

SportCruiser / PiperSport

AIRPLANE MAINTENANCE MANUAL



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SportCruiser / PiperSport

AIRPLANE MAINTENANCE MANUAL

SportCruiser / PiperSport airplane is designed and manufactured by



Czech Sport Aircraft a.s.
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RECORD OF REVISIONS

Rev. No.	Revision name	Changed pages	Issue date	Date and signature
1	Supplementation of LiFePo4 battery	i, ii, iii, iv, 0-1, 0-5, 0-7, 0-8, 0-9	2013-09-05	2013-05-09 Konečný
2	Check of nose landing gear leg for cracks	i, ii, iii, iv, 0-1, 0-5 to 0-7, 2-8, 2-12, 8-1, 8-21 to 8-30	2013-10-11	2013-10-11 Konečný
3	Supplementation of improved nose landing gear and modification of relevant maintenance practices	i, ii, iii, iv, 0-1, 0-5, 0-6, 0-7, 2-8, 2-12, 8-5, 8-6, 8-21	2014-02-17	2013-02-17 Konečný
4	Supplementation of balance ballast description and installation.	i to iv, 0-1, 0-5, 3-1, 3-6, 3-10, 3-11	2014-09-08	2014-09-08 Konečný
5	The inspection interval of NLG leg Dwg. No. SG0270N has been changed from the original 50 flight hours to 25 flight hours or 50 cycles whatever occurs first.	i to iv, 0-1, 0-5, 2-1, 2-4, 2-5, 2-8, 2-9	2015-05-24	2015-05-24 Konečný
6	Coolant Temperature (CT) as an alternative to the Cylinder Head Temperature (CHT) added for cases that the engine is equipped with new cylinder heads design acc.to the SB-912-066 and SB-912-066UL Rotax bulletin	i to iv, 0-1, 0-5, 0-7, 0-8, 0-9 1-14, 10-3, 10-4, 10-36, 10-46, 12-3, 12-4, 12-5, 12-6, 12-7, 12-8, 12-9, 12-13, 12-21, 12-46, 17-6	2016-01-18	2016-01-18 Konečný
7	New / updated propeller limits (inspections, works) for: Woodcomp Klassic 170/3/R Sensenich 3B0R5R68C Sensenich 2A0R5R70EN	I to iv 0-1, 0-5, 0-7, 2-3, 2-4, 2-8, 2-9, 2-15 10-1, 10-2, 10-37, 10-38, 10-39, 10-40, 10-41	2016-03-30	2016-04-05 Konečný
8	New cockpit with Dynon HDX1100 system – valid for SportCruiser S/N C0596 and C0600.	I to iv, RoR: 0-1, LoEF: 0-5, 0-6, 0-7, 0-8, 2-1, 2-3, 2-17, 6-1, 6-6, 6-7, 9-1, 9-5, 9-6, 11-1, 11-6, 11-7, 11-8, 11-9, 11-10, 12-1, 12-2, 12-10, 12-11, 12-22, 12-45, 12-46	2017-06-30	2017-06-30 Konečný
9	New landing light Trail Tech D112-SX as an approved replacement of the Trail Tech 4213-SX. Cleaning and maintenance of the plexiglass cover	i to iv RoR:0-1 LoEP: 0-1 11-1, 11-6, 11-7, 11-8, 11-9, 11-10 13-1, 13-3	2017-09-15	2017-09-15 Konečný



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10	Fuel Return Line – additional information added Nose Landing Gear – Discard of old types from operation	i to iv RoR: 0-2 LoEP: 0-5, 0-6, 0-7 2-1, 2-5, 2-9, 2-10, 2-14, 4-6, 8-1, 8-5, 8-15, 8-20, 8-22, 8-30, 9-1, 9-8	2017-10-18	2017-10-18 Konečný
11	Supplementation of conditions for operation with old types of nose landing gear leg and new inspection interval for the older nose landing gear checks.	i to iv RoR: 0-2, LoEP: 0-5, 0-6, 0-7, 1-1, 1-11, 2-1, 2-5, 2-7, 2-10, 2-14, 8-1, 8-5, 8-15, 8-21, 8-30	2018-01-22	2018-01-22 Konečný
12	Information concerning new main landing gear leg SG0158L/R, added S/N of airplanes without wheel fairings.	i to iv RoR: 0-2, LoEP: 0-5, 0-6, 1-1, 8-1, 8-4, 8-7, 8-14, 8-15	2018-06-26	2018-06-26 Konečný
13	Attention on use of correct fuel in terms of temperature conditions due to risk of vapour formation	i to iv RoR: 0-2, LoEP: 0-5, 0-7, 1-1, 10-1, 10-4	2018-07-20	2018-07-20 Konečný
14	Supplementation of improved canopy guidance during closing.	i to iv RoR: 0-2, LoEP: 0-5, 1-1, 3-1, 3-5, 3-6, 3-8, 3-9	2018-11-26	2018-11-26 Konečný
15	Information added for installation of the main landing gear leg - torque moments, locknuts, spacer. Number of washers on stabilizer and on wing updated. Washer on landing gear wheel deleted. Caution for engine test updated. Information added about modified lower engine cowling for better cooling.	i to iv RoR: 0-2, LoEP: 0-5, 0-6, 0-7, 1-1, 4-1, 4-8, 5-1, 5-7, 5-8, 8-1, 8-9, 8-10, 8-15, 10-1, 10-2, 10-5, 10-35	2019-01-18	2019-01-18 Konečný
16	New / updated propeller limits for: Woodcomp Klassic 170/3/R, Woodcomp SR3000/2W	I to iv, 0-2, 0-5, 0-7, 1-1, 2-1, 2-4, 2-5, 2-8, 2-9, 2-15, 10-1, 10-2, 10-12, 10-13, 10-15 to 10-19, 10-21 to 10-23, 10-26, 10-28, 10-31, 10-33, 10-37, 10-38, 10-40, 10-41	2019-09-11	2019-09-11 Koukal



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1.1 Introduction

In accordance with requirements of the ASTM LSA regulations, the Czech Sport Aircraft a.s., as manufacturer of SportCruiser / PiperSport airplane, provides information on maintaining airworthiness of the SportCruiser / PiperSport airplane. Information is also contained in the following manuals issued by airplane manufacturer or by manufacturers of equipment used on the airplane:

- Pilot Operating Handbook
- Airplane Maintenance Manual (Doc. No. SC-AMM-1-0-00)
- Illustrated Parts Catalog (Doc. No. CR-IPC-1-0-00)
- PS-28 Cruiser / SportCruiser Wiring Manual (Doc. No. CR-WMA-1-0-01, 1-0-02, 1-0-03, 1-0-04)
- PiperSport -LTD- Wiring Manual (Doc. No. PS-WM-1-0-01)
- PS-28 Cruiser / SportCruiser Instructions for Continued Airworthiness (Doc. No. CR- ICA-1-0-00)
- PiperSport Instructions for Continued Airworthiness (Doc. No. PS-ICA-1-0-00)
- SportCruiser Instructions for Continued Airworthiness (Doc. No. SC-ICA-1-0-00)
- PS-28 Cruiser / SportCruiser Aircraft Assembly Manual (Doc. No. CR-AMM-1-0-00)
- PiperSport Aircraft Assembly Manual (Doc. No. PS-AMM-1-0-00)
- SportCruiser Aircraft Assembly Manual (Doc. No. SC-AMM-1-0-00)
- Installation Manual for ROTAX Engine Type 912 Series (IM-912, P/N 898643)
- Operator's Manual for ROTAX Engine Type 912 Series (OM-912, P/N 899649)
- Maintenance Manual (Line Maintenance) for ROTAX Engine Type 912 Series (MML-912, P/N 899191)
- Maintenance Manual (Heavy Maintenance) for ROTAX Engine Type 912 Series (MMH-912, P/N 899603)
- Owner's Manual for BRS-6 Emergency Parachute Recovery Systems (Doc. No. 020000-03)
- Parachute Installation Manual for the BRS-1350 onto the Czech Sport Aircraft PS-28 Cruiser & SportCruiser (Doc. No. 020016-PM)
- Woodcomp Klassic operation and assembly instructions
- Operator's Manual Electrical Adjustable Aircraft Propeller SR 3000
- EZ-Pitch Composite Aircraft Propeller Installation and Operation Instructions (Doc. No. comp-ac-cf-rev-1a)
- Sensenich Three Blade Composite Aircraft Propeller Installation and Operation Instructions for Rotax Engines (Doc. No. 3b0r5)
- Installation and operation instructions for the installed equipment

This Airplane Maintenance Manual contains information on airplane maintenance including description of airplane structure and function.



1.2 Airplane Classification

SportCruiser / PiperSport airplane is two-seat, single engine, low-wing, all-metal airplane with fixed three-wheel landing gear.

The airplane is designed for basic and advanced training and for leisure time flying.

1.2.1 Power Unit

Power unit consists of:

- Four-stroke, four-cylinder engine with opposite pistons Rotax 912 ULS2 with max. continuous power of 69 kW (92.5 hp) at 5,500 RPM.
- Woodcomp Klassic 170/3/R three-blade, ground adjustable propeller or
- Woodcomp SR 3000/2W two-blade, in flight adjustable propeller or
- Sensenich 2A0R5R70EN two-blade, ground adjustable propeller or
- Sensenich 3B0R5R68C three-blade, ground adjustable propeller.



1.2.2 Main Technical Data

PiperSport / SportCruiser (early model)

Wing

- Span..... 8.810 m (28.90 ft)
- Area..... 12.30 m² (132.3 sq.ft)
- MAC 1,500 mm (59.1 in)
- Wing loading 49 kg/m² (10.0 lb/sq.ft)
- Aileron area..... 0.46 m² (4.98 sq.ft)
- Flap area..... 0.65 m² (7.0 sq.ft)

Fuselage

- Length 6.500 m (21.33 ft)
- Width..... 1.280 m (50.4 in)
- Height..... 2.370 m (7.78 ft)
- Cockpit width..... 1.170 m (46 in)

Horizontal tail unit

- Span..... 2.930 m (9.61 ft)
- HTU area..... 2.2 m² (23.7 sq.ft)
- Elevator area..... 0.8 m² (8.6 sq.ft)

Vertical tail unit

- Height..... 1.070 m (3.51 ft)
- VTU area..... 1 m² (10.7 sq.ft)
- Rudder area 0.4 m² (4.3 sq.ft)

Landing gear

- Wheel track 1.520 m (4.98 ft)
- Wheel base 2.070 m (6.79 ft)
- Nose landing gear wheel diameter 343 mm (13.5 in)
- Main landing gear wheel diameter 343 mm (13.5 in)

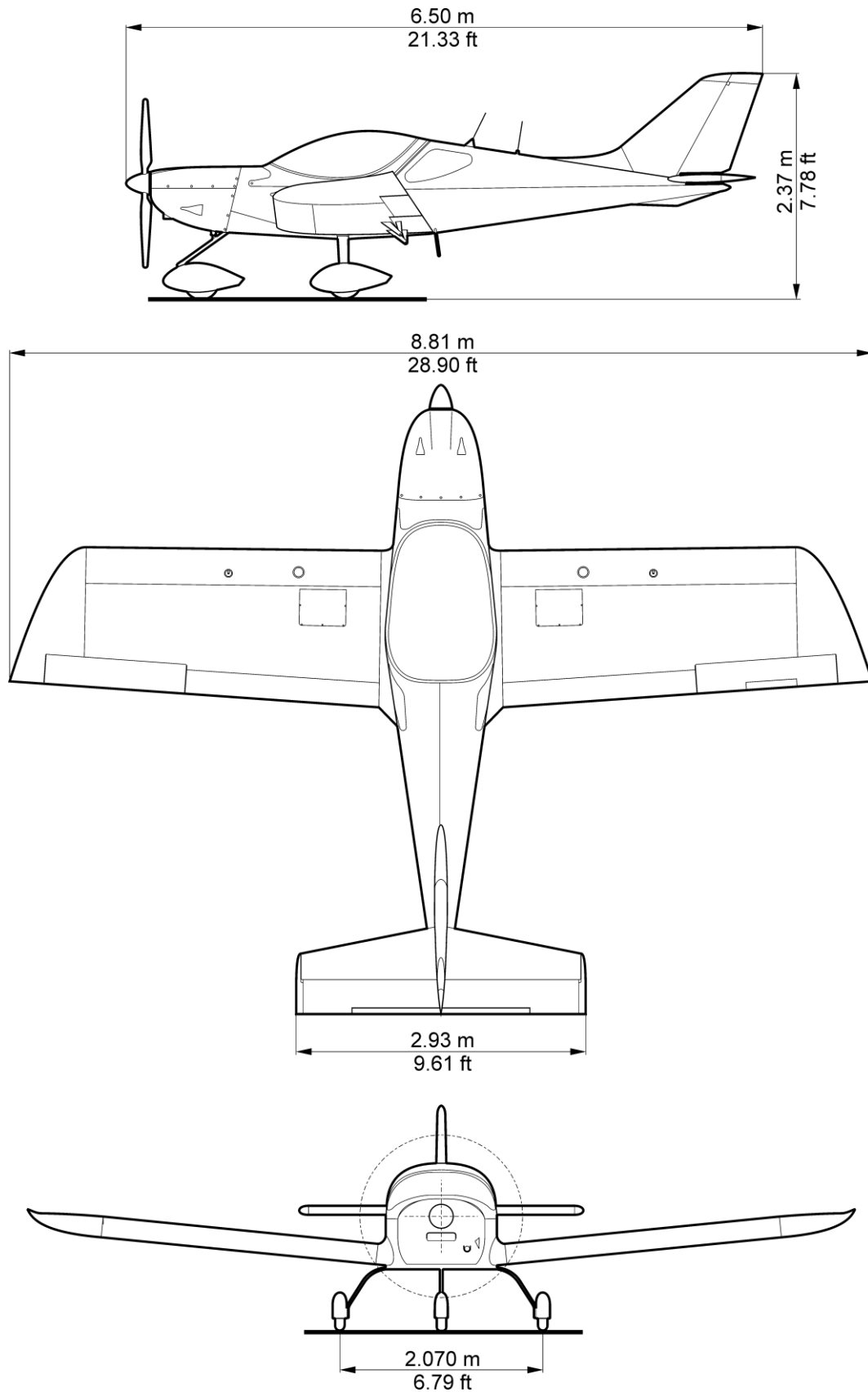


Fig. 1-1: SportCruiser / PiperSport Three-view drawing



SportCruiser (S/N P1102012, P1102014, P1102015, P1102016, P1102019, P1102027, P1102031, P1102034, C0416 and up)

Wing

- Span.....8.600 m (28.22 ft)
- Area.....12.30 m² (132.3 sq.ft)
- MAC1,500 mm (59.1 in)
- Wing loading49 kg/m² (10.0 lb/sq.ft)
- Aileron area.....0.40 m² (4.31 sq.ft)
- Flap area.....0.65 m² (7.0 sq.ft)

Fuselage

- Length.....6.620 m (21.78 ft)
- Width.....1.280 m (50.4 in)
- Height.....2.315 m (7.60 ft)
- Cockpit width.....1.170 m (46 in)

Horizontal tail unit

- Span.....2.930 m (9.61 ft)
- HTU area.....2.2 m² (23.7 sq.ft)
- Elevator area.....0.8 m² (8.6 sq.ft)

Vertical tail unit

- Height.....1.070 m (3.51 ft)
- VTU area.....1 m² (10.7 sq.ft)
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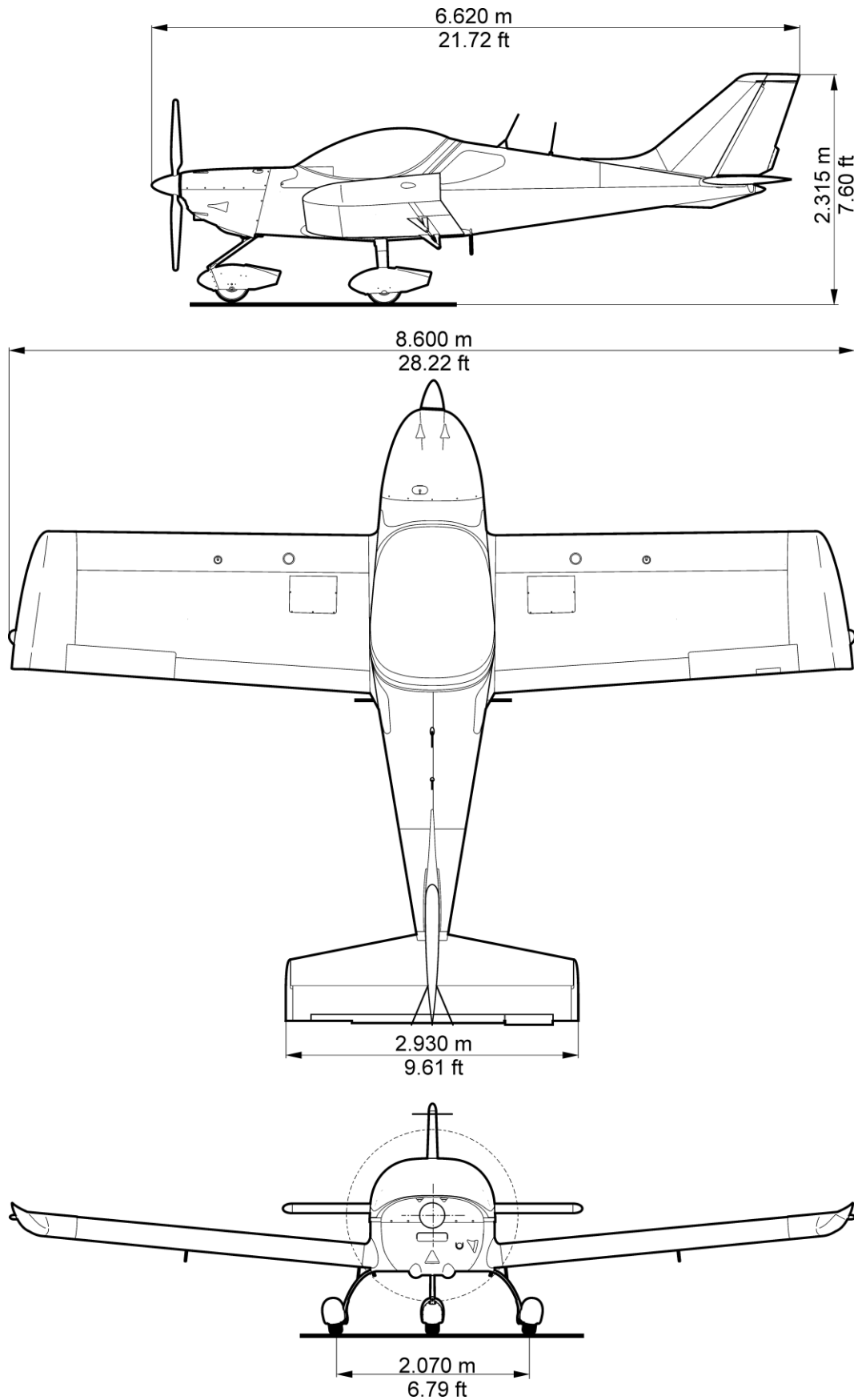


Fig. 1-2: SportCruiser Three-view drawing



1.3 Airplane Manufacturer

**Czech Sport Aircraft a.s.
Na Záhonech 212, 686 04 Kunovice
Czech Republic**

**www.czechsportaircraft.com; office@czechsportaircraft.com
Fax: +420 576 519 394, Phone: +420 576 514 034 (Sales Dept.)**

1.4 Chapter Order

Chapters in this manual are ordered in ascending sequence from No. 1. Every chapter describes one system or assembly.

1.4.1 Page Numbering

Example:

12 – POWERPLANT

Page **12 – 10**

Chapter Number nad Title

Chapter No.

Page No.

1.5 Warnings, Cautions, and Notes

WARNING: MEANS THAT NON-OBSERVATION OF THE CORRESPONDING OPERATING INSTRUCTION, INSPECTION OR MAINTENANCE PROCEDURE CAN LEAD TO INJURY OR DEATH OF PERSONS.

CAUTION: MEANS THAT NON-OBSERVATION OF THE CORRESPONDING OPERATING INSTRUCTION, INSPECTION OR MAINTENANCE PROCEDURE CAN LEAD TO DAMAGE OR DESTRUCTION OF DEVICE.

NOTE: Means that the corresponding operating instruction, inspection or maintenance procedure is considered to be important.



1.6 Equipment List

Refer to the SportCruiser / PiperSport Pilot's Operating Handbook, Section 9 for actual Equipment list.

1.7 Sources to Purchase Parts

Spare parts can be ordered from CSA through the PS-28 Cruiser / SportCruiser / PiperSport Illustrated Parts Catalogue (Doc. No. CR-IPC-1-0-00).

1.8 List of Disposable Replacement Parts

ITEM	PART NUMBER	SOURCE
Air filter	825710	Czech Sport Aircraft BRP-Powertrain
Fuel filter	10543-1	Czech Sport Aircraft Aircraft Parts Store
Oil filter	825701	Czech Sport Aircraft BRP-Powertrain
Tire and tube	Goodyear Flight Special II – 5.00-5	Czech Sport Aircraft Aircraft Parts Store
Brake lining	WHL66-106	Czech Sport Aircraft Aircraft Parts Store

1.9 Weight and Balance Information

Refer to SportCruiser / PiperSport Pilot's Operating Handbook, Section 4 or 6 for the Weight and Balance Data.

1.10 Tire Inflation Pressure

Refer to Section 8.5.1 of this manual for the tire inflation data.

1.11 Approved Oils and Capacities

Refer to the SportCruiser / PiperSport Pilot's Operating Handbook, Section 9 or Section 17.5 of this manual for the approved oil and capacity data.

1.12 Recommended Fastener Torque Values

Refer to Section 15.7 of this manual for the torque moments.

1.13 Instructions for Reporting Possible Safety of Flight concerns during Inspection / Maintenance

If you discover any problems during maintenance of this airplane that in your opinion can cause safety of flight issues, please report that concern to Czech Sport Aircraft a.s. For this purpose use Airplane Failure Card (see 17.4).

Please note that if the concern is related to the engine internals, we may refer you to a certified engine service station.



1.14 General Safety Information

Safety must be considered the first priority when performing maintenance or service on an aircraft or part. To minimize the risk to both yourself and others, begin by thinking through each task that is to be performed before starting any work. Using common sense, think of ways to avoid these hazards. Be sure to also use the right tool for the task at hand and to use the proper personal protective equipment. Such equipment may include, but is not limited to:

- Eye protection – safety glasses, goggles, and face shield
- Gloves
- Hearing protection – ear plugs or muffs
- Apron
- Protective footwear with non-slip soles

Some other general rules to follow are:

- Prior to performing maintenance or repair always disconnect the negative (-) battery cable from the battery.
- During all service and repair work beware of activating the BRS rocket (if installed).
- Never leave the ignition switch or the master switch turned on when the engine is not running. While running the engine on the ground, keep away from the propeller.
- Remove any loose clothing, such as neckties and scarves. Tuck in your shirt and secure any long hair to prevent them from becoming tangled in power tools.
- Remove all jewelry. Not only can items such as rings, watches, and necklaces become caught in rotating tools, they can also conduct electricity and may cause a short circuit. This could result in burns or damage to electrical circuits.
- Aviation gasoline is also highly flammable. When working with the fuel system, always work in a well-ventilated environment. Any nearby source of ignition such as sparks or an open flame can result in a fire or explosion. Keep all ignition sources away. Always ground the airframe to a suitable earth ground during fueling/defueling operations to reduce the risk of a static discharge ignition source.
- When working with the landing gear, always support the aircraft properly with jacks. Do not work underneath the aircraft unless it is properly supported.



1.15 Definitions and abbreviations

ACCU	Accumulator
ADAHRS	Air Data Attitude and Heading Reference System
Annual condition inspection	detailed inspection accomplished once a year on a LSA in accordance with instructions provided in the maintenance manual supplied with the aircraft. The purpose of the inspection is to look for any wear, corrosion, or damage that would cause an aircraft to not be in a condition for safe operation.
ALT	Altimeter
A&P	airframe and powerplant mechanic as defined by Part 66 or 14 CFR Part 65
ATC	Air Traffic Control
bar	Pressure unit (1 bar = 14.5037 psi)
BEACON	Anti-collision beacon
°C	Temperature in degree of Celsius ($1^{\circ}\text{C} = (^{\circ}\text{F} - 32) / 1.8$)
CAS	Calibrated Airspeed
CHT/CT	Cylinder Head Temperature / Coolant Temperature
COMM	Communication transmitter
EASA	European Aviation Safety Agency
EFIS	Electronic Flight Instrument System
ELT	Emergency Locator Transmitter
EMS	Engine Monitoring System
°F	Temperature in degree of Fahrenheit ($1^{\circ}\text{F} = (^{\circ}\text{C} \times 1.8) + 32$)
FAA	United States Federal Aviation Administration
ft	foot / feet (1 ft = 12 in = 0.3048 m = 304.8 mm)
ft/min	Vertical speed in feet per minute
GPS	Global Positioning System
Heavy maintenance	any maintenance, inspection, repair, or alteration a manufacturer has designated that requires specialized training, equipment, or facilities
hp	Power unit (1 hp = 0.7457 kW)
HTU	Horizontal Tail Unit
IAS	Indicated Airspeed
IC	Intercom
IFR	Instrument Flight Rules
in	inch (1 in = 25.4 mm)
ISA	International Standard Atmosphere
KCAS	Calibrated Airspeed in knots
kg	kilogram (1 kg = 2.2046 lb)
knot	Speed in NM per hour
KIAS	Indicated Airspeed in knots
km/h	Speed in kilometer per hour
knot	Speed in NM per hour



CHAPTER 1 – GENERAL

kW	Power unit (1 kW = 1.341 hp)
l	liter (1 l = 0.22 UK gal = 0.264 US gal)
lb	pounds (1 lb = 0.4536 kg)
lbf	force unit (1 lbf = 4.45 N)
Line maintenance	any repair, maintenance, scheduled checks, servicing, inspections, or alterations not considered heavy maintenance that is approved by the manufacturer and is specified in the manufacturer's maintenance manual
LoEP	List of Effective Pages
LSA Airplane (Light Sport Aircraft Airplane)	a powered fixed wing aircraft designed per CS-LSA / Specification F2245
LSA Repairman Inspection	U.S. FAA certificated repairman (light sport aircraft) with an inspection rating, defined by 14 CFR Part 65, authorized to perform the annual condition inspection on experimental light sport aircraft, or an equivalent rating issued by other civil aviation authorities.
LSA Repairman Maintenance	U.S. FAA certificated repairman (light sport aircraft) with a maintenance rating as defined by 14 CFR Part 65, authorized to perform line maintenance on aircraft certificated as special LSA aircraft. Authorized to perform the annual condition/100-hour inspection on an LSA, or an equivalent rating issued by other civil aviation authorities.
m	meter (1 m = 1,000 mm = 3.28 ft = 39.37 in)
mm	millimeter (1 mm = 0.03937 in)
MAC	Mean Aerodynamic Chord
Maintenance manual	manual provided by an LSA manufacturer or supplier that specifies all maintenance, repairs, and alterations authorized by the manufacturer
Major repair, alteration, or maintenance	any repair, alteration, or maintenance for which instructions to complete the task excluded from the maintenance manual(s) supplied to the consumer are considered major
Manufacturer	any entity engaged in the production of an LSA or component used on an LSA
max.	maximum
min.	minimum or minute
Minor repair, alteration, or maintenance	any repair, alteration, or maintenance for which instructions provided for in the maintenance manual(s) supplied to the consumer of the product are considered minor
mph	Speed in statute miles per hour
N	Newton - force unit (1 N = 0.225 lbf)



NM	Nautical Mile (1 NM = 1,852 m)
OAT	Outside Air Temperature
OFF	System is switched off or control element is in off-position
ON	System is switched on or control element is in on- position
Overhaul	maintenance, inspection, repair, or alterations that are only to be accomplished by the original manufacturer or a facility approved by the original manufacturer of the product
POH	Pilot Operating Handbook
psi	Pressure unit - pounds per square inch (1 psi = 0.0689bar)
RoR	Record of Revisions
rpm	revolutions per minute
sec.	second
SM	Statute Mile (1SM = 1.609 m)
US gal	US gallon (1 US gal = 0.83 UK gal = 3.785 l)
V	Volt
VFR	Visual Flight Rules
VMC	Visual Meteorological Conditions
VSI	Vertical Speed Indicator
VTU	Vertical Tail Unit
V _A	Maneuvering airspeed
V _{FE}	Maximum flap extended speed
V _{NE}	Never exceed speed
V _{NO}	Maximum structural cruising speed
V _{SO}	Stall speed with wing flaps in extended position
V _{S1}	Stall speed with wing flaps in retracted position
V _X	Best angle of climb speed
V _Y	Best rate of climb speed
XPDR	Secondary radar transponder
TSN	Time since new
TSO	Time since overhaul
FH	Flight hour
Cycle	Flight
100-h inspection	same as an annual condition inspection, except the interval of inspection is 100h of operation instead of 12 calendar months. This inspection is utilized when the LSA is being used for commercial operations such as flight instruction or rental, or both



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2.6	Lubrication chart	2-18



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**CHAPTER 2 – TIME LIMITS / MAINTENANCE CHECKS****2.1 General**

This chapter contains information about:

- airframe life limitations
- aircraft parts life limitations
- terms and list of aircraft regular maintenance works
- lubrication chart

2.2 Airframe life limitation

Initial airframe life is 5,000 FH.

2.3 Aircraft parts life limitation**2.3.1 Aircraft parts life time limitation**

	ITEM	INTERVAL	REPLACE	OVERHAUL	NOTES
1	Engine	2,000 FH or 15 years		X	Whichever comes first See OM for Engine Type 912 Series
2	BRS rocket	12 years	X		
3	BRS parachute	25 years	X		Every 6 years repack
4	Flexible fuel system hoses	5 years	X		
5	Flexible oil system hoses	5 years	X		
6	Flexible cooling system hoses	5 years	X		
7	Battery	5 years or at capacity drop below 80%	X		Whichever comes first
8	ELT main unit battery	5 years	X		
9	ELT remote unit battery	5 years	X		
10	Dynon EFIS D100 battery unit	At low capacity ¹⁾	X		
11	Dynon SV-D1000 battery unit	At low capacity ²⁾	X		
12	Dynon SV-HDX 1100 battery unit	At low capacity ³⁾	X		

- 1) For battery test, see procedure in the EFIS-D100 Installation Guide, P/N 100478-000, Rev.H, dated August, 2010, Page 7-1: Internal Battery Check.
- 2) For battery test, see procedure in the SkyView Pilot's User Guide, Document 101321-016, Rev.R dated August, 2014, Section 3-11 Backup Battery Charging and Testing.
- 3) For battery test, see procedure in the Dynon SkiView HDX System Installation Guide, Document 101320-027, Rev.AB, dated March, 2017.



2.3.2 Propeller parts inspections and overhauls schedule:

- Woodcomp Klassic 170/3/R
- Sensenich 3B0R5R68C
- Sensenich 2A0R5R70EN

ITEM	TIME BETWEEN MEDIUM REPAIRS	TIME BETWEEN OVERHAULS	LIFE TIME	NOTES
Klassic 170/3/R propeller	500 oper. hrs or 36 months	1000 oper. hrs or 72 months	---	Whichever comes first

ITEM	TIME TO PERIODIC INSPECTION	TIME BETWEEN OVERHAULS	LIFE TIME	NOTES
Sensenich 3B0R5R68C or 2A0R5R70EN propeller	2000 hrs	---	---	No specified overhaul time. The propeller parts are removed from service when they can no longer meet the Continued Airworthiness Requirements

2.3.3 Propeller SR 3000/2W – Periodical inspections / overhauls

OPERATION HOURS	INSPECTION / OVERHAUL	AUTHORISATION TO PERFORM
Every 300 hrs. or 60 months (whichever comes first)	Overhaul	Manufacturer or authorised service organization

Notes for 2.3.2 and 2.3.3:

Inspections must be performed by aircraft engineer (AML ICAO, AML part 66, etc.) or by Certifying staff (EU 1321 / 2014) for SportCruiser / Piper Sport aircraft operating under EASA rules.

In addition to the inspections and overhauls schedule mentioned above, Woodcomp and Sensenich propellers must be inspected also after first 25 hrs of propeller operation and after each 100 hrs of aircraft operation or 12 months (whichever comes first).

See also last instructions issued by the propeller manufacturers (www.woodcomp.cz / www.sensenich.com)



2.4 Ordering spare parts

Order spare parts through the Airplane failures card - see Section 17.4.

2.5 Terms and list of aircraft regular maintenance works

2.5.1 General

Authorization to perform Time Limits/Maintenance Checks and Inspections:

Aircraft engineer (AML ICAO, AML part 66, etc.).

Certifying staff (EU 1321 / 2014) for SportCruiser / Piper Sport aircraft operating under EASA rules.

Maintenance system serves to maintain flight airworthiness of the SportCruiser / PiperSport airplane.

Maintenance system is composed of special and scheduled inspections, which must be performed at least in the following intervals:

CAUTION: THE INTERVALS OF ENGINE INSPECTIONS AND THE LIST OF WORKS ARE SHOWN IN THE MAINTENANCE MANUAL (LINE MAINTENANCE) FOR INSTALLED ENGINE. THE INTERVALS OF PROPELLER INSPECTIONS AND THE LIST OF WORKS ARE SHOWN IN INSTALLATION AND OPERATION INSTRUCTIONS FOR THE INSTALLED PROPELLER. IF THE PERIODICAL INSPECTION IS PERFORMED BEFORE REACHING THE SPECIFIED TIME INTERVAL, THEN THE FOLLOWING INSPECTION MUST BE PERFORMED AT THE LATEST WITHIN THE SPECIFIED TIME INTERVAL FROM THIS INSPECTION (E.G. IF THE FIRST 100-FH INSPECTION IS PERFORMED AFTER 87 FH THEN THE FOLLOWING 100-FH INSPECTION MUST BE PERFORMED AT THE LATEST AFTER 187 FH).

- (a) Preflight inspection is performed within the scope given in the POH, Section 4.
- (b) Scheduled special inspection of original, old NLG leg (i.e. other than SG0300N) after each 25 landings.
- (c) Scheduled special propeller inspection after 25, 100, 300, 500, 1000 and 2,000 FH (see Installation and Operating Instructions for installed propeller)

NOTE: To be performed with a newly installed propeller or with the propeller that was dismantled and reinstalled on the airplane.

- (d) Special engine inspection after the first 25 FH.

CAUTION: INSPECTION AFTER THE FIRST 25 FH TO BE PERFORMED WITH THE new engine or with the engine after overhaul.

- (e) Scheduled inspection after 50 FH - inspection of engine compartment and NLG leg Dwg.No.SG0300N.
- (f) Scheduled inspection after 100+5 FH - airframe and propeller inspections, engine inspection according to maintenance system, which is described in Maintenance Manual (Line Maintenance) for installed engine.

CAUTION: 100-FH LIMIT CAN BE EXCEEDED MAX. BY 5 FH PROVIDING THAT THIS EXCEEDING WILL BE JUST TO FINISH FLIGHT WHICH STARTED BEFORE REACTING 100-FH TERM OR FOR FLIGHT WITH THE PURPOSE TO REACH A PLACE WHERE THE INSPECTION WILL BE CARRIED OUT. OPERATION TIME, WHICH EXCEEDED 100-FH INTERVAL, MUST BE INCLUDED AS A TIME FLOWN FOR DETERMINATION OF THE NEXT 100-FH INSPECTION.



2.5.2 Tables of inspection tasks

Tables of inspection tasks include the list of all works, which are performed during inspection.

Number of chapter is indicated in the first column of this Maintenance Manual where you can also find more detailed information for performing individual works.

The description of works, which are performed during inspection, is indicated in the second column.

CAUTION: ALL DEFECTS FOUND OUT DURING AIRCRAFT INSPECTIONS MUST BE ELIMINATED!



SCHEDULED SPECIAL INSPECTION			
Aircraft S/N:		TSN (FH):	
Registration mark:		TSN (cycles):	
Page: 1 of 1			
Chpt.	Prescribed works	Made by	Checked by
8	Nose landing Gear		
	Inspection after each 25 landings		
	8.4.3 Check of nose landing gear for cracks		
	Check of the original, old (i.e. other than SG0300N) nose landing gear leg for cracks, bendings or any non-standard changes of the NLG shape or function.		
Notes:			
Date:		Signature:.....	

SPECIAL INSPECTION AFTER FIRST 25 FH			
Aircraft S/N:		TSN (FH):	
Registration mark:		TSN (cycles):	
Page: 1 of 1			
Chpt.	Prescribed works	Made by	Checked by
10	Engine and propeller		
	List of performed operations for engine is shown in Maintenance Manual (Line Maintenance) for ROTAX Engine Type 912 Series (MML-912).		
	Remove and check engine cowlings for evident signs of heat damage or cracks.		
	Inspect and check tightening and securing bolts on the engine brackets and the engine mount.		
	Check the engine mount for occurrence of cracks.		
	Check the exhaust system (and its attachment) for occurrence of cracks on the exhaust system and welds (see 10.4.11).		
	Remove and clean the fuel filter screen inserted in gascolator.		
	Fuel system – visual check of tightness.		
	Oil system – visual check of tightness.		
	Cooling system – visual check of tightness.		
Notes:			
Date:		Signature:.....	



SCHEDULED SPECIAL INSPECTION

Aircraft S/N: TSN (FH):
 Registration mark: TSN (cycles):

Page: 1 of 1

Chpt.	Prescribed works	Made by	Checked by
10	Klassic 170 I3/R propeller		
	Inspection after the first 25 hrs of operation (see 10.4.2.2).		
	Remove the propeller spinner.		
	Visually check the propeller.		
	Tighten the fixing bolts and bolts on spokes of the hub.		
	Install the propeller spinner.		
	Inspection after 100 hrs of operation or 12 months * (see 10.4.2.2).		
	Remove the propeller spinner.		
	Visually check the propeller and check the grip.		
	Visually check the propeller hub.		
	Tighten the fixing bolts and bolts on spokes of the hub.		
	Install the propeller spinner.		
	Inspection after 500 hrs of operation or 36 months *		
	Remove the propeller and send it to the manufacturer/authorized service organization - checking of propeller after 500 hrs is done at manufacturer or his authorized service organization.		
	Inspection after 1,000 hrs of operation or 72 months *		
	Remove the propeller and send it to the manufacturer/authorized service organization - checking of propeller after 1,000 hrs is done at manufacturer or his authorized service organization.		
	SR 3000 propeller		
	Inspection after 25 hrs of operation		
	See 10.4.3.2		
	Inspection after each 100 hrs of operation or 12 months *		
	See 10.4.4.3.2		
	Inspection after 300 hrs of operation or 60 months *		
	Remove the propeller and send it to the manufacturer/authorized service organization - checking of propeller after 300 hrs is done at manufacturer or his authorized service organization.		

Notes:

*) hrs of operation or months, whichever comes first

See also last instructions issued by the propeller manufacturers (www.woodcomp.cz)

Date:

Signature:

**SCHEDULED SPECIAL INSPECTION - continue**

Aircraft S/N: TSN (FH):
Registration mark: TSN (cycles):

Page: 1 of 1

Chpt.	Prescribed works	Made by	Checked by
10	3.2.2 Sensenich 3B0R5R68C / 2A0R5R70EN propeller.		
	Inspection after the first 25 hrs of operation		
	See the propeller manufacturer documentation - Sensenich Three/Two Blade Composite Aircraft Propeller Installation and Operation Instructions for Rotax Engines		
	Inspection after 100 hrs of operation or 12 months *		
	See the propeller manufacturer documentation - Sensenich Three/Two Blade Composite Aircraft Propeller Installation and Operation Instructions for Rotax Engines		
	Major inspection after 2000 hrs of operation		
	Remove the propeller and send it to the manufacturer/authorized service organization - checking of propeller after 2000 hrs is done at manufacturer or his authorized service organization.		

Notes:

*) *hrs of operation or months, whichever comes first*
See also last instructions issued by the propeller manufacturers (www.sensenich.com).

Date:

Signature:



SCHEDULED INSPECTION AFTER 50 FH

Aircraft S/N: TSN (FH):
 Registration mark: TSN (cycles):

Page: 1 of 1

Chpt.	Prescribed works	Made by	Checked by
8	Landing Gear		
	Main Landing Gear		
	Check visually (using mirror) the condition and wearing of brake pads (minimum admissible thickness of brake pad is 2.5 mm) and brake disc.		
	Check visually the condition and wearing of brake disc - minimum admissible thickness of brake disc is 4.25 mm (0.167 in).		
	Nose Landing Gear		
	Check of the landing gear leg for cracks.		
10	Engine		
	Remove and check engine cowlings for evident signs of heat damage or cracks.		
	Check the engine mount for occurrence of cracks.		
	Check the exhaust system (and its attachment) for occurrence of cracks on the exhaust system and on welds (see 10.4.11).		

Notes:

Date:

Signature:.....



SCHEDULED ANNUAL PERIODICAL INSPECTION OR INSPECTION AFTER 100 FH

Aircraft S/N: TSN (FH):
 Registration mark: TSN (cycles):
 Type of inspection:

Page: 1 of 7

Chpt	Prescribed works	Made by	Checked by
	General		
	Check the aircraft's logbooks for condition and check if all prescribed records are current (airplane log book, engine log book, propeller log book, and etc.).		
	Check the remaining service life of life limited items.		
	Check that the replacement or overhaul of life limited parts has been in accordance to their specified intervals.		
	Assure that replacements of these parts are performed in appropriate intervals.		
	Check all issued Airworthiness Directives for their accomplishment.		
	Check all aircraft, engine and propeller service bulletins for their accomplishment.		
	Clean the cockpit carefully.		
	Clean the aircraft's exterior, engine and propeller carefully.		
	Check all exterior and interior markings and placards for their condition (legibility, placement and security).		
	Remove and/or open all required covers and hatches.		
	Jack and support the aircraft.		
3	Fuselage		
	Visually check surface condition including fiberglass parts - loosened rivets, deformation, cracks and some other damage.		
	Check condition of fuselage-wing and fuselage-stabilizer fairings.		
	Check condition of foot rests.		
	Check condition and attachment of the tailskid.		
	Check condition and attachment of the canopy frame.		
	Check condition of the canopy plexiglass and fixed windows (scratches, cracks, silvering).		
	Check condition and function of canopy gas struts.		
	Check attachment and function of the sunshield.		
	Check condition of the canopy control including canopy lock.		
	Check condition and adjustment of terminal switches.		
	Check condition of rubber sealing of the canopy.		



SCHEDULED ANNUAL PERIODICAL INSPECTION OR INSPECTION AFTER 100 FH			
Page: 2 of 7			
Chpt	Prescribed works	Made by	Checked by
4	Wing		
	Visually check surface condition - loosened rivets, deformation, cracks and some other damage.		
	Check play in the wing attachments; check fuselage – wing attachment hardware for tightening.		
	Check condition of antislip strips.		
	Check condition of the wing lockers.		
	Check condition and attachment of the wing tips.		
	Aileron		
	Visually check surface condition - loosened rivets, deformation, cracks and some other damage.		
	Check for free travel.		
	Check hinges.		
	Check for securing control links.		
	Check condition and attachment of the trim tab (right aileron only).		
	Flap		
	Visually check surface condition - loosened rivets, deformation, cracks and some other damage.		
	Check for free travel.		
	Check hinges.		
	Check condition of the control rods and actuator.		
5	Tail Unit		
	HTU		
	Visually check surface condition - loosened rivets, deformation, cracks and some other damage.		
	Check horizontal stabilizer attachment and securing.		
	Check elevator attachment and securing.		
	Check condition and attachment of elevator tips.		
	Check free travel of the elevator.		
	Check condition of stop (elevator fully deflected down).		
	Check condition and attachment of the trim tab.		
	Check trim tab actuator connector for connection and securing.		
	Check condition and attachment of the balance tab (if installed).		
	Check condition and securing of the elevator control rod and the trim tab control actuator.		
	VTU		
	Visually check surface condition - loosened rivets, deformation, cracks and some other damage.		
	Check attachment and securing of the rudder lower hinge.		

**SCHEDULED ANNUAL PERIODICAL INSPECTION OR
INSPECTION AFTER 100 FH**

Page: 3 of 7

Chpt	Prescribed works	Made by	Checked by
5	Tail Unit (continued)		
	Check for free travel of the rudder.		
	Check condition of the stops on the vertical fin.		
	Check attachment and securing of rudder cables.		
	Check run cables over pulleys, securing of the pulleys.		
6	Control		
	Aileron and Elevator Control		
	Check for free travel of control (see 6.4.2).		
	Check plays (see 6.4.1).		
	Check securing of links.		
	Check condition of the stops.		
	Rudder Control		
	Check free play of control (see 6.4.2).		
	Check plays (see 6.4.1).		
	Check securing of turnbuckles.		
	Check condition and attachment of pedal springs.		
	Check condition and of cables (see 6.4.5).		
	Check adjustment of pedals and full deflections in all position.		
	Flap Control		
	Check for free travel of the control lever.		
	Check securing of links.		
	Check condition of control actuator and position indicator.		
	Control of the Pitch and Roll Trim Tab		
	Check condition of the control actuators and position indicators.		
	Check plays (see 6.4.1).		
	Check securing of links.		
	Check trim tab neutral position adjustment.		
7	Equipment		
	Check cleanness and condition of upholstery.		
	Check condition of seats.		
	Check condition, damage, function and attachment of safety harnesses and straps in baggage compartment.		
	Check condition and attachment of ELT.		
	Check attachment and security of BRS parachute container and rocket.		
	Check security and routing of airframe BRS bridles		



SCHEDULED ANNUAL PERIODICAL INSPECTION OR INSPECTION AFTER 100 FH

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Chpt.	Prescribed works	Made by	Checked by
7	Equipment (continued)		
	Check attachment, security and routing of BRS activating handle.		
	Check attachment of egress cover.		
8	Landing Gear		
	Main Landing Gear		
	Check condition of landing gear legs and attachment points.		
	Check attachment of the wheel axis.		
	Remove and disassemble wheel, clean and lubricate the bearings; reassemble it and install back.		
	Check condition, wear and inflation of tires.		
	Check condition of the wheel disk for occurrence of cracks.		
	Check securing of bolts.		
	Check wheel for free rotation.		
	Check condition and attachment of wheel fairings.		
	Check function of brakes and parking brake.		
	Check condition and attachment of brake hoses.		
	Check visually (using mirror) the condition and wearing of brake pads – min. admissible thickness of brake pad is 2.5 mm (0.1 in).		
	Check visually the condition and wearing of brake disc –min. admissible thickness of brake disc is 4.25 mm (0.167 in).		
	Check brake fluid leakage - brake fluid hoses, brake pumps, brake cylinders. Replenish brake fluid as needed (see 8.5.5).		
	Exchange brake fluid - applied for annual inspection only (see 8.5.5).		
	Nose Landing Gear		
	Check condition and attachment points of landing gear leg in fuselage.		
	Check of the landing gear leg for cracks.		
	Remove and disassemble wheel, clean and lubricate the bearings; reassemble it and install back.		
	Check condition, wear and inflation of tire.		
	Check condition of wheel disk and for occurrence of cracks.		
	Check securing of bolts.		
	Check for free travel of wheel rotation.		
	Check of friction shock absorber, check friction torque; as necessary tighten the nut (see 8.4.2).		
	Check condition and attachment of wheel fairing.		
	Check depression of nose wheel absorber (see 8.4.1).		

**SCHEDULED ANNUAL PERIODICAL INSPECTION OR
INSPECTION AFTER 100 FH**

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Chpt.	Prescribed works	Made by	Checked by
9	Fuel System		
	Drain fuel tanks and gascolator (see 9.5.2).		
	Remove and clean or replace the fuel filter screen inserted in gascolator (see 9.5.3).		
	Check condition and integrity of fuel pumps and hose sleeves in the engine compartment.		
	Check fuel selector valve for attachment, function and arrestment.		
	Visually check for fuel system tightness.		
	Check of condition and function of filler caps.		
	Check tightness and condition of fuel pump for occurrence of cracks on the pump body (see 9.4.2).		
	Visual check for impurities in the tank.		
	Check the fuel tank's vent for its condition (assure that the vent tube is not clogged).		
10	Engine and Propeller		
	List of performed operations for engine is shown in Maintenance Manual (Line Maintenance) for ROTAX Engine Type 912 Series (MML-912).		
	List of performed operations for the propeller is shown in Installation and Operating Instructions for installed propeller. See also 10.4.2.2, 10.4.3.2 or 10.4.4.1, as applicable.		
	Remove and check engine cowlings for evident signs of heat damage or cracks.		
	Check attachment of the propeller and propeller spacer.		
	Check condition of the firewall and equipment on firewall.		
	Inspect and check for tightening and securing the bolts on the engine brackets and the engine mount.		
	Check the engine mount for cracks.		
	Check the exhaust system (and its attachment) for cracks on the exhaust system and on welds (see 10.4.11).		
	Check condition and attachment of the airbox.		
	Check condition and cleanness of the air filter.		
	Check for leak of fluids.		
	Check function and condition of throttle and choke controls.		
	Remove and clean oil tank; install tank back - applied for annual inspection only.		



SCHEDULED ANNUAL PERIODICAL INSPECTION OR INSPECTION AFTER 100 FH

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Chpt.	Prescribed works	Made by	Checked by
11	Electrical System		
	Check attachment and condition of battery.		
	Check level of battery charge.		
	Perform battery capacity test- applied for annual inspection only.		
	Check condition, attachment and integrity of wiring.		
	Check condition and securing of plug/socket outlets.		
	Check condition of switches, fuses and circuit breakers.		
	Check condition of the landing light.		
	Check condition of the position / strobe lights.		
12	Instruments and Avionics		
	Check general condition and attachment of the instrument panel.		
	Check condition and attachment of instruments.		
	Check condition and attachment of the pitot tube.		
	Check cleanness of air inlet holes of pitot tube.		
	Check attachment and securing of hoses to the instruments.		
	Check for pitot-static system tightness (see 12.4.1) (with 2 years periodicity).		
	Visually check condition of navigation and communication instruments.		
	Perform compensation of magnetic and EFIS compass - applied for annual inspection only.		
	Check condition of COMM, ELT, XPDR, NAV antennas and OAT probe.		
	Perform capacity test of EFIS D100 internal emergency battery - applied for annual inspection only.		
13	Heating and Ventilation System		
	Check cleanness and passage of air inlet holes.		
	Check line and integrity of the heating and ventilation system hoses.		
	Check condition and attachment of the heat exchanger.		
	Check of functionality of rod and flap.		
All	Check for corrosion.		
	Check for hard handling.		

**SCHEDULED ANNUAL PERIODICAL INSPECTION OR
INSPECTION AFTER 100 FH**

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Chpt.	Prescribed works	Made by	Checked by
	Operational and Functional Tests		
	Check the function of the interior and exterior lighting.		
	Check the function of the canopy closed signalization.		
	Check the function of the flap control actuator including signalization.		
	Check the function of the roll and pitch control actuators including signalization.		
	Check function of navigation and communication instruments - in accordance with all valid and applicable regulations - applied for annual inspection only.		
	ELT - perform a functional test according to the applicable regulations		
	Dynon EFIS D100 - perform backup battery test		
	Dynon EFIS D1000 - perform backup battery test		
	Dynon SV-HDX 1100 - perform backup battery test		
	Check function of the signalling / warning lights.		
	Check all instruments for their function.		
	Close up Tasks		
	Lubricate all items according to the lubrication chart.		
	Install and close all covers and hatches.		
	Lower the aircraft.		
	Carry out an engine performance check and verify the engine's power (see 10.4.1).		
	After engine run-up, test and visually check the fuel and oil system for leakage and their security of all components.		
	Check the removal of all detected defects.		
	Fill out the required logbook entries.		

