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Beech Aircraft Corp.
Baron Model 55, A55, B55, C55, D55, E55, and 58
Shop Manual

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MFG.

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Shop Manual

NOTE

This manual was formerly called the Beechcraft Baron Shop Manual.

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RECORD OF REVISIONS

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RECORD OF TEMPORARY REVISIONS

When inserting or removing a temporary revision, the applicable revision number and the initials of the person(s) inserting and/or removing these revisions should be recorded on these pages.

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P/N 55-590000-13E, REVISION E18, November 10, 2000

The sections which have been revised or added are listed below with the highlights of each change. Remove the affected pages and insert the E18 revision in accordance with the attached Instruction Page. Enter the revision number and the date inserted on the Record of Revisions page of this manual. The Highlight Page may be retained with the manual for future reference.

HIGHLIGHTS

Chapter/Section	Description of Change
Section 1	Added a warning to identify each side of a component being disconnected to facilitate correct reassembly. Added an overhaul manual for electric boost pumps under Supplier Publications.
Section 3	Added Forward Carry-Through Spar Cover Removal and Installation procedures. Revised Wing Installation to inspect the wing bolts by magnetic particle process before installation. The wing bolt mounting nuts must be replaced at each inspection interval.

REVISION 55-590000-13E18
to the
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Basic publications are assigned a part number which appears on the title page with the date of the issue. Subsequent revisions are identified by the addition of a revision code after the part number. A1 after a part number denotes the first revision to the basic publication, A2 the second, etc. Occasionally, it is necessary to completely reissue and reprint a publication for the purpose of obsoleting a previous issue and outstanding revisions thereto. As these replacement reissues are made, the code will also change to the next successive letter of the alphabet at each issues. For example, B for the first reissue, C for the second, etc.

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SECTION

1

**GENERAL
INFORMATION**

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GENERAL INFORMATION

WARNING

Any maintenance requiring the disconnection and reconnection of flight control cables, plumbing, electrical connectors or wiring requires identification of each side of the component being disconnected to facilitate correct reassembly. At or prior to disassembly, components should be color coded, tagged or properly identified in a way that it will be obvious how to correctly reconnect the components. After reconnection of any component, remove all identification tags. Check all associated systems for correct function prior to returning the airplane to service.

The organization of the Beech Baron Shop Manual has been planned with the intention of presenting the various data in logical sequence for maximum convenience and minimum time required to locate the desired information. The information in the manual is directed toward assisting the experienced mechanic with specialized and more complex maintenance procedures while repetitive procedures are given less emphasis. Throughout the manual illustrations supplement the text and are located as closely as possible to the related discussion. The manual is divided into sixteen sections, with each section devoted to a specific system or major component. For convenience, all information pertaining to a particular system (except servicing and wiring diagrams) may be found in one place in the manual.

To aid you in quickly locating the information you need, an alphabetical index contains multiple entries for each subject. Additional information which should prove most helpful includes troubleshooting guides, an overhaul and replacement schedule, based on past component performance; and a list of publications, comprising information on various components of the Beech Baron.

If a question should arise concerning the care of your airplane, it is important to include the airplane serial number in any correspondence. Airplane serials TC-1 thru TC-1035 and TE-1 thru TE-451, the model designation placard is attached to the bottom of the fuselage immediately forward of the tie-down lug. Airplane serials TC-1036 and after, TE-452 and after, and TH-1 and after, the model designation placard is attached to the right side of the fuselage at the inboard end of the flap. The placard is visible with the flaps lowered. The Beech Baron series is presently serialized as follows:

Model 55, serials TC-1 thru TC-190

Model A55, serials TC-191 thru TC-501, except TC-350 and TC-371

Model B55, serials TC-371, TC-502 and after

Model C55, serials TC-350, TE-1 thru TE-451

Model D55, serials TE-452 thru TE-767

Model E55, serials TE-768 and after

Model 58, serials TH-1 and after

The Models E55 and 58, except for wiring diagrams, are not in all cases denoted by serial effectivity throughout the manual. However, information contained in the text for the Model D55 will apply to the Models E55 and 58 unless otherwise noted.

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The wiring diagram for the serials TC-1 thru TC-1935, except TC-1913; TE-1 thru TE-1063 and TH-1 thru TH-647, except TH-598, are contained in Section 14 of this Beech Baron Shop Manual. The serial effectivity of each diagram is shown in the title of the diagram.

Refer to the Beech Baron B55 Wiring Diagram Manual, part number 96-590011-15, for the wiring diagrams pertaining to the Baron B55 airplane serials TC-1913, TC-1936 and after. Refer to the Beech Baron E55 and Baron 58 Wiring Diagram Manual, part number 96-590010-15, for the wiring diagrams pertaining to the Baron E55 airplane serials TE-1064 and after and to the Baron 58 airplane serials TH-598, TH-648 and after.

NOTE

Service Publication reissues or revisions are not automatically provided to the holders of this manual. For information on how to obtain reissues or revisions applicable to this manual, refer to the latest revision of Raytheon Aircraft Service Bulletin No. 2001 or subsequent revision.

It shall be the responsibility of the owner/operator to ensure that the latest revision of publications referenced in this shop manual are utilized during operation, service, and maintenance of the airplane.

Raytheon Aircraft Company expressly reserves the right to supersede, cancel and/or declare obsolete any part, part numbers, kits or publication that may be referenced in this manual without prior notice.

WARNING

Use only genuine Raytheon Aircraft Company or Raytheon Aircraft Company-approved parts obtained from Raytheon Aircraft Company-approved sources, in connection with maintenance and repair of Raytheon Aircraft Company airplanes.

Genuine Raytheon Aircraft Company parts are produced and inspected under rigorous procedures to insure airworthiness and suitability for use in Raytheon Aircraft Company airplane applications. Parts purchased from sources other than Raytheon Aircraft Company, even though outwardly identical in appearance, may not have had the required tests and inspections performed, may be different in fabrication techniques and materials, and may be dangerous when installed in an airplane.

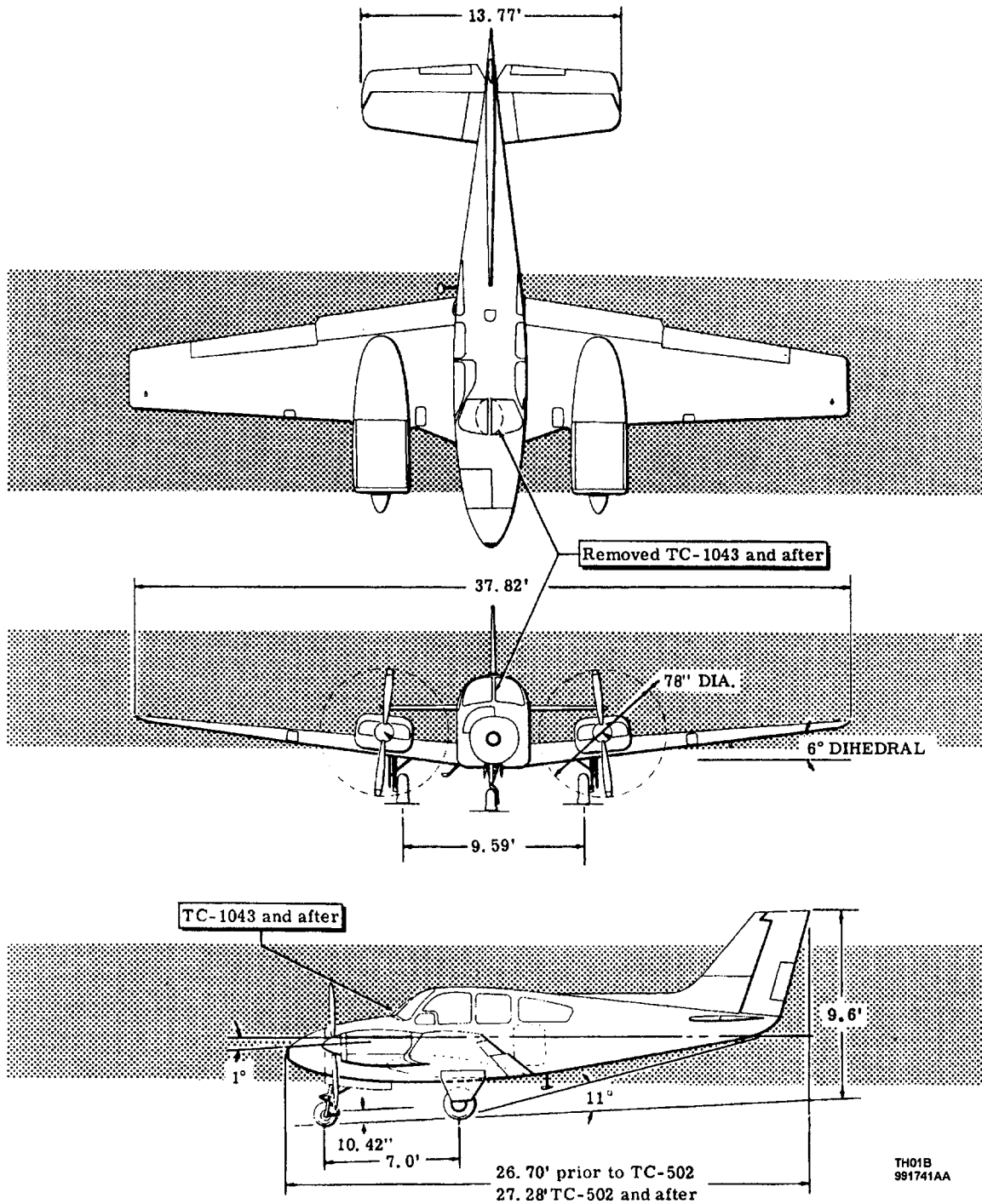
Salvaged airplane parts, reworked parts obtained from non-Raytheon Aircraft Company-approved sources, or parts, components or structural assemblies, the service history of which is unknown or cannot be authenticated, may have been subjected to unacceptable stresses or temperatures or have other hidden damage, not discernible through routine visual or usual nondestructive testing techniques. This may render the part, component or structural assembly, even though originally manufactured by Raytheon Aircraft Company, unsuitable and unsafe for airplane use.

Raytheon Aircraft Company expressly disclaims any responsibility for malfunctions, failures, damage or injury caused by use of non-Raytheon Aircraft Company parts.

Complete operating instructions for the Beech Baron may be found in the applicable model Pilot's Operating Handbook.

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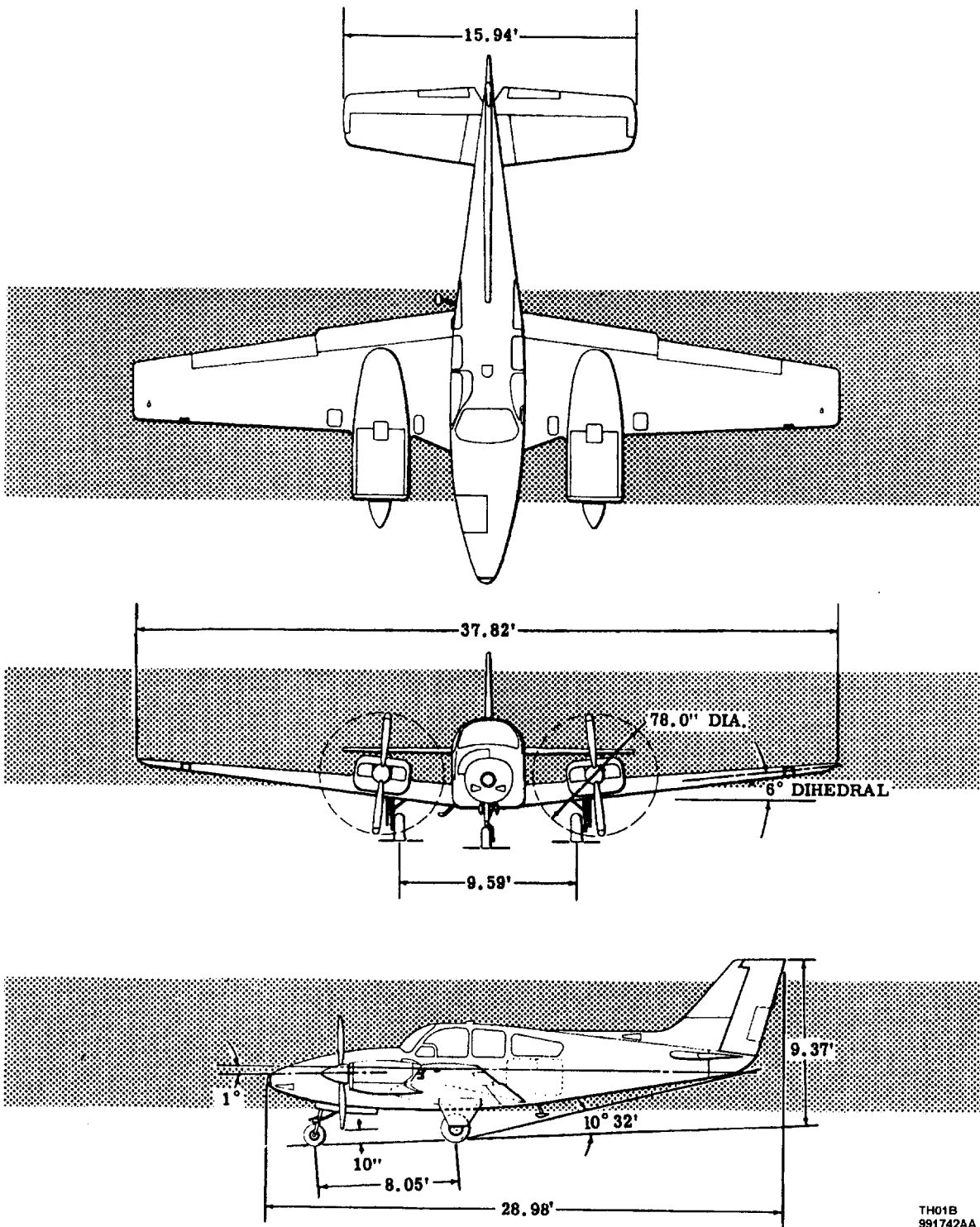
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Dimensions of Airplane (TC-1 and After)
Figure 1-1

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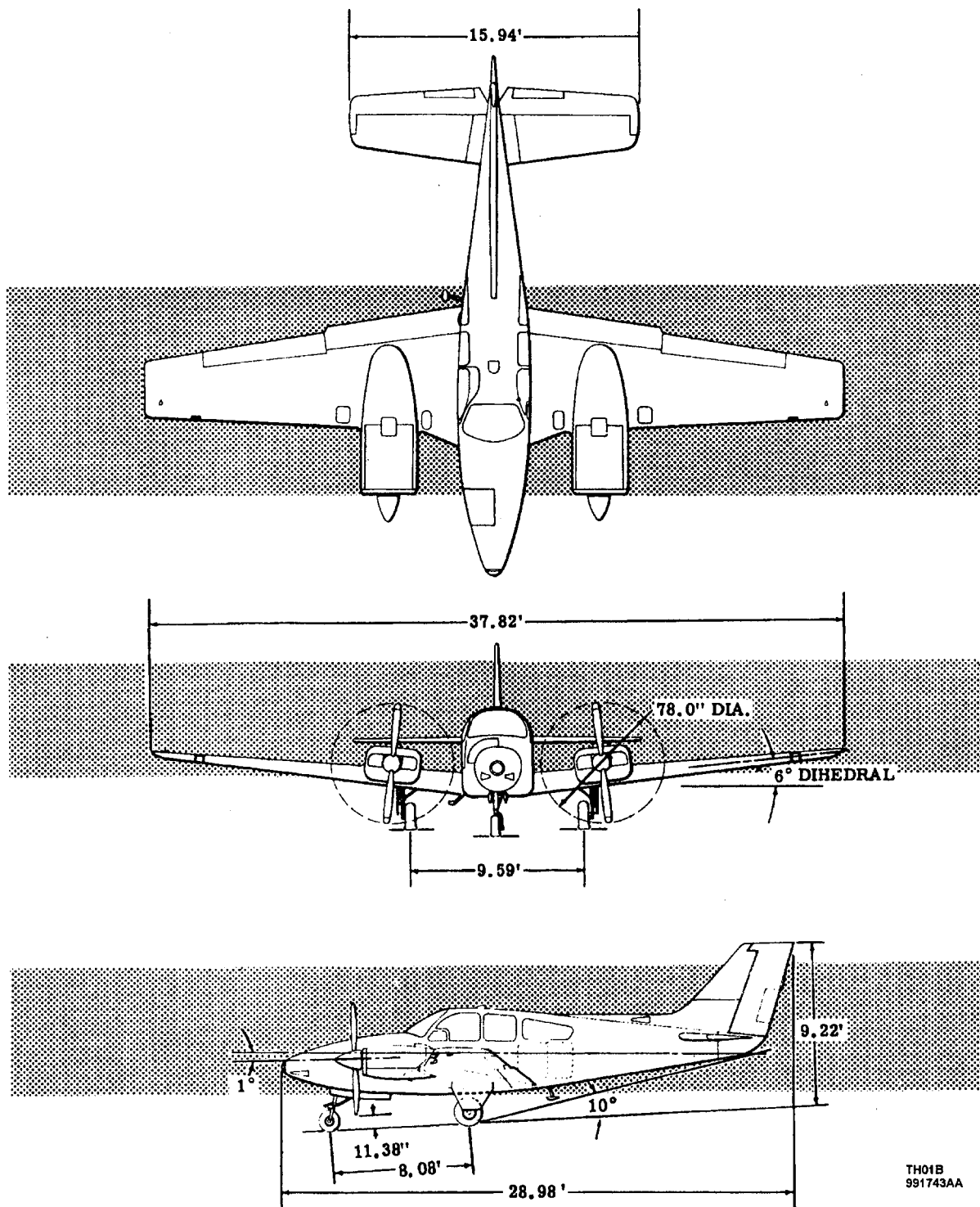
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Dimensions of Airplane (TE-1 thru TE-300)
Figure 1-2

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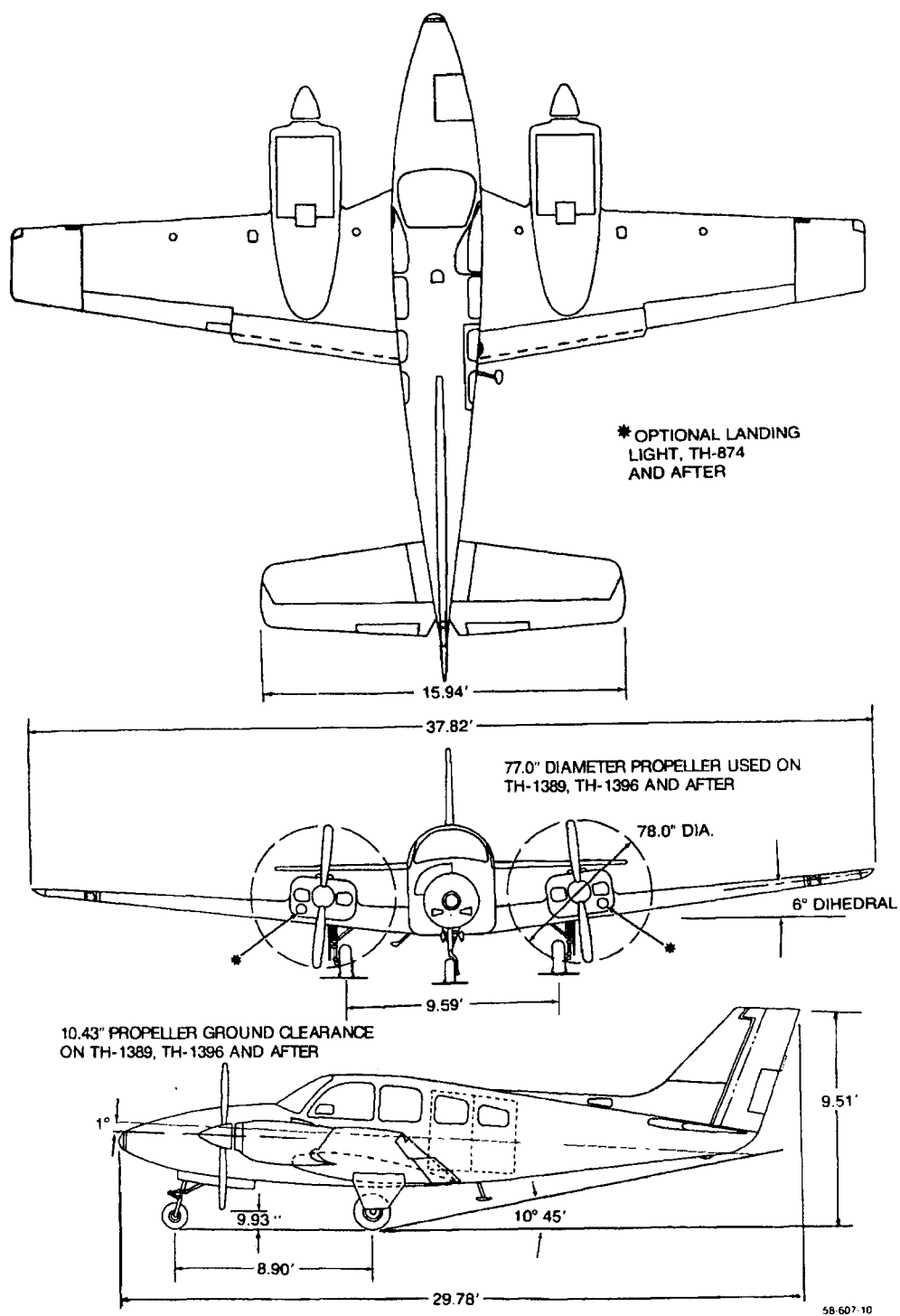
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Dimensions of Airplane (TE-301 and After)
Figure 1-3

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BEECH BARON 55 AND 58 SHOP MANUAL



Dimensions of Airplane (TH-1 and After)
Figure 1-4

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BEECH BARON 55 AND 58 SHOP MANUAL

POWER PLANT

ENGINE

Model 55, A55 and B55, two Continental, 6 cylinder, 10-470-L fuel injected engines rated at 260 horsepower at 2625 rpm.

Model C55, D55, E55 and 58 (Serials TH-1 thru TH-1396 except TH-1389) two Continental 6 cylinder, IO-520-C fuel injected engines rated at 285 horsepower at 2700 rpm.

Model E55, serial TE-1143 and after, and Model 58, serial TH-973 thru TH-1395 except TH-1389, two Continental 6 cylinder, IO-520-CB engines are installed. These engines are identical to the IO-520-C engines except the IO-520-CB engine has a stronger crankshaft and other changes related to the stronger crankshaft.

Model 58 serials TH-1389, TH-1396 and after, two Continental 6 cylinder IO-550-C fuel injected engines rated at 300 horsepower at 2700 rpm.

MAGNETO TIMING

18° to 20° before top center of number one cylinder, (IO-470)

19° to 21° before top center of number one cylinder, (IO-520)

21° to 23° before top center of number one cylinder, (IO-550-C)

SPARK PLUGS

(Refer to Spark Plug Chart, Section 2)

Champion GAP: 0.018 to 0.022

A.C. GAP: 0.018 to 0.022

FIRING ORDER

163254

NOTE

Number one cylinder is the rear cylinder on the right hand side of the engine.

OIL PRESSURE

30 to 60 psi at 75° to 240° at 2,500 rpm.

OIL CAPACITY

12 quarts

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PROPELLER

Two constant speed full feathering.

The following is a list of propellers that were installed on the Baron at the factory.

PROPELLERS - BARON (MODEL B55)

PROPELLER PART NUMBER	SERIAL EFFECTIVITY	INSTALLATION	MANUFACTURER
96-960006-603*/ 78BFMO	TC-1 thru TC-472 ex. TC-371, and TC-408	OPTIONAL	McCAULEY
2AF36C39P/78BFMO	TC-1 thru TC-472 ex. TC-371, and TC-408	STANDARD	MCCAULEY
96-960006-604*/78FF-0	TC-371, TC-408, TC-473 thru TC-1415	OPTIONAL	McCAULEY
96-960007-614**/78FF-0	TC-874 thru TC-988	OPTIONAL	McCAULEY
2AF34C55/78FF-0	TC-371, TC-408, TC-473 thru TC-1415	STANDARD	McCAULEY
96-960006-608*/ PC8465-6, C8465-6	TC-1416 and after	OPTIONAL	HARTZELL
96-960022-601**/ PC8465-6, C8465-6	TC-1416 and after	OPTIONAL	HARTZELL
BHCC2YF2CHF/ FC8465-6	TC-1416 and after	STANDARD	HARTZELL
BHCC2YF2CH/C8465-6	TC-1416 and after	OPTIONAL	HARTZELL
PHCA3VF2BF*/7636DB	TC-502 and after	OPTIONAL	HARTZELL
96-960009-604**/ V7636D	TC-973 and after	OPTIONAL	HARTZELL
PHCA3VF2BF/7636D	TC-502 and after	STANDARD	HARTZELL
96-960006-610*	TC-1419 and after	OPTIONAL	HARTZELL
96-960022-603**	TC-1419 and after	OPTIONAL	HARTZELL
PHCC3YF2C7663-2R	TC-1419 and after	OPTIONAL	HARTZELL
PHCC3YF2F/ FC7663-2R	TC-1419 and after	OPTIONAL	HARTZELL

*ANTI-ICE EQUIPPED

**DEICE EQUIPPED

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PROPELLERS - BARON (MODEL C55, D55, E55)

PROPELLER PART NUMBER	SERIAL EFFECTIVITY	INSTALLATION	MANUFACTURER
96-960006-604*/78FF-0	TE-1 thru TE-848	OPTIONAL	McCAULEY
96-960006-606*/78FF-0	TE-1 thru TE-848	OPTIONAL	McCAULEY
2AF34C55/78FF-0	TE-1 thru TE-848	STANDARD	McCAULEY
96-960008-610*/ FC8475-6	TE-849 and after	OPTIONAL	McCAULEY
96-960021-609**/ FC8475-6	TE-849 and after	OPTIONAL	McCAULEY
BHCC2YF2CHF/ FC84756	TE-849 thru TE-942 except TE-938	STANDARD	HARTZELL
96-960008-601*/D3567/ 82NE6	TE-1 thru TE-848	OPTIONAL	McCAULEY
96-960010-606**/D3567/ 82NB6	TE-1 thru TE-860	OPTIONAL	McCAULEY
3AF32C75/82NB6/ D3567	TE-1 thru TE-849	OPTIONAL	McCAULEY
96-960008-611*/ FC7663-2R	TE-849 and after	OPTIONAL	HARTZELL
96-960020-602**/ FC7663-2R	TE-861 and after	OPTIONAL	HARTZELL
PHCC3YF2F/ FC7663-2R	TE-850 and after	OPTIONAL	HARTZELL

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PROPELLERS - BARON (MODEL 58)

PROPELLER PART NUMBER	SERIAL EFFECTIVITY	INSTALLATION	MANUFACTURER
96-960008-612*/ FC8475-6	TH-1 thru TH-1395 except TH-1389	OPTIONAL	HARTZELL
96-960021-61**/ FC8475-6	TH-1 thru TH-1395 except TH-1389	OPTIONAL	HARTZELL
BHC-J2YF2CF/ FC8475-6	TH-1 thru TH-1395 except TH-1389	STANDARD	HARTZELL
96-960008-613*/ FC8475-6	TH-1 thru TH-1395 except TH-1389	OPTIONAL	HARTZELL
58-960010-607**/ FC8475-6	TH-1 thru TH-1395 except TH-1389	OPTIONAL	HARTZELL
PHCJ3YF2F/FC7663-2R	TH-1 thru TH-1395 except TH-1389	OPTIONAL	HARTZELL
3AF32C512 / 82NEA-5	TH-1389, TH-1396 and after	STANDARD	McCAULEY

*ANTI-ICE EQUIPPED

**DEICE EQUIPPED

PROPELLER GOVERNORS MODEL 55, C55, D55, E55

PART NUMBER	EFFECTIVITY
210355	TC-1 thru TC-936 except TC-663
210438	TC-663, TC-937 thru TC-1398 and TC-1402
210666	TC-1399 thru TC-1709 except TC-1402
210714	TC-1710 and after
210439	TE-1 thru TE-851
210662	TE-852 thru TE-981 and TE-1710
210710	TE-981 and after except TE-1710

PROPELLER GOVERNORS MODEL 58

PART NUMBER	EFFECTIVITY
210662	TH-1 thru TH-466, TH-473, and TH-474
210710	TH-467 thru TH-472, TH-475 thru TH-1395 except TH-1389
96-380030-11	TH-1389, TH-1396 and after

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PROPELLER DEICER BRUSH REPLACEMENT

On BF Goodrich deicers replace brushes when 15/32 inch maximum distance is measured on a wire inserted through the inspection hole in the brush support block.

On McCauley deicers refer to BRUSH WEAR LIMITS (McCauley) in Section 11.

FUEL SYSTEM

FUEL GRADES: 100 LL (Blue) preferred. 100 (Green)

FUEL CAPACITY

AIRPLANE SERIAL:	FUEL SELECTOR POSITIONS:	CAPACITIES:
TC-1 thru TC-1607; TE-1 thru TE-942, except TE-938	OFF-AUX-MAIN-CROSSFEED	112 Gallon Capacity System (106 Gallon Usable)
TC-1 thru TC-1607; TE-1 thru TE-942, except TE-938	OFF-AUX-MAIN-CROSSFEED	142 Gallon Capacity System (136 Gallon Usable)
TC-1608 and after; TE-938, TE-943 and after; TH-1 and after	OFF-ON-CROSSFEED	142 Gallon, Interconnected, Capacity System (136 Gallon Usable)
TE-938, TE-943 and after; TH-1 and after	OFF-ON-CROSSFEED	172 Gallon, Interconnected, Capacity System (166 Gallon Usable)
TH-669 and after With Wet Wing Tips	OFF-ON-CROSSFEED	200 Gallon, Interconnected, Capacity System (194 Gallon Usable)

FUEL PRESSURE ADJUSTMENT (ENGINE-DRIVEN PUMP)

See Adjusting Fuel Pump, Power Plant Section 6.

MISCELLANEOUS

AIRCRAFT DIMENSIONS

OVERALL LENGTH

55, A55, B55.....	26.70' prior to TC-502, 27.28' TC-502 and after
C55, D55, E55	28.98' TE-1 and after
58.....	29.78' TH-1 and after

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WING SPAN

55, A55, B55, C55, D55, E55, and 58 37.82'

TAIL HEIGHT

55, A55, and B55..... 9.6'

C55..... 9.37'

D55, E55..... 9.22'

58..... 9.51'

TREAD WIDTH

55, A55, B55, C55, D55, E55, and 58 9.59'

PROPELLER DIAMETER

55, A55, B55, C55, D55, E55, and 58 prior to TH-1396 except TH-1389 ... 78"

58 TH-1389, TH-1396 and after 77"

PROPELLER GROUND CLEARANCE

55, A55, and B55..... 10.42"

C55, TE-1 thru TE-300 10"

C55, TE-301 thru TE-451, D55 and E55 11.38"

58 Prior to TH-1396 except TH-1389 9.93"

58 TH-1389, TH-1396 and after 10.43"

BRAKE FLUID RESERVOIR

Fill to 1 1/2 inch of the top with MIL-H-5606 or MIL-H-83282 hydraulic fluid (Item 13, Consumable Materials Chart). Maintain visible fluid level on the dip stick.

BRAKE WEAR LIMITS

Refer to Section 5, LANDING GEAR AND BRAKES, for brake wear limit dimensions.

OXYGEN CYLINDER

Fill slowly to 1850 $\pm$ 50 psi at 70° F. Increase the system 3.5 psi for every degree of temperature increase and decrease 3.5 psi for every degree decrease in temperature.

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BEECH BARON 55 AND 58 SHOP MANUAL

STALL WARNING SWITCH

Adjust to 7 to 9 m.p.h. above a complete stall.

ADJUSTMENT OF PRESSURE RELIEF VALVES

For adjustment of pressure relief valves refer to the PRESSURE SYSTEM ADJUSTMENT CHART in Section II.

MOTOR BRUSH REPLACEMENT GUIDE

NOTE

On airplanes TC-2003 and after, TE-1084 and after, and TH-773 and after, the flap motor should be replaced any time it needs overhauled for any reason.

Flap..... 5/16 inch minimum

L.G. Retract 5/16 inch minimum

Heater Blower..... 3/16 inch minimum

Combustion Air Blower 3/16 inch minimum

Alternator Slip Ring..... On Condition

Propeller Slip Ring..... On Condition

FLIGHT CONTROL SURFACE TRAVEL

Flap..... 0° Full Up, 15° ±1° Approach, 30° + 0° -2° Full Down

Aileron 20° ±1° UP, 20° ±1° DOWN

Aileron Tab 10° ±1° UP, 10° ±1° DOWN

Rudder..... 25° ±1° RIGHT, 25° ±1° LEFT

Rudder Tab..... 25° ±1° RIGHT, 25° ±1° LEFT

Elevator 30° ±1° UP, 15° ±1° DOWN

Elevator Tab 10° ±1° UP, 23° ±1° DOWN

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BEECH BARON 55 AND 58 SHOP MANUAL

SERVICE

TIRE PRESSURES

NOSE WHEEL TIRE

TC-1 thru TC-501 (Except TC-350, TC-371)	50 psi
TC-350, TC-371, TC-502 and after	48 to 52 psi
TE-1 thru TE-300	48 to 52 psi
TE-301 and after	55 to 60 psi
TH-1 and after	55 to 60 psi

MAIN WHEEL TIRES

TC-1 thru TC-501 (Except TC-371)	50 psi
TC-371, TC-502 and after	50 to 54 psi
TE-1 thru TE-451	55 to 60 psi
TE-452 and after	52 to 56 psi
TH-1 and after	52 to 56 psi
TC-2092 and after, TE-1114 and after, TH-873 and after (That are equipped with Cleveland Heavy Duty Brakes)	50 to 54 psi

MAIN GEAR STRUT EXTENSION

3 inches

NOSE GEAR STRUT EXTENSION

4 1/2 inches	TC-1 and after; TE-1 thru TE-300
3 3/16 to 3 7/16 inches	TE-301 thru TE-405
3 1/2 to 3 3/4 inches	TE-406 and after

WHEEL BEARINGS (REPACK)

100 hours

BATTERY (SINGLE 24 VOLT OR TWO 12 VOLT)

100 hours

PNEUMATIC FILTERS/SCREENS

Inlet filter (Pressure Pump)

Replace every 300 hours or sooner if conditions warrant.

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VACUUM FILTERS/SCREENS

Central Air Filter (Gyro Instruments)..... Replace every 300 hours or sooner if conditions warrant.

Gyro Instrument Air Filters..... Replace every 300 hours or sooner if conditions warrant.

Suction Relief Screen 100 hours

FUEL SCREENS/STRAINERS

Fuel System Screens and Strainers 100 hours or sooner if conditions warrant.

OIL SYSTEM

Oil Filter 100 hours (at oil change)

Oil Pressure Screen Clean in solvent every 25 hours

Oil Change..... 25 hours (TC-1 and after), 100 hours (TE-1 and after), 100 hours (TH-1 and after)

NOTE

New engines with Rustband oil (MIL-C-6529 Type 2) should have the oil changed at 20 hours but NO later than 25 hours or 6 months. The oil filter MUST be changed when the break-in oil with Rustband is removed.

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TABLE OF TORQUES

ENGINE MOUNTING

Engine Mount Bracket Bolts and Nuts (At Firewall)	400 ±15 inch-pounds
Engine Shock Mount Bolts and Nuts	325 ±25 inch-pounds (TC-1 and after), 475 ±25 inch-pounds (TE-1 and after; TH-1 and after)
Engine Bonding Jumper (At Starter)	190 - 200 inch-pounds

COMPONENT ATTACHING BRACKETS TO ENGINE

Engine Sump Bolts (At Control Cable Attaching Brackets)	155 - 175 inch-pounds
Mixture Lever Nut	100 - 110 inch-pounds with lever in idle cutoff position (do not torque against lever stop)
Throttle Lever Nut	100 - 110 inch-pounds with lever in closed position (do not torque against lever stop)

ENGINE BAFFLE ATTACHING BOLTS AND NUTS

10-32	40 inch-pounds MAX.
1/4-20	80 ±5 inch-pounds
1/4-20 (Rocker Box Cover Only)	50 ±5 inch-pounds
1/4-28	100 ±10 inch-pounds
3/8-24	370 - 390 inch-pounds

REB3N OR F34-14M ROD END NUTS (Used on throttle, mixture and prop controls)

AN316-4R	30 ±5 inch-pounds
AN310-3	15 ±5 inch-pounds

Propeller torque in inch-pounds

	Hartzell	McCauley
Propeller IO-470 Engines	720 to 840	660 to 780
Propeller IO-520 Engines	840 to 960	660 to 780
Propeller IO-550 Engines		960 to 1020

WING MOUNTING

See Section 3 Airframe.

HORIZONTAL AND VERTICAL STABILIZER

Front Spar Mounting Bolts (Horizontal Stabilizer)	85 - 100 inch-pounds (Prior to TC-2457 except TC-350) 200 - 225 inch-pounds (All TE and TH Serials and TC-350, TC-2457 and after)
Rear Spar Mounting Bolts (Horizontal Stabilizer)	85 - 100 inch-pounds (All TC, TE & TH Serials)
Front Spar Mounting Bolts (Vertical Stabilizer)	160 - 190 inch-pounds (All TC, TE & TH Serials)

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BEECH BARON 55 AND 58 SHOP MANUAL

TABLE OF TORQUES (CONTINUED)

Front Spar Mounting Bolts and Upper Aft Spar Mounting Bolts (Vertical Stabilizer)	160 - 190 inch-pounds (Prior to TC-2457, Prior to TE-1202, Prior to TH-1484), 330 - 360 inch-pounds (TC-2457 and after, TE-1202 and after, TH-1484 and after)
Lower Aft Spar Mounting Bolts (Vertical Stabilizer)	50 - 70 inch-pounds (Prior to TC-2457, Prior to TE-1202, Prior to TH-1484), 85 - 100 inch-pounds (TC-2457 and after, TE-1202 and after, TH-1484 and after)
Elevator Horn Hinge Mounting Bolts	50 - 70 inch-pounds (Prior to TC-2457, Prior to TE-1202, Prior to TH-1484), 30 - 40 inch-pounds Maximum of 70 inch-pounds if necessary to align cotter pin holes. (TC-2457 and after, TE-1202 and after, TH-1484 and after)

WING SURFACE CONTROLS

Push Rod to Bell Crank	30 - 60 inch-pounds
Bell Crank to Structure	50 - 100 inch-pounds

AIR CONDITIONER

Drive Pulley	700 - 800 inch-pounds
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LANDING GEAR

Main Landing Gear Brace Bolts	180 - 200 inch-pounds
Cross Arm to Barrel Attach Bolts	80 inch-pounds
Main Landing Gear Hinge Bolts	250 - 690 inch-pounds
Brake Back Plate Attach Bolts (For Cleveland Heavy Duty Brakes only)	80 - 90 inch-pounds

WHEEL HALF ASSEMBLIES

(All TC and TE serials)	
Main Wheel Assembly	140 inch-pounds
Nose Wheel Assembly	83 inch-pounds
(All TH serials)	
Main Wheel Assembly	150 inch-pounds
Nose Wheel Assembly	90 inch-pounds

NOTE:

Be sure to tighten all wheel attach bolts evenly to make certain the assembly is not warped.

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BEECH BARON 55 AND 58 SHOP MANUAL

TORQUING FINE THREAD SERIES BOLTS LOADED IN SHEAR

TORQUE LIMITS RECOMMENDED FOR INSTALLATION (INCH-POUNDS)						MAXIMUM ALLOWABLE TIGHTENING TORQUE (INCH-POUNDS)			
SIZE		COLUMN 1		COLUMN 2		COLUMN 3		COLUMN 4	
		MS20365 & AN310 Nuts	MS21042 Dry-Film Lub. Nut	MS20364 & AN320 Nuts	MS21245 Dry-Film Lub. Nut	MS20365 & AN310 Nuts	MS21042 Dry-Film Lub. Nut	MS20364 & AN320 Nuts	MS21245 Dry-Film Lub. Nut
.1640-36	8-36	12-15		7-9		20		12	
.1900-32	10-32	20-15	15-19	12-15		40	30	25	
.2500-28	1/4-28	50-70	37-47	30-40		100	70	60	
.3125-24	5/16-24	100-140	56-78	60-85		225	135	140	
.3750-24	3/8-24	160-190	72-108	95-110		390	200	240	
.4375-20	7/16-20	450-500		270-300		840		500	
.5000-20	1/2-20	480-690		290-410	210-230	1100		660	415
.5625-18	9/16-18	800-1000		480-600	310-430	1600		960	660
.6250-18	5/8-18	1100-1300		660-780	485-605	2400		1400	1060
.7500-16	3/4-16	2300-2500		1300-1500	1090-1250	5000		3000	2500
.8750-14	7/8-14	2500-3000		1800-2400	1640-2100	7000		4200	3740
	1-14	3700-5500		2200-3300		10000		6000	
	1 1/8-12	5000-7000		3000-4200		15000		9000	
	1 1/4-12	9000-11000		5400-6600		25000		15000	
NOTE: The above values apply to Class 3 threads, cadmium plates and nonlubricated (except as noted). The above torque values may be used as a guide when specific torques are not called out within this manual.									

Raytheon Aircraft

BEECH BARON 55 AND 58 SHOP MANUAL

TORQUING COARSE THREAD SERIES BOLTS LOADED IN SHEAR

TORQUE LIMITS RECOMMENDED FOR INSTALLATION (INCH-POUNDS)			MAXIMUM ALLOWABLE TIGHTENING TORQUE (INCH-POUNDS)	
SIZE	COLUMN 1	COLUMN 2	COLUMN 3	COLUMN 4
	MS20365 & AN310 Nuts	MS20364 & AN320 Nuts	MS20365 & AN310 Nuts	MS20364 & AN320 Nuts
8-32	12-15	7-9	20	12
10-24	20-25	12-15	35	21
1/4-20	40-50	25-30	75	45
5/16-18	80-90	48-55	160	100
3/8-16	160-185	95-110	275	170
7/16-14	235-255	140-155	475	280
1/2-13	400-480	240-290	880	520
9/16-12	500-700	300-420	1100	650
5/8-11	700-900	420-540	1500	900
3/4-10	1150-1600	700-950	2500	1500
7/8-9	2200-3000	1300-1800	4600	2700
1-8	3700-5000	2200-3000	7600	4500
1 1/8-8	5500-6500	3300-4000	12000	7200
1 1/4-8	6500-8000	4000-5000	16000	10000
NOTE: The above values apply to Class 3 threads, cadmium plates and nonlubricated (except as noted). The above torque values may be used as a guide when specific torques are not called out within this manual.				

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FLARE FITTING TORQUE CHART TORQUE - INCH POUND

TUBING OD INCHES	ALUMINUM - ALLOY TUBING FLARE AND10061 OR AND10078		STEEL TUBING FLARE AND10061		HOSE END FITTING AND HOSE ASSEMBLIES	
	MINIMUM	MAXIMUM	MINIMUM	MAXIMUM	MINIMUM	MAXIMUM
1/8	-	-	-	-	-	-
3/16	-	-	90	100	70	100
1/4	40	65	135	150	70	120
5/16	60	80	180	200	85	180
3/8	75	125	270	300	100	250
1/2	150	250	450	500	210	420
5/8	200	350	650	700	300	480
3/4	300	500	900	1000	500	850
1	500	700	1200	1400	700	1150
1 1/4	600	900	-	-	-	-
1 1/2	600	900	-	-	-	-
1 3/4	750	1050	-	-	-	-
2	800	1100	-	-	-	-

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TORQUE WRENCHES

When a torque wrench and adapter is used, (Figure 1-5) compensation must be made for the extra leverage gained. New indicator readings must be calculated before the wrench is used. To figure the desired lower readings which will actually give the torques specified, use the following formula:

$$\frac{\text{Original wrench length} \times \text{specified torque}}{\text{length of wrench} + \text{adapter}} = \frac{\text{desired}}{\text{reading}}$$

example:

D = Desired reading

L = Length of torque wrench

A = Adapter length

T = Torque

D = ?

L = 33 inches

A = 11 inches

T = 5,000 inch-pounds

$$\frac{33 \times 5,000}{33 + 11} = \frac{165000}{44} = 3750 \text{ inch-pounds}$$

An acceptable method of checking the torque, if a torque wrench is not available, (Figure 1-6) is to attach a spring scale to a conventional flex or "T" handle inserted in an adapter. Force should be applied in a direction perpendicular to an imaginary line extending from the center of the bolt through the spring scale attaching point.

To calculate the force in pounds (scale reading) required to obtain the specified torque, divide the torque in inch-pounds by the distance in inches between the center of the bolt and the scale attaching point. For example, if the specified torque, is 5,000 inch-pounds and the distance is 25 inches a pull of 200 pounds must be applied. Unless torque values are specified as wet (lubricated), bolts to be torqued must be clean and free of all lubricants; otherwise loss of normal friction allowed for establishing the torque values may result in over torquing of the bolt.

When a torque wrench adapter is used, the length of the adapter must be added to the length of the flex or "T" handle wrench and a value calculated for the particular combination. The following is a typical example in finding a desired value.

Effective length of flex or "T"

Handle wrench..... 12 inches

length of adapter..... 3 inches

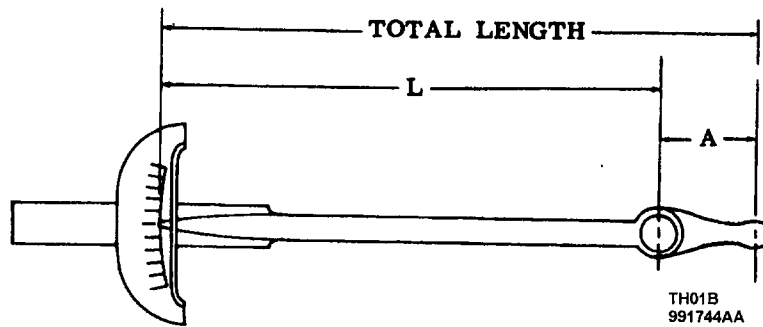
Total length..... 15 inches

Desired torque on bolt 2000 inch-pounds

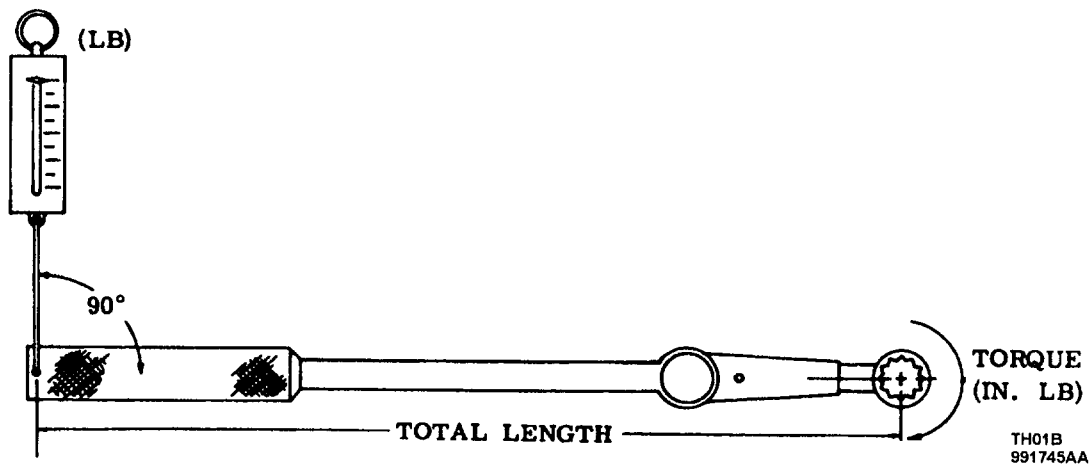
$$\frac{2000 \text{ inch-pounds}}{15 \text{ inches}} = 133.3 \text{ pounds (scale reading)}$$

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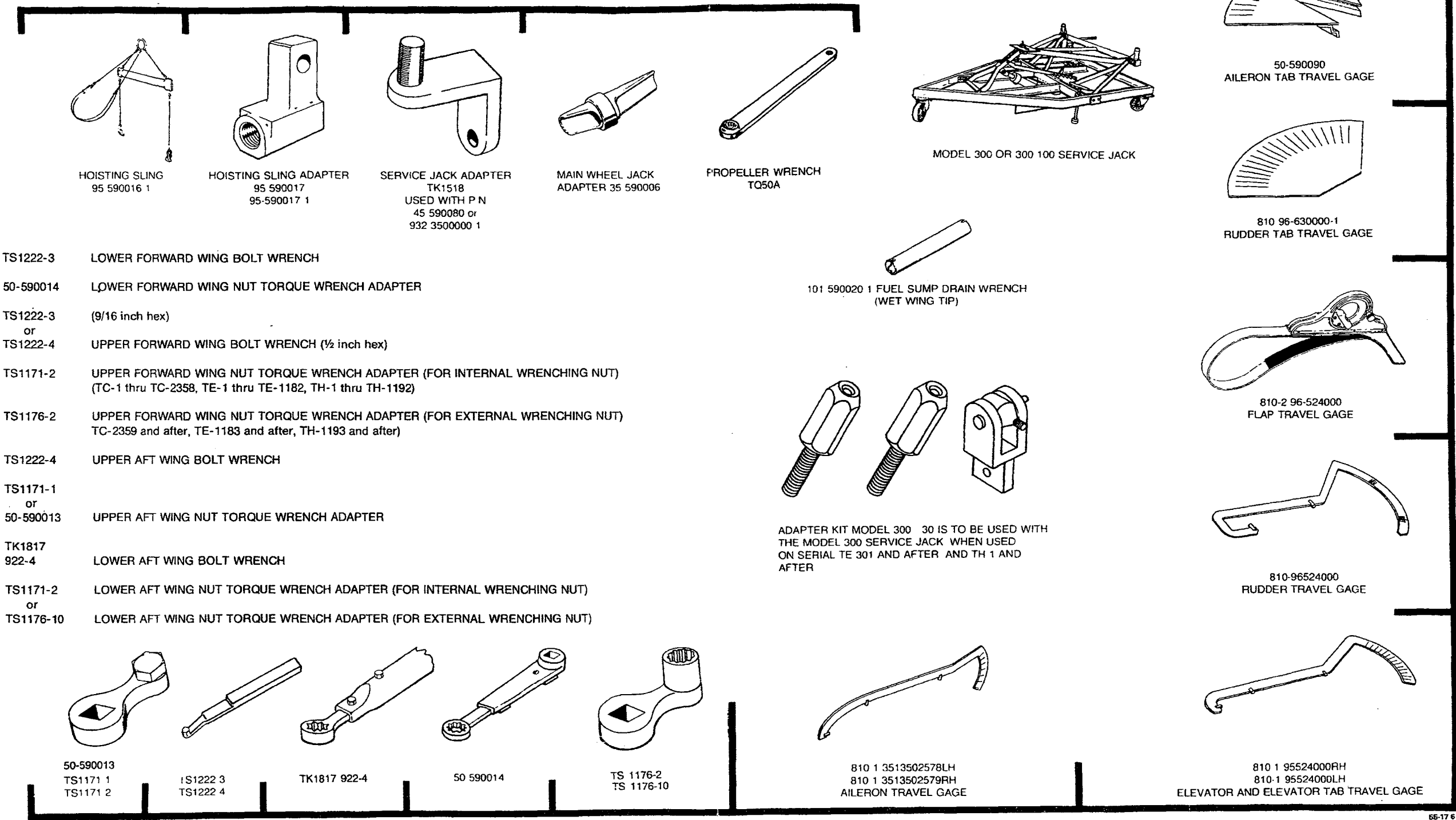


Torque Wrench and Adapter
Figure 1-5



Determining Torque by spring Scale
Figure 1-6

SPECIAL TOOLS



Special Tools
Figure 1-7

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SUPPLEMENTARY PUBLICATIONS

Following is a list of publications providing servicing, overhaul and parts information on various components of the Beech Baron which you may obtain to supplement the Shop Manual. In most instances, you should obtain the publications directly from the manufacturer or his distributor. Raytheon supplementary publications, are available from Raytheon Aircraft Company Technical Support. Those which are available are listed in the current Publications Price List. Since a wide variety of radio equipment is available and because radio manufacturers normally supply parts and servicing manuals with each set, radio publications have not been included in the list.

As publications on additional components become available, they will be added to this list of publications.

SUPPLIER PUBLICATIONS

ENGINE

NOTE

The following engine manuals are not available through Raytheon Aircraft Company. Please order all publications for the engine from Teledyne Continental Motors, Aircraft Products, Mobile, Alabama.

Operations and Service Maintenance Instructions Form No. X-30024, IO-470 Engine Series, Teledyne Continental Motors Corporation, Box 90, Mobile, Alabama 36601.

Maintenance and Overhaul Manual Form No. X-30022, IO-470 Engine Series, Teledyne Continental Motors Corporation, Box 90, Mobile, Alabama 36601.

Parts Catalog Form No. X-30023A, IO-470 Engine Series, Teledyne Continental Motors Corporation, Box 90, Mobile, Alabama 36601.

Operating and Field Maintenance Manual Form No. X-30041, IO-520 Engine Series, Teledyne Continental Motors Corporation, Box 90, Mobile, Alabama 36601.

Maintenance and Overhaul Manual Form No. X-30039A, IO-520 Engine Series, Teledyne Continental Motors Corporation, Box 90, Mobile, Alabama 36601.

Parts Catalog Form No. X-30040A, IO-520 Engine Series, Teledyne Continental Motors Corporation, Box 90, Mobile, Alabama 36601.

Tips on Engine Care, Teledyne Continental Motors Aircraft Products Division, Box 90, Mobile, Alabama 36601.

FUEL SYSTEM

Description, Operation, Adjustment and Service Instructions Continental Fuel Injection System Manuals, Form No. X-30048 and X-30049, IO-470 and IO-520 Engine Series, Teledyne Continental Motors Corporation, Box 90, Mobile, Alabama 36601.

Fuel Injection Manual Form No. X-30052, IO-470 and IO-520 Engine Series, Teledyne Continental Motors Corporation, Box 90, Mobile, Alabama 36601.

Overhaul Manual for Electric Boost Pumps, P/N 4613-00-1 and 4404-00-1, Dukes Inc., 9060 Winnetka Ave., Northridge CA 91324.

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BEECH BARON 55 AND 58 SHOP MANUAL

PROPELLER

Owner's Manual 206C for Hartzell Propeller PHC-A3XF and PHC-A3VF Series, Optional Three Blade Propeller, Hartzell Propeller Inc., 350 Washington Avenue, Piqua, Ohio 45356.

Overhaul Instructions 114B for Hartzell Propeller PHC-A3 () with Errata Sheet No. 2 Optional Three Blade Propeller, Hartzell Propeller Inc., 350 Washington Avenue, Piqua, Ohio 45356.

Maintenance Handbook for Constant Speed Hydraulic Propeller Governor Type CSSA, No. 330014, Woodward Governor Company, 5001 North Second Street, Rockford, Illinois 61101.

Owners Manual No. 651030 for McCauley 2AF34C, 2AF36C and 3AF32C Series Propellers, McCauley Industrial Corporation, Parker at Howell Ave., Dayton, Ohio 45417.

Spinner Assembly Maintenance Instruction Guide, Part No. () 3000 Hartzell Propeller, Inc., Piqua, Ohio.

VACUUM PUMP

Overhaul Manual G-455 Series, (includes parts list), Carruth Laboratories, Garwin Division, 1326 South Walnut, Wichita, Kansas 67201.

Aro Vacuum Pumps, Overhaul and Maintenance Instructions with Illustrated Parts Breakdown, Publication No. TM66-1, The Aro Corporation, 400 Enterprise Street, Byron, Ohio.

BATTERY

Operation and Service Manual, GET-3593A, For Nickel-Cadmium Batteries, General Electric Company, Battery Products Section, P.O. Box 114, Gainesville, Florida 32601.

Service Manual, GSM-1277, for Gill Aircraft Batteries, Teledyne Battery Products, Redlands, California.

Service Manual CB12-9, for the Concorde Aircraft Battery, Concorde Battery Corp., 2009 San Bernadino Rd. West Covina CA 91790.

GENERATORS

DR 324S Test Specifications, Delco-Remy Division, General Motors Corporation, Detroit, Michigan.

Group 93G Parts List, Delco-Remy Division, General Motors Corporation, Detroit, Michigan.

ALTERNATOR

IG-262, Service Bulletin, Test and Maintenance of "Delcotrons" Delco-Remy Division, General Motors Corporation, Detroit, Michigan.

Group 88L Parts List, Delco-Remy Division, General Motors Corporation, Detroit, Michigan.

Equipment Lists, Service Parts Lists, Technical Data, Publication No. OE-A1, Prestolite Company, Toledo, Ohio.

Overhaul Manual Form X30531 Continental-Crittenden 100 Ampere Alternator, Teledyne Continental Motors, Aircraft Products, Mobile, Alabama.

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BEECH BARON 55 AND 58 SHOP MANUAL

VOLTAGE REGULATOR

DR 324S Test Specifications, Delco-Remy Division, General Motors Corporation, Detroit, Michigan.

Group 6K Parts List, Delco-Remy Division, General Motors Corporation, Detroit, Michigan.

IR-273, Service Bulletin, Test and Adjustments of Transistor Regulators, Delco-Remy Division, General Motors Corporation, Detroit, Michigan.

OIL COOLER

Test Specifications, P/N 8256732, Harrison Radiator Division, General Motors Corporation, Buffalo, New York.

Overhaul Instructions, Service Bulletin HES 77E, Harrison-Radiator Division, General Motors Corporation, Buffalo, New York.

STARTER

Group 55A Cranking Motor Parts List, Delco-Remy Division, General Motors Corporation, Detroit, Michigan.

MAGNETO

Installation, Operation and Maintenance Instructions, Bendix S-1200 Series Magnetos Form L-609B, Scintilla Division, Bendix Aviation Corporation, Sherman Avenue, Sidney, New York.

Service Parts List, Bendix S-1200 Series Magnetos, Form L-608, Scintilla Division, Bendix Aviation Corporation, Sherman Avenue, Sidney, New York.

Installation, Maintenance and Operation Instructions, Bendix S-200 Series Magnetos, Form L-526, Scintilla Division, Bendix Aviation Corporation, Sherman Avenue, Sidney, New York.

Service Parts List, Bendix S-200 Series Magnetos, Form L528-2, Scintilla Division, Bendix Aviation Corporation, Sherman Avenue, Sidney, New York.

Catalog and Service Manual, Form 1012, 600 Series, Slick Electro Inc., 530 Blackhawk Park Avenue, Rockford, Illinois 61101.

WHEELS, BRAKES AND TIRES

Maintenance Instructions for Goodyear 6.50-8 Brake Assembly 9532475, P/N AP-125, Goodyear Tire and Rubber Company, 1210 Massillon Road, Akron, Ohio.

Overhaul Information for Brake Shuttle Valve, Publication No. 74456, Hoof Products Co., 6543 South Laramie Avenue, Chicago 38, Illinois.

Overhaul Information for Brake Shuttle Valve, Publication No. 23595, Paramount Machine Co., 4122 Kent Road, Stow, Ohio.

HEATER

Maintenance Instructions for Janitrol D83 A28, Aircraft Heater, P/N 30C57, Janitrol Aero Division, Midland-Ross Corporation, 4200 Surface Road, Columbus, Ohio.

Maintenance Instructions for Janitrol 81D94-3 Aircraft Heater, P/N 98D19-1, Janitrol Aero Division, Midland-Ross Corporation, 4200 Surface Road, Columbus, Ohio.

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Maintenance Instructions for Janitrol 11C30 Aircraft Heater Ignition Unit, No. 24C54, Janitrol Aero Division, Midland-Ross Corporation, 4200 Surface Road, Columbus, Ohio.

Maintenance Instructions for Janitrol 87D24-5 Aircraft Heater Ignition, P/N 93D00-1, Janitrol Aero Division, Midland-Ross Corporation, 4200 Surface Road, Columbus, Ohio.

HEATER AIR BLOWER

Overhaul Instructions Vane Axial for Part No. M4862H1A, with Motor M2916V, Dynamic Air Engineering Inc., 620 East Dyer Road, Santa Ana, California, 92705.

LIGHTWEIGHT DEICER BOOTS

Installation Manual for Lightweight Reservoir Type Pneumatic Deicing Systems for Beech Aircraft, Report No. 58-138, B. F. Goodrich Company, 448 South Main, Akron, Ohio.

Maintenance and Repair of Lightweight Reservoir Assembly, Report No. 61-137, B. F. Goodrich Company, 448 South Main, Akron, Ohio.

AUTOPILOT

B-5 Flight Control System Ground and Flight Check Procedures, P/N 3952, Brittain Industries Inc., P.O. Box 51370, Tulsa, Oklahoma, 74151.

B-5 Automatic Flight Control System, Maintenance Manual, P/N 3950, Brittain Industries Inc., P.O. Box 51370, Tulsa, Oklahoma, 74151.

Brittain Industries B-VII or B-7 Flight Control System Flight Procedures Manual, P/N 3959, Brittain Industries, Inc., P.O. Box 51370, Tulsa, Oklahoma, 74151.

Troubleshooting Manual, P/N 3960, B-7 Autopilot System, Brittain Industries Inc., P.O. Box 51370, Tulsa, Oklahoma, 74151.

STROBE LIGHT

Instruction and Service Manual for Airguard Anti-collision Beacon, Publication Number: 50082. Bullock Magnetics Corp., Pomona, California.

AIR CONDITIONER COMPRESSOR

Service Manual. I.D. 160717, Abacus Air Conditioning Compressor Models 506-507, Abacus International, Dallas, Texas.

EMERGENCY LOCATOR TRANSMITTER

Operating Instructions for Model CIR-10 () Emergency Locator Transmitter System, Transmitter P/N TR70-17, Collins/Communications Components Corporation, Costa Mesa, California.

Operating Instructions for Model CIR-11 () Emergency Locator Transmitter System, Transmitter P/N TR70-13, Collins/Communications Components Corporation, Costa Mesa, California.

Owners Manual, Installation and Pilot's Guide P/N 037160601 for the Narco FLT 10 Emergency Locator Transmitter, Narco Avionics, Division of Narco Scientific Industries, Fort Washington, Pennsylvania.

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RAYTHEON AIRCRAFT BEECH PUBLICATIONS

Maintenance Instructions for Beech Propeller Model 2AF34C Series, 2AF36C Series and 3AF32C75 Series, 630901, Raytheon Aircraft Company.

Owner's Manual for Beech Propeller Model 2AF34C Series and 2AF36C Series 651030-1, Raytheon Aircraft Company.

92-30582 Maintenance Instructions for Goodyear Nose Wheel and Tire.

92-30583 Maintenance Instructions for Goodyear Main Wheels, Brakes and Tires.

98-35061 Maintenance Instructions for Cleveland Nose and Main Wheels and Brakes.

98-33857 Maintenance Instructions and Parts Breakdown for Oeco Voltage Regulator.

98-36235 Installation, Maintenance and Illustrated Parts Breakdown for Oeco Voltage Regulator P/N 60-389017-1.

98-37515D Safety Information Booklet.

H-14 AUTOPILOT

98-34350 H-14 Operators' Manual.

13033F Adaptive Maintenance Manual.

92-30103B Overhaul Instructions for BG274B2, BG274C1 and BG274C2 Computer.

92-30204B Overhaul Instructions for CG217B1, CG217B2 and CG217B3 Flight Controller.

92-30105 Overhaul Instructions for CG136A1 Heading Selector.

92-30106B Overhaul Instructions for MG113A1, MG113A2, MG113A3 and MG113A4 Actuator and SG28A1, SG28A3 Switch.

92-30107A1 Overhaul Instructions for PG51A1 Altitude Control.

98-32523 Overhaul Instructions for MG112A1 and MG112A2 Pitch Trim Actuator.

92-30229 Overhaul Instructions for GG205A3, GG205A4 Turn and Bank Indicator Gyro.

92-30230 Overhaul Instructions for DG103A1, B1 Adapter.

92-30411B Overhaul Instructions for GG201A1 and GG201B1 Vertical Gyro.

Raytheon Aircraft

BEECH BARON 55 AND 58 SHOP MANUAL

SUPPLEMENTARY RAYTHEON AIRCRAFT PUBLICATIONS

92-30412B Overhaul Instructions for GG202A1 and GG202B1 Directional Gyro.

92-30413 Overhaul Instructions for GG301B1 Vertical Gyro.

92-30414 Overhaul Instructions for GG302B1 Directional Gyro.

92-30614 Overhaul Instructions for AIM 200 Gyro Direction Indicator.

92-30615 Overhaul Instructions for AIM 300 Horizon Reference Indicator.

98-32839 Overhaul Instructions for CG417B1, CG417B2 Flight Controller,

130376A B-4 New-matic Operating Servicing Instructions

130409 New-matic Maintenance Instructions.

888-34679 B-5 Operator's Manual.

98-35850 Electronics Components Maintenance Manual and Parts Breakdown.

RAYTHEON AIRCRAFT NEW-MATIC AUTOPILOT

11807 B-4 and B-4A Maintenance and Service Manual.

92-402 New-Matic Pilot Operating Instructions.

130332 Dynertial Pitch Control Pilot Operating Instructions.

SECTION

2

**GROUND HANDLING
AND SERVICING**

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GROUND HANDLING

Exercise care in the ground handling of the airplane to avoid unnecessary damage. The following procedures are provided to reduce the possibility of ground damage.

TOWING

Attach the hand tow bar to the two lugs on the nose gear lower torque knee.

CAUTION

Do not push on the propeller or control surfaces. Do not place any weight on the horizontal stabilizer to raise the nose wheel off the ground. When towing, observe the turn limits to prevent damage to the nose gear. When removing the tow bar, use care to avoid damaging the grease fittings. DO NOT attempt to tow the airplane backwards by the tail tiedown lug.

CAUTION

Never tow or taxi with a flat strut. Even brief towing or taxiing with a deflated strut can cause severe damage.

JACKING

CAUTION

Prior to jacking the airplane, ensure that an unbalanced condition does not exist. Fuel should be distributed evenly in both wings to prevent an unbalanced condition which could cause the airplane to be unstable while on the jacks. Older versions of the Bonanza three point jack, which do not have a movable aft jacking adapter attach point, should not be used to jack Baron airplanes.

JACKING WITH MODEL 300 JACK (EQUIPPED WITH TRONAIR EXTENSION KIT)

The jacking procedures for a Model 300 jack equipped with a Tronair Extension Kit P/N 4013 are as follows:

WARNING

Do not exceed the structural limitations of the Model 300 jack. It is recommended that no airplane weighing over 5,000 pounds be jacked on the Danair/Tronair Model 300 jack, and that a similar limitation be observed on older models of this jack. Make sure that the safety bar is engaged at any time the airplane is raised on the jack. Do not move any airplane on a Model 300 jack.

- a. Place a suitable weight on the tray at the rear of the jack extension; 500 pounds is recommended.
- b. Screw the rear jack fitting or eyebolt adapter completely into the rear jack point.
- c. Position the jack under the airplane up against the two forward jack points, and position the rear clevis plate for attachment of the rear fitting/eyebolt adapter.
- d. Install the safety pin in the rear jack point fitting/eyebolt and clevis.

WARNING

The rear jack point eyebolt safety pin must be installed to reduce the possibility of the airplane nosing over on the jack.

CAUTION

Do not attach the rear support arm on the jack extension to the tail of the airplane at this time. Damage to the airplane and the jack could result if the jack is raised or lowered with the jack extension rear support arm attached to the tail of the airplane.

- e. Raise the jack to the desired height and install the jack safety lock.
- f. Attach the rear support arm to the tie-down fitting in the tail of the airplane, securing the sliding tube to ensure a stable attach point.

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- g. To lower the jack, disconnect the jack extension rear support arm from the airplane before removing the jack safety lock.

CAUTION

Never raise or lower the jack with the jack extension rear support arm attached to the airplane.

- h. Remove the aft jack point fitting/eyebolt after removal of the Model 300 jack from under the airplane.

JACKING WITH MODEL 300 JACK (WITHOUT A TRONAIR EXTENSION KIT)

The jacking procedures for a Model 300 jack which has not been equipped with a Tronair Extension Kit are as follows:

WARNING

Do not exceed the structural limitations of the Model 300 jack. It is recommended that no airplane weighing over 5,000 pounds be jacked on the Danair/Tronair Model 300 jack, and that a similar limitation be observed on older models of this jack. Make sure that the safety bar is engaged at any time the airplane is raised on the jack. Do not move any airplane on a Model 300 jack.

- a. Make sure a suitable weight is available to anchor the tail of the airplane to be jacked. The use of a tail tiedown device with a suitable weight - 500 pounds - such as P/N 35-590021 embedded in a movable concrete-filled barrel or equivalent.
- b. Screw the rear jack fitting or eyebolt adapter completely into the rear jack point.
- c. Position the jack under the airplane up against the two forward jack points, and position the rear clevis plate for attachment of the rear fitting/eyebolt adapter.
- d. Install the safety pin in the rear jack point fitting/eyebolt and clevis.

WARNING

The rear jack point eyebolt safety pin must be installed to reduce the possibility of the airplane nosing over on the jack.

CAUTION

Do not attach the rear support weight to the tail of the airplane at this time.

- e. Raise the jack to the desired height and install the jack safety lock.
- f. Attach the rear support tube to the tie-down fitting in the tail of the airplane. Secure the adjustable sliding tube to ensure a stable point for the airplane.
- g. To lower the jack, disconnect the rear support tube from the airplane before removing the jack safety lock.

CAUTION

Never raise or lower the airplane on a Model 300 jack with a rear support tube/weight assembly attached.

- h. Remove the aft jack point fitting/eyebolt after removal of the Model 300 jack from under the airplane.

JACKING WITH (2) TRIPOD JACKS, TRONAIR MODEL 100 OR EQUIVALENT

- a. Attach a suitable weight to anchor the tail of the airplane to be jacked. P/N35-590021 embedded in a movable concrete-filled barrel or equivalent may be used.
- b. Position the two tripod jacks under the forward jack points. Ensure proper clearance from all movable components and gear doors.
- c. Simultaneously jack both jacks to ensure a level jacking action until the required clearance is obtained for normal gear operation of both the nose and main gears.
- d. Make sure the jack safety locks are engaged immediately after jacking.
- e. To lower the airplane, disengage the jack safety locks and simultaneously lower both jacks.

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- f. Remove the rear weight assembly after removing the two tripod jacks and before moving the airplane.

WARNING

ANCHORING AND MOORING PROVISIONS

Three mooring eyes are provided, one in each wing and one in the tail bumper. To moor the airplane, chock the wheels fore and aft, install the control locks and tie-down with a nylon cord or chain of sufficient length at each point. Avoid overtightening the rear line, which will pull up the nose so that wind will create higher lift on the wings. If bad weather is anticipated, it is advisable to nose the airplane into the wind.

STORAGE

The storage procedures are intended to protect the airplane from deterioration while the airplane is not in use. The primary objective of these measures are to prevent corrosion and damage from exposure to the elements. The three types of storage are:

- a. Flyable storage - 7 to 30 days.
- b. Temporary storage - 31 to 90 days.
- c. Indefinite storage - 91 days and after.

FLYABLE STORAGE - 7 TO 30 DAYS

a. Mooring

1. Place the airplane in a hangar.
2. If the airplane cannot be placed in a hangar, tie it down securely at the three tie-down points provided on the airplane. Do not use hemp or manila rope. It is recommended that a tail support be used to compress the nose strut which will reduce the wing angle of attack. Attach a line to the nose gear.

b. Engine

1. Operate the engine until the oil temperature reaches the normal range. Drain the oil supply from the sump as completely as possible and replace the drain plug.
2. Fill the sump to the full mark on the oil dipstick with MIL-C-6529 Type II oil (3, Consumable Materials Chart). This will mix with normal oil, is suitable as a lubricant and will provide protection against corrosion.
3. Run the engine at least five minutes at a speed between 1000 and 1200 rpm with the oil temperature and cylinder head temperature in the normal operating range.

Before rotating the propeller blades, make certain the magneto/start switches are OFF, throttles are in the CLOSED position, and the mixture controls are in the IDLE CUT-OFF position. Always stand clear while turning the propeller.

4. Each seven days during flyable storage, the propeller shall be rotated by hand without running the engine. After rotating the engine six revolutions, stop the propeller 45° to 90° from its previous position.

5. If at the end of thirty days the airplane will not be removed from storage, the engine shall be started and run. The preferred method will be to fly the airplane for thirty minutes. If flying the airplane is impractical, a ground run shall be made of thirty minutes duration, and up to, but not exceeding normal oil temperatures.

- c. Fuel Cells. Fill the fuel cells to capacity to minimize fuel vapor.
- d. Flight Control Surfaces. Lock the flight control surfaces with internal locks.
- e. Grounding. Static ground the airplane securely and effectively.
- f. Pitot Tube. Install pitot tube covers.
- g. Windshield and Windows.
 1. Close all windows.
 2. It is recommended that covers be installed over the windshield and windows.

PREPARATION FOR SERVICE

- a. Remove all covers, tape and control locks. Clean the airplane and give it a thorough inspection, particularly wheel wells, flaps and control openings.
- b. Drain the MIL-C-6529 (3, Consumable Materials Chart) after ground warm-up. Fill with engine oil (2, Consumable Materials Chart) before flight.
- c. Preflight the airplane.

TEMPORARY STORAGE - 31 TO 90 DAYS

a. Mooring

1. Place the airplane in a hangar.

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2. If the airplane cannot be placed in a hangar, tie it down securely at the three tie-down points provided on the airplane. Do not use hemp or manila rope. It is recommended that a tail support be used to compress the nose strut which will reduce the wing angle of attack. Attach a line to the nose gear.

b. Engine

1. Operate the engine until the oil temperature reaches the normal range. Drain the oil supply from the sump as completely as possible and replace the drain plug.

2. Fill the sump to the full mark on the oil dipstick with MIL-C-6529 Type II oil (3, Consumable Materials Chart). This will mix with normal oil, is suitable as a lubricant and will provide protection against corrosion.

3. Run the engine at least five minutes at a speed between 1000 and 1200 rpm with the oil temperature and cylinder head temperature in the normal operating range.

4. Remove the top and bottom spark plugs and atomize-spray preservative oil (3, Consumable Materials Chart) through the upper spark plug hole of each cylinder with the piston in the down position. Rotate the crankshaft as each pair of cylinders is sprayed. Stop the crankshaft with no piston at the top position.

5. Respray each cylinder without rotating the crankshaft. To thoroughly cover all surfaces of the cylinder interior, move the nozzle of the spray gun from the top to the bottom of the cylinder.

6. Reinstall the spark plugs.

7. Apply preservative to the engine interior by spraying preservative oil (3, Consumable Materials Chart) (approximately 2 ounces) through the oil filler tube.

8. Seal all engine openings exposed to the atmosphere using suitable plugs, or nonhygroscopic tape, and attach red streamers at each point.

9. Affix a tag to the propeller in a conspicuous place with the following notation on the tag: "DO NOT TURN PROPELLER - ENGINE PRESERVED".

10. Seal the propeller blade spinner cutouts with tape.

c. Fuel Cells. Fill the fuel cells to capacity to minimize fuel vapor.

d. Flight Control Surfaces. Lock the flight control surfaces with internal locks.

e. Grounding. Static ground the airplane securely and effectively.

f. Pitot Tube. Install pitot tube covers.

g. Windshield and Windows.

1. Close all windows.

2. It is recommended that covers be installed over the windshield and windows.

h. Airplane batteries and ELT (Emergency Locator Transmitter) battery.

1. Remove airplane batteries and ELT battery from the airplane and store in accordance with standard practices.

2. Clean the battery box and battery cable terminals to neutralize any battery acid that may be present.

PREPARATION FOR SERVICE

a. Remove all covers, tape and control locks. Clean the airplane and give it a thorough inspection, particularly wheel wells, flaps and control openings.

b. With the bottom spark plugs removed, hand-turn the propeller several revolutions to clear excess preservative oil, then reinstall the spark plugs.

c. Drain the MIL-C-6529 (3, Consumable Materials Chart) after ground warm-up. Fill with engine oil (2, Consumable Materials Chart) before flight.

d. Preflight the airplane and flight test.

INDEFINITE STORAGE

a. Mooring

1. Place the airplane in a hangar.

2. If the airplane cannot be placed in a hangar, tie it down securely at the three tie-down points provided on the airplane. Do not use hemp or manila rope. It is recommended that a tail support be used to compress the nose strut which will reduce the wing angle of attack. Attach a line to the nose gear.

b. Engine

1. Operate the engine until the oil temperature reaches the normal range. Drain the oil supply from the sump as completely as possible and replace the drain plug.

2. Fill the sump to the full mark on the oil dipstick with MIL-C-6529 Type II oil (3, Consumable Materials Chart). This will mix with normal oil, is suitable as a lubricant and will provide protection against corrosion.

3. Run the engine at least five minutes at a speed between 1000 and 1200 rpm with the oil temperature and cylinder head temperature in the normal operating range.

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4. Remove the top and bottom spark plugs and atomize spray preservative oil (3, Consumable Materials Chart) through the upper spark plug hole of each cylinder with the piston in the down position. Rotate the crankshaft as each pair of cylinders is sprayed. Stop the crankshaft with no piston at the top position.

5. It is recommended that the propellers and the engines be removed from the airplane. Each propeller shaft should be coated with preservative oil and wrapped with moisture proof material and tape.

6. Install protex plugs in each of the spark plug holes, making sure that each protex plug is blue in color when installed. Protect and support the spark plug leads with AN4060-1 protectors.

7. Place a bag of desiccant in the exhaust pipes and seal the openings with moisture-resistant tape.

8. Seal the engine breathers by inserting protex plug in the breather and clamping in place.

9. Wrap the engines with moisture-proof material and tape after the desiccant bags have been installed.

10. Attach a red streamer to each place on the engine where bags of desiccant are placed. Attach red streamers outside of the sealed area with safety wire to prevent wicking of moisture into the sealed area.

11. The plugs should be changed as soon as their color indicates an unsafe condition of storage. If the dehydrator plugs have changed color in one-half or more of the cylinders, all desiccant material on the engine should be replaced.

12. The cylinder bores should be resprayed with corrosion-preventative mixture every six months or more frequently if bore inspection indicates corrosion has started earlier than six months. Replace all desiccant and protex plugs. Before spraying, the engine shall be inspected for corrosion as follows: Inspect the interior of at least one cylinder on each engine through the spark plug holes. If the cylinder shows the start of rust, spray the cylinder with corrosion-preventative oil and turn the prop over five or six turns, then respray. Remove at least one rocker box cover from each engine and inspect the valve mechanism.

c. Propellers

1. Clean the propellers to remove dirt, oil and bug accumulation. Use water and a soft brush.

2. Coat the blades with a preservative oil and wrap with a moisture-proof material and tape. If the propellers have been removed, coat all parts with a preservative oil, wrap with protective material to exclude dust, then tape.

d. Grounding. Static ground the airplane securely and effectively.

e. Seats. Install protective covers.

f. Fuel Cells.

NOTE

If Goodyear fuel cells, manufactured after 1961 (Construction No. BTC-39 or BTC-67) are installed, no preservative procedures are necessary when the cell is to be empty for an indefinite time. The fuel cells should not be opened to the atmosphere except for the normal vent lines in the airplane. Goodyear fuel cells manufactured prior to 1961 and Uniroyal fuel cells must be filled every ten days or the walls must be coated with a thin coat of light engine oil.

1. Drain the fuel cells and coat the cells with a thin coat of light engine oil or fill the cells every ten days or let stand empty, as applicable.

g. Flight Control Surfaces

1. Lubricate all flight control surfaces hinge pins, bearings, bellcranks, chains, control rods and quadrants and coat lightly with corrosion-preventative compound (49, Consumable Materials Chart)

2. Lock with internal locks.

h. Pitot Tube.

1. Apply a thin coat of grease (11, Consumable Materials Chart).

2. Install Covers.

i. Windshield and Windows.

1. Close all windows.

2. Install covers over windshields and windows.

j. Landing Gear

1. Clean the brakes and apply a coating of primer (24, Consumable Materials Chart) to the brake discs.

2. Touch up all spots where the paint has been chipped from the wheels.

3. After mooring, cover or wrap the wheels with barrier material and secure with tape.

4. Check the air pressure periodically and inflate as necessary.

5. It is advisable that unserviceable tires be used for prolonged storage.

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6. Coat the exposed surfaces of the shock strut pistons and nose gear shimmy damper piston with preservative hydraulic fluid (40, Consumable Materials Chart) and protect with barrier material.

CAUTION

Do not apply corrosion preventative to the exposed surfaces of the landing gear strut piston or to the extended polished surfaces of the hydraulic cylinders.

k. Airplane batteries and ELT (Emergency Locator Transmitter) battery.

1. Remove airplane batteries and ELT battery from the airplane and store in accordance with standard practices.

2. Clean the battery box and battery cable terminals to neutralize any battery acid that may be present.

l. Instrument Panel. Cover with barrier material and secure with tape.

m. Seats. Install protective covers.

n. Landing Lights. Cover with barrier material and secure with tape.

o. Stall Warning Unit.

1. Remove and store according to standard practices.

2. Tape connections.

p. Loose Tools and Equipment. Remove the loose tools and equipment and store in a dry room.

q. Airframe. Cover static ports and all openings with barrier material and secure with tape to exclude rain, sun and foreign material.

r. Avionics. Clean and cover any equipment sensitive to dust or moisture and take any additional precautions recommended by manufacturer of such equipment.

s. Hydraulic System. Fill the hydraulic reservoir to the operational level and inspect the system for leaks, then repair as necessary prior to storage.

PREPARATION FOR SERVICE

a. Remove all covers, tape and tags from the airplane.

b. Remove the cylinder protex plugs, all paper tape and dehydrating agent used to preserve the engines.

c. Drain the MIL-C-6529 Type II oil after ground warm-up. Install engine oil (2, Consumable Materials Chart) before flight.

d. Rotate the propellers to clear excess preservative oil from the cylinders.

e. Reinstall the spark plugs and battery.

WARNING

Before rotation of the propeller blades, ascertain that the magneto/start switches are OFF, the throttles are in the CLOSED position, and the mixture controls are in the IDLE CUT-OFF position. Always stand in the clear while turning the propellers.

f. Rotate the propellers by hand through all compressions of the engines to check for liquid lock. Reinstall the cowlings and start the engines in the normal manner.

g. Give the airplane a thorough cleaning, visually inspect and flight test.

CONTROL LOCK (TC-1 THRU TC-1436; TE-1 THRU TE-859; AND TH-1 THRU TH-222)

NOTE

The rudder pedals must be in the aft position before the rudder lock can be installed.

The control lock holds the throttles closed and all primary flight controls in the neutral position. The elevator and aileron controls are locked by a locking pin which slides into matching holes in the elevator shaft, aileron torque tube, and control column hanger. Another part of the lock slips over the throttles, preventing them from opening while the elevator and aileron controls are locked. To insert the locking pin, place the elevator and aileron controls in an approximately neutral position.

A rudder control locking pin, which joins and locks the pilot's rudder pedals, is attached to the control column lock by a chain or cable. The pin is inserted in the holes at the top of the pilot's rudder pedal arms, where it is retained by spring tension. Install the rudder lock after first attaching the control column lock. Insert the spring end of the rudder lock into the left-hand pilot's

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rudder pedal arm, neutralize the pedals, and insert the opposite end of the locking pin in the other pedal arm by compressing the spring.

To lessen the possibility of taxiing or takeoff with the control lock installed, remove the locking components in the following order: rudder, elevator-aileron and throttle.

(TC-1437 AND AFTER; TE-860 AND AFTER; TH-223 AND AFTER)

The control lock holds the throttles closed, the elevator 11° down, and the aileron control wheel 12° right of the neutral position. The throttle, elevator and aileron controls are locked by a locking pin that is inserted between the throttle levers through the control column hanger, the elevator shaft and matching holes in the aileron torque tube. The portion of the lock that is inserted between the throttle levers and through the control column hanger prevents the throttles from being opened.

A rudder control locking pin, which joins and locks the pilot's rudder pedals, is attached to the control column lock by a chain or cable. The pin is inserted in the holes at the top of the pilot's rudder pedal arms, where it is retained by spring tension.

The throttle control locks are to be installed in the following sequence: Close the throttles, install the control locking pin between the throttles through the control column hanger, through the elevator control and the aileron torque tube. Route the cable and rudder lock around the right side of the control column, position the rudder pedals in the aft position and install the rudder lock by inserting the spring end of the lock into the left hand pilot's rudder pedal arm. Neutralize the pedals and insert the opposite end of the locking pin in the other pedal arm by compressing the spring.

To lessen the possibility of taxiing or takeoff with the control lock installed, remove the locking components in the following order: rudder, elevator-aileron and throttle.

LEVELING

To level the airplane longitudinally, attach a cord and plumb bob to the Phillips-head screw just aft of the rear window on the LH side of the airplane. Inflate or deflate the nose gear shock strut as necessary to pass the cord through the center of a second Phillips-head screw directly below. Suspending the plumb bob in a can of light engine oil will assist in stabilizing it.

Lateral leveling is done by putting a bubble level on the rear baggage compartment floorboard and deflating the tire or strut on the high side of the airplane to center the bubble.

HOISTING (Figure 2-1)

The airplane may be hoisted as follows:

- a. Install one 95-590017 hoisting sling adapter on each forward wing attach bolt.

NOTE

When hoisting the airplane with the wings removed, install the 95-590017-1 sling adapters, and add a 95-590016-23 spacer between each sling adapter and the spar carry-through fitting. Install the upper rear wing attach bolts. (See Figure 2-1.) The sling must be capable of lifting 5,000 pounds.

- b. Attach the sling assembly (P/N 95-590016-1) to the sling adapter.
- c. Install the sling strap around the nose forward of the nose landing gear (see Figure 2-1).
- d. Hoist the airplane smoothly.

NOTE

Adjust the sling strap to keep the airplane in a level or slightly nose-down attitude.

EXTERNAL POWER (OPTIONAL EQUIPMENT)

Before connecting an auxiliary power unit, turn off the generator/alternator switches and any other electrically operated equipment except the battery switch. The airplane has a negatively grounded auxiliary power receptacle. If the auxiliary power unit does not have a standard AN plug, check the polarity of the unit and connect the positive lead to the battery positive post and the negative lead to the battery negative post and resume normal starting procedure.

NOTE

When using external electrical power, the battery switch should be left on so that the battery will absorb any transient electrical spikes.

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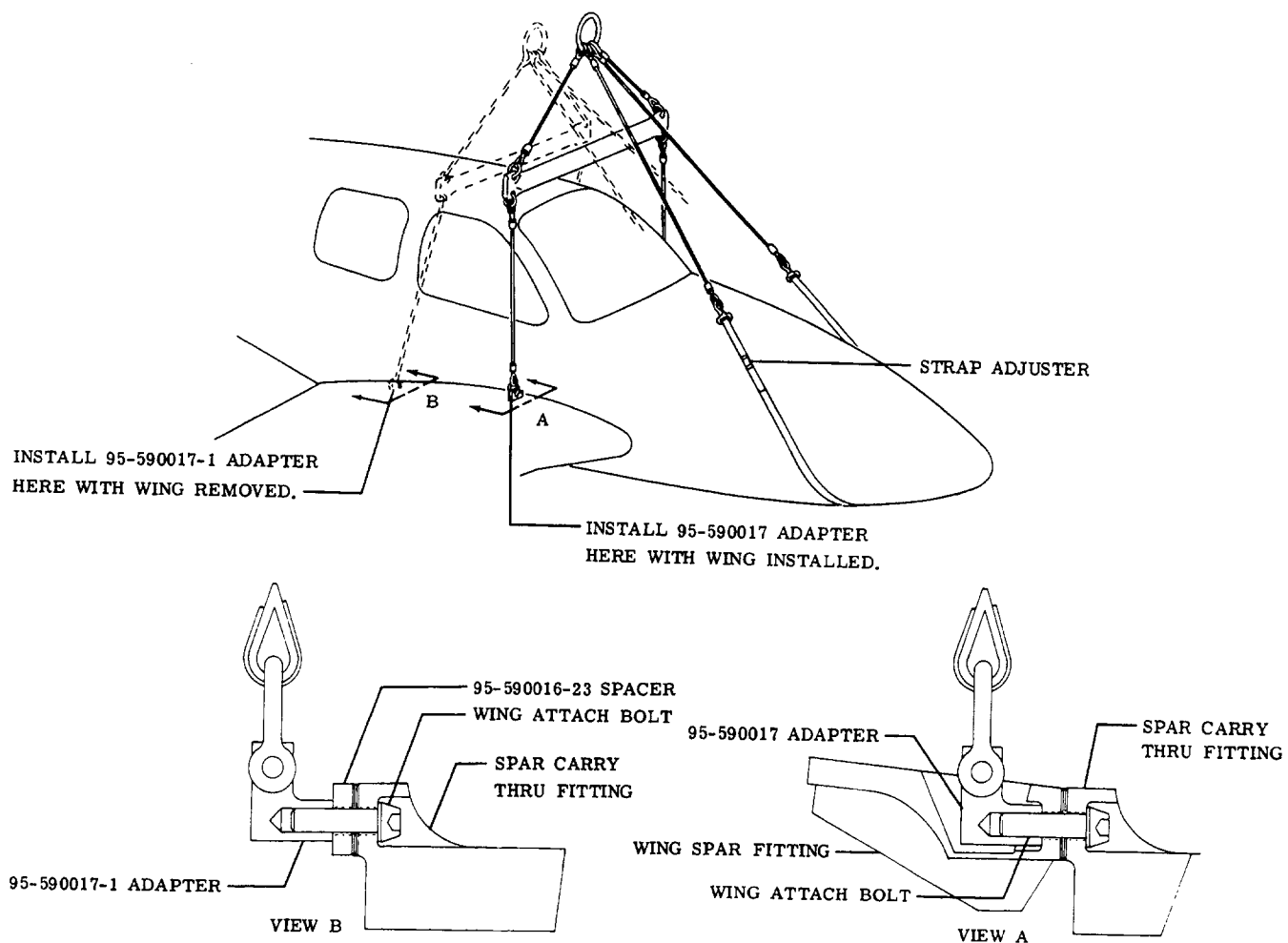


Figure 2-1. Hoisting the Airplane

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After the airplane has been started and the auxiliary power disconnected, the electrical switches may be turned on and normal procedures resumed. Recharging the battery without removing it from the airplane may be accomplished by connecting a known negatively ground auxiliary power unit to the airplane external power receptacle and turning the battery master switch ON. In case of an extremely weak battery, removing and recharging may be necessary since the battery may not have sufficient capacity to close the battery solenoid. It is essential that you make certain that the power unit is negatively grounded.

NOTE

On airplanes TC-1011 and after; and TE-197 and after, a protection feature is incorporated into the external power circuit to protect against a ground power unit with reversed polarity.

CAUTION

The battery may be damaged if exposed to voltages higher than 30 volts.

SERVICING

Proper and periodic servicing of the airplane will prevent considerable wear and greatly lengthen the service life of parts and systems involved. For points of lubrication and the correct interval and materials, refer to the lubrication and servicing charts in this section.

BATTERY

The battery is located beneath the baggage compartment floor on the right-hand side and is accessible for servicing by opening the access door on the baggage compartment floor.

LEAD ACID BATTERIES

Never add anything but distilled water to the lead acid battery. The water level in the BEECHCRAFT or Gill battery should be maintained at 1/2 inch above the separators.

NOTE

Do not overfill. When the battery cells are overfilled, water and acid may spill on the lower portion of the fuselage.

NICKEL-CADMIUM BATTERIES

The following list of battery servicing precautions and checks is meant to be a guide. For specific details and a complete procedure, see Section 13 of this manual.

a. After each 100 hours of operation or every 30 days, whichever occurs first, check the electrolyte level and clean the battery and filler vent plugs.

b. Any time the battery is subjected to more than 32 volts for as long as two minutes, the battery must be completely serviced. Clean the battery, charge it, and adjust the electrolyte level.

c. Periodically check that the cell vents are clean and open. Plugged vents may cause excess internal cell pressure and cause leaks.

d. Never remove a cell from the battery case unless a replacement is immediately available; otherwise, the remaining cells may swell, making replacement of the removed cell difficult. Loosen the vent before cell replacement to eliminate the possibility of cells swelling from internal gas pressure.

e. Check the torque of the terminal screws securing the cross-links connecting the cells together. This torque should be from 48 to 60 inch-pounds (4 to 5 foot-pounds).

f. Check that no carbon deposit has built up on the cross-links or between them and the battery case. If such deposits are present, clean the affected area as indicated under Cleaning and Inspection, Section 13.

g. When there is any indication of oil in the battery, remove all cells from the case and check all rubber parts for deterioration. Remove the oil and replace all damaged rubber parts. Do not use a solvent; use soap and water only.

h. Do not add electrolyte just because the level in the battery is low. If electrolyte is added instead of distilled water each time the battery is low, the high concentration of electrolyte may cause dissolution of the plates under high temperature conditions. This is indicated by the presence of black particles in the affected cells.

i. Keep nickel-cadmium and lead-acid batteries stored separately to prevent mutual contamination. Unless kept in closed storage containers, nickel-cadmium electrolyte (potassium hydroxide) will absorb enough carbon dioxide from the air to render it ineffective.

TIRES

The main wheel tires are 6-ply or 8-ply 6.50 X 8 tires and the nose wheel tire is a 6-ply 5.00 X 5 tire. Maintaining proper tire inflation will minimize tread wear and in preventing tire rupture caused from running

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over sharp stones and ruts. When inflating tires, visually inspect them for cracks and breaks. For correct inflation see General Information in Section 1.

In service, tire carcasses grow slightly due to shock loads in landing. Normally, this growth is balanced by tread wear so there is no increase in tire diameter. Beech Aircraft Corporation cannot recommend the use of recapped tires. The tires may pass the retraction test when first installed; however, recapped tires have a tendency to swell after use and may cause malfunction of the retract system or damage the landing gear doors.

CAUTION

Because of possible damage to the retract system or landing gear doors, tires that measure more than 62.33 inches in circumference or 19.85 inches in diameter should not be used.

Oil and other hydrocarbons spilled on the tires not only weaken the rubber but may cause them to swell. Avoid spilling oil, fuel or solvent on the tires and clean off any accidental spillage as soon as possible.

NOTE

While Beech Aircraft Corporation cannot recommend the use of recapped tires, tires retreaded by an FAA approved repair station with a specialized service limited rating for TSO-C62c may be used.

BRAKES

The fluid reservoir, accessible through the forward baggage compartment, should be checked regularly and a visible fluid level maintained on the dipstick at all times by adding hydraulic fluid (13, Consumable Materials Chart).

LANDING GEAR

The landing gear retract mechanism is a complex system with very small clearances between working parts. Adjustments should be made only at a BEECH-CRAFT Authorized Service Station. Any malfunction should be corrected by an Authorized Service Station.

SHOCK STRUTS

The shock struts are filled with compressed air and hydraulic fluid (13, Consumable Materials Chart). The

same procedure is used for servicing both the main and nose gear shock struts. To service a strut proceed as follows:

- a. Remove the air valve cap and depress the valve core to release the air pressure.

WARNING

Do not unscrew the air valve assembly until the air pressure has been released or it may be blown off with considerable force, causing injury or property damage.

- b. With the weight of the airplane on the gear, loosen the air valve assembly slowly to ensure that all air has escaped, then remove the air valve assembly.
- c. With the shock strut fully deflated, jack the strut barrel 1/4-inch off fully compressed, block it there and fill to the level of the air valve assembly hole with hydraulic fluid (13, Consumable Materials Chart).
- d. Jack the main strut an additional 2 inches, then replace the air valve assembly, depress the valve core and lower the jack, releasing the excess air and oil. On the nose strut, merely remove the block and allow the excess oil to drain away, then install the air valve assembly.
- e. Rocking the airplane gently to prevent possible binding of the piston in the barrel, inflate the nose gear strut and main gear strut until they reach the dimensions which are specified in General Information, Section 1 (airplane resting on the ground).

NOTE

It is recommended that the nose and main strut inflation dimension and recommended tire pressure be adhered to. Properly inflated tires and shock struts reduce the possibility of ground damage occurring to propellers; however, exercise caution when taxiing over rough surfaces.

- f. The shock strut pistons must be clean. Remove foreign material by wiping the strut with a cloth containing hydraulic fluid.

SHIMMY DAMPER

To check the fluid level in the shimmy damper, insert a wire of approximately 1/16-inch diameter through the hole in the disc at the end of the piston rod until it

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touches the bottom of the hole in the floating piston. Mark the wire, remove and measure the depth of insertion. Inserting the wire in the hole of the floating piston, rather than letting it hit against the face of the piston, will give a more accurate check.

NOTE

To determine if the wire is inserted in the hole of the floating piston, insert the wire several times, noting each insertion depth. When the wire is correctly inserted the length will be approximately 1/4 inch greater.

When the shimmy damper is full, the inserted depth is 2-3/16 inches. The empty reading is 3-1/16 inches. To add hydraulic fluid (13, Consumable Materials Chart), remove the shimmy damper and proceed as follows:

- a. Remove the cotter pin, washer and spring from the piston rod.
- b. Remove the internal snap ring, scraper ring and the end seal from the aft end of the barrel. (Opposite the clevis end.)
- c. Insert a 6/32-threaded rod into the floating piston and remove the piston, using extreme care when moving the O-ring seal of the floating piston past the drilled holes in the piston rod.
- d. Push the piston rod to the clevis end and fill the barrel with hydraulic fluid (13, Consumable Materials Chart).
- e. Slowly actuate the piston rod, allowing the fluid to flow into the clevis-end chamber, then return the piston to the clevis end of the barrel.
- f. Refill the displaced fluid and replace the end seal, scraper ring and internal snap ring.
- g. Fill the piston rod with fluid.
- h. Reinstall the floating piston, spring, washer and cotter pin. Spread the cotter pin to allow clearance for the measuring wire.

LUBRICATION OF LANDING GEAR UPLOCK ROLLERS (PRIOR TO TC-1403, TE-847 AND TH-175, UNLESS MODIFIED IN COMPLIANCE WITH S.I. 0448-211)

- a. Lubricate the uplock roller bearings with SAE 20 or SAE 10W30 oil every 50 hours. Every 100 hours pack the bearings with grease (11, Consumable Materials Chart) or any time the bearings are subjected to degreasing.

- b. Every 100 hours clean the uplock rollers with solvent and lubricate as follows:

1. Place the airplane on jacks and partially retract the landing gear.
2. Remove the bolt attaching the uplock roller and the center hinge point of the "V" brace leg.
3. Remove the uplock roller bearing from the bolt.
4. Hold a finger over one end of the center bearing race of the uplock roller and place the fitting of the grease gun against the opposite side of the bearing, then pump grease into the bearing inner race. This will force grease into the bearing cavity through the hole in the inner race. Completely fill the bearing with grease (11, Consumable Materials Chart).
5. Reinstall the bolt attaching the uplock roller at the center hinge point of the "V" brace drag leg. Check the uplock roller for free movement and a maximum clearance of .010 to .020 inch between the roller and uplock block. If this clearance is not correct, the uplock must be adjusted as indicated under RIGGING THE LANDING GEAR in Section 5 of this manual.

LUBRICATION OF THE LANDING GEAR UPLOCK ROLLERS (TC-1403 AND AFTER; TE-847 AND AFTER; TH-175 AND AFTER, AND PRIOR AIRPLANES IN COMPLIANCE WITH S.I. 0448-211)

The uplock roller bearings should be lubricated with grease (11, Consumable Materials Chart) every 100 hours or any time that while cleaning the wheel well, the bearings are subjected to degreasing with solvent under pressure. The uplock bearing is lubricated by means of a grease fitting installed in the uplock bearing bolt.

NOTE

The grease fitting on the drag leg, directly above the uplock roller does not supply lubricant for the uplock roller bearing.

HEATER FUEL PUMP

After every 100 hours of airplane operation, remove the heater fuel pump strainer by turning the base of the pump counterclockwise. Wash the strainer in clean PD680 solvent (15, Consumable Materials Chart) and blow dry with compressed air.

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HEATER FUEL FILTER

NOTE

Airplane serials TC-1406 and after; TE-847 and after; and TH-176 and after, do not have the heater fuel filter installed.

A fuel filter is installed in the nose wheel well next to the heater fuel pump and filters foreign matter from the fuel. The strainer is equipped with a snap-type drain and should be drained daily during cold weather to remove accumulated moisture which, if allowed to freeze, could cause heater malfunction.

FUEL SYSTEM

CAUTION

When inserting or removing the fuel nozzle, use extreme care to prevent the fuel hose from rubbing against the deicer boot. Also, do not allow fuel to contact the deicer boot.

Service all fuel systems with aviation gasoline 100LL (blue) preferred, or 100 (green).

Airplane serials TC-1 through TC-1607; TE-1 through TE-942 except TE-938, are equipped with a total of 8 snap-type drains (4 drains per wing). One drain in each wing is provided for the inboard wing leading edge fuel cell sump, fuel strainer drain, auxiliary fuel cell sump and the fuel system low point in each side of cabin fuselage bottom.

Airplane serials TC-1608 through TC-2002, except TC-1970; TE-938 and TE-943 through TE-1083, except TE-1081, are equipped with a total of 8 snap-type drains (4 drains per wing). One drain in each wing is provided for the inboard wing leading edge fuel cell sump, fuel strainer, box section wing fuel cell sump, and the fuel system low point (in each wing).

Airplane serials TC-1970, TC-2003 and after; TE-1081, TE-1084 and after, are equipped with a total of 6 snap-type drains (3 drains per wing). Each wing is provided with 1 drain for the inboard wing leading edge fuel cell sump, fuel strainer and the fuel cell sump in the box section of the wing.

Airplane serials TH-1 and after are equipped with a total of 6 snap-type drains (3 per wing). Each wing is

provided with 1 drain for the inboard wing leading edge fuel cell sump, fuel strainer and the wing fuel cell sump in the box section of the wing.

Airplane serials TH-669 and after, equipped with wet wing tips, are provided with the same 6 snap-type drains (3 drains per wing) used on airplane serials TH-1 and after, in addition to 1 flush-type drain for each wet wing tip.

In an injection-type system, most fuel malfunctions can be attributed to contaminated fuel; therefore, the wheel-well-mounted strainers, finger strainers and sump strainers should be inspected and cleaned regularly. The frequency of inspection and cleaning will depend upon the service conditions, fuel handling equipment, cleanliness and local sand and dust conditions.

NOTE

If Goodyear fuel cells, manufactured after 1961 (Construction No. BTC-39 BTC-54A and BTC-67) are installed, no preservation procedures are necessary when the cell is to be empty for an indefinite period of time. The fuel cells should not be open to the atmosphere except for the normal vent lines in the airplane. Goodyear fuel cells manufactured prior to 1961 and Uniroyal fuel cells must be filled every ten days or the walls must be coated with a thin coat of light engine oil.

MAIN FUEL STRAINER SCREENS

Inspect and clean the screens each 100 hours or more frequently depending on the service conditions and when operating in localities where there is an excessive amount of dust or sand in the air.

INSPECTION PROCEDURE

- a. Place the fuel selector to the OFF position.
- b. Drain the fuel strainers.
- c. Remove the safety wire and strainer bolt.
- d. Remove the screen and inspect for contaminants.
- e. Clean the screen and blow dry with dry air.
- f. Replace the gasket and install the screen.
- g. Tighten the strainer bolt and install safety wire.
- h. Place the fuel selector to the ON position.
- i. Place the mixture control to the OFF position.

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- j. Turn the boost pump ON to pressurize the fuel system. Check for leaks at the fuel strainer.
- k. Turn the boost pump OFF.

**SERVICING AIR CONDITIONING SYSTEM
(TE-1119, TE-1125 AND AFTER; TH-873,
TH-895 AND AFTER)**

NOTE

The original air-conditioning installation for serials prior to TH-1745 used R-12 refrigerant while serials TH-1745 and after use R-134a refrigerant.

Servicing the air conditioning system consist of periodically checking the refrigerant level and changing the system air filters (both forward and aft evaporator filters). Recharge the system whenever the refrigerant level is low, air has entered the system or components carrying refrigerant are replaced. Refrigerant leaks may be detected by inspection with a flameless leak detector.

NOTE

If the flared freon lines on the air conditioning system are removed, new Seco 7A washers of the proper size should be used when reinstalling the lines to ensure a good seal.

CHARGING THE AIR CONDITIONING SYSTEM

WARNING

A face shield should be worn when servicing the lines; refrigerant, coming in contact with the eyes, can cause the loss of sight.

The system should be recharged when:

- a. The refrigerant level is insufficient or the refrigerant observed through the sight glass in the receiver-dryer contains bubbles or appears milky.
- b. Leaks have been detected in system.
- c. Air has entered the system.
- d. Components carrying refrigerant have been replaced.

Hook the recycle/recovery servicing unit to the connections located under the copilot's seat.

WARNING

Due to air quality control regulations being enacted in the United States, R-12 and R-134a refrigerant cannot be vented into the atmosphere. When performing maintenance on the vapor cycle system where refrigerant R-12 or R-134a can escape from the system, evacuate the system with a recovery or recycle servicing unit that will salvage the refrigerant.

NOTE

To prevent possible damage to the compressor, refrigerant is to be added to the system in the vapor form to prevent liquid slugging. The compressor does not have to be run during the charging cycle.

Charge a completely purged system with 3 pounds of R-12 or R-134a refrigerant (34 or 68, Consumable Materials Chart) On airplanes TH-1 thru TH-1744 use R-12 refrigerant. On airplanes TH-1745 and after use R-134a refrigerant. When charging the system, observe the sight glass for bubbles or a milky appearance caused by an insufficient refrigerant level. On a fully charged system the sight glass should be clear in an ambient temperature of 75°F or above.

If it is necessary to add refrigerant to a partially charged system, add refrigerant slowly until the bubbles disappear as observed through the sight glass, then add an additional two ounces of refrigerant.

EXPANSION VALVES

Even though the expansion valves are of the adjustable type, it is impossible to properly adjust them on the airplane. The expansion valves are adjusted at the factory to 38± .5 psi, but without proper equipment, a satisfactory adjustment can not be achieved. If the valves are not operating properly, replace the valves with new ones.

**REPLENISHING AIR CONDITIONING SYSTEM
LUBRICATION**

Under normal operating conditions the oil charge in the compressor should not require periodic checking. Unless the system has suffered a catastrophic failure such as a broken line or severely leaking compressor seal the system should not need the oil checked.

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NOTE

If the system is opened after the initial charging, measure any oil lost in opening the system and add to the system only an amount equal to the loss.

To maintain four ounces of oil in the compressor, the air conditioning system requires 11 to 12 ounces of 500 viscosity oil (35, Consumable Materials Chart) on airplanes TH-1 thru TH-1744, or 13 ounces of oil (67, Consumable Materials Chart) on airplanes TH-1745 and after. Satisfactory operation depends on sufficient lubrication, but too much oil will decrease cooling efficiency. The air conditioner compressor oil level should be checked by a qualified air conditioner service man if the refrigerant charge is lost.

Check the compressor oil level as follows:

- a. Fabricate a dip stick by bending a wire to a 90° angle so that 1-1/2 inches of the wire will insert into the compressor.
- b. Paint the dipstick with a flat black paint. Allow sufficient time for the paint to dry.
- c. Start the engine in accordance with the applicable Pilot's Operating Handbook and run the air conditioning system for 15 minutes with the engine running at low rpm to allow the oil to accumulate in the compressor. Observe the engine operating limitations as noted in the applicable Pilot's Operating Handbook. Shut down the engine in accordance with the applicable Pilot's Operating Handbook.
- d. Relieve the system pressure by evacuating with a recycle servicing unit.
- e. Remove the oil filler plug.
- f. Insert the dipstick through the oil filler port. Slowly rotate the compressor clutch until the dipstick will insert to the bottom of the compressor.
- g. Withdraw the dipstick; oil should appear on the dipstick 5/8 inch below the oil filler port. Add oil as necessary to maintain this oil level.

NOTE

Make sure that the O-ring is not twisted and that dirt and or foreign particles are not on the seat of the plug. The plug should be snug. Do not overtighten the plug.

- h. Install and secure the oil filler plug. Torque the plug to 6 to 9 foot-pounds. If the plug leaks replace the O-ring.

- i. Charge the air conditioning system as noted in CHARGING THE AIR CONDITIONING SYSTEM.

- j. Check the area around the filler plug for leaks. If leaks exist, do not overtighten the filler plug. Remove the plug as noted in step e and install a new O-ring after depressurizing the system with a recycling service unit. Secure the plug and recharge the system as noted in steps h and i. In order to accurately determine the oil level of the air conditioning system, the system should be operated for several minutes and the compressor removed, immediately after shutdown, as noted in COMPRESSOR REMOVAL IN Section 10. Drain the oil from the compressor into a measuring cup. If the total amount of oil drained from the compressor measures 3-4 ounces, the system is fully charged. If the amount is less than three ounces, add a necessary amount of oil to bring the total level to 4 ounces and pour this amount back into the compressor. Reinstall the compressor as noted in COMPRESSOR INSTALLATION in Section 10.

ENGINE INDUCTION MANIFOLD DRAIN

Induction manifold drains permit excess fuel to drain overboard by means of a ball-check valve or a drilled orifice attached to a boss fitting at each rear manifold and at the transfer tube at the forward lower engine section. Inspect the valves at each 100 hours of engine operation to prevent malfunction and possible contamination.

BREAK-IN ENGINE OIL

The new airplane is delivered with Rustband oil (MIL-C-6529, Type II) in the engine. It is recommended that this corrosion-preventive oil be changed at 20-25 hours of engine operation, and the use of Rustband oil must never exceed 6 months of operation before an oil change. If the Rustband oil is not removed at the proper time, varnish may form in the engine. Oil conforming to MIL-L-6082 may be added to the Rustband oil as necessary. After removing the Rustband oil, refill and use MIL-L-6082 mineral oil until oil consumption has stabilized. After oil consumption has stabilized, an ashless dispersant oil, complying with Continental Motors' Specification MHS-24B and MIL-L-22851, must be used. For several suitable engines oils, see the Consumable Materials Chart, Item 2.

NOTE

A 75% power setting is recommended during the break-in period. Avoid overcooling caused by long power-off and/or rapid descent.

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OIL SYSTEM

NOTE

After engine break-in period and at each oil change thereafter, use only detergent oil meeting Teledyne Continental Motors Specification MHS-24B for all Continental engines. The break-in oil in the engine when the airplane is delivered from the factory is a Rustband oil (MIL-C-6529, Type II) and should be changed after 20 to 25 hours or 6 months of eng-

ine operation. Replace with new mineral oil which is used until oil consumption stabilizes.

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The engines are equipped with a wet sump, pressure type, oil system. Each engine sump has a capacity of 12 quarts. Servicing the oil system is provided through access doors in the engine cowling. A calibrated dip stick adjacent to the filler cap on TC serials and attached to the filler cap on TE and TH serials indicates the oil level. Due to the canted position of the engines, the dip sticks are calibrated for either right or left engines and are not interchangeable.

Under normal operating conditions, the recommended number of operating hours between oil changes on all TC serials is 25 hours. A 100 hour oil change interval is recommended for all TE and TH serials provided the oil filter element is changed at each oil change. When operating under adverse weather conditions or continuous high power settings, the oil should be changed more frequently. Torque disposable type oil filters 216 - 240 inch-pounds. Torque cartridge type oil filters 180 - 216 inch-pounds.

Engines manufactured after April, 1975, used on the TE and TH serials, use an oil filter which has a by-pass valve designed into it and an oil filter adapter with the by-pass valve eliminated. The later oil filters (P/N 641583 and P/N 641584) are a gold color.

CAUTION

The earlier oil filters (P/N 632399 and P/N 637584) are a black color and MUST NOT be used on engines manufactured after April, 1975, since the later gold oil filter has an adapter without the by-pass valve.

However, the gold oil filter (P/N 641583 and P/N 641584) can be used on either oil filter adapters without any modifications.

The oil may be drained by opening the drain valve on the bottom inboard side of the oil sump, the low spot of the system. Before draining the oil, the engines should be warmed up to operating temperature to assure complete draining of the oil. Moisture that may have condensed and settled in the oil sump should be drained by occasionally opening the oil drain valve and allowing a small amount of oil to escape. This is particularly important in winter, when the moisture will collect rapidly and may freeze.

The oil pressure screen (installed in TC serials only) should be cleaned at each periodic oil change. To clean the oil pressure screen, remove the hex head plug directly below the starter and pull out the screen. Wash the screen in solvent (Item 15, Consumable Materials Chart) and dry with compressed air. Inspect the screen for physical deterioration

and damage prior to reinstalling. Upon reinstallation the oil filter screen plug should be torqued to 500 to 520 inch-pounds. If slush deposits are heavy, subsequent oil changes should be made at more frequent intervals.

The oil grades listed below are general recommendations only, and will vary with individual circumstances. Any detergent aviation grade engine oil which meets Continental Motors Corporation Specifications MHS-24B is acceptable for use.

RECOMMENDED OIL GRADES FOR ENGINES

Ambient Air Temperature	Recommended Viscosity	Oil Inlet Temp. Desired Max.
Above 40°F	SAE-50	170°F 225°F
Below 40°F	SAE-30 or 10W30	
All temperatures	15W50 20W50	

During cold weather the oil sumps should be checked at pre-flight inspection to be sure that they are not blocked with ice.

Also, since there may be more cylinder blow-by during cold weather starting, with an attendant increase in oil sludge, the oil pressure screen should be checked more frequently and if indicated, the oil drain intervals should be shortened.

OXYGEN SYSTEM (OPTIONAL)

WARNING

Avoid making sparks and keep all burning cigarettes or fire away from the vicinity of the airplane. Make sure the oxygen shut-off valve on the console is in the closed position. Inspect the filler connection for cleanliness before attaching it to the filler valve. Make sure that your hands, tools, and clothing are clean, particularly of grease or oil, for these contaminants will ignite upon contact with pure oxygen under pressure. As a further precaution against fire, open and close all oxygen valves slowly during filling.

When recharging the oxygen system remove the protective cap from the filler valve and attach the hose from an oxygen

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recharging cart to the filler valve. (The oxygen cylinder prior to serial TC-502 is located behind the cabin aft bulkhead. On serials TC-502 and after, and TE-1 and after, the cylinder and filler valve are located in the forward utility compartment of the nose section).

To prevent overheating, fill the oxygen system slowly by adjusting the recharging rate with the pressure regulating valve on the cart. The oxygen cylinder should be filled to a pressure of 1850 ± 50 psi at a temperature of 70°F . This pressure may be increased an additional 3.5 psi for each degree of increase in temperature; similarly, for each degree of drop in temperature, reduce the pressure for the cylinder by 3.5 psi. When it becomes necessary to disconnect a fitting refer to the table of thread lubricants for correct thread lubricant before connecting the fitting back into the system.

MAGNETOS

Ordinarily, the magnetos will require only occasional adjustment, lubrication and breaker point replacement.

CAUTION

The internal automatic grounding devices used on the original S series magnetos have proved unreliable in service and current production magnetos do not have this feature. To be safe, treat all S series, S200 series, and S1200 series magnetos as hot whenever the ground lead is disconnected. To ground the magneto, connect a wire to the switch lead at the filter capacitor and ground the wire to the engine case. If grounding is impractical, remove the cable outlet plate on the rear of the magneto or disconnect all the spark plug leads.

DELCOTRON ALTERNATOR

The Delcotron alternator and regulator are designed for use on only one polarity system, therefore, the following precautions must be observed when working on the charging circuit. Failure to observe these precautions will result in serious damage to the electrical equipment.

- When installing a battery, always make absolutely sure the ground polarity of the battery and the ground polarity of the "Delcotron" are the same.
- When connecting a booster battery, make certain to connect the negative battery terminals together and the positive battery terminals together.
- When connecting a charger to the battery, connect the charger positive lead to the battery positive terminal and the charger negative lead to the battery negative terminal.

d. Never operate the "Delcotron" on open circuit. Make absolutely certain all connections in the circuit are secure.

e. Do not short across or ground any of the terminals on the "Delcotron" or regulator.

f. Do not attempt to polarize the "Delcotron."

For additional overhaul, testing, brush replacement and lubrication, refer to Delco-Remy Service Bulletins IG-262 and IR-273.

LIGHTWEIGHT SURFACE DEICER SYSTEM (RESERVOIR-TYPE)

a. Pull the air supply valve control out so that the valve is full open.

b. Remove the yellow cap on the reservoir filler valve.

c. Attach the filler hose to the valve and turn the hex nut on the valve assembly counterclockwise $\frac{1}{4}$ turn.

WARNING

- Connect the filler hose to the filler valve before releasing the filler valve locking device.
- Never service the system with oxygen or corrosive gases.

d. Charge the reservoir to a pressure of 2800 ± 200 psi with dry compressed air or nitrogen.

e. Tighten the hex nut, remove the filler hose, replace the safety cap, and close the air supply valve.

PROPELLER ANTI-ICER SYSTEM (ALCOHOL)

The anti-icer tank is located beneath the left floorboard of the forward utility compartment and has a capacity of 3 U.S. gallons. The tank filler cap may be reached by removing an access door in the floor of the utility compartment. Check the tank fluid level before each cold weather flight and refill with anti-icer fluid (Item 30, Consumable Materials Chart), if necessary. The tank should be drained and flushed twice a year.

NOTE

The anti-icer tank should be flushed only with anti-icer fluid (Item 30, Consumable Materials Chart). The use of other types of fluids may cause chemical reaction that will corrode aluminum. This will create a gummy residue in the system and make the system inoperative.

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INSTRUMENT ACCESS

To gain access to the flight and/or engine instruments on the BEECHCRAFT Baron, proceed as follows:

- a. Remove the glare shield.
- b. Disconnect the plumbing and hoses at the base of the flight instruments and unplug the electrical plugs on the engine instruments.
- c. Remove the instrument wedge light (TE-768 and after; TH-1 and after) by holding up and tilting the instrument, then thru the instrument panel mounting opening, remove the two screws that attach the light tray to the instrument bezel. Separate the light tray from the instrument and remove the instrument from the airplane.
- d. Radio equipment located on the right hand side of the instrument panel may be removed as an assembly or as a separate unit. To remove as an assembly, loosen and remove the bordering attach screws from the radio panel, pull straight out and unplug the electrical plugs. To remove a single unit, loosen the attach screw on the unit and pull the unit straight out.
- e. Install the flight instruments, engine instruments and radio equipment by reversing the above procedure.

INSTRUMENT WEDGE LIGHTING (TE-768 and after, TH-1 and after)

Internal lighting of the instruments provides additional illumination across each instrument. A light tray mounted on the top side of the bezel of each instrument holds two bulbs wired in parallel. If the light bulbs are damaged or burned out the light tray with bulbs must be replaced.

LIGHT TRAY REMOVAL

- a. Remove the screws that secure the instrument panel in place and tilt the instrument panel aft to gain access to the instruments.

NOTE

Instruments located at the lower edge of the panel may be removed if necessary to gain access to the light tray at the top of the instruments.

- b. Remove the two screws that attach the light tray to the instrument bezel.

LIGHT TRAY INSTALLATION

- a. Install the new light tray and secure in place with the two attaching screws.

- b. Install the instrument in the instrument panel if removed and secure in place with the attaching screws.
- c. Secure the instrument panel in place.

VACUUM SYSTEM

REPLACING THE GYRO INSTRUMENT AIR FILTERS

The replacement of the gyro instrument air filters may be accomplished without removing the instrument from the airplane. The frequency of cleaning or replacing the air filters will depend upon service conditions; however, they should be checked approximately every 100 hours of operation. When operating in localities where there is an excessive amount of sand or dust in the air, or when subjected to continuous cabin smoke (tobacco), the filter should be inspected and replaced at more frequent intervals if necessary. Under extremely dusty conditions, it may be necessary to inspect the filter daily. A clogged filter reduces air flow and slows up the rotor, causing improper gyro indication due to a loss of gyroscopic inertia.

To replace the filter assembly on the instrument, remove the air filter body cover by taking out the four fillister-head machine screws. Lift out the snap ring which holds the filter in place, remove the filter, and replace it with a new one. Replace the air filter body cover and gasket, securing them with the screws. If the air filter body cover is not used, the filter may be removed by lifting the snap ring past the four protective lugs.

CENTRAL AIR FILTER

(TC-1014 and after, TE-208 and after)

A central instrument air filter (two installed on airplanes equipped with dual instrumentation) is incorporated in the instrument plumbing lines to protect the instruments from dust and other foreign particles. This filter(s) is a sealed unit mounted on a bracket behind the instrument panel and should be replaced every 500 hours (or less during operation in dusty or heavy smoke conditions). Replacement is made as follows:

- a. Locate the filter(s), mounted centrally behind the control panel at the base of the panel.
- b. Remove the wing nut at the base of the filter housing and remove the filter from the bracket.
- c. Disconnect the hose at the top of the filter by removing the attach clips.
- d. Discard the old filter and install a new filter by reversing the above procedure.

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PNEUMATIC PRESSURE SYSTEM

(TE-452 and after, TC-2003 and after, TH-1 and after)

FILTER REPLACEMENT

The pneumatic system has four filters which need to be replaced periodically. The inline filters are located directly down stream from the pressure regulators in each engine compartment and should be replaced every 300 hours or sooner depending on conditions. The intake filters are located on the forward side of each engine rear baffle. The foam type filter should be removed each 100 hours, washed in solvent, and blown dry with low pressure shop air. On serials TE-937 and after, TC-2003 and after, TH-373 and after, and earlier airplanes which have complied with BEECHCRAFT Service Instructions No. 0581-194, the intake filter (Figure 2-1A) should be replaced annually or every 300 to 500 hours of service time. This filter element must not be subjected to solvent and must be replaced if this occurs. Always reinstall the filter cover with the opening facing down. Any time a pump is replaced the inline filter must be replaced.

PROPELLER UNFEATHERING ACCUMULATORS

To insure proper operation, the accumulator should be checked periodically for correct pressure. When checking the air pressure, the propeller control should be in the low pitch position so that all oil can be exhausted from the accumulator. The pressure in the propeller accumulators should be maintained at 100 ± 5 psi. When inflating the accumulator, use commercial dry air or nitrogen. The

accumulators are located in, and may be serviced through, an access door in the top inboard side of each nacelle.

SEATS

ROTON LOCKS

(Figure 2-2)

Usually, Roton locks will need no service. If there is a grinding and binding in the lock as the seat reclines or the return action becomes jerky, a little grease properly applied as follows should improve the operation.

- a. Use only Enco ANDOK-B grease (product of Humble Oil Co., Houston, Texas) on the thread as shown in Figure 2-2. Too much grease or grease in the wrong place can cause improper operation.
- b. Compress the spring guide and counter-balance spring approximately one inch.
- c. Remove the retaining ring.
- d. Relax pressure on the spring guide and counter-balance spring slowly until the spring is fully extended.
- e. Remove the lock from the fixture and remove the spring guide, counter-balance spring, and spring guide tube.
- f. Apply a small quantity of grease to the completely extended thrust screw. See Figure 2-2.
- g. Reassemble the lock.

HYDROLOK

If the hydrolok seat back adjusters need service they may be returned to P.L. Porter Co., 6355 DeSoto Ave., Woodland Hills, Calif. 91364.

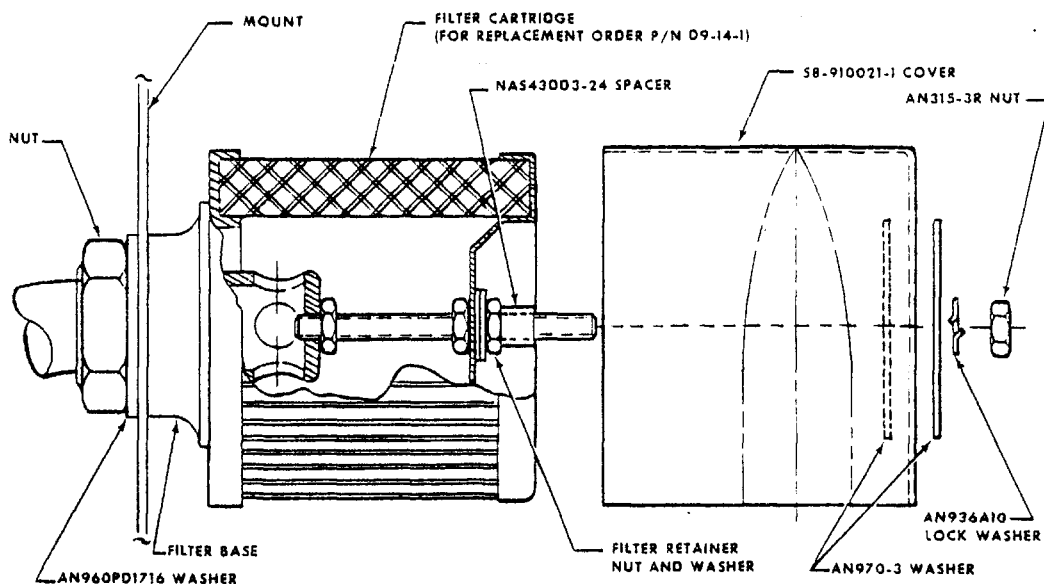


Figure 2-1A. Air Filter Replacement

STD-190-19

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INSTALLATION OF FLARED FITTINGS

When installing flare fittings, make sure the male threads are properly lubricated. Torque the fittings in accordance with the Flare Fitting Torque Chart in Section 1. Do not over-torque.

LUBRICATION OF THREADS (Figure 2-3)

All plumbing fittings on external lines, including their points of attachment at the engine, the threads on the oil pressure transmitter and other component shall be lubricated with the proper lubricant as specified in Table Of Thread Lubricants. When applying thread lubricants, the following rules should be observed.

- Clean threads before applying lubricant.
- Use only thin coats of selected thread lubricant.
- Apply lubricant to male threads only.
- On straight thread fittings, lubricate the first 3 threads.
- On tapered thread fittings, do not lubricate first 2 threads. Apply lubricant to next 3 threads only.
- Never allow lubricant to enter fittings or flare areas.
- Engine fittings should be lubricated only with the fluid transported in the line, i.e. engine oil, fuel. Air lines are not lubricated.

RUBBER SEALS

Deterioration and/or sticking of rubber seals around doors, windows and cowlings may be prevented by coating them with Oakite 6 compound, (product of Oakite Products Inc., 19 Rector St., New York 6, New York). No special care is required when applying the compound to keep it from coming in contact with any painted surfaces. The compound is non-injurious to paint and may be removed by employing normal cleaning methods.

LUBRICATION OF GASKETS AND SEALS

Gaskets and "O" ring seals requiring lubrication are to be lubricated with the fluid type which they are sealing.

EXTERIOR CLEANING

Prior to cleaning the exterior, install wheel covers, making certain that wheel brakes are covered; attach pitot covers securely; install plugs in, or mask off, all other openings. Be particularly careful to mask off both static air buttons before washing or waxing.

UNPAINTED SURFACES

Use a "Bon-Ami" type mild abrasive for cleaning unpainted clad aluminum and stainless steel surfaces and for removing stains and embedded surface dirt. These cleaners, while they restore a bright metal finish to the surface, remove any wax that may be on the surface; rewaxing will be necessary. Use cleaner sparingly, applying directly to the surface with a clean damp cloth. Rub briskly so that cleaner will penetrate the dirt and oxide film. Remove excess cleaner and dissolved dirt with another clean damp cloth, and polish surface with a clean dry cloth. Rub to obtain a smooth polished finish.

PAINTED SURFACES

The materials for removing dirt, grease and bug juice from the painted surface are easily obtainable, such as a cellulose sponge, or mild soap — absolutely no synthetic detergents can be used — naphtha, a few clean white rags, a chamois and lots of cool water. When removing dust and dirt, use a cellulose sponge rubbing in a circular motion and adding water when needed. Dry with chamois to prevent water marks.

Oil and grease can be removed with a rag dampened with naphtha. For removing dust and bug juice which adhere to the leading edges and nose, use a mild soap solution and a

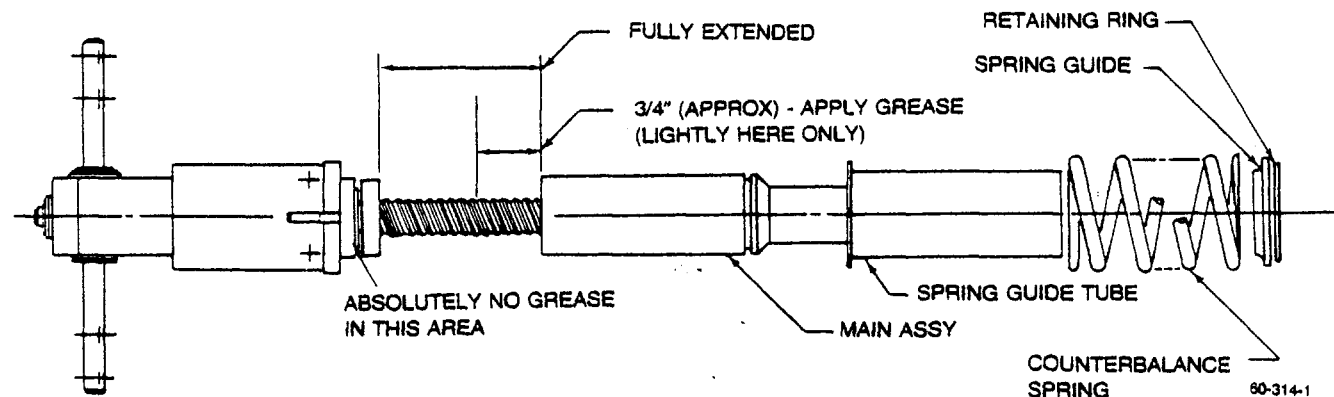


Figure 2-2. Servicing Roton Chair Lock

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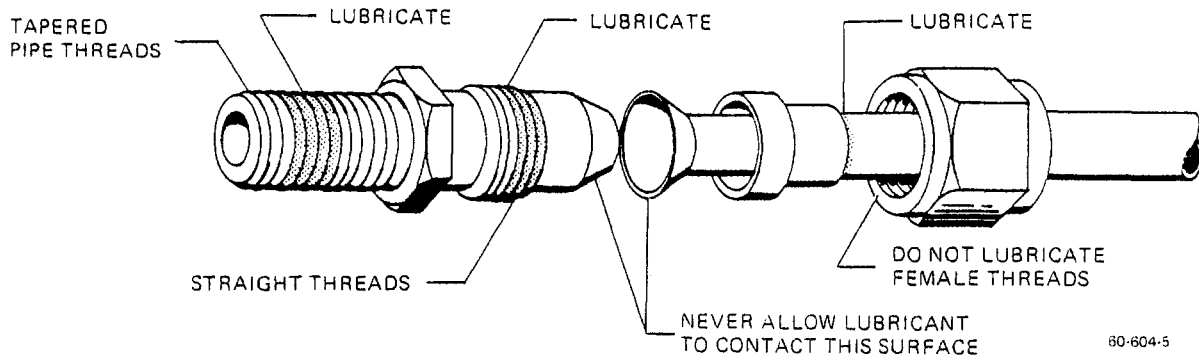


Figure 2-3. Lubrication of Threads

cellulose sponge. Do not use a synthetic detergent or any harsh soaps. Do not use a hard scrubbing action with the sponge. Flush the entire surface with water to remove all traces of soap and dry with a chamois.

ENGINE CLEANING

The engine may be cleaned with kerosene, Stoddard solvent, or any standard solvent recommended for cleaning engines. The cleaner may be sprayed or brushed on the engine. Wipe the engine dry; compressed air may be used to remove excessive oil.

CLEANING THE ENGINE INDUCTION AIR FILTERS

The induction air intake filter, in the induction air box on TC serials, and below the airscoop on TE and TH serials, provides filtered air to the air metering section of the fuel injection system. The filter should be removed and cleaned every 50 hours (up to a maximum of 10 times) or more often when operating in dusty conditions. See Donaldson Instruction Sheet No. P11-6704 or subsequent for cleaning instructions. The filter should be replaced after 500 hours of service or one year, whichever occurs first. If, after cleaning, metal wires are showing or the filter shows other damage, it should be replaced.

To remove the air filter for cleaning on TC serials, remove the air filter access plate in the top of the engine cowling aft of the oil access door. Then remove a second access plate on the top of the air box and slide out the filter. To remove the filter on TE and TH serials, remove the access plate on top of the air scoop on the upper engine cowling and lift out the filter. Clean the filter as specified by the manufacturers instructions on the filter.

PROPELLERS

Since propellers are subject to severe wear and atmospheric conditions, check blades and dome for oxidation and corrosion. Brush area with a phosphatizing agent to remove

superficial corrosion. Smooth etched and pitted areas by buffing smooth with an aluminum polish. Take the following precautionary measures while cleaning the propellers:

- a. Be sure ignition switches are "OFF" before cleaning propellers.
- b. If a liquid cleaner is used, avoid using excessive amounts because it may spatter or run down the blade and enter the hub or engine accessories.
- c. Check area around hub to be sure all compound is removed.

LANDING GEAR AND TIRES

Emulsion type cleaners are recommended for cleaning landing gear. These solutions usually contain solvents which are injurious to rubber if allowed to remain in contact for any length of time. If these solvents come in contact with tires as a result of other cleaning operations, the solvent should be removed with a thorough water rinse.

WHEEL WELL AND NACELLES

Most compounds used for removing oil, grease, and surface dirt from wheel wells and nacelles are emulsifying agents. These compounds, when mixed with petroleum solvents, emulsify the oil, grease, and dirt. The emulsion is then removed by rinsing with water or by spraying with a petroleum solvent. Take the following precautionary measures while cleaning the wheels and nacelles:

- a. Cover openings and air scoops.
- b. During cold weather (if water rinse is used) remove any evidence of water by blowing out with an air gun. Any water that remains may freeze and lock the controls.

CLEANING DEICER BOOTS

The boots should be checked for engine oil after servicing and at the end of each flight, and any oil found should be removed. This can be accomplished, preferably, by the use

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of a neutral soap and water solution. If necessary, however, the oil may be removed by wiping the boot surface lightly with a rag moistened with toluol or uncontaminated unleaded aviation gasoline. When gasoline is used, the surface should be wiped dry immediately without allowing the gasoline to penetrate into the rubber. Also care should be exercised to avoid scrubbing the surface of the boot as this will tend to remove the thin coating of conductive cement.

NOTE

Since deicer boots are made of soft, flexible stock, care must be exercised against dragging gasoline hoses over them or resting ladders or platforms against the boot's surface.

PLASTIC WINDOWS

Ordinary cleaning of the plastic windows in the pilot's compartment will cause severe damage to the surfaces and will result in limited vision or costly replacements. To prevent scratching, or distortion of the plastic windows, special care must be taken when cleaning them. Flush the surface with clean water, using the bare hand to dislodge any dirt or abrasives. This will prevent the possibility of scratching the surface during the washing procedure. Wash thoroughly with a mild soap solution, taking care that the water is free from all possible abrasives. A soft cloth, sponge, or chamois may be used to apply the soap solution. Light films of oil or grease may be removed with trisodium phosphate completely dissolved in water. Stubborn oil or grease on the surface may be removed by rubbing lightly with a clean cloth dampened with hexane, aliphatic, naphtha, or methanol. Flush with clean water and then dry the surface with a clean damp chamois. After the surface is dry, continuous rubbing should be avoided as it is likely to cause scratches, also it builds up a static charge which attracts dust particles to the surface. If the surface should become charged, patting or gently blotting with a clean damp chamois will remove the dust and the charge.

When the airplane is equipped with windshield wipers use only Curtiss-Wright CW-100 cleaner and dust repellant to clean the windshield. Cleaner and repellant may be obtained from Curtiss-Wright, Marquette Division, Cleveland, Ohio. For additional information concerning windshield cleaning, refer to handbook A2-01335 included in the loose tool and equipment bag.

CAUTION

Do not use gasoline, benzene, acetone, carbon tetrachloride, fire extinguisher fluid, deicing fluid, lacquer thinners, dry cleaning fluid, window sprays or kitchen scouring compounds

on plastics as they have a tendency to soften and craze or scratch the surface.

FINAL WAX APPLICATION

A thorough waxing protects painted and unpainted metal surfaces by preventing salt air, smoke, moisture and exhaust gas attacks; it retards adherence of sticky airborne dust and minimizes corrosion. The frequency of rewaxing is dependent upon frequency with which regular maintenance cleaning is performed. Apply wax with a soft damp cloth. Rub on surface with a light circular motion, covering an area of approximately two square feet at a time. Polish with a clean dry cloth.

CAUTION

At time of delivery, painted surfaces should not be polished or waxed until the finish has cured for at least 90 days. No hard rubbing, abrasive cleaners or wax seals detrimental to the proper curing of the finish should be used.

INTERIOR CLEANING

Frequently the seats, rug, upholstery panels and head lining should be vacuum-cleaned to remove as much surface dust as possible.

Experience has shown that commercial foam-type cleaners or "shampoos" can be used to condition the surface of rugs, carpets and upholstered materials. The upholstery is first vacuum-cleaned, stains removed, then a solution of the cleaner is prepared by mixing a small amount in a bucket of water, and beating the mixture until a heavy foam is formed. Apply the foam uniformly over the surface to be cleaned with a brush, then remove the suds with a vacuum cleaner, or by wiping off with a brush or cloth. Since there is very little moisture in this foam, wetting of the fabric or retention of moisture in the warp does not occur. Unlacquered metal fittings and furnishings within the airplane can be cleaned with most commercial metal polishes. Use a soft, clean rag for application; then polish to a brilliant gloss with a dry cloth. Protect the finish with a good grade of wax.

LEATHER UPHOLSTERY

Leather upholstery should be kept waxed for maximum protection. For cleaning, a nonabrasive, chemically neutral, nonreactive, emulsion type cleaner of cream-like consistency is recommended. Dilute the cleaner with water, and apply it over the dirty surface with a sponge or soft cloth (use a gentle wiping motion, do not scrub). The solution should not be allowed to stand, but should be wiped off before drying.

APPROVED SPARK PLUG AND GAP SETTING CHART

Correct Torque for all Spark Plugs is 320 to 380 in. lbs.

SPARK PLUG MANUFACTURER AND TYPE

ENGINE: IO-470-L	CHAMPION	A.C.
	REB37N	HSR86L
	RHB37N	HSR87LP*
	RHB38E	AC271
	RHB36P*	AC281
	RHB32N	
	RHB33E	
ENGINE: IO-520-C IO-520-CB IO-550-C	RHB32N	AC271
	RHB33E	AC281
		AC273
		AC283

*Indicates fine wire platinum electrodes.

Gap setting is .018 - .022 for all spark plug types listed. Wide gap (.018 to .022) spark plugs provide improved starting and idling characteristics.

NOTE

Heat range is progressively colder as you read down each column corresponding to the manufacturer's spark plug type. Where more than one heat range is listed, the colder type is recommended unless extended low power operation or engine condition results in spark plug fouling.

TABLE OF THREAD LUBRICANTS

<i>SYSTEM</i>	<i>MATERIAL</i>	<i>SPECIFICATIONS</i>	<i>VENDOR PRODUCTS</i>
			Any product conforming to the referenced specification may be used.
Fuel	Anti-Seize, Graphite Petrolatum	MIL-T-5544	Armite Product, Armite Laboratories, Los Angeles, Calif. Anti-seize Compound I, Esso Standard Co.
Oil, Manifold Pressure Anti-icer, Vacuum	Lubricating Grease (Gasoline and Oil Resistant)	MIL-G-6032	L-237, Lehigh Chemical Co., Chestertown, Maryland Rockwell 950, Rockwell Mfg. Co., New York, N.Y. Royce 32, Royal Eng. Co., Whippany, N.J.
Brake, Deicer, Static and Pitot	Anti-Seize Compound White Lead Base	Federal Specification TT-A-580	Armite Product, Armite Laboratories, Los Angeles, Calif.
Oxygen	Thread Compound, Anti-Seize and Sealing, Oxygen Systems	MIL-T-5542	No. 15 Rector Well Equipment Co., Houston, Texas Dag 217 Acheson Colloies Co., Port Huron, Michigan Key Abso-Lute, Type B., Key Co., East St. Louis, Illinois
Oxygen, High Pressure Side Only	Ribbon Dope Thread Sealant	MIL-T-27730	Permacel Tape Corp., New Brunswick, N.J.

CONSUMABLE MATERIALS CHART

Only the basic number of each Military Specification is included in the Consumable Materials Chart. No attempt has been made to update the basic number with the letter suffix that designates the current issues of the various specifications.

Vendors listed as meeting Federal and Military Specifications are provided as reference only and are not specifically recommended by Beech Aircraft Corporation; consequently, any product conforming to the specification listed may be used. The products listed below have been tested and approved for aviation usage by Beech Aircraft Corporation, or by the vendor, or by compliance with the applicable specifications. Other products that are locally procurable which conform to the requirements of the applicable Military Specification may be used even though not specifically included herein.

It is the responsibility of the operator/user to determine the current revision of the applicable Military Specification prior to usage of that item. This determination may be made by contacting the vendor of a specific item.

<i>ITEM</i>	<i>MATERIAL</i>	<i>SPECIFICATIONS</i>	<i>VENDOR PRODUCTS</i>
1.	Fuel, Engine	* 100/130 octane (If not available, use 115/145)	
2.	Oil, Engine	Continental Motors Corp., Specification No. MHS-24B	See Approved Engine Oils Chart
3.	Corrosion Preventive Compound	MIL-C-6529 Type II	Anti-Corrode No. 205, Cities Service Oil Co., 60 Wall Tower, New York 5, N.Y. Rust Foil No. 652-2, Franklin Oil and Gas Co., Bedford, Ohio Kendex No. 7038, Kendall Refining Co., Bradford, Pa.
4.	Lubricating Oil	MIL-L-6081	Castrolaero 1010 Castrol Oil, Inc., Castrol Limited, 254-266 Doremus Ave., Newark, N.J. Kendex 7042, Kendall Refining Co., Bradford, Pa. Royco 460, Royal Lubricants Co., River Road, Hanover, N.J.
5.	Lubricating Oil	SAE 20	
6.	Lubricating Oil, Aircraft Reciprocating (Piston Engine)	MIL-L-6082	Conoco Aero Oil No. 1065, Continental Oil Co., Ponca City, Oklahoma

CONSUMABLE MATERIALS CHART (Cont'd)

ITEM	MATERIAL	SPECIFICATIONS	VENDOR PRODUCTS
			Phillips 66 Aviation Engine Oil, Grade 1065, Phillips Petroleum Co., Bartlesville, Oklahoma
			Or any approved aircraft engine oil (graded at 1100 or 1065)
7.	Lubricating Oil (Gear)	MIL-L-2105 Grade 75 or 101-380016-1	Mobilube SHC, Mobil Oil Corp., Shoreham Building, Washington, D.C.
8.	Lubricating Grease (General Purpose) (Superseded by MIL-G-81322)	MIL-G-7711	
9.	Lubricating Grease (High Temperature)	**MIL-G-81322	Mobilgrease 28, Mobil Oil Corp., Shoreham Building, Washington D.C.
			Aeroshell No. 22, Shell Oil Co., 50W 50th Street, New York, N.Y.
10.	Lubricating Grease (Gear)	Mobil Compound G.G. or Mobil 636	Mobil Oil Corp., Shoreham Building, Washington, D.C.
11.	Lubricating Grease (Aircraft and Instruments, Low and High Temperature)	**MIL-G-23827	Supermil Grease No. A72832, American Oil Co., 910 South Michigan Ave., Chicago, Ill. 60680
			Royco 27A, Royal Lubricants Co., River Road, Hanover, N.J.
			Shell 6249 Grease, Shell Oil Co., 50 West 50th St., P.O. Box 95, New York, N.Y. 07936
12.	Lubricant Molybdenum Disulfide Powder	MIL-M-7866	Molykote Z, Wilco Co., Wichita, Kansas
			Molykote Z, Standard Oil of Kentucky
			Molykote Z, Hafkel Seals, Glendale, California

CONSUMABLE MATERIALS CHART (Cont'd)

<i>ITEM</i>	<i>MATERIAL</i>	<i>SPECIFICATIONS</i>	<i>VENDOR PRODUCTS</i>
			Moly-Paul No. 4, K.S. Paul Products Ltd., Nobel Road, London, England
13.	Hydraulic Fluid	MIL-H-5606	Brayco 756D, Bray Oil Co., 3344 Medford Street, Los Angeles 63, California
			TL-5874, Texaco, Inc., 135 East 42nd Street, New York, N. Y.
			PED 3565, Standard Oil Co. of California, 225 Bush Street, San Francisco 20, Calif.
14.	Oxygen System Leak Testing Compound	MIL-L-25567	
15.	Solvent, Dry Cleaning or White Spirit	PD680 or British Specification 245	
16.	Lubricating Oil	SAE 10	
17.	Aviator's Breathing Oxygen	MIL-O-27210	
18.	Naphtha	TT-N-95	
19.	Methyl Ethyl Ketone	TT-M-261	
20.	Toluol	TT-T-548	
21.	Paint Remover		Turco No. 4260, Turco Products Inc., Los Angeles, California
22.	Epoxy Primer	MIL-P-23377	Ameron Industrial Coatings Div., P.O. Box 2153, Wichita, Kansas 67201
23.	Wash Primer		EX201G, Ameron Industrial Coatings Div., P.O. Box 2153, Wichita, Kansas 67201
24.	Zinc Chromate Primer	MIL-P-8585	
25.	Rubber Hose	MIL-H-5593	
26.	Oil, Engine Preservative	MIL-L-21260	
27.	See Item 12		
28.	Lubricating Grease	ENCO ANDOK-B	Humble Oil Co., Houston, Texas

CONSUMABLE MATERIALS CHART (Cont'd)

<i>ITEM</i>	<i>MATERIAL</i>	<i>SPECIFICATIONS</i>	<i>VENDOR PRODUCTS</i>
29.	Solvent		CRC-2-26, Corrosion Reactions Consultants, Inc., Philadelphia, Pa.
30.	Anti-Icer Fluid	TT-I-735 (Replaces MIL-F-5566)	Anti-Icer Fluid, Sherwood and Co., Wichita, Kansas
31.	Sealer	890B-1/2	Coast Pro-Seal and Manufacturing Co., Los Angeles, Calif.
32.	Sealer	EC-1675B-1/2	Minnesota Mining and Manufacturing Co., St. Paul, Minnesota
33.	Compound	EC-1020	Minnesota Mining and Manufacturing Co., St. Paul, Minnesota
34.	Air Conditioner Refrigerant	R-12	Racon Inc. Wichita, Kansas
		Racon 12	
		Genetrol 12	
		Freon 12	Dupont Inc., Freon Products Division, Wilmington, Delaware
35.	Oil (Air Conditioner Compressor)	500 Viscosity Suniso No. 5	Virginia Chemical and Smelting Co., West Norfolk, Virginia
		Texaco Capella E	Texaco Inc. 135 East 42nd Street, New York, New York
36.	Spray Adhesive	No. 77	Minnesota Mining and Manufacturing Co., St. Paul, Minnesota
37.	Adhesive	EC2216	Minnesota Mining and Manufacturing Co., St. Paul, Minnesota
38.	Lubricating Oil	10W30	
39.	Deleted. Refer to Item 3.		
40.	Preservative Hydraulic Fluid	MIL-H-6083	Mobil Oil Corporation, 150 E. 42nd St., New York, N.Y. 10017
41.	Air Conditioning Refrigerant (Flushing)	R 11	Racon Inc., Wichita, Kansas

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CONSUMABLE MATERIALS CHART *(Continued)*

Item	Material	Specifications	Vendor Products
42.	.003-inch-thick, 2-inch-wide Vinyl Film Tape	No.474	Minnesota Mining and Manufacturing Co., 3M Center, St. Paul, MN 55101
43.	Sealant	Presstite No. 576	Presstite-Keystone Engineering Co., 3900 Chateau Ave., St. Louis MO
44.	Adhesive Acrylic	PS-30	Cadillac Plastics & Chemical Co., Detroit MI
45.	Adhesive/Sealant	RTV732	Dow Corning Corporation, Midland, MI 48640
46.	Cement	EC776	Minnesota Mining and Manufacturing Co., 3M Center, St. Paul, MN 55101
47.	Cement Primer	Bostic 1007P	B.B. Chemical Co., 784 Memorial Drive, Cambridge, NE 69022
48.	Cement	Bostic 1008	B.B. Chemical Co., 784 Memorial Drive, Cambridge, NE 69022
49.	Corrosion Preventive Compound	MIL-C-16173 Grade 2	Braycote 137, Bray Oil Co., 1925 North Marianna, Los Angeles, CA 90032
50.	Water Displacement Lubricant	LPS-1	LPS Research Laboratories Inc., Los Angeles, CA
		CRC 3-36	CRC 3-36, CRC Chemicals U.S.A., Warminster, PA 18974
		WD-40	WD-40 Company, San Diego. CA
		VV-L-800A	Brayco 300, Bray Oil Co., 1925 North Marianna, Los Angeles, CA
51.	Sealer	5651 Isocryl Tape	Shnee-Moorhead Chemical Inc., Irving TX
52.	Thread Locking Compound	Loctite Sealant Grade A	Loctite Corp., 705 N. Mountain Rd., Newington, CT 06111
53.	Solvent	CRC 2-26	CRC 2-26, Chemicals U.S.A. Warminster, PA 18974
54.	Coating	Alodine 1200, 1200S or 1201	Amchem Products, Inc., Spring Garden St., Ambler, PA. 19002
55.	Cement	EC750	Minnesota Mining and Manufacturing Co., 3M Center St. Paul MN 55101
56.	Lubricating Grease	Aeroshell Grease 5	Shell Oil Co., One Shell Plaza, P.O. Box 2463, Houston, TX 77001

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CONSUMABLE MATERIALS CHART *(Continued)*

Item	Material	Specifications	Vendor Products
57.	Silicon Compound	MIL-S-8660	
58.	Adhesive/Sealant	Loctite 222	Loctite Corp., 705 Mountain Road., Newington, CT 06111
59.	Retaining Compound	Loctite 601	Loctite Corp., 705 Mountain Road., Newington, CT 06111
60.	Cement	EC-1403 or 1300L	Minnesota Mining and Manufacturing Co., 3M Center St. Paul MN 55101
61.	Enamel (Sealer)	Sunbrite 78-U-1003 Enamel U-100-C Catalyst	Sterling Paint and Laquer Manufacturing Co., 315 Brannon Ave., St. Louis, MO. 63139
62.	Mylar Tape (3/4 inch)	Mylar Mystic No. 733	Minnesota Mining and Manufacturing Co., 3M Center, St. Paul, MN 55101
63.	Cement	EC-801 Class A-1/2	Minnesota Mining and Manufacturing Co., 3M Center, St. Paul, MN 55101
64.	Antiseptic	QS4	Burlin and Company, Inc., 2920 Martindale Ave., P.O. Box 270-B Indianapolis, IN. 26206 A 2840
65.	Cement	A56B	B. F. Goodrich Co., Akron, OH 44318
66.	Grease	MIL-G-10924F	Obtain locally
67.	Oil (Air Conditioner)	RL 100S	ICI Americas Inc., Concord Plaza, 3411 Silverside Road, Wilmington DE 19850 Virginia KMP, 400 Platinum Way, Dallas, TX 75237
68.	Air Conditioning Refrigerant (Charging)	R-134a	Obtain locally
69.	Cleaner, Air Conditioning System	AC Flush	Castrol North America, Specialty Products Division, 16715 Von Karman Ave., Irvine, CA 92714-4918
70.	Refrigerant Leak Detector Dye	Trace	Highside Chemicals, Inc., 10-12 Colfax Ave., Clifton, NJ 07013
71.	Adhesive/Sealant	Loctite 209	Loctite Corp. 705 N Mountain Rd Newington, CT 06111-1411
72.	Locquic Primer	Primer N	Loctite Corp. 705 N Mountain Rd Newington, CT 06111-1411

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CONSUMABLE MATERIALS CHART *(Continued)*

Item	Material	Specifications	Vendor Products
73.	Masking Tape	UU-T-106	3M Tape and Industrial Division, 3M Center St. Paul, Minnesota 55044
74.	Icex Compound	Silicone Coating	B.F. Goodrich Company, 500 South Main St., Akron, Oh 44318
75.	Age-Master No. 1		B.F. Goodrich Company, 500 South Main St., Akron, Oh 44318

* Aviation gasoline 100LL (Blue) Preferred. 100 (Green) Minimum grade.

** Precaution should be taken when using MIL-G-23827 and MIL-G-81322 since these greases contain chemicals harmful to painted surfaces.

LUBRICATION CHART

See Figure 2-4 (Model 55 Series)
See Figure 2-4A (Model 58 Series)

<i>ITEM</i>	<i>LOCATION</i>	<i>LUBRICANT</i>	<i>INTERVAL</i>
DETAIL A			
1.	ΔΔ Control column linkage (18)	SAE 20 or SAE 10W30	100 hrs.
2.	ΔΔ Control column head (6)	SAE 20 or SAE 10W30	100 hrs.
3.	ΔΔ Control column aileron link (3)	SAE 20 or SAE 10W30	100 hrs.
DETAIL B			
1.	Door handle (1)	SAE 20 or SAE 10W30	100 hrs.
2.	Door latch (2)	SAE 20 or SAE 10W30	100 hrs.
3.	** Door latch (1)	SAE 20 or SAE 10W30	100 hrs.
DETAIL C			
1.	Rudder pedals (8)	SAE 20 or SAE 10W30	100 hrs.
DETAIL D			
1.	Landing gear motor gear box (1)	Δ MIL-G-81322	600 hrs.
2.	Landing gear actuator gear box (1) (When properly filled, the oil level on a dip stick inserted through the filler hole is approximately 1/4 inch)	Mobil Compound GG Mobil 636 or MIL-L-2105 Grade 75	300 hrs.
3.	Landing gear retract arms (14)	SAE 10W30	100 hrs.
4.	††† Nose landing gear retract arm (1)	SAE 10W30	100 hrs.
DETAIL E			
1.	Main landing gear door hinges (10)	SAE 20 or SAE 10W30	100 hrs.
DETAIL F			
1.	Door latch mechanism (3)	SAE 20 or SAE 10W30	100 hrs.

LUBRICATION CHART

See Figure 2-4 (Model 55 Series)

See Figure 2-4A (Model 58 Series)

ITEM	LOCATION	LUBRICANT	INTERVAL
2.	Door handle (1)	SAE 20 or SAE 10W30	100 hrs.
3.	Door hinges (2)	MIL-M-7866	100 hrs.
DETAIL G			
1.	Rudder trim tab actuator (1)	Δ MIL-G-23827	900 hrs. or 5 years
2.	Rudder trim tab hinge (1)	VV-L-800A (Preferred) LPS-1 CRC 3-36 WD-40	100 hrs.
3.	Rudder trim tab clevis (1)	VV-L-800A (Preferred) LPS-1 CRC 3-36 WD-40	100 hrs.
DETAIL H			
1.	Elevator trim tab actuator (2)	Δ MIL-G-23827	900 hrs. or 5 years
2.	Elevator trim tab hinge (2)	VV-L-800A (Preferred) LPS-1 CRC 3-36 WD-40	100 hrs.
3.	Elevator push-pull rod ends (4)	SAE 10W30	100 hrs.
4.	Elevator trim tab clevis (2)	VV-L-800A (Preferred) LPS-1 CRC 3-36 WD-40	100 hrs.
DETAIL I			
1.	Aileron trim tab actuator (1)	Δ MIL-G-23827	900 hrs. or 5 years
2.	Aileron trim tab hinge (1)	VV-L-800A (Preferred) LPS-1 CRC 3-36 WD-40	100 hrs.
3.	Aileron trim tab clevis (1)	VV-L-800A (Preferred) LPS-1 CRC 3-36 WD-40	100 hrs.
DETAIL J			
1.	Aileron bell cranks (6)	SAE 20 or SAE 10W30	100 hrs.
2.	ΔΔΔΔ Aileron push-pull rod ends (4)	Δ MIL-G-23827 or SAE 20 or SAE 10W30	100 hrs.

LUBRICATION CHART

See Figure 2-4 (Model 55 Series)
See Figure 2-4A (Model 58 Series)

ITEM	LOCATION	LUBRICANT	INTERVAL
DETAIL K			
1.	Flap actuator (2)	MIL-L-2105C Grade 75	900 hrs.
DETAIL L			
1.	Main wheel bearings (4)	ΔΔΔ Aeroshell 5 (Preferred) or MIL-G-81322	100 hrs.
2.	Main shock struts (2)	MIL-H-5606	100 hrs.
3.	Up lock rollers (2) (Refer to detailed LUBRICATION OF LANDING GEAR UP LOCK ROLLERS in this section)		
4.	* Main gear attach points (4)	Δ MIL-G-81322	100 hrs.
5.	Main gear retract points (8)	Δ MIL-G-81322	100 hrs.
6.	Main gear torque knee (10)	Δ MIL-G-81322	100 hrs.
DETAIL M			
1.	† Flap motor gear box (1)	Δ MIL-G-23827	600 hrs.
2.	†† Flap flexible drive shaft (2)	Δ MIL-G-23827	900 hrs.
DETAIL N			
1.	Nose wheel door hinges (4)	SAE 20 or SAE 10W30	100 hrs.
DETAIL O			
1.	Nose wheel bearings (2)	ΔΔΔ Aeroshell 5 (Preferred) or MIL-G-81322	100 hrs.
2.	Shimmy damper (1)	MIL-H-5606	100 hrs.
3.	Nose shock strut (1)	MIL-H-5606	100 hrs.
4.	**** Nose gear torque knee (6)	Δ MIL-G-81322	100 hrs.
5.	†††† Nose gear swivel fittings (2)	Δ MIL-G-81322	100 hrs.
6.	†††† Nose gear attach points (2)	Δ MIL-G-81322	100 hrs.
7.	Nose gear retract points (4)	Δ MIL-G-81322	100 hrs.

LUBRICATION CHART

See Figure 2-4 (Model 55 Series)
See Figure 2-4A (Model 58 Series)

ITEM	LOCATION	LUBRICANT	INTERVAL
8.	Rod end fitting (1)	Δ MIL-G-81322	100 hrs.
DETAIL P			
1.	Nose steering mechanism (6)	Δ MIL-G-81322	100 hrs.
DETAIL Q			
1.	Heater iris valve (1)	MIL-M-7866	As Required

NOTES

Any parts that rotate or slide (metal-to-metal) and have no other provision for lubrication must be lubricated with SAE 20 or SAE 10W30 oil.

() Number in parenthesis indicates number of lubrication points.

* No lubrication required TC-251, TC-344 and after, TE-1 and after.

** Lubrication required TC-1093 and after, TE-560 and after.

*** Flap track rollers (pre-lubed sealed bearings).

**** No lubrication required TE-301 and after, and TH-1 and after.

† The flap motor gear box cannot be lubricated on airplane serials TC-2003 and after, TE-1084 and after and TH-773 and after.

†† Lubricate the inner cable of the flexible drive shaft. Access is gained at the actuator end of the flexible drive shaft by removing the retaining ring from the actuator housing, then pulling the inner cable from the flexible housing.

††† The nose gear retract arm is located beneath the gear box.

†††† Lubrication required TH-484 and after, TE-1 and after except TE-301 through TE-985.

Δ Precaution should be taken when using MIL-G-23827 and MIL-G-81322, since these greases contain chemicals harmful to painted surfaces.

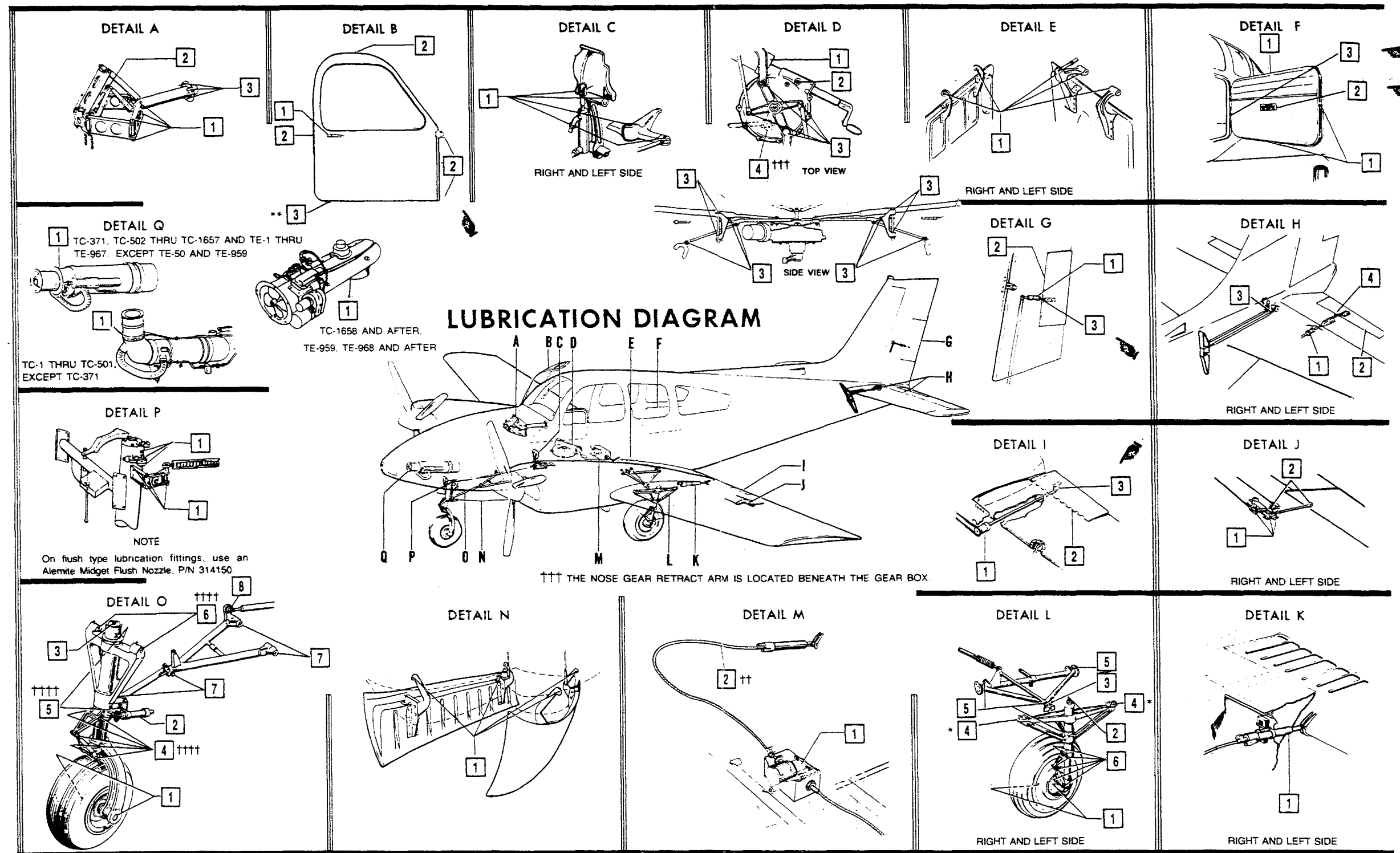
ΔΔ Lubrication points shown for airplane serials TC-1 and after, TE-1 and after, TH-1 through TH-1388 and TH-1390 through TH-1395. For later models with dual control columns, see Figure 2-3A.

ΔΔΔ Aeroshell 5 and MIL-G-81322 are not compatible lubricants and must not be mixed.

CAUTION

If the type of grease in the wheel bearings is changed, make certain that all affected are thoroughly cleaned before relubrication.

ΔΔΔΔ Lubricate the aileron push-pull rod ends in place at 100-hour intervals using SAE 20 or SAE 10W30 oil, or remove the aileron push-pull rod assembly, and clean and lubricate rod ends using MIL-G-23827 grease. Rotate the rod end eye balls to check for adequate lubrication coverage. Check the aileron system rigging after reinstallation of the push-pull rod assembly.

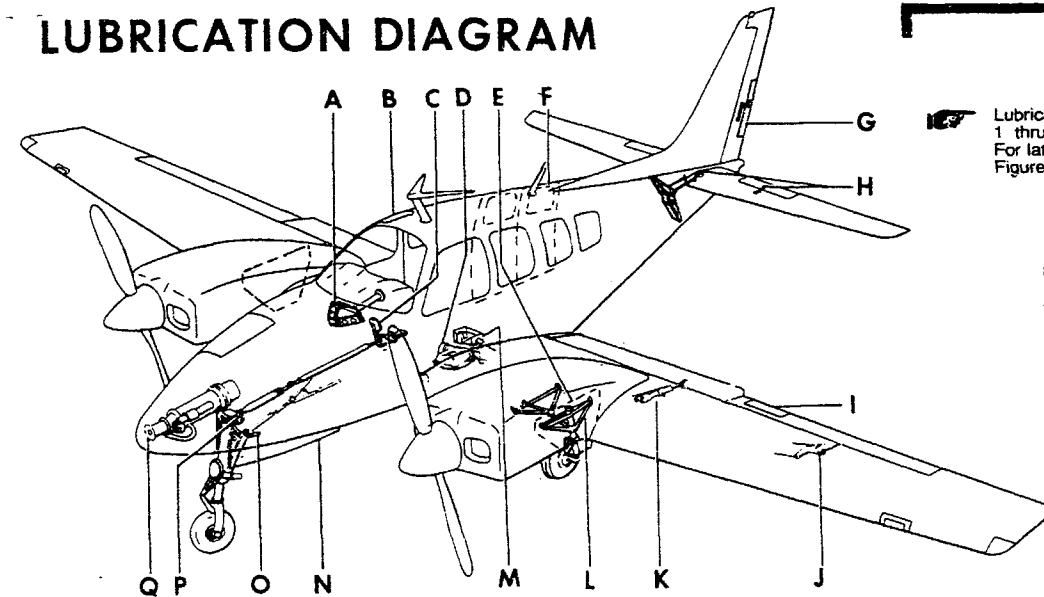


55-604-11

Figure 2-4. Lubrication Diagram (TC-1 and after, TE-1 and after)

DENOTES AREA OF CHANGE

LUBRICATION DIAGRAM



Lubricate points shown for airplane serials TH-1 thru TH-1388 and TH-1390 thru TH-1395. For later models with dual control columns, see Figure 2-4A.

††† THE NOSE GEAR RETRACT ARM IS LOCATED BENEATH THE GEAR BOX.

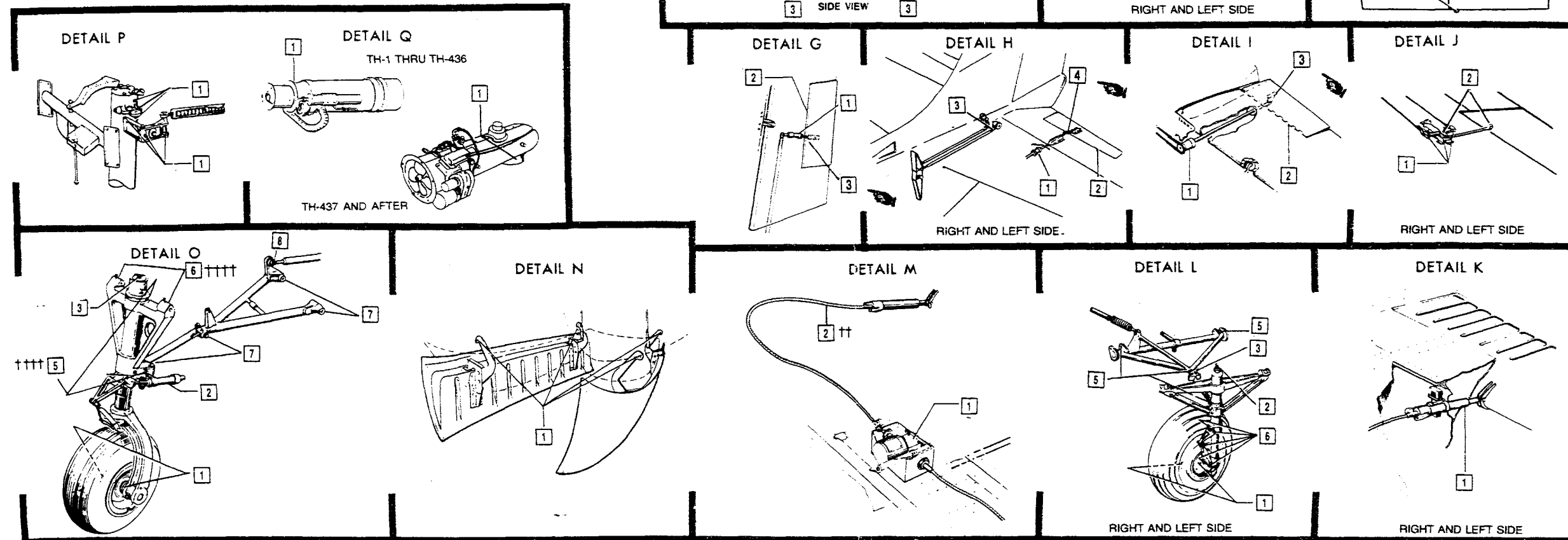


Figure 2-4A. Lubrication Diagram (TH-1 and after)

DENOTES AREA OF CHANGE

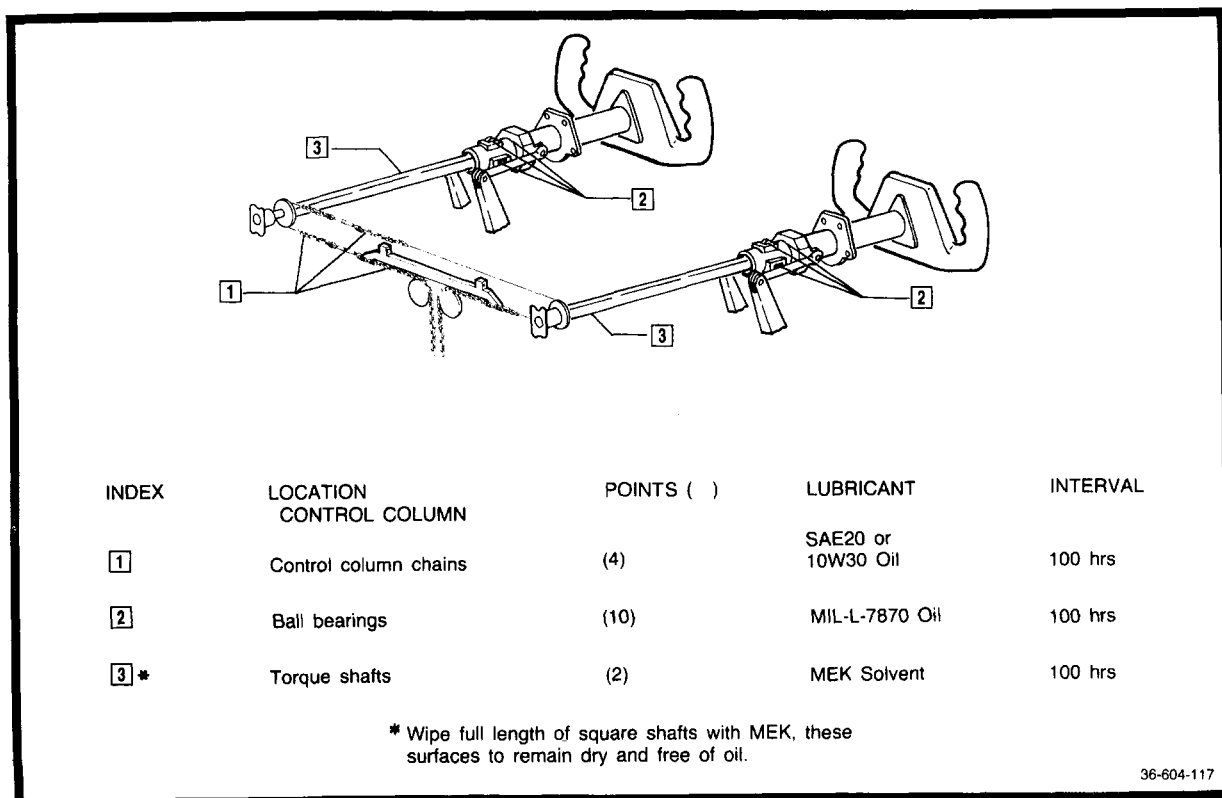


Figure 2-4B. Dual Control Wheel Lubrication (TH-1389, TH-1396 and after)

DENOTES AREA OF CHANGE

SERVICING CHART

<i>ITEM</i>	<i>LOCATION</i>	<i>SERVICE WITH</i>	<i>INTERVAL</i>
CHECK			
Engine Oil Level	Access door on upper cowling	See Oil Grades Chart	Preflight
Battery Electrolyte Level	Forward Utility compartment under baggage floor	See Section 13 for detailed instructions	100 hrs.
Autopilot Servo Air Filter	Aft of baggage compartment partition		100 hrs.
Propeller Accumulator (if installed)	Upper rear inboard side of engine compartment	Dry air or nitrogen	100 hrs.
Air Conditioner Compressor Oil Level	Refer to Section 10 for location and special instructions	Suniso No. 5 or Texaco Capella E, 500 Viscosity Oil	As required
Air Conditioner Refrigerant	Refer to Section 10 for location and special instructions	Refrigerant No. 12	As required
CHANGE			
Engine Oil	Access plate on lower nacelle	See Oil Grades Chart	25 hrs. TC serials 100 hrs. TE and TH
Engine Oil Filter	Access door on side of nacelle		100 hrs. TE and TH serials
CLEAN			
Engine Oil Screen	Directly below starter	Clean with solvent and blow dry with compressed air	25 hrs. TC serials
Fuel Strainers	In wheel wells	Clean with solvent and blow dry with compressed air	100 hrs.
Fuel Injection Control Valve Screen	Access door on side of the nacelle	Clean with solvent and blow dry with compressed air	100 hrs.
Heater Fuel Pump Strainer	In nose wheel well	Clean with unleaded gas and blow dry with compressed air	100 hrs.
Heater Fuel Filter (Prior to TC-1406, TE-847 and TH-176)	In nose wheel well	Clean with solvent and blow dry with compressed air	100 hrs.
Induction Air Filter	At the base of the induction air intake	Clean with solvent and blow dry with compressed air	50 hrs.
Pressure Regulator Valve Screens	Forward of the instrument panel on each side	Clean with solvent and blow dry with compressed air	100 hrs.
Pressure System Filter (Foam) (TE-452 thru TE-936, TH-1 thru TH-372)	Forward of rear engine baffle	Clean with soap and water solution	100 hrs.

SERVICING CHART (Cont'd)

<i>ITEM</i>	<i>LOCATION</i>	<i>SERVICE WITH</i>	<i>INTERVAL</i>
CLEAN (Cont'd)			
Evaporator Blower Filters	Aft of FS 190.00 and fwd of FS 49.00 (E55) fwd of 39.00 (58)	Backflow with compressed air	Every 100 hrs.
DRAIN			
Main Fuel Cell Drains	Lower side of nacelle		Preflight
Auxiliary Fuel Cell Drains	Lower wing surface		Preflight
Fuel Strainer Drains	In wheel well		Preflight
Heater Fuel Filter (Prior to TC-1406, TE-847 and TH-176)	In nose wheel well		Preflight
Static Drain	On upholstery panel beside pilot's subpanel		100 hrs.
REPLACE			
Gyro Central Air Filter	Forward of instrument panel		500 hrs.
Induction Air Filter	At the base of the induction air intake		500 hrs.
Autopilot Servo Air Filter	Aft of the baggage compartment partition		1000 hrs.
Pressure System Filter (TE-937 and after, TH-373 and after and TC-2003 and after)	Forward of rear engine baffle		Annually or 300 to 500 hrs. depending upon conditions.
SERVICE			
Brake Fluid Reservoir	Forward utility compartment	MIL-H-5606 Hydraulic Fluid	As Required
Main and Nose Landing Gear Struts	Top of each strut	MIL-H-5606 Hydraulic Fluid and Compressed Air	100 hrs.
Shimmy Damper	Nose landing gear	MIL-H-5606 Hydraulic Fluid	100 hrs.
Oxygen Cylinder	Located behind the cabin aft bulkhead prior to serial TC-502, TE-1 and after, and TH-1 and after, the cylinder is located in the forward utility compartment of the nose section.	MIL-O-27210 Aviator's Oxygen	As Required

APPROVED ENGINE OILS

COMPANY	BRAND
Phillips Petroleum Company	Phillips 66 Aviation Oil, Type A X/C Aviation Multiviscosity Oil SAE 15 W/50 X/C Aviation Multiviscosity Oil SAE 25W 60
Shell Oil Company	Aeroshell Oil W
Continental Oil	Conoco Aero S
Texaco, Inc.	Texaco Aircraft Engine Oil - Premium AD
Mobil Oil Company	Mobil Aero Oil
Castrol Limited (Australia)	Castrolaero AD Oil
Pennzoil Company	Pennzoil Aircraft Engine Oil
Sinclair Oil Company	Sinclair Avoil
Exxon Company, U.S.A.	Exxon Aviation Oil E E
BP Oil Corporation	BP Aero Oil
Quaker State Oil & Refining Company	Quaker State AD Aviation Engine Oil
Delta Petroleum Company	Delta Avoil Oil
Union Oil Company of California	Union Aircraft Engine Oil HD
Gulf Oil Company	Gulfpride Aviation AD
Red Ram Limited (Canada)	Red Ram X/C Aviation Oil 20W-50

NOTE

This chart lists oils which were known to be certified as meeting the requirements of Continental Motors Corporation Specification MHS-24B at the time this manual was published. Any other oil which conforms to this specification may be used.

SEALING CHART

<i>ITEM</i>	<i>PRODUCT</i>	<i>VENDOR</i>
1.	A56B Cement	B.F. Goodrich Co., Akron, Ohio
2.	EC870 Glue	Minnesota Mining and Manufacturing Co., St. Paul, Minnesota
3.	Permatex Sealer No. 2	Permatex Co., Inc., Kansas City, Kansas
4.	Presstite Sealer No. 576	Presstite Engineering Co., St. Louis, Mo.
5.	Silastic Sealer No. 140	Dow Corning, Midland, Michigan

SECTION

3

AIRFRAME

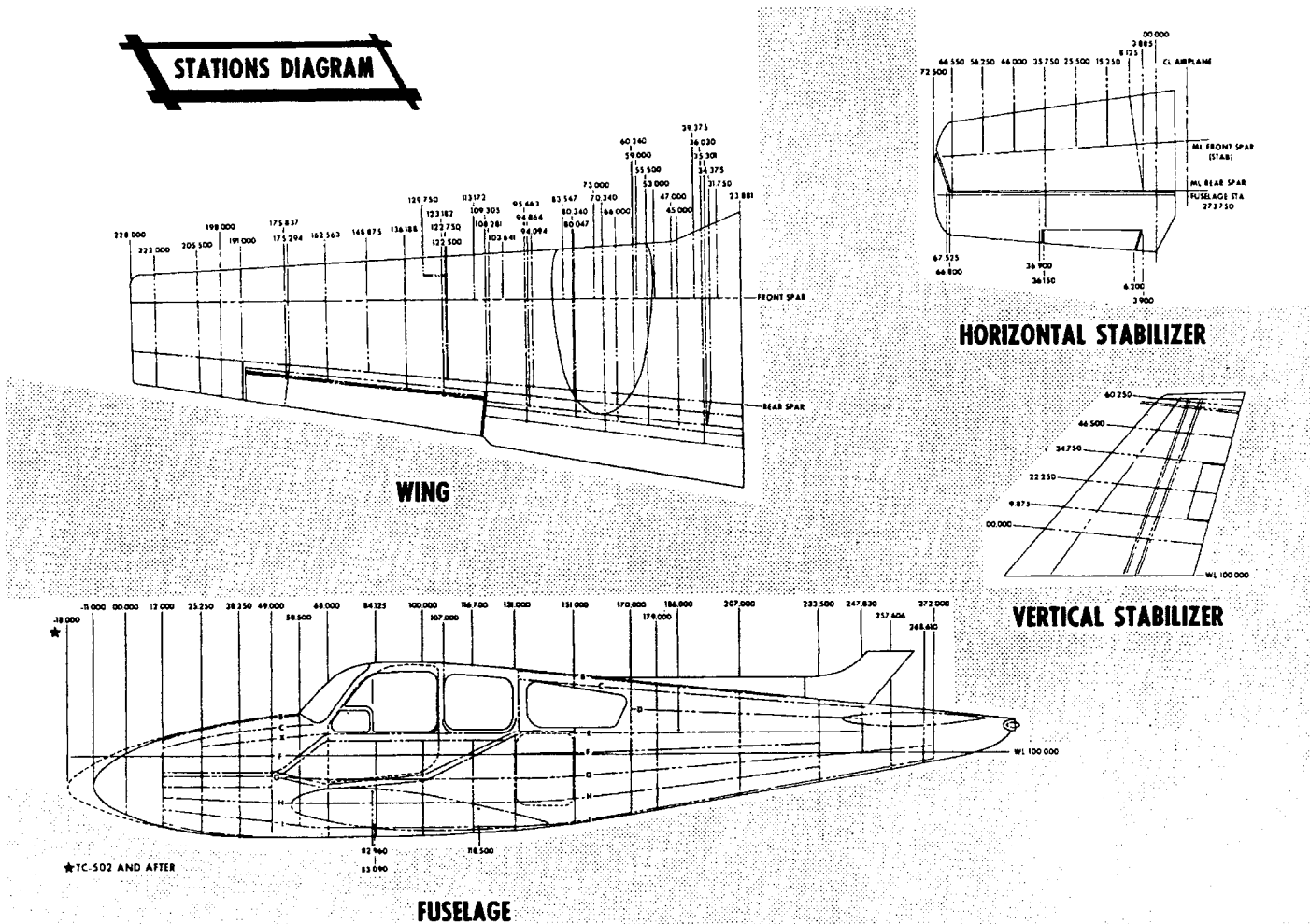
Raytheon Aircraft

BEECH BARON 55 AND 58 SHOP MANUAL

55-603-26

STATIONS DIAGRAM

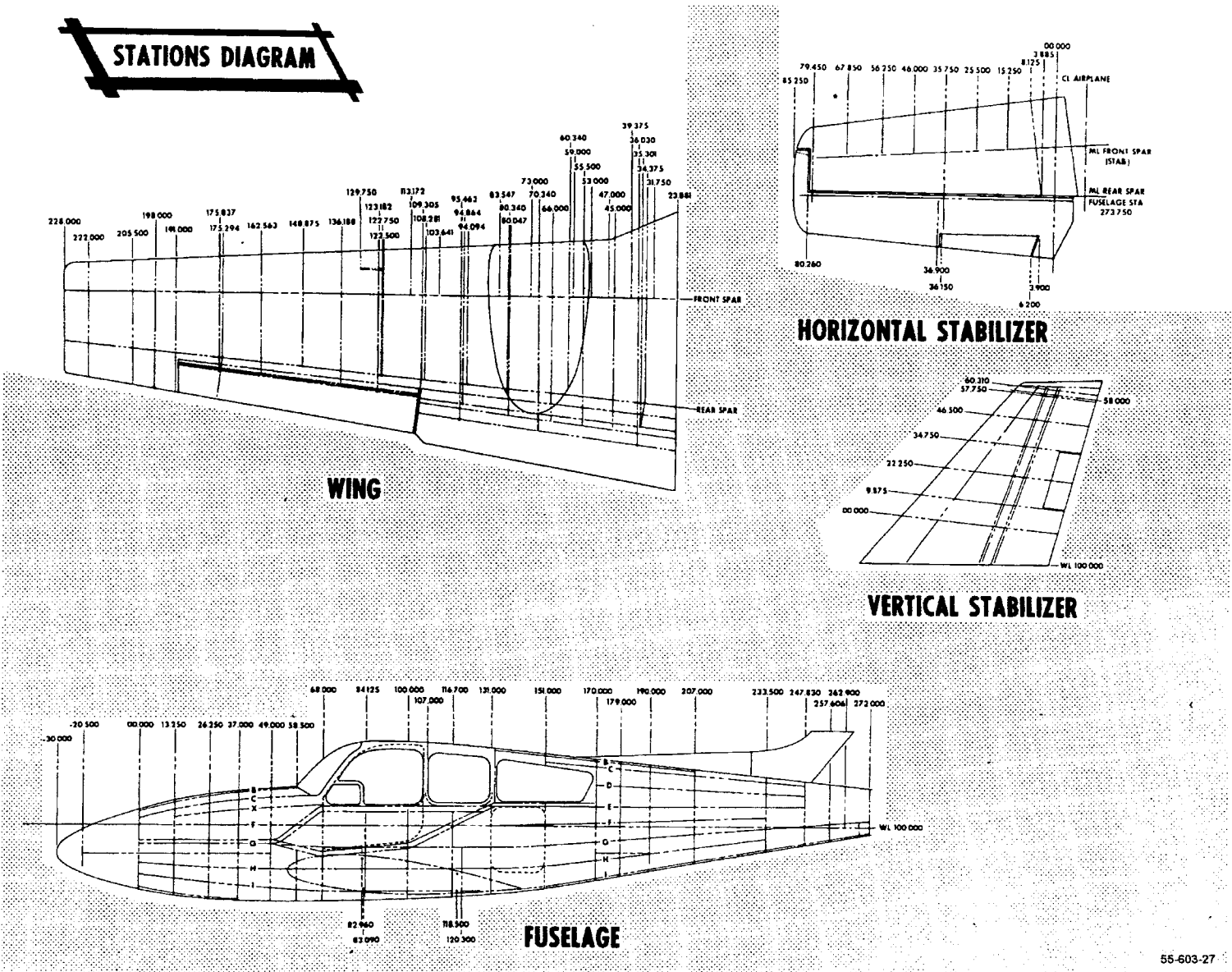
Stations Diagram (TC-1 and After)
Figure 3-1



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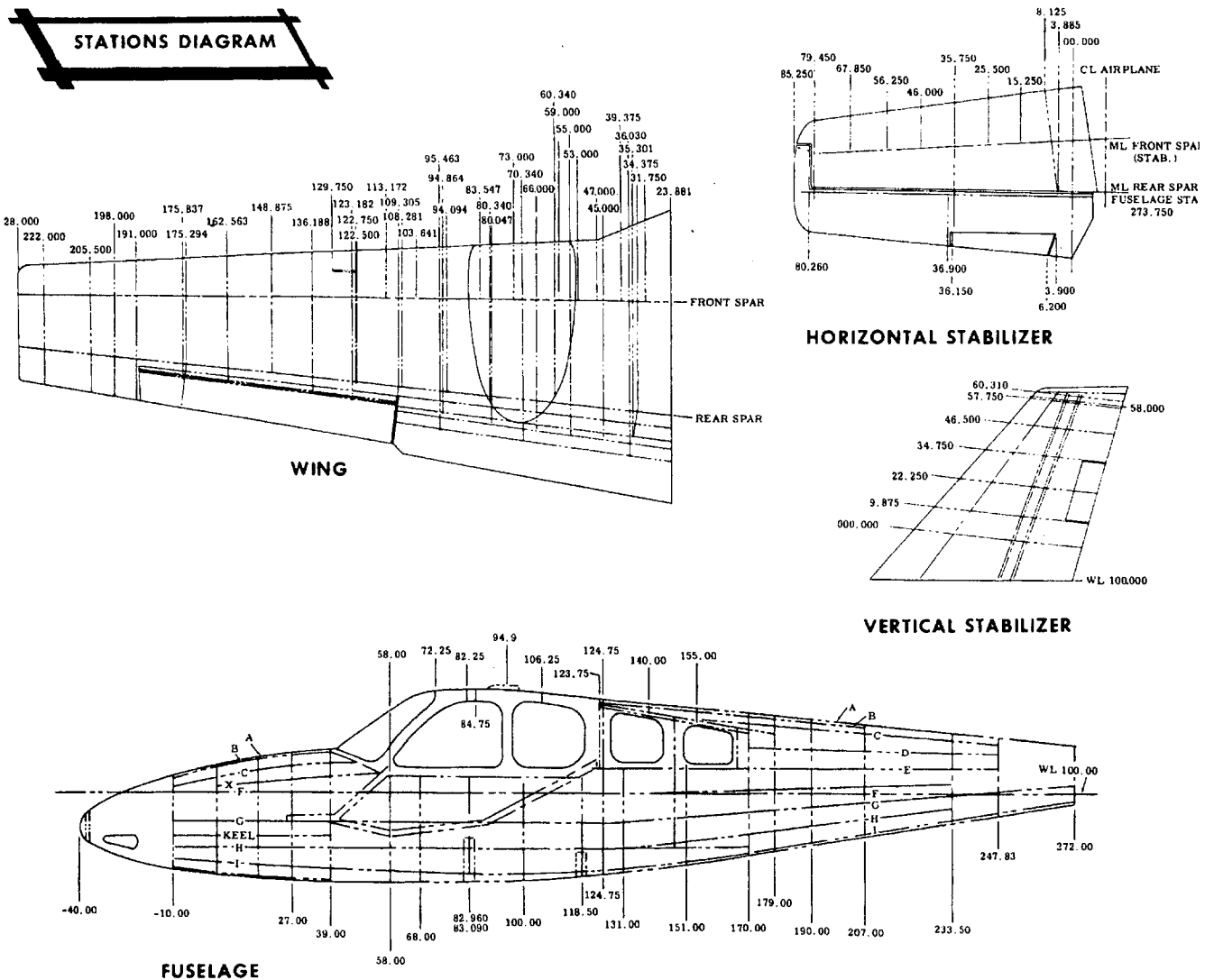
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Stations Diagram (TE-1 and After)
Figure 3-2

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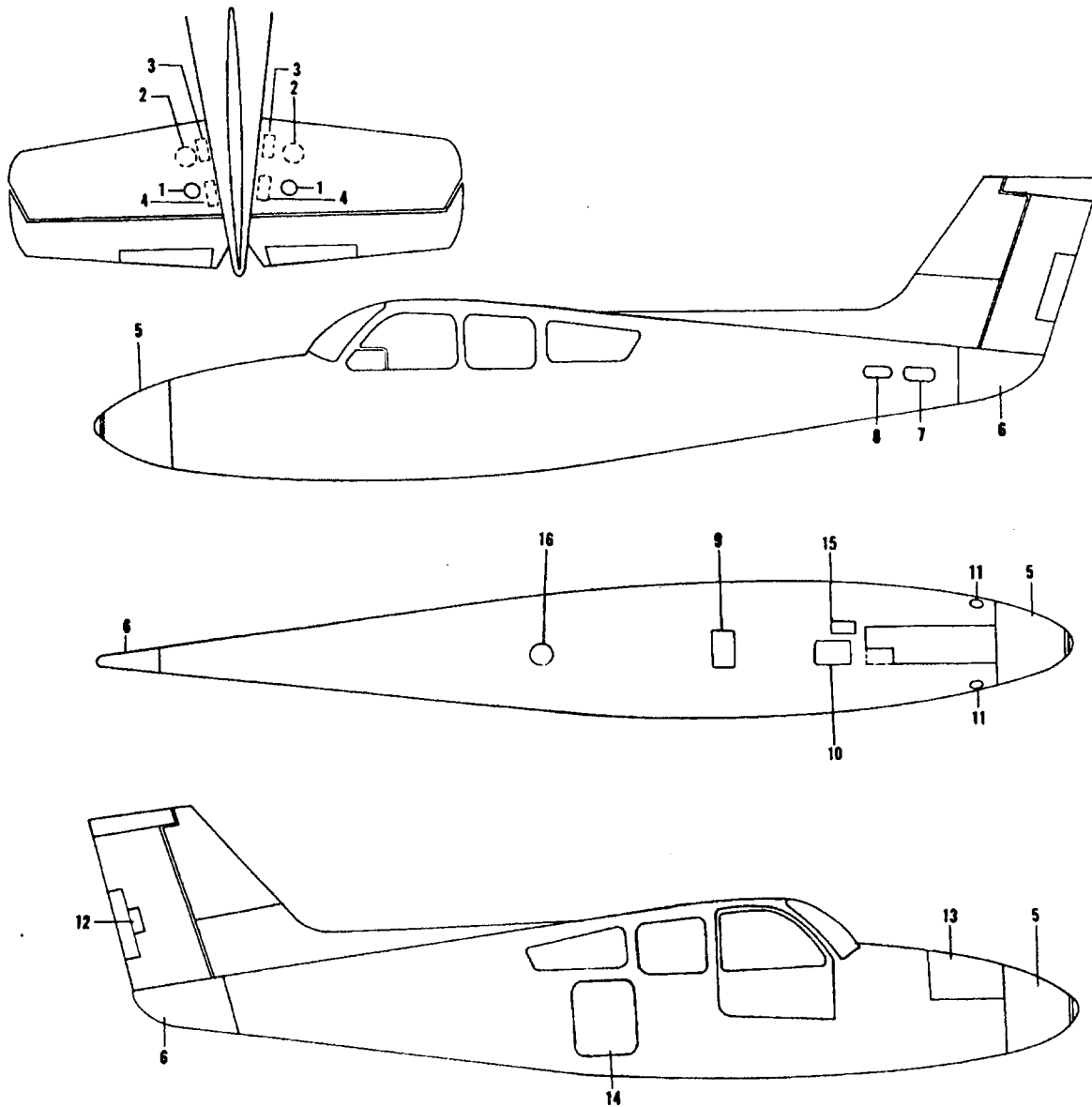


Stations Diagram (TH-1 and After)
Figure 3-3

58-603-1

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1. Elevator trim tab actuator
2. Elevator trim tab actuator sprocket
3. Elevator tab cables
4. Horizontal stabilizer mounting bolts
5. Heater ignition, iris valve and blower assembly
6. Tail cone
7. Elevator bellcrank, elevator down spring, and turnbuckles
8. Cable inspection

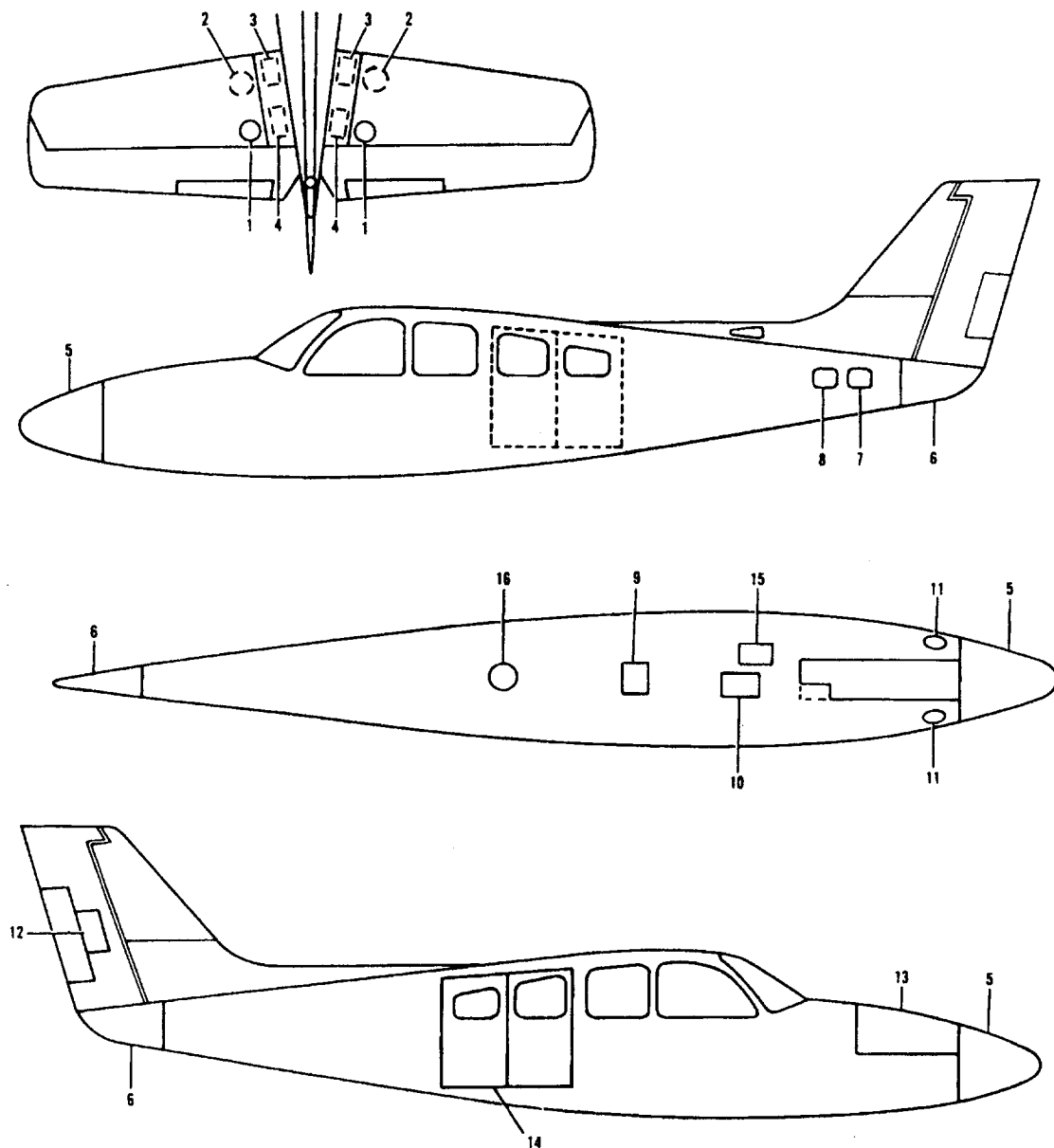
9. Landing gear actuator
10. Control cable pulleys and nose gear retract idler arm
11. Hinge bolts for nose wheel strut
12. Rudder tab actuator
13. Nose baggage door
14. Aft baggage compartment
15. Nose gear retract idler arm (TE-1 and after)
16. Jack attach point

55-13-7

Fuselage Access Openings (TC-1 and After; TE-1 and After)
Figure 3-4

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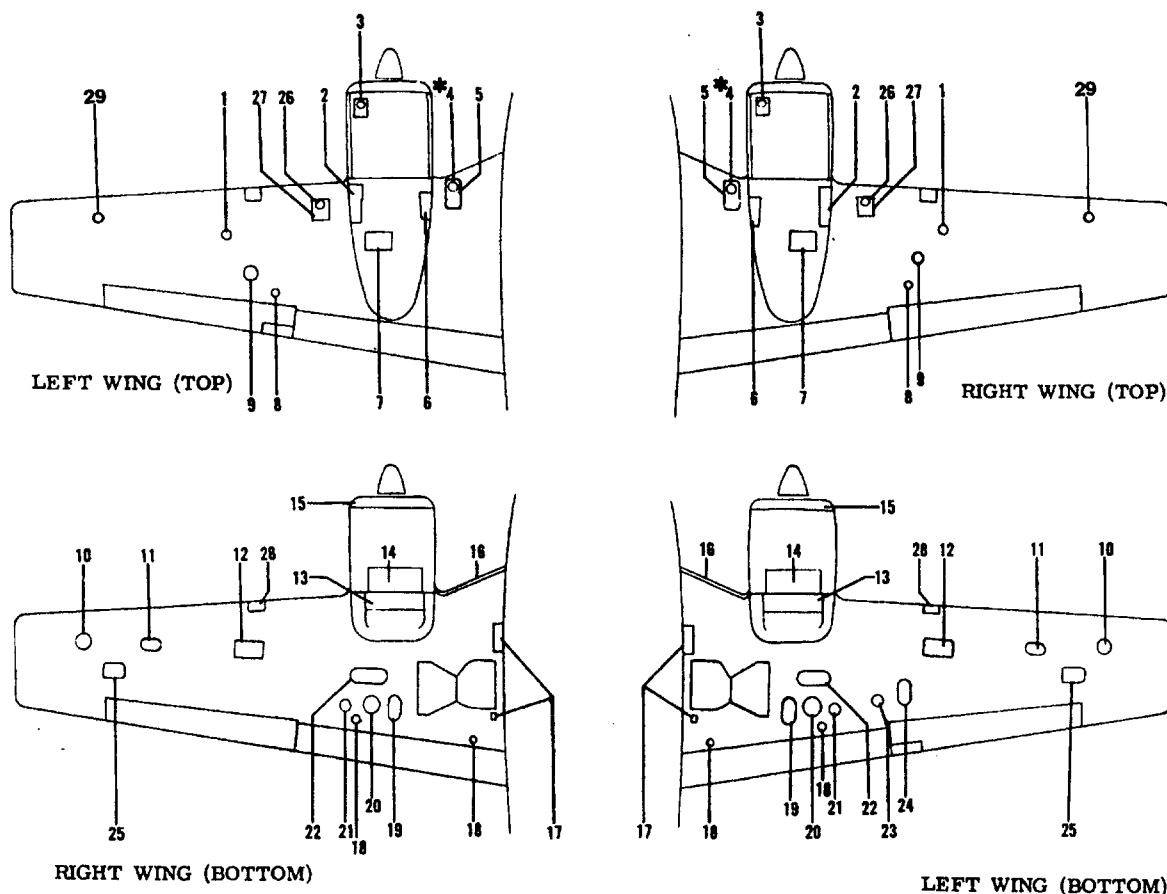
- | | |
|--|---|
| 1. Elevator Trim Tab Actuator | 9. Landing Gear Actuator |
| 2. Elevator Trim Tab Actuator Sprocket | 10. Control Cable Pulleys and Nose Gear Retract Idler Arm |
| 3. Elevator Tab Cables | 11. Hinge Bolts for Nose Wheel Strut |
| 4. Horizontal Stabilizer Mounting Bolts | 12. Rudder Tab Actuator |
| 5. Heater Ignition, Iris Valve and Blower assembly | 13. Nose Baggage Door |
| 6. Tail Cone | 14. Cargo Door |
| 7. Elevator Bellcrank, Elevator Down Spring, and Turnbuckles | 15. Nose Gear Retract Idler Arm |
| 8. Cable Inspection | 16. Jack Attach Point |

58-13-1

Fuselage Access Openings (TH-1 and After)
Figure 3-5

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1. Auxiliary fuel cell filler neck
2. Propeller accumulator, voltage regulator and alternator fuse panel
3. Oil level indicator access
- *4. Main fuel cell filler neck
5. Main fuel cell transmitter
6. Nacelle inspection plate and access to engine plumbing
7. Auxiliary fuel cell transmitter
8. Aileron bell crank
- **9. Auxiliary fuel cell transmitter
10. Wing tip spar fitting
11. Auxiliary tank siphon valve
12. Auxiliary tank access
13. Firewall terminal bus (starter relay left hand only)
14. Cowl Flap

**Removed TC-1847 and after, and TE-1039 and after.

15. Removable cowl nose cap
16. Wing leading edge cap
17. Wing mounting bolts
18. Flap access
19. Aileron cable inspection
20. Aileron cable inspection
21. Aileron cable pulley
22. Auxiliary tank access
23. Aileron cable inspection
24. Aileron tab actuator and pulley
25. Wing tip access
26. Main fuel cell filler neck (optional 39 gallon tank)
27. Main fuel cell transmitter (optional 39 gallon tank)
28. Pitot mast access
29. Extended range tank filler

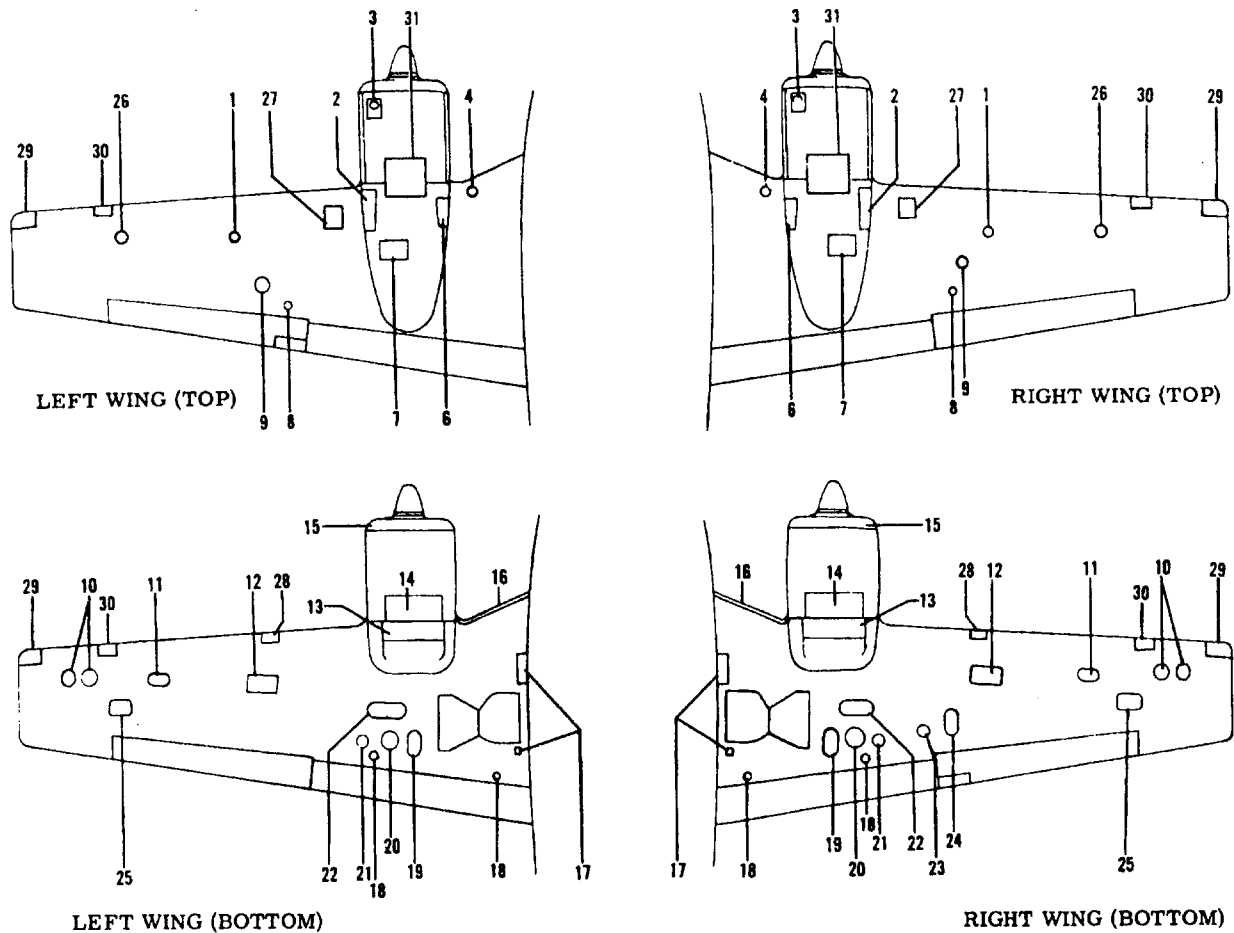
*25 Gallon Main Fuel Cell Installation.

TH03B
991747AA

Wing Access Openings (TC-1 and After; TE-1 and After)
Figure 3-6

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- | | |
|--|-------------------------------------|
| 1. Fuel transmitter | 16. Wing leading edge cap |
| 2. Wing ice light and relay | 17. Wing mounting bolts |
| 3. Oil level indicator access | 18. Flap access |
| 4. Fuel transmitter | 19. Aileron cable inspection |
| 5. Main fuel cell transmitter | 20. Aileron cable inspection |
| 6. Nacelle inspection plate and access to engine propeller accumulator | 21. Aileron cable pulley |
| 7. Pressure regulator | 22. Auxiliary tank access |
| 8. Aileron bell crank | 23. Aileron cable inspection |
| 9. Fuel cell transmitter | 24. Aileron tab actuator and pulley |
| 10. Wing tip spar fitting | 25. Wing tip access |
| 11. Fuel cell siphon valve | 26. Fuel filler opening |
| 12. Fuel cell access | 27. Main fuel cell transmitter |
| 13. Firewall terminal bus (starter relay left hand only) | 28. Pitot mast access |
| 14. Cowl flap | 29. Navigation light |
| 15. Removable cowl nose cap | 30. Landing light |
| | 31. Nacelle access |

TH03B
991748AA

Wing Access Openings (TH-1 and After)
Figure 3-7

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WING

WING TIP REMOVAL (STANDARD)

- a. Remove the fasteners attaching the wing tip to the wing (screws prior to TC-1916, TE-1071 and TH-680; blind rivets TC-1916 and after, TE-1071 and after and TH-680 and after).

NOTE

Airplane serials TC-1916 thru TC-1921, TE-1071 and TE-1072, and TH-703 thru TH-707 have screws in the upper and lower wing tip tabs which must be removed.

- b. Disconnect the electrical leads to the navigation light and the landing light (if installed).

WING TIP INSTALLATION (STANDARD)

- a. Attach the electrical leads to the navigation light and the landing light (if installed).
- b. Position the wing tip to the wing and install the fasteners (screws prior to TC-1916, TE-1071, and TH-680; rivets TC-1916 and after, TE-1071 and after, and TH-680 and after).

WET WING TIP REMOVAL

- a. Disconnect the battery.
- b. Drain the fuel from the airplane.
- c. Remove the access panels adjacent to the wing tip.
- d. Disconnect the electrical leads to the navigation light.
- e. Disconnect the fuel interconnect and vent lines from the wing tip.
- f. Remove the blind rivets attaching the wing tip to the wing.

WET WING TIP INSTALLATION

- a. Position the wing tip and install the rivets.
- b. Connect the fuel interconnect and vent lines to the wing tip.
- c. Connect the electrical leads to the navigation light.
- d. Refuel the airplane.
- e. Check the fuel line connections for leaks.
- f. Install the access panels.
- g. Connect the battery.

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WING REMOVAL

- a. Drain all fuel from the airplane.
- b. Remove the front seats and side panels.
- c. Remove the rear seat panel.
- d. Remove the wing bolt access covers from the wing.
- e. Place the airplane on a three point jack and raise until the wheels are clear of the ground. Refer to Section 2 for jacking instructions. A three point jack should be used because of the unbalanced condition of the airplane after the wing is removed.
- f. Place a suitable cradle under the wing being removed and a wing stand under the opposite wing. A tail stand will also be required to assure stability.
- g. Disconnect and cap off brake lines at root rib.
- h. Retract the landing gear until the inboard landing gear doors are fully open.
- i. Disconnect the inboard door actuating rod from the control horn.
- j. Disconnect the landing gear uplock cable at the idler arm in cabin.
- k. Disconnect the landing gear actuator rod from the V brace in the wheel well.
- l. Disconnect the aileron cables at the turnbuckle in the wheel well and remove the roll pins from inboard aileron cable pulley brackets. Disconnect aileron tab cables and aileron tab stops in left wheel well.
- m. Disconnect fuel lines between wing root rib and the fuselage.
- n. Disconnect the flap drive shaft at the motor and remove the clamps attaching the shaft to the fuselage.
- o. Remove the lower aft nacelle fairing assembly.
- p. Remove the leading edge cover of the wing located between the fuselage and nacelle.
- q. Remove the clamps securing the wiring bundles to the wing inboard leading edge. Disconnect wiring bundles at terminals located on aft side of nacelle firewall.
- r. Disconnect wiring to the electrical components located in each side of the upper nacelle.
- s. Disconnect the plumbing between the wing root rib and the fuselage.
- t. Disconnect flap wire bundle and safety switch wiring in left wheel well. Disconnect plumbing and electrical wiring (booster pump and fuel quantity transmitter) in each wheel well.
- u. Remove the clamps securing engine controls to leading edge.
- v. Disconnect the pitot line between the wing root rib and the fuselage (left wing only).
- w. Using a grease pencil, outline the position of the wing on the fuselage.

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CAUTION

There should be no bolt binding during removal. Should binding occur, adjust the wing position until the bolt disengages freely. Do not screw or drive a bolt in or out of the fittings.

- x. Remove the wing attach bolts from the fittings.
- y. Remove the wing by pulling it straight away from the fuselage.

NOTE

Discard the mounting nuts. Install new mounting nuts when installing the wing.

Discard the soft aluminum washers installed between the upper wing attach fittings. Install new washers when the wing is installed.

WING PANEL LEADING EDGE REMOVAL

- a. Support the wing on a suitable cradle.

NOTE

The entire nacelle must be removed prior to removal of the leading edge.

- b. Remove the access doors.
- c. Disconnect the fuel lines and remove the fuel cell.
- d. Remove the wing tip (see wing tip removal).
- e. Remove the screws attaching the forward section of the outboard rib to the spar.
- f. Remove the screws attaching the nose skin to the front spar at the wing root.
- g. Remove the machine screws that attach the root nose rib to the front spar.
- h. Assure that the aft portion of the wing panel is adequately supported.
- i. Remove the hinge wires (Clamp vise grip pliers on the hinge wire and using the pliers as both fulcrum and lever, pull).

CAUTION

Do not attempt to spin the hinge wire out with a drill motor; the heating and expansion of the wire will cause it to seize in the hinge and break.

- j. Remove the wing panel leading edge.

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WING PANEL LEADING EDGE INSTALLATION

NOTE

Before assembling the spar to the wing section, drive a hinge wire through the sections to remove burrs and foreign matter and to assure that no areas of excessive binding exist.

- a. Use a hinge wire coated liberally with Molybdenum Disulfide (12, Consumable Materials Chart, Section 2).
- b. Support the aft section of the wing panel and align the leading edge hinges.
- c. Insert the hinge wire into the attaching hinge, as far as possible by hand.
- d. Drive the hinge wire using a telescoping guide tube and rivet gun. As the wire is driven in remove sections of the telescoping guide.

CAUTION

Do not attempt to spin the hinge pin with a drill motor as the heat and expansion may cause the wire to seize and break.

NOTE

Use Kit No. 35-588S when installing the hinge wire. To prevent kinking of hinge wire, hold the larger tube firmly against the hinge throughout the entire driving procedure.

- e. Install the machine screws that attach the root nose rib to the front spar.
- f. Install screws attaching the nose skin to the front spar.
- g. Install the screws attaching the forward section of the outboard rib to the spar.
- h. Connect the navigation light wire and install the wing tip.
- i. Install the screws that attach the wing tip to the wing.
- j. Connect the electrical wiring to the landing light.
- k. Install the nacelle.
- l. Cement the rubber fillet to the root of the wing, using cement (55, Consumable Materials Chart, Section 2) or an equivalent fuel resistant rubber cement.
- m. Install the fuel cell and connect the fuel lines.
- n. Install the access doors.

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WING INSTALLATION

NOTE

When replacing wing bolts make sure that the replacement bolts have been properly inspected using the magnetic particle process. Bolts must be magnetically inspected before installation as wing bolts. Bolts may be acquired through Raytheon Aircraft Parts Inventory and Distribution (RAPID). The individual placing the order must stipulate the need to have the bolts inspected before shipment.

- a. Using a nonmetallic brush and solvent (18 or 19, Consumable Materials Chart, Section 2), clean the wing attach fittings and hardware (bolts, washers and nuts). Inspect the wing attach fittings and hardware as instructed under WING BOLT, NUT, AND FITTING INSPECTION.

WARNING

Wing bolts that have reached their life limit (10 years after the initial inspection), must not be reused. See Chart 1. The mounting nuts must be replaced at each inspection interval.

- b. Coat the fitting bolt bores and bearing faces, bolts, washers, and nuts with corrosion preventive compound (49, Consumable Materials Chart, Section 2).

CAUTION

Each bolt must be inserted by hand without binding. If a bolt cannot be easily inserted, reposition the wing until the bolt moves freely in the fittings. Do not screw or drive the bolt into the fittings.

- c. Move the wing into position and align the wing fittings with the carry-through fittings. Insert the bolts into the fittings.

CAUTION

Bolts, washers and nuts must be oriented as shown in the applicable figure for each location (Figures 3-8, 3-9, 3-10, and 3-11).

- d. Start the nuts on the upper forward and aft bolts. Rotate the wing trailing edge until alignment with the outline drawn on the fuselage is realized. After rotation is established, verify that the lower forward bolt is not binding in the bolt bore. If bolt binding is encountered, adjust the wing until the bolt moves freely.

- e. Tighten the upper forward and aft nuts.

CAUTION

Prior to torquing the lower aft nut, a slight gap may be evident between the fittings. This gap should not exceed 0.060 in width. No gap should remain after torquing the lower aft nut.

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f. Torque the wing nuts in the following order: Upper forward, upper aft, lower forward and lower aft. When a torque wrench adapter is used, the length of the adapter must be added to the length of the torque wrench and the proper torque value computed as detailed in Section 1. Coat the bolt threads that protrude through the nut with corrosion preventive compound (49, Consumable Materials Chart, Section 2).

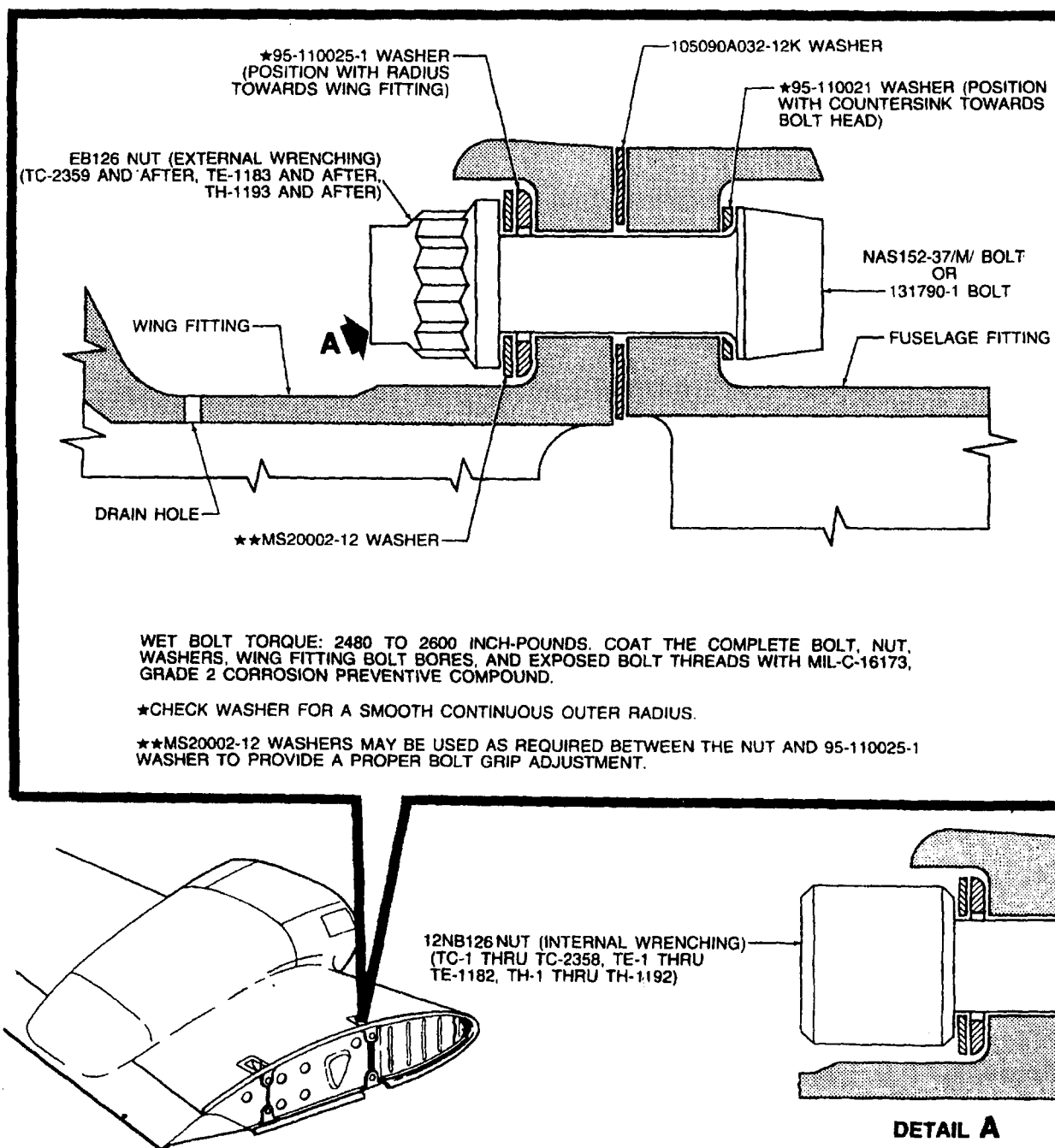
CAUTION

When torquing the wing bolts, assure that the wing bolt wrenches do not bottom out on the wing fittings. Such an occurrence could cause false torque readings and damage the fittings. After torquing the upper forward wing attach bolt, remove the holding force from the wing cradle prior to torquing the remaining three bolts.

- g. Install the engine and connect the engine controls. Install the clamps that secure the engine controls to the leading edge.
- h. Connect the plumbing between the wing root rib and the fuselage.
- i. Connect the plumbing and wiring in the wheel well. Connect the aileron cables and install the roll pins in the inboard aileron cable pulley brackets. Connect the aileron tab cables and aileron tab stops (LH only).
- j. Connect the landing gear actuator rod to the V-brace in the wheel well and install the inboard door actuating rod on the inboard door control horn.
- k. Connect the wiring to the electrical components located in each side of the upper nacelle. Install the clamps securing the wire bundles to the leading edge and connect the wiring to the terminals on the aft side of the firewall.
- l. Install the leading edge cover between the fuselage and nacelle. Install the lower aft nacelle fairing assembly.
- m. Connect the flap drive shafts at the motor and install the clamps that attach the shafts to the fuselage.
- n. Connect the uplock cable at the inboard floor idler arm in the cabin.
- o. Fill the brake reservoir with hydraulic fluid and bleed the brake system.
- p. Remove the stands from under the wing and tail and take the airplane off the jack.
- q. Install the wing bolt covers.
- r. Install the rear seat panel, side panels and front seats.
- s. Test fly the airplane to assure proper wing and stall warning vane adjustment.

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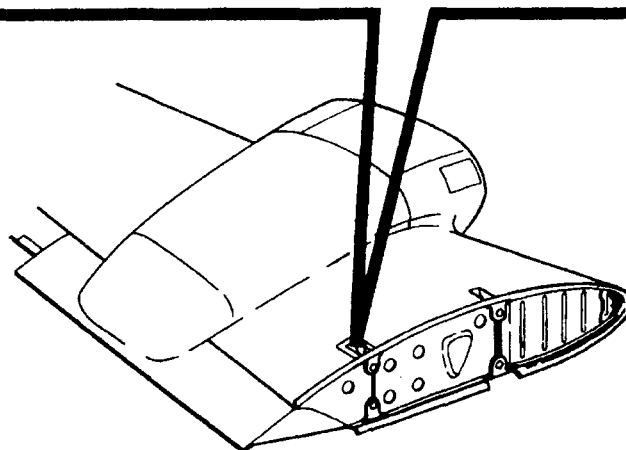
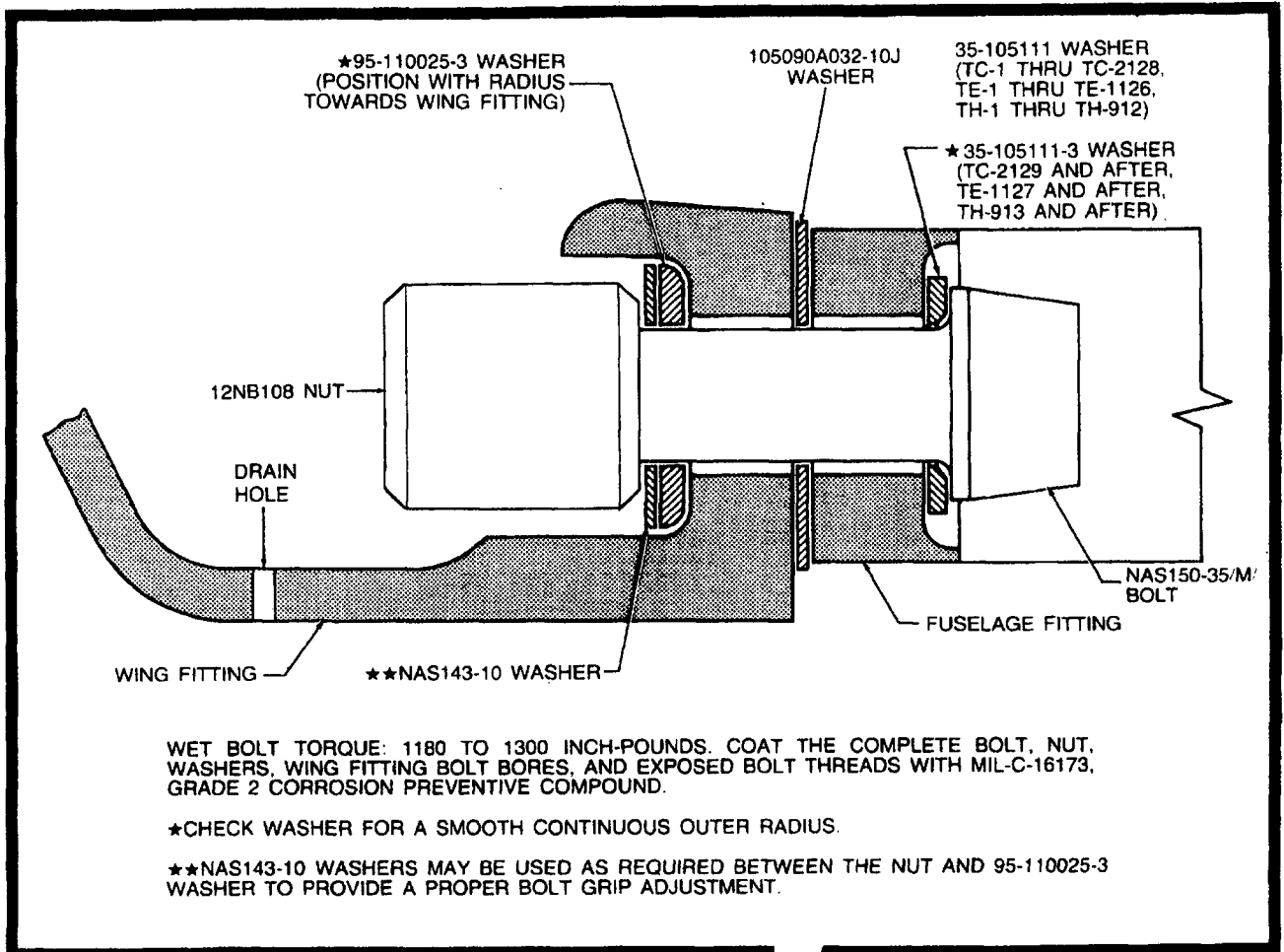


55-31-28

Upper Forward Wing Bolt Installation
Figure 3-8

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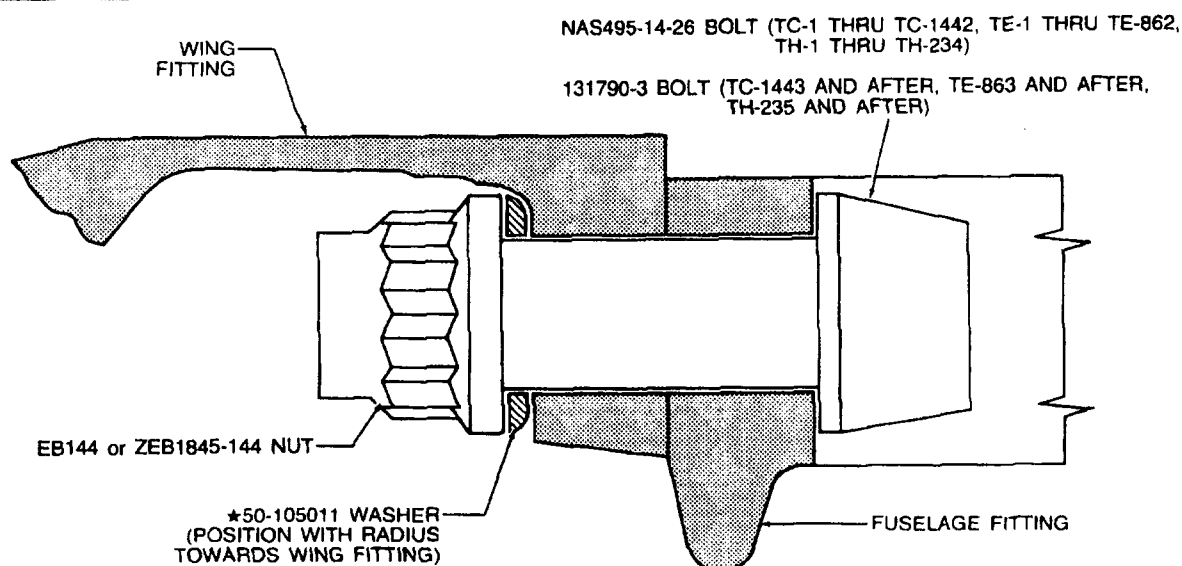
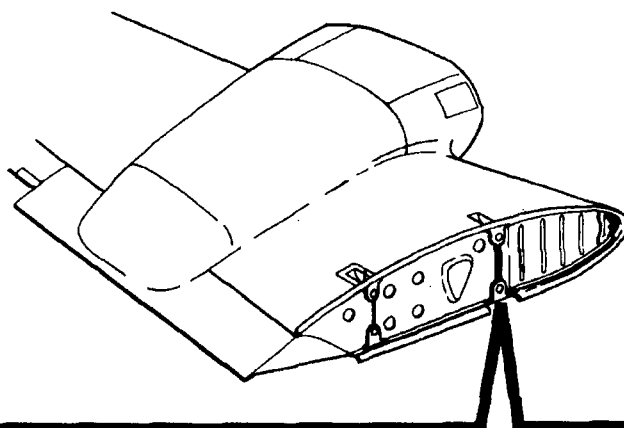


55-31-27

Upper Aft Wing Bolt Installation
Figure 3-9

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WET BOLT TORQUE: 2880 TO 3000 INCH-POUNDS. COAT THE COMPLETE BOLT, NUT, WASHER, WING FITTING BOLT BORES, AND EXPOSED THREADS WITH MIL-C-16173, GRADE 2 CORROSION PREVENTIVE COMPOUND.

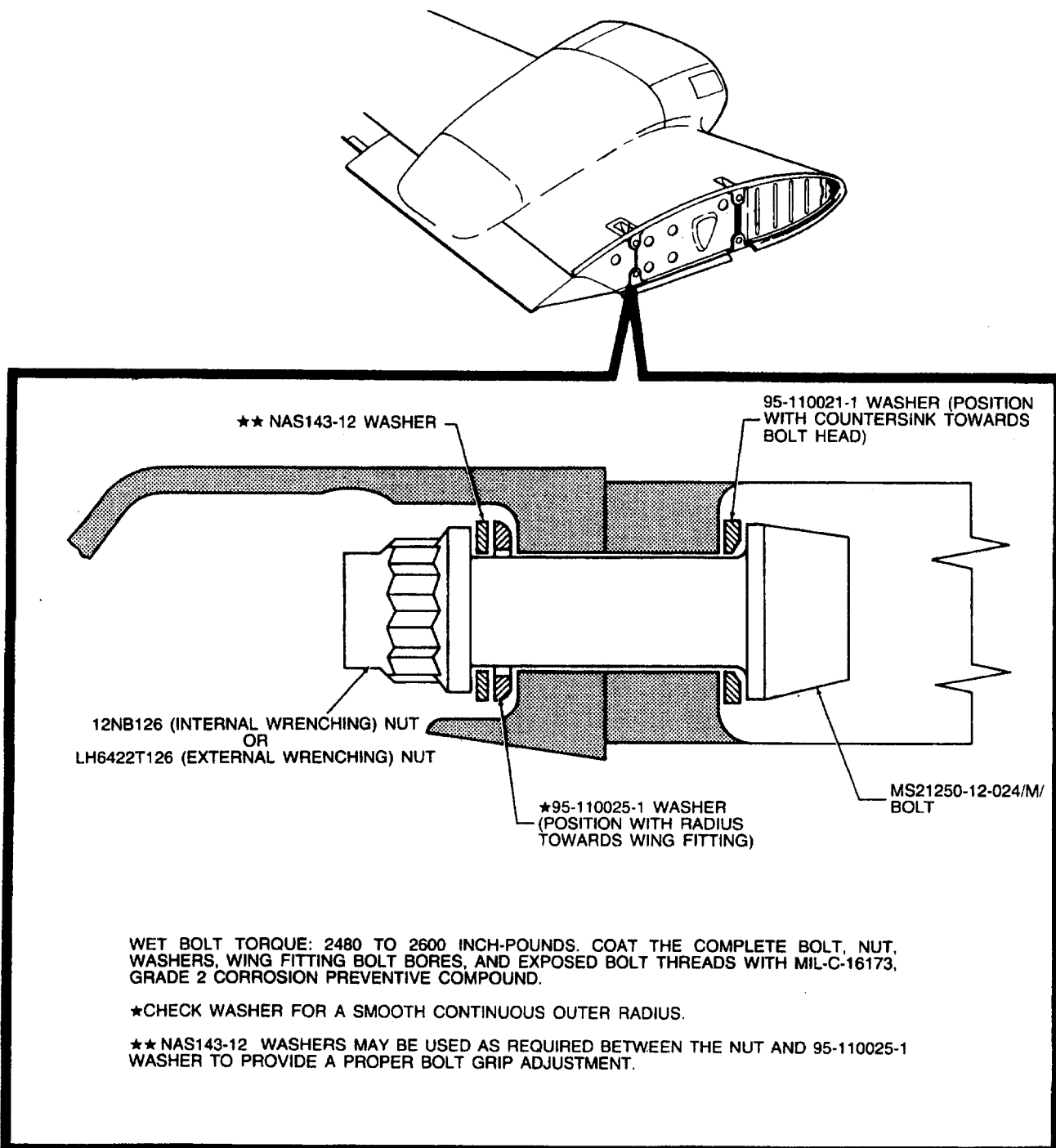
★CHECK WASHER FOR A SMOOTH CONTINUOUS OUTER RADIUS.

55-31-29

Lower Forward Wing Bolt Installation
Figure 3-10

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55-31-26

Lower Aft Wing Bolt Installation
Figure 3-11

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ADJUSTING THE WING

After installation of a wing, or repairs to it, flight tests may show one wing is chronically heavy. If so, alter the angle of attach of either or both wings to correct the difference, using the following procedure:

a. Raise the trailing edge of the light wing to decrease its lift or lower the trailing edge of the heavy wing to increase its lift as follows:

1. Using a grease pencil, outline the position of the wing on the fuselage.
2. Place the airplane on a three point jack and raise until the wheels are clear. See Section 2 for jacking instructions. Place a suitable cradle under the wing being adjusted and a wing stand under the opposite wing. A tail stand will also be required to assure stability.
3. Loosen the nuts on the lower wing attach bolts and remove the bolts and nuts from the upper wing attach fittings. Coat the bearing faces and bolt bores of the fittings, the complete bolt, washers, and nut with corrosion preventive compound (49, Consumable Materials Chart, Section 2). Install new soft aluminum washers between the upper wing attach fittings. Install the bolts, washers and nuts into the fittings. Raise or lower the trailing edge as required and torque the wing attach nuts in the following order: upper forward, upper aft, lower forward, and lower aft. There should be no gap between the fittings after the last nut is torqued. Torque each nut to the wet torque value shown in the appropriate illustration (Figure 3-8, 3-9, 3-10, and 3-11). Coat the exposed threads that protrude through the nuts with corrosion preventive compound (49, Consumable Materials Chart, Section 2).

NOTE

After torquing the upper forward wing attach nut, remove the holding force from the wing cradle and torque the three remaining nuts.

4. Remove the wing and tail stands, remove the airplane from the jack and test fly the airplane.

WING BOLT, NUT, AND FITTING INSPECTION

NOTE

Read the entire section before removing any bolts for inspection.

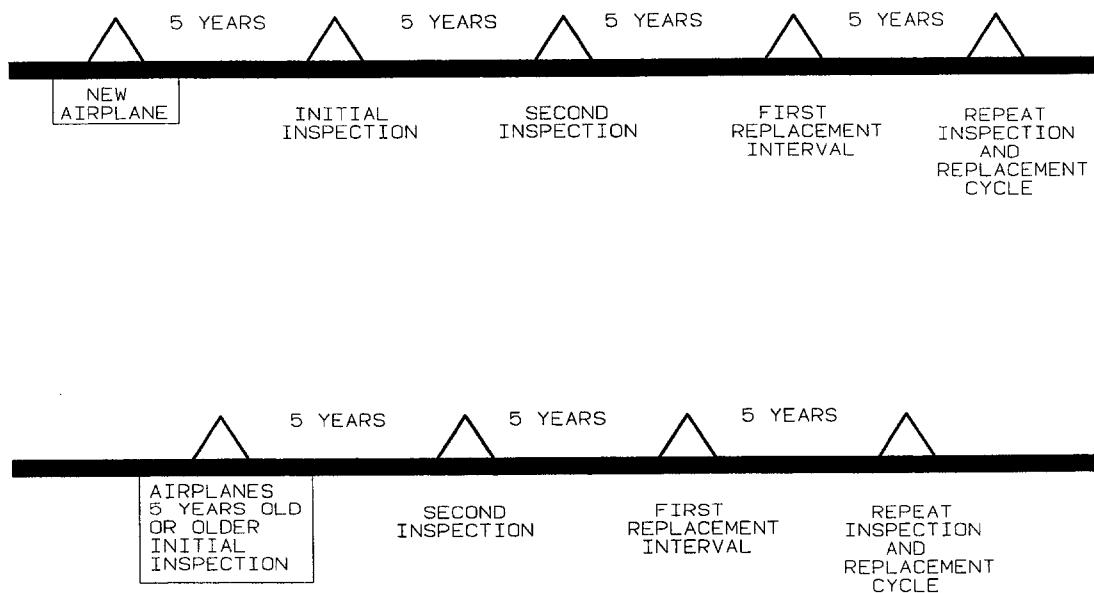
WARNING

The wing bolts installed in all airplanes five years old or older must be removed and inspected. If after inspection the bolts prove to be free of corrosion, cracks and mechanical damage, they may be installed for an additional five year period at which time another wing bolt inspection must be performed. Ten years after the initial inspection, all wing bolts must be replaced with new hardware. Render unserviceable all components removed in compliance with the Wing Bolt And Nut Inspection And Replacement Chart.

- a. Before removing any wing bolt, draw an outline of the wing position on the fuselage with a grease pencil to aid realignment, should it be necessary.

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NOTE

THE FIRST WING BOLT INSPECTION FOR AIRPLANES FIVE YEARS OLD OR OLDER MUST BE PERFORMED AT THE FIRST SCHEDULED INSPECTION FOLLOWING THE ISSUE DATE OF REVISION E7.

NOTE

AT EACH REPLACEMENT INTERVAL, ALL WING ATTACH HARDWARE (BOLTS, WASHERS, AND NUTS) MUST BE REPLACED.

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**WING BOLT AND NUT INSPECTION AND REPLACE CYCLE
CHART 1**

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CHART 2 WING BOLT WRENCHES AND TORQUE ADAPTERS

POSITION	BOLT PART NUMBER	WRENCH PART NUMBER	NUT PART NUMBER	NUT TORQUE ADAPTER
LOWER FORWARD	NAS495-14-26 TC-I thru TC-1442, TE-I thru TE-862, TH-1 thru TH-234. 131790-3 TC-1443 and after, TE-863 and after, TH-235 and after.	TS1222-3	EB144 or ZEB1845-144	50-590014
UPPER FORWARD	NAS152-37 /M/ or 131790-1	TS1222-3 (9/16 inch hex) TS1222-4 (1/2 inch hex)	12NB126 TC-I thru TC-2358, TE-I thru TE-1182, TH-I thru TH-1192. EB126 TC-2359 and after, TE-1183 and after, TH-1193 and after.	TS1171-2 TS1176-2
UPPER AFT	NAS150-35 /M/	TS1222-4	12B108	TS1171-1 or 50-590013
LOWER AFT	MS21250-12-024 / M/	TK1817-922-4	12NB126 or LH6422T-126	TS1171-2 or TS1176-10

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CAUTION

There should be no bolt binding during removal or installation. Do not drive or screw a bolt in or out of the fittings. If wing bolt binding is encountered, place the airplane on a three point jack and raise the airplane until the wheels are clear (see Section 2 for jacking instructions). Place a suitable cradle under each wing and a tail stand under the aft portion of the fuselage. Defuel the wing, loosen the remaining bolts and reposition the wing until the bolt moves freely through the fittings. Replace the soft aluminum washers between the upper fittings and torque the bolts as instructed under WING INSTALLATION. If bolt binding is not encountered and the wing is not shifted, replacement of the soft aluminum washers between the upper wing attach fittings is not required.

NOTE

Raytheon Aircraft Company supplies wing attach hardware (bolts and nuts) that have been given an additional magnetic particle inspection since manufacture. These components may be identified by the green dye on the head of the bolt and on the nut.

WARNING

Use only the components specified in the applicable illustrations. DO NOT INSTALL THE BLACK P/N H-20 NUTS, these nuts have been dry film lubricated with molybdenum disulfide. When MIL-C-16173 Grade II corrosion preventive compound is added to these nuts, the additional lubrication may cause improper preload in the bolt when it is tightened to the wet torque values specified in Figures 3-8, 3-9, 3-10, and 3-11.

- b. Starting at the lower forward wing attach point on each side, remove, inspect, and replace one bolt and nut set at a time until the complete set of eight bolts and nuts have been inspected.
- c. Using a nonmetallic brush, thoroughly clean the bolt washers and nut with solvent (18 or 19, Consumable Materials Chart, Section 2).

CAUTION

Assure that the 50-105011, 95-110025-1 and 95110025-3 washers shown in Figures 3-8, 3-9, 3-10, and 3-11 have a full complete radius with no sharp edges which could mark the fittings. Replace the washer if it has an incomplete radius or sharp edges.

- d. If the bolts and nuts do not exceed the life limit shown in Chart 1, visually inspect each bolt and nut with a 10-power or stronger magnifying glass; inspect for corrosion, cracks, and mechanical damage. The cadmium plating may display areas that appear rubbed, discolored or polished. These areas are usually the result of prevailing installation procedures and are of no significance. A bolt should not be rejected because of cadmium plating deterioration; however, any component (bolt, washer or nut) that is cracked, corroded or has mechanical damage must be replaced.
- e. Using the magnetic particle inspection process described in this chapter, check each bolt for circumferential crack indications and each nut for longitudinal crack indications. If the bolt and nut prove to be free of all damage (corrosion, cracks, crack indications, and mechanical damage), they may be reused after demagnetization and cleaning.

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- f. Clean the spar fitting bolt bores with solvent (18 or 19, Consumable Materials Chart, Section 2). Do not strip the epoxy paint from this area. Inspect the surface condition of each fitting; focus special attention on the washer seat and bolt bore area. If scoring, corrosion pitting, or washer impressions are discovered in this area, contact the Technical Support Department of Raytheon Aircraft Company. If the fitting is satisfactory, coat the bolt bore and bearing faces of the fitting with coating (54, Consumable Materials Chart, Section 2). Allow the coating to remain on the surface for approximately five minutes. When the five minutes have elapsed, wash the coated areas with water and blow dry (do not wipe dry). Paint the treated areas with zinc chromate primer (49, Consumable Materials Chart, Section 2).
- g. Coat the bearing faces and bolt bores of the fittings, the complete bolt, washers and nut with corrosion preventive compound (49, Consumable Materials Chart, Section 2).
- h. Install the bolt, washer or washers, and nut into the wing fittings.

CAUTION

Ensure that the wing bolt wrenches do not bottom out on the wing fittings. This could cause erroneous torque readings and damage to the fittings.

- i. Torque the nut to the wet torque value shown in the appropriate illustration (Figure 3-8, 3-9, 3-10, and 3-11). When a torque wrench adapter is used, the length of the adapter must be added to the length of the torque wrench and the proper torque value computed as detailed in Section 1.
- j. Coat the exposed threads that protrude through the nut with corrosion preventive compound (49, Consumable Materials Chart, Section 2).
- k. Check that the decal shown in Figure 3-12 is affixed to the appropriate locations on the airplane.
- l. At the first scheduled inspection after the wing bolts have been loosened and torqued or after initial installation, check each bolt for proper torque.
- m. Check the drain ports in the upper wing attach fittings to ensure that they are unobstructed.

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NOTICE

WING BOLTS ARE LUBRICATED
SEE MAINTENANCE MANUAL
FOR CORRECT TORQUE VALUES

WHEN THE CORROSION PREVENTIVE COMPOUND HAS BEEN APPLIED TO THE WING BOLTS,
AFFIX THE ABOVE DECAL TO THE FOLLOWING LOCATIONS:

1. ON THE SIDE OF THE FUSELAGE IMMEDIATELY ABOVE THE RH FORWARD AND AFT WING BOLT COVERS.
2. ON THE WING IMMEDIATELY FORWARD OF THE LH FORWARD AND AFT WING BOLT COVERS.
3. ON THE WING IMMEDIATELY FORWARD OF THE LOWER FORWARD WING BOLT COVERS ON BOTH SIDES.
4. ON THE WING IMMEDIATELY AFT OF THE LOWER AFT WING BOLT COVERS ON BOTH SIDES.

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Lubricated Bolt Identification Placard Location

Figure 3-12

MAGNETIC-PARTICLE INSPECTION

Magnetic-Particle Inspection is a method for locating surface and subsurface discontinuities in ferromagnetic materials (i.e. materials capable of being magnetized); consequently, non ferromagnetic materials (such as aluminum alloys, magnesium alloys, copper alloys, lead, titanium alloys, nickel base alloys and many stainless steel alloys) cannot be inspected by this method. Magnetic-Particle Inspection is based upon the principle that any discontinuities lying in a direction generally transverse to the direction of the magnetic field of the part magnetized for the test will cause a leakage field to be formed at and above the surface of the part. The presence of the leakage field denoting the discontinuity is detected by the use of finely divided ferromagnetic particles over the surface of the part. Some of the particles are magnetically gathered and held by the leakage field to form an outline indicating the location, size, shape and extent of the discontinuity. In general, magnetic particle inspection utilizes a variety of types of equipment for magnetization, as well as several methods for application of ferromagnetic particles to the test part. Additionally, the ferromagnetic particles are available in a selection of colors (including fluorescent) and particle shapes. Magnetic particle inspections required by this manual can best be accomplished by utilizing the wet continuous method on the standard wet horizontal type equipment, with either visible or fluorescent magnetic particles suspended in a petroleum base vehicle (normally kerosene). Since magnetic particle indications are best obtained when the discontinuity lies in a direction transverse to the magnetic field, the following procedures are recommended for optimum detection of discontinuities in both bolts and nuts.

WARNING

Improper operation of the magnetic particle inspection because of faulty equipment or untrained operators can jeopardize the airworthiness of parts being inspected. Minute electrical arc burns caused during inspection by improper operation of the test equipment can result in eventual failure of the part.

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Bolts: Inspection of a bolt is accomplished by longitudinal magnetization in a multi turn low-fill factor coil (i.e. the inner diameter of the coil greatly exceeds the bolt diameter). For proper magnetization the bolt is positioned close to the coil inside wall with the bolt length perpendicular to the winding direction. The magnetic particle suspension is flowed on the bolt and the appropriate current is applied to the winding direction. The magnetic particle suspension is flowed on the bolt and the appropriate current is applied to achieve adequate field strength. Using the described procedure, laboratory testing has indicated that the ampere turn values listed in Chart 3 provide for optimum detection of discontinuities perpendicular to the bolt axis.

**CHART 3
MAGNETIC-PARTICLE INSPECTION (BOLTS)**

BOLT DIAMETER	TOTAL BOLT LENGTH INCLUD- ING HEAD TO NEAREST 1/4 INCH	AMPERE TURNS
5/8 INCH	2 1/2 INCH	7,900
5/8 INCH	2 3/4 INCH	7,100
5/8 INCH	3 INCH	6,600
3/4 INCH	3 INCH	7,900
3/4 INCH	3 1/4 INCH	7,400
3/4 INCH	3 1/2 INCH	6,700
3/4 INCH	3 3/4 INCH	6,300
7/8 INCH	3 1/2 INCH	7,900
7/8 INCH	3 3/4 INCH	7,400
7/8 INCH	4 INCH	6,900
7/8 INCH	5 INCH	5,500
1 INCH	5 INCH	6,300

*Amperage requirement is the ampere turns value divided by the number of turns on the coil. For example: A 1-inch diameter x 5-inch long bolt tested on a 5-turn coil would require 6,300/5, or 1,260 amps.

CHART 4 MAGNETIC-PARTICLE INSPECTION (NUTS)

NUT SIZE	CENTRAL CONDUCTOR SIZE	AMPERAGE
5/8 INCH	1/2 INCH	500 AMPS
3/4 INCH	5/8 INCH	600 AMPS
7/8 INCH	3/4 INCH	700 AMPS
1 INCH	7/8 INCH	800 AMPS

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Nuts: Inspection of a nut is accomplished by circular magnetization on a central conductor (usually a copper rod) the approximate size of the nut inside diameter. For proper magnetization, the central conductor bar is inserted through the nut and the bar is positioned between the heads of the wet horizontal equipment. The magnetic particle suspension is flowed on the nut and the appropriate current is applied through the central conductor to achieve adequate field strength. Using the described procedure, laboratory testing has indicated that the amperage values listed in Chart 4 provide for optimum detection of discontinuities parallel to the nut axis.

After magnetic particle inspection, the parts must be carefully demagnetized and cleaned of the ferromagnetic particles. Examine parts for any possible evidence of electric arc burn that may have occurred during the inspection.

WING MAIN SPAR CAP VISUAL INSPECTION **FIGURE 3-13**

The wing spar cap must be inspected for corrosion annually.

WARNING

All areas of the wing main spar caps, from the wing attach fitting to the outboard end of the spar cap, must be inspected.

Beech Kit No. 58-4002-1S contains the parts and instructions necessary to install a new LH and RH spar on the model 55 and 58 series wing panels. The kit does not contain the spars which must be ordered separately.

NOTE

Special emphasis should be placed on airplanes that have been operated or stored for extended periods (5 years or longer) in geographical locations where atmospheric conditions are highly conducive to corrosion.

Inspection of the upper and lower spar caps should be accomplished in the following manner:

- a. Examine the forward and aft sides of the spar cap where it meets the skin. If a whitish, saltlike, nonmetallic substance is noted, a thorough inspection must be performed to determine if corrosion has occurred. Wax or paint trapped between the edge of the skin and the exposed section of the spar cap should not be misinterpreted as corrosion.

NOTE

To gain access to the upper spar cap in the nacelle area, remove the shaded panels shown in Figure 3-14.

- b. Wash all exposed areas of the upper and lower spar caps.
- c. Visually inspect all exposed areas of the upper and lower spar caps for irregularities, such as paint blisters, raised or uneven areas, and cracks. The exposed areas of the spar caps are extruded flat and irregularities could be an indication of corrosion. Thoroughly investigate all irregular areas to determine if any damage has occurred.

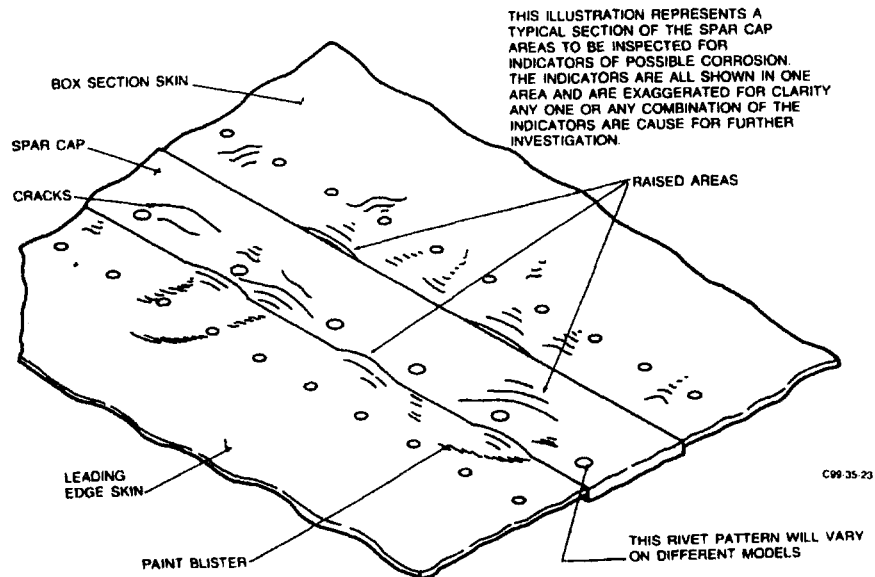
NOTE

Uneven or raised areas on the spar caps may be detected by sliding the fingers over the surface, by moving a straight edge over the surface or by sighting down the length of the spar cap surface.

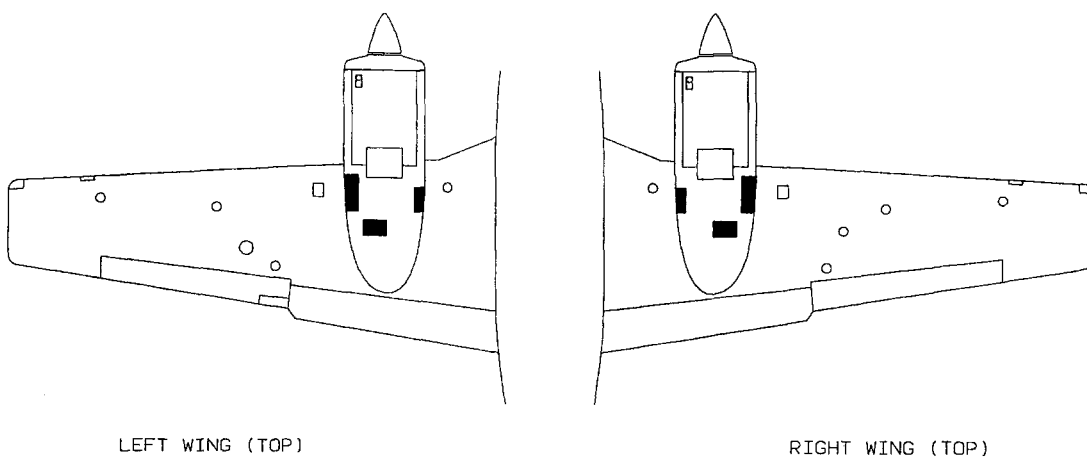
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If unusual conditions are encountered that cannot be resolved locally, contact the Technical Support Department at Raytheon Aircraft Company for evaluation and determination of corrective action that may be required.



Visual Spar Cap Inspection
Figure 3-13



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Upper Spar Access Panel
Figure 3-14

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FUSELAGE

FORWARD CARRY-THROUGH SPAR COVER REMOVAL

- a. Remove the pilot and copilot seats.
- b. Remove emergency landing gear crank cover from spar cover.
- c. On aft side of spar cover, pull back carpet and remove screws from spar cover.
- d. On forward side of spar cover, pull back carpet and remove screws from spar cover.
- e. Remove RH access cover.
- f. From inside of RH access cover, loosen clamp and remove air duct from plenum and grill assembly.
- g. Lift spar cover and remove from forward spar.

FORWARD CARRY-THROUGH SPAR COVER INSTALLATION

CAUTION

Improper installation of the forward carry-through spar cover may interfere with the landing gear emergency hand crank operation. Ensure the landing gear hand crank will engage and rotate without interference with the spar cover.

- a. Center spar cover on the forward spar.
- b. From inside of RH access cover, install air duct on plenum and grill assembly and tighten clamp.
- c. Install RH access cover assembly.
- d. On forward side of spar cover, install screws to secure forward end of spar cover and install carpet.
- e. On aft side of spar cover, install screws to secure aft end of spar cover and install carpet.
- f. Check the emergency landing gear hand crank to ensure handle will engage and rotate without interference with the forward carry-through spar cover.
- g. Install emergency landing gear crank cover to spar cover.
- h. Install the pilot and copilot seats.

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WING FORWARD SPAR CARRY-THROUGH STRUCTURE INSPECTION WITHOUT REPAIR KIT

This procedure provides inspection and repair information relating to the forward wing spar structure at the forward and aft frames.

NOTE

The areas identified in Figure 3-15 should be inspected for cracking at the intervals specified for non repaired structures by Chart 5 using the following inspection procedure:

- a. Remove the pilot's and copilot's seats and the carry-through cover to obtain access to the front spar carry-through structure.
- b. Thoroughly clean the forward and aft frames (webs) of the front spar carry-through structure in the areas shown in Figure 3-15 with solvent (18, Consumable Materials Chart, Section 2).
- c. Perform a visual inspection of the cleaned areas for evidence of cracks.
- d. Perform a fluorescent or dye penetrant inspection of the cleaned area per MIL-STD-6866 and inspect for evidence of cracks.
- e. If cracks are discovered, determine the crack size and method of repair as outlined in the WING FORWARD SPAR CARRY-THROUGH STRUCTURE REPAIR/INSPECTION procedure.
- f. If no cracks are noted, install the carry-through cover and the pilot's and copilot's seats.

WING FORWARD SPAR CARRY-THROUGH STRUCTURE INSPECTION WITH REPAIR KIT

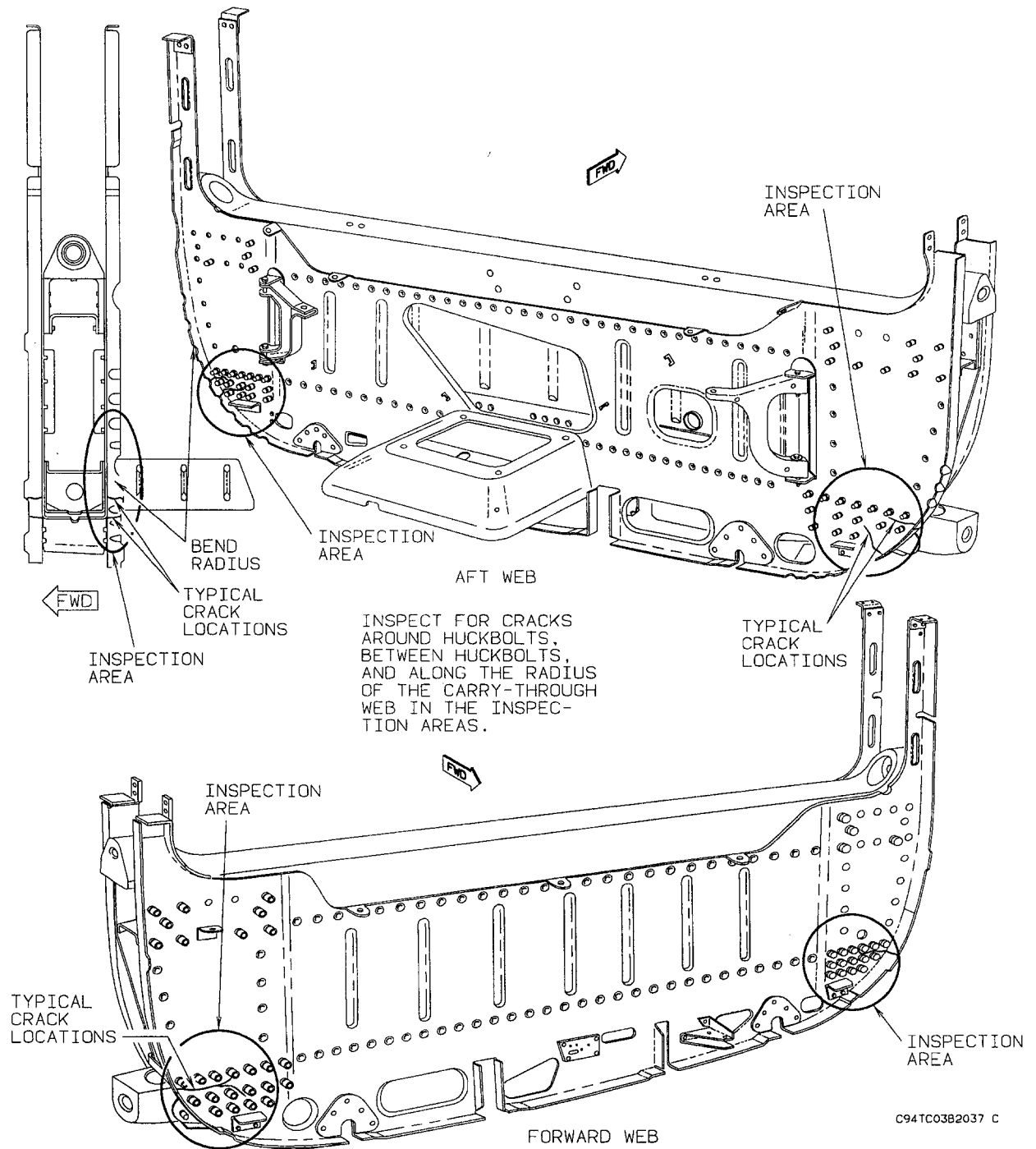
NOTE

The areas identified in Figure 3-15 should be inspected for cracking at the intervals specified for repaired structure by Chart 6 using the following inspection procedure:

- a. Remove the pilot's and copilot's seats and the carry-through cover to obtain access to the front spar carry-through structure.
- b. Thoroughly clean the forward and aft frames (webs and reinforcing doubler) of the front spar carry-through structure in the areas shown in Figure 3-15 with solvent (18, Consumable Materials Chart, Section 2).
- c. Perform a visual inspection of the cleaned areas for evidence of cracks.
- d. Perform a fluorescent or dye penetrant inspection of the cleaned area per MIL-STD-6866 and inspect for evidence of cracks.
- e. If cracks are discovered in the doubler or the existing web face, the crack has progressed beyond the doubler profile; contact the Technical Support Department at Raytheon Aircraft Company for further instructions.
- f. If no cracks are noted, install the carry-through cover and the pilot's and copilot's seats.

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Wing Forward Spar Carry-Through Structure Inspection
Figure 3-15

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WING FORWARD SPAR CARRY-THROUGH STRUCTURE REPAIR/INSPECTION FIGURE 3-15

NOTE

The extent of repair/inspection is limited to cracking in the radius of the web flange and cracks in the web face around the fasteners in the lower front spar cap.

BEND RADIUS CRACK

The following procedure should be performed to repair/inspect cracks in the bend radius:

- a. A crack up to 2.25 inches in length must be stop drilled with a #30 drill bit at the crack ends, then inspected for progression at each annual inspection or every 200 hours, whichever occurs first. One stop-drilled crack per left side and one stop-drilled crack per right side of the bend radius is permissible, if neither one exceeds 2.25 inches.

CAUTION

Caution must be used during the stop drilling operation. Do not drill into the spar cap, skin or any other structure. A thin stainless steel sheet may be used to prevent damaging adjacent structure.

- b. A crack between 2.25 inches and 4.0 inches in length must be stop-drilled with a #30 drill bit at the crack ends. The area must be repaired within the next 100 flight hours with the applicable kit listed in Chart 7.
- c. A crack exceeding 4.0 inches in length must be repaired prior to further flight with the applicable kit listed in Chart 7.

WEB FACE CRACK

The following procedure should be performed to repair/inspect cracks in the web face around the huck-bolt fasteners:

- a. A crack less than 1.0 inch in length or one crack between two fasteners does not require immediate repair, but shall be inspected for progression at each annual inspection or every 200 hours, whichever occurs first. A crack emanating from one fastener in two directions is considered to be one crack.

CAUTION

Do not stop drill, due to the possibility of damaging structure behind web face.

One crack per left side and one crack per right side of the web face is allowed, if neither one exceeds 1.0 inch.

- b. A crack more than 1.0 inch in length or crack extending less than 0.5 inch beyond the two fasteners on either end shall be repaired within the next 25 flight hours with the applicable kit listed in Chart 7.
- c. A crack passing through two fasteners and extending beyond for more than 0.5 inch on either end shall be repaired prior to further flight with the applicable kit listed in Chart 7.

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COMBINATION BEND RADIUS AND WEB FACE CRACKS

A combination of BEND RADIUS and WEB FACE CRACKS are acceptable without repair. However, if there are any cracks in both the forward and the aft web face or in the bend radius on the same side of the airplane, or if any cracks more than 1.0 inch long are found, they must be repaired prior to further flight with the applicable kit listed in Chart 7.

- a. If a fuselage skin crack is discovered around the opening for the lower forward carry-through fitting, an external skin doubler may be required. Contact the Technical Support Department at Raytheon Aircraft Company for further instructions.
- b. Repair all cracks per the appropriate kit listed in Chart 7 if the limitations in the BEND RADIUS CRACK and WEB FACE CRACK procedures are exceeded.
- c. Install the carry-through cover and the pilot's and copilot's seats.

CHART 5
INSPECTION PROGRAM FOR NON REPAIRED STRUCTURES

AIRCRAFT SERIAL NO.	INITIAL INSPECTION	FREQUENCY OF INSPECTION
TC-1 THRU TC-2456 (EXCEPT TC-1471)	1,500 HOURS	500 HOURS
TE-1 THRU TE-1201	1,500 HOURS	500 HOURS
TH-1 THRU TH-1475	1,500 HOURS	500 HOURS
TH-1476 AND AFTER	3,000 HOURS	1,000 HOURS

CHART 6
INSPECTION PROGRAM FOR REPAIRED STRUCTURE

AIRCRAFT SERIAL NO.	INITIAL INSPECTION	FREQUENCY OF INSPECTION
TC-1 THRU TC-2456 (EXCEPT TC-1471)	1,500 HOURS	1,500 HOURS
TE-1 THRU TE-1201	1,500 HOURS	1,500 HOURS
TH-1 THRU TH-1475	1,500 HOURS	1,500 HOURS
TH-1476 AND AFTER	3,000 HOURS	1,500 HOURS

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CHART 7
FRONT SPAR CARRY-THROUGH STRUCTURE REPAIR KITS

AIRCRAFT SERIAL NO.	PART NUMBER	KIT DESCRIPTION	QUANTITY PER AIRCRAFT
MODEL 55, SERIALS TC-1 THRU TC-190; MODEL A55, SERIALS TC-191 THRU TC-501 (EXCEPT TC-350 AND TC-371); MODEL B55, SERIALS TC-371, TC-502 AND AFTER; MODEL C55, SERIALS TE-1 THRU TE-451; MODEL D55, SERIALS TE-452 THRU TE-767; MODEL E55, SERIALS TE-768 AND AFTER	58-4008-1S	FRONT SPAR CARRY-THROUGH STRUCTURE REINFORCEMENT (FORWARD FRAME)	1 REQUIRED
MODEL 55, SERIALS TC-1 THRU TC-190; MODEL A55, SERIALS TC-191 THRU TC-501 (EXCEPT TC-350 AND TC-371); MODEL B55, SERIALS TC-371, TC-502 AND AFTER; MODEL C55, SERIALS TE-1 THRU TE-451; MODEL D55, SERIALS TE-452 THRU TE-767; MODEL E55, SERIALS TE-768 AND AFTER	58-4008-3S	FRONT SPAR CARRY-THROUGH STRUCTURE REINFORCEMENT (AFT FRAME)	1 REQUIRED
MODEL 58, SERIALS TH-1 THRU TH-303, EXCEPT TH-255	58-4008-5S	FRONT SPAR CARRY-THROUGH STRUCTURE REINFORCEMENT (FORWARD FRAME)	1 REQUIRED
MODEL 58, SERIALS TH-1 THRU TH-303, EXCEPT TH-255	58-4008-7S	FRONT SPAR CARRY-THROUGH STRUCTURE REINFORCEMENT (AFT FRAME)	1 REQUIRED
MODEL 58, SERIALS TH-255, TH-304 AND AFTER	58-4008-9S	FRONT SPAR CARRY-THROUGH STRUCTURE REINFORCEMENT (FORWARD FRAME)	1 REQUIRED
MODEL 58, SERIALS TH-255, TH-304 AND AFTER	58-4008-11S	FRONT SPAR CARRY-THROUGH STRUCTURE REINFORCEMENT (AFT FRAME)	1 REQUIRED

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SEATS

FRONT SEAT REMOVAL

- a. Remove the seat stop or stops at the aft end of the seat tracks.
- b. Release the fore and aft adjustment lock.
- c. Move the seat aft until it clears the mounting tracks.

FRONT SEAT INSTALLATION

- a. Align the seat guide with the seat track. If shims were installed in the front center seat guide, they should be installed in the same location as that from which they were removed.
- b. Pull up on the fore and aft adjustment lever and slide the seat onto the seat track. Release the adjustment lever and ensure that the seat is securely in place.
- c. If the lock pin does not align with the holes in the center seat track, it will be necessary to reposition the seat guides with shims. Use shims as needed to center the locking pin with the holes in the seat track.

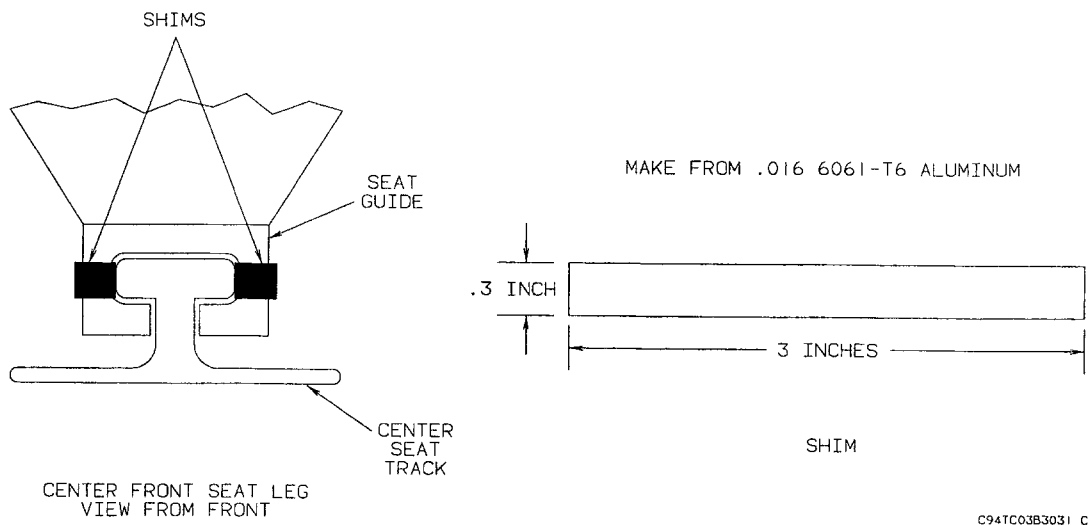
NOTE

Shims (three inches long X 0.3 inch wide) may be fabricated from 0.016 6061 T6 sheet aluminum as shown in Figure 3-16. The shims are placed inside the seat guide and formed around the guide as shown in Figure 3-16.

