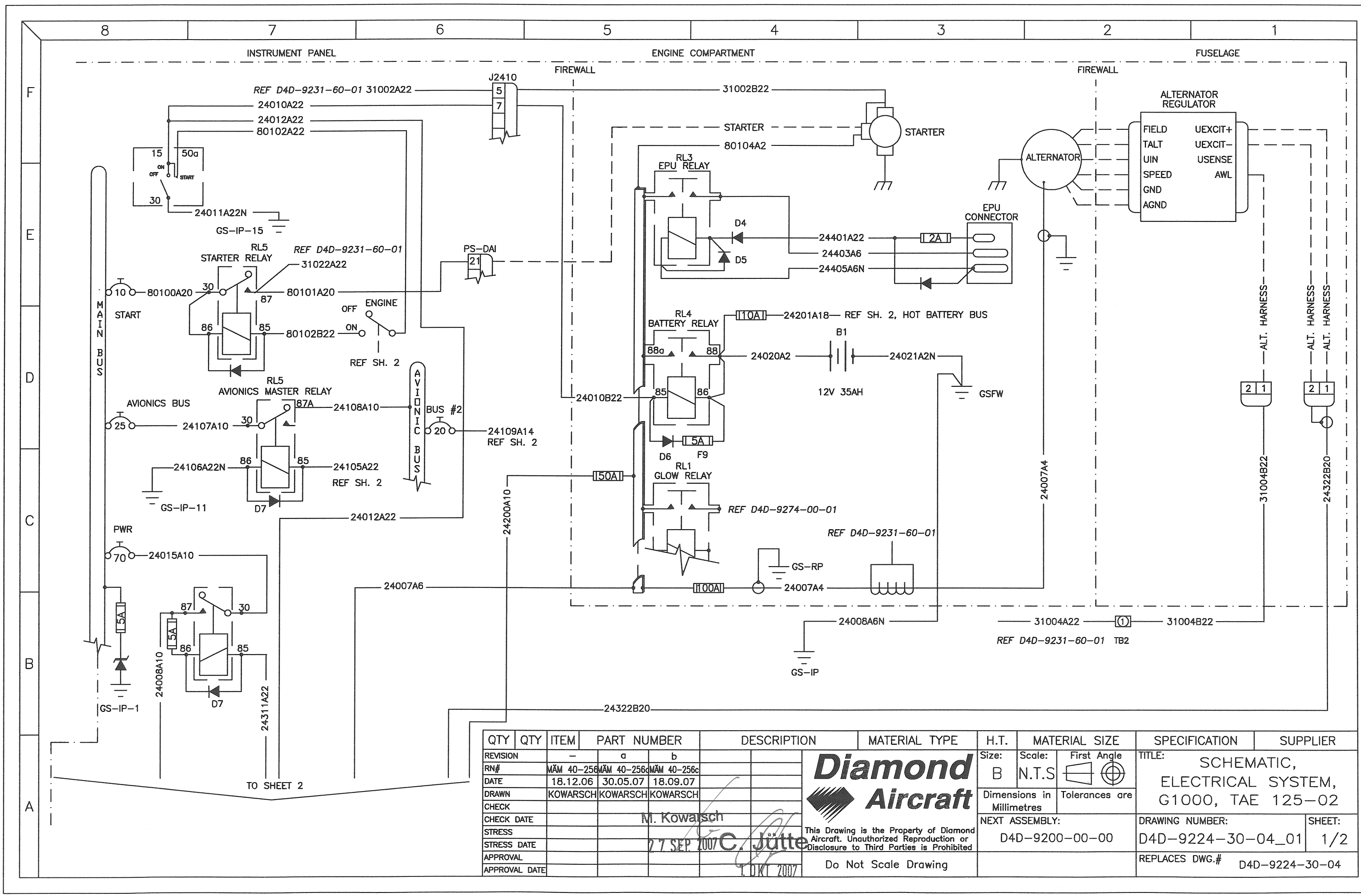
Ersetzt durch neues Design.
Nur noch als Ersatzteil zu verwenden.
Replaced by new design.
To be used only for spare parts.

QTY	QTY	ITEM	PART NUMBER		DESCRIPTION		MATERIAL TYPE	H.T.	MATERIAL SIZE		SPECIFICATION	SUPPLIER
REVISION		–	a	b	c	d		Size:	Scale:	First Angle	TITLE: SCHEMATIC, ELECTRICAL SYSTEM, G1000	
RN#			ÖÄM 40-224	ÖÄM 40-193a	MÄM 40-271	MÄM 40-286		B	N.T.S			
DATE		01.06.05	11.07.05	12.12.05	03.10.06	27.02.07		Dimensions in Millimetres		Tolerances are		
DRAWN		KOWARSCH	KOWARSCH	KOWARSCH	KOWARSCH	Schuster		NEXT ASSEMBLY: D4D-9200-00-00			DRAWING NUMBER: D4D-9224-30-04	SHEET: 2/2
CHECK											REPLACES DWG.# N/A	
CHECK DATE			M. Volc 19. MRZ. 2007									
STRESS												
STRESS DATE												
APPROVAL												
APPROVAL DATE												

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Do Not Scale Drawing



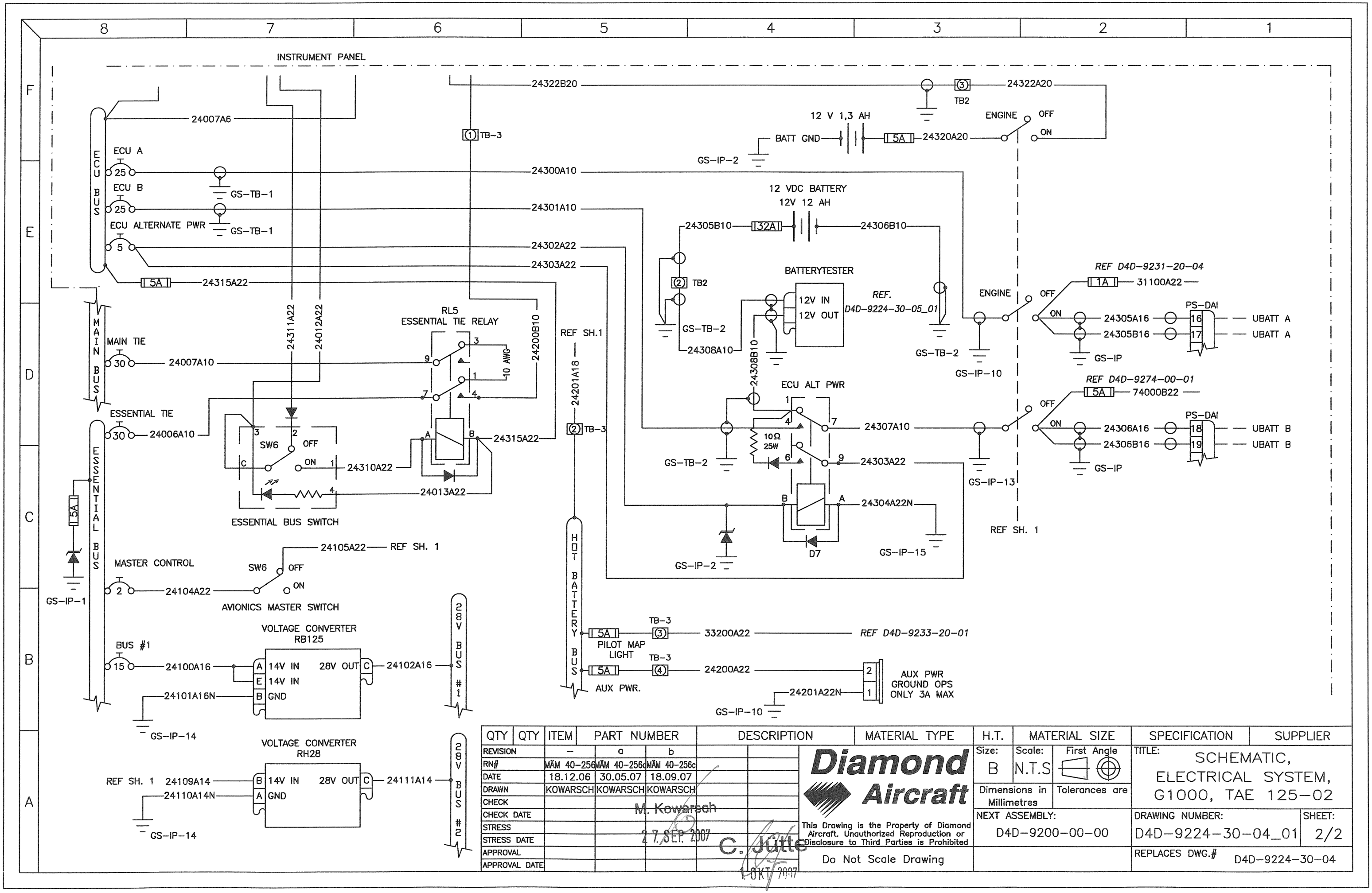
QTY	QTY	ITEM	PART NUMBER			DESCRIPTION	MATERIAL TYPE	H.T.	MATERIAL SIZE		SPECIFICATION	SUPPLIER
REVISION		–	a	b				Size: B	Scale: N.T.S	First Angle	TITLE: SCHEMATIC, ELECTRICAL SYSTEM, G1000, TAE 125-02	
RN#		MÄM 40-256	MÄM 40-256c	MÄM 40-256c				Dimensions in Millimetres		Tolerances are		
DATE		18.12.06	30.05.07	18.09.07				NEXT ASSEMBLY: D4D-9200-00-00			DRAWING NUMBER: D4D-9224-30-04_01	SHEET: 1/2
DRAWN		KOWARSCH	KOWARSCH	KOWARSCH							REPLACES DWG.# D4D-9224-30-04	
CHECK												
CHECK DATE			M. Kowarsch									
STRESS												
STRESS DATE			27 SEP 2007									
APPROVAL			C. Jütte									
APPROVAL DATE												

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Do Not Scale Drawing

1. OKT 2007

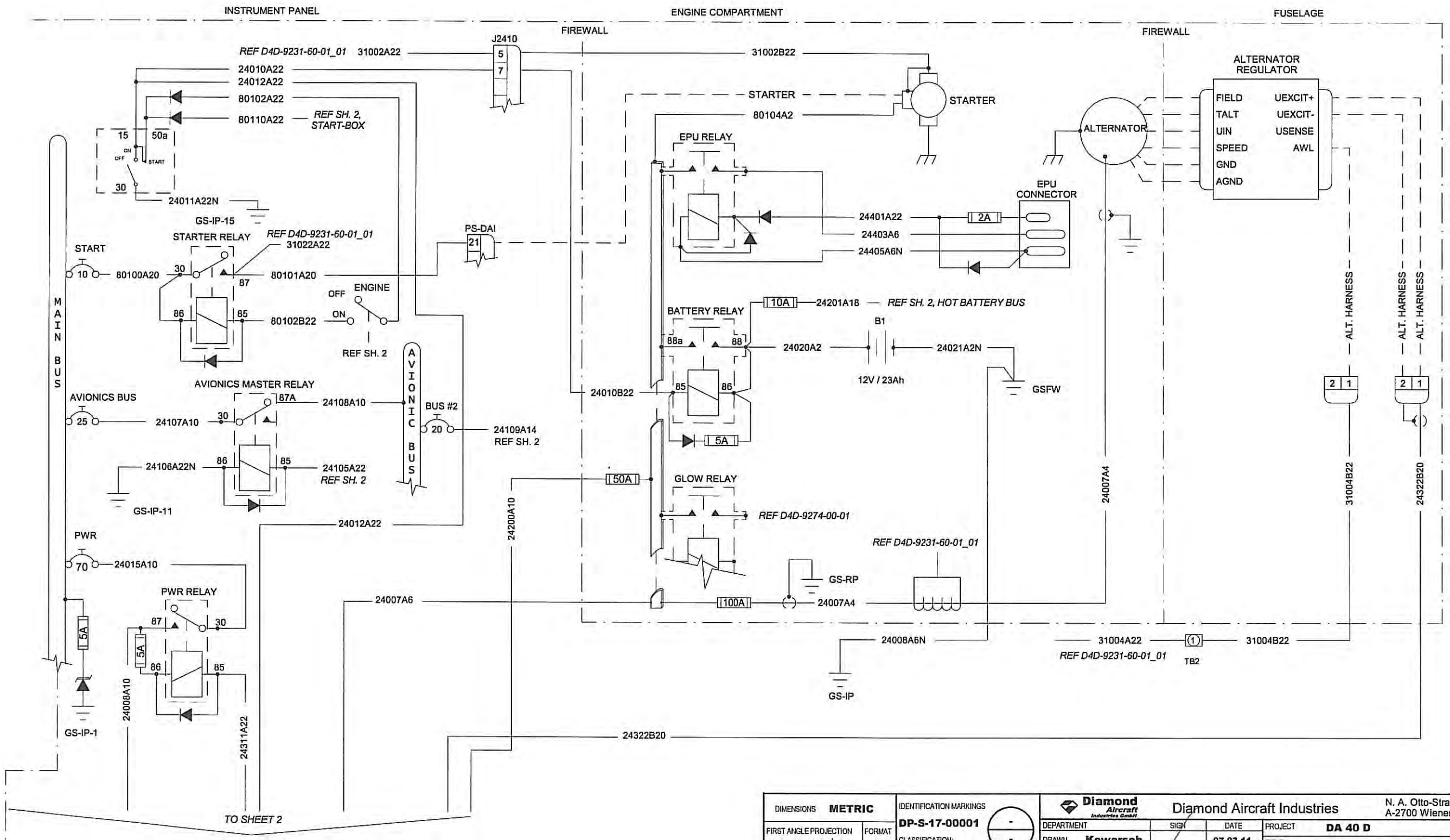


QTY	QTY	ITEM	PART NUMBER			DESCRIPTION	MATERIAL TYPE	H.T.	MATERIAL SIZE		SPECIFICATION	SUPPLIER
REVISION		–	a	b				Size: B	Scale: N.T.S	First Angle	TITLE: SCHEMATIC, ELECTRICAL SYSTEM, G1000, TAE 125-02	
RN#		MÄM 40-256	MÄM 40-256c	MÄM 40-256c				Dimensions in Millimetres		Tolerances are		
DATE		18.12.06	30.05.07	18.09.07				NEXT ASSEMBLY: D4D-9200-00-00			DRAWING NUMBER: D4D-9224-30-04_01	SHEET: 2/2
DRAWN		KOWARSCH	KOWARSCH	KOWARSCH							REPLACES DWG.# D4D-9224-30-04	
CHECK			M. Kowarsch									
CHECK DATE			27. SEP. 2007									
STRESS												
STRESS DATE												
APPROVAL			C. Jütte									
APPROVAL DATE			1. OKT. 2007									

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Confidential

REVISION					
REV	SH	ZONE	DESCRIPTION	DATE	APPROVAL
-	01	ALL	MÄM 40-422 FIRST RELEASE	19.05.10	JÜTTE
A	01	ALL	IN TITLE BOCK DRAWING NUMBER D4D-9224-30-01_02 CORRECTED TO D4D-9224-30-04_02. (REDLINECORR.)	03.03.11	SEE TB
B	01	E-7	MÄM 40-422/b Diodes added	07.03.11	SEE TB



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NOR DISCLOSED TO A THIRD PARTY IN WHOLE OR IN PART WITHOUT THE PRIOR WRITTEN CONSENT OF
DIAMOND AIRCRAFT INDUSTRIES

DIMENSIONS: METRIC	IDENTIFICATION MARKINGS: DP-S-17-00001	Diamond Aircraft Industries	N. A. Otto-Straße 5, A-2700 Wiener Neustadt
FIRST ANGLE PROJECTION	CLASSIFICATION: NONE	DEPARTMENT / SIGN / DATE	PROJECT: DA 40 D
FORMAT: A2	INTERCHANGEABLE PART: NO	DRAWN: Kowarsch — 07.03.11	TITLE: SCHEMATIC, ELECTRICAL SYSTEM, G1000, TAE 125-02
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN MM	THIS DRAWING WAS PRODUCED USING SOFTWARE: SOLID EDGE V18	CHECKED: Kowarsch — 07.03.2011	DWG.ORIG.: DAIA
DIMENSION TOLERANCES: 2 DECIMAL ±0,25; 1DECIMAL ±0,5; DECIMAL ±1; ANGLE ±1°; RAD ±0,5	FILENAME: D4D-9224-30-04_02b.dft	QA: N/A; STRESS: N/A; MANUF.: N/A; SYSTEM: N/A	DWG.NO.: D4D-9224-30-04_02 — REV: "B"
3.2 FINISH IN MICRO-METER		APPROVED: Volck — 07. MRZ. 2011	CODE: 710197 — SCALE: NTS — SH 01 OF 02

Confidential

Confidential

REVISION					
REV	SH	ZONE	DESCRIPTION	DATE	APPROVAL
-	01	ALL	MÄM 40-422 FIRST RELEASE	19.05.10	JÖTTE
A	01	ALL	REVISION LEVEL RAISED DUE TO CHANGES ON SHEET 1. (REDLINECORR.)	03.03.11	SEE TB
B	01	ALL	REVISION LEVEL RAISED DUE TO CHANGES ON SHEET 1.	07.03.11	SEE TB

TO SHEET 1

INSTRUMENT PANEL

ECU BUS
- ECU A — 25 — GS-IP
- ECU B — 25 — GS-IP
- ECU ALTERNATE PWR — 5 — GS-IP
- 5A — 24315A22

MAIN BUS
- MAIN TIE — 30 — 24007A10
- ESSENTIAL TIE — 30 — 24006A10

ESSENTIAL BUS
- 5A — GS-IP-1
- MASTER CONTROL — 2 — 24104A22
- SW6 OFF / ON — AVIONICS MASTER SWITCH
- 24105A22 — REF SH. 1

ESSENTIAL TIE RELAY
- 24311A22, 24012A22
- 10 AWG
- 24200B10
- REF SH.1
- 24201A18

ESSENTIAL BUS SWITCH
- SW6 OFF / ON
- 24310A22
- 24013A22
- 24315A22

VOLTAGE CONVERTER RB125
- BUS #1 — 15 — 24100A16
- 24101A16N — GS-IP-14
- A 14V IN, E 14V IN, B GND
- 28V OUT C — 24102A16 — 28V BUS#1

VOLTAGE CONVERTER RH28
- REF SH. 1 — 24109A14
- 24110A14N — GS-IP-14
- B 14V IN, A GND
- 28V OUT C — 24111A14 — 28V BUS#2

24322B20 — TB2 (3) — 24322A20

24007A6 — TB-3 (1)

24300A10 — GS-IP-2

24301A10

24302A22

24303A22

12 V 1,3 AH — BATT GND — 10A — 24320A20 — 7A — 24330A20

ENGINE OFF / ON

START-BOX
- 12V IN — 31105B22 — REF D4D-9231-60-01_01 SHEET 5/7
- START — 31155B22
- 80110A22 — REF SH. 1, STARTSWITCH

12 VDC BATTERY 12V / 12 Ah
- 24305B10 — 32A — 24306B10
- TB2 (2) — GS-TB-2 — 24308A10

BATTERYTESTER
- 12V IN / 12V OUT — REF D4D-9224-30-05_01
- 24308B10

ENGINE OFF / ON
- REF D4D-9231-20-04
- 1A — 31100A22
- 24305A16, 24305B16 — GS-IP
- PS-DAI 16, 17 — UBATT A
- GS-IP-10

ECU ALT PWR
- 24307A10
- 10Ω 25W
- 24303A22
- 24304A22N — GS-IP-15
- GS-IP-2

ENGINE OFF / ON
- REF D4D-9274-00-01
- 5A — 74000B22
- 24306A16, 24306B16 — GS-IP
- PS-DAI 18, 19 — UBATT B
- GS-IP-13

REF SH. 1

HOT BATTERY BUS
- 5A — PILOT MAP LIGHT — TB-3 (3) — 33200A22 — REF D4D-9233-20-01
- 5A — AUX PWR. — TB-3 (4) — 24200A22
- 24201A22N — GS-IP-10
- AUX PWR GROUND OPS ONLY 3A MAX

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DIMENSIONS	METRIC	IDENTIFICATION MARKINGS	DP-S-17-00001
FIRST ANGLE PROJECTION	FORMAT A2	CLASSIFICATION:	NONE
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN MM		INTERCHANGEABLE PART	NO
DIMENSION TOLERANCES: 2 DECIMAL ±0,25; 1DECIMAL ±0,5; DECIMAL ±1; ANGLE ±1°; RAD ±0,5	3,2 FINISH IN MICRO-METER	THIS DRAWING WAS PRODUCED USING SOFTWARE:	SOLID EDGE V18
		FILENAME	D4D-9224-30-04_02b.dft

Diamond Aircraft Industries GmbH — Diamond Aircraft Industries — N. A. Otto-Straße 5, A-2700 Wiener Neustadt

DEPARTMENT		SIGN	DATE
DRAWN	Kowarsch		07.03.11
CHECKED:	Kowarsch		07.03.2011
QA:	N/A		
STRESS:	N/A		
MANUF.:	N/A		
SYSTEM:	N/A		
APPROVED:	Volck		07 MRZ 2011

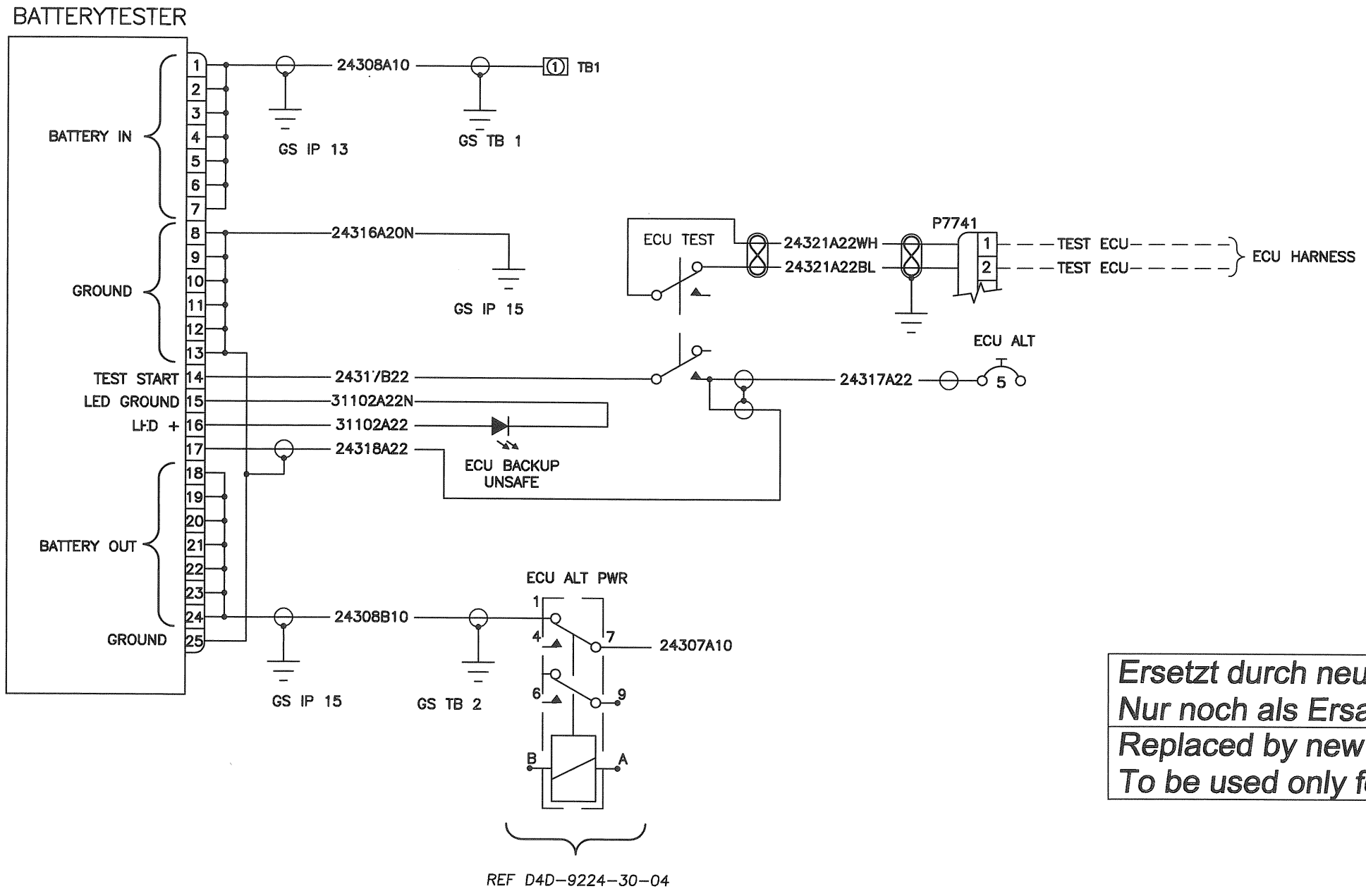
PROJECT: DA 40 D

TITLE: SCHEMATIC, ELECTRICAL SYSTEM, G1000, TAE 125-02

DWG.ORIG.	DWG.NO.	REV
DAIA	D4D-9224-30-04_02	"B"

CODE 710197 | SCALE NTS | SH 02 OF 02

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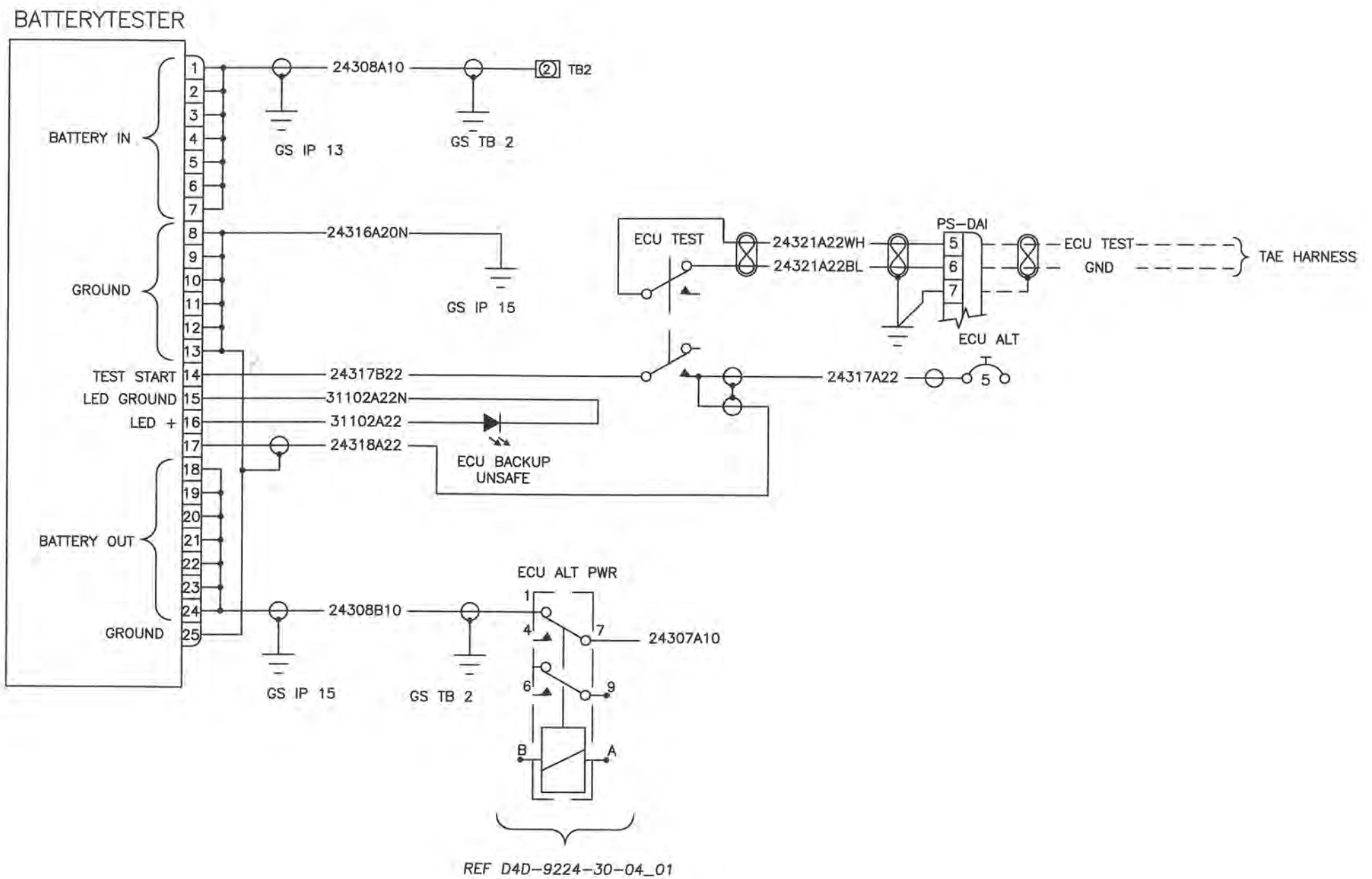
Ersetzt durch neues Design.
Nur noch als Ersatzteil zu verwenden.
Replaced by new design.
To be used only for spare parts.

QTY	QTY	ITEM	PART NUMBER			DESCRIPTION	MATERIAL TYPE	H.T.	MATERIAL SIZE		SPECIFICATION	SUPPLIER
REVISION		'–'	'a'	'b'	'c'			Size: B	Scale: N.T.S	First Angle	TITLE: SCHEMATIC, ECU BACKUP BATTERYTESTER	
RN#		OÄM 40-224	MÄM 40-221	MÄM 40-248	MÄM 40-286			Dimensions in Millimetres	Tolerances are			
DATE		21.06.05	06.10.05	20.03.06	27.02.07			NEXT ASSEMBLY: D4D-9224-30-04			DRAWING NUMBER: D4D-9224-30-05	SHEET: 1/1
DRAWN		MANDL	KOWARSCH	KOWARSCH	Schuster							
CHECK												
CHECK DATE		M. Voick 19. MRZ. 2007			C. Müller 19. MRZ. 2007							
STRESS												
STRESS DATE												
APPROVAL												
APPROVAL DATE											REPLACES DWG.# N/A	

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QTY	QTY	ITEM	PART NUMBER	DESCRIPTION	MATERIAL TYPE
REVISION		'–'			
RN#		MÄM 40–256			
DATE		18.12.06			
DRAWN		KOWARSCH			
CHECK		M. Kowarsch			
CHECK DATE		18. DEZ. 2006			
STRESS					
STRESS DATE					
APPROVAL					
APPROVAL DATE					

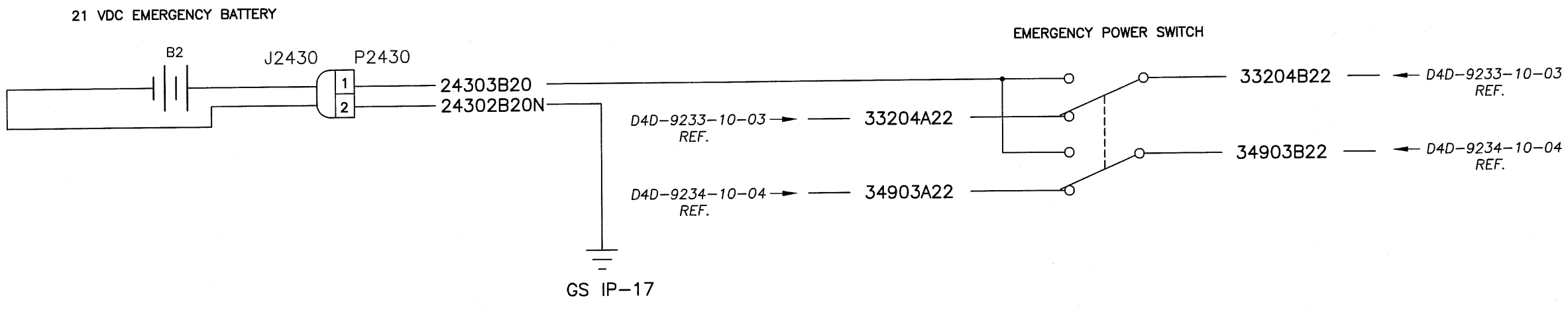
C. Jütte 20. DEZ. 2006

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H.T.	MATERIAL SIZE		SPECIFICATION	SUPPLIER
Size: B	Scale: N.T.S	First Angle	TITLE: SCHEMATIC, ECU BACKUP BATTERYTESTER TAE 125–02	
Dimensions in Millimetres	Tolerances are			
NEXT ASSEMBLY: D4D–9224–30–04_01			DRAWING NUMBER: D4D–9224–30–05_01	SHEET: 1/1
			REPLACES DWG.# D4D–9224–30–05	



QTY	QTY	ITEM	PART NUMBER	DESCRIPTION	MATERIAL TYPE
REVISION		–			
RN#		OÄM 40-136			
DATE		07.01.03			
DRAWN		KOWARSCH			
CHECK					
CHECK DATE					
STRESS					
STRESS DATE					
APPROVAL					
APPROVAL DATE					

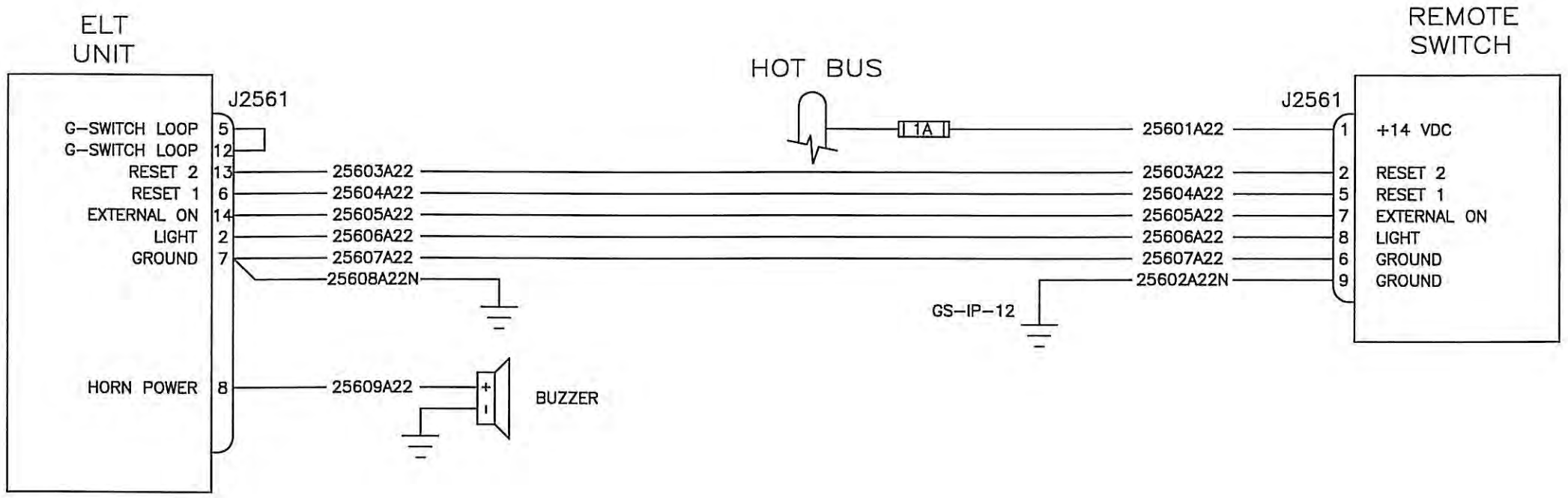
M. Reichel
18. JUNI 2003

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H.T.	MATERIAL SIZE		SPECIFICATION	SUPPLIER
Size: B	Scale: N.T.S	First Angle	TITLE: SCHEMATIC, EMERGENCY POWER PACKAGE WIRING, DIESEL	
Dimensions in Millimetres	Tolerances are			
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			REPLACES DWG.#	



