

MAINTENANCE MANUAL

POWERED SAILPLANE

STEMME S12



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REGISTRATION

This aircraft may only be maintained in accordance with the instructions given in this manual.

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0.1 RECORD OF AMENDMENTS

Any revision of the present manual must be recorded in the following table, with the exception of:

- Installation status of optional equipment, for optional equipment refer to section »9«,
- Amendments to the original ROTAX Maintenance Manual for the ROTAX 914 F (refer to Annex E).

The record of amendments in section »0.1« and the list of effective pages in section »0.2« are assigned to an individual aircraft serial number. The indicated amendment no. in the feed line of these pages does not change with entries after delivery of the aircraft.

Revision of pages must be endorsed in the following list. Necessary amendments, needs to be mandatory included in the present manual.

The new or amended text will be marked on the revised page by a black vertical line on the right hand margin; the amendment number and the date will be shown in the outside of the footer page. The inspector certifies by his signature the correspondence of this individual Aircraft Maintenance Manual and the following list with the aircraft designated by serial number.

Any modification or correction within the approved sections must be signed by the Competent Authority. Information about amendments which must be inserted in this Manual, are given in the »Record of Airworthiness Directives and Service Bulletins« (refer to Annex B).

The original ROTAX Maintenance Manual for the ROTAX 914 F is separately revised by BRP-ROTAX® GmbH & Co.KG, Austria (refer to Annex E).

The insertion must be signed by the performing person. The actuality and correct insertion of amendments will be check during the annual airworthiness review.

Am. No.	Removed Pages	Inserted Pages	Date of Amendment	Reference	Date of Insertion	Signature
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0.2 LIST OF EFFECTIVE PAGES

This list is only valid for the serial no. specified on title page. The list contains all amendments of the maintenance manual, effective until final approval of this serial no. amendments added later must be recorded.

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1. GENERAL

1.1 REMARKS ON MAINTENANCE

The legal owner or operator of the STEMME S12 is obliged to ensure that the maintenance of the aircraft follows the instructions of this manual in accordance with applicable national laws and regulations. Among others, these include:

- Scheduled maintenance,
- Adjustments,
- Replacement of fluids and lubricants,
- Replacement of parts after expiration of their service life,
- Minor repairs.

Any maintenance work must be documented (aircraft logbook).

The manufacturer must be informed immediately in case of any change of ownership. The message must be confirmed by the manufacturer, so that all information concerning airworthiness (AD's, SB's) can be given to the legal owner.

For maintenance work the following documents are relevant:

1. This Maintenance Manual for the motorglider STEMME S12.
2. STEMME - Flight Manual for the motorglider STEMME S12.
3. ROTAX - Maintenance Manual (Line Maintenance) for ROTAX Engine Types ROTAX 912 and 914 Series.
4. ROTAX - Maintenance Manual (Heavy Maintenance) for ROTAX Engine Types ROTAX 912 and 914 Series.
5. ROTAX - Operating Manual ROTAX 914 F.
6. ROTAX - Installation Manual ROTAX 914 F.
7. ROTAX - Main Overhaul Manual ROTAX 914 F.
8. ROTAX - Spare Parts List ROTAX 914 F.
9. STEMME Document Number A26-11AM-M: Technical Specification of the ROTAX 914 F2/S1.
10. Maintenance instructions for the L'Hotellier quick-disconnects in flight control system.
11. Manufacturer's documents referring to the equipment listed in the equipment list of the corresponding S/N.
12. SB's published by STEMME, ROTAX and manufacturer of other equipment installed.
13. Maintenance Instructions from STEMME.
14. Service Information from ROTAX.
15. Aircraft Logbook.

The amount and kind of maintenance work depend on the aircraft utilization, the climate, airfield conditions, storage facilities and other factors, irrespective of the periodic checks. E. g., in sandy environs it might be necessary to clean all filters before every commencement of operation; on

the other hand in coastal or in rainy regions it is important to take more care of the preservation of the aircraft.

The instructions in this manual are valid under normal conditions and use.

Use only spare parts from the manufacturer or according to the manufacturer's requirements.

NOTICE

Materials required and recommended procedures for minor repairs on composite materials are indicated in the repair guide »Small Repairs of Composite Materials« in Annex A of the S12 Aircraft Maintenance Manual.

In case of any incident endangering airworthiness, the manufacturer must be informed immediately.

Maintenance work must be performed by qualified personnel.

NOTICE

This Maintenance Manual does not include instructions for assembly, daily inspection and Pre-flight inspection, which are provided in section »4 Normal Operating Procedures« of the S12 Aircraft Flight Manual. To perform these procedures, the S12 Aircraft Flight Manual must be available to the maintenance personnel.

1.2 CONVERSION TABLE

For the conversion of technical data the following factors have been used:

Data	Factor
1 cubic in	16.387 cm ³
1 dr	1.772 g
100 fpm	0.508 m/s
1 ft	0.3048 m
1 ft lb	1.356 Nm
1 hp	0.7457 kW
1 Imp.gal.	4.546 l
1 in	25.4 mm
1 inHg	33.86 hPa
1 kgm	86.8 lb in
1 kgmm	0.001 kgm
1 kgmm	0.007 lb ft
1 kt	1.852 kph
1 lb	0.4536 kg
1 lbf	4.45 N
1 lbf ft	135.6 Ncm
1 mph	1.609 kph
1 sqft	0.0929 m ²
1 oz.	28.349 g
1 psi	0.06895 bar
1 US gal.	3.785 l

1.3 ABBREVIATIONS

The following abbreviations are being used for clarity:

ACL	Anti-Collision Light
AD's	Airworthiness Directives
AGL	Above Ground Level
AMM	Aircraft Maintenance Manual
ANSI	American National Standards Institute
AOA	Angle Of Attack
ASAP	As Soon As Possible
ASI	Airspeed Indicator
AUW	All-Up-Weight
CB	Circuit Breaker
CCT	Cylinder Coolant Temperature
CD	Constant Depression
CFRP	Carbon Fiber Reinforced Plastic
CG	Center Of Gravity
CHT	Cylinder Head Temperature
DCDI	Dual Capacitive Discharge Ignition
EFIS	Electronic Flight Information System
EMC	Electromagnetic Compatibility
EQL	Equipment List
FBO	Fixed-Base Operator
FOD	Foreign Object Damage
FRP	Fiber Reinforced Plastic
GEN	Generator
GFRP	Glass Fiber Reinforced Plastic
GPS	Global Positioning System
IMC	Instrument Meteorological Conditions
IPC	Illustrated Parts Catalog
KIAS	Knots Indicated Airspeed
kt	Knots (equivalent to KIAS)
LBA	Luftfahrtbundesamt - German Civil Aviation Authority
LH	Left Hand
MAP	Manifold Pressure
MCP	Maximum Continuous Power
MEL	Minimum Equipment list
MMEL	Master Minimum Equipment list
MNLP	Maximum Weight of Non Lifting Parts
MTOW	Maximum Take-Off Weight
NLP	Non Lifting Part

OAT	Outside Air Temperature
OVP	Over Voltage Protection
PIC	Pilot In Command
PPC	Propeller Pitch Control
PTT	Push To Talk
R/C	Rate Of Climb
RH	Right Hand
RP	Reference Plane
RPM	Revolutions Per Minute
RTD	Resistance Temperature Detector
RWY	Runway
SB's	Service Bulletins
SI	Service Information
SL	Service Letter
STC	Supplemental Type Certificate
TBO	Time Between Overhaul
TBR	Time Between Replacement
TC	Type Certificate
TCDS	Type Certificate Data Sheet
TCU	Turbocharger Control Unit
TE	Total Energy
T/O	Take-Off
TSO	Technical Standard Order
TTL	Transistor-Transistor Logic

1.4 SAFETY SYMBOLS

The following safety instructions are based loosely on the ANSI Z535.

Symbols	Z535.3 Criteria for Safety Symbols
Signs and Labels	Z535.4 Product Safety Signs and Labels
Product Safety	Z535.6 Product Safety Information in Product Manuals, Instructions, and Other Collateral Materials.

 WARNING	WARNING An operating procedure or technique that may result in personal injury or loss of life if not followed.
 CAUTION	CAUTION An operating procedure or technique that may result in damage to equipment if not followed.
NOTICE	NOTICE An operating procedure or technique needing special emphasis.

2. DESCRIPTION

The STEMME S12 is a twin-seat, self-launching motorglider, constructed mostly from carbon fiber and is aerodynamically optimized for high performance. The two seats are arranged side-by-side (forward of the wing) and the S12 is equipped with dual controls.

The wing is shoulder mounted and consists of a center section with flaps and Schempp-Hirth air brakes, two outer wing sections with continuous ailerons, two wing extensions with ailerons and two winglets. The flaps and ailerons of inner and outer wing/wing extension are interconnected ("flaperons").

The motorglider is in "T"-tail design.

The retractable two-wheel main landing gear is electrically operated and is equipped with hydraulic wheel brakes.

The engine of the STEMME S12 is based on the ROTAX 914 F2-01, which has been certificated by BRP-ROTAX® GmbH & Co.KG, Austria. STEMME modified the arrangement of some accessories (induction and exhaust system including turbo-charger, engine mounts etc.) to adapt the systems to specific installation requirements of the S12. These modifications are certified in the STEMME S12 as engine model ROTAX 914 F2-01/S1.

ENGINE DESCRIPTION

Four-cylinder, four-stroke opposed type Otto-engine, turbocharged with electronic manifold pressure control (TCU); a center cam shaft and tappets; OHV; liquid cooled cylinder heads, cylinder barrels cooled by ram air; dry-sump lubrication; Dual Capacitive Discharge Ignition (DCDI); 2 CD-carburetors (variable-choke); integrated reduction gear with mechanical vibration absorber and overload clutch.

The engine is mounted in the fuselage in a center steel frame near the aircraft's CG. Engine power is transmitted via a propeller shaft made of composites and a spur gear to the variable pitch propeller in the fuselage nose.

When the aircraft is in gliding configuration, the propeller blades are folded and covered by a movable nose cone (nose-cone). Propeller pitch change from take-off into cruise position is accomplished by electrically heated expansion elements, and from cruise back to take-off position (elements unheated) by springs as well as aerodynamic and centrifugal forces.

A fuel tank is located at each outboard end of the wing center section. Each tank supplies the feeder tank in the fuselage by use of electrically driven fuel pumps. From the feeder tank the fuel is supplied by two fuel pumps (one main and one auxiliary) to the engine to provide required redundancy.

2.1 TECHNICAL DATA

FUSELAGE		
Design	Front section CFRP-Kevlar-GFRP-structure, center steel frame, GFRP-fairing, tail boom with integrated vertical tail fin (CFRP).	
Length	8.42 m	27.62 ft
Width	1.18 m	3.87 ft
Cockpit width	1.16 m	3.81 ft
Cockpit height	0.93 m	3.05 ft
Height of tail unit	1.75 m	5.74 ft

WING		
Design	5 sections CFRP-Spar with GFRP-shearweb, CFRP-sandwich skin.	
Wing span	25.07 m	82.25 ft
Center wing span	9.90 m	32.48 ft
Wing area	19.95 m ²	214.75 sqft
Aspect ratio	31.5	
Dihedral angle (V-form)	0.75°/1.75°/4°	
Mean aerodynamic chord	0.741 m	2.43 ft
Wing Airfoil	HQ41/14.35	
Sweep of wing center section leading edge	0°	
Sweep of outboard wing leading edge up to the bend	0°	

AIR BRAKES		
Type	Two blade Schempp-Hirth type, position outer part of wing center section.	
Length	1.50 m	4.92 ft/59.01 in
Area	0.22 m ²	2.37 sqft
Maximum height above wing upper surface.	0.16 m	0.52 ft/6.29 in

HORIZONTAL TAIL		
Design	Web GFRP, skin CFRP-Sandwich, elevator GFRP-Sandwich.	
Span	3.10 m	10.17 ft
Area	1.46 m ²	15.72 sqft
Aspect ratio	6.58	
Airfoil	FX 71-L-150/25	

VERTICAL TAIL		
Design	Web GFRP, skin CFRP, rudder GFRP-sandwich.	
Span	1.60 m	5.25 ft
Area	1.78 m ²	19.16 sqft
Airfoil	FX71-L150/30 x*1.3	

WEIGHTS		
Max. T/O-weight	900 kg	1984 lb
Empty weight	690 kg (approx., min. equipment.)	1556 lb
Maximum weight of non-lifting parts	610 kg	1345 lb
Total useful load (Occupants, fuel, baggage)	210 kg	463 lb

WING FLAPS (CENTER WING)		
Span	4.39 m	14.40 ft
Area	0.75 m ²	8.07 sqft
Flap positions:	-10°, -5°, 0°, +5°, +10°, L (+16°)	

AILERONS (OUTER WINGS AND EXTENSIONS)		
Span	5.70 m + 1.50 m	18.70 ft + 4.92 ft
Area	0.78 m ² + 0.13 m ²	8.40 sqft. + 1.40 sqft

LANDING GEAR		
2 main wheels with brake discs, rim of wheel	127x127-30	
Tire size	6.00-5	
Wheel track	1.36 m	4.46 ft
Tail wheel (steerable), tire size	210 x 65	
Wheel base	5.46 m	17.91 ft

ENGINE		
Design	4-cylinder 4-stroke-Otto-motor, opposed type, turbocharged, electronic manifold pressure control integrated reduction gear.	
Type	ROTAX 914 F2-01/S1	
Engine reduction gear ratio	i = 2.4286	
Bore	79.5 mm	3.13 in
Stroke	61 mm	2.40 in
Displacement	1211 cm ³	73.9 cubic in
Compression ratio.	9.0	
Drive shafts turns.	Clockwise	
Max. T/O power.	84.5 kW at 5800 RPM	113.2 hp
Max. cont. power.	73.4 kW at 5500 RPM	98.4 hp
Fuel flow at T/O power (115%).	33.0 l/h 8.72 US gal./h 7.26 Imp.gal./h	
Fuel flow at max cont. power (100%).	27.2 l/h 7.19 US gal./h 5.98 Imp.gal./h	
Fuel flow at 75% power.	20.4 l/h 5.34 US gal./h 4.49 Imp.gal./h	
Specific fuel consumption at max. cont. power (100%).	276 g/kWh	0.454 lb/hph

PROPELLER		
Design	2-blade folding propeller, CFRP blades, propeller hub and blade suspension. Forks aluminum. Pitch control via electrically heated thermo elements.	
Type	STEMME 11 AP-V	
Propeller diameter	1.63 m	5.35 ft
Mass of the propeller (incl. outer-casing of needle bearing and rubber buffers)	9350 g	20.61 lb
Overall mass of propeller blade	650 g $\pm$ 10 g	1.433 lbs $\pm$ 0.022 lb
Max. propeller	2.650 RPM	
Propeller blade angle (station 0.7)	17.65° in T/O 24.05° in cruise.	
Propeller blade pitch (station 0.7)	114 cm / 44.9 in (T/O position) 160 cm / 63.0 in (cruise position)	
Max. current consumption of both resistor elements	10 A	
Propeller turns	Counter-clockwise	

IN-FLIGHT CENTER OF GRAVITY RANGE		
In-flight center-of-gravity range aft of datum (See section 6.3 for center wing leading edge)	265 - 420 mm	10.41 in - 16.5 in

PROPELLER GEARBOX	
Design	Helical spur gear, aluminum alloy-housing, elastic mounting in rubber elements.
Type	STEMME 11AG
Drive shaft turns	Clockwise
Ratio of propeller gearbox	$i = 1.109$

FUEL SYSTEM	
Design	2 FRP-tanks in wing center section + 1 feeder tank, 1 electrical fuel transfer pump for each wing-tank + 2 electrical pumps from feeder tank to the engine.
Maximum fuel volume	126.0 l (± 2%) 33.28 US gal. 27.72 Imp.gal.
Unusable fuel	1.4 l 0.37 US gal. 0.31 Imp.gal.

NOTICE

For more technical data, please refer to the S12 Aircraft Flight Manual.

2.2 THREE VIEW DRAWING

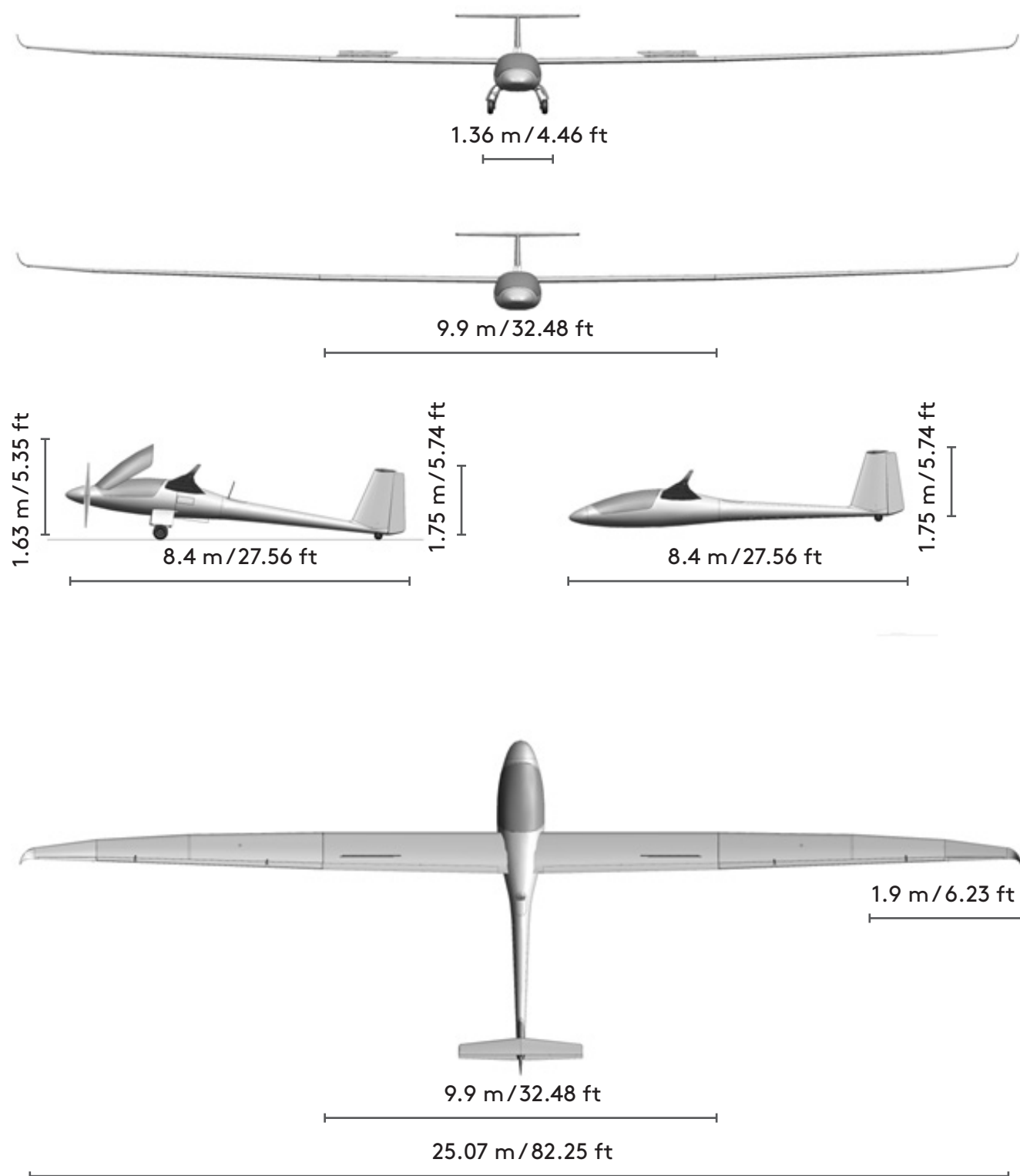


Figure 2.2.a
Three View Drawing of the S12

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3. DESCRIPTION OF ASSEMBLIES

3.1 AIRFRAME, PRIMARY AND SECONDARY STRUCTURE

The Primary Structure includes:

- Wing spars, root ribs, and wing spar boxes
- Wing shells
- Center steel frame
- Tail boom and vertical stabilizer
- Front section of fuselage
- Horizontal stabilizer
- Fittings

The Secondary Structure includes:

- Control surfaces
- Cowlings, cooling air system ducts, cockpit components

3.1.1 WING

Structural design: 5 sections; CFRP-Spar with GFRP-shearweb, CFRP-sandwich skin.

The wing consists of four sections: A wing center section with a span of 9.9 m/32.48 ft, two outer wing sections and two wing extensions including winglets with a length of 1.9 m/6.23 ft each. Attachment of the wing center section to the fuselage is by means of four sliding bolts, attachment of the outboard wings to the wing center section as well as the connection of wing extensions to the outer wings is with one sliding bolt each.

A removable fairing covers the wing/fuselage junction. Beneath the fairings, free access to the wing attachment, the control system joints and the combined aileron/flap controls is possible. For disassembly, the wing center section can be lifted vertically.

The flaps extend over the total span of the wing center section and the ailerons over the total span of the outboard wings. The controls of flaps and ailerons are interconnected ("flaperons"), the ailerons acting as differential flaps and the flaps acting as differential ailerons. The flap deflection is reduced from the inner to the outer wing, the aileron deflection is reduced from the outer wing to the wing center section and from up to down deflections (differential aileron deflection). The ailerons of the wing extension are directly connected to those of the outer wing and have no separate actuation.

Two-blade Schempp-Hirth air brakes are installed on the wing center section upper surface. The flaps and aileron gaps are sealed with elastic adhesive tape and a sliding layer on the upper surface of the wing and with a textile tape (optional: elastic adhesive tape and sliding layer) on the lower surface.

A boundary layer turbulator (adhesive 60° zigzag tape, leading edge at 69% of chord, 12 x 0.5 mm/0.47 x 0.02 in) on the wing lower surface ensures a defined flow transition.

3.1.2 FUSELAGE

The fuselage is a modular construction of three assemblies with bolted joints: The forward fuselage section (CFRP) construction, the center fuselage framework (steel frame) and the tail boom (CFRP construction).

Loads from the fuselage front section, the wing, the landing gear, the power-plant and the tail unit are transmitted by center steel frame.

The center fuselage framework is covered by self-supporting fairings (upper fairing and engine cowlings LH/RH as well as lower fairing) of GFRP sandwich. The attachment of the fairings is by means of camlocks, which can be easily opened with a screw-driver. The upper fairing includes an oil service access door, which can be opened without a tool.

3.1.3 TAIL UNIT

Horizontal Tail

- T-arrangement, easily removable (simple spring-bolt connection),
- Stabilizer as sandwich construction of CFRP, elevator made of CFRP.
- Elevator gaps sealed by elastic tape.
- Boundary layer turbulator (adhesive 60° zigzag tape, leading edge at 65% of chord, 12 x 0.5 mm / 0.47 x 0.02 in) on upper and lower side for defined flow transition.

Vertical Tail

- Stabilizer as a sandwich construction of CFRP, rudder as a sandwich construction of GFRP,
- Rudder gap sealed by elastic tape with integrated zigzag turbulator (combi-tape),
- COM antenna integrated in rudder.

3.2 COCKPIT

3.2.1 GENERAL

The two seats are arranged side by side (forward of the wing) and the S12 is equipped with dual controls. The FRP seat backrests are multi-adjustable. Each seat is equipped with 4-point seat belts with a center locking mechanism.

Between the seats a console covers both systems and the drive shaft tunnel. The instrument panel is designed in mushroom-style panel arrangement.

The one-piece canopy is hinged at the front and held in its opened position by two gas springs. Three canopy locks on each side of the canopy frame, left hand and right hand side, are operated by one locking lever on each side. The locking levers are mechanically interconnected by two bowden cables so that they act simultaneously. One additional lock to improve canopy emergency jettisoning ("Röger-hook") is installed in the rear upper canopy frame, operated by adjacent handle.

The emergency jettison will be activated by opening either lateral locking lever on canopy side (operating one is sufficient) and the red T-shaped handle on the instrument panel.

Canopy hinge opens and is lifted approximately 0.1 m/4 in by a gas spring.

The "Röger-hook" must remain closed, since it is the axis of rotation until the canopy is jettisoned.

The cockpit is ventilated via two nozzles (LH and RH side) in the instrument panel. The canopy ventilation is via openings in the instrument panel cover.

3.2.2 CONTROL ELEMENTS AND INSTRUMENTS

COCKPIT CONTROLS AT THE AIRFRAME

Following overview includes the controls at the airframe.

No.	Name of Control	Airframe Position
1.	Control Stick	Centered in front of each seat.
2.	Rudder Pedals	For each seat and adjustable. The pedals also steer the tail wheel, which is coupled to the rudder via spring device.
3.	Airbrake Lever	At the LH side of each seat. Blue lever at LH cockpit side and on the center console between seats.
4.	Flap Lever	At the LH side of each seat. Black lever at LH cockpit side and on the center console. Indication of settings (-10, -5, 0, +5, +10, L) in center console. Unlocking is by moving lever to the right against a spring force which locks the flap positions.
5.	Pedal Adjustment Handle	In front of each seat. Unlocking is by pulling the handle.
6.	Canopy Locks	Two white handles with red stripe, one on left and one on right side of the canopy frame, to open and lock the canopy. The handles are mechanically connected so that both always move simultaneously. In addition a white handle at rear top center of the canopy is provided to insure correct movement of the canopy during jettison ("Röger-hook").
7.	Brake Lever	Lever on each control stick. Separate lever for parking brake valve on the floor panel console in front of the LH control stick.
8.	Trim Knob	A green switch on the control stick.
9.	Throttle Lever	One black lever on center console with two forward stops (For max. continuous and max. T/O-power). It is coupled with a spring acting forward in direction FULL POWER. Its position is fixed by friction discs, which can be adjusted with a knurled knob on LH side of the center console.
10.	Choke Lever	Black lever on center console, RH side of the throttle lever. It is coupled with a spring acting rearward in direction CHOKE OFF. Its position is fixed by friction discs, which can be adjusted with a knurled knob on RH side of the center console.

No.	Name of Control	Airframe Position
11.	Propeller Pitch	Switch on center console. The forward position is the TAKE-OFF position. A green light located in the upper area of left instrument panel indicates if propeller pitch (not switch) is in T/O) -position.
12.	Fuel Valve	Red handle on the rear console between the seat back rests. Turning the handle into its horizontal position (fuel valve CLOSED) cuts off the fuel supply for the engine.

NOTICE

Throttle positions for 115% and 100% can be selected by feel. The first stop is the 100% throttle position. To select 115% the throttle lever must be moved through a throttle gate to the left and then pushed to the next stop.

3.2.3 CONTROLS AT THE INSTRUMENT PANEL

The following overview includes controls in the lower area of the instrument panel. These elements are included in figure »3.2.3.a Arrangement of Elements on the Instrument Panel«, see section »3.2.4«.

No.	Name of Control	Airframe Position
1.	Emergency Canopy Release	Red pull-handle on LH side of the switch panel. It is pulled for emergency canopy jettison after opening the canopy locks on LH or RH side of the canopy frame.
2.	Cowl Flap Adjustment	Black T-handle on LH side of the lower middle section of the instrument panel to reduce engine cooling in cruise condition. The foremost position means cowl flaps fully OPEN, 5 settings aft are available to reduce the opening of the cowl flaps.
3.	Nose-cone Operation	Black handle in the bottom center of the instrument panel to open, close and lock the nose-cone, linked to the engine electric master switch. Unlock by lifting, lock by pushing down the handle. In the forward position (Nose-cone OPEN) the engine master switch turns ON when nose-cone is LOCKED.
4.	Propeller Brake	Black T-handle to the RH side of the cowl flap adjustment to brake the propeller to a full stop after engine has been switched off in flight. Braking is by pulling the handle.
5.	Propeller Positioning	Black T-handle to the RH side of the propeller brake to position the propeller to fit within the nose-cone contour. Operation is by a slow and steady pull on the handle to its stop.
6.	Air Vents	Two adjustable air vents for cockpit ventilation, one on LH and one on RH side of the Instrument panel, are provided.
7.	Canopy Ventilation	Knob on RH side of the ignition/starter switch to ventilate the canopy. The pulled position means canopy ventilation OPEN.

3.2.4 INSTRUMENT PANEL

The following description gives an overview of instruments, controls, monitor devices and CB's installed on the instrument panel. The minimum Equipment List of the S12 Aircraft Fligh Manual is relevant.

The positions of the elements are shown in figure »3.2.3.a Arrangement of Elements on the Instrument Panel«, valid for the aircraft serial number as indicated on the title page of this Aircraft Maintenance Manual.

The flight control instruments include at least

1. One ASI (airspeed range 50 – 300 km/h/27 – 162 kt),
2. One Altimeter,
3. One magnetic compass,
4. Trim indicator display.

These instruments are located directly in the view area of the PIC (in front of LH seat). Dual instrumentation is possible to provide an optimum view on flight control instruments from the RH

seat (e. g. instruction flights).

Additional avionics may be installed on customer demands and concurrent applicable approval.

Engine monitoring includes at least:

- Tachometer
- Oil pressure and oil temperature
- Cylinder head temperature (CCT) LH and RH
- Voltmeter and ammeter
- Fuel quantity in LH and RH wing tanks
- Engine hour-meter

These instruments are located as a rule, with the exception of the engine hour-meter, in the RH area of the panel, if not installed (i. e. with dual flight instrumentation) in the center area. The engine hour-meter is located on the center console between the seats.

The red fire-warning light (test by pushing light for optic and acoustic signal) is adjacent to the engine instrumentation.

The following warning and monitoring lights are combined in a group, arranged independently of its location on the instrument panel. They inform the pilot about the proper condition of the aircraft at a glance. The group is always located at the upper instrument panel below the glare shield to allow for glare-free reading.

The following lights are arranged:

- A. Red fuel pressure warning,
- B. Yellow low fuel warning,
- C. Green status indication for fuel aux pump operation,
- D. Red warning light for manifold pressure (boost pressure),
- E. Yellow caution light for malfunction of TCU,
- F. Red warning light for malfunction of external alternator (battery charge control),
- G. Yellow caution light for malfunction of internal generator.

The landing gear position and warning indication is also located below the glareshield and consists of two lights, indicating the situation with green or red steady or flashing light.

The following CB's are combined in a group, arranged independently of its location at the panel:

- Master CB,
- CB for external alternator,
- Landing gear CB,
- CB's for main, transfer and auxiliary fuel pumps.

The lower center section of the instrument panel comprises a row of levers and switches. Any switches, except a switch to select voltmeter indication at the upper RH panel, are systematically arranged here. The red handle for canopy emergency jettison is installed LH of the row of switches. Sequence of levers and switches, starting from the left, is:

1. Red handle for canopy emergency jettison,
2. Landing gear lever with three positions (down: extension, center: neutral (electrically de-energized), up: retraction),
3. Switch for auxiliary fuel pump,
4. Fuel selector switch (positions "LEFT", "BOTH", "RIGHT")
5. Electric master switch,
6. TCU emergency switch to isolate waste-gate actuator and TCU control in case of malfunction (switch is guarded with a red protecting plate for unintended operation),

The control elements for propeller and nose-cone (propeller brake, propeller positioning and nose-cone handle) are arranged below the row of switches in the center console. In the same area the canopy ventilation knob and the ignition/starter switch (positions OFF, Right, Left, BOTH and START) are installed.

The following figure »3.2.3.a Arrangement of Elements on the Instrument Panel« shows layout and arrangement of the instrument panel of the aircraft serial number as indicated on the title page, including control elements, monitoring devices and CB's.

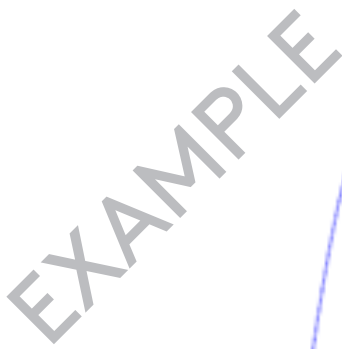


Figure 3.2.3.a

3.3 FLIGHT CONTROL SYSTEM

3.3.1 LONGITUDINAL CONTROL

Both control sticks are coupled by a connection tube. The control movements are transmitted via push-pull rods to the end of the tail boom and then straight up to the elevator fitting. In the tail boom, the push-pull rod is supported by linear motion ball bearings. Adjustable stops for the longitudinal control are installed in the middle of the connection tube beneath the right control system cover in the cockpit. A control tube connection in the tail boom is linked to the spring trim system.

3.3.2 LONGITUDINAL TRIM (-)

Longitudinal trim is achieved by means of a spring system. The spring forces are adjusted by an electrical actuator. This actuator is controlled by a switch on the control sticks. The actuator together with the spring system and the linkage to the elevator control system are situated in the front part of the tail-boom.

3.3.3 WING FLAP CONTROL SYSTEM

Both flap control levers are coupled by a connection tube beneath the control system cover in the cockpit. Control inputs are transmitted from this connection tube via push-pull rods to a "mixing shaft" in the center fuselage. From this "mixing shaft", the control inputs are transmitted via bell-crank levers, push-pull rods and quick release couplings to the control rods in the wing. The control rods in the wing are supported by means of linear motion ball bearings. The control movement is transmitted to the flap drive fittings via bell-crank levers.

At the mixing unit, the wing flap control is supported by a gas spring against the center steel frame. This is to minimize loads on the flap lever at appropriate airspeeds related to the respective flap setting. A viscous damper acting in both directions isolates shock loads from the flap lever and the flap lock-in. The flap positions are locked at the output lever on the connection tube in a gate beneath the control system cover.

3.3.4 LATERAL CONTROL

Lateral inputs with the control sticks are transferred via an adjustable push rod to a center bell-crank lever beneath the connection tube of the longitudinal (elevator) control.

From this bell-crank lever, control inputs are transmitted via push rods to the "mixing shaft" in center fuselage. Via this "mixing shaft", bell-crank levers, push-pull rods and quick release couplings, the control rods in the wing are moved.

Both sides of the wing center section contain a straight-through control rod, supported by several linear motion ball bearings and equipped with a quick release coupling (L'Hotellier) at the division of inner and outer wing. From the push-pull rods in the outboard wing, the control movements are transmitted via two bell-crank levers to the drive fittings of the ailerons.

By means of the "mixing shaft", the ailerons are moved together with flap position changes and the flaps are moved together with aileron deflections ("flaperons"). The percentage of co-movement depends on the position of the control surfaces. Stops for aileron control inputs (adjustment screws) are located LH and RH side of the elevator connection tube beneath the covers of the control system well in the cockpit.

3.3.5 CONTROL OF AIR BRAKES

The air brake-levers are coupled by means of a connection tube. Travel of the levers is transmitted via push rods and bell-crank levers to a driving lever (over-center strut) in the center fuselage, from which it is transmitted via push rods and quick release couplings to push-pull rods in the wing, which then move the air brakes. The push rods in the wing are supported by linear motion ball bearings.

The air brakes are locked in retracted position by over-center-locking of the over-center strut. The locked position can be adjusted by a stop screw at the over-center strut. The fully extended position is determined by a fixed rubber stop, which one end of the driving lever butts upon when this position is reached.

3.3.6 DIRECTIONAL CONTROL

From the LH and RH rudder pedal supports, control cables are led through the center fuselage to the tail boom behind the luggage compartment, where the control cables of the left pedals and the right pedals meet to be directed further to the rudder driving lever. The rudder driving lever is connected to the tail wheel by a spring assy. The stops for the directional control are mounted on the lower rudder support, the pertinent adjustment screws are located at the rudder on the drive fitting.

3.4 POWER-PLANT

3.4.1 ENGINE

Engine description	See »Maintenance Manual (Heavy Maintenance) for ROTAX Engine Types ROTAX 912 and 914 Series«, section 71.
Upper (rear) Engine Attachment	A tubular steel frame at the upper engine flanges, mounted in two vibration absorbing elements in the upper lateral tube of the fuselage frame.
Lower (front) Engine Attachment	A separate tubular steel frame at the lower engine flanges in two vibration absorbing elements in the forward lateral framework junctions.
Type	ROTAX 914 F2/S1 (modified ROTAX 914 F Aircraft engine, propeller shaft design with flange for fixed pitch propellers).

The ROTAX 914 F2/S1 is modified by STEMME and based on the type ROTAX 914 F2. The modification was completed as a co-operation with ROTAX and with approval by ROTAX.

The base engine ROTAX 914 F2/01 is certified according to JAR-E / FAR 33. It is turbocharged and has an electronic dual ignition system.

The modified version ROTAX 914 F2/S1 was specially developed for the model S12, a derivative of the motorglider STEMME S10.

The engine modifications are certified together with the S12 according to JAR 22. The modified version ROTAX 914 F2/S1 has the STEMME (internal) production No. 11AM-M.

Due to special requirements for installation in the center fuselage, the following modifications were made:

- Relocation of the turbocharger unit to the aft of the engine to stay within the outlines of the S12 fuselage. The turbocharger unit is supported by five struts aft of the engine. A supercharger inter-cooler is installed. Relocation of the turbocharger unit required modifications of the exhaust system. The exhaust headers are attached to the turbocharger by springs, positioning them in spite of the high thermal stress.
- The layout of the oil pipes for the turbocharger are modified.
- The exhaust headers and the muffler are shrouded by temperature-resistant material, thus thermally isolating the system from the engine bay. The turbocharger unit and the air box are isolated by radiation protective shields.
- The original ROTAX engine mounting is not used. STEMME specially developed an engine mounting for a center installation, consisting of two upper and one lower supporting element.

- In the liquid cooling system, the combined function of the expansion reservoir and refill container was split up in two separate containers, with the expansion reservoir located above the engine and the refill container on the left side of the fire-wall.
- The ignition unit is installed above of the engine slightly behind the original ROTAX-position.
- The throttle levers on the carburetors have been slightly modified (modification does not affect the throttle rigging of the original engine) and additional springs have been installed (pulling towards full-power position) to compensate for friction due to the long control cables between cockpit and engine bay.

Engine performance data of the ROTAX 914 F2/S1 are identical to those of the ROTAX 914 F.

ENGINE PERFORMANCE DATA		
Max. T/O power.	84.5 kW at 5800 RPM	113.2 hp
Max. continuous power.	73.4 kW at 5500 RPM	98.4 hp
Engine reduction gear ratio	i = 2.4286	
Max. propeller	2650 RPM	

3.4.2 LUBRICATION SYSTEM

SYSTEM DESCRIPTION

Refer to »Maintenance Manual (Heavy Maintenance) for ROTAX Engine Types ROTAX 912 and 914 Series«, section 79.

The ROTAX 914 is equipped with a dry-sump pressure lubrication system. The pumps are part of the engine. It was necessary to modify the routing of the oil pipes between oil pump and turbo-charger. Oil is returned from the crankcase to the oil tank by compression blow-by pressure, and from the turbocharger via the secondary oil pump (scavenge pump).

The oil tank is standard from ROTAX. It is installed behind the fire-wall on the LH side of the fuselage frame. The oil filler cap is below a service access in the upper center fuselage fairing.

Oil is taken in flexible pipes from the oil tank through the fire wall to the engine bay. Any flexible oil lines in the engine compartment are shrouded by fire protective sleeves.

The oil cooler is installed on the RH side of the fuselage frame and supplied with air from the RH cowl flap.

3.4.3 COOLING SYSTEM

SYSTEM DESCRIPTION

Refer to »Maintenance Manual (Heavy Maintenance) for ROTAX Engine Types ROTAX 912 and 914 Series«, section 75.

Engine is cooled by liquid cooled cylinder heads, ram air cooled cylinders and by cooling the oil.

LIQUID COOLING

The radiator for the coolant is installed on the LH side of the fuselage frame, supplied by ram air from the LH cowl flap. The refill container is installed on the forward left side of the upper fire wall. A thin tube links the relief valve in the refill container with the overflow container, which is installed in the LH landing gear bay. The quantity of the coolant can be checked at the scale on the overflow container and must be between min and max markings.

The coolant lines consist of flexible coolant hoses and aluminum tubes.

RAM AIR CYLINDER COOLING

Ram air for cylinder cooling is guided from the RH cowl flap through a duct to a distribution plenum on the engine upper side. The distributor is made of special heat-resistant GFRP.

INLET COWL FLAPS

Oil cooler, radiator, inter-cooler, ram air cylinder cooling and the carburetors are supplied with ram air from the LH and RH cowl flaps in the lateral engine cowlings. To avoid low engine temperatures during high cruising speeds or descents from high altitudes, the cowl flap aperture can be reduced with a handle on the instrument panel. During T/O, climb and at high OAT's, the cowl flaps should be fully open. Five reduced apertures can be set for different conditions. It is not possible to close the cowl flaps completely as long as the nose-cone is open. The cowl flap control is linked to the nose-cone operation: closing of the nose-cone also closes the cowl flaps and opening of the nose-cone opens the cowl flaps to the position set by the cowl flap handle.

OUTLET COWL FLAP

The warmed air streams exit the engine compartment via the lower outlet cowl flap. The aperture of the outlet cowl flap, like the inlet cowl flaps, is controlled by the nose-cone operation as well as by the cowl flap handle on the instrument panel. The shape of the small fuselage fairing behind the outlet cowl flap maintains a slot when the cowl flap is closed with the nose-cone, to allow a permanent ventilation of the engine compartment.

3.4.4 AIR INDUCTION SYSTEM

SYSTEM DESCRIPTION

Refer to the »Maintenance Manual (heavy maintenance) for ROTAX Engine Types ROTAX 914 Series«, section 73.

The engine induction air is routed from the RH inlet cowl flap via a duct, an air filter, and a short flexible tube to the turbocharger unit. Compressed air from the turbocharger is routed via two tubes through the inter-cooler to the airbox. The inter-cooler, with a drain at its lowest point, is installed on the RH side of the center fuselage frame.

Cooling air for the inter-cooler is taken from the RH inlet cowl flap, directed into the engine bay and to the outside via the lower outlet cowl flap.

The airbox is supported by two rubber mounts on the diagonal strut of the turbocharger unit. The airbox drainage lines are routed to the outlet cowl flap, in order to allow drained fuel to leave the engine compartment.

3.4.5 ENGINE EXHAUST INCL. TURBOCHARGER AND ATTACHMENT

SYSTEM DESCRIPTION

Refer to the »Maintenance Manual (heavy maintenance) for ROTAX ENGINE TYPES 914 SERIES«, section 78.

TURBOCHARGER ATTACHMENT

Five steel tube struts at aft engine mounts.

The turbocharger unit, consisting of turbocharger and muffler, is installed aft of the engine and supported by five struts on the crankshaft housing. The turbocharger is supplied with oil by oil suction and oil pressure pipes from the engine oil pump.

The exhaust headers are installed below the engine, constructed using original ROTAX connecting elements. The headers are isolated from heat sensitive components. The exhaust headers are attached to the turbocharger by springs, positioning the headers in spite of the thermal effects. The exhaust headers are shrouded by a temperature-resistant glass-fiber-tape (Frenzelit Isotherm 1000). The tape terminals are fixed by special spring-loaded brackets.

The muffler is covered by formed elements of an insulation material (Frenzelit „Isosafe“ 12 mm). To avoid heat radiation, heat protective shields (stainless steel) are installed close to the turbocharger unit. The exhaust pipe of the muffler is routed through a hole in the LH engine cowling. In order to protect overflowing fuel from contact with hot exhaust system parts, drain lines from the drip trays below each carburetor are routed to the lower cowl flap.

3.4.6 FUEL SYSTEM

3.4.6.1 FUEL SYSTEM RELATED CONTROLS AND INDICATION SYSTEM

The S12's cockpit provides the following fuel system related controls and indication systems:

- The fuel shut-off valve (horizontal "OFF"; vertical "ON") is located on the rear center console.
- The fuel selector switch (with positions "LEFT", "BOTH", and "RIGHT") is located on the instrument panel.
- The switch for the auxiliary fuel pump (with positions "ON" and "OFF") is located on the instrument panel.
- The fuel pressure indication, the low-fuel light for the feeder tank as well as the green status light for the operation of the auxiliary fuel pump, are located on the instrument panel.
- The fuel quantity indicators for the two wing tanks are on the instrument panel.
- The four fuel pumps (one main and one auxiliary pump plus one transfer pump from each wing fuel-tank) have separate fuses, which are located in the Electronic System Boxes on top of the steel frame.

NOTICE

For the location of the listed switches, lights or indicators please refer to the S12 Aircraft Flight Manual, section »7.3 Instrument Panel«.

3.4.6.2 FUEL SYSTEM DESIGN

WING FUEL SYSTEM

Both wing tanks are located in the outer sections of the wing center section. The ends of the vent lines are located at the lower, outer ends of the wing center section. The filler caps are located on the upper surface of the wing center section. The fuel line from each tank includes a strainer, a fine filter and quick drain as well as a piston pump including a fuel-check valve for each tank.

All these components are accessible through an opening in the lower wing skin near the root rib. Depending on the position of the fuel selector switch and a float switch in the feeder tank, the feeder receives fuel from either the right or the left tank separately, or from both tanks simultaneously. A single quick release connector is located between the fuel line from the wing and the corresponding connection in the fuselage.

3.4.6.3 FUEL SYSTEM OF THE FUSELAGE

FUEL SYSTEM OF THE FUSELAGE

Beginning at the quick release connector, fuel flows directly to the feeder tank. A float switch in the feeder tank prevents feeder tank overfilling. The feeder tank is vented through the right shell of the forward fuselage above the landing gear door at the rear edge. The feeder tank has a sump at its bottom that is connected to a quick drain. From the lower part of the feeder tank (approximately 1 cm above the bottom) the fuel is pumped by the main fuel pump (powered by the engine electric system) or the auxiliary fuel pump (powered by the main electric system) to the engine.

The main pump runs continuously whenever the engine electrical system is powered (nose-cone is pushed forward and locked). A fuel return line delivers surplus fuel back to the feeder tank. Contaminated fuel (i.e. particles, water, etc.) from the sumps can be drained by use of the quick drain in the landing gear bay or by the two quick drains in the wing tanks.

3.4.6.4 ELECTRICAL LAYOUT AND OPERATION OF THE FUEL PUMPS

For normal operation, the auxiliary fuel pump is switched off, and only the main pump is operating. The main pump is electrically supplied by the internal generator of the engine, or the engine battery respectively.

The auxiliary fuel pump can be added if necessary, for example during take-off and landing. It is supplied by the external alternator, or the main battery respectively:

- The right wing tank pump operates with the fuel selector switch in position "RIGHT" or "BOTH" tanks and the float switch in the feeder tank switching the pumps "ON".
- The left wing tank pump works with the fuel selector switch in position "LEFT" or "BOTH" tanks, plus the float switch in the feeder tank switching the pumps "ON".
- The main pump works when the engine electrical system is powered.
- The auxiliary fuel pump works when the main electrical system is powered and the auxiliary fuel pump switch is selected "ON".

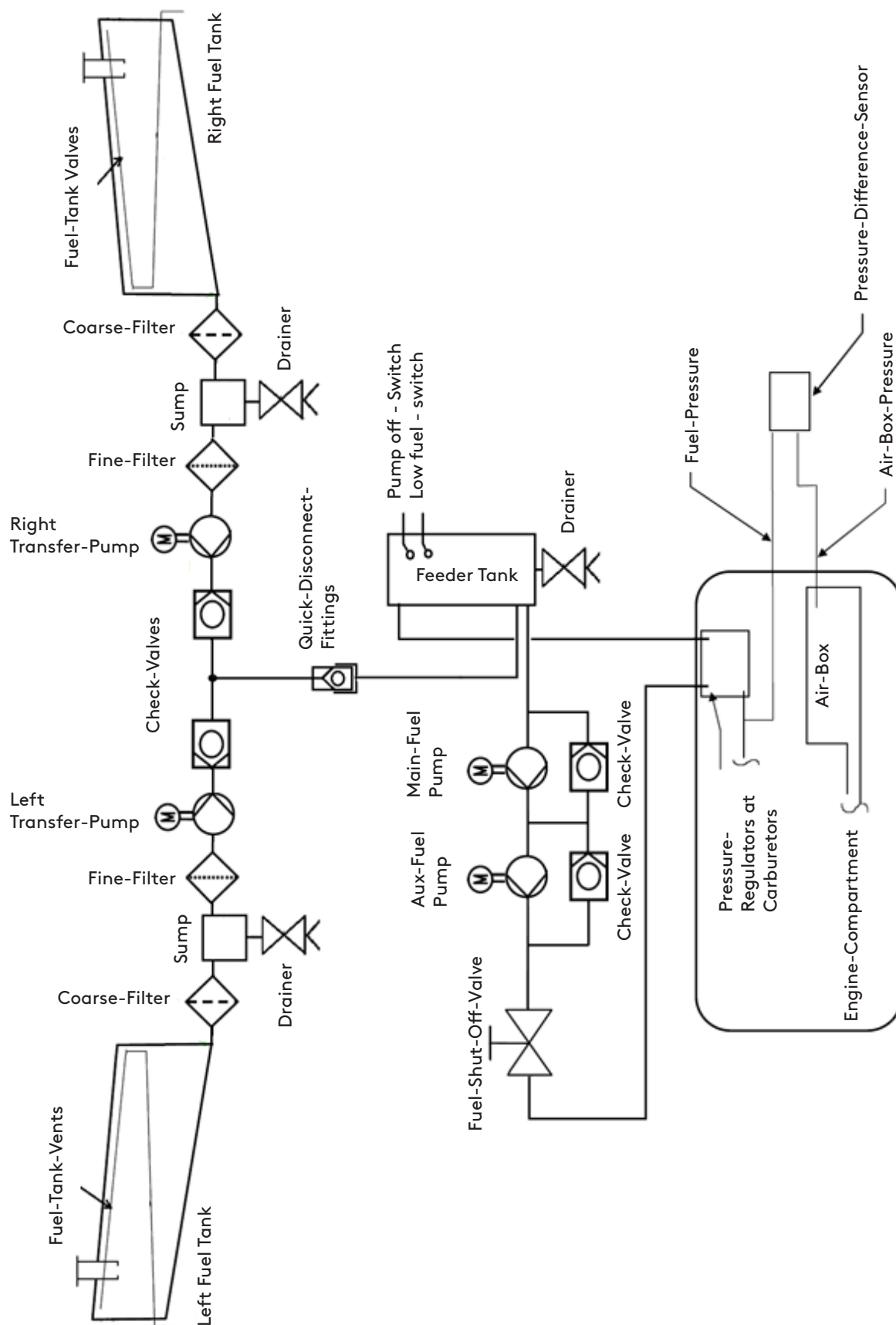


Figure 3.4.6.a.
Diagram of the Fuel System

3.4.7 ENGINE CONTROLS AND INSTRUMENTATION

REFER ALSO SECTION »3.2.2«

The throttle and choke are operated by Bowden cables, linking the carburetors with the cockpit levers, which have adjustable friction control. The throttle and choke lever are installed in the center console between the pilots. The throttle lever has two stops, one for the 100% (max continuous) power position and one for the 115% (max takeoff) power position.

Engine cooling is controlled by the cowl flaps, opened and closed by a linkage to the nose-cone handle. In addition, the cowl flap aperture can be reduced in five steps by the cowl flap operation handle on the instrument panel (see section »3.4.3«).

Both engine ignition and engine starter are controlled by a key switch. A special feature is a three-second ignition delay after switching the key to position "START", to allow the propeller blades to unfold before engine ignition (see section »3.7.11«).

The engine instruments are located on the RH instrument panel.

For positions and function of switches and instruments, refer to section »3.2.2« and »3.7«.

3.4.8 FIRE PROTECTION

The engine including exhaust and induction system is isolated from the front, top and rear areas by firewalls. The firewalls consist of stainless steel sheets (thickness 0.38 mm/0.015 in).

The insides of the engine cowlings on the LH and RH side of the engine and below the engine are coated with a fire-protective painting (manufacturer: Courtaulds Aerospace). It consists of three coats of a white fire resistant paint (type N 56582/T508) and one coat of clear varnish (type 4232-0303, hardener N39-1327 or N50/2509, thinner N39-3091).

The fuel and oil hoses in the engine compartment are covered by fire-protective sleeves.

The fire warning system is triggered by two bimetallic temperature sensors above the carburetors. The fire warning is by means of a red warning light (push-to-test function) on the instrument panel, combined with an acoustic warning tone via the loudspeaker.

3.4.9 ENGINE COWLINGS

COWL FLAPS: REFER TO SECTION »3.4.3«

The engine cowling consists of three, (LH, RH and lower) parts. The cowlings are self-supporting and connected to the fuselage structure forward and aft by means of camlocks.

The LH and RH cowlings are each fastened to the structure by 5 camlocks. Each includes an inlet cowl flap and air duct assy.

The cooling air duct of the LH cowling maintains a gap of approx. 5 mm/0.19 in to the radiator with the cowling installed, to allow for relative motion.

The air inlet of the RH cowling distributes the air for cylinder ram air cooling, for the intercooler and for the oil radiator.