- d. Pull up on the fore and aft adjustment lever and slide the seat through the full travel of seat adjustment. Ensure that the locking pin has positive engagement in all holes of the seat track.
- e. Install the seat stops at the aft end of the seat tracks.

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Seat Track Shim Installation
Figure 3-16

CENTER SEAT REMOVAL

- Release the fore and aft adjustment lock and move the seat forward against the stop.
- Remove the seat stop from the aft end of the center track.
- Release the fore and aft adjustment and move the seat aft until it clears the mounting tracks.

NOTE

If the rear facing seats are to be changed to forward facing seats on aircraft serials TH-733 to TH-764, the two MS24694S51 screws that secure the center seat center tracks and the rear spar carry-through structure are to be replaced with NAS1203-5 screws. The MS24694S51 screws are to be discarded. The center seat center track screws only need to be replaced one time unless an inspection reveals a broken screw or stripped threads. An entry is to be made in the Maintenance Log that the CENTER SEAT CENTER TRACK SCREWS HAVE BEEN REPLACED.

CENTER SEAT INSTALLATION

- Place the seat in position and align the seat guides with the mounting track.
- Release the fore and aft adjustment lock and slide the seat onto the mounting track. Engage the fore and aft lock and make certain the seat is securely in place.
- Replace the seat stop on the aft end of the center track.

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FIFTH AND SIXTH SEAT REMOVAL

- a. Raise the seat bottom up to release the tension on the seat back support rod.
- b. Remove the seat back support rod from the mounting brackets and fold the seat back forward.
- c. Remove the attaching bolts and seat.

FIFTH AND SIXTH SEAT INSTALLATION

- a. Position the seat and secure in place with attaching bolts.
- b. Raise the seat bottom and insert the seat back support rod into the mounting brackets.

FIFTH AND SIXTH SEAT STOWAGE

The fifth and sixth seat may be folded either in a horizontal or vertical position to provide additional cargo space. This may be accomplished as follows:

VERTICAL POSITION

- a. Fold the seat bottom up to a vertical position.
- b. Fold the seat support into the retract position.
- c. Position the seat against the rear bulkhead in a vertical position.

HORIZONTAL POSITION

- a. Fold the seat support into the retract position and position the seat bottom on the floorboard.
- b. Fold the seat back forward and position it on top of the seat bottom.

SEAT-BACK ADJUSTMENT

The device used to control the pilot's seat-back adjustment is a three-position mechanical stop. The copilot's and passenger's seat-back adjustments are controlled by either a three-position mechanical stop or a Roton lock. On serials TC-2258 and after, TE-1164 and after, TH-1027, TH-1062, TH-1080 and after, the Roton locks were replaced with Hydroloks. On airplanes equipped with vertically adjusting copilot's seats, the copilot's seat-back adjustment is controlled by the three-position mechanical stop. The lever for actuating the Roton lock or Hydrolok adjusters is on the side of the seat toward the front, while the lever for the mechanical adjusters is at the base of the seat back. Roton lock and Hydrolok servicing information may be found in Section 2.

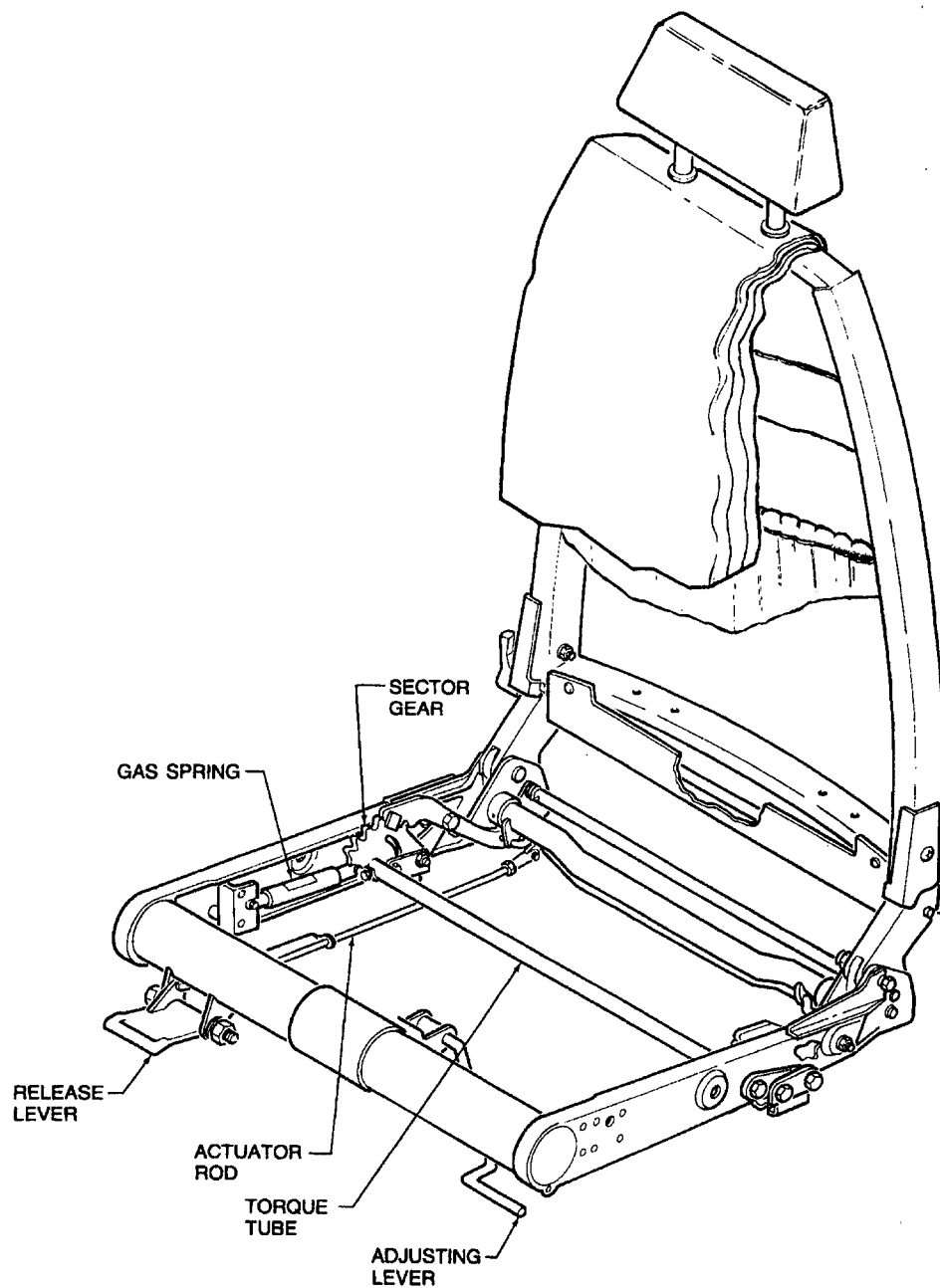
VERTICAL ADJUSTING SEATS

FIGURE 3-17

Airplanes with serials TH-1389, TH-1396 and after are equipped with vertically adjusting seats for the pilot (copilot's seat is optional). The seat is raised and lowered by a gas spring mounted underneath the seat. The seat is adjustable through a range of 1.3 inches for improved visibility and crew comfort. The raising and lowering action is initiated by pulling up on the release lever located on the front RH side of the seat. When the release lever is raised, two ratchet-type cam lots are disengaged from sector gears attached to the gas springs mounted on each side underneath the seat, allowing the gas spring's piston rod to extend retract, raise or lower the seat. To raise the seat, the pilot's weight must be shifted forward. To lower the seat, the weight must be shifted to the rear to overcome the gas spring tension.

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36-313-51

**Vertically Adjusting Seat
Figure 3-17**

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GLARE SHIELD REMOVAL (ALL TC, TE, AND TH SERIALS EXCEPT TH-1389, TH-1396 AND AFTER)

- a. Remove the attaching screws on both sides of the glare shield.
- b. Pull the glare shield away from the slide-on fasteners located in three places at the base of the windshield.
- c. Pull up gently on the glare shield.
- d. Disconnect the wiring for the compass and floodlights at the connectors.
- e. Disconnect the glare shield air conditioning duct from the main duct at the clamp.
- f. Disconnect the defroster duct tube from the main defroster at the clamp.
- g. Remove the glare shield from the airplane.

GLARE SHIELD INSTALLATION (ALL TC, TE, AND TH SERIALS EXCEPT TH-1389, TH-1396 AND AFTER)

- a. Place the glare shield in the airplane and connect the electrical wiring for the compass and the floodlights at the connectors.
- b. Connect the defroster duct and the air conditioning ducts and secure them with clamps.
- c. Place the glare shield down in position making sure that it fits properly over the fasteners at the base of the windshield.
- d. Secure the glare shield on both sides with the attach screws.

GLARE SHIELD REMOVAL (TH-1389, TH-1396 AND AFTER)

At serials TH-1389, TH-1396 and after, the glare shield is a two-part assembly. The forward section must be removed before the aft section is removed. The words "forward" and "aft" are used to indicate position in relation to the airplane. Remove the glare shield as follows:

- a. Remove the five screws which pass through the forward section of the glare shield into the instrument panel.
- b. Lift out the forward section of the glare shield.
- c. Remove the three screws which pass through the aft section of the glare shield into the instrument panel.
- d. Remove the screws on each side of the glare shield.
- e. Locate and disconnect the compass light, annunciator lights, and flood light connector.
- f. Remove the aft section of the glare shield.

GLARE SHIELD INSTALLATION (TH-1389, TH-1396 AND AFTER)

- a. Place the aft section of the glare shield into the proper location.
- b. Connect the electrical connector.
- c. Install the screw on each side of the glare shield.
- d. Install the three screws which pass through the glare shield into the instrument panel.

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- e. Place the forward section of the glare shield into its proper location.
- f. Install the five screws which pass through the glare shield into the instrument panel.

HEADLINER REMOVAL (TH-1027, TH-1062, TH-1067, TH-1080 AND AFTER)

- a. Remove the seats from the flight compartment as outlined in FRONT SEAT REMOVAL in this chapter.
- b. Remove the webbing and hat shelf from the aft baggage compartment and then remove the clips retaining the webbing and hat shelf.
- c. Remove the snap-on cover over the rear shoulder harness inertial reel and remove the mounting bolt that attaches the inertial reel to the airplane. Pull the upholstery inserts from the molding on the RH and LH side of the airplane and remove the molding attach screws.
- d. Remove the screws attaching the aft garment hanger to the airplane and remove the hanger.
- e. Remove the lower aft bulkhead closure. The closure is held in place by velcro, fasteners.
- f. Remove the tape (42, Consumable Materials Chart, Section 2) (working through the aft bulkhead closure) at the seam where the overhead air ducts join.
- g. Remove the glare shield as outlined in this chapter under GLARE SHIELD REMOVAL.
- h. Remove the attach screws securing the molding around the windshield and remove the molding.
- i. Remove the attach screws securing the trim above the flight compartment door and remove the trim.
- j. Remove the coat hooks on the upper window molding, then pull the upholstery inserts from the molding. The inserts are located between and below the passenger compartment windows.
- k. Pull the snap-on covers from the pilot's and copilot's shoulder harness inertial reels and remove the mounting bolt that attaches the reel to the airplane. Remove the reel from the airplane.
- l. Remove the attach screws from the molding around the windows on the RH and LH side of the airplane. Remove the molding from the airplane.
- m. Remove the screws attaching the overhead forward console to the headliner and pull down on the console while pulling the console forward to disconnect the console air duct and the main air duct.
- n. Disconnect the wiring from the console and tag and identify the wiring.
- o. Remove the console from the airplane.
- p. Gently pull down on the headliner to disconnect it from the velcro fasteners. The velcro tape is spaced evenly across the length of the headliner.
- q. Disconnect the electrical wiring to the headliner lights. A connector is located above the pilot's window.
- r. Remove the headliner through the flight compartment door or the aft utility door.

HEADLINER INSTALLATION (TH-1027, TH-1062, TH-1067, TH-1080 AND AFTER)

- a. Place the headliner in the airplane and connect the electrical wiring.
- b. Place the headliner in position (ensuring that the aft headliner air duct and the aft main air duct fit properly) and press on the areas where the velcro tape is located.

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- c. Connect the electrical wiring to the forward overhead console at the connector.
- d. Place the forward overhead console into position, making sure that the air ducts slide correctly into position. Seal the air duct seam with sealant (43, Consumable Materials Chart, Section 2).
- e. Secure the console in place with the attach screws.
- f. Replace the molding around the windows on the RH and LH side of the airplane and secure with the attach screws.
- g. Replace the upholstery inserts (located between the passenger compartment windows, below the passenger compartment windows, and in the aft baggage compartment).
- h. Replace the forward and aft coat hooks and secure with attach screws.
- i. Replace the trim above the flight compartment door and secure with the attach screws.
- j. Install the molding around the windshield and secure with the attach screws.
- k. Install the glare shield as outlined in GLARE SHIELD INSTALLATION in this chapter.
- l. Wrap tape (42, Consumable Materials Chart, Section 2) (working through the aft bulkhead closure) around the seam where the aft overhead air ducts join.
- m. Install the aft bulkhead closure that is held in place with velcro fasteners.
- n. Install the aft garment hanger in the airplane and secure with attach screws.
- o. Install the RH and LH rear shoulder harness inertial reels and secure with attach bolts, then replace the snapping covers over the inertial reels.
- p. Install the mounting clips for the baggage webbing and hat shelf, then mount the hat shelf and baggage webbing.
- q. Install the RH and LH forward shoulder harness inertial reels and secure them with the attach bolts, then replace the snapping covers over the inertial reels.
- r. Install the flight compartment seats as outlined in FRONT SEAT INSTALLATION in this chapter.

CABIN DOOR

CABIN DOOR REMOVAL AND INSTALLATION FIGURES 3-18 AND 3-19

- a. Remove the inboard door handle, ashtray assembly and the arm rest.

NOTE

The attaching screws for the ashtray assembly are located behind the ash tray insert, and attaching screws for the arm rest are located behind two car plugs in the inboard side of the arm rest.

- b. Remove the attaching screws from the center upholstery panel. Lift the panel up and out.
- c. Remove the attaching screws and release the snaps on the lower upholstery panel.
- d. Remove the lower upholstery panel.

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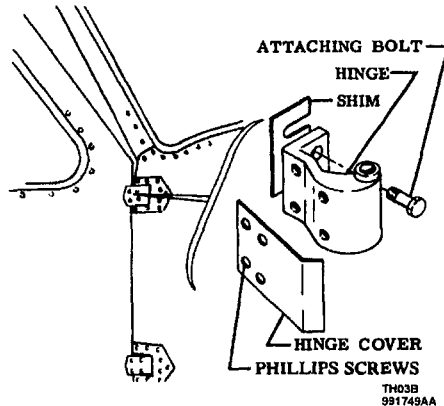
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- e. Remove the screws from each hinge cover (see Figure 3-18).
- f. With the door open, insert a screwdriver between the doorstop and the bottom of the door. Slowly close the door while applying a downward pressure on the doorstop until the stop is released from the door (see Figure 3-19).
- g. Remove the attaching bolts from each door hinge (see Figure 3-18).

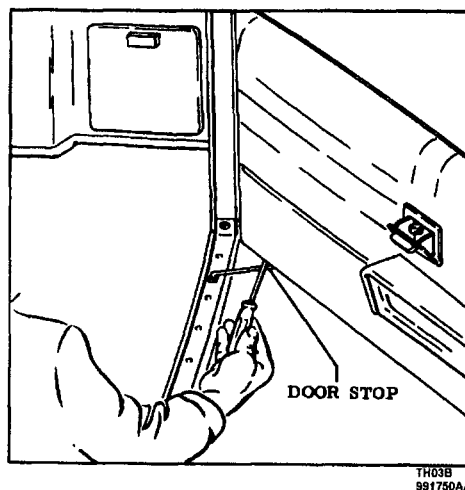
NOTE

Shims have been installed between the hinges and the door to obtain a proper fit. The shims should be retained and the same number of shims installed under each hinge when the door is installed.

- h. Installation is accomplished in the reverse of the removal procedure.



Cabin Door Hinge
Figure 3-18



Cabin Door Stop
Figure 3-19

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CABIN DOOR LATCHING ADJUSTMENT

If any of the following conditions exist, check and adjust the cabin door latching mechanism:

- The door is difficult to close.
 - There is excessive wind noise around the door.
 - The door is not airtight or watertight.
 - The door is opening in flight.
 - The door has recently been removed or repaired.
- a. Ensure that the door's internal latch mechanism is not binding and/or preventing proper door closing as follows:
1. With the door in the open position, operate the latching mechanism several times to ensure that the internal mechanism is operating smoothly and properly.
 2. With the door still in the open position, rotate the inside door handle counterclockwise as far as possible. Mark the inside handle escutcheon plate at the edge of the blade protruding from the inner forward end of the handle.
 3. Place the latch in the open position and then close and latch the door. Check to see that the handle rotates to the position that was marked in the previous step. If the handle does not line up with the mark, open the door and remove the door upholstery. Inspect the latching mechanism to determine the reason for the interference and make the necessary adjustments.

NOTE

The areas of possible interference are where the lower pin, the upper latch hook, and the aft latch bolt engage in the door frame.

- b. The latches may require adjustment to ensure positive door locking as follows:
1. **UPPER LATCH** - There are three points that should be inspected and/or adjusted on the upper latch.
 - a) Referring to Figure 3-20 (Sheet 1 of 3), check to ensure that the upper latch mechanism is over center when the door is latched. This can be accomplished by using a small inspection mirror to see that the upper operating link is against the adjustment screw and the forward edge of the upper operating link is forward of the forward edge of the lower operating link. If the latch mechanism is not over center when the door is latched, adjust the over center stop screw.
 - b) Referring to Figure 3-20 (Sheet 1 of 3), check to ensure that the upper latch hook pin is positioned so that it is almost touching the aft portion of the hook without riding on the hook. If the upper hook does not properly engage the pin, move the pin forward or aft, (it has four positions) to obtain proper adjustment.
 - c) Check for proper adjustment of the door upper latch bracket in the door sill above the door. If the door does not fit properly in the frame (inboard/outboard) when closed and latched, leaving a noticeable gap between the door and the frame, the upper latch bracket needs to be adjusted "in" to create more tension on the door. This can be accomplished by adjusting the forward tension screw. Refer to Figure 3-20 (Sheet 1 of 3).

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2. **LOWER LATCH** - The lower aft latch pin should be adjusted in the latched (closed) position so that the shoulder (straight sided) portion of the pin has extended through both the striker plate and the door opening frame to a minimum of 0.05 inch below the lower surface of the door opening frame, as shown in Figure 3-20 (Sheet 2 of 3). Adjust the pin as follows, so that it just clears the striker plate when the latch is in the unlatched (open) position, and does not interfere with door opening.

NOTE

The amount of the pin protruding from the door with the latch open will depend on the gap between the bottom of the door and the door frame in the fuselage.

- a) Remove the safety wire in the turnbuckle.
- b) Turn the barrel to extend or retract the pin as necessary.

NOTE

It may be necessary to shorten the pin guide by grinding a maximum of 0.2 inch off the top of the pin guide as shown in Figure 3-20 (Sheet 2 of 3), in order to obtain enough travel to make this adjustment.

- c) Safety the turnbuckle.

3. **AFT LATCH BOLT** - Check to ensure that the aft latch bolt provides a pre catch and protrudes into the socket on the aft door frame as far as possible without bottoming out. If adjustment is required, proceed as follows, referring to Figure 3-20 (Sheet 3 of 3).

- a) Disconnect the operating tube at the inside door handle.
- b) Disconnect the lower aft latch pin mechanism from the operating tube.
- c) Rotate the tube to allow the bolt to protrude the proper distance.

NOTE

When this is done the outside handle may protrude up to 0.25 inch into the airstream, which is acceptable.

- d) Connect the lower aft latch pin mechanism to the operating tube. Connect the operating tube to the inside door handle.

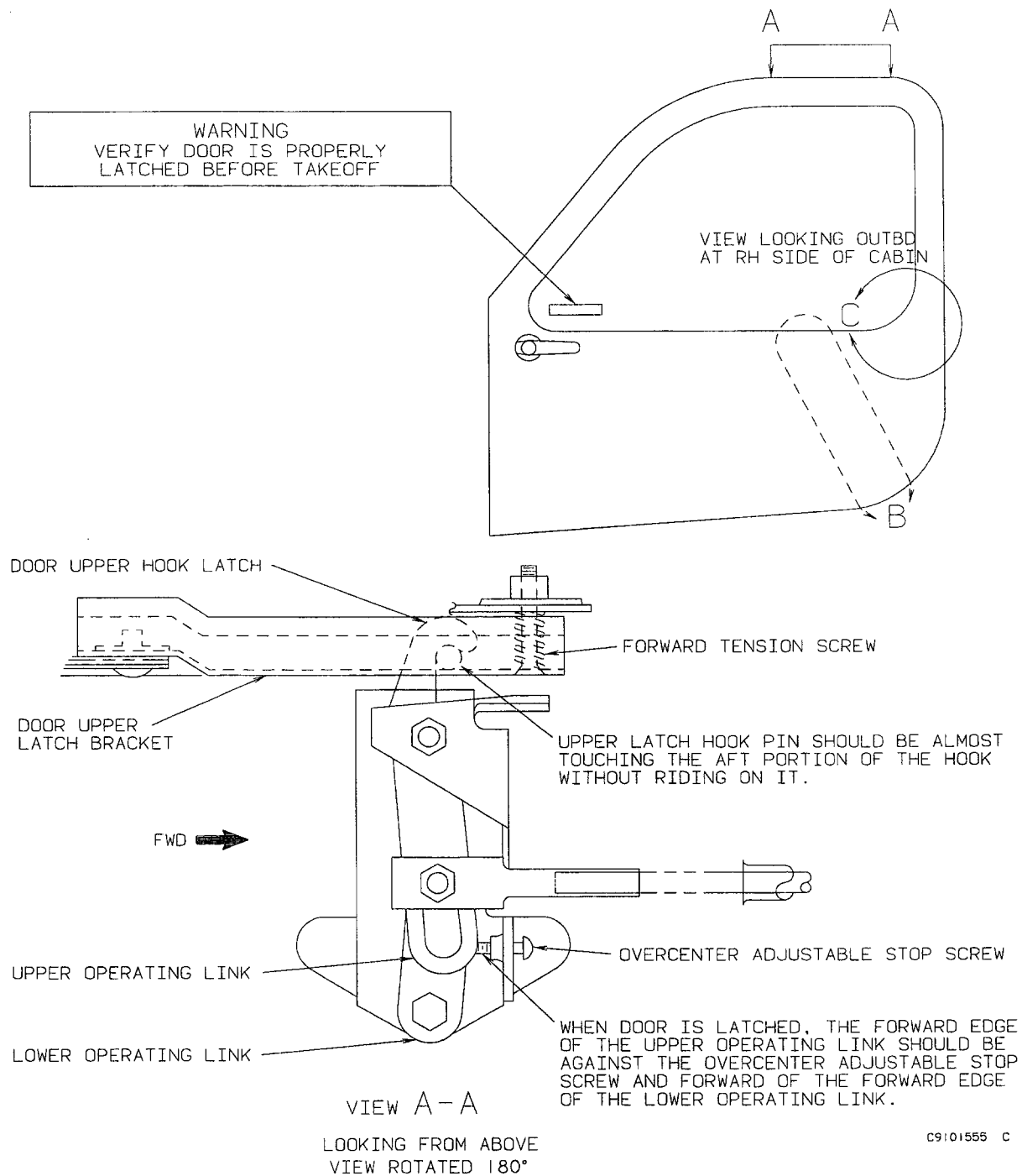
NOTE

The aft latch bolt can be adjusted inboard or outboard by loosening the four retaining screws on the aft side of the door and moving the bolt inboard or outboard as necessary, and then tightening the four screws.

- c. Install any upholstery and/or equipment that was removed.

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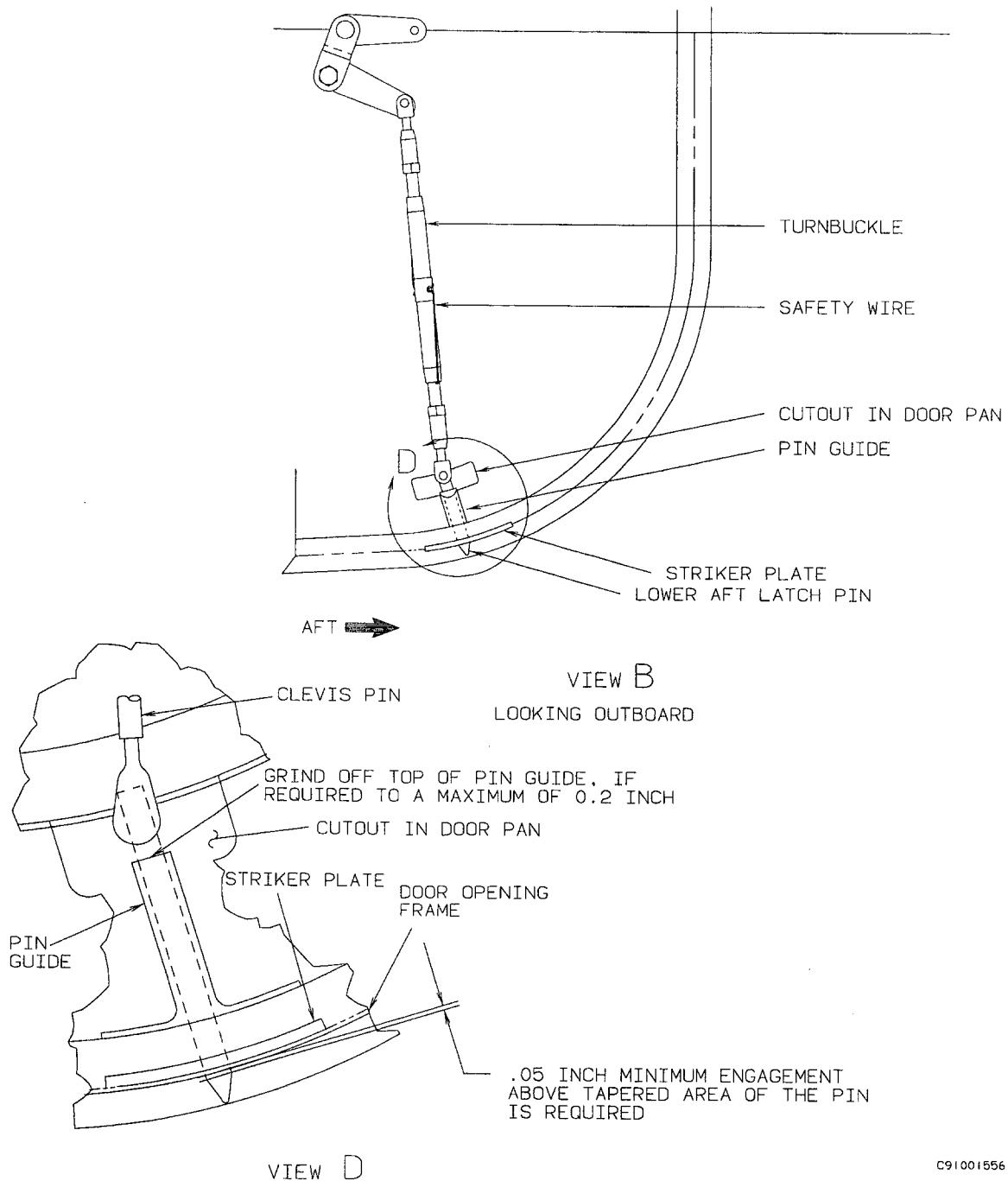
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Cabin Door Latch Points
Figure 3-20 (Sheet 1 of 3)

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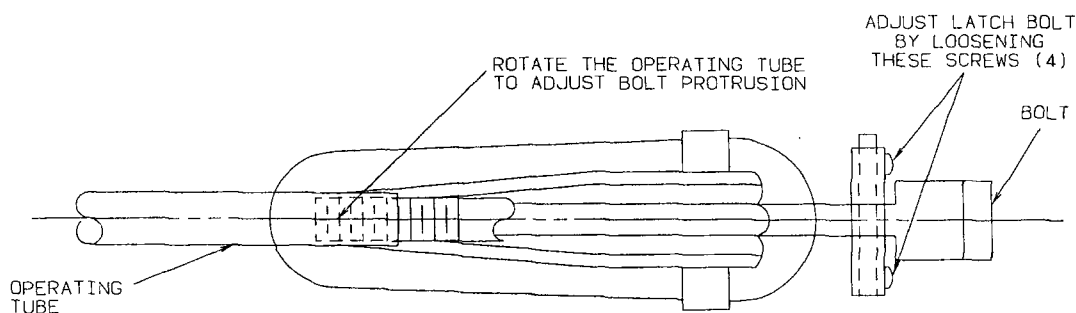
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**Cabin Door Latch Points
Figure 3-20 (Sheet 2 of 3)**

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VIEW C

INSIDE DOOR LOOKING OUTBOARD

C9101557 C

Cabin Door Latch Points
Figure 3-20 (Sheet 3 of 3)

UTILITY BAGGAGE DOOR (OPTIONAL)

The utility baggage compartment door is located on the right hand side of the fuselage, aft of the wing, below the rear window. The door is opened by turning a "D" shaped handle and is held in the open position by a support rod in the upper right hand corner. A small stop chain prevents the door from being opened too far and striking the trailing edge of the flap. The latching mechanism incorporates a bayonet type latching mechanism. When the mechanism is actuated (by turning the handle) the bayonet points enter the door facing and hold the door securely in the closed position. A locking mechanism, actuated by a key from outside the airplane, prevents the handle from turning.

UTILITY BAGGAGE DOOR REMOVAL AND INSTALLATION

NOTE

Parts that rotate, swivel or slide (metal to metal) and that have no provisions or instructions for lubrication, should be lubricated with SAE 20W oil, 10W30 oil or equivalent (5, Consumable Materials Chart, Section 2).

- Open the door to the full open position.
- Disconnect the stop chain at the upper right hand corner of the door.
- Remove the piano hinge wire at the right hand side of the door and remove the door. Installation of the baggage door is the reverse of the removal procedure.

UTILITY BAGGAGE DOOR RIGGING

FIGURE 3-21

- Remove the door.
- For ease of maintenance, place the door on a bench.

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- c. Remove the upholstery panel and turn the handle to the closed position and note that the vertical legs on the latching mechanism "T" bracket of the door travels $20^{\circ} \pm 10^{\circ}$ past the center position with a slight retraction of all three bayonet points. In this position ($20^{\circ} \pm 10^{\circ}$ past center) the latching mechanism "T" bracket should fully engage the stop and the "D" handle should be in a horizontal position.
- d. If the vertical legs of the latching mechanism "T" bracket do not travel $20^{\circ} \pm 10^{\circ}$ past center with full engagement of the stop, adjust the length of the bayonet post or the position of the stop until this reading is attained.
- e. After the proper alignment, lubricate all moving parts of the latching system with a mixture of oil (16, Consumable Materials Chart, Section 2), and graphite (27, Consumable Materials Chart, Section 2). Apply door-ez to the bayonet attach points in the area of the striker plates and guide blocks.
- f. After lubricating the designated areas, actuate the handle several times. A maximum pull of 40 inch-pounds of torque should be required to actuate the door handle to the closed and latched position.
- g. Install the interior upholstery panel and install the door on the airplane.

AFT BAGGAGE DOOR

The aft baggage door is located on the right hand side of the fuselage just aft of the trailing edge of the wing. The door is opened by pushing in the latch button which releases the locking mechanism and allows the door to open. The door may be locked by the key furnished with the airplane.

AFT BAGGAGE DOOR REMOVAL AND INSTALLATION

NOTE

Parts that rotate, swivel or slide (metal to metal) that have no provisions or instructions for lubrication should be lubricated with SAE 20W oil, 10W30 oil or equivalent (5, Consumable Materials Chart, Section 2).

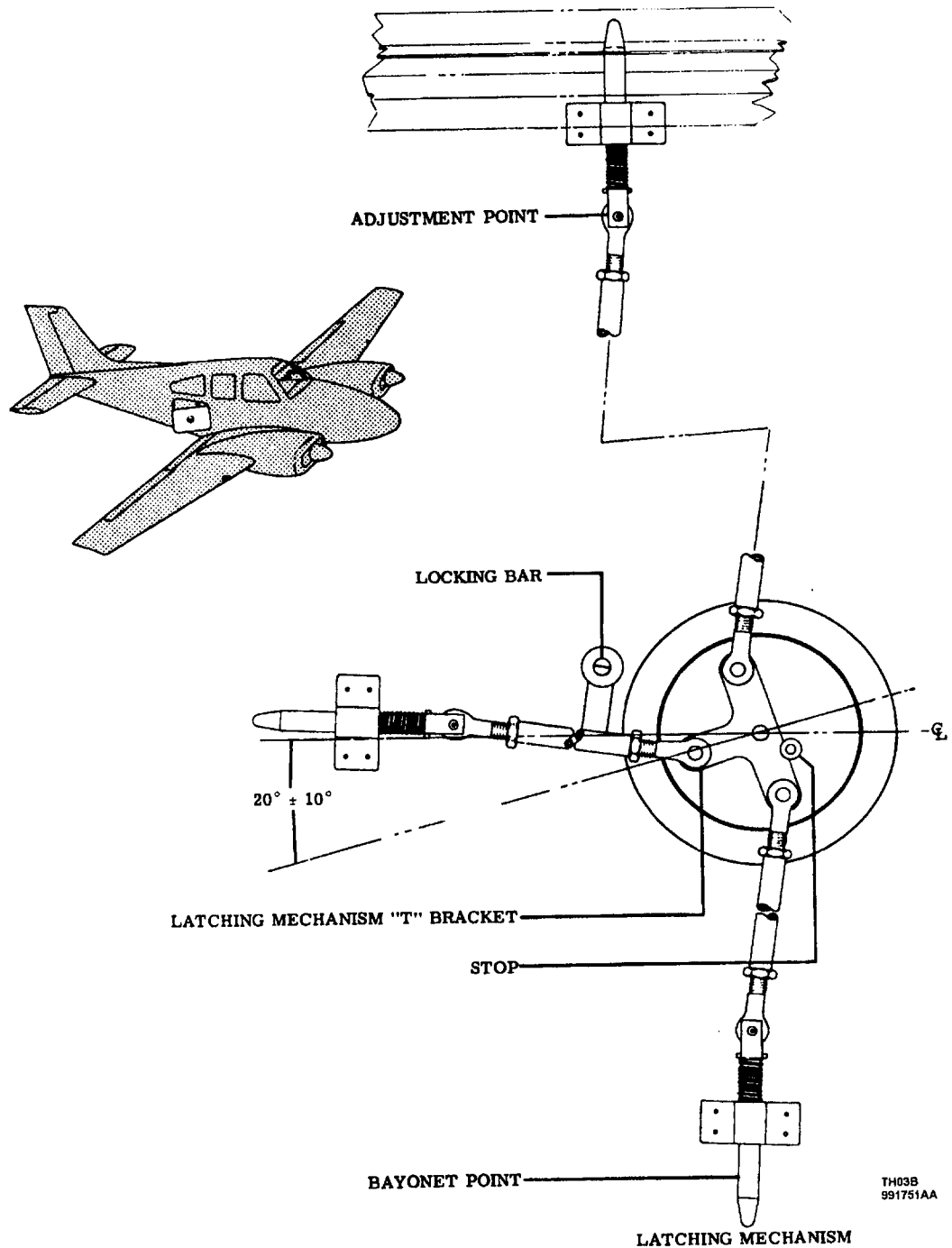
- a. Open the door to the full open position.
- b. Remove the piano wire hinge at the edge of the door.
- c. Remove the door from the airplane.
- d. Installation of the aft baggage door is the reverse of the removal procedure.

AFT BAGGAGE DOOR ADJUSTMENT

Adjustment of the door is accomplished by readjusting the position of the latching mechanism striker plate at the rear edge of the door frame. Turn the attach screws on the striker plate and move the striker plate either in or out to obtain the desired holding tension of the door in the closed position.

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Utility Door
Figure 3-21

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INTERIOR DOOR HANDLE

INTERIOR DOOR HANDLE REMOVAL AND INSTALLATION

NOTE

It may be necessary to place the door handle in the unlatched position to access both screws that secure the door handle.

- a. Remove the two screws that secure the interior door handle base plate.
- b. Slide the interior door handle from the shaft, maintaining the same orientation of the door handle with respect to the shaft. Refer to Figure 3-22.
- c. Rotate the door handle 90° clockwise, maintaining the base plate in the same position as shown in Figure 3-22.

NOTE

Interior door handle configuration of some airplanes may differ from that shown in Figure 3-22.

- d. Slide the interior door handle over the shaft and secure, using the screws removed in step a.
- e. Latch the door by rotating the interior door handle counterclockwise.

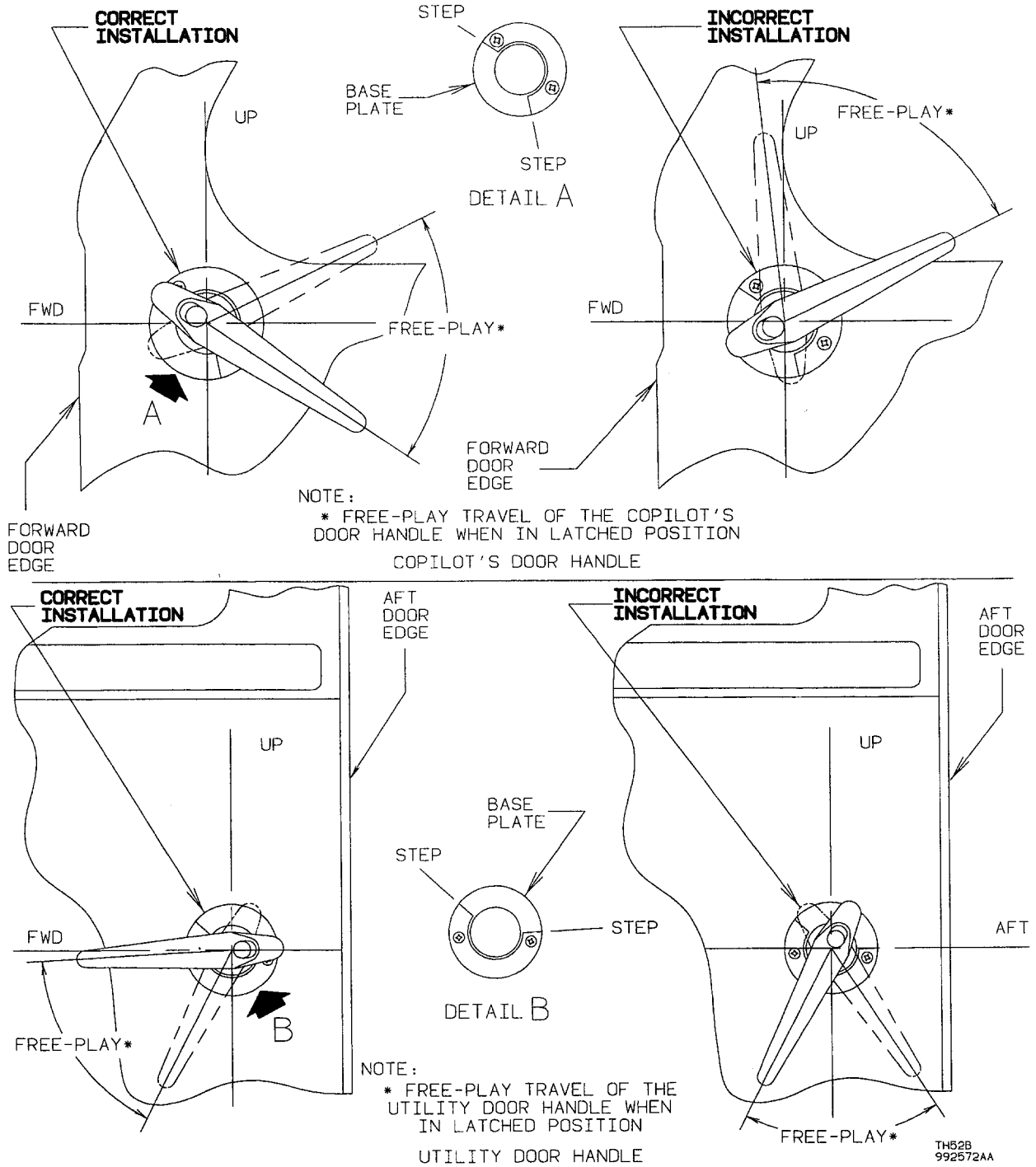
CAUTION

Rotation of the interior door handle without depressing the handle lock release button should not result in unlatching of the door.

- f. Rotate the interior door handle clockwise without depressing the handle lock release button. If the door remains latched, proceed to step g. If the door becomes unlatched, repeat steps a through e.
- g. With the door latched, depress the handle lock release button while rotating the door handle clockwise. The door should unlatch.

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Interior Crew Door Handle and Interior Utility Door Handle Installation and Orientation
Figure 3-22

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CARGO DOOR (TH-1 AND AFTER)

DOOR REMOVAL AND INSTALLATION

NOTE

Parts that rotate, swivel or slide (metal to metal) that have no provisions or instructions for lubrication should be lubricated with SAE 20W oil, 10W30 oil or equivalent (5, Consumable Materials Chart, Section 2).

- a. With the doors open, remove the Phillips head screws that attach the scissors door stop to the door sill.
- b. Support the doors and remove the hinge pins by pulling straight up.
- c. Installation of the doors may be accomplished by reversing the removal procedures.

DOOR ADJUSTMENT

If the cargo door does not close properly or permits air leaks while completely closed, several adjustments may be made to assure proper sealing of the door. After determining the origin of the air leakage as to whether it is from around the forward half of the cargo door or the aft half of the door, make the following adjustments as necessary:

ADJUSTMENT OF THE AFT HALF OF THE DOOR

- a. Adjustments of the aft door may be performed by removing the upholstery paneling and shortening or lengthening the door latch connecting tube assembly.

NOTE

By shortening the connecting tube assemblies, the door will be pulled tighter against the door seal.

- b. To adjust the length of the connecting tube assembly, remove the cotter key, washers and pin. Turn the pin eye "IN" to shorten the tube assembly and turn the pin eye "OUT" to lengthen the tube assembly.
- c. After the desired length has been set, install the pin, washers and cotter key.
- d. Replace the upholstery paneling.

ADJUSTMENT OF THE FORWARD HALF OF THE DOOR

- a. If the air leakage is around the forward half of the door, the necessary adjustments may be made at the door latch striker plate located in the center of the rear door.
- b. For a tighter fit, loosen the two Phillips head screws and move the striker plate inboard.

DOOR LATCH PIN ADJUSTMENT

If the forward door does not open freely, the door latch pins may not be retracting enough. This may be corrected by the following adjustments:

- a. Remove the upholstery paneling.
- b. Remove the cotter keys, pins and washers.
- c. Loosen the pin eye jam nut and turn the pin eye "IN" to shorten the tube assemblies; turn the pin eye "OUT" to lengthen the tube assemblies.

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- d. After the desired length has been set, tighten the pin eye jam nut. Install the pins, washers and cotter keys.
- e. Replace the upholstery paneling.

FORWARD BAGGAGE AND AVIONICS COMPARTMENT DOOR

The forward baggage compartment door is located on the right hand side of the nose area. Some doors are opened by depressing the two latch buttons located at the base of the door and some doors are opened by turning the two Dzus fasteners at the same location. The door is held in the open position by a support rod. The door also has a locking mechanism which is actuated by a key from outside the airplane.

FORWARD BAGGAGE DOOR REMOVAL AND INSTALLATION

NOTE

Parts that rotate, swivel or slide (metal to metal) that have no provisions or instructions for lubrication should be lubricated with SAE 20W oil, 10W30 oil or equivalent (5, Consumable Materials Chart, Section 2).

- a. Open the door to the full open position.
- b. Disconnect the door hinges at the top of the door and remove the door from the airplane.
- c. Installation of the forward baggage door is the reverse of the removal procedure.

ADJUSTMENT OF THE FORWARD BAGGAGE DOOR

Adjustment of the door is accomplished by readjusting the position of the latching mechanism striker plates at the bottom edge of the door frame. Adjustment is accomplished by turning the attach screws on the striker plates and moving the striker plates either in or out to obtain the desired holding tension of the door in the closed position.

WINDOWS

WINDSHIELD REMOVAL (ONE AND TWO PIECE)

FIGURE 3-23

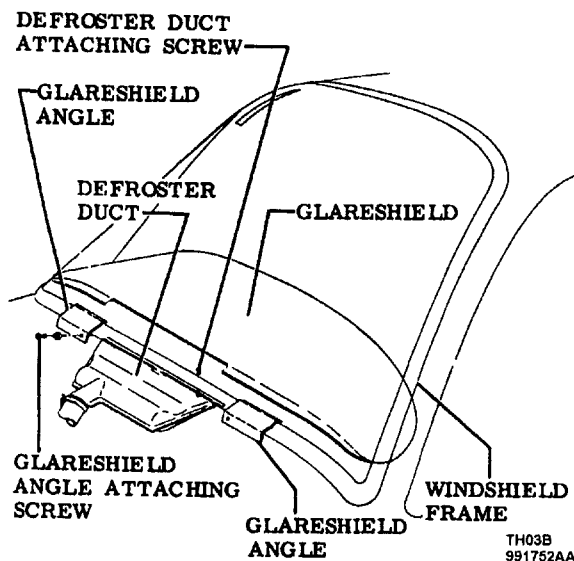
- a. Remove the glare shield and outside air temperature gage (if installed).
- b. Remove the attaching screws from the defroster duct and move duct to clear lower row of rivets on windshield.
- c. Remove the screws and spacers from the glare shield angles. On TE-832 and after, TH-104 and after, TC-502 and after, hook and pile tape is used.
- d. Remove the trim strips from around the inside of the windshield.
- e. To facilitate installation, mark the location of the trim strip clips.
- f. Remove the rivets from around the windshield.
- g. Remove the windshield. The one piece windshield is removed by moving it to the left.

NOTE

Due to the windshield being sealed, considerable effort may be required to break the windshield loose from the canopy section.

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Windshield (Typical)
Figure 3-23

WINDSHIELD INSTALLATION

- Clean the sealer from the canopy section where the old windshield was removed using toluol.
- Trim the tooling tabs from the windshield. Place the windshield in position and mark the areas where material must be removed from the windshield to obtain a proper fit. Trim from the top first to maintain edge distance for side rivets.
- Remove the windshield and trim off excess material as determined in step b.
- Place the windshield in position and cleco in place using the pilot holes provided.
- Back drill the windshield frame using the existing holes in the canopy section as a guide.
- Remove the windshield, clean and deburr all holes and apply sealer (43, Consumable Materials Chart, Section 2) to the windshield frame where it makes contact with the canopy section.
- Place the windshield in position and cleco in place.
- Using AN470AD4 rivets, secure the windshield to the canopy section.

NOTE

When riveting the windshield in place, install the trim strip clips in the same locations as marked in step e of the windshield removal procedure.

- Secure the glare shield angles in place with attaching screws, nuts and spacers. TE-832 and after, TH-104 and after, TC-502 and after tape is used.
- Position the defroster duct and secure in place with the attaching screws.

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- k. Install the trim strips.
- l. Install the glare shield and outside air temperature gage (if removed).
- m. Clean and paint as necessary.

STORM WINDOW REMOVAL AND INSTALLATION

- a. Remove the attaching bolt from the storm window sleeve assembly.
- b. Remove the hinge pin.
- c. Installation is accomplished by reversing the above procedure.

STORM WINDSHIELD REMOVAL AND INSTALLATION (TE-768 AND AFTER; TH-I AND AFTER)

- a. Remove the two internally threaded hinge pins.
- b. Installation is accomplished by reversing the above procedure.

FORWARD LH WINDOW REMOVAL (TE-768 AND AFTER; TH-I AND AFTER)

- a. Remove the upholstery panels as required to gain access to the window frame.
- b. Remove the trim strip from around the inside of the window.
- c. Remove the rivets from around the window.
- d. Remove the window.

FORWARD LH WINDOW INSTALLATION (TE-768 AND AFTER; TH-I AND AFTER)

- a. Clean the sealer from the canopy section where the old window was removed using toluol (20, Consumable Materials Chart, Section 2).
- b. Place the window in position and mark the area where material must be removed to obtain a proper fit.
- c. Remove the window and trim off the excess material as determined in step b and check for proper fit.
- d. Place the window in position and cleco in place, using the pilot holes provided.
- e. Back drill the window frame, using the existing holes in the canopy section as a guide.
- f. Remove the window; clean and deburr all holes and apply sealer (4, Sealing Chart, Section 2) to an area approximately 1/2 inch wide on the canopy section where the old sealer was removed.
- g. Place the window in position and cleco in place.
- h. Using AN470AD4 rivets, secure the window to the canopy section.
- i. Install the trim strip.
- j. Install the storm window.

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FORWARD LH WINDOW REMOVAL

- a. Remove the storm window.
- b. Remove the upholstery panels as required to gain access to the window frame.
- c. Remove the trim strip from around the inside of the window.
- d. Remove the screws and nuts attaching the storm window striker to the window frame.
- e. To facilitate installation, mark the location of the trim strip clips.
- f. Remove the rivets from around the window.
- g. Remove the window.

FORWARD LH WINDOW INSTALLATION

- a. Clean the sealer from the canopy section where the old window was removed using toluol (20, Consumable Materials Chart, Section 2).
- b. Place the window in position and mark the areas where material must be removed to obtain a proper fit.
- c. Remove the window and trim off the excess material as determined in step b.
- d. Place the window in position and cleco in place using the pilot holes provided.
- e. Back drill the window frame using the existing holes in the canopy section as a guide.
- f. Remove the window, clean and deburr all holes and apply sealer (4, Sealing Chart, Section 2) to an area approximately 1/2 inch wide on the canopy section where the old sealer was removed.
- g. Place the window in position and cleco in place.
- h. Using AN470AD4 rivets, secure the window to the canopy section.

NOTE

When riveting the window in place, install the trim strip clips in the same locations as marked in step e of the window removal procedure.

- i. Install the trim strips.
- j. Attach the storm window striker to the window frame.
- k. Install the storm window.
- l. Clean and paint as necessary.
- m. Install the upholstery panels.

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CABIN DOOR WINDOW REMOVAL

- a. Remove the inboard door handle, ash tray and arm rest.
- b. Remove the center upholstery panel.
- c. Remove the trim strip around the inside of the window.
- d. To facilitate installation, mark the location of the trim strip clips.
- e. Remove the rivets around the window.
- f. Remove the window.

CABIN DOOR WINDOW INSTALLATION

- a. Clean the sealer from the door where the old window was removed using toluol (20, Consumable Materials Chart, Section 2).
- b. Place the window in position and mark the areas where material must be removed to obtain a proper fit.
- c. Remove the window and trim off excess material as determined in step b.
- d. Place the window in position and cleco in place using the two pilot holes on the aft side of the window frame.

NOTE

To eliminate the possibility of the door being warped, the door must be closed and latched when drilling the attaching holes and riveting the window in place.

- e. Back drill the window frame using the existing holes in the door as a guide.
- f. Remove the window, clean and deburr all holes and apply sealer (4, Sealing Chart, Section 2) to an area approximately 1/2 inch wide on the door where the old sealer was removed.
- g. Place the window in position and cleco in place.
- h. Using AN470AD4 rivets, secure the window to the door.

NOTE

When riveting the window in place, install the trim strip clips in the same locations as marked in step d of the window removal procedure.

- i. Install the trim strip.
- j. Clean and paint as necessary.
- k. Install the center upholstery pane.
- l. Install the inboard door handle, ash tray and arm rest.

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CENTER WINDOW REMOVAL AND INSTALLATION

- a. Remove the emergency release pin.
- b. Remove the hinge pin.
- c. Installation is accomplished by reversing the above procedure.

NOTE

Some hand forming may be required to obtain a proper fit.

AFT WINDOW REMOVAL

- a. Remove the upholstery panel along bottom of the window.
- b. Remove the royalite molding around the window.
- c. Remove the top, bottom and forward retaining angles by removing the attaching screws.
- d. Remove the window.

AFT WINDOW INSTALLATION

- a. Clean the sealer from the canopy section where the old window was removed using toluol (20, Consumable Materials Chart, Section 2).
- b. Apply sealer (4, Sealing Chart, Section 2) to an area approximately 1/2 inch wide on the canopy section where the old sealer was removed.
- c. Position the window and secure in place with the retainer angles and retainer attaching screws.
- d. Install the royalite molding and the upholstery panel.

THIRD OR FOURTH WINDOW REMOVAL (TE-768 AND AFTER; TH-I AND AFTER)

- a. Remove the upholstery panels as required to gain access to the window frame.
- b. Remove the trim strip from around the inside of the window.
- c. To facilitate installation, mark the location of the trim strip clips.
- d. Remove the rivets from around the window.
- e. Remove the window.

THIRD OR FOURTH WINDOW INSTALLATION (TE-768 AND AFTER; TH-I AND AFTER)

- a. Clean the sealer from the cabin section where the old window was removed using toluol (20, Consumable Materials Chart, Section 2).
- b. Place the window in position and mark the areas where material must be removed to obtain a proper fit.
- c. Remove the window and trim off the excess material as determined in step b.
- d. Place the window in position and cleco in place using the pilot holes provided.

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- e. Back drill the window frame using the existing holes in the back section as a guide.
- f. Remove the window, clean and deburr all holes and apply sealer (4, Sealing Chart, Section 2) to an area approximately 1/2 inch wide on the canopy section where the old sealer was removed.
- g. Using AN470AD4 rivets, secure the window to the cabin section.

NOTE

When riveting the window in place, install the trim strip clips in the same location as described in step c of the window removal procedure.

- h. Install the trim strips.
- i. Clean and paint as necessary.
- j. Install the upholstery panels.

FIBERGLASS

REPAIR OF FIBERGLASS COMPONENTS

- a. Large holes and cracks require that the damaged area be cut out and trimmed just beyond the area of damage. If the parts are painted, remove the paint and sand that portion of the part extending at least 2 inches beyond the cutout.
- b. Prepare 3 patches of laminated glass cloth, such as Trevano, Uniglass, or their equivalent. Cut the first patch to the dimensions of the sanded area, the second patch 1/2-inch smaller than the first, and the third patch 1/2-inch smaller than the second.
- c. Prepare the resin (Laminac 4116, Glidpol 1001, or their equivalent) for the patch in accordance with the manufacturer's instructions. Make sure that your hands are free of oil, grease, or dirt when handling the resin.
- d. Apply an even coat of resin to the sanded area. Impregnate all three laminated glass cloth patches by laying the patches on clean waxed paper and working the resin through the fabric with a 2-inch brush.
- e. Place the large patch over the cutout area, working out all air bubbles and wrinkles. If the patch starts to sag, place a support behind the repair area. Coat the support with automobile wax or waxed paper to prevent the resin from adhering to the support. Work out all air bubbles and wrinkles. while installing the second patch over the first. Install the third patch over the second in the same manner.
- f. Brush the repaired area with an even coat of resin. After the patches have cured for 24 hours at temperatures between 23°C (75°F) and 66°C (150°F), blend the patch into the contour of the part with fine sandpaper. Paint the repair to match the rest of the part.

SECTION

4

**FLIGHT CONTROLS
AND SURFACES**

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FLIGHT CONTROLS AND SURFACES

CONTROL SURFACES

WARNING

On airplane serials TH-1389, TH-1396 and after and earlier airplanes with new spare replacement parts, observe the color coding. On these airplanes the control cables bellcrank and other components are color coded. Do not connect coded parts of one color to coded parts of a different color. Ensure that the primary and secondary controls are operating in the proper direction.

NOTE

On all control column systems and control surface systems, the inside surface of all turnbuckles must be coated with grease (11, Consumable Materials Chart, Section 2).

All primary flight controls are conventional cable-operated surfaces, and are manually controlled through cable-bellcrank systems. Each system includes surface travel stops and linkage adjustments. The optional electric elevator trim and wing flaps are driven by electric motors.

The ailerons, elevators and rudder can be secured with control locks (gust locks) in the pilot's compartment. Refer to the GROUND HANDLING AND SERVICING section of this manual for control lock installation procedures.

Airplane serials TC-1 and after, TE-1 and after, TH-1 through TH-1388 and TH-1390 through TH-1395 are equipped with either a standard single throw-over control arm, or a dual control T column. On TH-1389 and TH-1396 and after, dual controls are installed as standard equipment.

The rudder pedals are interconnected by linkage below the floor. The pedals are adjustable to two positions by pressing a spring-loaded lever on the side of the pedal. If brakes are not installed on the copilot's pedals, the same lever can be used to place the copilot's pedals against the floor.

The wing flaps are operated by an electric motor-driven gearbox on the forward side of the rear spar at the centerline of the airplane. The gearbox drives two flexible drive shafts, each connected to an acme-thread-type jackscrew at the flap. The flaps are controlled by a lever (switch) on the instrument subpanel. The lever must be pulled out of a detent to change positions.

The flap position transmitter, if installed, is located near the left flap actuator. On airplanes with the single throw-over control or the T control, the flap position is indicated by an instrument to the left of the flap control lever. On TH-1389 and TH-1396 and after, the flap position is indicated by three lights to the left of the flap control lever. The lights indicate down, approach and in-transit positions. All lights are out when the flaps are up.

Trim tabs are installed on each elevator, the rudder and the left aileron. The tabs are manually controlled through cable-drum systems, using jackscrew actuators. Tab position indicators are provided on or near the tab controls.

The optional electric elevator trim tab is controlled by a switch in the outboard handle of the pilot's control wheel.

Positive stops on the primary flight control surfaces limit their travel. Travel stops secured to the tab control cables limit trim tab movement. The correct routing of cables as shown in the applicable rigging illustrations will prevent crossing the cables and causing incorrect movement after the cables have been removed and reinstalled. Control movement and direction should be checked after maintenance.

Refer to the applicable rigging procedures for details regarding chain and cable tension, control wheel movement and force, downspring force and system friction.

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EFFECT OF TEMPERATURE UPON CABLE TENSION

Graphs specifying the correct maximum and minimum cable tension for the various controls appear on the individual control system rigging illustrations.

The graphs provide tension limits at temperatures from 30° to 110° Fahrenheit. The horizontal scales on the graphs designate the temperature at which the control cables can be rigged, and the vertical scales designate the correct tension in pounds for each temperature reading.

CAUTION

A control cable must be replaced if it is determined to have more than three broken strands along any three foot segment.

NOTE

When inspecting control cables, it is important to operate the controls through their full range so that the cables move away from the pulleys and all portions of the cables are exposed for inspection.

TAPER PINS

When installing taper pins, use a lightweight rawhide or nylon mallet to set the pin. The small end of the tapered shank must be flush with, or extend no more than 0.06 inch above the surface.

CAUTION

The taper pin can crack the torque tube if it is driven too far.

SINGLE THROW-OVER CONTROL COLUMN (OPTIONAL ON TC-1 AND AFTER; TE-1 AND AFTER; TH-1 THRU TH-1388, TH-1390 THRU TH-1395) FIGURE 4-1

CONTROL COLUMN ARM REMOVAL

- a. Remove the four screws that secure the retainer collar assembly to the control column housing.
- b. Disconnect any electrical wiring.
- c. Pull the T handle located on the forward side of the control arm.
- d. Rotate the control column arm to the nearly vertical position and slide the control column arm off the housing.

CONTROL COLUMN ARM INSTALLATION

- a. Position the control arm in a vertical position. Refer to Figure 4-1. Ensure that the slot in the lower sprocket is approximately parallel to the sides of the arm and the turnbuckles between the long and short chains are opposite each other near the access opening.
- b. The ailerons **MUST** be in the neutral position.
- c. Pull the T handle located on the forward side of the control arm.

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- d. Slide the control column arm on the control column housing.
- e. Connect all electrical wiring.
- f. Install the retainer collar and attach it with the four screws.
- g. Check for full control column movement and for proper direction of movement.

RIGGING THE CONTROL ARM CHAIN

- a. Position the control arm, control wheel, and sprockets as shown in Figure 4-1. The long and short chains must be centered on the sprockets within one link. The turnbuckles must be near the access opening. The slot in the lower sprocket should be approximately parallel to the sides of the arm.
- b. Remove the safety wire from the turnbuckles and loosen or tighten the chain as necessary.

NOTE

Tighten the chain until friction or binding is felt on the control wheel, then loosen the chain just enough to remove the binding or friction from the control wheel.

- c. Check the control wheel and control surfaces for proper operation and freedom of movement.
- d. After the adjustments are complete, check the location of the control wheel, sprockets, and turnbuckles. Refer to Figure 4-1.
- e. Safety wire the turnbuckles.

NOTE

Airplane serials TC-1482 through TC-2456, TE-881 through TE-1201, TH-265 through TH-1388 and TH-1390 through TH-1395 have roller-type chain and sprockets installed in the control column arm. Modification of earlier models from the silent type chain and sprocket to the roller type can be performed in accordance with Beech Service Instructions No. 0523-155 or subsequent. Rigging instructions are identical for both types of wheel.

DUAL CONTROL ARM (OPTIONAL ON TC-1 AND AFTER; TE-1 AND AFTER; TH-1 THRU TH-1388, TH-1390 THRU TH-1395) FIGURE 4-2

DUAL CONTROL ARM REMOVAL

- a. Remove the four screws that secure the retainer collar assembly to the control column housing.
- b. Disconnect the electrical wiring.
- c. Remove the screw and washer retaining the pin assembly on the right forward side of the control arm.

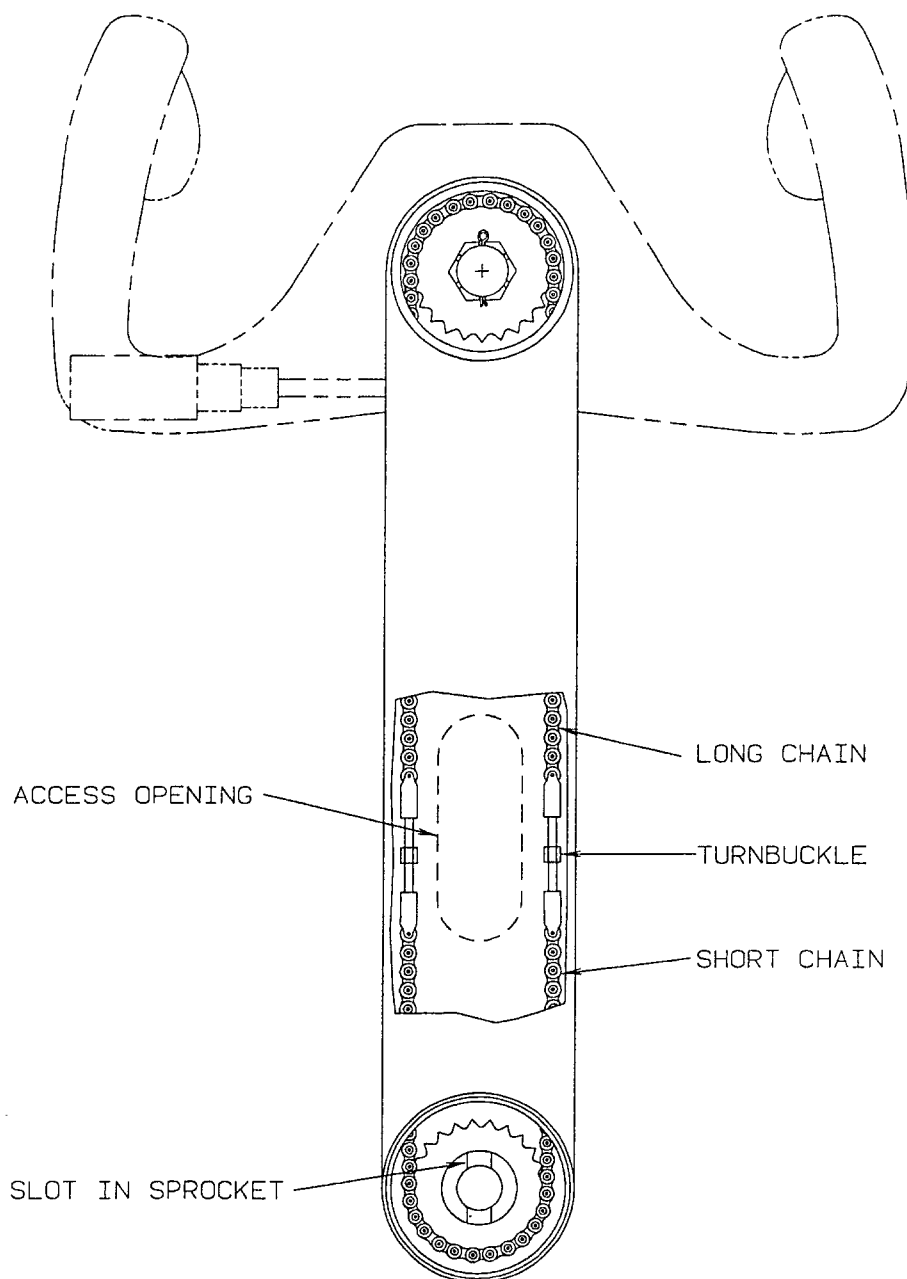
NOTE

Some installations have a T handle on the right forward side of the dual control arm. On these installations, pull the T handle and omit step c.

- d. Slide the control arm off the housing.

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Single Throw-Over Control Column
(TC-1 and After; TH-1 thru TH-1388, TH-1390 thru TH-1395)
Figure 4.1

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DUAL CONTROL ARM INSTALLATION

- a. Position the control arm as shown in Figure 4-2.
- b. Ensure that the slot in the center sprocket is approximately vertical and the turnbuckles between the long chains and the short chains are opposite each other near the access openings.
- c. The ailerons **MUST** be in neutral.

NOTE

Some installations have a T handle on the right forward side of the dual control arm. On these installations, pull the T handle and omit step e.

- d. Slide the control column arm onto the control column housing.
- e. Install the pin assembly on the right side of the center control arm hub.
- f. Install the retainer collar and attach it with the four screws.
- g. Check for full control movement and for proper direction of movement.

RIGGING THE DUAL CONTROL ARM CHAIN

- a. Position the control arm, control wheel, and sprocket as shown in Figure 4-2.
- b. Center the long and short chains on their sprockets within one link.
- c. The slot in the center sprocket must be approximately vertical. Refer to Figure 4-2.
- d. Remove the safety wire from the turnbuckles.
- e. Adjust the chains as necessary.

NOTE

The chains are properly adjusted by tighten the chains until binding is noticed on the control wheel, then loosen the chains just enough to remove the binding or friction from the control wheel.

- f. After the adjustments are complete, check that the location of the control arm, control wheels, sprockets and turnbuckles are as shown in Figure 4-2.
- g. Safety wire the turnbuckles.

Check the controls for freedom of movement and the control surfaces for proper direction of movement.

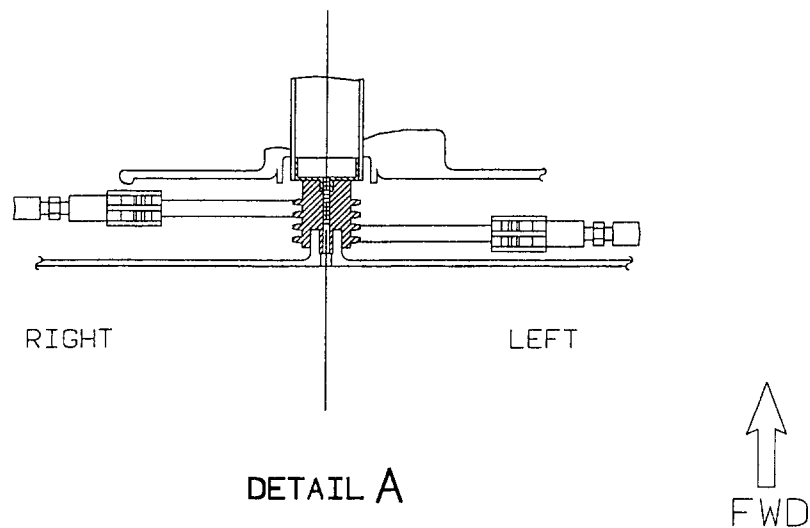
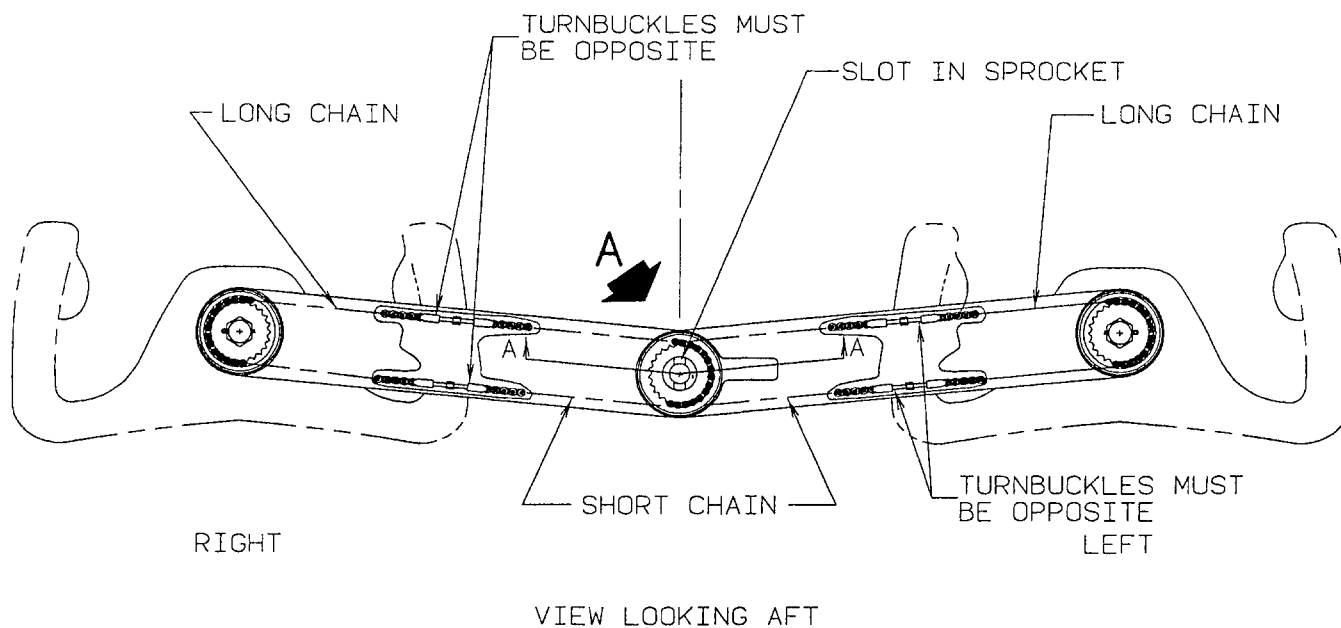
DUAL CONTROL COLUMNS (TH-1389, TH-1396 AND AFTER) FIGURE 4-3

CONTROL COLUMN CHAIN REMOVAL FIGURE 4-4

- a. Paint one tooth on each control column sprocket and its corresponding chain link to ensure correct alignment of the control wheel at installation.

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Dual Control Column Chains
(TC-1 and After; TE-1 and After; TH-1 thru TH-1388, TH-1390 thru TH-1395)
Figure 4-2

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- b. Loosen the turnbuckles on the control column chain.
- c. Remove the safety wire from the four bolts (two on each end) and remove the six bolts from the channel between the control columns.
- d. Remove the channel from the airplane.
- e. Disconnect the turnbuckles from the control column chain.
- f. Remove the four connector links from the link assembly, and remove the link assembly.

NOTE

It may be necessary to remove the stop before removing the link assembly.

- g. Slide the sprocket support assemblies aft over the U-joints and remove the chains from the control columns.

CONTROL COLUMN CHAIN INSTALLATION *FIGURE 4-4*

- a. Install the chains over the control column sprockets. The painted marks on the chain must align with the corresponding marks on the sprockets.
- b. Install the link assembly. Install the control column chain in the outboard holes of the link assembly.
- c. Install the aileron cable chains in the inboard holes of the link assembly.

NOTE

Make certain the connector links are installed correctly.

- d. Install the stop if it was removed.
- e. Connect the turnbuckles, but do not tighten them.
- f. Slide the sprocket support assemblies forward and install the channel between the control columns. Safety wire the bolts.
- g. Tighten the control column chains as described in CONTROL COLUMN CHAIN RIGGING.

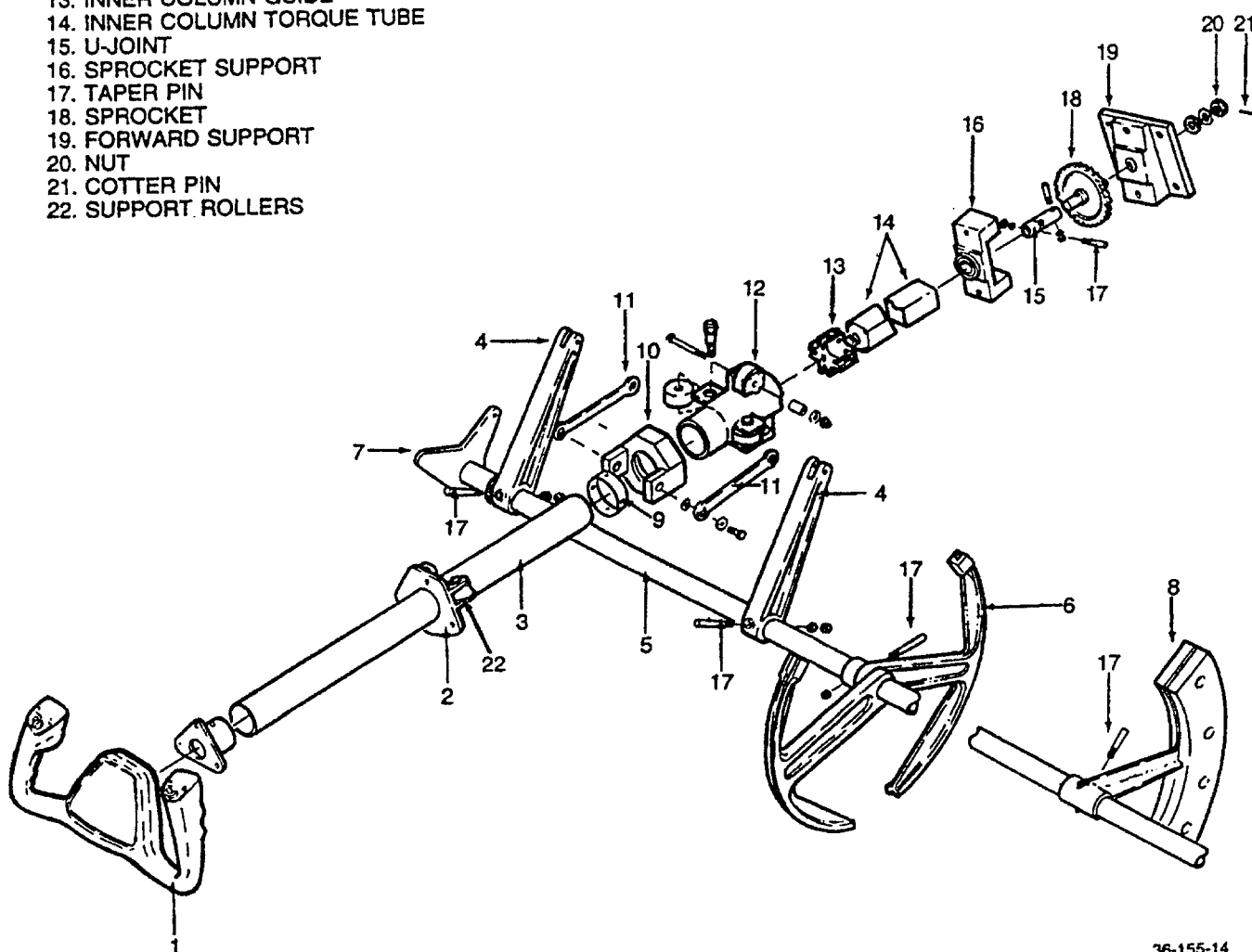
WARNING

Check the ailerons for correct direction of movement. When the control wheel is moved to the left, the left aileron must move up and the right aileron must move down. When the control wheel is moved to the right, the right aileron must move up and the left aileron must move down.

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1. WHEEL
2. COLLAR ASSEMBLY
3. COLUMN TORQUE TUBE
4. ELEVATOR TORQUE ARM
5. ELEVATOR TORQUE TUBE
6. ELEVATOR BELLCRANK
7. ELEVATOR TORQUE TUBE SUPPORT
8. BOB WEIGHT ASSEMBLY
9. COLLAR
10. COLLAR ASSEMBLY
11. ELEVATOR PUSHROD
12. CONNECTOR
13. INNER COLUMN GUIDE
14. INNER COLUMN TORQUE TUBE
15. U-JOINT
16. SPROCKET SUPPORT
17. TAPER PIN
18. SPROCKET
19. FORWARD SUPPORT
20. NUT
21. COTTER PIN
22. SUPPORT ROLLERS



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Dual Control Columns
(TH-1389 and TH-1396 and After)
Figure 4-3

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CONTROL COLUMN CHAIN RIGGING

FIGURE 4-4

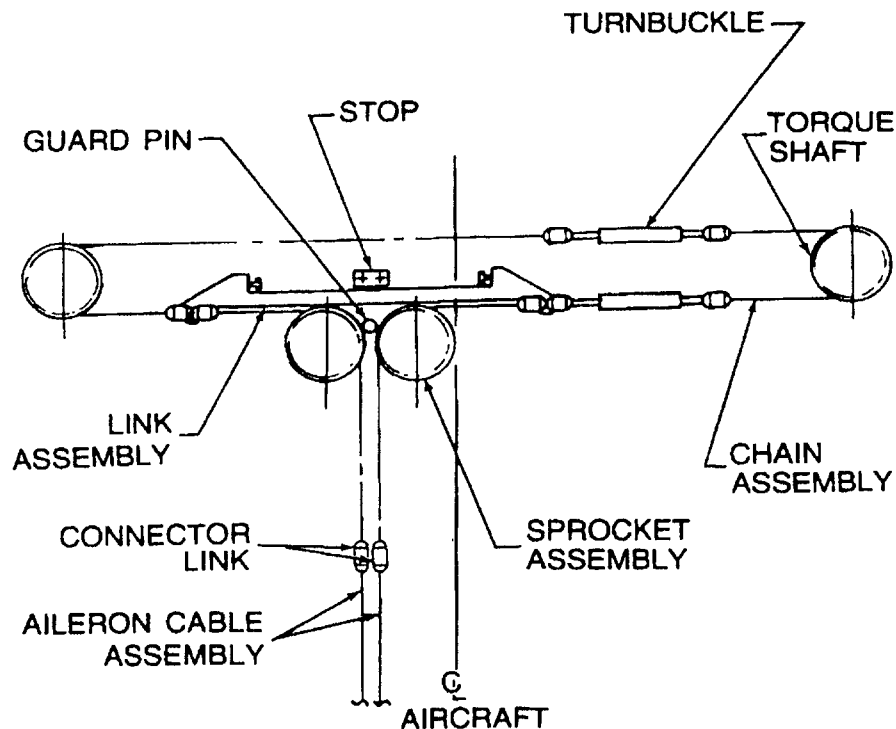
- Rig neutral on the control wheels by securing a straightedge across the tops of both control wheels. The grips must be aligned within 0.06 inch.
- The ends of the control column chain around the right sprocket must be equidistant, within one link, from the centerline of the sprocket.
- The link assembly must be centered within 0.20 inch with respect to the stop.
- Adjust the turnbuckles to obtain 0.19 to 0.31 inch of deflection with a vertical pressure of 1.50 to 2.50 pounds on the upper control column chain near the airplane centerline.
- Rig the aileron control system as described in RIGGING THE AILERON CONTROL SYSTEM.

CONTROL COLUMN ROLLER ADJUSTMENT

FORWARD OUTER-TUBE ROLLERS (ROLL ON THE SQUARE INNER SHAFT)

FIGURE 4-5

There are four rollers on the forward end of each control column which transmit torque to the square inner shaft. Two of the rollers for each control column are installed with eccentric bolts which allow for adjustment of roller clearance. These two bolts may be identified by their 10-32 threads. Adjust the rollers as follows:



36-155-6

Dual Control Column Chain Rigging
(TH-1389, TH-1396 and After)
Figure 4-4

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- a. Wipe the shafts clean and dry.
- b. Hold one of the nonadjustable rollers firmly against the shaft.
- c. The roller on the opposite side of the shaft should turn freely while having no more than 0.002 inch of clearance.
- d. If the conditions of step c are not met, loosen the nut on the roller which has the bolt with 10-32 threads. Turn the bolt until in compliance with the conditions of step c.
- e. Tighten the nut. Recheck the roller clearance after tightening (steps b and c).
- f. Check the other pair of rollers as indicated in steps b and c.
- g. If the adjustment is needed for the second set of rollers, follow steps d, e, and f.

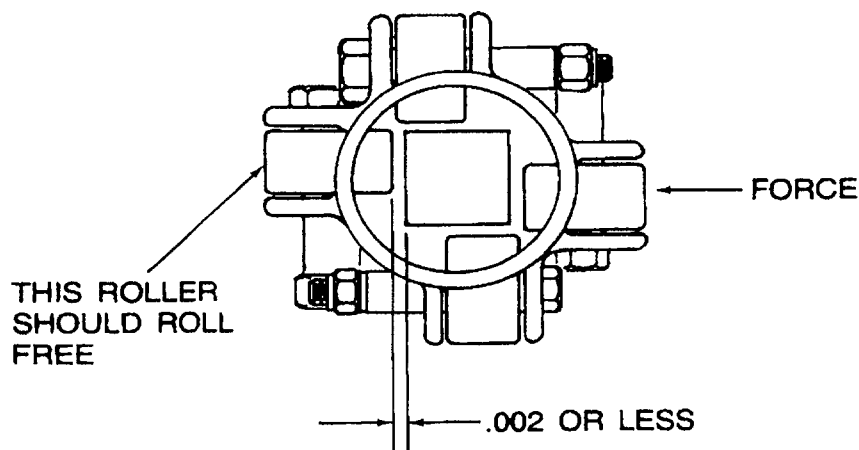
Repeat this procedure for the other control column.

CONTROL COLUMN SUPPORT ROLLER ADJUSTMENT (ATTACHED TO THE INSTRUMENT SUBPANEL)

The top two rollers of each control column support are installed with eccentric bolts which may be used for adjustment. Check the roller adjustment as follows:

Pull the control column fore and aft until the position of least clearance between the control column and support rollers is located. Keep the control column in this position while checking and/or adjusting the clearance. Each control column will probably have its own position of least clearance.

- a. Hold the control column firmly against the two top rollers.
- b. The clearance between the control column tube and the lower roller should be 0.005 ± 0.002 inch.
- c. If the correct clearance is not indicated loosen the nuts on the two top rollers.
- d. Rotate the bolts to obtain the proper clearance.



36-150-4

Forward Control Column Rollers
Figure 4-5

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- e. Tighten the nuts.
- f. Recheck for proper clearance (step b).
- g. Repeat for the other control column.

AILERON SYSTEM

AILERON REMOVAL

- a. Disconnect the lower aileron tab push-pull rod (left aileron only).

NOTE

Lowering the flaps will aid in disconnecting the aileron tab push-pull rod.

- b. Support the aileron and remove the two attaching screws from the top and bottom of each hinge bracket.
- c. Pull the aileron straight away from the wing to avoid damage to the attaching areas and gain access to the bonding cable screws.
- d. Remove the screws attaching the bonding cable to the aileron.

AILERON INSTALLATION

NOTE

If the aileron tab has been removed and reinstalled, or a new tab installed, lubricate the tab hinge with VV-L-800A (preferred) or CRC 3-36, LPS-1 or WD-40 (50, Consumable Materials Chart, Section 2).

- a. Attach the bonding cable to the aileron.
- b. Place the aileron in position on the hinge brackets. The hinge brackets must be in the correct place between the aileron skin and the reinforcing structure.
- c. Install the upper and lower hinge bracket screws.
- d. Pull on the aileron in a direction straight away from the wing to make sure that the hinge brackets are positioned correctly. If there is any movement of the aileron, recheck the position of all hinge brackets.
- e. Connect the aileron tab push-pull rod and install the cotter pin (left aileron only).

NOTE

Lowering the flaps will aid in connecting the aileron tab push-pull rod.

RIGGING THE AILERON CONTROL SYSTEM

(TC-1 AND AFTER; TE-1 AND AFTER; TH-1 THRU TH-1388, TH-1390 THRU TH-1395)
FIGURE 4-6

NOTE

Beech recommends the use of the aileron travel gage shown in the GENERAL INFORMATION section of this manual. Locate the travel gage at wing station 122.75.

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- a. Aileron and flap surfaces must align with the upper and lower surfaces of the wing within 1/16 inch.
- b. Check the aileron for lost motion at the midpoint of the trailing edge with the bellcrank stationary. The maximum allowable lost motion is 1/16 inch.
- c. Position the left aileron bellcrank so that the center of the attach point hole for the cable is 1.9 to 2.0 inches from the adjacent rib. The aileron is in neutral when the aileron trailing edge aligns with the trailing edge of the wing, and its inboard end is parallel with the outboard end of the flap. A horizontal misalignment of $\pm 3/16$ inch is allowed between the trailing edges of the aileron and wing. If the aileron is not in neutral, adjust the length of the aileron push-pull tube. Loosen the locknuts of both ends and turn the tube to shorten or lengthen. Tighten the locknuts. Repeat the procedure for the right aileron.
- d. Place the control wheel in neutral by leveling the top of the control wheel with a spirit level.

NOTE

The control wheel must be level in relation to the airplane. If the airplane is not level, make a corresponding change to the position of the control wheel using a spirit level protractor.

- e. Adjust the turnbuckles in the wheel wells to bring the right and left ailerons to neutral.
- f. Adjust the travel stops (primary stops) on both aileron bellcranks to obtain 19° to 21° of deflection in each direction.
- g. Tighten the locknuts on both stop bolts for the bellcrank.
- h. Rig the aileron cables to the tension shown in Figure 4-6. Use the turnbuckles in the wheel wells.
- i. Be sure each aileron bellcrank contacts its upstop at the same time the bellcrank in the opposite wing contacts its downstop.
- j. Check the control stop (secondary stop) in the control column for 0.12 to 0.18 inch clearance in each direction. If the clearance is not correct, recheck the entire aileron control system for correct chain and cable rigging.

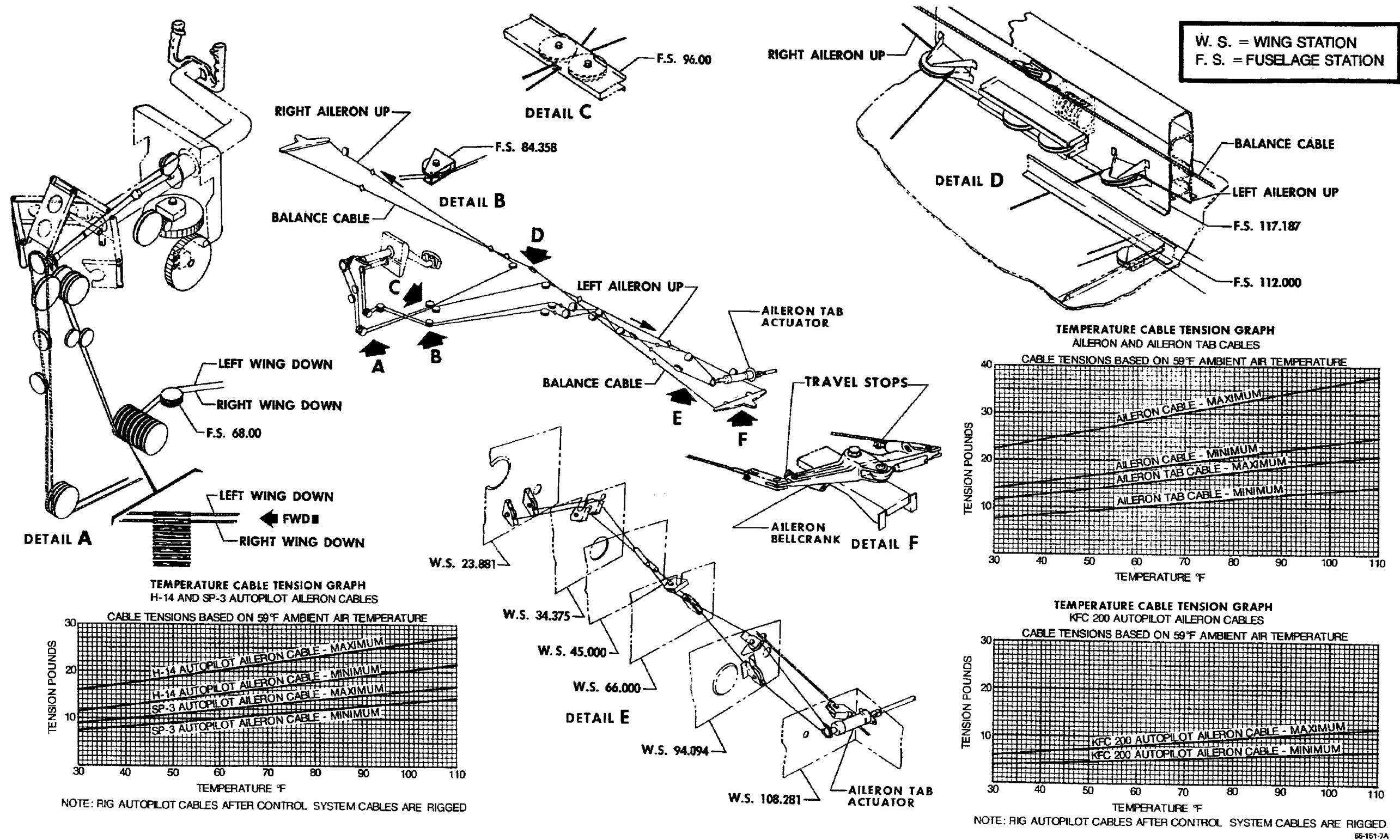
NOTE

The control stop clearance provides a slight movement of the control wheel (a "cushion") after the travel stops on the aileron bellcranks make contact.

- k. Recheck cable tension and safety wire the turnbuckles. Be sure that all locknuts are tight.

WARNING

Check the ailerons for correct direction of movement. When the control wheel is moved to the left, the left aileron must move up and the right aileron must move down. When the control wheel is moved to the right, the right aileron must move up and left aileron must move down.



Rigging the Aileron Control System
(TC-1 and After; TE-1 and After; TH-1 thru
TH-1388, TH-1390 thru TH-1395)
Figure 4-6

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RIGGING THE AILERON CONTROL SYSTEM (TH-1389, TH-1396 AND AFTER) *FIGURE 4-7*

WARNING

When replacing or installing control cables, bellcranks and other control system components, observe the color coding on all parts. Do not connect coded parts of one color to coded parts of a different color.

NOTE

Beech recommends the use of the aileron travel gage shown in the GENERAL INFORMATION section of this manual. Locate the travel gage at wing station 122.75.

- a. Aileron and flap surfaces must align with the upper and lower surfaces of the wing within 1/16 inch.
- b. Check the aileron for lost motion at the midpoint of the trailing edge with the bellcrank stationary. The maximum allowable lost motion is 1/16 inch.
- c. Position the left aileron bellcrank so that the center of the attach point hole for the cable is 1.9 to 2.0 inches from the adjacent rib. The aileron is in neutral when the aileron trailing edge aligns with the trailing edge of the wing, and its inboard end is parallel with the outboard end of the flap. A horizontal misalignment of $\pm 3/16$ inch is allowed between the trailing edges of the aileron and wing. If the aileron is not in neutral, adjust the length of the aileron push-pull tube. Loosen the locknuts on both ends and turn the tube to shorten or lengthen. Tighten the locknuts. Repeat the procedure for the right aileron.
- d. Secure a straightedge across the tops of both control wheels. Check the control columns for correct chain rigging. Refer to CONTROL COLUMN CHAIN RIGGING.
- e. Adjust the turnbuckles in the wheel wells to bring the right and left ailerons to neutral.
- f. Remove the straightedge from the control wheels.
- g. Adjust the travel stops (primary stops) on both aileron bellcranks to obtain 19° to 21° of deflection in each direction.
- h. Tighten the locknuts on both of the stop bolts for the aileron bellcrank.
- i. Rig the aileron cables to the tension shown in Figure 4-7. Use the turnbuckles in the wheel wells.
- j. Be sure each aileron bellcrank contacts its upstop at the same time the bellcrank in the opposite wing contacts its downstop.
- k. Adjust the secondary stop bolts on the link assembly at the forward end of the control column. Clearance between the stop and each stop bolt must be 0.19 to 0.31 inch with the ailerons at full travel in either direction.
- l. Recheck cable tension and safety wire the turnbuckles. Be sure that all locknuts are tight.

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m. With the aileron control system fully rigged, the torque required to move the control wheel 10° right and left of neutral must not be over 15 inch-pounds.

WARNING

Check the ailerons for correct direction of movement. When the control wheel is moved to the left, the left aileron must move up and the right aileron must move down. When the control wheel is moved to the right, the right aileron must move up and the left aileron must move down.

AILERON TRIM TAB RIGGING

NOTE

Beech recommends the use of the aileron trim tab travel gage shown in the GENERAL INFORMATION section of this manual.

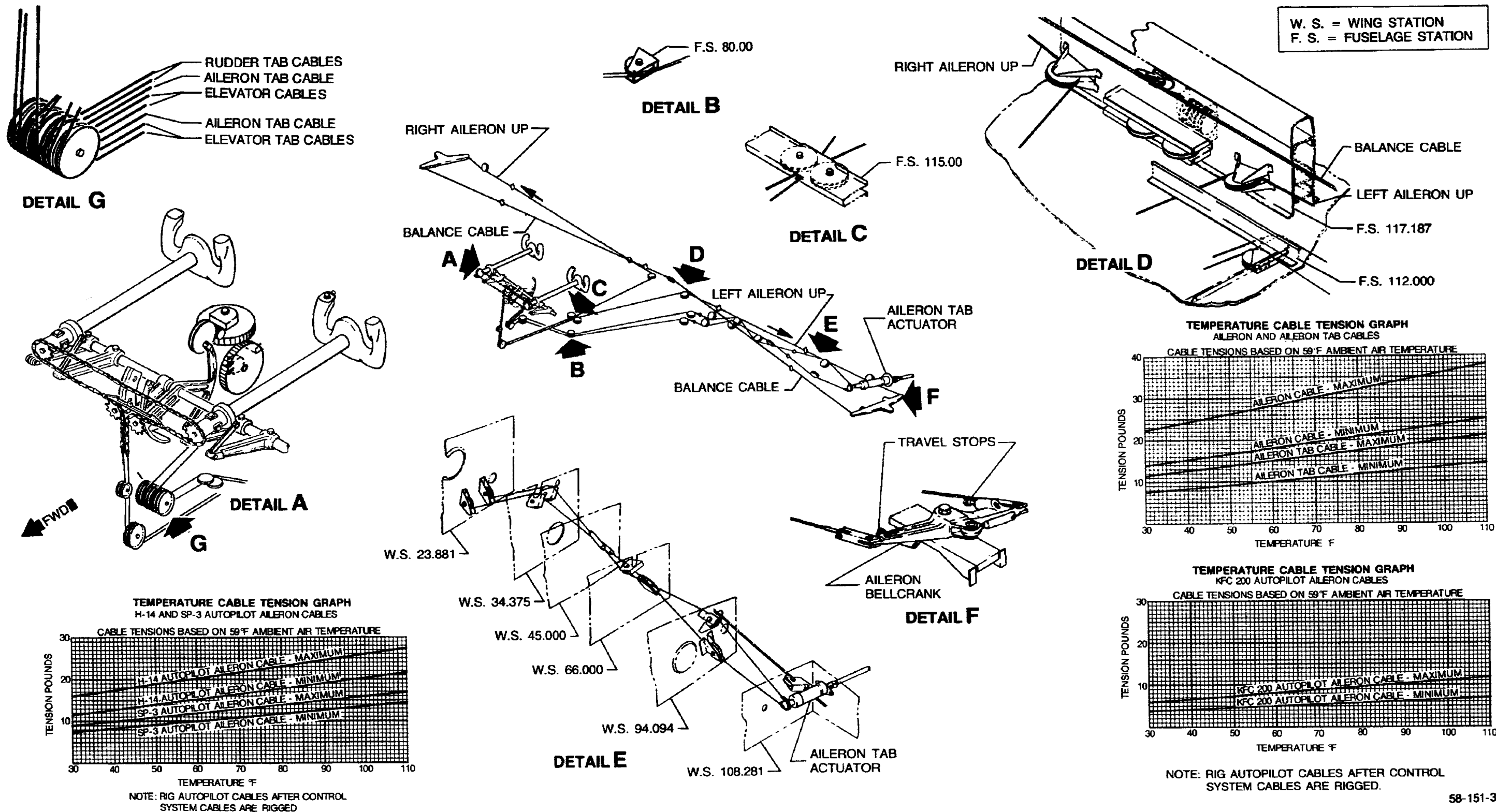
- a. Place the aileron trim tab control in neutral.
- b. Remove the access plate to the trim tab actuator.
- c. Place the aileron in neutral.
- d. Loosen the cable and remove the chain from the trim tab actuator sprocket. By turning the sprocket, move the trim tab actuator to both extremes of travel. Measure both settings and return the trim tab actuator to the midpoint of the two extremes of travel. This places the trim tab actuator in neutral.
- e. If the trim tab is not in neutral, adjust the length of the tab push-pull rod to place the trim tab in neutral.
- f. Center the chain on the sprocket and tighten the cable.
- g. Rig the cable tension as shown in Figures 4-6 and 4-7.
- h. Adjust the cable stops for the aileron trim tab to obtain 9° to 11° of surface deflection in each direction.
- i. Check trim tab travel. Safety wire all turnbuckles and cable stops.

NOTE

After rigging the aileron and aileron trim tab control systems, check for correct movement of the control surfaces with respect to the controls. Since the aileron trim tab is a servo tab, the tab moves up when the aileron moves down. When the trim tab control is moved to RIGHT WING UP, the tab moves down.

AILERON TRIM TAB ACTUATOR REMOVAL

- a. Remove the access plates at the actuator.
- b. Loosen the cable and remove the chain from the actuator sprocket.
- c. Disconnect the actuator from the trim tab linkage.
- d. Remove the bolts attaching the actuator to the wing structure. Remove the actuator.



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Rigging the Aileron Control System
(TH-1389, TH-1396 and After)
Figure 4-7

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AILERON TRIM TAB ACTUATOR INSTALLATION

- a. Position the actuator against the wing structure and install the attaching bolts and reconnect the tab linkage.
- b. Follow the procedure described in AILERON TRIM TAB RIGGING.

AILERON TRIM TAB ACTUATOR DISASSEMBLY

- a. Remove the pins from the nut assembly (5) and sprocket (1) and remove the sprocket (1) from the actuator assembly. Refer to Figure 4-8.
- b. Remove the snap ring (10) from the actuator housing (6), and pull the nut assembly (5) out of the housing.
- c. Remove the actuator screw (8) from the nut assembly.
- d. Remove the pins from the actuator screw (8) and the actuator rod end (11) and remove the actuator rod end (11) from the screw (8). The bearing (4) and the bushing (9) can now be removed from the screw.
- e. Remove the check nut (2), and screw out the adjusting bushing (3) with a spanner wrench.
- f. Remove the bearing (4) from the nut assembly.

AILERON TRIM TAB ACTUATOR CLEANING AND INSPECTION

- a. Clean all parts with solvent (15, Consumable Materials Chart, Section 2), and inspect for cracks, corrosion and distortion.
- b. Replace the bushings and any parts showing evidence of wear.
- c. Lubricate the actuator screw threads and the bearings with lubricating grease (11, Consumable Materials Chart, Section 2) before assembly.

AILERON TRIM TAB ACTUATOR ASSEMBLY

NOTE

During assembly lubricate all moving parts with grease (11, Consumable Materials Chart, Section 2).

- a. Install the bearing (4) on the nut assembly (5). Refer to Figure 4-8.
- b. Install the other bearing (4) and bushing (9) on the actuator screw (8).
- c. Install the actuator screw in the nut assembly.
- d. Push the nut assembly into the actuator housing (6), and install the snap ring (10) in the housing.
- e. Use a spanner wrench to install the adjusting bushing (3) into the housing until the end play between the screw housing and nut assembly is less than 0.025 inch. If the end play cannot be reduced to within limits, replace the actuator.
- f. Install the check nut (2) on the adjusting bushing.
- g. Install the actuator rod end (11) on the screw.
- h. Align the holes in the screw (8) with those of the actuator rod end (11) and install the two pins.

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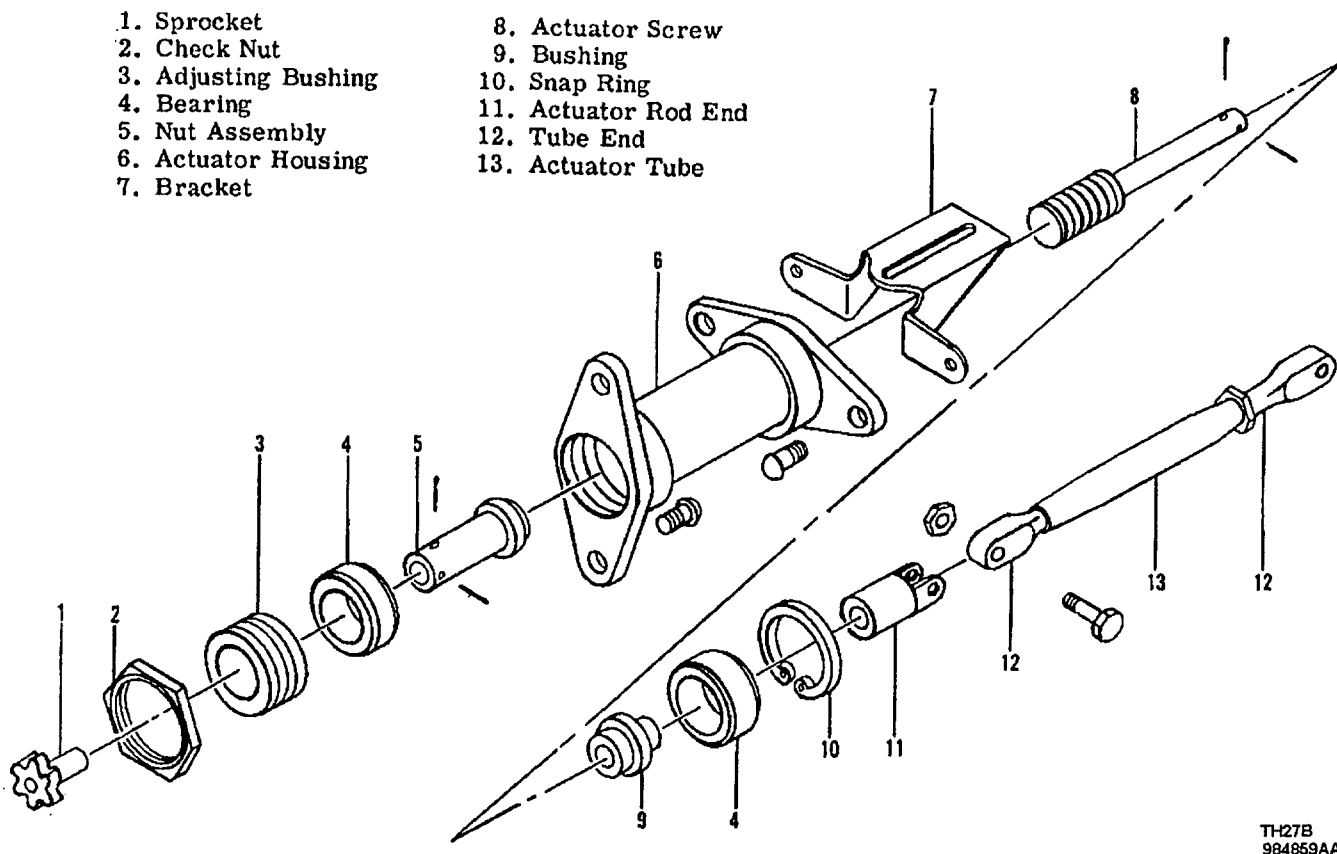
- i. Install the sprocket (1) on the actuator assembly.
- j. Align the holes in the sprocket (1) with those in the nut assembly (5) and install the two pins.

CHECKING AILERON TRIM TAB FREE PLAY FIGURE 4-9

Visually inspect the aileron trim tab for damage, security of hinge attach points, and for tightness of the actuating system. Inconsistencies must be corrected before checking the free play of the tab.

A check fixture (P/N 45-135030-9/810) or equivalent a dial indicator, and a push-pull scale for applying accurate loading to the tab are required for making the inspection for tab free play. Refer to Figure 4-9.

- a. Securely lock the control surfaces to prevent movement of the ailerons. Set the aileron trim tab in neutral.
- b. Use shot bags to hold the dial indicator check fixture so that the point of the dial indicator is 2.0 inches aft of the tab hinge line and on the outboard edge of the aileron tab.
- c. Apply a small piece of masking tape (for paint protection) 4.0 inches aft of the tab hinge line and along the centerline of the tab actuator. This is the point of pressure against the tab by the push-pull scale.

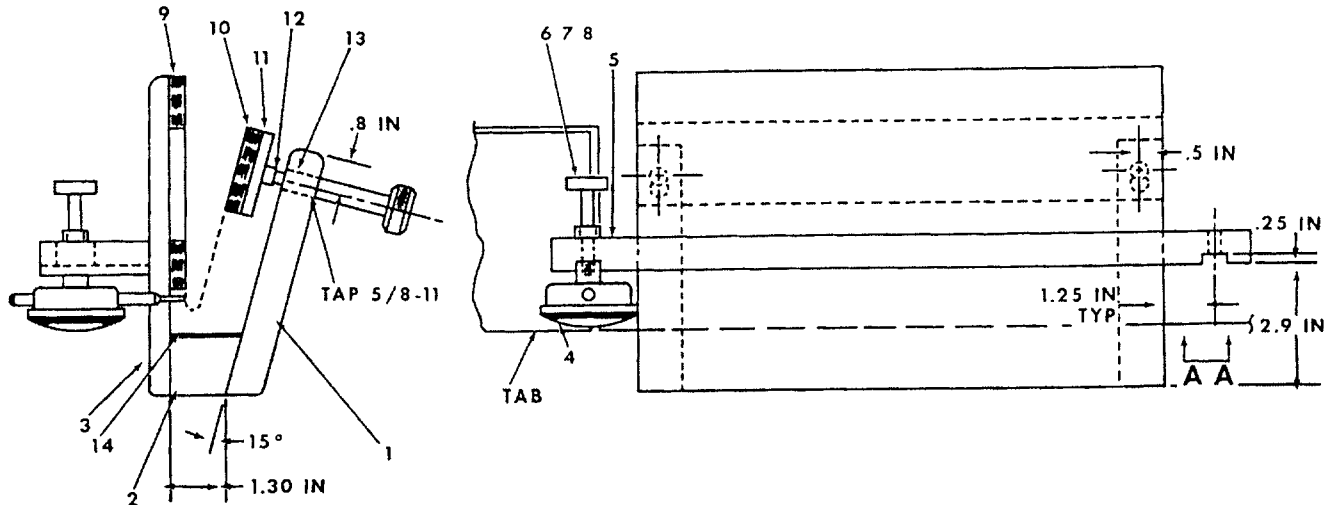


TH27B
984859AA

**Aileron Trim Tab Actuator
Figure 4-8**

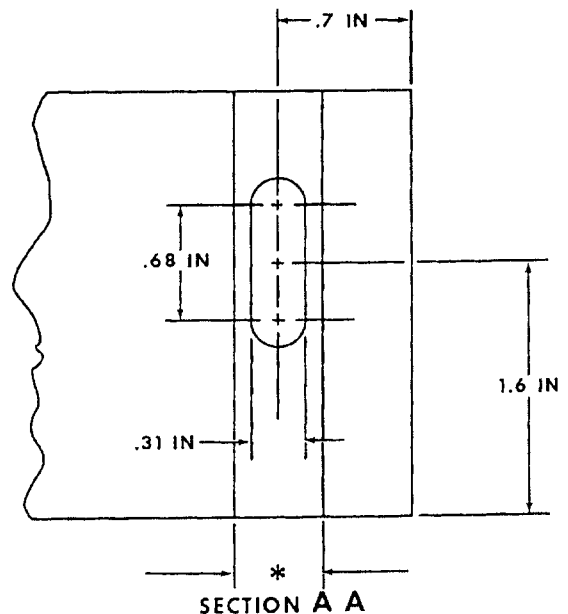
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ITEM NO.	QUANT.	DESCRIPTION
1	2	3/4 x 1 x 6 aluminum or equiv.
2	2	1 x 1 3/8 x 1 3/4 aluminum or equiv.
3	1	1/2 x 7 1/2 x 10 aluminum or equiv.
4	1	C81Q Indicator**
5	1	3/4 x 2 1/2 x 14 aluminum or equiv.
6	1	1/4 Dia. x 2 corrosion res. stl.
7	1	1/4 Dia. x 1 corrosion res. stl.
8	1	1/4-28 nut
9	1	3/8 x 5 x 10 rubber
10	1	3/8 x 2 x 10 rubber
11	1	1/4 x 2 x 10 corrosion res. stl.
12	2	1/2 x 13 x 3 VLIER Torque screw
13	2	KN813 Keensert or tap 1/2 - 13
14	2	1/8 x 1 x 3/4 rubber

**P/N of Federal Products Corp., Providence, R. I.



SECTION A A
* THIS GROOVE TO BE A SNUG FIT TO THE SCREW BRACKET ON THE DIAL INDICATOR

100-135-8

Fabricating Clamp for Tab Deflection
Figure 4-9

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- d. Apply another piece of masking tape in the corresponding location on the bottom surface of the tab.
- e. Set the dial indicator at zero. Do not reset the dial indicator during the checking procedure.
- f. With the push-pull scale on the masking tape, apply a 3.0 pound downward load. Record the dial reading as A.
- g. Release half of the load to obtain a 1.5 pound downward load. Record the dial reading as B.
- h. On the masking tape on the bottom surface, apply a 3.0 pound upward load. Record the dial reading as C.
- i. Release half of the load to obtain a 1.5 pound upward load. Record the reading as D.
- j. Enter the recorded readings on a copy of Chart 4-1 and proceed as follows:
 1. Multiply B by 2 and record as 2B.
 2. Subtract A from 2B and record as X.
 3. Multiply D by 2 and record as 2D.
 4. Subtract C from 2D and record as Y.

NOTE

X and Y can be negative numbers.

Add X and Y and record as E.

**CHART 4-1
AILERON TAB FREE PLAY LIMITS**

1.5-POUND READING	3-POUND READING	
B _____		
2B _____	- A _____	= X _____
D _____		
2D _____	- C _____	= Y _____
X _____	+ Y _____	= E _____

E = 0.094 inch maximum

- k. If the free play is over the maximum specified in Chart 4-1, inspect all components of the tab actuator system to determine the cause. All worn parts must be replaced.

ELEVATOR SYSTEM

ELEVATOR REMOVAL

NOTE

Refer to Beech Service Instructions No. 0636-133 for inspection of the elevator hinges and torque fittings on airplane serials TC-1 through TC-1414, TE-1 through TE-848 and TH-1 through TH-184.

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- a. Detach the tailcone. Disconnect the wire for the tail navigation light and remove the tail cone.
- b. Remove the tail section access doors on the left side of the fuselage.
- c. Remove the attaching nuts at the elevator hinge points.
- d. Disconnect the elevator push-pull tubes from the elevator torque fittings.
- e. Disconnect the elevator trim tab actuator rods from the elevator trim tabs.
- f. Disconnect the elevator bonding cable. Remove the hinge bolts and remove the elevator.

ELEVATOR INSTALLATION

- a. Position the elevator on the stabilizer and install the elevator hinge bolts. Connect the elevator bonding cable.
- b. Connect the elevator trim tab actuator rod to the trim tab.
- c. Install the attaching nuts at the elevator hinge points. Torque the center and outboard hinge bolts to 20 to 25 inch-pounds.

NOTE

If cotter pin holes are not aligned continue tightening until the cotter pin may be inserted. Do not tighten beyond 40 inch-pounds.

- d. Torque the inboard hinge bolt to 30 to 40 inch-pounds.

NOTE

If cotter pin holes are not aligned continue tightening until the cotter pin may be inserted. Do not tighten beyond 70 inch-pounds.

- e. Connect the elevator push-pull tube at the elevator torque fitting.
- f. Install the tail cone and connect the navigation light wires. Install the access doors.

ELEVATOR SKIN REPLACEMENT (TC-547 AND AFTER; TE-1 AND AFTER; TH-1 AND AFTER) FIGURE 4-10

NOTE

The elevators on airplane serials TC-1 through TC-546 have skins that are riveted to the ribs. These elevator skins can be replaced using best sheet metal practices. The following procedure for bonded skins does not apply.

If an elevator is damaged to the point where skin replacement is required, it is possible to replace one or both skins. Replacement must be made only by an experienced sheet metal mechanic in a fully equipped sheet metal shop using the following procedure.

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NOTE

The following special tools must be fabricated for use when replacing one or both elevator skins:

A holding fixture which attaches to each of the elevator hinge points and holds the spar rigid during skin removal and replacement.

A tool for clamping the trailing edge of the elevator while the bonding material cures. Refer to Figure 4-10. This tool must also hold the trailing edge straight.

A small bucking bar with a handle long enough to reach from the trailing edge down between the skins to the rivets through the spar.

- a. Remove the damaged elevator from the airplane.

CAUTION

Do not remove both skins from the elevator at the same time. If both skins are to be replaced, one skin must be removed and the replacement skin installed on the elevator before the other skin is removed.

- b. Install the elevator in the holding fixture.
- c. Remove the forward outboard elevator tip cover.
- d. Remove the elevator tab.

NOTE

Use the correct size drill bits when removing rivets to avoid oversize holes in the structure.

- e. Drill out all the rivets along the trailing edge of the elevator.
- f. Drill out the rivets that attach the skin to the ribs and tab hinge bracket.
- g. Use a thin sharp putty knife or equivalent tool to cut through the bonded area at the aft end of the skin stiffeners.

NOTE

Be careful while cutting the bonding material to prevent damage to the honeycomb stiffeners on the undamaged skin.

- h. Drill out the rivets that attach the skin to the spar and remove all attaching screws from the skin.
- i. Remove the skin from the elevator.
- j. If the upper skin is to be replaced, drill out the rivets in the tab actuator rod fairing and remove the fairing.

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- k. Remove the stiffeners from the damaged skin and secure the skin to the replacement skin. Trim and drill the new skin as necessary to match the old skin. Do not drill the trailing edge rivet holes.

CAUTION

Extreme caution must be exercised throughout the assembly procedure. The replacement skin must fit so that the trailing edge is perfectly straight from the inboard end to the outboard end. The centerline of the trailing edge must be on the same centerline as the hinges (see Figure 4-10).

- l. Paint the inside of the new skin and the attaching surfaces of the elevator structure with epoxy primer. DO NOT PRIME AREAS TO BE BONDED.
- m. Remove all rivet butts, metal shavings and burrs from the elevator structure and skin.

NOTE

Use MS20470B rivets of the correct size and length to secure the skin to the elevator, except as noted.

- n. Install the tab actuator rod fairing (upper skin only).
- o. Position the new skin on the elevator structure and hold in place with Cleco fasteners.
- p. Rivet the skin to the elevator spar and ribs working from the center out to each end. Leave the trailing edge loose.

NOTE

45-610005-14 channels are installed at the forward tab actuator rod opening on newer elevator assemblies. Use MS20470AD rivets of the correct size and length to secure the skin to the spar in the area of the channel.

- q. Rivet the skin to the hinge bracket.
- r. If both skins are to be replaced, repeat the preceding procedure on the remaining skin.
- s. Clean the bonding strips, and apply PR890 (P/N of Coast Proseal Company, Los Angeles California) or PR1440 (P/N of Products Research, Burbank California) bonding cement to the bonding strips on the new skin. Apply the bonding cement just before riveting the trailing edge and allow curing time as specified by the sealant manufacturer.

CAUTION

Do not use too much cement as it can affect the elevator balance. Apply the cement 1/8-inch thick to only one side of the bond area.

- t. Insert a new 96-610006-15 inboard trailing edge spacer, a new 96-610006-35 outboard trailing edge spacer and the fixed elevator tab between the trailing edge skins.

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- u. Use a clamping device to clamp the bonding area of the elevator. Refer to Figure 4-10.

NOTE

The clamping device must be tightened just enough to hold the bonded area together.

- v. Use a suitable clamping device to hold the trailing edge of the skins together for drilling and riveting.
- w. Drill rivet holes in the trailing edge using the same spacing as was used on the old skin. Use a No. 40 drill bit.
- x. Rivet the trailing edge.
- y. Install all screws and attaching hardware removed during disassembly.
- z. Paint the elevator.
- aa. Balance the elevator. (See BALANCING THE ELEVATOR)
- ab. Install the elevator on the airplane.

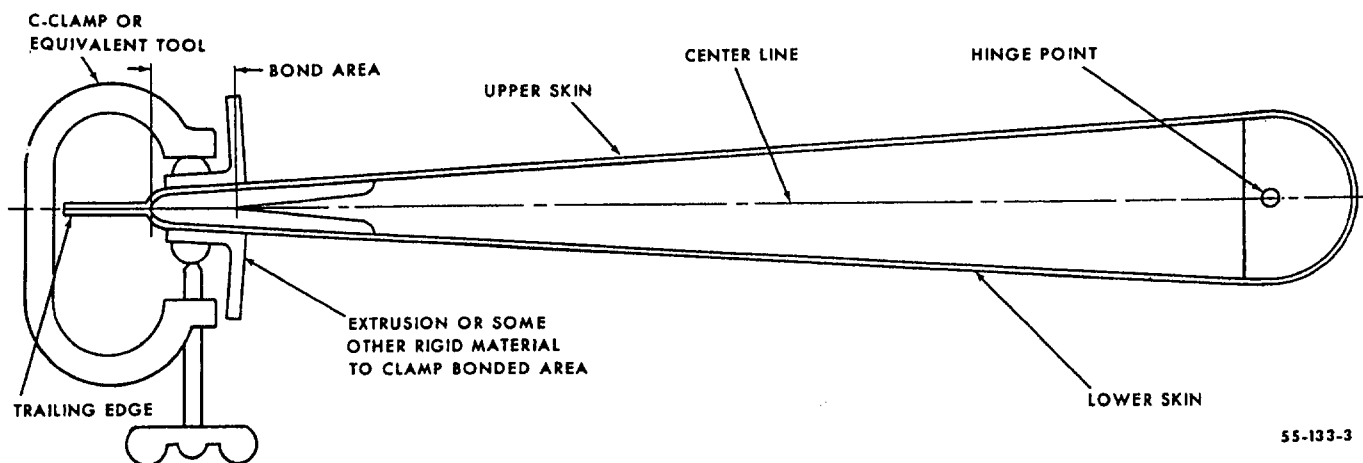
RIGGING THE ELEVATOR CONTROL SYSTEM

(TC-1 AND AFTER; TE-1 AND AFTER; TH-1 THRU TH-1388, TH-1390 THRU TH-1395)
FIGURE 4-11

NOTE

Beech recommends the use of the elevator travel gage shown in the GENERAL INFORMATION section of this manual. Locate the travel gage at station 35.75.

- a. Adjust the upper elevator stop bolt so that the centerline of the bottom cable attachment hole in the elevator bellcrank is 0.70 to 0.80 inch from the aft bulkhead.



Elevator Skin Replacement
(TC-547 and After; TE-1 and After; TH-1 and After)
Figure 4-10

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- b. Adjust the length of the elevator push-pull rods to obtain 14° to 16° of down travel.
- c. Adjust the lower stop bolt in the elevator bellcrank to obtain 29° to 31° of up travel.
- d. Rig the cable tension as shown in Figure 4-11. Adjust the cable so that the elevator bellcrank contacts its downstop before the control column is in the full forward position.

NOTE

Tensiometer readings must be taken on the top and bottom cables with the elevator in the down position against the stop and the downsprings connected.

- e. With the elevator bellcrank against its upstop, adjust the control column stop to obtain a clearance of 0.06 to 0.12 inch.
- f. Check elevator travel.

WARNING

Check the elevators for correct direction of movement. When the control wheel is moved forward, the elevators must move down. When the control wheel is moved aft, the elevators must move up.

- g. Check the elevator downspring loads as described in the following procedure.

ELEVATOR DOWNSPRING LOADS

With the downsprings connected, the loads in the elevator control system must be within the limits given below. Measure the loads in a draft-free area using a push-pull scale on the control wheel.

For TC-1 and After:

- 24 to 28 pounds breakout (down elevator),
- 23 to 25 pounds breakout at 0° elevator (neutral),
- 10 to 12 pounds at 30° up elevator (0.06 inch off stop).

For TE-1 and After:

- 21 to 24 pounds breakout (down elevator),
- 22 to 24 pounds breakout at 0° elevator (neutral),
- 20 to 21 pounds at 30° up elevator (0.06 inch off stop).

For TH-1 thru TH-1388, TH-1390 thru TH-1395:

- 32 to 35 pounds moving the control wheel aft through neutral from full down elevator,
- 19 to 33 pounds moving the control wheel forward through neutral from full up elevator,
- 0 to 14 pounds difference between readings.

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RIGGING THE ELEVATOR CONTROL SYSTEM (TH-1389, TH-1396 AND AFTER) FIGURE 4-12

WARNING

When replacing or installing control cables, bellcranks and other control system components, observe the color coding on all parts. Do not connect coded parts of one color to coded parts of a different color.

NOTE

Beech recommends the use of the elevator travel gage shown in the GENERAL INFORMATION section of this manual. Locate the travel gage at station 35.75.

To position the elevator in neutral, a tool can be fabricated from 5/16-inch-diameter steel rod. Refer to Figure 4-13.

- a. Adjust the upper elevator stop bolt so that the centerline of the bottom cable attachment hole in the elevator bellcrank is 0.70 to 0.80 inch from the aft bulkhead.
- b. Adjust the length of the elevator push-pull rods to obtain 14° to 16° of down travel.
- c. Adjust the lower stop bolt in the elevator bellcrank to obtain 29° to 31° of up travel.
- d. Disconnect the elevator downsprings.
- e. Set the elevator controls in neutral. To obtain neutral, insert the short end of the fabricated tool in the control column hanger. Refer to Figure 4-13. Move the control wheel aft and insert the other end of the tool into the control shaft and torque tube.
- f. Rig cable tension as shown in Figure 4-11.

NOTE

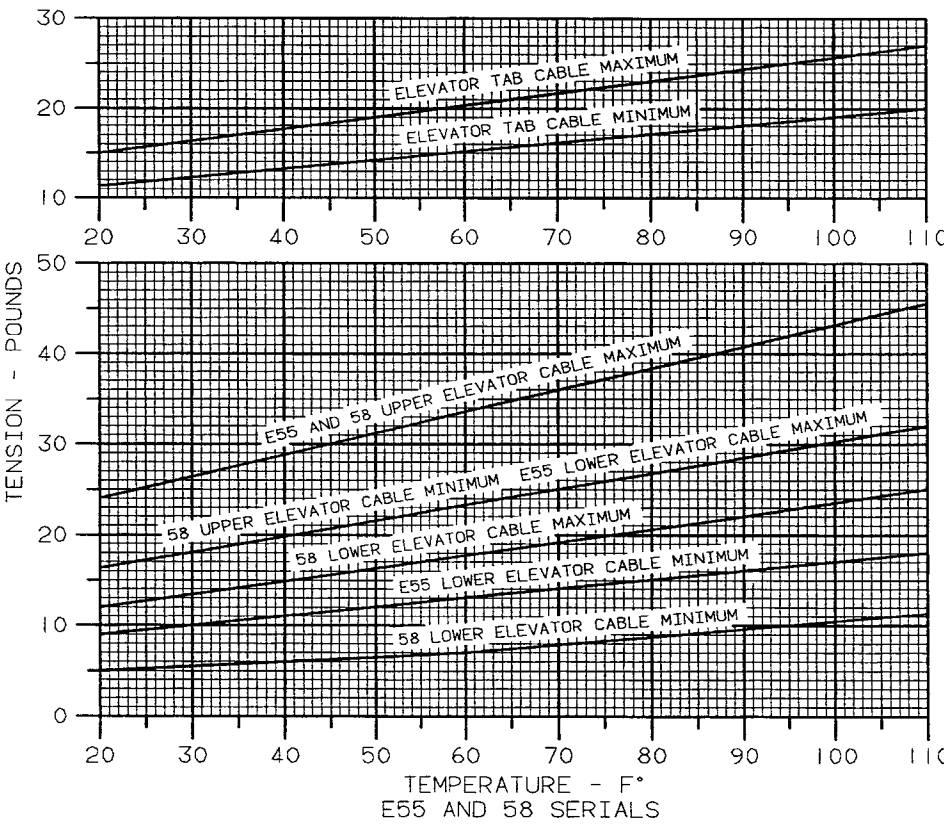
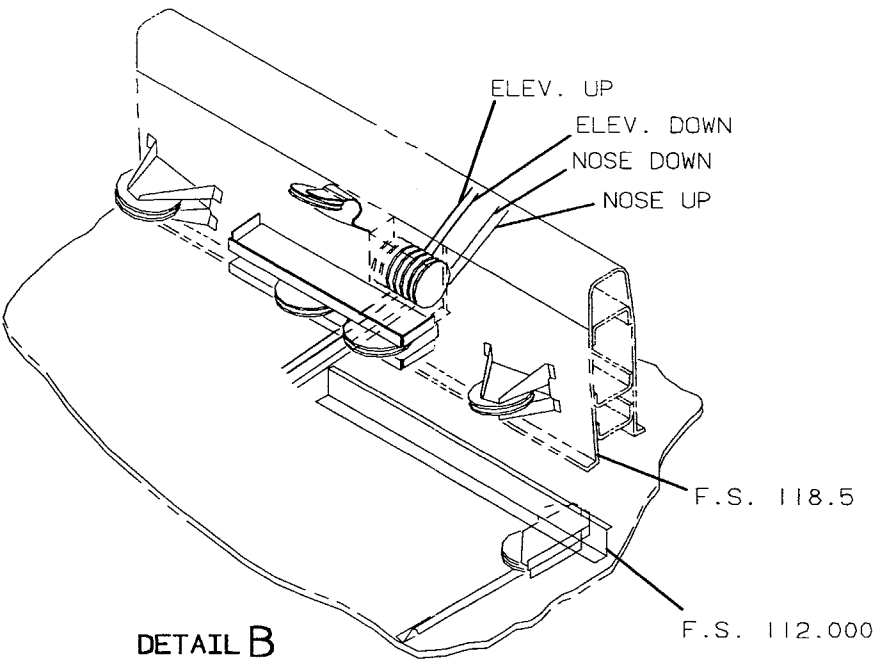
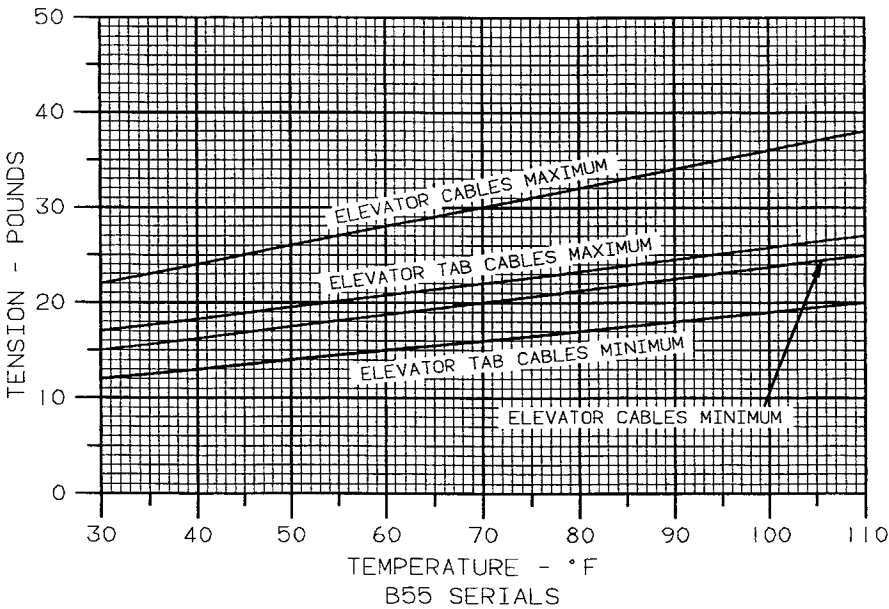
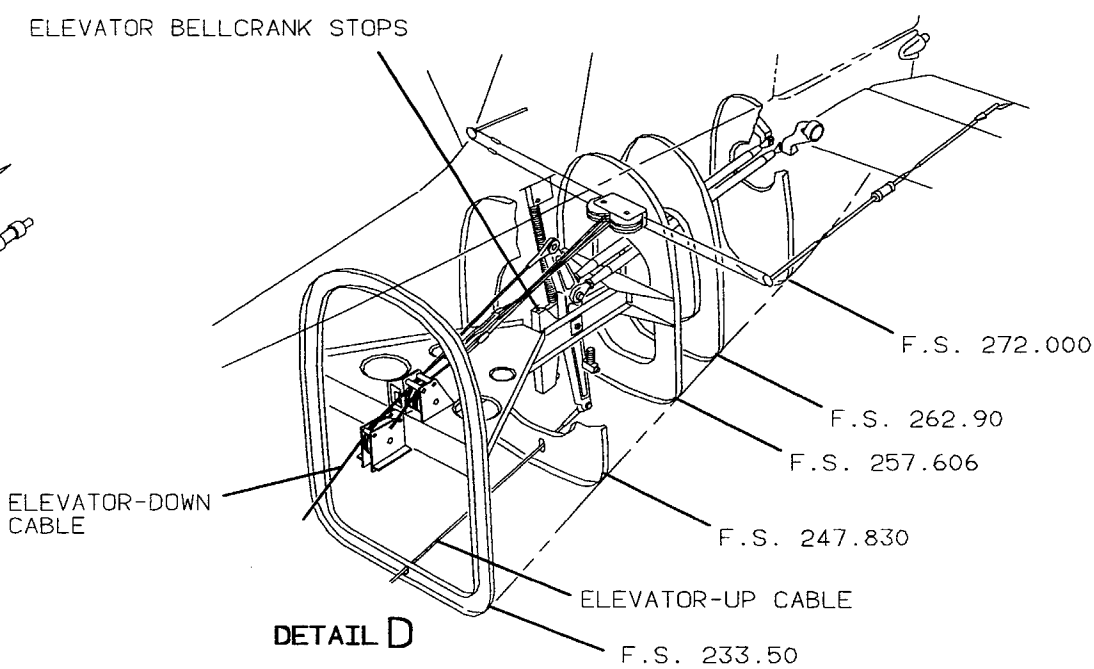
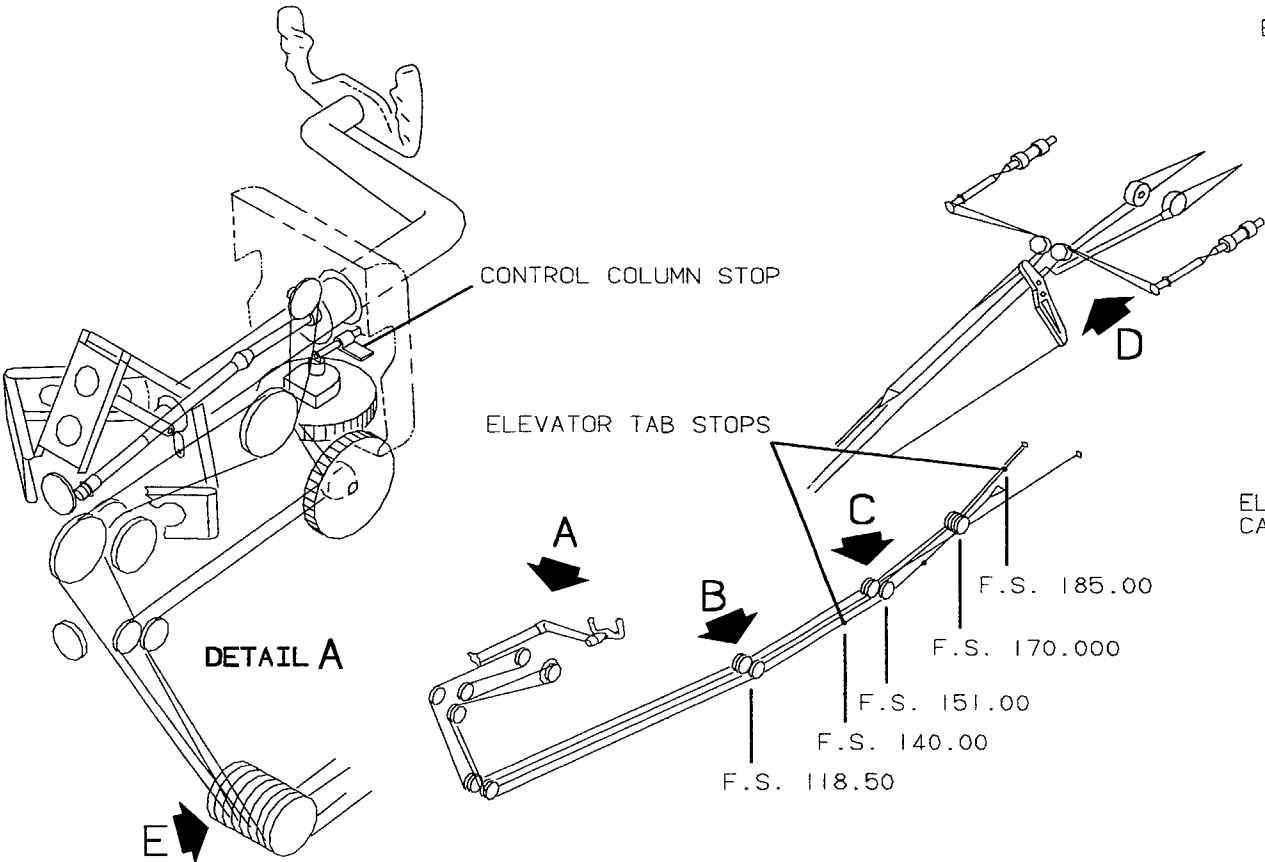
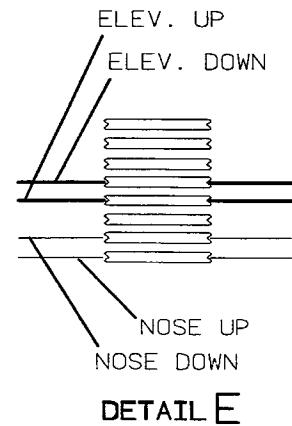
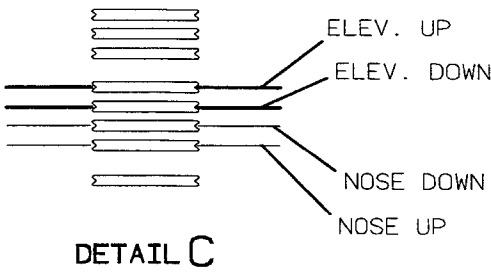
Tensiometer readings must be taken on the upper and lower elevator cables with the downsprings disconnected.

- g. Connect the elevator downsprings.
- h. Check elevator travel.

WARNING

Check the elevators for correct direction of movement. When the control wheel is moved forward, the elevators must move down. When the control wheel is moved aft, the elevators must move up.

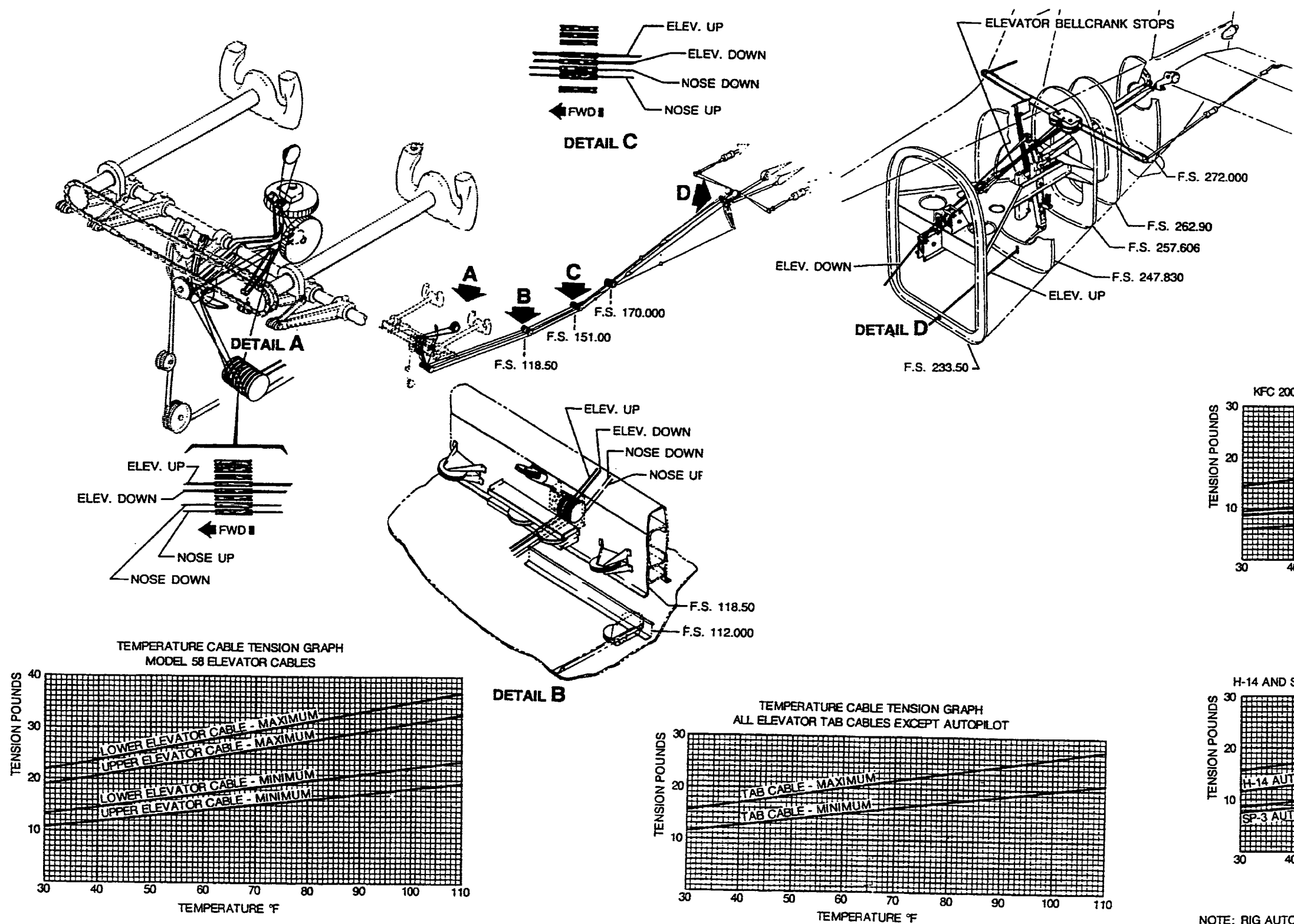
- i. Check the loads in the elevator control system in a draft free area using a push-pull scale on the control wheel. Pulling the control wheel aft from full down elevator, the load through neutral must be 39 to 43 pounds. Pushing the control wheel forward from full up elevator, the load through neutral must be 23 to 27 pounds. The difference between the two readings must be 13 to 19 pounds.



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NOTE: RIG AUTOPILOT CABLES AFTER CONTROL SYSTEM CABLES ARE RIGGED.

58-152-33

Rigging the Elevator Control System
(TH-1389, TH-1396 and After)
Figure 4-12

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BEECH BARON 55 AND 58 SHOP MANUAL

ELEVATOR TRIM TAB RIGGING

NOTE

Airplane serials TC-1 through TC-1194 are equipped with elevator trim tabs which are cambered only on the bottom surface. Airplane serials TC-1195 and after, TE-1 and after and TH-1 and after use uncambered trim tabs.

Beech recommends the use of the elevator trim tab travel gage shown in the GENERAL INFORMATION section of this manual. Locate the travel gage at station 35.75.

To position the elevators in neutral on airplane serials TC-1437 and after, TE-860 and after and TH-223 and after, a tool can be fabricated from 5/16-inch-diameter steel rod as shown in Figure 4-13.

- a. Set the elevators in neutral. To obtain neutral on airplane serials prior to TC-1437, TE-860 and TH-223, insert the control column locking pin into the matching holes in the control shaft torque tube and control column hanger. To obtain neutral on later models, insert the short end of the fabricated tool into the control column hanger. Refer to Figure 4-13. Move the control column aft and insert the other end of the tool into the control shaft and torque tube.
- b. Set the elevator trim tab control to 23° nose up.
- c. Adjust the tab actuator so that the actuator rod extends for two-thirds of its total travel.
- d. Set the tab at 23° down and connect the pushrod to the actuator.
- e. Install the chain on the actuator sprocket so that the three links on the bottom of the sprocket are left unengaged. Tighten the cables.
- f. Rig the tab cable tension as shown in Figures 4-11 or 4-12. Where the cable divides into two cables, the tensions of the two cables must be equal within 2 pounds.
- g. Check the elevator trim tab travel and adjust the tab cable stops to obtain 9° to 11° deflection above, and 22° to 24° deflection below the elevator.
- h. Safety wire the turnbuckles and stops.
- i. Use a push-pull scale to check the force required to move the tab cable system. Pulling in line with the cable, the force must not be over the following limits:

TC-1 and After	20 Pounds
TE-1 and After	20 Pounds
TH-1 thru TH-1388, TH-1390 thru TH-1395	20 Pounds
TH-1389, TH-1396 and After	20 Pounds

WARNING

After rigging the elevator and elevator trim tab control system, check for correct movement of the control surfaces with respect to the movement of the controls. When the elevator trim tab control is moved toward the NOSE DOWN position, the elevator trim tab should move UP.

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REPLACING THE ELEVATOR TRIM TAB INDICATOR CABLE

(TC-1 AND AFTER; TE-1 AND AFTER; TH-1 THRU TH-1388, TH-1390 THRU TH-1395)

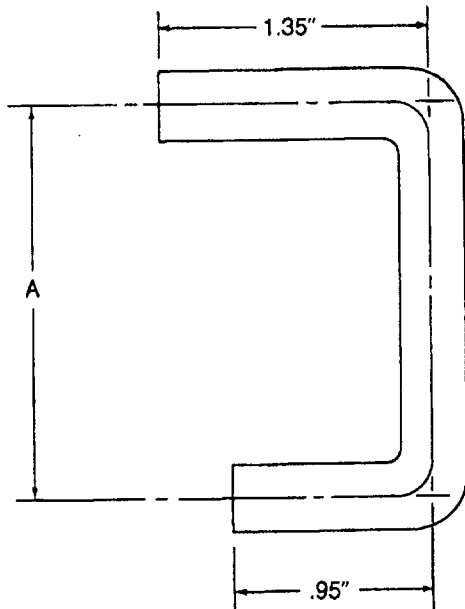
FIGURE 4-14

NOTE

On the later TH serials the elevator trim tab indicator is driven directly by the tab control wheel.

- The elevator trim tab control system must be correctly rigged and the elevator control in neutral.
- Install the indicator cable through the head of the cotter pin on the side of the indicator drum. Bring both ends of the cable out through the hole in the indicator drum.
- With the indicator set a 0° (neutral), both ends of the cable must be equal in length.
- Wrap each end of the cable around the drum one full turn in opposite directions. The end that wraps to the right wraps clockwise around the drum, and the end that wraps to the left wraps counterclockwise around the drum, as viewed from the left side.
- Route both ends of the cable over the idler pulleys down to the shaft of the tab control wheel.
- With the indicator still at 0° (neutral), take the cable coming off the top of the indicator drum (wrapped counterclockwise) down to the forward side of the control wheel shaft to the left of the hole.

FABRICATE FROM 5/16 INCH DIAMETER STEEL ROD



AIRPLANE SERIAL NO.	DIMENSION A
TC-1437 AND AFTER TE-860 AND AFTER TH-223 THROUGH TH-1388 TH-1390 THROUGH TH-1395	1.75 INCHES
TH-1389 TH-1396 AND AFTER	2.50 INCHES

58-17-31

Elevator Neutral Rig Pin
Figure 4-13

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- g. Wrap the cable counterclockwise (as viewed from the left) around the shaft toward the hole three full turns. Insert the cable through the holes and wrap the excess cable clockwise around the shaft.
- h. Take the cable coming off the bottom of the indicator drum (wrapped clockwise) down to the aft side of the control wheel shaft to the right of the hole.
- i. Wrap the cable clockwise (as viewed from the left) around the shaft toward the hole three full turns. Insert the cable through the holes and wrap the excess cable counterclockwise around the shaft.
- j. Twist the two cable ends together and solder with rosin core solder.
- k. Check the tab control and dial to be sure that it moves freely from one stop to the other.
- l. Check the tab travel and direction of movement to be sure that it corresponds to the movement of the control and indicator.

ELEVATOR TRIM TAB ACTUATOR REMOVAL

- a. Remove the access panel near the trailing edge of the horizontal stabilizer to gain access to the elevator trim tab actuator.
- b. Detach the tail cone, disconnect the tail navigation light wire and remove the tail cone.
- c. Remove the access panel on the left hand side of the fuselage just forward of the horizontal stabilizer.
- d. Remove the access panel near the leading edge of the horizontal stabilizer to gain access to the elevator trim tab actuator sprocket.
- e. Remove the elevator as outlined in Section 4 of this Shop Manual under the heading ELEVATOR REMOVAL.
- f. Disconnect the elevator trim tab cables at the turnbuckles in the aft fuselage. Secure the forward elevator trim tab cables to prevent them from unwinding at the universal.

CAUTION

Do not damage the cables. Use a material such as phenolic to protect the cables.

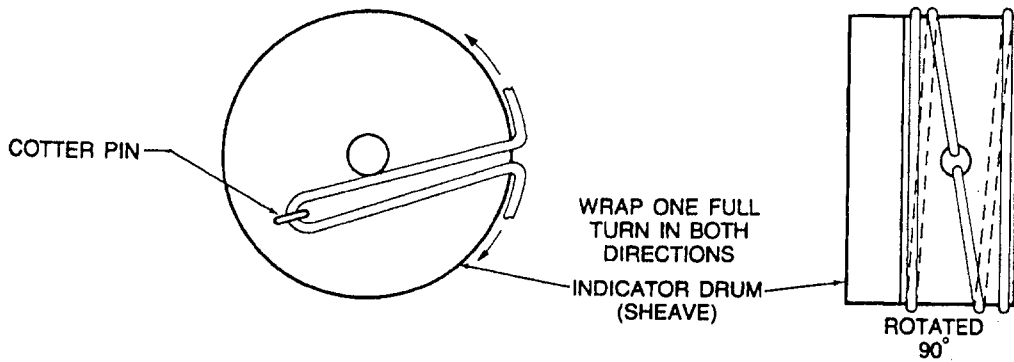
- g. Remove the chain and cable assembly from the elevator trim tab actuator sprocket.
- h. Remove the hardware attaching the elevator trim tab actuator to the horizontal stabilizer. Remove the actuator from the airplane.

NOTE

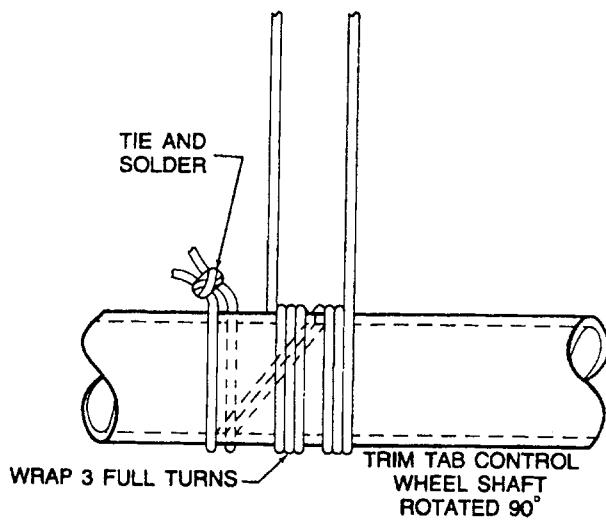
If the actuator is to be reinstalled, identify with a tag to ensure proper movement of the elevator tabs upon reinstallation of the actuators.

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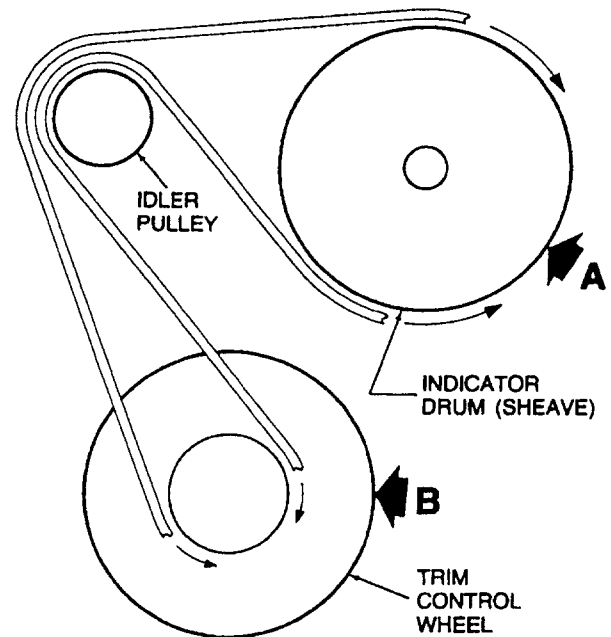
BEECH BARON 55 AND 58 SHOP MANUAL



DETAIL A



DETAIL B



36-152-39

Elevator Trim Tab Indicator Cable
(TC-1 and After; TE-1 and After; TH-1 thru TH-1338, TH-1390 thru TH-1395)
Figure 4-14

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BEECH BARON 55 AND 58 SHOP MANUAL

ELEVATOR TRIM TAB ACTUATOR INSTALLATION

WARNING

To ensure proper movement of the trim tabs, make sure that the left-hand actuator is installed on the left-hand horizontal stabilizer and the right-hand actuator is installed on the right-hand horizontal stabilizer.

The trim tab actuator that will be installed on the left-hand horizontal stabilizer, shall have threads on its actuator screw (4) that will rotate clockwise when screwed into the nut assembly (2). Refer to figure 4-15. The trim tab actuator that will be installed on the right hand horizontal stabilizer, shall have threads on the actuator screw (4) that rotate counterclockwise when screwed into the nut assembly (2). Refer to figure 4-15.

The elevator trim tab actuators must not be interchanged between the right and left horizontal stabilizers when they are reinstalled. Reversing the actuators, reverses the direction, and nose-up trim would actually result in an inadvertent nose-down trim condition that could result in an uncontrollable airplane attitude. Refer to elevator trim tab actuator color coding to reduce the probability of unintentionally switching the actuators upon installation.

- a. Position the elevator trim tab actuator in the horizontal stabilizer and install the attaching hardware.
- b. Position the chain and cable assembly on the actuator sprocket so that the ends of the chain are equidistant within ± 0.20 inch at the sprocket centerline.
- c. Install the elevator as outlined in Section 4 of this Shop Manual under the heading ELEVATOR INSTALLATION.
- d. Connect the elevator trim tab cables to the turnbuckles in the aft fuselage.
- e. Remove material used to protect the cables.
- f. Rig the elevator trim tab control system as outlined in Section 4 of this Shop Manual under the heading ELEVATOR TRIM TAB RIGGING.

NOTE

After rigging the elevator and elevator trim tab control system, check for correct movement of the control surfaces with respect to the movement of the controls. When the elevator trim tab control wheel is moved toward the NOSE DOWN position, the elevator trim tab should move UP.

- g. Install the access panel, located near the leading edge of the horizontal stabilizer.
- h. Install the access panel, located near the trailing edge on the horizontal stabilizer.
 1. Install the access panel on the left-hand side of the fuselage, just forward of the horizontal stabilizer.
- i. Connect the tail navigation light wire and install the tail cone.

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BEECH BARON 55 AND 58 SHOP MANUAL

ELEVATOR TRIM TAB ACTUATOR COLOR CODING

Elevator trim tab actuators should be color coded with LH blue and RH black. Color coding of the elevator trim tab actuators can be accomplished with the actuators installed or before installation. This will reduce the probability of unintentionally switching the actuators. Use Beech Mandatory Service Bulletin No. 2399 for painting instructions on how to color code elevator trim tab actuators.

WARNING

Do not install a blue-coded actuator on a black-coded stabilizer or a black-coded actuator on a blue-coded stabilizer.

ELEVATOR TRIM TAB ACTUATOR DISASSEMBLY (TC-1 THRU TC-1143; TE-1 THRU TE-617) FIGURE 4-15

NOTE

Refer to Beech Service Instructions No. 0610-152, Revision II, for modification of the elevator trim tab installation.

- a. Remove the snap ring (1) from the actuator housing (11), and pull the nut assembly (2) out of the housing.
- b. Remove the actuator screw (4) from the nut assembly.
- c. Drill out the rivets (12 and 13), and remove the spacer (5) and the actuator rod end (6) from the screw. The bearing (7) and the bushing (8) can now be removed from the screw.

NOTE

The rivets (12 and 13) and spacer (5) were replaced with a shoulder pin, washer, nut and rivet at airplane serials TC-1071, TC-1073 through TC-1143, TE-521, TE-528 through TE-538 and TE-543 through TE-617. Refer to Figure 4-15 insert.

- d. Remove the check nut (9), and screw out the adjusting bushing (10) using a spanner wrench.
- e. Remove the O-ring (14) from the adjusting bushing.
- f. Remove the bearing (3) from the nut assembly.

ELEVATOR TRIM TAB ACTUATOR CLEANING AND LUBRICATION (TC-1 THRU TC-1143; TE-1 THRU TE-617)

NOTE

Refer to Beech Service Instructions No. 0610-152, Revision II, for modification of the elevator trim tab installation.

- a. Clean all parts in solvent (15, Consumable Materials Chart, Section 2) and inspect for cracks, corrosion and distortion.

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- b. Replace any parts showing evidence of wear. Lubricate the screw threads with lubricating grease (11, Consumable Materials Chart Section 2).
- c. Lubricate the O-ring with Silicone Compound (57, Consumable Materials Chart, Section 2).

ELEVATOR TRIM TAB ACTUATOR ASSEMBLY (TC-1 THRU TC-1143; TE-1 THRU TE-617) FIGURE 4-15

- a. Install the bearing (3) on the nut assembly (2).
- b. Install the bushing (8) and the bearing (7) on the actuator screw (4).
- c. Install the actuator rod end (6) on the screw using the spacer (5) and new rivets (12 and 13).

NOTE

The rivets (12 and 13) and spacer (5) were replaced with a shoulder pin, washer, nut and rivet at airplane serials TC-1071, TC-1073 through TC-1143, TE-521, TE-528 through TE-538 and TE-543 through TE-617. Refer to Figure 4-15 insert.

- d. Install the actuator screw into the nut assembly.

WARNING

The trim tab actuator that will be installed on the left-hand horizontal stabilizer, shall have threads on its actuator screw (4) that will rotate clockwise when screwed into the nut assembly (2). The trim tab actuator that will be installed on the right-hand horizontal stabilizer, shall have threads on the actuator screw (4) that rotate counterclockwise when screwed into the nut assembly (2).

- e. Push the nut assembly into the actuator housing (11).
- f. Install the snap ring (1) in the housing.
- g. Install O-ring (14) in bushing (10).
- h. Use a spanner wrench to install the adjusting bushing (10) into the housing until end play of the nut assembly is no more than 0.005 inch. The nut assembly must be free to rotate with no more than 15 inch-pounds of torque applied to the shaft, with no binding. If the end play cannot be reduced to within limits, replace the actuator.
- i. Install the check nut (9) on the adjusting bushing.

ELEVATOR TRIM TAB ACTUATOR DISASSEMBLY (TC-1144 AND AFTER; TE-618 AND AFTER; TH-1 AND AFTER) FIGURE 4-16

- a. Remove the bearing cap (1) from the housing (5).
- b. Remove the retaining ring (2) from the actuator housing and pull the collar (3) out of the housing.
- c. Remove the check nut (8) and the threaded bushing (7) from the housing.
- d. Remove the nut assembly (6) and the actuator screw (4) from the housing.

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BEECH BARON 55 AND 58 SHOP MANUAL

ELEVATOR TRIM TAB ACTUATOR CLEANING AND LUBRICATION (TC-1144 AND AFTER; TE-618 AND AFTER; TH-1 AND AFTER)

NOTE

Refer to Beech Service Instructions No. 0610-152, Revision II, for modification of the elevator trim tab installation.

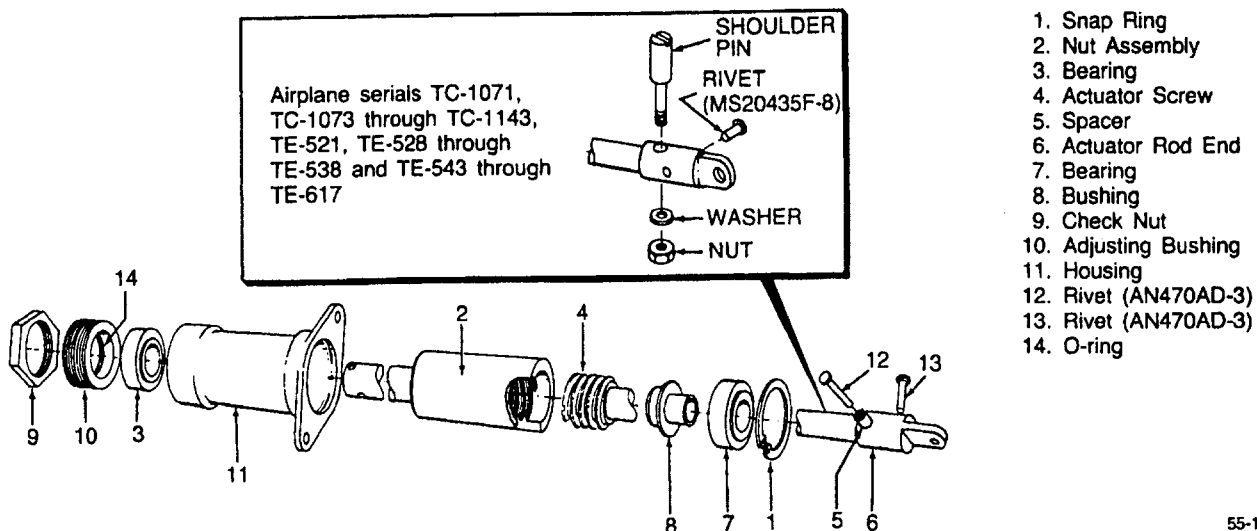
- Clean all parts with solvent (15, Consumable Materials Chart, Section 2) and inspect for cracks, corrosion and distortion.
- Replace any parts showing evidence of wear.
- Lubricate all parts with lubricating grease (11, Consumable Materials Chart, Section 2).

ELEVATOR TRIM TAB ACTUATOR ASSEMBLY (TC-1144 AND AFTER; TE-618 AND AFTER; TH-1 AND AFTER) FIGURE 4-16

- Install the actuator screw (4) into the nut assembly (6).

WARNING

The trim tab actuator to be installed on the left-hand horizontal stabilizer, shall have threads on its actuator screw (4) that rotate clockwise when screwed into the nut assembly (6). The trim tab actuator to be installed on the right-hand horizontal stabilizer, shall have threads on the actuator screw (4) that rotate counterclockwise when screwed into the nut assembly (6).



Elevator Trim Tab Actuator
(TC-1 thru TC-1143; TE-1 thru TE-617)
Figure 4-15

55-164-10

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BEECH BARON 55 AND 58 SHOP MANUAL

- b. Install the nut assembly into the housing (5).
- c. Install the collar (3) and the retainer ring (2) in the housing.
- d. Use a spanner wrench to install the threaded bushing (7) into the housing until total end play of the nut assembly is no more than 0.010 inch. The nut must be free to rotate and operate smoothly through its full travel. If end play cannot be reduced to within limits, replace the actuator.
- e. Install the check nut (8) on the threaded bushing.
- f. Install the bearing cap (1) on the housing.

CHECKING ELEVATOR TRIM TAB FREE PLAY FIGURE 4-17

Visually inspect the elevator trim tab for damage, security of hinge attach points, and for tightness of the actuating system. Inconsistencies must be corrected before checking the free play of the tab.

A check fixture (P/N 45-135030-9/810) or equivalent, a dial indicator, and a push-pull scale for applying accurate loading to the tab are required for making the inspection for tab free play. Refer to Figure 4-17.

- a. Securely lock the control surfaces to prevent movement of the elevators. Set the elevator trim tab in neutral.
- b. Use shot bags to hold the dial indicator check fixture so that the point of the dial indicator is 4.0 inches aft of the tab hinge line (TE-1 and After; TH-1 and After) or 3.3 inches aft of the tab hinge line (TC-1 and After) on the outboard edge of the elevator tab.
- c. Apply a small piece of masking tape (for paint protection) 4.5 inches aft of the tab hinge line and along the centerline of the tab actuator. This is the point of pressure against the tab by the push-pull scale.
- d. Apply another piece of masking tape in the corresponding location on the bottom surface of the tab.
- e. Set the dial indicator at zero. Do not reset the dial indicator during the checking procedure.
- f. With the push-pull scale on the masking tape, apply a 3.0 pound downward load. Record the dial reading as A.
- g. Release half of the load to obtain a 1.5 pound downward load. Record the dial reading as B.
- h. On the masking tape on the bottom surface, apply a 3.0 pound upward load. Record the dial reading as C.
- i. Release half of the load to obtain a 1.5 pound upward load. Record the dial reading as D.
- j. Enter the recorded readings on a copy of Chart 4-2 and proceed as follows:
 - 1. Multiply B by 2 and record as 2B.
 - 2. Subtract A from 2B and record as X.
 - 3. Multiply D by 2 and record as 2D.
 - 4. Subtract C from 2D and record as Y.

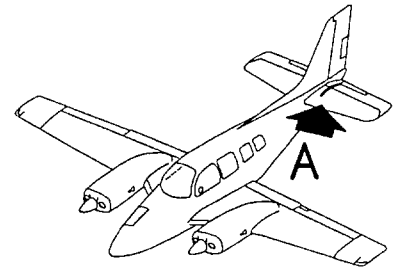
NOTE

X and Y can be negative numbers.

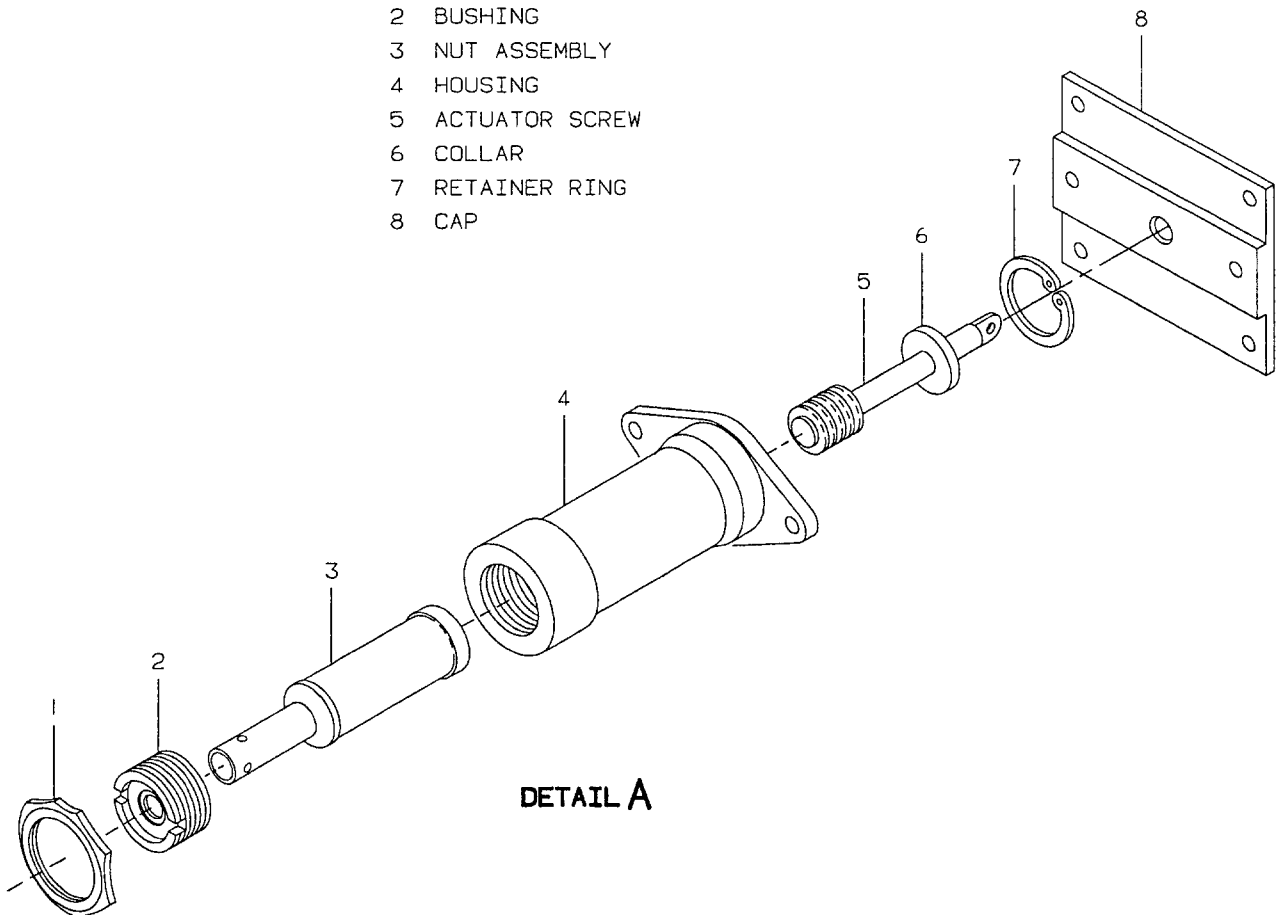
- 5. Add X and Y and record as E.

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- 1 CHECK NUT
- 2 BUSHING
- 3 NUT ASSEMBLY
- 4 HOUSING
- 5 ACTUATOR SCREW
- 6 COLLAR
- 7 RETAINER RING
- 8 CAP



DETAIL A

C95TH27B0935 C

**Elevator Trim Tab Actuator
(TC-1144 and After; TE-618 and After; TH-1 and After)
Figure 4-16**

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BEECH BARON 55 AND 58 SHOP MANUAL

- k. If the free play is over the maximum specified in Chart 4-2, inspect all components of the tab actuator system to determine the cause. All worn parts must be replaced.
- l. Repeat steps b through k on the other elevator trim tab.

CHART 4-2
ELEVATOR TAB FREE PLAY LIMITS

1.5-POUND READING	3-POUND READING	
B _____		
2B _____	- A _____	= X _____
D _____		
2D _____	- C _____	= Y _____
X _____	+ Y _____	= E _____

E = 0.084 inch maximum (TE-1 and After; TH-1 and After)

E = 0.069 inch maximum (TC-1 and After)

ELEVATOR TRIM TAB HORN REPAIR

NOTE

Elevators must be removed from the airplane and checked for static balance after the repair procedures described below are performed.

FOR TAB HORNS WITH BRAZED IN BUSHINGS

- a. Carefully grind or spot face the brazed-in bushing flush with the sides of the tab horn.

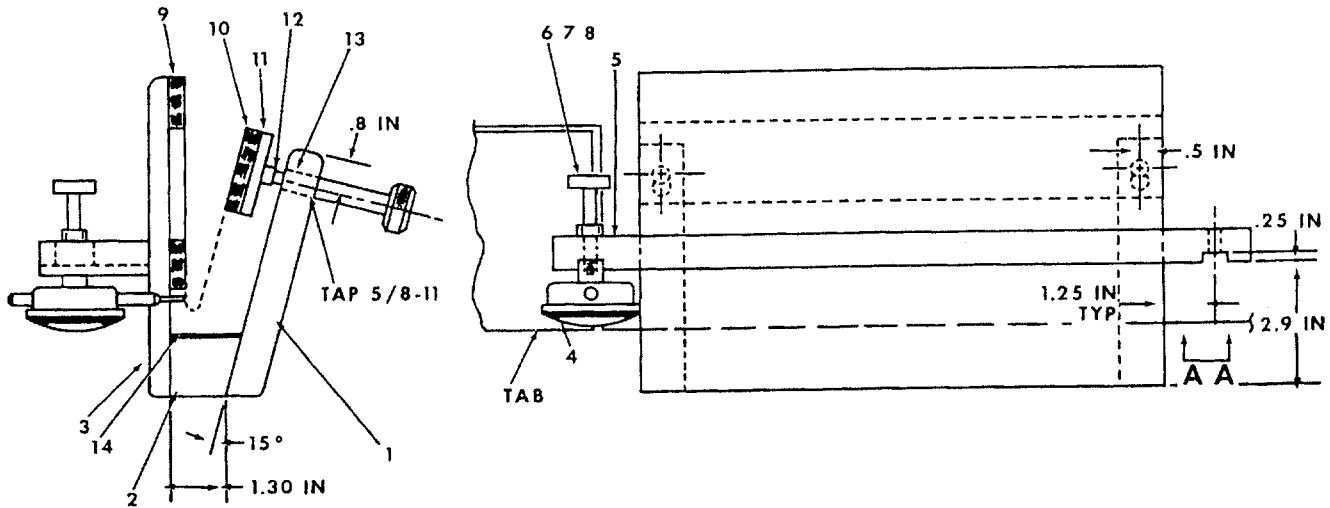
NOTE

Maintain the bushing centerline as nearly perpendicular as possible to trim tab tube centerline.

- b. Drill and ream the existing hole to an inside diameter of 0.4995/0.5010-inch.
- c. Using a clean rag dampened with solvent (19, Consumable Materials Chart, Section 2), thoroughly clean the hole in the tab horn, the area around the hole and a new P/N 96-610026-1 bushing.
- d. Scuff sand the contact surfaces of the bushing and the tab horn and clean the area thoroughly as specified in step c.
- e. Wipe off the parts with a clean rag before the solvent evaporates.
- f. Apply a thin coat of adhesive (37, Consumable Materials Chart, Section 2) to the contact surfaces of both the bushing and the tab horn.

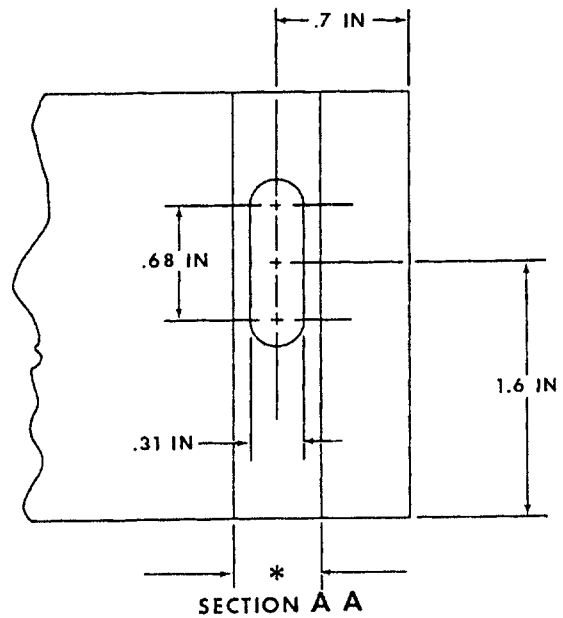
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ITEM NO.	QUANT.	DESCRIPTION
1	2	3/4 x 1 x 6 aluminum or equiv.
2	2	1 x 1 3/8 x 1 3/4 aluminum or equiv.
3	1	1/2 x 7 1/2 x 10 aluminum or equiv.
4	1	C81Q Indicator**
5	1	3/4 x 2 1/2 x 14 aluminum or equiv.
6	1	1/4 Dia. x 2 corrosion res. stl.
7	1	1/4 Dia. x 1 corrosion res. stl.
8	1	1/4-28 nut
9	1	3/8 x 5 x 10 rubber
10	1	3/8 x 2 x 10 rubber
11	1	1/4 x 2 x 10 corrosion res. stl.
12	2	1/2 x 13 x 3 VLIER Torque screw
13	2	KN813 Keensert or tap 1/2 - 13
14	2	1/8 x 1 x 3/4 rubber

**P/N of Federal Products Corp., Providence, R. I.



* THIS GROOVE TO BE A SNUG FIT TO THE SCREW BRACKET ON THE DIAL INDICATOR

100-135-8

Fabricating Clamp for Tab Deflection
Figure 4-17

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BEECH BARON 55 AND 58 SHOP MANUAL

- g. Join the horn, bushing and clamp together until the adhesive has cured completely (approximately 24 hours).

NOTE

When clamping the horn and bushing together, use care not to squeeze out all of the adhesive.

- h. Lubricate the new 104-524056-3 grip bushing with lubricating grease (11, Consumable Materials Chart, Section 2) and install the grip bushing in the 96-610026-1 tab horn bushing.
- i. Install the trim tab and lubricate all pivotal points with lubricating grease (11, Consumable Materials Chart, Section 2).

NOTE

If the rod end on the pushrod assembly is worn, the pushrod assembly should be replaced.

When connecting the tab pushrod assembly to the tab horn, tighten the castellated nut against the rod end and turn the nut to the next castellation to install the cotter key. The grip bushing must be secure within the yoke, the rod end should not rotate.

FOR TAB HORNS OF 0.125-INCH-THICK FLAT STEEL SHEET AND NO BUSHINGS

NOTE

Maintain the bushing centerline as nearly perpendicular to the trim tab tube centerline as possible.

- a. Drill and ream the existing hole in the tab horn to an inside diameter of 0.3745/0.3760 inch.
- b. Using a clean rag dampened with solvent (19, Consumable Materials Chart, Section 2), clean the hole in the tab horn, the area around the hole and a P/N 96-610026-3 bushing.
- c. Scuff sand the contact surfaces of the bushing and the tab horn, and clean the area thoroughly as specified in step b.
- d. Wipe off the parts again with a clean rag before the solvent evaporates.
- e. Apply a thin coat of adhesive (37, Consumable Materials Chart, Section 2) to the contact surfaces of both the bushing and the tab horn.
- f. Join the tab horn and bushing and clamp together (use care not to squeeze out all of the adhesive) until the adhesive has cured completely (approximately 24 hours).
- g. Install the trim tab with a new P/N 96-526021-1 rod assembly and a new NAS464P4-8M bolt at the tab horn end.

NOTE

When connecting the tab pushrod to the tab horn, the rod end must be free to move without binding against the bushing in the tab horn. (Turning the nut on the bolt to contact the rod end plus one castellation should accomplish this.)

- h. Lubricate all pivotal points with grease (11, Consumable Materials Chart, Section 2).

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FOR TAB HORNS OF 0.091-INCH-THICK ALUMINUM WITH A PRESSED IN STEEL BUSHING

- a. Remove the existing bushing from the tab horn and ream the hole in the tab to an inside diameter of 0.3276/0.3291 inch.

NOTE

Maintain the bushing centerline as nearly perpendicular to the trim tab tube centerline as possible.

- b. Using a clean rag dampened with solvent (19, Consumable Materials Chart, Section 2) or equivalent, clean the hole in the tab horn, the area around the hole and a P/N 96-610026-5 bushing.
- c. Scuff sand the contact surfaces of the bushing and the tab horn, and clean the area thoroughly as specified in step b.
- d. Wipe off the parts with a clean rag before the solvent evaporates.
- e. Apply a thin coat of adhesive (37, Consumable Materials Chart, Section 2) to the contact surfaces of both the bushing and the tab horn.
- f. Join the tab horn and the bushing and clamp together until the adhesive has cured completely.

NOTE

When clamping the horn and bushing together, use care not to squeeze out all of the adhesive.

- g. Remove the existing rod end and locknut from the tab pushrod assembly at the tab horn end and replace it with a P/N 96-610026-7 rod end, along with locknut.
- h. Install the trim tab and install a new P/N AN173C6/M/ bolt in the tab horn end on the pushrod.

NOTE

When connecting the tab pushrod to the tab horn, the rod end must be free to move without binding against the tab horn or the bushing in the tab horn. (Turning the nut on the bolt to contact the rod end plus one castellation should accomplish this.)

- i. Lubricate all pivotal points with grease (11, Consumable Materials Chart, Section 2).

ELECTRIC TRIM TAB SYSTEM (OPTIONAL) FIGURE 4-18

ELECTRIC TAB ACTUATOR REMOVAL

- a. Disconnect the actuator wire harness at the disconnect splices.
- b. Place a wood or sheet metal shim between the cable drum and the cable guard to prevent the cable from unwinding.
- c. Remove the fairlead from the bulkhead aft of the actuator.
- d. Disconnect the actuator cable at the turnbuckle first, then at the aft fitting.
- e. Remove the three bolts securing the actuator to the bracket, remove the actuator from the airplane.

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BEECH BARON 55 AND 58 SHOP MANUAL

ELECTRIC TAB ACTUATOR INSTALLATION

Installation procedure is the reverse of the removal procedure. Tab rigging and cable tension are identical to the manually operated tab.

NOTE

Adjust the variable resistor mounted adjacent to the actuator until the cable travels from stop to stop within 18 to 20 seconds on Model E55 airplanes or within 27 to 30 seconds on Model 58 airplanes when 28 vdc is applied to the circuit.

TAB CABLE REMOVAL

- a. Remove the fairleads and disconnect the cables at the turnbuckles.
- b. Connect a lead line to the end of each forward cable (identify the line for tab-up cable movement), and pull the cable from the airplane structure.
- c. Remove the cable guide and cable retaining pin from the cable drum.
- d. Remove the cable from the cable drum.

TAB CABLE INSTALLATION

Note the position of the cable on the cable drum in relation to the forward cable fittings. Install the new cable in the same position. This will ensure adequate free cable on the drum in both directions to allow full travel on the cable stops.

MAGNETIC CLUTCH REMOVAL

- a. Remove the lid from the clutch housing.
- b. Loosen the setscrew in the clutch rotor and armature hubs.
- c. Remove the motor from the clutch housing.
- d. Slide the cable drum and shaft assembly from the clutch housing.
- e. Remove the clutch from the clutch housing.

MAGNETIC CLUTCH INSTALLATION

Installation procedure is the reverse of the removal procedure. No lubrication is required. Tighten the clutch armature setscrew with no visible end play in the cable drum shaft. Slide the clutch rotor on the motor shaft to obtain 0.010 to 0.015 inch of clearance between the friction surfaces of the clutch before tightening the setscrew. Stake both setscrews.

MAGNETIC CLUTCH TORQUE TEST

The following check should be performed any time the magnetic clutch is replaced.

- a. Using a 28 vdc power source, connect the red electrical lead of the magnetic clutch to ground and the white electrical lead to the power source. Using a torque wrench, check that the clutch holds with 30 inch-pounds of torque applied at the actuator shaft.

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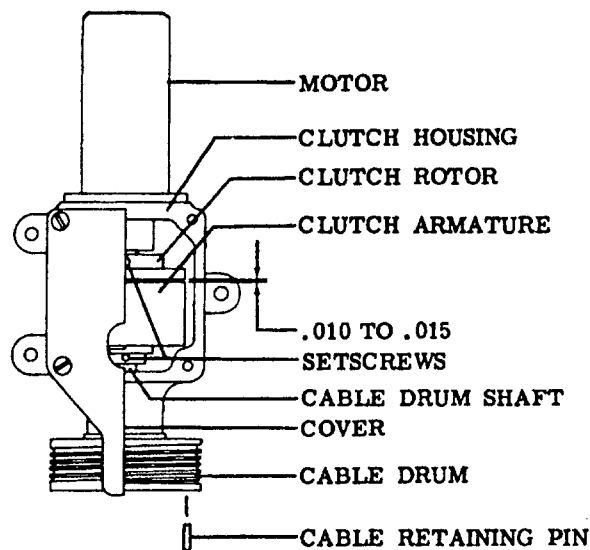
BEECH BARON 55 AND 58 SHOP MANUAL

b. If the static torque of the clutch is less than 30 inch-pounds, burn in the clutch as follows:

1. Find a metal plate of sufficient thickness for rigidity and large enough to fit in a vise with the actuator assembly attached. Anchor the plate in a vise and drill three holes in the plate to match the actuator mounting holes. Bolt the actuator to the plate.
2. Slot the end of a tube that will fit snugly into the 0.437-inch-diameter hole in the end of the shaft on which the drum is mounted.
3. Insert the tube into the shaft until the slot engages the drum retaining pin.
4. Attach the free end of the tube to a slow speed (approximately 450 rpm) half-inch drill motor.
5. Remove the access plate from the clutch housing and blow the housing and clutch clean with clean dry air.
6. Using a regulated power source set at 14 to 16 vdc, connect the red electrical lead of the clutch to ground and the white electrical lead to the power source with alligator clips.
7. Start the drill motor and unclip the lead to the power source after 15 seconds. Let the clutch cool for approximately one minute before reattaching the lead for another 15-second interval. Repeat the foregoing sequence until the clutch will hold 30 inch-pounds of torque as indicated in step a, then blow the clutch and housing clean with clean dry air.

CAUTION

Exceeding the 15-second burn-in periods may overheat and damage the magnetic clutch.



90-133-8

Electric Trim Tab Actuator
Figure 4-18

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BEECH BARON 55 AND 58 SHOP MANUAL

RUDDER AND TAB

RUDDER REMOVAL

- a. Detach the tail cone, disconnect the tail navigation light wire and remove the tail cone.
- b. Remove the tail section access doors on the left hand side of the fuselage.
- c. Disconnect the rudder tab cables at the turnbuckles. Remove the cable retainer pins and the fairlead.
- d. Remove the bolts attaching the rudder torque tube to the bellcrank. Remove the bonding cable.
- e. Remove the rudder hinge bolts and remove the rudder.

RUDDER INSTALLATION

WARNING

Due to rudder imbalance the airplane must not be flown with the rotating beacon light removed from the rudder.

- a. Align the holes in the rudder and stabilizer hinges and install the attaching bolts. Install the bonding cable.
- b. Install the attaching bolts through the rudder torque tube and bellcrank.
- c. Connect the rudder tab cables at the turnbuckles. Install the cable retainer pins and fairlead.
- d. Check the travel of the tab and rudder tab indicator to see that the tab and indicator agree.
- e. Install the tail cone and connect the tail light wires. Replace the access doors.

RIGGING THE RUDDER CONTROL SYSTEM

FIGURES 4-19, 4-20 AND 4-21

WARNING

When replacing or installing control cables, bellcranks and other control system components, on airplane serials TH-1389 and TH-1396 and after, observe the color coding on all parts. Do not connect coded parts of one color to coded parts of a different color.

NOTE

Beech recommends the use of the rudder travel gage shown in the GENERAL INFORMATION section of this manual. Locate the travel gage on the left side of the rudder at station 9.9.

To position the rudder pedals in the correct position for rigging, a tool can be fabricated from a steel block and two 3/8-inch-diameter steel pins. The pins are parallel and located forward on the block at the spacing shown in Figure 4-21.

- a. Place the rudder pedals in the aft position.

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- b. Install the rudder pedal rig tool in the holes in the pilot's rudder pedals. Refer to Figure 4-19. The left rudder pedal must be 0.38 to 0.45 inch aft of the right rudder pedal.

NOTE

When the rig tool is installed on the pilot's rudder pedals, the copilot's pedals are locked in the same position.

- c. Rig the cables to the tension shown, then remove the rig tool. Refer to Figures 4-19 or 4-20. The rudder bellcrank must be in neutral.
- d. Adjust the rudder bellcrank travel stops to obtain 24° to 26° rudder travel left and right.
- e. Check rudder travel.

WARNING

Check the rudder for correct direction of movement. When the left rudder pedal is depressed, the rudder must move to the left. When the right rudder pedal is depressed, the rudder must move to the right.

RUDDER TRIM TAB RIGGING FIGURES 4-19 AND 4-20

NOTE

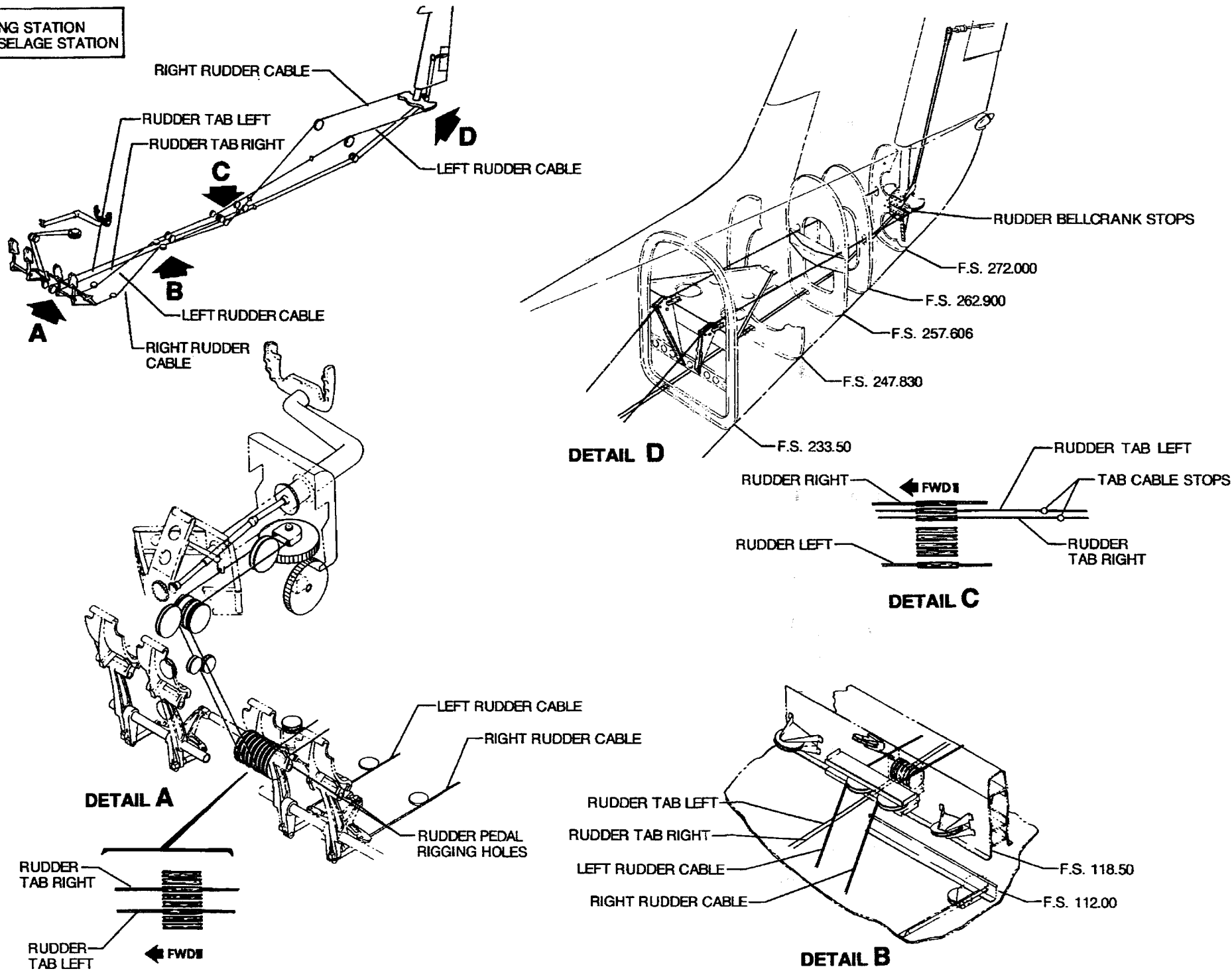
Beech recommends the use of the rudder trim tab travel gage shown in the GENERAL INFORMATION section of this manual.

- a. Set the rudder trim tab control so that the indicator reads 0° (neutral).
- b. Set the rudder in neutral.
- c. Adjust the tab actuator so that the tab actuator rod extends a little less than half its total travel.
- d. Disconnect the rudder tab push-pull rod. Adjust the length of the push-pull rod to set the rudder trim tab in neutral. Connect the push-pull rod to the actuator rod.
- e. Center the chain on the actuator sprocket and rig the tab cable to the tension shown in Figures 4-19 or 4-20.
- f. Adjust the tab cable stops to obtain tab travel of 24° to 26° left and right. Safety wire the turnbuckles and stops.
- g. Check tab travel.

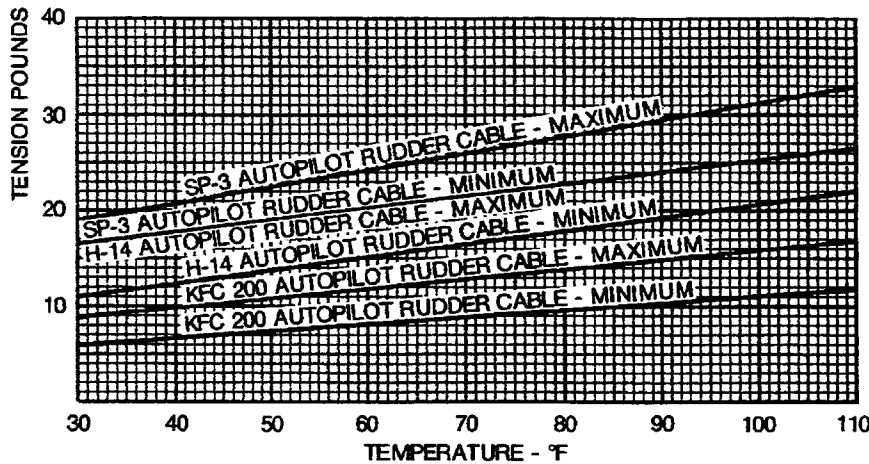
WARNING

Check the rudder trim tab for correct direction of movement. When the tab control is moved to the left, the tab must move to the right. When the tab control is moved to the right, the tab must move to the left.

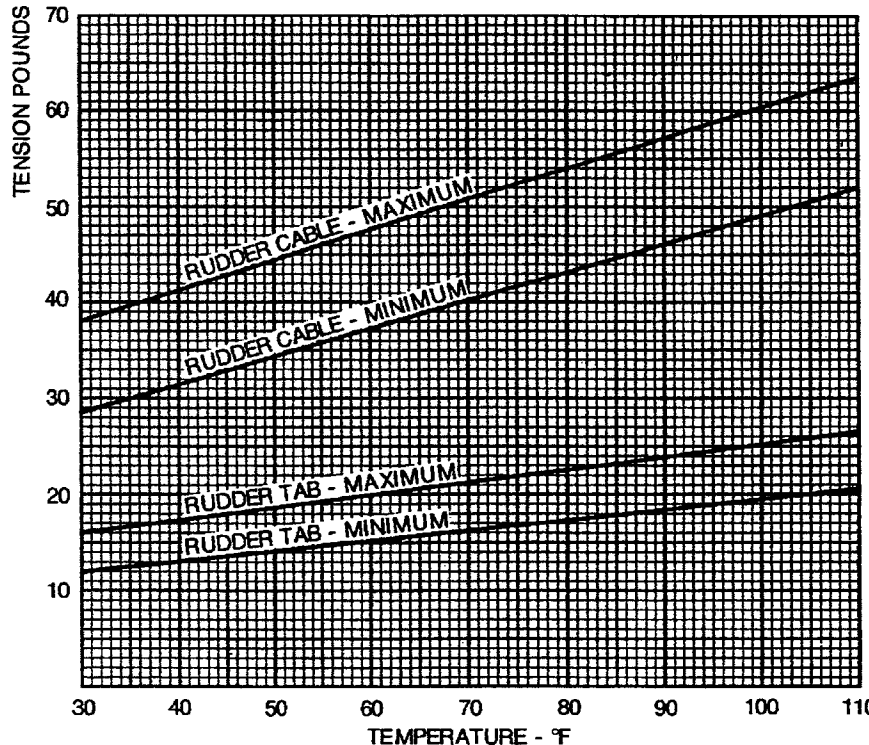
W. S. - WING STATION
F. S. - FUSELAGE STATION



TEMPERATURE CABLE TENSION GRAPH



NOTE: RIG AUTOPILOT CABLES AFTER CONTROL SYSTEM CABLES ARE RIGGED.



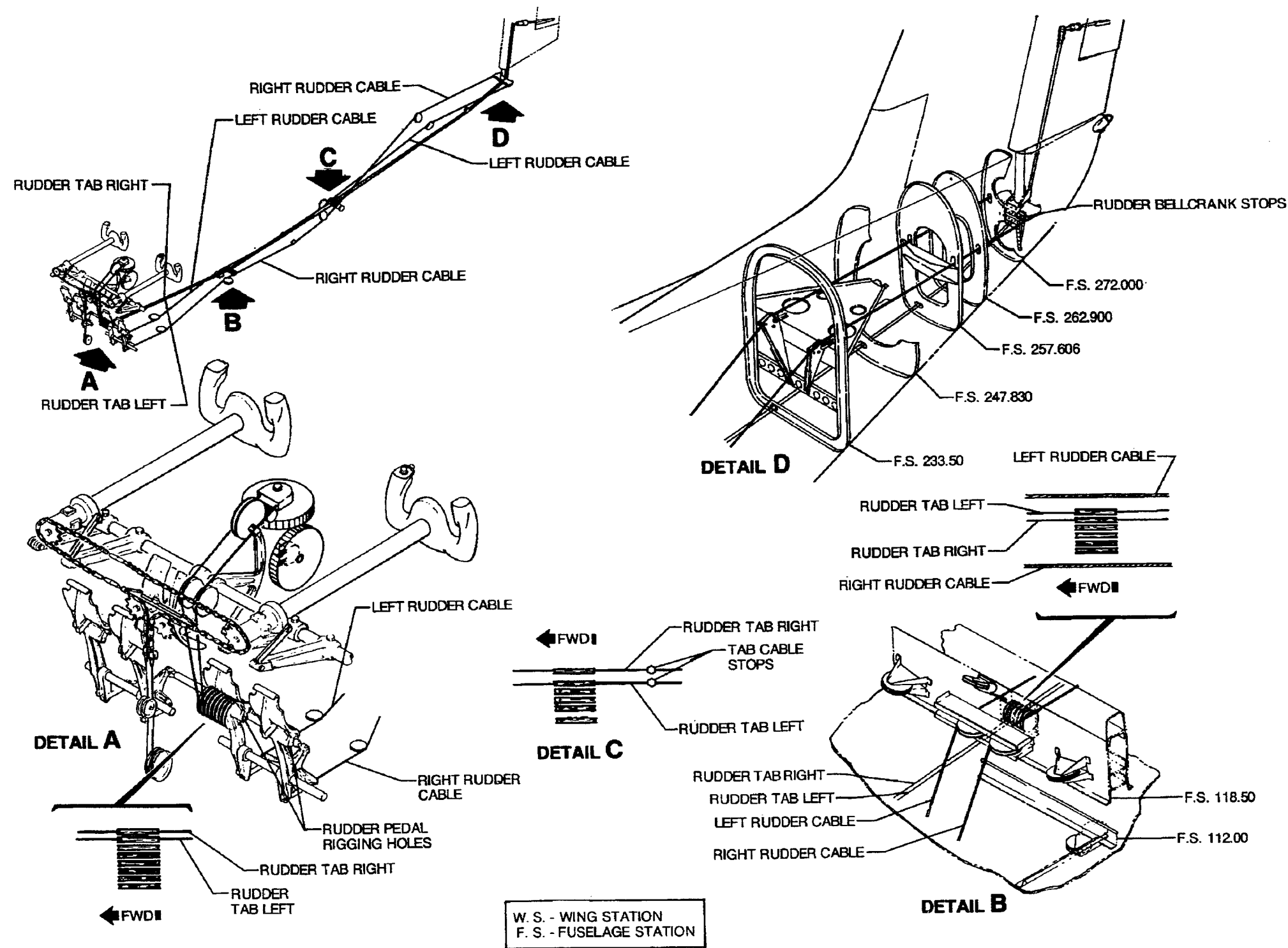
58-153-23

Rigging The Rudder Control System
(TC-1 and After; TE-1 and After; TH-1 thru TH-1388, TH-1390 thru TH-1395)
Figure 4-19

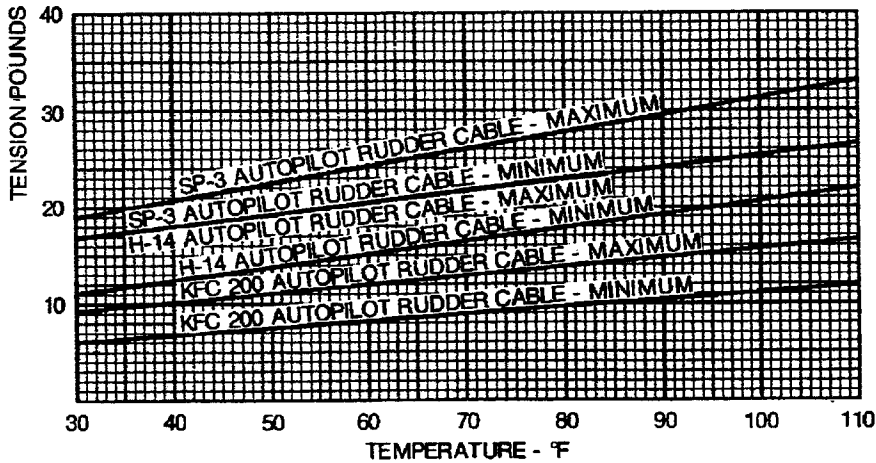
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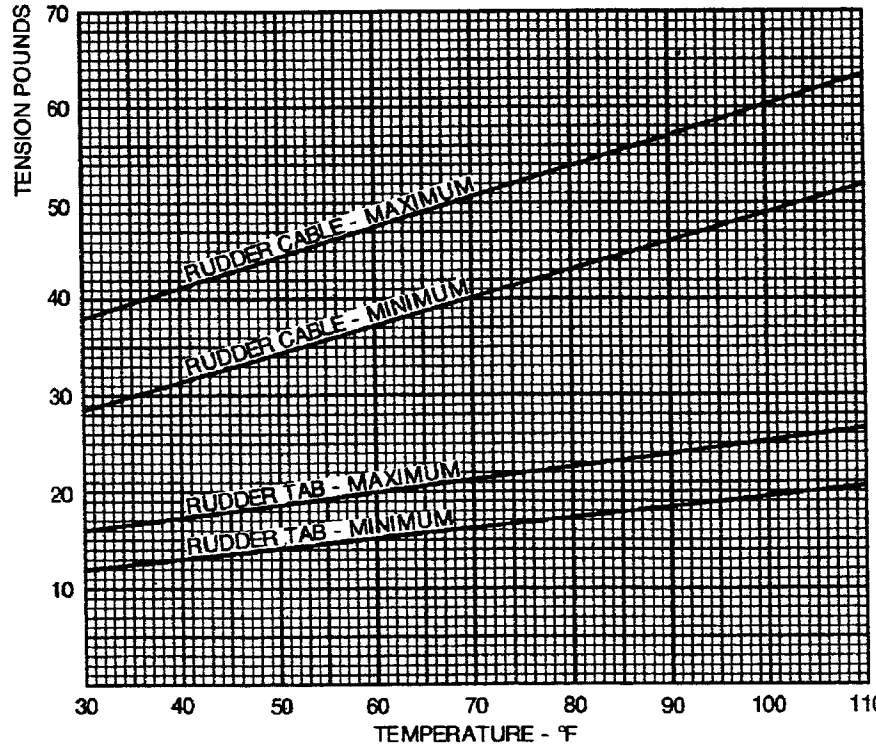
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TEMPERATURE CABLE TENSION GRAPH



NOTE: RIG AUTOPILOT CABLES AFTER CONTROL SYSTEM CABLES ARE RIGGED.



58-153-24

Rigging The Rudder Control System
(TH-1389, TH-1396 and After)
Figure 4-20

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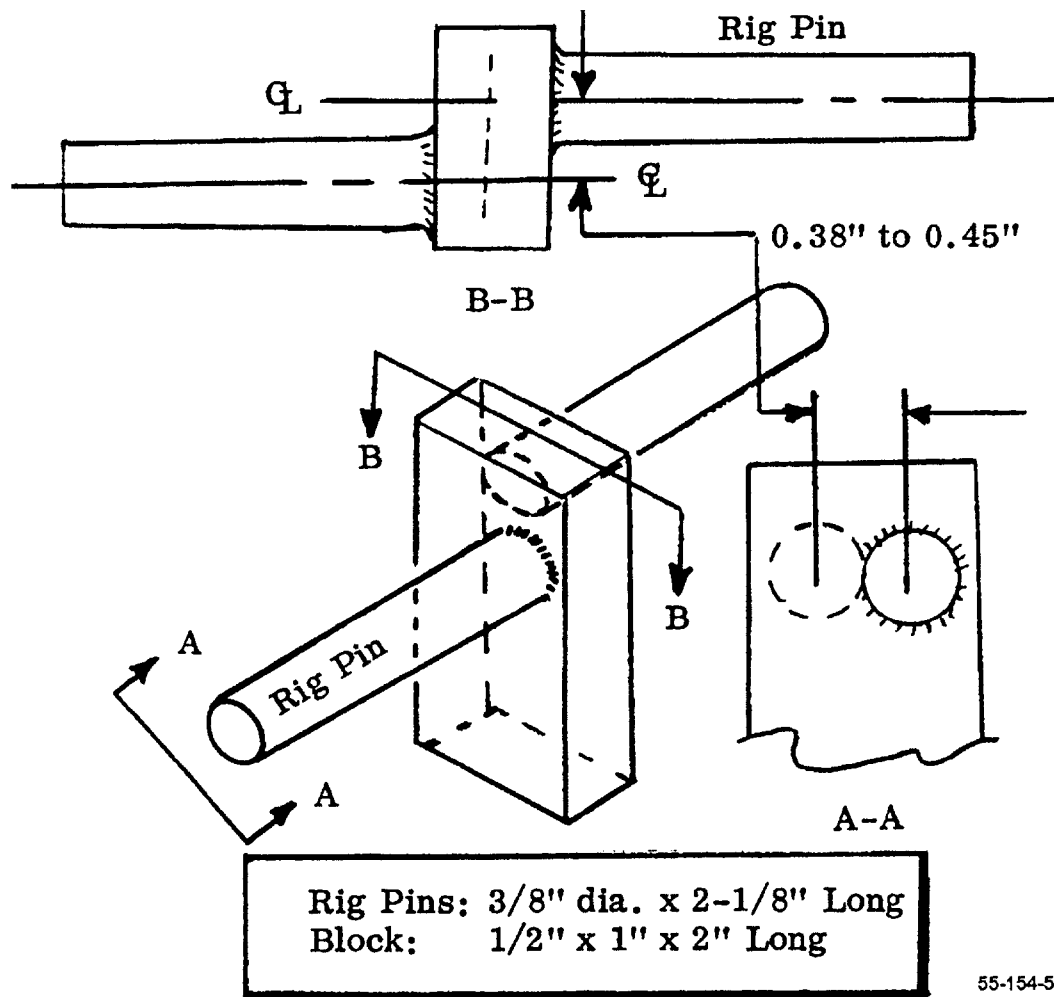
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MEASURING THE RUDDER AND RUDDER TRIM TAB TRAVEL IN INCHES FIGURE 4-22

When a travel gage is not available, rudder and rudder trim tab travel can be measured in inches rather than degrees as follows:

- Lightly clamp two strips of 1/4-inch plywood or equivalent to the rudder trailing edge. Extend them forward along the vertical stabilizer.
- Pull the free ends of the plywood firmly against the skin contour to fair the rudder to neutral (0°).
- Mark the point on the tail cone that corresponds to the bottom corner of the rudder trailing edge. Refer to Figure 4-22).
- The points used for measurement on the rudder and rudder trim tab are shown in Figure 4-22. All measurements given in the TABLE OF RUDDER AND RUDDER TRIM TAB TRAVEL are the straight line distance between the position of the surface at neutral (0°) and its position at maximum deflection.



Rudder Pedal Rig Tool
Figure 4-21

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RUDDER TRIM TAB ACTUATOR DISASSEMBLY *FIGURE 4-23*

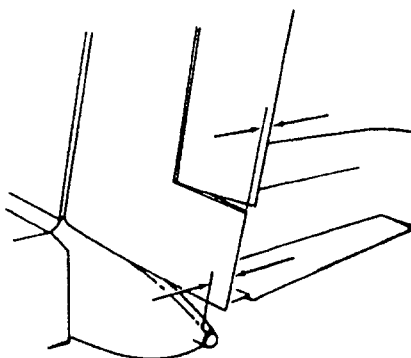
- a. Cut and remove all safety wire.
- b. Loosen the check nut (1), and remove the actuator rod end (2) from the actuator screw (3).
- c. Remove the retaining nut (4) and the actuator screw (3) from the housing (5).
- d. Remove the retaining screws from the sprocket housing (6), and pull the back half of the housing off of the sprocket assembly (7).
- e. Remove the roll pins (10), and remove the sprocket assembly.
- f. Remove the bearings (8) and the bushings (9 and 12).

RUDDER TRIM TAB ACTUATOR CLEANING AND INSPECTION

- a. Clean all parts in solvent (15, Consumable Materials Chart, Section 2) and inspect for cracks, corrosion, distortion and excessive wear.
- b. Replace bushings and any other parts showing evidence of wear.
- c. Lubricate the actuator screw threads and bearings with lubricating grease (11, Consumable Materials Chart, Section 2) before assembly.

RUDDER TRIM TAB ACTUATOR ASSEMBLY *FIGURE 4-23*

- a. Install the new bushing (9) in the actuator housing (5). Using the existing holes in the actuator housing as pilot holes, drill 0.094- to 0.097-inch-diameter holes through the new bushing.
- b. Be sure to clean all metal particles and filings from the housing and bushing.
- c. Install the new bushing (12) into the back half of the sprocket housing (6).
- d. Install the shim (11) on the sprocket assembly.



55-135-6

Rudder and Rudder Trim Tab Travel
Figure 4-22

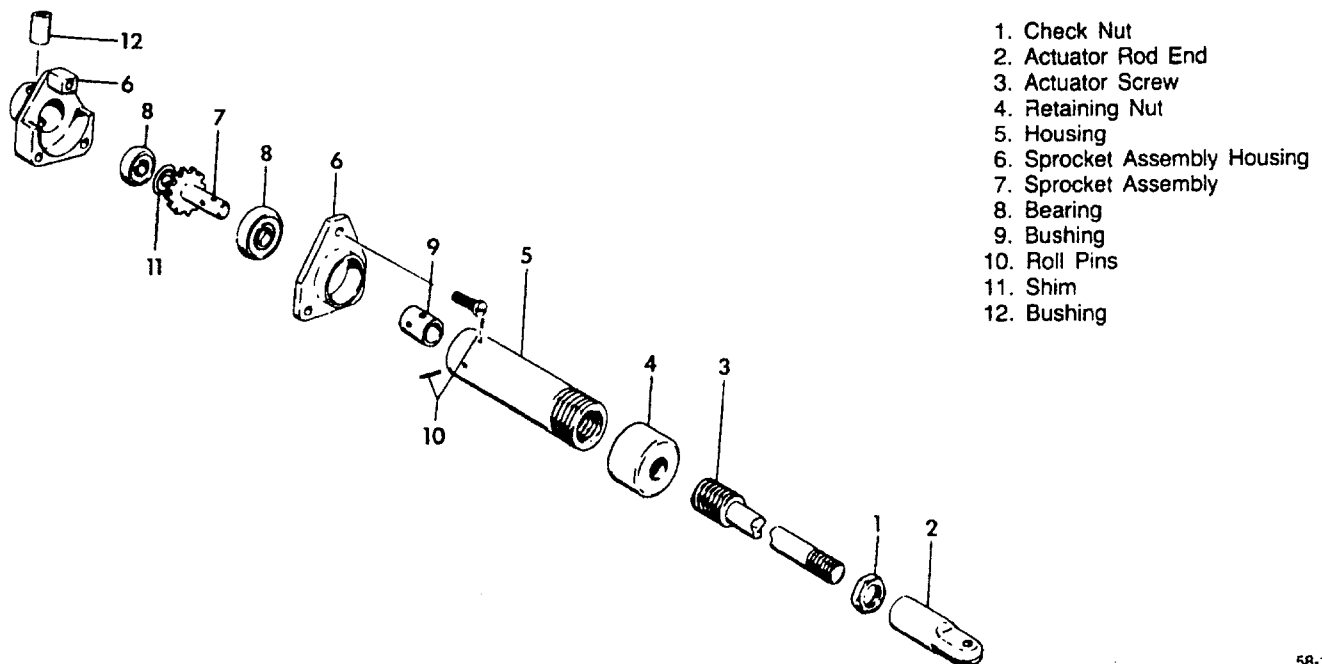
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- e. Install the bearings (8) on the sprocket assembly.
- f. Install the sprocket assembly in the housing.
- g. Align the holes in the sprocket assembly with the holes in the housing and bushing, then install the roll pins (10).
- h. Install the back half of the sprocket housing using the retaining screws. Safety wire the retaining screws.
- i. Install the actuator screw (3) in the housing and install the retaining nut (4).
- j. Safety wire the retaining nut and the roll pins (10) together.
- k. Install the actuator rod end (2) on the actuator screw and tighten the check nut (1). Safety wire the check nut to the actuator rod end.
- l. Check that the end play between the actuator screw and the housing does not exceed 0.011 inch.

TABLE OF RUDDER AND RUDDER TRIM TAB TRAVEL IN INCHES

Surface	Direction	Maximum	Minimum	Measuring Point
Rudder	R and L	9.60 or (26*)	8.88 or (24*)	Bottom corner of trailing edge
Rudder Trim Tab	R and L	4.50 or (26*)	4.16 or (24*)	Bottom corner of trailing edge



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**Rudder Trim Tab Actuator
Figure 4-23**

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CHECKING RUDDER TRIM TAB FREE PLAY

FIGURE 4-24

Visually inspect the rudder trim tab for damage, security of hinge attach points, and for tightness of the actuating system. Inconsistencies must be corrected before checking the free play of the tab.

A check fixture (P/N 45-135030-9/810) or equivalent, a dial indicator, and a push-pull scale for applying accurate loading to the tab are required for making the inspection for tab free play. Refer to Figure 4-24.

- a. Securely lock the control surfaces to prevent movement of the rudder. Set the rudder trim tab in neutral.
- b. Use tape to hold the dial indicator check fixture so that the point of the dial indicator is 8.10 inches aft of the tab hinge line and on the bottom edge of the rudder tab.
- c. Apply a small piece of masking tape (for paint protection) 9.5 inches aft of the tab hinge line and along the centerline of the tab actuator. This is the point of pressure against the tab by the push-pull scale.
- d. Apply another piece of masking tape in the corresponding location on the other side of the tab.
- e. Set the dial indicator at zero. Do not reset the dial indicator during the checking procedure.
- f. With the push-pull scale on the masking tape, apply a 3.0 pound load to the right. Record the dial reading as A.
- g. Release half of the load to obtain a 1.5 pound load. Record the dial reading as B.
- h. On the masking tape on the left surface, apply a 3.0 pound load to the left. Record the dial reading as C.
- i. Release half of the load to obtain a 1.5 pound load. Record the dial reading as D.
- j. Enter the recorded readings on a copy of Chart 4-3 and proceed as follows:
 1. Multiply B by 2 and record as 2B.
 2. Subtract A from 2B and record as X.
 3. Multiply D by 2 and record as 2D.
 4. Subtract C from 2D and record as Y.

NOTE

X and Y can be negative numbers.

5. Add X and Y and record as E.
- k. If the free play is over the maximum specified in Chart 4-3, inspect all components of the tab actuator system to determine the cause. All worn parts must be replaced.

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CHART 4-3 RUDDER TAB FREE PLAY LIMITS

1.5-POUND READING	3-POUND READING
B _____	
2B _____	- A _____ = X _____
D _____	
2D _____	- C _____ = Y _____
X _____	+ Y _____ = E _____

E = 0.090 inch maximum

VERTICAL STABILIZER

VERTICAL STABILIZER REMOVAL

Remove the tail section access doors on the left hand side of the fuselage.

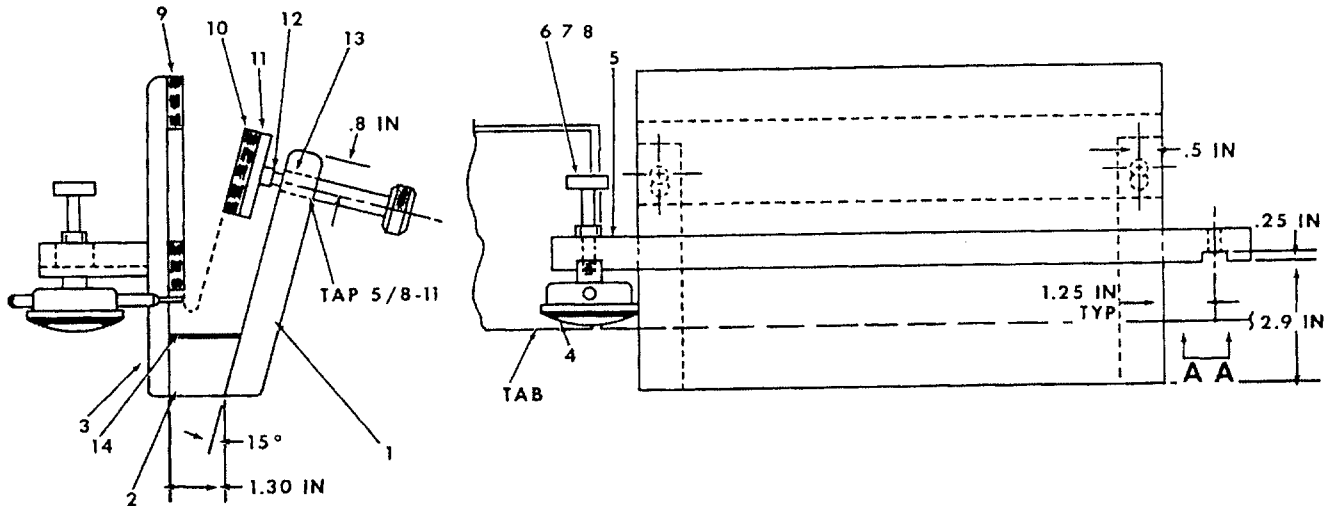
- l. Remove the rudder. See RUDDER REMOVAL.
- m. Remove the screws securing the fairings to the vertical stabilizer.
- n. Remove the attaching bolts at the forward and rear spars and remove the center hinge bracket from the lower center spar and remove the stabilizer.

VERTICAL STABILIZER INSTALLATION

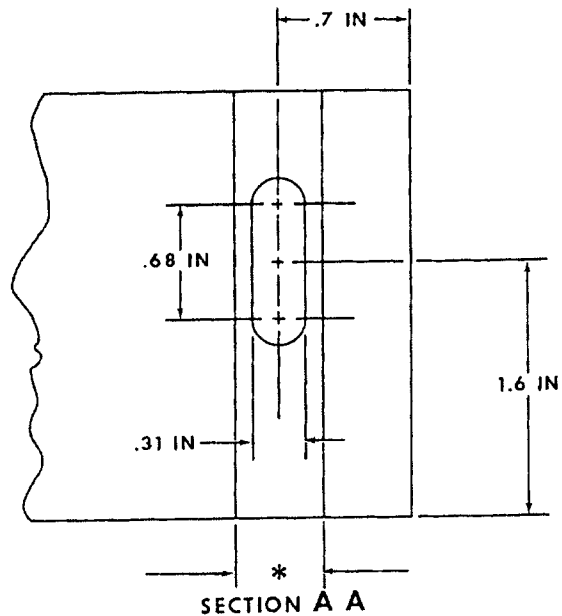
- a. Position the vertical stabilizer and install the bolts as follows:
 - 1. On airplanes TC-1 through TC-2456, TE-1 through TE-1201 and TH-1 through TH-1483, torque the bolts at the forward spar and upper rear spar to 160 to 190 inch-pounds. Install the elevator center hinge bracket on the bottom of the rear spar and torque the bolts to 50 to 70 inch-pounds.
 - 2. On TC-2457 and after, TE-1202 and after and TH-1484 and after, torque the bolts at the forward spar and upper rear spar to 330 to 360 inch-pounds. Install the elevator center hinge bracket on the bottom of the rear spar and torque the bolts to 85 to 100 inch-pounds.
- b. Install the vertical stabilizer fairings.
- c. Install the rudder. See RUDDER INSTALLATION in this section.
- d. Install the access doors.

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ITEM NO.	QUANT.	DESCRIPTION
1	2	3/4 x 1 x 6 aluminum or equiv.
2	2	1 x 1 3/8 x 1 3/4 aluminum or equiv.
3	1	1/2 x 7 1/2 x 10 aluminum or equiv.
4	1	C81Q Indicator**
5	1	3/4 x 2 1/2 x 14 aluminum or equiv.
6	1	1/4 Dia. x 2 corrosion res. stl.
7	1	1/4 Dia. x 1 corrosion res. stl.
8	1	1/4-28 nut
9	1	3/8 x 5 x 10 rubber
10	1	3/8 x 2 x 10 rubber
11	1	1/4 x 2 x 10 corrosion res. stl.
12	2	1/2 x 13 x 3 VLIER Torque screw
13	2	KN813 Keensert or tap 1/2 - 13
14	2	1/8 x 1 x 3/4 rubber



* THIS GROOVE TO BE A SNUG FIT TO THE SCREW BRACKET ON THE DIAL INDICATOR

**P/N of Federal Products Corp., Providence, R. I.

100-135-8

Fabricating Clamp for Tab Deflection
Figure 4-24

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HORIZONTAL STABILIZER

HORIZONTAL STABILIZER REMOVAL

- a. Detach the tail cone, disconnect the tail navigation light wire and remove the tail cone.
- b. Remove the tail section access doors on the left hand side of the fuselage.
- c. Remove the elevator. See ELEVATOR REMOVAL.
- d. Loosen the elevator trim tab cables at the turnbuckles just aft of the rear cabin bulkhead and disconnect them at the connection in the aft tail section. Remove the pulleys from the pulley brackets aft of the disconnect to free the cables.
- e. Remove the stabilizer attaching bolts at the forward and rear spars.
- f. Remove the stabilizers.

HORIZONTAL STABILIZER INSTALLATION

- a. Position the stabilizers on the fuselage and install the attaching bolts in the forward and rear spars. On TC serials prior to TC-2457 (except TC-350), torque the bolts to 85-100 inch pounds. On TE, TH and TC serials (TC-350, TC-2457 and After), torque the forward spar bolts to 200-225 inch-pounds dry and torque the rear spar bolts to 85-100 inch-pounds dry.
- b. Route the tab cables back through the fuselage and connect the cables at the turnbuckles.
- c. Install the elevator. See ELEVATOR INSTALLATION.
- d. Connect the elevator tab actuator rods.
- e. Rig the trim tabs.
- f. Install the access doors.

CAUTION

If new stabilizers are installed on an airplane prior to serials TC-1144 and TE-618, weight and balance must be computed.

BALANCING CONTROL SURFACES

AILERON

BALANCING THE AILERON FIGURE 4-25

When the aileron control surface is being repainted, suspend it by the trailing edge so that excess paint will drain toward the leading edge.

After any modifications, repairs or repainting, the finished surface must be check balanced to ensure that its static moment about the hinge line is within the prescribed limits.

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The left-hand painted aileron assembly must be nose-heavy by 0.2 to 1.5 inch-pounds. The right-hand painted aileron assembly must be nose-heavy by 0.2 to 1.5 inch-pounds. The static moment of the aileron is determined by multiplying the unbalanced weight of the aileron assembly times the perpendicular distance from the hinge centerline to the center of gravity when the chord line is horizontally level. The weight is measured in pounds and the distance in inches. The static moment of a 100 percent balanced control surface is 0.0 inch-pounds. A tail-heavy surface exhibits static underbalance. A nose-heavy surface exhibits static overbalance.

CHECKING BALANCE

The aileron balance must be checked in a draft-free area with the aileron completely assembled in flying condition. All painting, including stripes and touch-up, must be completed. The tab, tab pushrod, static wicks and hinge bolts must be attached. The chord line must be horizontally level and the hinge line must be properly supported when the static moment is measured. Although many different methods of check balancing exist, they can be categorized under the following two headings:

- a. Counterbalancing - The application of a known force or weight at a measured distance from the hinge line to counter the unbalance moment of the aileron assembly.
- b. Actual Force Measurement - A measurement of the force applied by the aileron surface on a single support at a known distance from the centerline of the hinge.

NOTE

Counterbalancing is the simplest method of check balancing.

COUNTERBALANCING METHOD

CHECK BALANCE BY COUNTERBALANCING

The equipment required to perform the check balance by counterbalancing is as follows:

- a. A stand with knife-edge supports as illustrated in Figure 4-25. The knife edges must be in the same horizontal plane.
- b. A paper cup or similar lightweight container.
- c. Approximately 1 pound of lead shot.
- d. A certified beam balance weighing device calibrated in units of 0.01 pound or less.
- e. A straightedge, ruler, and spirit level.

BALANCING PROCEDURE COUNTERBALANCING METHOD

- a. Locate the chord line by placing a straightedge at the inboard end of the aileron assembly so that one end is on the trailing edge and the other end is centered on the leading edge. Mark the chord line with a suitable marker, such as a grease pencil, then remove the straightedge.
- b. Secure the trim tab (LH only) in its neutral position with a small piece of masking tape.
- c. Fit the correct size bolts in the hinge brackets and mount the aileron on the knife-edge supports. Ascertain that the aileron is free to rotate about the hinge line.
- d. To determine if weight should be added or removed, suspend a paper cup from a point near the center of the aileron trailing edge. Use a short length of small diameter string secured to the surface with a small piece of masking tape as illustrated in Figure 4-25. The cup must be free to hang vertically.

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- e. Add small quantities of lead shot to the cup until the aileron balances with the chord line level. Check this by holding the spirit level aligned with the marked chord line.
- f. The distance D must be perpendicular to the hinge line. Measure D from the hinge line to the suspension point of the cup.
- g. Remove the cup, contents, and string, then weigh them.

NOTE

Since any weighing error is magnified by the distance D, weighing is most important and must be done carefully on scales that are certified for accuracy.

- h. Calculate the static balance as follows:

- 1. The weight of the cup and contents is designated by W.
- 2. The over- or underbalance moment is designated by M.
- 3. $M = W \times D$

4. The following is a typical example of a balancing calculation: Assume the aileron is overbalanced (nose-heavy) and the paper cup was suspended from the trailing edge. Assume that the aileron balances with the chord line level at $W = 0.150$ pound and $D = 10.0$ inches, then. . .

$$M = 0.150 \times 10.0$$

$$M = 1.50 \text{ inch-pounds. The product of } W \times D.$$

In this instance, M is within the required static balance range and is therefore acceptable.

- i. The painted aileron assembly must be nose-heavy by 0.2 to 1.5 inch-pounds. If the static balance does not comply, pig lead weight may be added or removed to obtain static overbalance, as illustrated in Figure 4-25.

ELEVATOR

BALANCING THE ELEVATOR FIGURE 4-26

When the elevator control surface is being repainted, suspend it by the trailing edge so that excess paint will drain toward the leading edge. After any modifications, repairs, or repainting, the finished surface must be checked balanced to ensure that its static moment about the hinge line is within the manufacturers prescribed limits. The complete elevator assembly, painted or unpainted, including the control arm and the tab control rod must not be tail-heavy over the maximum moment noted as follows:

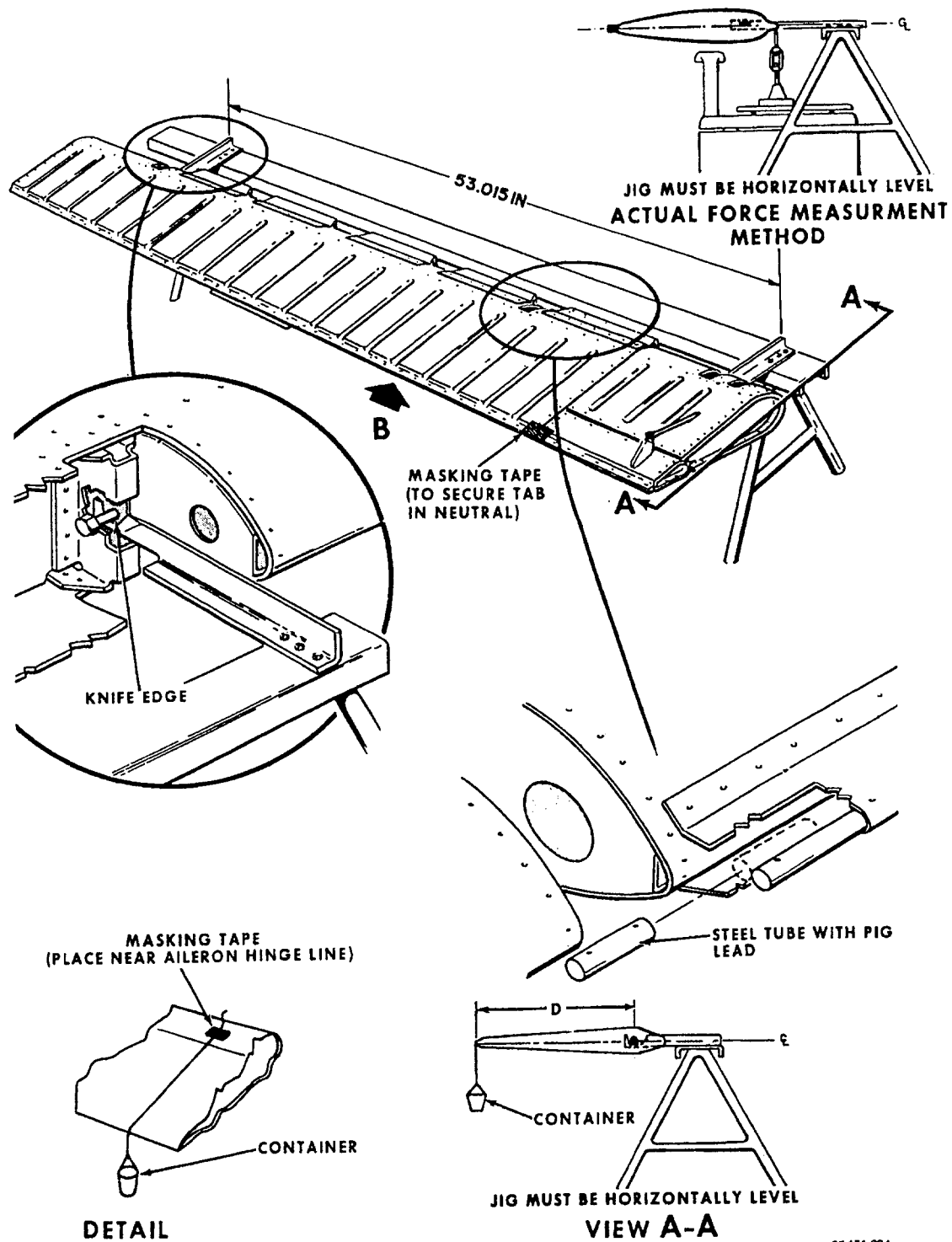
NOTE

A tail-heavy surface exhibits static underbalance. A nose-heavy surface exhibits static overbalance.

- a. 22.6 inch-pounds on TC-1 through TC-546 equipped with original skin or authorized spare replacement beaded skin.
- b. 18.0 inch-pounds on TC-1 through TC-546 equipped with authorized spare replacement smooth skin elevator(s).

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Balancing the Aileron
Figure 4-25

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- c. 17.5 inch-pounds on TC-502 through TC-546 equipped with original beaded skins and utility baggage door or authorized spare replacement beaded skin for airplanes with utility baggage door.
- d. 18.0 inch-pounds on TC-547 and after equipped with smooth skin original equipment or authorized spare replacement.
- e. 12.4 inch-pounds on TE-1 through TE-875 and TH-1 through TH-257 equipped with original or authorized spare replacement 12.4 in. lbs.
- f. 14.0 inch-pounds on TE-876 and after and TH-258 and after equipped with original or authorized spare replacement.

CHECKING BALANCE

The elevator balance must be checked in a draft-free area with the elevator completely assembled in flying condition. All painting, including stripes and touch-up, must be completed. The tab, tab pushrod, static wicks, and hinge bolts must be attached. The chord line must be horizontally level and the hinge line must be properly supported when the static moment is measured. Although many different methods of check balancing exist, they can be categorized under the following two headings:

- a. Counterbalancing - The application of a known force or weight at a measured distance from the hinge line to counter the unbalance moment of the elevator assembly.
- b. Actual Force Measurement - A measurement of the force applied by the elevator surface on a single support at a known distance from the centerline of the hinge.

FORCE MEASUREMENT METHOD

CHECK BALANCE BY FORCE MEASUREMENT

The equipment required to perform the check balance by force measurement is as follows:

- a. A stand with knife-edge supports as illustrated in Figure 4-26. The knife-edges should be in the same horizontal plane.
- b. A certified beam balance calibrated in units of 0.01 pound or less. The balance should have a flat weighing platform and its capacity should equal tare plus a minimum of 2.0 pounds.
- c. A support spindle similar to the illustrations and leveling blocks, as required. (Blocks + spindle = tare).
- d. A straightedge, rule and spirit level.

BALANCING PROCEDURE FORCE MEASUREMENT METHOD

- a. Locate the chord line by placing a straightedge at the inboard end of the elevator so that one end is aligned with the center of the torque tube and the other end is centered on the trailing edge.
- b. Mark the chord line by grease pencil or other means on the rib. Remove the straightedge.
- c. Fit correct sized bolts in the outboard and center hinge brackets and mount the elevator on the knife-edges. Ensure that it is free to rotate about the hinge line.
- d. Support the trailing edge behind the center hinge point spindle resting on a leveled beam balance platform as illustrated. The spindle must be vertical throughout the balancing procedure.

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- e. Hold a spirit level against the marked chord line and level it by extending or contracting the spindle, or by using blocks and shims under the spindle.
- f. Measure the perpendicular distance from the hinge centerline to the point supported by the spindle.
- g. Ensure that the spirit level and rule are removed from the surface and read the reaction on the beam balance.
- h. Calculate the static underbalance moment M from the formula:

$M = D (R - T)$ inch-pounds where,

D = Perpendicular distance from the hinge centerline to the spindle point (inches).

R = Reaction (pounds) read from the beam balance.

T = Tare, i.e., spindle plus leveling blocks or shims on the scale platform (pounds).

EXAMPLE

D is 13.5 inches, R is 1.89 lb. and T = 1.00 lb.

$M = 13.5 (1.89 - 1.00)$; $M = 12.0$ inch-pounds.

M is within the range which is satisfactory.

If M is not within the prescribed range, refer to step i. under BALANCING PROCEDURE COUNTERBALANCING METHOD.

COUNTERBALANCING METHOD

CHECK BALANCE BY COUNTERBALANCING

The equipment required to perform the check balance by counterbalancing is as follows:

- a. A stand with knife-edge supports as illustrated in Figure 4-26. The knife-edges must be in the same horizontal plane.
- b. A paper cup or similar lightweight container.
- c. Approximately 2 pounds of lead shot.
- d. A certified beam balance weighing device calibrated in units of 0.01 pound or less.
- e. A straightedge, ruler, and spirit level.

BALANCING PROCEDURE COUNTERBALANCING METHOD

- a. Locate the chord line by placing a straightedge at the inboard end of the elevator assembly so that one end is on the hinge centerline and the other end is centered on the trailing edge. Mark the chord line with a suitable marker, such as a grease pencil, then remove the straightedge.
- b. Secure the trim tab in its neutral position with a small piece of masking tape.
- c. Fit the correct size bolts in the hinge clevises and mount the elevator on the knife-edge supports. Ascertain that the elevator is free to rotate about the hinge line.

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d. To determine if weight should be added or removed, use a short length of small-diameter string secured to the surface with a small piece of masking tape and a cup hanging vertically as illustrated in Figure 4-26. Slightly loosen the forward top screw on the tip of the elevator leading edge. Suspend a paper cup on the inboard side of the tip and wrap the string around the screw. Secure the string to the surface with a small piece of masking tape aft of the top forward screw and near the hinge center line as shown in Figure 4-26. The cup must be free to hang vertically.

CAUTION

Be certain the forward top screw on the tip of the elevator leading edge is secured after the elevator has been balanced.

- e. Add small quantities of lead shot to the cup until the elevator balances with the chord line level. Check this by holding the spirit level aligned with the marked chord line.
- f. The distance D must be perpendicular to the hinge line. Measure D from the hinge line to the suspension point of the cup.
- g. Remove the cup, contents, and string, then weigh them.

NOTE

Since any weighing error is magnified by the distance D, weighing is most important and must be done carefully on scales that are certified for accuracy.

h. Calculate the static balance as follows:

- 1. The weight of the cup and contents is designated by W.
- 2. The over- or underbalance moment is designated by M.
- 3. $M = W \times D$

4. The following is a typical example of a balancing calculation: Assume the elevator is underbalance (tail-heavy) and the paper cup was suspended from the horn. If the elevator balances with the chord line level at $W = 0.95$ pound and $D = 12.6$ inches, then . . .

$$M = 0.95 \times 12.6$$

$$M = 12.0 \text{ inch-pounds}$$

In this instance, M is within the required static balance range and is therefore acceptable.

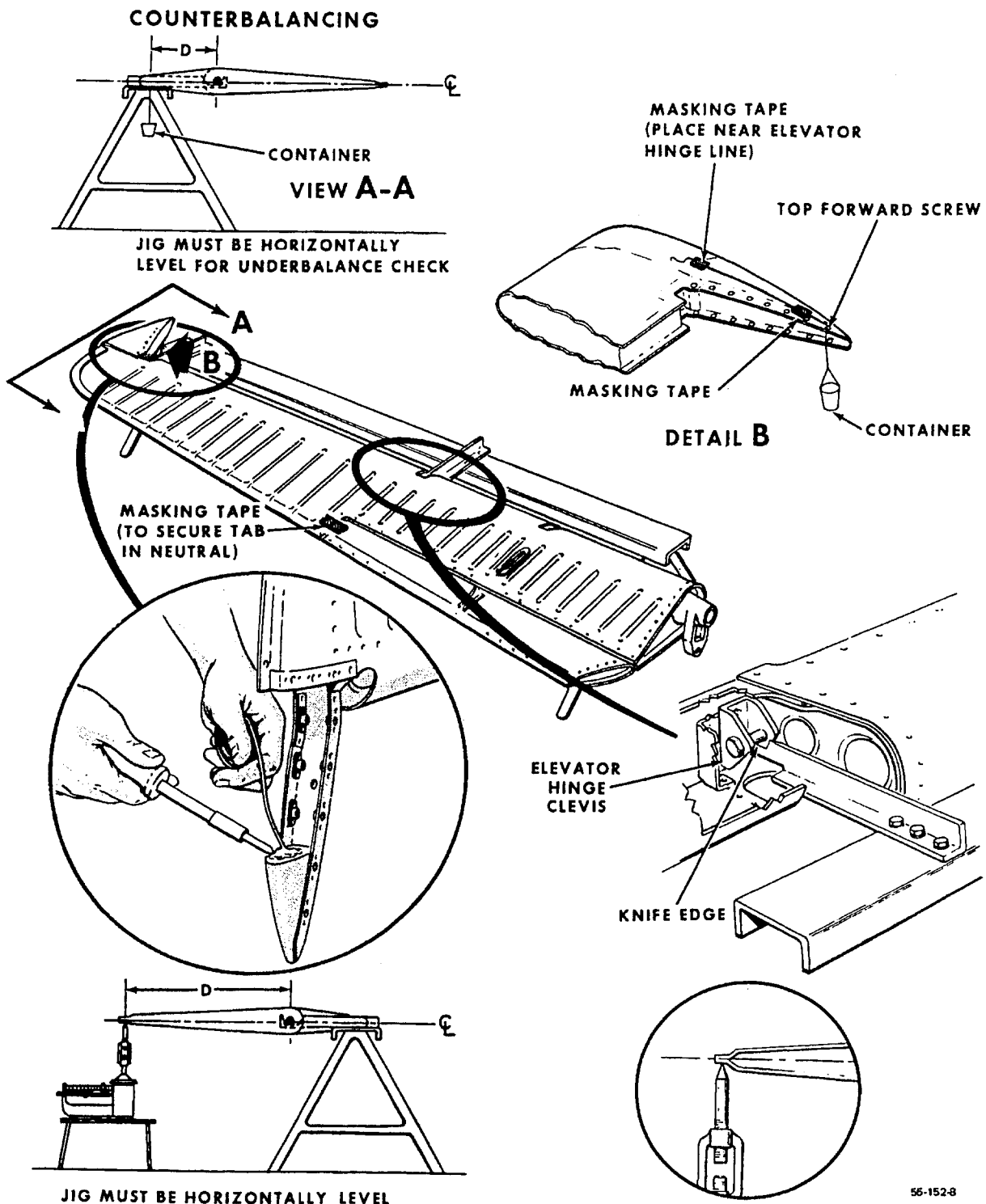
i. The complete elevator assembly, painted or unpainted including the control arm and the tab control rod, must not be tail-heavy over a maximum moment (see ELEVATOR BALANCING for applicable airplane serials and maximum moment). If the static balance does not comply, remove the elevator horn cover and add or remove solder to bring the elevator balance within required limits.

NOTE

Coat the weight with a corrosion preventative material such as zinc chromate primer to insulate the dissimilar metals. Replace the elevator horn cover and recheck the balance.

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BEECH BARON 55 AND 58 SHOP MANUAL



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RUDDER

BALANCING THE RUDDER

FIGURE 4-27

WARNING

Due to rudder imbalance the airplane must not be flown with the rotating beacon light removed from the rudder.

When the rudder surface is being repainted, suspend it by the trailing edge so that excess paint will drain toward the leading edge. After any modifications, repairs or repainting, the finished surface must be check balanced to ensure that its static moment about the hinge line is within the manufacturer's prescribed limits. The complete rudder assembly, painted or unpainted including the control arm and with or without the bellcrank attached, on serials TC-1 and after, shall not be tail-heavy over a maximum of 15.0 inch-pounds. On serials TE-1 and after and TH-1 and after, the complete painted rudder assembly, with or without the bellcrank attached, shall not be tail-heavy over a maximum of 4.5 inch-pounds. The static moment of the rudder is determined by multiplying the unbalanced weight of the rudder assembly times the perpendicular distance from the hinge center line to the center of gravity when the chord line is horizontally level. The weight is measured in pounds and the distance in inches. The static moment of a 100 percent balanced rudder assembly is 0.0 inch-pounds. Tail heaviness indicates static underbalance while nose heaviness indicates static overbalance.

CHECKING BALANCE

The rudder balance must be checked in a draft free area with the rudder completely assembled in flying condition. All painting, including stripes and touch-up, must be completed. The tab, tab push rod, static wicks, and hinge bolts must be attached. The chord line must be horizontally level and the hinge line must be properly supported when the static moment is measured. Although many different methods of check balancing exist, they can be categorized under the following two headings:

- a. Counterbalancing - The application of a known force or weight at a measured distance from the hinge line to counter the unbalance moment of the rudder assembly.
- b. Actual Force Measurement - A measurement of the force applied by the rudder surface on a single support at a known distance from the center line of the hinge.

FORCE MEASUREMENT METHOD

CHECK BALANCE BY FORCE MEASUREMENT

The equipment required to perform the check balance by force measurement is as follows:

- a. A stand with knife edge supports as illustrated in Figure 4-27. The knife edges should be in the same horizontal plane.
- b. A certified beam balance calibrated in units of 0.01 lbs. or less. The balance should have a flat weighing platform and its capacity should equal tare plus 2.0 lbs. minimum.
- c. A support spindle similar to the illustration and leveling blocks, as required. (Blocks + spindle = tare).
- d. A straightedge, rule and spirit level.

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BALANCING PROCEDURE FORCE MEASUREMENT METHOD

- a. Locate the chord line by placing a straightedge at the lower end of the rudder so that one end is aligned with the center of the torque tube and the other end is centered on the trailing edge.
- b. Mark the chord line by grease pencil or other means on the rib. Remove the straightedge.
- c. Fit correct size bolts in the upper and center hinge brackets and mount the rudder on the knife edges. Ensure that it is free to rotate about the hinge line.
- d. Support the trailing edge behind the center hinge point with a spindle resting on a leveled beam balance platform as illustrated. The spindle must be vertical throughout the balancing procedure.
- e. Hold a spirit level against the marked chord line and level it by extending or contracting the spindle, or by using blocks and shims under the spindle.
- f. Measure the perpendicular distance from the hinge centerline to the point supported by the spindle.
- g. Ensure that the spirit level and rule are removed from the surface and read the reaction on the beam balance.
- h. Calculate the static underbalance moment M from the formula:

$M = D (R - T)$ inch-pounds where,

D = Perpendicular distance from the hinge center line to the spindle point (inches).

R = Reaction (pounds) read from the beam balance.

T = Tare; i.e. spindle plus leveling blocks or shims on the scale platform (pounds).

EXAMPLE

D is 13.8 inches, R = 1.87 lb. and T is 1.00 lb.

$M = 13.8 (1.87 - 1.00)$; $M = 12.0$ inch-pounds

M is within the range which is satisfactory.

If M is not within the prescribed range, refer to step i. under BALANCING PROCEDURE COUNTERBALANCING METHOD.

■ COUNTERBALANCING METHOD

CHECK BALANCE BY COUNTERBALANCING

■ The equipment required to perform the check balance by counterbalancing is as follows:

- a. A stand with knife-edge supports as illustrated in Figure 4-27. The knife-edges must be in the same horizontal plane.
- b. A paper cup or similar light weight container.
- c. Approximately 2 pounds of lead shot.
- d. A certified beam balance weighing device calibrated in units of 0.01 pound or less.
- e. A straightedge, ruler, and spirit level.

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BEECH BARON 55 AND 58 SHOP MANUAL

BALANCING PROCEDURE COUNTERBALANCING METHOD

- a. Locate the chord line by placing a straightedge at the lower closure rib of the rudder so that one end is aligned with the center of the torque tube while the other end is centered on the trailing edge. Mark the chord line with a suitable marker, such as a grease pencil, then remove the straightedge.
- b. Secure the trim tab position in its neutral position with a small piece of masking tape.
- c. Fit the correct sized bolts in the hinge brackets and mount the rudder on the knife-edge supports. Ascertain that the rudder is free to rotate about the hinge line.
- d. To determine if weight should be added or removed, suspend a paper cup from a point near the center of the rudder trailing edge if the balance is nose down or near the center of the leading edge if the balance is tail down. Use a short length of small-diameter string secured to the surface with a small piece of masking tape as illustrated in Figure 4-27. The cup must be free to hang vertically.
- e. Add small quantities of lead shot to the cup until the rudder balances with the chord line level. Check this by holding a spirit level aligned with the marked chord line.
- f. The distance D must be perpendicular to the hinge line. Measure D from the hinge line to the suspension point of the cup.
- g. Remove the cup, contents, and string, then weigh them.

NOTE

Since any weighing error is magnified by the distance D, weighing is most important and must be done carefully on scales that are certified for accuracy.

- h. Calculate the static balance as follows:
 1. The weight of the cup and contents is designated by W.
 2. The over- or underbalance moment is designated by M.
 3. $M = W \times D$
 4. The following is a typical example of a balancing calculation: Assume the rudder was slightly underbalance (tail heavy) and the paper cup was suspended from the leading edge. If the rudder balances with the chord line level at W = 0.35 pound and D = 10.0 inches then...

$$M = 0.35 \times 10.0$$

$$M = 3.5 \text{ inch-pounds}$$

In this instance, M is within the required static balance range and is therefore acceptable.

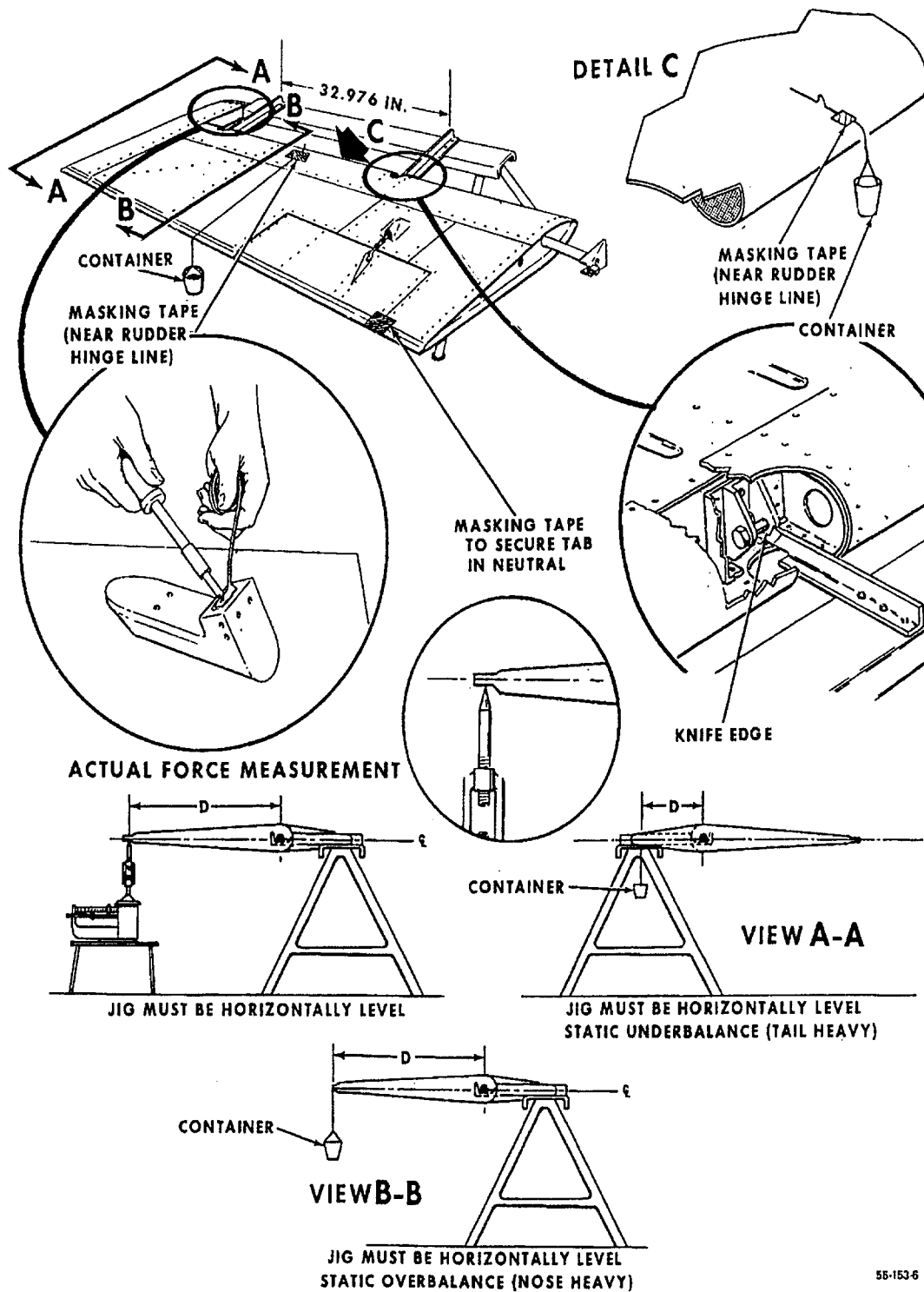
- i. The complete rudder assembly, painted or unpainted, including the control arm and with or without the bellcrank attached, must not be tail-heavy over a maximum moment (see RUDDER BALANCING for applicable airplane serials and maximum moments). If the static balance does not comply, remove the rudder-horn weight and add or remove solder to bring the rudder balance within required limits.

NOTE

Coat the weight with a corrosion preventative material such as zinc chromate primer to insulate the dissimilar metals. Replace the rudder horn weight and recheck the rudder balance.

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Balancing the Rudder
Figure 4-27

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BEECH BARON 55 AND 58 SHOP MANUAL

FLAPS

FLAP REMOVAL

FIGURE 4-28

- a. Remove the bolt from the flap actuating arm.
- b. Remove the bonding cable from the flap.
- c. Remove the bolts from the rollers in the flap track and remove the flap.

FLAP INSTALLATION

FIGURE 4-28

- a. Hold the flap in position and install the rollers and bolts in the flap track.

NOTE

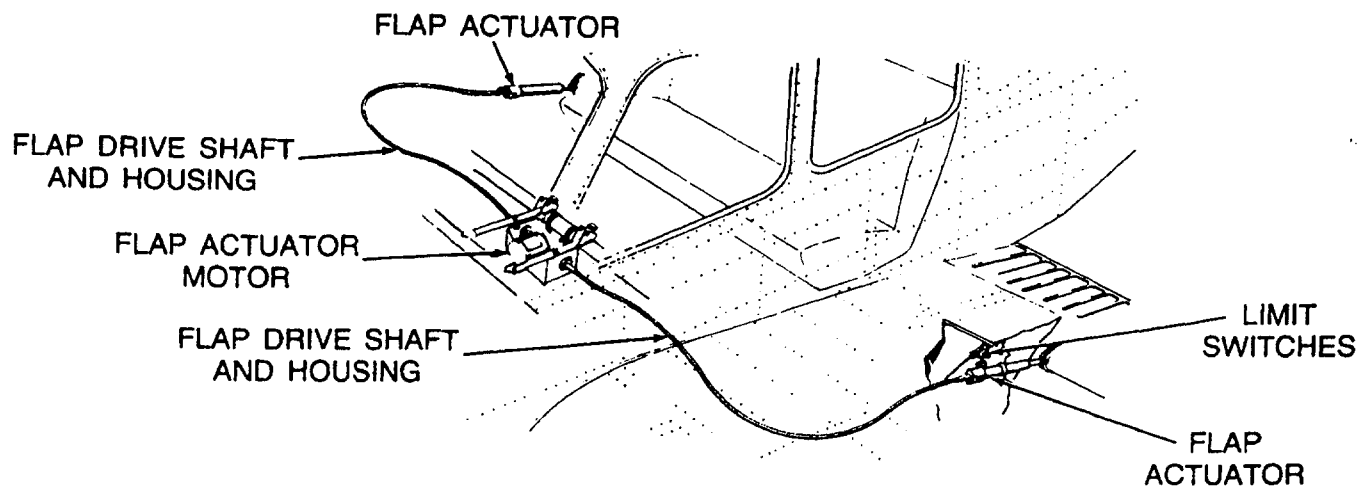
Install the flap track rollers (four rollers per flap and two rollers per track) in the flap track with the flanges of the rollers in one track facing the flanges of the rollers in the other track.

- b. Connect the bonding cable and install the bolt in the flap actuating arm.

FLAP TRACK WEAR LIMITS

The allowable track wear on the bearing surfaces is 0.032 inch, resulting in a maximum dimension of 0.785 inch for the slot in the flap track. The allowable wear into the track side surface is 0.050 inch.

Track wear within the preceding limitations can be dressed smooth with fine emery cloth to prevent roller binding. Lubricate the tracks with Molykote Z mixed with naphtha (12 and 18, Consumable Materials Chart, Section 2), brushed on the flap tracks.



58-161-17

Flap System
Figure 4-28

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BEECH BARON 55 AND 58 SHOP MANUAL

FLAP LIMIT SWITCH ADJUSTMENT

FIGURE 4-29

NOTE

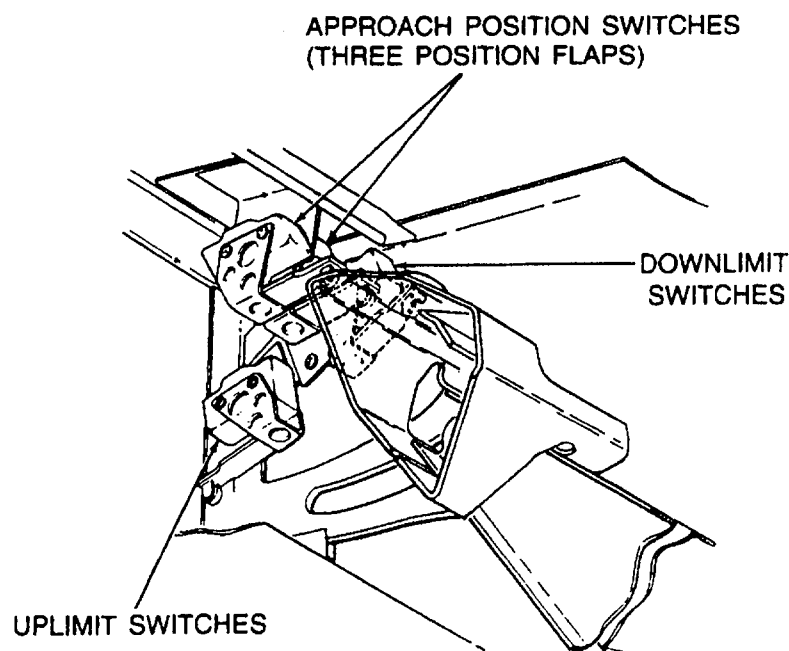
Battery voltage is not sufficient to cycle the flaps correctly during rigging. Use an auxiliary power supply capable of maintaining 28.00 to 28.50 vdc. If an external power receptacle is not provided on the airplane, jumper cables can be used between the battery and the power supply. Be sure of the polarity before connecting the power supply.

The flap limit switches are mounted on a bracket and installed on the outboard side of the inboard flap track in the left wing. They are accessible by lowering the flaps.

CAUTION

Operation of the flap motor without adequate cooling can damage the motor. Allow a brief cooling time after each extension and retraction cycle.

The limit switches control the travel of the flaps by breaking the circuit to the flap motor at the extreme limits of travel. The flap travel is adjusted by moving the limit switches. Rig the left wing flap first, then synchronize the right flap with the left flap.



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Flap Limit Switches
Figure 4-29

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BEECH BARON 55 AND 58 SHOP MANUAL

TWO-POSITION FLAPS (TC-1 THRU TC-2002)

NOTE

Beech recommends the use of the flap travel gage shown in the GENERAL INFORMATION section of this manual. Position the travel gage on the flap just aft of the flap actuator.

Two limit switches control the uplimit position and the downlimit position. To adjust the flap to neutral (UP position), loosen the screws on the switch assembly so that it can pivot on the forward elongated hole. Adjust the switch to stop the flaps in neutral.

NOTE

Rig the flaps under a simulated flight load to minimize overtravel (coasting) of the motor after the limit switch has been actuated.

Move the flap control switch to the down position and measure the flap travel with a flap travel gage. Adjust the downlimit switch to obtain 28° to 30° of down travel.

THREE-POSITION FLAPS (TC-2003 AND AFTER; TE-1 AND AFTER; TH-1 AND AFTER)

NOTE

Beech recommends the use of the flap travel gage shown in the GENERAL INFORMATION section of this manual. Place the travel gage on the flap just aft of the flap actuator.

Four limit switches (one for up position, two for approach position and one for down position) control the travel of the flaps. Use a flap travel gage to measure flap travel when adjusting the limit switches.

NOTE

Rig the flaps under a simulated flight load to minimize overtravel (coasting) of the flap motor after the limit switch has been actuated.

- a. Adjust the uplimit switch so that the flap stops at neutral (UP position).
- b. Adjust the 14° (outboard) limit switch in its mounting slot to stop the flap at 14° to 14.5° after the flap moves from the UP position to the APPROACH position.
- c. Adjust the 16° (inboard) limit switch in its mounting slot to stop the flap at 15.5° to 16° after the flap moves from the DOWN position to the APPROACH position.
- d. Adjust the downlimit switch in its mounting slot to stop the flap at 28° to 30° of down travel.
- e. Remove the bolt attaching the right actuator to the right flap.
- f. Turn the jackscrew on the right actuator in or out until the right flap aligns with the left flap.
- g. Install the bolt connecting the right actuator to the flap.

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- h. With the flaps down, adjust the rubber bumper installed on the rib between the flap and the aileron. Turn the adjusting screw in or out as required to remove play or stop vibration when the flap is in the UP position.

NOTE

A distinct change in the sound of the flap motor near completion of the flap travel can indicate excessive outward adjustment of the rubber bumper.

- i. Operate the flaps through their full travel. Make sure that the flaps contact the limit switch before they contact the rubber bumper.

FLAP POSITION INDICATOR ADJUSTMENT (TC-350, TC-371, TC-1011 AND AFTER; TE-198 AND AFTER; TH-1 THRU TH-1388, TH-1390 THRU TH-1395)

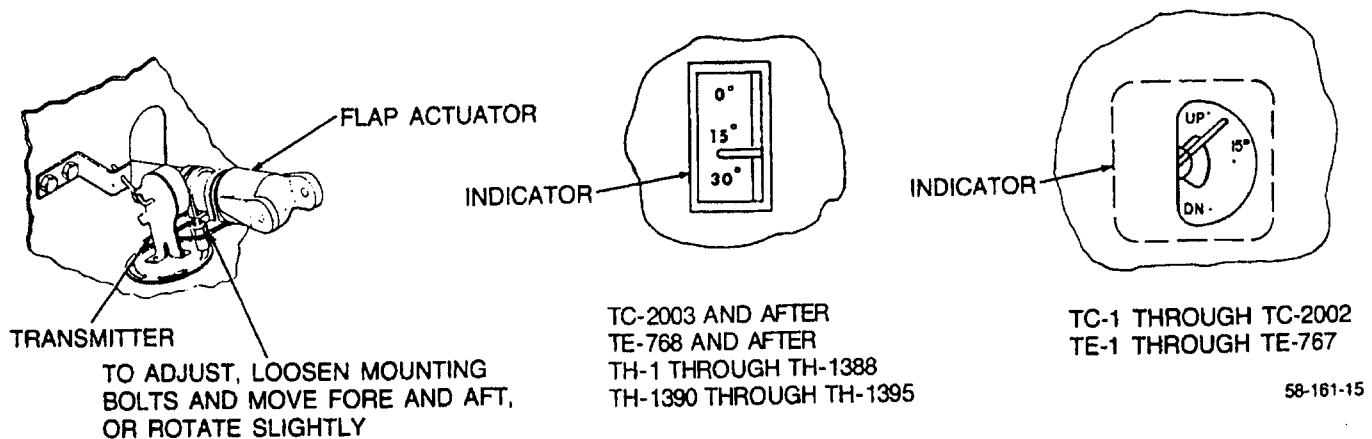
FIGURE 4-30

NOTE

Airplanes manufactures prior to the serials noted above used lights on the instrument panel to indicate the up and down positions in conjunction with stripes painted on the flaps to indicate intermediate positions. Airplanes with serials after those noted above used lights to indicate all of the flap positions.

An adjustable transmitter for the flap position indicator is installed on the flap actuator in the left wing, just forward of the rear spar.

- Adjust the flap limit switches to obtain the correct flap travel (see FLAP LIMIT SWITCH ADJUSTMENT).
- Run the flaps fully down and check the flap position indicator for the corresponding reading. If fully down flaps are not indicated, loosen the transmitter attaching bolts. Adjust the transmitter forward and aft, or rotate it slightly to get the correct reading. Tighten the bolts attaching the transmitter.
- Run the flaps fully up and check the indicator for full up flaps (0°) reading.



Flap Position Transmitter and Indicator
Figure 4-30

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FLAP MOTOR AND GEARBOX REMOVAL FIGURE 4-32

CAUTION

The flap motor used on airplane serials TC-2003 and after, TE-1084 and after and TH-773 and after is not interchangeable with the flap motor used on earlier airplanes.

- a. Remove the cabin front seats.
- b. Remove the access cover (TC-1 thru TC-1607; TE-1 thru TE-942 except TE-938; TH-1 thru TH-384).
- c. Remove the spar cover (TC-1608 and After; TE-938, TE-943 and After; TH-385 and After).
- d. Disconnect the clamps supporting the electrical wiring.

NOTE

A retainer has been added to the flap cables where they join the flap gearbox. This retainer may have been on production airplanes or added by Beech Service Bulletin No. 2460.

- e. Loosen the two set screws in each cable retainer.
- f. Rotate the retainers 90° to line up the keyway with the key slot.
- g. Loosen the nuts on the inboard side of the mounting supports.
- h. Pull the flap drive shafts from the flap motor shaft and retainers.
- i. Disconnect the motor electrical wiring at the quick disconnect(s).
- j. Remove the flap motor attaching bolts and remove the flap motor. Airplane serials TC-1 through TC-2002, TE-1 through TE-1083, and TH-1 through TH-772 have a ground wire attached to one of the flap motor attaching bolts. Remove the ground wire.

FLAP DRIVE CABLE CONNECTION FIGURE 4-32

Connect the LH and RH flap drive cables to the flap drive motor as follows, using the illustration for component locations:

- a. Install the outboard nut and washer as far as it will go on the threaded portion of the flap cable.
- b. Insert the retainer through the mount support and onto the motor shaft as far as it will go. Align the retainer keyway with the key slot in the flap motor drive shaft and tighten one set screw temporarily.
- c. While inserting the flap cable through the mount support, install the inboard washer and nut. Install the cable through the retainer and into the motor drive shaft until the keyway is just past the key slot in the retainer.
- d. Loosen the set screw that was tightened in step b. Ensure that the retainer is still installed on the motor shaft as far as it will go and rotate the retainer 90°.
- e. Keep inboard pressure on the retainer and tighten both retainer set screws.

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- f. Secure the flap drive cable to the mounting support by tightening the nuts. Tighten the inboard nut to ensure that there is sufficient clearance between the outboard edge of the retainer and the cable housing to allow the retainer to rotate without coming into contact with the cable housing. If the threaded part of the cable housing is not long enough to install the two nuts and washers, using a die, add 5/8-24 UNEF threads until 0.88 inch thread length is reached. Tighten the outboard nut against the mounting support.

FLAP MOTOR AND GEARBOX INSTALLATION

CAUTION

The flap motor used on airplane serials TC-2003 and after, TE-1084 and after and TH-773 and after is not interchangeable with the flap motor used on earlier airplanes.

- a. Position the flap motor and install the flap motor attaching bolts. Airplane serials TC-1 through TC-2002, TE-1 through TE-1083 and TH-1 through TH-772 have a ground wire attached to one of the flap motor attaching bolts. Install the ground wire.
- b. Connect the motor electrical wiring at the quick disconnect(s).

NOTE

A retainer has been added to the flap cables where they join the flap gear box. This retainer may have been on production airplanes or added by Beech Service Bulletin No. 2460.

- c. Connect the flap drive cables to the flap drive motor in accordance with FLAP DRIVE CABLE CONNECTION.
- d. Install the spar cover (TC-1608 and After; TE-938, TE-943 and After; TH-385 and After).
- e. Install the access cover (TC-1 thru TC-1607; TE-1 thru TE-942 except TE-938; TH-1 thru TH-384).
- f. Install the cabin front seats.

FLAP MOTOR AND GEARBOX DISASSEMBLY (TC-1 THRU TC-2002; TE-1 THRU TE-1083; TH-1 THRU TH-772) FIGURE 4-31

- a. Cut and remove all safety wire.
- b. Remove the two long screws (26) from the motor brush housing (25) to separate the motor and gearbox.
- c. Remove the screws which attach the cover plate (8) and gasket (7) to the gear housing.
- d. Remove the set screw (11), and remove the countershaft (10) from the gearbox.
- e. Remove the worm and gear (14), washer (12), thrust washer (15), bearing (16) and bearing cup (17).
- f. Remove the retaining pin (24) from the control shaft (20). Slip the spacer (21) and washer (22) down enough to remove the control shaft.

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FLAP MOTOR AND GEARBOX CLEANING AND INSPECTION (TC-1 THRU TC-2002; TE-1 THRU TE-1083; TH-1 THRU TH-772)

- a. Clean all gearbox parts in solvent (15, Consumable Materials Chart, Section 2) and inspect for worn, cracked or corroded parts. Pay particular attention to the worm and gear (14) and worm wheel gear (19) and the bearings (9) in the sides of the gearbox.
- b. Inspect the brushes (27) of the flap motor for wear. The original length of the brushes is 1/2 inch long. Apply adhesive/sealant (58, Consumable Materials Chart, Section 2) to the brush holder threads before installing the brush plug.

FLAP MOTOR AND GEARBOX ASSEMBLY (TC-1 THRU TC-2002; TE-1 THRU TE-1083; TH-1 THRU TH-772) FIGURE 4-31

- a. Install the spacer (21), washer (22) and shim washers (23), and install the control shaft (20). Install the retaining pin (24).
- b. Install the washer (12), worm and gear (14), thrust washer (15), bearing (16) and bearing cup (17).
- c. Install the countershaft (10) and secure with the set screw (11).
- d. Fill the gearbox with lubricating grease (11, Consumable Materials Chart, Section 2).
- e. Install the gasket (7) and cover (8) on the gearbox and secure with the attaching screws.
- f. Install the long screws (26) through the motor brush housing (25) to secure the motor to the gearbox.
- g. Install all safety wire.

FLAP MOTOR AND GEARBOX OVERHAUL (TC-2003 AND AFTER; TE-1084 AND AFTER; TH-773 AND AFTER)

Overhaul of the flap motor and gearbox assembly on these serials is not recommended. The motor coupler and transmission can be obtained individually from Raytheon Aircraft Parts Inventory and Distribution (RAPID).

FLAP SHAFT REMOVAL FIGURE 4-32

- a. Place the airplane on jacks and retract the landing gear until the inboard doors are open (use the circuit breaker).
- b. Remove the front seat assemblies.
- c. Remove the spar cover.

NOTE

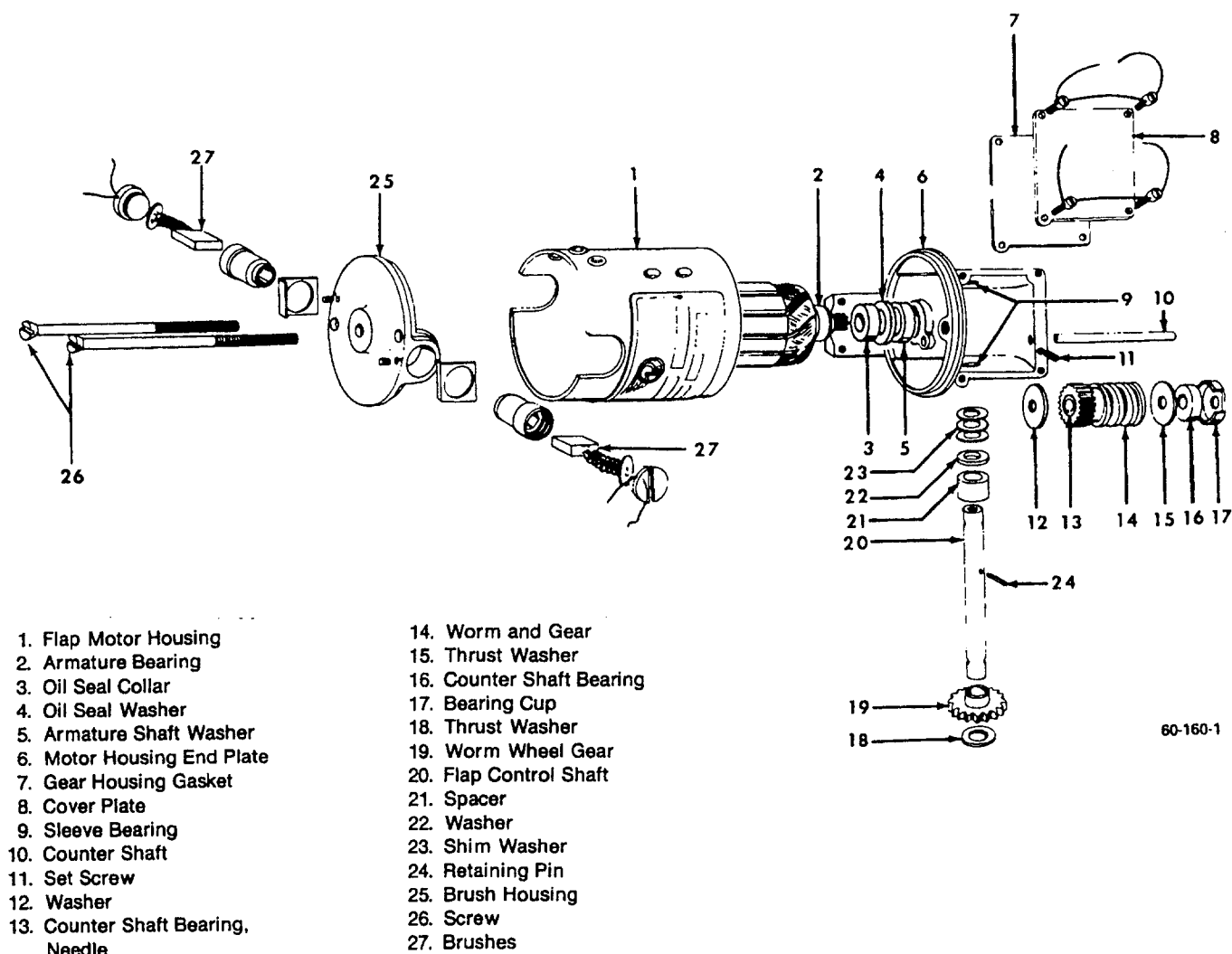
A retainer has been added to the flap cables where they join the flap gearbox. This retainer may have been on production airplanes or added by Beech Service Bulletin No. 2460.

- d. Loosen the two set screws on each cable retainer.
- e. Rotate the cable retainer 90°.
- f. Remove the nut on the inboard side of the mounting support.

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- g. Pull the flap drive shafts from the flap motor shafts and retainers.
- h. Disconnect all clamps securing the shaft housing to the wing structure.
- i. Remove the dust cover in the rear section wheel well.
- j. Disconnect the flap actuator from the wing flap and the wing spar section.
- k. Pull the actuator and flap shaft housing out of the wing.



Flap Motor and Gearbox
Figure 4-31

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BEECH BARON 55 AND 58 SHOP MANUAL

FLAP SHAFT INSTALLATION

FIGURE 4-32

- a. Pull the flap shaft and housing through the wing and attach the actuator to the wing flap and wing spar section.
- b. Set the flaps in the neutral position.

NOTE

A retainer has been added to the flap cables where they join the flap gearbox. This retainer may have been on production airplanes or added by Beech Service Bulletin No. 2460.