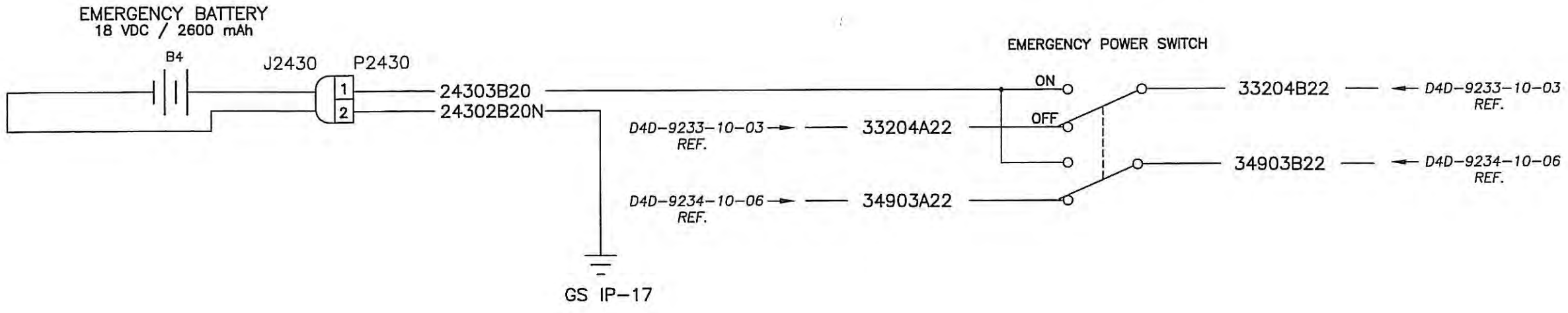
QTY	QTY	ITEM	PART NUMBER	DESCRIPTION	MATERIAL TYPE
REVISION		'_'			
RN#		OÄM 40-247			
DATE		03.03.06			
DRAWN		MANDL			
CHECK				M. Reicher	
CHECK DATE				20. MRZ. 2006	
STRESS					
STRESS DATE					
APPROVAL					
APPROVAL DATE					

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H.T.	MATERIAL SIZE		SPECIFICATION	SUPPLIER
Size: B	Scale: N.T.S	First Angle	TITLE: SCHEMATIC, ARTEX ME 406 ELT, WIRING	
Dimensions in Millimetres	Tolerances are			
NEXT ASSEMBLY: D4D-9200-00-00			DRAWING NUMBER: D4D-9225-60-02x01	SHEET: 1/1
			REPLACES DWG.#	



QTY	QTY	ITEM	PART NUMBER	DESCRIPTION	MATERIAL TYPE	H.T.	MATERIAL SIZE	SPECIFICATION	SUPPLIER
REVISION		'-'							
RN#		OAM 40-193							
DATE		21.07.05	270805						
DRAWN		KOWARSCH							
CHECK									
CHECK DATE									
STRESS									
STRESS DATE									
APPROVAL									
APPROVAL DATE									

M. Reichel
05 OCT 2005

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Size:	Scale:	First Angle
B	N.T.S	

Dimensions in Millimetres | Tolerances are

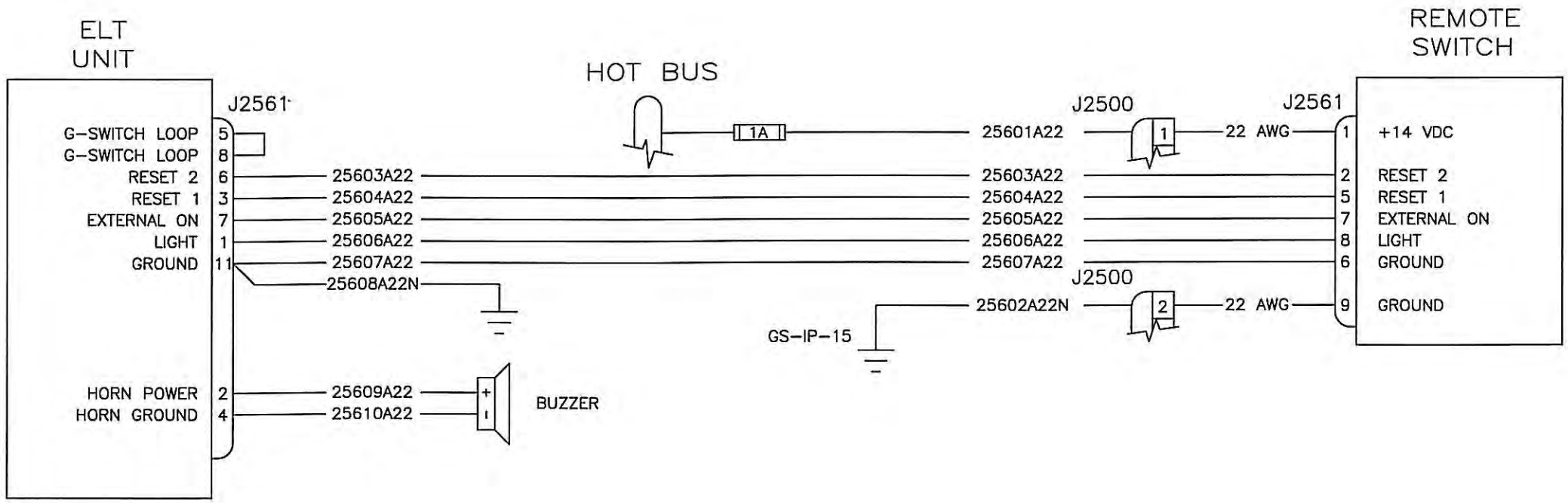
TITLE: SCHEMATIC, EMERGENCY POWER PACKAGE WIRING, DIESEL, G1000

NEXT ASSEMBLY: D4D-9200-00-00

DRAWING NUMBER: D4D-9225-60-03

SHEET: 1/1

REPLACES DWG.#



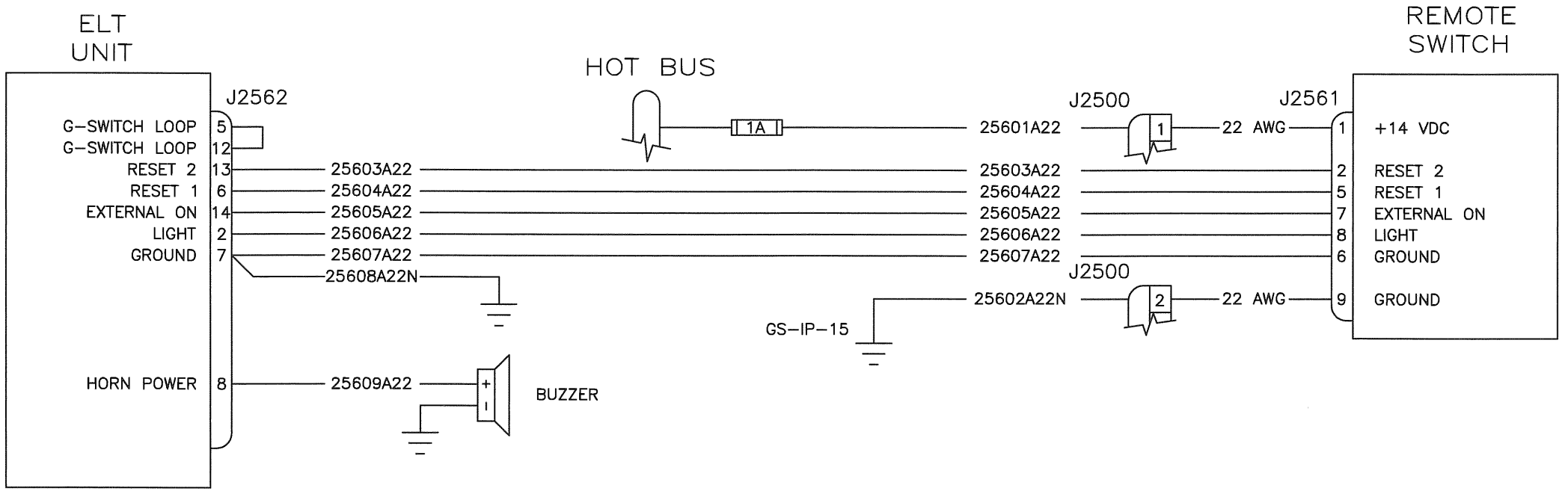
QTY	QTY	ITEM	PART NUMBER	DESCRIPTION	MATERIAL TYPE
REVISION		'–'			
RN#		CAM 40-240			
DATE		19.12.05			
DRAWN		KOWARSCH	11.01.06	M Reichel	
CHECK					
CHECK DATE				2 JAN 2006	
STRESS					
STRESS DATE					
APPROVAL					
APPROVAL DATE					

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H.T.	MATERIAL SIZE		SPECIFICATION	SUPPLIER
Size: B	Scale: N.T.S	First Angle	TITLE: SCHEMATIC, ARTEX 406 MHZ ELT, WIRING, G1000	
Dimensions in Millimetres	Tolerances are			
NEXT ASSEMBLY: D4D-9200-00-00			DRAWING NUMBER: D4D-9225-60-04	SHEET: 1/1
			REPLACES DWG.#	



QTY	QTY	ITEM	PART NUMBER		DESCRIPTION		MATERIAL TYPE	H.T.	MATERIAL SIZE		SPECIFICATION	SUPPLIER
REVISION		'_'	'a'									
RN#		OÄM 40-247	MÄM 40-271									
DATE		09.02.06	03.10.06									
DRAWN		MANDL	KOWARSCH									
CHECK			M. Kowarsch									
CHECK DATE												
STRESS			03 OKT. 2006									
STRESS DATE												
APPROVAL			C. Jäde									
APPROVAL DATE			19 JUNI 2007									

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Do Not Scale Drawing

Size:	Scale:	First Angle
B	N.T.S	

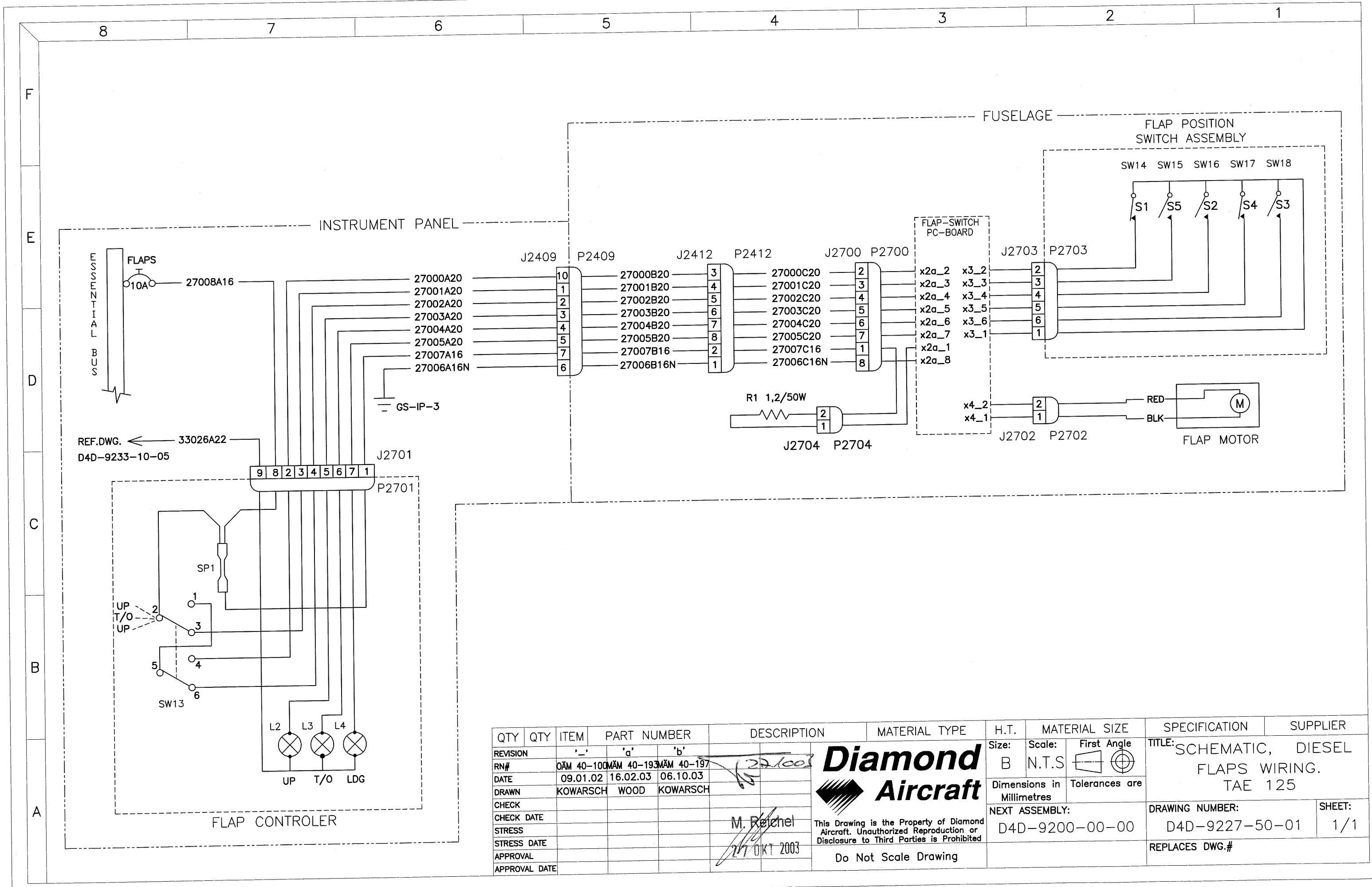
Dimensions in Millimetres | Tolerances are

NEXT ASSEMBLY: D4D-9200-00-00

TITLE: SCHEMATIC, ARTEX ME 406 ELT, WIRING, G1000

DRAWING NUMBER: D4D-9225-60-04x01 | SHEET: 1/1

REPLACES DWG.#



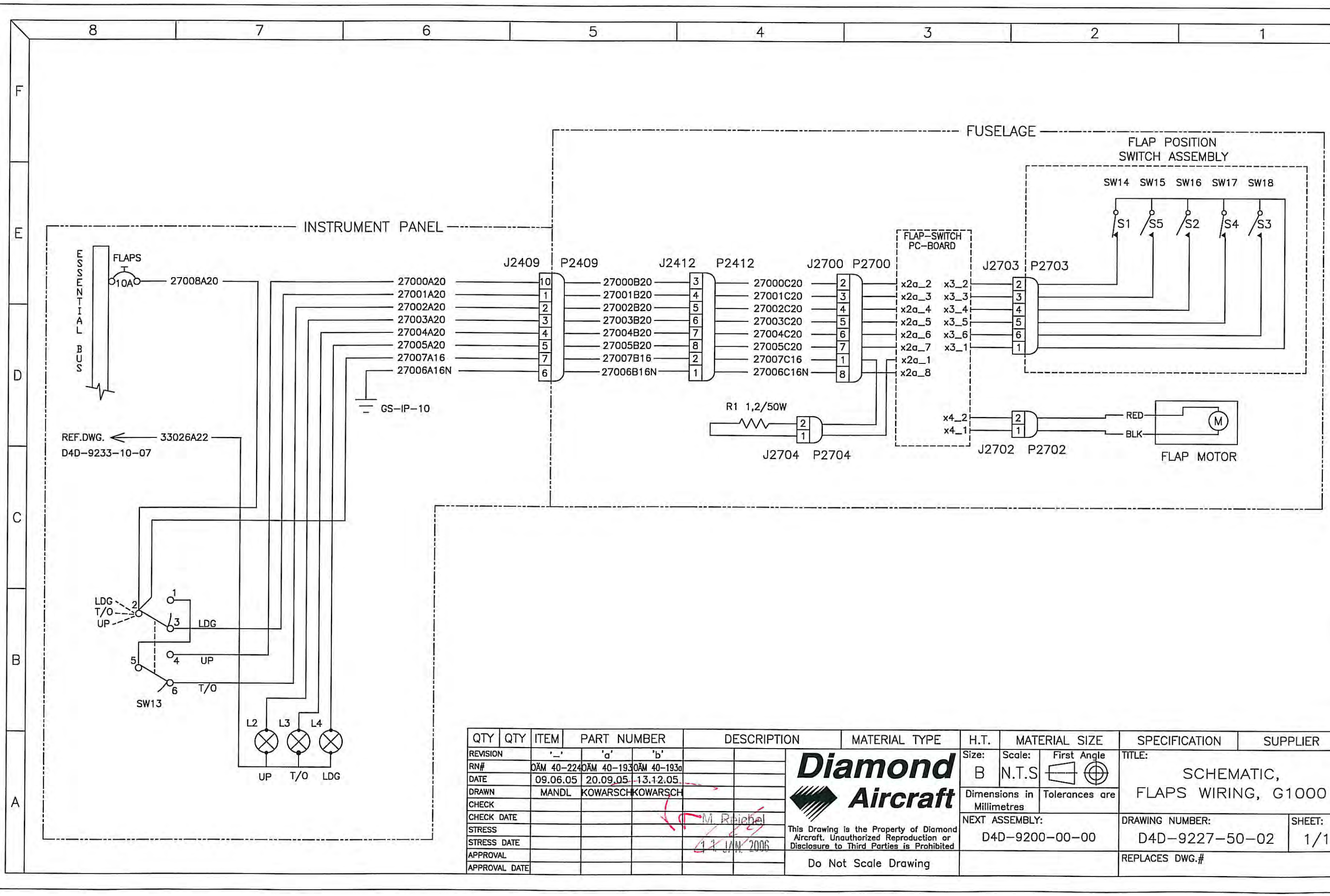
QTY	QTY	ITEM	PART NUMBER			DESCRIPTION	MATERIAL TYPE	H.T.	MATERIAL SIZE		SPECIFICATION	SUPPLIER
REVISION		'_'	'a'	'b'				Size:	Scale:	First Angle	TITLE: SCHEMATIC, DIESEL FLAPS WIRING. TAE 125	
RN#		ÖÄM 40-100	MÄM 40-193	MÄM 40-197				B	N.T.S			
DATE		09.01.02	16.02.03	06.10.03				Dimensions in Millimetres		Tolerances are		
DRAWN		KOWARSCH	WOOD	KOWARSCH				NEXT ASSEMBLY: D4D-9200-00-00			DRAWING NUMBER: D4D-9227-50-01	SHEET: 1/1
CHECK											REPLACES DWG.#	
CHECK DATE												
STRESS												
STRESS DATE												
APPROVAL												
APPROVAL DATE												

M. Reichel
27 OKT 2003

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Do Not Scale Drawing



QTY	QTY	ITEM	PART NUMBER			DESCRIPTION		MATERIAL TYPE	H.T.	MATERIAL SIZE		SPECIFICATION	SUPPLIER
REVISION		'_'	'a'	'b'									
RN#		OÄM 40-224	OÄM 40-193	OÄM 40-193a									
DATE		09.06.05	20.09.05	13.12.05									
DRAWN		MANDL	KOWARSCH	KOWARSCH									
CHECK													
CHECK DATE													
STRESS													
STRESS DATE													
APPROVAL													
APPROVAL DATE													

M. Riedel
17. JAN. 2006

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Do Not Scale Drawing

Size:	Scale:	First Angle
B	N.T.S	

Dimensions in Millimetres | Tolerances are

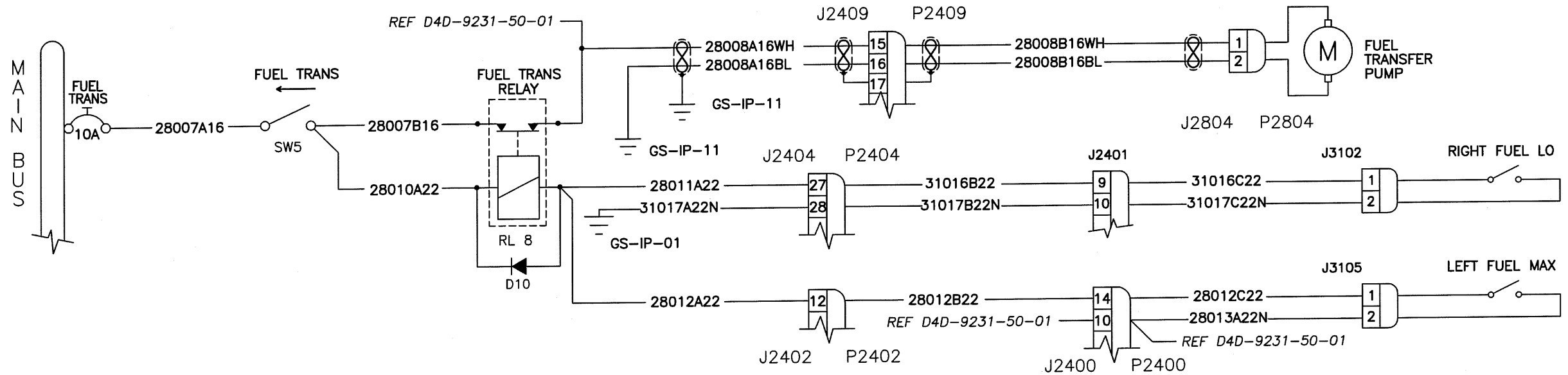
TITLE: SCHEMATIC, FLAPS WIRING, G1000

NEXT ASSEMBLY: D4D-9200-00-00

DRAWING NUMBER: D4D-9227-50-02

SHEET: 1/1

REPLACES DWG.#



QTY	QTY	ITEM	PART NUMBER			DESCRIPTION	MATERIAL TYPE	H.T.	MATERIAL SIZE	SPECIFICATION	SUPPLIER
REVISION		'_'	'a'	'b'	'c'						
RN#					OÄM 40-100						
DATE		10.04.02	05.09.02	24.09.02	10.10.02						
DRAWN		KOWARSCH	KOWARSCH	KOWARSCH	STURGE						
CHECK					M. Voick						
CHECK DATE					13 NOV 2002						
STRESS											
STRESS DATE											
APPROVAL											
APPROVAL DATE											

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Do Not Scale Drawing

Size:	Scale:	First Angle
B	N.T.S	

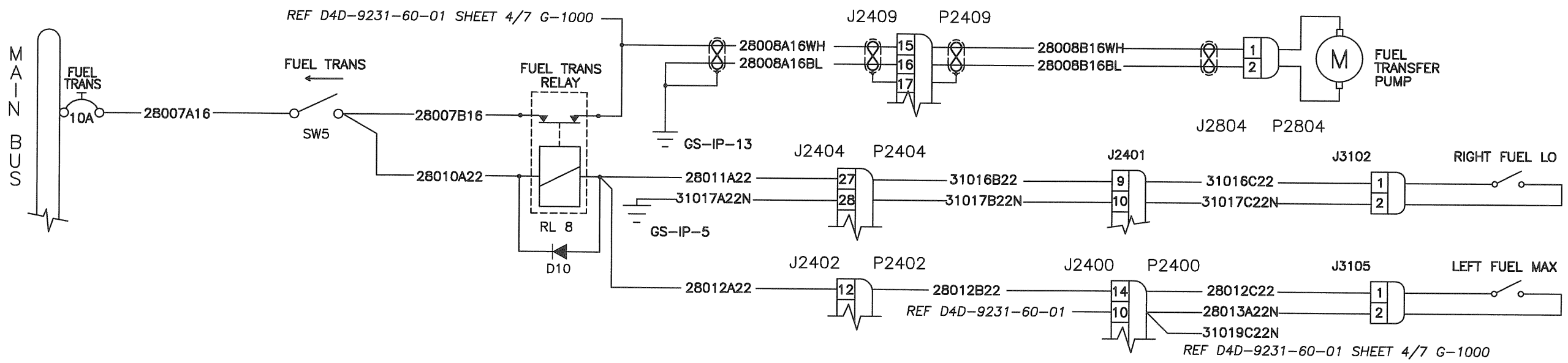
Dimensions in Millimetres | Tolerances are

NEXT ASSEMBLY: D4D-9200-00-00

TITLE: SCHEMATIC, FUEL TRANSFER PUMP TAE 125

DRAWING NUMBER: D4D-9228-20-01 | SHEET: 1/1

REPLACES DWG.#



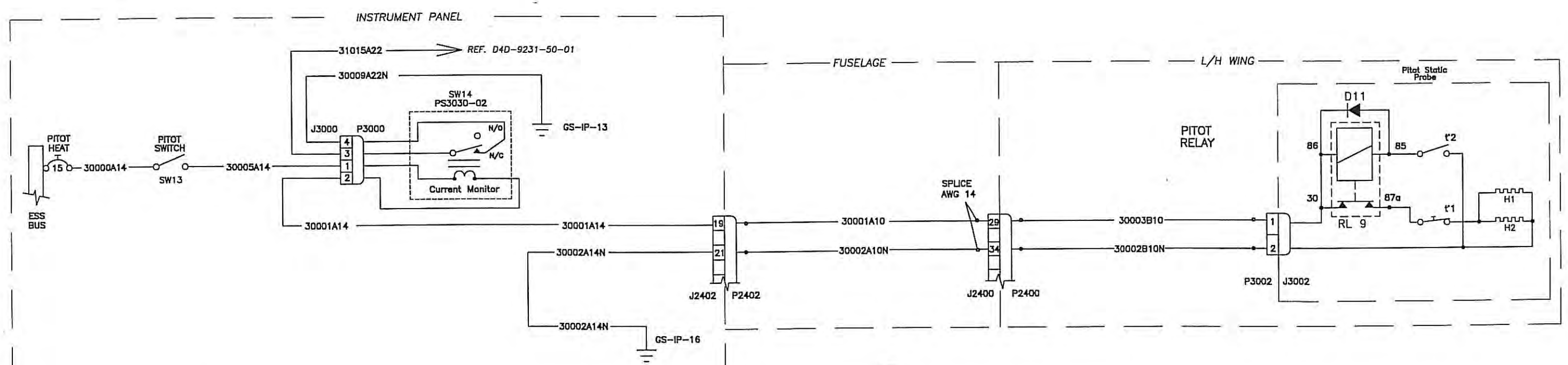
QTY	QTY	ITEM	PART NUMBER		DESCRIPTION	MATERIAL TYPE
REVISION		'_'	'a'	B		
RN#		ÖÄM 40-224	ÖÄM 40-193a	MÄM 40-236		
DATE		16.06.05	16.06.05	30.08.06		
DRAWN		MANDL	KOWARSCH	YC		
CHECK			M. Kowarsch			
CHECK DATE			22. JUNI 2007			
STRESS						
STRESS DATE						
APPROVAL				C. Quitt		
APPROVAL DATE				22. JUNI 2007		

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Do Not Scale Drawing

H.T.	MATERIAL SIZE		SPECIFICATION	SUPPLIER
Size: B	Scale: N.T.S	First Angle	TITLE: SCHEMATIC, FUEL TRANSFER PUMP TAE 125/G1000	
Dimensions in Millimetres	Tolerances are			
NEXT ASSEMBLY: D4D-9200-00-00			DRAWING NUMBER: D4D-9228-20-03	SHEET: 1/1
			REPLACES DWG.#	

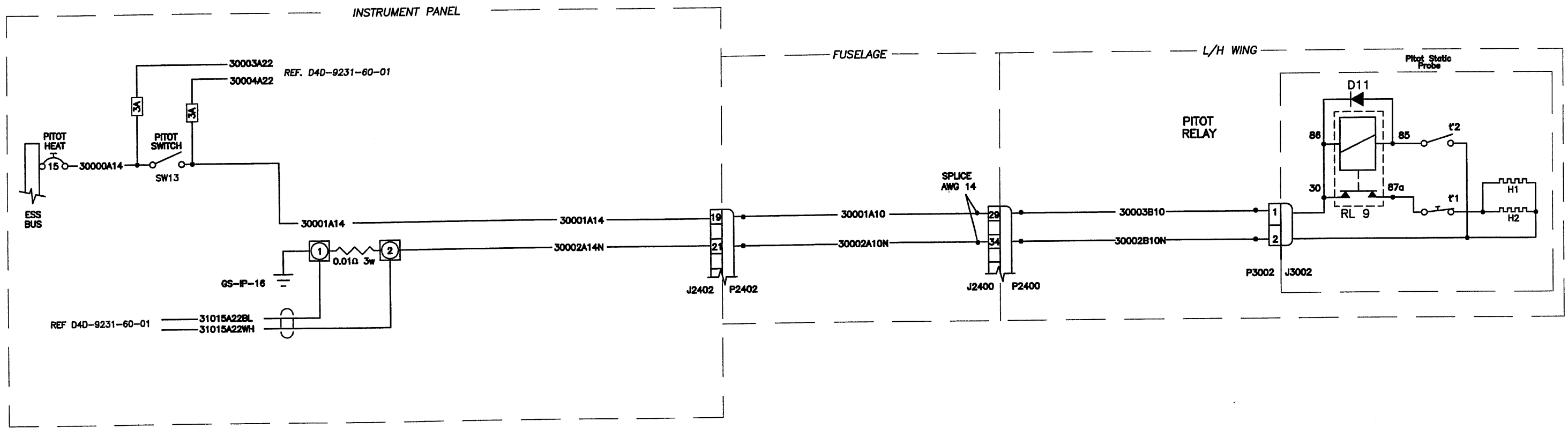


QTY	QTY	ITEM	PART NUMBER			DESCRIPTION	MATERIAL TYPE	H.T.	MATERIAL SIZE		SPECIFICATION	SUPPLIER
REVISION		–	'a'	'b'	'c'			Size:	Scale:	First Angle	TITLE: SCHEMATIC, PITOT HEAT WIRING	
RN#				ÖÄM 40-100	MÄM 40-195			B	NTS			
DATE		10.04.02	01.09.10	15.10.02	14.07.03			Dimensions in Millimetres		Tolerances are		
DRAWN		KOWARSCH	STURGE	KOWARSCH	KOWARSCH			NEXT ASSEMBLY: D4D-9200-00-00			DRAWING NUMBER: D4D-9230-30-01	SHEET: 1/1
CHECK											REPLACES DWG.#	
CHECK DATE												
STRESS												
STRESS DATE												
APPROVAL						M. Reichel						
APPROVAL DATE						22. JULI 2003						

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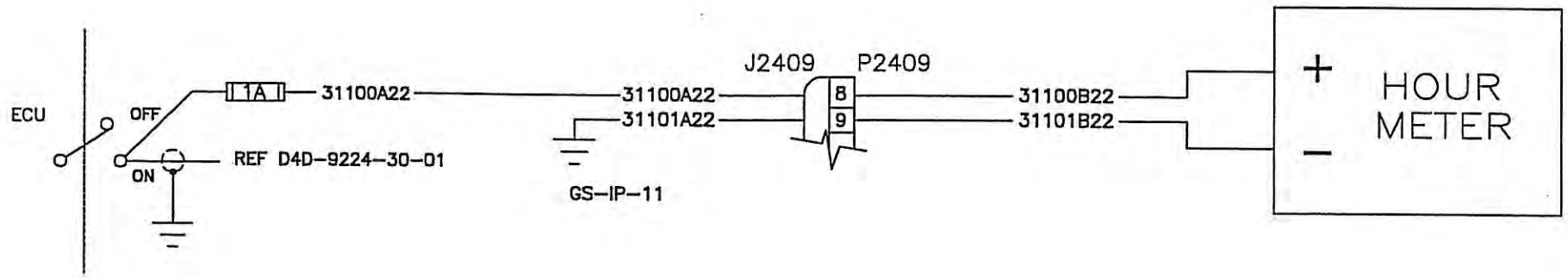
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REVISION		–			
RN#		OAM 40-224			
DATE		08.06.05			
DRAWN		MANDL			
CHECK					
CHECK DATE				M. Reichel	
STRESS					
STRESS DATE				02 SEP 2005	
APPROVAL					
APPROVAL DATE					

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H.T.	MATERIAL SIZE		SPECIFICATION	SUPPLIER
Size: B	Scale: NTS	First Angle	TITLE: SCHEMATIC, PITOT HEAT WIRING	
Dimensions in Millimetres	Tolerances are			
NEXT ASSEMBLY: D4D-9200-00-00			DRAWING NUMBER: D4D-9230-30-02	SHEET: 1/1
			REPLACES DWG.#	



QTY	QTY	ITEM	PART NUMBER	DESCRIPTION	MATERIAL TYPE	H.T.	MATERIAL SIZE	SPECIFICATION	SUPPLIER
REVISION		'–'							
RN#		OAM 40-100							
DATE		15.10.02							
DRAWN		STURGE		M. Volck					
CHECK									
CHECK DATE				13 NOV 2002					
STRESS									
STRESS DATE									
APPROVAL									
APPROVAL DATE									