When installing the RH cowling, the opening for the cylinder cooling is pressed against a rubber sealing on the coupling sheet of the upper support of the cylinder cooling air hose, routed to the distribution plenum for the cylinders. The induction air duct is prepared with a cut-out for the induction air filter. The filter assy. on the turbocharger inlet, consisting of filter, sealing plate and air hose, remain installed while cowling is removed.

The complete lower cowling forms the outlet cowl flap. It is fastened by its forward hinges and positioned by a rear control cable assy., which counteracts two springs acting towards the open position of the flap.

3.4.10 PROPELLER

The foldable propeller consists of a center hub and two propeller blades hinged to this central unit. The folding axis allows the propeller blades to move in the plane of propeller rotation. When the propeller is not rotating, the blades fold in by spring forces. The central part of the propeller is made of high strength aluminum. The propeller blades consist of carbon, Kevlar and glass composite.

During engine starting, the blades unfold automatically by centrifugal force. Rubber stops protect the blades in case of a possible over-swing. The fully folded position of the propeller blades also has rubber stops. The propeller blades may be retracted at any possible pitch angle.

After engine shut-down in flight, the propeller must be stopped by the propeller brake to allow the blades to fold in. The brake is operated by the propeller brake handle on the instrument panel. In the folded position the propeller can be positioned with the propeller positioning handle on the instrument panel to allow the nose-cone, which forms the fuselage nose, to retract to the closed position. After closing the nose-cone with the nose-cone handle in the center part of the instrument panel, the propeller is completely enclosed within the contours of the fuselage to achieve optimum soaring performance.

The propeller blade pitch can be changed from take-off (fine pitch) to cruise (coarse pitch) position. The pitch control is electrically actuated and operated by a switch on the center console behind the throttle assy. The take-off position of the propeller blades (not merely the switch) is indicated by the green light next to the switch.

3.4.10.1 DESIGN OF VARIABLE PITCH PROPELLER

The numerical positions in the following text refer to the propeller diagram (see figure »3.4.10 a/b«).

The propeller blades (1) are hinged in a forked mounting plate (4). The complete assembly, consisting of the fork, blade and hub, is rotated in order to set the pitch angle of the blade. The hollow axle (3) houses a spiral torsion spring (23) to fold the blade by means of a cam lever (22) that fits into the aperture for the buffer-stop in the propeller blade.

Electrically heated expanding servo-elements (15) actuate the blade pitch mechanism. On achieving their activating temperature, these expanding servo elements drive a piston connected to the propeller blades. All components of blade angle mechanism are double-redundant and mechanically interconnected by a coupling ring (12) so that both propeller blades always have identical pitch.

3.4.10.2 PROPELLER BLADES

The propeller blades are manufactured from GFRP (Glass Fiber Reinforced Plastic) material in a twin shell construction. The shells are of hybrid laminate type (glass, carbon, aramid). Polyurethane tape is affixed to the leading edges to improve protection against gravel.

To balance the pressure in the blades with the outside atmosphere there is a 1 mm bore hole in the blade tip. These holes also drain condensed moisture by centrifugal force.

3.4.10.3 PROPELLER BLADE ANGLE CONTROL MECHANISM

When disconnected from the power supply (unheated), the dilation effect actuator (15) is pushed inwards via the rocking lever (14) by the spring (20), thus moving the propeller blade into T/O position via the push-rod (13), the synchronizing ring (12) and the connector (11).

Heating of the servo-element by the heating element (16) generates piston pressure that pushes the swing-arm/push-rod system into the almost fully extended position, thus rotating the propeller blade against the spring towards high pitch. It is assured, that, in case of heating element malfunction, propeller blade position is automatically in T/O under all operating conditions.

The transmission of the actuating forces to the fork is effected by the drive pin (10) which is attached to the fork with an eccentric bolt to allow for accurate setting of propeller blades. The available range of adjustment of the servo-elements is 12.1 mm/0.476 in. The stop setting for the T/O position is adjusted for the fully retracted piston. The range of the blade angle change is set to 6° 24', limited by a stop switch.

A mechanical stop is adjusted so that only minimum override of the end position switch setting is possible (< 6'). The piston movement caused by the two-point control system, result in minor changes in propeller blade pitch angle with neglectable influence on the propeller behavior.

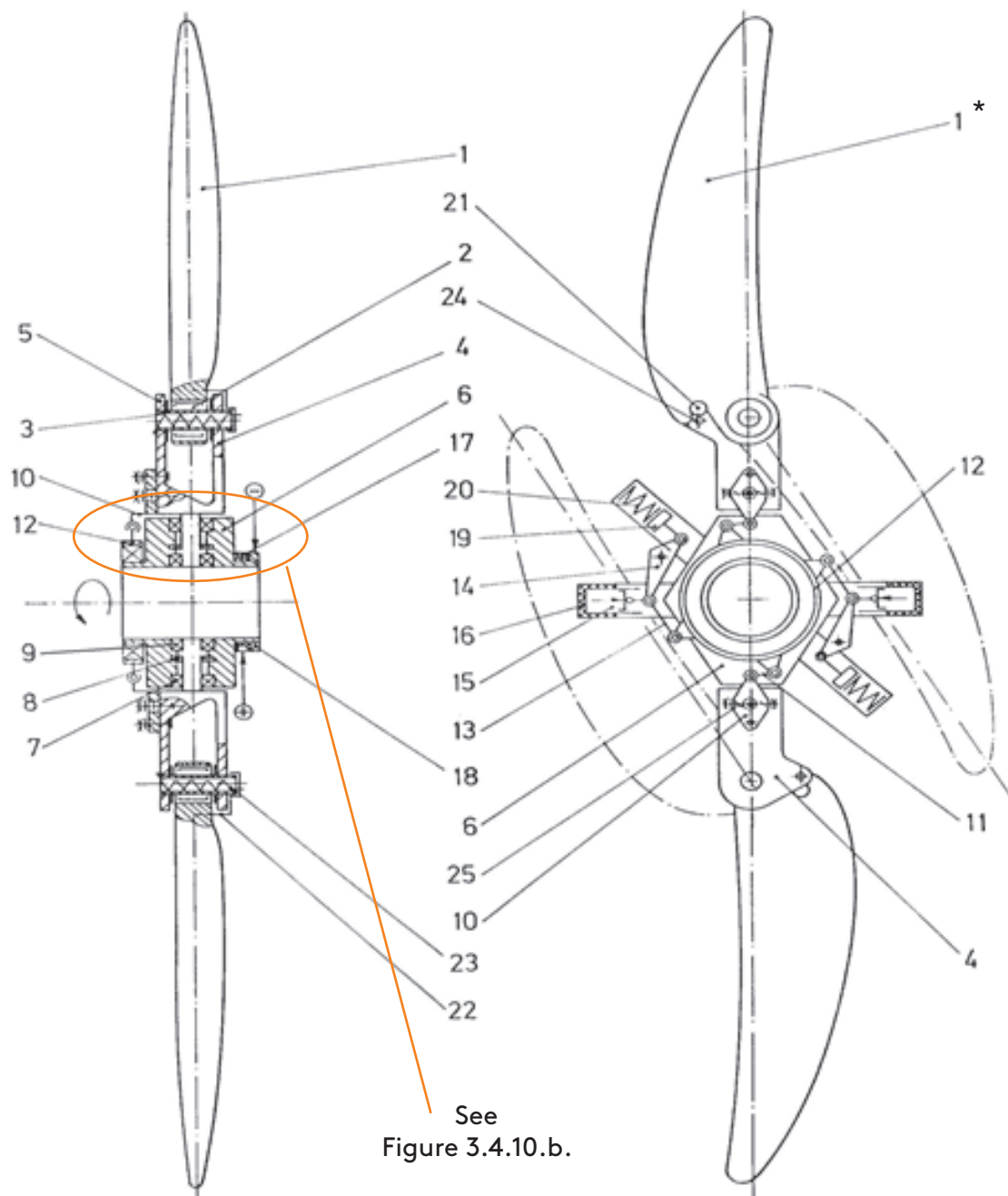


Figure 3.4.10.a
Variable Pitch-Propeller

* The numbering of the position in accordance with the "Propeller Adjustment Report".

Position Number	Part
1	Propeller blade
2	Needle bearing (articulated joint)
3	Hollow axle
4	Blade suspension fork
5	Thrust plate
6	Propeller hub
7	Grooved ball bearing
8	Axial needle bearing
9	Grooved ball bearing
10	Drive pin
11	Coupling Part
12	Synchronization ring
13	Push rod
14	Rocking lever
15	Dilation effect actuator
16	Heating element
17	Slip ring (+)
18	Slip ring (-)
19	Fly-weight
20	Compression spring
21	Rubber stop
22	Cam lever
23	Torsion Spring
24	Stop
25	Adjustment screw
26	Yield bolt
27	Base
28	Nut
29	Ball washer

NOTICE

In order to prevent incorrect assembly, all parts relevant for the variable pitch of one propeller blade are marked with a red dot. All other parts remain unmarked.

3.4.10.4 PROPELLER WEIGHT BALANCE

The variable pitch propeller is balanced by the manufacturer. Final balancing is accomplished by means of balancing weight washers fastened on the base-plate of the pitch change unit. The positions provided on the base-plate for fastening of the washers are shown in figure »3.4.10 c«.

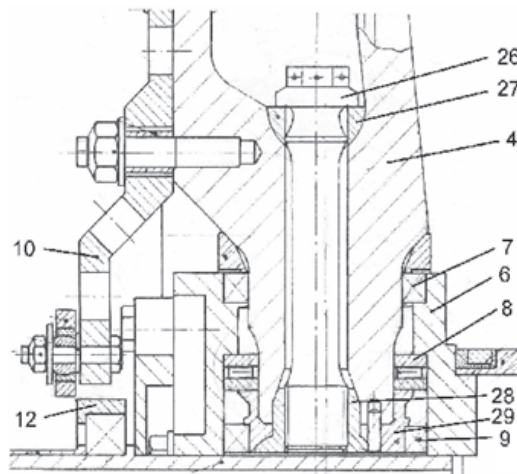


Figure 3.4.10.b
Propeller for Mounting

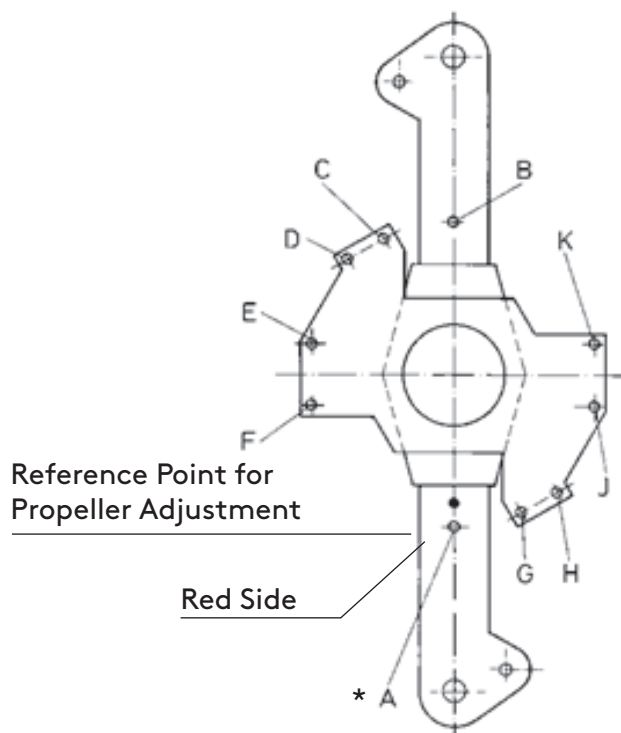


Figure 3.4.10.c
Position of Balancing Weights

* The numbering of the position in accordance with the "Propeller Adjustment Report".

 WARNING

Balancing the variable pitch propeller or its assemblies may only be performed by the manufacturer or by authorized and licensed maintenance facilities according to the specific instructions and using appropriate equipment.

The positions, number and weights of the balancing weight washers of the individual propeller must be entered in the maintenance form »Propeller Adjustment Report« (Annex D).

3.4.10.5 EXPANSION ELEMENT AND CONTROL SYSTEM

The thermo expansion actuators are heated electrically and cooled by convection and heat dissipation. Electric energy is transferred to the propeller blades by slip rings. The expansion elements actuate only towards the high pitch angles. The propeller blades are rotated in the direction of lower pitch position by the return spring at the lever mechanism assisted by mass and aerodynamic forces on the blades.

When the propeller switch in the cockpit is in „cruise“-position, the expansion elements are heated with about 50 Watts (with the engine running). The elements are heated until a temperature of 55° C is achieved and the element expands. As soon as the stop is reached propeller blades are in cruise position and are held in this position by the two-point control system. If the propeller switch is set to T/O position, the heating elements are switched-off and the expansion elements cool down. By duplicating any essential elements and realization of logic-OR the control system is fully redundant.

Heat insulation of operating elements is optimized to insure that the time for full change of pitch in either direction will not exceed 5 minutes under any operating conditions (from idle to full power). Typical actuating time for full change of pitch is about 2 ½ min.

The electrical energy to the expansion elements is interrupted (blade pitch automatically to T/O) as soon as the propeller switch is set to T/O or when the nose-cone handle is not locked in OPEN position (engine master switch is OFF).

If the nose-cone is closed, electrical energy to engine and propeller is isolated to save energy when soaring.

In order to check the pitch range mechanism, a push-button that can be operated from outside is provided on the right hand side (in flight direction) of the front gearbox frame. With the master switch "ON" and the button pushed and held, the expansion elements are heated and the propeller is brought into the cruise setting. When the cruise setting is achieved, the stop switch disconnects the electrical current to the heating elements. For this check, the push-button must be activated for about 3 to 4 minutes to heat the expansion elements. On releasing the push-button, the elements cool down and the propeller returns in the start position.

3.4.10.6 IDENTIFICATION OF PROPELLER SYSTEM AND ASSEMBLY

Complete Propeller	11 AP V/XXXXX/YYYY
Propeller Blade	11 AP VB/XXXXX - ZZ

- X Number of ordering for production share (corresponds to the aircraft serial no. for complete propeller); 5 digits, starting with 30001, in addition 20038;
- Y Month and Year of production, 4 digits;
- Z Consecutive number of production share, 2 digits.

3.4.11 POWER TRANSMISSION

The components of the power transmission system are:

- Centrifugal clutch (in between engine and drive shaft): A force transmitting clutch actuated by direction of rotation and rotating speed. Since the centrifugal clutch transmits torque by friction, it is also an overload protection.
- Drive shaft.
- Flexible coupling forward and aft, allowing for angular and torsional elasticity.

The rear terminal of the drive shaft is maintenance-free due to a hard film coating (30 µm), which also is anti-corrosive. The sliding friction coefficient decreases with increasing torque by design. Optimum behavior of the coating is only attained if not greased. The condition of the coating should be checked regularly (refer to section »5.4.16«).

3.4.12 FORWARD PROPELLER REDUCTION GEARBOX

The propeller reduction gearbox utilizes helical gears in an cast aluminum housing with a gear ratio of 1.109. It is almost maintenance-free. Propeller reduction gear oil level can be checked by means of an inspection glass with MIN/MAX markings. The extension shaft is connected to the lower gear drive shaft with a flexible coupling. The propeller is mounted on the upper propeller shaft of the reduction gearbox.

The reduction gearbox is attached to a milled aluminum suspension, which is supported by 4 shock mounts in the fuselage front frame to reduce vibrations. The cut-outs in the front frame for the shock mounts are sealed by rubber adapter shapes.

3.4.13 OPERATION MECHANISM OF THE PROPELLER FOLDING SYSTEM

3.4.13.1 NOSE-CONE

The nose-cone forms the fuselage nose in front of the cockpit section and covers the folded propeller during flight in glider configuration. To change from gliding to powered flight, the nose-cone can be shifted forward to allow the propeller unfold and rotate after starting the engine. In the forward position locking and unlocking of the nose-cone lever simultaneously operates the engine master switch (see section »3.7.11«).

The nose-cone consists of a CFRP shell, a GFRP frame and an aluminum tube, which provides suspension of the nose-cone at the front fuselage. The aluminum tube is guided through the hollow propeller drive shaft into an aluminum tubular guided pipe, including Teflon slip rings to allow axial sliding of the nose-cone tube. The tubular guided pipe is firmly bonded to the GFRP guide block in the forward cockpit.

Shifting the nose-cone is by means of the nose-cone handle, installed in the lower section of the instrument panel (see figure »3.2.3.a«). The pull rod of the handle is connected to the nose-cone sliding tube via a milled aluminum bracket, which is screwed to the rear tube terminal and guided in a slot at the guide block. The bracket and the handle guide assy. prevent rotation of the nose-cone. The handle assy. includes a spring which acts towards the locked (down) position of the handle.

3.4.13.2 PROPELLER POSITIONING

The propeller positioning assy. allows rotation of the propeller drive shaft after engine shut down and braking the propeller to a full stop, to the position so that the folded propeller fits into the nose-cone contour. It is operated by a pull handle on the lower instrument panel next to the propeller brake handle (see figure »3.2.3.a«).

The propeller positioning is driven by a Bowden cable. The bowden cable is routed from the handle to and around an aluminum disc, which is pivoted on the guide block of the nose-cone sliding tube in the forward cockpit. When the handle is pulled, the disc rotates against a circumferential spring force until reaching a screw stop, which is adjustable and defines the final position of the propeller. The spring is wound around the nose-cone guide block and rotates the disc back toward its initial position when the handle is released.

A spring-loaded catch lever is installed on the disc and is connected to the bowden cable rotating the disc. If not operated, the spring acts on the catch lever, so it is clear of the propeller brake drum, mounted on the rear propeller drive shaft of the front gear. When the handle is pulled the spring force unlocking the catch lever is over-balanced by the circumferential spring force acting on the disc and the catch will engage in one of two notches of the brake drum, thus rotating the drive shaft until reaching the screw stop of the disc. The two notches of the brake drum are opposed; therefore the propeller rotates a maximum 180° as the handle is pulled to the stop.

3.4.13.3 PROPELLER BRAKE

The propeller brake is used to decelerate the propeller rotation to a full stop after engine shut down in flight, to allow folding of the propeller by spring forces. It is operated by a pull handle on the lower instrument panel (see figure »3.2.3.a«).

The propeller brake is driven by a bowden cable, routed from the handle through the front fuselage frame to the propeller brake assy., which is mounted on the rear housing of the front gear.

The cable is connected to a spring-loaded shift lever, which is mounted on the lower front gear housing and pulls down one terminal of a brake belt during operation of the brake. The brake band consists of a steel sheet with a riveted brake lining. The brake band is installed around a brake drum mounted on the propeller drive shaft of the propeller gearbox. The second brake band terminal is fastened to the gear housing opposite the other, driven, terminal. Some adjustment of the clearance between brake lining and drive shaft is possible by loosening and shifting the bowden cable support.

3.4.14 FLUIDS

3.4.14.1 FUEL

It is recommended to use premium gasoline, unleaded, minimum RON 95.

Suitable fuels:

- Super DIN EN 228
- Super Plus DIN EN 228

ACCORDING DOT

Gasoline min. grade 1, AKI 90.0, acc. to Canadian General Standard Board CAN/CGBS 3.5 (Unleaded Automotive Gasoline)

ACCORDING FAA

Standard Specification for Automotive Spark-Ignition Engine Fuel, ASTM D 4814

AVGAS 100LL

When using AVGAS 100LL, valve seats are stressed by the high amount of lead and in addition combustion chambers will accumulate residues. AVGAS should be used only in case of fuel vapor problems or if other fuel is not available.

CAUTION

The engine manufacturer recommends not to use AVGAS for an extended period, because an increased amount of residues may accumulate in the engine.

 CAUTION

Danger of fuel vapor lock when using "winter" fuel during summer time.

 CAUTION

Use only the appropriate fuel, recommended for the climate zone.

NOTICE

In accordance with the EASA SIB 2011-01 R2 "Unleaded Aviation Gasoline (AVGAS) UL91" is also approved for operation. (See STEMME »SB A31-10-104« latest approved revision).

3.4.14.2 COOLANT FLUID

Mixture of 50% concentrated antifreeze agent with anti-corrosion additives and 50% water. Freezing point of this mixture is about -38°C / -34°F. »BASF Glysantin Antikorrosion« has proved to be good; this or equivalent coolant may be used.

WARNING

As the cooling system is pressurized, to avoid the risk of scalding by escaping hot coolant, do not open the locking cap on the coolant expansion tank unless the engine is cold (or barely lukewarm).

NOTICE

Waterless coolant is not approved for operation.

CAUTION

Check of the coolant fluid: The quantity in the overflow container (lower left side in the landing gear bay) must be between "min." and "max." markings. Missing coolant in the overflow container must be added.

CAUTION

If the level of coolant in the overflow container is below "min." marking, proper supply to the breather valve and coolant tank is not assured and air may have been introduced into the cooling system. To check, confirm that the engine is cold, open the locking cap on the expansion tank (left side on fire-wall in engine compartment), and add coolant if necessary.

NOTICE

If the engine is warm, the indicated quantity in the overflow container is noticeably higher. An excessive coolant level in the overflow container will not result in engine damage, but will result in overflow of coolant into the landing gear bay.

3.4.14.3 LUBRICANTS

ENGINE WITH INTEGRATED REDUCTION GEAR

According to the ROTAX Operation Manual the following oil specification should be met:

- Use only oil with API classification SG or higher!
- Due to the high stresses in the reduction gears, oils with gear additives such as high performance motor cycle oils are recommended.
- Heavy duty 4-stroke motor cycle oils meet all the requirements. These oils are usually not mineral oils but semi- or full synthetic oils.
- Oils primarily for Diesel engines have insufficient high temperature properties and additives which favor clutch slipping, and are generally unsuitable.

For more detailed information refer to appropriate ROTAX publications (SI-914-019 latest approved revision).

Oil quantity	0.8 US gal/0.66 Imp. gal./3 l (minimum 0.53 US gal/0.44 Imp gal/2 l)
Oil consumption	max. 0.026 US gal/h/0.022 Imp gal/h/0.1 l/h

CAUTION

The reduction gear additives, specified "GL4" or "GL5", are required for a safe lubrication of the integrated reduction gear. Never use other oil additives!

CAUTION

A full synthetic oil in combination with AVGAS results in abnormally high abrasion and/or residues. During utilization of AVGAS, only semi-synthetic oils should be used.

NOTICE

Full- or semi-synthetic oils are to be preferred because of the temperature stability and less residue formation.

a) Viscosity:

Use of multi-grade oils is recommended. Viscosity of multi-grade oils is less depending on temperature compared to single-grade oils. Multi-grade oils can be used year-round; after an engine start at low temperatures the engine components are lubricated faster and at higher temperatures the oil is heavier. Temperatures of adjacent SAE-classes overlap, so for short-term temperature variations there is no need to change oil. The suitable oil grade can be chosen from the table.

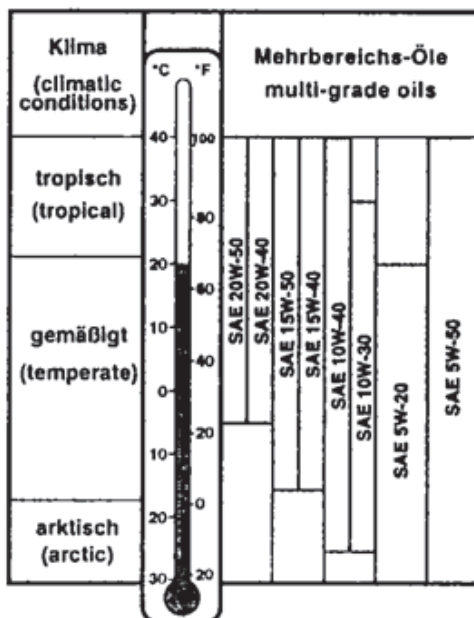


Figure: 3.4.14.3.a
Engine Oil Table

PROPELLER GEARBOX

Use reduction gear oils specified according to MIL-L-2105C (Grade 90) or automotive gear oils HYP 80W (ARAL), HYP 85W-90, HYP 85W 140 according to API-GL5 or Shell Aviation Oil S 8350 according to DTD 900/4981.

NOTICE

Oil specification: Only use "GL5" oils according to the API-system.

3.5 LANDING GEAR

3.5.1 MAIN LANDING GEAR

The landing gear (L/G) consists of a tail wheel and two retractable main landing gear legs, hinged at the center fuselage frame with the hinge axis in flight direction and locked in the extended position by means of an over-center locking strut ("elbow lever") for each leg. The wheel is mounted on a trailing arm that is supported against the leg's frame by a pre-loaded elastomeric spring for shock absorption purposes.

Retracting of the L/G legs and doors is managed by an electrically driven linear actuator for each leg that is built up around a high precision ball screw. Each of the linear actuators is hinged with the top end at the fuselage frame; the bottom end is coupled to the respective elbow strut by means of a locking mechanism which can be released for emergency landing gear extension by pulling a T-handle in the cockpit (one for each of the legs) and via a bowden cable. In case of an emergency extension the two legs should be released in succession (right-side-first order is suggested, but wrong order is not critical), they then extend out by gravitational force. Secure locking in the extended position is achieved by a spring that forces the over-center strut into its end position.

The actuators are controlled and sequenced by stop switches, the switches for EXTENDED being integrated in the elbow struts and detecting the over-center position, those for RETRACTED mounted at the fuselage frame and detecting the top position of each L/G leg. All these switches are in duplicate, the second one giving the signal for the indication and warning system, which is displayed by focused green and red LED's on the right face of the instrument panel (refer to the S12 Aircraft Flight Manual).

Both L/G doors are actuated by the landing gear legs. The RH landing gear door is coupled directly to the RH landing gear leg via a spring device. The LH door is controlled by a cable mechanism. During retraction, the LH landing gear leg starts closing the LH door by means of a cable, but it remains open enough to allow retraction of the RH landing gear leg. The RH landing gear leg effects complete closing of the LH door via the cable during the last portion RH main gear retraction. Opening of the LH door is by a spring loaded roller strut, which rolls on the LH door. It pushes the door to the outside against the cable to keep the door from moving due to air loads, and is blocked with the landing gear retracted, thus locking the door. In closed position the doors are additionally locked at the rear by means of magnets.

The disk brakes on the main L/G wheels are operated hydraulically. The master cylinders for both the left and right wheel are located on the control sticks. The pressure line from the master brake cylinders to the brake calipers of the wheel brakes in the center fuselage are designed as metal-shielded brake hoses. The brake fluid reservoir is located in the landing-gear bay, cabin rear wall.

The parking brake valve to set and to release the parking brake is located on the floor panel console in front of the LH control stick. The parking brake valve is operated by a lever respectively rotary handle. Braking action is simultaneous on both main wheels. Maximum brake pressure for the system layout is 115 bar/1668 psi, maximum allowed system pressure is 200 bar/2900 psi.

MAIN LANDING GEAR EMERGENCY EXTENSION

By pulling two T-handles in the cockpit, one after the other, the landing gear actuators are disconnected from the locking elbow struts by means of Bowden cables and the landing gear legs extend by gravity to the "gear down" position. The secure locking of each leg in the extended position is achieved by a spring that forces the over-center strut into its over-center position.

In case of emergency extension the two legs should be released in the recommended sequence (T-handles marked 1 & 2, wrong order is not critical). The RH gear strut is equipped with a mechanism to avoid jamming of the struts in case of an incorrect sequence.

3.5.2 TAIL WHEEL

The tail wheel is not sprung and fits in a trailing fork mounted in two bearings. The upper bearing is a combined radial/axial sleeve bearing. The journal is constructed so that a certain friction damping is produced at the axial sleeve surfaces when loaded in axial direction in order to avoid tail wheel flutter whilst taxiing. For steering on the ground the tail wheel fork is coupled with the rudder by means of two pre-loaded tension springs.

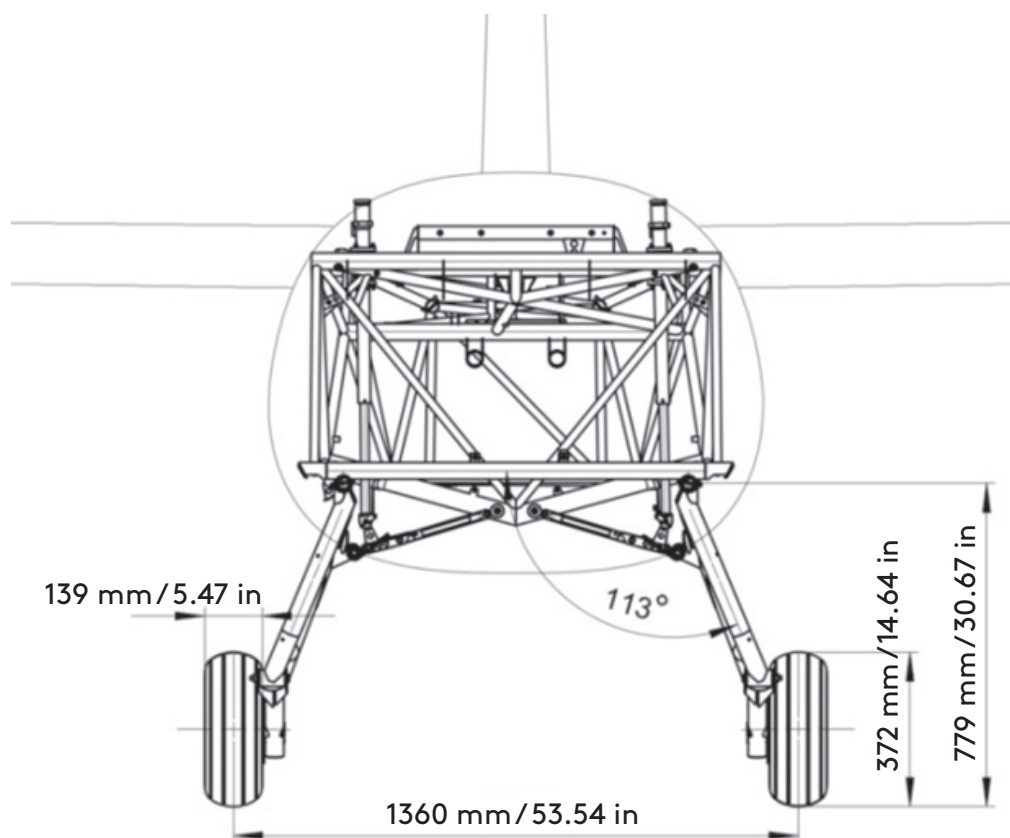


Figure 3.5.1.a
Main Landing Gear

3.6 FLIGHT CONTROL INSTRUMENTS, PITOT STATIC SYSTEM

Instruments: See Equipment List.

CAUTION

For modifications sections »3.8« and »9« must be respected.

Pitot pressure, static pressure and total energy compensation are measured by means of a multi-purpose probe in the nose-cone. Its orifices are plumbed to the instrument panel through the nose-cone sliding tube.

NOTICE

Some instruments, e. g. Bohli-diaphragm-type rate-of-climb indicator, need additional static ports for proper operation at the widest area of the forward fuselage. These additional static ports are installed only, if they were required for instrumentation at time of delivery.

All hose lines of the pitot-static system are equipped with a water separator/filter in the front cockpit area below the instrument panel.

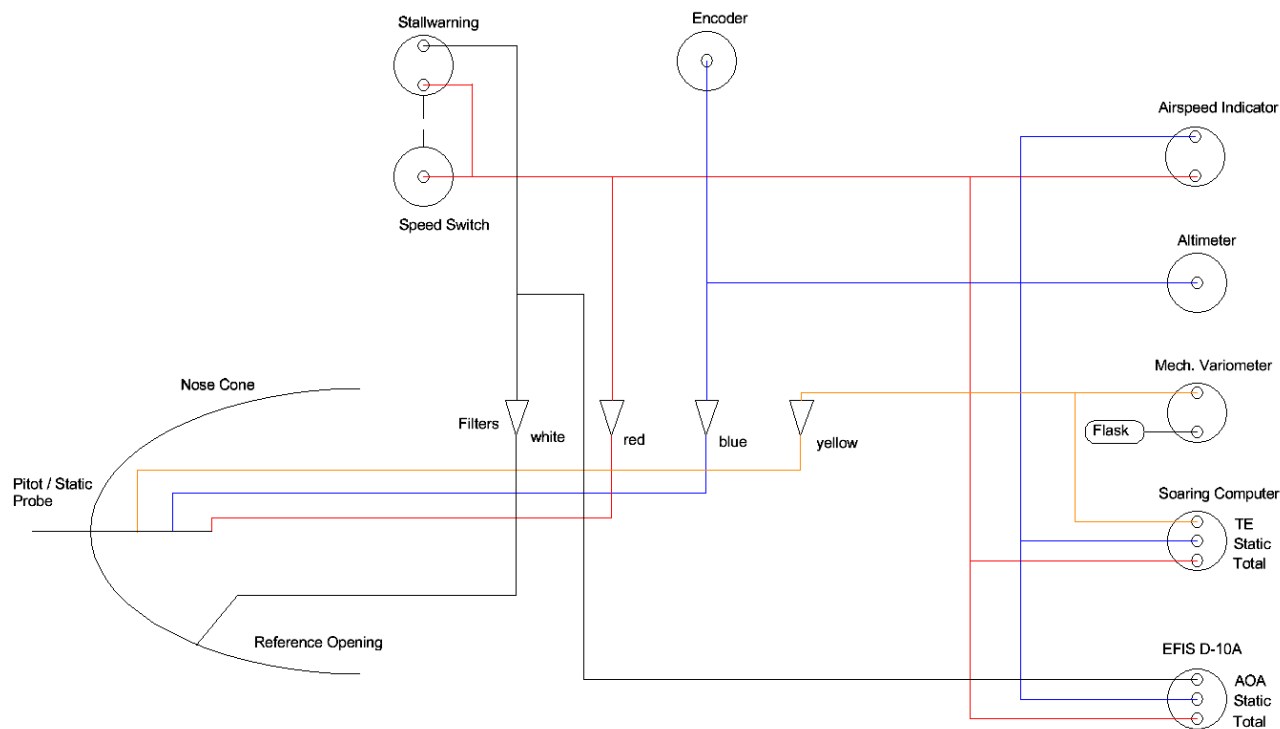


Figure 3.6.a
Pitot and Static Pressure System

NOTICE

Any line must be as short as possible.

The water/separators must always be located upstream of the device and upstream of any junction.

3.7 ELECTRICAL SYSTEM

3.7.1 GENERAL SYSTEM ARCHITECTURE

The electrical system of the S12 consists of two independent, separate sub-systems: the main system and the engine system. Each system incorporates a dedicated battery and generator (actually an alternator and rectifier for the main system). Failures of one system will not interfere the other system. There is no provision to cross-tie the two sub-systems.

The engine system powers exclusively those devices needed to operate the engine or which are available only when the engine is running. Under normal conditions the engine system battery is charged by the internal generator of the ROTAX engine. In gliding flight the engine system is shut off completely. The operational mode of the engine battery is a stand-by mode, as it is normally used only for engine starting. Under normal conditions it will not be discharged.

The main system powers all other devices of the aircraft. During powered flight its battery is charged by the external belt driven alternator. During gliding flight the main system battery powers all active devices. Once the main system battery is exhausted, the pilot is able to restart the engine using the still fully charged engine system battery.

After successful restart of the engine, the external alternator will power the main system and will recharge the main system battery. The operational mode of the main system battery is as a storage battery in cycle mode. Under normal conditions it will be regularly discharged and recharged.

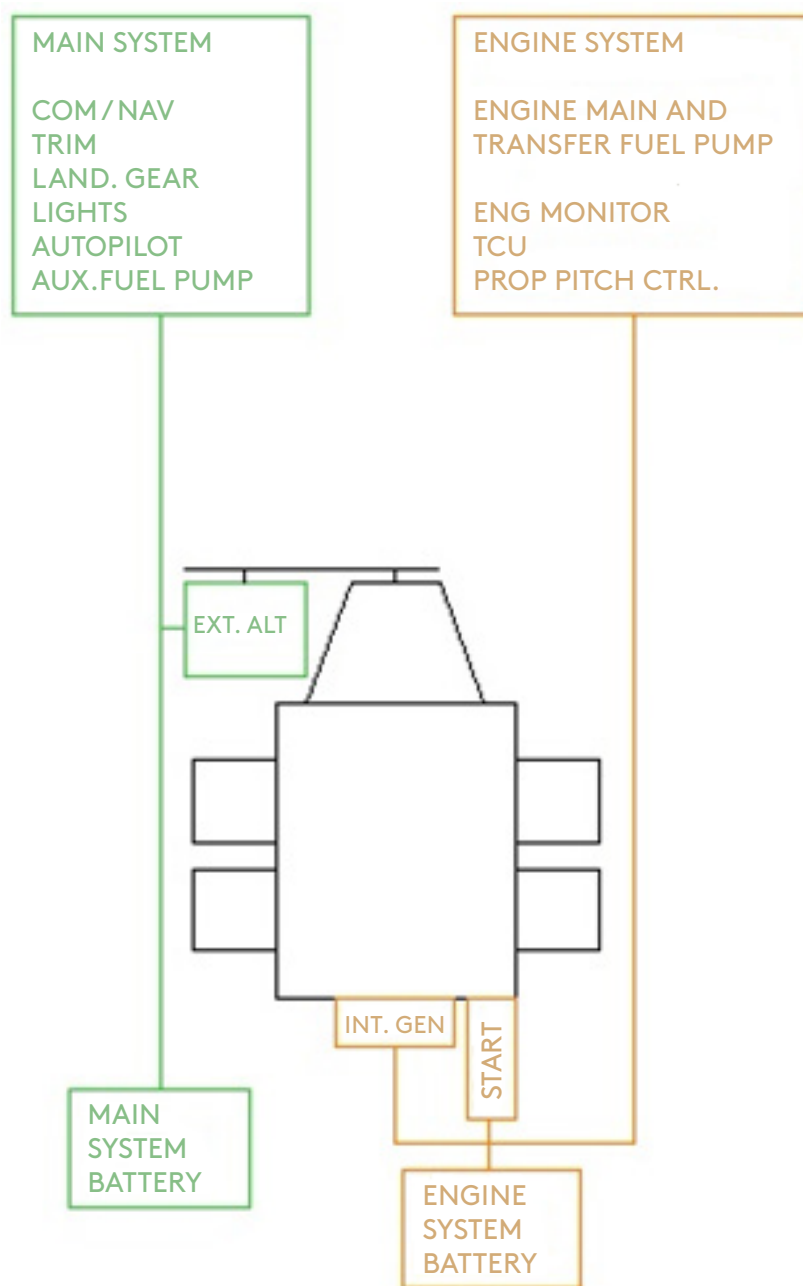


Figure 3.7.a
Electrical System S12

3.7.2 DC GENERATION (ATA 24-30-00)

3.7.2.1 MAIN SYSTEM DC POWER GENERATION

The DC power for the main system is generated by the belt-driven alternator of the engine and stored in a LiFePO₄ battery.

MAIN SYSTEM BATTERY

Type	Super B SB12V19E-EC
STEMME p/n	831.489
Nominal Voltage	12.8 V
Nominal Capacity C1	19.2 Ah
Technology	Lithium Iron Phosphate LiFePO ₄
Protection device	Over-voltage protection device OVP-15.5
Qualification	Airworthiness and eligibility are proven in /A/
Location	Battery case at front ring frame of tail boom

MAIN SYSTEM ALTERNATOR

Type	Nippon Denso 42A,
STEMME p/n	830.600
Drive	V-Belt
Excitation	External, controlled automatically depending on running engine
Field circuit protection	5 A fuse
Nominal Voltage:	14 V
Max Output Power	42 A
Voltage Regulator	built-in
Regulated Voltage	14.2 – 14.8V @ 25°C
Qualification	The alternator is part of the certified aircraft engine ROTAX 914 series
Location	Left side of propeller gear housing of engine

FUNCTION

When aircraft master switch is switched ON the main system master relay connects the battery to the system. From that moment on all devices supplied by main system are powered, except those with a dedicated ON/OFF switch. When the engine is running, a pulse train representing the engine's rpm is present at the input of a frequency-controlled relay. The relay switches on the field circuit of the alternator and the alternator starts to generate voltage. The alternator output is controlled by a voltage regulator built in the alternator. A red warning light indicates failures at the alternator, e.g. a broken V-belt.

3.7.2.2 ENGINE SYSTEM DC POWER GENERATION

The DC power for the engine system is generated by the crankshaft-mounted generator of the engine and stored in a LiFePO4 battery. The battery is used to crank the engine to start.

ENGINE SYSTEM BATTERY

Type	Super B SB12V7800P-CC
STEMME p/n	831.488
Nominal Voltage	13.2 V
Nominal Capacity C1	7.8 Ah
Technology	Lithium Iron Phosphate LiFePO4
Protection device	Over-voltage protection device OVP-15.5
Qualification	Airworthiness and eligibility are proven in /A/
Location	Battery case at front ring frame of tail boom

ENGINE SYSTEM INTERNAL GENERATOR

Type	ROTAX (Part of engine)
STEMME p/n	n/a
Drive	crankshaft, directly mounted
Excitation	permanent magnet
Nominal Voltage	14 V
Max Output Power	18 A
Voltage Regulator	external rectifier-regulator (ROTAX)
Regulated Voltage	13.7 – 14.3 V
Qualification	The generator is part of the certified air raft engine ROTAX 914 series
Locations	Coils and magnets mounted on aft end of crankshaft housing, voltage regulator installed on TCU-Starter-Board.

FUNCTION

If aircraft master switch is switched ON and the aircraft nose cone is opened and locked, a micro switch at the nose cone lever activates the engine system master relay. The relay connects the battery to the engine system. The TCU and the main fuel pump operate immediately. Pushing the ignition-starter key to START activates the starter relay and connects the battery to the starter. When the engine is running the rotating magnets generate voltage in the generator coils. The regulator limits the output voltage. A yellow warning light indicates failures of the generator system.

3.7.2.3 OVER VOLTAGE PROTECTION

The outputs of the belt driven alternator and of the internal generator are monitored by a dedicated over-voltage device OVP. The device senses the voltage of the related system and disconnects the related alternator resp. generator in the case of system voltages of more than 15.2 V.

Each OVP is located in the related distribution box. A yellow light at the box indicates a triggered over-voltage protection.

3.7.3 DC INDICATION (ATA 24-37-00)

3.7.3.1 DESCRIPTION

Each electrical system includes a voltmeter to indicate the system voltage and an ammeter to indicate the current between system and battery. Both instruments can be toggled between main and engine system by a common toggle switch. The ammeter is supplied by shunts in the positive lines of the batteries. Positive reading indicates battery charging, negative reading indicates battery discharging.

A red warning light indicates failure of the main system alternator.

A yellow warning light indicates failure of the engine system generator.

Voltmeter, ammeter, toggle switch and warning lights are located on the right hand part of the instrument panels and easy to read and to operate by the crew. Switch and warning lights are clearly labeled.

3.7.4 PARTS SPECIFICATION

Part	STEMME p/n	Manufacturer p/n
Voltmeter	831.120	UMA N141100917V0A0
Ammeter	831.121	UMA N15110003CA000
Shunt	831.122	UMA 1C1

3.7.5 OPERATION

Use toggle switch to choose indication of engine system voltage and current or main system voltage and current.

3.7.6 DC POWER DISTRIBUTION SYSTEM (ATA 24-60-00)

The system is designed to distribute electrical energy from the source to the electrical loads. Because the engine of the S12 is located in mid-fuselage, there are long distances between voltage sources and the loads.

Therefore, special attention is paid to subdivide the system into functional assemblies which includes sub-distributions with related protective devices.

3.7.6.1 WIRE SPECIFICATIONS

	Cross Section	Specification
Battery and Starter Cables	16 mm ²	EN 50525-2-81
All other, unshielded and shielded	AWG 24...8	MIL-22579/16 or Raychem 44A

The cross section of each single wire is optimized individually.

The wires are bundled with spiral wrap to a wire harness. This harness is routed and fixed along the aircraft's steel tube frame from the electrical distribution rack to the instrument panel. Inside the cockpit, the wire bundle is routed along the tunnel between the seats.

Sufficient distance to moving parts and heat sources is provided. Mechanical damage by tight bending or chafing is prevented.

3.7.6.2 DESIGN OF ELECTRICAL CONNECTIONS

Electrical connections are made by screw terminals, push-on contacts or multiple position connectors.

Terminals and contact pins are generally crimped to the wires. Use of soldering techniques is minimized.

Terminals and connector systems meet industrial standards.

3.7.6.3 PROTECTION DEVICES

Fuses and circuit breakers of different industrial standards are used to protect each electrical circuit. The protective devices are rated according to the maximum allowed electrical load of the protected wire. Protection devices are located as close as possible to the voltage source to minimize the length of unprotected wire.

Fuses are grouped in fuse holders at different locations at the aircraft. The fuse holders are not reachable by the pilot in flight. Devices and circuits protected by fuse are considered as non-essential to safe flight. The loss of the related function caused by a blown fuse will not cause hazards to aircraft or crew. On the other hand, because of the fuse ratings there must be a severe reason for a blown fuse. It is considered improbable, that this could be corrected by the pilot by replacing a fuse in flight. A sufficient number of spare fuses is provided with the on-board tool set for a repair on ground.

The circuits of landing gear and electronic equipment are protected by resettable circuit breakers, located on the instrument panel and easy to reach by the crew in flight. This enables the pilot to evaluate the state of power supply of such devices in the case of malfunction. In addition, it allows the pilot to deactivate certain devices during gliding flight to save battery power (load shedding).

Each circuit breaker is clearly labeled with its function.

3.7.6.4 FUSE AND CB SPECIFICATIONS: MAIN SYSTEM

Circuit	Location of Fuse/CB	Fuse/CB Rating (A)	STEMME p/n	Qualification
Main System Master Fuse	Main System Box	50	832.247	ISO 8820-5
External Alternator	Main System Box	50	832.247	ISO 8820-5
Position Lights	Fuse holder Main System Box	5	831.430	ISO 8820-3
Landing Headlight		5		
ACL (Anti-collision light)		5		
Landing Headlight		5		
Auxiliary Fuel Pump		5		
Ammeter Hi		5		
Ammeter Lo		5		
COM		Instrument Panel Front		
XPDR	CB 5			
EFIS	CB 5			
GPS	CB 5			
Autopilot	CB 5			
Landing Gear System	CB 7.5		832.235	LN 29886
Trim System	Fuse holder Instrument Panel	5	831.430	ISO 8820-3
Alternator Field		5	831.430	
Fire Warning		2	831.429	
Alternator Warning Light		2		
Soaring Computer		2		
Volt/Ammeter		2		
Stall warning		2		

3.7.6.5 FUSE SPECIFICATIONS: ENGINE SYSTEM

Circuit	Location of Fuse/CB	Rating (A)	STEMME p/n	Qualification
Starter	Engine System Box	80	831.491	ISO 8820-5
External Power Supply		80	831.491	
System Master Fuse		50	831.247	
Engine Bus Supply	Fuse holder Engine System Box	15	831.432	ISO 8820-3
Internal Generator		15		
Prop Pitch Control Power		15		
Main Fuel Pump		5	831.430	
TCU Power		5		
Fuel Transfer Pump RH		5		
Fuel Transfer Pump LH		5		
Ammeter Hi		5		
Ammeter Lo		5		
Internal Generator warning		2	831.429	
Starter Relay	Fuse holder Instrument Panel	5	831.430	ISO 8820-3
Propeller Pitch Indication		2	831.429	
Low Fuel Warning Light		2		
Tachometer		2		
Ignition retarder		2		
Fuel Pressure Indicator		2		
Fuel Level Indicator Left		2		
Fuel Level Indicator Right				
Oil Press + CHT Left		2		
Oil Temp + CHT Right		2		
Fuel Flow Meter	Fuse holder Instrument Panel	2	831.429	ISO 8820-3
Volt/Ammeter		2		
Engine Hour Meter		2		
Prop Pitch Sense		2		

3.7.7 SWITCHING DEVICES

Power switching devices are located as close as possible to the voltage source. Due to the distances between voltage source and cockpit, the most electrical loads are remotely controlled. With the manually operated toggle and rotary switches on the instrument panel the pilot controls the negative (ground) lines of control circuits of electro-mechanical or semiconductor relays, which are located on the electric distribution board. The wiring of the load circuits is routed directly from distribution board to load device the voltage drop between power supply and load to minimize.

3.7.7.1 MANUAL SWITCHES

Manual switches are located on the instrument panel and easy to reach by the crew. The position of a toggle or rotary switch is indicated by the position of the operating lever or knob. The use of momentary switches or push-buttons is limited to certain functions of electronic equipment, as such electrical elevator trim, the PTT button of the communication radio, autopilot disengage and the remote control unit of the soaring computer.

Each switching element is sufficiently rated to carry the electrical load of the related circuit. None of the electrical circuits controlled by manual switches on the instrument panel has an electrical consumption of more than 3 A. Each switch is clearly labeled with its function.

Function	STEMME p/n	Electrical Load	Rating
Master Switch	831.151	Relay Coil, < 1 A	3 A
Auxiliary Fuel Pump ON	831.151	MOSFET Gate, < 0.1 A	3 A
Engine System Back-Up	831.151	Relay Coil, < 1 A	3 A
TCU Emergency	831.151	Relay Coil, < 1 A	3 A
Transfer Pump Selector	831.507	Waste Gate Servo, < 2A	0.15 A
Landing Gear UP/DOWN	831.225	MOSFET Gate, < 0.1 A	20 A
Ignition-Starter-Key-Switch	831.107	Relay Coils, < 2 A	
Position Light Switch	831.493	MOSFET Gate, < 0.1 A	3 A
ACL Switch	831.493	MOSFET Gate, < 0.1 A	3 A
Landing Light	831.493	MOSFET Gate, < 0.1 A	3 A
Propeller Pitch	831.151	MOSFET Gate, < 0.1 A	3 A

3.7.7.2 ELECTROMECHANICAL RELAYS

Power relays are used as master relays for the main system and the engine system, as starter relay and as contactor for the optional ground power supply. The relays are typically ground-controlled, the control switch is connected to the negative side of the relay coil. This improves the system reliability.

Each relay is rated sufficiently for its electrical load.

Function	STEMME p/n	Rating	Fuse	Qualification
Main System Master	831.416	70 A	50 A	
Engine System Master	831.416	70 A	50 A	
Starter Relay	830.725	75 A cont./300 A short time	80 A	Part of certified engine
Ground Power Relay	831.111	75 A	80 A	

3.7.7.3 SEMICONDUCTOR SWITCH BOX

An 8-channel MOSFET-based switch box is installed to control the power for fuel pumps, lights and variable pitch propeller. The use of semiconductors improves the system reliability, reduces electromagnetic emissions and saves weight and space. The switch box is located close to the batteries and to the distribution boxes.

The box includes 8 channels with a switching capacity of max. 36 A each.

Connector	System	Channel #	Function	Fuse
Gray	Main	1	Position lights	5 A
		2	Anti-Collision Lights	5 A
		3	Landing Light	5 A
		4	Auxiliary Fuel Pump	5 A
Black	Engine	1	-spare-	
		2	Propeller Pitch Control	15 A
		3	Transfer Pump Left Wing	5 A
		4	Transfer Pump Right Wing	5 A

3.7.8 MAIN SYSTEM DISTRIBUTION BOX

4.7.8 Main System Distribution Box

This box includes a metallic bus bar to which the main system battery and the alternator are connected via master fuses. The main system master relay and a number of fuses are located in a combined fuse-relay-holder. The box is made of plastic with a sealed cover and is mounted on a rack on the aft area of upper fire wall.

3.7.9 ENGINE SYSTEM DISTRIBUTION BOX

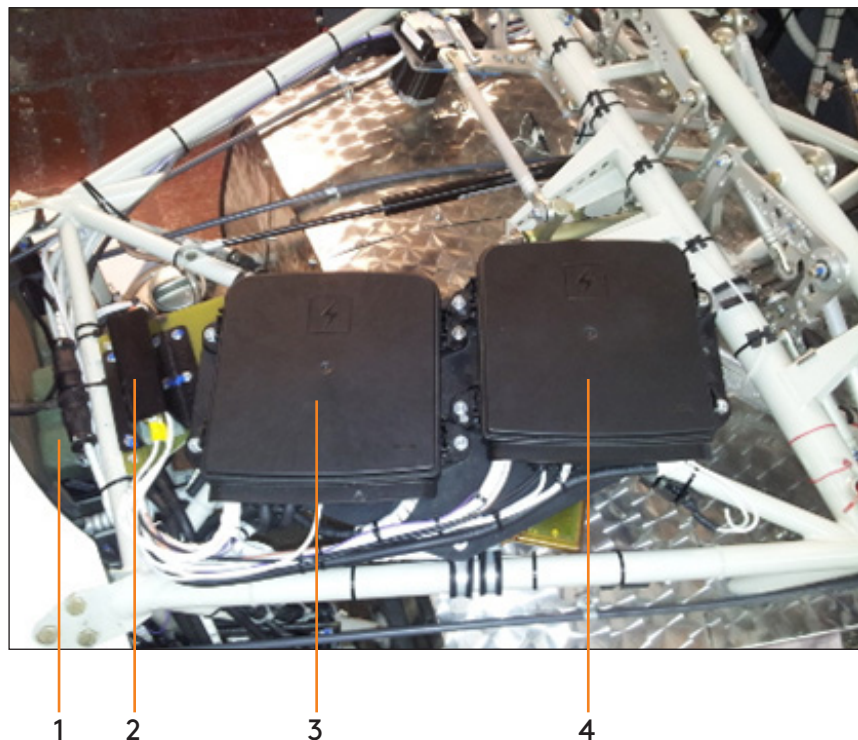
This box includes a metallic bus bar to which the engine system battery, the starter, the generator and the external power supply are connected via master fuses. The engine system master relay and a number of fuses are located in a combined fuse-relay-holder. The box is made of plastic with a sealed cover and is mounted on a rack on the aft area of upper fire wall.