- c. Connect the flap drive cables to the flap drive motor in accordance with FLAP DRIVE CABLE CONNECTION.
- d. Install the clamps securing the shaft housing to the wing structure.
- e. Install the dust cover in the rear section of the wheel well.
- f. Run the flaps through fully up and fully down travel to check flap rigging.
- g. Lower the landing gear and remove the airplane from the jacks.
- h. Install the spar cover.
- i. Install the front seat assemblies.

FLAP INNER FLEX SHAFT REMOVAL

FIGURE 4-32

- a. Place the airplane on jacks and retract the landing gear (using the circuit breaker) until the inboard door is open.
- b. Remove the front seat assemblies.
- c. Remove the spar cover.

NOTE

A retainer has been added to the flap cables where they join the flap gearbox. This retainer may have been on production airplanes or added by Beech Service Bulletin No. 2460.

- d. Loosen the two set screws on cable retainer.
- e. Rotate the cable retainer 90°.
- f. Remove the dust cover in the rear of the wheel well to gain access to the actuator.
- g. Remove the two bolts holding the forward end of the actuator in place.

NOTE

The first clamp which secures the flex drive to the wing may have to be removed to allow more flexibility to the flex drive.

The position transmitter may need to be removed from the left flap.

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- h. Remove the snap ring holding the flex drive to the actuator.

NOTE

There are spacers under the flange of the flex drive; use caution that they are not lost.

- i. Note how far the shaft protrudes past the flange of the housing. (This will be used for later installation.)
- j. Pull the flex inner shaft from the housing.

FLAP INNER FLEX SHAFT INSTALLATION

FIGURE 4-32

- a. Lubricate the inner flex shaft with grease (11, Chart 1, 91-00-00).
- b. Install the inner flex shaft into its housing.
- c. Rotate the inner flex shaft until the key on the inner end of the shaft slides into place. (When this is accomplished the measurement noted in step i of FLAP INNER SHAFT REMOVAL should again be noted at this time.)

NOTE

A retainer has been added to the flap cables where they join the flap gearbox. This retainer may have been on production airplanes or added by Beech Service Bulletin No. 2460.

- d. Push the flap shafts into the flap motor shafts and retainers.
- e. Rotate the retainers 90°.
- f. While holding the retainers onto the motor shafts as far as possible, tighten the two set screws in each retainer.

NOTE

Be certain the spacers are in place in the actuator.

- g. Install the flap shaft into the actuator and install the snap ring.

NOTE

A screwdriver may be used to make small adjustments to the screw of the actuator if the slot in the actuator does not align with the key of the flex shaft.

- h. Secure the actuator in place with the two bolts, washers, and nuts.

NOTE

On the left flap the position transmitter will have to be installed if it was removed. Install the clamp on the shaft if it was removed.

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- i. Install the dust cover.
- j. Lower the landing gear and remove the airplane from the jacks.
- k. Use the circuit breaker to slowly cycle the flaps to determine that they are properly rigged.

NOTE

For correct adjustment and rigging of the flap position transmitter, refer to the FLAP POSITION INDICATOR AND ADJUSTMENT in this chapter.

FLAP ACTUATOR DISASSEMBLY

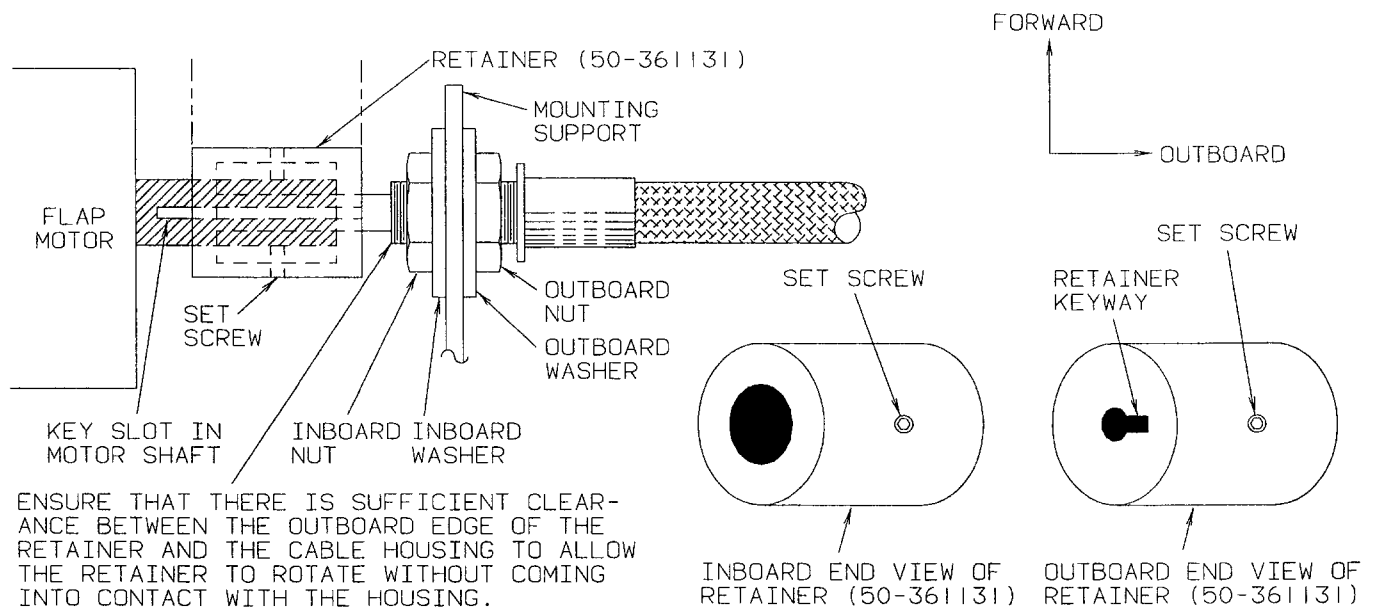
FIGURE 4-33

- a. Remove the snap ring (1) and disconnect the flexible shaft (2) from the actuator.
- b. Tap on the piston plug (3) to drive out the seals (5), spacers (4 and 12) and bearings (6).
- c. Slide the piston (7) out of the housing (8), and unscrew the actuator screw (9) from the piston.
- d. Remove the O-ring (10) from the housing.

NOTE

The following step is necessary only if the piston plug (3) must be replaced because of damage or wear.

- e. Drill out the pin (11) and take the piston plug out of the piston.



Flap Drive Cable Retainer
Figure 4-32

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FLAP ACTUATOR LUBRICATION

FIGURE 4-33

- a. Clean all parts with solvent (15, Consumable Materials Chart, Section 2) and inspect for cracks, corrosion, distortion and excessive wear. Replace the O-ring and seals.
- b. Pack the bearings with gear lube (7, Consumable Materials Chart, Section 2). Lubricate the O-ring with silicone compound (57, Consumable Materials Chart, Section 2) before installation.

FLAP ACTUATOR ASSEMBLY

FIGURE 4-33

CAUTION

The flap actuator must be assembled so that the vent hole in the housing is on top when the actuator is installed. Be sure there are no obstructions.

- a. If the piston plug (3) was removed, apply retaining compound (59, Consumable Materials Chart, Section 2) to the new piston plug and insert the piston plug into the piston (7). Align the holes in both parts and install the new pin (11). Peen the pin and file the ends flush with the piston exterior. Remove the excess retaining compound from both the inside and outside of the piston. Coat the piston plug and pin with primer (24, Consumable Materials Chart).
- b. Install the O-ring (10) into the housing (8).
- c. Pour 2/3 ounce of gear lube (7, Consumable Materials Chart), into the threaded end on the piston (7).
- d. Install one of the bearings (6) over the threaded end of the actuator screw (9). Start the screw into the piston, and insert the piston into the housing.
- e. Install the other bearing (6) and the seal (5). Use approximately 100 pounds of force to seat these parts in the housing.
- f. Install the thick spacer (4) and the thin spacers (12), the flexible shaft (2), and the snap ring (1) in the housing. Apply approximately 100 pounds of reverse force to seat the parts against the snap ring.
- g. The end play between the piston and the housing must be 0.002 to 0.010 inch. Remove the snap ring and adjust the quantity of spacers (4 and 12) to obtain the correct end play. Install the snap ring.

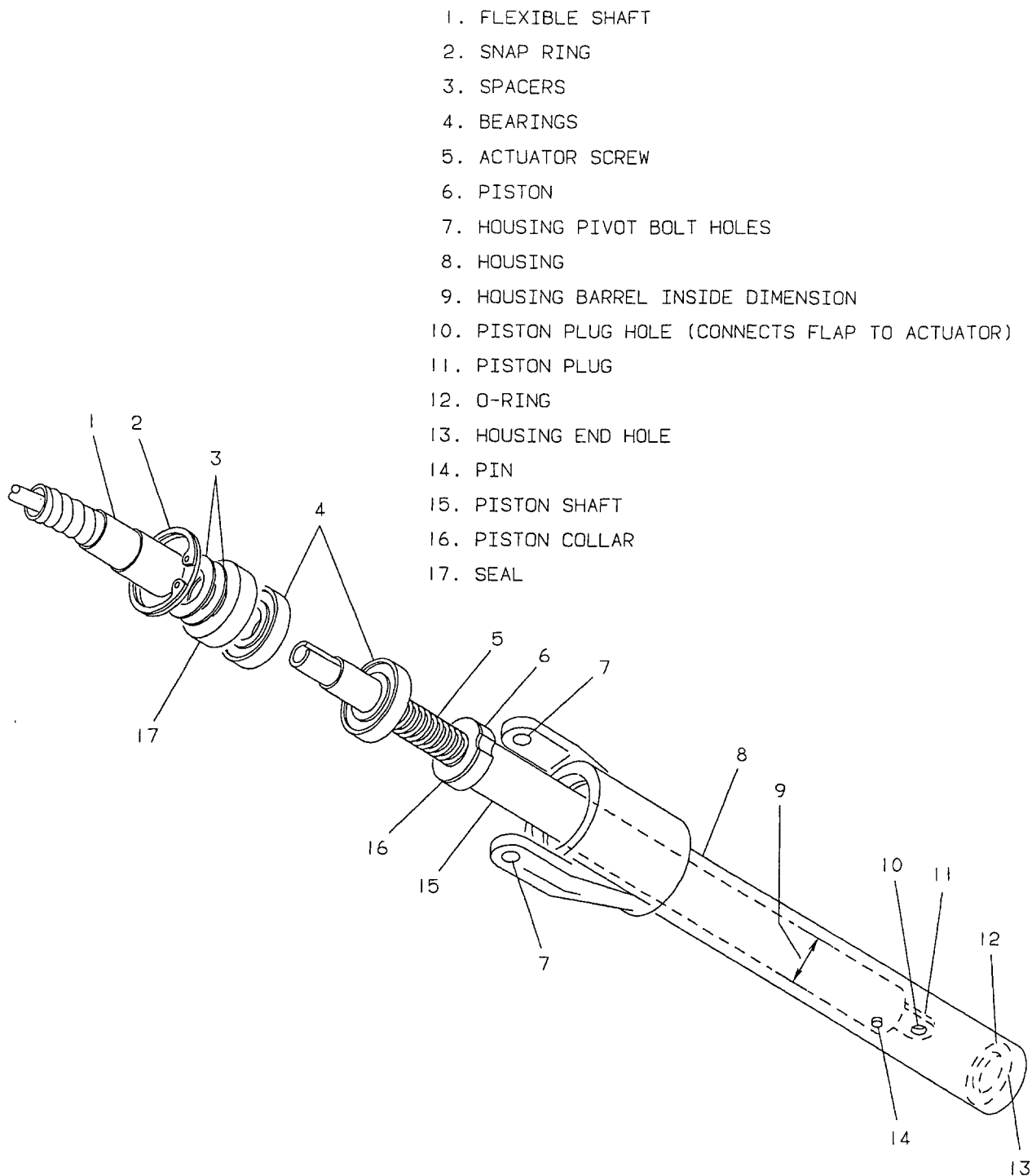
NOTE

A maximum of five thin spacers (12) and maximum of one thick spacer (4) is allowed in the assembly.

- h. Run the actuator in and out several times to check operation to its full travel. Excess lubricant will be forced out of the vent hole.
- i. Install the actuator with the vent hole up. Be sure there is no tape or obstruction covering the vent hole.

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**Flap Actuator
Figure 4-33**

SECTION

5

**LANDING GEAR AND
BRAKE SYSTEM**

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BRAKE SYSTEM FIGURE 5-1

BRAKE WEAR LIMITS (TC-1 THRU TC-422, EXCEPT TC-371)

The brake lining wear is indicated by the distance between the steel brake disc and the outside edge of the brake housing with the brakes applied. Replace the linings when this distance is 0.250 inch. On serials TC-1 thru TC-99 the measurement is to the face of the disc outside of the lining contact area. On TC-100 thru TC-422, except TC-371, the measurement is to the recessed surface at the outer edge of the disc. Replace the steel brake disc when the thickness is 0.225 inch, measured at the thinnest section. The brake disc and wheel side must also be replaced when the distance between the disc teeth and wheel teeth reaches 0.040.

(TC-423 THRU TC-662, TC-664 THRU TC-978, TC-980 THRU TC-983, TC-985 THRU TC-998, AND TC-1002)

On serials noted above, with the brakes applied, measure the distance between the brake disc and the flat surface of the brake housing (parallel to the disc) near the center of the disc face. Replace the linings when this distance is 0.187 inch. Replace the brake disc when the thickness of the brake disc has worn to 0.310 inch, or when an irregular surface on the face of the disc has developed in excess of 1/16 inch. Replace the wheel half when any of the disc drive teeth have worn to a thickness of 0.070 inch when measured 0.100 inch from the top of the tooth.

(TC-371, TC-663, TC-979, TC-984, TC-999 AND AFTER, EXCEPT TC-1002; TE-1 AND AFTER; AND TH-1 AND AFTER)

On serials noted above, the brake linings should be replaced before the metal back plate is exposed through the abrasive surface. This can be checked visually without disassembling the brake. The minimum allowable thickness for the abrasive surface is 0.100 inch. The brake disc should be replaced when its thickness measures 0.330 inch.

PARKING BRAKE ADJUSTMENT

Put the parking brake control in the OFF position and check the parking brake valve to make sure it is in the OFF position. Loosen the lock nut and screw and take up slack in the actuator wire. Tighten the screw and lock nut down on the brake actuator wire. Pull the brake control to the ON position and pump the brakes to see if the pedals are solid. If the brake pedals are not solid, put the brakes in the OFF position and recheck the rigging.

ADJUSTING THE LINKAGE ON BRAKE MASTER CYLINDER

The proper linkage arrangement will adjust the brake pedals to a straight up-right position. This is considered the best adjustment since it will prevent the pedals from hitting the firewall in their extreme forward position. To adjust the linkage for this position loosen the jam nut on the upper end of the master cylinder piston rod and turn the piston rod to attain the desired length. After both pistons are adjusted to the same length tighten the jam nuts.

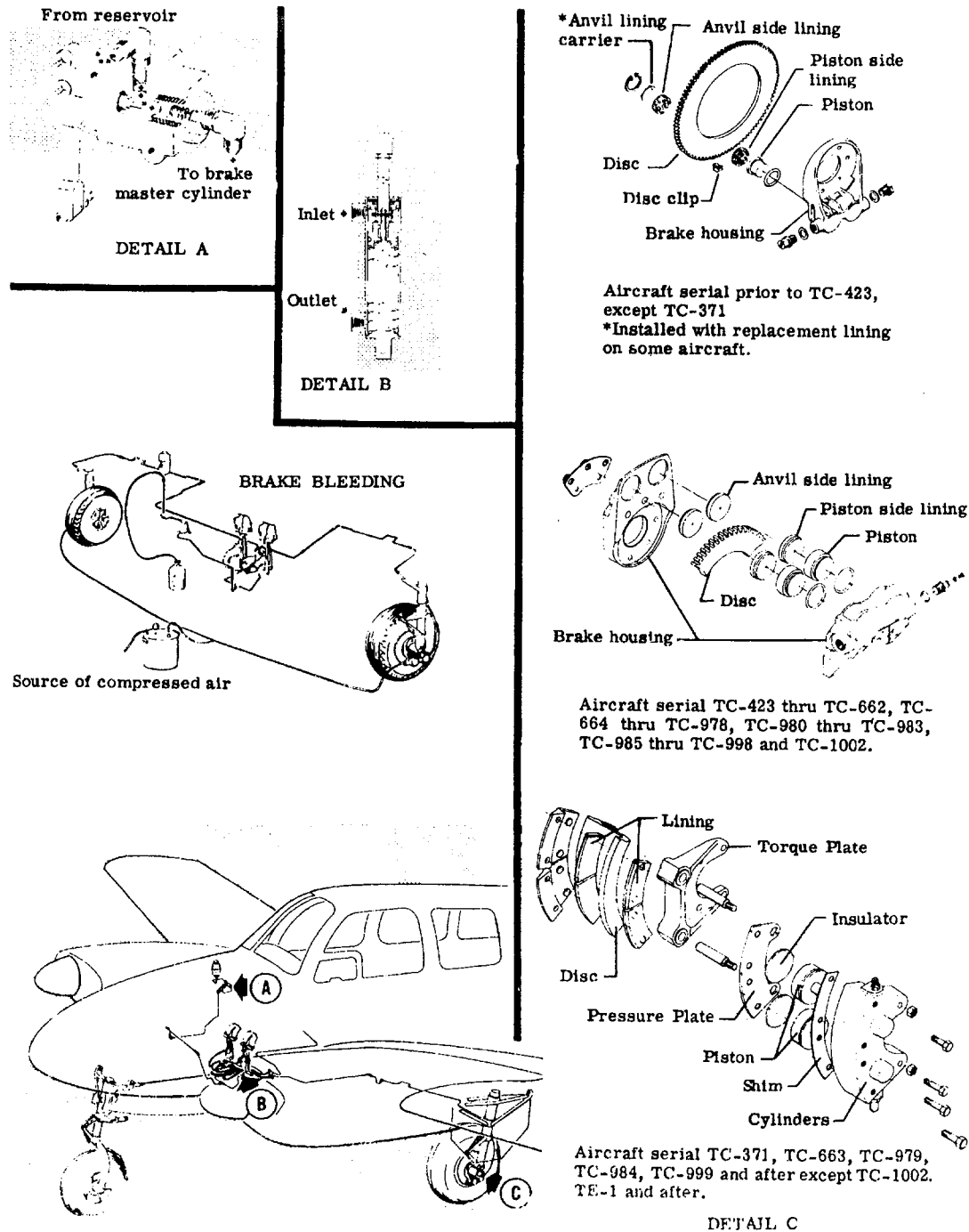
BLEEDING THE BRAKE SYSTEM

Use only hydraulic fluid (13, Consumable Materials Chart, Section 2) in the brake lines and insure that no dirt or foreign matter is allowed to get in the brake system. Dirt can get under seals and cause leaks or clog the compensating valve and cause the brakes to lock.

Use either gravity flow or pressure bleeding to bleed brakes. Using either method, the parking brake lever and toe brake pedals must both be fully released to open the compensating port in the brake master cylinders.

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Brake System
Figure 5-1

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GRAVITY BLEEDING

The reservoir must be kept full during bleeding. The brake pedals should be operated slowly and smoothly to eliminate trapped air in the master cylinders. When no more air bubbles appear in the fluid drained from the bleeder plug, close the bleeder valve.

PRESSURE BLEEDING

Connect the hoses from a pressure pot to the bleeder fitting on the brake and bleed the system from the wheel cylinder up. Disconnect the fluid supply line at the reservoir, attach a hose to it and put the other end of the hose in a large, clean container. Using not more than 30 pounds pressure, bleed the system until all air bubbles are gone from the draining fluid. Pumping the brakes is not necessary.

BLEEDING DUAL BRAKE SYSTEM

In airplanes having the optional dual brake system, the copilot's brake system is bled by closing the valve on the pressure pot and pumping the copilot's brake pedal to change the shuttle valve position. This causes hydraulic fluid to be routed through the copilot's system and this system should be bled as was the pilot's system.

After the pilot's and copilot's brakes have been bled, close the bleeder valve and repeat for the other wheel.

REMOVING THE WHEEL AND BRAKE ASSEMBLY (GOODYEAR) (TC-1 THRU TC-370, TC-372 THRU TC-662, TC-664 THRU TC-978, TC-980 THRU TC-983, TC-985 THRU TC-998 AND TC-1002)

- a. Place airplane on a jack.
- b. Remove the cotter pin, wheel retaining nut, spacers, bearings, wheel and release disc clips. Support the brake disc to prevent it from dropping and striking the axle when the wheel is removed.
- c. Disconnect the brake hydraulic line, remove the six brake housing attaching bolts and remove the brake housing.

INSTALLING THE WHEEL AND BRAKE ASSEMBLY (GOODYEAR) (TC-1 THRU TC-370, TC-372 THRU TC-662, TC-664 THRU TC-978, TC-980 THRU TC-983, TC-985 THRU TC-998 AND TC-1002)

- a. Place the brake housing on the axle and position the housing on the axle attaching hole from the perpendicular so that the brake cylinders slant down and aft from the strut center line.
- b. Install the brake housing attaching bolts and connect the brake hydraulic line to the brake assembly.
- c. Clean the wheel bearings with solvent (15, Consumable Materials Chart, Section 2) and repack with grease (9, Consumable Materials Chart, Section 2).
- d. Position the brake disc and install the wheel assembly, aligning the square notches in the disc teeth with corresponding notches in the wheel. Install the bearings, spacers, wheel retaining nut, and brake disc clips.
- e. Tighten the wheel retaining nut, then back off until the wheel rotates.
- f. Install the wheel retaining nut cotter pin.
- g. Bleed the brake system.

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REMOVING THE WHEEL AND BRAKE ASSEMBLY (CLEVELAND) (TC-371, TC-663, TC-979, TC-984, TC-999 AND AFTER, EXCEPT TC-1002; AND TE-1 AND AFTER)

- a. Place the airplane on a jack.
- b. Remove the four bolts (six bolts on the heavy duty brakes) which attach the back brake plate and inner linings to the cylinders, then remove the back plate assembly.
- c. Disconnect the brake hydraulic line, and remove the cylinder assembly by sliding the two guide pins out of the torque plate.
- d. Remove the cotter pin, wheel retaining nut, spacers, and bearing. Slide the wheel off the axle.
- e. The brake disc assembly can be removed, if desired, by removing the six bolts which join the wheel halves. However, the tires should first be completely deflated.

NOTE

The brake linings and cylinder assembly can be removed without removing the wheel, by utilizing steps a, b, and c.

INSTALLING THE WHEEL AND BRAKE ASSEMBLY (CLEVELAND) (TC-371, TC-663, TC-979, TC-984, TC-999 AND AFTER, EXCEPT TC-1002; AND TE-1 AND AFTER)

- a. Clean the wheel bearings with solvent (15, Consumable Materials Chart, Section 2) and repack with grease (9, Consumable Materials Chart, Section 2). Replace any damaged grease seals, and be sure grease seal retaining rings are in place before installing the wheel.

NOTE

Lightly saturate the felt oil seal with oil (38, Consumable Materials Chart, Section 2). Remove the excess oil by lightly compressing the felt oil seal sides. Coat the sides and the outer diameter of the felt oil seal with wheel bearing grease.

- b. Slide the wheel on the axle; and install the bearings, spacers, and wheel retaining nut.

NOTE

If the torque plate has been removed, it should be installed so that the guide pin holes are positioned aft, and are centered above and below the horizontal center line of the axle.

- c. Install the brake cylinder assembly by inserting the two guide pins into the torque plate.
- d. Install the back plate (inner lining) assembly, and tighten the four attaching bolts (six on the heavy duty brake).

NOTE

On the Cleveland heavy duty brakes, torque the six back plate attach bolts to 80 to 90 inch-pounds.

- e. Connect the brake hydraulic line.
- f. Tighten the wheel retaining nut, then back off until the wheel rotates freely and there is no side motion.

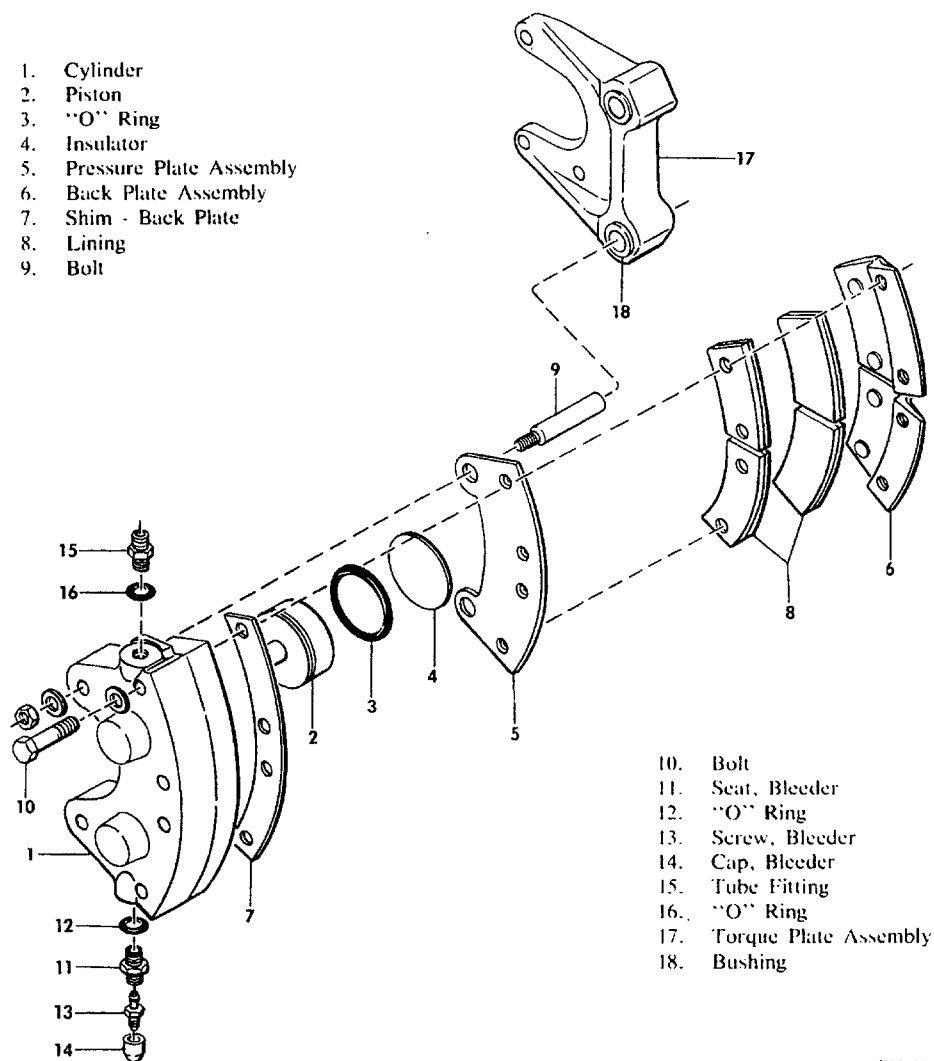
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- g. Install a new wheel retaining nut and cotter pin.
- h. Bleed the brake system.

CLEVELAND BRAKE LINING REMOVAL

On all aircraft which have the CLEVELAND brake assembly, the lining, after extended use, has a tendency to stick to the retaining plate. The locating pins for the lining section are peened into the retaining plate. (See Figure 5-2 or 5-3.) It is not necessary to drill out these locating pins to remove the brake lining. To remove the lining apply a screwdriver or a similar prying tool between the retaining plate and the lining, the lining should then pop off. Replace the lining by fitting a new lining section over the locating pins in the retainer plate.

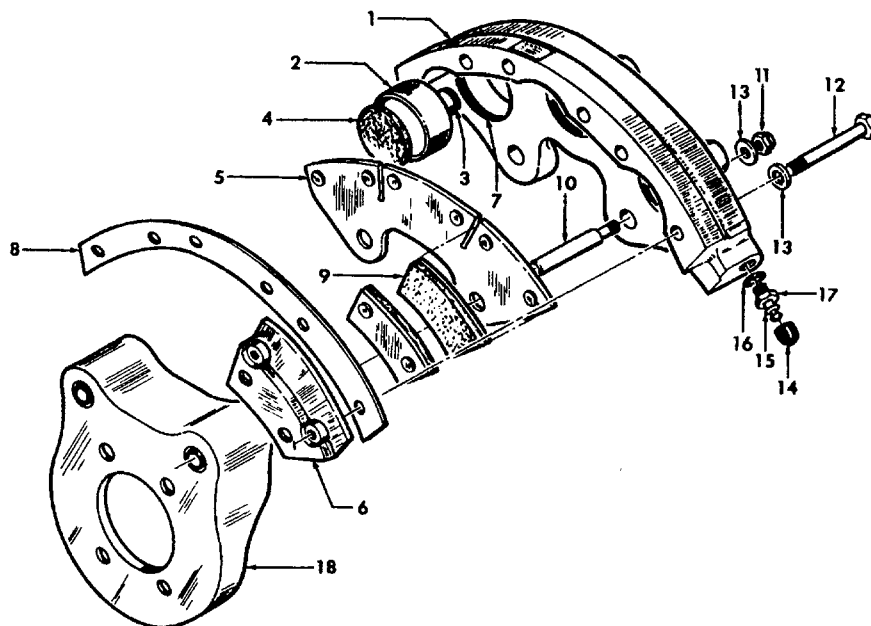


E55-218-1

Cleveland Standard Brake Assembly
Figure 5-2

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58-218-10

1. Cylinder
2. Piston
3. Friction Ring
4. Insulator
5. Pressure Plate Assembly
6. Back Plate Assembly
7. "O" Ring
8. Shim - Back Plate
9. Lining

10. Anchor Bolt
11. Nut
12. Bolt
13. Washer
14. Cap, Bleeder
15. Screw, Bleeder
16. "O" Ring
17. Seat, Bleeder
18. Torque Plate Assembly

Cleveland Heavy Duty Brake Assembly

Figure 5-3

WHEEL AND TIRE REPAIR

Smooth wheel abrasions, nicks and burrs with a fine file and retouch with zinc chromate primer and aluminum lacquer to prevent corrosion. Replace any damaged wheel parts. Replace tire casings showing breaks, blisters, or excessive wear.

In service, tire carcasses grow slightly due to shock loads in landing. Normally, this growth is balanced by tread wear so there is no increase in tire diameter. Raytheon Aircraft Company cannot recommend the use of recapped tires on the Baron models. The tires may pass the retraction test when first installed; however, recapped tires have a tendency to swell after use and may cause malfunction of the retract system or damage the landing gear doors.

REMOVING AND INSTALLING THE BRAKE MASTER CYLINDERS

- a. Close parking brake valve by pulling parking brake handle.
- b. Unsnap the floor mat and remove the floorboard section below the brake pedals.

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- c. Disconnect the two brake hydraulic lines at each master cylinder and mark the lines to assure correct installation.
- d. Remove the master cylinder attaching bolts and nuts and remove the master cylinders.
- e. If new master cylinders are to be installed, note the positions of the master cylinder 45-degree elbow fittings.
- f. Install the master cylinders by reversing the removal procedure.
- g. Replenish and bleed the brake hydraulic system.

BRAKE MASTER CYLINDER OVERHAUL

PARAMOUNT FIGURE 5-4

DISASSEMBLY

- a. Remove the snap ring (3) and pull the piston assembly from the housing (18).
- b. Remove the clevis (1), nut (2) and cotter pin (11) from rod (16); this will allow the removal of retaining washers (4), rod wiper (5), guide bushing (6) and O-rings (7 and 8) from the piston rod.
- c. Remove the piston (10) and O-ring (9) from piston rod and remove the spring washer (15).
- d. Remove the cotter pin (12) from valve stop (14) and remove the valve stop from the piston rod.
- e. The valve assembly (13) and spring (17) will fall free of the housing (18) with the piston assembly removed.
- f. Clean all parts with solvent (15, Consumable Materials Chart, Section 2).
- g. Check all parts for cracks, corrosion, distortion and wear.

ASSEMBLY

- a. Lubricate all parts with hydraulic fluid (13, Consumable Materials Chart, Section 2).

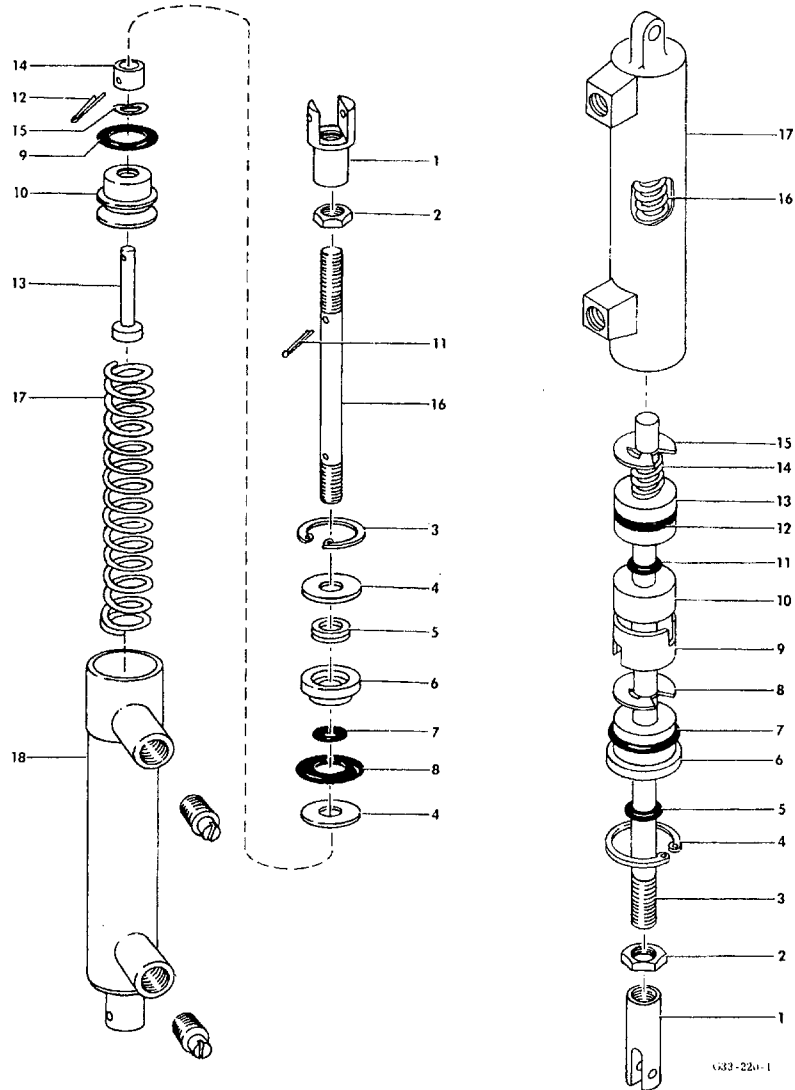
NOTE

During assembly, install new washers and seals.

- b. Install the valve assembly (13) and spring (17) into the housing (18).
- c. Install the valve stop (14) and cotter pin (12) to the piston rod (16).
- d. Install the spring washer (15), O-ring (9) and piston (10) to the piston rod (16).
- e. Install the O-rings (7 and 8), guide bushing (6), rod wiper (5), retaining washer (4), cotter pin (11), nut (2) and clevis (1) to the piston rod (16).
- f. Install the assembled piston assembly into the housing (18) and install the snap ring (3).

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PARAMOUNT

GERDES

- | | | | |
|----------------------|---------------------------|----------------------|---------------|
| 1. Clevis | 10. Piston | 1. Clevis | 9. Collar |
| 2. Nut | 11. Cotter Pin | 2. Lock Nut | 10. Spacer |
| 3. Snap Ring | 12. Cotter Pin (Modified) | 3. Shaft | 11. O-Ring |
| 4. Retaining Washers | 13. Valve Assembly | 4. Snap Ring | 12. O-Ring |
| 5. Rod Wiper | 14. Valve Stop | 5. O-Ring | 13. Piston |
| 6. Guide Bushings | 15. Spring Washer | 6. Cap End & Bearing | 14. Spring |
| 7. O-Ring | 16. Piston Rod | 7. O-Ring | 15. Snap Ring |
| 8. O-Ring | 17. Spring | 8. Snap Ring | 16. Spring |
| 9. O-Ring | 18. Housing | | 17. Housing |

**Brake Master Cylinders
Figure 5-4**

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GERDES

FIGURE 5-4

DISASSEMBLY

- a. Remove the snap ring (4) from the clevis end of housing (17) and pull the assembled piston assembly from the housing.
- b. Remove the clevis (1), lock nut (2), and cap end and bearing (6) from shaft (3).
- c. Remove O-rings (5 and 7) from cap end and bearing.
- d. Remove snap ring (8), thrust collar (9) and spacer(10) from shaft.
- e. Remove O-ring (11) from shaft.
- f. Remove snap ring (15) and spring (14) from shaft.
- g. Remove piston (13) from shaft.
- h. Remove O-ring (12) from piston.
- i. Remove spring (16) from housing.
- j. Clean all parts with solvent (15, Consumable Materials Chart, Section 2).
- k. Check all parts for cracks, corrosion, distortion and wear.

ASSEMBLY

- a. Lubricate all parts with hydraulic fluid (13, Consumable Materials Chart, Section 2).

NOTE

During assembly, install new washers and seals.

- b. Install spring (16) into housing (17).
- c. Install O-ring (12) on piston (13).
- d. Install piston (13) on shaft (3).
- e. Install O-ring (11) on shaft.
- f. Install spacer (10), thrust collar (9) and snap ring (8) on shaft.
- g. Install O-rings (5 and 7) to cap end and bearing (6).
- h. Install cap end and bearing, locknut (2) and clevis (1) to shaft.
- i. Install assembled piston assembly into housing.
- j. Install snap ring (4) to housing.

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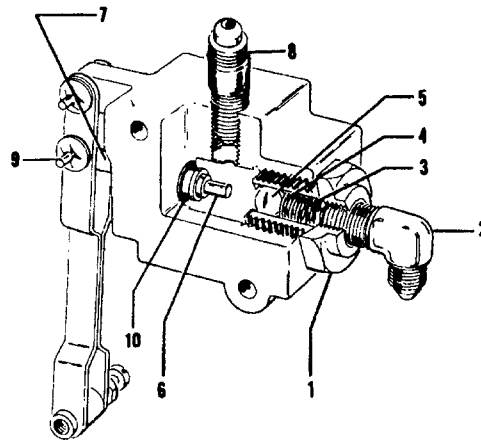
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PARKING BRAKE VALVE OVERHAUL

FIGURE 5-5

- a. Remove the valve seat (1) from the parking brake valve assembly.
- b. Remove the elbow (2) from the valve seat.
- c. Remove the spring (3), washer (4) and ball (5) from the valve seat.
- d. Remove the lock washer (9) from the pin through the brake valve handle, remove the spacers (7) on the arm and push the plunger (6) through housing and out through the valve seat bore.
- e. Remove the old O-ring (10) from the inside of the brake valve housing.
- f. Clean all parts in solvent (15, Consumable Materials Chart, Section 2) and air dry all parts.
- g. Place a new O-ring inside the brake valve housing.
- h. Check the valve seat for wear and distortion. If necessary replace the valve seat.

Check the parking brake valve for leaks by placing 1,500 pounds pressure in the valve through the elbow (2). Remove the pressure and place it in the nozzle (8). The valve should open with application of 2 pounds pressure or less. If this is not the case, the valve is not serviceable.



1. Valve Seat
2. Elbow
3. Spring
4. Washer
5. Ball
6. Plunger
7. Spacers
8. Nozzle
9. Lock Washers
10. O-Ring

TH05B
991754AA

Parking Brake Valve
Figure 5-5

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LANDING GEAR SYSTEM FIGURE 5-6

CAUTION

Under no circumstance should the landing gear be operated electrically while the hand crank is engaged. In the event of such an operation, a tear down and magnetic inspection should be performed for damage to engagement slot in worm gear. (See Item 19, Figure 5-15.)

LANDING GEAR SAFETY SYSTEM (OPTIONAL)

The optional landing gear safety system functions through the action of a solenoid in the landing gear position switch in conjunction with a three position safety system switch, a relay and diode mounted on the front spar, two pressure switches mounted on the inboard side of the left main landing gear wheel well and a micro-switch located adjacent to each existing throttle position warning switch.

Each pressure switch is connected into the pitot and static system. The pressure switch in the gear-up circuit is actuated by the pressure differential that exists between the pitot and static air system and will close with increasing pressure at approximately 70 mph. The pressure switch in the gear-down circuit will close with decreasing pressure at 120 mph.

When the landing gear position switch is in the UP position and an airspeed of 70 mph has been attained, the pressure switch in the gear-up circuit closes and actuates a relay mounted on the front spar, thus completing the circuit and retracting the landing gear. A diode locks the relay in the closed position until the retraction cycle is completed. For the preceding to occur however one micro-switch adjacent to the throttle position warning switch must also be in the open position. This micro-switch is actuated by the throttle control when the throttle is advanced sufficiently for the manifold pressure gage to register approximately 19 inches Hg. Conversely, if both throttles are retarded beyond the position corresponding to approximately 17 inches Hg of manifold pressure, the micro-switches will close. If at the same time the micro-switches close the airspeed has dropped below 120 mph, the resultant pressure differential between the pitot and static systems will actuate the pressure switch in the gear-down circuit. With both micro-switches and pressure switches closed, the current flow through the solenoid will cause the landing gear position switch to drop into the DOWN position, thus completing the gear-down circuit.

If the landing gear position switch is placed in the UP position while the landing gear safety system switch is in the ON position, the landing gear will retract only when the following conditions are mutually fulfilled.

- a. The airplane must have attained an airspeed of at least 70 mph.
- b. One throttle setting must have been advanced sufficiently to have produced a manifold pressure of approximately 19 inches Hg.

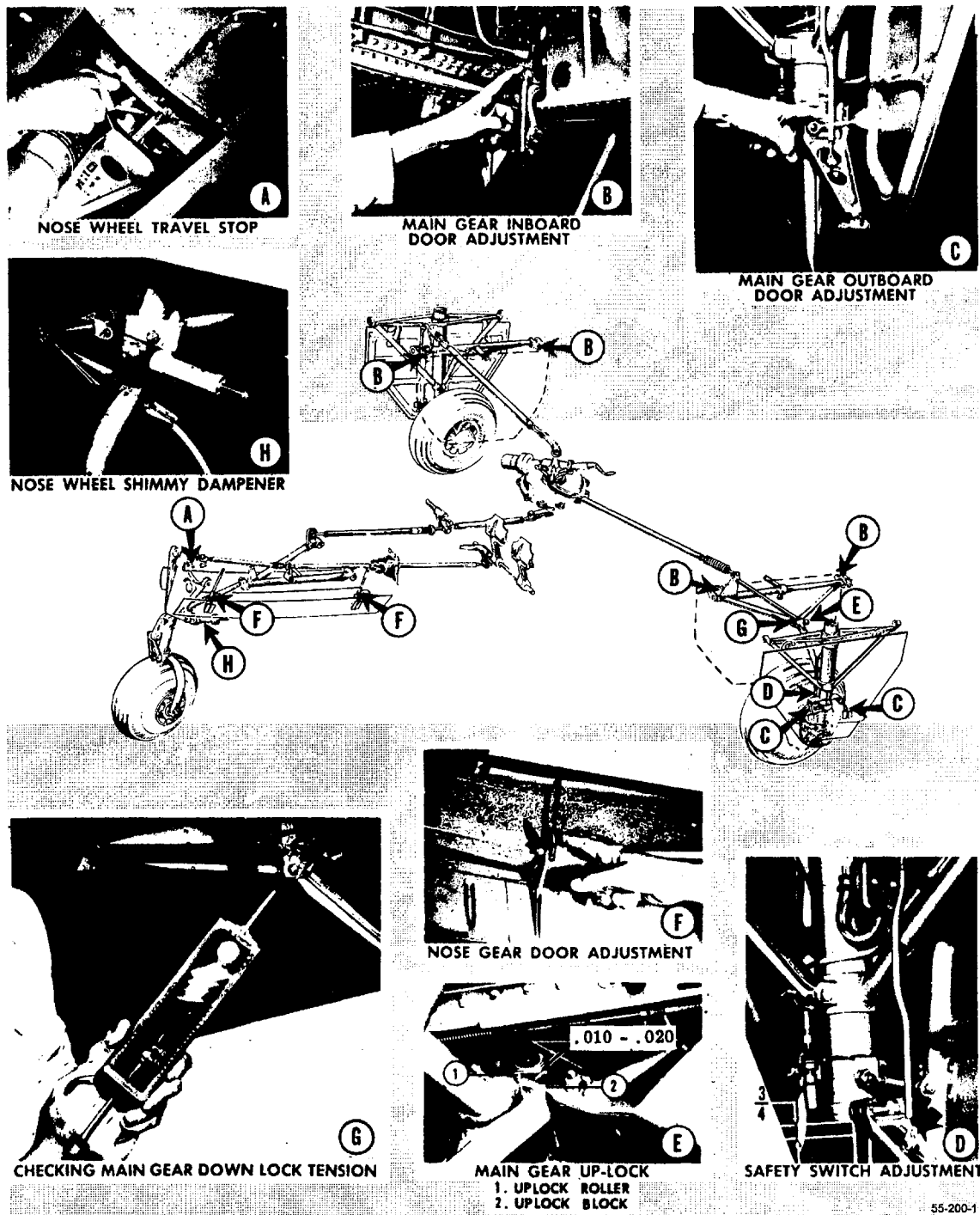
By the same token, the landing gear will automatically extend under the following conditions:

- a. The airspeed must have dropped below 120 mph.
- b. Both throttles must have been retarded enough for manifold pressure to have dropped below approximately 17 inches Hg.

The safety system switch is a three position switch, with normally ON and OFF positions. The switch also contains a momentary or test position for checking that the system is functioning properly. When released from the test position, the switch returns to the ON position.

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Landing Gear System
Figure 5-6

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SYSTEM MAINTENANCE AND ADJUSTMENT

No maintenance is required for the landing gear safety system, other than replacing defective units or checking the electrical wiring for condition, security of attachment, and tightness of electrical connections. The switches are pre-set and adjustment will not normally be required; however, should the system fail to function properly, the following checks and adjustments may be accomplished.

CHECK OF SYSTEM WITH SAFETY SWITCH IN TEST POSITION

- a. Place the throttles in the closed or retarded position.
- b. Place the battery master switch ON. The landing gear circuit breaker may be either in or out.
- c. Place the landing gear safety system switch in the momentary full up (TEST) position. Noise or movement of the solenoid in the landing gear position switch indicates that the automatic landing gear extension part of the system is functioning properly. The ON-OFF switch returns normally to the ON position unless the pilot intentionally places the switch in the OFF position.

MICROSWITCH ADJUSTMENT

The landing gear safety system micro-switches are set to operate at 3 to 5 inches Hg above the throttle warning horn switch (see this section for proper setting of the Throttle Warning Horn Switch). This is accomplished by a step in the cam which operates the throttle warning horn switch.

PRESSURE SWITCH ADJUSTMENT

The pressure switches are preset and will not normally require adjustment. Because of the built-in tolerance of these switches, they should not be tampered with unless radically out of adjustment, that is unless the switch in question fails to actuate at an airspeed within 2 mph above or below the setting recommended for it. Even then the system plumbing and electrical wiring should be checked to ascertain that the source of trouble is not something other than improper adjustment of the pressure switches.

- a. Place the airplane on jacks.
- b. With the master switch ON, the landing gear circuit breaker on, and the landing gear warning circuit breaker off, advance the throttles to maximum position.
- c. Place the landing gear safety position switch in the ON position.
- d. Place the landing gear position switch in the UP position.
- e. Clamp a section of soft rubber tubing over the pitot head inlet, making certain that the connection is airtight.
- f. Crimp the end of the tubing and roll it up until the airspeed indicator registers 70 mph. The landing gear will start retracting immediately if the pressure switch is properly adjusted.

NOTE

Before starting the rigging procedure, place the airplane on jacks and start the retraction cycle enough to break the down lock tension. Apply a sharp load by hand in an aft direction against the nose gear strut. If this causes the main gear wheels to move approximately 1/2 to 1 inch, it is a good indication that the landing gear actuator assembly needs overhaul and/or internal adjustment.

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CAUTION

To avoid rupturing the diaphragm of the airspeed indicator, the rubber tubing must be rolled slowly.

g. If the landing gear failed to retract in the preceding step, turn the master switch OFF and adjust the pressure switch (outboard switch of the two installed in the left main wheel well) as follows:

1. Secure the rolled up tubing so that it will hold the airspeed indicator reading at 70 mph.

2. Connect a continuity tester across the contacts of the pressure switch, then turn the adjustment screw until the switch closes at the 70 mph reading on the airspeed indicator.

h. Turn the master switch ON; roll up the rubber tubing until the airspeed indicator registers 130 mph; then secure the tubing so that the airspeed indicator will hold that reading.

i. Retard the throttles.

j. Slowly bleed off pressure until the airspeed indicator registers 120 mph. The landing gear will extend immediately if the pressure switch is properly adjusted.

k. Should the landing gear fail to extend, turn the master switch OFF and adjust the pressure switch (inboard switch of the two installed in the left main gear wheel well) as follows:

1. Secure the rolled up tubing so that it will hold the airspeed indicator reading at 120 mph.

2. Connect a continuity tester across the contacts of the pressure switch, then turn the adjustment screw until the switch closes at the 120 mph reading on the airspeed indicator.

l. Turn the master switch ON and check the landing gear safety system through the complete cycle of operation.

RIGGING THE LANDING GEAR (PRIOR TO TC-1721; TE-990; AND TH-493)

FIGURE 5-6

WARNING

To prevent possible injury, the emergency landing gear actuator handcrank must always be disengaged when operating the gear electrically.

Before starting the rigging procedure, place the airplane on jacks and start the retraction cycle enough to break the downlock tension. Apply a sharp load by hand in an aft direction against the nose gear strut. If the main gear wheels move approximately 1/2 to 1 inch, it is a good indication that the landing gear actuator assembly needs overhaul and/or adjustment.

CAUTION

Prior to jacking the airplane, ensure that an unbalanced condition does not exist. Fuel should be distributed evenly in both wings to prevent an unbalanced condition which could cause the airplane to be unstable while on jacks.

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NOTE

Beech Kit No. 55-8007-1S, Positive Down Lock Mechanism, is available for airplane serials TC-251, TC-344 and TC-355 thru TC-1720 (except TC-1402), TE-1 thru TE-989 and TH-1 thru TH-492. Beech Kit No. 55-8007-3S, Positive Down Lock Mechanism, is available for airplane serials TC-1 thru TC-354 (except TC-251 and TC-344). The landing gear rigging procedures for those airplanes having complied with Beech Service Instructions No. 0724-211, and installation of the aforementioned kits, will be the same as in RIGGING THE LANDING GEAR (TC-1721 and after; TE-990 and after; and TH-493 and after).

Whenever the landing gear mechanism or doors are removed or disconnected, retract the gear and check the rigging. The following procedure for rigging the landing gear was written on the assumption that the entire landing gear is out of rig.

CAUTION

Overtightening the nut on the bolt that connects the retract rod to the shock strut can bind the strut or distort the retract rod attach points on the strut. Torque the nut only to 25 - 75 inch-pounds.

All landing gear operations, tests and adjustments are to be made with a regulated voltage source of 28.25 ± 0.25 volts under load.

- a. Lengthen the main and nose gear retract rods sufficiently to eliminate the danger of the V brace on the main gear damaging the skin when the gear is retracted and excessive tensions on the nose gear retract rods. Damage to vital parts may result if abnormal loads are applied to the retract system. By lengthening the retract rod, such danger is removed. Disconnect up lock cables at the brackets, leaving the springs attached. If the springs are disconnected, upon the retraction of the gear the up lock arm may damage the top wing skin. Place the up lock block in the lower position.
- b. Disconnect the nose wheel door linkage at the attaching point on the door and remove links by unscrewing at the upper ball joint.
- c. Remove bolts attaching the main gear outboard door links to main strut. Remove inboard door actuator rod by unscrewing from inboard rod ends and removing bolt in door bracket.
- d. Screw stop bolts in (V brace assembly, main gear) until approximately four or five threads are showing.

CAUTION

When running the gear electrically before the switches are reset or for the first time after resetting the switches, run it with extreme caution to make sure the switches open the electrical circuits before the sector gear hits the internal stops in the gear box. The sector gear should not be touching the stop when the motor stops coasting. Serious damage may result if the internal stops are hit by the sector gear.

NOTE

To operate the landing gear control circuit breaker as a momentary switch, push it in for operating the gear and pull it out for stopping the operation. Leave the breaker pushed in only long enough for the gear to make the desired distance of travel.

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- e. Using the landing gear control circuit breaker as a momentary switch, run the gear about 2/3 up. Inch the gear the remaining distance to the limit switch by the momentary operation of the circuit breaker. Check the hand crank for 3/8 to 1/2 turn between retracted position and the internal stop for preliminary settings. If this clearance is not obtained adjust the landing gear up limit switch. The limit switches are located adjacent to the landing gear actuator assembly under the pilot's seat. To adjust the up limit switch, lower the landing gear 1/8 to 1/4 turn of the emergency hand crank and adjust the switch by turning the screw in the actuator so that it just breaks the circuit. This is to prevent the sector gear from hitting the internal stops.
- f. Extend gear electrically and check with the hand crank. There should be 1/8 to 1/4 turn between the extended position and the internal stop. The down limit switch adjustment is accomplished by bending the switch actuator arm tab so that it just breaks the circuit.
- g. Extend and retract the gear two or three times to assure that the switches are correctly set. Check the hand crank each time to ensure proper adjustment.

NOTE

It may be necessary to make a closer setting of the limit switches, but there should never be less than 1/8 of a turn on the hand crank in either the extended or retracted positions.

- h. Adjust the main retract rod (either right or left) to maintain 1/16 inch minimum clearance between the joint (knee) of the V brace and lift leg and the top wing skin with the landing gear fully retracted. The main gear should retract only far enough to clear the inboard door in addition to maintaining the minimum of 1/16 inch clearance. To decrease the clearance between the knee and the top wing skin, shorten the retract rod; to increase clearance, lengthen the retract rod.
- i. When the proper setting is obtained, leave the gears in the retracted position and screw the stop bolt down against the main strut. To assure a firm seating, insert a 0.003 feeler gage under the bolt head and adjust the bolt until a firm, steady effort is required to pull the feeler gage out. With the feeler gage removed, screw the bolt down an additional 3/4 turn. Tighten locknut securely.

NOTE

Refer to Beech Service Instructions No. 0448-211 Rev. 1 or subsequent, Installation of Up Lock Roller Lubricating Bolt Assembly.

- j. Check the up lock roller for free movement and a maximum clearance of 0.010 to 0.020 inch between the roller and the up lock block. If this clearance is not correct, the up lock must be adjusted. To adjust, loosen the block retaining bolts and adjust the clearance between the roller and the up lock block. The up lock bracket and the block are serrated and the serration must be interlocked with each other.

NOTE

The up lock cable attach bolt must be installed with the head pointing aft to avoid interference with stringer in the main gear wheel well when the gear is fully retracted.

- k. Extend gears and attach the up lock cable to bracket.
- l. Retract the gears intermittently as in step e, above and observe the locking action of the up lock bracket. If it starts to lock too soon it is an indication that the up lock cable is too tight. The cable should be adjusted for a tension of 52-1/2 +10 -0 pounds. The tension is adjusted at the outboard end of the cable. If sufficient adjustment is not obtainable at the cable eye, additional adjustment may be made at No. 3 wing rib by moving the cable housing inboard or outboard.

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m. Extend the main gear and check the force required to deflect the main gear knee joint. With the gears in down position, it should take 45 to 65 pounds of force to deflect the main gear knee joint. To increase tension, add 100951S063YU washers between the spring and rod end. A maximum of five washers may be added. If more tension is needed, replace the spring.

NOTE

If unable to obtain adequate spring tension, check for worn bushings in the retract linkage. Wear in the bushings has the effect of lengthening the entire linkage, causing the rod end spring to compress and stack, leaving nothing for spring adjustments. New bushings will shorten the linkage, again permitting adjustment of the spring.

n. With the gear's extended in the full down position and the wheel clearing the floor, adjust the nose gear tension at the aft retract rod (shorten or lengthen) to obtain deflection force of 55 pounds or higher (providing the retract spring does not stack at any point during the full travel of the nose gear) at the union of the V brace assembly and the drag leg assembly. The deflection force should be applied at the pivot point of this union in a plane perpendicular to the center line between these assemblies. To obtain the above requirements, additional 100951DD032XM and/or 100951DD064XM washers may be required at the forward end of the retract rod spring. With the nose wheel in fully retracted position (strut against bumper on V brace) and with doors disconnected, a force of 30 to 35 pounds applied downward at the center line of the tow pin shall be required to move the strut off the bumper. With the nose gear in full retracted position and both doors fully rigged, a force of 20 pounds minimum applied downward at center line of tow pin shall be required to move the strut 0.12 inch, measured along the line of force application.

o. Unscrew main gear outboard door attaching link to assure the door is not damaged when retracted. Connect outboard door linkage and retract gear slowly, checking to see that clearance is maintained between the door and gear. After checking to see that the door is not too tight, run gear down and adjust linkage as required, continue this procedure until a snug, firm fit is obtained when the door is completely closed.

p. Connect main gear inboard door linkage, retract gear slowly and check for clearance between door linkage and root rib. Run gear to 3/4 down position and adjust to maintain 1/4 inch minimum clearance between gear and inboard door with the slack removed from the door linkage. Continue this procedure until door will close tightly in both up and down position. Adjust doors by varying the length of the push-pull linkage rods. Disconnect the rods at the clevis fitting to make this adjustment.

CAUTION

Install the main landing gear door push rod attaching bolt in the door linkage bracket with the head to the rear. If installed wrong, the bolt may catch on the fuselage skin and root rib of the wing, causing damage to the landing gear retract mechanism or preventing the gear from retracting.

q. Connect nose door linkage and rig nose door. Check closely to see that the right hand aft hinge clears the tire. Adjust the nose gear doors by varying the length of the push-pull linkage rods in the nose wheel well. With the gear retracted the doors should have a slight tension on them from the actuator rods to keep the doors from vibrating.

NOTE

To aid in maintaining proper nose gear door tension, the drag brace assembly on TC-1361 thru TC-1721; TE-841 thru TE-990; TH-165 thru TH-170, and TH-178 thru TH-493 has an adjustable up lock pin.

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r. Check the landing gear safety switch for proper adjustment. Measure 3/4 inch down on the piston from the bottom of the left shock strut cylinder and mark the piston with a piece of tape. Raise the left wheel with a small jack compressing the shock strut, until the tape is even with the lower edge of the cylinder. Adjust the switch actuating arm at the clevis so the switch is actuated as the tape touches the end of the cylinder. Remove the small jack from the wheel. Pull Landing Gear Motor circuit breaker. Disconnect the left safety switch operating arm at the torque link and position to simulate an "on-ground" position. Select "Gear Up", check for audible warning. Select "Gear Down". Reconnect the safety switch operating arm. Repeat the process with the right landing gear safety switch.

s. With the gear in the retracted position and the throttle closed, check the operation of the throttle warning horn. If the throttle linkage or warning horn switch have been disconnected, removed, or replaced, the throttle linkage must be adjusted so that the warning horn switch closes when the throttle is approximately 3/8 inch from being fully closed.

NOTE

This is only a temporary adjustment. The throttle must be set so the throttle warning horn activates at approximately 11 inches of manifold pressure. Refer to the procedure for adjustment of Throttle Warning Horn Switch contained in this section.

t. Run gear up and check landing gear position indicator. To adjust the position indicator, remove the indicator cover and bend the actuating wire to move the flag or bend the tab on the clamp to increase or decrease the flag travel. Set the covering in place, retract the gear and check the indicator position with the gear retracted. On airplane serials TC-1608 and after; TE-938, TE-943 and after; and TH-385 and after, check the four landing position lights. Three green lights, one for each gear, are illuminated whenever the landing gears are down and locked. A red light illuminates any time one or all of the landing gears are in transit or in any intermediate position. All of the lights will be extinguished when the gears are up and locked.

u. Check limit switch adjustment and remove airplane from jack.

RIGGING THE LANDING GEAR

(TC-1721 AND AFTER; TE-990 AND AFTER; AND TH-493 AND AFTER)

FIGURE 5-6

Read the entire procedure before attempting to rig the landing gear system. Physically locate each item while reading through the procedure. When any part of the system requires rigging, it is recommended that ALL of the steps in the rigging process be accomplished in the order shown.

CAUTION

Do not change the position of the control switch to reverse the direction of the landing gear while the gear is in transit, as this could cause damage to the retract mechanism.

Before starting the rigging procedure, place the airplane on jacks and start the retraction cycle enough to break the downlock tension. Apply a sharp load by hand in an aft direction against the nose gear strut. If the main gear wheels move approximately 1/2 to 1 inch, it is a good indication that the landing gear actuator assembly needs overhaul and/or adjustment.

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CAUTION

Prior to jacking the airplane, ensure that an unbalanced condition does not exist. Fuel should be distributed evenly in both wings to prevent an unbalanced condition which could cause the airplane to be unstable while on jacks.

Whenever the landing gear mechanism or doors are removed or disconnected, retract the gear and check the rigging. The following procedure for rigging the landing gear was written on the assumption that the entire landing gear is out of rig.

WARNING

To prevent possible injury, the emergency landing gear actuator hand crank must always be disengaged when operating the gear electrically.

CAUTION

Battery voltage is not sufficient to properly cycle the landing gear during rigging. A 28.25 ± 0.25 volt power supply should be utilized for landing gear rigging. If an external power receptacle is not available on the airplane, jumper cables may be used between the battery and power supply. Be sure of the polarity before making the connection.

Excessive operation of the landing gear motor without proper cooling may cause damage to the motor. Allow a short cooling time after each extension and retraction cycle.

CAUTION

Over tightening the nut on the bolt that connects the drag leg to the shock strut can bind the strut or distort the strut attaching points. Torque the nut to 25 - 75 inch-pounds.

- a. Place the airplane on jacks as indicated in Section 2.
- b. Lengthen the main and nose gear retract rods sufficiently to eliminate the danger of the V brace on the main gear damaging the skin when the gear is retracted and to prevent excessive tensions on the nose gear retract rods. Damage to vital parts may result if abnormal loads are applied to the retract system. By lengthening the retract system. By lengthening the retract rod.
- c. Insert the retract arm/retract rod attach bolt pointing aft.
- d. Disconnect the up lock cables at the brackets, leaving the springs attached. If the springs are disconnected, upon the retraction of the gear the up lock arm may damage the top wing skin. Place the up lock block in the lower position.
- e. Lengthen the nose gear retract rod.
- f. Disconnect the nose wheel door linkage at the attaching point on the door and remove links by unscrewing at the upper ball joint.

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- g. Remove bolts attaching the main gear outboard door links to main strut. Remove inboard door actuator rod by unscrewing from inboard rod ends and removing bolt in door bracket.
- h. Screw stop bolts in (V brace assembly, main gear) until approximately four or five threads are showing.

CAUTION

When running the gear electrically before the switches are reset, or for the first time after resetting the switches, run it with extreme caution to make sure the switches open the electrical circuits before the sector gear hits the internal stops in the gearbox. The sector gear should not be touching the stop when the motor stops. Serious damage may result if the internal stops are hit by the sector gear. When checking the dynamic brake system, actuate one of the limit switches and the motor should stop immediately.

- i. Using the landing gear control circuit breaker (placarded LDG GR POS) as a momentary switch, run the gear about 2/3 up. Bump the gear the remaining distance to the limit switch by the momentary operation on the circuit breaker. Check the hand crank for 1/8 to 1/4 turn (5/8 to 3/4 turn on airplanes using new or white actuators) Between the retracted position and the internal stop of the actuator.

NOTE

A new actuator may be installed on earlier airplanes as a spare. The new actuator may be identified by white epoxy paint on the upper actuator arm, and the upper and lower actuator housing. When the new actuator is installed as a spare on earlier airplanes, the actuator should be adjusted by using the 5/8 to 3/4 hand crank turns remaining after the motor has stopped. If this clearance is not obtained adjust the landing gear up limit switch. The limit switches are located adjacent to the landing gear actuator assembly under the pilot's seat. To adjust the up limit switch, lower the landing gear 1/8 to 1/4 turn (5/8 to 3/4 turn on airplanes using new white actuators) of the emergency hand crank and adjust the switch by turning the screw in or out to increase or decrease travel so that it just breaks the circuit.

- j. Extend gear electrically and check with the hand crank. There should be 1/8 to 1/4 turn (5/8 to 3/4 on airplanes using the new or white actuators) between the extended position and the internal stop. On older models the down limit switch is adjusted by hand forming the switch actuator arm tab. On models with the new actuator there is an adjustment screw on the switch. Adjust the down limit switch so that it just breaks the circuit.

- k. Extend and retract the gear two or three times to assure that the switches are correctly set and the dynamic brake is operating correctly. Check the hand crank each time to ensure proper adjustment.

NOTE

It may be necessary to make a closer setting of the limit switches, but there should never be less than 1/8 of a turn (or 5/8 of a turn with the new or white actuators) on the hand crank in either the extended or retracted positions.

- l. Adjust the main retract rod (either right or left) to maintain 1/16-inch minimum clearance between the joint (knee) of the V brace and lift leg and the top wing skin with the landing gear fully retracted. The main gear should retract only far enough to clear the inboard door in addition to maintaining the minimum of 1/16-inch clearance. To decrease the clearance between the knee and the top wing skin, shorten the retract rod; to increase clearance, lengthen the retract rod.

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m. When the proper setting is obtained, leave the gears in the retracted position and screw the up stop bolt down against the main strut. To assure a firm seating, insert a 0.003 feeler gage under the bolt head and adjust the bolt until a firm, steady effort is required to pull the feeder gage out. With the feeler gage removed, screw the bolt down an additional 3/4 turn. Tighten locknut securely.

NOTE

Refer to Service Instructions No. 0448-211, Rev.1 or subsequent, Installation of Up Lock Roller Lubricating Bolt Assembly.

n. Check the up lock roller for free movement and a clearance of 0.010 to 0.020 inch between the roller and the up lock block. If this clearance is not correct, the up lock must be adjusted. To adjust, loosen the block retaining bolts and adjust the clearance between the roller and the up lock block. The up lock bracket and the block are serrated and the serrations must be interlocked.

o. Extend the gears and attach the up lock cable to the bracket.

CAUTION

The up lock cable attach bolt must be installed with the head pointing aft to avoid interference with the stringer in the main gear wheel well when the gear is fully retracted.

p. With the main landing gear fully extended and the down lock in the locked position, check the rollers for free movement and a clearance of 0.010 to 0.020 inch between the roller and the down lock block. If this clearance is not obtained, loosen the block retaining bolts and adjust to proper clearance. Torque the bolts to 90 - 100 inch-pounds. Fully retract the main landing gear and repeat this procedure with the up lock in the locked position.

q. Fully extend the main landing gear and with the down lock in the locked position, check for a clearance of 0.03 to 0.10 inch between the inboard ends of the down lock spring and the down lock at the point of juncture where the down lock attaches to the strut. Add or remove washers (P/N 100951DD040ZZ) as necessary to obtain this clearance.

r. With the main landing gear fully extended and the down locks engaged, adjust the down lock cable to a tension of 52.5 +10 -0 pounds. The tension is adjusted at the outboard end of the cable. If sufficient adjustment is not obtained at the cable eye, additional adjustment may be made at No. 3 wing rib by moving the cable housing inboard or outboard.

s. If the down lock cable clamp is to be repositioned, clean the threads of the cable clamp and nut. Apply a light coat of thread locking compound (52, Consumable Materials Chart, Section 2) on the cable clamp threads. Immediately after applying thread locking compound, install down lock cable and cable clamp on up lock cable. With the gear in the down and locked position the cable clamp must maintain the clearance of 0.10 to 0.15 inch between the cable clamp and the cable pulley. Torque cable clamp assembly to 80 - 90 inch-pound. After 5 - 7 minutes torque cable clamp assembly to 89 - 90 inch-pounds.

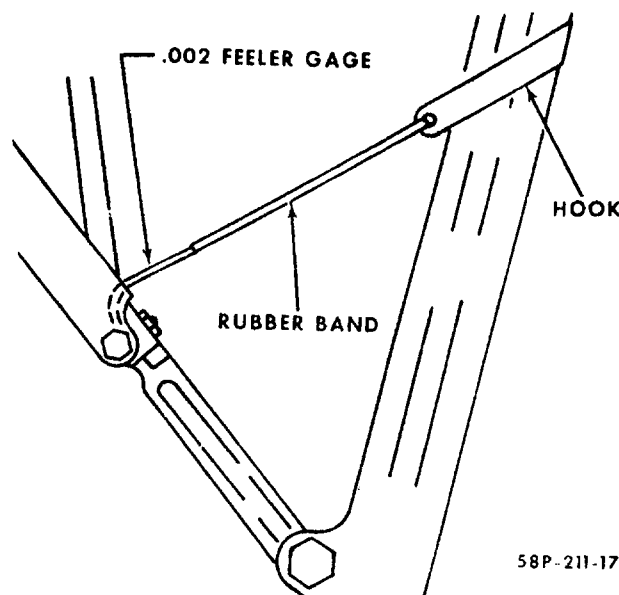
t. Fabricate a spring feeler gage from a piece of metal 0.002 inch thick by 1/2 inch wide by 1-1/2 inches long, a rubber band and a hook made of a heavier piece of metal. (See Figure 5-7). The rubber band must stretch tight enough to pull the 0.002 inch material from the torque knee contact surface when sufficient force is applied.

u. With the main landing gear fully extended and the down lock disconnected, check the main gear retract rod end spring for minimum, compression of 0.08 inch. Insert the spring feeler gage fabricated in step t, as shown in Figure 5-7, in the knee contact surface of the main gear lift leg. Apply a force, as shown in Detail G of Figure 5-6, using a push-pull scale. Apply the force until the torque knee contact surface of the lift leg releases the 0.002 spring feeler

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gage. The reading on the push-pull scale should be 55 to 65 pounds. To increase tension add washer (P/N 100951S063XP) as required (maximum of 6), between spring and rod end. Check for a total minimum gap of 0.060 inch between the spring coils.



Main Gear Deflection
Figure 5-7

NOTE

If proper down-tension cannot be established, install a new spring.

- v. With the main landing gear fully retracted and the uplock in the locked position, rig the uplock cable to the tension of 52 + 10 - 0 pounds. (Take tensiometer reading on cable just inside of cabin.)
- w. Connect the outboard main linkage and retract the gear slowly, checking to see that clearance is maintained between the door and gear. After checking to see that the door is not too tight, run the gear down and adjust the linkage as required; continue this procedure until the snug, firm fit is obtained when the door is completely closed.
- x. Swivel the nose wheel to check the turning radius of the strut and for freedom of movement without binding or rough spots. Adjust nose wheel travel stops to stop shimmy damper piston 1/32 inch to 1/4 inch maximum from maximum travel in both directions.
- y. With the gears extended in the full down position and wheel clearing the floor, adjust the nose gear tension at the aft retract rod (shorten or lengthen) to obtain deflection force of 55 pounds or higher (providing the retract spring does not stack at any point during the full travel of the nose gear) at the union of the V brace assembly and the drag leg assembly. The deflection force should be applied at the pivot point of this union in a plane perpendicular to the center line between these assemblies. To obtain the above requirements, additional 100951DD032XM and/or 100951DD064XM washers may be required at the forward end of the retract rod spring. With the nose wheel in fully retracted position (strut against bumper on V brace) and with the doors disconnected, a force of 30 to 35 pounds applied downward at the center line of the tow pin shall be required to move the strut off the bumper. With the nose

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gear in fully retracted position and both doors fully rigged, a force of 20 pounds minimum applied downward at center line of tow pin shall be required to move the strut 0.12 inch, measured along the line of force application.

z. Unscrew attaching link of the main gear on the outboard door to assure the door is not damaged when retracted. Connect outboard door linkage and retract gear slowly, checking that clearance is maintained between the door and gear. After checking that the door is not too tight, run gear down and adjust linkage as required; continue this procedure until a snug, firm fit is obtained when the door is completely closed.

aa. Connect inboard door linkage on the main gear; retract gear slowly and check for clearance between door linkage and root rib. Run gear to 3/4-down position and adjust to maintain 1/4-inch minimum clearance between gear and inboard door with the slack removed from the door linkage. Continue this procedure until door will close tightly in both up and down positions. Adjust doors by varying the length of the push-pull linkage rods. Disconnect the rods at the clevis fitting to make this adjustment.

CAUTION

Install the push rod attaching bolt in the main gear door linkage bracket with the head to the rear. If installed wrong, the bolt may catch on the fuselage skin and root rib of the wing, causing damage to the landing gear retract mechanism or preventing the gear from retracting.

ab. Connect nose door linkage and rig nose door. Check closely to see that the right-hand aft hinge clears the tire. Adjust the nose gear doors by varying the length of the push-pull linkage rods in the nose wheel well. With the gear retracted, the doors should have a slight tension on them from the actuator rods to keep the doors from vibrating.

NOTE

Proper nose gear door tension may be maintained through adjustment of the uplock pin on the drag brace assembly.

ac. Check the landing gear safety switch for proper adjustment. Measure 3/4 inch down on the piston from the bottom of the left shock strut cylinder and mark the piston with a piece of tape. Raise the left wheel with a small jack, compressing the shock strut, until the tape is even with the lower edge of the cylinder. Adjust the switch actuating arm at the clevis so the switch is actuated as the tape touches the end of the cylinder. Remove the small jack from wheel. Pull Landing Gear circuit breaker. Disconnect the left safety switch operating arm at the torque link and position to simulate an "on-ground" position. Select "Gear Up", check for audible warning. Select "Gear Down". Reconnect the safety switch operating arm. Repeat the process with the right landing gear safety switch.

ad. With the landing gear retracted, check the operation of the warning horn (horn and light on airplane serials TH-1543 and TH-1545 and after). For adjustment of the warning system, refer to the throttle warning horn adjustments in this section. The horn or horn and light should be actuated by the following conditions: 1) Throttle retarded below throttle warning switch setting on airplane serials TH-1 thru TH-1542 and TH-1544; 2) Throttle retarded below throttle warning switch setting and/or flaps fully extended on airplanes serials TH-1543 and TH-1545 and after.

ae. Run the gear up and check the landing gear position lights. Three green lights, one for each gear, are illuminated whenever the landing gears are down and locked. A red light illuminates any time one or all of the landing gears are in transit or in any intermediate position. All of the lights will be extinguished when the gears are up and locked.

af. Recheck limit switch adjustment.

ag. Safety all bolts. Tighten locknuts and remove airplane from jacks.

ah. On airplane serials TH-1543, TH-1545 and after, check the landing gear-up-circuit throttle-interrupt switch for

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proper operation. Refer to the latter part of this section for adjustment procedures. To check switch operation use the following procedures:

1. Extend the landing gear fully down.
2. With the throttle fully closed, place the landing gear switch in UP position. The landing gear should not retract.
3. Slowly advance throttle until landing gear retracts.
4. When retraction starts, retard throttle to check latching relay. Landing gear should go all the way up. Replace relay (located under RH instrument panel) if required.

MAIN LANDING GEAR SERVICING

Service the main landing gear. Refer to Section 2, SHOCK STRUTS.

LUBRICATION

Lubricate the main wheel bearings and grease fittings. Refer to Section 2, LUBRICATION CHART.

MAIN LANDING GEAR REMOVAL

When removing the landing gear, take care to preserve the original adjustments at the rod-end fittings to facilitate assembly.

- a. With the airplane on jacks, retract the landing gear until the inboard door is in the fully open position.
- b. Disconnect the outboard landing gear door from the landing gear strut.
- c. Disconnect the inboard landing gear door actuating rod at the forward door hinge.
- d. Unsnap the canvas cover and disconnect the uplock assembly from the strut.
- e. Open the brake cylinder bleed ports and pump all fluid from the system.
- f. Disconnect the hydraulic lines where the flexible hose connects to the tubing on the landing gear.
- g. Disconnect the safety switch wire.
- h. Remove the bolt attaching the lift leg to the strut.
- i. Remove the stainless steel exhaust shield on the lower surface of the wing.
- j. Remove the access door in the lower surface of the wing leading edge for access to the forward hinge bolt retaining nut and remove the nut. The rear strut brace hinge bolt is accessible by lowering the flap.
- k. Remove the brace hinge bolts and associated hardware which attach the main gear to the front and rear spars.
- l. Lower the main gear assembly from the airplane, being careful not to bend the skin at the edge of the wheel well.

MAIN LANDING GEAR INSTALLATION

- a. Carefully position the main landing gear assembly in place against the front and rear spars.
- b. Align the hinge bolt holes and install the bushings, bolts, washers and nuts. Torque each nut to 250 - 690 inch-pounds. Install new cotter pins.

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NOTE

Install 100951-S-016-XF or 100951-S-032-XF washers as required between the landing gear and the front and rear spars to maintain a maximum total clearance of 0.016 inch. The placement of these washers at the front or rear may help align the lift leg.

- c. Install the access door in the lower wing leading edge.
- d. Install the stainless steel exhaust shield to the lower surface of the wing.
- e. Install the bolt attaching the lift leg to the strut.

NOTE

Overtightening the nut on the bolt that connects the lift leg to the shock strut can bind the strut or distort the strut attaching point. Torque the nut to 25 - 75 inch-pounds.

- f. Connect the landing gear safety switch wire.
- g. Connect the brake hydraulic line.
- h. Connect the uplock assembly to the strut and snap the canvas cover in place.

CAUTION

The uplock cable attachment bolt must be installed with the head of the bolt pointing aft. This is to avoid interference between the bolt and the stringer in the main gear wheel well as the landing gear is retracted.

- i. Connect the inboard landing gear door actuating rod to the forward door hinge.
- j. Install the outboard landing gear door to the landing gear strut.
- k. Bleed the brake.

CAUTION

Excessive operation of the landing gear motor without proper cooling may cause damage to the landing gear motor. Allow a short cooling time after each extension and retraction cycle.

- l. Operate the landing gear and check for proper rigging of the uplock and doors.

MAIN LANDING GEAR-OVERHAUL (TC-1 THRU TC-354 EXCEPT TC-251 AND TC-344)

NOTE

Refer to the OVERHAUL AND REPLACEMENT SCHEDULE in Section 15 for time limits and maintenance checks of the main landing gear.

Experience in the field indicates the points of greatest wear on the main landing gear are the upper and lower bearings in the cylinder assembly. The wear caused to the bearings during takeoff, landing and taxiing tend to result in

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an oversized condition. The oversized condition of the upper bearing in the cylinder assembly will result in leakage of hydraulic fluid through the upper bearing and O-ring. This will eventually cause fluid to seep down through the felt pad and out the lower bearing.

When replacement of the scraper ring and all O-rings in the cylinder assembly fails to stop leaks, the oversized condition of the bearings is probable. In such instances the landing gear should be overhauled. The following information will aid in determining the extent of landing gear wear and whether it is possible to overhaul or necessary to replace critical landing gear components.

MAIN GEAR DISASSEMBLY (TC-1 THRU TC-354 EXCEPT TC-251 AND TC-344)

FIGURE 5-8

WARNING

Do not begin any disassembly of the main landing gear until all air pressure has been released.

- a. Place the landing gear in a vertical position to prevent hydraulic fluid from spilling.
- b. Release the air pressure from the cylinder assembly (10) by depressing the valve core in the air valve assembly (1).
- c. To prevent damage, remove all hydraulic plumbing, safety switch components, and clamps.
- d. Remove the main wheel and brake assembly. Refer to Section 5, REMOVING THE WHEEL AND BRAKE ASSEMBLY.
- e. Remove the snap ring (3), barrel end lock (2), barrel end plug (4) and retract the lower shock assembly (37) to push the orifice tube (11) out of the cylinder assembly (10).
- f. Invert the landing gear and drain the hydraulic fluid.
- g. Remove the air valve assembly (1) and O-ring (5) from the barrel end plug (4).
- h. Remove the piston ring (16) from the orifice head (15).

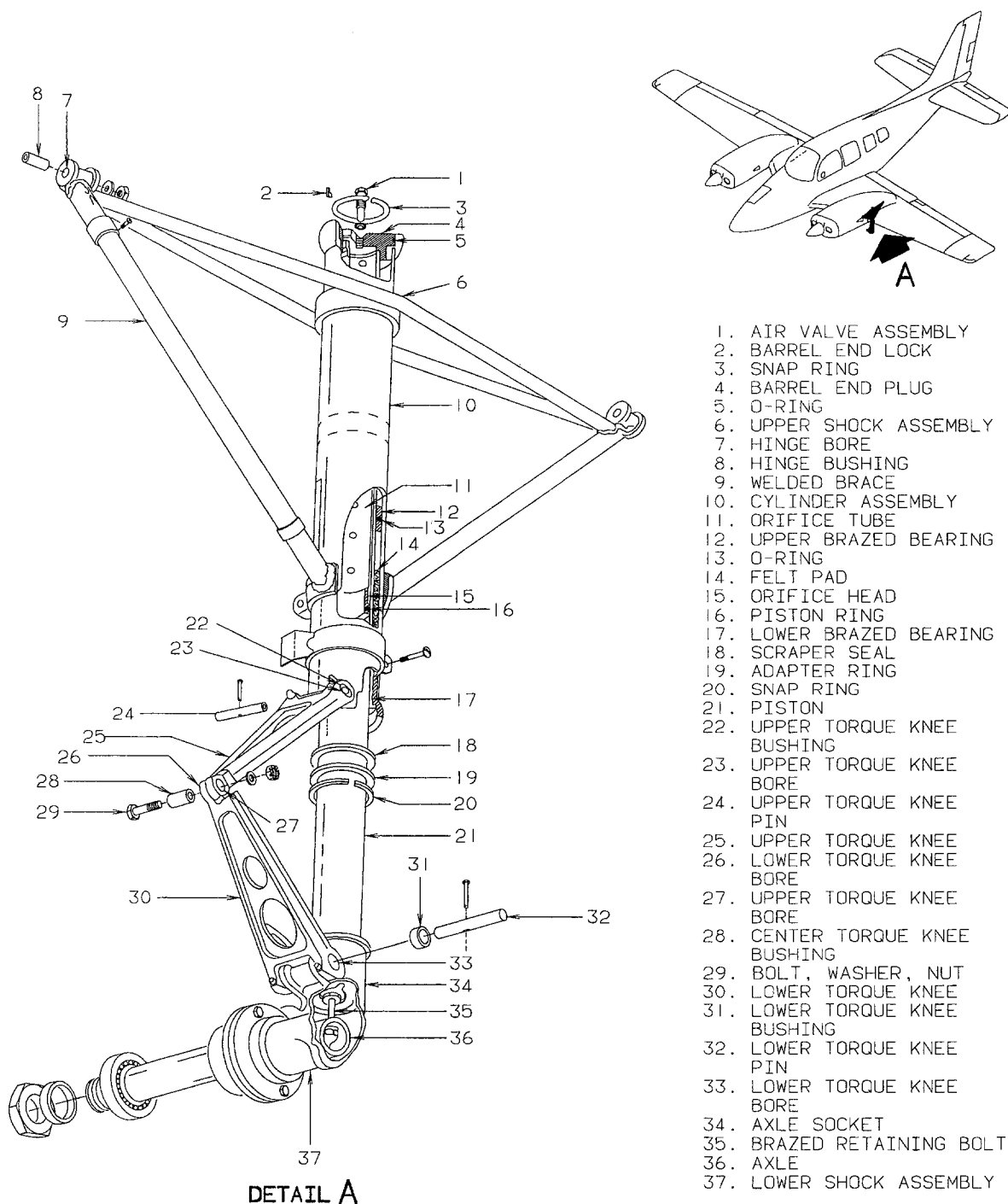
WARNING

Do not disconnect the torque knees (25 and 30) without first deflating the cylinder assembly (10). The torque knees provide the extension stop for the lower shock assembly, and when disconnected, the lower shock assembly is free to slide out of the cylinder assembly.

- i. Remove the nut, washer, and bolt (29) connecting the upper torque knee (25) to the lower torque knee (30).
- j. Remove the upper and lower torque knees (25 and 30) by removing the upper and lower torque knee pins (24 and 32), retaining pins and cotter pins.
- k. Slide the lower shock assembly (37) out of cylinder assembly (10).

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Main Landing Gear Assembly (TC-1 thru TC-354 except TC-251 and TC-344)

Figure 5-8

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CAUTION

The scraper seal (18) may become sharp during normal operation of the gear; care should be exercised to avoid possible injury when removing the scraper seal.

l. Remove the snap ring (20), adapter ring (19), and scraper seal (18). Remove the felt pad (14) and O-ring (13). The O-ring is located in the upper brazed bearing (13) of the cylinder assembly (10). Removal of the O-ring may be simplified by using a hook manufactured from music wire. Refer to Figure 5-10.

m. Remove the main landing gear hinge bushing (8).

MAIN GEAR CLEANING, REPLACEMENT PARTS AND REPAIRS (TC-1 THRU TC-354 EXCEPT TC-251 AND TC-344)

CLEANING (TC-1 THRU TC-354 EXCEPT TC-251 AND TC-344)

- a. Clean all parts with solvent (15, Consumable Materials Chart, Section 2). Remove all excess solvent and wipe dry after cleaning.
- b. Immerse all internal parts in clean hydraulic fluid (13, Consumable Materials Chart, Section 2) prior to assembly.

REPLACEMENT PARTS (TC-1 THRU TC-354 EXCEPT TC-251 AND TC-344) FIGURE 5-8

- a. Inspect all parts and assemblies for damage or excessive wear. The following conditions are cause for rejection:
 - Wear which is greater than the allowable wear tolerances. Refer to Chart 5-1.
 - Damage which cannot be corrected or repaired.
 - Screws that are severely damaged or have stripped, severely worn or scored threads.
 - Parts that are cracked, chipped or broken.
 - Parts that have corrosion or other defects that cannot be repaired.
- b. Replace the following parts when main landing gear is overhauled:
 - Cotter pins
 - Felt Pad (14)
 - Piston Ring (16)
 - O-Rings (5, 13)
 - Safety Wire
 - Scraper Seal (18) and Adapter Ring (19)
 - Snap Rings (3, 20)
- c. Replace the following parts on condition when main landing gear is overhauled:
 - Bushings (8, 22, 28, 31)

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- Grease Fittings
- Grommets
- Hydraulic Hoses
- Hydraulic Tubing
- Safety Switch Components
- Valve Core
- Wiring

REPAIRS (TC-1 THRU TC-354 EXCEPT TC-251 AND TC-344)

FIGURE 5-8

- Visually inspect castings for cracks and pitting; and finished surfaces for scoring, pitting, nicks, cracks, distortion and wear. Refer to Chart 5-1 for tolerances to aid in determining the extent of wear. Replace all defective and excessively worn parts.
- If fluid leaks have been observed on top of the air valve assembly (1), check the small O-ring of the valve; then look for defects in the valve.
- If the leak is from the junction of the barrel end plug (4) with the cylinder assembly walls (10), check the O-ring (5) in the barrel end plug (4).
- All parts or assemblies may be repaired if any of the following problems exist:
 - Slight scoring of shafts may be corrected by lapping carefully with a flat oil stone.

NOTE

Do not exceed 10% of the component material thickness when removing nicks, burrs and scratches.

- Smooth minor nicks, burrs, and scratches.
- Those parts that are scratched or have worn paint may be stripped and repainted with the same type of paint as that removed or to be replaced with new parts.
- Minor thread damage, chase to clean or smooth.

NOTE

Corrosion damage requires inspection to determine the depth of penetration and the cross-sectional area change. The damaged area must be thoroughly cleaned and the corrosion must be removed. The deterioration caused by corrosion or removal of corrosion must not reduce the material thickness of any component by more than 10%. Refer to Chart 5-1 for MAIN LANDING GEAR WEAR TOLERANCES AND INSPECTION PROCEDURES on components. For additional information contact the Technical Support Department of Raytheon Aircraft Company, P.O. Box 85, Wichita, KS 67201.

- Remove corrosion if applicable, and apply corrosion prevention materials as necessary per MIL-C-5541 or cadmium plate per Fed QQ-P-416, Type II.

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- Bushings that check within allowable wear tolerances may be reused.
- When evidence of damage exists to steel parts, magnetic particle inspect per MIL-STD-1949.

NOTE

Do not remove paint or primer from the area to be fluorescent or dye penetrant inspected per MIL-STD-6866. If the finish absorbs the penetrant so that bleed out prevents satisfactory inspection or if a new finish has not cured for at least 30 days, contact the Technical Support Department of Raytheon Aircraft Company, P.O. Box 85, Wichita, KS 67201.

- When evidence of damage exists to metal parts other than steel, fluorescent penetrant inspect per MIL-STD-6866, Type I.
- Replace damaged or unserviceable parts with new or serviceable parts.

MAIN GEAR ASSEMBLY (TC-1 THRU TC-354 EXCEPT TC-251 AND TC-344) FIGURE 5-8

NOTE

Prior to assembly, immerse all internal parts (except felt pad (14)) in hydraulic fluid (13, Consumable Materials Chart, Section 2).

- Install the O-ring (13) in the upper brazed bearing (12) of the cylinder assembly (10). Two dowel rods may be used to work O-ring (13) into position. Refer to Figure 5-10.
- Soak the felt pad (14) in SAE 10W30 oil and install in the cylinder assembly (10) between the upper and lower brazed bearings (12 and 17).
- Slide the scraper seal (18), adapter ring (19) and snap ring (20) over the piston (21) and insert the lower shock assembly (37) into the cylinder assembly (10). Work the scraper seal (18) into the lower end of the cylinder assembly (10) until seated. Secure scraper seal (18) with adapter ring (19) and snap ring (20).
- Install upper torque knee (25) to the cylinder assembly (10) and lower torque knee (30) to the lower shock assembly (37) using torque knee pins (24 and 32), retaining pins and cotter pins. Insert the center torque knee bushing (28) and connect the torque knees (25 and 30) using bolt (29), washers and nut.
- Lubricate bearings at grease fittings with grease (8, Consumable Materials Chart, Section 2).
- Install new hinge bushings (8) into hinge bore (7).
- Raise and block the lower shock assembly (37) 1/4 inch from the fully compressed position and fill cylinder assembly (10) with hydraulic fluid (13, Consumable Materials Chart, Section 2) until the top of piston (21) is covered (approximately 2 pints of hydraulic fluid).
- Assemble the piston ring (16) to orifice head (15) and install into the cylinder assembly (10). Slowly extend lower shock assembly (37) allowing the suction to pull orifice tube (11) down into the cylinder assembly (10). Install air valve assembly (1) into barrel end plug (4). Install O-ring (5) around the barrel end plug (4) and insert into the top of the cylinder assembly (10). Secure barrel end plug (4) with barrel end lock (2) and snap ring (3).

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WARNING

As with all operations involving equipment under high pressure, exercise caution when performing the leak test; avoid the areas directly above and below the strut.

- i. Inflate the cylinder assembly (10) to approximately 100 psi using dry air or nitrogen. Coat the top of the barrel end plug (4) and air valve assembly (1) with soapsuds and check for air leaks.
- j. Release the air pressure; clean the soapsuds off the top of the barrel end plug (4) and air valve assembly (1) with fresh water and wipe dry.
- k. Install all hydraulic plumbing, safety switch components and clamps.
- l. Install main wheel and brake assembly. Refer to Section 5, INSTALLING THE WHEEL AND BRAKE ASSEMBLY.
- m. Install main landing gear to the airplane. Refer to Section 5, MAIN LANDING GEAR INSTALLATION.
- n. Service the main landing gear. Refer to Section 2, SHOCK STRUTS.

CHART 5-1 MAIN LANDING GEAR WEAR TOLERANCES AND INSPECTION PROCEDURES (TC-1 THRU TC-354 EXCEPT TC-251 AND TC-344)

ITEM	I.D.	O.D.	WEAR TOLERANCES AND INSPECTION PROCEDURES
------	------	------	---

NOTE

Listed below are the tolerances used to determine the extent of wear in the main landing gear components. Where pertinent, the permissible wear limits are given for those components. All inside-diameter (I.D.) and outside-diameter (O.D.) dimensions are given in inches. Refer to Figure 5-8.

Lower Shock Assembly (37)

Visually inspect piston (21), axle (36), axle socket (34), and brazed retaining bolt (35) for wear, damage and corrosion. Any sign of scratches and worn areas which can not be repaired is cause for rejection. Conduct a magnetic-particle inspection per MIL-STD-1949. Any sign of cracking is cause for rejection.

Piston (21)

- Chrome Portion

1.602	1.8635
1.593	1.8600

Visually inspect for wear, damage and corrosion. Replace if wear tolerances are exceeded.

Axle (36)

1.498
1.497

Visually inspect for wear, damage and corrosion. Strip and cadmium plate axle as necessary, per Fed QQ-P-416, Type II, Class 2 on scratched or worn areas.

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CHART 5-1

MAIN LANDING GEAR WEAR TOLERANCES AND INSPECTION PROCEDURES (TC-1 THRU TC-354 EXCEPT TC-251 AND TC-344) (CONTINUED)

ITEM	I.D.	O.D.	WEAR TOLERANCES AND INSPECTION PROCEDURES
Upper and Lower Torque Knees (25 and 30)			Visually inspect for wear, damage and corrosion. Conduct a magnetic particle inspection per MIL-STD-1949. Any sign of cracks, scratches or worn areas which can not be repaired is cause for rejection. Remove all bushings and inspect bores for corrosion. Replace bushings as needed and cadmium plate per FED QQ-P-416, Type II, Class 2.
- Torque Knee Bore (23 and 33)	0.6255 0.6245	---	Visually inspect for wear, damage and corrosion. Replace if wear tolerances are exceeded.
- Bushings (22 and 31)	0.5015 0.4995	---	Visually inspect for wear, damage and corrosion. If bushings exceed wear tolerances, replace with new bushings. Alignment ream new bushings to specified wear tolerances. Drill out lubricator holes through bushings and install lubricators.
- Knee Pins (24 and 32)	---	0.4990 0.4980	Visually inspect for wear, damage and corrosion. Any sign of scratches or worn areas which can not be repaired is cause for rejection. If no visible wear is evident, conduct magnetic particle inspection per MIL-STD-1949. Any sign of cracks is cause for rejection. Replace if wear tolerances are exceeded.
Torque Knee Center Hinge Joint			
- Bore (Upper) (27)	0.4420 0.4370	---	Inspect for wear, damage and corrosion. Replace if wear tolerances are exceeded.
- Bushing (28)	0.3150 0.3120	0.4360 0.4330	Visually inspect for wear, damage and corrosion. Replace if wear tolerances are exceeded.
- Bore (Lower) (26)	0.3175 0.3125	---	Visually inspect for wear, damage and corrosion. Replace if wear tolerances are exceeded.

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CHART 5-1 MAIN LANDING GEAR WEAR TOLERANCES AND INSPECTION PROCEDURES (TC-1 THRU TC-354 EXCEPT TC-251 AND TC-344) (CONTINUED)

ITEM	I.D.	O.D.	WEAR TOLERANCES AND INSPECTION PROCEDURES
Orifice Tube (11)	---	1.560 1.557	Visually inspect for wear, damage and corrosion. Any sign of scratches or worn areas which can not be repaired is cause for rejection. Check the orifice O.D. does not exceed wear tolerances. Check that orifice hole does not exceed 0.187 inch. Cadmium plate as necessary (except for ring groove in orifice head) per Fed QQ-P-416, Type I, Class 2.
Upper Shock Assembly (6)			Visually inspect the cylinder (10) and welded brace (9) assemblies for wear, damage and corrosion. Any sign of cracks, scratches or worn areas which can not be repaired is cause for rejection. If no visible wear is evident, conduct magnetic particle inspection per MIL-STD-1949. cadmium plate per FED QQ-P-416, Type II, Class 2 and touch up paint as required.
Cylinder Assembly (10)			
- Upper Brazed Bearing (12)	1.8680 1.8645	---	Visually inspect for wear, damage and corrosion. If internal bearing wear tolerances are exceeded, replace upper shock assembly.
- Lower Brazed Bearing (17)	1.8680 1.8645	---	Visually inspect for wear, damage and corrosion. If internal bearing wear tolerances are exceeded, replace upper shock assembly.
- Instruction Placards			Do not remove from cylinder assembly except for inspection purposes or replacement.
Welded Brace (9)			
- Hinge Bore (7)	0.6275 0.6245	---	Visually inspect for wear, damage and corrosion. If wear tolerances are exceeded, contact the Technical Support Department of Raytheon Aircraft Company, P.O. Box 85, Wichita, KS 67201.
- Hinge Bushings (8)	0.5005 0.4995	0.6235 0.6220	Replace bearings when main landing gear is overhauled.
Safety Switch Components			Ensure there is electrical continuity when switch is activated. Replace wiring and components on condition.

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MAIN LANDING GEAR-OVERHAUL

(TC-251, TC-344, TC-355 AND AFTER; TE-1 AND AFTER; TH-1 AND AFTER)

NOTE

Refer to the OVERHAUL AND REPLACEMENT SCHEDULE in Section 15 for time limits and maintenance checks of the main landing gear.

Experience in the field indicates the points of greatest wear on the main landing gear are the upper and lower bearings in the cylinder assembly. The wear caused on the bearings during takeoff, landing and taxiing tend to result in an oversized condition. The oversized condition of the upper bearing in the cylinder assembly will result in leakage of hydraulic fluid through the upper bearing and O-ring. This will eventually cause fluid to seep down through the felt pad and out the lower bearing.

When replacement of the scraper ring and all O-rings in the cylinder assembly fails to stop leaks, the oversized condition of the bearings is probable. In such instances the landing gear should be overhauled. The following information will aid in determining the extent of landing gear wear and whether it is possible to overhaul or necessary to replace critical landing gear components.

MAIN GEAR DISASSEMBLY (TC-251, TC-344, TC-355 AND AFTER; TE-1 AND AFTER; TH-1 AND AFTER)

FIGURE 5-9

WARNING

Do Not Begin Any Disassembly Of The Main Landing Gear Until All Air Pressure Has Been Released.

- a. Place the landing gear in a vertical position to prevent hydraulic fluid from spilling.
- b. Release the air pressure from the cylinder assembly (9) by depressing the valve core (2).
- c. To prevent damage, remove all hydraulic plumbing, safety switch components, and clamps.
- d. Remove the main wheel and brake assembly. Refer to Section 5, REMOVING THE WHEEL AND BRAKE ASSEMBLY.
- e. Remove the retainer ring (5) and retract the lower shock assembly (35) to push the orifice tube (6) out of the cylinder assembly (9).
- f. Invert the landing gear and drain the hydraulic fluid.
- g. Remove the air valve assembly (3) O-ring (4), piston ring (8) and O-ring (7) from the orifice tube (6).

WARNING

Do not disconnect the torque knees (23 and 34) without first deflating the cylinder assembly (9). The torque knees provide the extension stop for the lower shock assembly and when disconnected, the shock assembly is free to slide out of the cylinder assembly (9).

- h. Remove the nut, washers, and bolt (32) connecting the upper torque knee (23) to the lower torque knee (34).

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- i. Remove the upper and lower torque knees (23 and 34) by removing the upper and lower torque knee pins (21 and 31), retaining pins and cotter pins.
- j. Slide the lower shock assembly (35) out of the cylinder assembly (9).

CAUTION

The scraper seal (27) may become sharp during normal operation of the gear; care should be exercised to avoid possible injury when removing the scraper seal.

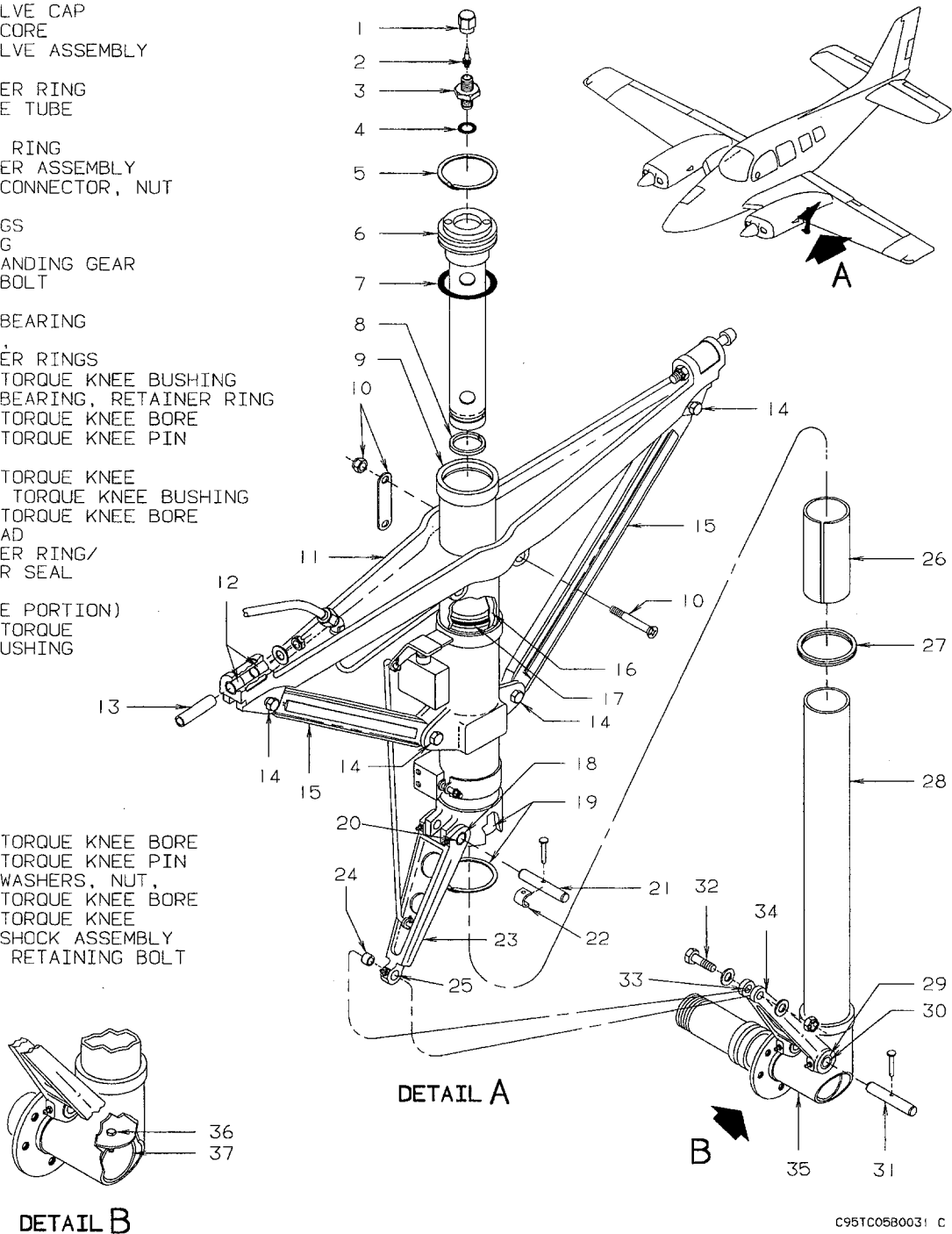
- k. Remove the scraper seal (27), felt pad (26), O-ring and retainer rings (17). The O-ring is located between two retainers within the cylinder assembly (9). Removal of the O-ring may be simplified by using a hook manufactured from music wire. Refer to Figure 5-10.
- l. Disconnect the columns (15) and brace (11) from the cylinder assembly (9) and from each other. Remove bushings (12) from the brace (11).

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1. AIR VALVE CAP
2. VALVE CORE
3. AIR VALVE ASSEMBLY
4. O-RING
5. RETAINER RING
6. ORIFICE TUBE
7. O-RING
8. PISTON RING
9. CYLINDER ASSEMBLY
10. BOLT, CONNECTOR, NUT
11. BRACE
12. BUSHINGS
13. BUSHING
14. MAIN LANDING GEAR
BRACE BOLT
15. COLUMN
16. UPPER BEARING
17. O-RING,
RETAINER RINGS
18. UPPER TORQUE KNEE BUSHING
19. LOWER BEARING, RETAINER RING
20. UPPER TORQUE KNEE BORE
21. UPPER TORQUE KNEE PIN
22. STOP
23. UPPER TORQUE KNEE
24. CENTER TORQUE KNEE BUSHING
25. UPPER TORQUE KNEE BORE
26. FELT PAD
27. RETAINER RING/
SCRAPER SEAL
28. PISTON
(CHROME PORTION)
29. LOWER TORQUE
KNEE BUSHING

30. LOWER TORQUE KNEE BORE
31. LOWER TORQUE KNEE PIN
32. BOLT, WASHERS, NUT,
33. LOWER TORQUE KNEE BORE
34. LOWER TORQUE KNEE
35. LOWER SHOCK ASSEMBLY
36. BRAZED RETAINING BOLT
37. AXLE

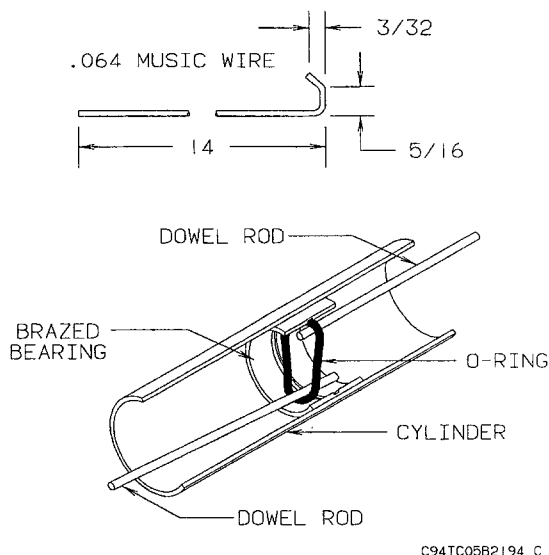


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Main Landing Gear Assembly (TC-251, TC-344, TC-355 and after; TE-1 and after; TH-1 and after)
Figure 5-9

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O-Ring Removal and Installation
Figure 5-10

MAIN GEAR CLEANING, REPLACEMENT PARTS AND REPAIRS **(TC-251, TC-344, TC-355 AND AFTER; TE-1 AND AFTER; TH-1 AND AFTER)**

CLEANING (TC-251, TC-344, TC-355 AND AFTER; TE-1 AND AFTER; TH-1 AND AFTER)

- Clean all parts with solvent (15, Consumable Materials Chart, Section 2). Remove all excess solvent and wipe dry after cleaning.
- Immerse all internal parts in clean hydraulic fluid (13, Consumable Materials Chart, Section 2) prior to assembly.

REPLACEMENT PARTS (TC-251, TC-344, TC-355 AND AFTER; TE-1 AND AFTER; TH-1 AND AFTER) **FIGURE 5-9**

- Inspect all parts and assemblies for damage or excessive wear. The following conditions are cause for rejection:
 - Wear which is greater than the allowable wear tolerances. Refer to Chart 5-2.
 - Damage which cannot be corrected or repaired.
 - Screws that are severely damaged or have stripped, severely worn or scored threads.
 - Parts that are cracked, chipped or broken.
 - Parts that have corrosion or other defects that cannot be repaired.
- Replace the following parts when the main landing gear is overhauled:
 - Cotter pins
 - DU Bushings (12)
 - Felt Pad (26)

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- Piston Ring (8)
- O-Rings (4, 7, 17)
- Retainer Rings (5, 17, 19)
- Safety Wire
- Scraper Seal (27)
- c. Replace the following parts on condition when the main landing gear is overhauled:
 - Bearings (16, 19)
 - Bushings (13, 18, 24, 29)
 - Grease Fittings
 - Grommets
 - Huck Bolt and Collar (Replace if removed from the upper bearing (16).)
 - Hydraulic Hoses
 - Hydraulic Tubing
 - Safety Switch Components
 - Valve Core (2)
 - Wiring

REPAIRS (TC-251, TC-344, TC-355 AND AFTER; TE-1 AND AFTER; TH-1 AND AFTER) *FIGURE 5-9*

- a. Visually inspect castings for cracks and pitting; and finished surfaces for scoring, pitting, nicks, cracks, distortion and wear. Refer to Chart 5-2 for tolerances to aid in determining the extent of wear. Replace all defective and excessively worn parts.
- b. If fluid leaks have been observed on top of the air valve assembly (3), check the small O-ring (4) of the valve; then look for defects in the valve.
- c. If the leak is from the junction of the orifice tube assembly (6) with the cylinder assembly (9) walls, check the O-ring (7) in the orifice tube (6).
- d. All parts or assemblies may be repaired if any of the following problems exist:
 - Slight scoring of shafts may be corrected by lapping carefully with a flat oil stone.

NOTE

Do not exceed 10% of the component material thickness when removing nicks, burrs and scratches.

- Smooth minor nicks, burrs, and scratches.

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- Those parts that are scratched or have worn plating may be stripped and replated with the same type of plating as that removed or be replaced with new parts.
- Minor thread damage, chase to clean or smooth.

NOTE

Corrosion damage requires inspection to determine the depth of penetration and cross-sectional area change. The damaged area must be thoroughly cleaned and the corrosion must be removed. The deterioration caused by corrosion or removal of corrosion must not reduce the material thickness of any component by more than 10%. Refer to Chart 5-2 for MAIN LANDING GEAR WEAR TOLERANCES AND INSPECTION PROCEDURES on components. For additional information contact the Technical Support Department of Raytheon Aircraft Company, P.O. Box 85, Wichita, KS 67201.

- Remove corrosion if applicable, and apply corrosion prevention materials as necessary per MIL-C-5541 or cadmium plate per Fed QQ-P-416, Type II.
- Bushings that check within allowable wear tolerances may be reused.
- When evidence of damage exists to steel parts, magnetic particle inspect per MIL-STD-1949.

NOTE

Do not remove paint or primer from the area to be fluorescent or dye penetrant inspected per MIL-STD-6866. If the finish absorbs the penetrant so that bleed out prevents satisfactory inspection or if a new finish has not cured for at least 30 days, contact the Technical Support Department of Raytheon Aircraft Company, P.O. Box 85, Wichita, KS 67201.

- When evidence of damage exists to metal parts other than steel, fluorescent penetrant inspect per MIL-STD-6866, Type I.
- Replace damaged or unserviceable parts with new or serviceable parts.

MAIN GEAR ASSEMBLY (TC-251, TC-344, TC-355 AND AFTER; TE-1 AND AFTER; TH-1 AND AFTER) FIGURE 5-9

NOTE

Prior to assembly, immerse all internal parts (except felt pad (26)) in hydraulic fluid (13, Consumable Materials Chart, Section 2).

- a. Install the O-ring (17) and retainer rings in the upper bearing (16) of the cylinder assembly (9). Two dowel rods may be used to work O-ring and retainers into position. Refer to Figure 5-10.
- b. Soak the felt pad (26) in SAE 10W30 oil and install in the cylinder assembly (9) between the upper and lower bearings (16 and 19).
- c. Slide the scraper seal (27) over the piston (28) and insert the lower shock assembly (35) into the cylinder assembly (9). Work the scraper seal (27) into the lower end of the cylinder assembly (9) until seated.

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- d. Install upper torque knee (23) to the cylinder assembly (9) and lower torque knee (34) to the lower shock assembly (35) using torque knee pins (21 and 31), retaining pins and cotter pins. Install stop (22) to the upper torque knee pin (21). Insert the center torque knee bushing (24) and connect the torque knees (23 and 34) using bolt, washers and nut (32).
- e. Lubricate bearings at grease fittings with grease (8, Consumable Materials Chart, Section 2).
- f. Install new bushings (12) into brace (11). Install brace (11) onto the cylinder assembly (9) with bolt, connector and nut (10). Install forward and aft columns (15) to the brace (11) and cylinder assembly (9) using main landing gear brace bolts (14).
- g. Raise and block lower shock assembly (35) 1/4 inch from the fully compressed position and fill cylinder assembly (9) with hydraulic fluid (13, Consumable Materials Chart, Section 2) until the top of piston (28) is covered (approximately 2 pints of hydraulic fluid).
- h. Install O-ring (4), valve core (2) and valve assembly (3) into orifice tube (6). Assemble the O-ring (7) and piston ring (8) to orifice tube and install into cylinder assembly (9). Slowly extend lower shock assembly (35) allowing the suction to pull orifice tube down into the cylinder assembly (9), then install retainer ring (5).

WARNING

As with all operations involving equipment under high pressure, exercise caution when performing the leak test; avoid the areas directly above and below the strut.

- i. Inflate the cylinder assembly (9) to approximately 100 psi using dry air or nitrogen. Coat the top of the orifice tube (6) and air valve assembly (3) with soapsuds and check for air leaks.
- j. Release the air pressure; clean the soapsuds off the top of the orifice tube (6) and air valve assembly (3) with fresh water and wipe dry.
- k. Install air valve cap (1) to air valve assembly.
- l. Install all hydraulic plumbing, safety switch components and clamps.
- m. Install main wheel and brake assembly. Refer to Section 5, INSTALLING THE WHEEL AND BRAKE ASSEMBLY.
- n. Install main landing gear to the airplane. Refer to Section 5, MAIN LANDING GEAR INSTALLATION.
- o. Service the main landing gear. Refer to Section 2, SHOCK STRUTS.

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CHART 5-2 MAIN LANDING GEAR WEAR TOLERANCES AND INSPECTION PROCEDURES (TC-251, TC-344, TC-355 AND AFTER; TE-1 AND AFTER; TH-1 AND AFTER)

ITEM	I.D.	O.D.	WEAR TOLERANCES AND INSPECTION PROCEDURES
------	------	------	---

NOTE

Listed below are the tolerances used to determine the extent of wear in the main landing gear components. Where pertinent, the permissible wear limits are given for those components. All inside-diameter (I.D.) and outside-diameter (O.D.) dimensions are given in inches. Refer to Figure 5-9.

Lower Shock Assembly (35)

Visually inspect piston (28), axle (37) and brazed retaining bolt (36) for wear, damage and corrosion. Any sign of scratches and worn areas which can not be repaired is cause for rejection. Conduct a magnetic-particle inspection per MIL-STD-1949. Any sign of cracking is cause for rejection.

Piston (28)

- Chrome Portion

1.602
1.593

1.8635
1.8600

Visually inspect for wear, damage and corrosion. Replace if wear tolerances are exceeded.

Axle (37)

1.498
1.497

Visually inspect for wear, damage and corrosion. Strip and cadmium plate axle as necessary, per Fed QQ-P-416, Type II, Class 2, on scratched or worn areas.

Upper and Lower Torque Knees (23 and 34)

Visually inspect for wear, damage and corrosion. Conduct a magnetic particle inspection per MIL-STD-1949. Any sign of cracks, scratches or worn areas which can not be repaired is cause for rejection. Remove all bushings and inspect bores for corrosion. Replace bushings as needed and cadmium plate per FED QQ-P-416, Type II, Class 2.

- Torque Knee Bores
(20 and 30)

0.6255
0.6245

Visually inspect for wear, damage and corrosion. Replace if wear tolerances are exceeded.

- Bushings (18 and 29)

0.5015
0.4995

Visually inspect for wear, damage and corrosion. If bushings exceed wear tolerances, replace with new bushings. Alignment ream new bushings to specified wear tolerances. Drill out lubricator holes through bushings and install lubricators.

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CHART 5-2

MAIN LANDING GEAR WEAR TOLERANCES AND INSPECTION PROCEDURES (TC-251, TC-344, TC-355 AND AFTER; TE-1 AND AFTER; TH-1 AND AFTER) (CONTINUED)

ITEM	I.D.	O.D	WEAR TOLERANCES AND INSPECTION PROCEDURES
- Knee Pins (21 and 31)	---	0.4990 0.4980	Visually inspect for wear, damage and corrosion. Any sign of scratches or worn areas which can not be repaired is cause for rejection. If no visible wear is evident, conduct magnetic particle inspection per MIL-STD-1949. Any sign of cracks is cause for rejection. Replace if wear tolerances are exceeded.
Torque Knee Center Hinge Joint			
- Bore (Upper) (25)	0.4420 0.4370	---	Inspect for wear, damage and corrosion. Replace if wear tolerances are exceeded.
- Bushing (24)	0.3150 0.3120	0.4360 0.4330	Visually inspect for wear, damage and corrosion. Replace if wear tolerances are exceeded.
- Bore (Lower) (33)	0.3175 0.3125	---	Visually inspect for wear, damage and corrosion. Replace if wear tolerances are exceeded.
Orifice Assembly (6)	---	1.560 1.557	Visually inspect for wear, damage and corrosion. Any sign of scratches or worn areas which can not be repaired is cause for rejection. Check the orifice O.D. does not exceed wear tolerances. Check that orifice hole does not exceed 0.192/0.187 inch. Cadmium plate as necessary except for ring groove in orifice head, per Fed QQ-P-416, Type I, Class 2.
Cylinder Assembly (9)			Visually inspect for wear, damage and corrosion. Any sign of cracks, scratches or worn areas which can not be repaired is cause for rejection. If no visible wear is evident, conduct fluorescent or dye penetrant inspection per MIL-STD-6866. Corrosion proof per MIL-C-5541 and touch up paint as required.

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CHART 5-2

MAIN LANDING GEAR WEAR TOLERANCES AND INSPECTION PROCEDURES (TC-251, TC-344, TC-355 AND AFTER; TE-1 AND AFTER; TH-1 AND AFTER) (CONTINUED)

ITEM	I.D.	O.D	WEAR TOLERANCES AND INSPECTION PROCEDURES
Internal Bearings			
- Upper (16)	1.8695 1.8650	---	Visually inspect for wear, damage and corrosion. Replace bearing if wear tolerances are exceeded. If replacement is required, remove the bearing from the cylinder assembly (9) and measure the O.D. Select from the O.D. dimensions below to determine the correct replacement bearing: 2.3225/2.3215 inches (P/N 35-815246-13, Standard Bearing) 2.3345/2.3335 inches (P/N 35-815246-23, Oversize Bearing) 2.3425/2.3415 inches (P/N 35-815246-25, Oversize Bearing) If the O.D. dimension of the bearing is greater than the replacement dimensions above, replace the cylinder assembly (9). If additional information is required, contact the Technical Support Department of Raytheon Aircraft Company, P.O. Box 85, Wichita, KS 67201.

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CHART 5-2

MAIN LANDING GEAR WEAR TOLERANCES AND INSPECTION PROCEDURES (TC-251, TC-344, TC-355 AND AFTER; TE-1 AND AFTER; TH-1 AND AFTER) (CONTINUED)

ITEM	I.D.	O.D.	WEAR TOLERANCES AND INSPECTION PROCEDURES
- Lower (19)	1.8695 1.8650	---	Visually inspect for wear, damage and corrosion. Replace bearing if wear tolerances are exceeded. If replacement is required, remove the bearing from the cylinder assembly (9) and measure the O.D. Select from the O.D. dimensions below to determine the correct replacement bearing: 2.0035/2.0010 inches (P/N 35-815246-9, Standard Bearing) 2.0185/2.0170 inches (P/N 35-815246-27, Oversize Bearing) If the O.D. dimension of the bearing is greater than the replacement dimensions above, replace the cylinder assembly (9). If additional information is required, contact the Technical Support Department of Raytheon Aircraft Company, P.O. Box 85, Wichita, KS 67201. If replacement of bearing is required, coat bore with locquic primer (72, Consumable Materials Chart, Section 2) and install new bearing using an adhesive (71, Consumable Materials Chart, Section 2).
Upper Torque Knee Attachment Hole	0.5010 0.4995	---	Visually inspect for wear, damage and corrosion. Replace if wear tolerances are exceeded.
Instruction Placards			Do not remove from cylinder assembly except for inspection purposes or replacement.
Brace Assembly (11)			Visually inspect for wear, damage and corrosion. Conduct a fluorescent or dye penetrant inspection per MIL-STD-6866. Any sign of cracks, scratches or worn areas which can not be repaired is cause for rejection.
Hinge Bushings			
- Outer Hinge (12)	---	0.7192 0.7184	Replace bearings when main landing gear is overhauled.

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CHART 5-2

MAIN LANDING GEAR WEAR TOLERANCES AND INSPECTION PROCEDURES (TC-251, TC-344, TC-355 AND AFTER; TE-1 AND AFTER; TH-1 AND AFTER) (CONTINUED)

ITEM	I.D.	O.D	WEAR TOLERANCES AND INSPECTION PROCEDURES
- Inner Hinge (13)	0.6240 0.6230	---	Replace bearings when main landing gear is overhauled.
Brace Bores			
- Forward Bolt (14) Bore	0.4425 0.4370	---	Visually inspect for wear, damage and corrosion. Replace if wear tolerances are exceeded.
- Center Bolt (10) Bore	0.2520 0.2495	---	Visually inspect for wear, damage and corrosion. Replace if wear tolerances are exceeded.
- Aft Bolt (14) Bore	0.4425 0.4370	---	Visually inspect for wear, damage and corrosion. Replace if wear tolerances are exceeded.
Forward and Aft Columns (15)			
Upper and Lower Attachment			
- Forward Bolt (14) Bores	0.4425 0.4370	---	Visually inspect for wear, damage and corrosion. Replace if wear tolerances are exceeded.
- Aft Bolt (14) Bores	0.4425 0.4370	---	Visually inspect for wear, damage and corrosion. Replace if wear tolerances are exceeded.
Safety Switch Components			Ensure there is electrical continuity when switch is activated. Replace wiring and components on condition.

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NOSE GEAR SERVICING

Service the nose gear. Refer to Section 2, SHOCK STRUTS.

LUBRICATION

Lubricate the nose wheel bearings and grease fittings. Refer to Section 2, LUBRICATION CHART.

NOSE WHEEL REMOVAL

- a. Jack the nose wheel.
- b. Remove the nut and bushing which retains the nose wheel assembly on the axle.
- c. Remove the nose wheel assembly by sliding it off the axle.

NOSE WHEEL INSPECTION AND CLEANING

WARNING

Dry cleaning solutions are toxic and volatile. Use in a well ventilated area. Avoid contact with skin or clothing. Do not inhale the vapors.

- a. Degrease all parts and dry thoroughly. A soft bristle brush may be used to remove hardened grease, dust and dirt.

CAUTION

Do not spin bearings with compressed air. This will cause damage

- b. Visually inspect bearing cups and cones for nicks, scratches, water staining, galling, heat discoloration, roller wear, cage damage, and cracks or distortion. Replace if damaged or worn.
- c. Inspect the wheel bearing grease for contamination and solidification at each periodic maintenance inspection.
- d. Inspect wheel halves for cracks, corrosion and other damage. Cracked or badly corroded castings should be replaced. Small nicks, scratches, or pits can be blended out using fine (400 grit) sandpaper.
- e. Inspect the snap rings and grease seals for deterioration and wear; replace if damaged or deformed. Saturate felt seal with 10W30 oil (remove excess by pressing slightly). Also coat the sides and outer diameter with grease (8, Consumable Materials Chart, Section 2) prior to assembly.
- f. Inspect the wheel bolts for cracks, corrosion or other damage. Replace any cracked bolts.

NOSE WHEEL INSTALLATION

- a. Clean and repack wheel bearings. Refer to Section 5, NOSE WHEEL INSPECTION AND CLEANING. Replace any damaged grease seals and insure the grease seal retaining rings and snap rings are in place before installing the wheel.

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NOTE

A bushing is permanently installed on the inboard end of the axle. No other hardware is required between the wheel and the inboard end of the axle.

- b. Install the wheel, outer spacer, retaining nut and cotter pin.
- c. Torque the axle nut as follows:
 - 1. Check for burrs or rough threads on the axle and retaining nut. Apply grease (8, Consumable Materials Chart, Section 2) to the axle threads and bearing surface of the nut.
 - 2. While rotating the wheel, tighten the axle retaining nut to 150 - 200 inch-pounds to insure that the bearings are properly seated.
- Back off the axle retaining nut to zero torque.
- While rotating the wheel, torque the axle retaining nut to 30 inch-pounds and check for alignment of the locking holes.
- If not at a locking position, continue tightening the axle nut to the first locking position and install the cotter pin.

NOSE GEAR REMOVAL

When removing the nose gear, take care to retain the original adjustment at the rod end fittings to facilitate reassembly.

- a. Jack the airplane and partially retract the landing gear to relieve the load on the retract rod compression springs.
- b. Disconnect the drag leg at its fitting on the nose gear brace assembly.
- c. Disconnect the steering mechanism at the nose gear.
- d. Disconnect the landing light wiring.
- e. Remove the nuts, washers, bolts, and bushings which connect the nose gear upper brace to the wheel well structure.
- f. Lower the nose gear assembly from the nose wheel well.

NOSE GEAR INSTALLATION

- a. Carefully position the nose gear assembly against the nose wheel well structure.
- b. Align bolt holes and install bushings, bolts, washers, and nuts. Torque the nuts to 150 - 200 inch-pounds. Install new cotter pins.

NOTE

Use 100951S016YP washers (maximum of two per side) to obtain total end play of 0 to 0.015 inch between the nose gear assembly and supports.

- c. Connect the landing light wire.
- d. Connect the drag leg of the nose gear brace assembly.

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- e. Connect the steering mechanism to the nose gear.

CAUTION

Excessive operation of the landing gear motor without proper cooling may cause damage to the landing gear motor. Allow a short cooling time after each extension and retraction cycle.

- f. Operate the landing gear and check for proper rigging and nose gear adjustment. (Cycle the landing gear a minimum of six complete cycles.)

NOSE GEAR-OVERHAUL (TC-1 AND AFTER; TE-1 THRU TE-300)

NOTE

Refer to the OVERHAUL AND REPLACEMENT SCHEDULE in Section 15 for time limits and maintenance checks of the nose gear.

Experience in the field indicates the points of greatest wear on the nose gear are the upper and lower bearings in the barrel assembly. The forces exerted on the bearings during takeoff and landing tend to result in an oversized condition. The oversized condition of the upper bearing in the barrel assembly will result in leakage of hydraulic fluid through the upper bearing and O-ring. This will eventually cause fluid to seep down through the felt pad and out the lower bearing.

When replacement of the scraper ring and all O-rings in the landing gear fails to stop leaks, the oversized condition of the bearings is probable. In such instances the landing gear should be overhauled. The following information will aid in determining the extent of landing gear wear and whether it is possible to overhaul or necessary to replace critical landing gear components.

NOSE GEAR DISASSEMBLY (TC-1 AND AFTER; TE-1 THRU TE-300)

FIGURE 5-11

WARNING

Do not begin any disassembly of the nose landing gear until all air pressure has been released.

- a. Place the strut in a near vertical position to prevent the hydraulic fluid from spilling when the air valve assembly (1) is removed.
- b. Depress the valve core to deflate the strut and remove the air valve assembly (1).
- c. Remove the nose wheel. Refer to Section 5, NOSE WHEEL REMOVAL.
- d. Remove the snap ring (4) retaining the orifice tube (6).
- e. Retract the piston and fork assembly (48) to push the orifice tube (6) out of the barrel (23).
- f. Remove the orifice tube (6). Remove the O-ring (5) and piston ring (7).
- g. Invert the nose gear and drain out the hydraulic fluid.

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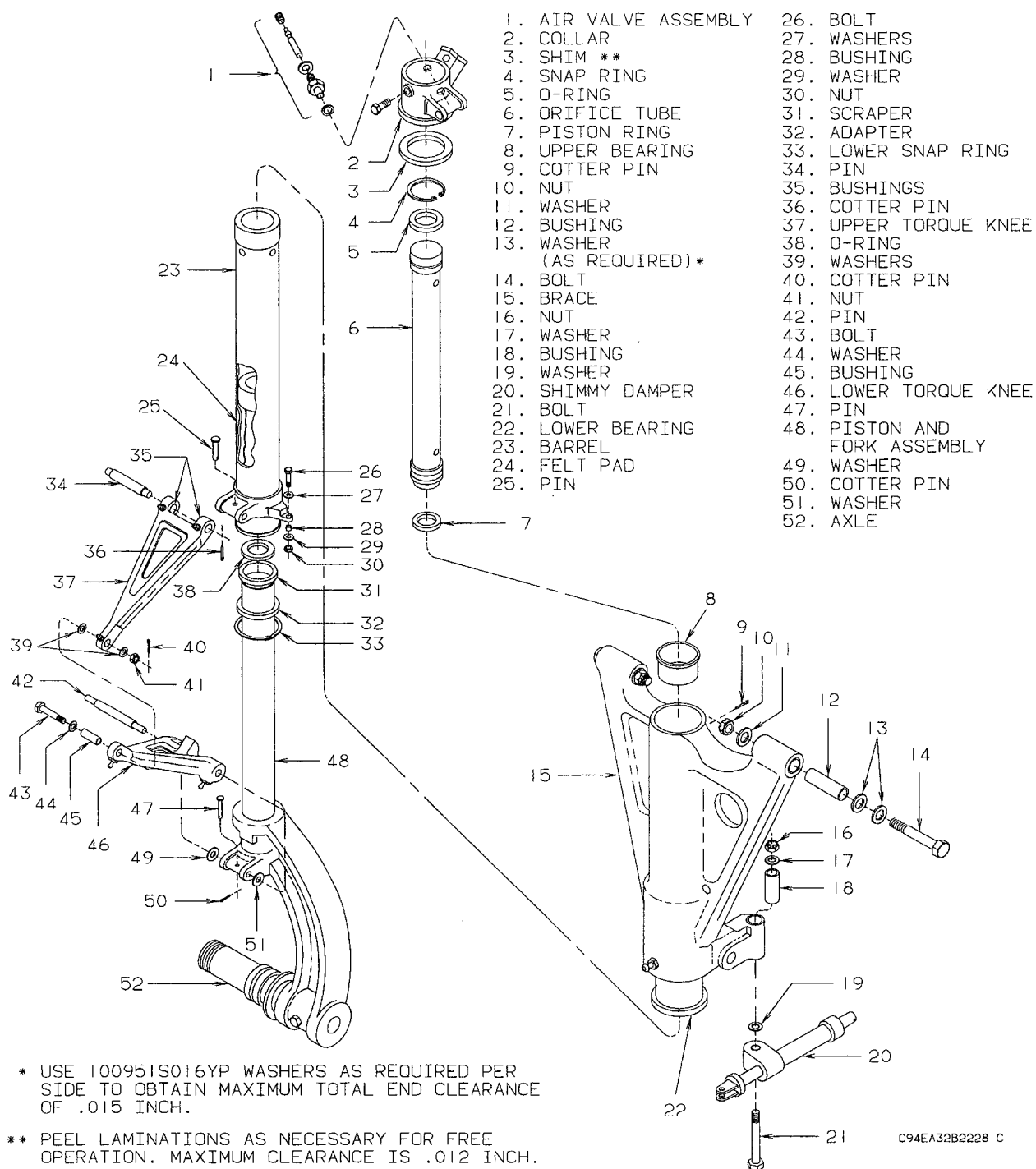
WARNING

Do not disconnect the torque knees (37 and 46) without first deflating the nose gear. The torque knees provide the extension stop for the piston and fork assembly (48). When disconnected, the piston and fork assembly (48) is free to slide out of the barrel (23).

- h. Remove the cotter pin (40), nut (41), washers (39 and 44), bushing (45), and bolt (43).
- i. Remove the cotter pin (36), and pins (25 and 34) to disconnect the upper torque knee (37).
- j. Remove the cotter pin (50), pins (42 and 47), and washers (49 and 51) to disconnect the lower torque knee (46).
- k. Slide the piston and fork assembly (48) out of the barrel (23). Remove the collar (2) and shim (3).
- l. Remove the lower snap ring (33), scraper (31), and adapter (32).
- m. Remove the O-ring (38) and remove the felt pad (24) from inside the barrel (23). Removal of the O-ring may be simplified by using a hook manufactured from music wire. Refer to Figure 5-10.
- n. Remove the nut (16), washers (17 and 19), bushing (18), and bolt (21) attaching the shimmy damper (20) to the brace (15).
- o. Remove the nut (30), washers (27 and 29), bushing (28), and bolt (26) to disconnect the shimmy damper (20) from the barrel (23).
- p. Pull the barrel (23) out of the brace (15).

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Nose Gear Assembly (TC-1 and after; TE-1 thru TE-300)

Figure 5-11

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NOSE GEAR CLEANING, REPLACEMENT PARTS AND REPAIRS (TC-1 AND AFTER; TE-1 THRU TE-300)

CLEANING (TC-1 AND AFTER; TE-1 THRU TE-300)

- a. Clean all parts with solvent (15, Consumable Materials Chart, Section 2). Remove all excess solvent and wipe dry after cleaning.
- b. Immerse all internal parts in clean hydraulic fluid (13, Consumable Materials Chart, Section 2) prior to assembly.

REPLACEMENT PARTS (TC-1 AND AFTER; TE-1 THRU TE-300)

FIGURE 5-11

- a. Inspect all parts and assemblies for damage or excessive wear. The following conditions are cause for rejection:
 - Wear which is greater than the allowable wear tolerances. Refer to Chart 5-3.
 - Damage which cannot be corrected or repaired.
 - Screws that are severely damaged or have stripped, severely worn or scored threads.
 - Parts that are cracked, chipped or broken.
 - Parts that have corrosion or other defects that cannot be repaired.
- b. Replace the following parts when nose gear is overhauled:
 - Adapter (32)
 - Bushing (12)
 - Cotter Pins
 - Felt Pad (24)
 - Piston Ring (7)
 - O-Rings (5, 38)
 - Safety Wire
 - Scraper (31)
 - Snap Rings (4, 33)
- c. Replace the following parts on condition when nose gear is overhauled:
 - Bearings (8, 22)
 - Bushings (18, 28, 35, 45)
 - Grease Fittings
 - Placards
 - Valve Core (1)

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REPAIRS (TC-1 AND AFTER; TE-1 THRU TE-300)

FIGURE 5-11

- a. Visually inspect castings for cracks and pitting; and finished surfaces for scoring, pitting, nicks, cracks, distortion and wear. Refer to Chart 5-3 for tolerances to aid in determining the extent of wear. Replace all defective and excessively worn parts.
- b. If fluid leaks have been observed on top of the air valve assembly (1), check the small O-ring of the valve; then look for defects in the valve.
- c. If the leak is from the junction of the orifice tube (6) and the barrel (23), check the O-ring (5) on the orifice tube (6).
- d. All parts or assemblies may be repaired if any of the following problems exist:
 - Slight scoring of shafts may be corrected by lapping carefully with a flat oil stone.

NOTE

Do not exceed 10% of the component material thickness when removing nicks, burrs and scratches.

- Smooth minor nicks, burrs, and scratches.
- Those parts that are scratched or have worn plating may be stripped and replated with the same type of plating as that removed or be replaced with new parts.
- Minor thread damage, chase to clean or smooth.

NOTE

Corrosion damage requires inspection to determine the depth of penetration and the cross-sectional area change. The damaged area must be thoroughly cleaned and the corrosion must be removed. The deterioration caused by corrosion or removal of corrosion must not reduce the material thickness of any component by more than 10%. Refer to Chart 5-3 for NOSE GEAR WEAR TOLERANCES AND INSPECTION PROCEDURES on components. For additional information contact the Technical Support Department of Raytheon Aircraft Company, P.O. Box 85, Wichita, KS 67201.

- Remove corrosion if applicable, and apply corrosion prevention materials as necessary per MIL-C-5541 or cadmium plate per Fed QQ-P-416, Type II.
- Bushings that check within allowable wear tolerances may be reused.
- When evidence of damage exists to steel parts, magnetic particle inspect per MIL-STD-1949.

NOTE

Do not remove paint or primer from the area to be fluorescent or dye penetrant inspected per MIL-STD-6866. If the finish absorbs the penetrant so that bleed out prevents satisfactory inspection or if a new finish has not cured for at least 30 days, contact the Technical Support Department of Raytheon Aircraft Company, P.O. Box 85, Wichita, KS 67201.

- When evidence of damage exists to metal parts other than steel, fluorescent penetrant inspect per MIL-STD-6866, Type I.

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- Replace damaged or unserviceable parts with new or serviceable parts.

NOSE GEAR ASSEMBLY (TC-1 AND AFTER; TE-1 THRU TE-300) FIGURE 5-11

NOTE

Prior to assembly, immerse all internal parts (except felt pad (24) in hydraulic fluid (13, Consumable Materials Chart, Section 2).

- Install new O-ring (38) into the upper bearing of the barrel (23). Two dowel rods may be used to work O-ring into position. Refer to Figure 5-10.
- Saturate felt pad (24) with SAE 10W30 oil before installation. Install felt pad (24) in the barrel (23).
- Install new scraper (31), adapter (32) and secure with lower snap ring (33).
- Install barrel (23) into the brace (15).
- Install shims (3) as necessary.

NOTE

Add or remove lamination from shims (3) as necessary for free operation. Maximum clearance is 0.012 between collar (2) and brace (15).

- Install collar (2) to brace (15) and tighten two bolts securing collar. Rotate collar to ensure freedom of movement after tightening bolts. Adjust shims (3) as necessary to allow collar to rotate freely. Secure bolts with safety wire.
- Install air valve assembly (1) excluding valve core.
- Install upper torque knee (37) with the pins (25 and 34), and cotter pin (36).

NOTE

Install the washers (17 and 19) above or below the bushing (18) on the brace (15) to align the shimmy damper (20) with the lug on the barrel (23).

- Position shimmy damper (20) and install the bushing (18), bolt (21), washers (17 and 19) and nut (16).
- Install the bushing (28), bolt (26), washer (27 and 29) and nut (30) to connect the shimmy damper (20).
- Slide the piston and fork assembly (48) into the barrel (23).
- Connect the lower torque knee (46) with the pins (42 and 47), washers (49 and 51) and cotter pin (50).
- Install the bushing (45), bolt (43), washers (39 and 44), nut (41) and cotter pin (40), to connect the upper and lower torque knees (37 and 46)
- Install new O-ring (5) and piston ring (7) to orifice tube (6). Push orifice tube (6) down into the barrel (23) and secure by attaching snap ring (4) to the top of collar (2).
- Lubricate bearings at grease fittings with grease (8, Consumable Materials Chart, Section 2).
- With the strut in the vertical position and approximately 1/4 inch from fully compressed, fill through the air valve assembly (1) with approximately 500/550 cc of hydraulic fluid (13, Consumable Materials Chart, Section 2).

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- q. Fully extend and recompress the piston and fork assembly (48) three times or until no additional fluid can be added. Add additional fluid as required with the strut in the compressed position.
- r. With the piston and fork assembly (48) compressed, install the valve core into air valve assembly (1).

WARNING

As with all operations involving equipment under high pressure, exercise caution when performing the leak test; avoid the areas directly above and below the strut.

- s. To leak test, inflate the nose gear to approximately 90 psi using dry air or nitrogen. Coat the top of the collar (2) and air valve assembly (1) with soapsuds and test for air leaks.
- t. Release the air pressure by depressing the valve core in the air valve assembly (1). Clean the soapsuds from the top of the collar (2) and air valve assembly (1) with fresh water.
- u. Install the air valve cap on the air valve assembly (1).
- v. Install the nose wheel onto the axle (52). Refer to Section 5, NOSE WHEEL INSTALLATION.
- w. Install nose gear onto the airplane. Refer to Section 5, NOSE GEAR INSTALLATION.
- x. Service the nose gear. Refer to Section 2, SHOCK STRUTS.

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CHART 5-3 NOSE GEAR WEAR TOLERANCES AND INSPECTION PROCEDURES (TC-1 AND AFTER; TE-1 THRU TE-300)

ITEM	I.D.	O.D.	WEAR TOLERANCES AND INSPECTION PROCEDURES
NOTE			
Listed below are the tolerances used to determine the extent of wear in the nose gear components. Where pertinent, the permissible wear limits are given for those components. All inside-diameter (I.D.) and outside-diameter (O.D.) dimensions are given in inches. Refer to Figure 5-11.			
Collar (2)	0.3150 0.3120	---	Visually inspect for wear, damage and corrosion. Any scratches or worn areas which can not be repaired is cause for rejection. Conduct magnetic particle inspection per MIL-STD-1949. Any crack is cause for rejection. Replace if wear tolerances are exceeded. cadmium plate as necessary per Fed. QQ-P-416, Type II Class 2.
Torque Knee Assembly (37 and 46)			Visually inspect for wear, damage and corrosion. Any scratches or worn areas which can not be repaired is cause for rejection. Remove all bushing and inspect bores for corrosion. Corrosion proof as necessary per MIL-C-5541. Any crack is cause for rejection. Replace bushing as needed.
Upper Torque Knee (37)			
- Bore	0.4380 0.4370	---	Visually inspect for wear, damage and corrosion. Replace if wear tolerances are exceeded.
- Bushing (35)	0.3775 0.3745	---	Visually inspect for wear, damage and corrosion. If bushings exceed 0.3775 inches I.D., replace with new bushings. Alignment ream new bushings to specified wear tolerances. Drill out lubricator holes through bushings and install lubricators.
- Knee Pin (34)	---	0.3735 0.3725	Visually inspect for wear, damage and corrosion. Any scratches or worn areas which can not be repaired is cause for rejection. If no visible wear is evident, conduct a magnetic particle inspection per MIL-STD-1949. Any crack is cause for rejection. Replace if wear tolerances are exceeded.
Torque Knee Center Hinge Joint			
- Bore (Upper)	0.3150 0.3120	---	Visually inspect for wear, damage and corrosion. Replace if wear tolerances are exceeded.
- Bushing (45)	0.2505 0.2495	0.311 0.310	Visually inspect for wear, damage and corrosion. Replace if wear tolerances are exceeded.
- Bore (Lower)	0.3150 0.3120	---	Visually inspect for wear, damage and corrosion. Replace if wear tolerances are exceeded.

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CHART 5-3 NOSE GEAR WEAR TOLERANCES AND INSPECTION PROCEDURES (TC-1 AND AFTER; TE-1 THRU TE-300) (CONTINUED)

ITEM	I.D.	O.D.	WEAR TOLERANCES AND INSPECTION PROCEDURES
Lower Torque Knee (46)			
- Bore	0.3775 0.3745	---	Visually inspect for wear, damage and corrosion. Replace if wear tolerances are exceeded.
- Knee Pin (42)	---	0.374 0.373	Visually inspect for wear, damage and corrosion. Any scratches or worn areas which can not be repaired is cause for rejection. If no visible wear is evident, conduct a magnetic particle inspection per MIL-STD-1949. Any crack is cause for rejection. Replace if wear tolerances are exceeded.
Orifice Assembly (6) P/N 35-825195 (TC-1 thru TC-2433, TE-1 thru TE-300)	---	1.449 1.436	Visually inspect for wear, damage and corrosion. Any sign of scratches or worn areas which can not be repaired is cause for rejection. Conduct a magnetic-particle inspection per MIL-STD-1949. Any sign of cracking is cause for rejection. Check the orifice O.D. does not exceed wear tolerances. Check that orifice hole does not exceed 0.185/0.180 inches. cadmium plate as necessary per Fed QQ-P-416, Type I, Class 2. NOTE: If the orifice assembly P/N 35-825195 exceeds wear tolerances, use Orifice Assembly P/N 36-820021 as a replacement spare.
Orifice Assembly (6) P/N 36-820021 (TC-2434 and after)	---	1.449 1.436	Visually inspect for wear, damage and corrosion. Any sign of scratches or worn areas which can not be repaired is cause for rejection. Conduct a magnetic-particle inspection per MIL-STD-1949. Any sign of cracking is cause for rejection. Check the orifice O.D. does not exceed wear tolerances. Check that orifice hole does not exceed 0.142/0.140 inches. cadmium plate as necessary per Fed QQ-P-416, Type I, Class 2.
Barrel Assembly (23)			Visually inspect for wear, damage and corrosion. Any sign of scratches or worn areas which can not be repaired is cause for rejection. Conduct a magnetic-particle inspection per MIL-STD-1949. Any sign of cracking is cause for rejection.
Bearings			
- Upper	1.755 1.751	---	Visually inspect for wear, damage and corrosion. Replace barrel assembly if wear tolerances are exceeded.
- Lower	1.755 1.751	---	Visually inspect for wear, damage and corrosion. Replace barrel assembly if wear tolerances are exceeded.
Upper Torque Knee Attachment Hole	0.3755 0.3745	---	Visually inspect for wear, damage and corrosion. Replace if wear tolerances are exceeded.

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CHART 5-3 NOSE GEAR WEAR TOLERANCES AND INSPECTION PROCEDURES (TC-1 AND AFTER; TE-1 THRU TE-300) (CONTINUED)

ITEM	I.D.	O.D.	WEAR TOLERANCES AND INSPECTION PROCEDURES
Piston and Fork Assembly (48)			
Chrome Portion (top)	1.490 1.482	---	Visually inspect for wear, damage and corrosion. Any sign of scratches and worn areas which can not be repaired is cause for rejection. Conduct a magnetic-particle inspection per MIL-STD-1949. Any sign of cracking is cause for rejection. Replace if wear tolerances are exceeded.
Axle (52)	---	1.249 1.248	Visually inspect for wear, damage and corrosion. Any sign of scratches and worn areas which can not be repaired is cause for rejection. Conduct a magnetic-particle inspection per MIL-STD-1949. Any sign of cracking is cause for rejection. Strip and cadmium plate axle as necessary, per Fed QQ-P-416, Type II, Class 2 on scratched or worn areas.
Brace Assembly (15)			Visually inspect for wear, damage and corrosion. Any scratches or worn areas which can not be repaired is cause for rejection. Remove all bearings and inspect for corrosion. Conduct fluorescent or dye penetrant inspection per MIL-STD-6866. Any crack is cause for rejection. Coat interior of brace and hinge bearing holes with corrosion preventative compound per MIL-C-16173, Grade 1 or 2. Replace all bearings when nose gear is overhauled.
Hinge Bushings (12)	0.4692 0.4682	---	Replace bearings when nose gear is overhauled. Alignment ream new bearings to specified wear tolerances. Drill out lubricator holes through bearings and install lubricators.
Internal Bearings			
- Upper and Lower (8 and 22)	2.252 2.250	---	Replace bearings when nose gear is overhauled. Alignment ream new bearings to specified wear tolerances. Drill out lubricator holes through bearings and install lubricators.
Instruction Placards			Do not remove from brace assembly except for inspection purposes or replacement.

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NOSE GEAR-OVERHAUL (TE-301 AND AFTER; TH-1 AND AFTER)

NOTE

Refer to the OVERHAUL AND REPLACEMENT SCHEDULE in Section 15 for time limits and maintenance checks of the nose gear.

Experience in the field indicates the points of greatest wear on the nose gear are the upper and lower strut bearings in the strut housing. The forces exerted on the bearings during takeoff and landing tend to result in an oversized condition. The oversized condition of the upper and lower strut bearings will eventually result in leakage of hydraulic fluid.

When replacement of all O-rings in the landing gear fails to stop leaks, the oversized condition of the bearings is probable. In such instances the landing gear should be overhauled. The following information will aid in determining the extent of landing gear wear and whether it is possible to overhaul or necessary to replace critical landing gear components.

NOSE GEAR DISASSEMBLY (TE-301 AND AFTER; TH-1 AND AFTER)

FIGURE 5-12

- a. Place the nose gear in a near vertical position to prevent the hydraulic fluid from spilling when the air valve assembly (14) is removed.

WARNING

Do not remove the air valve assembly (14) until all air pressure has been released. It may be blown out with considerable force and cause personal injury or property damage.

- b. Release the air pressure in the nose gear, cut the safety wire and remove the air valve assembly (14).
- c. Invert the nose gear and drain out the hydraulic fluid.
- d. Cut the safety wire and remove the bolts attaching the upper strut housing retainer (2) to the gear brace (6). Remove the upper strut housing retainer (2), laminated shims (3) and spacer (4).
- e. Slide the strut housing (15) out of the gear brace (6).
- f. Remove the nut, washers, bolt (19) and bushing (20) connecting the upper and lower torque knees (18 and 22) together.

NOTE

Only remove bushings (21 and 25) when required for replacement.

- g. Cut the safety wire and remove the lower strut retainer (39) from the strut housing (15), using a spanner wrench.
- h. Slide the piston and axle assembly (40) out of the strut housing (15).
- i. Remove items (30) through (38) from the piston and axle assembly (40).
- j. Remove the nut, washers, seal (13), and the orifice rod assembly (26).
- k. Remove the nut and washer (29), and the O-ring (28) and orifice (27) from the orifice rod assembly (26).

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WARNING

Do not disconnect the torque knees (18 and 22) without first deflating the nose gear. The torque knees provide the extension stop for the piston and axle assembly (40). When disconnected, the piston and axle assembly (40) is free to slide out of the strut housing.

NOTE

Only remove bushings (16) when required for replacement.

- l. Remove the roll pin (17), retaining pin, washers and cotter pin attaching the upper torque knee (18) to the strut housing (15).

NOTE

Only remove bushings (24) when required for replacement.

- m. Remove roll pin (23), retaining pin, washers and cotter pin attaching the lower torque knee (22) to the piston and axle assembly (40).
- n. Remove steering straightener bearing (1) from the upper strut housing retainer (2).

NOTE

The small allen head screw at the top of the strut housing (15) is a bonded installation and should not be removed unless replacement of the fill tube (12) is necessary.

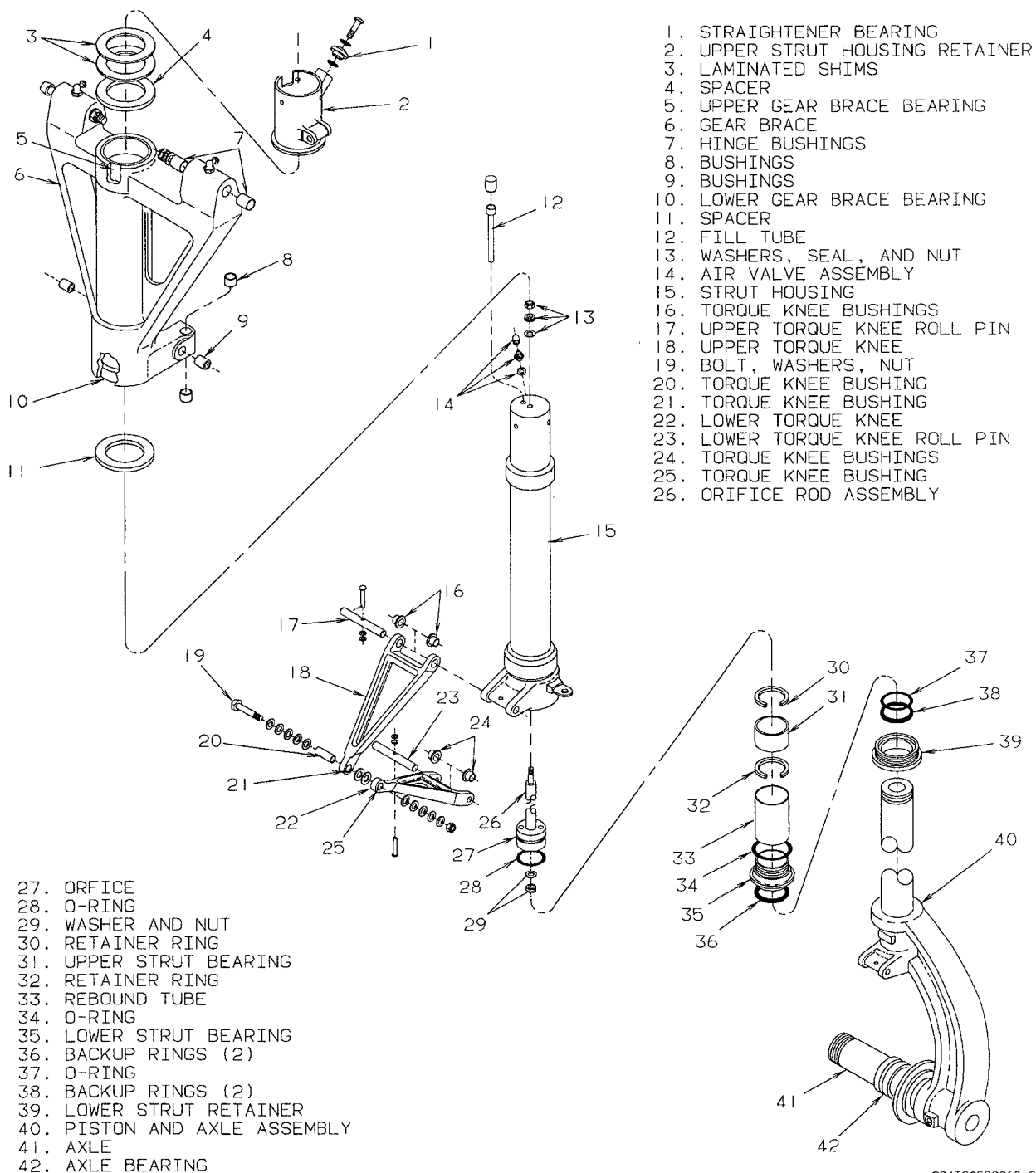
NOSE GEAR CLEANING, REPLACEMENT PARTS AND REPAIRS (TE-301 AND AFTER; TH-1 AND AFTER)

CLEANING (TE-301 AND AFTER; TH-1 AND AFTER)

- a. Clean all parts with solvent (15, Consumable Materials Chart, Section 2). Rinse and dry thoroughly after cleaning.
- b. Immerse all internal parts in clean hydraulic fluid (13, Consumable Materials Chart, Section 2) prior to assembly.

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Nose Gear Assembly (TE-301 and after; TH-1 and after)

Figure 5-12

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REPLACEMENT PARTS (TE-301 AND AFTER; TH-1 AND AFTER)

FIGURE 5-12

- a. Inspect all parts and assemblies for damage or excessive wear. The following conditions are cause for rejection:
 - Wear which is greater than the allowable wear tolerances. Refer to Chart 5-4.
 - Damage which cannot be corrected or repaired.
 - Screws that are severely damaged or have stripped, severely worn or scored threads.
 - Parts that are cracked, chipped or broken.
 - Parts that have corrosion or other defects that cannot be repaired.
- b. Replace the following parts when nose gear is overhauled:
 - Backup Ring (36, 38)
 - Bushings (7, 8, 9, 16, 20, 21, 24, 25)
 - Cotter Pins
 - Lower Strut Retainer (39)
 - O-Rings (28, 34, 37)
 - Safety Wire
- c. Replace the following parts on condition when nose gear is overhauled:
 - Bearings (5, 10, 31, 35)
 - Grease Fittings
 - Placards
 - Spacers (4, 11)
 - Valve Core

REPAIRS (TE-301 AND AFTER; TH-1 AND AFTER)

FIGURE 5-12

- a. Visually inspect castings for cracks and pitting; and finished surfaces for scoring, pitting, nicks, cracks, distortion and wear. Refer to Chart 5-4 for tolerances to aid in determining the extent of wear. Replace all defective and excessively worn parts.
- b. If fluid leaks have been observed on top of the air valve assembly (14), check the small O-ring of the valve; then look for defects in the valve.
- c. All parts or assemblies may be repaired if any of the following problems exist:
 - Slight scoring of shafts may be corrected by lapping carefully with a flat oil stone.

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NOTE

Do not exceed 10% of the component material thickness when removing nicks, burrs and scratches.

- Smooth minor nicks, burrs, and scratches.
- Those parts that are scratched or have worn plating may be stripped and replated with the same type of plating as that removed or be replaced with new parts.
- Minor thread damage, chase to clean or smooth.

NOTE

Corrosion damage requires inspection to determine the depth of penetration and the cross-sectional area change. The damaged area must be thoroughly cleaned and the corrosion must be removed. The deterioration caused by corrosion or removal of corrosion must not reduce the material thickness of any component by more than 10%. Refer to Chart 5-4 for NOSE GEAR WEAR TOLERANCES AND INSPECTION PROCEDURES on components. For additional information contact the Technical Support Department of Raytheon Aircraft Company, P.O. Box 85, Wichita, KS 67201.

- Remove corrosion if applicable, and apply corrosion prevention materials as necessary per MIL-C-5541 or cadmium plate per Fed QQ-P-416, Type II.
- Bushings that check within allowable wear tolerances may be reused.
- When evidence of damage exists to steel parts, magnetic particle inspect per MIL-STD-1949.

NOTE

Do not remove paint or primer from the area to be fluorescent or dye penetrant inspected per MIL-STD-6866. If the finish absorbs the penetrant so that bleed out prevents satisfactory inspection or if a new finish has not cured for at least 30 days, contact the Technical Support Department of Raytheon Aircraft Company, P.O. Box 85, Wichita, KS 67201.

- When evidence of damage exists to metal parts other than steel, fluorescent penetrant inspect per MIL-STD-6866, Type I.
- Replace damaged or unserviceable parts with new or serviceable parts.

NOSE GEAR ASSEMBLY (TE-301 AND AFTER; TH-1 AND AFTER) FIGURE 5-12

- a. Install the steering straightener bearing (1) on the upper strut housing retainer (2).

NOTE

New bushings (24) are to be installed if they have been removed during the nose gear disassembly.

- b. Attach the lower torque knee (22) to the piston and axle assembly (40) with roll pin (23), retaining pin, washers and cotter pin.

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NOTE

New bushings (16) are to be installed if they have been removed during the nose gear disassembly.

- c. Attach the upper torque knee (18) to the strut housing (15) with roll pin (17), retaining pin, washers and cotter pin.
- d. Lubricate the bore of the strut housing (15), orifice rod assembly (26), orifice (27) and O-ring (28), the outer diameter of the piston (40), O-ring (34) and items (30) through (39) with a light coating of clean hydraulic fluid (13, Consumable Materials Chart, Section 2).
- e. Install the O-ring (28) and orifice (27) on the orifice rod assembly (26) with washer and nut (29).
- f. Install the orifice rod assembly (26) in the bore of the strut housing (15) with the washers, seal and nut (13).
- g. Install O-ring (34) inside the strut housing (15). Assemble items (30) through (39) on the piston end of the piston and axle assembly (40). Slide the piston and axle assembly (40) into the strut housing (15). Tighten the lower strut retainer (39) using a spanner wrench, and safety wire.

NOTE

New bushings (21 and 25) are to be installed if they have been removed during the nose gear disassembly.

- h. Connect the upper and lower torque knees (18 and 22) with bolt, washers, nut (19) and bushing (20).
- i. Slide the strut housing (15) into the gear brace (6). Insure that the spacer (11) is installed with the coated side down between the gear brace and the strut housing.

NOTE

Add or remove lamination from shims (3) as necessary for free operation. Maximum clearance is 0.010 inch between the strut housing (15) and the gear brace (6).

- j. Place the gear brace (6) in the vertical position. Assemble the laminated shims (3) and spacer (4) in the upper strut housing retainer (2). Insure that the coated side of the spacer (4) is facing up. Loosely install the upper strut housing retainer (2) over the top of the strut housing (15) and measure the distance between the gear brace (6) and the strut housing (15).
- k. Install the bolts attaching the upper strut housing retainer (2) and safety wire.
- l. With the nose gear in a vertical position and the piston and axle assembly (40) compressed, fill through the air valve assembly hole with approximately 1 pint of hydraulic fluid (13, Consumable Materials Chart, Section 2). When the fluid overflows, cycle the piston and axle assembly (40) (full extension to compressed) and refill. Repeat until fluid cannot be added to the strut housing (15) with the piston and axle assembly (40) in the compressed position.
- m. Install the air valve assembly (14).
- n. To leak test nose gear assembly, inflate to 300 psi with dry air or nitrogen and coat the air valve assembly (14) and upper strut housing retainer (2) with soapsuds.

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WARNING

As with all operations involving equipment under high pressure, exercise caution when performing the leak test; avoid the areas directly above and below the strut.

- o. Release the air pressure and clean soapsuds off the top of the nose gear with fresh water and wipe dry.
- p. Safety wire the air valve assembly (14) and install the cap.

CHART 5-4 NOSE GEAR WEAR TOLERANCES AND INSPECTION PROCEDURES (TE-301 AND AFTER; TH-1 AND AFTER)

ITEM	I.D.	O.D.	WEAR TOLERANCES AND INSPECTION PROCEDURES
------	------	------	---

NOTE

Listed below are the tolerances used to determine the extent of wear in the nose gear components. Where pertinent, the permissible wear limits are given for those components. All inside-diameter (I.D.) and outside-diameter (O.D.) dimensions are given in inches. Refer to Figure 5-12.

Upper Strut Housing Retainer (2) (Hole Diameter)	0.3145 0.3120		Visually inspect for wear, damage and corrosion. Any scratches or worn areas which can not be repaired is cause for rejection. Conduct fluorescent or dye penetrant inspection per MIL-STD-6866. Any crack is cause for rejection. Replace if wear tolerances are exceeded. Corrosion proof retainer per MIL-C-5541.
Torque Knee Assembly (18 and 22)			Visually inspect torque knee assembly for wear, damage and corrosion. Any scratches or worn areas which can not be repaired is cause for rejection. If no visible wear is evident, conduct fluorescent or dye penetrant inspection per MIL-STD-6866. Any crack is cause for rejection. Corrosion proof as necessary per MIL-C-5541 and touch up paint as required.
<i>Upper Torque Knee (18)</i>			
- Bore	0.4698 0.4683	---	Replace if upper torque knee wear tolerances are exceeded.
- Bushings (16)	---	---	Remove all bushings and inspect bores for corrosion. Coat all bores with locquic primer (72, Consumable Materials Chart, Section 2) and install new bushings using an adhesive (71, Consumable Materials Chart, Section 2).

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CHART 5-4 NOSE GEAR WEAR TOLERANCES AND INSPECTION PROCEDURES (TE-301 AND AFTER; TH-1 AND AFTER) (CONTINUED)

ITEM	I.D.	O.D.	WEAR TOLERANCES AND INSPECTION PROCEDURES
- Knee Pin (17)	---	0.3740 0.3730	Visually inspect for wear, damage and corrosion. Any scratches or worn areas which can not be repaired is cause for rejection. If no visible wear is evident, conduct a magnetic particle inspection per MIL-STD-1949. Any crack is cause for rejection. Replace if wear tolerances are exceeded.
<i>Torque Knee Center Hinge Joint</i>			
- Bore (Upper)	0.3760 0.3740	---	Replace if torque knee wear tolerances are exceeded.
- Bushings (21, 25)	---	---	Remove all bushings and inspect bores for corrosion. Coat all bores with locquic primer (72, Consumable Materials Chart, Section 2) and install new bushings using an adhesive (71, Consumable Materials Chart, Section 2).
- Bore (Lower)	0.3760 0.3740	---	Replace if torque knee wear tolerances are exceeded.
<i>Lower Torque Knee (22)</i>			
- Bore (Lower)	0.4698 0.4683		Replace if lower torque knee wear tolerances are exceeded.
- Bushings (24)	---	---	Remove all bushings and inspect bores for corrosion. Coat all bores with locquic primer (72, Consumable Materials Chart, Section 2) and install new bushings using an adhesive (71, Consumable Materials Chart, Section 2).
- Knee Pin (23)	---	0.3740 0.3730	Visually inspect for wear, damage and corrosion. Any scratches or worn areas which can not be repaired is cause for rejection. If no visible wear is evident, conduct a magnetic particle inspection per MIL-STD-1949. Any crack is cause for rejection. Replace if wear tolerances are exceeded.
Strut Housing (15)	0.1940 0.1840	---	Visually inspect for wear, damage and corrosion. Any sign of scratches or worn areas which can not be repaired is cause for rejection. Conduct a fluorescent or dye penetrant inspection per MIL-STD-1966. Any sign of cracking is cause for rejection. Check the I.D. of bushing does not exceed wear tolerances.
<i>Lower Strut Bearing (35)</i>	1.757 1.752	---	Visually inspect for wear, damage and corrosion. Replace if wear tolerances are exceeded.

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CHART 5-4

NOSE GEAR WEAR TOLERANCES AND INSPECTION PROCEDURES (TE-301 AND AFTER; TH-1 AND AFTER) (CONTINUED)

ITEM	I.D.	O.D.	WEAR TOLERANCES AND INSPECTION PROCEDURES
Orifice Rod Assembly (26)	---	---	Visually inspect for wear, damage and corrosion. If rod shows no severe wear or damage, check for straightness within 0.03 inches. Conduct a fluorescent or dye penetrant inspection per MIL-STD-6866. If rod is bent or any sign of cracking is cause for rejection.
Piston and Fork Assembly (40)			
Chrome Portion (top)	1.503	1.750	Visually inspect for wear, damage and corrosion. Any sign of scratches and worn areas which can not be repaired is cause for rejection. Conduct a magnetic-particle inspection per MIL-STD-1949. Any sign of cracking is cause for rejection. Replace if wear tolerances are exceeded or plating is unacceptable.
	1.497	1.747	
Upper Strut Bearing (31)	1.751	1.999	Visually inspect for wear, damage and corrosion. Conduct a magnetic particle inspection per MIL-STD-1949. Replace if plating is scratched or worn through.
	1.748	1.998	
Axle (41)	---	1.249	Visually inspect for wear, damage and corrosion. Any sign of scratches and worn areas which can not be repaired is cause for rejection. Conduct a magnetic-particle inspection per MIL-STD-1949. Any sign of cracking is cause for rejection. Strip and cadmium plate axle as necessary, per Fed QQ-P-416, Type II, Class 2 on scratched or worn areas.
		1.248	
Axle Bearing (42)	1.258	1.750	Visually inspect for wear, damage and corrosion. Replace if wear tolerances are exceeded.
	1.254	1.745	
Brace Assembly (6)			Visually inspect for wear, damage and corrosion. Any scratches or worn areas which can not be repaired is cause for rejection. Remove all bearings and inspect for corrosion. Conduct fluorescent or dye penetrant inspection per MIL-STD-6866. Any crack is cause for rejection. Coat interior of brace and hinge bearing holes with corrosion preventative compound per MIL-C-16173, Grade 1 or 2. Replace all bearings when nose gear is overhauled.
Hinge Bushings (7)	0.4995 0.4980	---	Replace bushings when nose gear is overhauled.
Bushings (9)	0.3760 0.3745	---	Replace bushings when nose gear is overhauled.
Bushings (8)	0.5010 0.4995		Replace bushings when nose gear is overhauled.

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CHART 5-4 NOSE GEAR WEAR TOLERANCES AND INSPECTION PROCEDURES (TE-301 AND AFTER; TH-1 AND AFTER) (CONTINUED)

ITEM	I.D.	O.D.	WEAR TOLERANCES AND INSPECTION PROCEDURES
<i>Internal Bearings</i>			
- Upper and Lower (5 and 10)	2.504 2.502	---	Replace bearings when nose gear is overhauled. Alignment ream new bearings to specified wear tolerances Drill out lubricator holes through bearings and install lubricators.
Spacer (4)	---	---	Visually inspect for wear, damage and corrosion. If the coated side (up side) of spacer is worn through replace. Minor scratches and scuffing is acceptable.
Spacer (11)	---	---	Visually inspect for wear, damage and corrosion. If the coated side (down side) of spacer is worn through, replace. Minor scratches and scuffing is acceptable.
Instruction Placards	---	---	Do not remove from brace assembly except for inspection purposes or replacement.

NOSE GEAR SHIMMY DAMPER SERVICING

Service the shimmy damper. Refer to Section 2, SHIMMY DAMPER.

NOSE GEAR SHIMMY DAMPER REMOVAL

- Remove the nut, washers, bushing and bolt which attach the shimmy damper to the gear brace.
- Remove the nut, washers, bushing, bolt and remove the shimmy damper from the barrel/strut.

NOSE GEAR SHIMMY DAMPER INSTALLATION

- Install the bushing, washers, nut and bolt attaching the shimmy damper to the barrel/strut.
- Install the bushing, washers, nut and bolt attaching the shimmy damper to the gear brace. For alignment purposes, attach a 100951-X031-YN washer between the damper and the lug on the brace, and a 100951-X031-YM washer under the nut.
- Swivel the nose wheel to check the turning radius of the strut and for freedom of movement without binding or rough spots. Adjust the nose gear steering travel adjustment bolts to the stop shimmy damper piston 1/32 inch to 1/4 inch from maximum travel in both directions.

NOSE GEAR SHIMMY DAMPER-OVERHAUL

NOTE

Refer to the OVERHAUL AND REPLACEMENT SCHEDULE in Section 15 for time limits and maintenance checks of the nose gear shimmy damper.

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NOSE GEAR SHIMMY DAMPER DISASSEMBLY

FIGURE 5-13

- a. Remove cotter pin (1), washer (8) and compression spring (9) by holding the washer (8) down with a small rod or screw driver so that the parts will not spring out when the cotter pin (1) is removed.
- b. Remove the floating piston (10) by engaging it with a long 6-32 screw or threaded rod. Remove O-ring (11) from the floating piston (10).
- c. Remove the snap ring (2) and piston scraper (3). Force the barrel end (5) out of the barrel (6) by working the piston rod (12) back and forth. Remove O-rings (4) from the barrel end (5).
- d. Remove all remaining hydraulic fluid by inverting shimmy damper and pumping the piston rod (12).
- e. Remove the snap ring (23) and slide the piston rod (12) with the remaining parts out of the barrel (6).
- f. Insert a long 6-32 screw or threaded rod into the hole at the clevis (24) end of the piston rod (12) and engage the forward floating piston (17). Pull floating piston (17) toward clevis (24) so that the piston retaining pin (15) can be driven-out.
- g. Remove the piston retaining pin (15) and push the floating piston (17) out the open end of the piston rod (12) and remove O-ring (16).
- h. Remove the remaining compression spring (18) and slide the damper piston (14) off the piston rod (12). Remove O-rings (13) from the damper piston (14).
- i. Remove remaining barrel end (19) and piston scraper (22) from the piston rod (12). Remove O-rings (20 and 21) from the barrel end (19).

NOSE GEAR SHIMMY DAMPER CLEANING, REPLACEMENT PARTS AND REPAIRS

CLEANING

Clean all parts with cleaning solvent (15, Consumable Materials Chart, Section 2). Rinse and dry thoroughly after cleaning.

CAUTION

For replacement, use O-rings approved for use with mineral base hydraulic fluid.

Lubricate all internal parts with hydraulic fluid (13, Consumable Materials Chart, Section 2) prior to assembly.

REPLACEMENT PARTS

FIGURE 5-13

- a. Inspect all parts and assemblies for damage or excessive wear. The following conditions are cause for rejection:
 - Wear which is greater than the allowable wear tolerances. Refer to Chart 5-5.
 - Damage which cannot be corrected or repaired.
 - Parts that are cracked, chipped or broken.
 - Parts that have corrosion or other defects that cannot be repaired.

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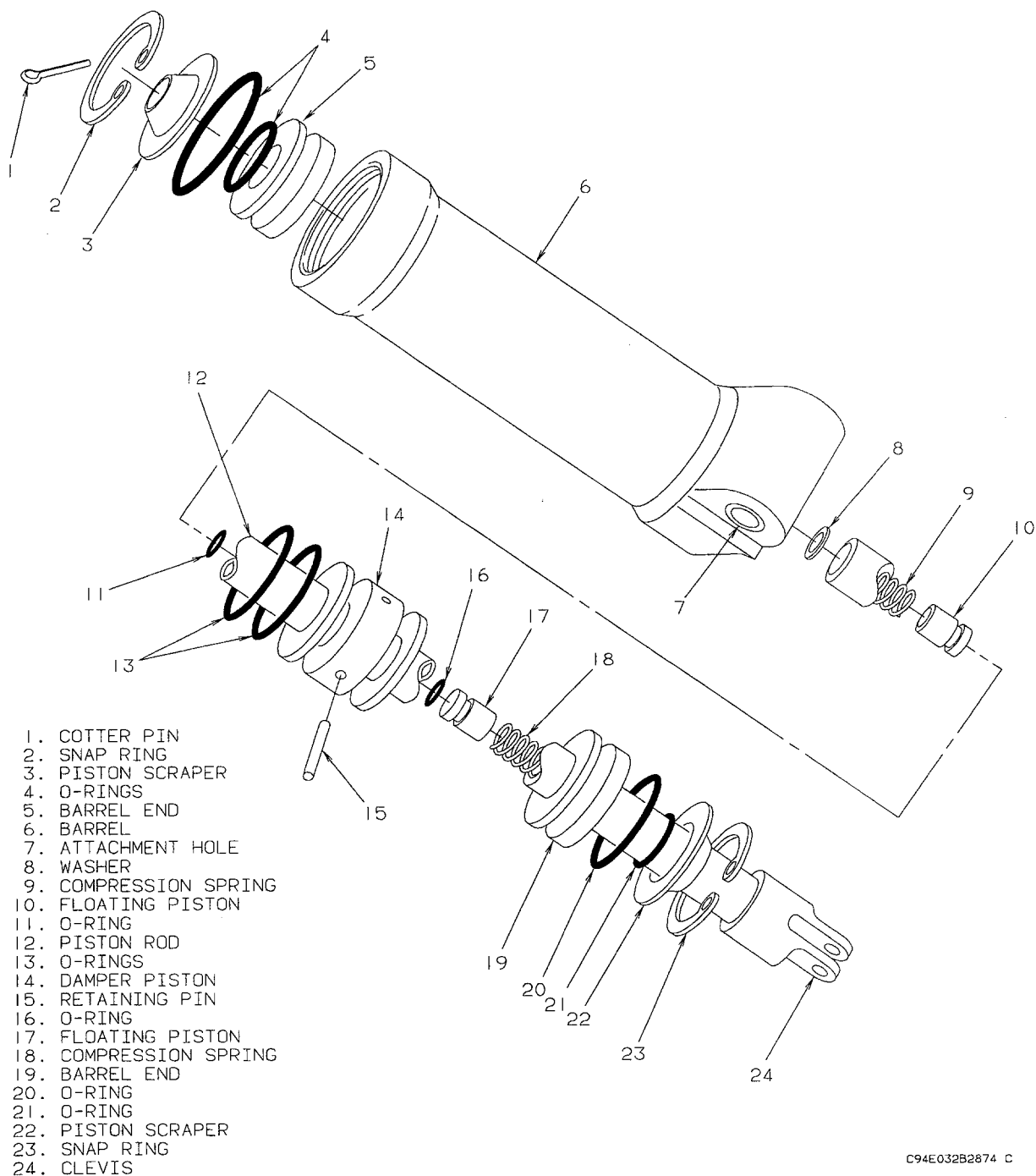
BEECH BARON 55 AND 58 SHOP MANUAL

b. Replace the following parts when nose gear shimmy damper is overhauled:

- Cotter Pin (1)
- Retaining Pin (15)
- O-Rings (4, 11, 13, 16, 20, 21)
- Safety Wire
- Snap Ring (2)
- Springs (9, 18)
- Piston Scrapers (3, 22)
- Washer (8)

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Shimmy Damper
Figure 5-13

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REPAIRS

- a. Visually inspect casting for cracks and pitting; and finished surfaces for scoring, pitting, nicks, cracks, distortion and wear. Refer to Chart 5-5 for tolerances to aid in determining the extent of wear. Replace all defective and excessively worn parts.
- b. All parts or assemblies may be repaired if any of the following problems exist:
 - Slight scoring of shafts may be corrected by lapping carefully with a flat oil stone.

NOTE

Do not exceed 10% of the component material thickness when removing nicks, burrs and scratches.

- Smooth minor nicks, burrs, and scratches.
- Those parts that are scratched or have worn plating may be stripped and replated with the same type of plating as that removed or be replaced with new parts.
- Minor thread damage, chase to clean or smooth.

NOTE

Corrosion damage requires inspection to determine the depth of penetration and the cross-sectional area change. The damaged area must be thoroughly cleaned and the corrosion must be removed. The deterioration caused by corrosion or removal of corrosion must not reduce the material thickness of any component by more than 10%. Refer to Chart 5-5 for NOSE GEAR SHIMMY DAMPER WEAR TOLERANCES AND INSPECTION PROCEDURES on components. For additional information contact the Technical Support Department of Raytheon Aircraft Company, P.O. Box 85, Wichita, KS 67201.

- Remove corrosion if applicable, and apply corrosion prevention materials as necessary per MIL-C-5541 or cadmium plate per Fed QQ-P-416, Type II.
- Bushings that check within allowable wear tolerances may be reused.
- When evidence of damage exists to steel parts, magnetic particle inspect per MIL-STD-1949.

NOTE

Do not remove paint or primer from the area to be fluorescent or dye penetrant inspected per MIL-STD-6866. If the finish absorbs the penetrant so that bleed out prevents satisfactory inspection or if a new finish has not cured for at least 30 days, contact the Technical Support Department of Raytheon Aircraft Company, P.O. Box 85, Wichita, KS 67201.

- When evidence of damage exists to metal parts other than steel, fluorescent penetrant inspect per MIL-STD-6866, Type I.
- Replace damaged or unserviceable parts with new or serviceable parts.

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NOSE GEAR SHIMMY DAMPER ASSEMBLY

FIGURE 5-13

- a. Replace the O-rings (20 and 21) on the barrel end (19). Slide the piston scraper (22) and barrel end onto piston rod (12).
- b. Replace the O-ring (16) on the floating piston (17) and insert the compression spring (18) and the floating piston into the piston rod (12). With a long 6-32 screw or threaded rod, engage the floating piston (17) by pulling it toward the clevis (24) so that the retaining pin (15) can be inserted. Install the damper piston (14) on the piston rod (12) and insert the retaining pin (15). Replace the O-rings (13) on the damper piston (14).
- c. Insert the piston rod (12) and components into the barrel (6) and place the snap ring (23) into position.
- d. Place the barrel (6) in a vise with the open end up and fill the barrel (6) and piston rod (12) with hydraulic fluid (13, Consumable Materials Chart, Section 2). Work the piston rod (12) up and down until bubbles stop appearing in the fluid, then refill the barrel (6) and the piston rod (12). To eliminate the possibility of an air pocket under the barrel end (5), ensure that the barrel (6) is completely full of hydraulic fluid. Any excess fluid will be forced into the piston rod (12) as the barrel end (5) is inserted.
- e. Replace the O-rings (4) on the barrel end (5). Insert the barrel end (5) and piston scraper (3) into the barrel (6) and secure with snap ring (2).
- f. Fill the piston rod (12) with hydraulic fluid (13, Consumable Materials Chart, Section 2). Engage the floating piston (17) with a 6-32 long screw and pull towards the clevis (24). At the same time, insert and push the floating piston (10) down into the piston rod (12). This will cause hydraulic fluid to be sucked into the piston rod (12) and preventing the entry of air.
- g. Install compression spring (9), washer (8) and secure with cotter pin (1). Release the 6-32 rod from the piston (17) and remove from the assembly.
- h. Check the fluid level in the shimmy damper by spreading the cotter pin (1) and inserting a 1/16 inch diameter wire into the piston rod (12). Measure the distance to the top of the floating piston (10). If the distance to the piston rod (10) exceeds 2-3/16 inches, remove the floating piston (10) and add more fluid to the piston rod (12).
- i. Install shimmy damper on nose gear of the airplane, refer to NOSE GEAR SHIMMY DAMPER INSTALLATION in this Section.
- j. Service the shimmy damper as described under the heading SHIMMY DAMPER in Section 2.

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CHART 5-5 NOSE GEAR SHIMMY DAMPER WEAR TOLERANCES AND INSPECTION PROCEDURES

ITEM	I.D.	O.D.	WEAR TOLERANCES AND INSPECTION PROCEDURES
NOTE			
Listed below are the tolerances used to determine the extent of wear in the nose gear shimmy damper components. Where pertinent, the permissible wear limits are given for those components. All inside-diameter (I.D.) and outside-diameter (O.D.) dimensions are given in inches. Refer to Figure 5-13.			
Barrel (6)	0.865 0.860	---	Visually inspect for wear, damage and corrosion. Any sign of scratches or worn areas which can not be repaired is cause for rejection. If localized damage exists, conduct a fluorescent or dye penetrant inspection per MIL-STD-6866. Any sign of cracking is cause for rejection. Replace if wear tolerances are exceeded.
Attachment Hole (7)	0.3765 0.3745	---	Visually inspect for wear, damage and corrosion. Replace if wear tolerances are exceeded.
Damper Piston (14)	---	0.857 0.850	Visually inspect for wear, damage and corrosion. Replace if there is any noticeable ridges or grooves at O-ring seats. Replace if wear tolerances are exceeded.
Floating Pistons (10 and 17)	---	0.240 0.232	Visually inspect for wear, damage and corrosion. Replace if there is any noticeable ridges or grooves at O-ring seat. Replace if wear tolerances are exceeded.
Piston Rod (12)	0.253 0.246	0.3745 0.3725	Visually inspect for straightness, cracks, scratches, corrosion or worn areas. Any signs of wear which can not be repaired is cause for rejection. Replace if wear tolerances are exceeded.
Clevis (24)			Visually inspect for wear, damage and corrosion. cadmium plate as necessary per Fed QQ-P-416, Type II, Class 2.
- Bore	0.196 0.190	---	Visually inspect for any sign of wear. Replace if wear tolerances are exceeded.
- Slot	0.198 0.193	---	Visually inspect for any sign of wear. Replace if wear tolerances are exceeded.
Barrel Ends (5 and 19)			Visually inspect for wear, damage and corrosion. Corrosion proof with Alodine (54, Consumable Materials Chart, Section 2) as required.
Hole Diameter	0.379 0.376	---	Visually inspect for wear or damage. Replace if wear tolerances are exceeded.

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NOSE GEAR RETRACT MECHANISM SERVICING

NOSE GEAR RETRACT BRACE ASSEMBLY CHECK

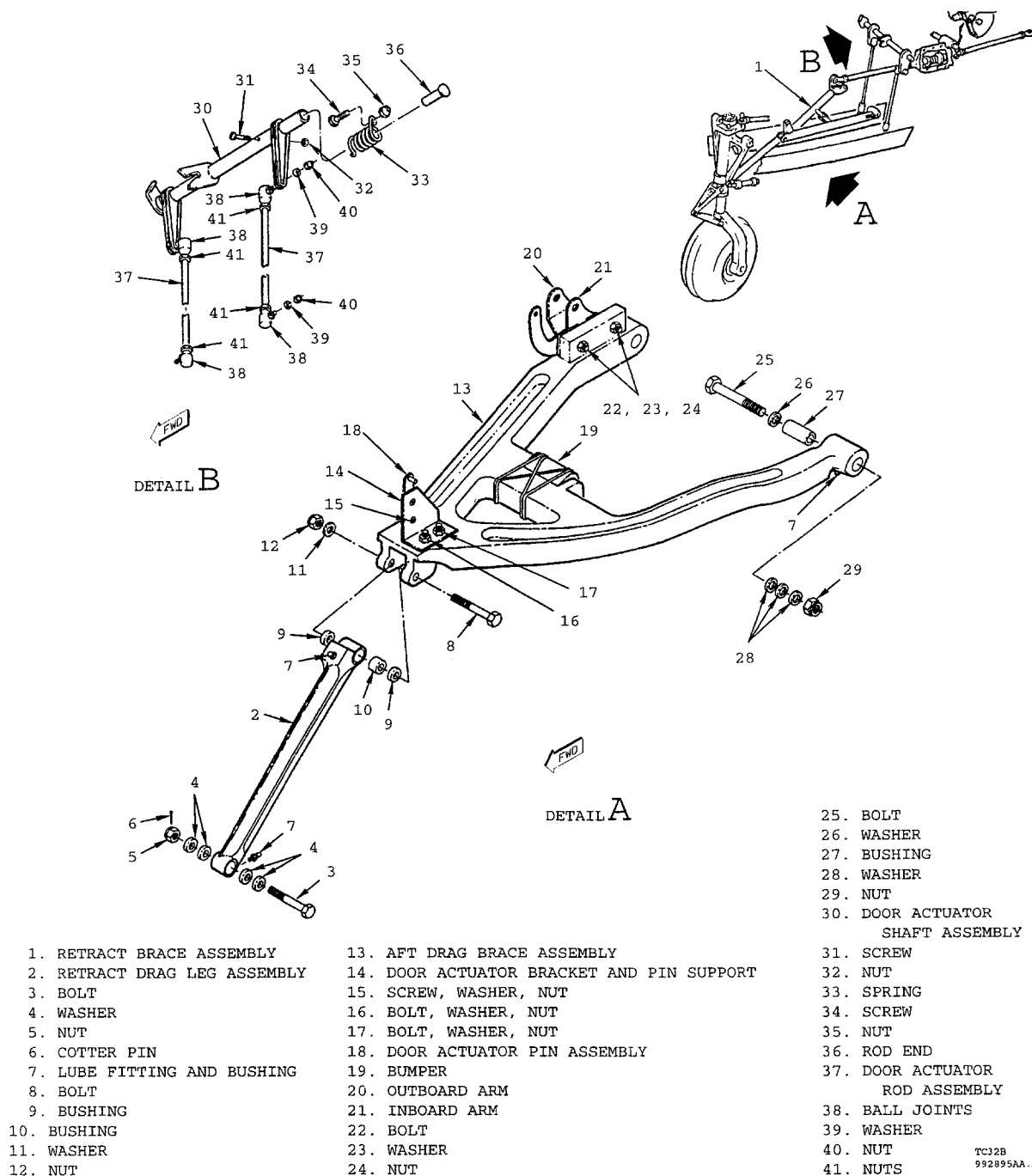
**(TC-1608 THRU TC-2091, TE-938, AND TH-1 THRU TH-871 WITH BEECH KIT NO. 35-4012-1 INSTALLED;
TC-2092 AND AFTER; TE-1114 AND AFTER; AND TH-872 AND AFTER)**

FIGURE 5-14

- a. Check outboard arm (20), inboard arm (21), attachment bolts (22), washers (23) and nuts (24) for security. Check retract rod rod-ends (59) and (90) for indications of cracking and the mechanism assembly for shear stress, wear and/or corrosion. Refer to Section 16 for scheduled service and maintenance checks.
- b. Tighten any loose hardware and replace all hardware that show signs of shear stress, wear, corrosion and/ or cracking. Clean area of any corrosion before installing hardware.

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BEECH BARON 55 AND 58 SHOP MANUAL



Nose Gear Retract Mechanism

(TC-2092 and After; TE-1114 and After; TH-872 and After; and TC-1608 thru TC-2091, TE-938, and TH-1 thru TH-871 with Beech Kit No. 35-4012-1 Installed)

Figure 5-14. (Sheet 1 of 3)

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43. RETRACT ROD BOOT ASSEMBLY

44. BOOT RETAINING RING

45. STUD

46. CABLE TIE

47. RETRACT ROD BOOT

48. STRIP

49. STUD

50. CABLE TIE

51. COVER

52. SCREW AND WASHER

53. RETRACT AFT ROD ASSEMBLY

54. BOLT

55. WASHER

56. NUT

57. COTTER PIN

58. TUBE

59. ROD END

60. NUT

61. WASHER

62. NUT

63. RETRACT IDLER ARM ASSEMBLY

64. BOLT

65. WASHER

66. NUT

67. COTTER PIN

68. BRACKET

69. COLLAR

70. WASHER

71. FLATHEAD PIN

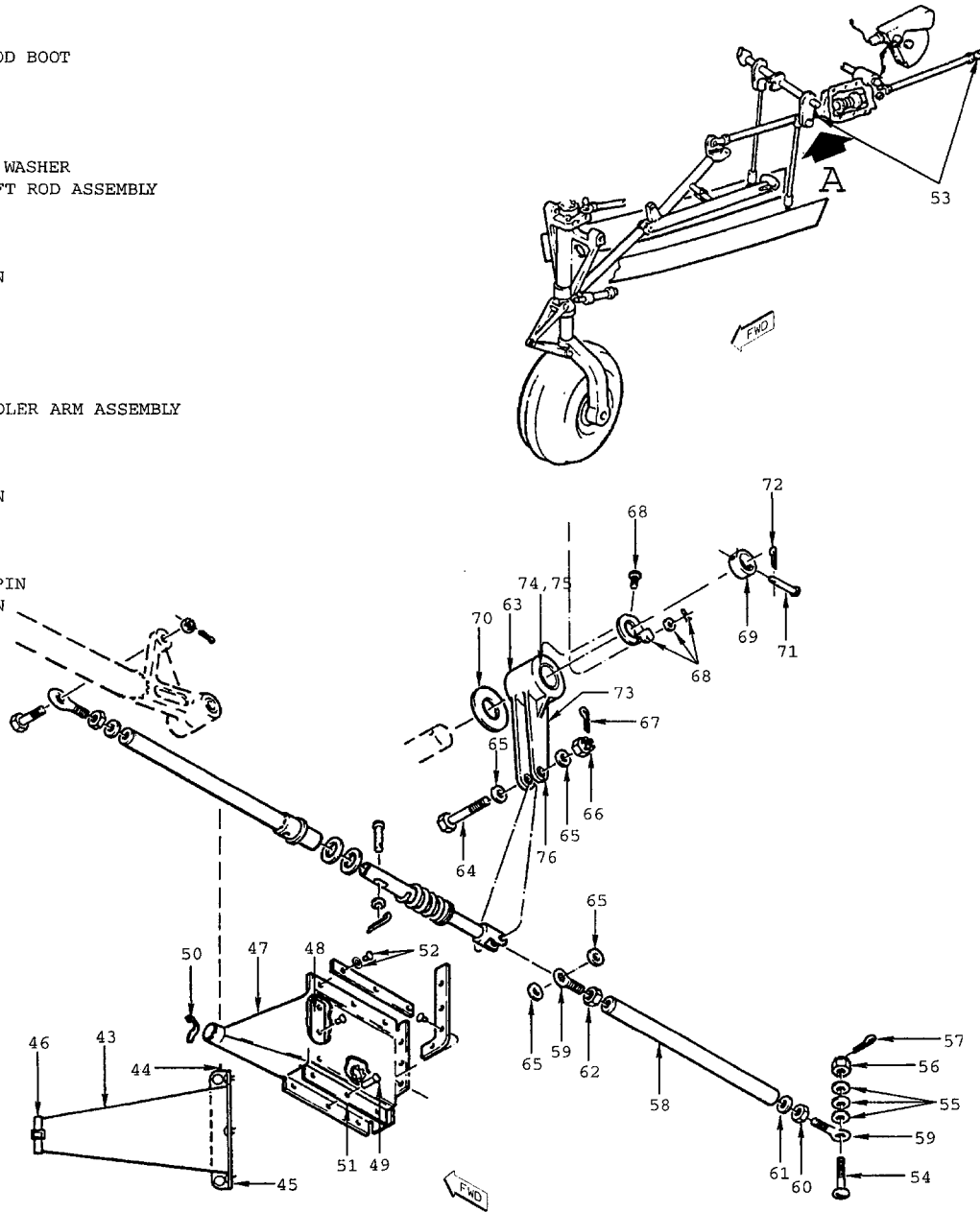
72. COTTER PIN

73. IDLER ARM

74. BUSHING

75. BEARING

76. BUSHING



DETAIL A

TC32B
992896AA AI

Nose Gear Retract Mechanism

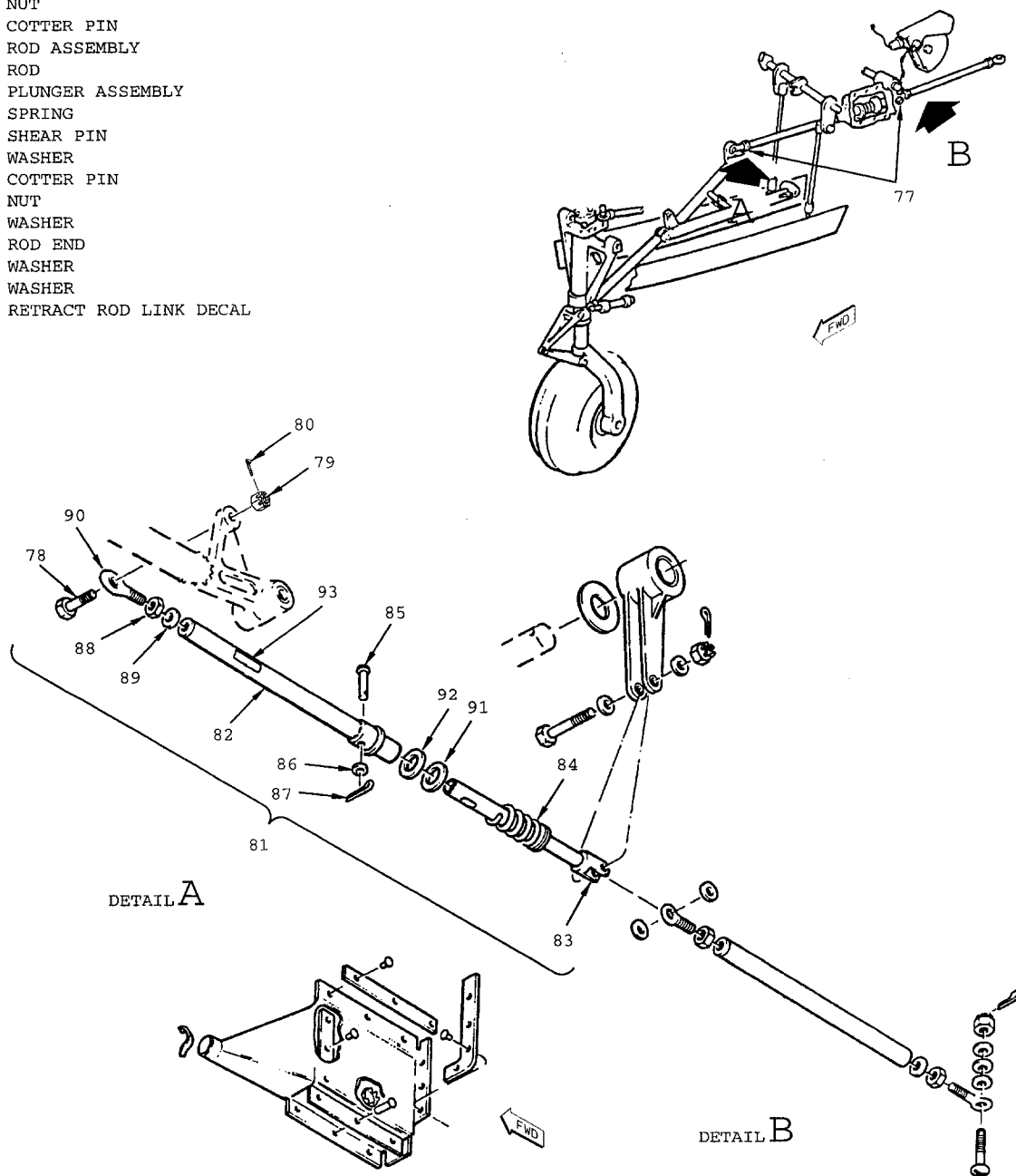
(TC-2092 and After; TE-1114 and After; TH-872 and After; and TC-1608 thru TC-2091, TE-938, and TH-1 thru TH-871 with Beech Kit No. 35-4012-1 Installed)

Figure 5-14. (Sheet 2 of 3)

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- 77. RETRACT FORWARD LINK ROD ASSEMBLY
- 78. BOLT
- 79. NUT
- 80. COTTER PIN
- 81. ROD ASSEMBLY
- 82. ROD
- 83. PLUNGER ASSEMBLY
- 84. SPRING
- 85. SHEAR PIN
- 86. WASHER
- 87. COTTER PIN
- 88. NUT
- 89. WASHER
- 90. ROD END
- 91. WASHER
- 92. WASHER
- 93. RETRACT ROD LINK DECAL



TC32B
992897AA..AI

Nose Gear Retract Mechanism
(TC-2092 and After; TE-1114 and After; TH-872 and After; and TC-1608 thru TC2091,
TE-938, and TH-1 thru TH-871 with Beech Kit No. 35-4012-1 Installed)
Figure 5-14. (Sheet 3 of 3)

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REMOVING AND INSTALLING THE LANDING GEAR ACTUATOR ASSEMBLY

- a. Remove the cabin front seats.
- b. Remove the access covers on top and directly behind the front carry through structure.
- c. Disconnect the main landing gear retract rods at the actuator.
- d. Remove the flap motor attaching bolts and disconnect the landing gear door actuating rods at the actuator.
- e. Remove the four screws securing the landing gear limit switch assembly on the left hand side of the actuator and move the switch assembly aside to permit removal of the actuator.
- f. Disconnect the landing gear motor electrical wiring.
- g. Remove the landing gear actuator access door on the bottom of the fuselage, and remove the nose gear actuator retract arm and linkage from the actuator.
- h. Remove the four actuator attaching nuts and remove the actuator.
- i. Installation is a reverse of removal. When installing the nose gear actuator retract arm on the actuator, make certain that the index mark on the arm coincides with the index mark on the actuator shaft.
- j. Make certain that the landing gear limit switch actuators are installed when the retract rods are connected to the actuator.
- k. Install cotter pins and safety wire.
- l. After completing the landing gear actuator installation, check the landing gear for proper rigging.

LANDING GEAR ACTUATOR OVERHAUL

FIGURE 5-15

- a. Remove the motor (1) from the actuator and remove the gear (2) from the face of the motor.
- b. Remove the snap ring (3) from the end of the shaft (19) and remove the gear (4) from the shaft.
- c. Remove the snap ring (5) from the end of the actuator drive shaft (7) and remove the actuator retract arm (6) from the shaft. On all aircraft except as noted below, push the shaft out of the assembly in the direction of the arrow.

NOTE

On aircraft serials TC-538 thru TC-541, TC-585, TC-589, TC-590 thru TC-595 and TC-612 the actuator drive shaft (7) and the actuator worm sector (10) are a one-piece unit and may be removed by separating the actuator housing. With this exception, all maintenance procedures are the same.

- d. Remove the screws (8) from around the housing, also the bolt (9). Separate the housing and remove the sector gear (10).
- e. Remove the screw (11) from the actuator hand crank (12) and remove the spacer (13) and O-ring (14) from the shaft.
- f. Remove the screws (15) from the hand crank housing (16) and remove the hand crank housing from the actuator housing.

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- g. With a lug spanner wrench, remove the retainer nut (17) from the actuator housing. Tap out the shaft (19) in the direction of the arrow. Remove the cotter pin and back off the lock nut (21). Slide the bearing (20) down the shaft until the two sections of the half ring (18) may be removed. The bearing can now be removed from the shaft. Drive the seal (22) out of the actuator housing.
- h. Remove the bearings (23 and 24) from the actuator housing.
- i. Remove the seal (25) and the bearing (26) from the top and bottom housing halves.
- j. Remove the snap ring (27) from the shaft (7) and slide the nose gear actuator retract arm (28) off the shaft.
- k. Remove the bearing (29) from the housing.

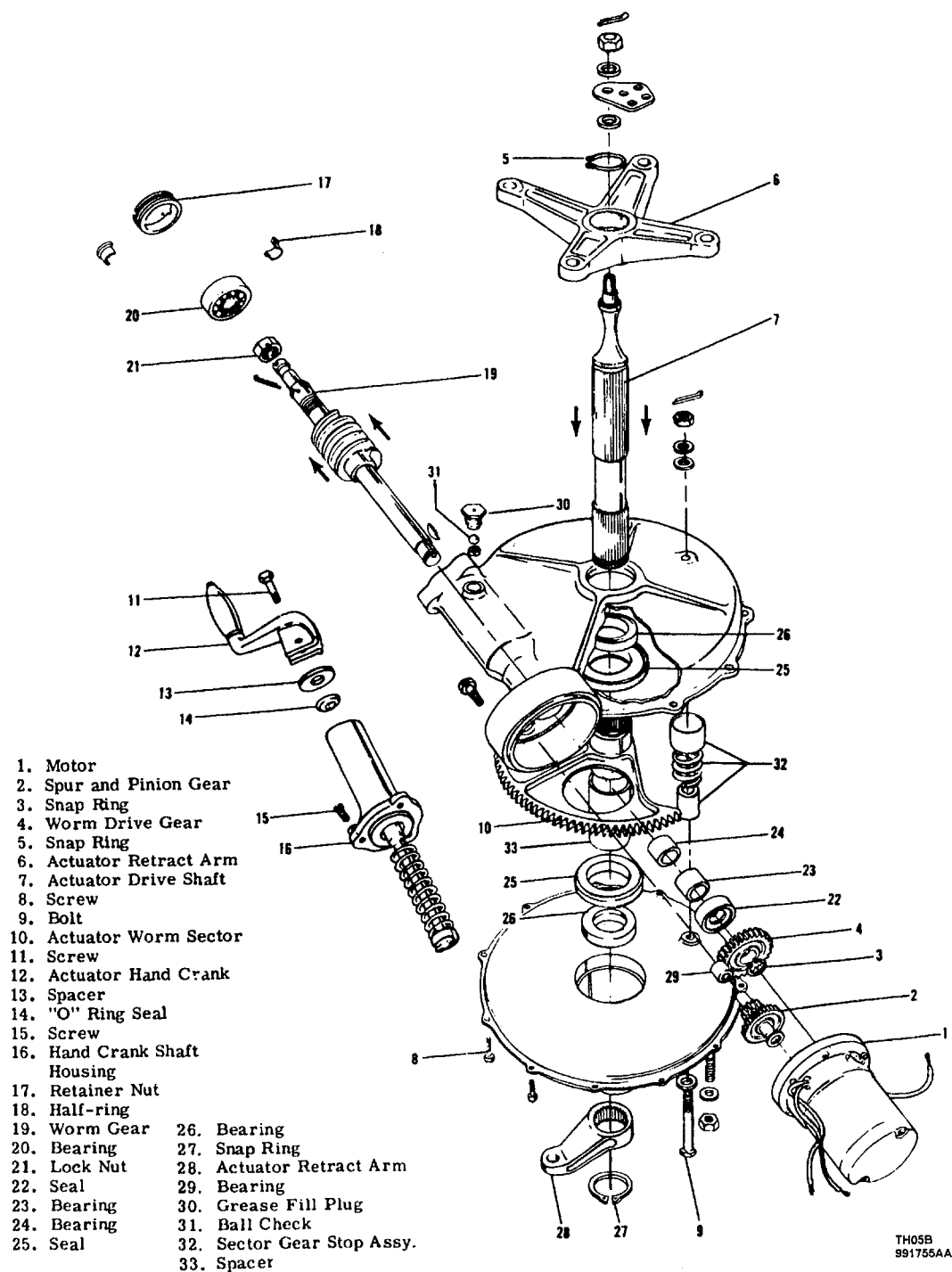
Clean all parts in solvent removing the grease and oil. Check all bearings for cracks and wear. Check the teeth of the sector gear for cracks and wear. Replace parts as necessary. Replace all seals at reassembly. Seal the upper and lower housing joints using silastic sealer (5, Sealing Chart, Section 2). Reassemble the actuator in the reverse of the above procedure. Remove the filler plug (30) from the actuator housing and fill the housing with 1/2 pint of gear grease (10, Consumable Materials Chart, Section 2). Before attaching the motor, pack the motor gear housing with approximately one ounce of grease (8, Consumable Materials Chart, Section 2). (Fill within +0.00 -0.10 in. of the housing center line.)

NOTE

At assembly when installing the actuator drive shaft through the sector gear make sure the scribe marks on each piece match. The same applies when installing the nose gear actuator retract arm and the main actuator retract arm on each end of the actuator drive shaft.

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Landing Gear Actuator Assembly
 Figure 5-15

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REMOVING AND INSTALLING THE LANDING GEAR MOTOR

- a. Remove the right front seat.
- b. Remove the access plate over the motor.
- c. Disconnect the electrical wiring at the landing gear dynamic brake relay.
- d. Remove the three landing gear motor attaching bolts and remove the landing gear motor.
- e. Install the landing gear motor by reversing the above removal procedure and safety the three attaching bolts.

REMOVING AND INSTALLING THE LANDING GEAR DYNAMIC BRAKE RELAY

- a. Remove the right front seat.
- b. Remove the access covers on top and directly behind the front carry through structure.
- c. Disconnect the electrical wiring at the dynamic brake relay.
- d. Remove the two dynamic brake relay attaching screws and remove the dynamic brake relay.
- e. Reinstall the dynamic brake relay by reversing the above removal procedure and check rigging.

NOSE WHEEL STEERING MECHANISM

The nose wheel should be parallel to the fore and the aft center line of the airplane with the rudder pedals in the neutral position. Take the nose gear steering actuator arm loose at the back end and screw the end fitting either in or out to make the adjustment.

NOSE WHEEL TRAVEL STOP ADJUSTMENT

The travel stop must be adjusted so the nose wheel travel is stopped when the shimmy damper is 1/32 inch from its maximum travel. If adjustment is required the following procedure is recommended:

- a. Loosen the lock nuts on the adjustment bolts until they clear the stops on the nose wheel straightener.
- b. Turn the nose wheel to the extreme left turn position. The adjustment bolts must clear the stops with the nose wheel in this position.
- c. Place tape around the aft end of the shimmy damper piston rod 1/32 inch from the scraper ring.
- d. Turn the lock nuts on the adjustment bolts so the nose wheel is turned and the tape on the piston rod just contacts the scraper ring. Tighten the lock nuts securely.
- e. Turn the nose wheel to the extreme right, place the tape on the forward end of the piston rod and repeat step d.

LANDING GEAR POSITION LIGHT ADJUSTMENT (TC-1608 AND AFTER; TE-938, TE-943 AND AFTER; TH-385 AND AFTER)

The landing gear position lights on the instrument panel are controlled by the UP indicator switches and DOWN indicator switches on each gear. With the airplane on jacks, adjustment of these switches may be made as follows:

MAIN GEAR

- a. With the gear down and locked, adjust the DOWN switch (located on the forward side of the main gear V brace) so that the overtravel of the switch plunger is 0.050 inch after the switch is actuated to the ON position. With the

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gear in the full up position, adjust the UP switch (located inboard of the forward side of the main gear V brace) so that the overtravel of the switch plunger is 0.050 inch after the switch is actuated to the ON position.

NOSE GEAR

a. With the gear down and locked, adjust the DOWN switch (located on the right side of the wheel well) so that the overtravel of the switch plunger is 0.050 inch after the switch is actuated to the ON position. With the gear in full up position, adjust the UP switch (located on the right side of the wheel well) so that the overtravel of the plunger is 0.050 inch after the switch is actuated to the ON position. Check the instrument panel to be sure the indicator lights correspond to the gear position.

b. Recheck the switch adjustment, then remove the airplane from the jacks.

THROTTLE WARNING HORN SWITCH ADJUSTMENT (TC-1 AND AFTER)

Adjustment of the throttle warning horn may be accomplished as follows:

a. With the airplane in flight, place the propeller controls in the low pitch position and slowly retard the throttle controls until 12 to 14 inches of manifold pressure is indicated.

b. Mark the position of the throttle controls.

c. After the airplane has landed and with the engines shut off, position the throttle controls at the mark made in step b.

d. Adjust the phenolic blocks on the threaded linkage behind the instrument panel until the switches actuate closed as indicated by an audible click.

e. Secure the blocks in this position.

THROTTLE WARNING HORN SWITCH ADJUSTMENT (TE-1 AND AFTER; TH-1 THRU TH-1542 AND TH-1544)

Adjustment of the throttle warning horn may be accomplished as follows:

a. With the airplane in flight, place the propeller controls in the low pitch position and slowly retard the throttle controls until 12 to 14 inches of manifold pressure is indicated.

b. Mark the position of the throttle controls.

c. After the airplane has landed and with the engines shut off, position the throttle controls at the mark made in step b.

d. Adjust the microswitch in each engine compartment until the switch is actuated closed as indicated by an audible click.

e. Secure the switch in this position.

THROTTLE WARNING HORN AND LIGHT SYSTEM ADJUSTMENT (TH-1543, TH-1545 AND AFTER)

The system is designed for the landing gear warning horn to sound intermittently and for the red gear-up annunciator light to flash with the landing gear retracted and either or both throttles retarded to obtain approximately 13 ± 1 inches of Hg in manifold pressure. The warning horn and light are also actuated when the flaps are fully down and the landing gear is retracted. System adjustment is as follows:

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- a. With the airplane in flight and the landing gear retracted, retard the throttles to obtain 13 ± 1 inches of Hg in manifold pressure.

NOTE

Make all subsequent checks at the same altitude and airspeed.

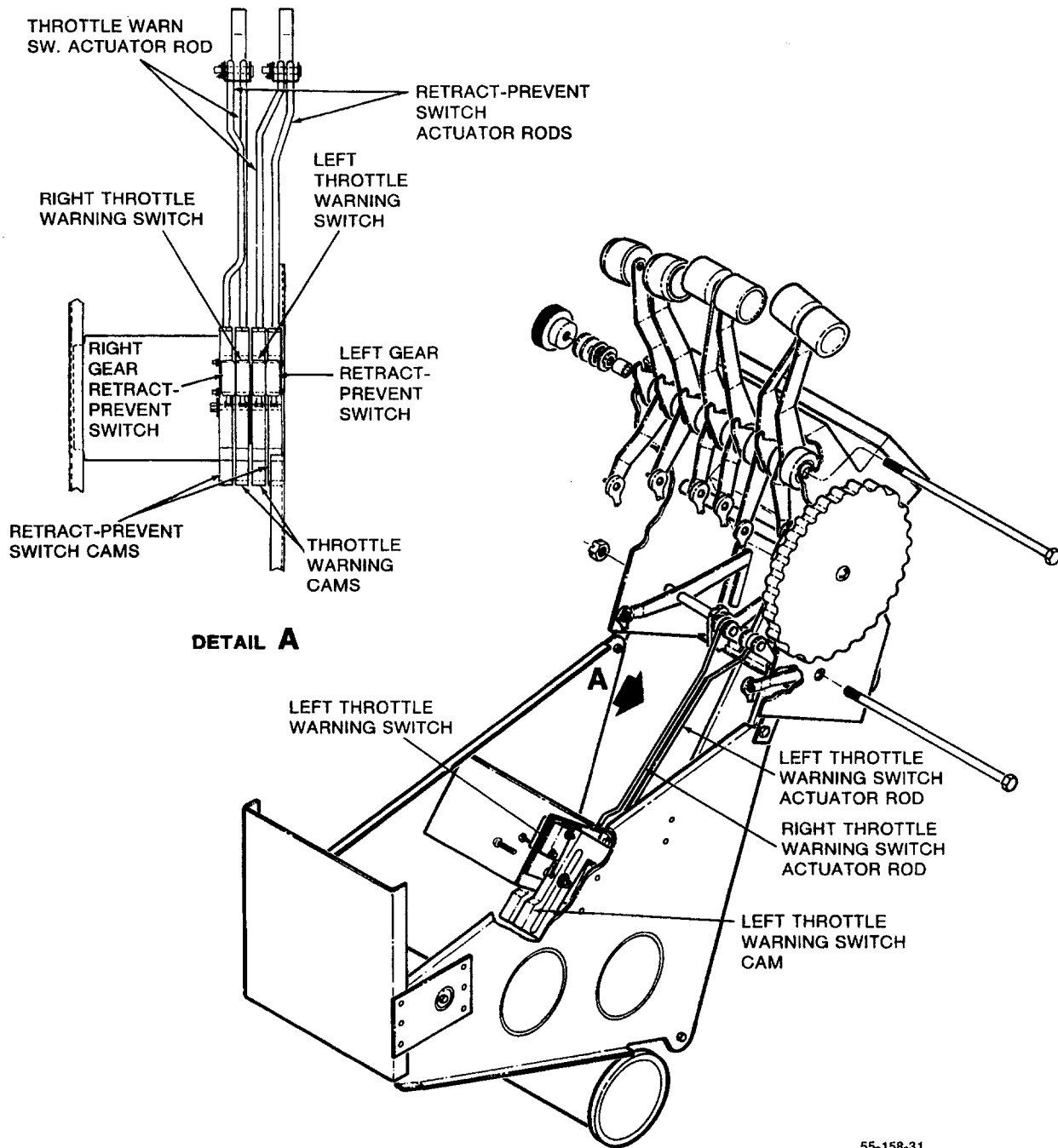
- b. Mark the position of the throttle controls on the pedestal.
- c. After the airplane has landed and the engines have been shut down, match the position of each throttle control to the marks made on the pedestal.
- d. Loosen the retaining nuts and adjust each cam on the end of its respective actuator rod for the throttle warning switch just forward of the pedestal so that the switch closes (indicated by a click) at the point where the throttle control position matches the marks made in step b (see Figure 5-16 for switch identification). Tighten the retaining nuts securing the cam in this position.
- e. Check the switches for proper operation in flight as described at the beginning of this section.

LANDING GEAR-UP INTERRUPT CIRCUIT (TH-1543, TH-1545 AND AFTER)

These airplanes are equipped with switches actuated by throttle position to interrupt the landing gear-up circuit to prevent the landing gear from retracting when the throttles are retarded below $15 +2 -1$ inches of Hg in manifold pressure.

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Throttle Warning Horn (and Light) and Gear Retract Prevent Switches
Figure 5-16

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GEAR-UP INTERRUPT CIRCUIT ADJUSTMENT (TH-1543, TH-1545 AND AFTER)

- a. With the airplane in flight at a speed between 100 to 110 knots, place the propeller controls fully forward to high rpm, then slowly retard the throttle controls to obtain 15 +2 -1 inches of Hg in manifold pressure.
- b. Mark the position of the throttle controls on the pedestal.
- c. After the airplane has landed and the engines have been shut down, position the throttle controls to match the marks made on the pedestal in the preceding step.
- d. Loosen the retaining nuts and adjust each cam on the end of the actuator rod for each retract-prevent switch just forward of the pedestal so that the switch closes (indicated by a click) at the point where the throttle control position matches the marks made on the pedestal (see Figure 5-16 for switch identification). Tighten the nuts securing the cam in this position.
- e. Check the switches for proper operation in flight as follows:
 1. With the landing gear down, retard both throttle controls to a position below the switch setting.
 2. Place the landing gear in the UP position; the landing gear should not retract.
 3. Advance either throttle control slowly and note the manifold pressure at which the landing gear retracts. The landing gear should retract with only one throttle control advanced if the system is functioning properly.

NOTE

The system circuit includes a latching relay that enables the landing gear to fully retract once retraction is initiated. Retarding the throttle control should not stop the gear in mid-travel.

TROUBLESHOOTING BRAKE SYSTEM

INDICATION	PROBABLE CAUSE	REMARKS
1. Solid pedal and no brakes.	a. Brake lining worn beyond allowable limit.	a. Replace lining.
2. Spongy brake.	a. Air in system.	a. Bleed brake system.
3. Unable to hold pressure.	a. Leak in brake system.	a. Visually check entire system for evidence of leaks. b. Check master cylinder seals, replace if scored.
4. Parking brake will not hold.	a. Air in system. b. Faulty parking brake valve.	a. Bleed brake system. b. Replace the valve.
5. Brakes grab.	a. Stones or foreign matter locking brake disc. b. Warped or bent disc.	a. Clean brake disc and lining. b. Replace disc.

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TROUBLESHOOTING LANDING GEAR ELECTRICAL SYSTEM

INDICATION	PROBABLE CAUSE	REMARKS
1. Landing gear motor fails to shut off when gear is retracted.	a. Up-limit switch out of adjustment.	a. Adjust switch.
	b. Faulty switch.	b. Replace switch.
2. Landing gear fails to retract.	a. Safety switches not closing.	a. Adjust switches.
	b. Up-limit switch remaining open.	b. Replace limit switch.
3. Landing gear motor fails to shut off when gear is extended.	a. Down-limit switch does not open.	a. Adjust limit switch.
	b. Faulty down-limit switch.	b. Replace limit switch.
4. Landing gear actuator is hitting internal stops.	a. Limit switch out of adjustment.	a. Adjust limit switch.
	b. Limit switch is inoperative.	b. Replace switch.
5. Warning horn or GR UP annunciator light (on airplane serials TH-1543, TH-1545 and after) inoperative or malfunctioning.	a. Open or grounded circuit.	a. Check continuity.
	b. Throttle switches inoperative.	b. Check and adjust as necessary.
	c. Flap switch inoperative.	c. Check and adjust as necessary.
6. Landing gear fails to extend.	a. Tripped circuit breaker.	a. Reset circuit breaker.
	b. Down-limit switches open.	b. Check down-limit switches, with the gear retracted the down-limit switches should be closed.
	c. Open circuit.	c. Run a continuity check on the down-limit switch.
	d. Landing gear motor inoperative.	d. Check brushes, overhaul or replace motor.
7. Landing gear will not retract or extend.	a. Faulty electrical connections.	a. Run a continuity check between system components.
	b. Landing gear motor not grounded.	b. Check motor ground.
	c. Faulty control circuit.	c. Check items 1 through 3.
	d. Landing gear motor inoperative.	d. Check brushes, overhaul or replace motor.

SECTION

6

POWERPLANT

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POWER PLANT

ENGINE REMOVAL

CAUTION

The engine air for the Baron TE series is supplied through an overhead induction air scoop on the engine cowling. Care should be taken when removing or installing the engine that no foreign objects, dirt, etc., be allowed to enter the air valve.

- a. Remove the upper and lower cowl, cowl flap actuator and fillets.

CAUTION

To be safe, treat all magnetos as hot whenever the ground lead is disconnected. To ground the magneto, connect a wire to the switch lead at the filter capacitor and ground the wire to the engine case. If grounding is impractical, remove the cable outlet plate on the rear of the magneto or disconnect all the spark plug leads.

- b. Remove the propeller. (See Section 7.)
- c. Disconnect all plumbing at the firewall. Note the position of all plumbing and tag each line for ease of reinstallation.
- d. Disconnect the engine controls. Note the position of the controls and tag them for ease of reinstallation.
- e. Disconnect the electrical wiring at the firewall, or at the accessories as necessary. Note the position of all wires and tag them for ease of reinstallation.
- f. Place a wing stand under the opposite wing and a stand under the tail.
- g. Position the engine hoist and attach the hoisting hook to the engine lifting ring. Remove slack from the cable.

NOTE

It is more practical to remove the four bolts from the engine vibration isolator mounts than to remove the bolts from the mount and firewall. If the bolts are to be removed from the vibration isolator mounts, note the position and number of plates and the thickness of the plates on each side of the engine mount. Tag the plates for identification at reinstallation. Refer to Figures 6-1 and 6-2.

- h. Remove the bolts holding the engine mount to the nacelle firewall or remove the bolts holding the engine to the vibration isolators.
- i. Remove the engine.

ENGINE INSTALLATION

NOTE

Prior to installing the engine to the airplane, accomplish an inspection in accordance with Service Instruction No. 0396-241, Rev. 1.

- a. Connect an engine hoist hook to the lifting ring of the engine.
- b. Hoist the engine into position on the airplane.

NOTE

If the engine vibration isolator mounts were removed during removal, check the notes made during removal for the number and location of the plates.

- c. Install the bolts securing the engine to the airplane. (If applicable see Figures 6-1 and 6-2.)

NOTE

When reinstalling the engine mount to the firewall on serials TC-1 thru TC-244, torque the nuts on the engine mount frame bolts between 265 and 290 inch-pounds. On serials TC-245 and after, TE-1 and after, TH-1 and after and those airplanes complying to Service Bulletin, No. 1, Revised June, 1962, torque the nuts on the engine mount frame bolts to 400 $\pm$ 15 inch-pounds.

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To avoid bottoming out of the nut and to assure proper tightening of the nut, a maximum of three AN960-616 washers may be installed for each bolt installation, using one washer under the bolt head and two washers under the nut.

NOTE

If the engine is disconnected at the engine shock mounts (vibration isolators), rather than at the firewall, on reinstallation torque these engine mount bolts to 323 ± 25 inch-pounds on TC-1 and after and torque to 475 ± 25 inch-pounds on TE-1 and after and TH-1 and after. Be careful to align the holes in the rubber mount bushings (plates) with the index pin which protrudes equidistantly on both sides of the steel bushing.

- d. Remove the hoist hook from the engine lifting ring and move the hoist away from the airplane.
- e. Connect the electrical wiring at the firewall or at the accessory as necessary.
- f. Connect the engine controls to the engine.

- g. Connect the plumbing at the firewall.
- h. Install the propeller (see Section 7).

CAUTION

Because the cowling is an integral part of the cooling system, the engine will overheat if operated with the cowling removed for more than a very brief test period.

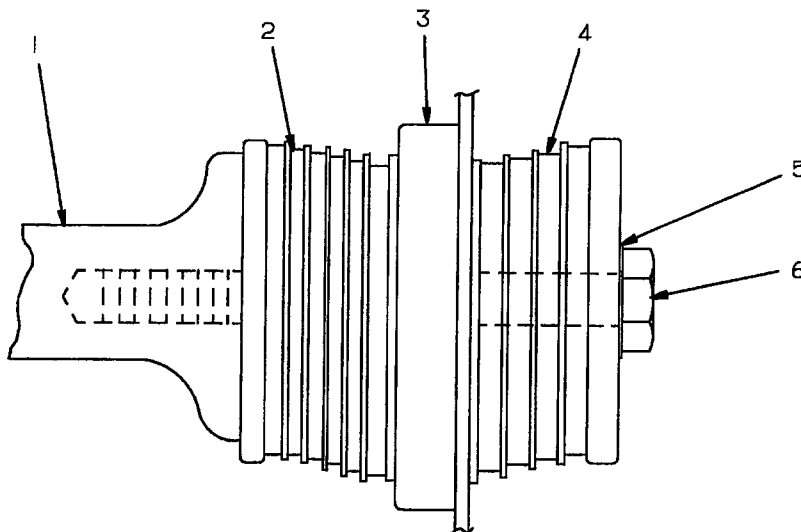
FUEL INJECTOR LINE NUTS

If the fuel injector line nuts at the nozzle are removed from the IO-470 or the IO-520 engine, they should be retorqued to 40 - 45 in. lbs. The injector line nuts at the manifold valve should also be retorqued to 40 - 45 in. lbs.

CYLINDER HEAD TEMPERATURE BULB

The cylinder head temperature bulb may be located in one of two locations, depending on the engine model. On the IO-470-L engines the temperature bulb is

- 1. ENGINE
- 2. PLATES (5 EACH)
- 3. ENGINE MOUNT
- 4. PLATES (3 EACH)
- 5. AN960-716L WASHER
- 6. BOLT



C95TH7180227 C

Figure 6-1. Lower Engine Vibration Isolator Mount

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located in the lower side of the number five cylinder head. On the IO-520 and IO-550 engines the temperature bulb is located in the lower side of the number two cylinder head.

CYLINDER HEAD TEMPERATURE BULB REMOVAL

- a. Remove the appropriate cowl from the engine.
- b. Remove the wire clamp from the engine and wire bundle.
- c. Push the wire cover back to reveal the wire connections.
- d. Remove the nut and bolt securing the wires together.
- e. Push in on the knurled knob and rotating it counterclockwise.
- f. Pull the temperature bulb from the head.

CYLINDER HEAD TEMPERATURE BULB INSTALLATION

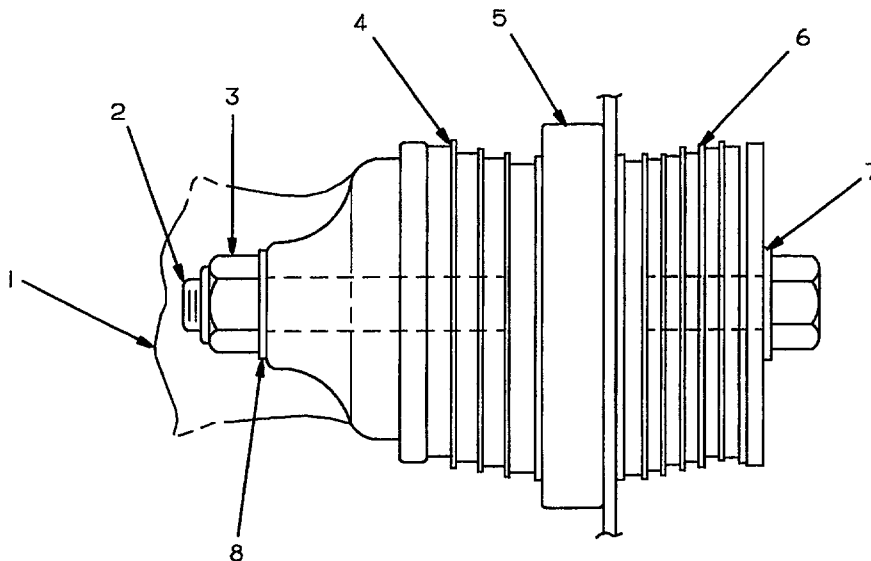
- a. Place the temperature bulb in position in the appropriate head.

- b. Push in on the knurled knob and rotate the knob clockwise.
- c. Connect the appropriate wires and install the bolts and nuts.
- d. Pull the wire cover back over the wire connections.
- e. Install the clamp around the wire bundle and attach it to engine.
- f. Install the cowl on the engine.

THROTTLE WARNING HORN CAM
(Figure 6-4)

The throttle warning horn cam and switch are located on the left side of the engine at the rear of the accessory case on the throttle body. The cam is attached to the butterfly valve shaft and actuates the switch which provides power to the warning horn. The switch should be adjusted to actuate the landing gear warning horn any time the landing gear is in the unlocked position and the throttle is retarded to below 12 to 14 in. Hg. of manifold pressure.

1. ENGINE
2. BOLT
3. NUT
4. PLATES (3 EACH)
5. ENGINE MOUNT
6. PLATES (5 EACH)
7. AN960-716L WASHER
8. AN960-716 WASHER



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Figure 6-2. Upper Engine Vibration Isolator Mount

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THROTTLE WARNING HORN CAM INSTALLATION

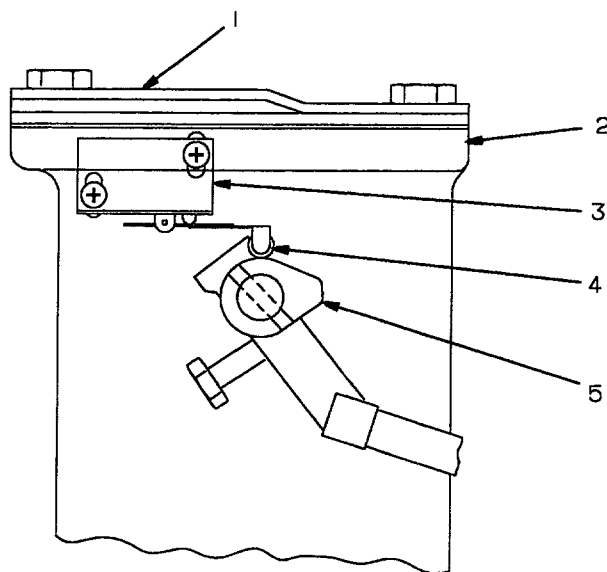
If the cam is new, the roll pin hole (.125- to .129-inch diameter) will need to be drilled all the way through. The throttle butterfly shaft may also need a matching hole drilled for the cam roll pin. If these holes need to be drilled, position the cam and butterfly valve as indicated. Refer to Figure 6-4.

- a. Place the throttle body butterfly valve in the fully closed position. (It is spring-loaded to the open position; consequently, it will have to be held in the fully closed position.)
- b. Place the cam on the left side of the butterfly shaft with the high lobe of the cam pointing up.

NOTE

The predrilled hole on a new cam should be on the aft side of the cam to provide better accessibility for drilling.

- c. Push the cam all the way onto the shaft until it butts against the throttle linkage.



THROTTLE IN FULL THROTTLE POSITION

NOTE

Before the cam and throttle shaft are drilled, the throttle butterfly valve should be fully closed with the high lobe of the cam straight up and lobe centerline aligned with the centerline of the throttle body.

- d. With the throttle still in the closed position, drill the 1/8-inch hole (.125 to .129) in the cam and throttle shaft.

- e. Install the roll pin.

NOTE

Use two wraps of .032-inch safety wire through the roll pin and under the cam to safety wire the roll pin as shown. Refer to Figure 6-4.

- f. Safety wire the roll pin.

- g. Adjust the switch per THROTTLE WARNING HORN ADJUSTMENT in Section 5.

1. MOUNTING BRACKET
2. THROTTLE BODY
3. SWITCH
4. CAM FOLLOWER
5. CAM

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Figure 6-3. Throttle Warning Horn Cam and Throttle Body

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**OIL RADIATOR REMOVAL (Effectivity:
TC-1 and after)**

The oil radiator is located at the right front of each engine. Removal may be accomplished as follows:

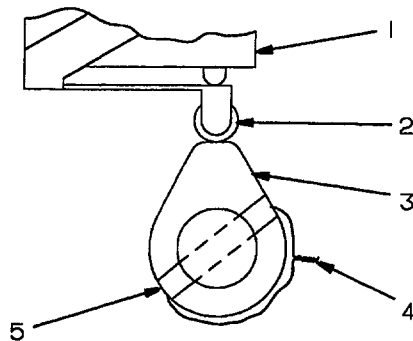
- a. Remove the baffling around the oil radiator.
- b. Remove the 12 mounting bolts at the base of the radiator.
- c. Remove the radiator and gasket.

**OIL RADIATOR INSTALLATION (Effectivity:
TC-1 and after)**

- a. Install a new gasket.
- b. Install the radiator.
- c. Install the 12 mounting bolts at the base of the radiator
- d. Install the baffling around the oil radiator.

**OIL RADIATOR REMOVAL (Effectivity:
TE-1 and after and TH-1 and after)**

The oil radiator is located at the left rear of each engine. Removal may be accomplished as follows:



THROTTLE IN IDLE POSITION

1. SWITCH
2. CAM FOLLOWER
3. CAM
4. SAFETY WIRE
5. ROLL PIN

C95TH2780260 C

Figure 6-4. Throttle Warning Horn Cam

- a. Remove the 12 attaching bolts.
- b. Disconnect the oil temperature bulb.
- c. Disconnect the oil drain line.
- d. Remove the five retaining nuts.
- e. Remove the radiator and gasket.

**OIL RADIATOR INSTALLATION (Effectivity:
TE-1 and after and TH-1 and after)**

- a. Install a new gasket.
- b. Install the radiator.
- c. Install the five retaining nuts.
- d. Connect the oil drain line.
- e. Connect the oil temperature bulb.
- f. Install the 12 attaching bolts.

OIL PRESSURE INDICATOR

The oil pressure indicator was a direct-reading instrument on TH-1 thru TH-1395 except TH-1389. An electric oil pressure indicator was installed on TH-1389 and TH-1396 and after. The oil pressure transmitter is located to the right of the engine centerline and is attached to the aft side of the firewall on both the left and right engines.

**OIL PRESSURE TRANSMITTER
REMOVAL (Effectivity: TH-1389 and
TH-1396 and after)**

- a. Remove the stainless steel heat shield from the bottom of the engine nacelle.

NOTE

Note the position of the electrical wires and label them for reinstallation.

- b. Disconnect the electrical wires from the transmitter.
- c. Disconnect the oil line from the transmitter.
- d. Remove the screw holding the transmitter clamped to the firewall.
- e. Remove the transmitter.

**OIL PRESSURE TRANSMITTER
INSTALLATION (Effectivity: TH-1389 and
TH-1396 and after)**

- a. Place the transmitter in position in the clamp and install the screw in the clamp.

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- b. Connect the oil line to the transmitter.
- c. Connect the electrical wires to the transmitter.
- d. Start the engine in accordance with the applicable Pilot's Operating Handbook and check for oil leaks.
- e. Shut down the engine.
- f. Install the heat shield on the bottom of the engine nacelle.

AIR BOX REMOVAL (Effectivity: TC-1 and after)

- a. Remove the upper engine cowl.
- b. Disconnect the fuel supply line to the fuel manifold valve.
- c. Disconnect the blast tubes to the generator or alternator, fuel metering valve, and the fuel pump at the air box.
- d. Remove the screws securing the air box to the engine baffle and the aft brace to the air box.
- e. Remove the four nuts attaching the air box to the metering valve assembly.
- f. Disconnect the bracket on the forward side of the metering valve assembly and remove angles (two) from mounting bolts.
- g. Remove the air box.

AIR BOX INSTALLATION (Effectivity: TC-1 and after)

- a. Position the air box for installation.
- b. Install the angles (two) on the mounting bolts and connect the brace to the forward side of the metering valve assembly.

NOTE

On serials TC-1714 and after and prior airplanes having complied with Service Instructions No. 0688-258, tighten the four air box nuts only until a positive seal is created between the throttle body and the air box.

- c. Install the four nuts attaching the air box to the air metering valve assembly.
- d. Install the screws securing the air box to the engine baffle and aft air box brace.
- e. Connect the blast tubes to the generator (or alternator), fuel metering valve, and fuel pump at the air box.

- f. Connect the fuel supply line to the fuel manifold valve.
- g. Install the upper engine cowl.

NOTE

Position the fuel line to the fuel manifold valve before connecting the flexible blast duct from the fuel metering valve.

AIR BOX REMOVAL (Effectivity: TE-1 and after and TH-1 and after)

- a. Remove the upper engine cowl.
- b. Remove the flexible duct from the air scoop duct.
- c. Remove the rod end from the flapper valve arm assembly.
- d. Disconnect the brace on the forward side of the metering valve assembly and remove the angles (two) from the mounting bolts.
- e. Loosen the flex duct clamp and remove the air box.

AIR BOX INSTALLATION (Effectivity: TE-1 and after and TH-1 and after)

- a. Install the air box to the flex duct and tighten the clamp.
- b. Install the angles (two) on the mounting bolts and connect the brace on the forward side of the metering valve assembly.
- c. Install the rod end in the flapper valve arm assembly.
- d. Connect the flexible duct to the air scoop duct.
- e. Install the upper engine cowl.

ENGINE CONTROLS ADJUSTMENT

THROTTLE AND MIXTURE (Effectivity: TC-1 thru TC-97)

On airplanes that are equipped with the original controls, the following adjustment may be made to the engine throttle or mixture.

- a. Remove the glare shield to gain access to the control assembly.
- b. Remove the two screws securing the upper portion of the instrument panel and tilt the panel aft.
- c. Disconnect the control lever from the rod end on the control assembly adjustment mechanism.

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- d. Loosen the locknut (upper) on the control assembly adjusting mechanism.
- e. Hold the rod end to prevent its turning, then pull upward on the rod end with a firm pressure.

NOTE

Do not use any tool as an aid when exerting upward pressure on the rod end; applying a strong pressure will have a tendency to stretch the cable in the control assembly.

- f. Turn the lower retaining nut down against the sleeve on the adjusting mechanism.

NOTE

Never overtighten the retaining nut against the sleeve as this will increase the effort required to operate the control.

- g. Turn the locknut down against the lower retaining nut. Do not let the rod end turn when tightening the locknut.
- h. Connect the control lever to the rod end.
- i. Install the two screws securing the instrument panel and replace the glareshield.

THROTTLE AND MIXTURE (TC-98 AND AFTER, TE-1 AND AFTER, TH-1 AND AFTER)

The engine throttle and mixture controls may be adjusted by loosening the jam nut, removing the rod end pin, and turning the rod end either in or out to obtain an adjustment which provides smooth operation of the controls. Refer to Figure 6-5.

COWL FLAP ACTUATOR RIGGING (TC-1 THRU TC-1607)

This rigging procedure is applicable to both right and left cowl flaps.

- a. Retract the cowl flap electrically.
- b. To adjust the actuator to obtain $1 \pm .1$ inch of clearance between the trailing edge of the cowl flap and the nacelle, disconnect the actuator shaft at the attaching bracket, remove the 102933S92T1680 spacer and install 100951S032XD and 100951S063XD washers on the actuator shaft as necessary.

NOTE

Normally, one of each of the washers on the actuator shaft will be sufficient to maintain the clearance required for the closed flap position.

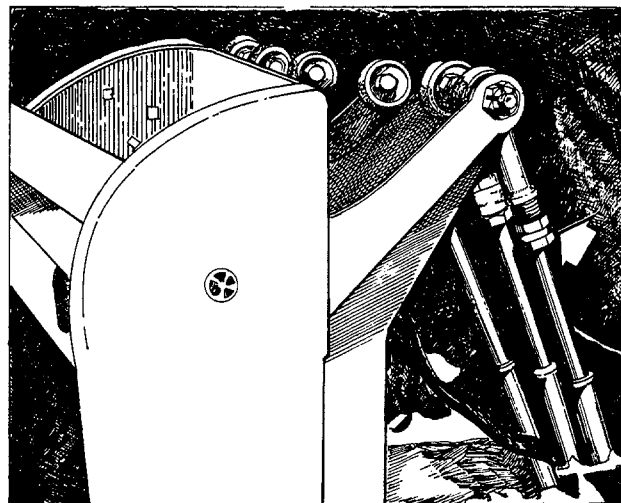
- c. Reinstall the 102933S92T1680 spacer on the actuator shaft.
- d. The extended position of the cowl flap should be $3.6 \pm .1$ inch as measured from the trailing edge of the cowl flap to the nacelle.

NOTE

If the opening is not $3.6 \pm .1$ inch, relocate the attaching bracket to obtain this setting.

COWL FLAP ACTUATOR RIGGING (TE-1 THRU TE-942 EXCEPT TE-938)

- a. Retract the cowl flap electrically.
- b. Disconnect the actuator shaft from the attaching bracket.
- c. Adjust the rod end on the actuator shaft to obtain $1 \pm .1$ inch of clearance between the trailing edge of the cowl flap and the nacelle.
- d. Connect the actuator shaft to the attaching bracket.



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Figure 6-5. Engine Controls

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- e. The extended position of the cowl flap should be $3.6 \pm .1$ inch as measured from the trailing edge of the cowl flap to the nacelle.

NOTE

If the opening is not $3.6 \pm .1$ inch, relocate the attaching bracket to obtain this dimension.

COWL FLAP ACTUATOR RIGGING
(Effectivity: TH-1 thru TH-384)

- a. Retract the cowl flap electrically.
- b. Disconnect the actuator shaft from the attaching bracket.
- c. Adjust the rod end on the actuator shaft to obtain a flush fitting between the trailing edge of the cowl flap and the nacelle.
- d. Connect the actuator shaft to the attaching bracket.
- e. The extended position of the cowl flap should be $2.6 \pm .1$ inch as measured from the trailing edge of the cowl flap to the nacelle.

NOTE

If the opening is not $2.6 \pm .1$ inch, relocate the attaching bracket to obtain this dimension.

MECHANICAL COWL FLAP RIGGING
(Effectivity: TC-1608 and after; TE-938, TE-943 and after; TH-385 and after)

- a. Open the cowl flap.
- b. Remove the attach bolt connecting the control cable to the crank assembly.
- c. Remove the attach bolt connecting the pushrod to the cowl flap.
- d. Loosen the jam nuts at each end of the pushrod.
- e. Loosen or tighten equally the rod ends on the pushrod to obtain the desired clearance for the cowl flap as follows:

1. For TC-1608 and after and for TE-938, TE-943 and after, the clearance for the cowl flap is 1.0 inch in the closed position and 3.5 inches in the open position.

2. For TH-385 thru TH-1395 (except TH-1389), the cowl flap should be flush with the skin of the cowling in the closed position and 2.5 inches from the skin in the open position.

3. For TH-1389 and TH-1396 and after the clearance between the cowl flap and the cowling is .5 to 1.0 inch in the closed position and 4.4 to 4.6 inches in the open position.

- f. Attach the pushrod to the cowl flap and check for the desired clearance, making sure that the cowl flap control crank assembly contacts the crank stop in both the open and closed position.

- g. Loosen the jam nut on the control cable.

NOTE

To reduce the tendency for the cowl flap to creep away from the fully closed position, rig the cowl flap bellcrank to an on-center position or slightly beyond.

- h. Loosen or tighten the rod end to obtain a slight cushion effect on the cowl flap controls in both the open and closed positions.
- i. Attach the control cable to the bellcrank assembly.
- j. Operate the cowl flap controls to both the open and closed positions, making sure that the clearance for the cowl flap is correct, that the bellcrank assembly is contacting the crank stop in both positions and that there is a slight cushion effect on the cowl flap controls in each position.

FUEL INJECTOR PUMP REMOVAL

- a. Remove the air box. (See REMOVAL OF THE AIR BOX (TC-1 and after.) TE-1 and after and TH-1 and after do not require removal of the air box.
- b. Disconnect fuel the lines, loosen the clamps, and remove the intake tube assembly between the air metering valve assembly and the No. 2 intake.
- c. Remove the lower fitting from the left side and the upper fitting from the right side of the fuel injection pump.
- d. Remove the four screws from the injector pump shroud, disconnect the flexible duct, and remove the shroud.
- e. Remove the pump retaining nuts and remove the pump.

FUEL INJECTOR PUMP INSTALLATION

- a. Place a new gasket on the pump pad.
- b. Place the pump in position on the engine and install the retaining nuts.

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- c. Place the shroud in position and install the attaching screws and the flexible duct.
- d. Install the upper fitting on the right side and the lower fitting on the left side of the pump.
- e. Install the intake tube assembly between the air metering valve assembly and the No. 2 intake, then tighten the clamp.
- f. Connect the fuel lines.
- g. Install the air box if applicable. See INSTALLATION OF AIR BOX (TC-1 and after.)

GROUND RUNNING AND WARM-UP

- a. Head the airplane into the wind.
- b. Operate the engines on the ground with the propeller blades set at the minimum angle (high rpm) setting.
- c. Maintain the cylinder head temperature between 200°F and 460°F. Never allow the cylinder head temperature to exceed 460°F.
- d. Extended periods of idling at low rpm may result in fouled spark plugs.
- e. The Mixture controls should remain in the "FULL RICH" position unless leaning is required during the checkout.
- f. Use a throttle setting of 1200 rpm for engine warmup.

NOTE

An oil pressure indication of 10 psi should be noted within 30 seconds in warm weather, and within 60 seconds in cold weather. If no pressure is noted within the specified time, stop the engine and investigate the cause. Normal oil pressure at maximum rpm should be 30-60 psi and 10 psi at idle.

FUEL SYSTEM ADJUSTMENT

NOTE

Any fuel system leaks may produce erratic fuel system indications, and must be fixed before proceeding.

PRESSURE ADJUSTMENT, FIXED ORIFICE FUEL PUMP, IO-470-L (55, A55, B55)

Fuel pressure on the fixed-orifice pump can only be set by adjusting the screw located at the rear center-

line of the pump. Adjust the unmetered fuel pressure to 12 psi at 625 to 650 rpm, then reset idle mixture to best setting. This will produce a richer mixture at take-off and at full throttle operation.

PRESSURE ADJUSTMENT, ADJUSTABLE ORIFICE FUEL PUMP, IO-470-L, IO-520-C AND IO-520-CB ENGINES (Effectivity: 55, A55, B55, C55, D55, E55, and 58)

- a. Unmetered pressure can be checked by connecting a test gage into the fuel pump outlet or from a fitting installed in the hex head of the filter screen located at the bottom of the metering control unit.
- b. Adjust engine idle speed to 625 to 650 rpm using the idle speed adjustment on the air throttle with mixture control in the full rich position. Refer to Figure 6-6.
- c. Set the fuel pump relief valve adjustment, on the centerline of the fuel pump, to 9 to 11 psi by adjusting the screw clockwise to raise the pressure and counterclockwise to lower the pressure. Refer to Figure 6-7.
- d. After adjusting the idle unmetered pressure at 9 to 11 psi, check the idle mixture. Advance the throttle to approximately 2,000 rpm to clear the engine, then back to idle. Move the mixture control to idle cutoff: the engine speed should increase approximately 25-50 rpm when the mixture control is moved toward the lean position.
- e. Advance the throttle to maximum rated engine speed with the mixture control in the full rich position. The unmetered fuel pressure should be 25 to 27.5 psi (IO-470-L Engines) or 28 to 31 psi for IO-520-C and IO-520-CB Engines. Refer to Chart 6-1.
- f. To increase the unmetered fuel pressure, turn the recessed slot-headed needle valve (located just below the fuel pump inlet fitting) in a clockwise direction, and turn in a counterclockwise direction to reduce pressure.

IDLE SPEED AND MIXTURE ADJUSTMENT, IO-470-L, IO-520-C, IO-520-CB ENGINES (Effectivity: 55, A55, B55, C55, D55, E55 and 58)

- a. Remove the side cowl and fairing directly aft of it from the left-hand side of the engine.
- b. Install an appropriate pressure gage in the fuel line between the fuel pump and metering unit to monitor pump outlet pressures. This gage to be vented to atmosphere.

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c. Start and warm-up the engine according to the applicable Pilot's Operating Handbook.

NOTE

The engine may overheat when operated on the ground for more than short test periods. Exercise caution as overheating will occur even sooner with part of the cowling removed. Monitor the cylinder head temperature and oil temperature.

d. Retard the throttle to the idle position.

e. Adjust the idle speed to 625 to 650 rpm with the spring-loaded screw located forward of the air throttle lever. Turn the screw clockwise to increase the rpm, or counterclockwise to decrease rpm.

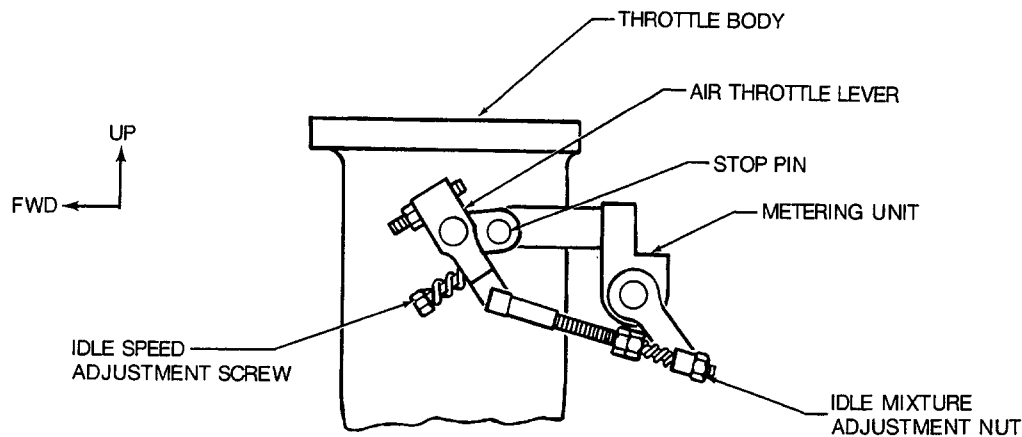
f. Advance the throttle to 2,000 rpm then return it to the idle speed position to check the adjustment.

g. Set the pump pressure at idle RPM (refer to Chart 6-1) using the relief valve adjustment screw on the aft centerline of the engine fuel pump. Refer to Figure 6-7. Turn the screw clockwise to increase pressure and counterclockwise to decrease pressure.

h. When the idle setting has been stabilized, move the cockpit control lever with a smooth steady pull into the IDLE CUTOFF position. Observe the rpm during the leaning process. Adjust the idle mixture to obtain approximately 25/50 rpm gain in the idle speed as the mixture control is slowly moved toward the IDLE CUTOFF. (If the mixture is too lean, the idle speed will drop under the same conditions.) The idle mixture adjustment is the locknut at the metering valve end of the linkage between the metering valve and the air throttle levers. Tightening the nut to shorten the linkage provides a richer mixture. A leaner mixture is obtained by backing off the nut to lengthen the linkage.

i. After each idle mixture adjustment change, clear the engine by running it up to 2000 rpm before making a mixture check.

j. If the idle setting does not remain stable, check the idle linkage; any looseness in this linkage will cause erratic idling. In all cases, allowance should be made for the effect of weather conditions upon idling adjustments.



VIEW OF LEFT SIDE OF THROTTLE BODY
AND METERING UNIT. (PLUMBING, INDUCTION
AIR SYSTEM, ETC. OMITTED FOR CLARITY.)

58-282-7

Figure 6-6. Idle Adjustment

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NOTE

After each idle mixture adjustment, clear the engine by increasing rpm to approximately 2000 before making the next mixture check.

IDLE SPEED AND MIXTURE ADJUSTMENT (Effectivity: TH-1389, TH-1396 and after IO-550-C Engine)

a. Install a pressure gage in the fuel line between the engine-driven fuel pump and the metering unit. The gage will be used to monitor fuel pump outlet pressure (also called unmetered pressure).

NOTE

The pressure gage should be vented to the atmosphere.

b. Start and run the engine according to the warm-up procedures in the applicable Pilot's Operating Handbook. Move the mixture control to full rich. The idle

speed should be 625 to 650 rpm. If the engine is not idling within the specified range, change the idle speed adjustment screw as required to obtain the proper idle speed. Refer to Figure 6-6. Turn the idle speed adjustment screw clockwise to increase rpm and counterclockwise to decrease rpm.

c. The engine-driven fuel pump pressure should read 8.00 to 10.00 psig. If adjustment is required to achieve the proper pump pressure, turn the relief valve adjustment screw clockwise to increase pressure and counterclockwise to decrease pressure. Refer to Figure 6-7

d. Maintain the specified idle rpm and the fuel pump pressure. Adjust the mixture to attain a momentary gain of 25 to 50 rpm when the mixture control is moved toward the idle cutoff position. If the mixture is too lean, the rpm will drop. If an idle mixture adjustment is required, turn the idle mixture adjustment nut as necessary (tighten the nut to enrich the mixture or loosen the nut to lean the mixture) to obtain the correct idle mixture. Refer to Figure 6-6.

ENGINE	RPM	METERED OR NOZZLE PRESSURE PSI	FUEL FLOW LBS/HR **	FUEL FLOW GAL/HR (APPROX.)	UNMETERED OR PUMP OUTLET PRESSURE (PSI) (REF. ONLY)
IO-470-L	625-650				9-11
	*2625	15.5 - 16.5	123 - 130	20.5 - 21.7	25 - 27.5
IO-520-BB and IO-520-CB	625-650				9 - 11
	*2700	15.5 - 16.5	136 - 146	22.7 - 24.3	28 - 31
IO-550-C	625-650				8.00 - 10.00
	*2700	17.9 - 18.5			35-38
* Values given are for maximum rated RPM. If rated rpm at static run-up cannot be achieved with full throttle, adjust flow slightly below values given. Make certain specified values are achieved when rated rpm is obtained during takeoff roll.			** When setting up full throttle fuel flow on an above standard day (above 60 °F), the system should be set toward the lower limit. On a below standard day (below 60°F), the system should be set toward the higher flow limit.		

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**Fuel Pressure and Flow
Chart 6-1**

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NOTE

After each mixture adjustment, clear the engine by running up to approximately 2000 rpm before making the next mixture check.

**FULL THROTTLE FUEL PRESSURE
ADJUSTMENT, IO-550-C ENGINE**
(Effectivity: TH-1389, TH-1396 and after)

- a. Install a pressure gage in the line between the engine fuel flow transducer and the manifold valve.

NOTE

The pressure gage should be vented to the atmosphere and mounted at approximately the same level as the manifold valve.

- b. Run the engine until normal operating temperatures are attained.
- c. With the mixture control in the full rich position, advance the throttle control to full throttle and maximum static rpm. Check the metered fuel pressure.
- d. Refer to Chart 6-2 to determine of the correct metered fuel pressure. If a fuel pressure adjustment is required, turn the fuel bypass adjustment screw as necessary to obtain the correct metered fuel pressure. Turn the bypass adjustment screw clockwise to increase pressure or counterclockwise to decrease pressure. Refer to Figure 6-7.

NOTE

The fuel pump adjustment procedure is a starting point for fuel pressure adjustment at full throttle. "FUEL FLOW SYSTEM CALIBRATION AND CORRECTION" MUST also be completed.

**FUEL FLOW SYSTEM CALIBRATION AND
CORRECTION (Effectivity: TH-1389,
TH-1396 and after)**
(Figure 6-8)

A fuel flow system calibration and correction should be obtained from the following procedure:

- a. Remove the upper engine cowl assembly.
- b. Install a Fisher Porter Flow Rator or equivalent flow meter at a point between the fuel flow transducer and the engine fuel distributor valve. (The Fisher Porter Flow Rator must be installed in a straight vertical

position in order to provide the most accurate reading.) Return the fuel from the Flow Rator back to the airplane fuel system through the wing filler port.

NOTE

Use an external power supply capable of providing $28.25 \pm .25$ volts for the source of electrical power.

- c. Turn the airplane AUX FUEL PUMP to HI.
- d. Adjust the Flow Rator (using the adjustable valve) to the test readings in Chart 6-3 and record the airplane fuel flow (gph) from the fuel flow indicator on a copy of Chart 6-3.

NOTE

The throttle and mixture levers must be fully forward. Use the adjustable valve shown to adjust the fuel flow as necessary. Refer to Figure 6-8.

- e. Once an error in the airplane fuel flow hardware has been determined. Correct the system as in the following example:

EXAMPLE:

At 80 pph flow rate with the fuel temperature at 40° F, an airplane fuel flow indicator reads 13.0 gph. Using a fuel density of 5.9, Chart 6-3 shows the indicator should be reading 13.5 gph. Therefore, the instrument error is 0.5 gph low. When the airplane indicator is reading 13.0 gph, add 0.5 gph for system correction.

NOTE

This fuel flow indicator check should be made at all ten flow rates as the system error may vary as the flow rate changes.

- f. Repeat the preceding steps for the opposite engine fuel flow system.

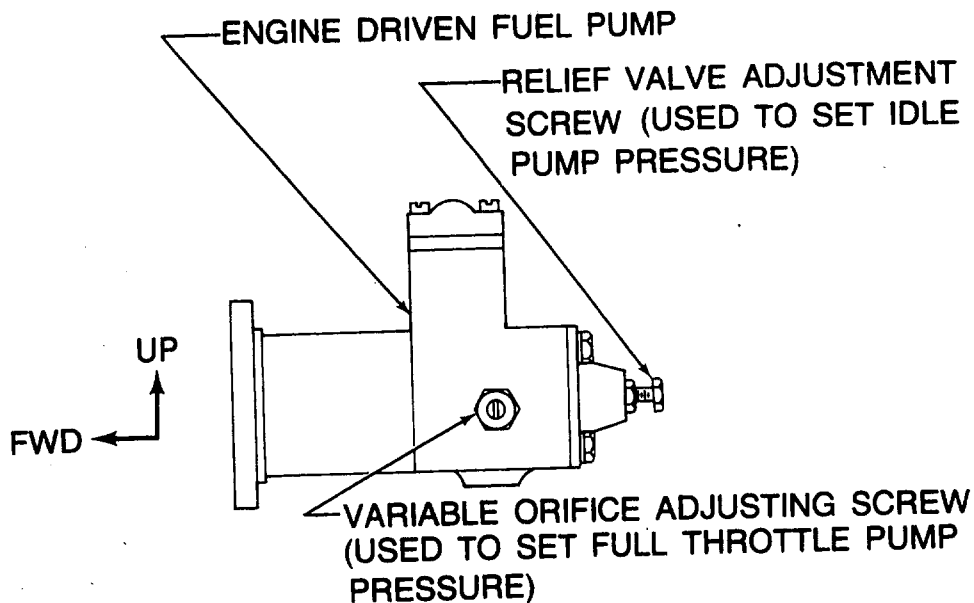
NOTE

The FULL THROTTLE FUEL PRESSURE ADJUSTMENT, IO-550-C TH-1389 and TH-1396 and after) procedure MUST be completed before proceeding.

- g. Flight check for proper engine fuel schedule. Establish a climb at 110 kias (knots indicated air speed).

- Throttle.....Fully Forward
- Prop.....2500 rpm

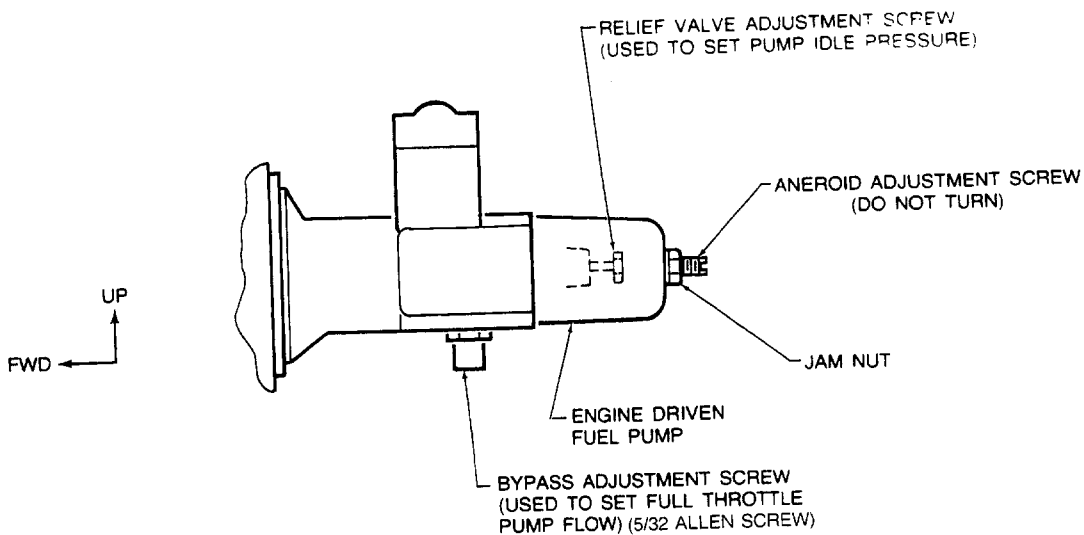
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VIEW OF LEFT SIDE OF ENGINE DRIVEN FUEL PUMP
 TYPICAL FOR THE IO-520BB ENGINES
 (FITTINGS, COOLING SHROUD, ETC. OMITTED FOR CLARITY)

36-283-2

IO-470L WITH ADJUSTABLE ORIFICE PUMP, IO-520C AND IO-520CB ENGINES



VIEW OF LEFT SIDE OF ENGINE DRIVEN
 FUEL PUMP. (FITTINGS, COOLING
 SHROUD, ETC. OMITTED FOR CLARITY.)

IO-550-C ENGINE

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Figure 6-7. Fuel Pump Adjustment

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- Mixture.....Full Rich
- Boost PumpOff

h. Record the fuel flow at all pressure altitudes (altimeter set at 29.29 in. Hg.) shown in Chart 6-4 if possible.

i. While in flight at 8,000 feet, set power to 20.5 in. manifold pressure with the prop at 2,300 rpm and mixture control at full rich. The EGT margin should be 20° C to the rich side of peak temperature or greater. Next lean the mixture from peak to engine roughness. The margin should be 20° C to the lean side of peak temperature or greater.

NOTE

If the fuel flow at 12,000 to 16,000 feet is below the minimum required in Chart 6-4 for high altitude, check and reset the idle unmetered or pump outlet pressure to the upper limit. Refer to Chart 6-1, 8.00-10.00 psi.

j. If the corrected fuel flow does not fall within the required fuel flow limits (see Chart 6-4) or if the rich side-of-peak margin is not obtained, readjust the metered engine fuel pressure refer to step d of FULL THROTTLE FUEL PRESSURE ADJUSTMENT, IO-550-C Engine (TH-1389 and TH-1396 and after). Turn the engine-driven fuel pump bypass adjustment screw clockwise to increase pressure (fuel flow) or counterclockwise to decrease pressure (fuel flow). Refer to Figure 6-7. One psi is approximately equal to one gph.

NOTE

Conditions: Full Throttle, Full Rich, Boost Pumps off, 2500 rpm, 110 kias.

OIL PRESSURE ADJUSTMENT

The function of the oil pressure relief valve is to maintain engine oil pressure within specified limits by withdrawing a portion of the oil from the circulating system and returning the oil to the sump.

The oil pressure adjustment screw is located approximately 3 inches below the oil filter housing. To adjust, turn the adjusting screw clockwise to increase, or counterclockwise to decrease, the oil pressure. The oil pressure should be 10 psi minimum at idle and between 30 to 60 psi at maximum operating rpm and temperature.

Foreign matter lodged between the ball and seat will result in a drop in oil pressure. It is advisable to disassemble, inspect, and clean the relief valve if excessive pressure fluctuations are noted.

HIGH OIL TEMPERATURE

Oil temperature is controlled by a spring-loaded oil cooler valve. This valve will operate properly if the oil has not become contaminated with dirt or other foreign particles. If indications are that the valve is not operating properly, remove the valve and clean it in solvent (Item 15, Consumable Materials Chart, Section 2). Also inspect the valve seat for damage. No repairs can be made to the valve and adjustments are not recommended since special testing equipment is required. The travel of the valve can be checked by immersing the valve assembly in heated water. The minimum amount of travel should be 0.090 inch as the temperature is raised from 120° F to 170° F. Replace defective valves.

MAGNETOS

RPM DROP-OFF CHECK

The purpose of the drop-off check is to determine that the electrical system for firing the fuel in the cylinders of the engine is in a satisfactory condition. A drop in rpm is a natural characteristic while operating on single ignition of a dual ignition system. The absence of an rpm drop may be an indication of the magneto timing advanced beyond the setting specified, or of an open magneto primary lead (hot mag), or of a defective mag switch. Verify the cause before checking mag timing.

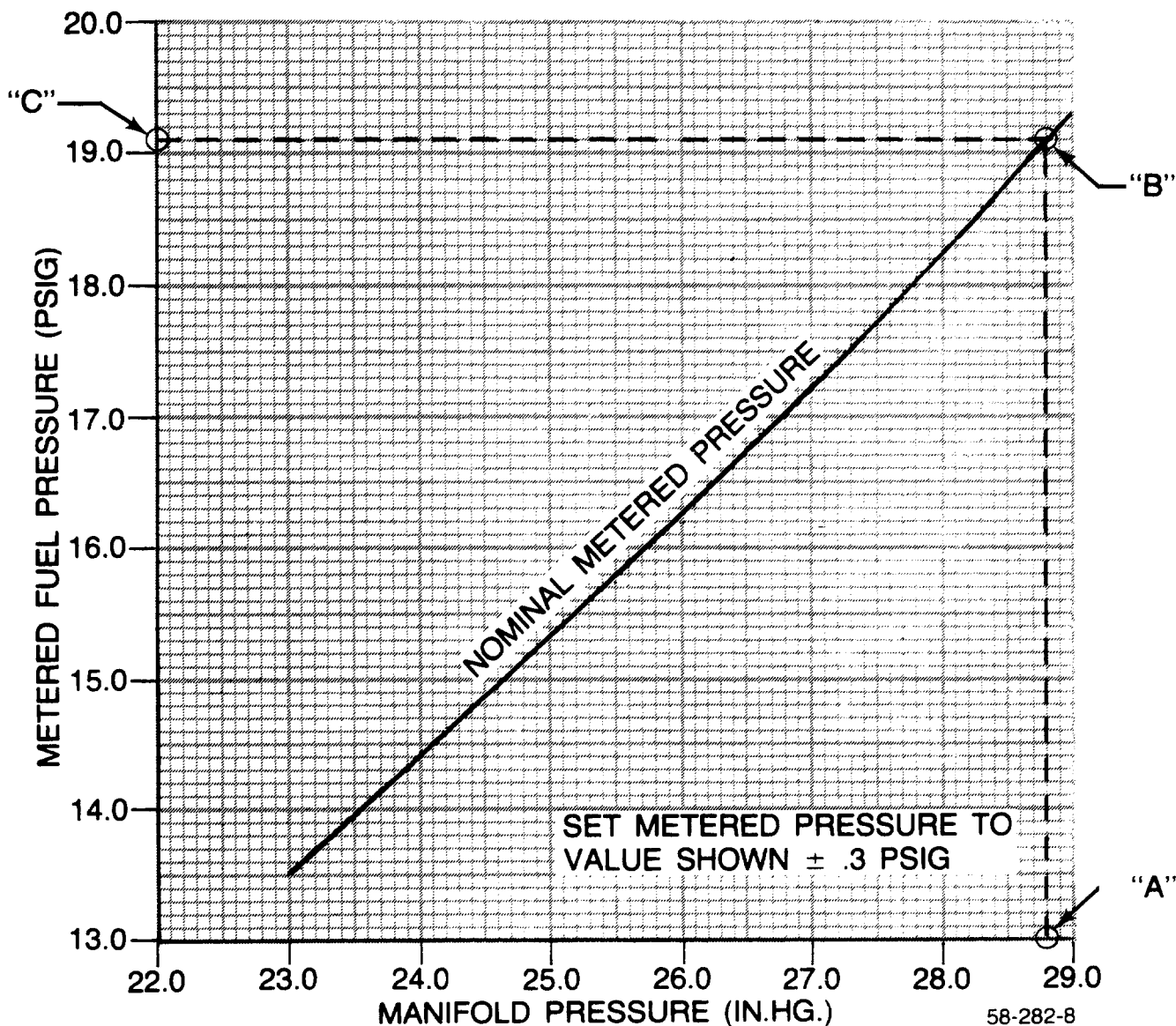
CAUTION

Never advance the timing beyond the specifications in order to reduce rpm drop. Timing advanced beyond the setting specified by the engine manufacturer can cause detonation and/or preignition, resulting in broken rings, cracked and burned pistons and abnormal and excessive stress induced into cylinder heads, cylinder barrels, crankcase, crankshaft and connecting rods.

The drop-off check should be accomplished as follows:

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OPERATING CONDITIONS
Full Throttle, Static R.P.M., Full Rich



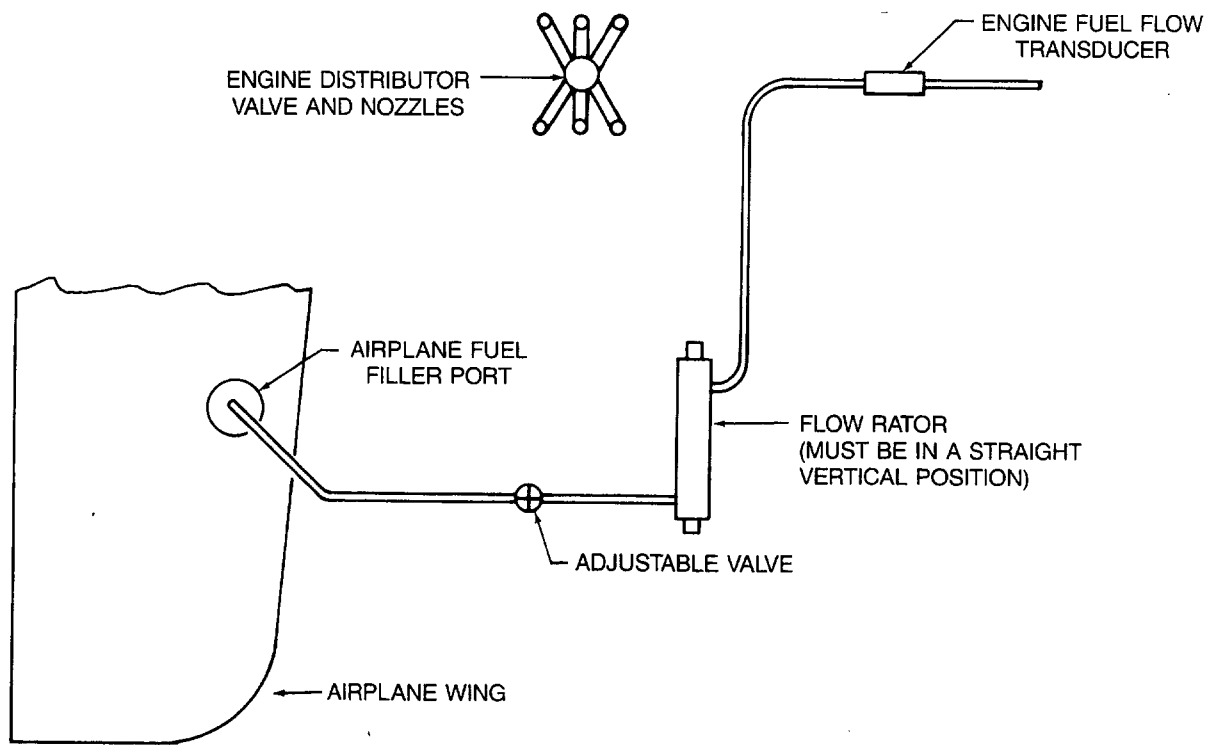
LOCATE MANIFOLD PRESSURE ATTAINED DURING FULL THROTTLE STATIC RPM RUN-UP (POINT "A").

AT THE POINT WHERE THE MANIFOLD PRESSURE READING INTERSECTS THE NOMINAL METERED PRESSURE LINE (POINT "B"), READ THE METERED FUEL PRESSURE IN PSIG (POINT "C"). FULL THROTTLE METERED FUEL PRESSURE IS TO BE SET AT THE INDICATED VALUE $\pm$.3 PSIG.

NOTE: THIS IS A SAMPLE; VALUES SHOWN MAY VARY FROM UNIT TO UNIT.

Full Throttle Fuel Pressure Chart For The IO-550-C Engines
Chart 6-2

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Figure 6-8. Fuel Flow Calibration

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TEMPERATURE WHEN FUEL FLOW IS CHECKED (FUEL TEMPERATURE) _____ DEGREES F.

Flow Rator Setting in Pounds Per Hour (pph)	Flow Of Fuel In Gallons Per Hour (gph) Based on Density (Temperature) lbs.per.gal.				Record Airplane Fuel Flow From Indicator (gph)		Correction To Airplane Fuel Flow System (gph)	
Density	6.0	5.9	5.8	5.7	L.H.	R.H.	L.H.	R.H.
gph	gph	gph	gph	gph				
Flow 60 pph	10.0	10.2	10.3	10.5				
Flow 80 pph	gph 13.3	gph 13.5	gph 13.8	gph 14.0	(13.0 gph in example)		(+ 0.5 gph in example)	
Flow 90 pph	gph 15.0	gph 15.3	gph 15.5	gph 15.8				
Flow 110 pph	gph 18.3	gph 18.6	gph 19.0	gph 19.3				
Flow 120 pph	gph 20.0	gph 20.3	gph 20.7	gph 21.0				
Flow 140 pph	gph 23.3	gph 23.7	gph 24.1	gph 24.5				
Flow 160 pph	gph 26.7	gph 27.1	gph 27.6	gph 28.0				
Flow 180 pph	gph 30.0	gph 30.5	gph 31.0	gph 31.5				
Flow 200 pph	gph 33.3	gph 33.9	gph 34.5	gph 35.0				
Flow 210 pph	gph 35.0	gph 35.5	gph 36.2	gph 36.8				
Density Of Fuel Based On Temperature				20°F6.0 lbs. per. gal.	70°F5.8 lbs. per. gal.			
				40°F5.9 lbs. per. gal.	100°F5.7 lbs. per gal.			

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**Fuel Flow Check
Chart 6-3**

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- a. Start and operate the engine at full rich mixture, with the prop in low pitch at 1,200 rpm until a normal warm-up temperature (200° to 460° F) has been obtained.
- b. Advance the throttle to obtain 1,700 rpm.
- c. Move the magneto switch to the R position and observe the rpm drop.
- d. Move the magneto switch to BOTH and clear the plugs.
- e. Move the magneto switch to the L position and observe the rpm drop.
- f. Move the magneto switch to BOTH and clear the plugs.
- g. Shut down the engine to idle then off.

NOTE

Maximum drop for either magneto and the difference between the two magnetos should conform to that noted in the applicable Pilot's Operating Handbook.