Diamond Aircraft

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Do Not Scale Drawing

Size:	Scale:	First Angle
B	N.T.S	

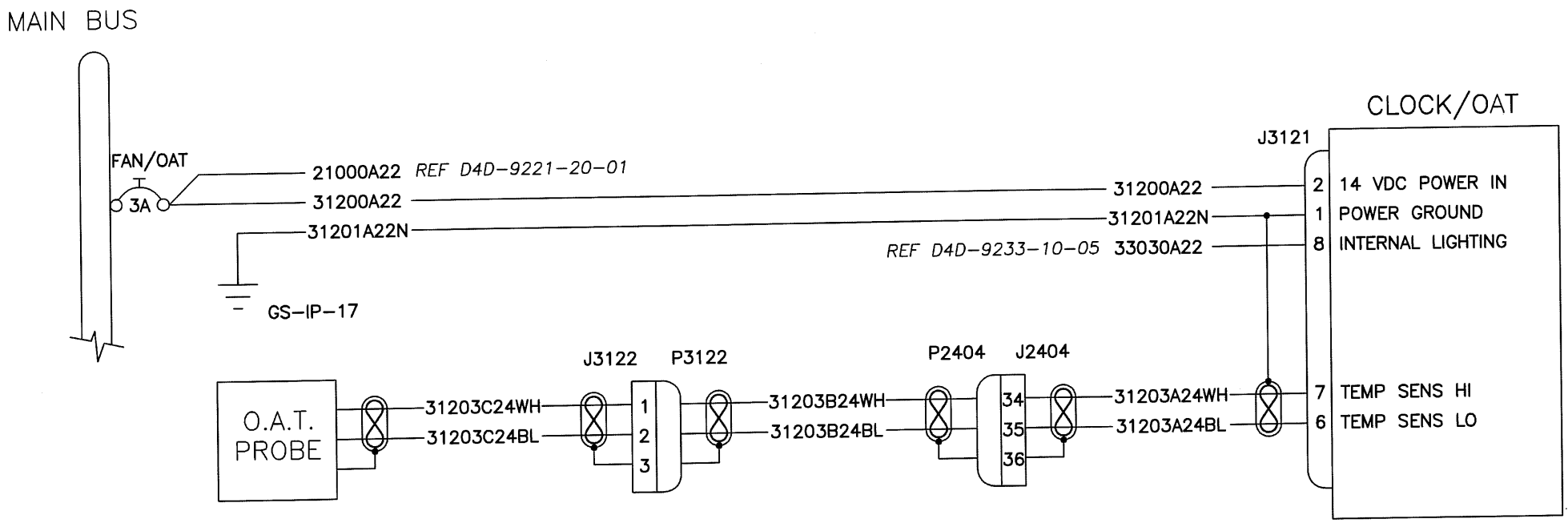
Dimensions in Millimetres | Tolerances are

NEXT ASSEMBLY: D4D-9200-00-00

TITLE: SCHEMATIC, HOURMETER WIRING

DRAWING NUMBER: D4D-9231-20-02 | SHEET: 1/1

REPLACES DWG.#: N/A



QTY	QTY	ITEM	PART NUMBER	DESCRIPTION	MATERIAL TYPE	H.T.	MATERIAL SIZE	SPECIFICATION	SUPPLIER
		'-'							

REVISION	
AN#	MÄM 40-197
DATE	06.10.03
DRAWN	KOWARSCH
CHECK	
CHECK DATE	
STRESS	
STRESS DATE	
APPROVAL	
APPROVAL DATE	

M. Reichel
27. OKT. 2003

Diamond Aircraft

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Do Not Scale Drawing

Size:	Scale:	First Angle
B	NTS	

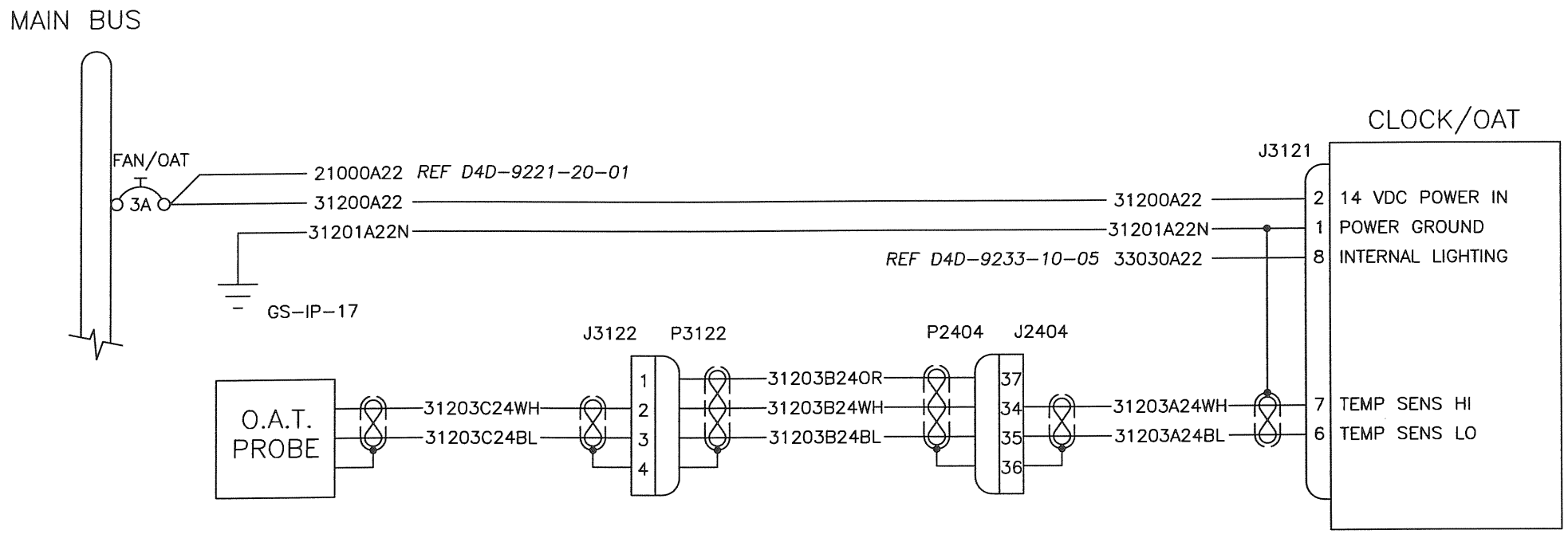
Dimensions in Millimetres | Tolerances are ISO 2768 m

NEXT ASSEMBLY: D4D-9200-00-00

TITLE: SCHEMATIC O.A.T.

DRAWING NUMBER: D4D-9231-20-03 | SHEET: 1/1

REPLACES DWG.#



QTY	QTY	ITEM	PART NUMBER	DESCRIPTION	MATERIAL TYPE	H.T.	MATERIAL SIZE	SPECIFICATION	SUPPLIER
REVISION		'–'							
AN#		MÄM 40-283							
DATE		11.01.07							
DRAWN		KOWARSCH							
CHECK									
CHECK DATE		M. Kowarsch							
STRESS									
STRESS DATE		11 JAN 2007							
APPROVAL									
APPROVAL DATE									

C. Jutte 19 JAN 2007

Diamond Aircraft

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Do Not Scale Drawing

Size:	Scale:	First Angle
B	NTS	

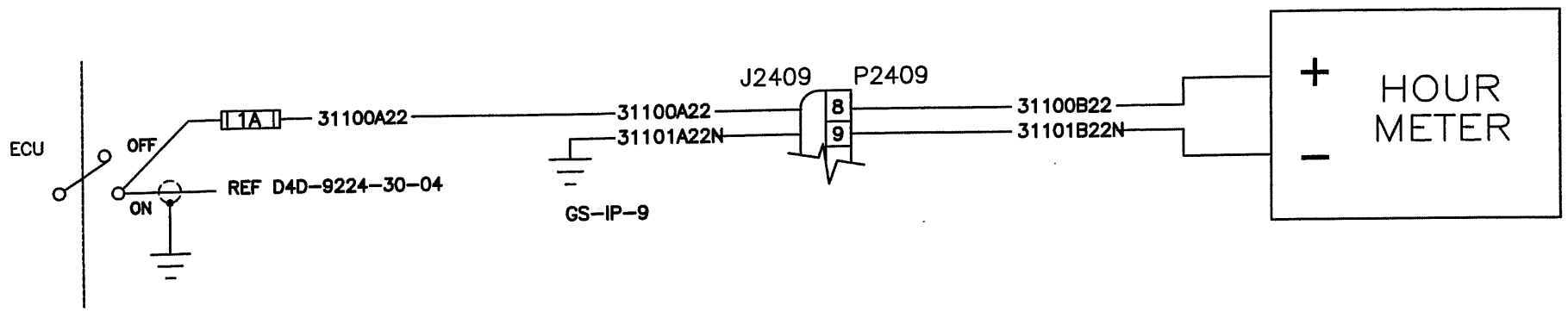
Dimensions in Millimetres | Tolerances are ISO 2768 m

TITLE: SCHEMATIC O.A.T.

NEXT ASSEMBLY: D4D-9200-00-00

DRAWING NUMBER: D4D-9231-20-03_01 | SHEET: 1/1

REPLACES DWG.# D4D-9231-20-03



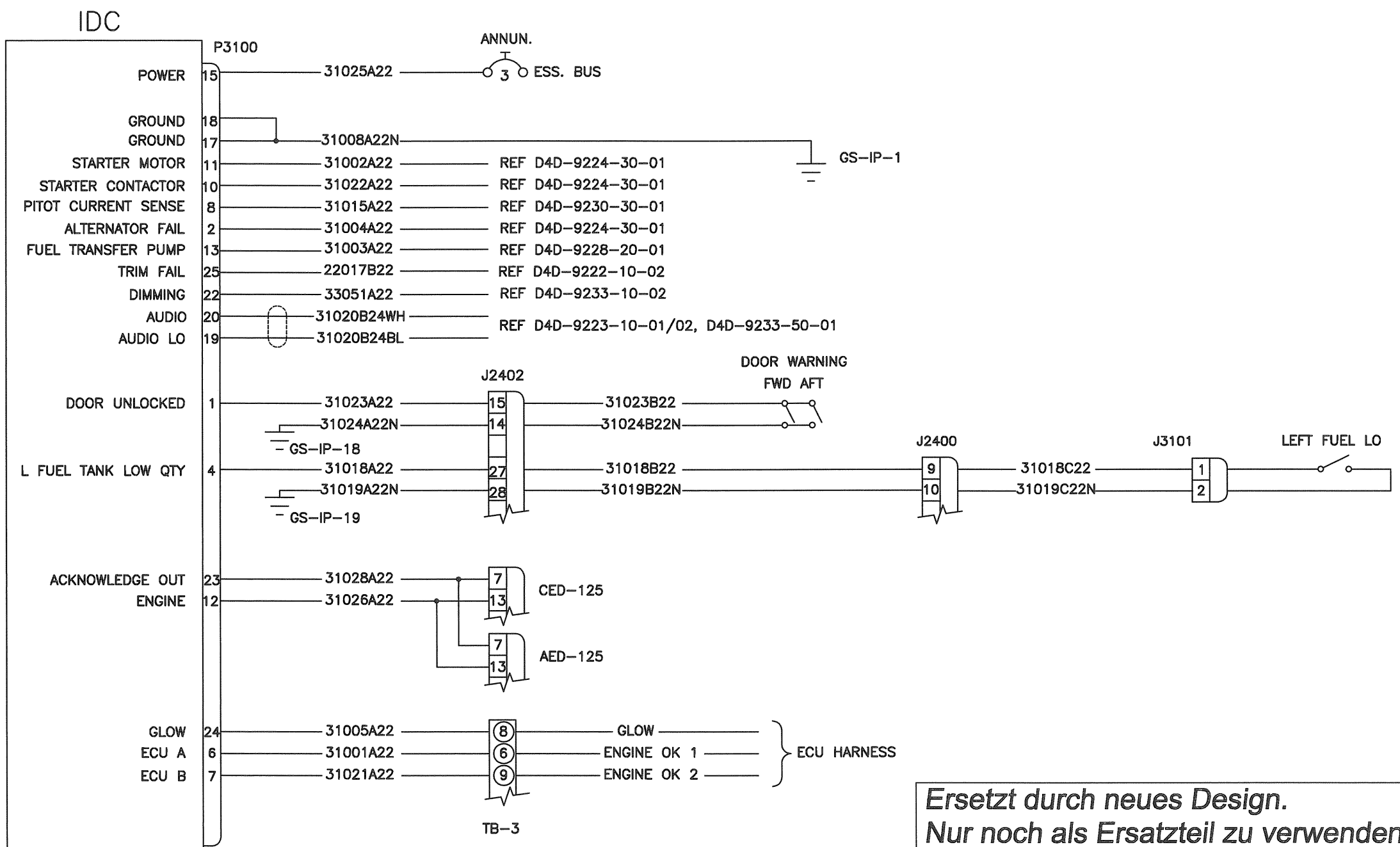
QTY	QTY	ITEM	PART NUMBER	DESCRIPTION	MATERIAL TYPE
REVISION		'_'			
RN#		OÄM 40-224			
DATE		16.06.05			
DRAWN		MANDL			
CHECK					
CHECK DATE					
STRESS				M. Reichel	
STRESS DATE				02 SEP 2005	
APPROVAL					
APPROVAL DATE					

Diamond Aircraft

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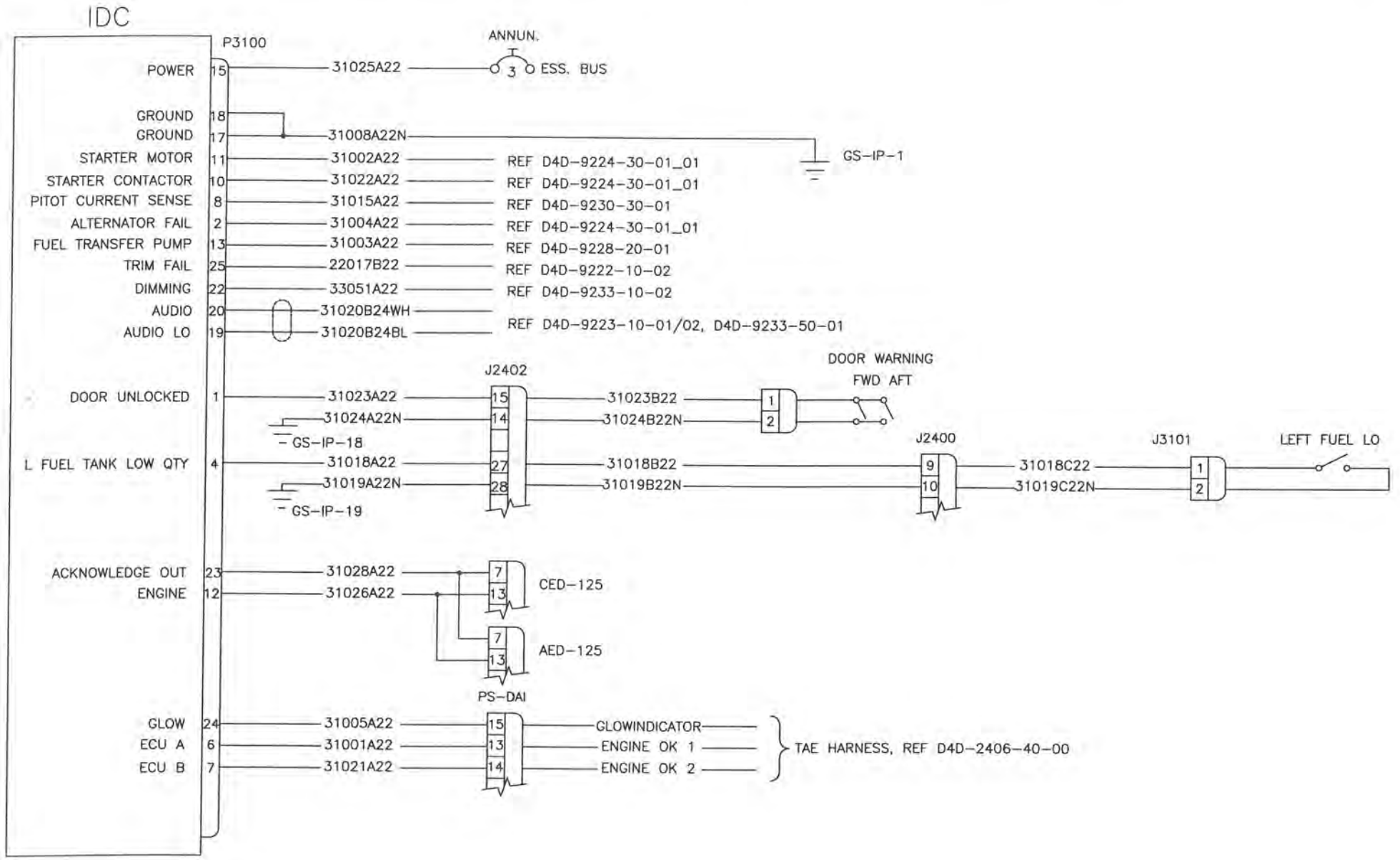
Do Not Scale Drawing

H.T.	MATERIAL SIZE		SPECIFICATION	SUPPLIER
Size: B	Scale: N.T.S	First Angle	TITLE: SCHEMATIC, HOURMETER WIRING G1000	
Dimensions in Millimetres	Tolerances are			
NEXT ASSEMBLY: D4D-9200-00-00			DRAWING NUMBER: D4D-9231-20-04	SHEET: 1/1
			REPLACES DWG.# N/A	



Ersetzt durch neues Design.
Nur noch als Ersatzteil zu verwenden.
Replaced by new design.
To be used only for spare parts.

QTY	QTY	ITEM	PART NUMBER		DESCRIPTION		MATERIAL TYPE	H.T.	MATERIAL SIZE		SPECIFICATION	SUPPLIER
REVISION		'–'	'A'	'B'	'C'	'D'	Diamond Aircraft	Size: B	Scale: N.T.S	First Angle	TITLE: SCHEMATIC CAUTION & WARNING	
RN#				ÖÄM 40-100	MÄM 40-191	MÄM 40-286						
DATE		05.09.02	23.09.02	15.10.02	11.03.03	27.02.07		Dimensions in Millimetres		Tolerances are		
DRAWN		KOWARSCH	STURGE	STURGE	KOWARSCH	Schuster		NEXT ASSEMBLY: D4D-9200-00-00			DRAWING NUMBER: D4D-9231-50-01	SHEET: 1/1
CHECK												
CHECK DATE			M. Voick 19. MRZ. 2007		C. Stürke 19. MRZ. 2007		This Drawing is the Property of Diamond Aircraft. Unauthorized Reproduction or Disclosure to Third Parties is Prohibited					
STRESS												
STRESS DATE							Do Not Scale Drawing				REPLACES DWG.# N/A	
APPROVAL												
APPROVAL DATE												



QTY	QTY	ITEM	PART NUMBER	DESCRIPTION	MATERIAL TYPE	H.T.	MATERIAL SIZE	SPECIFICATION	SUPPLIER
REVISION		'-'							
RN#		MÄM 40-256							
DATE		11.12.06							
DRAWN		KOWARSCH							
CHECK									
CHECK DATE		M. Kowarsch 12 DEZ 2006							
STRESS									
STRESS DATE									
APPROVAL									
APPROVAL DATE									

C. Jütte 20 DEZ. 2006

Diamond Aircraft

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Do Not Scale Drawing

Size:	Scale:	First Angle
B	N.T.S	

Dimensions in Millimetres | Tolerances are

TITLE: SCHEMATIC CAUTION & WARNING TAE 125-02

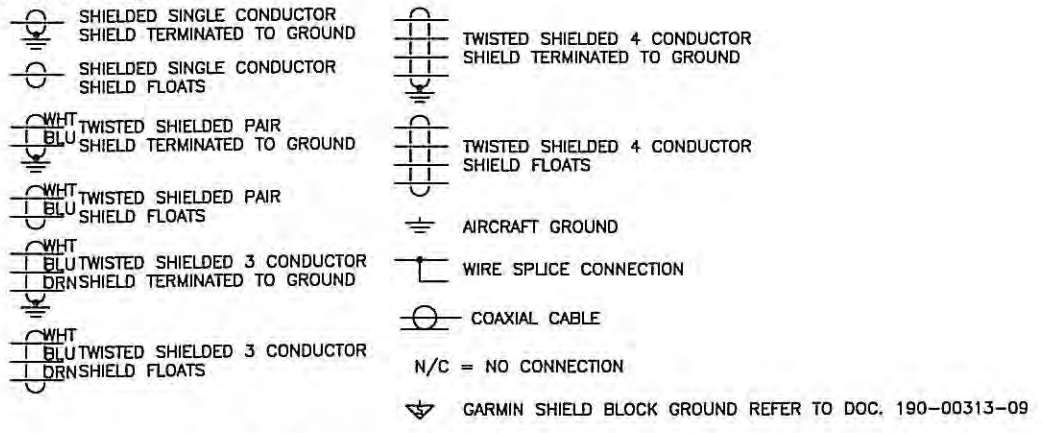
NEXT ASSEMBLY: D4D-9200-00-00

DRAWING NUMBER: D4D-9231-50-01_01 | SHEET: 1/1

REPLACES DWG.# D4D-9231-50-01

NOTES:

1. UNLESS OTHERWISE NOTED, ALL STRANDED WIRE MUST CONFORM TO MIL-W-22759716 OR EQUIVALENT
2. UNLESS OTHERWISE NOTED, ALL SHIELDED WIRE MUST CONFORM TO MIL-C-27500 OR EQUIVALENT
3. UNLESS OTHERWISE NOTED, ALL WIRES ARE 24 GAUGE MINIMUM.
4. SYMBOL DESIGNATIONS



5. UNLESS OTHERWISE NOTED, ALL SHIELD GROUNDS MUST BE MADE TO THE RESPECTIVE UNIT BACKSHELL
   ALL OTHER GROUNDS SHOULD BE TERMINATED TO AIRCRAFT GROUND AS CLOSE TO THE RESPECTIVE UNIT AS POSSIBLE.
7. USE AIRCRAFT GRADE CATEGORY 5 ETHERNET CABLE

MANUFACTURER	P/N
PIC WIRE AND CABLE	E10422 (22 GAUGE)
PIC WIRE AND CABLE	E10424 (24 GAUGE)
ELECTRONIC CABLE SPECIALIST	392404 (24 GAUGE)

8. INSTALLATION INSTRUCTIONS FOR OAT PROBE, GMU 44, GND HARNESS, CONFIGURATION MODULES, AND THERMOCOUPLES.

DESCRIPTION	DRAWING NUMBER
INSTR SHEET, OAT PROBE	190-00313-00
INSTR SHEET, GMU 44	190-00313-04
INSTR SHEET, CONFIG MODULE	190-00313-02
INSTR SHEET, THERMOCOUPLE	190-00313-01

9. FOR FAN FAIL OUTPUT: OPEN = ACTIVE = FAN FAIL, GROUND = INACTIVE = FAN OK
10. FOR TRIM FAIL OUTPUT: GROUND = ACTIVE = TRIM FAIL, OPEN = INACTIVE = TRIM OK

19. RELATED DOCUMENTS
    190-00295-36 UNIT INTERCONNECT SUMMARY
    190-00295-37 UNIT POWER.
    190-00295-38 INTERCONNECT.

21. FOR GROUNDING PROCEDURES, REFER TO 190-00313-00 & 190-00313-04
    ADDITIONAL FOR IFR OPERATION, REFER TO GARMIN DOCUMENT 190-00313-09.

22: NOTE THE FOLLOWING PIN DIFFENCES IN REV 2 AND REV 3 GIA 63 P603

PIN NAME	REV 2 PIN	REV 3 PIN
CAN BUS 1 TERMINATION	35	34
CAN BUS 2 HI	29	32

REV 2 UNITS HAVE SERIAL NUMBERS LESS THAN 46901600
REV 3 UNITS HAVE SERIAL VUMBERS OF 46901600 OR GREATER

QTY	QTY	ITEM	PART NUMBER		DESCRIPTION		MATERIAL TYPE	H.T.	MATERIAL SIZE	SPECIFICATION	SUPPLIER
REVISION		'a'	'b'	'c'	'd'	'e'					
AN#		OÄM 40-193	OÄM 40-193a	OÄM 40-241	MÄM 40-248	MÄM 40-280					
DATE		01.09.05	13.12.05	07.02.06	20.03.06	18.01.07					
DRAWN		KOWARSCH	KOWARSCH	KØWARSCH	KOWARSCH	KOWARSCH					
CHECK			B. Jäger		M. Kowarsch						
CHECK DATE			18. JAN. 2007		18. JAN. 2007						
STRESS											
STRESS DATE											
APPROVAL											
APPROVAL DATE											

Diamond Aircraft

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Do Not Scale Drawing

Size: B | Scale: NTS | First Angle

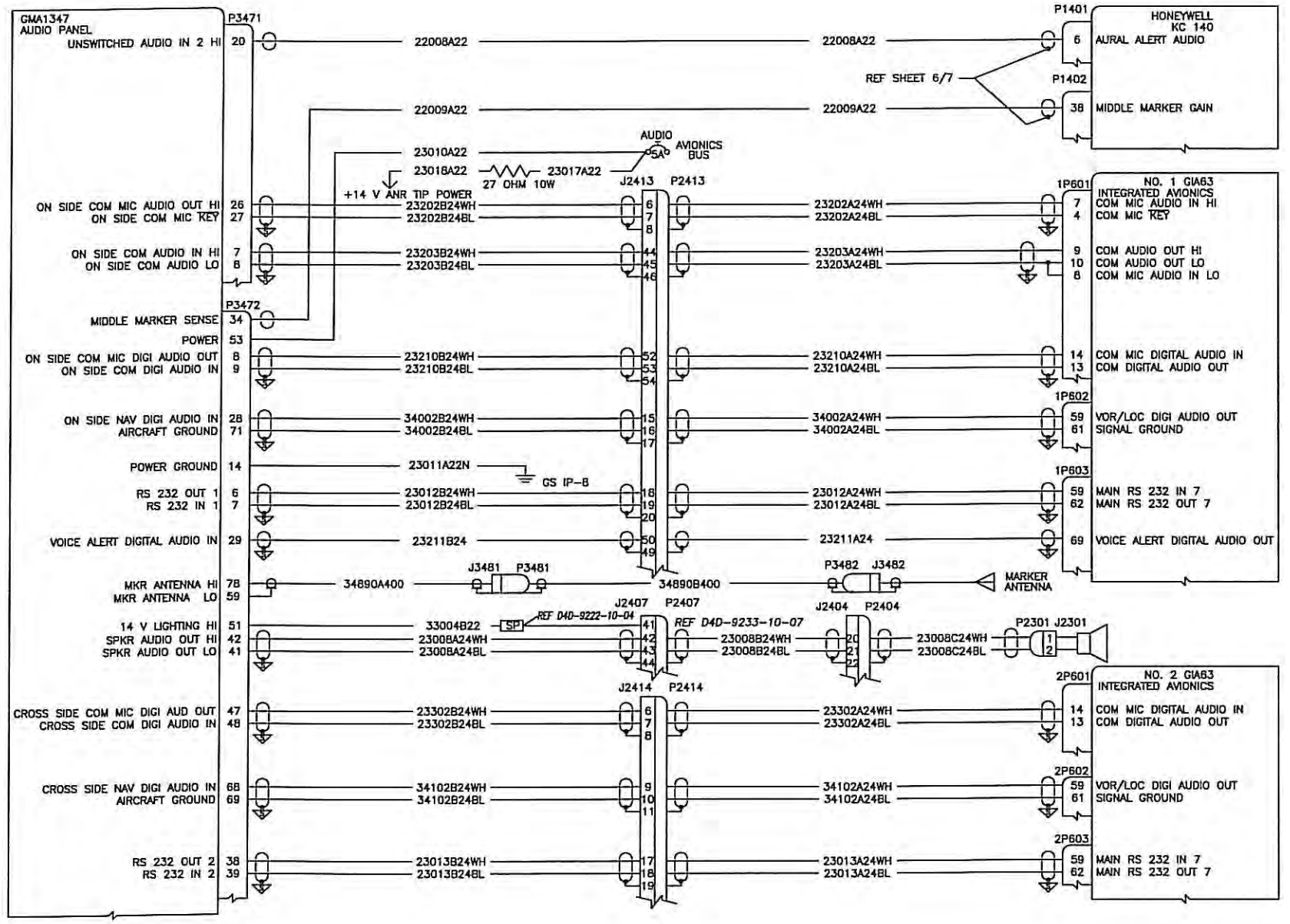
Dimensions in Millimetres | Tolerances are ISO 2768 m

NEXT ASSEMBLY: D4D-9200-00-00

TITLE: SCHEMATIC G 1000

DRAWING NUMBER: D4D-9231-60-01 | SHEET: 1/7

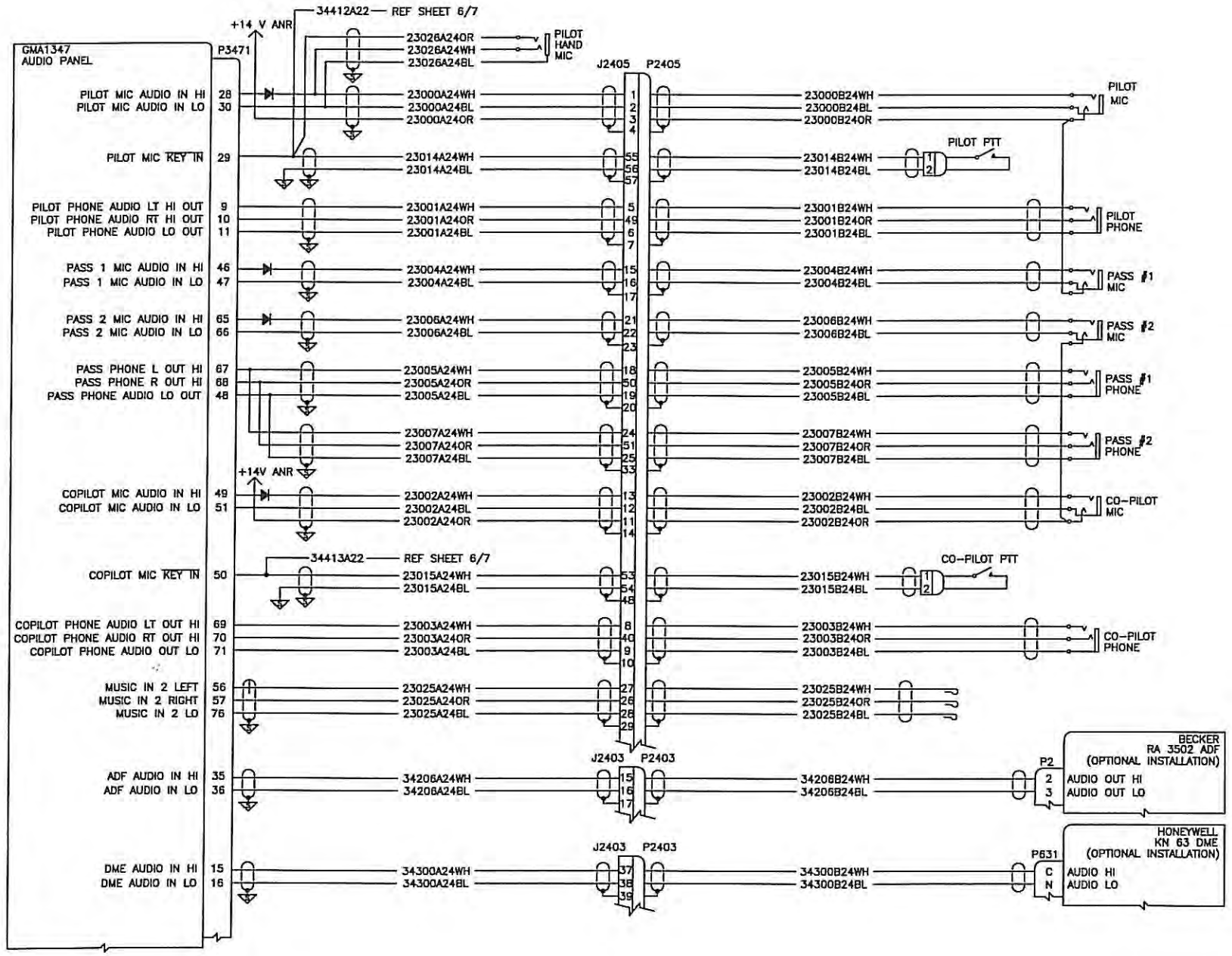
REPLACES DWG.#



QTY	QTY	ITEM	PART NUMBER		DESCRIPTION		MATERIAL TYPE	H.T.	MATERIAL SIZE		SPECIFICATION	SUPPLIER
REVISION		'a'	'b'	'c'	'd'	'e'	Diamond Aircraft	Size: B	Scale: NTS	First Angle	TITLE: SCHEMATIC G 1000	
AN#		OÄM 40-193	OÄM 40-193a	OÄM 40-241	MÄM 40-248	MÄM 40-280		Dimensions in Millimetres		Tolerances are ISO 2768 m		
DATE		01.09.05	13.12.05	07.02.06	20.03.06	18.01.07		NEXT ASSEMBLY: D4D-9200-00-00			DRAWING NUMBER: D4D-9231-60-01	SHEET: 2/7
DRAWN		KOWARSCH	KOWARSCH	KOWARSCH	KOWARSCH	KOWARSCH					REPLACES DWG.#	
CHECK			B. Jäger		M. Kowarsch							
CHECK DATE												
STRESS					18. JAN. 2007							
STRESS DATE			18. JAN. 2007									
APPROVAL												
APPROVAL DATE												

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Do Not Scale Drawing



QTY	QTY	ITEM	PART NUMBER		DESCRIPTION		MATERIAL TYPE	H.T.	MATERIAL SIZE	SPECIFICATION	SUPPLIER
REVISION		'a'	'b'	'c'	'd'	'e'					
AN#		OÄM 40-193	OÄM 40-193a	OÄM 40-241	MÄM 40-248	MÄM 40-280					
DATE		01.09.05	13.12.05	07.02.06	20.03.06	18.01.07					
DRAWN		KOWARSCH	KOWARSCH	KOWARSCH	KOWARSCH	KOWARSCH					
CHECK			B. Jäger								
CHECK DATE			18. JAN. 2007		M. Kowarsch						
STRESS											
STRESS DATE					18. JAN. 2007						
APPROVAL											
APPROVAL DATE											