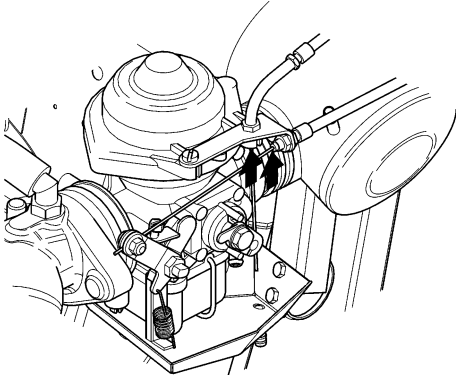
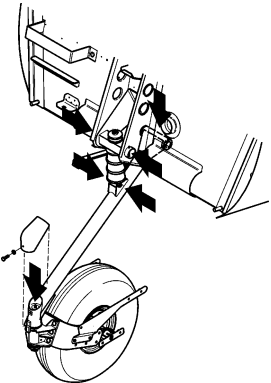
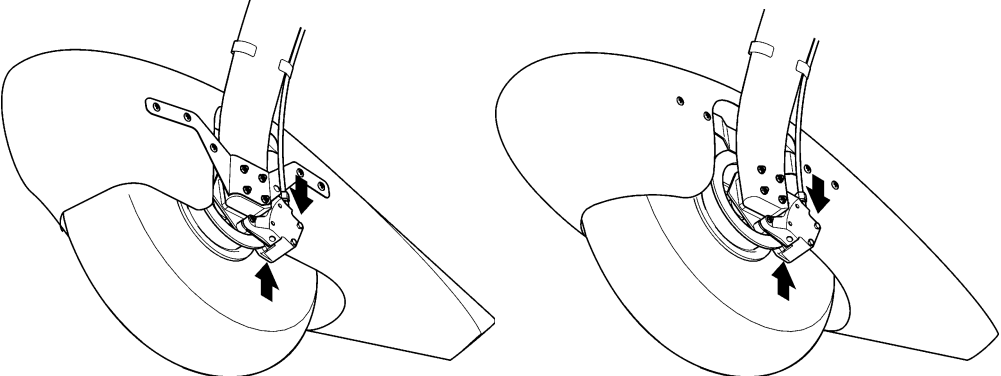
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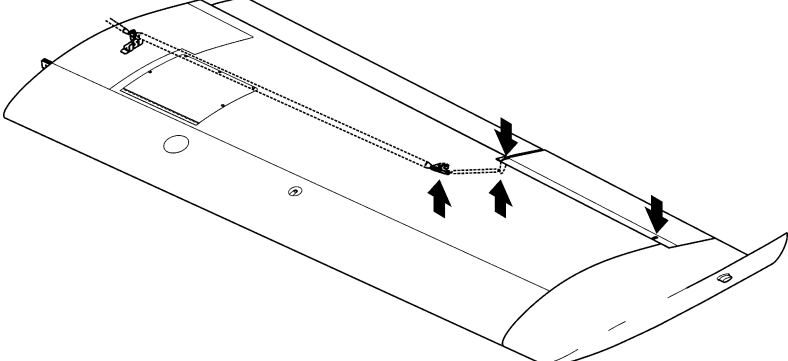
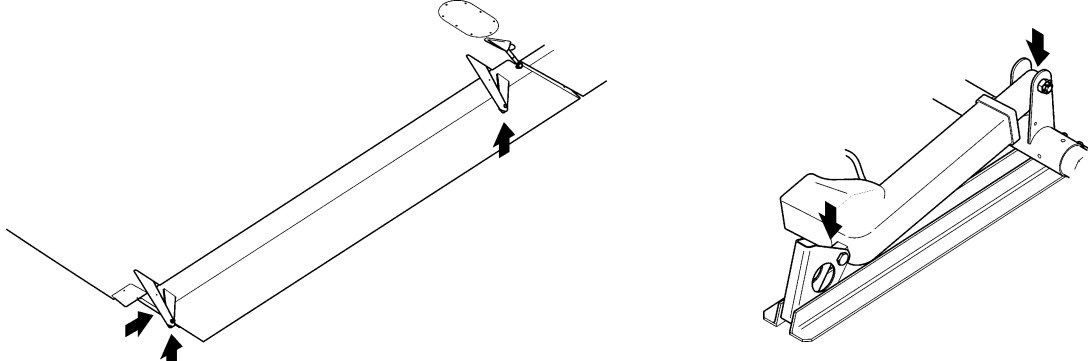
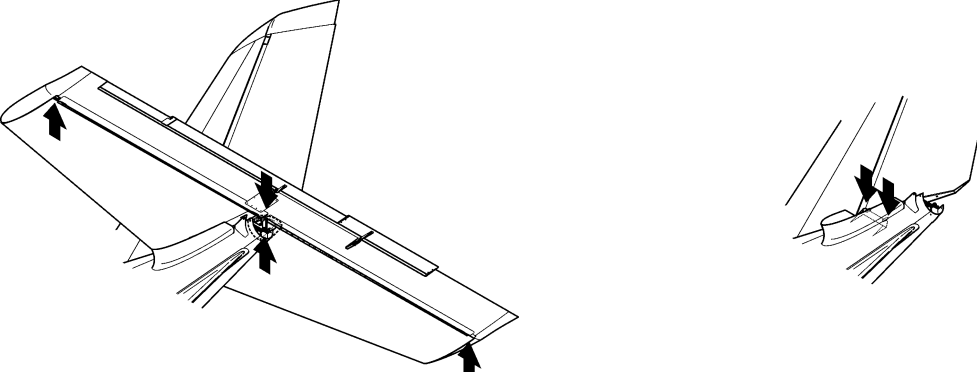
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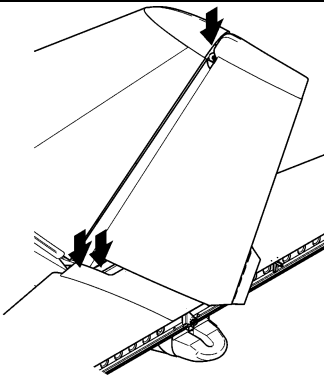
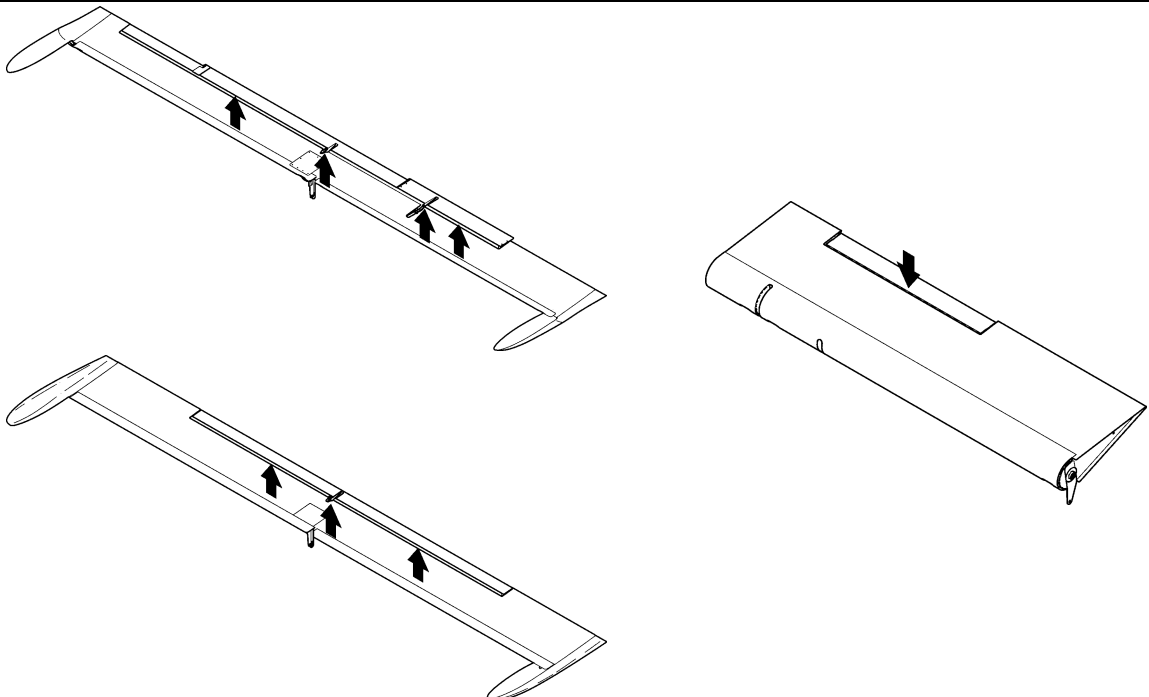
2.6 Lubrication chart

Unit	Area of lubrication	After first 25 FH	Every 100 FH	Every 500 FH	Lubricant
Engine	Throttle control cable on the inlet into terminal (in the engine compartment).	X	X	X	LPS1
	Choke control cable on the inlet into terminal (in the engine compartment).	X	X	X	LPS1
					
Nose landing gear	Landing gear leg in the area of mounting (lubricator) and the axis of rotation (see 8.5.4).	X	X	X	AeroShell Grease 22
					
Main landing gear	Brake pad pins.	X	X	X	LPS3
					

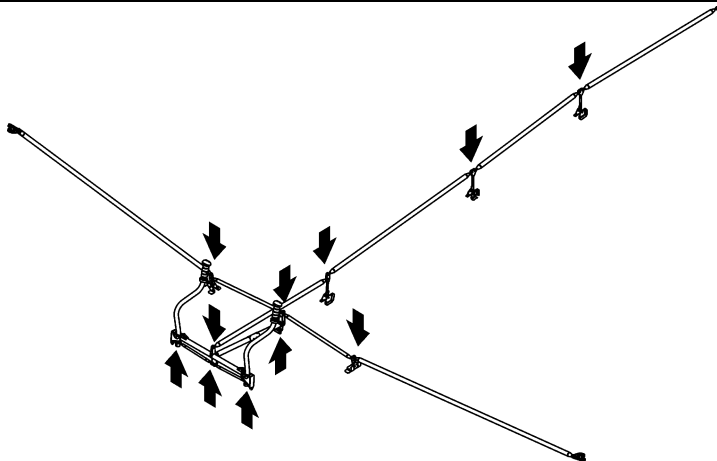
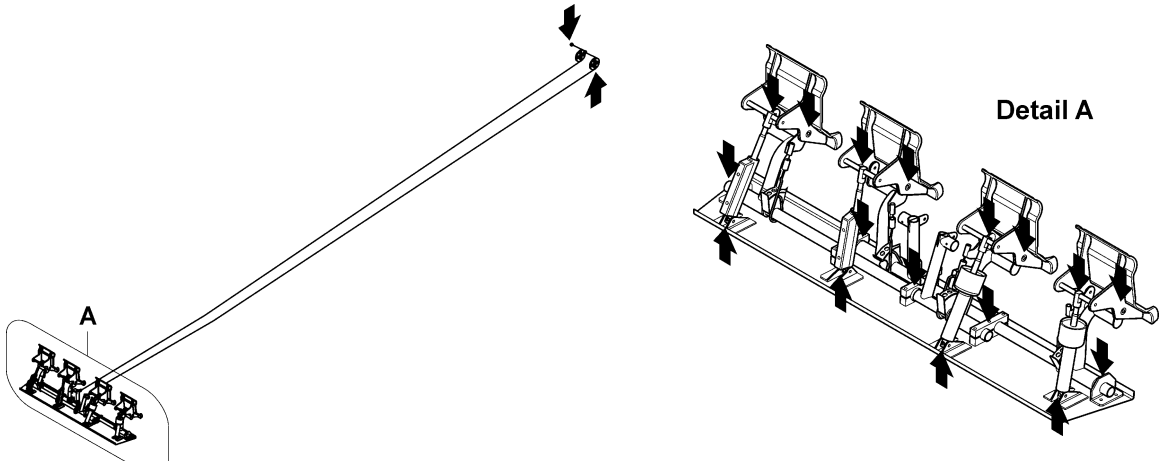


Unit	Area of lubrication	After first 25 FH	Every 100 FH	Every 500 FH	Lubricant
Ailerons	Hinges.	X	X	X	AeroShell Grease 22
	Rod end bearings of the control tubes.	-	-	X	AeroShell Grease 22
	Two-arm control levers in the fuselage.	-	-	X	AeroShell Grease 22
	Bell cranks in the wings.	-	-	X	AeroShell Grease 22
					
Flaps	Hinges.	X	X	X	AeroShell Grease 22
	Rod end bearings on actuator.	-	-	X	AeroShell Grease 22
					
HTU	Elevator hinges.	X	X	X	AeroShell Grease 22
	Rod end bearing of the elevator control tubes.	-	-	X	AeroShell Grease 22
	Pins (front stabilizer hinge)		Annual insp.		LPS3
					



Unit	Area of lubrication	After first 25 FH	Every 100 FH	Every 500 FH	Lubricant
VTU	Rudder hinges.	X	X	X	AeroShell Grease 22
	Cable shackles on the rudder control cables.	X	X	X	AeroShell Grease 22
					
Trim and balance tabs	Tabs hinges.	X	X	X	LPS1
	Rod end on actuators.	X	X	X	AeroShell Grease 22
					



Unit	Area of lubrication	After first 25 FH	Every 100 FH	Every 500 FH	Lubricant
Aileron, elevator control	All movable links in the cockpit.	-	-	X	AeroShell Grease 22
					
Rudder control	All movable links in the cockpit.	-	-	X	AeroShell Grease 22
	Cable shackles of rudder control.	X	-	X	AeroShell Grease 22
					





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3.1 General

SportCruiser / PiperSport fuselage is a semi-monocoque structure formed by stiffeners and aluminum sheet. The fuselage consists of the front part with the cockpit and the rear part, the integral part of which is the fin.

This chapter describes the following:

- front part of the fuselage
- rear part of the fuselage
- cockpit (crew compartment)
- baggage compartment
- cockpit canopy.

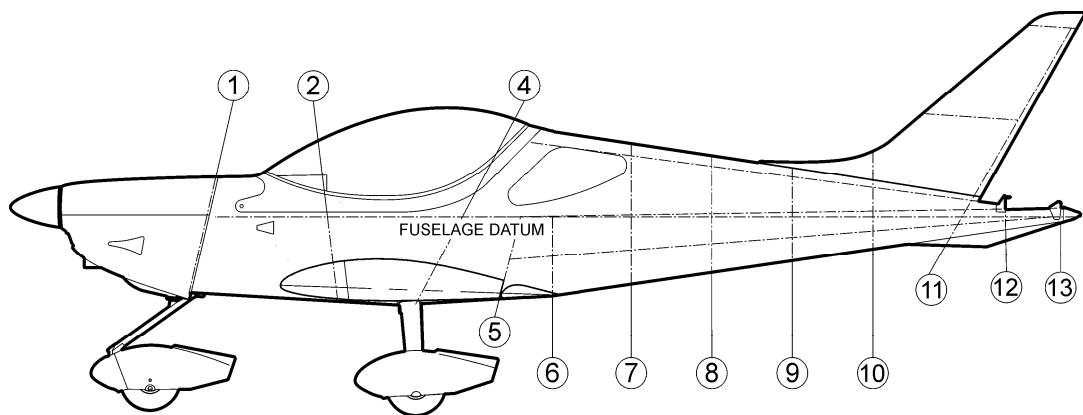


Fig. 3-1: Fuselage layout

3.2 Description and operation

3.2.1 Front part of the fuselage

The front part of the fuselage consists of bulkheads No. 1 to 5 (see Fig. 3-1). The nose landing gear attachments (1, Fig. 3-2) are located on the bulkhead No. 1, which also separate the cockpit from the engine compartment. Cockpit with fixed seats is located between bulkheads No. 1 and 5. The baggage compartment is located behind the seats. Center section of wing consists of the main attachments (2) are located between bulkheads No. 2 and 3 and the rear attachment (3), which is located on the bulkhead No. 5, main landing gear attachment points (4) are located behind main center wing spar, the engine mount attachment points (5) are located on the bulkhead No. 1, which is firewall.

3.2.2 Rear part of the fuselage

The rear part of the fuselage is located in the area from the bulkhead No. 6 up to the bulkhead No. 13 (see Fig. 3-1). It is a semi-monocoque structure formed by stiffeners and aluminum skin. The rear part of fuselage is of elliptic section covered by aluminum sheet. The fin with rudder attachments (6, Fig. 3-2) and stabilizer attachments (7) is an integral part of the rear part of the fuselage. The bulkheads No. 12 and 13 form the stabilizer attachment points.

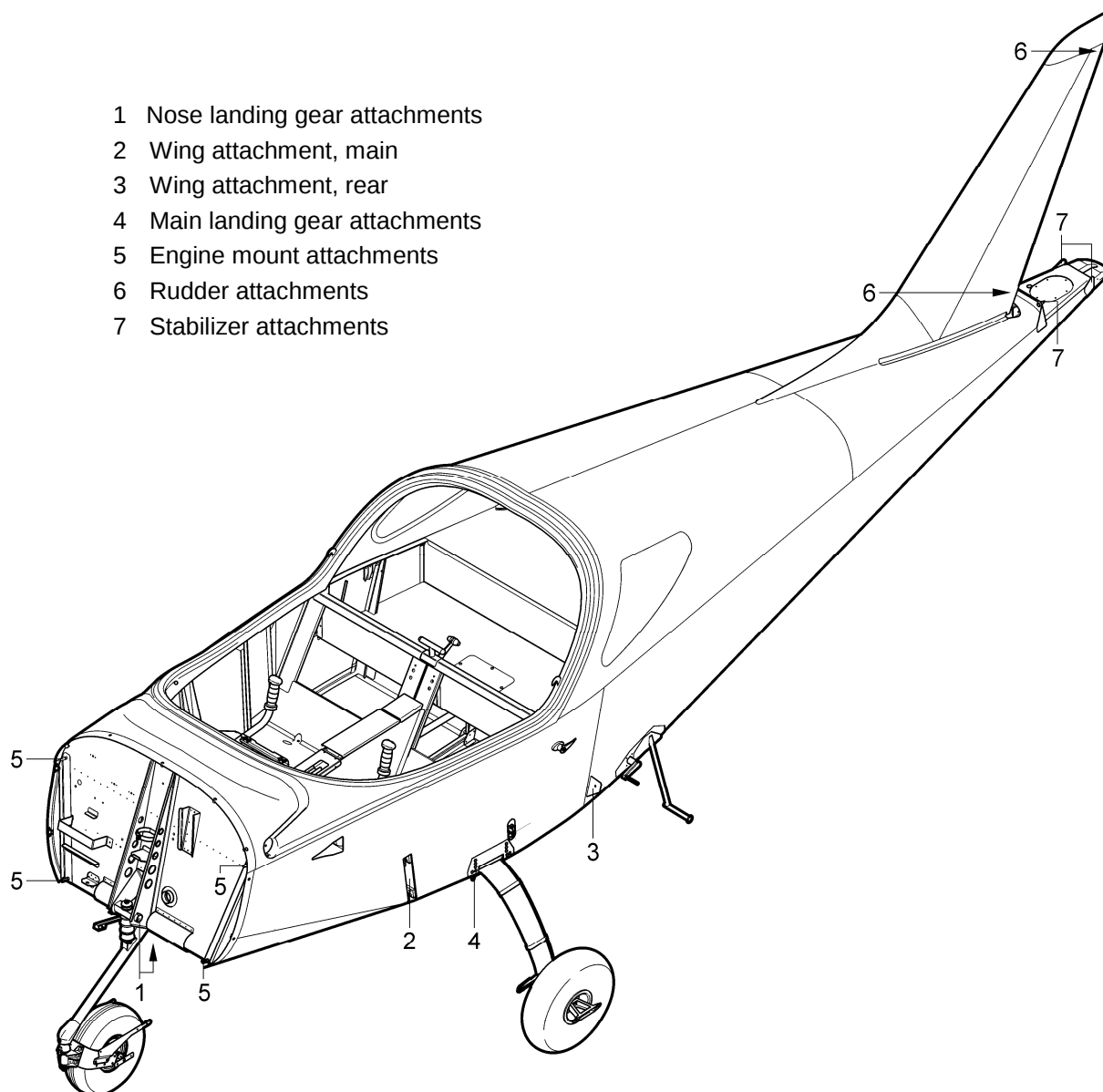


Fig. 3-2: Fuselage monocoque

3.2.3 Cockpit

The cockpit (see Fig. 3-1) is located in the front part of the fuselage between the bulkheads No. 1 and 5. The instrument panel is located between bulkhead No. 1 and frame No. 2. In the middle of the cockpit there is a middle console with control elements. The cockpit is equipped with two fixed seats.

NOTE: Current instrument panel arrangement is stated in the Pilot's Operation Handbook, Supplement No. 2.

The cockpit floor and baggage compartment is covered with a removable carpet and the middle console is covered with thin upholstery. The interior cockpit sides are covered with padded panels containing pockets and armrests.



3.2.4 Baggage compartment

Baggage compartment (8, Fig. 3-3) is located between the seats and the bulkhead No. 7. Max. baggage weight transported in the baggage compartment is 18 kg (40 lbs).

3.2.5 Crew canopy

The crew canopy is produced of organic glass and consists of opening canopy and rear fixed canopy windows.

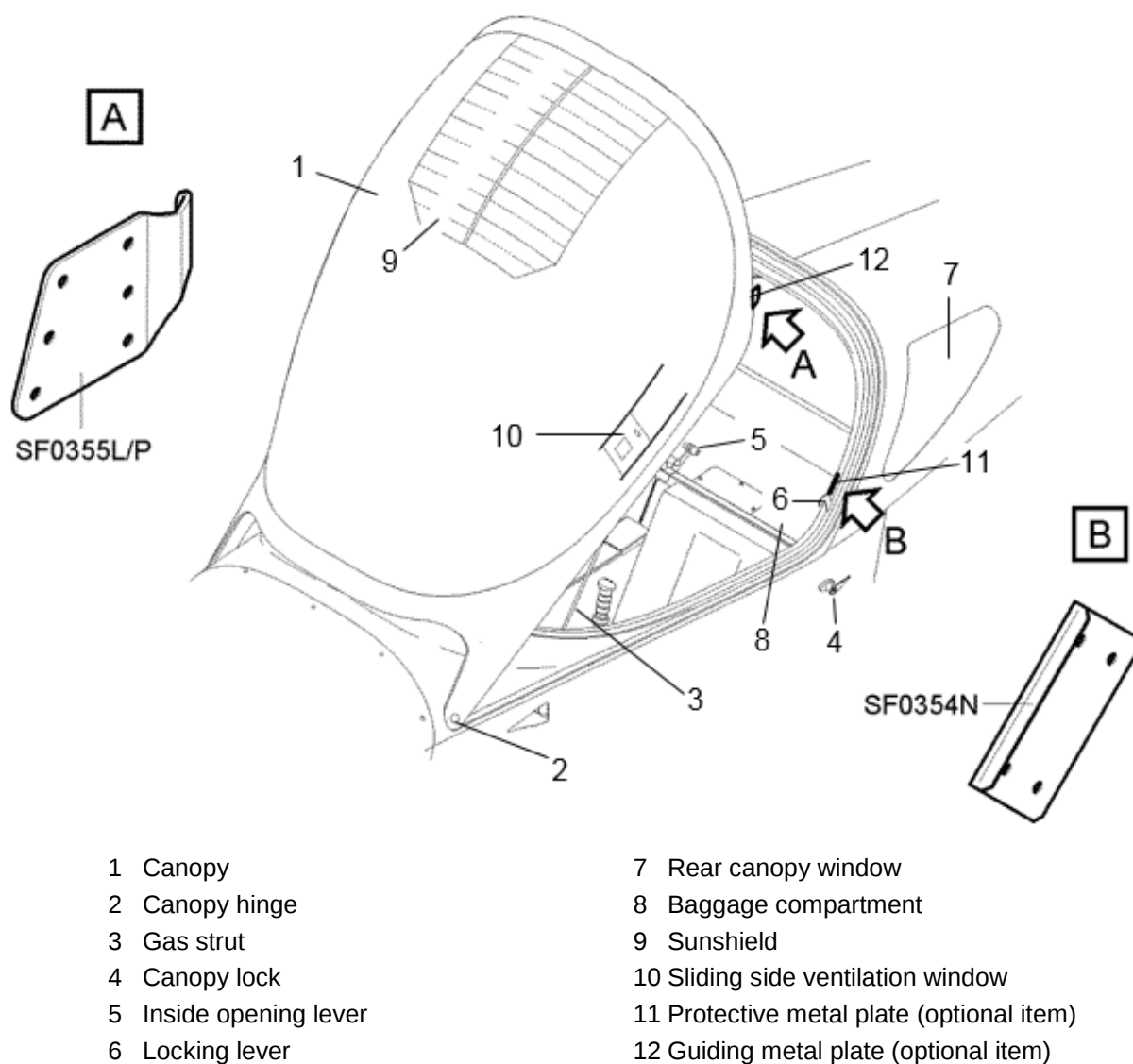


Fig. 3-3: Canopy, rear canopy window



3.2.5.1 Canopy

The canopy (1, Fig. 3-3) has a semi drop shape and enables access to the cockpit. The canopy consists of composite frame on which the windscreen is attached. The canopy is suspended in two swivel hinges (2) on front sides of the composite fixed frame. The canopy can be opened forward and is lightened by a gas strut (3) each side which keep it in the opened position. The canopy lock (4) is placed on the left side of fuselage below the cockpit frame. The locking levers (6) are installed inside the fixed frame. The opening lever (5) is placed between the seats backs. The handle (7, Fig. 3-5) is attached on the upper part of the composite frame. Along its whole perimeter, the canopy is sealed with a silicone profile. The canopy is generally equipped with the sunshield (9, Fig. 3-3) and sliding ventilation windows located on both sides of the canopy. For newer models of the SportCruiser airplane closing and securing of the canopy is sensed by one terminal switch, located at the inside opening lever between the seats (see Wiring Manual). If the canopy is not properly closed and secured, the **CABIN OPENED** light will be flashed in red on the upper part of the left instrument panel.

On option, some models can be equipped with set for improved and easier guidance of the canopy on the locking hooks during canopy closing (see items 11, 12, Fig. 3-3).

3.2.5.2 Rear fixed canopy windows

The rear fixed canopy windows consists of two symmetrical windows (7, Fig. 3-2) riveted and glued on the fuselage side skins.

3.2.6 Balance ballast

The airplane can be equipped with balance ballast (see Fig. 3-8), installed in the airplane tail part. Balance ballast ensures of not exceeding of the approved maximal front C.G. position of the empty airplane if combination of the optional “nose heavy” airplane installation (e.g. Sensenich propeller, improved nose landing gear leg, efficient heating, BRS) is installed.

Balance ballasts are graduated – 0.25 kg, 0.5 kg and 0.8 kg. The total weight is the sum of weight of all items - plate, fasteners and balance ballast.



3.3 Removal / Installation

3.3.1 Canopy removal

Type of maintenance: line

Authorization to perform:

- Sport pilot, Repairman (LS-M) or Mechanic (A&P)

Tools needed:

- socket wrench 7/16"
- screwdriver
- pliers

CAUTION: DURING CANOPY REMOVAL BE CAREFULLY TO AVOID SCRATCHING THE GLASS.

NOTE: For canopy removal two persons are requested.

- Open the canopy (1, Fig. 3-4).
- Remove the dummy plugs (3).
- Disconnect upper end of the gas struts (2) on both sides of canopy (1) (see 3.3.3).
- Hold the canopy.
- Unscrew the nuts (5), remove the washers (6) and the bolts (4).
- Carefully remove the canopy (1) and store it in a safe place so that windscreen damage cannot occur.

3.3.2 Canopy installation

Type of maintenance: line

Authorization to perform:

- Sport pilot, Repairman (LS-M) or Mechanic (A&P)

Tools needed:

- Socket wrench size 7/16
- screwdriver
- pliers

CAUTION: DURING CANOPY INSTALLATION BE CAREFULLY TO AVOID SCRATCHING THE GLASS.

NOTE: For canopy installation two persons are requested.

- Set the canopy (1, Fig. 3-4) on the fixed frame.
- Insert the bolts (4) into the hinges, install the washers (6), screw and tighten the nuts (5).
- Open the canopy (1) and hold it.
- Connect upper end of the gas struts (2) on both sides of canopy (1) (see 3.3.4).
- Install new dummy plugs (3).

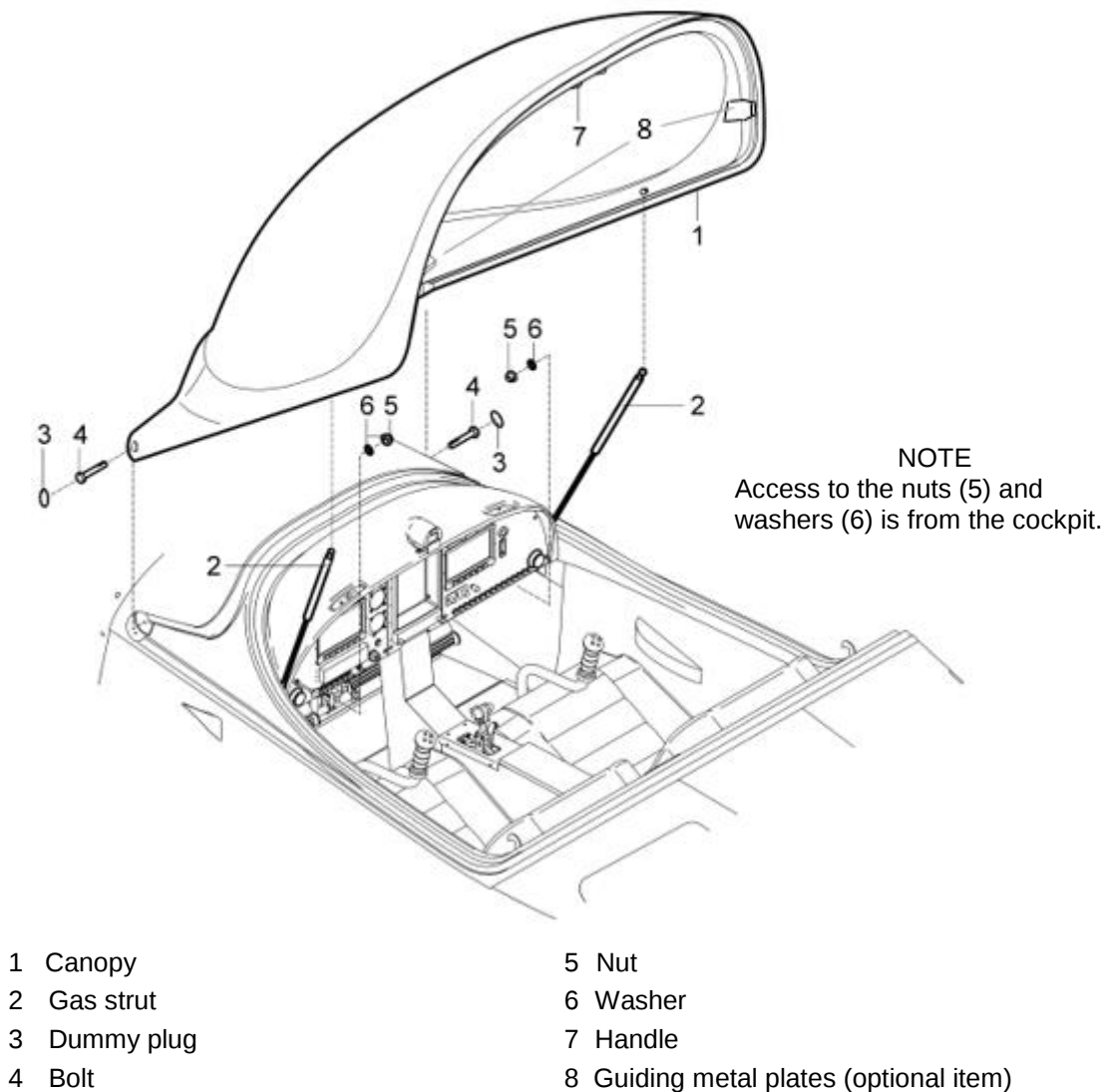


Fig. 3-4: Canopy removal / installation

3.3.3 Gas strut removal

Type of maintenance: line

Authorization to perform:

- Sport pilot, Repairman (LS-M) or Mechanic (A&P)

Tools needed:

- screwdriver
- pliers

- (a) Open the canopy (5, Fig. 3-5); hold it.
- (b) Remove the safety clip (3) from the ball joint end fittings (2) on the canopy frame (5) and on the fixed frame (6).
- (c) Remove the gas strut (1).

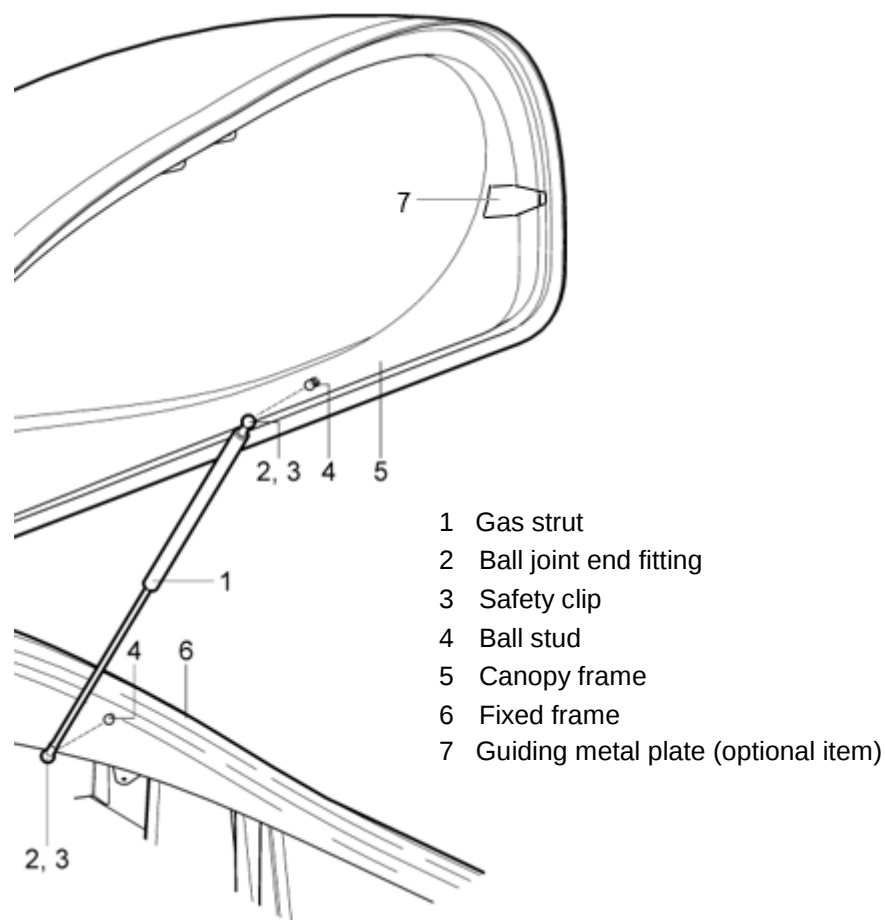


Fig. 3-5: Gas strut removal / installation

3.3.4 Gas strut installation

Type of maintenance: line

Authorization to perform:

- Sport pilot, Repairman (LS-M) or Mechanic (A&P)

Tools needed:

- pliers

- (a) Inspect the strut (1, Fig. 3-5) whether it is not damaged.
- (b) Insert top ball joint end fitting (2) on the ball stud (4) on the canopy frame (5), and bottom ball joint end fitting (2) on the ball stud (4) on the fixed frame (6)
- (c) Secure the joints with safety clips (3).

3.3.5 Cabin lock removal

Type of maintenance: line

Authorization to perform:

- Sport pilot or higher

Tools needed:

- screwdriver

- (a) Unscrew the screw (2, Fig. 3-6) attaching the lock (1) to the fuselage skin.



(b) Remove the lock (1).

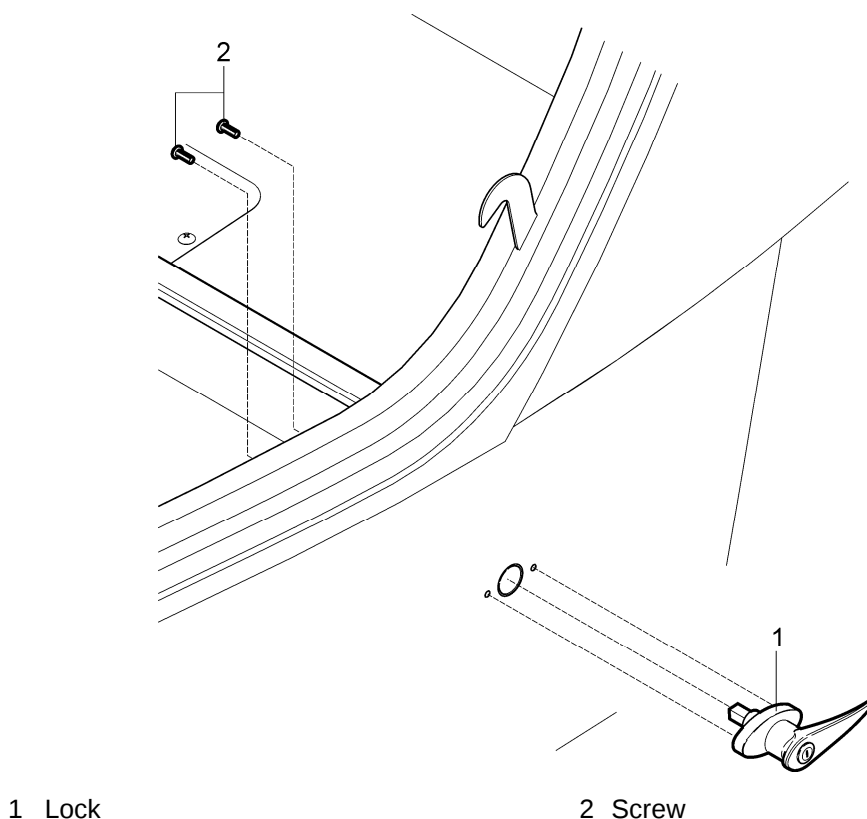


Fig 3-6: Canopy lock removal / installation

3.3.6 Cabin lock installation

Type of maintenance: line

Authorization to perform:

- Sport pilot, Repairman (LS-M) or Mechanic (A&P)

Tools needed:

- screwdriver

(a) Put the lock (1, Fig. 3-6) in to the hole in the fuselage skin.

(b) Screw the screw (3) attaching lock to the fuselage skin.

3.3.7 Balance ballast installation

Type of maintenance: heavy

Authorization to perform:

- Repairman (LS-M) or Mechanic (A&P)

Tools needed:

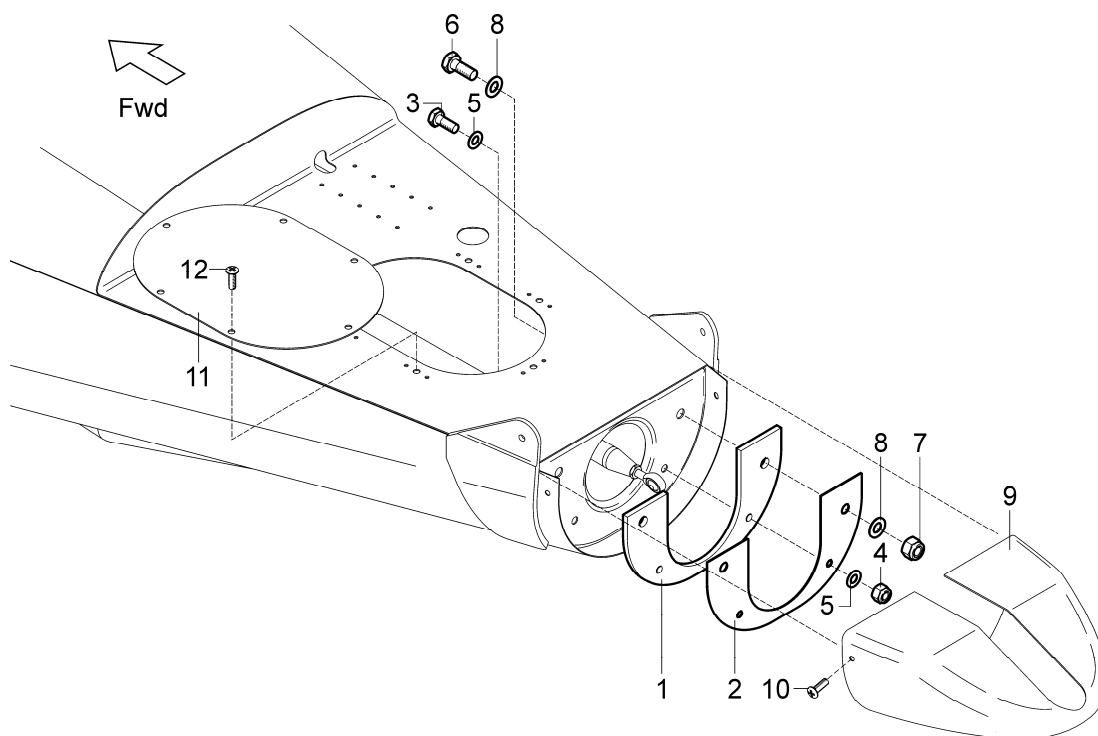
- wrench size 3/8, 7/16 in
- screwdriver
- pliers
- electric drill
- drill bit 4.8 mm (7/16 in)



CHAPTER 3 – FUSELAGE

CAUTION: USE ONLY ONE BALANCE BALLAST, NOT THEIR COMBINATION. MAX. WEIGHT OF BALLAST IS 0.8 KG.

- (a) By weighing or computation determine the mass of required ballast (mass of ballast: 0.25 kg or 0.5 kg or 0.8 kg; arm of ballast: 4,545 mm). Weighing process is given in the POH, Section 6.
- (b) Remove the horizontal stabilizer (see 5.3.1).
- (c) Unscrew the bolts (12, Fig. 3-8) and remove the cover (11).
- (d) According to Fig. 3-8 insert to the upper holes of the bulkhead No. 13 bolts (6) with washers (8), on the bolts insert balance ballast (1), plate (2), washers (8); screw and tighten nuts (7).
- (e) According holes in the plate (2) drill both lower holes.
- (f) Insert to the lower holes of the bulkhead No. 13 bolts (3) with washers (5), on the bolts insert washers (5); screw and tighten nuts (4).
- (g) Place the cover (11) and fasten it by bolts (12).
- (h) Install the horizontal stabilizer (see 5.3.2).
- (i) Weight the airplane and verify that C.G. of the empty airplane is in desire range.



- | | | |
|-------------------|-------------------|----------|
| 1 Balance ballast | 6 Bolt (2 pcs.) | 10 Bolt |
| 2 Plate | 7 Nut (2 pcs.) | 11 Cover |
| 3 Bolt (2 pcs.) | 8 Washer (4 pcs.) | 12 Bolt |
| 4 Nut (2 pcs.) | For information: | |
| 5 Washer (4 pcs.) | 9 Rear cover | |

Fig 3-8: Balance ballast installation



3.4 Check / Adjustment

3.4.1 Canopy lock adjustment

Adjust the locks so that the canopy could be locked freely.

Set the length of the rod.

3.4.2 Towing gear control cable adjustment

Adjust the length of towing gear control cable so that the control lever and hook lever in the open position touched the stops.



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4.1 General

SportCruiser / PiperSport wing is an aluminum structure and is equipped with flaps, ailerons and fuel tanks.

This chapter describes the structure of:

- wings
- wing flaps
- ailerons
- fuel tanks

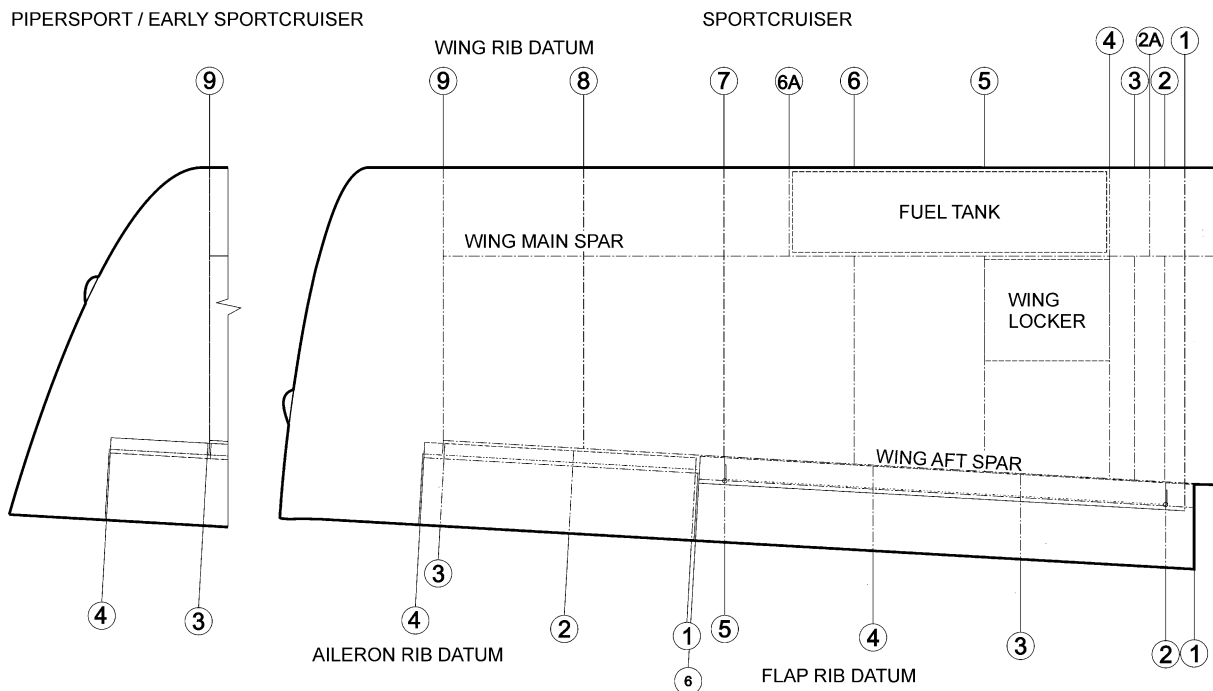


Fig. 4-1: Wing layout

4.2 Description and operation

4.2.1 Wing

The wing of the airplane is formed from center section of wing made as main and rear spar, which is integrated part of fuselage (Fig. 3-1), and from outer wings placed between ribs No. 1 and 9, which have trapezoid shape (Fig. 4-1). The wing is of all-metal main spar structure with a rear spar. In the outer wings are installed between ribs No. 4 and 6a leading edge fuel tanks, on the aft spar there are hinged ailerons (1, Fig. 4-2) and flaps (2). The wing tips (3), made out of fiberglass, are riveted on the wing ribs No. 9. On wing tips are installed the position lights (6). The outer wing is attached to the center section by means of 6 bolts (4) and the rear attachment (5) (positioned on the rear spar). The aileron control push rods are lead between the spars. The aileron trim tab is installed on the right aileron.

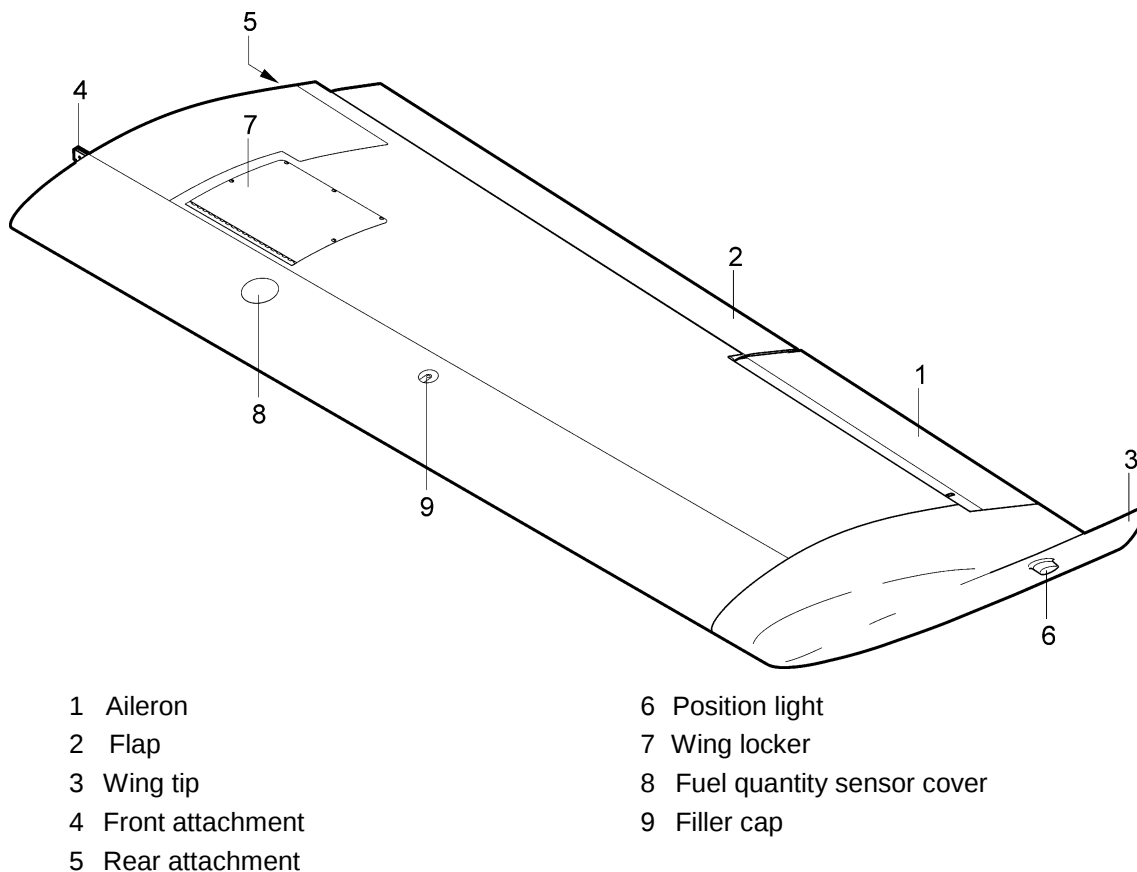


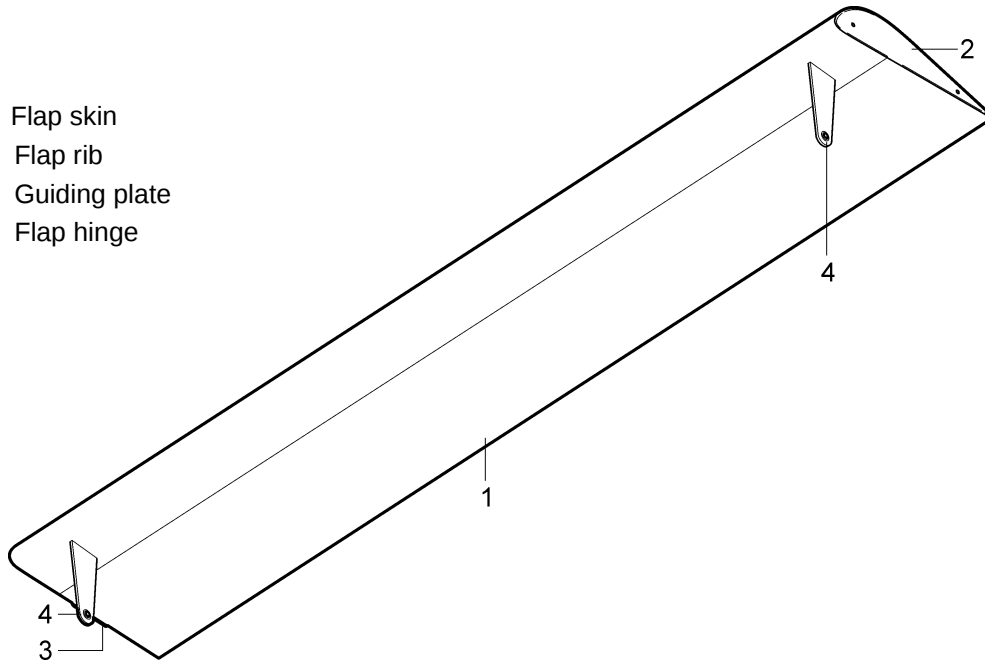
Fig. 4-2: Wing, left

4.2.2 Wing flaps

Flaps are of all-metal structure consisting of the skin (1, Fig. 4-3) aluminum sheet metal, spar and ribs (2) which are connected by means of riveting. Flaps are suspended on the wing aft spar by means of two hinges (4). There is a guiding plate (3) on flap root rib, where is connected the flap control pin. The flap control actuator is installed in the fuselage behind left seat under floor of baggage space.

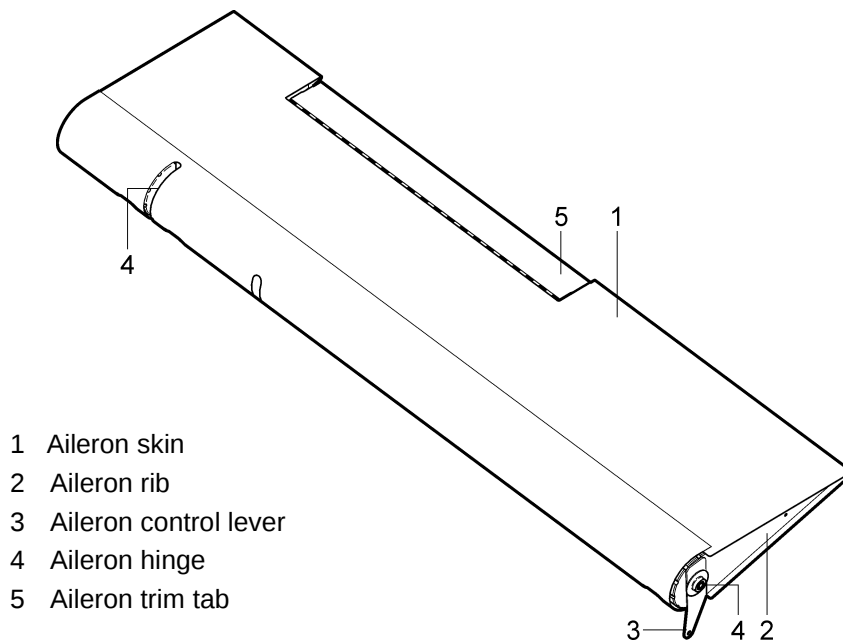


- 1 Flap skin
- 2 Flap rib
- 3 Guiding plate
- 4 Flap hinge

**Fig. 4-3:** Wing flap, left

4.2.3 Ailerons

Ailerons (Fig. 4-4) are of aluminum structure consisting of the skin (1) aluminum sheet metal, spar and ribs (2) which are connected by means of riveting. Ailerons are suspended on the rear spar by means of two hinges (4). Moreover the trim tab (5) is installed on the right aileron serving the lateral balance of airplane. The trim tab actuator is installed inside of aileron. Control lever (3) is installed on the root aileron rib.



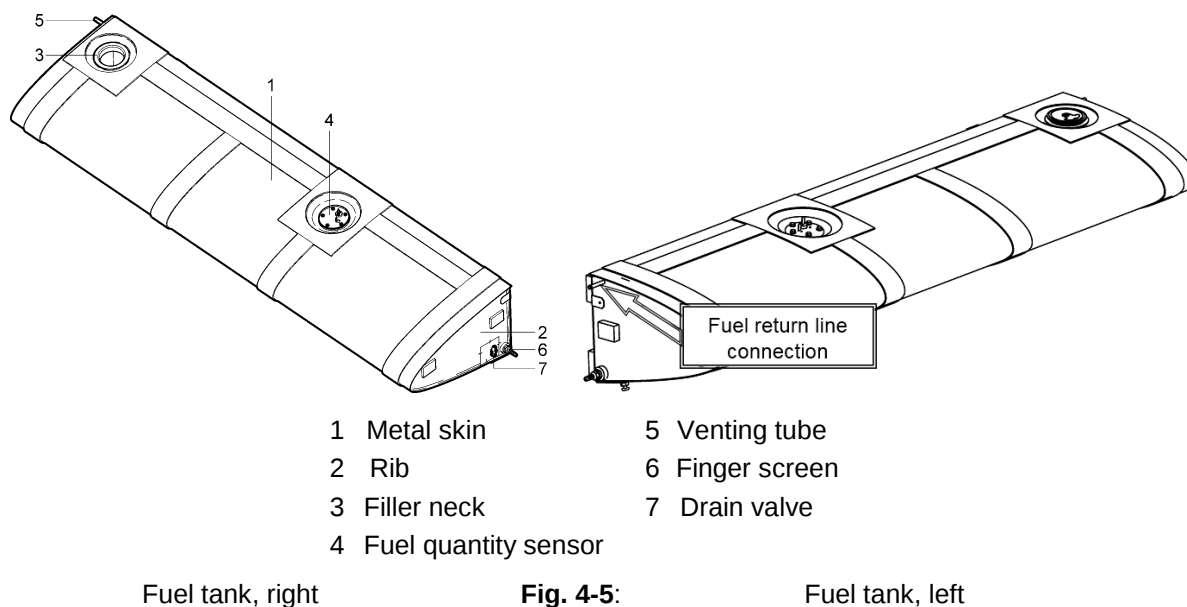
- 1 Aileron skin
- 2 Aileron rib
- 3 Aileron control lever
- 4 Aileron hinge
- 5 Aileron trim tab

Fig. 4-4: Aileron, right



4.2.4 Fuel tanks

Fuel tanks are of welded all-metal structure consisting of aluminum sheet metal skin (1, Fig. 4-5) and two ribs (2). There are on each tank filler neck (3), fuel quantity sensor (4), venting tube (5), finger screen (6) and drain valve (7).



4.2.5 Wing lockers

Wings are equipped with wing locker (7, Fig. 4-2) placed between ribs No.4 and 5 behind main spar. Capacity of each wing locker is 10 kg (22 lbs). Access doors installed on piano hinge are locked per quick fasteners.

4.3 Removal / Installation

4.3.1 Wing removal

Type of maintenance: heavy

Authorization to perform:

- Repairman (LS-M) or Mechanic (A&P)

Tools needed:

- wrench size 7/16 in, 1/2 in
- Phillips PH2 screwdriver
- cutting pliers
- hammer

- (a) Remove the seats and access cover plates on the seats floor.
- (b) Disconnect whole 6 nuts from the attachment bolts on the main spar and remove 6 bolts.
- (c) Disconnect aileron control push rod on the control lever in fuselage behind the seats.



CHAPTER 4 - WING

- (d) Remove bushes (24, Fig. 4-6) (if installed) from the aileron control push rod (valid for SportCruiser airplanes from S/N C0416).
- (e) Remove cover (11, Fig. 4-7) on the bottom wing root.
- (f) Disconnect rear attachment bolts on rear spar.
- (g) Secure the flap in closed position by means of the cable ties (on flap hinges).
- (h) The first person will hold the wing on the wing tip.
- (i) One person hold the wing on the winglet side, the second person by the root on the leading edge side remove first bottom attachment bolt from the main spar, the third person by the root on the trailing edge.
- (h) Release the wing by slight lifting the wing tip upwards.
- (i) By pulling the wing in direction from the fuselage, disconnect the outer wing from the fuselage.
- (j) Move the wing about 300 mm (12 in) out from the fuselage and disconnect fuel lines, cable plugs, aileron rod sealing, sockets of electrical systems and on left wing also pitot-static tubes.
- (k) Position the disconnected wing in such a way that its damaging cannot occur.

4.3.2 Wing installation

Type of maintenance: heavy

Authorization to perform:

- Repairman (LS-M) or Mechanic (A&P)

Tools needed:

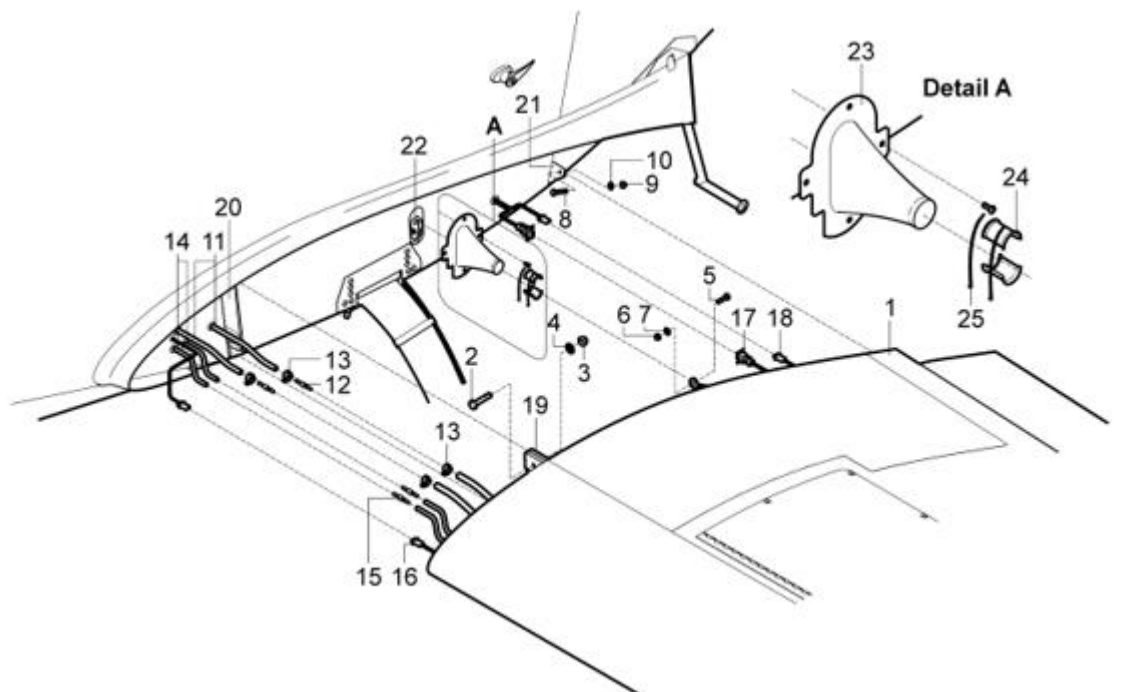
- wrench size 7/16 in, 1/2 in
- Phillips PH2 screwdriver
- pliers
- hammer

Install the wing according to the following procedure:

- (a) Before installation clean the attachments and bolts of the outer and center wing from dirt. Preserve bolts and attachments by means of lubricating grease.
- (b) Set the wing about 300 mm (12 in) to the fuselage side. The first person will hold the wing on the wing tip, the second person near the root on the leading edge and the third person near the root on the trailing edge.
- (c) Connect wiring (see Wiring Manual or Chapter 17).
- (d) Connect fuel hoses and pitot-static hoses on the left wing; attach the aileron rod sealing.
- (e) Set the outer wing carefully with the wing attachments on the center wing so that the attachments on the wing and on the fuselage are concentric and flap control pin placed in the flap guiding plate.
- (f) The person keeping the wing on the leading edge will insert the first bolt into the upper main attachment (the bolt head is in flight direction) and shift it by means of slight hammering to the stop (shifting can be facilitated by slight moving the wing tip up and



- down). Then insert the bolts into the lower main attachment and shift them by slight hammering to the stop.
- (g) Attach the bolt and nut into the rear attachment of the wing and tight it with the tightening moment 11 – 16 Nm (100 – 140 inch.lb).
 - (j) Put the washers on all of 6 attachment bolts of the wing and screw the nuts on them.
 - (k) Connect the aileron control push rod on control lever behind the seats and perform tightening up to the tightening torque.
 - (l) Install bushes (24, Fig. 4-6) (if installed) to the aileron control push rod (valid for SportCruiser airplanes from S/N C0416).
 - (m) Perform check the trim tab operation, flaps and ailerons deflections (see 6.4.3), possibly adjusting of theirs deflections (see 6.4.4).
 - (n) Install access cover plates on the seats floor and access cover on the bottom wing root.



1 Wing, left	10 Washer	19 Front attachment
2 Bolt (6 pcs)	11 Fuel hose	20 Front attachment
3 Nut (6 pcs)	12 Hose connector	21 Rear attachment
4 Washer (10 pcs)*	13 Hose clamp	22 Control lever
5 Bolt	14 Pitot static hose	23 Aileron rod sealing
6 Nut	15 Hose connector	24 Bush (2 pcs)
7 Washer	16 Fuel quantity sensor wiring	25 Cable tie (2 pcs)
8 Bolt	17 Aileron trim tab wiring (only right side)	
9 Nut	18 Position light wiring	

Fig. 4-6: Wing removal / installation

* There are one or two washers used depending on bolt thread protrusion (2 washers for less protruding two bolts and 8 washers for the other four bolts).