BENDIX MAGNETO TIMING (S-200 SERIES)

To determine if the magnetos are properly timed, proceed in the following manner:

- a. Remove the top spark plug from each cylinder.
- b. Install any suitable top dead center indicator in the spark plug port of the number one cylinder.
- c. Secure a pointer on the nose case of the engine and secure a timing disc to the propeller shaft.

NOTE

If a timing disc is not available, the propeller may be removed and the timing marks inscribed on the crankshaft flange

- d. Turn the crankshaft to find the top dead center of the number one cylinder on the compression stroke. Align the zero degree mark on the timing disc with the pointer.
- e. Connect a timing light to the left magneto and turn the crankshaft approximately 28° opposite to the normal rotation. The timing light should come on at about 20° BTC.

Conditions: Engine instruments-ships indicators, Full throttle, Full rich, Boost pumps off, 2500 rpm, 110 kias.

Pressure Altitude (Set Altimeter At 29.92 In. Hg)	Observed Fuel Flow In Flight		System Correction From Chart 3		Corrected Fuel Flow		Required Fuel Flow (gph)
	L.H.	R.H.	L.H.	R.H.	L.H.	R.H.	
Static Run-Up							
2,000							22.2 to 24.0
4,000							20.7 to 22.5
6,000							19.2 to 21.3
8,000							17.8 to 20.0
10,000							16.4 to 18.9
12,000							15.0 to 17.8
14,000							13.6 to 16.8
16,000							12.3 to 15.9

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**Altitude Versus Fuel Flow
Chart 6-4**

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NOTE

When timing the magnetos on airplane serials TC-2 thru TC-23, do not rotate the propeller shaft opposite the normal direction of rotation far enough to engage the magneto impulse drives. This will delay the opening of the points until the piston is at top center. If the impulse drives do become engaged, rotate the shaft in the normal direction until the points open, then in the opposite direction for approximately 28°.

- f. Turn the crankshaft in the normal direction of rotation until the light just goes out and note the degree before TDC. The light should go out at 20° + 0° - 2° before TDC.
- g. Connect the timing light to the right magneto and again turn the crankshaft approximately 28° opposite the normal rotation. The timing light will come on at about 20° BTC.
- h. Turn the crankshaft in the normal direction of rotation until the light just goes out and note the degree before TDC. The light should go out at 20° + 0° - 2° before TDC.

If the preceding procedure is used and the magnetos check within +0° - 2°, they are timed correctly. If the magnetos are not timed correctly, proceed in the following manner:

1. Set the number one piston at 20° before TDC on the compression stroke.
2. Loosen the right magneto mounting nuts.
3. Rotate the magneto until the light just goes out.
4. Tighten the magneto mounting nuts.
5. Repeat the same procedure for the left magneto.

After magnetos have been properly timed, clean the breaker points to remove any trace of oil or dirt. Replace the breaker cover, lock washers and retaining screws, and secure with safety wire.

NOTE

Breaker points on Bendix Scintilla S6RN-25 type magnetos are not to be adjusted to a given clearance. For proper S6RN-25 magneto adjustment, refer to Scintilla's instructions.

BENDIX MAGNETO TIMING (S-1200 SERIES)

- a. Check the magneto for proper rotation before replacing the magneto on the engine.
- b. Remove the timing inspection plug from the top of the magneto, and turn the magneto drive shaft in the direction of rotation until the timing mark on the distributor gear is approximately aligned with the mark on the distributor block. The magneto is now in the No. 1 cylinder firing position.

NOTE

The timing marks are for reference only. No adjustment of contact opening shall be made from these marks. Use these marks as an indication of proper internal timing. For internal timing of the magnetos refer to Bendix, Scintilla Division, manual Form L-609B.

- c. Position the engine piston in No. 1 cylinder (right rear cylinder) to fully advanced position by covering the lower spark plug hole in No. 1 cylinder with the thumb and turning the crankshaft until pressure is felt on the thumb.
- d. Remove the threaded plug in front of No.6 cylinder (left front cylinder) and observe the timing marks on the alternator drive gear as the crankshaft is rotated slowly. When the mark on the gear is centered in the viewing hole, No.1 piston is at the 20° BTC position on the IO-470 engines and 22° BTC position on the IO-520 engines.
- e. Install the magneto on the engine and tighten the mounting bolts only enough to permit rotating the magneto for final timing.
- f. Connect the positive lead of a timing light to the switch terminal (capacitor stud) of the magneto and secure the ground lead to a suitable ground.

NOTE

When timing the magneto to the engine, the timing light should go out 20° + 0° - 2° BTC.

- g. If the timing light is out, rotate the magneto housing in the direction of its magnet's rotation a few degrees beyond the point where the light comes on, then slowly turn the magneto in the opposite direction until the light just goes out. Secure the magneto in this position and recheck the adjustment.

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h. Disconnect the timing light from the magneto and make connections to the magneto's switch and retard terminals.

WARNING

The magneto is in a SWITCH ON condition when the switch wire is disconnected. Disconnect the switch wire at the capacitor and ground the capacitor to a suitable ground, or disconnect the outlet plate from the magneto or spark plug leads.

i. Check magneto contact assemblies as specified in Section 16. Points with deep pits or with excessively burned areas should be discarded. If necessary, points can be cleaned by using any hard finished paper. Inspect the felt of the cam follower for proper lubrication and clean the breaker compartment with a dry cloth.

MAGNETO POINT GAP AND TIMING

It is assumed that the magnetos have been internally timed properly with the points adjusted per the applicable Bendix or Slick vendor publication. To adjust the magneto points other than as specified in the applicable vendor publication manual will alter the magneto "E" gap and cause a weak spark. This internal timing and point adjustment should not be made on the airplane. For inspection purposes, the point gap may be checked when the cam follower is resting on the high point of the cam lobe. The magneto point gap should be as follows:

MAGNETO	POINT GAP IN INCHES
Bendix S6RN-1201	
• Main Breaker.....	0.016 ± 0.003
• Retard Breaker.....	0.016 ± 0.006
Bendix S6RN-1205	
• Breaker.....	0.016 ± 0.003
Bendix S6RN-1225	
• Main Breaker.....	0.016 ± 0.003
Slick 6210	
• Main Breaker.....	0.009 ± 0.001

The magneto's internal timing and point adjustment should be made at the time of assembly or overhaul.

Bendix Timing Kit No. no. 11-8150-1 is available for internal timing of the magneto. Slick T100 Assembly and Timing Kit is available for Slick magnetos.

NOTE

For adjustment of contact opening and internal timing of Bendix or Slick magnetos, refer to the applicable vendor manuals. Check magneto contact assemblies as specified in Section 16.

PREPARING THE BENDIX MAGNETO FOR INSTALLATION ON THE ENGINE

On Bendix magnetos, turn the magneto drive in the direction opposite to normal rotation (this keeps the impulse couplers from engaging; nonimpulse coupled magnetos may also be rotated opposite to normal rotation) until the respective timing mark (viewed through the inspection hole) on the distributor gear is aligned with the divided casting line of the magneto housing. Now the magneto is ready to install on the engine and is ready to fire the number 1 cylinder.

PREPARING THE SLICK MAGNETO FOR INSTALLATION ON THE ENGINE

- Insert the T-118 timing pin (or a sixpenny nail) in the R hole in the distributor block.
- Turn the magneto drive in the direction opposite to normal rotation until the pin inserts through the hole in the gear (approximately 1/4 inch).

NOTE

If the pin is binding, but will not insert into the hole in the gear, it has hit the pointer on the gear. Pull the pin out until the pointer has passed, reinstall the pin and continue rotation until the pin inserts in the hole in the gear.

- The magneto is now ready to install on the engine and supply ignition spark to number one cylinder.
- As soon as the magneto is installed on the engine, the timing pin MUST be removed.

CAUTION

If the magneto drive is rotated with the timing pin installed, the magneto will be damaged.

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REMOVAL OF THE MAGNETOS

- a. Remove the four screws retaining the high tension outlet and remove the outlet from the magneto.

CAUTION

Current production magnetos do not have the automatic grounding devices featured on earlier Scintilla magnetos. To be safe, treat all magnetos as hot whenever the ground lead is disconnected. To ground the magneto, connect a wire to the switch lead of the magneto and ground the wire to the case.

- b. Remove the grounding wire from the magneto.
c. Remove the two magneto retaining nuts and washers and pull the magneto away from the accessory case.

INSTALLATION AND TIMING OF MAGNETOS (IO-520-C, IO-520-CB AND IO-550-C ENGINES)

- a. Remove the lower spark plug from each cylinder.
b. Cover the lower spark plug hole of No. 1 cylinder with thumb and turn the crankshaft until pressure is felt on thumb.
c. Remove the plug in front of No. 6 cylinder and observe the timing mark on the alternator drive gear as the crankshaft is rotated slowly. When the mark on the gear is centered in the viewing hole, No. 1 piston is at the $22^\circ \pm 1^\circ$ BTC position.

NOTE

Prepare the magneto for installation on the engine as described in PREPARING THE MAGNETO FOR INSTALLATION ON THE ENGINE.

- d. Hold the magneto in the position it will occupy when installed, and check alignment of gear coupling slot and impulse coupling lugs. If not aligned, pull the gear out of mesh but not out of the oil seal. Turn to correct alignment and push the gear back into mesh.
e. Place a new gasket on the magneto flange, and install the magneto carefully so that the drive coupling lugs mate with the slots of the drive coupling. Install holding washers, lock washers and nuts, but tighten only enough to permit turning the magneto (without looseness) for final timing.

- f. Connect the timing light lead to the ground terminal of each magneto. Both timing lights should be on. Tap the right magneto up with a nonmarring hammer until that light goes out. Tap the left magneto down until the light goes out. Secure the magnetos.

- g. Turn the crankshaft a few degrees counterclockwise and bring it back again until the timing marks are aligned. At this point both timing lights should go out at the same instant that the timing mark on the crankshaft flange aligns with the crankcase parting flange or the timing mark on the alternator drive gear appears in the center of the crankcase inspection hole.

- h. If the timing lights do not go out at the same time, loosen the magneto that is late or early and repeat the process outlined in steps e and f.

INSTALLATION AND TIMING OF SLICK MAGNETOS (IO-470 ENGINES)

To determine if the magnetos are properly timed, proceed in the following manner:

- a. Cover the lower spark plug hole of No.1 cylinder with thumb and turn the crankshaft until pressure is felt on thumb.
b. Use a timing disc or marks on the crankshaft flange and engine crankcase parting surface or marks on the generator/alternator drive pulley to position No.1 piston at the $20^\circ + 0^\circ - 2^\circ$ BTC position.
c. Remove the inspection hole plugs from the magnetos.

NOTE

The red timing marks, located on the side of the magneto with the trademark, should be in line at $20^\circ + 0^\circ - 2^\circ$ before TDC. When the red marks are in line, the black marks visible through the vent hole on the opposite side are in line.

- d. Turn the impulse coupling backward, so latches will not engage until the timing pointer inside the inspection hole is aligned with the marked distributor gear tooth.
e. Insert the timing pin through the hole in the frame and rotor shaft. This holds the magneto for timing to the engine. Hold the magneto in the position it will occupy when installed, and check the alignment of gear coupling slot and impulse coupling lugs. If not aligned, pull the gear out of mesh, but not out of the oil seal, and turn to correct alignment. Push the gear back into mesh.

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f. Place a new gasket on the magneto flange and install the magneto carefully so drive coupling lugs mate with the slots of the drive bushings. Install holding washers, lock washers and nuts, but tighten only enough to permit turning the magneto (without looseness) for final timing.

g. Connect the timing light lead to the ground terminal of each magneto. Both timing lights should be on. Tap the right magneto up with a nonmarring hammer until that light goes out. Tap the left magneto down until the light goes out. Secure the magnetos.

NOTE

Rotate the crankshaft until the impulse clicks, then rotate the crankshaft opposite the normal direction of rotation to the approximate 25° BTC position. Care must be exercised to be sure the crankshaft is not turned to the point where the magneto impulse drives are engaged; opening of the points will be delayed by approximately 26°.

h. Turn the crankshaft a few degrees counterclockwise and bring it back again until the timing marks are aligned. At this point both timing lights should go out at the same instant that the timing mark on the crankshaft flange aligns with the crankcase parting surface or the timing mark on the generator/alternator drive pulley aligns with the 20° + 0° - 2° timing mark.

i. If the timing lights do not go out simultaneously, loosen the magneto that is late or early and repeat the process outlined in steps g and h.

**INSTALLATION AND TIMING OF SLICK
MAGNETOS (IO-520 AND IO-550
ENGINES)**

To determine if the magnetos are properly timed, proceed in the following manner:

a. Cover the lower spark plug hole of No. 1 cylinder with thumb and turn the crankshaft until pressure is felt on thumb.

b. Remove the plug in front of No. 6 cylinder and observe the timing mark on the alternator drive gear as the crankshaft is rotated slowly. When the mark on the gear is centered in the viewing hole, the No. 1 piston is at the 22° + 0° - 2° BTC position.

c. Remove the inspection hole plugs from the magnetos.

NOTE

The red timing marks, located on the side of the magneto with the trademark, should be in line at 22° + 0° - 2° BTC. When the red marks are in line, the black marks visible through the vent hole on the opposite side are in line.

d. Turn the impulse coupling backward, so latches will not engage, until the timing pointer inside the inspection hole is aligned with the marked distributor gear tooth.

e. Insert the timing pin through the hole in the frame and rotor shaft. This holds the magneto for timing to the engine. Hold the magneto in the position it will occupy when installed, and check the alignment of gear coupling slot and impulse coupling lugs. If not aligned, pull the gear out of mesh, but not out of the oil seal, and turn to correct alignment. Push the gear back into mesh.

f. Place a new gasket on the magneto flange, and install the magneto carefully so that the drive coupling lugs mate with the slots of the drive bushings. Install holding washers, lock washers and nuts, but tighten only enough to permit turning the magneto (without looseness) for final timing. Remove the timing pin.

g. Connect the timing light lead to the ground terminal of each magneto. Both timing lights should be on. Tap the right magneto up with a nonmarring hammer until that light goes out. Tap the left magneto down until the light goes out. Secure the magnetos.

NOTE

Rotate the crankshaft until the impulse clicks, then rotate the crankshaft opposite the normal direction of rotation to approximately the 25° BTC position. Care must be exercised to be sure the crankshaft is not turned to the point where the magneto impulse drives are engaged, opening of the points will be delayed approximately 26°.

h. Turn the crankshaft a few degrees counterclockwise and bring it back again until the timing marks are aligned. At this point both timing lights should go out at the same instant that the timing mark on the crankshaft flange aligns with the crankcase parting surface, or the timing mark on the alternator drive gear appears in the center of the crankcase inspection hole.

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i. If the timing lights do not go out at the same time, loosen the magneto that is late or early and repeat the process outlined in steps g and h earlier.

***MAGNETO BREAKER POINT
ADJUSTMENT OF SLICK MAGNETOS***

The amount of opening between the points should not be used as a method for adjusting the magneto contact points, since a weak spark will result if the opening of the contact points is not in time with the occurrence of the "E" gap. The proper "E" gap is obtained when the timing pin is in place through the hole in the frame and rotor shaft of the magneto. With the timing pin inserted in place, the rotor is in position for the cam to start opening the contact points. To adjust the contact points correctly, loosen the screws securing the contact point kit to the rotor bearing plate. Insert a screwdriver into the notch at the base of the contact

point kit and pry the points into the position where any further rotation of the cam will begin opening the points. Retighten the contact kit screws and check the distributor lead spring to make sure it is located in the center of the distributor shaft hole in the distributor bearing plate. Before removing the timing pin and reinstalling the distributor block housing on the magneto frame assembly, apply a drop of SAE 20 lubricating oil to the oilite bearings.

***CYLINDER DIFFERENTIAL
COMPRESSION CHECK***

A cylinder differential compression check should be accomplished at each 100-hour inspection or when it is suspected that the cylinders have become worn or have damaged components. The check may be accomplished in accordance with Continental Service Bulletin M73-19 or subsequent bulletins.

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CHART 6-5 TROUBLESHOOTING THE ENGINE

The troubleshooting chart is provided as a guide. Review all probable causes given; check other listings of trouble with similar symptoms. The items are presented in the sequence of approximate ease of checking, not necessarily in the order of probability of occurrence.

Indication	Probable Cause	Remarks
1. Engine will not start.	a. no fuel gage pressure (No fuel to engine).	a. Check fuel control for proper position, with auxiliary pump "ON" and operating, feed valves open, fuel filters open, and tank fuel level.
	b. Have gage pressure (engine flooded).	b. Turn off auxiliary pump and ignition switch, set throttle to full open and fuel control to idle cut-off, then crank engine to clear cylinders of excess fuel. Repeat starting process.
	c. Have gage pressure (no fuel to engine).	c. Check for bent or loose fuel lines. Loosen one line at fuel nozzle; if no fuel shows, replace fuel manifold valve.
2. Engine starts but fails to keep running	a. Inadequate fuel to fuel manifold valve.	a. Set fuel control in "FULL RICH" position, turn auxiliary pump "ON"; check to be sure feed lines and filters are not restricted. Clean or replace defective components.
	b. Defective ignition system.	b. Check accessible ignition cables and connections. Tighten loose connections. Replace defective spark plugs.
3. Engine runs rough at idle.	a. Improper idle mixture adjustment.	a. Readjust idle setting. Tighten adjustment screw to lean mixture and back off adjustment screw to richen mixture.
	b. Fouled spark plugs.	b. Remove and clean spark plugs, adjust gap. Replace defective spark plugs.
4. Engine has poor acceleration.	a. Idle mixture too lean.	a. Readjust idle mixture as described in 3a.
	b. Incorrect fuel-air mixture, worn control linkage, or restricted air cleaner.	b. Tighten loose connections, replace worn elements of linkage. Service air cleaner.
	c. Defective ignition system.	c. Check accessible ignition cables and connections. Replace defective plugs.

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CHART 6-5 TROUBLESHOOTING THE ENGINE *(Continued)*

Indication	Probable Cause	Remarks
5. Engine runs rough at speeds above idle	a. Improper fuel-air mixture	b. Check manifold connections for leaks. Tighten loose connections. Check fuel control linkage for setting and adjustment. Check fuel filters and screens for dirt. Check for proper pump pressure, and replace pump if defective.
	b. Restricted fuel nozzle.	b. Remove and clean all nozzles.
	c. Ignition system and spark plugs defective.	c. Clean and regap spark plugs. Check ignition cables for defects. Replace defective components.
6. Engine lacks power, reduction in maximum manifold pressure at critical altitude.	a. Incorrectly adjusted throttle control, "sticky" linkage or dirty air cleaner.	a. Check movement of linkage by moving control from idle to full throttle. Make proper adjustments and replace worn components. Service air cleaner.
	b. Defective ignition system.	b. Inspect spark plugs for fouled electrodes, heavy carbon deposits, eroded electrodes, improperly adjusted electrode gaps, and cracked porcelains. Test plugs for regular firing under pressure. Replace damaged or misfiring plugs. Spark plug gap should be 0.018 to 0.022 inch.
	c. Loose or damaged intake manifolding.	c. Inspect entire manifold system for possible leakage at connections. Replace damaged components, tighten all connections and clamps.
	d. Fuel nozzle defective.	d. Check for restricted nozzles and lines and clean or replace as necessary.
7. Low fuel pressure.	a. Restricted flow to fuel metering valve.	a. Check mixture control for full travel. Check for restriction in fuel filters and lines, adjust control and clean filters. Replace damaged parts.
	b. Fuel control lever.	b. Check operation of throttle control and for possible contact with cooling shroud. Adjust as required to obtain correct operation.
	c. Incorrect fuel injector pump adjustment and operation.	c. Check and adjust using appropriate equipment. Replace defective pumps.
	d. Defective fuel injector pump relief valve.	d. Replace pump.
8. High fuel pressure.	a. Restricted flow beyond fuel control assembly.	a. Check for restricted fuel nozzles or fuel manifold valve. Clean or replace nozzles. Replace defective fuel manifold valve.

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CHART 6-5 TROUBLESHOOTING THE ENGINE (Continued)

Indication	Probable Cause	Remarks
9. Fluctuating fuel pressure.	b. Defective relief valve operation in fuel injector.	b. Replace fuel injector pump.
	c. Restricted recirculation passage in fuel injector pump.	c. Replace pump.
	a. Vapor in fuel system, excess fuel temperature.	a. Normally operating the auxiliary pump will clear system. Operate auxiliary pump and purge system.
	b. Fuel gage line leak or air in gage line.	b. Drain gage line and tighten connections.
10. Low oil pressure on engine gage or high oil temperature.	c. Restriction in vapor separator vent.	c. Check for restriction in ejector jet of vapor separator cover. Clean jet with solvent (only). Do not use wire as probe. Replace defective parts.
	a. Insufficient oil in oil sump, oil dilution or using improper grade oil for prevailing ambient temperature.	a. Add oil or change oil to proper viscosity.
	b. Defective vernatherm valve.	b. Check for defective vernatherm valve. Replace valve if defective.
	c. Oil cooler restriction.	c. Clean oil cooler.
	d. Leaking, damaged, or loose oil line connection.	d. Check for restricted lines and loose connections and for partially plugged oil filter. Clean parts, tighten connections and replace defective parts.
11. Poor engine idle cut-off.	e. Low oil pressure.	e. Readjust oil pressure as necessary.
	a. Engine getting fuel.	a. Check fuel control for being in full "IDLE CUT-OFF" position. Check auxiliary pump for being "OFF". Check for leaking fuel manifold valve. Replace defective components.

SECTION

7

PROPELLER

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PROPELLERS

The Beech Baron propellers are of the constant speed full feathering type. Feathering the propeller is accomplished by pulling the propeller control levers into the full feather position, thereby releasing governor oil pressure, allowing the counterweights and feather spring to feather the propeller blades. A port in the governor is opened by pulling the governor control levers into the full feather position and allows the oil from the propeller to drain back into the engine. Average feathering time is between three and ten seconds.

NOTE

The airplane must be equipped with like propellers of the same manufacturer.

For unfeathering and starting procedures, refer to the applicable Pilot's Operating Handbook.

REMOVING THE PROPELLER (MCCAULEY)

- a. Remove the spinner dome retaining screws and remove the spinner dome. If the airplane is equipped with the alcohol anti-icing system, remove the spray nozzle retaining screws and disconnect the rubber tubing before removing the spinner dome retaining screws. Remove the spinner dome support, and shims if installed, from the mounting post.
- b. Using a 3/4-inch wrench, remove the six propeller nuts.
- c. Remove the propeller and O-ring.

NOTE

Use clean rags to plug the center of the engine crankshaft and propeller hub to prevent foreign material from contaminating the engine or propeller.

INSTALLING THE PROPELLER (MCCAULEY)

- a. Make sure the propeller and engine flanges are clean.
- b. Apply a light coat of engine oil to the O-ring and install the O-ring in the circular groove of the propeller hub.
- c. Apply another light coat of engine oil to the O-ring and to the inner surfaces of the propeller hub.
- d. Apply a liberal coat of grease (A-1637-16, supplied with a new propeller, or MIL-T-83483) to the threads of the six mounting studs and to the threads and faces of the six mounting nuts.

NOTE

It is possible to install the propeller in either of two positions relative to the crankshaft. The correct position is with one blade aligned directly over the T/C mark on the crankshaft flange.

- e. Position the propeller on the engine with one blade aligned directly over the T/C mark on the crankshaft flange. Install the six mounting nuts, then apply a wet torque of 540 - 600 inch-pounds to the mounting nuts. Wipe off any excess grease after torquing.
- f. Prepare the spinner dome for installation by cleaning the surface, inspecting for cracks, etc. Install two 0.016 inch P/N B3281-1 shims, one 0.032 inch P/N B3281-2 shim and the spinner support on the mounting post. Lightly press the spinner against the support and hold snug to check the alignment of the spinner attach holes with the spinner bulkhead. Misalignment of 3/64 inch is permissible.

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g. Using two men for even pressure, push hard on the spinner just enough to allow the installation of four equally spaced attach screws and washers in the attach holes. Remove shims as necessary until it is just possible to install the four attach screws and washers all equally spaced around the circumference of the spinner. Relax the force and install the remaining screws and washers. Torque the spinner attach screws to 40 - 45 inch-pounds. If the airplane is equipped with alcohol anti-icing, install the rubber tubing onto the spray nozzle and install the spray nozzles to the spinner dome.

REMOVING THE PROPELLER (HARTZELL)

- a. Remove the spinner dome retaining screws and remove the spinner dome.
- b. Remove the six bolts or nuts attaching the propeller to the engine flange.
- c. Remove the propeller.

NOTE

Use clean rags to plug the engine crankshaft and propeller hub to prevent foreign material from contaminating the engine or propeller.

INSTALLING THE PROPELLER (HARTZELL)

- a. Clean the propeller and engine flanges, removing any possible nicks which would prevent proper mating of the surfaces.

NOTE

Before installation of the propeller, lubricate the O-ring in the circular groove of the propeller hub with engine oil (2, Consumable Materials Chart).

- b. Install the O-ring on the engine crankshaft flange.
- c. Install the propeller on the engine flange.

NOTE

When installing the propeller, align the No. 1 blade directly over the T/C mark on the crankshaft flange.

- d. Install the six bolts or nuts attaching the propeller to the engine flange. Torque to 720 - 840 inch-pounds for airplane serials TC-1 and after. Torque to 840 - 960 inch-pounds for airplane serials TE-1 and after and TH-1 and after.
- e. Install the spinner dome.

NOTE

The spinner to spinner bulkhead should be misaligned with the bulkhead at least 1/2 hole aft of the spinner. The spinner bulkhead should be pulled forward to install the attach bolts. This causes a desired preload on the spinner.

For propeller slip ring Removal and Installation see Utility Systems, Section 11.

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PROPELLER GOVERNOR

PROPELLER GOVERNOR REMOVAL

- a. Ensure that the propellers are in the unfeathered (low pitch) position.
- b. Remove the lower engine cowl.
- c. Remove the engine baffling just forward of the propeller governor.
- d. Remove the cotter pin, nut, washer and bolt attaching the adjusting rod end to the governor.
- e. Disconnect all electrical wiring to the governor.

CAUTION

On airplanes with synchronizers, the magnetic pickup wires and the governor coil wires are not interchangeable. Tag and identify all electrical wires to facilitate later installation.

- f. Disconnect the oil line from the governor.
- g. Remove the four governor attaching nuts and remove the governor.
- h. Cover the engine boss.

PROPELLER GOVERNOR INSTALLATION

- a. Remove the cover from the engine boss; wipe the engine pad clean and install a new governor mounting pad gasket.

CAUTION

Make sure the gasket is placed on the engine mounting pad with the raised side of the screen up so that it will fit into the recess in the base of the governor.

- b. Align the governor spline with the engine drive spline, and install the washers and nuts. Diagonally torque the nuts to 216 - 264 inch-pounds.
- c. Connect the oil line to the governor.
- d. Reconnect the electrical wires to the governor. These wires should have been properly identified during removal.
- e. Install the bolt, washer, nut and cotter pin attaching the adjusting rod end to the governor.

NOTE

To ensure proper adjustment, do not turn the adjusting rod end when installing on the governor.

- f. Install the engine baffling just forward of the propeller governor.

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PROPELLER GOVERNOR ADJUSTMENT

FIGURE 7-1

HIGH RPM ADJUSTMENT

The high rpm adjustment must be checked while the airplane is in flight. Observe the takeoff rpm to see if it exceeds the redline figure. If excessive rpm is observed, land the airplane and adjust the high rpm screw inward to reduce the rpm to the redline figure. The high rpm adjustment screw is located at the front of the governor just forward of the speed adjusting control lever. One complete revolution of the screw reduces the propeller rpm by approximately 25 - 30 revolutions.

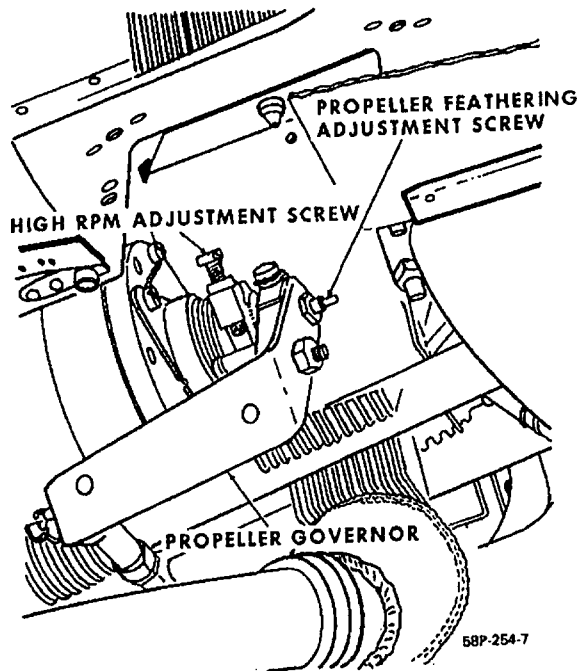
FEATHERING ADJUSTMENT

To adjust the feathering action, pull the control slowly back through the detent and observe the point at which the rpm setting begins to fall off sharply, then bring the propeller back to low rpm. The point at which propeller feathering starts should be at 1850 rpm. If adjustment is required turn the square-head screw on the end of the governor control shaft inward or outward to correct the setting. One half revolution of the screw inward will lower the feathering rpm approximately 100 revolutions. (See Figure 7-1.)

LOW RPM ADJUSTMENT

FIGURE 7-2

The low rpm adjustment is made while the airplane is on the ground. To make this adjustment, pull the propeller lever back against the detent and observe the rpm setting. If the rpm varies from the specified low rpm setting of 2,000 rpm, the low rpm setting must be adjusted. The low rpm adjustment is made on the detent rod which is located behind the instrument panel on the governor control linkage. To increase the setting, shorten the rod. To decrease the setting, lengthen the rod.



Propeller Governor Adjustment
Figure 7-1

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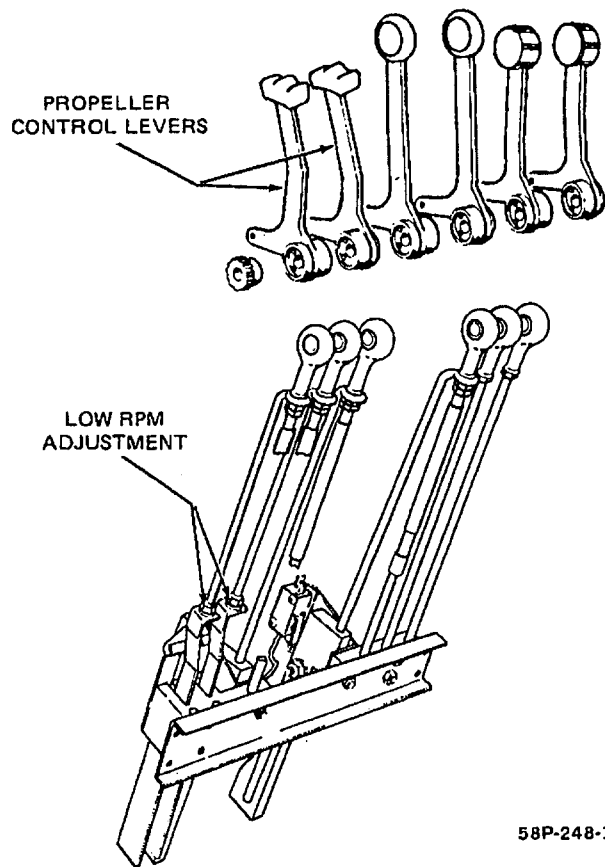
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PROPELLER SYNCHRONIZER (TC-1710 AND AFTER; TE-981 AND AFTER; TH 467 AND AFTER, EXCEPT TH-473 AND TH-474)

The optional propeller synchronizer automatically matches the rpm of the two engines. When the rpm of one engine changes, the other will automatically follow the change over a predetermined range. This limited range prevents either engine from losing more than a fixed amount of rpm in case the other engine is feathered while the propeller synchronizer remains ON.

A slotted disc in each governor passes a magnetic pick-up and an electrical impulse is transmitted to a transistorized control box installed behind the pedestal. This control box measures the difference in pulse rates and changes the governor speed setting by varying the coil voltage of each governor until the rpm of each engine is equal. The propeller synchronizer may be turned ON by a toggle switch located on the lower pedestal.

To operate the system, synchronize the propellers in the normal manner and turn the synchronizer ON. The propeller rpm of each engine will automatically adjust to the same rpm. To change rpm, adjust both propeller controls at the same time. This will keep the propeller rpm of each engine within the limited range of the synchronizer. If the synchronizer is ON and the propeller rpm will not synchronize, the propeller rpm is outside the synchronizer range. Turn the synchronizer OFF, readjust the rpm of each engine manually to equal rpm and turn the synchronizer ON.



58P-248-11

**Propeller Low RPM Adjustment
Figure 7-2**

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SYNCHRONIZER FUNCTIONAL TEST

Proper operation of the propeller synchronizer can be determined by the following method. Manually adjust the propeller control levers to equal rpm. Turn the propeller synchronizer ON. Slowly adjust, in small increments, either propeller governor to increase or decrease rpm. The rpm should remain synchronized over a limited range predetermined by the synchronizer. Turn the synchronizer OFF and establish a maximum of 25 rpm difference between the engine rpm of the left and right engines. Turn the synchronizer ON and the rpm of both engines should synchronize.

SYNCHRONIZER CHECKS

These checks will help locate the source of trouble should the synchronizer system malfunction. If no malfunctions are found among the units being tested, the transistorized control box is probably the source of trouble. An ohmmeter, voltmeter and oscilloscope are required to conduct the tests below.

SYNCHRONIZER WIRING CHECK

- a. To eliminate the most obvious causes for malfunction make sure that the airplane battery master switch is ON, that the propeller synchronizer circuit breaker is not tripped, and that the modified Jones plug receptacle is properly mated with the plug in the airplane electrical system.
- b. Unplug the control box, turn the airplane master switch OFF, and pull the propeller synchronizer circuit breaker before proceeding further with these checks.
- c. Complete the following resistance checks: (See Figure 7-2A.)

CAUTION

Zero the ohmmeter and read on the X1 or X10 scale during the following checks. Do not use a probe greater than 0.045 inch in thickness. Insert and remove the probe carefully to avoid damaging the pin connectors.

NOTE

Readings may be 20 percent higher during heat soak following engine shutdown.

1. Check the resistance between pin 1 and airplane ground. The ohmmeter should indicate 0 ohms.
2. Check the resistance between pin 2 and airplane ground. The ohmmeter should indicate an open circuit.
3. Check the resistance between pin 3 and airplane ground. The ohmmeter should indicate 52 - 68 ohms.
4. Check the resistance between pin 4 and airplane ground. The ohmmeter should indicate an open circuit.
5. Check the resistance between pin 5 and airplane ground. The ohmmeter should indicate 52 - 68 ohms.
6. Check the resistance between pin 6 and airplane ground. The ohmmeter should indicate an open circuit.
7. Check the resistance between pin 7 and airplane ground. The ohmmeter should indicate an open circuit.
8. Check the resistance between pins 4 and 7. The ohmmeter should indicate 112 - 138 ohms.

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9. Check the resistance between pins 6 and 7. The ohmmeter should indicate 112 - 138 ohms.
10. Check the resistance between pins 7 and 8. The ohmmeter should indicate 23 - 27 ohms. The plug incorporates a resistor and a fuse between these pins.
- d. Turn the airplane battery master switch ON, and reset the propeller synchronizer circuit breaker, but leave the control box unplugged.
- e. Using the dc voltmeter, check that the voltage between pin receptacles 1 and 2 is the same as the supply voltage, and the polarity of pin number 1 is negative while that of pin number 2 is positive.
- f. Using an oscilloscope, check the voltage between pins 5 and 1, and 3 and 1. With the engine operating at cruise rpm, the oscilloscope should indicate 3.0 volts, peak to peak. The voltage should not read less than 2.0 peak to peak, at minimum cruise rpm nor more than 10.0 volts, peak to peak, at maximum cruise rpm.

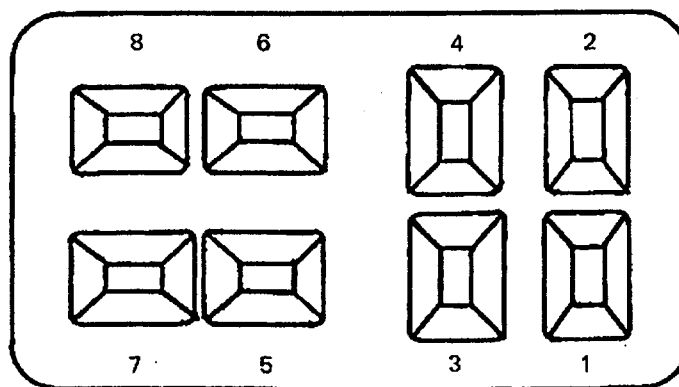
NOTE

These readings are based on a magnetic pickup/toothed wheel clearance gap of approximately 0.005 inch. If adjustment is required, refer to the Woodward Test Specification SP-197 for adjustment procedures.

- g. When the system is in compliance with the preceding check values, plug the control box into the synchronizer system and flight check.

FLIGHT CHECK

- a. Check the effect of rpm and/or power setting, particularly in the lower cruise range on synchronizer action. If operation at lower rpm results in improved synchronization, inspect the drives to the governors.
- b. Reduce the electrical load and turn off the generator and all other electrical units, except the master switch and synchronizer. If synchronizing improves, abnormal voltage spikes on the airplane bus from some other electrical accessory may have been upsetting the synchronizer. Isolate the offending accessory and repair it. If the trouble lies in the control box, replace it.



VIEW OF CONTROL BOX CONNECTOR
SHOWING NUMBERED TERMINALS

58P-351-2

Synchronizer Plug
Figure 7-2A

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BEECH BARON 55 AND 58 SHOP MANUAL

PROPELLER ACCUMULATOR REMOVAL

(FOR AIRPLANES WHICH ARE EQUIPPED WITH THE UNFEATHERING ACCUMULATOR)

- Check the propeller control lever for the low pitch position in order to release the accumulator pressure.
- Open the access door on the inboard side of the nacelle immediately aft of the firewall, to gain access to the accumulator.
- Remove the accumulator line from the end of the accumulator.
- Remove the four attach bolts and attach bracket from the accumulator and remove the accumulator from the airplane.

Installation is the reverse of the removal procedures.

NOTE

The pressure in the accumulators should be maintained at 100 ± 5 psi. When inflating the accumulators, use commercial dry air or nitrogen.

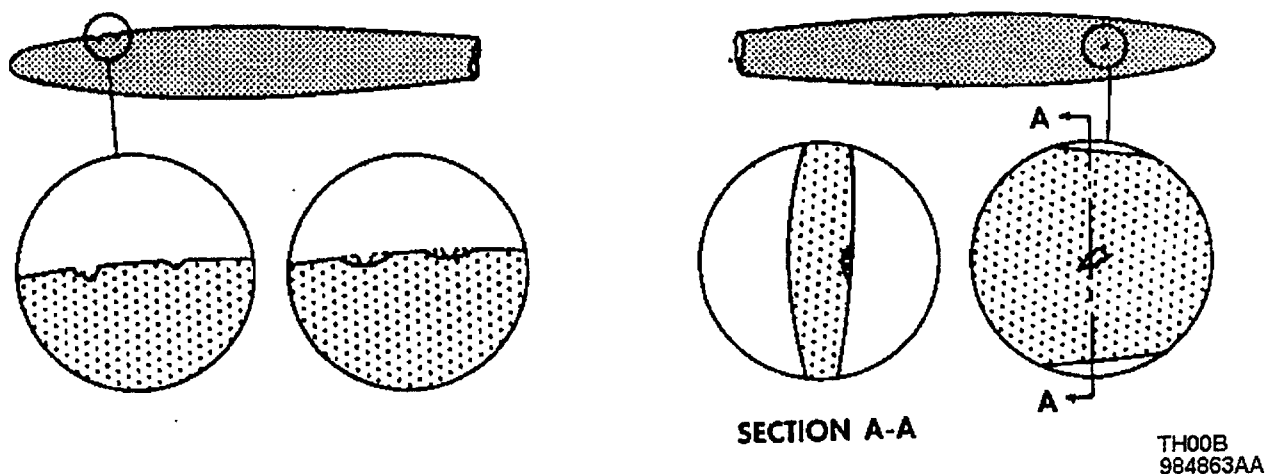
PROPELLER ADJUSTMENT

For High and Low pitch adjustments, service, overhaul and maintenance procedures, refer to the manufacturers applicable FAA Approved Propeller Manuals.

MINOR PROPELLER BLADE REPAIR

FIGURE 7-3

Minor nicks, dents, and gouges may be dressed out by approved personnel. Blend any nicks or gouges into the leading edge with smooth curves, and generous radii as shown in Figure 7-3. Reanodize reworked areas by the chromic acid process only.



Minor Propeller Blade Repair
Figure 7-3

Raytheon Aircraft

BEECH BARON 55 AND 58 SHOP MANUAL

TROUBLESHOOTING PROPELLER SYNCHRONIZER

TROUBLE	PROBABLE CAUSE	REMARKS
1. Synchronizer inoperative.		
a. Circuit breaker trips.	a. Short in airplane wiring.	a. Isolate and repair faulty component.
b. Intermittent readings on pins 1 & 3 or 1 & 5 (circuit breaker may also trip).	b. Intermittent short or open magnetic pickup in governor.	b. Repair or replace magnetic pickup.
c. Left governor pickup gives open or short circuit reading on pins 1 & 5.	c. Broken or grounded wire in magnetic pickup in governor.	c. Repair or replace magnetic pickup.
d. Right governor pickup gives open or short circuit reading on pins 1 & 3.	d. Broken or grounded wire in magnetic pickup in governor.	d. Repair or replace magnetic pickup.
e. Left governor coil gives open or short reading on pins 6 & 7.	e. Broken or grounded wire in coil. Coil defective.	e. Repair or replace broken wire or replace governor.
f. Right governor coil gives open or short reading on pins 4 & 7.	f. Broken or grounded wire in coil. Coil defective.	f. Repair or replace broken wire or replace governor.
2. Poor synchronization.		
a. Pickup voltage exceeds 3.0 volts at cruise rpm.	a. Insufficient pickup to flyweight head clearance.	a. Reset pickup to give specified voltage output. (See Woodward Governor Bulletin No. 33117.)
3. Oil leaks from magnetic pickup connection in governor body.		
	a. Defective O-ring between pickup and lock nut.	a. Replace.
	b. Defective gasket under lock nut.	b. Replace.
	c. Nut loose.	c. Tighten to 25 inch-pounds.
	d. Defective pickup.	d. Replace pickup.

CAUTION

See Woodward Governor Bulletin No. 33117. Never turn pickup into flyweight head. Check voltage output.

SECTION

8

FUEL SYSTEM

FUEL SYSTEM

Service all fuel systems with aviation gasoline, 100 LL (Blue) preferred or 100 (Green) octane minimum grade.

TC-1 THRU TC-1607 AND TE-1 THRU TE-942, EXCEPT TE-938

Airplane serials TC-1 thru TC-1607 and TE-1 thru TE-942, except TE-938 are equipped with a non-interconnected fuel system. The main and auxiliary cells in each wing provide the airplane with a total fuel capacity of either 112 gallons (106 gallons usable) or 142 gallons (136 gallons usable). These systems have either 25 or 40 gallon baffled or unbaffled inboard wing leading edge main fuel cells with a finger strainer in each inboard wing leading edge, and a 31 gallon auxiliary fuel cell with finger strainer in each wing box section. Thus, there is a total of either 53 or 68 gallons usable in each wing for a total of either 106 or 136 gallons usable with all fuel cells full. One flush-type filter cap is in each inboard wing leading edge and one flush-type filler cap is located in the outboard end of each wing box section cell.

A fuel selector panel in the cabin fuselage, in front of the spar cover between the front seats, is placarded OFF-AUX-MAIN-CROSSFEED for fuel management. The fuel selector valve for each engine is located below this panel and during normal operation fuel is consumed from the fuel cells in each wing as indicated by the fuel selector handles. Two fuel quantity indicators on the instrument panel indicate the amount of fuel in either the main or auxiliary fuel cells for their respective wings. A two position fuel cell selector switch on the pilots sub-panel determines the fuel cells, main or auxiliary, to which the fuel quantity indicators are connected. Fuel may be used as desired during level flight, however, since fuel from auxiliary cells must be used in level flight only, sufficient reserve must be retained in the main fuel cells for take-off, climb and landing. Fuel crossfeed operation is used in these systems during emergency conditions in level flight only.

8 snap-type drains (4 per wing) are provided. One drain in each wing is provided for the inboard wing leading edge fuel cell sump; fuel strainer drain; auxiliary fuel cell sump; fuel system low point in each side of cabin fuselage bottom.

TC-1608 THRU TC-2002, EXCEPT TC-1970

Airplane serials TC-1608 thru TC-2002, except TC-1970, are equipped with an interconnected fuel system. The tanks are interconnected within each wing and provide the airplane with a total fuel capacity of 142 gallons (136 gallons usable). This system has an inboard wing leading edge unbaffled fuel cell with fuel reservoir, finger strainer and fuel outlet nipple through the wing root rib that is interconnected to a wing box section fuel cell for 68 gallons usable in each wing system or a total of 136 gallons usable with left and right wing systems full. One flush type filler cap is located in the outboard end of the wing box section cell. A fuel selector panel, located in the cabin fuselage in the front spar cover between the front seats, is placarded OFF-ON-CROSSFEED for fuel manage-

ment. The fuel selector valve for each engine is located below this panel and during normal operation, fuel is consumed from each wing system as indicated by the fuel selector handles. Two fuel quantity indicators on the instrument panel indicates the amount of fuel in each wing system. Fuel crossfeed operation is used during emergency conditions in level flight only.

8 snap-type drains (4 per wing) are provided. One drain in each wing is provided for the inboard wing leading edge fuel cell sump; fuel strainer; wing box section fuel cell sump; fuel system low point (in wing).

TE-938, TE-943 THRU TE-1083 EXCEPT TE-1081

Airplane serials TE-938, TE-943 thru TE-1083, except TE-1081 are equipped with interconnected fuel cells in each wing to provide the airplane with a total fuel capacity of either 142 gallons (136 gallons usable) or 172 gallons (166 gallons usable). Except for the engine fuel lines forward of the firewalls, the 142 gallon total capacity system is the same as described under the heading TC-1608 THROUGH TC-2002, EXCEPT TC-1970 in this section.

The 172 gallon system utilizes cells described in the 142 gallon system and an additional fuel cell in each outboard wing leading edge. This cell has a bottom mounted fuel level transmitter located in the inboard end of the cell. The cells are interconnected to provide 83 gallons usable in each wing system or a total of 166 gallons usable with left and right wing systems full. One flush-type filler cap is in the outboard end of each outboard wing leading edge cell.

The function for fuel management and the fuel selector panel, fuel selector valves and fuel quantity indicators are in the same location as described for the 142 gallon total capacity system under the heading TC-1608 THROUGH TC-2002, EXCEPT TC-1970.

NOTE

Fuel crossfeed operations are used in these systems during emergency conditions in level flight only.

8 snap-type drains (4 per wing) are provided. One drain in each wing is provided for the inboard wing leading edge fuel cell sump; fuel strainer; wing box section fuel cell sump; fuel system low point (in wing).

TH-1 THRU TH-384

Airplane serials TH-1 thru TH-384 are equipped with interconnect cells in each wing to provide the airplane with a total fuel capacity of either 142 gallons (136 gallons usable) or 172 gallons (166 gallons usable). The 142 gallon total capacity system has an inboard wing leading edge baffled fuel cell with sump strainer and fuel outlet nipple through the inboard end of the wing main spar. This cell is interconnected to a

wing box section fuel cell for 68 gallons usable in each wing system or a total of 136 gallons usable with left and right wing systems full. One flush-type filler cap is located in the outboard end of the wing box section cell. A fuel selector panel, located on the cabin fuselage floorboard forward of the front spar cover, is placarded OFF-ON-CROSSFEED for fuel management. Remote fuel controls in this panel are attached to fuel selector valves in the wheel wells for each engine. During normal operation, fuel is consumed from each wing system as indicated by the remote fuel selector handles in the cabin fuselage. Two fuel quantity indicators on the instrument panel indicate the amount of fuel in each wing system.

The 172 gallon total capacity system utilizes the cells described in the 142 gallon system and an additional fuel cell in each outboard wing leading edge. The cells are interconnected to provide 83 gallons of usable fuel in each wing system or a total of 166 gallons usable with left and right wing systems full. One flush-type filler cap is in the outboard end of each outboard wing leading edge. A fuel level transmitter is mounted in the top of the outboard wing leading edge fuel cell.

The function for fuel management and the fuel selector panel, remote fuel controls, fuel selector valves and fuel quantity indicators are in the same location as described for the 142 gallon total capacity system.

NOTE

Fuel crossfeed operations are used in these systems during emergency conditions in level flight only.

6 snap-type drains (3 per wing) are provided. Each wing is provided with 1 drain for: inboard wing leading edge fuel cell sump; fuel strainer; wing box section fuel cell sump.

TH-385 THRU TH-772, EXCEPT TH-766

Airplane serials TH-385 thru TH-772, except TH-766 are equipped with an interconnected fuel system. The cells are interconnected within each wing and provide the airplane with a total fuel capacity of 142 gallons (136 gallons usable), 172 gallons (166 gallons usable), or 200 gallons (194 gallons usable).

The 142 gallon total capacity system has an inboard wing leading edge un baffled fuel cell with a fuel reservoir, finger strainer and fuel outlet nipple through the wing root rib. This cell is interconnected to a wing box section fuel cell for 68 gallons usable in each wing system or a total of 136 gallons usable with left and right wing systems full. One flush-type filler cap is located in the outboard end of the wing box section cell. A fuel selector panel, located on the cabin fuselage floor forward of the front spar cover, is placarded OFF-ON-CROSSFEED for fuel management. Remote fuel

controls in this panel are attached to fuel selector valves in the wheel wells for each engine. During normal operation, fuel is consumed from each wing system as indicated by the remote fuel selector handles in the cabin fuselage. Two fuel quantity indicators on the instrument panel indicate the amount of fuel in each system.

The 172 gallon total capacity system utilizes the fuel cells described in the 142 gallon fuel system and an additional fuel cell in each outboard wing leading edge. This cell has a bottom mounted fuel level transmitter located in the inboard end of the cell. The cells are interconnected to provide 83 gallons usable in each wing system or a total of 166 gallons usable with left and right wing systems full. One flush-type filler cap is in the outboard end of each outboard wing leading edge cell.

The 200 gallon total capacity system (TH-669 thru TH-772, except TH-766) utilizes the fuel cells described in the 172 gallon fuel system and an additional wet wing tip fuel tank on each wing. The system is interconnected to provide 97 gallons of usable fuel in each wing system or a total of 194 gallons usable with left and right wing systems full. One flush-type filler cap is in each wet wing tip tank in addition to the flush-type filler cap in the outboard end of each outboard wing leading edge cell for the 172 gallon capacity system.

CAUTION

When servicing this system, remove the outboard cap first to prevent loss of fuel if it is above the level of the inboard cap.

The function for fuel management and the fuel selector panel, remote fuel controls, fuel selector valves and fuel quantity indicators are in the same location for the 172 or 200 gallon total capacity system as described for the 142 gallon total capacity system.

NOTE

Fuel crossfeed operations are used in these systems during emergency conditions in level flight only.

Airplane serials TH-385 thru TH-772, except TH-766, with either the 142 or 172 gallon total capacity fuel system, are equipped with a total of 6 snap-type drains (3 drains per wing). Each wing is provided with 1 drain for the inboard wing leading edge fuel cell sump; fuel strainer; wing box section fuel cell sump.

Airplane serials TH-669 thru TH-772, except TH-766 equipped with wet wing tips (200 gallon total capacity system) are provided with a total of 6 snap-type and 2 flush-type drains (4 drains per wing). Each wing is provided with 1 drain for the inboard wing leading edge fuel cell sump; fuel strainer;

wing box section fuel cell sump; wet wing tip (flush-type drain).

NOTE

Fuel crossfeed operations are used in these systems during emergency conditions in level flight only.

TC-1970, TC-2003 AND AFTER

Airplane serials TC-1970, TC-2003 and after are equipped with an interconnected fuel system. The cells which are interconnected within each wing, provide the airplane with a total fuel capacity of 142 gallons (136 gallons usable).

This system has an inboard wing leading edge, baffled fuel cell with sump strainer and fuel outlet nipple through the inboard end of the wing main spar. This cell is interconnected to a wing box section fuel cell for 68 gallons usable in each wing system or a total of 136 gallons usable with left and right wing systems full. One flush-type filler cap is located in the outboard end of the wing box section cell. A fuel selector panel, located on the cabin fuselage floorboard forward of the front spar cover, is placarded OFF-ON-CROSSFEED for fuel management. Remote fuel controls in this panel are attached to fuel selector valves in the wheel wells for each engine. During normal operation, fuel is consumed from each wing system as indicated by the remote fuel selector handles in the cabin fuselage. Two fuel quantity indicators on the instrument panel indicates the amount of fuel in each wing system.

6 snap-type drains (3 drains per wing) are provided. One drain in each wing is provided for: inboard wing leading edge fuel cell sump; fuel strainer; wing box section fuel cell sump.

TE-1081, TE-1084 AND AFTER

Airplane serials TE-1081, TE-1084 and after are equipped with an OFF-ON-CROSSFEED 142 or a 172 gallon total capacity fuel system. Except for engine lines forward of the firewalls, the 142 gallon total capacity system is the same as the 142 gallon total capacity system described under the heading TC-1970, TC-2003 AND AFTER in this section.

The 172 gallon total capacity system utilizes the fuel cells described in the 142 gallon fuel system and an additional outboard wing leading edge fuel cell on each wing. This system is interconnected to provide 83 gallons usable in each wing system, or a total of 166 gallons usable with left and right wing system full. One flush type filler cap is in the outboard end of each outboard wing leading edge cell.

The function for fuel management is the same and the fuel selector panel, remote fuel controls, fuel selector valves and fuel quantity indicators are in the same location as described for the 142 gallon total capacity system under the heading TC-1970, TC-2003 AND AFTER.

6 snap-type drains (3 drains per wing) are provided. One drain in each wing is provided for the inboard wing leading edge fuel cell sump; fuel strainer; wing box section fuel cell sump.

TH-766, TH-773 AND AFTER

Airplane serials TH-766, TH-773 and after, are equipped with an OFF-ON-CROSSFEED interconnected 142, a 172 or a 200 gallon total capacity fuel system.

Airplane serials TH-766, TH-773 and after, the 142 and 172 gallon total capacity systems are the same as the 142 and 172 gallon systems described for airplane serials TH-1 thru TH-384 except, the fuel sensor in the inboard end of the outboard wing leading edge fuel cell is bottom mounted instead of top mounted.

The 200 gallon total capacity fuel system utilizes the cells described in the 172 gallon fuel system and an additional wet wing tip fuel tank. This system is interconnected to provide 97 gallons usable in each wing system, or a total of 194 gallons usable with left and right systems full. One flush type filler cap is in each wet wing tip tank in addition to the flush type filler cap in the outboard end of each outboard leading edge cell for the 172 gallon system.

The fuel selector panel, remote fuel controls, fuel selector valves and fuel quantity indicators for the above systems are in the same location as described for TH-1 through TH-772, except TH-766, fuel systems. The function for fuel management is also the same.

NOTE

Fuel crossfeed operations are used in these systems during emergency conditions in level flight only.

Airplane serials TH-766, TH-773 and after, with either the 142 or 172 gallon total capacity fuel system are equipped with a total of 6 snap-type drains (3 drains per wing). Each wing is provided with 1 drain for the inboard wing leading edge fuel sump; fuel strainer; wing box section fuel cell sump.

Airplane serials TH-766, TH-773 and after, equipped with wet wing tips (200 gallon total capacity system) are provided with a total of 6 snap-type and 2 flush-type drains (4 drains per wing). Each wing is provided with 1 drain for the inboard wing leading edge fuel cell sump; fuel strainer; wing box section fuel cell sump; wet wing tip (flush-type drain).

Airplane serials TC-1608 and after, TE-938, TE-943 and after and TH-385 and after, are equipped with a fuel level sight gage located in each wing leading edge cell, outboard of the engine nacelle. The gages are to be used for fuel off loading and not to be used as fuel quantity indicators.

Being an injection type system most fuel malfunctions can be attributed to contaminated fuel, therefore, the wheel well mounted strainers, finger strainers and sump strainers should be inspected and cleaned regularly. The frequency of inspection and cleaning will depend upon service conditions, fuel handling equipment, cleanliness and local sand and dust conditions.

NOTE

If Goodyear fuel cells, manufactured after 1961 (Construction No. BTC-39, BTC-54A and BTC-67) are installed, no preservation procedures are necessary when the cell is to be empty for an indefinite period of time. The fuel cell should not be open to the atmosphere except for the normal vent lines in the airplane. Goodyear fuel cells manufactured prior to 1961 and Uniroyal fuel cells must be filled every ten days or the walls coated with a thin coat of light engine oil.

FUEL SYSTEM CAPACITIES

FUEL CAPACITY

AIRPLANE SERIAL	FUEL SELECTOR POSITIONS	CAPACITY
TC-1 thru TC-1607; TE-1 thru TE-942, except TE-938	OFF-AUX-MAIN-CROSSFEED	112 Gallon, Non-Interconnected, Capacity System (106 Gallon Usable)
TC-1 thru TC-1607; TE-1 thru TE-942, except TE-938	OFF-AUX-MAIN-CROSSFEED	142 Gallon, Non-Interconnected, Capacity System (136 Gallon) Usable)
TC-1608 and after; TE-938, TE-943 and after; TH-1 and after	OFF-ON-CROSSFEED	142 Gallon, Interconnected, Capacity System (136 Gallon Usable)
TE-938, TE-943 and after; TH-1 and after	OFF-ON-CROSSFEED	172 Gallon, Interconnected, Capacity System (166 Gallon Usable)
TH-669 and after With Wet Wing Tips	OFF-ON-CROSSFEED	200 Gallon, Interconnected, Capacity System (194 Gallon Usable)



Prior to TC-251

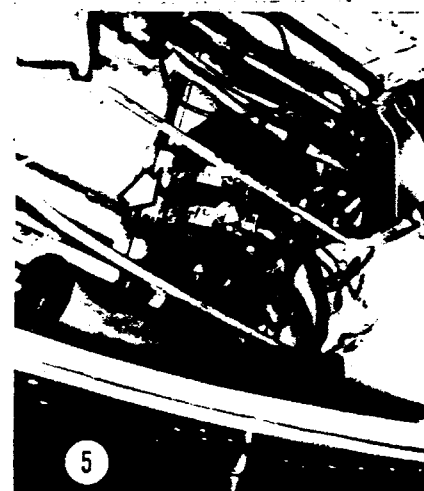


FUEL STRAINER

TC-251 thru TC-1607
TE-1 thru TE-942,
except TE-938



Prior to TC-251

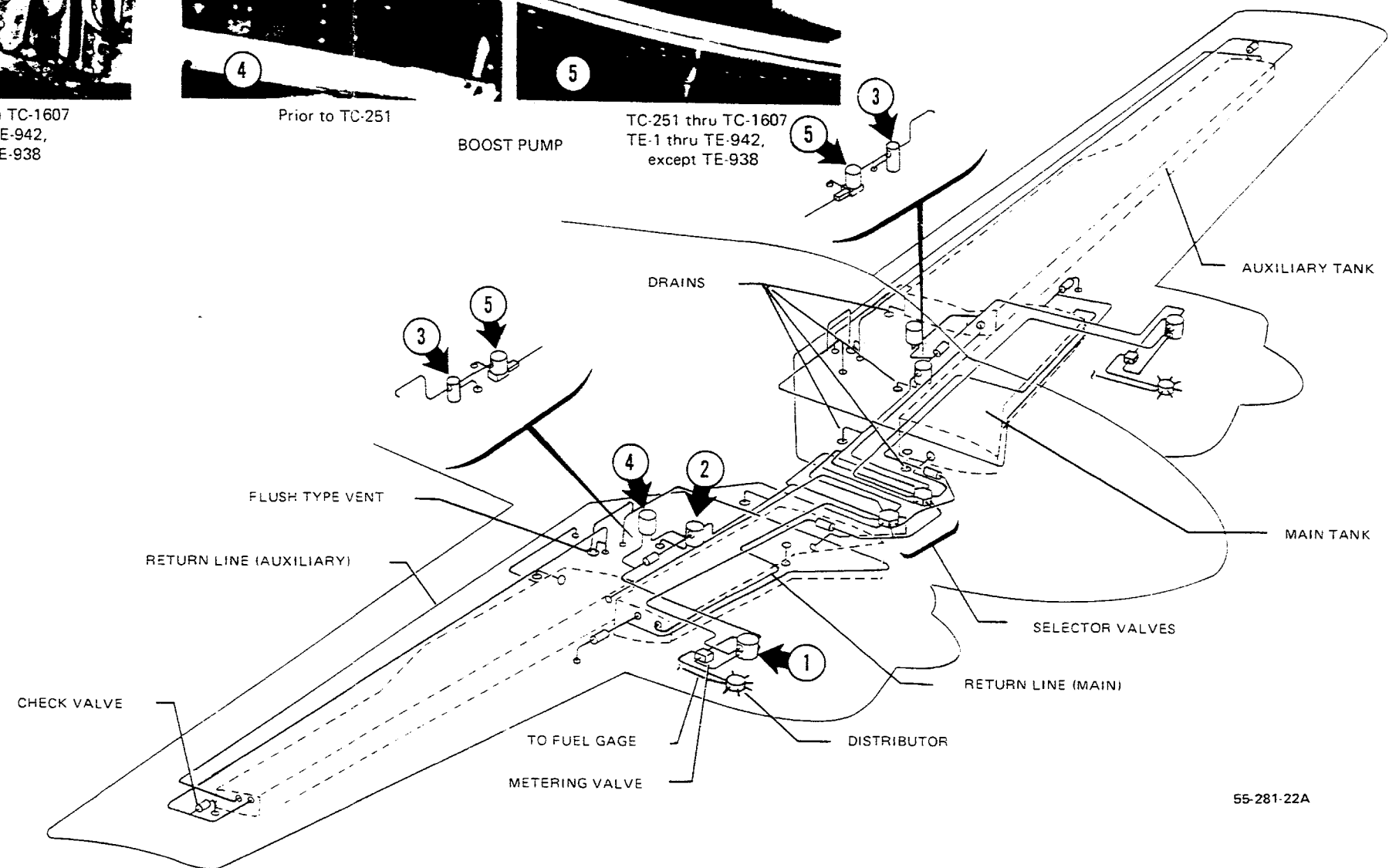


BOOST PUMP

TC-251 thru TC-1607
TE-1 thru TE-942,
except TE-938

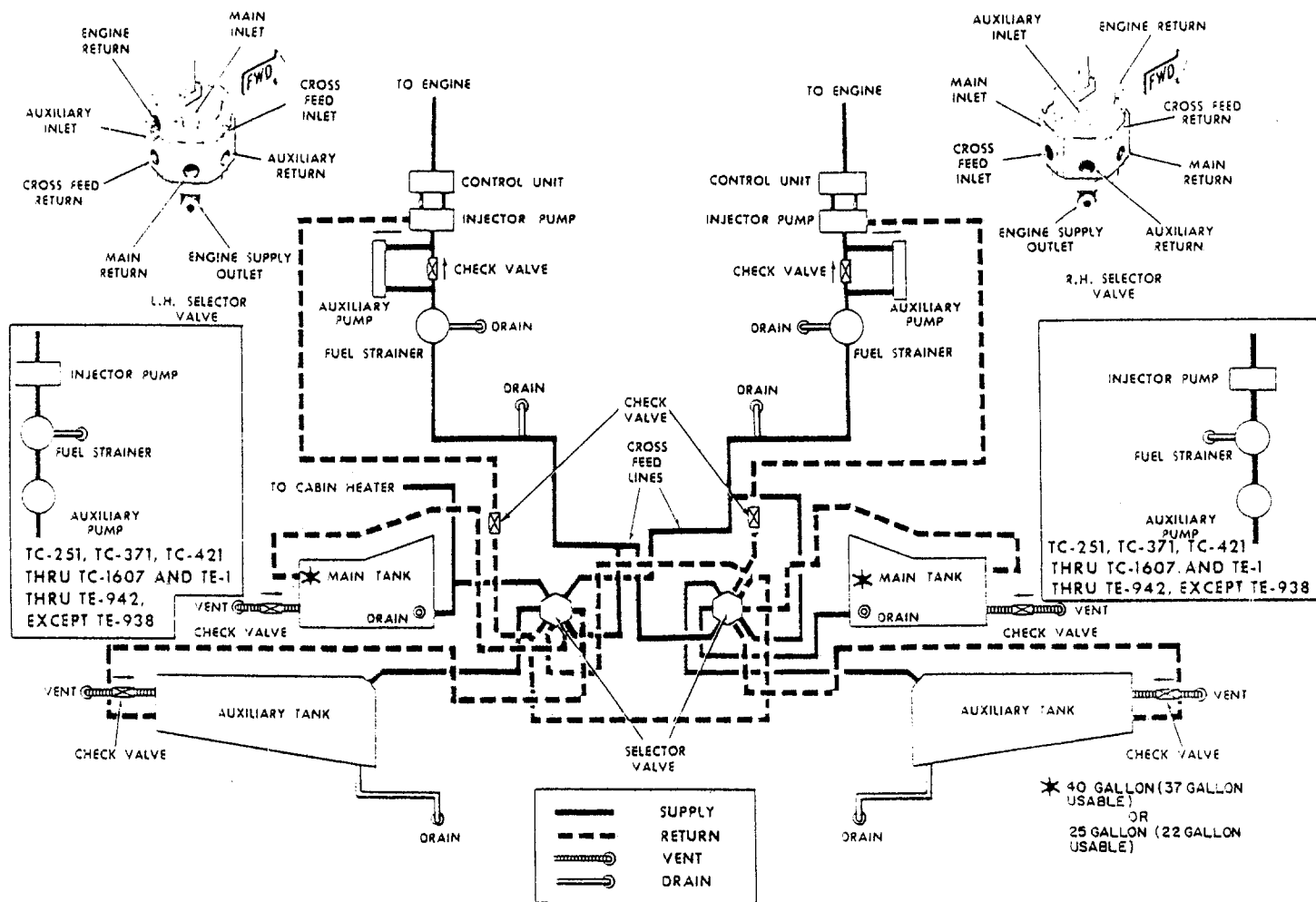


ENGINE DRIVEN FUEL PUMP



55-281-22A

Figure 8-1. Fuel System (TC-1 thru TC-1607 and
TE-1 thru TE-942, except TE-938)



55-603-28A

Figure 8-2. Fuel System Schematic, OFF-ON-CROSSFEED, (TC-1 thru TC-1607, and TE-1 thru TE-942, except TE-938).

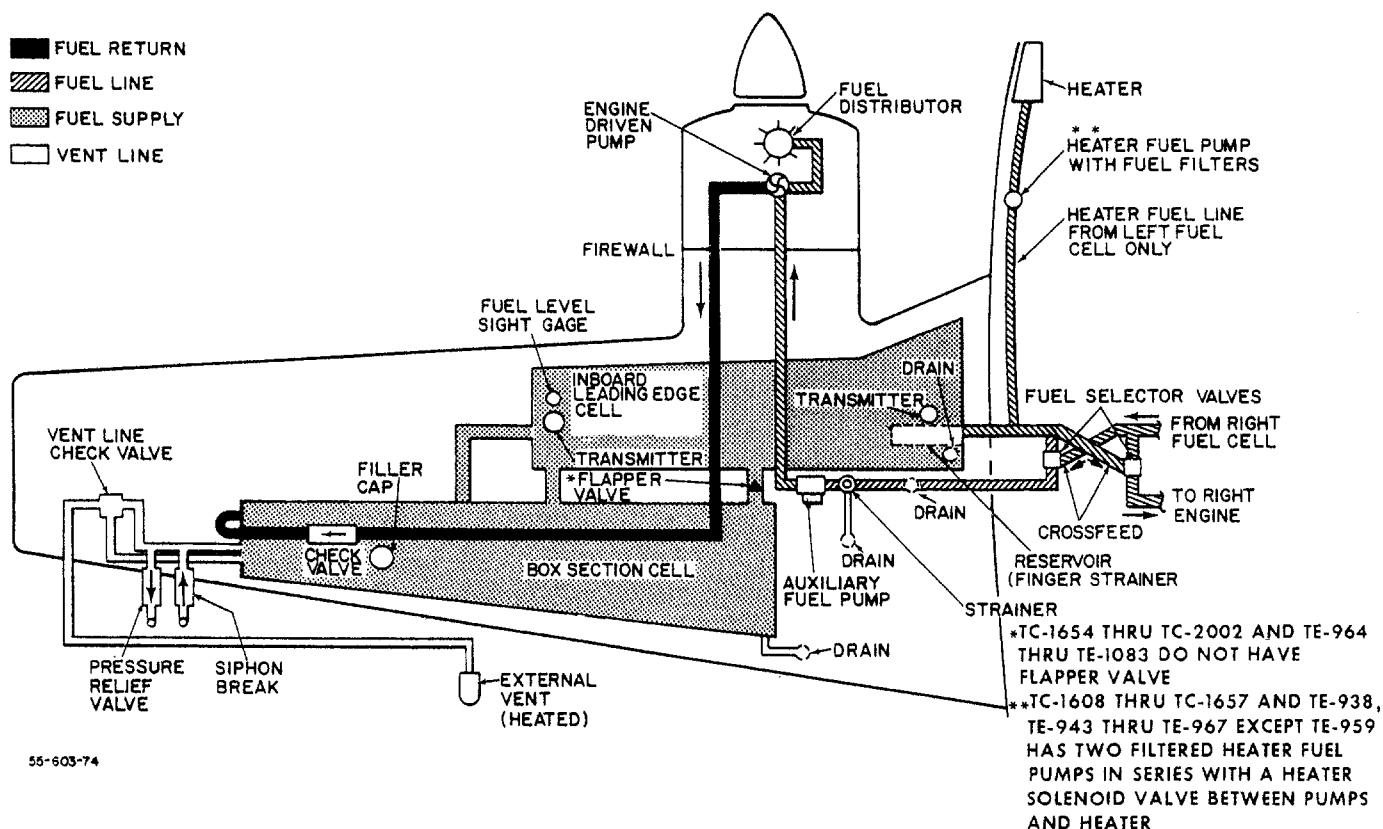


Figure 8-3. Fuel System 142 Gallon Capacity,
 (136 Gallons Usable, TC-1608 thru TC-2002 except TC-1970,
 TE-938, TE-943 thru TE-1083 except TE-1081).

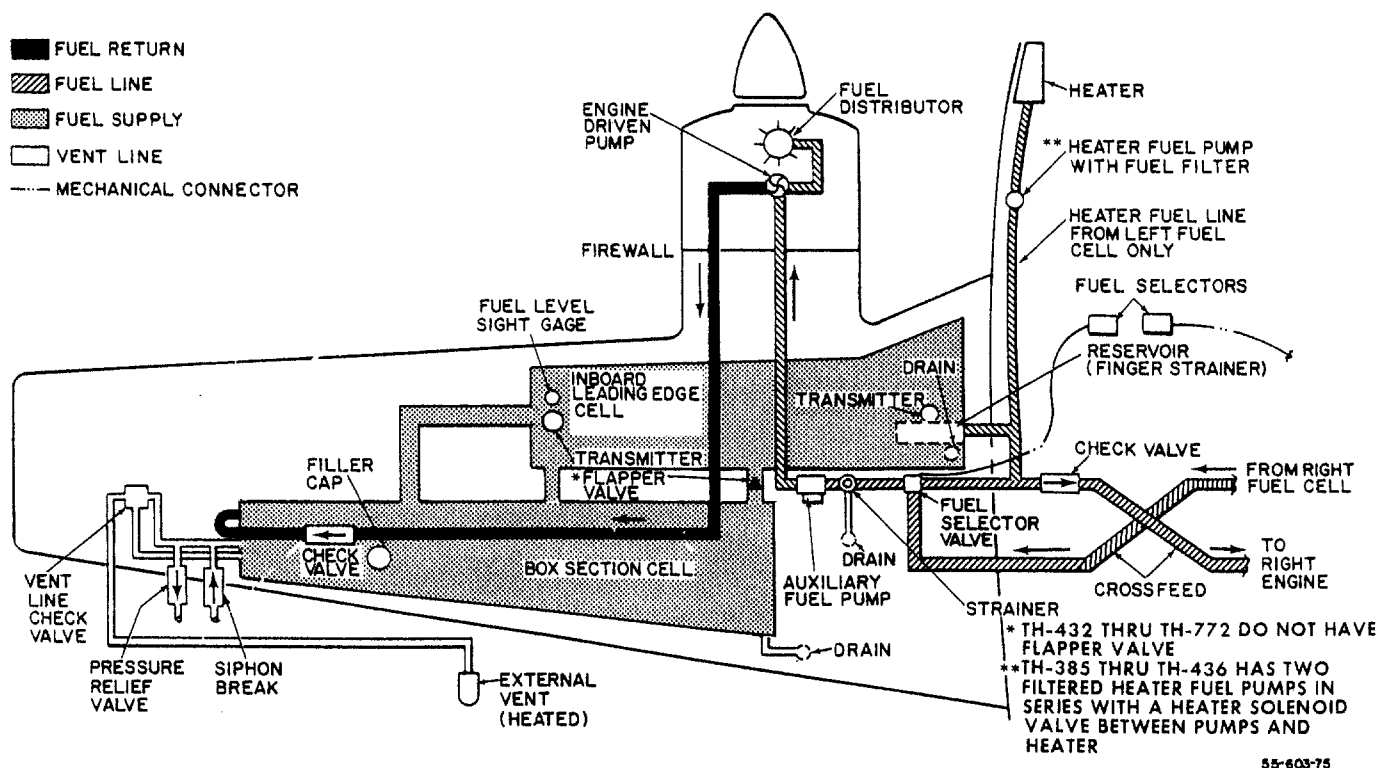


Figure 8-4. Fuel System 142 Gallon Capacity,
 (136 Gallons Usable, TH-385 thru TH-772 except TH-766).

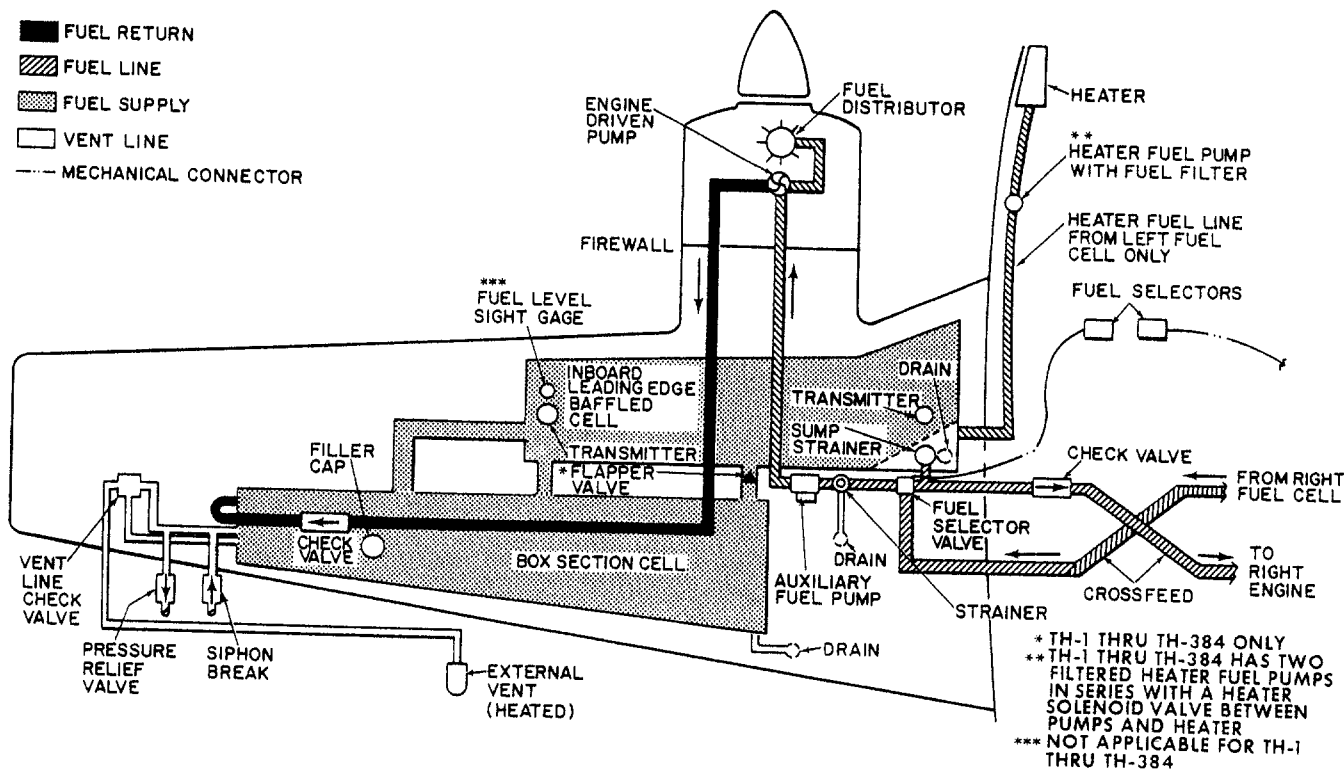


Figure 8-5. Fuel System, 142 Gallon Capacity,
 (136 Gallons Usable, TC-1970, TC-2003 and after,
 TE-1081, TE-1084 and after, TH-1 thru TH-384, TH-766, TH-773 and after).

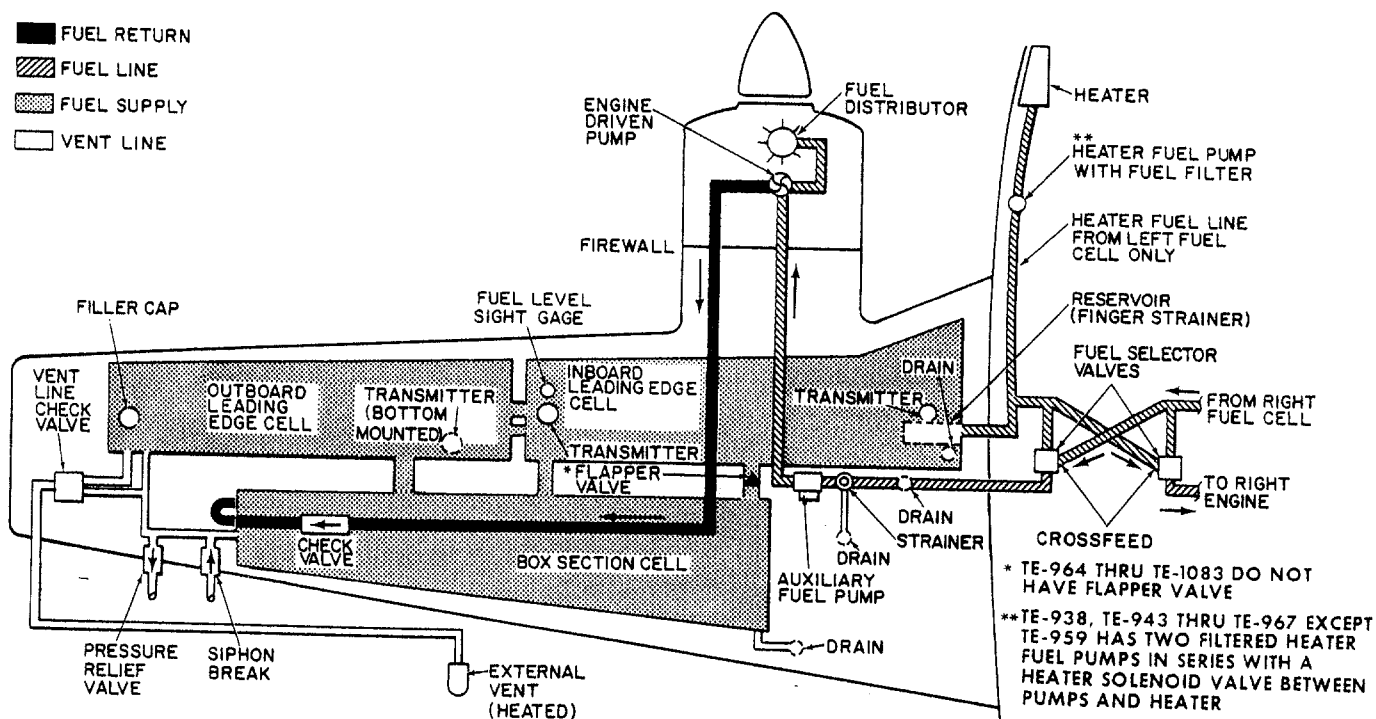


Figure 8-6. Fuel System, 172 Gallon Capacity,
 (166 Gallons Usable, TE-938, TE-943 thru TE-1083
 except TE-1081).

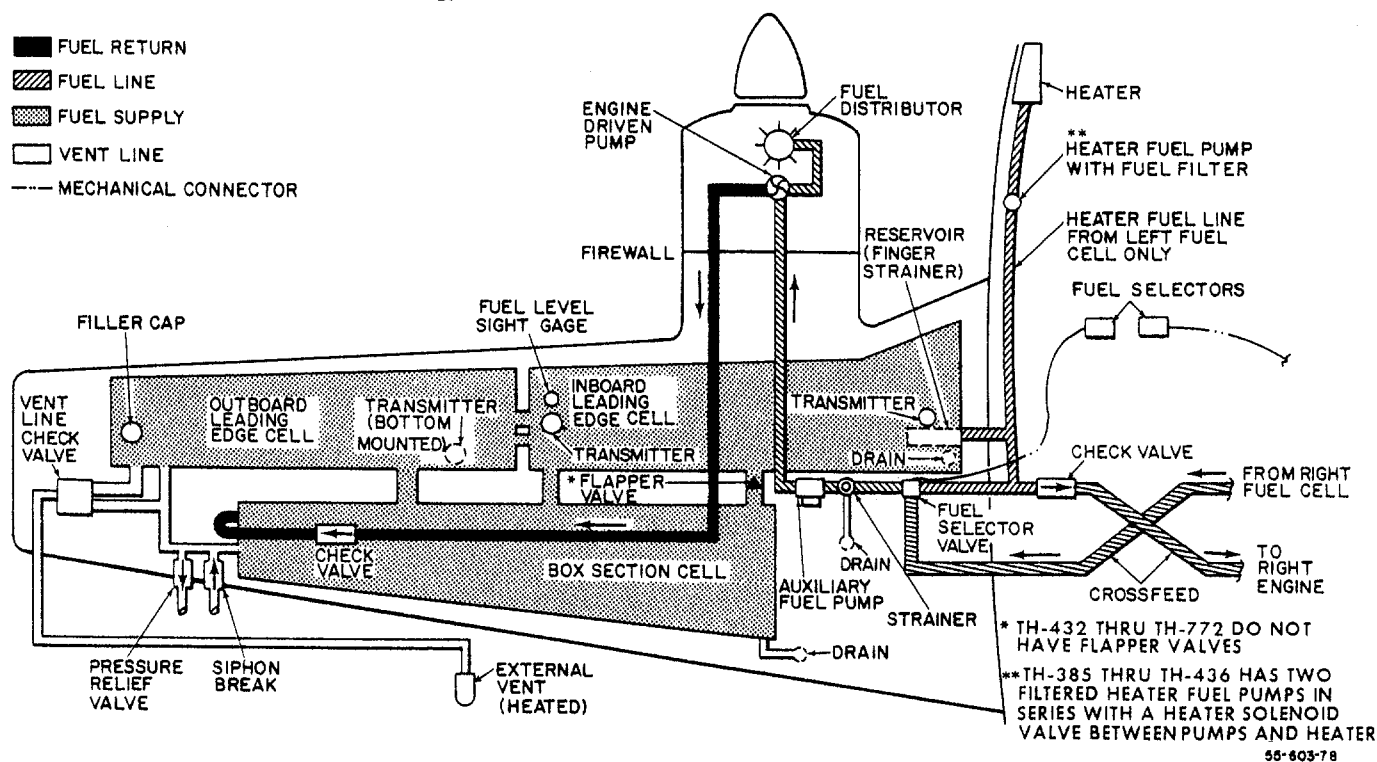


Figure 8-7. Fuel System, 172 Gallon Capacity,
(166 Gallons Usable, TH-385 thru TH-772 except TH-766).

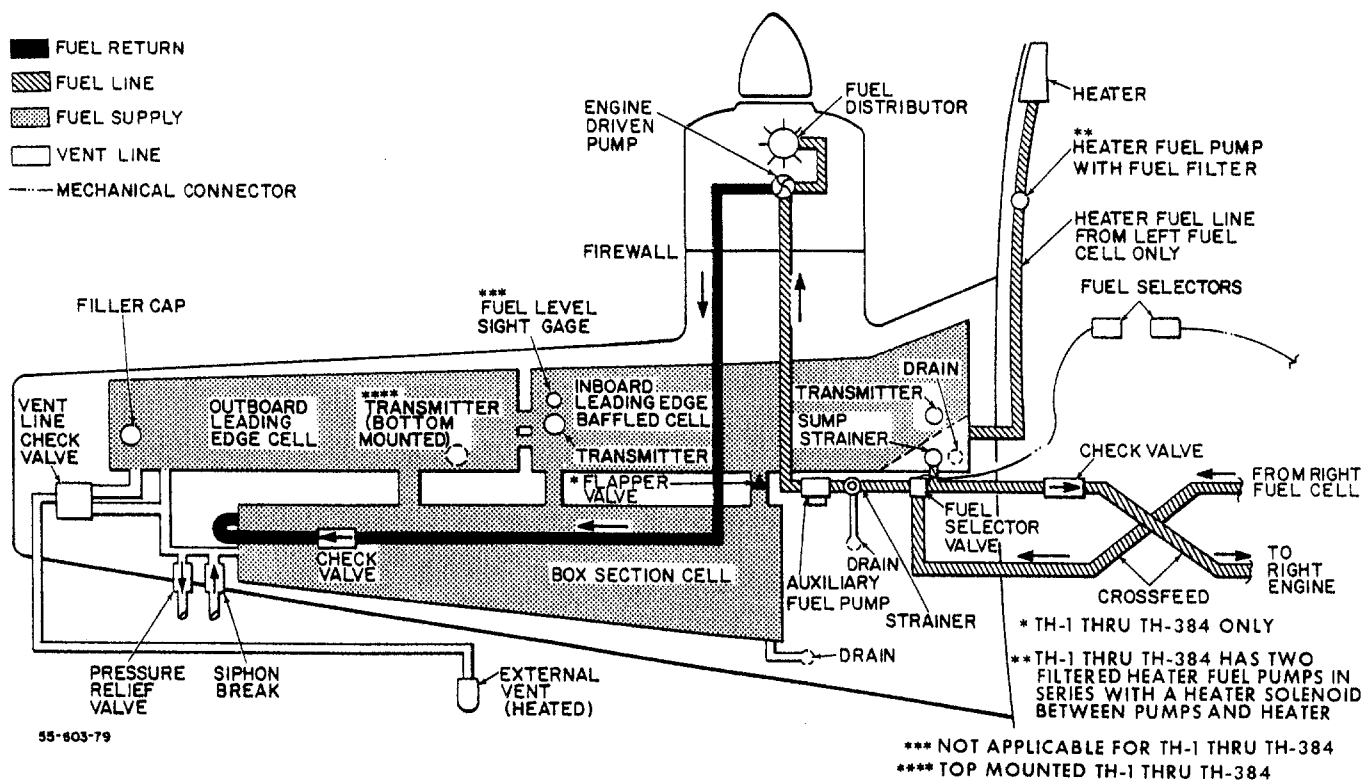
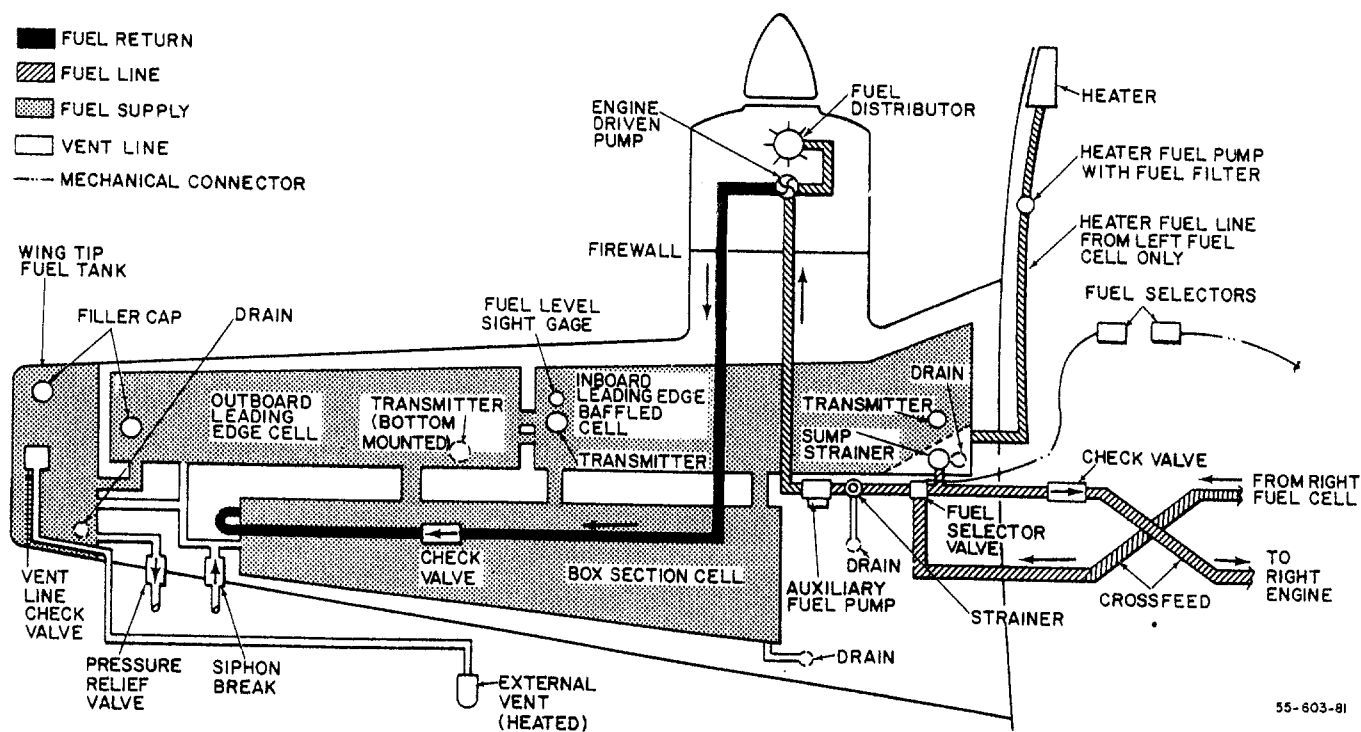
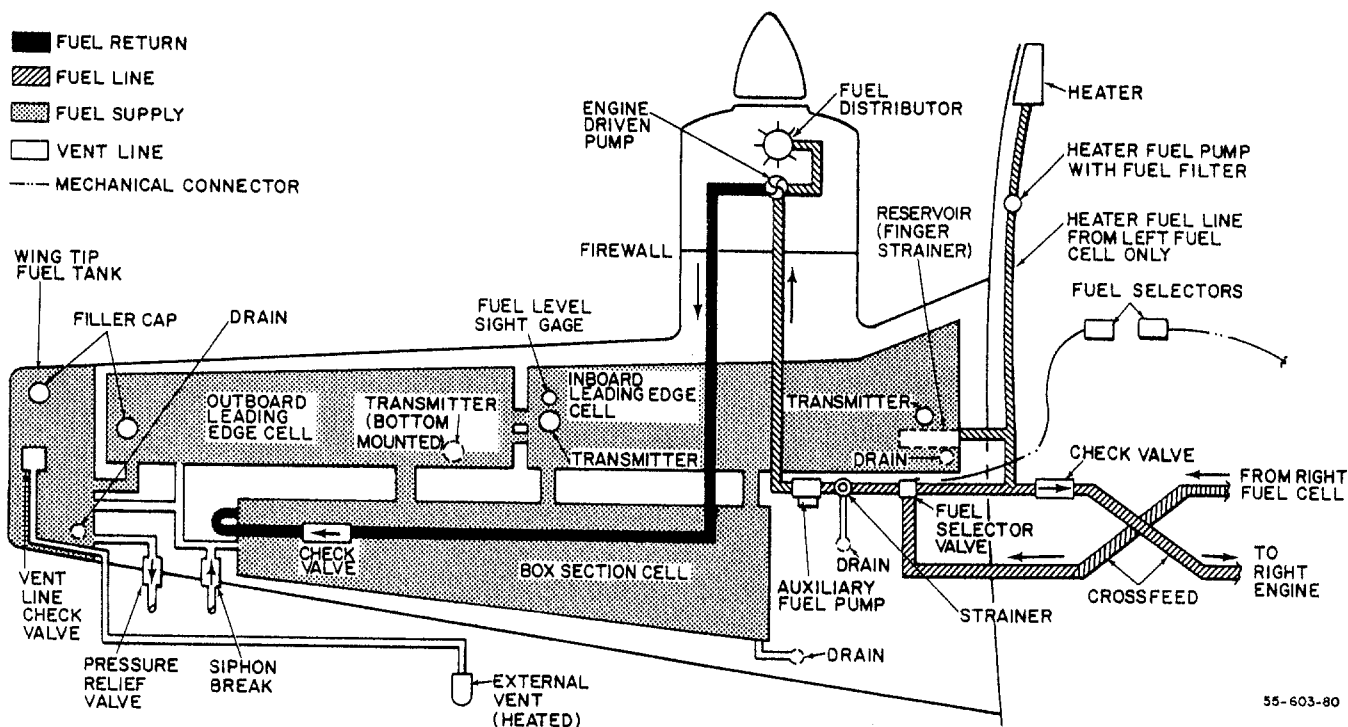


Figure 8-8. Fuel System, 172 Gallon Capacity,
(166 Gallons Usable, TE-1081, TE-1084 and after,
TH-1 thru TH-384, TH-766, TH-773 and after).



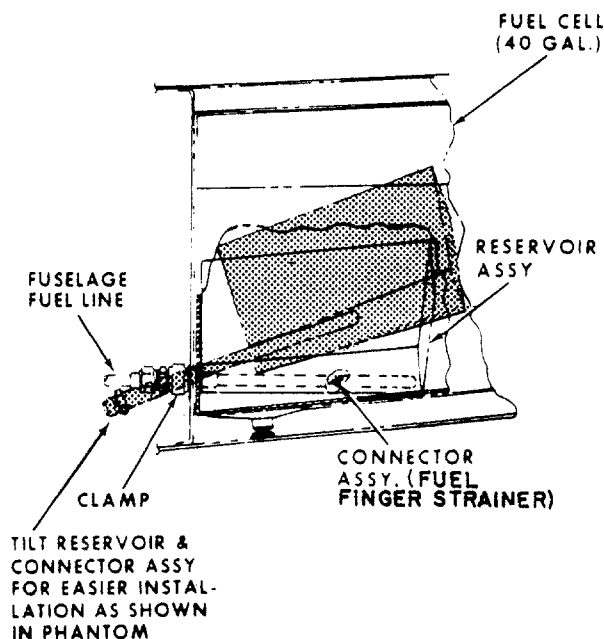
RESERVOIR REMOVAL (TC-1608 thru TC-2002, except TC-1970; TE-938, TE-943 thru TE-1083, except TE-1081; TH-385 thru TH-772, except TH-766)

- With the fuel selector valves in the OFF position, drain the fuel cells.
- Remove the wing access cover and plate.
- Remove the jack pad cover plate.
- Loosen the nipple clamp and disconnect the fuel line to the connector assembly.

NOTE

Wrap the edges of the access hole and liner with masking tape to prevent damage to the reservoir during removal.

- Remove the connector assembly from the reservoir while tilting both the reservoir and connector assembly upward.
- Compress the reservoir (squeeze by hand) into a small circumference and pass it through the fuel access ring to remove from the fuel cell.



55-295-5

Figure 8-11. Fuel Cell Reservoir, (TC-1608 thru TC-2002, except TC-1970; TE-938, TE-943 thru TE-1083, except TE-1081; TH-385 thru TH-772; except TH-766).

RESERVOIR INSTALLATION (TC-1608 thru TC-2002, except TC-1970; TE-938, TE-943 thru TE-1083, except TE-1081; TH-385 thru TH-772, except TH-766)

Install the reservoir after the fuel cell is in the wing and before the access plate is installed. Installation may be accomplished as follows:

- Tape the reservoir flapper valve shut before installing the reservoir.
- Compress the reservoir (squeeze by hand) into a small circumference and pass it through the fuel access ring into the fuel cell.

c. Release the reservoir, allowing it to assume its original shape.

d. Insert the connector assembly into the reservoir while tilting both the reservoir and connector assembly upward.

CAUTION

Care should be exercised to avoid cross threading the connector into the reservoir. Also avoid bending or distorting the fuel strainer which is attached to the end of the connector, for it may become entangled in the foam inside the reservoir.

e. Thread the connector assembly into the reservoir until it will advance no further. No specific torque is required.

f. Tighten the nipple clamp.

g. Connect the fuel line to the connector assembly.

h. Remove the tape from the flapper valve and check the valve for free play and a good seal.

i. Check to make sure the reservoir is positioned properly on the bottom of the fuel cell.

j. Close all accesses.

CAUTION

The parts of the aerobatic reservoir type fuel cells, baffled fuel cells, and non-baffled fuel cells are not interchangeable. When installing a new fuel cell, use only those items pertaining to that particular cell being installed. Extreme care should be used when installing the finger fuel strainer to prevent damage to the fuel cell. The long finger fuel strainer (approximately 9 inches) is used only in the aerobatic reservoir type fuel cell as provided in Kit No. 35-9012. All other inboard main fuel cells that use a finger fuel strainer use the short type finger fuel strainer (approximately 4 inches long). Refer to the applicable BEECHCRAFT Parts Catalog for the particular installation. The reference to "aerobatic" in this "CAUTION" refers only to the type of reservoir fuel cells and does NOT express or imply that the airplanes involved are to be flown in an aerobatic configuration. The Baron airplanes are NOT certified for aerobatic flight; refer to the applicable Pilot's Operating Manual for certified flight operations.

REMOVING MAIN FUEL CELLS (TC-1 thru TC-1607 and TE-1 thru TE-942, except TE-938)

- Drain and purge the fuel cell.
- Remove the access plate at the fuel cell filler cap adapter and transmitter.
- Remove the transmitter, the liner access cover and inboard fuel cell cover plate.
- Remove the jack pad cover plate and remove the fuel strainer.
- Remove the fuel cell drain plug.
- Remove the fuel cell access door on the underside of the wing.
- Disconnect the fuel cell plumbing at the access door on the underside of the wing at the outboard end.

NOTE

Wrap the edges of the access hole and liner with masking tape to prevent damage to the cell during removal.

- h. Unsnap the fuel cell and remove it from the wing cavity.

INSTALLING MAIN FUEL CELLS (TC-1 thru TC-1607 and TE-1 thru TE-942, except TE-938)

NOTE

For ease of installation, place the fuel cell in an area where the temperature is at least 60°F and allow a sufficient heat soak period to ensure flexibility of the fuel cell.

- a. Carefully insert the fuel cell through the access hole and snap the cell in place.
- b. Connect the fuel cell plumbing at the access hole on the underside of the wing.
- c. Install the fuel cell drain plug.
- d. Install the fuel strainer.
- e. Install the transmitter.
- f. Install the clamps on the interconnects. Torque the nipple clamps to 11 ± 1 inch-pounds on Uniroyal cells and 25 ± 5 inch-pounds on Goodyear cells.
- g. Install the access covers.

REMOVING AUXILIARY FUEL CELLS (TC-1 thru TC-1607 AND TE-1 thru TE-942, except TE-938)

- a. Drain and purge the fuel cell.
- b. Detach the fuel cell cap adapter from the wing and remove the inboard and outboard fuel cell transmitters. The inboard transmitter is accessible through the inspection door in the upper nacelle skin.
- c. Remove the fuel cell access plates on the underside of the wing and remove the fuel cell access plates.
- d. Disconnect the plumbing at the inboard and outboard ends of the fuel cell.
- e. Remove the drain valve tube from the inboard aft corner of the fuel cell.

NOTE

Wrap the edges of the access hole and liner with masking tape to prevent damage to the cell during removal.

- f. Unsnap the fuel cell and remove it from the wing cavity.

INSTALLING AUXILIARY FUEL CELLS (TC-1 thru TC-1607 and TE-1 thru TE-942, except TE-938)

NOTE

For ease of installation, place the fuel cell in an area where the temperature is at least 60°F and allow a sufficient heat soak period to ensure flexibility of the fuel cell.

- a. Carefully insert the fuel cell through the access hole and snap the cell in place.
- b. Install the drain valve tube in the inboard aft corner of the fuel cell.
- c. Connect the plumbing at the inboard and outward ends of the fuel cell.
- d. Install the fuel cell access plates, located under the fuel cell access plates on the underside of the wing.
- e. Install the inboard and outboard fuel cell transmitters. The inboard transmitter is accessible through the inspection door in the upper nacelle skin.
- f. Install the fuel cell cap adapter to the wing. Apply Permatex No. 2 (Item 3, Sealing Chart) between the adapter and skin attach.
- g. Install the clamps on the interconnects. Torque the nipple clamps to 11 ± 1 inch-pounds on Uniroyal and 25 ± 5 inch-pounds on Goodyear cells.
- h. Install the access covers.

REMOVING INBOARD LEADING EDGE FUEL CELL (TC-1608 and after, TE-938, TE-943 and after and TH-1 and after)

- a. With the selector valves in the OFF position, drain the wing cells.
- b. Remove the access cover and the transmitter (outboard in top of the wing) and fuel level sight gage if installed, as described in FUEL CELL TRANSMITTER REMOVAL in this section.
- c. Remove the access cover and transmitter (inboard on top of the wing) as described in FUEL CELL TRANSMITTER REMOVAL in this section.
- d. Remove the exhaust heat shield and the access cover on the underside of the wing.
- e. Remove the fuel cell access plate.
- f. Remove the cotter pin which holds the flapper valve inside the inboard interconnect tube if installed.
- g. Disconnect the inboard and outboard interconnect tubes through the access doors.
- h. Airplane serials TH-1 thru TH-384, TH-766, TH-773 and after, TC-1970, TC-2003 and after and TE-1081, TE-1084 and after;

1. Disconnect the hose to the sump assembly through the inboard access door.
2. Remove the hose, sump assembly and the fuel outlet.

3. Disconnect the heater fuel line (LH cell only).

i. Airplane serials TC-1608 thru TC-2002, except TC-1970; TE-938, TE-943 thru TE-1083, except TE-1081; TH-385 thru TH-772, except TH-766:

1. Remove fuel cell reservoir and fuel connector as described in RESERVOIR REMOVAL in this section.

j. Disconnect the vent lines at the outboard end of the cell.

k. Snap out the cell and pull it through the top of the outboard access opening.

NOTE

Wrap the edges of the access hole and the liner with masking tape to prevent snagging the fuel cell during its removal.

INSTALLING INBOARD LEADING EDGE FUEL CELL (TC-1608 and after, TE-938, TE-943 and after and TH-1 and after)

NOTE

This note does not apply to airplane serials TH-1 thru TH-384. Prior to installing a new inboard leading edge fuel cell, particular attention should be paid to the removable yellow tag which is attached to the cell near the nipple and which reads as follows:

THIS CELL CONTAINS AN INTERNAL NIPPLE WHICH IS COVERED BY A WEB INTEGRAL WITH THE CELL. WHEN THIS CELL IS BEING INSTALLED IN MODELS E55 AND 58 EQUIPPED WITH THE OUTBOARD LEADING EDGE CELL, THE NIPPLE MUST BE LOCATED AND THE WEB CAREFULLY CUT-OUT. THIS NIPPLE IS LOCATED ON THE OUTBOARD END, 2.87 INCHES FORWARD OF THE LOWER AFT CORNER.

NOTE

For ease of installation, place the fuel cell in an area where the temperature is at least 60°F, and allow a sufficient heat soak period to ensure flexibility of the cell.

a. Install the cell through the top outboard access opening.

b. Align the snap hangers that secure the cell to the upper wing and fasten it in place.

c. Connect the vent lines.

d. Airplane serials TH-1 thru TH-384, TH-766, TH-773 and after, TC-1970, TC-2003 and after and TE-1081, TE-1084 and after:

1. Position the fuel cell in place and press the velcro pile and hook together pressing outward in the area of the velcro tape.

2. Inspect flapper valve as described in INSPECTION OF MAIN FUEL CELL FLAPPER VALVE in this section.

3. Install hose, sump assembly and fuel outlet.

4. Install heater fuel line (LH only).

e. Airplane serials TC-1608 thru TC-2002, except TC-1970; TE-938, TE-943 thru TE-1083, except TE-1081; TH-385 thru TH-772, except TH-766:

1. Install the fuel cell reservoir and fuel connector as described in this section under the heading RESERVOIR INSTALLATION.

CAUTION

This caution does not apply to airplanes serials TH-1 thru TH-384. To prevent pushing the interconnect tubes out of place when installing the inboard leading edge fuel cell, it may be necessary to hold interconnect tubes through access in the box section cell.

f. Connect the fuel outlet. Torque 20 to 30 inch-pounds and safety wire.

g. Install the clamps on the interconnect tubes. Torque the nipple clamps to 11 ± 1 inch-pounds on Uniroyal cells and 25 ± 5 inch-pounds on Goodyear cells.

NOTE

On airplane serials prior to TC-1654, TE-964 and TH-432 which were originally equipped with inboard interconnect flapper valves, there is no need to replace a flapper valve should either one or both be removed.

h. Install the fuel cell access plates and safety wire.

i. Install the transmitters as described under the heading FUEL CELL TRANSMITTER INSTALLATION in this section.

j. Install the access covers.

REMOVING BOX SECTION CELL (TC-1608 and after, TE-938, TE-943 and after and TH-1 and after)

a. With the selector valves in the OFF position, drain all wing cells.

b. Remove the screws securing the fuel cell filler cap

adapter or access cover to the wing skin.

- c. Remove the inboard and outboard access covers on the underside of the wing.
- d. Remove the inboard and outboard fuel cell access plates.
- e. Remove the interconnect clamps.

CAUTION

Airplane serials TH-1 thru TH-234 do not apply to this caution. When removing fuel cells from the interconnect tubes, exercise caution to prevent pulling interconnect tubes out of the inboard and/or outboard leading edge cells.

- f. Disconnect the drain and vent plumbing.
- g. Snap out the cell and pull it through the outboard access opening.

NOTE

Wrap the edges of the access hole and the liner with masking tape to prevent damage to the cell during its removal.

INSTALLING BOX SECTION CELL (TC-1608 and after, TE-938, TE-943 and after, and TH-1 and after)

NOTE

For ease of installation, place the fuel cell in an area where the temperature is at least 60°F and allow sufficient heat soak period to ensure flexibility of the fuel cell.

- a. Install the filler cap adapter or access plate to the fuel cell. Torque 45 to 55 inch-pounds and safety wire. Apply Permatex No. 2 (Item 3, Sealing Chart) between the adapter and skin and attach.
- b. Install the cell through the outboard access opening.
- c. Align the snap hangers that secure the cell to the upper wing skin and fasten it in place.
- d. Connect the vent and drain lines.
- e. Install the clamps on the interconnect tubes. Torque the nipple clamp 11 ± 1 inch pounds on Uniroyal cells and 25 ± 5 inch pounds on Goodyear cells.
- f. Install the fuel cell access plates and safety wire. Install the access cover.
- g. Install the screws securing the fuel cell filler cap adapter or access cover to the wing skin.

REMOVING OUTBOARD LEADING EDGE CELL (TE-938, TE-943 and after and TH-1 and after)

- a. With the selector valves in the OFF position, drain the wing cells.

- b. Remove the screws securing the filler cap adapter to the wing skin.
- c. Remove the access cover and the transmitter as described under the heading FUEL CELL TRANSMITTER REMOVAL in this section.
- d. Remove the inboard and outboard access covers on the underside of the wing.
- e. Remove the inboard and outboard fuel cell access plates.
- f. Disconnect the vent lines and interconnect tubes. The vent lines are located aft, near the outboard end.
- g. Snap out the cell and pull it through the access opening.

NOTE

Wrap the edges of the access opening and the liner with masking tape to prevent snagging the cell during its removal.

INSTALLING OUTBOARD LEADING EDGE CELL (TE-938, TE-943 and after and TH-1 and after)

NOTE

For ease of installation, place the fuel cell in an area where the temperature is at least 60°F, and allow a sufficient heat soak period to ensure flexibility of the cell. The following portion of this note is not applicable on airplane serials TH-1 thru TH-384. Prior to installing a new outboard leading edge fuel cell, particular attention should be paid to the removable yellow tag which is attached to the cell, near the nipple.

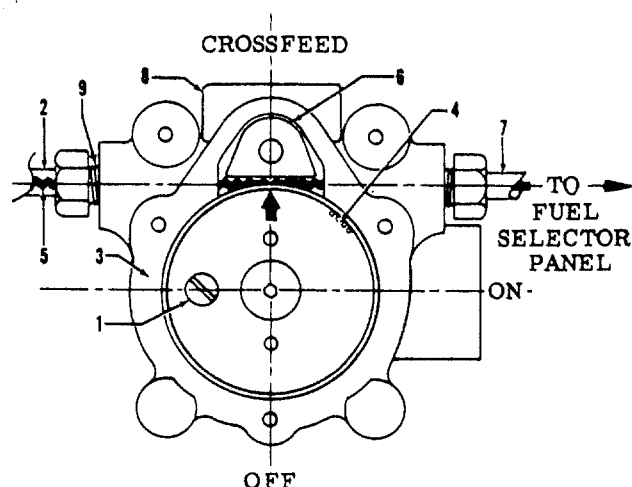
- a. Collapse the cell and install it through the outboard access opening.
- b. Align the snap hangers that secure the cell to the upper wing skin and fasten it in place.
- c. Connect the vent lines.
- d. Install the clamps on the interconnect tubes. Torque the nipple clamps to 11 ± 1 inch-pounds on Uniroyal cells and 25 ± 5 inch-pounds on Goodyear cells.
- e. Install the cell access plates and the transmitter and safety wire. Install the transmitter as described under the heading FUEL CELL TRANSMITTER INSTALLATION in this section.
- f. Install the access covers.

REMOVING THE FUEL SELECTOR VALVES (TC-1 thru TC-2002, except TC-1970, TE-1 thru TE-1084, except TE-1081)

- a. Turn both fuel selector valves to OFF.
- b. Unsnap the floor mat and remove the screws securing the fuel selector valve cover.
- c. When removing the fuel selector valve cover, be certain phone jacks, etc., if installed, are disconnected.
- d. With the fuel drained, identify the fuel selector

valve plumbing and disconnect.

e. Remove the fuel selector valve attaching screws and remove the fuel selector valve.



FUEL SELECTOR VALVE

(L. H. Shown, Cover Plate Removed)

- | | |
|---------------------------|---------------------|
| 1. Stop Screw | 6. Slider |
| 2. Over Travel Tube | 7. Cable Housing |
| 3. Selector Valve Gearbox | 8. Cross Feed Port |
| 4. Selector Gear | 9. Over Travel Port |
| 5. Control Cable | |

Figure 8-12. Fuel Selector Valve, (TH-1 and after, TC-1970, TC-2003 and after, TE-1081, TE-1084 and after).

INSTALLING THE FUEL SELECTOR VALVES (TC-1 thru TC-2002, except TC-1970, TE-1 thru TE-1084, except TE-1081)

a. Position the fuel selector valve and make certain the selector valve shafts are installed in the same position as removed and are properly engaged with the valves.

b. Install the fuel selector valve attaching screws.

c. Install the fuel selector valve plumbing, being certain it is in the same location as when removed. Remove plumbing identity tags.

d. If equipped, install phone jacks, etc., on fuel selector valve cover.

e. Install the fuel selector valve cover and attaching screws.

REMOVING THE FUEL SELECTOR VALVE (TC-1970, TC-2003 and after, TE-1081, TE-1084 and after and TH-1 and after)

a. Drain the fuel system.

b. Place the airplane on jacks and partially retract the gear until the inboard main gear door is fully extended.

c. Remove the selector control cable as described in this section under the heading FUEL SELECTOR VALVE CONTROL CABLE REMOVAL.

d. Remove the fuel selector valve plumbing.

e. Remove the bolts securing the selector valve to the mounting bracket.

INSTALLING THE FUEL SELECTOR VALVE (TC-1970, TC-2003 and after, TE-1081, TE-1084 and after and TH-1 and after)

a. Lubricate the fuel line threads with anti-seize compound (See Table of Thread Lubricants in Section 2) before installation.

b. Position the selector valve on the mounting bracket and install the attaching bolts.

c. Install the fuel selector valve plumbing.

d. Install the fuel selector control cable as described under the heading FUEL SELECTOR VALVE CONTROL CABLE RIGGING in this section.

FUEL SELECTOR VALVE CONTROL CABLE REMOVAL (TC-1970, TC-2003 and after, TE-1081, TE-1084 and after, TH-1 and after) (Figure 8-12)

a. Remove cover plate, overtravel tube and slider (held by snap-ring) from selector valve gear box (located in wheel well).

b. Rotate selector handle pointer (in fuel panel) to OFF position, rotate cable (in wheel well) by hand until cable is disengaged from fuel selector panel.

c. Slide cable out of housing and fuel selector valve gear box.

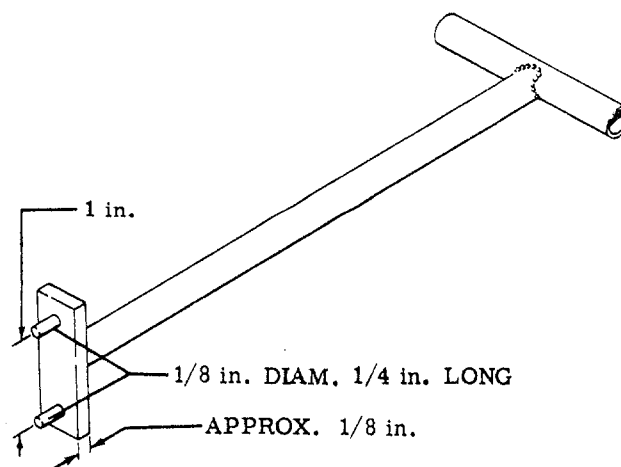


Figure 8-13. Rigging Tool, (TH-1 and after, TC-1970, TC-2003 and after, TE-1081, TE-1084 and after).

CAUTION

Handle cable with care to prevent damage.

FUEL SELECTOR VALVE CONTROL CABLE INSTALLATION AND RIGGING (TC-1970, TC-2003 and after, TE-1081, TE-1084 and after, TH-1 and after) (Figures 8-12 and 8-13)

To aid in the rigging procedure, a locally manufactured "Rigging Tool" (see Figure 8-13) may be constructed for turning the selector gear. Tubing of 1/4 or 3/8 inch diameter

is used for the handle and 1/8 inch steel pins are used for the protrusions which contact the selector gear.

With fuel selector control panel assembly installed, cable housing routed through the structure and the fuel valve installed in wheel well, proceed as follows:

- a. Remove cover plate, overtravel tube and slide (held by retaining ring) from selector valve gear box (located in wheel well).
- b. Set selector valve (using spanner wrench or rigging tool) to CROSSFEED position (arrow on selector gear at 12 o'clock).
- c. Insert cable through overtravel port and slide through the gear box and cable housing. Be certain the cable slides freely with no hang-ups.
- d. Slide cable inboard until the inboard end makes contact with gear in selector. The outboard end of the cable should be approximately 4 inches from the gear box surface.
- e. Set selector handle pointer (located in the fuel selector panel) to CROSSFEED position (pointing inboard). Hold in position.
- f. Rotate cable (LH threads) until tip end of cable is 2.8" min. to 3.2" max. from gear box surface.
- g. Install slider and secure with retaining ring (removed in step a.). Install overtravel tube (removed in step a.). Cycle the selector handle to all positions and check for proper operation and selection.
- h. Safety wire the overtravel tube.
- i. Install and safety wire cover plate screws.
- j. Do not apply grease or oil to gear.

INSTALLATION OF REPLACEMENT FUEL LEVEL TRANSMITTERS IN THE MAIN FUEL CELLS (TC-1 thru TC-1607, TE-1 thru TE-942, except TE-938)

The fuel level transmitters, P/N 95-380012-1 and 95-380012-3, originally installed in the inboard leading edge (main) fuel cell on these airplane serials are not available for spares replacement. The transmitters that are available are not of the same manufacturer, and are not compatible in the same wing indicating system as transmitters which were originally installed in the airplane. Thus, when replacement of either transmitter is required, both transmitters installed in the same cell must be of the same manufacturer. After the initial replacement of both transmitters and the accomplishment of the required rewiring, the transmitters may be replaced individually as required for maintenance of the airplane.

The current fuel level sensor which should be used as a replacement for the inboard transmitter is P/N 95-380012-13. This unit supersedes P/N 95-380012-5 and is a replacement for P/N 95-380012-1. A servicable transmitter, P/N 95-380012-5, which has been previously installed as a replacement, and which is stamped with the manufacturers P/N 7740-56, may be reused. The current fuel level sensor which should be used as a replacement for the outboard transmitter is P/N 95-380012-15. This transmitter supersedes P/N 95-380012-7 and is a replacement for P/N 95-380012-3. A servicable transmitter, P/N 95-380012-7, which has been previously installed as a replacement, and which is stamped with the manufacturers P/N 7740-55, may be reused.

The fuel quantity circuit for the inboard leading edge fuel cell must be reconnected whenever the original fuel level transmitters are replaced. The required circuit connections are provided in Figure 8-15, and are also included in Kit 55-5001 (which is furnished with the purchase of the replacement transmitters). The circuit changes consist of reconnecting the wires in a single wing fuel quantity indicating system using the existing fuel gage and existing wires.

ADJUSTING FUEL QUANTITY INDICATOR (TC-1 thru TC-1607, TE-1 thru TE-942, except TE-938)

The fuel quantity system may be adjusted by removing the liquidometer access covers from the cells and bending the float wire up or down slightly to obtain the proper reading in both the full and empty tank conditions.

NOTE

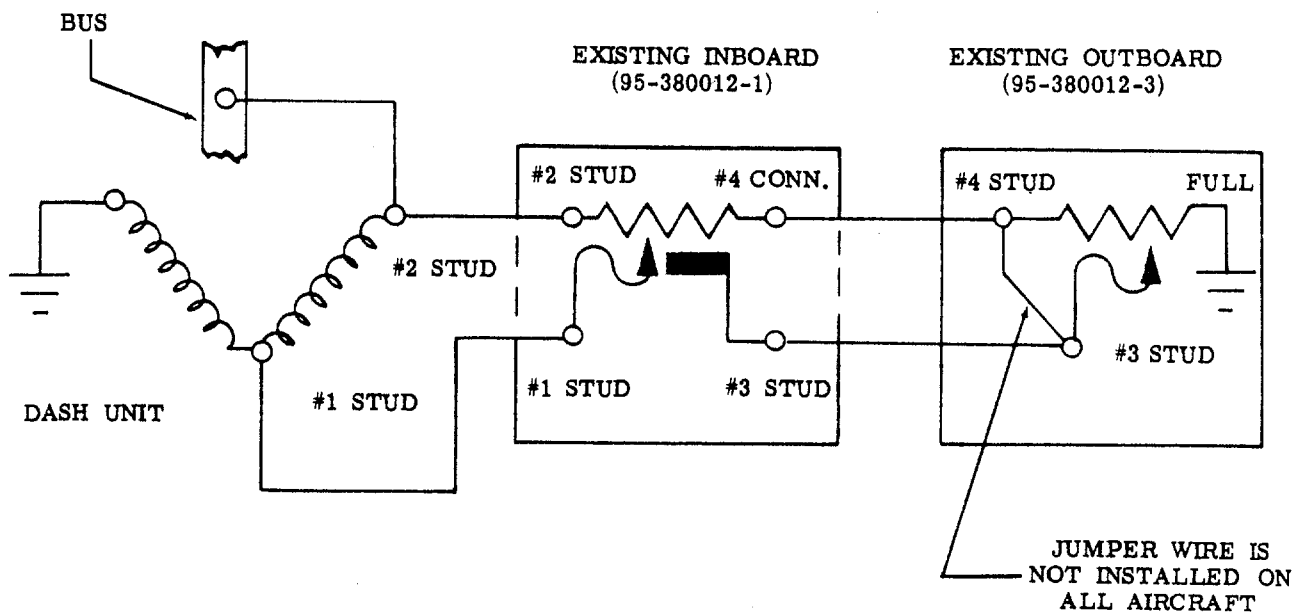
Do not raise the outboard float in the auxiliary cell or 40 gallon main cell when the inboard float is on the bottom of the cell and power is applied to the circuit. Never reverse the power leads to the 25 gallon main cell transmitter. These actions will cause excessive current flow in the circuit. Airplanes TC-113, TC-129, TC-133, TC-141, TC-148, TC-164, TC-166, TC-168 through TC-1607, TE-1 through TE-942 except TE-938, and prior airplanes incorporating Service Letter No. 4 have two 50 ohm resistors to protect the system components. Two fuses are installed to protect the system on airplanes TC-1, TC-2, and TC-34 through TC-167, except TC-113, TC-129, TC-133, TC-141, TC-148, TC-164, TC-166 and airplanes modified according to Service Letter No 4. Airplanes serials TC-3 through TC-33 not modified according to Service Letter No.4 have no circuit protection other than the 5 amp circuit breaker. On these airplanes, excessive current may burn out the fuel level transmitter.

FUEL CELL TRANSMITTER REMOVAL

CAUTION

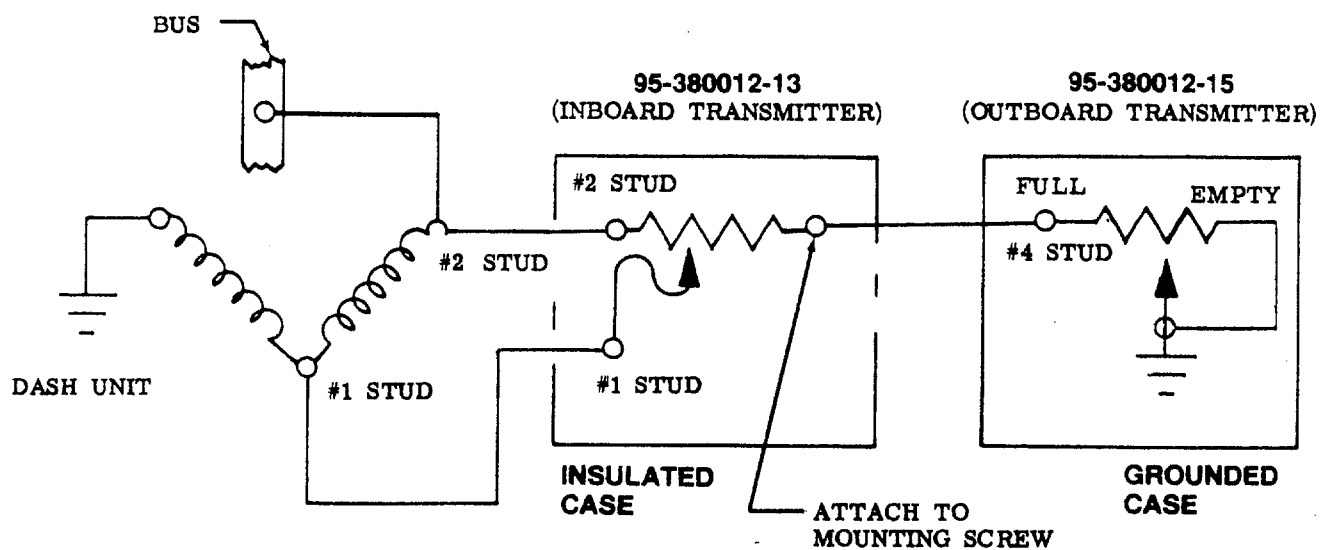
Make sure battery and external power are disconnected from airplane.

- a. Remove the access cover over the transmitter.
- b. Disconnect the electrical leads from the transmitter.
- c. Remove the screws securing the transmitter to the fuel cell.
- d. Remove the transmitter from the cell. Use care to avoid bending the float wire.



55-369-265

Figure 8-14. Wiring Diagram, (Original Transmitters)



55-369-264

Figure 8-15. Wiring Diagram, (Replacement inboard and outboard transmitters)

FUEL CELL TRANSMITTER INSTALLATION

NOTE

Before installing the transmitter, inspect if liner material is grommet or felt. If grommet, replace as required. If felt is replaced, fold a 1/2 x 1/16 inch strip of felt around the edge of the opening in the liner and cement with sealer (Item 2, Sealing Chart).

- a. Position the transmitter in the fuel cell.
- b. Make sure the float arm is mechanically free through its full range of travel. Non-metallic floats must turn freely on the float arm.
- c. Install and torque the retaining screws to 25 inch-pounds and safety wire.
- d. Connect the electrical leads to the transmitter.

ADJUSTING FUEL QUANTITY GAGES (TC-1608 and after, TE-938, TE-943 and after, and TH-1 and after)

ADJUSTMENT FOR FULL READING

NOTE

When adjusting the fuel quantity gages to register a "F" (full) reading, make sure that the fuel cells are completely full.

- a. Remove the glareshield as outlined in Section 3 under GLARESHIELD REMOVAL.
- b. Locate the two printed circuit boards on the back of the instrument panel just to the left of center.
- c. Locate the calibration screw in the back of each printed circuit board.
- d. Calibrate the fuel quantity gage as follows:

1. Ensure that the fuel cells corresponding to the fuel quantity gage being calibrated are full.
2. Turn the calibration screw in back of the corresponding printed circuit board until the needle on the fuel quantity gage points to the "F" (full) mark.

- e. Reinstall the glareshield as outlined in Section 3 under GLARESHIELD INSTALLATION.

ADJUSTMENT FOR EMPTY READING

The fuel quantity gages can be adjusted to register an "E" (empty) position by carefully bending the float arms of the inboard fuel quantity transmitters. The fuel gages should read "E" (empty) with three (3) gallons of unusable fuel aboard.

FUEL FLOW INDICATING - MAINTENANCE PRACTICES

FUEL FLOW INDICATOR

(TC-2276, TC-2363 and after, TE-1183 and after, TH-1199 and after)

The fuel flow indicator is an aid to the pilot when leaning the engines during flight. The major components of the system are the transducer or transmitter and the indicator. The transducer or transmitter is located in the fuel line of each engine forward of the firewall. This device generates a signal that is directed to the fuel flow indicator. The fuel flow indicator gives a readout in gallons of fuel per hour. The indicator has dual pointers, one for each engine, and is located in the upper RH corner of the engine instruments cluster. The circuit breaker is located in the left subpanel.

TRANSDUCER OR TRANSMITTER REMOVAL

- a. Open the right engine cowl.
- b. Disconnect the electrical wiring at the connection.
- c. Disconnect the two fuel lines from the transducer or transmitter by unscrewing the nuts securing the fuel lines to the transducer or transmitter. Cover the ends of the fuel lines to prevent contaminants from entering the fuel lines.
- d. Cut the safety wire from the two clamps securing the transducer or transmitter to the mounting bracket and remove the two clamps. Remove the transducer or transmitter.

TRANSDUCER OR TRANSMITTER INSTALLATION

- a. Position the transducer or transmitter in place on the mounting bracket and secure with the two clamps. Safety wire the clamps.
- b. Uncap and reconnect the two fuel lines.
- c. Connect the electrical wiring at the connection.
- d. Close the engine cowl.

INSTALLATION OF VELCRO TAPE (KIT NO. 35-9009-5S) WITH REPLACEMENT FUEL CELLS (TC-1 thru TC-1298, TE-1 thru TE-767)

Airplanes that have had or will have existing fuel cells replaced with spare baffled type fuel cells (P/N 35-380135-1, 35-380135-2, 35-380135-3, and 35-380135-4) should install Kit 35-9009-5S in the fuel cell liner top, bottom, root rib and spar as described below. Serials TC-1299 and after and TE-768 and after are delivered from the factory with the equivalent of Kit 35-9009-5S installed.

- a. Remove the fuel cell as described in this section under the heading REMOVING AND INSTALLING MAIN CELLS.

NOTE

Airplanes that have had any of the preceding fuel cells previously installed do not require complete removal of the fuel cell. Access covers and inboard fittings should be removed and the inboard end of the fuel cell pulled back far enough to allow installation of the velcro tape.

b. Lightly sand the surface that the velcro tape will be bonded to as shown in Figure 8-16 and clean the sanded surface with naphtha, (Item 18, Consumable Materials Chart).

c. Activate the velcro by dipping into methyl ethyl ketone, (Item 19, Consumable Materials Chart) and press the velcro tape in place as shown in Figure 8-16.

d. Position the fuel cell in place and press the velcro pile and hook together by pressing outward in the area of the velcro tape.

e. Inspect the flapper valve for free movement under it's own weight. If the flapper valve binds, see INSPECTION OF MAIN FUEL CELL FLAPPER VALVE in this section.

NOTE

Before closing the zipper, inspect the fuel cell for any foreign material.

f. Close the zipper and refer to REMOVING AND INSTALLING THE MAIN CELLS in this section for further instructions on installing the fuel cell.

NOTE

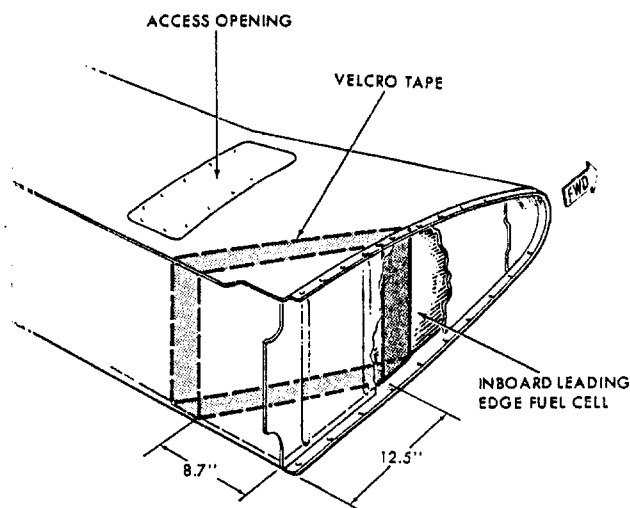
Installation of Kit 35-9009-5S (velcro tape) is required on a first time basis only for each fuel cell. Repeat installations of the kit are unnecessary when new fuel cells are installed.

INSPECTION OF THE BAFFLE MAIN FUEL CELL FLAPPER VALVE OR RESERVOIR FLAPPER VALVE

On airplanes that are equipped with baffled main fuel cells or fuel cell reservoirs, the flapper valves should be inspected periodically (Beech Aircraft recommends that the inspection be accomplished at each annual inspection) for freedom of operation and proper seating.

The inspection may be accomplished as follows:

- a. Drain all fuel from the airplane.
- b. Remove the rectangular access cover located just



33-36-1

Figure 8-16. Installation of Velcro Tape, (TC-1 thru TC-1298, TE-1 thru TE-767).

outboard of the fuselage on the upper skin of each wing leading edge.

NOTE

On airplane serials TH-1 thru TH-384 the fuel cell access plate is circular and located just outboard of the fuselage on the lower skin of each wing leading edge.

c. Cut the safety wire and remove the attaching bolts from the fuel cell access plate.

NOTE

Clean the area around the access plate before removing the plate.

d. Remove the fuel cell access plate and open the zipper in the baffle of the main fuel cell.

e. Locate the flapper valve in the lower outboard section of the baffle or reservoir and determine if the flapper valve is metal or phenolic.

f. If the flapper valve is metal, it should be inspected and repaired, if necessary, as described below.

1. Move the flapper element of the valve through its full travel. There should be no binding and the element should seat securely against the valve plate.

2. If the flapper element binds and/or does not seat properly, the flapper element arm could be bent. The arm can be straightened by placing a screwdriver between the arm

and the element and pressing the element toward the closed position.

3. If after straightening the arm, the flapper element still binds and/or does not seat properly, the flapper valve must be removed.

g. If the flapper valve is phenolic, it should be inspected and reworked, if necessary, as described below.

1. Move the flapper valve element through its full travel. There should be no binding and the element should seat securely against the valve plate.

2. If the flapper element binds and/or does not seat properly, the upper rear side of the flapper element may be binding against the valve plate.

3. The flapper valve element may be relieved from binding by filing a small radius on the upper rear side of the element.

NOTE

A shop towel saturated with light oil may be placed directly below the flapper valve to absorb the phenolic dust during rework.

4. After determining that the flapper valve is functioning properly, thoroughly wipe the area in the vicinity of the flapper valve with an oil saturated shop towel.

h. Clean the gasket contact area on the fuel cell and fuel cell access plate.

i. Close the zipper in the baffle.

j. Install a new gasket, and secure the fuel cell access plate in place.

k. Tighten the fuel cell access plate attaching bolts to a torque of 45 to 50 inch-pounds and safety wire.

l. Reinstall the access plate on the wing leading edge skin.

EXTERNAL FUEL CELL VENT LINE (Figure 8-17)

The end of the fuel vent lines should extend 10 degrees forward from vertical for a distance of 1.75 inches below the lower surface of the wing. The end of the line is scarfed at a 45 degree angle facing forward to ensure a positive vent pressure. Any

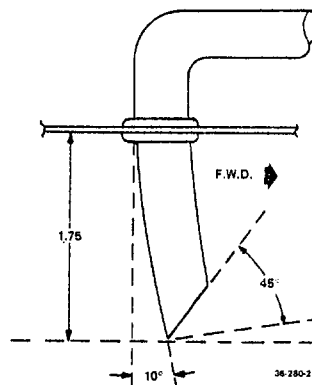


Figure 8-17. Fuel Vent Line

other configuration would create a negative pressure that would pull the air, or air and fuel from the fuel cell. At serials TC-1608 and after; TE-938, TE-943 and after; and TH-1 and after, the external vent tube is electrically heated to protect it from icing conditions. The two major components of the system are the 5-amp circuit breaker in the left subpanel and the heater wrapped around the exposed portion of the vent. The resistance of the heater at room temperature should be between 18.72 and 22.88 ohms for a delivery of 37.5 watts at 28 volts.

INSTALLATION OF FUEL FLARED FITTINGS

When installing flared fittings and hoses, make sure the threads are lubricated properly (see Figure 2-3) with anti-seize compound (in accordance with the TABLE OF THREAD LUBRICANTS). When previously installed fittings are removed, they should be wiped clean and relubricated before they are reinstalled. Torque all fittings in accordance with the FLARE FITTING AND HOSE FITTING TORQUE CHART.

FUEL BOOST PUMP REMOVAL

a. Drain the fuel from the wing cells.

NOTE

When a malfunctioning pump is replaced, the opposing pump plus the crossfeed valve may be utilized to drain the affected wing.

- b. After the fuel is drained, place the fuel selector valve in the OFF position.
- c. Disconnect all the electrical power to the airplane.
- d. Disconnect the electrical lead to the pump.
- e. Cut the safety wire and loosen the mounting bracket.
- f. Remove the plumbing to the fuel boost pump. Note inlet and outlet ports position on pump.
- g. Remove the retaining bolts.
- h. Remove the pump.

FUEL BOOST PUMP INSTALLATION

- a. Position the pump in place, being certain the inlet and outlet ports are in same position as when pump was removed.
- b. Install the retaining bolts.
- c. Connect the plumbing and install the bracket. Safety wire.
- d. Connect the electrical lead.

CARE AND REPAIR OF FUEL CELLS

The following is a recommended method of handling bladder-type fuel cells, including storage, and post-installation inspection.

When synthetic rubber fuel cells are placed in service, the gasoline has a tendency to extract the plasticizer from the inner liner of the cell. This extraction of plasticizer is not detrimental as long as gasoline remains in the fuel cell, in as much as the gasoline itself will act as a suitable plasticizer.

A thin coating of light engine oil should be flushed, sprayed or rubbed on the inner liners of all serviceable fuel cells which have contained gasoline if it is evident that the cells will remain without fuel for more than 10 days, whether installed in airplanes or not, or if cells are to be collapsed or deformed inside their bays. The oil will act as a temporary plasticizer and will prevent the inner liner from drying out and cracking.

The cell should not be removed or handled until 24 hours after the oil has been applied.

CAUTION

Never store fuel cells in the vicinity of electrical equipment, such as generators and motors. The movement of brushes across the commutators

of these units results in minute sparks that cause the formation of ozone gas. Ozone has a highly destructive effect on fuel cells. Although it leaves no visible indication, ozone makes the material of which the cells are formed brittle so that the cells will disintegrate upon the application of stress.

UNIROYAL FUEL CELL REPAIR

For information pertaining to the repair, handling and storage of Uniroyal Fuel Cells, refer to Report FC-1473-73 entitled "Recommended Handling and Storage Procedures for Bladder Type Fuel and Oil Cells", which is published by Uniroyal Inc., Engineered Systems Department, Mishawaka, Indiana.

NOTE

No repairs are to be made on the radius of a cell or in the fitting area of the cell. Cells with such damage are to be returned to Uniroyal Inc., Fuel Cell Division, Mishawaka, Indiana, for repair. No damage area larger than 2 inches may be repaired in the field.

GOODYEAR FUEL CELL REPAIR

For information pertaining to repair, handling and storage of Goodyear Fuel cells, refer to Manual AP368 entitled "Repair and Maintenance Manual for Vithane Fuel Cells", which is published by Goodyear Aerospace Corporation, Engineering Fabrics Division, Rockmart, Georgia.

a. Chemical Test.

1. Attach test plates to all fitting openings except one.
2. Pour ammonia on the absorbent cloth in the ratio of 3 cc per cubic foot of cell capacity. Place the saturated cloth inside the cell and install the remaining test plate.
3. Make up a phenolphthalein solution as follows: add 40 grams phenolphthalein crystals to 1/2 gallon of ethyl alcohol, mix, then add 1/2 gallon of water.
4. Inflate the cell with air to a pressure of 1/4 psi maximum.
5. Soak a large white cloth in the phenolphthalein solution, then wring it out thoroughly and spread it smoothly on the outer surface of the cell. Press the cloth down to insure detection of minute leaks.
6. Check the cloth for red spots which will indicate a leak. Mark any leaks found and move the cloth to a new location. Repeat this procedure until the entire exterior surface of the cell has been covered. If red spots appear on the cloth, they may be removed by resoaking the cloth in the solution.
7. The solution and test cloth are satisfactory

NOTE

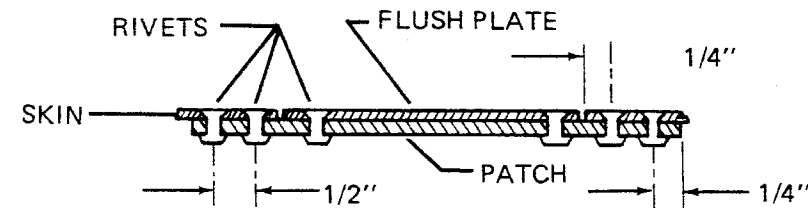
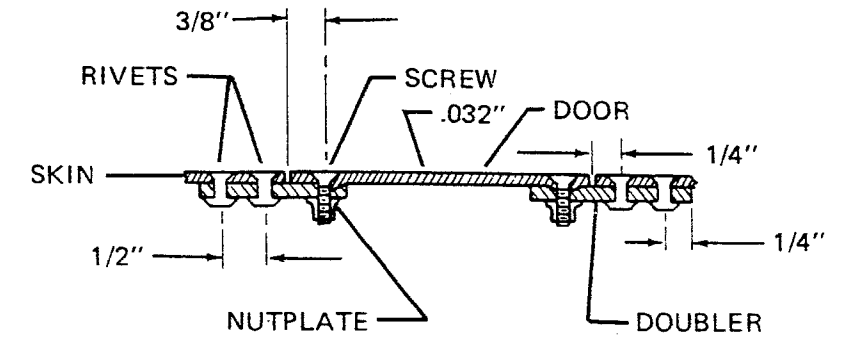
Repair of the wet wing tip is permissible providing the damaged area is far enough from the rib to allow a doubler or plate to be installed. Holes cut to remove damaged area must be round or at least have generous radii. Should a stringer be damaged or fall within the repair area it must be bridged across and be attached to the repair.

CAUTION

It must be realized the wet wing tip is a highly stressed area; consequently, the repair structure must be of equal capability.

GENERAL INSTRUCTIONS

1. Seal edges of doubler or plate, rivet butts and nut plates with Sealer (Items 32 or 33, Consumable Material Chart).
2. Fill the rivet heads, screw heads and the patch/skin joints with Sealer (Items 32 and 33, Consumable Material Chart).
3. Pressure test (0.50 + 0.25 - 0.00 psig) before applying filler to outer surface.



REPAIR OF INACCESSIBLE AREAS

1. Door material - .032 2024 T3 Aluminum ALCLAD.
Doubler material - .051 2024 T3 Aluminum ALCLAD.
Nut Plates - K1000-832 or equivalent.
Screws - AN507-8R--length to be determined.
Rivets - AN426AD3--for attaching nut plates.
Rivets - AN426AD4--for attaching doubler.
2. Two rows rivets in doubler and skin--1/4" E.D., 1/2" spacing between rows and rivets.
3. Single row of screws through doubler and door--3/8" E.D., 5/8" spacing. Dimple door and countersink doubler.
4. Doubler may be cut on one side only in order to place it on inside of cell. Cut side of doubler to be placed on inboard or outboard side of repair.

REPAIR OF ACCESSIBLE AREAS

1. Rivets - AN426AD4-5
Patch material - .032 2024 T3 Aluminum ALCLAD
Plate material - .032 2024 T3 Aluminum ALCLAD
2. Two rows rivets through patch and skin (patch plate to be on inner surface of cell. --If the plate is too large for entry through access openings, use method for inaccessible area.)
3. Rivet E.D. 1/4"--spacing 1/2" between rows and rivets.
4. Fit flush plate and secure with only enough rivets to prevent filler from cracking.

60-608-1

Figure 8-18. Minor Wet Wing Tip Repair
(TH-669 and after, and Prior Airplanes Equipped with Wet Wing Tip Kit).

only as long as they remain clean. Indicator solution that is not in immediate use should be stored in a closed container to prevent evaporation and deterioration.

After the test, remove all plates and test equipment. Allow the cell to air out.

NOTE

In conducting the tests outlined above, the cell need not be confined by a cage or jig, providing the 1/4 psi pressure is not exceeded.

b. Pressure test fuel cells installed on the airplane as follows:

1. Pressure test fuel cells and vent system to $0.75 + 0.25 - 0.00$ for 15 minutes with no drop in pressure.

WET WING TIP REMOVAL (TH-669 and after)

a. Disconnect external power from the airplane. Place battery and generator switches in the OFF position.

b. Defuel the airplane, to the point where fuel cannot be seen from the inboard filler position.

c. Remove access plates from the outboard lower wing.

d. Remove deice boot from wing tip leading edge (if installed) as described in Section 11 under the heading SURFACE DEICER BOOT REMOVAL.

e. Working through the access opening in the under side of the wing, loosen the clamps on the 3 inch fuel interconnect and vent lines.

f. Disconnect the electrical connections.

g. Support wing tip. Using a 1/8 inch drill bit, drill out rivets along the connecting strap and remove the strap.

h. Remove the support angle screws at the juncture of the wing tip and wing front and rear spar. Remove the wing tip.

WET WING TIP INSTALLATION (TH-669 and after)

a. Disconnect external power from the airplane. Place battery and generator switches in the OFF position.

CAUTION

Support the wing tip on a platform which will give firm support but will allow some flexibility of movement of the wing tip to facilitate proper alignment. Protect the wing tip surface from scratches, dents and other damage during installation.

b. Support the wing tip in the proper position to attach to the wing. Connect the hoses from the wing to the 3 inch fuel interconnect and vent lines. Secure with clamps.

c. Connect electrical connections.

d. Move wing tip into position and secure support angles to the front and rear spars with screws.

e. Using MS20426AD3 rivets, rivet the connecting strap to both the wing and wing tip.

f. Install the deicer boots (if required) as described in Section 11 under the heading SURFACE DEICER BOOT INSTALLATION.

g. Install and secure access plates.

h. Pressurize the fuel system using $0.75 + 0.25 - 0.00$ psig. There should be no pressure loss in 15 minutes.

i. Fuel and restore electrical power to the airplane as required.

LEAK TEST (TH-669 and after) (Figure 8-19)

a. Ensure that all repairs to the wet wing tip are completed and sealed.

b. Connect pressure source to the wet wing tip as shown in Figure 8-19.

CAUTION

Ensure that the filler cap and access plates are secure. This test must be done when the wet wing tip is removed from the fuel system of the airplane

c. Apply 3.73 ± 0.25 psi to the wet wing tip for 5 minutes.

d. Apply leak testing compound MIL-L-25567, Item 14, Consumable Materials Chart, to the outside of the wet wing tip.

e. Mark all leaks as indicated by bubbles.

f. Depressurize the wet wing tip, locate and repair leaks as shown in Figure 8-18.

g. Repeat the pressurization test procedure and repair leaks until there is no leakage.

h. Rinse leak testing compound off the wet wing tip with clean water and wipe dry with clean cloth.

i. Install the wet wing tip on the airplane as described in this section under the heading WET WING TIP INSTALLATION.

LEAKAGE CHECKS AND REPAIRS (WET WING TIP) (TH-669 and after) (Figure 8-20)

To classify the degree of leakage in a wet wing tip fuel cell, measure the size of the wet area around the leak. A more accurate measurement may be obtained by wiping the leakage clean and apply talcum powder in the area of the leak. After 30 minutes, recheck the area to determine if the leak classifies as a stain, seep, heavy seep or running leak as indicated in Figure 8-20. Fuel leaks must also be classified as to whether they occur in an open area or in an enclosed area to differentiate between those that require immediate repair and those not considered potential flight hazards.

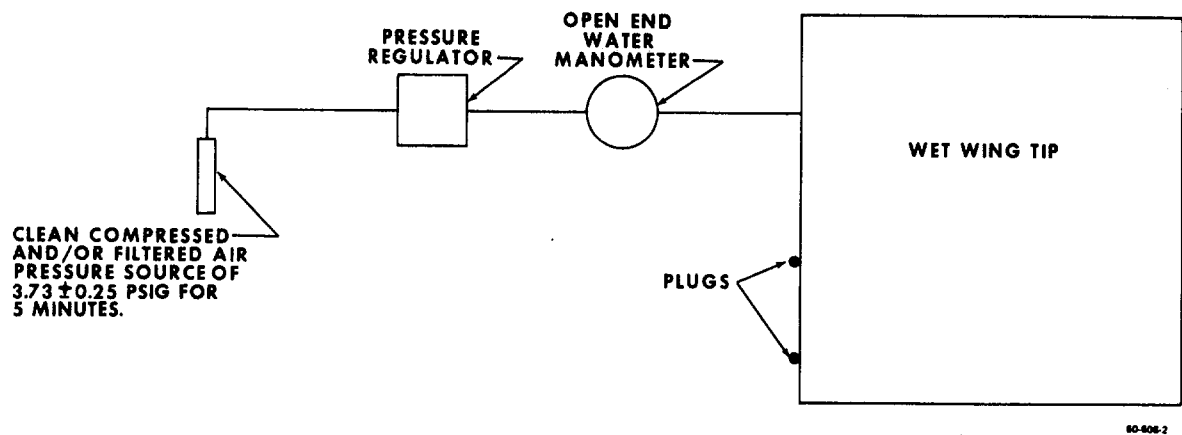
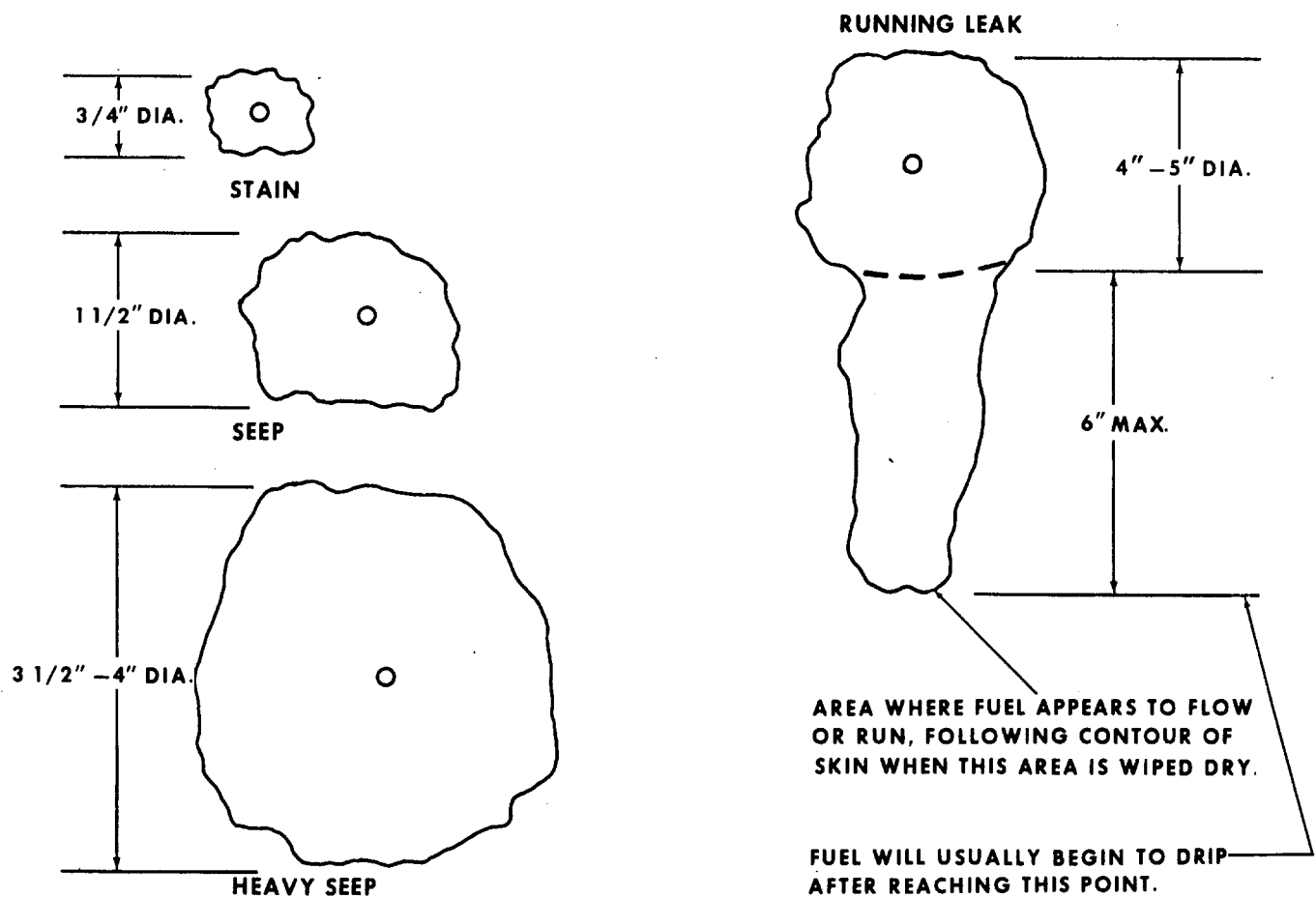


Figure 8-19. Leak Test Set-up (TH-669 and after).



A100-281-23

Figure 8-20. Leakage of Wet Wing Tip Fuel Cell, (TH-669 and after).

WARNING

ANY leakage in an enclosed area or in an area where the fuel will blow into the fuselage, requires grounding until repair is made.

- a. Repair of heavy seeps or smaller leaks in an open area may be delayed until the airplane is down for other maintenance.
- b. ANY leakage in an enclosed area requires immediate grounding and repair.
- c. Remove any sealant around the leak with a sharp, nonmetallic tool, such as a tool of chisel-shaped Formica.

Scarf the ends of the existing fillet so that a new sealant can form a continuous and smooth tie-in. PR-890B-1/2, Item 31, Consumable Materials Chart or EC-1675B-1/2, Item 32, Consumable Materials Chart, is recommended for the sealing process. Thoroughly clean the area to be repaired with methyl ethyl ketone, Item 19, Consumable Materials Chart or naphtha, Item 18, Consumable Materials Chart, prior to sealing. The following repairs are permissible:

1. If the leakage is around a rivet, restrike the rivet. This can only be done once. If the leak persists, replace the rivet.

2. If the leakage is around a bolt with a gasket type seal, retorque the bolt. If the leak persists, replace the seal or the bolt.

3. If the leakage is at the gasket around an access opening or fitting, retorque the attaching hardware. If the leak persists, replace the gasket.

AIRPLANE DEFUELING

To ensure that all fuel is removed from the system, the fuel should be drained through the boost pump. To expedite the defueling operation, the boost pump may be used to pump the fuel out of the system. The following steps must be accomplished before energizing the pump.

- a. Apply external power to the airplane electrical system.
- b. Place the fuel selector valve in the ON position and the mixture lever in IDLE CUT-OFF.
- c. Remove the filler caps to vent the system.
- d. Disconnect the main fuel line at the firewall and attach a drain hose. Provide a suitable container for the fuel.
- e. Energize the boost pump.
- f. When the fuel is no longer pumped from the airplane, open the sump drains to complete the defueling operation.

SECTION

9

PRESSURIZATION

THIS SECTION IS NOT APPLICABLE TO THE BEECHCRAFT BARONS

SECTION

10

**HEATING AND
COOLING SYSTEM**

HEATING AND VENTILATION

(TC-1 thru TC-1657, TE-1 thru TE-967 (except TE-959) and TH-1 thru TH-436)

Figure 10-1 and Figure 10-2)

THE HEATER CONTROL SYSTEM

The heater control system consists of two thermostats. A thermostat in the heater duct controls the duct temperature according to its setting, which is varied by the push-pull control (CABIN HEAT) in the subpanel. When the push-pull control is all the way out the heater will automatically shut off when the duct temperature reaches 180 degrees Fahrenheit. The further the control is pushed in, the lower the temperature at which the heater will shut off.

An overheat thermostat on the heater is set to shut off the heater at 300 degrees Fahrenheit in case the duct thermostat malfunctions. As in other combustion heater installations, it is a normally-open thermostatic switch which closes if an overheat condition develops. When closed, it shorts the heater power supply to ground, blowing a fuse and shutting down the heater. The fuse cannot be replaced in flight.

NOTE

Single or dual heater fuel pump operation is controlled by the landing gear limit switch. While on the ground, or with the landing gears extended, heater operation is supplied by one heater fuel pump. During flight, or with landing gears retracted, heater operation is supplied by both heater fuel pumps.

RIGGING THE HEATER CONTROLS

The cabin air control on the far left side of the subpanel controls the iris valve and the heater safety switch. Place the iris valve actuator as far to the right (facing forward) as possible. With the "CABIN AIR" control pushed in, attach the control wire to the iris valve actuator arm. The safety switch is positioned on the underside of the heater shelf in adjustable slots. Pull the "CABIN AIR" control to the half-open position and set the safety switch arm so that the switch will be open at this point.

When disconnecting the iris valve control for adjustment purposes, position the control in either the full-open or full-closed position, so that it may be reinstalled without disturbing the adjustment of the safety switch.

The heater ductstat control located at the far right of the left hand subpanel controls the heater thermostat. With the "CABIN HEAT" control pushed in and the lug on the ductstat pushed to the far right, push the control wire thru the lug and tighten the screw. Make sure the guide lug on the ductstat switch is in the straight downward position before securing the control wire. Serials TC-955 thru TC-1657, TE-1 through TE-967 (except TE-959) and TH-1

through TH-436, the pilot's and co-pilot's air vent doors above the rudder pedals are controlled by push-pull knobs located at the extreme left just below the subpanel. The doors are adjusted at the attachment of the cable and vent door on the firewall.

OVERHEAT THERMOSTAT

The overheat thermostat is controlled by an adjusting screw on the bottom of the thermostat. A letter "H" with an arrow through it on the head of the switch indicates the direction the sleeve should be turned to increase the temperature setting. One turn will change the temperature setting approximately 125 degrees Fahrenheit.

The overheat thermostat is set at the factory to operate at 300 degrees Fahrenheit and ordinarily will not need to be adjusted.

WARNING

Never set the thermostat for temperature above 300 degrees Fahrenheit. The heater is not designed for higher temperature and fire may result.

HEATER SPARK PLUG GAP

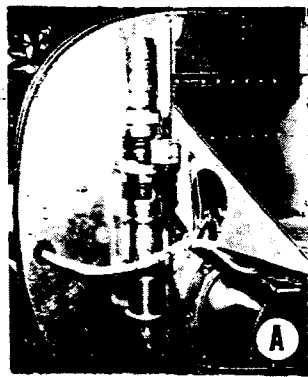
Heater spark plug gap should be set from 0.250 to 0.312 inches.

HEATER IGNITER POINTS

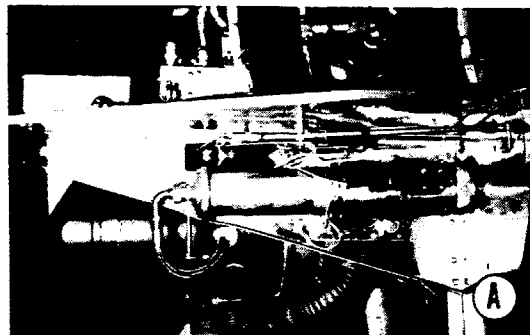
Two sets of heater ignition points are installed in the vibrator of the heater ignition unit. The primary set of igniter points has a service life of 1000 hours, (heater operation) at which time the alternate set of points should be put in use. When the alternate set of points has been used for 1000 hours, replacement of the vibrator must be accomplished. Failure to switch to the alternate set of points at 1000 hours may cause the points in use to fail making the alternate set of points inoperative.

The alternate set of points can be placed in service on serials prior to TC-191 by a point selector switch on the circuit breaker panel beneath the instrument panel. Serials TC-191 through TC-420 the switch is on the left hand electrical panel. TC-421 through TC-1657 the selector switch is removed and the points are placed in service by adding a 20 gage jumper wire between terminals "A" and "B" on the heater ignition unit (see Wiring Diagram, Section 14.)

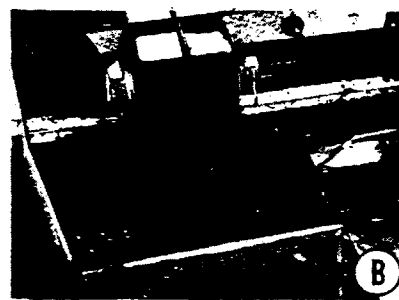
Serials TE-1 through TE-451 the points are placed in service by adding a 20 gage jumper wire between terminals "A" and "B" on the heater ignition unit. Serial TE-452 through TE-967 (except TE-959) and TH-1 through TH-436, the points are placed in service by a point selector switch on the left hand electrical panel.



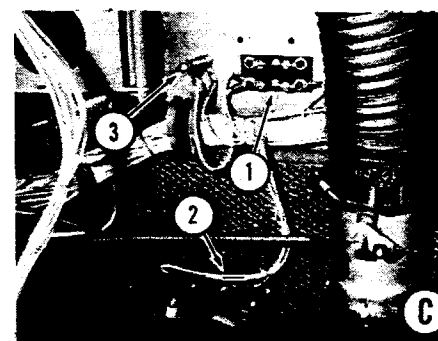
IGNITOR
Airplane Serials TC-1 thru TC-501



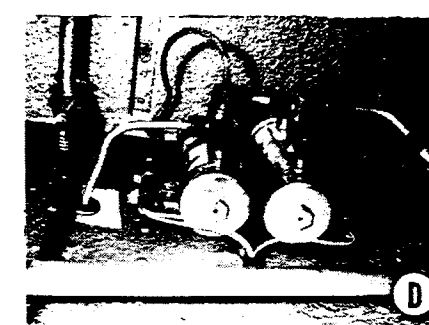
IGNITOR
Airplane Serials TC-502 and After



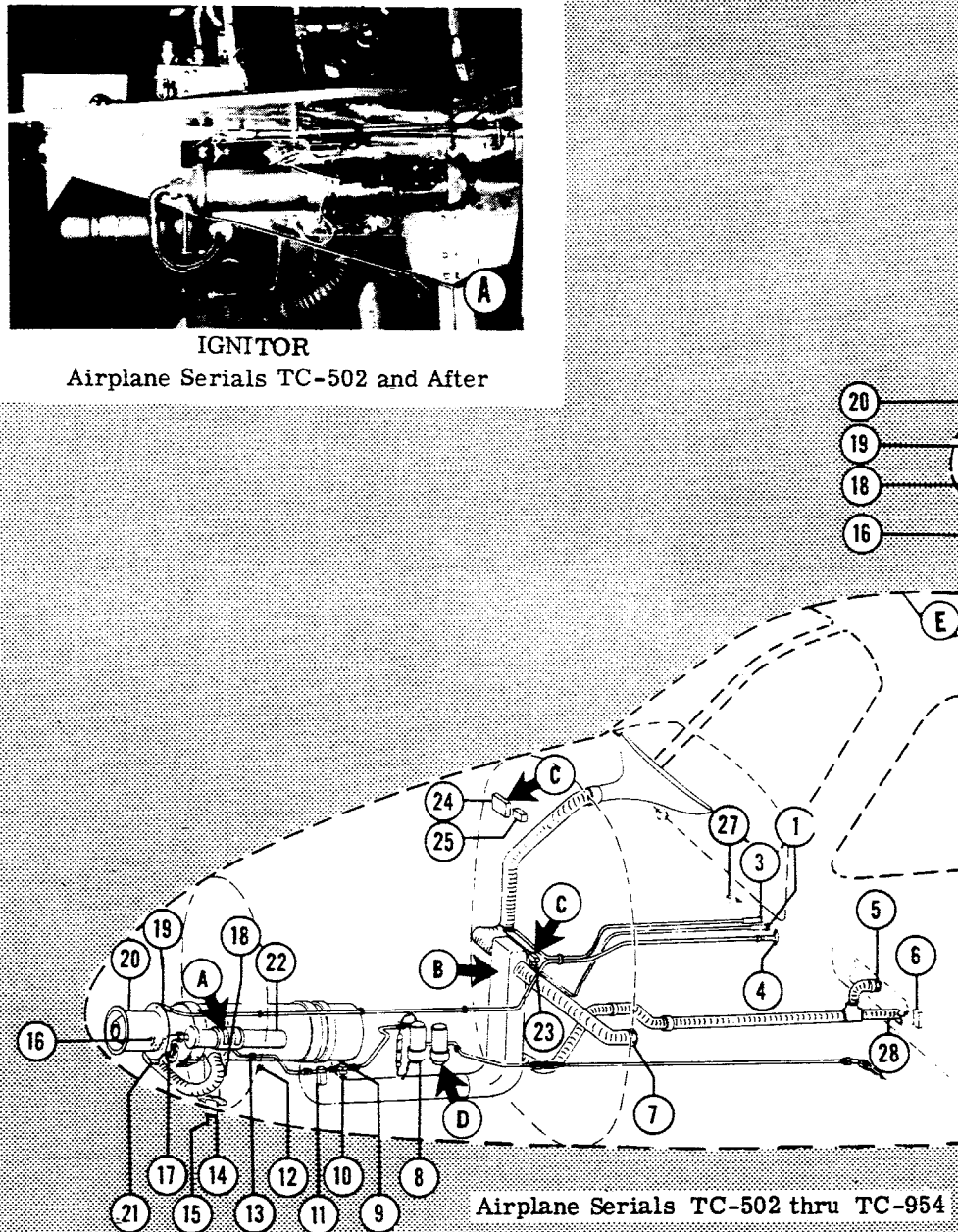
HEATER PLENUM DUCT



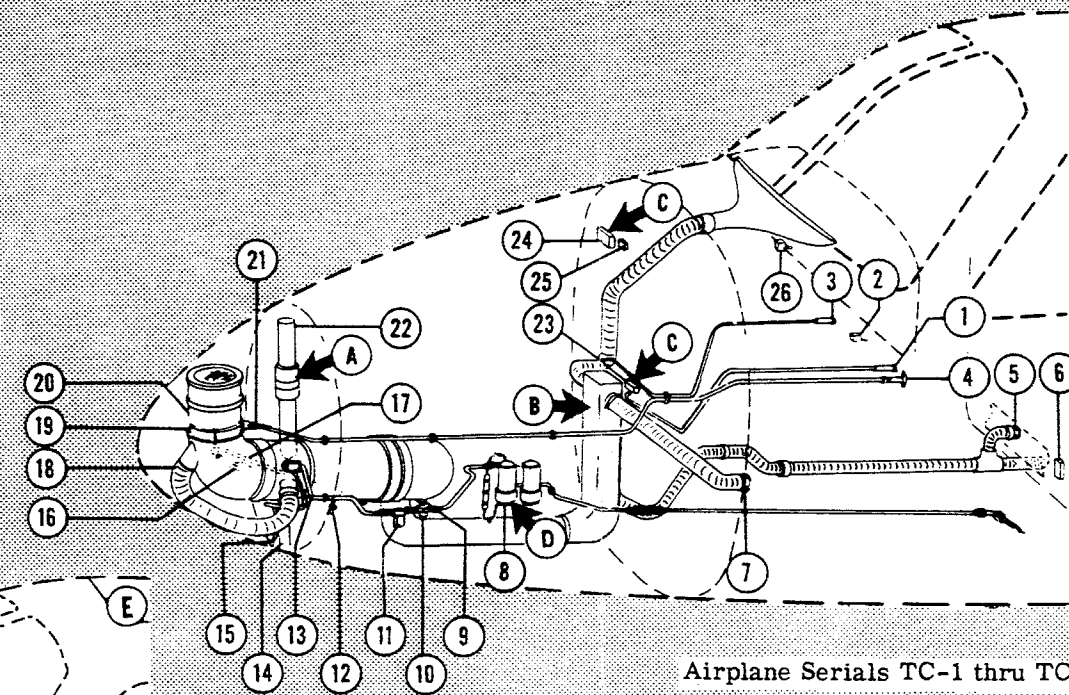
1. FUSES
2. HEATER THERMOSTAT
3. RESISTOR



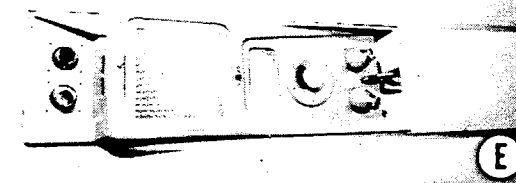
HEATER FUEL PUMP



Airplane Serials TC-502 thru TC-954



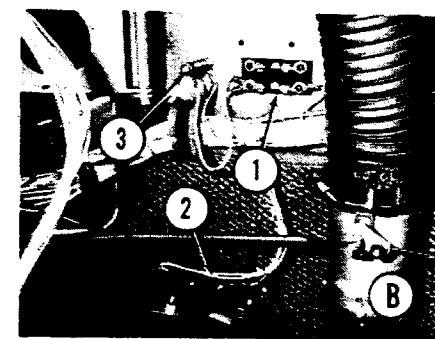
Airplane Serials TC-1 thru TC-501



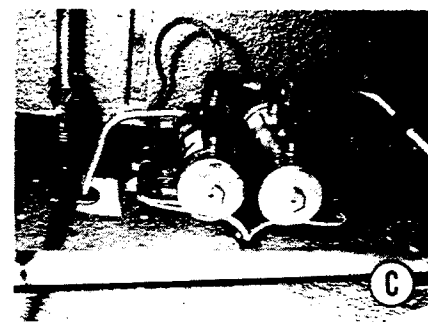
FRESH AIR VENT
Effective TC-1 thru TC-954

1. Temperature Control
2. Alternate Points - Switch
3. Defroster Control
4. Iris Valve Control
5. Rear Seat Outlet
6. Heater and/or Blower switch
7. Pilot's Outlet
8. Heater Fuel Pump
9. Overheat Thermostat (300°F)
10. Heater Fuel Strainer
11. Solenoid Valve
12. Heater Overboard Fuel Line
13. Combustion Fuel Inlet Line
14. Heater Exhaust
15. Heater Shroud Drain
16. Heater Spark Plug
17. Heater Ignition Lead Assy.
18. Combustion Air Intake Duct
19. Iris Valve
20. Intake Blower Assembly
21. Heater Safety Switch
22. Ignition Assembly
23. Heater Duct Thermostat
24. Overheat Fuse
25. Heater Resistor
26. Cabin Heat Switch
27. Cabin Heat Circuit Breaker
28. Rear Seat Outlet

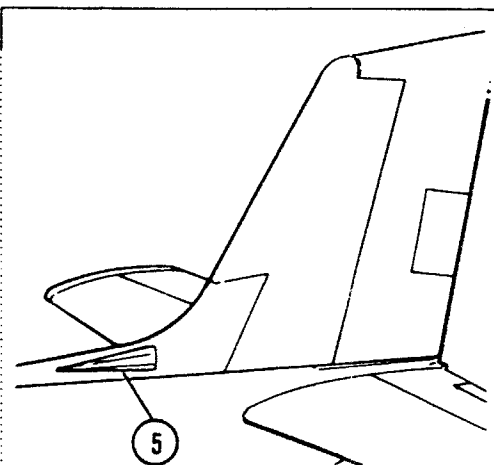
Figure 10-1. Heat and Vent System TC-1 through TC-954



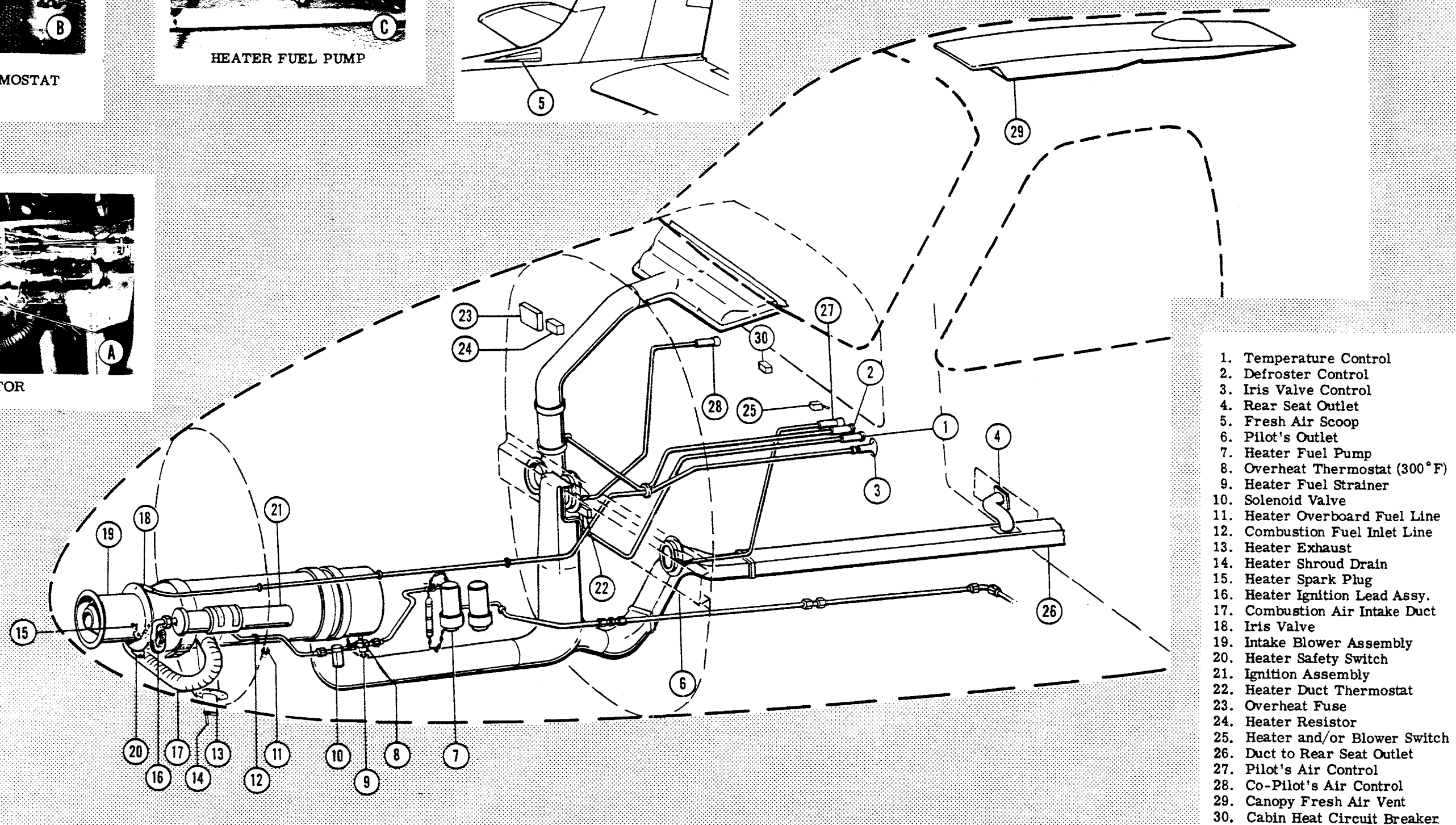
1. FUSES
2. HEATER THERMOSTAT
3. RESISTOR



HEATER FUEL PUMP



IGNITOR



1. Temperature Control
2. Defroster Control
3. Iris Valve Control
4. Rear Seat Outlet
5. Fresh Air Scoop
6. Pilot's Outlet
7. Heater Fuel Pump
8. Overheat Thermostat (300°F)
9. Heater Fuel Strainer
10. Solenoid Valve
11. Heater Overboard Fuel Line
12. Combustion Fuel Inlet Line
13. Heater Exhaust
14. Heater Shroud Drain
15. Heater Spark Plug
16. Heater Ignition Lead Assy.
17. Combustion Air Intake Duct
18. Iris Valve
19. Intake Blower Assembly
20. Heater Safety Switch
21. Ignition Assembly
22. Heater Duct Thermostat
23. Overheat Fuse
24. Heater Resistor
25. Heater and/or Blower Switch
26. Duct to Rear Seat Outlet
27. Pilot's Air Control
28. Co-Pilot's Air Control
29. Canopy Fresh Air Vent
30. Cabin Heat Circuit Breaker

Figure 10-2. Heat and Vent System (TC-955 thru TC-1657, TE-1 thru TE-958 and TE-960 thru TE-967, TH-1 thru TH-436)

HEATER OVERHAUL

The heater should be overhauled and pressure tested every 500 hours of heater operation in accordance with the Midland-Ross Maintenance and Overhaul Manual, P/N 30C57.

HEATER SOLENOID VALVE

Check the valve operation by connecting a 24-volt dc power source with an ammeter with a 0-1 ampere range in the line. Turn the power on and off several times. The valve should draw 0.26 amperes current and click when the valve opens.

To check for valve leakage, apply 35 psi air pressure to the inlet end of the valve and submerge the outlet end in water (check direction of flow arrow on valve). If the valve leaks more than 20 bubbles per minute, clean the valve and recheck.

To clean the valve, wipe all parts with a soft cloth saturated with solvent, making sure that no solvent gets in the electrical parts. Inspect the plunger cap, seal and spring. Replace these parts if worn or damaged. Blow out the valve body with compressed air before reassembling.

CLEANING THE HEATER

a. Cleaning the Combustion Chamber and Radiator Assembly can be accomplished using either of the two following methods:

1. Soak the combustion chamber and radiator assembly in an Oakite M-3 stripper solution for 10 hours. The solution is made by mixing one pound of Oakite (Oakite Products, Inc., 22 Thames Street, New York 6, New York) with each gallon of water used. The solution should be maintained at a temperature between 190 to 210 degrees Fahrenheit during the soaking period. Flush the heater thoroughly with water after it is removed from the Oakite solution.

2. Use a stainless steel brush or sandblast to remove any accumulation of carbon or other foreign material from the inside of the combustion chamber. Clean thoroughly with compressed air.

b. Cleaning the Spray Nozzle.

1. Disassemble the spray nozzle by unscrewing the fuel strainer and two piece core from the nozzle body.

2. Clean the parts in Stoddard solvent.

3. If soaking fails to thoroughly clean the parts, scrub them with a soft, non-metallic brush.

4. The grooves in the core and orifice in the body, may be cleaned with a soft pointed piece of wood.

NOTE

Do not use a metal tool for cleaning the parts as it will alter the flow characteristics of the nozzle.

5. When reassembling the spray nozzle, tighten the core with a screwdriver and the strainer with the fingers.

c. Cleaning the Spark Plug.

1. Before cleaning, examine the spark plug for evidence of cracked or broken porcelain, arcing or carbon tracks inside the well of the spark plug. If cracks are found, discard the plug. Arcing or carbon tracks may be caused by shorting of the plug or by dirt on the spring connector that seats in the well of the spark plug. In either case the fault should be corrected before reinstalling the plug.

2. Wipe out the inside of the well of the spark plug with a clean cloth dampened with carbon tetrachloride.

3. Close the plug well with a stopper and sandblast the plug.

COMBUSTION CHAMBER AND RADIATOR INSPECTION

a. Slight scaling and discoloration of the combustion chamber and radiator assembly is a normal condition on heaters that have been in use. The scale will be mottled and a blue powder can be rubbed off of the scaled areas. This does not constitute ground for rejecting the heater since considerable life can still be expected if there are no soft spots in the metal where it has been subjected to severe overheating.

b. Severe overheating will result in general weakening of the metal that results in soft and spongy spots. These are usually found directly opposite the crossover passages. They can be detected by tapping lightly with a ball peen hammer. This will give a slightly soft or spongy response in contrast to a solid feel when tapping on live metal. These soft spots will usually have a dull gray appearance indicating considerable surface oxidation. The presence of soft spots is reason for rejecting the combustion chamber and radiator assembly.

CAUTION

If any soft spots are located in the combustion chamber and radiator assembly, there is a malfunction in the heater system and a new heater should be installed until trouble has been corrected.

REMOVING AND INSTALLING THE CABIN HEATER

- a. Remove the nose cone attaching screws, disconnect the taxi light wiring on airplanes incorporating the optional taxi light and remove the nose cone.

- b. Disconnect the iris valve control and blower wiring. Remove the clamp that secures the blower to the support bracket.

- c. Remove the five bolts that attach the iris valve to the fiberglass plenum and lift the blower and iris valve from the plenum.

- d. Disconnect the heater ignition lead from the spark plug and heater ignitor.
- e. Disconnect the combustion air flexible tubing from the combustion air inlet at the heater.
- f. Remove the fiberglass plenum from the heater by removing the clamp and asbestos strip.
- g. Disconnect the fuel inlet line from the solenoid in the nose wheel well and the drain line at the heater fuel inlet.
- h. Disconnect the heater shroud drain line in the nose wheel well.
- i. Remove the clamp securing the plenum to the rear of the heater.
- j. Remove the two clamps securing the heater in the wheel well.
- k. Remove the eight heater attaching bolts that secure the heater supporting ring to the No. 1 bulkhead and remove the heater from the nose section.
- l. Installation is the reverse of the removal procedure. When installing the heater position the support ring and gasket so that the heater exhaust extends to the left of perpendicular approximately 8°.
- m. Make certain the clamps securing the inlet and outlet plenums are properly positioned to prevent damage to the plenums.
- n. Use Presstite No. 576, (product of Presstite Engineering Company, St. Louis, Missouri) as required when reinstalling the iris valve.

REMOVING AND INSTALLING THE CABIN HEATER BLOWER

- a. Remove the nose cone attaching screws, disconnect the taxi light wiring on airplanes incorporating the optional taxi light and remove the nose cone.
- b. Disconnect the electrical wiring at the blower.
- c. Disconnect the iris valve control at the iris valve.
- d. Remove the blower attaching clamp.
- e. Remove the five bolts that attach the iris valve to the fiberglass plenum and remove the blower and iris valve.
- f. Installation is the reverse of removal procedure. When installing the blower, check for a good seal between the iris valve and fiberglass plenum. Apply additional No. 576 Presstite Sealer (product of Presstite Engineering Company, St. Louis, Missouri) as necessary.

REMOVING AND INSTALLING THE CABIN HEATER IGNITION UNIT

To remove the heater ignition unit, disconnect the wiring at

the electrical plug, disconnect the ignition lead, remove the ignition unit attaching screws and remove the unit. Reinstall the ignition unit by reversing the removal procedure.

REMOVING AND INSTALLING THE CABIN HEATER SPARK PLUG

- a. Remove the nose cone.
- b. Remove the heater blower and iris valve.
- c. Disconnect the spark plug lead and remove the spark plug.
- d. Installation is the reverse of the removal procedure. Use a standard spark plug thread lubricant.

REMOVING AND INSTALLING THE CABIN HEATER FUEL DISCHARGE NOZZLE

- a. Remove the nose cone.
- b. Disconnect the combustion air flexible tubing from the combustion air inlet at the heater.
- c. Disconnect the heater ignition lead at the ignition unit and remove the clamp securing lead to iris valve assembly.
- d. Remove the blower attaching clamp and disconnect the iris valve control. (See Figure 10-1).
- e. Unfasten the clamp securing fiberglass plenum to the heater and lift plenum and blower assembly forward.
- f. Disconnect the ignition lead at spark plug and remove the plenum and blower assembly.
- g. Remove the fuel inlet cover, if installed, and disconnect the combustion fuel inlet line.
- h. Remove the two screws securing the fuel inlet shroud assembly and remove the shroud assembly and the 90-degree fuel inlet elbow.
- i. Disconnect the aerating line at the heater forward end.
- j. Remove the fuel discharge nozzle body from the heater and remove the discharge nozzle using a 5/8-inch socket wrench.
- k. Flush the heater fuel system before reinstalling the fuel discharge nozzle.
- l. Reinstallation procedure is the reverse of the removal procedure. When securing the inlet plenum to the heater, make certain that the clamp cleats are positioned between the plenum and the heater or the cleats may damage the plenum.

TROUBLESHOOTING HEATER SYSTEM

TC-1 through TC-1657, TE-1 through TE-967 (except TE-959) and TH-1 through TH-436

<i>INDICATION</i>	<i>PROBABLE CAUSE</i>	<i>REMARKS</i>
1. Blower runs but heater will not start.	a. Blown fuse. b. Faulty ignition unit vibrator. c. Faulty ignition unit coil. d. Faulty spark plug. e. Fuel solenoid valve not energized. f. Fuel filter clogged. g. Spray nozzle clogged. h. Insufficient combustion air. i. Faulty differential pressure switch.	a. Check ductstat operation; check combustion chamber and ducts for obstructions. b. Switch to reserve vibrator contacts. If this corrects trouble, replace vibrator at first opportunity. c. Remove lead from spark plug and hold so spark may jump to structure. If no spark, repair or replace ignition unit. d. If test in (c) produces spark, remove and clean or replace spark plug. e. Check electrical connections. Disconnect fuel line and check for fuel flow. Replace defective valve. f. Clean filter. g. Clean spray nozzle. h. Remove obstructions or repair leaks. Check for combustion blower operation. i. With heater ON, check terminals to ascertain if switch is open.
2. Heater will not shut off automatically.	a. Defective ductstat.	a. Connect continuity meter across ductstat leads and operate control. As the control is pulled out, ductstat switch should close, completing the circuit.
3. Heater backfires intermittently.	a. Loose connection in control circuit or loose ignition lead to spark plug. b. Mixture too rich. c. Restriction in combustion air duct.	a. Check electrical connections. b. Make checks in item 4 below. c. Check duct for obstruction, and combustion blower for proper operation.
4. Fuel mixture too rich; exhaust smudges fuselage.	a. Restriction in combustion air duct. b. Restriction in exhaust duct. c. Loose core in fuel nozzle. d. Both pumps operating with gear extended.	a. Check ducts for obstructions and combustion blower for proper operation. b. Check exhaust outlet. c. Clean nozzle. Make sure core is seated tightly in shell. d. Check limit switch.

TROUBLESHOOTING HEATER SYSTEM (Cont'd)

INDICATION

5. Heater produces inadequate heat.

PROBABLE CAUSE

a. Thermostat not properly adjusted.

b. Fuel filter partially clogged.

c. Restriction in fuel lines.

d. Iris valve opening too small.

e. Restriction in air ducts.

f. Spray nozzle partially clogged.

g. One pump operating with gear retracted.

REMARKS

a. Adjust thermostat.

b. Clean filter.

c. Clean line or otherwise remove restriction.

d. Check limit switch to operate at 1/2 opening.

e. Check air valve and ducts for obstruction.

f. Clean spray nozzle.

g. Close L. G. limit switch and check both pumps for operation.

HEATING AND VENTILATION

(TC-1658 and after, TE-959, TE-968 and after and TH-437 and after)

(Figure 10-3)

THE HEATER CONTROL SYSTEM

The heater control system consists of two thermostats. A thermostat in the heater duct controls the duct temperature according to its setting, which is varied by the push-pull control (CABIN HEAT) in the subpanel. When the push-pull control is all the way out the heater will automatically shut off when the duct temperature reaches 180 degrees Fahrenheit. The further the control is pushed in, the lower the temperature at which the heater will shut off.

An overheat thermostat on the heater is set to shut off the heater between 260 and 325 degrees Fahrenheit in case the duct thermostat malfunctions. On TC-1658 through TC-1722, TE-959, TE-968 through TE-990 and TH-437 through TH-496, it is a normally closed thermostatic switch which opens in an overheat condition breaking the circuit. When the heater has cooled sufficiently, the switch will reset completing the circuit again.

On TC-1723 and after, TE-991 and after and TH-497 and after, the thermostatic switch is a normally closed circuit breaker which opens in an overheat condition breaking the circuit. The circuit breaker must be manually reset before the heater will operate again. The circuit breaker can not be reset while the airplane is in flight.

NOTE

There is only one heater fuel pump in this system which furnishes fuel to the heater on the ground or in the air.

RIGGING THE HEATER CONTROLS

The cabin air control on the far left side of the subpanel controls the iris valve and the heater safety switch. Place the iris valve actuator as far to the right (facing forward) as possible. With the "CABIN AIR" control pushed in, attach the control wire to the iris valve actuator arm. The safety switch is positioned on the underside of the heater shelf in adjustable slots. Pull the "CABIN AIR" control to the half-open position and set the safety switch arm so that the switch will be open at this point.

When disconnecting the iris valve control for adjustment purposes, position the control in either the full-open or full-closed position, so that it may be reinstalled without disturbing the adjustment of the safety switch.

The heater ductstat control located at the far right of the left hand subpanel controls the heater thermostat. With the "CABIN HEAT" control pushed in and the lug on the ductstat pushed to the far right, push the control wire thru

the lug and tighten the screw. Make sure the guide lug on the ductstat switch is in the straight downward position before securing the control wire. The pilot's and co-pilot's air vent doors above the rudder pedals are controlled by push-pull knobs located at the extreme left just below the subpanel. The doors are adjusted at the attachment of the cable and vent door on the firewall.

OVERHEAT THERMOSTAT

The overheat thermostat is set at the factory to operate between 260 and 325 degrees Fahrenheit and can not be adjusted, but must be replaced if it malfunctions.

HEATER SPARK PLUG GAP

The spark gap is .156 to .188 inch. The gap may be adjusted by moving the ground electrode to obtain the proper gap.

HEATER IGNITION UNIT

The electric current for the ignition is supplied by the ignition unit, which converts 24 volt direct current to high voltage oscillating current. This provides a continuous spark across the gap of the spark plug during heater operation. Inspect and repair in accordance with Maintenance Instructions for Ignition Unit Assembly Manual, P/N 93D00-1, Janitrol Aero Division, Midland-Ross Corporation.

HEATER OVERHAUL

At the end of each 500 heater operating hours, or after each heating season (whichever comes first), remove the heater from the airplane for pressure test of the combustion tube, complete inspection of heater parts and any necessary overhaul operations. Inspect and overhaul in accordance with Maintenance Instructions for Aircraft Heater Unit Assembly, P/N 92D88-1, Janitrol Aero Division, Midland-Ross Corporation.

COMBUSTION TUBE PRESSURE TEST

At each overhaul, pressure test the combustion tube for leaks as follows:

- a. Make sure that all openings except the combustion air pressure switch connection are plugged. This is the most convenient connection for attaching the test air pressure source.

- b. Connect a regulated air pressure supply to the opening that has not been plugged. Apply a pressure of three to six psi to the combustion tube.

- c. Submerge the assembly in water for several minutes while watching for bubbles that would indicate leaks. Turn the combustion tube in the water so that any entrapped bubbles will be freed. Bubbles will indicate leaks. Small leaks, if accessible, can be repaired.

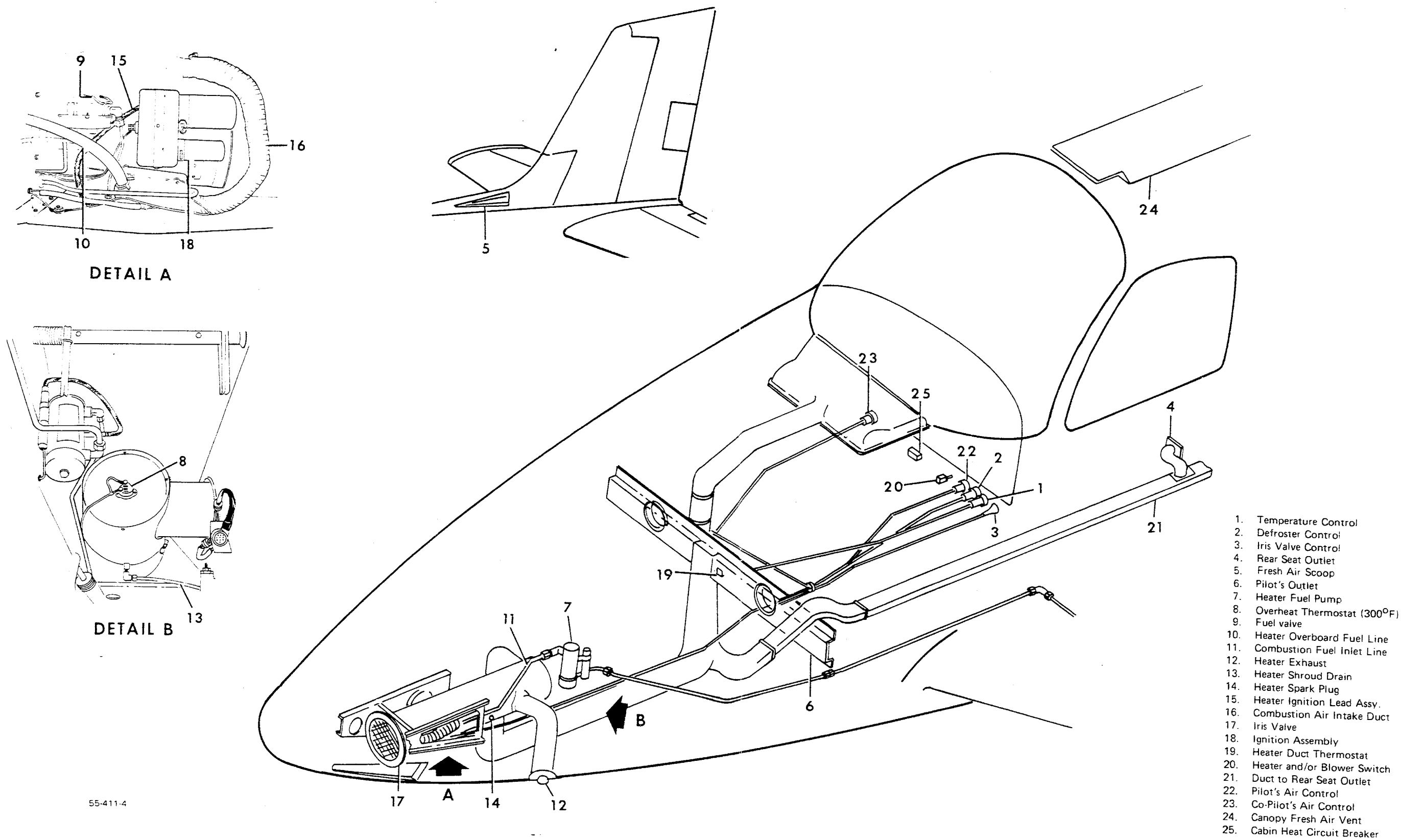


Figure 10-3. Heat and Vent System (TC-1658 and after, TE-959, TE-968 and after, TH-437 and after)

CLEANING THE HEATER

a. Cleaning the Combustion Chamber and Radiator Assembly can be accomplished using either of the two following methods:

1. Soak the combustion chamber and radiator assembly in an Oakite M-3 stripper solution for 10 hours. The solution is made by mixing one pound of Oakite (Oakite Products, Inc., 22 Thames Street, New York 6, New York) with each gallon of water used. The solution should be maintained at a temperature between 190 to 210 degrees Fahrenheit during the soaking period. Flush the heater thoroughly with water after it is removed from the Oakite solution.

2. Use a stainless steel brush or sandblast to remove any accumulation of carbon or other foreign material from the inside of the combustion chamber. Clean thoroughly with compressed air.

b. Cleaning the Spray Nozzle.

1. Disassemble the spray nozzle by unscrewing the fuel strainer and two piece core from the nozzle body.

2. Clean the parts in Stoddard solvent.

3. If soaking fails to thoroughly clean the parts, scrub them with a soft-non-metallic brush.

4. The grooves in the core and orifice in the body, may be cleaned with a soft pointed piece of wood.

NOTE

Do not use a metal tool for cleaning the parts as it will alter the flow characteristics of the nozzle.

5. When reassembling the spray nozzle, tighten the core with a screwdriver and the strainer with the fingers.

c. Cleaning the Spark Plug.

1. Before cleaning, examine the spark plug for evidence of cracked or broken porcelain, arcing or carbon tracks inside the well of the spark plug. If cracks are found, discard the plug. Arcing or carbon tracks may be caused by shorting of the plug or by dirt on the spring connector that seats in the well of the spark plug. In either case the fault should be corrected before reinstalling the plug.

2. Wipe out the inside of the well of the spark plug with a clean cloth dampened with carbon tetrachloride.

3. Close the plug well with a stopper and sandblast the plug.

COMBUSTION CHAMBER AND RADIATOR INSPECTION

a. Slight scaling and discoloration of the combustion

chamber and radiator assembly is a normal condition on heaters that have been in use. The scale will be mottled and a blue powder can be rubbed off of the scaled areas. This does not constitute ground for rejecting the heater since considerable life can still be expected if there are no soft spots in the metal where it has been subjected to severe overheating.

b. Severe overheating will result in general weakening of the metal that results in soft and spongy spots. These are usually found directly opposite the crossover passages. They can be detected by tapping lightly with a ball peen hammer. This will give a slightly soft or spongy response in contrast to a solid feel when tapping on live metal. These soft spots will usually have a dull gray appearance indicating considerable surface oxidation. The presence of soft spots is reason for rejecting the combustion chamber and radiator assembly.

CAUTION

If any soft spots are located in the combustion chamber and radiator assembly, there is a malfunction in the heater system and a new heater should not be installed until trouble has been corrected.

REMOVING THE CABIN HEATER

NOTE

The heater can be removed without removing the radio shelf, but can be accomplished more readily if the shelf is loose or removed.

- a. Remove the nose cone attaching screws and the nose cone.

- b. Disconnect the iris valve control, blower wiring and the igniter leads.

- c. Remove the bolts attaching the iris valve to the heater and forward support.

- d. Remove the screws and remove the forward support.

- e. Remove the screws holding the exhaust pipe and remove the pipe.

- f. Remove the combustion air flex duct from the heater.

- g. Disconnect the fuel lines from the heater and cap the openings.

- h. Disconnect and remove the two heater drain lines.

- i. Disconnect and remove the hot air duct from the heater.

- j. Remove the aft clamp from around the heater.

- k. Remove the screws from the upper and lower plates on the No. 1 bulkhead and remove the plates.

- l. Grasp the heater on the forward end and pull while rotating the heater to the right and left, as required, to clear the surrounding structures.

NOTE

The cabin heater blower, heater ignition unit and the heater fuel discharge nozzle are an integral part of the heater and are removed with the heater.

INSTALLING THE CABIN HEATER

NOTE

The cabin heater blower, heater ignition unit and the heater fuel discharge nozzle are an integral part of the heater and must be installed with the heater.

- a. Grasp the heater on the back end and push while rotating the heater right and left, as required, to clear the surrounding structure.
- b. Replace the upper and lower plates on the No. 1 bulkhead with the attaching screws.
- c. Replace the aft clamp around the heater.
- d. Replace and reconnect the hot air duct on the heater.
- e. Connect the two heater drain lines.

- f. Connect the fuel lines to the heater.
- g. Replace the combustion air flex duct to the heater.
- h. Connect the exhaust pipe with the attaching screws.
- i. Replace the forward support and attach with attaching screws.
- j. Connect the iris valve to the heater and forward support with bolts and connect the iris valve control, blower wiring, and igniter leads.
- k. Replace the nose cone with the attaching screws.

REMOVING THE CABIN HEATER SPARK PLUG

- a. Remove the nose cone.
- b. On the left side of the heater, disconnect the spark plug lead and remove the spark plug.

INSTALLING THE CABIN HEATER SPARK PLUG

- a. Lubricate the heater spark plug with a standard spark plug lubricant.
- b. On the left side of the heater install the heater spark plug, and spark plug lead.
- c. Replace the nose cone.

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TROUBLESHOOTING HEATER SYSTEM TC-1658 AND AFTER; TE-959, TE-968 AND AFTER; TH-347 AND AFTER

INDICATION	PROBABLE CAUSE	REMARKS
1. Blower runs but heater will not start.	a. Overtemp circuit breaker tripped.	a. Check ductstat operation; check combustion chamber and ducts for obstructions.
	b. Faulty ignition unit vibrator.	b. Replace vibrator at first opportunity.
	c. Faulty ignition unit coil.	c. Remove lead from spark plug and hold so spark may jump to structure. If no spark, repair or replace ignition unit.
	d. Faulty spark plug.	d. If test in (c) produces spark, remove and clean or replace spark plug.
	e. Fuel solenoid valve not energized.	e. Check electrical connections. Disconnect fuel line and check for fuel flow. Replace defective valve.
	f. Fuel filter in fuel pump clogged.	f. Clean filter.
	g. Spray nozzle clogged.	g. Clean spray nozzle.
	h. Insufficient combustion air.	h. Remove obstructions or repair leaks. Check for combustion blower operation.
	i. Faulty differential pressure switch.	i. With heater ON, check terminals to ascertain if switch is open.
2. Heater will not shut off automatically.	a. Faulty ductstat.	a. Connect continuity meter across ductstat leads and operate control. As the control is pulled out, the ductstat switch should close, completing the circuit.
3. Heater backfires intermittently.	a. Loose connection in control circuit or loose ignition lead to spark plug.	a. Check electrical connections.
	b. Mixture too rich.	b. Make checks in Item 4.
	c. Restriction in combustion air duct.	c. Check duct for obstruction. Check combustion blower for proper operation.
4. Fuel mixture too rich; exhaust smudges fuselage.	a. Restriction in combustion air duct.	a. Check iris valve. Check ducts for obstruction.
	b. Restriction in exhaust duct.	b. Check exhaust outlet.
	c. Loose core in fuel nozzle.	c. Clean nozzle. Make sure core is seated tightly in shell.

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TROUBLESHOOTING HEATER SYSTEM TC-1658 AND AFTER; TE-959, TE-968 AND AFTER; TH-347 AND AFTER (Continued)

INDICATION	PROBABLE CAUSE	REMARKS
5. Heater produces inadequate heat.	a. Thermostat not properly adjusted.	a. Adjust thermostat.
	b. Fuel filter in fuel pump partially clogged.	b. Clean filter.
	c. Restriction in fuel lines.	c. Clean line or otherwise remove restriction.
	d. Iris valve opening too small.	d. Check limit switch to operate at 1/2 opening.
	e. Restriction in air ducts.	e. Check air valve and ducts for obstruction.
	f. Spray nozzle partially clogged.	f. Clean spray nozzle.

AIR-CONDITIONING SYSTEM (TE-1119, TE-1125 AND AFTER; TH-873, TH-895 AND AFTER)

NOTE

On serials TE-1119, TE-1125 and after and TH-873 through TH-1744 the refrigerant used on the original installation is R-12. On serials TH-1745 and after the refrigerant used is R-134a.

The optional air-conditioning system is a recirculating air-cooling-refrigerant system controlled by two switches located on the left subpanel. The on/off air-conditioner switch engages the compressor clutch circuit and the hi/lo evaporator blower switch controls the output of the forward and the aft evaporator blowers. The system is wired through the landing gear downlimit switch and the left landing gear safety switch. If the air-conditioning is in operation and the airplane is on the ground, power through the left landing gear safety switch causes the condenser air scoop to fully open. At the same time, power through the landing gear downlimit switch causes the condenser blower to operate. With the airplane airborne and the landing gear retracted, the power through the left landing gear safety switch causes the air scoop to partially close to a flight position. The landing gear downlimit switch is opened, removing any power from the condenser blower for inflight conditions.

Two pressure-sensing switches and a high pressure relief valve protect the air-conditioning system from operating any time the pressure within the air-

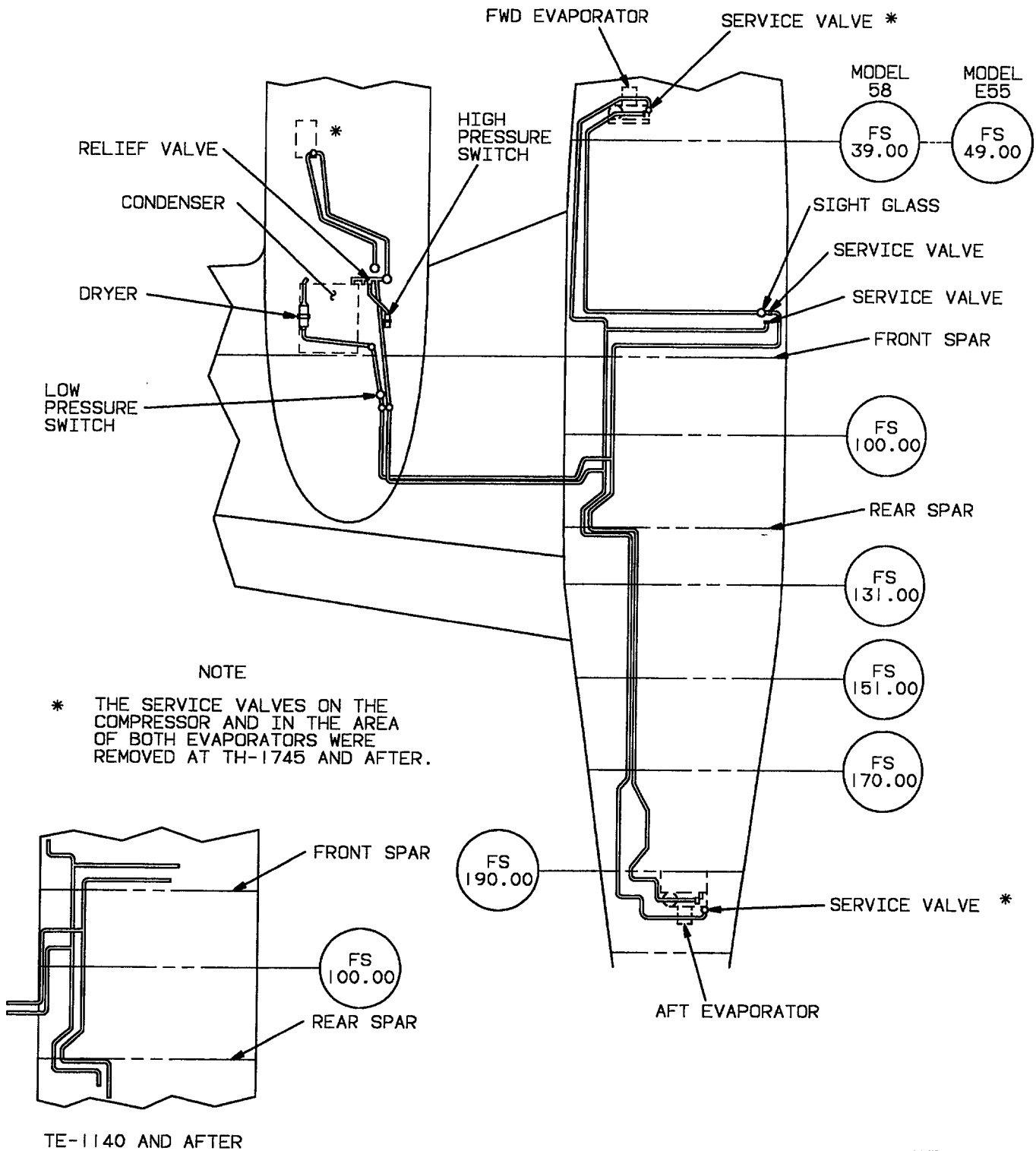
conditioning system falls outside the normal operating range. Both pressure sensing switches are wired to a common 5-ampere fuse located on the left nacelle.

The high pressure switch and relief valve are incorporated into the system to protect against a high pressure condition. The high pressure relief valve is located in the left nacelle in the pressure discharge line immediately before it enters the condenser. It is set to bleed off excess pressure in the event pressure exceeds 450 psi.

The high pressure switch is located in the left nacelle in the pressure line and is set to activate at 375 ± 5 psi. When the switch is activated, the 5-ampere fuse is shorted through a resistor to ground and power is removed from the compressor magnetic clutch. The high pressure switch will automatically reset when the pressure drops to 250 ± 25 psi but further operation of the compressor cannot be obtained until the cause of the high pressure has been isolated and repaired and the 5-ampere fuse has been replaced.

The low pressure switch is also located in the left nacelle and is installed in the suction line. This switch is designed to actuate when the pressure drops to 7 ± 1 psi. When this switch is actuated, the 5-ampere fuse common to both high and low pressure switches is again shorted through a resistor to ground and power is removed from the compressor magnetic clutch. Further operation of the compressor cannot be obtained until the air-conditioning has been serviced or repaired and the 5-ampere fuse is replaced.

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Figure 10-4. Air-Conditioning Plumbing

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PRECAUTIONARY SERVICE MEASURES

WARNING

Due to the air quality control regulations enacted in the United States, R-12 and R-134a refrigerant cannot be vented into the atmosphere. When performing maintenance on the air-conditioning system where R-12 or R-134a can escape from the system, evacuate the system with a recovery or recycle servicing unit that will salvage the refrigerant.

Before any service is attempted which requires opening of refrigeration plumbing or units, the person doing the work should be thoroughly familiar with instructions on servicing the system. These instructions should be followed very carefully when performing the tasks that will maintain this system in a proper functioning order.

The major reasons for these measures are for safety and to prevent dirt and moisture from entering the system. Dirt contaminants may cause leaky valves or wear in the compressor. Moisture may not only freeze into ice at expansion valves, but can also cause the formation of hydrochloric or hydrofluoric acids in the system.

All subassemblies are shipped sealed and dehydrated. They are to remain sealed until just prior to making connections. They should be at room temperature before uncapping. (This prevents condensation of moisture from the air that enters the system.)

If for any reason caps are removed, but the connections are not made, then the tubes and other parts should not remain unsealed for more than 15 minutes. If the time period is longer, reseal the connections.

All precautions should be taken to prevent damage to fittings or components. Even minute damage to a connection could cause it to leak. Any fitting getting grease or dirt on them should be wiped clean with a cloth dampened with alcohol. Do not use chlorinated solvents such as trichlorethylene for a cleaning agent, for they are a contaminant. If dirt, grease or moisture gets inside pipes and cannot be removed, the pipe will have to be replaced. Use a small amount of clean

refrigerant oil on all tube joints and dip the O-ring in this oil before assembling the joint to help ensure a leak-proof joint. Use oil (35, Consumable Materials Chart, Section 2) for this purpose on airplanes TH-1 thru TH-1744. RL 100S oil (67, Consumable Materials Chart, Section 2) is used on airplanes TH-1745 and after.

WARNING

A face shield should be worn when performing maintenance on the lines because refrigerant coming in contact with the eyes can cause loss of sight.

NOTE

The receiver-dryer is the last assembly to be connected. This is necessary to ensure maximum moisture protection of the refrigeration system.

- a. This is a high pressure system. When disconnecting a refrigerant line, the system must be discharged with a recovery or recycle servicing unit.
- b. Whenever a refrigerant line is disconnected, purge the entire system with a vacuum pump operating at the 125-micron level.

CAUTION

Insufficient torque, when tightening tubing connections, can result in loose joints and excessive torque can result in deformed joint parts. Either condition can result in refrigerant leakage. Refer to step c for correct torque values.

- c. When connecting aluminum fittings in the refrigerant system, torque all 5/8-inch fittings to 18-21 foot-pounds and all 1/2-inch fittings to 11-13 foot-pounds.
- d. Use refrigerant R-12 (Item 34, Consumable Materials Chart, Section 2) in this system on airplanes TH-1 thru TH-1744 or R-134a (Item 68, Consumable Materials Chart) on airplanes TH-1745 and after. Other refrigerants, particularly those containing methyl chloride, will cause rapid deterioration of aluminum components.

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WARNING

Do not smoke when servicing the system because the refrigerant converts to a highly toxic gas when exposed to an open flame.

SYSTEM LEAK DETECTION

NOTE

It is permissible to add 4 ounces of refrigerant leak detector dye (70, Consumable Materials Chart, Section 2), to the suction side of the refrigerant system to detect leaks. A red film will appear in the areas of leakage.

A reduction of system cooling ability, or the presence of bubbles in the refrigerant, may indicate a partial loss of refrigerant. The sight glass should be checked during operation at maximum available ambient and cabin temperature. Streams of bubbles past the glass or foam in the glass indicates an inadequate refrigerant quantity. If a loss of refrigerant is suspected; an inspection of the system plumbing should be carried out to locate the source of the leak. Large leaks may be located by the appearance of oily spots where oil has been carried out by escaping refrigerant. Smaller leaks, which are much more difficult to locate, may be detected by detergent bubbles, or an electronic detector. In order to use the above detectors, the system must contain a partial charge and be operating. The detergent test is accomplished by covering a suspected area with soap suds and watching for bubbles. An electronic detector has a probe which is moved along the plumbing to pick up escaping refrigerant. Refrigerant is heavier than air so the probe should be held below the lines. Various types of electronic and fluorescent leak detectors are available and each type operates in a somewhat different manner. The detector manufacturer's instructions should be reviewed for proper usage of the instrument. If a leak is detected at a fitting, the use of a soft copper flare gasket in the flare fitting is permissible if the connection does not seal by the normal method.

Any leak detected with soap bubbles or Halide flame detector is leaking sufficiently to require repair. Electronic detectors are very sensitive and may detect leaks that are small enough to be insignificant. While compressor shaft seals should be repaired only if they

leak more than 0.5 ounce a year, any other leak exceeding 0.3 ounce a year should be repaired. Any area suspected of leaking should be cleaned with soap and water.

NOTE

A useful device may be made of a 1/4-inch copper tube for detecting shaft seal leaks on an installed compressor. Acquire a 12-inch-long tube and put a 90° bend 3/4 inch from the end. Insert the straight end into the detector hose and insert the other end into one of the holes in the compressor clutch plate.

CLUTCH TEST

Check the clutch amperage. The clutch should draw approximately 1.7 amps. A poor ground could be the cause of low voltage or amperage. If the voltage or amperage is incorrect, check that there is a good ground. If clutch engagement is erratic, use a feeler gage to check the air gap. A gap of 0.016 to 0.030 inch is required for proper engagement.

If a faulty pulley (clutch) bearing is suspected, remove the belt and check for roughness. Disengage the clutch and turn the pulley by hand. If there is roughness, replace the rotor pulley and clutch front assembly or bearing set.

UNUSUAL NOISE

If there is unusual noise in the compressor, check the following:

- a. Loose belt; torque to 80 to 90 foot-pounds.
- b. Broken bracket and/or compressor mounting.
- c. Missing, broken or loose bolt at the compressor.
- d. Low refrigerant level; restore the proper refrigerant level.

AIR-CONDITIONING FUNCTIONAL TEST

With the engine running at 1000 rpm and the system on, observe the sight glass, if the refrigerant appears milky or bubbles appear, charge the system as noted in CHARGING THE AIR CONDITIONING SYSTEM in Section 2. Check the system for leaks using a flameless leak detector.

COMPRESSOR BELT REMOVAL

- a. Remove the left engine cowl to gain access to the compressor belt.

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- b. Remove the propeller per Section 2.
- c. Loosen the adjustment bolt on the idler pulley bracket to remove tension on the compressor belt.
- d. Remove the compressor belt.

COMPRESSOR BELT INSTALLATION

- a. Install the compressor belt over the compressor pulley, idler pulley and drive pulley.
- b. Tighten the adjustment bolt on the idler pulley bracket to increase tension on the compressor belt per COMPRESSOR BELT TENSION ADJUSTMENT in this section.
- c. Install the propeller per Section 2.
- d. Install the left engine cowling.

COMPRESSOR BELT TENSION ADJUSTMENT

After 36 to 48 hours operating, a new belt will stretch to its normal operating length. The belt tension should be checked at this time and adjusted by torquing the adjustment bolt, located on the pulley bracket, so that

a belt tension gage, placed at the midpoint between the idler pulley and the compressor, will register a belt tension of 75 to 90 pounds. After adjusting the belt tension, make sure the belt has ample clearance on all sides.

CONDENSER BLOWER REMOVAL

- a. Gain access to the condenser blower in the left nacelle.
- b. Tag and disconnect the electrical wiring to the blower motor.
- c. Remove the attaching hardware and remove the blower.

CONDENSER BLOWER INSTALLATION

- a. Place the condenser blower in position.
- b. Secure the blower by installing the attaching hardware.
- c. Connect the electrical wiring to the blower motor.
- d. Install access panels and secure.

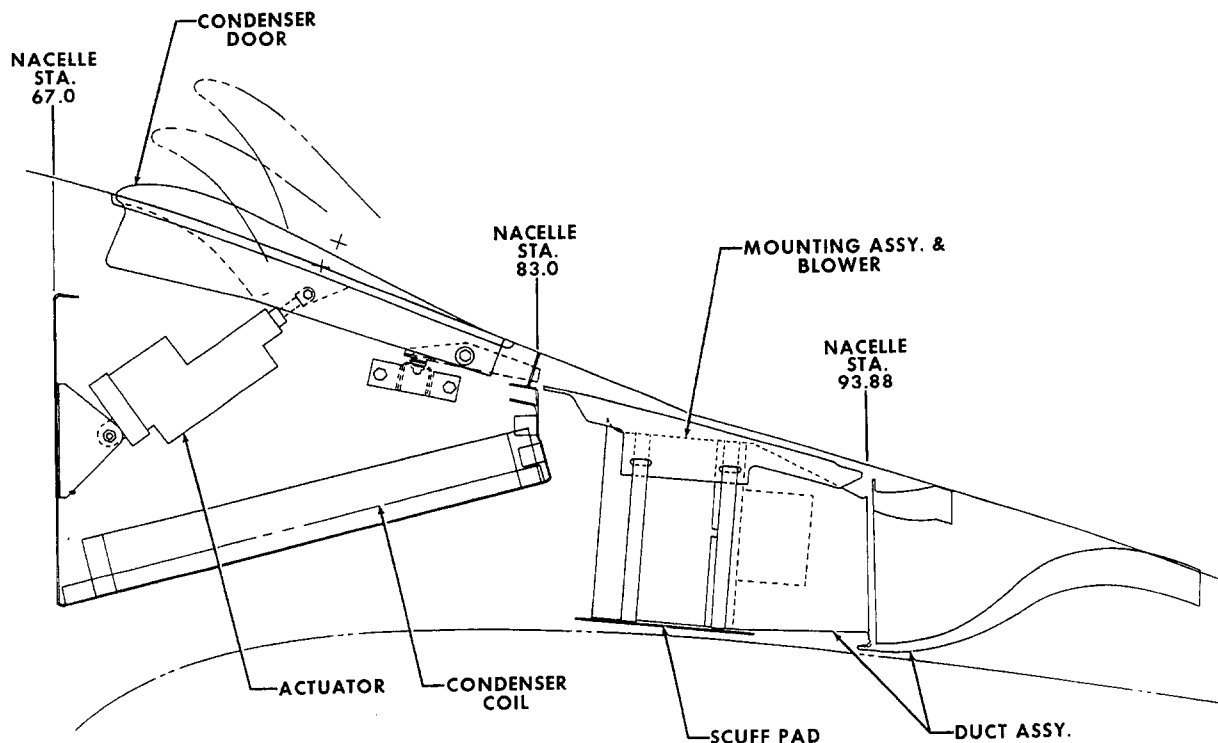


Figure 10-5. Condenser and Blower

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CONDENSER REMOVAL

- a. Open the left engine cowling.
- b. Remove the screws from the engine air scoop and remove the scoop.
- c. Remove the screws from the two skins on the top of the left nacelle and remove the skins.
- d. Remove the screws from the air scoop door.
- e. Disconnect the air scoop door actuator and remove the actuator.
- f. Disconnect the instrument air line over the aft end of the condenser and remove the air line.
- g. Remove the screws from the three brackets over the aft end of the condenser and remove the brackets.
- h. Using a recycle/recovery service unit, discharge the system slowly, through the service ports under the copilot's seat, until all pressure is bled off.
- i. Disconnect the freon lines to the condenser.
- j. Cap and plug all openings.
- k. Remove the bolts from the aft end of the condenser.
- l. Remove the bolts from the forward end of the condenser.
- m. Lift the condenser up and out of the nacelle.

CONDENSER INSTALLATION

- a. Place the condenser in position.
- b. Secure the condenser by installing the bolts.
- c. Remove the caps and plugs and install the inlet and outlet lines and secure.
- d. Charge the system as indicated in Section 2.
- e. Install the instrument air line.
- f. Install the three brackets.
- g. Place the two skins in position and install the screws.
- h. Place the air scoop door in place and install the screws.
- i. Install the actuator to the air scoop door.
- j. Place the engine air scoop in position and install the screws.
- k. Close the engine cowling.

COMPRESSOR REMOVAL

- a. Gain access to the LH engine accessory section.

- b. Remove electrical leads from compressor clutch terminals.

WARNING

Due to the air quality control regulations enacted in the United States, R-12 and R-134a refrigerant cannot be vented into the atmosphere. When performing maintenance on the air-conditioning system where R-12 or R-134a can escape from the system, evacuate the system with a recovery or recycle servicing unit that will salvage the refrigerant.

The air-conditioning system is a high pressure system. Before disconnecting a refrigerant line, the system must be discharged with a recovery servicing unit. Purge the entire system to a 125-micron level.

Do not smoke when servicing the system with R-12 or 134a because it converts to a highly toxic gas when exposed to an open flame.

- c. Using the service valves in the fuselage forward of the main spar, slowly discharge the system with the recovery recycle servicing unit until all pressure is bled off.
- d. Disconnect refrigerant lines at the compressor. Cap the refrigerant lines and compressor fittings.
- e. Remove the compressor belt per COMPRESSOR BELT REMOVAL in this section.
- f. Remove the four compressor mounting bolts and nuts and remove the compressor.

REPLACING COMPRESSOR

- a. Drain oil from the new compressor.
- b. Drain and measure the oil from the old compressor.
- c. Measure new oil (35 or 67, Consumable Materials Chart, Section 2) equal to the amount drained from the old compressor and use it to refill the new compressor.

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NOTE

If the oil level in the old compressor cannot be determined, then the oil should be drained from the entire system and the system reserviced in accordance with REPLENISHING AIR CONDITIONING SYSTEM LUBRICATION in Section 2. Drainage can be accomplished by cracking the freon line fittings at low points in the system. Approximately one ounce of oil will remain in the system after draining.

If any contamination of the system is suspected, the system should be flushed as noted in FLUSHING THE SYSTEM in this Section.

COMPRESSOR INSTALLATION

NOTE

Check and service the compressor with oil as noted in REPLACING COMPRESSOR in this section.

- a. Position compressor on the mounting bracket and install the attaching bolts and nuts.
- b. Install the compressor belt as noted in COMPRESSOR BELT INSTALLATION in this Section.
- c. Adjust belt tension as noted in COMPRESSOR BELT TENSION ADJUSTMENT in this section.
- d. Remove caps from lines and compressor and install lines to the fittings on the compressor.
- e. Install the electrical leads to the magnetic clutch.
- f. Purge the system as noted in FLUSHING THE SYSTEM in this Section.
- g. Charge the system with refrigerant as noted in CHARGING THE AIR-CONDITIONING SYSTEM in Section 2.
- h. Install and secure the access panels.

FLUSHING THE SYSTEM

It is necessary that the air-conditioning system be flushed and evacuated when the system has been contaminated. The system can be flushed by using AC Flush (69, Consumable Materials Chart, Section 2) as a liquid cleaning agent and dry nitrogen as a vapor propellant. Flushing of the system may be accomplished as follows:

WARNING

Due to the air quality control regulations enacted in the United States, R-12 and R-134a refrigerant cannot be vented into the atmosphere. When performing maintenance on the air-conditioning system where R-12 or R-134a can escape from the system, evacuate the system with a recovery or recycle servicing unit that will salvage the refrigerant.

The air-conditioning system is a high pressure system. Before disconnecting a refrigerant line, the system must be discharged with a recovery servicing unit. Purge the entire system to a 125-micron level.

Do not smoke when servicing the system with R-12 or R-134a because it converts to a highly toxic gas when exposed to an open flame.

- a. Using the service valves in the fuselage forward of the main spar, slowly discharge the system with the recovery/recycle servicing unit until all pressure is bled off.
- b. Disconnect both hose connections to the compressor.

NOTE

When flushing with AC Flush, do not allow it to enter the compressor.

- c. Remove and discard the filter-drier.
- d. Connect the AC Flush connector to the discharge hose connection and allow approximately one pound of the AC Flush to enter the discharge side of the condenser.
- e. Connect the dry nitrogen container at the same point with pressure set between 100 and 250 psig. Allow pressurized vapor to enter until all flushing liquid is purged out of the inlet to the filter-drier hose connection.
- f. Cap both connections.
- g. Remove the expansion valves and clean.
- h. Using the above procedure, flush and purge the liquid hose from the filter-drier to the expansion valves and suction hose and evaporator.

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- i. Evacuate the system as noted in EVACUATING THE SYSTEM in this Section.

EVACUATING THE SYSTEM

Using a recycle/recovery service unit, evacuate the system as follows:

- a. Attach the LO service hose of the recycle/recovery unit to the suction port.
- b. Attach the HI service hose to the discharge port.
- c. Adjust the vacuum to control the turbulence of the oil in the pump.
- d. As the pump-down progresses and the turbulence reduces, gradually open the vacuum and HI and LO valves until they are fully open for maximum evacuation efficiency.
- e. When the pressure is down to about 200 microns, close the valve to permit continuing the pump-down.
- f. The system must be evacuated to 125 microns or lower.

FORWARD EVAPORATOR BLOWER MODULE REMOVAL

- a. Gain access to the forward evaporator blower module through the forward baggage compartment.
- b. The module is located to the rear left side of the forward baggage compartment.
- c. Remove the blanket from the floor.
- d. Remove the screws from the metal guard around the evaporator module and remove the guard from the airplane.
- e. Tag and remove the electrical wiring from the evaporator blower module.

WARNING

Due to the air quality control regulations enacted in the United States, R-12 and R-134a refrigerant cannot be vented into the atmosphere. When performing maintenance on the air-conditioning system where R-12 or R-134a can escape from the system, evacuate the system with a recovery or recycle servicing unit that will salvage the refrigerant.

The air-conditioning system is a high pressure system. Before disconnecting a refrigerant line, the system must be discharged with a recovery servicing unit. Purge the entire system to a 125-micron level.

A face should be worn when performing maintenance on the lines because refrigerant coming in contact with the eyes can cause loss of sight.

Do not smoke when servicing the system with R-12 or R-134a because it converts to a highly toxic gas when exposed to an open flame.

- f. Using a recycle/recovery service unit, discharge the system slowly, through the service ports under the copilot's seat, until all pressure is bled off.
- g. Remove the air-conditioning hoses and ducts from the evaporator blower module.
- h. Remove the evaporator blower attaching bolts and remove the evaporator blower module.

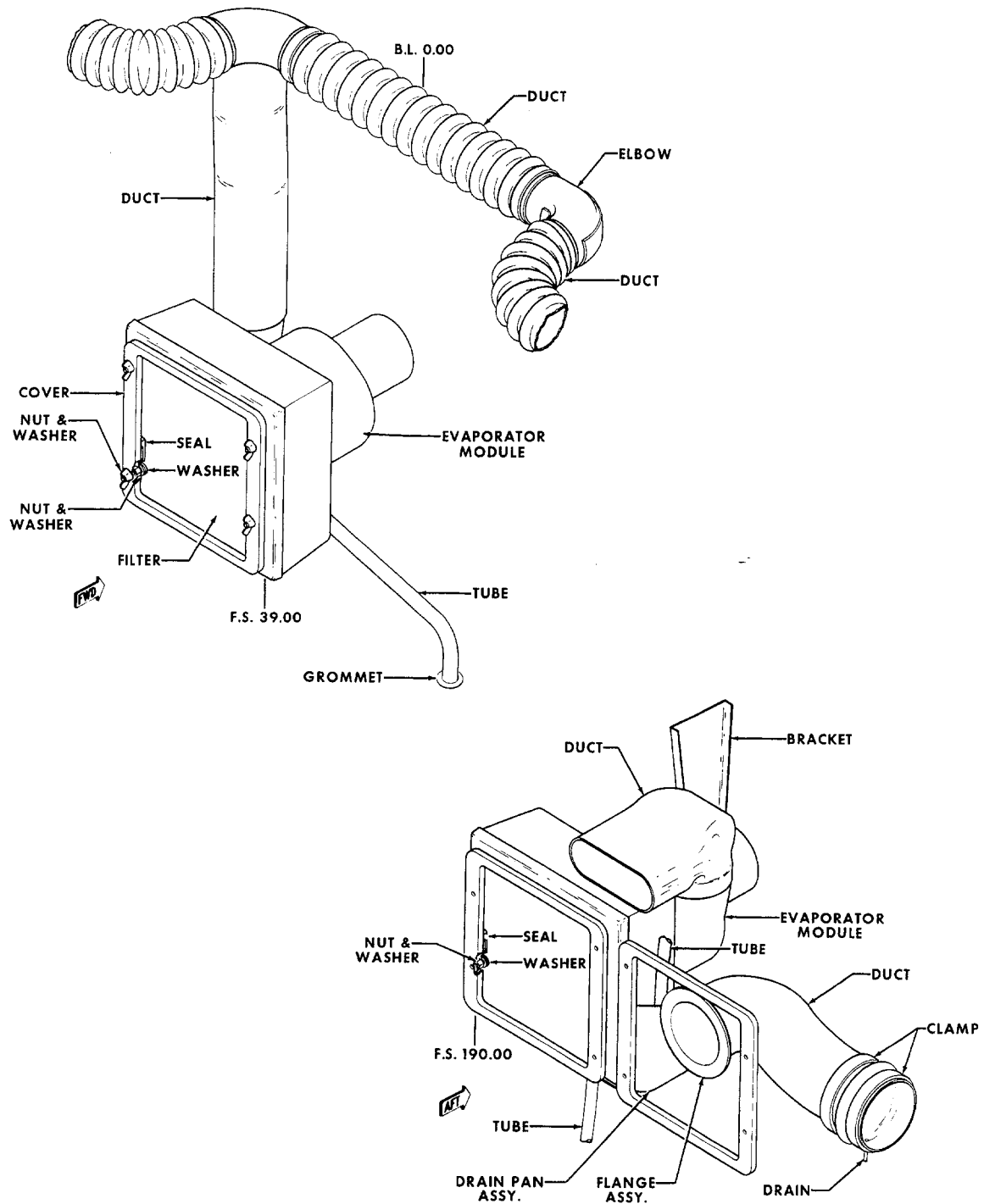
FORWARD EVAPORATOR BLOWER MODULE INSTALLATION

- a. Place the forward evaporator blower module in position and secure with attaching bolts.
- b. Remove tags from the electrical wiring and connect the wires to the evaporator blower module.
- c. Connect the air-conditioning system hoses and duct to the evaporator blower module.
- d. Place the metal guard in position around the evaporator module and install the screws.
- e. Charge the refrigerant system as indicated in Section 2.
- f. Install the blanket on the floor.
- g. Close the baggage compartment door.

FORWARD EVAPORATOR BLOWER MOTOR REMOVAL

- a. Gain access to the forward evaporator blower motor through the forward baggage compartment.
- b. The module is located to the rear left side of the forward baggage compartment.
- c. Remove the blanket from the floor.

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Figure 10-6. Evaporator Modules

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- d. Remove the screws from the metal guard around the evaporator module and remove the guard from the airplane.
- e. Tag and remove the electrical wiring from the evaporator blower motor.
- f. Remove the screws from the fan closure.
- g. Remove the motor and fan from the evaporator.

FORWARD EVAPORATOR BLOWER MOTOR INSTALLATION

- a. Place the motor and fan in position on the evaporator.
- b. Install the screws holding the fan and motor in place.
- c. Remove the tag and install the electrical wires on the motor.
- d. Place the metal guard in position around the evaporator module and install the screws.
- e. Install the blanket on the floor.
- f. Close the baggage compartment door.

AFT EVAPORATOR BLOWER MODULE REMOVAL

- a. Open the aft baggage compartment doors.
- b. Remove the lower portion of the aft bulkhead (held in by velcro).
- c. Tag and remove the electrical wiring from the evaporator blower motor.

WARNING

Due to air quality control regulations enacted in the United States, R-12 and R-134a refrigerant cannot be vented into the atmosphere. When performing maintenance on the air-conditioning system where R-12 or R-134a can escape from the system, evacuate the system with a recovery or recycle servicing unit that will salvage the refrigerant.

The air-conditioning system is a high pressure system. Before disconnecting a refrigerant line, the system must

be discharged with a recovery servicing unit. Purge the entire system to a 125-micron level.

A face shield should be worn when performing maintenance on the lines because refrigerant coming in contact with the eyes can cause loss of sight.

Do not smoke when servicing the system with R-12 or R-134a because it converts to a highly toxic gas when exposed to an open flame.

- d. Remove the air-conditioning hoses and ducts from the evaporator blower module.
- e. Remove the evaporator blower attaching bolts and remove the evaporator blower module.

AFT EVAPORATOR BLOWER MODULE INSTALLATION

- a. Place the aft evaporator blower module in position and secure with attaching bolts.
- b. Remove tags from the electrical wiring and connect the wires to the evaporator blower module.
- c. Connect the air-conditioning system hoses and duct to the evaporator blower module.
- d. Charge the refrigerant system as indicated in Section 2.
- e. Check the refrigerant line connections for leaks.
- f. Install the lower portion of the aft bulkhead.
- g. Close the aft baggage door.

AFT EVAPORATOR BLOWER MOTOR REMOVAL

- a. Open the aft baggage compartment doors.
- b. Remove the lower portion of the aft bulkhead (held in by velcro).
- c. Tag and remove the electrical wiring from the evaporator blower motor.
- d. Remove the screws from around the fan closure.
- e. Move the motor and fan aft and away from the aft blower module.

AFT EVAPORATOR BLOWER MOTOR INSTALLATION

- a. Place the motor and fan in position on the aft blower module.

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- b. Install the screws in the fan closure.
- c. Remove the tags and install the electrical wiring on the motor.
- d. Check that the fan operates.
- e. Install the lower half of the aft bulkhead.
- f. Close the aft baggage compartment doors.

**EVAPORATOR BLOWER MODULE
FILTERS**

Clean filters with compressed air every 100 hours of air-conditioner operation and replace the filter whenever the filter material is discolored or at 500 hours of air-conditioner operation whichever occurs first.

**AFT EVAPORATOR BLOWER MODULE
FILTER CLEANING**

- a. Locate the air outlet at the top of the bulkhead at FS 190.00. Remove the air-outlet louvered molding plate.
- b. Remove upholstery panels from the bulkhead at FS 190.00.
- c. Using clean compressed air, back blow all dust, sand and other contaminants out of the filter.
- d. Install the upholstery panels with the filter attached.
- e. Install the air outlet louvered molding plate.

**AFT EVAPORATOR BLOWER MODULE
FILTER REPLACEMENT**

- a. Locate the air outlet at the top of the bulkhead at FS 190.00. Remove the air outlet louvered molding plate.
- b. Remove the upholstery panels from the bulkhead at FS 190.00.
- c. Remove the filter from the back of the upholstery panel.
- d. Using No. 77 spray adhesive (Item 36, Consumable Materials Chart, Section 2), bond a new filter to the back of the upholstery panel.
- e. Allow adhesive to dry and install the upholstery panel.

- f. Install the air outlet louvered molding plate.

**FRESH AIR VENT BLOWER SYSTEM
(OPTIONAL)**

An optional fresh air blower located in the aft fuselage provides additional ventilation through the overhead outlets during ground operations. The blower utilizes the same ducts and air outlets as the standard fresh air system.

FRESH AIR VENT BLOWER REMOVAL

- a. Remove the fifth and sixth seats (if installed) to gain access to the blower assembly mounted on the aft bulkhead.
- b. Remove the rear upholstery panel.
- c. Tag and disconnect the electrical wiring.
- d. Remove clamps from the blower ducts and disconnect the ducts from the inlet and outlet.
- e. Remove the blower attaching bolts from the mounting plate and support bracket.

**FRESH AIR VENT BLOWER
INSTALLATION**

- a. Position the blower assembly on the mounting support bracket and install the attaching bolts.
- b. Install air ducts to the blower inlet and outlet.
- c. Install the appropriate clamps to the ducts and tighten.
- d. Connect the electrical wiring to the blower assembly according to the tags or the BEECHCRAFT Baron electrical wiring diagram manual.
- e. Install the upholstery panel.
- f. Install the fifth and sixth seats if necessary.

ADJUSTING THE EXPANSION VALVES

Even though the expansion valves are of the adjustable type, it is impossible to properly adjust them on the airplane. The expansion valves are adjusted at the factory to $38 \pm .05$ psi. Without proper equipment a satisfactory adjustment can not be achieved. If the valves are not operating properly replace the valves with new ones.

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TROUBLESHOOTING AIR-CONDITIONING SYSTEM TE-1119, TE-1125 AND AFTER; TH-873, TH-895 AND AFTER

TROUBLE	PROBABLE CAUSE	REMARKS
1. Insufficient cooling.	a. Blower not functioning. b. Obstructed or disconnected air duct. c. Compressor clutch or belt slipping. d. Evaporator filter clogged. e. Refrigerant level low.	a. Repair. b. Remove obstruction or repair. c. Repair or adjust. d. Replace. e. Leak-test and recharge.
2. No cooling.	a. Blown fuse, loose connection. b. Blower not functioning. c. Leak in system. d. Compressor valves inoperative. e. Slipping or broken belt.	a. Check connections, fuse, continuity, and proper adjustment of expansion valves. b. Repair. c. Leak-test and recharge. d. Repair or replace. e. Tighten or replace.
3. Excessive vibration of unit.	a. Overcharged. b. Air in system. c. Mount or compressor bolts loose. d. Drive pulley loose.	a. Correct refrigerant charge. b. Purge and recharge system. c. Tighten. d. Tighten.
4. Noisy unit.	a. Compressor oil level low. b. Faulty belt. c. Low refrigerant level. d. Fan hitting shroud. e. Faulty compressor.	a. Add oil. b. Replace. c. Add refrigerant. d. Align and tighten shroud. e. Replace.
5. Hissing in evaporator module.	a. Low charge.	a. Add refrigerant.
6. Chatter or knock in evaporator module.	a. Faulty expansion valve.	a. Replace.
7. Belt slipping.	a. Loose. b. Overcharged. c. Air in system.	a. Adjust. b. Correct refrigerant level. c. Evacuate and recharge.
8. Excessive belt wear.	a. Pulleys not in line. b. Belt too tight. c. Belt width wrong.	a. Align pulleys. b. Adjust or replace. c. Replace with correct belt.
9. Broken belt.	a. Pulleys not in line. b. Belt width wrong. c. Belt was too tight.	a. Align pulleys. Replace belt. b. Replace with correct belt. c. Replace and adjust to correct tension.

SECTION

11

UTILITY SYSTEMS

OXYGEN SYSTEM

The oxygen system consists of an oxygen regulator, oxygen outlets, and an oxygen cylinder. The oxygen cylinder may be located either behind the aft cabin bulkhead or in the nose baggage compartment. The system may be fitted with either a 38 cubic foot, 48 cubic foot or 65 cubic foot oxygen cylinder.

On early model Barons, oxygen cylinder pressure is monitored with a pressure gage and controlled by a shut-off valve located either forward of the cabin aft bulkhead or just forward and left of the pilot's seat. On Barons, serials TC-955 and after, TE-1 and after, and TH-1 thru TH-456, cylinder pressure is connected directly to the pressure gage on the console. The pressure gage indicates the supply (psi) of oxygen available. System operation may be limited to altitudes above 8,000 feet by an optional altitude-compensating regulator whose sensing element meets each increase in altitude with increased oxygen flow. On serials TC-1673 and after, TE-976 and after, and TH-457 and after, the oxygen cylinder is mounted forward of the cabin forward bulkhead. The cylinder (of either 49 or 66 cubic foot capacity) includes an altitude-compensating regulator and cable-operated shutoff valve. The handle for the shutoff valve is located on the left subpanel in front of the pilot. The oxygen supply pressure gage is mounted near the pilot's outlet on the left sidepanel. The other outlets are located in the sidepanels near the seats for which they provide service. The filler valve is located forward of the cylinder to the right of the airplane centerline. An overboard vent is installed on the right side of the airplane. The oxygen masks for the pilot and copilot are stowed in a box attached to the spar cover under their respective seats. The third and fourth seats masks are stowed in boxes attached to either the front or rear of the aft spar cover, depending on the seating arrangement. The masks for the fifth and sixth seats are stowed in boxes attached to the bottom of the seats. While the system forward of the cabin forward bulkhead remained essentially the same, the cabin was redesigned at serials TC-2340, TC-2355 and after; TE-1152, TE-1181 and after; and TH-1027, TH-1062, TH-1067, TH-1080 and after. All of the passenger outlets were moved to the headliner near the center of the airplane, while the pilot's and copilot's outlets remained in their sidepanels. At serials TH-1389, TH-1396 and after, the pilot may stow his mask in a place he considers convenient while the copilot's mask must be stowed in a box attached to the spar cover under his seat. The third and fourth seat masks are both stowed in a single box attached to either the front or back of the rear spar cover, depending on the seating arrangement. The masks for the fifth and sixth seats are stowed in a box under the seats. When the system is not in use, shut off the control valve to prevent oxygen loss. For system servicing refer to Section 2.

WARNING

Keep fires, cigarettes and sparks away when outlets are in use. Open and close all oxygen valves slowly. Inspect the filler connection for cleanliness before attaching it to the filler valve. Keep tools, hands and components clean, as fire or explosion may occur when pure oxygen under pressure comes in contact with organic material such as grease or oil.

CAUTION

All persons handling and servicing oxygen systems should review proper precautions to be observed during servicing. FAA Advisory Circular 43.13-1A contains the necessary information.

OXYGEN LOW PRESSURE TEST PROCEDURE (TC-502 and after, TE-1 and after, TH-1 and after)

WARNING

Keep fire, cigarettes and sparks away from the vicinity of the oxygen cylinder. Hands, clothing and tools should be clean. Oil and grease will ignite upon contact with pure oxygen under pressure.

- a. Turn the oxygen to the full off position (use the push-pull knob).
- b. Disconnect the oxygen low pressure line from the regulator and cap the open line.
- c. Plug an oxygen gage (0 to 100 psi range) into any outlet.
- d. Pressurize the system to 60-80 psi with MIL-O-27210 oxygen, then allow the system to stabilize for 2 minutes.
- e. The pressure drop should not exceed 5.0 psi during the next 15 minutes.
- f. If the pressure test is satisfactory, reconnect the line disconnected in step "b."
- g. Pressure test the connection made in step "f" by using cylinder pressure (1500 psi or higher in the cylinder), and leak test compound, (14, Consumable Materials Chart, Section 2).
- h. After the test, wipe the area clean and dry.

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OXYGEN HIGH PRESSURE TEST PROCEDURE
(TC-502 and after, TE-1 and after, TH-1 and after)

WARNING

Keep fire, cigarettes and sparks away from the vicinity of the oxygen cylinder. Hands, clothing and tools should be clean. Oil and grease will ignite upon contact with pure oxygen under pressure.

- a. Check to make certain the system is charged to 1500 psi or higher.
- b. Make sure the shut-off valve is off (check the push-pull knob).
- c. Observe the pressure gage; there should be no pressure drop in 2 hours.
- d. If the leak test is not satisfactory, use leak test compound (14, Consumable Materials Chart) on the system connections until the leak is located.
- e. Make the necessary repairs and repeat step "c."
- f. Wipe the tested areas clean and dry.

OXYGEN MASK CLEANING

(Puritan-Bennett Constant Flow Mask)

- a. Prepare a cleaning solution by mixing one ounce of antiseptic (64, Consumable Materials Chart, Section 2) (or equivalent) into two gallons of warm (no hotter than 140° F.) distilled water.

NOTE

Wear Protective gloves.

CAUTION

Do not allow any of the cleaning solution to enter the reservoir bag or the flow indicator.

- b. Using a soft cotton cloth or gauze pad dipped in the cleaning solution, wipe the exterior of the mask facepiece, reservoir bag, flow indicator and the oxygen tubing.

CAUTION

Use caution not to damage the dilution valve

diaphragm when wiping the interior of the face cushion.

- c. Wipe the interior face cushion with a soft cotton cloth or gauze pad dipped in the cleaning solution.
- d. Using distilled water and a soft cotton cloth or gauze pad, wipe the areas just cleaned to remove any residue of the cleaning solution.
- e. Dry the mask.
- f. Place the mask in a clean plastic bag.

OXYGEN SYSTEM PURGING

WARNING

Do not use oxygen intended for medical purposes, or such industrial uses as welding. Such oxygen may contain excessive moisture that could freeze up the valves and lines of the oxygen system. When filling the oxygen system, use only MIL-O-27210 Aviator's Breathing Oxygen (17, Consumable Materials Chart, Section 2).

The oxygen system may be rid of obnoxious and offensive odors by purging. The system should also be purged any time the system pressure falls below 50 psi or the lines have been left open for a period of time. The purging operation consists of nothing more than connecting a recharging cart filler hose to the oxygen filler valve and allowing oxygen to flow through the system and escape at the outlets carrying away the bad odors. The following steps outline the procedure for purging the oxygen system.

- a. Connect a line from a recharging cart to the oxygen filler valve.
- b. Slowly open the oxygen supply.
- c. Slowly open the high pressure line valve on the oxygen control console, to left of the pilot.
- d. Plug in an oxygen mask at each outlet in the cabin and cockpit.
- e. Open all doors and windows.
- f. Set the cart pressure regulator to deliver 50 psi to the system.
- g. Allow system to purge for one hour and check for the presence of odor. If the odor is still present continue purging for one additional hour. If the odor is still present after the second hour of purging replace the supply cylinder.

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**OXYGEN CYLINDER REMOVAL
(TC-1 thru TC-501)**

WARNING

Keep fire, cigarettes and sparks away from the vicinity of the oxygen cylinder. Hands, clothing and tools should be clean. Oil and grease will ignite upon contact with pure oxygen under pressure.

The oxygen bottle on the above noted airplanes is located behind the aft cabin bulkhead and may be removed as follows:

- a. Slowly close the oxygen supply cylinder valve.
- b. Disconnect the line from the supply cylinder.
- c. Cap the open line immediately with a clean metal fitting.
- d. Loosen the bracket clamp wing nuts.
- e. Raise the cylinder clamps and remove the cylinder from the brackets.

**OXYGEN CYLINDER INSTALLATION
(TC-1 thru TC-501)**

- a. Place the new cylinder in the brackets and close the cylinder clamps.
- b. Tighten the bracket clamp wing nuts.
- c. Carefully inspect the fittings on both the cylinder and the line for cleanliness and the presence of foreign matter, which may contaminate the oxygen.
- d. Connect the line fitting to the cylinder fitting.
- e. Slowly open the supply cylinder valve.
- f. Test the connections for leaks with Oxygen System Leak-Test Compound (Item 14, Consumable Materials Chart.)

**OXYGEN CYLINDER REMOVAL AND INSTALLATION
(TC-502 and after, TE-1 and after and TH-1 and after)**

The removal and installation of the oxygen cylinder for the above noted airplanes is the same as airplanes prior to serial TC-502, except the cylinder is located in the nose baggage compartment.

OXYGEN CYLINDER RETESTING

Oxygen cylinders used in the Baron are of two types. The light-weight cylinder is stamped 3HT on a plate on the side of the cylinder. This cylinder must be hydrostatically tested every three years and the test date stamped on the cylinder.

This cylinder has a service life of 4380 pressurizations or 24 years, whichever occurs first, and then must be discarded. The regular weight cylinder is stamped 3A or 3AA. This cylinder must be tested every five years and stamped with the retest date. Service life on this cylinder is not limited.

**VACUUM SYSTEM
(TC-1 thru TC-2002, TE-1 thru TE-451)**

**ADJUSTING THE VACUUM SYSTEM
(TC-1 thru TC-190)
(Figure 11-1)**

- a. Start only one engine and set the throttle to obtain 2200 rpm.

- b. Position the vacuum selector valve to the operating engine and check the vacuum gage reading for 5 inches of mercury. If the gage does not indicate 5 inches:

1. Tape the air intake screen on the bottom of the central vacuum regulator.

2. With the engine running at 2200 RPM, adjust the vacuum regulator in the nacelle to obtain a gage reading of 5 inches of mercury. Loosen the lock nut and turn the adjusting screw clockwise to increase suction or counterclockwise to decrease suction.

- c. Stop the engine and repeat steps "a" and "b" with the opposite engine running.

- d. After both vacuum regulators have been individually adjusted to obtain 5 inches of mercury, remove the tape from the central relief valves.

NOTE

If a reading of 5 inches of mercury has been obtained on one engine and the other engine does not agree, check for restrictions in the vacuum system lines from the selector gage to the engine not agreeing.

- e. Start both engines and set throttles to obtain 2200 RPM. Then adjust the central vacuum regulator just forward of the instrument panel to obtain a gage reading of 5 inches of mercury.

**ADJUSTING THE VACUUM SYSTEM
(TC-191 thru TC-2002; TE-1 thru TE-451)
(Figure 11-1, 11-2, and 11-3)**

- a. Start only one engine and set the throttle to obtain 2200 RPM.

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b. Adjust the appropriate vacuum regulator behind the instrument panel to obtain a gage reading of 4.8 to 4.9 inches of mercury. Shut down engine.

c. Repeat steps "a" and "b" with the opposite engine running.

d. After both vacuum regulators have been individually adjusted, start both engines and set throttles to obtain 2200 RPM. The gage reading should then be between 5.0 and 5.2 inches of mercury.

NOTE

On airplane serials TC-955 thru TC-2002 and TE-1 thru TE-451, a vacuum source indicator located in the vacuum gage, will indicate failure of either vacuum pump.

CENTRAL GYRO AIR FILTER (TC-1014 thru TC-2002; TE-208 thru TE-451)

A central air filter (2 installed for dual instruments) is incorporated in the instrument lines to protect the instruments from dust and other foreign particles. This filter(s) is a sealed unit mounted on a bracket behind the instrument panel and should be replaced every 500 hours (or less during operation in dusty or heavy smoke conditions). Replacement may be made as follows:

- Locate the filter(s), mounted centrally behind the control panel at the base of the panel.
- Remove the wing nut at the base of the housing and remove the filter from the bracket.
- Disconnect the hoses at the top of the filter by removing the attach clips.
- Discard the old filter and install a new filter by reversing the above noted procedure.

CLEANING THE SUCTION RELIEF VALVE SCREEN (TC-1 thru TC-2002; TE-1 thru TE-451)

How often the screens are cleaned depends on the conditions under which the airplane is flown. Should the valves need adjusting, especially to lower the vacuum, the screen should be cleaned and the setting rechecked before readjusting. The screen should be washed in Stoddard solvent, or a similar cleaner, then blown dry with high pressure air.

REPLACING GYRO INSTRUMENT AIR FILTERS (TC-1 thru TC-2002; TE-1 thru TE-451).

The replacement of the air filter in the gyro instruments may be accomplished without removing the instrument from the

airplane. The frequency of cleaning or replacing the air filters will depend upon service conditions; however, they should be checked approximately every 100 hours of operation. When operating in localities where there is an excessive amount of sand or dust in the air, or when subjected to continuous cabin smoke (tobacco, etc.) the filter should be inspected, and if necessary, replaced at more frequent intervals. Under extremely dusty conditions, it may be necessary to inspect the filter daily. A clogged filter reduces air flow and slows up the rotor, causing a loss of gyroscopic inertia and improper gyro indication.

To replace the filter assembly on the instrument, remove the air filter body-cover by taking out the four fillister-head machine screws. Lift out the snap ring which holds the filter in place, remove the filter, and replace it with a new one. Replace the air filter body-cover and gasket, securing them with screws. If the air filter body-cover is not used, the filter may be removed by lifting the snap past the four protective lugs.

SURFACE DEICER SYSTEMS

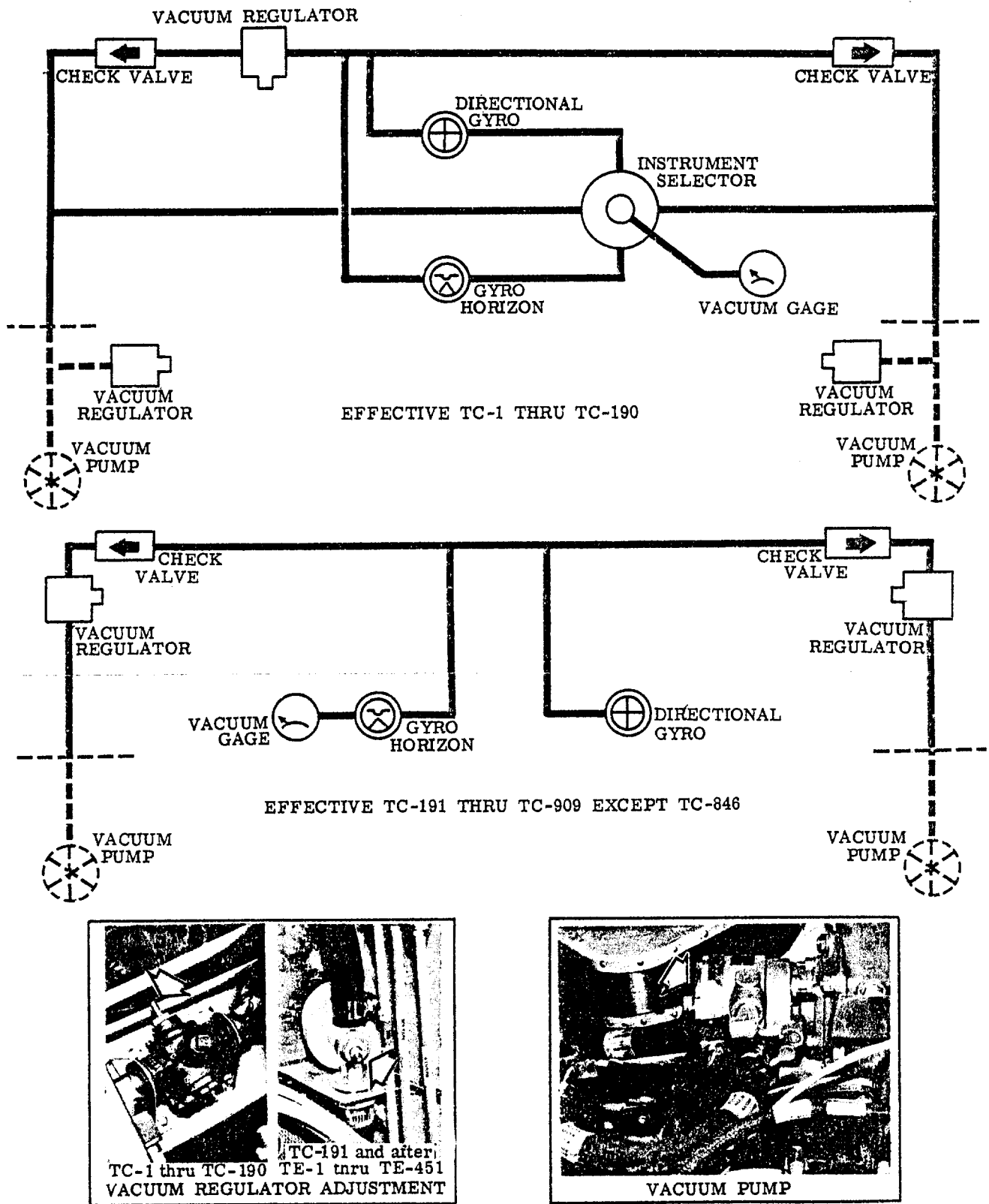
LIGHTWEIGHT AUTOMATIC (PUMP-DRIVEN) SURFACE DEICER SYSTEM

The following description applies to deicer systems utilizing Goodrich control valves, but is applicable also to systems incorporating Tavco control valve assemblies, with the exception of control valve operation and air filtering provisions, which will be discussed separately.

The principle components of the deicer system are: Lightweight rubber and fabric pneumatic deicer boots cement-bonded to the wing and empennage leading edges; the two engine-driven vacuum pumps which provide air pressure for deicer boot inflation and vacuum for deicer boot deflation; an electric timer forward of the instrument panel which actuates a solenoid operated combination overboard-pressure relief control valve in each engine nacelle; pressure sensitive shuttle valves to control the flow of air to and from the boots; a three-position switch to control the operation of the timer (and hence the deicer system); and the necessary plumbing and wiring components (see Figures 11-4, 11-5 and the wiring diagram in Section 14).

Normally, the engine-driven vacuum pumps apply vacuum to the deicer boots at all times, except when the boots are being inflated. When the deicer system control switch is placed in either the MANUAL or AUTOMATIC position, the timer energizes the combination overboard-pressure relief valves, the energized control valves port pressurized air to the pressure sensitive shuttle valves which, in turn, shut off the vacuum normally applied to the boots and allow pressurized air to inflate the boots. A deicer system pressure of 15 to 18 psig is maintained by the pressure relief function of the control valves. When the control valves are de-energized by the timer, the shuttle valves port the boot

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Figure 11-1. Vacuum System (TC-1 through TC-909 except TC-846, TE-1 through TE-451)

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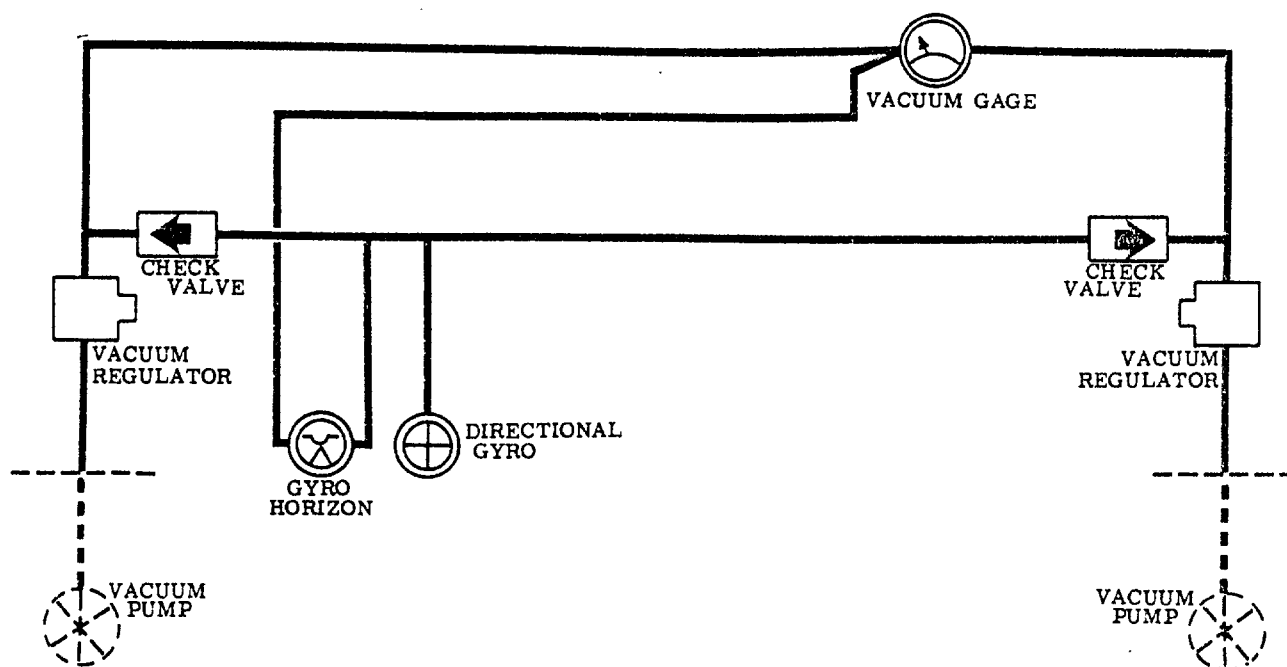


Figure 11-2. Vacuum System(TC-846, TC-910 through TC-1013,TE-1 through TE-207)

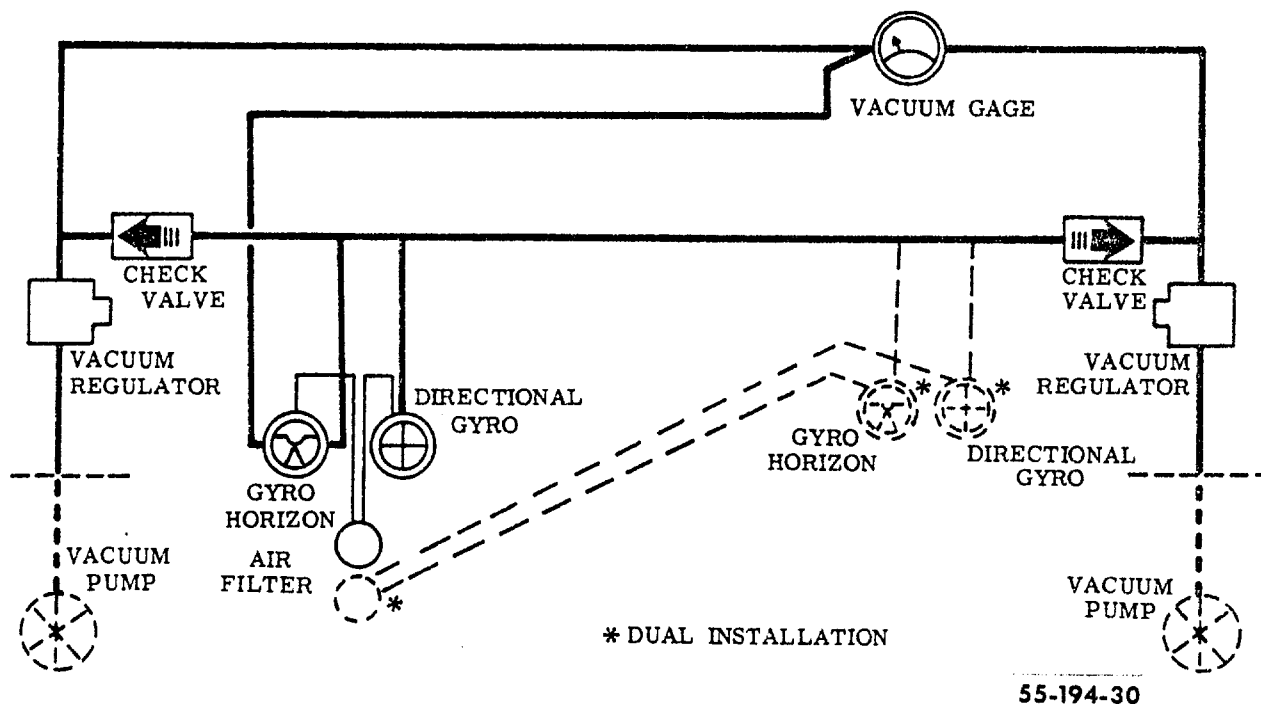
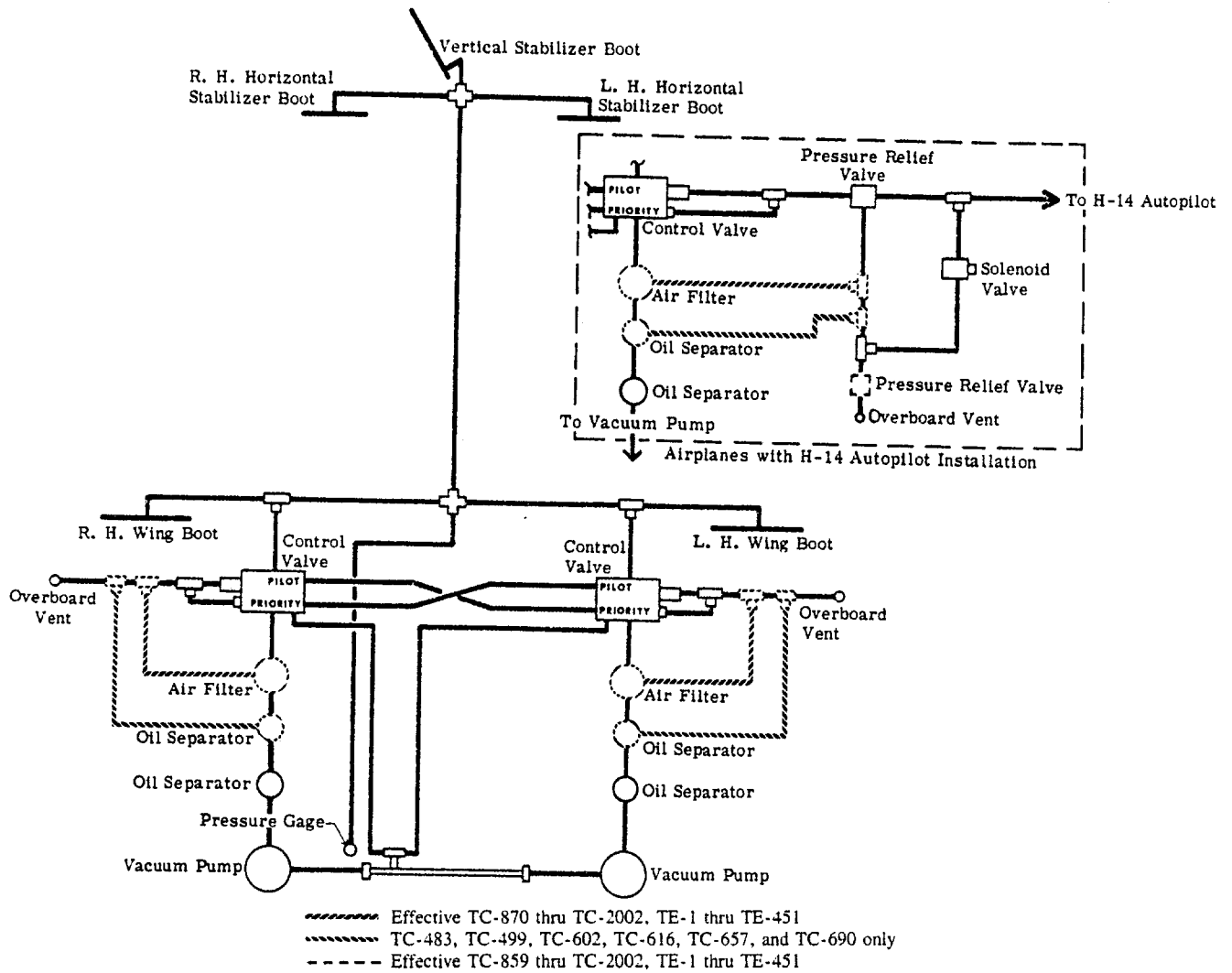


Figure 11-3. Vacuum System (TC-1014 thru TC-2002, TE-208 thru TE-451)

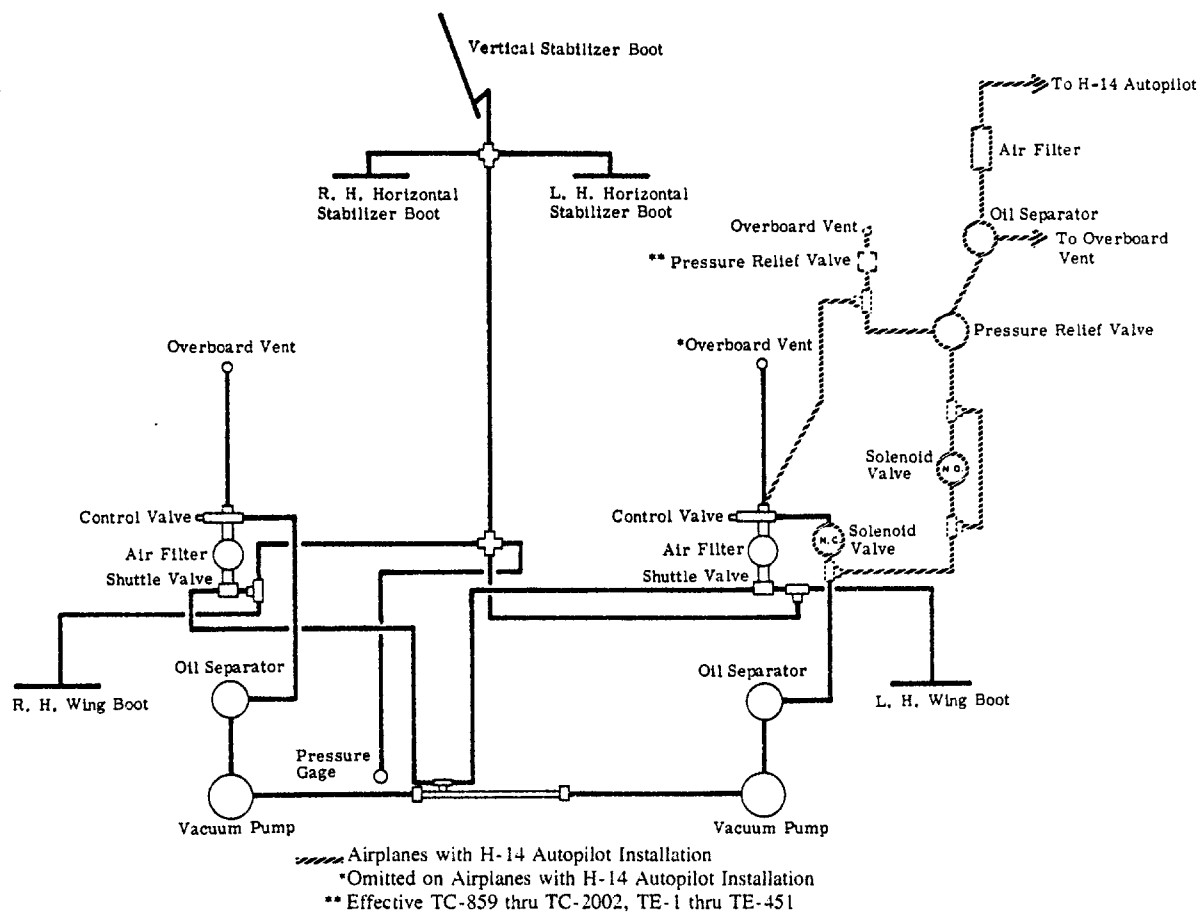
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55-193-36

Figure 11-4. Lightweight Automatic (Pump-Driven) Surface Deicer with Tavco Valves

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**Figure 11-5. Lightweight Automatic (Pump-Driven) Surface Deicer System
with Goodrich Valve Assemblies**

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inflating air overboard through the control valves; system vacuum is then reapplied to the boots.

Through the electric timer the solenoid operated control valves cause all of the boots to be inflated simultaneously; therefore, the system is described as a "single-inflation" type. Since the control valves operate simultaneously and are positive in positioning from "dump" to "deicer pressure" the system will operate with one engine-driven vacuum pump inoperative, which permits operation of the deicer system on one engine.

Both MANUAL and AUTOMATIC positions of the deicer switch are momentary. Momentary engagement of the AUTOMATIC position will automatically inflate the deicer boots for five to eight seconds before they resume the vacuum hold-down condition. The MANUAL position will inflate the boots only while the switch is held in engagement; when the switch is released, the boots will return to the vacuum hold-down condition.

The oil separator in each engine accessory section recovers oil in the pump output air; the oil is then returned to the engine sump. An air filter is connected to the pressure outlet of each control valve to remove foreign particles and any remaining oil from the deicer boot inflating air. The deicer system also contains a gage in the cockpit to register system pressure and a standard reset type circuit breaker to protect the deicer system electrical circuit.

SYSTEMS INCORPORATING TAVCO CONTROL VALVE ASSEMBLIES

When the deicer system three-position switch is activated, a solenoid-operated pilot valve builds up pressure against the pressure-vent shuttle spool, causing the boots to be pressurized. When the pressure reaches approximately one psig, a ball poppet closes off the vacuum port and the pressure continues to increase until regulated boot pressure is reached. The pressure relief valve is an integral part of the control valve assembly.

After the solenoid is de-energized, the shuttle returns to the "dump" position. When the remaining boot pressure lowers to 1 to 1.5 psig, the ball poppet opens to the vacuum port, permitting the boots to evacuate.

Two small lines, pilot pressure and priority pressure, plumbed between the valve assemblies in the nacelles allow operation of the system on one engine by using pressure from the valve for the operative engine to operate the shuttle in the opposite valve.

Each control valve assembly incorporates a filter to remove oil and any foreign particles from the system. On airplanes TC-483, TC-499, TC-602, TC-616, TC-657, and TC-690

only, a second oil separator is plumbed between each engine oil separator and control valve assembly; a drain line from the second oil separator connects with the overboard vent line to convey the condensed oil vapor overboard. Effective TC-870, TE-1 through TE-451, a 0.3 - micron filter is plumbed between each engine oil separator and corresponding control valve assembly to remove oil vapor. Condensed oil vapor is conducted overboard through a drain line connected to the overboard vent line.

Each Tavco control valve assembly contains a screw immediately inside the vent port. On airplanes equipped with the H-14 Autopilot, this screw is removed and pressure during the deicing cycle is utilized for powering the autopilot servos.