Diamond Aircraft

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Do Not Scale Drawing

Size: B | Scale: NTS | First Angle

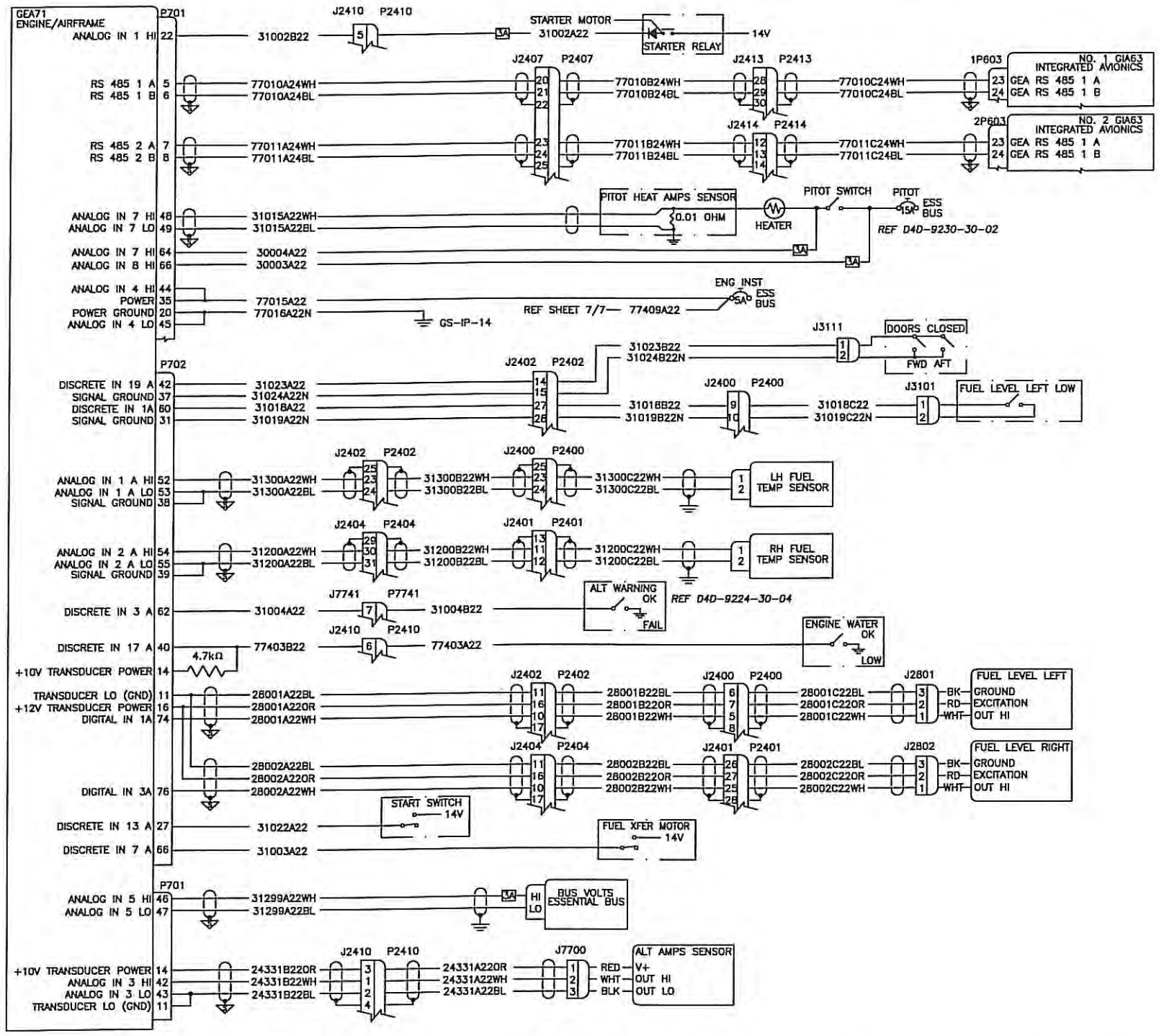
Dimensions in Millimetres | Tolerances are ISO 2768 m

NEXT ASSEMBLY: D4D-9200-00-00

TITLE: SCHEMATIC G 1000

DRAWING NUMBER: D4D-9231-60-01 | SHEET: 3/7

REPLACES DWG.#



QTY	QTY	ITEM	PART NUMBER		DESCRIPTION		MATERIAL TYPE	H.T.	MATERIAL SIZE		SPECIFICATION	SUPPLIER
REVISION		'a'	'b'	'c'	'd'	'e'						
AN#		OÄM 40-193	OÄM 40-193a	OÄM 40-241	MÄM 40-248	MÄM 40-280						
DATE		01.09.05	13.12.05	07.02.06	20.03.06	18.01.07						
DRAWN		KOWARSCH	KOWARSCH	KOWARSCH	KOWARSCH	KOWARSCH						
CHECK												
CHECK DATE			B. Jäger		M. Kowarsch							
STRESS												
STRESS DATE			18. JAN. 2007		18. JAN. 2007							
APPROVAL												
APPROVAL DATE												

Diamond Aircraft

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Do Not Scale Drawing

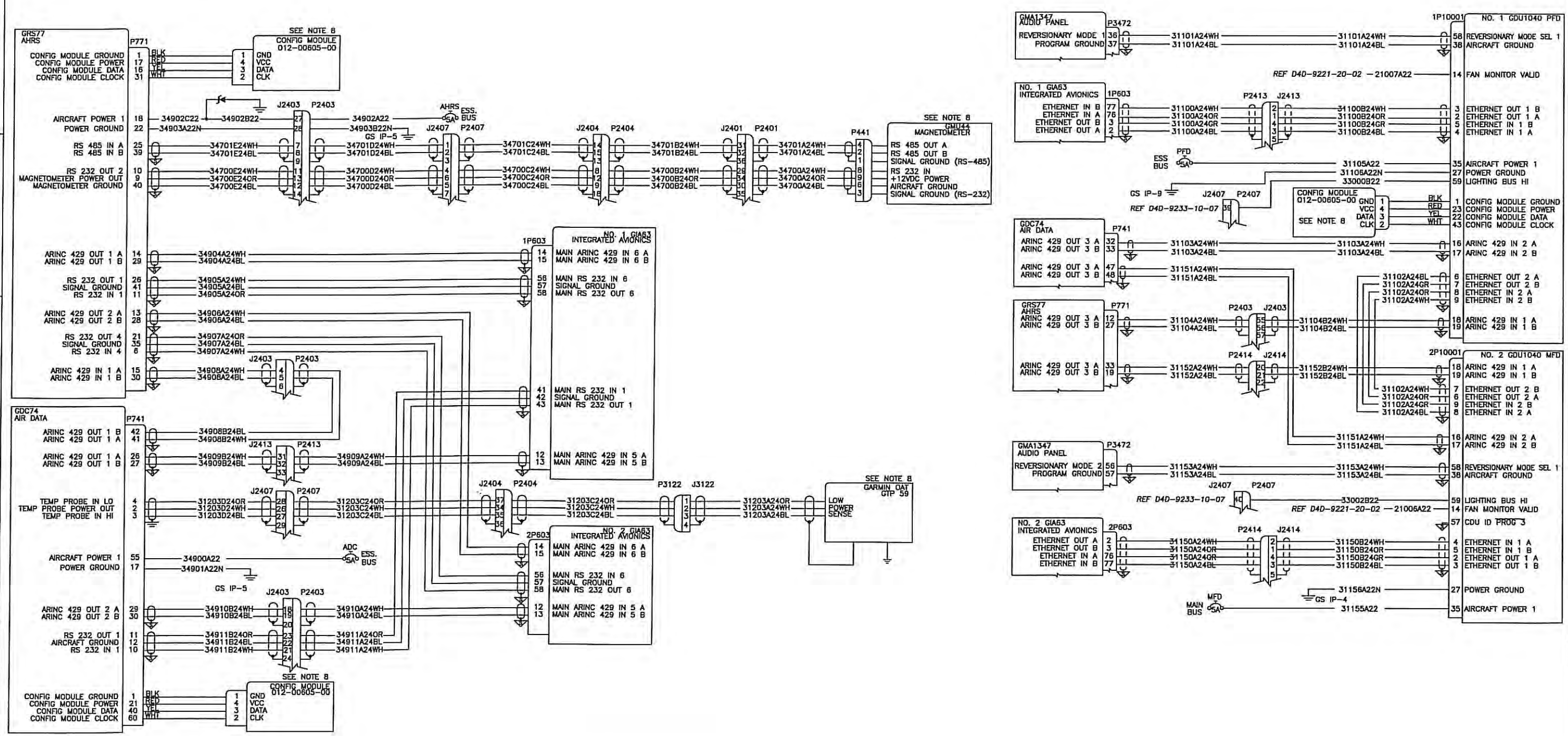
Size: B | Scale: NTS | First Angle | Dimensions in Millimetres | Tolerances are ISO 2768 m

NEXT ASSEMBLY: D4D-9200-00-00

TITLE: SCHEMATIC G 1000

DRAWING NUMBER: D4D-9231-60-01 | SHEET: 4/7

REPLACES DWG.#



QTY	QTY	ITEM	PART NUMBER	DESCRIPTION	MATERIAL TYPE	H.T.	MATERIAL SIZE	SPECIFICATION	SUPPLIER

REVISION	'a'	'b'	'c'	'd'	'e'
AN#	OÄM 40-193	OÄM 40-193a	OÄM 40-241	MÄM 40-248	MÄM 40-280
DATE	01.09.05	13.12.05	07.02.06	20.03.06	18.01.07
DRAWN	KOWARSCH	KOWARSCH	KOWARSCH	KOWARSCH	KOWARSCH
CHECK					
CHECK DATE		B. Jäger		M. Kowarsch	
STRESS					
STRESS DATE		18. JAN. 2007		18. JAN. 2007	
APPROVAL					
APPROVAL DATE					

Diamond Aircraft

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Do Not Scale Drawing

Size: B | Scale: NTS | First Angle

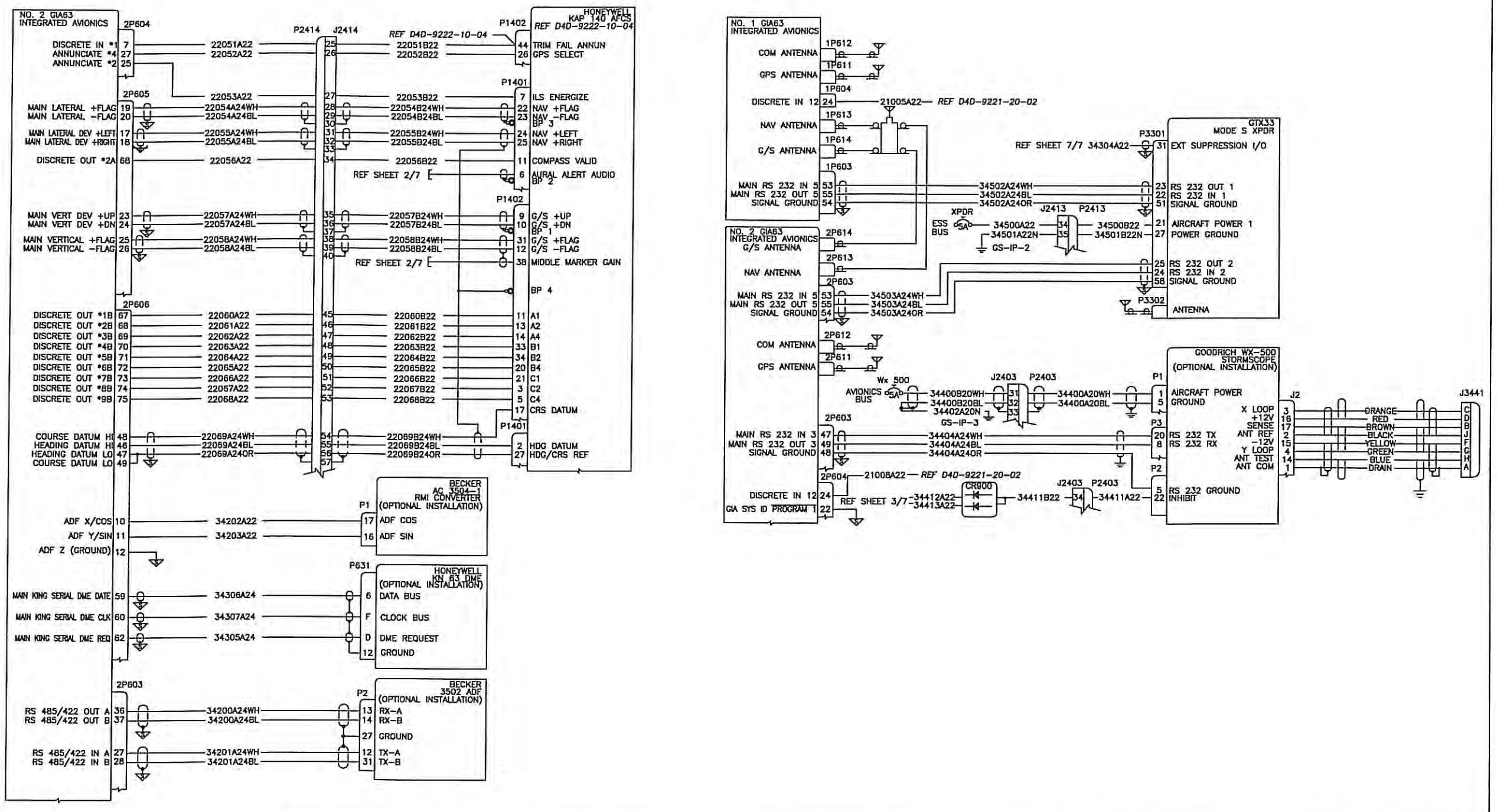
Dimensions in Millimetres | Tolerances are ISO 2768 m

TITLE: SCHEMATIC G 1000

NEXT ASSEMBLY: D4D-9200-00-00

DRAWING NUMBER: D4D-9231-60-01 | SHEET: 5/7

REPLACES DWG.#



QTY	QTY	ITEM	PART NUMBER		DESCRIPTION		MATERIAL TYPE	H.T.	MATERIAL SIZE		SPECIFICATION	SUPPLIER
REVISION		'a'	'b'	'c'	'd'	'e'						
AN#		ÖÄM 40-193	ÖÄM 40-193a	ÖÄM 40-241	MÄM 40-248	MÄM 40-280						
DATE		01.09.05	13.12.05	07.02.06	20.03.06	18.01.07						
DRAWN		KOWARSCH	KOWARSCH	KOWARSCH	KOWARSCH	KOWARSCH						
CHECK					M. Kowarsch							
CHECK DATE			B. Jäger		18. JAN. 2007							
STRESS												
STRESS DATE			18. JAN. 2007									
APPROVAL												
APPROVAL DATE												

Diamond Aircraft

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Do Not Scale Drawing

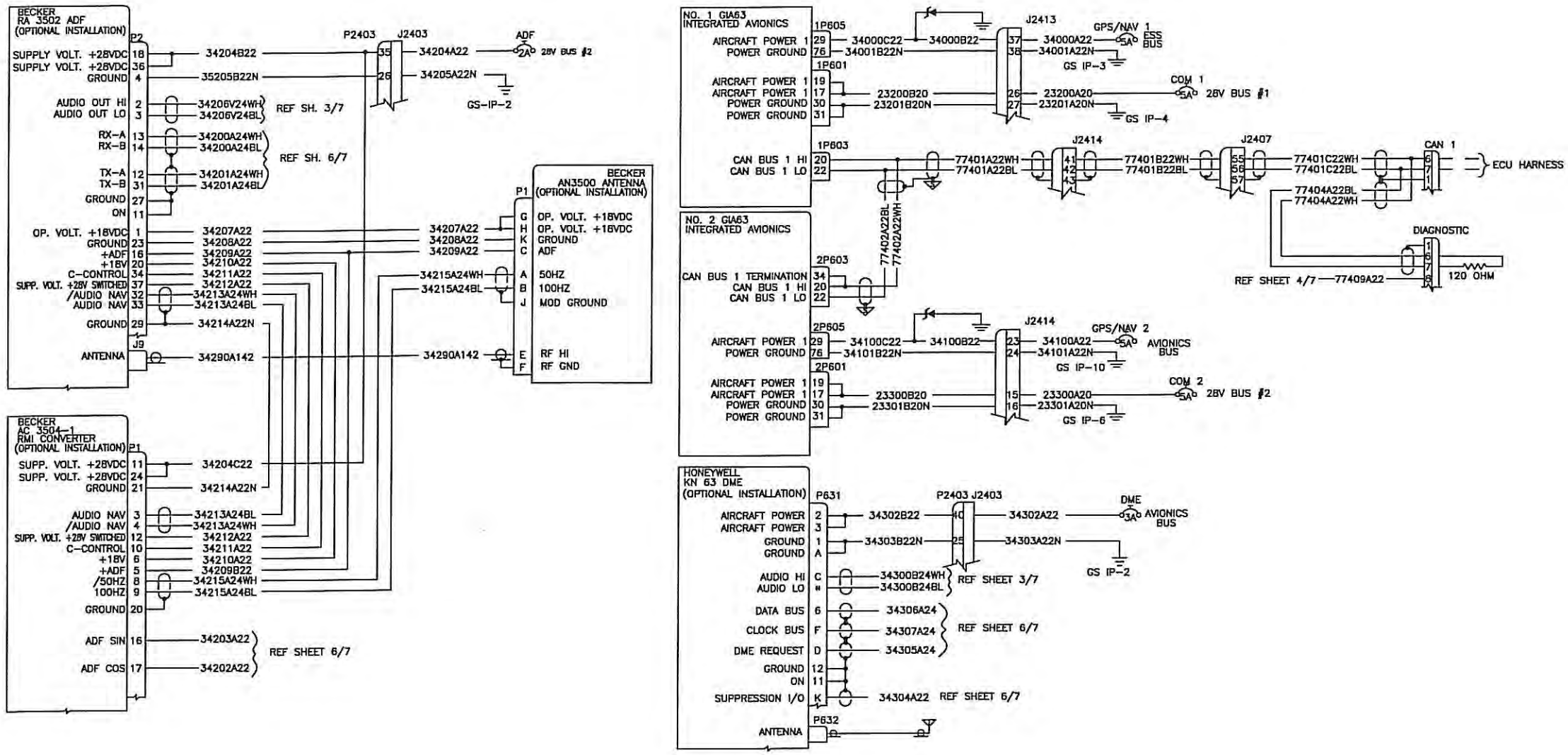
Size: B | Scale: NTS | First Angle | Dimensions in Millimetres | Tolerances are ISO 2768 m

NEXT ASSEMBLY: D4D-9200-00-00

TITLE: SCHEMATIC G 1000

DRAWING NUMBER: D4D-9231-60-01 | SHEET: 6/7

REPLACES DWG.#



QTY	QTY	ITEM	PART NUMBER		DESCRIPTION		MATERIAL TYPE	H.T.	MATERIAL SIZE		SPECIFICATION	SUPPLIER
REVISION		'a'	'b'	'c'	'd'	'e'						
AN#		OÄM 40-193	OÄM 40-193a	OÄM 40-241	MÄM 40-248	MÄM 40-280						
DATE		01.09.05	13.12.05	07.02.06	20.03.06	18.01.07						
DRAWN		KOWARSCH	KOWARSCH	KOWARSCH	KOWARSCH	KOWARSCH						
CHECK			B. Jäger		M. Kowarsch							
CHECK DATE												
STRESS												
STRESS DATE			18. JAN. 2007		18. JAN. 2007							
APPROVAL												
APPROVAL DATE												

Diamond Aircraft

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Do Not Scale Drawing

Size:	Scale:	First Angle
B	NTS	
Dimensions in Millimetres	Tolerances are ISO 2768 m	

TITLE: SCHEMATIC G 1000

NEXT ASSEMBLY: D4D-9200-00-00

DRAWING NUMBER: D4D-9231-60-01

SHEET: 7/7

REPLACES DWG.#

REVISION					
REV	SH	ZONE	DESCRIPTION	DATE	APPROVAL
-	01	ALL	MÄM 40-422 FIRST RELEASE	12.05.10	JÜTTE
A	01	ALL	MÄM 40-594 REVISION LEVEL RAISED DUE TO CHANGES ON SHEET 7. (REDLINECORR.)	22.05.12	SEE TB

NOTES:

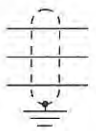
1. SYMBOL DESIGNATIONS

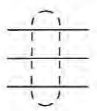

TWISTED SHIELDED SINGLE CONDUCTOR
SHIELD TERMINATED TO GROUND


TWISTED SHIELDED SINGLE CONDUCTOR
SHIELD FLOATS

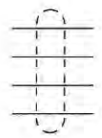

TWISTED SHIELDED PAIR
SHIELD TERMINATED TO GROUND


TWISTED SHIELDED PAIR
SHIELD FLOATS


TWISTED SHIELDED 3 CONDUCTOR
SHIELD TERMINATED TO GROUND

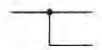

TWISTED SHIELDED 3 CONDUCTOR
SHIELD FLOATS

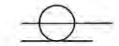

TWISTED SHIELDED 4 CONDUCTOR
SHIELD TERMINATED TO GROUND


TWISTED SHIELDED 4 CONDUCTOR
SHIELD FLOATS


AIRCRAFT GROUND


GARMIN (SHIELD BLOCK) GROUND
REFER TO DOC. 190-00313-09


WIRE SPLICE CONNECTION


COAXIAL CABLE

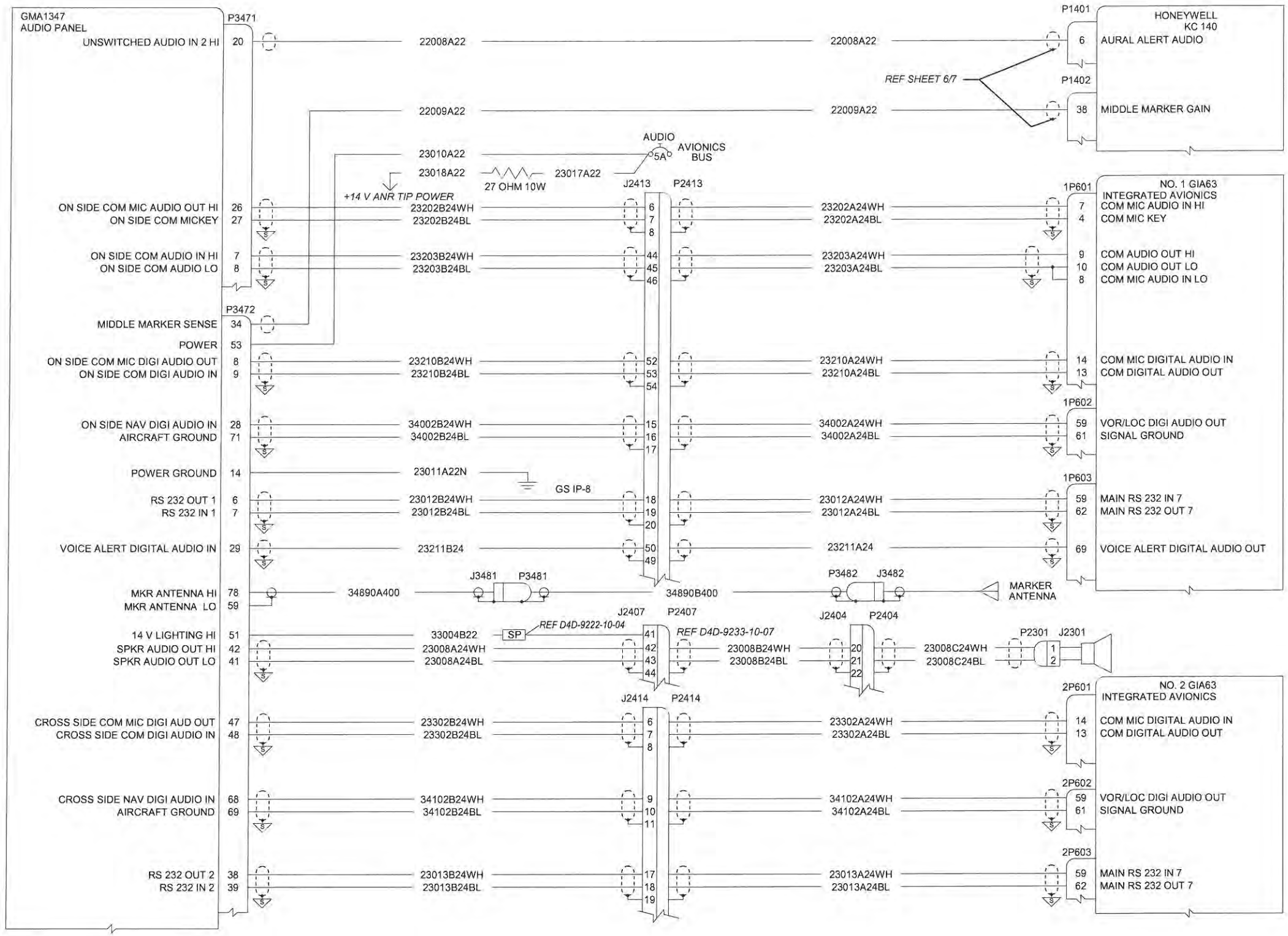
N/C = NO CONNECTION

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DIMENSIONS **METRIC**	IDENTIFICATION MARKINGS **DP-S-17-00001** - -	Diamond Aircraft Industries GmbH	Diamond Aircraft Industries, N. A. Otto-Straße 5, A-2700 Wiener Neustadt
FIRST ANGLE PROJECTION / FORMAT **A3**	CLASSIFICATION: **NONE**	DEPARTMENT / SIGN / DATE	PROJECT **DA 40 D**
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN MM	INTERCHANGEABLE PART **NO**	DRAWN **Schuster** / 22.05.12	TITLE **SCHEMATIC, G1000**
DIMENSION TOLERANCES 3.2	THIS DRAWING WAS PRODUCED USING	CHECKED: **Scheikl** / 3. AUG. 2012	
2 DECIMAL ±0,25 1DECIMAL ±0,5 DECIMAL ±1 ANGLE ±1° RAD ±0,5	SOFTWARE: **SOLID EDGE V18**	QA: **N/A**	
FINISH IN MICRO-METER	FILENAME **D4D-9231-60-01_01a.dft**	STRESS: **N/A**	
		MANUF.: **N/A**	
		SYSTEM: **Kowarsch** / 13-Sep-2012	DWG.ORIG. **DAIA** / DWG.NO. **D4D-9231-60-01_01** / REV "A"
		APPROVED: **Burger** / 25-09-2012	CODE **710197** / SCALE NTS / SH **01** OF **07**

Confidential

REVISION					
REV	SH	ZONE	DESCRIPTION	DATE	APPROVAL
-	02	ALL	MÄM 40-422 FIRST RELEASE	12.05.10	JÜTTE
A	02	ALL	MÄM 40-594 REVISION LEVEL RAISED DUE TO CHANGES ON SHEET 7. (REDLINECORR.)	22.05.12	SEE TB



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DIMENSIONS **METRIC**
FIRST ANGLE PROJECTION
FORMAT **A2**
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN MM
DIMENSION TOLERANCES
2 DECIMAL ±0,25
1DECIMAL ±0,5
DECIMAL ±1
ANGLE ±1°
RAD ±0,5
3.2
FINISH IN MICRO-METER

IDENTIFICATION MARKINGS
DP-S-17-00001
CLASSIFICATION:
NONE
INTERCHANGEABLE PART **NO**
THIS DRAWING WAS PRODUCED USING
SOFTWARE: **SOLID EDGE V18**
FILENAME:
D4D-9231-60-01_01a.dft

Diamond Aircraft Industries GmbH
Diamond Aircraft Industries
N. A. Otto-Straße 5
A-2700 Wiener Neustadt

		SIGN	DATE
DEPARTMENT			
DRAWN	**Schuster**		**22.05.12**
CHECKED:	**Scheikl**		13.Sep.2012
QA:	**N/A**		
STRESS:	**N/A**		
MANUF.:	**N/A**		
SYSTEM:	**Kowarsch**		13-Sep-2012
APPROVED:	**Burger**		25-09-2012

PROJECT **DA 40 D**
TITLE
SCHEMATIC, G1000

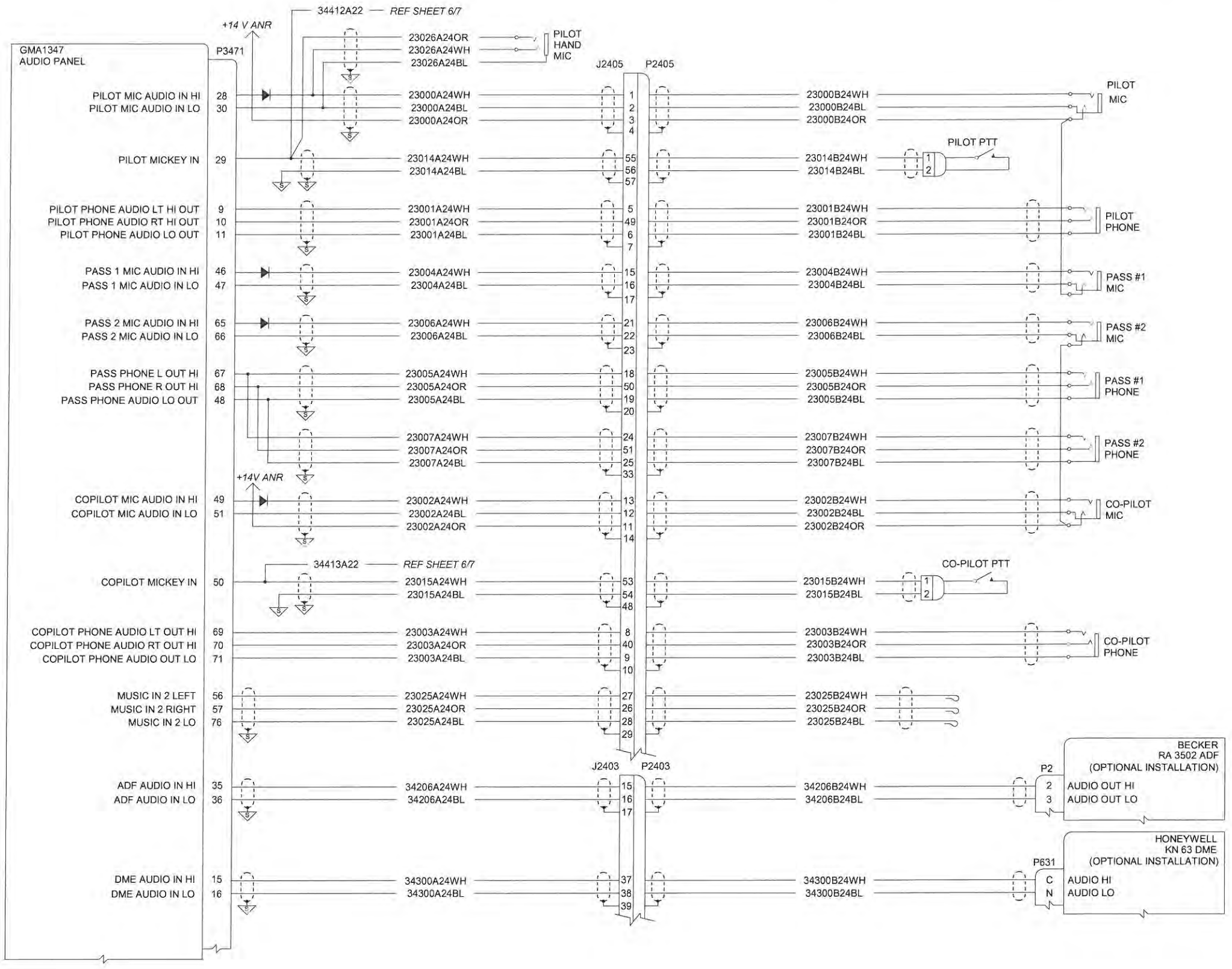
DWG.ORIG.	DWG.NO.	REV
DAIA	**D4D-9231-60-01_01**	"A"

CODE: **710197** SCALE: NTS SH **02** OF **07**

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REVISION					
REV	SH	ZONE	DESCRIPTION	DATE	APPROVAL
-	03	ALL	MÄM 40-422 FIRST RELEASE	12.05.10	JÜTTE
A	03	ALL	MÄM 40-594 REVISION LEVEL RAISED DUE TO CHANGES ON SHEET 7. (REDLINECORR.)	22.05.12	SEE TB



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DIMENSIONS **METRIC**
FIRST ANGLE PROJECTION
FORMAT **A2**
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN MM
DIMENSION TOLERANCES
2 DECIMAL ±0,25
1DECIMAL ±0,5
DECIMAL ±1
ANGLE ±1°
RAD ±0,5
3.2
FINISH IN MICRO-METER

IDENTIFICATION MARKINGS
DP-S-17-00001
CLASSIFICATION:
NONE
INTERCHANGEABLE PART **NO**
THIS DRAWING WAS PRODUCED USING
SOFTWARE: **SOLID EDGE V18**
FILENAME
D4D-9231-60-01_01a.dft

Diamond Aircraft Industries GmbH
Diamond Aircraft Industries
N. A. Otto-Straße 5
A-2700 Wiener Neustadt

DEPARTMENT		SIGN	DATE
DRAWN	Schuster		22.05.12
CHECKED:	Scheikl		13-Sep-2012
QA:	N/A		
STRESS:	N/A		
MANUF.:	N/A		
SYSTEM:	Kowarsch		13-Sep-2012
APPROVED:	Burger		25-09-2012