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4.3.3 Wing flap removal

Type of maintenance: line

Authorization to perform:

- Repairman (LS-M) or Mechanic (A&P)

Tools needed:

- wrench size 7/16 in

- Open the flap (1, Fig, 4-7) in full position.
- Unscrew the nuts (5), remove the washers (6), bolts (4) and disconnect both flap hinges; remove the washers (7).
- Carefully remove the flap (1) from the wing.
- Store the removed flap on a safe place and prevent it from damage.

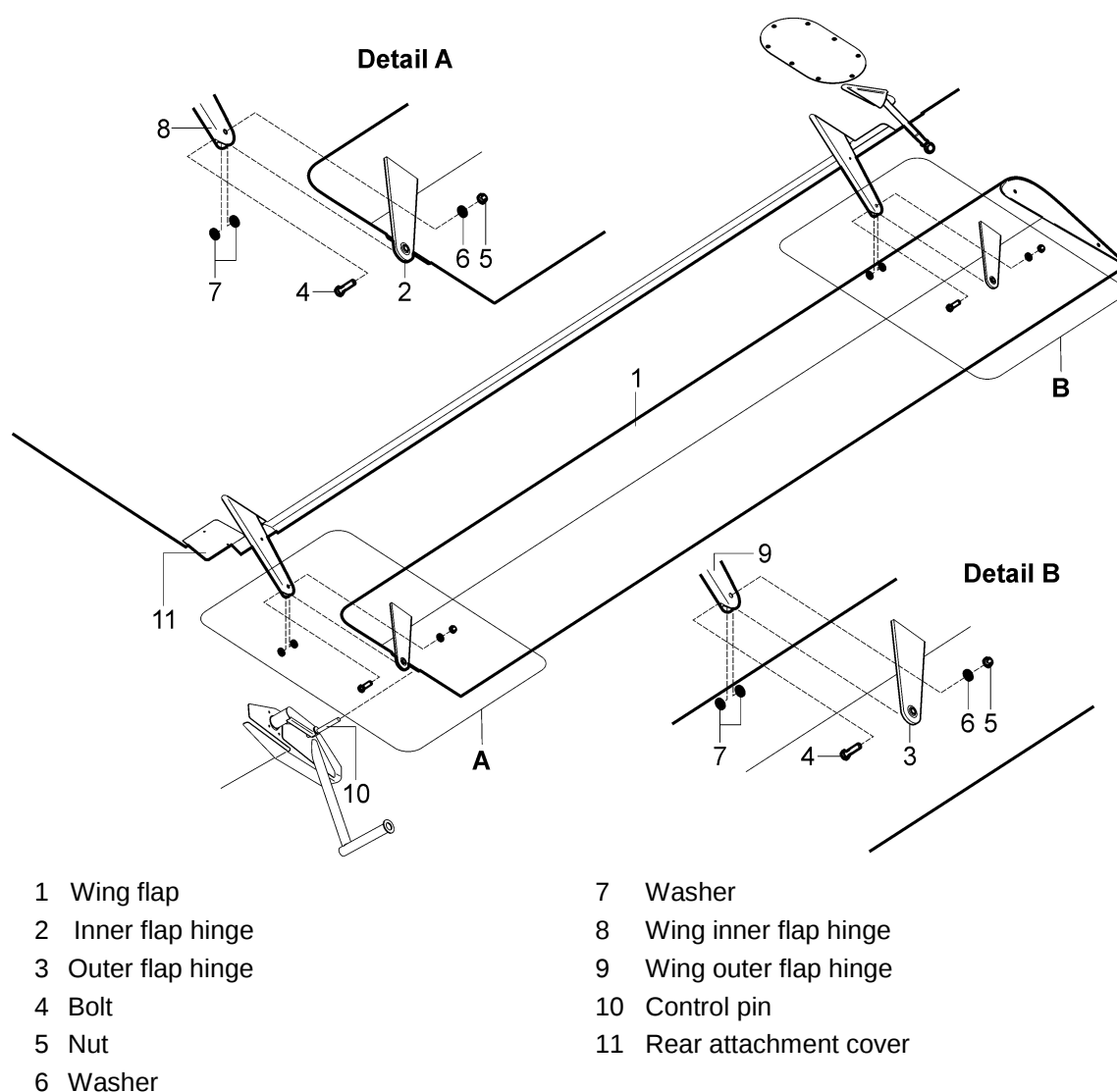


Fig. 4-7: Wing flap removal / installation



4.3.4 Wing flap installation

Type of maintenance: line

Authorization to perform:

- Repairman (LS-M) or Mechanic (A&P)

Tools needed:

- wrench size 7/16 in
- (a) Clean all attachments and apply lubricant on it (see 2.6). Do the same for the hinges on the wing.
- (b) Set the flap hinges (2; 3, Fig. 4-7) in to the wing hinges (8; 9) and control pin (10) in to the guiding plate.
- (c) Insert the bolts (4) and the washers (7) in to the hinges.
- (d) Install the washers (6) and the nuts (5); tight the nuts with prescribed tightening moment 5.5 – 8 Nm (50 – 70 inch lb).
- (e) Close the flap in the zero (up) position.
- (f) Perform check the wing flaps operation and their deflections (see 6.4.3).

4.3.5 Aileron removal

Type of maintenance: heavy

Authorization to perform:

- Repairman (LS-M) or Mechanic (A&P)

Tools needed:

- wrench size 7/16 in
- cutting pliers
- (a) Disconnect the control rod with control lever.
- (b) On the right aileron only:
 - remove the cover (10, Fig. 6-8) from the hole for access to trim tab actuator (1)
 - disconnect trim tab actuator wires (2).
- (c) Unscrew the nuts (4, Fig. 4-8), remove the washers (5), bolts (3) and disconnect both aileron hinges.
- (d) Carefully remove the aileron (1) from the wing.
- (e) Store the removed aileron on a safe place and prevent it from damage.



4.3.6 Aileron installation

Type of maintenance: heavy

Authorization to perform:

- Repairman (LS-M) or Mechanic (A&P)
- Tools needed:
- wrench size 7/16 in
- pliers

- (a) Clean all attachments and apply lubricant on it (see 2.6). Do the same for the hinges on the wing.
- (b) Set the aileron (1, Fig. 4-8) on the wing in to the both hinges.
- (c) Insert trim tab actuator wires (2, Fig. 6-8) going out from wing to the aileron.
- (d) Insert the bolts (3, Fig. 4-8) in to the hinges, install the washers (5) and screw the nuts (4).
- (e) Connect the control rod (6) with aileron control lever (2) by means of bolt (7), nut (8) and washer (9).
- (f) Connect trim tab actuator wires (2, Fig. 6, 8); close the access hole with cover (10) - on the right aileron only (see Wiring Manual or Chapter 17).
- (g) Perform check the trim tab operation and aileron deflections (see 6.4.3), possibly adjusting of aileron deflections (see 6.4.4).

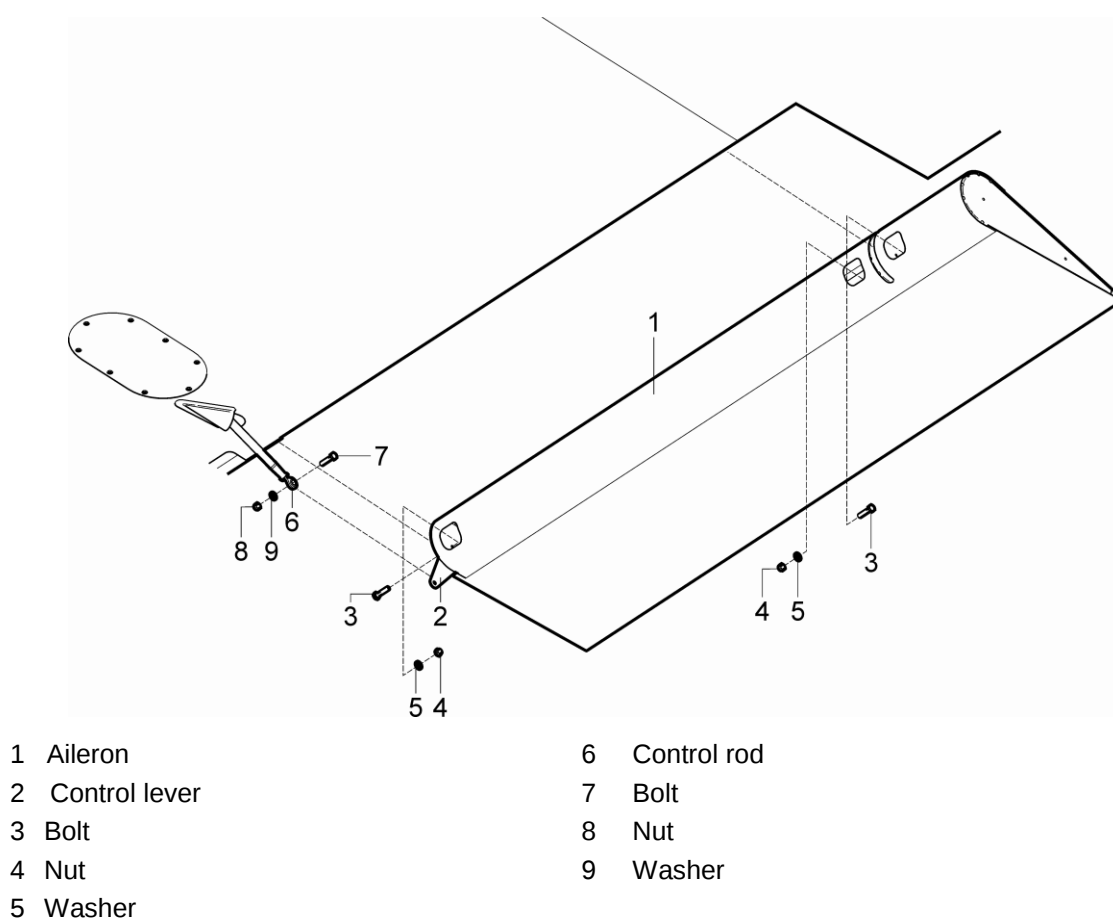


Fig. 4-8: Aileron removal / installation



4.4 Check / Adjustment

No procedures included.

4.5 Exchanges / Service information

No procedures included.



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5.1 General

Tail unit of SportCruiser / PiperSport airplane is of all-metal structure and is composed of:

- stabilizer
- elevator with tabs
- fin
- rudder.

5.2 Description and operation

5.2.1 Stabilizer

Stabilizer (1, Fig. 5-1) is of the all-metal structure consisting of the two spars, ribs and aluminum skin. Individual parts are assembled by riveting. The elevator is attached to the rear spar by means of three hinges (2; 3). The horizontal stabilizer is mounted on the fuselage by means of front and rear attachments. The front attachments consist of two pins (5, Fig. 5-3), which are riveted on bulkhead No. 12 and bushings (4, Fig. 5-1) riveted on front stabilizer spar. The rear attachments consist of two hinges (6, Fig. 5-3) riveted on sides of bulkhead No. 13.

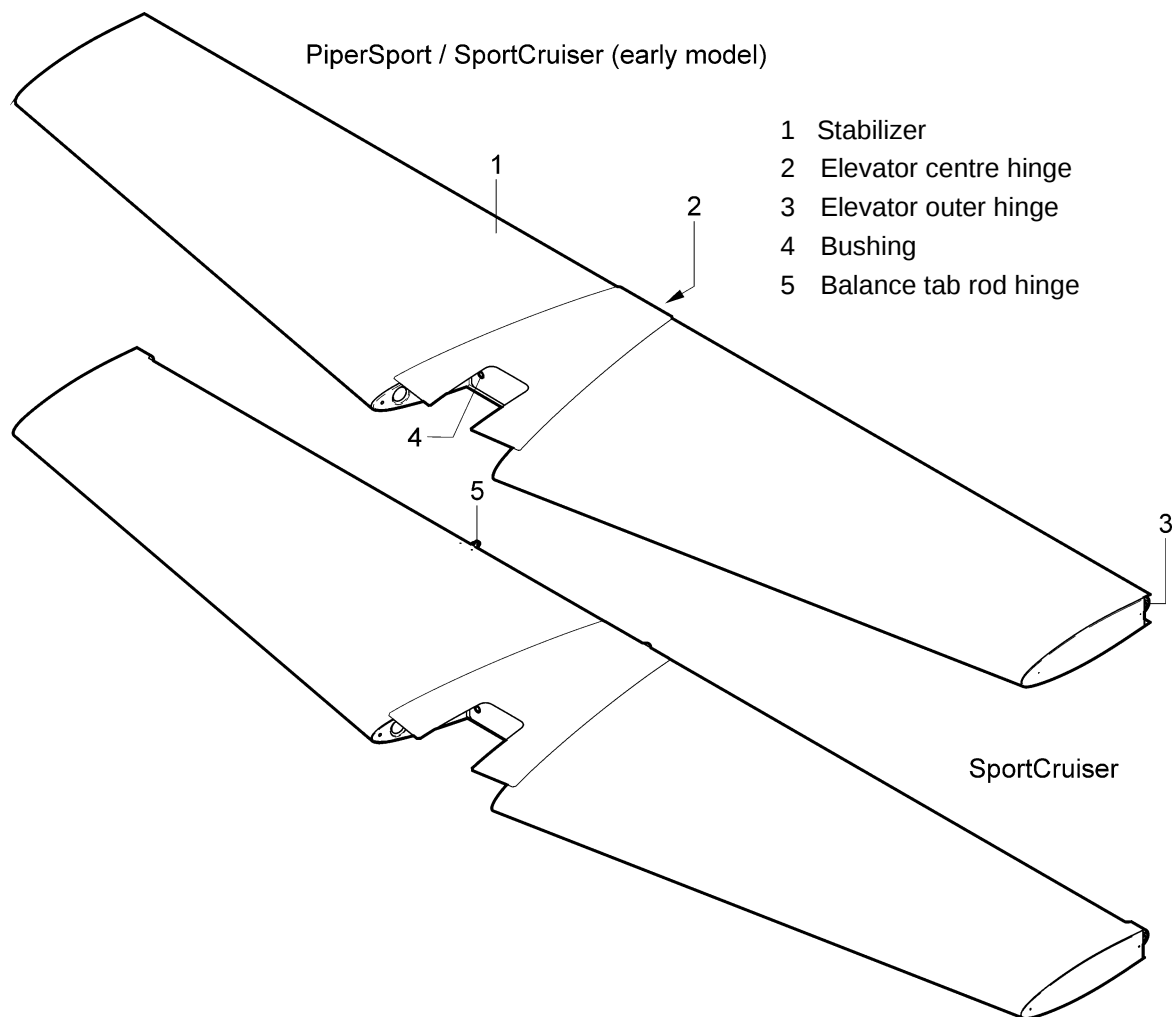


Fig. 5-1: Stabilizer



5.2.2 Elevator with tabs

Elevator (1, Fig.5-2) is of all-metal structure and consists of aluminum skin, spar and ribs. Individual parts are assembled by riveting. Control lever (5) is riveted on middle elevator rib. Mass balances (6) are riveted at the both elevator ends and covered composite tips (7). The elevator is equipped with the trim tab (2); newer SportCruiser airplanes also have balance tab (3). Both tabs are hinged by means of the piano hinge on the rear spar close to the trailing edge of the elevator. The balance tab (3) is interconnected by means of the rod with the hinge (5, Fig. 5-1) on the stabilizer. The tabs are made of aluminum sheet.

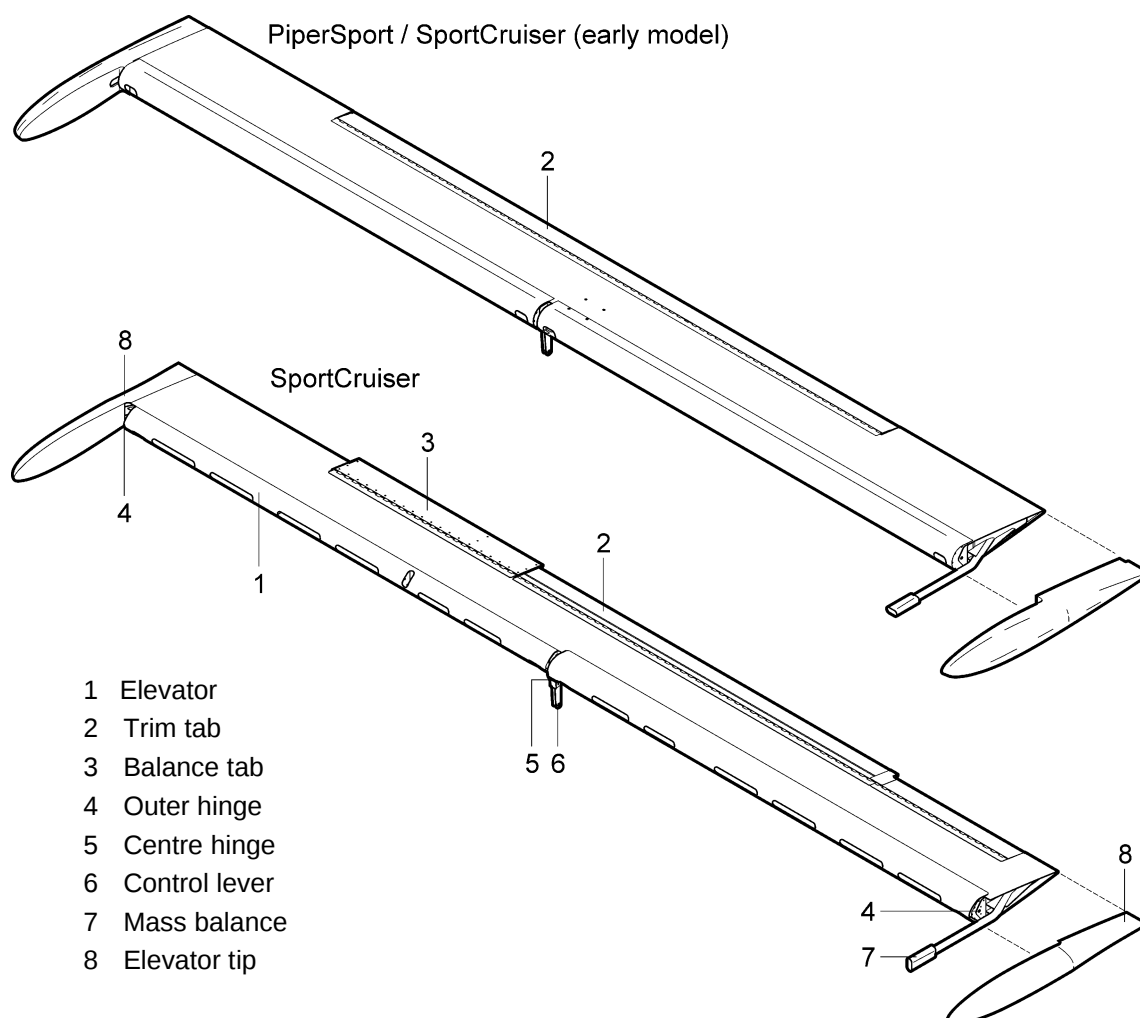


Fig. 5-2: Elevator



5.2.3 Fin

The vertical fin (1, Fig. 5-3) is of an aluminum structure and is an integral part with the rear part of the fuselage. The fin consists of stiffeners, spar, ribs and aluminum skin. Individual parts are assembled by riveting. The fin tip (4) is made of fiberglass. On the spar are two rudder hinges, lower one (3) and upper one (2).

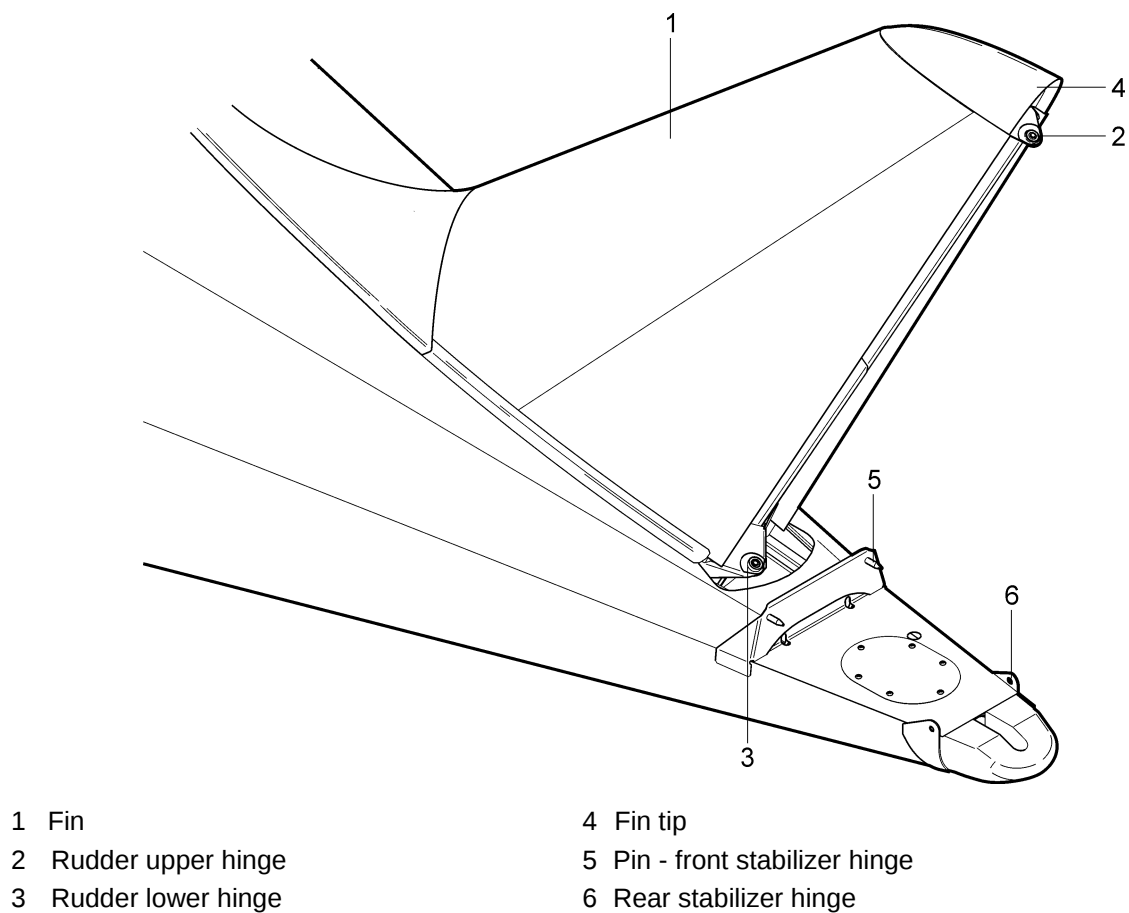


Fig. 5-3: Fin



5.2.4 Rudder

The rudder (1, Fig. 5-4) is of aluminum structure and consists of spar, ribs and aluminum skin. Individual parts are assembled by riveting. On the spar are two attachments lower one (3) and upper one (2) for the rudder suspension on the fin. Control lever (4) is riveted on root rib. On the trailing edge is riveted fixed trim tab (6) – only newer SportCruiser airplanes.

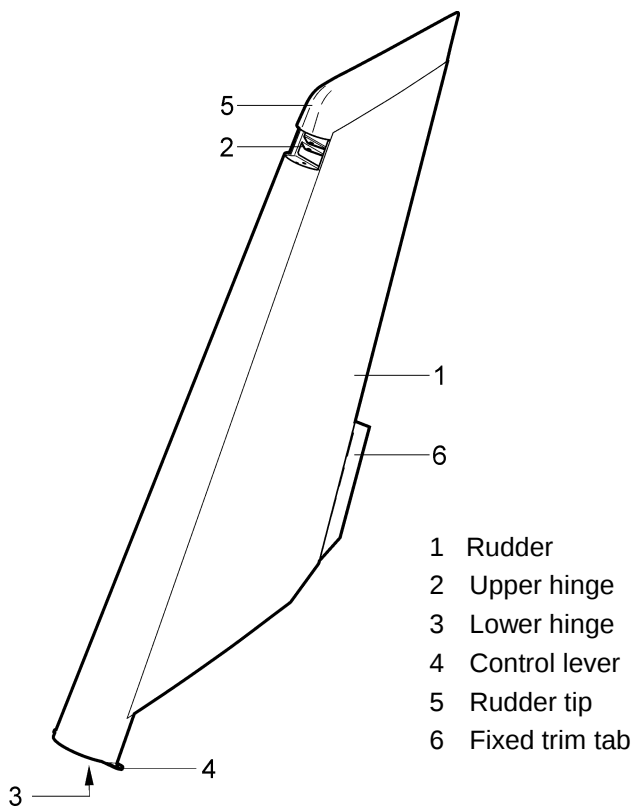


Fig. 5-4: Rudder



5.3 Removal / Installation

5.3.1 Horizontal stabilizer removal

Type of maintenance: heavy

Authorization to perform:

- Repairman (LS-M) or Mechanic (A&P)

Tools needed:

- wrench size 7/16 in
- screwdriver
- cutting pliers

NOTE: For stabilizer removal three persons are requested.

- (a) Remove the bolts (6, Fig. 5-5) from top side of the stabilizer fairing (5).
- (b) Unscrew the bolts (4) and remove fiberglass cover (3).
- (c) Disconnect the trim tab actuator connector located between the stabilizer and fuselage.
- (d) Unscrew the nut (19, Fig. 5-5), remove washer (20), bolt (18) and disconnect elevator control rod (17).
- (e) Unscrew the nuts (11), remove washers (12), and bolts (10).
- (f) Hold the full deflection of the rudder.
- (g) Carefully pull out the stabilizer (1) in horizontal direction of the attachments and store it in such a way that a damage cannot occur.

5.3.2 Horizontal stabilizer installation

Type of maintenance: heavy

Authorization to perform:

- Repairman (LS-M) or Mechanic (A&P)

Tools needed:

- wrench size 7/16 in
- screwdriver
- pliers

NOTE: For stabilizer installation three persons are requested.

- (a) Clean all attachments and apply lubricant grease on it.
- (b) Hold the full deflection of the rudder.
- (c) Put the horizontal stabilizer (1, Fig. 5-5) from behind to the fuselage so that it slides on two pins (7); slip stabilizer up to stop.
- (d) Insert bolts (10) into rear hinges (8; 9), slip washers (12), screw and tighten nuts (11).
- (e) Connect the trim tab actuator connector, and secure it with cable tie.
- (f) By means of the bolt (18), washer (20), and nut (19) connect elevator control rod (17) and tighten the nut.
- (g) Install rear cover (3). The lower bolt (4) screw at first.
- (h) Screw the bolts (6) on top side stabilizer fairings (5).



- (i) Perform check of the trim tab operation and elevator deflections (see 6.4.3), possibly adjust elevator deflections (see 6.4.4).

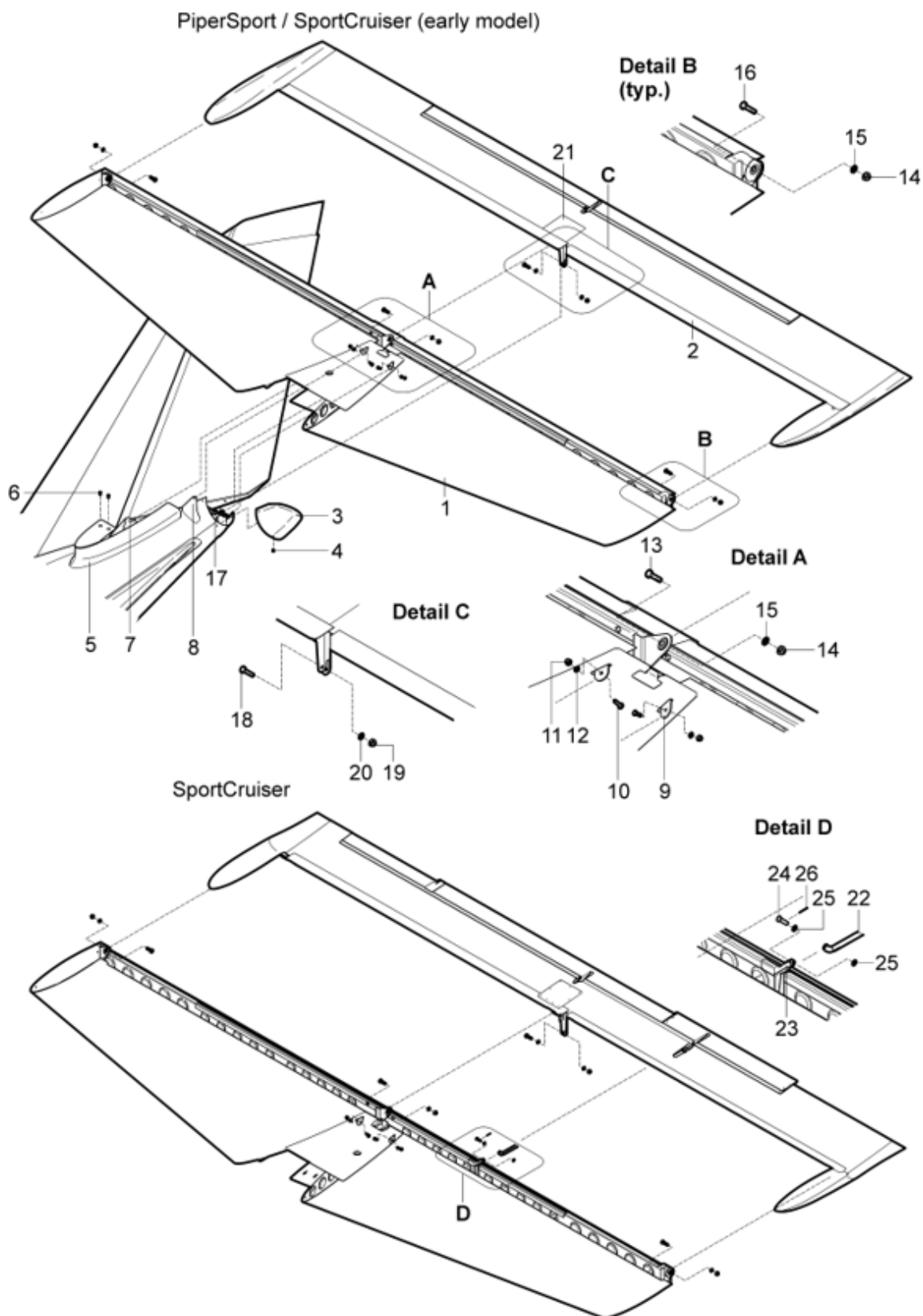


Fig. 5-5: Stabilizer, elevator removal / installation (page 1 of 2)



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1 Stabilizer	14 Nut
2 Elevator	15 Washer
3 Rear cover	16 Bolt
4 Bolt	17 Elevator control rod
5 Stabilizer fairing	18 Bolt
6 Bolt	19 Nut
7 Pin - front stabilizer hinge	20 Washer
8 Rear stabilizer hinge	21 Cover
9 Rear hinge	22 Balance tab control rod
10 Bolt	23 Balance tab rod hinge
11 Nut	24 Pin
12 Washer	25 Washer
13 Bolt	26 Cotter pin

Fig. 5-5: Stabilizer, elevator removal / installation (page 2 of 2)

5.3.3 Elevator removal

Type of maintenance: heavy

Authorization to perform:

- Repairman (LS-M) or Mechanic (A&P)

Tools needed:

- wrench size 7/16 in
- cutting pliers

NOTE: For elevator removal two persons are requested.

- Remove the cover (21, Fig. 5-5) from the bottom elevator surface (see 6.3.6).
- Disconnect the trim tab actuator connector (see Fig 6-8).
- Unscrew the bolts (4, Fig. 5-5) and remove fiberglass cover (3).
- Unscrew the nut (19), remove washer (20), bolt (18) and disconnect elevator control rod (17).
- Only if balance tab installed, remove the cotter pin (26), washers (25), pin (24) and disconnect the rod (22) from the hinge (23).
- Unscrew the nuts (14), remove washers (15), and bolts (13; 16) from all three hinges.
- Carefully remove the elevator (2) from the stabilizer (1) and store it in such a way that a damage cannot occur.

5.3.4 Elevator installation

Type of maintenance: heavy

Authorization to perform:

- Repairman (LS-M) or Mechanic (A&P).

Tools needed:

- wrench size 7/16 in
- pliers



NOTE: For elevator installation two persons are requested.

- (a) Inspect the hinges on the elevator, clean them and apply lubricant on them (see 2.6). Do the same for the hinges on the stabilizer.
- (b) Put the elevator (2, Fig. 5-5) in all three hinges on the stabilizer (1).
- (c) Insert the trim tab actuator wires going from the stabilizer to the elevator.
- (d) Insert bolts (13; 16) into all three hinges, slip washers (15), screw and tighten nuts (14).
- (e) Only if balance tab installed, fit the rod (22) to the hinge (23), insert pin (24) with washer (25) into the hole, insert the washer (25) and secure with the new cotter pin (26).
- (f) By means of the bolt (18), washers (20), and nut (19) connect elevator control rod (17) and tighten nut.
- (g) Install rear cover (3). The lower bolt (4) screw at first.
- (h) Connect the trim tab actuator wires (see Fig.6-8).
- (i) Install the cover (21, Fig. 5-5) on the bottom elevator surface (see 6.3.7).
- (j) Perform check the trim tab operation and elevator deflections (see 6.4.3), possibly adjusting of elevator deflections (see 6.4.4).

5.3.5 Trim tab removal

Type of maintenance: heavy

Authorization to perform:

- Repairman (LS-M) or Mechanic (A&P)

Tools needed:

- pliers, cutting pliers
 - electric drill, drill diam. 3.2 mm (1/8 in)
- (a) Remove cotter pin (5, Fig. 5-6), washers (4), pin (3) and disconnect control rod (6) from the trim tab control lever (2).
 - (b) Drill out the rivets (8) connecting the piano hinge with elevator.
 - (c) Remove the trim tab (1) with piano hinge (7) from elevator.

5.3.6 Trim tab installation

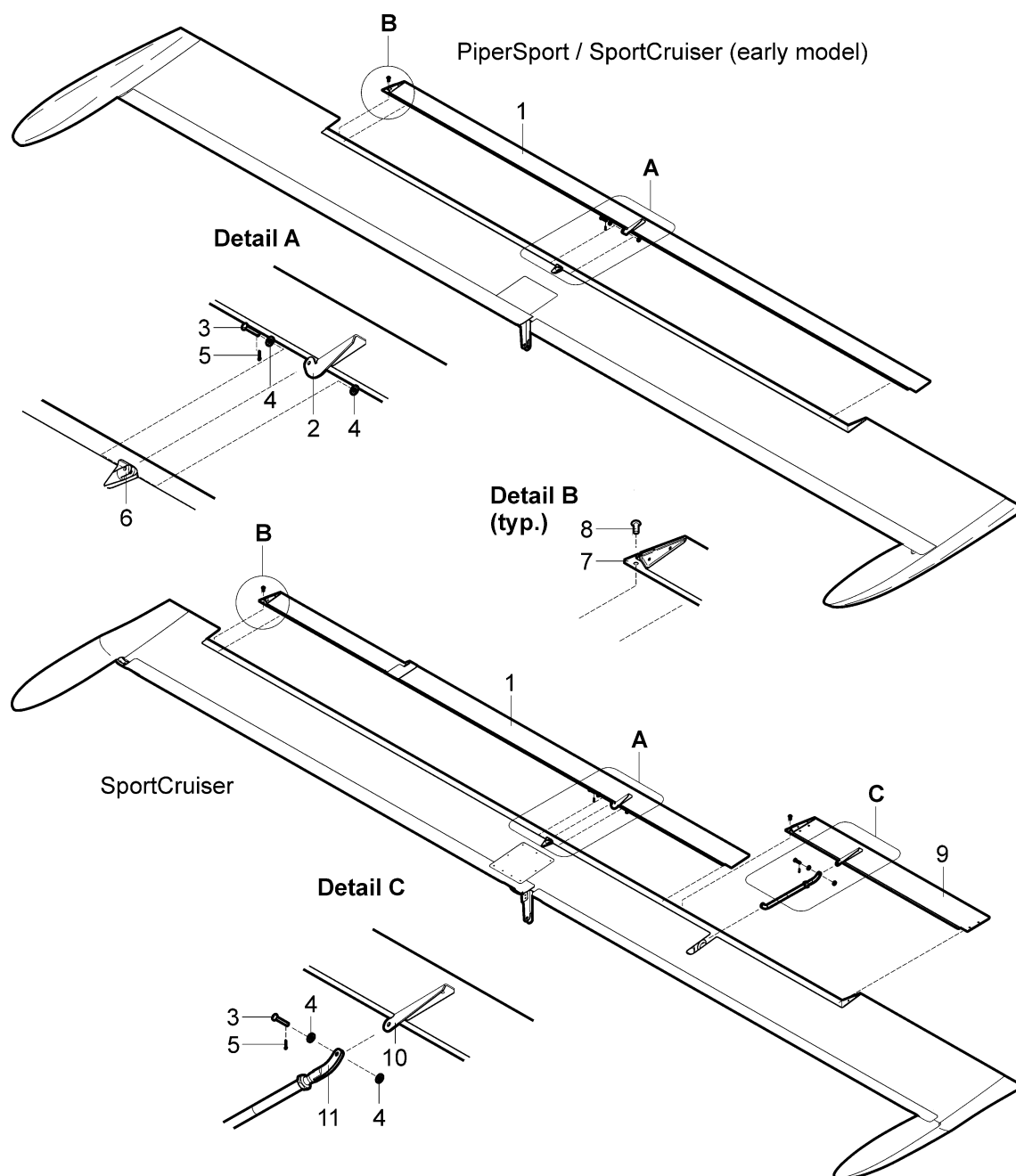
Type of maintenance: heavy

Authorization to perform:

- Repairman (LS-M) or Mechanic (A&P)

Tools needed:

- pliers, cutting pliers
 - pliers for riveting
- (a) Put the trim tab (1, Fig. 5-6) with piano hinge (7) in appropriate position to the elevator.
 - (b) Rivet the piano hinge into the elevator.
 - (c) Check for free rotation of the trim tab.
 - (d) By means of the pin (3), washers (4) connect control rod (6) to the control lever (2); secure the pin with the new cotter pin (5). At installation follow instructions in 6.3.1.
 - (e) Perform check (see 6.4.3), possibly adjustment (see 6.4.4) of trim tab deflections.



- 1 Trim tab
- 2 Control lever
- 3 Pin
- 4 Washer
- 5 Cotter pin
- 6 Control rod

- 7 Piano hinge
- 8 Rivet
- 9 Balance tab
- 10 Control lever
- 11 Control rod

Fig. 5-6: Elevator tabs removal / installation



5.3.7 Balance tab removal

Type of maintenance: heavy

Authorization to perform:

- Repairman (LS-M) or Mechanic (A&P)

Tools needed:

- pliers, cutting pliers
- electric drill, drill diam. 3.2 mm (1/8 in)

- Remove cotter pin (5, Fig. 5-6), washers (4), pin (3) and disconnect control rod (11) from the tab control lever (10).
- Drill out the rivets (8) connecting the piano hinge with elevator.
- Remove the balance tab (9) with piano hinge from elevator.

5.3.8 Balance tab installation

Type of maintenance: heavy

Authorization to perform:

- Repairman (LS-M) or Mechanic (A&P).

Tools needed:

- pliers, cutting pliers
- pliers for riveting

- Put the balance tab (9, Fig. 5-6) with piano hinge in appropriate position to the elevator.
- Rivet the piano hinge into the elevator.
- Check for free rotation of the tab.
- By means of the pin (3), washers (4) connect control rod (11) to the control lever (10); secure the pin with the new cotter pin (5).
- Perform check (see 6.4.3), possibly adjustment (see 6.4.4) of balance tab deflections.

5.3.9 Rudder removal

Type of maintenance: heavy

Authorization to perform:

- Repairman (LS-M) or Mechanic (A&P)

Tools needed:

- wrench size 3/8 in, 7/16 in

NOTE: For rudder removal on two persons are requested.

- Remove the two cotter pins (9, Fig. 5-7), unscrew nuts (7), remove washers (8) and bolts (6) and disconnect control cables (5) from the control lever on the root rudder rib.
- Remove the nuts (3) and washers (4) from the bolts on both hinges of the rudder.
- Remove top bolt (2) from the hinge and lift the rudder (1) from lower hinge.
- Carefully remove the rudder and store it in such a way that a damage cannot occur.



5.3.10 Rudder installation

Type of maintenance: heavy

Authorization to perform:

- Repairman (LS-M) or Mechanic (A&P)

Tools needed:

- wrench size 3/8 in, 7/16 in

NOTE: For rudder installation two persons are requested.

- Inspect the hinges on the rudder, clean them and apply lubricant on them (see 2.6). Do the same for the hinges on the fin.
- Set the rudder (1, Fig. 5-7) to the hinges on the fin.
- Put the bolt (2) on the top hinge, slip washers (4), screw and tighten nuts (3) with the tightening torque.
- By means of the bolts (6), washers (8), and nuts (7) connect rudder cable (5) to the control lever observing the tightening torques.
- Secure the nuts (7) with the new cotter pins (9).
- Perform check (see 6.4.3), possibly adjustment (see 6.4.4) of rudder deflections.

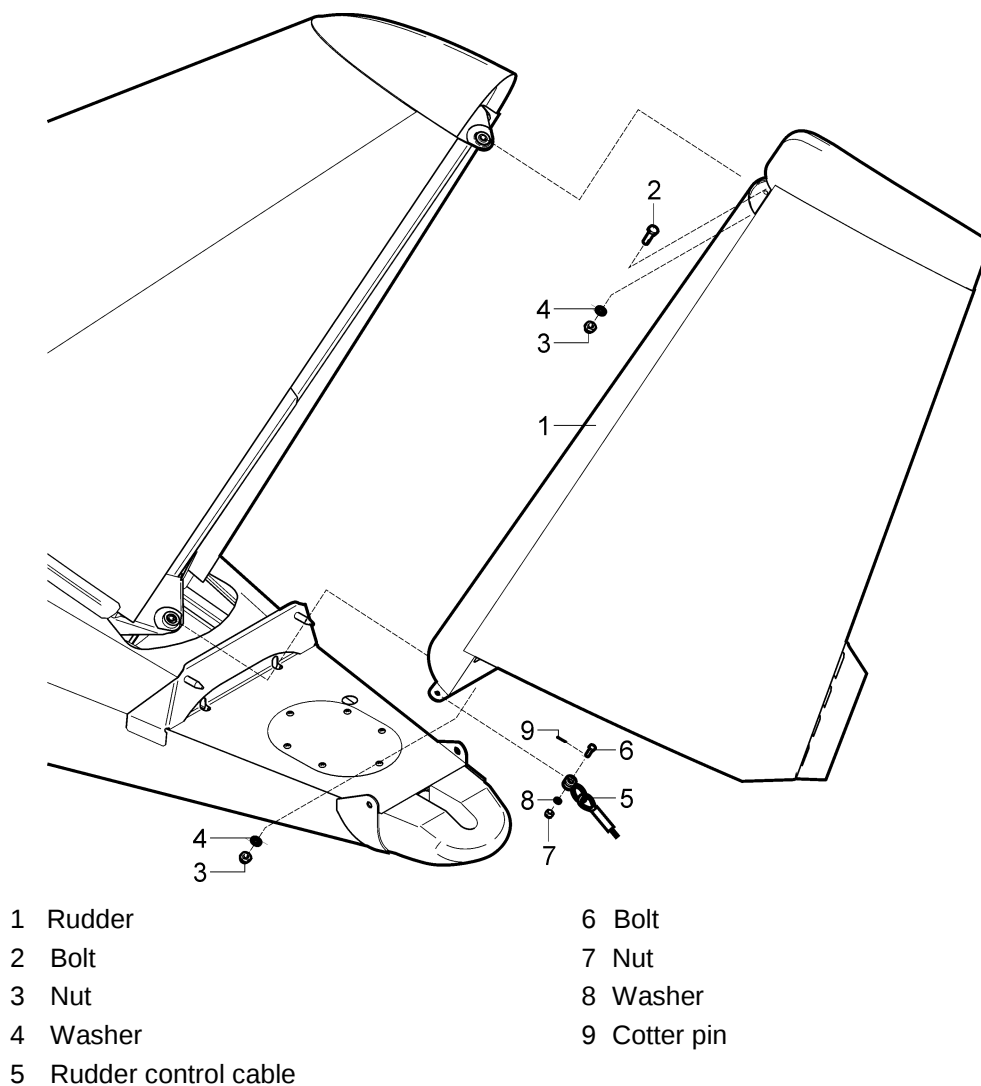


Fig. 5-7: Rudder removal / installation

5.4 Check / Adjustment

No procedures included.

5.5 Exchanges / Service information

No procedures included.



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6.1 General

SportCruiser / PiperSport airplane is equipped with dual controls which enables pilot training.

Airplane control includes:

- lateral control (aileron control)
- longitudinal control (elevator control)
- directional control (rudder control)
- aileron trim tab control
- elevator trim tab control
- wing flap control
- autopilot system

6.2 Description and operation

6.2.1 Lateral control

Ailerons are controlled by control sticks. Movement of control sticks is transferred by two push rods lead from the control stick to the transmission tube which transmits the movement to two push rods installed behind bulkhead No. 5 behind the seats. This two push rods lead to the control levers installed in the fuselage. Deflection from the control lever is transferred by means of the push rods to the bell crank installed on rear rib No. 7 in outer wing. Bell crank is connected per push rod with aileron control lever. Push rods have adjustable terminals with spherical bearings on the ends enabling aileron deflection adjustment. Lateral control stops are located on control sticks and the transmission tube.

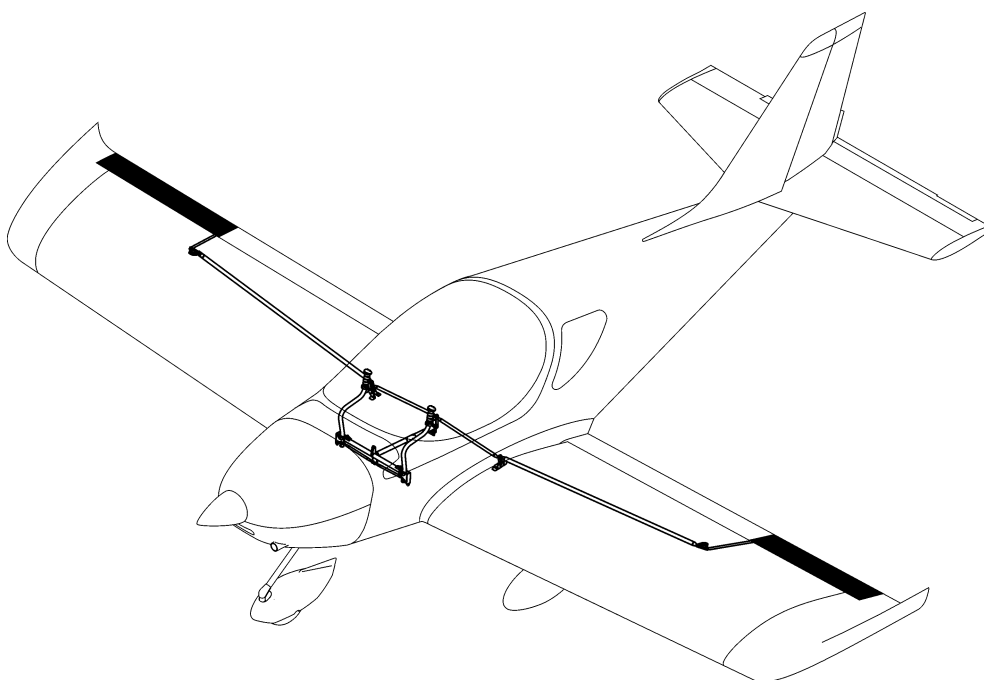


Fig. 6-1: Lateral control scheme



6.2.2 Longitudinal control

The elevator is controlled by control sticks. Movement of control sticks is transferred by system of transmission levers and push rods to the elevator. Forward and backward movement of the control stick is transferred by the push rod lead through the central channel between seats to the two-arm lever which is located under the baggage floor. Lever deflection is transferred to the movement of the push rods in the rear part of fuselage to the elevator. Push rods have adjustable terminals with spherical bearings on the ends enabling elevator deflection adjustment.

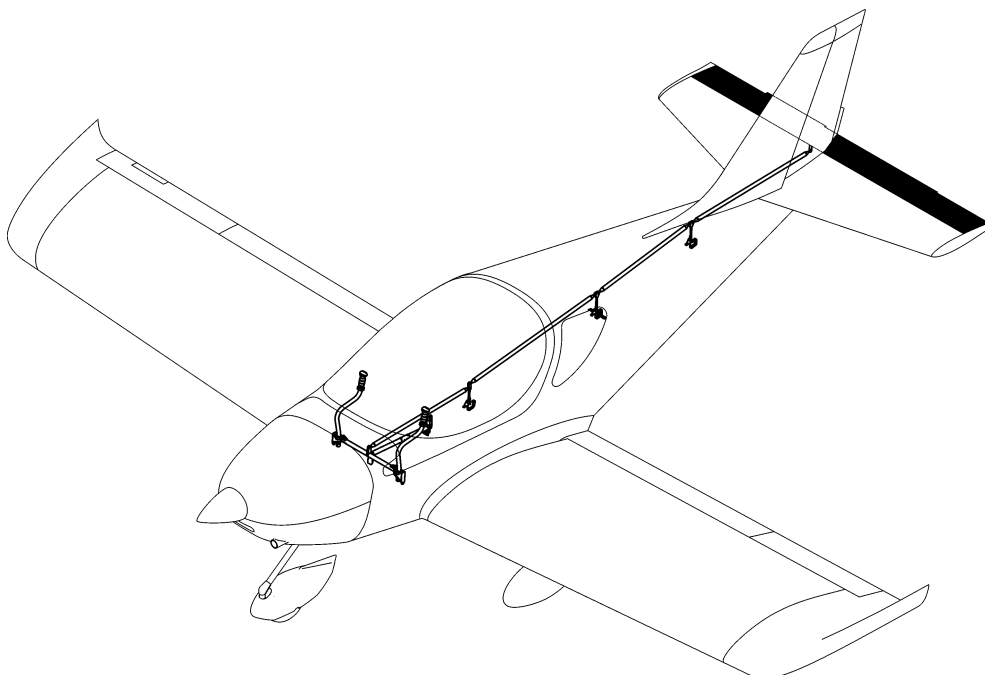
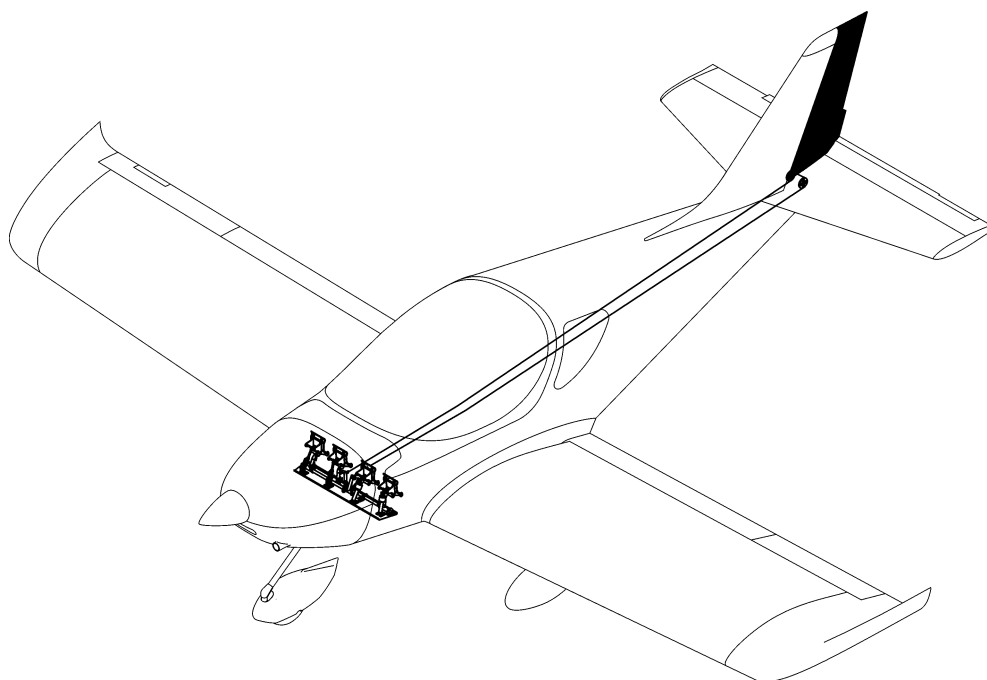


Fig. 6-2: Longitudinal control scheme

6.2.3 Directional control

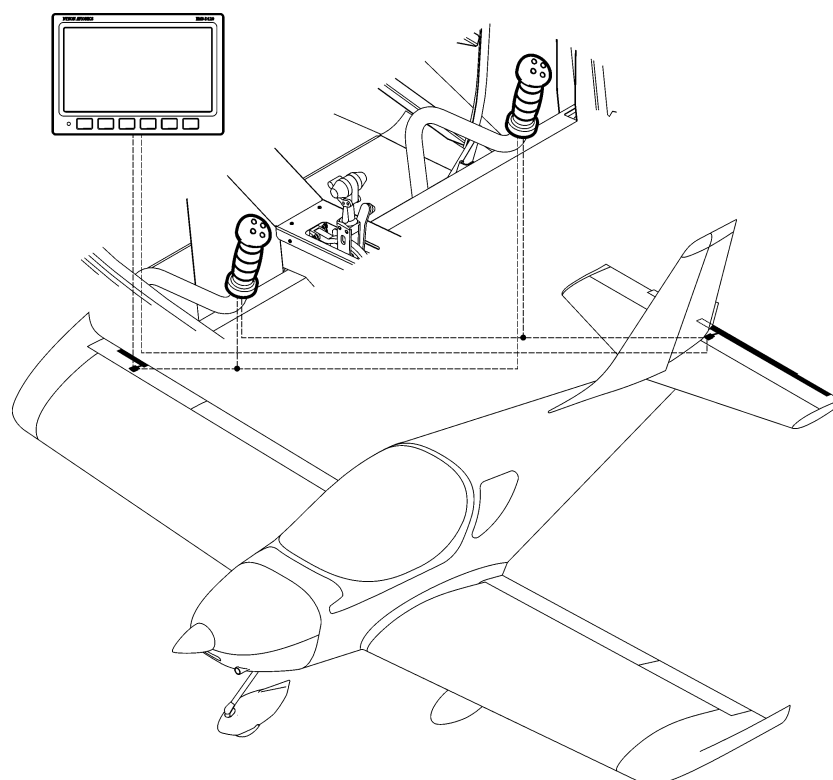
The rudder control is controlled by means of foot control pedals. Pedal deflections of foot control are transferred by means of steel cables to the rudder. Steel cables are lead through middle channel of the fuselage. Cable ends are bent over the pulleys installed on bulkhead No. 12 and attached to the rudder control lever installed on root rudder rib. Other cable end is connected with foot control pedals.

Foot control pedals are setting to three positions (back, middle and front) by means of control lever **PEDAL SETTING** located on the side wall of fuselage under instrument panel.

**Fig. 6-3:** Directional control scheme

6.2.4 Elevator and aileron trim tab control

The elevator and aileron trim tabs are controlled by the electrical actuators installed in elevator/right aileron and connected per threaded rod with trim tab. Control switches are integrated part of grips. Trim tabs position is displayed either on the two separate indicators or on the EFIS.

**Fig. 6-4:** Trim tabs control scheme



6.2.5 Wing flap control

Wing flaps are controlled by electric flaps actuator connected with flaps per torque tube with control pins on each end. The flaps actuator located in fuselage under floor of baggage space and is controlled by a rocker switch located in cockpit. A LED position indicator is installed together with the rocker switch (with positions **FLAPS DOWN**, **FLAPS UP**) on the middle channel under instrument panel. It is possible to set the wing flaps to whatever position from 0° to 30°.

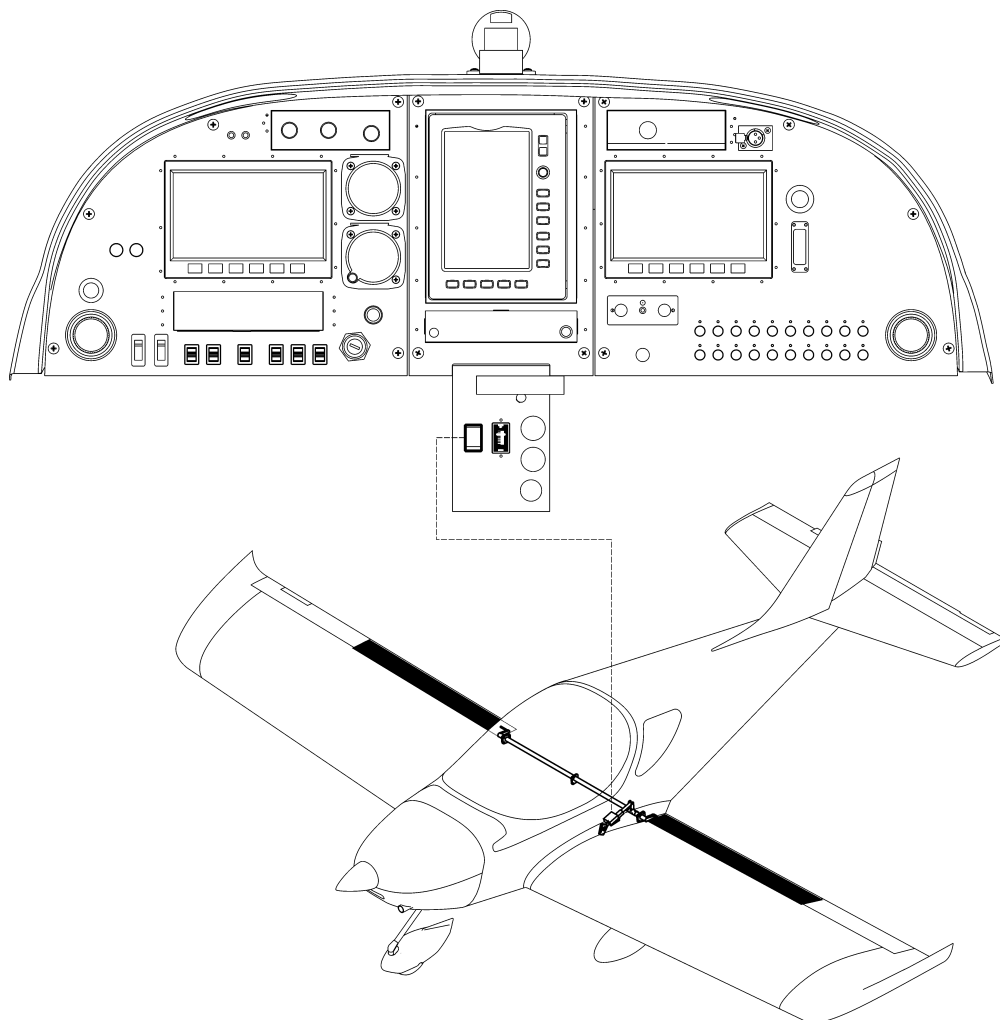


Fig. 6-5: Wing flap control scheme

Note: The picture of the instrument panel is for information only and could differ from the real state.