SYSTEM CHECKOUT

Control Valves

- a. Check control valve operation as follows:
 1. Turn on the battery master switch.
 2. Momentarily place the deicer system switch in the AUTOMATIC position.
 3. The control valve solenoid should be actuated immediately for seven seconds as evidenced by an audible "click" at the beginning and at the end of the cycle. The "click" can also be detected by placing the hand on the solenoid.
- b. If a control valve does not function, proceed as follows:
 1. Unplug the electrical connector at the solenoid.
 2. Attach a test light or other suitable test equipment to the connector and place the deicer switch in the AUTOMATIC position.
 3. If the test equipment does not indicate a complete circuit, check the circuit from the timer to the solenoid connector to ground.
 4. Replace defective timer component (holding relay or time-delay), if necessary.
 5. Use an ohmmeter to check the solenoid for an open circuit. If the solenoid circuit is open, replace the control valve.
- c. On Goodrich control valves only, if the solenoid circuit is satisfactory perform the following check:
 1. Remove the solenoid safety wire and unscrew solenoid.

CAUTION

Do not lose the steel hex actuator pin or the valve poppet.

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2. Reattach the connector to the solenoid, insert the hex actuator pin into the solenoid, and actuate the deicer switch. If the pin is not ejected from the solenoid, replace the control valve.

Air Leakage Test

- a. Cap the overboard port of the control valve in either the left or right nacelle.
- b. Connect a source of clean air to the inlet port of the capped control valve. A minimum inlet pressure of 18 to 20 psig is required for the test.
- c. Install a pressure gage in the air line to observe system pressures.
- d. Apply 18 psig pressure to the system and, with a hand operated valve, trap the pressure in the deicer system.
- e. Observe the system for leakage; the leakage rate should not exceed a pressure drop of 4.0 psig per minute.
- f. Remove the test equipment, lubricate all threads, and replace all system components.

Vacuum Relief Valve Adjustment

For proper operation of the deicer system the airplane vacuum relief valves must be adjusted to provide adequate vacuum. See Vacuum System, this Section, if adjustment is required.

OPERATION CHECK

- a. With both engines operating at cruise rpm, momentarily place the deicer switch in the AUTOMATIC position; the deicer boots should inflate for five to eight seconds, then deflate and reach a vacuum holddown condition. During inflation, check to see that system pressure is within the green arc on the deicer system pressure gage.
- b. Place the deicer switch in the MANUAL position and hold for a few seconds; the deicer boots should inflate and remain inflated while the switch is retained in the MANUAL position. Check for correct system pressure.
- c. Release the deicer switch, permitting it to return to the OFF position; the deicer boots should deflate and reach a vacuum hold-down condition.
- d. Repeat Steps "a" through "c" with each engine operating individually at cruise rpm.

COMPONENT MAINTENANCE AND REPLACEMENT

Air Filters

- a. Goodrich Control Valve Installation.

Examine the filter discs after each 100 hours of engine operation and clean if oil has accumulated in the filter housing. For a cleaning agent use a commercial hydrocarbon type solvent such as naphtha, petroleum ether, or gasoline; kerosene-type distillates should be avoided.

- b. Tavco Control Valve Installation.

After each 100 hours of engine operation, remove the filter cover on each control valve assembly to dispose of residual oil in the filter.

Control Valves

- a. Goodrich Control Valve

After approximately 100 hours of engine operation, the valve poppet and internal lining of the control valve may become coated with a film of dried oil, causing the valve poppet to stick. To determine if the valve poppet is sticking, perform the checks outlined in System Checkout, Control Valves. If the solenoid ejects the hex actuator pin (Step e, 2), proceed as follows:

1. Remove the solenoid electrical connector.
2. Remove the valve poppet.

NOTE

It may be necessary to apply slim nose pliers to the pin projection in order to pull the poppet from the valve.

3. Thoroughly clean the control valve bore and poppet with a commercial hydrocarbon-type solvent.
4. Reassemble the valve and reinstall and safety the solenoid.

- b. Tavco Control Valve Assembly

Sticking of the valve poppet may be caused by a film of dried oil on the poppet and the interior of the valve. The valve may be cleaned as follows:

1. Disconnect the valve assembly and remove it from the airplane.
2. Force a commercial hydrocarbon-type solvent into the inlet port of the valve assembly while operating the solenoid several times.

WARNING

Observe the normal safety precautions required for this type of operation.

3. Reinstall the valve assembly.

Timer

The timer consists of a holding relay and a time-delay device. Defective components may be replaced as required.

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Shuttle Valves

No field maintenance is recommended or authorized. Defective valves should be sent to Beech Aircraft Corporation for repair or replacement. Since the Tavco shuttle valve is an integral part of the complete control valve

assembly, the entire unit must be submitted for inspection.

Component Replacement

No component maintenance other than that described in this shop manual is recommended.

TROUBLESHOOTING SURFACE DEICER (PRESSURE SYSTEM) (Prior to TC-2003 & TE-452)

<i>INDICATION</i>	<i>PROBABLE CAUSE</i>	<i>REMARKS</i>
1. Lack of adequate vacuum deflate boots completely.	a. Clogged lines. b. Leaking lines. c. Pressure regulator valve needs adjustment. d. Distributor valve is defective.	
2. Lack of adequate air pressure to inflate boots completely.	a. Clogged lines. b. Leaking lines. c. Pressure regulator valve needs adjustment. d. Distributor valve is defective.	
3. Boots fail to inflate with switch in either AUTO or MANUAL position.	a. Blown or defective fuse.	
4. Boots fail to inflate with switch in AUTO position.	a. Defective control relay.	
5. Boots inflate with switch in AUTO position, but deflate instantaneously when the spring loaded switch returns to off position.	a. Defective timer relay.	
6. Boots fail to inflate over 12 to 15 seconds with switch in AUTO position.	a. Defective timer relay.	
7. Boot inflation time either more or less than 5 to 8 seconds with switch in AUTO position.	a. Timer relay not properly adjusted.	

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**LIGHTWEIGHT SURFACE DEICER SYSTEM
(RESERVOIR TYPE)**

COMPONENT TEST AND ADJUSTMENT

a. Control Cables

1. The air supply valve control cable should be attached to the reservoir air supply valve so that the valve operating lever closes completely without the cable stopping short against the cable mounting in the cabin.

2. The cycling control cable should be attached to the cycling valve so that the control arm can operate to the extreme limits of the cycling valve. The cable handle in the "IN" position should have a ¼ inch cushion from the cable mounting in the cabin to insure the cycling valve is in the fully closed position.

b. Air Pressure Regulator (See Figure 11-6)

Regulator gages will not register unless the air supply valve is open. With the air supply valve in the open position observe the gages. If the gages do not correspond to the following table, reset the regulator to agree with this table.

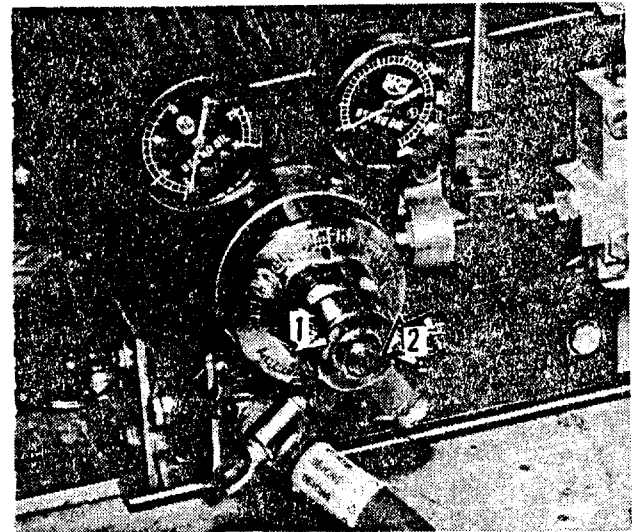
INLET PRESSURE (PSI)	REGULATED PRESSURE (PSI)
3000	17.0
2500	18.0
2000	19.0
1500	20.25
1000	21.5
750	22.75
500	24.0
250	25.5

The pressure regulator may be adjusted by loosening the locknut on the pressure regulator and turning the screw clockwise to decrease pressure and counterclockwise to increase pressure.

c. Cycling Valve (See Figure 11-7)

1. Cycling Valve Control Arm Adjustment.

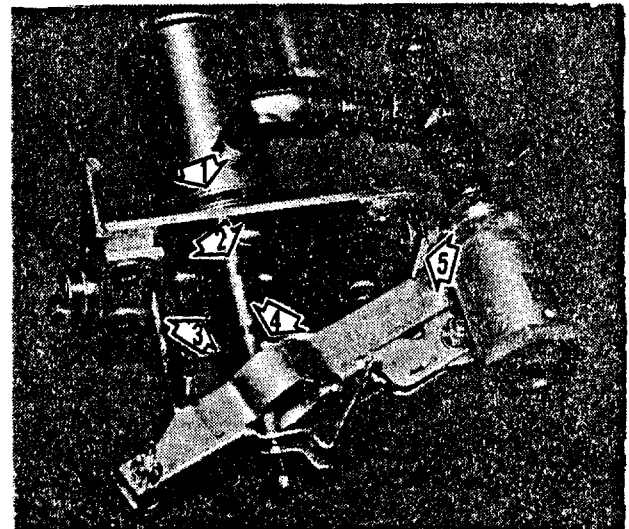
(a) Adjustment for all possible variations in the control arm assembly is accomplished by the addition or removal of laminated shims between the upright supporting the control arm and the angle attaching the upright to the valve mechanism base.



1. Lock Nut
2. Pressure Adjusting Screw

55-190-13

Figure 11-6. Air Pressure Regulator



1. "Pop-Off" Pressure Adjusting Ring
2. Detent
3. Cotter Pin
4. "Dog"
5. Shim Location

55-190-14

Figure 11-7. Cycling Valve

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(b) With the valve shaft actuated and locked in the detent, the control arm is properly adjusted only when the "dog" which operates the valve shaft will:

(1) Engage 1/64 to 1/32 an inch on the shaft and then:

(2) Slide past the shaft without driving the shaft beyond and out of the detent.

(c) The adjustment of the mechanism is accomplished by loosening the fasteners between the previously described upright and angle, then adding or removing laminated shim stock.

If the "dog" engages too far on the shaft or drives the shaft past the detent, add shims until the mechanism is properly adjusted. If the "dog" does not cause the valve shaft to engage in the detent, remove shims until the valve shaft engages in the detent satisfactorily.

(d) The valve operating mechanism and valve should be functionally tested with pressure from the reservoir package.

2. Cycling Valve Adjustment.

(a) The valve is properly adjusted when the low pressure gage on the regulator reads 15 to 17 psi at the time the valve shaft automatically returns to its normal position, completing the deicing cycle. This is known as the "pop-off" pressure. The low pressure gage on the regulator will show a higher value after the valve completes the deicing cycle. This higher value is the set pressure of the regulator.

(b) The value is adjusted by rotating a ring on the valve located directly below the top plate on the working end of the valve. The cam action of the interior of this ring increases or decreases the "pop-off" pressure as the ring rotates.

(c) To adjust the "pop-off" pressure of the valve:

(1) Remove the cotter pin locking the adjusting ring to the valve body.

(2) Cycle the valve and observe the "pop-off" pressure on the low pressure gage of the regulator.

(3) Rotate the adjusting ring, recycle the valve and again observe the "pop-off" pressure.

(4) Determine from the "pop-off" pressures, the direction of the adjusting ring to increase or decrease the "pop-off" pressure.

(5) Set the adjusting ring on the valve so that the "pop-off" pressure is from 15-17 psi.

(6) Relock the adjusting ring to the valve body with the cotter pin.

**PNEUMATIC PRESSURE SYSTEM-INSTRUMENTS
(TE-452 and after; TH-1 and after; TC-2003 and after)**

NOTE

Airplanes with four (or more) air-driven gyros and an air-operated autopilot installed should be equipped with high capacity air pumps to safely operate these components in the event of single-engine operation. A pump of the same capacity must be used as a replacement.

The pneumatic pressure system supplies air to operate the pressure-driven instruments and (if installed) the deice and autopilot systems. Pressure system operation is by air intake through the ambient air (foam rubber) filters located forward of the rear engine baffle on each engine. The filtered air is then passed through the two engine-driven dry air pumps to the pressure regulators located on the topside of each nacelle aft of the firewall. The regulators reduce the pressure of the air from the pumps to a preset level then pass it on through a pair of inline system filters to a pressure manifold. The pressure manifold is located aft of the front spar, behind the upholstery panel in the LH sidewall. Air is then distributed from the manifold forward through an adjustable orifice (TE-452 thru TE-767) or a regulator valve (TC-2003 and after; TE-768 and after; TH-1 and after) to the instrument panel. Air is plumbed off the manifold to operate (if installed) the deice and autopilot systems.

**PRESSURE SYSTEM INTAKE (AMBIENT) AIR FILTER
REPLACEMENT**

The intake filters are located on the forward side of each engine rear baffle. The foam type should be removed each 100 hours (or sooner depending upon conditions) and washed in solvent and blown dry with low pressure shop air. On serials TE-937 and after, TC-2003 and after, TH-373 and after and earlier airplanes which have complied with BEECHCRAFT Service Instruction No. 0581-194, the intake filters (Figure 11-8) should be replaced annually, every 300 hours (or sooner depending upon conditions) or whichever comes first. This filter element should not be subjected to solvent and must be replaced if this occurs. Always reinstall the filter cover with the opening facing down.

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TROUBLESHOOTING LIGHTWEIGHT SURFACE DEICER (RESERVOIR-TYPE)

<i>INDICATION</i>		<i>PROBABLE CAUSE</i>		<i>REMARKS</i>
1. Deicers do not inflate, or inflate slowly.	a.	Control cables not connected or not fastened to the valves tightly.	a.	Inspect cable connections to the valves for tightness and proper adjustment.
	b.	Mechanical interference of cables	b.	Correct interference problem.
	c.	Reservoir empty.	c.	Charge reservoir.
	d.	Shut-off valve not open.	d.	Check shut-off valve control cable for proper adjustment.
	e.	Regulator set for too low a pressure.	e.	Reset regulator.
	f.	Cycling valve not operating or not completely engaged.	f.	Check cycling control cable for proper adjustment.
	g.	Piping, lines blocked or not connected.	g.	Blow out lines and inspect connections.
2. Deicers do not deflate, or deflate slowly.	a.	Cycling valve not operating properly.	a.	Check cycling control cable for proper adjustment and possible mechanical interference.
	b.	Piping, lines blocked or not connected.	b.	Blow out lines and inspect connections.
	c.	Check valve malfunctions at cycling valve assembly.	c.	Observe check valve. Unplug outlet, repair or replace check valve if defective.
	d.	Right engine not running vacuum supply to aid deflation and hold down is not available.	d.	Start right engine or correct vacuum system malfunction.
3. Deicer remains inflated: reservoir drains on first cycle or automatic return of cycling valve does not function.	a.	Improper tubing connection.	a.	Check tubing connections to cycling valve.
4. Regulator safety valve popping under 30 psi.	a.	Regulator safety valve improperly set.	a.	Reset valve.
5. Shut-off valve does not effect complete shut-off.	a.	Shut-off valve actuating pin does not drop free so as to let the shaft inside the valve seat completely.	a.	Check actuating pin, replace if defective.
6. Cycling valve automatic return functions before deicers are fully inflated or inflation cycle is longer than 5 to 9 seconds.	a.	Cycling valve out of adjustment.	a.	Adjust the cycling valve "popoff" pressure.

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***PRESSURE SYSTEM IN-LINE FILTER
INSPECTION (TE-452 AND AFTER, TH-1
AND AFTER, TC-2003 AND AFTER)***

On airplane serials TE-452 thru TE-936 and TH-1 thru TH-372, remove both in-line filters from the system and check for obstruction by comparing the resistance to flow with a new filter. Use a dry, low-pressure air source (max. of 10 psi) to accomplish this test. If the resistance to air flow in a filter removed from the airplane exceeds that of a new filter by more than one psi, the filter should be replaced. On airplane serials TE-937 and after; TH-373 and after; TC-2003 and after, the filter should be replaced annually, every 300 hours of service time or sooner depending upon operating conditions. The filter must not be subjected to solvents and must be replaced if this occurs.

***PRESSURE SYSTEM ADJUSTMENT
(TE-452 AND AFTER, TH-1 AND AFTER,
TC-2003 AND AFTER)***

Adjustment of the pressure system components in a specified sequence is given independently for each configuration available. The following system headings will facilitate adjustments on a particular airplane.

Adjustments may be accomplished as follows:

BASIC PRESSURE SYSTEM (INSTRUMENTS ONLY)

(Figure 11-9)

NOTE

Airplane serials TE-452 thru TE-767 are equipped with a gyro instrument adjustable orifice. Airplanes TC-2003 thru TC-2102, TE-768 thru TE-1133, and TH-1 thru TH-935 are equipped with a gyro instrument regulator valve.

- a. Install a test gage (0 - 10 psi) at the "out" side of each pressure regulator.
- b. Operate one engine at 2300 rpm and adjust the pressure regulator for that engine to obtain a reading of $5.0 \pm .5$ psi on the test gage.

NOTE

Rotate the pressure regulator adjusting screw clockwise to increase pressure and counterclockwise to decrease pressure.

- c. Repeat the adjustment in step b on the opposite side of the airplane.

- d. Locate the gyro instrument adjustable orifice or regulator valve (if installed) on the LH side of the airplane forward of the instrument panel, near the top of the upholstery panel and adjust as follows:

1. Loosen the check nut and rotate the orifice body (adjusting screw on the regulator) to obtain a reading of $5.0 \pm .1 - .2$ in. Hg on the gyro pressure indicator with both engines operating at 2300 rpm.

2. Tighten the check nut and recheck the gyro pressure indicator to read in the green arc with both engines operating at 1500 rpm.

- e. After adjusting the orifice (regulator), the pressure on the test gages at the pressure regulators in the nacelles should be rechecked with each engine operating individually at 2300 rpm. If the pressure on these gages has been affected by the adjustment of the orifice (regulator), the regulators in the nacelles should be readjusted to $5.0 \pm .5$ psi.

- f. With both engines operating at 2300 rpm, the difference between the pressure gages at the pressure regulators in the nacelles should not exceed .5 psi.

NOTE

If the requirements of this adjustment procedure cannot be obtained, the complete system (including the check valves on the manifold) should be checked for leaks and/or restrictions; then any discrepancy should be repaired and the system readjusted.

- g. Remove the test gages from the airplane.

BASIC PRESSURE SYSTEM WITH B-4, B-5, OR B-7 AUTOPILOT INSTALLATION

(Figure 11-10)

NOTE

Airplane serials TE-452 thru TE-767 are equipped with a gyro instrument adjustable orifice. Airplanes TC-2003 thru TC-2102, TE-768 thru TE-1133, and TH-1 thru TH-935 are equipped with a gyro instrument regulator valve.

- a. Install a test gage (0-10 psi) at the "out" side of each pressure regulator.
- b. Install a test gage (0-10 psi) in the turn coordinator supply line. Refer to Figure 11-10.

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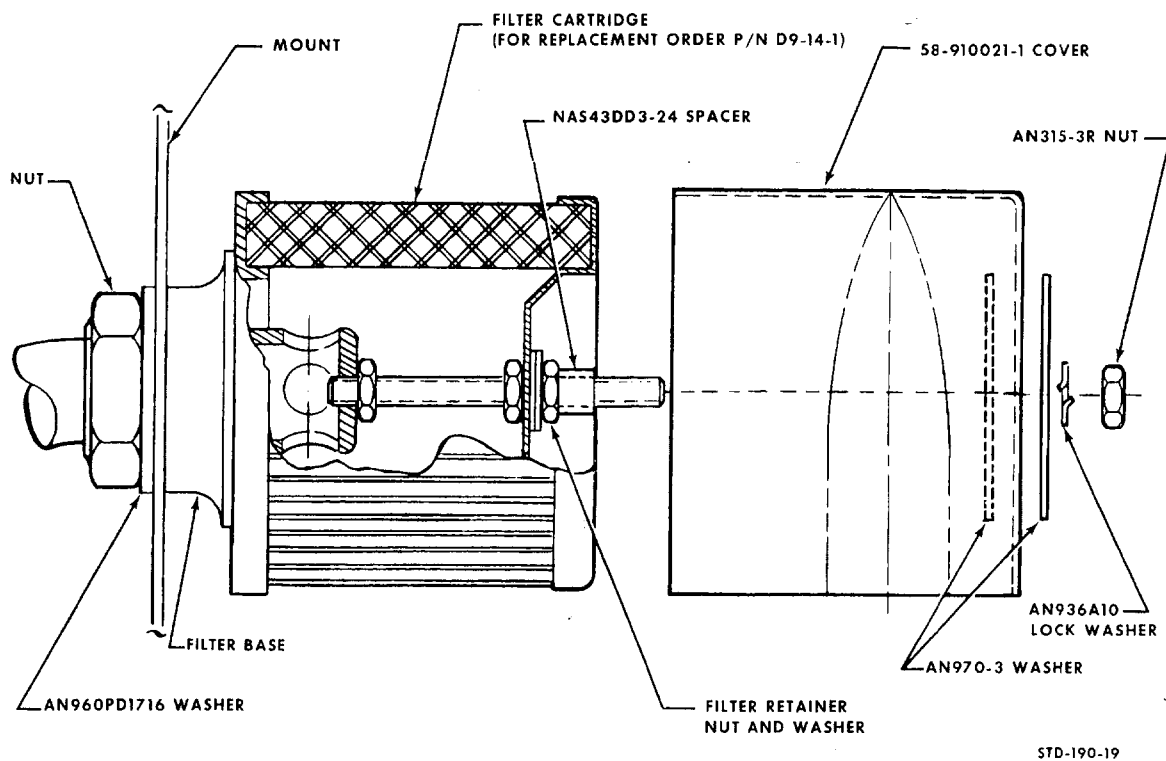


Figure 11-8. Ambient Air Filter Assembly (1J2-5)

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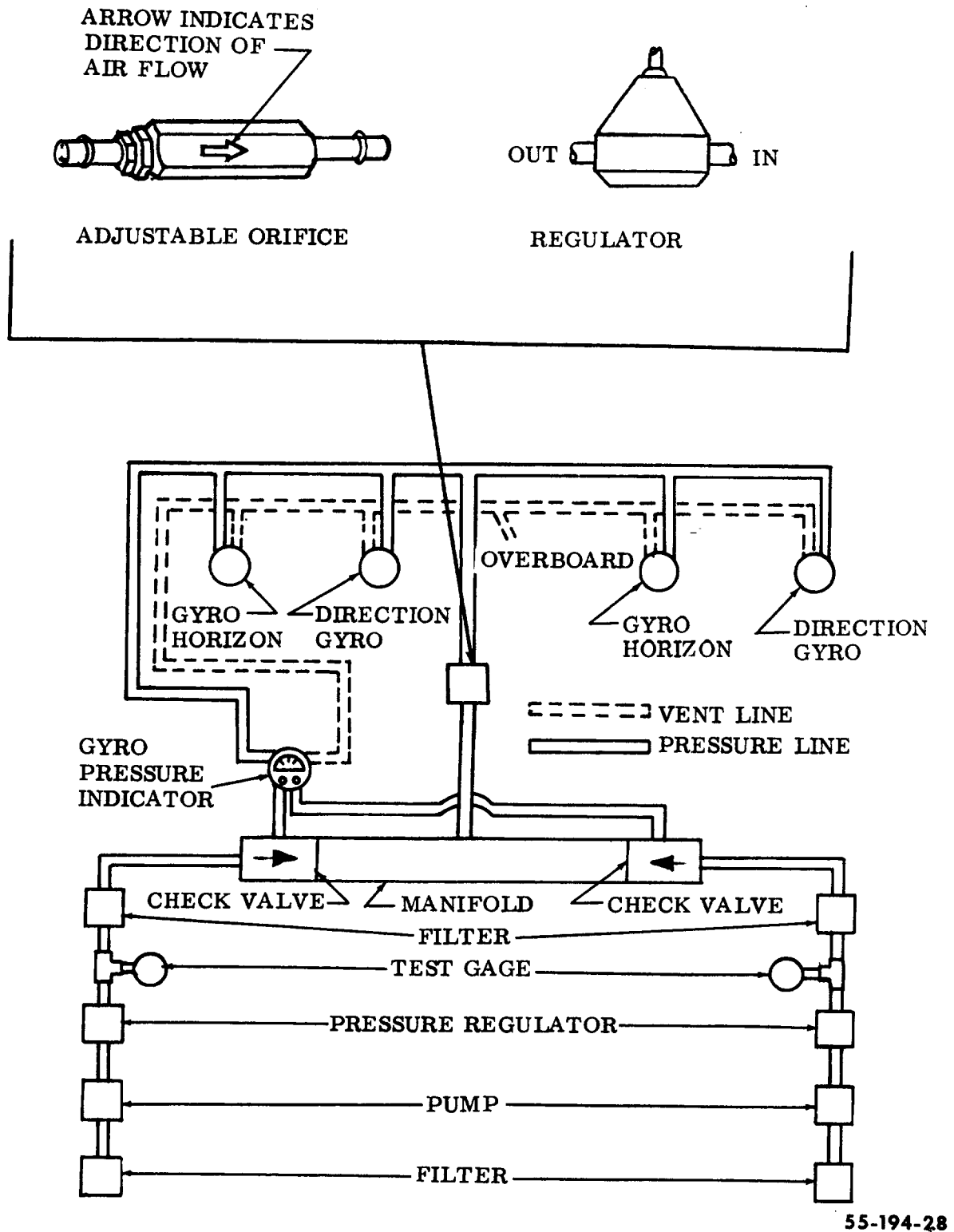
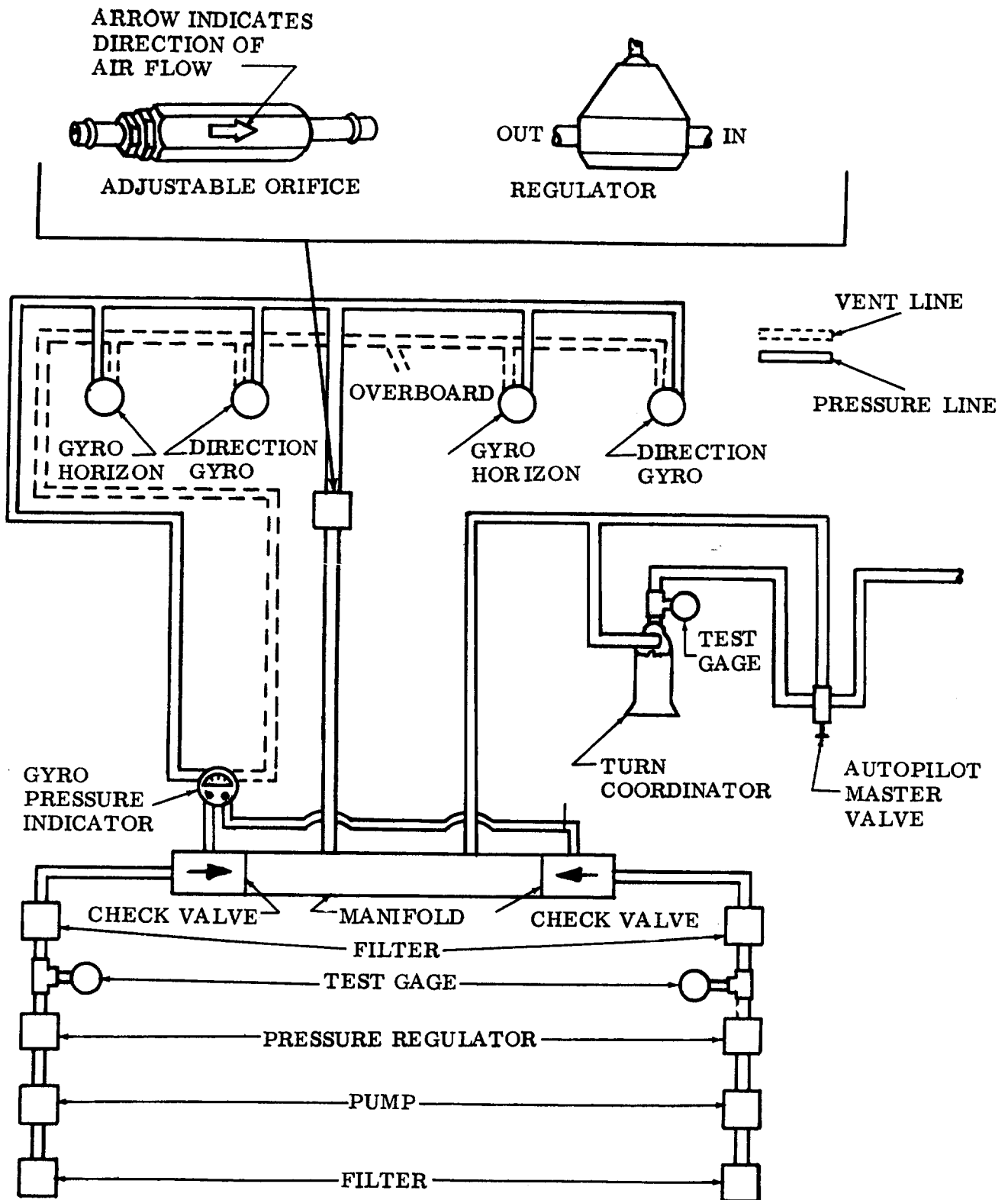


Figure 11-9. Pressure System, Basic (Instruments only)

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55-191-8

Figure 11-10. Pressure System, Basic with B-4, B-5 or B-7 Autopilot Installation

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c. Operate one engine at 2300 rpm and adjust the pressure regulator for that engine to obtain a reading of 5.0 ± 0.5 psi on the test gage in the turn coordinator supply line with the autopilot ON. Normally a pressure of 6.5 psi on the test gage at the pressure regulator is sufficient to obtain the 5.0 ± 0.5 psi reading at the turn coordinator. Under no circumstances should the reading at the pressure regulator exceed 7.0 psi.

NOTE

Rotate the pressure regulator adjusting screw clockwise to increase pressure and counterclockwise to decrease pressure.

d. Repeat step c on the opposite side of the airplane.

e. Locate the gyro instrument adjustable orifice or regulator valve (if installed) on the LH side of the airplane forward of the instrument panel, near the top of the upholstery panel and adjust as follows:

1. Loosen the check nut and rotate the orifice body (adjusting screw of the regulator) to obtain a reading of $5.0 \pm 0.1 - 0.2$ in. Hg on the gyro pressure indicator with both engines operating at 2300 rpm.

2. Tighten the check nut and recheck the gyro pressure indicator to read in the green arc with both engines operating at 1500 rpm.

f. After adjusting the gyro pressure orifice (regulator), the pressure on the test gage in the turn coordinator supply line should be rechecked with each engine operating individually at 2300 rpm. If the pressure on the test gage has been affected by the adjustment of the orifice (regulator), the regulators in the nacelles should be readjusted as specified in steps c and d.

g. With both engines operating at 2300 rpm, the difference between the pressures on the test gages at the pressure regulators in the nacelles should not exceed .5 psi.

NOTE

If the requirements of this adjustment procedure cannot be obtained, the complete system, including the check valves and the gaskets in the manifold, should be checked for leaks and/or restrictions; then repair the discrepancy and readjust the system.

h. Remove the test gages from the airplane.

BASIC PRESSURE SYSTEM WITH H-14 AUTOPILOT (Figure 11-11)

NOTE

Airplane serials TE-452 thru TE-767 are equipped with a gyro instrument adjustable orifice. Airplanes TC-2003 thru TC-2102, TE-768 thru TE-1133, and TH-1 thru TH-935 are equipped with a gyro instrument regulator valve.

a. Install a test gage (0-15 psi) at the "out" side of each pressure regulator.

b. Install a test gage (0-10 psi) in the autopilot supply line, at the "out" side of the pressure manifold.

c. Operate one engine at 2300 rpm and adjust the pressure regulator for that engine to obtain a reading of 7.5 ± 0.5 psi on the test gage in the autopilot supply line with the autopilot ON. Normally a pressure of 8.5 psi on the test gage at the pressure regulator is sufficient to obtain the 7.5 ± 0.5 reading in the autopilot supply line. Under no circumstances should the reading at the pressure regulator exceed 9.0 psi.

NOTE

Rotate the pressure regulator adjusting screw clockwise to increase pressure and counterclockwise to decrease pressure.

d. Locate the gyro instrument adjustable orifice or regulator valve (if installed) on the LH side of the airplane, near the top of the upholstery panel forward of the instrument panel, and adjust as follows:

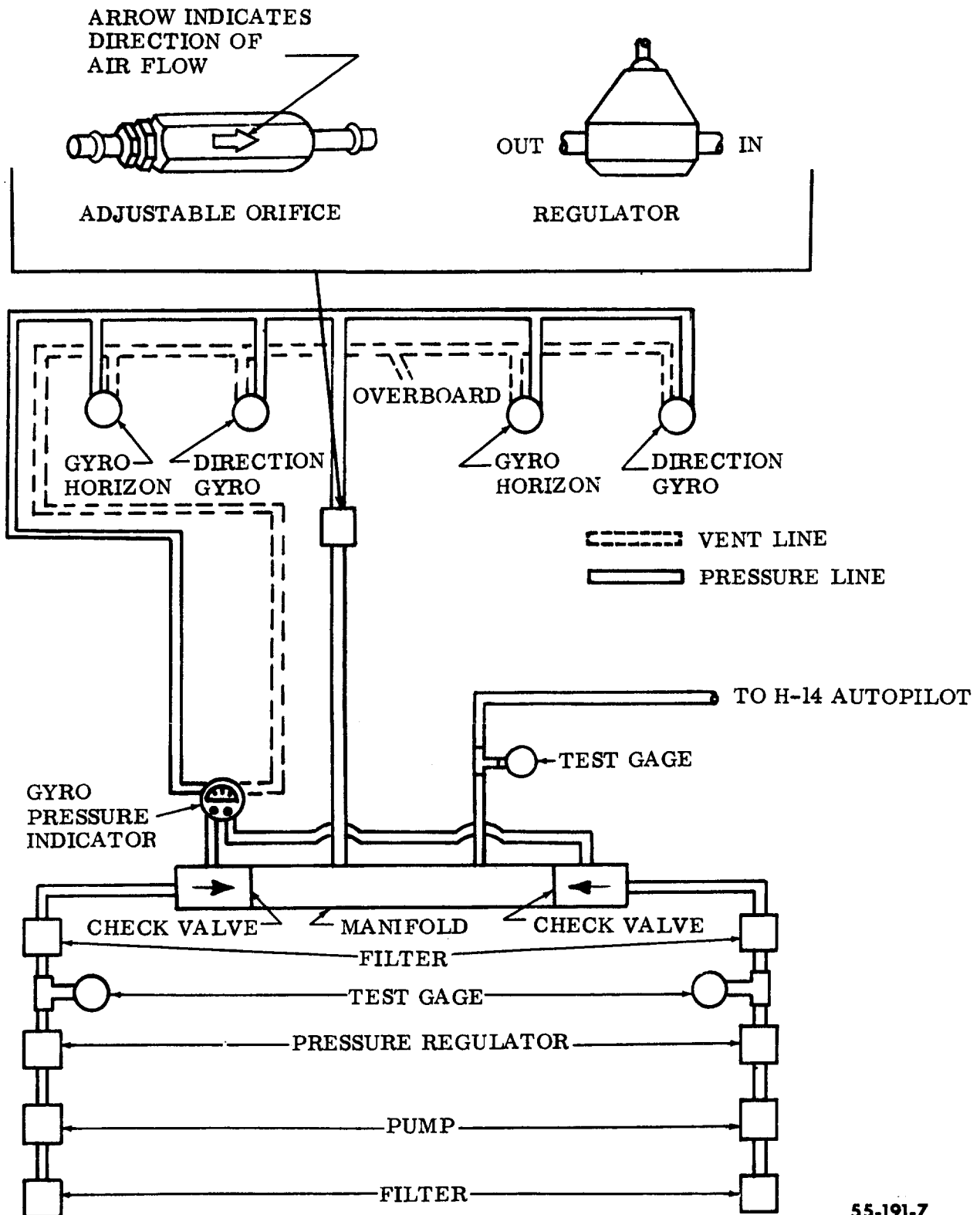
1. Loosen the check nut and rotate the orifice body to obtain a reading of $5.0 \pm 0.1 - 0.2$ in. Hg on the gyro pressure indicator with both engines operating at 2300 rpm.

2. Tighten the check nut and recheck the gyro pressure indicator to read in the green arc with both engines operating at 1500 rpm.

e. After adjusting the gyro pressure orifice (regulator), the pressure on the test gage in the autopilot supply line should be rechecked with each engine operating individually at 2300 rpm. If the pressure on the test gage has been affected by the adjustment of the orifice (regulator), the regulators in the nacelles should be readjusted as specified in steps c and d.

f. With both engines operating at 2300 rpm, the difference between the pressures on the test gages in the nacelles should not exceed .5 psi.

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Figure 11-11. Pressure System, Basic with H-14 Autopilot Installation

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NOTE

If the requirements of this adjustment procedure cannot be obtained, the complete system, including the check valves and gaskets in the manifold, should be checked for leaks and/or restrictions; repair any discrepancy and readjust the system.

- g. Remove the test gages from the airplane.

BASIC PRESSURE SYSTEM WITH DEICER

(Figure 11-12)

- a. Install a test gage (0-20 psi) at the "out" side of each two-stage pressure regulator.

- b. Operate one engine at 2300 rpm and adjust the two-stage pressure regulator for that engine as follows:

1. Adjust the low-pressure section of the regulator (section with solenoid) to obtain a reading of $7.5 \pm .5$ psi on the deicer pressure gage with the deicer system OFF. A pressure of 9.0 psi on the test gage in the nacelle should be sufficient to obtain the reading of $7.5 \pm .5$ psi on the deicer pressure gage.

2. Adjust the high-pressure section of the regulator (section without solenoid) to obtain a reading of 16 to 19 psi on the deicer pressure gage with the deicer system ON. A pressure of 17 to 20 psi on the test gage in the nacelle should be sufficient to obtain the reading of 16 to 19 psi on the deicer pressure gage.

- c. Repeat step b on the opposite side of the airplane.

NOTE

Rotate the pressure regulator adjusting screws clockwise to increase pressure and counterclockwise to decrease pressure.

- d. Locate the gyro instrument adjustable orifice (TE-452 thru TE-767 or the regulator valve (TC-2003 thru TC-2102, TE-768 and after, TH-1 and after) on the LH side of the airplane forward of the instrument panel and adjust as follows:

1. Loosen the check nut and rotate the orifice body (or adjusting screw on the regulator) to obtain a reading of $5.0 \pm .1$ -2 in. Hg on the gyro pressure indicator with both engines operating at 2300 rpm.

2. Tighten the check nut and recheck the gyro pressure indicator to read in the green arc with both engines operating at 1500 rpm.

- e. After adjusting the gyro pressure orifice (regulator), the pressure on the test gage in the nacelles should be rechecked with each engine operating individually at 2300 rpm. If the pressure on the test gage has been affected by the adjustment of the orifice (regulator), the regulators in the nacelles should be readjusted as specified in steps d and e

NOTE

If the requirements of this adjustment procedure cannot be obtained, the complete system, including the check valves and the gaskets in the manifold, should be checked for leaks and/or restrictions; then repair any discrepancy and readjust the system.

- f. Remove the test gages from the airplane.

BASIC PRESSURE SYSTEM WITH DEICER AND B-4, B-5, OR B-7 AUTOPILOT (Figure 11-13)

- a. Install a test gage (0-20 psi) at the "out" side of each two-stage pressure regulator.

- b. Install a test gage (0-10 psi) in the turn coordinator supply line.

- c. Operate one engine at 2300 rpm and adjust the low-pressure section of the two-stage pressure regulator (section with solenoid) to obtain a reading of $7.5 \pm .5$ psi on the deicer pressure gage with the deicer OFF. A pressure of 9.0 psi on the test gage in the nacelle should be sufficient to obtain the $7.5 \pm .5$ psi reading on the deicer pressure gage.

NOTE

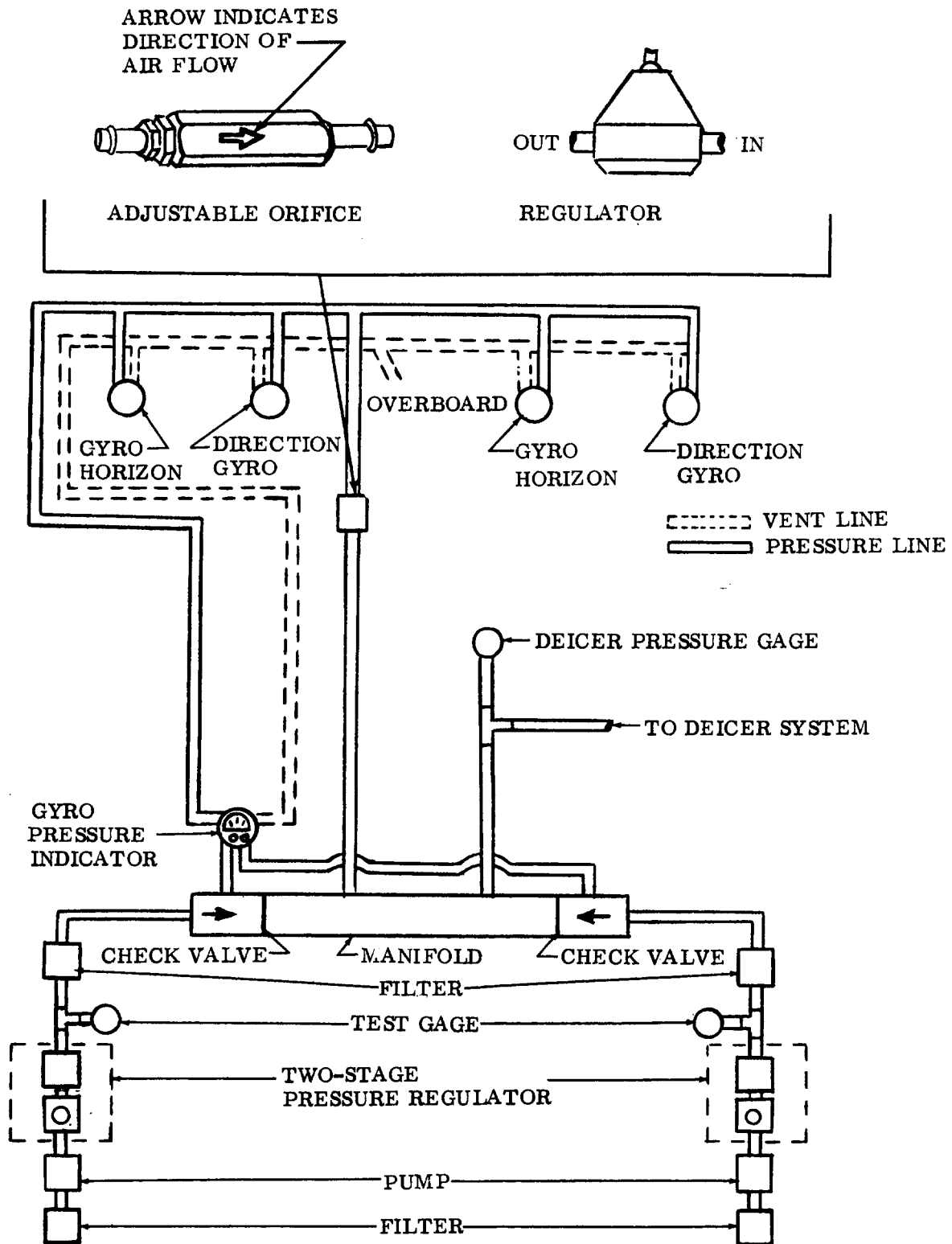
Rotate the pressure regulator adjusting screw clockwise to increase pressure and counterclockwise to decrease pressure.

- d. Repeat step c on the opposite side of the airplane.

- e. Operate both engines at 2300 rpm and adjust the autopilot pressure regulator to obtain a reading of $5.0 \pm .0$ -5 psi on the test gage in the turn coordinator supply line with the autopilot ON and the deicer OFF. The autopilot pressure regulator is located in the nose baggage compartment or under the pilot's seat aft of the main spar.

- f. Operate one engine at 2300 rpm and adjust the high-pressure section of the two-stage pressure regulator (section without solenoid) to obtain a reading of

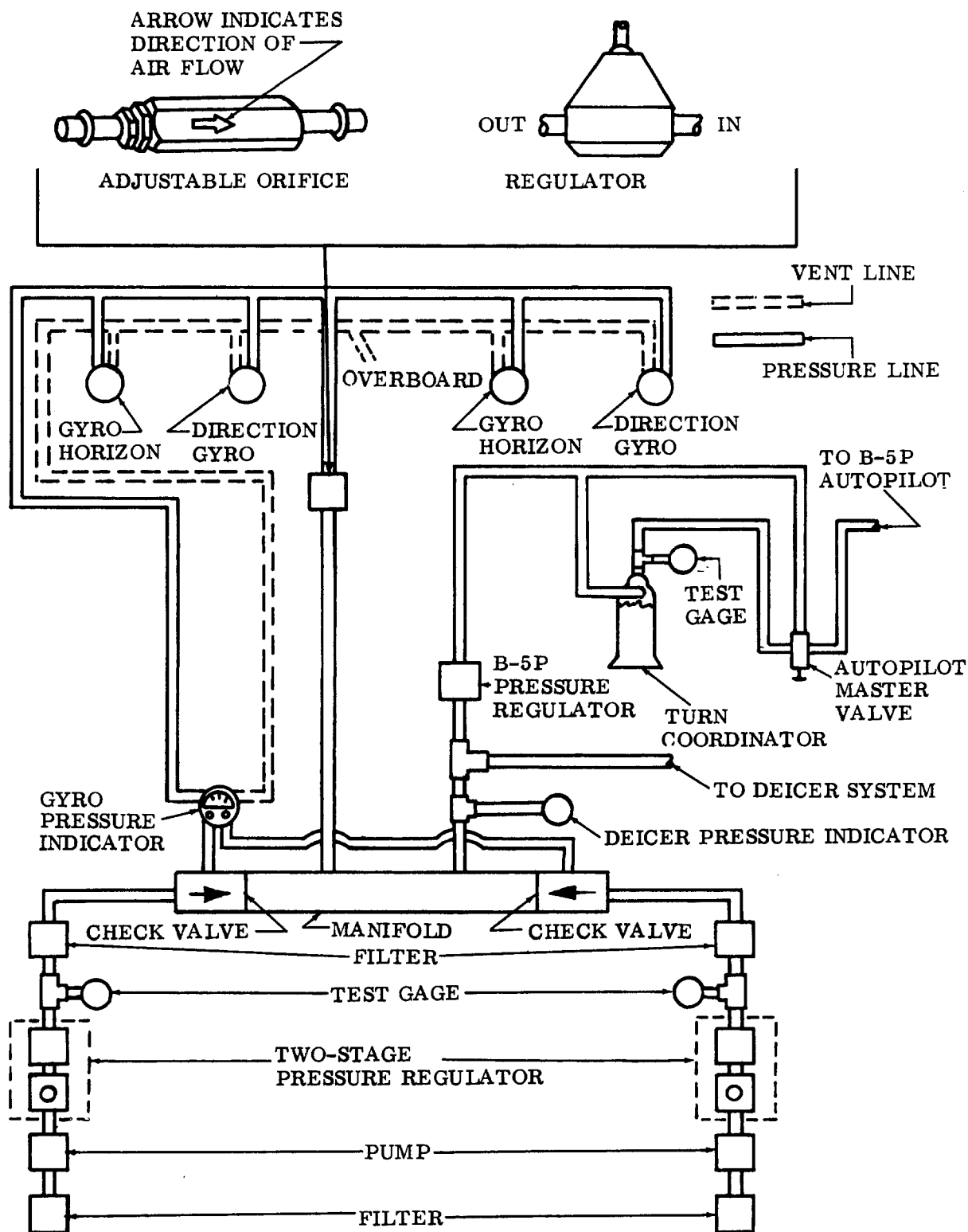
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Figure 11-12. Pressure System, Basic with Delcer Installation

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Figure 11-13. Pressure System, Basic with Deicer and B-4, B-5 or B-7 Autopilot Installation

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16 to 19 psi on the deicer pressure gage with the deicer system ON. A pressure of 17 to 20 psi on the test gage in the nacelle should be sufficient to obtain the 16 to 19 psi reading on the deicer pressure gage.

g. Repeat step f on the opposite side of the airplane.

h. Locate the gyro instrument adjustable orifice (TE-452 through TE-767) or the regulator valve (TC-2003 through TC-2102; TE-768 and after; TH-1 and after) on the LH side of the airplane, forward of the instrument panel, near the top of the upholstery panel and adjust as follows:

1. Loosen the check nut and rotate the orifice body (adjusting screw on the regulator) to obtain a reading of $5.0 \pm .1 \text{ } -.2$ in. Hg on the gyro pressure indicator with both engines operating at 2300 rpm.

2. Tighten the check nut and recheck the gyro pressure indicator to read in the green arc with both engines operating at 1500 rpm.

i. After adjusting the gyro pressure orifice (regulator), the pressure on the test gage in the turn coordinator supply line should be rechecked with each engine operating individually at 2300 rpm. If the pressure on the test gage has been affected by the adjustment of the orifice (regulator), the regulators in the nacelles should be readjusted as specified in steps c through g.

j. With both engines operating at 2300 rpm, the difference between the pressures on the test gages at the pressure regulators in the nacelles should not exceed .5 psi.

NOTE

If the requirements of this adjustment procedure cannot be obtained, the complete system, including the check valves and the gaskets in the manifold, should be checked for leaks and/or restrictions; then repair any discrepancy and readjust the system.

k. Remove the test gages from the airplane.

BASIC PRESSURE SYSTEM WITH DEICER AND H-14 AUTOPILOT (Figure 11-14)

a. Install a test gage (0-20 psi) at the "out" side of each two-stage pressure regulator.

b. Operate one engine at 2300 rpm and adjust the two-stage pressure regulator for that engine as follows:

1. Adjust the low-pressure section of the pressure regulator (section with solenoid) to obtain a reading of $7.5 \pm .5$ psi on the deicer pressure gage with the deicer system OFF and the autopilot ON. A pressure of 9.0 psi on the test gage in the nacelle should be sufficient to obtain the reading of $7.5 \pm .5$ psi on the deicer pressure gage.

2. Adjust the high-pressure section of the pressure regulator (section without solenoid) to obtain a reading of 16 to 19 psi on the deicer pressure gage with the deicer system ON. A pressure of 17 to 20 psi on the test gage in the nacelle should be sufficient to obtain the reading of 16 to 19 psi on the deicer pressure gage.

c. Repeat step b on the opposite side of the airplane.

NOTE

Rotate the pressure regulator adjusting screws clockwise to increase pressure and counterclockwise to decrease pressure.

d. Locate the gyro instrument adjustable orifice (TE-452 through TE-767) or the regulator valve (TC-2003 through TC-2102, TE-768 and after, TH-1 and after) on the LH side of the airplane forward of the instrument panel, near the top of the upholstery panel and adjust as follows:

1. Loosen the check nut and rotate the orifice body to obtain a reading of $5.0 \pm .1 \text{ } -.2$ in. Hg on the gyro pressure indicator with both engines operating at 2300 rpm.

2. Tighten the check nut and recheck the gyro pressure indicator to read in the green arc with both engines operating at 1500 rpm.

e. After adjusting the gyro pressure orifice (regulator), the pressure on the gage in the nacelle should be rechecked with each engine operating individually at 2300 rpm. If the pressure on the test gage has been affected by the adjustment of the orifice (regulator), the regulator in the nacelles should be readjusted as specified in steps b and c.

NOTE

If the requirements of this adjustment procedure cannot be obtained, check the complete system (including the check valves and manifold gaskets) for leaks and/or restrictions, then repair the discrepancy and readjust the system.

f. Remove the gages from the airplane.

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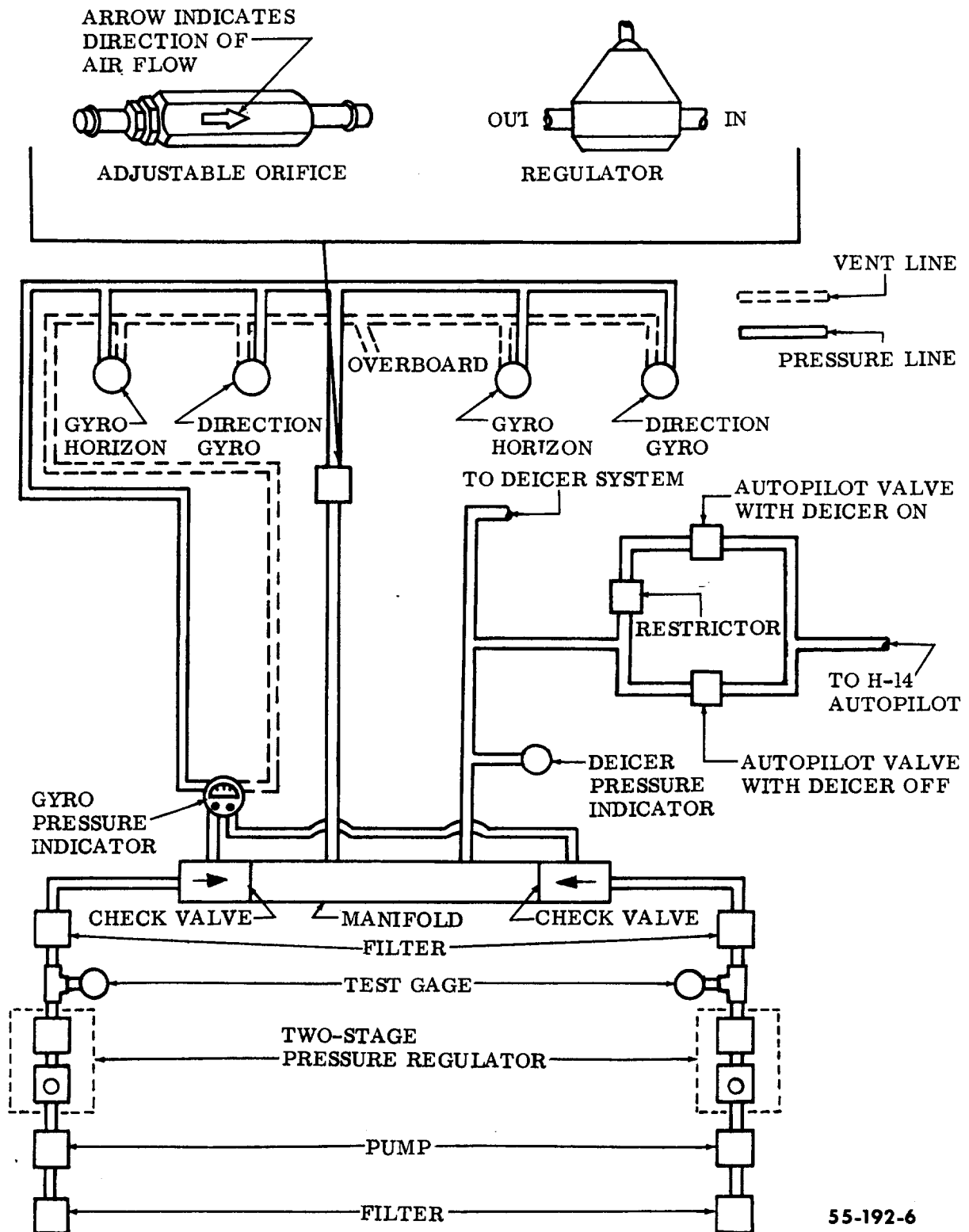


Figure 11-14. Pressure System, Basic with Deicer and H14 Autopilot Installation

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PNEUMATIC PRESSURE SYSTEM SURFACE DEICE (TE-452 THROUGH TE-1201, TC-2003 AND AFTER, TH-1 THROUGH TH-1471 EXCEPT AIRPLANES EQUIPPED WITH KITS FULFILLING FLIGHT IN ICING REQUIREMENTS)

The pressure-operated surface deicer system consists of lightweight pneumatic deicer boots cement bonded to the wing and empennage leading edge surfaces, two engine-driven dry air pumps which provide pressure for boot inflation and evacuation, a pair of air filters to remove contaminants from the air, and a distributor valve located in the aft section which shuttles the air flow to and from the deicer boots. In operation the engine-driven pumps supply filtered air through the pressure relief valves and the air filters to the manifold located in the center section beneath the pilot's and copilot's floorboards. Air from the manifold is directed forward to the instruments or aft to the distributor valve. The air then passes through the distributor valve to the deice boots for inflation. When the distributor valve is actuated to inflate the boots, a time delay relay is actuated at the same time. After 5 to 8 seconds, the relay returns the distributor valve to the original or evacuate position. In the evacuate position, the air flow is routed through an integrated venturi to create a vacuum in the deicer supply lines to hold the boots in the down position.

The deicer control switch on the panel has two positions placarded AUTOMATIC and MANUAL. Either position may be selected. In the automatic mode, the boots will have only one inflation cycle of 5 to 8 seconds. The manual cycle will inflate the boots as long as the switch is held in this position. When the switch is released the boots will return to the deflated position. The system pressure may be monitored by a deice pressure gage mounted on the instrument panel. Regulator adjustments for the two-stage regulator and the distributor and the sequence in which they should be regulated may be found under the appropriate pneumatic pressure system heading found in this section.

TIMER RELAY ADJUSTMENT

The timer relay that controls the inflation time of the deicer boots is located under the floorboards of the passenger compartment just forward of the main spar on the left-hand side. If the deicer boots do not inflate 5 to 8 seconds when the switch is in the AUTOMATIC position, the timer relay may need adjusting. This can

be accomplished by inserting a screwdriver through the hole in the top of the relay and turning the adjusting screw until a 5 to 8 second inflation time is established. Inflation time is reduced by turning the adjusting screw in a clockwise direction and increased by turning the adjusting screw in a counterclockwise direction.

RESURFACING DEICER BOOTS

Static electric charges, if allowed to accumulate, would eventually discharge through the boot to the metal skin underneath, causing static interference with radio equipment and possibly puncturing the rubber. Such static charges are also a temporary fire hazard after each flight. To dissipate static electric charges, a thin coating of conductive cement is applied over the neoprene of the boot.

From time to time it may become necessary to restore the conductivity to efficiently dissipate such charges. The principle factors involved when resurfacing seems advisable are: If the surfacing material has abraded off; if the surfacing has developed cracks; if conductivity is low.

The following procedure should be followed when resurfacing deicer boots:

- a. Clean the deicer boot thoroughly with a mild soap and water solution.
- b. Roughen the entire surface of the boot with fine sandpaper.
- c. Clean the entire surface again with a clean, lint-free cloth moistened with a mild soap and water solution. Rinse with clean water to remove all traces of the soap.
- d. Apply masking tape beyond the upper and lower trailing edges, leaving a 1/4-inch gap of bare metal.
- e. Brush one coat of A56B cement on the boot and allow it to dry at least one hour, then apply a second coat and allow it to dry at least four hours before operating the deicers. The airplane may be flown as soon as the cement is dry.

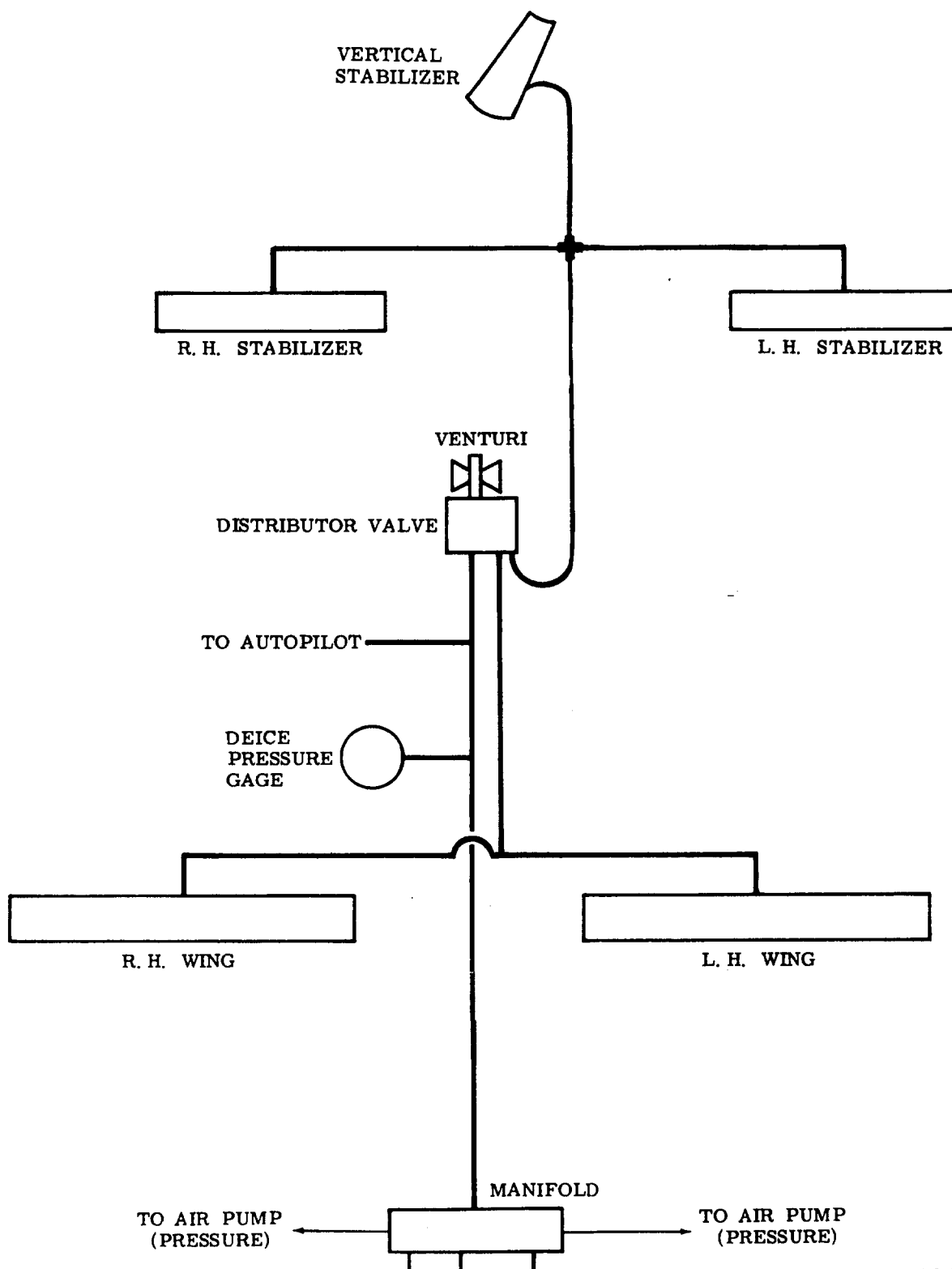
NOTE

If A56B cement has aged 3 months or more, it may be necessary to dilute it with toluol to obtain the proper brushing consistency. Mix thoroughly approximately 5 parts cement to one part toluol.

SURFACE DEICER BOOT REPAIRS

Minor scuffed areas on the boots normally require only restoring the conductive surface in the immediate

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Figure 11-15. Pressure System with Surface Deicer (TE-452 through TE-1201, TC-2003 and after, and TH-1 through TH-1471)

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area; however, if the entire surface ply has been removed, exposing the brown natural rubber underneath, or if the boot is cut, torn or ruptured, it is necessary to patch the damage. B.F. Goodrich Repair Kit No. 74-451-C contains cold patches suitable for repairing damaged area. A cold patch on a deicer boot, however, is a temporary or emergency method of repair, and at the first opportunity the boot should be removed and returned to the factory for a vulcanized repair. Cold patch repairs can be made by the following methods:

- a. Clean around the damaged area with a clean lint-free cloth moistened with toluol or uncontaminated, nonleaded aviation gasoline.
- b. Select a patch which will extend at least one half inch beyond the damaged area in all directions.
- c. Buff the area around the damage with steel wool or fine sandpaper to remove the conductive coating and thoroughly roughen the exposed surface.

NOTE

A locally manufactured buffing shield will assure a neater job. The shield can be fabricated from any thin sheet material such as acetate, steel, etc., formed into long strips and taped to the boot around the perimeter of the damaged area. Remove the buffing shield after the area has been buffed.

- d. Wipe the buffed area with a clean lint-free cloth moistened with toluol or uncontaminated, nonleaded gasoline to remove all loose particles.
- e. Brush one even coat of No. 4 cement (supplied in the repair kit) on the boot corresponding to the patch. Remove the backing from the patch and apply one coat of cement to that surface of the patch.
- f. Allow the cement to set until tacky.
- g. Position the patch over the boot and make contact with one edge or the center of the patch. Work down the remainder of the patch carefully to avoid trapping air pockets. Roll the patch thoroughly, starting from the center and working to the edges.
- h. Allow the patch to set for ten to fifteen minutes, then wipe the patch and surrounding area with a clean lint-free cloth moistened with toluol or uncontaminated, nonleaded gasoline.
- i. Satisfactory adhesion of the patch will be reached in about four hours; however, the boot may be inflated to check the repair after a minimum of 25 minutes.

- j. To restore the conductive surface, apply one light coat of A56B cement to the patched area extending beyond the buffed area. Allow the cement to dry thoroughly (at least one hour) and apply a second light coat. The airplane may be flown as soon as the cement is dry; however, do not operate the deicers until the cement has dried for at least four hours.

SURFACE DEICER BOOT REMOVAL

Soften the adhesion line of the boot with toluol. Apply a minimum amount of toluol to the seam line of the boot while exerting just enough pressure to peel back the boot. Work slowly enough for the solvent to undercut the boot to prevent damage to the boot surface.

NOTE

Use as little solvent as possible on a brush or long-spouted oil can.

SURFACE DEICER BOOT INSTALLATION

- a. Clean the area to be covered by the boot with a clean grease-free cloth soaked in methyl ethyl ketone. Change cloths frequently, and never dip a used cloth in the clean supply of methyl ethyl ketone.
- b. Reclean the metal surface with a clean cloth soaked with methyl ethyl ketone, then quickly wipe the surface dry with a clean dry cloth.
- c. Vigorously scrub the metal surface with a clean, grease-free cloth wetted with Turco Metal-Glo No. 3. After one minute wipe the surface dry with a clean dry cloth. Cover the cleaned surface with kraft paper and wait an hour before rechecking the surface for cleanliness with a clean, dry white cloth. If the clean cloth picks up any dirt, repeat the preceding steps.

CAUTION

Use plastic, not metal, containers for Turco Metal-Glo No. 3. It is also recommended that persons handling the cleaner wear rubber gloves even though the cleaner is harmless to skin if immediately washed off with water.

- d. Carefully clean the rough backside on the boot at least twice with a clean, grease-free cloth moistened with toluol. Change cloths frequently to avoid recontaminating the cleaned portions of the boot. If necessary, continue wiping the boot until completely clean.

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NOTE

If the finish of the back of the boot is smooth, mechanically roughen the bonding surface before cleaning.

e. Mask off a portion of the metal surface 1/2 to 3/4 inch beyond the actual boot area.

f. Open the container and thoroughly stir the EC1403 cement with a stick. Do not attempt to use cement that has jelled too much to drip from the stick.

NOTE

Do not apply the cement at a relative humidity higher than 80 percent or under extremely dusty conditions. The table below will serve as a further guide for application of the cement.

Temperature in °F	Drying Time in Minutes
Above 80	30
60 to 80	45
Below 60	60

g. Either of the two following methods may be used to apply the cement:

1. Brush one even coat of EC1403 cement on both the deicer boot back and metal surfaces. After permitting the cement to dry for at least 30 minutes, apply a second even coat to both surfaces.

NOTE

Brushing too long in one area will cause the cement to "roll" or "ball up".

Allow the second coat to dry for at least 30 minutes, and preferably an hour, before installing the deicer boot.

2. Using a spray gun (Binks No. 7 with a No. 63 PB head, DeVilbiss JGA 75X, or their equivalent), spray one even coat of EC1403 cement (60, Consumable Materials Chart, Section 2) on both the deicer boot back and metal surfaces. After permitting the cement to dry for at least 30 minutes, spray a second even cross-coat on both surfaces. Allow the second coat to dry for at least 30 minutes, and preferably an hour, before installing the deicer boot.

NOTE

For spraying consistency, dilute the EC1403 cement with a solvent blend of 2 parts petroleum naphtha to one part methyl ethyl ketone (18, 19, Consumable Materials Chart, Section 2) until a No. Ford cup will empty in 20 seconds.

h. Snap a chalk line along the center of the leading edge of the airfoil. Snap a corresponding chalk line lengthwise along the center line of the cemented side of the deicer boot.

i. Attach hoses to the deicer boot connections without leaving fingerprints on the cemented side of the boots.

j. Using a clean, lint-free cloth heavily moistened (but not dripping) with toluol, reactive the cement on the airfoil leading edge and boot in spanwise strips about 6 inches wide and 24 inches long. Match the boot chalk line to the leading edge chalk line, and roll the boot surface spanwise along the leading edge with a 2-inch rubber roller to remove all air from between the adjoining surfaces. Rubbing the cemented surfaces excessively will remove some of the cement. If the boot is misaligned, pull it free quickly with a quick motion and reposition it properly.

k. Activate the cemented surfaces and roll on each top half and lower half of the boot in sequence. Exerting pressure, use the 2-inch roller on the entire surface of the boot parallel with the inflatable tubes and use the narrow stitcher roller between the tubes. Take care to avoid entrapping air throughout the rolling operation. If an air blister does occur, insert a hypodermic needle into the blister so that the air can escape, then press the surface down until the adhesive surface seals.

CAUTION

If the blister is within the inflatable tube area, be careful to avoid puncturing tubes.

l. Clean off all exposed cement up to within 1/4 inch of the boot edge.

m. Install masking tape around the boot for uniform edge lines, then cover all exposed cement and fair around all cut edges and trailing edges of the boot with EC801 sealing compound.

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n. After the cement and sealing compound have dried and cured, remove the masking tape and clean the surface adjacent to the boot with methyl ethyl ketone. The airplane should not be flown for another 12 hours.

SURFACE DEICE (TH-1472 AND AFTER, AND AIRPLANES EQUIPPED WITH KITS FULFILLING FLIGHT-IN-ICING REQUIREMENTS) (Figure 11-16)

The pressure-operated surface deice system consists primarily of lightweight pneumatic deice boots bonded to the wing and empennage leading edge surfaces, and two engine-driven dry-air pumps which supply air pressure for boot inflation and evacuation. The surface deice system receives its air from the instrument air pumps on each engine. The air is drawn in through the air filter mounted on the engine rear baffle. From this point on the air passes through the pump, two-stage regulator, in-line filter, and the check valve into the manifold (located on the left side of the airplane under the pilot's floor). From the manifold the instrument air is routed forward to the instrument pressure regulator while the deice air is routed aft to the ejector, thus dividing into two separate systems at this point. On airplanes equipped with surface deicers the nacelle regulator is actually an assembly with two regulators. The first regulator sets the pressure at approximately 5.5 psi. The second regulator, which does not function except during the boot inflation cycle, sets the pressure at approximately 18.5 psi. (Another regulator, located forward of the pilot, further reduces the air pressure to approximately 5.0 to 6.0 in. Hg. for the instruments.) This 5.5 psi of air pressure (from the first regulator) operates the ejector (part of the duplex valve located in the aft fuselage of the airplane at approximately F.S. 207) and is converted to 5.0 in. Hg. of vacuum by the ejector. This vacuum is used to positively hold the boots down when the deice system is turned off or during the deflate portion of the cycle.

When the system is turned on, it may be placed in either the AUTO (automatic) or MAN (manual) position. If placed in the AUTO position, a timer located in the aft fuselage (F.S. 207) near the duplex valve will control the deicer cycling (1 cycle). In the MAN position the boots will inflate or partially inflate as long as the switch is held in that position.

For the boots to inflate, the duplex valve must change positions, allowing air into the boots. At the same time

the solenoid in the low pressure (in the nacelle) must actuate (removing that regulator from the system), allowing high pressure air from the second regulator into the system.

NOTE

Airplanes manufactured without surface deicers will not have the instrument pressure regulator located forward of the pilot.

PRESSURE PUMP REMOVAL

- Gain access to the accessory section of the engine compartment.
- Remove pump inlet and outlet hoses from the pressure pump.
- Remove the four attaching nuts and washers and pull the pump straight aft.

PRESSURE PUMP INSTALLATION

NOTE

When installing a new pump, replace the in-line filter, and blow out the line between the filter and the pump. Make certain the inlet line to the pump is clean. If the inlet line to the pump contains foreign material, the new pump will ingest this material, which may destroy the new pump. Never use an air pump which has been dropped or mishandled.

- Install a new gasket on the mounting pad flange.

NOTE

Never jam or force the pump onto the engine mounting pad.

- Position the pump on the mounting pad and install the attaching nuts and washers. Torque nuts to 180-220 inch-pounds.
- Reinstall the plumbing.
- Start the engine and check for leakage at the mounting flange, and check for proper operation and pressure readings.

DUAL PRESSURE REGULATOR (RELIEF) VALVE REMOVAL

The dual pressure relief valves are accessible through the access doors, located on the aft top of both nacelles.

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- a. Disconnect electrical connections.
- b. Remove the inlet and outlet hoses from the valve.
- c. Remove the screws and washers, which hold the valve, and remove the valve.

DUAL PRESSURE REGULATOR (RELIEF) VALVE INSTALLATION

- a. Position the dual pressure relief valve and secure with the washers and screws.
- b. Install the inlet and outlet hoses on the relief valve and secure with the clamps.
- c. Connect the electrical wires.
- d. Replace the access door and secure.

SERVICING THE FILTERS

Impurities and foreign matter are removed from the air by two pressure system filters. The intake filter is located on top of the engine, ahead of the pressure pump. This filter should be replaced annually or every 300 hours of service time or sooner, depending upon operating conditions. The filter element must not be subjected to solvents and must be replaced if this occurs. Always reinstall the filter cover with the opening facing down. The in-line filters are located between the pressure regulators and instruments. The frequency of replacing these air filters will depend upon service conditions; however, they should be checked approximately every 100 hours of operation and replaced every 300 hours of operations, or sooner if conditions warrant. When operating in localities where there is a great amount of dust or sand in the air, the filters should be inspected and replaced at more frequent intervals. Under extreme dusty conditions, it may be necessary to inspect the filters daily. A clogged filter reduces air flow and slows up the rotor, causing improper gyro indication due to a loss of gyroscopic inertia.

AIR FILTER REMOVAL (INTAKE) (Figure 11-8)

- a. Gain access to the filter by opening the engine cowl.
- b. Remove the nut, washers, and cover from the filter.
- c. Remove the spacer and nut which secures the filter.
- d. Remove the filter.

AIR FILTER INSTALLATION (INTAKE) (Figure 11-8)

- a. Install the filter and secure with the nut.
- b. Install the spacer and cover. The cover should be installed with the cover opening facing down.
- c. Secure the cover with the washers and nut.
- d. Close the engine cowl.

AIR FILTER REMOVAL (IN-LINE)

- a. The air filters (between dual pressure relief valve and manifold) are accessible through the access doors, located on the aft top of the LH and RH nacelles.
- b. Remove the air filter inlet and outlet hoses from the air filter.
- c. Remove the clamp, screws, and washers and remove the filter.

AIR FILTER INSTALLATION (IN-LINE)

- a. Position the air filter and secure with the clamp, washers, and screws.
- b. Install the inlet and outlet hoses on the filter and secure with the clamps.
- c. Replace the access door on the top aft of the nacelle and secure.

PRESSURE REGULATOR ADJUSTMENT

- a. Locate the pressure regulator and in-line filter installed in the upper nacelle aft of the firewall.
- b. Install a test gage (0 to 20 psi range) between the regulator and the in-line filter.
- c. Check that the deicer system is off and adjust the engine to 2,000 rpm.
- d. Adjust the low pressure section of the regulator (section with the solenoid) to give a reading of 5.0 + 1.0 - .0 psi on the deice pressure gage.
- e. Check that the test gage in the nacelle never exceeds 7.0 psi.

NOTE

Airplane serials TC-2102 and after, TE-1133 and after, and TH-935 and after that do not have surface deicers will not have the high-pressure regulator or the instrument pressure regulator located forward of the pilot. On these airplanes, adjust the nacelle regulator so that the instrument gyro pressure gage will indicate 5 + .1 -.2 in Hg. Omit step d through k.

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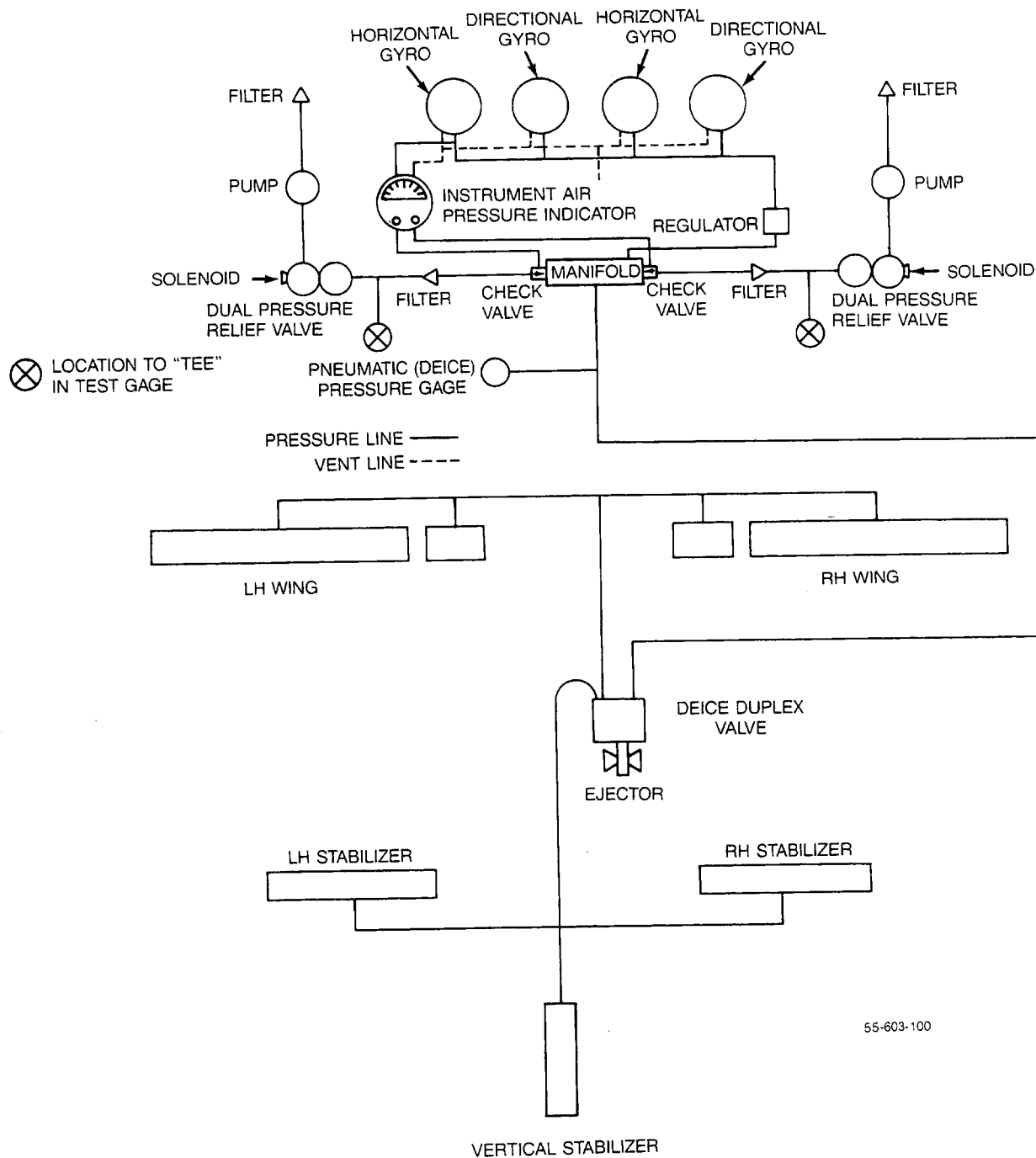


Figure 11-16. Airfoil Deice System Schematic

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f. Adjust the high pressure section of the regulator (section without the solenoid) to 16 to 19 psi on the deice pressure gage.

g. Check that the test gage in the nacelle never exceeds 20 psi.

NOTE

When complying with steps f and g, turn the deice system to AUTO and the gage should show a pressure rise to 16 to 19 psi, then sink back to approximately 5 psi within 10 to 15 seconds.

h. Shut the engine down.

NOTE

Do not remove the test pressure gage at this time.

i. Repeat the preceding procedure on the opposite engine.

NOTE

Steps j through o may be accomplished with either engine running.

j. Adjust the engine to 2,300 rpm.

k. Adjust the instrument pressure regulator (located forward of the instrument panel on the left side) to obtain a reading of 4.8 to 5.1 in. Hg. on the instrument pressure gage.

l. Set the engine at 800 rpm and check that the instrument pressure gage is indicating in the green arc.

m. Check that all check nuts are tight.

n. Set the engine at 800 rpm and check that the instrument pressure gage still indicates in the green arc.

o. Check that the test gages in the nacelles are indicating within $\pm .5$ psi of each other with both engines running.

p. If the test gages do not indicate within $\pm .5$ psi of each other, this is an indication of a leak or restriction which must be located and corrected.

q. Shut the engine down and remove the test gages.

r. Reinstall the access doors.

SURFACE DEICER BOOT REMOVAL

Should it become necessary to remove or loosen the deicer boot, use methyl ethyl ketone (19, Consumable Materials Chart, Section 2) solvent to soften the adhe-

sion line. Use a brush, a pump-type oil can with a long spout or a plastic squeeze bottle to apply the solvent. Apply a minimum amount of solvent while tension is applied to remove the boot. The boot should be removed slowly enough to allow the solvent to undercut the boot, thus preventing damage to the boot. If care is exercised in removal of the boot, it will not be damaged and may be reinstalled.

SURFACE DEICE BOOT INSTALLATION (TH-1472 AND AFTER, AND AIRPLANES EQUIPPED WITH KITS FULFILLING FLIGHT-IN-ICING REQUIREMENTS)

a. Mask off a portion of the leading edge surface 1/2 to 3/4 of an inch beyond the actual boot area.

b. Clean the area to be covered by the boot with a clean, grease-free cloth saturated with methyl ethyl ketone (19, Consumable Materials Chart, Section 2). Change cloths frequently, and never dip a used cloth in the clean supply of methyl ethyl ketone.

c. Reclean the surface with a clean cloth saturated with methyl ethyl ketone (19, Consumable Materials Chart, Section 2), then quickly wipe the surface dry with a clean dry cloth.

NOTE

If the surface to be covered by the boot and the edge sealer is painted with epoxy and has a glazed appearance, remove the gloss with 400-grit sandpaper. (Do not remove the epoxy paint.) Use a clean cloth wetted with methyl ethyl ketone to remove the dust.

d. Cover the cleaned surface with kraft paper and wait one hour before rechecking the surface with a clean dry, white cloth. If the clean cloth picks up any dirt repeat the cleaning.

e. Carefully clean the rough backside of the boot at least twice with a clean, grease-free cloth moistened with methyl ethyl ketone (19, Consumable Materials Chart, Section 2). Change cloths frequently to avoid recontaminating the cleaned portion of the boot. If necessary, continue cleaning the boot until completely clean.

NOTE

If the finish on the back of the boot is smooth, mechanically roughen the bonding surface before cleaning.

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f. Open the container and thoroughly stir the EC-1300L cement (60, Consumable Materials Chart, Section 2) with a stick. Do not attempt to use cement that has jelled too much to drip from the stick.

NOTE

Do not apply the cement if dusty conditions are prevalent, if the relative humidity is higher than 80 percent, or if the temperature is lower than 40°F. The table that follows provides a guide for the proper application of cement.

Temperature	Drying Time in Minutes
Above 80°F	30
60°F to 80°F	45
40°F to 60°F	60

g. Either of these two methods may be used to apply the cement.

1. Brush one even coat of EC-1300L cement (60, Consumable Materials Chart, Section 2) on both the deicer boot and the bonding edge surface. After letting the cement dry for at least 30 minutes apply a second coat to both surfaces.

NOTE

Brushing too long in one place will cause the cement to "roll" or "ball up".

Allow the second coat to dry for at least 30 minutes (preferably one hour) before installing the boot.

NOTE

The brush application method is preferred.

2. Using a spray gun (binks No. 7 with No. 63 BP head De Vilbiss JGA75X or equivalent) spray one even coat of EC-1300L cement (60, Consumable Materials Chart, Section 2) on both the deicer boot and the leading edge surface. After permitting the cement to dry for at least 30 minutes, spray a second even coat on both surfaces. Allow at least 30 minutes and preferably one hour before installing the boot.

NOTE

For spraying consistency dilute the EC-1300L cement (60, Consumable Materials Chart, Section 2) with a solvent blend of 2 parts petroleum naphtha to one part methyl ethyl ketone (18, 19, Consumable Materials Chart, Section 2) until a No. 4 Ford cup will empty in 20 seconds.

h. Snap a chalk line along the leading edge centerline of the airfoil. Snap a corresponding chalk line along the centerline of the cemented side of the deicer boot.

NOTE

If the boot has a white centerline the chalk line on the boot is not necessary.

i. Attach the deicer boot to the airplane air hose without leaving fingerprints on the cemented side of the boot.

NOTE

Applying a vacuum to the deicer boot may aid in installation.

j. Using a clean lint-free cloth heavily moistened (not dripping) with toluoil (20, Consumable Materials Chart, Section 2), reactivate the cement on the airfoil leading edge and the boot in spanwise strips about 3 or 4 inches wide and 24 inches long. Match the boot centerline with the leading edge chalk line. Roll the boot surface spanwise along the leading edge with a 2-inch rubber roller to remove all air from between the adjoining surfaces. Rubbing the cemented surfaces excessively will remove some of the cement.

NOTE

If the deicer should attach "off course" (centerline not connecting with each other), apply methyl ethyl ketone with a small brush or squirt can to soften the bond line. Apply a minimum of solvent to the bond line while applying tension to peel back the deicer boot. Remove slowly enough to allow the solvent to soften the cement, thus preventing removal of the cement coat or damage

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to the boot. Avoid using excess solvent, twisting the boot, bending the boot sharply or jerking the boot loose from the bonded area. Allow the cement to dry before continuing with the application. Reapply cement if any has pulled loose.

If an air pocket or blister is noted on type 25S boots after installation, the boot will have to be removed as described earlier in this note. On type 23S boots the air may be removed by inserting a hypodermic needle into the blister and allowing the air to escape, then press the area down allowing the cement to bond. If the blister is in the inflatable tube area, insert the needle between the tubes, being careful not to puncture the tubes.

k. Activate the cemented surface and roll each top half and lower half of the boot in sequence. Exerting pressure, use the 2-inch roller on the entire surface of the boot parallel to the inflatable tubes, and use the narrow stitcher roller between the tubes. Take care to avoid entrapping air throughout the rolling process.

l. Using a sharp knife, trim the boots as required for proper fit. A 75-inch edge distance must be maintained between the inflatable tubes and the edge of the trim. After the trimming process has been completed, roll the entire surface of the boot. Always start at the centerline of the boot when initiating the rolling process. Roll the trailing edge with a stitcher roller.

m. Using a cloth dampened with methyl ethyl ketone, clean off all exposed cement up to 1/8 inch of the edge.

NOTE

Do not allow the methyl ethyl ketone to run to the edge of the boot as it will weaken the cement.

n. Apply masking tape to the boot 1/8 to 1/4 inch from the edge of the boot.

o. Apply masking tape to the flight surface approximately 1/2 inch from the edge of the boot.

p. Apply Bostik 1007-P (47, Consumable Materials Chart, Section 2) to the area between the masking tape, and allow to dry a minimum of 30 minutes.

q. Using a brush apply EC-8001 Class A-1/2 (63, Consumable Materials Chart, Section 2) to the area between the masking tape.

r. Remove the masking tape and allow to cure 6 to 12 hours or longer in cool weather.

s. After the EC-8001 Class A-1/2 has cured, clean the boot and surrounding area with methyl ethyl ketone (19, Consumable Materials Chart, Section 2).

NOTE

The airplane may be flown 24 hours after the final installation.

SURFACE DEICER--SURFACE COATINGS

Age-Master No. 1 (75, Consumable Materials Chart, Section 2) is an effective protective coating for rubber. Age-Master No. 1 protects rubber against attacks from ozone and other airborne contaminants. Apply Age-Master No. 1 as instructed on the Age-Master No. 1 container.

Icex compound (74, Consumable Materials Chart, Section 2), a product of B. F. Goodrich Company, is a silicon-based material specifically compounded to lower the strength of ice adhesion on the surface of deicer boots. Icex will not harm the boots and offers added ozone protection. When properly applied and renewed at periodic intervals, Icex provides a smooth, polished film that evens out microscopic irregularities on the rubber surfaces; therefore, ice formations have less chance to cling and are removed faster and cleaner when the boots are operated. Apply Icex as instructed on the container.

SURFACE DEICER BOOT CLEANING

The surfaces of the deicer boots should be checked for indications of engine oil after servicing and at the end of each flight. Any oil spots that are found should be removed with a nondetergent soap and water solution. It should also be remembered during servicing of the airplane that the deicer boots are made of soft, flexible rubber stock which may be damaged if gasoline hoses are dragged over the surface of the boots or if ladders and platforms are rested against them.

Petroleum products are injurious to rubber and their use as a cleaning agent should be avoided. Limited use of Mineral Spirits or unleaded gasoline is not harmful in cleaning the deicers if the cloth is dampened (not dripping) with solvent and a dry cloth is used to wipe the deicer before the solvent has time to soak into the rubber.

Wash the deicers with a mild soap and water solution and rinse with clean water when the airplane is cleaned. The temperature of the soap solution and rinse water should not exceed 140°F (60°[.].]

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SURFACE DEICER BOOT REPAIR

B. F. Goodrich Kit 74-451-L contains an adhesive binder/urethane coating system used to restore weathered deicers. It will smooth roughened surfaces and fill small cracks when applied per the instructions furnished with the kit.

Minor scuff areas on the boots normally require only restoring the surface in the immediate area. However, if the entire surface ply has been removed, exposing

the brown natural rubber underneath, or if the boot is cut, torn or ruptured, it is necessary to patch. B. F. Goodrich Repair Kit No. 75-451-C contains cold patches for repairing damaged areas. A cold patch on a boot, however, is a temporary or emergency method of repair; therefore, at the first opportunity, the boot should be removed and returned to the factory for a vulcanized repair. Cold patch repairs can be made following the instructions with the kit.

TROUBLESHOOTING PNEUMATIC PRESSURE SYSTEM (TC-2003 AND AFTER, TE-452 AND AFTER, TH-1 AND AFTER)

Indication	Probable Cause	Remarks
INSTRUMENT AIR SYSTEM		
1. Zero indication on instrument gage. Pump out recess button recessed.	a. Hole in plumbing line, line plugged or plumbing disconnected between manifold and gage. b. Defective gage. c. Defective gyro horizon or directional gyro. d. Defective regulator	a. Inspect plumbing, replace or connect lines as necessary. b. Replace gage. c. Inspect instruments and replace or repair as necessary. d. Replace regulator.
2. Pump-out button(s) extended.	a. Defective pumps. b. Filter or line plugged between pump and manifold. c. Defective dual pressure relief valve. d. Hole in line or line disconnected between pump and manifold.	Replace pump(s). b. Replace filter. Clean lines as necessary. c. Replace valve. d. Inspect lines, replace as necessary.
3. Frequent pump replacement.	a. Partially restricted pump intake or discharge line. b. Plugged or partially plugged inlet or in-line filter.	a. Replace lines. b. Replace filter(s).
4. No pressure at low rpm.	a. Oil in pump.	a. Replace hose.
5. Erratic air pressure.	a. Oil in pump. b. Engine oil seal defective.	a. Replace. b. Replace.

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TROUBLESHOOTING PNEUMATIC PRESSURE SYSTEM LIGHTWEIGHT AUTOMATIC SURFACE DEICER (PUMP-DRIVEN) (TC-2003 AND AFTER, TE-452 AND AFTER, TH-1 AND AFTER)

The following troubleshooting procedures are based on the assumption that the airplane engine-driven dry air pumps are operational.

Indication	Probable Cause	Remarks
1. Deicer boots do not inflate (either or both engines operating at minimum cruise rpm for a period of eight seconds).	a. Open circuit breaker.	a. Push deicer circuit breaker to reset.
	b. Loose electrical connections or broken wire.	b. Tighten or repair as required.
	c. Time delay relay not functioning.	c. Replace the relay.
	d. Deicer boot puncture.	d. Repair as prescribed in this section or replace.
	e. Distributor valves not functioning.	e. See items 4 and 5.
	f. Piping lines kinked, blocked or not connected.	f. Inspect lines and connections; blow out lines.
	g. Leak in system	g. See System Checkout, locate and repair.
2. Deicer boots inflate too slowly (either or both engines operating at minimum cruise rpm for a period of eight seconds).	a. Piping lines kinked, partially blocked, or not connected securely.	a. Inspect lines and connections; blow out lines.
	b. Leak in system.	b. See system checkout, locate and repair.
	c. Deicer boot puncture.	c. Repair as prescribed in this section or replace.
	d. Distributor valve not functioning.	d. See items 4 and 5.
3. Deicer boots deflate too slowly.	a. Clogged instrument air filter.	a. Replace air filter.
	b. Piping lines kinked or partially blocked.	b. Inspect and blow out lines.
	c. Overboard line from distributor valve partially blocked.	c. Inspect and blow out lines.
	d. Distributor valve not operating properly.	d. Overhaul or replace.
	e. Electrical circuit malfunctioning.	e. See system wiring diagram.

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TROUBLESHOOTING PNEUMATIC PRESSURE SYSTEM LIGHTWEIGHT AUTOMATIC SURFACE DEICER (PUMP-DRIVEN) (TC-2003 AND AFTER, TE-452 AND AFTER, TH-1 AND AFTER) (CONT'D)

The following items might aid in ascertaining whether or not the distributor valve is functioning properly.

Indication	Probable Cause	Remarks
4. One or more boots do not inflate with pressure gage at normal reading and timer cycling.	a. Defective wiring in external circuit or other units.	a. Refer to airplane system wiring diagram and make check. Disconnect plug at distributor valve.
	b. Faulty solenoid in distributor valve.	b. Measure resistance of solenoids. Reading should be 17.5 ohms $\pm$ 5% through the receptacle pins. Replace distributor valve if readings do not check.
	c. Mechanical failure, distributor valve.	c. Disconnect the lines at the outlet ports of the distributor valve and check valve operation with a gage. If trouble is not found in the distributor valve, inspect boots and lines for leaks or blockage.
5. One or more boots inflate but do not deflate readily with pressure gage at normal reading timer cycling.	a. Exhaust port of distributor valve not vented to low pressure area.	a. Route exhaust line to low pressure area.
	b. Vacuum ejector on distributor valve plugged or partially blocked.	b. Overhaul or replace distributor valve.
	c. Defective boots.	c. Repair as prescribed in this section or replace.
	d. Obstruction of lines.	d. Disconnect line from exhaust port of distributor valve and see if line is clear to low pressure area.
	e. Mechanical failure in distributor valve.	e. With line disconnected see if exhaust port is discharging; if not, replace distributor valve.

STALL STRIP INSTALLATION (Figure 11-17)

The stall strip is located on the left wing only and is located as indicated in Figure 11-17. Stall Strip installation is accomplished as follows:

- Clean the boot surface thoroughly, removing all old glue. Mask off the area where the new strip is to be installed and wipe with methyl ethyl ketone (19, Consumable Materials Chart, Section 2).
- Install the stall strip to the deicer boot using Bostic 1008 (48, Consumable Materials Chart, Section 2),

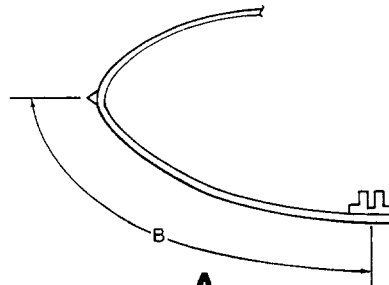
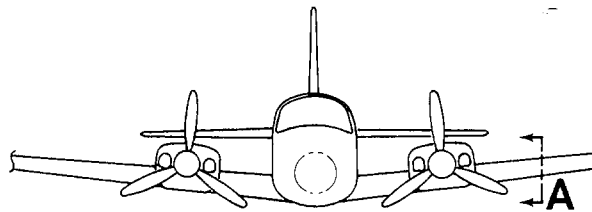
a two-part cement. Mix the Bostic 1008 in the following manner: 30 parts (by weight) of the base material (in the "A" package) with 1 part (by weight) of the accelerator (in the "B" package).

- Apply a coat to both the stall strip and the area to which it will be bonded. Allow to dry 10 to 15 minutes, then install the strip as described in the illustration. The cement will set in about 6 hours.
- When dry, coat the area with A56B cement (1, Sealing Chart, Section 2) to replace the conductivity of the boot.

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VIEW A
ROTATED 90°

55-600-20

	Serial No.	Wing Station Station	
WITH DEICE BOOTS	TC-1 thru TC-1402 except TC-350 Reservoir system	111.38 B= 14.75 in.	to 120.38 B= 14.25 in.
	TC-502 thru TC-2002 Vacuum system	111.38 B= 14.88 in.	to 120.38 B= 14.38 in.
	TC-350 TE-1 thru TE-451 Vacuum system	123.25 B= 14.38 in.	to 132.25 B= 14.03 in.
	TC-2003 and after TE-452 and after TH-1 and after Pressure system	123.25 B= 14.38 in.	to 132.25 B= 14.03 in.
WITHOUT DEICE BOOTS	TC-1 thru TC-1607 TE-1 thru TE-942 except TE-938	111.38 B= 14.75 in.	to 120.38 B= 14.25 in.
	TC-1608 and after	111.38 B= 14.78 in.	to 120.38 B= 14.28 in.
	TE-938, TE-943 and after TH-1 and after,	123.25 B= 14.28 in.	to 132.25 B= 13.93 in.

Figure 11-17. Stall Strip Installation

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STALL WARNING SYSTEM ADJUSTMENT

The stall warning switch is carefully adjusted when the airplane is test flown at the factory. Should it require readjusting, proceed as follows: Locate the switch installation on the undersurface of the left wing and loosen the two phillips-head screws, one on either side of the vane

NOTE

On airplane serials TH-1377 and after the stall warning switch is adjusted by loosening the four mounting screws (one on each corner of the mounting plate). Tighten the screws after each adjustment.

If the stall warning has been coming on too early, pull the vane back and down. If the stall warning has been coming on too late, push the vane up and forward. Moving the vane with the Phillips screw loosened moves the entire unit up or down inside the wing causing the switch to be closed earlier or later. Retighten the screws after making each adjustment. NEVER TRY TO ADJUST THE SWITCH BY BENDING THE VANE.

As a rule of thumb, moving the vane 1/4 inch will change the time the stall warning actuates by about 5 mph of indicated air speed. The only way to test the accuracy of the setting is to fly the airplane into a stall, noting the speed at which the warning horn and light comes on and the speed at which the full stall occurs. The stall should be made with the flaps and gear up and power off. Prior to the stall decelerate no faster than one mph per second. It may be necessary to make several alternate adjustments and test flights before the desired setting can be reached. The stall warning should actuate, ideally, at 7 to 9 mph ahead of the complete stall, although 5 to 10 mph ahead of the complete stall will meet FAA requirements. The switch setting should be checked and adjusted as necessary whenever a wing or wing leading edge is replaced or extensively repaired or if a new switch is installed. The switch should require no adjustment in normal service.

STALL WARNING SWITCH HEATER

The stall warning switch heater is installed to prevent ice from forming around or on the switch vane causing erroneous indications. All of the heated switches have a heating element in the switch while the high heat switch (installed as part of optional deice boot

installation on TH-1377 and after) has an additional heating element in the mounting plate. The earliest airplanes (prior to TE-738, to TH-182 and to TC-1936 except TC-1913) were produced with heaters as optional equipment. Except for installations with high heat, the stall warning switch draws its electrical power from the pitot heat circuit breaker. On those installations equipped with a right and left pitot heat circuit breaker, the stall warning switch heater draws its power from the left pitot heat circuit breaker.

The heater for the high heat stall warning switch draws electrical power from its own 7.5-amp circuit breaker, which is located in the left subpanel. On the ground the heater is restricted to operation at 1/4 bus voltage to prevent overheating. When the airplane leaves the ground, the contacts in the landing gear safety switch close to actuate the landing gear safety relay. Refer to Figure 11-19. When the relay contacts close, full bus voltage is applied to the stall warning switch heater. The major components of the system are as follows:

- a. The 7.5-amp circuit breaker in the left subpanel.

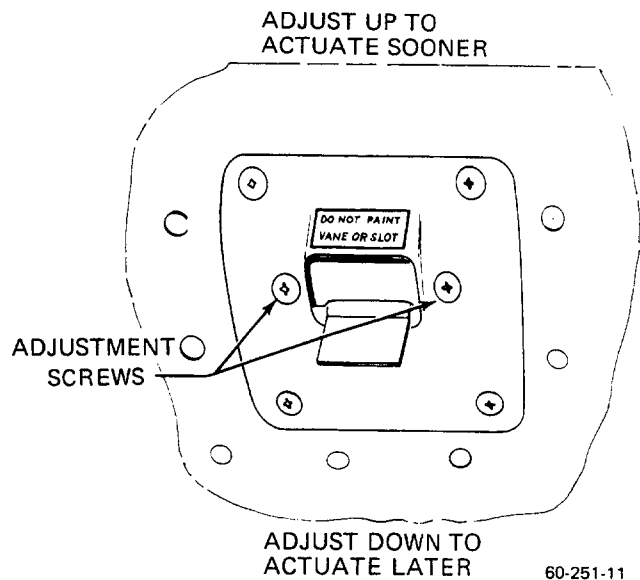


Figure 11-18. Stall Vane Adjustment (TH-1 thru TH-1377)

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- b. The 16-ohm 50-watt resistor attached to the inboard side of the rib at wing station 45.0.
- c. The landing gear safety switch relay located forward of the main spar carry-through.
- d. The landing gear safety switch.
- e. The 5-amp stall warning circuit breaker.

***HEAT TEST FOR HIGH HEAT STALL
WARNING SWITCH, (OPTIONAL ON
TH-1377 AND AFTER)***

For this test an accurate ohmmeter (Fluke 8100A or equivalent) is required.

- a. Remove the switch from the left wing.
- b. Disconnect the red or white and purple wires from the airplane wiring.
- c. Connect the ohmmeter to the red or white and purple wires.
- d. The ohmmeter should indicate 4.8 to 6.7 ohms.
- e. If the indication is correct, remove the wires and reinstall the switch.
- f. If the indication is incorrect, replace the switch.

**ANTI-ICING SYSTEMS
(Figure 11-23)**

***PROPELLER AND WINDSHIELD
ANTI-ICING MAINTENANCE***

The isopropyl alcohol used by the propeller and windshield anti-icing system is supplied by a three-gallon tank located beneath the floor on the left side of the nose baggage compartment. The filler cap to the tank is accessible through a door in the nose compartment floor. The supply line from the tank is routed directly aft to the pump that provides the pressure to operate the anti-icing system. The outflow line from the pump is routed aft under the floor and outboard along the wing leading edge to the right side of each nacelle, then forward to the slinger rings on each propeller. The flow of anti-icing fluid to the propeller is controlled by two orifices located at the ends of the discharge tubes at the propeller slinger rings. On airplanes equipped with the optional windshield anti-icing system, another line from the anti-icing pump tees off to the solenoid valve that regulates the flow of anti-icing fluid to the windshield anti-icing discharge tube. This valve is mounted just outboard of the pump and the line from the valve is routed to the center of the fuse-

lage, where it connects to the discharge tube that runs along the lower edge of the pilot's windshield. The discharge tube has five orifices equally spaced for effective diffusion of the anti-icing fluid.

The propeller anti-icing system is controlled by a circuit breaker switch on the left subpanel. The amount of anti-icing fluid available in the supply tank is indicated by a gage on the upper right corner of the instrument panel. The propeller anti-icing system must be turned on to supply power to the anti-icing pump before the windshield anti-icing system can be used. The windshield anti-icing system is controlled by a three-position switch mounted on the left subpanel. The windshield anti-icer may be operated either continuously (when the switch is in the ON position) or momentarily (while the switch is held in the MOM. ON position). When the control switch is actuated, power is supplied to open the solenoid valve that regulates the flow of anti-icing fluid to the discharge tube at the pilot's windshield. To ensure proper operation of the anti-icing system, observe the following maintenance precautions:

- a. Since the orifices in the discharge tube are small (.0130/.0225 inch in diameter for the propeller and .0210 inch in diameter for the windshield) and easily plugged, the system should be periodically checked to ensure that proper fluid flow is maintained. The propeller anti-icing system should be checked to ensure that 2.25 to 2.75 quarts per hour per propeller is maintained.
- b. To prevent the orifices in the discharge tubes from becoming clogged or restricted, periodically clean the screen located at the bottom of the anti-icing pump and service the tank only with clean isopropyl alcohol.
- c. Drain and flush the supply tank twice a year.
- d. Check the clearance of the discharge tube to the anti-icer boot with the propeller blade rotated to the low pitch stop. Adjust the discharge tube centerline to discharge the anti-icing fluid onto the anti-icer boot at the foreward groove of the boot with the tube clearing the boot by $.06 \pm .03$ inch.

***ANTI-ICE FLUID INDICATOR
CALIBRATION***

- a. Fill the alcohol anti-ice tank with clean isopropyl alcohol.
- b. Remove the cover from the junction box mounted on the upper LH side of the forward closure.
- c. Locate the potentiometer adjustment screw on the aft printed circuit board in the junction box. Turn the

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screw either clockwise or counterclockwise until the anti-ice fluid indicator gives a full reading.

- d. Replace the cover on the junction box.

INSTALLING THE PROPELLER ANTI-ICE BOOT

- a. Locate the anti-icer boot in the following manner:

1. Sight along the centerline of the blade leading edge and make a temporary mark on the hub directly above this centerline. The mark should be used as a guide in locating the boot.

2. Place the boot along the leading edge of the blade as follows:

- a) Locate the end of the boot one inch from the propeller hub clamp, then locate the centerline of the boot 1/8 to 1/4 inch forward of the leading edge centerline on the propeller blade. At the outboard end of the boot, locate the centerline of the boot on the leading edge centerline of the propeller blade.

3. Mask around the area covered by the boot, leaving a 1/4 inch border on all sides except for the outer end where the border is increased by the amount of stretch.

- b. Prepare the blade for bonding by:

1. Remove the paint or other organic coating within the masked area with a suitable paint stripper. In many instances, stripping may be accomplished with methyl ethyl ketone (19, Consumable Materials Chart, Section 2).

2. After stripping off the organic coating, clean the area with a cloth wet with toluol (20, Consumable Materials Chart, Section 2), scrubbing well, and follow with a clean dry cloth. Finally, clean with a cloth wet (not dripping) with methyl ethyl ketone (19, consumable Materials Chart, Section 2) and immediately follow with a clean dry cloth before the solvent evaporates.

- c. Prepare the boot for bonding by:

1. Mask the perimeter on the ribbed side with 1/4-inch tape to prevent excessive curling of the feathered edges, after the cement is applied.

2. Sand the smooth sides thoroughly with No. 280-grit adhesive paper and clean with naphtha (18, Consumable Materials Chart, Section 2). The boot is now ready to install on the blade.

3. Warm the cleaned blade to 70°F (minimum) with heat lamps or equivalent heaters and maintain

this minimum temperature throughout the installation. The heating operation is unnecessary during warm seasons. A maximum temperature of 150°F shall not be exceeded.

4. Brush apply one thin uniform coat of EC776 cement (46, Consumable Materials Chart, Section 2) over the entire cleaned area of the blade. Allow one hour to air dry.

5. Brush a thin coat of Bostic 1007P cement primer (47, Consumable Materials Chart, Section 2) over the entire cleaned area of the blade and let dry for up to three hours. This time may be shortened to 30 minutes by accelerated aging under heat lamps or Chromalox heaters at 150°F. Check the perimeter for hardness by scratching with a thumb nail. If any degree of tackiness is indicated, additional cure is needed before applying the bonding cement.

6. Brush a heavy coat of Bostic 1008 cement (48, Consumable Materials Chart, Section 2) on the primed blade and a similar coat on the sanded side of the boot. Allow to stand 45 minutes and repeat the brush coat operation on both the surfaces.

7. Allow the second cement coat to dry about 30 minutes before placing the boot into position. Do this by aligning the inboard end center with the propeller hub mark and working outward. It is necessary to stretch the boot lengthwise over the blade in the area between the root end and the flat cross section in order to prevent wrinkling of the boot at the edges. The outward section of the boot will lay into position without stretching and should fall within 1/4 inch of the glue line. Roll the boot firmly by working outward from the full length of the centerline in order to prevent excessive local stretching and the trapping of air under the boot.

8. Remove the masking tape carefully so that the 1/4 inch of glue around the boot remain undisturbed.

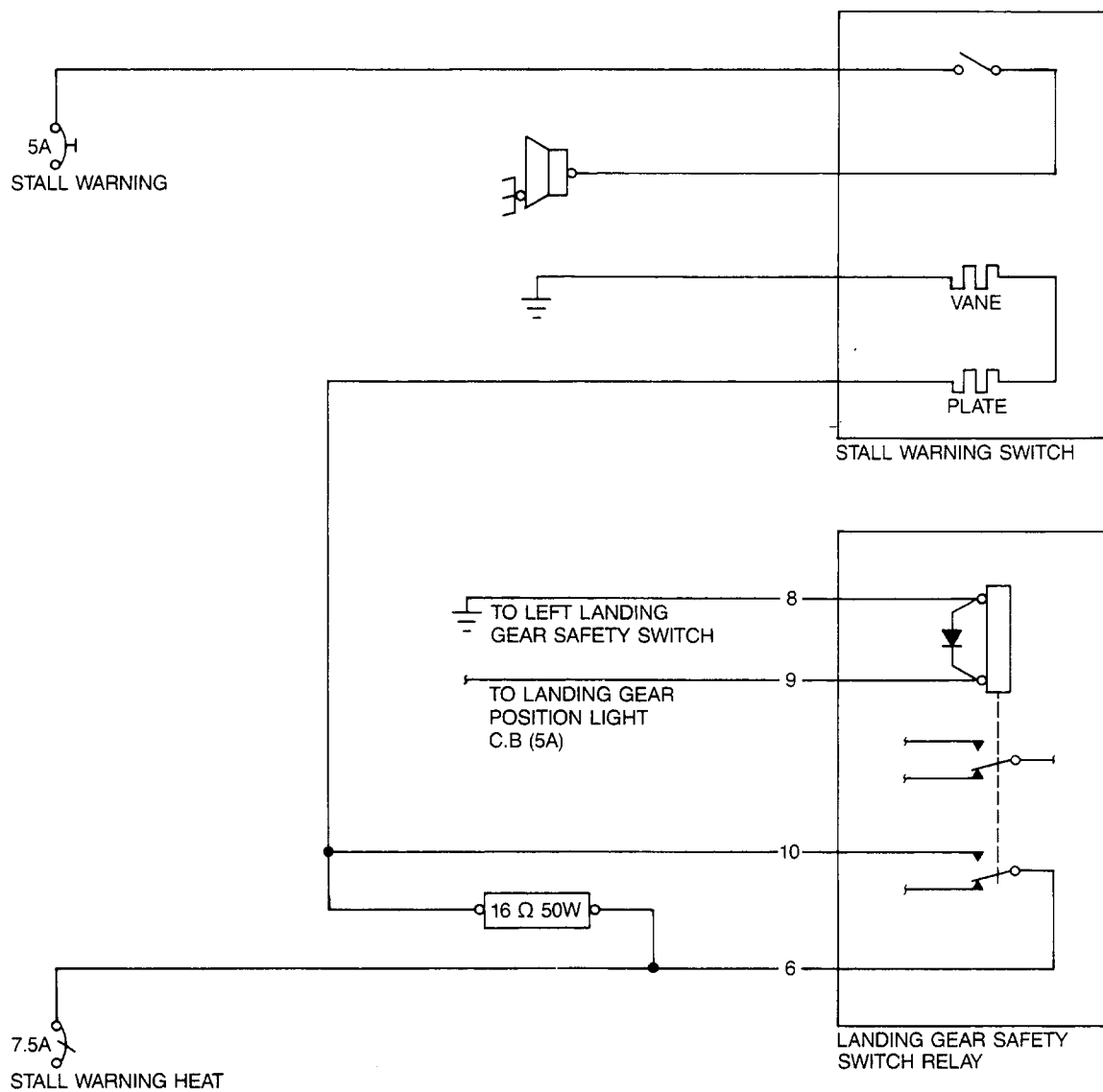
9. Remove any trapped air with the aid of a hypodermic needle and roller.

10. Allow the installation to cure 48 hours undisturbed before placing into service.

WINDSHIELD ANTI-ICING SYSTEM (ELECTRICAL) TE-1169 AND AFTER, TH-1080 AND AFTER)

On these airplanes ice may be prevented from forming on the windshield by an electrical windshield heater

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Figure 11-19. Stall Warning Electrical Schematic

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The windshield heater is of the heated segment design. The windshield heater is approximately 9.6 X 11.5 inches, conforming to the contour of the windshield and located on the centerline of the airplane. The windshield heater is controlled by a 20-ampere toggle-type circuit breaker switch, placarded WSHLD, located on the left subpanel. With the switch on, 28 vdc of power is applied to the windshield temperature controller, windshield heater relay and windshield heater. The temperature controller senses the temperature of the windshield heater. The temperature controller removes power from the system (de-energizing the relay) when the temperature of the windshield is between 100°F and 110°F. When the windshield heater has cooled to a temperature of 90° to 100°F, power is applied to the system (energizing the relay) allowing the temperature to rise again. Thus the temperature controller maintains the temperature of the windshield heater between a temperature of 90° and 110°F.

CAUTION

Ground operation of the windshield heater is limited to 10 minutes.

CAUTION

The magnetic compass is erratic when the windshield heater is in operation. If the directional gyro is to be reset, turn off the windshield heat for 15 seconds to allow a stable reading of the standby compass.

NOTE

Heat should be applied to the windshield before ice forms.

WINDSHIELD HEATER REMOVAL (TE-1169 AND AFTER, TH-1080 AND AFTER)

Using masking tape, mask off an area on the windshield approximately 14-inches long by 12-inches wide above the heater frame. On each side of the heater frame, apply masking tape along each edge the entire height of the frame and at least 6 inches out from the edge. This will help to prevent scratching the windshield when removing the windshield heater.

- a. Working in the nose baggage compartment, tag and disconnect the windshield heater wiring from the windshield heater control box.
- b. Remove the two screws securing the wire cover.
- c. Using a sharp-edged tool such as a putty knife or pocket knife, insert the tool under the edge of the wire cover. Loosen the bond of the sealant either by cutting or by prying it loose. Be careful not to scratch the airplane finish, bend the wire cover or damage the wiring. Refer to Figure 11-20.
- d. Lift up the wire cover. Using a sharp-edged tool, pry or cut the sealant out of the inside of the wire cover. Be careful not to damage the wires.
- e. Separate the wires from the wire cover.
- f. Pull the wires up and out of the hole in the fuselage.
- g. Remove the sealant from the hole in the bottom retainer where the wires pass through to the heater plate. Be careful not to damage the wires. Refer to Figure 11-20.

NOTE

If it is desired to retain the existing windshield heater plate for continued use, make a putty knife-like scraper out of Plexiglas or wood. Sharpen one edge and use this tool instead of the putty knife used in step i. This tool will help prevent scratching the heater plate. Applying masking tape to the heater plate will further protect the surface from scratches.

- h. Using a sharp-edged putty knife or similar tool, scrape off the sealant around the perimeter of the windshield heater plate. Refer to Figure 11-20.
- i. It may be necessary to insert a sharp-edged tool between the heater plate and the retainers in order to completely loosen the bond of the sealant. If this is done, be careful not to pry on the side or bottom retainers, as they are likely to break. It is permissible to break the top retainer, as it should be replaced. Refer to Figure 11-20.
- j. Start working at the top left corner of the windshield heater assembly; use a sharp putty knife to remove the top windshield heater plate retainer. Insert the edge of the putty knife between the windshield and the top retainer. Insertion depth should not exceed 1/8 inch. Refer to Figure 11-21. Working along the entire length of the top retainer, pry off the retainer and discard it. Take care not to scratch the windshield.

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CAUTION

If the putty knife is inserted too far between the windshield and the windshield heater retainer, damage may occur that could require replacement of the windshield.

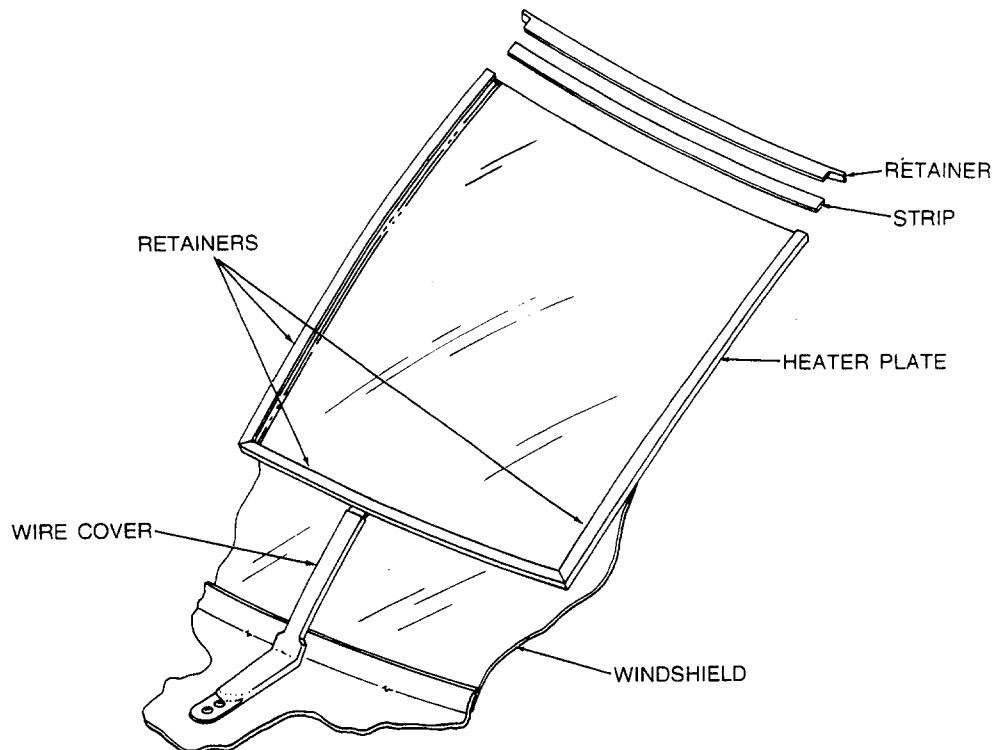
k. After removal of the top retainer, insert a sharp tool between the top of the windshield heater plate and the attachment strip of the windshield heater frame which is bonded to the windshield. This is necessary in order to break the bond between these two parts. Refer to Figure 11-21 Detail A. Be careful not to scratch the windshield.

l. Slide the heater plate up and out of the frame. If the existing heater plate is going to be used again, take care not to scratch it during removal.

**WINDSHIELD HEATER INSTALLATION
(TE-1169 AND AFTER, TH-1080 AND
AFTER)**

Carefully scuff sand any bonding material and sealant off the top attachment strip of the windshield heater frame.

- a. Make sure all sealant is scraped off of the heater retainers.
- b. Clean the windshield and frame with naphtha (18, Consumable Materials Chart, Section 2) and wipe dry with a clean white cloth.
- c. Cut a piece of masking paper to the width of the heater plate and 2 or 3 inches longer than the plate.
- d. Slide the paper down into the heater frame and tape down the edge. This will help prevent the heater plate from being scratched during installation.
- e. Slide the new windshield heater plate into the frame. Ensure that the wires are at the bottom. Guide



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Figure 11-20. Windshield heater

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the wires through the hole in the bottom retainer. Carefully remove the masking paper.

f. Lay the new top retainer onto the heater plate frame in the installed position. Trim the ends of the retainer to obtain a good fit. Apply Mylar tape (62, Consumable materials Chart, Section 2) to the windshield parallel to, and lightly touching, the upper vertical surface of the retainer. This will prevent getting adhesive on portions of the windshield where it is unwanted. Mylar tape is used because the adhesive will not stick to it.

CAUTION

Use adhesive and sealant sparingly to avoid runs.

g. Brush on PS-30 adhesive (44, Consumable Materials Chart, Section 2) per the instructions on the package. Apply adhesive to the top horizontal and vertical surfaces of the top attachment strip of the windshield heater frame and to the exposed portion of the windshield directly above the attachment strip.

h. Apply adhesive to the bottom surface of the new top windshield heater retainer. Apply adhesive to the portion of the top retainer that butts up against the ends of the side retainers.

i. Place the new heater retainer in the proper position. Secure the retainer in place with masking tape and allow at least four hours for the adhesive to cure.

j. Insert the tip of the sealant applicator into the hole where the wires from the heater plate pass through the bottom retainer. Squeeze enough RTV-732 sealant (45, Consumable Materials Chart, Section 2) into the hole to ensure that no water can get inside.

k. Lay the wire cover in its installed position on the fuselage. Mark the fuselage along the outer edges of the wires cover to show where the wires will lay in the installed position.

l. Remove the wire cover and apply sealant to the area between the pencil marks.

m. Apply sealant to the inside of the wire cover until approximately three-fourths full of sealant.

n. Lay the wires down into the sealant that was applied to the fuselage. Insert the wires down into the hole in the fuselage and install the wire cover with the two screws.

o. If sealant does not squeeze out from underneath the wire cover, apply a bead of sealant around the bottom edge of the wire cover. Wipe off the excess sealant.

p. Remove the tape securing the top retainer. Remove the Mylar tape. Apply sealant around the perimeter of the windshield heater plate where the heater contacts the retainers. Apply sealant to the top two corners of the windshield heater frame and to the bottom two corners. Be sure that any possible paths of moisture penetration have been sealed. Allow the sealant to cure.

q. Remove the tags and connect the electrical wiring to the windshield heater temperature control box.

r. Turn the power and WSHLD switch on, and place a hand on the windshield heater to make sure that the heater is operative.

s. If the windshield heater is found to be operative, turn WSHLD switch and power off. If the windshield heater is found to be inoperative, troubleshoot the system per the WINDSHIELD HEATER TROUBLESHOOTING CHART and WINDSHIELD DEICER CHECK (electrical) to isolate and correct the problem.

t. Remove all tape from the windshield.

**WINDSHIELD HEATER TEMPERATURE
CONTROLLER REMOVAL (TE-1169 AND
AFTER, TH-1080 AND AFTER)**

The windshield temperature controller is located in the nose baggage compartment just forward of FS 39.00.

a. Gain access to the controller through the nose baggage compartment door and locate the controller.

b. Tag and remove the electrical wiring from the controller.

c. Remove the clip nuts, washers and screws which attach the controller to the mounting bracket and remove the controller.

**WINDSHIELD HEATER TEMPERATURE
CONTROLLER INSTALLATION (TE-1169
AND AFTER, TH-1080 AND AFTER)**

a. Position the controller on the mounting bracket and secure with the screws, washers and clip nuts.

b. Remove the tags and connect the electrical wiring to the controller.

c. Close and secure the nose baggage compartment door.

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**WINDSHIELD HEATER RELAY REMOVAL
(TE-1169 AND AFTER, TH-1080 AND
AFTER)**

The windshield heater relay is located in the nose baggage compartment forward of FS 39.00 adjacent to the windshield heater temperature controller.

- a. Gain access to the relay through the baggage compartment door and locate the windshield heater relay.
- b. Tag and remove the electrical wiring from the relay.
- c. Remove the screws, nuts and washers that hold the relay in place and remove the relay.

**WINDSHIELD HEATER RELAY
INSTALLATION (TE-1169 AND AFTER,
TH-1080 AND AFTER)**

- a. Place the relay in the proper position and secure with screws, washers and nuts.
- b. Remove the tags from the electrical wiring and connect the electrical wiring to the relay.

- c. Close the nose baggage compartment door and secure.

**WINDSHIELD DEICER CHECK
(ELECTRICAL)**

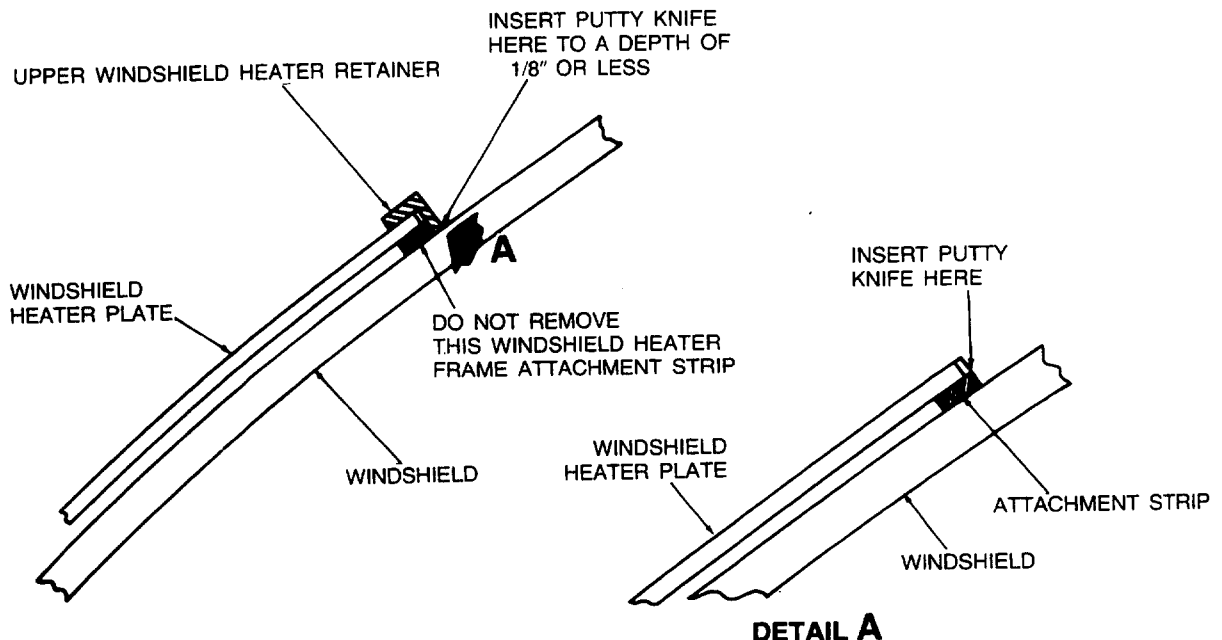
The control box, relay, and heater assembly should all be checked before any item is replaced.

- a. Disconnect the heater from the control box and relay.
- b. Check that there is a circuit through the two blue wires of the heater.
- c. Check that there is a circuit between the black and white (black and red on later units) leads of the heater.

NOTE

If both of these circuits conduct electricity, the heater is probably functioning properly. If an accurate ohmmeter is available, a more complete check of the system may be made as follows:

1. Check the heating circuit (black and white or red and white) for a resistance of 1.69 ± 25 ohms.



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Figure 11-21. Windshield Heater Retainer Removal

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2. The sensing element in the heater is temperature sensitive; therefore, the resistance will vary with temperature change. Check the temperature resistance chart for the correct reading. Refer to Figure 11-22.

**FUNCTIONAL CHECK OF THE
WINDSHIELD HEATER CONTROLS**

NOTE

As the sense element (heater) cools, the resistance will drop.

- a. Check that the controller turns the heater on as the sense element resistance drops to 328 ± 3 ohms (88°F to 100°F).

NOTE

As the sense element (heater) heats, the resistance will become greater.

- b. Check that the controller turns the heater off when the sense element resistance reaches 338 ± 4 ohms (100°F to 110°F).

**ELECTRIC PROPELLER DEICING,
(GOODYEAR)
(Figure 11-24)**

The propeller deicer uses two heating elements per blade. The timer applies current to the outboard element first and then to the inboard element. The cycling sequence of the timer starts from the outboard halves to the inboard halves on the left engine prop, then completes the timer cycle with the outboard halves to

the inboard halves of the right engine prop. Each element is heated for 30 seconds to make a complete cycle every two minutes. The ammeter hand will deflect as each element cycles, indicating the system is operating properly. The system must not be operated for more than two minutes on the ground as a precaution against overheating of the iceguard. After a 5-minute cooling period, the system has cooled sufficiently to permit the second operation. The timer needs no periodic maintenance. In the event of failure return the timer to the installing facility.

**ELECTRIC PROPELLER DEICER BRUSH
REPLACEMENT (GOODYEAR)**

Brush replacement is normally required after 500 hours of service. The copper-plated area of each brush indicates its wear limitations. To prevent the copper from damaging the slip ring, the brushes must be replaced as soon as the copper plating becomes visible. Prior to installing new brushes, the slip ring should be wiped clean with a paper towel or rag that has been dampened with an Acetone-based solvent.

Allow to air dry completely before installing new brushes. Maintain sufficient clearance between the brush block and slip ring by adjusting the floating lock-nuts in the brush block bracket until the brushes extend from .08 to .09 inch from the block. Brushes should be aligned to move freely in the brush holder with the entire face of each brush making contact with the slip ring throughout 360 degrees of rotation. This provides preventive measures against arcing, slip ring pitting, and excessive brush wear.

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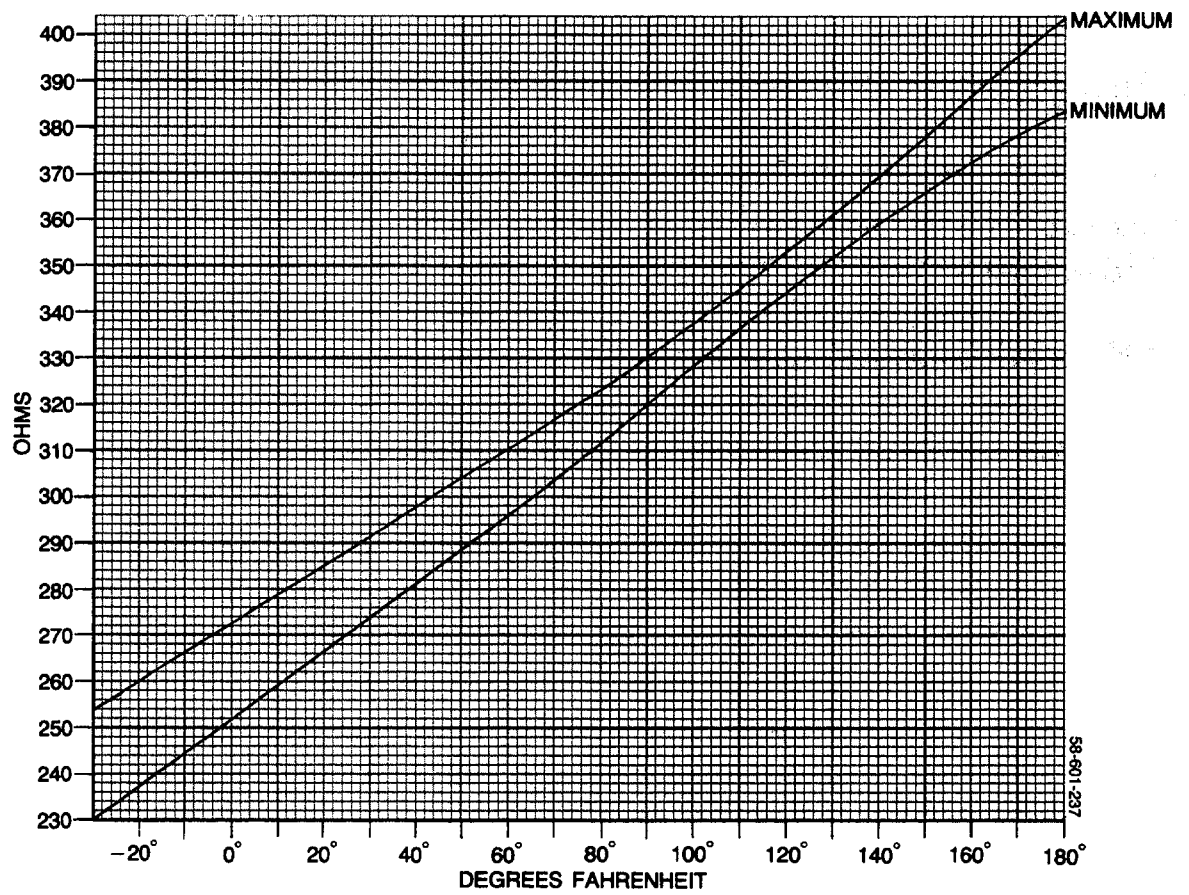
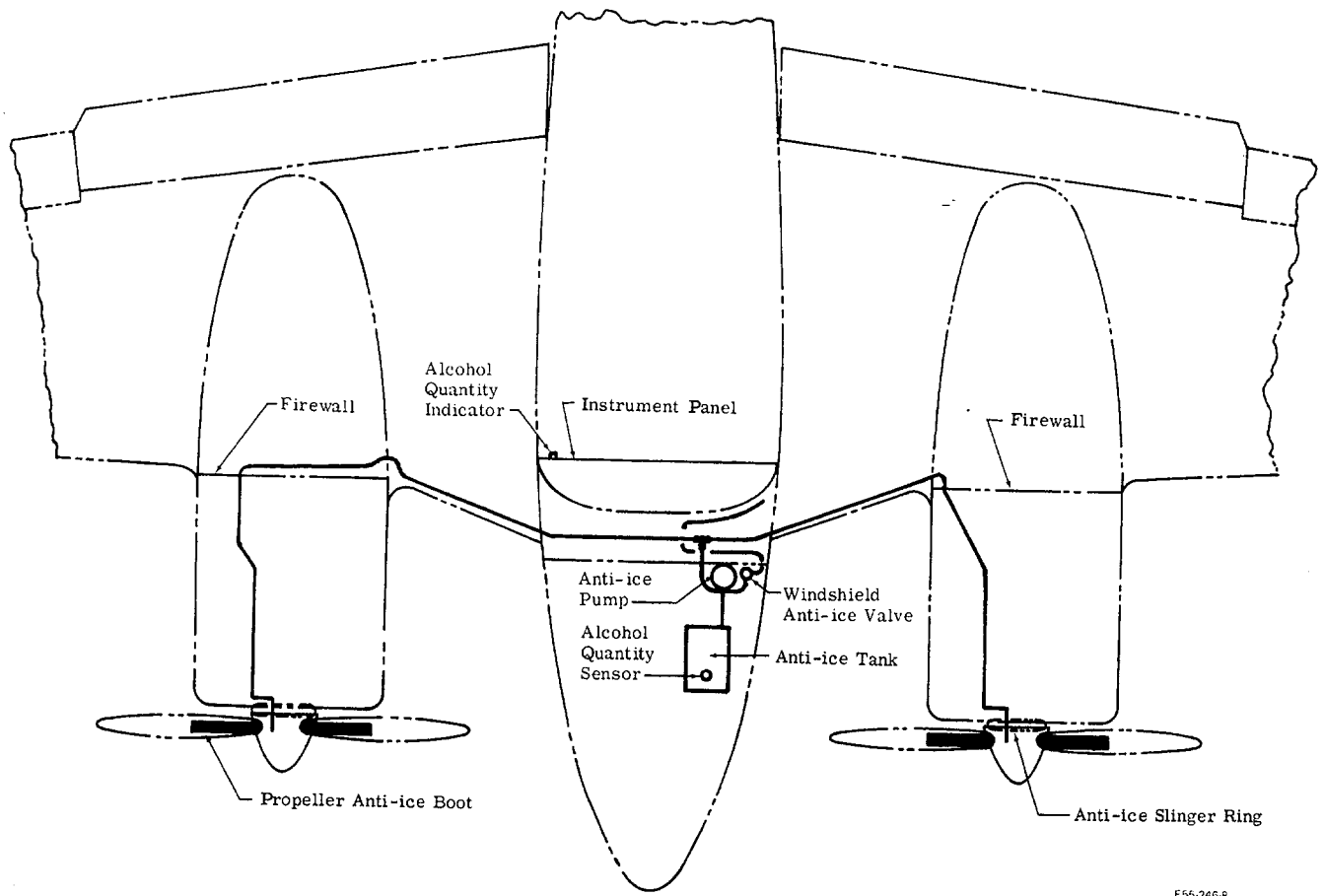


Figure 11-22. Temperature/Resistance Chart

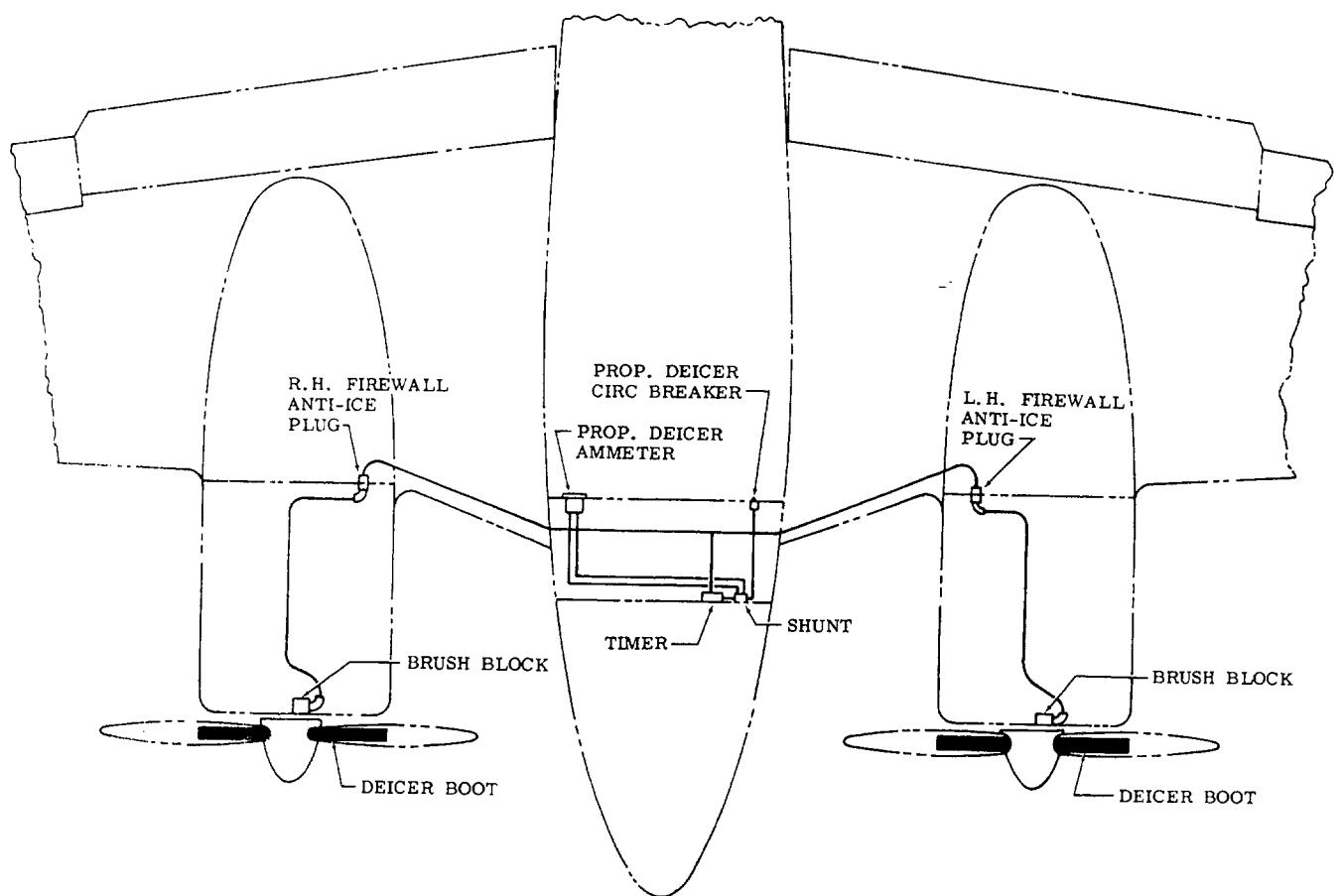
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Figure 11-23. Propeller Anti-icer System

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Figure 11-24. Electrical Propeller Deicing System

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TROUBLESHOOTING WINDSHIELD HEATER SYSTEM

Trouble	Probable Cause	Remarks
1. Windshield heater inoperative.	a. Loose connections or broken wires.	a. Check for loose connections. Check for continuity between components, isolate damage and repair.
	b. Defective WSHLD switch.	b. Replace switch.
	c. Windshield heater relay stuck in the open position.	c. Replace relay.
	d. Defective temperature controller	d. Replace controller.
	e. Damaged windshield heater.	e. Replace heater.
2. Windshield heater will not cycle off.	a. Defective temperature controller.	a. Replace controller.
	b. Windshield heater relay stuck in the closed position.	b. Replace relay

To prevent damage to the brushes, the brush block assembly should be angled in such a manner that the brushes contact the slip ring at an angle of approximately 2° from perpendicular, as measured toward the direction of the slip ring rotation. Refer to Figure 11-14. A dial indicator gage may be used to check the amount of slip ring runout (wobble) in relation to the brush block. If the total runout over 360 degrees of rotation exceeds .005 inch, or over any 4-inch arc exceeds .002 inch, the slip ring should be aligned by adding shims between the slip ring and its mounting surface. To avoid error in the gage readings during such a check, slowly rotate the slip ring while pushing in on the propeller to take the play out of the thrust bearings.

After the brushes have been installed, the airplane should be flown for at least one hour before the system is energized for a period longer than that required for the normal installation checkout. This will allow the brushes to set and a film to form on the slip ring.

ELECTRIC PROPELLER DEICER TIMER CHECK (GOODYEAR)

The deicer timer, located in the pilot's compartment on the left hand side of the firewall, can be checked by one of two methods. Apply power to the plug attached to the timer. Check the DC voltage to the ground from the pins on the timer. Each pin should read 24 volts in the following sequence:

Timing Sequence	Timer On	Areas of Prop Deicer Heated
Pin B	30 sec.	Left Engine prop, outboard halves
Pin A	30 sec.	Left Engine prop, inboard halves
Pin D	30 sec.	Right Engine prop, outboard halves
Pin C	30 sec.	Right Engine prop, inboard halves

The second method of checking the timer is to turn on the system and, following the above sequence, feel the sections on the propeller iceguard to see if they are heating in the proper order.

NOTE

The timer does not reposition itself when the system is shut off; therefore, when the timer is turned on, the cycling will start where it left off on the previous operation.

ELECTRIC PROPELLER DEICING (GOODRICH) (TE-938, TE-943 THRU TE-1181, TH-1 THRU TH-1230, TC-1608 THRU TC-2418, TC-2420 THRU TC-2449)

The electric propeller deicer system includes an electrically heated boot for each propeller blade, brush

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assemblies, slip rings, an ammeter, timer and an on-off switch on the LH instrument subpanel. When the switch is turned on, the ammeter on the LH instrument subpanel registers the amount of current (14 to 18 amperes) passing through the system. If the current rises above the switch limit, an integral circuit breaker will cut off the power to the timer. The current flows from the timer in the RH wing center section to the brush assembly mounted on front of the engine case and is conducted by the brush assembly to the slip rings installed on the spinner backing plate. The slip rings distribute current to the deicer boot on the propeller blades. Heat from the boots reduces the grip of the ice, which is then removed by the centrifugal effect of propeller rotation and the blast of the air stream. Power to the two heating elements on each blade is cycled by the timer to the outboard and inboard heating elements in the following sequence; RH outboard, RH inboard, LH outboard, LH inboard. Since each of these phases is 30 seconds in duration, the timer makes a complete cycle every two minutes. Whenever the timer switches to the next phase of operation,

the ammeter on the LH subpanel will register a momentary deflection.

ELECTRIC PROPELLER DEICER BRUSH REPLACEMENT (GOODRICH) (TE-938, TE-943 THRU TE-1181, TH-1 THRU TH-1230, TC-1608 THRU TC-2418, TC-2420 THRU TC-2449)

- a. Check brush wear by inserting a piece of safety wire into the holes above each brush assembly block. If the wire will insert more than 17/32 inch it is time to replace the brushes. Refer to Figure 11-26.
- b. Disconnect the cannon plug and remove the brush assembly from the bracket. Refer to Figure 11-28.

NOTE

Secure brushes in place before removing the brush assembly to prevent breaking reusable brushes during and after removal. Refer to Figure 11-27.

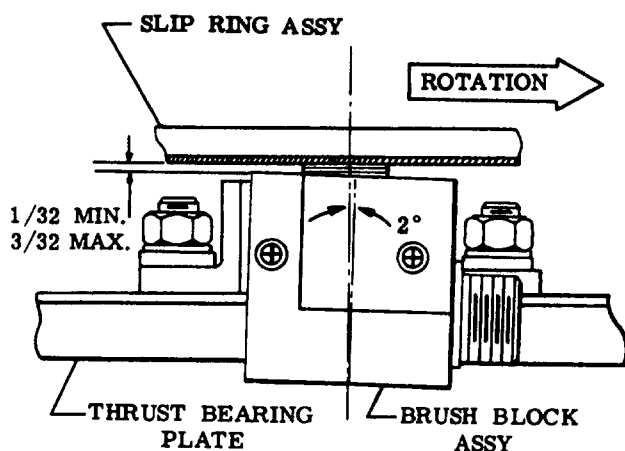


Figure 11-25. Propeller Deicer Brush Block Installation

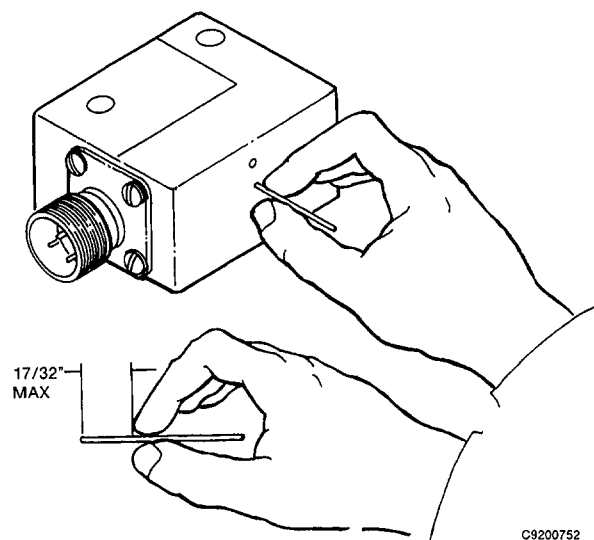


Figure 11-26. Determining Deicer Brush Wear

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c. Remove the screws attaching the cannon plug to the brush holder, then disassemble the brush holder by pulling the guide approximately 1/4 inch toward the cannon plug to disengage the pins. Refer to Figure 11-28.

d. Remove the plug, brushes, and springs from the brush holder, then slide the springs off the brushes.

e. Unsolder the wires for the brushes being replaced, noting which pin on the cannon plug they correspond to.

f. Solder both wires from the new brush to the appropriate pins on the plug, holding the "wicking" to 1/8-inch maximum.

g. Set the springs in the holes of the larger block and insert the brush rods enough to partially compress the springs. Make certain that a side load is not applied to the brushes. This prevents the brush leads from being pinched or damaged. Slip the smaller block over the brushes and onto the larger block.

NOTE

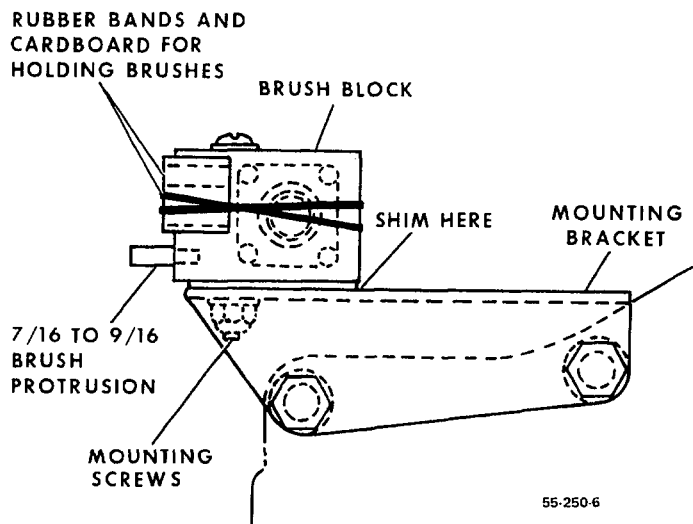
When replacing brushes or brush retainer assemblies, always install new springs.

h. Install the cannon plug on the brush block with the attaching screws and washers. Note that the guide pin of the plug must be toward the brush support block and that the brush wires must not be crossed to assure proper deicer operation.

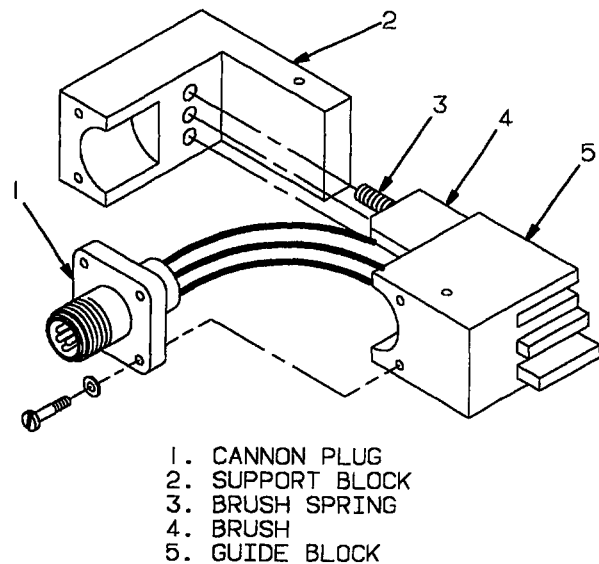
NOTE

Secure brushes in the brush holder to prevent breakage during assembly and installation. Refer to Figure 11-27.

i. Check the amount of brush protrusion from the block. Brushes should protrude from 7/16 to 9/16 inch. If the brushes protrude less than 7/16 inch, the brush leads should be untwisted to lengthen. If this distance is more than 9/16 inch, the leads should be twisted to shorten. Check the brushes for free sliding action. Refer to Figure 11-27.



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Figure 11-27. Deicer Brush Block Assembly

Figure 11-28. Propeller Deicer Brush Assembly

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j. Place the brush block assembly on the mounting bracket and insert the mounting screws through both the block and bracket. Refer to Figure 11-27.

k. Before installing the retainer nuts, make sure that the brushes are aligned with the slip rings such that the entire brush face contacts the copper rings. If the brushes do not align with the slip rings throughout the entire 360 degrees of slip ring rotation, install shims (P/N 1 E 1157) between the brush holder and the mount until the brushes are properly aligned with the approximate center of the copper ring.

l. Install the retaining washers and nuts, making certain that 1/32 to 3/32 inch is maintained between the brush block and slip ring surface. To prevent damage to the brushes, the brush block assembly should be angled in such a manner that the brushes contact the slip ring at an angle of approximately two degrees from perpendicular, as measured toward the direction of slip ring rotation. Refer to Figure 11-25.

m. Connect and safety wire the cannon plug.

n. To preclude arcing caused by the rough surfaces of the new brushes, the engine should be operated for at least five hours before the deicer system is turned on. This does not apply to ground checks of the system performed while the engine is not running.

REPLACEMENT OF BRUSH BLOCK ASSEMBLY WITH MODULAR BRUSH BLOCK ASSEMBLY (GOODRICH) (TE-938, TE-943 THRU TE-1181, TH-1 THRU TH-1230, TC-1608 THRU TC-2418, TC-2420 THRU TC-2449)

Modular brush assemblies were developed to replace brush block assemblies. Each module brush assembly is made up of three modules. Each module consists of a plastic housing with an integral brush and spring. These modular units are stacked with the appropriate spacers to produce the assemblies. Screws are used to hold the modules and spacers together.

To replace brush blocks with modular brush blocks contact an Authorized BEECHCRAFT Parts Outlet and request the BEECHCRAFT Kit applicable to the specific installation.

ELECTRIC PROPELLER DEICER TIMER CHECK (GOODRICH) (TE-938, TE-943 THRU TE-1181, TH-1 THRU TH-1230, TC-1608 THRU TC-2418, TC-2420 THRU TC-2449)

Experience in the field has often indicated that the timer is considered defective when the source of the trouble lies elsewhere. For this reason, the following test should be performed before the timer is removed as defective:

a. With the wiring harness disconnected at the timer and the deicer switch in the ON position, check the voltage from pin B of the harness plug to ground. If no voltage is present, the timer is NOT at fault; however, if system voltage is present at pin B, check the circuit from harness plug pin G to ground with an ohmmeter. If no circuit is indicated, the fault is in the ground lead rather than the timer. If the ground connection is open, the timer step switch will not change position.

b. After the ground and power circuits have been checked, connect a jumper wire between pin B of the timer receptacle and terminal B of the connector plug and from pin G on the timer receptacle to ground. With the deicing system switch ON, check the voltage to ground from pin B of the timer. The voltmeter should indicate approximately 24 volts when the airplane battery supply is being used. Next, check the DC voltage to ground from pins C, D, E, and F, the points at which the system voltage is impressed in sequence to cycle power to the propeller deicers. Each of the plugs should read 24 volts in the following sequence:

Timing Sequence	Timer On	Areas of Prop Deicer Heated
Pin C	30 sec.	Right Engine prop, outboard halves
Pin D	30 sec.	Right Engine prop, inboard halves
Pin E	30 sec.	Left Engine prop, outboard halves
Pin F	30 sec.	Left Engine prop, inboard halves

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NOTE

The timer does not reposition itself to start at pin C when the system is turned off, but will begin its cycling at the same position in which it was when last turned off. Cycling will then proceed in the order of C, D, E, and F as before.

After a voltage reading of 24 volts DC is obtained, hold the voltmeter probe on the pin until the voltage drops to zero before moving the probe on to the next pin in the sequence noted above. After the correctness of the cycling sequence has been established, turn the deicing system switch OFF at the beginning of one of the "on-time" periods and record the letter of the pin at which the voltage supply is present to facilitate performance of the following test.

HEAT TEST (GOODRICH) (TE-938, TE-943 THRU TE-1181, TH-1 THRU TH-1230, TC-1608 THRU TC-2418, TC-2420 THRU TC-2449)

Before this test can be performed, the jumper wire installed for the timer test must be removed so that the connector plug can be replaced in the timer receptacle. Two men are required to perform this test, one in the cockpit to monitor the ammeter while the other checks the deicer boots. The man in the cockpit turns the deicer system switch ON while the man outside feels the deicer boots to see if they are heating properly. The man in the cockpit observes the ammeter for the proper readings (14 to 18 amperes) throughout the timing sequence. The ammeter needle should deflect every 30 seconds in response to the switching action of the timer. Each time this occurs, the man in the cockpit must notify the man inspecting the propeller deicer boot so that the latter can change the position of his hands to check the proper heating sequence of the propeller deicer areas. If any irregularities are detected, a continuity check should be performed on the wiring from the timer to the brush block holders and the propeller deicer terminal connections.

CAUTION

While following the instructions of the "HEAT TEST" section, move the propeller back and forth to prevent arcing between the brushes and slip ring.

WARNING

Before moving the propeller, make certain that the ignition switch is off and that the engine has cooled completely. There is always some danger of a cylinder firing when the propeller is moved.

CONTINUITY TEST (GOODRICH) (TE-938, TE-943 THRU TE-1181, TH-1 THRU TH-1231, TC-1608 THRU TC-2418, TC-2420 THRU TC-2449)

After removing the plug from the timer, use an ohmmeter to check continuity from:

- a. Pin C of the plug to the outboard terminal of one prop boot on the right engine.
- b. Pin D of the plug to the inboard terminal of one prop boot on the right engine.
- c. Pin E of the plug to the outboard terminal of one prop boot on the left engine.
- d. Pin F of the plug to the inboard terminal of one prop boot on the left engine.
- e. Pin G of the plug to ground.
- f. Ground terminal of one prop boot on the right engine to ground.
- g. Ground terminal of one prop boot on the left engine to ground.

ELECTRIC PROPELLER DEICING (GOODRICH) (HOT PROP) (TE-1182 AND AFTER, TH-1231 THRU TH-1396 EXCEPT TH-1389, TC-2419, TC-2450 AND AFTER)

Airplanes with the above serials are equipped with single-element deicer boots. The deice boot incorporates a ribbon element which replaces a wire element. Power to the boot is cycled in 90-second phases instead of 30-second phases. The leads out of the deice boot are reduced from 3 to 2. The slip ring mounts in the same location but also reduces from 3 rings to 2 rings. The brush block mounts on the same bracket, but instead of 3 brushes, there are 2 modular brushes. A smaller timer is used and requires new mounting holes. The wiring harness on the modular brush assembly has 2 wires. Refer to the BEECHCRAFT Parts Catalog for BF Goodrich Kit applicable to the specific installation.

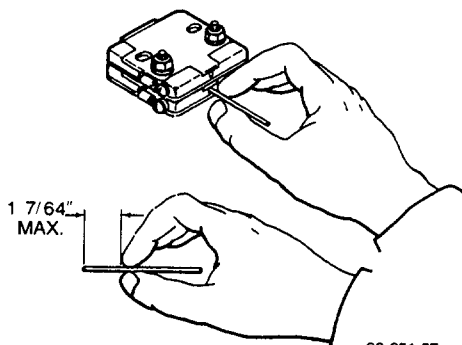
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**ELECTRIC PROPELLER DEICER
MODULAR BRUSH REPLACEMENT
(GOODRICH) (TE-1182 AND AFTER,
TH-1231 THRU TH-1396 EXCEPT
TH-1389, TC-2419, TC-2450 AND AFTER)**

The modular brush assembly is made up of two modules. Each module consists of a plastic housing with an integral brush and spring. The modular units are stacked with a spacer and are held together with screws. When a brush wears out, the entire module must be replaced. A brush module is considered to be worn out when only 3/8 inch of material remains.

CAUTION

When replacing propeller deicer brushes, all attaching hardware must be torqued to no more than 18 inch-pounds in order to avoid damaging the brush modules.



NOTE
During the measurement only 1/16 inch of brush should be allowed to protrude from the brush module.

90-251-27

NOTE

During measurement only 1/16 inch of brush should protrude from the brush module, this being the normal protrusion when the brush is installed on the airplane.

Brush wear is determined by inserting a pin into a hole in the back of the brush module as shown. Refer to Figure 11-29. On all rodless brushes, the brush module must be replaced when the dimension shown is $1\text{--}7/64 \pm 1/32$ inches. Refer to Figure 11-29.

- a. Disconnect the wire harness terminals at the terminal screws of the modular units that make up the brush assembly.
- b. Remove the screws, nuts, and washers securing the modular units to the mounting bracket.
- c. Remove the assembly retaining screws and separate the modules and spacer.
- d. Replace each module with another of the same part number. The part number is etched into the surface of the plastic housing.
- e. Restack the modules and spacer.
- f. Install the assembly screws so that the screw head fits in the recess in the spacer. Place the flat washer between the star washer and modular housing and install the retaining nut. Make sure the assembly is "square" before tightening the assembly screws in place.
- g. Place the modular units on the mounting screws through the modules and bracket. One washer fits under the head of the screw and one under the retaining nut.
- h. Before installing the retainer nuts, make sure that the brushes are aligned with the slip rings such that the entire brush face contacts the copper rings. If the brushes do not align with the slip rings throughout the entire 360 degrees of slip ring rotation, install shims (P/N 1E1157) between the brush module spacer and the mounting bracket until the brushes are properly aligned with the approximate center of the copper ring.
- i. Install the retaining washers and nuts, making certain that 1/32 to 3/32 inch is maintained between the brush modules and the slip ring surface. To prevent damage to the brushes, the brush modules should be angled so that the brushes contact the slip rings at an angle of approximately two degrees from perpendicular, as measured toward the direction of slip ring rotation, as shown. Refer to Figure 11-30.

Figure 11-29. Brush Wear On Modular Brush

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j. Reconnect the terminals of the airplane system wire harness to the same designated terminals of the modular brush assembly.

ELECTRIC PROPELLER DEICER TIMER CHECK (GOODRICH) (TE-1182 AND AFTER, TH-1231 THRU TH-1396 EXCEPT TH-1389, TC-2419, TC-2450 AND AFTER)

Experience in the field has indicated that often the timer is considered inoperable when the source of the trouble is elsewhere. For this reason, the following test should be performed before the timer is judged to be inoperable.

a. With the timer harness plug disconnected and the deicer switch in the ON position, check for voltage from pin B of the plug to ground. If no voltage is present, the timer is not defective; check the power supply. However, if system voltage is present at pin B, check the circuit from the harness to ground with an ohmmeter. If there is no continuity, the fault is in the ground circuit rather than the timer. If the ground circuit is open, the timer will not cycle.

b. After the ground and power circuits have been checked, connect a jumper wire between pin B of the timer receptacle and terminal B of the connector plug, and from pin G on the timer receptacle to ground. With the deicing system switch ON, check the voltage to ground from pin B of the timer. The voltmeter should indicate approximately 24 volts dc when the airplane battery supply is being used. Next, check the voltage to ground from pins D and F, the points at which the system voltage is impressed in sequence to cycle power to the LH and RH propeller deicers. The presence of 24 vdc system voltage should alternate at pins D and F for 90 seconds in duration as the timer cycles.

c. After a voltage reading of 24 volts DC is obtained, hold the voltmeter probe on the pin until the voltage drops to zero before moving the probe on to the next pin in the sequence. Refer to Figure 11-40. After the correctness of the cycling sequence has been established, turn the deicing system switch OFF at the beginning of one of the "on-time" periods and record the letter of the pin at which the voltage supply is present to facilitate performance of the following test.

HEAT TEST (GOODRICH) (TE-1182 AND AFTER, TH-1231 THRU TH-1396 EXCEPT TH-1389, TC-2419, TC-2450 AND AFTER)

a. Remove the jumper wires that were installed for the timer test and reconnect the timer receptacle. Two men are required to perform this test, one man in the cockpit to operate the propeller deice switch and observe the propeller deice ammeter, the other on the ground checking the deice boots for proper heating.

b. While the person in the cockpit observes the ammeter for a reading of 14 to 18 amps, the person on the ground checks for a rise in heat on each propeller deice boot for approximately 90 seconds on each side.

c. If either boot fails to heat, check the circuit between the timer and the propeller deice boot for continuity.

CAUTION

While following the instructions of the "HEAT TEST" section, move the propeller back and forth to prevent arcing between the brushes and slip ring.

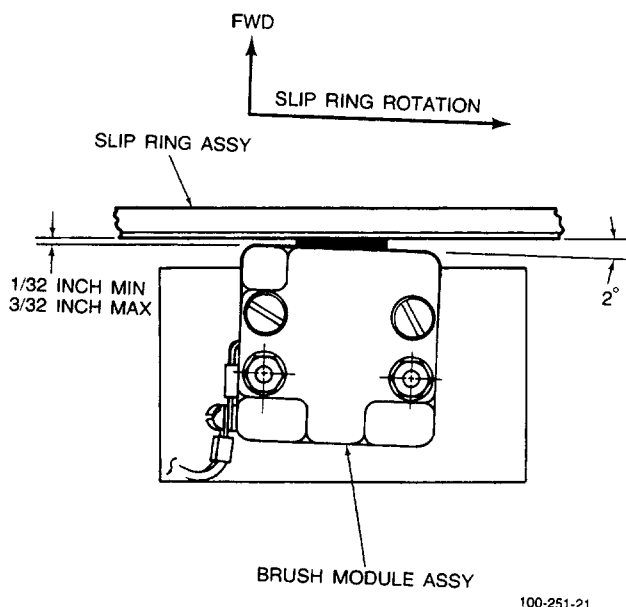


Figure 11-30. Modular Brush Assembly Installation

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WARNING

Before moving the propeller, make certain that the magneto/start switch is off and that the engine has cooled completely. There is always some danger of a cylinder firing when the propeller is moved.

CONTINUITY TEST (GOODRICH) (TE-1182 AND AFTER, TH-1231 THRU TH-1396 EXCEPT TH-1389, TC-2419, TC-2450 AND AFTER)

After removing the plug from the timer, use an ohmmeter to check continuity from:

- a. Pin D of the plug to the terminal of the propeller deice boot on the right engine.
- b. Pin F of the plug to the terminal of the propeller deice boot on the left engine.
- c. Pin G of the plug to ground.
- d. Ground terminal of the propeller boot on the right engine to ground.
- e. Ground terminal of the propeller boot on the left engine to ground.

BRUSH-TO-SLIP RING RESISTANCE TEST (GOODRICH)

- a. To check for incorrect resistance or the presence of a short or open circuit at the brush-to-slip ring contact, disconnect the harness at the timer and check the resistance from each deicer circuit lead (pins C, D, E, and F of the harness plug) to ground with a low range ohmmeter.
- b. If the resultant readings are not 1.55 to 1.78 ohms, disconnect the deicer lead straps to measure heater resistance individually. Individual boot resistance should measure between 4.58 and 5.26 ohms.
- c. If the readings in the first check are not within the accepted limits but those in the second check are, the trouble is probably in the brush-to-slip ring area. If the readings in the second check are also off, the deicer concerned is damaged and must be replaced.

PROPELLER SLIP RING REMOVAL (GOODRICH)

- a. Remove the propeller as described in Section 7, REMOVING THE PROPELLER.

- b. Remove the six slip ring attach bolts and washers.
- c. Remove the slip ring.

PROPELLER SLIP RING INSTALLATION (GOODRICH)

- a. Place the slip ring in place with AN936B416 star washers between the slip ring and the spinner bulkhead.
- b. Torque the six slip ring attach bolts to approximately 25 inch-pounds being careful not to compress the star washers too much, which provides slip ring alignment adjustment.
- c. Install the propeller as described in Section 7, INSTALLING THE PROPELLER.
- d. The slip rings may be properly aligned as described in SLIP RING ALIGNMENT in this section.

BRUSH BLOCK/MODULE RESISTANCE CHECK (GOODRICH)

- a. To check for an open circuit, a short, or high resistance in the brush block or brush module, measure the resistance from the face of the brush to its terminal stud with a low range ohmmeter. The probe contacting the brush should have a minimum contact surface of 1/16 square inch.
- b. If this resistance measures over 0.013 ohms, locate and repair the cause of excessive resistance.
- c. If the resistance is infinite, locate and correct the open circuit or ground, or else replace the brush.
- d. Check the resistance between the terminal studs and/or connector pins. This resistance should not be less than .5 megohms after one minute. Use a tester having a 500-VDC, 1000-megohm capacity.

NOTE

The preceding adjustments may affect the clearance between the brush block/module and slip rings. Consequently, after slip ring alignment, a check should be made to ascertain that a distance from 1/32 to 3/32 inch is maintained between the brush block/module and slip ring surface. Refer to Figure 11-30.

SLIP RING ALIGNMENT (GOODRICH)

The slip rings are properly aligned when they run in a true plane relative to the brush block/module. This condition may be checked by attaching a dial indicator

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gage to the engine in such a manner that a reading of the slip ring runout may be obtained. To avoid error in readings, rotate the slip rings slowly while pushing in on the propeller to take the play out of the thrust bearings. If the total runout over 360 degrees of rotation exceeds 0.005 inch, the slip rings should be aligned as follows:

- a. Approximately a 0.012 inch adjustment may be made to correct the slip ring runout by varying the torque on the attachment bolts. Using the dial indicator to follow the points of maximum deviation, adjust the slip ring assembly to the prescribed runout limits by varying the torque of the mounting bolts as required, within a range of 25 to 65 inch-pounds.
- b. If more than 0.012 inch of adjustment is required for alignment, the slip ring assembly may be shimmed to within the prescribed limits for true running by the addition of AN960C416L washers on the mounting bolts between the slip ring assembly and the spinner bulkhead. If necessary fabricate thinner shims to the AN960 size.

SLIP RING MACHINING (GOODRICH)

Slip rings which have roughened or damaged surfaces, but are structurally sound, can be machined and restored to serviceability.

- a. Remove the slip ring assembly from the airplane and mount it in a lathe. Position it concentrically in the lathe, with not over 0.002 inch of wobble or runout over 360 degrees of rotation.
- b. Take light cuts for a smooth finish and cut no deeper than required to remove surface damage. The contact surfaces of the three slip rings must be parallel within 0.005 inch, and flat within 0.005 inch overall. Deviation from flat is not to exceed 0.002 inch over a 4-inch arc.
- c. If necessary, undercut the insulation between the slip rings to a depth of 0.020 to 0.030 inch below the contact surface of the slip rings. In this operation, the width of the slip ring **MUST NOT** be reduced by more than 0.0005 inch. The contact surfaces of the slip rings must have a finish of 29-35 microinches.
- d. Deburr the slip ring edges and reinstall in the airplane and align.

NOTE

If, the solder or braze connection on the underside of the slip ring is exposed by machining, replacement of the slip ring assembly will be necessary.

PROPELLER DEICER BOOT REMOVAL (GOODRICH)

- a. Remove the propeller spinner.
- b. Disconnect the deicer boot leads from the spinner bulkhead.
- c. Remove the clip securing the lead strap to the spinner bulkhead and the clamp securing it to the propeller hub.
- d. Using methyl ethyl ketone or toluol (19, 20 Consumable Materials Chart, Section 2) to soften the adhesion line between the boot and the blade, loosen one corner of the boot sufficiently to grasp it with vise grip pliers or a similar tool.

CAUTION

Unless the boot being removed is to be scrapped, cushion the jaws of any pulling tool to prevent damaging the boot surface.

- e. Apply a slow, steady pull on the boot to pull it off the propeller surface while continuing to use the solvent to soften the adhesive.
- f. Remove the remaining adhesive from the boot and propeller blade with toluol or methyl ethyl ketone.

PROPELLER DEICER BOOT INSTALLATION (GOODRICH)

- a. Position the deicer boot on the propeller blade so that its centerline at the inboard end is adjacent to the split in the propeller blade clamp and 1 inch outboard of the clamp, and the centerline at the outboard end falls on the blade leading edge. Be sure the lead strap is in the proper position to be clamped to the blade retaining clamp.
- b. Mask off an area approximately 1/2 inch from the end of each side of the boot. Refer to Figure 11-31.
- c. Remove the deicer boot and strip any paint in the masked area from the retaining clamp outboard. Clean the area thoroughly with methyl ethyl ketone or toluol (Item 19 or 20, Consumable Materials Chart). For final cleaning, wipe the solvent off quickly with a clean, dry, lint-free cloth to avoid leaving a film.

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CAUTION

The metal and rubber parts must be thoroughly clean to assure maximum adhesion.

d. Moisten a clean cloth with methyl ethyl ketone or toluol and clean the unglazed surface of the deicer boot, changing the cloth frequently to avoid contamination of the clean area.

e. Thoroughly mix EC1403 cement (Item 60, Consumable Materials Chart, Section 2) and apply one even brush coat to the propeller blade. Allow the cement to dry for at least one hour at 40°F or above when the relative humidity is less than 75% or two hours if the humidity is between 75% and 90%. Do not apply the cement if the relative humidity is higher than 90%.

f. After allowing sufficient drying time, apply a second brush coat of cement to the propeller and one coat of cement to the unglazed surface of the deicer boot. It is not necessary to cement more than 1/2 inch of the deicer lead strap. Allow the cement to dry.

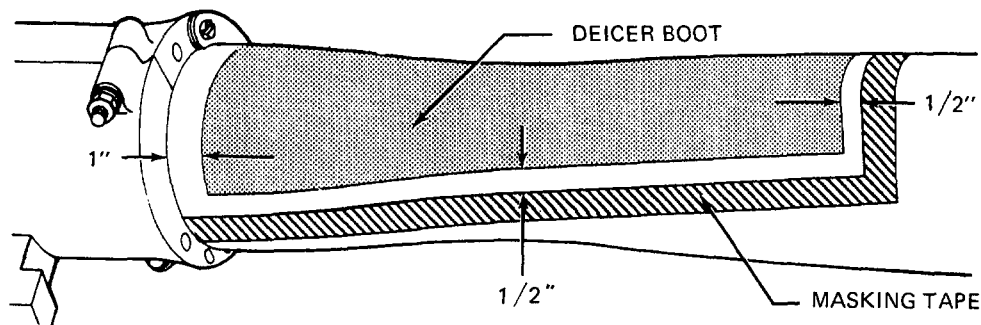
g. Position the deicer boot on the propeller, starting 1 inch from the blade retaining clamp, making sure the lead strap is in position to clamp to the blade retaining clamp. Moisten the cement lightly with methyl ethyl ketone or toluol and tack the boot center line to the blade leading edge. If the centerline of the boot deviates from the blade leading edge, pull up with a quick motion and replace properly. Roll firmly along the centerline with a rubber roller. Refer to Figure 11-32.

CAUTION

Never use a metal or wooden roller for this purpose, for they would damage the heating elements in the deicer boot.

h. Gradually tilting the roller, work the boot carefully over each side of the blade contour. Avoid trapping air pockets under the boot. Refer to Figure 11-33.

i. Roll outwardly from the centerline to the edges of the boot. Refer to Figure 11-31. If excess material at the edges tends to form puckers, work them out smoothly and carefully with the fingers.



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Figure 11-31. Deicer Boot Installation

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j. Roll the tapered edges of the boot with a narrow steel stitcher roller.

k. Clean the blade with a clean cloth moistened with toluol or methyl ethyl ketone. Be careful not to let solvent run into the edge of the boot.

l. Apply one even brush coat of A56B cement (Item 65, Consumable Materials Chart, Section 2) around the edges of the boot, allowing 1/16 to 1/8 inch of overlap of the boot but extending to the masking tape. Remove the masking tape after applying the cement to obtain a neat border.

m. Install the clamp securing the lead strap to the propeller blade retaining clamps.

n. Connect the lead terminals and install the clip on the spinner bulkhead. There must be no slack between the terminal and the clip to assure enough slack between the clip and the clamp on the blade to allow full propeller travel.

**ELECTRIC PROPELLER DEICING
(MCCAULEY) (HOT PROP) (TH-1389,
TH-1397 AND AFTER)**

**PROPELLER DEICE BOOT REMOVAL
(MCCAULEY)**

- a. Remove the propeller spinner
- b. Disconnect the deicer boot leads from the mounting bracket.

CAUTION

Place the blade so the solvent will run away from the hub. If the solvent enters the propeller seals they may be damaged.

- c. Using methyl ethyl ketone or toluol (Item 19 or 20 Consumable Materials Chart, Section 2) to soften the

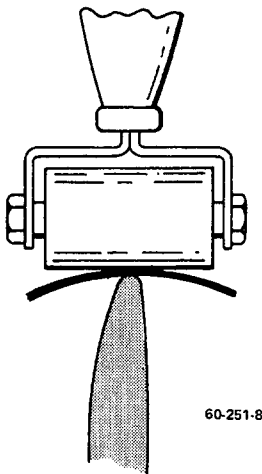


Figure 11-32. Center Rolling

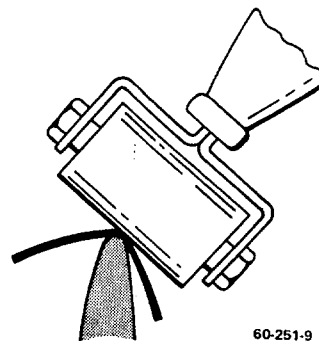


Figure 11-33. Side Rolling

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adhesion line between the boot and the blade, loosen one corner of the boot sufficiently to grasp it with vise grip pliers or similar tool.

CAUTION

Unless the boot being removed is to be scrapped, cushion the jaws of the pulling tool to prevent damaging the boots.

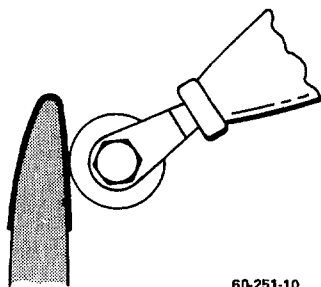
d. Slowly and steadily pull the boot to remove it from the propeller surface while continuing to use the solvent to soften the adhesive.

e. Remove the remaining adhesive from the boot and the propeller blade with methyl ethyl ketone or toluol (19 or 20, Consumable materials chart, Section 2).

PROPELLER DEICER BOOT INSTALLATION (MCCAULEY)

(Figures 11-30, 11-31, 11-32 and 11-33)

a. Place the deice boot on the propeller so that its centerline is on the leading edge of the propeller and .250-inch outboard of the propeller shoulder;



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Figure 11-34. Edge Rolling

b. Mask off an area 1/2 inch from the outer end and each side of the boot. Refer to Figure 11-35.

c. Remove the deicer boot and clean the blade in the masked area from the shoulder outboard.

CAUTION

If the blade is painted with lacquer, remove all paint in the masked off area. If the blade is painted with polyurethane lightly sand within the masked off area using 400-grit sand paper.

Clean the area thoroughly with methyl ethyl ketone or toluol (19 or 20, Consumable Materials Chart, Section 2). For the final cleaning wipe the solvent off quickly with a clean, dry, lint-free cloth to avoid leaving a film.

CAUTION

The metal and rubber parts must be thoroughly clean to assure maximum adhesion.

d. Moisten a clean cloth with methyl ethyl ketone or toluol (19 or 20, Consumable Materials Chart, Section 2) and clean the unglazed surface of the deicer boot, changing the cloth frequently to avoid contamination of the clean area.

e. Thoroughly mix the EC-1403 or 1300L cement (60, Consumable Materials Chart, Section 2) and apply one even brush coat to the propeller blade and to the unglazed side of the deicer boot. Allow the cement to dry for at least one hour at 50°F or above when the relative humidity is less than 75% or two hours if the humidity is between 75% and 90%. Do not apply the cement if the humidity is higher than 90% or the temperature is below 50°F.

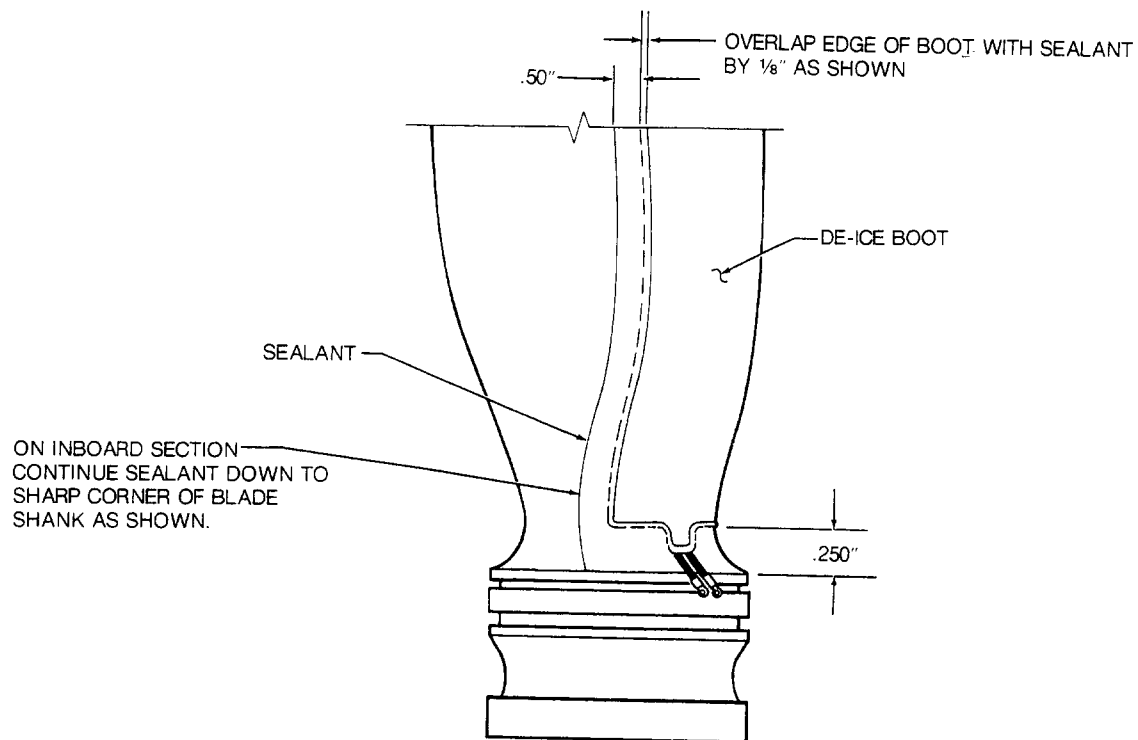
f. After allowing sufficient time for drying, apply a second coat of cement to the propeller and the deicer boot.

g. Allow the cement to become tacky then apply the boot to the propeller.

NOTE

Methyl ethyl ketone or toluol may be used to tackify the cement. Methyl ethyl ketone will provide approximately 10 seconds of working time while toluol will provide approximately 40 seconds of working time.

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Figure 11-35. Boot Location

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h. Position the boot on the propeller, starting at the inboard end and making sure the leads are in proper position. Moisten the cement lightly with methyl ethyl ketone or toluol (19 or 20 Consumable Materials Chart, Section 2) and tack the boot centerline to the blade leading edge. If the centerline of the boot deviates from the blade leading edge, pull up with a quick motion and replace properly. Roll firmly along the centerline with a rubber roller. Refer to Figure 11-30.

CAUTION

Never use a metal or wooden roller for this purpose, for they will damage the heating element in the deicer boot.

i. Gradually tilting the roller, work the boot carefully over each side of the blade contour. Avoid trapping air pockets under the boot. Refer to Figure 11-32.

j. Roll outwardly from the centerline to the edges of the boot. Refer to Figure 11-32. If excess material at the edges tends to form puckers, work them out smoothly and carefully with the fingers.

k. Roll the tapered edges of the boot with a narrow steel stitcher roller.

l. Clean the blade with a clean cloth moistened with methyl ethyl ketone or toluol (19 or 20, Consumable Materials Chart, Section 2). Be careful not to let the solvent run into the edge of the boot.

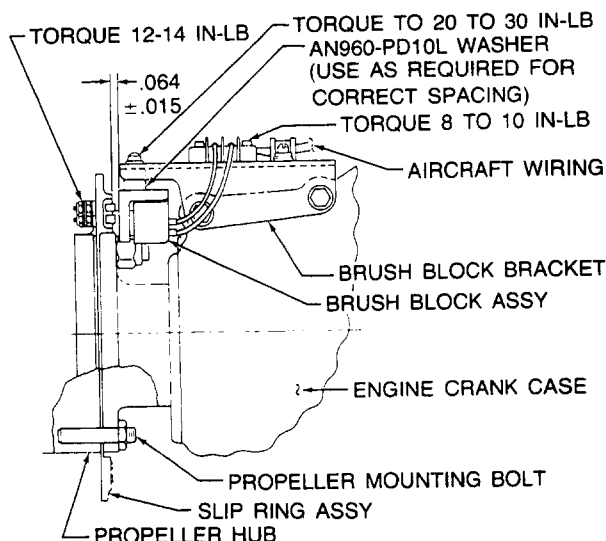
m. Apply one even brush coat of Sunbrite 78-U-1003 enamel and U-1001-C catalyst (sealer) (61, Consumable Materials Chart, Section 2) around the edges of the boot, allowing 1/16 to 1/8 inch of overlap on the boot but extending to the masking tape.

n. Install the clamp securing the lead strap to the propeller blade retaining clamps.

o. Connect the lead terminals and install the clip on the spinner bulkhead. There must be no slack between the terminals and the clip to assure enough slack between the clip and the clamp on the blade to allow full propeller travel.

CAUTION

After deicer boot installation allow at least 12 hours for the EC-1403 or 1300L cement to dry before starting the engine, and 12 hours more before energizing the deicers.



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Figure 11-36. Propeller Brush Block Module

ELECTRIC PROPELLER DEICER TIMER CHECK (MCCAULEY)

Experience in the field has indicated that often the timer is considered malfunctioning when the source of the trouble lies elsewhere. For this reason, the following test should be performed before the timer is removed as defective.

a. With the wiring harness disconnected at the timer and the deicer switch in the ON position, check the voltage from pin B of the harness plug to ground. If no voltage is present, the timer is NOT at fault; however, if system voltage is present at pin B, check the circuit from harness plug pin G to ground with an ohmmeter. If no circuit is indicated, the fault is in the ground lead rather than the timer. If the ground connection is open, the timer step switch will not change positions.

b. After the power and ground circuits have been checked, connect a jumper wire between pin B of the timer receptacle and terminal B of the connector plug and from pin G of the timer receptacle to ground. With the deicing system switch ON, Check the voltage to

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ground from pin B of the timer. The voltmeter should indicate approximately 24 volts when the airplane battery supply is being used. Next, check the DC voltage to ground from pins D, and F, the points at which the system voltage is impressed in sequence to cycle power to the deicers. The plugs should read 24 volts for 90 seconds each, then repeat.

Timing Sequence	Time ON	Prop Deicer Heated
Pin D	90 sec.	Right Engine Prop
Pin F	90 Sec.	Left Engine Prop

NOTE

The timer does not reposition itself, but will begin its cycling at the same position in which it was last turned off.

If the engines are not operating the voltage may become low enough to cause improper cycling of the timer. Do not allow the voltage to drop below 22 volts.

After a voltage reading of 24 volts DC is obtained, hold the voltmeter probe on the pin until the voltage drops to zero before moving the probe on to the next pin in sequence noted earlier. After the correctness of the cycling sequence has been established, turn the deicing system switch OFF at the beginning of one of the "on-time" periods and record the letter of the pin at which the voltage supply is present to facilitate performance of the following test.

HEAT TEST (MCCAULEY)

Before this test can be performed, the jumper wire install for the timer test must be removed so that the connector plug can be replaced in the timer receptacle. Two men are required to perform this test, one in the cockpit to monitor the ammeter while the other checks the deicer boots. The man in the cockpit turns the deicer switch ON while the man outside feels the boots to see if they are heating properly. The man in the cabin observes the ammeter for the proper reading (14 to 18 amperes) throughout the timing sequence. The ammeter needle should deflect every 90 seconds in response to the switching action of the timer. Each time this occurs, the man in the cockpit must notify the man inspecting the propeller deicer boots so that the latter can change the position of his

hands to check for the proper heating sequence of the propeller deicer. If any irregularities are detected, a continuity check should be performed on the wiring from the timer to the brush block holder and the propeller deicer terminal connection.

CAUTION

While following the instructions of the "HEAT TEST" section, move the propeller back and forth to prevent arcing between the brushes and slip ring.

WARNING

Before moving the propeller, make certain that the ignition switch is off and that the engine has cooled completely. There is always some danger of a cylinder firing when the propeller is moved.

BRUSH WEAR LIMITS (MCCAULEY) (Figures 11-37)

The brushes may be checked for wear by one of the following methods.

ON THE AIRPLANE

- Insert a thin, stiff feeler gage into the slot on the side of the brush block.
- If the gage goes past the back of the brushes the brushes need replaced.

REMOVED FROM THE AIRPLANE.

- Insert a thin, stiff feeler gage into the slot on the side of the brush block past the back of the brushes.
- Gently push the brushes into the brush block.
- If any brush has .094 inch of brush or less remaining outside the brush block, that brush assembly needs to be replaced.

BRUSH REPLACEMENT (MCCAULEY) (Figure 11-37)

- Remove the brush block from the engine as indicated in BRUSH BLOCK REMOVAL.

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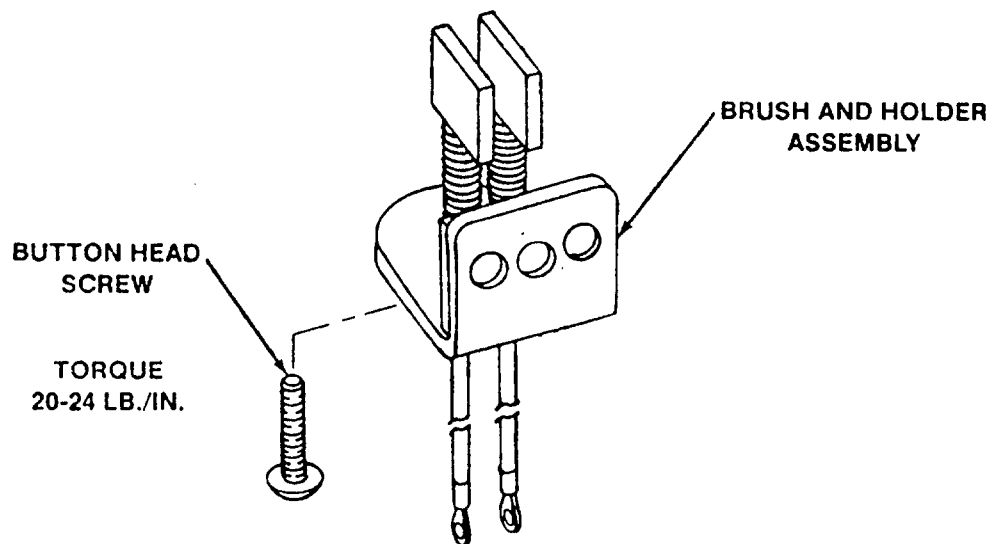
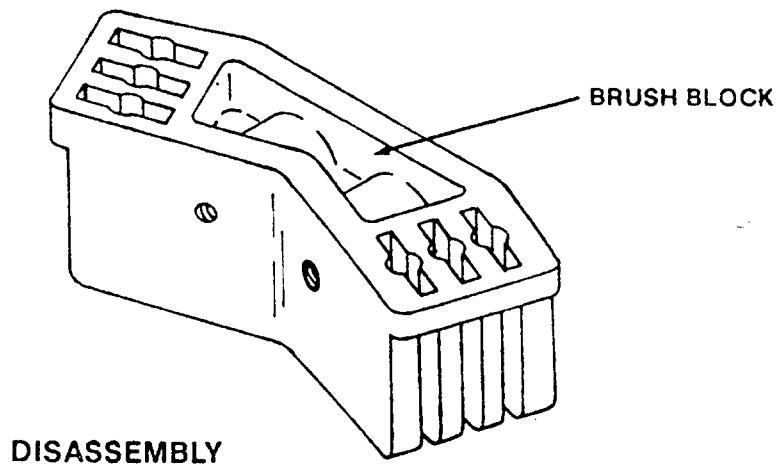
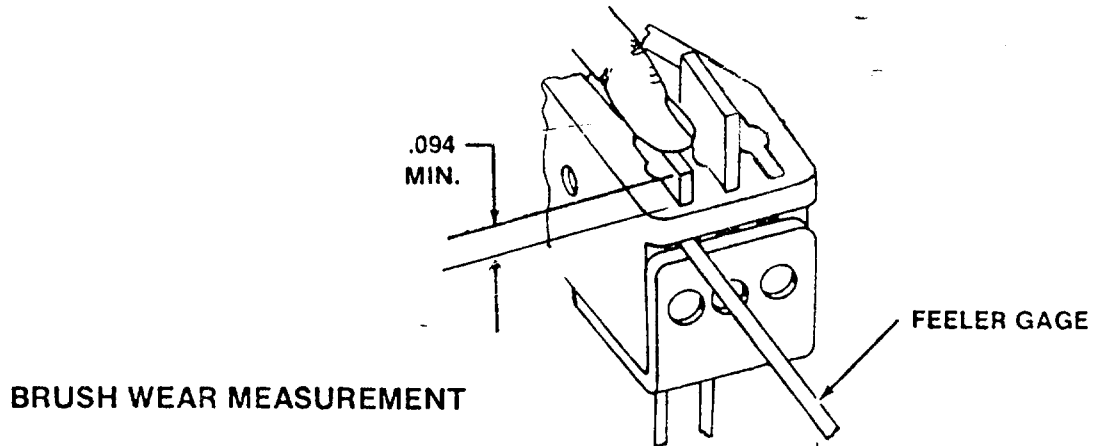


Figure 11-37. Brush Block Assembly

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NOTE

Friction from the brushes will cause a concave wear pattern on the slip rings. This does not necessitate replacement or machining unless rapid brush wear is encountered. When a new brush assembly is installed on the slip rings with normal wear, the brushes will rapidly seat without degradation of operation or service life.

- b. Remove the two screws in the back of the brush block.
- c. Pull the brush holder and brushes from the brush block. Discard the brush holder and brushes.
- d. Replace the brushes and brush holder by first sliding the brushes into the slots of the brush block, then sliding the brush holder into place.
- e. Install the two screws which hold the brushes in place. Torque the screws to 20 to 24 inch-pounds.
- f. Push the brushes back into the brush block to ensure that they spring back freely.
- g. If the brushes bind, loosen the screws and reposition the brush holder so that the brushes ride freely in the slots. Torque the screws to 20 to 24 inch-pounds.
- h. Install the brush block as indicated in BRUSH BLOCK INSTALLATION.

BRUSH BLOCK REMOVAL (MCCAULEY)

- a. Disconnect the lead wires from the terminal strip.
- b. Disconnect the brush block mounting screws and remove the brush block from the engine.

**BRUSH BLOCK INSTALLATION
(MCCAULEY)**
(Figure 11-36)

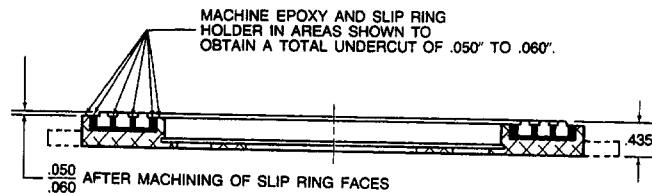
- a. Install the brush block on the engine with the two screws but do not tighten the screws.
- b. Add or remove shims to the mounting washers of the brush block until each entire brush is in contact with its slip ring throughout 360° of rotation. Refer to Figure 11-36.
- c. Position the brush block on the mounting bracket so that the distance between the brush block and the face of the slip ring is $.064 \pm .015$ inch.
- d. Tighten the screws.

SLIP RING (MCCAULEY)

The mounting bolts cannot be retorqued nor can shims be added to correct wobble or nonconcentric rotation on these slip rings. Wear or slight wobble may be removed by machining.

SLIP RING ALIGNMENT (MCCAULEY)

If a chattering or screeching noise is heard coming from the brush/slip ring area, the probable cause is improper brush block-to-slip ring alignment. A screeching or chattering detected while turning the propeller by hand (in the normal direction of rotation) should be corrected immediately. If the chattering or screeching is heard above the idling engine noise, the problem is severe. Repositioning the brush block as indicated should correct the problem. Refer to Figure 11-36. If slip ring wobble is the problem, attach a dial indicator to the front of the engine and check the slip



CAUTION
WHEN UNDERCUTTING INSULATION BETWEEN RINGS, DO NOT CUT INSIDE AND OUTSIDE DIAMETERS OF SLIP RINGS MORE THAN .003" PAST THE ORIGINAL UNDERCUT DIAMETERS.

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Figure 11-38. Slip Ring Machining (McCauley)

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rings. If the run-out over 160° of rotation is .008 inch or greater, the slip rings need machining or replacement.

**SLIP RING OR BRUSH BLOCK CLEANING
(MCCAULEY)**

The slip rings and brush block may be cleaned with a clean cloth dampened with methyl ethyl ketone (19, Consumable Materials Chart, Section 2)

SLIP RING MACHINING (MCCAULEY)

Structurally sound slip rings with damaged surfaces may be machined to restore them to serviceability.

- a. Clean the slip ring assembly with methyl ethyl ketone (19, Consumable Materials Chart, Section 2) before machining.
- b. Check the assembly mounting surface flatness. It must be flat within .005 inch overall.
- c. Locate the assembly concentrically in a lathe so that there is no more than .002 inch of wobble or run-out over 360° of rotation. The assembly should be fixed in the lathe in the same manner as it was attached to the propeller assembly. This will ensure that the run-out held while machining the assembly will be transferred when it is mounted on the propeller.
- d. Take a light cut for a smooth finish (25 to 20 micro inches).

NOTE

The spindle speed should be 500 rpm or greater. If machining vibration is noticed, it must be corrected. Machine vibration which is not corrected will result in a chattered finish. The feed rate is to be .002 inch or less with a final pass of .005 inch to .010 inch.

- e. Ensure that the face surface of the slip rings are parallel and flat within .008 overall.
- f. The slip ring holder face and the insulation around and between the slip rings must be undercut to .050 inch to .060 inch.

CAUTION

When undercutting the insulation between the slip rings, do not cut the inside diameter or the outside diameter of the slip rings by more than .003 inch past the original diameter.

- g. Deburr the slip ring edges.

- h. Polish the ring faces with crocus cloth to obtain a finish of 16 to 22 microinches.

- i. Check the electrical resistance between each ring and the holder, and between each ring. The resistance should be a minimum of 50K ohms.

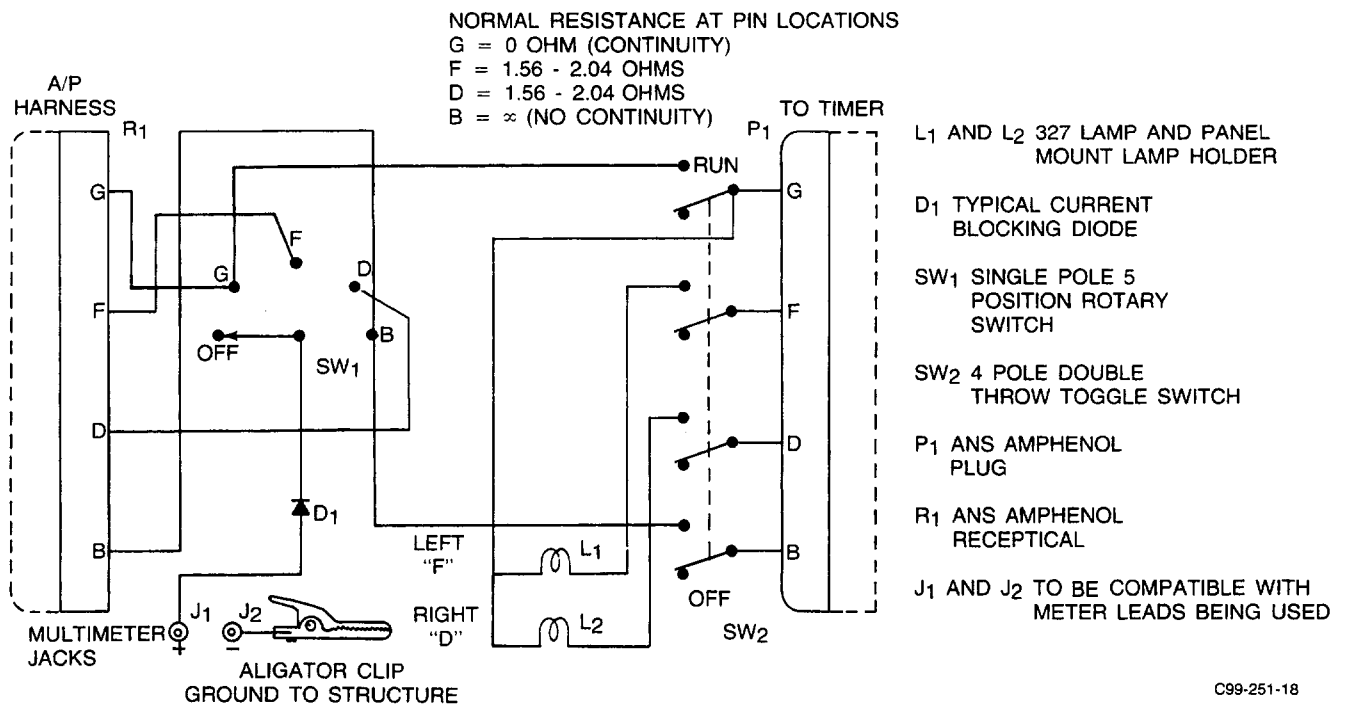
**TROUBLESHOOTING PROPELLER
ELECTRICAL DEICER SYSTEM
(GOODRICH AND MCCAULEY)**

The ammeter of the deicer system can be used to indicate the general nature of most electrical problems. Consequently, it is recommended that, to determine which circuits are involved, troubleshooting be preceded by the ammeter test outlined in the deicer 100-hour inspection (Section 16). A reading of two-thirds the normal amount of current (or one-half on two-blade props) is an indication that one of the circuits is open between the slip ring assembly and the deicer heater. If the ammeter registers excess current, the power lead is shorted to ground. It is possible that the excess current has welded the timer contacts in one phase. Under these circumstances, the timer will either feed current to the welded contacts continuously or not cycle. If the former is true, the heat test will show two phases heating simultaneously.

Unless the grounded power lead is located and corrected, any new timer that is installed may suffer the same internal damage during the first use of the system. In general, for most effective use of the troubleshooting chart, all of the "indication" entries should be read to locate that which matches conditions of the particular system being checked. The numbered "probable cause" and "remarks" then indicate the proper sequence of checks. It should be noted, however, that such numbers are assigned with respect to the approximate usefulness of the check rather than to the most likely sequence of occurrence.

The test unit was designed to be used in conjunction with these troubleshooting procedures and can be built with standard parts normally found in the shop. Refer to Figure 11-39. The test unit makes it possible to positively check the timer in the airplane during system operation.

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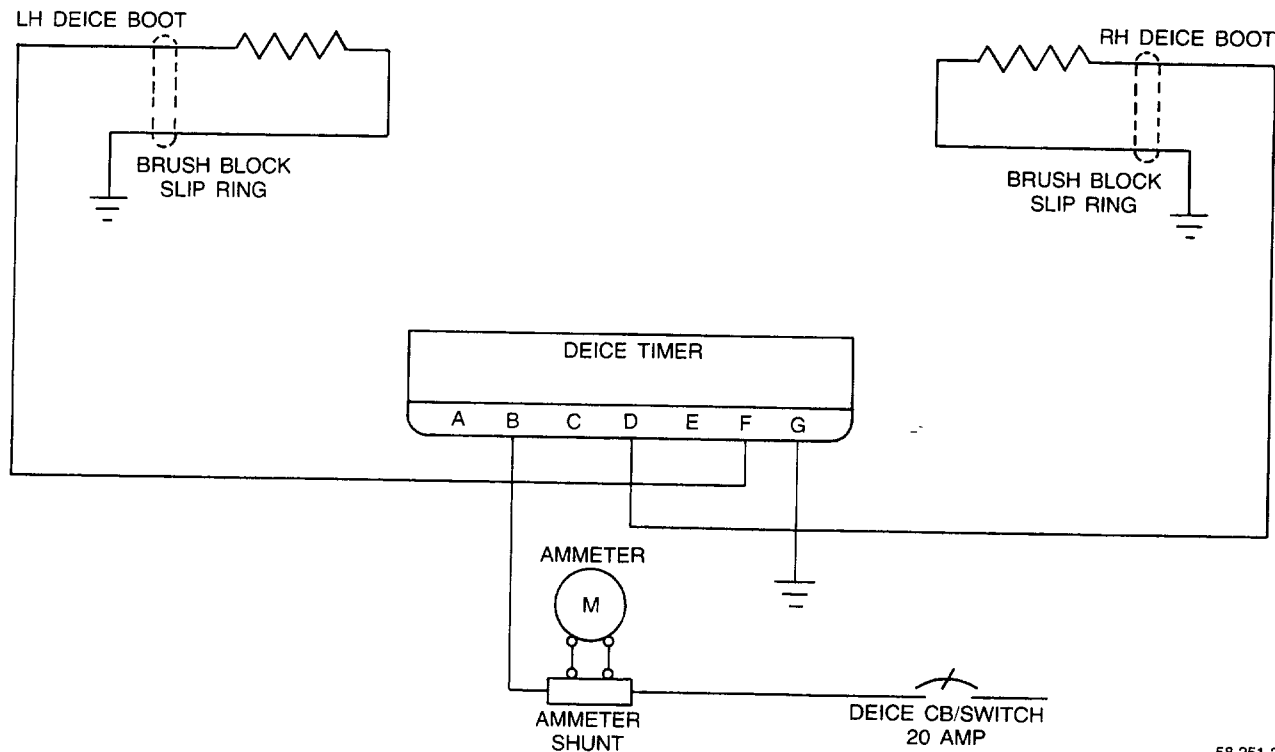
Figure 11-39. Electrothermal Propeller (Hot Prop) Deice Test Unit

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The troubleshooting chart which follows, allows for an orderly flow of checks in a sequence consistent with the most convenient order of activity for the technician. The electrothermal propeller deice control schematic should be used for reference during system troubleshooting. Refer to Figure 11-40.

CAUTION

The propeller deice system must not be ground operated for extended periods of time, as damage to the deice boots and pitting of the slip rings may occur.



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Figure 11-40. Propeller (Hot Prop) Deice Control Schematic

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CHART 6

TROUBLESHOOTING THE PROPELLER DEICER SYSTEM

Indication	Probable Cause	Remarks
1. Ammeter shows zero current. (All four phases of the two-minute cycle.) (on McCauley installation both phases of a 3-minute cycle)	a. Switch circuit breaker tripped.	a. Locate and correct the short before restoring circuit breaker by turning switch OFF, then ON.
	b. Switch Faulty.	b. If no voltage at switch output with voltage at switch input, replace the switch. If voltage is ok at switch output, go to step d.
	c. No power from airplane.	c. If no voltage into switch, locate and correct open circuit.
	d. Ammeter faulty. (If some or all deicers heat with ammeter at zero, replace ammeter.)	d. Test for voltage up to and out of ammeter. If low or zero output but proper input, replace ammeter. If no voltage to ammeter, locate and fix open between switch and ammeter.
	e. Open circuit ammeter and timer.	e. Disconnect harness at timer and check voltage pin B (of harness) to ground. If none locate and correct open circuit.
2. Ammeter shows normal current part of cycle, zero current rest of cycle.	a. Open in wiring between timer and firewall connector.	a. Refer to paragraph on heat test to find deicers not heating and test for voltage on that pin of firewall connector. If zero over 2 minutes (3 minutes on McCauley), Locate and fix open in wiring from timer to firewall.
	b. Open between firewall and deicer lead strap.	b. If voltage ok to firewall plug, try voltage at junction of deicer lead and slip ring lead. If no voltage, find and correct open in wiring to brush block, open within brush block, or brush with no contact to slip ring.
	c. No ground circuit.	c. If voltage at deicer leads, locate and fix open from deicer to ground.
3. Ammeter shows normal current part of cycle, low current rest of cycle.	a. Inner and outer deicers heating same phase (B. F. Goodrich only).	a. Locate and repair incorrect connections.
	b. Open in deicer or slip ring.	b. Disconnect deicer straps to check heater resistance. If resistance is within specified limits, locate and fix open in slip ring leads. If not, replace deicer with open circuit.
	c. High resistance in circuit with low current.	c. If no brush-to-slip-ring contact (including ground brush), trace wiring to deicer and to timer to fix partial or broken wire, loose or corroded connections.

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CHART 6

TROUBLESHOOTING THE PROPELLER DEICER SYSTEM *(Continued)*

Indication	Probable Cause	Remarks
4. Ammeter shows low current over entire cycle.	a. Airplane voltage low.	a. Check voltage into switch.
	b. Ammeter faulty.	b. Refer to step 1d.
	c. High resistance up to timer.	c. Check for partial broken wire, loose or corroded connection in wiring from airplane supply to timer input.
5. Ammeter shows excess current over entire cycle.	a. Ammeter faulty.	a. Refer to step 1d.
	b. Ground between ammeter and timer.	b. Disconnect harness at timer and check from pin B (of harness) to ground with an ammeter. If ground is indicated, locate and correct
6. Ammeter shows normal current part of cycle, excess current rest of cycle.	a. Ground between brush block and timer.	a. Disconnect leads at brush block and check from power leads to ground with ohmmeter. If ground is indicated, locate and correct.
	b. Ground between brush block and deicers (excluding ground brush circuit).	b. If no short exists at brush slip ring contact, check for ground from slip ring lead to bare prop while flexing slip ring and deicer leads. If a ground is indicated, locate and correct.
	c. Short between two adjacent circuits.	c. Check for shorts or low resistance between circuits; if any, locate and correct.
	d. Timer faulty.	d. Test timer as indicated in paragraph on timer check.
7. Ammeter does not "flick" each 30 seconds (90 seconds on McCauley installations)	a. Timer ground open.	a. Disconnect harness at timer and check with ohmmeter from pin G (of harness) to ground. If no circuit, refer to wiring diagram in Section 14 to fix open circuit.
	b. Timer contacts are welded (caused by short circuit in system).	b. Test timer as in paragraph on timer check. If timer does not cycle with voltage at pin B, replace timer but be sure short causing original failure has been located and corrected.
8. Ammeter "flicks" between 30 seconds phase periods (90 seconds on McCauley installations).	a. Loose connection between airplane power supply and timer input.	a. If trouble occurs over entire cycle, trace wiring from power source to timer input to locate and tighten loose connections.

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CHART 6 TROUBLESHOOTING THE PROPELLER DEICER SYSTEM (Continued)

Indication	Probable Cause	Remarks
9. Radio noise or interference with deicers on.	b. Loose or poor connection timer to deicer.	b. If trouble occurs in part of cycle, find which deicers are affected and check for rough or dirty slip rings causing brush to "skip". If not this, trace circuit to locate and fix loose or poor connections. (If all deicers on one prop are affected, check the ground circuit.)
	c. Timer cycles erratically.	c. Test timer as indicated in paragraph on timer check.
	d. Electrical wiring breakdown.	d. Replace the faulty deicer boot.
	a. Brushes "arcing".	a. Check brush alignment as in step g of ELECTRIC PROPELLER DEICER SYSTEM 100-hour inspection (Section 16). Look for rough or dirty slip rings. If this is the cause, clean, machine or replace the slip ring assembly. Check for slip ring alignment.
10. Cycling sequence not correct.	b. Loose connection.	b. Refer to step h of 100-hour inspection (Section 16).
	c. Switch faulty.	c. Try jumper wire across switch. If radio noise disappears, replace switch.
	d. Wiring located within less than 8 inches of radio equipment wiring.	d. Replace at least 8 inches from input wiring to radio equipment.
	a. Crossed connections.	a. Check system wiring against circuit diagram for improper connections.
11. Rapid brush wear or frequent breakage.	a. Brush block out of alignment.	a. Check brush alignment as in step "i" of 100-hour inspection (Section 16).
		b. Check slip ring alignment with dial indicator.
	c. Rough slip ring surface.	c. Replace or machine.
	d. Dirty slip rings.	d. Clean the slip rings.
	e. Brushes arcing.	e. See 8a.

PITOT AND STATIC SYSTEMS (Figures 11-41 and 11-42)

The pitot and static pressure system provides for a source of ram (impact) air and static air for instrument operation. Ram air enters the pitot mast and is routed to the airspeed indicator. The pitot mast is located on the underneath side of the LH wing leading edge just outboard of the nacelle on Barons, serials TC-1 thru TC-1607 and TE-1 thru TE-942, except TE-938. The pitot mast is located on the LH side of the nose section on Barons, serials TC-1608 and after, TE-938,

TE-943 and after and TH-1 and after. On optional dual pitot installations, the second pitot mast is located in the opposite position on the RH side of the airplane. A heating element is incorporated in the pitot mast to prevent the mast from being obstructed by ice. Static air is taken from a static air port located on each side of the aft fuselage. The static air is routed along the left side of the fuselage to the rate-of-climb indicator, altimeter and airspeed indicator. Should the normal static air system become inoperative, an emergency static air source control, located on the upholstery

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panel forward of the pilots seat, may be opened to provide a source of emergency static air.

TESTING THE PITOT SYSTEM FOR LEAKS

A functional test of the pitot system can be made by using an observer in the cabin to watch the airspeed indicator while air pressure is built up artificially by using a section of soft rubber tubing as follows:

- a. Clamp the rubber tubing over the pitot head inlet, making certain that the connection is air tight.
- b. Crimp the end of the tubing and slowly roll it up until the airspeed indicator registers approximately 100 miles per hour.

CAUTION

To avoid rupturing the diaphragm of the airspeed indicator, roll up the rubber tubing slowly and do not build up excessive pressure in the line.

- c. Secure the rolled up tubing so that it will hold the airspeed indicator reading.
- d. If there is no decline in the reading after several minutes, there is no leak in the pitot system.
- e. If a decline in the reading of the airspeed indicator is observed, check the pitot system plumbing for leaky hoses and loose connections.

CAUTION

Release the air pressure slowly by unrolling the rubber tubing; a sudden release of the air pressure may damage the airspeed indicator.

INSPECTING THE PITOT SYSTEM HOSE

After the pitot system is checked for leaks, inspect the hose sections for signs of deterioration. Check all polyethylene tubing for hardness or brittleness. Rubber hoses on which outer surfaces have checked or cracked, particularly at the bends or connecting points, or which have become hard, should be replaced. Replace the defective hose with Poly-flo tubing. When the new tubing is installed, recheck the pitot system for leaks using the preceding procedure.

CLEANING THE STATIC AIR SYSTEM (Figure 11-41)-

NOTE

On airplane serials TC-1403 and after, TE-847 and after and TH-1 and after, the aluminum static lines are replaced with Poly-flo tubing.

Blow low pressure air through the lines from the disconnected line at the airspeed indicator to the static ports. Cover each static port separately when blowing to insure that each line is clear. Instrument error or possible damage could result if even one port is clogged with dirt or foreign matter.

CAUTION

Never blow air through the line toward the instrument panel; to do so will seriously damage the instruments. When blowing back through the line from the instrument panel, make sure that no air is blown into the instruments.

NOTE

Wax or polish applied to the static air buttons can cause wrong instrument readings. The static air buttons should be cleaned periodically with a cleaning solvent to insure that no film exists on the static air buttons.

To drain the static air line on serials TC-1 thru TC-954, remove one end of the hose which forms the static air line drain on the left side panel near the aft bulkhead and permit the system to drain. On serials TC-955 and after, TE-1 and after and TH-1 and after, the static air line is drained at the emergency static air source by turning the knob to the emergency static air source position. Return the knob to normal position after the line is completely drained.

Frequent drainage of the static air line is recommended when humidity is high or when heavy dew is experienced. The line should also be drained each time the airplane is flown through heavy rain or washed down.

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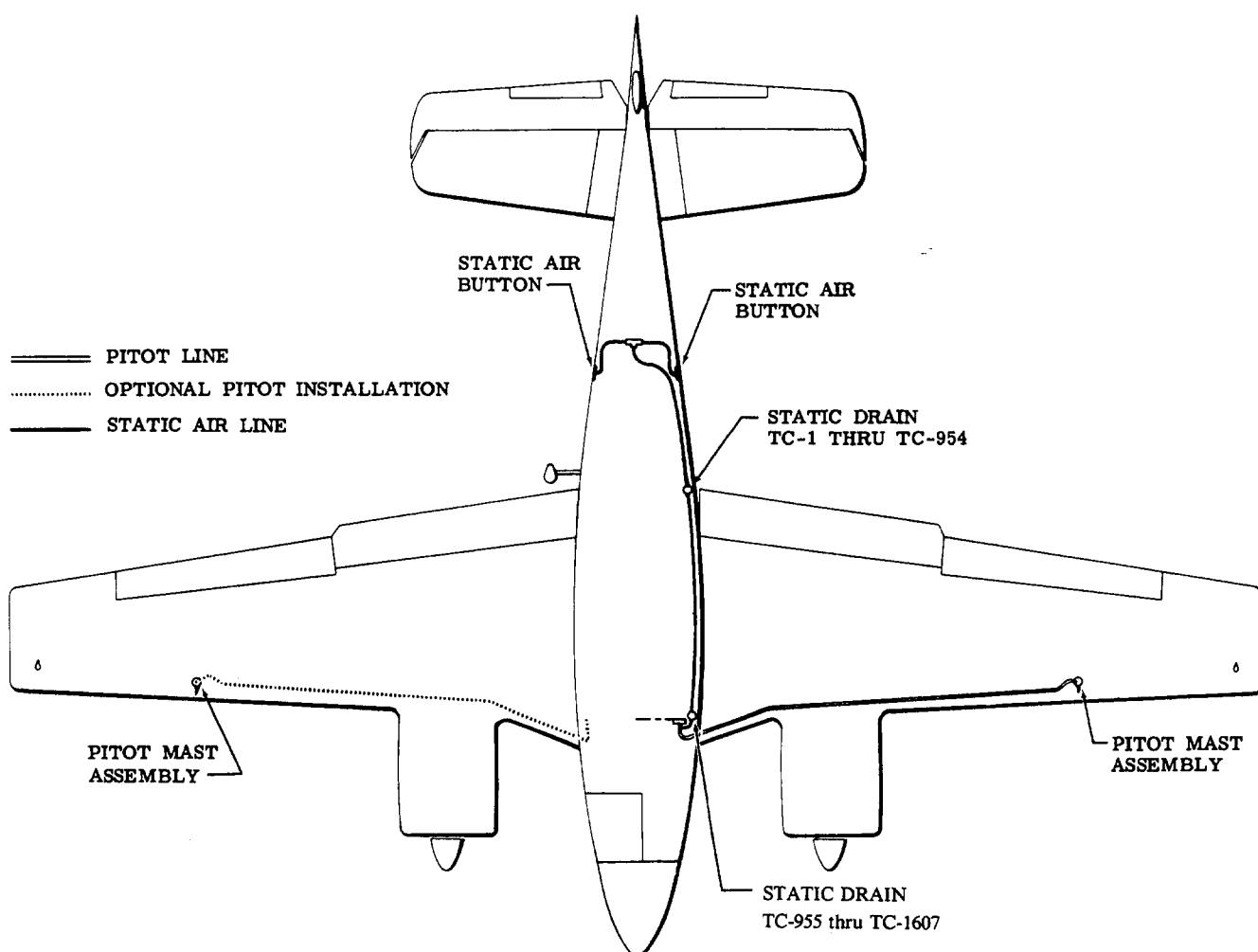


Figure 11-41. Pitot and Static Air System (TC-1 thru TC-1607, TE-1 thru TE-942, except TE-938)

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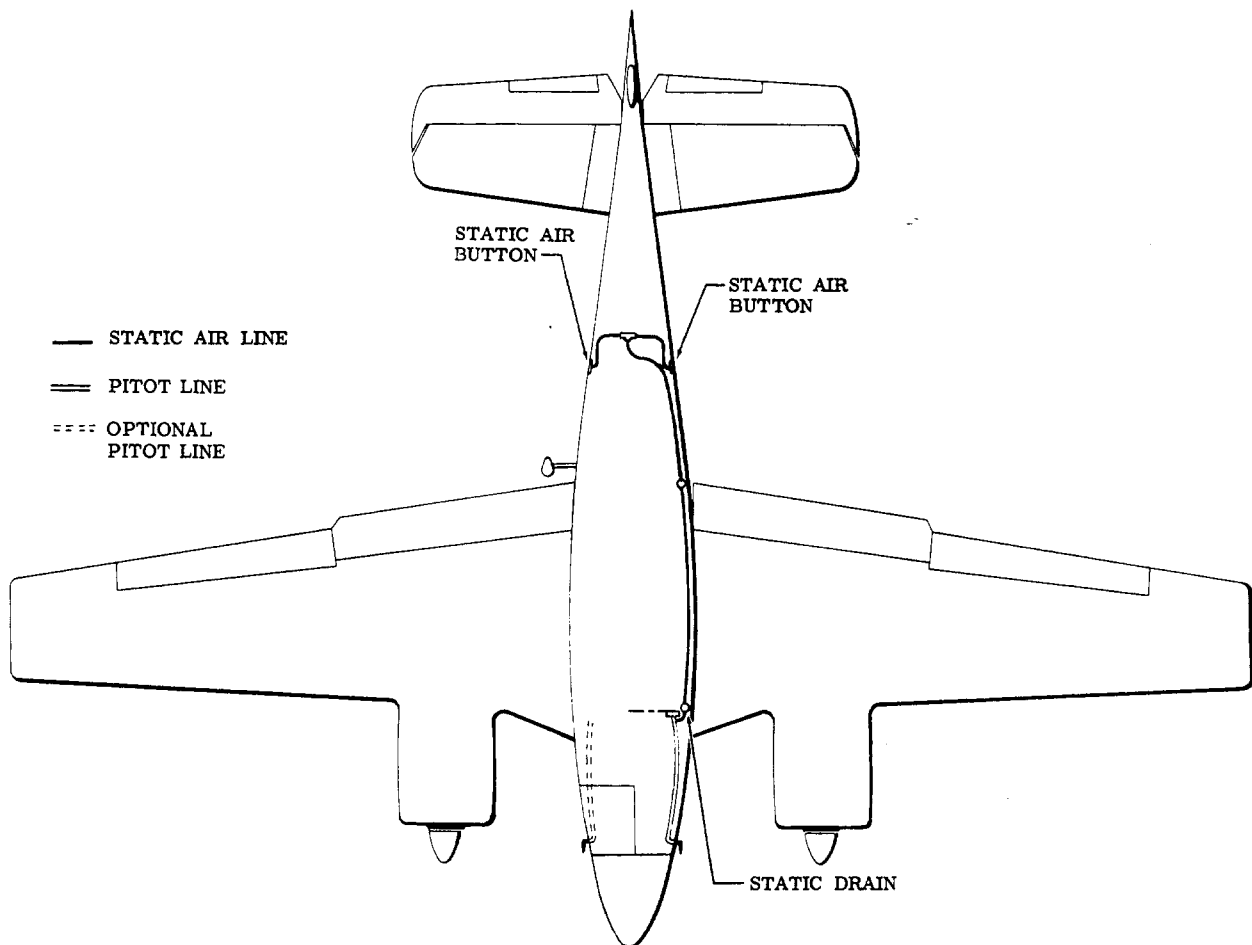


Figure 11-42. Pitot and Static Air System (TH-1 and after, TC-1608 and after, TE-938, TE-943 and after)

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INSPECTING THE STATIC SYSTEM

NOTE

On airplane serials TC-1403 and after, TE-847 and after, TH-1 and after, the aluminum static lines are replaced with Poly-flo tubing.

The static air system should be inspected at the same time as the pitot system is inspected, as follows:

Check the rubber hose or Poly-flow tubing connecting the static air lines to the instrument plumbing, and the rubber hose or Poly-flo tubing which forms the static line drain. Hoses with the outer surfaces checked or cracked, particularly at the bends or connecting points, or which have become hard, should be replaced. Replace damaged hose with Poly-flo tubing.

H-14 AUTOPILOT SYSTEM (Figure 11-43)

The primary components of the autopilot pneumatic system are shown. Refer to Figure 11-43. The air pressure is admitted to the autopilot pneumatic system through a solenoid valve actuated by the ON-OFF switch in the flight controller. A pressure control valve (up (upstream from the solenoid valve) maintains a pressure of 8.0 pounds in the system with the autopilot in operation. An air filter protects the servos from any impurities entering the system. Servo actuators, powered by the air pressure, move the airplane control surfaces. The servos can be overpowered without damage to the unit. The elevator trim tab actuator, also powered by air pressure, moves the airplane trim tab to automatically maintain pitch trim.

RIGGING

NOTE

Before the autopilot control cables are rigged, the respective airplane control system cables must be rigged as specified in Section 4.

a. Aileron control

1. Place the ailerons in the neutral position.
2. Set the aileron servo cable drum in the center of travel.
3. Rig the aileron servo cables as noted on the Cable Tension Temperature Chart in Section 4.

b. Elevator control

1. Place the elevator and elevator servo in the neutral position.

2. Center the servo bellcrank on the cable (approximate center reached when the bellcrank is in vertical position with servo).

3. Rig the elevator servo cables as noted on the Cable Tension Temperature Chart in Section 4.

c. Elevator Tab Control

The autopilot elevator trim tab actuator is connected directly to the airplane elevator tab control system. Rigging of the elevator tab system may be accomplished as described in Section 4.

d. Rudder Control

1. Release the rudder pedal adjusting levers and place all pedals in the aft position.
2. Install the rig pin in the holes provided in the pilot's rudder pedals.
3. Rig the rudder servo cables as noted on the Cable Tension Temperature Chart in Section 4.
4. Remove the rig pin from the pilot's rudder pedals and place rudder pedals in their original position.

MAINTENANCE AND REPAIR

Maintenance, repair, troubleshooting, and testing procedures are described in the BEECHCRAFT H-14 Adaptive Autopilot Maintenance Manual, P/N 13033F.

NOTE

When test air pressure is required, apply air pressure to the inlet side of the pressure control valve.

BEECHCRAFT NEW-MATIC AUTOPILOT (OPTIONAL) (Figure 11-44)

The BEECHCRAFT New-matic autopilots operate on an electro-pneumatic concept. Electronic circuitry is used for navigational beam detection and magnetic heading direction turns. Pneumatic servos are used for the flight control actuators. The systems are completely nontumbling. Yaw, roll and turn detection is made by a tilted gyro mounted in the instrument panel. A dampened miniature airplane serves as the instrument indicating arm. Any deviation from straight flight causes the rate gyro to move a pressure (or vacuum) valve which puts force into the aileron or rudder to

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return the airplane to straight flight. Turns or beam following is made by rotating a valve sleeve with a torquing movement proportional to the voltage imposed upon it. This unit also supplies an output voltage proportional to the turning rate that is used for dip compensation and the nose-up signal during turns. The

pitch control system does not use a gyro for reference, but uses the airspeed, rate-of-airspeed change and inertial signals to control the elevator through the pitch servos. An altitude hold sensing unit works in conjunction with the pitch control to sustain a given altitude.

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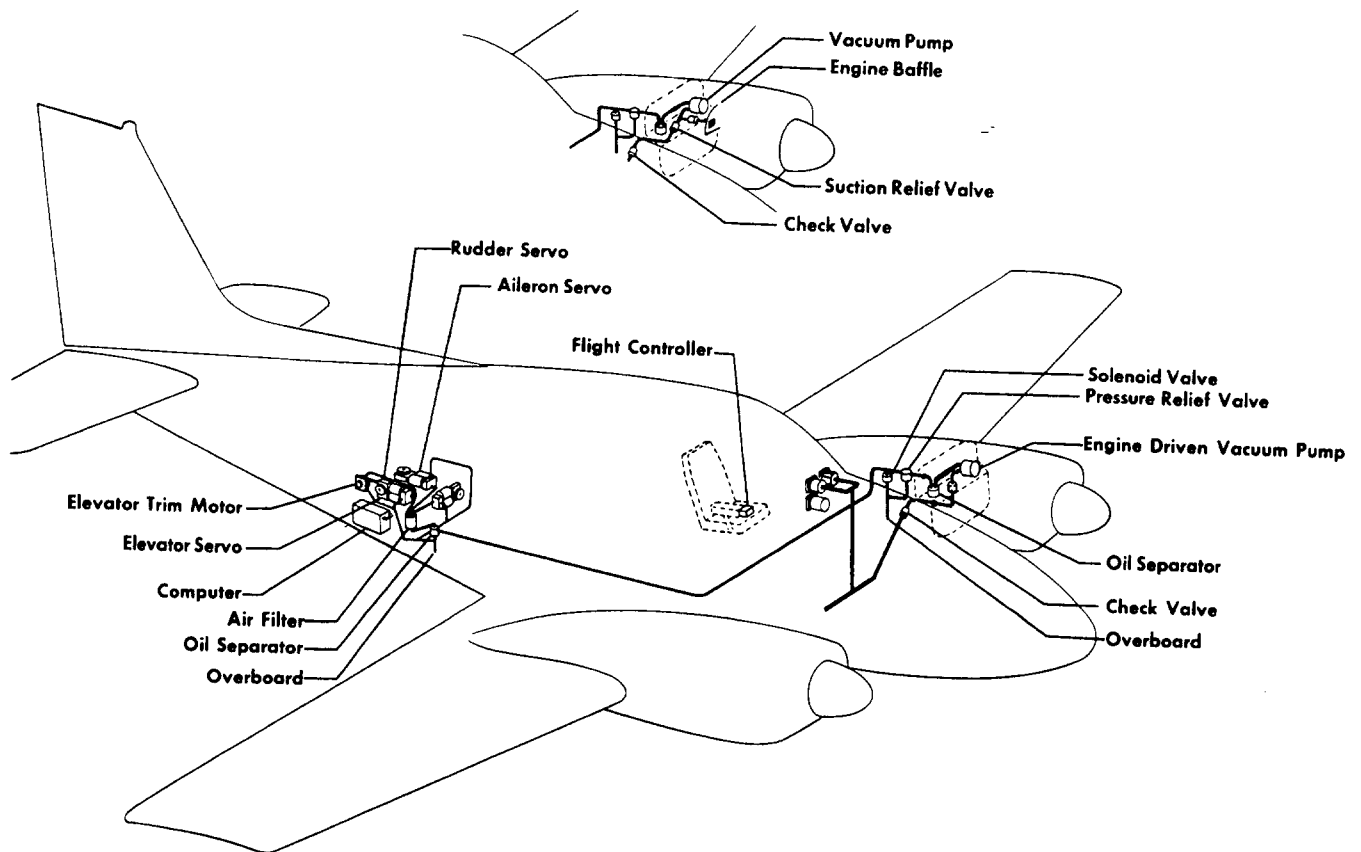


Figure 11-43. Autopilot Pneumatic System

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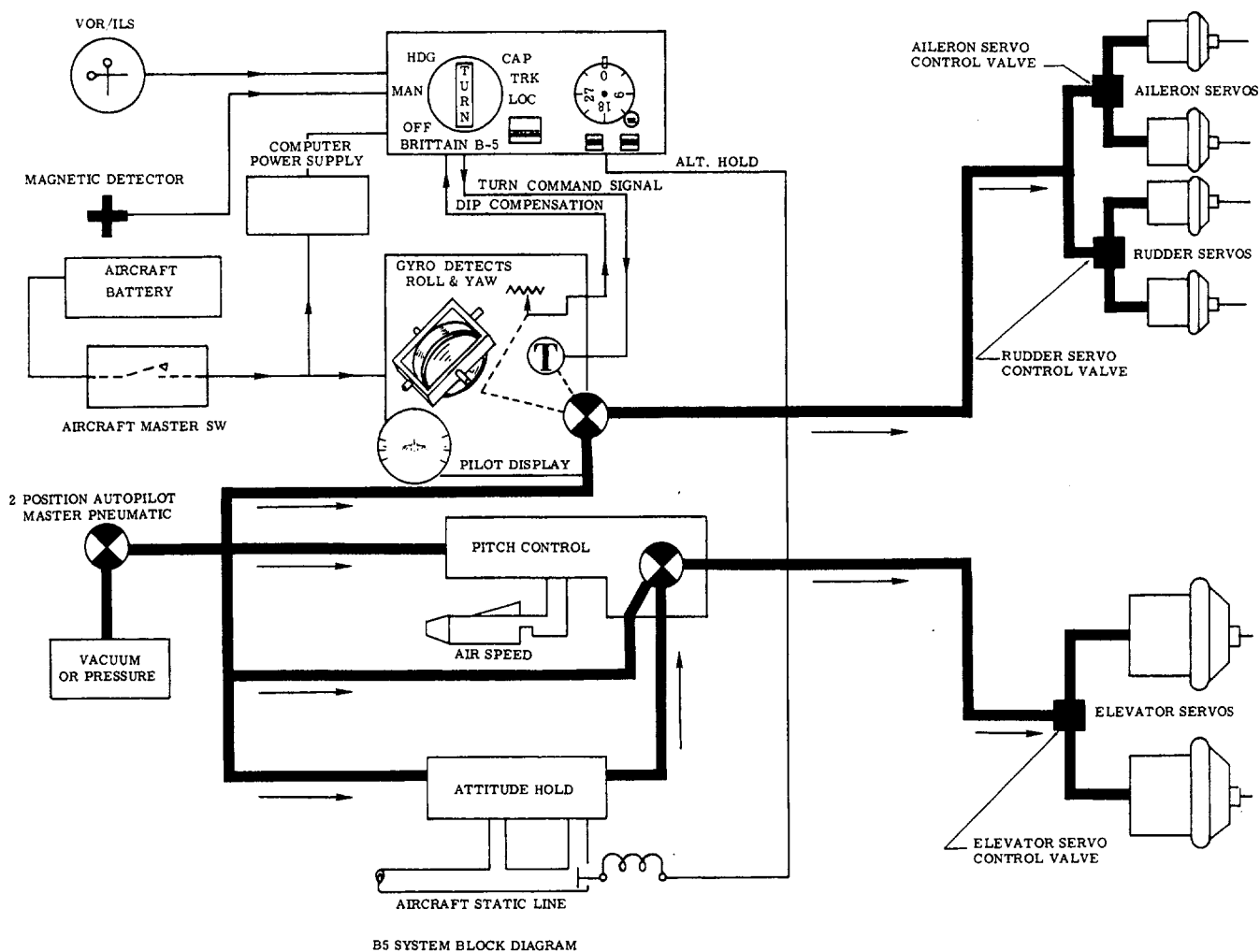
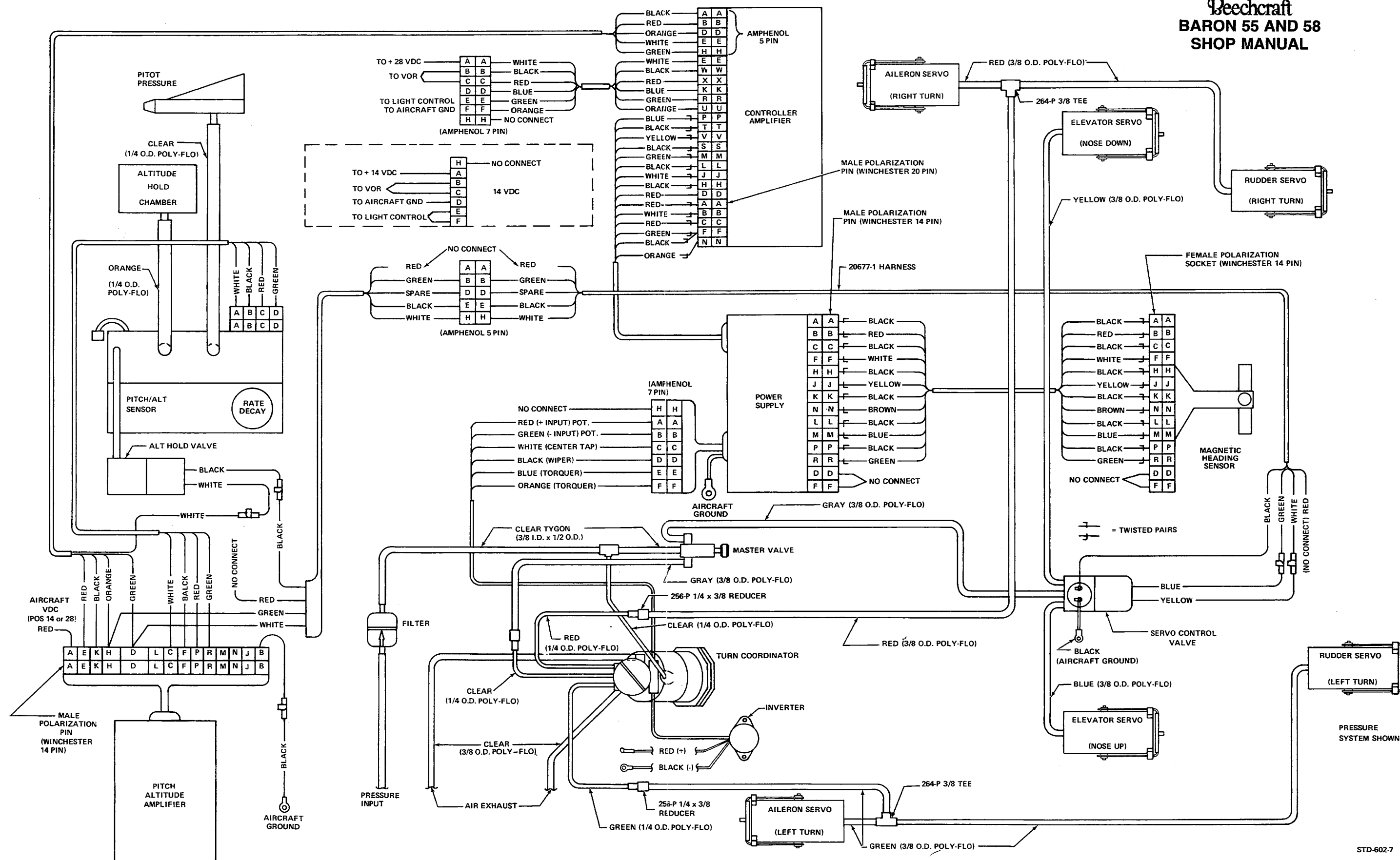


Figure 11-44. BEECHCRAFT New-Matic Autopilot System



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Figure 11-45. B-7 System Block Diagram

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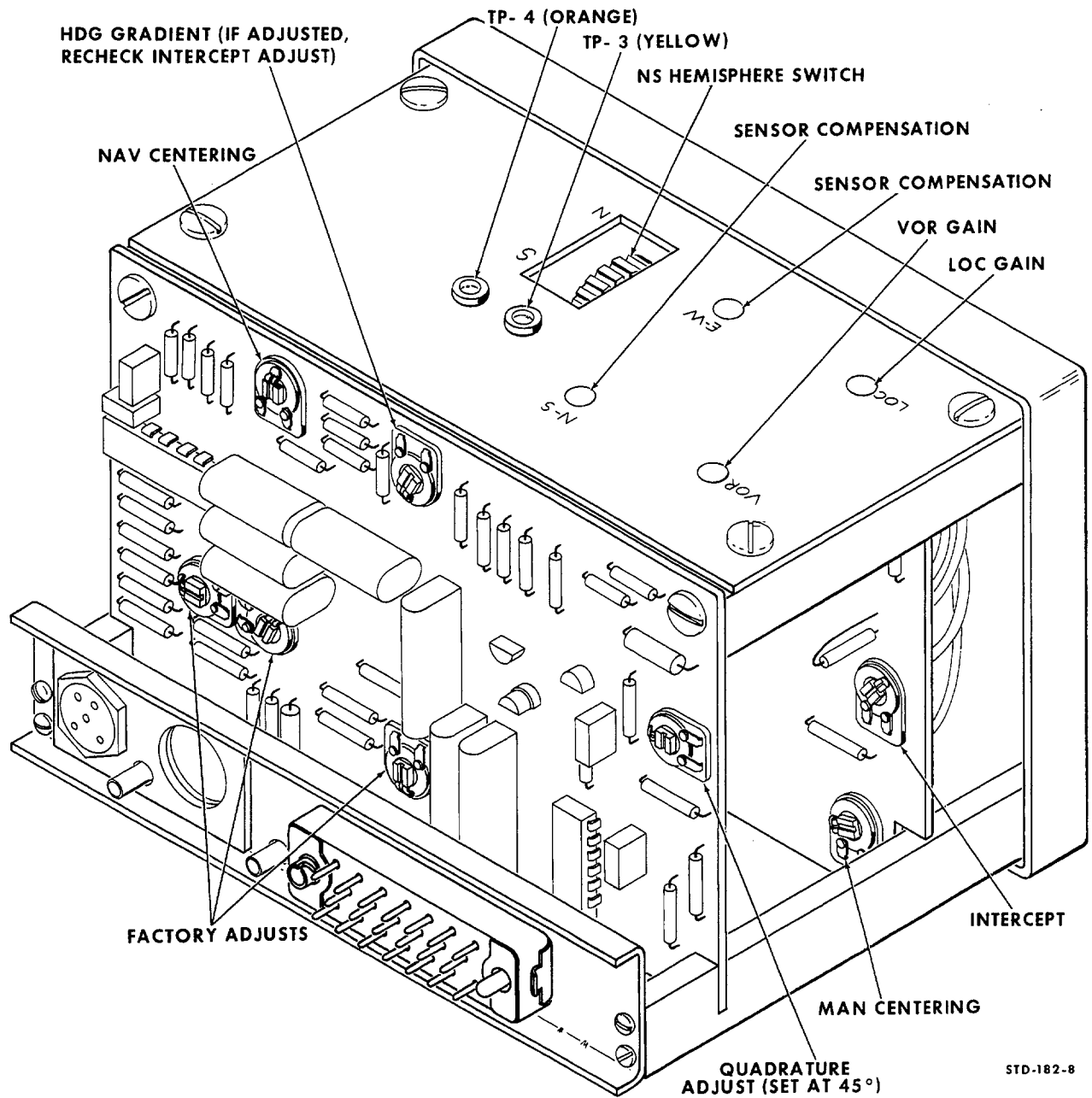


Figure 11-46. B-5 and B-7 Heading Lock/Navigation Coupler System Adjustment Points

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NOTE

This troubleshooting guide applies specifically to the B-7 autopilot but, in general, may also be used for the B-5 autopilot. Manuals noted in the Supplementary Publications List in Section 1 and the appropriate test sets as listed in those manuals will aid further in troubleshooting procedures.

AUTOPILOT TROUBLESHOOTING GUIDE

Indication	Probable Cause	Remarks
Roll Axis		
1. Insufficient or excessive vacuum (pressure) indicated on airplane system gage.	a. Leak in airplane vacuum (pressure) system.	a. Check all lines and fittings for leaks, looseness, kinks, etc.
	b. Regulator valve improperly adjusted.	Adjust as outlined elsewhere in this section.
	c. Adjustable orifice or regulator improperly adjusted.	Adjust as outlined elsewhere in this section.
	d. Faulty vacuum (pressure) pump.	d. Replace pump.
	e. Ambient air filter plugged.	e. Clean or replace.
	f. Clogged system filter.	f. Check as outlined elsewhere in this section and replace if necessary.
2. Airplane hunts or recovers slowly from turns in one direction.	a. Regulator valve improperly adjusted.	a. Adjust as outlined elsewhere in this section.
	b. Loose airplane primary cables or excessive friction in aileron and/or rudder cables, pulleys, bellcranks or loose servo cables.	b. Check security of attachment, binding, etc. and adjust as outlined in Section 4.
	c. Leak in servo or servo lines	c. Check for leaks.
	d. Obstruction in servo lines.	d. Check for foreign matter.
	e. Faulty turn coordinator gyro.	e. Replace turn coordinator.
3. Autopilot sluggish.	a. Low system vacuum (pressure) setting.	a. Check system filters and adjust as outlined elsewhere in this in section.
4. Airplane turns continuously on basic stabilization (controller OFF).	a. Airplane out of trim or improperly rigged.	a. Trim airplane or check controls for proper rig as outlined in Section 4.
	b. Loose primary cables or excessive friction in cables system. Loose servo cable.	b. Check security of attachment, binding, etc. and adjust as outlined in Section 4.
	c. Defective turn coordinator gyro.	c. Replace turn coordinator gyro.
	d. Leak in servo or servo line.	d. Check for servo or servo line leaks.
5. Airplane rate of turn too fast or too slow.	a. Improper regulator adjustment.	a. Adjust regulator as outlined in this section.
	b. Turn coordinator faulty.	b. Replace turn coordinator.

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AUTOPILOT TROUBLESHOOTING GUIDE *(Continued)*

Indication	Probable Cause	Remarks
6. Continuous control wheel oscillation in smooth air.	a. Turn coordinator faulty.	a. Replace turn coordinator.
	b. Improper gyro speed or excessive vacuum (pressure) in system.	b. Adjust system pressure as outlined in this section.
7. No turns or turns in one direction only in response to turn control or on all modes of navigation coupler operation.	a. Faulty turn coordinator.	a. Replace turn coordinator.
	b. Faulty control amplifier.	b. Replace control amplifier.
8. Airplane rolls on one direction either left or right.	a. Servo improperly phased.	a. Plumb as noted. Refer to Figure 11-45..
	b. Turn coordinator not plumbed properly.	b. Plumb as noted. Refer to Figure 11-45.
9. Airplane turns in the wrong direction in CAP and TRK modes.	a. Nav input signal reversed.	a. Reverse connectors to VOR.
10. No airplane response from navigation coupler in any mode, ground check shows normal.	a. Faulty turn coordinator gyro.	a. Replace turn coordinator.
	b. Obstruction in vacuum (pressure) lines.	b. Check for foreign matter.
11. Airplane fails to turn to and hold magnetic headings.	a. Faulty magnetic heading sensor.	a. Replace magnetic heading sensor.
	b. Faulty heading selector resolver.	b. Replace controller/ amplifier.
	c. Faulty controller/amplifier.	c. Replace controller/ amplifier.
12. Magnetic headings consistently high or low.	a. Heading sensor misaligned in airplane.	a. Check for proper installation.
	b. Heading azimuth dial shifted on shaft.	b. Tighten screw and recalibrate.
	c. Improper adjustment or controller/amplifier.	c. Calibrate for the magnetic cardinal points.
13. Cardinal headings inaccurate.	a. Controller/amplifier improperly adjusted.	a. Calibrate for the magnetic cardinal points.
	b. Leak in servo system.	b. Check for leaks.
	b. Low primary vacuum (pressure).	b. Adjust system as outlined in this section.
14. Cardinal headings accurate but intermediate headings inaccurate.	a. Faulty heading sensor.	a. Replace the heading sensor.
	b. Faulty controller/amplifier.	b. Replace controller/ amplifier.
15. Insufficient or no control in CAP and TRK modes.	a. Faulty controller/amplifier.	a. Replace controller/amplifier.
	b. Faulty omni converter.	b. Replace omni converter.
	c. Insufficient signal from omni.	c. Repair or replace omni indicator.

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AUTOPILOT TROUBLESHOOTING GUIDE *(Continued)*

Indication	Probable Cause	Remarks
	d. "NAV SENS" improperly adjusted.	d. Readjust.
16. Localizer approach is either sluggish or too sensitive.	a. Loc gain is set high or low.	a. Adjust localizer gain.
17. No electrical output left or right on controller/amplifier test jacks.	a. No A + input or improperly grounded. b. Defective controller/amplifier or power supply.	a. Check A + and ground. b. Replace controller/amplifier or power supply.
18. Output only one way on controller/amplifier test jacks.	a. Defective controller/amplifier.	a. Replace controller/amplifier.
19. No output on HDG mode on controller/amplifier test jacks	a. Defective controller/amplifier or harness or heading sensor.	a. Replace controller/amplifier or harness or heading sensor.
20. Heading output on two reciprocal headings but not on the other two.	a. Defective sensor or harness or faulty controller/ amplifier.	a. Replace heading sensor or check harness. Replace controller/ amplifier.
21. "0" output when in CAP, TRK or APP mode, with nav signal.	a. Defective nav switching console, no nav information, or defective controller/amplifier.	a. Check nav input leads. Replace controller/amplifier.
22. Output voltage in CAP mode decays to "0" voltage.	a. Wrong nav input signals. b. Defective switching console (if installed). c. Dirty input signal (AC volts).	a. Check wiring. b. Repair or replace console. c. Check indicators.
23. Voltage output in MAN, CAP, TRK and APP mode, but none in HDG mode.	a. Polarization pins reversed on heading sensor plug.	a. Reverse pins. Refer to Figure 11-45.
24. Nav indicator needle deflects left or right when controller/ amplifier or radio is turned on.	a. One of the components is shorted to ground.	a. Check for shorts.
25. Low or high intercept angle.	a. Incorrect setting on controller/ amplifier. b. Low or high voltage output on nav indicators.	a. Adjust intercept angle. b. Check nav indicators to manufacturer's specs.

PITCH AXIS

1. Pitch channel will not center up electrically.	a. Defective pitch/altitude sensor or amplifier.	a. Check on Test Set TS-108 or replace one at a time.
2. Altitude channel will not center up electrically.	a. Defective pitch/altitude sensor or amplifier.	a. Check on Test Set TS-108 or replace one at a time.
3. Altitude-hold solenoid valve will not actuate.	a. Pressure switch on servo control valve out of circuit. b. Defective solenoid valve. c. Defective altitude switch on controller/amplifier.	a. Check for faulty switch and replace if necessary. b. Replace solenoid valve. c. Check continuity. Refer to Figure 11-45.

Beechcraft

BARON 55 AND 58

SHOP MANUAL

AUTOPILOT TROUBLESHOOTING GUIDE *(Continued)*

Indication	Probable Cause	Remarks
4. Servo control valve will not center.	a. Improper vacuum (pressure) adjustment. b. Sticky valve.	a. Adjust as outlined in this section. b. Replace valve.
5. Output voltage is inadequate.	a. Pitch/altitude amplifier sensor or harness shorted or improperly wired.	a. Refer to Figure 11-45. Run a continuity check and check for shorts.
6. Pressure switch will not make contact when pressure is on.	a. Defective pressure switch or not set at proper pressure.	a. Replace pressure switch.
7. Output voltage one way only on pitch and altitude channels.	a. Servo control valve shorted to ground.	a. Replace valve.
8. System will not maintain trimmed configuration even though centered electrically.	a. Servo control valve not pneumatically centered. b. Leak in servos or improperly rigged. c. Leak in pitch/altitude sensor.	a. Disconnect electrical power. Center valve pneumatically by use of differential gage to ± 0.4 in. Hg. b. Check for leaks and rig. c. Replace sensor.
9. System will not respond to airspeed changes.	a. Primary vacuum (pressure) not set properly. b. Pitot pressure inadequate. c. Decay rate improperly adjusted.	a. Adjust as outlined in this section. b. Check pitot plumbing. Adjust as required.
10. System will not respond to up-command adjustment.	a. Defective pitch/altitude amplifier. b. NO EVT potentiometer output.	a. Replace pitch/altitude amplifier. b. Replace turn coordinator.
11. System will not respond to altitude-gain adjustments.	a. Pitch/altitude amplifier limiter improperly set.	a. Adjust as required.
12. Airplane has long term oscillation about pitch axis with altitude hold OFF.	a. Decay rate improperly adjusted b. Pitch/altitude gain improperly adjusted. c. Friction in elevator servo or system.	a. Adjust as required. b. Adjust as required. c. Check for friction and correct.
13. Airplane has short term oscillation about pitch axis.	a. Decay rate too tight. b. Pitch gain too high. c. Primary vacuum (pressure) too high.	a. Adjust as required. b. Adjust as required. c. Readjust as outlined in this section.
14. Airplane oscillates with altitude hold ON.	a. Altitude gain too high. b. Decay rate improperly adjusted.	a. Adjust as required. b. Adjust as required.
15. Airplane does not return to altitude when displaced.	a. Altitude hold solenoid inoperative. b. Leak in altitude system.	a. Replace solenoid. b. Check for leaks.

Beechcraft BARON 55 AND 58 SHOP MANUAL

AUTOPILOT TROUBLESHOOTING GUIDE *(Continued)*

Indication	Probable Cause	Remarks
	c. Altitude limiter improperly adjusted.	c. Adjust as require.
16. Airplane descends or ascends continually when system engaged.	a. Servo control valve not phased correctly.	a. Apply positive 6.0 volts (max) to blue lead and verify nose up response.

STATIC WICKS (TC-2421 AND AFTER, TE-1196 AND AFTER, TH-1298 AND AFTER)

A static electrical charge may build up on the surface of the airplane while in flight. This electrical charge, if retained, can cause interference in radio and avionics equipment operation; therefore, static wicks are installed on the trailing edges of flight surfaces to aid in dissipating the electrical charge. The static wicks, three on each wing tip, three on each elevator, and three near the top of the rudder, are removed and installed in the same manner. The static wick base is riveted to the flight surface and should not be removed in normal service.

STATIC WICK REMOVAL

- a. Unscrew the static wick from the base.
- b. Remove the static wick and lock washer.

STATIC WICK INSTALLATION

NOTE

The surface between the static wick and the mounting surface must be clean and free of paint or corrosion.

- a. Install the static wick and lock washer.
- b. Torque the static wick to 4.7 inch-pounds.

STATIC WICK INSPECTION

The static wicks should be inspected when there is a noticeable static buildup from precipitation and any time there is a lightning strike. Check the static wicks using a megohmmeter with a minimum test voltage of 500 volts to measure the resistance of the static discharger wicks. Test voltages of less than 500 volts will not generate a leakage rate sufficient to provide an accurate reading.

NOTE

To ensure the best possible functioning of the static wicks, the resistance between the base of the static wick and the surface to which each base is attached must be less than .0100 ohms. The resistance between the control surface on which the static wick is attached to and the airplane structure must be less than .0025 ohms. Check the static wicks using the following procedure:

CAUTION

Electrical shock can result if the megohmmeter is improperly used. Refer to the applicable manufacturer's operating handbook for proper operating procedures.

- a. Connect a test lead from the megohmmeter to the metal tip on the static wick.
- b. Connect the other test lead from the megohmmeter to the base of the static wick.
- c. Place the megohmmeter power switch to ON and observe the meter indication. A reading of between 1 and 100 megohms indicates the static wick is satisfactory. A reading of less than 1, or in excess of 100 megohms indicates that the static wick is unsatisfactory and must be replaced.
- d. Place the megohmmeter power switch to OFF and disconnect the test leads from the static wick tip and its base.

SECTION

12

AIRCRAFT FINISHES

AIRPLANE FINISH CARE

Urethane paint is the standard exterior surface finish on the Baron. Special procedures such as cleaning, removal, application and touch up repair are listed to aid in preserving and maintaining the exterior finish of the airplane. Each type of paint available for the Baron is listed by paint name and part number to aid in reordering matching colors. Airplane areas which require other paints and special procedures, such as battery box and lid, magnesium surfaces, etc., are also listed.

NOTE

Ascertain that all placards are in place and legible whenever the airplane has been repainted or touched up after repairs. Replace any placards that have been inadvertently defaced or removed.

PAINTING ALUMINUM

Preparation of Airplane Aluminum Exterior For Paint

- a. Mask windows with a double thickness of paper. Cover all openings where paint might enter the airplane.
- b. With sandpaper or a nylon pad, roughen the entire surface to be painted and smooth scratches and rough areas to ensure a satisfactory paint finish.
- c. Clean airplane surface to be painted with solvent (lacquer thinner or methyl ethyl ketone) to remove shop primer, exposed sealer, silicone deposits, and other contaminants which could adversely affect the paint finish.
- d. Wipe the cleaned surface with a tacky rag to remove dust. Do not touch the surface to be painted with your hands or contact the surface with your clothing.

Application of Exterior Paint on Aluminum Skins

- a. Apply one light wet coat of pretreatment wash primer (Item 23, Consumable Materials Chart). Mix the wash primer to the manufacturer's directions. Keep air pressure at a minimum during application of the primer to prevent overspray.

NOTE

Temperature and humidity will affect drying time of the wash primer. It should dry at least one hour, but not over six hours, before the zinc chromate primer is applied.

- b. Proceed to prime with a wet coat of MIL-P-8585 zinc chromate primer (Item 24, Consumable Materials Chart), thinned one part primer and two parts toluol (Item

20, Consumable Materials Chart). A heavy hiding coat of this primer is not desired and will impair performance.

- c. With fine grit sandpaper (400 to 600), very lightly sand the zinc chromate primer surface and remove the sanding dust with a tacky rag.

- d. The exterior surfaces are now ready for the color coat. Cross-coat the color application until complete coverage is obtained.

EXTERIOR PAINT TOUCH-UP REPAIR

- a. Mask around the skin containing the damaged area.
- b. Remove any loose edges of paint by using a high tack adhesive tape around the edge of the damaged area.
- c. Using a coarse sandpaper, fair the edge of the damaged area with the metal.
- d. When the edge of the paint begins to "feather" into a smooth joint, use a fine grade of sandpaper to eliminate the sand scratches left by the coarse paper so that the finish will be perfectly smooth. Take care to avoid removing any more metal than is absolutely necessary.
- e. Wash the sanded area with a solvent, such as naphtha, (Item 18, Consumable Materials Chart), or toluol, (Item 20, Consumable Materials Chart). Change the wash cloths used for this purpose frequently so that all the sanding dust will be picked up.
- f. After the area to be touched up has been cleaned with solvent until all trace of discoloration is gone, apply a coat of pretreatment primer to the damaged area.
- g. Spray two or three coats of zinc chromate primer, (Item 24, Consumable Materials Chart), for a heavier than normal build-up.
- h. After the primer has dried, sand the area being repaired with a medium fine sandpaper. Sand the edge of the repair area until the indentation where the metal and the old paint meet is gone. If it is necessary, apply additional primer until the junction of the paint and metal is no longer visible.
- i. Spray on two thin topcoats of finish paint.

The following is a list of the Enamel paints available for the BEECHCRAFT Baron.

ENAMEL TOPCOATS

BLUE

COLOR	PART NUMBER
Astro Blue	118684-361
Bahama Blue	118684-351
Blueberry Blue	118684-5
Bristol Blue	118684-503
Capri Blue	118684-265
Aristo Blue	118684-605
Marlin Blue	118684-349
Morning Glory Blue	118684-3
Pacific Blue	118684-1
Pavonne Blue	118684-353
Terrace Blue	118684-335

TURQUOISE

Peacock Turquoise	118684-333
Turquoise	118684-11

GREEN

Beechwood	118684-345
Citrus Green	118684-515
Jade Mist Green	118684-359
Olive Green	118684-517
Shamrock Green	118684-9
Surf Green	118684-7

YELLOW

Antique Gold	118684-341
Bright Gold	118684-507
Champagne Gold	118684-39
Jubilee Gold	118684-221
Klondike Yellow	118684-343
Lemon Yellow	118684-15
Mesa Gold	118684-511
Metallic Gold	118684-271
San Mateo Wheat	118684-13
Saturn Gold	118684-17
Sunburst Yellow	118684-357
Sunshine Yellow	118684-231
Yellow Jacket	118684-519

ORANGE

Calypso Orange	118684-509
Mandarin	118684-513
Omaha Orange	118684-273

RED

Chianti Red	118684-29
Embassy Red	118684-347
Flamingo	118684-23
Huntsman Red	118684-25
Matador Red	118684-355
Really Red	118684-499
Toreador Red	118684-27
Vendetta Red	118684-501

BROWN

Beaver Brown	118684-21
Castle Tan	118684-19
Sable Brown	118684-223
Sahara Tan	118684-337

BLACK

Black	118684-33
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GRAY

Gamma Gray	118684-497
Kingston Gray	118684-299

WHITE

Matterhorn White	118684-31
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BEIGE

Prairie Beige	118684-339
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EPOXY PAINT

Besides forming a tougher film than enamel or lacquer, epoxy has a very lustrous finish. However, the painted surface oxidizes a little faster than enamel or lacquer, and must be polished more frequently to retain the sheen. Oxidation is accelerated by exposure to the sun, hence, in hot weather oxidation will occur faster than in cold weather. A good coat of wax will protect the airplane surface from the sun's rays and keep the surface from oxidizing as fast. Any good automotive polish or wax can be used.

PAINT REPAIR PROCEDURES

NOTE

At temperatures below 70°F, the paint cure time required for any of the paints used in this procedure will extend beyond the time normally required. Under no circumstances should the paint be applied at temperatures below 60°F, since the paint will not cure.

The Baron may be finished with pretreatment (wash) primer, Epoxy primer, and a topcoat of Epoxy enamel. The following procedures including cleaning, paint stripping, prepaint preparation, priming, Epoxy painting, and an alternate method for small repairs that does not involve paint stripping. Careful observance of these procedures should result in a smooth, high luster finish with firm adhesion for maximum life.

PAINT STRIPPING AND CLEANING

Epoxy paints and primer are difficult to strip because of their resistance to chemicals and solvents; therefore, a paint stripper made specifically for Epoxy paints should be used. If an Epoxy stripper is not available, use a good enamel stripper. Removing the finish with such a substitute will require several applications and working the stripper with a stiff brush or wooden scraper.

a. Mask around the edge of the skin or skins containing the damaged area. Use a double thickness of heavy paper to prevent accidental splashes of paint stripper from penetrating the masking.

b. Apply Epoxy stripper as indicated by the manufacturer's directions. Try to stay approximately 1/8 inch away from the masking tape. This will necessitate a

little more clean up upon finishing, but will prevent any damage to the finish on the next skin. The stripper will not attack aluminum during the stripping process and can be neutralized by rinsing the affected area with water.

CAUTION

Epoxy stripper usually contains acids that will irritate or burn the skin. Wear rubber gloves and eye protection when using the stripper.

- c. Rinse the area with water and dry.
- d. Wash the stripped area carefully with a solvent such as acetone, methyl ethyl ketone, or lacquer thinner. This will prevent tiny particles of loose paint from adhering to the stripped area.
- e. Using a nylon scratch pad or aluminum wool dipped in clean water, clean the surface with a cleanser such as Bon Ami, Ajax, Comet Cleanser, etc. A good scouring will leave the surface completely clean.
- f. Rinse thoroughly with clean water and dry the affected area carefully. If the stripped area includes several joints or skin laps, let the airplane sit until all moisture has dried. This may be accelerated by blowing the skin laps with compressed air. Wet masking should be replaced.

PRETREATMENT (WASH) PRIMER

An acid etching primer that conforms to specification MIL-C-8514 should be applied to improve adhesion of the finishing coats. EX2016G base and EX2016 catalyst (products of Ameron Industrial Coatings, Wichita, Kansas) are used in equal parts as a pretreatment wash primer at the factory.

- a. Mix the primer in accordance with the manufacturers instructions.
- b. Apply a thin wet coat of primer. It should dry for at least an hour, but not over 6 hours before applying Epoxy primer.

EPOXY PRIMER

- a. Mix 54-23985 Epoxy primer (product of Ameron Industrial Coatings, Wichita, Kansas) in accordance with the manufacturers instructions.

NOTE

For the best results these directions must be followed carefully, since some manufacturers require that the primers be allowed to set for 1/2 hour after the catalyst and base have been mixed while others allow immediate use after mixing.

b. Apply a thin coat of Epoxy primer with a spray gun using 35 to 40 psi of air pressure. A dappled appearance indicates that the coat is too thin.

c. If the initial coat is allowed to cure for more than 24 hours before topcoating, sand the primer slightly to roughen the surface to assure adhesion. Wipe off the surface with a cloth dampened with a solvent (such as lacquer thinner), then apply the topcoat.

APPLYING EPOXY TOPCOAT

- a. Mix the paint and catalyst as directed by the manufacturer.
- b. Apply the topcoat with a spray gun at 35 to 45 psi of air pressure. Two coats are normally required to fully conceal the primer and build up the topcoat film to a thickness necessary for adequate service life and beauty. The Epoxy finish will normally cure to approximately 85% of its full hardness in 24 hours at temperatures of 80°F or higher.

EPOXY TOUCH-UP PAINT REPAIR

- a. Mask around the skin containing the damaged area.
- b. Remove any loose edges of paint by using a high track adhesive tape around the edge of the damaged area.
- c. Using a coarse sandpaper, fair the edge of the damaged area with the metal.
- d. When the edge of the paint begins to fair into a smooth joint, use a fine grade of sandpaper to eliminate the sand scratches left by the coarse paper so that the finish will be perfectly smooth. Take care to avoid removing any more metal than is absolutely necessary.
- e. Wash the sanded area with a solvent, such as lacquer thinner or methyl ethyl ketone. Change the wash cloths used for this purpose frequently so that all of the sanding dust will be picked up.
- f. After the area to be touched up has been cleaned with solvent until all trace of discoloration is gone, apply a thin coat of pretreatment primer to the damaged area.

NOTE

If a metal conversion coating such as iridite or alodine is used, the wash primer coating can be dispensed with. If the metal has not been treated with a metal conversion coating but no wash primer is available, carefully clean the surface to be touched up and apply Epoxy primer to the bare metal. This will produce a satisfactory undercoat for the repair area.

- g. Spray two or three coats of Epoxy for a heavier than normal buildup of primer.

h. After the Epoxy primer has cured for 24 hours, sand the area being repaired with a medium fine sandpaper. Sand the edge of the repair area until the indentation where the metal and the old paint meet is gone. If necessary, apply additional Epoxy primer until the conjunction of old paint with metal is no longer visible.

i. Spray on two topcoats.

EPOXY TOPCOAT

The following optional Epoxy paints are used as topcoats at the factory.

BLUE

COLOR	PART NUMBER
Blueberry Blue	118684-185
Capri Blue	118684-267
Morning Glory Blue	118684-189
Pacific Blue	118684-187
Turquoise	118684-197

GREEN

Shamrock Green	118684-195
Surf Green	118684-193

RED

Chianti Red	118684-215
Huntsman Red	118684-211
Toreador Red	118684-213

YELLOW

Champagne Gold	118684-269
Jubilee Gold	118684-185
Lemon Yellow	118684-201
San Mateo Wheat	118684-179
Saturn Gold	118684-203
Sunshine Yellow	118684-233

WHITE

Matterhorn White	118684-217
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ORANGE

Omaha Orange	118684-281
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BROWN

Beaver Brown	118684-207
Castle Tan	118684-205
Sable Brown	118684-227

GRAY

Kingston Gray	118684-301
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BLACK

Black	118684-219
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NOTE

Any order for the Epoxy paints listed above MUST include No. 5400 catalyst.

URETHANE PAINTS

NOTE

The procedures contained in this shop manual, which cover the preparation, application, and care of Urethane paints, are also applicable to Acrylic Enamel paint since it is considered a Modified Urethane paint.

The need for an extremely hard finish for protection against sandblast during takeoff and landings led to the development of urethane coatings for airplanes. Urethane paint dries into a high gloss and retains color much better than standard finishes. It is unaffected by the chemicals in hydraulic fluids, deicers, and fuels and requires far less care and maintenance than other finishes.

URETHANE PAINT REPAIR PROCEDURES

NOTE

The time normally required for urethane paint to cure must be extended at temperatures below 70°F. The paint will not cure at temperatures below 60°F.

The surface on the Baron may be finished with pretreatment (wash) primer, urethane primer, and a topcoat of urethane enamel. The following procedures include cleaning, paint stripping, prepaint preparation, priming, applying a urethane topcoat, and an alternate method for small repairs not requiring paint stripping. Careful observance of these procedures should result in a smooth, hard, glossy finish with firm adhesion for maximum life.

NOTE

Precut strip and number patterns are available through Mid-America Markings, Inc., 1720 South 151st Street West, Rt. 1, Goddard, Kansas 67052.

PAINT STRIPPING AND CLEANING URETHANE PAINT

Because of their resistance to chemicals and solvents, urethane paints and primers require a special paint stripper. If a urethane stripper is not available, a good enamel stripper may be used. Removing the finish with such a substitute will require several applications while working the stripper in with a stiff brush or wooden scraper.

a. Mask around the edge of the skin or skins containing the damaged area. Use a double thickness of heavy paper to prevent accidental splashes of paint stripper from penetrating the masking.

b. Apply urethane stripper as indicated by the manufacturer's directions. Try to stay approximately 1/8 inch away from the masking tape. This will necessitate a little more cleanup upon finishing, but will prevent damage to the finish on the next skin. The stripper will not attack aluminum during the stripping process and can be neutralized afterwards by rinsing the affected area with water.

CAUTION

Urethane strippers usually contain acids that irritate or burn the skin. Wear rubber gloves and eye protection when using the stripper.

c. Rinse the area with water and dry.

d. Wash the stripped area carefully with a solvent such as acetone, methyl ethyl ketone, or lacquer thinner. This will prevent tiny particles of loose paint from adhering to the stripped area.

e. Using a nylon scratch pad or aluminum wool dipped in clean water, clean the surface with a cleanser such as Bon Ami, Ajax, Comet Cleanser, etc. A good scouring will leave the surface completely clean.

f. Thoroughly rinse with clean water and carefully dry the affected area. If the stripped area includes several joints of skin laps, let the airplane sit until all moisture has dried. This may be accelerated by blowing the skin laps and seams with compressed air. Wet masking should be replaced.

PRETREATMENT (WASH) PRIMER FOR URETHANE PAINT

An acid etching primer that conforms to Specification MIL-C-8514 should be applied to improve adhesion of the finishing coats. EC2016G base and T6070 catalyst (products of Ameron Industrial Coatings, Wichita, Kansas) are used in equal parts as a pretreatment wash primer at the factory.

a. Mix the primer in accordance with the manufacturers instructions.

b. Apply a thin wet coat of primer. It should be

permitted to dry for at least one hour, but not over six hours, before the next coat of urethane primer is applied.

URETHANE PRIMER

a. Mix the urethane catalyst and base in accordance with the manufacturers instructions when preparing the primer.

NOTE

For the best results these directions must be followed carefully, for some manufacturers require that the primer be allowed to set for 1/2 hour after the catalyst and base have been mixed while others recommend immediate use after mixing.

b. Apply a coat of urethane primer with a spray gun using 35 to 40 psi of air pressure. A dappled appearance only indicates that the coat is thin.

c. If the initial coat is allowed to cure for more than 24 hours before the topcoat is applied, sand the primer slightly to roughen the surface and assure adhesion. Wipe off the surface with a cloth dampened with a solvent (such as lacquer thinner), then apply the topcoat.

APPLYING URETHANE TOPCOATS

a. Mix the paint and catalyst as directed by the manufacturer.

b. Apply the topcoat with a spray gun at 35 to 45 psi of air pressure. Two coats are required to fully conceal the primer and build up the topcoat film necessary for adequate service life and beauty. The urethane finish will normally cure to approximately 85% of its full hardness in 24 hours at temperatures of 80°F or higher.

URETHANE TOUCH-UP REPAIR

a. Mask around the skin containing the damaged area.

b. Remove all loose edges of paint by using a high tack adhesive tape around the edge of the damaged area.

c. Using a coarse sandpaper, fair the edge of the damaged area with the metal.

d. When the edge of the paint begins to fair into a smooth joint, use a fine grade of sandpaper to eliminate the scratches left by the coarse paper. Take care to avoid removing any more metal than is absolutely necessary.

e. Wash the sanded area with a solvent, such as a lacquer thinner or methyl ethyl ketone. Change the wash cloths used for this purpose often so that all the sanding dirt will be picked up.

f. After the area to be touched up has been cleaned with solvent until all traces of discoloration are gone, apply a thin coat of pretreatment primer to the damaged area.

NOTE

If a metal conversion coating such as iridite or alodine is used, the wash primer coating can be dispensed with. If the metal has not been treated with a metal conversion coating but no wash primer is available, carefully clean the surface to be touched up and apply urethane primer to the bare metal. This should produce a satisfactory undercoat for the repair area.

g. After the urethane primer has cured for 24 hours, sand the area under repair with medium fine sandpaper. Sand the edge of the repair area until the indentation where the metal and old paint meet is gone. If necessary, apply additional urethane primer until the juncture of old paint with metal is no longer visible.

h. Spray on two topcoats.