PROJECT **DA 40 D**
TITLE
SCHEMATIC, G1000

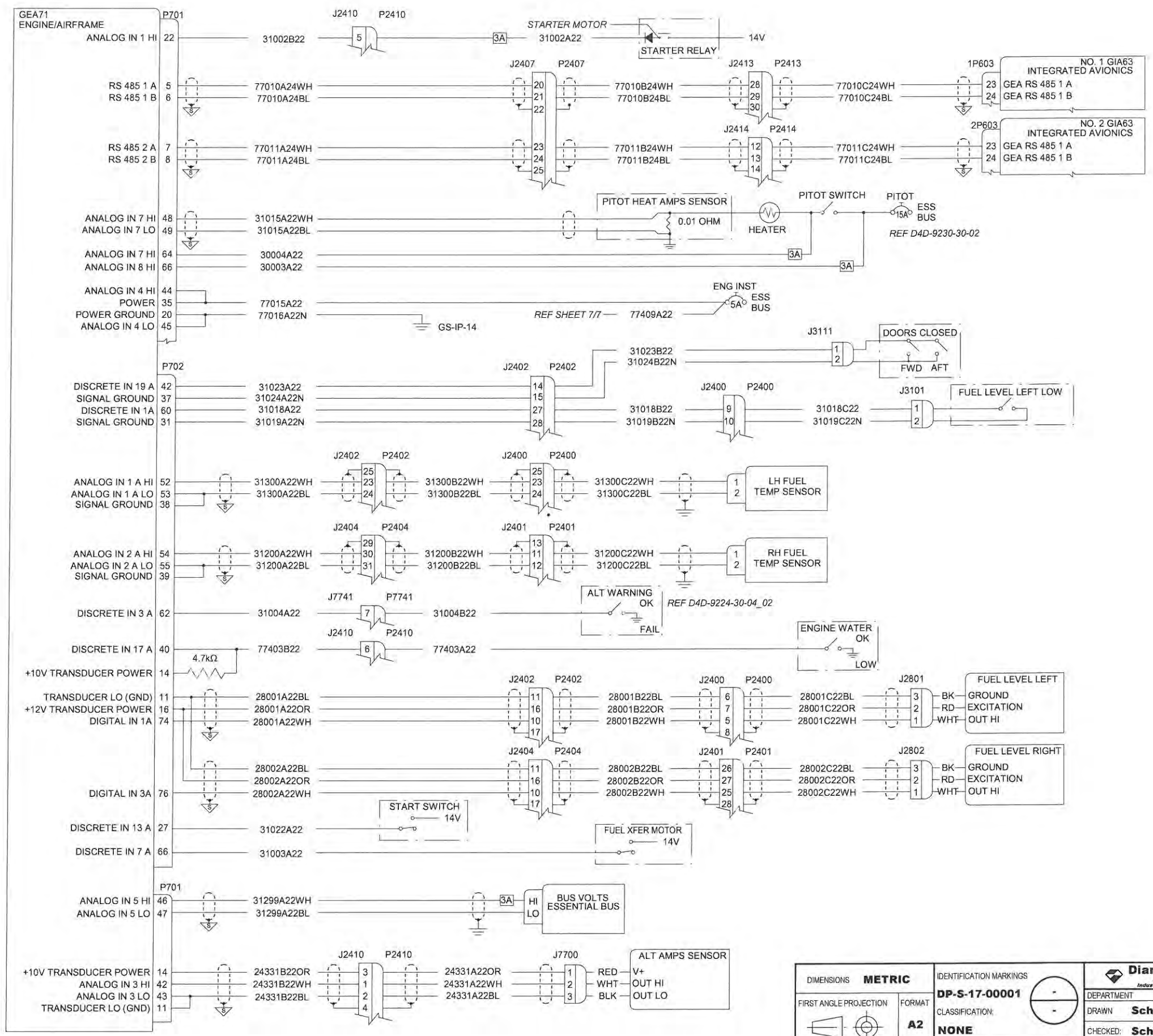
DWG.ORIG.	DWG.NO.	REV
DAIA	D4D-9231-60-01_01	"A"

CODE **710197** SCALE NTS SH **03** OF **07**

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REVISION					
REV	SH	ZONE	DESCRIPTION	DATE	APPROVAL
-	04	ALL	MÄM 40-422 FIRST RELEASE	12.05.10	JÜTTE
A	04	ALL	MÄM 40-594 REVISION LEVEL RAISED DUE TO CHANGES ON SHEET 7. (REDLINECORR.)	22.05.12	SEE TB

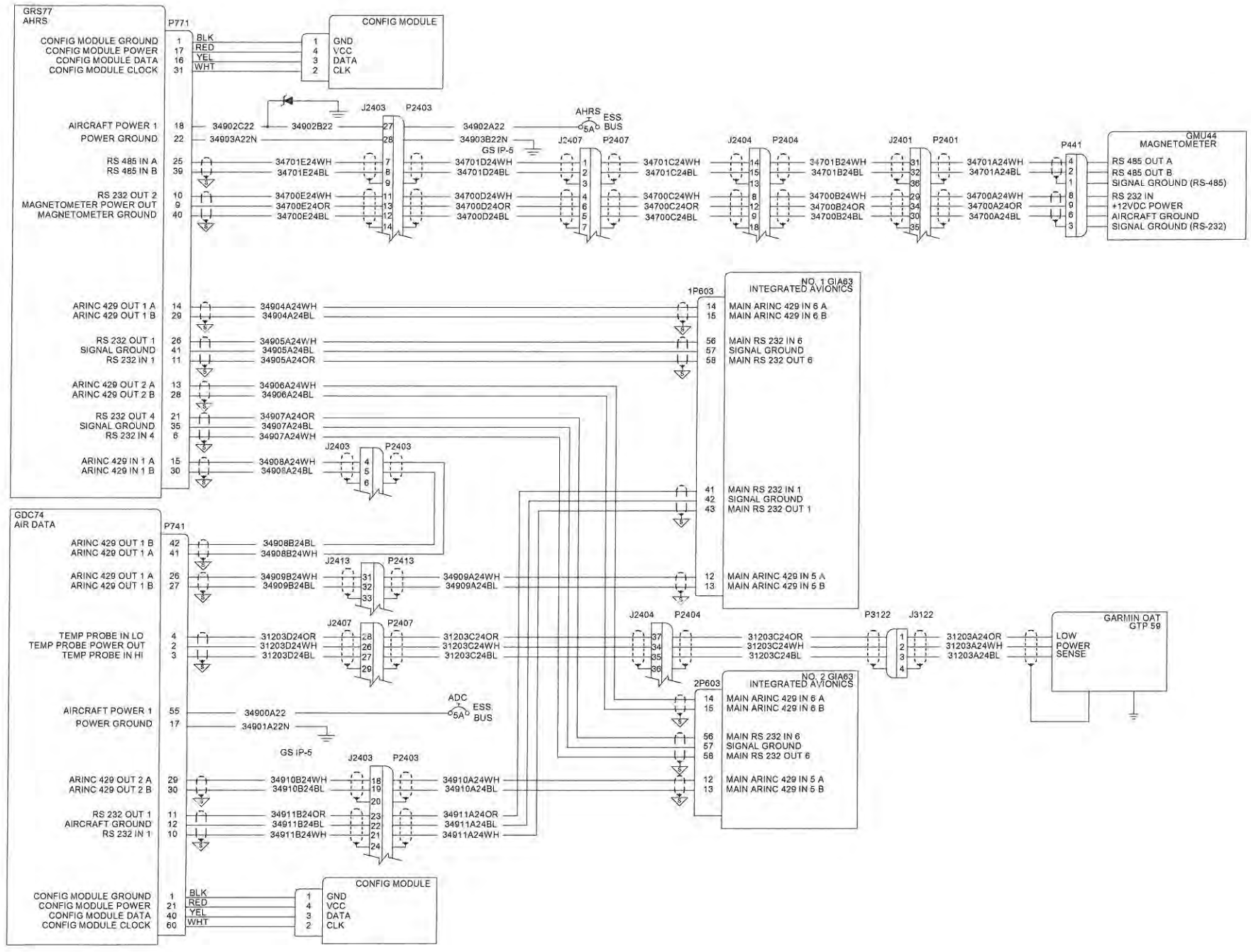


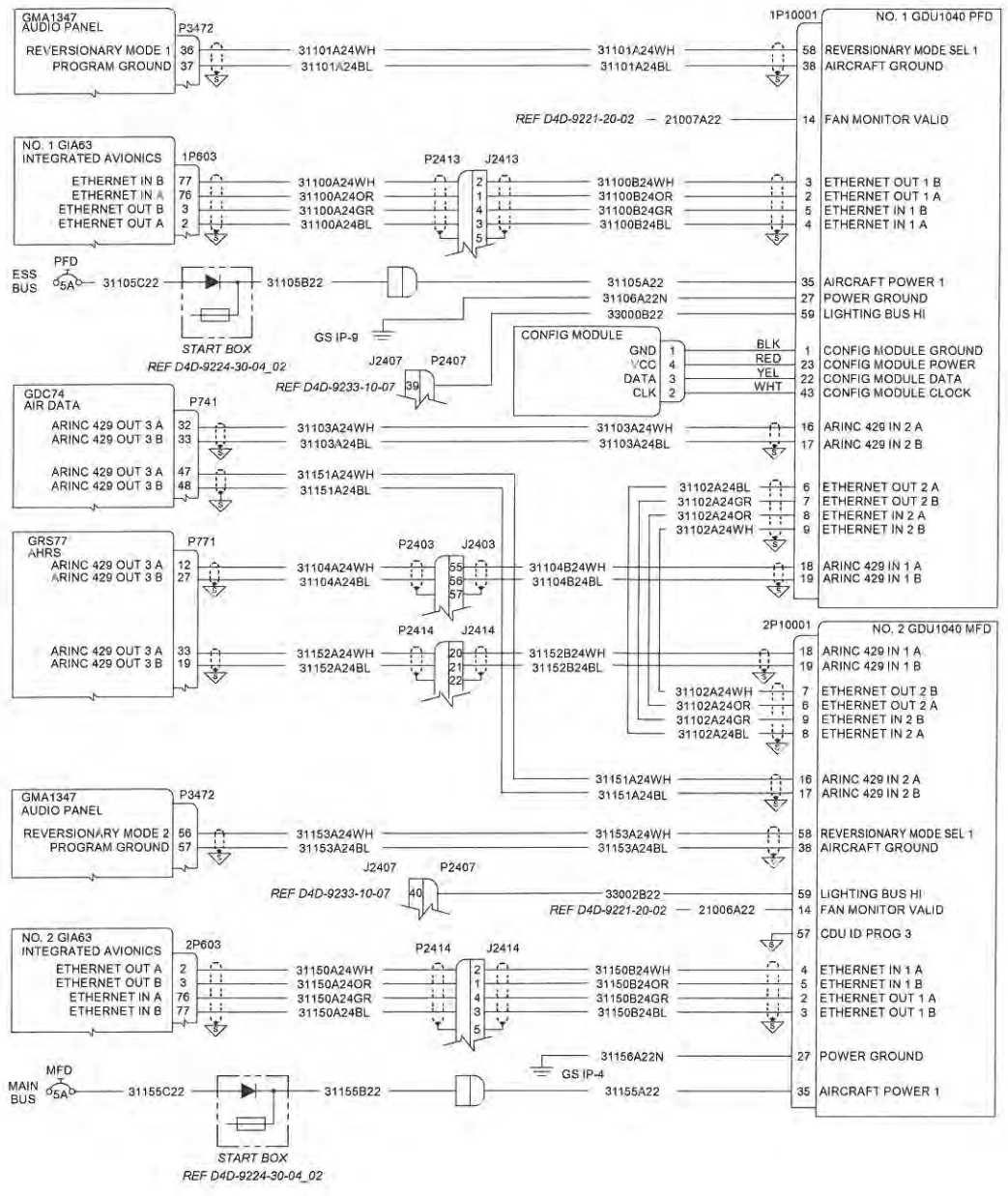
DIMENSIONS **METRIC**	IDENTIFICATION MARKINGS **DP-S-17-00001**	Diamond Aircraft Industries	N. A. Otto-Straße 5, A-2700 Wiener Neustadt
FIRST ANGLE PROJECTION — FORMAT **A2**	CLASSIFICATION: **NONE**	DEPARTMENT / SIGN / DATE	PROJECT **DA 40 D**
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN MM	INTERCHANGEABLE PART **NO**	DRAWN **Schuster** — 22.05.12	TITLE **SCHEMATIC, G1000**
DIMENSION TOLERANCES 3.2	THIS DRAWING WAS PRODUCED USING	CHECKED: **Scheikl**	
2 DECIMAL ±0,25 1DECIMAL ±0,5 DECIMAL ±1 ANGLE ±1° RAD ±0,5 — FINISH IN MICRO-METER	SOFTWARE: **SOLID EDGE V18**	QA: **N/A** STRESS: **N/A** MANUF.: **N/A**	
	FILENAME: **D4D-9231-60-01_01a.dft**	SYSTEM: **Kowarsch** — 13-Sep-2012 APPROVED: **Burger** — 25-07-2012	DWG.ORIG. **DAIA** — DWG.NO. **D4D-9231-60-01_01** — REV **"A"**
			CODE **710197** — SCALE NTS — SH **04** OF **07**

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REVISION					
REV	SH	ZONE	DESCRIPTION	DATE	APPROVAL
-	05	ALL	MÄM 40-422 FIRST RELEASE	12.05.10	JÜTTE
A	05	ALL	MÄM 40-594 REVISION LEVEL RAISED DUE TO CHANGES ON SHEET 7. (REDLINECORR.)	22.05.12	SEE TB





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DIMENSIONS **METRIC**

FIRST ANGLE PROJECTION | FORMAT **A2**

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN MM

DIMENSION TOLERANCES

2 DECIMAL	±0,25	3.2
1DECIMAL	±0,5	
DECIMAL	±1	FINISH IN MICRO-METER
ANGLE	±1°	
RAD	±0,5	

IDENTIFICATION MARKINGS: **DP-S-17-00001** - -

CLASSIFICATION: **NONE**

INTERCHANGEABLE PART **NO**

THIS DRAWING WAS PRODUCED USING

SOFTWARE: **SOLID EDGE V18**

FILENAME: **D4D-9231-60-01_01a.dft**

Diamond Aircraft Industries GmbH — Diamond Aircraft Industries — N. A. Otto-Straße 5, A-2700 Wiener Neustadt

DEPARTMENT		SIGN	DATE
DRAWN	Schuster		22.05.12
CHECKED:	Scheikl		13-Sep-2012
QA:	N/A		
STRESS:	N/A		
MANUF.:	N/A		
SYSTEM:	Kowarsch		13-Sep-2012
APPROVED:	Burger		25-09-2012

PROJECT **DA 40 D**

TITLE **SCHEMATIC, G1000**

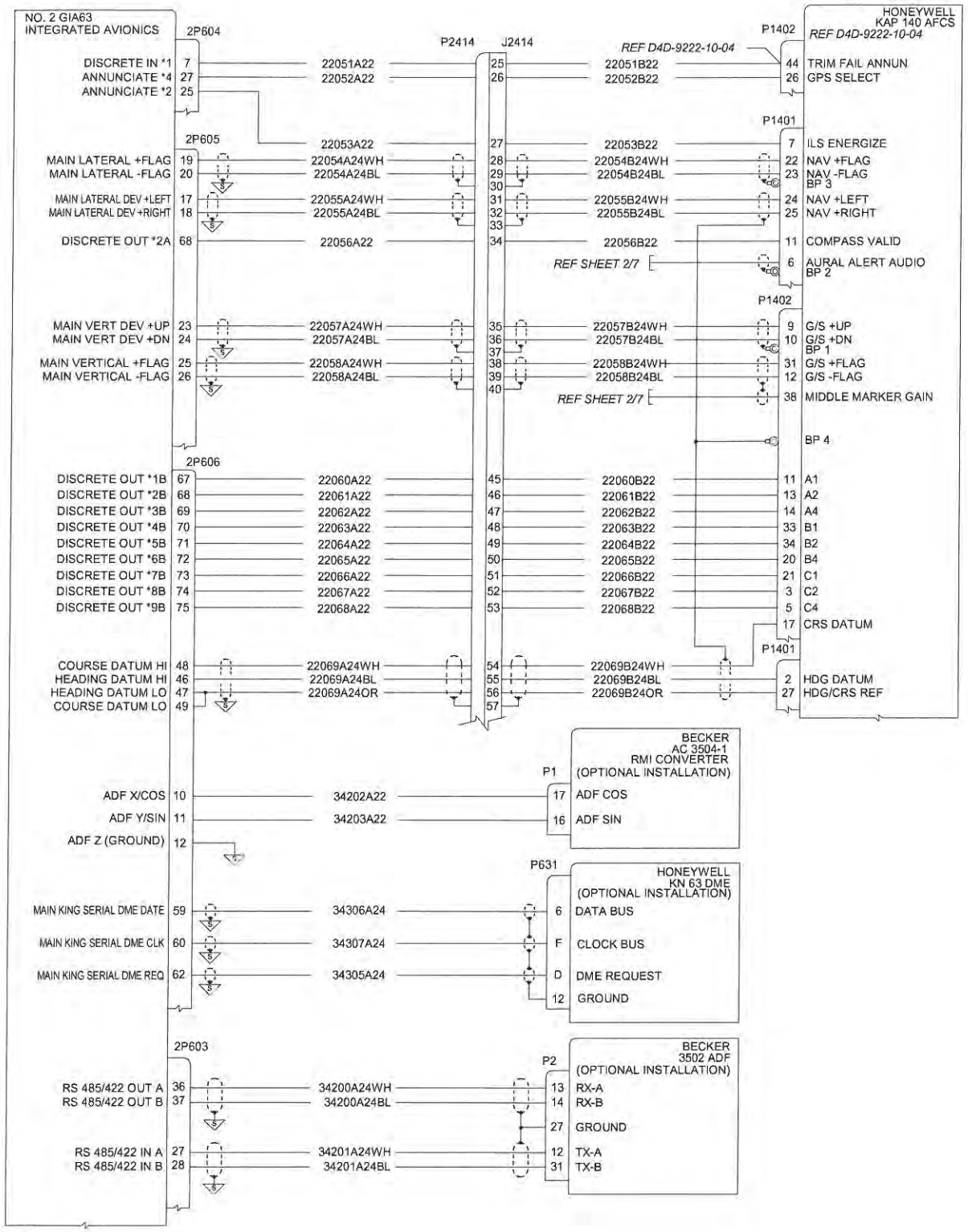
DWG.ORIG.	DWG.NO.	REV
DAIA	D4D-9231-60-01_01	"A"

CODE **710197** | SCALE NTS | SH **05** OF **07**

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REVISION					
REV	SH	ZONE	DESCRIPTION	DATE	APPROVAL
-	06	ALL	MÄM 40-422 FIRST RELEASE	12.05.10	JÜTTE
A	06	ALL	MÄM 40-594 REVISION LEVEL RAISED DUE TO CHANGES ON SHEET 7. (REDLINECORR.)	22.05.12	SEE TB



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DIMENSIONS: METRIC
FIRST ANGLE PROJECTION
FORMAT: A2
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN MM
DIMENSION TOLERANCES
2 DECIMAL ±0,25
1DECIMAL ±0,5
DECIMAL ±1
ANGLE ±1°
RAD ±0,5
3.2
FINISH IN MICRO-METER

IDENTIFICATION MARKINGS: DP-S-17-00001
CLASSIFICATION: NONE
INTERCHANGEABLE PART: NO
THIS DRAWING WAS PRODUCED USING
SOFTWARE: SOLID EDGE V18
FILENAME: D4D-9231-60-01_01a.dft

Diamond Aircraft Industries
N. A. Otto-Straße 5
A-2700 Wiener Neustadt

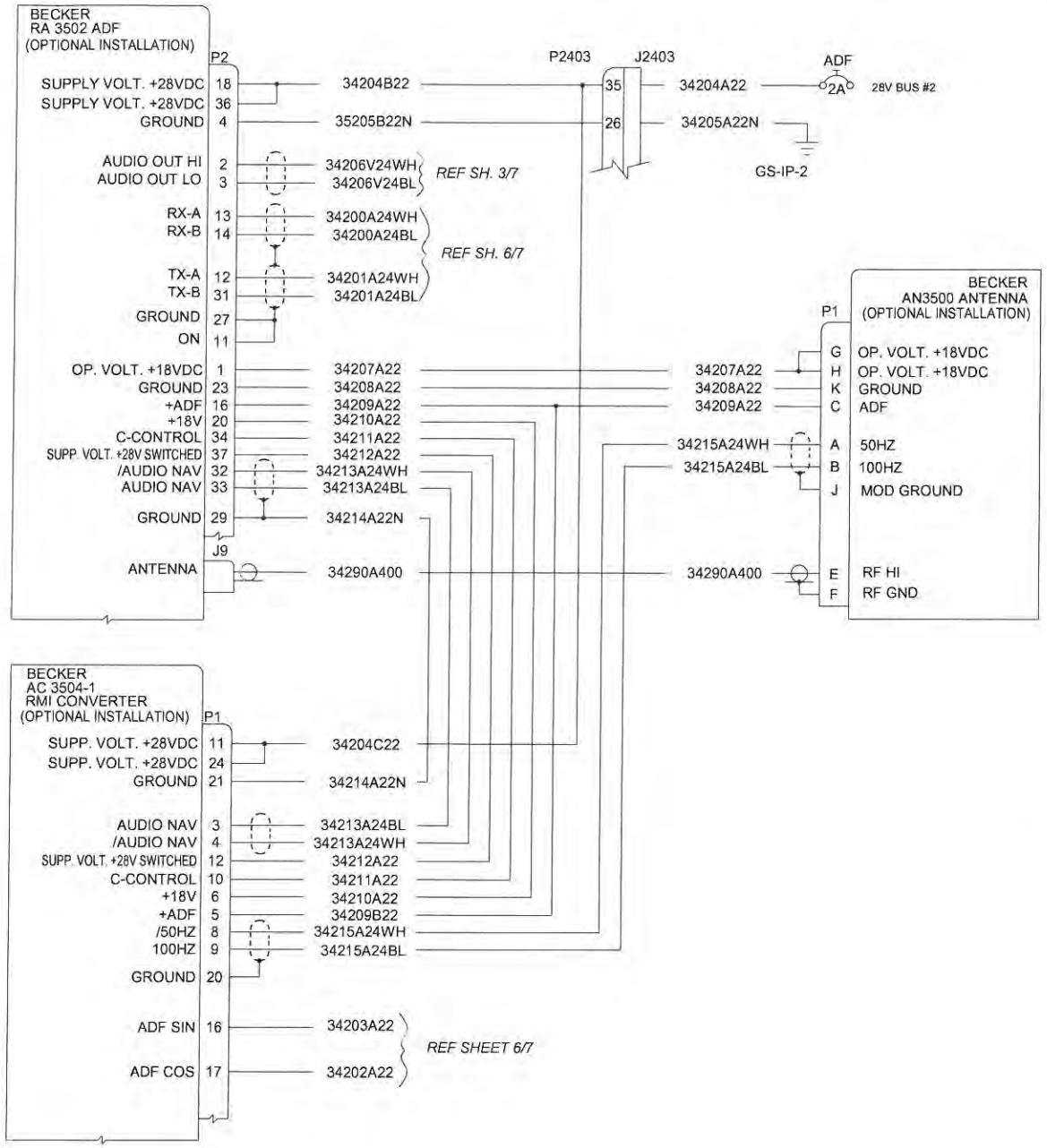
DEPARTMENT		SIGN	DATE
DRAWN	Schuster		22.05.12
CHECKED:	Scheikl		
QA:	N/A		
STRESS:	N/A		
MANUF.:	N/A		
SYSTEM:	Kowarsch		13-Sep-2012
APPROVED:	Burger		25-07-2012

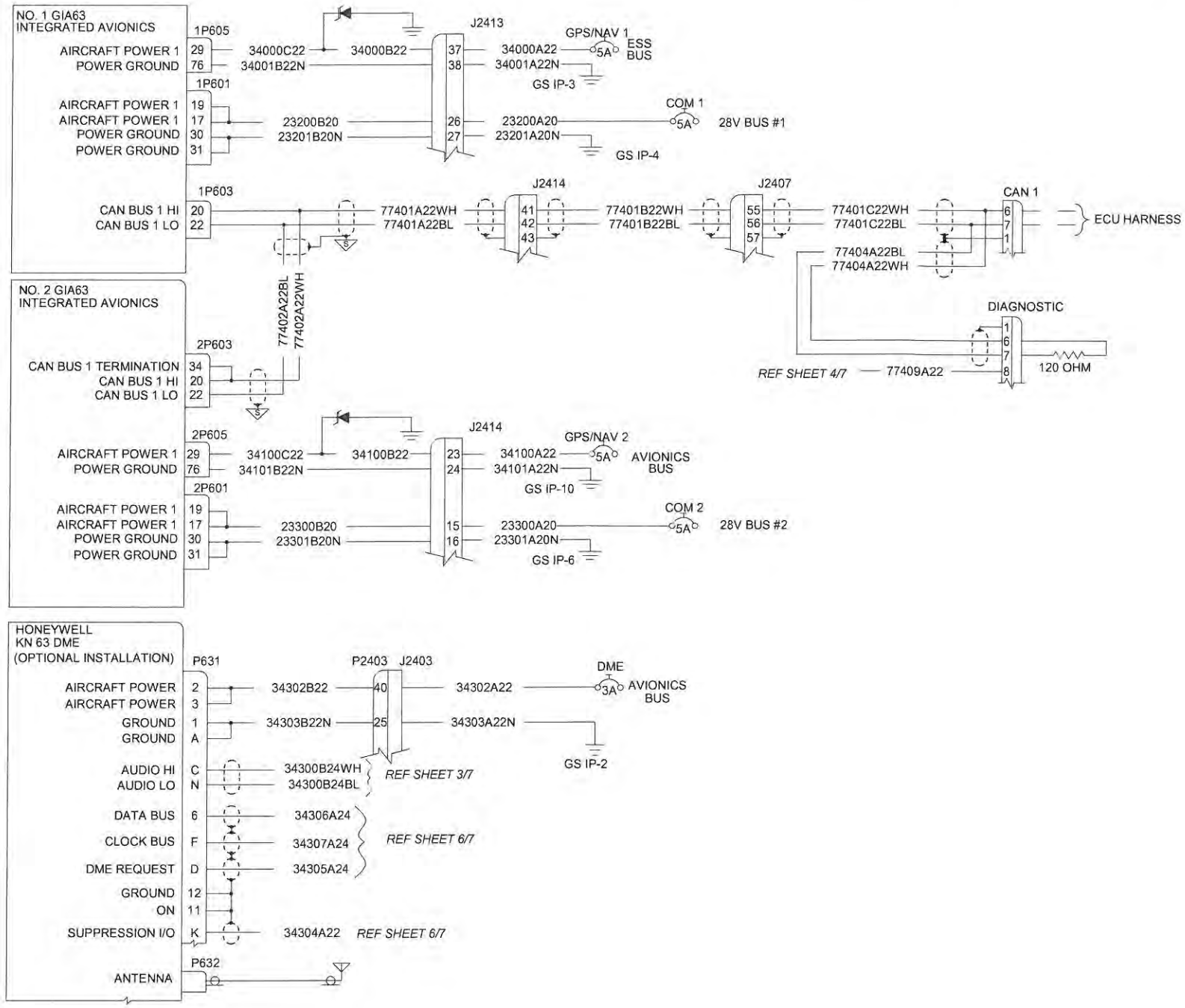
PROJECT: DA 40 D
TITLE: SCHEMATIC, G1000
DWG.ORIG.: DAIA
DWG.NO.: D4D-9231-60-01_01
REV: "A"
CODE: 710197 SCALE: NTS SH: 06 OF 07

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REVISION					
REV	SH	ZONE	DESCRIPTION	DATE	APPROVAL
-	07	ALL	MÄM 40-422 FIRST RELEASE	12.05.10	JÜTTE
A	07	ALL	MÄM 40-594 IN SECTOR D6/D7 NUMBER 34290A142 CORRECTED TO 34290A400. (REDLINECORR.)	22.05.12	SEE TB

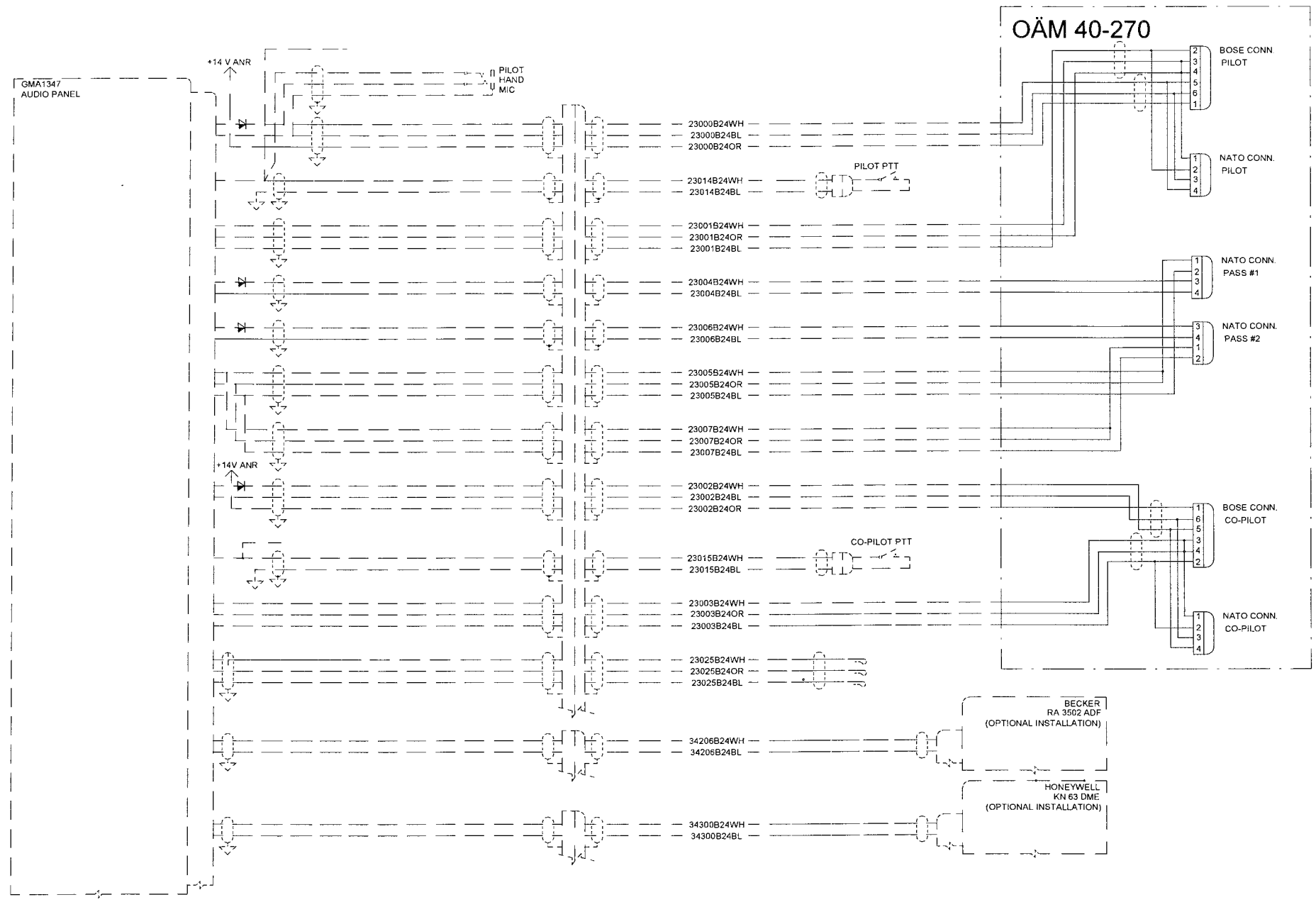




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DIMENSIONS METRIC	IDENTIFICATION MARKINGS DP-S-17-00001	Diamond Aircraft Industries	N. A. Otto-Straße 5, A-2700 Wiener Neustadt
FIRST ANGLE PROJECTION / FORMAT A2	CLASSIFICATION: NONE	DEPARTMENT / SIGN / DATE	PROJECT DA 40 D
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN MM	INTERCHANGEABLE PART NO	DRAWN Schuster / 22.05.12	TITLE SCHEMATIC, G1000
DIMENSION TOLERANCES 3.2	THIS DRAWING WAS PRODUCED USING	CHECKED: Scheikl / 13-Sep-2012	
2 DECIMAL ±0,25 1DECIMAL ±0,5 DECIMAL ±1 ANGLE ±1° RAD ±0,5 FINISH IN MICRO-METER	SOFTWARE: SOLID EDGE V18	QA: N/A	
	FILENAME D4D-9231-60-01_01a.dft	STRESS: N/A	
		MANUF.: N/A	
		SYSTEM: Kowarsch / 13-Sep-2012	DWG.ORIG. DAIA / DWG.NO. D4D-9231-60-01_01 / REV "A"
		APPROVED: Burger / 25-09-2012	CODE 710197 / SCALE NTS / SH 07 OF 07

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QTY	QTY	ITEM	PART NUMBER	DESCRIPTION	MATERIAL TYPE	H.T.	MATERIAL SIZE	SPECIFICATION	SUPPLIER
REVISION		-							
AN#		OÄM 40-270							
DATE		14.02.07							
DRAWN		C.WEIS							
CHECK		M. Kowarsch							
CHECK DATE		06. MRZ. 2007							
STRESS		C. Jutte							
STRESS DATE		9. MRZ. 2007							
APPROVAL									
APPROVAL DATE									

Diamond Aircraft

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Do Not Scale Drawing

Size:	Scale:	First Angle
B	NTS	

Dimensions in Millimetres | Tolerances are ISO 2768 m

TITLE: SCHEMATIC G 1000

NEXT ASSEMBLY: D4D-9200-00-00

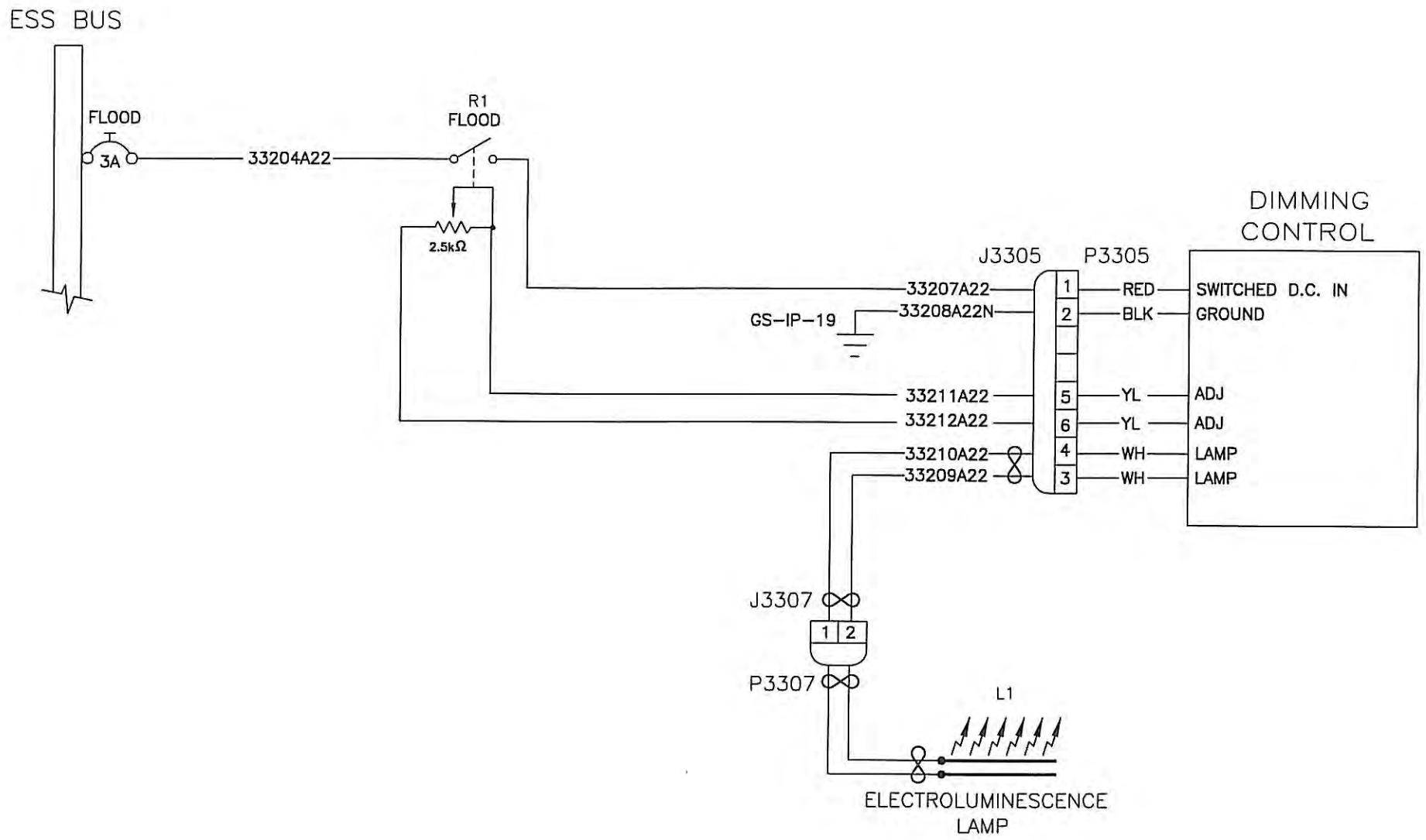
DRAWING NUMBER: D4D-9231-60-01X01

SHEET: 1/1

REPLACES DWG.#

Note for Production:

Dimensions, Parts List and other Information as in D4D-9231-60-01



QTY	QTY	ITEM	PART NUMBER		DESCRIPTION	MATERIAL TYPE	H.T.	MATERIAL SIZE	SPECIFICATION	SUPPLIER
REVISION		'_'	'A'							
RN#		OÄM 40-100	MÄM 40-198							
DATE		19.09.02	22.10.03							
DRAWN		STURGE	C.WOOD							
CHECK										
CHECK DATE										
STRESS										
STRESS DATE										
APPROVAL										
APPROVAL DATE										

24 NOV 2003
M. Reichel

Diamond Aircraft

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Do Not Scale Drawing

Size:	Scale:	First Angle
B	N.T.S	

Dimensions in Millimetres | Tolerances are

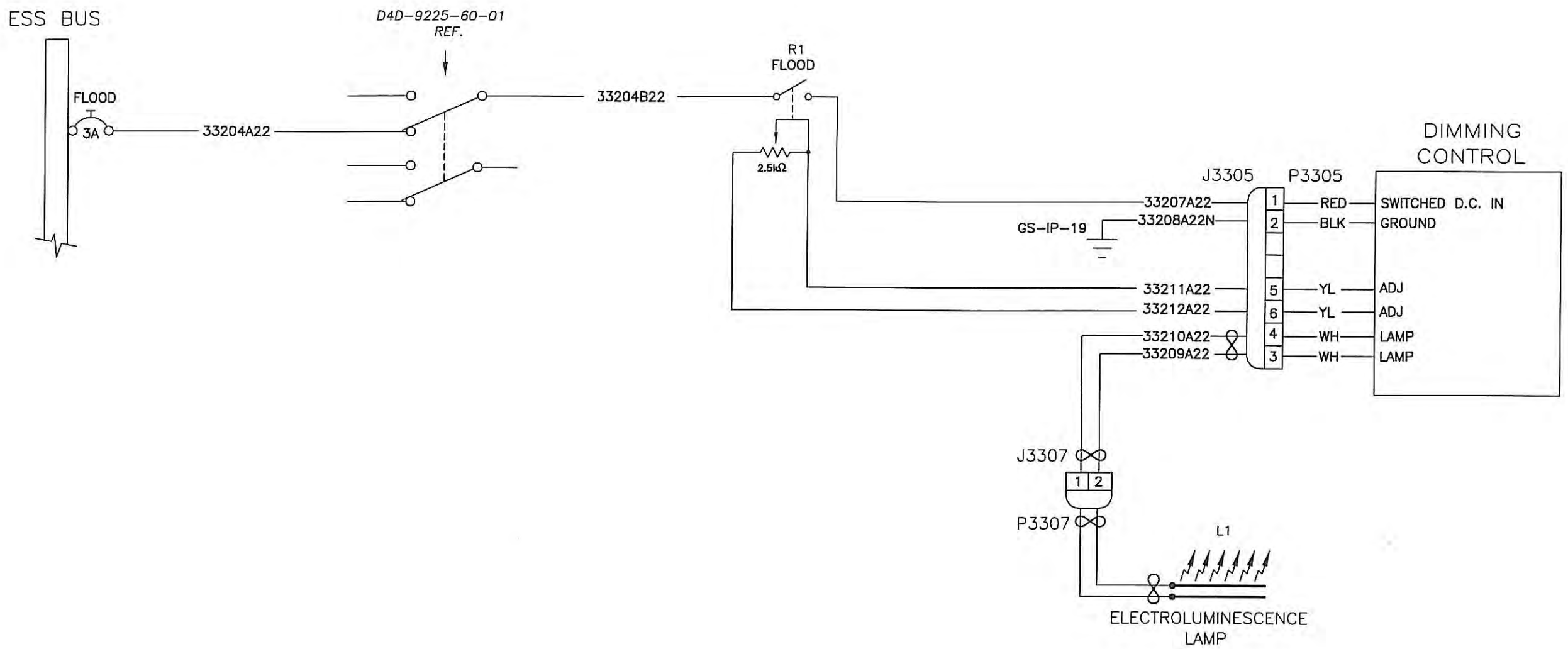
NEXT ASSEMBLY: D4D-9200-00-00

TITLE: SCHEMATIC, INSTRUMENT FLOOD LIGHT WIRING

DRAWING NUMBER: D4D-9233-10-01

SHEET: 1/1

REPLACES DWG.#



QTY	QTY	ITEM	PART NUMBER		DESCRIPTION	MATERIAL TYPE	H.T.	MATERIAL SIZE	SPECIFICATION	SUPPLIER
REVISION		'–'	'A'							
RN#		OÄM 40-136	MÄM 40-198							
DATE		07.01.03	22.10.03							
DRAWN		KOWARSCH	C.WOOD							
CHECK										
CHECK DATE										
STRESS										
STRESS DATE										
APPROVAL										
APPROVAL DATE										

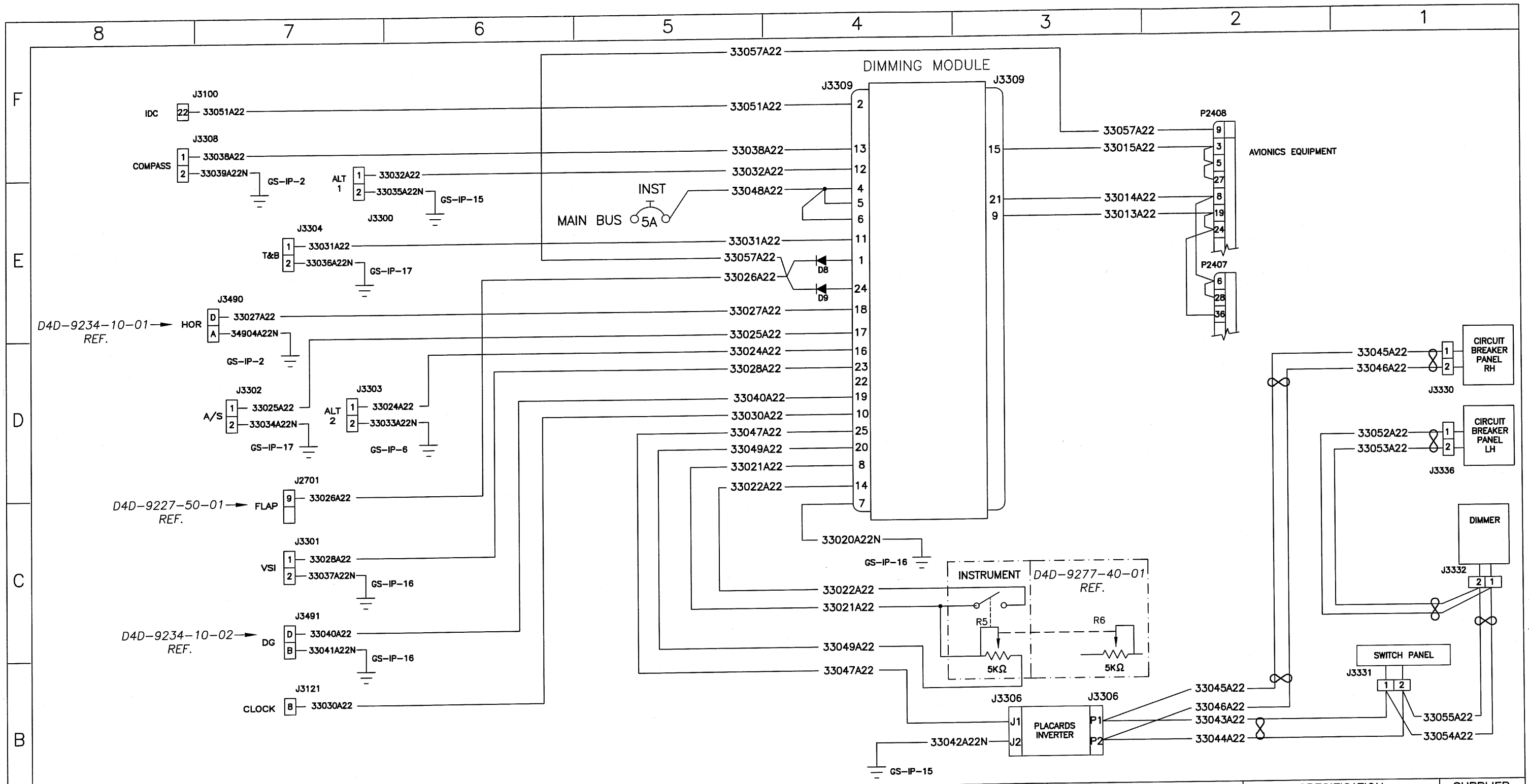
24NOV03
M. Reichel
24 NOV. 2003

Diamond Aircraft

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Do Not Scale Drawing

Size:	Scale:	First Angle	TITLE:
B	N.T.S		SCHEMATIC, INSTRUMENT FLOOD LIGHT WIRING, IFR
Dimensions in Millimetres	Tolerances are		
NEXT ASSEMBLY: D4D-9200-00-00			DRAWING NUMBER: D4D-9233-10-03 / SHEET: 1/1
			REPLACES DWG.#



UNIT	QTY	ITEM	PART NUMBER	DESCRIPTION	MATERIAL TYPE	H.T.
REVISION		–				
RN#		OÄM 40-100				
DATE		19.09.02				
DRAWN		STURGE				
CHECK						
CHECK DATE						
STRESS						
STRESS DATE						
APPROVAL						
APPROVAL DATE						

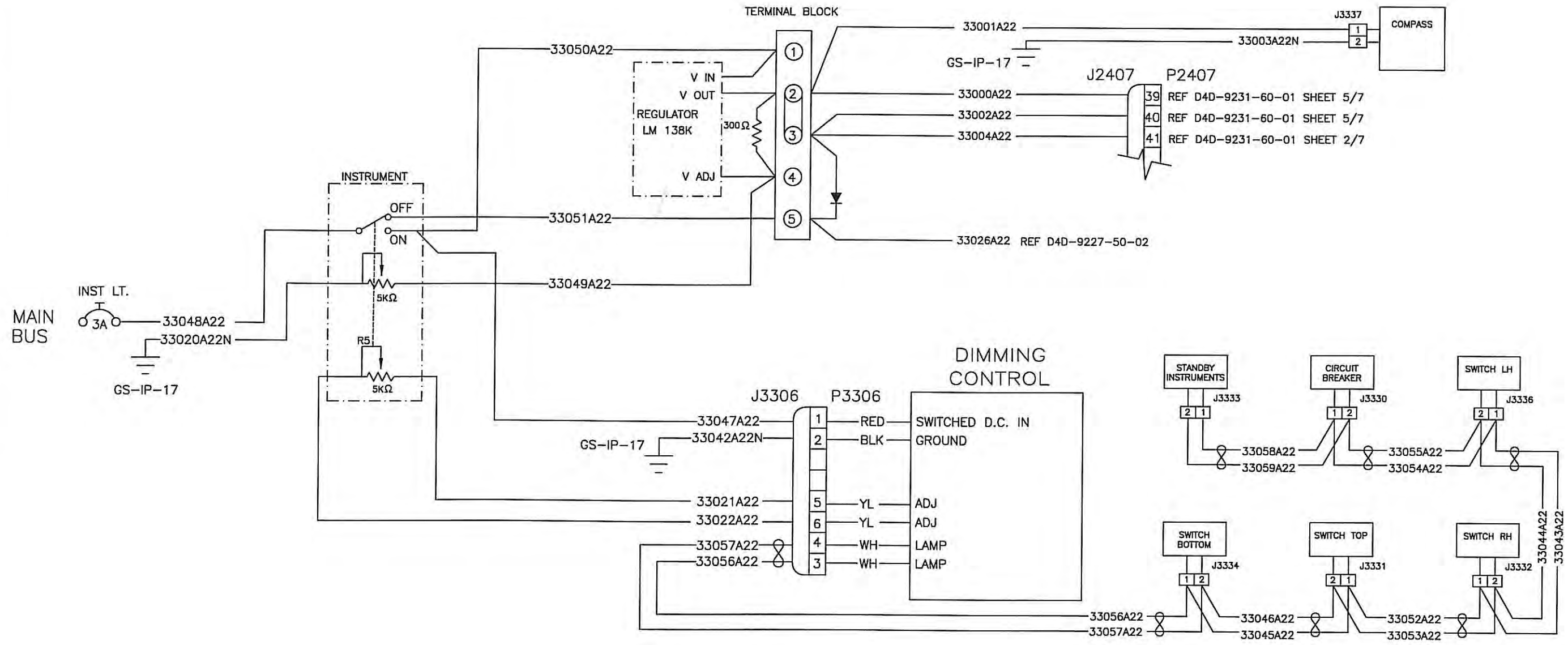
M. Volck
13 NOV 2002

Diamond Aircraft

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DO NOT SCALE DRAWING

MATERIAL SIZE			SPECIFICATION	SUPPLIER
SIZE: B	SCALE: NTS	FIRST ANGLE	TITLE: SCHEMATIC, INSTRUMENT PANEL LIGHT WIRING	
DIMENSIONS IN MILLIMETRES				
NEXT ASSEMBLY: D4D-9200-00-00			DRAWING NUMBER: D4D-9233-10-05	SHEET: 1/1
			REPLACES DRAWING:	



QTY	QTY	ITEM	PART NUMBER	DESCRIPTION	MATERIAL TYPE	H.T.	MATERIAL SIZE	SPECIFICATION	SUPPLIER
REVISION		'–'		'a'					
AN#		ÖÄM40–224		MÄM 40–221					
DATE		09.06.05		27.10.05					
DRAWN		MANDL		KOWARSCH					
CHECK									
CHECK DATE				18.01.06					
STRESS				M. Pichler					
STRESS DATE				16 JUNE 2006					
APPROVAL									
APPROVAL DATE									

Diamond Aircraft

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Do Not Scale Drawing

Size: B | Scale: NTS | First Angle

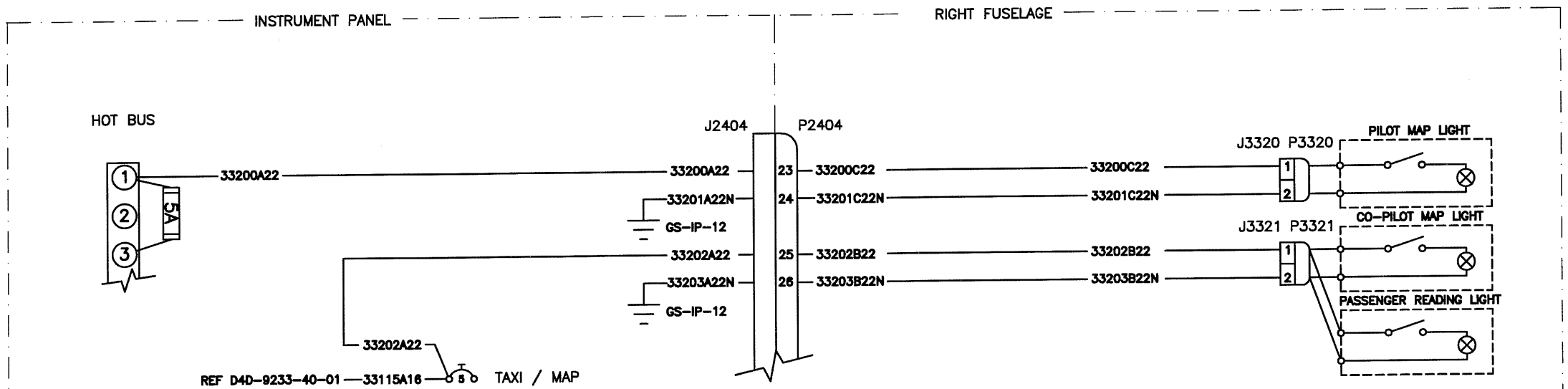
Dimensions in Millimetres | Tolerances are ISO 2768 m

NEXT ASSEMBLY: D4D-9200-00-00

TITLE: SCHEMATIC DIMMING REGULATOR & PLACARDS

DRAWING NUMBER: D4D-9233-10-07 | SHEET: 1/1

REPLACES DWG.#



QTY	QTY	ITEM	PART NUMBER	DESCRIPTION	MATERIAL TYPE
REVISION		'-'			
RN#		OAM 40-100			
DATE		19.09.02			
DRAWN		STURGE			
CHECK					
CHECK DATE					
STRESS					
STRESS DATE					
APPROVAL					
APPROVAL DATE					

M. Volck
13 NOV 2002

Diamond Aircraft

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Do Not Scale Drawing

H.T.	MATERIAL SIZE		SPECIFICATION	SUPPLIER
Size: C	Scale: N.T.S	First Angle		
Dimensions in Millimetres	Tolerances are			

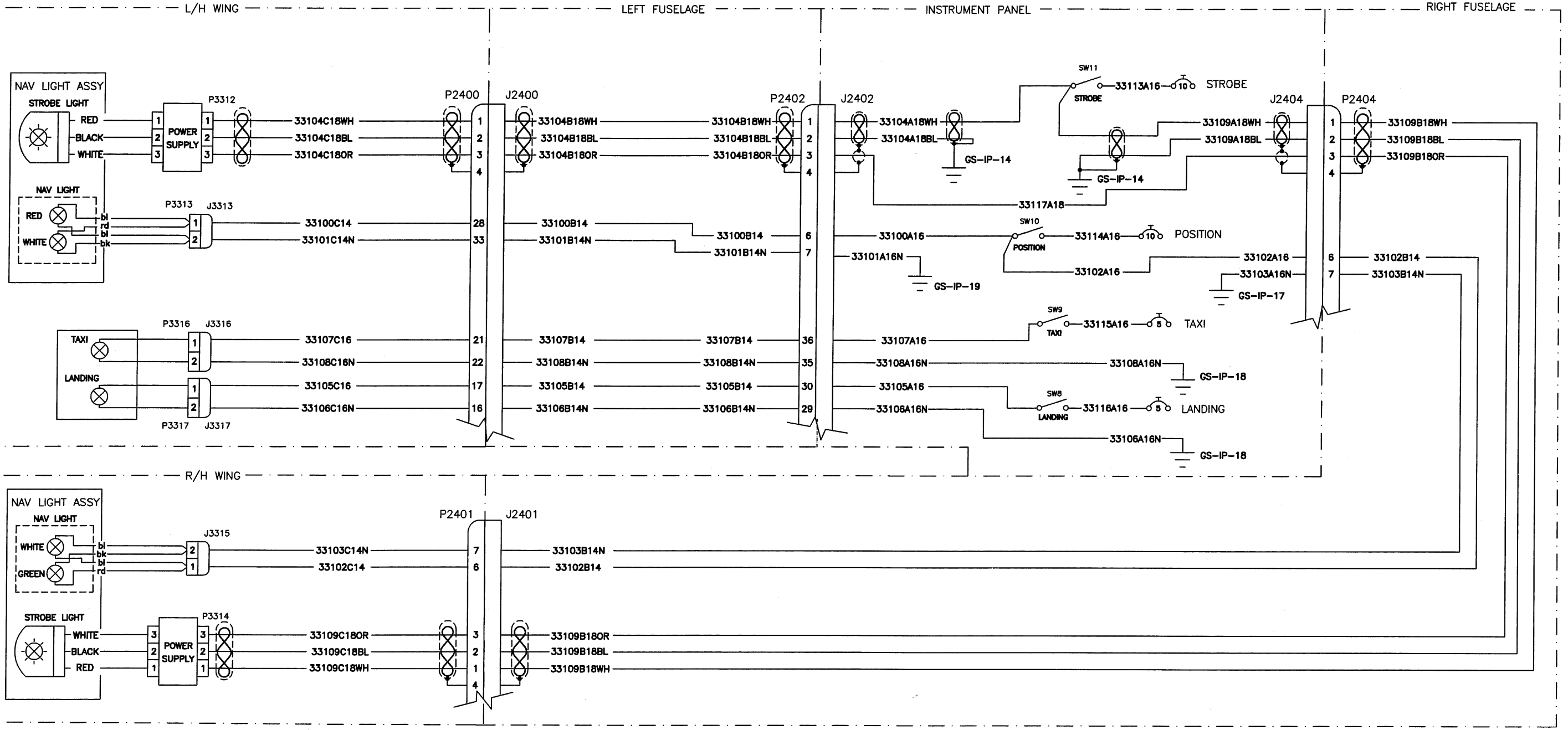
TITLE: SCHEMATIC, MAP/READING LIGHT WIRING

NEXT ASSEMBLY: D4D-9200-00-00

DRAWING NUMBER: D4D-9233-20-01

SHEET: 1/1

REPLACES DWG.# N/A



QTY	QTY	ITEM	PART NUMBER		DESCRIPTION	MATERIAL TYPE	H.T.	MATERIAL SIZE	SPECIFICATION	SUPPLIER
REVISION		'–'	'a'	'b'						
RN#				ÖÄM 40-100						
DATE		11.04.02	19.09.02	16.10.02						
DRAWN		KOWARSCH	STURGE	KOWARSCH						
CHECK				M. Volck						
CHECK DATE				13 NOV 2002						
STRESS										
STRESS DATE										
APPROVAL										
APPROVAL DATE										

Diamond Aircraft

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Do Not Scale Drawing

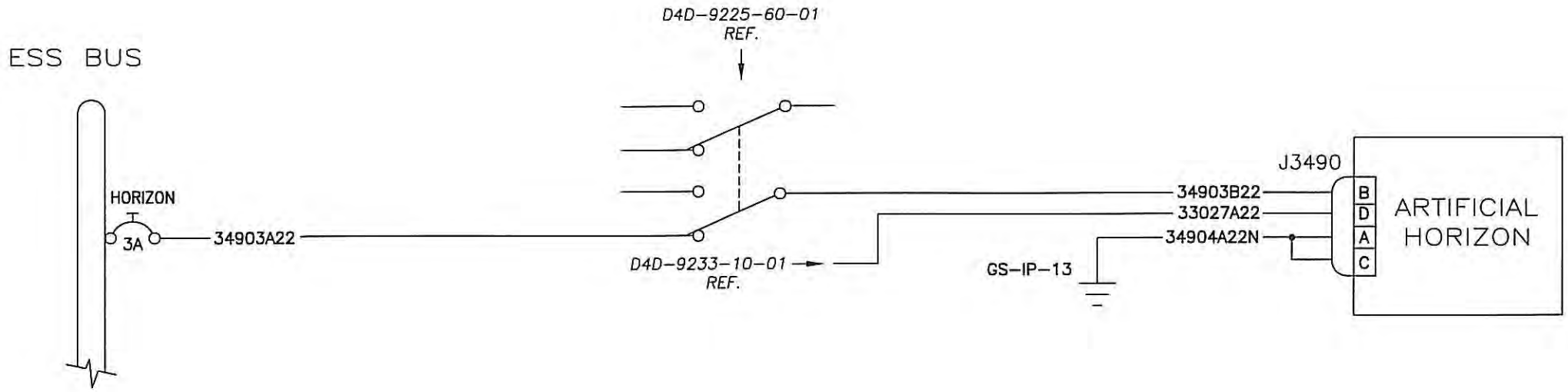
Size: C | Scale: N.T.S | First Angle | Dimensions in Millimetres | Tolerances are

TITLE: SCHEMATIC, EXTERIOR LIGHT WIRING

NEXT ASSEMBLY: D4D-9200-00-00

DRAWING NUMBER: D4D-9233-40-01 | SHEET: 1/1

REPLACES DWG.# N/A



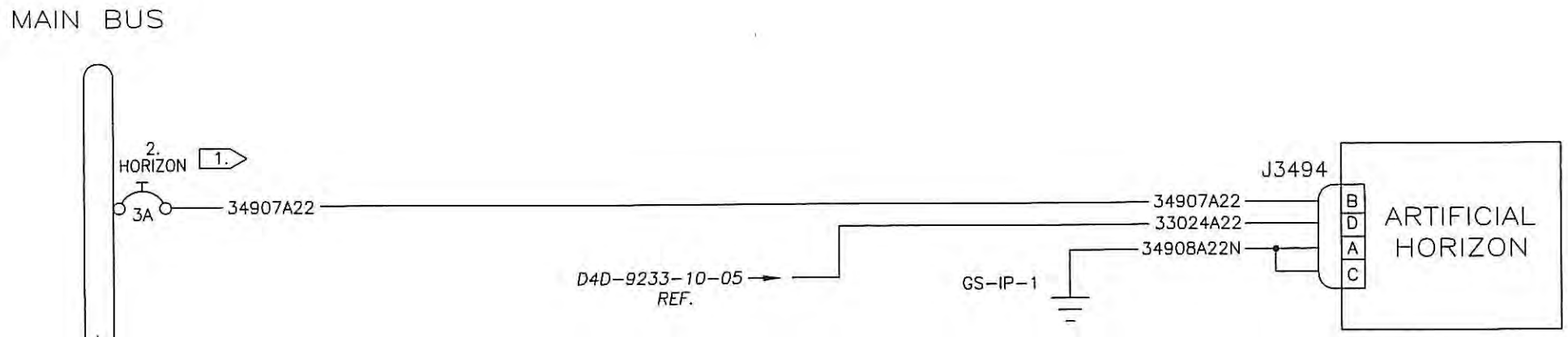
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REVISION		–							
RN#		OÄM 40-136							
DATE		07.01.03							
DRAWN		KOWARSCH							
CHECK									
CHECK DATE									
STRESS		M. Reichel							
STRESS DATE		18. JUNI 2003							
APPROVAL									
APPROVAL DATE									

Diamond Aircraft

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Do Not Scale Drawing

Size:	Scale:	First Angle	TITLE:
B	N.T.S		SCHEMATIC, ATTITUDE GYRO WIRING, IFR
Dimensions in Millimetres	Tolerances are		
NEXT ASSEMBLY: D4D-9200-00-00			DRAWING NUMBER: D4D-9234-10-04 / SHEET: 1/1
			REPLACES DWG.#



NOTES:

1. CB ORIGINALLY LABELED AS 'FUEL PUMP'.

QTY	QTY	ITEM	PART NUMBER			DESCRIPTION		MATERIAL TYPE
REVISION		–	a					
RN#		OÄM 40-1800	OÄM 40-227					
DATE		03.12.03	24.08.05					
DRAWN		KOWARSCH	KOWARSCH					
CHECK			27.08.2005					
CHECK DATE								
STRESS								
STRESS DATE								
APPROVAL								
APPROVAL DATE								

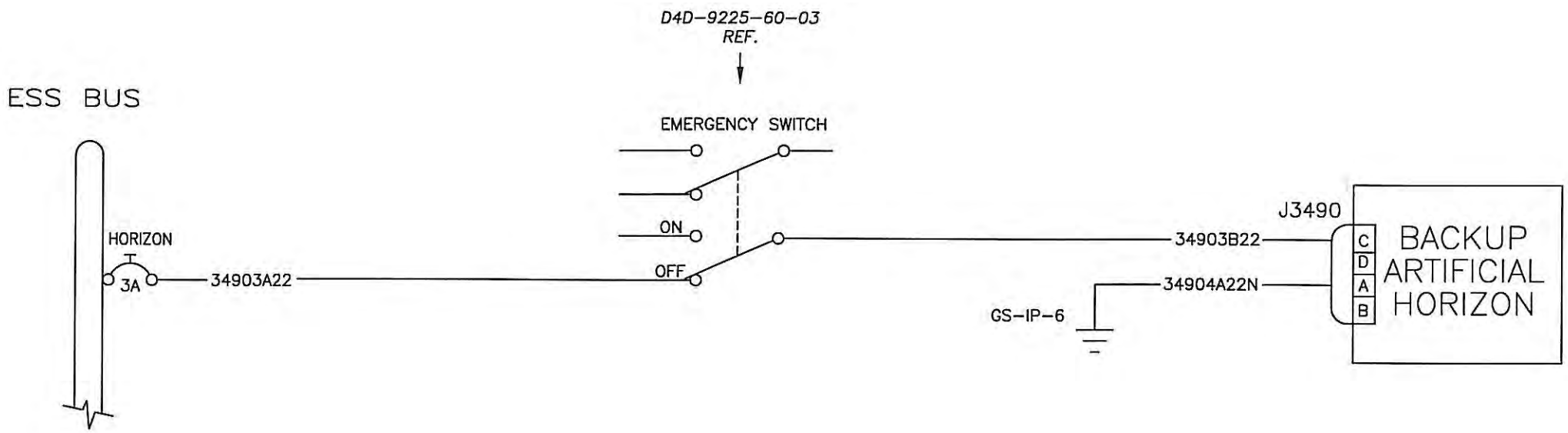
M. Reichel
27 SEP 2005

Diamond Aircraft

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Do Not Scale Drawing

H.T.	MATERIAL SIZE		SPECIFICATION	SUPPLIER
Size: B	Scale: N.T.S	First Angle	TITLE: SCHEMATIC, 2nd ATTITUDE GYRO WIRING	
Dimensions in Millimetres	Tolerances are			
NEXT ASSEMBLY: D4D-9200-00-00			DRAWING NUMBER: D4D-9234-10-05	SHEET: 1/1
			REPLACES DWG.#	



QTY	QTY	ITEM	PART NUMBER		DESCRIPTION	MATERIAL TYPE	H.T.	MATERIAL SIZE	SPECIFICATION	SUPPLIER
REVISION		–		'a'						
RN#		OÄM 40–193		OÄM 40–193a						
DATE		21.07.05		13.12.05						
DRAWN		KOWARSCH		KOWARSCH						
CHECK										
CHECK DATE					M. Reichel 11 JAN 2006					
STRESS										
STRESS DATE										
APPROVAL										
APPROVAL DATE										

Diamond Aircraft

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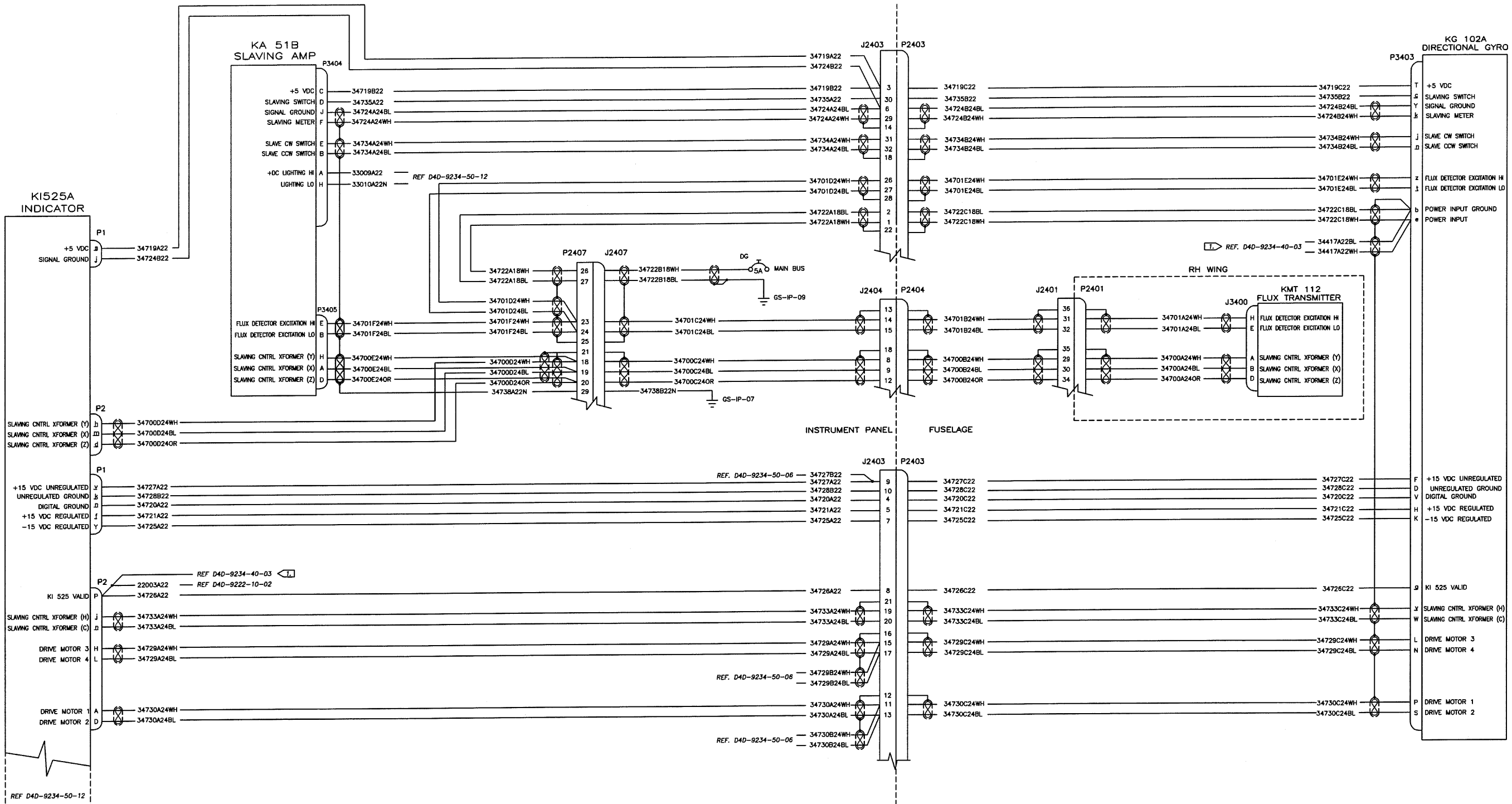
Do Not Scale Drawing