6.2.6 Autopilot system

The EFIS D100 autopilot system is a digital flight control system that provides roll and pitch control. The system has the following components:

- EFIS D100
- AP74 autopilot interface module
- HS34 HSI expansion module
- SV32 roll servo
- SV32 pitch servo.

The autopilot system is controlled via the AP74 autopilot interface module.

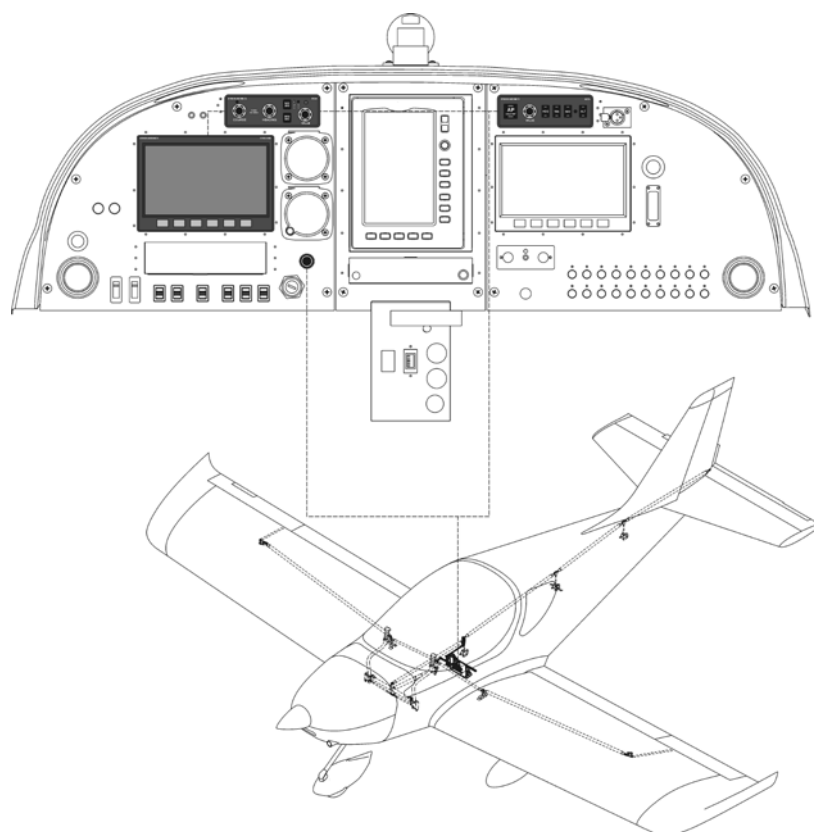


Fig. 6-6: Autopilot control scheme

Note: The picture of the instrument panel is for information only and could differ from the real state.

The roll and pitch servo are located behind the left seat. They are mounted on mounting plates which are made from sheet aluminum. Movement of each servo is transmitted to the appropriate control lever through a rod. The **AUTOPILOT DISCONNECT** button serves for quickly turn off the autopilot and is installed on the left instrument panel.

NOTE: For details about operation and the indications concerning autopilot functions refer to EFIS D100 Pilot's User Guide, P/N 100447-000, latest revision.



6.3 Removal / Installation

6.3.1 General principles for work on control system

Push rod assembly

Type of maintenance: heavy

Authorization to perform:

- Repairman (LS-M) or Mechanic (A&P)

Tools needed:

- wrench size 7/16 in

Set the push rods to the prescribed length before assembling, tighten the nuts slightly, and do not secure them for the time being. It is necessary to keep the following principles:

- (a) Terminal thread must overlap the inspection hole in the push rod
- (b) Terminals of all push rods must be uniformly screwed for setting the neutral position that serve for adjustment of control.

Grease bearings with lubricant grease before installing the push rods into airplane unless otherwise stated by the bearing manufacturer. Do not grease nor rinse the bearings with permanent filing that are covered by metal or plastic covers. Do not rinse bearings and articulated joints with technical gasoline. Mechanically remove contaminated lubricant grease carefully and refill the clean one.

Orientation of bolts and cotter pins

Put the bolts to the joint on the basis of "top-down" rule or "From the front to the back" with regard to the flight direction. This rule decreases possibility of spontaneous bolt falling out of the clamp joint in case that nut unlocking and falling out occurs in the course of operation. Follow the same rule also in case of securing nuts by securing pins or by cotter pins, with the exception of those cases when it is not possible to install the bolt for design or operation limitation reasons.

Lubrication

At assembling parts grease all joints and friction surfaces (bolts, pins, and threads) after mechanical or chemical cleaning by lubricant grease.

6.3.2 Control stick removal

Type of maintenance: heavy

Authorization to perform:

- Repairman (LS-M) or Mechanic (A&P)

Tools needed:

- wrench size 7/16 in, 3/8 in
- cutting pliers

- (a) Unscrew the nut (6, Fig. 6-7), remove the washers (7), bolt (5) and disconnect the elevator control rod (26) and fork on the transmission tube (1).



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- (b) Unscrew the nuts (17), remove the washers (18) and disconnect the aileron control rods (4) from sticks (2); remove the cases (19).
- (c) Remove the grips (3) and disconnect wires (24) for trim tab switches and PTT on the grips.
- (d) Remove the cotter pins (16), unscrew the nuts (13), remove the washers (14), bolts (12) and washers (15).
- (e) Carefully remove the control sticks assembly from the cockpit.
- (f) Remove the cotter pin (23), unscrew the nut (21), remove the washers (22) and bolt (20); turn the stick (2) 90 degree and remove it from the transmission tube (1).

6.3.3 Control stick installation

Type of maintenance: heavy

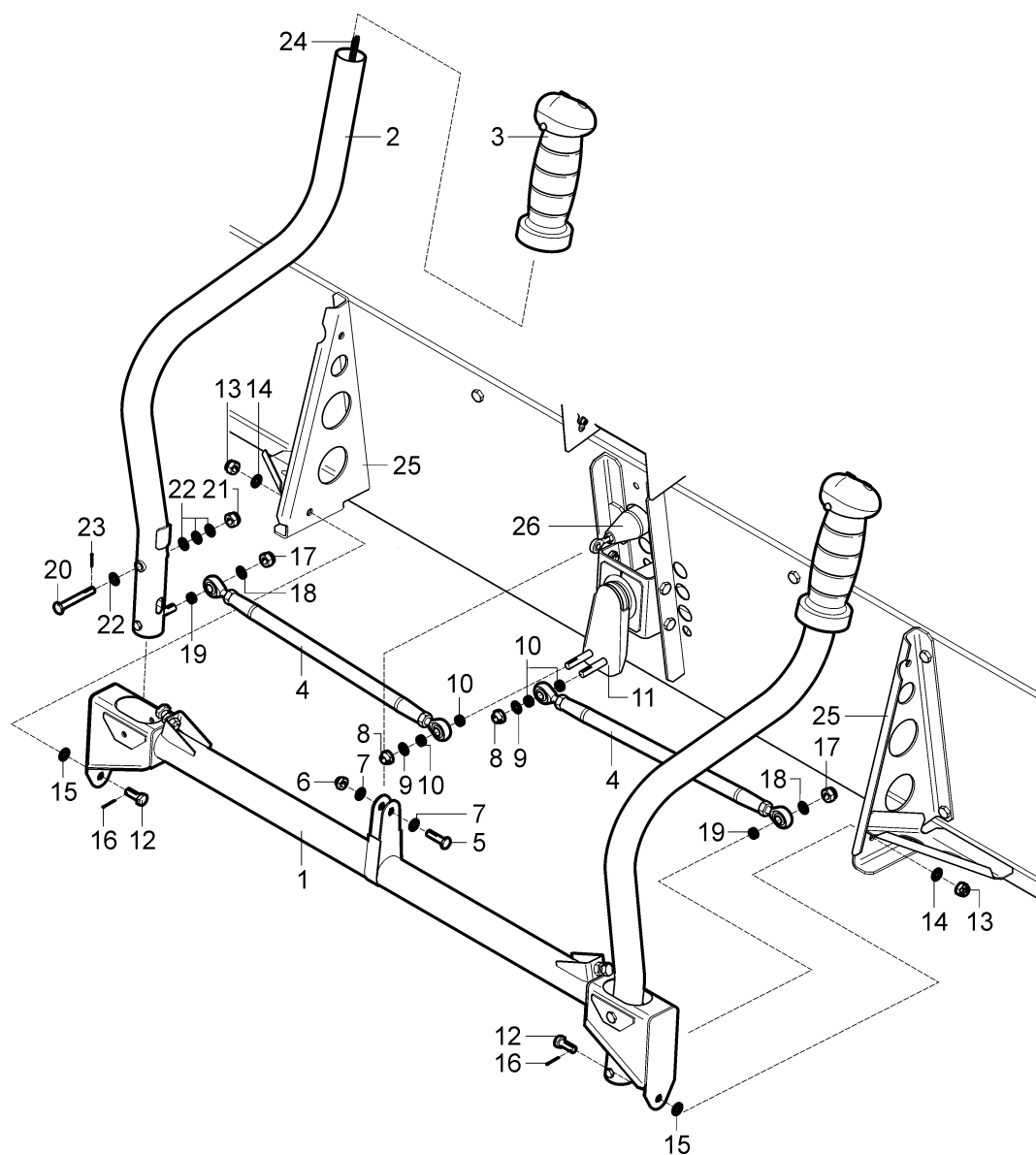
Authorization to perform:

- Repairman (LS-M) or Mechanic (A&P)

Tools needed:

- wrench size 7/16 in, 3/8 in
- pliers

- (a) Put the stick (2, Fig. 6-7) in the transmission tube (1).
- (b) Turn the stick (2) 90 degree and insert the bolt (20) with the washer (22) into the transmission tube (1) and stick (2), insert the washers (22), screw and carefully tighten the nut (21).
- (c) Secure the nut (21) with the new cotter pin (23).
- (d) Put the control stick assembly with the washers (17) between the brackets (25).
- (e) Insert the bolts (12) into the holes, insert the washers (14), screw and carefully tighten the nuts (13).
- (f) Secure the nuts (13) with the new cotter pin (16).
- (g) Connect the wires (24) for trim tab switches and PTT on the grips (3); install grips (see Wiring Manual or Chapter 16).
- (h) On the control sticks screw insert the cases (19), aileron rods (4), and washers (18), screw and tighten the nuts (17).
- (i) Put the control rod (26) to the fork on the transmission tube (1), insert the bolt (5) with washer (7) into the hole, insert the washer (7), screw and carefully tighten the nut (6).
- (j) Check aileron and elevator deflections (see 6.4.3) and check plays in control (see 6.4.1).



- | | |
|-----------------------|-------------------------|
| 1 Transmission tube | 14 Washer |
| 2 Control stick | 15 Nylon washer |
| 3 Grip | 16 Cotter pin |
| 4 Aileron control rod | 17 Nut |
| 5 Bolt | 18 Washer |
| 6 Nut | 19 Case |
| 7 Washer | 20 Bolt |
| 8 Nut | 21 Nut |
| 9 Washer | 22 Washer |
| 10 Case | 23 Cotter pin |
| 11 Lever | 24 Electrical wires |
| 12 Bolt | 25 Bracket |
| 13 Nut | 26 Elevator control rod |

Fig. 6-7: Control stick removal / installation



6.3.4 Flap control actuator removal

Type of maintenance: line

Authorization to perform:

- Repairman (LS-M) or Mechanic (A&P)

Tools needed:

- wrench size 7/16 in, 1/2 in,
- screwdriver

- Set the flap to the landing position; switch off electrical power of the airplane.
- Open the cover behind the left seat on the floor of baggage space.
- Disconnect flap actuator wire (2, Fig. 6-8).
- Remove the cotter pin (9), unscrew the nut (7), remove the washer (8), bolt (6) and disconnect flap arm (11) from the flap actuator (1).
- Unscrew the nut (4), remove the washer (5), bolt (3), and disconnect actuator (1) from the actuator hinge (10).
- Remove the flap actuator (1).

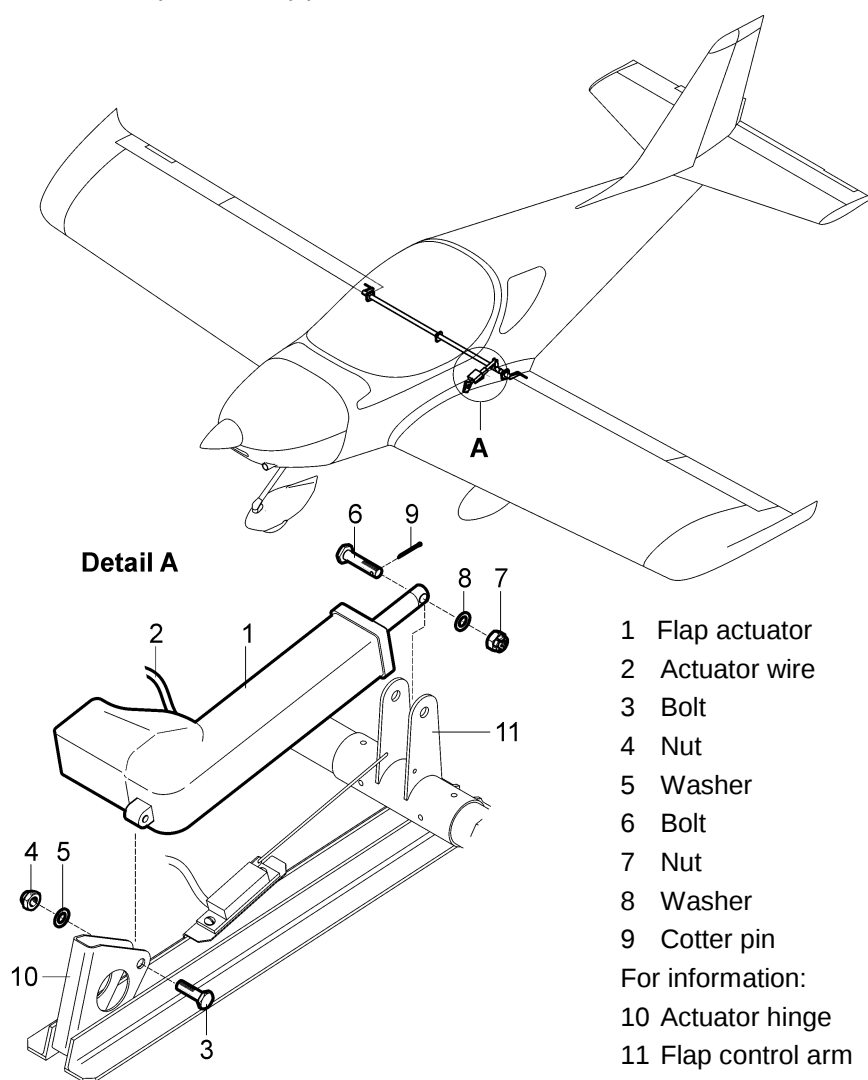


Fig. 6-8: Flap control actuator removal / installation



6.3.5 Flap control actuator installation

Type of maintenance: line

Authorization to perform:

- Repairman (LS-M) or Mechanic (A&P)

Tools needed:

- wrench size 7/16 in, 1/2 in,
- screwdriver

- Fit the flap actuator (1, Fig. 6-8) to the actuator hinge (10), insert the bolt (3) to the hole, install the washer (5), screw and tighten the nut (4).
- Fit the actuator rod to the flap arm (11), insert the bolt (6) to the hole, install washer (8), screw and slightly tighten the nut (7).
- Secure the nut (7) with the new cotter pin (9).
- Connect the actuator wire (2) (see Wiring Manual or Chapter 16).
- Check the flap operation and deflections (see 6.4.3).
- Install the cover on the floor of baggage space.

6.3.6 Trim tab control actuator removal

Type of maintenance: heavy

Authorization to perform:

- Repairman (LS-M) or Mechanic (A&P).

Tools needed:

- wrench size No.5
- screwdriver
- cutting pliers, pliers
- electric drill, drill diam. 3.2 mm (1/8 in)

NOTE: The trim tab control actuator is located in the elevator and the right aileron.

- Drill out the rivets (11, Fig. 6-9) and remove the cover (10) from the access hole.
- Disconnect the trim tab actuator wires (2).
- Remove the cotter pin (9), washers (8), pin (7) and disconnect the actuator rod (5) from the trim tab control lever (12).
- Unscrew the nuts (4), remove washers (5) and carefully remove the actuator (1) from the elevator or aileron through access hole.
- As requirement, remove the cotter pin (9), washers (8), pin (7) and disconnect the actuator rod (5) from the actuator (1).



6.3.7 Trim tab control actuator installation

Type of maintenance: heavy

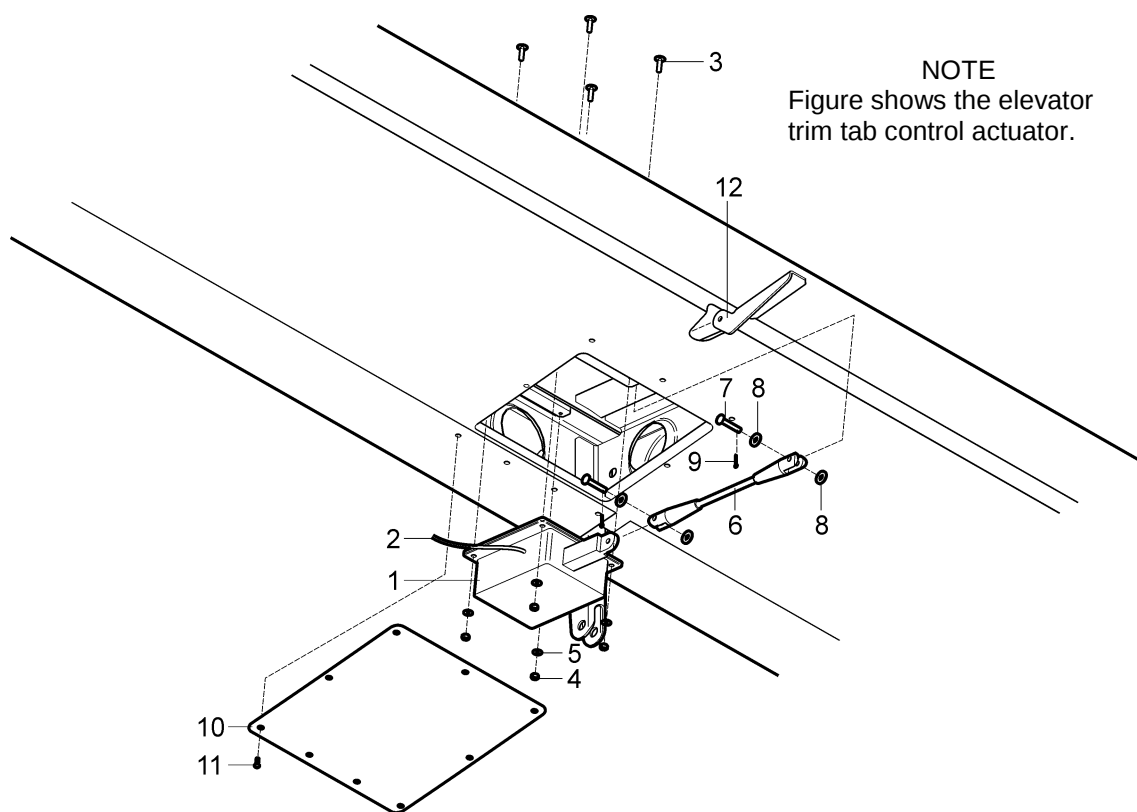
Authorization to perform:

- Repairman (LS-M) or Mechanic (A&P)

Tools needed:

- wrench size No.5
- screwdriver
- pliers
- pliers for riveting

- Fit the rod (6, Fig. 6-9) to the actuator rod, insert pin (7) with washer (8) into the hole, insert the washer (5) and secure with the new cotter pin (9).
- Insert the trim tab actuator (1) into the elevator or aileron through access hole and fit in place.
- Insert the screws (3) into the holes, insert the washers (5), screw and carefully tighten the nuts (4).
- Fit the rod (6) to the control lever (12), insert pin (7) with washer (8) into the hole, insert the washer (5) and secure with the new cotter pin (9).
- Connect the actuator wires (3) (see Wiring Manual).
- Check correct trim tab operation and adjustment of trim tab deflections (see 6.4.4).
- Fit the cover (10) to the access hole and rivet it.
- Check trim tab deflections (see 6.4.3) and check plays in control (see 6.4.1).



NOTE
Figure shows the elevator
trim tab control actuator.

- | | |
|-----------------------------|---------------------------|
| 1 Trim tab control actuator | 7 Pin (2 pcs.) |
| 2 Actuator wires | 8 Washer (2 pcs.) |
| 3 Screw | 9 Cotter pin (2 pcs.) |
| 4 Nut | 10 Cover |
| 5 Washer | 11 Rivet (9 pcs.) |
| 6 Actuator rod | 12 Trim tab control lever |

Fig. 6-9: Trim tab control actuator removal / installation

6.3.8 Removal of aileron control lever behind the seats

Type of maintenance: heavy

Authorization to perform:

- Repairman (LS-M) or Mechanic (A&P)

Tools needed:

- wrench size 7/16 in

- Tilt the seat backs.
- Unscrew the nuts (3; 6, Fig. 6-10), remove washers (4; 7) and bolts (2; 5) and disconnect rods (13; 14) from the control lever (1).
- Remove the cotter pin (12), unscrew the nut (9), remove washer (10), and bolt (8).
- Remove the control lever (1) and washers (11) from the bracket (15).



6.3.9 Installation of aileron control lever behind the seats

Type of maintenance: heavy

Authorization to perform:

- Repairman (LS-M) or Mechanic (A&P)

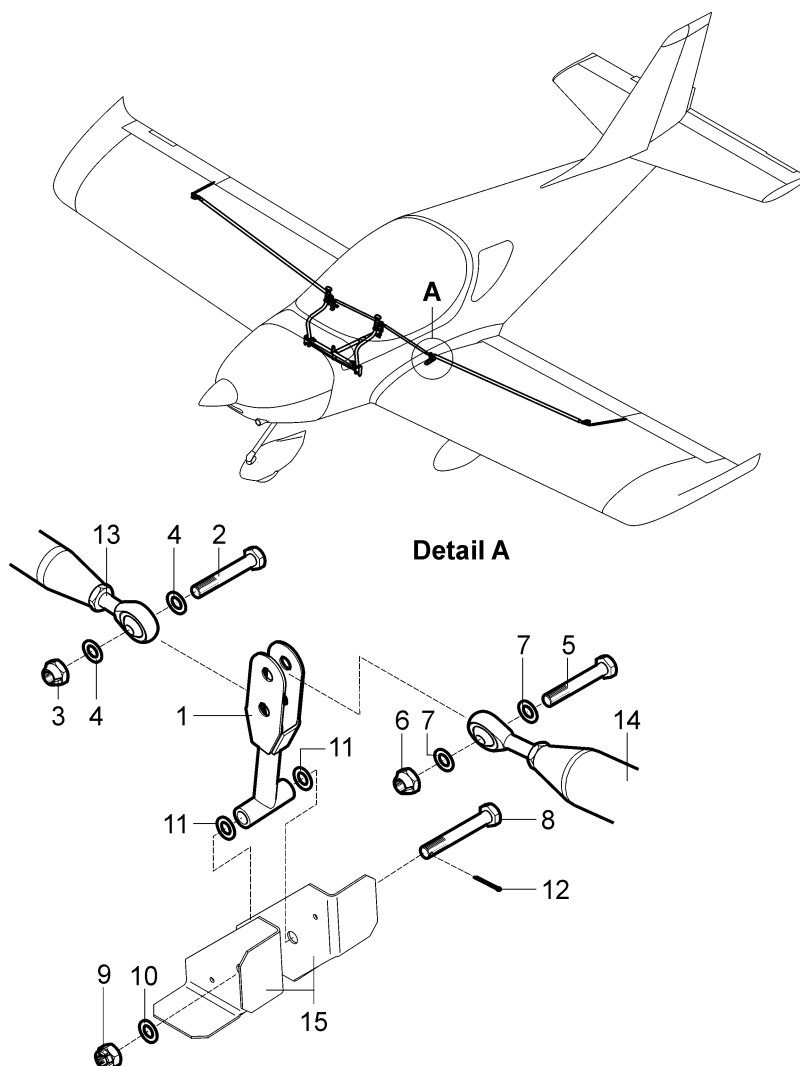
Tools needed:

- wrench size 7/16 in

- (a) Check condition of the control lever and lubrication of the friction surfaces. If the friction surfaces are contaminated, then carefully remove contamination and grease them with lubricant (see 2.6).
- (b) Fit the control lever (1, Fig. 6-10) with the nylon washers (11) to the bracket (15), insert the bolt (8) to the hole, install washer (10), screw and slightly tighten the nut (9).
- (c) Secure the nut (9) with the new cotter pin (12).

NOTE: The control lever must not show axial play after installing and its travel must be continuous without dragging.

- (d) Fit the rods (13; 14) to the control lever (1), insert the bolts (2; 5) with the first washers (4; 7) to the holes, install the second washers (4; 7), screw and tighten the nuts (3; 6).
- (e) Tilt the seat backs to backwards.
- (f) Check aileron deflections (see 6.4.3) and check plays in control (see 6.4.1).



- | | |
|-----------------|-------------------|
| 1 Two-arm lever | 9 Nut |
| 2 Bolt | 10 Washer |
| 3 Nut | 11 Nylon washer |
| 4 Washer | 12 Cotter pin |
| 5 Bolt | 13 Control rod I |
| 6 Nut | 14 Control rod II |
| 7 Washer | For information: |
| 8 Bolt | 15 Bracket |

Fig. 6-10: Aileron control lever behind the seats removal / installation

6.3.10 Removal of aileron control bell crank in the wing

Type of maintenance: heavy

Authorization to perform:

- Repairman (LS-M) or Mechanic (A&P)

Tools needed:

- wrench size 7/16 in
- screwdriver



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NOTE: The bell cranks located on the bracket in the position of the rear rib No. 7 between the spars. Removal is identical for the left and the right aileron bell crank.

- (a) Unscrew the screws (13, Fig. 6-11) and remove the cover (12).
- (b) Unscrew the nuts (8), remove the washers (4), bolts (7), and disconnect the rods (9; 10) from the bell crank (1).
- (c) Remove the cotter pin (6), unscrew the nut (3), remove the washers (4; 5), bolt (2), and the bell crank (1).

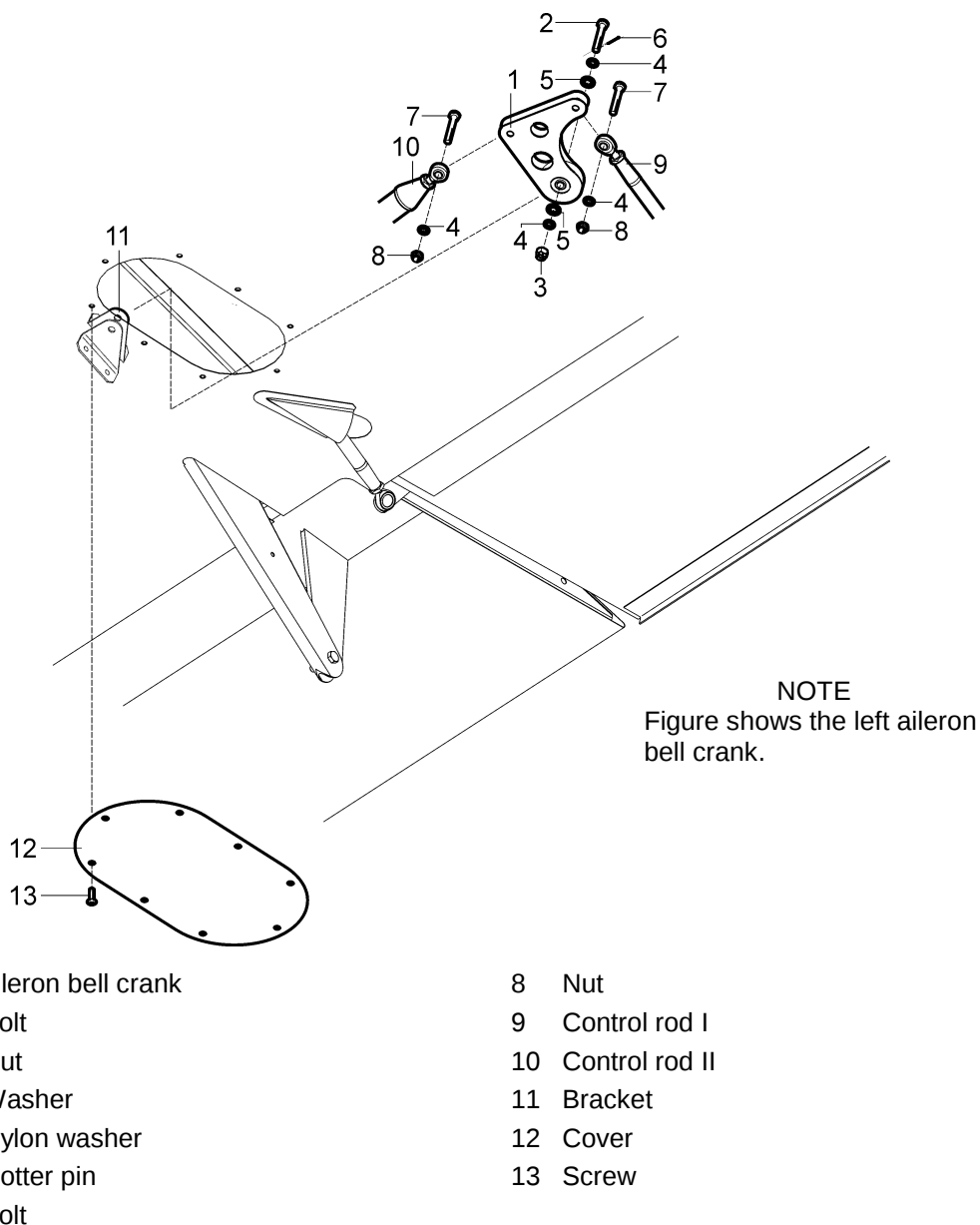


Fig. 6-11: Aileron bell crank removal / installation



6.3.11 Installation of aileron control bell crank in the wing

Type of maintenance: heavy

Authorization to perform:

- Repairman (LS-M) or Mechanic (A&P)

Tools needed:

- wrench size 7/16 in
- screwdriver

NOTE: Installation is identical for the left and the right aileron bell crank.

- (a) Check condition and lubrication of bell crank bearings. If the bearings are contaminated, then carefully eliminate the contamination and grease them with lubricant (see 2.6).
- (b) Fit the bell crank (1, Fig. 6-11) with the nylon washers (5) to the bracket (11), insert the bolt (8) with the first washer (4) to the hole, install the second washer (4), screw and slightly tighten the nut (3).
- (c) Secure the nut (3) with the new cotter pin (6).

NOTE: The bell crank must not show axial play after installing and its travel must be continuous without dragging.

- (d) Fit the rods (9; 10) to the bell crank, insert the bolts (7) to the holes, install the washers (4), screw and tighten the nuts (8).
- (e) Check aileron deflections (see 6.4.3) and check plays in control (see 6.4.1).

6.3.12 Removal of two-arm levers in the fuselage

Type of maintenance: heavy

Authorization to perform:

- Repairman (LS-M) or Mechanic (A&P)

Tools needed:

- wrench size 7/16 in
- screwdriver
- pliers

6.3.12.1 Removal of front two-arm lever

- (a) Remove the cover on the floor of baggage compartment.
- (b) Unscrew the nuts (5, Fig. 6-12), remove washers (6) and bolts (4) and disconnect rods (12; 13) from the control lever (1).
- (c) Remove the cotter pin (11), unscrew the nut (8), remove washer (9), and bolt (7).
- (d) Remove the control lever (1) and washers (10) from the bracket (16).

**6.3.12.2 Removal of middle two-arm lever**

- (a) Remove the front cover (between bulkheads No. 8 and 9) at the bottom of the fuselage rear part.
- (b) Unscrew the nuts (5, Fig. 6-12), remove washers (6) and bolts (4) and disconnect rods (13; 14) from the control lever (2).
- (c) Remove the cotter pin (11), unscrew the nut (8), remove washer (9), and bolt (7).
- (d) Remove the control lever (2) and washers (10) from the bracket (17).

6.3.12.3 Removal of rear two-arm lever

- (a) Remove the rear cover (between bulkheads No. 10 and 11) at the bottom of the fuselage rear part.
- (b) Unscrew the nuts (5, Fig. 6-12), remove washers (6) and bolts (4) and disconnect rods (14; 15) from the control lever (3).
- (c) Remove the cotter pin (11), unscrew the nut (8), remove washer (9), and bolt (7).
- (d) Remove the control lever (3) and washers (10) from the bracket (18).

6.3.13 Installation of two-arm levers in the fuselage

Type of maintenance: heavy

Authorization to perform:

- Repairman (LS-M) or Mechanic (A&P)

Tools needed:

- wrench size 7/16 in
- screwdriver
- pliers

6.3.13.1 Installation of front two-arm lever

- (a) Check condition of the control lever and lubrication of the friction surfaces. If the friction surfaces are contaminated, then carefully remove contamination and grease them with lubricant (see 2.6).
- (b) Fit the control lever (1, Fig. 6-12) with the nylon washers (10) to the bracket (16), insert the bolt (7) to the hole, install washer (9), screw and slightly tighten the nut (8).
- (c) Secure the nut (8) with the new cotter pin (11).

NOTE: The lever after installing must not show axial play and its travel must be smooth without dragging.

- (d) Fit the rods (12; 13) to the control lever (1), insert the bolts (4) with the first washers (6) to the holes, install the second washers (6), screw and tighten the nuts (5).
- (e) Check elevator deflections (see 6.4.3) and check plays in control (see 6.4.1).



6.3.13.2 Installation of middle two-arm lever

- (a) Check condition of the control lever and lubrication of the friction surfaces. If the friction surfaces are contaminated, then carefully remove contamination and grease them with lubricant (see 2.6).
- (b) Fit the control lever (2, Fig. 6-12) with the nylon washers (10) to the bracket (17), insert the bolt (7) to the hole, install washer (9), screw and slightly tighten the nut (8).
- (c) Secure the nut (8) with the new cotter pin (11).

NOTE: The lever after installing must not show axial play and its travel must be smooth without dragging.

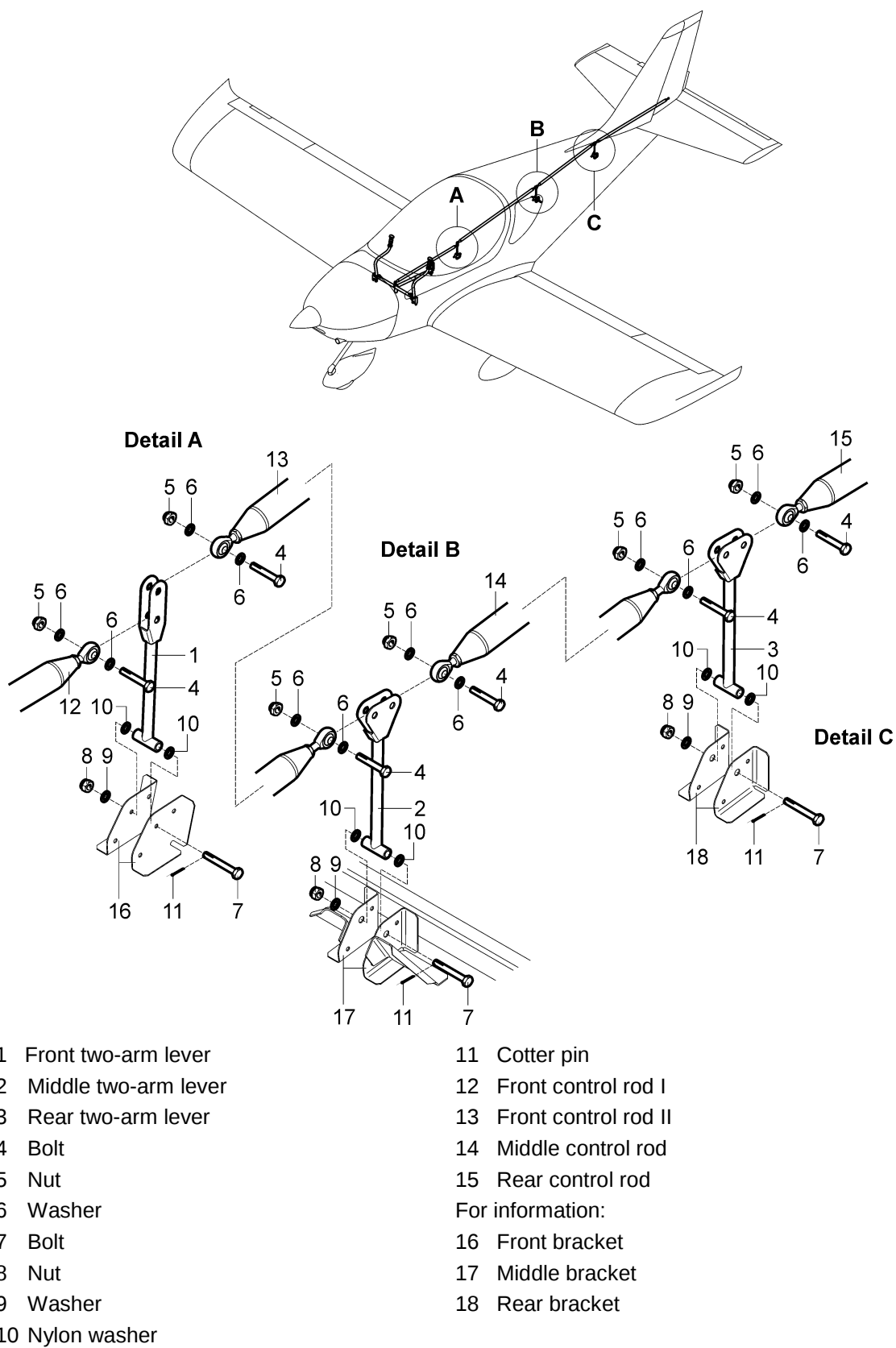
- (d) Fit the rods (13; 14) to the control lever (2), insert the bolts (4) with the first washers (6) to the holes, install the second washers (6), screw and tighten the nuts (5).
- (e) Check elevator deflections (see 6.4.3) and check plays in control (see 6.4.1).

6.3.13.3 Installation of rear two-arm lever

- (a) Check condition of the control lever and lubrication of the friction surfaces. If the friction surfaces are contaminated, then carefully remove contamination and grease them with lubricant (see 2.6).
- (b) Fit the control lever (3, Fig. 6-12) with the nylon washers (10) to the bracket (18), insert the bolt (7) to the hole, install washer (9), screw and slightly tighten the nut (8).
- (c) Secure the nut (8) with the new cotter pin (11).

NOTE: The lever after installing must not show axial play and its travel must be smooth without dragging.

- (d) Fit the rods (14; 15) to the control lever (3), insert the bolts (4) with the first washers (6) to the holes, install the second washers (6), screw and tighten the nuts (5).
- (e) Check elevator deflections (see 6.4.3) and check plays in control (see 6.4.1).

**Fig. 6-12:** Two-arm levers removal / installation



6.3.14 Autopilot servos removal

Type of maintenance: heavy

Authorization to perform:

- Repairman (LS-M) or Mechanic (A&P)

Tools needed:

- wrench size 7/16 in
- screwdriver
- pliers
- drill diam. 3.2 mm (1/8 in)
- electric drill

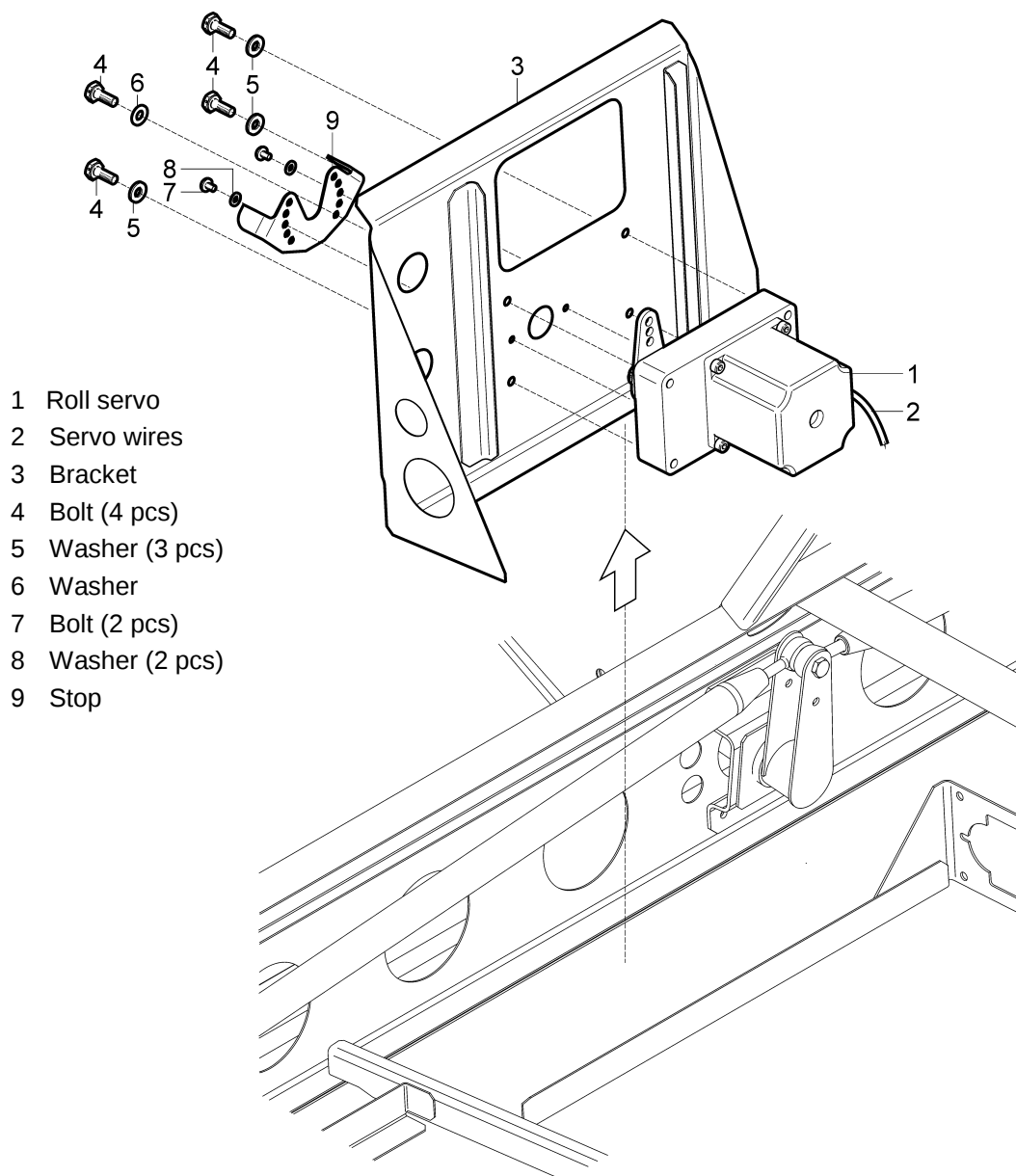
NOTE: From S/N P1102001 is aircraft equipped with a modified installation of the roll servo. In case of exchange, replace the old installation of the roll servo with the modified installation. Detail information are shown in the IPC, Doc. No. CR-IPC-1-0-00, Chapter 22.

6.3.14.1 Removal of roll servo

- Set the **MASTER BAT** or **MASTER, AUTOPILOT** switches, **EFIS** and **ROLL SERVO** or **AP** and **AP SERVO 1** circuit breakers to OFF.
- Remove the left seat (see Chapter 7).
- Disconnect the servo wires (2, Fig. 6-13).
- Unscrew the nut (15, Fig. 6-14), remove the washer (16) and the bolt (14) and disconnect rod (13) from the servo control lever.
- Carefully drill out the bracket (3, Fig. 6-13); remove the bracket with the servo (1).
- Unscrew and remove the bolts (7) with the washers (8); remove the stop (9).
- Remove the lockwire, unscrew and remove the bolts (4) with the washers (5; 6); remove the servo (1) from the bracket (3).

6.3.14.2 Removal of pitch servo

- Set the **MASTER BAT** or **MASTER, AUTOPILOT** switches, **EFIS** and **PITCH SERVO** or **AP** and **AP SERVO 2** circuit breakers to OFF.
- Remove the left seat (see Chapter 7).
- Disconnect the servo wires (24, Fig. 6-15).
- Unscrew the nut (18), remove the washers (19) and the bolt (17) and disconnect rod (12) from the servo control lever.
- Unscrew the nuts (22), remove the washers (5) ; remove the servo base (3) with the servo (1) from the bracket (21).
- Unscrew the nuts (22), remove the washers (23 and the bolts (21) and remove the bracket (20) with the servo (1) from the angles (26).
- Unscrew and remove the bolts (6) with the washers (7); remove the stop (2).
- Remove the lockwire, unscrew and remove the bolts (3) with the washers (4; 5); remove the servo (1) from the bracket (20).

(i) **Fig. 6-13:** Roll servo removal

6.3.15 Autopilot servos installation

Type of maintenance: heavy

Authorization to perform:

- Repairman (LS-M) or Mechanic (A&P)

Tools needed:

- wrench size 7/16 in
- screwdriver
- pliers



6.3.15.1 Installation of roll servo

- (a) Rivet the new bracket (3, Fig. 6-14) on the rear seat stiffener angle and lower fuselage skin.
- (b) Insert the servo (1) to the servo base (9), insert the bolts (4) with the washers (5; 6) to the holes and tighten the bolts; secure the bolts (4) with the lockwire.

NOTE: Make sure correct location of the washers (5; 6) - see Fig. 6-14.

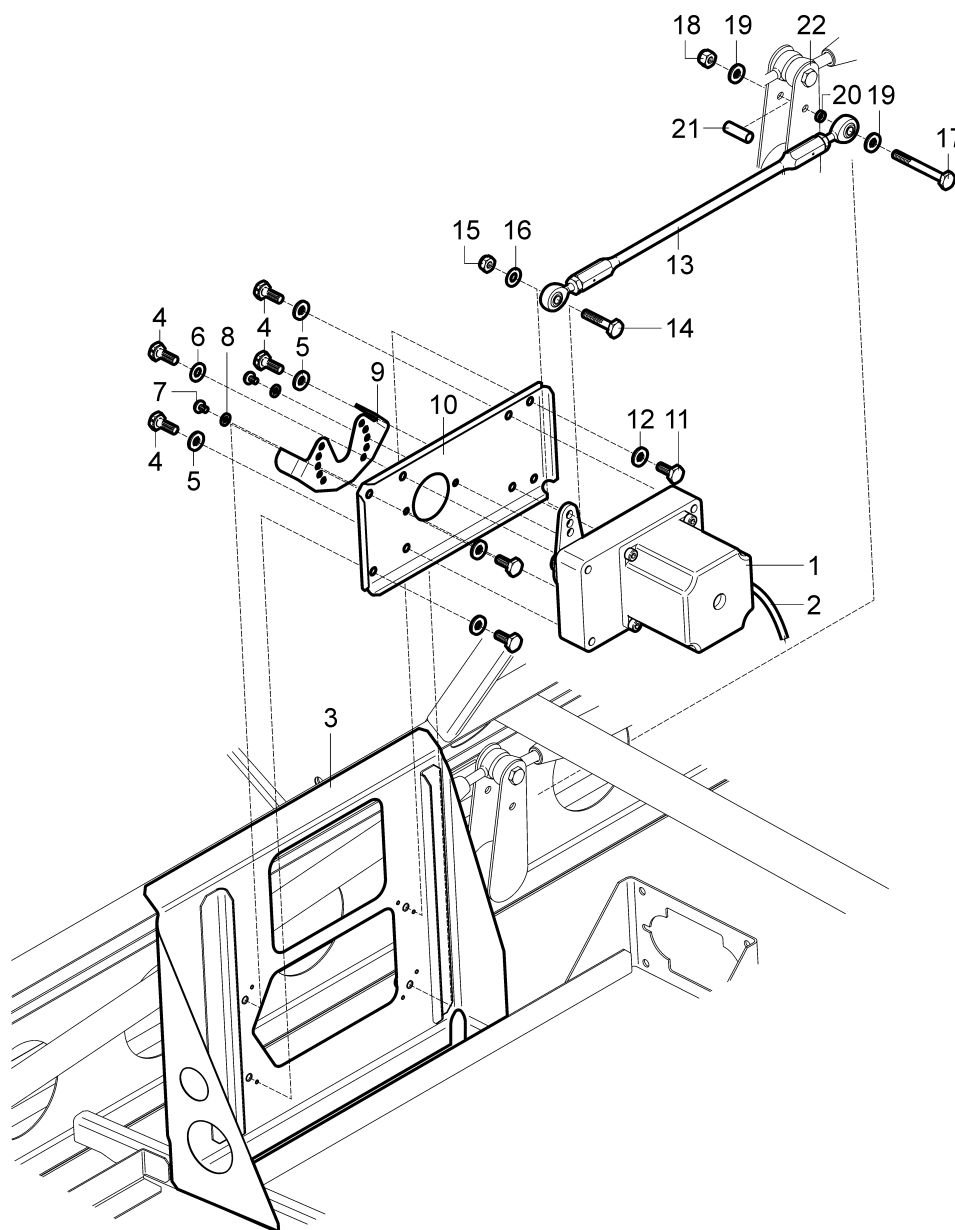
- (c) Fit the stop (2) to the servo base (3) and fasten it by the bolts (9) with the washers (10).
- (d) Fit the servo base (3) with the servo (1) to the bracket (21); insert the bolts (4) with the washers (5) into the holes, screw and tighten the bolts (4).
- (e) Fit the rod (11) to the servo control lever, insert the bolt (12) to the holes, install the washer (14), screw and tighten the nut (13).
- (f) Connect the servo wires (20) (see Wiring Manual).
- (g) Install the left seat (see Chapter 7).
- (h) Set the **MASTER BAT** or **MASTER, AUTOPILOT** switches, **EFIS** and **ROLL SERVO** or **AP** and **AP SERVO 1** circuit breakers to ON.
- (i) Do a test of the autopilot system - if no error message appears, then the system is operative.

6.3.15.2 Installation of pitch servo

- (a) Insert the servo (1, Fig. 6-15) to the bracket (20), insert the bolts (3) with the washers (4; 5) to the holes and tighten the bolts; secure the bolts (3) with the lockwire.

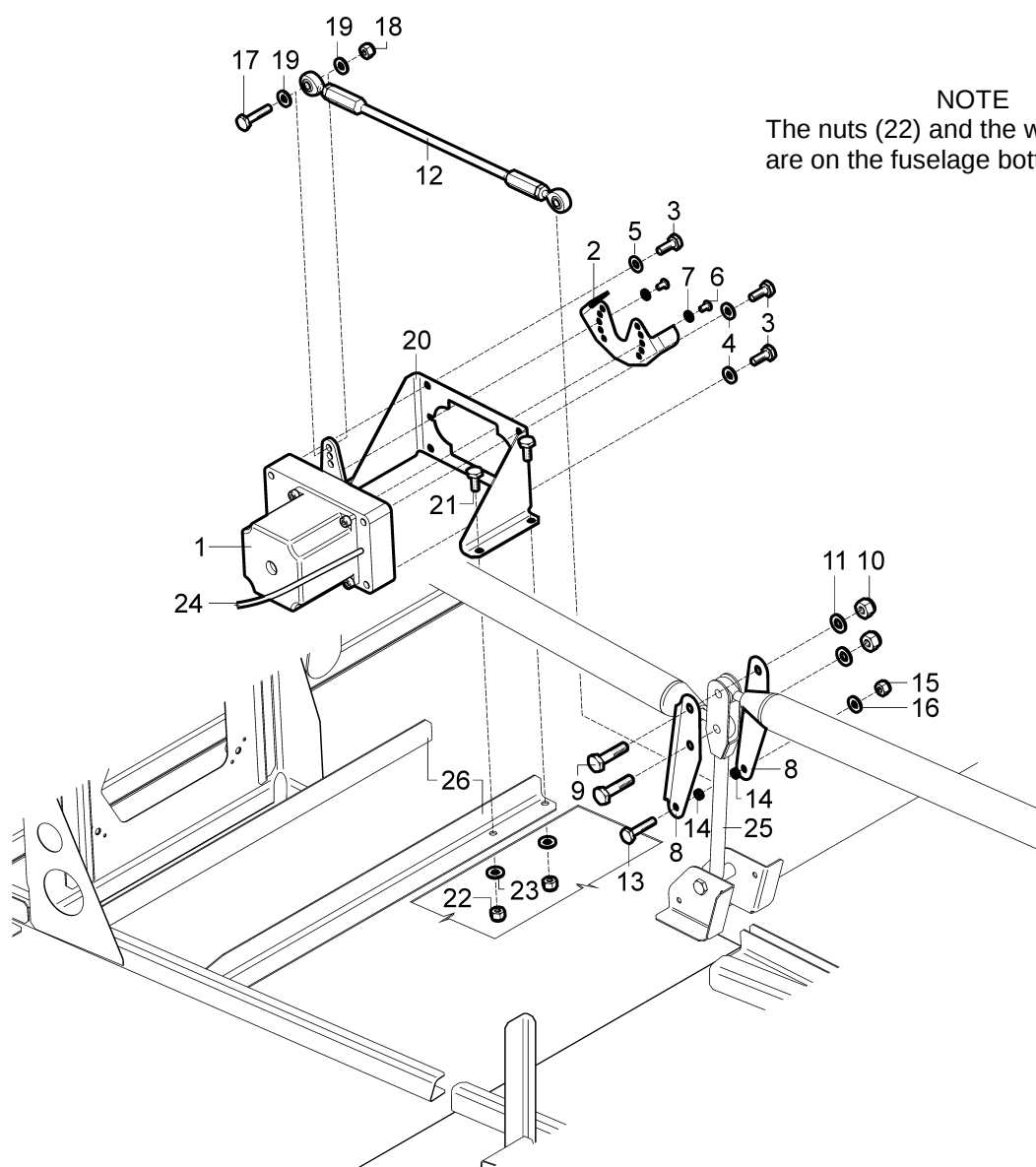
NOTE: Make sure correct location of the washers (4; 5) - see Fig. 6-15.

- (b) Fit the stop (2) to the servo base (3) and fasten it by the bolts (6) with the washers (7).
- (c) Fit the bracket (20) with the servo (1) to the angles (26); insert the bolts (21) into the holes, install the washers (23), screw and tighten the nuts (22).
- (d) Fit the rod (12) to the servo control lever, insert the bolt (17) with the first washer (19) to the holes, install the second washer (19), screw and tighten the nut (18).
- (e) Connect the servo wires (24) (see Wiring Manual).
- (f) Install the left seat (see Chapter 7).
- (g) Set the **MASTER BAT** or **MASTER, AUTOPILOT** switches, **EFIS** and **PITCH SERVO** or **AP** and **AP SERVO 2** circuit breakers to ON.
- (h) Do a test of the autopilot system - if no error message appears, then the system is operative.



- | | |
|-------------------|------------------|
| 1 Roll servo | 13 Rod |
| 2 Servo wires | 14 Bolt |
| 3 Bracket | 15 Nut |
| 4 Bolt (4 pcs) | 16 Washer |
| 5 Washer (3 pcs) | 17 Bolt |
| 6 Washer | 18 Nut |
| 7 Bolt (2 pcs) | 19 Washer |
| 8 Washer (2 pcs) | 20 Bushing |
| 9 Stop | 21 Bushing |
| 10 Servo base | For information: |
| 11 Bolt (4 pcs) | 22 Control lever |
| 12 Washer (4 pcs) | |

Fig. 6-14: Roll servo installation



NOTE
The nuts (22) and the washers (23)
are on the fuselage bottom side.

- | | |
|-------------------|------------------------|
| 1 Pitch servo | 15 Nut |
| 2 Stop | 16 Washer |
| 3 Bolt (4 pcs) | 17 Bolt |
| 4 Washer (3 pcs) | 18 Nut |
| 5 Washer | 19 Washer |
| 6 Bolt (2 pcs) | 20 Bracket |
| 7 Washer (2 pcs) | 21 Bolt (4 pcs) |
| 8 Lever | 22 Nut (4 pcs) |
| 9 Bolt (2 pcs) | 23 Washer (4 pcs) |
| 10 Nut (2 pcs) | 24 Servo wires |
| 11 Washer (2 pcs) | For information: |
| 12 Rod | 25 Front two-arm lever |
| 13 Bolt | 26 Angle |
| 14 Bushing | |

Fig. 6-15: Pitch servo removal / installation



6.4 Check / Adjustment

6.4.1 Check of play in control

Admissible plays in control are mentioned in the following table:

Control	Admissible play	Area to measure play
longitudinal	max 4 mm (5/32 in)	at the end of the control stick in longitudinal axis of the airplane
lateral	max 4 mm (5/32 in)	at the end of the control stick in lateral axis of the airplane
directional	max 4.8 mm (3/16 in)	on pedals in longitudinal axis of the airplane
trim tabs	max 3.2 mm (1/8 in)	at the end of the trim tab
wing flaps	max 3.2 mm (1/8 in)	at the end of the wing flap

CAUTION: IF THE MEASURED PLAYS EXCEED VALUES MENTIONED IN THE TABLE THEN ELIMINATE THE CAUSE OF IT AND REPEAT MEASURING.