3.7.10 TCU BOARD

The following elements of engine control are located on this board:

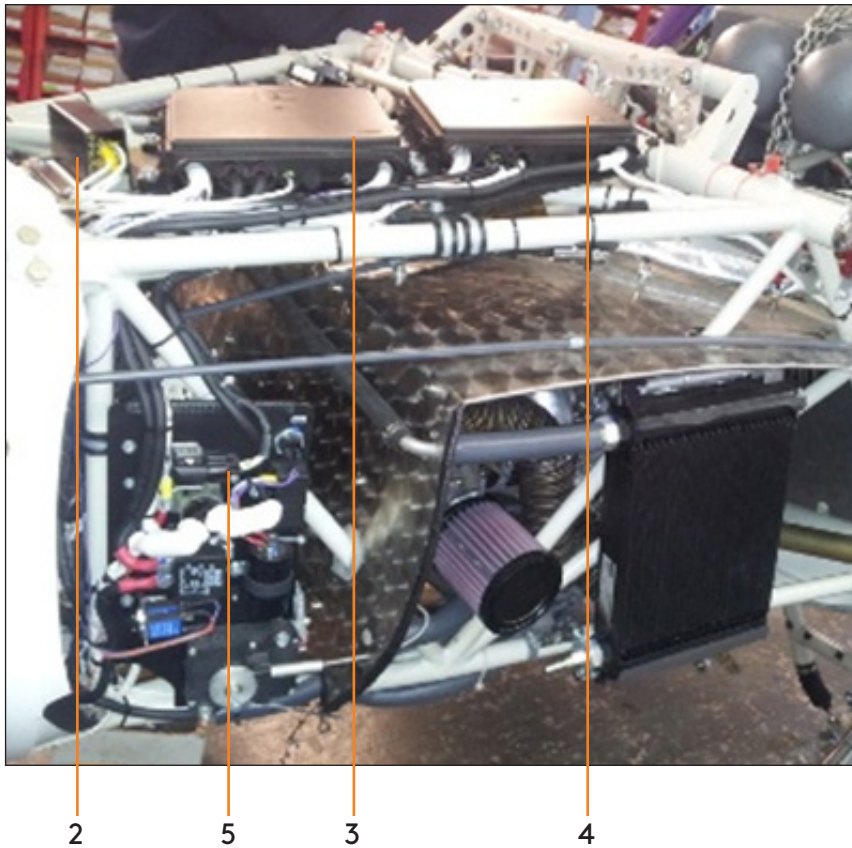
- The turbocharger control unit TCU.
- The waste gate servo.
- The ambient pressure sensor.
- The starter relay.
- The voltage regulator of the internal generator.
- The power relay for the ground power supply.

The elements are screwed to a mounting plate, which is fixed to the steel tube frame, aft of the engine compartment.



1. Batteries
2. Shunts
3. Engine System Box
4. Main System Box

Figure 3.7.a
Electrical Components Center Fuselage



- 2. Shunts
- 3. Engine System Box
- 4. Main System Box
- 5. TCU Box

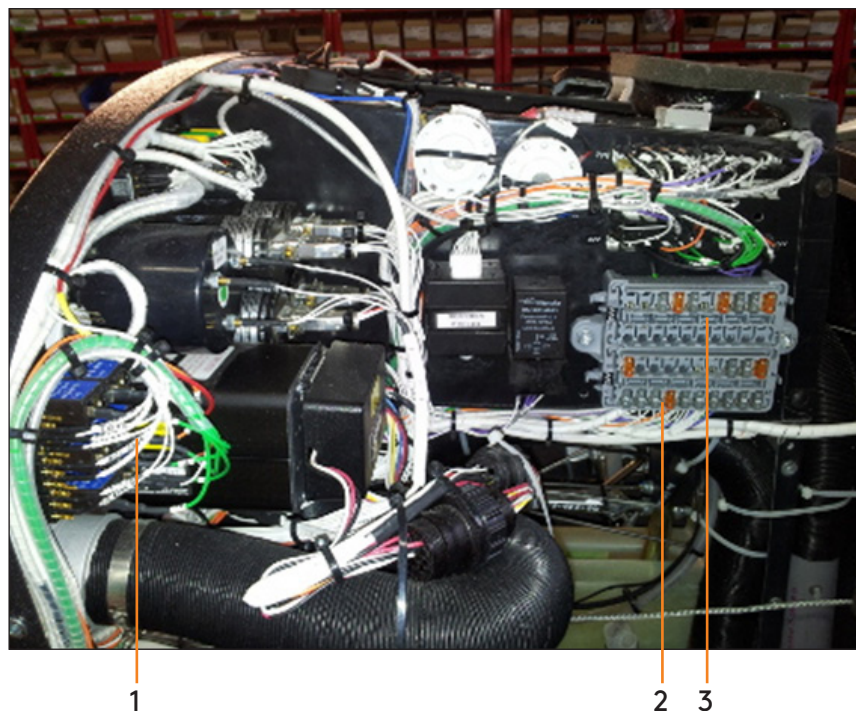
Figure 3.7.b
Electrical Components Center Fuselage

3.7.11 INSTRUMENT PANEL BUS SYSTEM

Two fuse holders, one for each system, are located behind the instrument panel. Each fuse holder forms a distribution bus. See chapter »7.3.1 «and »7.3.2« for a list of the connected devices on each bus.

From the main system bus a wire leads to the group of circuit breakers on the instrument panel front. These circuit breakers form the avionics bus. Radio communication and navigation equipment is connected here.

All engine monitoring instruments are connected to the engine system bus.



1. Circuit Breakers for Avionics
2. Engine Bus
3. Main Bus

Figure 3.7.c
Electrical Components Instrument Panel

3.7.12 ENGINE STARTING SYSTEM (ATA 80-00-00)

3.7.12.1 DESCRIPTION

The electrical starter is connected via starter relay to the engine system battery. The starter relay is controlled by the combined ignition-starter-key-switch located on the instrument panel. The control circuit for the relay triggers an ignition retarding module which allows the foldable propeller to unfold the blades completely before the engine fires. This protects the blade folding mechanism from damages caused by engine starting torque.

3.7.12.2 PARTS SPECIFICATION

Starter and starter relay are part of the engine, their specifications can be found in the ROTAX 914 Maintenance Manual.

3.7.12.3 OPERATION

The starter relay is triggered when the key switch is pushed to the "Start" position. The procedure to start the engine is described in the S12 Aircraft Flight Manual.

3.7.13 ENGINE IGNITION SYSTEM (ATA 74-00-00)

3.7.13.1 DESCRIPTION

The ROTAX 914 engine is equipped with a dual ignition. The ignition system works independently from the aircraft's electrical system and energy sources. The ignition system is part of the engine. A detailed description can be found in the ROTAX 914 Maintenance Manual.

The ignition system is controlled by the combined ignition-starter-key-switch located on the instrument panel. It includes the magneto check function. The ignition switch is connected with two shielded AWG22 wires to the electronic ignition control boxes, one for each box.

When the switch is closed, the related control box is grounded and deactivated. An ignition retarding module is connected in parallel to the ignition control boxes. It is actuated by the key switch. When in "Start" position, the ignition retarder deactivates the ignition control boxes for approximately 3 seconds. This allows the foldable propeller to unfold the blades completely before the engine fires. After the delay time the ignition is activated automatically.

The ignition system is not fused. The fuse of the ignition retarding module is located at the instrument panel fuse holder (engine bus).

3.7.13.2 PARTS SPECIFICATION

Part	STEMME p/n	Manufacturer p/n
Ignition-Starter-Key-Switch	831.107	ACS 11-03170
Ignition Retarder Module	124.211	n/a

3.7.13.3 OPERATION

- In "OFF" position the control inputs of both ignition boxes are connected to ground and the ignition is deactivated.
- In "LEFT" position the control input of the right side ignition box is connected to ground and the right ignition channel is deactivated.
- In "RIGHT" position the control input of the left side ignition box is connected to ground and the left ignition channel is deactivated.
- In "BOTH" position the control inputs of both ignition boxes are open and both ignitions are deactivated.
- In "START" position the control inputs of both ignition boxes are momentarily connected to ground and the ignition is inhibited for approximately 3 seconds.

The engine starting procedure and operation of the ignition-starter-key-switch is described in the S12 Aircraft Flight Manual.

3.7.14 ENGINE RPM INDICATING SYSTEM (ATA 77-14-00)

3.7.14.1 DESCRIPTION

The RPM signal is delivered by a pick-up coil at the rotating magnets of the internal generator to the tachometer input of the Turbocharger Control Unit (TCU). The TCU provides an output to which the electrical tachometer on the instrument panel is connected. The tachometer is wired with shielded AWG22 wire.

The RPM signal is secondarily used to trigger a frequency relay which activates the field circuit for the belt-driven alternator.

The tachometer fuse is located at the instrument panel fuse holder (engine bus).

3.7.14.2 PARTS SPECIFICATION

Pick-up and tachometer are part of the engine, their specifications can be found in the ROTAX 914 Maintenance Manual.

3.7.14.3 OPERATION

The engine RPM indicating system does not require operation actions by the pilot.

3.7.15 CYLINDER HEAD TEMPERATURE INDICATING SYSTEM (ATA 77-22-00)

3.7.15.1 DESCRIPTION

The CHT indicating system measures the cooling water temperature on two of the four cylinder heads of the ROTAX 914 engine. The temperature signal is generated by resistive type probes (Pt-100 characteristics) and displayed to the pilot by one pointer-style gauge for each side of the engine. The indicators share their fuses with the oil temperature resp. pressure indicator. The fuses are located at the instrument panel fuse holder (engine bus).

3.7.15.2 PARTS SPECIFICATION

Part	STEMME p/n	Manufacturer p/n
Oil Temperature Indicator	831.241	UMA T12113R150C050 TSO
Temperature probe RTD (Resistance Temperature Detector RTD)	831.243	UMA 1B4R

3.7.15.3 OPERATION

The CHT Indication system does not require operation actions by the pilot. Scale markings of operational limits and instructions to the pilot about corrective actions in the case of exceeded limits are defined in the S12 AFM.

3.7.16 OIL PRESSURE INDICATING SYSTEM (ATA 79-31-00)

3.7.16.1 DESCRIPTION

The oil pressure indicating system measures the pressure at the output of the mechanical oil pump of the ROTAX 914 engine. A transducer generates a voltage of 0...5 V proportional to the pressure. This voltage is displayed to the pilot by a pointer-style gauge.

The indicator shares a fuse with the CHT-left indicator. The fuse is located at the instrument panel fuse holder (engine bus).

3.7.16.2 PARTS SPECIFICATION

Part	STEMME p/n	Manufacturer p/n
Oil Pressure Indicator	831.115	UMA T04113U010B030 TSO
Pressure Sender	831.116	UMA T1EU150G

3.7.16.3 OPERATION

The Oil Pressure Indication system does not require operation actions by the pilot. Scale markings of operational limits and instructions to the pilot about corrective actions in the case of exceeded limits are defined in the AFM.

3.7.17 OIL TEMPERATURE INDICATING SYSTEM (ATA 79-33-00)

3.7.17.1 DESCRIPTION

The oil temperature indicating system measures the oil temperature in the crankcase of the ROTAX 914 engine. The temperature signal is generated by a resistive type probe (Pt-100 characteristics) and displayed to the pilot by a pointer-style gauge.

The indicator shares a fuse with the CHT-right indicator. The fuse is located at the instrument panel fuse holder (engine bus).

3.7.17.2 PARTS SPECIFICATION

Part	STEMME p/n	Manufacturer p/n
Oil Temperature Indicator	831.241	UMA T12113R150C050 TSO
Temperature probe RTD (Resistance Temperature Detector RTD)	831.243	UMA 1B4R

3.7.17.3 OPERATION

The oil temperature indication system does not require operation actions by the pilot. Scale markings of operational limits and instructions to the pilot about corrective actions in the case of exceeded limits are defined in the AFM.

3.7.18 FUEL DISTRIBUTION SYSTEM (ATA 28-20-00)

3.7.18.1 DESCRIPTION

The fuel is stored in two wing tanks of equal size, one in each side of the wing center section. Each tank is vented to the atmosphere to prevent overpressure or vacuum situations. Each tank has an over wing fuel filler. Each tank is connected via a coarse filter and quick drain to a dedicated electric plunger pump with downstream check valves. These check valves close off the fuel line when the pumps are not powered. The transfer pumps deliver the fuel into the feeder tank. The fuel line between check valves and feeder tank includes a quick-disconnect to facilitate handling during wing rigging and de-rigging.

The feeder tank incorporates two float switches to control the transfer pumps and to generate a low fuel warning signal to the pilot. From the feeder tank the fuel is delivered by a turbine pump (feeder pump) to the fuel pressure regulator, which provides the required fuel pressure to the carburetors. The regulator's return line ends in the feeder tank.

The feeder pump is backed up by another turbine pump of the same type.

3.7.18.2 PARTS SPECIFICATION

Part	STEMME p/n	Manufacturer p/n
Main and Auxiliary Feeder Pump	11AB-M02 (830.209)	Pierburg E1F
Fuel Transfer Pumps	830.521	HKT HEP-02

3.7.18.3 OPERATION

a) Main Feeder Pump Control

The main boost pump is supplied by the engine's electrical system. It automatically starts to work when the engine's electrical system is activated by the pilot. Proper operation of the main boost pump is indicated by the fuel pressure indicating system (refer 28-44-00). The electrical power line of the main feeder pump is protected by a fuse located inside the engine system junction box (refer 24-60-00).

b) Auxiliary Feeder Pump Control

The auxiliary boost pump is controlled by a switch to be manually activated by the pilot when required. To achieve better redundancy of the fuel system, the auxiliary boost pump is powered by the main electrical system, independently from the engine's electrical system. The proper function of the auxiliary boost pump is indicated by a green light and by the fuel pressure indicating system (ref 28-44-00). The electrical power line of the auxiliary boost pump is protected by a fuse located inside the main system junction box (refer 24-60-00).

3.7.18.4 TRANSFER PUMP CONTROL AND TANK SELECTION

The transfer pumps are powered by the engine electrical system. They transfer pumps are controlled by a float switch in the feeder tank and by a pump selector switch. At feeder tank fuel levels below 90% the transfer pump control is active. The pilot selects the pump on a rotary switch with the positions LEFT-BOTH-RIGHT. Due to the check valves downstream from the transfer pumps, the related tank outlet will be closed off completely when the associated transfer pump is not powered. Thus the pump selector switch functions as a tank selector.

The selected transfer pump/pumps stops automatically when the fuel level reaches 90% in the feeder tank. On feeder tank-fuel level below 90% the selected transfer pump/pumps start automatically.

The transfer pumps can be activated manually by a test push-button in the cockpit center console when the Master Switch is ON. This function is used for daily inspection or Maintenance Tasks. The transfer pump/pumps to be tested can be selected by using the fuel selector switch (Left, Right, Both).

3.7.19 FUEL QUANTITY INDICATION (ATA 28-40-00)

3.7.19.1 DESCRIPTION

A float type fuel level sender is installed in each fuel tank in the wing. The electrical resistance of the sender changes depending on the float position. This resistance is measured and displayed to the pilot on one pointer-type fuel level indicator for each tank. The indicator scale is marked with lines, each representing one eighth of full.

A separate float type switch is installed in the feeder tank which activates a yellow low fuel warning light on the instrument panel at feeder tank fuel levels below ca. 2.5 ltr.

The fuses for the fuel level indicator system are located in the instrument panel fuse holder (engine bus).

3.7.19.2 PARTS SPECIFICATION

Part	STEMME p/n	Manufacturer p/n
Fuel Quantity Indicator	831.435	UMA T18112F1F4, TSO
Fuel Level Sender	851.503	VDO 226 801 015 001 G, modified

3.7.19.3 OPERATION

The fuel quantity indication system does not require any operation actions by the pilot. Instructions to the pilot in case of low fuel level situation can be found in the AFM.

3.7.20 FUEL PRESSURE INDICATING (ATA 73-32-00)

3.7.20.1 DESCRIPTION

The ROTAX 914 engine requires the measurement of fuel pressure in relation to the “upper deck” air pressure of the turbocharger system. Therefore a differential pressure sender is installed which generates a voltage output of 0 V ... 5 V proportional to the difference between regulated fuel pressure and air box pressure. This voltage is displayed to the pilot on a dedicated digital voltmeter in the engine portion of instrument panel.

The operational range of 150 mbar ... 350 mbar is marked on a placard close to the voltmeter.

The fuse for the fuel pressure indicator system is located in the instrument panel junction box (engine bus).

3.7.20.2 PARTS SPECIFICATION

Part	STEMME p/n	Manufacturer p/n
Differential Pressure Indicator	831.123	UMA N1EU07D
Indicator	851.147	Conrad 134473

3.7.20.3 OPERATION

If the fuel pressure exceeds the limits, the pilot has to check the available amount of fuel and the state of the tank selector and the auxiliary fuel pump. Instructions about appropriate corrective actions are included in the S12 Aircraft Flight Manual.

3.7.21 FIRE DETECTION SYSTEM (ATA 26-12-00)

3.7.21.1 DESCRIPTION

Two bimetallic thermal switches are positioned on the upper firewall directly above the carburetors to detect increasing temperatures. At temperatures above 160°C the switches (or at least one) open the control circuit of a relay. This activates a red warning light and a piezo signal horn. The system includes a test switch on the panel.

3.7.21.2 PARTS SPECIFICATION

Part	STEMME p/n	Manufacturer p/n
Thermoswitch Microtherm R20	10AM-F01	on request
Switch with indication light - housing	10AM-F02	on request
Switch with indication light - cap	10AM-F03	on request
Switch with indication light - bulb	10AM-F04	on request

3.8 COM AND NAV EQUIPMENT

COM and NAV equipment is installed in the instrument panel.

The loudspeaker is installed on the rear wall of the cockpit above the LH baggage compartment. The gooseneck microphone is fastened between the backrests at the center console. When using headsets it can be deselected.

Antennas are installed for:

- VHF-COM in rudder,
- VOR-NAV on cockpit floor. (Kevlar shell, optional equipment, retrofit is not possible.)
- Transponder antenna in the front part of the tail cone or on nose-cone.

Only equipment listed in section »9« of this Maintenance Manual and approved for installation in the S12 may be installed without additional certification. Only this equipment has been proven by the manufacturer in accordance with the relevant certification requirements regarding initial airworthiness and proper function. For modifications, the installation instruction and the original wiring harness of the aircraft manufacturer must be used.

This is also relevant for equipment approved for operation in motorglider or equipment without certification requirements due to possible influence on power consumption, electromagnetic influence and structural characteristics of the instrument panel. Outside Germany it must be confirmed that the equipment is certified by the local authority in charge.

The weight limits for the equipment installed in the instrument panel and the influence on CG must be respected. The Equipment List and the Weight and Balance Report must be updated.

When equipment is modified, conformity with the type must be checked and confirmed by an inspector. If equipment is installed which is not certified for use in the relevant aircraft it must be proven by the authority, when applicable requirements are fulfilled (modification of a single aircraft).

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3.9 OXYGEN SYSTEM

One or maximum two oxygen system mountings (optional equipment) for one oxygen bottle each are installed in the upper baggage compartment.

The mountings are suitable for oxygen bottles from various manufacturers, provided the diameter is within a minimum of 0.132 m / 5.20 in, and the total length including regulator is approx. 0.45 m/17.72 in up to a maximum of 0.52 m/20.47 in.

The certification of the motorglider does not include a defined oxygen system and fulfillment of the requirements must be demonstrated to the authority by the supplier or the facility, which modified the aircraft (normally as a modification of a single aircraft).

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3.10 WING FOLDING DEVICE

The Stemme S12 optionally can be equipped with a wing folding device.

A description of the functioning and the handling is to be found in the associated supplement to the S12 Aircraft Flight Manual.

The wing folding device is maintenance-free.

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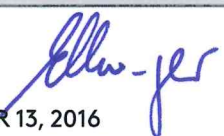
4. AIRWORTHINESS LIMITATIONS SECTION

These revisions to chapter »4 Airworthiness Limitations«, up to and including this revision, is EASA approved. The current revision applies to all U.S.-registered STEMME S12 aircraft.

NOTICE

Violation of time limits as defined in chapter »4« may impair proper function of the aircraft and/or aircraft systems. This may lead to loss of airworthiness and manufacturer warranty. An aircraft operated in a non airworthy condition represents a risk to health and life of pilot/crew, passenger and non involved persons!

RECORD OF REVISIONS TO CHAPTER 4

No. of Amendment	Date of Amendment	Description of Amendment	Agency Approval of Chapter 4 Signature and Date
00	JAN 22, 2016	Initial Approval	  MAR 13, 2016 EASA-APPROVED Approval-No.: 10026286

4.1 GENERAL

This chapter defines the mandatory overhaul (TBO – Time Between Overhaul), replacement (TBR – Time Between Replacement), and inspection intervals for components of the STEMME S12. The chapter also defines the structural inspection requirements for the STEMME S12 composite airframe. It contains information about the lifetime of all STEMME designed parts or components that must be overhauled, rebuilt, inspected, or replaced at either specific flight time limits or specified calendar time limits or that require monitoring through scheduled maintenance.

Compliance with the specified times and intervals is mandatory for maintaining continuing airworthiness of the aircraft.

For airworthiness limitations of other parts installed in the aircraft not designed by STEMME or with separate TC refer to chapter »5« and respective manufacturer documentation as amended from time to time.

4.2 MAINTENANCE LIMITATIONS

Be sure to verify compliance with chapter »4 Airworthiness Limitations« when performing scheduled maintenance per chapter »5«.

The following requirements must be adhered to consistent with applicable national regulations.

4.2.1 PAINT FINISH

To ensure that the temperature of the composite structure is kept below 54°C/130 °F, the airframe must be painted white as approved. Only the nose cone may be a darker color. On the rest of the airframe, you may only paint registration letters and numbers and placards in a color other than white.

When re-painting is needed on a cowlings, you must paint the engine side (interior side) of the lower and side cowlings with aviation grade fire-resistant paint approved by STEMME.

Refer to P520-901.502 "Small Repairs of Composite Materials" (latest approved issue), Annex A of this manual, for guidance on the paint approved for use by STEMME.

CAUTION

Aircraft control surface balance is critical to flight safety. Repair and removal or addition of any paint or body filler to a control surface requires that the control surface is rebalanced according Annex D of this manual.

4.3 COMPONENT REPLACEMENT AND OVERHAUL LIMITATIONS

This chapter defines replacement intervals and maintenance requirements for aircraft components, systems, and structures determined to be life-limited or to be monitored by scheduled maintenance.

Unless otherwise specified, the following components must be overhauled, rebuilt, or replaced with components that have service life remaining, within the life-time limits specified. To monitor remaining useful service life-time of components, maintenance work, e.g., overhauling, rebuilding, repairing, or replacing each item, must be recorded in accordance with applicable national regulations.

The IPC chapters mentioned below refer to the Illustrated Parts Catalog (IPC) for Type S10, Model S12 Doc.-No- L530-912.830 or latest revision.

MAXIMUM ALLOWABLE OPERATING TIMES

No.	Part/Assembly/ Equipment	Manufacturer	STEMME p/n	IPC Chapter	Overhaul	Replacement	Notes
1	Variable pitch propeller	STEMME AG	11AP-V	61-10	5 years	-	(1) (2)
2	Propeller hub	STEMME AG	10AP-V01	61-10	-	2000 hr	-
3	Propeller fork and fasteners/ attachment components	STEMME AG	10AP-V88, 10AP-V76, 10AP-V77, 10AP-V78, 10AP-VU	61-10	200 hr	400 hr	(1)
4	Propeller gear box (gear wheels)	STEMME AG	11AG	72-10	1000 hr	-	(1)
5	Propeller gear box mounting	STEMME AG	11AA	72-10	1000 hr	-	(1) (3)
6	Propeller Gear Box mounting elastomer parts	STEMME AG	11AA-S 11AA-36	72-10	-	12 years	(1) (3)
7	Centrifugal clutch (3 Flyweights)	STEMME AG	12AK	72-10	400 hr	-	(1)
8	Drive shaft	STEMME AG	10AS-07 10AS-W 10AS-F	72-10	800 hr	-	(1)
9	Flexible disk of the drive shaft system (Cardan Joints)	STEMME AG	11AS-09	72-10	-	12 years	(1)

NOTES

1. Overhauls of STEMME-manufactured components may only be performed in accordance with manufacturer-approved data.
2. Under extreme environmental conditions (hot, dusty) greasing of the propeller blade bearings as part of the overhaul can be required more frequently if indicated during Annual Inspection.
3. Different Overhaul and Replacement intervals in the variable pitch propeller assy. are, defined for specific individual mechanical components. Respective components are sorted by their applicable TBO/TBR.
4. If the limitation is given in engine operating hours and in a calendar period, the first occurring case applies for the affected components.
5. Even under ideal conditions, replacement or overhaul of parts or components may be required before attaining the chapter »4 Life Limits«. Even life-limited parts are subject to "on-condition" inspection before reaching TBO intervals.

4.4 STRUCTURAL LIMITATIONS

The airframe composite structure of the STEMME S12 (including various STEMME P/N's) is currently life limited to 6000 hours of flight time.

Extension of service life above 6000 hours can be achieved only by alteration from replacement (TBR) to TBO and introduction of an additional overhaul at 6000 hours and a subsequent mandated overhaul interval (TBO) for continuing airworthiness. The TBO change will be notified by a revision of this chapter.

The additional overhaul will include a comprehensive inspection of the airframe carried out in accordance with approved data based on an agency approved TBO program.

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5. TIME LIMITS / MAINTENANCE CHECKS

NOTICE

Violation of checks and recommended overhaul or replacement intervals as defined in chapter »5« may impair proper function of the aircraft and/or aircraft systems.

This chapter defines intervals for overhauling, rebuilding, and replacing components; provides guidance for scheduled and unscheduled maintenance; and specifies the minimum scope of required periodic inspections required by the Federal Aviation Regulations. Chapter »5« consists of the following sections:

- Section »5.1«: Overhaul and Replacement Schedule, lists manufacturer–recommended times–in service for overhauling, rebuilding, and replacing components.
- Section »5.2«: Pre-Flight Inspections are defined in the S12 Aircraft Flight Manual.
- Section »5.3«: Periodic Inspections, discusses mandatory periodic inspections generally with the caveat that less benign operating conditions reasonably entail more frequent inspections than the required minimum intervals provide.
- Section »5.4«: Checklist for Periodic Inspections, lists the type and subject of mandatory periodic inspections, organized by aircraft system or area and the recommended intervals at which items must be inspected based on normal usage under average environmental conditions.
- Section »5.5«: Special Inspections, covers unscheduled maintenance, such as after hard landings, prop strikes or intense turbulence.

Maintenance, pre-flight Inspections and preventive maintenance must be carried out by qualified and appropriately authorized personnel. In any case relevant national law must be respected.

Extreme environmental conditions, e.g. arid desert or humid lowlands, present added, albeit different maintenance and inspection challenges for the prudent owner and operator. In any event, the owner and operator must consider the operating conditions in which the aircraft is operated and stored when determining if the minimum specified inspections and intervals are adequate.

The owner and operator must share all relevant information with the responsible authorized maintenance person (according to the requirements detailed in the Federal Aviation Regulations or European Publications) who maintains or inspects the aircraft.

As with all certified aircraft, following each required annual or 100 hr Inspection, the aircraft must be returned to service by the responsible authorized maintenance person (according to applicable national regulations) before further flight.

Owners and operators are responsible for complying with all applicable Federal Aviation Regulations or national regulations. STEMME strongly recommends you to choose your mechanic with care and to demand diligence and documentation for all works.

5.1 OVERHAUL AND REPLACEMENT SCHEDULE

This section contains times recommended by the manufacturer for replacement or overhaul of components not subject to the Maximum Allowable Operating Times of chapter »4«.

For life-limited parts with separate time certificate (TC) or technical standard order (TSO), refer to the Airworthiness Limitations section of the manufacturer's documentation (applicable Maintenance Manual, Service Bulletin etc.) for permissible service-life limits prescribed by the respective manufacturer.

The following components shall be overhauled or replaced at their respective specified TBO or Replacement Interval (TBR) or sooner, if their condition so indicates, and reasonable care requires it.

STEMME strongly recommends adherence to the chapter »5« overhaul and replacement schedule, including the overhaul and replacement times applicable to the components listed below.

Overhaul and replacement of these items is to be done on condition but as STEMME recommendation not later than stated in the following table.

LOG BOOK ENTRIES

Inspections, maintenance, and preventive maintenance including correct observation of the overhaul and replacement times and the date of removal, installation or overhaul of each component shall be logged in strict compliance with applicable national requirements.

NOTICE

Aircraft storage or operation under less favorable or sub-normal conditions often requires more frequent inspection, overhaul, or replacement of components than at the intervals recommended below. More frequent inspection includes careful inspection before each flight. The owner and operator are ultimately responsible for keeping the aircraft in airworthy condition based on the defined requirements of the TC holder with the informed advice of an authorized maintenance person.

RECOMMENDED OPERATING TIMES BETWEEN OVERHAUL AND REPLACEMENT

No.	Part/Assembly/ Equipment	Manufacturer	STEMME p/n	IPC Chapter	Overhaul	Replace- ment	Notes
1	Engine	STEMME AG, ROTAX 914F2/S1	--	71-01	15 years	--	(1) (3) (4)
2	Rubber parts of the engine	ROTAX, Various Rubber	--	71-01	--	5 years	(2)
3	Fuel hoses	Various, STEMME AG approved	--	28-10	--	5 years	(5)
4	Lubrication hoses	Various, STEMME AG ap- proved	--	79-20	--	5 years	(5)
5	Coolant hoses	Various, STEMME AG approved	--	75-20	--	5 years	(5)
6	Neoprene hoses	Various, STEMME ap- proved	--	75-20	--	5 years	(5)
7	Silicone hoses	Various, STEMME ap- proved	--	75-20	--	5 years	(5)
8	Elastomer parts of the landing gear suspen- sion	Various, Elastomer	--	32-00	--	10 years	(5)
9	Seat belts	Various, Four-Point	--	24-10	See Note (7)		(6) (8)
10	Control Rod Connectors	L'Hotellier, --	--	27-00	--	3000h/ 10 years	(7) (8)

NOTES

1. The TBO for the STEMME engine type ROTAX 914 F2/S1 is established on the basis of the engine type ROTAX 914 F2-01 in following ROTAX Service Bulletins »Extension of the Time Between Overhauls« (TBO): SB 914-039, Initial Issue, dated March 25, 2010 or later approved.

The TBO stated in these Service Bulletins is according to respective engine S/N and is directly applicable to the STEMME engine type ROTAX 914 F2/S1.

To further clarify, in accordance with the applicable Service Bulletin the stated TBO means: TBO of 15 years

In all cases the limitation is given in operating hours and in a calendar period, the first occurring case applies. Please note that only the above referenced Service Bulletins shall apply to recommended TBO.

2. The recommended TBO for all rubber parts of STEMME's engine ROTAX 914 F2/S1 is established on the basis of the engine type ROTAX 914 F2-01 as detailed in the ROTAX Maintenance Manual, Line Maintenance: ROTAX MML-914, Edition 2, Revision 2, dated February 1, 2015 or later version.

The recommended TBO for all rubber parts as stated in the latest revision of ROTAX MML-914, Edition 2, applies to STEMME's ROTAX 914 F2/S1 engine.

3. STEMME does NOT approve operating beyond the stated engine TBO (defined by ROTAX and applied by STEMME) for its engine ROTAX 914 F2/S1. Any decision to operate beyond the recommended TBO for the engine ROTAX 914 F2/S1 based on the informed recommendation of competent, ROTAX-qualified, authorized maintenance personnel is without the recommendation of STEMME and as such STEMME does not assume the resultant risk.
4. STEMME builds the ROTAX 914 F2/S1 engine by modifying the certified ROTAX 914 F2-01 which is its major component. STEMME certified the ROTAX 914 F2/S1 engine and its variable pitch propeller as part of the S12 under EASA type certificate EASA.A.054. Only STEMME-approved data is applicable for overhaul and inspection of STEMME's ROTAX 914 F2/S1 engine.
5. STEMME strongly recommends that you not exceed the recommended TBOs as specified in the table. In any case, components must be replaced "on condition" if inspection indicates a need to do so or as required by mode of operation.
6. Seat belts must be inspected and, if needed, be repaired or replaced pursuant according to applicable national regulations or product limitations.
7. The L'Hotellier connections wear by use, which may critically impair airworthiness. STEMME recommends to owners and operators to inspect these connectors per L'Hotellier Instructions for the Maintenance L'Hotellier Ball and Swivel Joints, Ref. IMA10.01, in the latest approved revision. This technical data can be provided by L'Hotellier S.A., 93 Avenue Charles De Gaulle, 92270 Bois Colombes, France. See Annex A, for L'Hotellier's specified inspection procedure and tolerances.

8. Refer to instructions prescribed by the component manufacturers—airworthiness limitations section of the manufacturer documentation, applicable maintenance manual, Service Bulletins, etc.—for those manufacturer’s permissible service life limits and overhaul recommendations of components.

NOTICE

If the limitation is given in operating hours and in a calendar period, whichever limitation is reached first is applicable. Even parts with recommended TBO/TBR are subject to “on-condition” inspection before reaching the recommended interval.

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5.2 PRE-FLIGHT INSPECTIONS

Procedures for rigging, fueling, daily inspection and pre-flight inspection are defined in the S12 Aircraft Flight Manual.

5.2.1 RUBBER HOSE AND CLAMP INTEGRITY

To ensure that liquids remain safely contained during engine operation and during engine-off flight, the outward appearance and surface condition of all rubber hoses must be visually and manually inspected.

The scheduled maintenance, defined in chapter »5« is suitable to detect leaks, cracks, swelling, inflexibility, loose ends and signs of excessive wear or aging.

Depending upon environmental and operating conditions, elastomeric parts like rubber hoses can age more rapidly than expected.

Fuel system pressure tests are required with in Daily Inspection as defined in Chapter »4.« of the S12 Aircraft Flight Manual. Pressure test the fuel system before first engine start each day and after maintenance. Transfer pumps respond to draining of the feeder tank, refer to section »7.4.6.2«

In addition, the clamped connections of each rubber hose must be visually and manually inspected before first engine operation after maintenance to confirm that no hose can be pulled loose from its respective fittings.

5.3 PERIODIC INSPECTIONS

The intervals for general maintenance and inspections depend upon operating conditions, climate, storage conditions, and environmental factors. More frequent inspection and maintenance would be prudent under sub-normal conditions; however, the types and intervals of the minimum required inspections and scheduled maintenance for the S12 are those mandated by applicable national requirements and are defined below in section »5«.

Depending on applicable national regulations certified aircraft may also be required to be inspected and maintained more frequently than specified in this chapter depending on the mode of operation.

5.3.1 INSPECTION INTERVALS

The reasonable intervals for general maintenance depend on operating conditions, climate, hangarage, etc. The types and intervals of the minimum scheduled maintenance established for the S12 are indicated in the table below.

ANNUAL INSPECTIONS

The motorglider must undergo a complete inspection each 12 calendar months. The inspection has to be carried out according to applicable national requirements by an authorized maintenance person. A signed and dated record must be maintained as each inspection task is completed. When all inspections have been completed, the Inspection Report shall be signed off in the Log Book or Maintenance Record according to applicable national requirements in order to release the aircraft into service.

This Chapter of the Maintenance Manual summarizes the inspection items that must cover in each Annual Inspection. Annual Inspection items listed below in section »5.4« cover in scope to the inspection items required in the 100 hours inspection.

100 HOURS INSPECTIONS (AIRFRAME)

In addition to the annual inspection specific inspection tasks are required also every 100 hours of flight operating time.

The aircraft's mandatory Annual Inspection also covers the scope of the 100 hours inspection detailed in table »5.4«. The 100 hours interval between inspections must not be exceeded by more than 10 hours. This tolerance is reserved to reach a location where the inspection can be satisfactorily accomplished.

The time by which the inspection interval was exceeded must be included as flight hours in the next 100 hr interval. For example, if a 100 hr inspection was due at 650 hours of flight and was actually signed off at 658 flight hours, the next 100 hours inspection is due at 750 flight hours, not at 758 hours of flight. Inspection tolerances may not be accumulated.

100, 200, 600 ENGINE OPERATING HOURS INSPECTIONS

Additional periodic inspections must be performed every 100, 200 and 600 engine operating hours. They have to be carried out in accordance with the following Periodic Inspections Check List, chapter »5.4«.

This means that:

- A 100 engine hours inspection shall be done every 100 hours of engine operation;
- A 100 engine hours inspection shall be done every 200 hours of engine operation; plus additional 200 engine hours checks:
 - Check spark plug connectors for tight fit;
 - Renew heat insulation of exhaust headers;
 - Flush coolant system and replace coolant;
 - Change air filter;
 - Change fine filters in fuel system.
- A 100 engine hours and a 200 engine hours inspection shall be done every 600 hours of engine operating time, plus additional 600 engine hours check:
 - Check the reduction gear wheels of the engine.

Refer to the Periodic Inspections Check List, chapter »5.4« to see all relevant inspection tasks for each inspection.

BREAK-IN INSPECTION OF ENGINE AND AIRFRAME

In order to demonstrate continuing airworthiness, a new, overhauled or rebuilt airframe and engine must be inspected initially once (Break-In Inspection) after

- the first 25 engine operating hours or
- first 100 hours of flight operating time,

whichever applies first.

Depending on applicable national regulations inspections every 100 flight hours may be mandated depending on the mode of operation as if an Annual Inspection were being done.

5.3.2 GENERAL REMARKS ON PERIODIC INSPECTIONS

If operations or conditions indicate that a scheduled maintenance action must be performed before its current calendar or hour limit, a complete 100 hours inspection must be carried out. Alternatively, the maintenance task that was done "early" must be repeated with the next scheduled 100 hours inspection.

A scheduled maintenance task can be performed before reaching the hour limit if operational conditions reasonably require that. In this case all higher-level inspections also have to be advanced by the same time to avoid extended intervals.

Even though the operator can decide at each 100 flight hour airframe inspection, whether or not the engine hour related inspections (100, 200, or 600 engine hours inspections) shall be performed simultaneously, the manufacturer recommends simultaneous inspection provided the flight/engine hour ratio is less than 2:1.

The items to be checked are listed in section »5.4 Check List for Periodic Inspections«. A detailed description of maintenance procedures, adjustment data, tolerances, torque values etc. can be found in section »6« (for details of the aircraft generally) and in section »7« (for specific assemblies of the aircraft). The relevant subsection is indicated for each inspection item shown on the check list.

In addition, special inspections may be prescribed by the responsible authority or may be recommended by the manufacturer; those inspections must be performed as required in accordance with the issued directives and the Federal Aviation Regulations that apply to N-registered STEMME aircraft.

For instructions pertaining to maintenance of other equipment installed in the aircraft, refer to Annex A »Supplementary Instructions for Maintenance and Care, Maintenance Instructions«.

NOTICE

The inspection lists in section »5.1 Overhaul and Replacement Schedule«, and in section »5.4 Check List for Periodic Inspections«, cover the complete aircraft, including its propeller, its drive-train, and its engine.

The periodic checks listed in section »5.1« and »5.4« substitute for section 05-20 (»Maintenance Schedule«) of the »Maintenance Manual (Line Maintenance) for ROTAX Engine Type 914 F Series found in Annex E.

Section 05-20 of the original ROTAX Maintenance Manual need not be observed during maintenance of this aircraft.

5.3.3 UNSCHEDULED MAINTENANCE

AIRWORTHINESS DIRECTIVES AND SERVICE BULLETINS

In addition to scheduled maintenance described above, the need for special inspections and additional maintenance may arise. Normally, these situations will be publicized with a manufacturer's Service Bulletin (SB) or an Airworthiness Directive (AD) published by the responsible authority (e.g. EASA/FAA). Such notices typically include a deadline to complete the required actions. Compliance with Airworthiness Directives is mandatory.

STEMME strongly recommends that owners and operators, as a matter of prudence and flight safety, fully and promptly comply with all relevant Service Bulletins (except Service Bulletins classified as "optional").

ABNORMAL OPERATIONS

Abnormal airplane operations require special maintenance checks. Unscheduled checks following overweight or hard landings, over-speed flight, severe air turbulence, lightning strike, foreign-object damage, and high drag or side loads due to ground handling should be performed by an authorized maintenance person.

The inspector must conduct the relevant section »5.4«. Annual Inspection of the potentially damaged components and systems, e.g. landing gear, control surfaces, tail boom, empennage, etc. as appropriate and needed to assure airworthy condition of the aircraft.

In any case of doubt concerning the condition and possible unrevealed damage, the owner or operator is advised to contact the manufacturer or another appropriately approved maintenance organization specialized on diagnosing and repairing the affected type of components or systems.

Unscheduled Maintenance for Propeller Assembly, Engine Drive Section, and Front Gear Box Components

An unscheduled inspection, overhaul, repair, or replacement is mandatory following each case of:

- Sudden Stop or any Impact (possible ground contact) of the Propeller that reduces engine RPM, or
- Failure to perform the periodic inspections specified in the S12 Maintenance Manual, or
- Foreign Object Damage (FOD)

If the inspection of the propeller indicates detectable damage beyond mere cosmetic distress to the propeller, whether by ground contact, bird strike, stone strike or other impact, a qualified and authorized maintenance person shall determine the extent of the damage.

For any damage which requires a Major Repair, the TC-holder or an approved agency must determine which parts of the complete drive system are affected and require repair (if practicable), overhaul, rebuilding, or replacement. See detailed guidance for evaluating impact damage to the Propeller in section »5.5.2« below.

5.3.4 SPECIAL CONDITIONS AND CAUTIONARY NOTICE

Airplanes operated with high take-off/landing frequency or engaged in flight school use will likely need more frequent inspections.

In addition, more frequent inspections and maintenance will be indicated for:

- Airplanes that are either stored or operated under other conditions than normal,
- Airplanes stored or operated in hot or humid tropical conditions,
- Airplanes stored or operated in cold or damp climates, and
- Airplanes stored or operated in extreme temperature or in arid conditions, etc.

The more frequent inspections should cover, at a minimum, wear, leaks, corrosion, delamination, rubber deterioration, inflexibility, loose connections, and lack of lubricant, hydraulic fluid or coolant. Under the special conditions described above, the owner and operator and his authorized maintenance person should perform periodic inspections at a more frequent rate, i.e. at shorter intervals, until they can set their own more frequent inspection periods based upon experience.

5.3.5 GENERAL REMARKS ON MAINTENANCE

The recommended periods for maintenance and for inspection do not constitute a guarantee or warranty that the item will reach the recommended TBO without malfunction, as the range of in-service factors cannot be controlled by the manufacturer.

It is always and ultimately the responsibility of the owner, the operator and the authorized maintenance organization to make well informed decisions when and whether to shorten the components recommended TBO or TBR.

“On Condition” items are to be repaired, overhauled, rebuilt, or replaced using only manufacturer-specified parts or manufacturer-approved material and parts as appropriate, when inspection or observed performance of these items reasonably reveals a potentially unserviceable or unsafe condition.

The date on the applicable initial Certificate of Airworthiness issued with final production inspection is to be used as the starting date for all inspected components listed in chapters »4« and »5« of this aircraft’s Maintenance Manual. (Statement of Conformity, EASA Form 52).

SCHEDULED MAINTENANCE CHECKS AND GOOD PRACTICE

The owner and operator are primarily responsible for maintaining the airplane in an airworthy condition. This includes compliance with all applicable Airworthiness Directives. It is the responsibility of the owner and the operator to ensure that the airplane is inspected and maintained as specified in sections 43 and 91 of Federal Aviation Regulations.

The inspection requirements set out in chapter »5« should be regarded as minimum requirements that are not intended to be all-inclusive. More rigorous inspection will be appropriate when operating under harsh conditions. No maintenance checklist and table of requirements can replace the good judgment of a certified airframe and power plant mechanic. STEMME urges owners and operators, as these are primarily responsible for the airworthiness of the airplane, to select only qualified and authorized maintenance persons who have or can obtain adequate qualification and experience for STEMME and ROTAX products.

While the requirements stated in this chapter may be used as an outline, detailed information of the many systems and components in the airplane will be found in the various chapters of the maintenance manual and pertinent vendor publications.

The owner and operator are responsible to ensure that the airframe and power plant mechanic who inspects the airplane has access to the previously noted documents, as well as to this Maintenance Manual and other relevant technical data provided by STEMME.

In performing maintenance and inspection of the aircraft, the authorized maintenance organization shall refer to the applicable Maintenance Handbooks, Service Instructions, Service Bulletins, applicable Regulations and Publications, Vendor's Bulletins and Vendor Specifications for clearances, torque values, settings, tolerances, best practices and other relevant requirements.

During the inspection, verify that all interior and exterior placards are legible and in place.

NOTICE

In addition to the inspections prescribed in chapter »5«, the altimeter and static system — and for operation in airspace requiring transponder use, the altitude encoding transponder(s) — must be tested and inspected in separate intervals in compliance with the requirements.

5.3.6 INSPECTION GROUPS AND MAINTENANCE CRITERIA

VISUAL INSPECTION

When called for in conjunction with an inspection task, or at any time that an area is visible during an inspection or maintenance action, the following visual inspection criteria shall be accomplished without requiring disassembly or removal of adjacent equipment unless otherwise specified or indicated.

The criteria will normally apply to those areas, surfaces, or items made visible by the removal or opening of access panels, fairings, or cowlings. The visual inspection shall include an examination by area, component, detail, assembly, or installation, as well as any associated equipment within the immediate vicinity, using any inspection aids considered necessary.

When performing either an Annual or a 100 hr Inspection, each installed miscellaneous item not specifically covered in Section »5.1« or in section »5.4 Checklist for Periodic Maintenance«, shall also be inspected for proper installation and proper operation:

NOTICE

In addition to the inspections, you should carefully inspect the following categories of parts. All Chapter 5 references to performance of maintenance inspections are to be understood as references to the following criteria for visual inspection of such parts.

Visual inspection criteria will normally consist of but are not limited to the following criteria:

- **Moving Parts:**
Proper operation,
correct alignment,
securely installed,
sealing,
cleanliness,
lubrication,
adjustment,
tension,
travel,
condition,
binding,
excessive wear,
cracking,
corrosion,
deformation, and
any other apparent damage.
- **Composite Parts:**
Securely installed,
condition,
cleanliness,
separation of bond,
indications of delamination,

wear,
cracking,
obstruction of drainage or vent holes,
deformation,
signs of overheating, fluid saturation and
any other apparent damage.

- Metal Parts:

Securely installed,
condition of finish,
cleanliness,
distortion,
fatigue cracks,
welding cracks,
corrosion, and
any other apparent damage.

- Fuel, Air, Oil, Coolant and Hydraulic Fluid Lines and Hoses:

Leaks,
cracks,
dents,
kinks,
loss of flexibility,
sign of deterioration,
obstruction,
chafing,
improper bend radius,
cleanliness,
securely installed, and
any other apparent damage

- Electrical Wiring:

Cleanliness,
loose, corroded or broken terminals,
chafed, broken or worn insulation,
wires and wire bundles securely installed,
signs of heat deterioration, and
any other apparent damage.

- Bolts and Nuts:

Fretting,
wear,
damage,
stretch,
cross-threading,
proper torque,
corrosion, and
locking or safety wiring.

- **Filters and Screens:**

Filters and screens shall be removed, cleaned, and inspected for contamination and shall be replaced as appropriate or required.

Fuel filters encased in metal should be replaced at the recommended intervals.

- **Wet Fuel Areas:**

Cleanliness,
leaks,
bacterial growth,
corrosion,
delamination,
separation of bond,
deterioration of fuel tank lining,
and structural fatigue

- **Fire Sleeves:**

dents,
kinks, tears,
loss of flexibility,
deterioration,
obstruction,
chafing,
improper bend radius,
cleanliness,
securely installed,
open ends, and
any other apparent damage.

OPERATIONAL INSPECTION

When called for in conjunction with an inspection task, an “Operational Inspection” is a check to determine that a component or system is fulfilling its intended purpose. The operational inspection does not require quantitative tolerances.

FUNCTIONAL INSPECTION

When called for in conjunction with an inspection task, a “Functional Inspection” is a quantitative check to determine if one or more functions of a component performs within specified limits. The functional inspection is a comparative examination of a component or a system against a specified standard.

5.3.7 OTHER PARTICULARS OF MAINTENANCE

- Clean all screws and nuts before reinstalling the fasteners if not to be replaced. Inspect seats and thread of fasteners and screw connections upon removal for good condition or damage before re-use. Replace damaged, cross-threaded or corroded hardware.
- Self-locking nuts, once loosened or removed, must be replaced.
- Comply with torque values listed in relevant sections of this AMM, e.g. for the airframe, section 6.8. For the STEMME-ROTAX 914 F2/S1 engine refer to torque values in the Maintenance Manual (Line Maintenance) for ROTAX Engine Type 914 Series (Annex E to this AMM) and Maintenance Manual (Heavy Maintenance) for ROTAX Engine Types 912 and 914 Series.
- Clean or replace all filters, gaskets, lock washers, O-rings, and shaft seals before reassembly or re-installation and as required by Maintenance Check List.
- Electrical wire condition is critical to flight safety. Check the condition of electrical wires by inspecting for chafing, decay of the insulation, wearing or corrosion of terminals and conductor connections to terminals. In case of a deficiency, replace or repair the deficient wire and terminal. Any discrepancies must be found and corrected before further flight. Also refer, e.g. to FAA AC 43.13-1B, Chapter 11, §6.
- Condition of flexible hoses is critical to flight safety. Always check the condition of flexible hoses by examining for chafing, leakage, cracking, signs of decay from thermal or chemical effects, hardening and damage or defects at hose connections. Always look for cracks at the clamps and confirm that all hose connections are securely installed. If defects or deterioration are found, replace the hose, hoses of like kind and age, and the clamps. Then identify and correct the cause of the defect before further flight. Also refer, e.g., to FAA AC 43.13-1B, Chapter 8, §2, Chapter 9, §2 and associated table.

WARNING

Prior to any maintenance work switch OFF Master Switch and Ignition!

STEMME recommends that you always disconnect the batteries and ground the aircraft to prevent short circuits or arcing during maintenance work.

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5.4 CHECK LIST FOR PERIODIC INSPECTIONS

⚠ WARNING

Switch OFF Master-Switch and Ignition for any maintenance work!

NOTICE

Read maintenance instructions in sections »6« and »7« before carrying out adjustments! Additionally to maintenance instructions, these sections indicate special maintenance intervals (2 years) allowable for some items of the Annual inspection program in the following check list.

For explanation of type of inspection refer to section »5.3.1 and 5.3.4«.