Size:	Scale:	First Angle	TITLE:
B	N.T.S		SCHEMATIC, ATTITUDE GYRO WIRING, G1000

Dimensions in Millimetres | Tolerances are

NEXT ASSEMBLY:	DRAWING NUMBER:	SHEET:
D4D–9200–00–00	D4D–9234–10–06	1/1

REPLACES DWG.#



NOTES:

1. WIRE INSTALLED WITH WX 500.

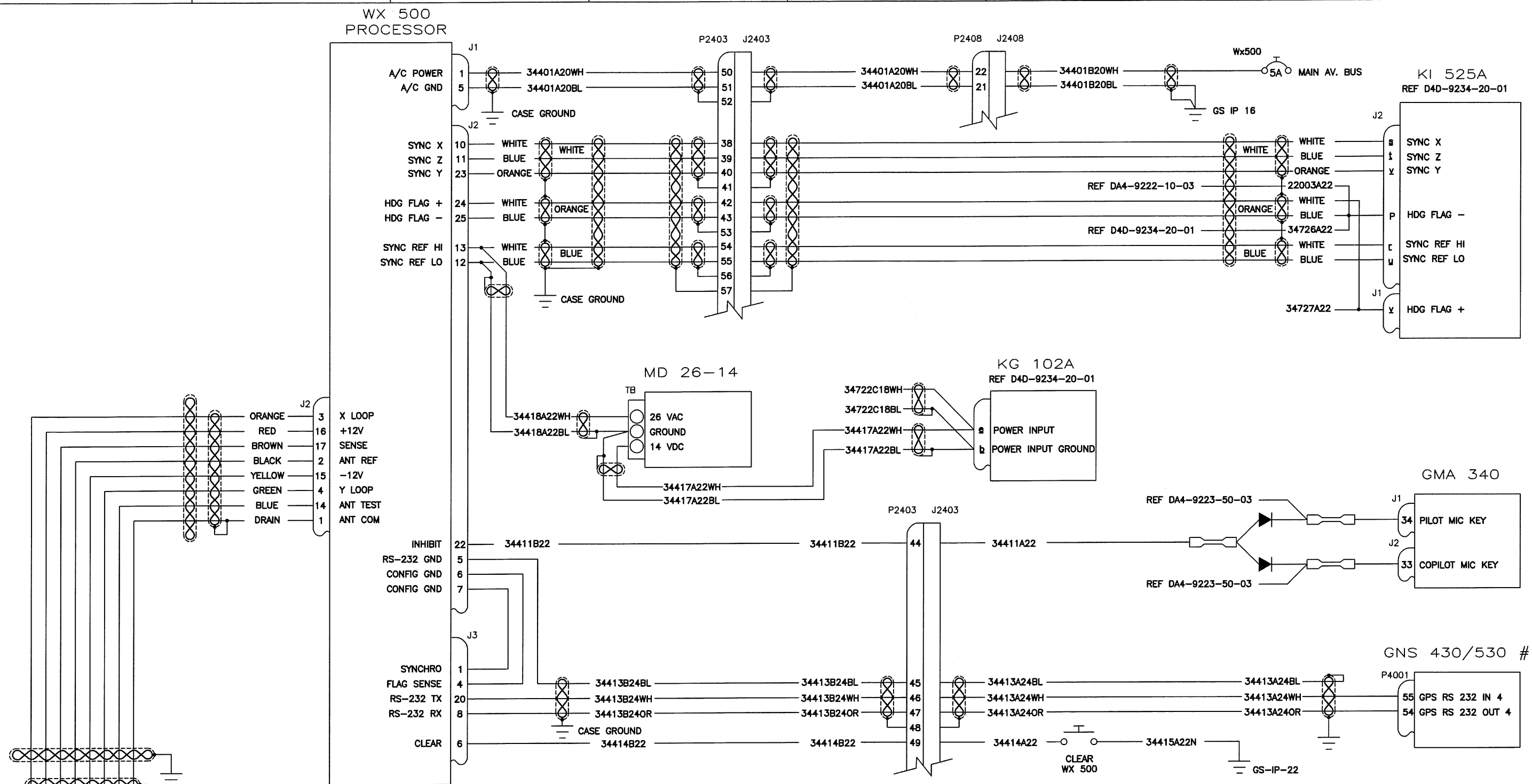
UNITS	QTY	ITEM	PART NUMBER		DESCRIPTION	MATERIAL TYPE
REVISION		–	'a'	'b'		
RN#		OÄM 40-136	MÄM 40-197	MÄM 40-198		
DATE		08.01.03	29.09.03	08.11.03		
DRAWN		KOWARSCH	KOWARSCH	KOWARSCH		
CHECK						
CHECK DATE						
STRESS						
STRESS DATE						
APPROVAL						
APPROVAL DATE						

Diamond Aircraft

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Do Not Scale Drawing

H.T.	MATERIAL SIZE		SPECIFICATION	SUPPLIER
Size: B	Scale: NTS	First Angle	TITLE: SCHEMATIC, COMPASS SYSTEM WIRING, DIESEL	
Dimensions in Millimetres	Tolerances are N/A			
NEXT ASSEMBLY: D4D-9200-00-00			DRAWING NUMBER: D4D-9234-20-01	SHEET: 1/1
			REPLACES DWG.#	



QTY	QTY	ITEM	PART NUMBER	DESCRIPTION	MATERIAL TYPE	H.T.	MATERIAL SIZE	SPECIFICATION	SUPPLIER
REVISION		–		a	'b'				
AN#		OÄM 40-137		OÄM 40-137a	MÄM 40-197				
DATE		21.02.03		26.06.03	29.09.03				
DRAWN		KOWARSCH		KOWARSCH	KOWARSCH				
CHECK									
CHECK DATE									
STRESS									
STRESS DATE									
APPROVAL					M. Reichel				
APPROVAL DATE					27 OKT 2003				

Diamond Aircraft
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Do Not Scale Drawing

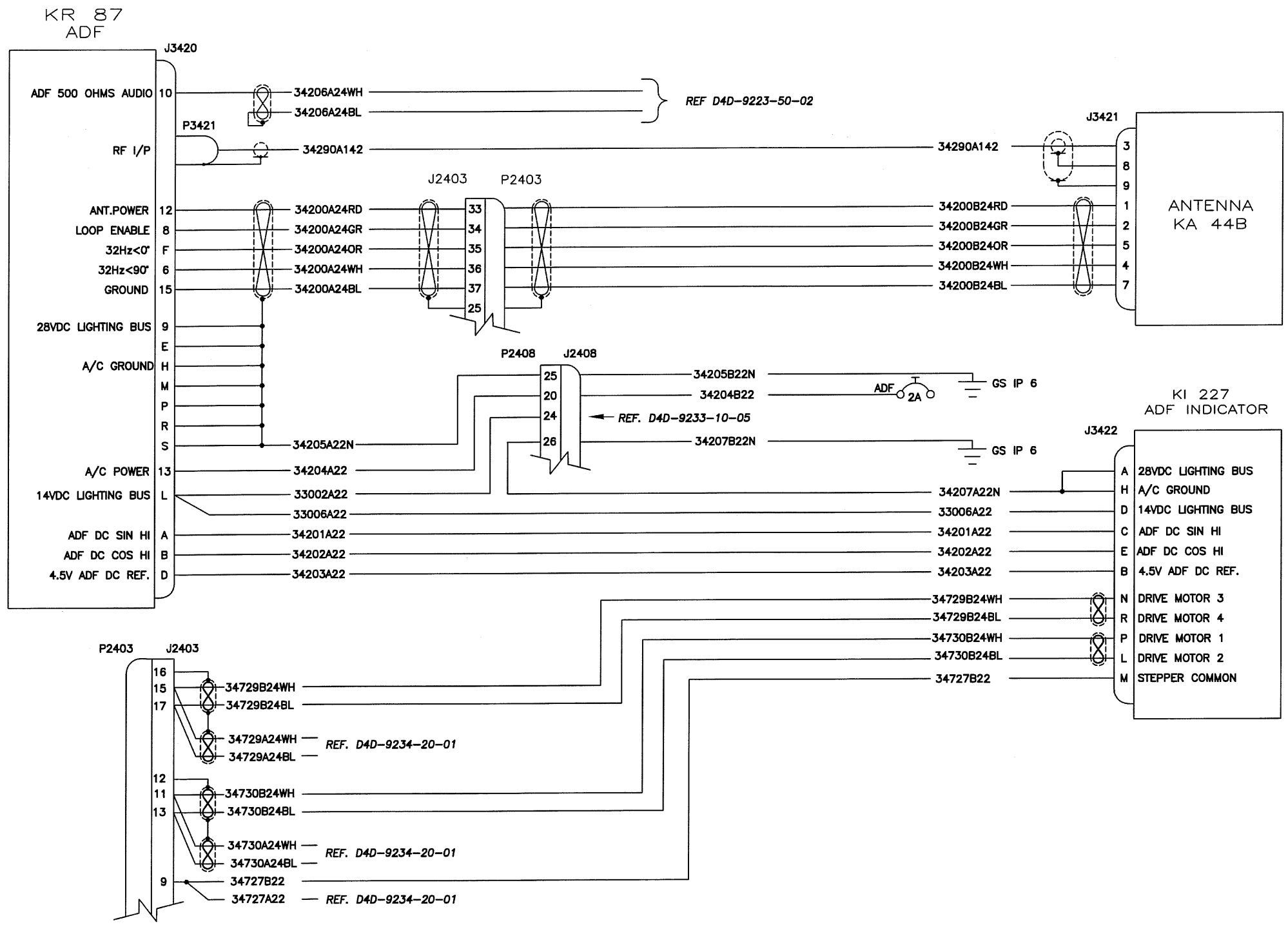
Size: B | Scale: NTS | First Angle | Dimensions in Millimetres | Tolerances are

TITLE: SCHEMATIC, STORMSCOPE WX 500, DIESEL

NEXT ASSEMBLY: D4D-9200-00-00

DRAWING NUMBER: D4D-9234-40-03 | SHEET: 1/1

REPLACES DWG.#: N/A



QTY	QTY	ITEM	PART NUMBER		DESCRIPTION	MATERIAL TYPE	H.T.	MATERIAL SIZE	SPECIFICATION	SUPPLIER
REVISION		–	'a'							
RN#		OÄM 40-136	MÄM 40-197							
DATE		11.03.03	25.09.03							
DRAWN		WOOD	KOWARSCH							
CHECK										
CHECK DATE										
STRESS										
STRESS DATE										
APPROVAL										
APPROVAL DATE										

30.10.03

M. Reichel
27 OKT 2003

Diamond Aircraft

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Do Not Scale Drawing

Size: B | Scale: N.T.S | First Angle

Dimensions in Millimetres | Tolerances are

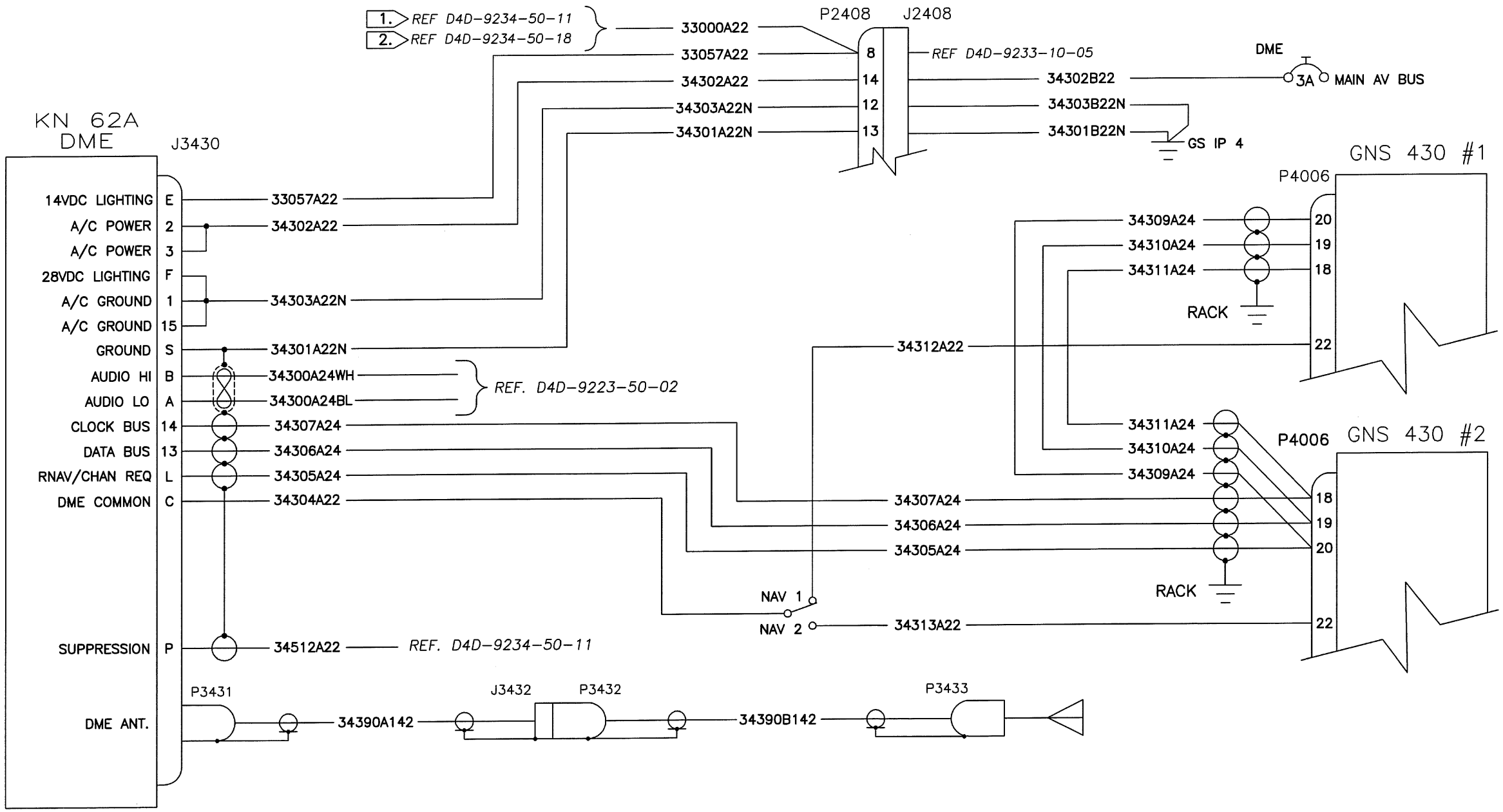
TITLE: SCHEMATIC, KR 87 WIRING, DIESEL

NEXT ASSEMBLY: D4D-9200-00-00

DRAWING NUMBER: D4D-9234-50-06

SHEET: 1/1

REPLACES DWG.# N/A



NOTES:

1. INSTALLED WITH GTX 327.
2. INSTALLED WITH GTX 330.

QTY	QTY	ITEM	PART NUMBER		DESCRIPTION	MATERIAL TYPE
REVISION		–	'a'			
RN#		ÖÄM 40-136	MÄM 40-197			
DATE		13.03.03	29.09.03			
DRAWN		WOOD	KOWARSCH			
CHECK						
CHECK DATE						
STRESS						
STRESS DATE						
APPROVAL						
APPROVAL DATE						

221003

M. Reichel
29 OKT 2003

Diamond Aircraft

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Do Not Scale Drawing

H.T.	MATERIAL SIZE		SPECIFICATION	SUPPLIER
Size: B	Scale: N.T.S	First Angle		
Dimensions in Millimetres	Tolerances are			

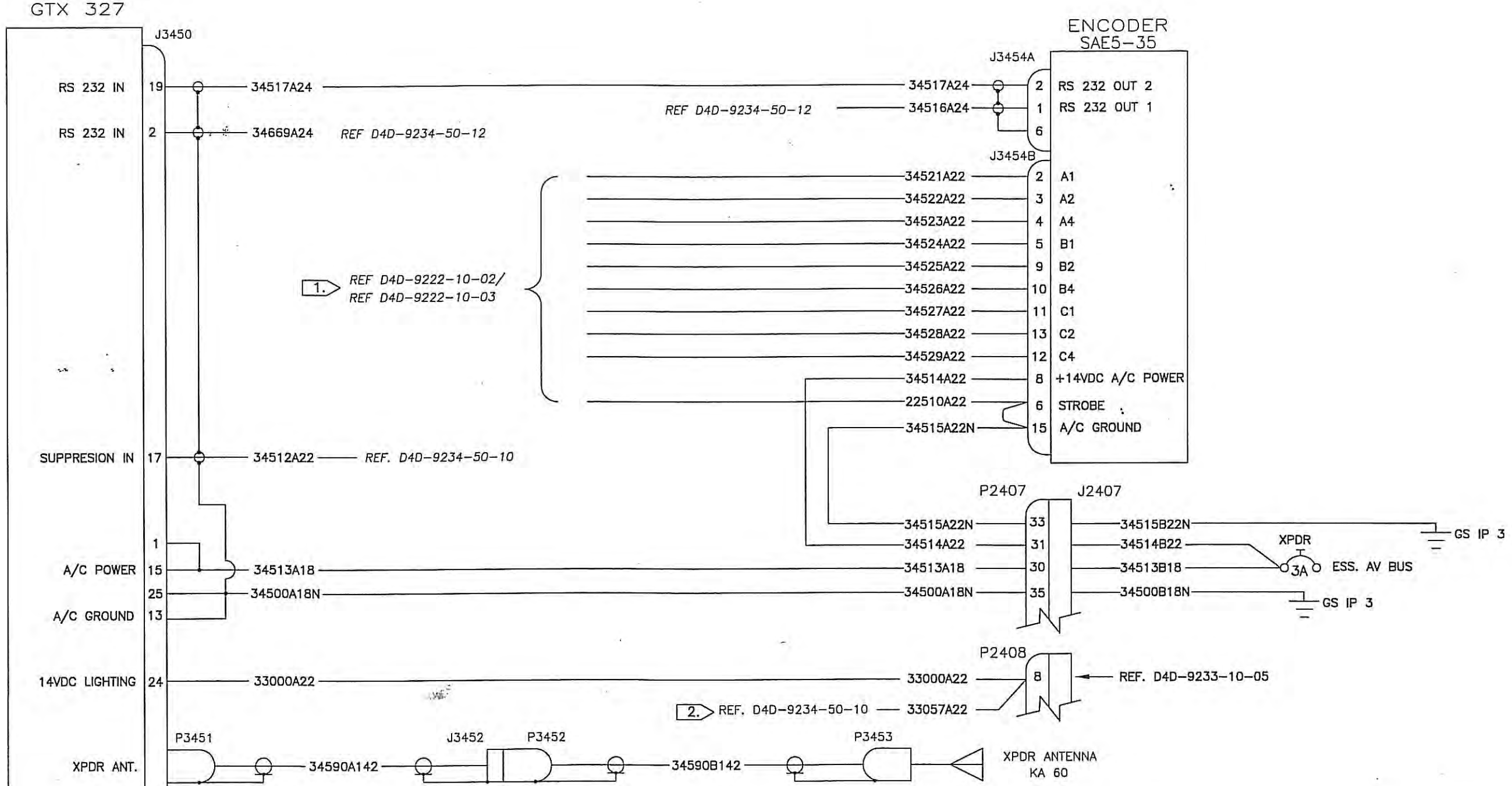
TITLE: SCHEMATIC, KN 62A WIRING, DIESEL (GARMIN INTERFACE)

NEXT ASSEMBLY: D4D-9200-00-00

DRAWING NUMBER: D4D-9234-50-10

SHEET: 1/1

REPLACES DWG.#



NOTES:

1. INSTALLED WITH KAP 140 AUTOPILOT.
2. INSTALLED WITH KN 62 DME.

QTY	QTY	ITEM	PART NUMBER			DESCRIPTION	MATERIAL TYPE	H.T.	MATERIAL SIZE	SPECIFICATION	SUPPLIER
REVISION		–	'a'	'b'	'c'						
RN#		OÄM 40-136	MÄM 40-197	MÄM 40-198	MÄM 40-202						
DATE		13.03.03	25.09.03	22.10.03	01.11.03						
DRAWN		WOOD	KØWARSCH	C.WOOD	C.WOOD						
CHECK		M Reichel			03.12.2004						
CHECK DATE											
STRESS											
STRESS DATE											
APPROVAL											
APPROVAL DATE											

Diamond Aircraft

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Do Not Scale Drawing

Size:	Scale:	First Angle
B	N.T.S	

Dimensions in Millimetres | Tolerances are

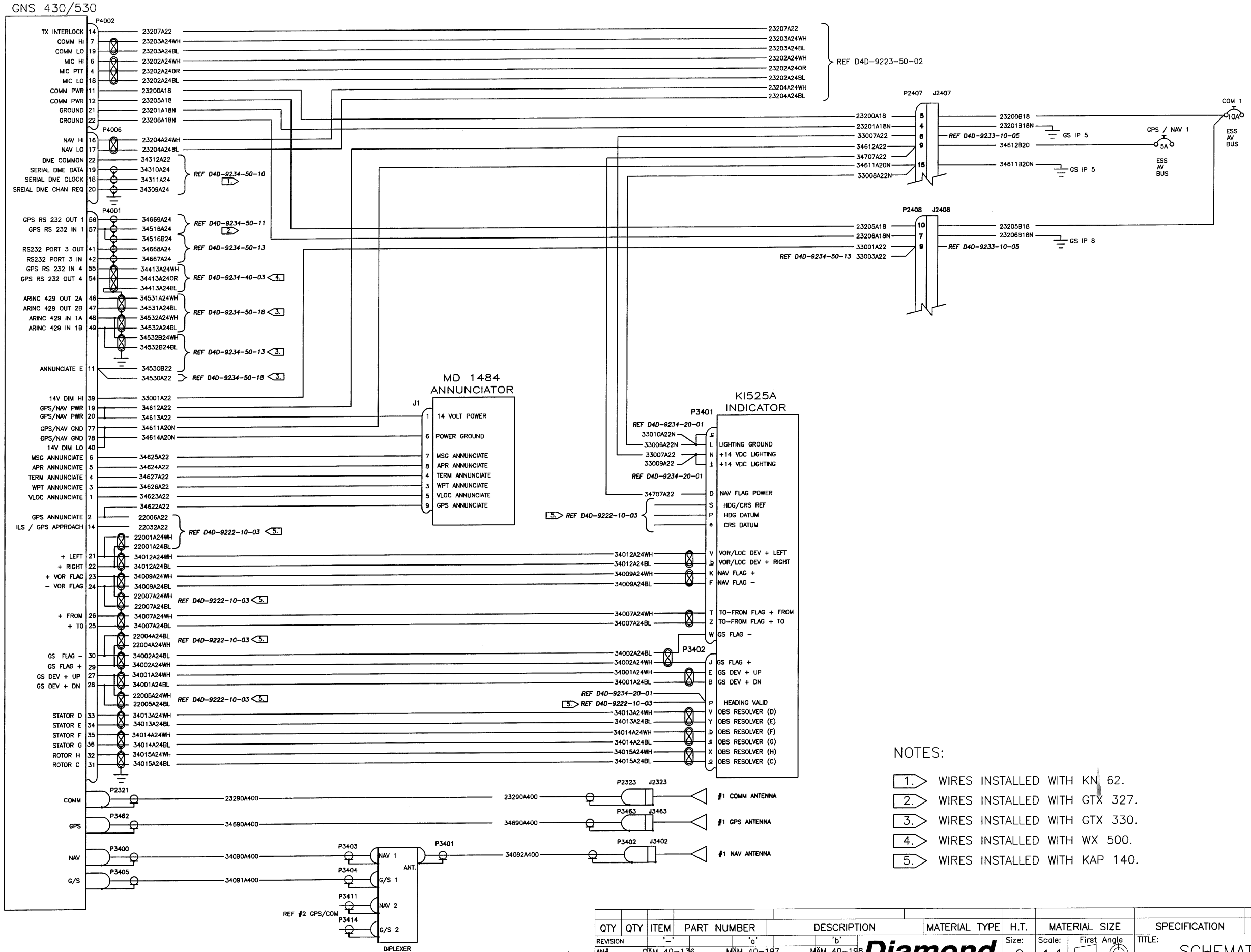
TITLE: SCHEMATIC, GTX 327 WIRING, DIESEL

NEXT ASSEMBLY: D4D-9200-00-00

DRAWING NUMBER: D4D-9234-50-11

SHEET: 1/1

REPLACES DWG.#



NOTES:

1. WIRES INSTALLED WITH KN 62.
2. WIRES INSTALLED WITH GTX 327.
3. WIRES INSTALLED WITH GTX 330.
4. WIRES INSTALLED WITH WX 500.
5. WIRES INSTALLED WITH KAP 140.

QTY	QTY	ITEM	PART NUMBER	DESCRIPTION	MATERIAL TYPE	H.T.	MATERIAL SIZE	SPECIFICATION	SUPPLIER
REVISION			'–'	'a'	'b'				
AN#			OÄM 40-136	MÄM 40-197	MÄM 40-198				
DATE			13.03.03	03.10.03	22.10.03				
DRAWN			WOOD	KOWARSCH	C.WOOD				
CHECK									
CHECK DATE									
STRESS									
STRESS DATE									
APPROVAL									
APPROVAL DATE									

M. Reichel
24 NOV 2003

Diamond Aircraft

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Do Not Scale Drawing

Size:	Scale:	First Angle
C	1:1	
Dimensions in Millimetres	Tolerances are ISO 2768 m	

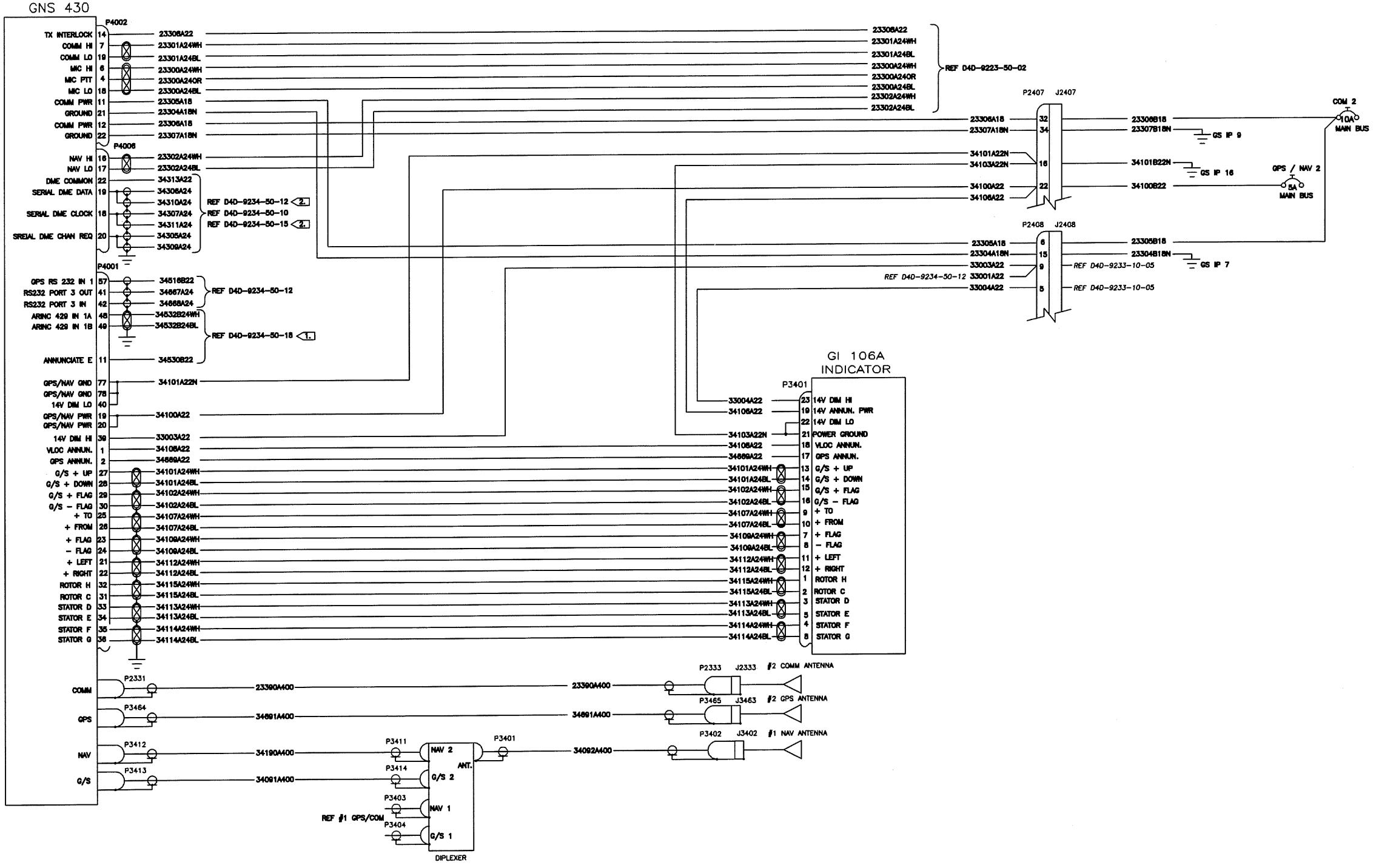
NEXT ASSEMBLY: D4D-9200-00-00

TITLE: SCHEMATIC, GNS 430 / 530 GPS COM #1

DRAWING NUMBER: D4D-9234-50-12

SHEET: 1/1

REPLACES DWG.#: N/A



NOTES:

1. WIRES INSTALLED WITH GTX 330.
2. USE REF D4D-9234-50-12 FOR COMM #1 WITH KI 525, AND REF D4D-9234-50-15 FOR COMM #1 WITH GI 106A.

QTY	QTY	ITEM	PART NUMBER	DESCRIPTION	MATERIAL TYPE	H.T.	MATERIAL SIZE	SPECIFICATION	SUPPLIER

REVISION	–	a
AN#	0ÄM 40-136	MÄM 40-197
DATE	08.01.03	03.10.03
DRAWN	KOWARSCH	KOWARSCH
CHECK		
CHECK DATE		
STRESS		
STRESS DATE		
APPROVAL		
APPROVAL DATE		

22.10.03

M. Reichel
21 OKT 2003

Diamond Aircraft

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Do Not Scale Drawing

Size: B	Scale: NTS	First Angle
Dimensions in Millimetres	Tolerances are ISO 2768 m	

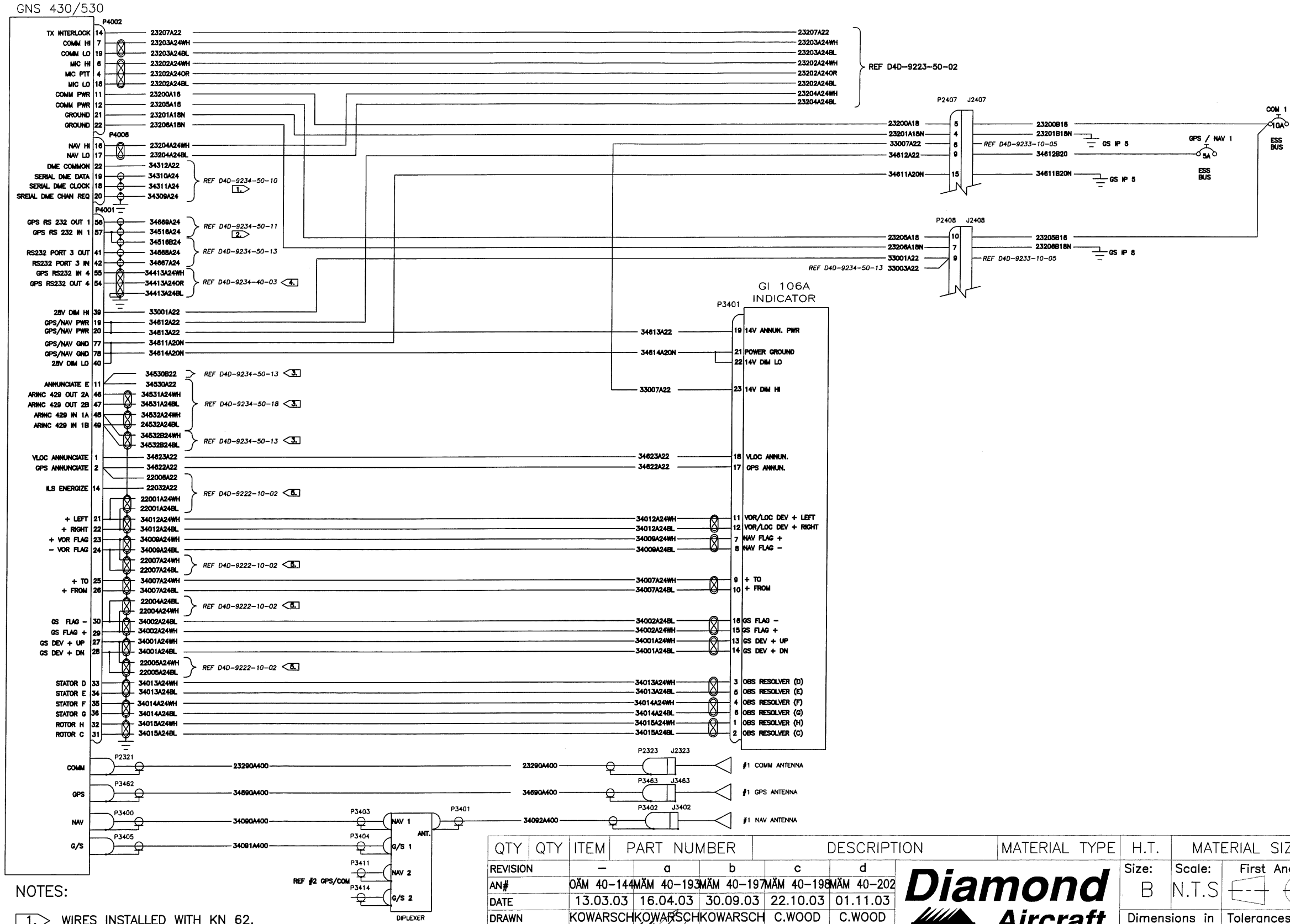
NEXT ASSEMBLY: D4D-9200-00-00

TITLE: SCHEMATIC, GNS 430 GPS COM #2

DRAWING NUMBER: D4D-9234-50-13

SHEET: 1/1

REPLACES DWG.# N/A



NOTES:

1. WIRES INSTALLED WITH KN 62.
2. WIRES INSTALLED WITH GTX 327.
3. WIRES INSTALLED WITH GTX 330.
4. WIRES INSTALLED WITH WX 500.
5. WIRES INSTALLED WITH KAP 140.