Measuring procedure

- Measure all plays three times and write down average values.
- Perform measuring with the blocked control surfaces. Before measuring it is necessary to push down the control surface by hand several times (max force of 5 kg (11 lbs) in the direction of the control surface deflection, so that the control system is unblocked and plays can be more easily identified.
- Push on the control stick or the pedal by force of 3 kg (6.6 lbs). Deflect the controlling element to one side and read the deflection. Then push the control stick to the other side and read the deflection. Sum of deflections presents plays in control.

Longitudinal control

Measure play at the end of the control stick at the blocked elevator in the neutral position. The total play must not exceed 4 mm (5/32 in) at the end of the control stick (see Fig. 6-16).

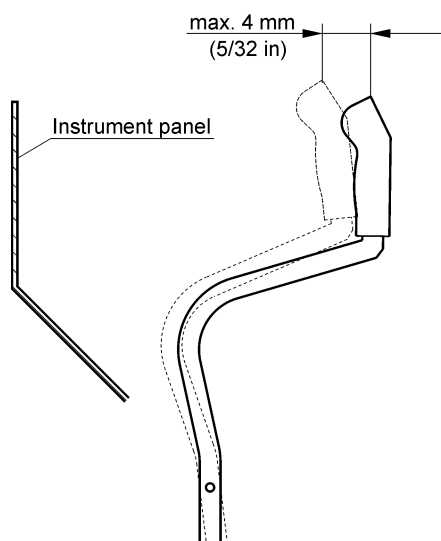


Fig. 6-16: Play in longitudinal control



Lateral control

Measure play at the end of the control stick by the measuring instrument from the fuselage side at blocked ailerons in the neutral position. First block the right aileron and measure play on the control stick, then measure play at the blocked left aileron. Total play of the control stick must not exceed 4 mm (*5/32 in*) at the end of the control stick.

Play in foot control pedals

Measure play at the end of pedals by the measuring instrument from the inner wall of the bulkhead No.1 at the blocked rudder at neutral position. Mutual total play between pedals must not exceed 4.8 mm (*3/16 in*) on the pedal tube.

Play in trim tab control

Measure play in elevator neutral position. Set the balance tab to position "max on head" and measure play at the end of the trim tab. Max play of the trim tab measured at the end of the trailing edge must not exceed 3.2 mm (*1/8 in*).

Play in wing flap control

Measure play in individual position of wing flaps (0°, 10°, 20° and 30°). Set the flap actuator to individual positions. Measure play in wing flap control on the wing flap trailing edge. Max play of the wing flap measured on the trailing edge must not exceed 4.8 mm (*3/16 in*).

6.4.2 Check for friction in control system

Control system must function smoothly within the whole scope of deflections. There must not be excessive friction or hitching in the control system. In case of failure detection, find out the cause and eliminate the defect.

Friction in the longitudinal control system

- (a) Balance elevator through the pulley to get it to neutral position.
- (b) Measure force by the dynamometer attached on the end of the control stick. Move the control stick from fully forward position to neutral and measure force. Then slowly move stick forward and measure force. Subtract forces from each other. Max. force can be 0.9 kg (*2 lbs*).

Friction in lateral control system

- (a) Set ailerons to neutral position.
- (b) Measure force at the moment of aileron deflection from neutral position by the dynamometer attached on the end of the control stick. Max. force can be 0.6 kg (*1.3 lbs*).

Friction in directional control system

- (a) Pushing move the rudder to max. L / R position.
- (b) Slowly move the rudder back to neutral position. Maximal permissible residual deflection of the rudder is on edge of central covering sheet (see Fig. 6-17).

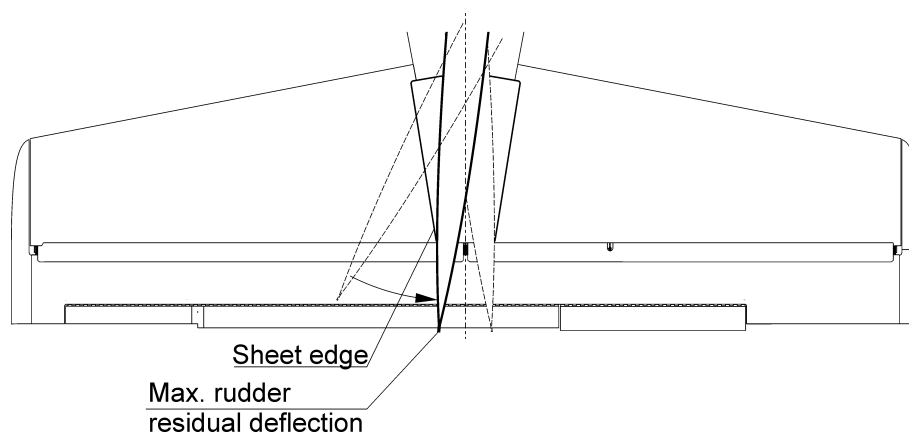


Fig 6-17: Friction in directional control system

6.4.3 Checking control surface deflections

Control surface deflections of SportCruiser / PiperSport are shown in the following table:

	Valid for S/N 06SC001 up to 08SC138 and all QBK, except of 08SC134	Valid for S/N 08SC134 and from 08SC139 further, except of QBK	Valid for S/N P1102012, P1102014, P1102015, P1102016, P1102019, P1102027, P1102031, P1102034, C0416 and up
Aileron	28° ± 2° up 18° ± 2° down	20° ± 2° up 15° ± 2° down	15° ± 1° up 15° ± 1° down
Rudder	30° ± 2° right 30° ± 2° left	30° ± 2° right 30° ± 2° left	30° ± 2° right 30° ± 2° left
Elevator	28° ± 2° up 25° ± 2° down	28° ± 2° up 25° ± 2° down	24° ± 2° up 24° ± 2° down
Wing flap	0° to 30°	0° to 30°	0° to 30° ± 1°
Difference between L/R flap deflections	± 0.5°	± 0.5°	± 0.5°
Elevator trim tab	22° ± 2° up 22° ± 2° down	22° ± 2° up 28° ± 2° down	22° ± 2° up 28° ± 2° down
Elevator balance tab	- -	- -	25° ± 2° up 19° ± 2° down
Aileron trim tab	20° ± 2° up 20° ± 2° down	20° ± 2° up 20° ± 2° down	20° ± 2° up 20° ± 2° down

Tab. 6-1: Deflections of control surfaces

For measuring deflections use protractor with deflecting pointer that will be attached to an appropriate control surface by means of the clamp.



Measuring aileron deflections

- (a) Attach the protractor with the deflecting pointer on the upper skin of the aileron by means of the clamp.
- (b) Set the aileron to neutral position.
- (c) Set the protractor to 0° - starting value for measuring.
- (d) Deflect aileron to the lower (possibly upper) extreme position and read the deflection value.
- (e) Check deflection values according to the Tab. 6-1.

Measuring wing flap deflections

- (a) Attach the protractor with the deflecting pointer on the upper flap skin by means of the clamp.
- (b) Set the wing flap to the 0° position.
- (c) Set the protractor to 0° - starting value of measuring.
- (d) Extend the flaps by means of the flap actuator to individual positions and read the deflection.
- (e) Check deflection values according to the Tab. 6-1.

Measuring elevator deflections

- (a) Set the protractor with the deflecting pointer on the trailing edge of the elevator by means of the clamps.
- (b) Set the elevator to neutral position.
- (c) Set the protractor to 0° - starting value of measuring.
- (d) Deflect the elevator to extreme positions by means of the control stick and read the deflection.
- (e) Check values of deflections according to the Tab. 6-1.

Measuring rudder deflections

The airplane manufacturer uses a special jig for measuring rudder deflections that is slid on the vertical tail unit and it is possible directly to read the rudder deflection. If you do not have this special jig, use the alternative procedure:

- (a) Set the rudder to neutral position.
- (b) Put the rod to the trailing edge of the rudder and mark the lower margin of the rudder trailing edge.
- (c) Deflect the rudder to extreme positions and with the rule measure distance from the sign to the lower margin of the rudder trailing edge.
- (d) Calculate angle and compare it with the value mentioned in the Tab. 6-1.

Measuring trim tab deflections (PiperSport / early SportCruiser)

- (a) Set the gauge to the trailing edge of the trim tab (see Fig. 6-18).
- (b) Set the trim tab to neutral position - 0°.
- (c) By means of the trim control actuator deflect the trim tab to extreme positions and read the deflection.



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(e) Check values of deflections according to the Tab. 6-1.

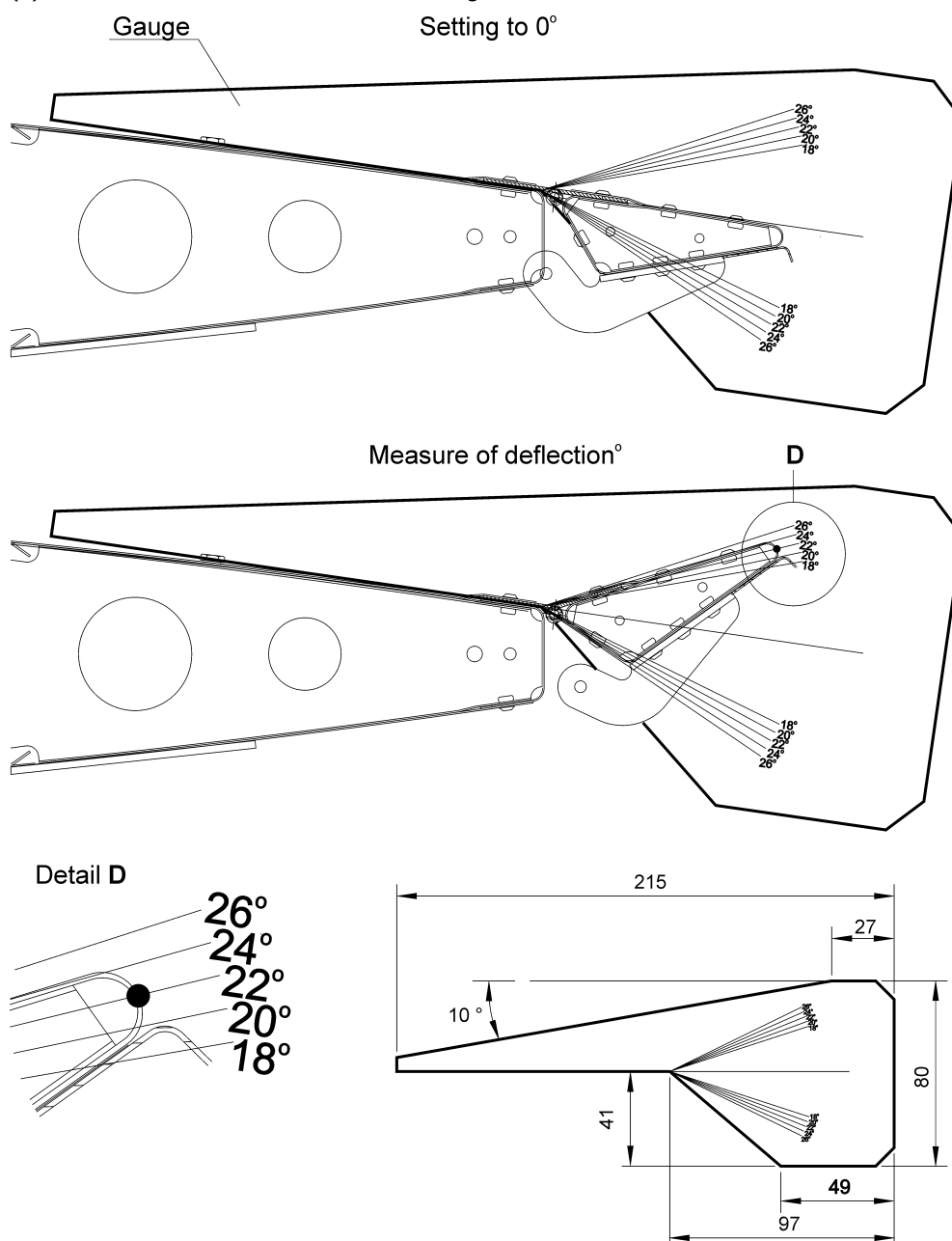


Fig 6-18: Measuring trim tab deflections

Measuring trim tab deflections (SportCruiser)

- Set the protractor with the deflecting pointer to the trailing edge of the trim tab by means of the clamp.
- Set the trim tab to neutral position.
- Set the protractor to 0° - starting value of measuring.
- By means of the trim control actuator deflect the trim tab to extreme positions and read the deflection.
- Check values of deflections according to the Tab. 6-1.



6.4.4 Adjustment of control surface deflections

Adjustment of control surface deflections to be made to the values showed in the Tab. 6-1. At adjusting the airplane control, neutral position of the control surfaces is taken as the starting point.

CAUTION: AFTER ADJUSTMENT OF CONTROL SURFACE DEFLECTIONS CHECK, IF THE END PIECES ARE SEEN THROUGH THE INSPECTION HOLE OF CONTROL RODS.

Adjusting aileron deflections

- (a) Aileron deflections up and down (different) are adjusted at the manufacturer.
- (b) For re-adjustment of the aileron neutral position:
 - Set control sticks to neutral position;
 - Through the adjustment of the end piece of the end control rod - set the left aileron to the neutral position.
 - Through the adjustment of the end piece of the end control rod - set the right aileron to the neutral position.
- (c) Adjust the range of deflections (if applicable) through the stops at control sticks.

Adjusting wing flap deflections

Wing flap deflections are given by the torque tube and actuator positioning in the fuselage. It is not possible to adjust flap deflection outside manufacturing company.

Adjust flap deflections through eccentric parts of pins.

Adjusting elevator deflections

Range of elevator deflections is given by setting the push rod terminals in the fuselage. At adjusting elevator deflections, proceed as follows:

- (a) Remove the chosen push rod from the bell crank.
- (b) Adjust the upper deflection as needed by means of the push rod terminal (or by means of push rod terminal on the elevator lever).
- (c) Put push rod end back and check if the deflections corresponds to the values mentioned in the Tab. 6-1.

Adjusting rudder deflections

Rudder deflections are given by setting the stops on the rudder control lever installed on root rudder rib.

- (a) Set the foot control pedals to neutral position and check if the rudder is in the neutral position.
- (b) Carry out correction of rudder deflection setting by adjusting the turnbuckles on the foot pedal side in cockpit.

Adjusting trim tab deflections

Trim tab deflections are given by control actuator and they are fixed.



6.4.5 Checking condition of rudder control cables.

- (a) Carefully inspect the control cable especially on the following areas:
 - in the area of cable attachment on the rudder control pedals
 - in the area of cable attachment on rudder lever
 - in the area of cable inlet on rear fuselage
- (b) Check for the following defects on the cable:
 - burst cable wires
 - evidence of sleeves deformation and damage on cable surface
 - evidence of cable corrosion
 - cable distortion
- (c) Exchange the cable in cases as follows:
 - broken any wire
 - wear of cable surface resulted in permanent deformation of cable section.
 - it is not possible to set the rudder to neutral position (see 6.4.4)
- (d) Check rudder deflections (see 6.4.3).

6.5 Exchanges / Service information

6.5.1 Rudder control cable exchange

- (a) Remove the lockwire from the turnbuckle (4; 5; 6, Fig. 6-19).
- (b) Cut the control cable (1) in the cockpit behind the rudder pedals.
- (c) Remove the cotter pin (15), unscrew the nut (13), remove the washer (14), bolt (12) and disconnect the cable shackle (11) from the rudder lever (3).
- (d) Remove cable on the rudder side from the fuselage.

NOTE: Grease the new cable with lubricant grease before installing it to the fuselage.

- (e) Insert the new cable (1) from the rudder side into the fuselage.
- (f) Set Nicopress sleeve (3) on the cable end in cockpit.
- (g) Bend the cable end in cockpit around the cable thimble (2), insert the turnbuckle eye (4) to the cable thimble (2), set Nicopress sleeve (3) close to the cable thimble and press Nicopress sleeve by Nicopress pliers (see 15.10).
- (h) Connect new cable with turnbuckle (5; 6) installed on rudder pedal (16).
- (i) Set the rudder and the pedal and secure them in neutral position.
- (j) Set on rear end of cable thimble (2) and cable shackle (11) and connect cable shackle with rudder lever (17) by means of the bolt (12).
- (k) Remove the cable from the rudder lever (17), cut the cable end to fit to the marked length and by means of Nicopress pliers (see 15.10) install the Nicopress sleeve (3).
- (f) Fit the cable shackle (11) to the rudder lever (17), insert the bolt (12) to the hole, install washer (14), screw and slightly tighten the nut (13).
- (l) Secure the nut (13) with the new cotter pin (15).



- (m) Check (see 6.4.3) and adjust (see 6.4.4) rudder deflections.
- (n) Secure the turnbuckle (4; 5; 6) with the lockwire.

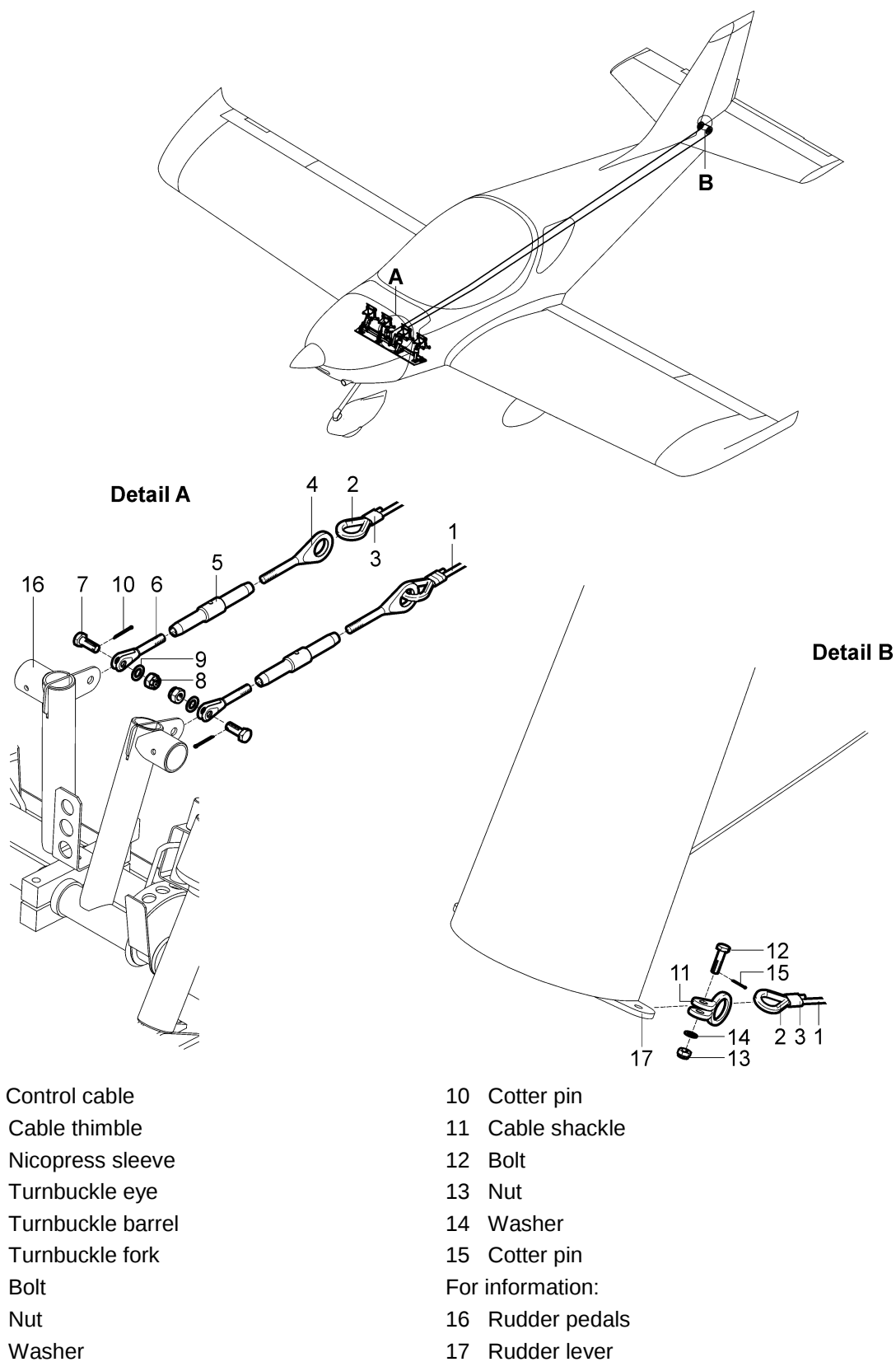


Fig 6-17: Rudder control cable exchange



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7.1 General

This is a two-seat cockpit with the side-by-side seat arrangement. The seats are fixed; the rudder control pedals are adjustable. The seats are equipped with safety harnesses. The baggage compartment is located behind the seats and is equipped with straps.

The equipment of SportCruiser / PiperSport airplane includes:

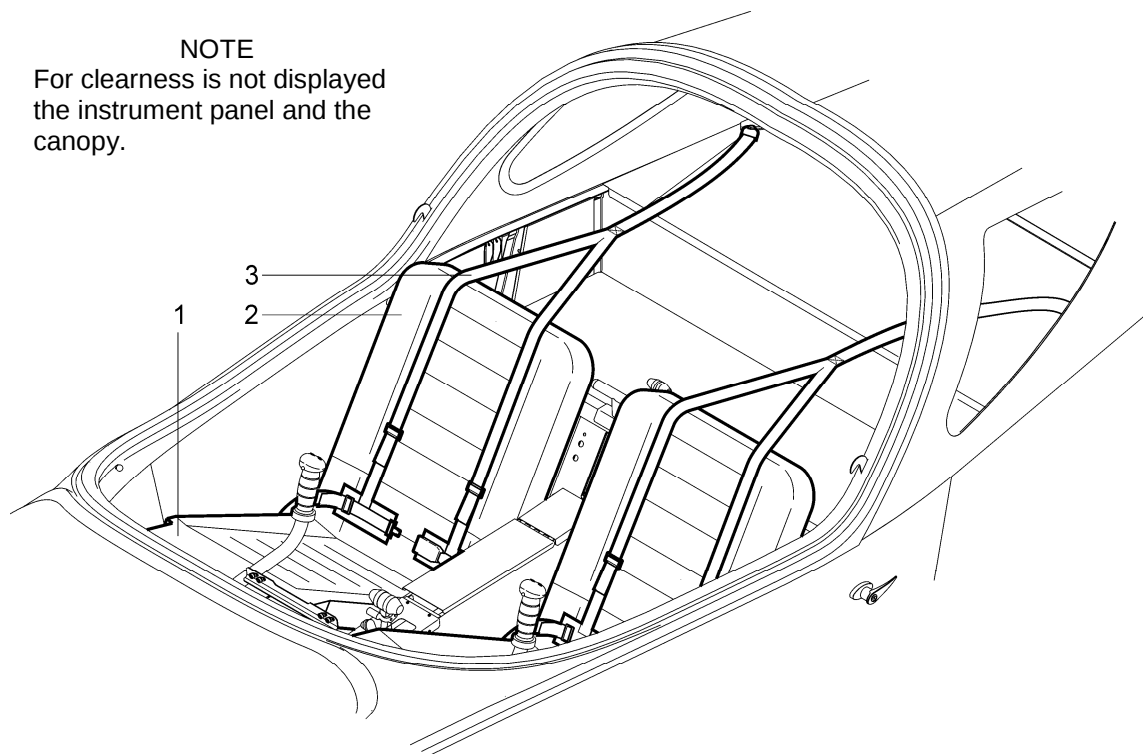
- seats
- safety harnesses
- Ballistic Recovery System
- Emergency Locator Transmitter.

7.2 Description and operation

7.2.1 Seats

Seats (1, Fig. 7-1) of the PS-28 Cruiser / SportCruiser airplane are fixed and are equipped with upholstered cushions attached on Velcro. The seat backs (2) are attached to the bulkhead No. 4 per piano hinge.

NOTE
For clearness is not displayed the instrument panel and the canopy.



- 1 Seat
2 Seat back

- 3 Safety harnesses

Fig. 7-1: SportCruiser / PiperSport cockpit

7.2.2 Safety harnesses

Seats are equipped with safety harnesses (3; 4, Fig. 7-1). Safety harnesses consist of two lap belts, two shoulder belts and a safety harness lock. Length of the lap belts and the shoulder belts is adjustable.

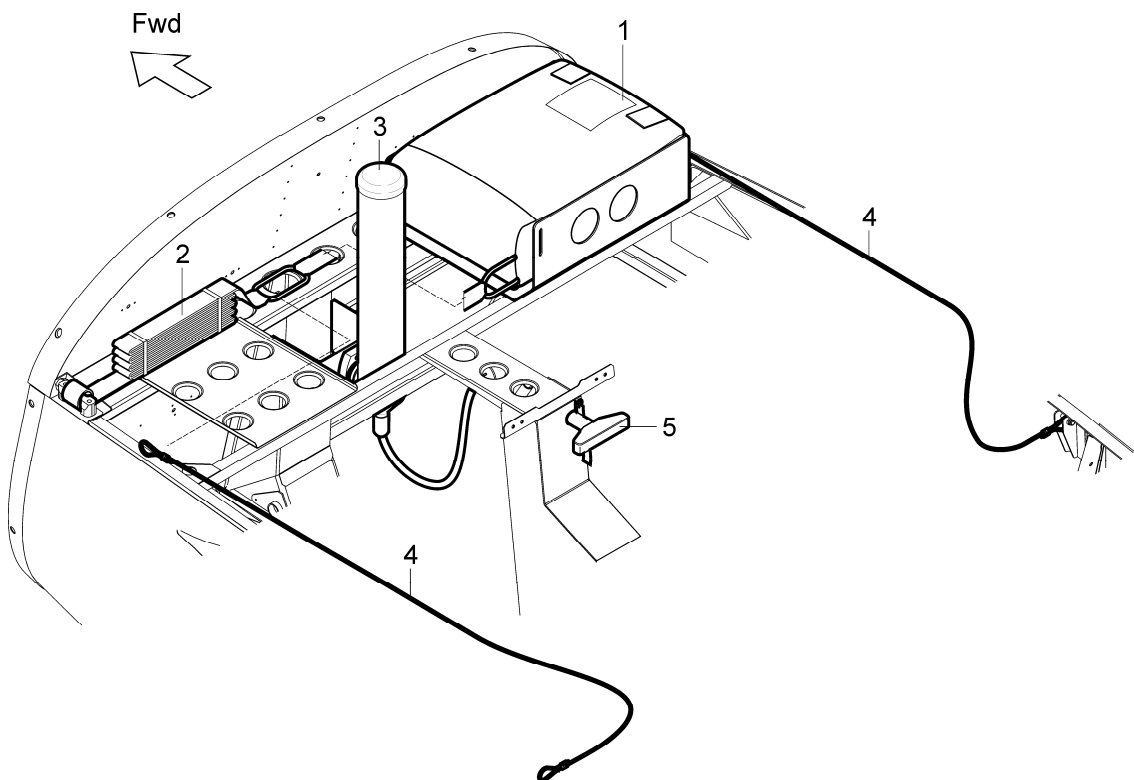


7.2.3 Ballistic Recovery System

The aircraft can be equipped (optional) with BRS emergency parachute system. BRS utilize a manually activated, solid propellant rocket motor to extract a round, non-steerable parachute and recover the aircraft in life-threatening emergency situations.

The parachute with harnesses and the rocket are installed aft of the firewall. Activating handle is located on the middle channel.

NOTE: For detailed information refer to Owner's Manual for BRS-6 Emergency Parachute Recovery Systems (Doc. No. 020000-03) and Parachute Installation Manual for the BRS-1350 onto the Czech Sport Aircraft PS-28 Cruiser & SportCruiser (Doc. No. 020016-PM), latest revision.



- | | |
|-------------|-------------------------|
| 1 Parachute | 4 Rear attachment cable |
| 2 Harnesses | 5 Handle |
| 3 Rocket | |

Fig. 7-2: BRS scheme

7.2.4 Emergency Locator Transmitter

The aircraft is equipped with the AK-451 ELT Emergency Locator Transmitter.

The AK-451 ELT is micro controller based, batteries operated and self contained equipment. The ELT is designed only for emergency use. The AK-451 consists of an ELT main unit with a mounting tray, an aircraft-fixed antenna, remote switch unit, an audible buzzer monitor, and interconnecting cables (see Fig. 7-6).



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The ELT main unit is mounted in baggage compartment; some SportCruiser airplanes from S/N C0416 have ELT main unit mounted below the right instrument panel (see Fig. 7-6). The remote switch unit with the buzzer is mounted on the right instrument panel; the ELT antenna is installed on the upper part of the fuselage.

NOTE: For detailed information refer to Installation and Operation Manual for Model AK-451-() Series, (Doc. No. IM 451), latest revision.

7.3 Removal / Installation

7.3.1 Seats removal

- (a) Remove the seats from the Velcro
- (b) Unscrew the seats together with the piano hinge.
- (c) Seat back is not removable.

7.3.2 Safety harnesses removal

NOTE: Removal of safety harnesses is the same for both safety harnesses models.

Type of maintenance: line

Authorization to perform:

- Sport pilot or higher, Repairman (LS-M) or Mechanic (A&P)

Tools needed:

- wrench size 1/2 in
- (a) Unscrew the nut (4, Fig. 7-3), remove the washer (5), bolt (3), the bushing (2) and disconnect the shoulder belts bracket (1) from the attachment bracket in baggage compartment.
- (b) Remove the bolt (3), the bushing (2), and disconnect the lap belt bracket (1) from the attachment point on the fuselage / central console side.

7.3.3 Safety harnesses installation

NOTE: Installation of safety harnesses is the same for both safety harnesses models.

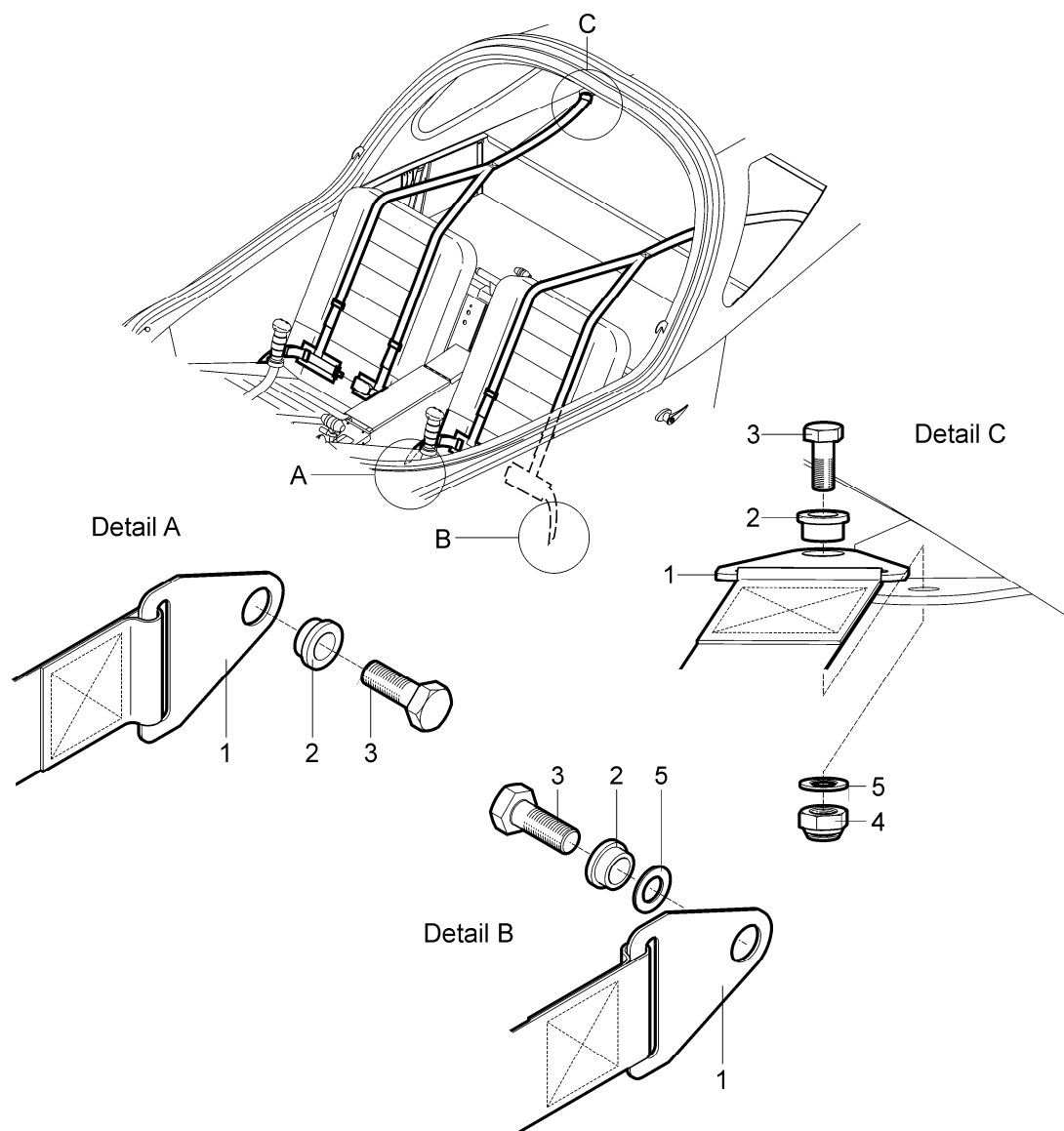
Type of maintenance: line

Authorization to perform:

- Sport pilot or higher, Repairman (LS-M) or Mechanic (A&P)

Tools needed:

- wrench size 1/2 in
- (a) Gradually put the bushing (2, Fig. 7-3), lap belt bracket (1) on the bolt (3); screw the bolt into the attachment point on the fuselage / central console side.
- (b) Put the bushing (2) and shoulder belts bracket (1) on the bolt (3), insert the bolt into the attachment bracket in baggage compartment, insert the washer (5), screw and tighten the nut (4).



- 1 Attachment bracket
- 2 Bushing
- 3 Bolt

- 4 Nut
- 5 Washer

Fig. 7-3: Safety harnesses removal / installation

7.3.4 BRS parachute removal

Type of maintenance: heavy

Authorization to perform:

- Repairman (LS-M) or Mechanic (A&P)

Tools needed:

- screwdriver, Philips screwdriver
- wrench size No.7
- cutting pliers, pliers
- Allen wrench size 1/8 in, 1/4 in



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WARNING: UNAUTHORIZED PERSONNEL SHOULD NOT ATTEMPT TO MODIFY, REPAIR, OR DISASSEMBLE BRS SYSTEM AT ANY TIME. DURING ALL SERVICE WORK BEWARE OF ACTIVATING THE BRS ROCKET!

NOTE: BRS parachute must be removed from the aircraft for repacking. This service date is printed on placards located on the side of centre panel and on the parachute.

- (a) Carefully unglue the cover over parachute on the canopy fixed frame.
- (b) Remove both instrument panels and disconnect all cable and pitot-static connection.
- (c) Remove COMM/NAV equipment from the centre panel and disassemble it.
- (d) Pull open the front flap of the parachute (1, Fig. 7-4) and expose the small link; unscrew the link nut and disconnect the rocket lanyards (5).
- (e) Carefully remove the BRS rocket (see 7.3.6).
- (f) Cut-off cable ties (4) securing link (3) to the tray.
- (g) Unscrew the link (3) nut and disconnect the loop of the main bridle (6).
- (h) Disengage all four Velcro retaining straps.
- (i) Carefully remove parachute (1) from the tray (2).
- (j) Repack the parachute by the authorized person.

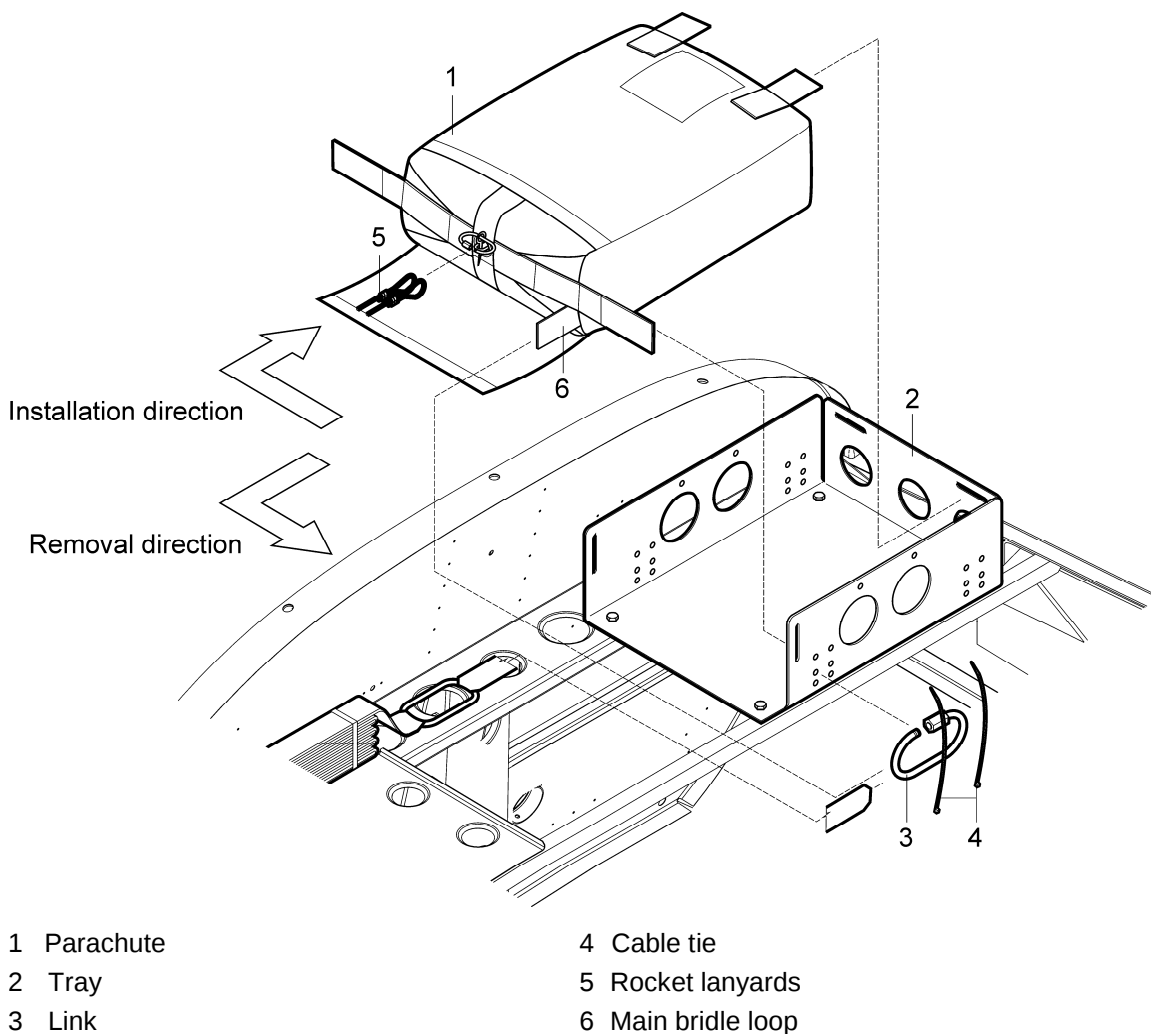


Fig. 7-4: BRS parachute removal / installation



7.3.5 BRS parachute installation

Type of maintenance: heavy

Authorization to perform:

- Repairman (LS-M) or Mechanic (A&P)

Tools needed:

- screwdriver, Philips screwdriver
- wrench size No.7
- cutting pliers, pliers
- Allen wrench size 1/8 in, 1/4 in

WARNING: UNAUTHORIZED PERSONNEL SHOULD NOT ATTEMPT TO MODIFY, REPAIR, OR DISASSEMBLE BRS SYSTEMS AT ANY TIME. DURING ALL SERVICE WORK BEWARE OF ACTIVATING THE BRS ROCKET!

- Install the parachute – see Parachute Installation Manual for the BRS-1350 onto the Czech Sport Aircraft PS-28 Cruiser & SportCruiser (Doc. No. 020016-PM), points 2.8 to 2-17, and 3-5 to 3.11.
- Install the BRS rocket (see 7.3.7)
- Assemble centre panel and install COMM/NAV equipment.
- Connect all cable and pitot-static connection and install both instrument panels.
- Glue (by means of the Emfimastic PU 50 sealant) the cover over parachute on the canopy fixed frame.
- Perform pitot-static leak test (see Chapter 12.4.1) and check correct function appropriate instruments and systems.

7.3.6 BRS rocket removal

Type of maintenance: heavy

Authorization to perform:

- Repairman (LS-M) or Mechanic (A&P)

Tools needed:

- screwdriver, Philips screwdriver
- cutting pliers, pliers
- Allen wrench size 1/8 in, 1/4 in

WARNING: UNAUTHORIZED PERSONNEL SHOULD NOT ATTEMPT TO MODIFY, REPAIR, OR DISASSEMBLE BRS SYSTEM AT ANY TIME. DURING ALL SERVICE WORK BEWARE OF ACTIVATING THE BRS ROCKET!

NOTE: BRS rocket motor must be replaced by its date of expiry. This service date is printed on placards located on the side of centre panel and on the rocket.

- Carefully unglue the cover over parachute on the canopy fixed frame.
- Pull open the front flap of the parachute (16, Fig. 7-5) and expose the small link; unscrew the link nut and disconnect the rocket lanyards (2).
- Cut-off cable ties securing lanyards.



CHAPTER 7 – EQUIPMENT

WARNING: NEVER POINT ROCKET AT ANYONE. ACCIDENTAL ACTIVATION MAY CAUSE DEATH OR SERIOUS INJURY!

ASSEMBLY MUST BE DONE IN THIS SEQUENCE. IF DONE INCORRECTLY, ACCIDENTAL DISCHARGE OF ROCKET MAY OCCUR AND MAY CAUSE DEATH OR SERIOUS INJURY!

(c) Remove plastic cap (6).

CAUTION: KEEP ALLEN WRENCH VERTICAL. BE CAREFUL NOT TO "LEVER" WRENCH AGAINST SIDE, SO AS TO NOT ACCIDENTLY ACTIVATE ROCKET!

(d) Remove screw (7) with 1/8 Allen wrench.

(e) Unscrew adapter (4) from rocket. Carefully remove housing (3) from rocket by turning entire housing assembly.

(f) Loose set screws (10).

(g) Carefully remove the BRS rocket.

(h) As necessary, remove right side panel of the middle channel, unscrew the nut (14), remove the washer (15), bolt (13) and activation housing (3).

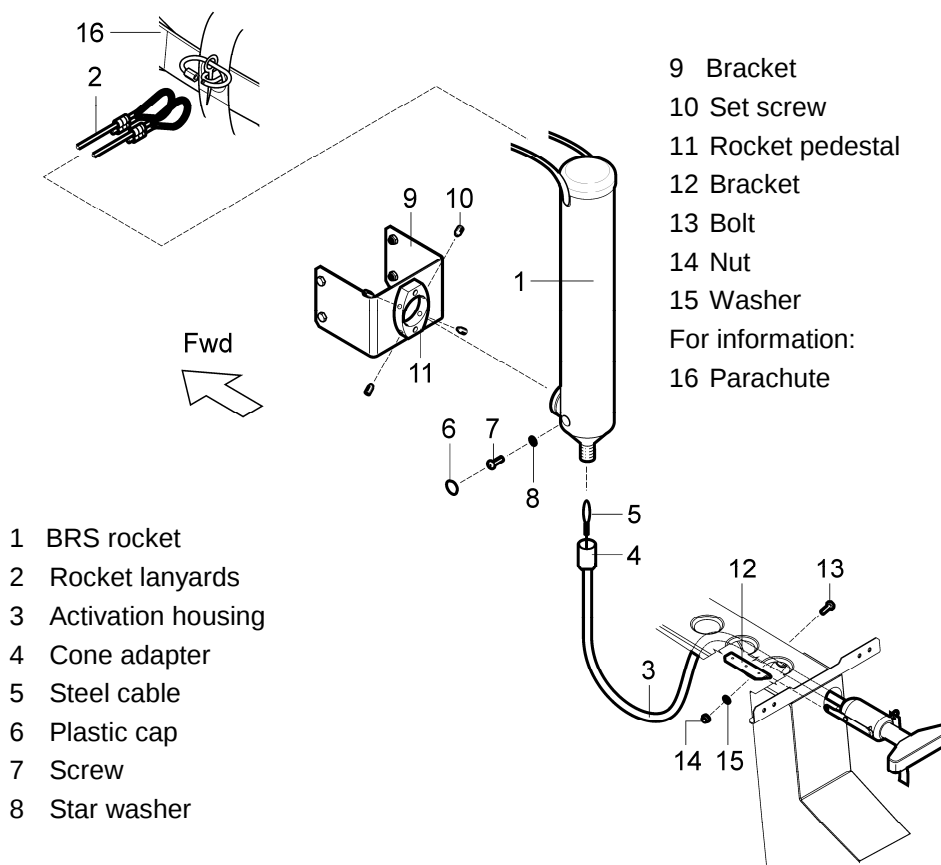


Fig. 7-5: BRS rocket removal / installation



7.3.7 BRS rocket installation

Type of maintenance: heavy

Authorization to perform:

- Repairman (LS-M) or Mechanic (A&P)

Tools needed:

- screwdriver, Philips screwdriver
- cutting pliers, pliers
- Allen wrench size 1/8 in, 1/4 in

WARNING: UNAUTHORIZED PERSONNEL SHOULD NOT ATTEMPT TO MODIFY, REPAIR, OR DISASSEMBLE BRS SYSTEM AT ANY TIME. DURING ALL SERVICE WORK BEWARE OF ACTIVATING THE BRS ROCKET!

- Carefully unglue the cover over parachute on the canopy fixed frame.
- As necessary, install the activation housing (3) to the middle channel; fasten handle by means of the bolt (13), washer (15) and nut (14); install right side panel of the middle channel.
- Route the housing in a gentle arc to the base on the rocket. The housing cable should have no abrupt bends.
- Install the rocket – see Parachute Installation Manual for the BRS-1350 onto the Czech Sport Aircraft PS-28 Cruiser & SportCruiser (Doc. No. 020016-PM), points 3.1 to 3-11.
- Connect the activation housing to the rocket - see Parachute Installation Manual for the BRS-1350 onto the Czech Sport Aircraft PS-28 Cruiser & SportCruiser (Doc. No. 020016-PM), points 5.1 to 5-7.
- Glue (by means of the Emfimastic PU 50 sealant) the cover over parachute on the canopy fixed frame.



7.3.8 ELT antenna installation

Type of maintenance: line

Authorization to perform:

- Repairman (LS-M) or Mechanic (A&P)

Tools needed:

- wrench No. 3/4 in

- (a) Remove the protective cover from the antenna connector.
- (b) Insert the antenna (4, Fig. 7-6) to the hole in the fuselage upper part (7).
- (c) Insert the washer (6), screw and tighten the nut (5) to between 25 to 30 inch lbs.
- (d) Connect the connector (2) to the antenna (4).
- (e) Install the circular cover on the aft wall of the baggage compartment.
- (f) Do an operational test.

7.3.9 ELT antenna removal

Type of maintenance: line

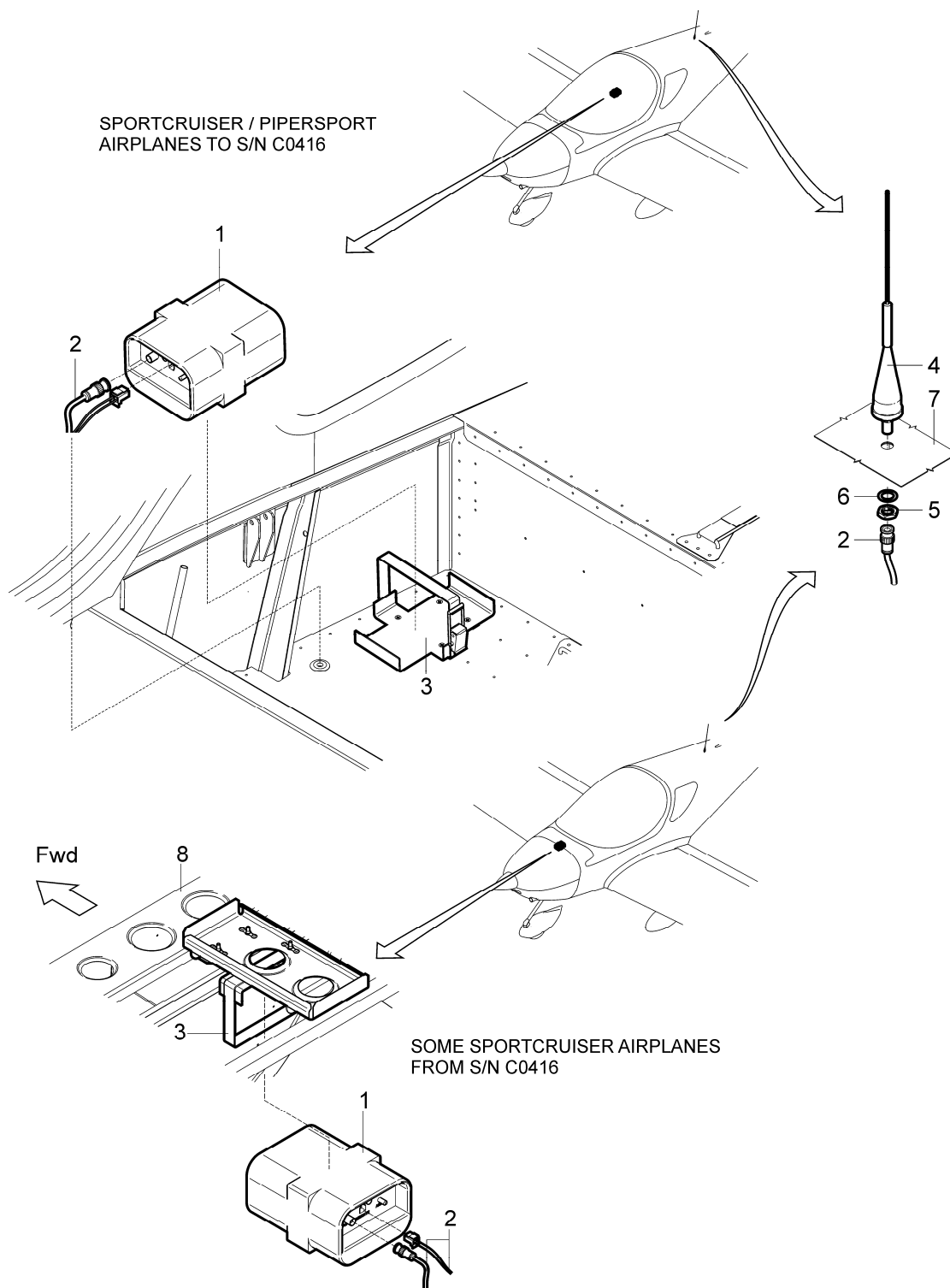
Authorization to perform:

- Repairman (LS-M) or Mechanic (A&P)

Tools needed:

- wrench No. 3/4 in

- (a) Remove the circular cover on the aft wall of the baggage compartment.
- (b) Set the **MASTER BAT** switch to OFF.
- (c) Disconnect the connector (2, Fig. 7-6) from the antenna.
- (d) Unscrew the nut (5), remove the washer (6) and the antenna (4).
- (e) Install the protective cover on the antenna connector.



- 1 ELT main unit
- 2 Cable connector
- 3 Mounting tray
- 4 ELT antenna
- 5 Nut

- 6 Lockwasher
- For information:
- 7 Fuselage upper part
- 8 Bulkhead No. 1 beam

Fig. 7-6: ELT antenna removal / installation



7.4 Check / Adjustment

7.4.1 Checking of safety harnesses

Check harnesses surface for any damages. Check the lock system function. Check the attachment points of shoulder and side harnesses for any damages or corrosion.

7.5 Exchanges / Service information

7.5.1 Cleaning seat covers and upholstery

- (a) Take upholstery and covers out of the airplane.
- (b) Brush impurities, possibly clean with warm water with addition of a suitable detergent.
- (c) Before reinstalling upholstery and seats in the airplane, let it thoroughly dry.

7.5.2 ELT main unit / remote unit battery replacement

NOTE: The battery pack has a 5 years useful life or batteries must be replaced when the transmitter has been in use for more than one cumulative hour. This service date is printed on placards located on ELT main unit.

For battery replacement refer to Installation and Operation Manual for Model AK-451-() Series, (Doc. No. IM 451), latest revision.



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8.1 General

SportCruiser / PiperSport airplane landing gear is of three-wheel fixed design and consists of the main landing gear and the nose landing gear. The nose landing gear is freely rotatable. The main landing gear wheels are equipped with hydraulic disc brakes.

Type and dimension of wheels (manufacturer Matco mfg):

- Main wheel - MHE51CZ (5 in)
- Nose wheel - WHLNW51CC.75R (5 in)
- Tire and tube- Goodyear FLIGHT SPECIAL II – 5.00-5 in (or equivalent aircraft grade).

This chapter provides information on:

- main landing gear
- nose landing gear
- brake system
- wheel fairings

NOTE: For detailed information refer to MHE51B, MHE51B.75, .MHE51S, MHE51CZ & MHE51J5"E – Series External Caliper Wheel and Brake Technical Service Bulletin (latest edition).

8.2 Description and operation

8.2.1 Main landing gear

The main landing gear consists of the composite landing gear leg (1, Fig. 8-1), wheel axle and wheel (2) equipped with the disc brake (3). The landing gear legs are inserted in the gear channel under the seats, where they are attached by two bolts (5) and stirrup (6).

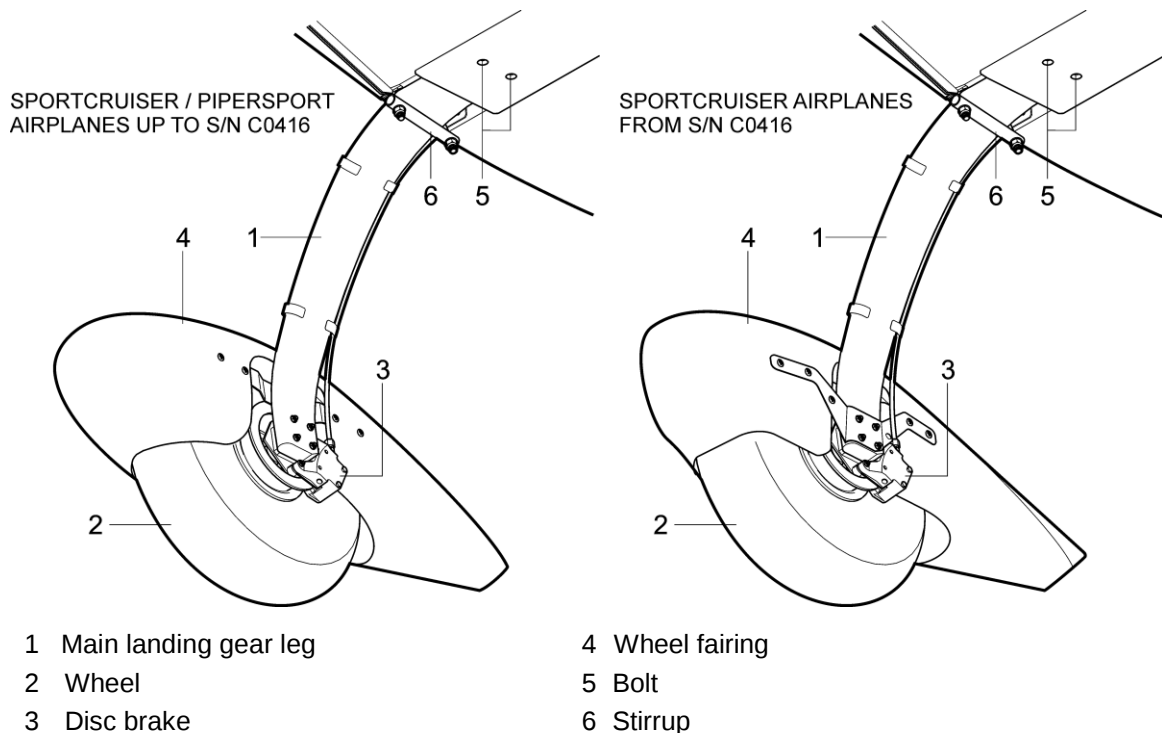


Fig. 8-1: Main landing gear, right



Instead of the original main landing gear legs SG0030L/P the reinforced main landing gear legs CG0030L/P can be installed. It is not permitted to combine the original main landing gear legs SG0030L/P with the reinforced main landing gear legs CG0030L/P on the respective airplane.

8.2.1.1 Main landing gear wheel

Main landing gear wheel rim (2; 3, Fig. 8-2) is pressed of aluminum. Wheel rim is split in order to facilitate assembly and disassembly of tire. Both halves are joined by bolts (9). Main landing gear wheels are equipped with the brake discs (7) which are attached to the inner half of the wheel rims (3). Wheels are equipped with tires and tubes (6).