5.4.1 GENERAL

Type and Subject of Inspection	Break-in	Aircraft 100 hr	Engine 100 hr	Engine 200 hr	Engine 600 hr	Annual	Refer to Section	Sign-off
1. Thoroughly clean aircraft and engine, remove or open all necessary inspection plates, access doors, fairings and cowlings.		X	X			X	-	
2. Inspect aircraft surfaces and markings (especially registration and national flag), renew if necessary.		X	X			X	6.6, 7.1	
3. Check all drain and ventilation holes (see position plan section 6.7).	X	X				X	6.7	
4. Check all points of lubrication and grease if required (ref. to section 6.5)	X	X				X	6.5	
5. Check function of flight controls.	X	X				X	7.3	
6. Check slackness/free play of aileron (outer wing and wing extension), flap and elevator controls.		X				X	6.4.3	
7. Check friction and forces in control system.						X	6.4.1	

5.4.2 WINGS AND FUEL SYSTEM COMPONENTS IN THE WING CENTER SECTION

Type and Subject of Inspection	Break-in	Aircraft 100 hr	Engine 100 hr	Engine 200 hr	Engine 600 hr	Annual	Refer to Section	Sign-off
1. Check fuel system components at spar bridge of wing center section.	X	X				X	7.4.6	
2. Check vent line outlets at end ribs of wing center section.	X	X				X	7.4.6	
3. Check function of quick-release coupling (fuel supply line).	X	X				X	7.4.6	
4. Clean coarse filters.			X			X	7.4.6	
5. Check quick drains and filters in wing center section through maintenance opening in lower surface Clean fine filters, check condition and change if necessary.	X		X					
6. Change fine filter.				X			7.4.6.2	
7. Check condition, attachment and function of electrical fuel pumps through maintenance opening in lower surface.	X		X			X	7.4.6.2	
8. Check fuel filler cap for leakage and for signs of leakage of wing tanks.	X	X	X			X	7.4.6	
9. Check condition and backlash of wing fittings, check securing device of wing attachment bolts.	X	X				X	7.1.1	
10. Check condition of wing flaps and ailerons, check clearance between components span-wise 3 ± 0.5 mm / 0.12 ± 0.02 in. Check gap seals and fairings on flap/aileron links.		X				X	7.1.1	
11. Check all control rods and supports in wing center section and wing attachment area, check secure fastening of spring bolt of each quick-connector.	X	X				X	7.3.1	

Type and Subject of Inspection	Break-in	Aircraft 100 hr	Engine 100 hr	Engine 200 hr	Engine 600 hr	Annual	Refer to Section	Sign-off
12. Inspect L'Hotellier-connectors of aileron control rod according to manufacturer instructions (Annex A). Check un-loose-able fastening of safety pin.	x	x				x	7.3.2	
13. Check bell-crank levers and adjacent components of wing flaps and aileron system in wing.						x	7.3.2	
14. Check swaged terminals of all control rods in wing.			x			x	7.3	
15. Check condition of air brakes.			x			x	7.3.2	

5.4.3 FORWARD FUSELAGE

Type and Subject of Inspection	Break-in	Aircraft 100 hr	Engine 100 hr	Engine 200 hr	Engine 600 hr	Annual	Refer to Section	Sign-off
1. Check safe locking of nose-cone.			x			x	7.1.2.3	
2. Check condition and backlash (3 mm / 0.12 in at nose-cone tip) of nose-cone.			x			x	7.1.2.3	

5.4.4 COCKPIT

Type and Subject of Inspection	Break-in	Aircraft 100 hr	Engine 100 hr	Engine 200 hr	Engine 600 hr	Annual	Refer to Section	Sign-off
1. Inspect canopy for damage and proper function of locking mechanism, grease canopy locks. Check tension of the metal wire rope in locking mechanism. Check and adjust the wire rope to ensure uniform locking/unlocking at each side.	X	X				X	7.2.1	
2. Canopy emergency jettison: Check function and gas spring force (minimum 150 ± 30 N/34 ± 7 lbf compressed).						X	7.2.1	
3. Check function of lateral gas springs of canopy (canopy must remain in open position).		X				X	7.2.1	
4. Check seat belts and attachment points.						X	7.2.2	
5. Check throttle and choke lever assy. in cockpit. Check stops of throttle lever. Check choke lever adjustment. Check throttle valve positions by means of the ROTAX communication program.	X	X				X	7.4.7	
6. Check controls in front fuselage for foreign objects, proper condition and installation.	X	X				X	7.3.1	
7. Check swagged terminals of all control rods in fuselage.			X			X	7.3	
8. Check condition and attachment of instruments, switches, circuit breakers, fuses and wiring. Check fire warning light.	X	X				X	7.2.2	
9. Check cockpit ventilation flexible hoses.	X		X			X	7.2.2	
10. Check rudder pedals and cables, check pedal adjustment.	X	X				X	7.3.1	
11. Check condition, attachment and adjustment mechanism of seats.		X				X	7.2.2	

Type and Subject of Inspection	Break-in	Aircraft 100 hr	Engine 100 hr	Engine 200 hr	Engine 600 hr	Annual	Refer to Section	Sign-off
12. Check nose-cone operation (do not grease!).	x	x				x	7.4.13	
13. Check condition, function and smooth operation of propeller positioning.	x	x				x	7.4.13	
14. Check condition and smooth operation of propeller brake assy. Check propeller brake band lining (minimum 1.5 mm/0.06 in).	x	x				x	7.4.13	

5.4.5 CENTER FUSELAGE (EXCEPT FOR FAIRINGS)

Type and Subject of Inspection	Break-in	Aircraft 100 hr	Engine 100 hr	Engine 200 hr	Engine 600 hr	Annual	Refer to Section	Sign-off
1. Check condition of center fuselage steel frame.			x			x	7.1.2.4	
2. Check condition of framework /tail boom connection.			x			x	7.1.2.4	
3. Check condition of upper and lower connection framework/ front fuselage.			x			x	7.1.2.4	
4. Check condition of control assy. in center fuselage.	x		x			x	7.3.1	
5. Check swagged terminals of all control rods in center fuselage.			x			x	7.3	
6. Check flap relief gas spring assy. for proper condition and tight fit.		x				x	7.3.1	

5.4.6 TAIL BOOM

Type and Subject of Inspection	Break-in	Aircraft 100 hr	Engine 100 hr	Engine 200 hr	Engine 600 hr	Annual	Refer to Section	Sign-off
1. Check elevator control lever in lower vertical fin.			X			X	7.3.3	
2. Check swaged terminals of all control rods in tail boom.			X			X	7.3	
3. Check rudder control cables in forward tail boom.	X		X			X	7.3.3	
4. Check trim system (actuator/springs).			X					

5.4.7 EMPENNAGE

Type and Subject of Inspection	Break-in	Aircraft 100 hr	Engine 100 hr	Engine 200 hr	Engine 600 hr	Annual	Refer to Section	Sign-off
1. Check rudder fittings.	X		X			X	7.1.3	
2. Check connection of COM antenna cable (bottom of rudder).			X			X	7.1.3	
3. Check adjustment and condition of rudder control.	X		X			X	7.3.3	
4. Check free movement of rudder, especially in case of tail wheel blockage.	X	X				X	7.3.1	
5. Check front fitting of horizontal stabilizer for spring tension, backlash of bolt, fatigue cracks and corrosion.	X		X			X	7.3.1	
6. Check rear fitting of horizontal stabilizer for wear of pins, fatigue cracks, axial and radial backlash and corrosion.	X		X			X	7.3.1	
7. Check tight fit of screw connections of both horizontal stabilizer fittings.	X		X			X	7.3.1	
8. Check connection of elevator control rod to rear fitting of elevator.	X		X			X	7.3.1	

Type and Subject of Inspection	Break-in	Aircraft 100 hr	Engine 100 hr	Engine 200 hr	Engine 600 hr	Annual	Refer to Section	Sign-off
9. Check backlash in fittings of horizontal stabilizer when installed.	X		X			X	7.3.1	
10. Check holes of water tank in the right shell of vertical tail. Verify correct markings of quantity.			X			X	7.3.1	
11. Check gap sealings and zigzag tape on empennage.			X			X	7.3.1	

5.4.8 FUEL SYSTEM COMPONENTS IN THE FUSELAGE

Type and Subject of Inspection	Break-in	Aircraft 100 hr	Engine 100 hr	Engine 200 hr	Engine 600 hr	Annual	Refer to Section	Sign-off
1. Check quick-release coupling in fuel supply line.	X	X				X	7.4.6	
2. Check condition of supply, return and drain lines outside the engine compartment, supply and return lines inside the engine compartment.	X	X				X	7.4.6	
3. Check condition, attachment and function of electrical fuel pumps.	X		X			X	7.4.6.2	
4. Replace the main fuel pump – every 1000 hours.						X	7.4.6.2	
5. Check fuel valve, fuel check valves and quick drains. Check fire-wall penetration assy. of supply and return lines for tight connection and leakage.	X		X			X	7.4.6.2	
6. Check drain lines of carburetor drip trays and airbox.	X		X			X	7.4.6.2	
7. Check fire protective sleeves on fuel supply and return lines in engine compartment.	X		X			X	7.4.8.2	

5.4.9 ENGINE AND ENGINE MOUNTINGS

(1) - use of leaded fuel more than 30% of operation

Type and Subject of Inspection	Break-in	Aircraft 100 hr	Engine 100 hr	Engine 200 hr	Engine 600 hr	Annual	Refer to Section	Sign-off
1. Engine cleaning.	X		X			X	7.4.1.3	
2. Visual inspection of engine and auxiliaries.	X		X			X	7.4.1.4	
3. Engine check for leakage.	X		X			X	7.4.1.5	
4. Check of engine auxiliaries.	X		X			X	7.4.1.6	
5. Check of waste-gate.	X		X			X	7.4.1.7	
6. Lubricate the waste-gate axle (waste-gate flap).	X		X			X	7.4.1.7	
7. Check of engine gearbox.	X		X			X	7.4.1.8	
8. Check magnetic plug for metal particles or foreign matter.	X		X			X	7.4.1.9	
9. Check of reduction gear wheels.					X	X	7.4.1.10	
10. Removal/Assembly of the two carburetors and carburetor inspection.	X			X		X	7.4.1.11	
11. Inspect the carburetor sockets for damages and abnormalities, checking for cracks, wear and good condition. Take note of changes caused by temperature influence.				X		X	7.4.1.11	
12. Check float weight.	X			X		X	7.4.1.11	
13. Check carburetor synchronization – mechanical or pneumatic synchronization.	X		X					
14. Check condition of fuel lines, pressure connection lines and compensating tube assy. at carburetors and air box.	X		X			X	7.4.6.2	
15. Check engine wiring and cables.	X		X			X	7.4.1.12	
16. Visual inspection of the temperature sensor and the oil pressure sensor, inspect for tight fit and good condition.	X		X				7.4.1.12	
17. Check of V-belt tension of additional auxiliary generator.	X		X			X	7.4.1.13	

Type and Subject of Inspection	Break-in	Aircraft 100 hr	Engine 100 hr	Engine 200 hr	Engine 600 hr	Annual	Refer to Section	Sign-off															
18. Replace spark plugs.			(1)	X		X	7.4.1.14																
19. Check spark plugs, Radiator can be removed (cam locks) if required.			X			X	7.4.1.14																
20. Check of spark plug connectors for tight fit.				X			7.4.1.15																
21. Check of compression pressure by differential pressure method. Test pressure:hPa (psi)				X		X	7.4.1.16																
<table><tr><td colspan="5">Pressure drop (% or fraction)</td></tr><tr><td>Cyl #</td><td>1</td><td>2</td><td>3</td><td>4</td></tr><tr><td>bar/psi</td><td></td><td></td><td></td><td></td></tr></table>									Pressure drop (% or fraction)					Cyl #	1	2	3	4	bar/psi				
Pressure drop (% or fraction)																							
Cyl #	1	2	3	4																			
bar/psi																							
22. Check mountings of turbo-charger / muffler.	X		X			X	7.4.5.1																
23. Check condition of exhaust headers for crack formation and uncharacteristic gunpowder burns (leaks); (incl. attachment and springs).	X		X			X	7.4.5.2																
24. Check heat insulation (exhaust headers, muffler, heat protection shields), renew if required.	X		X			X	7.4.5.3																
25. Check mounting points of engine housing.	X		X			X	7.4.1.18																
26. Check upper and lower engine mountings.	X		X			X	7.4.1.18																

5.4.10 LUBRICATION SYSTEM

(2) - every 50 hours - use of leaded fuel more than 30% of operation

Type and Subject of Inspection	Break-in	Aircraft 100 hr	Engine 100 hr	Engine 200 hr	Engine 600 hr	Annual	Refer to Section	Sign-off
1. Check condition of oil radiator and oil tank assemblies.	X		X			X	7.4.2.1	
2. Check oil lines (engine and turbocharger) and oil drain line.	X		X			X	7.4.2.1	
3. Check condition and routing of fire protective sleeves.	X		X			X	7.4.8.2	
4. Change oil. Unbolt oil cooler and rotate upward before draining old oil. Check drains plugs of oil tank and crankcase for metal particles or foreign matter.	X		X (2)				7.4.2.3	
5. Check and clean oil tank. Refill oil tank with approx 3 ltr oil.	X		X (2)				7.4.2.3	
6. Remove old oil filter from the engine. Install a new oil filter.	X		X (2)			X	7.4.2.4	
7. Cut old oil filter without producing any metal chips and inspect the following components for wear and/or missing materials: Filter mat Findings: Filter Cover: Findings: Sealing lip (wear, cracks missing materials): Findings: Spring of bypass valve (small): Findings: Positioning spring (large): Findings:	X		X (2)				7.4.2.4	

5.4.11 COOLING SYSTEM (LIQUID COOLING, RAM AIR COOLING)

Type and Subject of Inspection	Break-in	Aircraft 100 hr	Engine 100 hr	Engine 200 hr	Engine 600 hr	Annual	Refer to Section	Sign-off
1. Check condition of the cooling system assemblies: expansion reservoir, refill container, overflow container and radiator.	X		X			X	7.4.3	
2. Carry out visual of leakage bore at the base of the water pump for signs of leakage.	X		X			X	7.4.3	
3. Check condition of coolant hoses and pipes.	X		X			X	7.4.3	
4. Flushing the cooling system – When replacing the coolant.							7.4.3	
5. Check ram air cooling assy. (plenum) of cylinder barrels.	X		X			X	7.4.3	

5.4.12 AIR INDUCTION SYSTEM

Type and Subject of Inspection	Break-in	Aircraft 100 hr	Engine 100 hr	Engine 200 hr	Engine 600 hr	Annual	Refer to Section	Sign-off
1. Check of intercooler assy.	X		X			X	7.4.4	
2. Check condition of air filter assy.: Clean or change air filter.	X		X			X	7.4.4	
3. Change of air filter				X			7.4.4	

5.4.13 ENGINE CONTROLS & MONITORING

Type and Subject of Inspection	Break-in	Aircraft 100 hr	Engine 100 hr	Engine 200 hr	Engine 600 hr	Annual	Refer to Section	Sign-off
1. Throttle and choke: Check end stops of carburetor, springs and condition of bowden cables.	X		X			X	7.4.7	

Type and Subject of Inspection	Break-in	Aircraft 100 hr	Engine 100 hr	Engine 200 hr	Engine 600 hr	Annual	Refer to Section	Sign-off
2. Check condition of TCU and waste-gate-servo assy.	X		X			X	7.4.7	
3. Check sensors for oil pressure, oil temperature, cylinder coolant temperature, exhaust gas temperature (if installed), fuel pressure and fire warning.	X		X			X	7.4.7	
4. Check ignition lock shorting cables (aft firewall, lower LH side)			X			X	7.4.7	
5. Check function of ignition retarder module.			X			X	7.4.7	
6. Check function of engine instrumentation.	X	X				X	7.4.7	

5.4.14 CENTER FUSELAGE FAIRING, ENGINE COWLINGS AND FIREWALL

Type and Subject of Inspection	Break-in	Aircraft 100 hr	Engine 100 hr	Engine 200 hr	Engine 600 hr	Annual	Refer to Section	Sign-off
1. Check condition of upper center fuselage fairing, including oil service access.	X	X				X	7.4.9	
2. Check condition of LH and RH Cowling.	X	X				X	7.4.9	
3. Check condition of cowling fire protective paint. Repair if required.	X	X				X	7.4.8.1	
4. Check condition and function of inlet and outlet cowl flaps.	X	X				X	7.4.9	
5. Check fairing section aft of outlet cowl flap.	X		X			X	7.4.9	
6. Check openings of inlet cowl flap (fully opened and fully reduced aperture). Check if flaps close properly when nose-cone is closed.	X		X			X	7.4.9	
7. Check condition of firewall sheets.	X		X			X	7.4.8.3	

5.4.15 PROPELLER

Type and Subject of Inspection	Break-in	Aircraft 100 hr	Engine 100 hr	Engine 200 hr	Engine 600 hr	Annual	Refer to Section	Sign-off
1. Visual inspection of load bearing elements.	X	X				X	7.4.10	
2. Check complete propeller assembly.	X	X				X	7.4.10	
3. Check rubber stops within the blades and on the hub for cracks.	X	X				X	7.4.10.3	
4. Visual inspection of propeller blades. Repair leading edge protection tape if necessary (use material supplied by manufacturer only!).	X	X				X	7.4.10.3	
5. Check propeller folding mechanism for ease of operation and restoring force. Check condition of the blade retraction coupling lever.	X	X				X	7.4.10.3	
6. Check spring tension of propeller folding mechanism.	X		X			X	7.4.10.6	
7. Check propeller blade ventilation and drain holes.	X		X			X	7.4.10.3	
8. Check adjustment of propeller blade T/O and cruise pitch. Check respective setting of both blades and check for discrepancies.	X		X			X	7.4.10.7	
9. Check function of pitch change and time for pitch change in each direction.	X		X			X	7.4.10.7	
10. Check propeller blade T/O-position indication and pre-setting before reaching T/O position.	X		X			X	7.4.10.9	
11. Check carbon brushes, replace if necessary. Check for excessive abrasion (copper dust), clean slip rings with alcohol.	X		X			X	7.4.10.8	

5.4.16 DRIVE SHAFT WITH PROPELLER REDUCTION GEAR

Type and Subject of Inspection	Break-in	Aircraft 100 hr	Engine 100 hr	Engine 200 hr	Engine 600 hr	Annual	Refer to Section	Sign-off
1. Check noise and backlash of propeller reduction gear (turn propeller by hand).	X	X				X	7.4.12	
2. Check condition of propeller reduction gear suspension and attachment on front fuselage frame in shock mounts.	X		X			X	7.4.12	
3. Check fastening and condition of lower propeller reduction gear fairing.	X	X				X	7.4.12	
4. Check function of freewheel clutch.	X		X			X	7.4.11	
5. Check attachment of free-wheel clutch on engine flange.	X		X			X	7.4.11	
6. Check condition and tight fit of cardanic rubber disc joint on freewheel clutch.	X		X			X	7.4.11	
7. Check condition and tight fit of cardanic rubber disc joint on propeller reduction gear.	X		X			X	7.4.11	
8. Check condition of composite shaft.	X		X			X	7.4.11	
9. Check propeller reduction gear visually for condition and leakage (for inspection Break- In and aircraft 100h with the gear installed).	X	X				X	7.4.12	
10. Check oil quantity in propeller reduction gear.	X	X				X	7.4.12	
11. Check magnetic screw of propeller reduction gear.			X			X	7.4.12	
12. Change oil of propeller reduction gear.				X			7.4.12	

5.4.17 MAIN LANDING GEAR

Type and Subject of Inspection	Break-in	Aircraft 100 hr	Engine 100 hr	Engine 200 hr	Engine 600 hr	Annual	Refer to Section	Sign-off
1. Inspect the main landing gear legs and trailing arms for deformation and possible cracks as an result of overloads.	X	X				X	7.5.1	
2. Check the linear actuators for external damage.	X	X				X	7.5.1	
3. Check main landing gear tires for condition and creep markings. Check tire pressure: (2.6 ± 0.1 bar/37.7±1.5 p.s.i).	X	X				X	7.5.1	
4. Check function of trailing link spring suspension.	X	X				X	7.5.1	
5. Check ease of operation and backlash of wheel bearings.	X		X			X	7.5.1	
6. Check brake master cylinder and wheel cylinders, hoses and tubes.	X	X				X	7.5.1	
7. Check brake discs and brake linings (at least 1.5 mm/0.06 in.)			X			X	7.5.1	
8. Check quantity of brake fluid.	X		X			X	7.5.1	
9. Renew brake fluid (DOT 4) if indicated.				X		(X)	7.5.1	
10. Check brake effectiveness, adjust brake if required.	X	X				X	7.5.1	
11. Check condition of gear doors. Clean and grease hinges of gear doors.			X			X	7.5.1	
12. Check free movement of doors and actuating mechanism, including Bowden cable assy. of LH landing gear door.	X	X				X	7.5.1	
13. Check function of landing gear (support the aircraft on trestles). Check stop switches, fit of gear doors, Bowden cables for emergency release and the release mechanism on over-center strut.	X		X			X	7.5.1	

Type and Subject of Inspection	Break-in	Aircraft 100 hr	Engine 100 hr	Engine 200 hr	Engine 600 hr	Annual	Refer to Section	Sign-off
14. Check landing gear position indication and warning (visual and acoustic, during function test).	X		X			X	7.5.1	
15. Check function of emergency gear extension.			X			X	7.5.1	

5.4.18 TAIL WHEEL

Type and Subject of Inspection	Break-in	Aircraft 100h	Engine 100h	Engine 200h	Engine 600h	Annual	Refer to Section	Sign-off
1. Tail wheel: Check ease of operation, clearance to fairing, backlash.	X	X				X	7.5.2	
2. Check tire condition, pressure 2.8 ± 0.2 bar / 40.6 ± 2.9 p.s.i	X	X				X	7.5.2	
3. Check wheel fork for cracks and deformation.		X				X	7.5.2	
4. Check bearing of tail wheel fork.		X				X	7.5.2	
5. Check spring coupling assy. between tail wheel and rudder.	X	X				X	7.5.2	

5.4.19 FLIGHT INSTRUMENTATION AND PITOT/STATIC SYSTEMS

Type and Subject of Inspection	Break-in	Aircraft 100 hr	Engine 100 hr	Engine 200 hr	Engine 600 hr	Annual	Refer to Section	Sign-off
1. Check condition of Pitot/Static system and renew filters/ water separators if required.	X		X			X	7.6.2	
2. Check condition and function - service life limits if applicable- of flight instrumentation (refer to equipment list).			X			X	7.6	

5.4.20 ELECTRIC SYSTEM (EXCEPT FOR ENGINE AND TCU)

Type and Subject of Inspection	Break-in	Aircraft 100 hr	Engine 100 hr	Engine 200 hr	Engine 600 hr	Annual	Refer to Section	Sign-off
1. Check wiring of electric system.	x	x				x	7.7.1	
2. Check condition of all installed electric devices.	x		x			x	7.7.1	
3. Check condition and function of switches.		x				x	7.7.1	
4. Check both batteries. Observe maintenance instructions of manufacturer (Refer to Annex A).			x			x	7.7.2	
5. Check condition of grounding.			x			x	7.7.3	
6. Visually check electric distribution box (E-box).	x		x			x	7.7.4	

5.4.21 COM AND NAV EQUIPMENT

Type and Subject of Inspection	Break-in	Aircraft 100 hr	Engine 100 hr	Engine 200 hr	Engine 600 hr	Annual	Refer to Section	Sign-off
1. Check NAV and COM equipment for proper installation and safe mounting and compare to equipment list.						x	7.8	
2. Check function and, if applicable, service life limits of NAV and COM equipment (Refer to records of operating times, Annex C).						x	7.8	
3. Check each installed antenna.						x	7.8	

5.4.22 COMPLETION TASKS

Type and Subject of Inspection	Break-in	Aircraft 100 hr	Engine 100 hr	Engine 200 hr	Engine 600 hr	Annual	Refer to Section	Sign-off
1. After end of maintenance work on the drive system - Engine test run.	X	X	X			X	7.1.4.17	
2. Check IDLE speed.	X		X			X		
3. Check of oil quantity.	X	X	X			X	7.4.2.2	
4. Check for accomplishment of all applicable Service Bulletins.						X		

5.4.23 OPTIONAL EQUIPMENT

WING FOLDING DEVICE

The wing folding device itself is maintenance-free. The sliding surfaces should not be lubricated in order to avoid sticking of dirt, which could result in the formation of marks on the swivel arm and thus to wear. From time to time, the swivel arm should be cleaned by means of a soft cloth.

Type and Subject of Inspection	Break-in	Aircraft 100 hr	Engine 100 hr	Engine 200 hr	Engine 600 hr	Annual	Refer to Section	Sign-off
1. Check all screwed joints on the wing roots on the cardan flange for tightness.			X					
2. Completely remove the folding device; for this purpose separate in the cardan joint. Unscrew the cardan flange from the outboard wing and the slide bearing from the inner wing. First pull out the outboard wings then the swivel arms completely.						X		
3. Check the riveted joints on the swivel arms for perfect condition.						X		
4. Check the slide bearing for initial tearing or rupture, especially in the area between the lock-slit and the external end.						X		
5. Check the wing ribs in the area of the attachment bolts for initial tearing (crazing)						X		
6. Check the adhesive joint between the spar pocket and the lower shell of the inner wing for initial tearing.						X		

OXYGEN EQUIPMENT

Type and Subject of Inspection	Break-in	Aircraft 100 hr	Engine 100 hr	Engine 200 hr	Engine 600 hr	Annual	Refer to Section	Sign-off
1. Check oxygen equipment if installed. Observe maintenance instructions of manufacturer (Refer to Annex A).		X				X	7.9	

5.5 SPECIAL INSPECTIONS

5.5.1 INSPECTION FOLLOWING A HEAVY LANDING OR A WING TIP LANDING

Following a heavy landing or a wing tip landing, the aircraft must be inspected extensively. The inspection may be carried out by a skilled person, but, in case of obvious structural damage, by an authorized inspector with the appropriate rating. The inspection program must be requested from the manufacturer.

5.5.2 INSPECTION FOLLOWING AN IMPACT TO THE ROTATING PROPELLER

In the event of minor damage to the propeller blades (e.g. shortening of a propeller blade by less than 0.03 m/1.18 in – areas painted gray on both sides at the tips of the propeller blades are still visible –) the following procedure should be adopted:

1. Qualified staff must establish whether the propeller blades can be repaired or not. This is not generally the case and the propeller blades have to be replaced.
2. The minimum requirement is that a 100 Engine Operating Hours Inspection is carried out on the drive system in accordance with section »5.4.16« (as far as applicable).
3. After the propeller blades have been repaired or replaced, the drive system must be dynamically balanced, as laid down in A17-10AP-V/2-E »Dynamic Propeller Balancing STEMME S10« (see Aircraft Maintenance Manual Annex A).

In the event of major damage to the propeller blades (e.g. shortening of a propeller blade by more than 0.03 m/1.18 in – areas painted gray on both sides at the tips of the propeller blades are no longer visible –) the following procedure should be adopted:

1. The propeller blades must be replaced.
2. The propeller must be inspected by the manufacturer or an authorized workshop.
3. The drive system must be inspected by the manufacturer or an authorized workshop.
4. After an inspection has been carried out and the propeller blades have been replaced, the drive system must be dynamically balanced, as laid down in A17-10AP-V/2-E "Dynamic Propeller Balancing STEMME S10" (Aircraft Maintenance Manual Annex A).

In contrast to other aircraft, a shock-loading inspection of the engine in either event is not required because of an integrated over-load protection in the engine and the freewheel clutch as an additional safety device. Moreover the extension drive shaft system in between propeller and engine prevents the engine drive flange from bending loads in case of propeller contact with obstacles.

5.5.3 INSPECTION FOLLOWING EXCEPTIONAL EVENTS WITH WING FOLDING DEVICE

Collision of the spar stub of the outboard wing with an obstacle during taxiing or maneuvering in the hangar with the outboard wings folded:

- Inspection of the wing ribs for crazing in the area of the screw-on surfaces for the folding device as well as inspection of the spar stubs and spar stub bolts for visual damage prior to the next flight.
- Check the complete wing folding device for damage before using in the next time.

Shock loading of the folded wings by taxiing too fast over bump:

- Inspection of the wing ribs for crazing in the area of the screw-on surfaces for the folding device prior to the next flight.
- Check the riveted joint on the swivel arms between the tube and the fittings before using the folding device the next time.

If the outboard wing had been dropped while having been pulled out by more than 0.1 m/3.94 in but not completely, high loads may have occurred on the inner wing between the spar pocket and the shell, which in extreme cases might have resulted in initial tearing of the adhesive joint.

- After the occurrence of such a load, the inner wing in the area of the joint between the spar pocket and the lower shell has to be checked carefully for initial tearing prior the next flight.

6. MAINTENANCE INSTRUCTIONS, TOLERANCES, ADJUSTMENT DATA FOR THE AIRCRAFT

6.1 GENERAL REMARKS

This section includes maintenance instructions, tolerances and adjustment data relevant to or summarized for the entire motorglider. The instructions in section »7« for assemblies refer to this section, if affected.

Forms related to inspections described in this section (weight and balance, controls adjustment, control surface weights and hinge moments, propeller adjustment) are provided in Annex D of this S12 Maintenance Manual and include further information about performing the inspections.

6.2 TOWING ON GROUND, JACK POINTS AND LIFTING

The S12 may only be towed in flight direction, since the tail wheel deflection is limited to 30° in both directions.

For ground towing two ropes of textile material of at least 10 m / 32.80 ft each are needed. They should be attached to the front struts of the main landing gear as low as possible (pay attention to the hydraulic brake pipes). An instructed person should be seated in the cockpit. The towing speed should be no faster than a walk.

For maneuvering on the ground, the manufacturer offers a tail wheel dolly. The aircraft may be pushed backwards on level surface over a short distance without a tail wheel dolly, if the rudder is controlled by hand.

Supporting points for lifting the aircraft are on the wing bottom surface in the spar area, about 1 m / 3.28 ft from the fuselage (position of the wing spar can be determined by light tapping). The tail section is lifted approximately 0.5 m / 19.68 in supporting the tail wheel.

The wing supports for lifting must have an area of at least 0.2 m x 0.3 m / 9 in x 12 in (the longer side in direction of wing span). A plywood sheet of 0.05 mm / 1.97 in thickness with a felt layer of 0.15 m to 0.2 m / 0.6 to 0.9 in thickness or a comparative device must be used. The support under the plywood sheet center must be flexible so that it adapts to the wing contour and the wing is evenly supported by the plywood plate.

The support must be capable of safely carrying the aircraft weight and be sufficiently stable. The supporting surface may not be slippery.

WARNING

To avoid deformation and/or fatal damage of the wing shell and spar, ensure that the wings are lifted simultaneously and that the supports are correctly positioned.

During lifting and lowering of the aircraft, the wing chord should remain almost horizontal.

The fuselage with wing removed should be supported

- either in a felt-covered, adapted rigid tray, width 1 m / 3.28 ft and length 0.4 m / 15.75 in directly in front of the landing gear doors, or
- by removing the front wing attachment bolts and by replacing the bolts by round steel bars of St 37 or similar, $\varnothing 19.8 \pm 0.1$ mm / $0.78 \pm .004$ in, 0.30 m / 11.81 in length. The steel bars must be inserted by 0.15 m / 5.91 in and must be secured against displacement. The fuselage can be suspended or supported at these bolts.

For rigging and derigging refer to the S12 Aircraft Flight Manual, chapter »4«.

For transport refer to the S12 Aircraft Flight Manual, chapter »8«.

6.3 DETERMINATION OF EMPTY WEIGHT AND CORRESPONDING CENTER OF GRAVITY; WEIGHT LIMITS

This section provides procedures to determine aircraft empty weight, component weights and CG at empty weight and the certified weight and CG limits. To perform the inspection, the STEMME form »Weight and Balance Report« (form according to Annex D) should be used.

The list of equipment on which weighing was based must be entered in the weight and balance report and must correspond to the list in the inspection report. Any inspection documentation can be found in Annex C of this S12 Aircraft Maintenance Manual.

⚠ CAUTION

Amended data of empty weight and CG position must be entered in the Report of »Empty Weight and CG-Location« in section »6.3« of the S12 Aircraft Flight Manual and confirmed by authorized personnel before operating the motorglider.

In addition, the placard on center console in the cockpit must be corrected accordingly.

DEFINITIONS

The reference plane (RP) is located at the leading edge of the inner wing at the wing root. It is aligned vertically to the longitudinal-axis. This plane creates a reference line on the ground.

Longitudinal inclination: Place a wedge 1000:54 ($3.1^\circ = 3^\circ 06'$) on the rear fuselage-section. Align the top of the wedge horizontally. Keep in mind that the lateral axis must be almost horizontal (figure »6.3.a«).

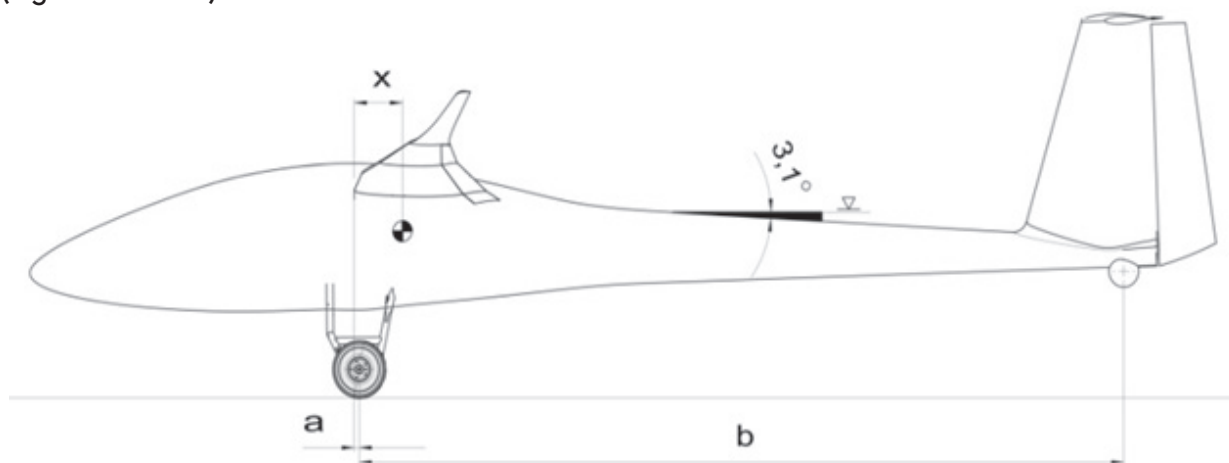


Figure 6.3.a
Definition of Reference Datum

Following items and fluids must be included when determining empty weight and CG:

Aircraft Logbook, S12 Aircraft Flight Manual, seat cushions and backrests with cushions or equivalent upholstery, standard tool-kit (baggage compartment behind backrest), 3.0 l/0.8 US gal./0.66 Imp.gal. of engine oil, coolant level at max marking and unusable fuel in wing tanks and feeder tank. For positions and other limiting conditions refer to the »Weight and Balance Report« (see Annex D).

Following an aircraft repair, painting or modification of equipment it always must be verified that component weights, empty weight and CG at empty weight are still within certified limits. If weight and arm of removed or installed equipment is known exactly, change of empty weight and CG can be calculated. For calculation of empty weight CG, the arm of removed or installed equipment or components is to be entered into the »Weight and Balance Report« (see Annex D).

FORMULA

$$x_{\text{neu}} = \frac{m_{\text{alt}} \cdot x_{\text{alt}} + m_{\text{zus1}} \cdot x_{\text{zus1}} + m_{\text{zus2}} \cdot x_{\text{zus2}} + \dots}{m_{\text{neu}}}$$

ABBREVIATIONS MEAN

- m_{alt} : Empty weight according to last weighing report
- x_{alt} : CG at empty weight according to last weighing report
- m_{zus} : Weight of added component
- x_{zus} : Arms of added components with reference plane (RP)
- m_{neu} : Resulting new total empty weight
- x_{neu} : Resulting new total empty CG

Minimum load due to the modification can be taken from figure 6.3.b. and 6.3.c for two different loading conditions.

⚠ CAUTION

Basically the arms of weights in front of the reference plane (RP) must be counted negative, those aft of the RP positive for any calculations.

If the effect of a modification or repair cannot be calculated (e. g. when having painted or following a repair of the composite structure) the aircraft must be weighed again.

To keep empty weight CG for unchanged minimum load within certified limits, it may be necessary to install ballast at the front gear frame or at the aft part of the tail wheel bay (rear web of fin). The required weight of the ballast can be calculated:

$$m_{\text{Ballast}} = m_{\text{alt}} \frac{x_{\text{neu}} - x_{\text{alt}}}{x_{\text{Ballast}} - x_{\text{neu}}}$$

Where m_{alt} and x_{alt} are empty weight and CG prior to the modification, x_{neu} the target for CG at empty weight and x_{Ballast} the arm of the ballast weight (in front or aft of RP). It must be observed, that the maximum weight which can be installed at the rear web of the vertical fin is structurally limited to 2.7 kg/5.95 lb.

This procedure may be used also to position the CG for good soaring performance with high cockpit payload. Following this a higher minimum cockpit load must be taken into account.

If a revision proved the aircraft to be "tail-heavy", the minimum load $m_{P, \min}$ for an unchanged empty weight m_{leer} and CG position x_{leer} can alternatively be determined by following formula:

$$m_{P, \min} = m_{\text{leer}} \frac{x_{\text{leer}} - x_{\text{Flug, h}}}{x_{\text{Flug, h}} - x_{P, h}}$$

With:	Aftmost aft in-flight CG:	$x_{\text{flug, h}} = 420 \text{ mm} / 16.54 \text{ in}$	(aft of RP)
	Aftmost aft seating (CG) position of pilot:	$x_{P, h} = - 650 \text{ mm} / 25.54 \text{ in}$	(in front of RP)

The certified limits of the empty weight CG as a function of minimum load can be derived from the following figure »6.3.b« and »6.3.c«. Two different minimum seat loads depending on the loading conditions have to be determined and noted on the »Weight of Balance Report« (Annex D), the weighing logsheet in the S12 Aircraft Flight Manual section »6.3« and the placards on the center console:

- Full trim water ballast and luggage compartment - takes into account that the tail water ballast tank and the luggage compartment in the tail-boom are fully loaded corresponding to their limitations. This "worst case" could lead values higher than the maximum load and should draw the pilot's attention to perform an operating weight and CG calculation before flight.
- Empty trim water ballast and luggage compartment - expect no loading in the water ballast tank and the luggage compartment in the tail-boom. This value could be used by the pilot if this loading case is ensure before flight.

If maximum or minimum loads for the different compartments and seats are observed and the empty weight CG is within limits, the in-flight aircraft CG is always within certified limits. This means, that the load in the seats must equal or be higher than the minimum load, whereas total cockpit load (pilot + co-pilot + parachutes + baggage) must be below the specified maximum load.

The difference of total cockpit load and the maximum load must at least allow for a fuel load required for a 30 minutes flight at maximum continuous power (13.6 l / 3.6 US gal. / 3 Imp.gal., 10 kg / 22.05 lb).

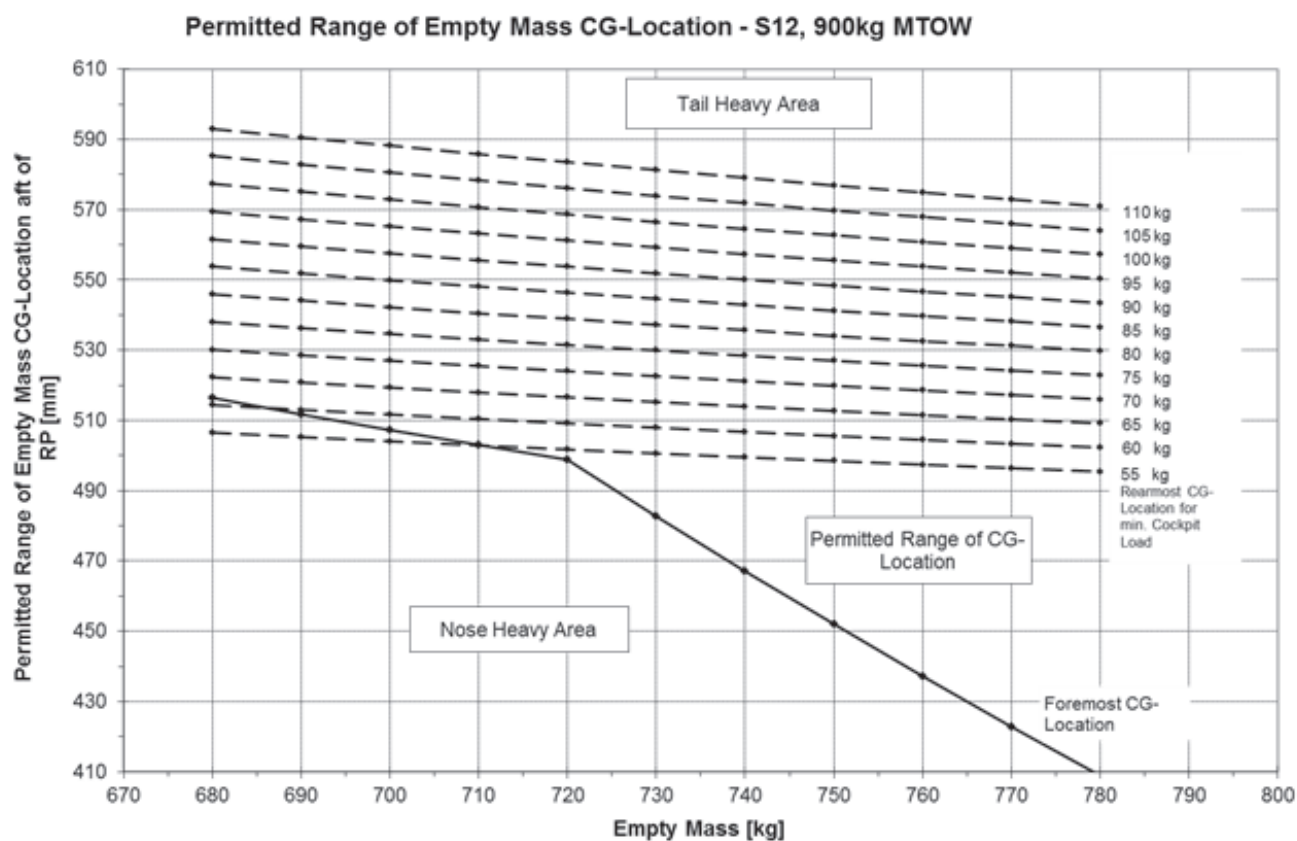


Figure 6.3.b
Range of Empty Weight CG as a function of Empty Weight and Minimum Load
for worst tail-boom (full water ballast and luggage compartment)

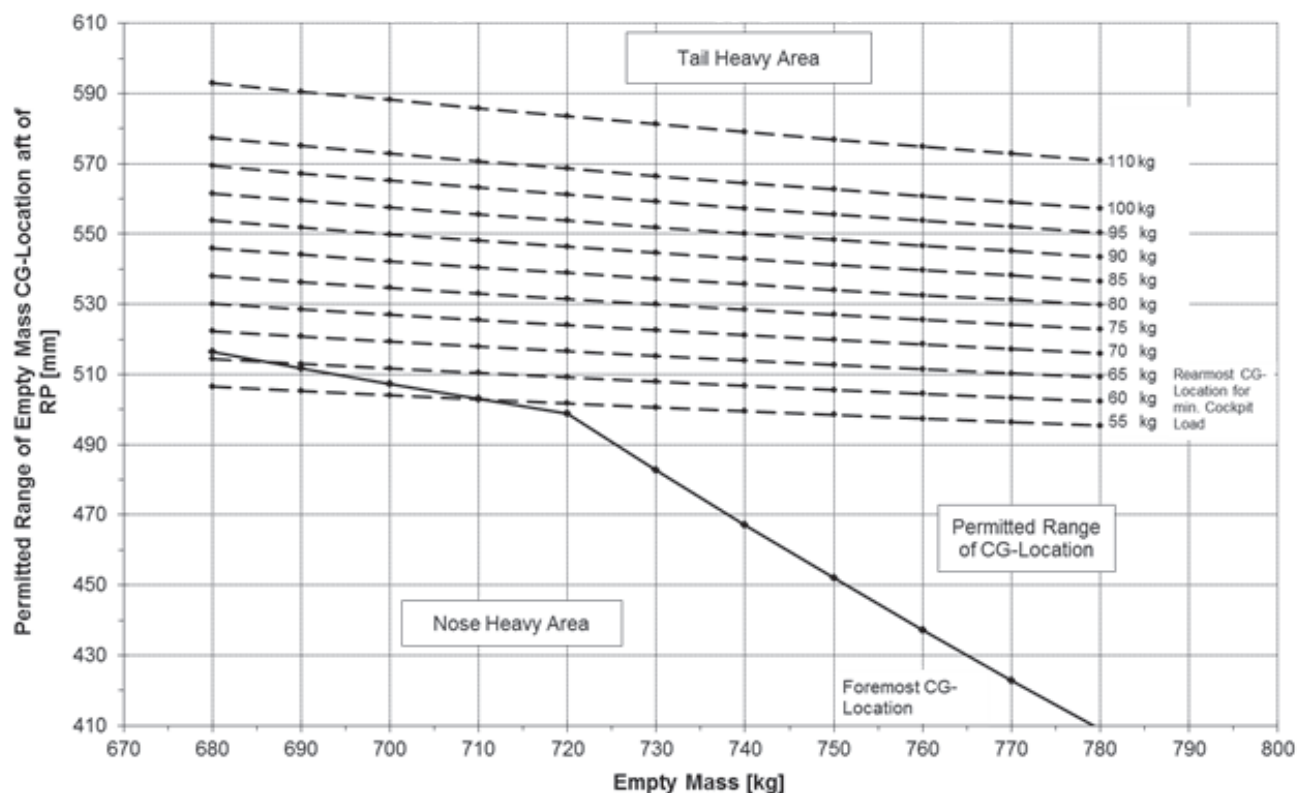


Figure 6.3.c

Range of Empty Weight CG as a function of Empty Weight and Minimum Load for no tail-boom loading (empty water ballast and luggage compartment)

THE FOLLOWING WEIGHT LIMITS MAY NOT BE EXCEEDED UNDER NO CIRCUMSTANCES:

- Max. T/O weight 900 kg/1984.16 lb,
- Max. weight of non-supporting parts (GNT) 610 kg/1344.82 lb,
- Max. total load, which is cockpit-load plus fuel: 900 kg minus empty weight according to valid »Weight and Balance Summary«,
- Max. cockpit-load, which is the sum of both cockpit occupants (incl. parachutes) plus weight of baggage in baggage compartments: 202 kg / 445.33 lb, but not more than the weight limit stated in the »Weight and Balance Report«,
- Max. 180 kg/396.83 lb total for both occupants including parachutes,
- Max. weight per seat (pilot or copilot, incl. parachute) 110 kg/242.51 lb,
- Max. baggage load in cockpit baggage compartments 22 kg / 48.5 lb, but maximum is also the difference between max cockpit load and max weight of both occupants (180 kg/396.83 lb).
- Max. baggage load in tail-boom baggage compartments 20 kg / 44.09 lb, but maximum is also the difference between max cockpit load and max weight of both occupants (180 kg/396.83 lb).

When loads are below minimum loads as stated in the flight manual (section »6.2«), the difference between minimum load and actual load must be compensated by ballast.

6.4 FLIGHT CONTROL SYSTEM

6.4.1 DEFLECTION OF CONTROL SURFACES, CONTROL SYSTEM FRICTION, AND CONTROL FORCES

After any adjustment or assembly work on the control system, control deflections, friction and forces in the control system must be measured.

For measurement procedures see form »Rigging Report» (Annex D). Rated values.

6.4.1.1 CONTROL SURFACE DEFLECTIONS

ELEVATOR

Measuring point is trailing edge of inner rib of elevator (140 mm/5.51 in from hinge line).

Full Deflection

$$\begin{array}{cc} -44^{+2}_{-5} \text{ mm} & +44^{+5}_{-2} \text{ mm} \\ (-1.73^{+0.08}_{-0.2} \text{ in}) & (+1.73^{+0.2}_{-0.08} \text{ in}) \end{array}$$

RUDDER

Measuring point is lower rear corner of control surface (420 mm/16.5 in. from hinge line).

Full Deflection

$$\begin{array}{cc} +220 \pm 15 \text{ mm} & -220 \pm 15 \text{ mm} \\ (+8.7 \pm 0.6 \text{ in}) & (-8.7 \pm 0.6 \text{ in}) \end{array}$$

WING FLAPS AND AILERONS

Flap Lever	Control Stick	Measurement points			
		1) Aileron: Inner rib of the control surface, 163 mm/6.42 in. from hinge line. 2) Wing flap: Inner rib of the control surface, 175 mm/6.89 in. from hinge line.			
		left aileron	left wing flap	right wing flap	right aileron
Position	Position	mm (in.)			
- 10°	neutral		-31 ± 4 (-1.22 ± 0.16)	-31 ± 4 (-1.22 ± 0.16)	
- 5°	neutral		-15 ± 4 (-0.6 ± 0.16)	-15 ± 4 (-0.6 ± 0.16)	
0	left	-48 ± 4 (-1.89 ± 0.16)			+27 ± 3 (+1.06 ± 0.12)
	neutral	0 ± 2 (0 ± 0.08)	0 ± 2 (0 ± 0.08)	0 ± 2 (0 ± 0.08)	0 ± 2 (0 ± 0.08)
	right	+27 ± 3 (1.06 ± 0.12)			-48 ± 4 (-1.89 ± 0.16)
+ 5°	neutral		+15 ± 4 (+0.6 ± 0.16)	+15 ± 4 (+0.6 ± 0.16)	
+ 10°	neutral		+31 ± 4 (+1.22 ± 0.16)	+31 ± 4 (+1.22 ± 0.16)	
L (+16°)	neutral		+51 ± 4 (+2 ± 0.16)	+51 ± 4 (+2 ± 0.16)	

Empty field: No measure to be checked.

6.4.1.2 FRICTION IN CONTROL SYSTEM

MEASURING POINT

At the operating lever/control stick, mid of the grip.

If installed temporarily disconnect autopilot actuators.

Elevator	$5 \pm 2 \text{ N (1.1} \pm 0.45 \text{ lbf)}$
Aileron	$15^{+5}_{-8} \text{ N (3.4}^{+1.1}_{-1.8} \text{ lbf)}$
Rudder (Tail wheel off the ground!)	$25^{+5}_{-8} \text{ N (5.6}^{+1.1}_{-1.8} \text{ lbf)}$

6.4.1.3 PILOT FORCES

Following rated forces apply for approx. 20°C, measured on ground. Measuring points for airbrake and wing flap forces are the respective handles, for down-spring/trim spring forces the uppermost finger notch of the control stick handle.

If installed temporarily disconnect autopilot actuators for elevator.

Air brake over-center lock and unlock	$150 + 50 \text{ N (34} + 11 \text{ lbf)}$
Wing Flap: Counter force in position L	$125 \pm 25 \text{ N (28} \pm 6 \text{ lbf)}$
Elevator: Down-Spring/Trim-Spring Force at uppermost finger notch of stick, stick full forward, trim setting fully "nose down".	$40 \pm 5 \text{ N (9} \pm 1.1 \text{ lbf)}$
Elevator: Down-Spring/Trim-Spring Force at uppermost finger notch of stick, stick full aft, trim setting fully "nose down".	$60 \pm 5 \text{ N (13.5} \pm 1.1 \text{ lbf)}$

6.4.2 WEIGHTS AND MOMENTS OF CONTROL SURFACES

After repair and re-painting of control surfaces, weights and rear hinge moments must be checked and confirmed to be within certified limits. If certified limits are exceeded, the manufacturer must be contacted.

The Form »Control Surfaces Weights and Hinge Moments« (Annex D) includes procedures to determine the weights and moments. Rated values are:

Control Surface	Weight of Control Surface	Hinge Moment of Control Surface	Force at trailing edge
	kg (lb)	Ncm (lbf ft)	N (lbf), Measuring point
Aileron (outer wing)	4.1 (9.04) to 5.0 (11.02)	66.7 (0.49) to 106.7 (0.78)	9.2 (2.07) to 12.2 (2.74) at inner operating rod. r = 14.3 cm (5.63 in)
Aileron (wing extension)	0.95 (2.1) bis 1.3 (2.86)	-1.9 (-0.01) bis 2.19 (0.02)	-0.19 (-0.04) to 0.219 (0.05) at inner end rib r = 10 cm (3.94 in)
Wing Flap	3.0 (6.61) bis 4.1 (9.03)	179 (1.32) bis 246 (1.81)	11.6 (2.61) to 15.8 (3.55) at operating rod r = 17.2 cm (6.77 in)
Elevator**	0.89 (1.96) bis 1.16 (2.55)	25.3 (0.19) bis 35.4 (0.26)	2.0 (0.45) to 2.7 (0.61) at inner end rib r = 14.0 cm (5.51 in)
Rudder	2.26 (4.98) bis 3.10 (6.83)	194 (1.43) bis 266 (1.96)	4.3 (0.967) to 5.3 (1.19) at bottom rear corner r = 42.5 cm (16.73 in)

** left and right measured separately

6.4.3 FREE PLAY IN FLIGHT CONTROL SYSTEM

For each control surface a maximum allowable slackness between cockpit control and control surface is defined. Each control free play is measured at the point used for measurement of the relevant control deflection (Refer to Form »Rigging Report«). For measuring, the controls are fixed in the cockpit (control stick and flap operation handle).

	Allowable free play
Aileron	2.5 mm / 0.1 in
Flaps	2.5 mm / 0.1 in
Elevator	2.5 mm / 0.1 in

The axial play of ailerons/flaps and elevator must be limited to a minimum without jamming, using suitable washers if necessary.

6.5 LUBRICATION

6.5.1 GENERAL REMARKS

LUBRICANTS

For friction bearings "steel-on-steel" and roller bearings lubricants and oils based on MoS₂ are recommended. For bearings containing brass, bronze or copper components, only MoS₂-free lubricants and oils shall be used.