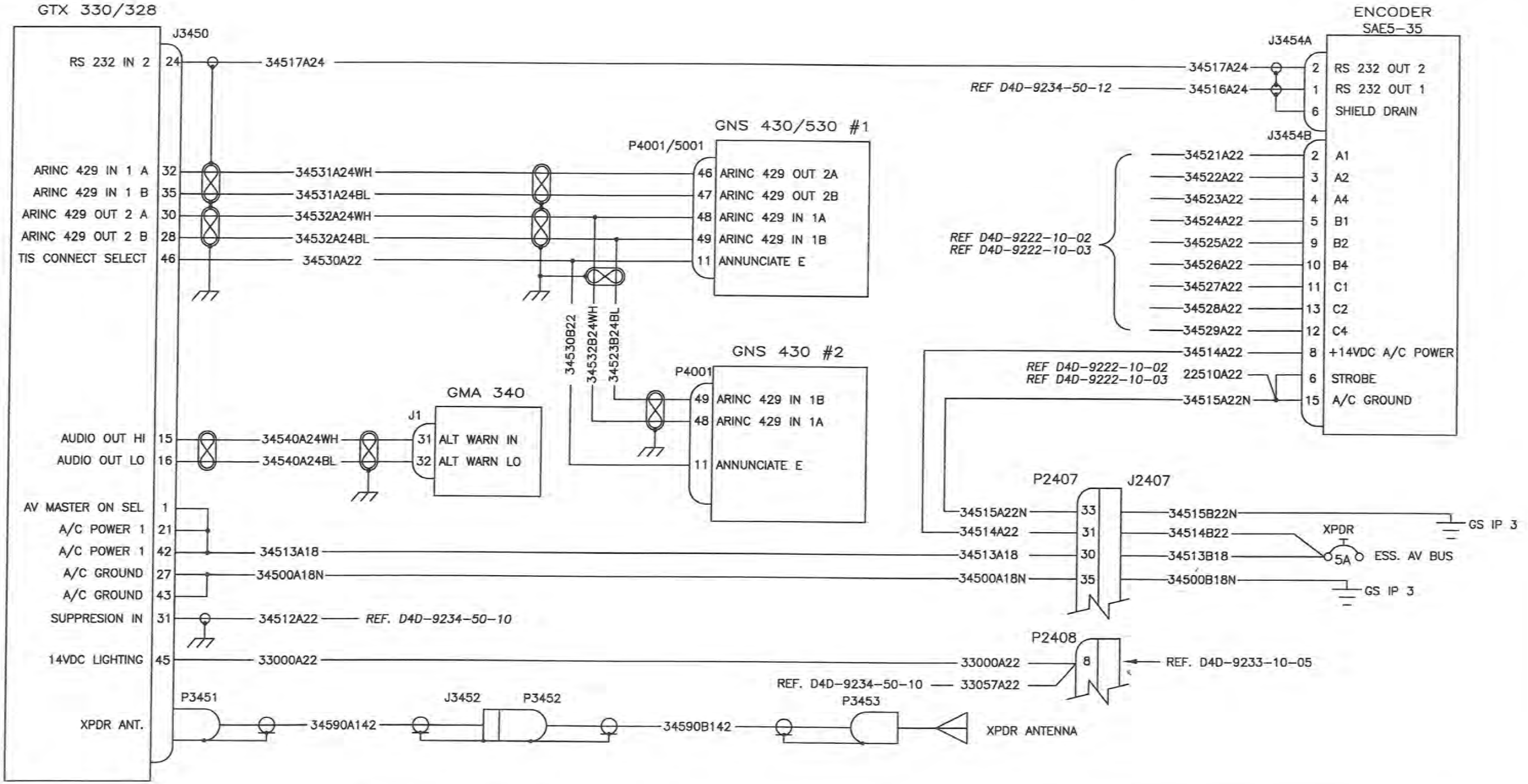
QTY	QTY	ITEM	PART NUMBER	DESCRIPTION	MATERIAL TYPE
REVISION		–	a	b	c	d
AN#		OÄM 40-144	MÄM 40-193	MÄM 40-197	MÄM 40-198	MÄM 40-202
DATE		13.03.03	16.04.03	30.09.03	22.10.03	01.11.03
DRAWN		KOWARSCH	KOWARSCH	KOWARSCH	C.WOOD	C.WOOD
CHECK		M. Reichel				
CHECK DATE						03.12.2004
STRESS						
STRESS DATE						
APPROVAL						
APPROVAL DATE						

Diamond Aircraft

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Do Not Scale Drawing

H.T.	MATERIAL SIZE		SPECIFICATION	SUPPLIER
Size: B	Scale: N.T.S	First Angle	TITLE: SCHEMATIC, GNS 430/530 & GI106A GPS COM #1	
Dimensions in Millimetres	Tolerances are			
NEXT ASSEMBLY: D4D-9200-00-00			DRAWING NUMBER: D4D-9234-50-15	SHEET: 1/1
			REPLACES DWG.#	



QTY	QTY	ITEM	PART NUMBER		DESCRIPTION	MATERIAL TYPE	H.T.	MATERIAL SIZE	SPECIFICATION	SUPPLIER
REVISION		'_'	'a'	'b'	'c'					
RN#		0ÄM 40-151	DÄM 40-151a	MÄM 40-198	0ÄM 40-294					
DATE		28.05.03	24.07.03	22.10.03	10.10.07					
DRAWN		KOWARSCH	KOWARSCH	C.WOOD	KOWARSCH					
CHECK										
CHECK DATE										
STRESS										
STRESS DATE										
APPROVAL										
APPROVAL DATE										

C. Jutte 8. JAN 2008 M Kowarsch 11. DEZ. 2007

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Do Not Scale Drawing

Size:	Scale:	First Angle
B	N.T.S	

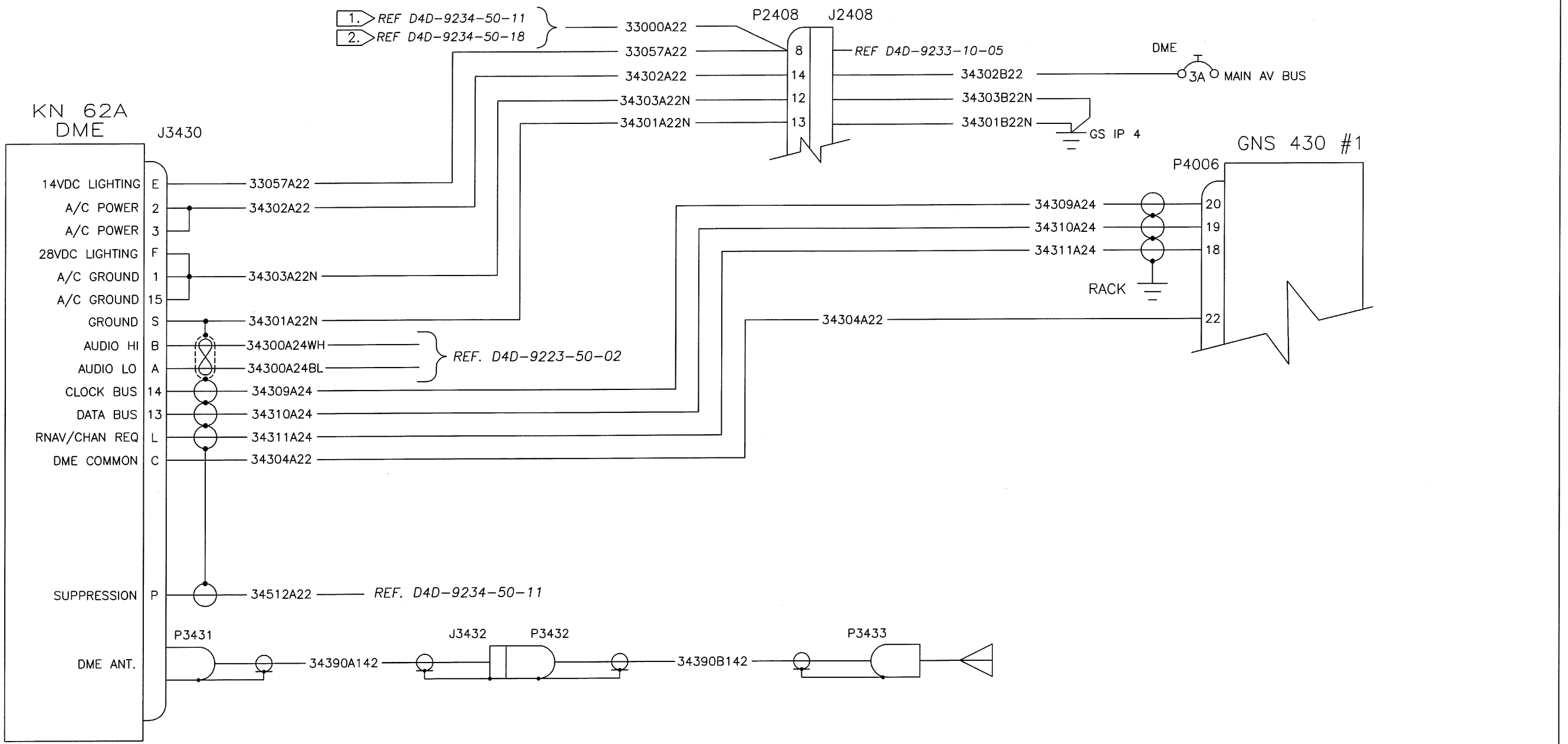
Dimensions in Millimetres | Tolerances are

NEXT ASSEMBLY: D4D-9200-00-00

TITLE: SCHEMATIC, GTX 330/328 WIRING, DIESEL

DRAWING NUMBER: D4D-9234-50-18 | SHEET: 1/1

REPLACES DWG.#



NOTES:

1. INSTALLED WITH GTX 327.
2. INSTALLED WITH GTX 330.

QTY	QTY	ITEM	PART NUMBER	DESCRIPTION	MATERIAL TYPE
REVISION		–			
RN#		ÖÄM 40-182			
DATE		12.01.04			
DRAWN		MANDL			
CHECK					
CHECK DATE					
STRESS					
STRESS DATE					
APPROVAL					
APPROVAL DATE					

M. Reichel 13. JAN. 2004

Diamond Aircraft

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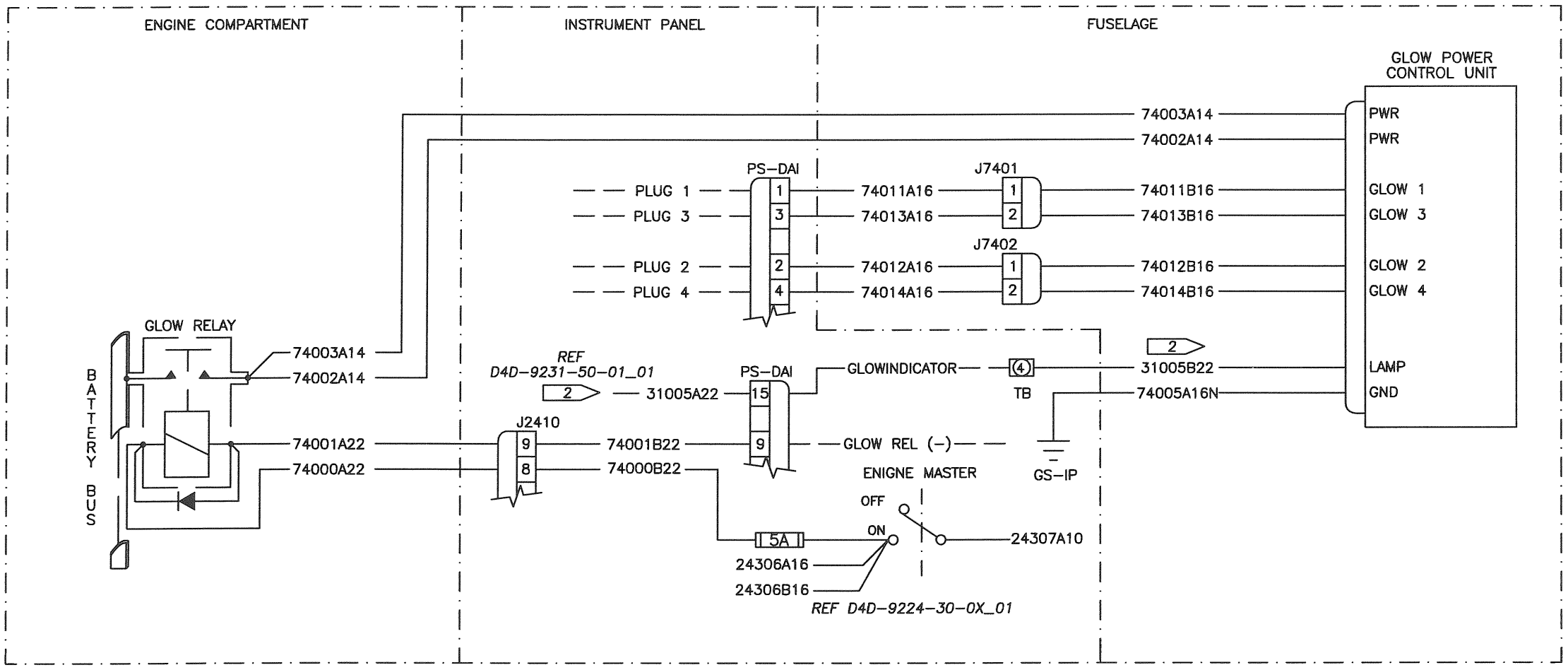
Do Not Scale Drawing

H.T.	MATERIAL SIZE		SPECIFICATION	SUPPLIER
Size: B	Scale: N.T.S	First Angle		
Dimensions in Millimetres		Tolerances are		

TITLE: SCHEMATIC, KN 62A WIRING, DIESEL, VFR

NEXT ASSEMBLY:	DRAWING NUMBER:	SHEET:
D4D-9200-00-00	D4D-9234-50-19	1/1
	REPLACES DWG.#	

REVISIONS		
Rev.	Zone	Description
"-"	-	see ÄM
"a"	D3	Relocated ground stud location to instrument panel, added wire number

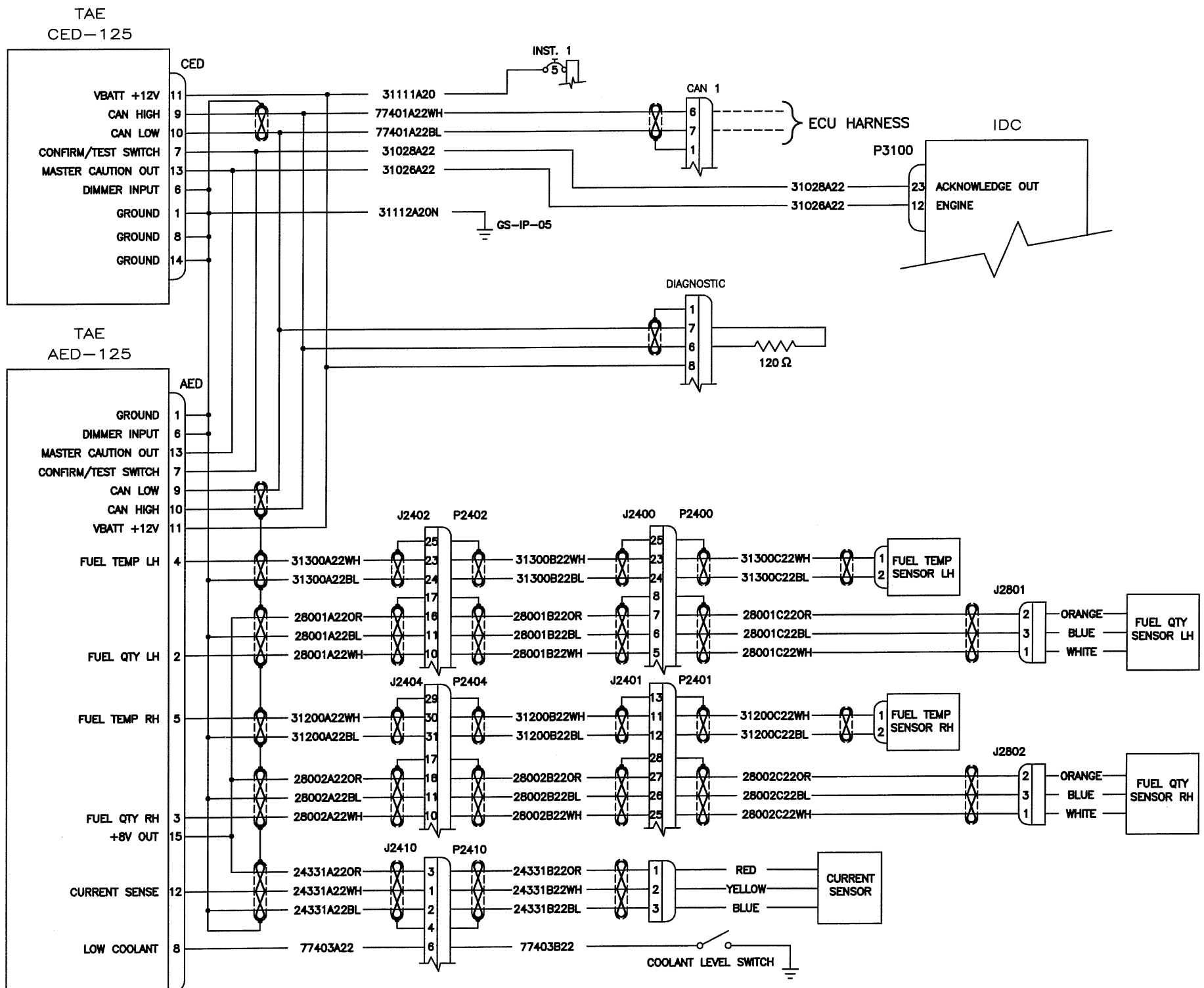


NOTES

1 *Dashed lines indicate the TAE Engine Harness.*

2 *This wire is installed in conventional instrument panel versions only.*

QTY	QTY	ITEM	PART NUMBER		DESCRIPTION		MATERIAL TYPE	H.T.	MATERIAL SIZE		SPECIFICATION	SUPPLIER
REVISION		–	a					Size: B	Scale: N.T.S	First Angle	TITLE: SCHEMATIC, GLOW SYSTEM TAE125-02	
RN#		MÄM 40-256	MÄM 40-256c					Dimensions in Millimetres		Tolerances are		
DATE		12.12.06	10.09.07					NEXT ASSEMBLY: D4D-9200-00-00			DRAWING NUMBER: D4D-9274-00-01	SHEET: 1/1
DRAWN		KOWARSCH	KOWARSCH									
CHECK		M. Kowarsch			C. Jütte		Diamond Aircraft				REPLACES DWG.# N/A	
CHECK DATE		27. SEP. 2007			1 OKT 2007							
STRESS							This Drawing is the Property of Diamond Aircraft. Unauthorized Reproduction or Disclosure to Third Parties is Prohibited					
STRESS DATE												
APPROVAL							Do Not Scale Drawing					
APPROVAL DATE												



QTY	QTY	ITEM	PART NUMBER		DESCRIPTION	MATERIAL TYPE	H.T.	MATERIAL SIZE	SPECIFICATION	SUPPLIER
REVISION		'–'	'a'	'b'						
RN#		OÄM 40–100	OÄM 40–100a	MÄM 40–192						
DATE		07.11.02	28.01.03	16.04.03						
DRAWN		KOWARSCH	KOWARSCH	KOWARSCH						
CHECK										
CHECK DATE										
STRESS										
STRESS DATE										
APPROVAL										
APPROVAL DATE										

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Do Not Scale Drawing

Size:	Scale:	First Angle
B	N.T.S	

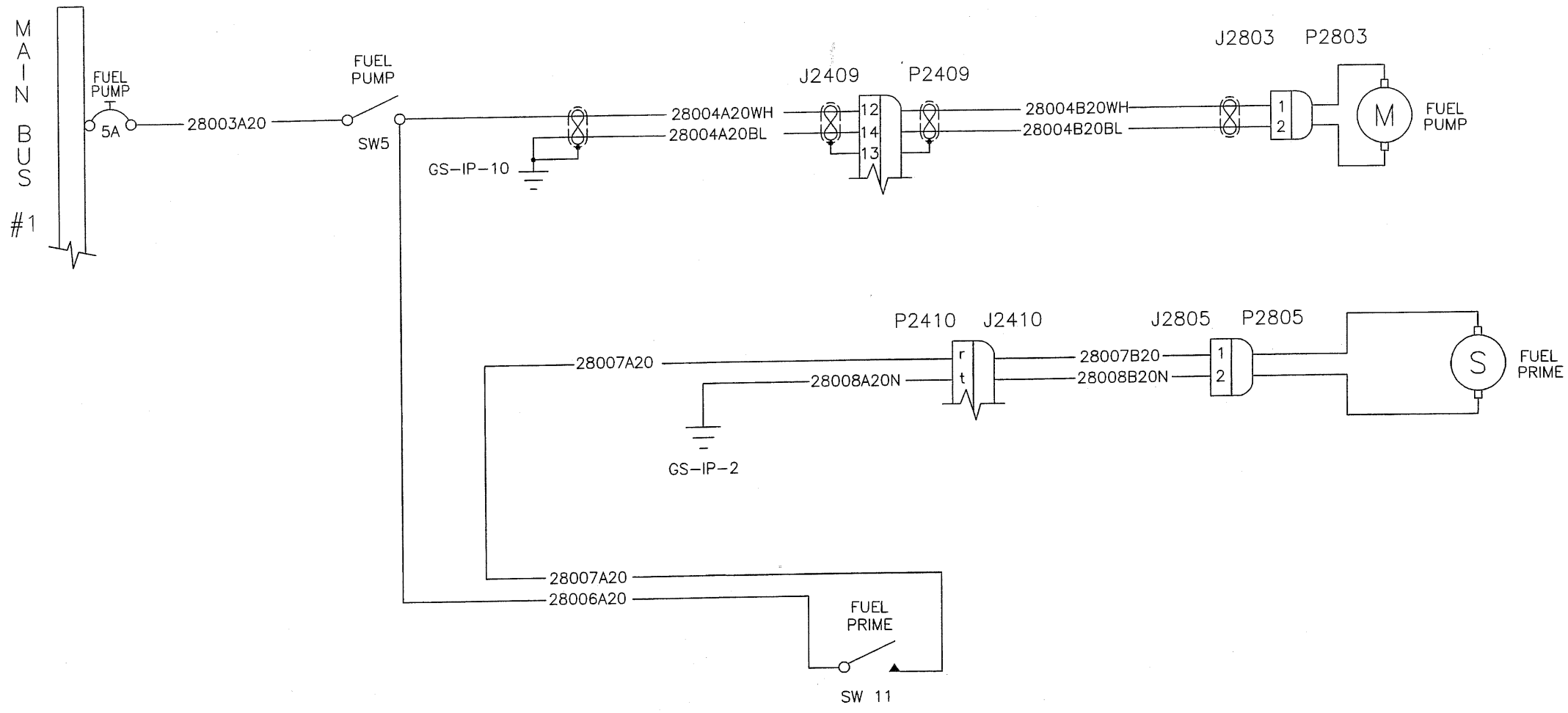
Dimensions in Millimetres | Tolerances are

TITLE: SCHEMATIC, ENGINE INDICATING

NEXT ASSEMBLY: D4D–9200–00–00

DRAWING NUMBER: D4D–9277–40–01 | SHEET: 1/1

REPLACES DWG.# N/A



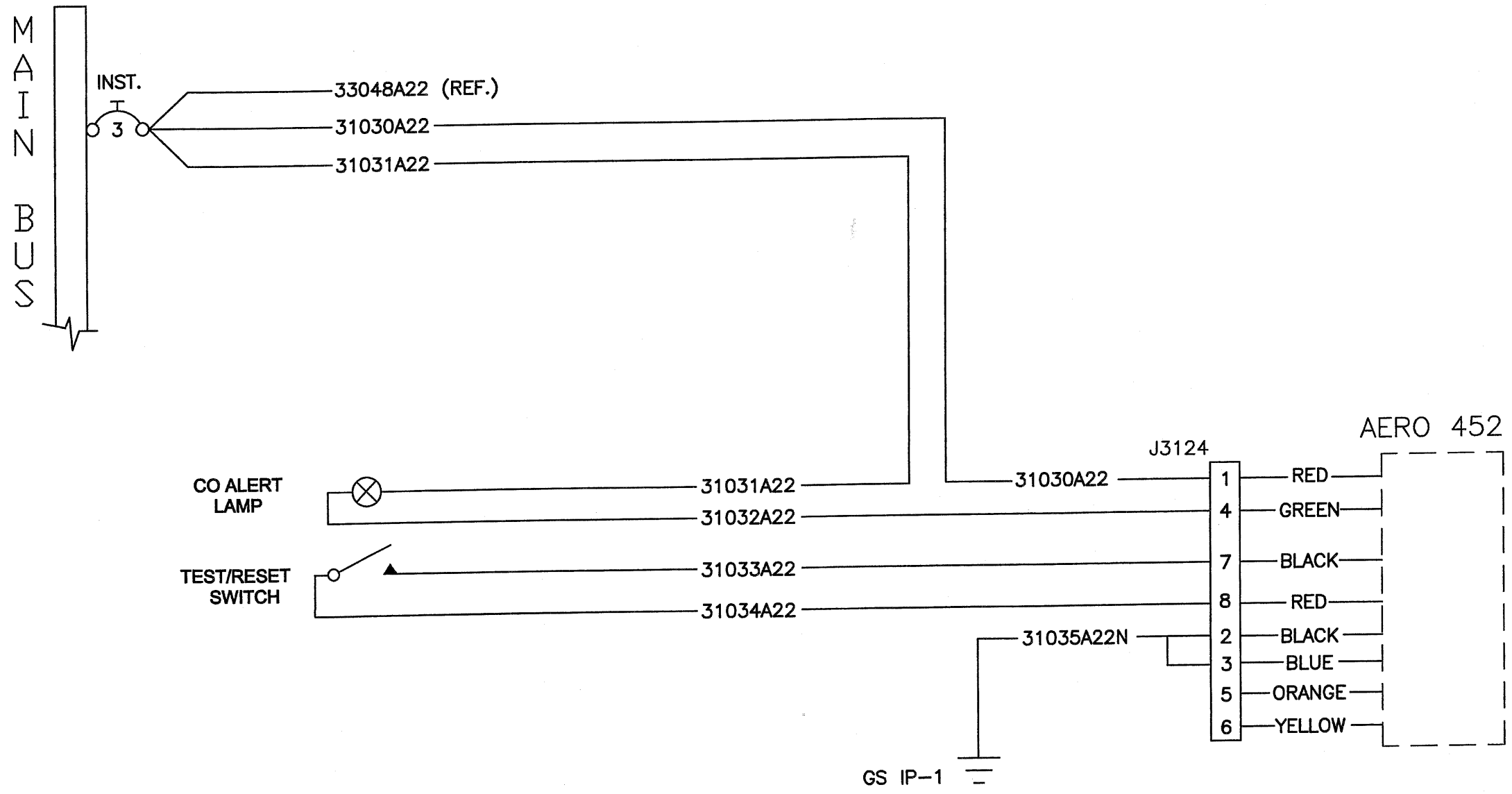
QTY	QTY	ITEM	PART NUMBER	DESCRIPTION	MATERIAL TYPE
REVISION		'–'			
RN#		VÄM 40–002			
DATE		01.02.05			
DRAWN		P.STURGE			
CHECK			M.Reichel		
CHECK DATE			15 JUNI 2005		
STRESS					
STRESS DATE					
APPROVAL					
APPROVAL DATE					

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Do Not Scale Drawing

H.T.	MATERIAL SIZE		SPECIFICATION	SUPPLIER
Size: B	Scale: N.T.S	First Angle	TITLE: SCHEMATIC, FUEL SYSTEM PUMP	
Dimensions in Millimetres	Tolerances are			
NEXT ASSEMBLY: D4F–9200–00–00			DRAWING NUMBER: D4F–9228–20–01	SHEET: 1/1
			REPLACES DWG.#	



QTY	QTY	ITEM	PART NUMBER	DESCRIPTION	MATERIAL TYPE	H.T.	MATERIAL SIZE	SPECIFICATION	SUPPLIER
REVISION		'-'							
AN#		VÄM 40-002b							
DATE		01.06.05							
DRAWN		C.WOOD							
CHECK									
CHECK DATE									
STRESS									
STRESS DATE									
APPROVAL									
APPROVAL DATE									

M.Reichel
15 JUNI 2005

Diamond Aircraft

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Do Not Scale Drawing

Size: B | Scale: NTS | First Angle

Dimensions in Millimetres | Tolerances are ISO 2768 m

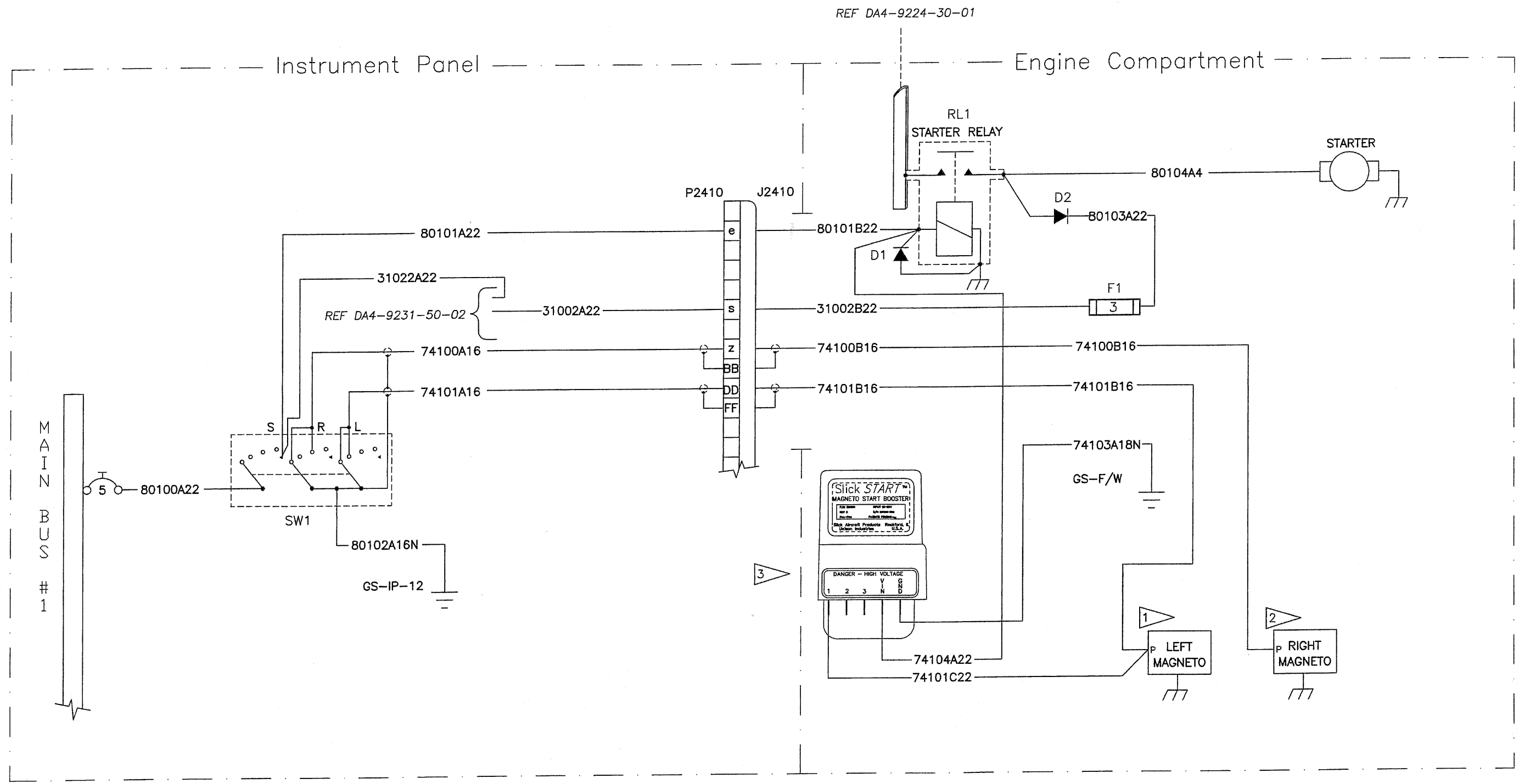
NEXT ASSEMBLY: D4F-3144-31-00

TITLE: SCHEMATIC, CO SENSOR, CONVENTIONAL PANEL

DRAWING NUMBER: D4F-9231-20-02

SHEET: 1/1

REPLACES DWG.#



1 > LEFT MAGNETO DA40F W/ SLICKSTART - P/N 4373

2 > RIGHT MAGNETO DA40F W/ SLICKSTART - P/N 4370

3 > SS 1001 SLICK START, MAGNETO START BOOSTER

QTY	QTY	ITEM	PART NUMBER	DESCRIPTION	MATERIAL TYPE
REVISION		-			
RN#					
DATE		13.06.05			
DRAWN		KELSON			
CHECK					
CHECK DATE					
STRESS					
STRESS DATE					
APPROVAL					
APPROVAL DATE					

M. Reichel
21 JULI 2005

Diamond Aircraft

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Do Not Scale Drawing

H.T.	MATERIAL SIZE		SPECIFICATION	SUPPLIER
Size: B	Scale: N.T.S	First Angle		
Dimensions in Millimetres	Tolerances are			

TITLE: SCHEMATIC SLICKSTART IGNITION & STARTING

NEXT ASSEMBLY: D4F-9200-00-00

DRAWING NUMBER: D4F-9274-00-01

SHEET: 1/1

REPLACES DWG.# N/A