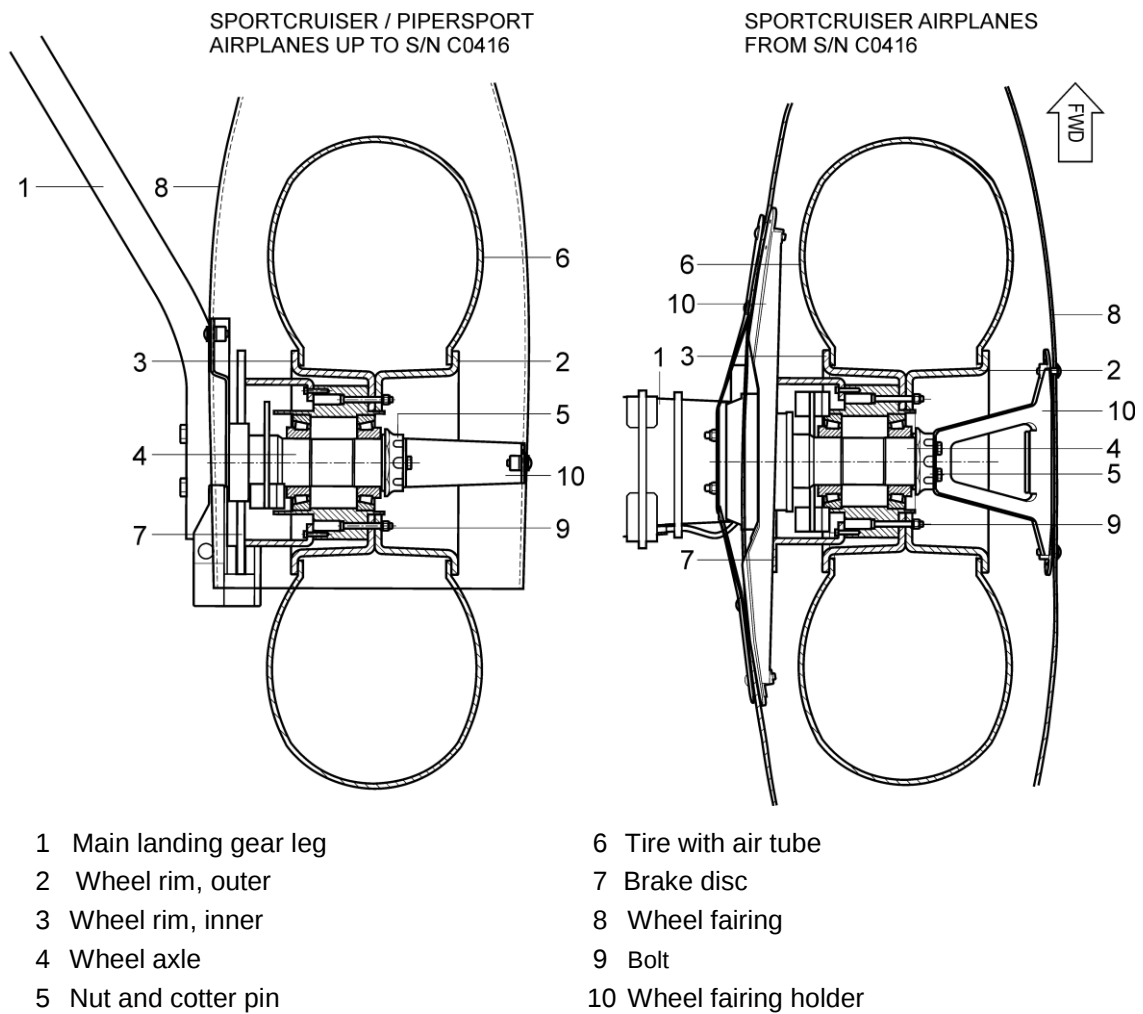


Fig. 8-2: Main landing gear wheel



8.2.2 Nose landing gear

The nose landing gear (NLG) of SportCruiser / PiperSport airplane is not steerable and consists of steel welded landing gear leg (1, Fig. 8-3), aluminum fork (1, Fig. 8-4), shock absorber (2, Fig. 8-3) and the wheel (9). The landing gear is attached to the brackets (7) installed on the bulkhead No. 1.

There were several old versions of the NLG used in the past, see Figure 8-3 and the point 8.5.8, Figure 8-20. The new improved and reinforced NLG No. SG0300N has further improved fatigue characteristics.

The new NLG has enlarged the inner cross section of the tube, modified fork (used stronger Al alloy and added third reinforcement), modified pin (used stronger steel). All nose landing gear legs have identical geometry.

NOTE: Due to the similarity of the old and new nose landing gear legs and the same maintenance procedures the original pictures are mostly retained.

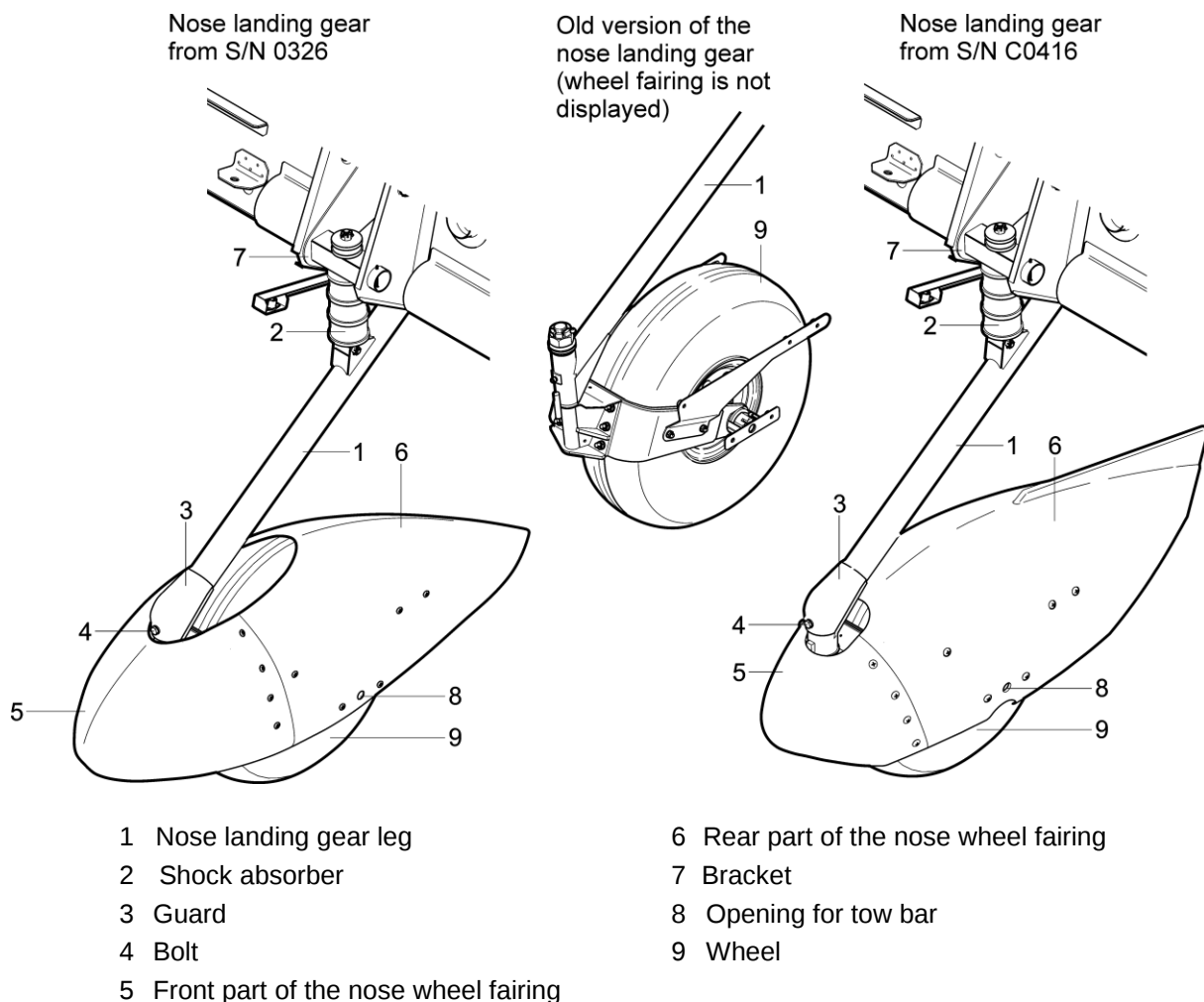


Fig. 8-3: Nose landing gear



8.2.2.1 Nose landing gear wheel

The nose landing gear wheel rim (2; 3, Fig. 8-4) is pressed of aluminum. Wheel rim is split in order to facilitate assembly and disassembly of tire. Both halves are connected by bolts (9). The wheel is equipped with tire and tube (6). Wheel rims are split in order to facilitate assembly and disassembly of tires

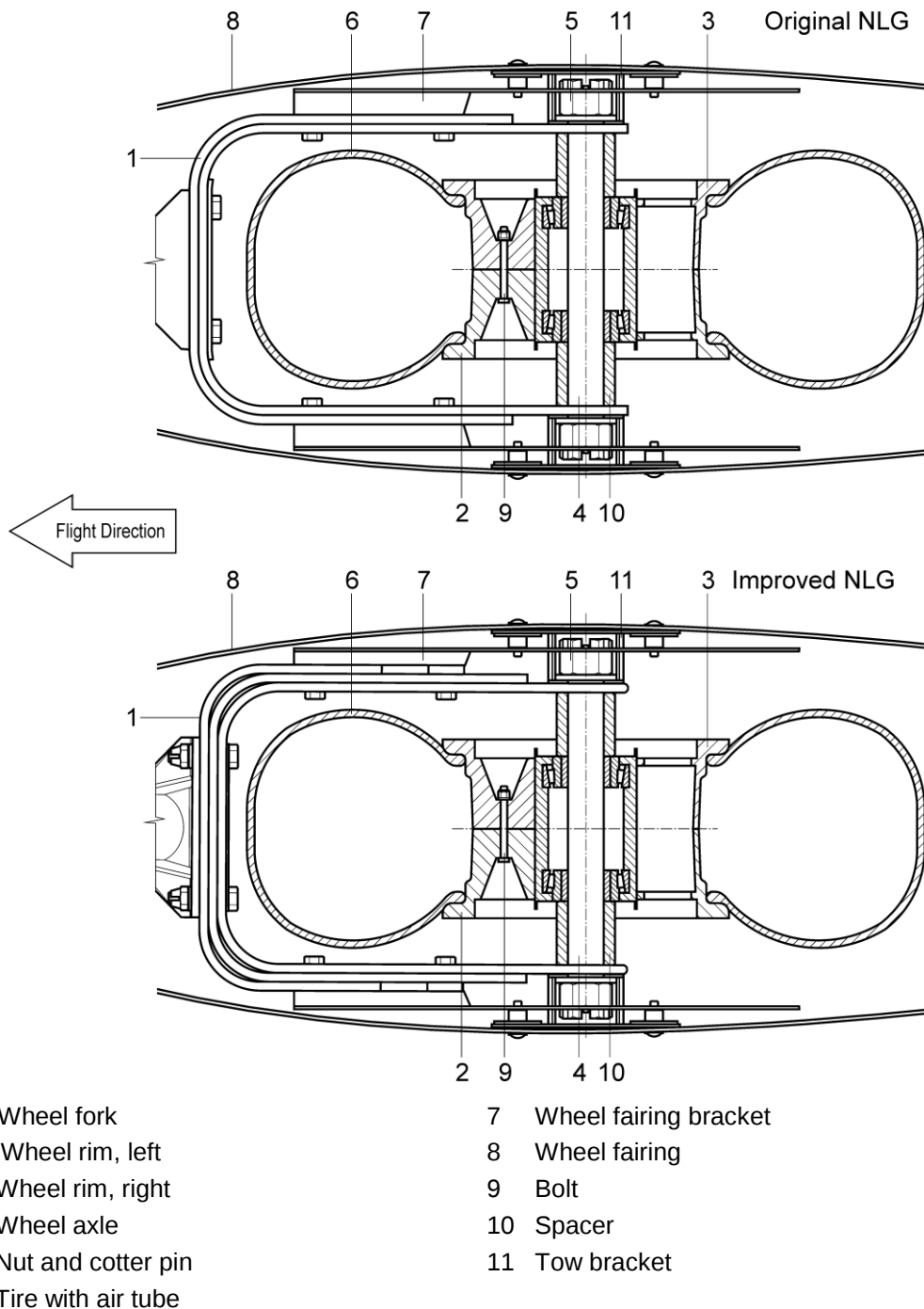


Fig. 8-4: Nose landing gear wheel



8.2.3 Brake system

SportCruiser / PiperSport airplane is equipped with hydraulic disc brakes on the main landing gear wheels. Brake system consists of the brake pedals (part of rudder control pedals, see Fig. 8-9), brake pumps, parking brake valve, hoses for brake fluid supply, brake calipers and brake pads. By depressing pedals, brake pumps are compressed and pressure generated in the brake circuit and the calipers pushes the brake pads onto the brake discs. Braking pressure can be controlled by force of brake pedal depressing.

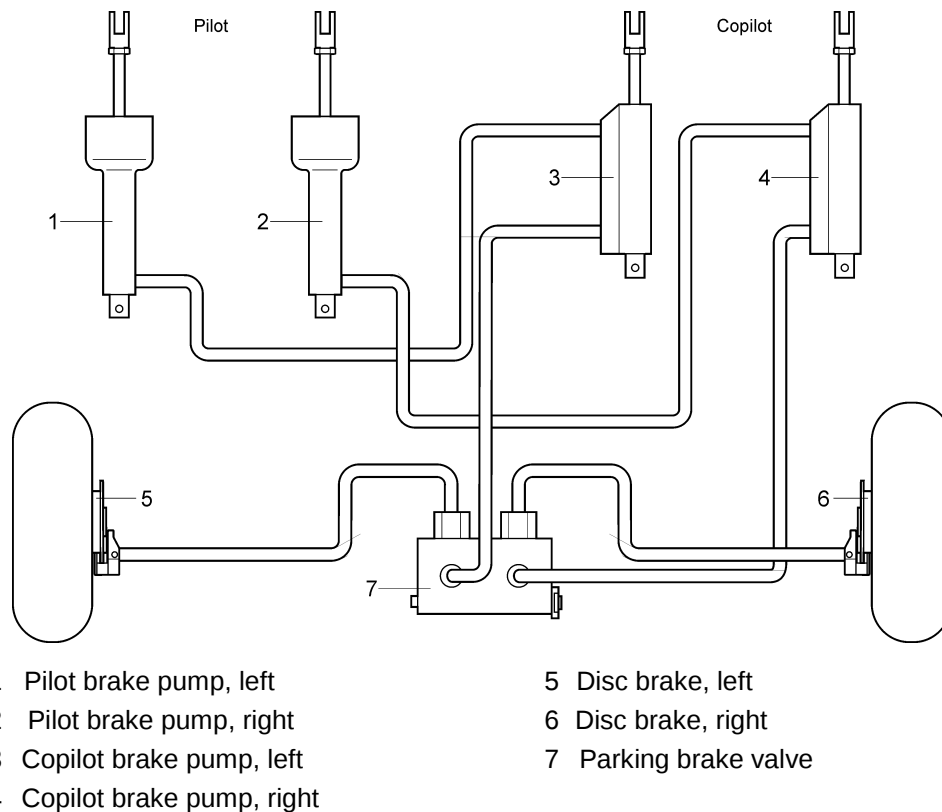


Fig. 8-5: Brake system scheme

8.2.3.1 Parking brake

The airplane is equipped with the hydraulic manually controlled parking brake. The **PARKING BRAKE** handle is located on the left instrument panel. The handle is mechanically connected with the stop valve. By depressing the brake pedals and by turning the handle from **PUSH OFF** to **PULL ON** position the brake hoses are locked and the pressure hold brake pads pressed on brake discs.

8.2.4 Wheel fairings

The airplane is standardly equipped with composite wheel fairings that decrease air drag and improve the airplane aerodynamic characteristics at cruise. The wheel fairings are installed on the brackets per bolts.

The airplane can be operated without the wheel fairings, as well.



8.3 Removal / Installation

8.3.1 Removal of main wheel fairing

Type of maintenance: line

Authorization to perform:

- Sport pilot, Repairman (LS-M) or Mechanic (A&P)

Tools needed:

- Phillips PH2 screwdriver

(a) Unscrew the bolts (4, Fig. 8-6) with the washers (5) (if used) attaching the wheel fairing (1) on the brackets (2; 3).

(b) Remove the fairing (1).

8.3.2 Installation of main wheel fairing

Type of maintenance: line

Authorization to perform:

- Sport pilot, Repairman (LS-M) or Mechanic (A&P)

Tools needed:

- Phillips PH2 screwdriver

(a) Set the wheel fairing (1, Fig. 8-6) to appropriate position.

(b) Attach the fairing (1) with bolts (4) and the washers (5) (if used) to the brackets (3).

(c) Attach the fairing (1) with bolts (4) and the washers (5) (if used) to the bracket (2).

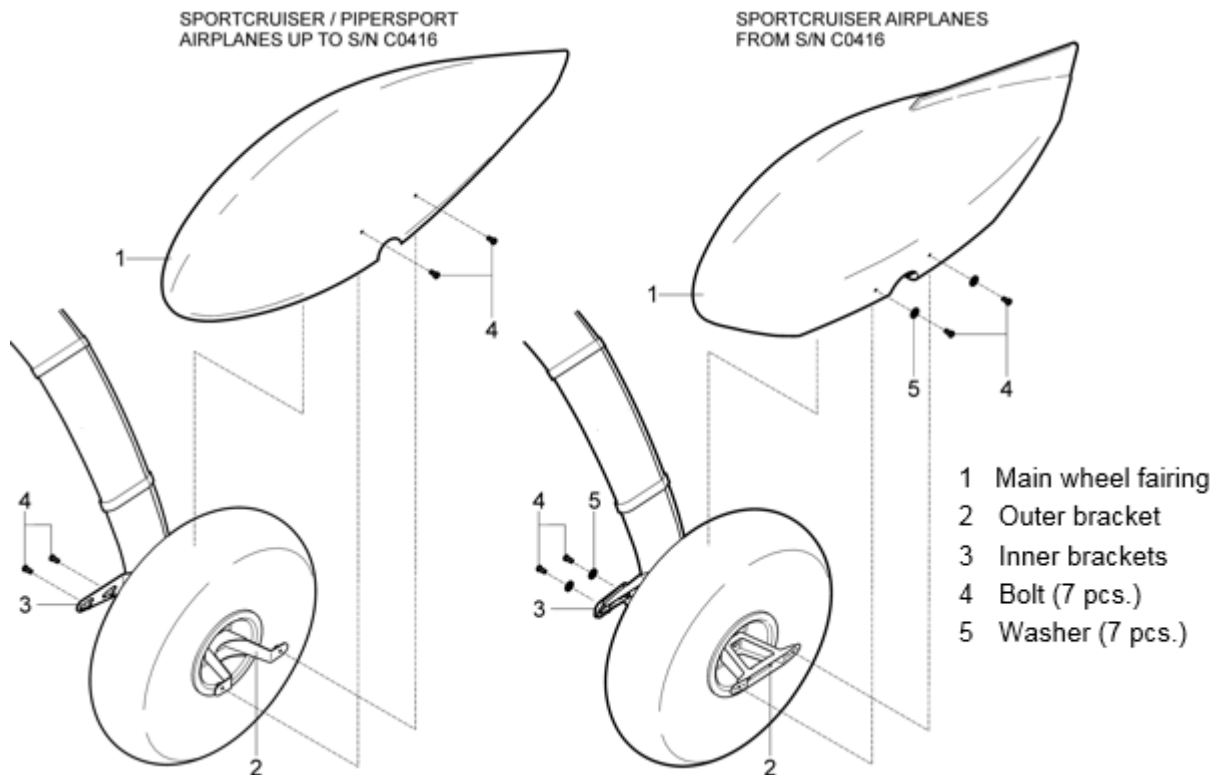


Fig. 8-6: Main wheel fairing removal / installation

**CHAPTER 8 – LANDING GEAR****8.3.3 Removal of main landing gear wheel**

Type of maintenance: line

Authorization to perform:

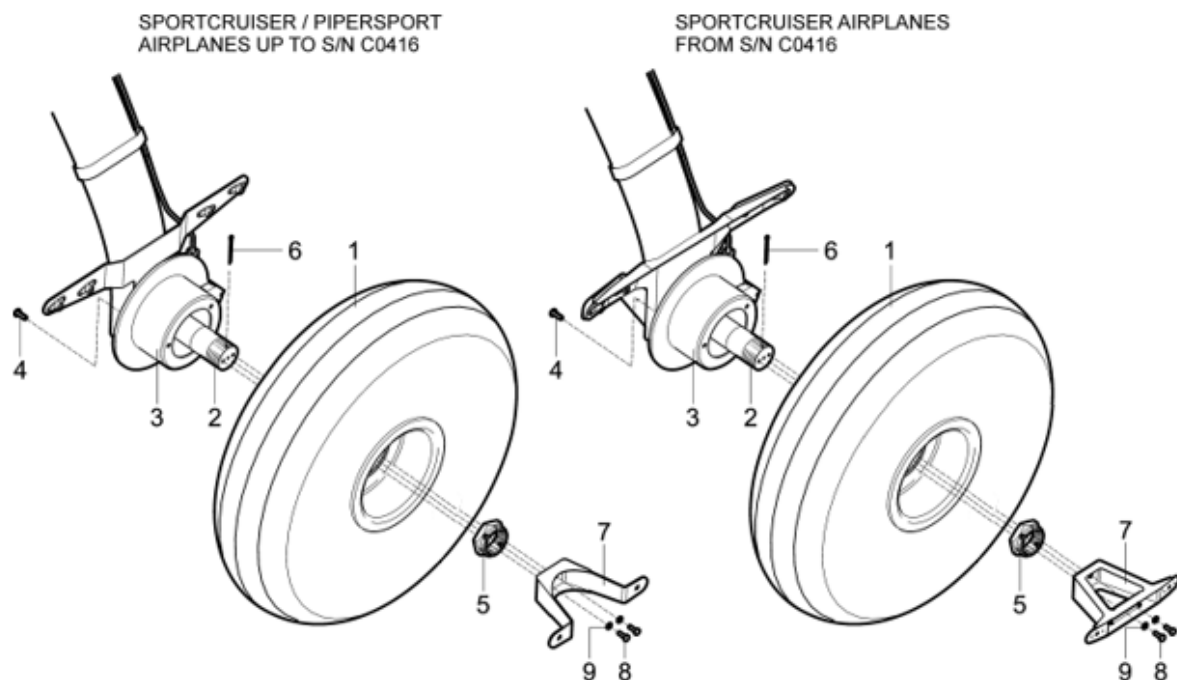
- Sport pilot, Repairman (LS-M) or Mechanic (A&P)

Tools needed:

- socket wrench size 1 1/2 in
- Allen wrench size 3/16 in
- pliers

The main landing gear wheel assembly consists of the wheel rim, the tube, the tire, the brake disc and the brake.

- Jack and support the airplane (see 14.2).
- Disassemble wheel fairing (see 8.3.1).
- Remove the lockwire from the bolts (8, Fig. 8-7),
- Remove the bolts (8), washers (9) and wheel fairing outer bracket (7).
- Unscrew three bolts (4) attaching the wheel rim with brake disc (3).
- Remove the cotter pin (6) and unscrew the nut (5).
- Remove the wheel (1) from the wheel axle (2).



- 1 Main landing gear wheel
- 2 Wheel axle
- 3 Brake disc
- 4 Bolt
- 5 Nut

- 6 Cotter pin
- 7 Outer bracket
- 8 Bolt
- 9 Washer

Fig. 8-7: Main landing gear wheel removal / installation



8.3.4 Installation of main landing gear wheel

Type of maintenance: line

Authorization to perform:

- Sport pilot, Repairman (LS-M) or Mechanic (A&P)

Tools needed:

- socket wrench size 1 1/2 in
- Allen wrench size 3/16 in
- pliers

- (a) Clear the wheel axle (2, Fig. 8-7) of impurities and apply slight layer of grease on it.
- (b) Put the wheel (1) on the axle (2).
- (c) Apply the securing liquid (blue Loctite 243) on the bolts threads (4) and attach with it the wheel rim and brake disc (3).
- (d) Screw and tighten the nut (5) on the wheel axle (2), tighten the nut until all play is out of the assembly. Rotate the wheel back and forth while tightening the nut to help seat the bearings. When all play is out and the wheel rotates freely, tighten to the next slot and insert the new cotter pin (6).
- (e) Attach fairing outer bracket (7) with bolts (8) and washers (9) to the axle (2); secure bolts with the lockwire.
- (f) Install the wheel fairing (see 8.3.2).

8.3.5 Removal of nose wheel fairing

Type of maintenance: line

Authorization to perform:

- Sport pilot, Repairman (LS-M) or Mechanic (A&P)

Tools needed:

- Phillips PH2 screwdriver

- (a) Unscrew the bolts (3, Fig. 8-8) with the washers (7) (if used) attaching the front (1) and rear part of the nose wheel fairing (2); remove front part (1).
- (b) Unscrew the bolts (4) with the washers (7) (if used) and remove the rear part of the nose wheel fairing (2).

8.3.6 Installation of nose wheel fairing

Type of maintenance: line

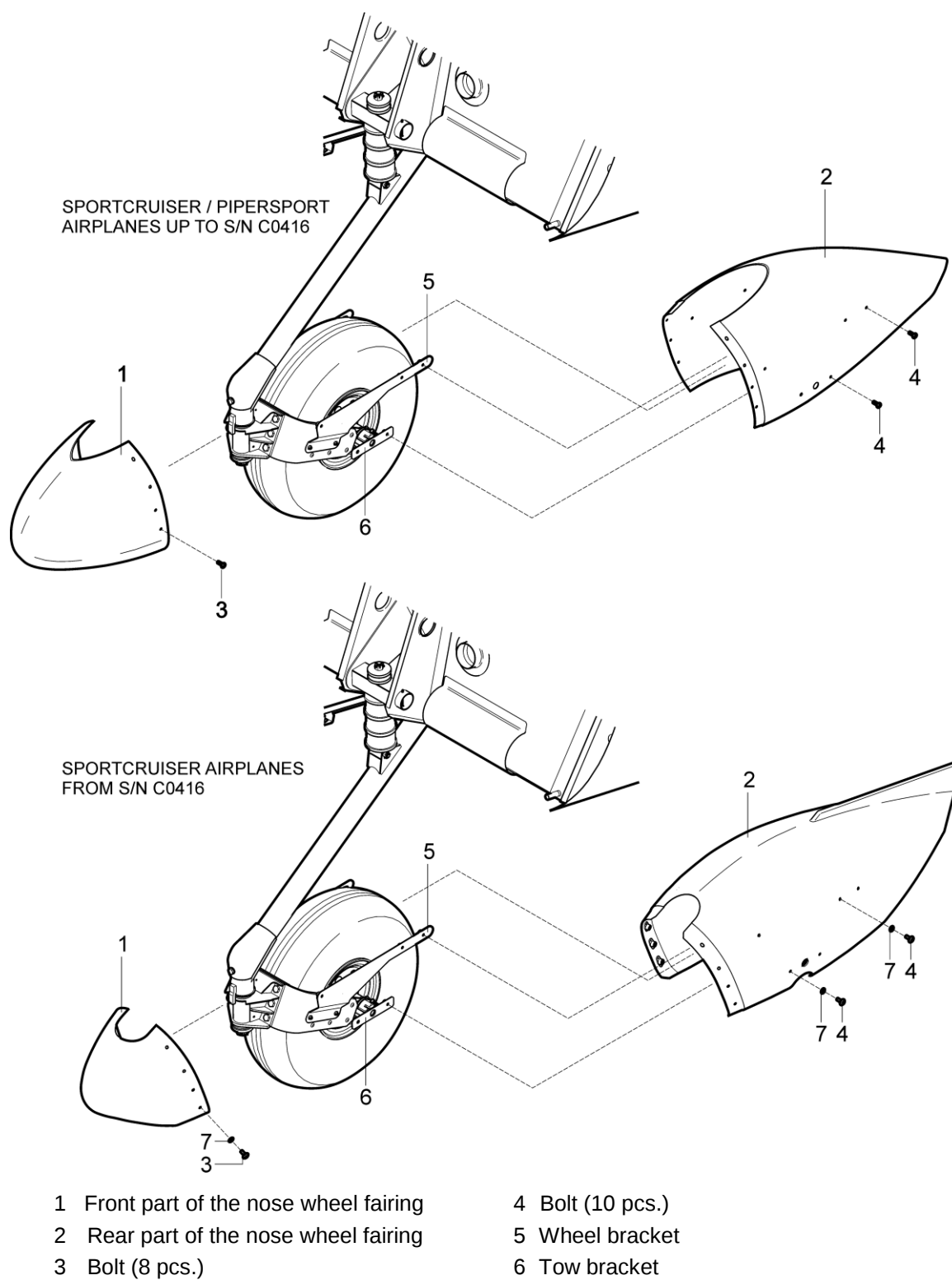
Authorization to perform:

- Sport pilot, Repairman (LS-M) or Mechanic (A&P)

Tools needed:

- Phillips PH2 screwdriver

- (a) Set the rear part of the nose wheel fairing (2, Fig. 8-8) to appropriate position and attach it with bolts (4) and the washers (7) (if used) to the brackets (4; 5).
- (b) Put the front part of the nose wheel fairing (1) to the rear part of the nose wheel fairing (2) and attach it with bolts (3) and the washers (7) (if used).

**Fig. 8-8:** Nose wheel fairing removal / installation



8.3.7 Removal of nose landing gear wheel

Type of maintenance: line

Authorization to perform:

- Sport pilot, Repairman (LS-M) or Mechanic (A&P)

Tools needed:

- wrench size 1 1/8 in
- pliers

(a) Jack and support the airplane (see 14.2).

(b) Disassemble wheel fairing (see 8.3.6).

(c) Remove the cotter pin (6, Fig. 8-9) securing nut (4) on wheel axle (2) – on one side only.

(d) Remove the nut (4), washer and tow bracket (8) from wheel axle (2).

(e) Release the wheel axle (2) from the wheel (1), bushings (3) and the wheel fork eyes (8).

- 1 Nose landing gear wheel
- 2 Wheel axle
- 3 Bushing
- 4 Nut
- 5 Washer
- 6 Cotter pin
- 7 Tow bracket
- 8 Wheel fork

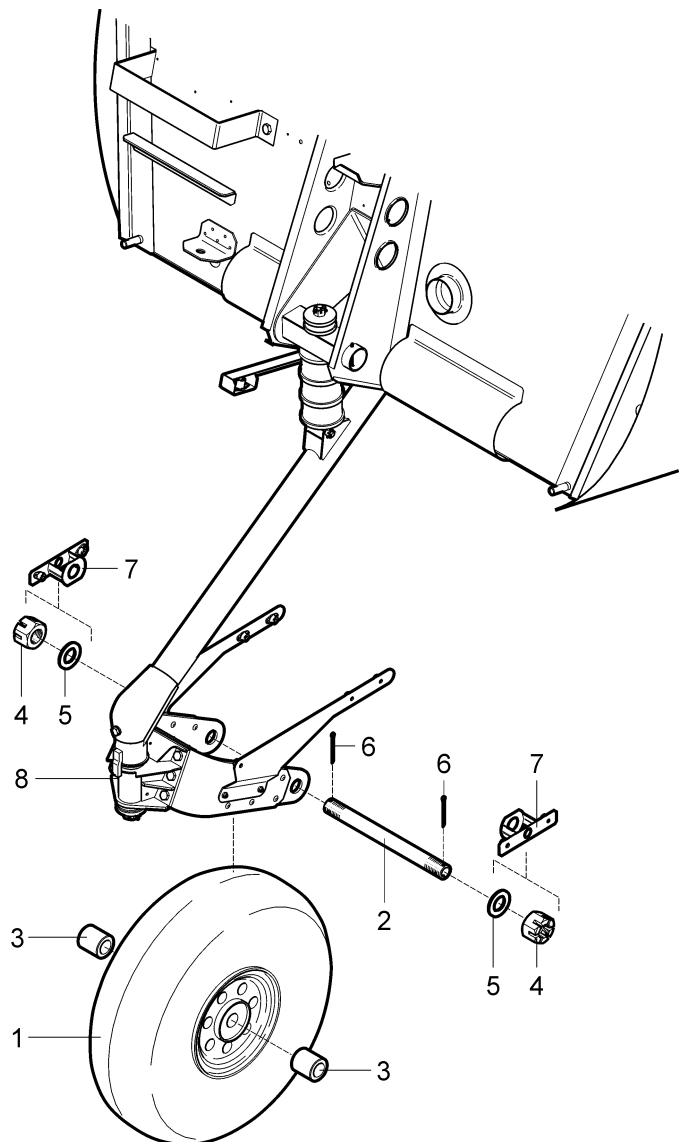


Fig. 8-9: Nose landing gear wheel removal / installation

**8.3.8 Installation of nose landing gear wheel**

Type of maintenance: line

Authorization to perform:

- Sport pilot, Repairman (LS-M) or Mechanic (A&P)

Tools needed:

- wrench size 1 1/8 in
- pliers

- (a) Clear the wheel axle (2, Fig. 8-9) of impurities and grease it slightly.
- (b) From one side shift the axle (2) into the wheel fork eye (8).
- (c) Gradually put first bushing (3), nose wheel (1) and second bushing (3) on the wheel axle (2) and tow bracket (7) according to the figure.
- (d) From one side install washer (5), screw nut (3) - set the tow brackets (7) so that the axes of holes for bolts fastening fairings were horizontally; tighten nut (3).
- (e) Check for free turning of the nose wheel (turning must be continual without catching).
- (f) Secure the nut (3) with the new cotter pin (6).
- (g) Install wheel fairing (see 8.3.6).

8.3.9 Removal of the main landing gear leg

Type of maintenance: heavy

Authorization to perform:

- Repairman (LS-M) or Mechanic (A&P)

Tools needed:

- wrench size 9/16 in, 1/2 in
- (a) Jack and support the airplane (see 14.2).
 - (b) Remove appropriate seat (see 7.3.1).
 - (c) Disconnect the brake line.
 - (d) Unscrew the nuts (8, Fig. 8-10), and remove the washers (9) and bolts (7).
 - (e) Unscrew the nuts (4), and remove the washers (5) and tube (3); remove the spacer (10) (if used).
 - (f) Remove the landing gear leg (1) from the chamber (6) and put it on a suitable place.

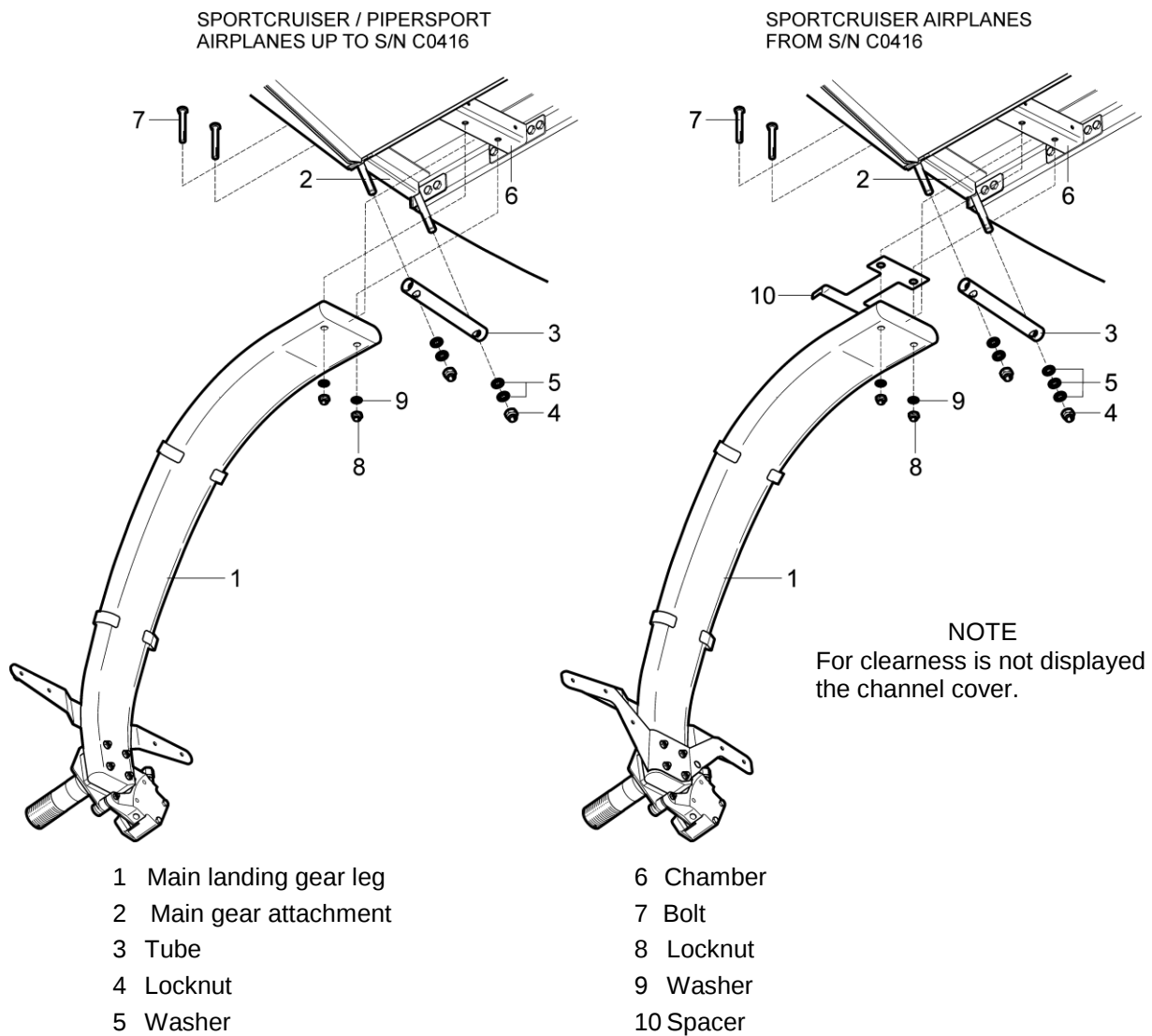


Fig. 8-10: Main landing gear leg removal / installation

8.3.10 Installation of the main landing gear leg

Type of maintenance: heavy

Authorization to perform:

- Repairman (LS-M) or Mechanic (A&P)

Tools needed:

- wrench size 9/16 in, 1/2 in

- (a) Check outer surface of the composite landing gear leg (1, Fig. 8-10) for occurrence of cracks and whether the axle connection is not damaged before installing the landing gear leg.

CAUTION: IF THE ORIGINAL SG0030L/P MAIN LANDING GEAR LEG (1) IS INSTALLED, THE SG0158L/P SPACER (10) MUST BE USED.

IF THE REINFORCED CG0030L/P MAIN LANDING GEAR LEG (1) IS INSTALLED, THE CG0159L/P SPACER (10) MUST BE USED.



CHAPTER 8 – LANDING GEAR

- (b) Insert the landing gear leg (1) with the spacer (10) (if used) into the chamber (6) in attachment channel on fuselage and fit the leg in main gear attachment (2). New spacer (10) (if used) is recommended at each replacement of the landing gear leg.
- (c) On the main gear attachment bolts (2) install the tube (3), washers (5), and slightly tighten the nuts (4).
- (d) Insert the bolts (7) through spacer (10) (if used), chamber (6) and leg (1), install the washers (9) and tighten nuts (8; 4). For the nut (8) use torque moment of 11.3-15.8 Nm (100-140 in lb), for the nut (4) use torque moment of 18.1-21.5 Nm (160-190 in lb), see the table 15-9, point 15.7 "Torque moments" in Chapter 15. Always use new locknuts (8; 4) at replacement.
- (e) Connect the brake lines.
- (f) Install seat.
- (g) Fill brake system with brake liquid and air-bleed it (see 8.5.4).

8.3.11 Removal of nose landing gear leg

Type of maintenance: heavy

Authorization to perform:

- Repairman (LS-M) or Mechanic (A&P)

Tools needed:

- wrench size 1/2 in, No.17
- (a) Jack and support the airplane, (see 14.2).
- (b) Remove the lockwire from the bolts (6, Fig. 8-11),
- (c) Remove the bolts (6) and washers (7).
- (d) Remove the tube (5) from the leg bracket (9).
- (e) Remove the cotter pin (9), unscrew the nut (3), remove washers (4), bolt (2) and disconnect the shock absorber (8) from the bracket on the nose gear leg (1).
- (f) Remove the gear leg (1) from the fuselage and put it on a suitable place.(d)

8.3.12 Installation of nose landing gear leg

Type of maintenance: heavy

Authorization to perform:

- Repairman (LS-M) or Mechanic (A&P)

Tools needed:

- wrench size 1/2 in, No.17
- (a) Check the welds of the gear leg for occurrence of cracks and corrosion and whether the bearings are not damaged before installing the gear leg.
- (b) Insert the gear leg (1, Fig. 8-11) into the bracket (9).
- (c) Insert the tube (5) to the hole in the bracket (9).
- (d) Screw the bolts (6) with the nuts (7) to the tube; tighten the bolts slightly; secure bolts with the lockwire.
- (e) Put the lower end of the shock absorber (8) to the bracket on the nose gear leg (1); install the bolt (2) with the nut (3) and washers (4), secure the nut with the new cotter pin (9).



- 1 Nose landing gear leg
 - 2 Bolt
 - 3 Nut
 - 4 Washer
 - 5 Tube
 - 6 Bolt
 - 7 Washer
 - 8 Shock absorber
 - 9 Cotter pin
- For information:
10 Bracket

NOTE
Access to the bolts (6) is from the cockpit.

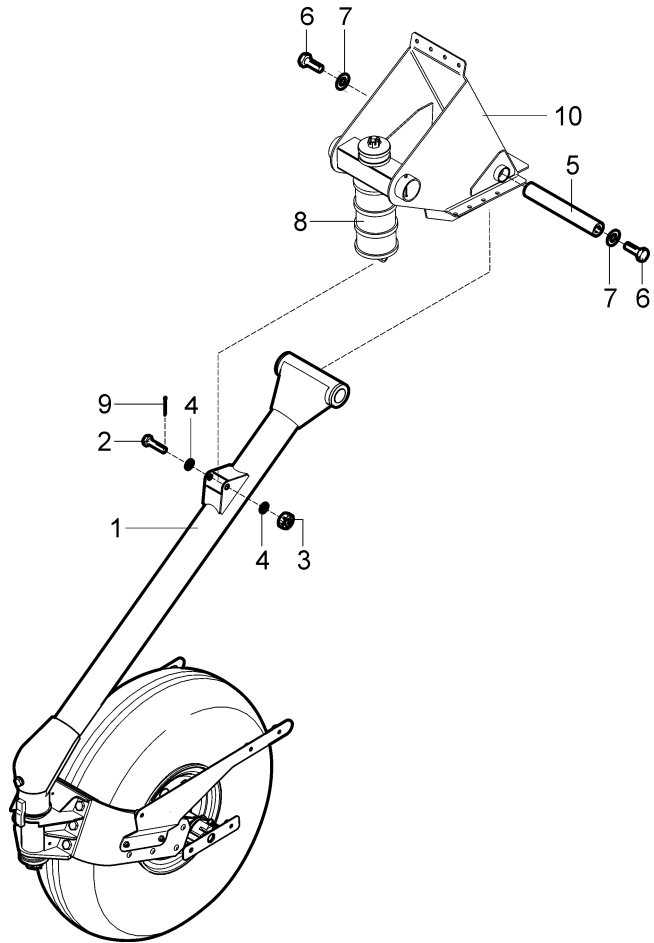


Fig. 8-11: Nose landing gear leg removal / installation.

8.3.13 Removal of brake pumps

Type of maintenance: line

Authorization to perform:

- Sport pilot, Repairman (LS-M) or Mechanic (A&P)

Tools needed:

- wrench size 1/2 in, 3/8 in
- (a) Disconnect the brake system hose from the brake cylinder on the main landing gear wheel and let brake fluid drain to a previously prepared can from that system line in which you want to remove the brake pump.
 - (b) Disconnect the brake system hose (3, Fig. 8-12) from the brake pump (1; 2).
 - (c) Remove cotter pin (7), unscrew nut (11), remove washer (12), spacers (9; 10), bolt (8) and disconnect brake pump rod eye from the rudder pedal (14).
 - (d) Remove cotter pin (7), unscrew nut (5), remove washer (6), bolt (4) and disconnect brake pump from the bracket (13) on the floor.



8.3.14 Installation of brake pumps

Type of maintenance: line

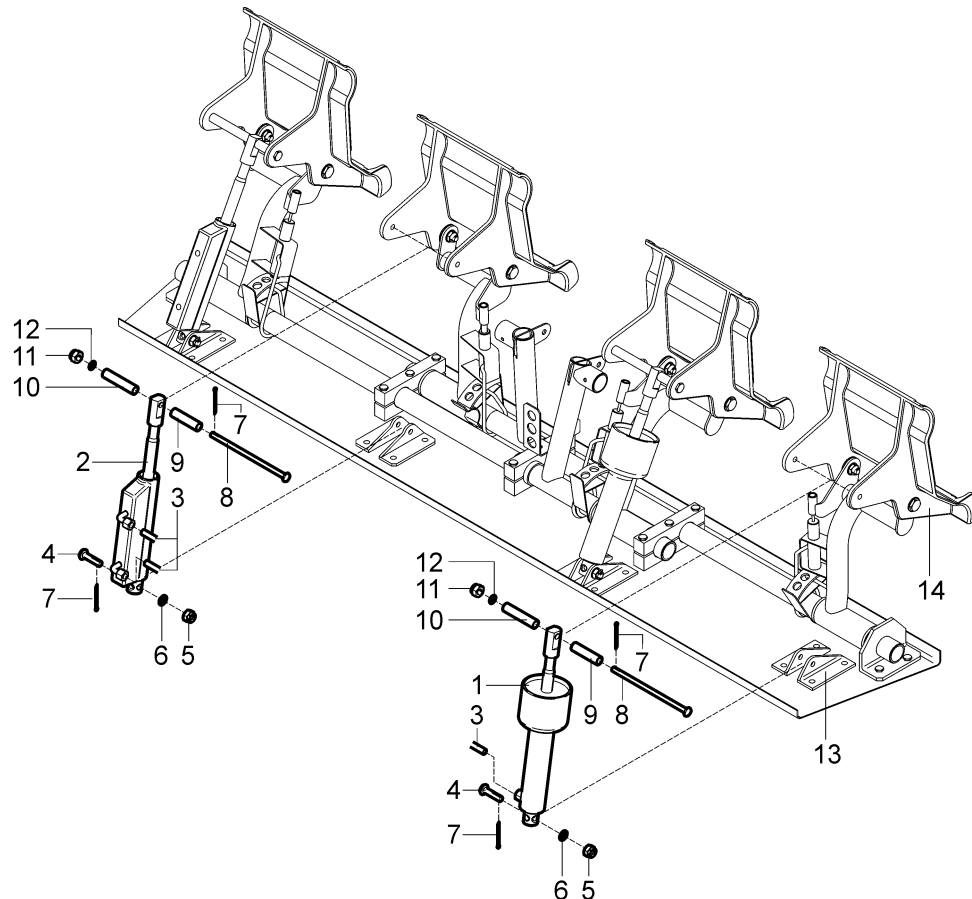
Authorization to perform:

- Sport pilot, Repairman (LS-M) or Mechanic (A&P)

Tools needed:

- wrench size 1/2 in, 3/8 in

- Insert the brake pump (1; 2, Fig. 8-12) according to the figure to the floor bracket (14) and install the bolt (4) with the nut (5) and washer (6); secure the nut by the new cotter pin (7).
- Connect brake pump rod end eye with pedal (14) by means of the bolt (8) with the nut (11), spacers (9; 10) and washer (12); secure the nut by the new cotter pin (7).
- Reinstall the brake system hose (3) on the brake pump (1; 2) and on the brake cylinder on main landing gear.
- Fill the brake system with brake fluid and air-bleed it (see 8.5.4.).



- | | | |
|----------------------|--------------|------------------|
| 1 Pilot brake pump | 6 Washer | 11 Nut |
| 2 Copilot brake pump | 7 Cotter pin | 12 Washer |
| 3 Brake hose | 8 Bolt | For information: |
| 4 Bolt | 9 Spacer | 13 Bracket |
| 5 Nut | 10 Spacer | 14 Rudder pedal |

Fig. 8-12: Brake pumps removal / installation



8.4 Check / Adjustment

8.4.1 Check of nose landing gear shock absorber

- (a) Several times hoist and lower the nose landing gear of the airplane.
- (b) Measure value of absorber and nose landing gear compression according to Fig. 8-13.
Perform measuring in vertical direction between the bottom of the engine cowl and the lower shock absorber attachment. The minimum value is 50 mm (2 in). If this value is lower than change the dumping elements (see 8.5.2).

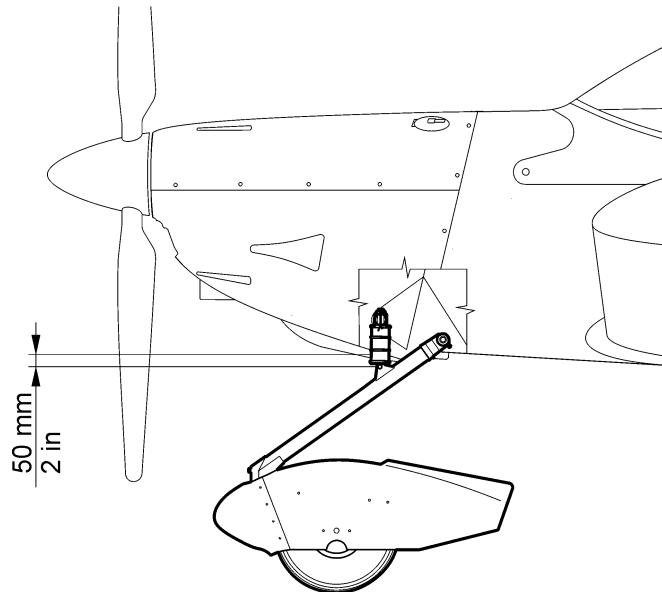


Fig. 8-13: Check of nose landing gear shock absorber

8.4.2 Check of nose landing gear after shimmy occurrence

Old version of the nose landing gear:

- (a) Remove the nose wheel fairing (see 8.3.5).
- (b) Remove the nose wheel (see 8.3.7).
- (c) Unload the nose landing gear.
- (d) Check condition of the fork, leg, and shock absorber for cracks (see Fig. 8-14). Use magnifying glass.
- (e) Check tire worn and specified inflation:

Air Trac 5.00-5	0.8 + 0.2 bar (11.6 + 2.9 psi)
Sava 5.00-6	1.0 + 0.2 bar (14.5 + 2.9 psi)
Goodyear FLIGHT SPECIAL II – 5.00-5	1.2 + 0.1 bar (17.4 + 1.5 psi)

CAUTION: DO NOT EXCESS SPECIFIED TIRE PRESSURE.

OVERPRESSURED TIRE CAUSED SHIMMY.

- (f) Check condition of spring washers (2, Fig. 8-14). Keep washers free of lubricants.
Remove cotter pin (5), loose nut (3) and clean washers (2; 4) if necessary, use some solvent for degreasing.
- (g) Attach spring scale (6) to fork (see Fig. 8-14).



CHAPTER 8 – LANDING GEAR

- (h) Torque castellated nut (3) so a constant force of 4-6 kg is required to rotate nose wheel fork. Take attention that nut does not spin against spindle (1) because there is a risk of cotter pin shear. In this case you may drill a new hole $\varnothing 2.5$ mm (0.098 in) for the cotter pin in spindle in a suitable position.
- (i) As necessary, install new spring washers (2) and repeat procedure (g).
- (j) Install new cotter pin (5).
- (k) Install nose wheel (see 8.3.8) and nose wheel fairing (see 8.3.6).

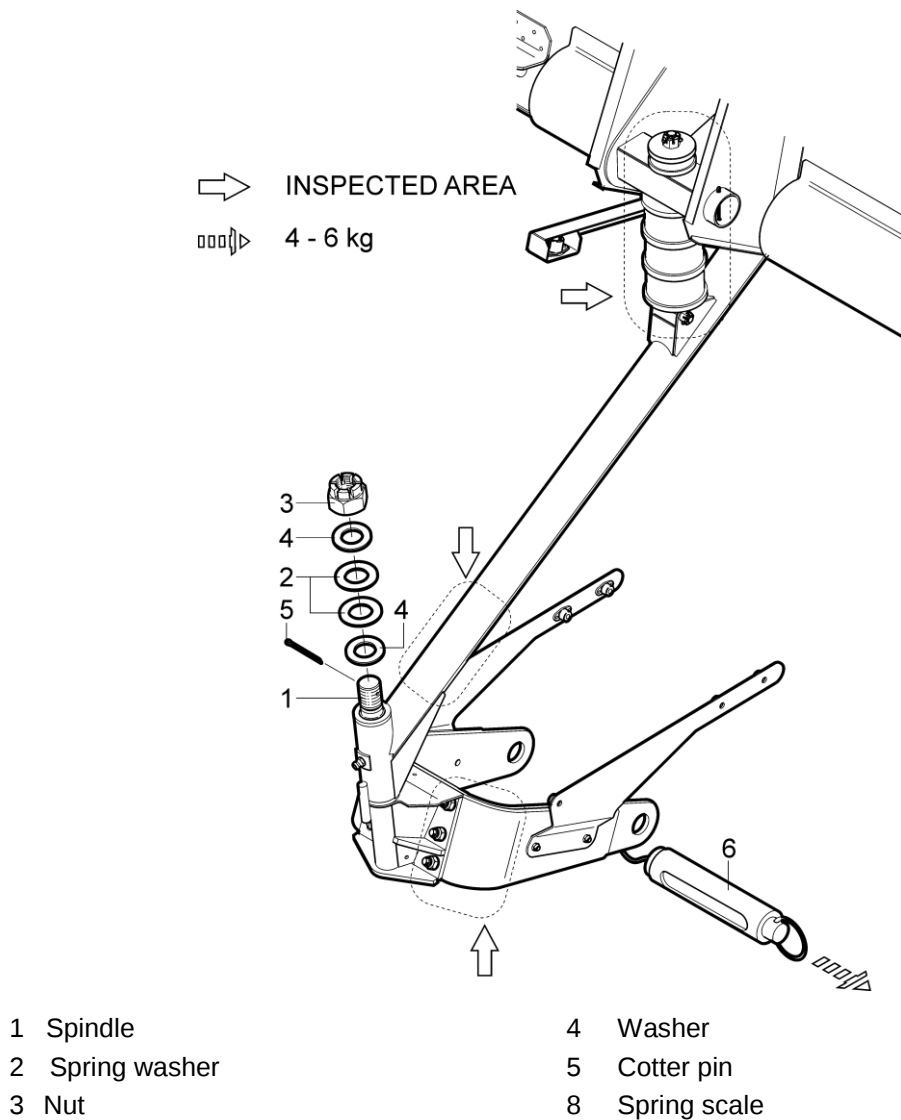


Fig. 8-14: Check of old version nose landing gear after shimmy occurrence

New version of the nose landing gear:

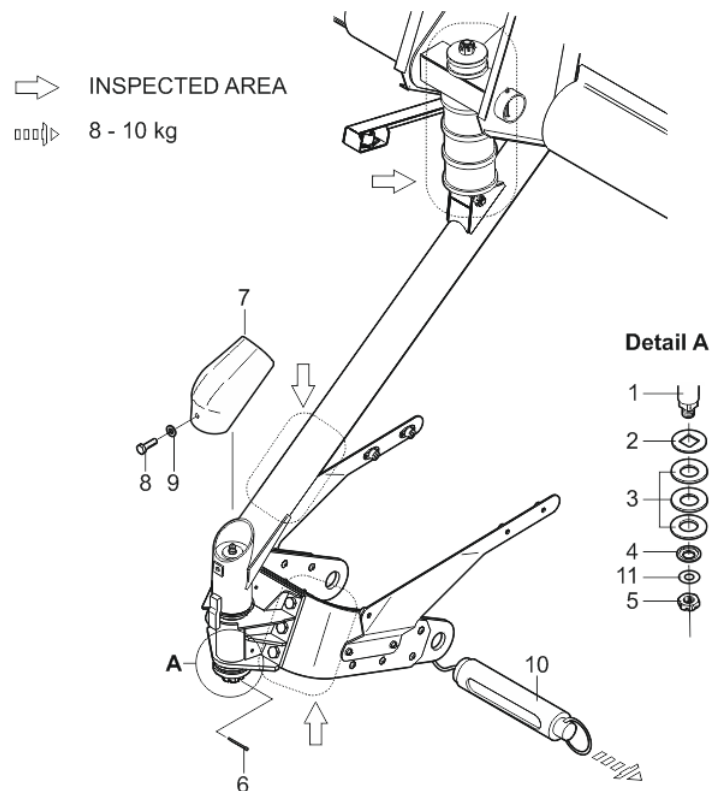
- (a) Remove the nose wheel fairing (see 8.3.5).
- (b) Remove the nose wheel (see 8.3.7).
- (c) Remove the cover (7, Fig. 8-15) and unload nose landing gear.
- (d) Check condition of the fork, leg, and shock absorber for cracks (see Fig. 8-15). Use magnifying glass.



- (e) Check tire worn and specified inflation ($1.2 + 0.1$ bar ($17.4 + 1.5$ psi)).

CAUTION: DO NOT EXCESS SPECIFIED TIRE PRESSURE OVERPRESSURED TIRE CAUSED SHIMMY.

- (f) Check condition of spring washers (3). Keep washers free of lubricants. Remove cotter pin (6), loose nut (5) and clean washers (2; 3; 4; 11) if necessary, use some solvent for degreasing.
- (g) Attach spring scale (10) to fork.
- (h) Torque castellated nut (5) so a constant force of 8-10 kg is required to rotate nose wheel fork.
- (i) Install new cotter pin (6).
- (j) As necessary, grease the axle per grease nipple.
- (k) Apply Loctite 221 on the bolt (8) and install the cover (7); install nose wheel (see 8.3.8) and nose wheel fairing (see 8.3.6).