ENGINE

For lubrication of the engine, the instructions in the »Maintenance Manual (Line Maintenance) for ROTAX Engine Type 914 Series«, section »12-20-00«, (Annex E) and the relevant Service Information (SB), Service Information (SI) and Service Letter (SL) must be observed.

BEARINGS OF CONTROL SYSTEM AND CONTROL SURFACES

The control system bearings in the fuselage and in the wings are provided with permanent greasing and do not require any service for a long period.

The control surface bearings (except rudder bearings) are coated and normally greasing is not required. However, greasing may be necessary in aggressive environmental conditions when bolts show first signs of corrosion. In this case use MoS₂-free grease.

The rudder hinges must be greased depending on the degree of exposure to contamination (especially the lower hinge).

CONNECTION OF THE PROPELLER EXTENSION SHAFT TO THE CLUTCH ON THE ENGINE SIDE (SPLINED JOINT)

Shafts with hard film coating.	Commercially available Teflon spray or non-acid grease can be used for lubrication if there is only minor damage to the hard film coating.
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CANOPY LOCKING

Always keep well-greased. Use MoS₂-free lubricant, since the rod bearing within the canopy frame is made of brass.

6.5.2 LUBRICATION PLAN

The lubrication points marked in the following figure should be checked and lubricated if required and during scheduled maintenance or rigging as indicated on the table below. Additional lubrication may be required for additional equipment, observe maintenance instructions in Annex A.

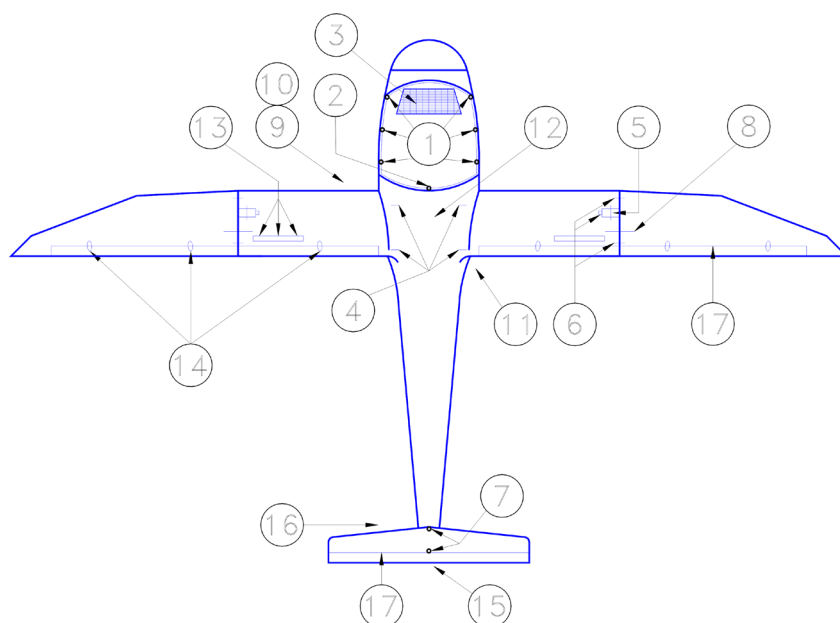


Figure 6.5.2.a
Lubrication Plan

Position.	Description	Lubricant, Occasion and Remarks (See also section 6.5.1)
(1)	Canopy locks	Grease (any scheduled maintenance)
(2)	Rear canopy lock ("Roeger Hook")	Oil (any scheduled maintenance)
(3)	T-Handles, locking clips (canopy emerg. handle, prop. brake, prop positioning)	Grease (any scheduled maintenance)
(4)	Center fuselage/wing fittings	Grease (any rigging and annually)
(5)	Connection bolt for: Inner/outer wing outer wing/wing extension wing extension/winglet	Grease (any rigging and annually)
(6)	Shear fittings for: Inner/outer wing outer wing/wing extension wing extension/winglet	Grease (any rigging and annually)

Position.	Description	Lubricant, Occasion and Remarks (See also section 6.5.1)
(7)	Forward and rear horizontal tail fitting.	Grease (any rigging and annually)
(8)	L'Hotellier connection aileron control rod.	Slightly grease only the ball (any rigging and annually), see also manufacturer instruction (Annex A)
(9)	Spring parts of landing gear doors.	Oil (any scheduled maintenance)
(10)	Landing gear: Elbow strut, wheel bearing, door hinges.	Grease (Inspection Type 2.c, door hinges annually)
(11)	Hinge bolts of lower cowl flap.	Grease, (Inspection annually)
(12)	Control rods in fuselage, swivel joints.	Grease, (every 2 years)
(13)	Eye bolts of air brakes.	Grease, (every 2 years)
(14)	Flap control links.	Grease, (every 2 years)
(15)	Rudder hinges, control cable connection.	Grease, (every 2 years)
(16)	Tail wheel, lower axial guide.	Grease, (every 2 years)
(17)	Flap and elevator hinges	Grease, only if corrosion has occurred

6.6 SURFACE OF COMPOSITE STRUCTURES

During any 100 hours airframe or higher inspection (100 or more engine hours or annually) the total surface of the motorglider shall be inspected for damage or cracks. Look carefully for signs of hidden structural damage during inspection. Bottom sides of fuselage, wings and elevator shall be checked for gravel strike damage.

- Check all labels and repair or renew if necessary.

Additional remarks about identification of structural damage, especially in force transfer areas etc. can be found in section »7.1« in relevant subsections for components.

According to the type approval data sheet the surface may only be colored white except for registration and areas for warning colors. Warning colors can be used from winglets to 0.30 m/11.81 in inboard, at the nose-cone and at the landing gear doors. For use of the white paint observe the statements in the repair guide P520-901.502 »Small Repairs of Composite Materials«.

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6.7 DRAINAGE AND VENTILATION HOLES

The following position plan shows positions of the drains and ventilation holes (except for propeller). Any drains and ventilation bores should be checked for blockage during any scheduled inspection.

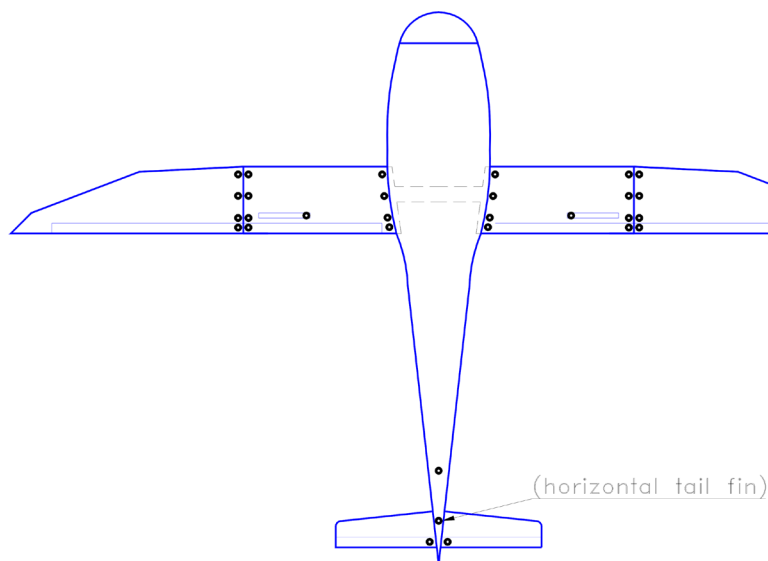


Figure: 6.7.a.
Positions of Drainage and Ventilation Holes

6.8 TIGHTENING TORQUES OF SCREWED JOINTS

The tightening torques listed below applies to hexagon nuts, hexagon bolts and hexagon socket screws of quality class 8.8 or higher:

Thread	Tightening Torque			
	Non-self-locking connection		Self-locking connection	
	[Nm]	[lbf ft]	[Nm]	[lbf ft]
M4	1.8 ^{+10%}	1.33 ^{+10%}	2.7 ^{-10%}	2.0 ^{-10%}
M5	3.6 ^{+10%}	2.65 ^{+10%}	5.2 ^{-10%}	3.8 ^{-10%}
M6	6.4 ^{+10%}	4.72 ^{+10%}	9.4 ^{-10%}	6.9 ^{-10%}
M8	16 ^{+10%}	11.8 ^{+10%}	22 ^{-10%}	16 ^{-10%}
M10	32 ^{+10%}	23.6 ^{+10%}	42 ^{-10%}	31 ^{-10%}
M12	57 ^{+10%}	42.0 ^{+10%}	72 ^{-10%}	53 ^{-10%}
M14	92 ^{+10%}	67.8 ^{+10%}	115 ^{-10%}	85 ^{-10%}

The above tightening torques are reduced by 25% if Loctite® or lubricated bolted joints are used.

⚠ CAUTION

Deviations from the standard tightening torque can be found also for some assemblies in chapter »7«.

NON-STANDARD TIGHTENING TORQUES INCLUDE THE FOLLOWING (FOR EXAMPLE)

Item	Designation	Loctite	Tightening Torque	
			[Nm]	[lbf ft]
1.	M8 connecting clutch and propeller flange of the engine.	without	22	16
2.	M10 connecting clutch and flexible disk (drive shaft).	243	35	25.8
3.	M10 connecting flexible disk and forked sleeve of the drive shaft.	243	35	25.8
4.	M10 connecting drive shaft and flexible disk (front gear).	243	35	25.8
5.	M10 connecting flexible disk and front gear.	221	35	25.8
6.	M8 connecting front gear in the gear suspension.	without	16	11.8
7.	M8 fastening screws of the propeller hub on the front gear flange.	without	1st step: 10 2nd step: 30	1st step: 7.4 2nd step: 22.1
8.	M8 locking nut on the propeller fork. WARNING - not included in normal maintenance	without	20	14.7
9.	Yield bolt fastening the fork on the propeller hub. WARNING - screw thread lubricated. - not included in normal maintenance	without	1st step: 50 2nd step: 16	1st step: 36.9 2nd step: 11.8
10.	Magnetic screw in the front gear.	without	15 - 20	11.1 - 14.7

CAUTION

Screws and bolts secured by Loctite 243!

ENGINE

For tightening torques of screw connections on the engine refer to »Maintenance Manual (Line Maintenance) for ROTAX Engine Type 914 Series« (Annex E), »Maintenance Manual (Heavy Maintenance) for ROTAX Engine Types ROTAX 912 and 914 Series« and applicable SI, SB and SL.

7. MAINTENANCE INSTRUCTIONS, TOLERANCES AND ADJUSTMENT DATA FOR ASSEMBLIES / EQUIPMENT

7.1 AIRFRAME

7.1.1 WING

Description: See section »3.1.1«

Lubrication: See section »6.5«

7.1.1.1 CRACKS AND STRUCTURAL DAMAGE

- Check wings for cracks and abnormal surface (local buckles, roughness, holes and delamination), especially near to force transmission points (fittings, control links, flap hinges) and at the division areas of inner and outer wing as well as of outer wing and wing extension.

See also section »6.6« and Annex A »Small Repairs of Composite Materials«.

7.1.1.2 DRAINAGE AND VENTILATION HOLES

- Check holes for cleanness and for fluid outflow; clean if necessary. Fuel trails found may indicate fuel tank leakage. The holes are located next to the air brakes, fuel tanks and next to the wing root of inner and outer wing and wing extension (see position plan in section »6.7«).

7.1.1.3 WING FITTINGS

- Check backlash of the wing fittings by moving wing tips forward and aft and up and down. If excessive backlash is found or in case of doubt the bolts and fittings must be measured by means of a micro meter.

CLEARANCE OF WING/FUSELAGE ATTACHMENTS

Axial	Maximum 0.4 mm / 0.016 in
Radial	Maximum 0.15 mm / 0.006 in

CLEARANCE OF INNER-TO-OUTER WING ATTACHMENTS

Front and rear bolts, axial	Maximum 0.3 mm / 0.012 in each
Front and rear bolts, radial	Maximum 0.2 mm / 0.008 in each
Main bolt, radial	Maximum of 0.15 mm / 0.006 in in the bearings of spar boxes.
Spar stub bolts axial	Maximum 2 mm / 0.08 in
Spar stub bolts radial	Maximum 0.2 mm / 0.008 in

CLEARANCE OF OUTER WING TO WING EXTENSION ATTACHMENTS

Front and rear bolts, axial:	Maximum of 0.3 mm / 0.012 in each
Front and rear bolts, radial	Maximum 0.2 mm / 0.008 in each
Main bolt, radial:	Maximum of 0.15 mm / 0.006 in in the bearings of spar boxes
Spar stub bolts axial:	Maximum 2 mm / 0.08 in
Spar stub bolts radial:	Maximum 0.2 mm / 0.008 in

These clearances are maximum allowable wears. If exceeded, the relevant bolt must be replaced (the shear bolts at the inner-outer wing connection are provided with a thread).

- Check bushings for size, roundness and surface quality (striations). If necessary the bushings must be reamed out and oversize bolts, available from the manufacturer, must be used.

CAUTION

Upon replacement of the bolts secure with Loctite type 638.

7.1.1.4 FLAPS AND AILERONS

- Check flaps for cracks, abnormal surface (local buckling, roughness, holes and delamination) and corrosion, especially near force transmission points (fittings, control links, flap hinges).
- Check wing flaps and aileron bearings for backlash (must be minimal).
- Check clearance between components and to wing spanwise.
- Check gap seals and tight fit of fairings on flap/aileron links.

Upon repair and re-painting the control surfaces weights and static hinge moments must be measured. If the limits are exceeded, contact the manufacturer.

Weights and Hinge Moments: See section »6.4.2«
Deflections: See section »6.4.1.1«

Clearance of Flaps: In span direction and against each other
 $3 \pm 0.5 \text{ mm} / 0.12 \pm 0.02 \text{ in}$

7.1.2 FUSELAGE

Description: See section »3.1.2«

Lubrication: See section »6.5«

7.1.2.1 CRACKS AND STRUCTURAL DAMAGE

- Check forward fuselage and the tail boom for cracks and abnormal surface (local buckling, roughness, holes and delamination), especially at the connection points to the center steel frame, along the adhesive bindings of the tail boom and at the vertical tail root.
- Check the lower sides of forward fuselage and tail boom for gravel strike damage. Deep damage to the coating, which may allow water to penetrate into the composite structure, should be repaired.

See also section »6.6« and Annex A »Small Repairs of Composite Materials«.

7.1.2.2 DRAINAGE HOLES

- Check holes for cleanness, clean if necessary.

Positions: See position plan in section »6.7«

7.1.2.3 NOSE-CONE

- Check proper fit of nose-cone on front fuselage.
- Check condition of composite structure, especially edge and bonding to nose-cone tube.
- Check operating lever for proper locking in both, forward and rear locked position. The force to unlock must be sufficient to secure locking even under vibrations, ground and flight loads.
- Check condition and backlash of nose-cone sliding tube.

Allowable Backlash of Nose-cone: At the top, perpendicular to flight direction, 3 mm / 0.12 in.

NOSE-CONE HANDLE ADJUSTMENT

- Remove left and right coverings of instrument panel.
- Loosen forward connection of handle and nose-cone sliding tube.
- Loosen counter nut and adjust the eyebolt.
- Tighten nut to secure the eyebolt.

RENEWAL OF LOCKING SPRING OF NOSE-CONE HANDLE

- Disassemble nose-cone operation.
- Change both locking springs and reassemble.

ADJUSTMENT OF ENGINE MASTER SWITCH

- Remove left and right coverings of instrument panel.
- Re-bend electrical contacts or change if necessary.

7.1.2.4 CENTER FUSELAGE

- Check the steel frame for damages. Repair damage of the paint and remove corrosion. If damage from chafing has occurred, determine and eliminate the cause of chafing.
- Check parts of the frame near to the force transmitting fittings (forward fuselage, tail boom, wings, landing gear), especially the welding seams, for cracks.
- Check the bolt connections of forward fuselage and tail boom to steel frame for tight connection.
- Check condition of tail boom composite structure close to the force transmission points.
- Check condition of upper and lower attachment points "framework to forward fuselage".
- Check condition of force transmission points in the front fuselage composite structure (cracks) and bonding of upper shear sleeves for tight fit.

Tightening Torques: See section »6.8«

NOTICE

Original paint of steel frame has got a defined brittleness by design. It facilitates deflection of cracks.

7.1.3 EMPENNAGE

Description: See section »3.1.3«

Lubrication: See section »6.5«

7.1.3.1 GENERAL CONDITION

- Check surface of vertical and horizontal tail (fins and stabilizer/rudder) for abnormal condition or cracks, especially near force transmission points (fittings, control links, hinges).
- Check condition and attachment of gap sealing / zigzag (turbulator) tape.

See also section »6.6« and Annex A »Small Repairs of Composite Materials«

7.1.3.2 VERTICAL TAIL

RUDDER ATTACHMENT AND FREE MOVEMENT

- Check condition of rudder fittings (stainless steel), specially check lower fitting for cracks and deformation.
- Check tight fit of screw connections and rivet connection of bearings, friction in bearings (observe section »6.5 Lubrication«) and backlash. The axial backlash of the rudder should be minimal (washer D125-08 must be installed between lower bearing and lower hinge bolt).
- Check condition of split pin. Move rudder to left and right stops to check for unobstructed movement. Especially the tail wheel coupling must not obstruct rudder deflections if the tail wheel steering is blocked.

ANTENNA

- Check condition of plug contact and heat-shrink tubing.
- Check fixing at lower rudder fitting (cable support).
- Check free movement of rudder without the coaxial cable obstructing rudder control cables and coupling rods to tail wheel.

WATER BALLAST TANK (OPTIONAL)

- Check condition of drainage, ventilation and filling holes of the water ballast tank in the right shell of the vertical tail for cleanliness, clean if necessary.
- Check the surrounding structure for abnormal surface (local buckling, roughness, holes and delamination) and cracks/deformation.
- Check the empennage structure in the area of the tail wheel for residue of water. Findings could indicate leaking of the water ballast tank. In this case check the interior space of the vertical tail with camera or equivalent technique.

7.1.3.3 HORIZONTAL TAIL

- Check forward fitting for cracks and corrosion, tight fit of screw connection, smooth operation of spring bolt (observe section »6.5 Lubrication«), backlash of bolt and sufficient spring tension for safe locking.
- Check rearward fitting for cracks, especially in or close to welding seams and the cut-outs of the fixing plates, tight fit of screw connection and wear of pins.
- Check nut of the assembly screw stop.
- Check backlash of the horizontal tail fitting (do not apply excessive force):
 - Move horizontal tail tip forward and aft and up and down.
 - Take hold of the mid section of the horizontal tail fin, push up and down.

If excessive backlash is found, the bolts and fittings must be measured.

MAXIMUM BACKLASH OF HORIZONTAL TAIL FITTINGS

Forward fitting	Vertically 0.15 mm / 0.006 in	Horizontally 0.1 mm / 0.004 in
Rear fitting	Vertically 0.15 mm / 0.006 in	Horizontally 0.15 mm / 0.006 in

7.1.3.4 WEIGHTS AND STATIC HINGE MOMENTS OF CONTROL SURFACES

Upon repair and re-painting the control surfaces weights and static hinge moments must be measured. If the limits are exceeded, contact the manufacturer.

Weights and Hinge Moments: See section »6.4.2«
 Deflections: See section »6.4.1«

7.2 COCKPIT

Description: See section »3.2«

Lubrication: See section »6.5«

7.2.1 CANOPY

7.2.1.1 CONDITION AND FUNCTION

- Check canopy for scratches and cracks, especially in the area of the clear vision/vent windows. Small cracks may be stop-drilled, long cracks must be repaired. (max. 200 mm length.)
- Check function and condition of the sliding window.
- Check canopy locks for smooth operation, clean bolts and bushings and observe section »6.5 Lubrication«.
- Check equal and simultaneous opening of both lateral locking levers. If necessary adjust cable tension so that both levers open completely and simultaneously.
- Check smooth function of lateral gas springs and whether they are able to balance the canopy weight.

7.2.1.2 TEST OF CANOPY EMERGENCY JETTISON

Carry out jettisoning procedure as adopted from the instructions in the S12 Aircraft Flight Manual

- Detach lateral gas springs from the canopy frame and remove gas springs from cockpit.
- Support the canopy by two assistants standing to the right and to the left of the cockpit.
- Perform jettisoning procedure according to the S12 Aircraft Flight Manual.

NOTICE

The canopy must be supported by two assistants standing to the right and to the left at the front of the aircraft.

- Check force of emergency release gas spring.

Force of Gas Spring	Compressed 150 ± 30 N / 34 ± 7 lbf
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7.2.1.3 RE-INSTALLATION OF THE CANOPY

- Unscrew the ball head bolted joint of the pneumatic springs which hold the canopy open.
- Loosen the M8 nuts on the fuselage side of the canopy hinge by two turns.
- Use a punch to brace the gas spring within the hinge (opening spring) and push the head half way under the side-wall so that the spring is fixed in place. If required, use a wooden block as support between the bonding seam of the hinge and the lower stationary part of the fuselage (guide tube).
- Turn the locking lever parallel to the direction of flight ("Unlocked" position).
- Two assistants are needed to hold the canopy in the open position and to ensure the precise position of the hinges one to each other.
- Turn the locking lever through 90 degrees° (as far as the stop); check through inspection window. Tighten M8 nut.
- Screw the pneumatic springs holding the canopy open back into the ball heads.
- Arm the opening mechanism by inserting a screw driver into the hole provided and press the gas spring forward until a distinct click is audible.

WARNING

If the gas spring is not initialized as described before, the canopy will not open when releasing jettisoned in flight.

7.2.2 EQUIPMENT AND SYSTEMS

7.2.2.1 SEAT BELTS

- Check condition and function of seat belts.
- Check proper fastening of the belts to the attachment fittings.
- Check attachment fittings for corrosion and cracks.
- Check service life of seat belts according to manufacturer airworthiness limitation.

7.2.2.2 INSTRUMENTS AND SWITCHES

- Remove cover of instrument panel.
- Check instrument panel for loose screws.
- Check condition and attachment of instruments, switches, circuit breakers, fuses and wiring. Press fire warning light to check it for acoustical and visual function.

7.2.2.3 AIR HOSES

- Check ventilation air hoses for condition (holes, crinkles) and proper attachment to the air vents and the air inlet at the bottom front fuselage (NACA-Inlets).

7.2.2.4 SEATS

- Check surface of seat pans for local damage (e.g. local overloads due to parachute buckles).
- Check composite back rests for structural damages.
- Check condition and tight attachment of metallic components.
- Check lower and upper adjustment mechanism for proper function.

7.3 CONTROLS

Description:	See section »3.3«
Lubrication:	See section »6.5«
Adjustment and Rated Data:	See section »6.4«

CONTROL RODS, GENERAL

The control rods must be checked with special attention on the condition of their terminals. The swaged terminals of all control rods must be checked for longitudinal and radial cracks, all fork terminals for cracks, especially at the transition area of fork root and side frame.

FUNCTION OF FLIGHT CONTROLS, GENERAL

- Check control sticks, pedals, flap levers and air brake levers for smooth and unobstructed operation.
- Check for correct spring forces in controls and proper locking and unlocking of air brakes. Check proper flap setting indication on center console.
- Check full deflections of stick and pedals to the relevant stops and symmetry of neutral positions.
- Check electric trim for smooth and unobstructed operation over the whole operating range. Compare trim indication in the instrument panel with position of the trim actuator (nose down, neutral, nose up).

7.3.1 CONTROLS IN FUSELAGE

- Remove control system coverings in cockpit.
- Check condition, smooth operation, proper installation and tight screw and rivet connections of components in cockpit (especially bearings, joints, rods and bell-cranks).
- Check for foreign objects.
- Check tight fit of control stops below stick cover.
- Check condition of pedals close to the cable guides and condition of cable guides.
- Check pedals for smooth adjustment, clean sliding guide with alcohol if required.
- Check all control rods and levers, including slides for rudder cables, in center fuselage for tight fit of all joints, proper condition of bearings, damage, scratches and deformation.

NOTICE

Do not use grease or oil to improve smooth operation of pedal adjustment!

- Check condition and attachment of rubber stops on center steel frame.
- Check function and proper installation of trim assembly in luggage compartment of the tail-boom. Check condition of springs, actuator and all screw connections.
- Check condition of flap gas spring assembly in flap controls for proper installation, tight fit and signs of leakage of gas spring.

- Check control rods and bearings in the area of wing-to-center fuselage attachments; check condition of quick-release joints and securing of its spring bolts.

7.3.2 CONTROLS IN THE WING

For checks and maintenance of the L'Hotellier Connections (aileron control rods at the inner-to-outer wing division) refer to Annex A.

To check bell-crank levers and adjacent components of flap and aileron control system remove fairings of the flap and aileron link rods and inspect the bell-crank levers and the other parts of the flap and aileron drive systems in the wing by means of a borescope or mirror.

The air brakes should properly close flush with the wing surface when locked. To allow for wing bending, there must be a clearance of minimum 1.5 mm/0.06 in. between the inboard and outboard ends of the airbrake covers and the adjacent wing skins.

- Check tight fit and securing of upper screw joints, and condition and tight fit of bolts in lower air brake.

7.3.3 CONTROLS IN TAIL CONE/VERTICAL TAIL

RUDDER CONTROL CONNECTIONS AND RUDDER STOPS

- Check condition of rudder control cables at the transition to PVC tube and connection of rudder control cables at the tail boom entrance for proper condition.
- Check rudder control links for tight fit of screw connections and brass bushings for wear (observe section »6.5 Lubrication«).
- Check proper installation of coupling rods to tail wheel.
- Check condition of rudder stops.

ADJUSTMENT OF RUDDER STOPS

- Adjust neutral position of rudder (use airfoil template), tail wheel free
- Mark reference on ground
- Adjust rudder stop screws on lower rudder fitting left/right for rated values according to section »6.4.1.1«.

ELEVATOR CONTROL CONNECTION

- Check control link in rear horizontal tail fitting for condition, tight screw connection, low friction of bearing (Observe section »6.5 Lubrication«).

To check bell-crank lever of the elevator control in the base of the vertical fin remove two stoppers from inspection holes on LH side.

- Check bell-crank lever for condition, tight connections and proper installation by means of an borescope.

7.3.4 DEFLECTION OF CONTROL SURFACES, CONTROL SYSTEM FRICTION, CONTROL FORCES

For rated values of deflection, friction and forces related to controls of aileron, flaps, elevator, rudder and air brakes refer to section »6.4.1.1«, »6.4.1.2« and »6.4.1.3«.

For measurement procedures also refer to »Rigging Report«. (Annex D)

7.3.5 FREE PLAY OF CONTROL SYSTEM BEARINGS

Refer to section »6.4.3 Free Play in Flight Control System«.

7.4 POWER-PLANT

7.4.1 ENGINE

Description: See section »3.4.1«

Lubrication: According to »Maintenance Manual (Heavy Maintenance) for ROTAX Engine Types ROTAX 912 and 914 Series« and section »6.5«, as applicable.

NOTICE

Check regularly for ROTAX Service Bulletins (SB's), Service Instructions (SI's) and Service Letters (SL's)!

7.4.1.1 GENERAL

Except for the inspection list provided in section 5, the maintenance of the engine ROTAX 914 F2/S1 is basically performed according to the instructions in the »Maintenance Manual (Line Maintenance) for ROTAX Engine Type 914 Series« (Annex E) and »Maintenance Manual (Heavy Maintenance) for ROTAX Engine Types ROTAX 912 and 914 Series«.

Procedures affected by the modifications made for the S12 are included in this section. Otherwise a reference to the relevant section in the original Maintenance Manuals given above is indicated.

Technical Service, especially maintenance of the engine ROTAX 914 F2/S1, may be performed by STEMME as well as by authorized distributors and service centers approved by ROTAX. (Refer to: www.flyrotax.com).

Service of modified components are carried out by STEMME only, as well as delivery of modified spare parts.

For identification of components affected by the modifications and in any case of doubt it is recommended to contact STEMME

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7.4.1.2 REMOVAL AND INSTALLATION OF THE ENGINE

a) Removal

- Disconnect battery.
- Remove fire wall sheets.
- Remove V-supports of the steel frame below the engine.
- Loosen clutch on engine side and push it forward on the sliding joint.

NOTICE

Do not lose bushings of screw joints!

- Disconnect electrical wiring, fuel hoses below the fire wall, Bowden cables, the oil and lubricant hoses attached to the engine and the air induction hoses.
- Support the engine. Then loosen front (lower) engine mount at the attachment to the frame, loosen upper (rear) engine mountings to the frame.

NOTICE

Mark distancing bushings LH/RH for re-installation!

- Lower the engine.

b) Installation

In the opposite order as removal.

7.4.1.3 CLEANING OF THE ENGINE

See »Maintenance Manual (Line Maintenance) for ROTAX Engine Type 914 Series«, section 12-20-00, subsection, (Annex E).

7.4.1.4 VISUAL CHECK OF ENGINE

Special attention must be paid to the condition and the proper attachment of the two metal oil lines between turbocharger and oil pump. In particular check the condition of the brazed joints between the pipe and its fittings (check for cracks).

Further information see »Maintenance Manual (Line Maintenance) for ROTAX Engine Type 914 Series«, section 12-20-00, (Annex E).

7.4.1.5 LEAKAGE CHECK

Special attention during the leakage check must be paid to the brazed fittings of the two metal oil lines between turbocharger and oil pump.

Further information see »Maintenance Manual (Line Maintenance) for ROTAX Engine Type 914 Series«, section 12-20-00, (Annex E).

7.4.1.6 INSPECTION OF EXTERNAL ENGINE COMPONENTS

See »Maintenance Manual (Line Maintenance) for ROTAX Engine Type 914 Series«, section 12-20-00, (Annex E).

7.4.1.7 CHECK OF WASTE-GATE

Deviating from the figures in the ROTAX manual the waste-gate control of the ROTAX 914 F2/S1 has been modified according to the following figure 7.4.1.7a. The servo cable and the spring are now attached to an additional swiveling lever (1), which is mounted on the original lever of the waste-gate. Information provided by the »Maintenance Manual (Line Maintenance) for ROTAX Engine Type 914 Series« will remain valid in an analogous sense.

Spare parts for the modified waste-gate-control can only be supplied by STEMME.

a) Check the components

In particular make sure that the whole waste-gate-control (cable, waste-gate including the swiveling lever (1)) moves smoothly and easily.

Further information see »Maintenance Manual (Heavy Maintenance) for ROTAX Engine Types 912 and 914 Series«, section »78-00-00«, (Annex E).

b) Check the waste-gate position

See »Maintenance Manual (Line Maintenance) for ROTAX Engine Type 914 Series«, section »12-20-00«, (Annex E).

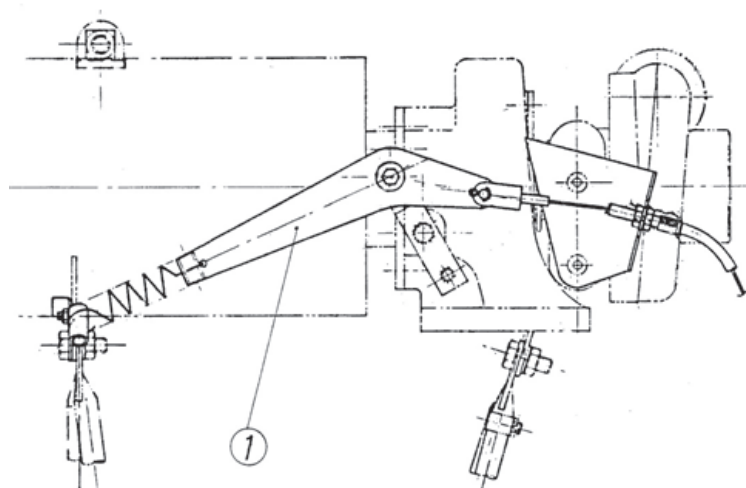


Figure 7.4.1.7a
Check of Waste Gate

7.4.1.8 CHECK OF GEARBOX

See »Maintenance Manual (Line Maintenance) for ROTAX Engine Type 914 Series«, section »12-20-00«, (Annex E).

7.4.1.9 INSPECTION OF THE MAGNETIC PLUG

See »Maintenance Manual (Line Maintenance) for ROTAX Engine Type 914 Series«, section 12-20-00, (Annex E).

7.4.1.10 EXAMINATION OF DRIVE GEAR SET

See »Maintenance Manual (Heavy Maintenance) for ROTAX Engine Types 912 and 914 Series«.

7.4.1.11 CHECK OF THE CARBURETOR

To access the right carburetor, it will be necessary to dismount and raise the oil cooler.

Visually check carburetor assy.: Check for proper installation, general condition and secure attachment of the carburetor assy. (carburetors, airbox, controls).

See »Maintenance Manual (Line Maintenance) for ROTAX Engine Type 914 Series«, section »12-20-00«, (Annex E).

7.4.1.12 CHECK OF ENGINE WIRING

- Check wiring in engine compartment for proper routing and support, tight connections and condition of cables.
- Check wiring for mechanical damages (chafing, brittle parts, poor connections) and signs of overheating (observe section »5.2.4«).

See also section »7.7 Electrical System« and »Maintenance Manual (Line Maintenance) for ROTAX Engine Type 914 Series«, section 12-20-00, (Annex E).

7.4.1.13 CHECK OF V-BELT TENSION

See »Maintenance Manual (Line Maintenance) for ROTAX Engine Type 914 Series«, section »12-20-00«, (Annex E).

7.4.1.14 REPLACEMENT OF SPARK PLUGS

The radiator on LH side can be removed prior to replacement the spark plugs.

See »Maintenance Manual (Line Maintenance) for ROTAX Engine Type 914 Series«, section 12-20-00, (Annex E).

7.4.1.15 CHECKING OF SPARK PLUG CONNECTOR

See »Maintenance Manual (Line Maintenance) for ROTAX Engine Type 914 Series«, section »12-20-00«, (Annex E).

7.4.1.16 CHECK OF COMPRESSION

According to the »Maintenance Manual (Line Maintenance) for ROTAX Engine Type 914 Series«, the check of compression follows the pressure difference method.

To perform this method two pins can be screwed into the clutch to lock the freewheel, allowing adjustment of the ignition T.D.C. by means of the propeller. Metric shank screws (M6) should be used.

CAUTION

Remove locking pins in freewheel clutch after performing the compression test! Engine start with screws installed may cause major damage to the propeller!

See »Maintenance Manual (Line Maintenance) for ROTAX Engine Type 914 Series«, section 12-20-00, (Annex E).

7.4.1.17 TEST RUN OF ENGINE

See »Maintenance Manual (Line Maintenance) for ROTAX Engine Type 914 Series«, section 12-20-00, (Annex E).

7.4.1.18 INSPECTION OF ENGINE MOUNTINGS

- Check upper (rear) and front (lower) engine mounting frames for damages. Repair damage to the paint and remove corrosion. If damages from chafing has occurred, determine and eliminate the cause of chafing.
- Check parts of the frames near to the force transmitting fittings, especially the welding seams, for cracks. Check screws for tight connection.
- Check condition of elastic elements (embrittlement).

See »Maintenance Manual (Line Maintenance) for ROTAX Engine Type 914 Series«, section 12-20-00, (Annex E)

7.4.2 LUBRICATION SYSTEM

System Description : See section »3.4.2«

7.4.2.1 VISUAL AND LEAKAGE CHECK OF OIL SYSTEM

(Oil tank, oil cooler, oil lines.)

- Check oil tank, oil cooler and lines for leakage.
- Check suspension of oil tank and oil cooler for condition and tight fit.
- Check condition of flexible lubricant hoses especially close to clamps and tight attachment of hoses to connections (observe section »5.2.1«).
- Check condition and tight fit of fire-wall penetration connections.
- Check routing of oil lines for clearance from hot parts, and for sufficient support of lines.
- Check condition, attachment and routing of drainage line from oil tank to rear lower fairing.
- Check condition of oil transfer lines to and from turbocharger, especially close to the collar nut connections, and the line support to frame for tight attachment.

CAUTION

Check service life of lubricant hoses. Refer to section 4 »Airworthiness Limitations Section«.

See »Maintenance Manual (Line Maintenance) for ROTAX Engine Type 914 Series«, section 12-20-00, (Annex E).

7.4.2.2 OIL LEVEL CHECK

Oil specification : See section 3.4.14.3

See »Maintenance Manual (Line Maintenance) for ROTAX Engine Type 914 Series«, section 12-20-00, (Annex E).

CAUTION

If the engine is operated with AVGAS, do not use fully synthetic motor oil.

7.4.2.3 OIL CHANGE

Additionally to the procedure in the "Maintenance Manual (Line Maintenance) for ROTAX Engine Type 914 Series", fold up oil cooler (loosen lower camlocks) to drain old oil. In addition to the drain screw of the oil tank remove one drain screw on the crankcase bottom side (rear plug screw) to completely drain oil. Inspect both screws for metal particles or foreign matter. Clean screws, refit and safety-wire screws before refilling with new oil.

Oil specification : See section »3.4.14.3«

See also »Maintenance Manual (Line Maintenance) for ROTAX Engine Type 914 Series«, section »12-20-00«, (Annex E) and »Operating Manual for ROTAX Engine Type 914 Series«.

CAUTION

If the engine is operated with AVGAS, do not use fully synthetic motor oil.

7.4.2.4 OIL FILTER - REPLACEMENT AND INSPECTION

See »Maintenance Manual (Line Maintenance) for ROTAX Engine Type 914 Series«, section 12-20-00, (Annex E).

7.4.3 COOLING SYSTEM

System Description : See section »3.4.3«

7.4.3.1 VISUAL AND LEAKAGE CHECK OF THE SYSTEM

(Radiator, expansion reservoir, refill container, overflow container and coolant lines.)

- Check radiator, expansion reservoir, refill container and overflow container for condition, attachment and leakage.
- Check condition and leakage of flexible coolant hoses, especially close to clamps and tight attachment of hoses on connections (observe section »5.2.1«).

- Check tight connections of flexible hoses and aluminum pipes.
- Check routing of lines for clearance from hot parts, and for sufficient support of tubes.
- Check condition, attachment and routing of drainage line from overflow container in landing gear bay.

⚠ CAUTION

Check service life of coolant hoses. Refer to section 4 »Airworthiness Limitations Section«.

See also »Maintenance Manual (Line Maintenance) for ROTAX Engine Type 914 Series«, section 12-20-00, (Annex E).

COOLANT LEVEL CHECK AND REPLENISHING

The coolant level in the overflow bottle must be between min. and max. marking. If the level is below min. marking, refill completely the expansion tank on the upper LH firewall, then replenish the overflow bottle to max. marking. After a short period of engine operation, check the level again and repeat if necessary.

⚠ WARNING

Never open container cap when cooling system is hot. For safety's sake, cover cap with a cloth and open cap slowly. Sudden opening of the cap could provoke exit of boiling coolant and in consequence, scalds.

Coolant specification : See section »3.4.14.2«

7.4.3.2 FLUSHING OF COOLING SYSTEM

See »Maintenance Manual (Line Maintenance) for ROTAX Engine Type 914 Series«, section 12-20-00, (Annex E).

7.4.3.3 COOLANT REPLACEMENT

Additionally to instructions of »Maintenance Manual (Line Maintenance) for ROTAX Engine Type 914 Series«: To drain the entire liquid cooling system, open the two valves installed in aluminum tubes below the engine. To improve ventilation during refilling of new coolant, loosen bleed screw on expansion reservoir on engine. Close screw after coolant replacement!

Coolant specification : See section »3.4.14.2«

See »Maintenance Manual (Line Maintenance) for ROTAX Engine Type 914 Series«, section 12-20-00, (Annex E) and »Operating Manual for ROTAX Engine Type 914 Series«.

7.4.3.4 RAM AIR COOLING

- Check condition of composite distributor (plenum) on cylinder barrels
- Check tight fit, routing and condition of air hose from distributor to aluminum coupling sheet.
- Check condition and attachment of the sheet to the fuselage steel frame and condition of its rubber sealing to the RH cowling.

7.4.4 AIR INDUCTION SYSTEM

System Description : See section »3.4.4«

7.4.4.1 INTERCOOLER AND AIR BOX

- Check condition and tight fit of air hoses (observe section »5.2.1«) and routing between turbocharger and air box.
- Check condition of inter cooler, tight fit of intercooler and condition of its suspension.
- Check tight fit of air box on the carburetors (clamps) and condition of connection tube.
- Check lower rubber support of air box on turbocharger suspension strut.

7.4.4.2 AIR FILTER

In addition to instructions in »Maintenance Manual (Line Maintenance) for ROTAX Engine Type 914 Series« check condition and tight fit of air hose assy. between turbocharger inlet and filter, including composite sealing plate.

See »Maintenance Manual (Line Maintenance) for ROTAX Engine Type 914 Series«, section 12-20-00, (Annex E).

7.4.5 EXHAUST SYSTEM

System description : See section »3.4.5«

7.4.5.1 TURBOCHARGER/MUFFLER MOUNTINGS

- Check tight fit of screw connections of the mounting struts, on engine housing and turbocharger/muffler side, and tight fit of turbine-compressor and turbine-muffler screw connections. Check tight fit of the clamp supporting the muffler.
- Check condition of struts (cracks, especially close to welding seams, corrosion, e.g. from chafing).
- Check proper position of turbocharger unit (clearance of exhaust headers to fuselage steel frame, especially cross-strut below engine).

7.4.5.2 EXHAUST HEADERS

- Remove heat insulation tape. Visually check condition of headers (deformation and cracks, especially connecting ends with spring supports and flanges).
- Check condition of screw connections on engine and manifold (Nuts M8, tightening torque 20 Nm/14.7 lbf ft) with cold engine.
- Check condition of springs and proper overlapping of connecting ends of the exhaust bends (min. 5 mm/0.2 in).
- Check condition of support plate on lower engine mounting frame below engine, and tight connection of header to the support plate.
- Re-assemble heat insulation tape.

7.4.5.3 HEAT INSULATION

CHECK OF HEAT INSULATION TAPE ON EXHAUST HEADERS

- Check condition of glass-fiber heat insulation tape on exhaust headers, especially close to spring clamps. Renew if fiber tape is brittle (fibers fall off when touched), has holes or is frayed.
- Check condition of spring clamps.

REPLACEMENT OF HEAT INSULATION TAPE

If required or at the latest after maximum 100 engine hours the heat insulation tape (type see section »3.4.5«, available from STEMME) must be replaced:

- Remove spring clamps and insulation tape.
- Fix beginning of new tape by means of a suitable glue.
- Wind new tape round the exhaust header with an overlap of approx. 50% with some tension.
- Fasten tape ends by means of the spring clamps. The headers of Cyl. 1 and 2 have an additional clamp midway along their length.

CHECK OF MUFFLER HEAT INSULATION

- Check condition of insulation cover and its fastening fittings.
- Check tight fit of springs and condition of securing wire to connect end wall insulation.
- Renew insulation if surface of cover is brittle or if fittings are loose (type see section »3.4.5«, available from STEMME).

REPLACEMENT OF MUFFLER HEAT INSULATION

- Remove upper heat protection steel sheet (M5 screw).
- Remove end wall insulation (cut off securing wire).
- Remove springs on muffler heat insulation.
- Remove muffler insulation to the rear.
- Re-assemble with new insulation in opposite order.

HEAT PROTECTION SHIELDS

- Check condition (cracks, deformation) of the heat protection shields (stainless steel).
- Check condition and tight fit of fastening elements (clamps, screws).

7.4.6 FUEL SYSTEM

System description : See section »3.4.6«

Fuels : See section »3.4.14.1«

FUEL LINES, GENERAL

The condition of the flexible fuel lines of the entire fuel system must be checked and the flexible lines must be replaced if required according to section »4« and »5«.

WARNING

Fuel lines in the engine compartment must be inspected especially carefully, because leakage of these lines under operating fuel pressure will probably result in fire.

CAUTION

Check service life of fuel hoses and check valves. Refer to section »4 Airworthiness Limitations Section«.

QUICK RELEASE COUPLING

A quick release coupling is installed in the fuel supply line to allow for easy connection of wing and fuselage fuel system during rigging. Keep the coupling clean, check for leakage, proper locking and condition of rubber seal. Replace the coupling if condition is poor.

7.4.6.1 FUEL SYSTEM IN THE WING

- Check condition of the steel supply lines at wing spar between the pump assemblies behind the wing roots. Look for damage or chafing from rigging.
- Check the screw connections for tight fit without leakage.
- Check condition and function of quick release coupling.
- Check condition of vent line outlet assy. at each end rib of wing center section.
- Check condition of electrical connections of fuel pumps and quantity transmitters.
- Check connection of the fuel pumps in the wing through the opening in the lower wing surface.
- To clean (or exchange) the filters the wing supply lines, loose clamps at flexible and then loose the whole pump/drainer/filter package from it's attachment (two M5 screws at the lower edge of spar) and remove the package through the lower shell opening. Re-assemble after the planned maintenance the package in reversed way.

CLEAN FINE FILTER OR RENEW IF REQUIRED

To clean (or exchange) the filters in the wing supply lines, loose clamps at flexible hose and then loosen the whole pump/drain/filter package from its attachment (two M5 screws at the lower edge of spar) and remove the package through the lower wing surface opening.

- Loosen clamps of fuel lines and remove filters in LH and RH wing.
- Install new filter using clamps of original. type (Spare parts available from STEMME.)

Re-assemble the package after the planned maintenance the package in reverse order.

REPLACEMENT OF FINE FILTERS (AT THE LATEST AFTER 200 ENGINE HOURS).

- Check fuel filler cap for leakage and proper locking. To check for leakage of wing tanks look for signs of fuel leaking from drain holes of the wing center section or around the fuel system maintenance opening.

7.4.6.2 FUEL SYSTEM IN THE FUSELAGE

See also »Maintenance Manual (Line Maintenance) for ROTAX Engine Type 914 Series«, section 12-20-00, subsection 2.3, (Annex E).

- Check condition and function of quick release coupling in the main supply line above the feeder tank.
- Check condition, routing (sufficient support, clearance from moving components, kinks), tight fit of clamp connections of the main supply line and supply/return line to/from engine.
- Check condition of the steel supply lines and the screw connection for tight fit without leakage.

See also »Maintenance Manual (Line Maintenance) for ROTAX Engine Type 914 Series«, section 12-20-00, (Annex E).

- Check fuel pump assy. in LH L/G bay for proper installation, condition and routing of lines (kinks), for leakage of terminals and check valves and tight fit of clamps.
- Check condition of GFRP mounting, tight attachment of fuel pumps and condition of electrical connections.
- Check that the drain is sealed properly.

FUNCTION CHECK OF FUEL PUMPS

Perform this function check with wings installed some fuel in both wing tanks, and feeder tank partly drained (drain feeder tank until low fuel warning is ON):

- Switch master switch on, open and lock nose-cone, switch fuel selector switch to positions "LEFT", "BOTH" and "RIGHT": Wing fuel pumps must operate corresponding to the switch positions. Low Fuel Warning light must turn out finally.
- Main pump must operate.
- Switch auxiliary fuel pump switch on, auxiliary fuel pump must operate in addition to main pump. Observe fuel pressure warning light.
- Check fuel shut-off valve and drain valve in LG bay for tight fit and function. After draining, the drain must close without leakage. If the screw joint of the drain leaks, carefully tighten the drain. If required, replace affected drain.
- Check for leakages at the feeder tank (Connections, switches, etc.).
- Check firewall penetration assembly of fuel lines for tight fit and for leakage. Check clearance between air box and firewall penetration assy.
- Check condition and routing (clearance from moving components, kinks) of supply and return lines inside the engine compartment. Check for tight fit of clamp connections at firewall penetration and pressure regulator.
- Check condition, routing and tight fit of fuel lines from pressure regulator to both carburetors, pressure connection hoses (air box, carburetors, pressure sensors) and compensating tube assy. at carburetors.

See »Maintenance Manual (Line Maintenance) for ROTAX Engine Type 914 Series«, section »12-20-00«, (Annex E).

- Check condition, attachment and routing (clearance from hot surfaces) of drain lines from carburetor drip tray and airbox to outlets above lower cowl flap.

7.4.7 ENGINE CONTROLS/MONITORING

System description: See section »3.4.7«

ADJUSTMENT OF CARBURETORS

See »Maintenance Manual (Line Maintenance) for ROTAX Engine Type 914 Series«, section 12-20-00, (Annex E).

CHECK OF THROTTLE ASSY.

- Check throttle lever in cockpit for condition, smooth operation and stops (115%, 100%, idle). Adjust friction of throttle lever brake via knurled knob LH side of lever assy.
- Check condition of bowden-cable and spring on both carburetors. With throttle lever at 115%, spring on both carburetors must maintain slight tension.
- Check stop positions of 115% and idle via corresponding positions of both carburetor throttle valve levers.

CHECK OF THROTTLE LEVER STOPS

- Adjust throttle lever to forward stop (end of gate): throttle valve lever on both carburetors must reach 115% stop.
- Adjust throttle lever to aft idle stop: throttle valve lever on both carburetors must reach screw stop for idle.

CHECK OF THROTTLE VALVE POSITIONS BY MEANS OF TCU COMMUNICATION PROGRAM

Perform this check by means of the TCU communication program. Usage is described »Maintenance Manual (Heavy Maintenance) for ROTAX Engine Types 912 and 914 Series«.

See »Maintenance Manual (Heavy Maintenance) for ROTAX Engine Types 912 and 914 Series«, section 76-00.

CHECK OF CHOKE ASSY.

- Check condition and smooth operation of choke lever. Adjust friction of choke lever brake via knurled knob RH side of lever assy.
- Check condition of bowden-cable and spring on both carburetors.
- Check reaching end stops of carburetor choke lever with forward and aft choke lever positions in cockpit.

CHECK OF TCU AND WASTEGATE SERVO

- Check condition, attachment and wiring of the TCU.
- Check pressure hoses (observe section »5.2.4«).
- Check condition of the wastegate servo assembly.
- Check condition of the bowden-cable driving the waste-gate.

CAUTION

It is most important to check condition and smooth operation of the bowden-cable actuating the wastegate. Poor condition of the bowden-cable can result in uncontrolled wastegate positions and engine malfunction in spite of intended function of the wastegate servo.

CHECK OF ENGINE INSTRUMENTS

Overview of Engine Monitoring Instruments: see equipment lists (section »9.1« and »9.3«).

Perform this check during engine test run, refer to section »7.4.1.17«.

- Check all engine instruments installed for intended function.
- Check tachometer indication by means of the TCU-Communication program.

Usage is described in »Maintenance Manual (Heavy Maintenance) for ROTAX Engine Types 912 and 914 Series«, section »76-00«.

CHECK OF ENGINE CONTROL AND INDICATION SENSORS

See »Maintenance Manual (Heavy Maintenance) for ROTAX Engine Types 912 and 914 Series«, section »72-00-80«, in the first subsection each.

- Check condition, tight fit, leakage if applicable and wiring of sensor assemblies of TCU, oil pressure, oil temperature, cylinder head coolant temperature, fuel pressure and fire warning.

CHECK OF IGNITION LOCK SHORTING CABLE ASSY.

- Check condition of shorting cables and connections on rear firewall lower LH side.

FUNCTIONAL CHECK OF IGNITION RETARDER MODULE

System Description: See section »3.7.13«

In addition to the periodic check (see section »5.4.13«) the Ignition Retarder Module must undergo a functional check after a failure during engine start.

To perform the following check, remove instrument panel cover. The module is mounted on the electronics / CB plate on the RH side of the panel. Correct function can be examined by means of two LED's mounted on the circuit board, visible through an opening in the module housing.

- Disconnect the control line from the starter relay (located next to the main battery at the foremost ring frame of the tail boom).
- Open and lock the nose-cone to switch the engine bus "ON".
- Switch ignition/starter key switch to position "START" and hold in this position:
 - one red and one green LED must illuminate simultaneously,
 - after 3 seconds, the green LED must extinguish,
 - the red LED must remain illuminated as long as the key position "START" is hold.
- Unlock the nose-cone.
- If the check showed normal function, reconnect control line to starter relay.
- If the check revealed malfunction, check lines and connectors. If still defective, the module must be exchanged.

 WARNING

Never start the engine with a defective ignition retarder module.

7.4.8 FIRE PROTECTION

System Description: See section »3.4.8«

7.4.8.1 COWLING-FIRE PROTECTIVE PAINTING

- Check condition of the white fire protective painting. Repair if necessary. If signs of excessive overheating are found or in case of doubt contact the manufacturer.

REPAIR OF THE FIRE PROTECTIVE PAINTING (OBSERVE MANUFACTURER INSTRUCTIONS)

- Completely polish off the damaged paint.
- Apply three coats of the fire protective paint.
Minimum coverage 300 g/m² / 0.06 lb/ft²
- Cover with one coat of clear varnish.

Specification of fire protective paint: See section »3.4.8«

7.4.8.2 FIRE PROTECTIVE SLEEVES

The fire protective sleeves must be checked for condition and complete cover of the fluid lines. Check routing, especially for kinks in fire protective sleeves, which might obstruct fluid flow in fluid lines covered.