URETHANE TOPCOATS

The following colors are available at the factory for urethane topcoats:

COLOR

PART NUMBER

BLACK

Black9100

BLUE

Aristo Blue1400
Bahama Blue1315
Blueberry Blue1436
Bristol Blue1098
Capri Blue1130
Crater Blue1097
Ethereal Blue6312
Marlin Blue1121
Morning Glory Blue1134
Pacific Blue1132
Pavonne Blue1314
Terrace Blue1313

BROWN

Beaver Brown4141
Camel4320
Castle Tan4145
Prairie Beige4303
Sable Brown4143
Sahara Tan4302

GRAY

Gamma Gray7014
Kingston Gray7101
Whisper Gray6311

GREEN

Beechwood8304
Citrus Green8320
Jade Mist Green8303
Olive Green8316
Shamrock Green8125
Surf Green8123

ORANGE

Calyspo Orange5045
Mandarin Orange5060
Omaha Orange5185

RED

Burgundy Red2087
Chianti Red2156
Embassy Red2303
Huntsman Red2150
Matador Red2087
Really Red2091
Toreador Red2153
Vendetta Red2185
Venetian Red2324

TURQUOISE

Peacock Turquoise1312
Turquoise8120

WHITE

Matterhorn White6160

YELLOW

Antique Gold5035
Bright Gold5083
Champagne Gold5186
Jubilee Gold5184
Klondike Yellow5065
Lemon Yellow5181
Mesa Gold5316
San Mateo Wheat5180
Saturn Gold5183
Sunburst Yellow5071
Sunshine Yellow5182
Tender Yellow6313
Yellow Jacket5041

ACRYLIC ENAMEL TOPCOATS

COLOR

PART NUMBER

BLUE

Aristo Blue	572-570
Bahama Blue	572-575
Bristol Blue	572-585
Ethereal Blue	572-534
Marlin Blue	572-565
Pavonne Blue	572-580

BLACK

Black	571-520
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BROWN

Castle Tan	577-520
Regimental Brown	577-775
Sable Brown	577-510
Sahara Tan	577-515

GRAY

Gamma Gray	570-570
Whisper Gray	570-592

GREEN

Beechwood	573-545
Citrus Green	573-550
Jade Mist Green	573-530
Olive Green	573-520
Shamrock Green	573-535

ORANGE

Calypso Orange	575-585
Mandarin Orange	575-580

RED

Burgundy Red	576-542
Really Red	576-601
Toreador Red	576-635
Vendetta Red	576-625
Venetian Red	576-576

TURQUOISE

Peacock Turquoise	572-590
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WHITE

Matterhorn White	570-550
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YELLOW

Antique Gold	574-830
Bright Gold	574-520
Champagne Gold	574-820
Mesa Gold	574-815
Tender Yellow	574-509
Yellow Jacket	574-825

PAINTING MAGNESIUM

PAINT REMOVAL FROM MAGNESIUM SURFACES

a. Mask around the edge of the damaged area with a double thickness of heavy paper to prevent accidental splashes of paint stripper from penetrating the masking.

b. Apply Turco No. 4260 (product of Turco Products Inc., Los Angeles, California) to the skin under repair with a brush or non-atomizing gun.

CAUTION

Stripping should be accomplished in a well ventilated area since prolonged exposure to high concentrates of Turco No. 4260 vapor may irritate the eyes and lungs.

c. Allow the paint stripper to work for 20 to 30 minutes, then work the remaining paint loose with a bristle brush.

CAUTION

Never use a wire brush for it will damage the magnesium surface.

d. Remove the masking paper and wash the affected area thoroughly with water under high pressure. Remove all remnants of paint with lacquer thinner.

e. Sand the repaired area lightly, then apply BEECHCRAFT Dow Number 19 solution to prevent corrosion. The surface must be dried completely after Dow treatment.

NOTE

If surface is not completely void of moisture before finish coat is applied the finish will blister and flake off.

PAINTING MAGNESIUM SURFACES

a. Prepare the surface to be repainted as indicated under **PAINT REMOVAL FROM MAGNESIUM SURFACES**. Clean the affected area thoroughly with lacquer thinner or an equivalent solvent.

b. Prime the affected area and apply the topcoat as indicated under the applicable (for urethane or epoxy) paint procedure in this section.

NOTE

Do not apply wash primer to magnesium surfaces. Allow a minimum of four hours drying time between application of the primer and topcoat.

CLEANING AND WAXING THE AIRPLANE FINISH

Airplane surfaces painted with enamel or epoxy paints should be washed with cold or lukewarm (never hot) water and a mild nondetergent soap. Any rubbing of the painted surface should be done gently and held to a minimum to avoid cracking the paint film. Airplane surfaces painted with urethane or acrylic enamel (modified urethane) paints can be cleaned with a sponge and a mild detergent soap. Rinse with clear water.

CAUTION

When washing the airplane with mild soap and water, use special care to avoid washing away grease from any lubricated area. After washing with solvent in the wheel well areas, lubricate all lubrication points. Premature wear of lubricated surfaces may result if the above precautions are not taken. Prior to cleaning, cover the wheels, making certain the brake discs are covered. Attach the pitot cover securely, and plug or mask off all other openings. Be particularly careful to mask off all static air buttons before washing or waxing.

Because the wax seals the paint from the outside air, a new enamel or epoxy paint job should not be waxed for a period of 90 days to allow the paint to cure. After the paint cures a thorough waxing will protect painted and unpainted metal surfaces from a variety of highly corrosive elements. Airplane surfaces painted with urethane or acrylic enamel (modified urethane) paints require a curing time of 6 to 7 days only and can then be waxed. Flush loose dirt away first with clear water, then wash the airplane with a mild soap and water. Harsh, abrasive or alkaline soaps or detergents should never be used. Use soft cloths or chamois to prevent scratches when cleaning and polishing. Any good grade automobile wax may be used to preserve painted surfaces. To remove stubborn oil and grease, use a soft cloth dampened with naphtha. After cleaning with naphtha, the surface should be rewaxed and polished.

NOTE

A build-up of several coats of wax may give the finish a yellowed appearance. The old wax should be removed before a new coat is applied.

INTERIOR COLORS

The following is a listing of the interior colors available for the BEECHCRAFT Baron.

INTERIOR LACQUER PAINTS

COLOR	PART NUMBER
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BLUE

Alpine Blue.....	118684-63
Banff Blue.....	118684-241
Blue Antique.....	118684-494
Chairman Blue.....	118684-483

GREEN

Lakewood Green.....	246-55911
Olive.....	118684-485

BEIGE

Artic Beige.....	118684-235
Desert Beige.....	118684-181
Seminole Beige.....	246-55762

BROWN

Castle Tan.....	118684-61
Executive Brown.....	118684-487
New Bronze.....	118684-475
Rawhide.....	118684-495
Walnut.....	118684-493

BLACK

Instrument Black.....	ANA 514
Black.....	118684-133

GRAY

Anchor Gray.....	118684-75
Autumn Smoke.....	246-55911
Driftwood.....	118684-183

RED

Chairman Red.....	118684-481
Red Antique.....	118684-491

YELLOW

Chairman Gold.....	118684-471
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WHITE

Nairobi Pearl.....	274-19251
Parchment	118684-489
White.....	118684-217

INTERIOR VINYL

Driftwood.....	118684-245
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INTERIOR ENAMEL

Black (Baking Enamel)	94-515
Driftwood.....	82A-23294
Insignia Red (Baking Enamel)	94-509

SPECIAL PROCEDURES

The following special procedures should be followed for best results when applying paint to the following areas:

BATTERY BOX AND LID

Apply a minimum of three coats of vinyl paint to the interior of the battery box and lid in the following manner.

- One coat of EX2016G wash primer.
- One coat of intermediate vinyl paint.
- One coat of finish vinyl paint.

NOTE

To insure complete coverage, each coat must be of a different color and must completely hide the preceding coat. The final coat shall be gray in color.

NOSE RADOME

No filler shall be used on the forward 13 inches of the nose cone. Spray with only one coat of primer and a maximum of two topcoats of non-metallic pigmented paint.

RUBBER SEALS

Apply one coat of a thoroughly dissolved solution of one part Oakite No. 6 and two parts water to all rubber surfaces that are to come in contact with either metal or other rubber surfaces. Apply a thin coat of Dow Corning No. 7 after completing the painting.

PROPELLER BLADES

Paint the backs of the propeller blades with quick drying enamel per MIL-E-5556, color No. 37038 per Federal Standard 595.

LANDING LIGHT

Paint the landing light wells, excluding the ribs and the inboard ends, with quick drying enamel per MIL-E-5556, color No. 37038 per Federal Standard 595.

PAINT FREE AREAS

The following areas shall be kept free from paint.

- Engine controls
- Flight control cables and chains.
- Control pedals.
- Exhaust manifolds and exhaust stacks.
- Firewalls and wrought aluminum surfaces forward of the firewall, with the following exception:

1. Aluminum parts attached directly to the firewall shall be primed and painted in detail.

- Aluminum flexible conduit.
- All tubing except unplated steel, which shall receive two coats of primer on the exterior, and except as noted for the interior of the engine compartment, and interiors where the color scheme must be maintained.
- Interior of all fluid lines.
- Chromium plated portions of the landing gear piston tubes.
- Rubber and rubber like surfaces.
- Electrical wiring, unless otherwise noted as a specific requirement.
- Glide path antenna (if installed).
- Pitot mast and static button.
- Cabin door sill and upper latch.
- Placards

The following items are painted with Insignia Red, Enmar 94-509 Baking Enamel on all BEECHCRAFT Baron airplanes.

- Fuel selector handle.
- Landing gear emergency operation handle.
- Control lock assembly except the portion of the pin which extends into the control column.
- Lock assembly, rudder pedal safety and chain.

The following items are painted with Instrument Black, ANA color No. 514.

- Console cover.
- Elevator tab drum shield.
- Upper and lower center console.
- Engine control levers.
- Nose gear indicator bezel.
- Instrument faces and bezels.
- Radio.
- Bendix ignition switch handles.
- Instrument panel cutout covers.

Apply Aluminum Lacquer to all sound deadener material above the baggage compartment floor in the forward baggage compartment.

SECTION

13

ELECTRICAL SYSTEM

ELECTRICAL SYSTEM

(Figure 13-1B)

LEAD-ACID BATTERIES

Either a standard single 24 volt lead-acid battery or two optional 12 volt lead-acid batteries may be installed in the BEECHCRAFT Baron, supplying a total system capacity of 24 volts. The batteries are located under the floor in the nose baggage compartment. The batteries should be maintained in a fully charged state at all times and the electrolyte level checked at regular intervals. A clean fully charged battery will provide peak performance. Never add anything but distilled water when adjusting the electrolyte level in the battery, if electrolyte is added each time the level in the battery is low, a high concentration of electrolyte may cause dissolution of the plates. Under high temperature conditions this may be indicated by the presence of black particles in the electrolyte of the affected cells.

NOTE

Do not fill the battery over one-half inch above the separators. Only lead-acid equipment should be used when servicing lead-acid type batteries.

BATTERY CLEANING

For peak performance, the battery must be kept clean and dry. If foreign materials are present in sufficient quantities the resultant deposits may form conductive paths that permit a rapid discharge of the battery. To prevent the collection of such deposits the battery should be cleaned after each 100 hours of service or every 30 days, whichever occurs first.

NICKEL-CADMIUM BATTERIES

To obtain optimum service from the two 12 volt 25 ampere-hour nickel-cadmium batteries installed in some Barons, proper and regular maintenance of the battery **MUST** be performed.

CAUTION

METHODS OF SERVICING LEAD-ACID BATTERIES DO NOT APPLY FOR THE SERVICING OF NICKEL-CADMIUM BATTERIES.

A Systematic Battery Maintenance Program should be established and carefully followed:

a. The battery should be removed from the airplane for service.

b. A log of the services performed on each battery should be maintained.

c. The battery should be removed from the airplane and serviced after: 100 Flight Hours or 30 days, whichever occurs first. If the ambient temperatures are above 90°F or the time between engine starts average less than 30 minutes, the duty cycle should be reduced.

d. The log of battery services performed should be evaluated to determine the need to service the battery at the above recommended intervals or to extend the intervals if justified. Accurate water consumption data is a valid barometer to use for adjustment of the servicing intervals.

Since the proper battery servicing requires two days, an additional battery (or batteries) will be required where aircraft utilization warrants. For additional information on battery maintenance, refer to the Marathon Battery Instruction Manual (P/N BA-89). Advisory Circular AC 00-33 printed by Department of Transportation, Federal Aviation Administration, is another good source of battery maintenance information.

MAINTENANCE LOG

Customers are advised to keep a complete and up-to-date maintenance log on each battery. This information will help determine the source of any battery problems and will assist in substantiating warranty claims. Sample formats for a service log (and installation and maintenance check list are) illustrated on the following pages.

PRE-INSTALLATION INSTRUCTIONS FOR NICKEL-CADMIUM BATTERIES

Unless otherwise indicated by a red warning tag, a nickel-cadmium battery is shipped in fully discharged state and contains the proper amount of electrolyte.

Observe the following precautions to ensure maximum performance and protect battery warranty:

a. Do not remove the shorting strap until prepared to charge the battery. Batteries from which the shorting strap has been removed (for even a short period of time) must be considered in an unknown state of charge condition and must be completely discharged prior to charging and installation.

b. Inspect batteries shipped from the factory for shipping plugs in the vent holes of each of the battery cells. The blunt aluminum screws that serve as shipping plugs must be removed prior to operation of the battery. The Bunson valves, included with the battery in a separate plastic bag, should then be screwed into the vent cap assembly in place of the screw plugs. The Bunson valves will release excessive pressure from gas accumulation to prevent cell rupture.

MAINTENANCE LOG

Catalog No. _____ Serial No. _____

Date Installed _____ On _____

[illegible]

AIRCRAFT BATTERY INSTALLATION CHECKLIST

- ☐ INSPECT FOR VISIBLE DAMAGE
- ☐ REMOVE SHIPPING HARDWARE
- ☐ ENSURE THAT ALL CONNECTORS ARE PROPERLY TIGHTENED
- (Do not level electrolyte on new battery prior to charging.)
- ☐ CONNECT BATTERY CORRECTLY TO CHARGER
- ☐ CHARGE BATTERY (Constant-current recommended)
- ☐ MEASURE END-OF-CHARGE VOLTAGE
- ☐ REST BATTERY 2 TO 4 HOURS
- ☐ CHECK ELECTROLYTE LEVEL
- ☐ CLEAN AND CHECK AIRCRAFT'S BATTERY CONNECTOR
- ☐ INSTALL BATTERY
- ☐ CHECK AIRCRAFT'S BATTERY CHARGER SYSTEM

PREVENTIVE MAINTENANCE CHECKLIST

- ☐ CLEAN BATTERY
- ☐ INSPECT FOR VISIBLE DAMAGE
- ☐ WASH VENT CAPS
- ☐ RECONDITION
 - ☐ DISCHARGE AND SHORT
 - ☐ CONSTANT-CURRENT CHARGE
 - ☐ MEASURE END-OF-CHARGE VOLTAGE
- ☐ REST BATTERY 2 TO 4 HOURS
- ☐ LEVEL ELECTROLYTE
- ☐ MEASURE ELECTRICAL LEAKAGE
- ☐ DISCHARGE, MEASURING CAPACITY

NOTE

On batteries not equipped with the screw-type plugs and Bunson valves, remove the shipping plugs and clean the filler-cap vent plugs as noted under BATTERY CLEANING. Retighten the cell vents with the vent plug wrench included with the battery.

c. Check for a torque of 6 foot-pounds on the terminal screws securing the cross links connecting the cells together.

d. Before charging, determine that all cells are properly installed by making a cumulative voltage check.

e. After determining the battery is in good physical condition and is properly assembled, it should be charged as outlined under BATTERY CHARGING and the electrolyte level adjusted.

BATTERY REMOVAL

a. Open the access door on the nose baggage compartment floor to gain access to the battery.

b. Cut the safety wire and remove the battery quick-disconnect.

c. Cut the safety wire and loosen the hold-down wing nuts. Push the wing nuts aside to clear the battery hold-down bar.

d. Disconnect the battery vent tubing.

e. Lift the battery out of the battery well.

BATTERY INSTALLATION

a. Place the battery in the battery well.

b. Connect the battery vent tubing.

c. Install the battery hold-down bar and wing nuts.

d. Install the battery disconnect and safety.

e. Close the battery access door.

BATTERY CHARGING

The two basic methods of charging nickel-cadmium batteries are the constant potential and constant current methods. Variations of the two basic methods may be incorporated in automatic equipment.

WARNING

Complete servicing of the battery is required if the battery is subjected to more than 32 volts for 2 minutes.

Special Notes on Charging

The following special comments are made with respect to charging nickel-cadmium batteries:

a. Charging is most efficient at battery temperatures between 40°F and 80°F.

b. Two or more batteries may be charged in parallel on a constant potential charging bus, provided the charging equipment has the proper current producing capability.

c. Do not charge batteries in parallel using the constant current method.

d. Do not charge individual cells unless the plastic case is supported on each side. A special frame may be built to fit the cell, or two boards or plates may be placed on each side of the cell and held together by a C-clamp. The sides of the cell must be kept flat during charging.

e. Perform necessary inspection, cleaning and repairs before charging.

f. Do not energize charging equipment until after the battery has been connected to the charging circuit.

g. When charging a battery in the shop, a thermometer should be placed so that the bulb is below and between the top of the cells. Do not place on charge any battery that has a temperature of 100°F or higher.

h. The foam sometimes seen in cells during charging does not indicate a defect. Foaming usually occurs after water is added and will disappear after a few cycles of operation.

The various charging procedures for the nickel-cadmium battery are outlined in the following paragraphs:

CONSTANT CURRENT CHARGING

CAUTION

Monitor the battery closely during charging (especially during the latter stages) to prevent an overcharge that will heat up and damage or destroy the battery.

Although slower, the constant current method is the recommended way of charging the battery. Most shops are equipped with constant current chargers. In cases where the chargers are limited to 6 ampere capability, it will be necessary to start the charge of most batteries at a lower rate than recommended on the battery nameplate. If a reduced rate is used, a longer charging time is required. The constant current method is much more effective in correcting cell imbalance and temporary loss of capacity and it permits easy computation of the charge capacity in ampere-hours. When using this method, one must usually monitor and maintain the constant current by manually adjusting the charger.

The following procedures for constant current charging are generally applicable to all airplane nickel-cadmium storage batteries:

a. The time required to charge a nickel-cadmium storage battery varies with respect to the discharging current, capacity rating, and amount of charge already in the battery. If fully discharged, the battery should be charged to 140 percent of its nominal ampere-hour rating.

b. When using the constant current method of charging, the battery may be charged in two steps by using

the START rate of current and the FINISH rate of current. (Lower starting rates may be used if required by such factors as equipment limitations.) These rates are usually given on the battery nameplate. The two step method is commonly used by the military. Single rates, slow or fast, are usually preferred by commercial service shops because of their simplicity. The single fast charging rate is 5.0 amperes per hour for 7 hours. The slow charging rate is 2.5 amperes per hour for 14 hours. See Figure 13-1 for slow (capacity/10), single rate, constant current charging voltage. A battery is charged at the START rate until the battery temperature takes a sharp rise or until the terminal voltage (while battery is charging) reaches 29.5 volts (for a 24-volt 19-cell battery). When the 29.5 volt point is reached or the temperature takes a sharp rise, the charging current is reduced to the FINISH rate and continued until one-third of the initial charge in ampere-hours is added. When the voltage rises to 29.5 volts, the charge received by the battery is approximately equal to that removed when it was previously discharged. The addition of ampere-hours at the FINISH rate equal to one-third of the ampere-hour input at the START rate will usually ensure that the battery is fully charged.

c. The time required for completing the charge at the FINISH rate may be computed by the following formula:

$$T_F = \frac{I_S \times T_S}{3 \times I_F}$$

T_F = Time, in hours, required for finishing charge

I_S = Starting charge rate in amperes

T_S = Time, in hours, of charge at the starting rate until

29.5 volts or temperature rise occurs.

I_F = Finish rate in amperes

As an example, assume that a 20 ampere-hour battery is charged at a start rate of 8 amperes for 2 hours, at which time the voltage rises to 29.5 volts. The ampere-hour input at the start rate is then $I_S \times T_S = 16$ ampere-hours. The ampere-hours of additional charge required are $(I_S \times T_S)/3 = T_F \times I_F = 16/3 = 5.3$. If a finish rate of 2 amperes is used the finish rate charge time will be:

$$T_F = \frac{I_S \times T_S}{3 \times I_F} = \frac{16}{3 \times 2} = 2.7 \text{ hours}$$

d. While the battery is being charged, the charging current should be kept constant at the rate being used. If the battery charger is not a self-regulating type, this operation can be achieved by manually adjusting the charger on a periodic basis.

e. During the finish charge, the individual cell voltages should be measured with a precision voltmeter to determine if all cells are rising evenly. Should some cells indicate a voltage lower than the others by 0.05 volts or

more, it is advisable to leave the battery on charge a while longer for additional equalization. Do not allow the battery to overheat.

CONSTANT POTENTIAL CHARGING

Nickel-cadmium batteries can be charged much faster by the constant potential method, but the charging time will depend on the current-delivery capability (300 ampere generators are good charging sources.) A disadvantage of constant potential charging is that full capacity cannot normally be restored if a battery suffers from temporary loss of capacity. It should also be noted that such a loss of capacity is quite common in batteries after prolonged use in an airplane.

a. Vented, 19-cell, 24-volt, nickel-cadmium batteries will normally be charged at 28.5 volts in the shop when charging with a constant potential voltage. Note that charging a 19-cell battery at 28.5 volts is equivalent to charging each cell at 1.50 volts. The initial charging current may be as high as 10 times the ampere-hour rating of the battery, depending on the amount of charge already in the battery. The high initial current will not damage the battery, but the charging equipment should have an inherent current-limiting capability or be provided with overload protection.

b. The time required to charge will depend primarily on the current-delivery capability of the charging unit. The lower the charging current, the longer the time required to charge. If the battery does not suffer from temporary loss of capacity, nearly full charge (approximately 90 percent of rated capacity) may be restored within 1 hour at 28.5 volts charging potential, provided the charging equipment is also capable of delivering current equal to two-to-three times the ampere-hour rating of the battery. See Figure 13-1A.

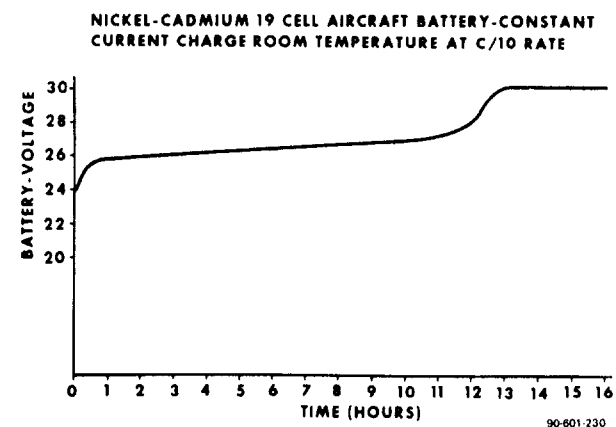


Figure 13-1. Constant Current Charge Charge at C/10 Rate

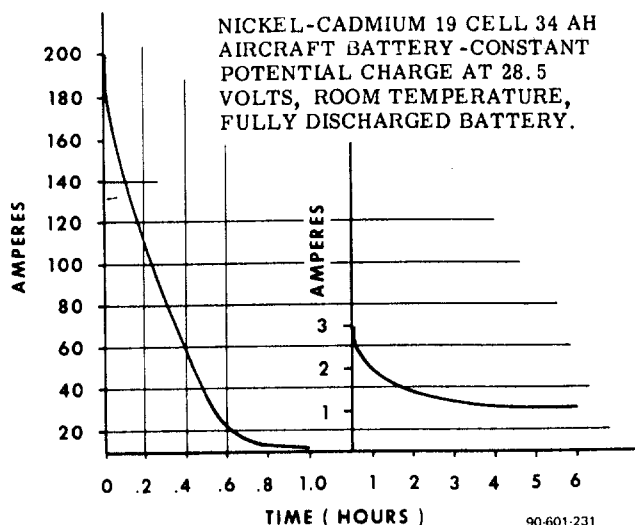


Figure 13-1A. Constant Potential Charging

CAUTION

When a battery is connected to a constant potential charging source, the initial high charging current will damage any 0-25 or 0-50 ampere-scale ammeter connected in series with the battery.

c. An ammeter with a range of zero to 25 or zero to 50 amperes should be connected in series with the battery and power source to monitor the charging current when the master generator panel meter indicates that the current has dropped sufficiently. Charging should continue until the ammeter indicates a current flow of 1 ampere or less, or until a maximum time of 4 hours has elapsed.

d. Should a battery be severely discharged, charging by the constant potential method may produce a slight imbalance in cell capacity. The imbalance can be detected by a periodic check of the cell terminal voltages with a precision voltmeter after the charging current levels off to a few amperes while the battery is charging. Should some cells differ from others by more than 0.05 volts, connect the battery to a constant current source and charge for 14 hours at a rate of 2.5 amperes.

BATTERY STAND-BY CHARGING

Since the self-discharge rate of a nickel-cadmium battery is approximately 1.2 percent per day at normal temperatures, standby charging is required to maintain a battery at its full rated capacity. For standby charging in the temperature range of 60°F to 90°F, use a current equal to 0.003 ampere per each ampere hour of rated capacity. Batteries on stand-by charge must be regularly checked to ensure adequate electrolyte level.

CAPACITY RECONDITIONING

The capacity of a nickel-cadmium battery does not decrease appreciably with age. However, there can be a temporary loss of capacity under certain duty cycles. A temporary loss of capacity is normally an indication of imbalance between cells. Imbalance can be caused by differences in temperature, charge efficiency, self-discharge rate, etc. The purpose of reconditioning is to restore a battery to its full capability and to prevent premature damage and failure. Effective reconditioning requires specific procedures for certain periods of time. No step in the procedure can be eliminated nor can any time period be shortened and still yield effective battery reconditioning.

FREQUENCY OF RECONDITIONING

Due to the variables involved in usage, it is impossible to establish a time interval for reconditioning that will cover all batteries. Until service experience dictates otherwise, a visual and electrolyte check of the battery should be made after the first 50 hours of flight. If the condition of the battery is normal and the level of electrolyte in the battery is satisfactory, schedule the initial reconditioning procedure outlined below at 100-hour intervals until servicing justifies a change:

NOTE

The log of battery services performed should be evaluated to determine the need for servicing, the battery at the above recommended intervals or extending the intervals. Accurate water consumption data is a valid barometer to use for adjustment of the servicing intervals.

RECONDITIONING PROCEDURE

a. Discharge the battery at a current equal to or less than the one-hour rate. Short out each cell as it drops below 0.5 volts. The cells may be shorted by clips or by wires having clips on each end. Allow the shorts to remain on the cells for a minimum of 16 hours, and preferably for 24 hours.

b. Remove the shorting clips and charge for 24 hours at 1.0 amperes. After approximately 5 minutes of charge, measure the individual cell voltages. If any cell voltage is greater than 1.50 volts, add distilled water. The amount of water required is approximately 1 cc per rated ampere-hour capacity, for example, a 25 ampere-hour cell may require about 25 cc of water at this time.

c. After approximately 10 minutes of charge, remeasure the cell voltages. Replace any cell that measures below 1.20 volts or above 1.55 volts.

d. Continue charging for 20 hours. After 20 hours of charging, measure and record the individual cell voltages. If necessary, add distilled water to level the cell 1/8 to 1/4 inch above the baffle. Do not remove any electrolyte from the cells.

e. Measure and record the voltage at 24 charge hours and compare with the 20 hour reading. If the 24 hour voltage reading is below the 20 hour reading by more than 0.04 volts, replace the cell. Also replace any cell that measured below 1.50 volts at 24 charge hours. After removing the battery from charge, measure the electrolyte temperatures. If the electrolyte temperature of any cell is greater than 30°F above the ambient, replace that cell.

BATTERY ELECTROLYTE LEVEL ADJUSTMENT

Although the electrolyte level in the nickel-cadmium battery varies with the state of charge, it should be visible above the bottom of the baffle when the battery is fully charged. When the state of charge of the battery is low, the plates absorb some of the electrolyte, then release it as the battery is recharged. The electrolyte level on any battery must be adjusted after a full charge and a two to four hour rest on open circuit. Check the electrolyte level of the battery (fully charged) in the following manner:

CAUTION

Never use acid or tools contaminated with acid during this adjustment, for both bodily injury and equipment damage may result. If possible, use equipment reserved for nickel-cadmium batteries. If lead-acid battery equipment must be used, remove all possible acid contamination with a sodium bicarbonate solution and rinse. Even minute traces of acid can damage a nickel-cadmium battery.

- a. Remove the battery from the airplane.
- b. With the battery removed from the airplane, remove the filler cap vent plug on each cell one cell at a time.
- c. Insert a transparent tube (approximately 6 inches long and 1/4 inch in diameter) perpendicularly into the filler well until the open end rests lightly on the cell baffle, then place the index finger over the top open end and withdraw the tube.

CAUTION

Do not push down, for the light material of the baffle will give enough to result in a false indication of the electrolyte level.

- d. The electrolyte level of a fully charged battery should be between 1/8 and 1/4 inch above the bottom of the baffle. If the level of liquid in the tube exceeds 1/4 inch, remove the excess with a syringe or squeeze bottle. If the level of the electrolyte is less than 1/8 inch above the bottom of the baffle, add **DISTILLED WATER** with a syringe or squeeze bottle.

CAUTION

Tap water contains minerals, chlorines, softening agents, and other foreign materials which will contaminate a storage battery and shorten its life.

WARNING

The battery may be damaged if the proper procedure is not followed when adding water to the cells.

- e. Clean and reinstall, the filler cap, vent cap, vent plugs and check the battery terminal links for tightness. Discolored links or melted nylon around cell terminals indicate loose link connections.

CAUTION

If water or electrolyte is spilled into the battery container, the resultant electrolyte corrosion may cause battery failure. The battery case must be cleaned as instructed in **BATTERY CLEANING**.

ELECTRICAL LEAKAGE CHECK

The self (internal) discharge rate of a vented nickel-cadmium airplane cell is in the order of C/1000 when fully charged. "C" in this formula represents capacity in ampere-hours. This is about 25 ma for 25 ampere-hour batteries. The only pertinent measure of external leakage is the rate of discharge caused by the leakage. The rate is significant only when it approaches the rate of internal leakage. Therefore, external leakage need be considered excessive only when an ammeter shorting the battery positive or negative terminal to the battery case indicates 25 ma or more. Any current less than the preceding limits indicates a magnitude of leakage that has a negligible effect on battery performance.

Perform the following test to determine if external leakage is sufficient to necessitate cleaning the battery. Set the range selector of a multirange ammeter to the 500 ma scale or higher (a low cost meter is recommended to preclude possible damage to an expensive precision meter). Connect the positive terminal of the ammeter to the positive battery terminal and the negative ammeter terminal to the battery case. Decrease the ammeter current range to obtain a readable value of current and record the value. Perform the same measurement at the negative battery terminal by connecting it to the negative terminal of the ammeter and connecting the positive terminal of the ammeter to the battery case. If the current reading at either terminal is more than 25 ma, the battery should be cleaned. This test

should be made again after the battery has been completely cleaned and charged. If the current measured is again more than 25 ma it may be assumed that one of the cells has a seal leak. That cell may be found by measuring connector-to-battery case voltages. The lowest voltages will occur at the connectors on each side of the defective cell. A cell found leaking in this manner should be replaced.

CAPACITY CHECK

a. Discharge the battery at a rate of 5.0 amperes until an average voltage of one volt per cell is reached. Measure the time required for the battery to reach that discharged state. Any battery that discharges to one volt per cell in 84 minutes or less should be given another reconditioning (deep) cycle.

b. After the second reconditioning cycle, recheck the battery capacity by discharging at the rate used in step "a". Measure the individual cell voltages after 84 minutes of discharge. If any cell is below one volt, replace it.

CLEANING AND INSPECTION

a. Scrub each cell with a 5 percent solution of boric acid in water, but take great care to prevent the solution from entering the cell.

b. Wash each cell off under running water and dry with an air hose or clean absorbent towel.

c. Inspect each cell for defects such as cracks, holes, or burn spots. Replace defective cells with new or rebuilt ones.

d. Make sure that battery hardware is clean and in good mechanical condition. Wash the hardware, liners, case, cover, and other associated parts in a warm soapy solution to remove accumulated dirt and carbonate deposits. Use a stiff brush to remove heavy deposits. After washing, rinse the parts free of soap and spread them out to dry.

e. Remove corrosion preventive from connectors, screws, nuts, and washers with alcohol or by degreasing.

f. Wash vent caps thoroughly with hot water and no soap.

g. After the parts are dry, sort out damaged or heavily corroded pieces. Scrap any links having burns, bends, or defective nickel plating. If a link is tarnished at the terminal connection, it should be polished with a wire brush. It is recommended that new terminal screws and nuts be used to ensure optimal electrical connection.

h. Check the battery receptacle for burns, cracks, and bent or pitted terminals. Defective receptacles can overheat, cause arcing, and decrease output voltage to result in premature battery failure.

i. Scrap bent or torn battery cases and covers that are beyond repair.

j. Replace or repair loose or damaged cover gaskets and cell holddown bars.

NOTE

Refer to the maintenance manual of the battery manufacturer for additional details on battery disassembly and assembly.

NICKEL-CADMIUM BATTERY CHARGE CURRENT DETECTOR

The nickel-cadmium battery charge current detector is a continuous type monitoring system indicating battery condition. The system consists of a shunt in the negative lead of the battery, a charge current detector assembly located adjacent to the battery and an amber caution light (BATTERY CHARGE) located on the instrument panel. The system senses battery charge current through the shunt. The detector receives power through a five ampere circuit breaker located on the circuit breaker panel. Whenever the battery charge current exceeds three amperes for six seconds after starting, or anytime during flight, the amber caution light will illuminate. The system is not activated by the discharge current of the battery.

DETECTOR ASSEMBLY REMOVAL

a. Ensure the battery switch is in the OFF position.

b. Remove the access cover in the nose baggage compartment floor.

c. Disconnect the electrical connector from the detector assembly.

d. Remove the screws and washers attaching the detector assembly to the base.

DETECTOR ASSEMBLY INSTALLATION

a. Position the detector assembly on the base and install the two screws and washers.

b. Connect the electrical connector to the detector assembly.

c. Install the access cover.

d. Perform a functional check to determine the system is working properly.

FUNCTIONAL CHECK

NOTE

Satisfactory load change as used herein, is defined as deflection of the loadmeter needle equal to or less than a .025 load change (approximately 3 amps) for airplane with a 13.5 amp-hour battery. A load change of .025 or .050 is barely perceptible.

The system may be checked in the airplane with either engine running. After the engine is started, turn the applicable generator ON. After a time delay of approximately 6 seconds (provided the battery is sufficiently discharged and will accept a charge), the amber caution light (BATTERY CHARGE) located on the instrument panel should illuminate. The light should remain illuminated until the battery is recharged. Under normal circumstances, the battery should be recharged and the light should go out within 5 minutes. However, if the battery has had unusually low or high drain, the recharge time could be considerably shorter or longer. When the

light does go out, turn the battery switch off while observing the affected loadmeter; the loadmeter should indicate a satisfactory load change.

Listed below are possible situations that could be experienced and corresponding action that is recommended:

a. Light does not illuminate - If the bulb is operational but the light does not come on within approximately 6 seconds after the operating generator is turned ON, it is possible that the battery is not sufficiently discharged to accept a charge. This can be determined by turning the battery OFF while observing the loadmeter needle deflection. A satisfactory load change indicates the battery is charged and the light should not be on. An unsatisfactory load change indicates the light should be on and that there is a malfunction in the detector system. Repair or replace the defective parts and repeat the functional check. If the battery was not discharged enough to accept a charge, turn the generator off and partially discharge the battery by operating electrical equipment. Repeat the functional check.

b. Light stays on - Check the following possibilities:

1. Battery is partially discharged and is being charged. If the light stays on after charging for approximately 5 minutes, careful attention should be given the airplane loadmeter. With a constant load on the airplane electrical system, continue to charge the battery. The loadmeter should indicate a constantly decreasing charge current until the battery is charged. When the loadmeter appears to stabilize (see NOTE in condition 2 below), turn the battery off while observing the loadmeter for load change. If the load change is satisfactory and the light has gone out, the battery is charged and the system is operating properly.

2. Battery is charged and is being excessively overcharged. If the loadmeter stabilizes and indicates an unsatisfactory load change when the battery is turned off, the battery is overcharging excessively and the light should not have gone out. Check the battery and charging circuit for condition and proper operation.

NOTE

As the battery approaches full charge, the charge current may decrease slowly enough that the loadmeter would appear to stabilize before the charge current has decreased enough for the light to go out.

In the event of doubt as to the amount of charge current after the loadmeter appears to have stabilized, an ammeter can be integrated into the charging circuit. To avoid possible damage to the ammeter, install the ammeter and check the charge current as follows:

(a) An ammeter that will indicate approximately 10 amps, lead lines that will reach from the battery relay to the cockpit and an on-off switch for the ammeter leads will be required.

(b) Wire the on-off switch into one of the leads and connect the leads to the ammeter.

(c) Connect the negative side of the ammeter to the battery side of the battery relay and the positive side of the ammeter to the generator side of the battery relay.

(d) With the switch in the ammeter lead turned off, start either engine. Allow the battery to charge until the loadmeter appears to stabilize.

(e) Turn the switch in the ammeter lead ON and turn the battery switch OFF, in that order, to prevent a current surge and possible damage to the ammeter.

(f) Note the charge current as indicated on the ammeter. The charge current should decrease until the light goes out at approximately three amps and may continue to decrease to a lower level.

Repair or replace any parts found to be defective and repeat the functional check.

3. Battery is charged and is not being excessively overcharged: If the light is on and the charge current has dropped to a satisfactory level, the detector assembly is malfunctioning and should be replaced.

c. Light is erratic or does not operate in unison with suitable charge current values as previously outlined. Check the wiring and detector assembly for proper operation. Repair or replace defective parts and repeat the functional check.

COMPONENT REPLACEMENT

Federal Aviation Agency Manual AC 43.13-1A and -2 should be used as a guide to aid in establishing a standard of workmanship for inspection, replacement and repair of electrical components.

ALTERNATOR SYSTEM

ALTERNATOR REMOVAL (BELT DRIVEN)

a. Gain access to the engine through the engine compartment door on the right side of the engine.

b. Remove the upper engine cowling.

c. Remove the small access plate aft of the engine compartment door.

d. Remove the air filter from the induction air box.

e. From inside the induction air box, loosen the attaching screws securing the access plate above the alternator positioning bolt and remove the access plate.

f. Cut the safety wire and remove the alternator positioning bolt.

g. Disconnect the alternator air blast tube.

h. Remove the nut on the alternator pivot bolt.

i. Position the alternator inward toward the center of the airplane enough to loosen the alternator drive belt; then remove the drive belt.

j. Disconnect all electrical wiring connections at the alternator. Tag and identify all wires to facilitate reinstallation.

CAUTION

Make sure the battery master switch is in the off position before removing the electrical wires at the alternator. The output terminal of the alternator is connected directly to the battery through the battery master relay. To prevent accidental damage to the wiring harness and the alternator, the battery ground cable and all external power should be disconnected.

- k. Remove the pivot bolt and washers.
- l. Remove the alternator by tilting slightly and moving outward.

ALTERNATOR INSTALLATION (BELT DRIVEN)

- a. Position the alternator on the pivot hinges and install the pivot bolt and washers.
- b. Connect all electrical wiring, tagged and identified during the removal procedures.

CAUTION

Ensure that the alternator wiring is properly connected. Reverse polarity will destroy diodes in the electrical system. Never close the battery master switch until all wiring harness connections have been made and properly tightened. It should be remembered that the alternator is polarized everytime the battery master switch is turned on; therefore, any attempt to polarize the unit will only damage the voltage regulator and the wiring harness.

- c. Position the alternator drive belt over the alternator drive pulley and install the alternator positioning bolt.
- d. Adjust the alternator belt tension according to the GENERATOR AND ALTERNATOR BELT ADJUSTMENT procedures in this chapter. Tighten the alternator positioning bolt and safety wire.
- e. Install the nut on the pivot bolt and tighten.
- f. Install the alternator air blast tube.
- g. Install the alternator access plate in the induction air box assembly.
- h. Install the air filter in the induction air box.
- i. Install the small access plate just aft of the engine compartment door; then install the upper engine cowling.
- j. Close the right side engine compartment door and secure.

ALTERNATOR REMOVAL (GEAR DRIVEN)

- a. Open the engine compartment door on the alternator side.
- b. Remove the lower portion of the nose bug.

- c. Disconnect the electrical wires from the alternator. Tag and identify the wires to facilitate reinstallation.

CAUTION

Make sure the battery master switch is in the off position before removing the wires at the alternator. The output terminal of the alternator is connected directly to the battery through the battery master relay. To prevent accidental damage to the wiring harness and the alternator, the battery ground cable and all external ground power should be disconnected.

- d. Remove the lockwashers, washers and nuts securing the alternator to the engine.
- e. Carefully remove the alternator from the engine pad.

CAUTION

Care must be taken, when removing the alternator, to prevent damage to the gear splines on the alternator drive gear.

ALTERNATOR INSTALLATION (GEAR DRIVEN)

CAUTION

Before installing the alternator, make sure the nut on the drive shaft of the alternator is torqued to 450 to 500 inch-pounds and is safetied with the cotter pin spread around the nut, not over the end of the shaft. If the drive shaft nut is safetied with the cotter pin spread over the end of the shaft, damage will result to the gears and the alternator shaft.

- a. Position the alternator gasket and alternator on the engine pad. It may be necessary to turn the prop slightly or remove the alternator and rotate the gear spline on the end of the alternator shaft in order to align the drive gear in the engine with the gear on the alternator.

WARNING

When working on a propeller, always make certain that the ignition switch is in the OFF position and the engine has cooled completely. To be safe, treat all magnetos as hot. To ground the magneto, disconnect the magneto switch wire at the capacitor and ground the capacitor pole. If this is impractical, remove the ignition harness, magneto distributor cap or disconnect the spark plug leads. **WHEN MOVING A PROPELLER, STAND IN THE CLEAR.**

- b. Install the lockwashers, washers and nuts that secure the alternator to the engine pad. Torque the nuts to 150 to 180 inch-pounds and safety in pairs.

NOTE

Tighten bolts evenly by bringing each one snug. Then, torque each bolt in rotation a little at a time until the required torque has been reached on each bolt.

- c. Connect all electrical wiring tagged and identified during the removal procedures.

CAUTION

Ensure that the alternator wiring is properly connected. Reverse polarity will destroy diodes in the electrical system. Never close the battery master switch until all wiring harness connections have been made and properly tightened. It should be remembered that the alternator is polarized everytime the battery master switch is turned on ; therefore, any attempt to polarize the unit will only damage the voltage regulator and the wiring harness.

- d. Install the lower portion of the nose bug.
- e. Close the engine compartment door and secure.

ALTERNATOR AND GENERATOR OVERHAUL

Refer to applicable Vendor Publications for complete tests and maintenance procedures.

VOLTAGE REGULATOR ADJUSTMENT (ALTERNATOR SYSTEM)

The alternators are controlled by two fully transistorized electronic voltage regulators. Only one regulator is operable in the system at any one time. The remaining regulator is used as an alternate or standby unit. When switched into the circuit, either regulator will automatically adjust the alternator output to the required electrical load, including battery recharging. Control and selection of the regulators is provided by a two position selector switch, placarded VOLT REG-1-2, located on the pilot's subpanel.

The voltage regulators are located in the nose baggage compartment on all series, either on the aft bulkhead of the nose baggage compartment (TC-1 thru TC-1072 and TE-1 thru TE-540, TE-542, TE-544, TE-546 and TE-548) or below the floorboard of the nose baggage compartment just forward of the battery box (TC-1073 and after, TE-541, TE-543, TE-545, TE-547, TE-549 and after, and TH-1 and after).

The voltage regulators utilized on the airplanes should be checked and, if necessary, adjusted when a voltage regulator or alternator is replaced or when a periodic inspection reveals a need for adjustment. The ideal time to adjust the voltage regulators is immediately following a flight of 20 to 30 minutes duration or longer, in which normal electrical loads have been used. If the electrical system, including the voltage regulators and alternators, cannot be warmed up by flight, they may be warmed up on the ground. The voltage regulator adjustments should be made while operating one engine only. The left engine has been selected to permit a completely safe access to both voltage regulators so that they may be adjusted while the engine is operating, without danger of personal injury from the propeller.

WARNING

Do not operate the right engine.

The following procedures should be used to adjust the voltage regulators:

CAUTION

During all tests and adjustments on the voltage regulators, make certain that the regulator circuits, including any meter or test leads, are always protected from accidental grounding to airplane structure and contact with other circuits. Even a momentary ground contact may permanently damage the voltage regulators.

- a. Start the left engine according to the ENGINE START procedures in the applicable Pilot's Operating Manual. Do not start the right engine.

- b. Place the left alternator switch, located on the pilot's subpanel, in the on position. Place the VOLT REG switch, also located on the pilot's subpanel, in the No. 1 position.

- c. Bring the voltage regulator up to normal operating temperature by running the engine for at least 20 minutes at minimum cruise rpm with approximately 15 to 20 percent electrical load as indicated on the respective loadmeter, located in the center section of the instrument panel.

CAUTION

Monitor the cylinder head temperature indicator to prevent overheating of the engine due to inadequate air cooling.

- d. Using a portable precision voltmeter (0-50 range, $\pm$ 1% accuracy), connect the POSITIVE lead to the common bus terminal and the NEGATIVE lead to structural ground.

CAUTION

Do not use the voltmeter on the airplane instrument panel, except to determine that the alternator is operating.

e. Check the voltage reading on the voltmeter. If the reading does not indicate $28.25 \pm .25$ vdc, remove the top plug (marked VOLTAGE ADJUSTMENT) covering the slotted adjustment screw inside the voltage regulator and adjust the regulator to $28.25 \pm .25$ vdc.

NOTE

To raise the voltage setting, turn the slotted adjusting screw clockwise; to lower the voltage setting, turn the slotted adjusting screw counterclockwise. A positive stop in each direction limits the setting of the adjustment screw to two notches.

f. Replace the plug in the VOLTAGE ADJUSTMENT hole in the appropriate voltage regulator.

g. Place the VOLT REG switch in the No. 2 position.

h. Bring the voltage regulator up to normal operating temperature by running the engine for at least 20 minutes at minimum cruise rpm with approximately 15 to 20 percent electrical load as indicated on the respective loadmeter, located in the center section of the instrument panel.

i. Again check the voltage reading on the voltmeter. If the reading does not indicate $28.25 \pm .25$ vdc, remove the top plug (marked VOLTAGE ADJUSTMENT) covering the slotted adjustment screw inside the voltage regulator and adjust the regulator to $28.25 \pm .25$ vdc.

NOTE

To raise the voltage setting, turn the slotted adjusting screw clockwise; to lower the voltage setting, turn the slotted adjusting screw counterclockwise. A positive stop in each direction limits the setting of the adjustment screw to two notches.

j. Replace the plug in the VOLTAGE ADJUSTMENT hole in the appropriate voltage regulator.

k. Start the right engine according to the ENGINE START procedures in the applicable Pilot's Operating Handbook. Place the right alternator switch in the ON position and allow the alternator to properly warm up.

l. Place the VOLT REG switch in the No. 1 position and perform the following Checks. Then place the VOLT REG switch in the No. 2 position and perform the same checks.

1. With both engines running at minimum cruise rpm and a 15 to 20 percent load indicated on the loadmeters, switch from one alternator to the other several times, then switch both alternators on. Monitor the voltage reading on the voltmeter. Make any final adjustment necessary on the appropriate voltage regulator to maintain the voltage reading at $28.25 \pm .25$ vdc.

WARNING

For any adjustment, the right engine must be shut down to provide safe access to the voltage regulators.

2. With both engines running at minimum cruise rpm and both alternators on, turn on all possible electrical loads. Check to see if the alternators share the load to within 10 percent of the rated output of one of the alternators. If they do not share the electrical load as described, see the section labeled ALTERNATOR PARALLELING in this chapter.

m. Shut down the left and right engines according to the ENGINE SHUT DOWN procedures in the applicable Pilot's Operating Handbook.

n. Remove the precision voltmeter from the airplane.

ALTERNATOR PARALLELING

On the airplanes, which use one regulator to regulate the output of both of the alternators, there are no provisions for paralleling the alternators. Unbalanced outputs between the alternators can be caused by : (1) voltage drops in the charging system wiring; (2) voltage drops in the ground circuit connections; (3) manufacturing tolerances in the alternators; (4) variations in the overall resistance characteristics between the two charging circuits; (5) operating temperature of the alternators and the voltage regulator, and (6) the engine rpm.

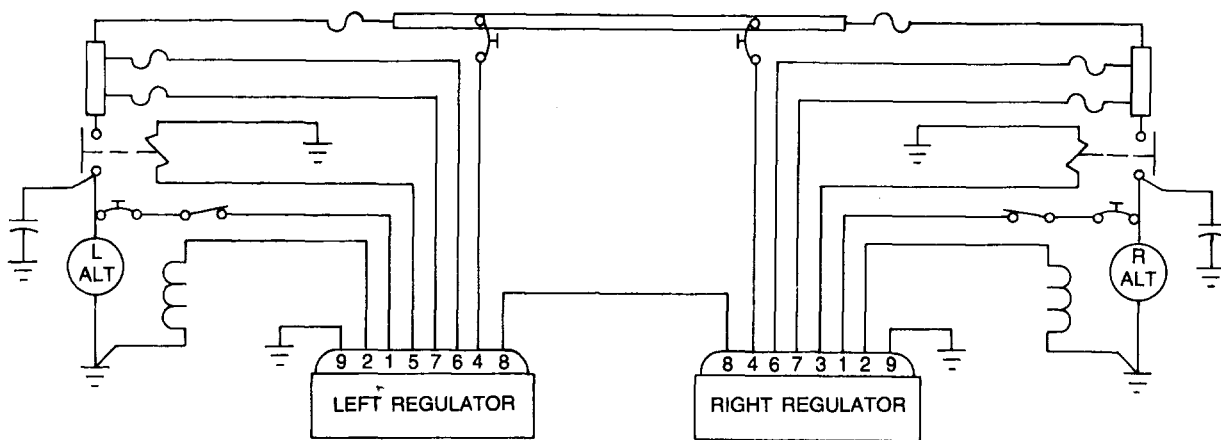
If either alternator is turned off and the remaining alternator "picks up" the load, the alternators are functioning properly.

Alternator charging systems, unlike the generator systems, do not require a balanced output to prevent component damage.

ALTERNATOR LOAD CONTROL UNITS (SPLIT VOLTAGE REGULATORS)

ALTERNATOR CONTROL UNIT ADJUSTMENT (TC-2457 AND AFTER, TE-1202 AND AFTER, AND TH-1377 AND AFTER)

Each alternator is individually controlled by an alternator control unit which regulates voltage, balances the load and provides overvoltage protection.



EXTERNAL WIRING DIAGRAM

- TERMINAL IDENTIFICATION:
1. - REGULATOR INPUT
 2. - FIELD
 3. - N/C
 4. - VOLTAGE SENSE
 5. - CONTROL (+RELAY COIL 28VDC, 1 AMP MAX)
 6. - CURRENT SENSE MINUS
 7. - CURRENT SENSE PLUS
 8. - EQUALIZATION
 9. - GROUND

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Figure 13-2 Alternator Control Unit Wiring

The alternator control units are located in the nose baggage compartment under the floor forward of the battery compartment on TH-1377 thru TH-1395 except TH-1389. On TC-2457 and after, TE-1202 and after, TH-1389 and TH-1396 and after, the alternator control units are located on the forward side of the forward bulkhead on both the right and left upper corners.

Load sharing depends on the alternators being adjusted to within 0.25 volts of each other. When both alternators are turned on, the bus voltage will be the output of the highest alternator and load sharing should be within 10% of the output of one alternator.

NOTE

During all tests and adjustments on the alternator control unit, make certain that the regulation circuits, including any meter leads, are always protected from accidental grounding to the airplane structure and contact with other circuits.

The following procedures should be used to adjust the alternator control unit.

a. Using a portable precision voltmeter (0-50 volt range, $\pm 1\%$ accuracy), connect the positive lead to the aircraft electrical bus and the negative lead to structural ground.

b. Start both engines according to the engine start procedures in the applicable Pilot's Operating Handbook.

c. Place both alternator switches, located on the pilot's subpanel to the ON position.

d. Bring the alternator control unit and alternator up to operating temperature by running the engines for at least 5 minutes at a minimum of 1200 RPM with the combined readings for both loadmeters indicating a TOTAL electrical load of 30%.

CAUTION

Monitor the cylinder head temperature indicator to prevent overheating of the engine due to inadequate air cooling.

e. Record the bus voltage while running the engines at 1200 rpm.

NOTE

Do not use the voltmeter on the airplane instrument panel except to determine that the alternator is operating.

f. Turn the right alternator off and record the bus voltage. Turn the right alternator on and the left alternator off and record the bus voltage. With both alternators on,

check for a bus voltage of 28.5 ± 0.3 vdc and record. The difference between the readings just recorded should not exceed 0.25 vdc.

g. If adjustment of the left alternator is required shut down the right engine and adjust the left alternator control unit (located in the nose baggage compartment) output to match the recorded voltage output of the right alternator.

h. If the right alternator control unit requires adjustment, shut down both engines and adjust the right alternator control unit in small increments.

NOTE

Due to the location of the right engine propeller to the nose baggage door, both engines should be shut down when adjusting the right alternator control unit.

i. Start the right engine according to the engine start procedures in the applicable P.O.H.

j. Place the right alternator switch to the ON position.

k. Bring the alternator control unit and alternator up to operating temperature and record the bus voltage while running the engine at 1200 rpm.

l. Start the left engine according to the Engine Start procedures in the applicable Pilot's Operating Handbook.

m. Place the left alternator switch to the ON position.

n. Bring the alternator and alternator control unit up to operating temperature by running the engines at minimum of 1200 RPM with the combined readings of both loadmeters indicating a TOTAL electrical load of 30%.

o. Check the voltage and load readings on the applicable volt and load meters. If the voltage on both alternators does not indicate 28.5 ± 0.3 vdc and the load is not shared approximately equal between alternators, the adjustment procedure will have to be repeated.

ALTERNATOR CONTROL UNIT ADJUST (BENCH CHECK)

To properly adjust the alternator control unit on the bench the following equipment is required:

1. A 28 vdc regulated power supply.
2. A Precision voltmeter (0-50 volt range, $\pm 1\%$ accuracy).
3. A dummy resistance load (4 amps).
4. An ammeter (0-5A range).
5. A contactor indicator device. (A small 28v relay, or a 28v indicator lamp, or a voltmeter.)
6. One connector (AMP-206708-1).

The alternator control unit is adjusted as follows:

- a. Set up test configuration as indicated in Figure 13-3.

b. Jumper the power supply positive lead to the ammeter positive lead.

c. Turn the power supply ON and set the output to 28.5 vdc.

d. Adjust the dummy load to obtain a 4 amp reading on the ammeter.

e. Turn the power supply OFF and remove the jumper.

f. Mate the test connector to the alternator control connector.

g. Turn the power supply ON and adjust the output to 28.5v.

NOTE

Hold this voltage constant. The contactor indicator device should indicate ON when power is applied.

h. After a 2 minute warm up period, adjust the alternator control unit as required to obtain 1.0 amp load indicated on the ammeter.

NOTE

While performing the following step, only one precision volt meter is required. The input voltage does not need to be maintained at any precise value, and the same voltmeter may be used for both tests.

i. With the 1.0 amp load indicated on the ammeter, the equalizer voltage should be 5.75 ± 0.1 vdc.

j. Turn the power supply OFF and disconnect the test setup.

NOTE

1. Deviation from the normal value (5.75volts) might be due to voltmeter calibration differences, temperature variations or ageing of the unit under test.

2. Equalizer voltage falling outside the 5.65 - 5.85 limit is not necessarily a cause for rejecting the unit.

3. The effect of large equalizer voltage variation will be a tendency of the current balance to be offset when the unit is operating as a companion unit in a complete airplane system.

4. The expected load current offset is about 1.0 amps for a 0.1 volt difference in the equalizer voltages of two alternator control units operating together in an airplane system. Such a small load balance difference would be difficult to verify in a field test facility.

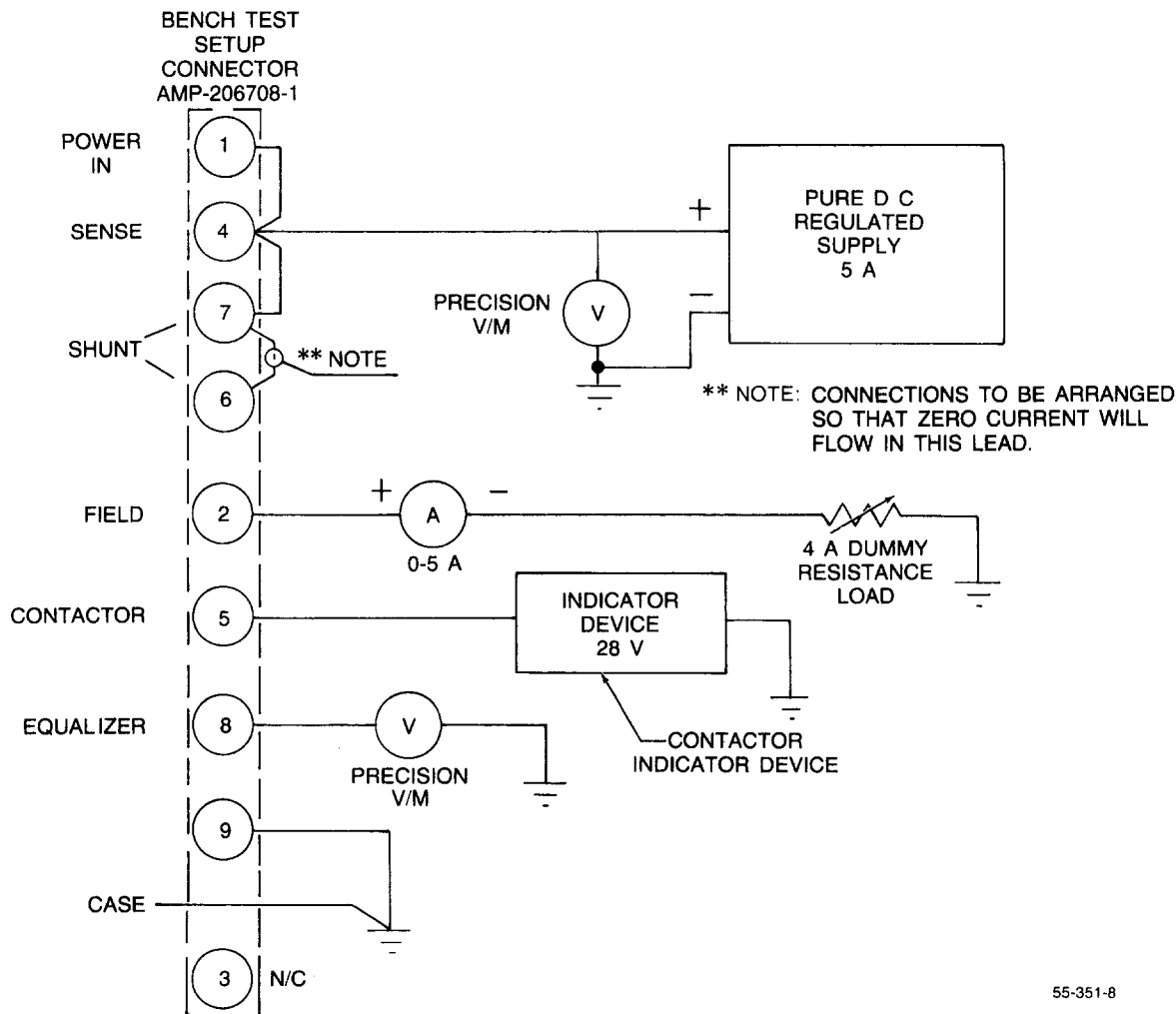


Figure 13-3 Alternator Control Unit Voltage Adjustment

5. If the equalizer voltage is substantially outside the indicated range (for example, several times the tolerance), the unit should be rechecked in a fully equipped test facility.

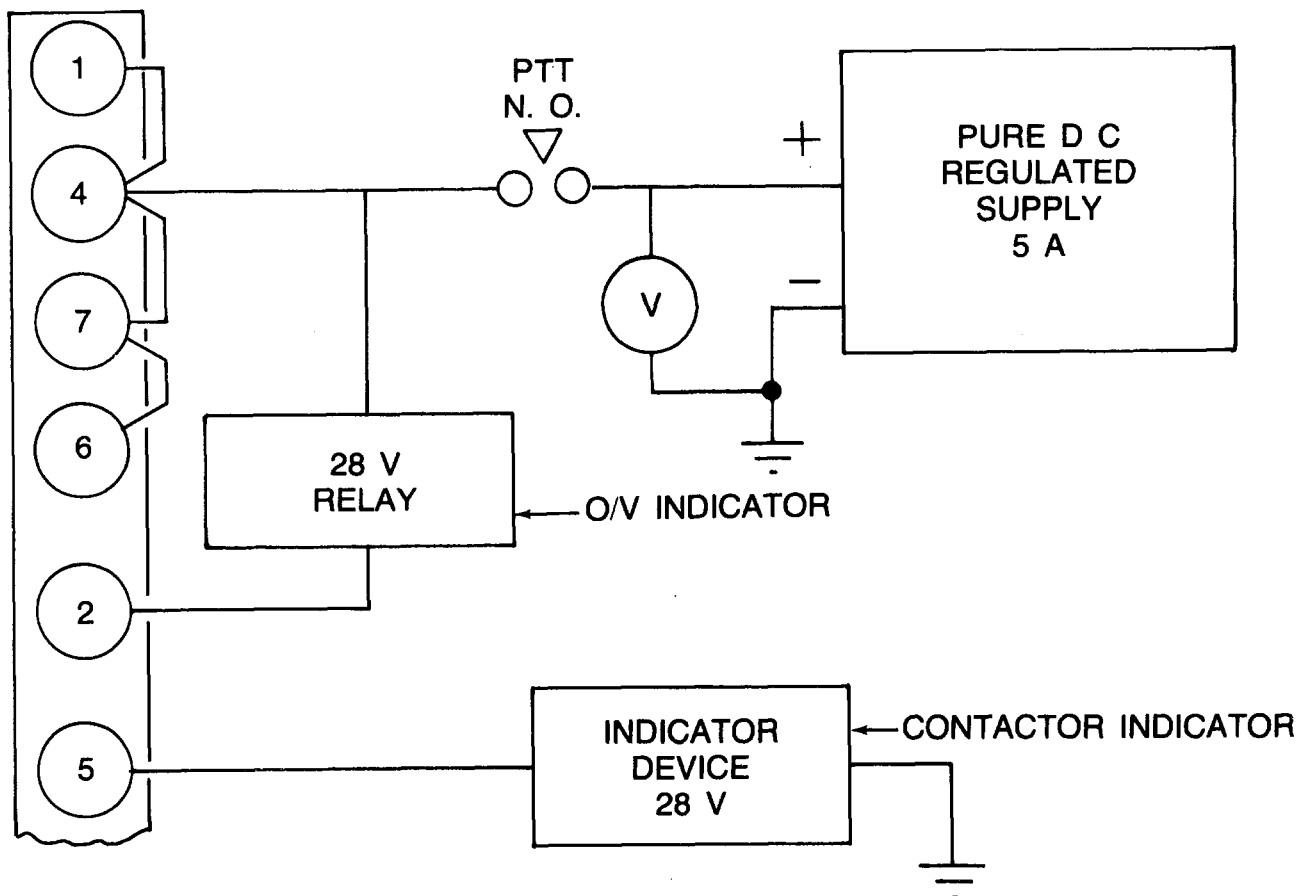
OVERVOLTAGE TRIP (BENCH CHECK)

Overvoltage protection is incorporated in the voltage regulator which locks out the output of the regulator in the event an overvoltage occurs. The voltage regulators are shipped from the manufacturer with the overvoltage trip point preset. To convert from the voltage adjustment test to Overvoltage test the following revisions to the test setup must be made:

1. Disconnect the dummy load.
2. Add a small 28 volt relay for overvoltage indication as shown in **Figure 13-4**.
3. Add a press-to-test switch in the input connection.

Overvoltage trip adjustment is accomplished as follows:

- a. Set up the test items as indicated in Figure 3.
- b. Turn the power supply ON.
- c. Bring the output of the power supply up until 28.5 volts is indicated on the precision voltmeter.
- d. Wait 5 to 10 minutes to allow the alternator control unit to reach operating temperature.
- e. After the alternator control unit has warmed up, increase the output of the power supply to 31.8 volts.



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Figure 13-4 Overvoltage Protection Function Test

f. Depress the press-to-test switch and hold for 5 seconds. The contactor indicator should be activated for the full time the press-to-test switch is depressed.

g. Set the regulated voltage to 32.2v. Depress the press-to-test switch and hold for 5 seconds; the contactor indicator should activate. After a fractional second delay, the overvoltage indicator should activate and simultaneously the contactor indicator should deactivate.

NOTE

The overvoltage trip is preset at the factory and should not be adjusted under field conditions. If the unit under test does not operate within the parameters of this test, the unit should be tested in a fully equipped test facility or replaced.

h. Turn the power supply to off and remove the alternator from the test setup.

GENERATOR AND ALTERNATOR BELT ADJUSTMENT

Test the belt tension by pushing down on the belt at a point midway between the pulleys. A deflection of 3/8 inch when a pressure of 12 pounds is applied indicates correct tension on a new belt. This same deflection indicates proper tension upon the application of 10 pounds against a used or readjusted belt. If the belt is too loose, tighten the belt by shifting the generator or alternator on its pivot.

On airplanes equipped with belt driven alternators, determine that the hex fitting at the engine fuel pump inlet connection is positioned such that the hex flat is parallel with the alternator drive face belt, thereby providing a minimum of .25 clearance between the two.

ALTERNATOR LUBRICATION (BELT DRIVEN)

Lubricate the bearing in the drive and frame to one-quarter full (do not overfill, as this may cause the bearing to overheat) with Delco-Remy lubricant No. 1960373 only. It is recommended that a new retainer plate be installed if the felt seal in the retainer plate is hardened or excessively worn. The bearing in the slip ring end frame should be replaced if its grease supply is exhausted. No attempt should be made to relubricate and reuse the bearing.

OVERVOLTAGE RELAYS

No attempt should be made to adjust the overvoltage relays. They are preset at the factory to trip at a voltage of 32 ± 1 vdc. When the relay is determined defective, it should be replaced with a new or exchange relay.

GENERATOR SYSTEM

GENERATOR REMOVAL

- a. Gain access to the engine through the engine compartment door on the right side of the engine.
- b. Remove the upper engine cowling.
- c. Remove the small access plate aft of the engine compartment door.
- d. Remove the air filter from the induction air box.
- e. From inside the induction air box, loosen the attaching screws securing the access plate above the generator positioning bolt and remove the plate.
- f. Cut the safety wire and remove the generator positioning bolt.
- g. Disconnect the generator air blast tube.
- h. Remove the nut on the generator pivot bolt.
- i. Position the generator inward toward the center of the airplane enough to loosen the generator drive belt; then remove the drive belt.
- j. Disconnect all electrical connections at the generator. Tag and identify the wires to facilitate reinstallation.

CAUTION

Make sure the battery master switch is in the off position before removing the electrical wires at the generator. To prevent accidental damage to the wiring harness and the generator, the battery ground cable and all external ground power should be disconnected.

- k. Remove the pivot bolt and washers.
- l. Remove the generator by tilting slightly and moving outward.

GENERATOR INSTALLATION

- a. Position the generator on the pivot hinges and install the pivot bolt and washers.

- b. Connect all electrical wiring, tagged and identified during the removal procedures.

CAUTION

Ensure that the generator wiring is properly connected. Reverse polarity will destroy diodes in the electrical system. Never close the battery master switch until all wiring connections have been made and properly tightened.

- c. Position the generator drive belt over the generator pulley and install the generator positioning bolt.
- d. Adjust the generator belt tension according to the GENERATOR AND ALTERNATOR BELT ADJUSTMENT procedures in this chapter. Tighten the generator positioning bolt and safety wire.
- e. Install the nut on the pivot bolt and tighten.
- f. Install the generator air blast tube.
- g. Install the generator access plate in the induction air box assembly.
- h. Install the air filter in the induction air box.
- i. Install the small side plate aft of the engine compartment door; then install the upper engine cowling.
- j. Close the right side engine compartment door and secure.

GENERATOR BRUSH WEAR LIMITS

Generator brushes should be replaced before their maximum wear limits are reached. The minimum permissible brush length is 5/16 inch.

VOLTAGE REGULATOR ADJUSTMENT (GENERATOR SYSTEM)

In those airplanes equipped with generators, each generator is controlled by its respective voltage regulator. When the generator is switched into the circuit, the voltage regulator will automatically adjust the output of the generator to the required electrical load, including battery recharging. The individual voltage regulators are located in the outboard side of each nacelle just aft of the engine firewall.

The voltage regulators utilized on the airplanes should be checked and, if necessary, adjusted when a voltage regulator or generator is replaced or when a periodic inspection reveals a need for adjustment. The ideal time to adjust the voltage regulators is immediately following a flight of 20 to 30 minutes duration or longer, in which normal electrical loads have been used. If the electrical system, including the voltage regulators and generators, cannot be warmed up by flight, they may be warmed up on the ground.

WARNING

Exercise extreme caution to avoid personal injury from the moving propeller or prop wash while adjusting the voltage regulators.

The following procedures should be used to adjust the voltage regulators:

CAUTION

During all tests and adjustments on the voltage regulators, make certain that the regulator circuits, including any meter or test leads, are always protected from accidental grounding to airplane structure and contact with other circuits. Even a momentary ground contact may permanently damage the voltage regulators.

a. Start the left and right engines according to the ENGINE START procedures in the applicable Pilot's Operating Manual.

b. Place the left generator switch, located on the pilot's subpanel, in the on position.

c. Bring the voltage regulator and generator up to operating temperature by running the engine for at least 20 minutes at minimum cruise rpm with approximately 15 to 20 percent electrical load as indicated on the respective loadmeter, located in the center section of the instrument panel.

CAUTION

Monitor the cylinder head temperature indicator to prevent overheating of the engine due to inadequate air cooling.

d. Using a portable precision voltmeter (0-50 range, $\pm 1\%$ accuracy), connect the POSITIVE lead to the common bus terminal and the NEGATIVE lead to structural ground.

CAUTION

Do not use the voltmeter on the airplane instrument panel, except to determine that the generator is operating.

e. Check the voltage reading on the voltmeter. If the reading does not indicate $28.25 \pm .25$ vdc, gain access to the voltage regulator by removing the small access plate on the outboard side of the left nacelle, just aft of the engine cowl door. Remove the voltage regulator cover and turn the voltage adjusting screw clockwise to increase the voltage reading and counterclockwise to decrease the voltage.

CAUTION

If the adjusting screw is turned down (clockwise) beyond the normal adjustment range, the spring support may fail to return when pressure is relieved. In such case, turn the screw counterclockwise until sufficient clearance develops between the screw head and the spring support, then bend the spring support upward carefully with small pliers until contact is made with the screw head. Final setting of the unit should be approached by increasing the spring tension, never by reducing it. If the setting is too high, adjust the unit below the required value, and then raise the value to the exact setting by increasing the spring tension.

f. Replace the voltage regulator cover, reduce the left generator speed until the relay points open and then bring the generator back to minimum cruise rpm. Check the voltage reading on the voltmeter. If the voltage reading does not indicate $28.25 \pm .25$ vdc, repeat the adjustment procedures for the left voltage regulator until it does.

NOTE

The voltage regulator cover must be replaced and the voltage regulator must be brought up to operating temperature again. Variations in the temperature will effect the voltage reading.

g. Replace the small access plate on the outboard side of the left nacelle.

h. Place the right generator switch in the on position and the left generator switch in the off position.

i. Bring the voltage regulator and generator up to operating temperature by running the engine for at least 20 minutes at minimum cruise rpm with approximately 15 to 20 percent electrical load as indicated on the respective loadmeter, located in the center section of the instrument panel.

j. Again check the voltage reading on the voltmeter. If the reading does not indicate $28.25 \pm .25$ vdc, gain access to the voltage regulator by removing the small access plate on the outboard side of the right nacelle, just aft of the engine cowl door. Remove the voltage regulator cover and turn the voltage adjusting screw clockwise to increase the voltage reading and counterclockwise to decrease the voltage.

CAUTION

If the adjusting screw is turned down (clockwise) beyond the normal adjustment range, the spring support may fail to return when pressure is relieved. In such case, turn the screw counterclockwise until sufficient clearance develops between the screw head and the spring support, then bend the spring support upward carefully with small pliers until contact is made with the screw head. Final setting of the unit should be approached by increasing the spring tension, never by reducing it. If the setting is too high, adjust the unit below the required value, and then raise the value to the exact setting by increasing the spring tension.

k. Replace the voltage regulator cover, reduce the right generator speed until the relay points open and then bring the generator back to minimum cruise rpm. Check the voltage reading on the voltmeter. If the voltage reading does not indicate $28.25 \pm .25$ vdc, repeat the adjustment procedures for the right voltage regulator until it does.

NOTE

The voltage regulator cover must be replaced and the voltage regulator must be brought up to operating temperature again. Variations in the temperature will effect the voltage reading.

l. Replace the small access plate on the outboard side of the right nacelle.

m. With both engines running at minimum cruise rpm, both generator switches in the on position, turn on all possible electrical loads. Each generator should share the load to within 10 percent of the rated output of one of the generators.

n. Shut down the left and right engines according to the ENGINE SHUT DOWN procedures in the applicable Pilot's Operating Manual.

o. Remove the precision voltmeter from the airplane.

PARALLELING RELAY

When accessory loads make it necessary to use two generators in the electrical charging system of twin engine airplanes and when they charge into a single battery, a paralleling generator regulator system is necessary for proper operation of the charging system. An external two unit paralleling relay also provides for separate operation of

either generator, should the other become inoperative. There is no adjustment to the paralleling relay; their operation is adjusted by the shunt paralleling coil located on the voltage regulator unit.

STARTER

STARTER REMOVAL

- a. Access to the starter may be gained through the right hand cowl door.
- b. Disconnect the electrical wiring from the starter.
- c. Remove the two "palnuts", hex nuts and washers from the mounting studs, and remove the starter.

STARTER INSTALLATION

- a. Install a new O-ring on the flange of the starter.
- b. Position the starter on the mounting pad.
- c. Install the attaching nuts and torque the nuts to 150-180 inch-pounds.
- d. Secure the attaching nuts with "palnuts".
- e. Connect the electrical wiring to the starter.
- f. Start the engine to check for oil seepage at the mounting flange and check for proper operation.

STARTER OVERHAUL

Refer to applicable Vendor Publications for complete tests and maintenance procedures.

STARTER LUBRICATION

No lubrication is required on the starting motor except at the time of overhaul. Bushings and armature shaft should be coated with a small amount of Delco-Remy Lubricant No. 1960954.

CAUTION

Do not clean the starter in any degreasing tank or grease dissolving solvents. Avoid excessive lubrication.

STARTER BRUSHES

The starter brushes should slide freely in the holders and make full contact on the commutator. The brushes should be replaced when they have worn to 3/8 inch length. Proper brush spring tension with new brushes installed is 24 ounces. This tension is measured with a scale hooked under the brush spring near the brush and the reading taken just as the spring leaves the brush.

ELECTRICAL UTILIZATION LOAD CHART

MODEL 55 AND A55

MAXIMUM CONTINUOUS LOAD (Standard Equipment)

Equipment	Part No.	No. Per Airplane	Amperes Per Unit	Amperes Total
Indicator Anti-Ice	50-384001-31	1	.10	.10
Indicator Fuel	5643081	2	.38	.76
Indicator Landing Gear Visual	356 Lamp	1	.17	.17
Indicator Landing Gear	313 Lamp	1	.17	.17
Indicator Engine	96-324010-3	2	.30	.60
Indicator Turn & Slip	95-324011-55	1	.15	.15
Indicator Trim Tab	1819 Lamp	2	.04	.08
Indicator Flap	313 Lamp	1	.17	.17
Indicator Cowl Flap	313 Lamp	1	.17	.17
Heated Pitot	50-384040	1	3.30	3.30
Rheostat (Light)	327 Lamp	1	.04	.04
Light Wing Tip	1524 Lamp	4	.75	3.00
Light Tail	1203	1	.65	.65
Light Instrument Overhead	303 Lamp	2	.30	.60
Light Placard	327 Lamp	7	.04	.28
Light Compass	303 Lamp	1	.20	.20
Light Fuel Selector	327 Lamp	2	.04	.08
Flasher Navigation Lights	90-28	1	.10	.10
Valve Solenoid Heater	AV1B1473	1	.30	.30
Ignitor Heater	11C30	1	1.20	1.20
Pump Fuel Heater	476439	1	.40	.40
Relay Battery Master	6041H189	1	.60	.60
Paralleling Box	1115902	1	.25	.25

ELECTRICAL UTILIZATION LOAD CHART

MODEL 55 AND A55

INTERMITTENT LOAD (Standard Equipment)

Equipment	Part No.	No. Per Airplane	Amperes Per Unit	Amperes Total
Relay Starter	34810A	2	.22	.44
Starter	1108234	2	100.00	200.00
Motor Flap	35-364151-57	1	13.00	13.00
Horn Stall Warning	1-02-300	1	1.50	1.50
Cigarette Lighter	LPA27630	1	7.50	7.50
Horn Landing Gear Warning	319	1	.60	.60
Flasher Landing Gear Warning	624	1	.30	.30
Motor Landing Gear	IS14818	1	10.00	10.00
Relay Box	6046H39A	1	.40	.40
Light Taxi	4570	1	5.36	5.36
Light Landing	4523	2	8.90	17.80
Motor Cowl Flap	95-369011	2	1.00	2.00
Light Cabin Dome	303 Lamp	3	.30	.90
Ignition Vibrator	10-176487-242	1	2.00	2.00
Motor Heater Blower	M2916V	1	14.00	14.00
Pump Fuel Boost	4032B	2	2.10	4.20

ELECTRICAL UTILIZATION LOAD CHART

MODEL 55 AND A55

MAXIMUM CONTINUOUS LOAD (Optional Equipment)

Equipment	Part No.	No. Per Airplane	Amperes Per Unit	Amperes Total
Lights Post	327 Lamp	35	.04	1.40
Rotating Beacon - Upper	G7740-9-24	1	3.75	3.75
Rotating Beacon - Lower	G7740-9-24	1	3.75	3.75
Light, Ice	MS25318-1	1	2.14	2.14
Meter Engine Hour	M1986	1	.05	.05
Pump Prop Anti-Ice	476439	1	.40	.40
Light De-Ice Post	327 Lamp	1	.04	.04
Meter Flight Hour	M1990	1	.05	.05
Indicator Prop Anti-Ice		1	.10	.10
Auto Pilot	Sperry	1	3.00	3.00

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ELECTRICAL UTILIZATION LOAD CHART

MODEL B55 (TC-371 through TC-2180)

MAXIMUM CONTINUOUS LOAD (Standard Equipment)

Equipment	Part No.	No. Per Airplane	Amperes Per Unit	Amperes Total
Indicator Anti-Ice	50-384001-31	1	.10	.10
Indicator Fuel	5643081	2	.38	.76
Indicator Landing Gear Visual	95-324006-75 Lamp	1	.17	.17
Indicator Landing Gear	327 Lamp	2 	.04	.04
Indicator Engine	96-324010-3	2	.30	.60
Indicator Turn & Slip	1680 Model TC-100(24)	1	.15	.15
Indicator Trim Tab	1819 Lamp	2	.04	.08
Indicator Flap	50-384001-35	1	.06	.06
Indicator Cowl Flap	327 Lamp	1	.04	.04
Heated Pitot	50-384040	1	3.40	3.40
Rheostat (light)	327 Lamp	1	.04	.04
Light Wing Tip	1524 Lamp	4	.75	3.00
Light Tail	1683	1	.65	.65
Light, Glareshield	1829 Lamp	8	.07	.56
Light Placard	327 Lamp	7	.04	.28
Light Fuel Selector	327 Lamp	2	.04	.08
Flasher Navigation Lights	90-28	1	.10	.10
Valve Solenoid Heater	AV1B1473	1	.30	.30
Ignitor Heater	11C30	1	1.90	1.90
Pump Fuel Heater	476439	1	.40	.40
Relay Battery Master	6041H189	1	.60	.60
Paralleling Box	1116902	1	.25	.25

 Only one used at a time.

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MODEL B55 (TC-371 through TC-2180)

INTERMITTENT LOAD (Standard Equipment)

Equipment	Part No.	No. Per Airplane	Amperes Per Unit	Amperes Total
Relay Starter	6041H189	2 	.60	.60
Starter	1108234	2 	100.00	100.00
Motor Flap	35-364151-57	1	13.00	13.00
Horn Stall Warning	169-380021-11	1	.70	.70
Cigarette Lighter	LPA27630	1	7.50	7.50
Horn Landing Gear Warning	169-380021-9	1	1.50	1.50
Flasher Landing Gear Warning Horn	R102-12V	1	.40	.40
Motor Landing Gear	96-380022	1	10.00	10.00
Landing Gear Dynamic Brake	6046H39A	1	.40	.40
Light Taxi	4626	1	5.36	5.36
Light Landing	4596	2	8.90	17.80
Motor Cowl Flap	96-369011	2	2.20	4.40
Light Cabin Dome	303 Lamp	3	.30	.90
Ignition Vibrator	10-176487-242	1	2.00	2.00
Motor Heater Blower	M2916V	1	14.00	14.00
Pump Fuel Boost	96-380020	2	3.00	6.00
Light, Compass	327	1	.04	.04
Light, O.A.T.	327	1	.04	.04

 Only one used at a time

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MODEL B55 (TC-371 through TC-2180)

MAXIMUM CONTINUOUS LOAD (Optional Equipment)

Equipment	Part No.	No. Per Airplane	Amperes Per Unit	Amperes Total
Lights Post	327 Lamp	39	.04	1.56
Rotating Beacon - Upper	D7080A1-24	1	3.75	3.75
Rotating Beacon - Lower	D7080A1-24	1	3.75	3.75
Light, Ice	MS25318-1	2 	2.14	4.28
Light, Ice	A7079B-24	1 	2.14	2.14
Meter Engine Hour	M1986	1	.05	.05
Pump Prop Anti-Ice	476439	1	.40	.40
Light De-Ice Post	327 Lamp	1	.04	.04
Meter Flight Hour	M1990	1	.05	.05
Indicator Prop Anti-Ice		1	.10	.10
Prop De-Ice, Two-Blade	7E1177 (Goodrich)	1	12.00	12.00
Prop De-Ice, Three-Blade	(Goodyear)	1	8.00	8.00

MODEL C55 (TC-350, TE-1 through TE-451)

MODEL D55 (TE-452 through TE-767)

MODEL E55 (TE-768 through TE-1142)

MODEL 58 (TH-1 through TH-679)

MAXIMUM CONTINUOUS LOAD (Standard Equipment)

Alternator Out Light	2399A17	2 	0.08	0.08
Alternator Out Relay	50-380048-3	2 	0.40	0.40
Voltage Regulator	60-389017	2 	0.07	0.07
Anti-Ice Indicator	50-384001-31	1	0.10	0.10

 Alternator out lights are not on when alternator out relays are energized

 Only one used at a time.

 Airplane serials TC-371 through TC-1935 except TC-1913

 Airplane serials TC-1913, TC-1936 through TC-2181

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**MODEL C55 (TC-350, TE-1 through TE-451)
MODEL D55 (TE-452 through TE-767)
MODEL E55 (TE-768 through TE-1142)
MODEL 58 (TH-1 through TH-679)**

INTERMITTENT LOAD (Standard Equipment)

Equipment	Part No.	No. Per Airplane	Amperes Per Unit	Amperes Total
Battery Relay	6041H189	1	0.60	0.60
Cyl Head & Oil Temp Meter	96-324010-3	2	0.30	0.60
Cowl Flap Indicator	327	1	0.04	0.04
Flap Position Indicator	50-384001-35	1	0.06	0.06
Fuel Boost Pump	96-380020-1	2	4.00	8.00
Fuel Gage	5643081	2	0.38	0.76
Heater Fuel Pump	476284	2 	0.40	0.40
Heater Ignitor	11C30	1	1.90	1.90
Heater Solenoid Valve	AV1B1473	1	0.39	0.39
Cabin Dome Light	303	1	0.30	0.30
Engine Instrument Light	327	8	0.04	0.32
Fuel Select Light	327	2	0.04	0.08
Glareshield Light	1829	8	0.07	0.56
Landing Gear Position Light	327	1 	0.04	0.04
Landing Gear Visual Light	356	1	0.17	0.17
Nav. Light (Tail)	1683	1	0.65	0.65
Nav. Light (Wing)	1524	4	0.75	3.00
Rheostat Light	327	1	0.04	0.04
Switch Panel Light	96-364055-3	1		
Tab Indicator Light	1819	2	0.04	0.08
LH Pitot Heater	50-384040	1	3.30	3.30
Nav. Light Flasher	90-28	1 	0.10	0.10
Turn Coordinator	1680 Model TC-100(24)	1	.15	.15

 Only one used at a time.

 Navigation light flasher is not installed when optional rotating beacon is installed.

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**MODEL C55 (TC-350, TE-1 through TE-451)
MODEL D55 (TE-452 through TE-767)
MODEL E55 (TE-768 through TE-1142)
MODEL 58 (TH-1 through TH-679)**

INTERMITTENT LOAD (Standard Equipment)

Equipment	Part No.	No. Per Airplane	Amperes Per Unit	Amperes Total
Cigarette Lighter	LPA27630	1	7.50	7.50
Cowl Flap Motor	95-369011	2	2.20	4.40
Flap Motor	35-364151-57	1	13.00	13.00
Heater Blower	M2916V, M4861H1A	1		
Landing Gear Horn	169-380021-9	1	1.50	1.50
Landing Gear Horn Flasher	R102-12V	1	0.40	0.40
Landing Gear Motor	96-380022	1	20.00	20.00
Landing Gear Relay	6046H39A	1	0.40	0.40
Compass Light	327	1	0.04	0.04
Landing Light, LH	4596	1	8.90	8.90
Landing Light, RH	4596	1	8.90	8.90
Reading Light	1870	2	0.30	0.60
O.A.T. Light	327	1	0.04	0.04
Taxi Light	4526	1	6.00	6.00
Stall Warning Horn	169-380021-11	1	0.70	0.70
Starter	1108234	2 	100.00	100.00
Starter Relay	6041H189	2 	0.60	0.60
Ignition Vibrator	10-176487-242	1	2.00	2.00

INTERMITTENT LOAD (Optional Equipment)

Magic Hand Switch	60-364011	1	2.50	2.50
Surface Deice Relay	50-380048-1	1	0.09	0.09
Surface Deice Solenoid	38E63-1A	1	1.50	1.50
Surface Deice Time Delay Relay	GT4738	1	0.17	0.17

 Only one used at a time.

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**MODEL C55 (TC-350, TE-1 through TE-451)
MODEL D55 (TE-452 through TE-767)
MODEL E55 (TE-768 through TE-1142)
MODEL 58 (TH-1 through TH-679)**

MAXIMUM CONTINUOUS LOAD (Optional Equipment)

Equipment	Part No.	No. Per Airplane	Amperes Per Unit	Amperes Total
Engine Hour Meter	M1986	1	0.05	0.05
Flight Hour Meter	M1990	1	0.05	0.05
Instrument Post Lights	327	39	0.04	1.56
Oxygen Light	327	1	0.04	0.04
Prop Deice (Three Blade)	7E1177 (Goodrich)	1	12.00	12.00
Prop Deice (Two Blade)	(Goodyear)	1	8.00	8.00
RH Pitot Heat	50-384040	1	3.30	3.30
Rotating Beacon, Lower	D7080A6-24	1 	3.75	3.75
Rotating Beacon, Upper	D7080A1-24	1 	3.75	3.75
Wing Ice Light	MS25318-1	2 	2.14	4.28
Wing Ice Light	A7Q79B-24	1 	2.14	2.14

 Navigation light flasher is not installed when optional rotating beacon is installed.

 Airplane serials TC-350, TE-1 through TE-1063 and TH-1 through TH-647 except TH-598.

 Airplane serials TE-1064 through TE-1142, TH-598, TH-648 through TH-679.

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MODEL 58 (TH-680 through TH-972)

MAXIMUM CONTINUOUS LOAD (Standard Equipment)

Equipment	Part No.	No. Per Airplane	Amperes Per Unit	Amperes Total
Flasher, Nav Light	90-28	1	0.10	0.10
Flap Position - Indicator Sensor & P.C. Board	60-384022-1	1	0.06	0.06
Heater, Cabin				
Combustion Blower	83D91	1	4.80	4.80
Fuel Pump	476284	1	0.40	0.40
Fuel Solenoid	81D24-6	1	1.10	1.10
Ignitor	83D59-2	1	0.50	0.50
Vent Air Blower	88D11-1	1 	7.20	
Heater, Fuel Vent	60-381002	2	1.35	2.70
Heater, Pitot, L.H.	50-384040	1	4.00	4.00
Heater, Stall Detector	04407-2	1	1.28	1.28
Indicator, Cylinder Head & Oil Temperature	96-380016-1	2	0.65	1.30
Indicator, Fuel Qty.	58-380050-1	2	0.02	0.04
Indicator, Turn & Bank	50-380024	1	0.15	0.15
Inverter, Electroluminescent Panel	X17512	1	0.60	0.60
Pot, Light Dimming (1000 Ω)	VW1KSPB	4	0.03	0.12
Relay, Annunciator Dimming	281XDX24VDC	1	0.04	0.04
Relay, Battery Master	6061H189	1	0.60	0.60
Sensor, Alternator Out	36-380000-3	2	0.04	0.08
Voltage Regulator	60-389017-1	2 	3.00	3.00
— LIGHTING —				
8-Day Clock	267	2	0.025	0.05
3rd & 4th Reading	303	2	0.30	0.60
Dome	1864	2	0.17	0.34
Elevator Tab	1819R	1	0.04	.04

-  Only one used at a time.
-  Not used while in flight.

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MODEL 58 (TH-680 through TH-972)

MAXIMUM CONTINUOUS LOAD (Standard Equipment)

Equipment	Part No.	No. Per Airplane	Amperes Per Unit	Amperes Total
Engine Instruments	327	4	0.04	0.16
Flap Position	356	1	0.17	0.17
Instrument Flood	313	12	0.12	1.44
Rudder & Aileron Tab	1819R	1	0.04	0.04
Tail Nav	1638	1	1.02	1.02
Wing Tip Nav	A7512-24	2	0.93	1.86

MAXIMUM CONTINUOUS LOAD (Optional Equipment)

Alcohol Anti-Ice Sys*				
Indicator, Quantity	50-384001-1	1	0.27	0.27
Pump	476284	1	0.40	0.40
Valve	AV-1B-1473	1 	0.35	0.35*
Anti-Ice, Prop (2-blades)	Kit 65-060	1	12.00	12.00
Anti-Ice, Prop (3-blades)	Kit 65-065	1	18.00	18.00
Heater, Pitot, R.H.	50-384040	1	4.00	4.00
Indicator, Engine Hours	15000 Series	1	0.05	0.05
Indicator, Flight Hours	58-380043-1	1	0.01	0.01
Power Supply, Strobe	60-1750-3	1	3.50	3.50
— LIGHTING —				
5th & 6th Reading	1495	2	0.30	0.60
Beacon, Rotating, Lower	40-0100-3	1	3.10	3.10
Beacon, Rotating, Upper	40-0100-3	1	3.10	3.10
Instrument, Post (single)	327	30	0.04	1.20
Instrument, Post (Dual)	327	48	0.04	1.92
Instrument, Wedge (single)	267 (2 ea)	16	0.05	0.80
Instrument, Wedge (dual)	267 (2 ea)	23	0.05	1.15

 Valve required only when windshield and prop - alcohol anti-ice are installed concurrently.

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MODEL 58 (TH-680 through TH-972)

INTERMITTENT LOAD (Standard Equipment)

Equipment	Part No.	No. Per Airplane	Amperes Per Unit	Amperes Total
Pump, Fuel Boost	4404-00-1	2	4.00	8.00
Flasher, L.G. Warning	R102	1	0.04	0.04
Heater, Cigarette Ltr.	206482	2	7.25	14.50
Horn, L.G. Warning	169-380021-9	1	1.50	1.50
Horn, Stall Warning	169-380021-11	1	1.50	1.50
Motor, Flap	35-364151-57	1	13.00	13.00
Motor, Landing Gear	96-380022	1	20.00	20.00
Relay, Dynamic Brake	6046-H39A	1	0.40	0.40
Relay, Starter	6041E190	2 	3.50	3.50
Starter, Engine	MHJ4002	2 	100.00	100.00
— LIGHTING —				
Alternator Out	327	2	0.04	0.08
Compass	327	1	0.04	0.04
Door Ajar	327	1	0.04	0.04
Landing	4596	2	8.93	17.86
Ldg. Gear Transit	327	1	0.04	0.04
Ldg. Gear Down	327	3	0.04	0.12
Outside Air Temp.	327	1	0.04	0.04
Nose Baggage	307	1	0.67	0.67

 Only one used at a time.

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MODEL 58 (TH-680 through TH-972)

INTERMITTENT LOAD (Optional Equipment)

Equipment	Part No.	No. Per Airplane	Amperes Per Unit	Amperes Total
Actuator, Pitch Trim	33-524033-15	1	1.60	1.60
Resistor, Trim Shunt	4587	1	0.38	0.38
Surface Deice	96-970004			
Relay	50-380048-1	1	0.10	0.10
Relay, Delay	GT4738	1	0.17	0.17
Valve, Distributor	38E63-1A	1	1.50	1.50
Valve, Pressure Relief	1H22-1	2	0.59	1.18

— LIGHTING —

Courtesy	1864	2	0.17	0.34
Ice	MS25318-1	2	1.61	3.22
Map	1495	1	0.30	0.30
Taxi	4626	1	5.36	5.36

AVIONICS LOAD

Equipment	Part Number	Amperes Per Unit
ADF	21A	2.80
ADF	21B	2.10
ADF System	ADF-T-12D	0.75
Audio Amplifier	102B	0.50
Automatic Flight Control	FCS-810FD/AP	5.00
Encoding Altimeter	3252013-0101	0.23
Glidescope/Marker Recvr	GM-247A	0.30
Marker Receiver	204A	0.16
Nav System	RN-242A	0.66
Power Supply	PS-243A	5.50
Transponder	TRR-660	1.30
VHF Comm Transceiver	RT-241A	0.80
VHF Comm Transceiver	RT-241A	4.56

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AVIONICS LOADS

Equipment	Part Number	Amperes Per Unit
VOR/ILS Indicator	IN-245A	0.30
VOR/LOC Indicator	IN-244A	0.06
Radar Altimeter	TRN-71	1.30
ADF System	DF-206	1.20
Amplifier	356C-4	0.19
Amplifier	356F-3	1.30
Comm Transceiver	VHF-20	0.60
Comm Transceiver	VHF-20	5.00
DME System	DME-40	1.42
Glideslope Receiver	517-5	0.25
Marker Beacon Receiver	51Z-6	0.45
Nav System	VIR-30	0.80
Pictorial Nav System	PN-101	2.60
Radio Altimeter	Alt-50	0.80
Transponder	TDR-90	1.90
VHF/NAV/Comm Receiver	51R-7A	0.80
VHF/NAV/Comm Receiver	51R-8A	1.00
VHF Transceiver	618M-2	2.00
VHF Transceiver	618M-2	7.00
Inverter	PC-14D	3.30
Inverter	PC-15B	13.10
Encoding Altimeter	519-22702	0.54
Encoding Altimeter	570-24929	0.32
ADF	KDF-800	1.50

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MODEL 58 (TH-680 through TH-972)

AVIONICS LOAD

Equipment	Part Number		Amperes Per Unit
ADF	KR-85		1.00
Amplifier	KA-25		1.10
Audio Control System	KAA-445		2.10
Autopilot	H14		3.00
Comm Transceiver	KTS-900A	R	0.60
Comm Transceiver	KTR-900A	T	7.00
Comm Transceiver	KX-195	R	0.65
Comm Transceiver	KX-195	T	4.50
Comm/Nav Transceiver	KX-170B	R	1.30
Comm/Nav Transceiver	KX-170B	T	5.10
Comm/Nav Transceiver	KX-175B	R	1.22
Comm/Nav Transceiver	KX-175B	T	4.50
DME	KDM-705		3.60
DME	KN-60C		1.40
DME	KN-65		1.40
Glideslope Receiver	KN-73		0.20
Glideslope/Marker Receiver	KMG-690		0.07
Glideslope/Marker Receiver	KMG-691		0.35
Glideslope/O.B.S. Indicator	KI-213		0.17
ILS Indicator	KI-214		0.28
Marker Beacon Receiver	KR-21		0.25
Marker Beacon Receiver/Amplifier	KMA-20		1.10
NAV Receiver	KNR-600A		0.70
NAV Receiver	KNR-660A		0.80

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ELECTRICAL UTILIZATION LOAD CHART

MODEL 58 (TH-680 through TH-972)

AVIONICS LOAD

Equipment	Part Number		Amperes Per Unit
NAV Receiver	KNR-661		0.80
Radar System	KWX-40		2.50
RMI	KT-226		0.08
RNAV	KNC-610		0.35
RNAV Computer	KN-74		0.35
Pictorial NAV	KPI-550A		1.40
Transponder	KT-76		1.30
Transponder	KXP-750A	R	0.60
Transponder	KXP-750A	T	1.10
Voltage Converter	KA-39		
VOR Indicator	KI-201C		0.16
VOR/LOC Converter	KN-77		0.10
Autopilot	Century I		2.00
Autopilot	Century II		1.50
Autopilot	Century III		4.50
Autopilot	Century IV		4.00
Flight Director	FD/AP-282		4.00
ADF	CP-25B/C/125		1.50
ADF	PDF-35		0.85
Autopilot	DGO-10		0.88
Comm	Com 11A/111	R	0.65
Comm	Com 11A/111	T	2.16
Course Line Computer	CLC-60		0.25
DME Receiver	DME-70		2.15

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ELECTRICAL UTILIZATION LOAD CHART

MODEL 58 (TH-680 through TH-972)

AVIONICS LOAD

Equipment	Part Number		Amperes Per Unit
Glideslope Receiver	UGR-2A		0.23
Marker Beacon Receiver	MBT-12		0.24
Marker Beacon Receiver	MBT-12R		0.24
Marker Beacon Receiver	MBT-24		0.24
Marker Beacon Receiver	MBT-24R		0.24
NAV	NAV 11/111		0.62
NAV	NAV 14/114		0.92
Transponder	AT-6A		1.40
Transponder	AT-50A		1.00
H.F. Transceiver	DX10-DA		3.25
H.F. Transceiver	DX10-DA		6.25
H.F. Transceiver	DX10-RA	R	3.25
H.F. Transceiver	DX10-RA		6.25
ATC Transponder	AVQ-95		1.40
Audio System	AVQ-310		2.74
DME System	AVQ-75		3.70
DME System	AVQ-85		4.40
NAV System	AVN-210A		0.30
NAV System	AVN-211A		0.19
RMI/Converter	AVI-200		0.41
RMI/Converter	AVI-202		0.66
VHF Transceiver	AVC-110A	R	0.65
VHF Transceiver	AVC-110A	T	4.50
Weather Radar	AVQ-21		10.00

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MODEL 58 (TH-680 through TH-972)

AVIONICS LOADS

Equipment	Part Number		Amperes Per Unit
Weather Radar	AVQ-47		5.00
Weather Radar	AVQ-55		3.00
Comm	ASB-60	R	2.50
Comm	ASB-60	T	7.50
Comm	ASB-100A	R	2.50
Comm	ASB-100A	T	9.00
Comm	ASB-125	R	2.50
Comm	ASB-125	T	7.50
H.F. Transceiver	ABS-130	R	2.50
H.F. Transceiver	ABS-130	T	15.00
ATC Transponder	1014A		4.60

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**MODEL 58 (TH-973 through TH-1395 except TH-1389)
MODEL E55 (TE-1143 and after)
MODEL B55 (TC-2181 and after)**

MAXIMUM CONTINUOUS LOAD (Standard Equipment)

Equipment	Part No.	No. Per Airplane	Amperes Per Unit	Amperes Total
Clock, Standard	58-380077-3	1	.01	.01
Heater, Cabin	81D94			
Combustion Blower	83D91	1	6.50	6.50
Fuel Pump	476284	1	.60	.60
Fuel Solenoid	83D24-5	1	.50	.50
Ignitor	87D24-5	1	1.50	1.50
Vent Air Blower	B27D39	1 	9.00	9.00
Heater, Fuel Vent	60-381002	2	1.58	3.16
Heater, Pitot L.H.	58-384040	1	4.60	4.60
Heater, Stall Detector	04402-4	1	1.47	1.47
Indicator, Cylinder Head & Oil Temp.	96-380016	2	.65	1.30
Indicator, Electrical Load	58-380048-1	2 	.01	.02
Indicator, Electrical Load	58-380048-5	2 	.01	.02
Indicator, Flap Position & P.C. Board	60-384022	1	.06	.06
Indicator, Fuel Quan.	58-380050	2	.02	.04
Inverter, Electroluminescent	X17512	1 	.50	.50
Paralleling Box	1116902	1 	.20	.20
Pot., Light Dimming	VW1KSPB	4 	.03	.12

 Unit operates in gear down position only.

 Used only on Models 58 and E55.

 Used only on Model 95-B55.

 Omit two potentiometers on Model 95-B55.

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ELECTRICAL UTILIZATION LOAD CHART

**MODEL 58 (TH-973 through TH-1395 except TH-1389)
MODEL E55 (TE-1143 and after)
MODEL B55 (TC-2181 and after)**

MAXIMUM CONTINUOUS LOAD (Standard Equipment)

Equipment	Part No.	No. Per Airplane	Amperes Per Unit	Amperes Total
Relay, Annunciator Dim.	281XDX103124VDC	1	.08	.08
Relay, Battery Master	6041H189	1	.50	.50
Sensor, Alternator Out	36-380000-3	2 	.04	.08
Turn Coordinator	601-009-680	1	.40	.40
Voltage Regulator	60-389017-3	2 	3.00	3.00
Voltage Regulator	1118976	2 	.85	1.70
— LIGHTING —				
3rd & 4th Reading Light	303	2	.30	.60
Aileron Tab	1819	1	.04	.04
Cabin Light	1864	2	.17	.34
Compass	327	1	.04	.04
Elevator Tab	1819	1	.04	.04
Engine Instruments	327	4	.04	.16
Flap Position	58-324065-5	1	.03	.03
Glareshield Flood	313	12	.17	2.04
Map Light	1495	1	.30	.30
OAT Light	327	1	.04	.04
Rheostat Light	327	1 	.04	.04
Switch Panel	327	7 	.04	.28
Tail Light	A2064-678	1	.80	.80
Wing Tip Nav. Light	A7512-24	2	.93	1.86

 Both units are not operated simultaneously.

 Used only on Model 95-B55.

 Optional on Model 95-B55 used when optional alternators are installed.

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**MODEL 58 (TH-973 through TH-1395 except TH-1389)
MODEL E55 (TE-1143 and after)
MODEL B55 (TC-2181 and after)**

MAXIMUM CONTINUOUS LOAD (Optional Equipment)

Equipment	Part No.	No. Per Airplane	Amperes Per Unit	Amperes Total
Air Conditioning				
Actuator, Condenser Door	96-380021-23	1 	.77	.77
Blower Motors	1523200-4	2	4.07	8.14
Compressor Clutch	102-389006-1	1	1.70	1.70
Condenser Blower	58-380081	1 	20.00	20.00
Relay, Condenser Blower	6041H200	1 	.35	.35
Alcohol Anti-Ice System				
Indicator, Quan.	50-384001	1	.01	.01
Pump	476284	1	.60	.60
Valve, Windshield	AV-1B-1473	1 	.29	.29
Clock, Digital	CT-24	1	.20	.20
Electrothermal Prop De-Ice				
Ammeter	58-380086	1	.01	.01
Heater, Prop. (2 Blade)	Kit 65-080	1	12.00	12.00
Heater, Prop. (3 Blade)	Kit 65-085	1	18.00	18.00
Timer	3E1150-3	1	.29	.29
Engine Hour Meter	58-380042	1	.01	.01
Flight Hour Meter	58-380043	1	.01	.01
Heater, Pitot R.H.	50-384040	1	4.60	4.60
Power Supply, Strobe	60-1750-3	1	5.00	5.00
Prop. Synchronizer & Governor System	213699	1	1.00	1.00

 Valve required only when windshield and prop alcohol anti-ice are both installed.

 Unit operates in gear down position only.

 Intermittent operation.

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ELECTRICAL UTILIZATION LOAD CHART

**MODEL 58 (TH-973 through TH-1395 except TH-1389)
MODEL E55 (TE-1143 and after)
MODEL B55 (TC-2181 and after)**

MAXIMUM CONTINUOUS LOAD (Optional Equipment)

Equipment	Part No.	No. Per Airplane	Amperes Per Unit	Amperes Total
— LIGHTING —				
5th & 6th Seat Reading Light	303	2	.30	.60
Control Wheel Clock	327	1	.04	.04
Engine Hour	327	1	.04	.04
Flight Hour	327	1	.04	.04
Instrument, Post Light (Single)	327	34	.04	1.36
Instrument, Post Light (Dual)	327	40	.04	1.60
Instrument, Wedge Light (Single)	58-380022-11	21	.048	1.01
Instrument, Wedge Light (Dual)	58-380022-11	23	.048	1.10
Rotating Beacon, Lower	D7080A-5-24	1 	3.22	3.22
Rotating Beacon, Lower	40-0100-3	1 	3.10	3.10
Rotating Beacon, Upper	D7080A-3-24	1 	3.22	3.22
Rotating Beacon, Upper	40-0127-1	1 	3.10	3.10

Notes:  Used only on Models 58 & E55.

 Used only on Model 95-B55.

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**MODEL 58 (TH-973 through TH-1395 except TH-1389)
MODEL E55 (TE-1143 and after)
MODEL B55 (TC-2181 and after)**

INTERMITTENT LOAD (Standard Equipment)

Equipment	Part No.	No. Per Airplane	Amperes Per Unit	Amperes Total
Cigarette Lighter	35-364160	2	6.00	12.00
Flasher, Gear Warning	R102	1	.04	.04
Horn, Gear Warning	169-380021-9	1	.20	.20
Horn, Stall Warning	169-380021-11	1	.20	.20
Motor, Flap	D160-00-3	1	11.00	11.00
Motor, Landing Gear	96-380022	1 	40.00	40.00
Pump, Fuel Boost	4404-00-1	2	4.00	8.00
Relay, Dynamic Brake	6046-H39A	1	1.25	1.25
Relay, Starter	6041-H190	2 	3.30	3.30
Starter, Engine	MHJ4002 or MHJ4003	2 	100.0	100.0
— LIGHTING —				
Alternator Out	327	2 	.04	.08
Courtesy Light	1864	2	.17	.34
Door Ajar	327	1 	.04	.04
Landing Gear Indicator	327	4	.04	.16
Landing Light	4596	2	8.93	17.86
Nose Baggage Light	307	1	.67	.67



Both units are not operated simultaneously.



Optional on Model 95-B55, used when optional alternators are installed.



Peak current after initial start-up load.



Used only on Model 58.

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**MODEL 58 (TH-973 through TH-1395 except TH-1389)
MODEL E55 (TE-1143 and after)
MODEL B55 (TC-2181 and after)**

INTERMITTENT LOAD (Optional Equipment)

Equipment	Part No.	No. Per Airplane	Amperes Per Unit	Amperes Total
Actuator, Elevator Trim	319A209-6	1 $\triangle_{12}$	.85	.85
Resistor, Trim Shunt	4587	1 $\triangle_{12}$	.38	.38
Surface De-Ice Ejector Distributor Valve	2H59-4	1	.22	.22
Pressure Relief Valve	2H22-11	2	.22	.44
Relay	50-380048-1	1	.10	.10
Relay, Time Delay	GT4738	1	.14	.14
— LIGHTING —				
Ice Light, L.H.	A7079B-24	1	1.43	1.43
Landing Light (Wet Wing Tip)	4596	2	8.93	17.86
Taxi Light	4626	1	5.40	5.40

Note: $\triangle_{12}$ Used only on Models 58 and E55.

AVIONICS LOAD

Equipment	Part Number	Amperes Per Unit
Inverter	P20	4.50
Rnav Computer	AD-611/D	0.90
Rnav Computer	RNAV-511	1.00
ADF Receiver	ADF-2070	0.50
Dual Comm/Nav	CN-2011A	R 2.30 T 3.40
Comm/Nav	CN-2012A	R 1.30 T 2.80
Comm/Nav	CN-2013A	R 1.20 T 2.70
ADF Receiver	DFA-73A-1	1.05

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**MODEL 58 (TH-973 through TH-1395 except TH-1389)
MODEL E55 (TE-1143 and after)
MODEL B55 (TC-2181 and after)**

AVIONICS LOAD

Equipment	Part Number	Amperes Per Unit
Dme	DME-2030	1.20
Autopilot	FCS-810 A/P	6.50 (A)
Autopilot	FCS-810 W/HSD-830 Compass	7.25 (A)
Compass System	HSD-880	2.10
Rnav Computer	NCP-2040	1.50
Radar	RDR-150	3.50
Radar	RDR-160	3.50
Transponder	TPR-2060	1.30
Encoding Altimeter	3252013-1101	0.16
	3252013-1401	0.16
Radar Altimeter	MARK 10X	1.00
ADF Receiver	ADF-650A	1.16
Radar Altimeter	ALT-50A	0.86
Marker Beacon Receiver/Audio Amplifier	AMR-350	1.18
Rnav Computer	ANS-351	0.73
Autopilot 2-Axis	AP-107 Less Gyros	8.50
Autopilot 3-Axis (Yaw)	AP-107 Less Gyros	11.90
Audio Amplifier	AUD-250	1.11
ADF Receiver	DF-206	1.20
Dme	DME-40	1.42
Dme	DME-451	1.10
Glideslope Receiver	GLS-350	0.51
Marker Beacon Receiver	MKR-350	0.255

(A) Based on hardover, single axis.

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MODEL E55 (TE-1143 and after)
MODEL B55 (TC-2181 and after)**

AVIONICS LOAD

Equipment	Part Number	Amperes Per Unit
Compass System	PN-101	2.60
Power Converter	PWC-150	0.02
Transponder	TDR-90	1.90
Transponder	TDR-950	1.74
Nav Receiver	VIR-30M	0.80
Nav Receiver	VIR-351	0.80
VHF Transceiver	VHF-20	R 0.70 T 6.00
VHF Transceiver	VHF-251	R 0.84 T 5.10
Radar	WXR-150	3.00
Amplifier	356F-3	1.30
Amplifier	356C-4	0.185
Autopilot	Century I	2.00
Autopilot	Century IIB	1.50
	Radio Coupler	1.03
Autopilot	Century III W/Trim	4.50
	Coupler	1.03
	G/S	0.20
Autopilot	Century IV	4.00
	Trim	2.00
Compass System	NSD-360 (Includes Slave Ampl. & Flux Detector)	0.50
	DG-360	0.50
Autopilot	Trim Only	1.00
Autopilot	Yaw Axis	1.90
Inverter	PC-14B	6.35
Inverter	PC-15B	13.10
Inverter	PC-50	2.75
Encoding Altimeter	Series 519	0.54
Encoding Altimeter	Series 570	0.32

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MODEL E55 (TE-1143 and after)
MODEL B55 (TC-2181 and after)**

AVIONICS LOAD

Equipment	Part Number		Amperes Per Unit
Code Translator	KA-43		0.10
Code Translator	KA-58		0.03
Audio Ampl.	KA-134		1.30
Audio Ampl.	KAA-445		2.10
Compass System	KCS-55A		1.73
ADF Receiver	KDF-805		0.75
Dme	KDM-705A		3.00
Autopilot	KFC-200	W/Yaw	11.05 (A)
	W/KCS-55A Comp. Sys	W/O Yaw	9.03
Glideslope Receiver	KGM-681		0.24
Marker Beacon/Glideslope Receiver	KGM-691		0.35
VOR/LOC Converter Indicator	KI-203		0.10
VOR/ILS Converter	KI-204		0.10
VOR/ILS Indicator	KI-206		0.10
VOR/LOC Converter Indicator	KI-208		0.15
VOR/ILS Converter Indicator	KI-209		0.15
Marker Beacon Receiver/Audio Amplifier	KMA-20		1.40
Dme	KN-65A		2.40
VOR/LOC Converter	KN-72		0.05
Rnav Computer	KN-74		0.35
Glideslope Receiver	KN-75		0.225
Nav Computer	KNC-610		0.35
Nav Receiver	KNR-600A		0.70
Nav Receiver	KNR-660A		0.80

(A) Based on hardover, single axis.

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**MODEL 58 (TH-973 through TH-1395 except TH-1389)
MODEL E55 (TE-1143 and after)
MODEL B55 (TC-2181 and after)**

AVIONICS LOAD

Equipment	Part Number		Amperes Per Unit
Nav Receiver	KNR-661		0.50
Rnav System	KNS-80		1.26
Radar Altimeter	KRA-405		0.970
Marker Beacon Receiver	KR-22		0.50
ADF Receiver	KR-85		1.00
Transponder	KT-76A		1.80
Radio Phone	KT-96	R	0.50
		T	3.00
VHF Transceiver	KTR-900A	R	0.60
		T	7.00
Radio Phone	KTR-960	R	0.60
		T	4.00
Radar	KWX-50		3.40
Nav/Comm	KX-170B	R	0.68
		T	4.67
Nav/Comm	KX-175B	R	0.60
		T	4.58
Transponder	KXP-755		1.50
VHF Transceiver	KY-195	R	0.73
		T	4.58
VHF Transceiver	KY-196	R	0.40
		T	5.00
A/P Coupler	AC-100		0.12
ADF Receiver	ADF-140		0.95
ADF Receiver	ADF-141		0.95
Transponder	AT-150	R	1.26
		T	1.86

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**MODEL 58 (TH-973 through TH-1395 except TH-1389)
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MODEL B55 (TC-2181 and after)**

AVIONICS LOAD

Equipment	Part Number		Amperes Per Unit
Rnav Computer	CLC-60A		0.25
VHF Transceiver	COM 120	R	0.76
		T	5.10
Audio Control Panel	CP-135		0.66
Marker Beacon Receiver/Audio Amplifier	CP-136		2.11
Dme	DME-190		1.60
Dme	DME-195		2.80
Compass System	HSI-100S		1.065
Compass System	HSI-100-1 or -2		0.965
Marker Beacon Receiver	MKR-101		0.29
Marker Beacon Receiver	MKR-101R		0.29
Converter	MP-10		0.40
Converter	MP-11		1.00
Nav Receiver	NAV 121		0.92
Nav Mkr Receiver	NAV 122A		0.92
Nav Receiver	NAV 124 & 124A		0.92
Nav Receiver	NAV 124R		0.80
Nav Receiver	RNAV-161		2.05
Glideslope Receiver	UGR-2A		0.23
H.F. Transceiver	DX-10-DA-24	R	3.25
		T	6.25
H.F. Transceiver	KX-10-RA-24	R	3.25
		T	6.25
DME	PRIMUS-10		1.30

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**MODEL 58 (TH-973 through TH-1395 except TH-1389)
MODEL E55 (TE-1143 and after)
MODEL B55 (TC-2181 and after)**

AVIONICS LOAD

Equipment	Part Number	Amperes Per Unit	
Radar	PRIMUS-20W XD		4.00
Radar	PRIMUS-30W XD		4.00
Radar	PRIMUS-35W XD		6.00
Radar	PRIMUS-40W XD		5.00
Encoding Altimeter	01-200-102		0.08
	Lighted		0.09
Radar Altm.	AA-100		0.50
HF Transceiver	ASB-60	R	2.50
		T	7.50
HF Transceiver	ASB-100A	R	2.50
		T	9.00
HF Transceiver	ASB-125	R	2.50
		T	7.50
HF Transceiver	ASB-130	R	2.50
		T	15.00
HF Transceiver	ASB-320	R	3.00
		T	15.00

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MODEL 58 (TH-1389, TH-1396 and after)

MAXIMUM CONTINUOUS LOAD (Standard Equipment)

Equipment	Part No.	No. Per Airplane	Amperes Per Unit	Amperes Total
Heater, Cabin	81D94			
Combustion Blower	83D91	1	6.50	6.50
Fuel Pump	476284	1	.60	.60
Fuel Solenoid	83D24-5	1	.50	.50
Ignitor	87D24-5	1	1.50	1.50
Hour Meter	35-380138	1	.01	.01
Heater, Fuel Vent	60-381002	2	1.58	3.16
Heater, Pitot, L.H.	50-384040	1	4.60	4.60
Heater, Stall Detector	04402-4	1	1.47	1.47
Indicator, Tachometer	102-380011	2	.15	.30
Indicator, Cylinder Head & EGT	58-380104	2	.15	.30
Indicator, Oil Temp & Press	102-380014	2	.15	.30
Indicator, Electrical Load	102-380018	2	.01	.02
Indicator, Fuel Flow	102-380012	2	.15	.30
Inverter, Electroluminescent	58-380101	1	.50	.50
Relay, Annunciator Dimming	58-384112	3	.04	.12
Relay, Battery Master	6041H189	1	.50	.50
Turn Coordinator	58-380085	1	.40	.40
Voltage Regulator	102-384038	2	3.33	6.66
Clock	LC2	1	.01	.01
Prop, Synchroscope Driver	EM2092	1	.20	.20
Cabin Lights	303	2	.30	.60
3rd & 4th Reading Lights	303	2	.30	.60
Aileron Tab	334	1	.04	.04

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MODEL 58 (TH-1389, TH-1396 and after)

MAXIMUM CONTINUOUS LOAD (Standard Equipment)

Equipment	Part No.	No. Per Airplane	Amperes Per Unit	Amperes Total
Rudder Tab	334	1	.04	.04
Elevator Tab	334	1	.04	.04
Fuel Quantity	58-380022	2	.04	.08
Engine Instruments	T1	30	.024	.720
Glareshield Hood	313	9	.17	1.53
Center Subpanel	102-384035	1	.58	.58
Map Light	1495	2	.30	.60
OAT Light	327	1	.04	.04
Compass	327	1	.04	.04
Flight Instruments	58-380022	7	.04	.28
Wing Tip Nav Lights	A7512-24	2	.93	1.86
Tail Light	1203	1	.71	.71

MAXIMUM CONTINUOUS LOAD (Optional Equipment)

Air Conditioning

Blower Motor	1523260-4	2	4.07	8.14
Compressor Clutch	102-389006	1	1.70	1.70
Alcohol Anti-Ice System Indicator, Quantity	50-384001	1	.01	.01
Pump	476284	1	.60	.60
Electric Windshield Anti-Ice Windshield Heater	102-384017	1	16.00	16.00
Windshield Temp Control	102-384041	1	1.00	1.00
Relay, Windshield Heater	MS24166D1	1	.35	.35
Electric Prop De-Ice Ammeter	50-380086	1	.01	.01

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ELECTRICAL UTILIZATION LOAD CHART

MODEL 58 (TH-1389, TH-1396 and after)

MAXIMUM CONTINUOUS LOAD (Optional Equipment)

Equipment	Part No.	No. Per Airplane	Amperes Per Unit	Amperes Total
Power Supply/Timer	B45018	1	.20	.20
Heater (3-Blade)	B40245-51	1	18.75	18.75
Heater (2-Blade)	B40245-51	1	12.50	12.50
Heater, Stall Detector	58-361013	1	5.90	5.90
Heater, Pitot R.H.	50-384040	1	4.60	4.60
Engine Hour Meter	35-380138	1	.01	.01
Flight Hour Meter	35-380138	1	.01	.01
Prop Synchronizer	21399	1	1.00	1.00
Power Supply, Strobe	60-1750-3	1	5.00	5.00
Rotating Beacon, Lower	40-0100-3	1	3.10	3.10
Rotating Beacon, Upper	40-0127-1	1	3.10	3.10

— LIGHTING —

Control Wheel Clock Light	58-380015	1	.05	.05
De-Ice Pressure	58-380022	1	.04	.04
Prop De-Ice	58-380022	1	.04	.04
5th & 6th Seat Reading	303	2	.30	.60

INTERMITTENT LOAD (Standard Equipment)

Starter, Engine	637847	2 	100.00	100.00
Relay, Starter	6041H190	2 	3.30	3.30
Heater, Cabin				
Heater Blower	B27D39	1	9.00	9.00
Motor, Landing Gear	96-380022	1 	40.00	40.00
Horn, Stall & Gear Warning	102-384040	1	1.50	1.50

 Both units are not operating simultaneously.

 Peak current after initial start-up load.

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INTERMITTENT LOAD (Standard Equipment)

Equipment	Part No.	No. Per Airplane	Amperes Per Unit	Amperes Total
Relay, Dynamic Brake	6046H39A	1	1.25	1.25
Motor, Flap	160-00-3	1	11.00	11.00
Relay, Flap	50-380048	2 [△] 17	.10	.10
Pump, Fuel Boost	476284	2	4.00	8.00
Motor, Fwd. Blower	58-380072	1	3.85	3.85
Cigarette Lighter	35-364160	2	6.00	12.00

— LIGHTING —

Landing Light	4596	2	8.90	17.86
Step Light	1495	2	.30	.60
Nose Baggage Light	307	1	.67	.67
Start Light	CM6839	2	.024	.048
Alternator Out Light	CM6839	4	.024	.096
Door Ajar Light	CM6839	2	.024	.048
Flap Position Lights	327	3	.04	.12
Landing Gear Indicators	327	4	.04	.16

INTERMITTENT LOAD (Optional Equipment)

Actuator, Elevator Trim	33-524023	1	1.15	1.15
Air Conditioning				
Condenser Blower	58-380081	1	20.00	20.00
Relay, Condenser Blower	6041H200	1	.35	.35
Actuator, Nacelle Scoop	50-380080	1	.77	.77

[△]17 Peak current after start-up load

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INTERMITTENT LOAD (Optional Equipment)

Equipment	Part No.	No. Per Airplane	Amperes Per Unit	Amperes Total
Surface De-Ice				
De-Ice Timer	GT5458	1	.05	.05
De-Ice Timer Relay	50-380048	1	.10	.10
De-Ice Valve	2H59-4	1	.22	.22
Pressure Regulator	2H22-11	2	.22	.44
— LIGHTING —				
Ice Light	A7079B-24	1	1.43	1.43
Taxi Light	4596	1	8.90	8.90

AVIONICS LOAD

Equipment	Part Number		Amperes Per Unit
Inverter	P20		4.50
RNAV Computer	AD-611/D		0.90
Stereo	EC-100A		1.50
ADF Receiver	ADF-2070		0.50
Dual COMM/NAV	CN-2011A	R	4.60
		T	3.40
COMM/NAV	CN-2012A	R	1.30
		T	2.80
ADF Receiver	ADF-2070		1.05
DME	DME-2030		1.20
Autopilot	FCS-810		6.50
Autopilot	FCS-810 W/HSD-830 Compass		7.25
RNAV Computer	NCP-2040		1.50
Radar	RDR-150		3.50

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ELECTRICAL UTILIZATION LOAD CHART

MODEL 58 (TH-1389, TH-1396 and after)

AVIONICS LOAD

Equipment	Part Number	Amperes Per Unit	
Radar	RDR-160		3.50
Radar	RDS-82		5.00
Transponder	TPR-2060		1.30
Encoding Altimeter	3252013-1101 or -1401		.16
Radar Altimeter	Mark 10X		1.00
ADF Receiver	ADF-650A		1.16
Radar Altimeter	ALT-50A		.86
Audio/Marker	AMR-350		1.18
RNAV Computer	ANS-351		0.73
Autopilot 2 Axis	AP-107		8.50
Autopilot 3 Axis (YAW)	AP-107		11.90
DME	DME-2030		1.20
Glideslope Receiver	GLS-350		0.51
Compass System	PN-101		2.60
Transponder	TDR-950		1.74
HF COMM	HF-220	R	3.00
		T	16.70
NAV Receiver	VIR-351		0.80
HF COMM	HF-200	R	2.65
		T	16.45
VHF Transceiver	VHF-251	R	0.84
		T	5.10
VHF Transceiver	VHF-253	R	0.29
		T	2.20
Radar	WXR-150		3.00
Radar	WXR-200		3.50

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MODEL 58 (TH-1389, TH-1396 and after)

AVIONICS LOAD

Equipment	Part Number	Amperes Per Unit
Amplifier	356F-3	1.30
Amplifier	356C-4	0.185
Autopilot	Century III w/	4.50
	Trim Coupler	1.03
	G/S	0.20
Autopilot	Century IV w/	4.00
	Trim	2.00
	Yaw Damp	1.90
Compass System	NSD-360A (Includes Slave Ampl & Flux Detector)	0.50
	DG-360	0.50
Encoding Altimeter	IU306-002	0.50
Inverter	PC-50	2.55
Audio Ampl.	KAA-455	2.10
Compass System	KCS-55A	1.73
ADF Receiver	KDF-805	0.75
DME	KDM-705A	3.00
NAV/G.S. Receiver	KN-53-00	0.25
NAV Receiver	KN-53-01	0.20
Audio/Marker	KMA-24	1.90
Glideslope Receiver	KGM-681	0.24
Marker Beacon/Glideslope Receiver	KGM-691	0.35
NAV Computer	KNC-610	0.35
NAV Receiver	KNR-600A	0.70
NAV Receiver	KNR-660A	0.80
NAV Receiver	KNR-661	0.50

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MODEL 58 (TH-1389, TH-1396 and after)

AVIONICS LOAD

Equipment	Part Number	Amperes Per Unit
Autopilot	KFC-200 w/Yaw	11.05
	w/KCS-55A Comp Sys	
	w/o Yaw	9.03
VOR/LOC Converter Ind.	KI-203	0.10
VOR/ILS Converter	KI-204	0.10
VOR/ILS Indicator	KI-206	0.10
VOR/LOC Converter Ind.	KI-208	0.15
VOR/ILS Converter Ind.	KI-209	0.15
RMI	KI-226	13.0 VA
DME	KN-63	0.60
VOR/LOC Converter	KN-72	0.05
NAV/RNAV	KNS-81	0.50
RNAV/DME with Bendix TBL — 2.5 Blower	KNS-80	1.40
Radar Altimeter	KRA-405	0.97
Encoding Altimeter	KEA-346	0.25
Marker Beacon Receiver	KR-22	0.50
ADF	KR-87	0.43
Transponder	KXP-755	1.50
Transponder	KT-76A	1.80
Transponder	KT-79	0.36
Radio Phone	KT-96	R 0.50 T 3.00
Radar Graphics	KGR-356	2.50
Radar	KWX-50	3.40
NAV/COMM	KX-165	R .40 T 6.00

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ELECTRICAL UTILIZATION LOAD CHART

MODEL 58 (TH-1389, TH-1396 and after)

AVIONICS LOAD

Equipment	Part Number	Amperes Per Unit	
Radio Phone	KTR-960	R	.60
		T	4.00
NAV/COMM	KY-196	R	.40
		T	5.00
VHF Transceiver	KTR-900A	R	.60
		T	7.00
Stormscope	WX-10		.50
Stormscope	WX-8		.50
ADF Receiver	ADF-141		0.95
Transponder	AT-150	R	1.25
		T	1.86
VHF Transceiver	COM 120B	R	1.26
		T	5.10
VHF Transceiver	COM 120	R	0.60
		T	3.50
Audio Control Panel	CP-135		0.66
DME	DME-195		2.80
Marker Beacon Receiver	MKR-101R		0.29
NAV Receiver	NAV 121		0.92
NAV Mkr Receiver	NAV 122A		0.92
Glideslope Receiver	UGR-2A		0.23
ADF (Dual Indicator)	ID-100		7.0 VA
Radar	100 B & W		2.0
Radar	100 (C)		3.2
Radar	200 (C)		4.5
Radar	Primus-20 WXD		4.00
Encoding Altimeter	01-200-102 (Lighted)		0.09
Radar Altimeter	AA-100		0.50

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MODEL 58 (TH-1389, TH-1396 and after)

AVIONICS LOAD

Equipment	Part Number	Amperes Per Unit
Radar	Weather Scout I (Color)	3.20
Radar	Weather Scout I (B & W)	2.00
HF Transceiver	ASB-100A	R 2.50
		T 9.00

LIGHT BULB REPLACEMENT GUIDE

<i>LOCATION</i>	<i>NUMBER</i>
Engine Instrument Post Lights	MS525237-327
Engine Instrument Wedge Lights (28v)	58-380022-13
Engine Instrument Wedge Lights (13v)	58-380022-9
Flight Instrument Post Lights	MS525237-327
Flight Instrument Wedge Lights	58-380022-13
Deice Post Light	MS525237-327
Clock Post Light	MS525237-327
Clock Wedge Light	58-380022-13
Rheostat Light	MS525237-327
Placard Lights	MS525237-327
Fuel Selector Placard Light	MS525237-327
Stall Warning Light	MS525237-327
Door Ajar Light	MS525237-327
Overhead Instrument Light	303
OAT Indicator Light	MS525237-327
Cabin Dome Light (2)	303
Glareshield Instrument Light (8)	1820
Glareshield Instrument Light (12) (Prior to TE-838 and TH-141)	1829

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LIGHT BULB REPLACEMENT GUIDE

Glareshield Instrument Light (12) (TE-838 and after, TH-141 and after)	313
Map Light	303
Reading Light (4)	1495
Cabin Lights (Overhead)	1864
*Tab Position Indicator Light	
Model 55	356
Models A55, B55 and C55	1819R
Models D55, E55 and 58	1819
**Tab Position Indicator Light	334
Landing Gear Visual Indicator Light	356
Overvoltage Warning Light (Models A55, B55 and C55)	330
Nose Baggage Light	307
Generator Out Light (Models B55 and D55)	2390A12
Landing Gear Position Light	MS525237-327
Taxi Light (Prior to TC-890)	4570
Taxi Light (TC-890 and after, TE-1 and after, TH-1 and after)	4596
Flap Position Light	MS525237-327
Courtesy Lights (2)	1864
Cowl Flap Position Light (Models 55, A55, B55 and C55)	313
Console Lights	
(Red)	D158-100-4T1
(White)	D158-100-5T1
Circuit Breaker and Switch Panel Lights	
(Red)	D158-100-4T1
(White)	D158-100-5T1
Ice Lights	A7796A24  

* Airplanes with "Throw-Over" control column.

** Airplanes with dual control columns.

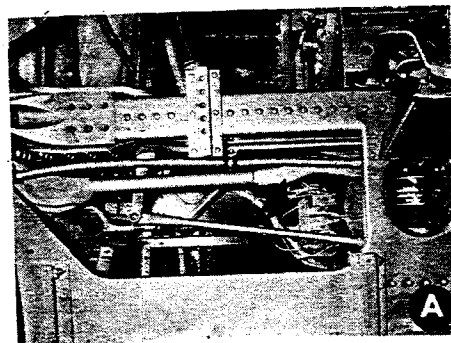
 Airplane serials TC-371 through TC-1935 except TC-1913.

 Airplane serials TC-350, TE-1 through TE-1063 and TH-1 through TH-647 except TH-598.

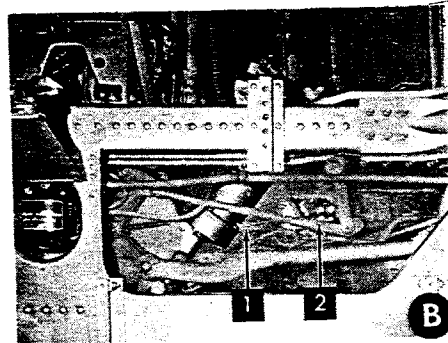
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LIGHT BULB REPLACEMENT GUIDE

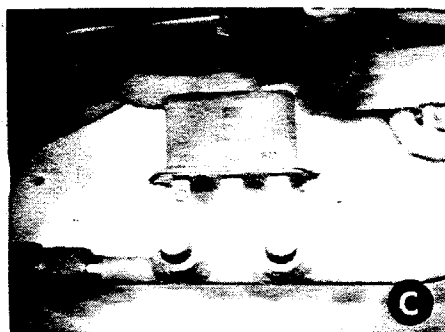
Ice Lights	A7079B24		
Alternator Out Light (Models B55 and D55)	2390A17		
Alternator Out Light (Models E55 and 58)	MS525237-327		
Rotating Beacon	A7079B24		
Wing Navigation Lights (Prior to TC-2003 and TE-768)	1524		
Wing Navigation Lights (TC-2003 and after, TE-768 and after, and TH-1 and after)	A7512-24		
Wing Strobe Light Flashtube (Grimes) (Prior to TC-1678 and TE-943 except TE-938)	55-0101-1		
Wing Strobe Light Flashtube (Grimes) (TC-1678 and after, TE-938, TE-943 and after and TH-1 and after)	55-0221-1		
Wing Strobe Light Flashtube (SDI)	202331		
Tail Navigation Light (Prior to TC-1449 and TC-768)	1203		
Tail Navigation Light (Hoskins) (TE-768 thru TE-856, TH-2 thru TH-208)	Grimes #1683		
Tail Navigation Light (Grimes) (TC-1449, TC-1936 and after; TE-856 thru TE-1200; TH-598, TH-684 thru TH-1362)	632		
Tail Navigation Light (Whelen) (TE-1201 and after; TH-1363 and after)	A508		
Tail Strobe Light Flashtube (Hoskins) (TE-768 thru TE-855, TH-2 thru TH-208)	31-0725-1		
Tail Strobe Light Flashtube (Grimes) (TC-1449, TC-1936 and after; TE-856 thru TE-1200; TH-598, TH-648 thru TH-1362)	31-1745		
Tail Strobe Light Flashtube Assy (Whelen) (TE-1201 and after; TH-1363 and after)	A506		
Landing Lights (Prior to TC-400 except TC-350)	4523		
Landing Lights (TC-350, TC-400 and after; TE-1 and after and TH-1 and after)	4596		
 Airplane serials TC-1913, TC-1936 through TC-2181.			
 Airplane serials TE-1064 through TE-1142, TH-598, TH-648 through TH-679.			



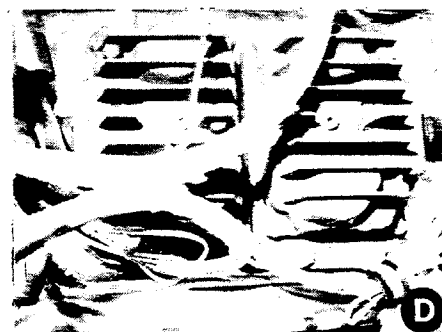
LDG. GEAR LIMIT SWITCHES



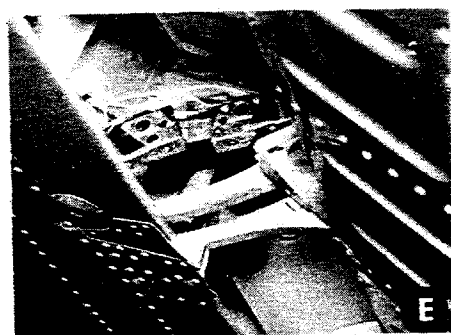
1. LANDING GEAR MOTOR
2. DYNAMIC BRAKE RELAY



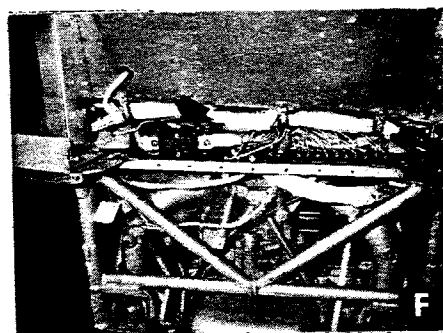
OVERVOLTAGE RELAY (ALTERNATOR)



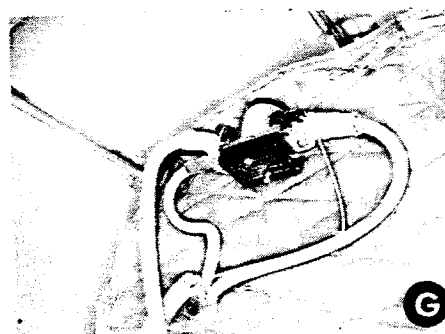
VOLTAGE REGULATORS (ALTERNATOR)



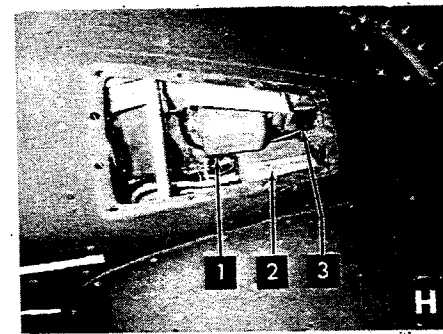
FLAP LIMIT SWITCHES



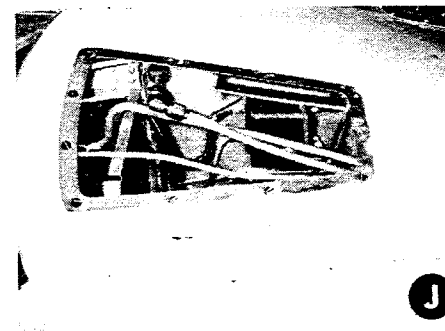
L.H. STARTER SOLENOID



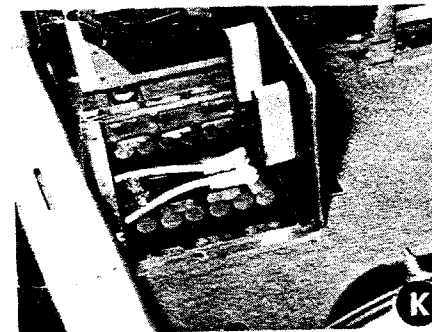
R.H. STARTER SOLENOID



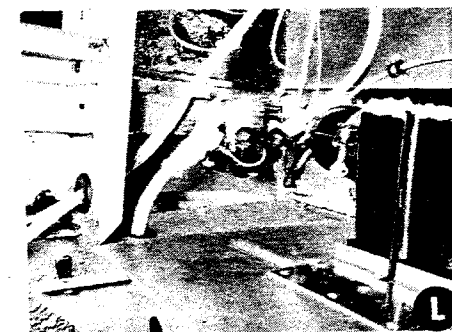
1. VOLTAGE REGULATOR (GEN)
2. EXTERNAL POWER RECEPT.
(OPTIONAL L.H. ONLY)
3. GENERATOR FILTER



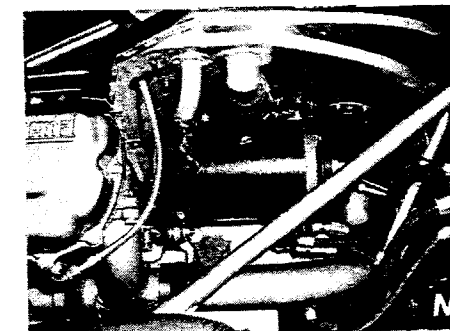
PARALLELING RELAY



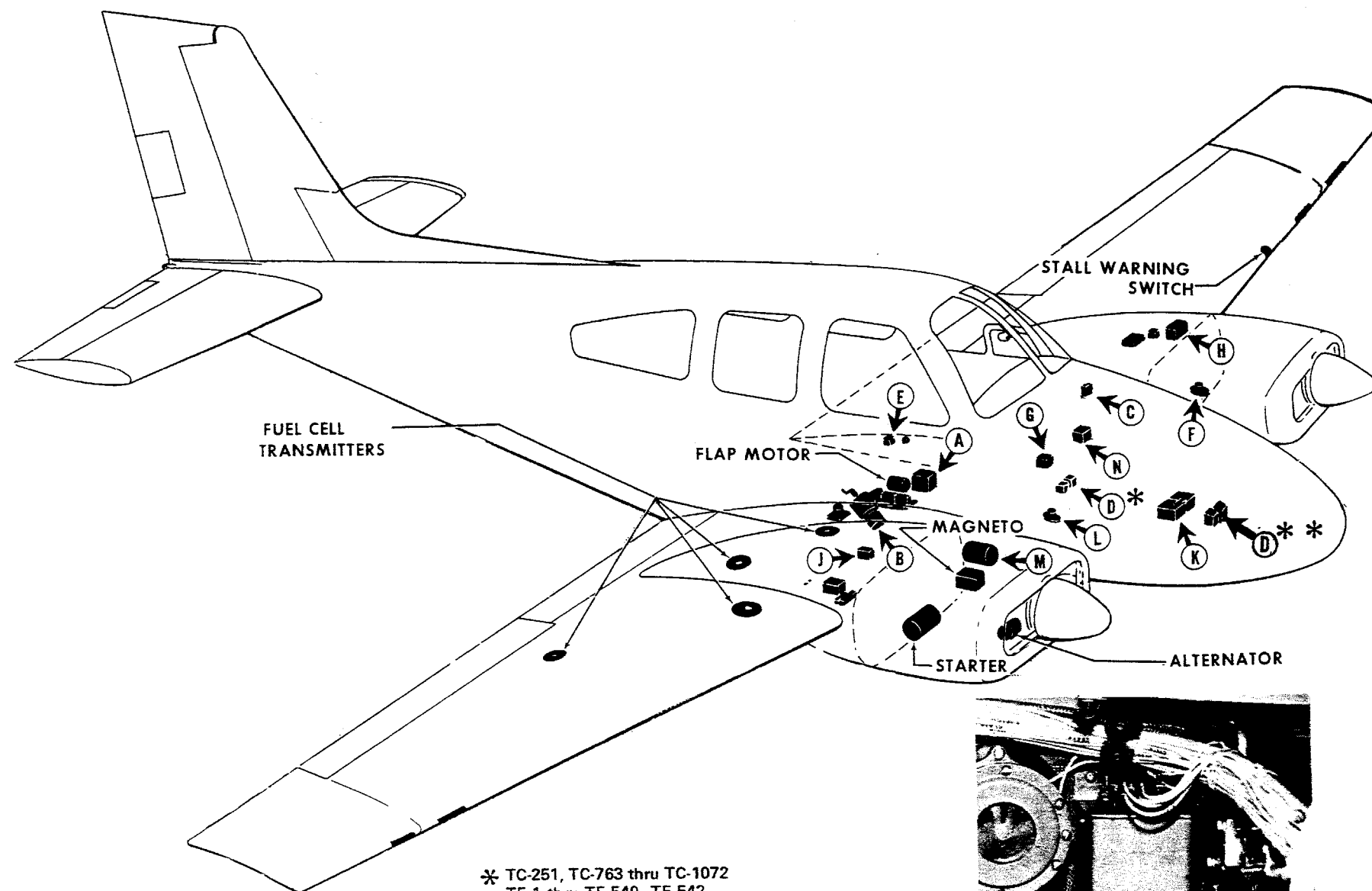
BATTERIES



BATTERY SOLENOID

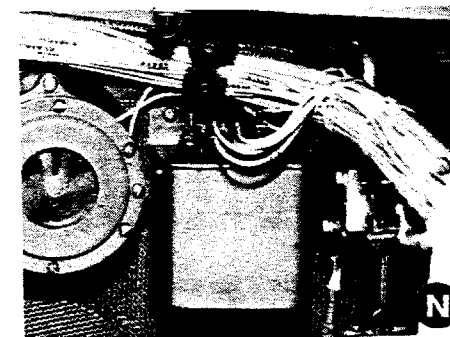


GENERATOR OR ALTERNATOR



* TC-251, TC-763 thru TC-1072
TE-1 thru TE-540, TE-542
TE-544, TE-546 and
TE-548

** TC-1073 and after
TE-541, TE-543, TE-545, TE-547,
TE-549 and after
TH-1 and after



INDUCTION VIBRATOR
TC-1, TC-24 THRU TC-1255
TE-1 THRU TE-724

Figure 13-5 Electrical System

TROUBLESHOOTING BATTERIES

INDICATION

PROBABLE CAUSE

REMARKS

LEAD-ACID

1. No power indicated with battery master switch on.

- | | |
|--|--|
| a. Batteries discharged or defective. | a. Test with hydrometer and voltmeter. |
| b. Open circuit between battery relay and master switch. | b. Check continuity. |
| c. Master switch defective. | c. Check switch for operation. Replace if necessary. |
| d. Defective battery relay. | d. Check relay for operation. Replace if necessary. |

2. Power on with master switch off.

- | | |
|----------------------------------|--|
| a. Master switch defective. | a. Check switch for operation. Replace if necessary. |
| b. Battery relay contacts stuck. | b. Replace relay. |

NICKEL-CADMIUM

1. Apparent loss of capacity.

- | | |
|--|---|
| a. Cells unbalanced. | a. Equalize cell voltage by performing full capacity discharge cycle. |
| b. Electrolyte level too low. | b. Charge, adjust electrolyte level, and capacity test. |
| c. Charging rate too low in airplane. | c. Check and adjust airplane charging system. |
| d. Too little usage or shallow discharges. | d. See "a" above. |

2. Complete failure to operate.

- | | |
|--|---|
| a. Loose or broken lead. | a. Repair or replace. |
| b. Loose or disengaged terminals in battery. | b. Repair or replace any damaged hardware, capacity test. |
| c. Battery not charged. | c. Charge and capacity test. |
| d. Cell open internally. | d. Replace defective cell and capacity test. |

3. Excessive spewage (crystalline deposits on outside of cells).

- | | |
|--------------------------------|--|
| a. Excessive charge rate. | a. Clean the battery, recondition, adjust the electrolyte level and capacity test. |
| b. Electrolyte level too high. | b. Clean cell. |
| c. Vent caps loose or broken. | c. Clean cell, replace or tighten vent cap. |
| d. Cracked cell case. | d. Replace cell, clean battery. |

TROUBLESHOOTING BATTERIES (Cont'd)

INDICATION	PROBABLE CAUSE	REMARKS
NICKEL-CADMIUM (Cont'd)		
4. Cell cases distorted.	a. Excessive charge rate. b. Cell with internal short. c. Plugged vent caps, minor explosion.	a. Clean the battery, recondition, adjust the electrolyte level and capacity test. Adjust voltage regulator of airplane. b. Replace defective cell, recondition and capacity test. c. Disassemble, replace defective parts, clean the battery, recondition and capacity test.
5. Unequal voltages among cells.	a. Cells unbalanced.	a. Equalize cell voltages (perform a full capacity discharge cycle) capacity test.
6. Foreign matter within cells.	a. Impure or acid-contaminated water.	a. Such cells will not normally respond to charging. They will show up as unbalanced cells and must be replaced.
7. Frequent addition of water.	a. Unbalanced cells. b. Leaky or defective cells, damage to O-ring or vent cap.	a. Equalize cell voltages. b. Replace defective parts and inspect for electrolyte leakage. Clean, recondition and level electrolyte.
8. Burn marks on connectors.	a. Loose connectors.	
9. Overheating of intercell connectors.	a. Loose or dirty intercell connectors.	a. Disassemble, clean, reassemble and properly torque intercell connectors, capacity test.
10. Foam or bubbling during charging.	a. Oil or grease contamination in the electrolyte. b. Low concentration of electrolyte.	a. Replace defective cells. b. Recondition, replace cells that continue to foam.
11. Below normal output.	a. Battery switch left ON. b. Voltage regulator set too low. c. Internal connection links loose. d. External connector burned or pitted. e. Defective or reversed cells.	a. Recharge and capacity-test. b. Recharge and capacity-test. Reset voltage regulator. c. Torque, recharge and capacity-test. d. Clean or replace, recharge and capacity-test. e. Replace, recharge and capacity-test.

TROUBLESHOOTING BATTERIES (Cont'd)

INDICATION

PROBABLE CAUSE

REMARKS

NICKEL-CADMIUM (Cont'd)

- | | |
|-------------------------------|--|
| f. Cell case current leakage. | f. Disassemble, clean and recondition, replace any defective cells, and capacity-test. |
|-------------------------------|--|

TROUBLESHOOTING STARTER SYSTEM

- | | | |
|-------------------------------|---|---|
| 1. Both starters inoperative. | a. Circuit breaker tripped in starter switch circuit. | a. Reset. |
| | b. Starter relay inoperative. | b. Check continuity of starter system. |
| | c. Low batteries. | c. Test batteries. If low, replace or start with external power. |
| | d. Loose connections or open circuit between battery positive relay and left starter relay. | d. Check connections and continuity. |
| 2. One starter inoperative. | a. Starter relay inoperative. | a. Check relay terminal connections and continuity of solenoid energizing circuit. If energizing circuit is closed and relay does not operate, replace relay. |
| | b. Poor ground at starter. | b. Test continuity from armature lead to ground. Repair if necessary. |
| | c. Open circuit. | c. Check continuity to starter. |
| | d. Defective starting motor. | d. Check brushes, springs, condition of commutator; replace if necessary. |

TROUBLESHOOTING GENERATORS

- | | | |
|---------------------------|---|---|
| 1. No ammeter indication. | a. Engine speed to low. | a. Increase speed. |
| | b. Loose connection. | b. Check connections throughout system. |
| | c. Open field circuit in generator; defective armature. | c. Test resistance of field. Check field circuit connections. Replace generator if defective. |
| | d. Brushes not contacting commutator. | d. Clean brushes and holders with a clean, lint-free, dry cloth. Replace weak springs. |

TROUBLESHOOTING GENERATORS (Continued)

INDICATION	PROBABLE CAUSE	REMARKS
	e. Brushes worn out.	e. Replace brushes if worn to a length of 5/16 inch.
	f. Dirty commutator.	f. With generator running, clean commutator with No. 0000 sandpaper. Use air jet to remove grit.
	g. Defective voltage regulator.	g. Replace regulator.
	h. Defective ammeter.	h. Replace ammeter.
2. No generator output.	a. Circuit breaker tripped.	a. Reset.
	b. Open circuit.	b. Check continuity of circuit.
	c. Loss of residual magnetism.	c. Flash generator field.
	d. Defective generator control switch or reverse current relay.	d. Test switches. Replace if defective.
3. Low generator output.	a. Generators not paralleled.	a. Readjust minimum-load voltage, then readjust paralleling coil in voltage regulator.
4. Ammeter reads off scale in wrong direction.	a. Defective reverse-current relay.	a. Replace relay.

TROUBLESHOOTING FULL TRANSISTOR REGULATOR - 9000591 TYPE - 24 VOLT

1. High system voltage.	a. Output transistor shorted.	a. Negative grounded systems: 1. F terminal of generator has been grounded. 2. Poor ground in system or poor connection at generator or regulator. 3. Regulator too hot. 4. Ground in wiring between F terminals of generator and regulator. 5. Defective transistor. 6. Shorted field in generator.
2. Battery overcharge.		
3. Lights burning out.		b. Positive grounded systems: 1. Poor ground in system or poor connection at generator or regulator. 2. Regulator too hot. 3. Short in wiring between F and Negative leads between generator and regulator. 4. Defective transistor. 5. Shorted field in generator.
4. No charge.	a. Output transistor open emitter.	a. Negative grounded systems: 1. Severe ground at F terminal of generator.

TROUBLESHOOTING FULL TRANSISTOR REGULATOR - 9000591 TYPE - 24 VOLT (Continued)

INDICATION	PROBABLE CAUSE	REMARKS
		2. Severe ground in wiring between F terminals of generator and regulator. 3. Generator field completely shorted.
		b. Positive grounded systems: 1. Severe short between F and negative leads between generator and regulator. 2. Generator field completely shorted.
5. No charge.	a. Driver transistor shorted.	a. Negative and positive grounded systems: 1. Reverse battery polarity. 2. High positive transient from an external source. 3. Defective transistor.
6. High system voltage.	a. Driver transistor open.	a. Negative or positive grounded systems: 1. Defective transistor.
7. No charge.	a. Zener diode shorted.	a. Either system: 1. Reverse battery polarity. 2. High system voltage. 3. Defective zener.
8. High system voltage.	a. Zener diode open.	a. Either system: 1. Defective zener.
9. Shorted output transistor and high system voltage.	a. Field discharge diode open.	a. Either system: 1. Reverse battery polarity. 2. Defective diode.
10. No charge.	a. Back bias diode open.	a. Negative grounded systems: 1. Severe ground at F terminal of generator. 2. Severe ground in wiring between F terminals of generator and regulator. 3. Generator field completely shorted. 4. Defective diode. b. Positive grounded systems: 1. Severe short between F and negative leads between generator and regulator. 2. Generator field completely shorted. 3. Defective diode.
11. Poor switching which would cause shorted output transistor.	a. Back bias diode shorted.	a. Negative grounded systems: 1. F terminal of generator has been grounded.

TROUBLESHOOTING FULL TRANSISTOR REGULATOR - 9000591 TYPE - 24 VOLT (Continued)

<i>INDICATION</i>	<i>PROBABLE CAUSE</i>	<i>REMARKS</i>
		2. Poor ground in system or poor connection at generator or regulator. 3. Regulator too hot. 4. Ground in wiring between F terminals of generator and regulator. 5. Defective transistor. 6. Shorted field in generator. 7. Defective diode.
		b. Positive grounded systems: 1. Poor ground in system or poor connection at generator or regulator. 2. Regulator too hot. 3. Short in wiring between F and negative leads between generator and regulator. 4. Defective transistor. 5. Shorted field in generator. 6. Defective diode.
12. Output transistor may short from transients - depends on application.	a. Transient suppression diode open.	a. Either system: 1. Reverse battery polarity. 2. High positive transient from external source.
13. Poor switching may or may not fail output transistor.	a. Filter capacitor open.	a. Defective connection or defective capacitor.
14. High system voltage.	a. Feedback capacitor shorted.	a. Defective capacitor.
15. Poor switching which could cause shorted output transistor.	a. Feedback capacitor open.	a. Poor connection or defective capacitor.
16. High system voltage.	a. Open resistor in negative side of voltage divider. Open negative side of potentiometer.	a. Defective resistor or potentiometer.
17. No charge.	a. Open resistor in positive side of voltage divider. Open positive side of potentiometer.	a. Defective resistor or potentiometer.
18. No charge.	a. Open collector load resistor.	a. Defective resistor.
19. Poor switching which will short output transistor.	a. Open driver emitter - base resistor.	a. Defective resistor.

TROUBLESHOOTING ALTERNATOR SYSTEM

INDICATION	PROBABLE CAUSE	REMARKS
	Install an accurate voltmeter on the airplane bus to monitor alternator voltage. Operate engines at idle with all electrical loads off, except the battery.	
1. Voltage output does not increase with engine rpm increase.	a. Alternator circuit breaker open or defective circuit breaker. b. Two ampere fuses (adjacent to over-voltage relay) defective. c. Wiring faulty or improperly connected. d. Voltage regulator voltage setting improper or defective regulator. e. Alternator defective.	a. Reset or replace circuit breaker. b. Replace fuse. c. Perform wiring continuity check. d. Adjust voltage setting. Check regulator. e. Repair or replace alternator.
2. Voltage increases to 28.25 volts and continues to increase with increased engine rpm.	a. Defective voltage regulator.	a. Replace regulator.
3. Voltage does not increase to $28.25 \pm .25$ volts at approximately 1000 engine rpm.	a. Low voltage setting in regulator.	a. Adjust voltage setting until $28.25 \pm .25$ volts is obtained at 1000 engine rpm.
4. Overvoltage relay trips below 30 volts or above 32 volts.	a. Defective overvoltage regulator.	a. Replace overvoltage relay.

TROUBLESHOOTING IGNITION SYSTEM

1. Hard starting.	a. Low voltage at vibrator input. b. Inoperative or defective vibrator. c. Retard breaker in retard (dual breaker) magneto not operating electrically. Engine may kick back during cranking due to advance timing of ignition.	a. Measure voltage between vibrator terminal marked "in" and the ground terminal while operating starter. A reading of at least 28.5 volts must be obtained. b. If voltage is adequate, listen for buzzing of vibrator during starting. If no buzzing is heard, either the vibrator is defective or the circuit from the "Output" terminal on the vibrator to the retard (dual breaker) magneto is open. Check both "Switch and Retard" circuits. Also check for good electrical ground. c. Retard points may not be closing due to wrong adjustment, or may not be electrically connected in the circuit due to poor connection. Inspect retard points to see if they close. Check for proper contact at the "SWITCH" and "RETARD" terminals of retard (dual breaker) magneto and at the vibrator. Check wiring.
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TROUBLESHOOTING IGNITION SYSTEM (Continued)

<i>INDICATION</i>	<i>PROBABLE CAUSE</i>	<i>REMARKS</i>
1. Hard Starting (Continued)	d. Vibrator-magneto combination not "putting-out" electrically.	d. Turn engine in proper direction of rotation until retard points just open on No. 1 cylinder position. Remove in-put connection from starter to prevent engine turning, and while holding No. 1 plug lead 5/16 inch from ground, energize vibrator by turning switch to start. Plug lead should throw a 5/16 inch spark. If spark is weak or missing try new vibrator. If this does not correct trouble remove magneto and check for improper internal timing or improperly meshed distributor gears.
	e. Magneto improperly timed to engine.	e. Check magneto-to-engine timing.
	f. Advance breaker out of adjustment.	f. Readjust breaker and check for correct gap tolerance.
	g. Retard points opening too late.	g. Check timing of retard points.
2. Engine roughness.		a. Install new spark plug.
		b. Check plug leads for continuity and breakdown.
		c. Check magneto breakers (main and retard) for burning or dirt.
3. Magneto rpm check is out of limits.		a. Check magneto-to-engine timing.
		b. Inspect breakers for proper opening.
		c. Check plugs and leads.

TROUBLESHOOTING LANDING GEAR POSITION INDICATOR CIRCUIT

1. One indicator light inoperative.	a. Defective light bulb or indicator.	a. Check bulb for proper contact and burned out filament.
	b. Defective switch.	b. Check continuity of switch. Replace if necessary.
	c. Open circuit.	c. Check continuity of circuit affected.
2. Indicator lights inoperative.	a. Tripped circuit breaker.	a. Check for short circuit. Reset circuit breaker.
	b. Defective bulbs or indicators.	b. Check bulbs for proper contact and burned out filament.
	c. Open circuit.	c. Make continuity check on circuit and check for loose connections.
3. Indicator lights inoperative when navigation lights are turned on.	a. Open circuit through dimming resistor.	a. Check dimming resistor for open circuit and loose wire connections.

TROUBLESHOOTING WARNING HORN CIRCUIT

<i>INDICATION</i>	<i>PROBABLE CAUSE</i>	<i>REMARKS</i>
1. Warning horn inoperative.	a. Tripped circuit breaker.	a. Check for short circuit. Reset circuit breaker.
	b. Throttle switch out of adjustment.	b. Check throttle switch for proper adjustment and continuity.
	c. Open circuit.	c. Check circuit for continuity and loose connections.

TROUBLESHOOTING FLAP CONTROL AND INDICATOR CIRCUIT

1. Flaps will not lower.	a. Tripped circuit breaker.	a. Check circuit. Reset circuit breaker.
	b. Defective down limit switch.	b. Check continuity of switch. Replace switch if defective.
	c. Open circuit or loose connections.	c. Run continuity check on circuit. Check for loose connections.
	d. Defective flap motor.	d. Check brushes, springs, condition of commutators. Replace if necessary.
2. Flaps will not raise.	a. Tripped circuit breaker.	a. Check circuit. Reset circuit breaker.
	b. Defective up limit switch.	b. Check continuity of switch. Replace if necessary.
	c. Open circuit or loose connections.	c. Check continuity of up position circuit. Check for loose connections.
	d. Defective flap motor.	d. Check continuity of switch. Replace if necessary.
3. Up position light inoperative.	a. Tripped circuit breaker.	a. Check circuit. Reset circuit breaker.
	b. Open circuit.	b. Check continuity of switches and circuit.
4. Up position light inoperative only when navigation lights are on.	a. Open circuit in dimming resistor circuit.	a. Check continuity of dimming resistor.
5. Down position light inoperative.	a. Tripped circuit breaker.	a. Check for short circuit. Reset circuit breaker.
	b. Open circuit.	b. Check continuity of switches and circuit.
6. Down position light inoperative only when navigation lights are on.	a. Open circuit in dimming resistor circuit.	a. Check continuity of dimming resistor. Replace if necessary.
7. Both position lights inoperative.	a. Open circuit or tripped circuit breaker.	a. Check continuity of circuit. Reset circuit breaker.

TROUBLESHOOTING STALL WARNING INDICATOR CIRCUIT

<i>INDICATION</i>	<i>PROBABLE CAUSE</i>	<i>REMARKS</i>
1. Warning buzzer inoperative.	a. Tripped circuit breaker.	a. Check and reset circuit breaker.
	b. Open circuit.	b. Check continuity of circuit.
	c. Defective switch.	c. Check switch for proper operation. Replace if necessary.
	d. Defective indicator.	d. Check buzzer or light for proper operation.
2. Buzzer or light operates continuously.	a. Grounded circuit between buzzer or light and switch.	a. Test for ground in circuit.
	b. Defective switch.	b. Check for proper switch operations.

TROUBLESHOOTING LANDING LIGHT CIRCUIT

1. Light inoperative.	a. Tripped circuit breaker.	a. Check for short circuit. Reset circuit breaker.
	b. Defective light.	b. Check bulb for proper contact and burned out filament.
	c. Open circuit.	c. Check continuity of circuit.
	d. Landing light switch defective.	d. Check continuity through switch. Replace if necessary.

TROUBLESHOOTING NAVIGATION LIGHT CIRCUIT

1. Navigation lights inoperative.	a. Tripped circuit breaker.	a. Check for short circuit. Reset circuit breaker.
	b. Open circuit.	b. Check continuity of entire circuit.
2. One navigation light inoperative.	a. Defective light.	a. Check bulb for proper contact and for burned filament.
	b. Open circuit.	b. Check continuity of circuit wiring from switch to ground.

TROUBLESHOOTING FUEL QUANTITY INDICATOR CIRCUIT

1. Fuel indicator inoperative on one tank only.	a. Defective selector switch.	a. Check selector for proper contact.
	b. Defective transmitter.	b. Check continuity of fuel transmitter.
	c. Open circuit from switch to transmitter.	c. Check continuity of circuit.
2. Fuel indicator inoperative on both tanks.	a. Tripped circuit breaker.	a. Check for short circuit. Reset circuit breaker.
	b. Open circuit.	b. Check continuity of circuit.

STROBE LIGHT, BULLOCK UNIT

The system consists of a solid state power supply unit, a circuit breaker switch on the instrument panel, a shielded power cable and a single, ventral-mounted xenon gas light. System operation is based on the capacitance discharge principle. A DC converter steps up the aircraft battery voltage to approximately 400 volts to charge the capacitor. The trigger circuit consists of a unijunction oscillator and a silicon controlled rectifier which applies a pulse of negative voltage to the trigger transformer in the lamp. The trigger transformer produces an ionization voltage of approximately 4000 volts to ignite the xenon gas in the lamp. As the lamp ignites, the energy stored in the capacitor is discharged through the lamp to produce a peak light intensity of over a million candle power. When the capacitor voltage drops below 50 volts, the lamp will go out and the capacitor begins recharging for the next cycle. System operational cycle will repeat, until the strobe light is turned off, at a flash rate of 45 flashes per minute.

TROUBLE ANALYSIS

Whenever trouble occurs, check all primary power lines, external circuit elements, fuses and wiring for a malfunction before troubleshooting the strobe light system. System electrical failure may be traced to any of three general areas: power unit, lamp assembly or wiring. A quick method of isolating the trouble source is to remove the lens of the xenon lamp and test the lamp. Inspect the lamp to see if it is broken or loose in its socket. If the lamp is intact, use a DC voltmeter to check for approximately 350 volts at the top of the lamp with the system turned on. The rate that the voltage peaks should be between 40 to 55 times per minute. If no voltage is present, the fault is probably located in the power unit.

TROUBLESHOOTING POWER UNIT

Disassemble the power unit by removing the screws securing the end plates to the power unit. Remove the end plate which has the power plug and slide the bottom heat sink forward until it can be separated. The large capacitor may be attached to the rear end plate by thermal epoxy for efficient heat transfer and care should be taken to avoid breaking this bond. The upper heat sink (with transistors mounted on it) can be slid forward, exposing the component board and capacitor bracket. Remove the nuts securing the board to the metal bracket and the component board will be completely accessible.

CONVERTER TROUBLESHOOTING

a. If the fuse keeps blowing, check transistor 2N3055 for a possible short. It will be necessary to remove the emitter wire, and unsolder the base wire before an ohmmeter check can be made. Many times only one transistor will fail. Failure of Capacitor C1 will also cause the fuse to blow.

b. If the converter won't start when voltage is first applied, a small current "kick" is noted and then no current

is drawn; look for a poor solder joint in the starting circuit, R2 2.7K and R1 82 ohms. The converter may be started by applying about 2 volts to the junction of R1 and R2.

c. Low or no output voltage, but converter operates otherwise. Using an ohmmeter, look for a shorted diode in the bridge circuit. In extreme cases, the transformer could have a shorted winding. As a check, disconnect a lead from the transformer secondary, if the current remains the same, the transformer should be replaced.

d. Low output voltage can be the result of a faulty capacitor C2. Check by removing the positive lead from the capacitor.

e. Low voltage coupled with very slow voltage buildup can be traced to a faulty transistor 2N3055. An ohmmeter check will indicate which transistor has failed. Select replacement transistors having a collector to emitter resistance of 100 ohms minimum.

TRIGGER CIRCUIT TROUBLESHOOTING

a. Using a high impedance voltmeter, check for 180 volts DC at the junction of R8, R9 and C5. If there is no voltage, check C5 and SCR T1145A2.

b. If there is voltage at the junction, it should periodically drop to around 30 volts as the SCR triggers. If the SCR does not trigger, measure the voltage across R7 (100 ohms). This voltage will be below .5 volts. If the voltage is indicated, place an oscilloscope across R7 and look for a positive going pulse of around 4 volts at the repetition rate of 40 to 55 times per minute. If the pulse is recorded on the scope, then the SCR is not triggering and should be replaced.

c. When no voltage is observed across R7, check for battery voltage at R5 and R6. If voltage is present, then the trouble is in the unijunction.

d. If normal voltage is observed across R7, check the capacitor C4 for shorts and leakage.

e. If unijunction Q3 is to be replaced, it may be necessary to readjust the flash rate. This can be done by changing R5 or by changing the value of C4. In many cases, the value is recorded on the component board, and it is only necessary to order the exact value from the manufacturer (see the Vendor Publication List).

NOTE

In some instances, power supply units which have been stored or not operated on the aircraft for a considerable period of time, may not operate instantly when the system is turned on. Before determining that the power unit is inoperative, leave the system on for a period of at least 30 minutes. If the power unit does not operate in this span of time, refer to TROUBLESHOOTING POWER UNIT.

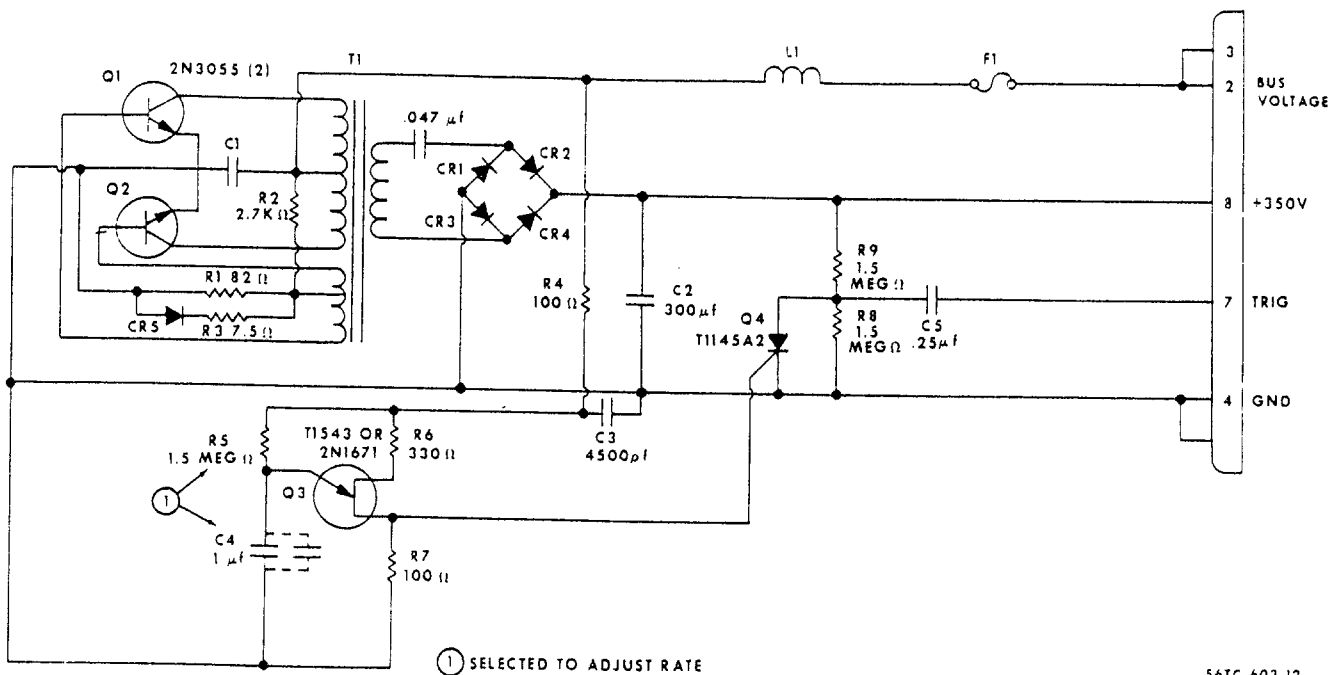


Figure 13-6 Bullock Power Supply Schematic (Internal)

GRIMES STROBE LIGHT SYSTEM

The system consists of a solid state power supply unit, a circuit breaker and switch on the LH subpanel, and xenon gas lights mounted in the tail and each wing tip. The function of the Grimes Strobe Light system is essentially the same as the strobe light system described earlier in this Section. Use that system description for a more detailed explanation of the method by which the Grimes system operates. The Grimes System does not incorporate a timing circuit, since all the lights flash at the same time at a rate of 60 flashes a minute.

POWER SUPPLY REMOVAL AND INSTALLATION

To gain access to the power supply unit, remove the floor-board on the RH side of the baggage compartment. The entire unit may be removed by disconnecting the electrical wiring to the power supply and removing the screws anchoring the module to the support structure. To reinstall the power supply unit, reverse the foregoing procedures.

CAUTION

Observe the precautions noted in the following procedure when removing and installing the power supply.

STROBE LIGHT WIRING

An incorrect hook-up of the wires at either the power input or between the strobe light assemblies and the power supply unit will cause a reversal of polarity that results in serious component damage and failure. Care must be taken to ensure that the red wire is connected to positive power and the black wire to ground. Make sure that the red, white, and black wires are connected to pins "A", "B", and "C" of the connector respectively and that the connectors are properly assembled. The shield for wing cables should be grounded to the airplane structure at the wing break and the shield for the tail light cables should be grounded to the airplane structure at the power supply.

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BARON 55 AND 58
SHOP MANUAL**

WARNING

Although a bleed-off resistor is incorporated in the power supply circuit, high voltage is involved in the circuit between the power supply and light assemblies. For this reason, turn the control switch for the strobe lights OFF and wait for at least 10 minutes to elapse before disconnecting the cables at the power supply or light assemblies and before handling or disassembling either of these units in any way. Failure to observe these precautions may result in physical injury from electrical shock.

**WING STROBE LIGHT REMOVAL AND
INSTALLATION**

CAUTION

To avoid damage to the strobe light system or possible physical injury from electrical shock, observe the precautions outlined under STROBE LIGHT WIRING in this section before removing or installing the strobe light assembly.

- a. Remove the transparent cover over the lights from the wing tip.
- b. Remove the 4 screws securing the strobe light assembly to the mounting bracket.
- c. Remove the bonding jumper from airplane structure.
- d. Unplug the strobe light assembly from the airplane electrical wiring.
- e. Reverse the foregoing procedures to reinstall the strobe light assembly.

**TAIL STROBE LIGHT REMOVAL AND
INSTALLATION**

CAUTION

To avoid damage to the strobe light system or possible physical injury from electrical shock, observe the precautions outlined under STROBE LIGHT WIRING in this section before removing or installing the strobe light assembly.

- a. Remove the retaining screws securing the strobe light assembly in place on the tail cone.
- b. Remove the lens retainer, and lens.
- c. Disconnect the strobe light from the airplane

electrical system and remove the flashtube.

- d. Reverse the foregoing procedures to reinstall the strobe light assembly.

**TAIL STROBE LIGHT REMOVAL (Grimes and
Symbolic Displays Inc.)**

WARNING

High voltage is involved in the circuit between the power supply and strobe light assemblies. Turn the control switch for the strobe lights OFF and allow at least 10 minutes to elapse prior to disconnecting the cables at the power supply or strobe light assemblies and before handling either of these units in any way. Failure to observe these precautions may result in physical injury from electrical shock.

- a. Remove the screws from the lens and remove the lens.
- b. If the nav light needs replaced, rotate the bulb counterclockwise and remove the nav light bulb.
- c. Remove the tail cone and disconnect the wire connector.
- d. Remove the screws from the light assembly and remove the light assembly.

**TAIL STROBE LIGHT INSTALLATION (Grimes and
Symbolic Displays Inc.)**

WARNING

High voltage is involved in the circuit between the power supply and strobe light assemblies. Turn the control switch for the strobe lights OFF and allow at least 10 minutes to elapse prior to disconnecting the cables at the power supply or strobe light assemblies and before handling either of these units in any way. Failure to observe these precautions may result in physical injury from electrical shock.

- a. Place the light assembly in position in the tail cone and install the screws.
- b. Make the electrical connection and install the tail cone on the airplane.
- c. Install the nav light if removed.
- d. Install the lens gasket.

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NOTE

If there is a lens drain hole be certain the drain is not obstructed.

- e. Install the lens.
- f. Install the lens retainer and secure with the screws.

TAIL STROBE LIGHT REMOVAL (*Whelen Engineering Inc.*)

WARNING

High voltage is involved in the circuit between the power supply and strobe light assemblies. Turn the control switch for the strobe lights OFF and allow at least 10 minutes to elapse prior to disconnecting the cables at the power supply or strobe light assemblies and before handling either of these units in any way. Failure to observe these precautions may result in physical injury from electrical shock.

- a. Remove the tail cone and disconnect the electrical connector.
- b. Disconnect the electrical bonding wire.
- c. Remove the screws from the light assembly.
- d. Remove the retainer, lens and gasket.
- e. Pull the light assembly from the tail cone.
- f. Remove the nav light shield from the nav light.
- g. Pull the nav light from the light assembly.

TAIL STROBE LIGHT INSTALLATION (*Whelen Engineering Inc.*)

WARNING

High voltage is involved in the circuit between the power supply and strobe light assemblies. Turn the control switch for the strobe lights OFF and allow at least 10 minutes to elapse prior to disconnecting the cables at the power supply or strobe light assemblies and before handling either of these units in any way. Failure to observe these precautions may result in physical injury from electrical shock.

- a. Install the nav light if necessary.
- b. Install the nav light shield if removed.

NOTE

Install the shield with the word "up" in the up position.

- c. Place the light assembly in the tail cone.
- d. Install the gasket, lens and retainer.
- e. Install the retainer screws.
- f. Install the bonding wire.
- g. Install the tail cone on the airplane.

STEP LIGHT

Airplane serials TH-1389, TH-1396 and after, a step light is mounted in the fuselage just forward of the step and aft of the right wing trailing edge. The switch is mounted in the top of the forward door. In these installations the aft door-ajar switch will activate the step light as well as perform its annunciator function. The timer is located on the forward side of the forward spar carry-through, and the five amp circuit breaker is located in the left circuit breaker side panel.

This system is wired directly to the battery through a five amp circuit breaker and will operate any time the doors are opened. The courtesy lights are a part of the same system and operate simultaneously with the step light. Once the step light has been activated, the timer will turn the light off in approximately 15 minutes.

STEP LIGHT BULB REPLACEMENT

- a. Locate the small upholstery sidepanel over the step light.
- b. Remove the screws which hold the upholstery panel in place and remove the panel.
- c. Pull the light assembly from its mounting bracket.
- d. Remove the light bulb.

STEP LIGHT BULB INSTALLATION

- a. Install a new bulb (1495 GE) in the light socket.
- b. Install the light assembly in its mounting bracket.
- c. Place the upholstery panel in place and install the screws.

EMERGENCY LOCATION TRANSMITTER

Airplane serials TC-1418 and after, TE-850 and after, TH-188 and TH-190 and after have an emergency locator transmitter (ELT) to assist in the tracking and recovery of any airplane and crew in the event of a crash, or if an emergency landing is necessitated. Airplane serials TC-1418 thru TC-2320, TE-850 thru TE-1177, TH-188, and TH-190 thru

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TH-1132 are equipped with Collins Communications Components Corporation ELTs. Narco ELTs are installed on airplane serials TC-2321 and after, TE-1178 and after, TH-1133 and after and on earlier airplanes equipped with Kit No. 101-3046-1. The ELT is mounted on the right side of the aft fuselage at approximately F.S. 230. An antenna is located on top of the aft fuselage inside the vertical fin fairing, and an access hole with a spring-loaded cover is located in the right aft fuselage skin adjacent to the transmitter, providing access for manual activation of the ELT.

The output frequencies are 121.5 and 243.0 MHz, simultaneously. Range is approximately line of sight. The ARM-OFF-ON switch is located on the transmitter, and controls the operation of the set. The ON position turns the set on for testing and the ARM position actuates the set to operate automatically upon impact. A reset switch, located on the forward end of the transmitter, resets the transmitter to the ARM position in the event the impact switch is accidentally triggered. Airplane serials TC-1418 thru EC-2320, TE-850 thru TE-1177, TH-188 and TH-190 thru TH-1132 with Kit No. 101-3039-1 installed have a remote switch installed on the RH side of the rear fuselage. The remote switch is placarded REARM-ARM-XMIT, and is accessible thru an access hole with a spring-loaded door adjacent to the transmitter. The XMIT position turns the set on for testing and the ARM position actuates the set to operate automatically upon impact. The REARM position resets the transmitter to the ARM position in the event the impact switch is accidentally triggered. Airplane serials TC-2321 and after, TE-1178 and after, TH-1133 and after and prior airplanes equipped with Kit No. 101-3046-1 have a remote switch installed on the RH side of the rear fuselage. The remote switch is placarded ARM-XMIT, and is accessible thru an access hole with a spring-loaded door located adjacent to the transmitter. An optional installation is available for the remote switch so that it may be installed on the instrument panel. The remote switch is a momentary switch and enables manual activation of the ELT for testing purposes while the unit is installed in the airplane.

MAINTENANCE

Maintenance on the ELT is normally limited to replacing the battery. The following is a list of the various conditions which warrant battery replacement.

- a. Visual inspection shows signs of leakage, corrosion or unsecured leads.
- b. Elapsed replacement date noted on the battery case (this date represents 50% of the useful life of the battery).

NOTE

The useful life of the battery is the length of time which the battery may be stored without losing its ability to continuously operate the ELT for 48 hours.

- c. After any emergency use.
- d. After one cumulative hour of use.
- e. After operation of unknown duration.
- f. If the transmitter is stored in an area where the temperature is normally above 38°C (100°F), the battery life will be shortened.

CAUTION

Avoid storage of batteries at temperatures in excess of 55°C (130°F).

The information on battery life and replacement is included in the data furnished with each ELT, and is usually placarded on the battery.

NOTE

Replacement batteries should be obtained only from ELT manufacturers, airplane manufacturers or other acceptable suppliers, since the condition and useful life of over-the-counter batteries, such as those sold for flashlights, portable radios, etc., are usually unknown.

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CAUTION

The ELT switch should not be turned ON unless the ELT is connected to its associated antenna or a 50-ohm dummy load.

**COLLINS COMMUNICATIONS COMPONENTS
CORPORATION BATTERY REPLACEMENT**

NOTE

The Narco ELT may be installed by Kit No. 101-3046 into airplanes originally equipped with Collins Communications Components Corporation ELT.

a. Place the ARM-OFF-ON switch on the ELT in the OFF position.

b. Disconnect the antenna cable and the remote switch wiring, if installed, and remove the ELT from the airplane.

c. Remove the screws which hold the mounting base on the transmitter and remove the base.

d. Remove the old battery and disconnect the electrical connector. Discard the old battery.

WARNING

DO NOT discard the battery in fire.

NOTE

Inspect for and properly treat any corrosion that may be indicated in the area when the battery is replaced.

e. Connect a fresh battery and install it in the compartment.

f. Replace the base and screws.

g. Install the transmitter in the airplane and attach the antenna cable and remote switch wiring, if installed.

h. The new replacement date should be marked on the ELT in a visible area. This will aid in future inspections of the ELT. This date is 50% of the useful life of the

battery as defined by the battery manufacturer.

**NARCO BATTERY REPLACEMENT
(Figure 13-7)**

a. Place the ARM-OFF-ON switch on the ELT in the OFF position.

b. Disconnect the antenna cable from the ELT. Disconnect the remote switch wiring, if installed, from the terminals on the ELT.

c. Unlatch the mounting strap and remove the ELT from the airplane.

d. Extend the portable antenna.

CAUTION

To avoid damage to the antenna or the plastic tab on the upper end, care must be exercised in extending the portable antenna and handling the control head.

e. Remove the four screws attaching the control head to the battery casing and slide the control head and battery case apart. The battery connections are approximately 3 inches long.

NOTE

Do not remove the sealant on the inside lip of the battery pack or a water tight seal will not be made when the ELT is reassembled.

f. Disconnect the battery by unsnapping the battery terminals from the bottom of the transmitter PC board. Discard the old battery.

NOTE

Inspect for and properly treat any corrosion that may be indicated in the area when the battery is replaced.

WARNING

DO NOT discard the battery in fire.

g. Connect the terminals of the new battery to the bottom of the transmitter PC board.

BEECHCRAFT BARON 55/58 SERIES SHOP MANUAL

h. Using a stick, apply a bead of sealant (supplied with each battery pack) around the area of the control head which is joined with the battery case when reassembled.

NOTE

This sealant provides a water tight seal when the unit is assembled.

i. Insert the control head section into the battery case, being careful not to pinch the wires, and install the four attaching screws. Wipe any excess sealant from the outside of the unit.

NOTE

If the four screw holes do not line up, rotate the battery case 180° and reinsert.

j. Stow the portable antenna.

CAUTION

Exercise extreme care in order to avoid damage to the antenna or the plastic tab on the upper end.

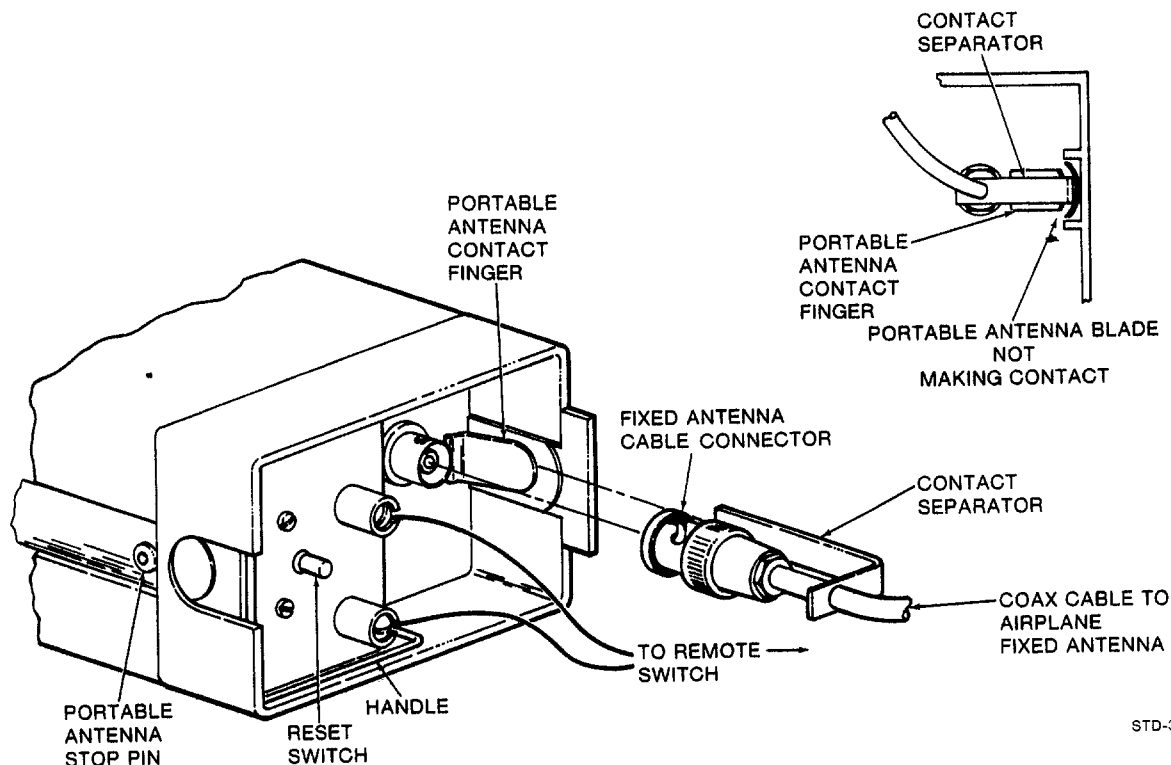
k. Install the transmitter in the airplane and secure the mounting strap.

l. Connect the fixed antenna cable to the ELT. Ensure that the plastic contact separator is inserted between the portable antenna contact and the portable antenna.

NOTE

When the contact separator is not in place, a very weak signal may be transmitted. This signal may be strong enough for a functional test, but too weak for emergency use.

m. Connect the remote switch wiring, if installed, to the terminals on the ELT.



STD-356-48

Narco ELT
Figure 13-7

**BEECHCRAFT
BARON 55/58 SERIES
SHOP MANUAL**

n. Press the RESET button and place the ARM-OFF-ON switch on the ELT in the ARM position.

o. The new replacement date should be marked on the ELT in a visible area. This will aid in future inspections of the ELT. This date is 50% of the useful life of the battery as defined by the battery manufacturer.

DORNE AND MARGOLIN BATTERY REPLACEMENT (CE-1033 AND AFTER, E-2148 AND AFTER, EA-412 AND AFTER, CJ-156 AND AFTER)

- a. Remove the aft upholstery panel.
- b. Make certain the ELT is turned off.
- c. Disconnect the antenna.
- d. Disconnect the remote switch.
- e. Remove the screws holding the ELT in place.
- f. Remove the ELT from the airplane.
- g. Remove the screws from the bottom of the ELT and remove the bottom.
- h. Disconnect the battery and discard it.

NOTE

Inspect for and properly treat any corrosion that may be indicated in the area when the battery is replaced.

- i. Connect the new battery.
- j. Install the bottom of the ELT and the screws.
- k. Install the ELT in the airplane and install the screws which hold it in place.
- l. Connect the antenna and remote switch.
- m. Install the aft upholstery panel.
- n. Test the ELT as indicated in TESTING EMERGENCY LOCATOR TRANSMITTER.

TESTING EMERGENCY LOCATOR TRANSMITTER

Generally, tests will be performed following maintenance or repair of ELTs, other than battery replacement, to determine their operational capability. Testing the ELT, if improperly done, could trigger false alerts and create frequency jamming, and may interfere with the reception of a bonafide emergency transmission. Federal Communications Commission regulations require that this testing be performed in a screened or shielded test room, or in a test enclosure that will hold the self contained ELT unit with the antenna fully extended.

CAUTION

The ELT switch should not be turned ON unless the ELT is connected to its associated antenna or a 50-ohm dummy load.

Operational testing of installed ELTs may be accomplished as follows:

NOTE

Tests should not be longer than three audio sweeps. One audio sweep may be defined as amplitude modulating the carrier with an audio frequency sweeping downward over a range of not less than 700 Hz, within the range 1600 to 300 Hz, and a sweep repetition rate between two and four Hz. Tests should be conducted only in the first five minutes of any hour. If the operational tests must be made at a time not included within the first five minutes after the hour, the tests should be coordinated with the nearest FAA tower or flight service station.

- a. Turn COMM-1 ON and tune to 121.5 MHz.
- b. Turn the COMM-1 audio switch to the SPEAKER position and place the volume control in the center of its range.
- c. Turn the ELT ARM-OFF-ON switch to ON and monitor ELT signal. On airplanes equipped with a remote switch (located in the aft fuselage on the RH side or on the instrument panel), the remote switch may

**BEECHCRAFT
BARON 55/58 SERIES
SHOP MANUAL**

be momentarily flipped to the XMIT position and the ELT signal monitored.

NOTE

If there is no audible signal, the battery is probably disconnected or dead, assuming that the VHF transceiver is operational.

d. Place the ARM-OFF-ON switch on the ELT to the OFF position. If the remove switch is being utilized to test the unit, the switch should be released so it will return to the ARM position. The audio signal should disappear completely.

e. Place the switch in the ARM position. There should be no audio signal present.

NOTE

If the signal is heard, the impact switch has probably been activated and should be reset.

f. Firmly press the reset switch on the front of the ELT and listen to ensure the audio signal disappears from COMM-1.

**GROUND COMMUNICATION (OPTIONAL)
(TH-1389, TH-1396 AND AFTER)**

The airplane may be equipped with an optional ground communication system. This system allows radio communication while all other electrical equipment is turned off. The switch for this system is a push-on, push-off switch located near the top of the instrument panel to the right of center. The system's two 5 amp circuit breakers are located in the nose baggage compartment.

"END"

SECTION

14

WIRING DIAGRAMS

WIRING DIAGRAMS

The wiring diagrams for serials TC-1 through TC-1935, except TC-1913; TE-1 through TE-1063 and TH-1 through TH-647, except TH-598 are contained in this section of the shop manual. The serial effectivity of each diagram is given in the title of the diagram.

Refer to the BEECHCRAFT Baron B55 Wiring Diagram Manual, part number 96-590011-15, for the wiring diagrams pertaining to the Baron B55 serials TC-1913, TC-1936 and after. Refer to the BEECHCRAFT Baron E55 and Baron 58 Wiring Diagram Manual, part number 96-590010-15, for the wiring diagrams pertaining to the Baron E55 serials TE-1064 and after and to the Baron 58 serials TH-598, TH-648 and after.

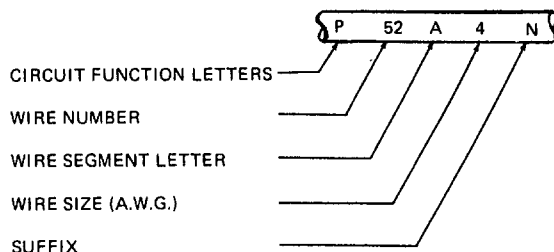
The individual circuit diagrams shown on the following pages identify each wire with a code assigned according to its usage in the airplane. The individual circuit components are

indexed and listed in the nomenclature accompanying each diagram. Wire bundles and harnesses are not indicated. The arrangement of the components in the diagram was chosen for clarity without the attempt to indicate the actual location in the airplane.

Optional equipment and changes have been noted by placing them in emphasized manner such as dotted lines and heavily outlined sections. Notes have been added for clarity when specific requirements need to be met.

The wire codes used, closely follow the military numbering system. Briefly, a wire code consists of: a circuit function letter, wire number, wire segment letter, and wire size (American Wire Gauge). Frequently, a suffix indicating a ground (N), phase (A, B, etc.), or material (alugel, etc.) is added.

Electrical symbols used in diagrams appear on pages 14-4 and 14-5.



STD-369-24

A list of circuit function designations follows:

- A Armaments
- B Photographic
- C Control surfaces; automatic pilot
- D Instruments other than flight or engine instrument; ammeter, landing gear position, free air temperature, cabin pressure, etc.
- E Engine instrument; fuel quantity, tachometer, synchroscope, etc.
- F Flight instrument
- G Landing gear, actuator, retraction, warning, down lock, etc.
- H Heating, ventilating, deicing
- J Ignition
- K Engine control; starter, prop pitch, prop synchronizer, etc.
- L Lighting
- M Miscellaneous electric; windshield wiper, etc.
- P DC power
- Q Fuel and oil; fuel valves, fuel pump motors, throttle control, oil pumps, etc.
- R Radio; RC-radio command, RM-marker beacon, etc.
- S Radar; SA-altimeter, SS-search, etc.
- T Special electronics; TK-telemetry, TR-receivers, etc.
- U Miscellaneous electronics (other than R, S or T)
- V DC power for AC systems
- W Warning and emergency
- X AC power
- Y Armaments special systems

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Alternator	14-27
Annunciator	14-163
Anti-Icer, Alcohol Quantity	14-84
Anti-Ice Pump, Prop	14-82
Autopilot, H-14	14-155

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Baggage	
Nose Compartment Light	14-148
Battery	14-8
Beacon, Rotating	14-128
Boost Pumps, Fuel	14-54

C	
Cabin Lights	14-123
Cigarette Lighter	14-111
Compartment Light,	
Nose Baggage	14-148
Cowl Flap	14-93
Cylinder Head and Oil	
Temperature	14-86

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Three Bladed Prop,	
Goodrich	14-107
Two Bladed Prop,	
Goodyear	14-102
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Electrical Trim Tab	14-113
Electrical Symbols	14-4
Engine Hour Meter	14-97
External Power and Starter	14-15

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Flaps	14-67
Flight Hour Meter (See	
Landing Gear)	14-60
Fuel Boost Pumps	14-54
Fuel Quantity Indicator	14-38
Fuel Vent Heater	14-101

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Gear, Landing	14-60
Generator	14-24

G	SECTION & PAGE No.
Goodrich Three Bladed Prop	
Deice	14-107
Goodyear Two-Bladed Prop	
Deice	14-102

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Deice Boost (Opt'l)	14-168
Heater, Fuel Vent	14-101
H-14 Autopilot	14-155

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Fuel Quantity	14-38
Vacuum Pressure	14-152
Instrument Lights	14-130
Optional	14-139
Optional Wedge	14-142
Introduction	14-1

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Indicator	14-66
Landing Light	14-121
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Landing	14-121
Nose Baggage	
Compartment	14-149
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Taxi	14-121
Lights,	
Cabin	14-123
Courtesy	14-149
Navigation	14-116
Instrument	14-130
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Optional Instrument	
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Strobe	14-158
Lighter, Cigarette	14-111

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Meter, Engine Hour	14-99

ALPHABETICAL INDEX FOR WIRING DIAGRAMS CALLOUTS ONLY

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Instrument Lights.....	14-139
Instrument Wedge Lights	14-142
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Power, External and Starter.....	14-15
Pressure, Vacuum Indicator	14-152
Prop Deice, Three Bladed Goodrich.....	14-107
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Prop Anti-Ice Pump	14-82
Prop Anti-Ice Quantity	14-84
Prop Synchronizer.....	14-169
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Pumps, Fuel Boost	14-54

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Stall Warning.....	14-97
Starter and External Power	14-15
Strobe Lights.....	14-158
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Trim Tab, Electric	14-113
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Two Bladed Prop Deice Goodyear	14-102

V	
Vacuum Pressure Indicator	14-152

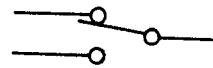
W	
Warning, Stall.....	14-97
Wedge Lights Optional	14-142
Optional Instrument.....	14-139

ELECTRICAL SYMBOLS

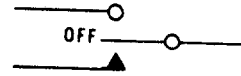
SWITCHES & RELAYS

- Positive Contact
- ▲ Momentary Contact

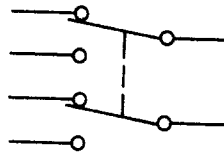
These contacts may be found in various combinations on most of the following type switches and relays.



2 - Position



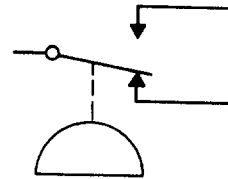
3 - Position



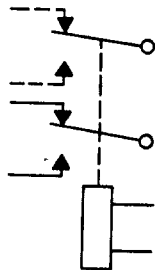
2 - Pole



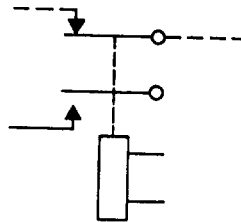
Thermal Switch



Pressure Switch



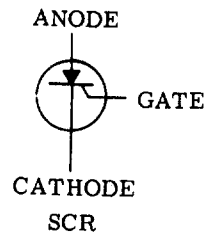
Low Current



High Current



Transistor



SCR

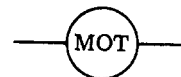


Circuit Breaker

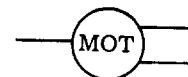


Diode

MOTORS

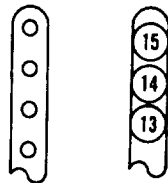


2 - Wire

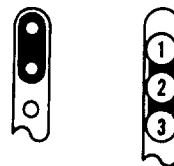


3 - Wire

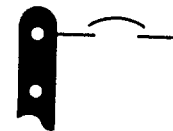
TERMINAL BOARDS & BUS BARS



Terminal Board



Terminal Board with Bus Bar



Open Bus Bar

ELECTRICAL SYMBOLS (Cont'd)

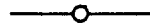
WIRES, CONNECTORS, CABLES



Wire Crossing
(Not Connected)



Permanent Splice



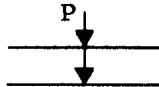
Wire Connection



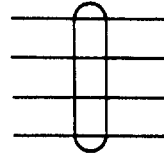
Quick Disconnect



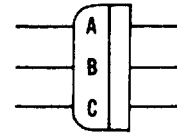
Shielded Wire



T = Triple
P = Pair
Q = Quad
Twisted Wiring



Multiple Conductor
Cables



Plug and Receptacle

GROUND CONNECTORS

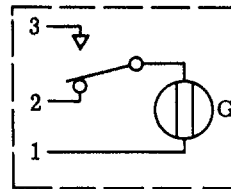


Ground Connection



Case Ground
Connection

LIGHTS



Press to Test Light



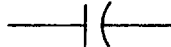
R = Color

Light

MISCELLANEOUS



Battery



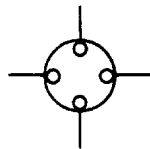
Capacitor



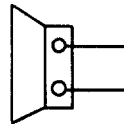
Heating Element



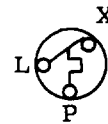
Thermocouple



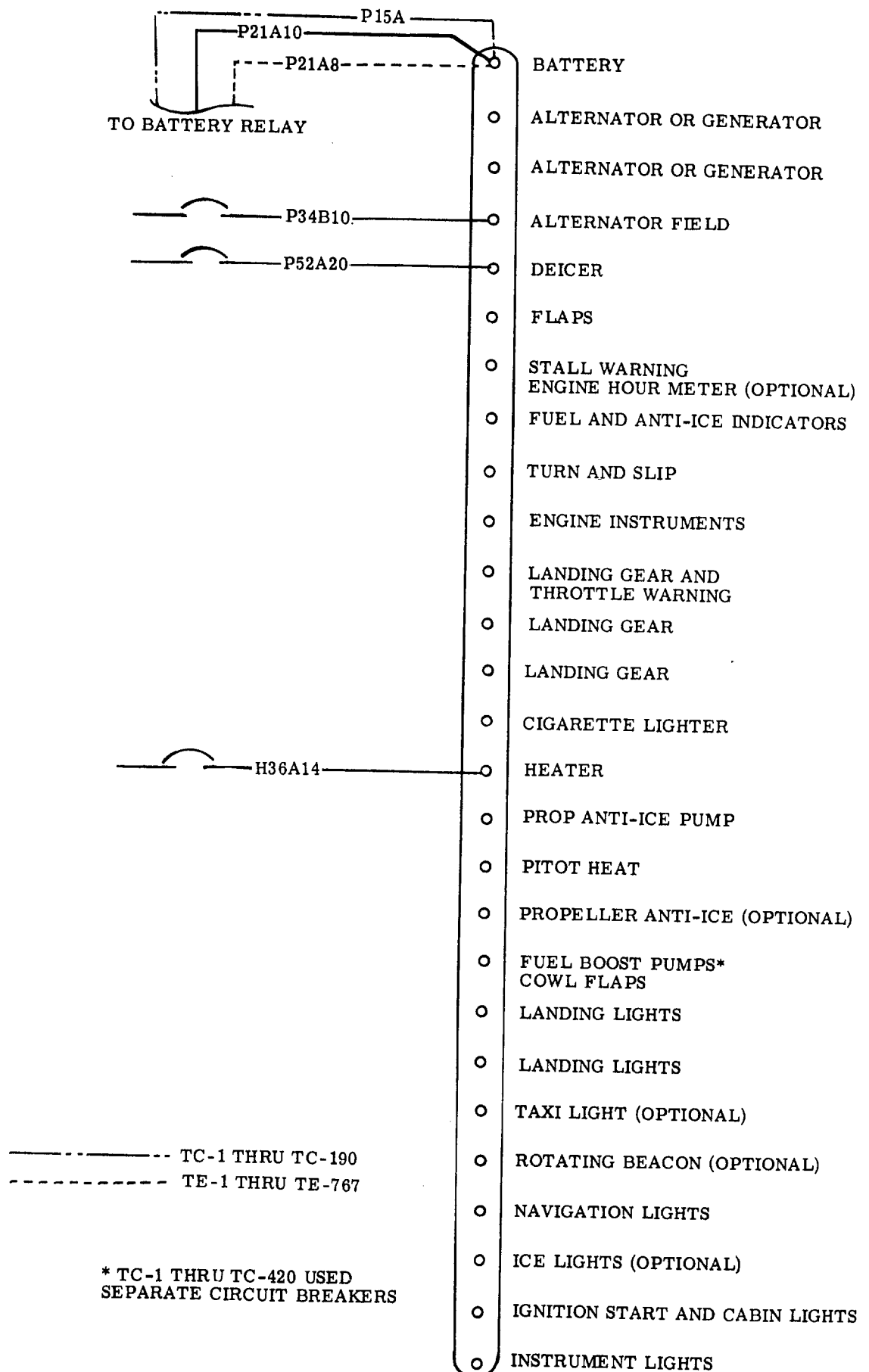
Electrical Instrument



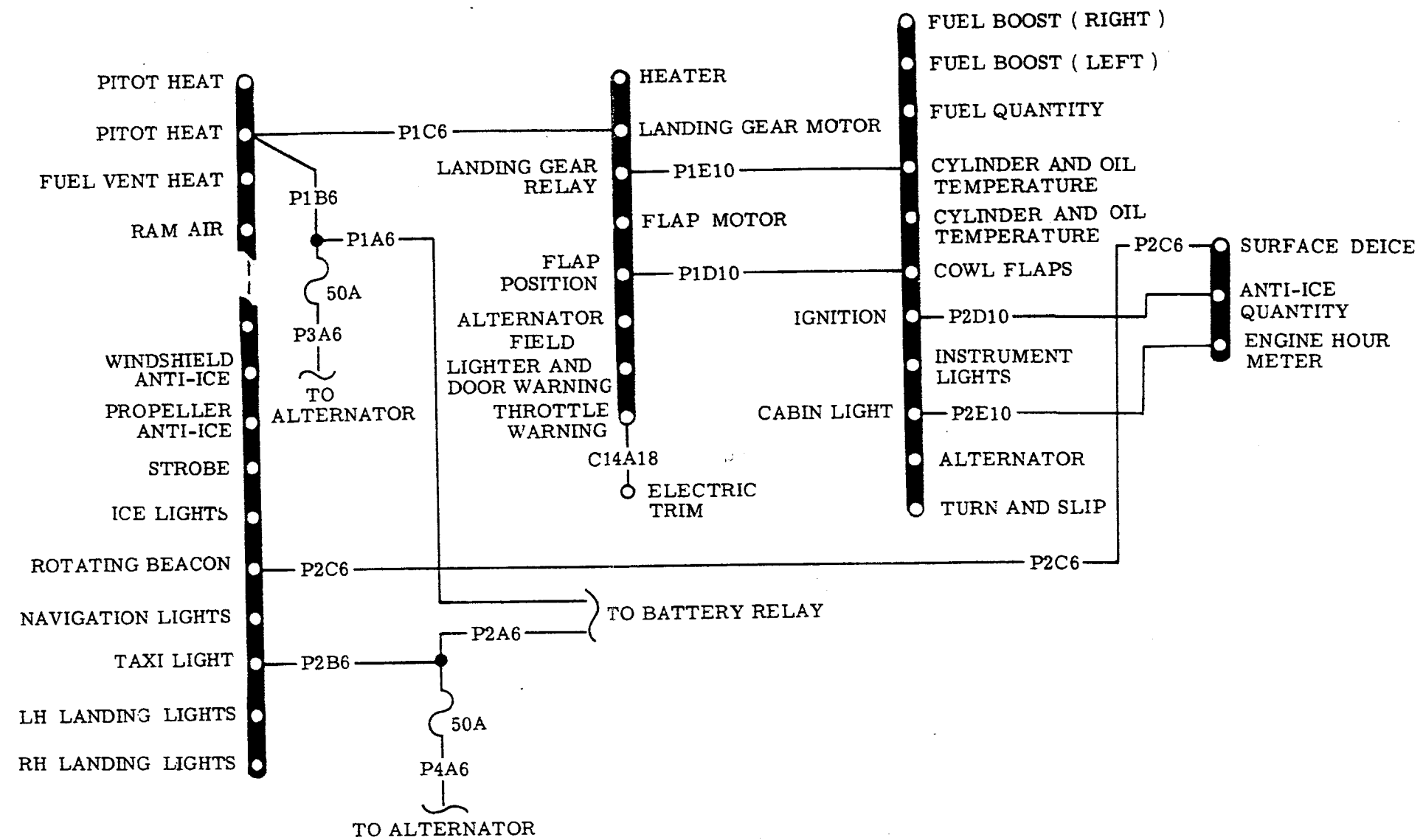
Speaker or
Warning Horn

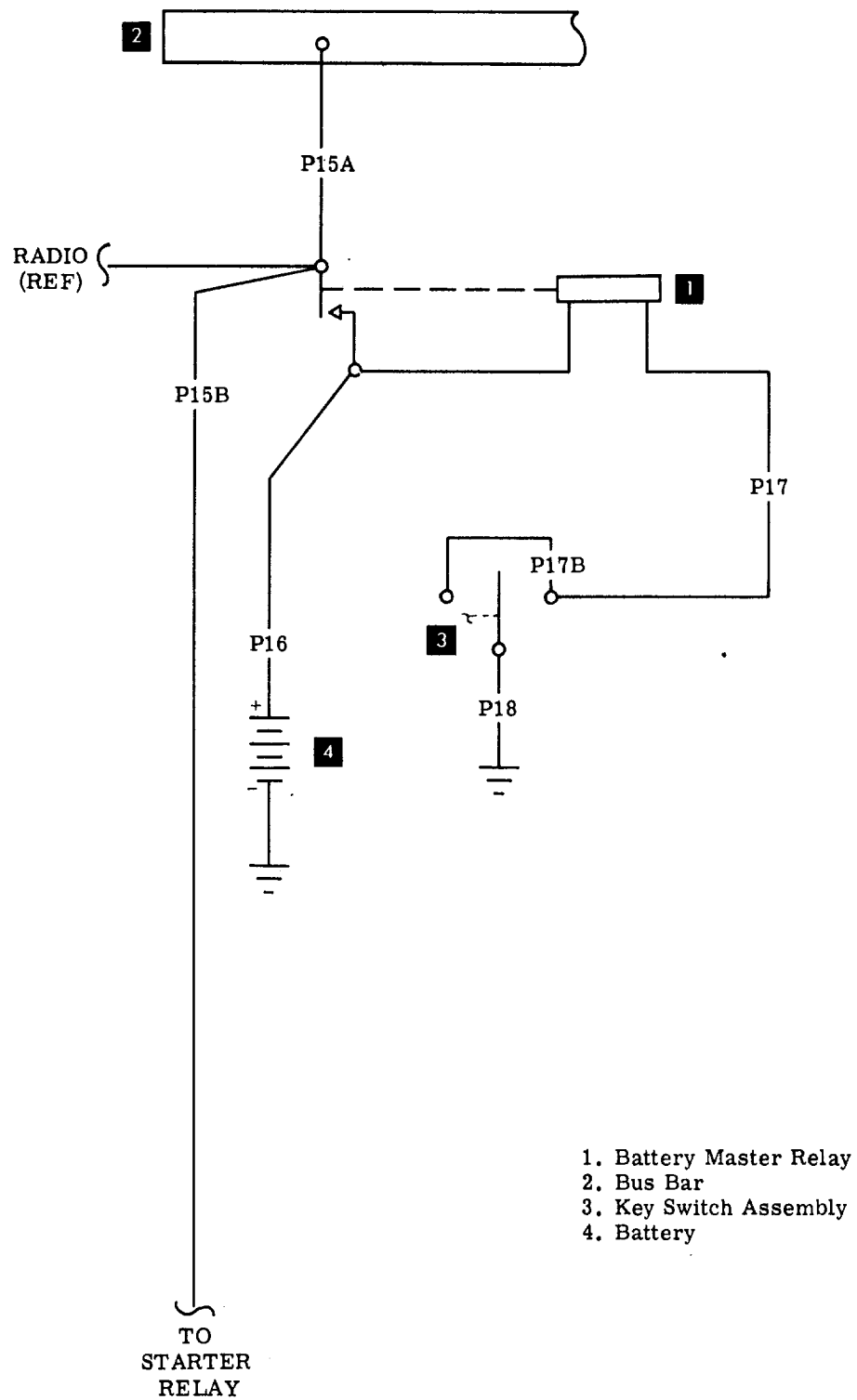


Warning Horn Flasher

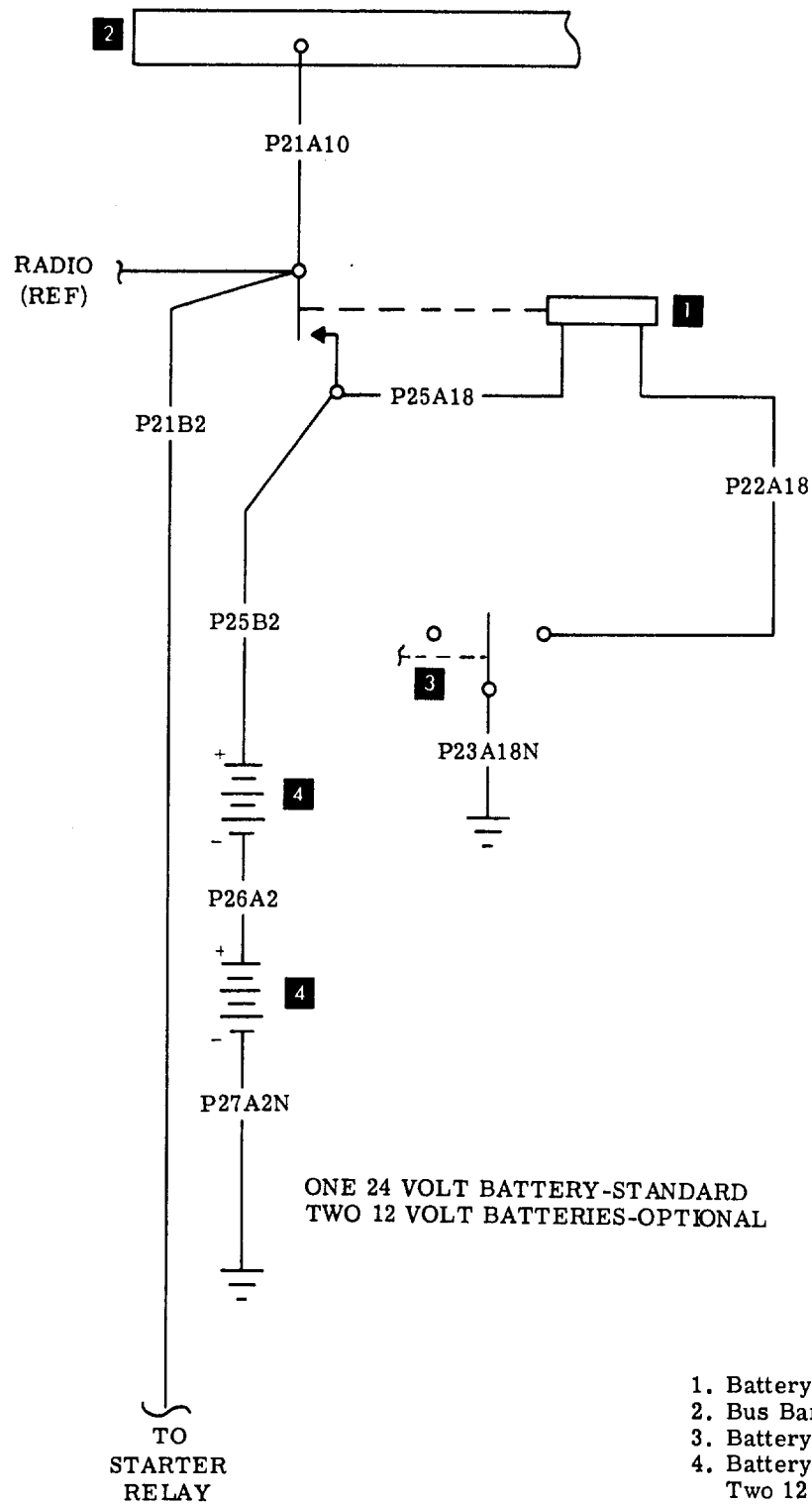


Power Distribution (TC-1 and after; TE-1 thru TE-767)

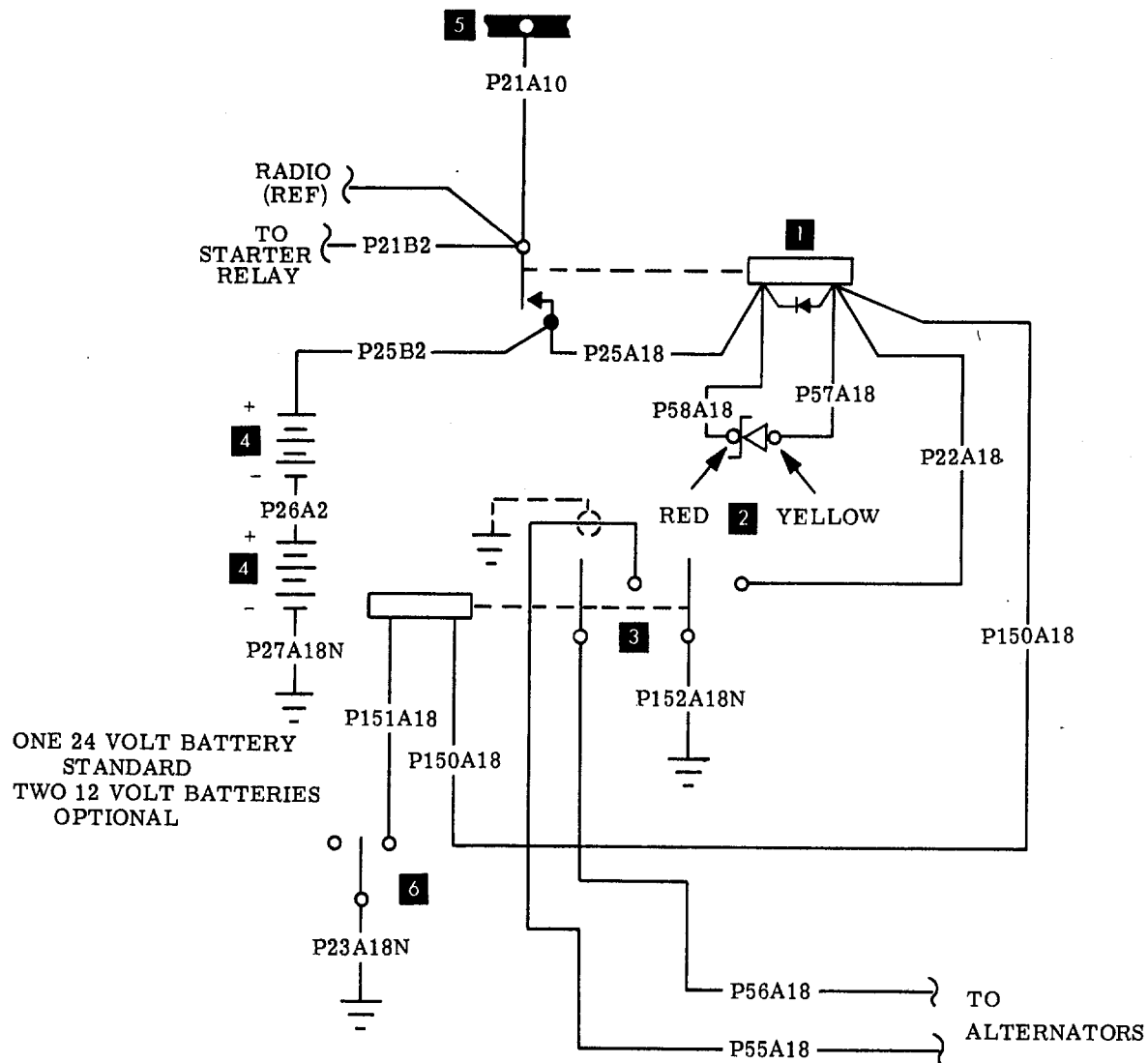




Battery
TC-1 thru TC-190



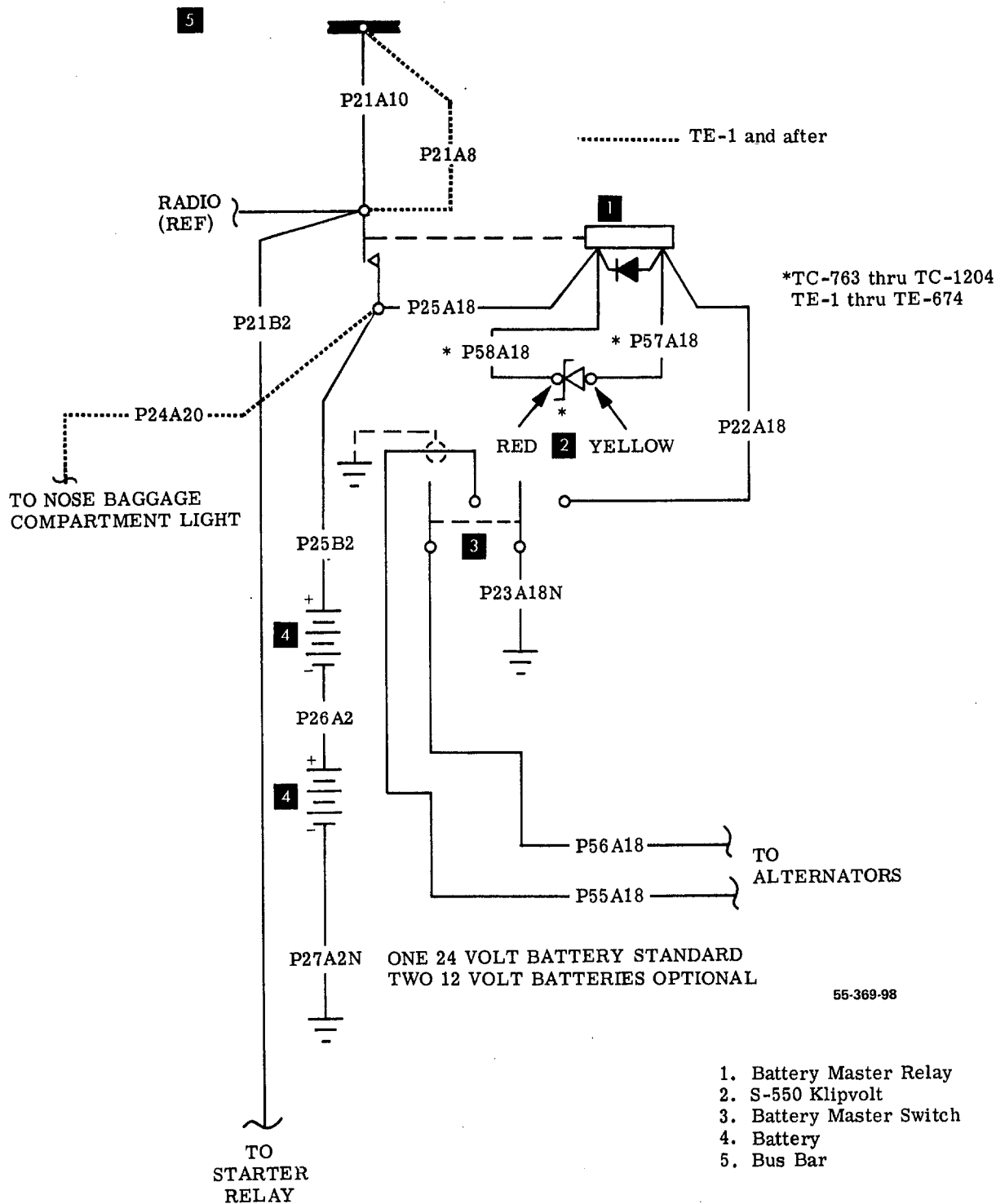
Battery
TC-191 thru TC-762



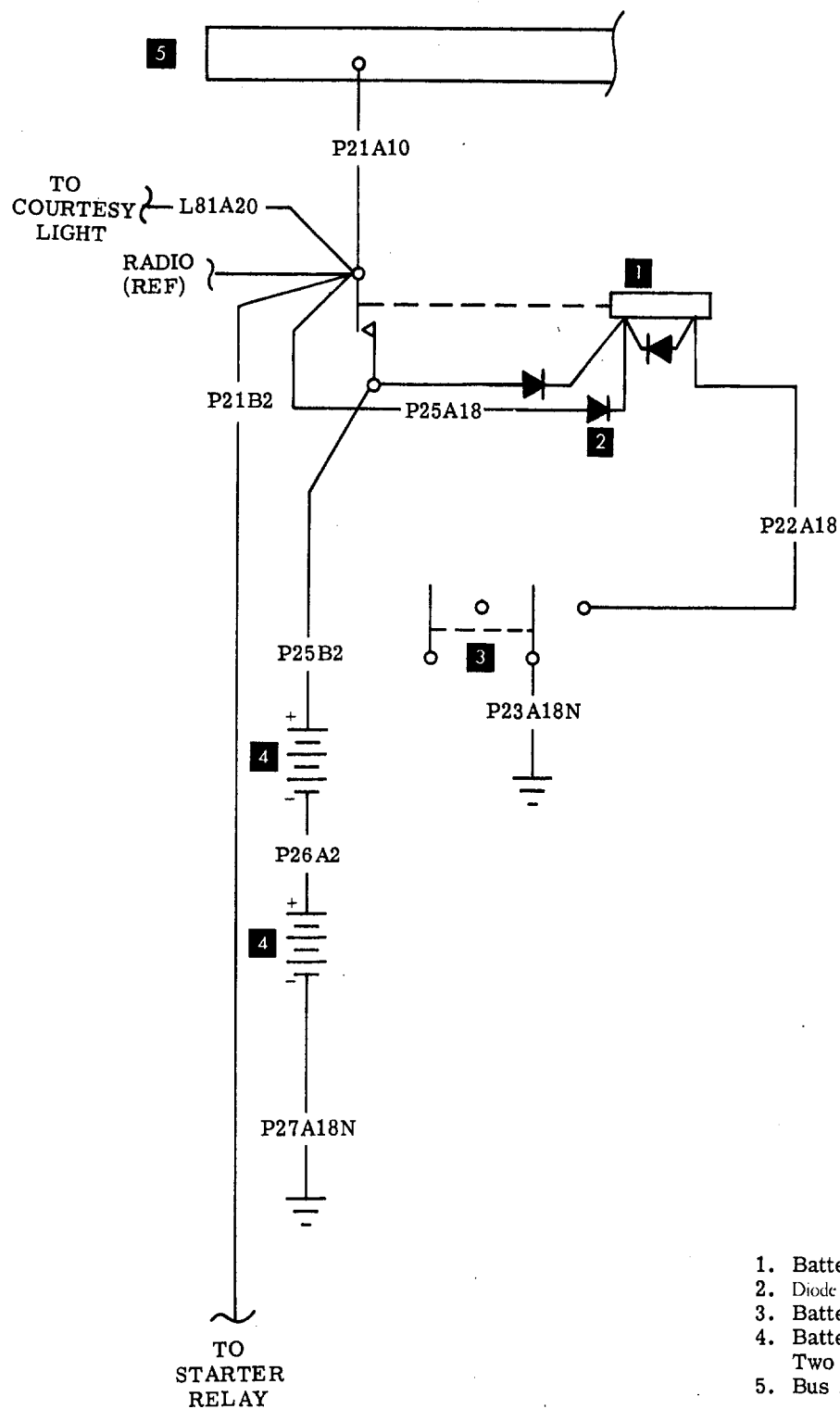
55-369-97

1. Battery Master Relay
2. S-550 Klipvolt
3. Battery Relay
4. Battery
5. Bus Bar
6. Battery Master Switch

Battery
TC-763 thru TC-831



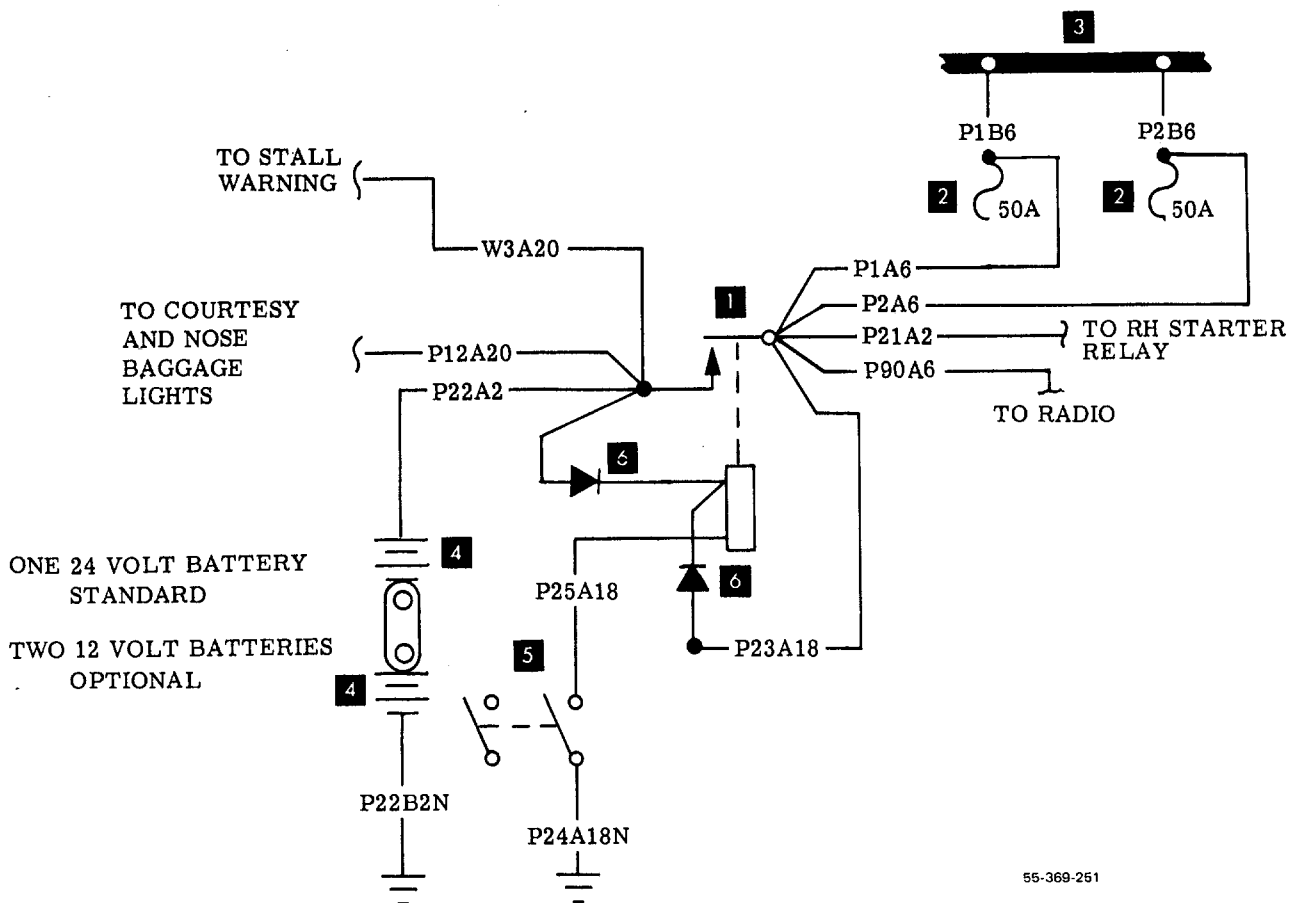
Battery
TC-832 thru TC-1402
TE-1 thru TE-767



1. Battery Master Relay
2. Diode
3. Battery Master Switch
4. Battery (24 V Standard, Two 12 V Optional)
5. Bus Bar

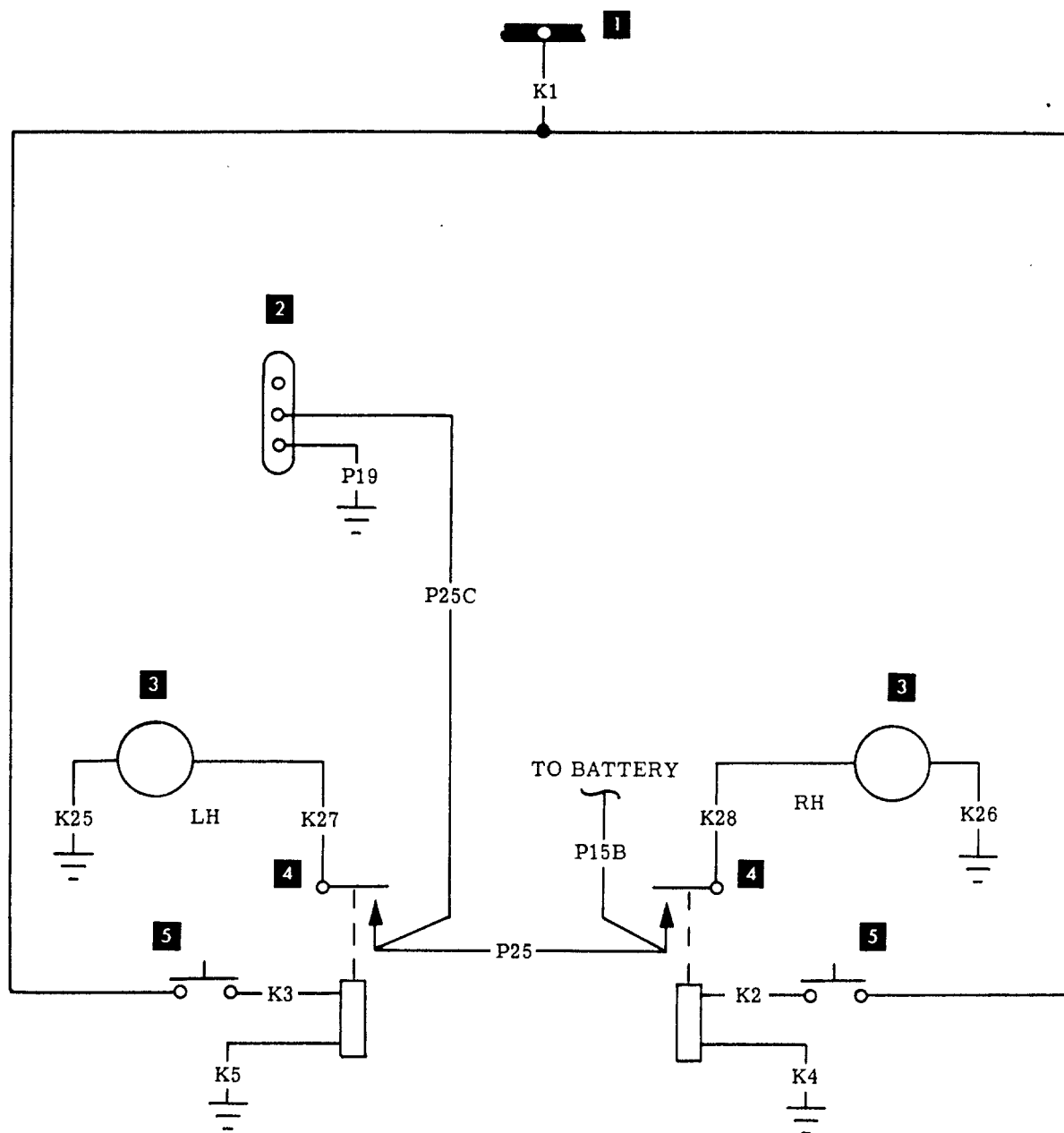
55-369-271

Battery
TC-1403 thru TC-1935 except TC-1913



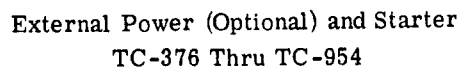
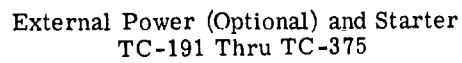
1. Battery Master Relay
2. Alternator Limiter
3. Subpanel Bus Bar
4. Battery
5. Battery Master Switch
6. Diode

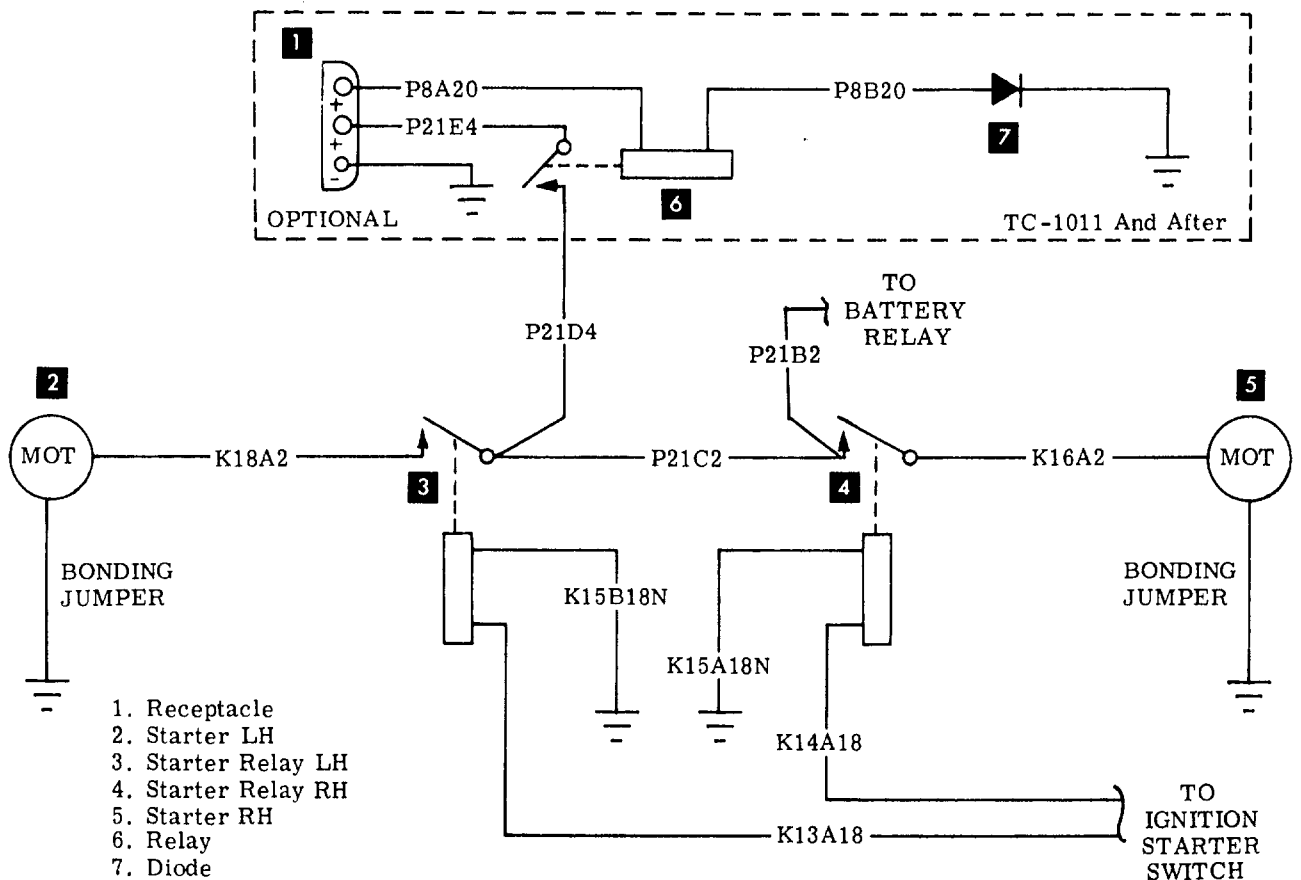
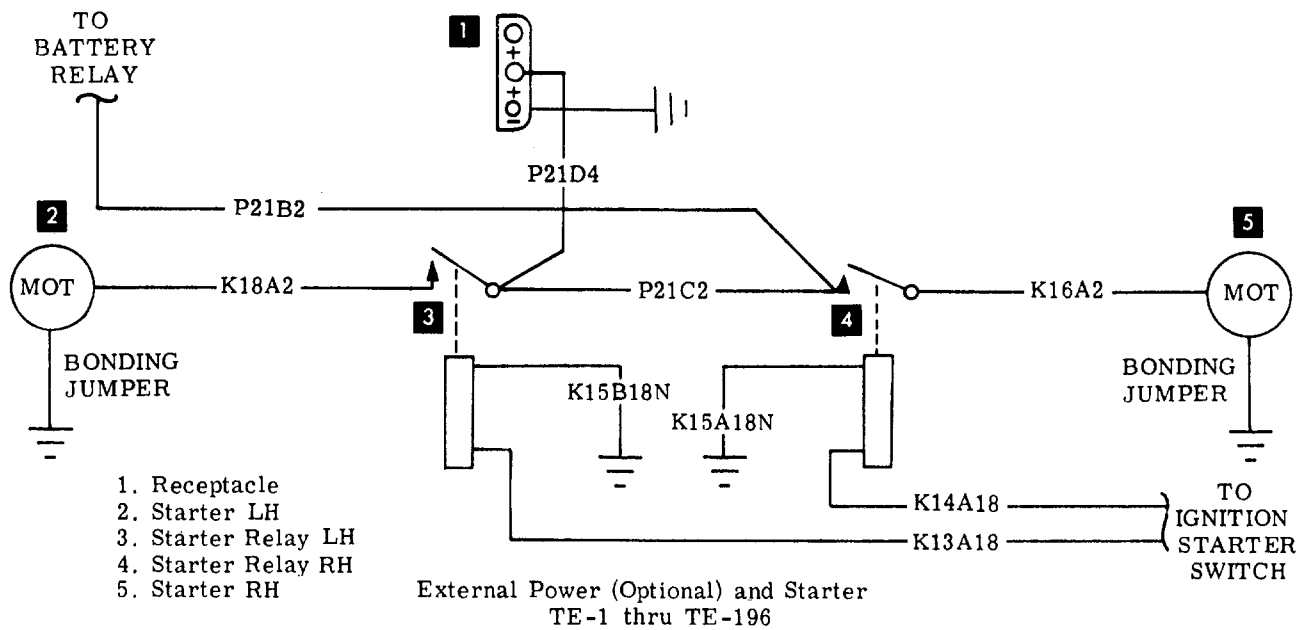
Battery
 TE-840 thru TE-1063
 TH-153 thru TH-647 except TH-598

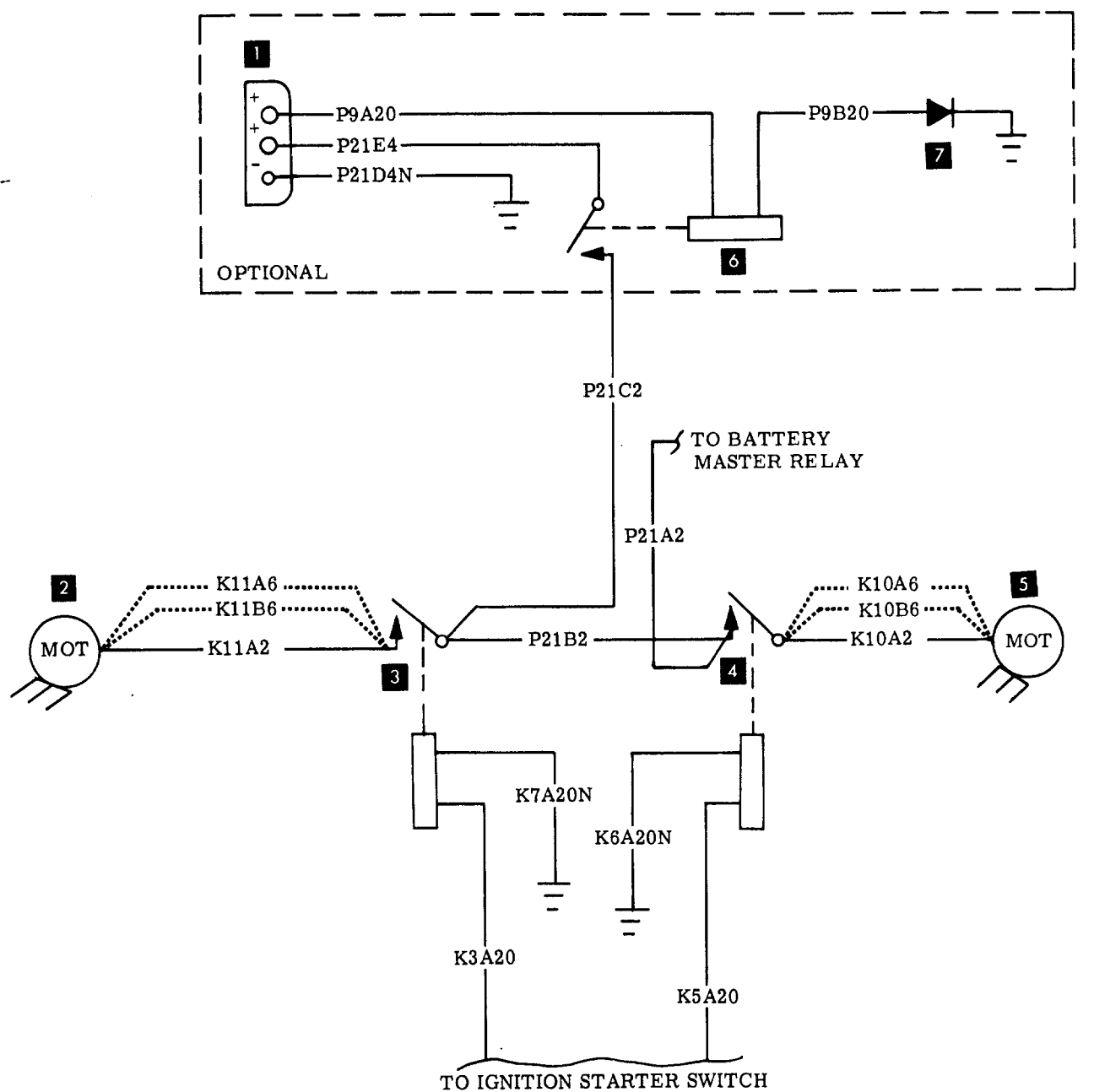


1. Bus Bar
2. External Power Receptacle
3. Starter
4. Starter Relays
5. Starter Switches

External Power and Starter
TC-1 thru TC-190



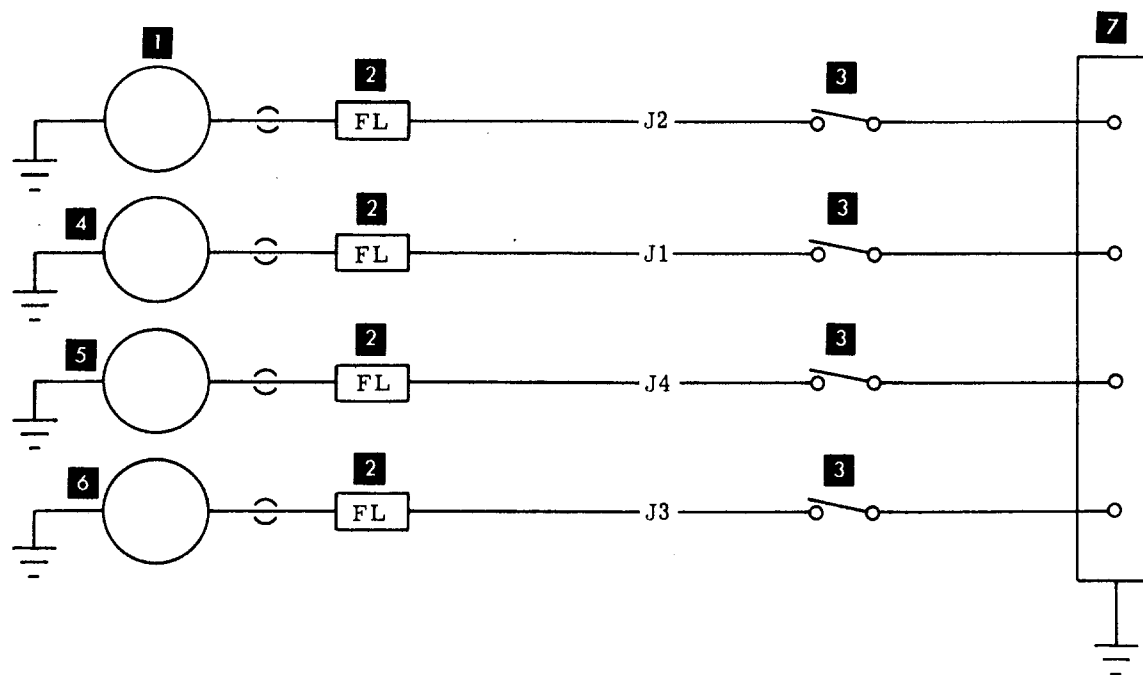




1. Receptacle
2. Starter LH
3. Starter Relay LH
4. Starter Relay RH
5. Starter RH
6. Relay
7. Diode

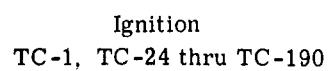
..... TWO 6 GAGE
WIRES MAY BE USED

External Power and Starter (Optional)
TE-768 thru TE-1063
TH-1 thru TH-647 except TH-598

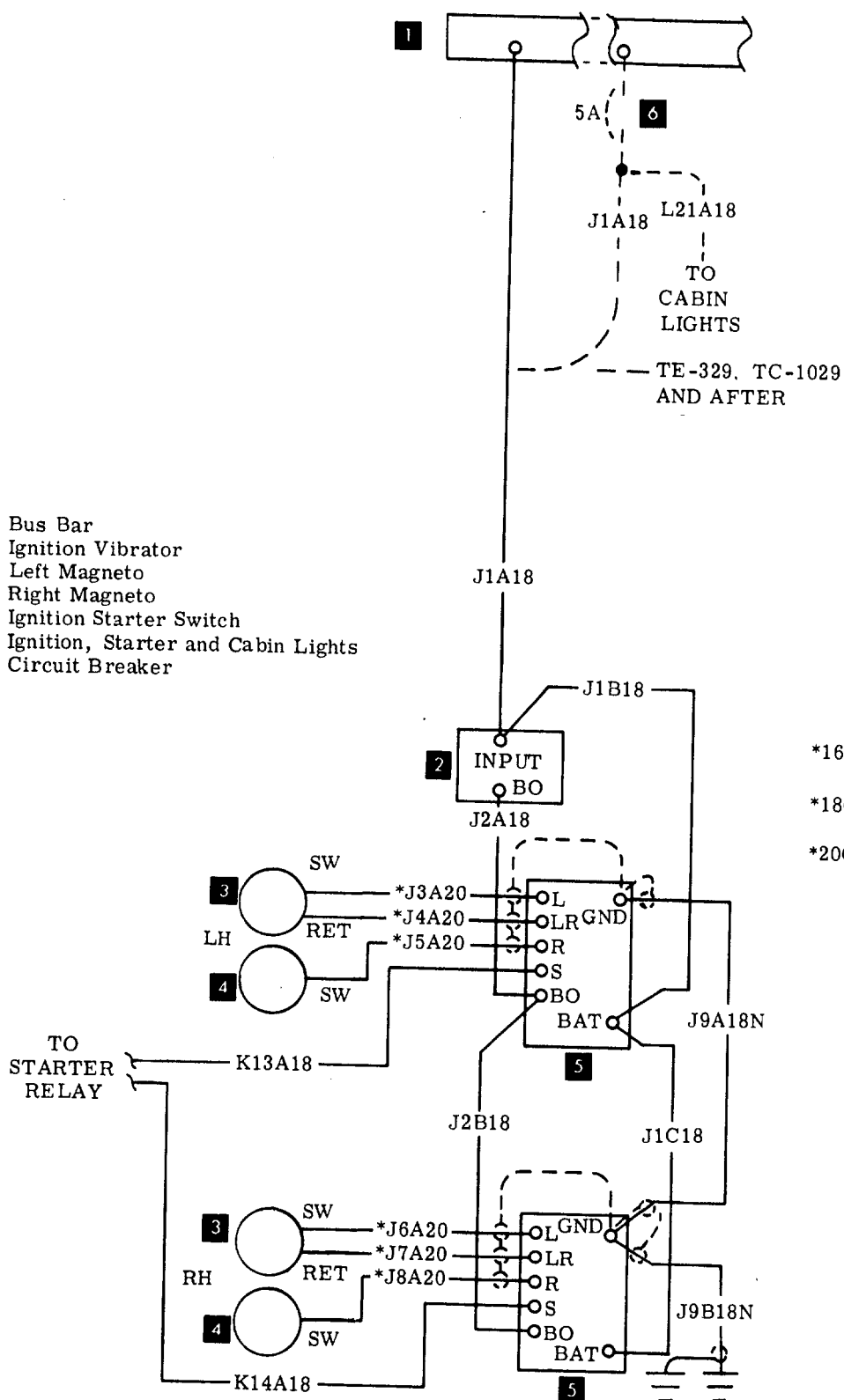


1. Right Magneto
2. Filter Units
3. Off-On Switches
4. Left Magneto
5. Right Magneto
6. Left Magneto
7. Bus Bar

Ignition
TC-2 thru TC-23

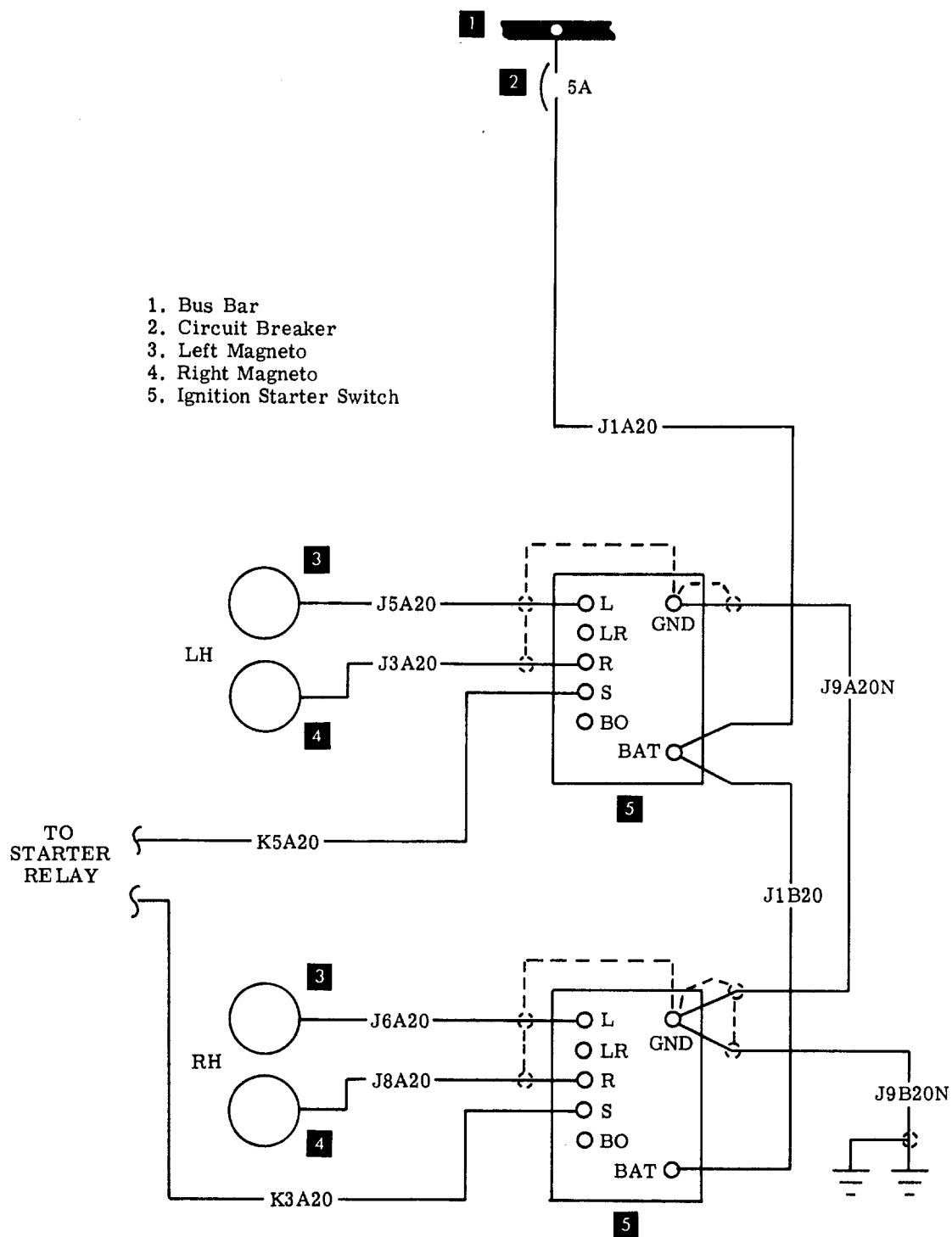


1. Bus Bar
2. Ignition Vibrator
3. Left Magneto
4. Right Magneto
5. Ignition Starter Switch
6. Ignition, Starter and Cabin Lights Circuit Breaker

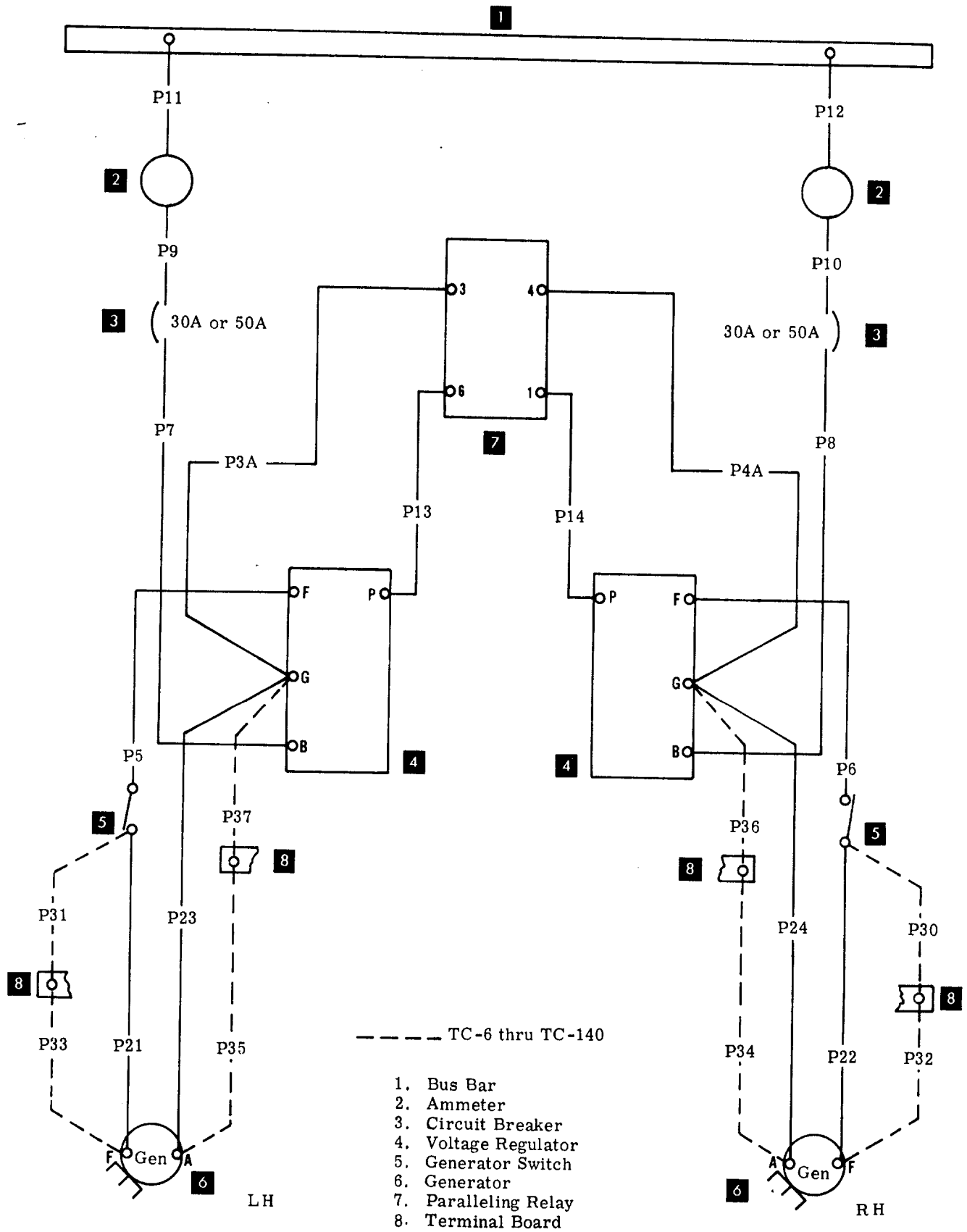


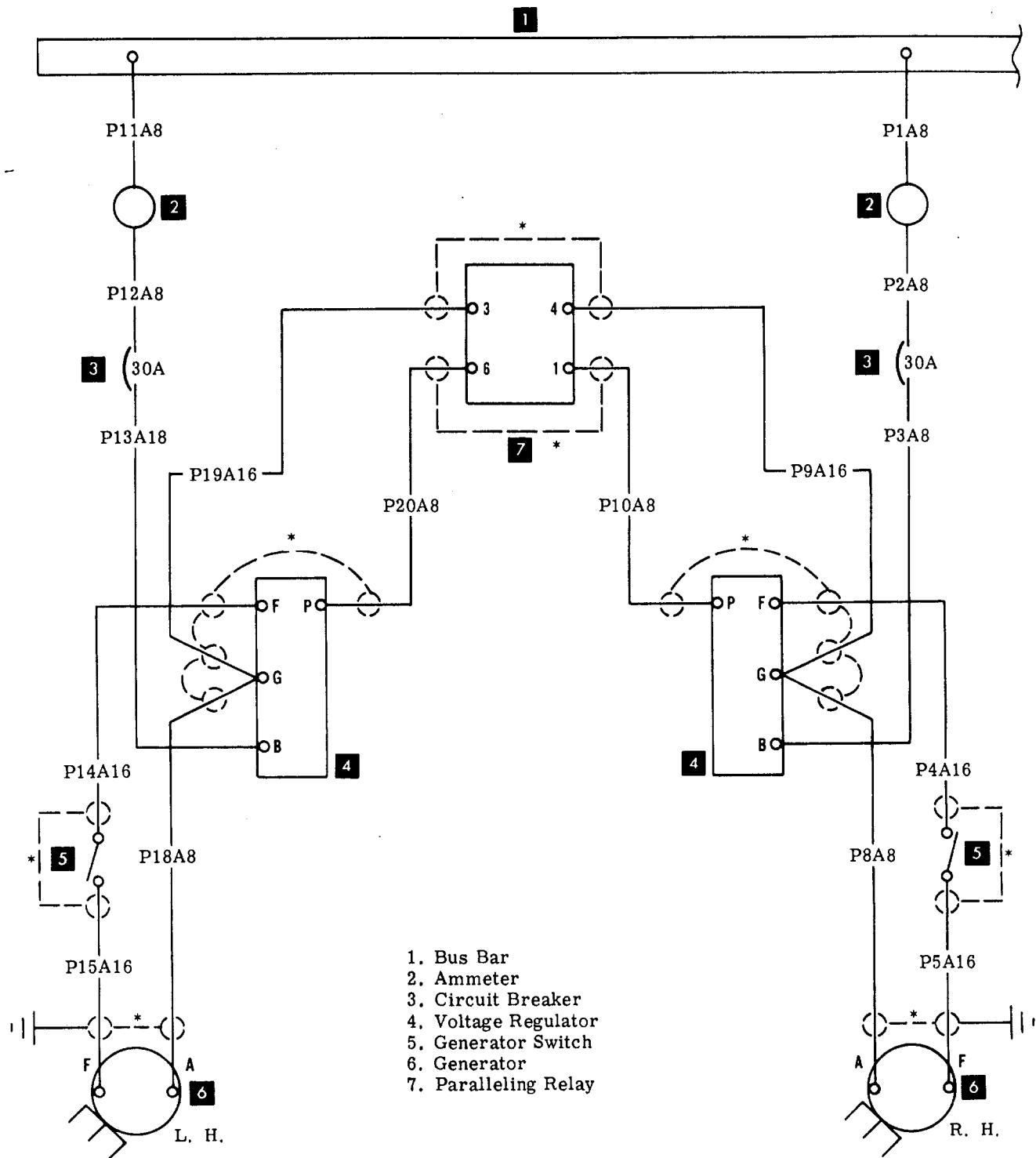
*16GA TC-191 THRU TC-233
EXCEPT TC-201
*18GA TC-201, TC-234 THRU
TC-319
*20GA TC-320 AND AFTER

Ignition
TC-191 thru TC-1255
TE-1 thru TE-724

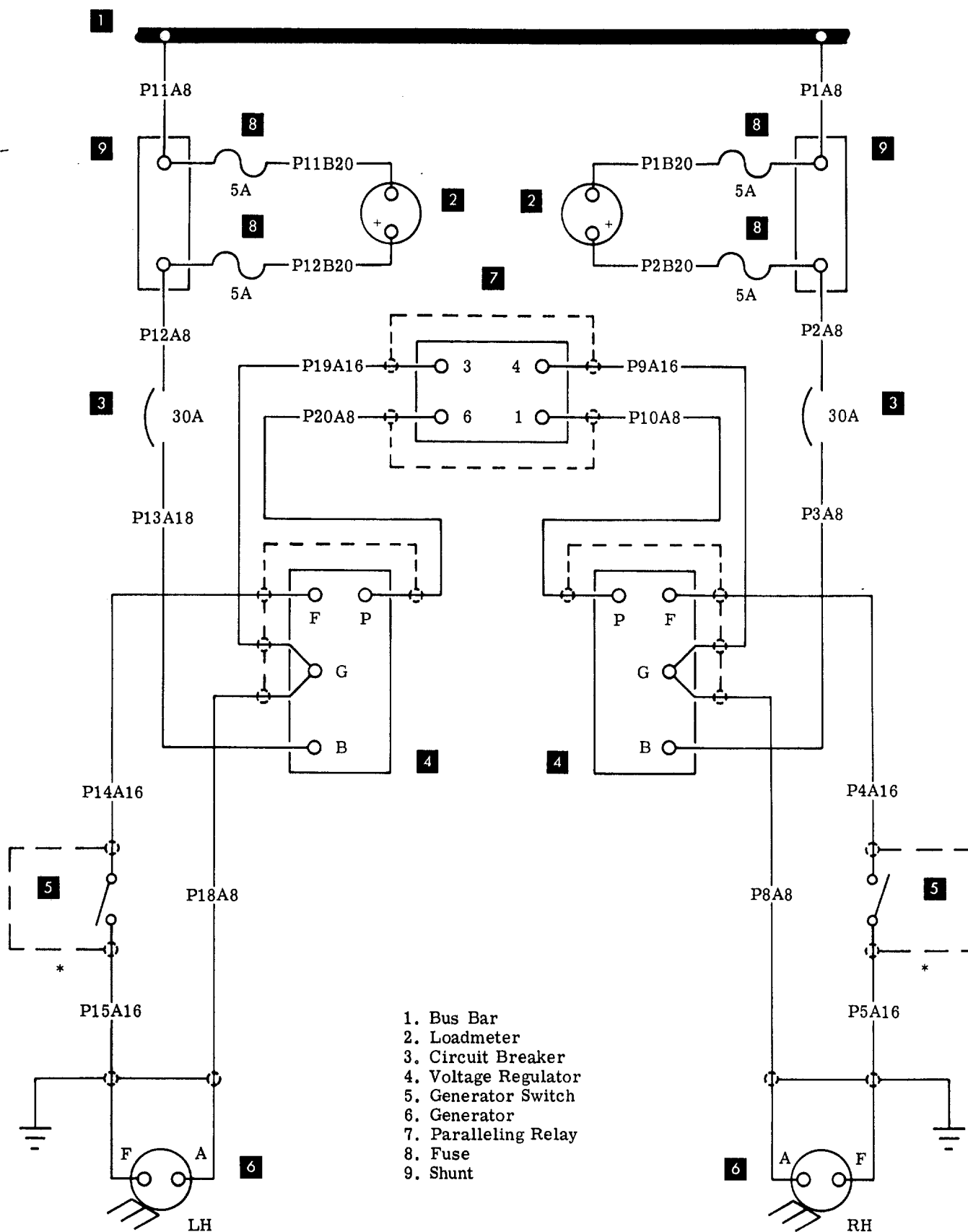


Ignition
 TE-768 thru TE-1063
 TH-1 thru TH-647 except TH-598

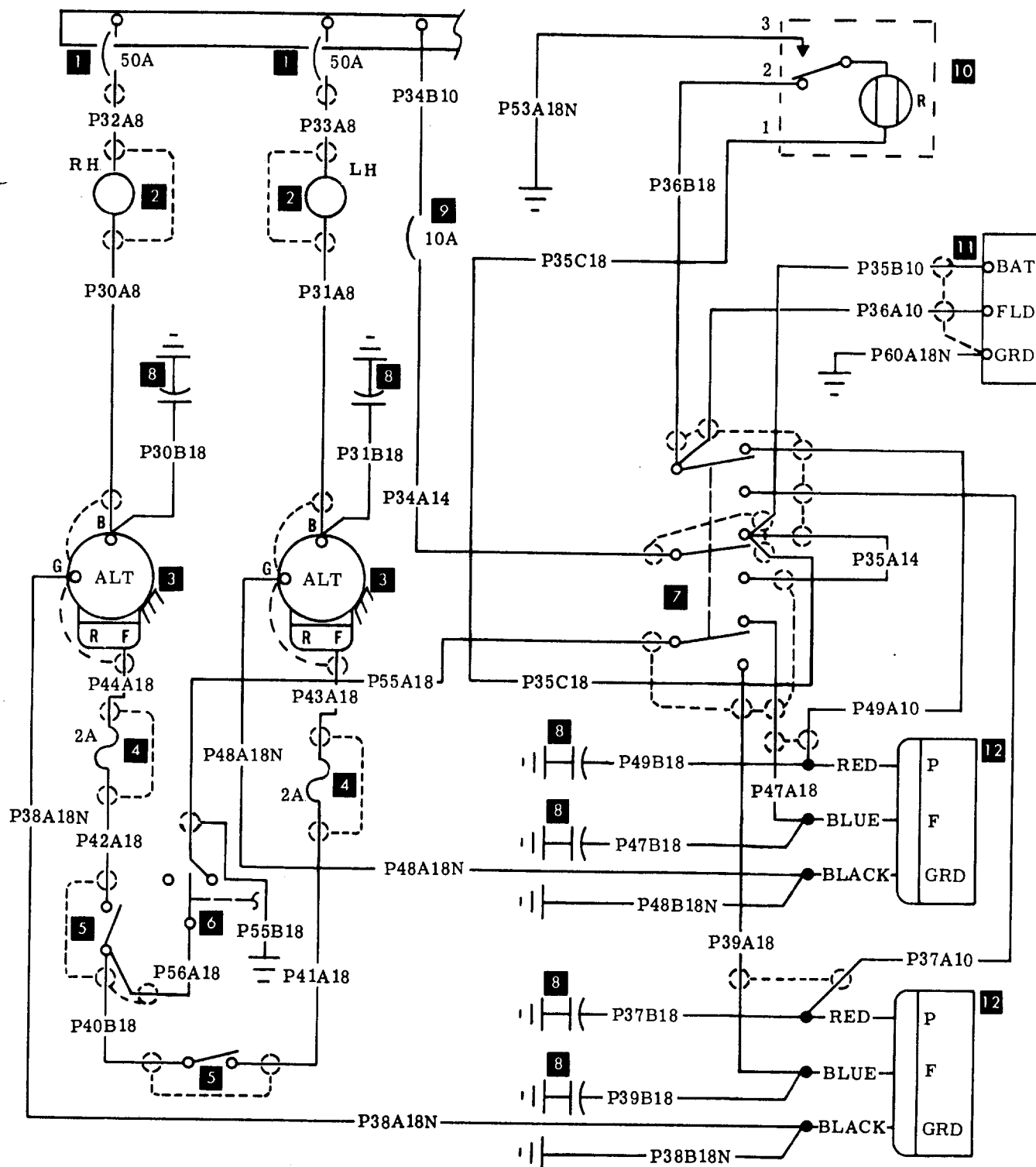




Generator Circuit
 TC-191 thru TC-1298



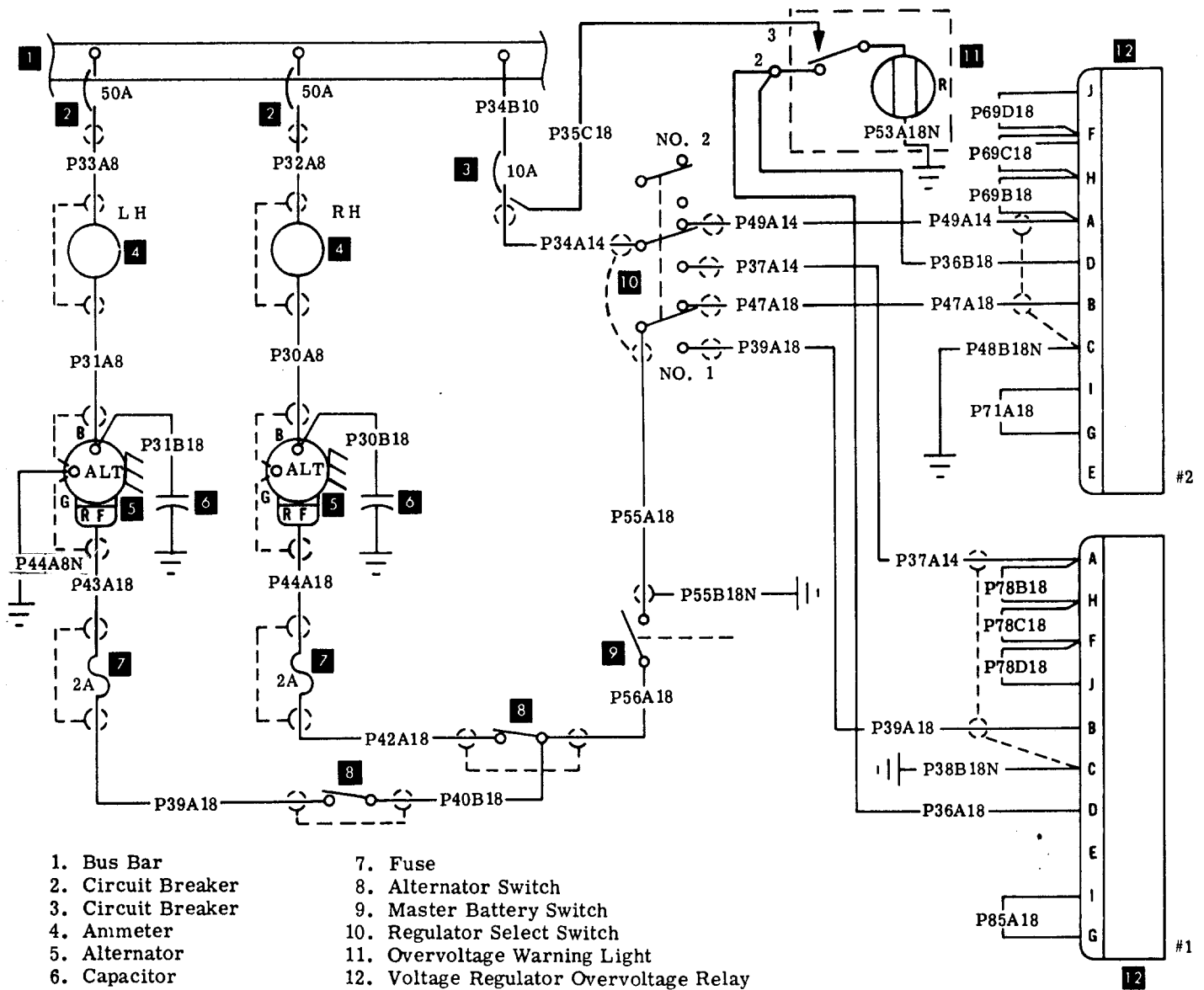
Generator
 TC-1299 thru TC-1935 except TC-1913