- | | |
|-------------------|-----------------|
| 1 Spindle | 6 Cotter pin |
| 2 Friction washer | 7 Cover |
| 3 Spring washer | 8 Bolt |
| 4 Thrust ring | 9 Washer |
| 5 Nut | 10 Spring scale |
| | 11 Washer |

Fig. 8-15: Check of new version nose landing gear leg after shimmy occurrence



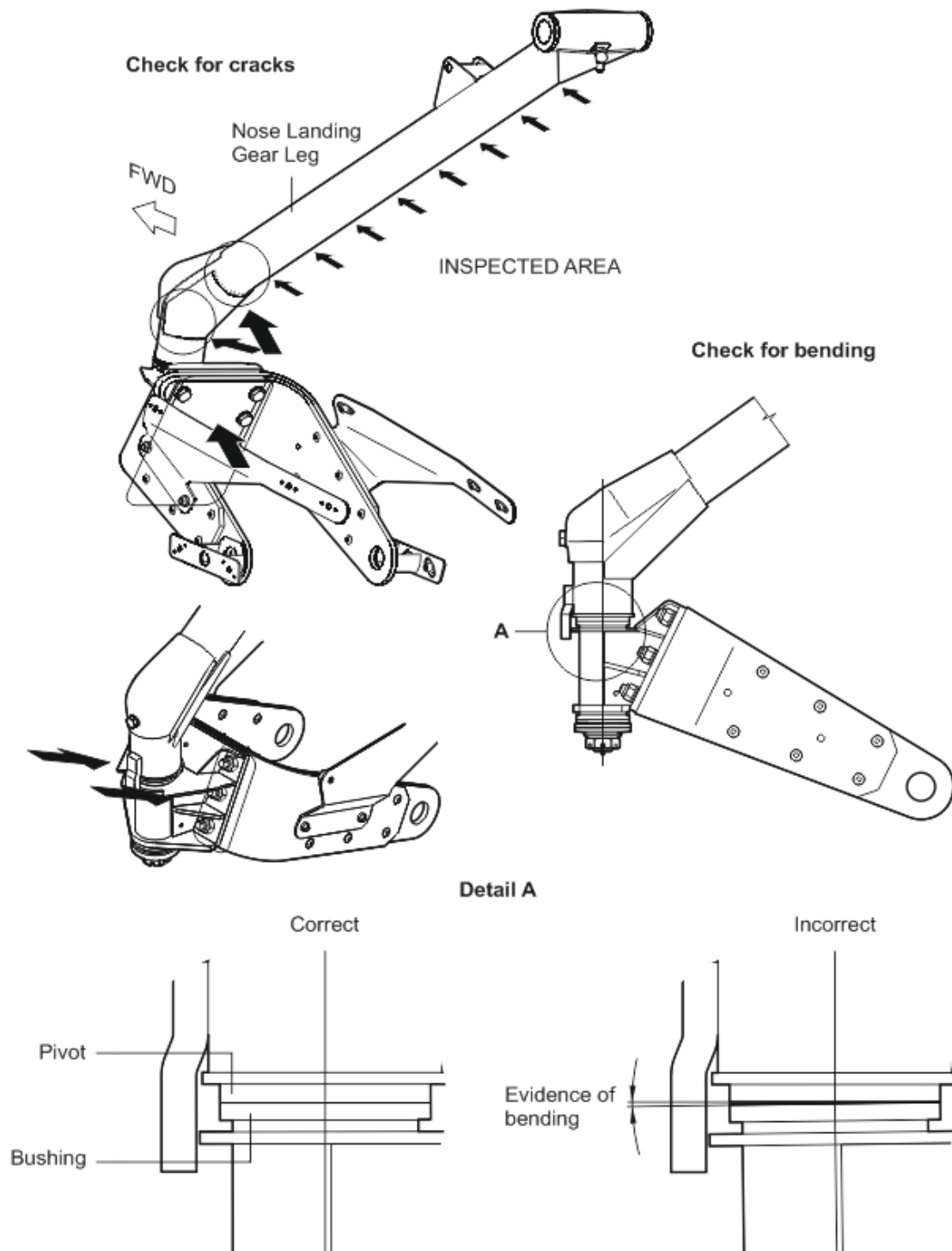
8.4.3 Check of nose landing gear leg for cracks

Tools needed:

- Flashlight
 - 10x magnifier
- (a) Remove key from ignition switch and disconnect battery.
 - (b) Remove the nose wheel fairing (see 8.3.5).
 - (c) Visually inspect the bottom side of the nose landing gear leg lower section, in the place of the weld of the tube and the bracket (see Fig. 8-16) in accordance with FAA AC 43.13-1B, Chapter 5, Section 2, Visual Inspection.
 - (d) Using flashlight and 10x magnifier, inspect thoroughly nose landing gear leg and verify there is no evidence of cracking in paint on or around place of the weld of the tube and the bracket.
 - (e) If no cracking is evident, perform the following steps:
 1. Install nose wheel fairing (see 8.3.6).
 2. Connect battery and restore aircraft to the airworthy condition.
 - (f) If an evidence of cracking is identified, perform the following steps for confirmation / not confirmation of cracking:
 1. Remove nose landing gear leg (see 8.3.11).
 2. Using NDT Penetration Check Kit perform a NDT penetration check in accordance with FAA AC 43.13-1B, Chapter 5, Section 5, Penetrant Inspection.
 - (g) In case of non confirmation of cracking, install nose landing gear leg back (see 8.3.12), install nose wheel fairing (see 8.3.6), connect battery and restore aircraft to the airworthy condition.
 - (h) In case of confirmation of cracking, perform the following steps:
 1. Assure Aircraft on Ground (AOG).
 2. Report this occurrence to the manufacturer (CSA) within 72 hours.
 3. Ask the manufacturer (CSA) for the NLG No. SG0300N.
 4. Install new nose landing leg (see 8.3.12).
 5. Install nose wheel fairing (see 8.3.6), connect battery and restore aircraft to the airworthy condition.



Fig. 8-16: Inspected area of the nose landing gear leg



The pictures are for illustration only. The individual NLG types can differ in details



8.5 Changes / Service information

8.5.1 Tire change

Type of maintenance: line

Authorization to perform:

- Sport pilot, Repairman (LS-M) or Mechanic (A&P)

Tools needed:

- wrench size 1/2 in
 - Allen wrench size 1/4 in
- (a) Jack and support the airplane (see 14.2).
 - (b) Remove the wheel fairing (see 8.3.1).
 - (c) Remove the main landing gear wheel (see 8.3.3) or the nose landing gear wheel (see 8.3.5).
 - (d) Deflate the tire.
 - (e) Unscrew the nuts (7, Fig. 8-17), remove the washers (8) and the bolts (5; 6).
 - (f) Set apart both halves of the rim (1; 2) and remove the tire (10) with the air tube (11).
 - (g) Exchange the air tube or the tire, if necessary.
 - (h) Put the air tube (11) into the tire (10) and inflate it slightly.
 - (i) Put the other half of the rim on this unit. Join both halves of the rim with the bolts (5; 6), washers (8) and the nuts (7) – torque value 11.3 Nm (100 in lbs).
 - (j) Put the other half of the rim on this unit. Join both halves of the rim with bolts – torque value 11.3 Nm (100 in lbs).
 - (k) Inflate tires to the prescribed pressure:
 - nose wheel 1.2 + 0.1 bar (17.4 + 1.5 psi)
 - main wheel 1.8 + 0.2 bar (26.1 + 2.9 psi)
 - (l) Mark position of the rim and the tire by redline overreaching about 10 mm (3/8 in) to the rim and the tire (serves for checking the tire slewing against the wheel rim in operation).

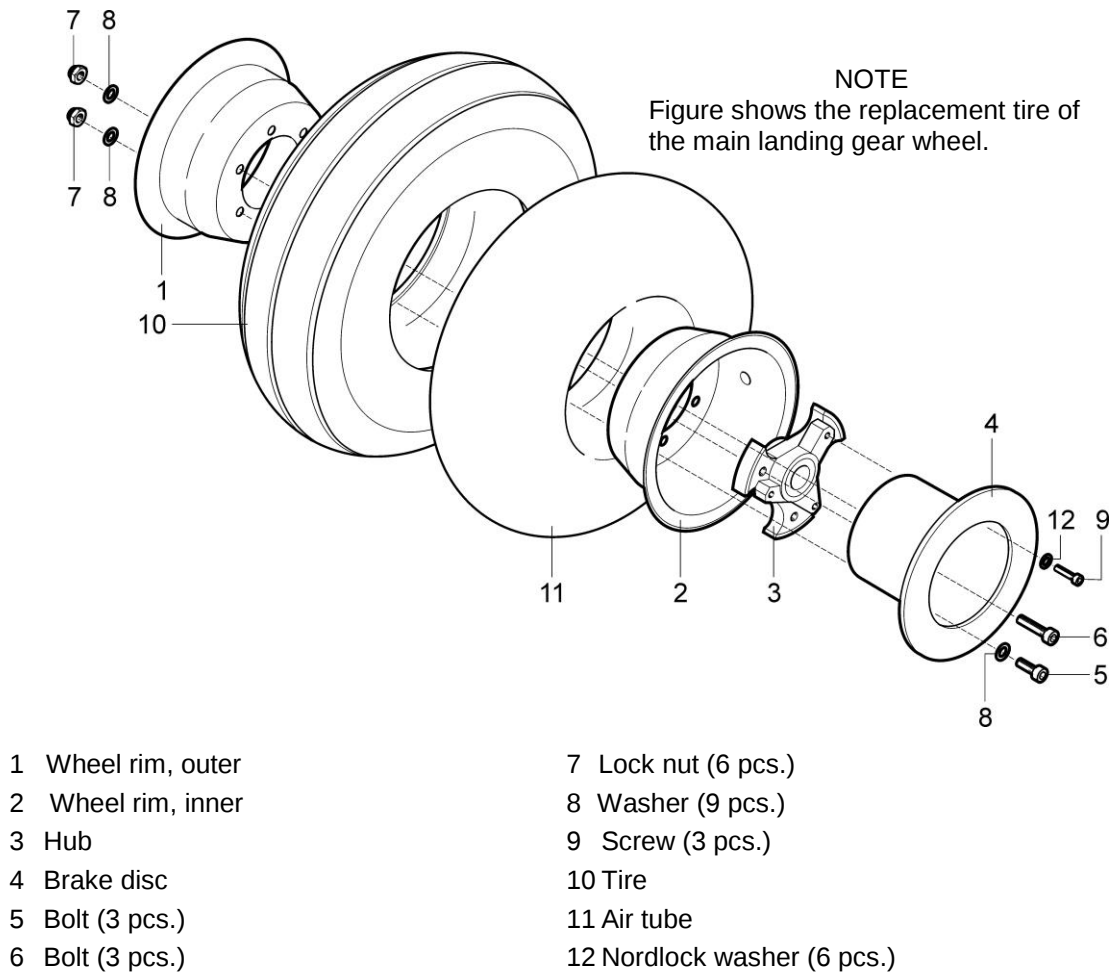


Fig. 8-17: Tire change

8.5.2 Change of nose landing gear shock absorber dumping elements

Type of maintenance: heavy

Authorization to perform:

- Repairman (LS-M) or Mechanic (A&P)

Tools needed:

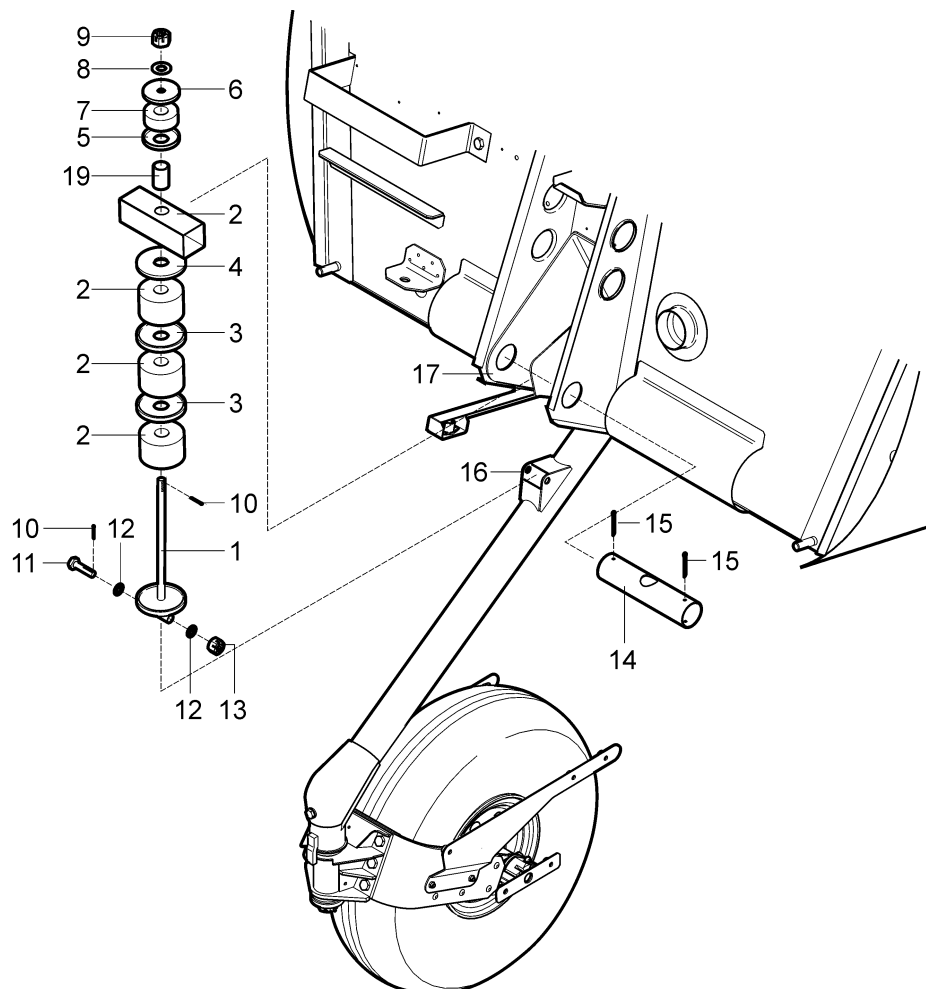
- wrench size 1/2 in

- (a) Jack and support the airplane (see 14.2).
- (b) Remove the cotter pin (10, Fig. 8-18), unscrew the nut (13), remove the washers (12), bolt (11) and disconnect tube (1) from the bracket (2) on the nose gear leg.
- (c) Remove the cotter pin (10), unscrew the nut (9) and remove washers (8; 6; 7; 5).
- (d) Turn the tube (1) forward and remove tube (1), dumping elements (2) and washers (3).
- (e) As needed, remove the cotter pins (15), push out the tube (14) and remove profile (18) and case /19).
- (f) Replace damaged dumping elements (3).
- (g) Gradually put on the tube (1) shock absorbers (2), washers (3) and insert tube into the hole on the tube (14) according to the figure.



CHAPTER 8 – LANDING GEAR

- (h) Gradually install on the tube end (1) washers (5; 7; 6; 8), screw and tighten the nut (9); secure it with new cotter pin (10).
- (i) Put the lower end of the tube (1) to the bracket (16); install the bolt (11) with the nut (13) and washers (12), secure nut with the new cotter pin (10).
- (j) Lower the airplane on jacks.



- | | |
|------------------|---------------------|
| 1 Tube | 11 Bolt |
| 2 Shock absorber | 12 Washer |
| 3 Washer | 13 Nut |
| 4 Washer | 14 Tube |
| 5 Washer | 15 Cotter pin |
| 6 Washer | 16 Nose leg bracket |
| 7 Rubber washer | 17 Bracket |
| 8 Washer | 18 Profile |
| 9 Nut | 19 Case |
| 10 Cotter pin | |

Fig. 8-18: Change of the dumping elements in the nose landing gear



8.5.3 Change of brake lining

Type of maintenance: line

Authorization to perform:

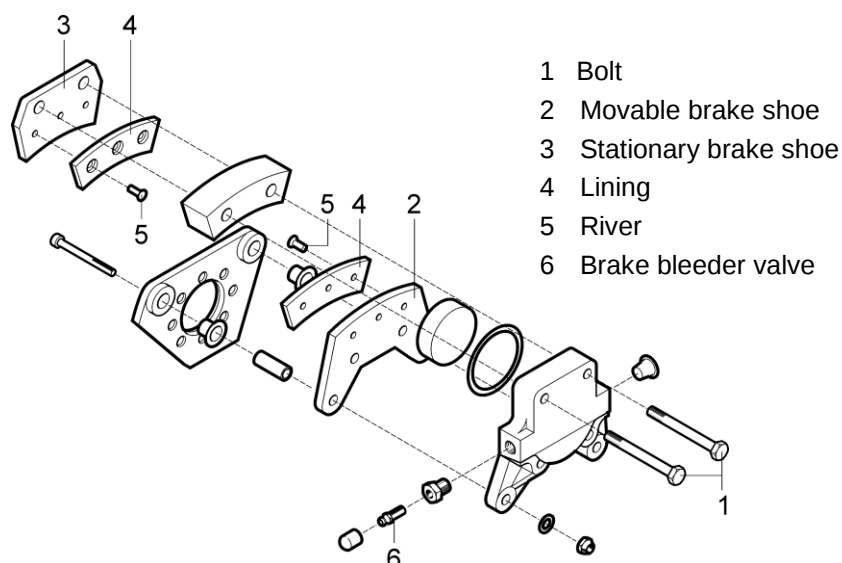
- Sport pilot or higher

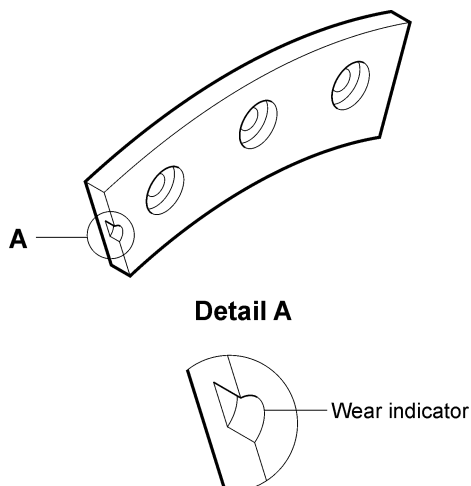
Tools needed:

- wrench size 7/16 in
- drill # 25
- electric drill
- brake relining tool, pneumatic press

CAUTION: EXCHANGE ALWAYS BOTH BRAKE PADS!

- Jack and support the airplane (see 14.2).
- Remove the main landing gear wheel (see 8.3.3).
- Remove the caliper from the wheel by removing the two bolts (1, Fig. 8-19) that hold in on.
- Remove old linings (4) by drilling the crimped side of the rivet (Do not use punch and hammer). Using a # 25 drill (0.1495 in. diameter), drill through rivet taking care to avoid damaging the rivet hole.
- After drilling crimped edge off rivets, lift old lining and remaining rivet pieces from the brake shoe.
- Inspect the brake shoe (2; 3) for any bending or other damage that may have occurred during service. A shoe with more than 0.010 in bend should be replaced. Inspect rivet holes to ensure that no damage has occurred during removal.
- Using a brake relining tool or pneumatic press, replace the lining using brass rivet (5).
- Insert the brake disc and screw them with the caliper – torque value 11.3 Nm (100 in lbs).
- Reinstall the main landing gear wheel (see 8.3.4).
- Check the brake function and carry out the conditioning procedures (see 8.5.7).





NOTE: The lining requires replacement when the wear indicator is no longer visible.

Fig. 8-19: Change of brake lining

8.5.4 Lubrication of axis of rotation of nose landing gear

Type of maintenance: line

Authorization to perform:

- Sport pilot or higher

Tools needed:

- wrench size 1/2 in
- grease gun

(a) Unscrew and remove the bolt (8, Fig. 8-15) with the washer (9) and remove cover (7).

(b) By means of the grease gun lubricate axis of rotation.

CAUTION: AVOID TO GREASE CONTAMINATES THE FRICTION AREAS!

(c) Apply Loctite 221 on the bolt (8) with the washer (9) and install the cover (7).



8.5.5 Refilling / exchanging brake fluid

Draining brake fluid from brake system

Type of maintenance: line

Authorization to perform:

- Sport pilot or higher

Tools needed:

- wrench size 7/16"

- (a) Disconnect the brake hose from the brake cylinder and let brake fluid drain into the previously prepared can.
- (b) You can accelerate brake fluid draining by compressing the relevant brake pedal.

Filling brake fluid into brake system

NOTE: Brake fluid used by aircraft manufacturer is shown in Section 17.5.

- (a) Fix the aircraft with help wedges.
- (b) Release the parking brake.
- (c) Bleed the hose of the filling equipment and connect it to the filling hole of the left wheel brake.
- (d) Unscrew the plug of the left brake cylinder with reservoir using the socket wrench.
- (e) Slowly fill the brake system with hydraulic fluid.
- (f) Repeatedly push the brake pedal.
- (g) Check the brake hose from the point of view of occurrence of bubbles.
- (h) Continuous occurrence of bubbles indicates a failure of the filling equipment.
- (i) After the reservoir is filled up to the filler hole – stop the filling through closing of the filling valve of the filling equipment.
- (j) Disconnect the hose of the filling equipment.
- (k) Suck off 20 ml of hydraulic fluid using the syrette.
- (l) Screw down the closing plug using the socket wrench.
- (m) Repeat the same procedure for the right brake cylinder.
- (n) Check the proper resistance of pedals.
- (o) Pull the parking brake.

By this way, both wheels must be braked equally.
- (p) Remove the wedges.

Refilling brake fluid into brake system

For the refilling – use the procedure for filling (see above).



8.5.6 Bleeding the brake system

Type of maintenance: line

Authorization to perform:

- Sport pilot or higher

Tools needed:

- wrench size 7/16"
- brake bleeder unit

- Open the brake bleeder valve (6, Fig. 8-19) slightly on the brake caliper to facilitate bleeding of air from the system.
- Attach a tube from the nozzle of a squirt can or brake bleeder unit containing brake fluid to the top of the brake bleeder valve. Pump the handle until oil flows bubble free from service hose before attaching.
- Make sure that the master cylinder shaft is fully extended to open up the internal bypass valve.
- Inject brake fluid into the puck housing and continue injecting until the fluid travels through the system in to the master cylinder.
- Air in the system will be pushed up and out in to the master cylinder only if the master cylinder is at the highest point in the system, and there are no loops in the brake lines.
- Fluid should be pushed through the system until it reaches approx. 6.4 mm (1/4 in) from the top of the master cylinder.
- Close the brake bleeder valve, and remove the service hose.
- If the brake system is free of air, the brake pedal should feel firm and not spongy. If not, repeat steps (a) through (g) until system is free of trapped air.
- Repeat for wheel of the opposite system.
- Fluid leakage from the top of the master cylinder during operation indicates too high a fluid level.

8.5.7 Conditioning procedures

NOTE: It is important to condition the new linings after installation to obtain maximum service life and performance.

- After the linings have been installed, apply brake pressure during high throttle static run-up. Note rpm at creep if any occurs.
- Perform two or three high speed taxi snubs. Apply firm braking at 25 – 35 kts down to 4 kts to generate the necessary 150 – 200 °C temperatures at the brake pads. Do not bring the airplane to a complete stop during taxi runs, and continue to roll airplane until reaching the tie down area. Release brake pressure at tie down area as soon as practical and park with brake pressure released. Allow brakes to cool for 10 – 15 minutes
- Repeat step (a) and note rpm at creep if any occurs. There should be a noticeable increase in holding torque.



- (d) If properly conditioned, the pads will have a uniform shiny appearance (glaze) on the surface. Repeat steps (a) – (c) if necessary to produce glaze.

NOTE: Forward movement of the airplane during runup could be caused by the wheels skidding and not brake malfunction.

Conditioning removes high spots, and creates a layer of glazed material at the lining surface.

Normal braking will produce enough heat to maintain glazing during the life of the lining.

Glazing can be worn off during light use such as taxiing.

8.5.8 Design changes on the Nose Landing Gear

History of the Nose Landing gear design is illustrated in Figure 8-20 below.

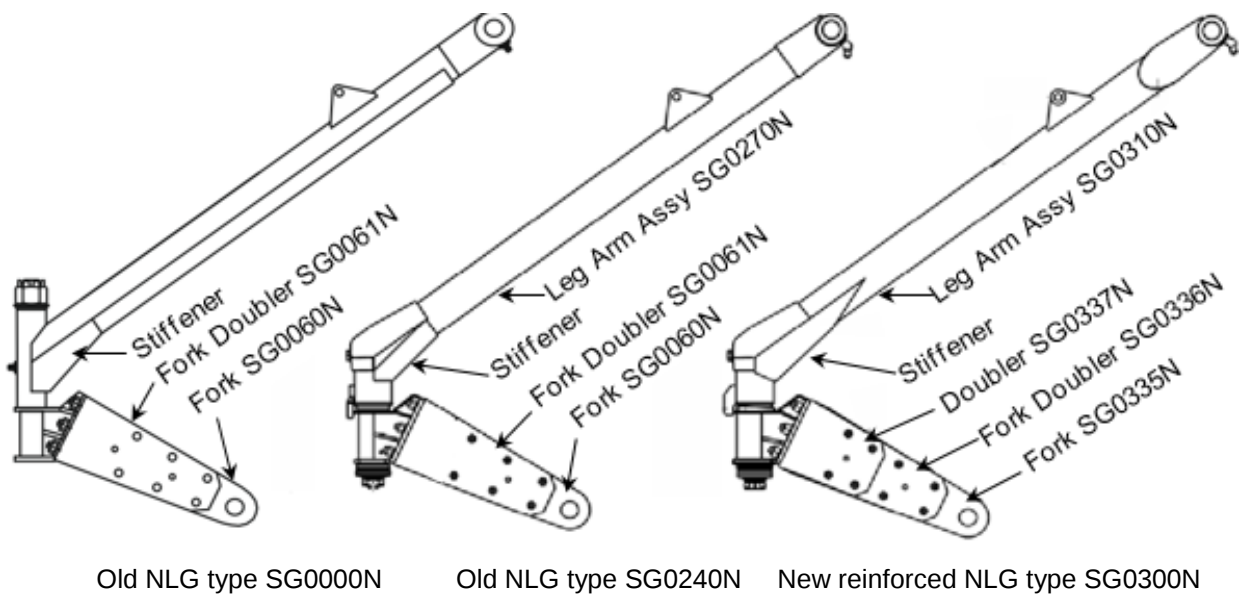


Fig. 8-20: Design changes of the Nose Landing Gear



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CHAPTER 9 – FUEL SYSTEM

9.1 General

The fuel system (see Fig. 9.1) is used for storing fuel in the airplane and it's delivering to the engine. The fuel system of SportCruiser / PiperSport airplane consists of the following parts: two fuel tanks, fuel tubing, selector valve, gascolator, mechanical fuel pump (located on the engine), electrical fuel pump, fuel quantity sensor, fuel flow-meter, fuel pressure sensor and drain valves of the fuel tanks.

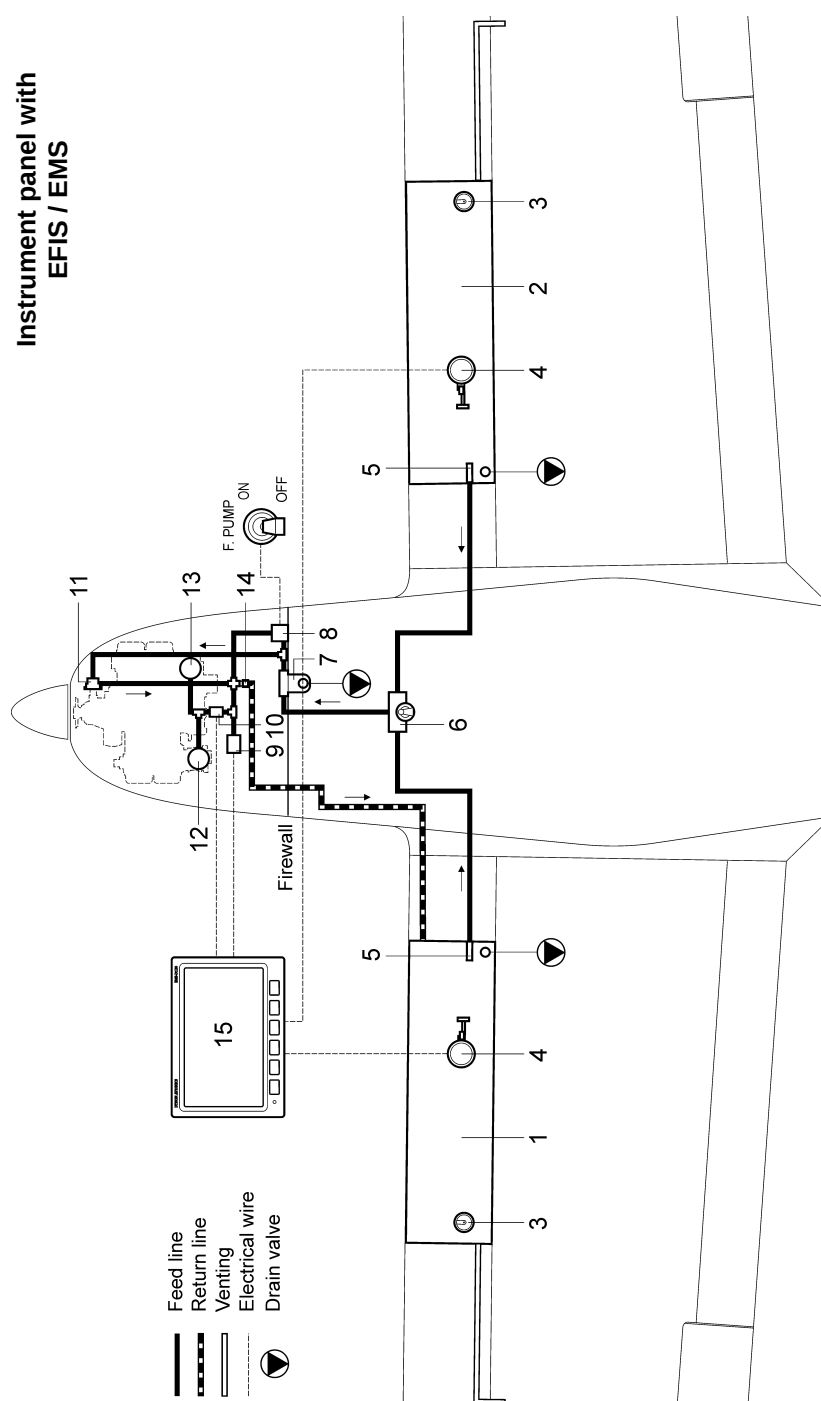


Fig. 9-1: Fuel system layout (page 1 of 4)

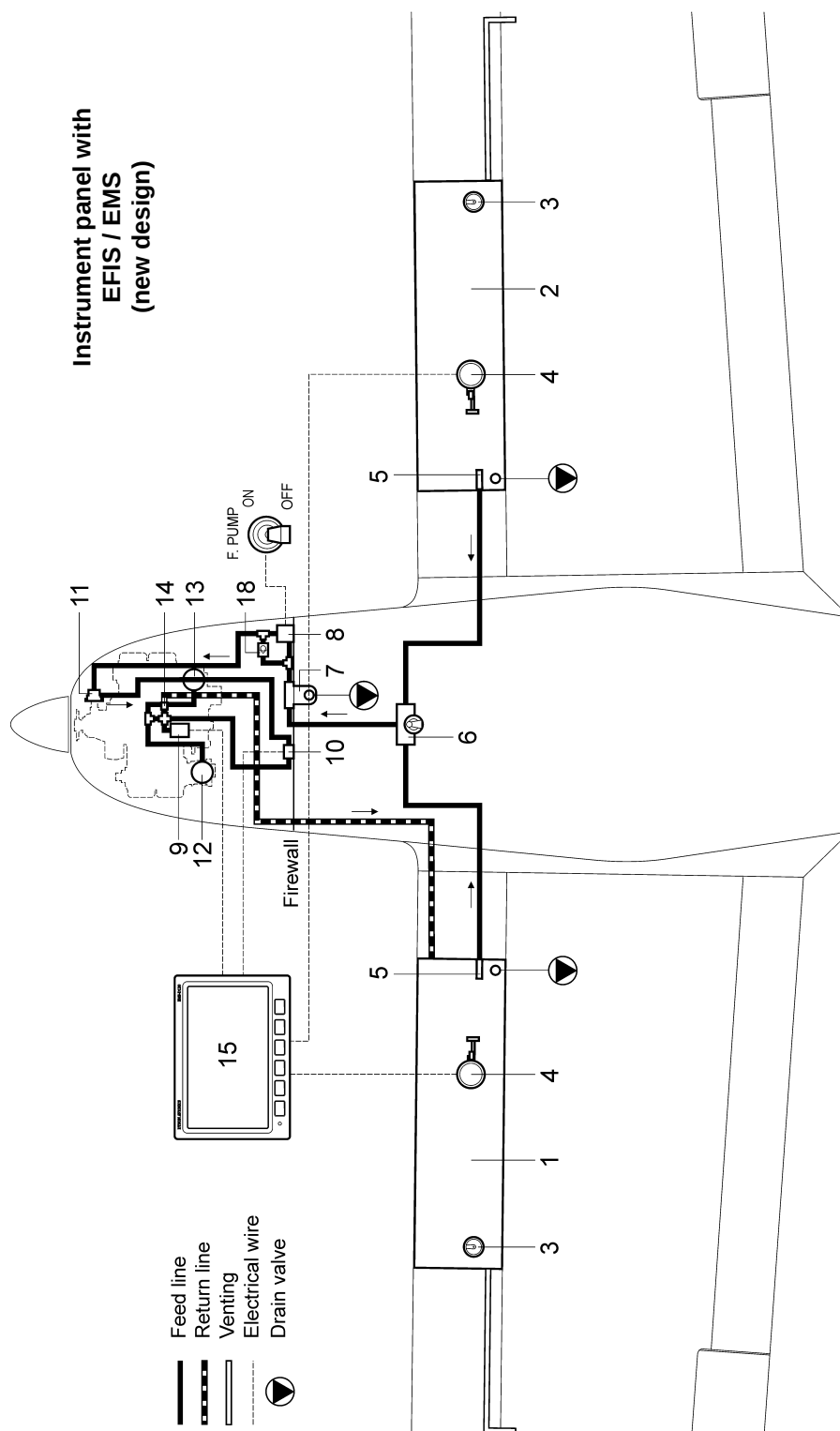
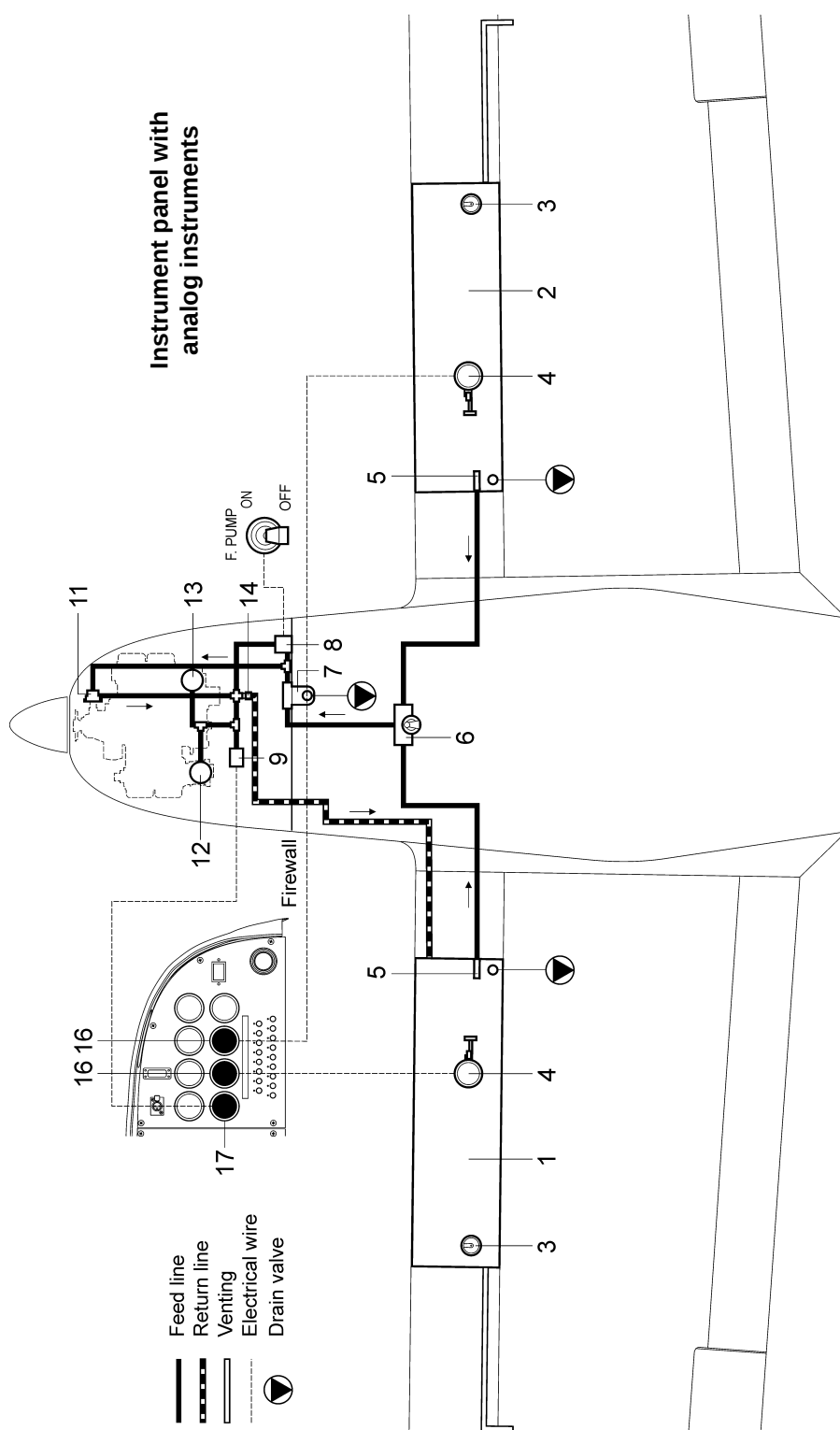


Fig. 9-1: Fuel system layout (page 2 of 4)



CHAPTER 9 – FUEL SYSTEM

**Fig. 9-1:** Fuel system layout (page 3 of 4)

Note: The picture of the instrument panel is for information only and could differ from the real state.

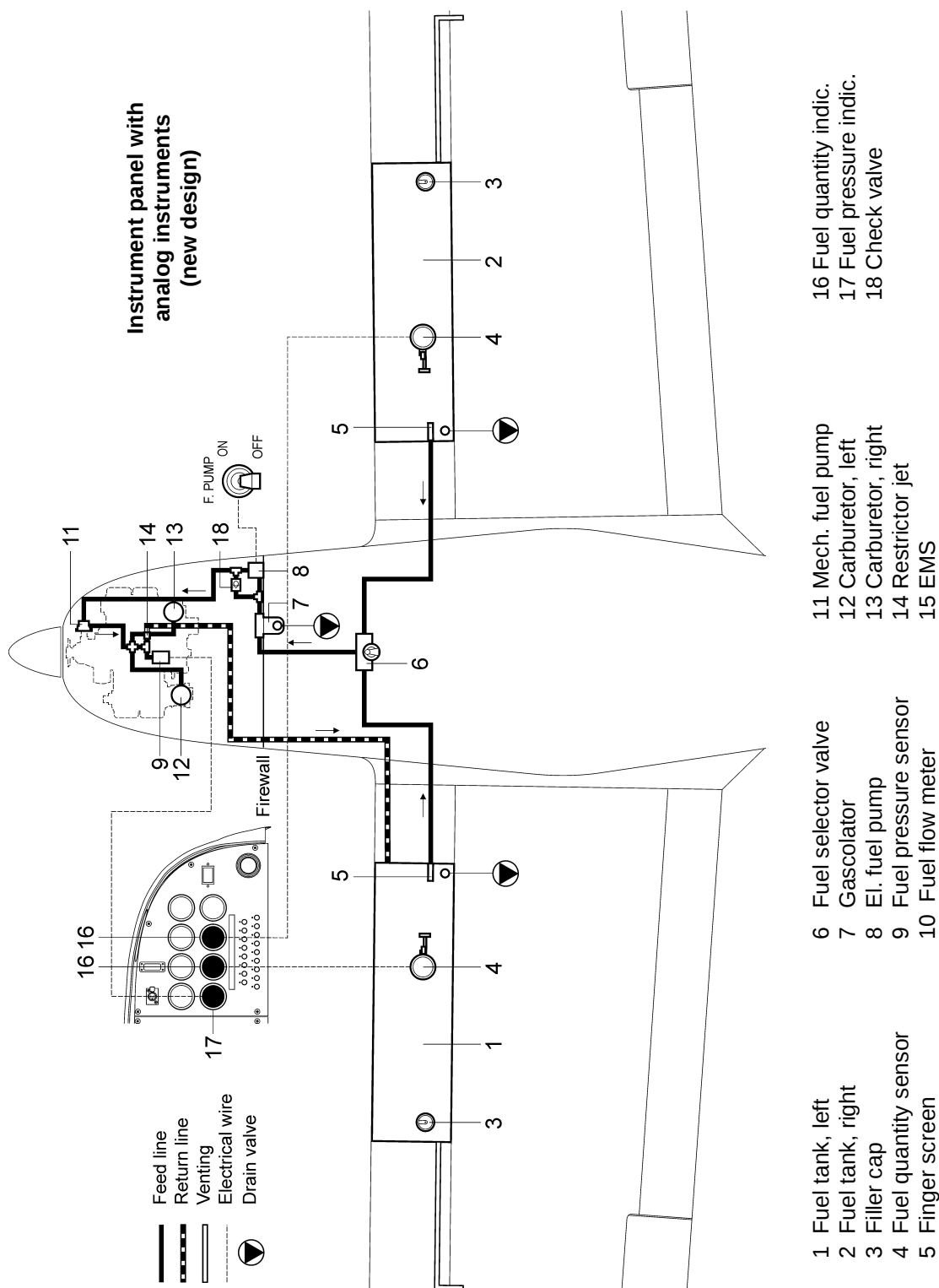


Fig. 9-1: Fuel system layout (page 4 of 4)

Note: The picture of the instrument panel is for information only and could differ from the real state.



9.2 Description and operation

9.2.1 Fuel storage

Fuel is stored in airplane in the fuel tanks. The fuel tanks are welded from Al-alloy sheet and their volume is 57 liters (15 US gallons) each. The tanks are located in the outer wings between ribs No.4 and 6a in front of the main spar. Their shape fits with 3.2 mm (1/8 in) offset with outer wing shape. The gap is filled with cork strips glued on the fuel tank. Cork strips protect the tank from touching the skin and the wing spar. Each fuel tank has a filler neck (1, Fig. 9-2) with flush head filler cap (2), venting tube (3), finger screen (4) and drain valve (5). Fuel is filled into the each tank through the filler neck (1), which is located on the top skin close to rib No.6a. Fuel drain from the tank is possible through the drain valve (5) located in the rear corner of bottom skin close to the root fuel tank rib.

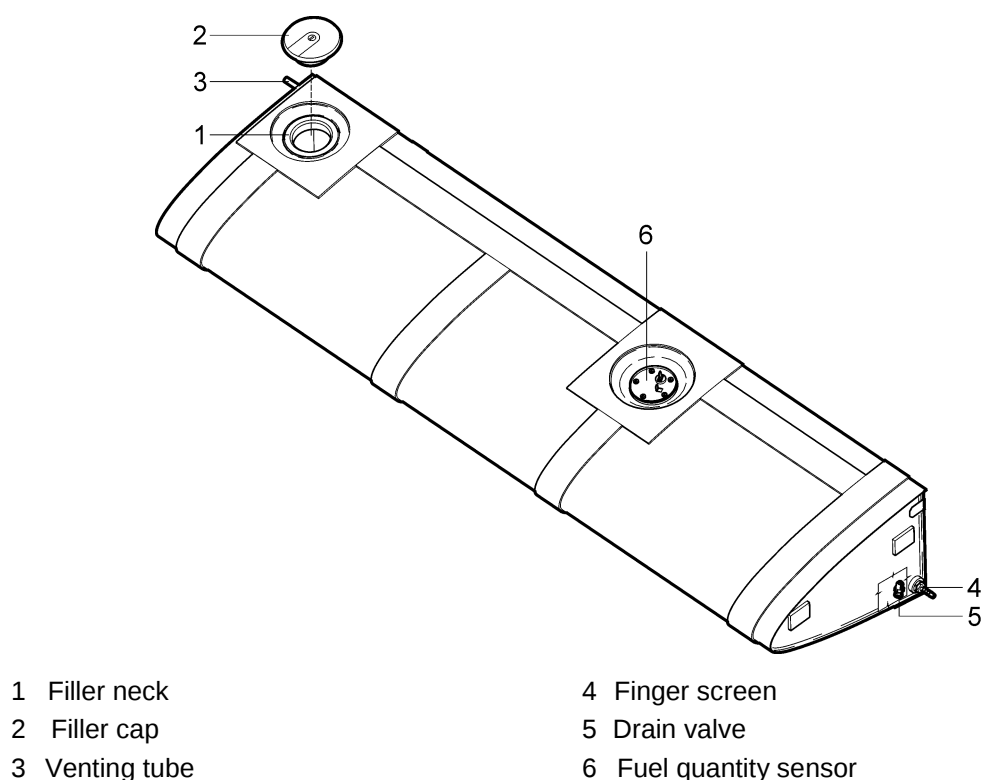


Fig. 9-2: Fuel tank, right

9.2.2 Fuel distribution

Fuel flows from the tank (1, Fig. 9-3.) and (2) through finger screens (3) to the fuel selector valve (4) and from there to the gascolator (5), electrical fuel pump (6) to the mechanical fuel pump (7) located on the engine. From there it is supplied through the fuel distributor to carburetors.

The fuel selector valve (4) is used also for interruption of fuel supply in case of engine fire or after long-time parking airplane. The fuel selector valve is located on the middle console between the seats in the cockpit. The gascolator (5) is located on the firewall in lowest point of



the firewall above the gascolator. The fuel return line (8) bleeds off any possible vapours into the left tank.

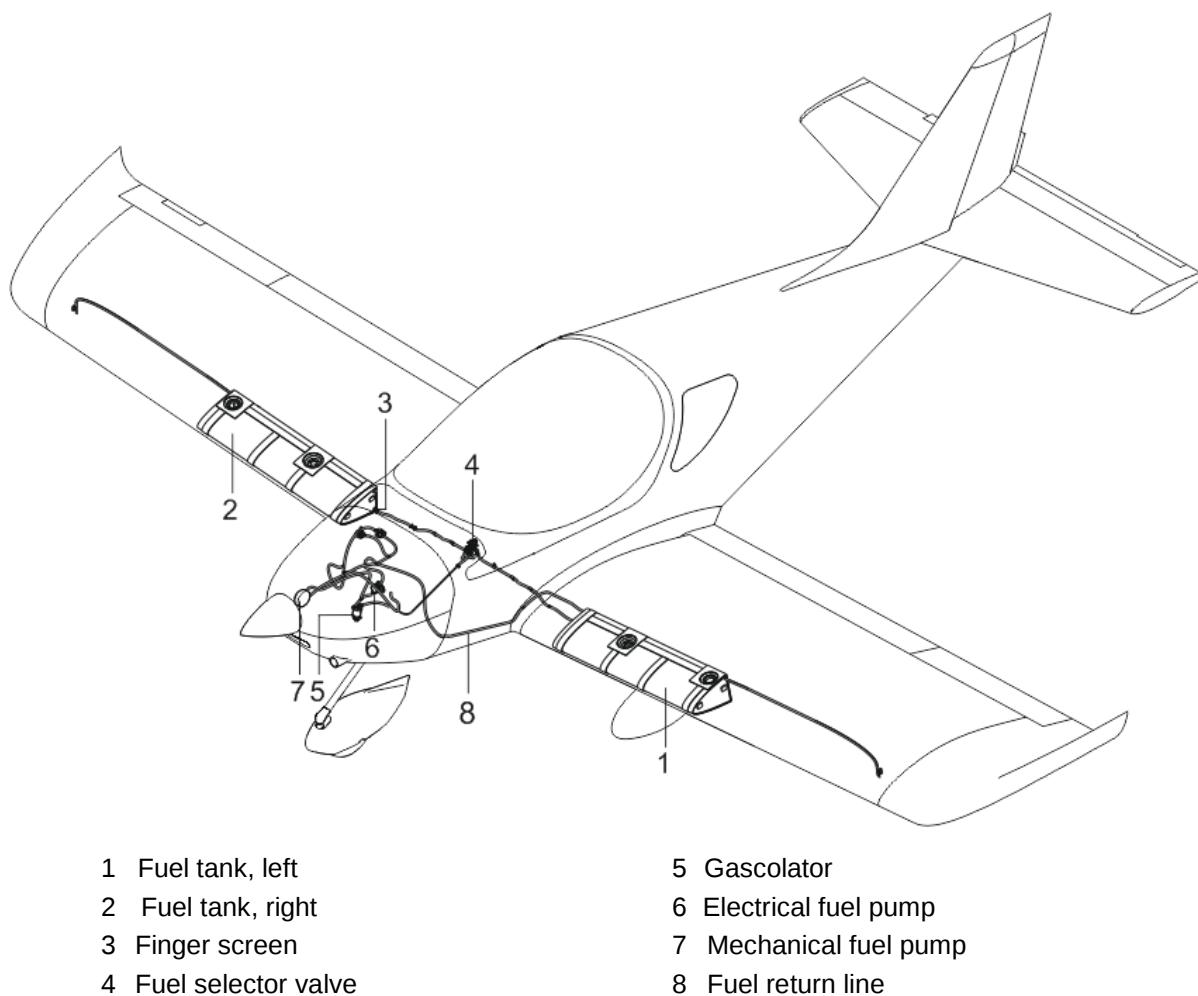
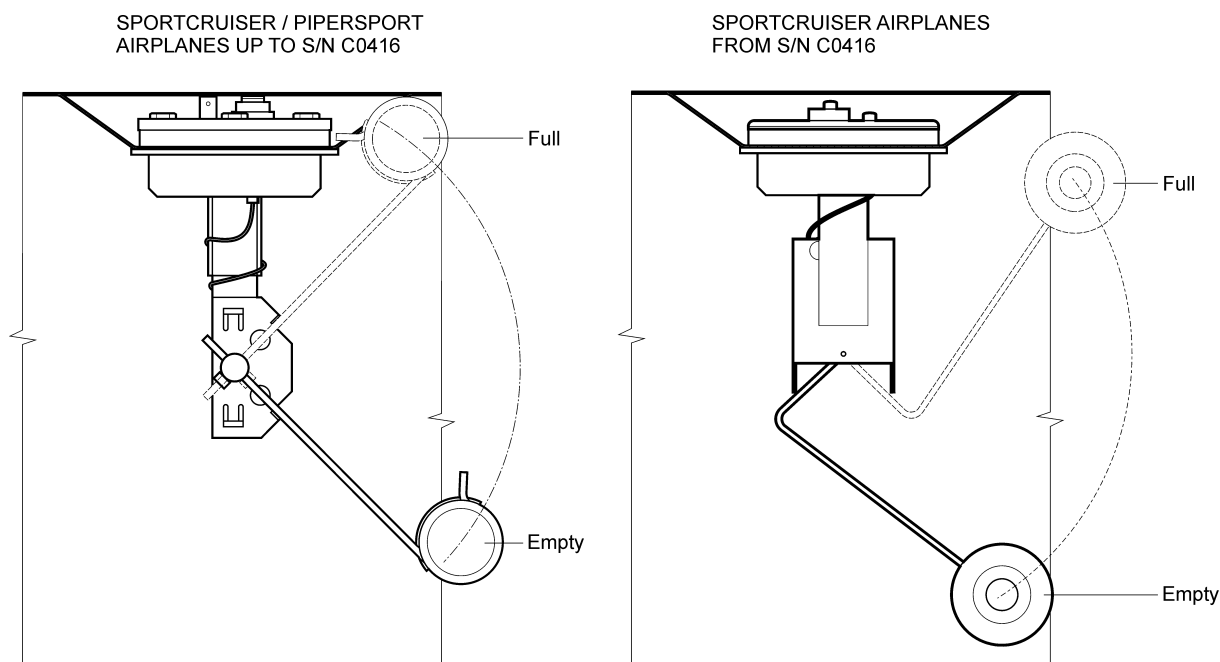


Fig. 9-3: Fuel system installation diagram

9.2.3 Indication of fuel quantity and pressure

Fuel quantity is measured by the fuel float sensor (see Fig. 9-4). The float position is converted to an electrical signal and fuel quantity in the tank is indicated either on the EMS or on the classical analog instruments (see Fig. 9-1).

Fuel pressure is measured by the electrical fuel pressure sensor. Electrical signal from the sensor is indicated either on the EMS or on the classical analog instruments (see Fig. 9-1).

**CHAPTER 9 – FUEL SYSTEM****Fig. 9-4:** Float mechanism**9.3 Removal / Installation****9.3.1 Fuel tank removal**

Type of maintenance: heavy

Authorization to perform:

Repairman (LS-M) or Mechanic (A&P)

Tools needed:

- wrench size No. 8, 1/2 in,
- screwdriver
- drill diam. 3.2 mm (1/8 in), 4.1 mm (5/32 in)
- electric drill
- cutting pliers, pliers

- (a) Disconnect the battery.
- (b) Drain fuel from the fuel system by the tank drain valve.
- (c) Unscrew the filler cap.
- (d) Remove the wing (see 4.3.1) and put it on the table.
- (e) Drill out the top half of the leading edge skin.
- (f) Disconnect wiring from fuel quantity sensor.
- (g) Disconnect fuel line.
- (h) Carefully remove the tank and store it. Seal the tank holes as needed.



9.3.2 Fuel tank installation

Type of maintenance: heavy

Authorization to perform:

- Repairman (LS-M) or Mechanic (A&P)

Tools needed:

- wrench size No. 8, 1/2 in,
- screwdriver
- riveting pliers
- cutting pliers, pliers

- (a) Remove any hole seals from the tank.
- (b) Set the tank to the position between the ribs No.4 and 6a. Before installing the tank, check the cork bands for completeness and damage. Change them, if needed.
- (c) Connect fuel quantity sensor wire, insert the finger screen – use LOCTITE 565 or equivalent sealant.
- (d) Close the leading edge skin on the wing and fit it to the spars and ribs per clecos each second hole through of securing harnesses.
- (e) Rivet the skin on the ribs and spar.
- (f) Screw back filler cap - use silicon to make connection of filler cap flange and wing skin watertight.
- (g) Install the wing (see 4.3.2).
- (h) Check the fuel system (see 9.4.1).
- (i) Connect the battery ground.

9.3.3 Removal of the finger screen

Type of maintenance: line

Authorization to perform:

- Repairman (LS-M) or Mechanic (A&P)

Tools needed:

- screwdriver
- socket wrench 11/16 inch

NOTE: The finger screen is located in the root tank rib.

- (a) Drain fuel from the fuel system.
- (b) Remove the wing (see 4.3.1).
- (c) Remove the hose clamp (3, Fig. 9-5) and disconnect the fuel hose (4).
- (d) Remove the finger screen (2).

**CHAPTER 9 – FUEL SYSTEM****9.3.4 Installation of the finger screen**

Type of maintenance: line

Authorization to perform:

- Repairman (LS-M) or Mechanic (A&P)

Tools needed:

- Screwdriver
- Socket wrench 11/16 inch

- (a) Screw the finger screen (2, Fig. 9-5) into the root tank rib – use LOCTITE 565 or equivalent sealant on finger screen thread.
- (b) Connect fuel hose (4) on the finger screen; tighten the hose clamp (3).
- (c) Install the wing (see 4.3.2).
- (d) Check fuel system tightness (see 9.4.1).

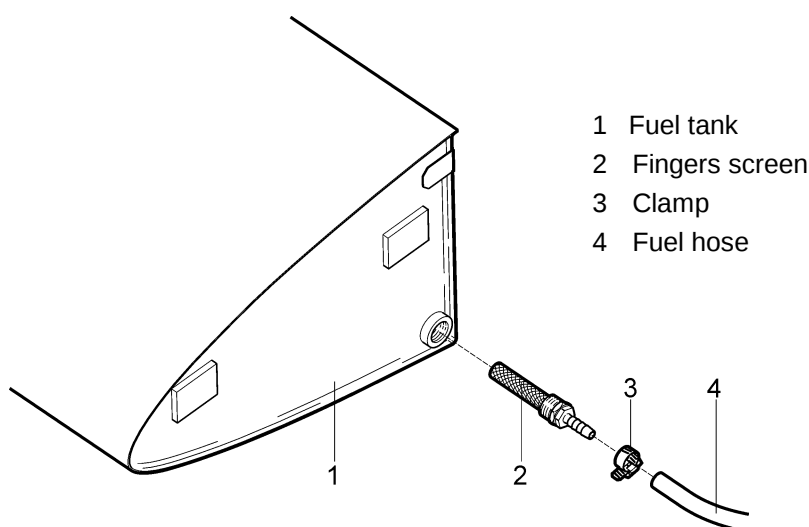


Fig. 9-5: Finger screen removal / installation

9.3.5 Fuel quantity sensor removal

Type of maintenance: line

Authorization to perform:

- Sport pilot, Repairman (LS-M) or Mechanic (A&P)

Tools needed:

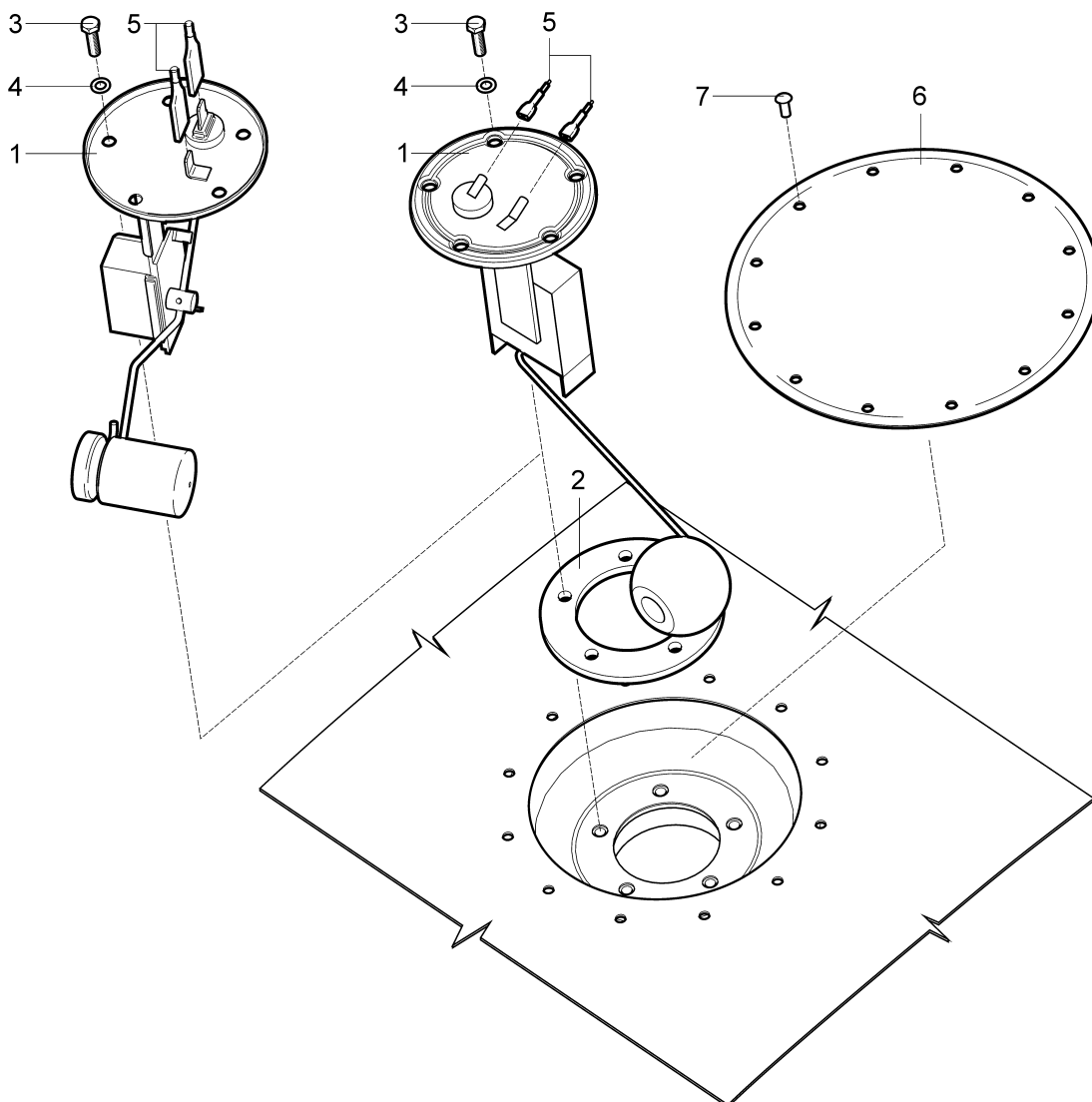
- electric drill
- drill diam. 3.2 mm (1/8 in)
- screwdriver
- cutting pliers, pliers

- (a) Remove (drill off) the fuel quantity cover plate (6, Fig. 9-6).
- (b) Disconnect fuel level sender wire (5).
- (c) Unscrew bolts (3), remove washers (4) and fuel quantity sensor (1) and gasket (2).