7.4.8.3 FIREWALL

- Check condition (deformation, cracks) of firewall sheets, their connection to each other and to the center steel frame.
- Check sheathing edges and renew if required. Look for chafing from firewall edges on fuselage steel frame, cables, hoses etc.
- Check fastening of penetration fittings of oil lines.

7.4.9 COWLINGS

System Description: See section »3.4.9«

CAM LOCK FITTINGS, GENERAL

- Check condition, tight fit and function of camlock fasteners on upper center fuselage fairing and engine cowlings.
- Check tight connection of camlock fittings in the composite structure of fairing/cowling and counterparts in fuselage.

UPPER CENTRE FUSELAGE FAIRING

- Check condition and proper fit of the upper fuselage fairing.
- Check condition, function and tight attachment of oil service access door.

ENGINE COWLINGS

- Check condition and proper fit of the LH and RH and lower engine cowlings.
- Check condition of air ducts and proper fit to oil cooler, intercooler and radiator.
- Check fit and sealing to composite sealing plate of air induction and rubber seals on coupling sheet of cylinder cooling air hose. Look for marks from chafing between ducts and engine components or firewall.

COWL FLAPS

- Check condition and fit of inlet and outlet cowl flaps. Grease hinge bolts of outlet cowl flap (observe section »6.5«).
- Check cable lines and connections to flaps.
- Check function of inlet and outlet cowl flaps when operating nose-cone handle and cowl flap reduction handle. Specially observe if flaps are fully opened by springs.
- Check fairing section aft of outlet cowl flap for condition, attachment and sealing to fire-wall.
- Check if flaps close properly if nose-cone is closed.
- Check apertures of inlet cowl flaps corresponding to cowl flap handle positions "Open" and "Closed" (5th notch) with nose-cone open and locked.

INLET COWL FLAP OPENINGS, MEASURED FROM LEADING EDGE OF FLAP TO COWLING:

Fully opened	120 ± 5 mm / 4.7 ± 0.2 in
Fully reduced opening (fifth notch)	30 ± 5 mm / 1.2 ± 0.2 in

7.4.10 PROPELLER

System description: See section »3.4.10«

The numerical positions in the following text refer to the propeller diagram (see figure »3.4.10.a«).

7.4.10.1 GENERAL

The complete propeller pitch control mechanism (including all mechanical and electrical components) is redundant and is able to operate each propeller blade separately. Both systems are coupled to each other through a mechanical coupling ring and an electrical backup system. Hence, the mechanism is fully redundant. In order to prevent incorrect assembly, all paired parts belonging to the pitch change of the one propeller blade are marked with a red dot; those belonging to the other blade remain unmarked.

Propeller pitch can be changed manually for inspection and maintenance purposes by swinging the blades approx. 90 degrees outward, gripping the blades in the outer third of their length and pushing them in the direction of flight (fine pitch) or against direction of flight (coarse pitch). See also details in the S12 Aircraft Flight Manual, section »4 Daily Checks«.

Adjustment of the propeller or its electric system may only be performed by the manufacturer or by qualified and authorized personnel. All results of an inspection of the adjustment or changes in setting must be entered in a report according to Form »Propeller Adjustment Report« (Annex D). The last valid report must be filed together with the Operational Documentation (Annex C).

Repair, overhaul and inspection of structural damage to the variable pitch propeller or to its subsidiary assemblies after an operational interruption may only be performed by qualified and authorized personnel.

Balancing the variable pitch propeller or its assemblies may only be performed by the manufacturer or by an authorized and licensed FBO according to the specific instructions and using appropriate equipment.

Balancing weights have to be applied for static or dynamic balancing. Their arrangement must be entered in the Rigging Report as laid down in the »Propeller Rigging Report« form (Annex D). In the case of damage of one propeller blade only, a suitable exchange blade may possibly be obtained from the manufacturer. The latest Report of Adjustment Settings must be transmitted to the manufacturer and in this case, re-balancing may not be necessary.

7.4.10.2 ADJUSTMENT AND INSPECTION RESULTS, TOLERANCES

Changes in pitch angle	$\Delta\beta = 6^\circ 24' \pm 15'$
Settings, measurement taken at the propeller blade mounting fork with reference to zero setting (this is when the axis of the joint is parallel to the propeller axis of rotation).	Take-Off setting: $-2^\circ 30' \pm 5'$ Cruise setting: $+3^\circ 54' \pm 10'$
Initial tension of the contact spring for the take-off position stop switch.	$\approx 0.2 \text{ mm} / 0.0079 \text{ in}$ ($\frac{1}{3}$ turn of the contact screw)
Duration of pitch change in each direction at an ambient temperature of $15^\circ - 25^\circ \text{ C}$ and battery voltage of not less than 12 V under loaded conditions.	max. 3 Min.
Unbalance: Permissible total static residual unbalance. Permissible dynamic unbalance.	200 g mm / 4.44 dr. in see A17-10AP-V/2-E
Permissible travel of the blade tips in the direction of flight.	4 mm / 0.16 in
Track at propeller blade joint (difference between both forks, measurement taken opposite the position 'upper left gear mount').	0.3 mm / 0.12 in
Track at propeller blade tips (difference between both blades).	3 mm / 0.12 in

7.4.10.3 VISUAL INSPECTION OF THE PROPELLER UNIT

- Check load bearing elements (hub and forks, blade suspension) for cracks, corrosion and other damage.
- Check complete propeller assembly for loose components, loose bolt connections or other apparent damage.
- Check condition of rubber stops within the blades and on hub for cracks.
- Check propeller blades for cracks or other damage, especially at blade tips, at bonding seam and in the area of stop buffers. Repair leading edge protection tape if necessary (use material supplied by the manufacturer only!).

- Check propeller folding mechanism for ease of operation and restoring force.
- Check propeller blade ventilation and drain holes at the blade tips, clean if necessary.

If the ignition retarder module failed during engine start, the propeller must be checked for damage. Special attention must be paid to the condition of the following items: blade side rubber stops and surrounding blade structure, stop bolt in the blade suspension forks and the blade retraction coupling levers.

7.4.10.4 REMOVAL OF THE PROPELLER UNIT

- Remove the nose-cone: remove left and right foot-well covers. Loosen clamp bolt at the guide block of the nose-cone, pull out locking screw with nose-cone spring, pull off pitot/static pressure lines, disconnect installed electrical wiring into the nose cone (XPDR antenna, sensor units, etc.), pull nose-cone off to the front.
- Unscrew the front cover of the variable pitch mechanism.
- Unscrew both sides of the electric covers (three M3 bolts).
- Disconnect the power supply to the electric element on both sides.
- Disconnect the drive pin (10) from the fork (4), (one M5 bolt, one M8 nut, one of the two adjustment screws (25), the second adjustment screw remains secured to facilitate finding the original position).

NOTICE

A counter-balancing weight washer may be attached to the inside of the fork by means of an M5 bolt. This washer must be re-installed at the same place on re-assembly.

- Loosen both bolts (M6 with secure washers) to separate the variable pitch mechanism from the hub centerpiece (18). Remove the variable pitch mechanism to the front.
- Loosen the six M8 bolts (three bolts in each group secured with safety wire) connecting propeller hub and propeller reduction gearbox. Remove the hub (with the propeller) to the front.

7.4.10.5 INSTALLATION OF THE PROPELLER UNIT

- Clean and degrease the propeller and the propeller gearbox flange with an appropriate solvent. The torque is transmitted by friction fit, therefore, the surfaces must be even, clean and free from grease.
- Inspect threaded bushings in the propeller gearbox flange for visible damage.
- Push carbon brushes fully into their supports and temporarily fix with adhesive tape (or similar) to avoid damage to the brushes and their supports when the hub is fitted to the gear flange.
- Tighten the M8 bolts securing the hub to the gear flange, using a torque wrench on opposing pairs of bolts in two steps:
 - Step 1: Torque 10 Nm / 7.4 lbf ft
 - Step 2: Torque 30 Nm / 22.1 lbf ft

Secure groups of three bolts together using safety wire (diameter 0.8 mm / 0.03 in).

- Mount variable pitch mechanism to the hub centerpiece (18) and fasten with bolts (two M6 bolts with locking washers). Pay attention to red marks.
- Release carbon brushes and check contact and appropriate pressure on the respective slip rings.
- Bolt the drive pin (10) onto both sides of the fork (4). Attach M5 bolts first and then screw on the M8 bolts loosely, then tighten the loose adjustment screw (25) and secure with lock nut. Then tighten the M5 bolt and the M8 nut (using a torque wrench, torque 20 Nm / 14.7 lbf ft). Secure the adjustment screws with safety wire.

NOTICE

If necessary, bolt the counter- balancing weight washer back at the inside of the fork.

If both adjustment screws are loose at the beginning of this step, the propeller must be adjusted again (see section »7.4.10.7 Checking of Pitch Control and Adjusting the Variable Pitch Propeller«).

- Connect the power supply to the electric element on both sides.
- Screw on both sides of the electric covers.
- Screw on the front cover of the variable pitch mechanism. Observe red marking (red point must correspond to "red side" of the variable pitch propeller).
- Install nose-cone (reverse sequence of removal, do not forget locking).
- Check adjustment. If tolerances are not met, re-adjust propeller pitch (see section »7.4.10.7 Checking of Pitch Control and Adjusting the Variable Pitch Propeller«).

7.4.10.6 SPRING TENSION OF THE PROPELLER FOLDING MECHANISM

- Check the spring pre-load for each blade: after the propeller has been installed, turn it until the leading edge of the (folded) lower propeller blade is in a horizontal position. The static holding force (not the lift-off force) on the rubber catch in this position must be $1.7 \text{ N} \pm 0.1 \text{ N}$ (approx. 30 mm / 1.18 in away from the tip of the propeller blade measured with a spring balance or weight). Even after swinging out slightly it must return to the fully folded position of its own accord. Move the propeller to the appropriate position before repeating the measurement on the other propeller blade.
- Removal of the propeller blades (to renew the lubrication of the blade bearings, installation in the reverse order):

NOTICE

Completely remove and reinstall the first blade before removing the second blade.

1. Unscrew the union nut of the hollow axle using a flat, size 30 nut wrench (approx. 4.5 mm / 0.18 in thick) while holding the hollow axle fast with a flat, size 22 nut wrench (approx. 4.5 mm / 0.18 in). Do NOT unscrew the castellated nut.
2. Twist the hollow axle (in an anti-clockwise direction) until the spring is no longer pre-loaded (approx. 1½ turns) and press it out. Make sure the blade does not drop off when doing so and then remove the blade from the fork (Warning: 2 thrust plates).
3. If necessary, dismantle the hollow axle (now undoing the castellated nut), clean, lubricate and reassemble it.
4. Push out the inner ring of the blade bearing, remove and clean the needles, inspect them for any damage, insert the 34 original needles with special grease in the outer ring, then push the inner ring back in.

⚠ CAUTION

Under no circumstances must the needles and the inner rings of the two blade bearings be mixed up. Should this nevertheless occur, send the entire (dismantled) propeller to the manufacturer immediately. The needles and inner rings generally have different tolerances to cater for bearing clearance.

- Setting the spring pre-load: the spring pre-load is generated by twisting the spiral torsion spring (23), i.e. by twisting the pre-mounted hollow axle (3) against the fork (4).
- Renew the safety plate beforehand: remove the M4 locking screw for the safety plate (beneath the union nut of the hollow axle), undo the union nut (see above: Dismantling and ...), renew the safety plate; screw the union nut tight again.
- Twist the hollow axle to achieve the required spring load. Drill a hole in the new safety plate (diameter 4.3 mm / 0.17 in) so that the locking screw can be mounted in the required position of the hollow axle (secure the locking screw by screwing it tight with a self-locking nut and locking compound). Secure the union nut through the safety plate.
- Check the function (see above).

7.4.10.7 CHECKING OF PITCH CONTROL AND ADJUSTING THE VARIABLE PITCH PROPELLER

- The basic setting of the blade-angle is performed by the manufacturer or by a facility or Field Base Operator (FBO) authorized by the manufacturer to perform major repairs on the variable pitch propeller.
- The propeller unit must be positioned in the take-off setting. Check to confirm that the pitch control mechanism is at the stop in the take-off setting by pressing the half opened propeller blade to the rear (against the direction of flight), so that the expanding element (15) is completely compressed. No significant further movement in the direction of fine pitch should be possible.
- Check the propeller pitch angle for take-off with a precision protractor with a vernier or digital scale. Turn the propeller to an approx. Vertical position, place the static arm of the protractor to the lower left on the reduction gear base-plate, rotate the movable arm to an approx. vertical position, then rotate the propeller clockwise until both fork cheeks are in their operating position (see figure 3.4.10.c). Lock protractor and read off result. The setting angle is $-2^{\circ} 30' \pm 5'$. The acceptable difference in blade angle settings of both blades is $10'$.
- Precision adjustment of the propeller pitch (e. g. to achieve correspondence between both propeller blades) is accomplished by means of two adjustment screws (25). During adjustment, the drive lever is only set loosely (M5 screw and M8 nut are not fully tightened).
- Tighten the M5 bolt and the M8 nut. Tighten the adjustment screw and lock nut. Check tightening torque of the M8 nut (20 Nm / 14.7 lbf) with a torque wrench. Re-check the setting angle and secure adjustment screw with safety lock wire.
- Check the pitch control mechanism for ease of operation: swivel both blades out by 90° against the fork and then pull forward on the blades near the tip without using too much force. The blades must be easily brought into cruise position and, after releasing them, the spring tension must return the blades to the stop in the take-off position.
- Activate the pitch control mechanism (Master switch "ON") by pressing the push button at the front bulkhead for 3 to 4 minutes until the cruise position is reached (fly-weights (19) are forced against the stop).
- Hold the push button (2nd person) and check the pitch angle of the propeller blades in the cruise setting (the method corresponds to measuring the take-off setting). The rated value is $+3^{\circ} 54' \pm 10'$.
- Due to design, after successfully having adjusted the take-off setting, the cruise setting must be within the permissible limits. If this cannot be achieved, damage or excessive wear may be presumed. In this case, repair must be performed by the manufacturer or by a facility or an FBO authorized by the manufacturer.

7.4.10.8 GENERAL ASPECTS OF THE ELECTRICAL CIRCUIT

An expansion element is supplied with an electric power of 50 W through a heating resistor. The supply period is determined mechanically by an adjustable end contact. Overheating is prevented by an NTC resistor in connection with an electronic control circuit.

Components with a larger power consumption such as landing lights cannot be turned on in the cruise setting.

Possible radio disruption caused by the slip ring contact is prevented by suppression capacitors. The generator circuit is provided with radio disturbance suppression. In the case of excessive radio disturbance, the carbon brushes and the slip rings should be cleaned with alcohol and checked for damage.

Carbon brushes worn so that less than 10 mm/0.39 in. of length remains within the brush holder should be replaced (Use only parts supplied by the manufacturer). Remove abrasion dust from slip rings with alcohol.

The function of the electrical variable pitch propeller can be checked while the engine is shut down pushing the test button at the front bulkhead. The master switch must be on.

7.4.10.9 ADJUSTMENT OF THE ELECTRICAL SWITCH FOR THE TAKE-OFF SETTING INDICATOR AND STOP SWITCH

Remove the lid of the adjusting unit and both lids of the electronic module.

Adjustment of the cruise setting stop switch: The contact screws at both rocker arms should be adjusted in a way to ensure light pressure (0.2 mm/0.008 in) against the stop switch in the closed position. To achieve this, the propeller should be put in the cruise setting with the push button. Maintaining this setting, the contact bolts should be adjusted so that the contact screw just is in contact with the contact plate (use an ohmmeter and check several times). Finally, secure contact screw.

Adjusting the take-off setting switch: allow the elements to cool down and check that the pitch change mechanism is at the stop in the take-off setting by pressing the half opened propeller blade to the rear, completely compressing the expansion element (15). The contact bolt protruding approx. 35 mm/1.38 in out of the switch socket should be adjusted so that there is only light contact between the flat lower surface of the bolt head and the contact spring (14), fitted at the rocker arm (check with ohmmeter or with the take-off setting indicator in the cockpit). Then rotate the bolt 1/3 of a revolution (0.2 mm/0.008 in) further in (in the direction of the contact), secure with lock nut and secure with sealing paint.

Check of the take-off setting indicator: the take-off setting indicator in the cockpit must illuminate when the propeller is in the take-off setting. If the propeller is moved by hand in the direction of the cruise setting (pressure should be applied near the tip of the half unfolded propeller blade, pulling the blade forward), the take-off setting indicator must extinguish within a small change in angle.

7.4.10.10 DYNAMIC BALANCING

After repairing or replacing parts or carrying out maintenance on the propeller, which put the dynamic balancing at risk (e.g. replacing or repairing the propeller blades, replacing the propeller forks, replacing the blade coupling parts), the propeller must be dynamically balanced, as laid down in Manufacturer's Instruction A17-10AP-V/2-E (see Annex A).

The dynamic balancing must be recorded in Annex C of the S12 Maintenance Manual.

7.4.11 DRIVE SHAFT SYSTEM

System description: See section »3.4.11«

CHECK OF FREEWHEEL CLUTCH

Rotate propeller

- Check smooth rotation in normal running direction and heavy friction in opposite direction.
- Check tight fit of screw connections of freewheel clutch on engine flange.

CAUTION

Prior to function check, remove locking screw in freewheel clutch if installed for assembly or disassembly of drive shaft unit.

CHECK OF DRIVE SHAFT

For inspection of the drive shaft remove propeller gear and drive shaft assy.

- Check condition of composite shaft (e. g. chafing, cracks) and steel ends (e. g. corrosion, wear, abrasion of surface treatment).
- Check connection between composite shaft and steel ends.

CHECK OF CARDANIC RUBBER DISC JOINTS

- Check condition (cracks and embrittlement of rubber) and tight screw connections of cardanic rubber disc joints on freewheel clutch and on forward drive shaft. To inspect rubber discs for cracks and embrittlement, apply a torsional load on the discs and observe rubber surface.

REMOVAL OF DRIVE SHAFT

The propeller shaft can be removed together with propeller reduction gearbox and the propeller in one step:

- Remove the nose-cone: Lift off left and right leg room coverings in the cockpit, loosen clamping screw at the guide block of the nose-cone, pull out locking screw with nose-cone spring, disconnect flexible hoses, disconnect the antenna connection to transponder/GPS, withdraw the nose-cone to the front.
- Remove cover of gearbox, fastened by tape and spring.
- Disconnect the control cable of the propeller brake at the connector.
- Disconnect the electrical connection (carbon brush)
- Loosen fastening screws on the front gear supports (shock mounts); loosen balancing spring on top of the propeller gearbox.
- Pull out propeller gearbox with propeller shaft.
- Disconnect the drive shaft on the gear (3x M10).

CAUTION

The free wheel clutch remains on the engine. Removal by loosening of the attachment screws on the engine flange.

INSTALLATION OF DRIVE SHAFT

Removal sequence in reverse order. For tightening torques observe section »6.8«. Ensure bolts/screw locked with Loctite 243.

CAUTION

Clean the splines and check the condition of the surface coating. No signs of corrosion should be detectable in and around the splines, and the color of the tooth profiles should be the same (see section »6.5.1«).

7.4.12 PROPELLER GEARBOX, MOUNTING AND SUPPORT

System Description: See section »3.4.12«

CHECK OF PROPELLER GEAR ASSY.

With front gear installed

- Check noise and internal backlash of propeller reduction gearbox by rotating propeller unit clock- and counter clock- wise. Some (minor) backlash is allowable, in case of doubt contact manufacturer.
- Check propeller gearbox visually for condition and leakage.

- Check tight fit of propeller gearbox assy. in four rubber shock mounts on front fuselage frame.
- Check weight balancing spring on propeller gearbox and its safety wire.
- Check connection of propeller brake control cable through hole in front fuselage frame.
- Check condition (composite structure, fastening spring assy.) and tight fit of lower propeller gearbox fairing.
- Check quantity of oil to be between min. and max. markings of the inspection glass, with the tail cone supported so that its axis is horizontal (approximate flight attitude). The propeller gearbox should use only a minimum of oil, so normally refilling is not required before scheduled oil change. Nevertheless some oil on the gear housing due to minor oil vapor leakage through the shaft seals is normal.

With propeller gearbox removed

- Check condition of propeller gearbox housing.
- Check the propeller gearbox for leakage, especially the screwing of both halves of the gear housing and the shaft sealings.
- Check condition of the milled aluminum suspension (cracks) and its connection to the propeller gearbox.
- Check condition and tight fit of the shock mount assemblies on the front fuselage frame. Especially check shock mount assemblies for tight bonding between rubber discs and milled suspension rings. In case of poor condition (cracks in milled suspension, rubber discs brittle or loose) renew shock mounts.
- Check composite structure of front fuselage frame close to the shock mounts for signs of overload.

CHECK OF MAGNET SCREW

Remove magnetic screw from the lower right front wall of the gear housing and inspect screw for possibly collected chips. In case of significant amount of chips on the screw and in case of doubt contact the STEMME Service.

PROPELLER GEARBOX OIL CHANGE

To change oil completely suck out used oil by means of a flexible bottle or syringe with tube via thread opening of magnetic screw. Refill new oil through same opening to max marking of inspection glass, again with the tail cone supported in flight attitude. Secure magnetic screw with safety-wire.

Oil specification: See section »3.4.14«

7.4.13 PROPELLER OPERATION

System Description: See section »3.4.13«

NOSE-CONE OPERATION

- Check condition and proper installation of components. Check smooth operation of nose-cone handle. If required, clean nose-cone sliding guide with alcohol.

NOTICE

Never grease nose-cone PTFE sliding guide!

PROPELLER POSITIONING

- Check condition and proper installation of components. Operate propeller positioning several times from different starting points.
- Check smooth operation and proper alignment of propeller in its end position.
- Check spring retraction of the T-handle and locking clip of the handle (observe section »6.5 Lubrication«).

PROPELLER BRAKE

- Check condition and proper installation of components.
- Check smooth function of propeller brake handle and test brake function during simultaneous rotation of propeller with propeller positioning.
- Check spring retraction of the T-handle and locking clip of the handle (observe section »6.5 Lubrication«).
- Check thickness of brake lining.

Minimum Thickness of the Propeller Brake lining: 1.5 mm / 0.06 in

7.5 LANDING GEAR

7.5.1 MAIN LANDING GEAR

Description: See section »3.5.1«
Adjustment data: See figure »3.5.1.a«
Lubrication: See section »6.5«

7.5.1.1 GENERAL

LANDING GEAR ASSY.

- Check condition of landing gear legs and trailing links (cracks in paint indicate overloads; especially inspect areas of welding seams).
- Check condition and tight connections of over-center struts and jackscrew linear actuators (especially upper swivel joint connection of actuators and fuselage frame).
- Check proper function of trailing link springs assy. by moving wing tips up and down. Move and rotate wheel to check friction and backlash of wheel bearings (observe section »6.5«).

WHEEL DOOR ASSY.

- Check condition of composite structure of wheel doors, in particular for delaminations at the hinges.
- Disconnect the joints of the actuation mechanism of the doors and check free movement of doors.
- Clean and grease hinges of L/G doors if required (observe section »6.5«). Reconnect joints (spring-securing at RH ball joint!).
- Check condition and function of spring linkage of the RH door.
- Check cable mechanism of the LH door for condition and proper installation of cables, springs, pulleys and pulley guides and roller strut. With the gear extended, the closing cable must have a minimum pre-load, barely free from slack. If required, adjust the pre-load compression pressure spring of the closing cable.
- Check clearance between tires and doors to be at least 10 mm/0.4 in. Adjust the RH door at the ball joint and the LH door at the roller of the roller strut if required.

WHEEL BRAKES

- Check condition of brake assembly in forward fuselage and in landing gear bay (proper routing, chafing and leakage of brake master cylinder, wheel cylinders, brake fluid lines and thread fittings).
- Check condition of brake discs (wear, scratches, cracks) and brake pads.

Minimum brake lining thickness: 1.5 mm/0.06 in

BRAKE FLUID

To check brake fluid level, remove the top of the brake cylinder. If required refill through the bleed valves on the brake calipers (refer to »7.5.1.5«).

WARNING

A rapid reduction of the brake fluid level indicates leakage of the system and must be investigated and eliminated before the aircraft returns to service.

- Check brake efficiency prior of return to service.
- Change brake fluid every scheduled inspection 100h airframe (200 engine hours) at the latest after 2 years (refer to »7.5.1.5«).

SPECIFICATION OF BRAKE FLUID: DOT 4

7.5.1.2 FUNCTIONAL TEST OF THE RETRACTABLE LANDING GEAR

Support the aircraft (clearance between the main wheels and the ground must be approximately 0.1 m/3.9 in), remove upper cowling of the center fuselage.

CHECKING PROCEDURE:

- Inspect screw joints (torque paint).
- Check wheels for smooth turning.
- Joint heads of the over-center struts should not be jammed.
- The articulations of the spindles and the over-center strut must have play.
- Installation of the landing gear emergency release system without kinks/interference.
- Landing gear stop switches on the over-center struts: check for halfway position and proper functioning, inspect wiring/connection.
- Retraction of left landing gear leg:
 - Check if the landing gear contacts surrounding components.
 - Brake hose must have regular bends, must not jam.
 - Check of stop switch adjustment: 2 – 5 mm/0.08 to 0.2 in clearance between the landing gear leg and the shaft housing.
 - The stop switch must be positioned in the middle of the landing gear strut.
 - Joint heads of the over-center strut must not be jammed.
 - Articulation between the spindle and the over-center strut must not jam.
- Extension of left landing gear leg: Check if over-center strut returns to its correct over-center-locked position, if necessary adjust the switch.

- Retraction of right landing gear leg: (independent from the left leg - for this purpose, first actuate left stop switch »retracted«, then disconnect the arm linking the operating cable to the left LG door - take care that the cable and arm do not jam as the right leg is retracted).
 - Check if the leg contacts surrounding components.
 - Brake hose must have regular bends, must not jam.
 - The stop switch must contact the center of the landing gear tube.
 - Joint heads of the operating over-center strut must not be jammed.
 - Articulation between the spindle and the operating over-center strut must not jam.
- Extension of right landing gear leg:
 - Check for correctly over-center-locked position of the operating elbow lever
- Retraction of both landing gear legs:
 - Interference check.
 - Align stop switch on the right landing gear leg for a clearance of 2 – 3 mm / 0.08 to 0.12 in between both gear legs.
- Check of landing gear doors (first connect left LG door):
 - Smooth operation of gear doors.
 - Fit of gear doors.
 - Positive clearance between gear doors and wheels.
- Retract landing gear with the upper cowling of the center fuselage installed:
 - Check clearance between the drive spindles and the cowling.
 - The bowden cables of the emergency release system must not be buckled or get stuck
- Test of complete system: retract and extend the landing gear three times with intermediate checks each time:
 - Inspect supports of switches.
 - Inspect switches (attachment), damage.
 - Listen to spindle motor noise.
 - If necessary, adjust brake bands.
 - Inspect for chafed spots on the brake hoses.
 - Check for stress-strain loads acting on the wiring.
 - Check position indication (LED's on instrument panel: two greens when extended, red flashing during operation, off when fully retracted) and acoustic warning (if L/G not fully extended and air brake lever in rear, unlocked positions).

7.5.1.3 FUNCTIONAL CHECK OF EMERGENCY UNDERCARRIAGE EXTENSION

- Support the aircraft and landing gear up.
- Landing gear switch "NEUTRAL".
- Actuate the EMERGENCY-UNDERCARRIAGE handles (in sequence 1-2). Actuating force is 100 - 200 N / 22.5 to 45 lbf. The landing gear legs must remain in the extended position (function of spring clips on the over-center struts).
- Re-connection of the over-center strut joints to the spindles: landing gear switch »DOWN«, move the spindles by means of the stop switches on the over-center struts, until their relative position to the articulations is correct.
- Install latch lever and shift it into the operating position, introduce release elbow lever, lock with spring element. After that perform a functional check: retract and extend the landing gear once.

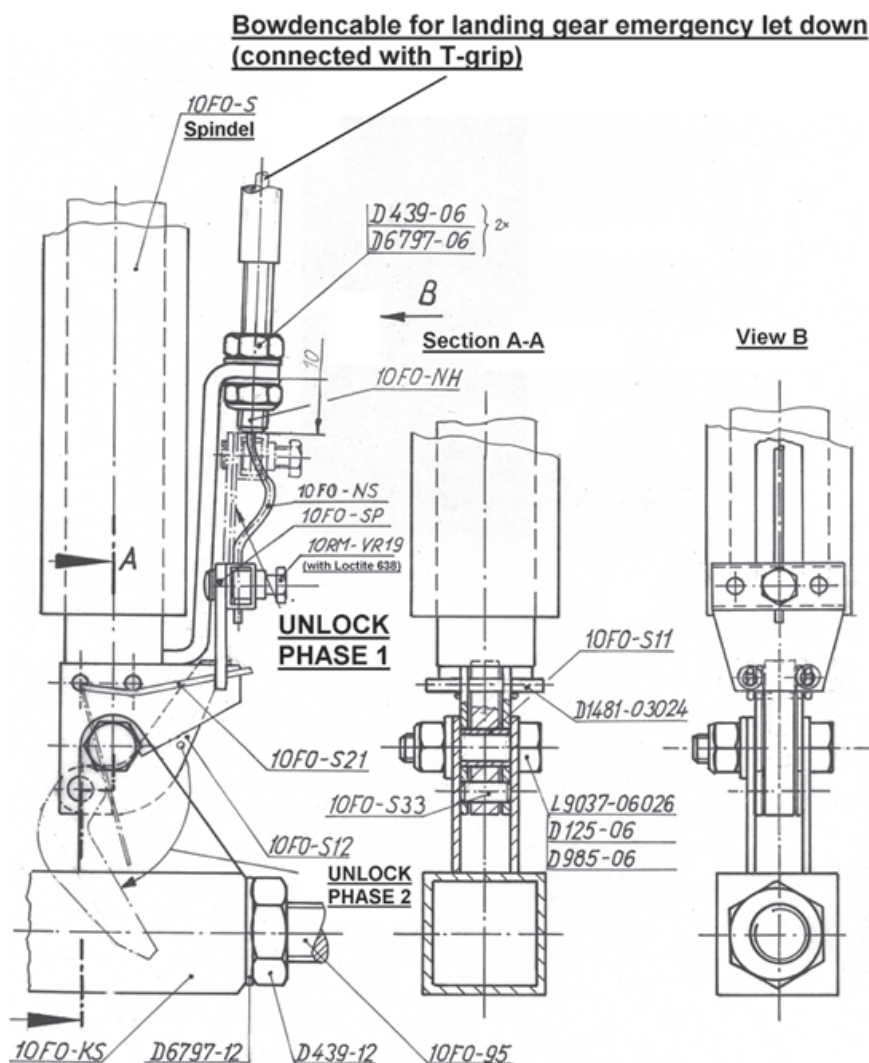


Figure 7.5.1.a
Emergency Release Mechanism

7.5.1.4 TIRES, CONDITION AND INFLATION PRESSURE

The tires must be replaced at the latest, if the treads are worn thin. Pay attention to the slip marks rim/tire. Apply Loctite (metal glue) to the attachment screws on the wheel axles.

NOTICE

The left wheel attachment bolt has a left hand thread.

INFLATION PRESSURE

2.6 ± 0.1 bar / 37.7 ± 1.5 psi.

7.5.1.5 ADJUSTMENT AND BLEEDING OF THE WHEEL BRAKE SYSTEM

HYDRAULIC BRAKE SYSTEM (TOST BRAKE SYSTEM)

Replenishing and bleeding the hydraulic Brake System (bleed with brake fluid DOT 4)

- Install transparent flexible hose and drain bottle at the three bleed ports of the parking brake valve and at the left and right brake caliper.
- Open the bleed valve of the parking brake valve.
- Replenish brake fluid by plastic injection nozzle to the brake fluid reservoir in landing gear bay (use sealed adapter) until the brake fluid passing through the transparent flexible hose at the parking brake valve is free of bubbles. If required dismount RH brake lever and tilt gently back and forth while holding brake lever upside down.
- Close bleed valve at the parking brake valve.
- Open bleed valve at the LH brake caliper.
- While continually adding brake fluid to the brake fluid reservoir by using the refill-adapter (Stemme P/N: 00FO-B17) as required; pump the brake fluid through the hydraulic brake system by operation of the RH brake lever until the brake fluid passing through the transparent flexible hose at the bleed valve of the LH brake caliper is free of bubbles. If required dismount LH brake lever and tilt gently back and forth while holding brake lever upside down.
- Close bleed valve at the LH brake caliper.
- Open bleed valve at the RH brake caliper.
- While continually adding brake fluid to the brake fluid reservoir as required, pump the brake fluid through the hydraulic brake system by operation of the RH brake lever until the brake fluid passing through the transparent flexible hose at the bleed valve of the RH brake caliper is free of bubbles.
- Close bleed valve at the RH brake caliper.
- Operate LH and RH brake lever to check.
=>Firm back pressure must be felt. while operating.
Otherwise repeat entire bleeding procedure!
- Reinstall brake levers (if applicable).

- Remove transparent flexible hose and check final brake fluid level at brake fluid reservoir.
- Perform functional check of brake system in accordance with pre-flight check, described in the S12 Aircraft Flight Manual, chapter »4«.

7.5.1.6 REPLACEMENT OF BRAKE LINING

The linings must be replaced at the latest shortly before the attachment rivets are exposed. The wheel brake calipers are provided with brake pads on both sides of the brake disc. For replacement of the brake pads, the brake calipers can be removed by undoing both 1/4" bolts.

CAUTION

Do not actuate the brake at this time, as this could force the brake pistons out of the calipers. It is recommended to temporarily insert suitable blocks (wood or similar) into the calipers to prevent this in case of inadvertent brake actuation.

The pads with the riveted brake lining can now be replaced by new ones.

7.5.1.7 REMOVAL AND INSTALLATION OF LANDING GEAR LEGS

- Loosen all attachments to the frame.
- Remove locking screws in front of the main bearings.
- Push the bearing bolts out to the front and to the rear, respectively.

Installation is carried out in the reverse order.

7.5.2 TAIL WHEEL

Description: See section »3.5.2«

Lubrication: See section »6.5«

- Support tail cone to check tail wheel. Fully deflect rudder pedals left and right and check clearance between wheel and fuselage structure (and additional fairing, if applicable) and ease of operation.
- Check condition of fork (cracks, corrosion, deformation).
- Check condition of tire and observe the slip mark. The tire wears down within a relatively short time, since during maneuvering on the ground, the high inertia moment of the wing span of 25.07 m / 82.25 ft. counteracts the steering force.

INFLATION PRESSURE OF TAIL WHEEL TIRES

2.8 ± 0.2 bar / 41 ± 3 psi

- Check friction damping of tail wheel: If pushed to its upper stops (under load) the fork must show a heavy friction against turning.
- Check smooth steering of the fork if hanging free.
- Check axial and radial backlash of fork in its bearings (no diametrical backlash or tilting due to worn out upper bearing, sufficient clearance for rudder control when tail is lifted). Grease lower axial bearing if required (observe section »6.5«).

NOTICE

Never grease upper axial bearing of the tail wheel! The friction under load is required to prevent tail wheel shimmy.

- Check condition of steering assembly coupled to rudder (springs, rods).
- Check rods and springs for safe connection, especially when spring tension is relieved, by deflecting rudder to its stops.

7.6 FLIGHT CONTROL INSTRUMENTS AND PITOT AND STATIC PRESSURE SYSTEM

Description: See section »3.6«

Perform maintenance of the flight instruments according to instructions given by the manufacturer concerned. (Manufacturer documents see Annex A).

NOTICE

If equipment is changed, the instructions in section »3.8« and »9« must be observed.

7.6.1 CALIBRATION OF STALL WARNING SYSTEM (OPTIONAL)

IN-FLIGHT CALIBRATION

- Fly with a center of gravity position in the rear range with a total weight of 900 kg/1985 lb.
- Configuration for the calibration: Wing flap position 0°, landing gear and air brakes retracted, throttle 0%, propeller pitch T/O, wings level, not above 1000 m / 3300 ft MSL. Maintain a speed of 87 km/h / 47 kt.
- Turn adjustment screw until the acoustic warning is actuated.
- Check several times.

SECOND CHECK CONFIGURATION

- Change wing flap position to L and throttle to IDLE°, the warning must operate at 80 km/h $\pm$ 3 km/h / 43 $\pm$ 1.5 kt

7.6.2 MAINTENANCE ON THE STATIC PRESSURE SYSTEM

See figure »3.6.a«

INSPECT AND CLEAN THE PRESSURE PORTS

Removable probe on the nose-cone (three ports: Static pressure, dynamic pressure, and TE-pressure) and the opening in the nose-cone for the stall warning positioned below the removable probe.

- Check pressure system for proper condition of air hoses and hose connections to instruments, to pressure ports and to each other.
- The flexible hoses and the filters/water separators must be replaced in case of contamination, embrittlement or cracks.
- If moisture has accumulated in the hoses, they must be removed and can be reused after they have been dried completely.

7.7 ELECTRICAL SYSTEM

Description: See section »3.7« and »Maintenance Manual (Line Maintenance) for ROTAX Engine Type 914 Series« (Annex E).

7.7.1 GENERAL

- Check wiring of entire electric system (observe section »5.2.4«). Specially check cable routing for sufficient supports, for chafing in the area of penetrations of cable (e. g. firewall) and for signs of overheating.
- Check condition of CB's, replace if required.
- Check any electrical device and all switches for proper installation, tight fit and proper cable connections.
- Check electrical switches in the cockpit for intended function. Perform this check during an engine test run, refer to section »7.4.1.17«.

REGULATOR VOLTAGE

Average:	13.75 V
Maximum:	14.20 V

The values indicated are valid for the engine bus with internal generator and main bus with external, belt driven, alternator.

7.7.2 BATTERIES

- Check condition of avionic battery (housing, contacts, state of charge) and starter battery.
- Check mounting assy. of main battery in forward tail cone.

Voltage drop of a charged main battery
as new at approximately 15° C during starter operation: 2 V

For maintenance on the batteries, please refer to the Manufacturer's Instructions (Annex A).

WARNING

If battery energy is not required for test purposes during any maintenance on the electrical system, the negative connection to the battery should be disconnected.

To remove the battery, disconnect the negative cable first. To install the battery, connect the positive cable first, then connect the negative.

The engine must never be started from the auxiliary, external electrical power receptacle (if installed) without the battery installed.

7.7.3 GROUNDING

- Check condition of cables and connections and tight fit of main grounding cable: Battery to engine suspension frame and grounding cable on LH engine suspension shock mount.
- Check condition of cables and connections and tight fit of grounding cables on fuel pumps.

7.7.4 E-BOXES

- Check condition of electric distribution box assy. on rear fuselage steel frame.
- Check tight fit of connections, tight fit of auxiliaries (capacitor, regulator) and fuses.
- Open E-boxes and check cables, connections and components for damage, fastening, foreign objects and moisture.

7.8 COMMUNICATION AND NAVIGATION EQUIPMENT

Description: See section »3.8«

During inspection and scheduled maintenance the following points must be observed:

- Check, if COM- and NAV-equipment installed correspond to the equipment lists.
- Check for correct installation and tight attachment.
- Check condition, function and - if applicable - records of operating times of the COM- and NAV-equipment.
- Check any antenna installed for condition, intended function and tight attachment.

Maintenance, inspection and adjustment of equipment installed according to the equipment list are performed according to instructions of the equipment manufacturers (see documents in Annex A).

NOTICE

If equipment is changed, the instructions in section »3.8« and »9« must be observed.

Equipment listed in chapter »9« can be installed without prior additional certification. Only these devices have been approved and faultless operation with respect to certification requirements has been verified by the type certificate holder.

In countries outside of the European Union, the equipment can be installed and operated only if it is certified also in the country in where the aircraft is registered.

If equipment will be installed which is not listed in the S12 Maintenance Manual, prior to the installation compliance with the relevant airworthiness requirements must be shown to the responsible aviation authority (i.e. »Modification to the Individual Aircraft« or »Major Modification«).

Upon changing of equipment and prior to Release to Service, the equipment list and, if relevant, the weight and balance report needs to be updated.

7.9 OPTIONAL - OXYGEN EQUIPMENT

Description: See section »3.9«

OXYGEN SYSTEM MOUNTING

- Check the oxygen system mounting, if installed as optional equipment, for condition and tight fit of components.

OXYGEN SYSTEM

Perform maintenance on the oxygen system in accordance with the instructions of the manufacturer (see Annex A).

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8. LIST OF PLACARDS AND THEIR POSITIONS

This section shows placards and their location.

NOTICE

The size of the depicted placards may deviate from the original size. The detailed and complete set of placards is available under part number »121990« and »121991«.

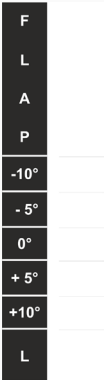
NOTICE

The units of limitations shown in the following placards must be adapted depending on the installed instrumentation and nationality. The values shown in chapter »2« of the S12 AFM apply. Affected placards are marked with *.

8.1 PLACARDS IN THE COCKPIT, FRONT

PLACARD	LOCATION/REMARKS
a) Descriptions / Displays: Manufacturer: STEMME AG Type: STEMME S10 Model: S12 Serial No.: 12- Year of Constr.: Certificated for: Never exceed Speed: V_{NE} 146 kt Manoeuvring Speed: V_A 97 kt Maximum Speeds - Rough Air: V_{RA} 97 kt - Land. Gear extended: V_{LO} 76 kt - Inflight Engine start: V_{PO} 76 kt - Flaps extended: $+5^\circ / +10^\circ$ V_{FE} 97 kt $L (+16^\circ)$ V_{FE} 76 kt Empty Mass: lb Max. Take-off Mass: 1984 lb Min. Seat Load (full water ballast and luggage) lb otherwise Min. Seat Load (no water ballast and luggage) lb Ballast Max. Cockpit Load: lb Tire inflation pressure Main Wheels: 37.7 psi Tire inflation pressure Tail Wheel: 40.6 psi WARNING: Check for WATER BALLAST and BAGGAGE in the tail before each flight. Do NOT FLY with WATER BALLAST and/or BAGGAGE without prior CG calculation (acc. to AFM 6.4) The placard is illustrated in reduced scale.	On the left side of the shaft tunnel*.

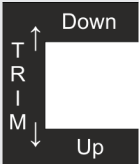
PLACARD	LOCATION/REMARKS																
NOSE HEAVY T R I M TAIL HEAVY	On the instrument panel next to the trim indication display.																
<table> <tr> <th>[ft MSL]</th><th>V_{NE} [kt IAS]</th></tr> <tr><td>10.000</td><td>139</td></tr> <tr><td>13.000</td><td>132</td></tr> <tr><td>16.000</td><td>125</td></tr> <tr><td>19.500</td><td>118</td></tr> <tr><td>26.000</td><td>105</td></tr> <tr><td>33.000</td><td>93</td></tr> <tr><td>39.500</td><td>81</td></tr> </table>	[ft MSL]	V _{NE} [kt IAS]	10.000	139	13.000	132	16.000	125	19.500	118	26.000	105	33.000	93	39.500	81	On top of the shaft tunnel cover between gas and chock lever.
[ft MSL]	V _{NE} [kt IAS]																
10.000	139																
13.000	132																
16.000	125																
19.500	118																
26.000	105																
33.000	93																
39.500	81																
(Nationality and registration)	On the instrument panel.																
FUEL DIFF. PRESS 2.5 +/- 1.0	Next to the fuel diff. pressure indication display.																
Baggage: Only light items Total: max. 0.3 kg / 0.66 lb	On the flap of the front storage compartment in center tunnel cover*.																
Do not rely on fuel flow instrument to determine fuel level in tanks.	Near the fuel flow instrument (if option is installed).																
L +10° + 5° 0° - 5° -10°	On the flap indication wheel at the forward shaft tunnel cover.																
The placard is illustrated in reduced scale.																	

PLACARD	LOCATION/REMARKS
 The placard is illustrated in reduced scale.	Next to the flap lever of the pilot and copilot seat.

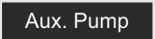
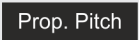
PLACARD	LOCATION/REMARKS
a) Handles:	
Canopy Jettison	Next to the canopy jettison knob in the lower center part of the instrument panel.
L / G UP ↑ DOWN ↓	Below the MLG-switch in the lower center part of the instrument panel.
	Canopy jettison symbol. On the top of the canopy jettison knob.
Open FLAPS Close	On the head of the cowl flap operation knob.
Propeller 1 Brake2 Position	On the center instrument panel support below the propeller brake and the position handles.
↑ Unlock- ↑ Unlock- Power ON Push Forward - Lock ↓ - Lock ↓	On the top of the nose-cone lever.
1	On the top of the propeller brake handle.
2	On the top of the propeller position handle.

PLACARD	LOCATION/REMARKS
Airbrakes ← Open Closed →	On the right side of the shaft tunnel cover near the copilot air brake lever and on the left cockpit side wall near the pilot air brake lever.
Pedal Adjustment	On the top of the pedal adjustment knob for the pilot and the copilot seat.
Canopy Defroster Pull: OPEN Push: CLOSED	On the center instrument panel support next to the venting knob for the canopy.
Parking Brake	Next to the parking brake knob on the pilots seat between the pilots legs.
On	Right of the parking brake knob on the pilots seat between the pilots legs (90° position).
Off	Above the parking brake knob on the pilots seat between the pilots legs (0° position).
Cold Air Supply	Next to the cold air supply nozzles left and right on the instrument panel.
Open Closed	Canopy frame next to the locking levers; location corresponding to function.

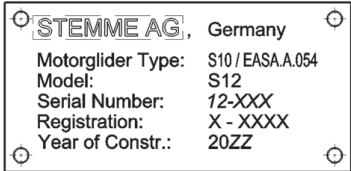
PLACARD	LOCATION/REMARKS
c) Switches:	Next to the auxiliary fuel pump switch in the lower center part of the instrument panel.
M a s t e r s Main Engine	Next to the master switch in lower center part of the instrument panel.
Main Batt. ↑ Eng. Batt. ↓	Next to the selector switch for the voltage and the ampere indication in the instrument panel.
TCU - Emergency	Next to the TCU emergency knob at the instrument panel.
L ← Both → R 2 x 59.3 l / 15.6 US gal.	Above the fuel tank selector switch in the lower center part of the instrument panel*.

PLACARD	LOCATION/REMARKS
Fuel Tank	Below the fuel tank selector switch in the lower center part of the instrument panel.
Microphone	Next to the selector switch for the microphone/headset.
	On the top of the pilots control sticks around the trim operation switch.
	Below the MLG-switch in the lower center part of the instrument panel.
Label for every additional switch, naming so that the function of the switch is clearly comprehensible by the crew.	Next to the corresponding switch.

PLACARD	LOCATION/REMARKS
d) Fuses /Circuit breakers: 	Next to the landing gear circuit breaker in the lower center part of the instrument panel.
Label for every additional fuse, naming so that the function of the fuse is clearly comprehensible by the crew.	Next to the corresponding fuse.

PLACARD	LOCATION/REMARKS
e) Warn and Caution Lights: 	Next to the landing gear indication lights.
	Next to the indication light of the auxiliary fuel pump.
 The placard is illustrated in reduced scale.	Next to the corresponding indication light.
	Next to the propeller pitch control indication light.
	Next to the fire warning indication light.

8.2 PLACARDS IN THE COCKPIT, REAR

PLACARD	LOCATION/REMARKS
a) Descriptions / Displays: Only logbook or lights items up to max. 0.5 kg / 1.10 lb	On the flap of the rear storage compartment in the center tunnel cover*.
Baggage max. 10 kg / 22.05 lb	On the top edge of the luggage compartment behind the pilot and copilot seats*.
Baggage: Only light items Total: max. 2 kg / 4.41 lb	On the lower edge of the luggage compartments behind/between the pilot and copilot headrests*.
Oxygen Cylinder Mounting: max. 9 kg / 20 lb per bottle	On the lower edge of the luggage compartment behind/between the pilot and copilot headrests (if option is installed)*.
 102 mm / 4.01 in 50 mm / 1.97 in The placard is illustrated in reduced scale.	Fireproof Type Placard, on the rear cockpit wall.

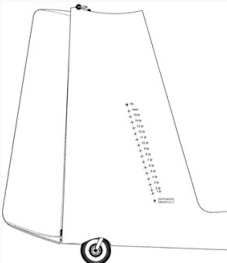
PLACARD	LOCATION/REMARKS
b) Handles: 1 Emergency Gear Pull First (red)	On the top of the landing gear emergency extension handle for the right landing gear strut (right knob in flight direction).
2 Emergency Gear Pull Second (red)	On the top of landing gear emergency extension handle for the left landing gear strut (left knob in flight direction).
Fuel valve Fuel 2x 59.3 l / 2x 15.6 US gal. EN 228 Super EN 228 Super Plus AVGAS 100LL	Right to the fuel shut-off valve*.
Pilot Headset	Near the pilots headset connectors.
Copilot Headset	Near the copilots headset connectors.

PLACARD	LOCATION/REMARKS
c) Switches: Label for every additional switch, naming so that the function of the switch is comprehensible clearly comprehensible to the crew.	Next to the corresponding switch.

PLACARD	LOCATION/REMARKS
d) Fuses /Circuit breakers: Label for every additional fuse, naming so that the function of the fuse is clearly comprehensible to the crew.	Next to the corresponding fuse.

PLACARD	LOCATION/REMARKS
e) Warn and Caution Lights: Label for every additional warning or caution lights, naming so that the function of the light is clearly comprehensible to the crew.	Next to the corresponding light.

8.3 PLACARDS ON FUSELAGE

PLACARD	LOCATION/REMARKS
Baggage max. 20 kg / 44.09 lb	Placard on the upper cover of the tail-boom luggage compartment*.
Coolant Fluid	On the coolant fluid reservoir on the left side of the landing gear compartment.
Brake Fluid DOT 4	On the brake fluid reservoir on the forward side of the landing gear compartment.
Detergent Oil API-SF or API-SG	On the right rear side of the steel frame near the oil reservoir.
	Markings of the water ballast holes in the tail boom next to the holes.

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9. EQUIPMENT

9.1 MINIMUM EQUIPMENT LIST

NOTICE

This Minimum Equipment List (MEL) does not comply with a Master Minimum Equipment List (MMEL) as part of the operational suitability data.

Subject	Manufacturer	Type	TC No., Specification No.	Range, Remarks
Airspeed Indicator	Winter	6FMS4	TS10.210/15	up to 300 km/h
				up to 300 km/h and v_{NE} depending on the altitude
				up to 180 mph
				up to 160 kt
				up to 160 kt and v_{NE} depending on the altitude
	Winter	7FMS4	TS10.210/19	up to 300 km/h
				up to 300 km/h and v_{NE} depending on the altitude
				up to 180 mph
				up to 160 kt
				up to 160 kt and v_{NE} depending on the altitude
Altimeter	Winter	4FGH10	TS10.220/46	up to 10.000 m
				up to 30.000 ft
	Winter	4FGH20	TS10.220/47	up to 10.000 m
				up to 30.000 ft
	Winter	4FGH40	TS10.220/48	up to 20.000 ft
	Aerosonic	101735-0110...	FAA TSO C-10b	35.000 ft
	United Instr.	S939 PM-3		20.000 ft
	United Instr.	5934PAD-A132		35.000 ft
	Kollmann	A-37		80.000 ft
	Smith	KAA 1803		50.000 ft
Compass	Airpath	C2300		-
	Airpath	C2400		-

Subject	Manufacturer	Type	TC No., Specification No.	Range, Remarks
Compass	Ludolph	FK16	10.410/3	-
	Ludolph	FK5	10.410/1	-
	Hamilton	HI400	TSO C7c Type 1	-
	Precision Aviation Inc.	PAI-700	TSO	-
Tachometer	ROTAX	966 403	-	up to 7000 min-1
Engine hour meter	Winter	FSZM	TS-GW 1510	-
	VDO	331.811/010/2	-	-
Engine hour meter	Honeywell	85094	-	-
Oil pressure indicator	UMA Instruments	T04113U010B030	-	up to 10 bar
Oil temperature indicator	UMA Instruments	T12116R150C010	-	up to 150°C / 302°F
Fuel contents indicator LH, RH	UMA Instruments	T18112F1F4	-	-
CHT indicator LH, RH	UMA Instruments	T12116R150C010	-	up to 150°C / 302°F
Voltmeter	UMA Instruments	N141100917V0A0	-	9-17 V
Ammeter	UMA Instruments	N15110003CA000	-	±30 A
Four point seat belt	Gadringer	BaGu 5203 SchuGu 2700	40.070/32 40.071/05	-
	Schroth	Automatic Shoulder belt, left Automatic Shoulder belt, right	SL/1-08-C702 (with stop) SR/1-08-C702 (with stop)	-
Back Cushion	One per seat compressed 50 mm/2 in thick. (If no parachutes are used.)			