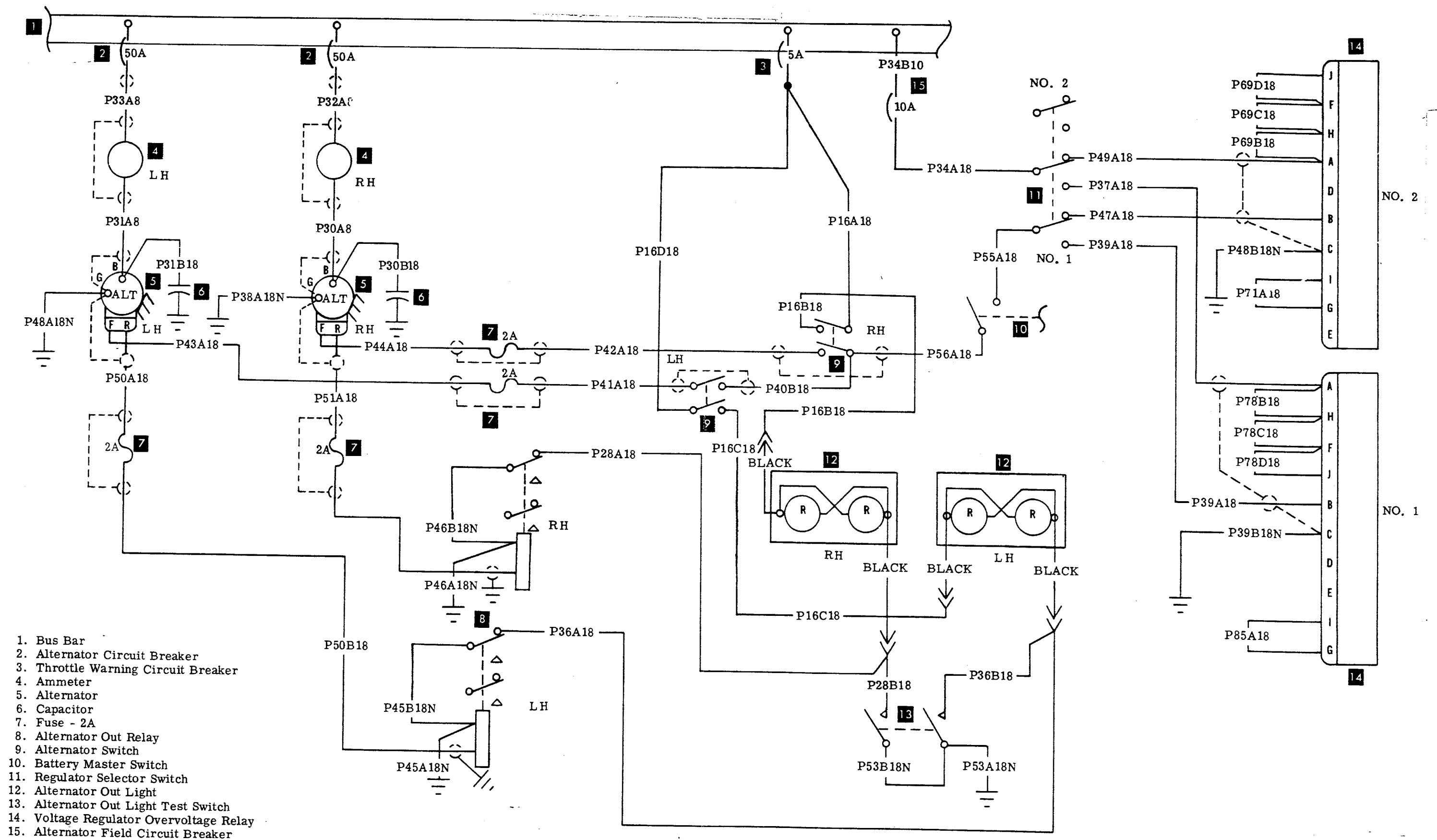


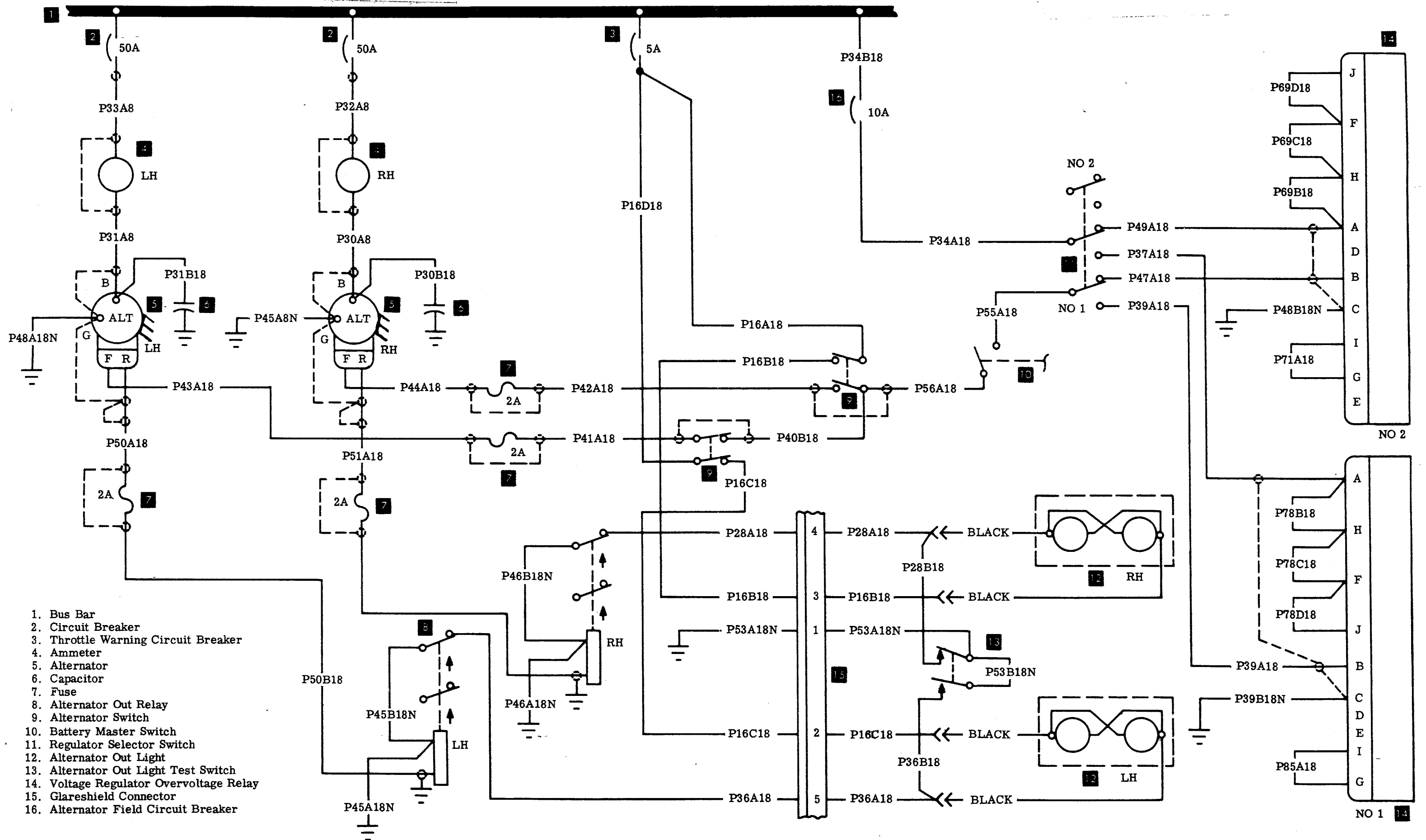
1. Circuit Breaker
2. Ammeter
3. Alternator
4. Fuse
5. Alternator Switch
6. Battery Master Switch

7. Regulator Selector Switch
8. Condensor
9. Circuit Breaker
10. Overvoltage Warning Light
11. Overvoltage Relay
12. Voltage Regulator

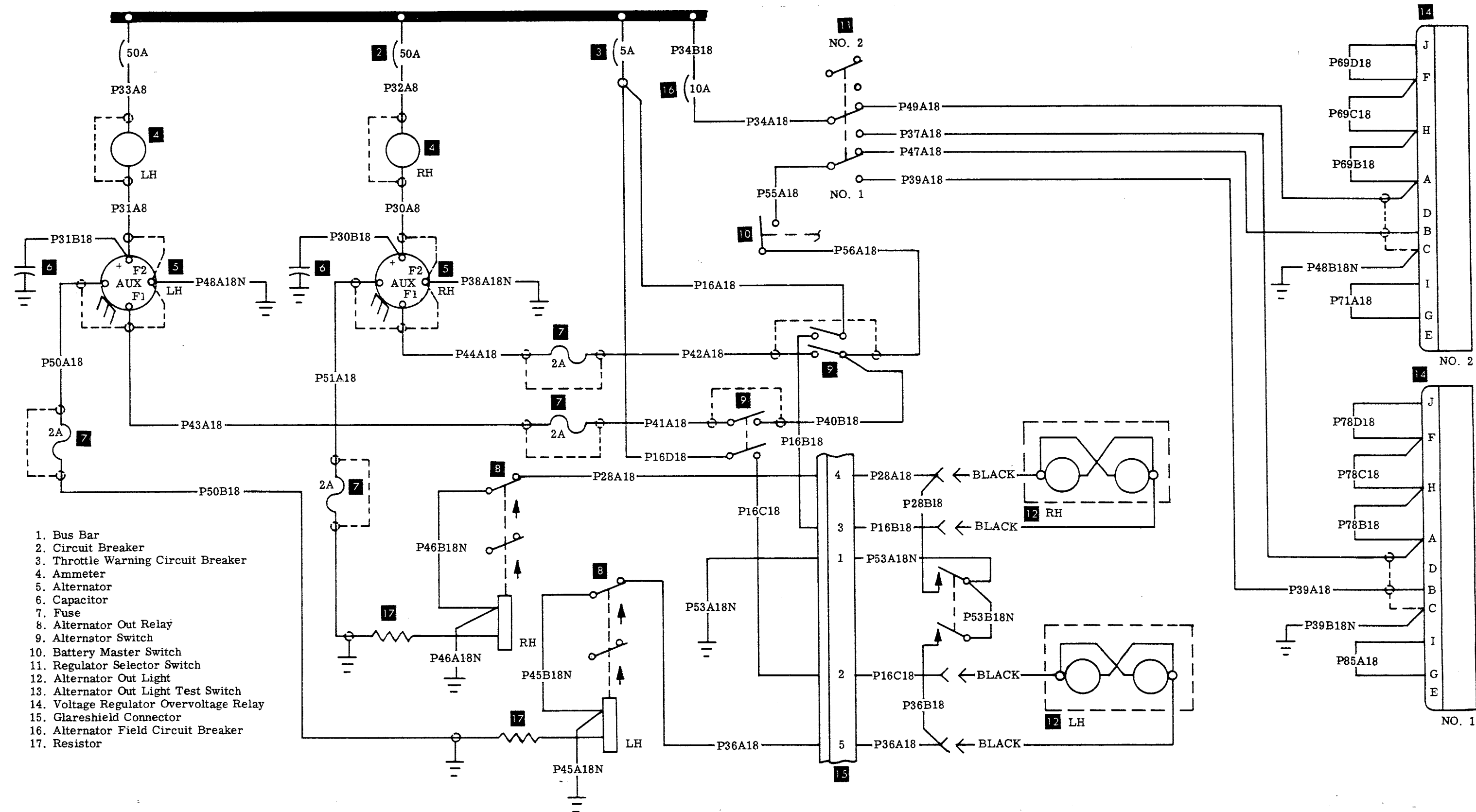
Alternator
TC-763 thru TC-1042



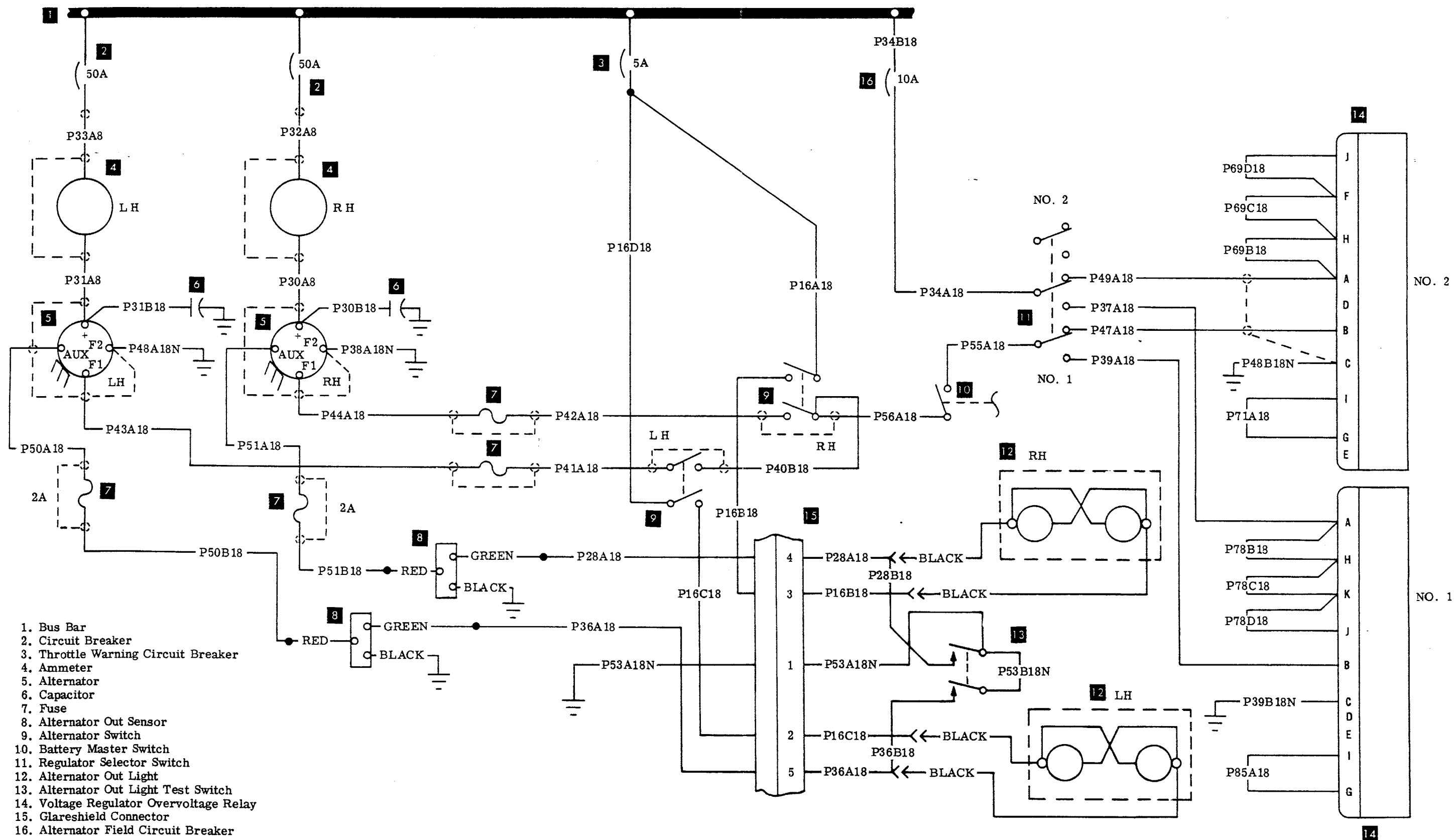


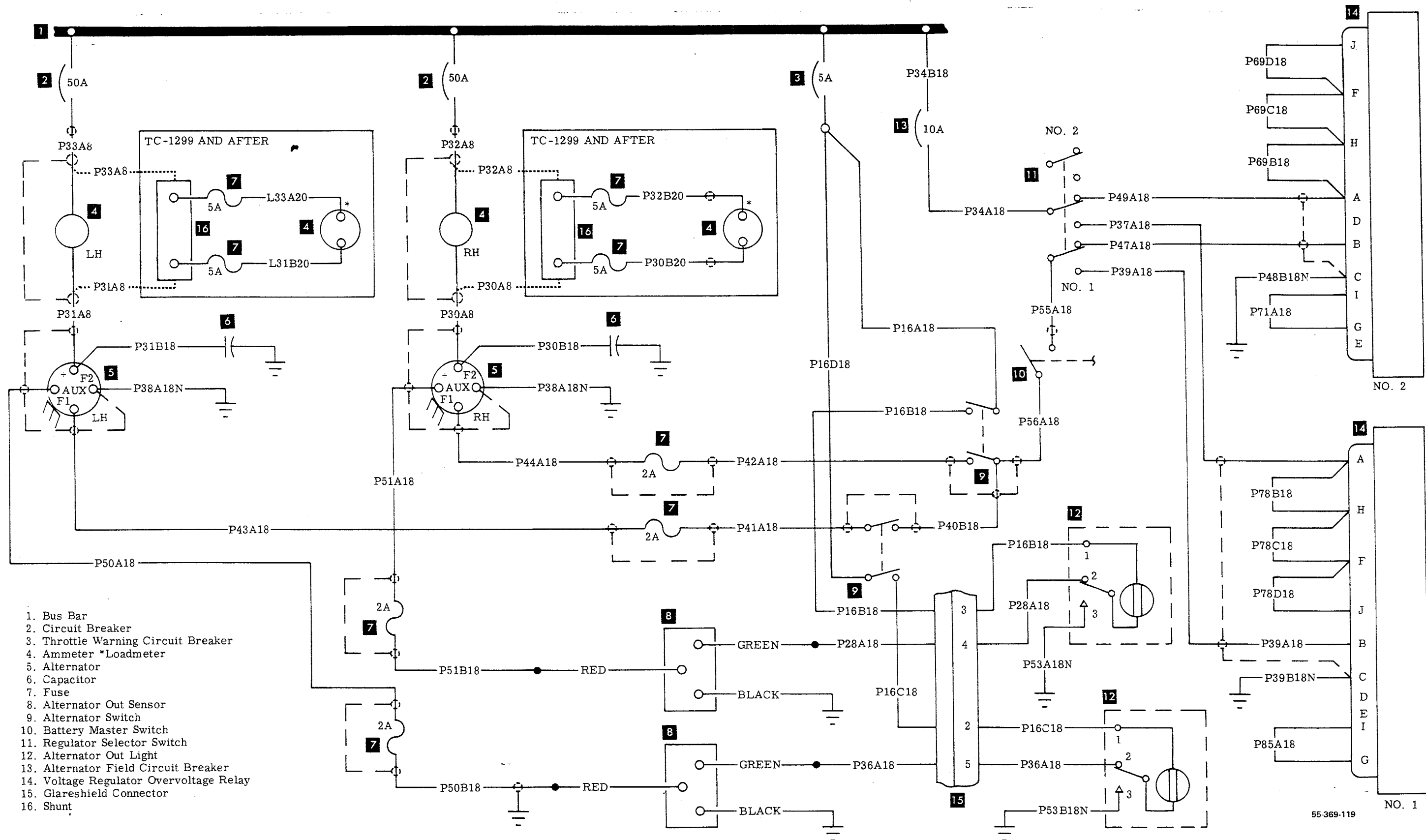


Alternator
 Optional TC-1114 thru TC-1177
 Standard TE-500, TE-584 thru TE-649

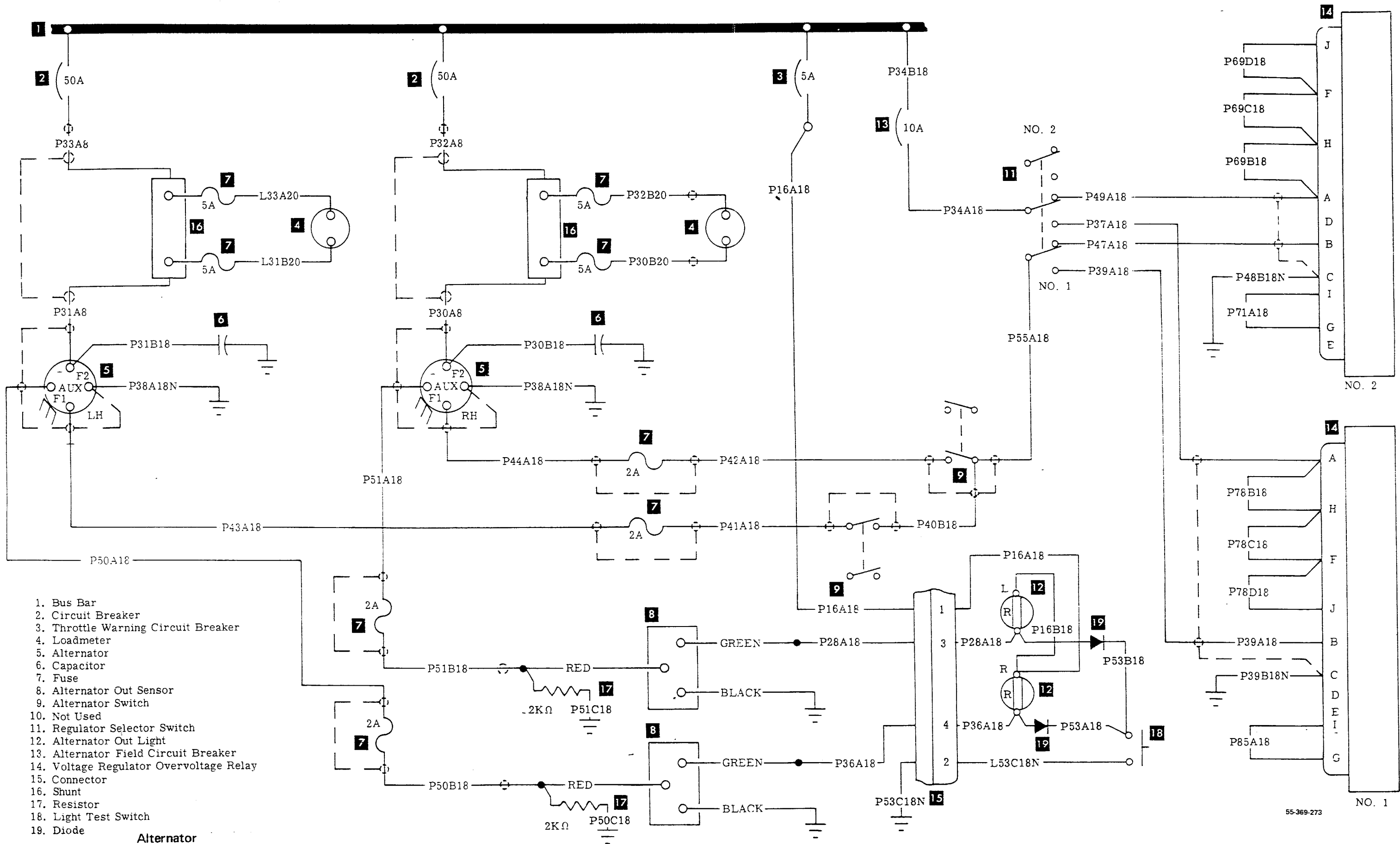


Alternator
 Optional TC-1178 thru TC-1223
 Standard TE-650 thru TE-695

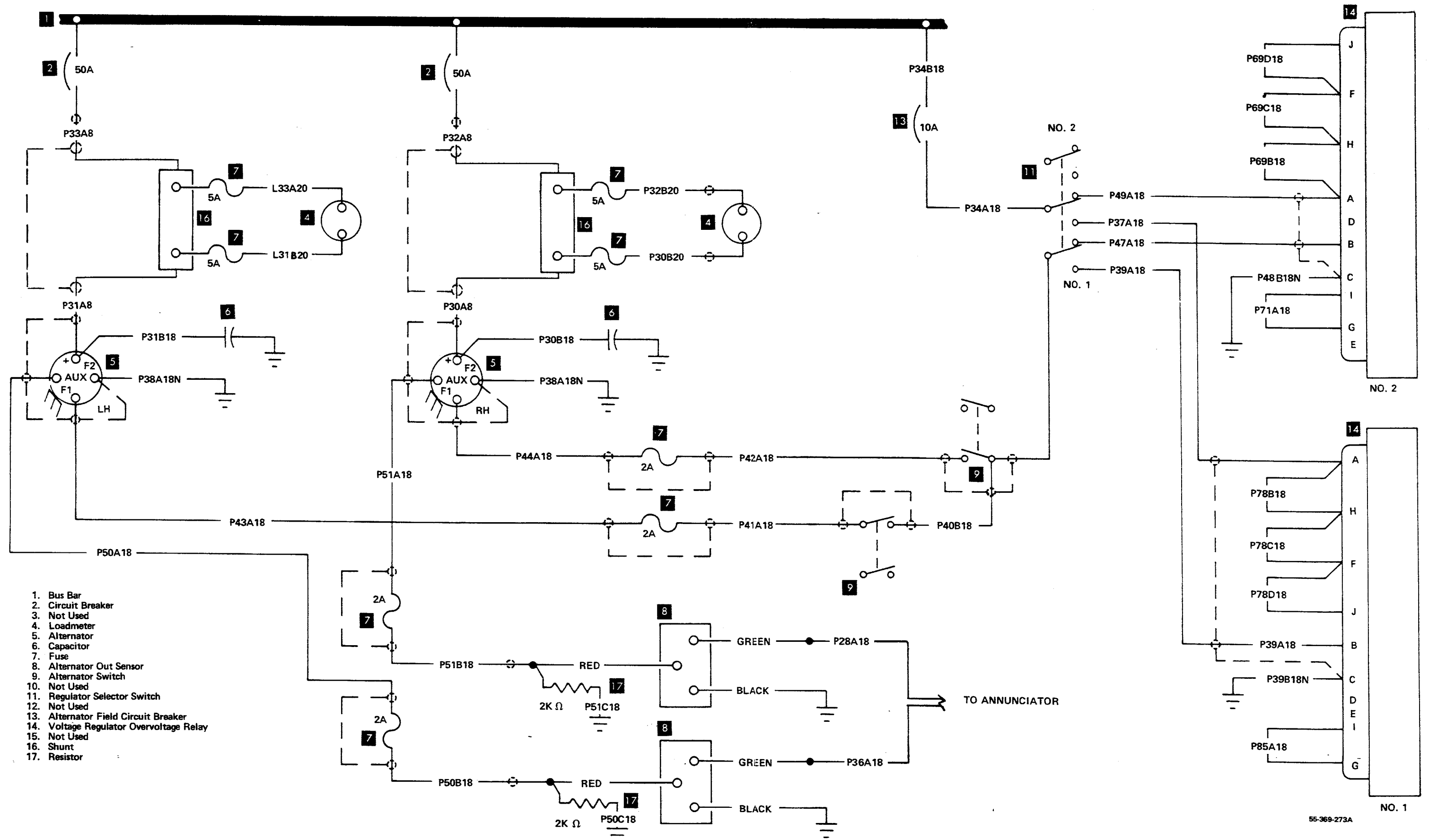




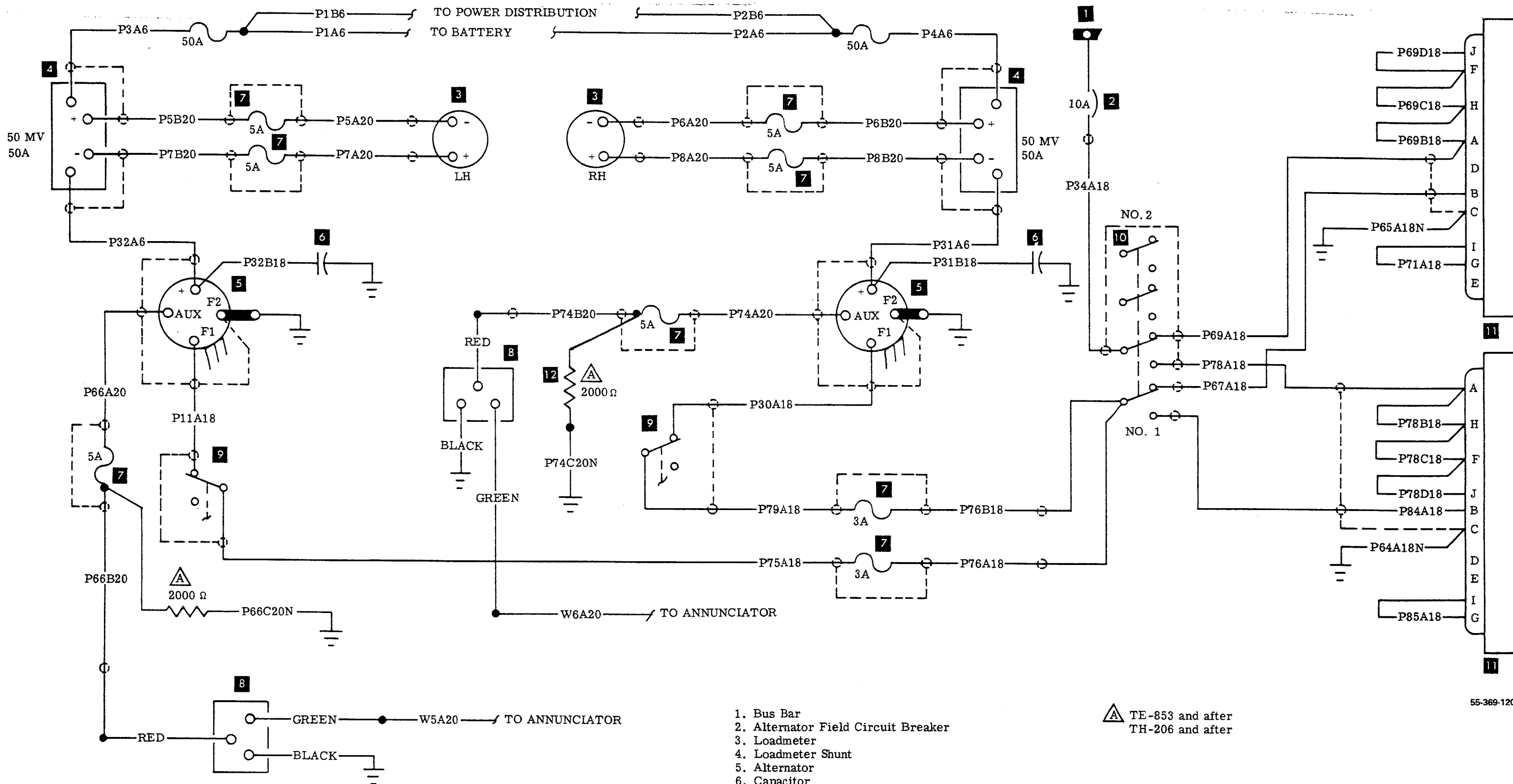
Alternator
 Optional - TC-1275 thru TC-1402
 Standard - TE-747 thru TE-767



55-369-273



Alternator
 TC-1608 thru TC-1935 except TC-1913

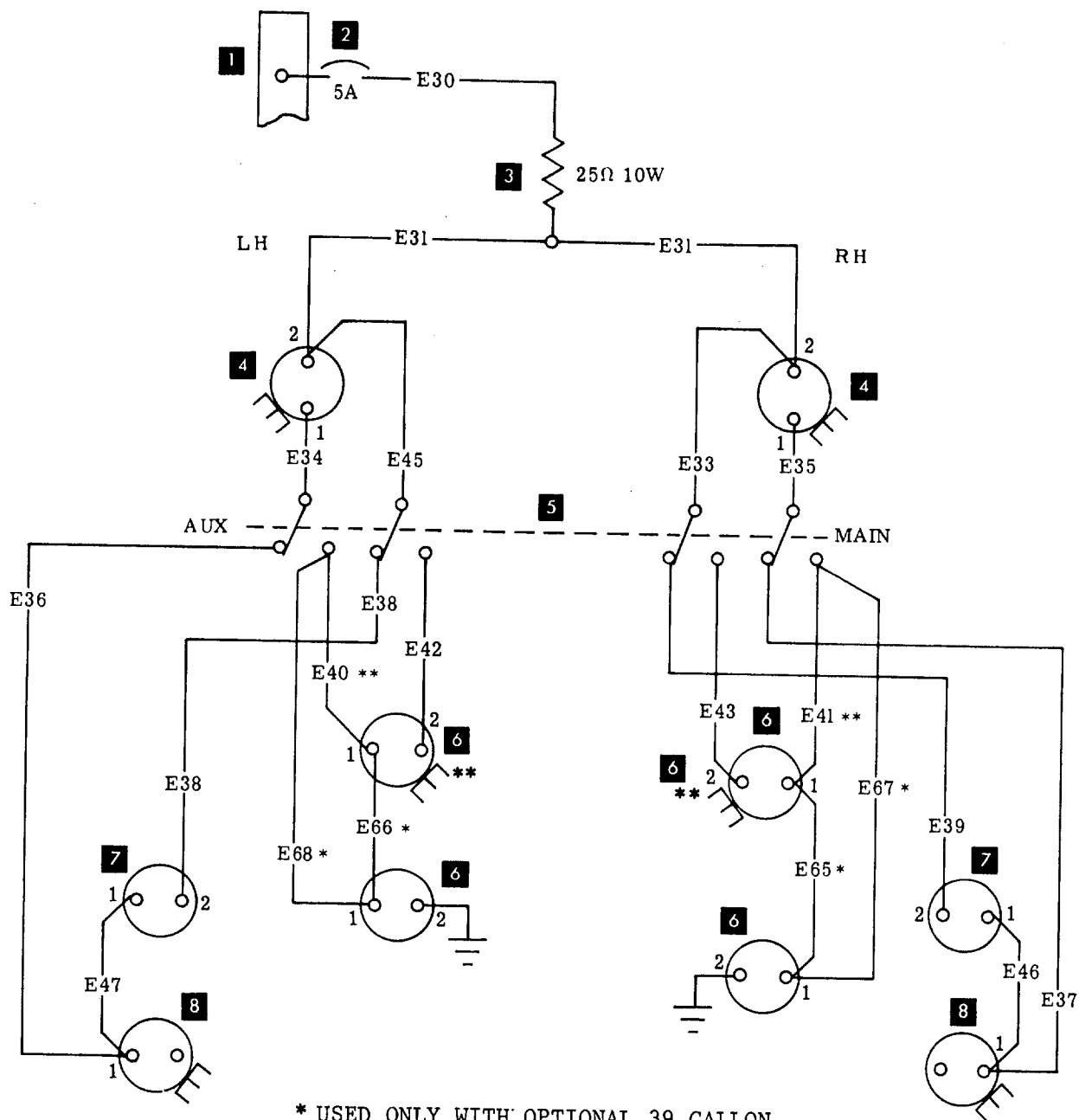


Alternator
TE-768 thru TE-1063
TH-1 thru TH-647 except TH-598

1. Bus Bar
2. Alternator Field Circuit Breaker
3. Loadmeter
4. Loadmeter Shunt
5. Alternator
6. Capacitor
7. Fuse
8. Alternator Out Sensor
9. Alternator Switch
10. Regulator Selector Switch
11. Voltage Regulator Overvoltage Relay

△ TE-853 and after
TH-206 and after

55-369-120



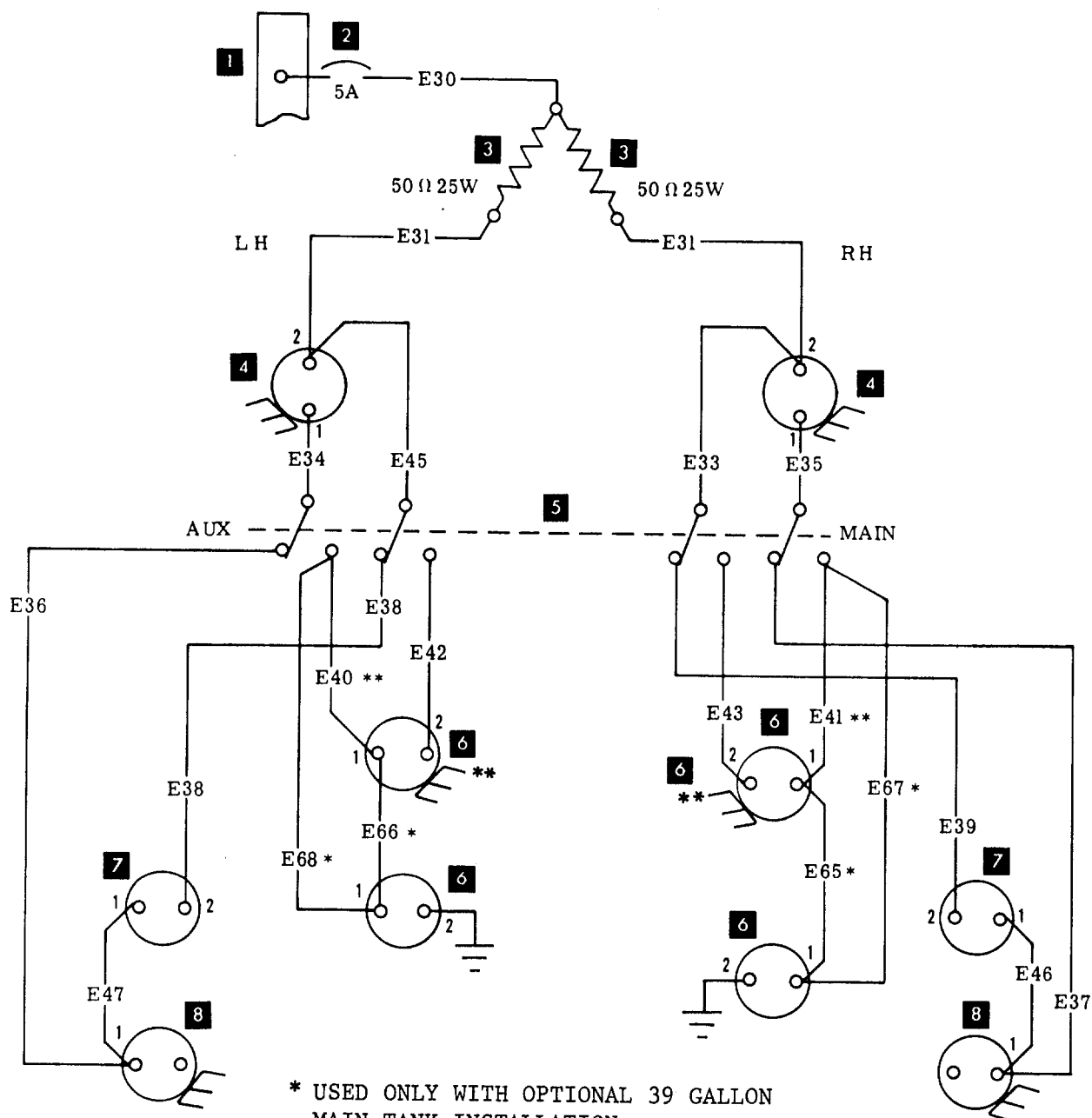
* USED ONLY WITH OPTIONAL 39 GALLON
MAIN TANK INSTALLATION

** THE WIRES E40, E41 AND THE BOND STRAPS
GROUNDING THE INBOARD MAIN TRANSMITTERS
ARE NOT USED WHEN THE OPTIONAL
39 GALLON MAIN TANK IS INSTALLED

1. Bus Bar
2. Circuit Breaker
3. Resistor
4. Fuel Gage
5. Fuel Gage Transfer Switch

6. Main Tank Transmitter
7. Aux. Inboard Transmitter
8. Aux. Outboard Transmitter

Fuel Quantity Indicator
TC-3 thru TC-33



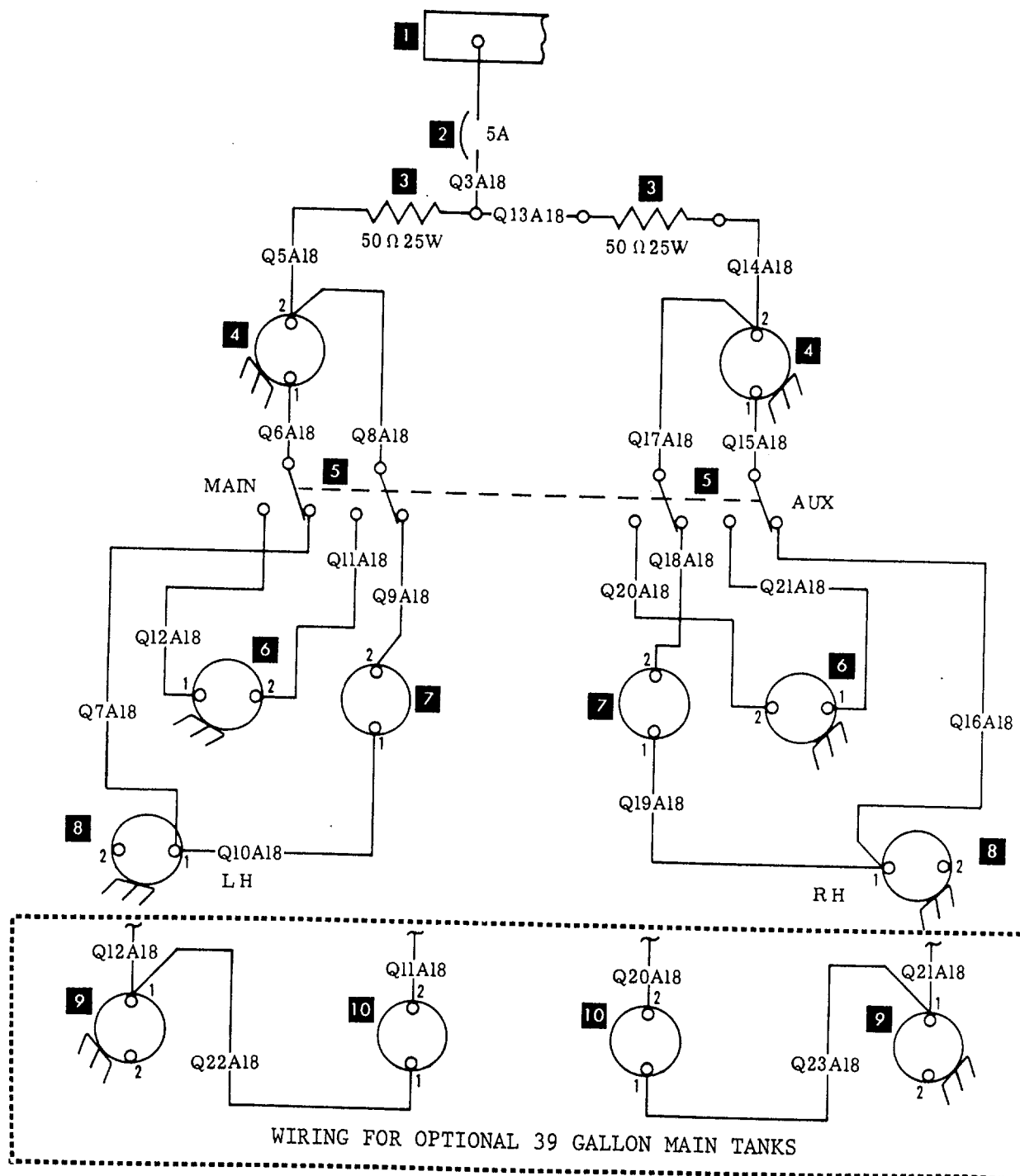
* USED ONLY WITH OPTIONAL 39 GALLON
MAIN TANK INSTALLATION

** THE WIRES E40, E41 AND THE BOND STRAPS
GROUNDING THE INBOARD MAIN TRANSMITTERS
ARE NOT USED WHEN THE OPTIONAL
39 GALLON MAIN TANK IS INSTALLED

- | | |
|------------------------------|------------------------------|
| 1. Bus Bar | 6. Main Tank Transmitter |
| 2. Circuit Breaker | 7. Aux. Inboard Transmitter |
| 3. Resistor | 8. Aux. Outboard Transmitter |
| 4. Fuel Gage | |
| 5. Fuel Gage Transfer Switch | |

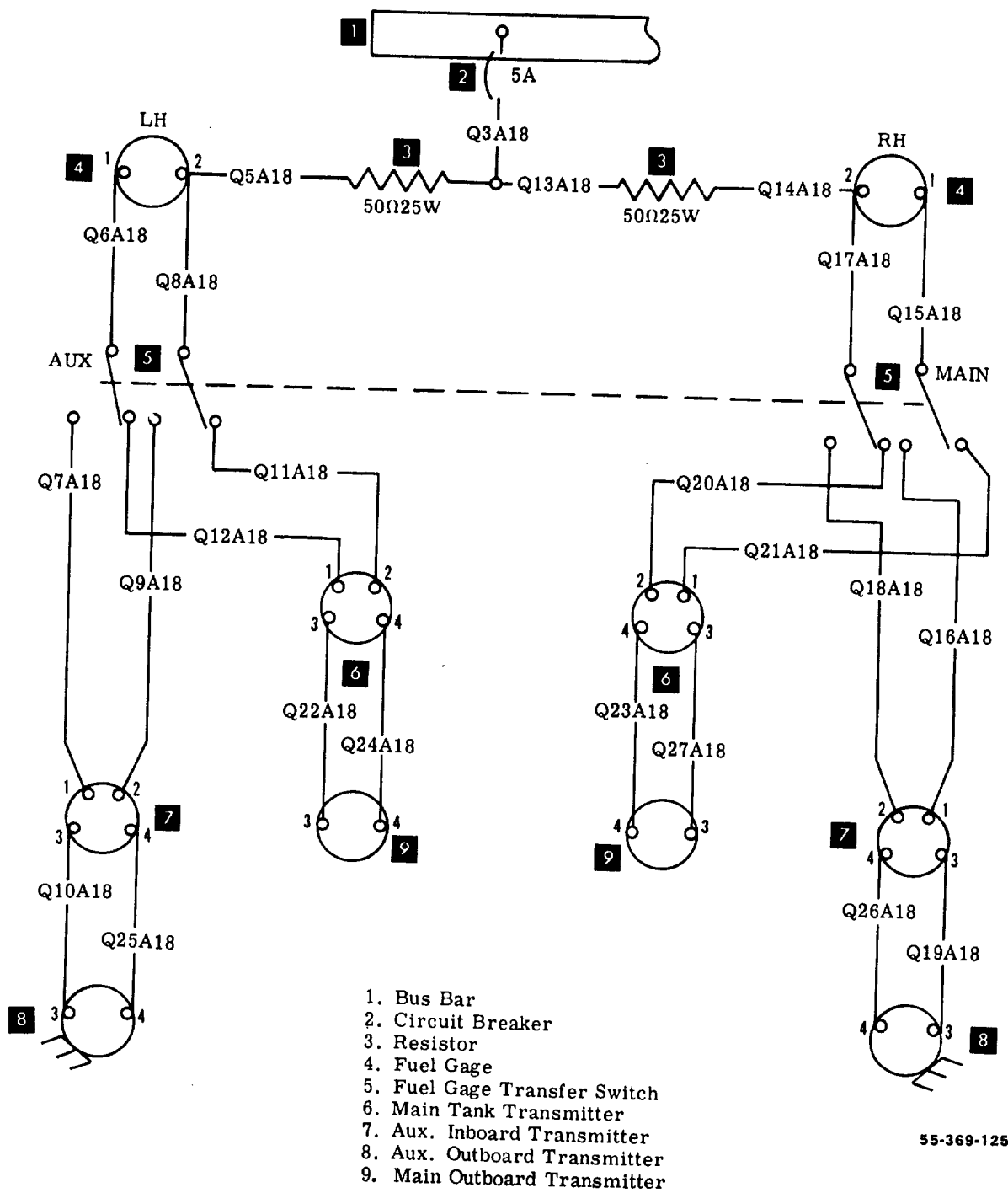
Fuel Quantity Indicator

TC-113, TC-129, TC-133, TC-141, TC-148, TC-164, TC-166, TC-168 thru TC-190
and Aircraft Complying With Service Letter No. 4.



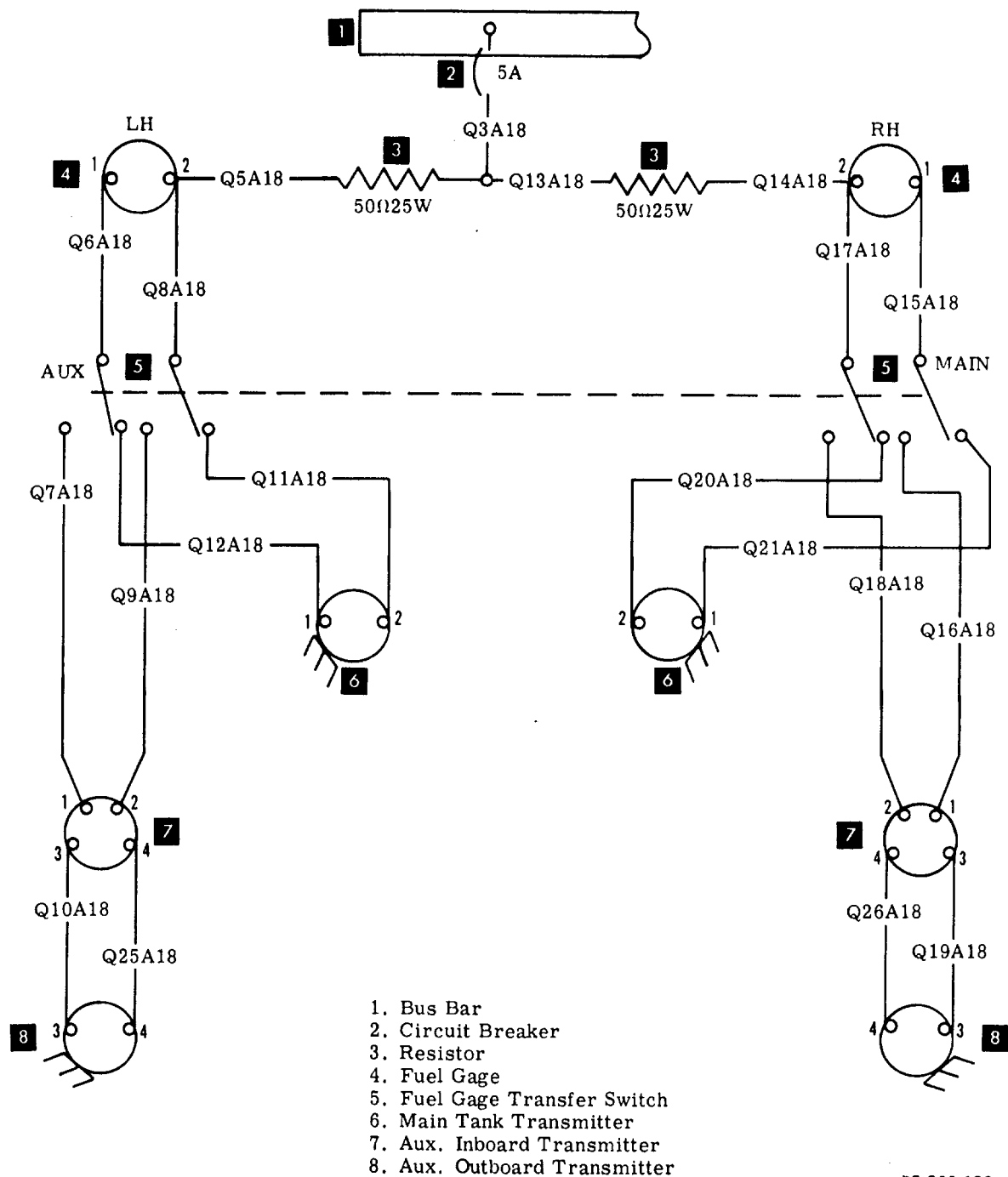
1. Bus Bar
2. Circuit Breaker
3. Resistor
4. Fuel Gage
5. Fuel Gage Transfer Switch
6. Main Tank Transmitter
7. Aux. Inboard Transmitter
8. Aux. Outboard Transmitter
9. Main Outboard Tank Transmitter
10. Main Inboard Tank Transmitter

Fuel Quantity Indicator
TC-191 thru TC-375

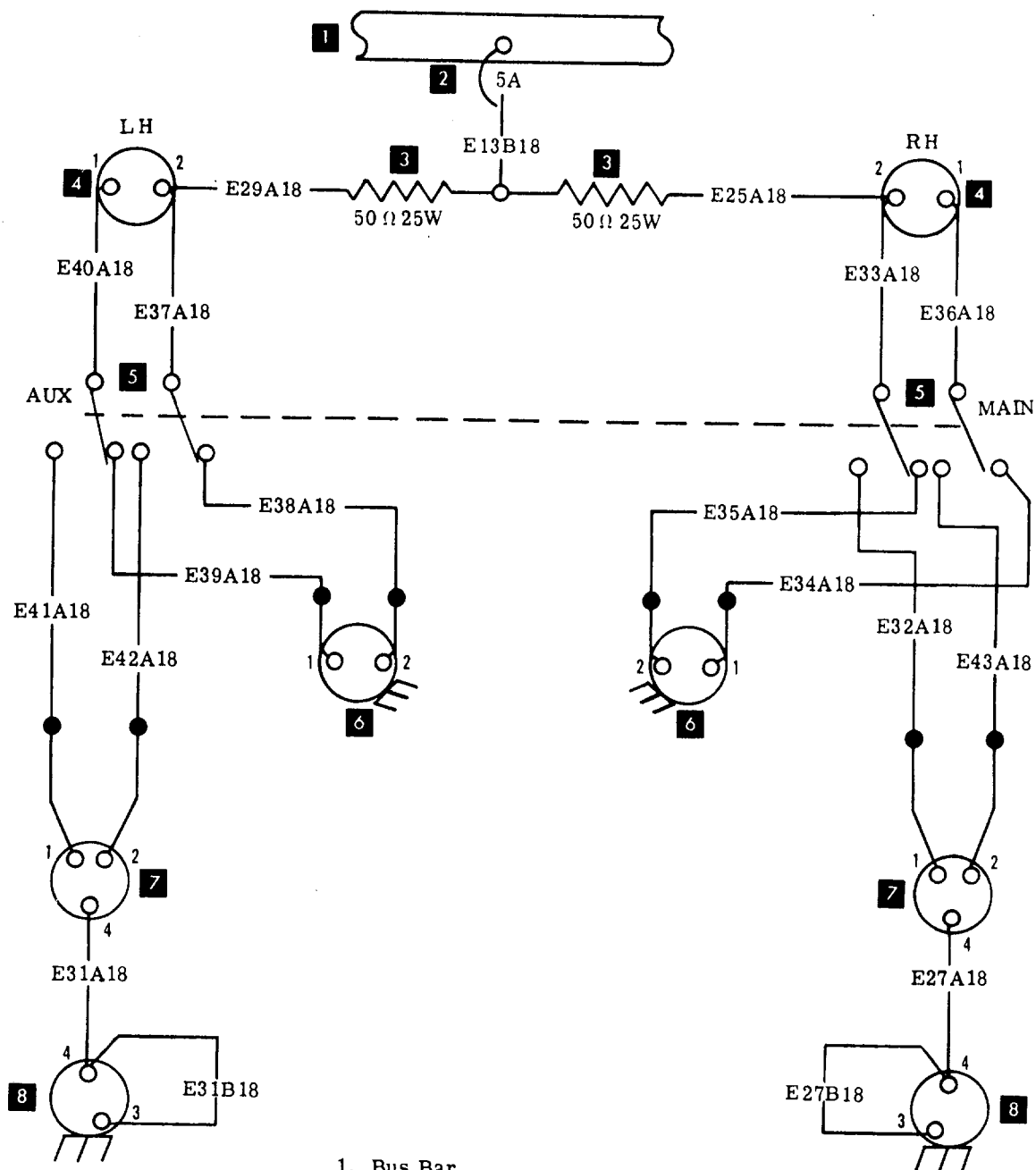


55-369-125

Fuel Quantity Indicator (Optional)
 TC-376 thru TC-530

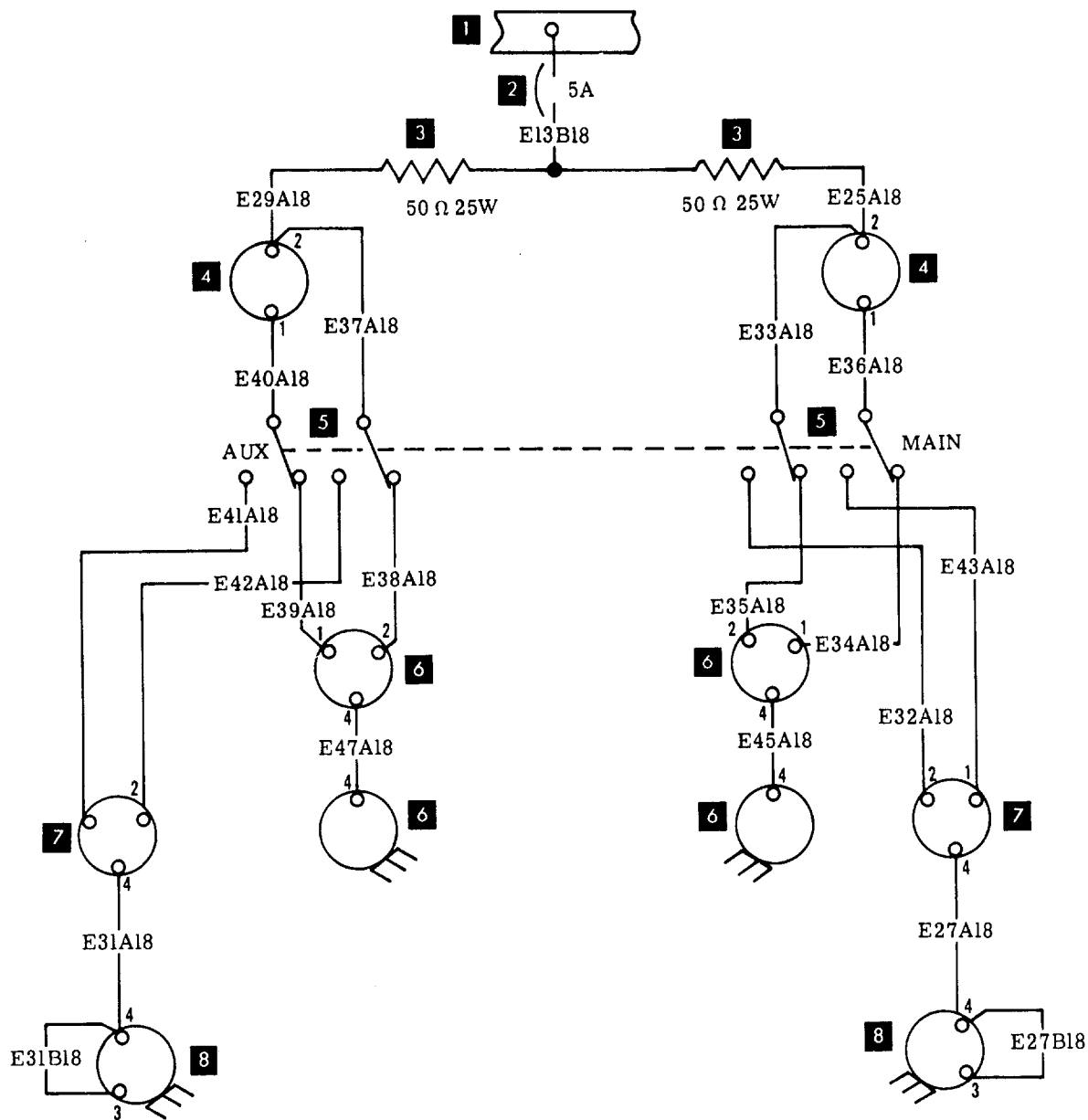


55-369-126



55-369-127

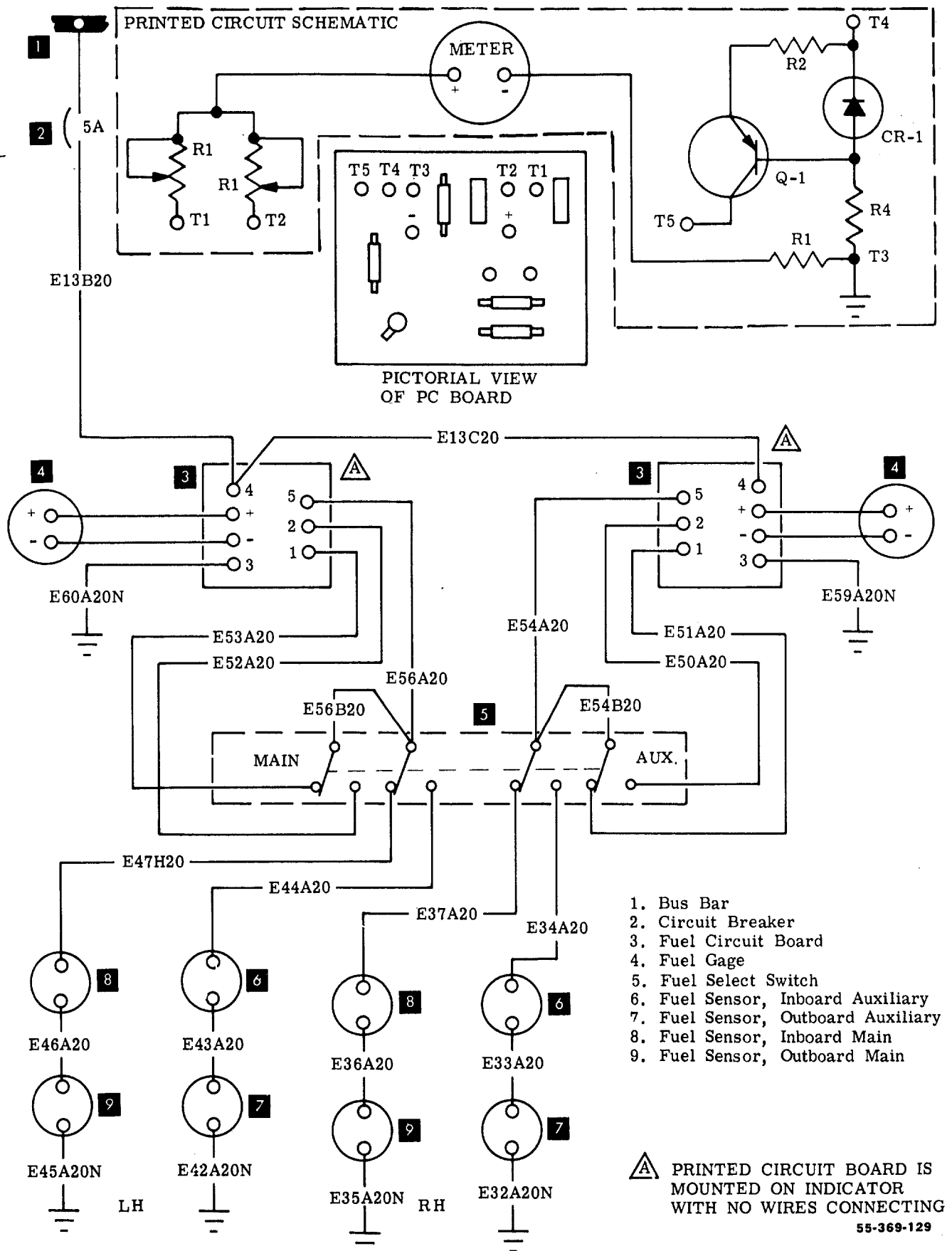
Fuel Quantity Indicator (Standard)
 TC-531 thru TC-1298
 TE-1 thru TE-767



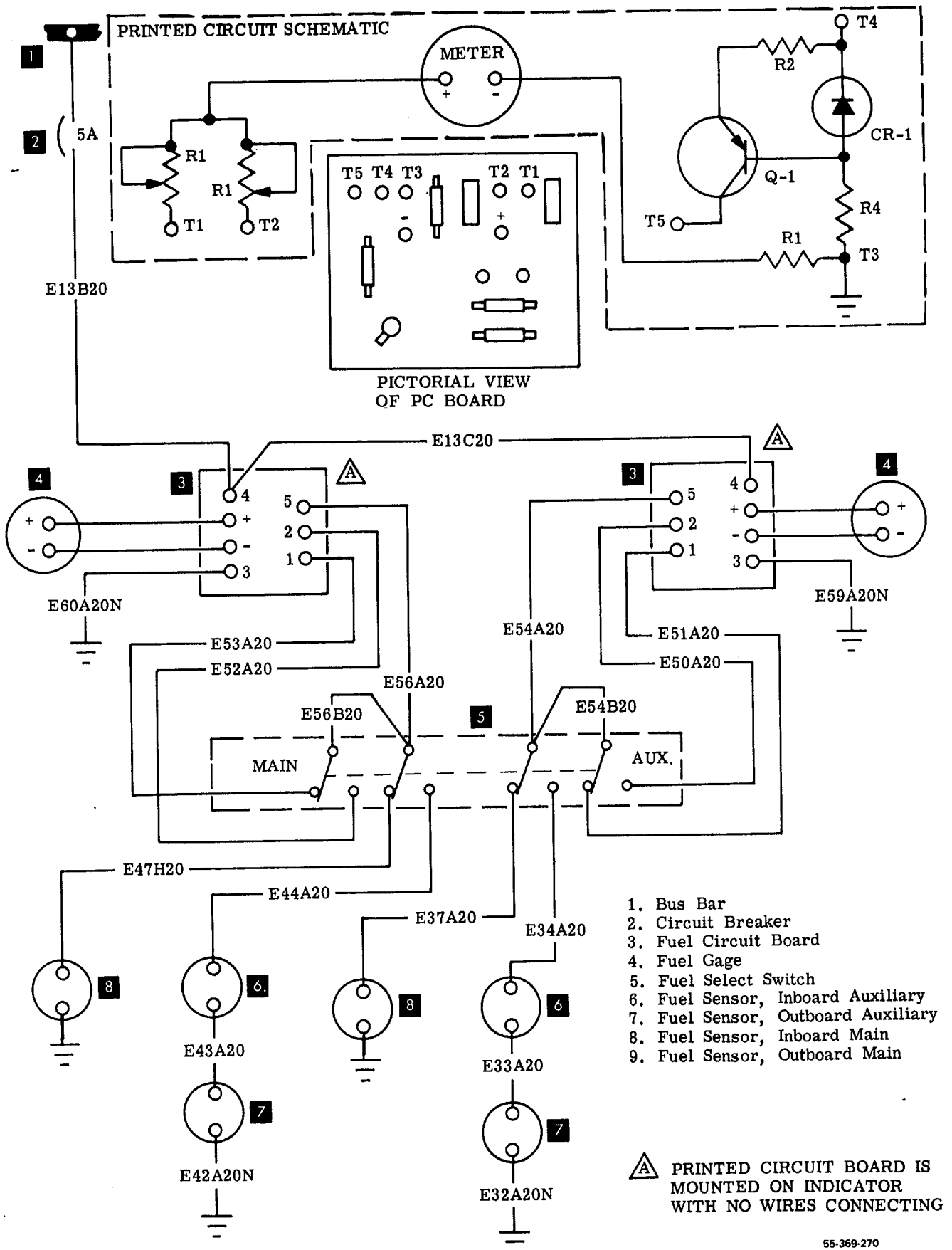
55-369-128

1. Bus Bar
2. Circuit Breaker
3. Resistor
4. Fuel Gage
5. Fuel Gage Transfer Switch
6. Main Tank Transmitter
7. Aux. Inboard Transmitter
8. Aux. Outboard Transmitter

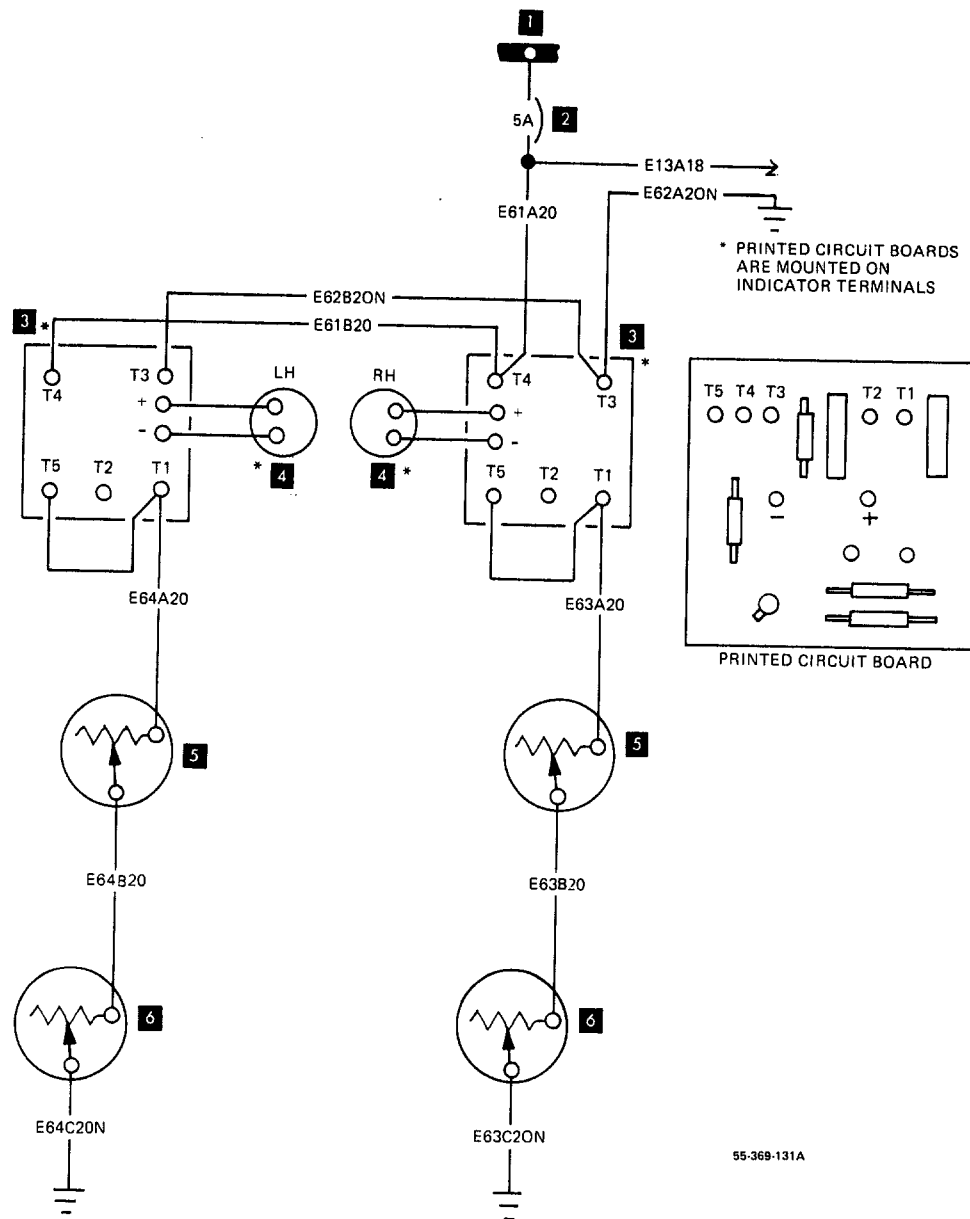
Fuel Quantity Indicator (Optional)
 TC-531 thru TC-1298
 TE-1 thru TE-767



**Fuel Quantity Indicator (Optional)
TC-1299 thru TC-1607**



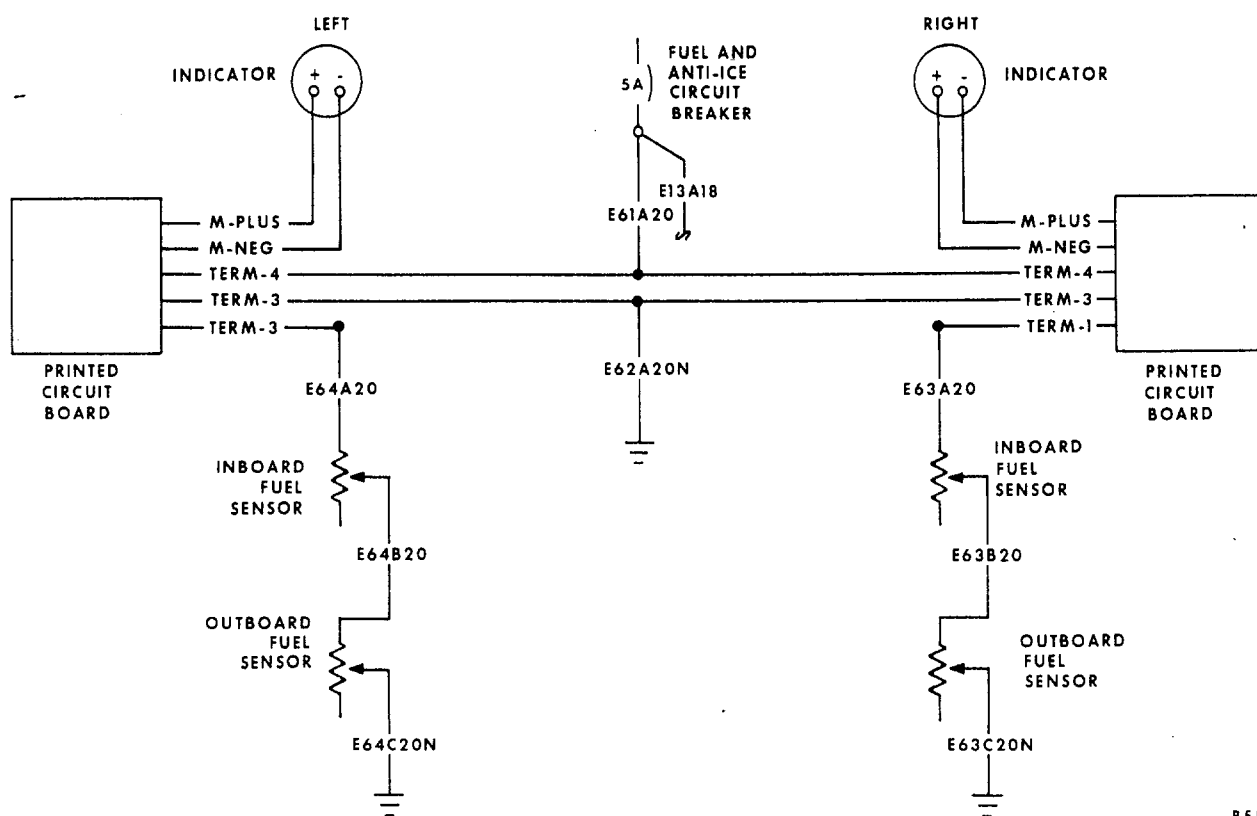
**Fuel Quantity Indicator (Standard)
TC-1299 thru TC-1607**



1. Bus Bar
2. Circuit Breaker
3. Fuel Quantity Printed Circuit Board
4. Fuel Quantity Gage
5. Transmitter (Inboard)
6. Transmitter (Outboard)

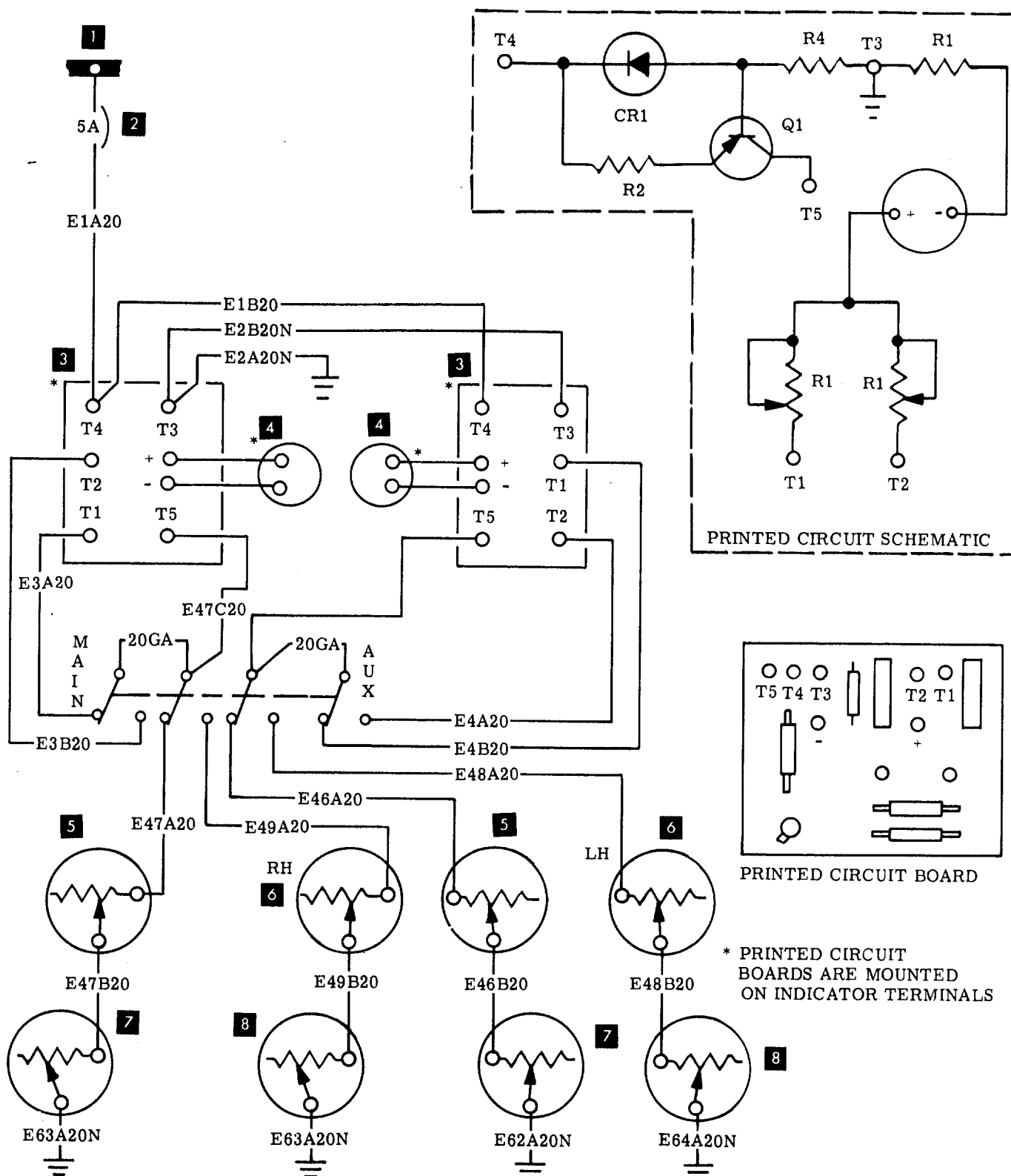
55-369-131A

Fuel Quantity Indicator TC-1608 thru TC-1631



B55-369-287

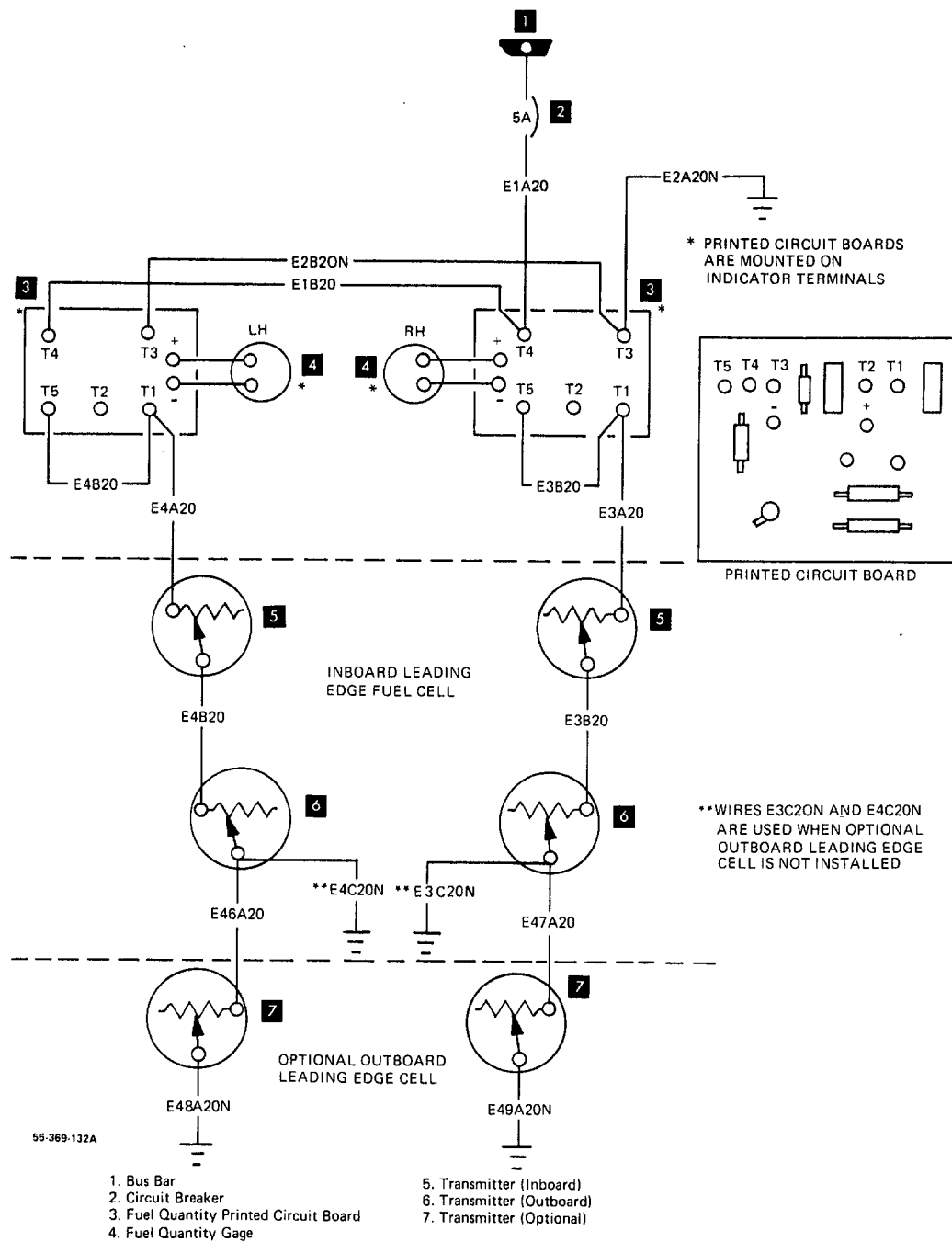
Fuel Quantity Indicator
TC-1632 thru TC-1935 except TC-1913



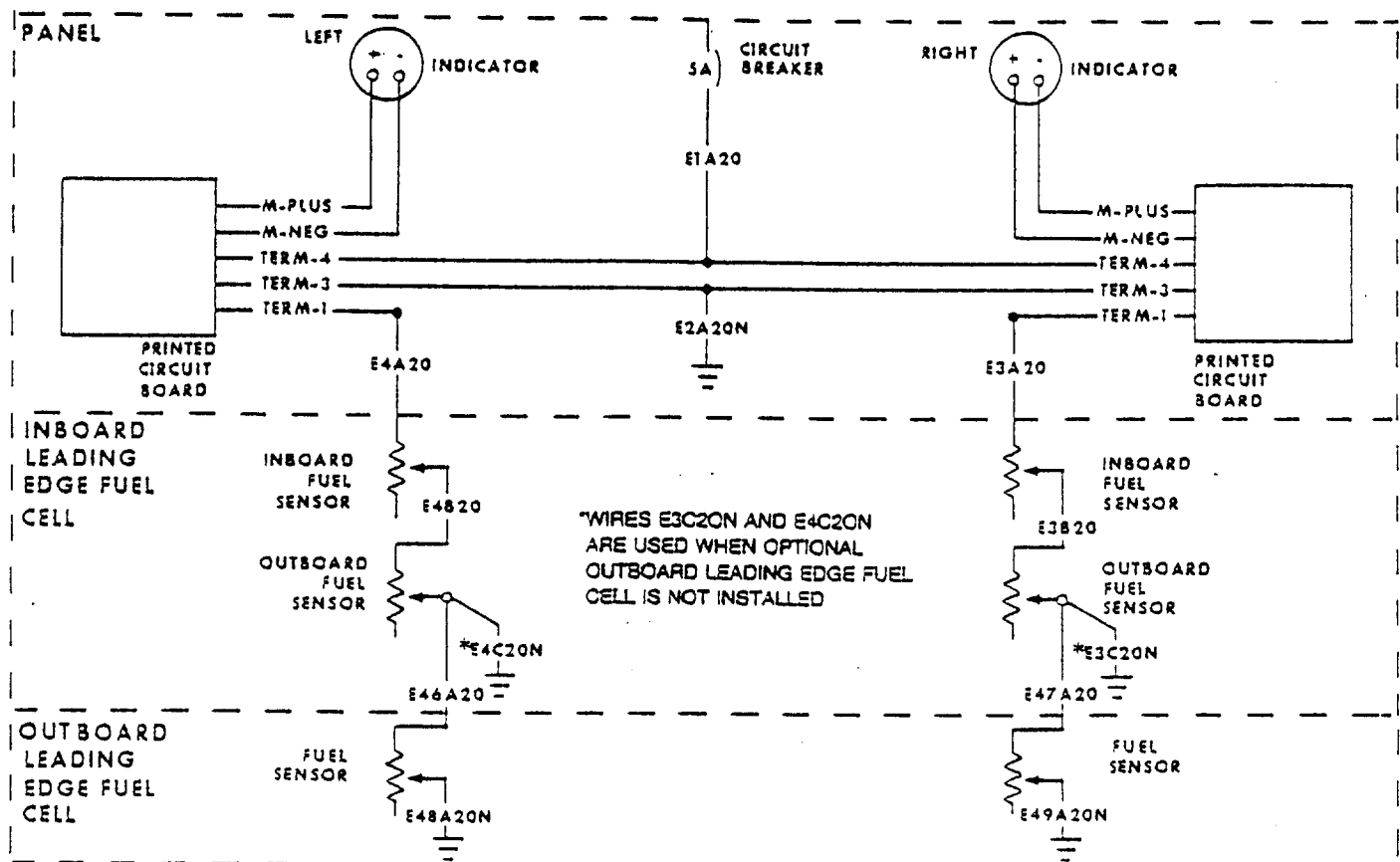
- | | |
|----------------------------|-------------------------------------|
| 1. Bus Bar | 5. Transmitter (Main Inboard) |
| 2. Circuit Breaker | 6. Transmitter (Auxiliary Inboard) |
| 3. Printed Circuit Board | 7. Transmitter (Main Outboard) |
| 4. Fuel Quantity Indicator | 8. Transmitter (Auxiliary Outboard) |

Fuel Quantity Indicator
TE-768 thru TE-942 except TE-938

55-369-130

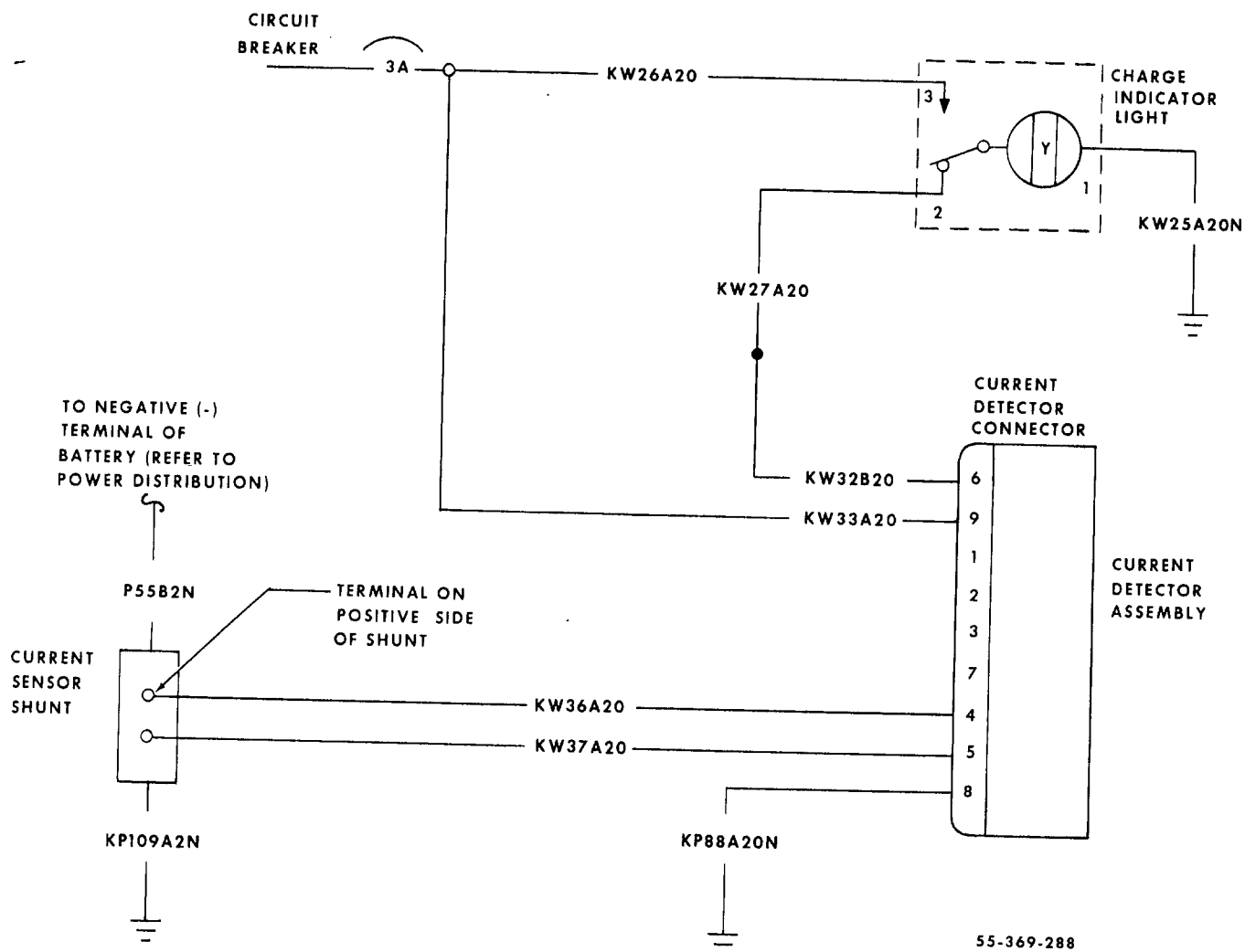


Fuel Quantity Indicator
TE-938, TE-943 thru TE-955
TH-1 thru TH-409

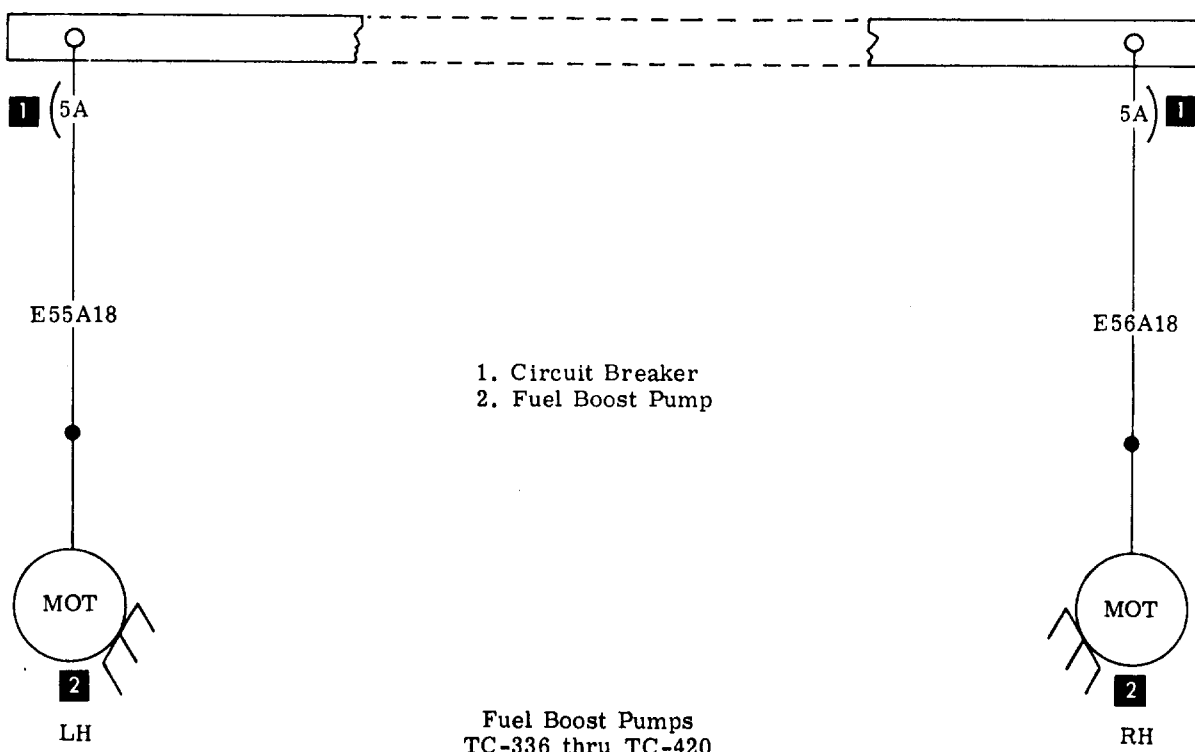
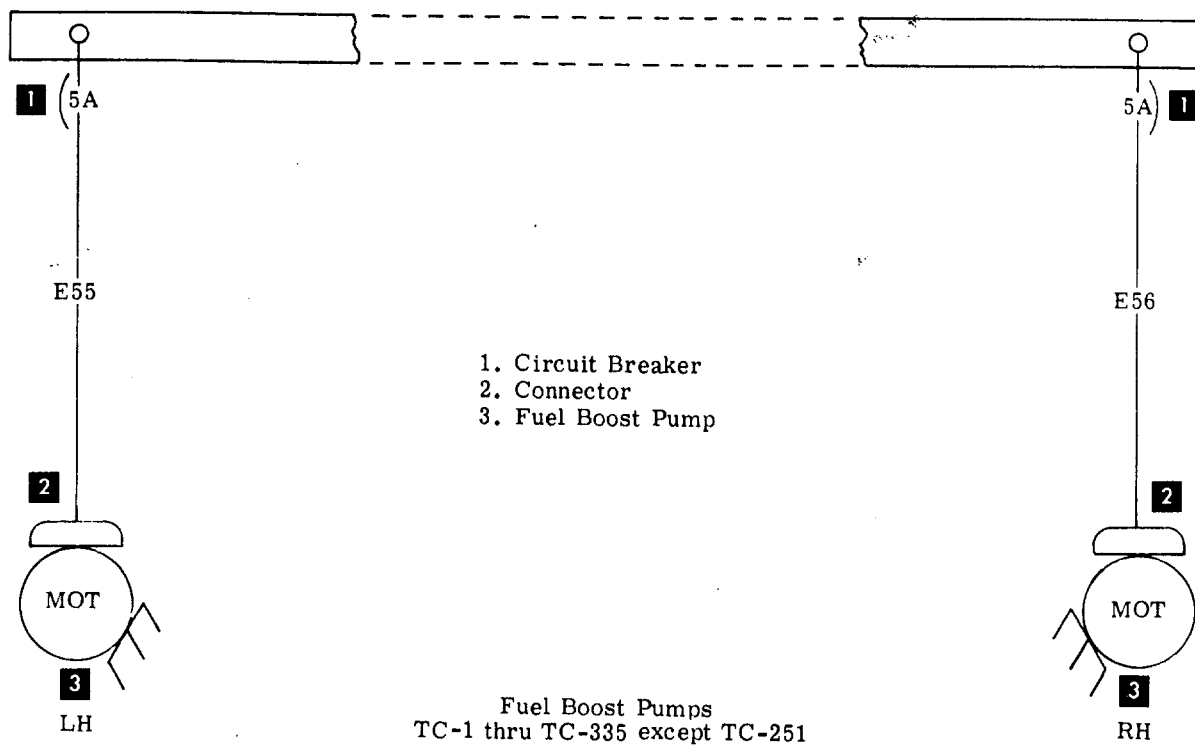


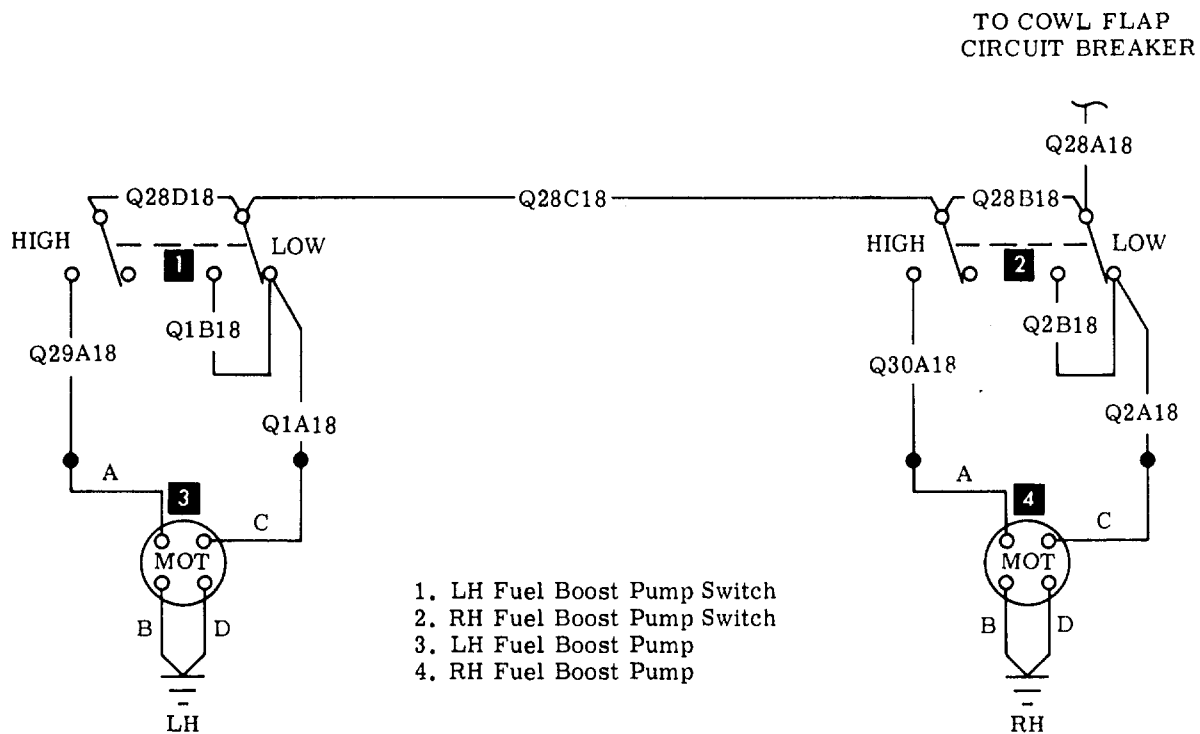
E55-369-286

Fuel Quantity Indicator
TE-956 thru TE-1063
TH-410 thru TH-647 except TH-598



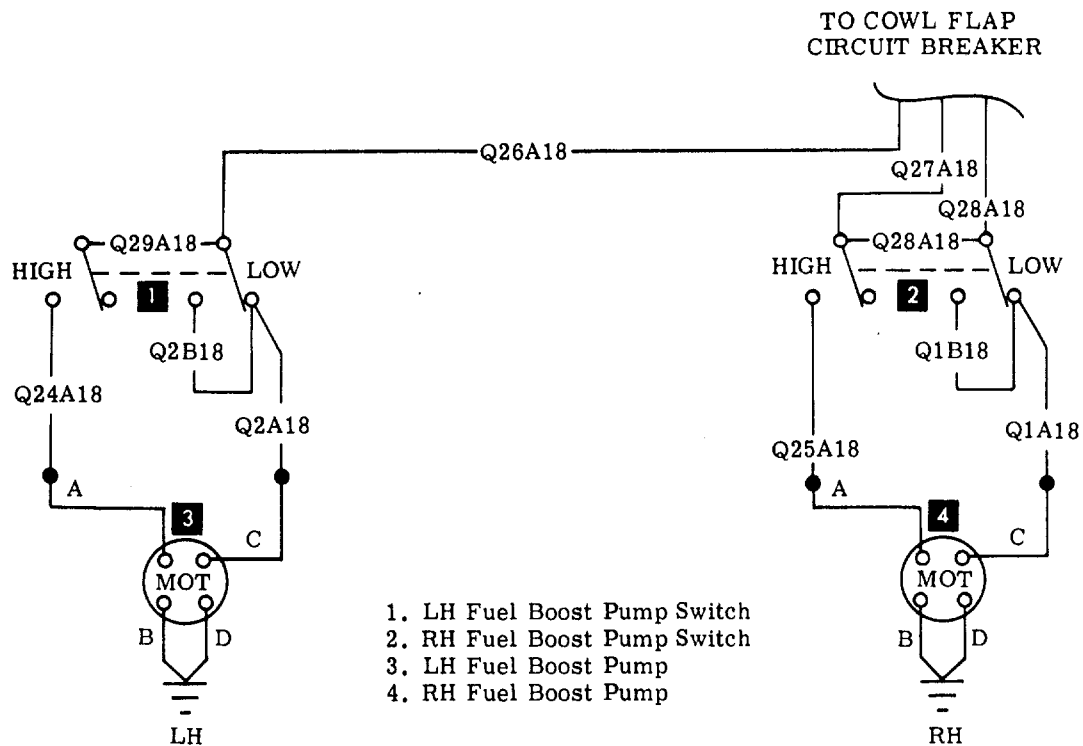
Battery Charge Monitor
 Aircraft equipped with Kit #60-3005-1S
 in compliance with S.I. 0587-356



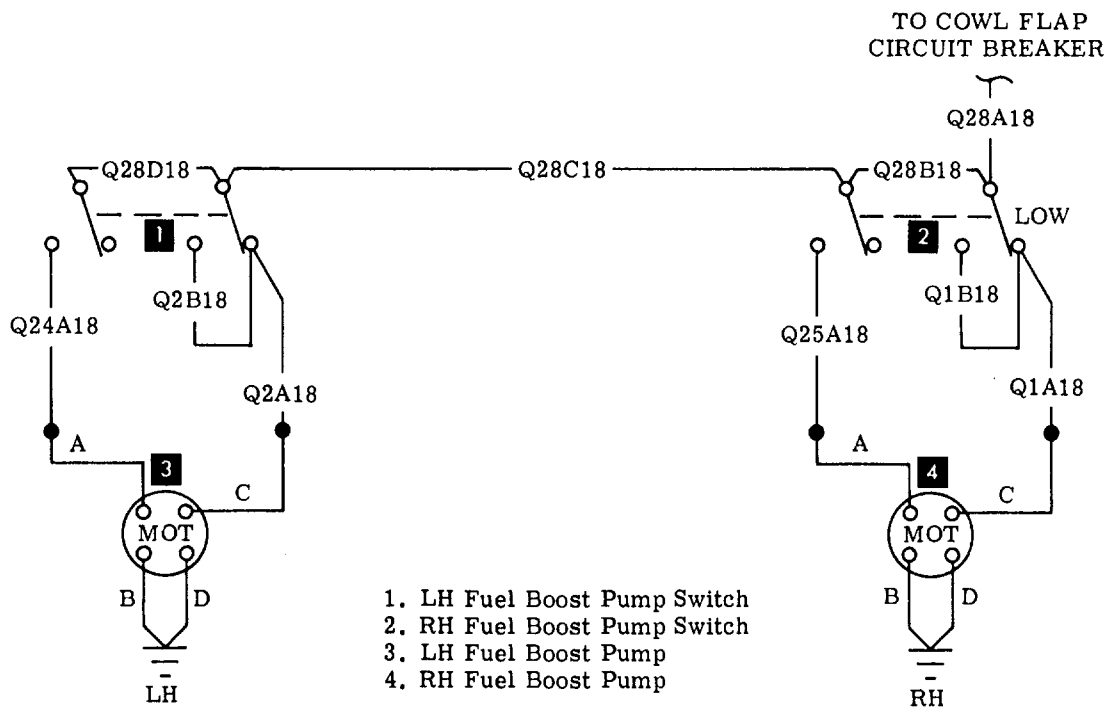


55-369-134

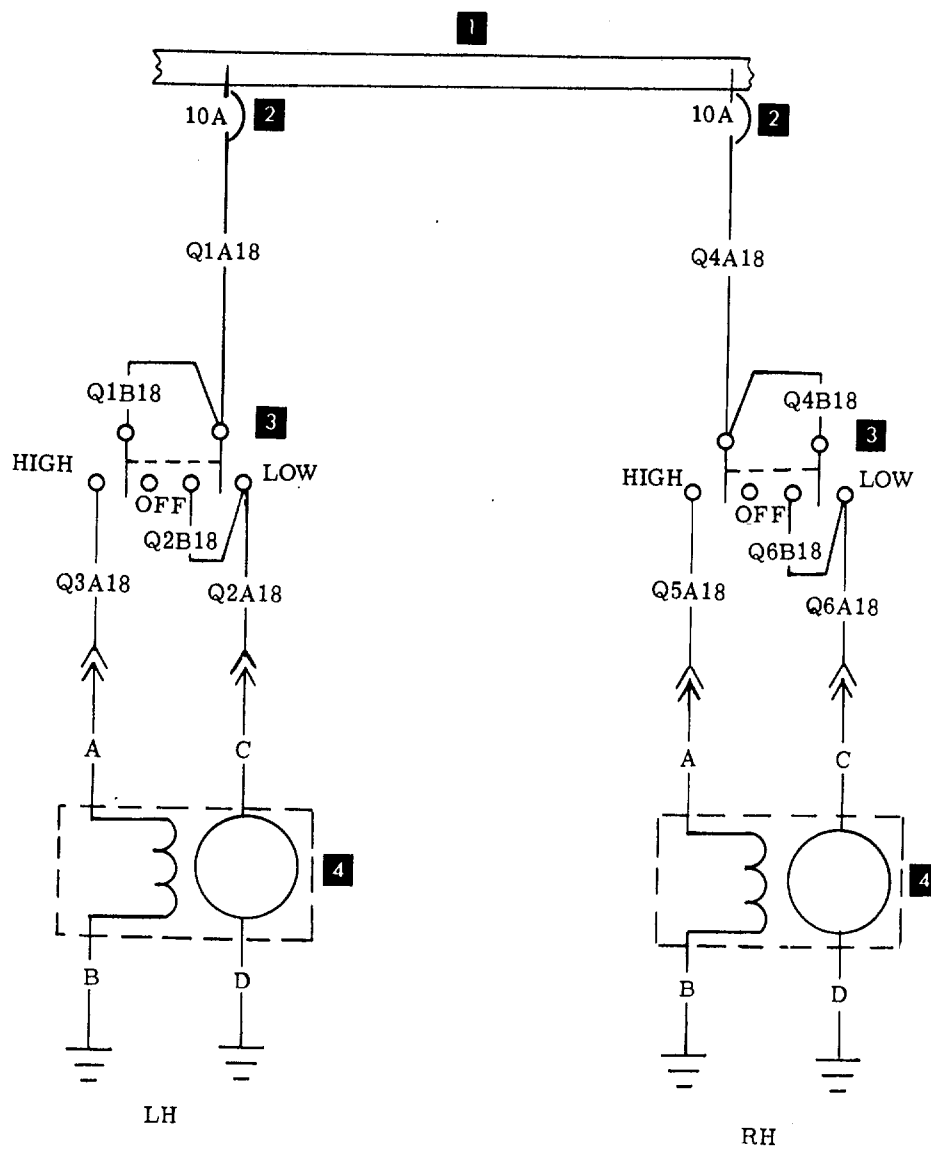
Fuel Boost Pump
 TC-251, TC-421 thru TC-954 and serials TC-955 thru TC-1419
 prior to compliance with S.I. 0584-285



Fuel Boost Pump
TE-1 thru TE-451 prior to compliance with S.I.0584-285



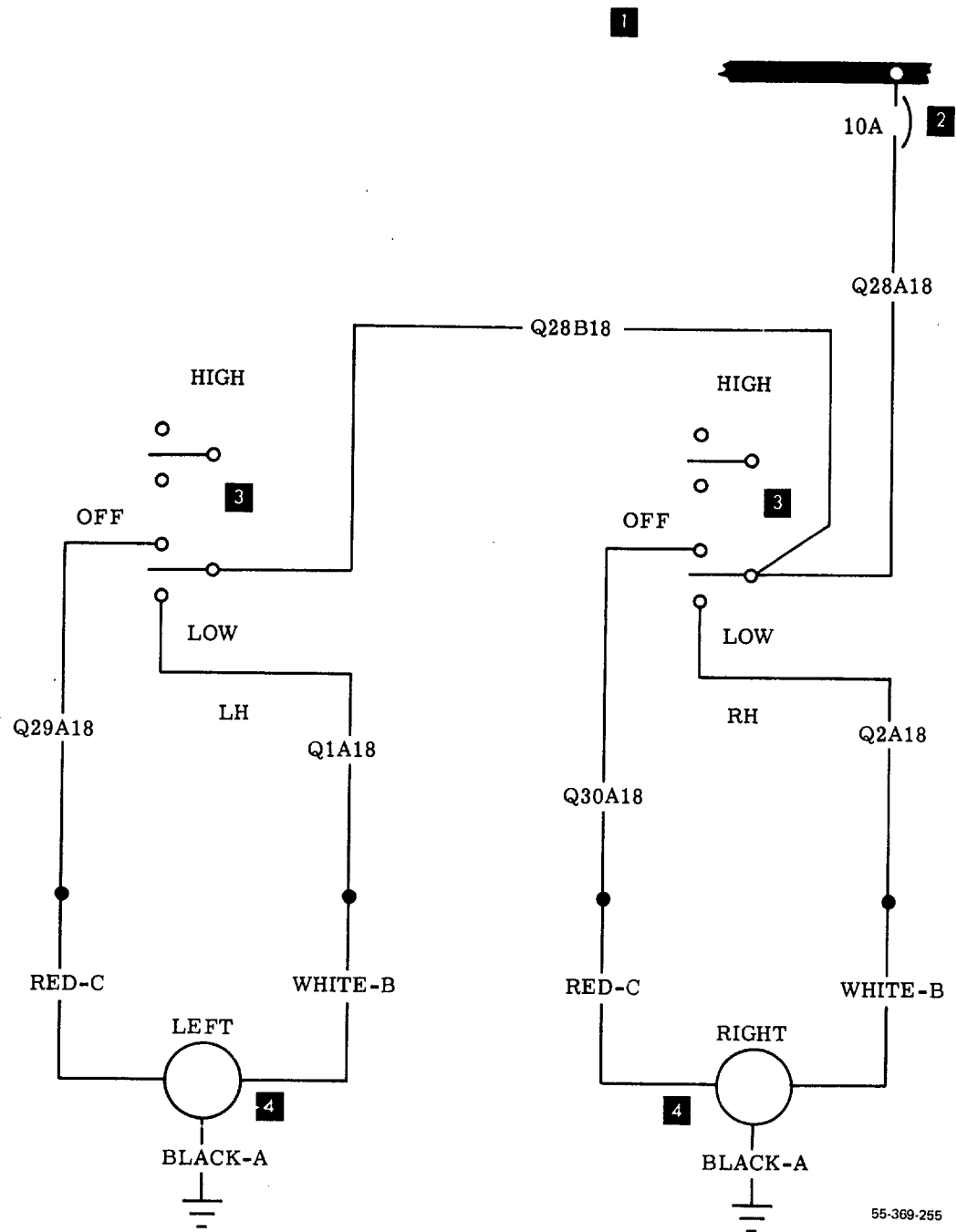
Fuel Boost Pump
TE-452 thru TE-767 prior to compliance with S.I.0584-285



E55-369-136

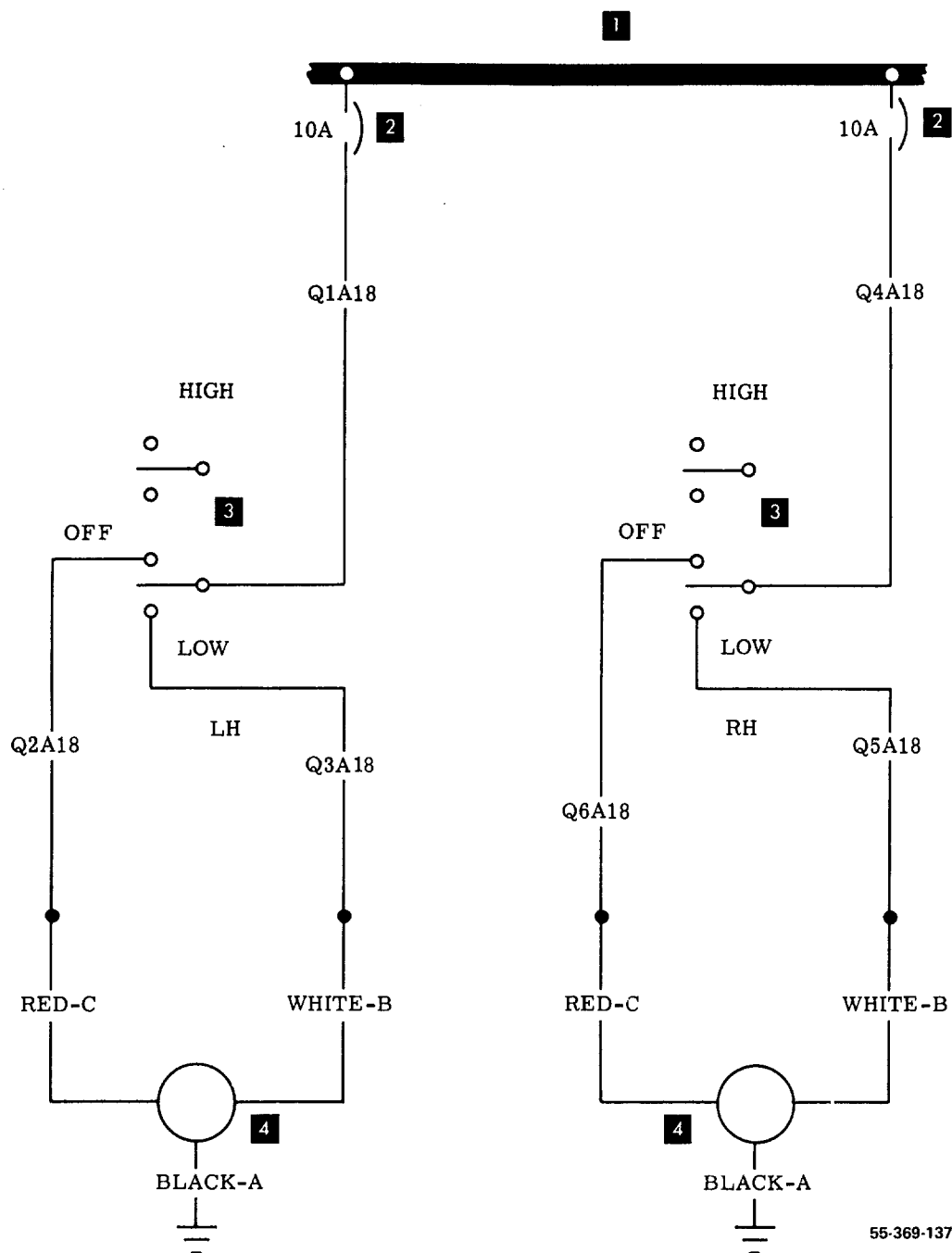
1. Bus Bar
2. Circuit Breaker
3. Fuel Pump Switch
4. Fuel Boost Pump

Fuel Boost Pump
TE-768 thru TE-856 and aircraft
prior to compliance with S.I. 0584-285



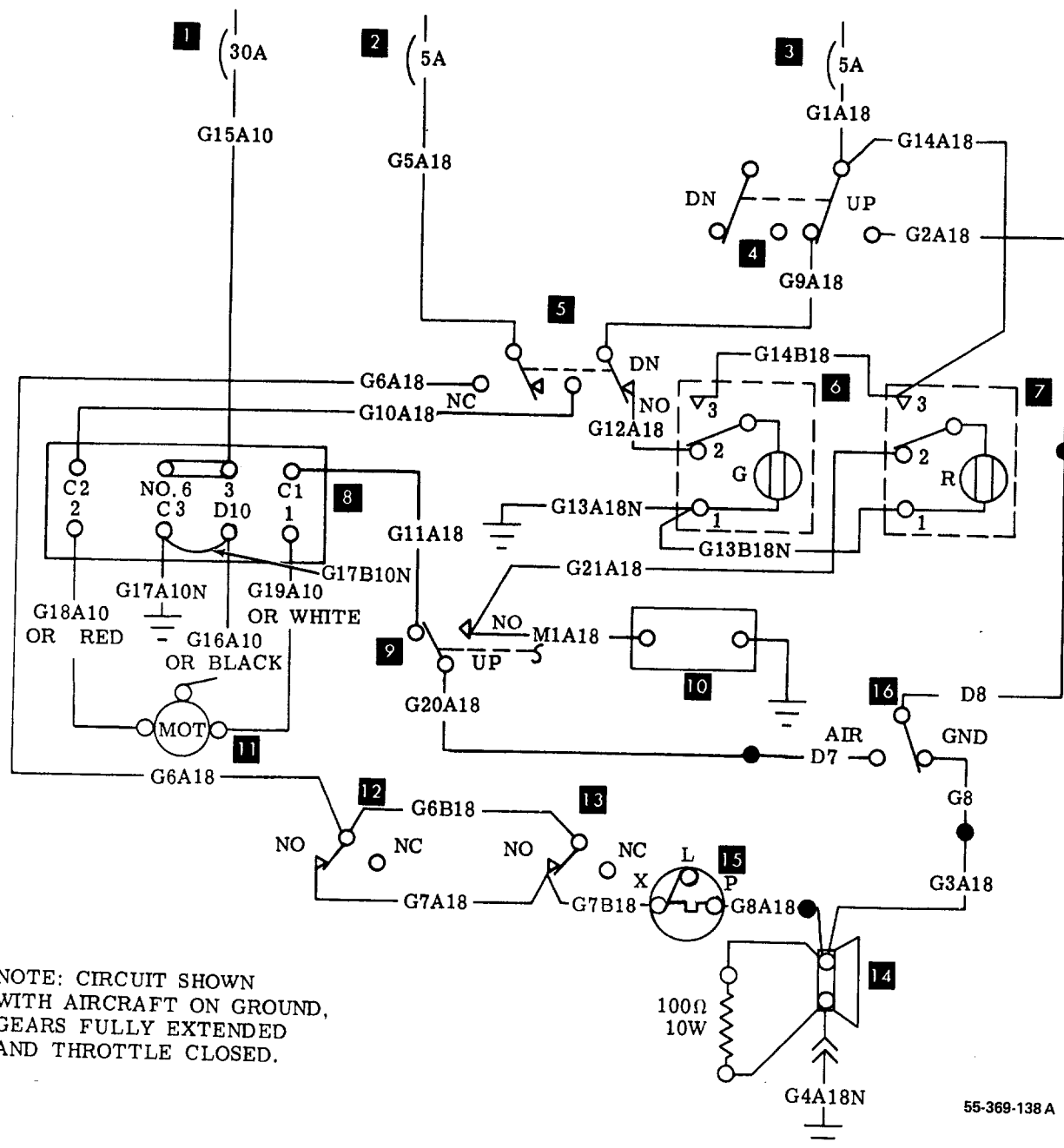
1. Bus Bar
2. Fuel Boost Circuit Breaker
3. Fuel Pump Switch
4. Boost Fuel Pump

Fuel Boost Pump
 TC-1420 thru TC-1935 except TC-1913
 and serials TC-955 thru TC-1419 in
 compliance with S.I. 0584-285



1. Bus Bar
2. Fuel Boost Circuit Breaker
3. Fuel Pump Switch
4. Boost Fuel Pump

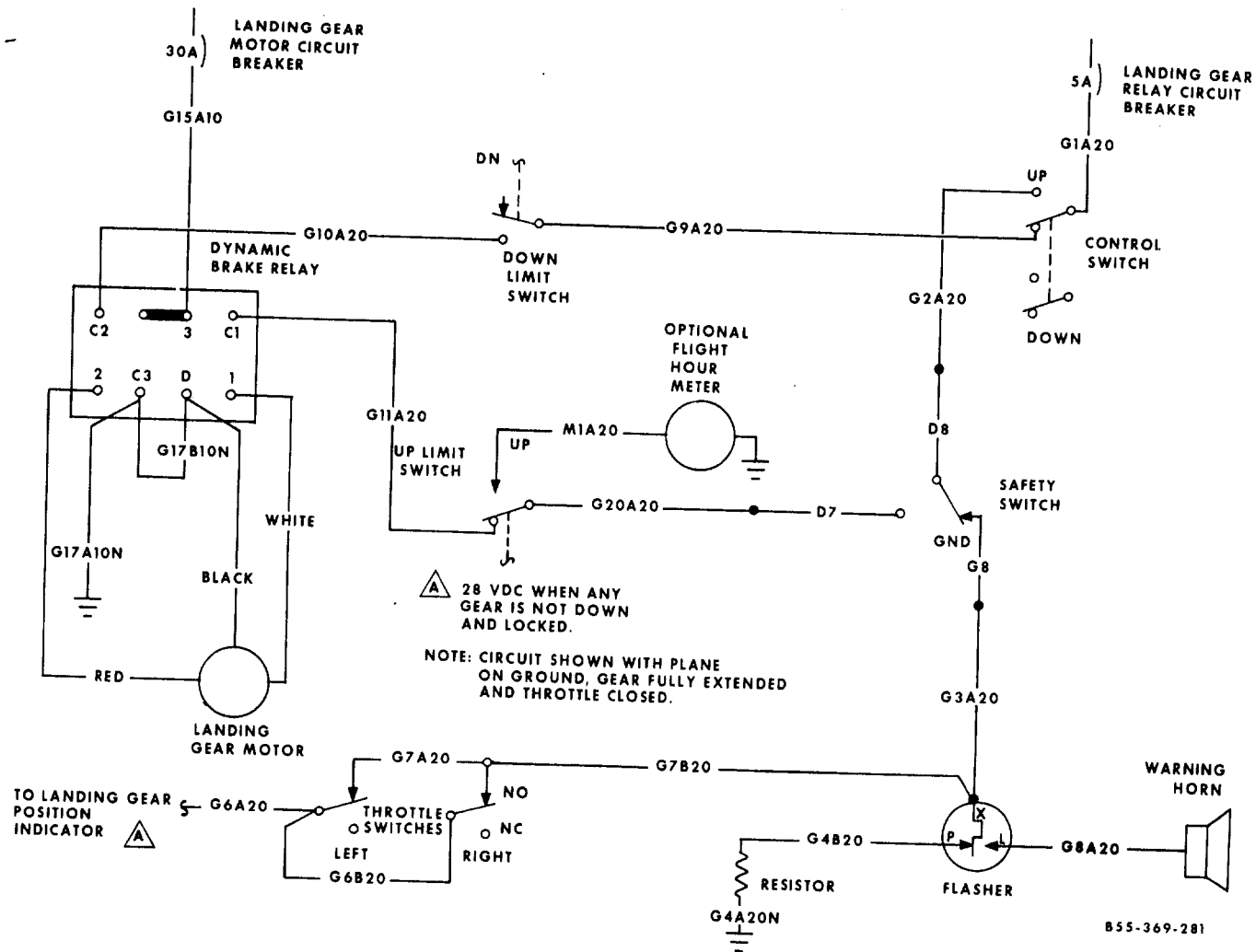
Fuel Boost Pump
 TE-857 thru TE-1063 and prior aircraft
 in compliance with S.I. 0584-285
 TH-1 thru TH-647 except TH-598



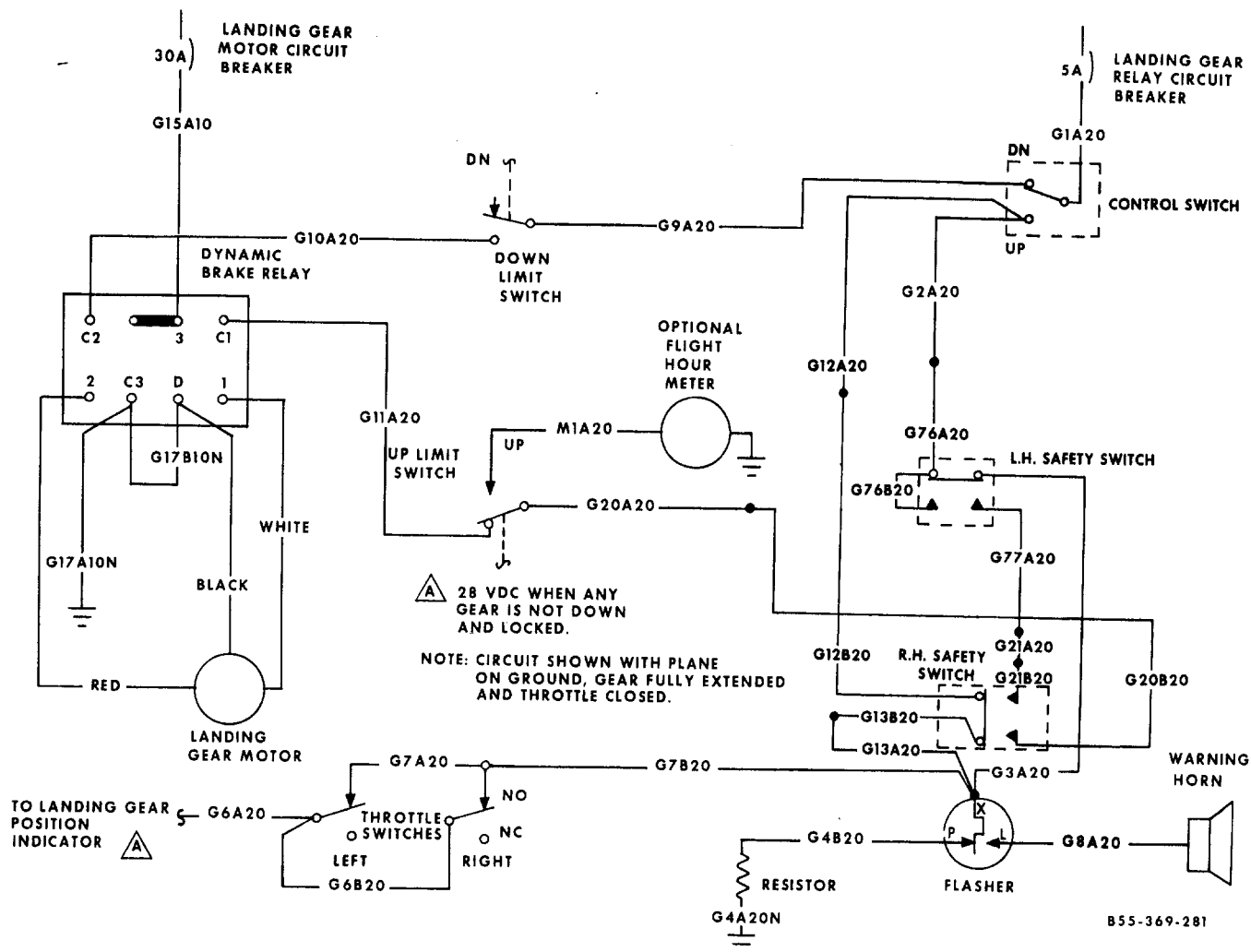
55-369-138 A

- | | |
|---|----------------------------------|
| 1. Landing Gear Motor Circuit Breaker | 9. Up Limit Switch |
| 2. Throttle Warning Circuit Breaker | 10. Flight Hour Meter (Optional) |
| 3. Landing Gear Control Circuit Breaker | 11. Landing Gear Motor |
| 4. Control Switch | 12. LH Throttle Warning Switch |
| 5. Down Limit Switch | 13. RH Throttle Warning Switch |
| 6. Gear Down Indicator | 14. Warning Horn |
| 7. Gear Up Indicator | 15. Warning Horn Flasher |
| 8. Dynamic Brake Relay | 16. Gear Safety Switch |

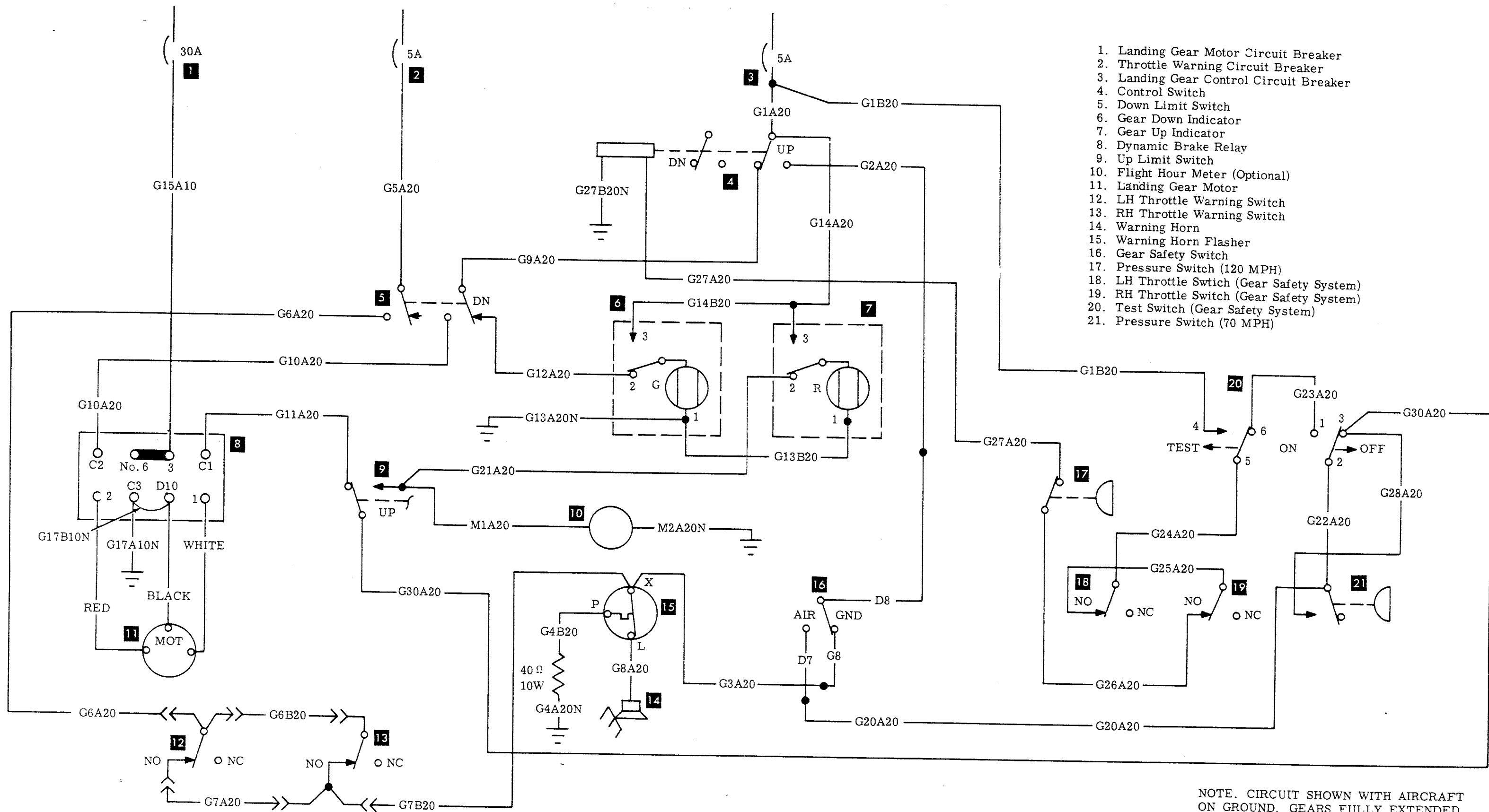
Landing Gear TC-1 thru TC-1002



Landing Gear
 TC-1608 thru TC-1777
 TE-938, TE-943 thru TE-1007
 TH-385 thru TH-539

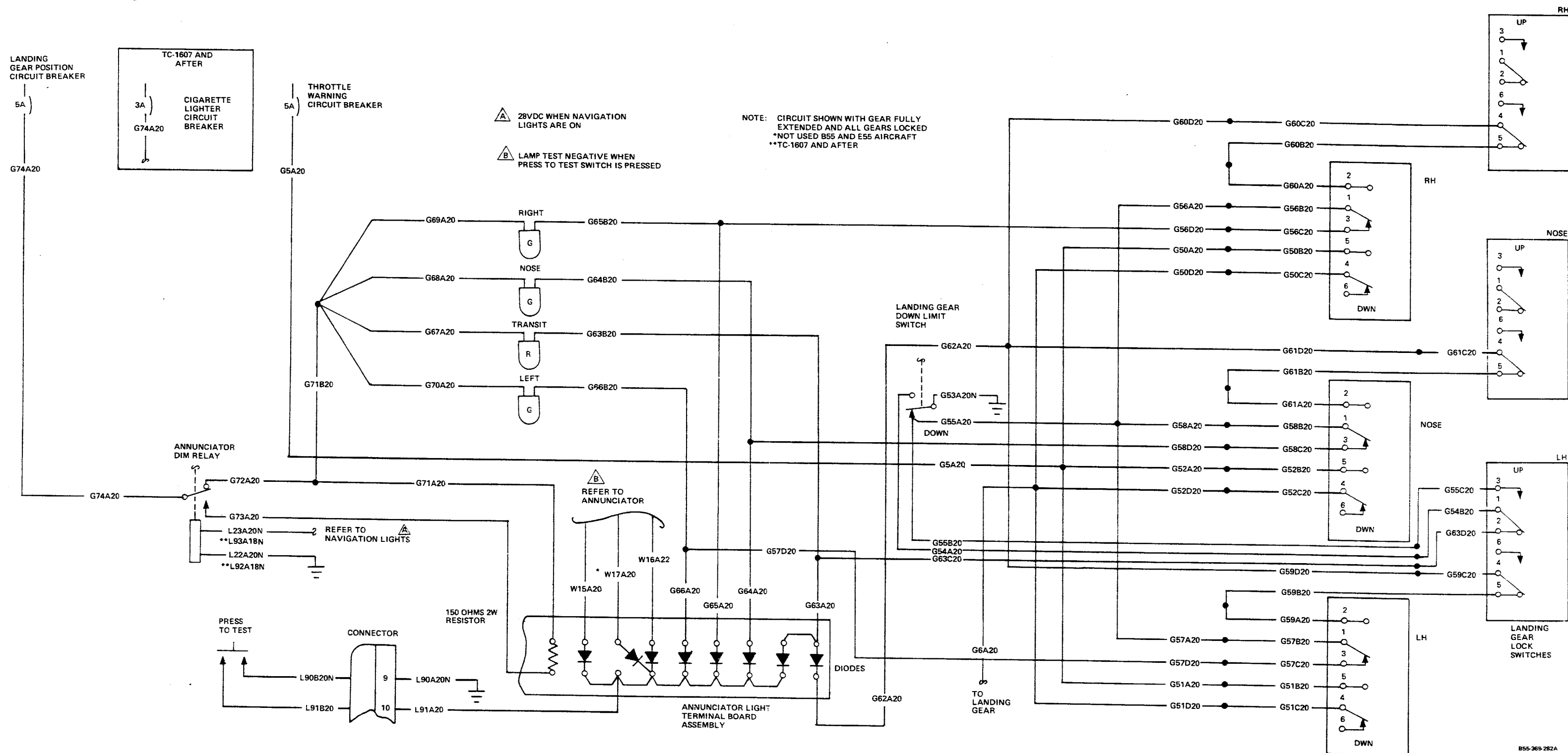


Landing Gear
 TC-1778 thru TC-1935 except TC-1913
 TE-1008 thru TE-1063
 TH-540 thru TH-647 except TH-598

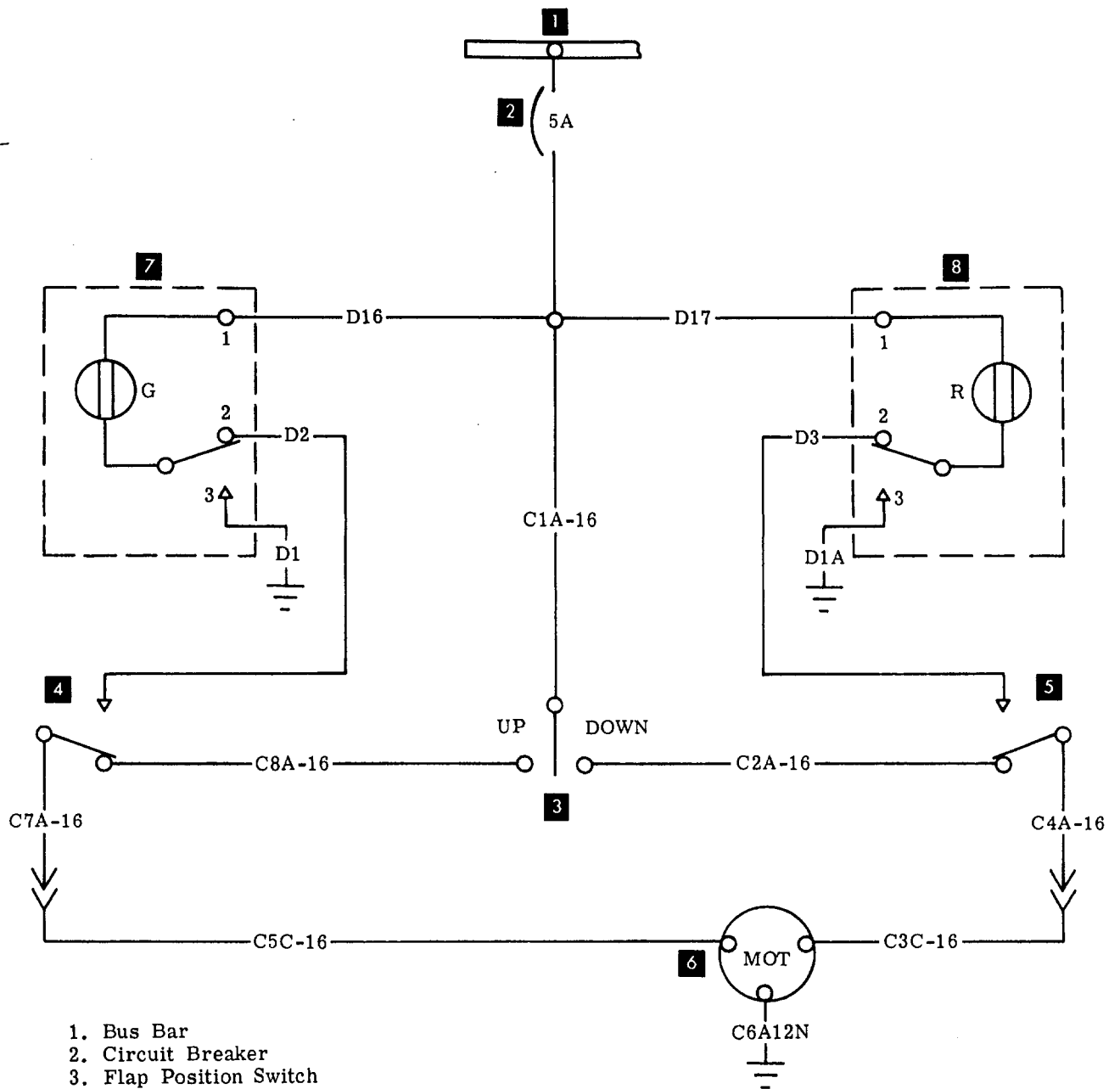


55-369-141 A

Landing Gear (with Safety System) Optional
 TE-768 thru TE-942 except TE-938
 TH-1 thru TH-384

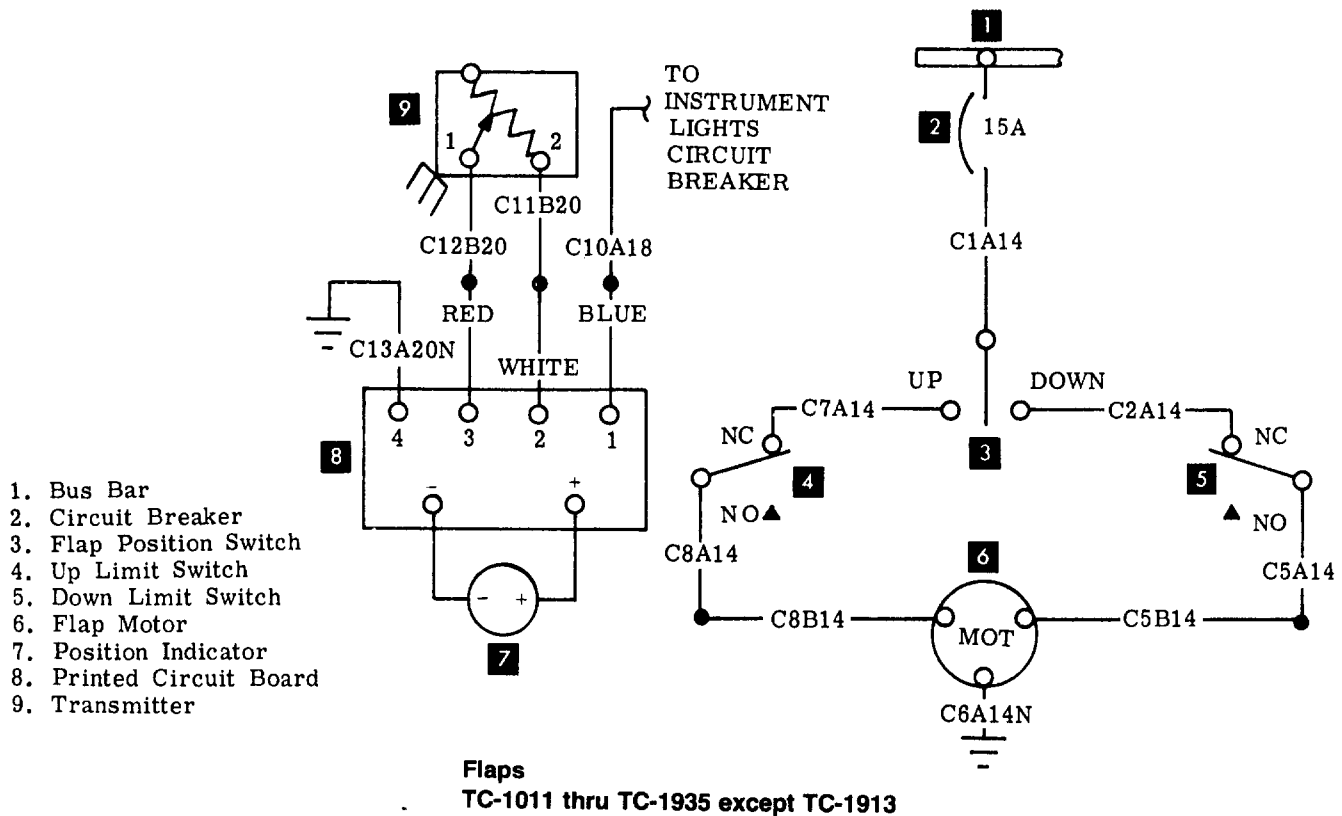
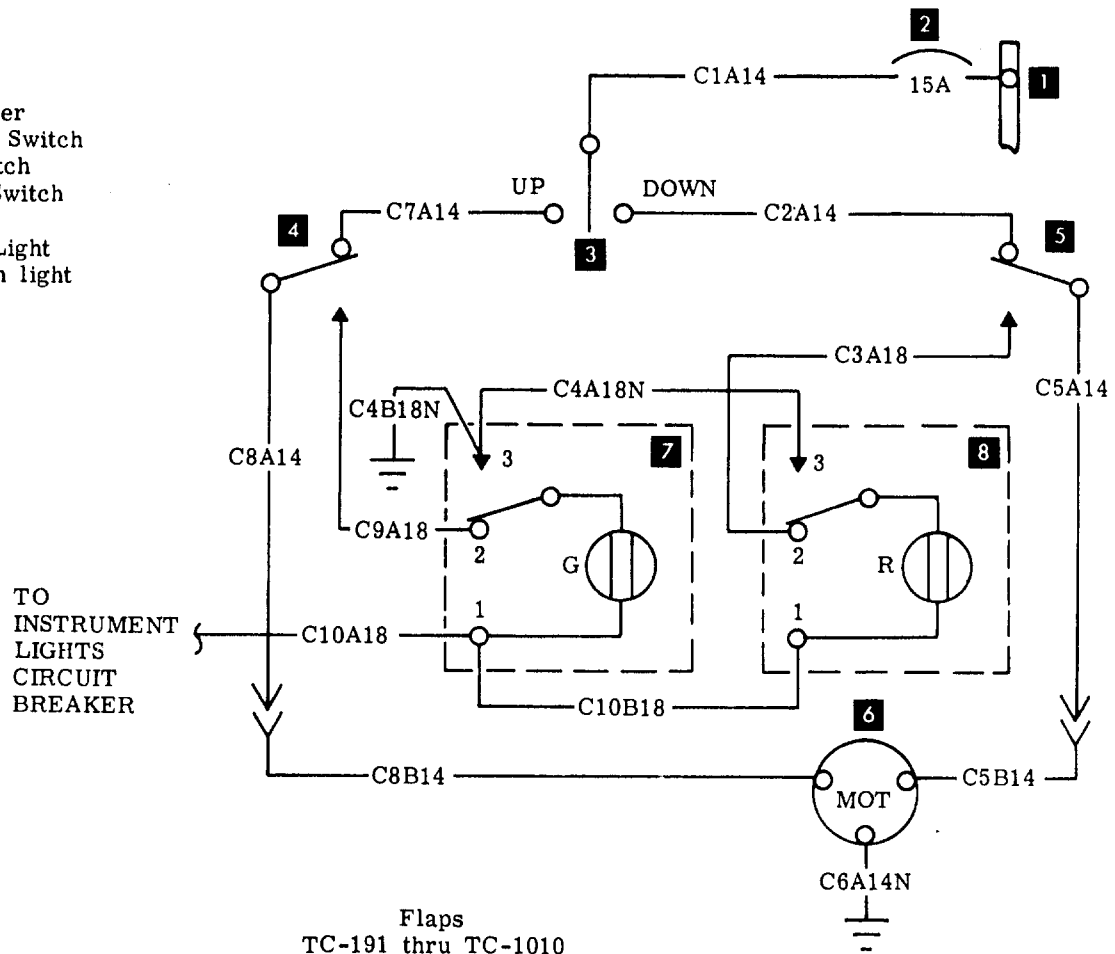


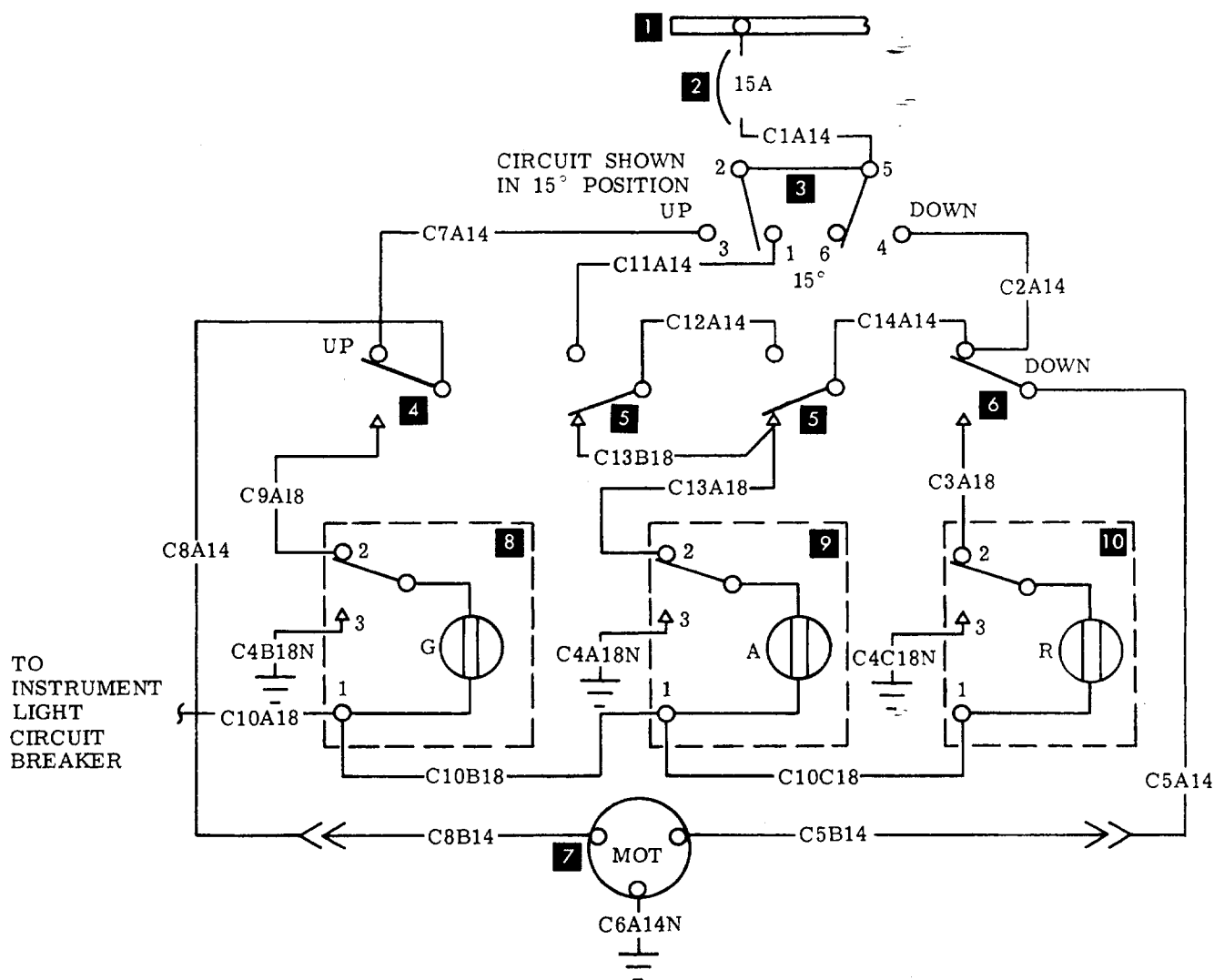
Landing Gear Position Indicator
 TC-1608 thru TC-1935 except TC-1913
 TE-938 thru TE-1063
 TH-385 thru TH-647 except TH-598



Flaps
 TC-1 thru TC-190

1. Bus Bar
2. Circuit Breaker
3. Flap Position Switch
4. Up Limit Switch
5. Down Limit Switch
6. Flap Motor
7. Up Position Light
8. Down Position light

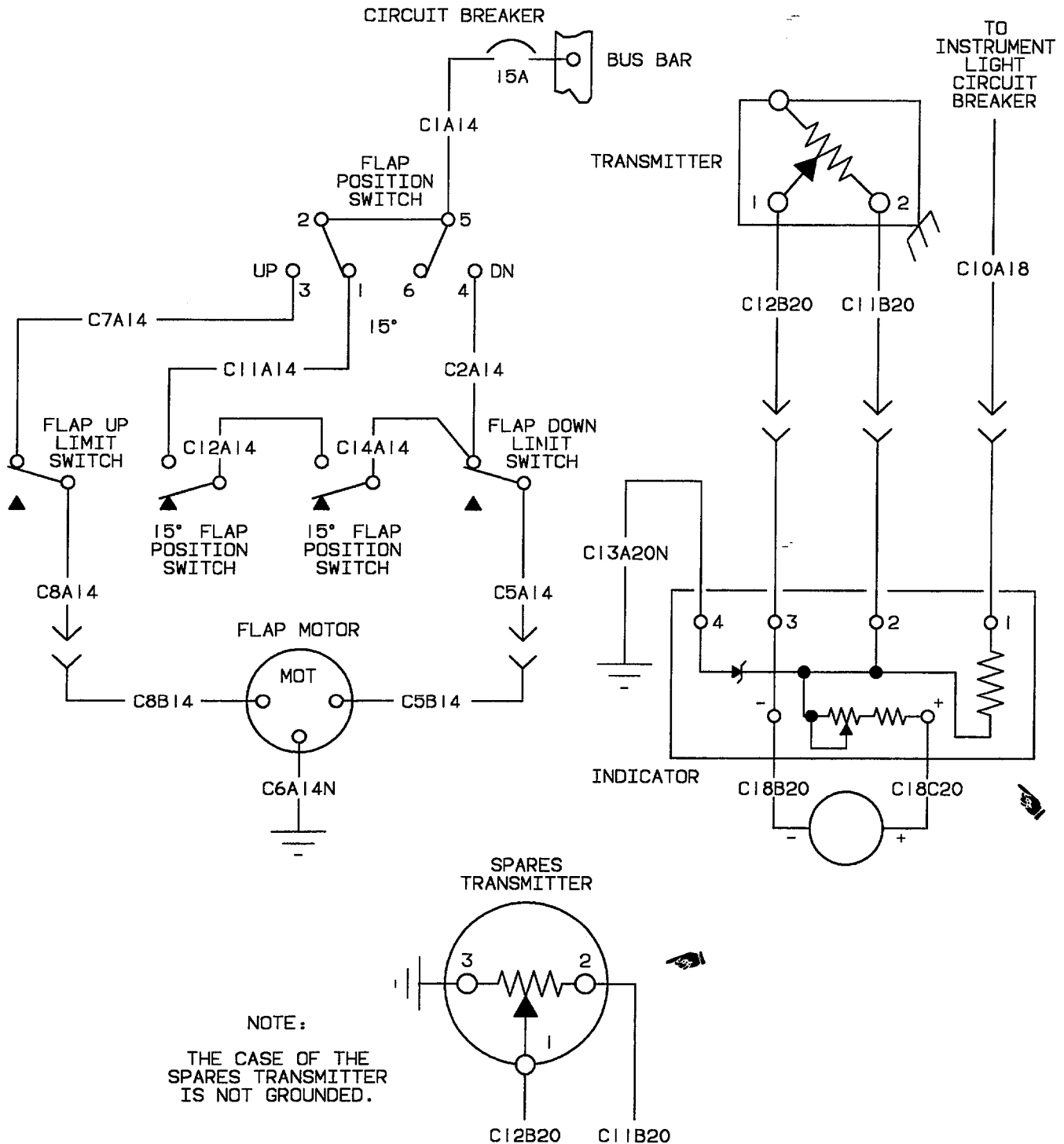




1. Bus Bar
2. Circuit Breaker
3. Flap Position Switch
4. Flap Up Limit Switch
5. 15° Flap Position Switch
6. Flap Down Limit Switch
7. Flap Motor
8. Flap Up Indicator - Green
9. 15° Flap Indicator - Amber
10. Flap Dn Indicator - Red

Flaps
TE-1 thru TE-197

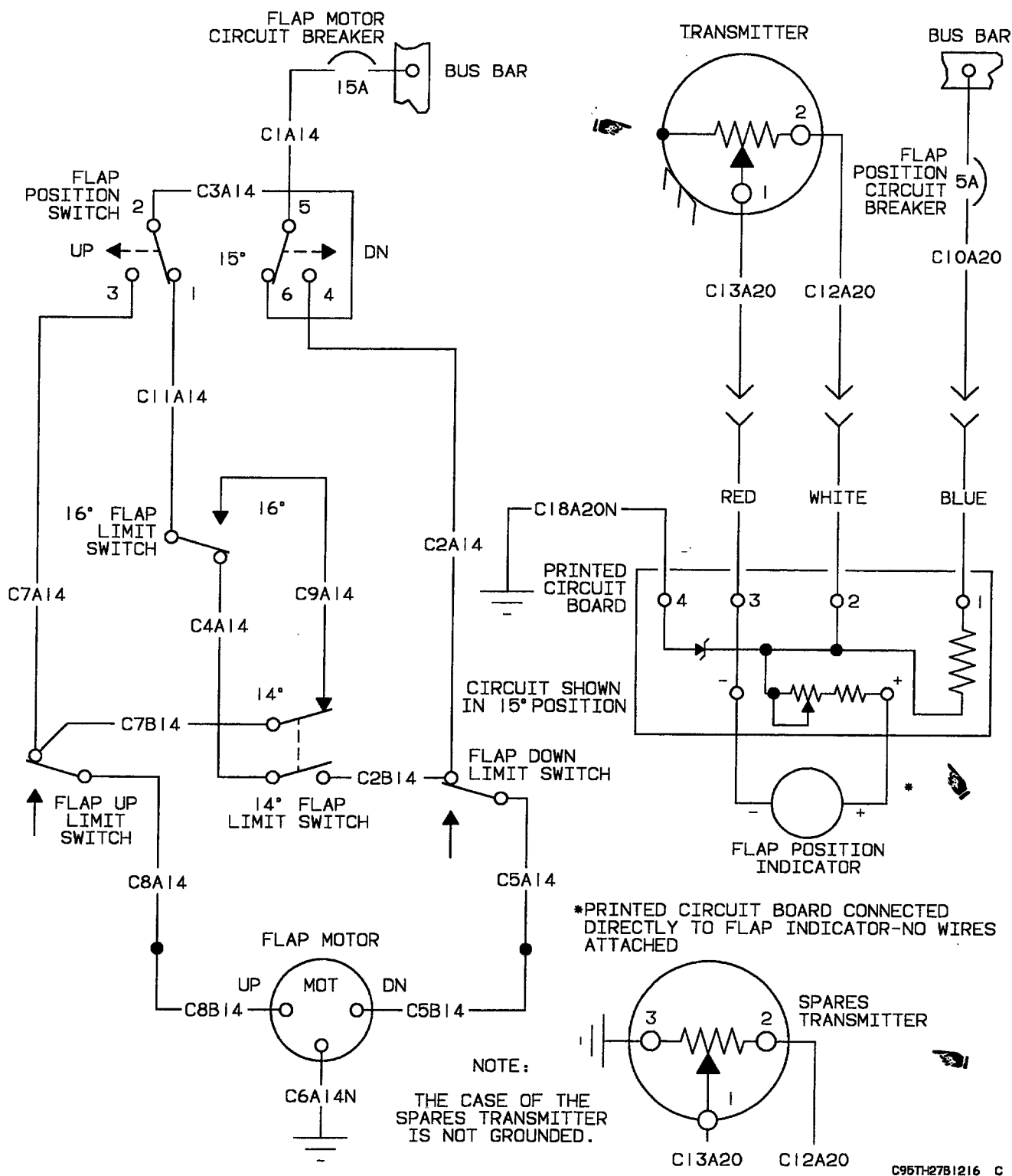
Deechcraft BARON 55 AND 58 SHOP MANUAL



C96TH2781217 C

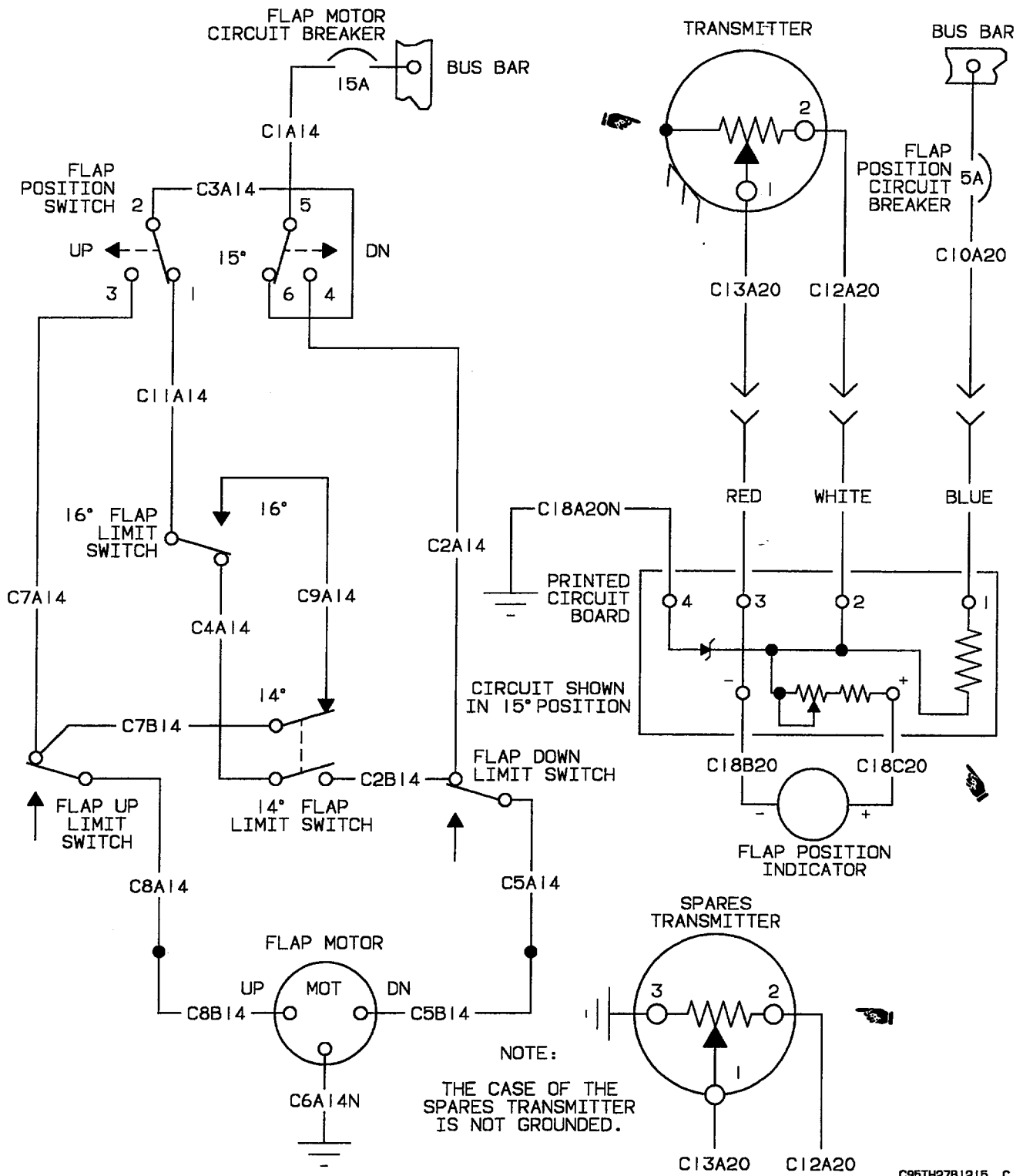
Flaps
TE-198 thru TE-767

Beechcraft BARON 55 AND 58 SHOP MANUAL

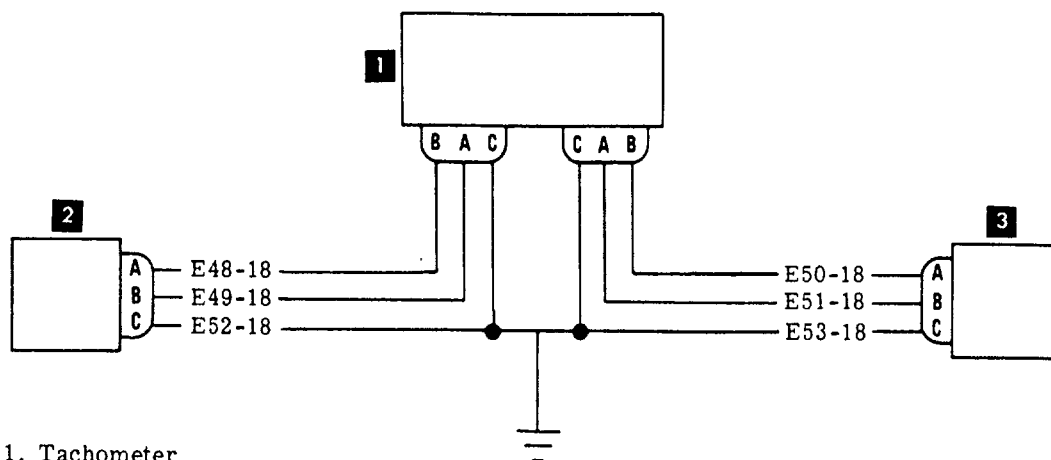


**Flaps
TE-768 thru TE-825
TH-1 thru TH-82**

Beechcraft BARON 55 AND 58 SHOP MANUAL

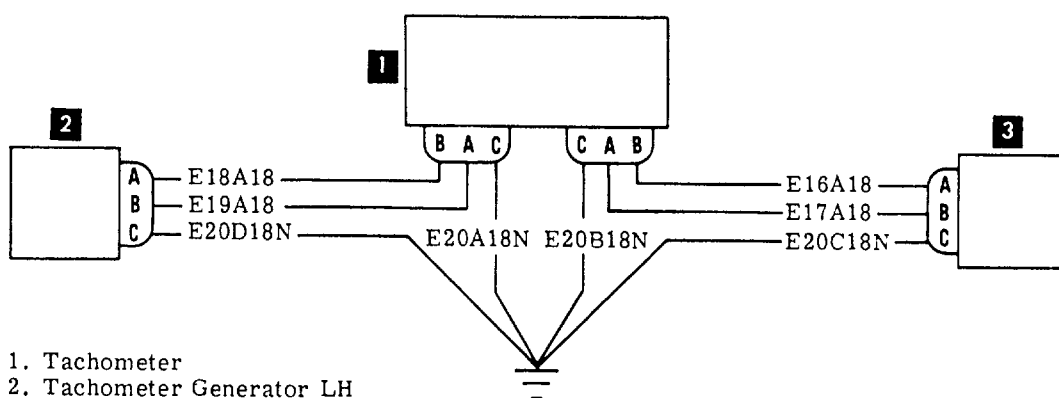


Flaps
TE-826 thru TE-1063
TH-83 thru TH-647 except TH-596



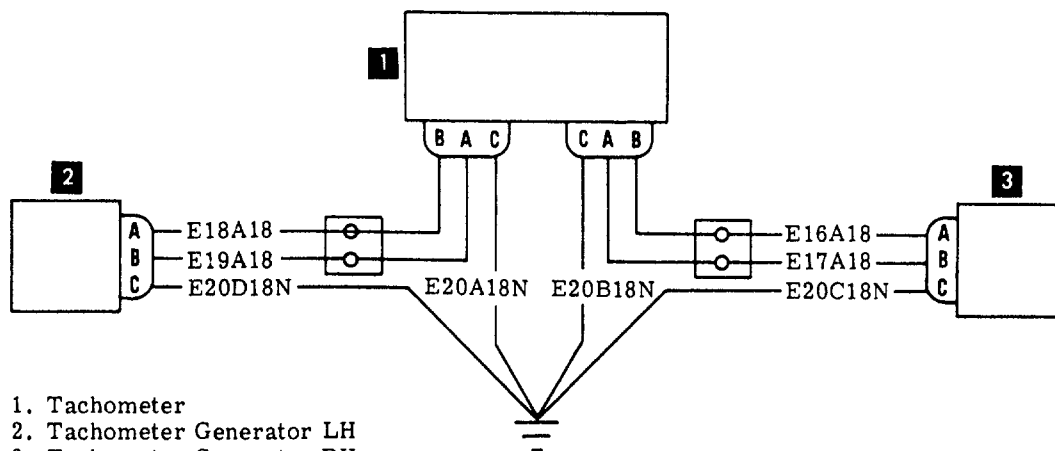
1. Tachometer
2. Tachometer Generator LH
3. Tachometer Generator RH

Tachometer
TC-1 Thru TC-190



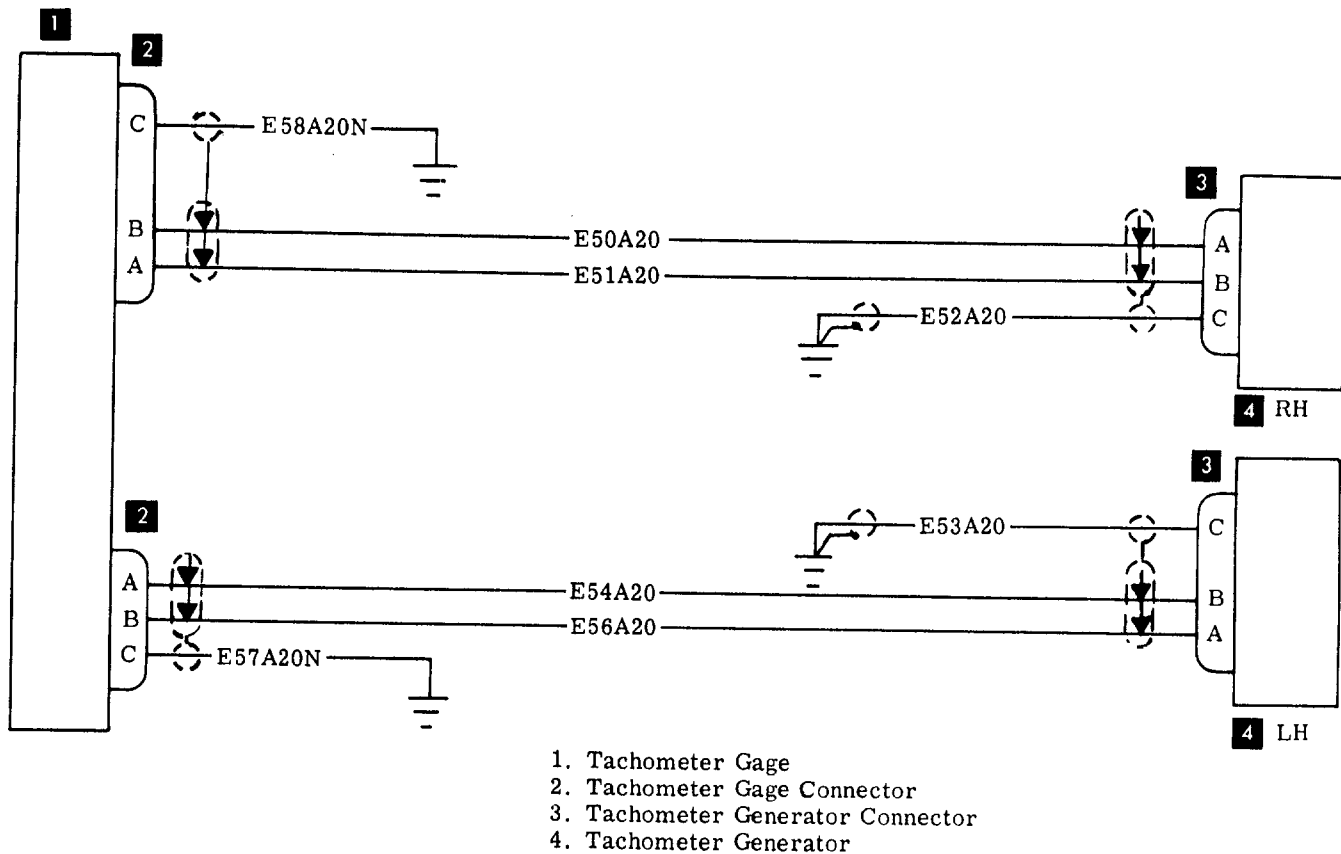
1. Tachometer
2. Tachometer Generator LH
3. Tachometer Generator RH

Tachometer
TC-191 Thru TC-954

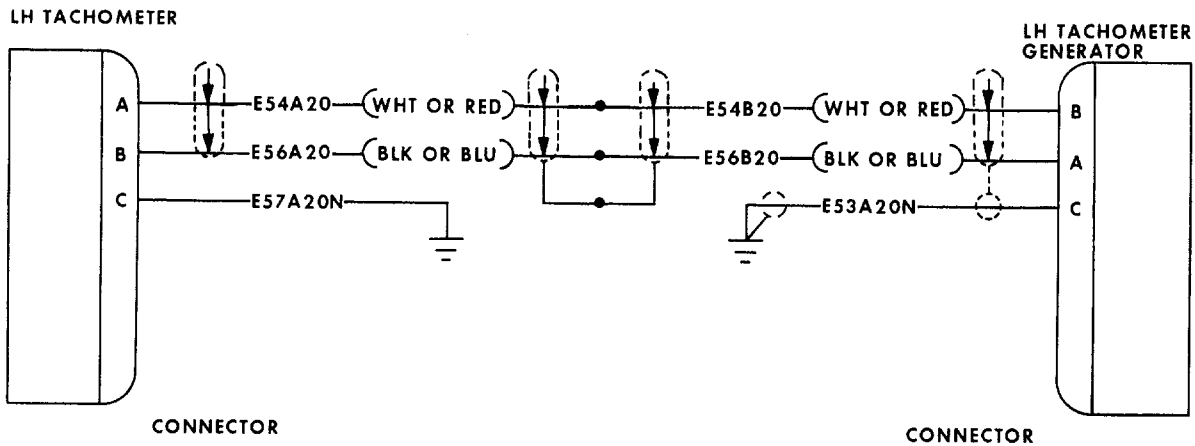
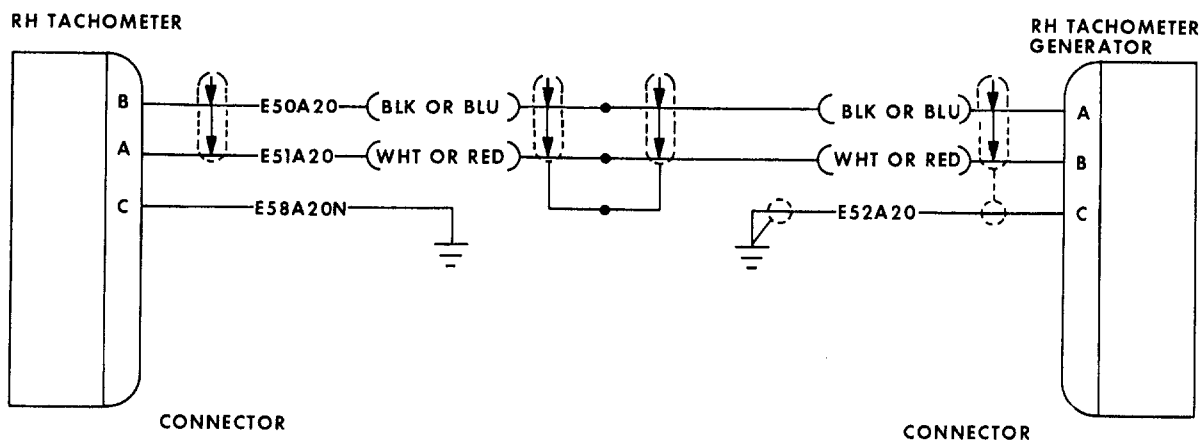


1. Tachometer
2. Tachometer Generator LH
3. Tachometer Generator RH

Tachometer
TC-955 thru TC-1859
TE-1 thru TE-767

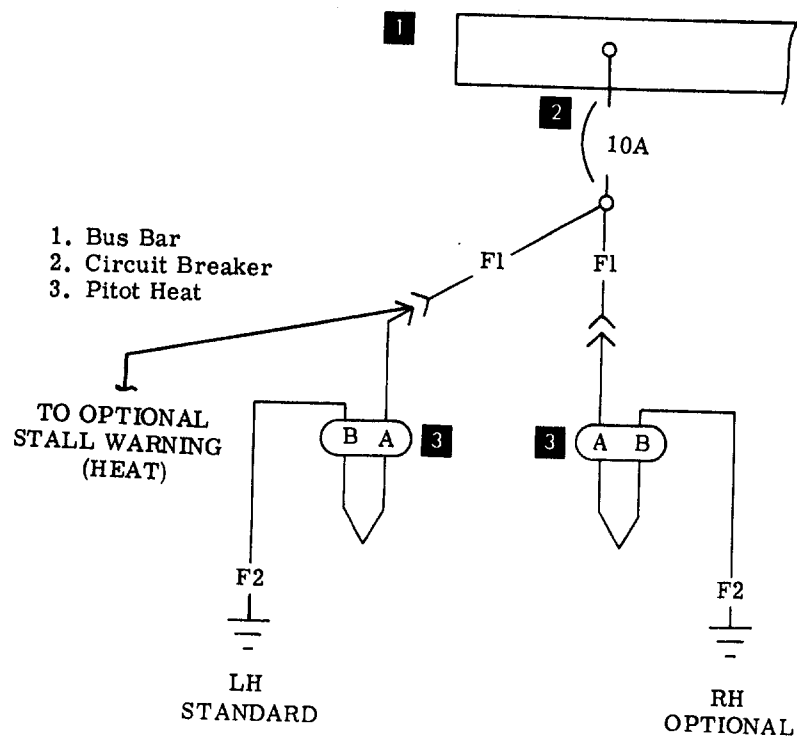


Tachometer
 TE-768 thru TE-988
 TH-1 thru TH-489



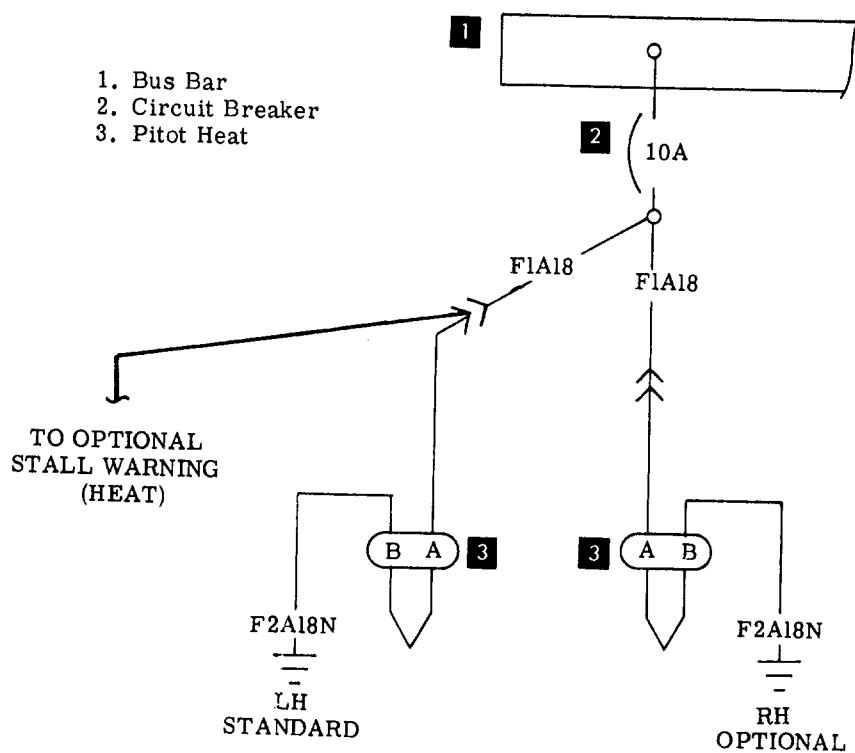
B55-369-29

Tachometer
 TC-1860 thru TC-1935 except TC-1913
 TE-989 thru TE-1063
 TH-490 thru TH-647 except TH-598



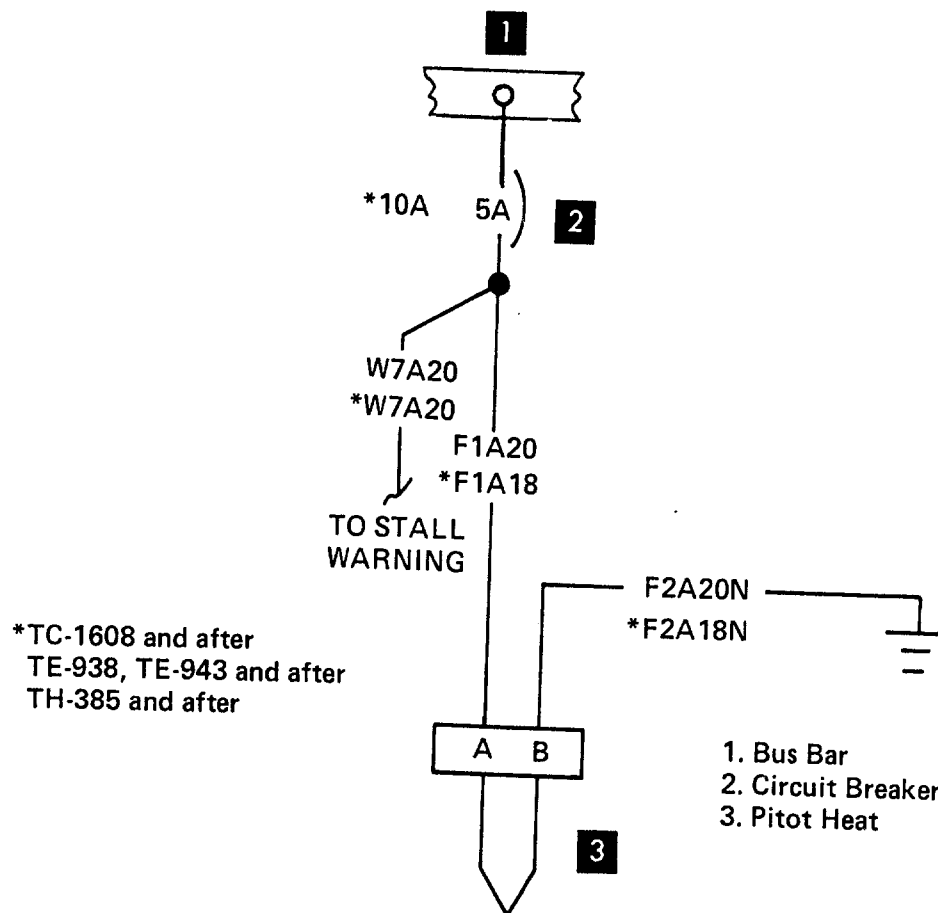
Pitot Heat
TC-1 thru TC-190

55-369-149



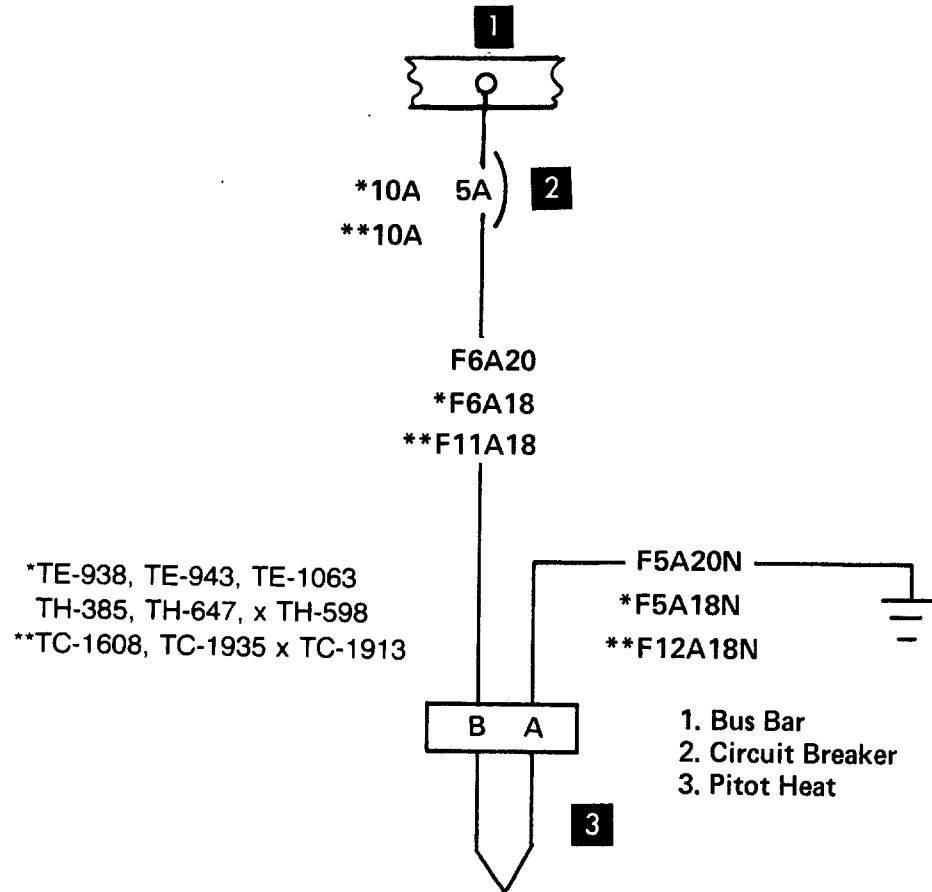
Pitot Heat
TC-191 thru TC-1607
TE-1 thru TE-767

55-369-181



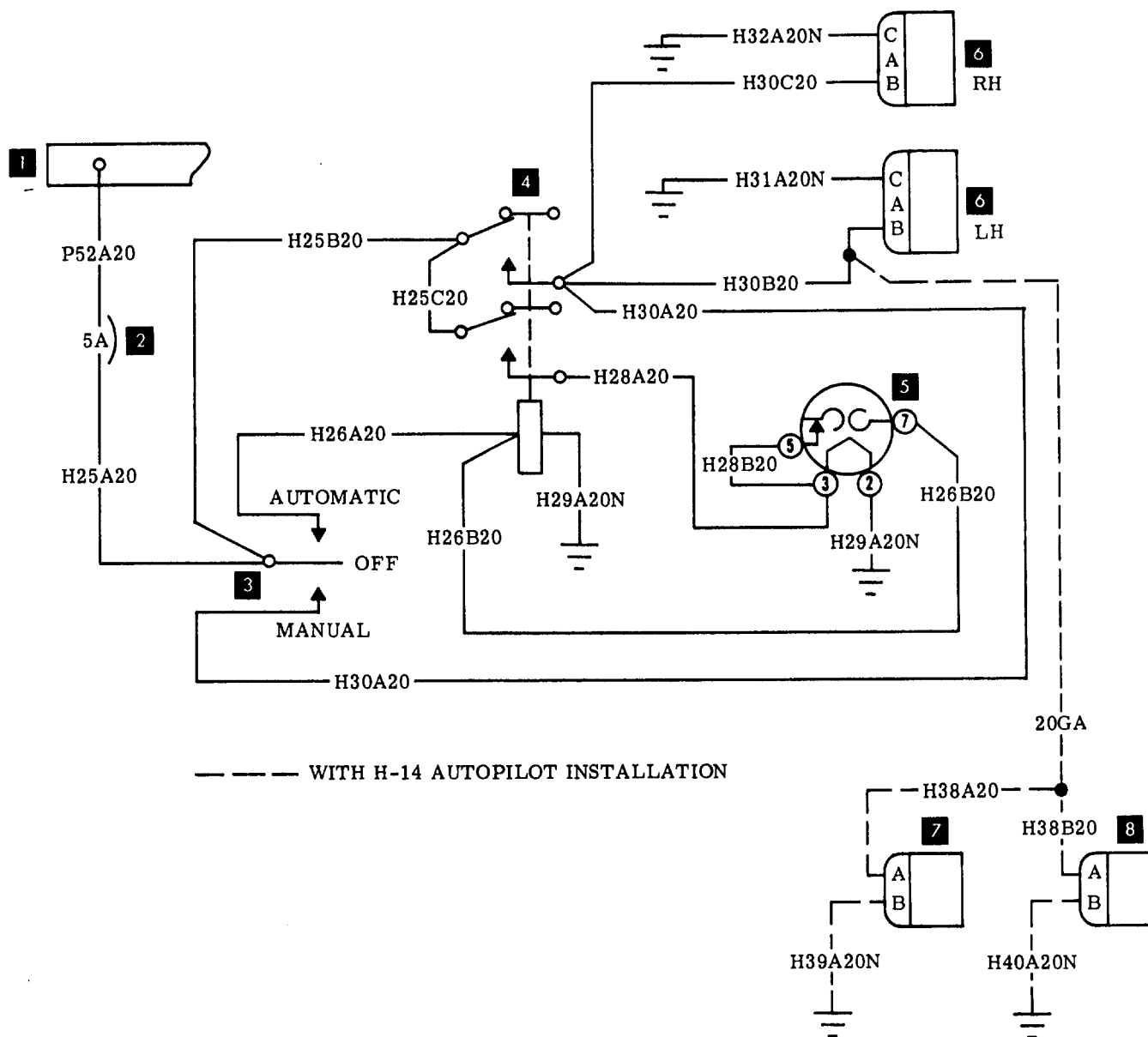
55-369-150A

Left Pitot Heat
 TC-1608 thru TC-1935 except TC-1913
 TE-938, TE-943 thru TE-1063
 TH-385 thru TH-647 except TH-598

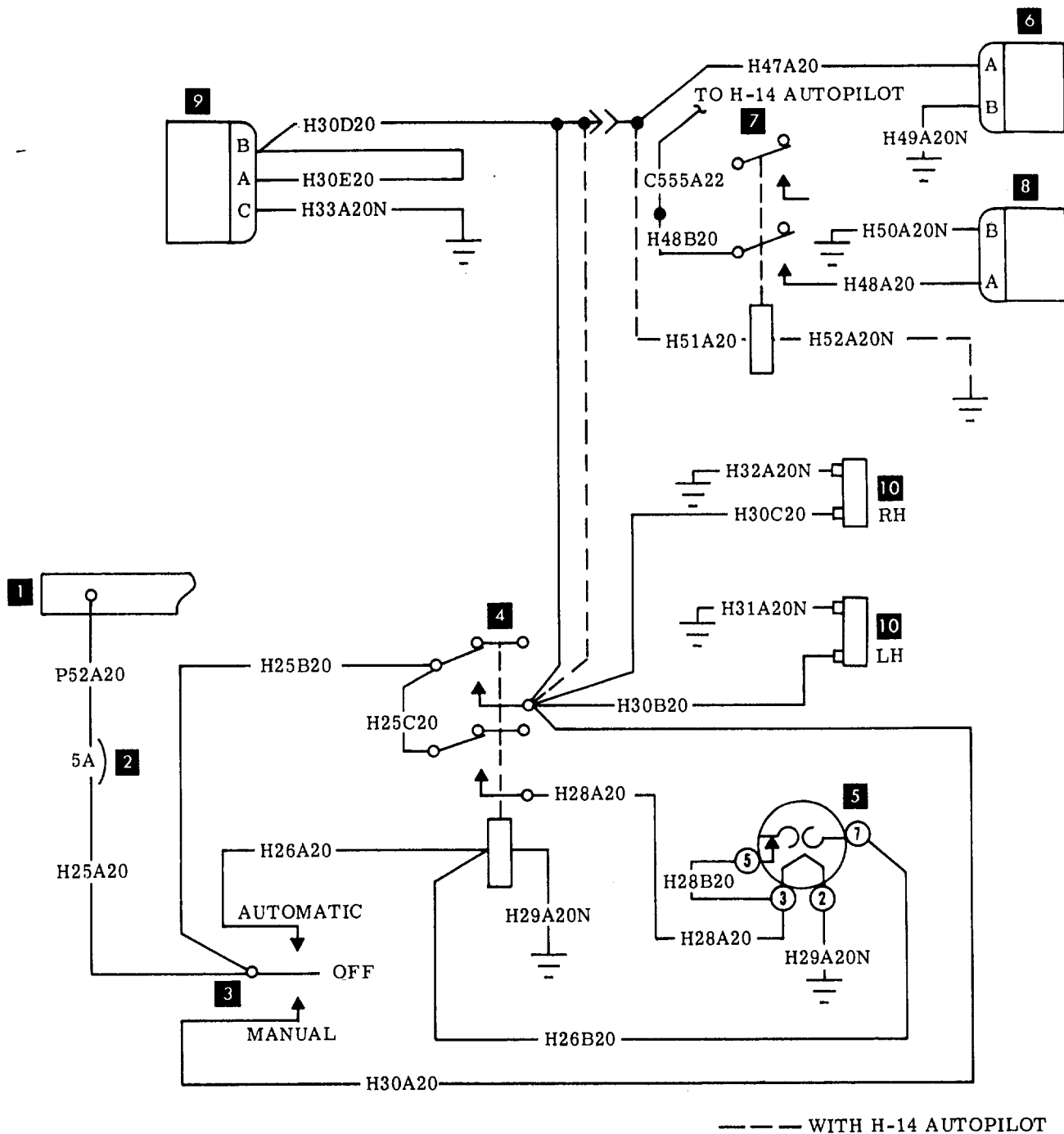


55-369-180A

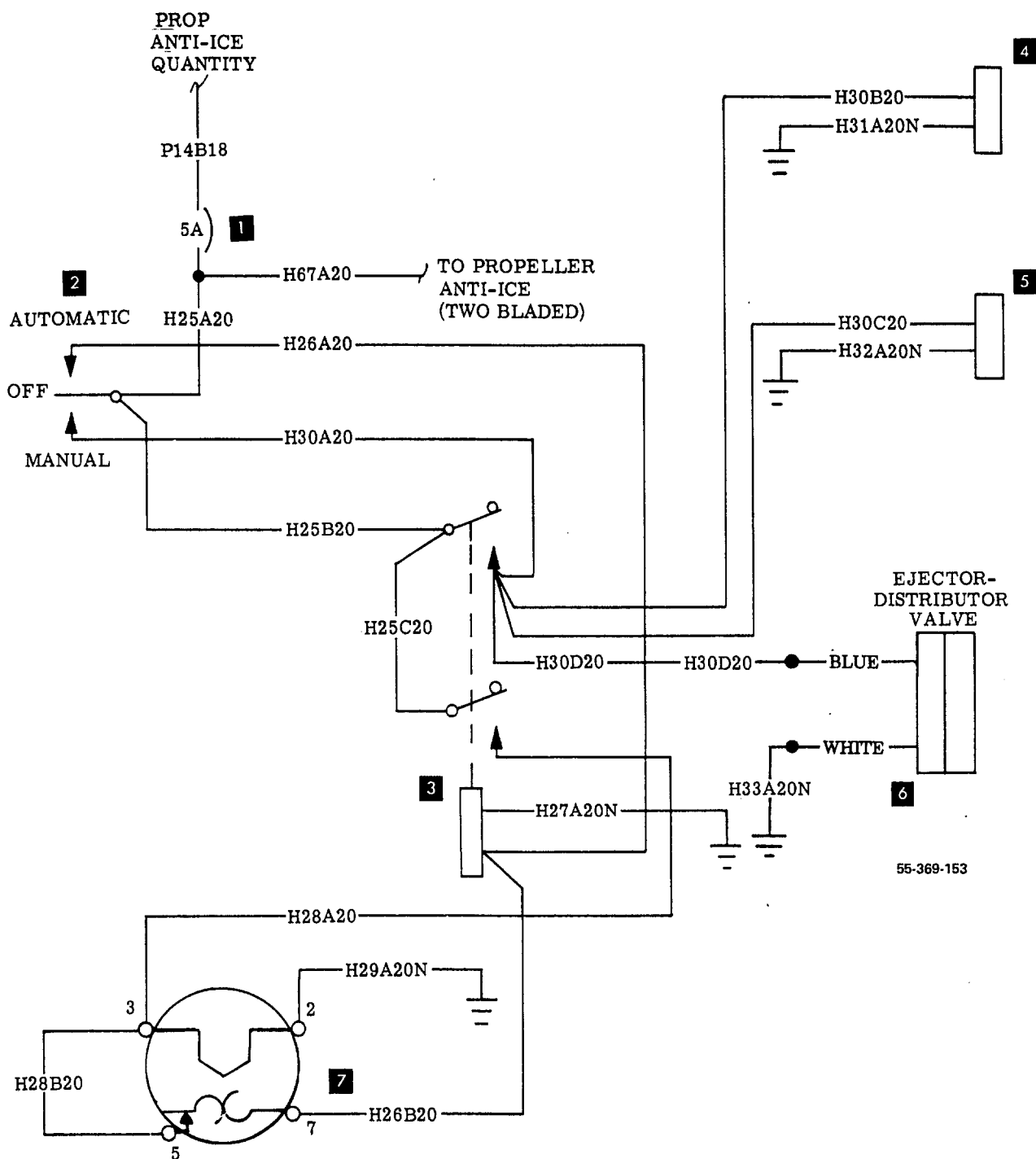
Right Pitot Heat
 TC-1608 thru TC-1935 except TC-1913
 TE-938, TE-943 thru TE-1063
 TH-385 thru TH-647 except TH-598



Surface Deice (Optional)
TC-483 thru TC-1935 except TC-1913
TE-1 thru TE-451

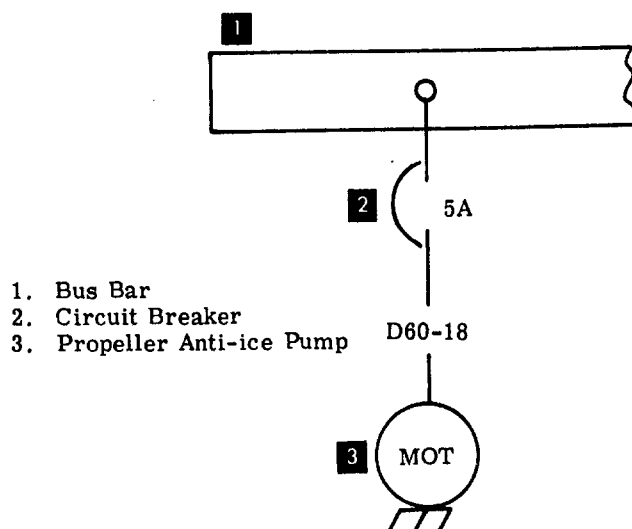


Surface Deicer (Optional) TE-452 thru TE-767



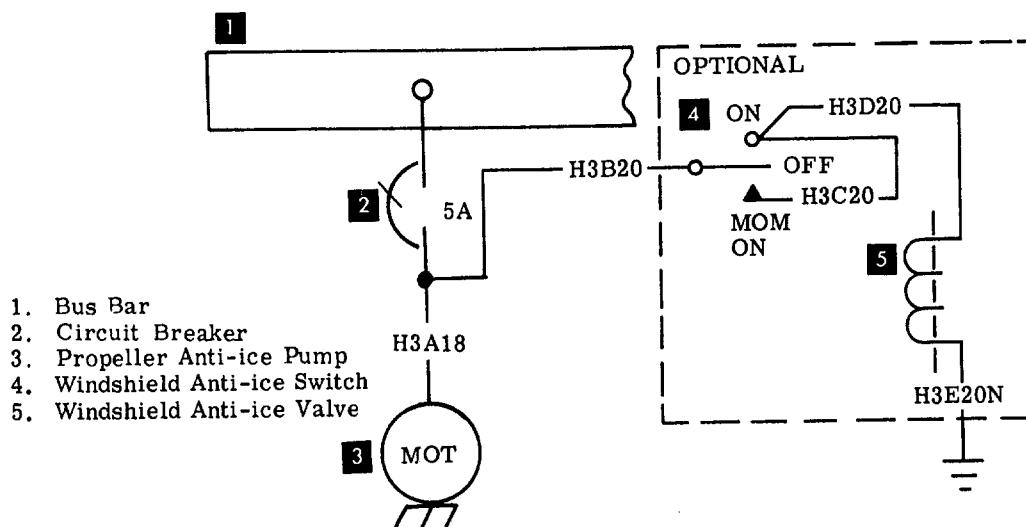
1. Circuit Breaker
2. Switch
3. Relay
4. Pressure Relief Valve LH
5. Pressure Relief Valve RH
6. Ejector Distributor Valve
7. Time Relay

Surface Deicer (Optional)
 TE-768 thru TE-1063
 TH-1 thru TH-647 except TH-598



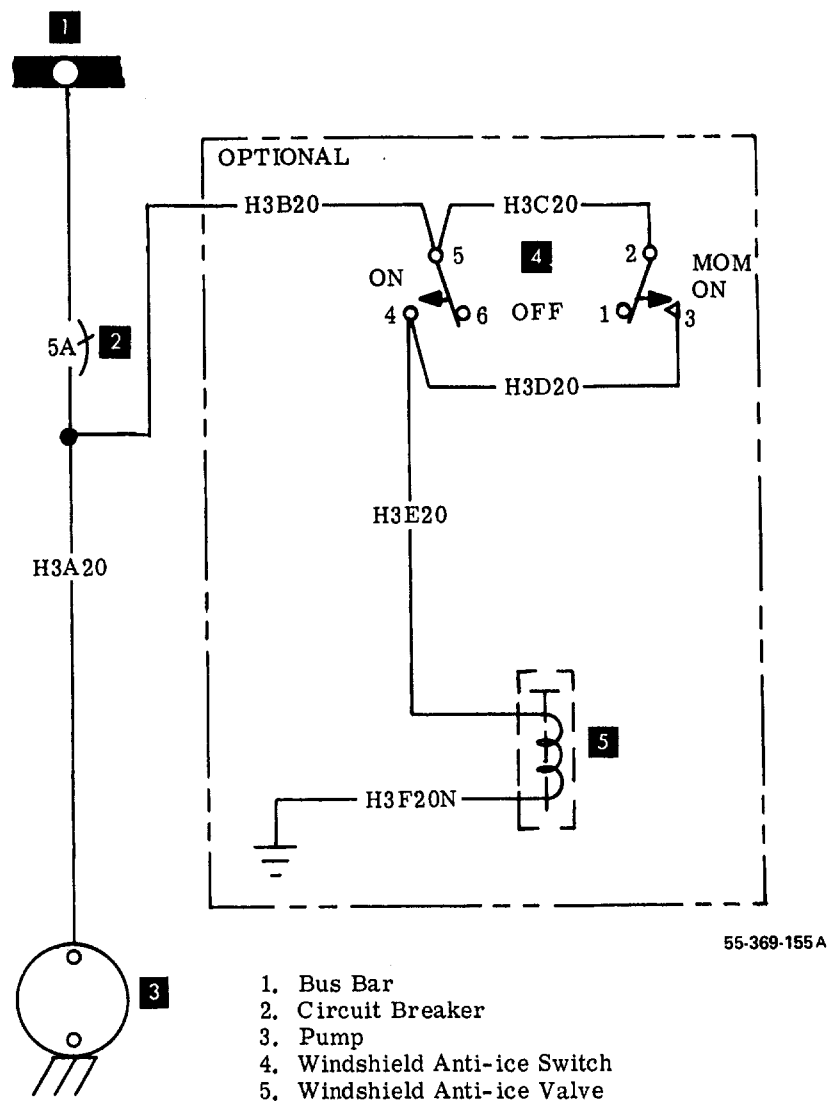
55-369-184

Prop Anti-ice Pump (Optional)
TC-1 thru TC-190



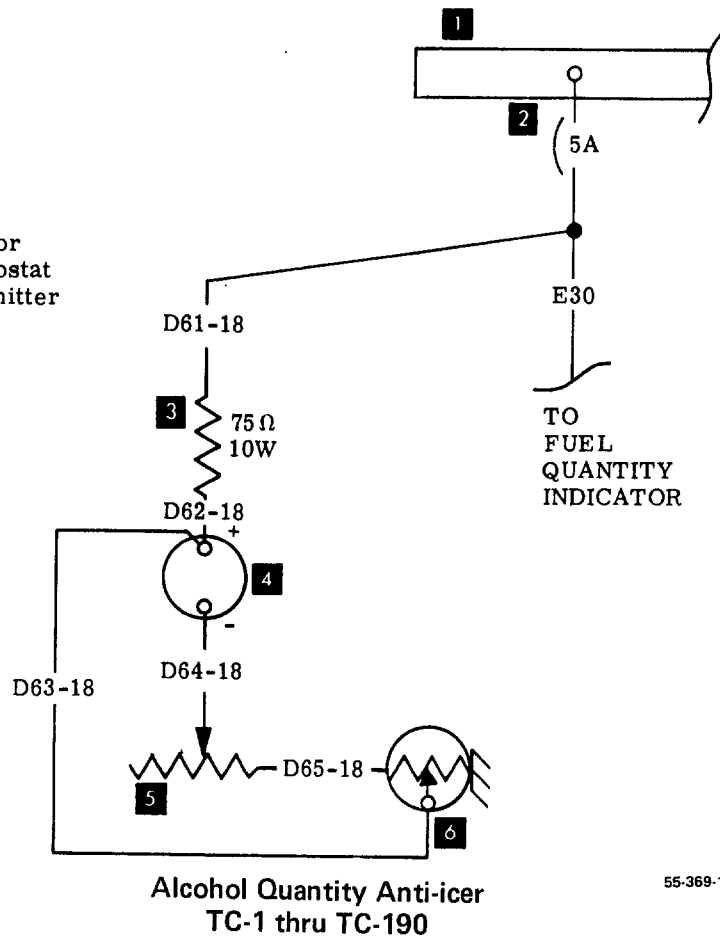
55-369-154 A

Prop and Windshield Anti-ice Pump (Optional)
TC-191 thru TC-1935 except TC-1913
TE-1 thru TE-767



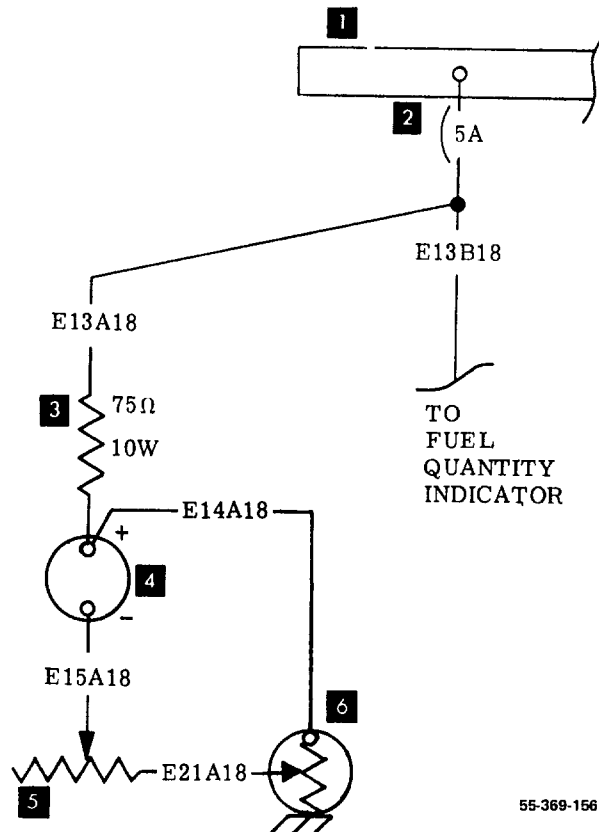
Prop and Windshield Anti-Ice Pump (Optional)
 TE-768 thru TE-1063
 TH-1 thru TH-647 except TH-598

1. Bus Bar
2. Circuit Breaker
3. Resistor
4. Anti-ice Indicator
5. Calibrating Rheostat
6. Anti-ice Transmitter

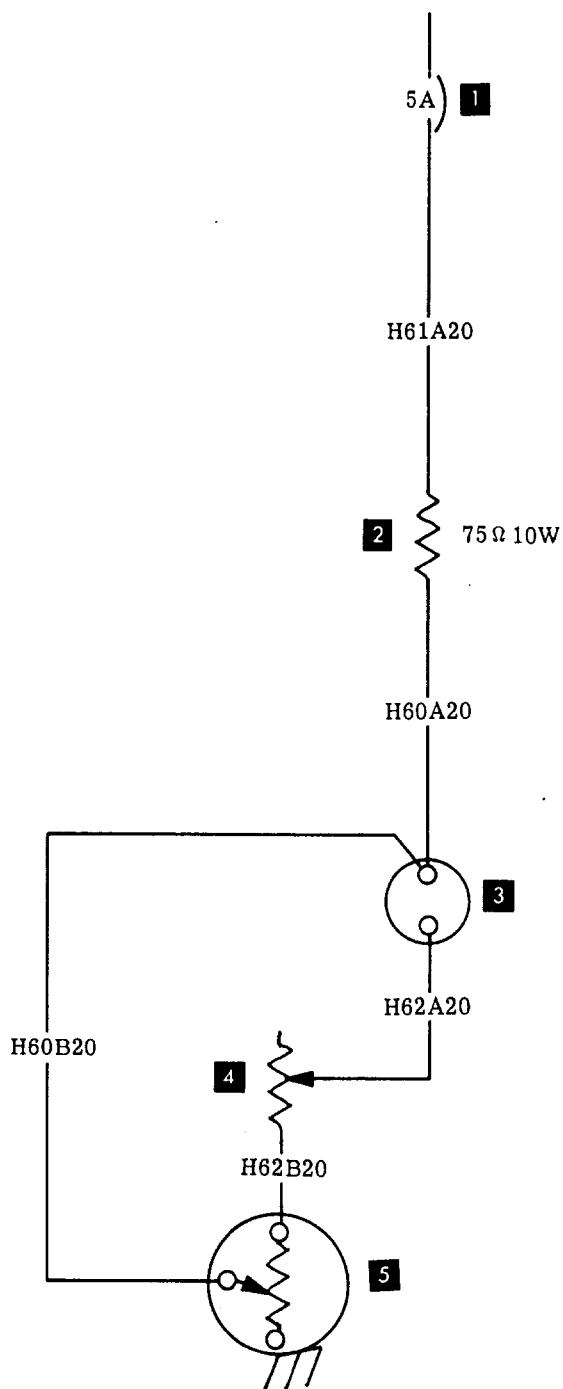


55-369-185

1. Bus Bar
2. Circuit Breaker
3. Resistor
4. Anti-ice Indicator
5. Calibrating Rheostat
6. Anti-ice Transmitter



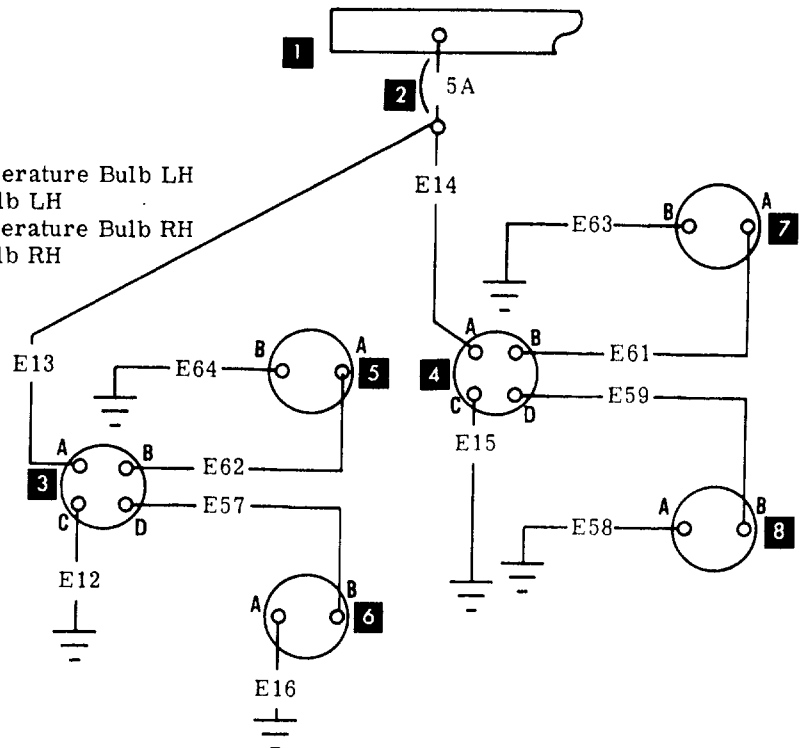
55-369-156



1. Circuit Breaker
2. Resistor
3. Alcohol Quantity Gage
4. Resistor
5. Alcohol Quantity Transmitter

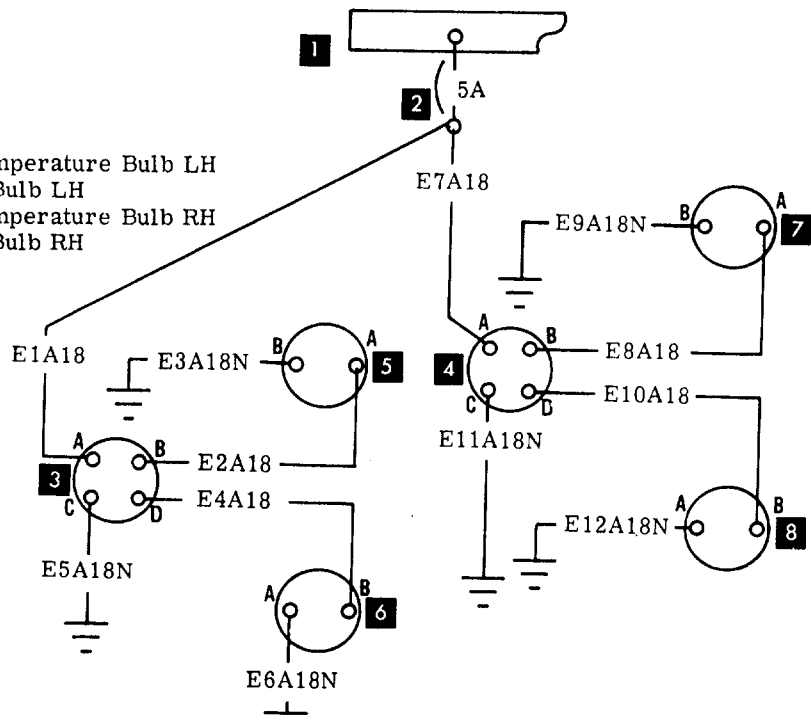
Propeller Anti-Ice Quantity Alcohol
TE-768 thru TE-1063
TH-1 thru TH-647 except TH-598

1. Bus Bar
2. Circuit Breaker
3. Engine Gage LH
4. Engine Gage RH
5. Cylinder Head Temperature Bulb LH
6. Oil Temperature Bulb LH
7. Cylinder Head Temperature Bulb RH
8. Oil Temperature Bulb RH

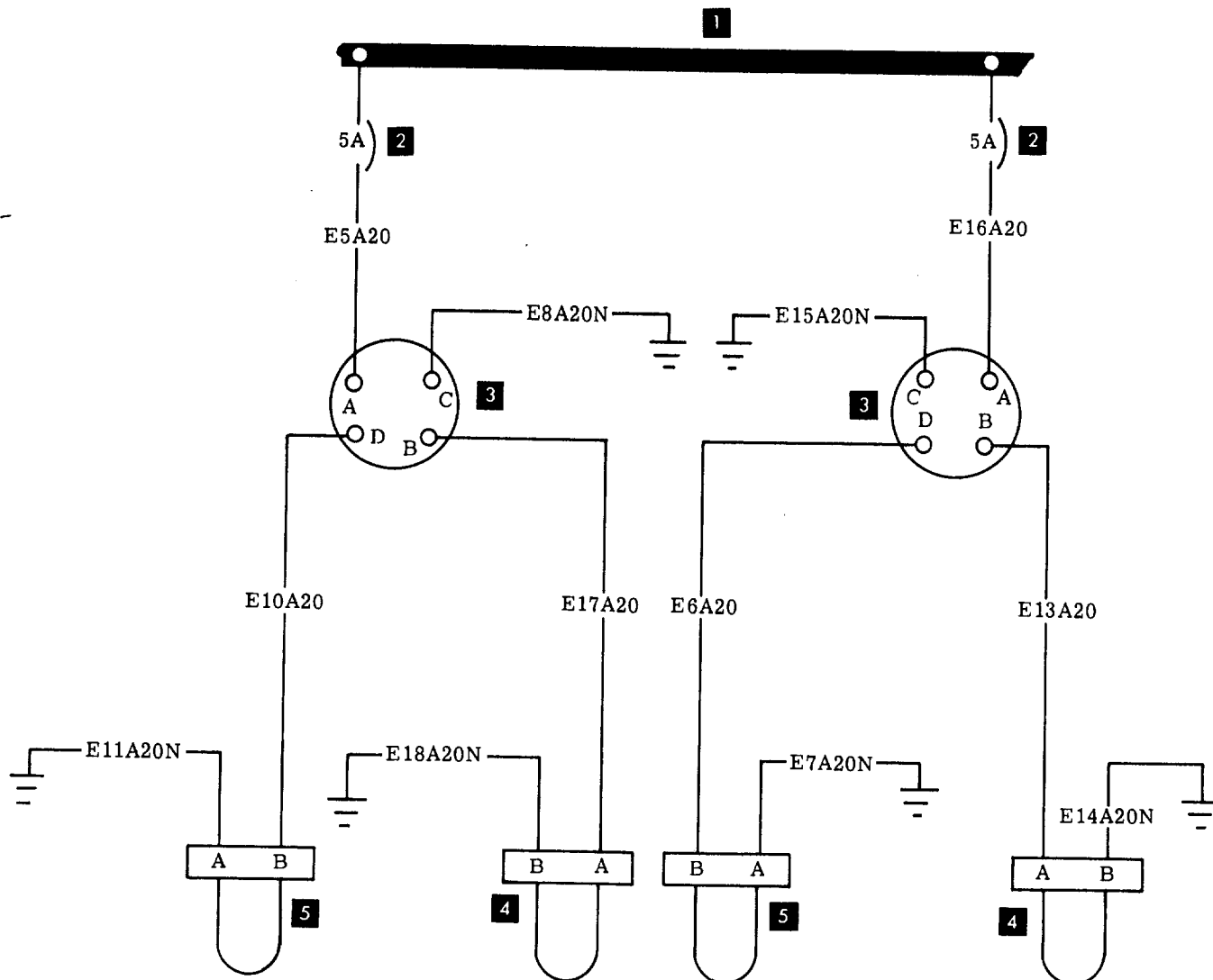


Cylinder Head and Oil Temperature
TC-1 thru TC-190

1. Bus Bar
2. Circuit Breaker
3. Engine Gage LH
4. Engine Gage RH
5. Cylinder Head Temperature Bulb LH
6. Oil Temperature Bulb LH
7. Cylinder Head Temperature Bulb RH
8. Oil Temperature Bulb RH

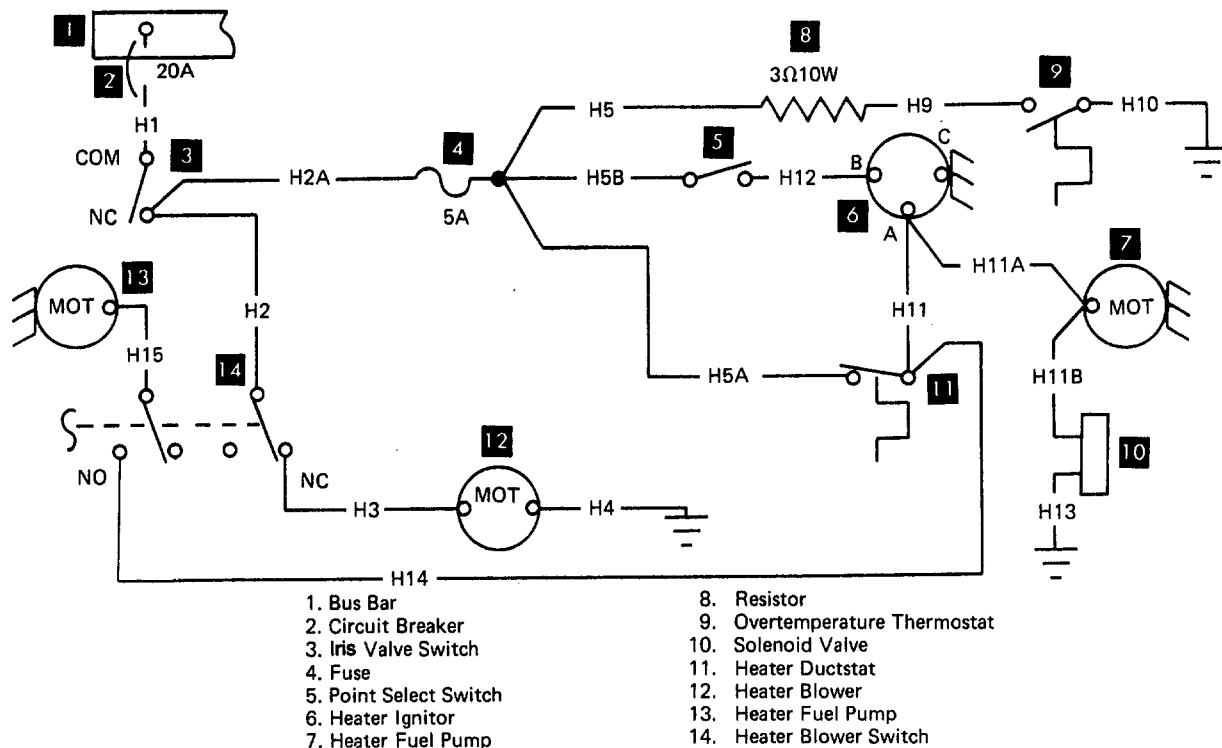


Cylinder Head and Oil Temperature
TC-191 thru TC-1935 except TC-1913
TE-1 thru TE-767



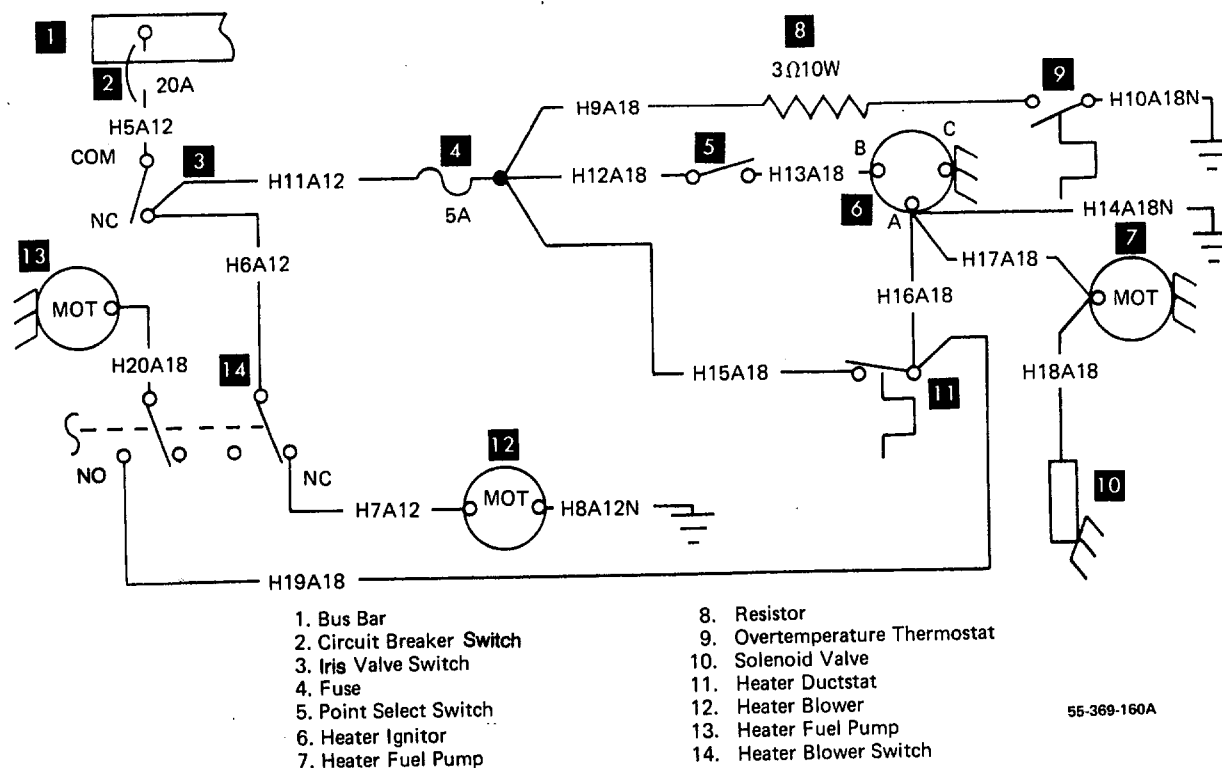
1. Bus Bar
2. Circuit Breaker
3. Engine Gage
4. Cylinder Head Temperature Bulb
5. Oil Temperature Bulb

Cylinder Head and Oil Temperature
 TE-768 thru TE-1063
 TH-1 thru TH-647 except TH-598



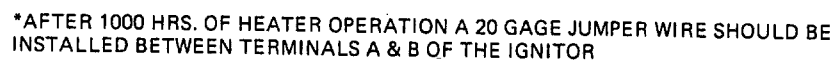
Heater
TC-1 thru TC-190

55-369-187A



55-369-160A

Heater
TC-191 thru TC-420



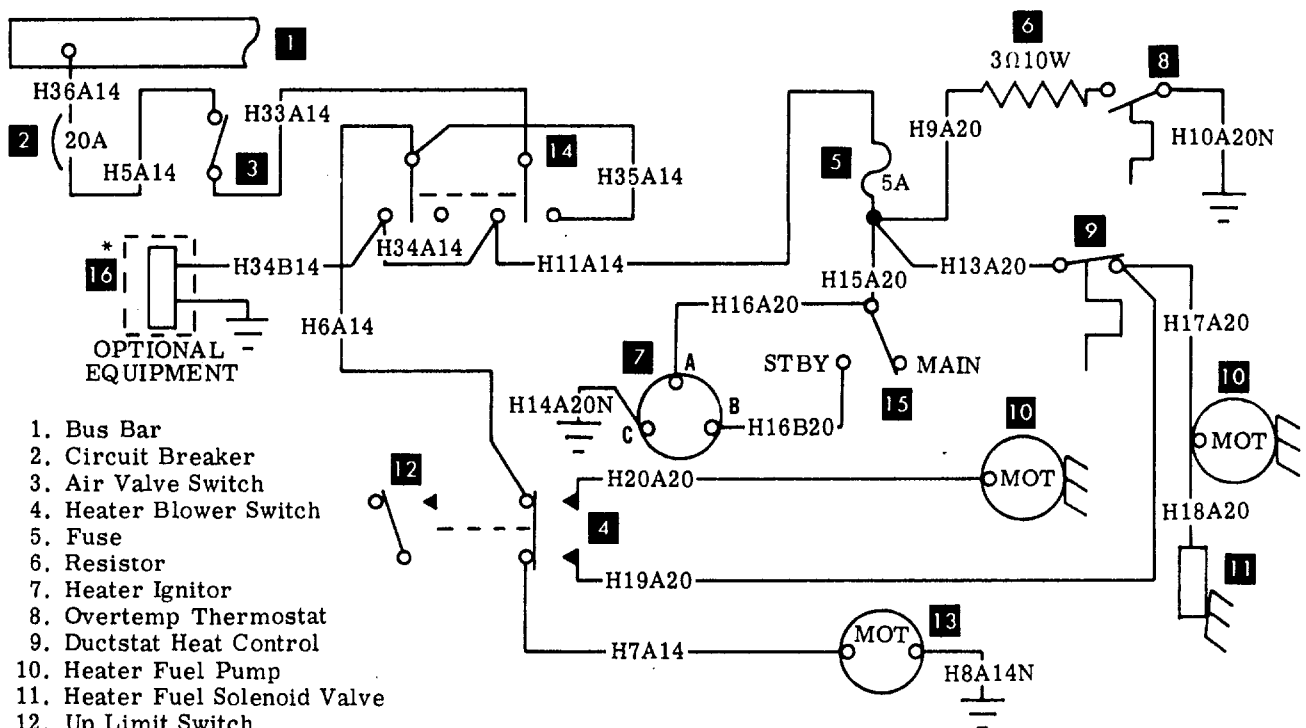
- | | | |
|----------------------|-------------------------------|--------------------------|
| 1. Bus Bar | 6. Heater Ignitor | 11. Heater Ductstat |
| 2. Circuit Breaker | 7. Heater Fuel Pump | 12. Heater Blower |
| 3. Iris Valve Switch | 8. Resistor | 13. Heater Fuel Pump |
| 4. Fuse | 9. Overtemperature Thermostat | 14. Heater Blower Switch |
| 5. Not Used | 10. Solenoid Valve | |

55-369-188A



***AFTER 1000 HRS. OF HEATER OPERATION A
20 GAGE JUMPER WIRE SHOULD BE INSTALLED
BETWEEN TERMINALS A & B OF THE IGNITOR**

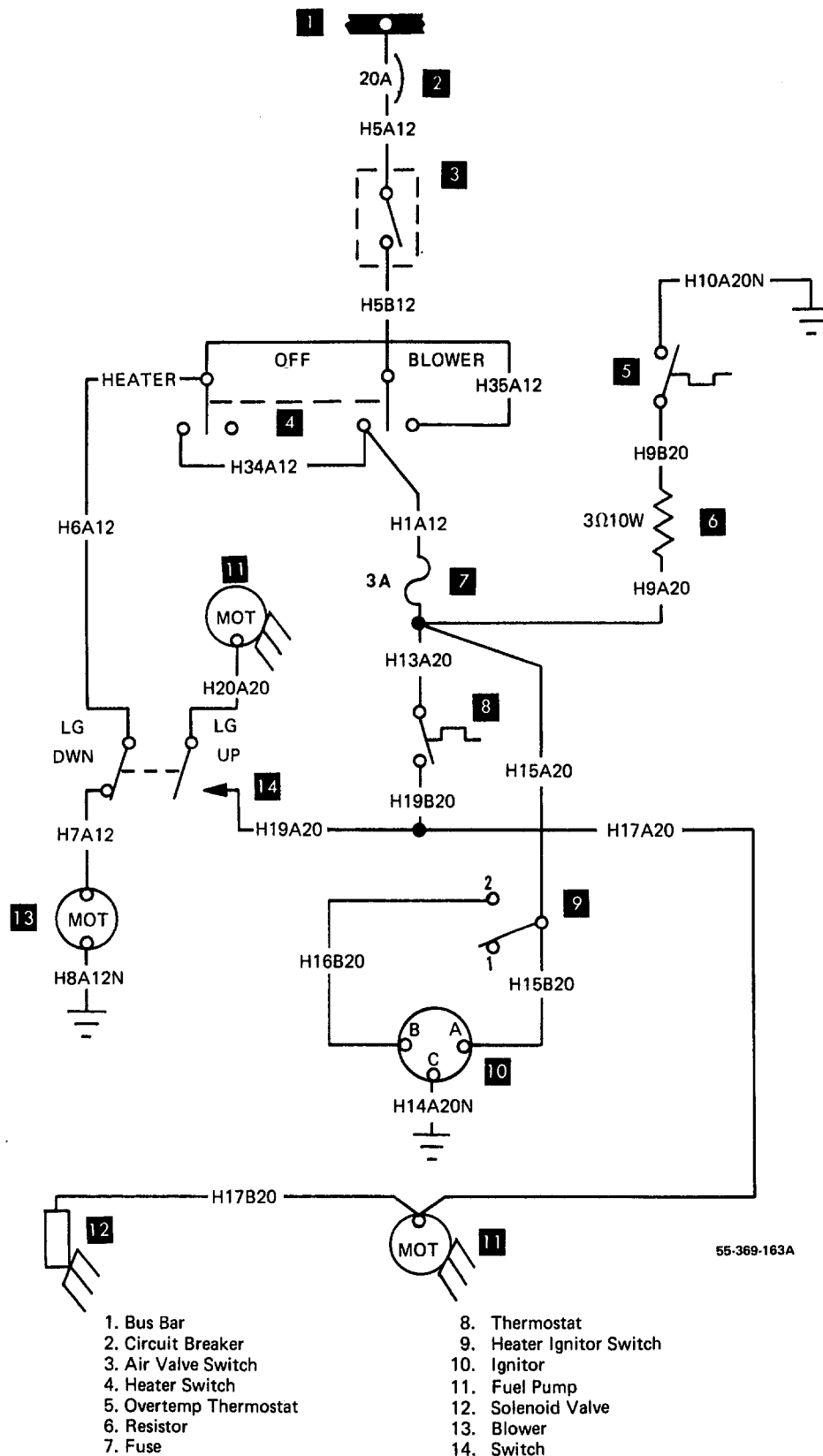
Heater
TC-955 thru TC-1657
TE-1 thru TE-451



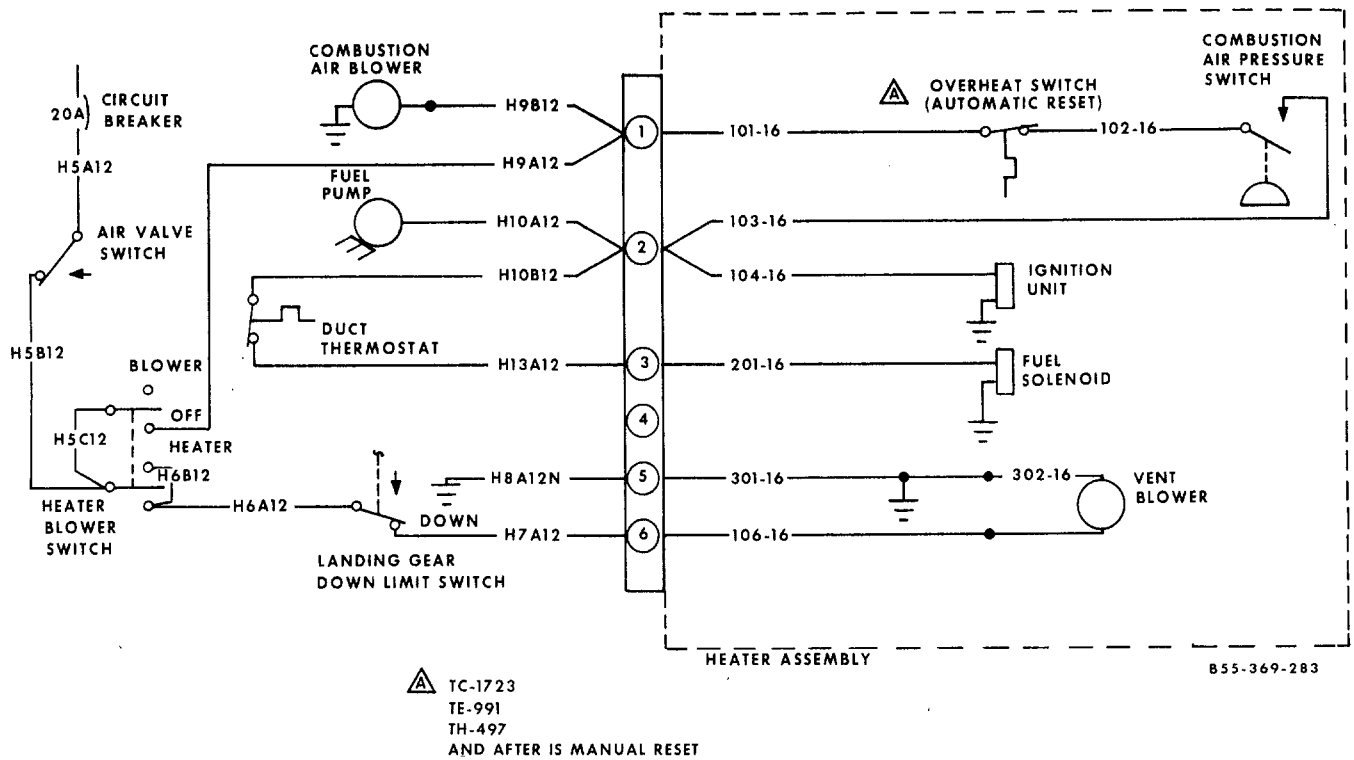
1. Bus Bar
2. Circuit Breaker
3. Air Valve Switch
4. Heater Blower Switch
5. Fuse
6. Resistor
7. Heater Ignitor
8. Overtemp Thermostat
9. Ductstat Heat Control
10. Heater Fuel Pump
11. Heater Fuel Solenoid Valve
12. Up Limit Switch
13. Heater Blower
14. Heater Blower Select Switch
15. Point Selector Switch
16. Air Entrance Duct Heater

* USE ONLY WHEN RADAR IS INSTALLED

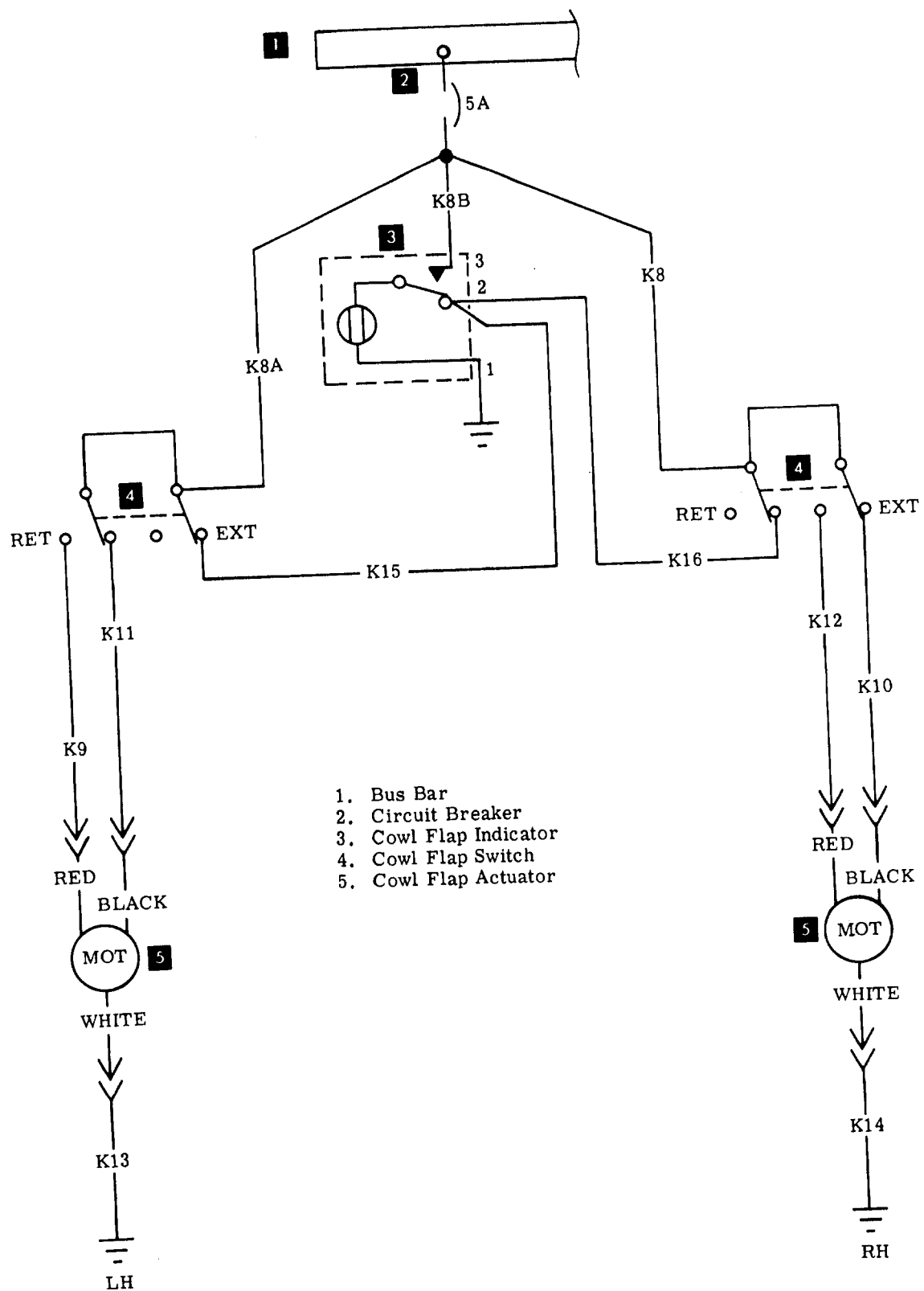
Heater
TE-452 thru TE-767



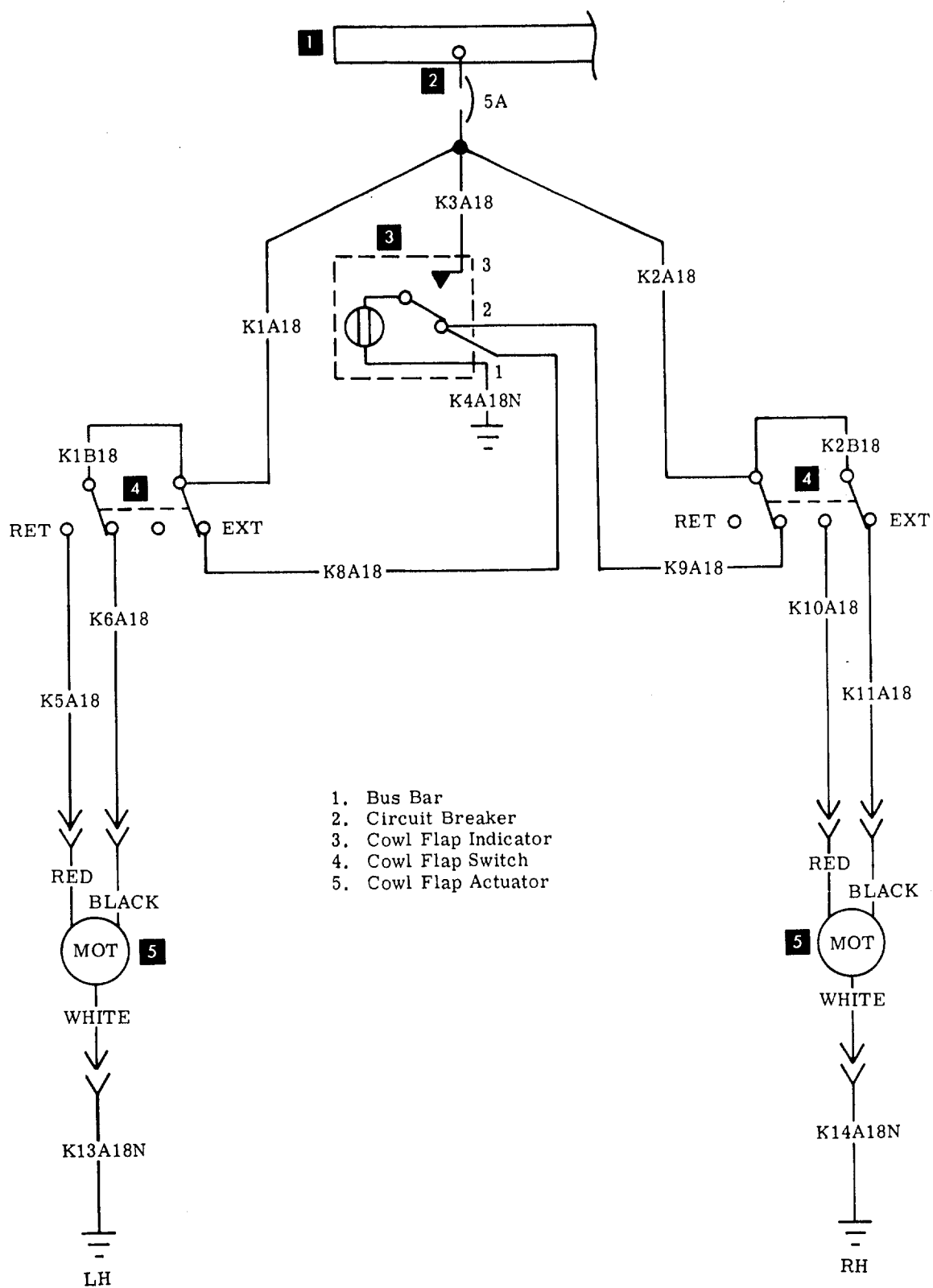
Heater
TE-768 thru TE-967 except TE-959
TH-1 thru TH-436



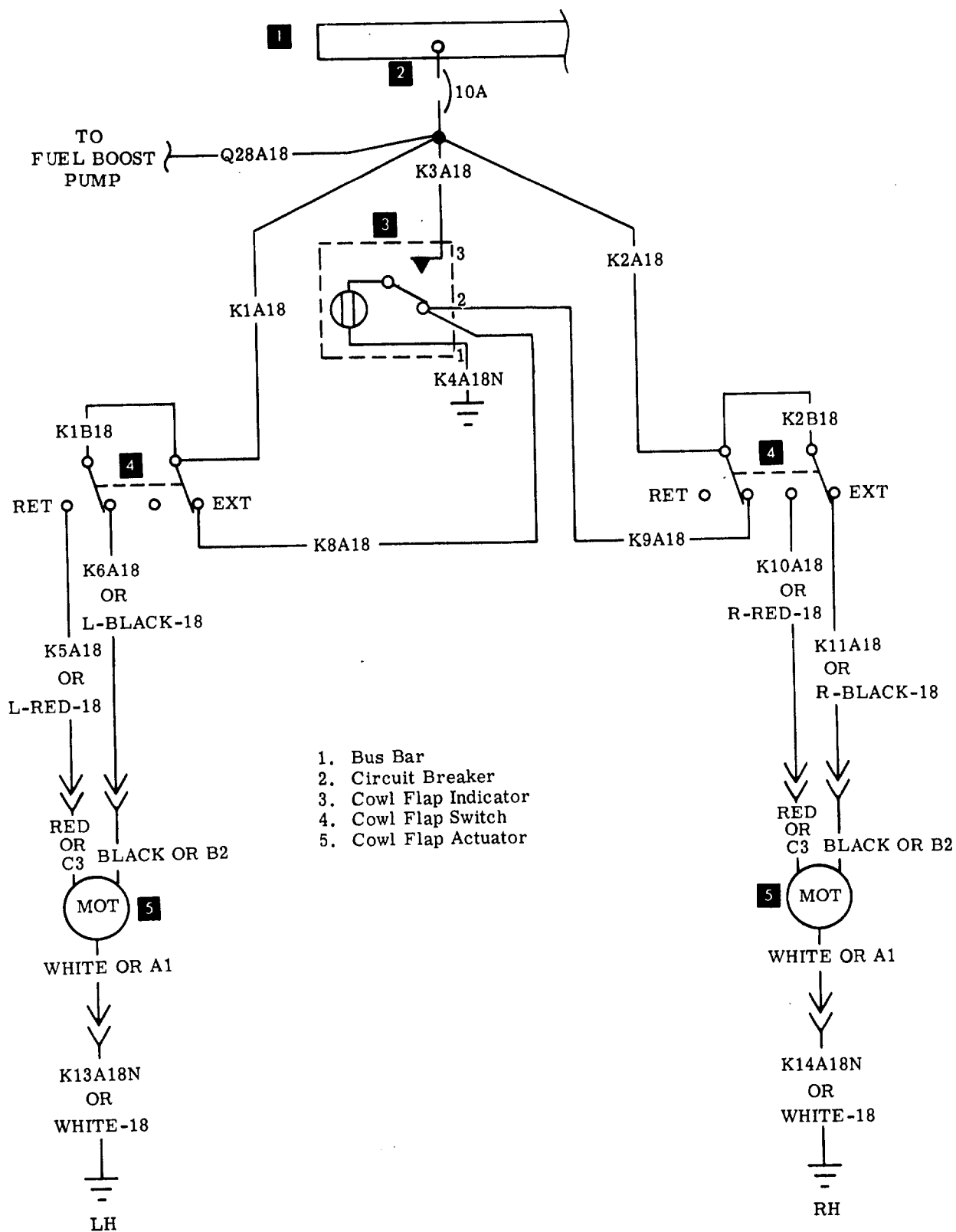
Heater
 TC-1658 thru TC-1935 except TC-1913
 TE-959, TE-968 thru TE-1063
 TH-437 thru TH-647 except TH-598



Cowl Flap
 TC-1 thru TC-190

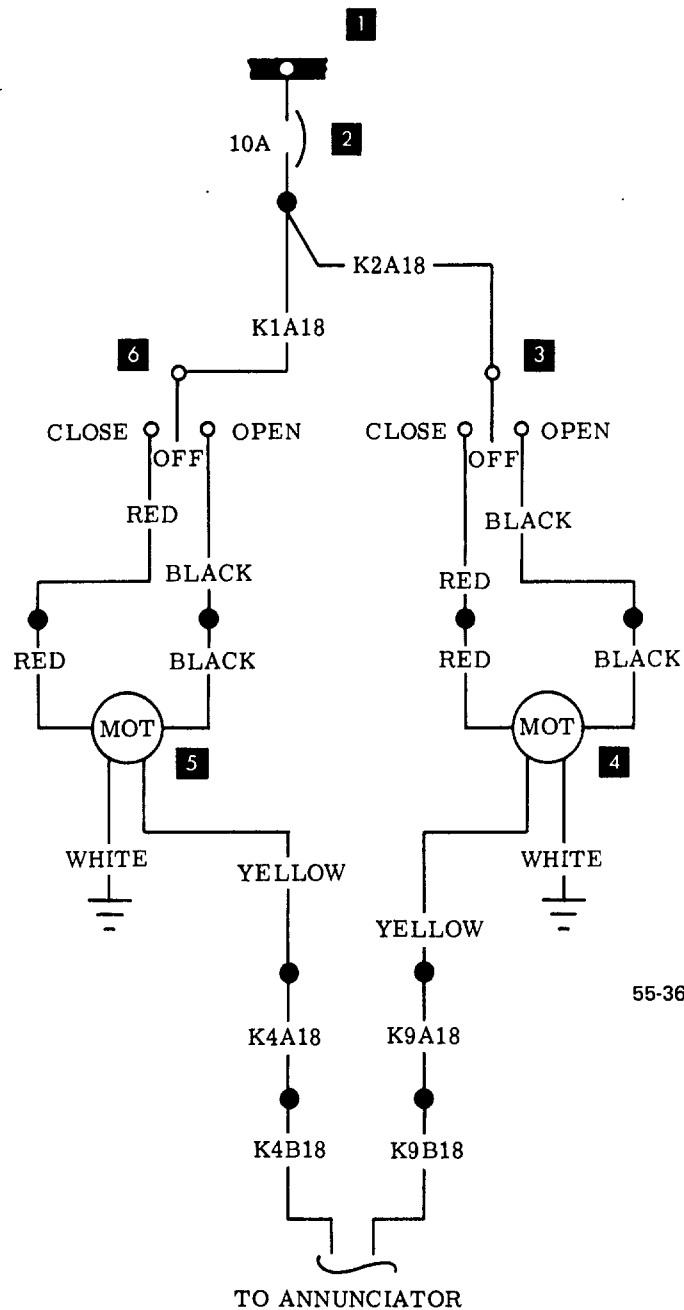


Cowl Flap
 TC-191 thru TC-420 except TC-251 and TC-371



55-369-166

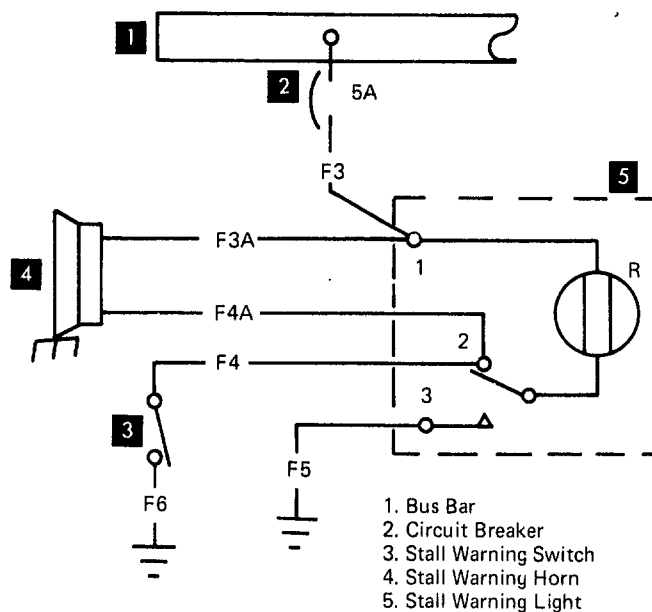
Cowl Flaps
 TC-251, TC-371, TC-421 thru TC-1607
 TE-1 thru TE-767



55-369-167

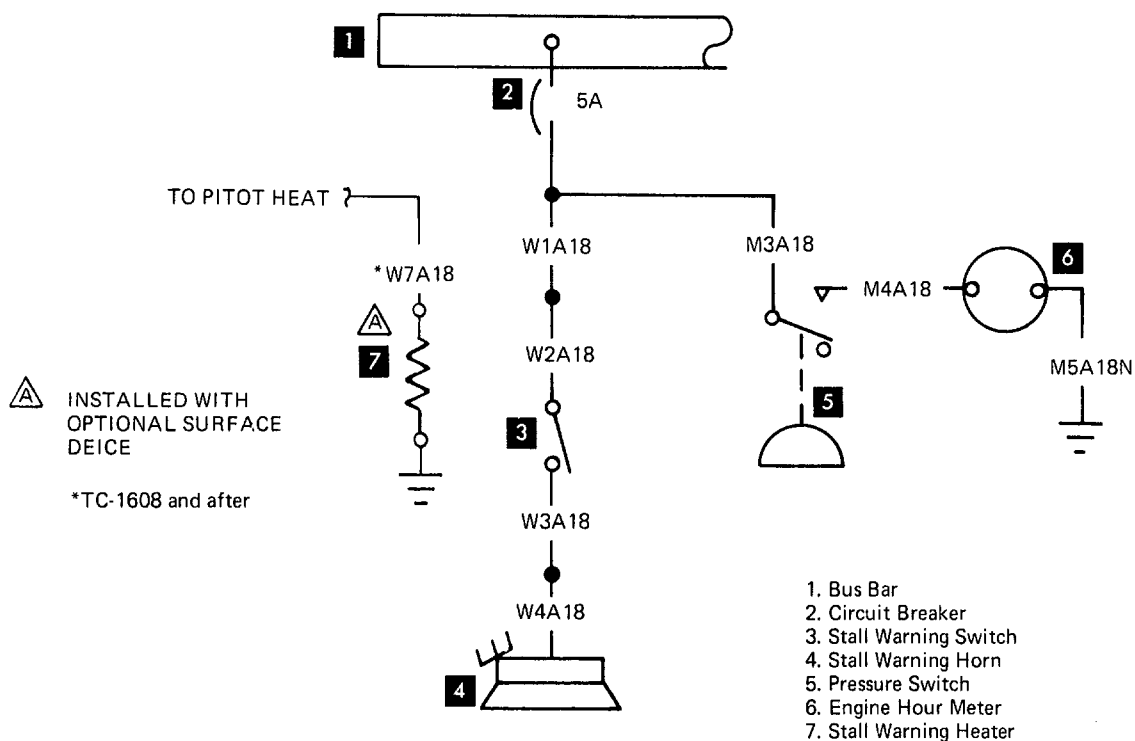
1. Bus Bar
2. Circuit Breaker
3. RH Cowl Flap Switch
4. RH Cowl Flap Motor
5. LH Cowl Flap Motor
6. LH Cowl Flap Switch

Cowl Flaps
TE-768 thru TE-942 except TE-938
TH-1 thru TH-384



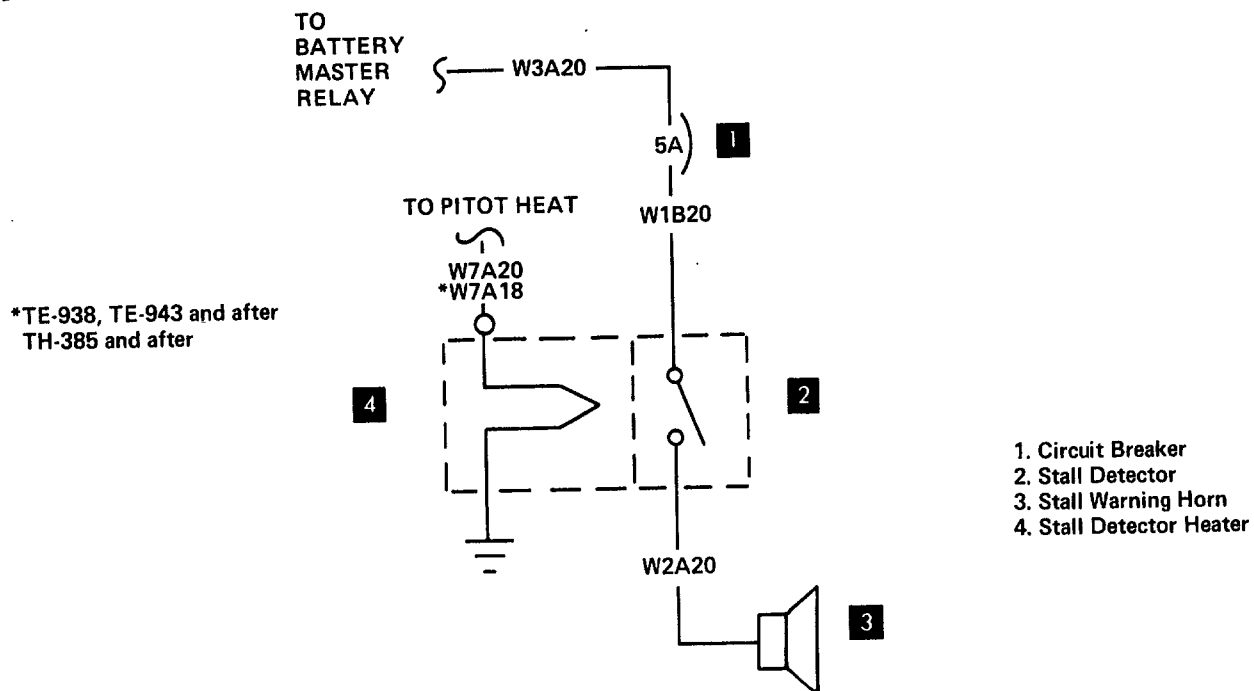
**Stall Warning
TC-1 thru TC-190**

55-369-168A



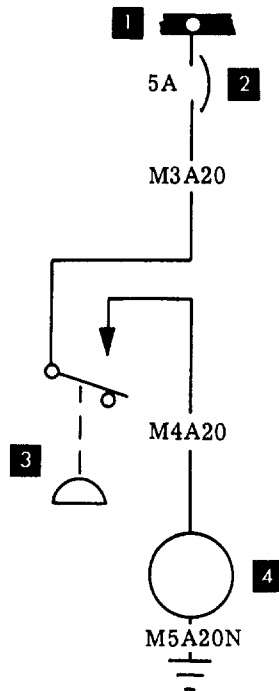
**Stall Warning and Engine Hour Meter (Optional)
TC-191 thru TC-1935 except TC-1913
TE-1 thru TE-767**

55-369-169A



55-369-171A

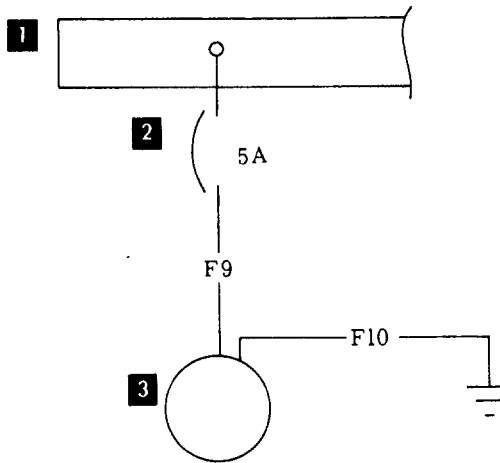
Stall Warning
TE-768 thru TE-1063
TH-1 thru TH-647 except TH-598



55-369-172

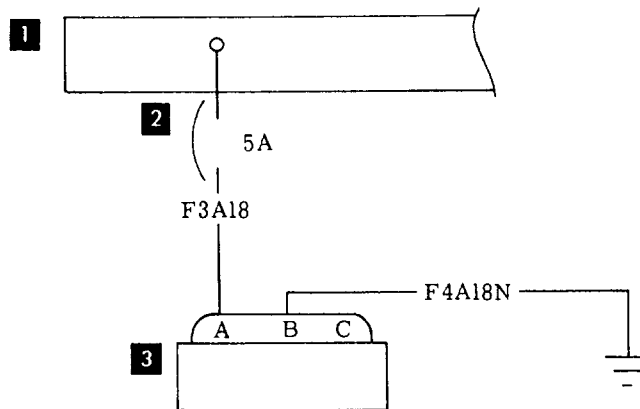
1. Bus Bar
2. Circuit Breaker
3. Pressure Switch
4. Engine Hour Meter

Engine Hour Meter (Optional)
TE-768 thru TE-1063
TH-1 thru TH-647 except TH-598



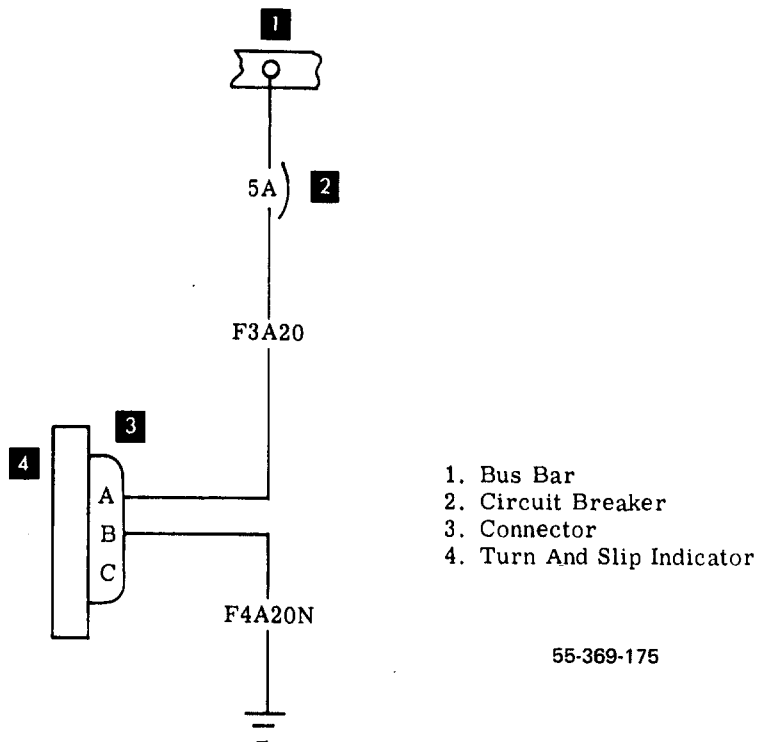
- 1. Bus Bar
- 2. Circuit Breaker
- 3. Indicator

Turn and Slip
TC-1 thru TC-190



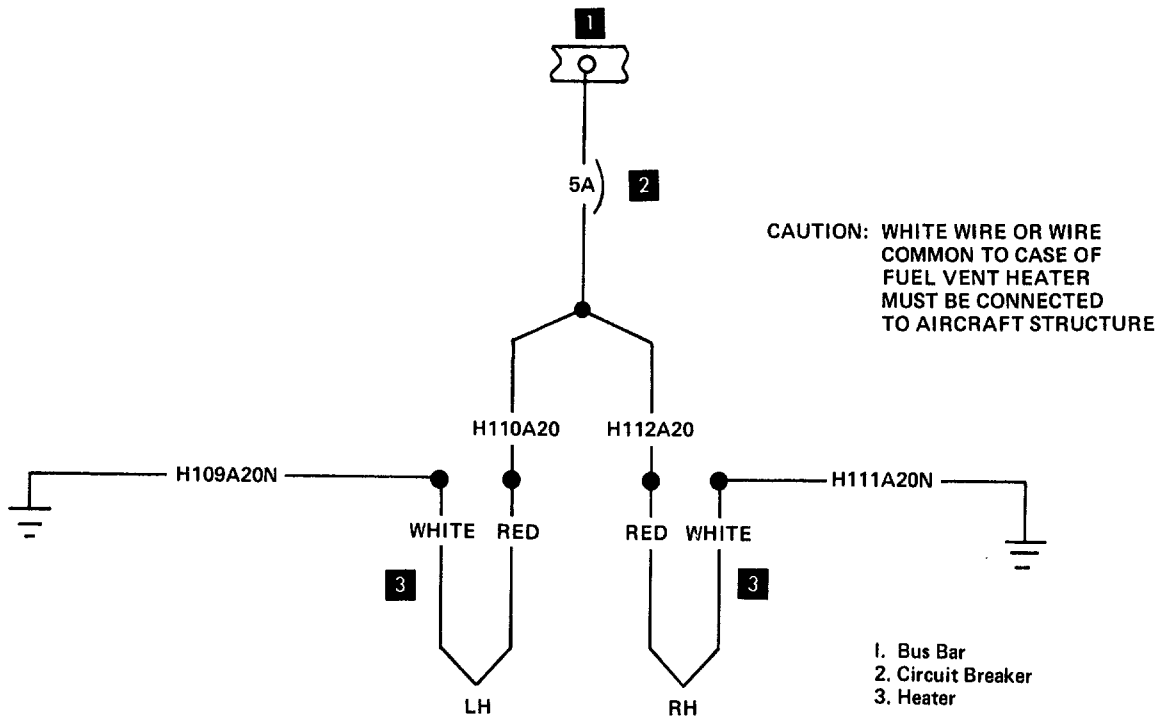
- 1. Bus Bar
- 2. Circuit Breaker
- 3. Indicator