9.2 SUPPLEMENTARY EQUIPMENT

Depending on operational and environmental conditions, further equipment may be mandatory or supplementary to the minimum compulsory equipment. The supplementary equipment allowed to be installed is listed in the following selection list.

Certification in standard configuration is only approved for daytime VFR flights. According to operational requirements additional lighting equipment may be required.

Subject	Manufacturer	Type	TC No., Specification No.	Range, Remarks	Part No. (STEMME)
Lighting Equipment					
ACL/Position Lights	Whelen/STEMME	OR6001G		Contact manu- facturer before installation of additional light- ing equipment	
Landing Light	Whelen/STEMME	Various			
Reserved					

9.3 ADDITIONAL EQUIPMENT AND SYSTEMS

Different equipment and systems may be installed in the motorglider S12, which are not part of the minimum or supplementary equipment and which normally are not series standard. Basically the cases »Additional Equipment« and »Optional Systems« have to be distinguished and treated differently.

9.3.1 ADDITIONAL EQUIPMENT

In addition to the minimum and supplementary equipment, installation of the following devices is approved. A precondition is that the electrical energy requirements remain within certified limits and the certified weight of equipment in the instrument panel is not exceeded.

Depending on the instrument panel type the following maximum equipment weights are certified.

Panel Type	Max. Equipment Weight
Standard	8 kg / 17.64 lb
Ultimate	12 kg / 26.46 lb
Premium	14 kg / 30.86 lb

Additionally a ground and flight test must be performed, showing electromagnetic compatibility (EMC). Changes of equipment may be performed by competent personnel only. An inspector must confirm the correct installation by an entry in the aircraft-logbook, the EMC-test flight, the continued compliance to the electrical energy requirement limit and the inclusion of the changes into the equipment list and the weight and balance report. The above-mentioned inspection and operation documents must be added to »Annex C« of the S12 Maintenance Manual.

Subject	Manufacturer	Type	TC No., Specification No.	Range, Remarks
Mechanical Variometer	various	various	-	-
VHF-COM	various	various	-	All approved TSO/ ETSO equipment.
Intercom	PS Engineering	PM 1000 II	-	And mechanically identical, all equip- ment, which is per- manently mountable to the instrument panel due to its own chassis or due to a suitable installation frame.
	TELEX	Pro Com 4	-	
	Sigtronics	SPA-400	TSO	
	Flightcom	403-MC	-	
	Flightcom	ATC-2	-	
Transponder	various	various	-	All approved TSO/ ETSO equipment.
Encoder	various	various	-	All approved TSO/ ETSO equipment.
Emergency Transmitter (ELT)	various	various	-	All approved TSO/ ETSO equipment.
GPS & Moving Map	various	various	-	All equipment, which is permanently mountable to the in- strument panel due to its own chassis or due to a suitable installation frame.
EFIS	Dynon Avionics	EFIS D-10 System	-	-
Electronic Vario, Soaring Computer	various	various	-	All equipment, which is permanently mountable to the in- strument panel due to its own chassis or due to a suitable installation frame.
Collision warning system	various	various	-	
VHF NAV (VOR)	various	various	-	All approved TSO/ ETSO equipment.
Horizon	various	various	-	All approved TSO/ ETSO equipment, which is permanently mountable to the in- strument panel due to its own chassis or due to a suitable installation frame.
Turn and Bank Indicator	various	various	-	
Directional Gyro	R.C.Allen	RCA15AK-2	-	
Fire Warning System	STEMME AG		-	Standard equipment.

9.3.2 OPTIONAL SYSTEMS

Optional systems are not normally included in the S12 Aircraft Maintenance Manual. A Service Bulletin is assigned to each of these systems delivered by STEMME, providing the information necessary for correct installation and inspection (e. g. Serial No.'s, Documents, supplementary procedures).

If installation requires additional instructions, an installation instruction is provided. If flight operation requires additional information, supplements to the Flight Manual are provided. Information required for maintained airworthiness are published as maintenance instructions, to be inserted in the Annex A of the S12 Aircraft Maintenance Manual and added to the list of maintenance instructions on the cover sheet of Annex A.

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10. LIST OF SPECIAL TOOLS

The following list includes tools, which may be required for maintenance of the S12 in addition to standard tools normally available in facilities performing maintenance on light aircraft.

- Precision protractor for propeller blade adjustment.
- Torque wrench.
- Spark plug wrench.
- Borescope.
- Micrometer.
- Inclinator.
- Spring scale (up to approx. 250 N / 56.20 lbf).
- TCU Communication Program (ROTAX Monitoring Kit, refer to »Maintenance Manual (Heavy Maintenance) for ROTAX Engine Types 912 and 914 Series«, section 76-00, subsection 3.1.1.
- Further tools and devices for maintenance of the engine: See »Maintenance Manual (Heavy Maintenance) for ROTAX Engine Types 912 and 914 Series«, section 00, subsection 10.6.
- Re-fill Adapter for hydraulic brake system (P/N: 00FO-B17.)

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11. LIST OF MAINTENANCE DOCUMENTS FOR PARTS BEING APPROVED INDEPENDENTLY FROM THE AIRCRAFT

ANNEX A COMPRISES

- Manufacturer's maintenance documents for all instruments specified in the equipment list for the aircraft serial number indicated on the title page.
- Procedural instruction »Dynamic balancing of the STEMME S 10 motorglider propeller in the S10-V and S10-VT models« A17-10AP-V/2-E.
- »Small Repairs of Composite Materials« P520-901.502 a repair guide by the STEMME Company for STEMME aircrafts.
- Instructions for the maintenance of "L'Hotellier" ball and swivel joints.

Maintenance instructions for equipment delivered by STEMME must be entered in the list on the cover sheet of Annex A, if the relevant equipment is installed in the aircraft serial number corresponding to the S12 Aircraft Maintenance Manual.

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THIS ANNEX COMPRISES

- Manufacturer's maintenance documents for all instruments specified in the equipment list for the serial number indicated on the title page.
- Procedural instruction »Dynamic balancing of the STEMME S 10 motorglider propeller in the S10-V and S10-VT models« A17-10AP-V/2-E.
- »Small Repairs of Composite Materials« P520-901.502 a repair guide by the STEMME Company for the STEMME aircrafts.
- Instructions for the maintenance of "L'Hotellier" ball and swivel joints.
- Maintenance instructions by STEMME as entered in the list below. This list must comprise at least those Maintenance Instructions relating to the additional equipment installed (refer to the record of accomplished SB's/AD's under Annex B).

[illegible]

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ANNEX B: SERVICE BULLETINS, AIRWORTHINESS DIRECTIVES

THIS ANNEX COMPRISES

- The »List of Airworthiness Directives and Service Bulletins« issued by the manufacturer for the aircraft type STEMME S10 (Document No. A31-10-000).
- The record of accomplished SB's/AD's for this serial number.
- All Service Bulletins already accomplished as well as those still to be accomplished.

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ANNEX C: DOCUMENTS (INSPECTION AND OPERATION REPORTS)

This Annex comprises any original documents for the serial number indicated on the title page which may be of importance to maintenance and repair. Those documents are listed in the table below.

CAUTION

Upon any Repair or Inspection the S12 Aircraft Maintenance Manual must be submitted including a complete Annex of documents, to allow inspection reporting and continuing of operative documentation in accordance with the rules.

New documents which must be added (e.g. new weight and balance record, revised equipment list or inspection certificates for instruments newly installed) are to be filed in this Annex. Documents which are no longer relevant should be kept in a separate file (service records).

Document	always	if any
Certificate of Conformity Inspection.	X	
Certificate of Avionic-Inspection.	X	
Last Certificate of Inspection for Continued Airworthiness.		X
Last Certificate of Inspection for Continued Airworthiness (Avionic).		X
Latest Records of Conformity Inspection or Inspection for Continued Airworthiness.	X	
Latest records of Avionic-Inspection or Inspection for Continued Airworthiness (Avionic).	X	
Release Certificate – Engine.	X	
Release Certificate – Propeller.	X	
Inspection Certificate for any instruments installed according to the Equipment List (except for engine instruments and other instruments not subject to certification).	X	
Component Card for engine, propeller, front gear, clutch, drive shaft.		X
Review of Operating Times.	X	
Current Equipment List.	X	
Latest Rigging Report (controls).	X	
Latest Rigging Report (variable pitch propeller).	X	
Latest Report of Dynamic Balancing.	X	
Latest Weight and Balance Record.	X	
Report Control Surface Weights and Hinge Moments.	X	
Latest Report on Compass Compensation.	X	

Document	always	if any
Flight Report related to the production inspection or to the last inspection for Continuing Airworthiness.	X	
List of Constructional Deviations ("minor modifications").		X
Latest Energy Balance Report following installation of Additional Instrumentation according section »9.3.1«		X

ANNEX D: MAINTENANCE AND INSPECTION FORMS

This section provides patterns of maintenance and inspection forms, relevant to maintenance according to sections »6« and »7«.

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STEMME	Weight and balance report STEMME S12	Document Number
		1001-12-S12-2
		Page 1 (of 2)

Serial Number:	Registration:	Relevant Equipment List:	Order No.:
----------------	---------------	--------------------------	------------

☐ This Weight and Balance Report was drawn up without weighing. Any weighing data have been taken from the Weight and Balance Report dated _____ and if need be corrected according to point 4.2.

Drawing Up Reason: ☐ Conformity Inspection
☐ Changes of Equipment:
☐ Repair. Date of Findings Report: _____
☐ Other: _____

1. Preparation and Conditions

- 1.1. The fuselage weight must be determined including rudder, back rests with cushions or equivalent upholstery, seat cushions, canopy, standard tool kit in baggage compartment behind backrest, Logbook and Flight Manual. Replenish oil and coolant if necessary. Fixed ballast must be installed, loose ballast must be removed.
- 1.2. Wing weight must be determined with bolts and 1.4 l / 0.31 imp. gal (unusable volume).
- 1.3. Fixed supplementary equipment must be installed.
- 1.4. Points 1.2 through 1.4 must be observed if an overall weighing of the powered glider is performed. The canopy has to be closed during weighing.
- 1.5. If weight and moment arm of additionally installed or removed items is known exactly, the new CG may be determined numerically (see point 4.2)

2. Overview of Component Weights and Weight Limits

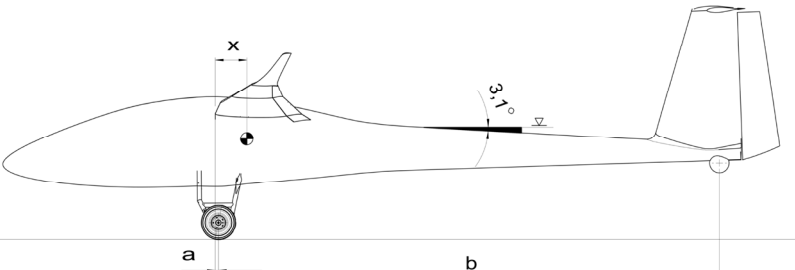
Component Weights from Separate Weighing	[kg] [lbs]***	[kg] [lbs]***	Weight Limits	[kg] [lbs]***
Central Wing			Maximum All Up Weight (incl. Fuel)	900kg 1984 lbs
Right Hand Outer Wing			Maximum Weight of Non-Lifting Parts NLP_{max} (incl. Load in Cockpit)	610kg 1345lbs
Left Hand Outer Wing			Of that: Maximum weight of equipment on Instrument Panel, without Minimum Equipment	7kg / 15.4 lbs 11 kg / 24.2 lbs
Fuselage			Maximum Load (MTOW - Empty Weight)	
Horizontal Tail			Max. Load in Cockpit (NLP _{max} - LNT**; maximum 202 kg / 445 lbs, of that max. 180 kg / 397 lbs in seats, max. 110 kg / 243 lbs in each seat and max. 22 kg / 48.5 lbs in baggage compartments) Cockpit load must be at least 10 kg / 22 lbs less than maximum load!	
Component Weight Sum				
	Empty Weight*	LNT**		

* Cross-check: compare with empty weight from 3.; Divergence of 2 kg / 4.4 lbs due to measure error is allowable.

** LNT: Empty weight of "Non Lifting Parts"

*** Units: cross out if not applicable

3. Determining of Empty Weight and Moment Arms

Weights and Moment Arms ***:			Datum level: Leading Edge of Central wing, vertical plane	Pitch: wedge 1000:54,2 (3,1°) on tail cone, upper edge horizontal
forward RH	m_r	kg / lbs		
forward LH	m_l	kg / lbs		
Tail Wheel	m_s	kg / lbs		
Σ =Empty Weight	m_e	kg / lbs		
Moment Arm	a	mm / in.		
Moment Arm	b	mm / in.		

STEMME	Weight and balance report STEMME S12	Document Number 1001-12-S12-2 Page 2 (of 2)
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4. Determining of Empty Weight Center of Gravity

4.1. After Weighing:

$$x_S = \frac{m_s \cdot b}{m_e} + a \quad [\text{mm / in.}]^{***} \Rightarrow x_S = \frac{\quad \times \quad}{\quad} + \quad = \quad \text{mm / in.}^{***}$$

4.2. After Changes, without Weighing:

Following changes have been made on the powered glider:

Install. / Removal	Item	Weight (+/-) $m = [\text{kg / lbs}]^{***}$	Moment Arm (+/-) $x = [\text{mm / in.}]^{***}$	Moment (+/-) $M = [\text{mm kg / in. lbs}]^{***}$
<i>Sum m_{add}</i>			<i>Sum M_{add}</i>	-

NOTE: Count weight installed positive, weights removed negative.
Count moment arms aft of datum positive, in front of datum negative.

$$x_{S,new} = \frac{m_{old} \cdot x_{old} + M_{add}}{m_{add}} [\text{mm / in.}]^{***} \Rightarrow x_{S,new} = \frac{\quad \times \quad}{\quad} + \quad = \quad \text{mm / in.}^{***}$$

5. Definition of load

Empty Weight:		kg / lbs***
Empty weight CG aft of datum:		mm / in. ***
Minimum Load Required on seat (full water ballast and luggage)	(otherwise ballast)****	kg / lbs***
Minimum Load Required on seat (empty water ballast and luggage)		kg / lbs***
Maximum Load (MTOW - Empty Weight)		kg / lbs***
Max. Load in Cockpit (Cockpit load must be at least 10 kg / 22 lbs less than maximum load!)		kg / lbs***

^{***} Units: cross out if not applicable

^{****} According to Maintenance Manual, Section 6.3

Strausberg, _____

Site, Date

Stamp

Sign Job Leader

Inspector Statement: All measured data are within the allowable ranges and correspond to the production and maintenance instructions of the type.

Strausberg, _____

Site, Date

Stamp

Sign Inspector

	Rigging Report STEMME S12	Document-No.: 1001-08-S12-2
DE.21G.0068		Page 1 (of 2)

Serial Number: 12-	Registration: -		Order No.:
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Drawing Up Reason: ☐ Conformity Inspection
☐ Inspection. Date of Finding Report:
☐ Other:

1. Angle of Incidence

The following rated values and actual values of the angles of incidence apply to the upper edge of a wedge 1000:84 on the straight part of the tail cone, with its vertex in flight direction.

Inspection of the angle of incidence is required for the Conformity Inspection and an Inspection following a heavy landing, furthermore after Major Repair, if wing and/or tail mountings have been affected.

	Rated	Reading
Angle of Incidence of the Wing Chord:	+2.0° ± 0.2°	°
Angle of Incidence of the Horizontal Tail Chord:	-2.0° ± 0.2°	°
Secondary Condition: The difference of actual angles of incidence wing/horizontal tail must be between 3.7° and 4.4°		°

2. Control Surface Deflections

Positive values (+) indicate full control surface deflections downward or left, negative Values (-) indicate deflections upward or right.

Elevator: Measuring point is trailing edge of inner rib of elevator (140 mm / [5.51 in.] from hinge line).				
	Rated	Reading *	Rated	Reading *
Full Deflection:	- 44 +2/-5 mm [-1.73 +0.08/-0.2 in.]	mm [in.]	+ 44 +5/-2 mm [+1.73 +0.2/-0.08 in.]	mm [in.]

Rudder: Measuring point is lower rear corner of control surface (420 mm / [16.5 in.] from hinge line).				
	Rated	Reading *	Rated	Reading *
Full Deflection:	+220 ± 15 mm [+8.7 ± 0.6 in.]	mm [in.]	-220 ± 15 mm [-8.7 ± 0.6 in.]	mm [in.]

Wing Flaps and Ailerons:									
Flap Lever Position	Control Stick Position	Measurement points: 1) aileron: inner rib of the control surface, 163 mm / 6.42 in. from hinge line. 2) wing flap: inner rib of the control surface, 175 mm / 6.89 in. from hinge line.							
		left aileron		left wing flap		right wing flap		right aileron	
		Rated mm [in.]	Reading* mm [in.]	Rated mm [in.]	Reading* mm [in.]	Rated mm [in.]	Reading* mm [in.]	Rated mm [in.]	Reading* mm [in.]
- 10°	neutral			-31 ± 4 [-1.22 ± 0.16]		-31 ± 4 [-1.22 ± 0.16]			
- 5°	neutral			-15 ± 4 [-0.6 ± 0.16]		-15 ± 4 [-0.6 ± 0.16]			
0	left	-48 ± 4 [-1.89 ± 0.16]						+27 ± 3 [+1.06 ± 0.12]	
	neutral	0 ± 2 [0 ± 0.08]		0 ± 2 [0 ± 0.08]		0 ± 2 [0 ± 0.08]		0 ± 2 [0 ± 0.08]	
	right	+27 ± 3 [1.06 ± 0.12]						-48 ± 4 [-1.89 ± 0.16]	
+ 5°	neutral			+15 ± 4 [+0.6 ± 0.16]		+15 ± 4 [+0.6 ± 0.16]			
+ 10°	neutral			+31 ± 4 [+1.22 ± 0.16]		+31 ± 4 [+1.22 ± 0.16]			
L (+16°)	neutral			+51 ± 4 [+2 ± 0.16]		+51 ± 4 [+2 ± 0.16]			

erstellt / bearbeitet:	Freigabe:	Ausgabe vom:	ersetzt Ausgabe vom:	Nicht belegt!
	Rutz	01.08.2011		

	Control Surface Masses and Hing Moments Report STEMME S12	Document No.:
		1001-12-S12-6
		Page 1 (of 1)

Serial No.: 12-	Registration:		Order No.:
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Control Surface	Mass of Control Surface		Hinge Moment of Control Surface			Force at trailing edge		
	Rated kg [lb]	Reading * kg [lb]	Rated Ncm [lbf ft]	Reading * Ncm [lbf ft]		Rated Value N [lbf]	Reading * N [lbf]	
		left right		left right		Measuring point	left right	
Aileron (outer wing)	4,1 [9.02] to 5,0 [11]		66,7 [0.5] to 106,7 [0.79]			9.2 (2.07) to 12.2 (2.74) at inner operating rod. r = 14.3 cm (5.63 in.)		
Aileron (wing extension)	0,95 [2.1] to 1,3 [2.86]		-1,9 [-0.01] to 2,19 [0.02]			-0,19 (-0.04) to 0,219 (0.05) at inner end rib r = 10.7 cm (3.94 in.)		
Wing Flap	3,0 [6.6] to 4,1 [9.02]		179 [1.34] to 246 [1.84]			11.6 (2.61) to 15.8 (3.55) at operating rod r = 17.2 cm (6.77 in.)		
Elevator**	0,89 [1.96] to 1,16 [2.55]		25,3 [0.19] to 35,4 [0.27]			2.0 (0.45) to 2.7 (0.61) at inner end rib r = 14.0 cm (5.51 in.)		
Rudder	2,26 [4.97] to 3,10 [6.82]		194 [1.46] to 266 [2]			4.3 (0.967) to 5.3 (1.19) at bottom rear corner r = 42.0 cm (16.7 in.)		

* Units: cross out if not applicable, reading Error $\leq 2,5\%$ acceptable

**left and right half of elevator separately

Measuring of Static Hinge Moment

The relation between hinge moment and force is:

$$\text{static hinge moment } M = F \cdot r,$$

wherein F is the force measured at the trailing edge of the control surface, and r is the horizontal distance between trailing edge and hinge axis. F may be measured with a spring balance or another suitable scale with an error in measurement not exceeding 2.5%.

The friction of the hinge bearing should be less than 2.5 % of the maximum permissible hinge moment. If the detached control surface is curved to the front or to the back at least three points should be used to ensure that the curvature is eliminated and thus cannot falsify the measurement.

Measuring Procedure with Attached Control Surface (not applicable with rudder):

The surface is to be kept in horizontal position by means of the spring balance. Then move the balance slowly upwards (by hand) and enter the force and direction of movement in the record at which the control surface overcomes the static friction and starts going (e.g.: 11.2 N $\uparrow$).

After that, starting from the horizontal position again, the spring scale is to be slowly lowered until the control surface starts moving. Note again force and direction (e.g. 10.8 N $\downarrow$).

Both results must be within the limits given in the above table.

_____ Site, date	_____ Stamp	_____ Sign
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Inspector Statement

The control surface masses and hinge moments are within the allowable ranges and correspond to the production and maintenance instructions of the type.

_____ Site, date	_____ Stamp	_____ Sign
---------------------	----------------	---------------

	Propeller Adjustment Report STEMME 11AP-V	Document number:
		0901-05-S10-7
DE.21G.0068		Page: 1 (of 2)

Serial No. of Propeller:	Order No.:
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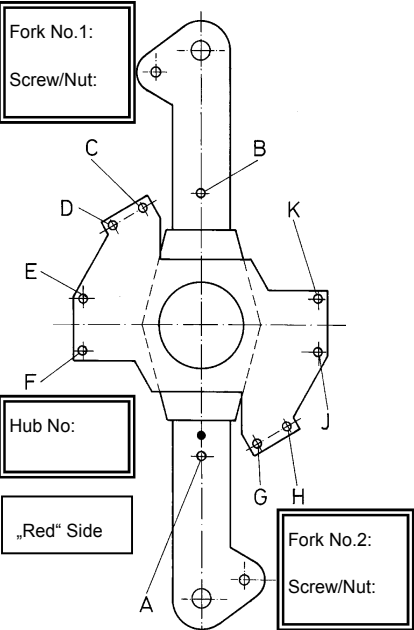
Drawing Up Reason: ☐ Conformity Inspection

☐ Repair or Inspection. Date of Finding Report: _____

☐ Other: _____

No.	Item or inspection to be performed / inspection results	performed	checked																																			
1.	Center of gravity [mm/ in.]*, mass [g] and radial mass-moment [gm] <table border="1" style="width: 100%;"> <thead> <tr> <th colspan="2"></th> <th>m [g/ dr.]</th> <th>z [mm/ in.]</th> <th>J_z [gm]</th> <th>x [mm/ in.]</th> <th>y [mm/ in.]</th> </tr> </thead> <tbody> <tr> <td>Propeller blade 1:</td> <td>blank</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>1 AP-VB/ /</td> <td>finished</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Propeller blade 2:</td> <td>blank</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>1 AP-VB/ /</td> <td>finished</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table> Blade No. 2 was marked red and installed on the corresponding side.			m [g/ dr.]	z [mm/ in.]	J _z [gm]	x [mm/ in.]	y [mm/ in.]	Propeller blade 1:	blank						1 AP-VB/ /	finished						Propeller blade 2:	blank						1 AP-VB/ /	finished							
		m [g/ dr.]	z [mm/ in.]	J _z [gm]	x [mm/ in.]	y [mm/ in.]																																
Propeller blade 1:	blank																																					
1 AP-VB/ /	finished																																					
Propeller blade 2:	blank																																					
1 AP-VB/ /	finished																																					

2.	Bearings (check appropriate block and complete items as indicated) <table border="1" style="width: 100%;"> <thead> <tr> <th colspan="2"></th> <th>P/N</th> </tr> </thead> <tbody> <tr> <td rowspan="4"> ☐ Variation 1 → Needle bearings with inner rings and needles </td> <td>Blade No. 1</td> <td>Inner ring</td> </tr> <tr> <td></td> <td>Needles</td> </tr> <tr> <td>Blade No. 2</td> <td>Inner ring</td> </tr> <tr> <td>(„red“ side)</td> <td>Needles</td> </tr> <tr> <td colspan="2"> ☐ Variation 2 → Needle bearings with needle cages </td> <td>---</td> </tr> </tbody> </table>			P/N	☐ Variation 1 → Needle bearings with inner rings and needles	Blade No. 1	Inner ring		Needles	Blade No. 2	Inner ring	(„red“ side)	Needles	☐ Variation 2 → Needle bearings with needle cages		---		
		P/N																
☐ Variation 1 → Needle bearings with inner rings and needles	Blade No. 1	Inner ring																
		Needles																
	Blade No. 2	Inner ring																
	(„red“ side)	Needles																
☐ Variation 2 → Needle bearings with needle cages		---																

3.	Balance weight washers [number and type] <table border="1" style="width: 100%;"> <thead> <tr> <th>Pos</th> <th>Number</th> <th>P/N</th> <th>Weight (sum) [g]</th> </tr> </thead> <tbody> <tr><td>A</td><td></td><td></td><td></td></tr> <tr><td>B</td><td></td><td></td><td></td></tr> <tr><td>C</td><td></td><td></td><td></td></tr> <tr><td>D</td><td></td><td></td><td></td></tr> <tr><td>E</td><td></td><td></td><td></td></tr> <tr><td>F</td><td></td><td></td><td></td></tr> <tr><td>G</td><td></td><td></td><td></td></tr> <tr><td>H</td><td></td><td></td><td></td></tr> <tr><td>J</td><td></td><td></td><td></td></tr> <tr><td>K</td><td></td><td></td><td></td></tr> </tbody> </table>  Remarks:	Pos	Number	P/N	Weight (sum) [g]	A				B				C				D				E				F				G				H				J				K					
Pos	Number	P/N	Weight (sum) [g]																																												
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J																																															
K																																															

erstellt / bearbeitet:	Freigabe:	Ausgabe vom:	ersetzt Ausgabe vom:	Nicht belegt!
Affeld	Rutz	08.02.2013	21.06.2011	

	Propeller Adjustment Report STEMME 11AP-V	Document number: 0901-05-S10-7
		Page: 2 (of 2)

No.	Item or inspection to be performed / inspection results	performed	checked
-----	---	-----------	---------

4.	Propeller all up weight [g] (incl. front cover)	m =	g		
----	---	-----	---	--	--

5.	Clearance in blade bearings [mm / in.] (Measured in direction of rotation axle)												
		<table border="1"> <thead> <tr> <th></th> <th>Blade 1</th> <th>Blade 2 („red“ side)</th> </tr> </thead> <tbody> <tr> <td>a) at fork: (No perceptible play)</td> <td>mm / in.</td> <td>mm / in.</td> </tr> <tr> <td>b) at blade tips: (max. 4 mm / 0.157 in.)</td> <td>mm / in.</td> <td>mm / in.</td> </tr> </tbody> </table>		Blade 1	Blade 2 („red“ side)	a) at fork: (No perceptible play)	mm / in.	mm / in.	b) at blade tips: (max. 4 mm / 0.157 in.)	mm / in.	mm / in.		
	Blade 1	Blade 2 („red“ side)											
a) at fork: (No perceptible play)	mm / in.	mm / in.											
b) at blade tips: (max. 4 mm / 0.157 in.)	mm / in.	mm / in.											

6.	Track of propeller blades [mm / in.] (Difference between axial position of both blades)									
		<table border="1"> <tbody> <tr> <td>a) at folding joint: (max. 0.3 mm / 0.012 in.)</td> <td></td> <td>mm / in.</td> </tr> <tr> <td>b) at blade tips: (max. 3.0 mm / 0.12 in.)</td> <td></td> <td>mm / in.</td> </tr> </tbody> </table>	a) at folding joint: (max. 0.3 mm / 0.012 in.)		mm / in.	b) at blade tips: (max. 3.0 mm / 0.12 in.)		mm / in.		
a) at folding joint: (max. 0.3 mm / 0.012 in.)		mm / in.								
b) at blade tips: (max. 3.0 mm / 0.12 in.)		mm / in.								

7.	Propeller fork incidence angle [°] (check appropriate items)																								
		<table border="1"> <thead> <tr> <th></th> <th>Blade 1</th> <th>Blade 2 („red“ side)</th> </tr> </thead> <tbody> <tr> <td>a) T/O- setting:</td> <td></td> <td></td> </tr> <tr> <td>☐ 10AP-V: -3°18' ± 5'</td> <td>° ' ,</td> <td>° ' ,</td> </tr> <tr> <td>☐ 11AP-V: -2°30' ± 5'</td> <td></td> <td></td> </tr> <tr> <td>b) Cruise- setting:</td> <td></td> <td></td> </tr> <tr> <td>☐ 10AP-V: +3°6' ± 10'</td> <td>° ' ,</td> <td>° ' ,</td> </tr> <tr> <td>☐ 11AP-V: +3°54' ± 10'</td> <td></td> <td></td> </tr> </tbody> </table>		Blade 1	Blade 2 („red“ side)	a) T/O- setting:			☐ 10AP-V: -3°18' ± 5'	° ' ,	° ' ,	☐ 11AP-V: -2°30' ± 5'			b) Cruise- setting:			☐ 10AP-V: +3°6' ± 10'	° ' ,	° ' ,	☐ 11AP-V: +3°54' ± 10'				
	Blade 1	Blade 2 („red“ side)																							
a) T/O- setting:																									
☐ 10AP-V: -3°18' ± 5'	° ' ,	° ' ,																							
☐ 11AP-V: -2°30' ± 5'																									
b) Cruise- setting:																									
☐ 10AP-V: +3°6' ± 10'	° ' ,	° ' ,																							
☐ 11AP-V: +3°54' ± 10'																									

8.	Static return force when blade rotated to cruise position [N / lbf] (blade in 90°- position; measuring point on blade tip)									
		<table border="1"> <tbody> <tr> <td>a) Blade 1:</td> <td></td> <td>N / lbf</td> </tr> <tr> <td>b) Blade 2; „red“ side:</td> <td></td> <td>N / lbf</td> </tr> </tbody> </table>	a) Blade 1:		N / lbf	b) Blade 2; „red“ side:		N / lbf		
a) Blade 1:		N / lbf								
b) Blade 2; „red“ side:		N / lbf								

9.	Duration to change pitch [s] (15-20°C; Operation Voltage: 12 V, amperage: 6,5 A ± 0,5)									
		<table border="1"> <tbody> <tr> <td>a) T/O- → Cruise- setting: (≤180 s)</td> <td></td> <td>s</td> </tr> <tr> <td>b) Cruise- → T/O- setting: (≤180 s)</td> <td></td> <td>s</td> </tr> </tbody> </table>	a) T/O- → Cruise- setting: (≤180 s)		s	b) Cruise- → T/O- setting: (≤180 s)		s		
a) T/O- → Cruise- setting: (≤180 s)		s								
b) Cruise- → T/O- setting: (≤180 s)		s								

10.	Propeller blade force on rubber stop [N / lbf] (propeller folded, leading edge horizontal)													
		<table border="1"> <tbody> <tr> <td>a) Blade 1:</td> <td></td> <td rowspan="2">N / lbf</td> </tr> <tr> <td> ☐ 10AP-V74 (1,7N ± 0,1N / 0.38 ± 0.02 lbf) ☐ 10AP-V79 (1,5N-0 / +0,1N / 0.34 - 0/ +0.02 lbf) </td> <td></td> </tr> <tr> <td>b) Blade 2; „red“ side:</td> <td></td> <td rowspan="2">N / lbf</td> </tr> <tr> <td> ☐ 10AP-V74 (1,7N ± 0,1N / 0.38 ± 0.02 lbf) ☐ 10AP-V79 (1,5N-0 / +0,1N / 0.34 - 0/ +0.02 lbf) </td> <td></td> </tr> </tbody> </table>	a) Blade 1:		N / lbf	☐ 10AP-V74 (1,7N ± 0,1N / 0.38 ± 0.02 lbf) ☐ 10AP-V79 (1,5N-0 / +0,1N / 0.34 - 0/ +0.02 lbf)		b) Blade 2; „red“ side:		N / lbf	☐ 10AP-V74 (1,7N ± 0,1N / 0.38 ± 0.02 lbf) ☐ 10AP-V79 (1,5N-0 / +0,1N / 0.34 - 0/ +0.02 lbf)			
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b) Blade 2; „red“ side:		N / lbf												
☐ 10AP-V74 (1,7N ± 0,1N / 0.38 ± 0.02 lbf) ☐ 10AP-V79 (1,5N-0 / +0,1N / 0.34 - 0/ +0.02 lbf)														

* Units; general: cross out if inapplicable

Remarks:

All measured data is correct. The data conforms to the type data sheet for this propeller.

_____	_____	_____
site, date	stamp	sign of Certifying Staff

3. Friction in Control System

Static friction is to be measured as follows: measuring point: 230mm [9.05 in.] above fulcrum of the operating lever / control stick on the grip; measure the force being reached when the system sets going - three times in both directions. The average of the higher values from each measurement is to be entered.

Prior to measuring trim should be positioned so as to center the stick approximately. To balance the "stick forward" force of the downspring, the trim lever has to be locked at the rear, nearly fully "tail heavy" position.

	Rated	Reading *
Elevator	$5 \pm 2 \text{ N}$ [$1.1 \pm 0.45 \text{ lbf}$]	N [lbf]
Aileron	15^{+5}_{-8} N [$3.4^{+1.1}_{-1.8} \text{ lbf}$]	N [lbf]
Rudder (tail wheel off the ground!)	25^{+5}_{-8} N [$5.6^{+1.1}_{-1.8} \text{ lbf}$]	N [lbf]

4. Pilot Forces

Following forces must be measured on ground. Measuring points for airbrake and wing flap forces are the respective handles, for down-spring / trim spring forces the uppermost finger notch of the control stick handle.

	Rated		Reading *	
Airbrake over-center lock and unlock	$150 \pm 50 \text{ N}$ [$34 \pm 11 \text{ lbf}$]	at 20°C	N [lbf]	at [°C]
Wing Flap: Counter force in position L	$125 \pm 25 \text{ N}$ [$28 \pm 6 \text{ lbf}$]	at 20°C	N [lbf]	at [°C]
Wing Flap: with jerky movement damping perceptible in both directions?	☒ YES	☐ NO		
Elevator-Force in direction "PULL", just to release the stick from its forward stop (measured at the uppermost finger notch of the stick handle, with trim setting fully "nose down")	$35 \pm 5 \text{ N}$ [$7.8 \pm 1.1 \text{ lbf}$]	at 20°C	N [lbf]	at [°C]
Elevator-Force in direction "PULL", directly before reaching the rear elevator stop (measured at the uppermost finger notch of the stick handle, with trim setting fully "nose down")	$65 \pm 5 \text{ N}$ [$14.6 \pm 1.1 \text{ lbf}$]	at 20°C	N [lbf]	at [°C]

* Units: delete as applicable

Strausberg,

Site, date

Stamp

Sign Job Leader

Certification of the Inspector: All measured data are in the permissible range and comply with the Production and Maintenance Instructions for the control system.

Strausberg,

Site, date

Stamp

Sign Inspector

erstellt / bearbeitet:	Freigabe:	Ausgabe vom:	ersetzt Ausgabe vom:	Nicht belegt!
	Rutz	01.08.2011		

ANNEX E: MAINTENANCE MANUAL (LINE MAINTENANCE) FOR ROTAX ENGINE TYPE 914 SERIES

This Annex comprises the original »Maintenance Manual (Line Maintenance) for ROTAX Engine Type 914 Series« (current issue).

The S12 Aircraft Maintenance Manual, is related to the motorglider including the modified engine ROTAX 914 F2/S1.

This S12 Aircraft Maintenance Manual is subject to changes by the manufacturer of the original engine, ROTAX.

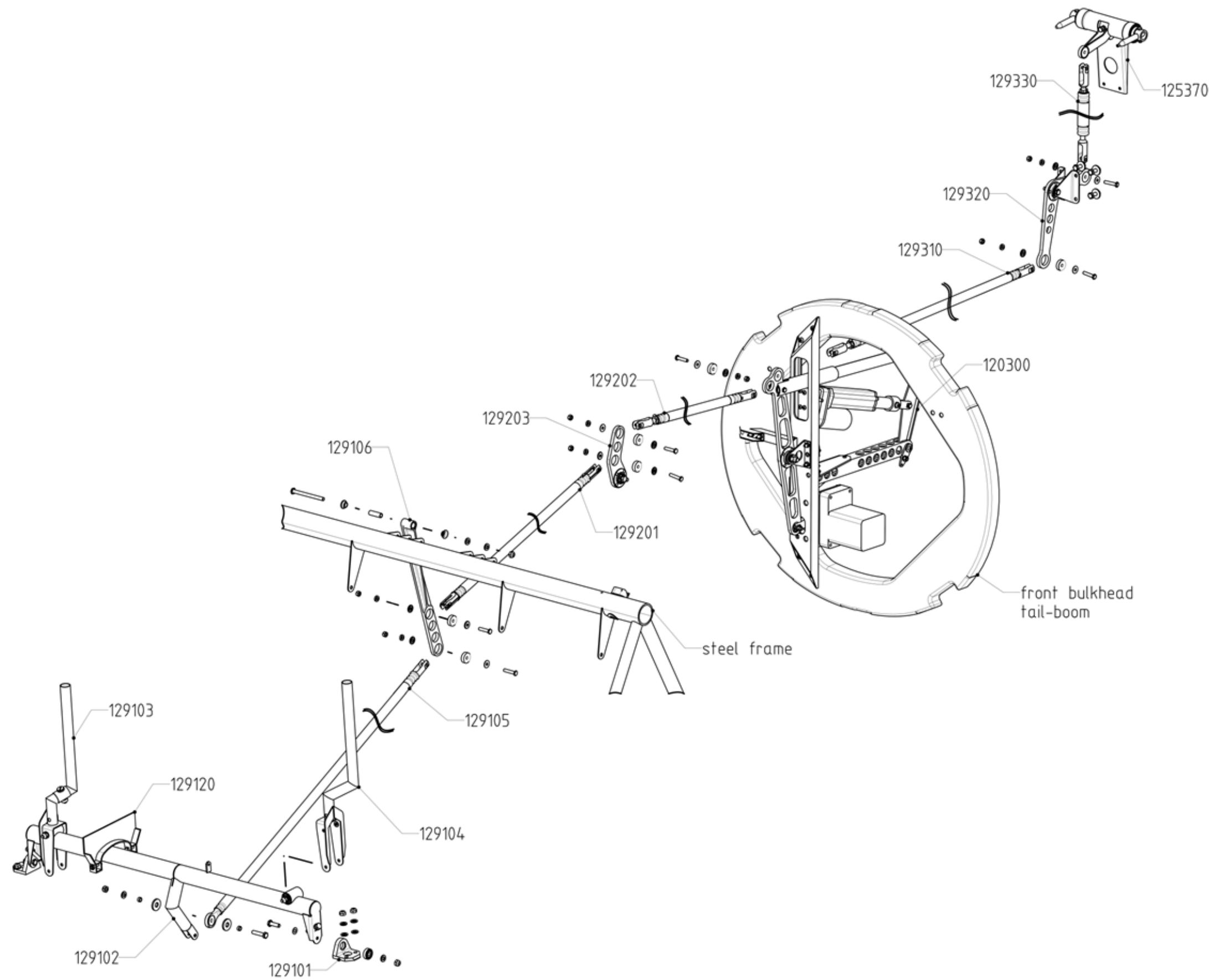
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ANNEX F: TECHNICAL DRAWINGS

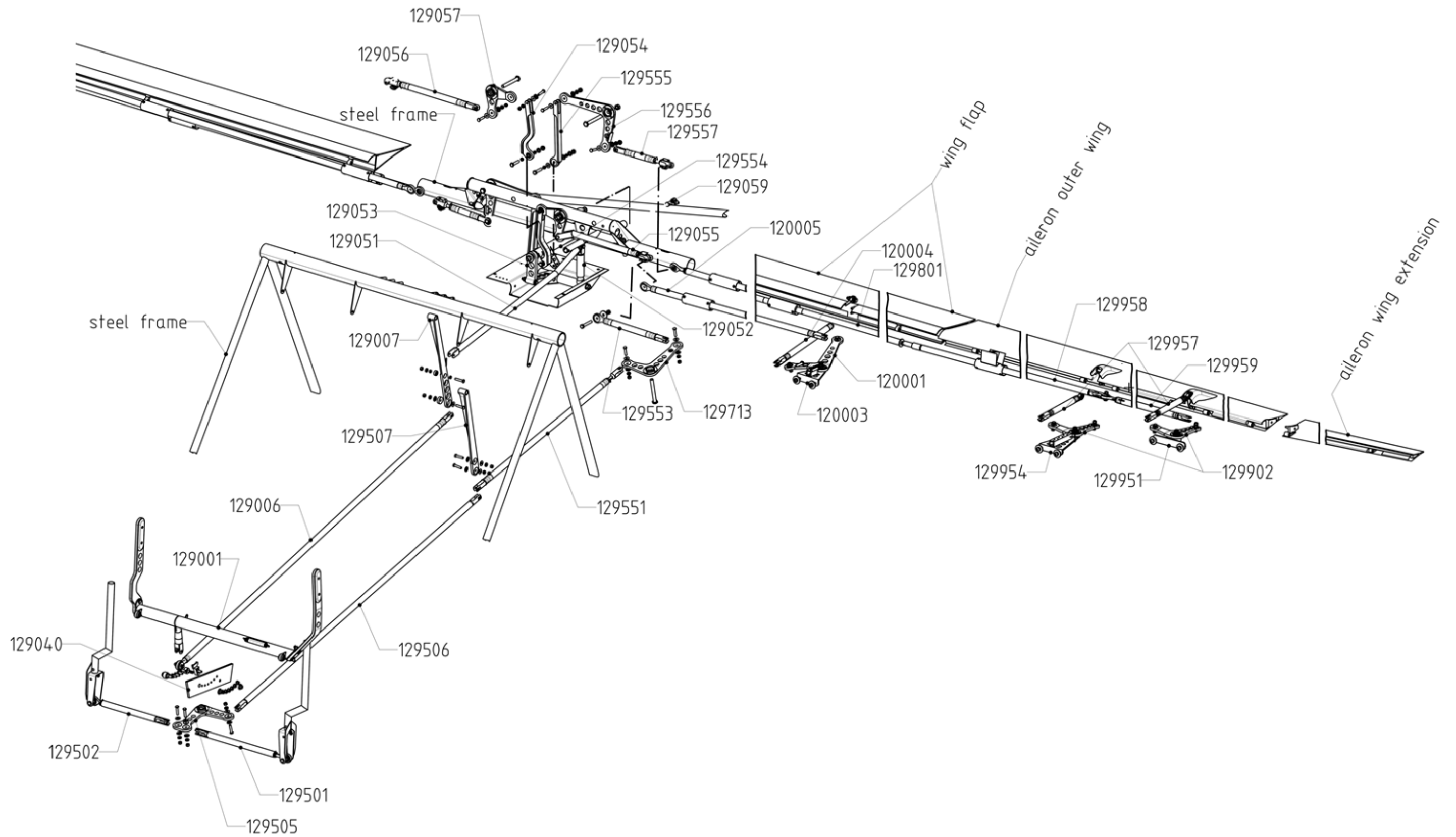
This section provides technical drawings and electric wiring diagrams relevant for maintenance.

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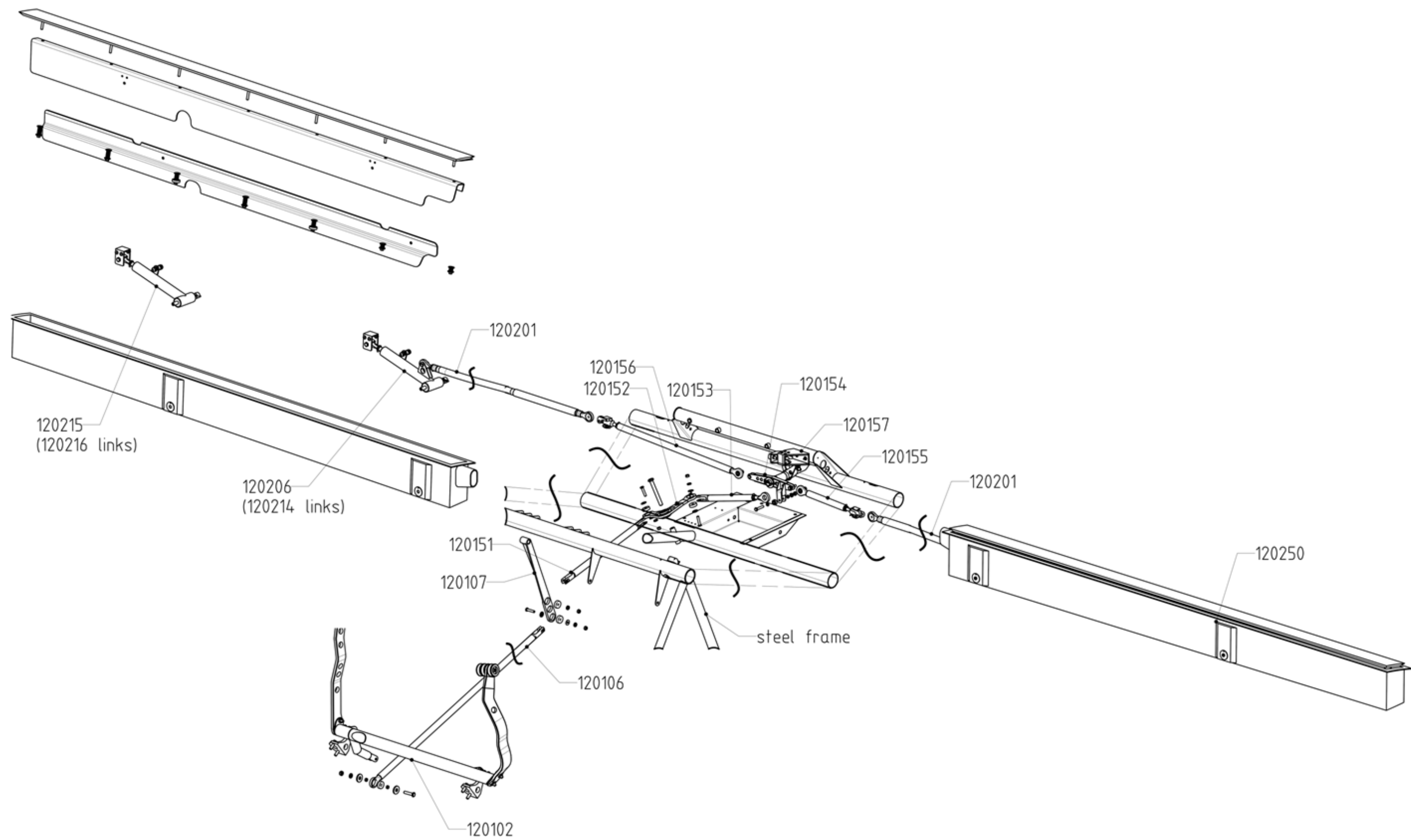
A) FLIGHT CONTROLS: PITCH CONTROL AND TRIM



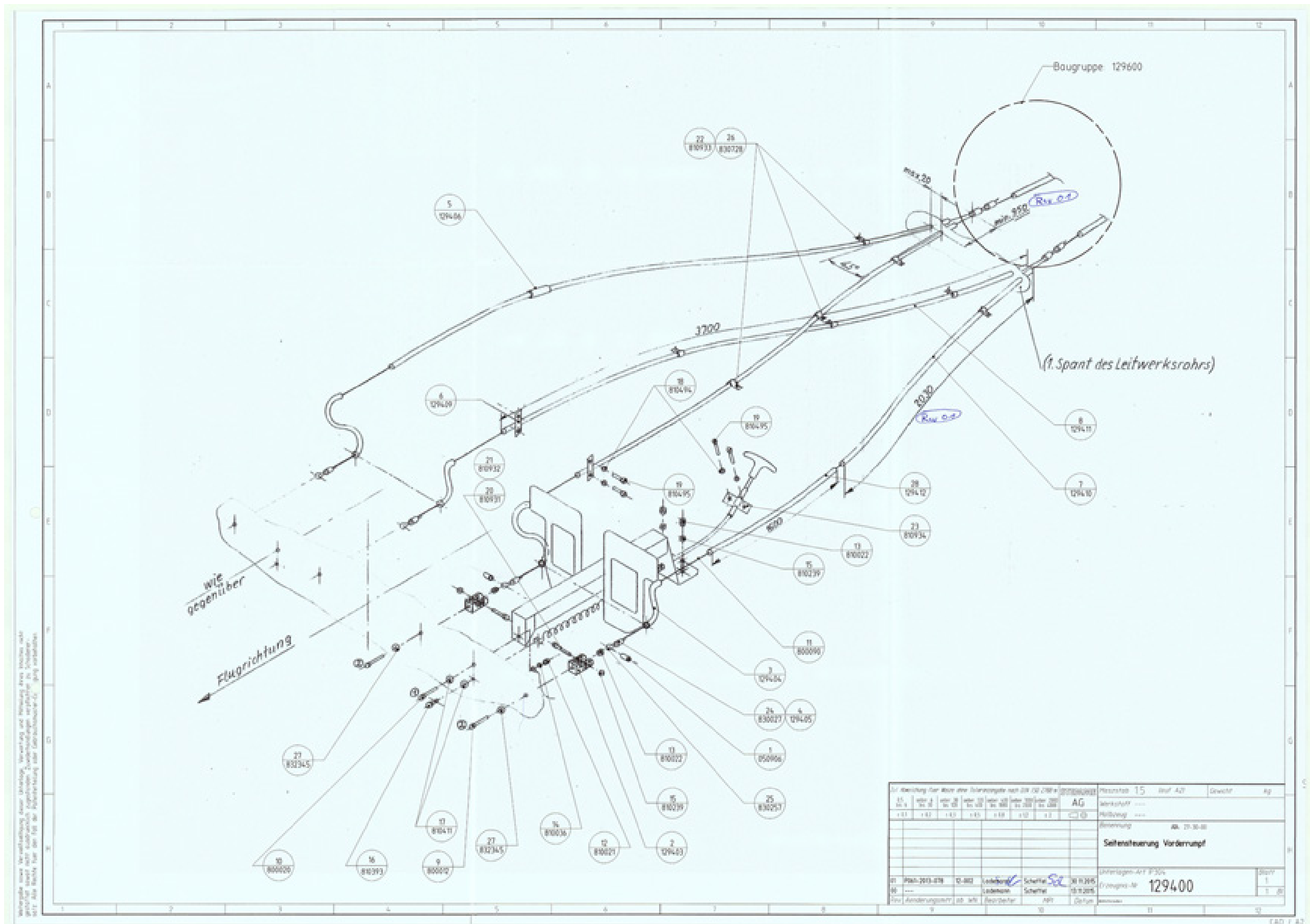
B) FLIGHT CONTROLS: LATERAL CONTROL (WING, FLAP, AILERON)

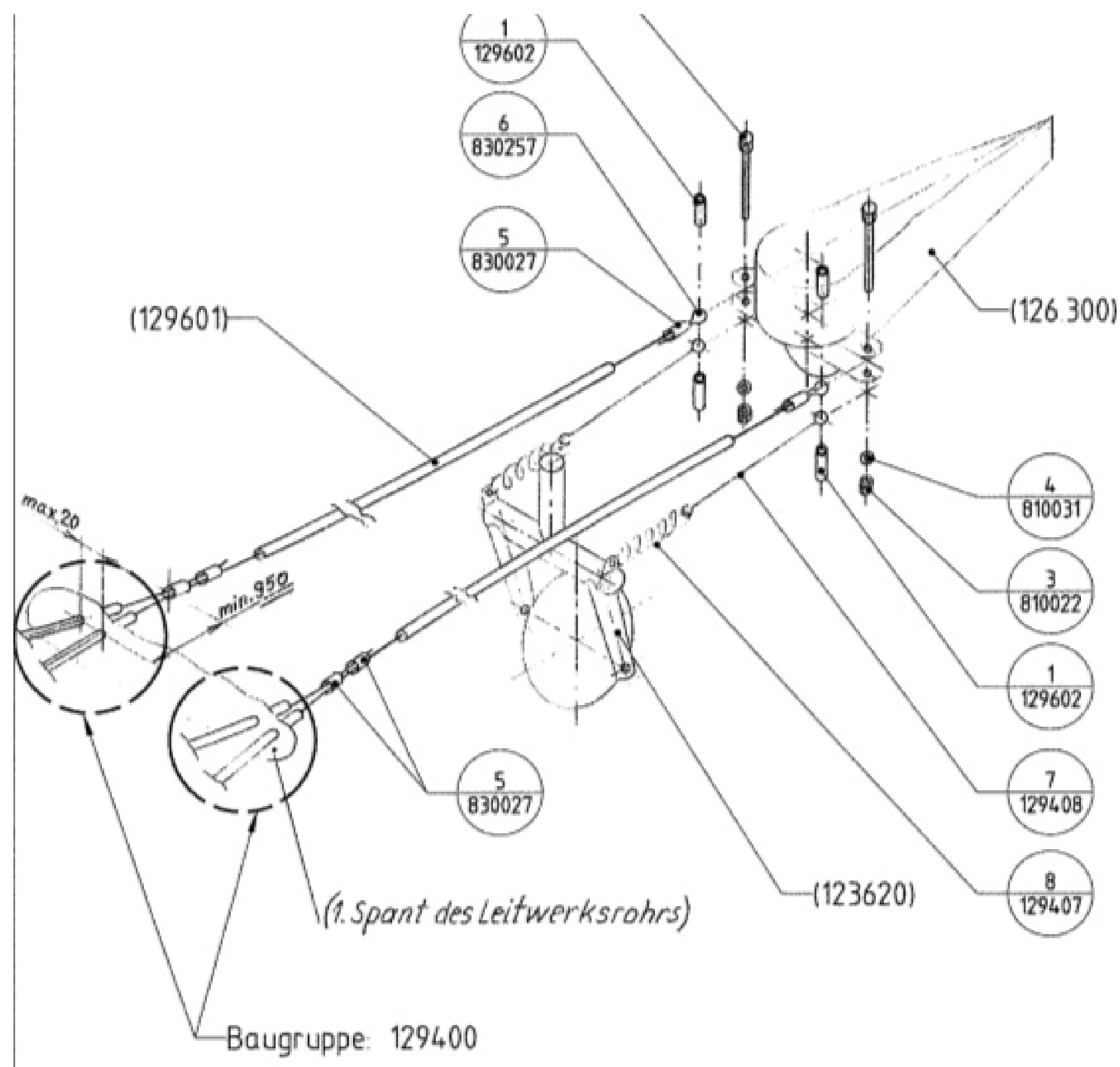


C) FLIGHT CONTROLS: AIRBRAKE CONTROL

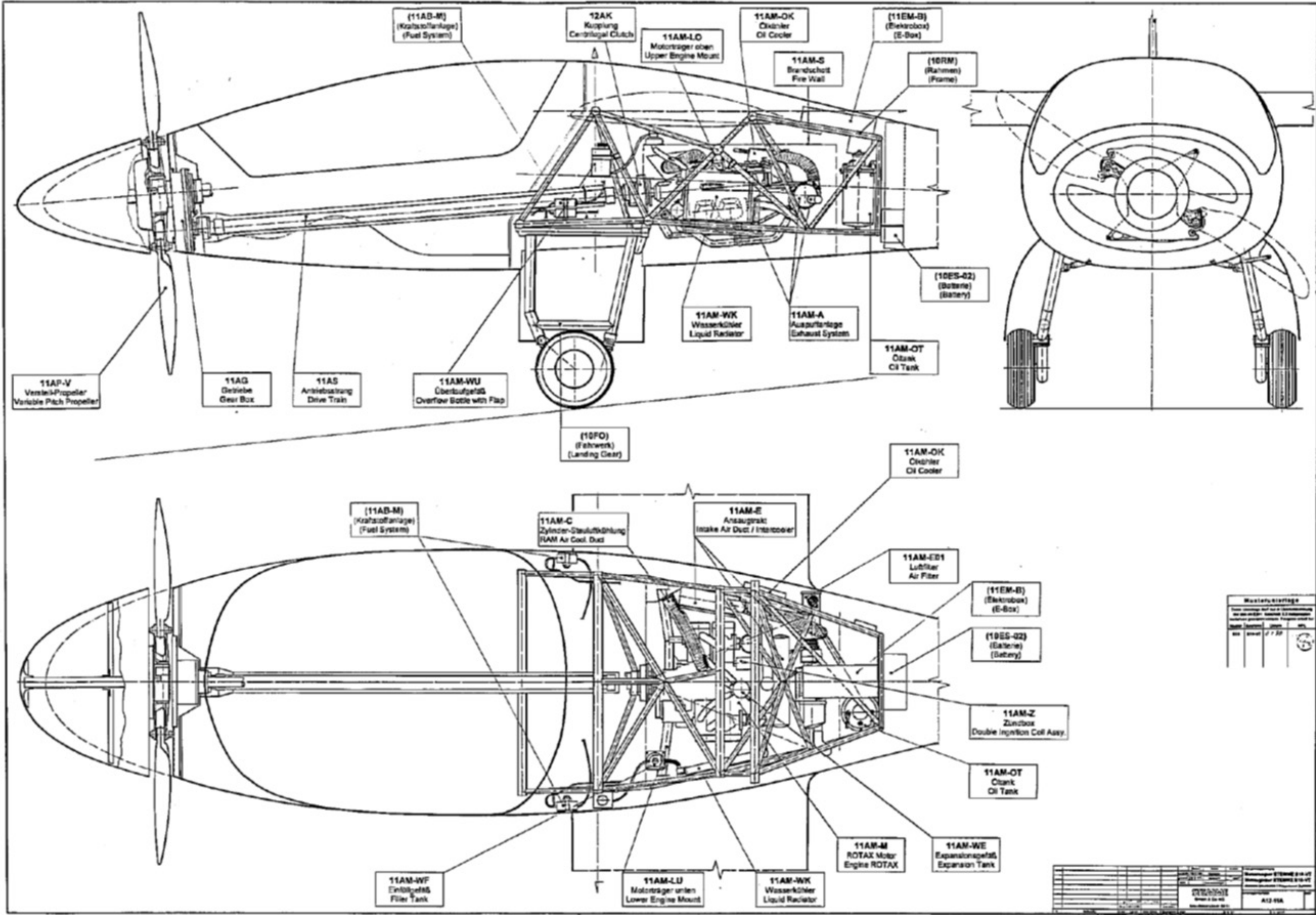


D) FLIGHT CONTROLS: RUDDER CONTROL

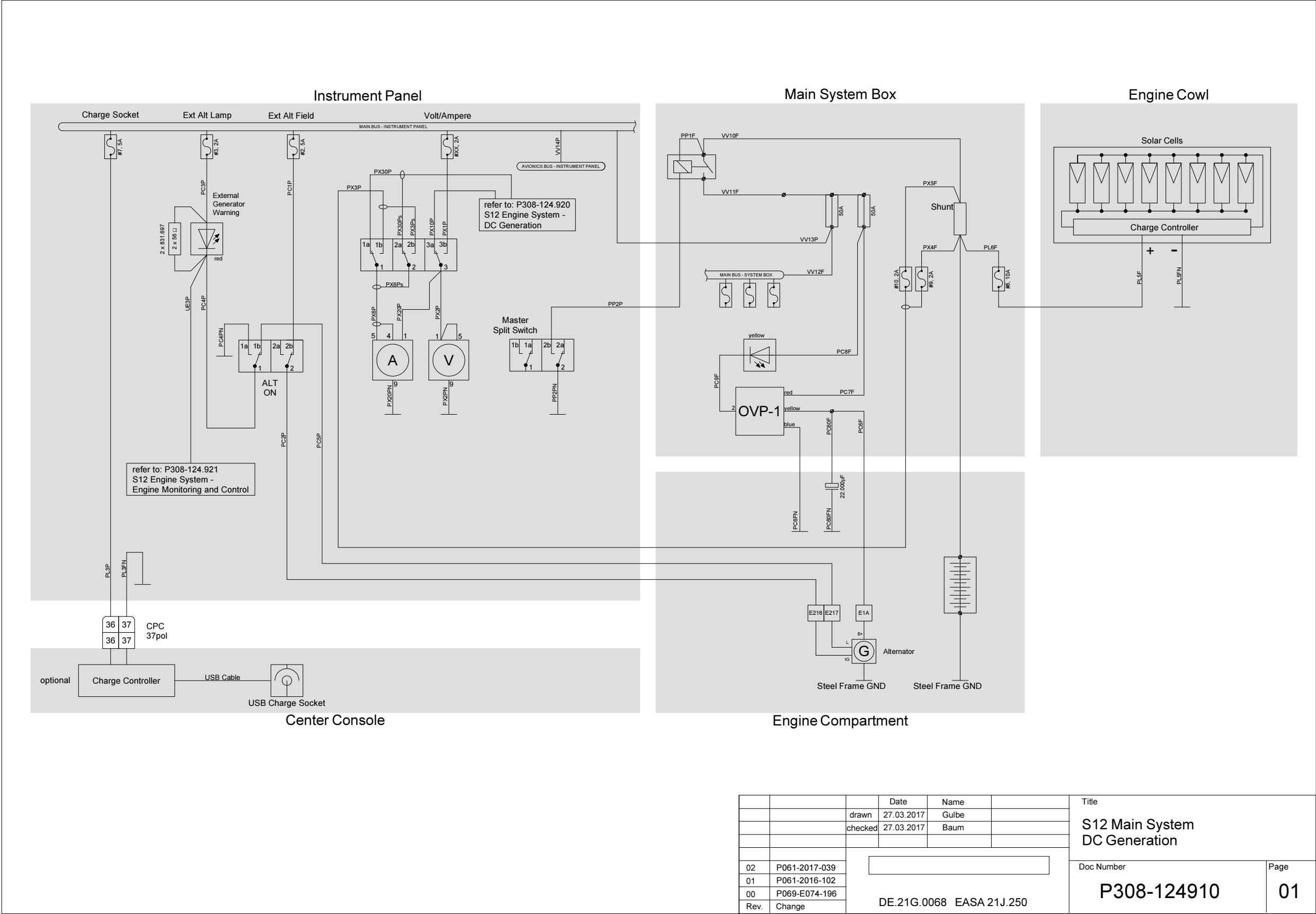




E) PROPULSION SYSTEM

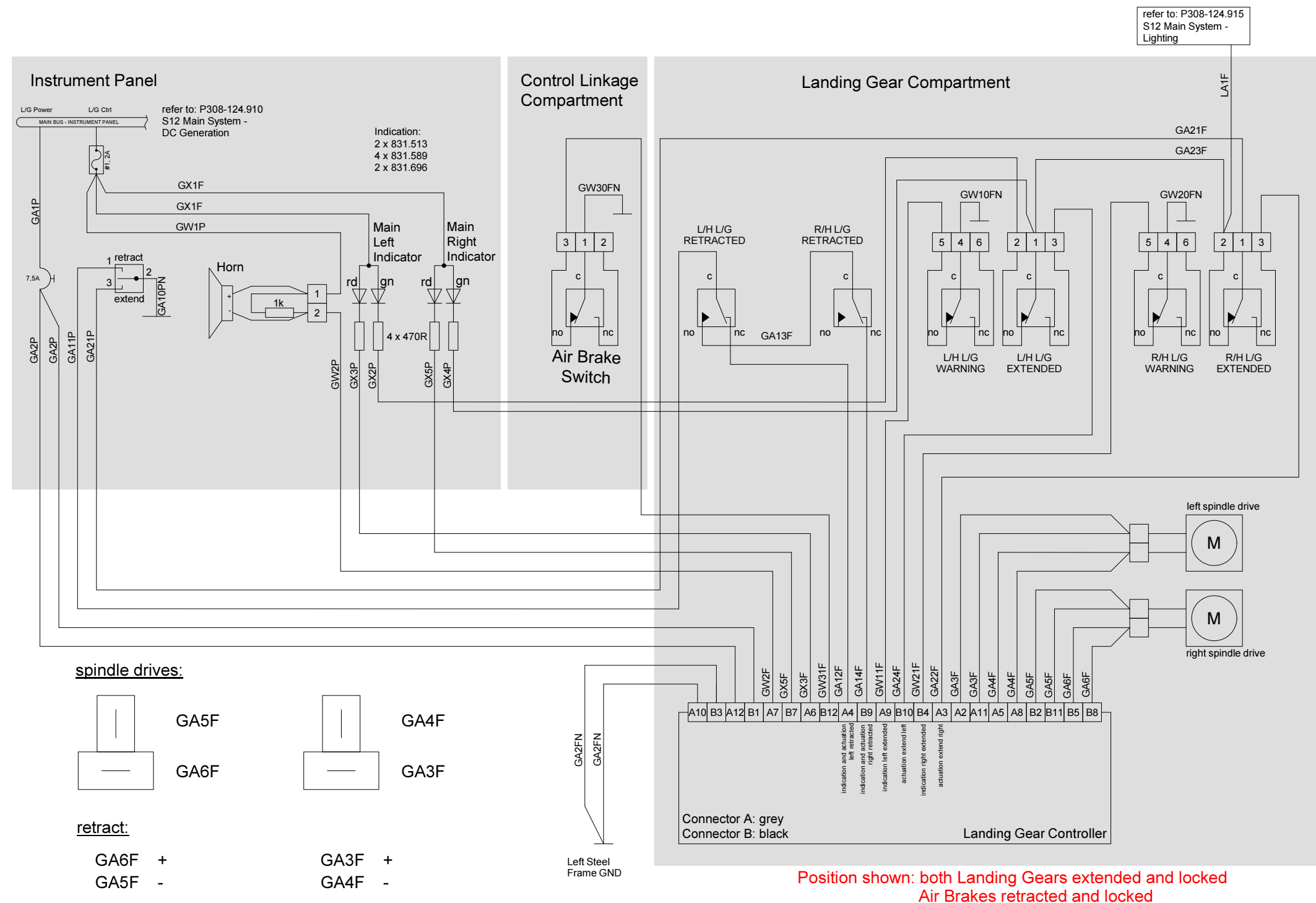


F) S12 MAIN SYSTEM - DC GENERATION



		Date	Name		Title	
		drawn	27.03.2017	Gulbe	S12 Main System DC Generation	
		checked	27.03.2017	Baum		
02	P061-2017-039				Doc Number	Page
01	P061-2016-102	DE.21G.0068 EASA 21J.250			P308-124910	01
00	P069-E074-196					
Rev.	Change					

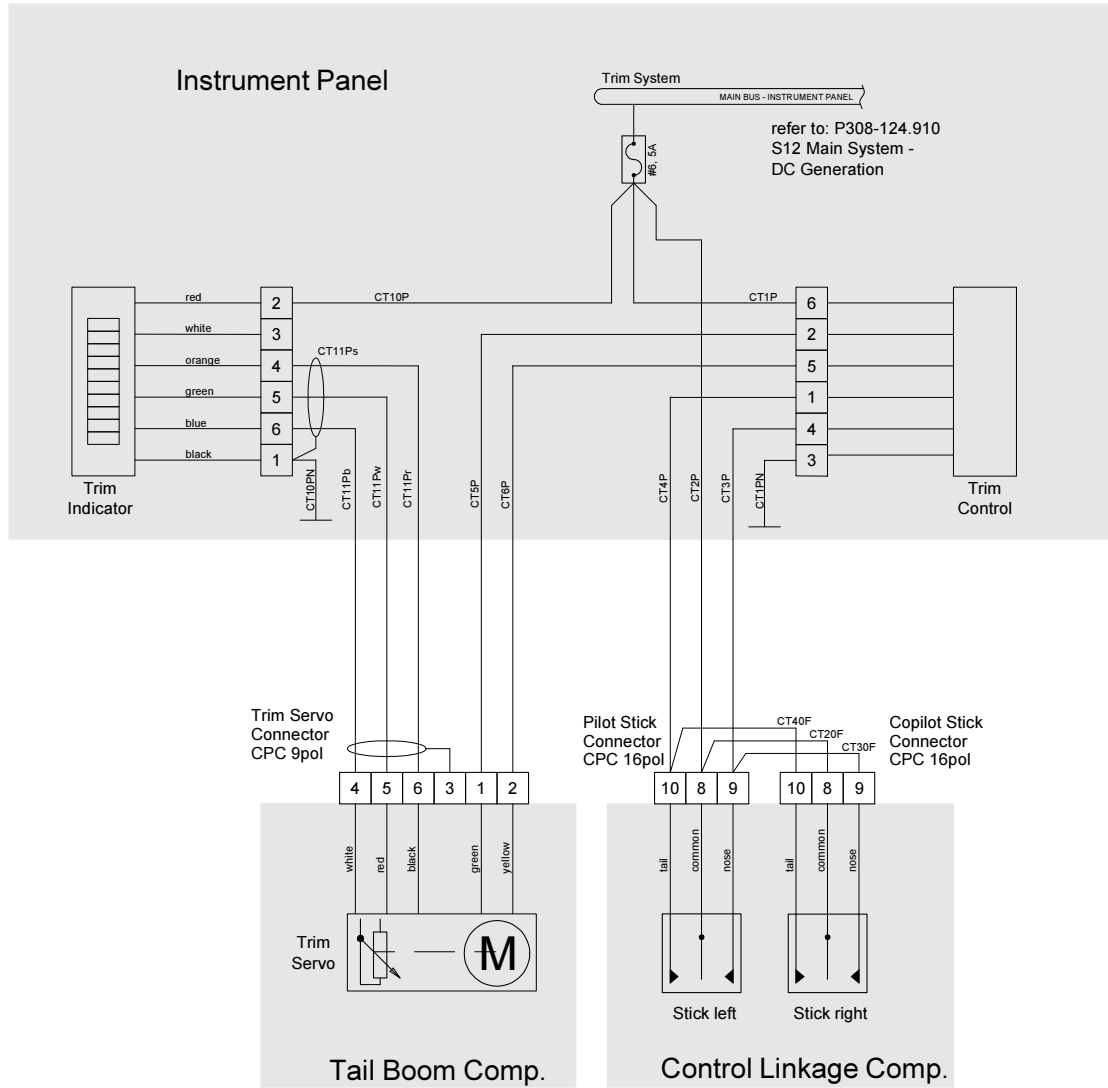
G) S12 MAIN SYSTEM - LANDING GEAR



Position shown: both Landing Gears extended and locked
Air Brakes retracted and locked

		Date	Name	Title
	drawn	27.03.2017	Gulbe	S12 Main System Landing Gear
	checked	27.03.2017	Baum	
				Doc Number
01	P061-2017-039			P308-124911
00	P061-2016-006			
Rev.	Change			
		DE.21G.0068 EASA 21J.250		Page
				01

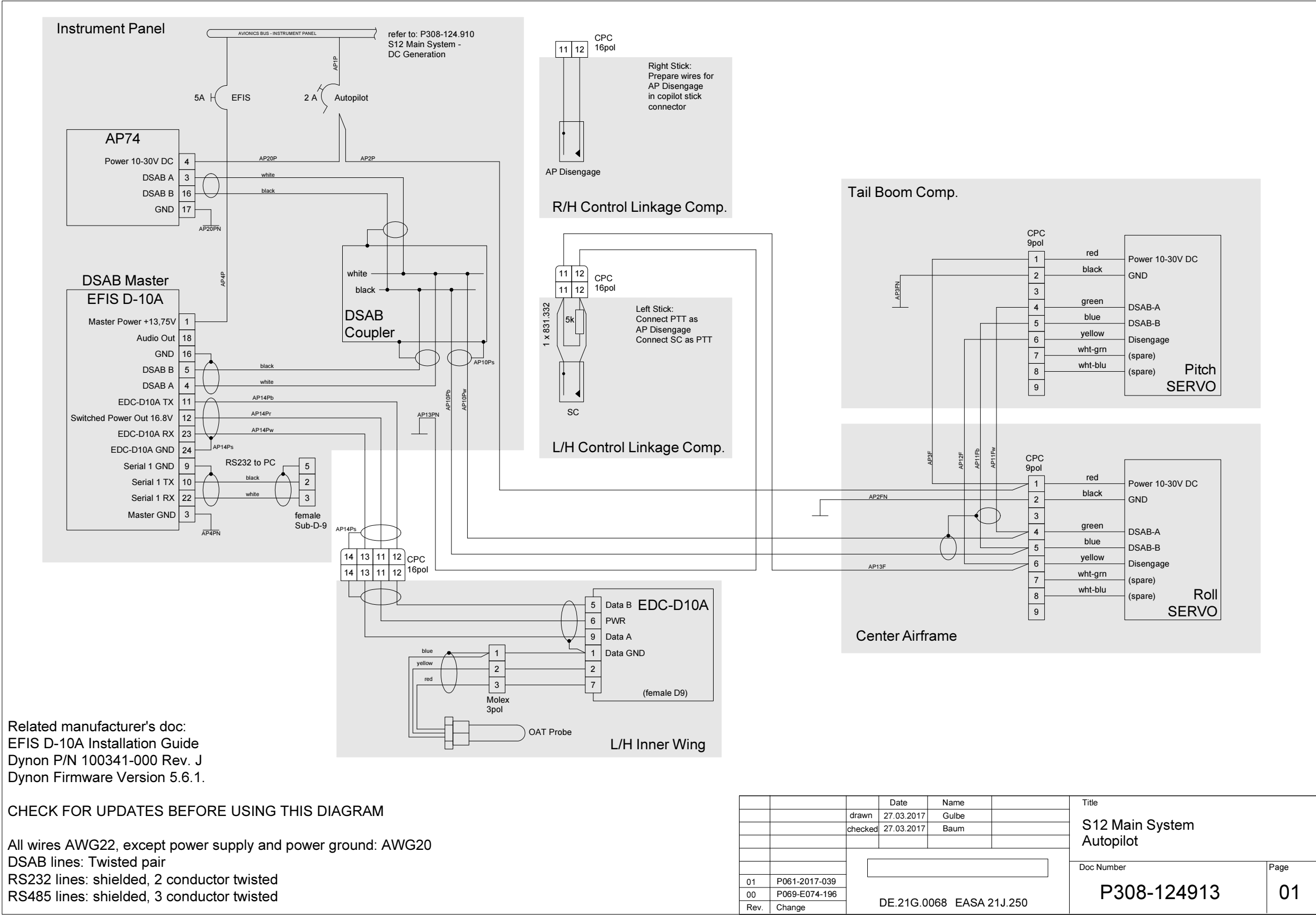
H) S12 MAIN SYSTEM - ELECTRICAL TRIM



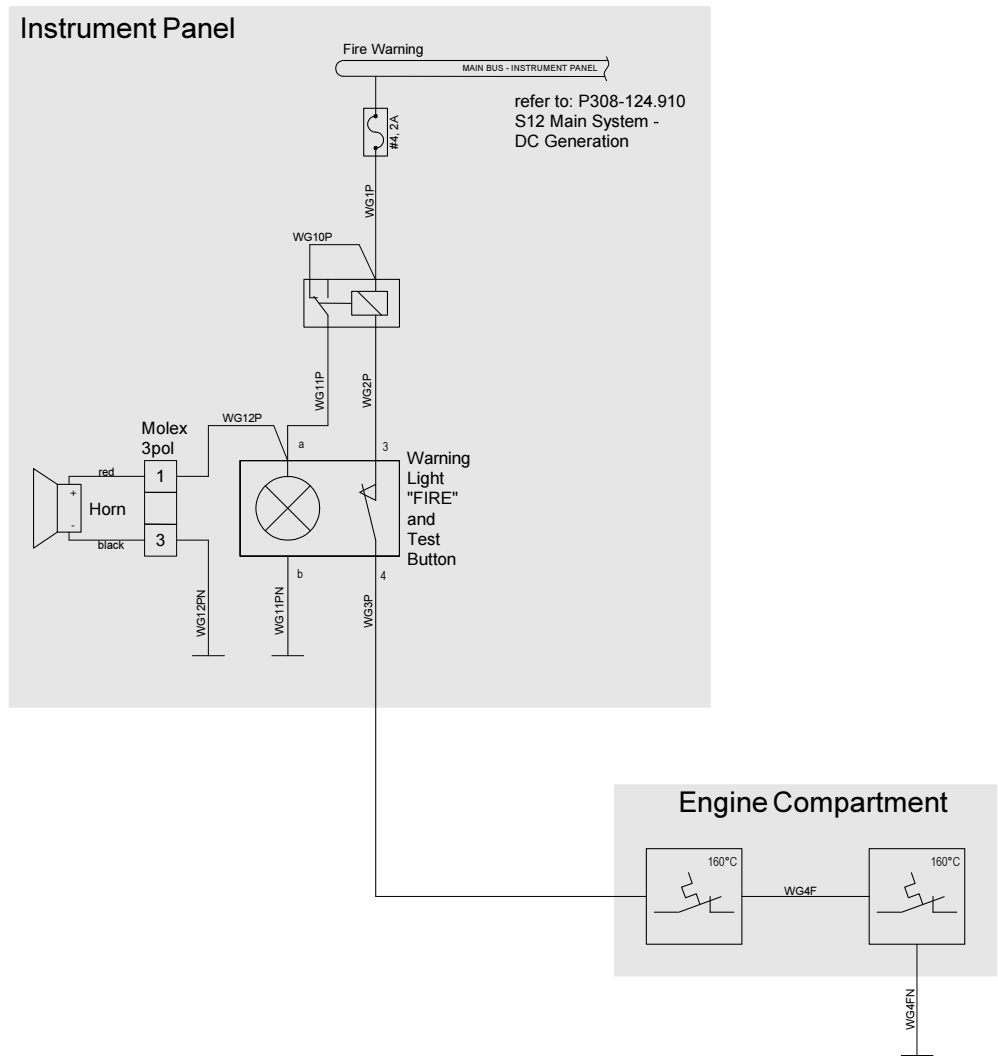
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		checked	27.03.2017	Baum			
						Doc Number P308-124912	
01	P061-2017-039					Page 01	
00	P069-E074-196						
Rev.	Change						

DE.21G.0068 EASA 21J.250

I) S12 MAIN SYSTEM - AUTOPILOT

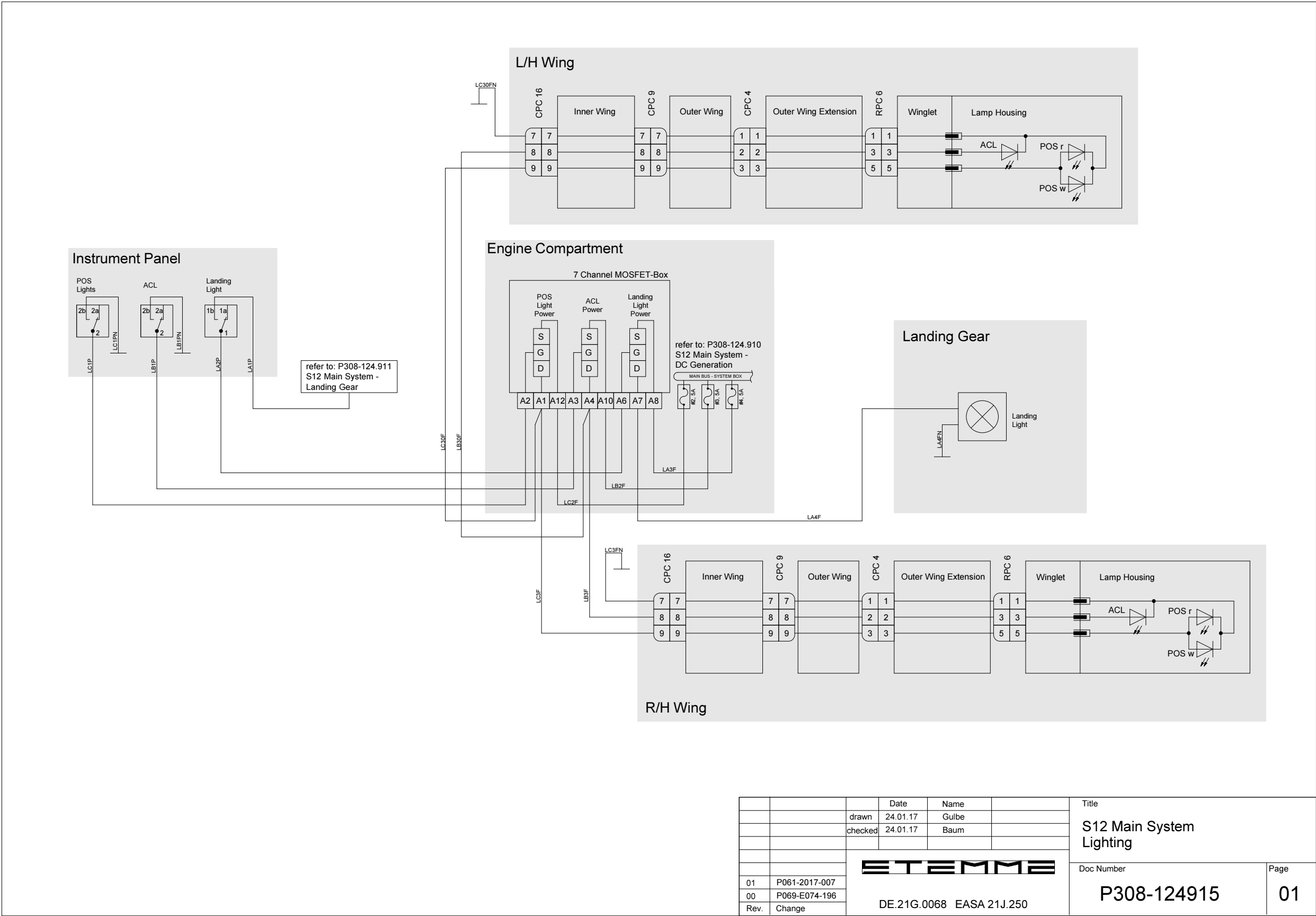


J) S12 MAIN SYSTEM - FIRE WARNING



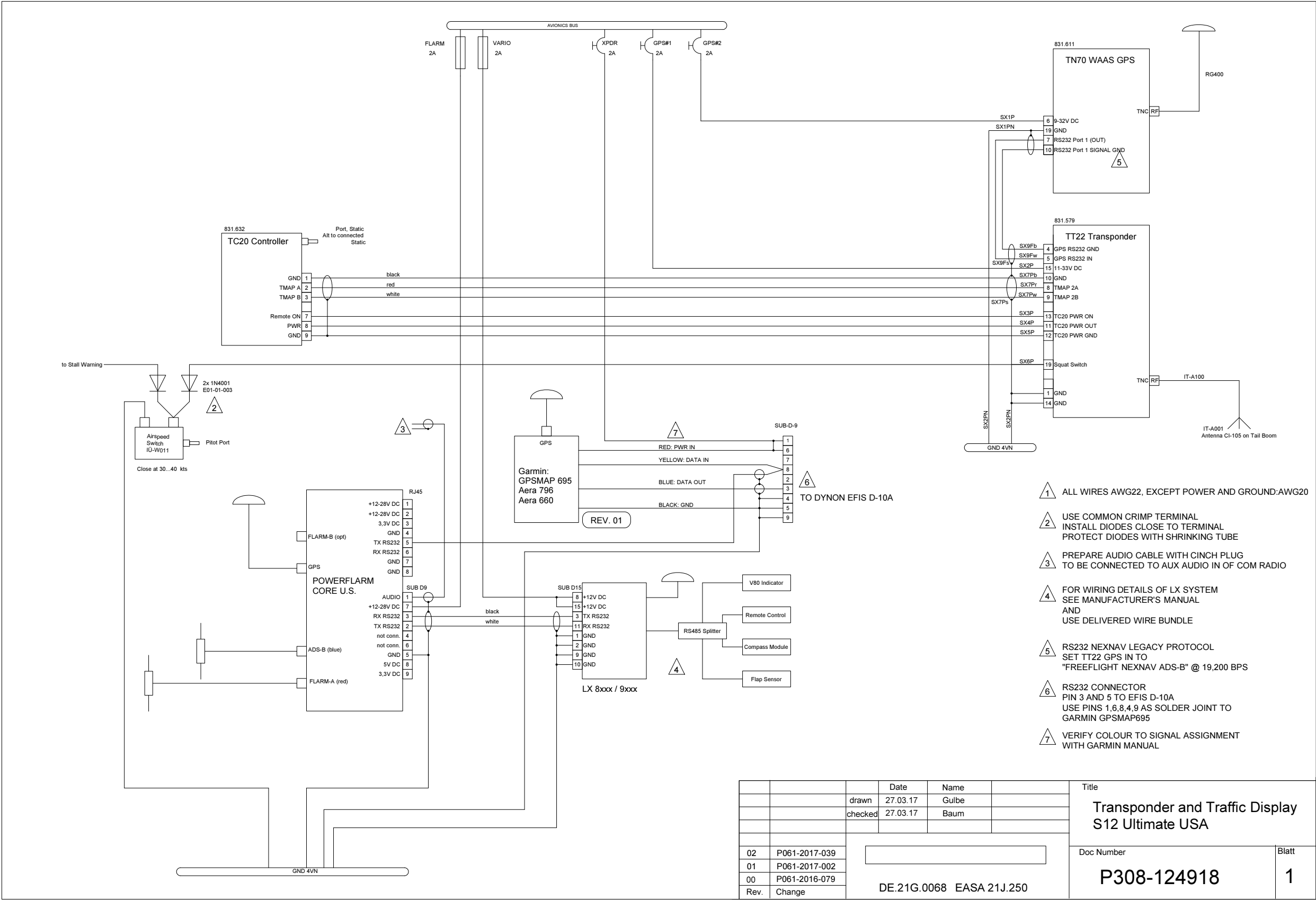
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	checked	17.08.16	Baum		
				Doc Number P308-124914	
				Page 01	
00	P069-E074-196	ETEMME		DE.21G.0068 EASA 21J.250	
Rev.	Change				

K) S12 MAIN SYSTEM - LIGHTING

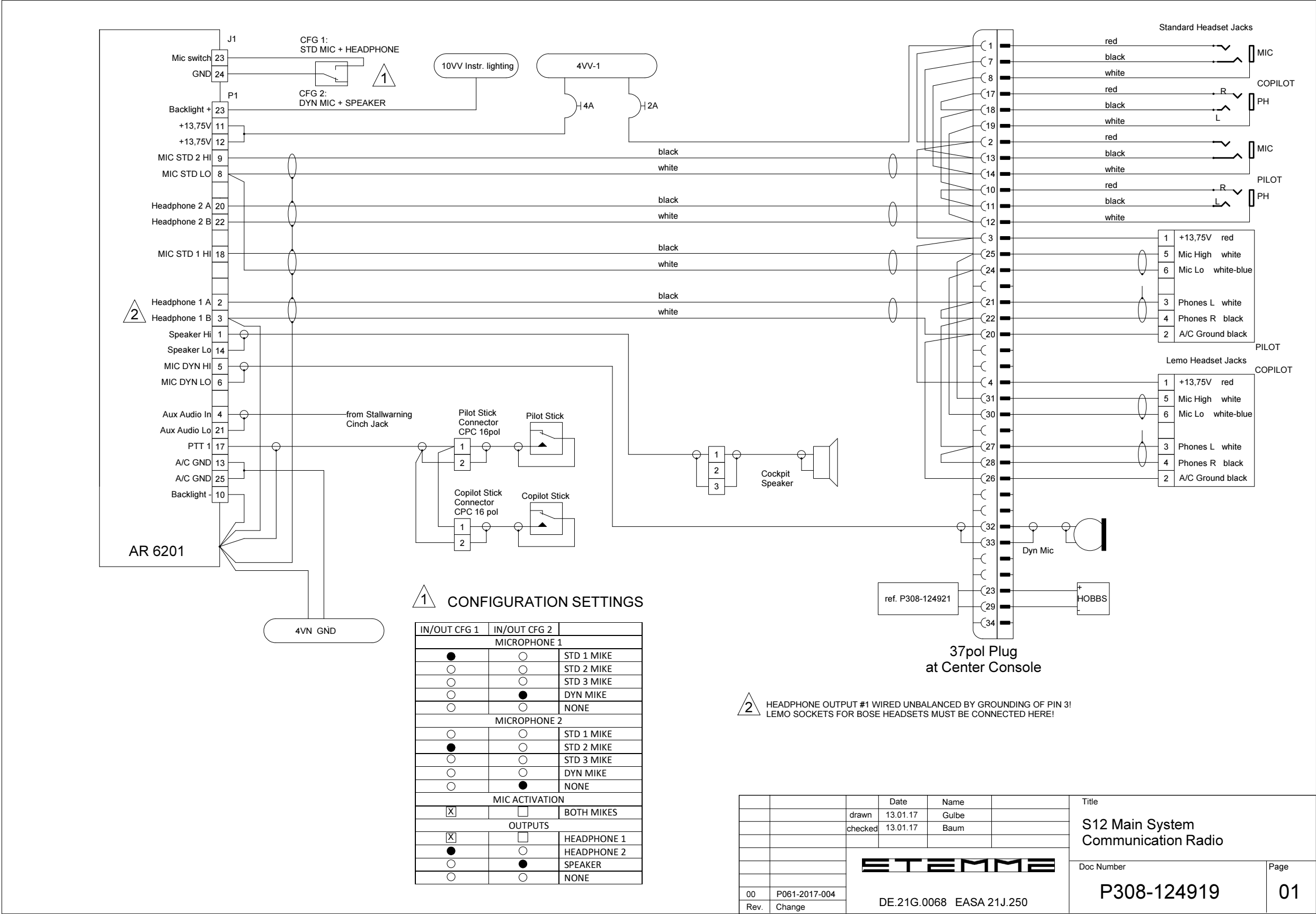


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						Doc Number		Page
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00	P069-E074-196							
Rev.	Change							

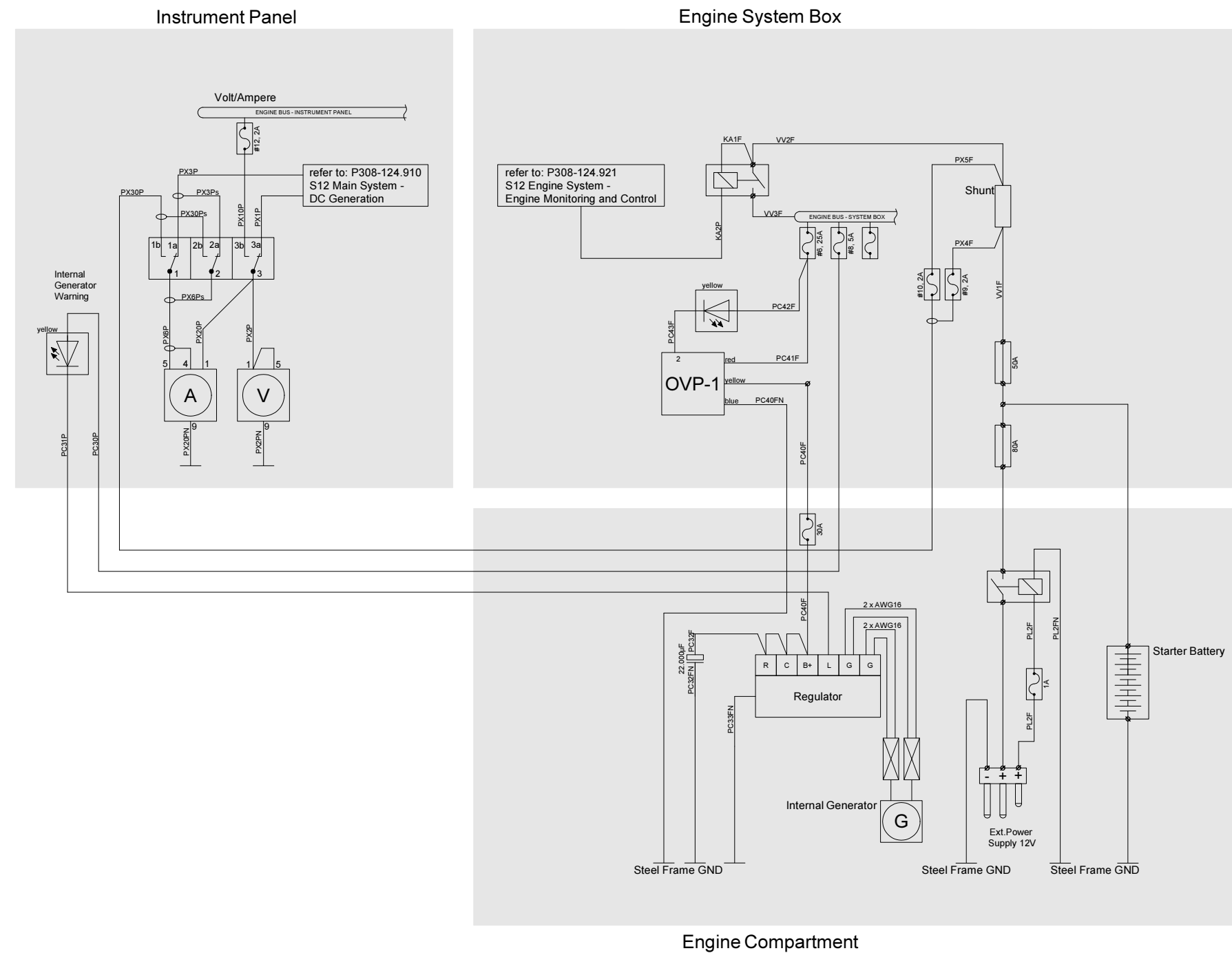
L) TRANSPONDER AND TRAFFIC DISPLAY



M) S12 MAIN SYSTEM - COMMUNICATION RADIO

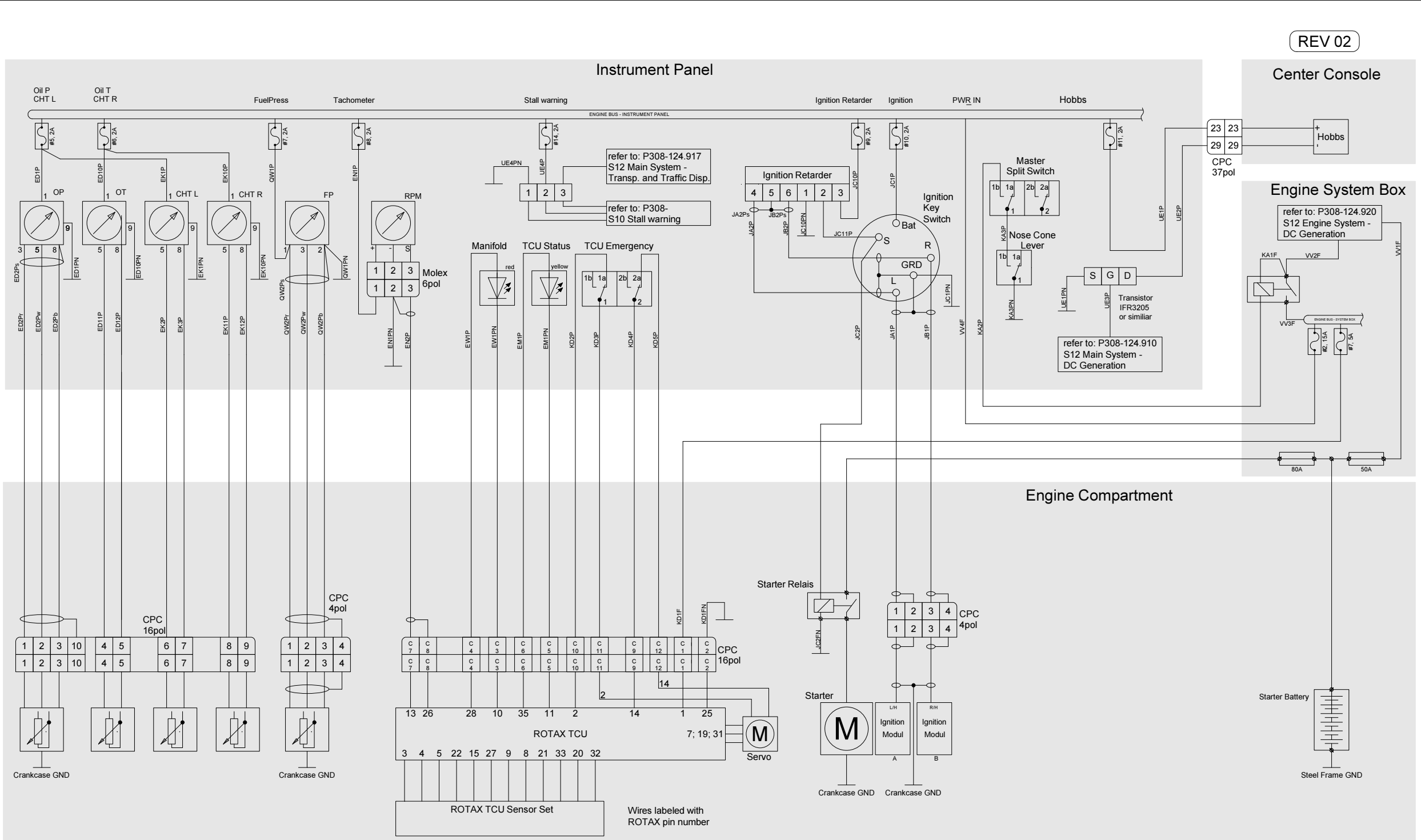


N) S12 ENGINE SYSTEM - DC GENERATION



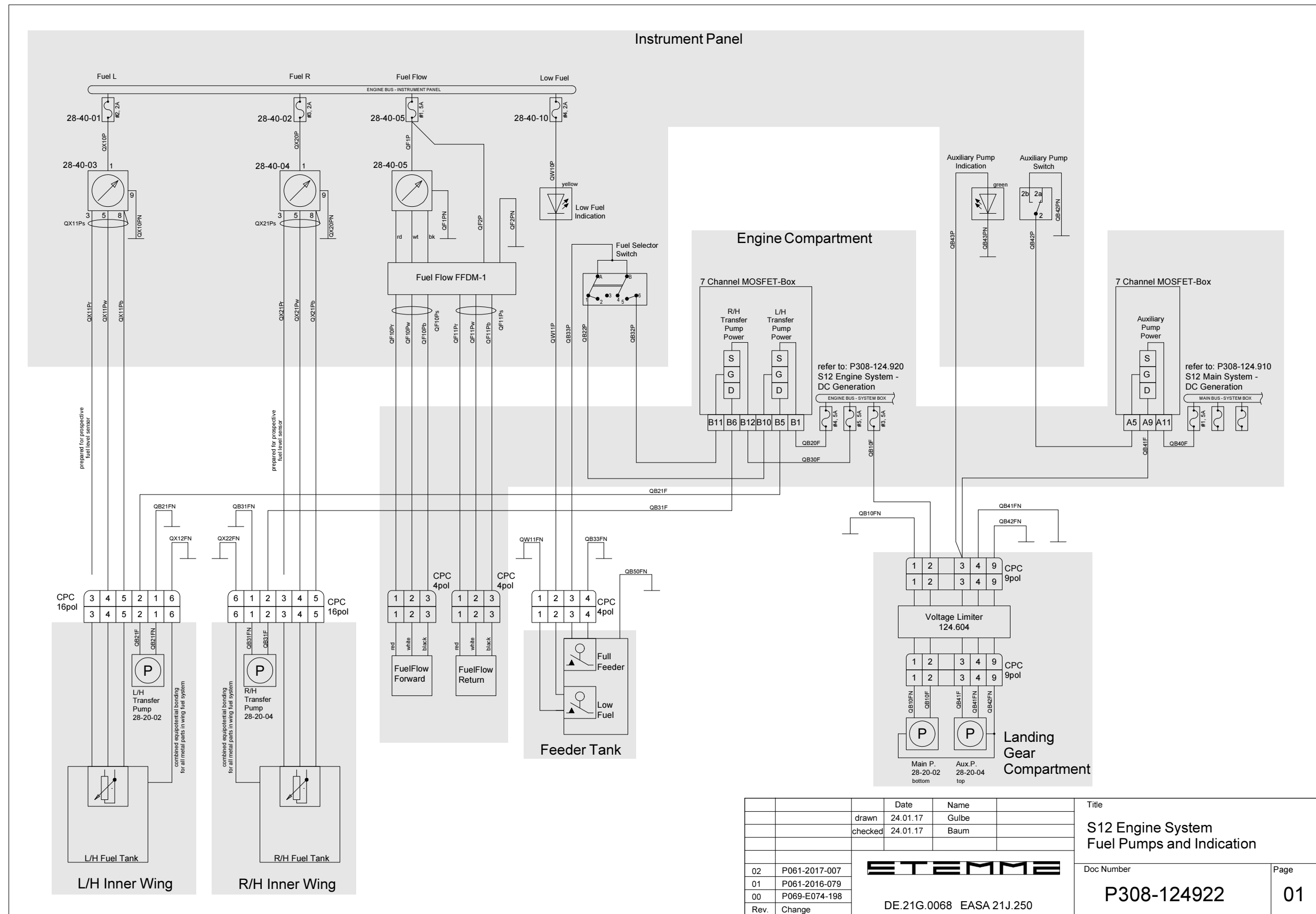
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01	P061-2016-102				Doc Number	Page
00	P069-E074-196					
Rev.	Change					
		DE.21G.0068 EASA 21J.250			P308-124920	01

O) S12 ENGINE SYSTEM - ENGINE MONITORING AND CONTROL

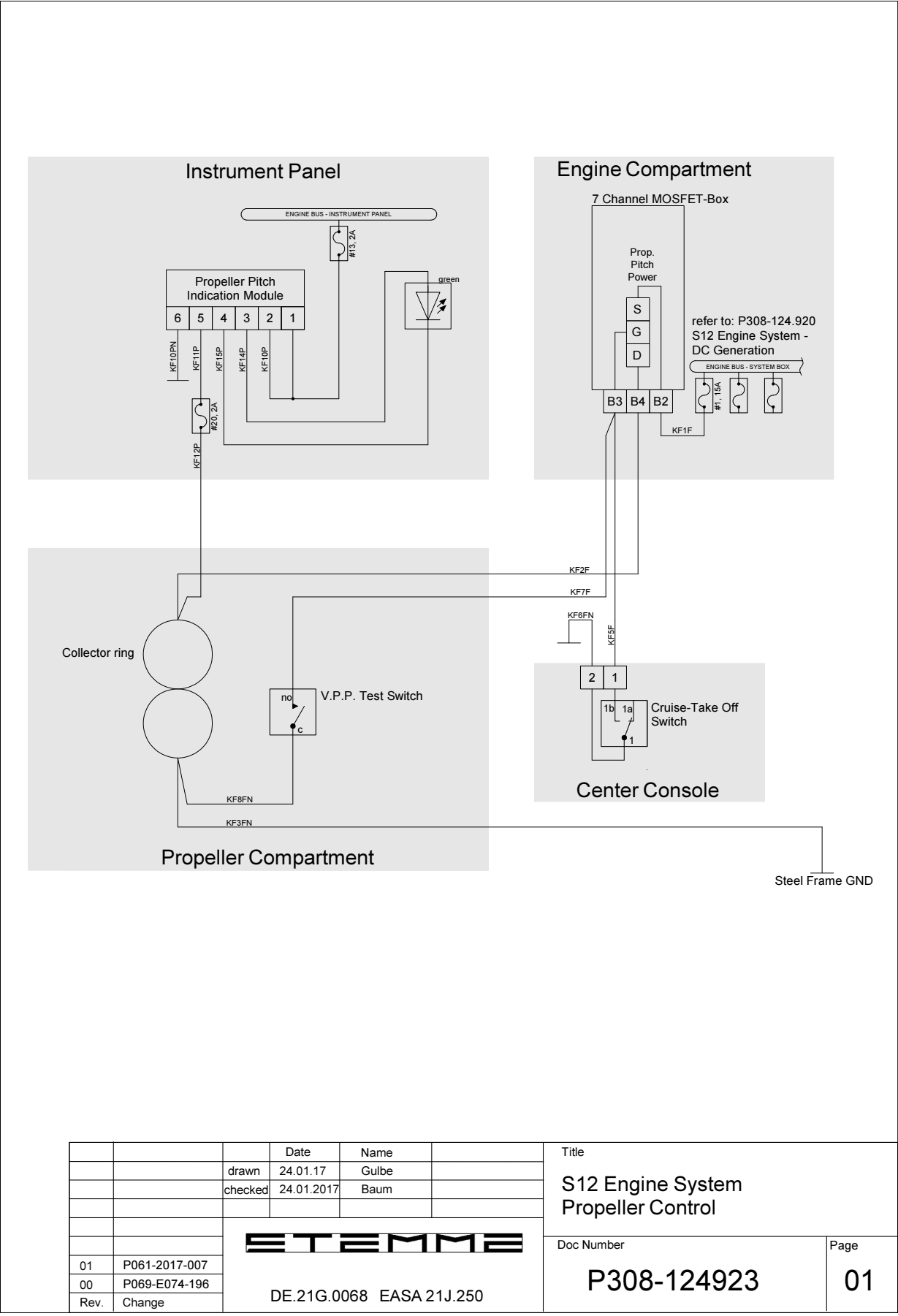


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01	2016-119				
00	2016-006				
Rev.	Change	DE.21G.0068 EASA 21J.250			Doc Number
					P308-124921
					Page
					01

P) S12 ENGINE SYSTEM - FUEL PUMPS AND INDICATION



Q) S12 ENGINE SYSTEM - PROPELLER CONTROL



		Date	Name	
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	checked	24.01.2017	Baum	
01	P061-2017-007			
00	P069-E074-196			
Rev.	Change			

ETEMME

DE.21G.0068 EASA 21J.250

Title	
S12 Engine System Propeller Control	
Doc Number	Page
P308-124923	01