Turn and Slip
TC-191 thru TC-1935 except TC-1913
TE-1 thru TE-767



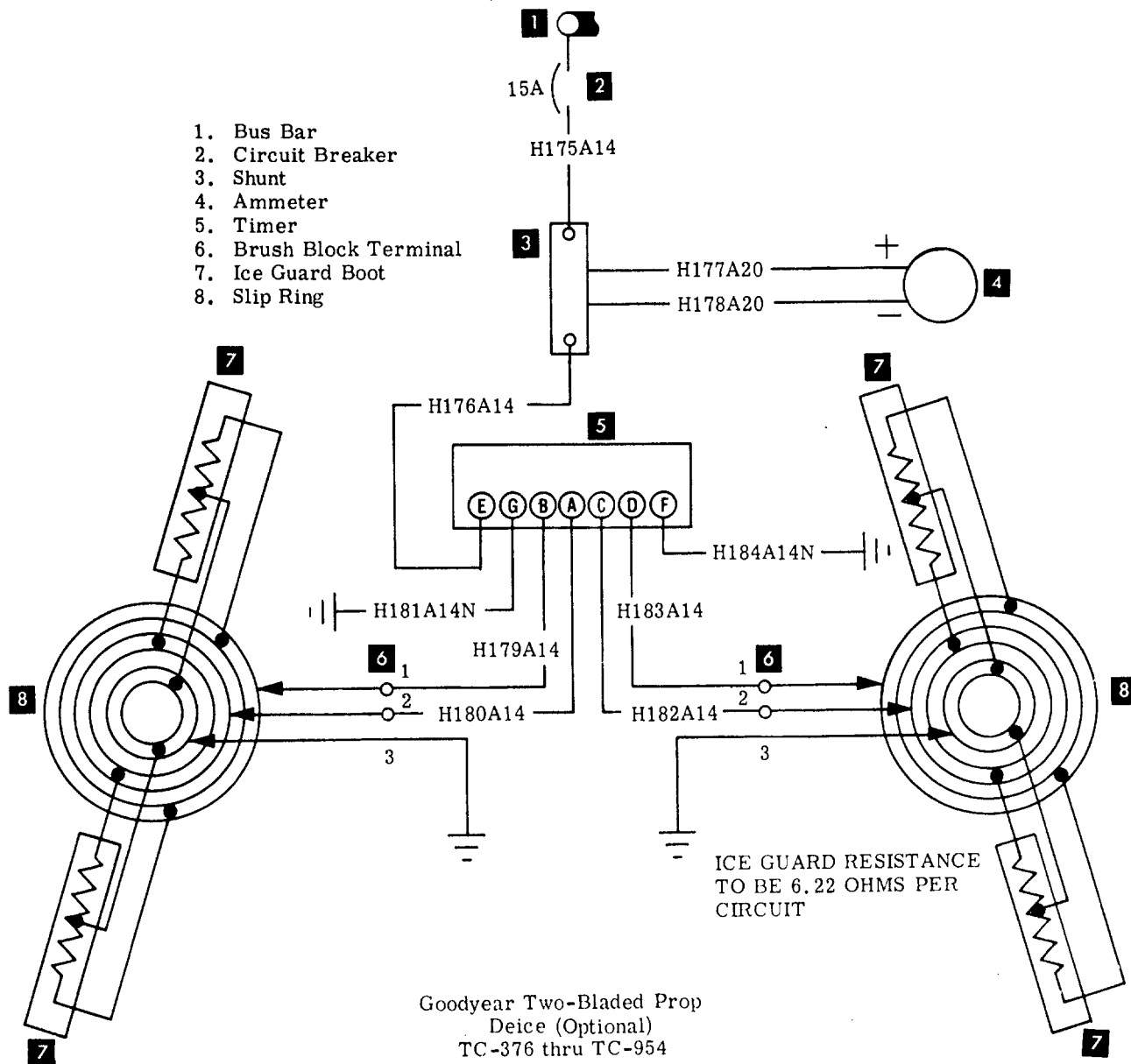
55-369-175

Turn and Slip
TE-768 thru TE-1063
TH-1 thru TH-647 except TH-598

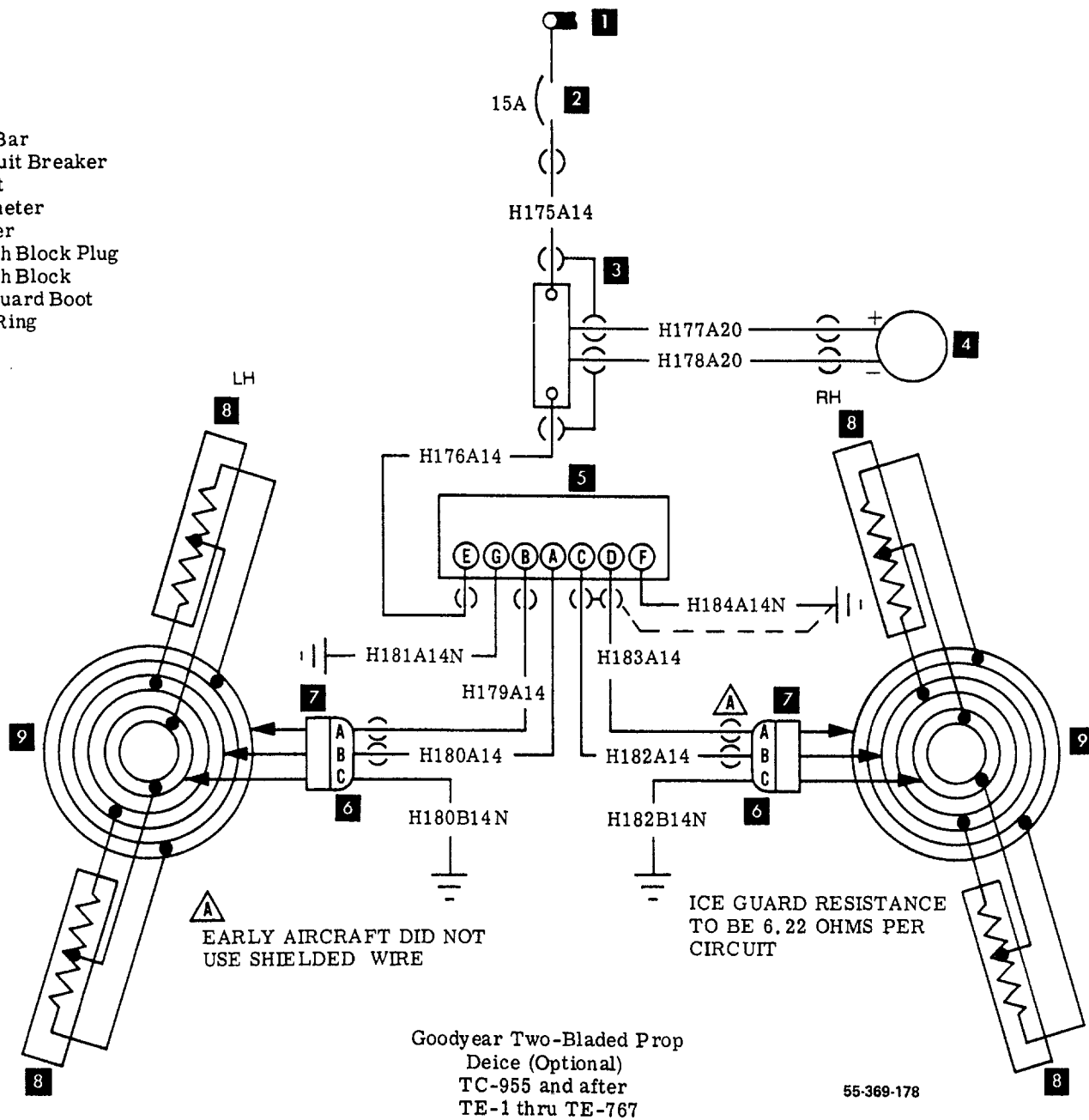


55-369-176A

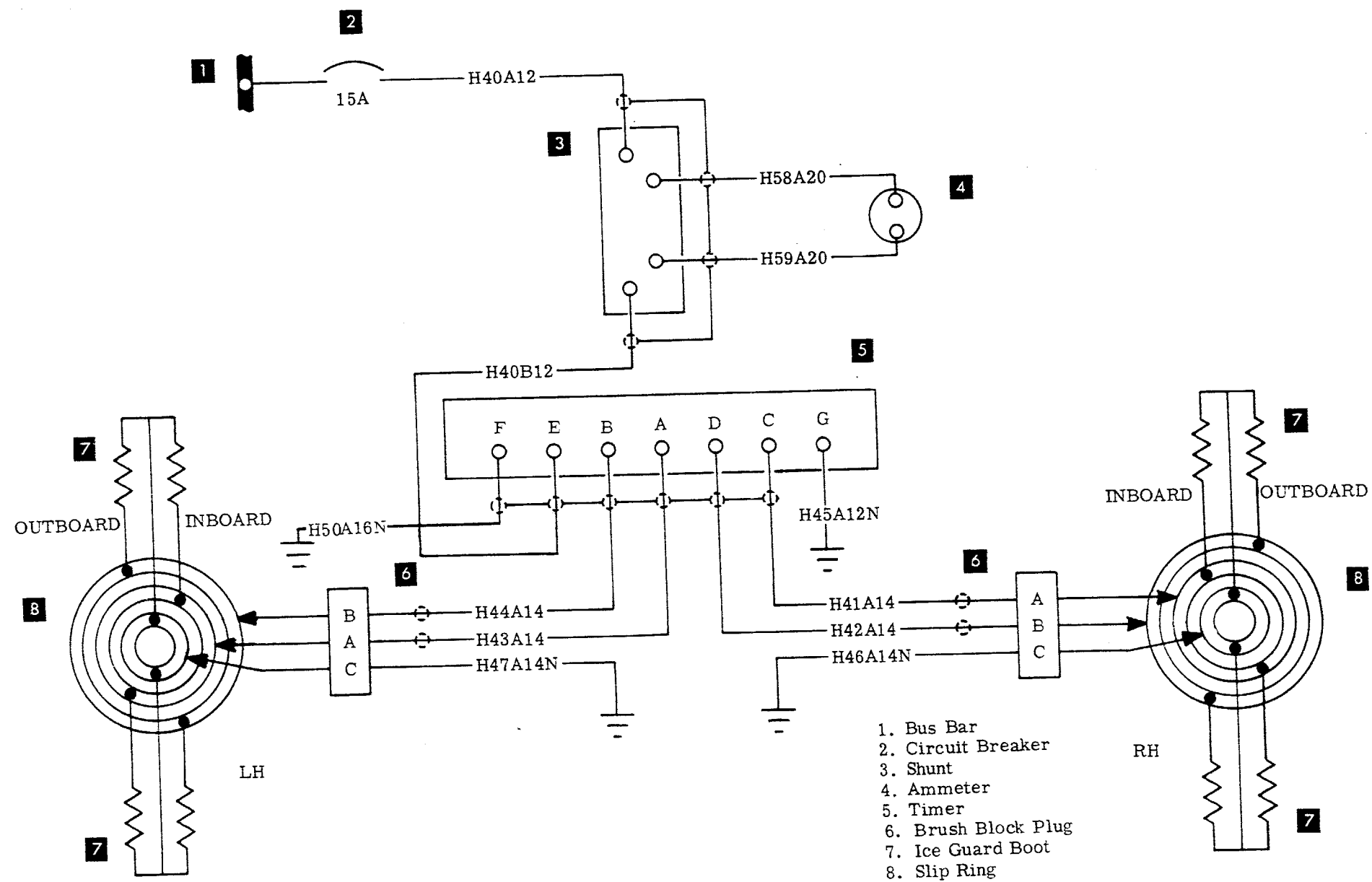
Fuel Vent Heater
TC-1608 thru TC-1935 except TC-1913
TE-938, TE-943 thru TE-1063
TH-1 thru TH-647 except TH-598



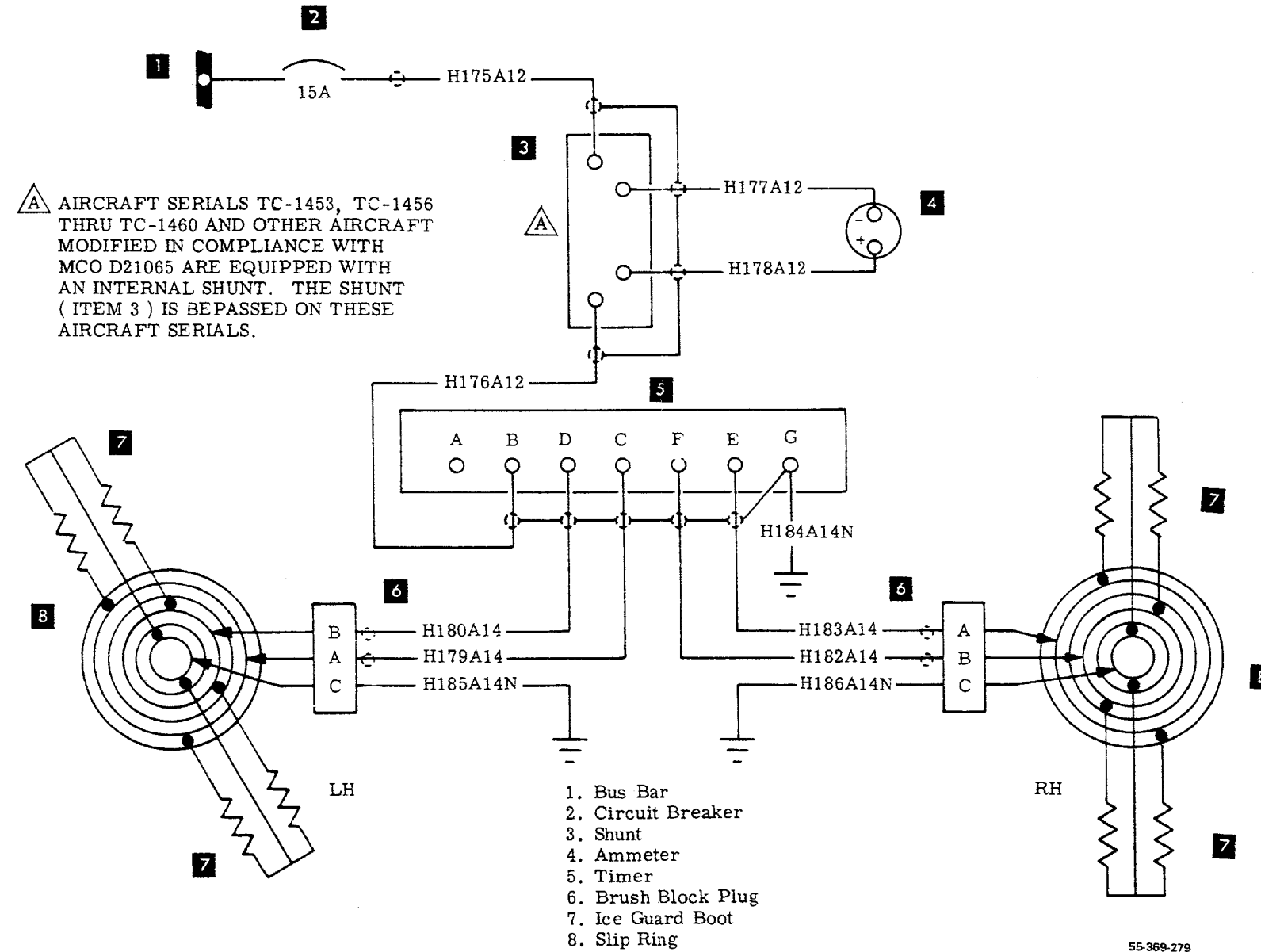
1. Bus Bar
2. Circuit Breaker
3. Shunt
4. Ammeter
5. Timer
6. Brush Block Plug
7. Brush Block
8. IceGuard Boot
9. Slip Ring



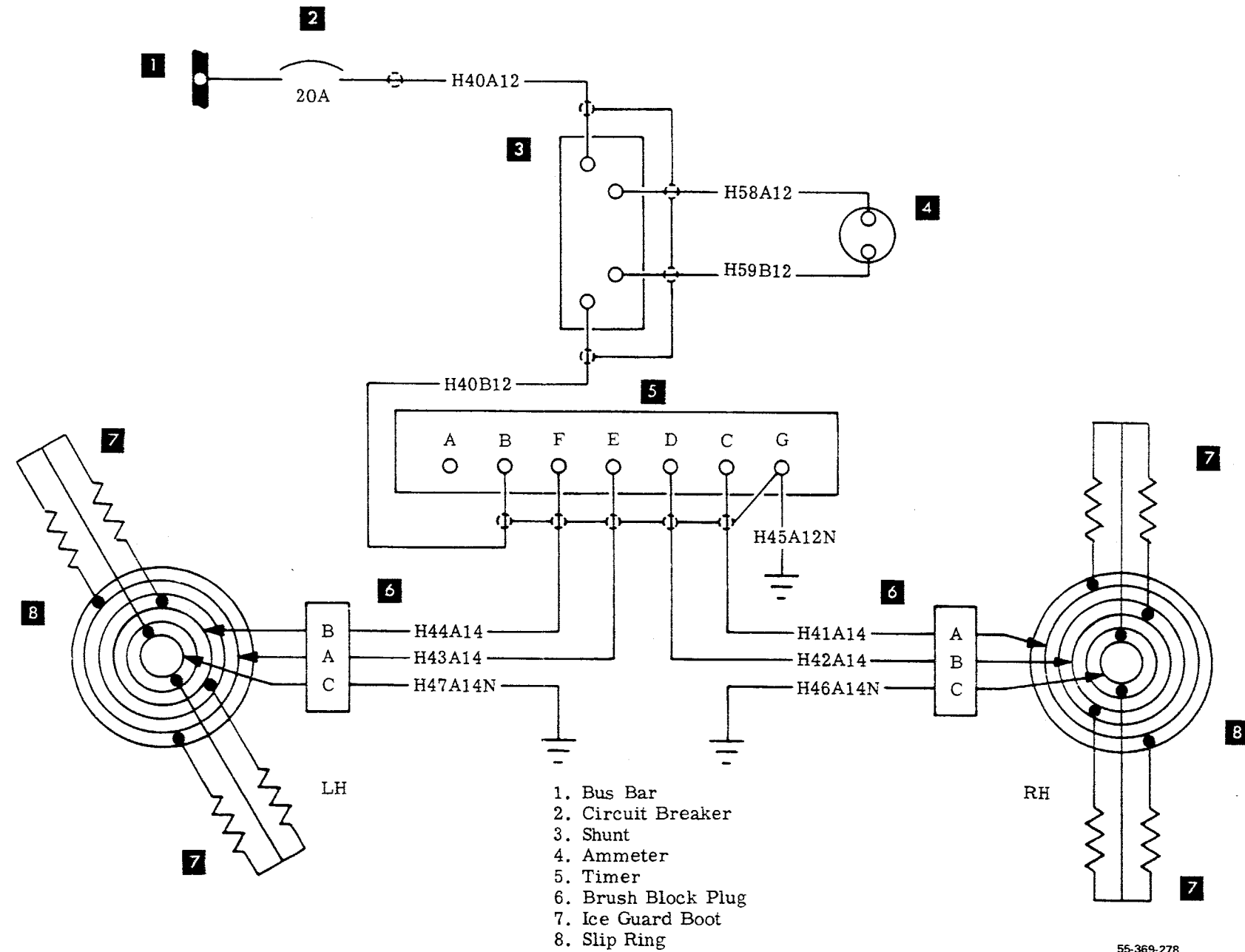
Goodyear Two-Bladed Prop Deice (Optional)
TC-955 thru TC-1935 except TC-1913
TE-1 thru TE-767



Goodyear Two-Bladed Prop Deice (Optional)
 TE-768 thru TE-1063
 TH-1 thru TH-647 except TH-598



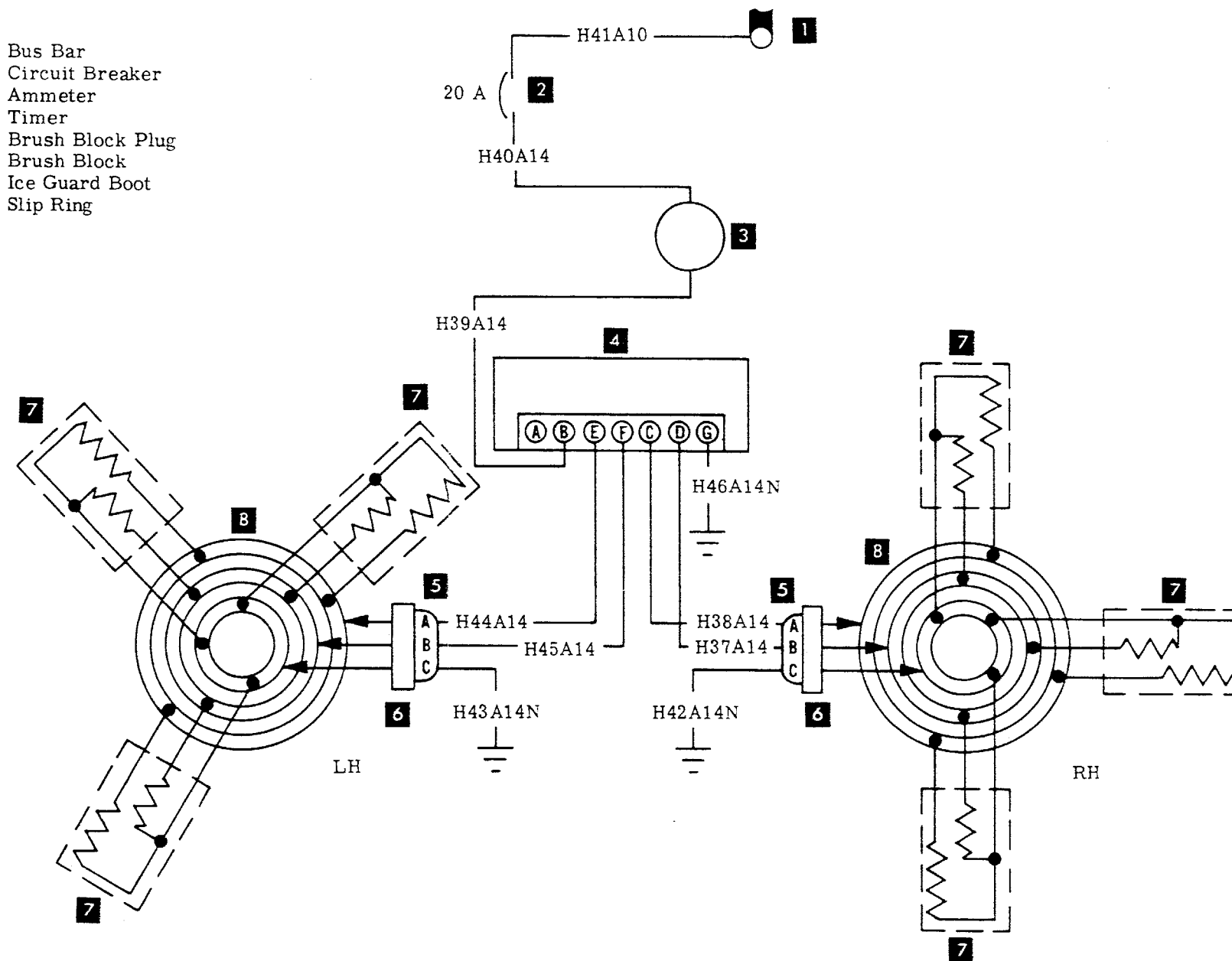
Hartzell Goodrich Two-Bladed Prop Deice (Optional)
 TC-1451 thru TC-1935 except TC-1913



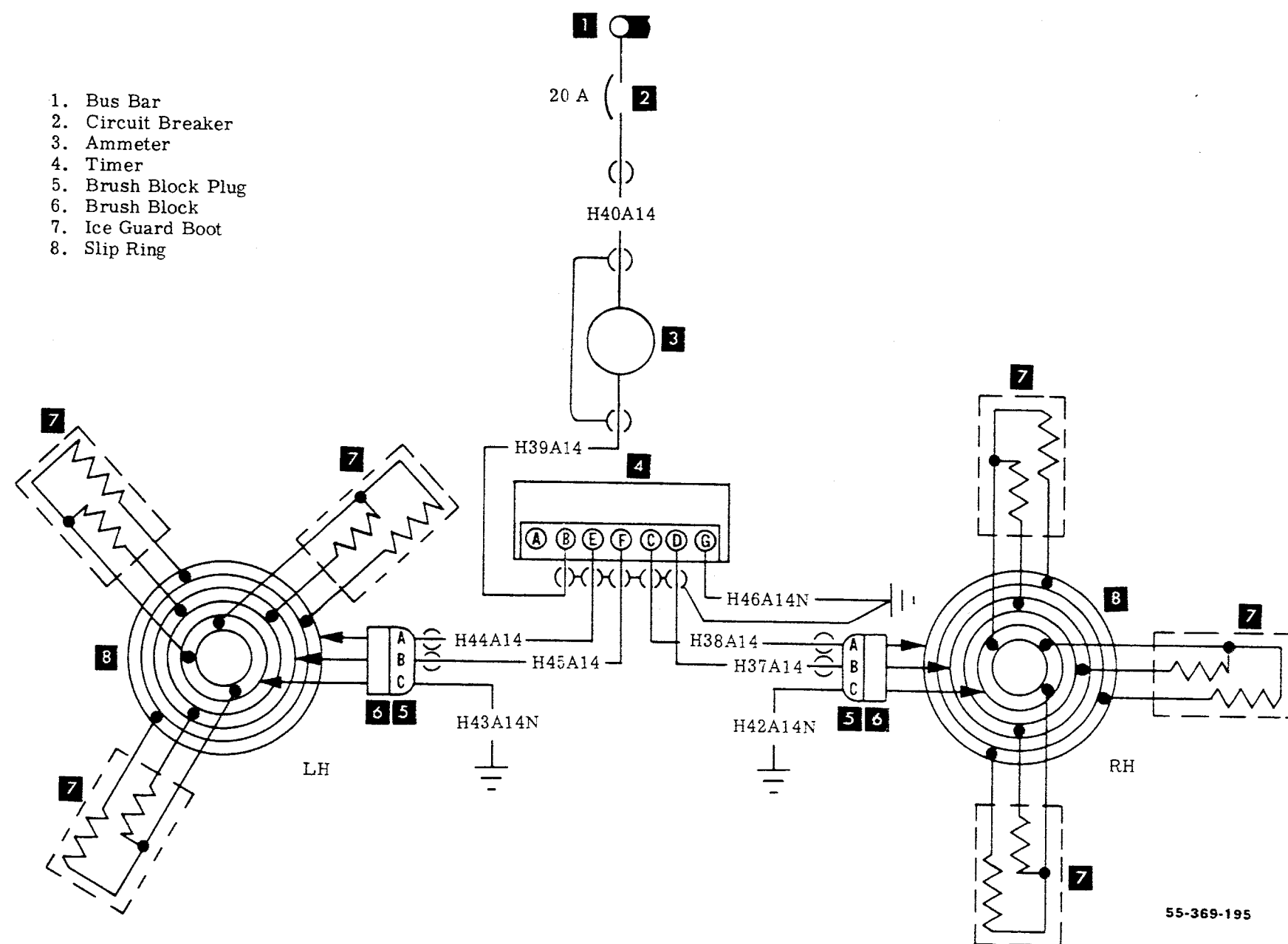
55-369-278

Hartzell Goodrich Prop Deice Two Blade (Optional)
TE-863 thru TE-1063
TH-232 thru TH-647 except TH-598

1. Bus Bar
2. Circuit Breaker
3. Ammeter
4. Timer
5. Brush Block Plug
6. Brush Block
7. Ice Guard Boot
8. Slip Ring

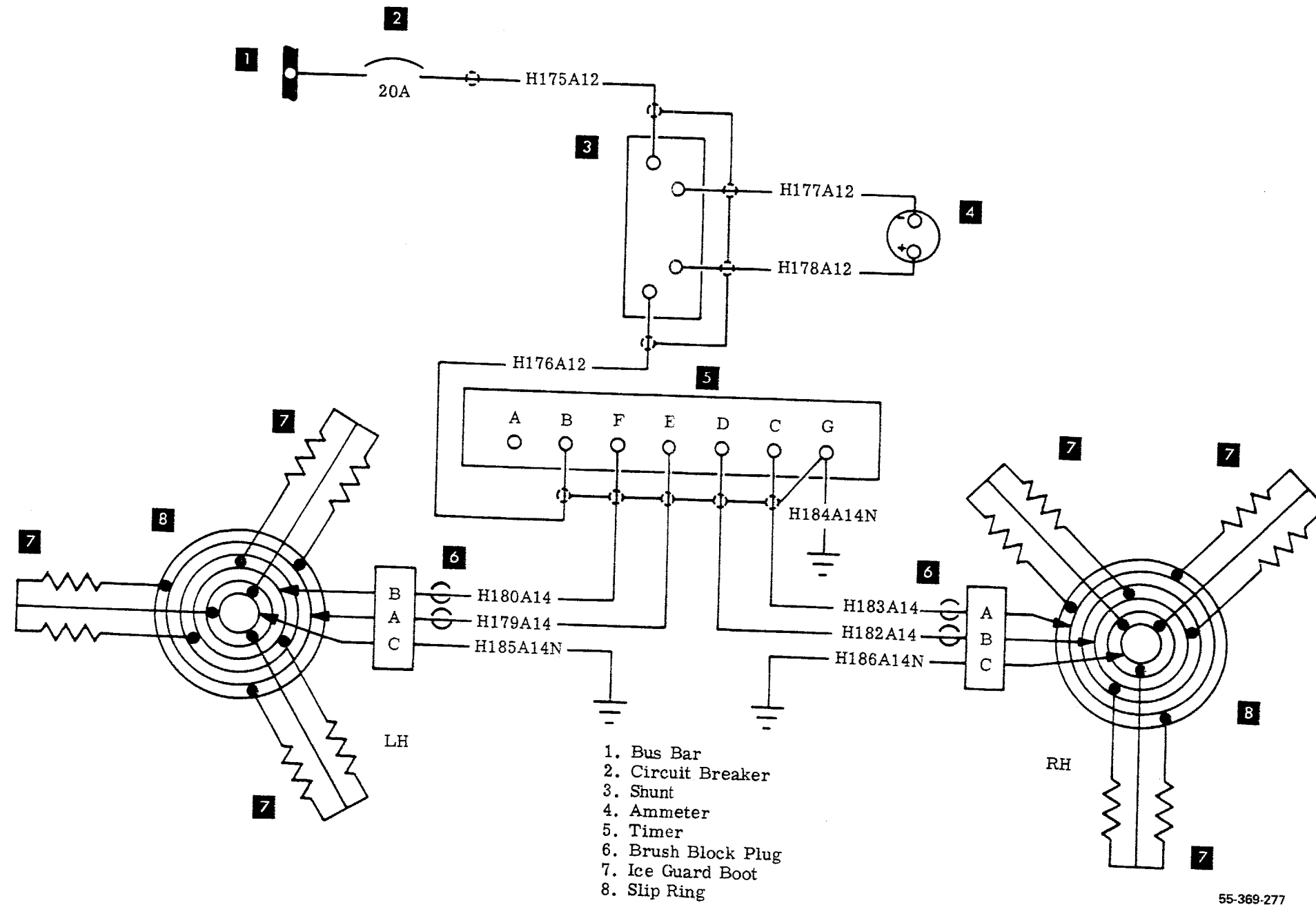


1. Bus Bar
2. Circuit Breaker
3. Ammeter
4. Timer
5. Brush Block Plug
6. Brush Block
7. Ice Guard Boot
8. Slip Ring

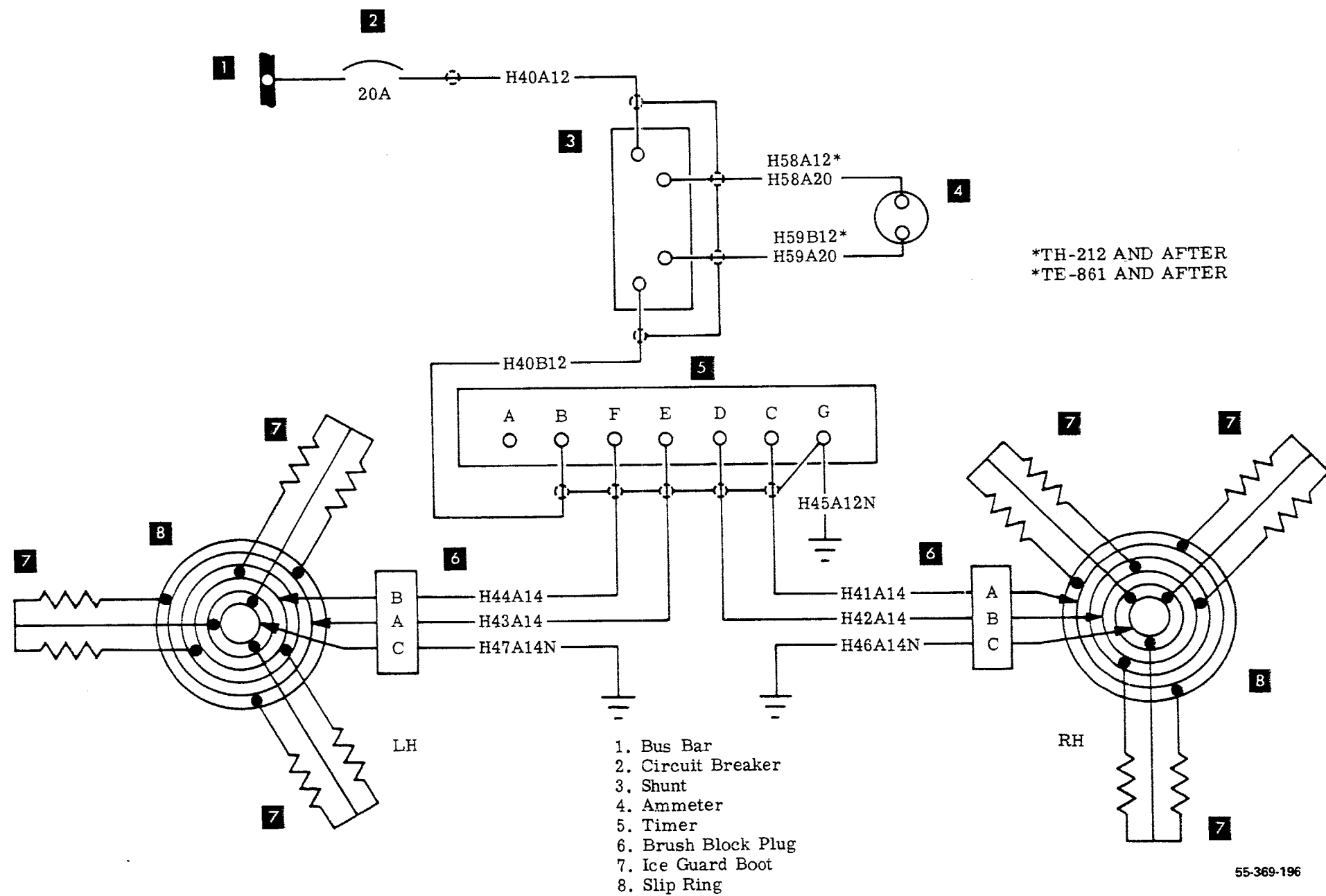


55-369-195

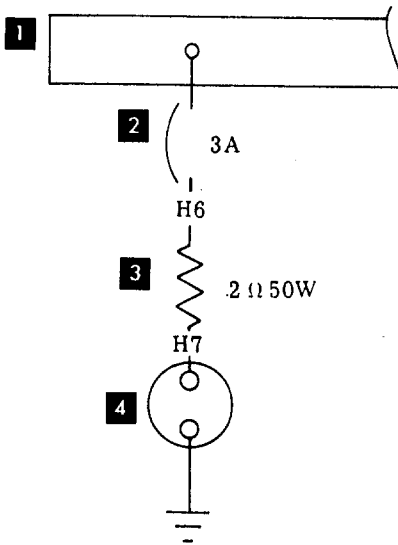
Goodrich Three-Bladed Prop Deice (Optional)
 TC-973 thru TC-1447
 TE-452 thru TE-767



Hartzell Goodrich Prop Deice Three Blade (Optional)
 TC-1448 thru TC-1935 except TC-1913



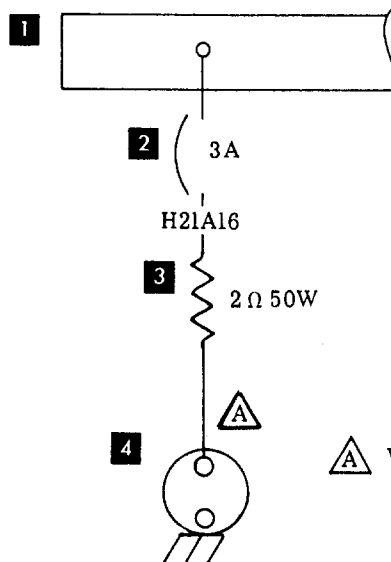
Hartzell Goodrich Prop Deice Three Blade (Optional)
 TE-768 thru TE-1063
 TH-1 thru TH-647 except TH-598



55-369-197

1. Bus Bar
2. Circuit Breaker
3. Resistor
4. Cigarette Lighter

**Cigarette Lighter
TC-1 thru TC-190**

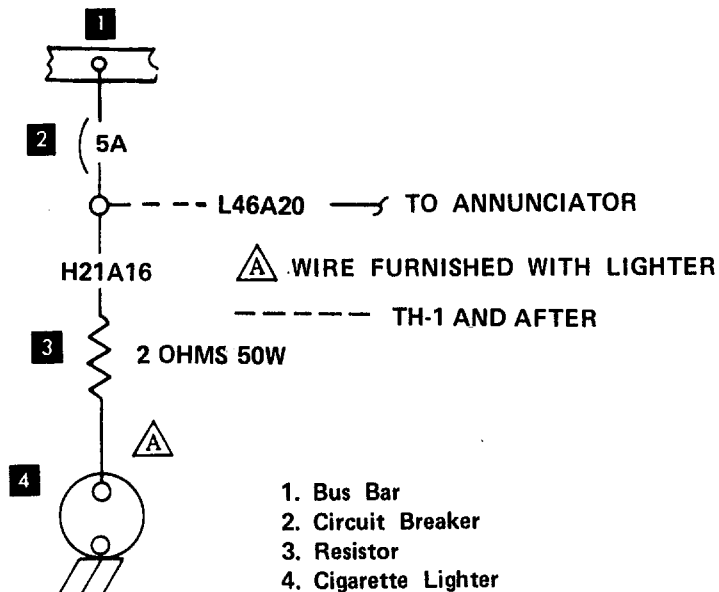


WIRE FURNISHED WITH LIGHTER

1. Bus Bar
2. Circuit Breaker
3. Resistor
4. Cigarette Lighter

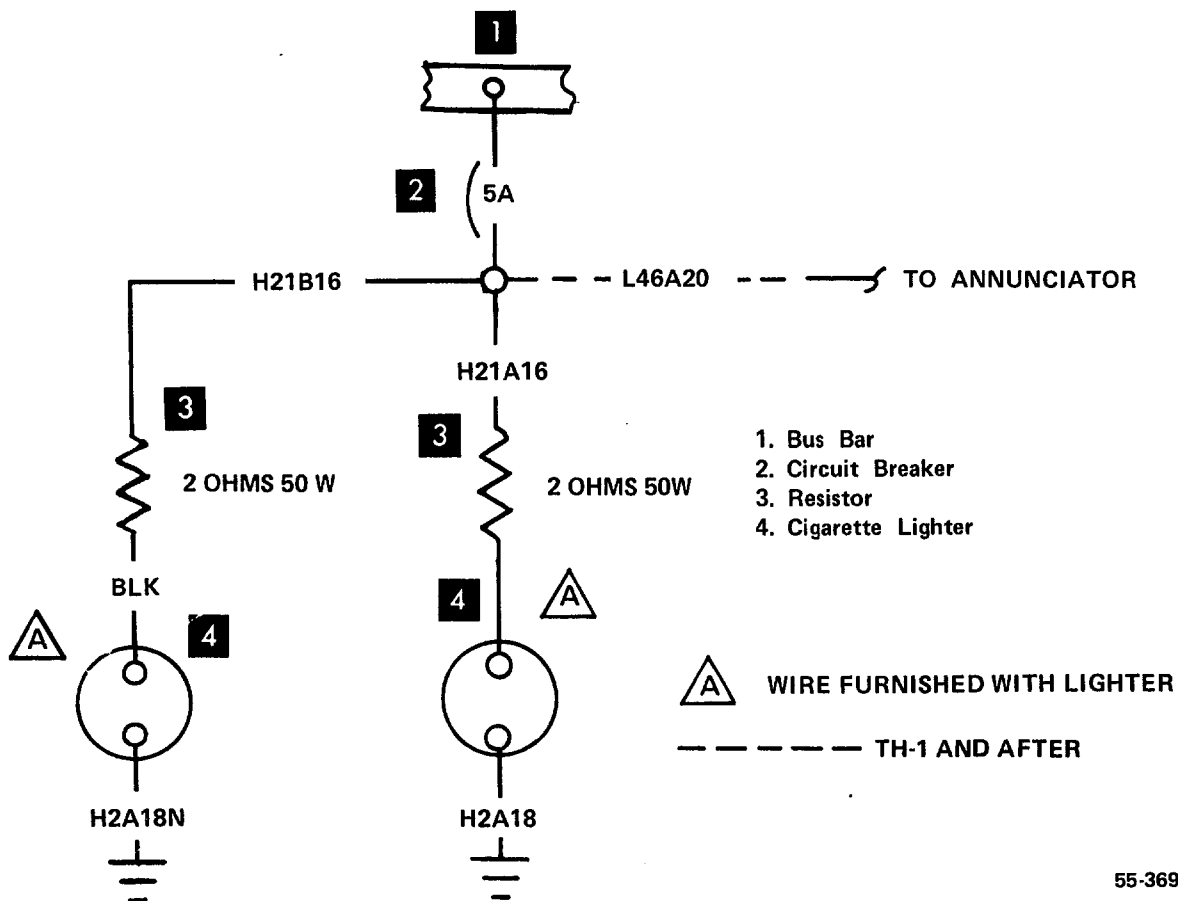
55-369-198

**Cigarette Lighter
TC-191 thru TC-1607
TE-1 thru TE-767**



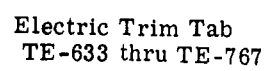
55-369-199

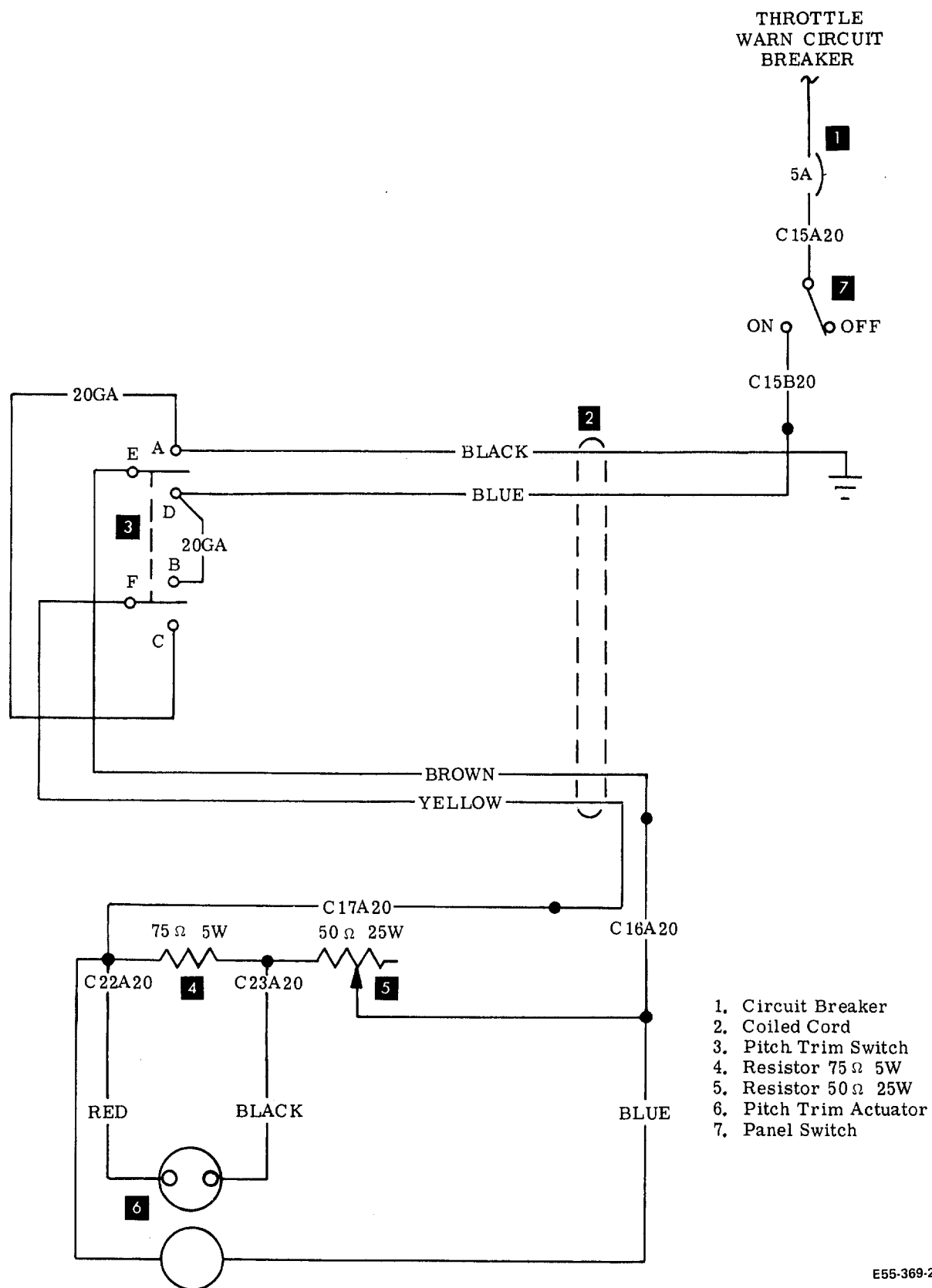
Cigarette Lighter
TE-768 thru TE-942 except TE-938
TH-1 thru TH-384



55-369-199A

Cigarette Lighter
TC-1608 thru TC-1935 except TC-1913
TE-938, TE-943 thru TE-1063
TH-385 thru TH-647 except TH-598

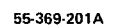




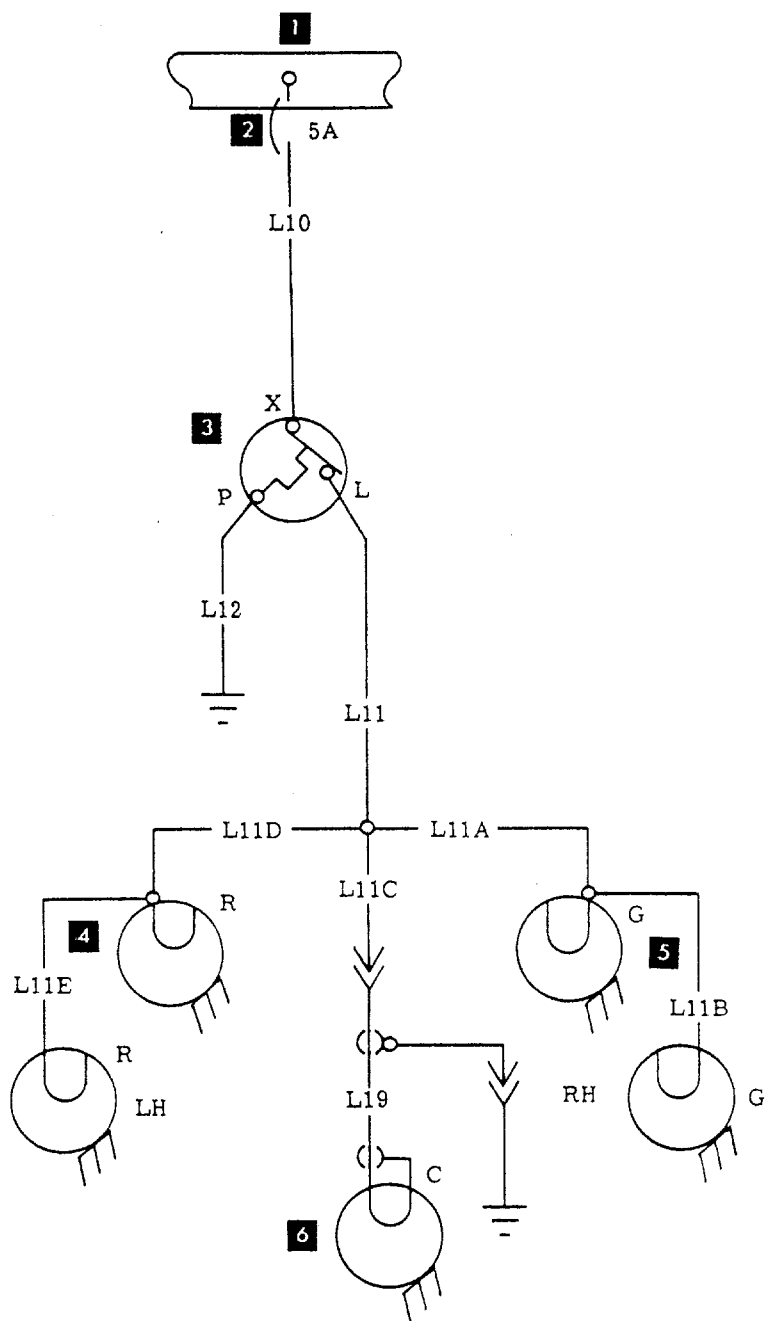
1. Circuit Breaker
2. Coiled Cord
3. Pitch Trim Switch
4. Resistor 75Ω 5W
5. Resistor 50Ω 25W
6. Pitch Trim Actuator
7. Panel Switch

E55-369-246

Electric Trim Tab (Optional)
TE-768 thru TE-1063

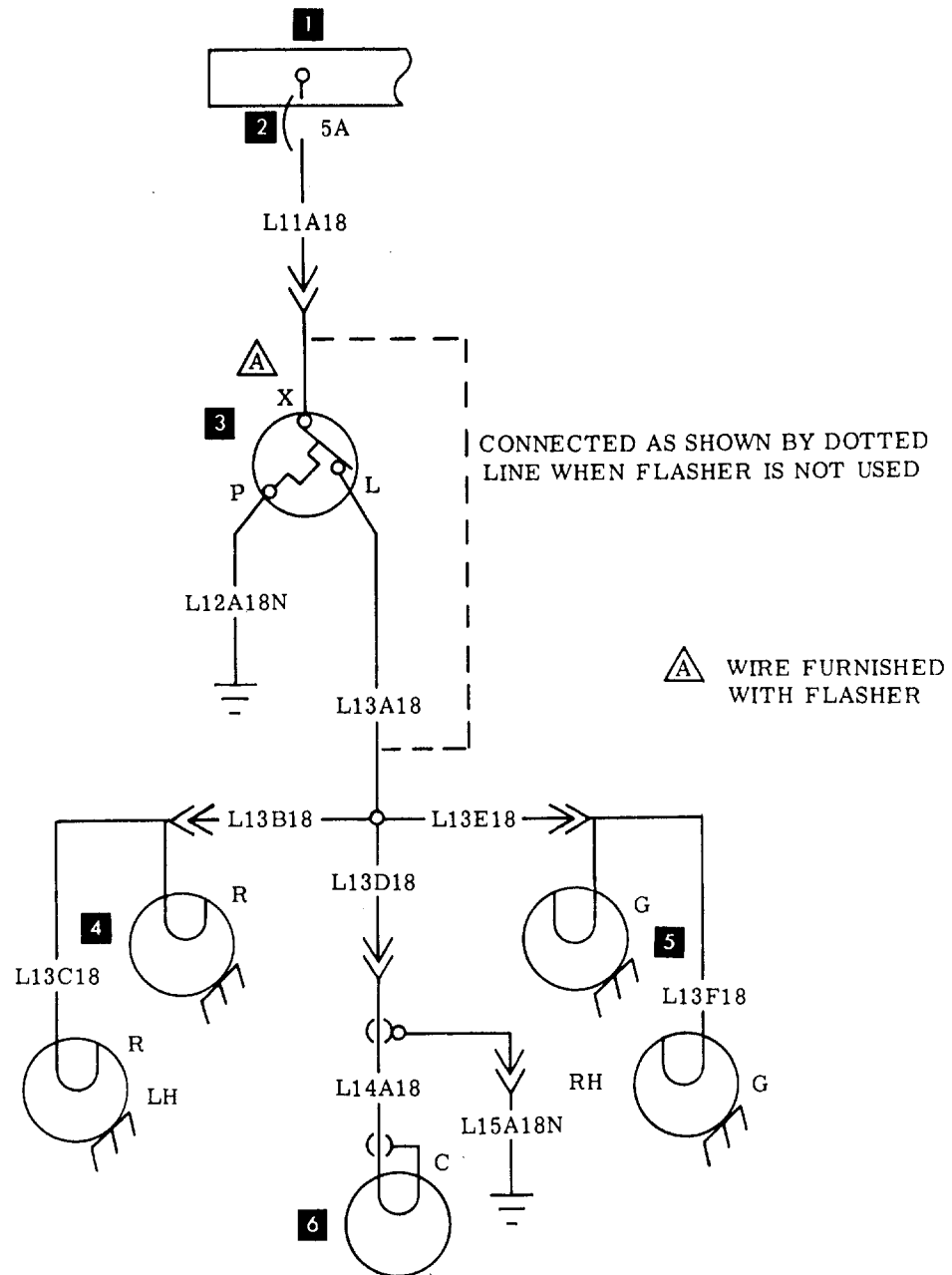


14-115



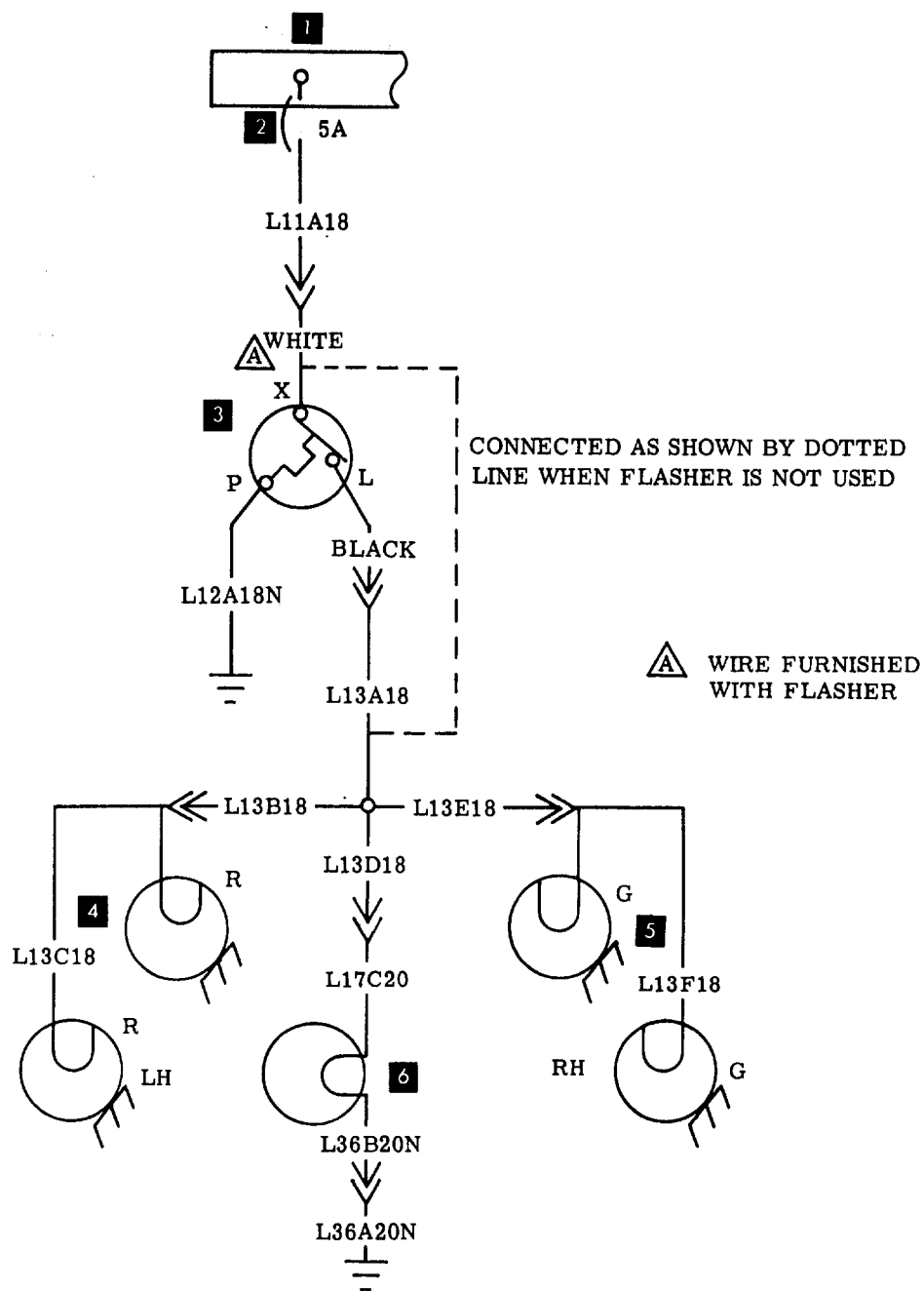
1. Bus Bar
2. Circuit Breaker
3. Navigation Lights Flasher (Optional)
4. Left Wing Tip Lights
5. Right Wing Tip Lights
6. Tail Light

Navigation Lights
TC-1 thru TC-190



1. Bus Bar
2. Circuit Breaker
3. Navigation Lights Flasher (Optional)
4. Left Wing Tip Lights
5. Right Wing Tip Lights
6. Tail Light

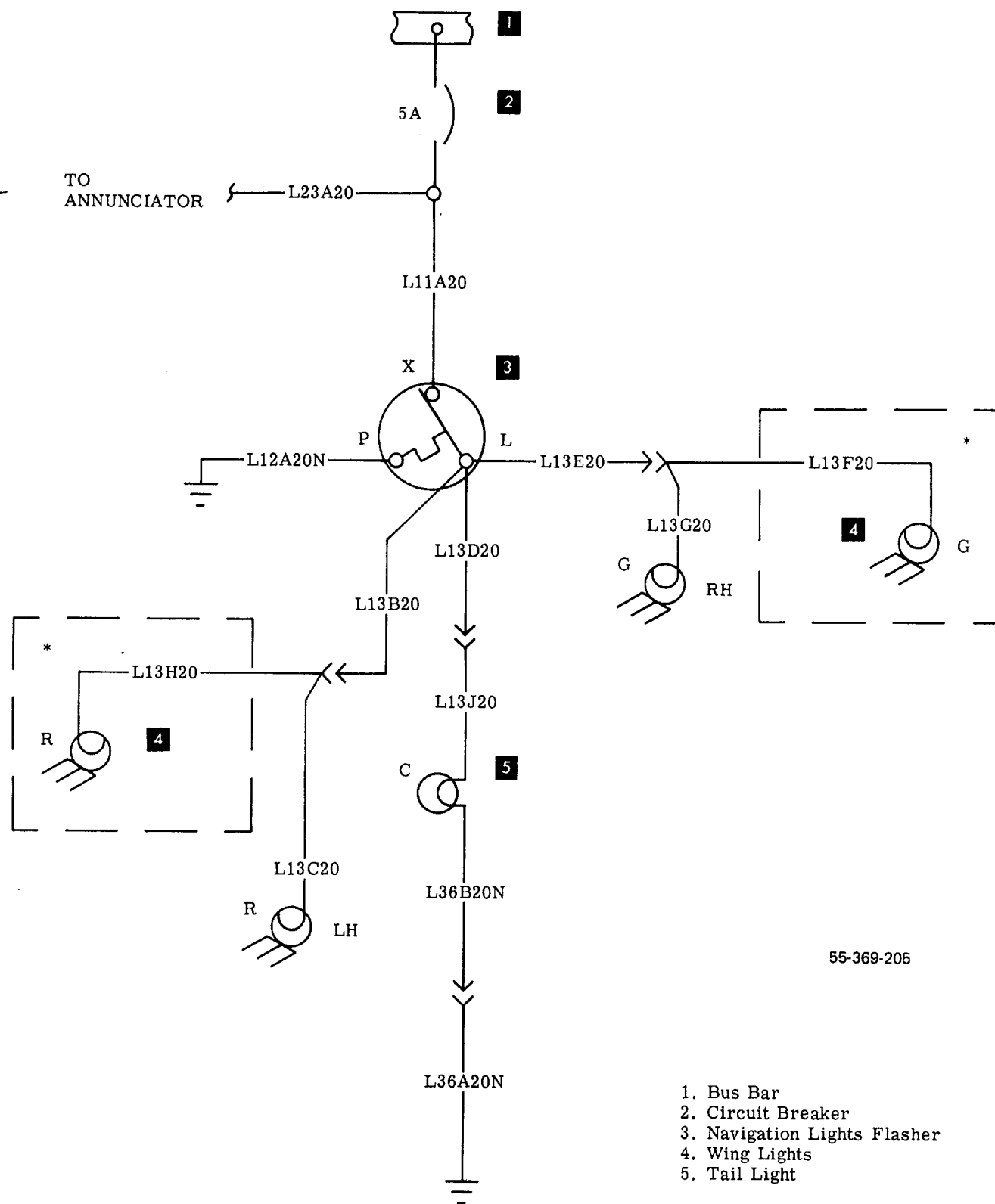
Navigation Lights
 TC-191 thru TC- 954
 TE- 1 thru TE-451



55-369-204

1. Bus Bar
2. Circuit Breaker
3. Navigation Lights Flasher
4. Left Wing Tip Lights
5. Right Wing Tip Lights
6. Tail Light

Navigation Lights
TC-955 thru TC-1600
TE-452 thru TE-767

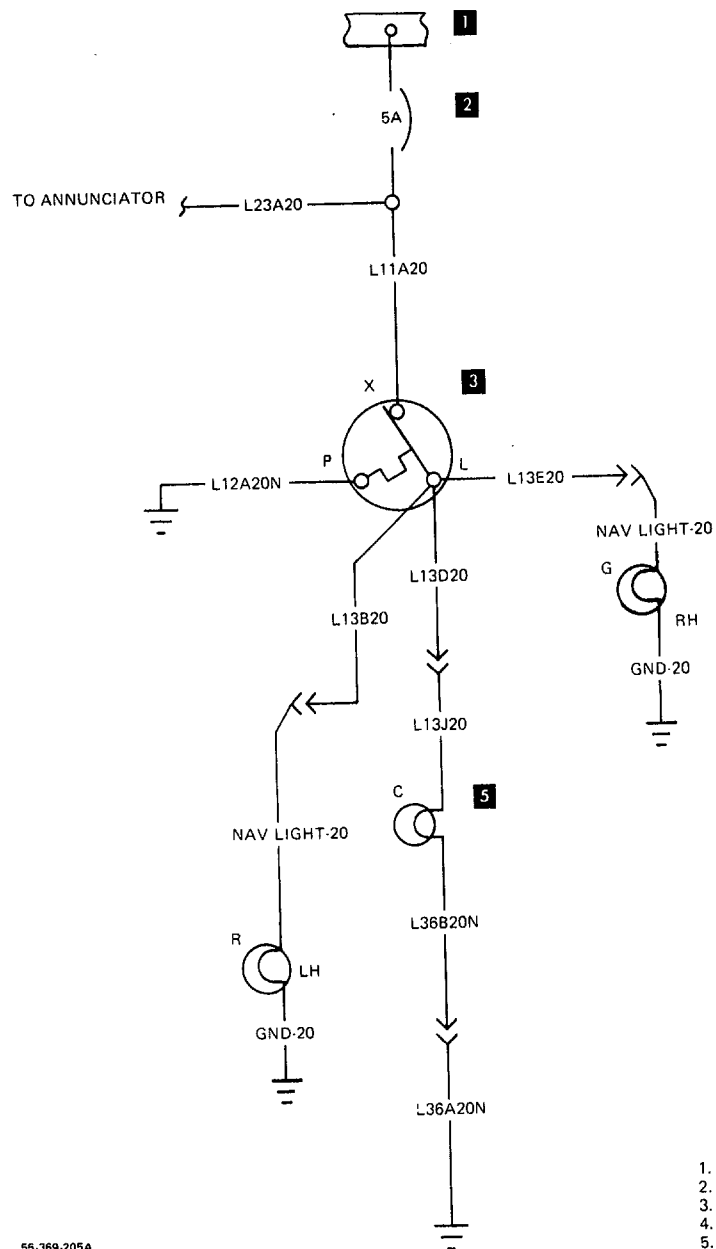


55-369-205

1. Bus Bar
2. Circuit Breaker
3. Navigation Lights Flasher
4. Wing Lights
5. Tail Light

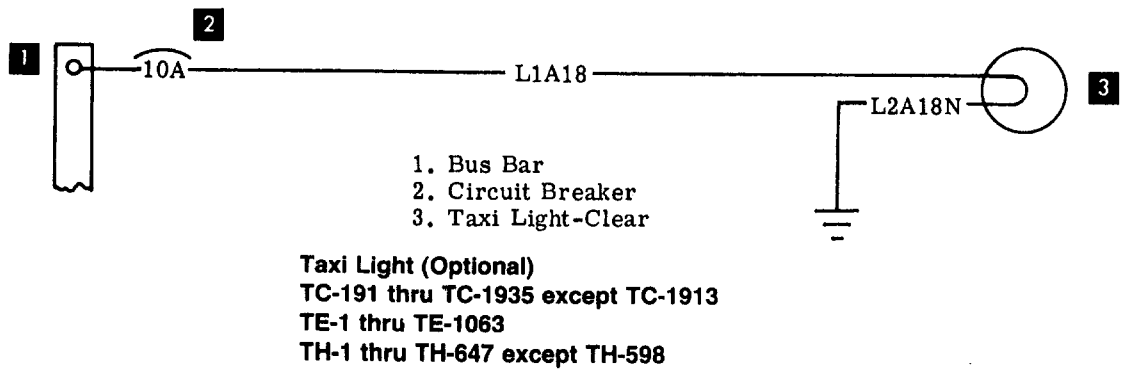
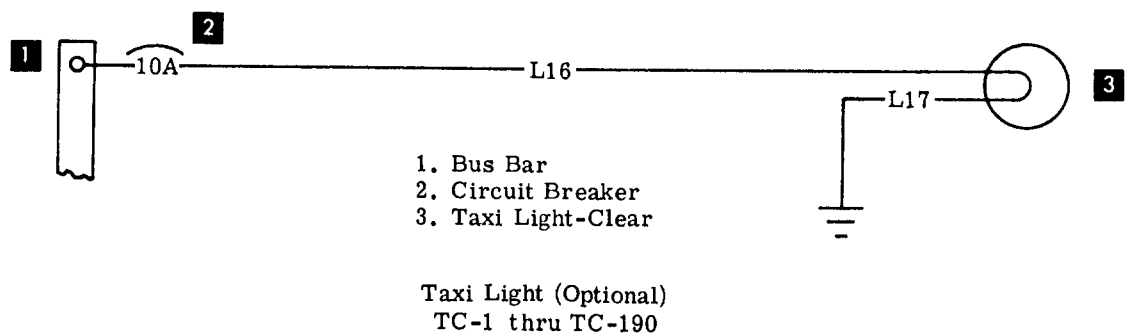
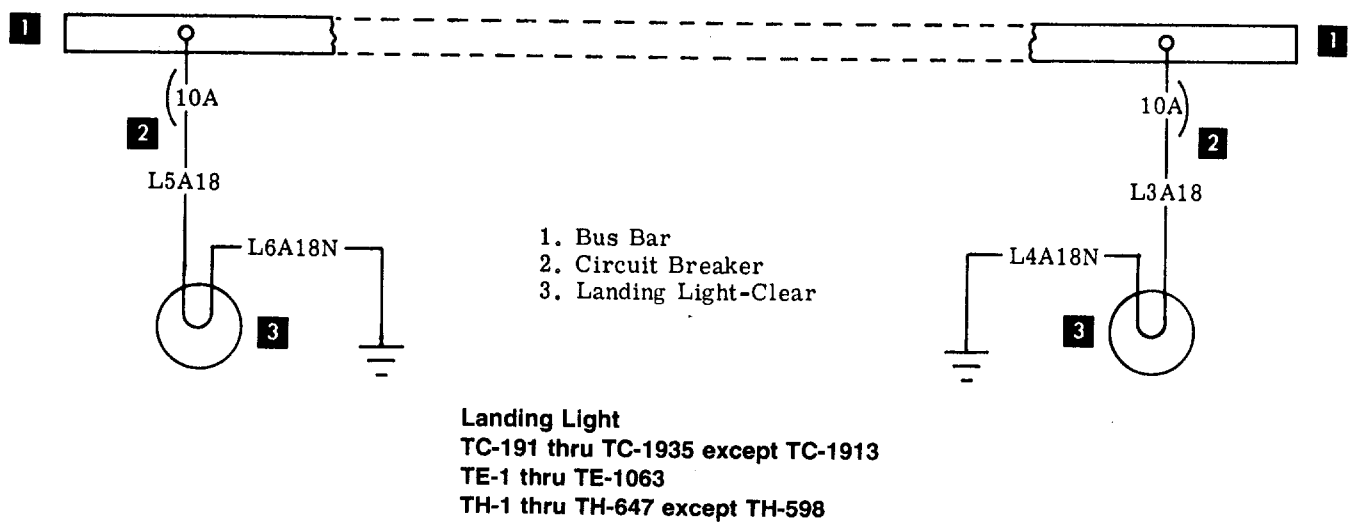
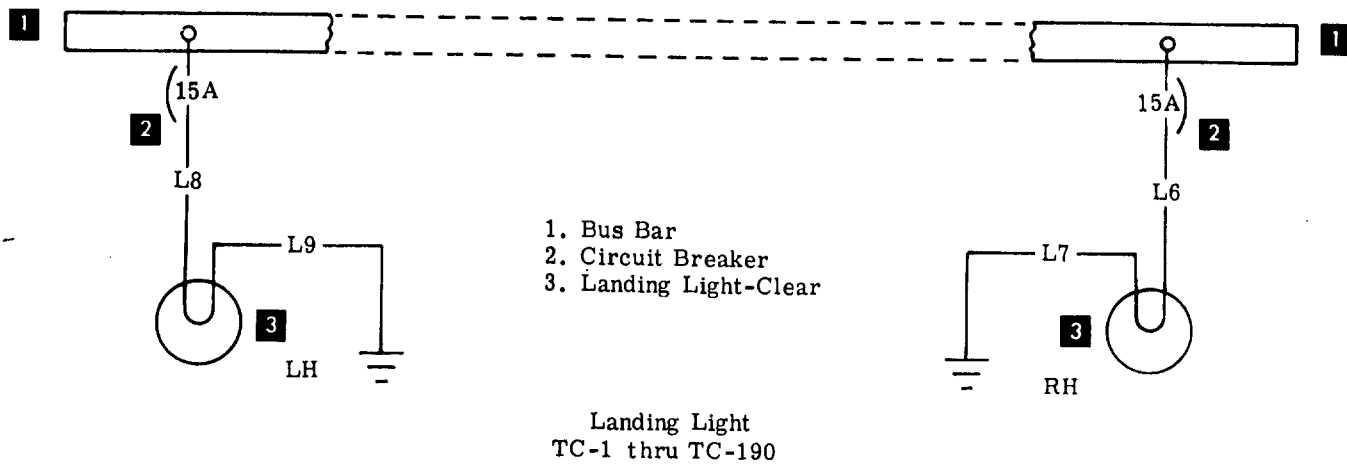
* USED WITH OPTIONAL
3 LIGHT STROBE ONLY

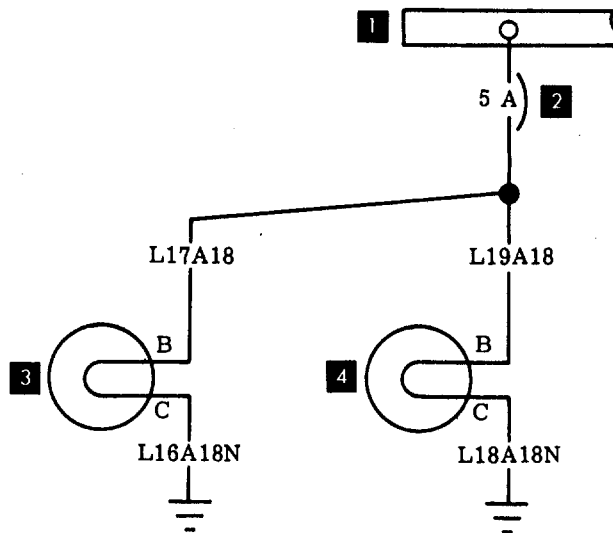
Navigation Lights
TE-768 thru TE-952
TH-1 thru TH-380



1. Bus Bar
2. Circuit Breaker
3. Navigation Lights Flasher
4. Wing Lights
5. Tail Light

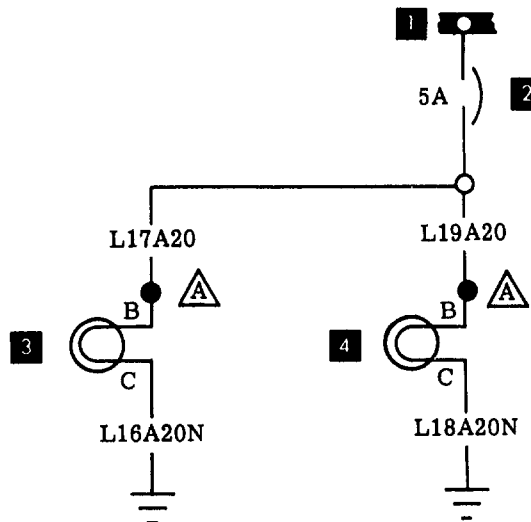
Navigation Lights
TC-1601 thru TC-1935 except TC-1913
TE-953 thru TE-1063
TH-381 thru TH-647 except TH-598





1. Bus Bar
2. Circuit Breaker
3. Ice Light LH
4. Ice Light RH

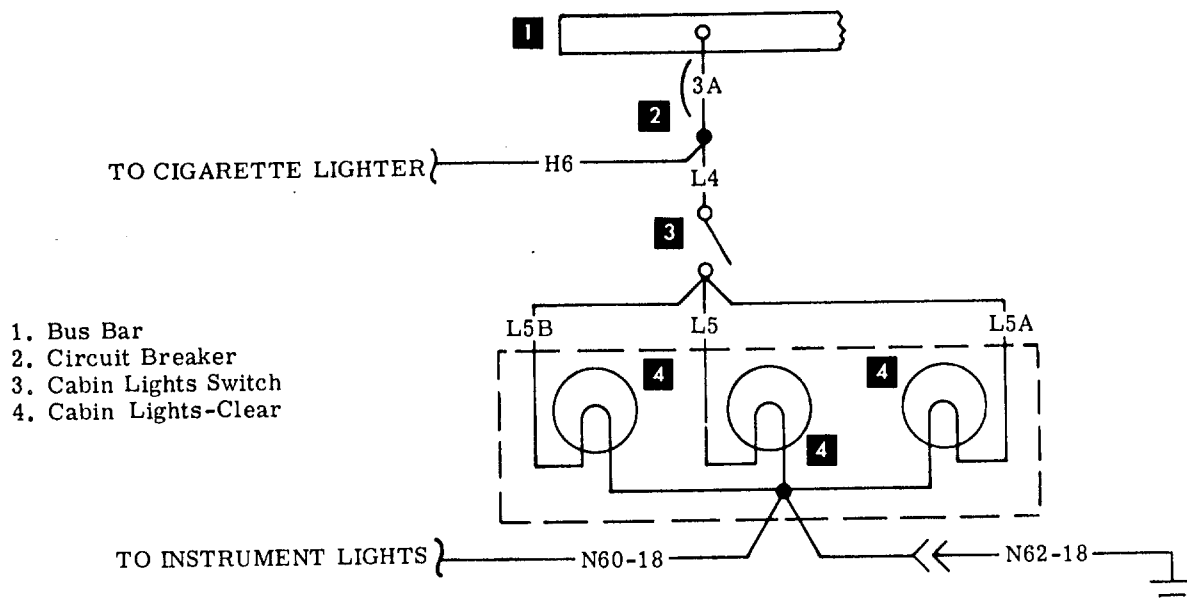
Ice Light (Optional)
 TC-191 thru TC-1935 except TC-1913
 TE-1 thru TE-767



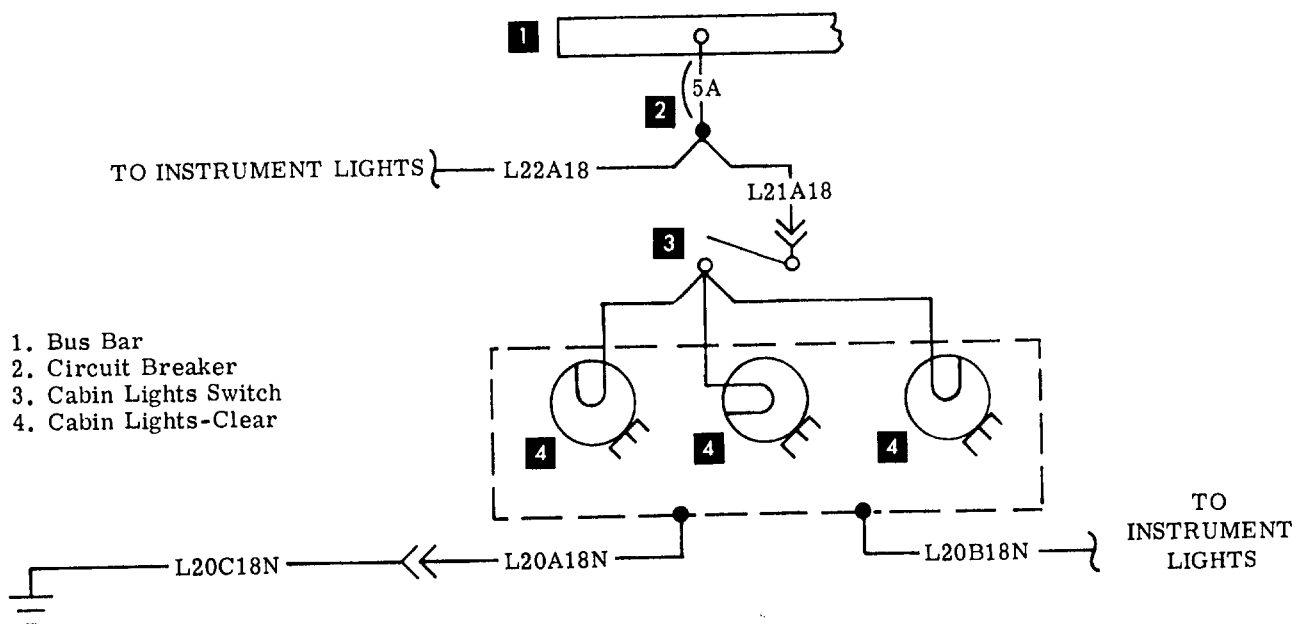
1. Bus Bar
2. Circuit Breaker
3. Ice Light LH
4. Ice Light RH

△ WIRE FURNISHED WITH LIGHTS

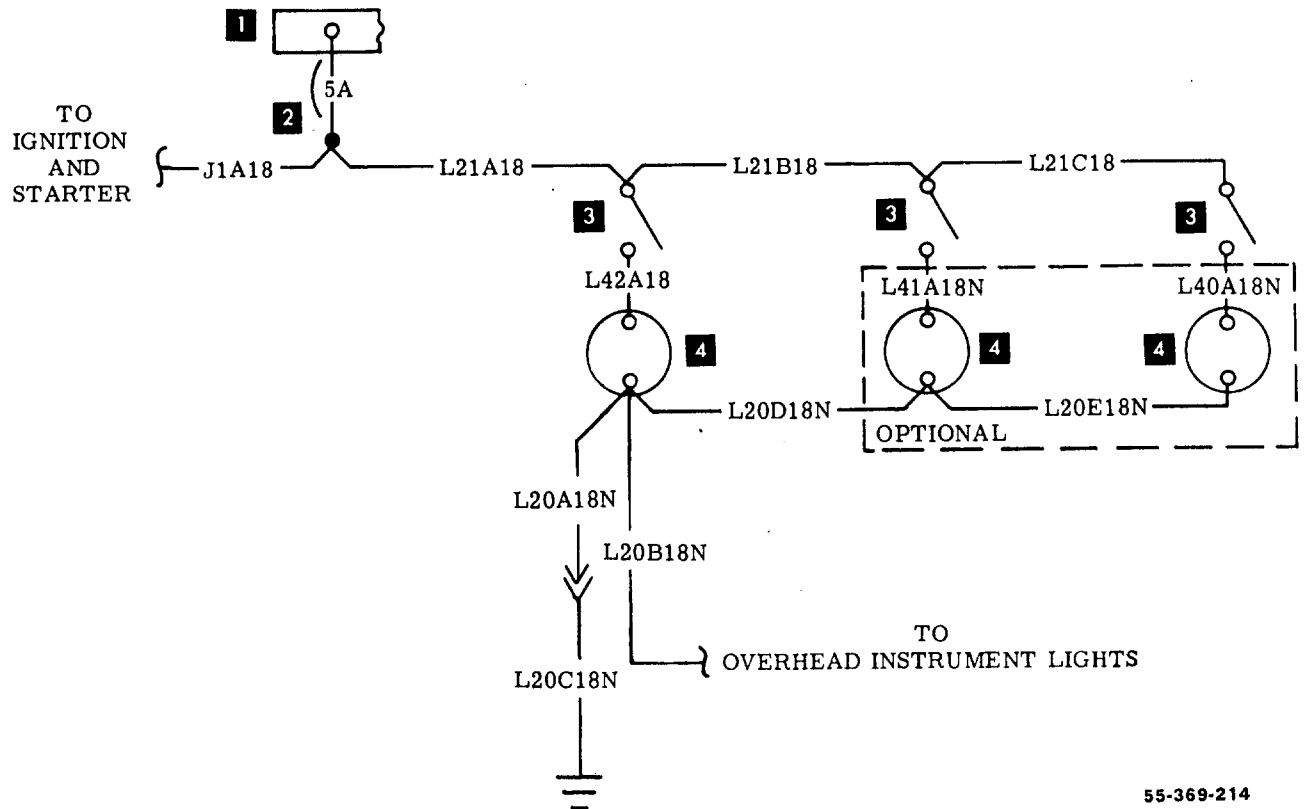
Ice Light (Optional)
 TE-768 thru TE-1063
 TH-1 thru TH-647 except TH-598



Cabin Lights
TC-1 thru TC-190



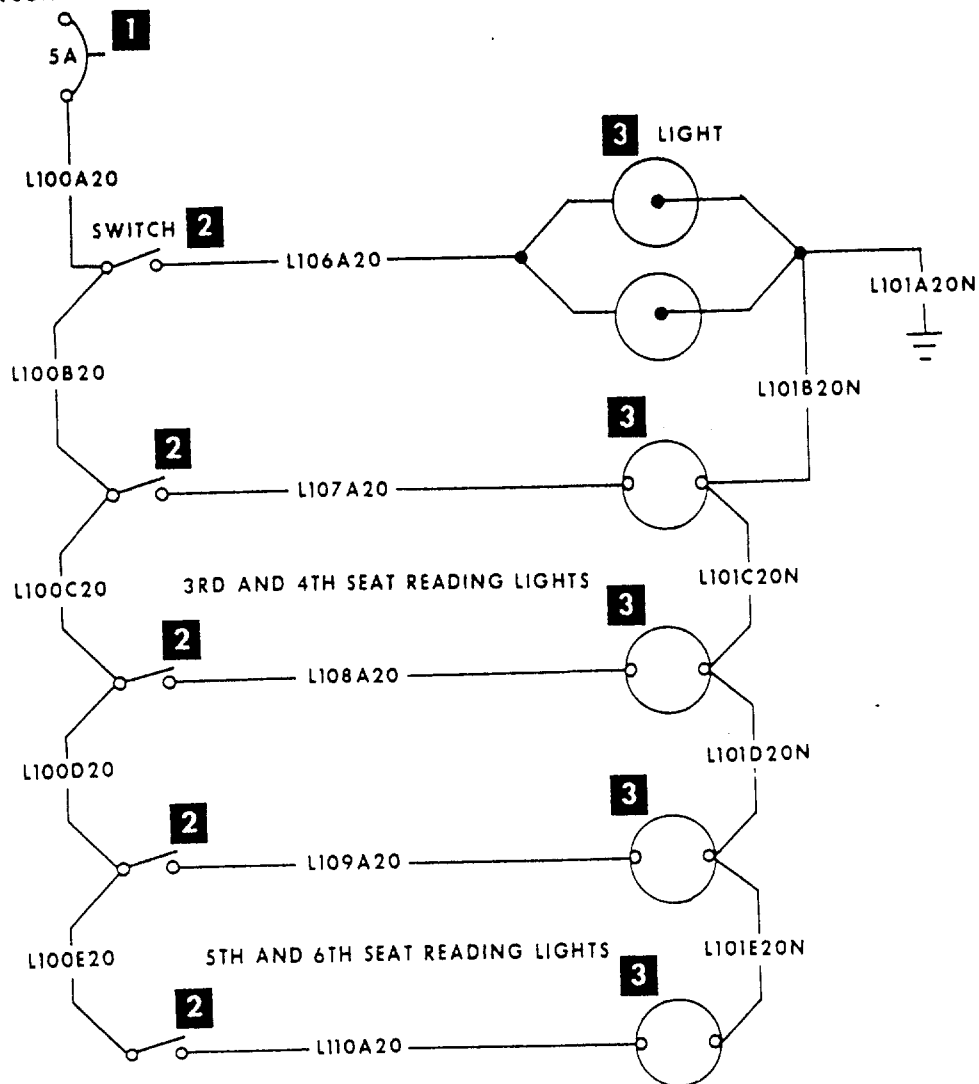
Cabin Lights
TC-191 thru TC-954



1. Bus Bar
2. Circuit Breaker
3. Cabin Lights Switch
4. Cabin Lights-Clear

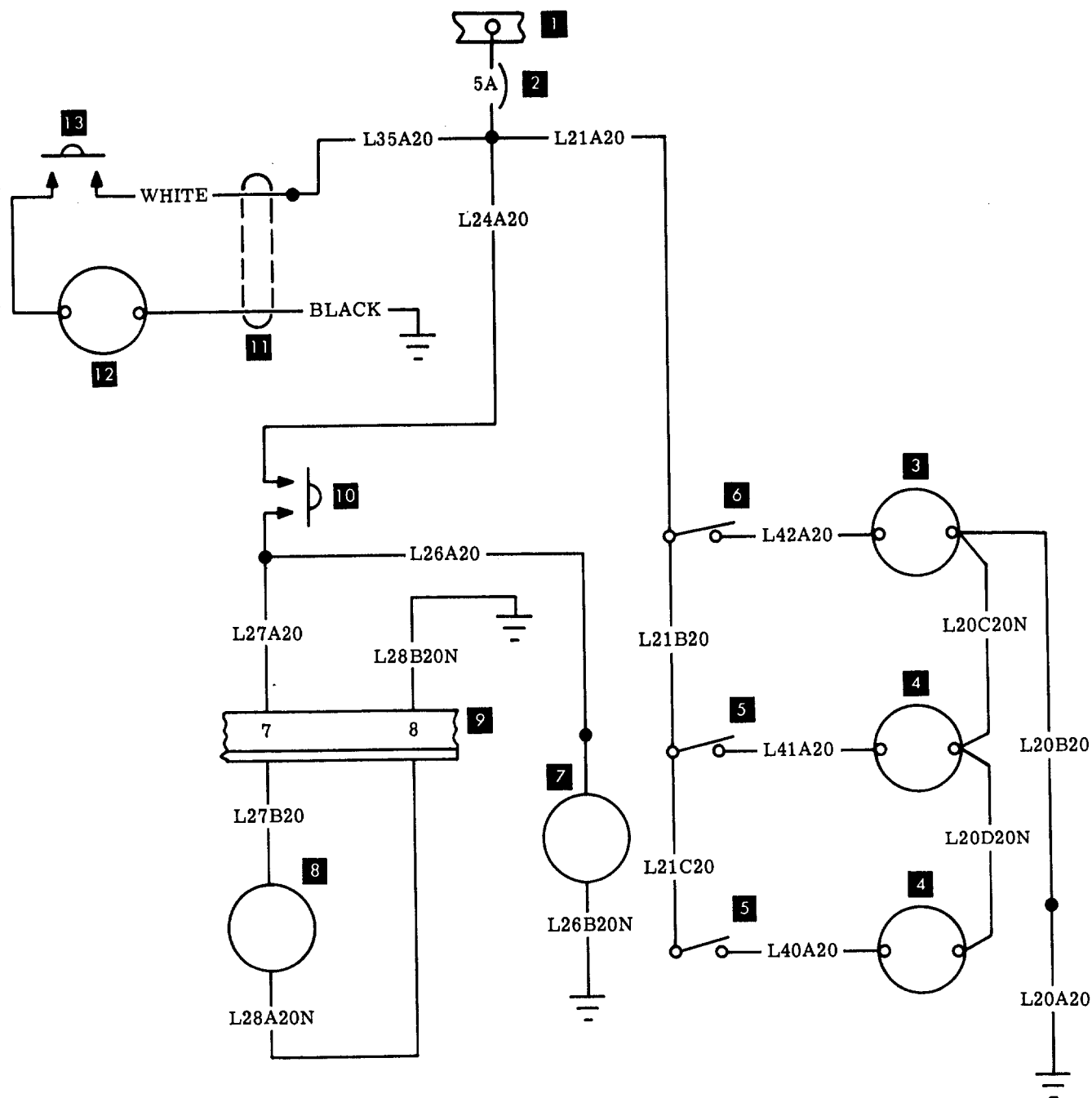
Cabin Lights (Overhead and Vent)
 TC-955 thru TC-1402
 TE-1 thru TE-767

IGNITION START AND
CABIN LIGHTS
CIRCUIT BREAKER



58-369-248A

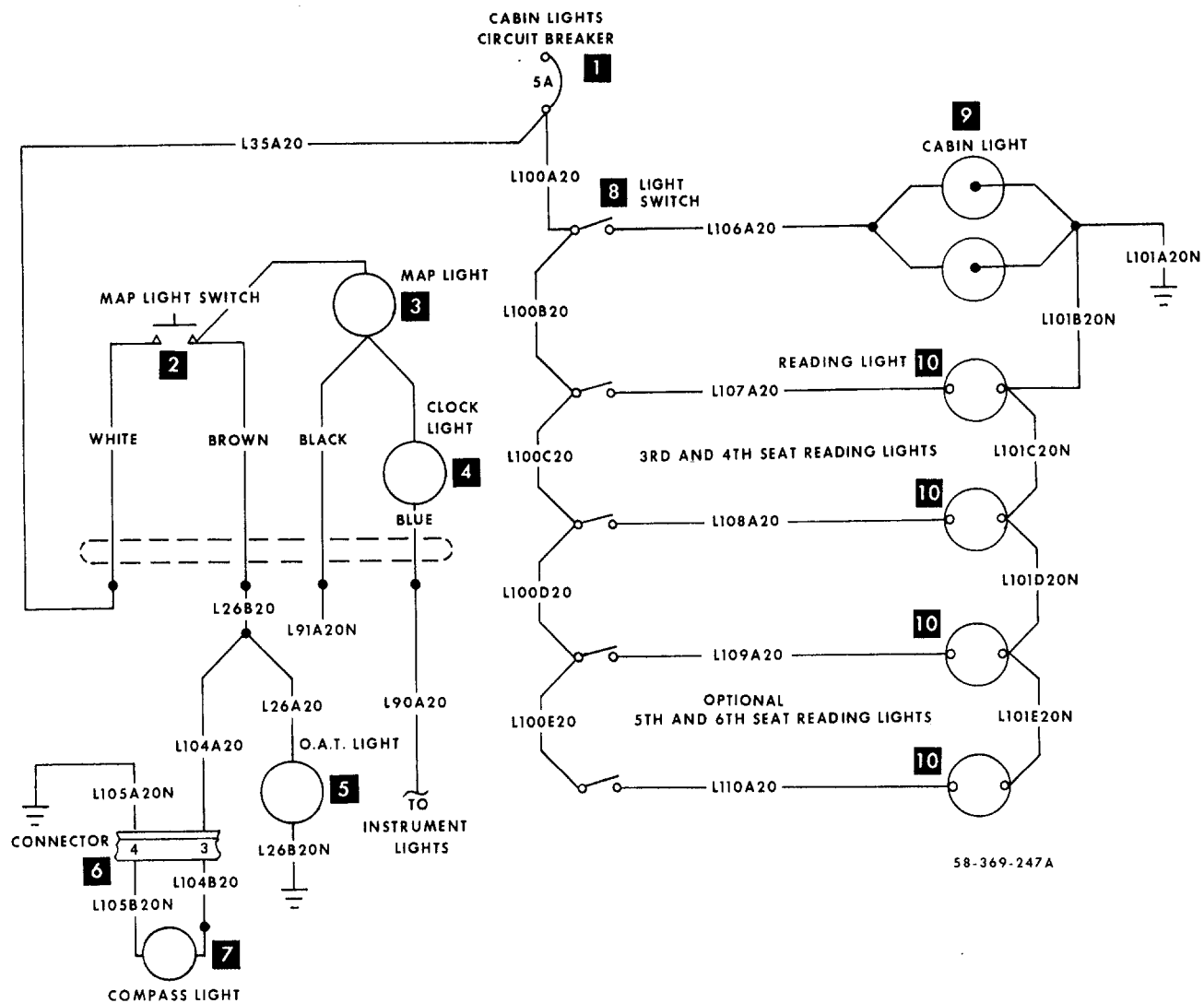
Cabin Lights
TC-1403 thru TC-1935 except TC-1913



1. Bus Bar
2. Circuit Breaker
3. Dome Light
4. Reading Light
5. Reading Light Switch
6. Dome Light Switch
7. O.A.T. Light
8. Compass Light
9. Glareshield Connector
10. Switch
11. Coiled Cord
12. Map Light
13. Map Light Switch

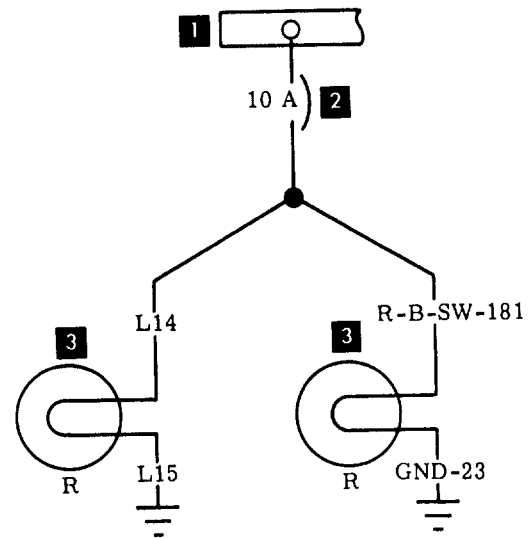
55-369-215

Cabin Lights
TE-768 thru TE-846
TH-1 thru TH-174



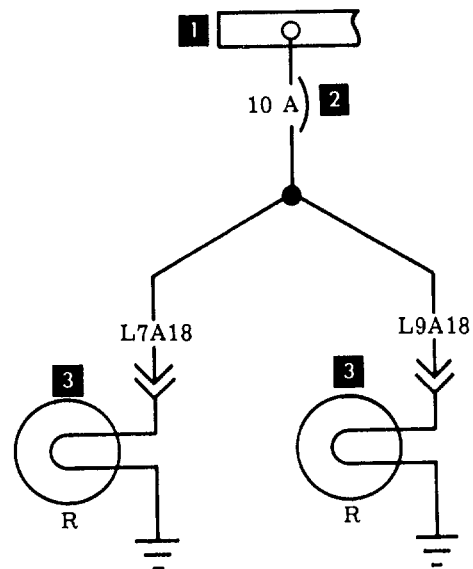
Cabin Lights
 TE-847 thru TE-1063
 TH-175 thru TH-647 except TH-598

1. Bus Bar
2. Circuit Breaker
3. Rotating Beacon



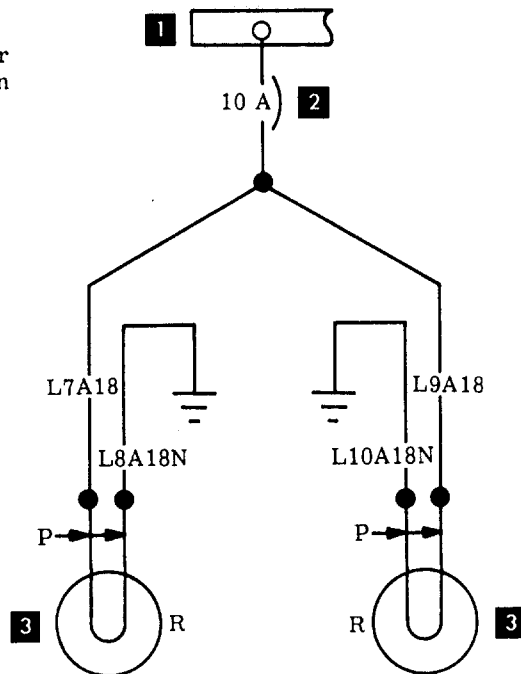
Rotating Beacon
TC-1 thru TC-190

1. Bus Bar
2. Circuit Breaker
3. Rotating Beacon

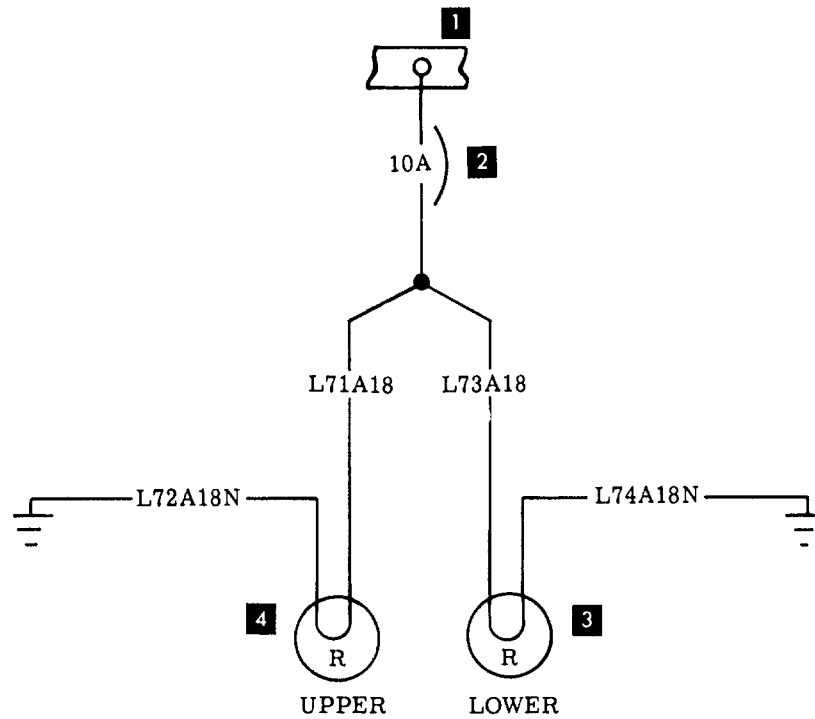


Rotating Beacon
TC-191 thru TC-954

1. Bus Bar
2. Circuit Breaker
3. Rotating Beacon

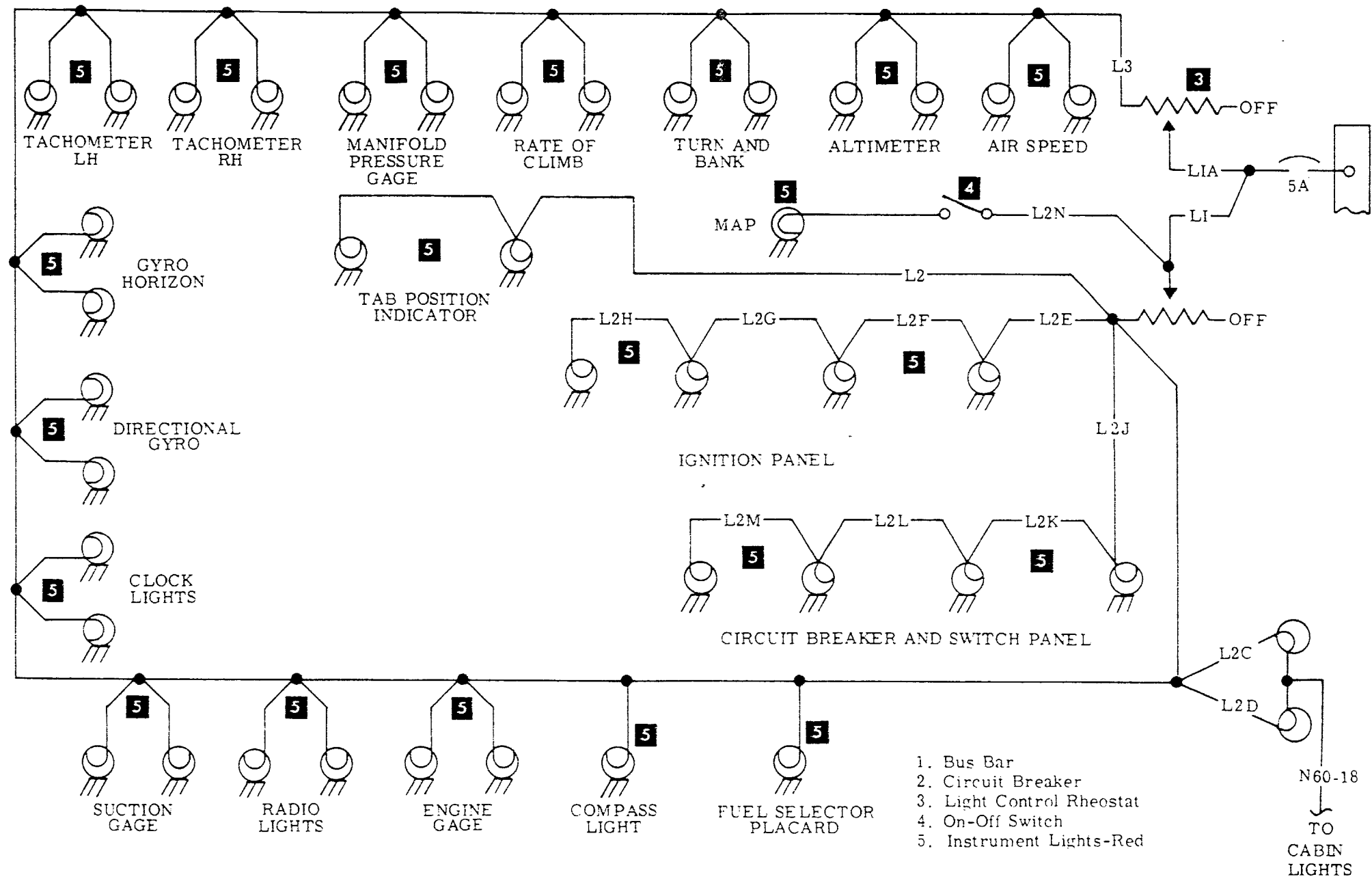


Rotating Beacon
 TC-955 thru TC-1935 except TC-1913
 TE-1 thru TC-767



1. Bus Bar
2. Circuit Breaker
3. Rotating Beacon-Lower-Red
4. Rotating Beacon-Upper-Red

Rotating Beacon
 TE-768 thru TE-1063
 TH-1 thru TH-647 except TH-598

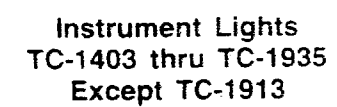


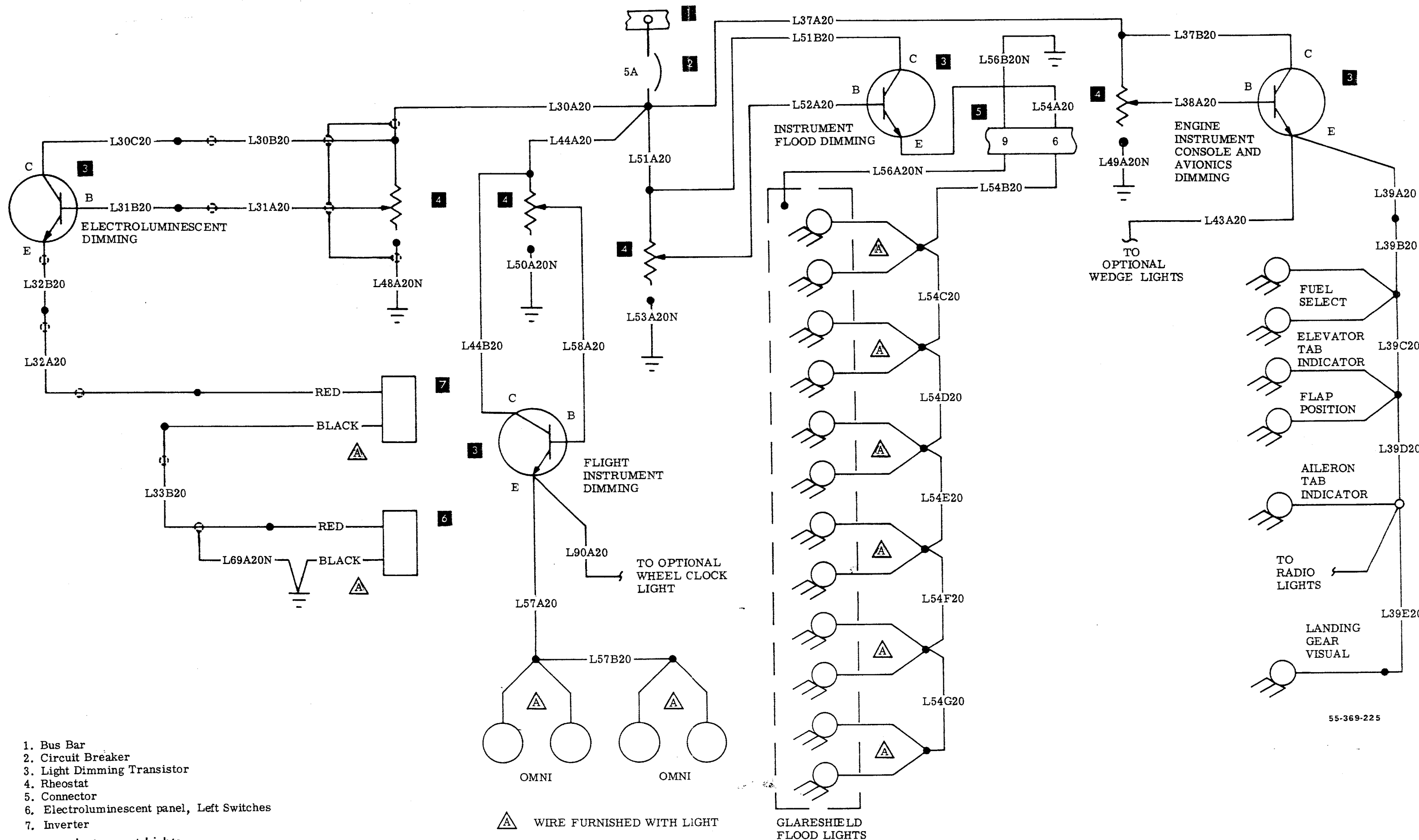
Instrument Lights
 TC-1 thru TC-190

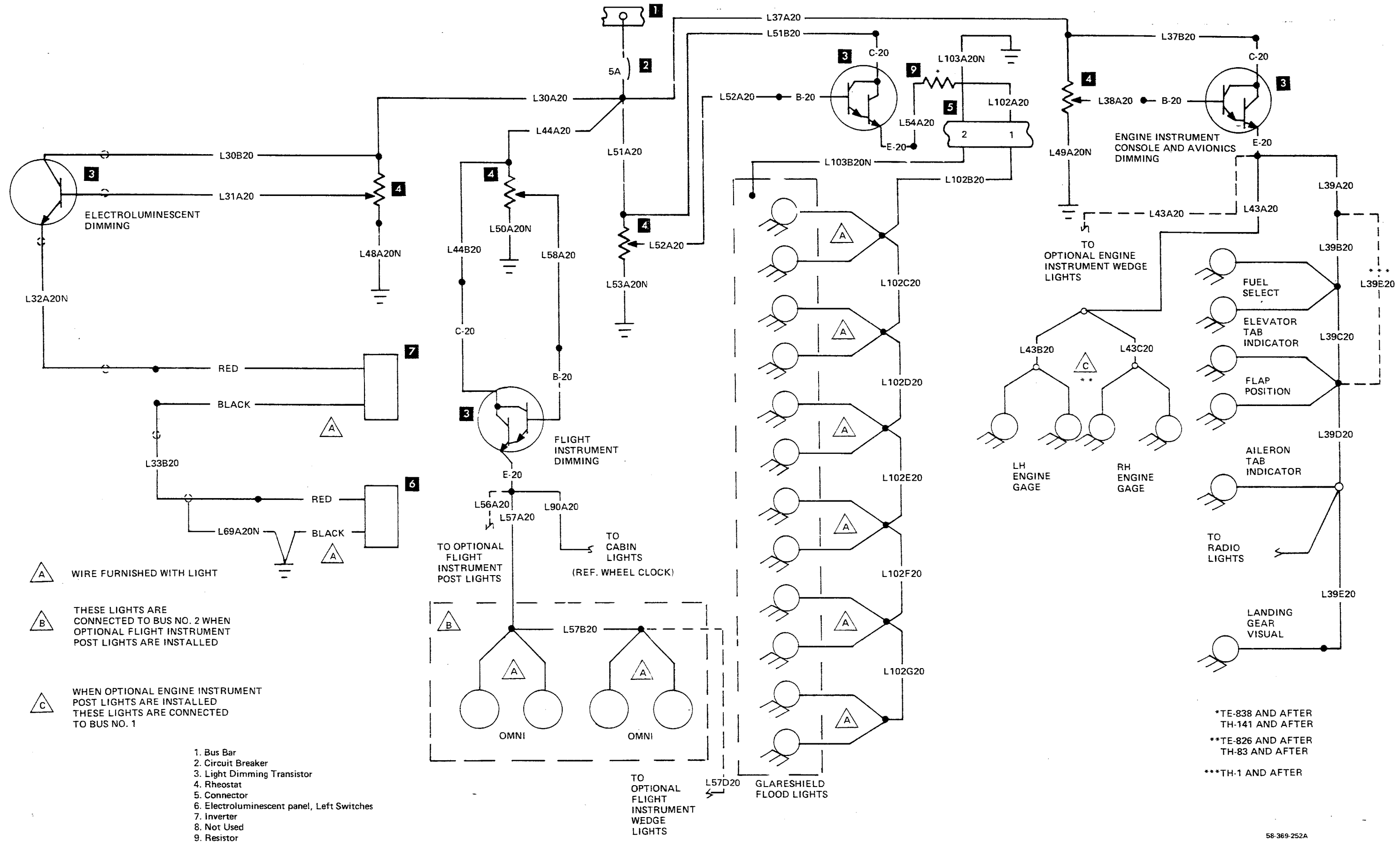
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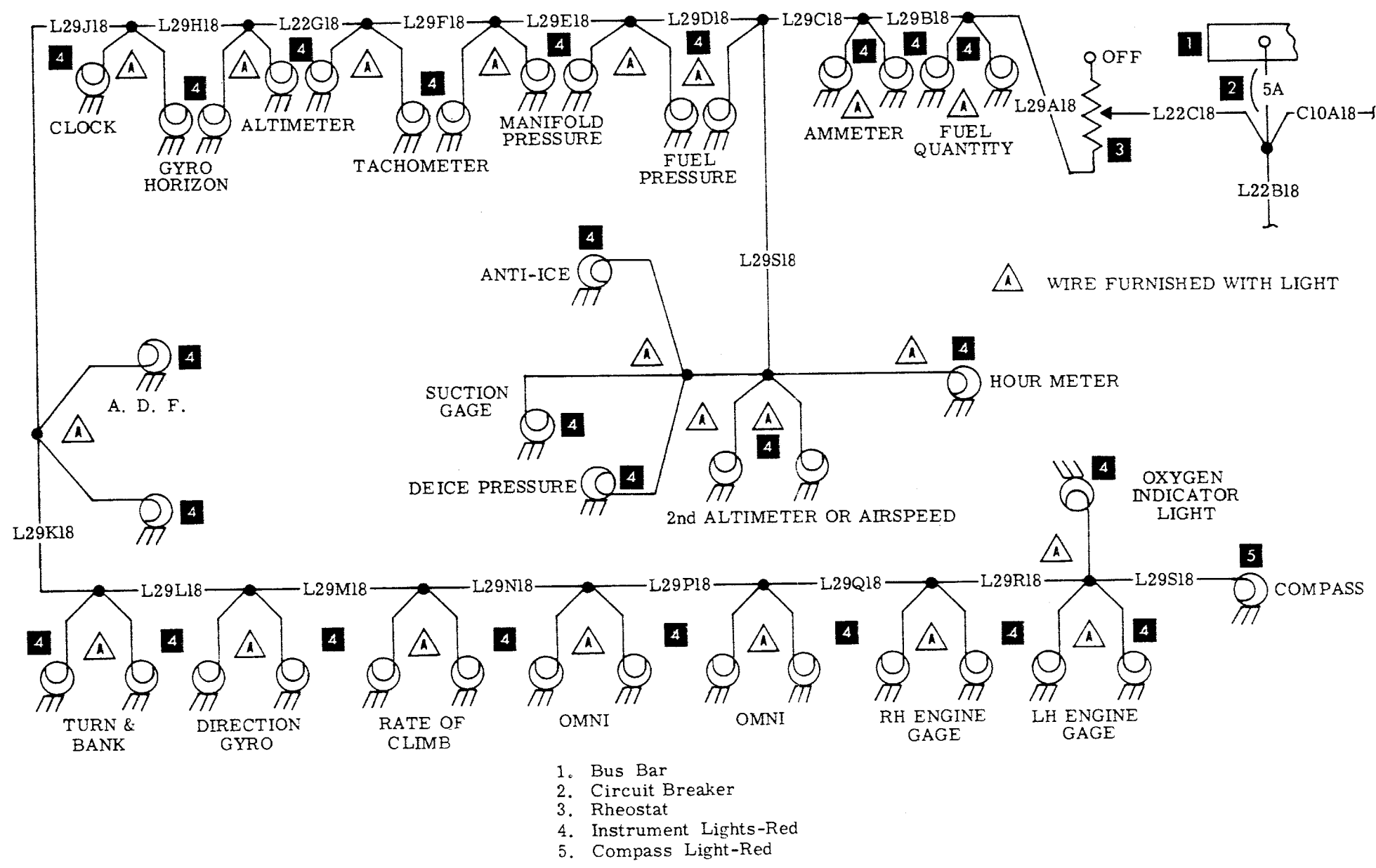
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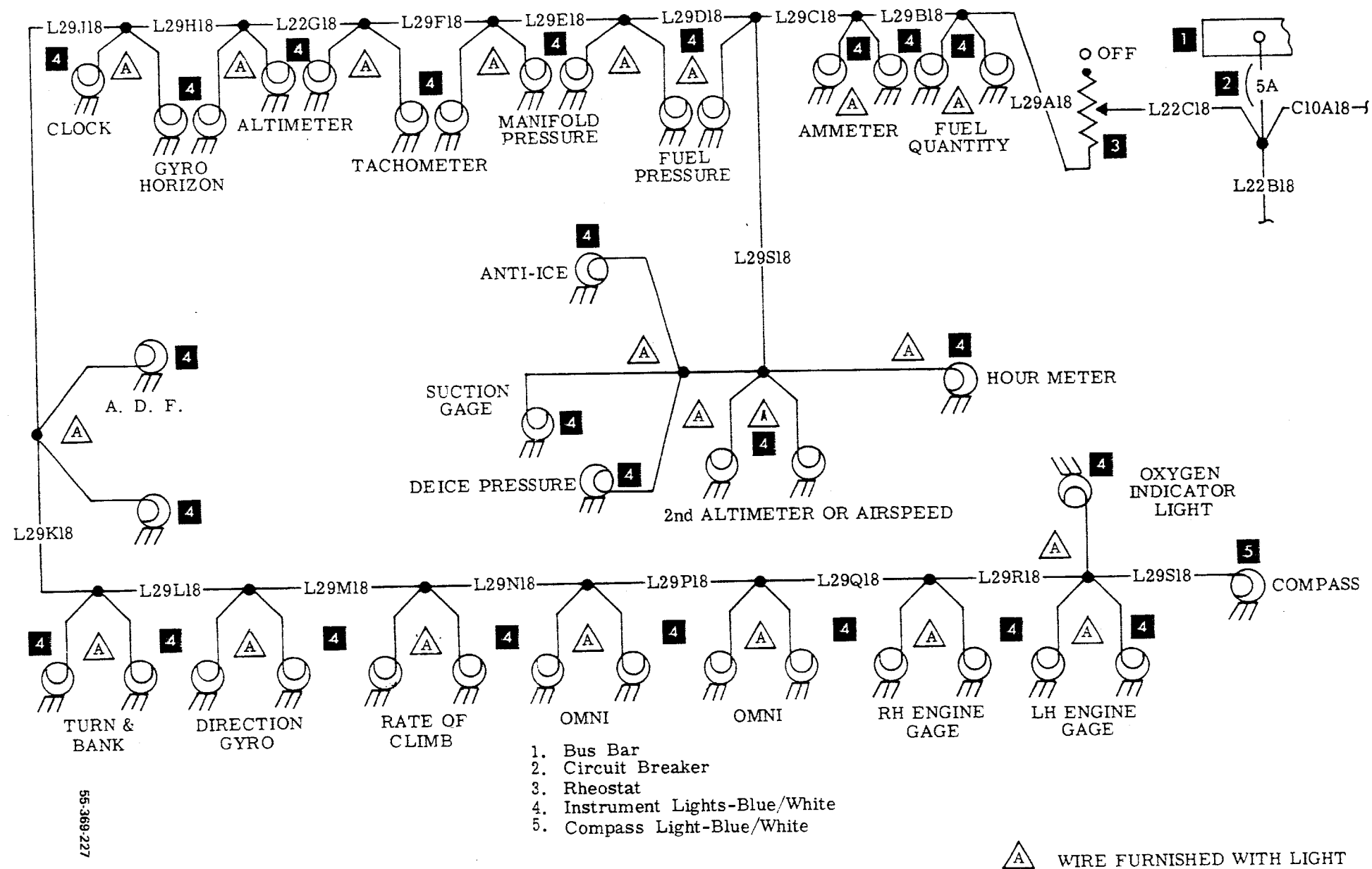




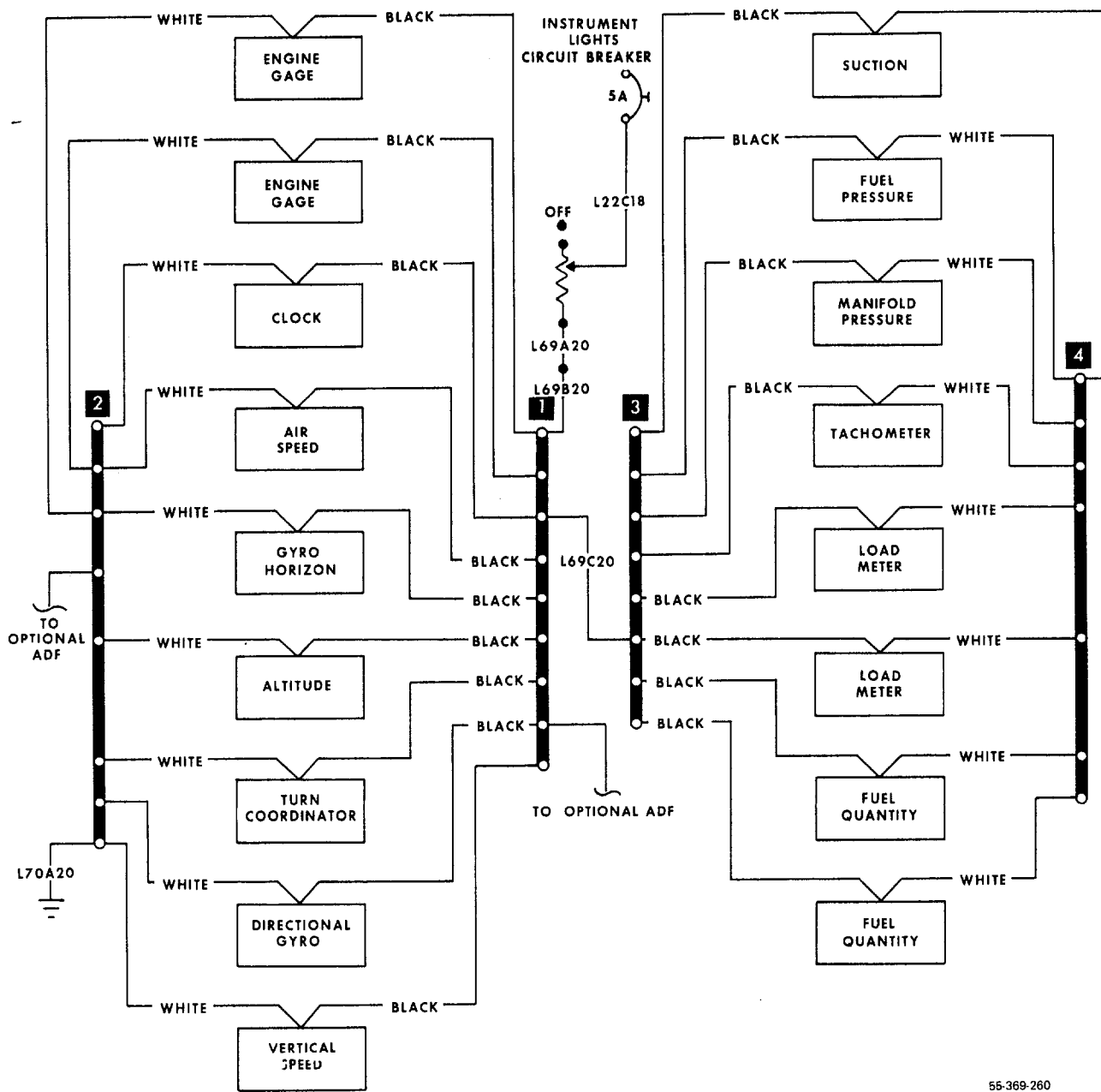
Instrument Lights
TE-938, TE-943 thru TE-1063
TH-385 thru TH-647 except TH-598



Optional Instrument Lights
 TC-191 thru TC-1050
 TE-1 thru TE-451

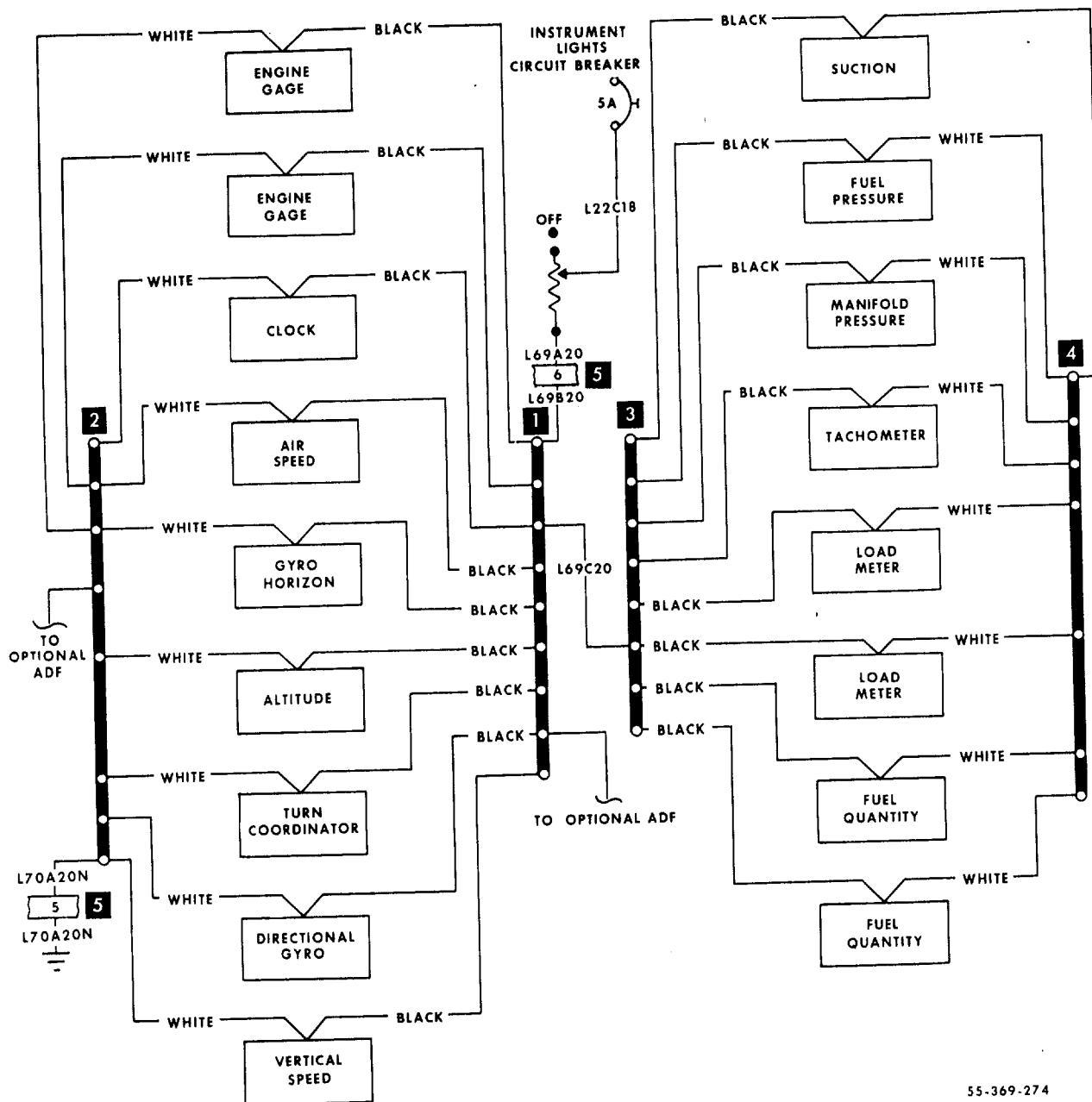


Instrument Post Lights (Optional)
 TC-1051 thru TC-1935 except TC-1913
 TE-452 thru TE-767



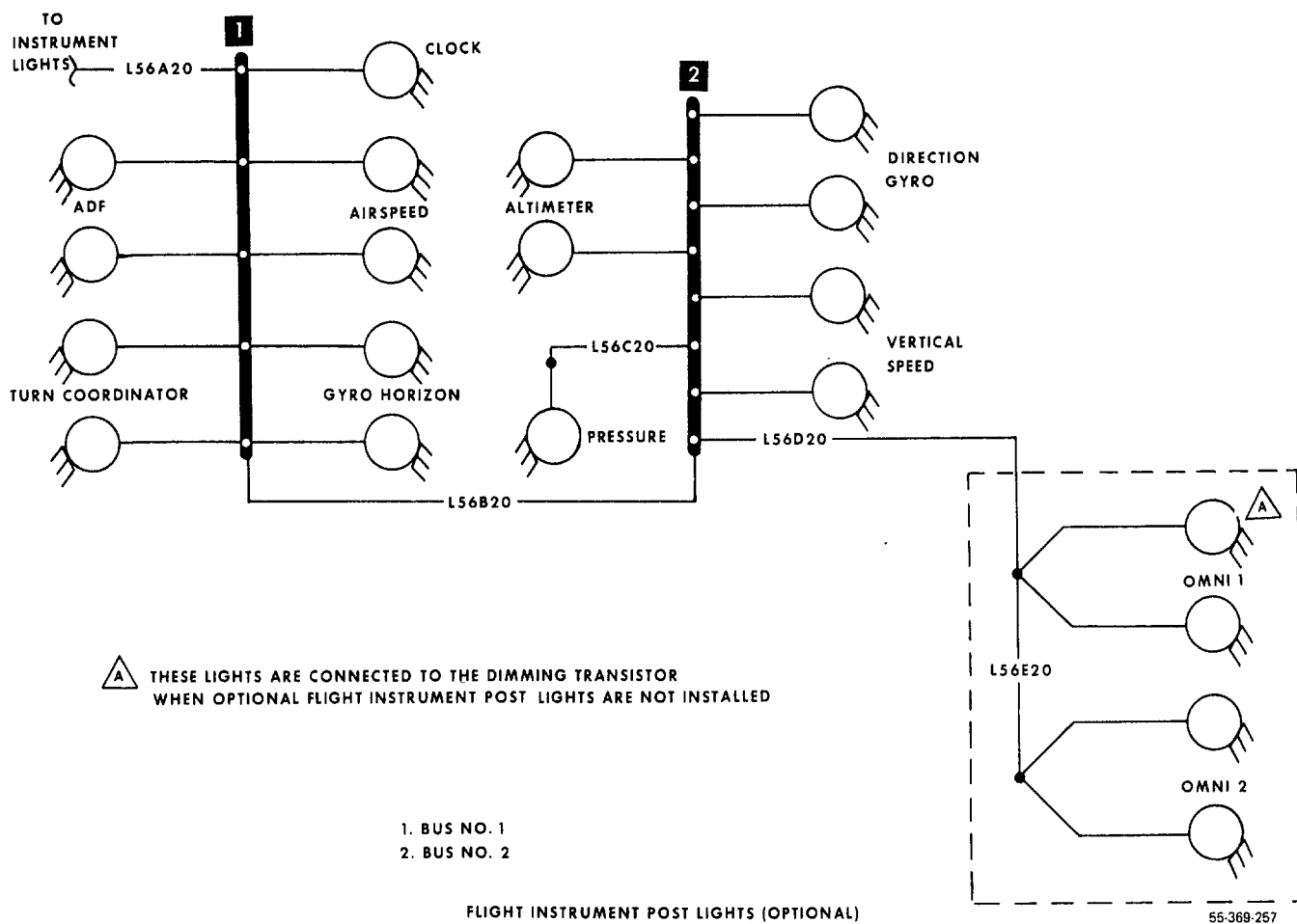
55-369-260

Optional Instrument Wedge Lights
TC-1299 thru TC-1329

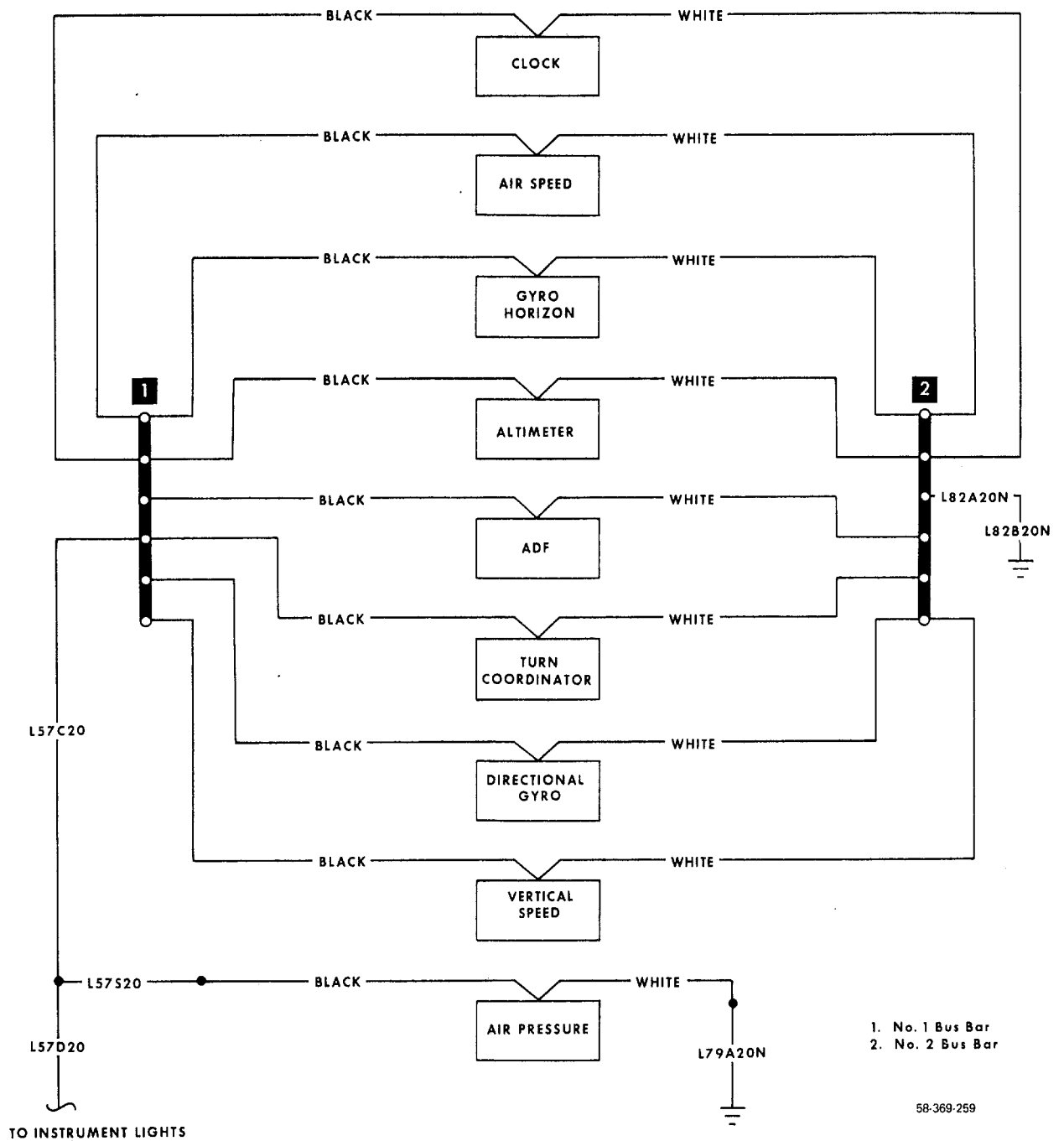


1. No. 1 Bus
2. No. 2 Bus
3. No. 3 Bus
4. No. 4 Bus
5. Connector

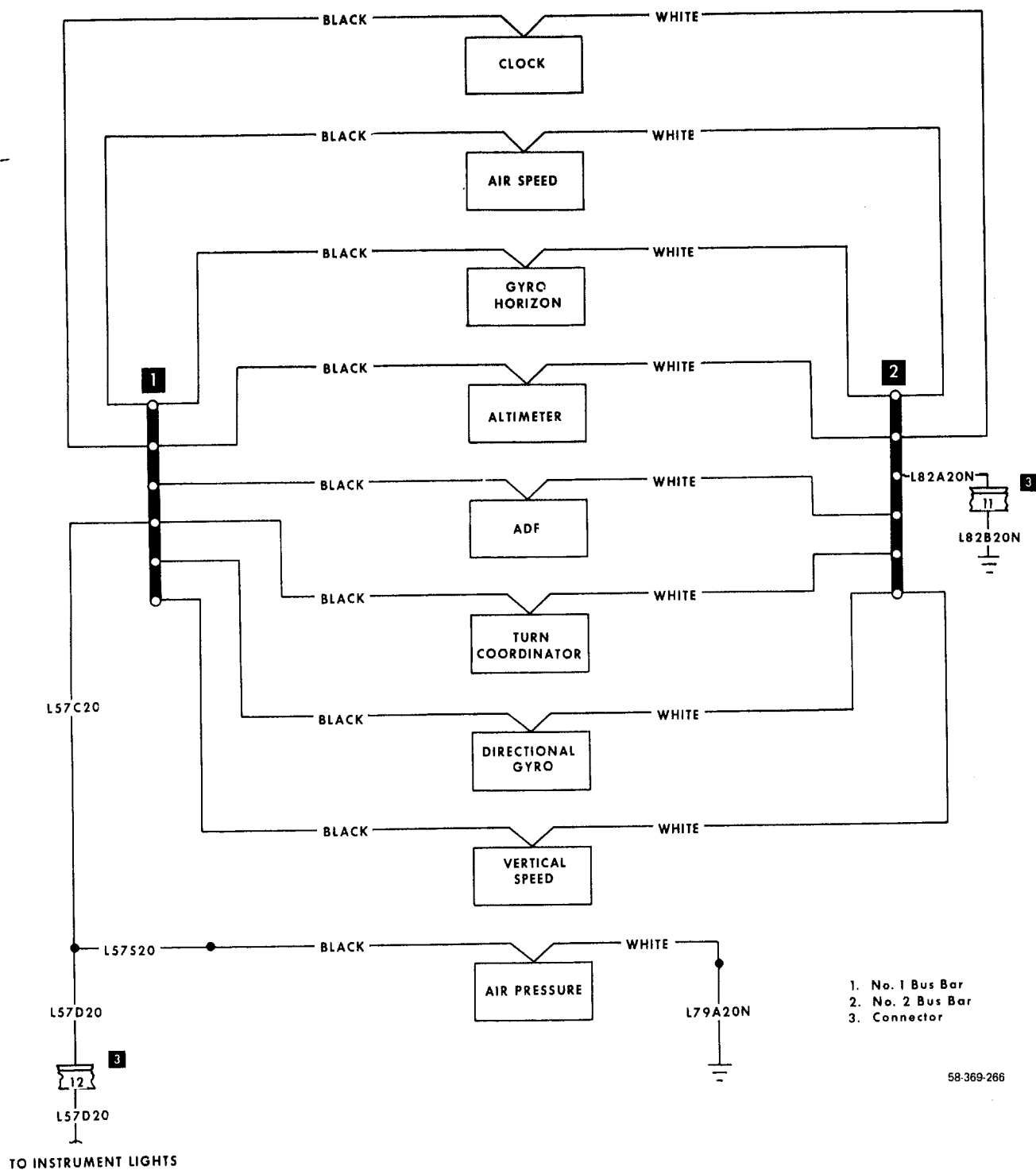
Instrument Wedge Lights (Optional)
TC-1330 thru TC-1935 except TC-1913



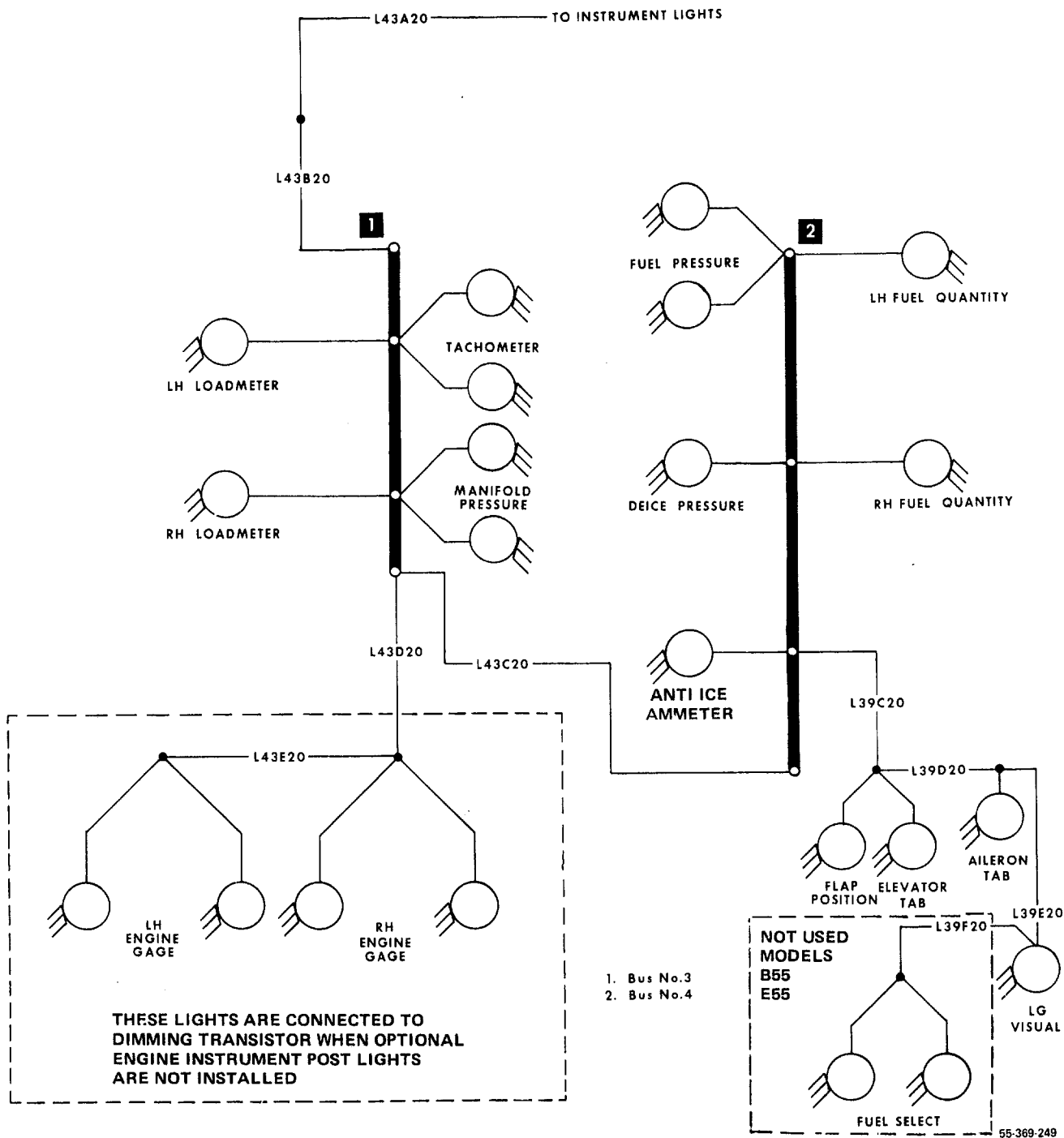
Flight Instrument Post Lights (Optional)
TE-841 thru TE-1063
TH-161 thru TH-647 except TH-598



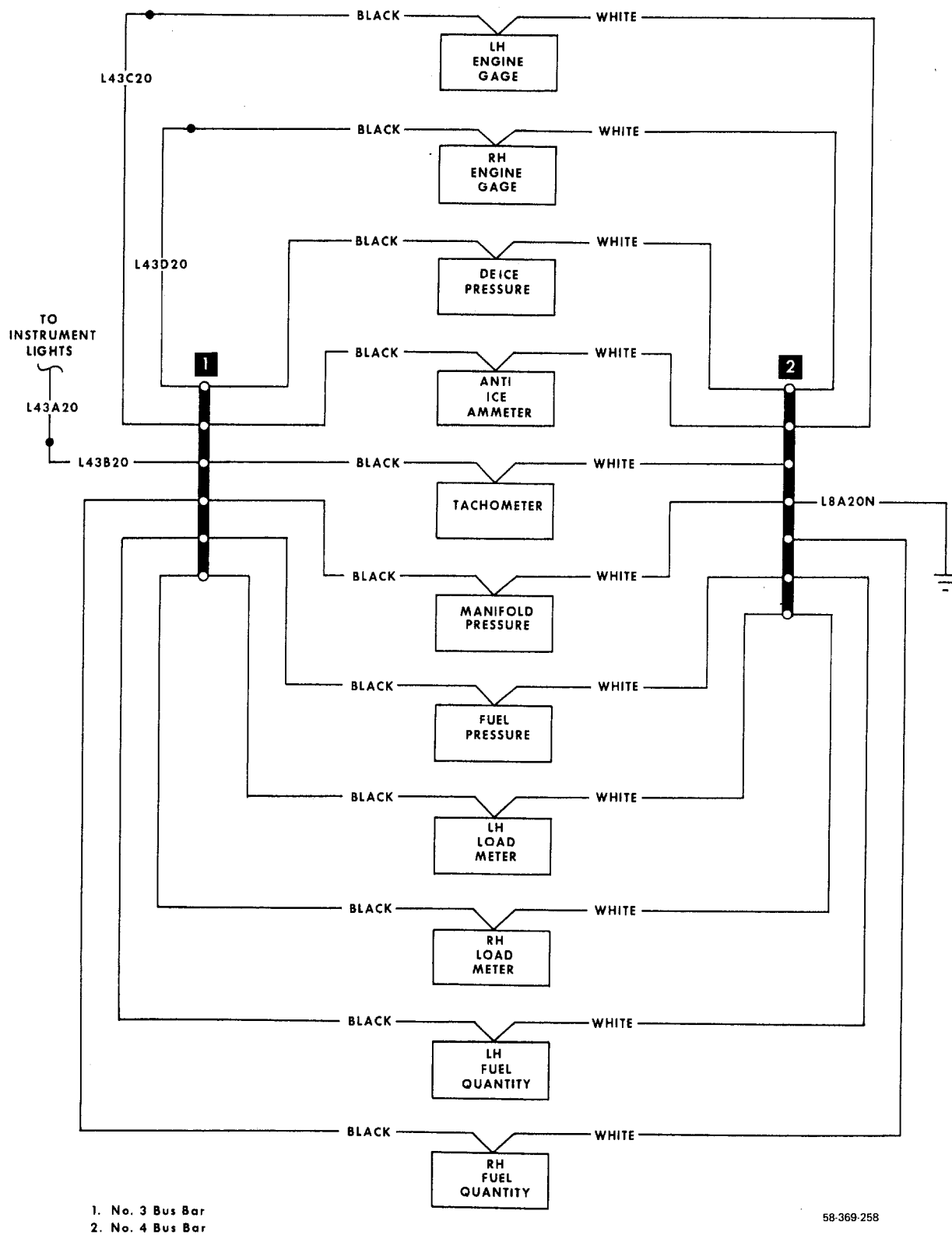
Optional Flight Instrument Wedge Lights
 TE-768 thru TE-873
 TH-1 thru TH-253



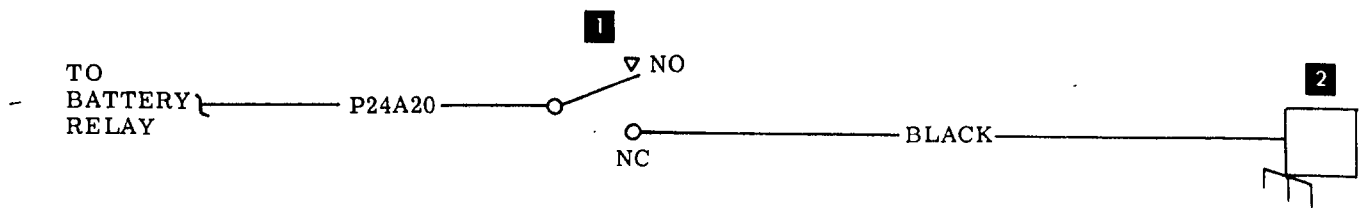
Flight Instrument Wedge Lights (Optional)
 TE-874 thru TE-1063
 TH-254 thru TH-647 except TH-598



Engine Instrument Post Lights (Optional)
 TC-1391 thru TC-1935 except TC-1913
 TE-841 thru TE-1063
 TH-161 thru TH-647 except TH-598

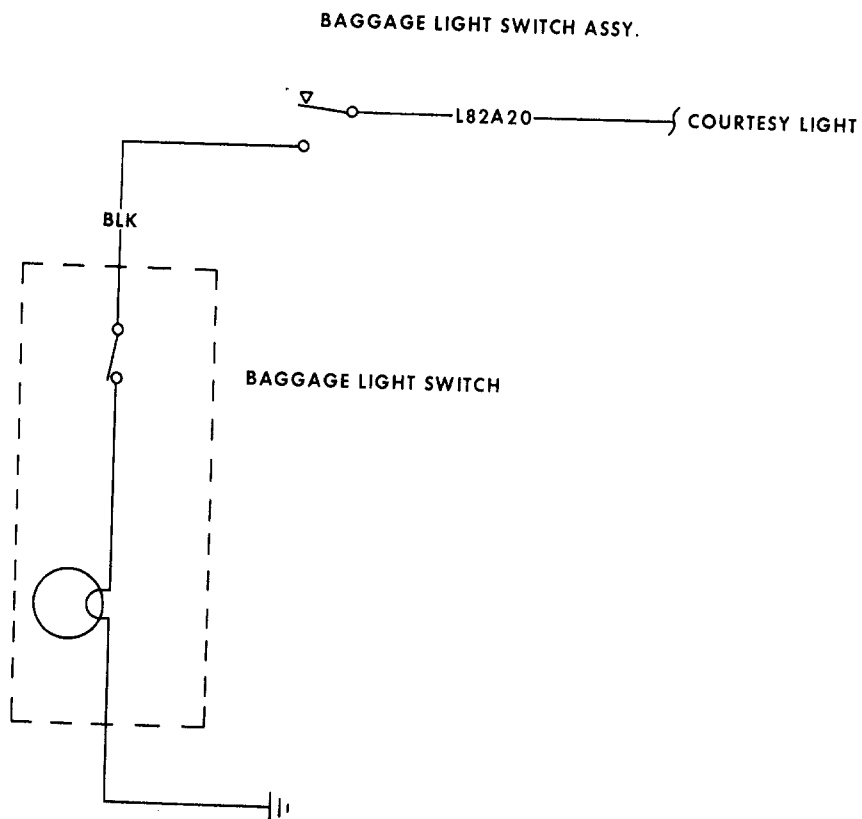


Engine Instrument Wedge Lights (Optional)
TE-768 thru TE-1063
TH-1 thru TH-647 except TH-598



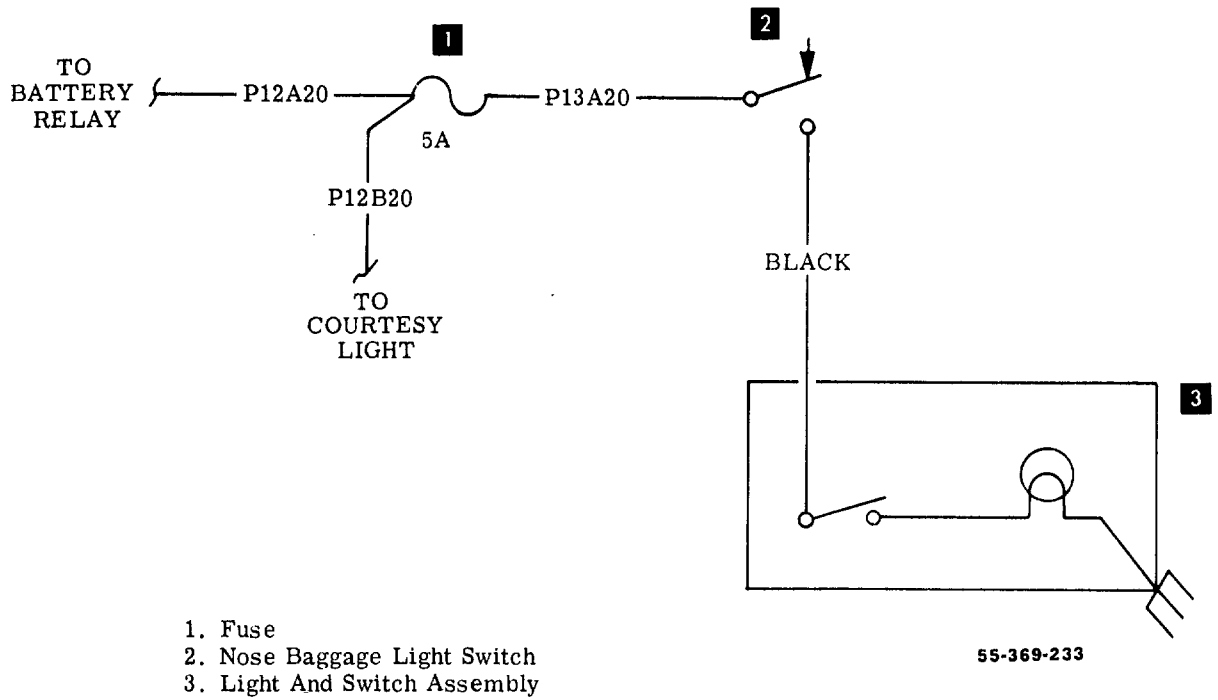
1. Nose Baggage Compartment Light Switch
2. Nose Baggage Light and Switch

Nose Baggage Compartment Light TE-1 thru TE-767

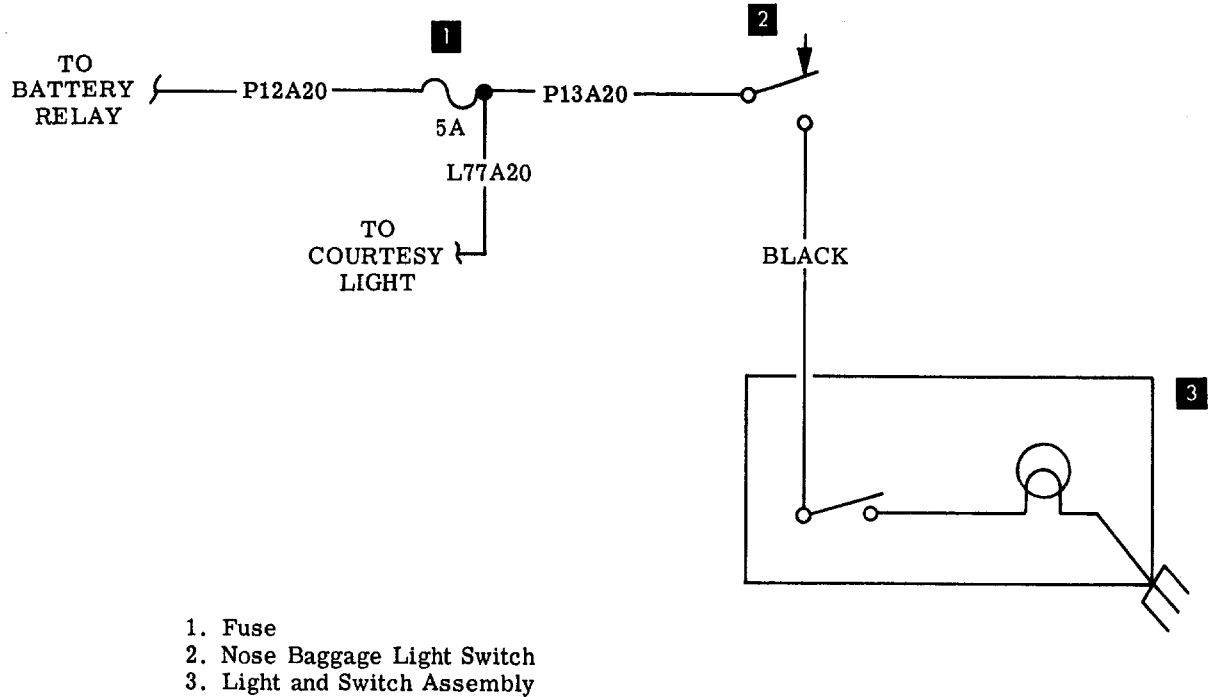


B55-369-301

Nose Baggage Compartment Light TC-1828 thru TC-1935 except TC-1913



Nose Baggage Compartment Light
TE-768 thru TE-848
TH-1 thru TH-185



Nose Baggage Compartment Light
TE-839 thru TE-1063
TH-186 thru TH-647 except TH-598

TO NOSE
BAGGAGE
COMPARTMENT
LIGHT

P12B20

1

5A

L77A20

L77B20

C

2

NC

L77C20

3

L34D20N

55-369-234

1. Fuse
2. Switch
3. Courtesy Light

Courtesy Light
TE-768 thru TE-848
TH-1 thru TH-185

TO NOSE
BAGGAGE
COMPARTMENT
LIGHT

~

L77A20

L77B20

C

1

NC

L77C20

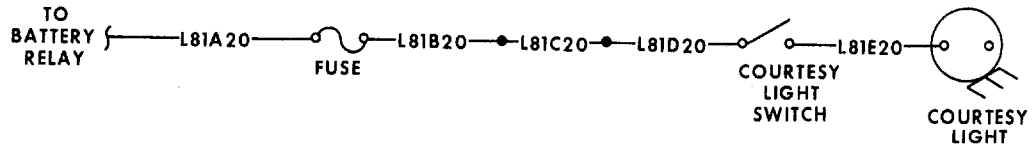
2

L34D20N

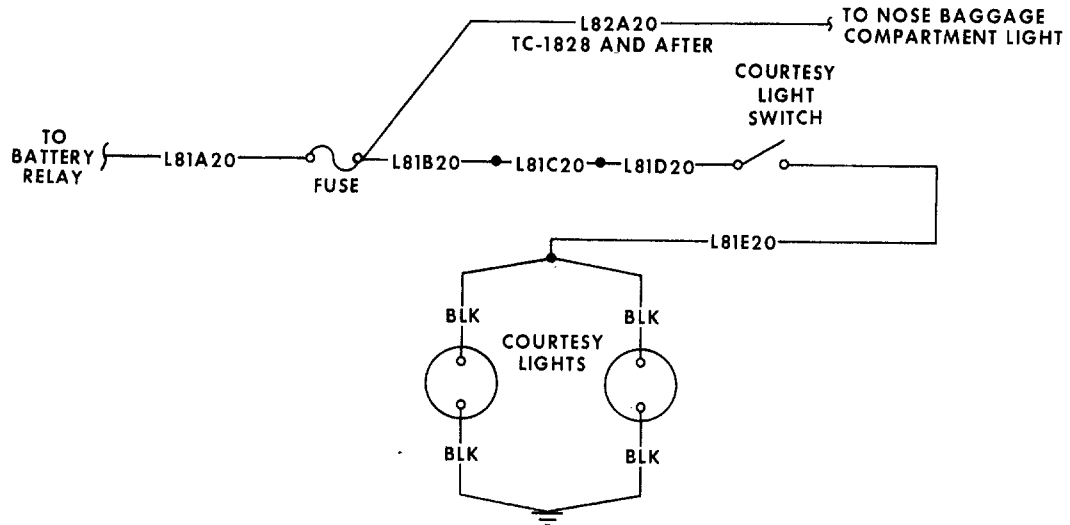
55-369-234A

1. Switch
2. Courtesy Light

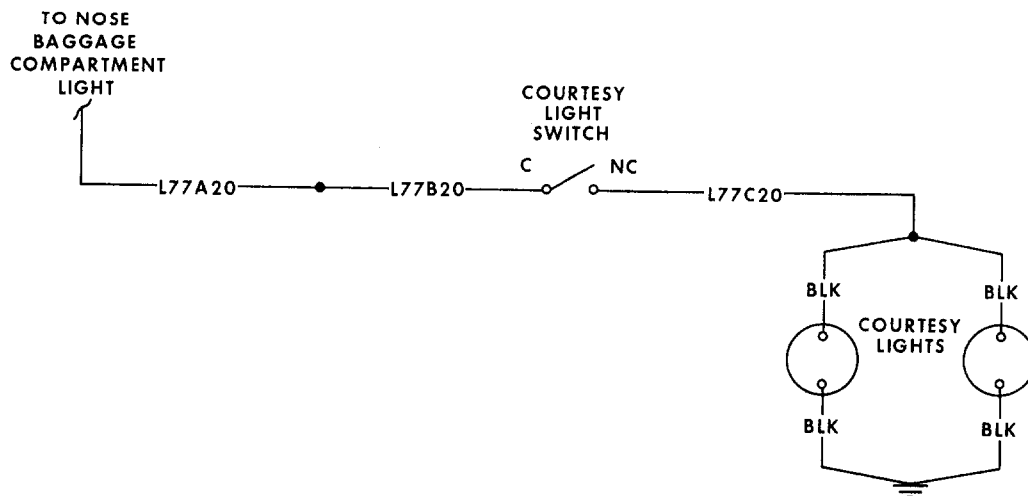
Courtesy Light
TE-849 thru TE-942 except TE-938
TH-186 thru TH-384



Courtesy Light
TC-1403 thru TC-1607

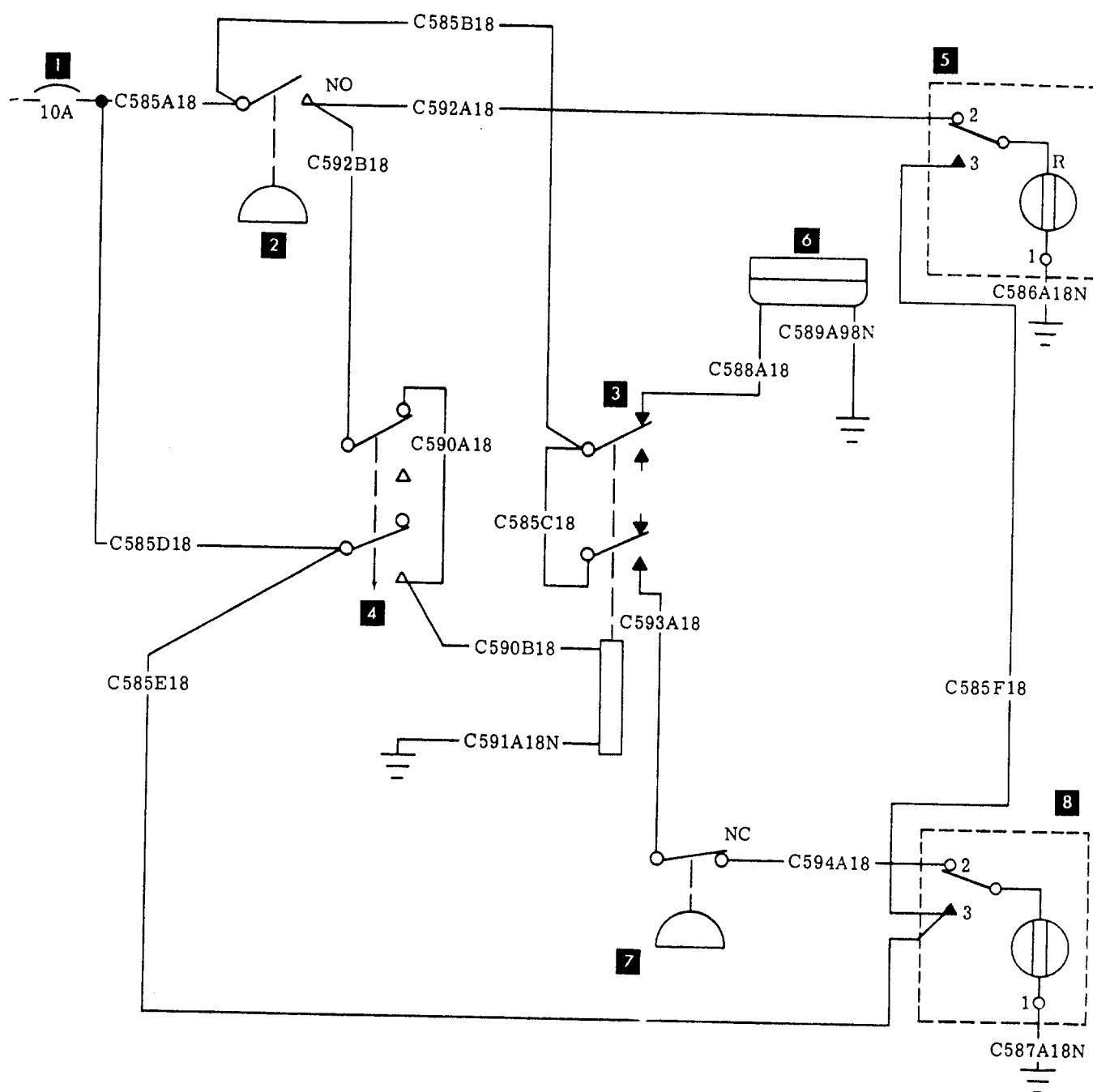


Courtesy Light
TC-1608 thru TC-1935 except TC-1913



55-369-302

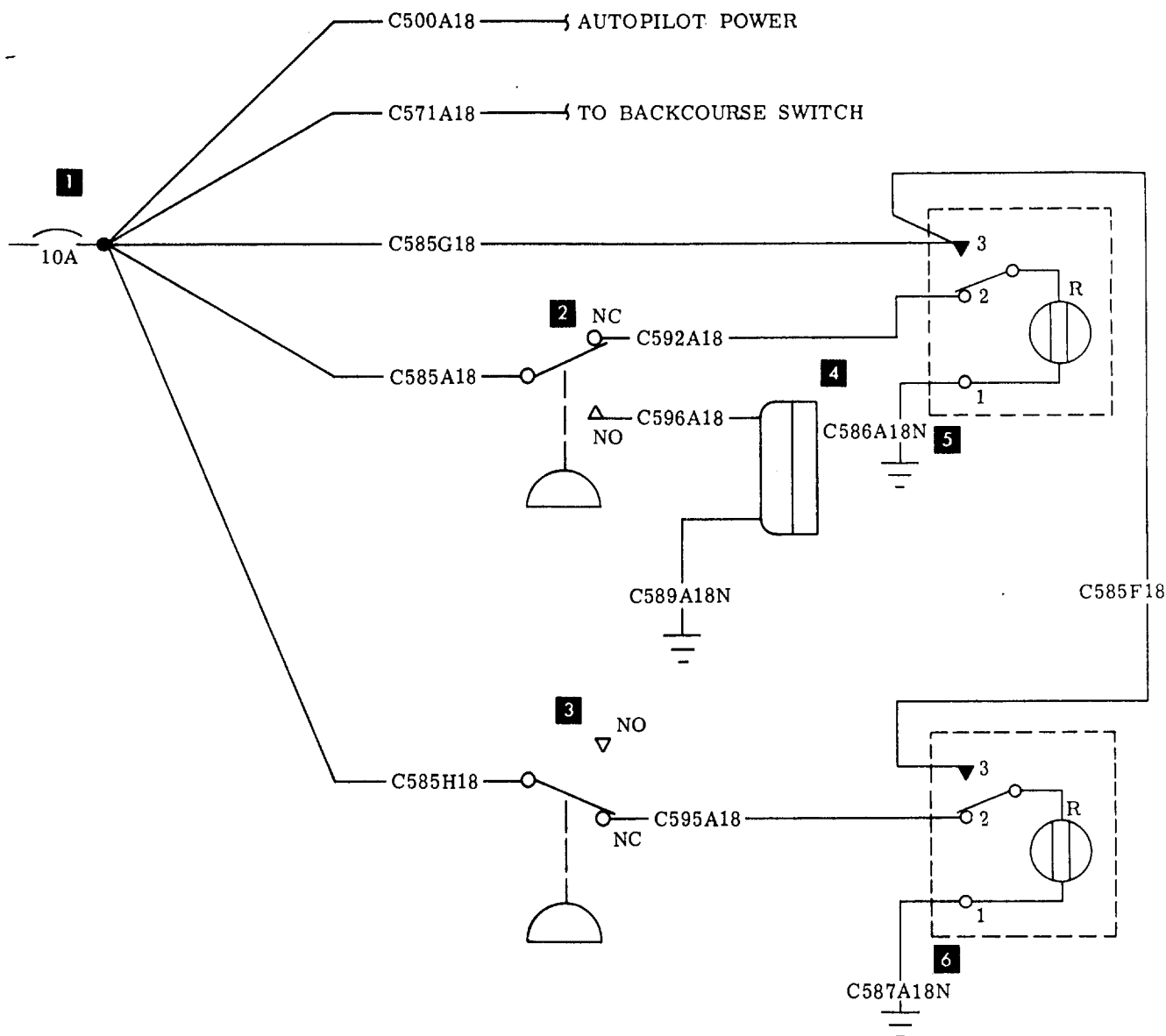
Courtesy Light
TE-938, TE-943 thru TE-1063
TH-385 thru TH-647 except TH-598



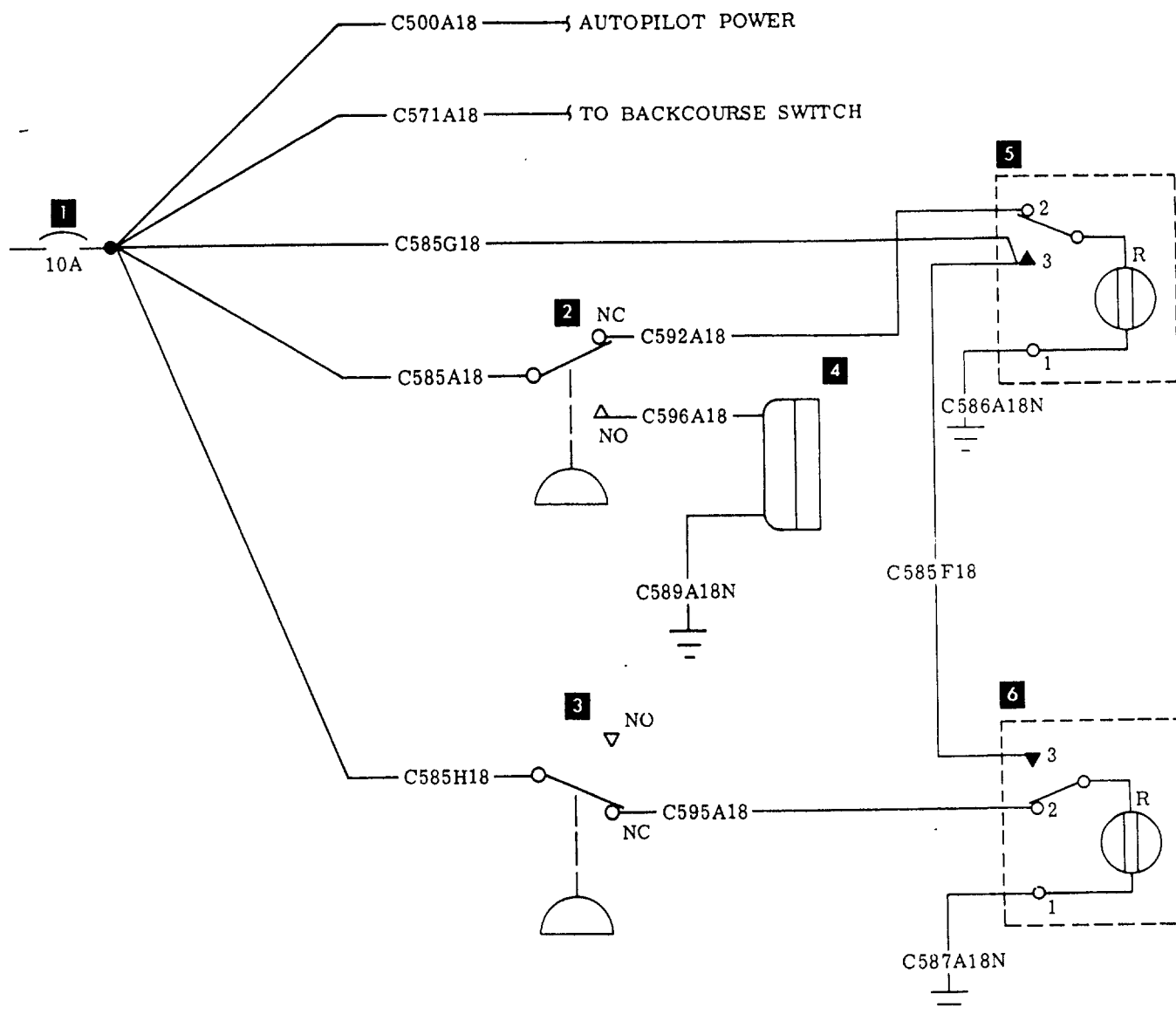
1. Autopilot Circuit Breaker
2. Vacuum Switch
3. Vacuum Pressure Relay
4. Vacuum Test Switch

5. Vacuum Failure Light
6. Ram Air Solenoid (N. C.)
7. Pressure Switch
8. Pressure Failure Light

Vacuum Pressure Indicator
(TC-602 through TC-837)

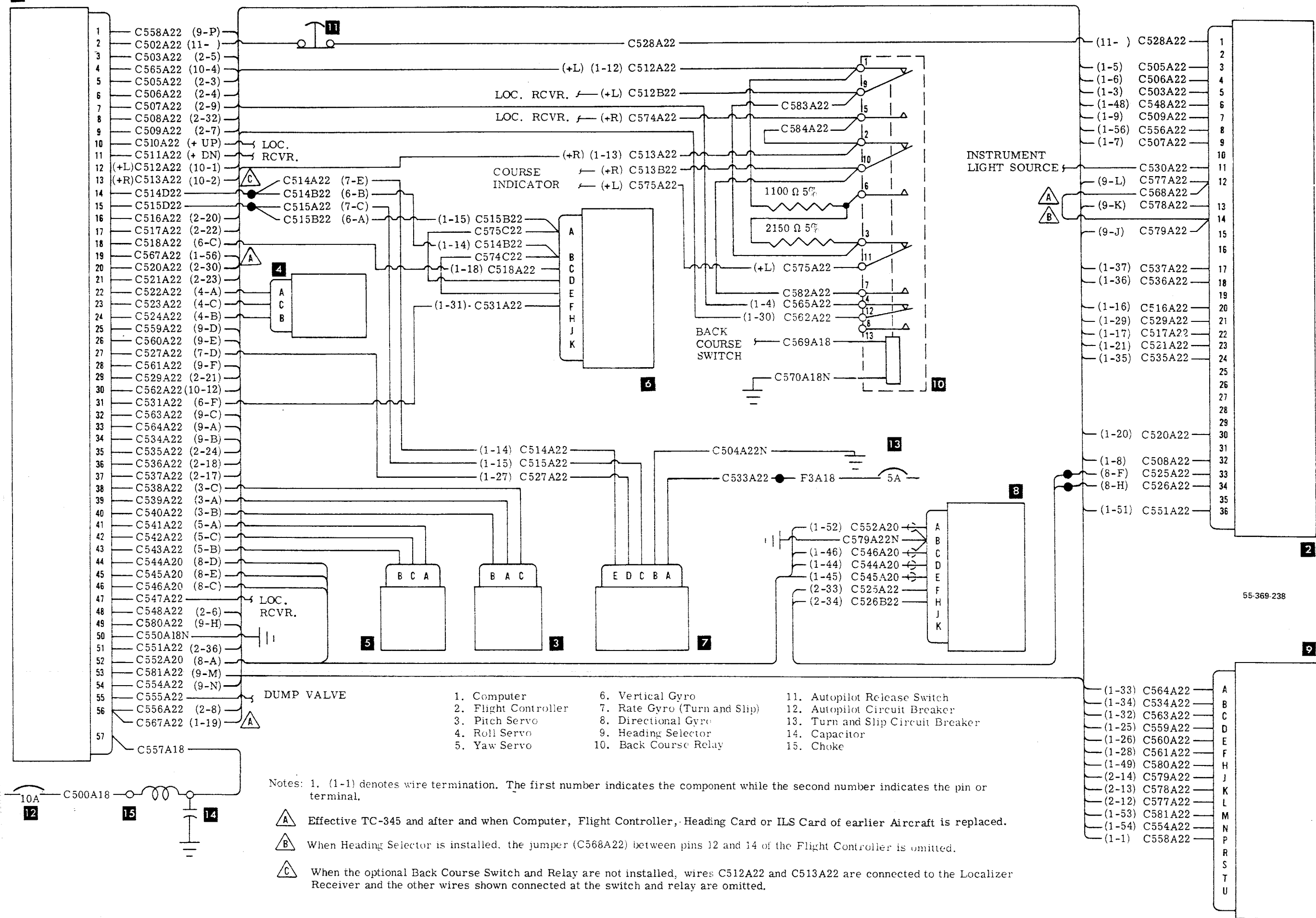


H-14 Autopilot Vacuum and Pressure Indicator
TC-838 thru TC-1935 except TC-1913

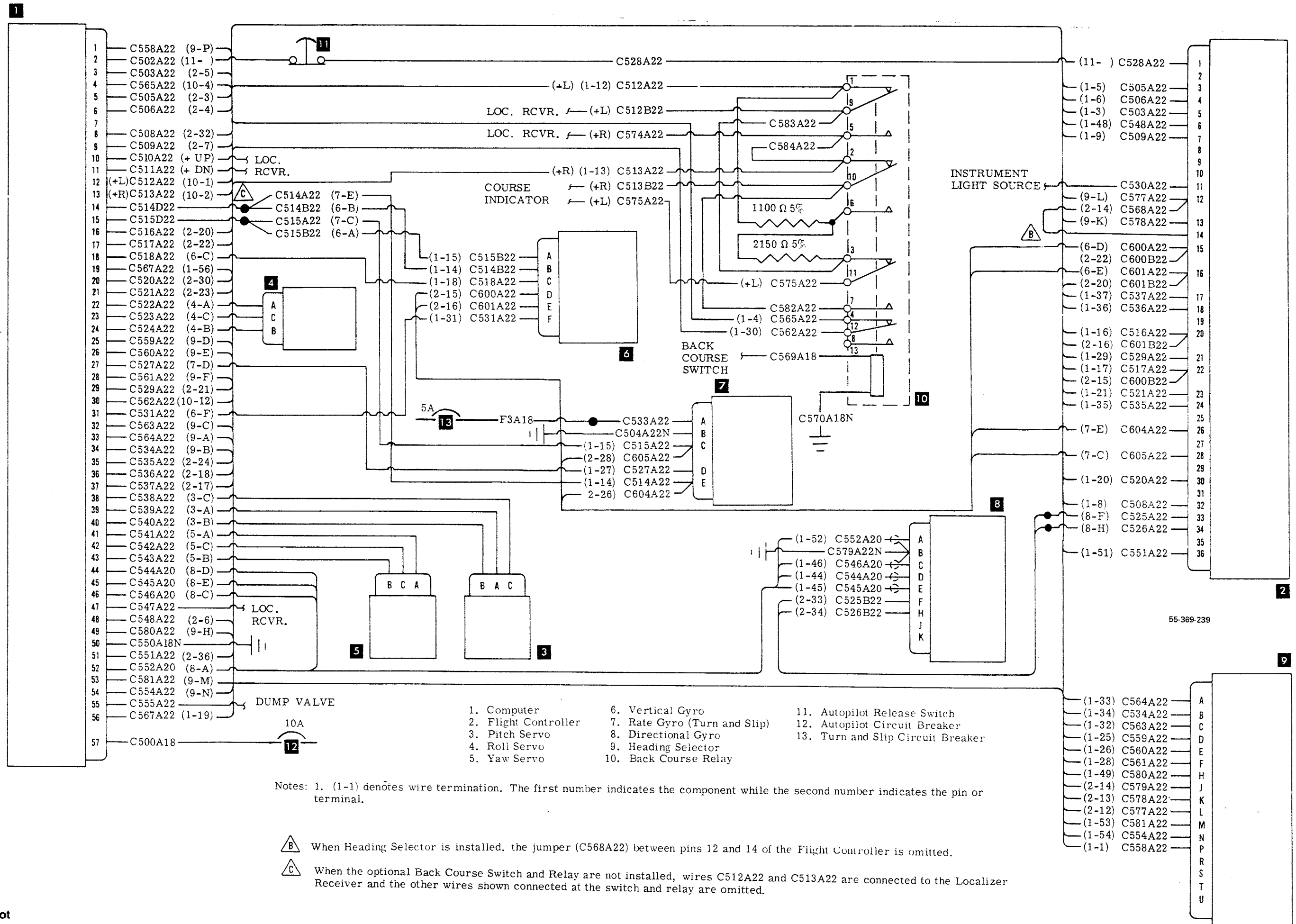


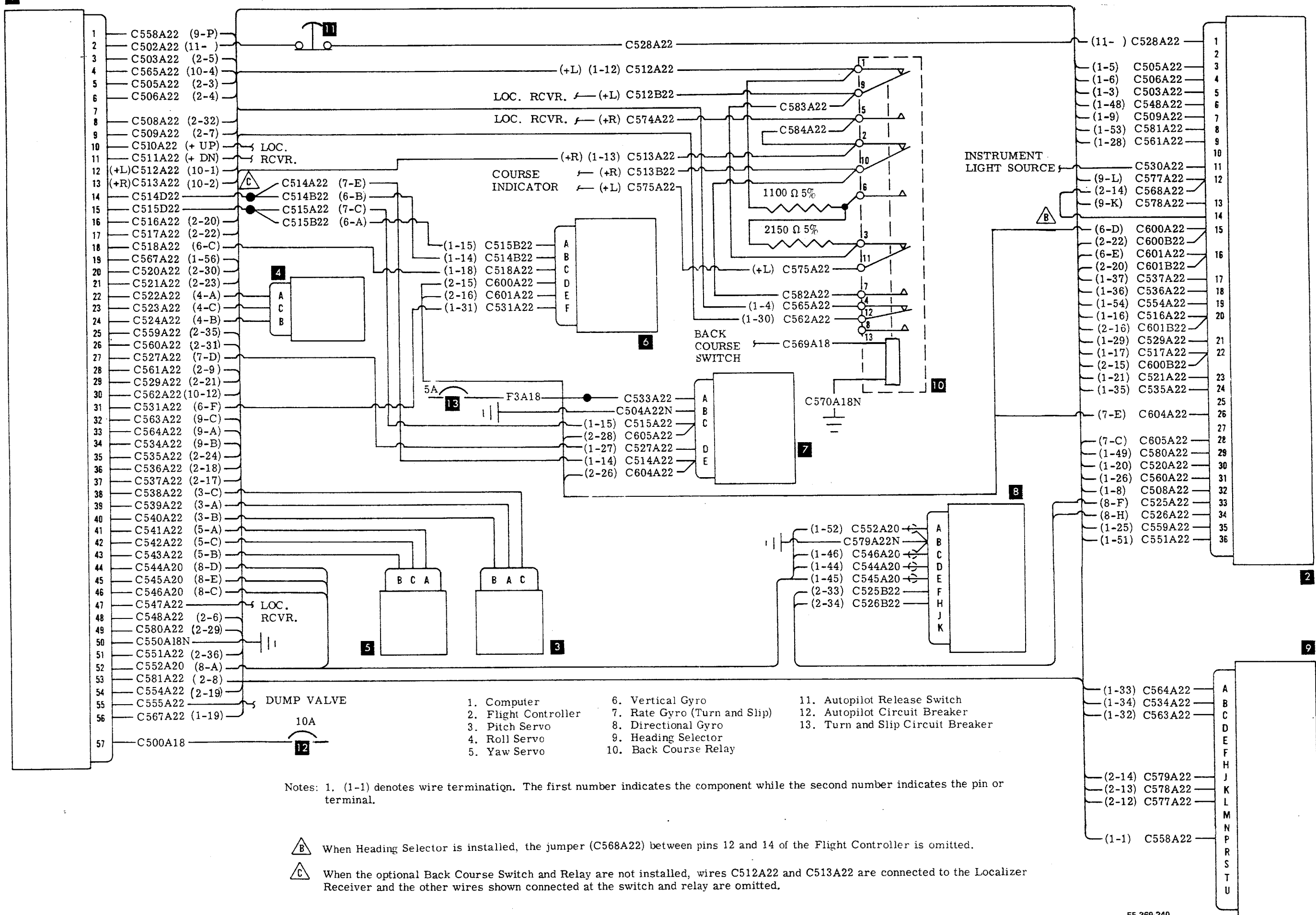
1. Autopilot Circuit Breaker
2. Vacuum Switch
3. Pressure Switch
4. Ram Air Solenoid (N.C.)
5. Vacuum Failure Light
6. Pressure Failure Light

H-14 Autopilot Vacuum and Pressure Indicator
TE-1 thru TE-451



H-14 Autopilot
TC-1 thru TC-814

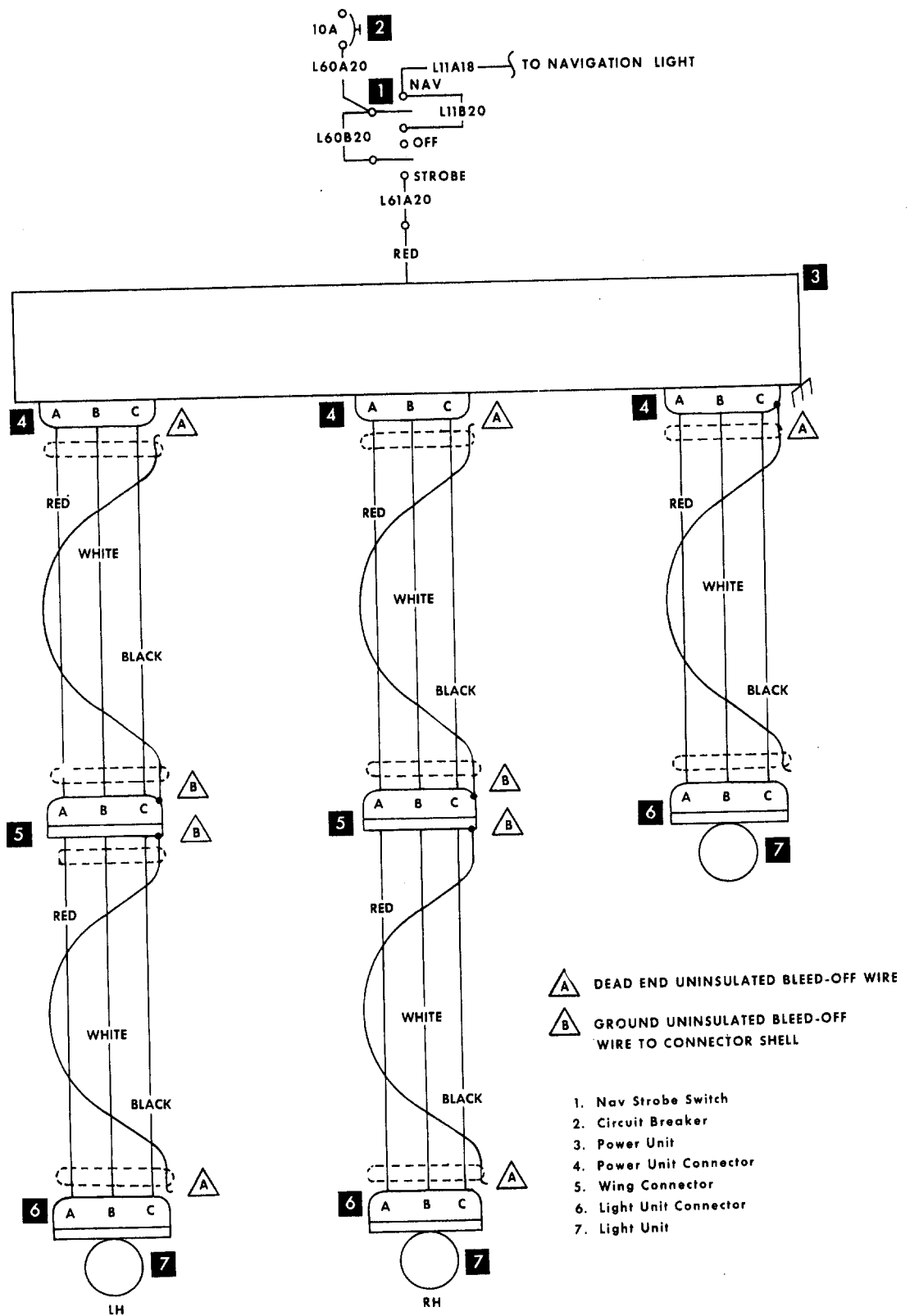




55-369-240

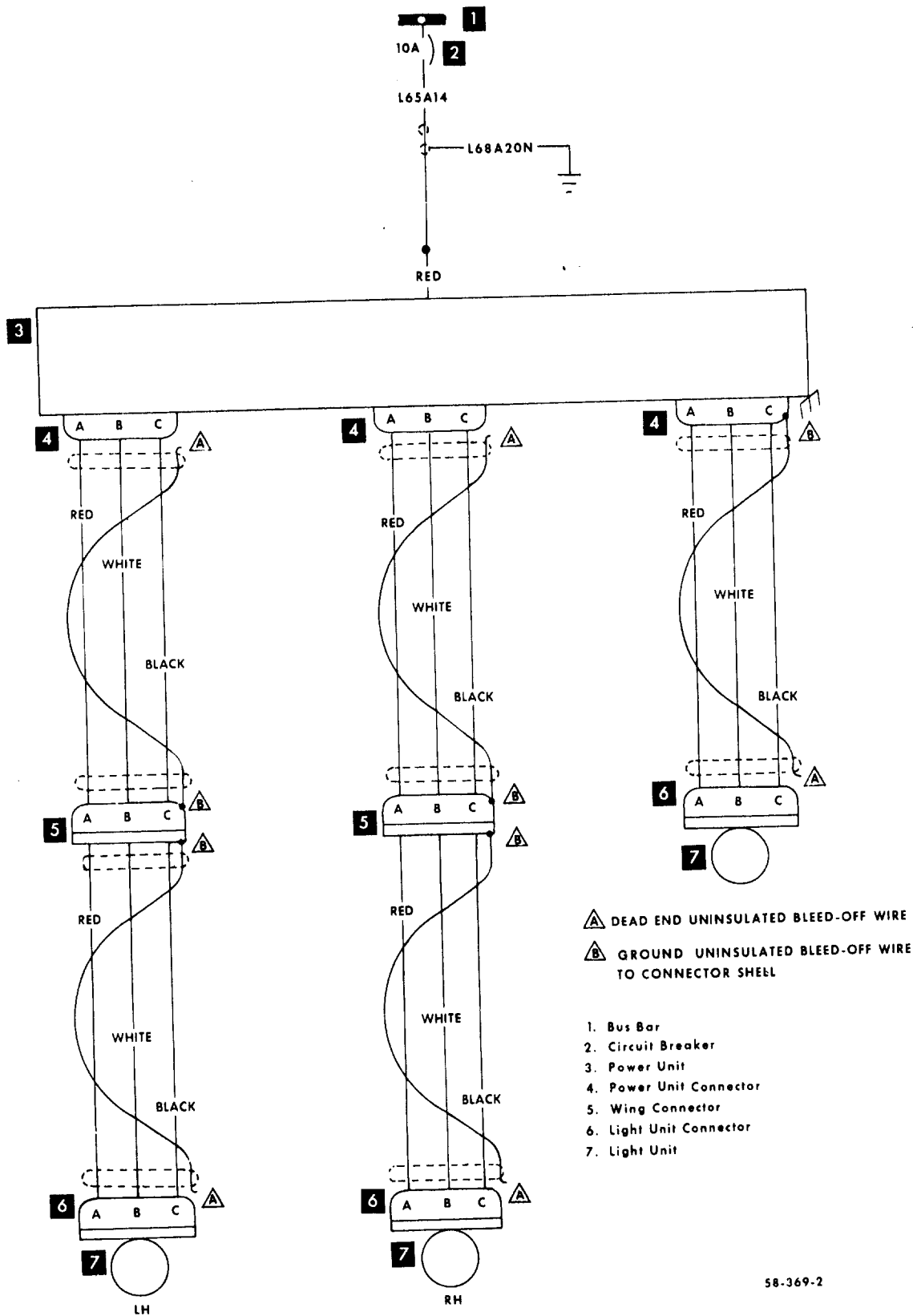
H-14 Autopilot

Effective only on Aircraft equipped with 4 Button Controller.



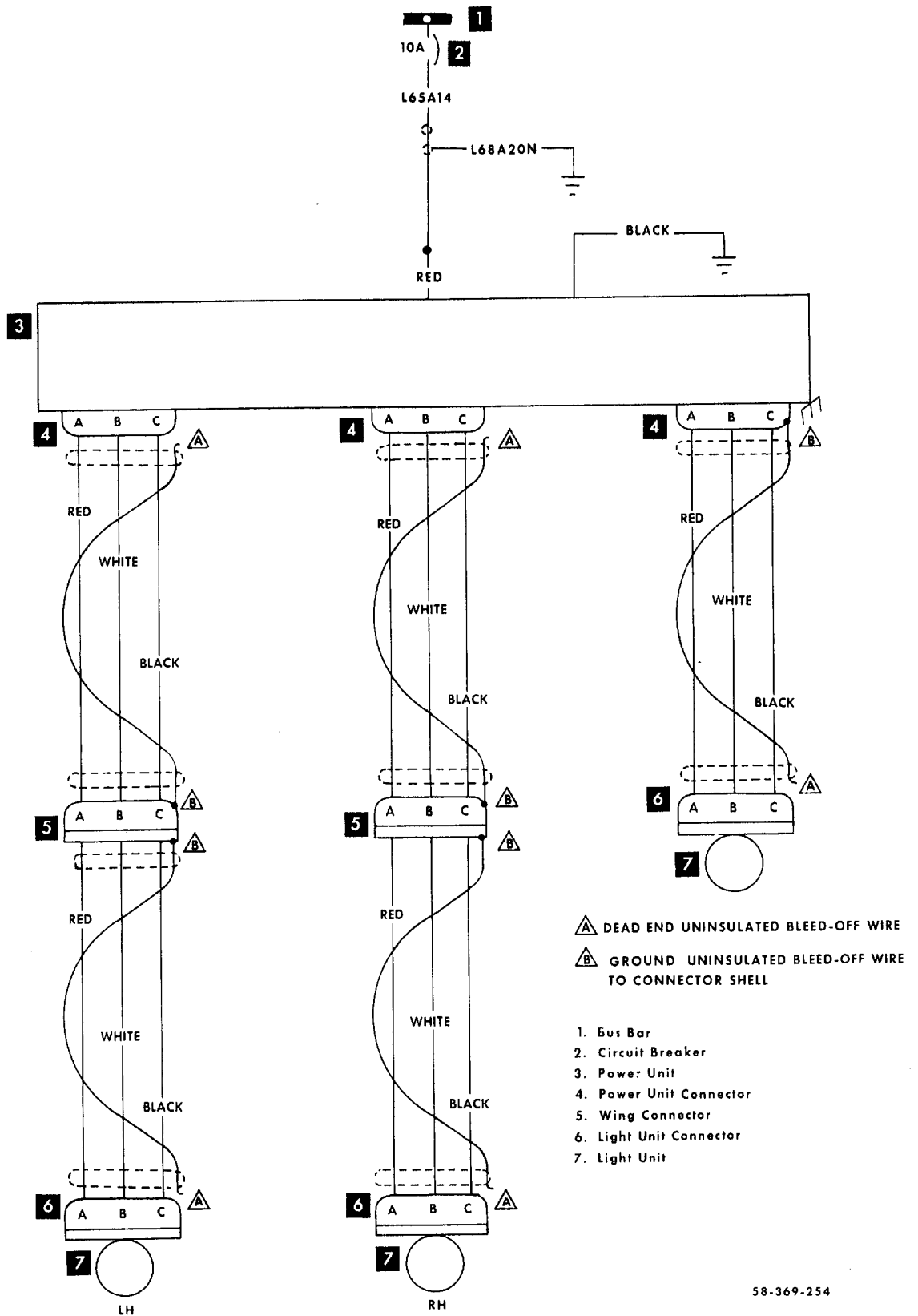
Hoskins Strobe Light (Optional)
 TC-1229 thru TC-1935 except TC-1913
 TE-788 thru TE-1063

55-369-253



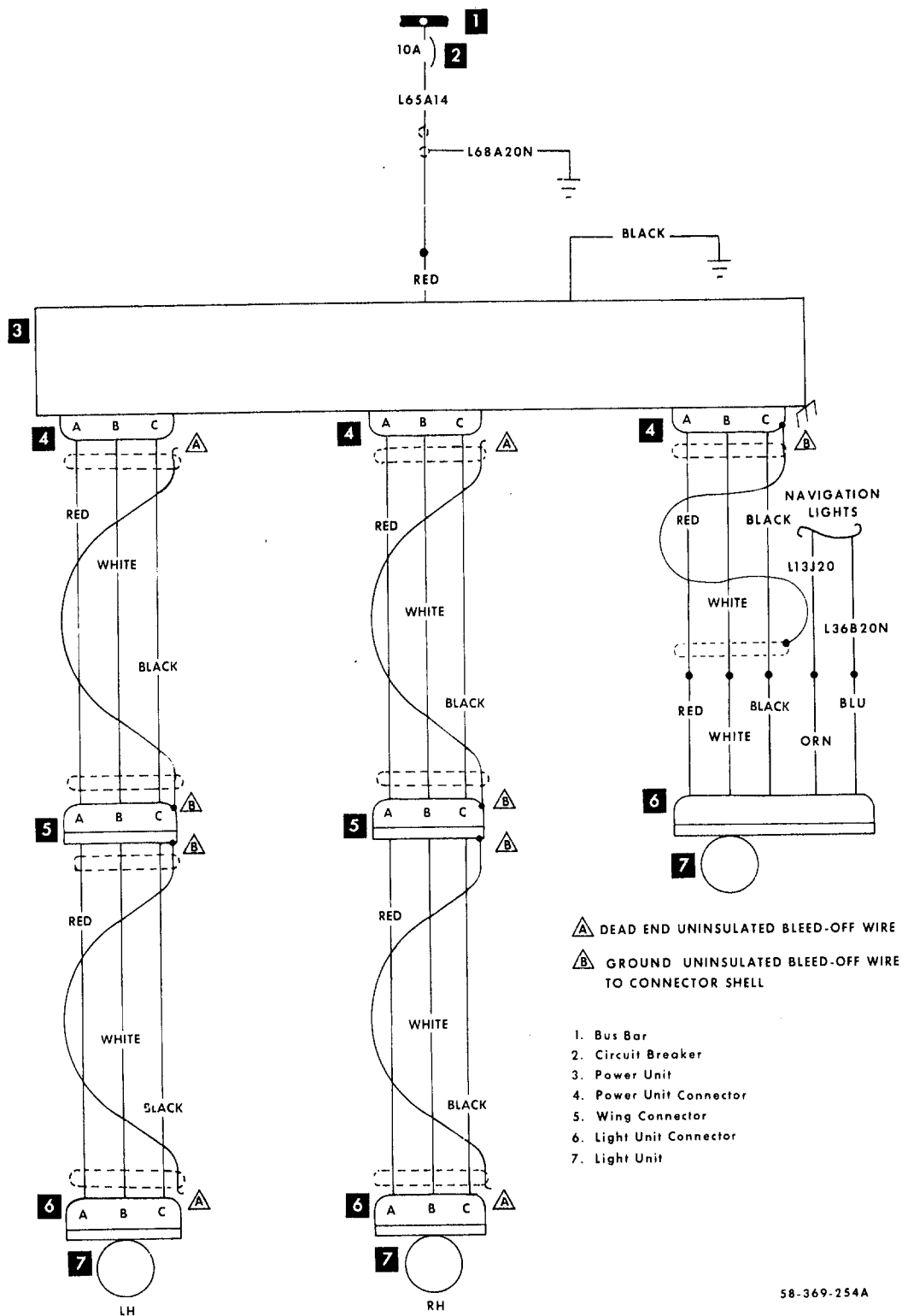
58-369-2

Hoskins Strobe Light (Optional)
TH-1 thru TH-647 except TH-598



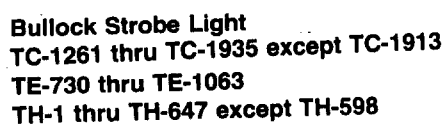
58-369-254

Strobe Light (Optional, Grimes)
 TC-1403 thru TC-1606
 TE-847 thru TE-942
 TH-175 thru TH-383



58-369-254A

Grimes Strobe Light (Optional)
 TC-1607 thru TC-1935 except TC-1913
 TE-943 thru TE-1063
 TH-384 thru TH-647 except TH-598



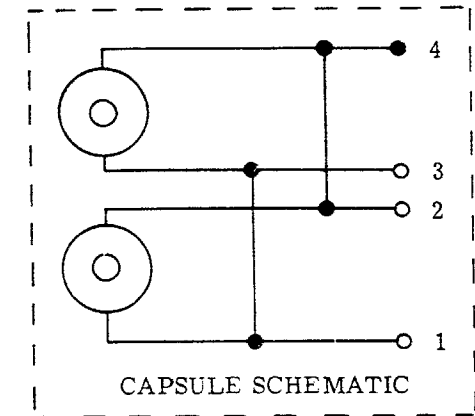
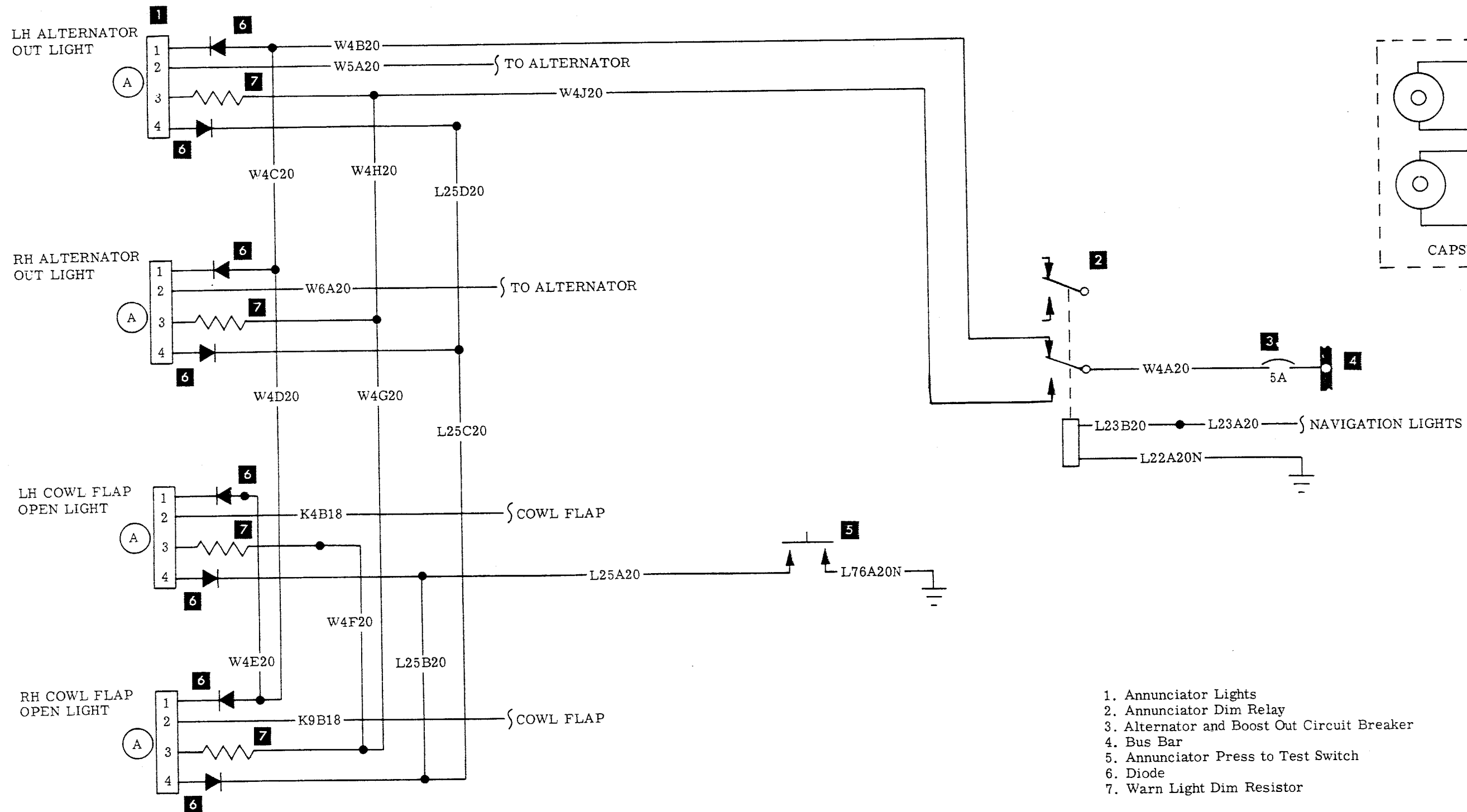
LEGEND

L. ALT OUT

R. ALT OUT

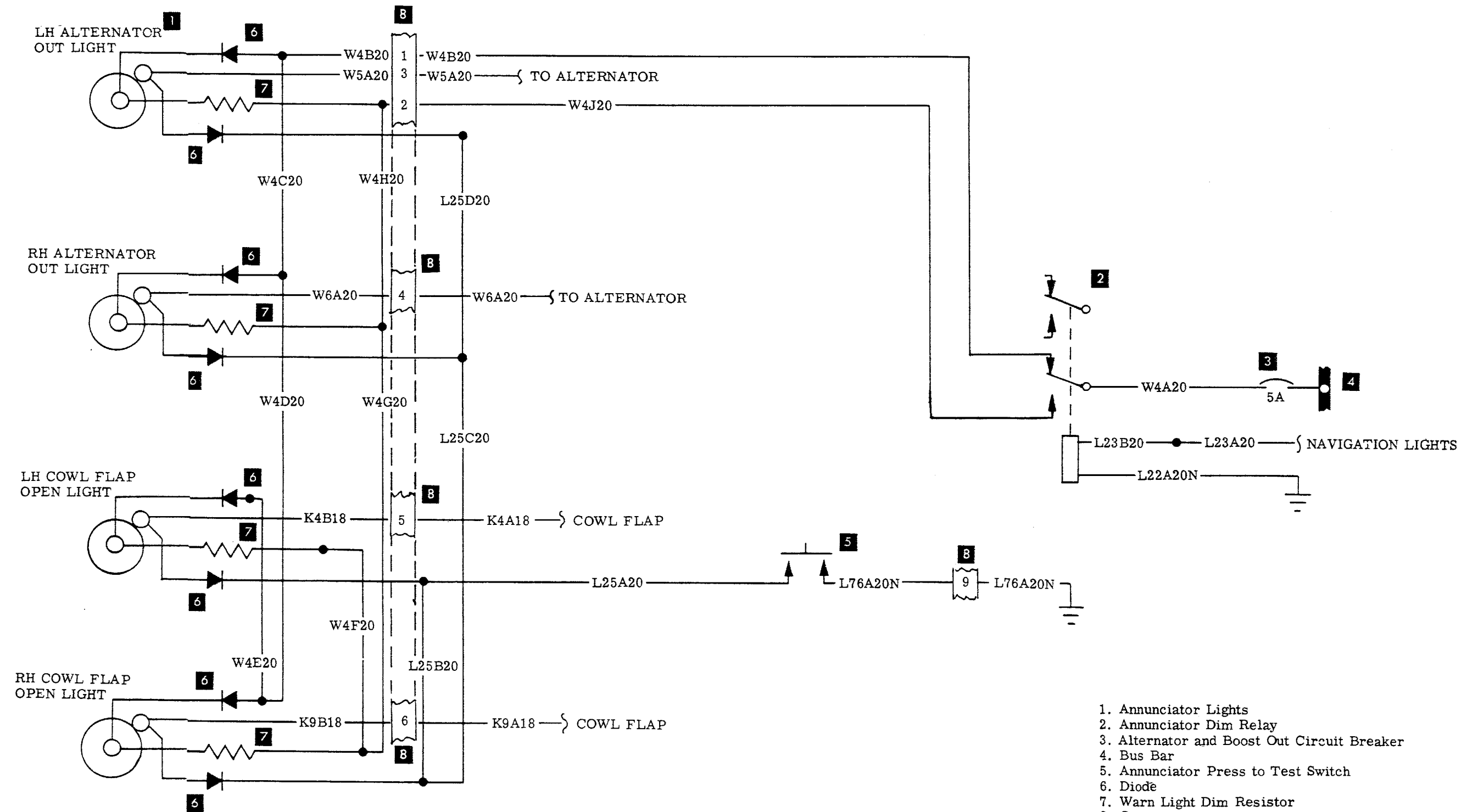
L. COWL FL. OPEN

R. COWL FL. OPEN



1. Annunciator Lights
2. Annunciator Dim Relay
3. Alternator and Boost Out Circuit Breaker
4. Bus Bar
5. Annunciator Press to Test Switch
6. Diode
7. Warn Light Dim Resistor

55-369-241



LEGEND

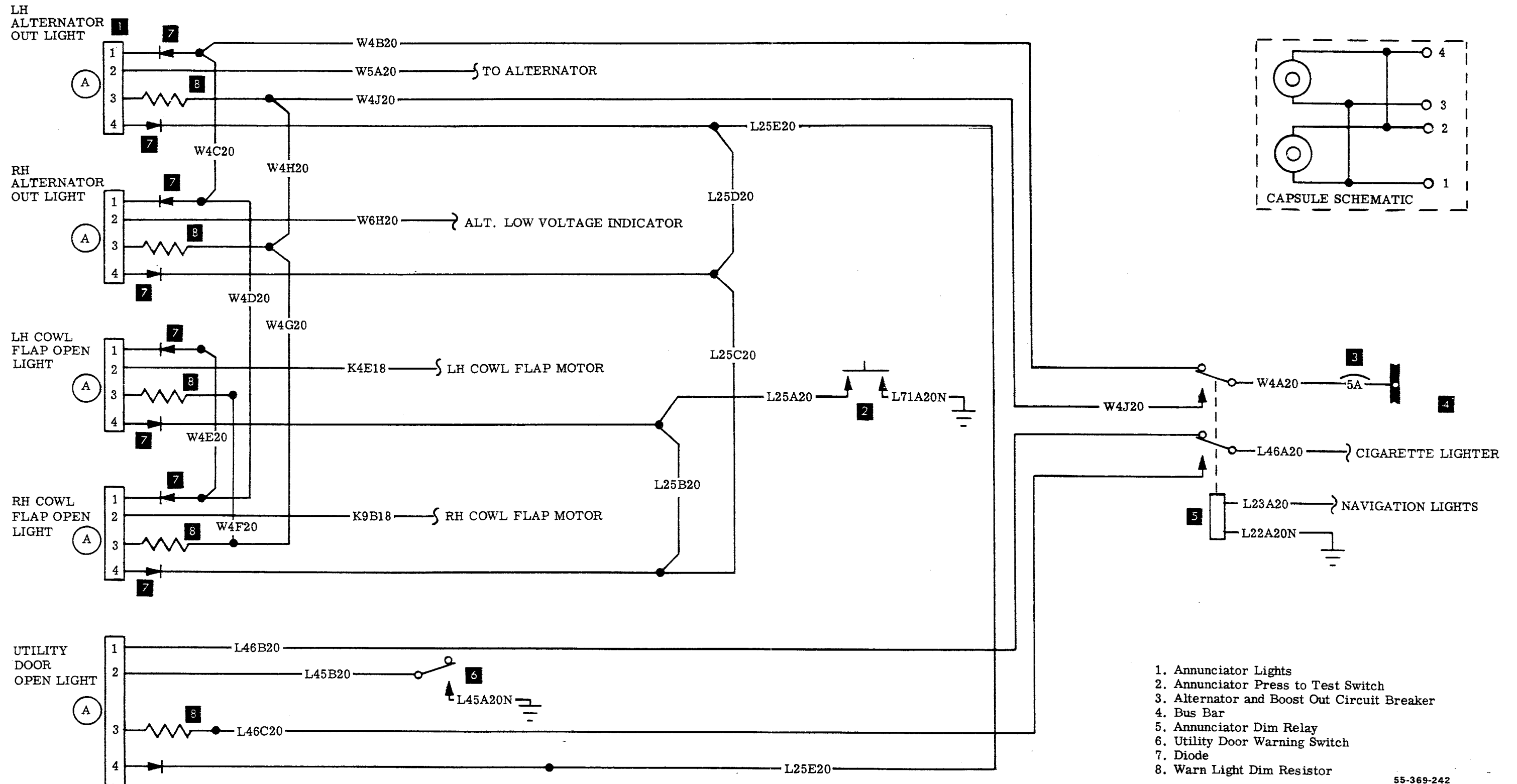
L. ALT OUT

R. ALT OUT

L. COWL FL. OPEN

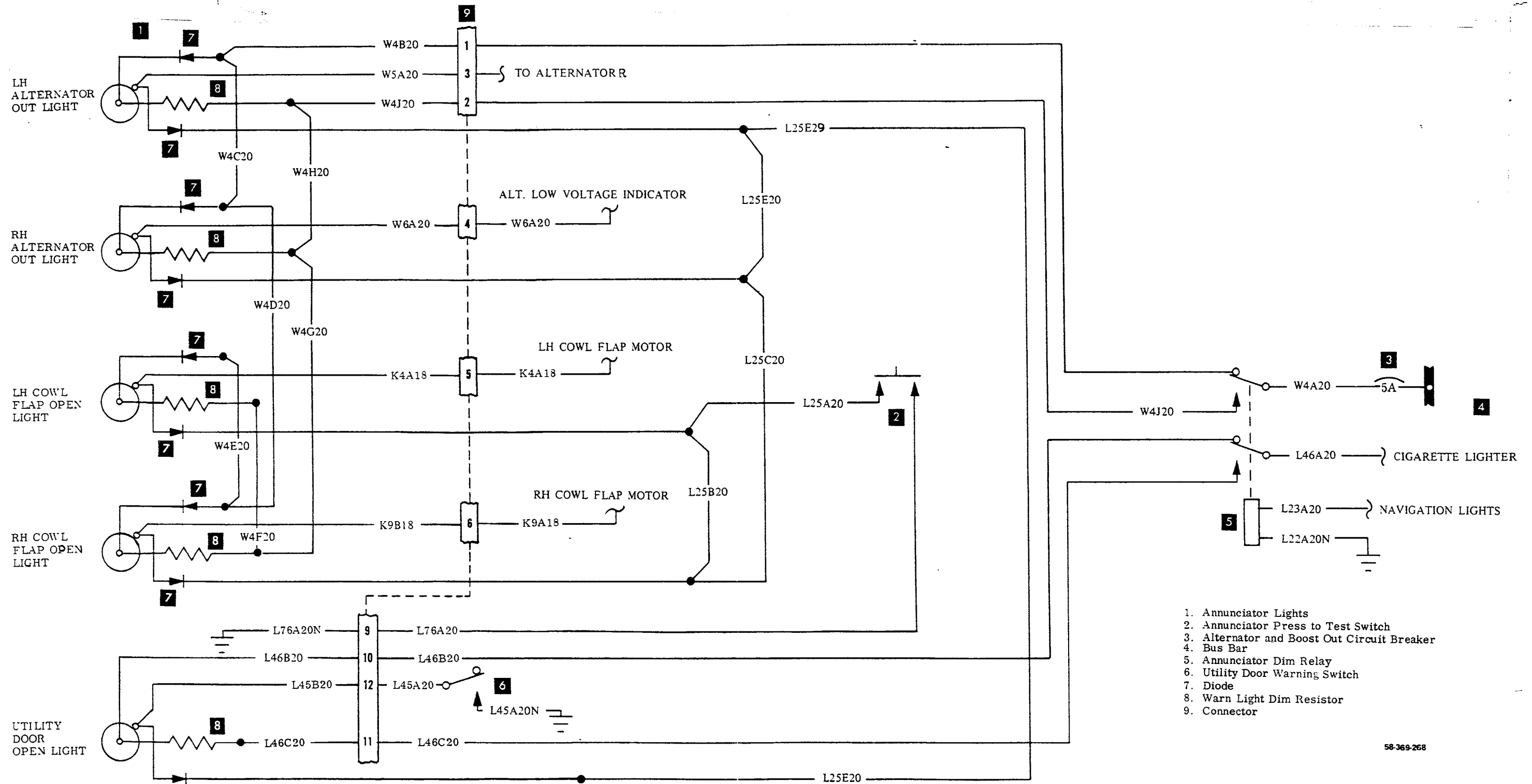
R. COWL FL. OPEN

UTILITY DOOR



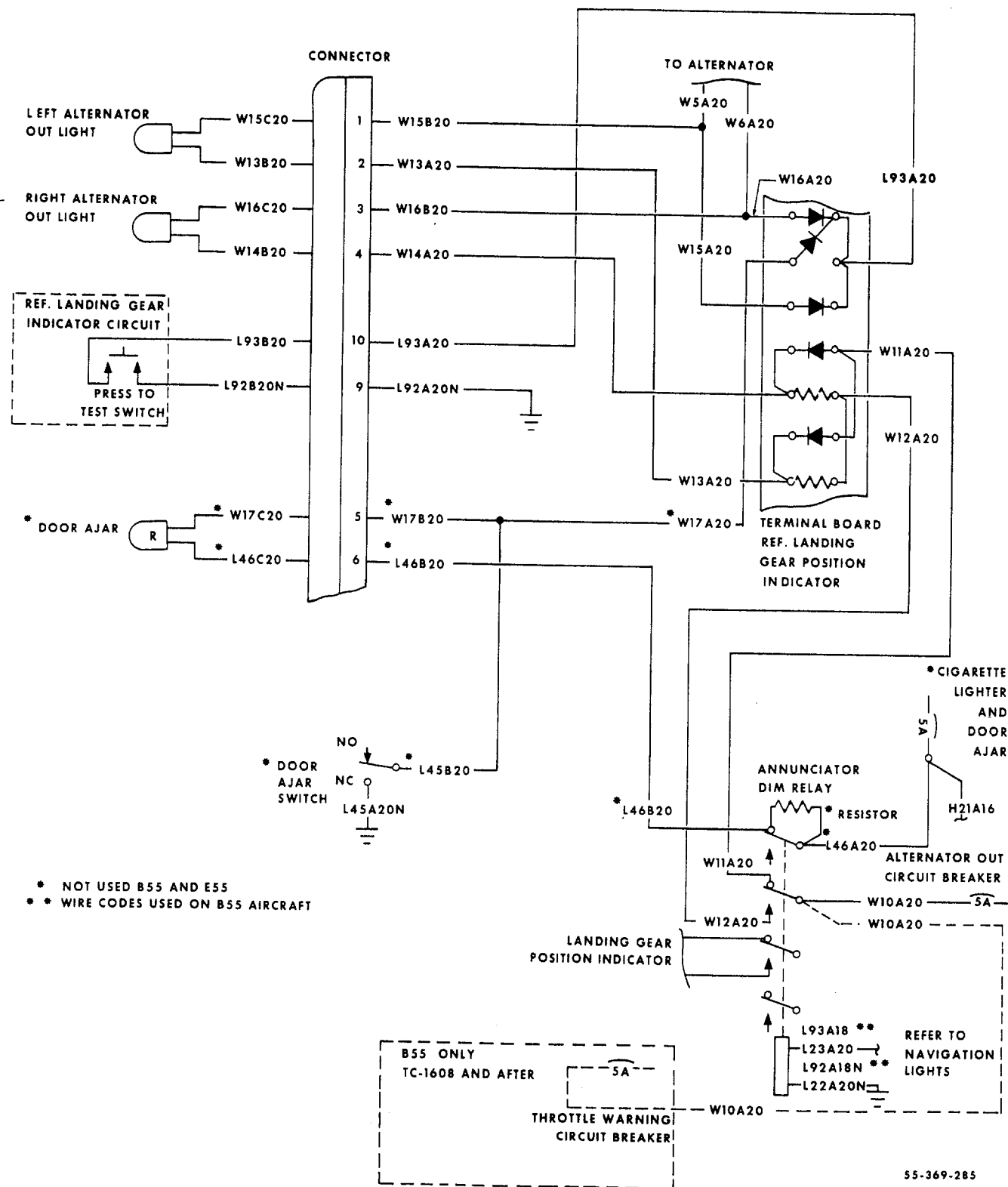
55-369-242

Annunciator
TH-1 thru TH-253



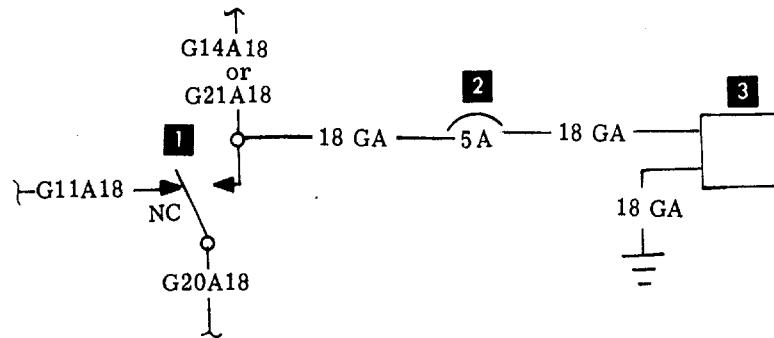
58-369-268

Annunciator
 TH-254 thru TH-384



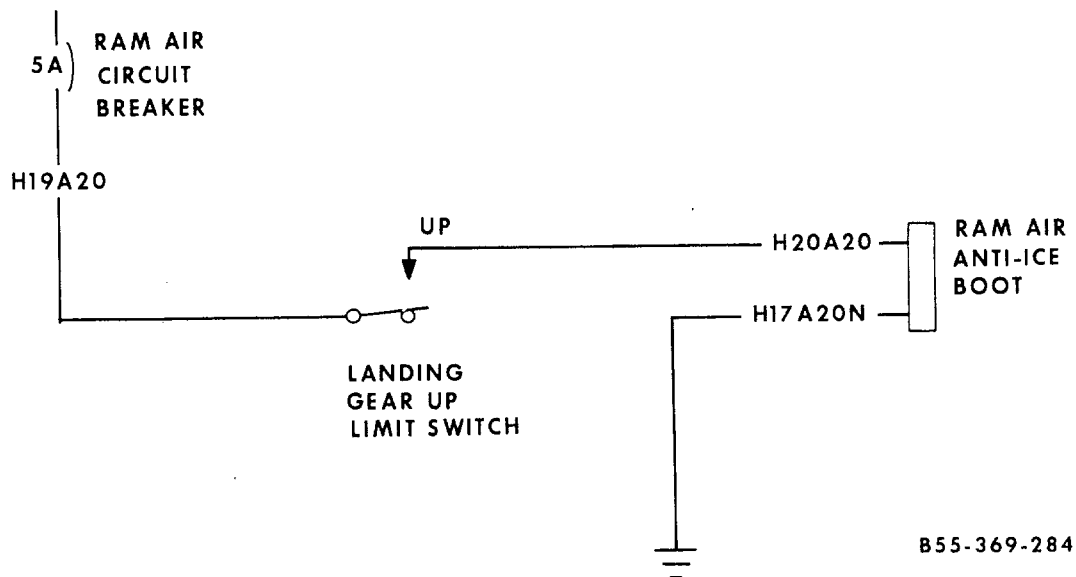
- * NOT USED B55 AND E55
- ** WIRE CODES USED ON B55 AIRCRAFT

Annunciator
 TC-1608 thru TC-1935 except TC-1913
 TE-938, TE-943 thru TE-1063
 TH-385 thru TH-647 except TH-598

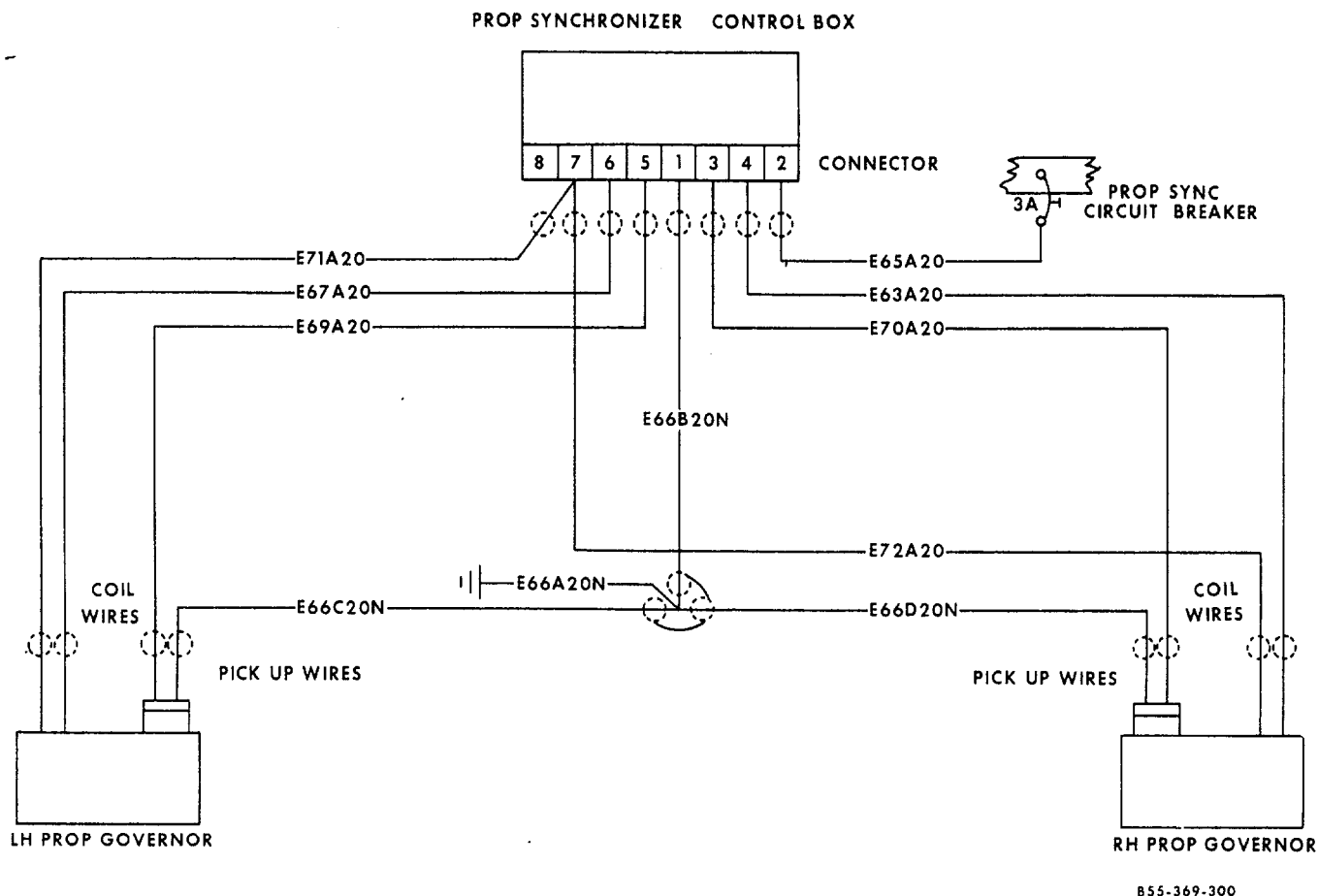


1. Landing Gear Up Limit Switch
2. Circuit Breaker
3. Ram Air Boot

**Ram Air Anti-Ice
Installed with Radar
Prior to TC-1658
TE-959 and TE-968
TH-437**



**Ram Air Anti-Ice with Radar
TC-1658 thru TC-1817
TE-959, TE-968 thru TE-1006
TH-437 thru TH-533**



Prop Synchronizer
 TC-1710 thru TC-1935 except TC-1913
 TE-981 thru TE-1063
 TH-467 thru TH-647 except TH-473, TH-474 and TH-598

SECTION

15

**OVERHAUL AND
REPLACEMENT
SCHEDULE**

Raytheon Aircraft

BEECH BARON 55 AND 58 SHOP MANUAL

TIME LIMITS - MAINTENANCE PRACTICES

The first overhaul or replacement should be performed not later than the required period. The condition of the item at the end of the first period can be used as a criteria for determining subsequent periods applicable to the individual airplane or fleet operation providing the operator has an approved monitoring system.

NOTE

The date on the "STANDARD AIRWORTHINESS CERTIFICATE", FAA Form No. 8100-2, which is issued with every new airplane, is to be used as the starting time for all overhaul, replacement, and inspection intervals listed in this section.

The time periods for inspections noted in this manual are based on average usage and average environmental conditions.

SPECIAL CONDITIONS CAUTIONARY NOTICE

Airplanes operated for Air Taxi or other than normal operation and airplanes operated in humid tropics or cold and damp climates, etc., may need more frequent inspections for wear, corrosion and/or lack of lubrication. In these areas periodic inspections should be performed until the operator can set his own inspection periods based on experience.

NOTE

The required periods do not constitute a guarantee the item will reach the period without malfunction as the aforementioned factors cannot be controlled by the manufacturer.

OVERHAUL AND REPLACEMENT SCHEDULE

Item	Overhaul or Replace
<i>LANDING GEAR</i>	
Main gear assembly	On condition. (Leaking or collapsed struts that cannot be corrected by seal replacement will constitute the "On condition" requirement. Any pitting, corrosion, cracking, distortion or visible wear noted during the seal replacement will also constitute the requirement for an overhaul.)
Nose gear assembly	On condition. (Leaking or collapsed struts that cannot be corrected by seal replacement will constitute the "On condition" requirement. Any pitting, corrosion, cracking, distortion or visible wear noted during the seal replacement will also constitute the requirement for an overhaul.)
Actuator assembly	Gray and green colored actuators every 2000 hours. White colored actuators every 4000 hours.
Retract motor	Every 2000 hours.
Retract motor brushes	Every 500 hours.
Shimmy damper	Every 1000 hours or On condition (TH-1389, TH-1396 and After).
Wheels and tires	On condition.
Brake assembly	On condition.

Raytheon Aircraft

BEECH BARON 55 AND 58 SHOP MANUAL

OVERHAUL AND REPLACEMENT SCHEDULE (CONTINUED)

Item

Overhaul or Replace

LANDING GEAR (Continued)

Brake lining	On condition.
Master cylinder	On condition.
Shuttle valve assembly	On condition.
Parking brake valve	On condition.
All hose	On condition.

POWER PLANT

Engine	
TC-1 and After	Every 1500 hours. *
TE-1 and After	Every 1700 hours. *
TH-1 and After	Every 1700 hours. *
Air filter	Replace after 10 cleanings, 500 hours, or 1 year, whichever occurs first.
Engine controls	On condition.
Engine vibration isolator mounts	On condition.
Exhaust system	On condition.
Oil cooler	On condition. (Replace when contaminated.)
Propeller	
Hartzell	Refer to the latest revision of Hartzell Service Letter 61 for TBO.
McCauley	Refer to the latest revision of McCauley Service Bulletin 137 for TBO.
Propeller controls	On condition.
Propeller governor	
Hartzell	Refer to the latest revision of Hartzell Service Letter 61 for TBO.
McCauley	Refer to the latest revision of McCauley Service Bulletin 137 for TBO.
Propeller accumulator	
Hartzell	At each engine overhaul/engine change due to engine failure, but not to exceed 1500 hours.
McCauley	Refer to the latest revision of McCauley Service Bulletin 137 for TBO.
Pressure pumps	600 hours.
Vacuum pumps	1200 hours.
All hose	Hoses carrying flammable liquids: When condition warrants, at engine overhaul or 5 years from date of delivery, whichever occurs first. All other hoses on condition.

* Refer to Continental Service Bulletin No. M85-13 Rev. 1, or subsequent, for detailed overhaul period instructions.

Raytheon Aircraft

BEECH BARON 55 AND 58 SHOP MANUAL

OVERHAUL AND REPLACEMENT SCHEDULE (CONTINUED)

Item	Overhaul or Replace
<i>FLAPS AND FLIGHT CONTROLS</i>	
Flight controls	On condition.
Aileron tab actuator	On condition.
Elevator tab actuator	On condition.
Rudder tab actuator	On condition.
Flap motor and drives	Every 2000 hours.
Flap motor brushes	On condition.
Flap gear box	Every 2000 hours.
Flap actuators	Every 2000 hours.
Flap flexible shaft	Every 2000 hours.
<i>FUEL SYSTEM</i>	
Fuel cells	On condition. Replace foam insert material every 10 years.
Wing fuel quantity transmitter	On condition.
Fuel cell drain valve	On condition.
Fuel system check valves	On condition.
Fuel selector valve	At engine overhaul or on condition, whichever occurs first.
Fuel boost pump	Overhaul 1500 hours.
All hose	Hoses carrying flammable liquids: When condition warrants, at engine overhaul or 5 years from date of delivery, whichever occurs first. All other hoses in condition.
Float valve	On condition.
Fuel filler caps	On condition.
<i>INSTRUMENTS</i>	
Turn coordinator	On condition.
Altimeter	(Inspect and calibrate.) Every 24 months per FAA Directive.
Directional gyro	On condition.
Gyro horizon	On condition.
Pressure gage	On condition.
Suction gage	On condition.
Engine gage units	On condition.
Manifold pressure	On condition.
Airspeed indicator	On condition.
Rate-of-climb	On condition.

Raytheon Aircraft

BEECH BARON 55 AND 58 SHOP MANUAL

OVERHAUL AND REPLACEMENT SCHEDULE (CONTINUED)

Item

Overhaul or Replace

INSTRUMENTS (Continued)

Fuel pressure gage	On condition.
Fuel flow gage	On condition.
Tachometer	On condition.
Flap position indicator	On condition.
Free air temperature indicator	On condition.
Suction filter	Replace after 300 hours or 1 year, whichever occurs first.
Pressure filter (inline)	300 hours - Replace.
Pressure filter (intake)	100 hours - Clean (foam type). 300 hours - Replace (paper cartridge).
Inline filters	On condition, but not to exceed 500 hours.
All hoses	On condition.

ELECTRICAL SYSTEM

Landing gear dynamic brake relay	On condition.
Battery master relay	On condition.
Paralleling relay	On condition.
All other relays	On condition.
Voltage regulators	On condition.
Starter	Inspect at engine overhaul and overhaul or replace on condition.
Starter relay	On condition.
Generator or Alternator	On condition.
Landing gear selector switch	Every 5000 hours or on condition.
Battery (Emergency Locator Transmitter)	At 50% of useful life (as stated on the battery) or any time transmitter is used more than one cumulative hour.

UTILITY SYSTEMS

H-14 Autopilot servo air filter	Replace every 1200 hours.
Cabin heater	Overhaul after 500 hours of operation. Pressure test after first 500 hours and every 100 hours of heater operation or 24 months thereafter, whichever occurs first.
Evaporator blower (TE-119, TE-1125 and After; TH-873, TH-895 and After)	On condition.
Heater ignition vibrator (mechanical)	Switch points every 1000 hours of heater operation and replace every 2000 hours of heater operation.
Heater ignition vibrator (solid-state)	On condition.

Raytheon Aircraft

BEECH BARON 55 AND 58 SHOP MANUAL

OVERHAUL AND REPLACEMENT SCHEDULE (CONTINUED)

Item	Overhaul or Replace
<i>UTILITY SYSTEMS (Continued)</i>	
Heater igniter and plug	On condition.
Heater fuel pump	On condition.
Heater fuel shutoff valve	On condition.
Propeller anti-icer pump	On condition.
Combustion blower	On condition.
Combustion blower brushes	500 hours.
Oxygen regulator	Every 2000 hours or 48 months.
Oxygen cylinder (22.0 cu. ft. Standard weight) DOT 3AA 1800	Hydrostatically test every 5 years (DOT Regulation).
Oxygen cylinder (49.2 and 65.5 cu. ft. Light weight) DOT 3HT 1850	Hydrostatically test every 3 years (DOT Regulation). Replace after 24 years or 4,380 refills.

MISCELLANEOUS

Seat belts or shoulder harnesses	Inspect every 12 months. Replace on condition.
All 8 wing attach bolts	See Chart 1, Section 3 for the inspection and replace schedule.
All 8 wing attach nuts (steel or Inconel)	See Chart 1, Section 3 for the inspection and replace schedule.

CAUTION

After removing wing attach nuts for any reason, always install new wing attach nuts. Do not reuse existing nuts.

NOTE

Inconel nuts cannot be inspected using the magnetic particle inspection method.

SECTION

16

**PERIODIC
INSPECTIONS**

Raytheon Aircraft

BEECH BARON 55 AND 58 SHOP MANUAL

SCHEDULED MAINTENANCE CHECKS - MAINTENANCE PRACTICES

The owner or operator is responsible for maintaining the airplane in an airworthy condition, including compliance with all applicable Airworthiness Directives as specified in Part 39 of the Federal Aviation Regulations. It is further the responsibility of the owner or operator to ensure that the airplane is inspected in conformity with the requirements covered in Parts 43.15 and 91.409 (f) (3) of the Federal Aviation Regulations. These FAR Parts cover the requirements concerning the Inspection Guide. This inspection guide is not intended to be all-inclusive, for no such guide can replace the good judgement of a certified airframe and power plant mechanic in the performance of his duties. As the one primarily responsible for the airworthiness of the airplane, the owner or operator should select only qualified personnel to maintain the airplane.

SPECIAL CONDITIONS CAUTIONARY NOTICE

The time periods for the inspections noted in this schedule are based on normal usage under average environmental conditions. Airplanes operated in humid tropics, or in cold, damp climates, etc., may need more frequent inspections for wear, corrosion, lubrication, and/or lack of maintenance. Under these adverse conditions, perform periodic inspections in compliance with this guide at more frequent intervals until the owner or operator can set his own inspection periods based on the contingencies of field experience.

NOTE

The required periods do not constitute a guarantee the item will reach the period without malfunction as the aforementioned factors cannot be controlled by the manufacturer.

This inspection program in accordance with FAR Parts 43 and 91 consist of, but is not limited to, inspection items listed in the Inspection Guide, any applicable Airworthiness Directives issued against the airframe or any equipment installed therein and conformity to Type Certificate Data Sheet as applicable

Material contained in this guide, including the inspection intervals, may be changed at any time by the owner/operator, with prior notification and approval of the local FAA General Aviation District Office, when warranted by service experience or engineering recommendations. Information contained herein is applicable to all Baron 55 and 58 series airplanes except where differences are indicated by serial effectivity.

While the inspection guide may be used as an outline, detailed information of the many systems and components in the airplane will be found in the various sections of this shop manual and the pertinent supplier publications. It is also recommended that reference be made to the applicable Maintenance Handbooks, Service Instructions, Raytheon Aircraft Company Service Bulletins, applicable FAA Regulations and Publications, suppliers bulletins and specifications for torque values, clearances, settings, tolerances, and other requirements. In the final analysis, it is the responsibility of the owner/operator to ensure the airframe and power plant mechanic inspecting the airplane has access to previously noted documents as well as to this inspection guide.

Raytheon Aircraft

BEECH BARON 55 AND 58 SHOP MANUAL

NOTE

Any time an airplane is repainted or touched up, inspect all placards and decals to assure they are not covered with paint, are easily readable, and are securely attached. Replace any placards that have been inadvertently defaced or removed.

In addition to the inspections prescribed by this schedule, the altimeter system and all ATC transponders **MUST** be tested and inspected at 24-month intervals in compliance with the requirements specified in FAR Parts 91.411, and 91.413 under title 14 of the Code of Federal Regulations.

A complete inspection of the airplane must be accomplished within each 12-month period for compliance with the Federal Aviation Regulations. The time periods for inspections stated in this inspection guide should **NEVER** be exceeded by more than 10 hours, and then only if the additional time is required to reach a place where the inspection can be satisfactorily accomplished. However, the additional time used must be deducted from the next inspection time. If 10 hours were used to reach the inspection facility, the next inspection would be due in 90 hours for the next 100-hour inspection with no extension allowed.

NOTE

An airplane must receive a complete 100-hour, annual, or complete continuing care inspection every 12 months regardless of the hours flown. The inspections completed during a 12-month period can be deleted from the items to be inspected. Rubber goods such as fuel lines are recommended to be changed at five year periods regardless of airplane time.

For a listing of alternative inspection programs available for use with this airplane, refer to the latest issue of the Publications Price List (P/N 118556).

All electrical systems operational inspections are to be made using an external power source capable of delivering and maintaining 28.25 volts ± 0.25 volts.

Raytheon Aircraft Company issues service information for the benefit of owners and operators in the form of two classes of Service Bulletins. **MANDATORY** (Red Border) Service Bulletins are changes, inspections or modifications that could affect safety. The factory considers compliance with these Service Bulletins mandatory. **OPTIONAL** (No Border) Service Bulletins cover changes, modifications, improvements or inspections which may benefit the owner. Due to the wide range of information covered by the **OPTIONAL** Service Bulletin, each owner or operator is responsible for conducting a thorough review of each **OPTIONAL** Service Bulletin to determine if compliance is required based on the applicability of the **OPTIONAL** Service Bulletin to their particular set of operating conditions. It is the responsibility of the owner or operator to ensure that all Raytheon Aircraft Company Service Bulletins which are pertinent to their particular operation are complied with.

REFERENCE MATERIAL

Beech Baron E55 and 58 Series Wiring Diagram Manual P/N 96-590010-15.

Beech Baron B55 Series Wiring Diagram Manual P/N 96-590011-15.

Beech Baron 58 Series Wiring Diagram Manual P/N 96-590011-29.

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INSPECTION PROCEDURES

1. As each item is inspected, the responsible person will make entries as required and will initial in the space provided in the right column.
2. When the inspection is complete, the person making the inspection will sign the form in the space provided.

100-HOUR INSPECTION

A. Operational Inspection	MECH		INSP
	LH	RH	
1. AUXILIARY FUEL PUMP - Check pump for proper operation, unusual noise and fluctuations.			
2. STARTERS - Check for proper operation, unusual noises and dragging. Check starter energized light (if installed) and/or load meter to ensure starter disengagement when the starter switch is released.			
3. FUEL PRESSURE - Check for proper fuel pressure limits and fluctuations.			
4. CYLINDER HEAD TEMPERATURE - Check for proper operation, temperature and fluctuations.			
5. ALTERNATOR/GENERATOR - Check for proper output and unusual noises.			
6. PROPELLER OPERATION - Cycle propeller and check for proper rpm drop and smoothness of operation.			
7. PROPELLER DEICER - Check for proper operation and amperage drawn on ammeter.			
8. OIL PRESSURE AND TEMPERATURE - Check for proper pressure, temperature limits and unusual fluctuations.			
9. MAGNETOS - Check the performance of the magneto by performing the MAGNETO DROP-OFF CHECK specified in the applicable Pilot's Operating Handbook.			
10. POWER CHECK - Check per the applicable Pilot's Operating Handbook.			
11. ALL ENGINE CONTROLS - With the engine running, check for proper operational limits, engine response and rigging. Check friction locks for proper operation.			
12. PROPELLER GOVERNORS - Check for proper governor operation and feathering.			
13. AIR CONDITIONER - Operate the air conditioner and verify that the air scoop moves to the ground position when turned on and returns to the retracted position when turned off. Check for proper operation and unusual noise.			
14. FLIGHT INSTRUMENTS - Check for condition and proper operation. Check gages for proper reading.			
15. DEICER (Surface) - Check for proper operation and cycling.			

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100-HOUR INSPECTION (CONTINUED)

A. Operational Inspection (Continued)	MECH		INSP
	LH	RH	
16. IDLE RPM AND MIXTURE SETTINGS - Check for both proper rpm and mixture settings. Check controls for freedom of operation.			
17. IGNITION SWITCH - Rotate the ignition switch through the OFF position to the extreme limit of switch travel; if the engine stops firing, the switch is normal. If the engine continues to run with the switch held against the OFF stop, it is an indication that one magneto is still "hot" or ungrounded. When the switch is released, it should automatically return to OFF and the engine should stop running. However, any ignition switch exhibiting this abnormal condition should be replaced.			
18. IDLE CUT-OFF - Check for proper operation and freedom of movement.			
19. HEATING AND VENTILATING SYSTEM - Check for proper operation, heat and airflow output. Check controls for freedom of operation.			
20. FUEL QUANTITY GAGES - Check for proper operation and unusual fluctuations.			
21. FUEL TANK SELECTOR - Check for proper placarding, proper operation and feel for positive de-tent.			
22. ALL LIGHTS - Check for condition, attachment, cracked or broken lenses. Check switches, knobs and circuit breakers for looseness and operation.			
23. STALL WARNING SYSTEM - Check for proper operation and heating of the unit.			
24. RADIO OPERATION - Check for proper operation, security of switches and knobs.			
25. FLAPS - Check for noisy operation, full travel and proper indication.			
26. PITOT HEAT - Check for proper heating of the unit.			
27. BRAKES - Check for condition and wear, ease of operation and proper release of the parking brake. Check for unusual brake chatter.			
28. EMERGENCY LOCATOR TRANSMITTER - Check for proper operation. Tune radio to 121.5 MHz on VHF or 243 MHz on UHF, then turn ELT switch to ON and monitor for one signal. Turn ELT switch OFF, then place in ARM position.			
29. OXYGEN SYSTEM - Functionally check the oxygen system for proper operation. Check the oxygen bottle shutoff valve for proper operation.			
30. SWITCHES, CIRCUIT BREAKERS - Check for proper operation.			
31. FLIGHT CONTROLS, TRIM CONTROLS AND TRIM INDICATOR - Check freedom of movement and proper operation through full travel with and without flaps extended. Check electric trim controls for operation.			
32. PROPELLER ANTI-ICER (Alcohol) - Check that the lines are unobstructed. Check for discharge of anti-ice solution from all tubes and/or outlets.			

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100-HOUR INSPECTION (CONTINUED)

B. Power Plant	MECH		INSP
	LH	RH	
NOTE After the first 25 hours of engine operating time, a new, remanufactured or newly overhauled engine should be given a 100-hour inspection including draining and renewing of oil.			
1. SPARK PLUGS - Clean, inspect, re-gap, test and replace as necessary. Tighten spark plugs to proper torque and check ignition harness condition and for proper attachment.			
2. COMPRESSION - Perform differential compression test.			
3. PLUMBING - Inspect plumbing and associated accessories for condition (such as cracks and fraying) and attachment. Check plumbing clearance and secure against possible chafing.			
4. ENGINE OIL SUMP - Check for cracks, leaks, proper fluid level, deformation and security.			
5. OIL DIPSTICK - Check the dipstick for rust and general condition. Inspect the dipstick tabs for security and that the tabs are not bent.			
6. OIL SUMP DRAINS AND SCREENS - Clean screens, check for holes in the screens and for obstructions. Check for metal particles or foreign matter on screens and filters. Check for proper torque after installation.			
7. DRAIN PLUGS - Check for leaks and security.			
8. OIL COOLER - Check oil cooler, lines and fittings for condition, security, chafing and leaks.			
9. PROPELLER AND MOUNTING BOLTS - Check for condition and security. Check the tip of the blades for evidence of lightning strikes. If there is evidence of lightning strikes, consult the propeller manufacturer, the engine manufacturer and Raytheon Aircraft Company. Inspect the blades for cracks, dents, nicks, scratches, erosion, corrosion, security and movement in the hub			
10. PROPELLER SPINNER - Check for deformation, security and cracks.			
11. PROPELLER HUB - Check for cracks, excessively leaking seals and condition. Check propeller dome pressure.			
12. PROPELLER ACCUMULATOR - Check pressure (located in nacelle).			
13. ALTERNATOR/GENERATOR - Check for condition and attachment. Check wiring for proper attachment and possible chafing. Check for unusual noise.			
14. ALTERNATOR - Remove and disassemble the alternator as necessary to inspect the rotor shaft bearings for condition and replace if necessary. Refer to Beech Service Instruction No. 0546-359 Rev II or subsequent.			
15. STARTER - Check for condition, attachment and chafed or loose wires.			
16. ALTERNATOR/GENERATOR BELT - Check for proper tension and worn or frayed condition. Check tension adjustment bolt for tightness.			

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100-HOUR INSPECTION (CONTINUED)

B. Power Plant <i>(Continued)</i>	MECH		INSP
	LH	RH	
17. MAGNETOS - Check contact points for proper clearance. Points with deep pits or excessively burned areas must be discarded. Inspect the cam follower felt pad for proper lubrication and clean the compartment with a clean, dry cloth. Check timing.			
18. IGNITION HARNESS - Inspect for fraying and attachment.			
19. CYLINDERS AND BAFFLES - Check cylinders and exhaust manifold for obvious leaks, security and cracks, check baffles for cracks and security. Check cylinders for broken cooling fins and loose or missing base nuts.			
20. EXHAUST SYSTEM - Check for deformation, security, cracks, leaks, loose or missing nuts and clamps. Check for thin wall condition which may occur due to normal internal erosion on stacks which have long service time.			
21. FIREWALL - Check for wrinkles, damage or cracks. Check all electrical and control access holes for proper sealing.			
22. HOSE AND DUCTS - Check all fuel, oil and air hose or duct for leakage, cracks, deterioration and damage. Check fittings for security.			
23. ENGINE ACCESSORIES - Check for condition, security and leaks. Check wiring, hoses and tubes for chafing, security and leaks.			
24. ENGINE MOUNTS - (TC-350; TE-1 thru TE-1201; TH-1 thru TH-1610 without Beech Kit No. 58-9007-1S or new engine mount P/N 96-910010-67) - Check for cracks (refer to Raytheon Aircraft Service Bulletin No. 2362), corrosion and security. Inspect rubber cushions, mount bolts and nuts, and grounding straps for condition and security.			
25. PROPELLER GOVERNOR - Check for leaks and control arm for security.			
26. ENGINE CONTROLS - Check controls and associated equipment for condition, attachment, alignment and rigging. Remove cable connection bolts and check for wear each 300 hours.			
27. ELECTRICAL WIRING AND EQUIPMENT - Inspect electrical wiring and associated equipment and accessories for fraying and attachment.			
28. PRESSURE PUMP INTAKE FILTER - Foam rubber type, clean every 100 hours; cartridge type, replace every 500 hours or as needed. Check for security.			
29. OIL SEPARATOR (Vacuum System) - Clean the screen by back flushing or submerge in solvent and blow dry with shop air. Check for condition, mounting and proper operation. Install the screen and check for security. Inspect for cracks.			
30. AIR CONDITIONER COMPRESSOR - Check for security and attachment. Check refrigerant level and for oil leaks. (See Section 2 of this shop manual.) Check belt for tension and worn or frayed condition.			
31. INDUCTION AIR FILTER - Check for condition, cleanliness and security.			
32. INDUCTION SYSTEM AND ALTERNATE AIR - Check flexible air ducts for delamination of the inner lining. Check the alternate air valve for blockage, security, cracks, operation and wear.			

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100-HOUR INSPECTION (CONTINUED)

B. Power Plant <i>(Continued)</i>	MECH		INSP
	LH	RH	
33. FUEL INJECTION CONTROL VALVE - Clean the screen and check for damage. Install screen and check for leaks.			
34. FUEL INJECTION SYSTEM - Inspect all fuel injection components, lines and fittings for evidence of fuel leaks, fraying and cracking.			
35. VACUUM RELIEF VALVE - Clean and inspect filter, check for the security of attachment.			
36. ELECTRIC PROPELLER DEICER - Check for service damage to the deicer heaters, brush rods, springs and brushes. Check the lead strap and all other clamps, connectors and wiring for electrical soundness. Check the slip rings for roughness, cracks, burned or discolored areas and for deposits of oil, grease or dirt. Check for security and attachment of all components. Check deicer boots for wrinkles, loose or torn areas.			
C. Nacelles			
1. NACELLE SKIN - Check for deformation and obvious damage or cracks. Check for loose or missing rivets.			
2. NACELLE STRUCTURE - Check for cracks and deformation. Check for loose or missing rivets and concealed damage.			
3. COWLING - Check for condition, security and adjustment of latches. Open the upper cowling and clean. Inspect for cracks.			
4. COWL FLAPS - Check for travel, deformation and security. Inspect for cracks.			
5. PNEUMATIC PRESSURE REGULATORS - Check for condition, security and attachment.			
6. IN-LINE FILTER - Check as indicated in PRESSURE SYSTEM FILTER INSPECTION in Section 11 of this shop manual.			
7. FUEL STRAINERS - On fuel cells with foam inserts, check for brown foam material. Refer to Raytheon Aircraft Service Bulletin No. 2109.			
D. Wings and Carry-Through Structure			
1. SKIN - Check for deformation and obvious damage. Check for cracks, loose or missing rivets. If damage is found, check adjacent structure. Check for indications of hard landing or excessive flight loading.			
2. STRUCTURE - Check for cracks, deformation and concealed damage. Check for loose or missing rivets. Refer to Section 3 of this shop manual for inspections for fuselage web cracks at the fuselage/wing spar carry-through area.			
3. ACCESS DOORS AND PANELS - Inspect for cracks, proper fit and secure attachment.			

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100-HOUR INSPECTION (CONTINUED)

D. Wings and Carry-Through Structure <i>(Continued)</i>	MECH		INSP
	LH	RH	
4. CABLES, PULLEYS AND TURNBUCKLES - Check the wing flight control components, cables and pulleys. Replace control system components (push rods, turnbuckles, end fittings, castings, etc.) that have bulges, splits, bends, or cracks. Check control cables, pulleys, and associated equipment for condition, attachment, alignment, clearance, and proper operation. Replace cables that have more than 3 broken strands in any 3-foot length of cable or evidence of corrosion. Check cables for proper tension at the first inspection and every 100 hours thereafter.			
5. AILERONS - Check for condition and security. Check for cracks, loose or missing rivets and freedom of movement. Check hinge bearings and brackets for condition, push-pull rods for security and rod ends for corrosion.			
6. FUEL CELLS AND VENTS - Inspect fuel cells and vent lines as indicated in Section 8 of this shop manual.			
7. PLUMBING - Check for leakage, chafing, condition and security.			
8. ELECTRICAL WIRING AND EQUIPMENT - Inspect for chafing, damage, security and attachment.			
9. FLAP LIMIT SWITCHES - Check for the condition, security and freedom of flap operation.			
10. FLAPS AND ACTUATORS - Check for condition, security, binding or chafing of actuator drive shafts. Check flap skin and structure for cracks, loose or missing rivets. Check roller bearings and tracks for condition. Check stop area for condition and damage.			
11. FLAP POSITION TRANSMITTER - Check for security and operation.			
12. DRAIN HOLES - Check the drain holes in the left and right upper wing attach fittings to ensure that they are open and free of obstruction.			
13. WING SPAR CAP - Inspect the wing spar cap for corrosion as outlined in Section 3 of this shop manual.			
14. WING BOLTS - Check wing bolts for proper torque at the first 100-hour inspection and at the first 100-hour inspection after each installation of the wing attach bolts. Refer to Section 3 of this shop manual for wing bolt, nut and fitting inspection criterion and frequency.			
15. PITOT TUBE AND STALL WARNING VANE - Check for condition and obstructions.			
16. AILERON TRIM TAB - Check for attachment and freedom of movement.			
17. FUEL QUANTITY TRANSMITTER - Check for attachment and electrical connection.			
18. NAVIGATION LIGHTS - Check for cracked or broken lenses and replace bulbs as necessary.			
19. LANDING LIGHTS - Check for security and operation. Replace lens and bulbs as necessary.			
20. AUXILIARY FUEL PUMP AND FUEL LINES - Check for condition, security and leaks. Check lines for signs of chafing or cracks.			

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100-HOUR INSPECTION (CONTINUED)

D. Wings and Carry-Through Structure <i>(Continued)</i>	MECH		INSP
	LH	RH	
21. FUEL SELECTOR VALVE (TC-1970, TC-2003 and After; TE-1081, TE-1084 and After; TH-1 and After) - Check for security, operation and leakage.			
22. FUEL STRAINER (Located in the main gear wheel well) - Inspect, clean and check for leaks. Refer to Section 8 of the shop manual.			
23. FUEL STAINS - Check the under side of the wings for fuel stains. See S.I. 0632.			
E. Cabin and Baggage Compartment	MECH		INSP
1. SKIN - Inspect skins for deformation, cracks and loose or missing rivets. If damage is found, check adjacent structure.			
2. STRUCTURE - Check for cracks and deformation. Check for loose or missing rivets and concealed damage.			
3. CABLES AND PULLEYS - Check the flight control components, cables and pulleys. Replace control system components (push rods, turnbuckles, end fittings, castings, etc.) that have bulges, splits, bends, or cracks. Check control cables, pulleys, and associated equipment for condition, attachment, alignment, clearance and proper operation. Replace cables that have more than 3 broken strands in any 3-foot length of cable or evidence of corrosion. Check cables for proper tension at the first inspection and every 100 hours thereafter.			
4. LANDING GEAR GEARBOX AND ACTUATING LINKAGE - Check for leakage, wear, condition and attachment. Check for unusual noise. Check oil level by engaging and turning the emergency hand crank 1/2 turn to determine that oil is being picked up on the worm gear. The oil level should be maintained no more than necessary to cover 1/2 of the diameter of the worm gear.			
5. FLAP MOTOR AND SHAFTS - Check for condition, security and wear at all points. Check drive shaft housing for security and check jam nuts for tightness.			
6. BRAKE MASTER CYLINDER AND PARKING BRAKE VALVE - Check for condition, security and leaks. Check lines for signs of chafing or cracks.			
7. RUDDER PEDALS - Check for freedom of movement. Check cables, push/pull rods, bell cranks, pulleys, turnbuckles, fair leads, for proper routing, condition and security. Check rudder pedal fore and aft positions for wear. Check locks and pins to ensure positive lock.			
8. CONTROL COLUMN, TRIM CONTROL AND INDICATOR (Electric and Manual) - Check for freedom of movement. Inspect pulleys, sprockets, bearings, actuators, chains and turnbuckles for condition, security and operation. Check trim indicator for proper indication.			
9. ENGINE CONTROLS - Check for ease of operation through full travel. Check friction locks for proper operation.			
10. ELECTRICAL WIRING AND EQUIPMENT - Check for condition, security and signs of chafing.			
11. PLUMBING - Check all plumbing and connections for security, leakage and general condition.			

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100-HOUR INSPECTION (CONTINUED)

E. Cabin and Baggage Compartment <i>(Continued)</i>	MECH	INSP
12. WINDOWS AND DOORS - Inspect windows for scratches, crazing and general condition. Inspect doors for security of attachment. Check latching mechanism for proper engagement and ease of operation. Check that rotation of the interior door handle without depressing the handle lock release button, does not unlatch the door.		
13. INSTRUMENTS AND INSTRUMENT PANEL - Inspect instrument panel, sub panels, placards and instruments for condition and attachment. Check all knobs for security. Inspect shock mounts, ground straps for cracks and security.		
14. SEATS, SEAT BELTS AND SHOULDER HARNESSSES - Inspect cabin seats, seat belts and shoulder harnesses for proper operation, condition and security of attachment. Inspect floorboards for condition and seat attachment. Check for operation of the seat stops.		
15. OXYGEN SYSTEM - Check condition of the oxygen system and check the oxygen masks for cleanliness and stowage.		
16. VENTILATING SYSTEM - Check all fresh air and heat outlet vents for proper movement and operation.		
17. FUEL SELECTOR VALVE (TC-1 thru TC-2002, except TC-197; TE-1 thru TE-1082, except TE-1081) - Inspect for leakage, security, freedom of movement, proper detent feel and condition. Check for proper placarding.		
18. VACUUM SYSTEM - Replace individual instrument air filters and/or time change master filter on vacuum system airplanes in accordance with Sections 11 and 15 of this shop manual.		
19. VACUUM SYSTEM AIR FILTER (Central gyro air filter) (Located behind instrument panel) - Check for security of attachment, replace as required (500 hours or as needed).		
20. EMERGENCY EXIT HATCH - Check emergency release handle and latch assembly for proper operation. Check that the hatch moves out freely. Check the complete latch assembly for condition and all moving parts for proper operation. With the hatch installed, check for proper latching and seal. Safety the emergency exit with 0.020 inch diameter copper wire after opening.		
21. STATIC SYSTEM - Check and drain water from the static lines.		
F. Nose Section		
1. SKIN - Inspect skin for corrosion, condition, and loose or missing rivets. If damage is found, check adjacent structure.		
2. STRUCTURE - Check for corrosion, cracks, loose or missing rivets, and concealed damage.		
3. RADAR ANTENNA COVER - Check the fiberglass for security, attachment and cracks.		
4. BATTERY - Inspect for clean, tight connections and correct fluid level. Add distilled water as required. Inspect vent hose at battery box for obstructions. The battery box should be washed out thoroughly and dried each time the battery is removed and cleaned.		

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100-HOUR INSPECTION (CONTINUED)

F. Nose Section <i>(Continued)</i>	MECH	INSP
5. BRAKE FLUID RESERVOIR - Check reservoir for security, attachment, open vent, proper fluid level and for leaks.		
6. ELECTRICAL WIRING AND EQUIPMENT - Inspect electrical wiring and associated equipment and accessories for condition, fraying, and attachment.		
7. HEATER FUEL SYSTEM - Check lines for connection and chafing.		
8. HEATER DUCTING AND WIRING - Check for security and chafing.		
9. AIR CONDITIONER EVAPORATOR - Check for condition and secure attachment.		
10. HEATER IRIS VALVE - Check for smooth operation.		
11. PROPELLER ANTI-ICE RESERVOIR AND PLUMBING - Check for security and unobstructed lines. Fill reservoir as necessary.		
12. OXYGEN - Check for condition and attachment.		
13. TAXI LIGHT - Check for security and operation. Replace if necessary.		
14. BAGGAGE DOOR - Check for condition and proper latching.		
15. PITOT MAST - Check for condition and obstruction.		
G. Rear Fuselage and Empennage		
1. SKIN - Check for deformation, cracks and obvious damage. Check for loose or missing rivets. If damage is found, check adjacent structure.		
2. STRUCTURE - Inspect the two most aft bulkheads for cracks, distortion, loose rivets or other obvious damage.		
3. CABLES, PULLEYS AND TURNBUCKLES - Check the elevator and rudder flight control components, cables and pulleys. Replace control system components (push/pull rods, turnbuckles, end fittings, castings, etc.) that have bulges, splits, bends, or cracks. Check control cables, pulleys, and associated equipment for condition, attachment, alignment, clearance, and proper operation. Replace cables that have more than 3 broken strands in any 3-foot length of cable or evidence of corrosion. Check cables for proper tension at the first inspection and every 100 hours thereafter.		
4. CONTROL SURFACES - Check for deformation, cracks and security. Check for loose or missing rivets. Check for freedom of movement and travel limits. Check the inboard elevator hinge casting (on the aft bulkhead) for cracks in the mounting bolt holes.		
5. TRIM TABS AND ACTUATORS - Check for security and wear. Check allowable free play per Section 4 of this shop manual. Check hinges and trim tab actuator for security and wear. Check trim tabs for cracks and control rods for attachment. Lubricate trim tab hinges per Section 2 of this shop manual.		
6. STATIC PORTS - Check for obstruction and clean as necessary.		
7. PLUMBING - Check for leakage, cracks, chafing, condition and security.		
8. ELECTRICAL WIRING AND EQUIPMENT - Inspect for chafing, damage, security and attachment.		

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BEECH BARON 55 AND 58 SHOP MANUAL

100-HOUR INSPECTION (CONTINUED)

G. Rear Fuselage and Empennage <i>(Continued)</i>		MECH	INSP
9. STATIC LINES - Check condition of static lines and drain.			
10. ASSIST STEP - Inspect for condition and attachment.			
11. ANTENNAS - Check for condition and security.			
12. SCUPPER DRAINS - Check that the drain guards are open facing aft and drain holes are free from obstruction.			
13. AIR CONDITIONER EVAPORATOR - Check for condition and security.			
14. AFT BULKHEADS (F.S. 257.6 and F.S. 271.92) (TC-1 thru TC-2124; TE-1 thru TE-1124; TH-1 thru TH-908) - Inspect for possible cracks in the bulkheads at the horizontal stabilizer stub spars. Refer to Beech Service Instruction No. 0990, Rev. II or subsequent for specific instructions.			
15. H-14 SERVO FILTER - Check attachment and change every 1200 hours.			
H. Main Gear and Brakes		LH	RH
1. BRAKES, LINES, LINING AND DISCS - Check for condition, wear and security. Check lines for chafing and signs of leakage or cracks. Check discs for wear or warping. Check brake discs for cracks.			
2. WHEELS AND TIRES - Check wheels for cracks and tires for wear, damage, condition and proper inflation. Check wheel bearings for condition and wear.			
3. ACTUATOR GEARBOX, MOTOR AND SWITCHES - Check for leakage, condition and security.			
4. LANDING GEAR STRUTS - Inspect the shock struts and components for cracks, attachment, corrosion, proper inflation and evidence of leakage.			
5. ACTUATING LINKAGE - Check for wear and cracks at attach points. Check for condition and security.			
6. GEAR DOORS AND LINKAGE - Check doors for damage and cracks to the structure and skins. Check linkage for wear and cracks at the attach points. Check for condition and security and that all clevis retaining pins are in place and secured with cotter pins.			
7. STRUT FLUID LEVEL - Check and maintain the proper hydraulic fluid level in the struts as outlined in Section 2 of this shop manual.			
8. STRUT AND A-FRAME HINGE BOLTS - Inspect for corrosion and security of attachment.			
I. Nose Gear			
1. WHEEL AND TIRE - Check wheel for cracks and tire for wear, damage, condition and proper inflation. Check wheel bearings for condition and wear.			
2. LANDING GEAR STRUT - Inspect the shock strut and components for cracks, attachment, proper inflation and evidence of leakage.			
3. ACTUATING LINKAGE - Check for wear at attach points. Check for cracks and security.			

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100-HOUR INSPECTION (CONTINUED)

I. Nose Gear <i>(Continued)</i>	MECH	INSP
4. GEAR DOORS AND LINKAGE - Check doors for damage and cracks to the structure and skins. Check linkage for wear and cracks at the attach points. Check for condition and security.		
5. NOSE GEAR STEERING LINKAGE - Inspect linkages for tightness, condition and security. Check linkage boots for condition.		
6. SHIMMY DAMPER - Check for condition and attachment. Check attach points for cracks. Check fluid level as outlined in Section 2 of this shop manual.		
7. STRUT FLUID LEVEL - Check and maintain the proper hydraulic fluid level in the strut as outlined in Section 2 of this shop manual.		
8. STRUT AND A-FRAME HINGE BOLTS - Inspect for corrosion and security of attachment.		
9. STATIC CABLE (If installed) - Inspect for condition and proper clearances and attachment.		
10. TAXI LIGHT - Check security and for cracked light.		
11. NOSE LANDING GEAR DRAG BRACE (TC-1608 thru TC-2091; TE-938; TH-1 thru TH-871 with Beech Kit No. 35-4012-1 installed; TC-2092 and After; TE-1114 and After; TH-872 and After) - Check that the two drag brace bracket attachment bolts are secure. Check drag brace assembly for indications of shear stress, wear and corrosion. At 2,000 hours, remove and inspect the two bracket attachment bolts. Replace all hardware with evidence of shear stress, wear and/or corrosion.		
12. NOSE LANDING GEAR RETRACT ROD ROD-ENDS (TC-1608 thru TC-2091; TE-938; TH-1 thru TH-871 with Beech Kit No. 35-4012-1 installed; TC-2092 and After; TE-1114 and After; TH-872 and After) - Check the retract rod rod-ends for cracking, sheer stress, wear and corrosion. Replace forward rod rod-end at 2,000 hours total aircraft time.		
J. Landing Gear Operation		
CAUTION <i>Under no circumstances should the landing gear be operated electrically while the hand crank is engaged. In the event of such an operation, a tear down and magnetic inspection should be performed for damage to the engagement slot in the worm shaft.</i> NOTE Since the battery voltage is not sufficient to properly cycle the landing gear for this inspection, use only an external power source capable of delivering and maintaining 28.25 ± 0.25 VDC to the airplane's electrical system throughout the extension and retraction cycles when performing the landing gear retraction inspection. For more specific information which may be necessary to accomplish the following items, refer to Section 5 of this shop manual.		

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100-HOUR INSPECTION (CONTINUED)

J. Landing Gear Operation <i>(Continued)</i>	MECH	INSP
1. LANDING GEAR ACTUATOR ASSEMBLY - With the airplane on jacks and the retraction cycle started enough to break the down lock tension, apply a sharp load by hand in an aft direction against the nose gear strut. If this causes the main gear wheels to move approximately 1/2 to 1 inch, it is a good indication that the gear actuator assembly needs overhaul and/or adjustment.		
2. DOORS - Check door operation, fit and fair. Check for unusual noise.		
3. GENERAL OPERATION - Place the airplane on jacks and cycle the landing gear while checking to ascertain that the position light switches operate in conjunction with the landing gear position. Check the condition and operation of the complete landing gear system per this shop manual.		
4. VISUAL INDICATOR - Inspect for proper adjustment and operation.		
5. POSITION LIGHTS - Check for security, adjustment, wiring for breaks, condition of insulation, loose connections and proper indication.		
6. EMERGENCY EXTENSION - Check system for freedom of operation and positive engagement of the down locks. Check for unusual noise.		
7. LIMIT SWITCH RIGGING - Check for security and proper adjustment of the limit switches. Refer to Section 5 of this shop manual for correct landing gear gearbox internal clearance.		
8. DYNAMIC BRAKING ACTION - Verify proper operation of dynamic brake relay.		
9. WARNING HORN - Check for proper operation.		
10. UPLOCK CABLE TENSION - Check up lock cable mechanism for condition and security. Check up lock cable for proper tension and for possible fraying.		
11. DOWNLOCK TENSION (MAIN GEAR) - Check for proper deflection force on the main gear knee joints. NOTE Down lock tension should be checked at the first 100-hour inspection and every 200 hours thereafter.		
12. DOWNLOCK TENSION (NOSE GEAR) - Check the down lock tension on the nose gear as indicated in Section 5 of this shop manual.		
13. UPLOCK ROLLERS - Check condition and clearance of up lock rollers and lubricate as indicated in Sections 2 and 5 of this shop manual. Check for binding.		
14. SAFETY SWITCH - Check for security, proper rigging and operation.		
15. NOSE GEAR UP TENSION - Check the up tension on the nose gear as indicated in Section 5 of this shop manual.		
16. NOSE GEAR STEERING - Check for condition and security.		

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100-HOUR INSPECTION (CONTINUED)

K. General	MECH	INSP
1. Airplane cleaned and serviced.		
2. Airplane lubricated, after cleaning, Refer to the LUBRICATION CHART in Section 2.		
3. Inspect all placards to ensure that they are easily readable and securely attached.		
4. Ensure that all Airworthiness Directives, Raytheon Aircraft Service Bulletins and previously issued Service Instructions are reviewed and complied with as required.		
For a complete 100-hour or annual inspection of the airplane, all items on the airplane that are noted in this guide should be inspected.		
MECHANIC _____		
QUALITY CONTROL INSPECTOR _____		

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ELECTRIC PROPELLER DEICER SYSTEM 50-HOUR INSPECTION GUIDE (GOODRICH AND MCCAULEY)

The various components of the deicer system should be inspected periodically for incipient defects. The purpose of the following inspection is to provide a means for detecting and correcting such defects before they render the system inoperative.

- a. Lock the brakes and operate the engines at near take-off power. Turn the deicer system switch ON and observe the ammeter for at least 2 minutes (3 minutes on McCauley). If the ammeter needle does not rest within the shaded band, except for a flicker at 30 second (90 seconds on McCauley) intervals when the step switch of the timer cycles, refer to the troubleshooting chart for the probable source of trouble.

WARNING

Before moving the propeller, make certain that the ignition switch is off and that the engine has cooled completely. There is always some danger of a cylinder firing when a propeller is moved.

CAUTION

While following the instructions of step "b", move the propeller back and forth to prevent arcing between the brushes and the slip ring.

- b. With the engine shut-off, turn the deicer switch ON and feel the deicer boots on the propeller for the proper sequence of heater operation. The presence of local hot spots indicate severe damage to the deicer heaters, which should be repaired before more serious damage develops.
- c. Remove the spinner dome and open all access doors pertaining to the wiring and components of the deicer system. Turn the deicer switch ON and station an assistant in the airplane to observe the ammeter. Flex all accessible wiring, particularly the lead straps, leads from the slip ring assembly, and the fire wall electrical connectors and their wiring. Any movement of the ammeter, other than the cycling flicker that occurs at 30 second (90 seconds on McCauley) intervals, indicates a short or open circuit that must be located and corrected.
- d. To extend the life of the lead strap between the hub clamp and clip, reposition the bend in the strap at a point at least 1/2 inch from the existing location of the bend.
- e. Check for damaged brush rods or springs and for worn or damaged brushes.

ELECTRIC PROPELLER DEICER SYSTEM 100-HOUR INSPECTION GUIDE (GOODRICH AND MCCAULEY)

- a. Repeat the 50-hour inspection.
- b. Check for radio noise or radio compass interference by operating the engine at near take-off power with the radio gear turned on. If, under these conditions noise or interference occurs when the deicer switch is ON and disappears when the switch is OFF, refer to the troubleshooting chart for the probable source of trouble.
- c. Check all clamps, clips, mountings, electrical connections, and connectors for tightness and electrical soundness. Also check for loose, broken or missing safety wire.
- d. Closely check the deicer boots for wrinkled, loose or torn areas, particularly around the outboard end and at the

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point where the strap passes under the hub clamp. Look for abrasions or cuts along the leading edge of the flat or thrust face. If the heater wires are exposed in damaged areas or if the rubber is found to be tacky, swollen, or deteriorated (as from contact with oil or solvent fluids), replace the damaged deicer boot.

e. Check that the hub clamps are tight. Inspect for cracks or other damage. Check to see that the cushioning material is not missing or damaged in the area under the hub clamp or on the edge of the spinner dome. Manually operate the propeller from "full pitch" to "feathering" while checking that the deicer lead straps do not come under tension.

f. Check the slip rings for gouges, roughened surface, cracks, burned or discolored areas, and for deposits of oil, grease, or dirt. Clean greasy or contaminated slip rings with solvent (methyl ethyl ketone on McCauley) (53 or 19, Consumable Materials Chart). After such a cleaning, a run-in time of 5 hours of engine operation must be allowed before the deicer system is turned on.

g. If uneven wear or wobble is detected, check the alignment of the slip rings on the prop shaft with a dial indicator. While checking the alignment, push in while turning the prop to eliminate play in the propeller thrust bearing. If the run-out over 360 degrees of rotation is over 0.005 inch or in excess of 0.002 inch in any 4-inch arc, refer to the paragraph on slip ring alignment in Section 11.

h. Examine the brush mounting brackets and housings for cracks, deformation or other indications of damage. Check for tight connections and that the leads are not chafed or binding.

i. Check that each brush rides fully on its slip ring over 360 degrees of rotation. If the brush is not properly aligned, add or remove shims under the brush block or elongate the holes in the mounting bracket to raise or lower the brush block to the proper position. If the brushes ride both high and low with respect to the slip rings in 360 degrees of rotation, the slip ring assembly is eccentrically mounted and must be replaced.

j. Check for proper spacing between the brush block and slip rings as indicated in Figure 11-25, 11-30 or 11-36 in Section 11. If this distance is not within the specified limits, loosen the mounting screws and reposition them in the elongated holes until the block is properly positioned. If necessary, shims can be added between the thrust bearing plate and the mounting bracket until the brush block is properly located.

k. Estimate the contact angle of the brush block in relation to the slip rings. If this angle is not approximately 2 degrees, (on McCauley they are to be parallel) as indicated in Figure 11-25 or 11-30 in Section 11, loosen the mounting bolts and reposition the brush block until the proper angle exist between the brush block and slip rings. It should be noted that the spacing established in step j must also be maintained after the proper angle is established.

WARNING

Before moving the propeller, make certain that the ignition switch is off and that the engine has cooled completely. There is always some danger of a cylinder firing when a propeller is moved.

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CAUTION

While following the instructions of step 1, move the propeller back and forth to prevent arcing between the brushes and slip ring.

I. With the deicer system operating and a man in the airplane observe the ammeter, visually inspect and physically flex the wiring from the brush block to each component of the deicer system and the airplane power supply. Jumps of the ammeter needle, other than the momentary flicker that occurs when the timer switches at 30- or 90- (McCaughey only) second intervals, indicates loose or broken wiring in the area under examination at the moment. In such instances, continue to flex the wiring in the area that first indicated trouble while checking the continuity through the individual wires of the affected harness until the source of trouble is located. Use the wiring diagram to trace the circuit of the deicer system.