SPORTCRUISER / PIPERSPORT
AIRPLANES UP TO S/N C0416

SPORTCRUISER AIRPLANES
FROM S/N C0416



- 1 Fuel quantity sensor
- 2 Gasket
- 3 Bolt
- 4 Washer

- 5 Wire
- 6 Cover plate
- 7 Rivet

Fig. 9-6: Fuel quantity sensor removal / installation

9.3.6 Fuel quantity sensor installation

Type of maintenance: line

Authorization to perform:

- Sport pilot, Repairman (LS-M) or Mechanic (A&P)

Tools needed:

- Phillips PH2 screwdriver
- riveting pliers (riveter)
- cutting pliers, pliers

**CHAPTER 9 – FUEL SYSTEM**

- (a) Set the gasket (2, Fig. 9-6) on the fuel tank flange.
- (b) Set position and length of the fuel quantity sensor lever according to the Fig. 9-4.
- (c) Carefully put the fuel quantity sensor (1) into the tank and attach it using bolts (3) with washers (4) – use LOCTITE 565 or equivalent sealant on bolts thread.
- (d) Connect electrical wires (5) to the fuel quantity sensor (see Wiring Manual).
- (e) Check fuel system tightness (see 9.4.1).
- (f) Connect the battery and check fuel gauge function.
- (g) Install (rivet) the cover plate (6).

9.3.7 Fuel drain valve removal

Type of maintenance: line

Authorization to perform:

- Sport pilot, Repairman (LS-M) or Mechanic (A&P)

Tools needed:

- wrench size 1/2 in

NOTE: The fuel drain valves are located on bottom side of the wings and on the gascolator.

- (a) Drain the fuel from the tank or gascolator.
- (b) Unscrew drain valve (1, Fig. 9-7) from the tank (2) or gascolator.
- (c) Check “O” ring and the valve spring.

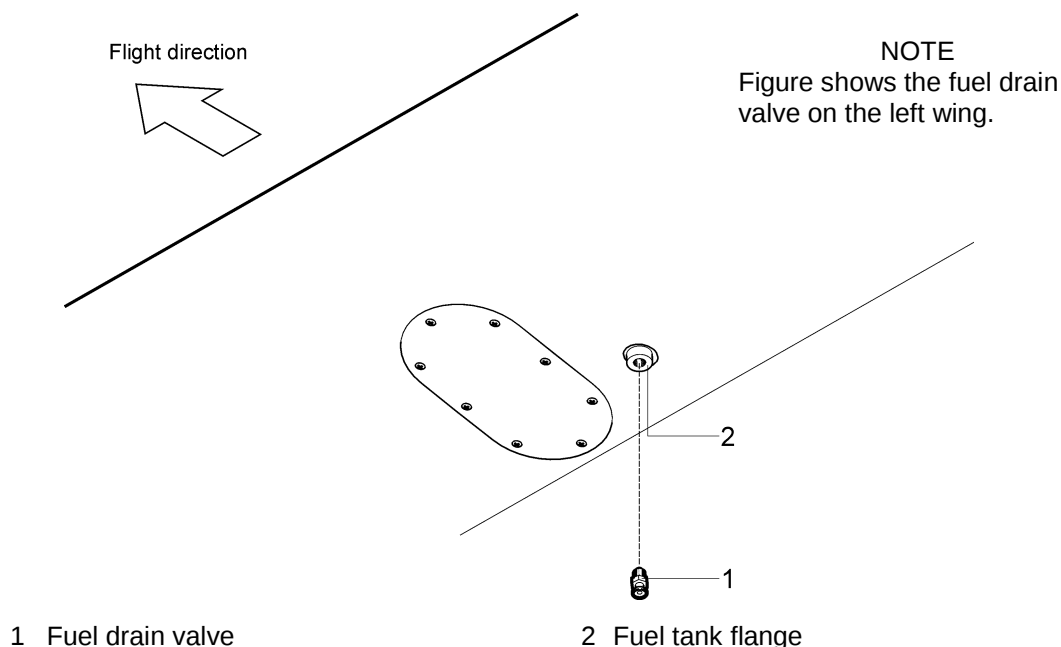


Fig. 9-7: Fuel drain valve removal / installation



9.3.8 Fuel drain valve installation

Type of maintenance: line

Authorization to perform:

- Sport pilot, Repairman (LS-M) or Mechanic (A&P)

Tools needed:

- wrench size 1/2 in

(a) Screw the drain valve (1, Fig. 9-7) in the tank (2) or gascolator – use LOCTITE 565 or equivalent sealant on the drain valve thread.

(b) Fill the tank with fuel and check drain valve tightness.

9.4 Check / Adjustment

9.4.1 Checking fuel system tightness

NOTE: Tightness is checked by pressurized air. When performing a specific tightness check, outside temperature fluctuations must not be bigger than $\pm 5^{\circ}\text{C}$ ($\pm 9^{\circ}\text{F}$). Reseal the found out leakage by a suitable method - by tightening, by using a suitable sealing.

Checking airplane fuel system tightness by air

- (a) Remove upper engine cowling.
- (b) Close the fuel tank filler caps.
- (c) Fuel selector valve - **OFF** position.
- (d) Connect the pressurization equipment hose to the venting tube outlet on the L/R wing bottom side.
- (e) Disconnect the hoses from the carburetors and return line; blind them by plugs.
- (f) Set the fuel selector valve to **LEFT / RIGHT** position (choose the tank).
- (g) Supply air pressure of 2 kPa (0.02 bar; 0.29 psi) to the appropriate fuel tank by means of the pressurization equipment.
- (h) Shut the air pressure supply. During 15 minutes there must not be any loss in pressure. Find out leakage by listening to and by soap water.
- (i) As necessary, repeat procedure for the second fuel tank.
- (j) Remove plugs from the hoses and reconnect them to the carburetors and return line.
- (k) Install upper engine cowling.

9.4.2 Fuel pump check

Check for cracks

Check the fuel pump body for cracks, including the inlet and the outlet hose. If cracks are detected, immediately exchange the fuel pump for the new pump.

Checking fuel leakage

Perform engine inspection and check the fuel pump body, including inlet and outlet hose, for fuel leakage. In case of fuel leakage, find out the reason and if necessary exchange the fuel pump for the new pump.



9.5 Exchanges / Service information

9.5.1 Fuel tank filling

CAUTION: WHEN FILLING FUEL IN THE AIRPLANE, USE ONLY APPROVED KINDS OF FUEL MENTIONED IN THIS MANUAL IN 10.2.1, IN THE POH SECTION 2.4, IN THE ROTAX OPERATOR'S MANUAL SECTION 10.2.2 FUEL, IN THE ROTAX SERVICE INSTRUCTIONS SI-912-016. SAFETY INSTRUCTIONS FOR FILLING FUEL INTO THE AIRPLANE TANKS

- (a) The fuel tanks can be filled with fuel only by persons who are fully instructed and familiarized with safety instructions.
- (b) It is prohibited to fill the fuel tank:
 - during rain and storm
 - in a closed space
 - when the engine is operating or with electric system switched on.
- (c) A person filling the fuel tank must not be wearing polyester clothing or any clothing from a material which creates static electricity.
- (d) It is prohibited to smoke or handle with open fire.

Procedure of fuel tank filing

- (a) Ground the airplane. The airplane ground point is located on the nose landing gear leg.
- (b) Open the fuel tank filler cap.
- (c) Fill necessary quantity of fuel.

CAUTION: WHEN FILLING FUEL INTO THE AIRPLANE, AVOID THE CONTACT OF FUEL WITH THE AIRPLANE SURFACE – IT WOULD CAUSE DAMAGE TO SURFACE TREATMENT OF THE AIRPLANE.

- (d) When the airplane is filled with fuel, wipe the filler neck of the rest of fuel and close the fuel neck filler cap.
- (e) Remove conductive interconnection between the filling device and the airplane.
- (f) Sludge the fuel tank.

9.5.2 Draining fuel system

Perform draining the fuel tanks and gascolator after every filling the tank with fuel before the first flight of the day. The fuel tank draining points are on bottom side of the wings and on the firewall.

Draining procedure

- (a) Open the drain valve by pressing up.
- (b) Drain required quantity of fuel.

NOTE: Draining serves for elimination of impurities and sediments from fuel. Drain so long unless clean fuel flows from the drain valve.

- (c) Close the drain valve by releasing pressure.
- (d) Check the purity of drained fuel (sediment, water).



9.5.3 Fuel filter cleaning

Perform fuel filter cleaning at each scheduled maintenance or signs of irregular engine running.

Cleaning procedure

- (a) Move the fuel selector valve to the **OFF** position.
- (b) Use the drain valve to drain the existing fuel from the gascolator bowl.
- (c) Remove the lockwire from nut (3. Fig. 9-8).
- (d) Loose the nut (3) and remove the gascolator bowl (4) and the gasket (5).
- (e) Use a small pointed tool to lift the edge of the filter screen (6) and carefully remove it for cleaning.
- (f) Clean the filter screen (6) by washing in fuel, or it can be blown off using an air line; inspect bowl (4) and clean if required.
- (g) Carefully install the filter screen (6) to the gascolator body, insert the gasket (5) and the gascolator bowl (4); make sure to correct installation.
- (h) Tighten the nut (3) and secure it by lockwire.
- (i) Move the fuel selector valve to **LEFT / RIGHT** position; check the gascolator for fuel leak.

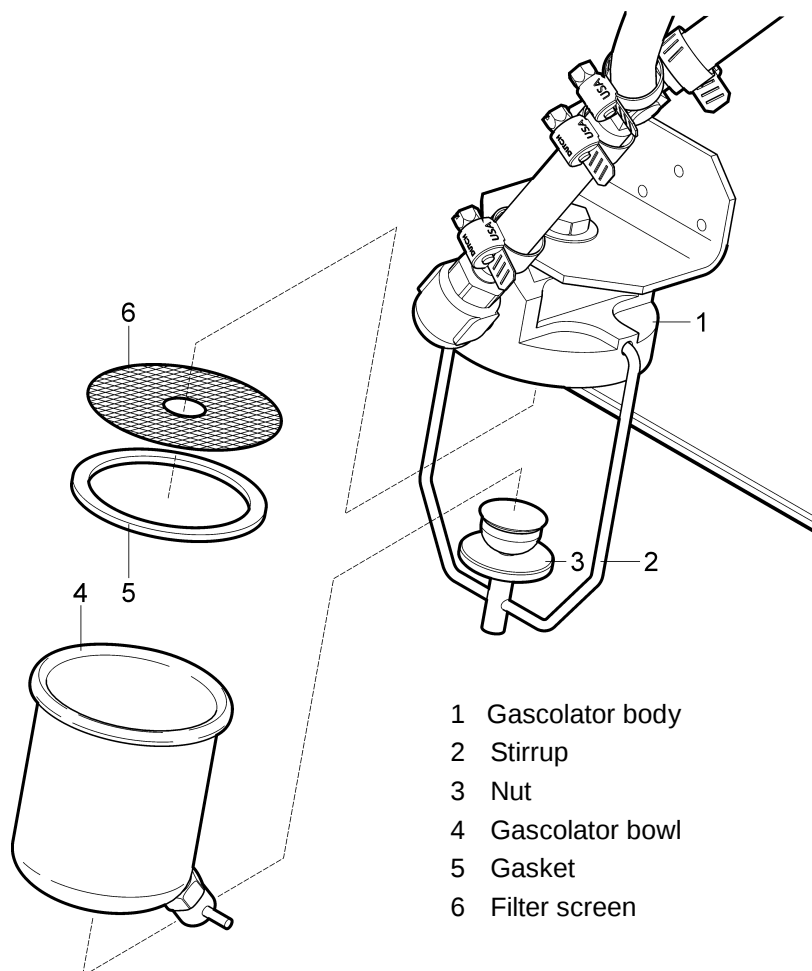


Fig. 9-8: Fuel filter cleaning



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10.1 General

Power unit of SportCruiser / PiperSport airplane is the ROTAX 912ULS2 engine and:

- Woodcomp Klassic 170/3/R ground adjustable 3-blade propeller or
- Woodcomp SR 3000/2W electrical adjustable 2-blade propeller or
- Sensenich 2A0R5R70EN ground adjustable 2-blade propeller or
- Sensenich 3B0R5R68C ground adjustable 3-blade propeller.

10.2 Description and operation

10.2.1 Engine

The engine ROTAX 912 ULS2 is a four-stroke, four-cylinder, opposed - cylinder engine, central cam shaft and OHV - mechanism with maximal power of 73.5 kW (98.6 HP) at 5,800 rpm.

Technical data of the engine:

Engine manufacturer:	BRP-Powertrain GmbH&Co.KG		
Engine type:	ROTAX 912 ULS2		
Power:	max. take-off	73.5 kW	(98.6 hp)
	max. continuous	69.0 kW	(92.5 hp)
RPM:	max. take-off	5,800 rpm max. 5 minutes	
	max. continuous	5,500 rpm	
	idle	1,400 rpm	
Cylinder head temperature CHT:	max.	135°C	(275°F)
Coolant temperature CT: *	max.	120°C	(248°F)
Oil temperature:	max.	130°C	(266°F)
	optimum operation	90 - 110°C	(194 - 230°F)
Oil pressure:	max.	7 bar	(102 psi)
	min.	0.8 bar	(12 psi)
	optimum operation	2 - 5 bar	(29 - 73 psi)
Fuel pressure:	max.	0.4 bar	(5.8 psi)
	min.	0.15 bar	(2.2 psi)

* With the change to a new cylinder heads design (for all the ROTAX 912 ULS2 engines from S/N 6 781 410 inclusive and for all the ROTAX 912 S2 engines from S/N 4 924 544 inclusive, and/or for all ROTAX engines with type designation followed by suffix-01, and/or for all ROTAX engines which have been later equipped with the new cylinder heads design of P/N 413185 at cylinder head position 2/3), the cylinder head temperature (CHT) is no longer measured, but the coolant temperature (CT) is measured instead.

Coolant type:

Refer to the Rotax Operator's Manual, Section 2.2 Operating limits, and Section 2.3 Operating media - Coolant; the Rotax Installation Manual - Cooling System; Rotax Service Instruction SI-912-016.

Old cylinder head design (CHT measurement method, engine type marking without suffix -01)

In principle, 2 different types of coolant are permitted:

- Conventional coolant based on ethylene glycol (with 50% of water)
- Waterless coolant based on propylene glycol

**WARNING: THE COOLANT CONCENTRATE (PROPYLENE GLYCOL) MAY NOT BE MIXED WITH CONVENTIONAL (GLYCOL/WATER) COOLANT OR WITH ADDITIVES!
NON OBSERVANCE CAN LEAD TO DAMAGES TO THE COOLING SYSTEM AND THE ENGINE!**



CAUTION: THE CONVENTIONAL GLYCOL/WATER COOLANT REDUCE TO APPLY MAXIMUM PERMISSIBLE COOLANT EXIT TEMPERATURE.

New cylinder head design

(CT measurement method, engine type marking with suffix -01, P/N 413185 for 2/3 cylinder head position)

Only one type of coolant is permitted:

- Conventional coolant based on ethylene glycol (with 50% of water)

CAUTION: Waterless coolant are not allowed to be used for Rotax engines with new cylinder head design.

Type of coolant used by the aircraft manufacturer is shown in the Section 17.5.

Fuel type:

MOGAS (EN228 Super or EN228 Super plus with max. 5 % ethanol blend, min RON 95; ASTM D4814, min. AKI 91); AVGAS (100LL; ASTM D910; ASTM D7547).

Refer to the Rotax Operator's Manual, Section Section 2.4 Operating media - Fuel, Rotax Service Instructions SI-912-016, latest revision.

ATTENTION: Use only fuel suitable for the specific climate zone.

Pay special attention to the current outside air temperature.

Do not use winter blends of MOGAS in warmer than normal temperatures.

There is a strong risk of vapor formation when using winter fuel for summer operation!

Oil type:

Refer to the Rotax Operator's Manual, Section 2.5 Operating media – Lubricants, Rotax Service Instructions SI-912-016 , latest revision.

NOTE: For detailed information refer to:

- Operator's Manual for ROTAX Engine Type 912 Series (OM-912, P/N 899649);
- Maintenance Manual (Line Maintenance) for ROTAX Engine Type 912 Series (MML-912, P/N 899191)

10.2.1.1 Engine mount

The engine mount serves for mounting the power unit to the airplane. It is welded from 4130 steel tubes and is attached to the firewall and to the engine by means of bolts. The engine mount is installed on the firewall by four attachments. The scheme of engine mount attachment to the firewall and to the engine is shown in the Fig. 10-1.

- 1 Firewall
- 2 Engine mount
- 3 Attachment bolt
- 4 Nut

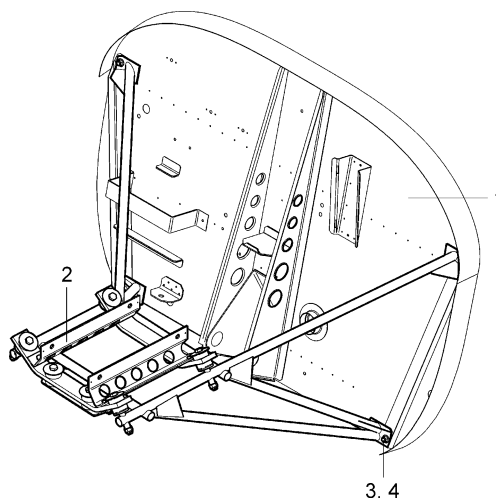


Fig. 10-1: Engine mount



10.2.1.2 Engine cowling

The engine cowling (Fig. 10-2) consists of two parts: upper cowling and lower cowling. The upper cowling (1) is attached by means of quick fasteners (4) to the firewall and to the lower cowling (2). Unlock the quick fasteners by turning the bolt by 90° counter-clockwise. The access cover (5), which is located on the upper cowling on the left in front of the firewall enables to check oil quantity in the oil tank without removing the upper cowling.

The lower cowling (2) is attached by means of quick fasteners (4) to the firewall and to the upper cowling (1). In the front part of the lower cowling (2), there is an oval hole (3) for air inlet to the radiator. In the bottom part of the lower cowling (2), there is a hole for air inlet to the oil cooler. On the left side in the lower cowling (2) there is a hole (6) for air inlet to the air filter to the engine inlet system.

- 1 Upper engine cowling
- 2 Lower engine cowling*
- 3 Air inlet hole for radiator
- 4 Quick fasteners
- 5 Access cover
- 6 Air inlet hole for engine inlet system
- 7 Landing light
- 8 Air inlet hole for cylinder cooling

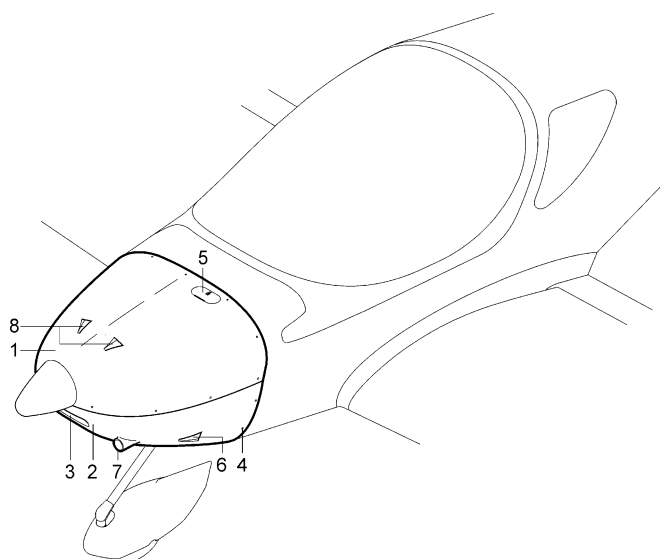


Fig. 10-2: Engine cowling

* As an alternative to the older design of engine lower cowlings a modified engine lower cowling P/N CE0561N for better cooling efficiency was developed and can be installed on airplanes depending on owner's decision.

10.2.1.3 Engine control

Engine power is controlled by means of the throttle control lever which is positioned on the middle channel between the seats and which controls engine power from idle up to max. take-off power. Engine power control lever is mechanically connected (by cable) to the carburetors.

If the control lever is fully pushed, this position corresponds to max. take-off power of the engine. If the control lever is fully pulled, this position corresponds to idle. Changes in the engine power setting can be made by moving of the control lever forward and backward.

10.2.1.4 Engine instruments

Engine parameters (RPM, CHT, EGT, oil pressure and temperature, fuel pressure, manifold pressure) are displayed either on the EMS or on the classical analog instruments. A typical example of the EMS display is shown in the Figure 10-3.

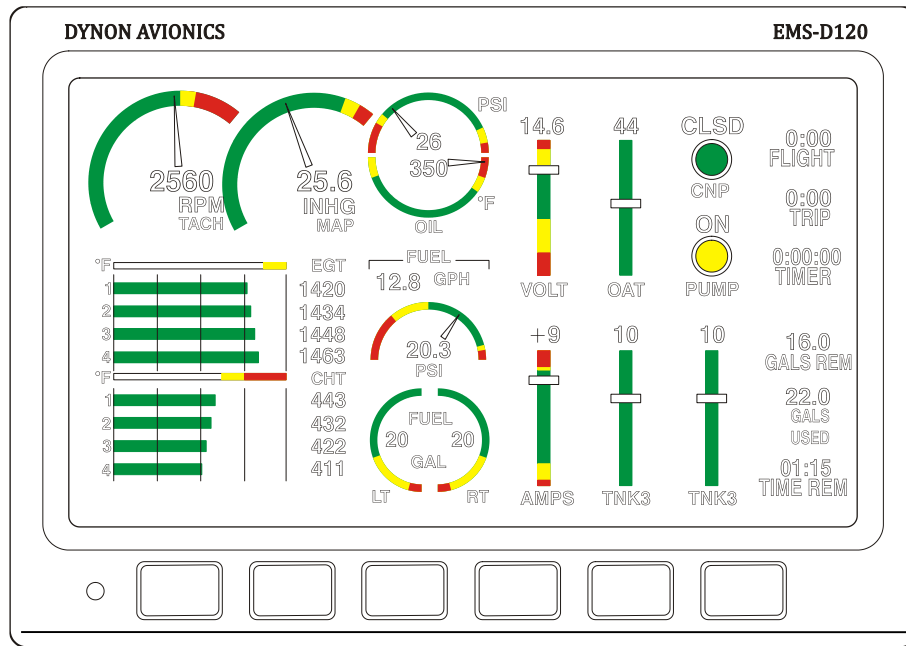
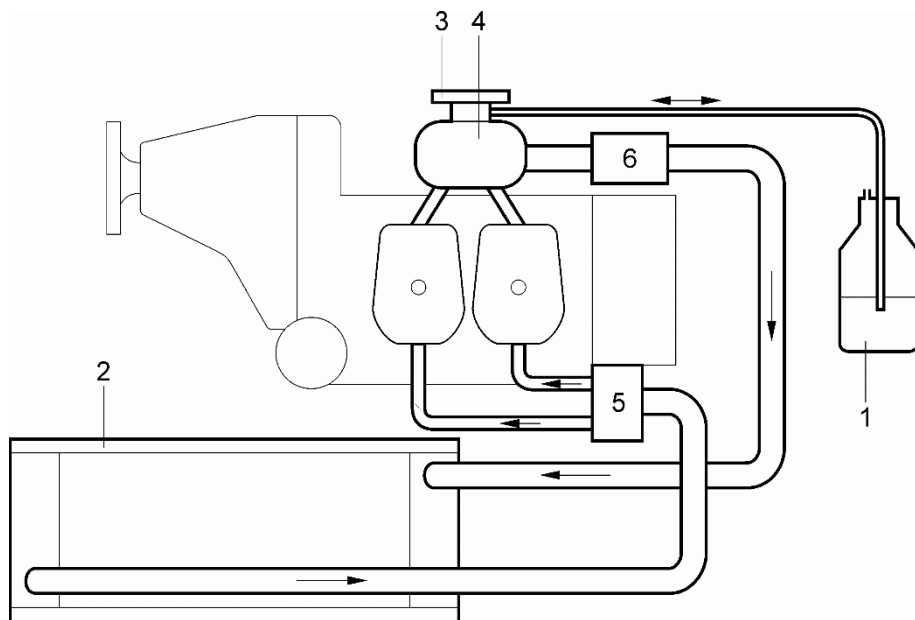


Fig. 10-3: EMS D-120

10.2.1.5 Engine cooling system

Engine cooling is combined, cylinder heads are liquid cooled, and cylinders are air cooled. Cooling circuit of cylinder heads is made as a closed system containing the pump (5, Fig. 10-4), expansion tank (4) with the pressure cap (3), thermostatic valve (6) (if used) and the overflow bottle (1).



- | | |
|-------------------|---------------------------------------|
| 1 Overflow bottle | 4 Expansion tank |
| 2 Cooler | 5 Pump |
| 3 Pressure cap | 6 Thermostatic valve (from S/N C0416) |

Fig. 10-4: Cooling system



10.2.1.6 Engine lubrication system

Engine lubrication system is made with the dry sump. Engine lubrication system is equipped with the mechanically driven oil pump (3, Fig. 10-5) with oil filter (6) which ensures oil supply from the oil tank (4) located on the firewall through the thermostatic valve (9) (if used) and the oil cooler (5) to the lubricated points on the engine. The oil pump is equipped with the pressure relief valve (1) and with the oil pressure sensor (2). The oil tank is ventilated by venting (7), which is connected to hose and is led under the airplane. Oil pressure and temperature are indicated either on the EMS or on the classical analog instruments.

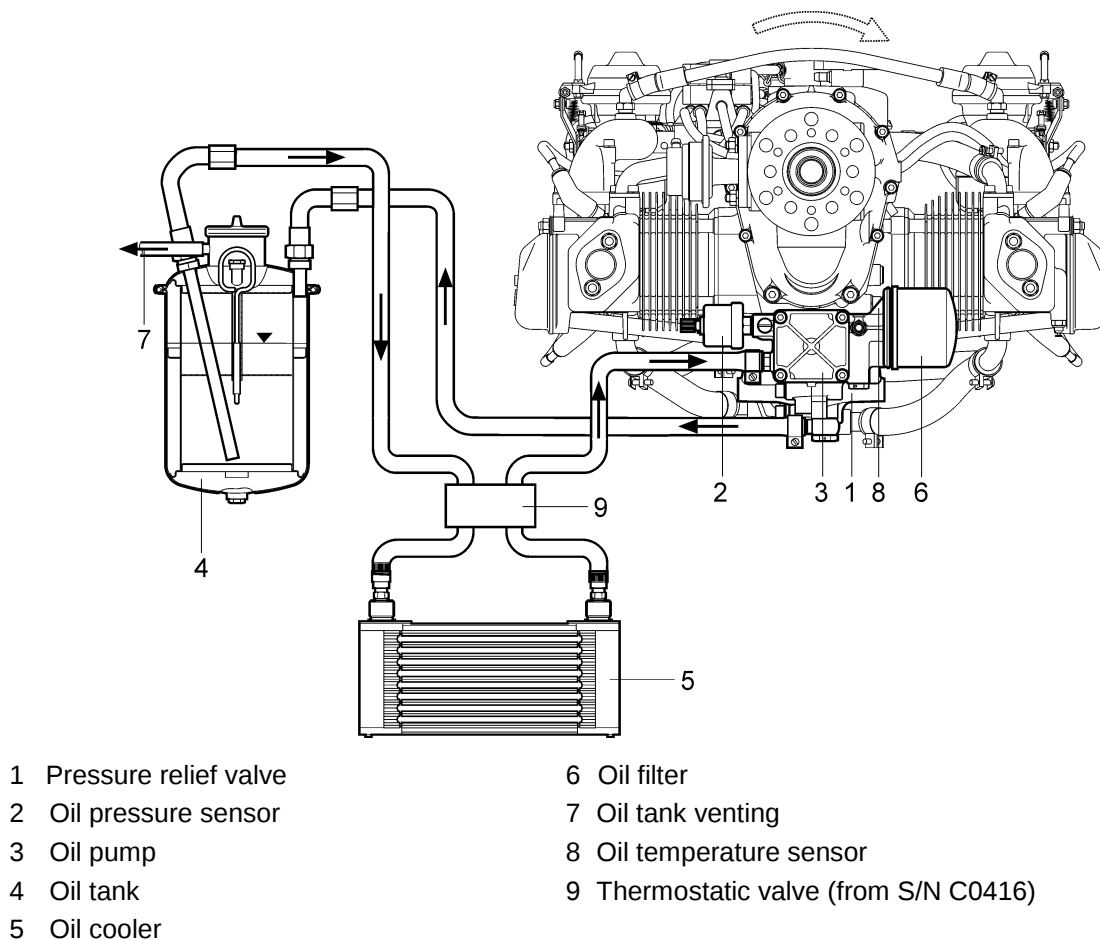


Fig. 10-5: Oil cooling system

10.2.1.7 Engine air inlet system

Engine air inlet system ensures supply of sufficient air volume to the engine. Air is supplied to the engine by the NACA type inlet (left on the engine cowling) through the air filter (4, Fig. 10-6) to the airbox (1). Heated air from the heat exchanger (2), which is attached to the exhaust (3), is controlled by flaps in the airbox. The heating control flaps is controlled by **CARB HEAT** knob (8) on the instrument panel.

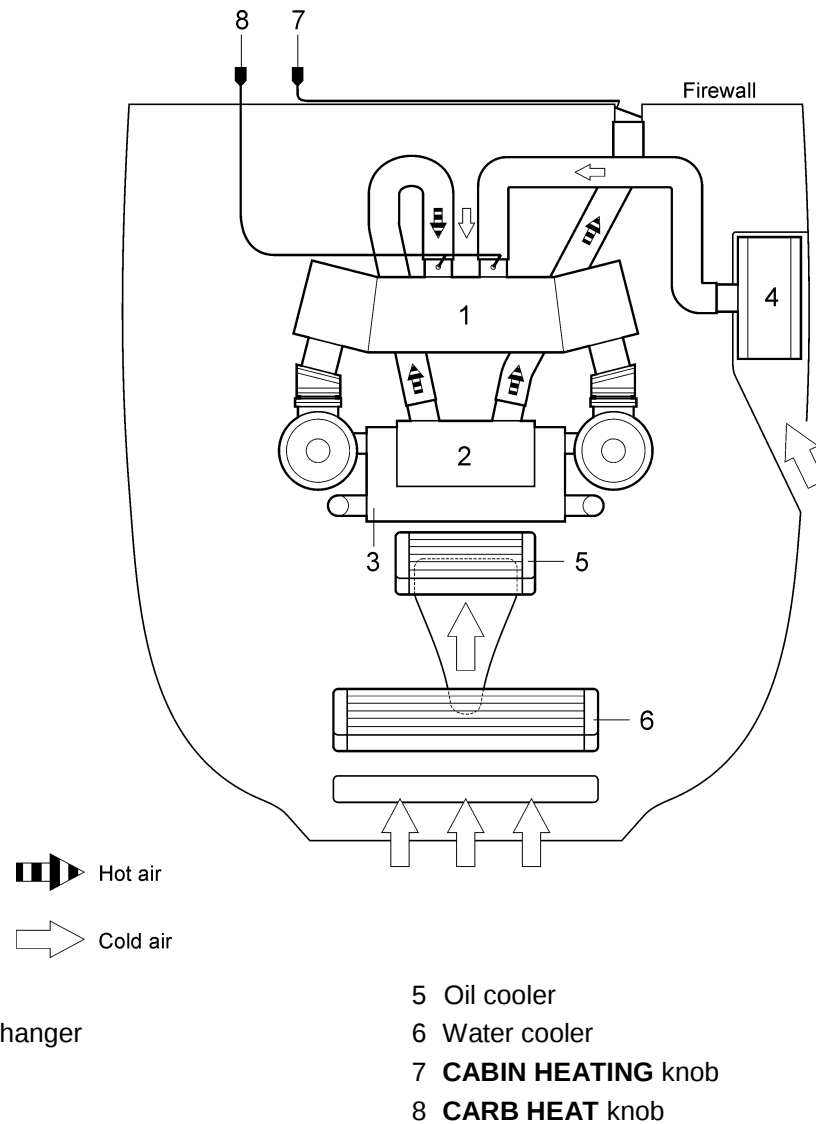


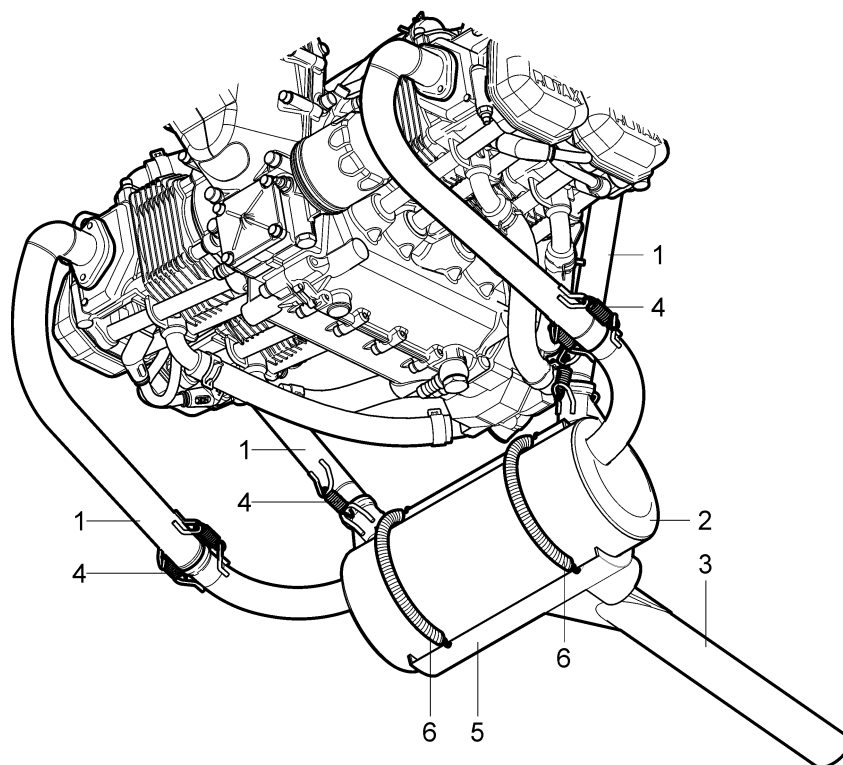
Fig. 10-6: Air inlet system

10.2.1.8 Exhaust system

Exhaust system of SportCruiser / PiperSport airplane consist of four exhaust tubes (1, Fig. 10-7) which lead exhaust gases from individual cylinders to the muffler (2). The muffler serves at the same time as a silencer. Exhaust gases are led from there by the exhaust tube (3) down the airplane.

On the muffler there is a heat exchanger (5) from which is taken the warm air for the carburetor preheating and for the cockpit.

The whole exhaust system is manufactured by welding from the stainless steel sheet.



- | | |
|-----------------------|------------------|
| 1 Exhaust tube | 4 Spring |
| 2 Muffler | 5 Heat exchanger |
| 3 Outlet exhaust tube | 6 Spring |

Fig. 10-7: Exhaust system

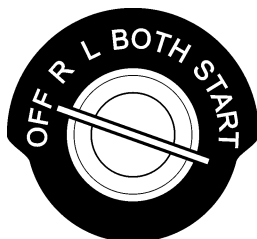
10.2.1.9 Ignition system

The engine is equipped with the double contactless ignition system. Every ignition circuit has its source of energy, control unit, 2-ignition coils and 4-spark plugs. It is fully independent on the other circuit and battery. High voltage current is distributed to the spark plugs by means of high voltage cables. The sequence of individual cylinder ignition of the engine is as follows: 1-4-2-3.

Ignition circuits are controlled by the ignition switch on the instrument panel.

Positions of ignition switch:

OFF	Engine ignition of
R	Only ignition circuit A on (spark plugs 1, 2 top; 3, 4 bottom)
L	Only ignition circuit B on (spark plugs 3, 4 top; 1, 2 bottom)
BOTH	Both circuits on
START	Both circuits on and the starter is running up the engine

**Fig. 10-8:** Ignition selection switch



10.2.2 Propeller

The Woodcomp Klassic is a three-blade ground adjustable composite propeller designed for the airplanes with piston engines with power up to 75 kW (100 hp) and max. propeller speed up to 2,600 rpm.

The Woodcomp SR 3000 is a two-blade electrically operated in flight adjustable propeller of mixed structure designed for the airplanes with piston engines with power up to 85.8 kW (115 hp) and max. propeller speed up to 2,650 rpm.

The angle of blade setting is adjusted by a servomotor controlled from the cockpit and it can be adjusted smoothly in the range from the minimum (fine) angle intended for take-off up to the maximum (coarse) angle. The propeller can operate with either of manual control or with automatic control as a constant speed propeller (see Fig. 10-9).

The Sensenich 2A0R5R70EN propeller is a two-blade ground adjustable composite propeller designed for the airplanes with piston engines with power up to 85.8 kW (115 hp) and max. propeller speed up to 2,600 rpm.

The Sensenich 3B0R5R68C propeller is a three-blade ground adjustable composite propeller designed for the airplanes equipped with engines Rotax 912 / 914 series.

The leading edge of the propeller blades is protected from damaging side by polyurethane tape (Woodcomp) and co-cured bonded stainless steel (Sensenich). The propeller surface is provided with a sprayed-on coat of resistant polyurethane varnish. The composite propeller spinner is a part of the propeller.

The propeller is attached to the engine by means of bolts.

Technical data of the propellers:

Woodcomp propellers

Propeller manufacturer:	Woodcomp s.r.o.	
Propeller type:	Klassic 170/3/R	
Max. speed:	2,600 rpm	
Diameter:	1.712 m	(67.4 in)
Pitch setting:	17.5° ± 0.5°	

Propeller type:	SR 3000/2W	
Max. speed:	2,650 rpm	
Diameter:	1.75 m	(68.9 in)
Range of setting:	12°	

Sensenich propellers

Propeller manufacturer:	Sensenich Propeller Manufacturing Co., Inc.	
Propeller type:	2A0R5R70EN	
Max. speed:	2,600 rpm	
Diameter:	1.78 m	(70 in)



Propeller type:	3B0R5R68C
Max. speed:	5,800 rpm engine
Diameter:	1.73 m (68 in)
Pitch setting:	No. 4

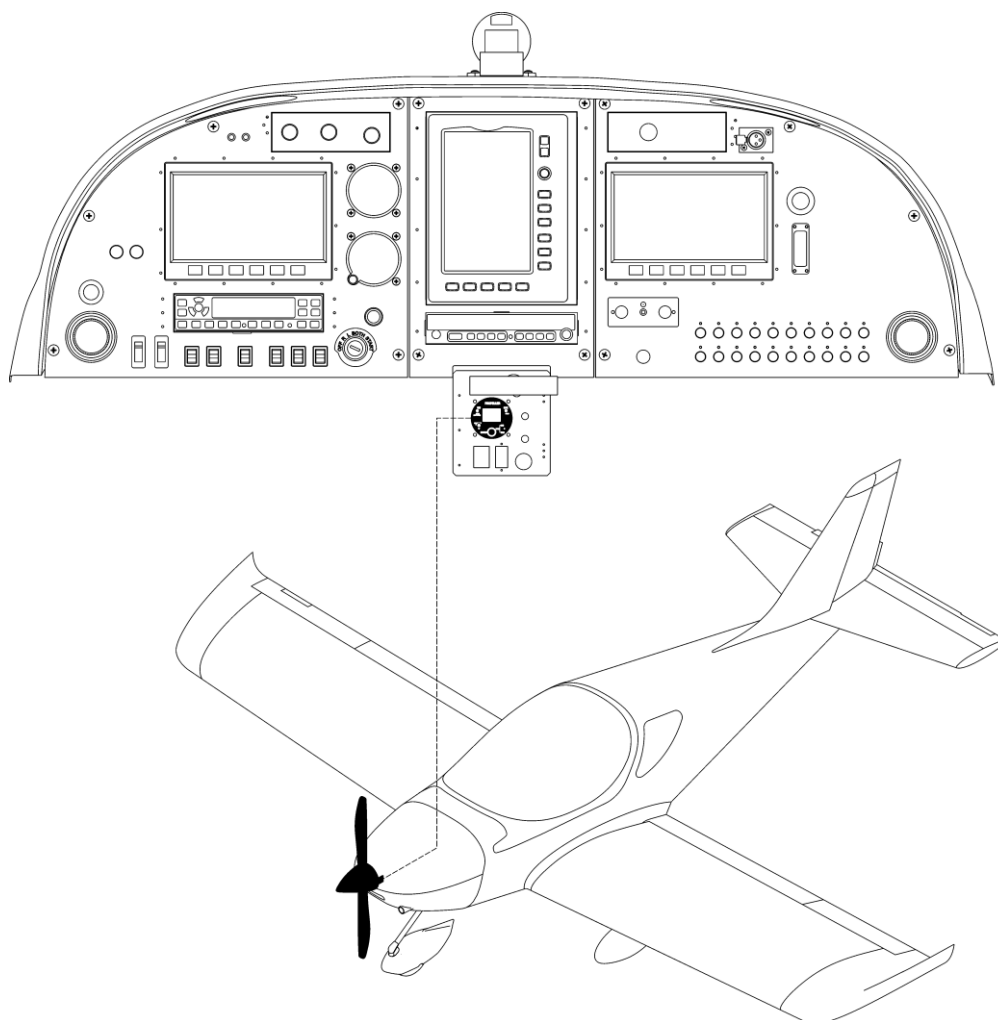


Fig. 10-9: SR 3000 propeller control scheme

- NOTE:
- For detailed information refer to:
 - Operator's Manual Electrical Adjustable Aircraft Propeller SR 3000;
 - EZ-Pitch Composite Aircraft Propeller Installation and Operation Instructions (Doc. No. comp-ac-cf-rev-1a)
 - Sensenich Three Blade Composite Aircraft Propeller Installation and Operation Instructions for Rotax Engines (Doc. No. 3b0r5).



10.3 Removal / Installation

10.3.1 Removal of the engine from the airplane

Type of maintenance: heavy

Authorization to perform:

- See 2.5.1

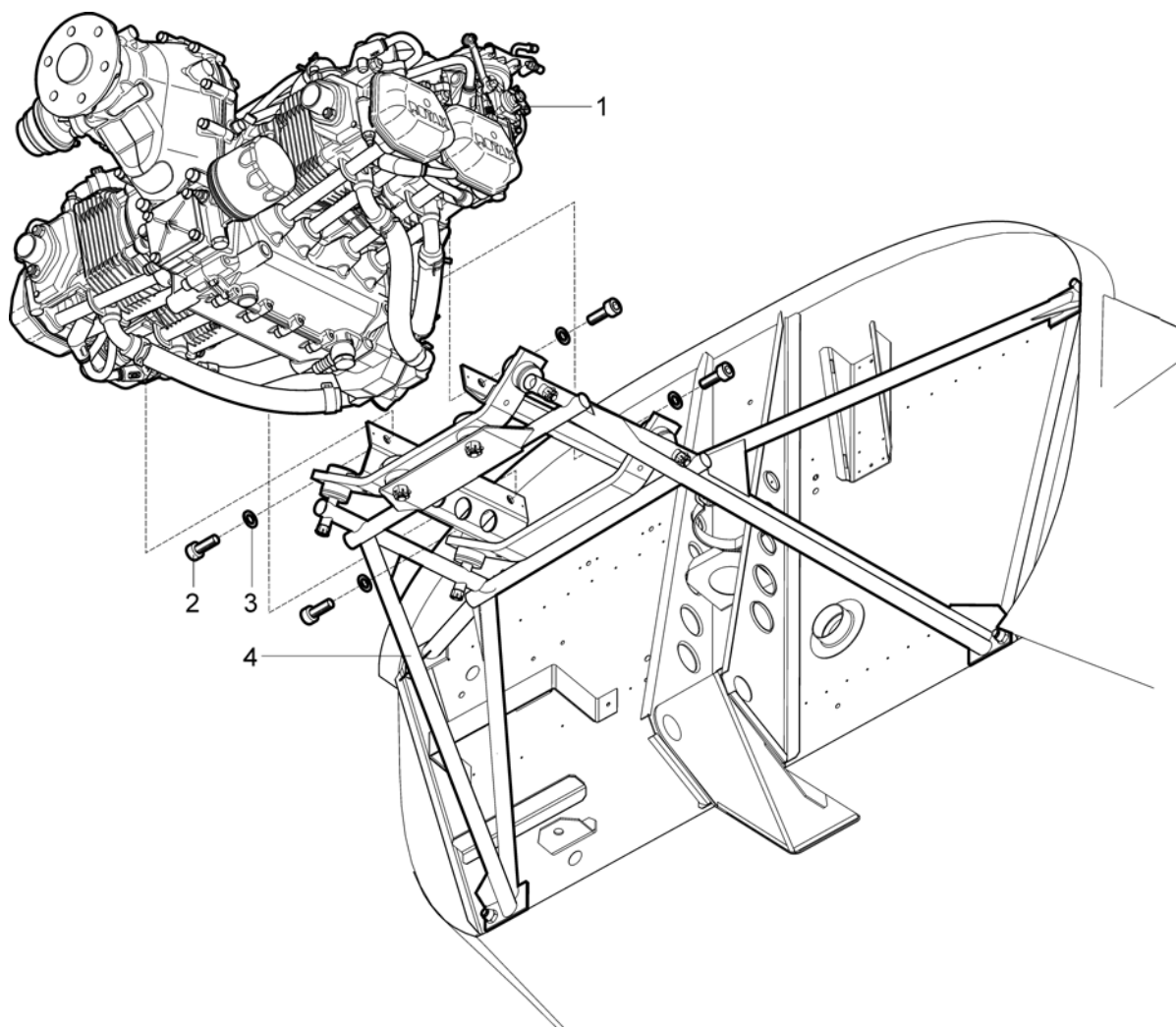
Tools needed:

- wrench size No.8, No.9, 3/8", 7/16", 9/16"
- Allen wrench size No.4
- screwdriver
- cutting pliers, pliers
- Cobra pliers (for clamps)

- (a) Remove engine cowl.
- (b) Disconnect and remove the battery (see 11.3.1).
- (c) Remove the propeller (see 10.3.3 or 10.3.5 or 10.3.7 or 10.3.9).
- (d) Disconnect all electrical system wires and bonding between the engine mount and the firewall.
- (e) Shut the fuel selector valve (possibly drain fuel from the fuel installation).
- (f) Drain oil from the engine (see 10.5.1) and cooling liquid (see 10.5.2).
- (g) Disconnect hoses of the oil and the cooling system.
- (h) Remove the oil cooler (see 10.3.15) and the water cooler (see 10.3.17).
- (i) Disconnect control of carburetors and carburetors heating.
- (j) Remove air intake (see 10.3.11).
- (k) Remove the exhaust system (see 10.3.13).
- (l) Blind all the holes on the engine so that no debris can get into the engine.
- (m) Cut off the wire securing the bolt heads (2, Fig. 10-10).
- (n) Remove bolts (2) and washers (3) attaching the engine to the engine mount (4).
- (o) Take the engine (1) away from the engine mount by the crane or with help 2 assistants.
- (p) Store the removed engine on a safe place on a suitable support and prevent it from damage.

NOTE: For detailed information refer to:

- Installation Manual for ROTAX Engine Type 912 Series (IM-912, P/N 898643);
- Maintenance Manual (Line Maintenance) for ROTAX Engine Type 912 Series (MML-912, P/N 899191)
- Maintenance Manual (Heavy Maintenance) for ROTAX Engine Type 912 Series (MMH-912, P/N 899603)



1 Engine

2 Bolt

3 Washer

4 Engine mount

Fig. 10-10: Engine removal / installation

10.3.2 Installation of the engine on the airplane

Type of maintenance: heavy

Authorization to perform:

- See 2.5.1
- Tools needed:
 - wrench size No.8, No.9, 3/8", 7/16", 9/16"
 - Allen wrench size No.4
 - screwdriver
 - cutting pliers, pliers
 - Cobra pliers (for clamps)

- (a) Put the engine (1, Fig. 10-10) on the engine mount (4) by the crane or with 2 assistants and attach it by the bolts (2) with washers (3). Tighten up to a torque of –40 Nm (354 inch lb).



- (b) Secure the bolt heads (2) by lockwire (see 15.8.2).
- (c) Install the exhaust system (see 10.3.14).
- (d) Connect wiring according the wiring diagrams (see Chapter 16).
- (e) Install the oil cooler (see 10.3.16).
- (f) Install the water cooler (see 10.3.18).
- (g) Connect and secure oil system hoses.
- (h) Connect and secure fuel system hoses.
- (i) Install air intake on the engine (see 10.3.12).
- (j) Connect control cable of the carburetors preheating flap.
- (k) According to the Fig. 10-11 connect control cables of the throttle and the choke on the carburetors control levers. Adjust throttle control (see 10.4.8) and the choke (see 10.4.9).
- (l) Connect the air hose from the heat exchanger for heating the airplane cockpit.
- (m) Fill the prescribed amount oil and cooling liquid quantity.
- (n) Check fuel system tightness (see 9.4.1).
- (o) Install the propeller (see 10.3.4 or 10.3.6 or 10.3.8 or 10.3.10).
- (p) Install and connect the battery (see 11.3.2).
- (q) Install engine cowlings.
- (r) Perform engine test (see 10.4.1).

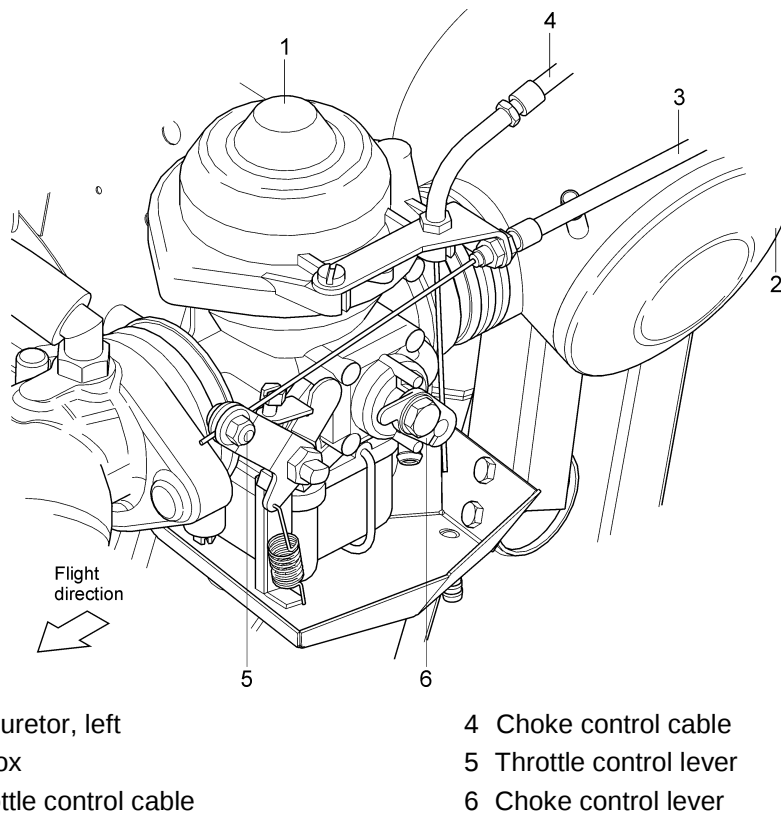


Fig. 10-11: Throttle and choke control connection



10.3.3 Klassic 170/3/R propeller removal

Type of maintenance: line

Authorization to perform:

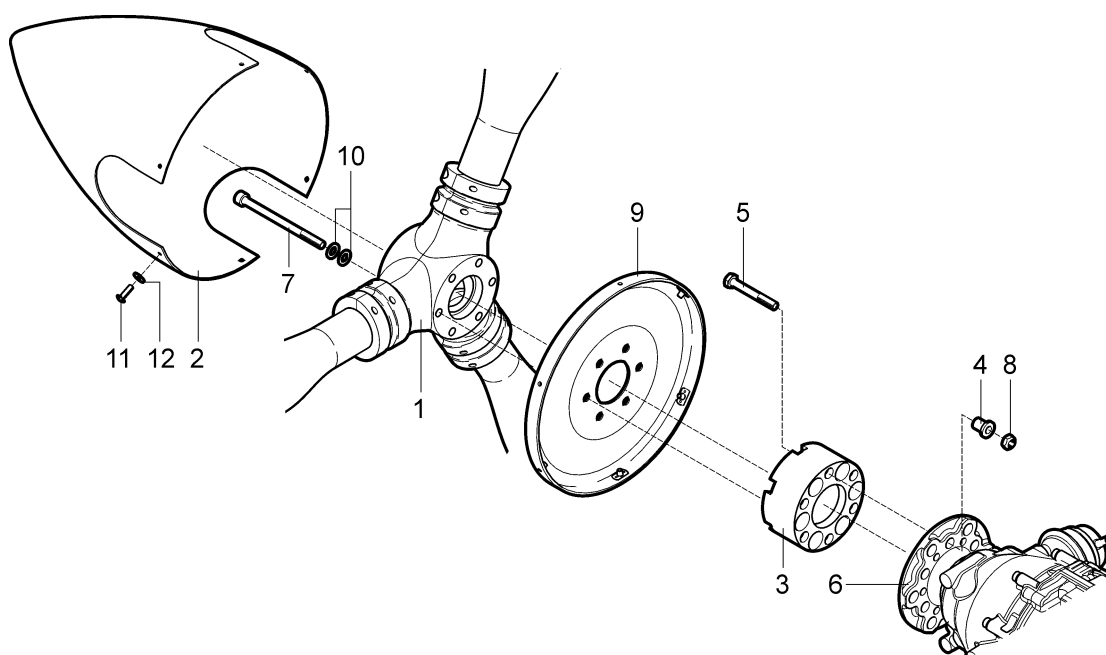
- See 2.5.1

Tools needed:

- wrench size No.13, No. 16 (5/8")
- Allen wrench size No.6
- screwdriver
- cutting pliers, pliers

WARNING: ENGINE IGNITION MUST BE SWITCHED OFF!

- Disconnect the battery and remove upper line of spark plugs from the engine.
- Unscrew the screws (11, Fig. 10-12) with the washers (12) and remove the propeller spinner (1).
- Cut of the wire securing the bolt heads (7).
- Unscrew and remove the bolts (7) with the washers (10) and take out the propeller along with spinner flange (9) from the spacer (3).
- Put the protective covers on the propeller blades and store the propeller on a safe place so that no damage can occur.



- | | |
|--------------------------|---------------------|
| 1 Propeller | 7 Bolt (6 pcs.) |
| 2 Propeller spinner | 8 Nut (6 pcs.) |
| 3 Spacer | 9 Spinner flange |
| 4 Drive bushing (6 pcs.) | 10 Washer (12 pcs.) |
| 5 Bolt (6 pcs.) | 11 Screw (6 pcs.) |
| 6 Propeller flange | 12 Washer (6 pcs.) |

Fig. 10-12: Klassic 170/3/R propeller removal / installation



10.3.4 Klassic 170/3/R propeller installation

Type of maintenance: line

Authorization to perform:

- See 2.5.1

Tools needed:

- wrench size No.13, No. 16 (5/8")
- Allen wrench size No.6
- screwdriver
- cutting pliers, pliers

WARNING: ENGINE IGNITION MUST BE SWITCHED OFF!

- Disconnect the battery and remove upper line of spark plugs from the engine.
- Check the contacting areas of the spacer propeller shaft flange (3, Fig. 10-12) and the propeller. Clear of all impurities.
- Remove protective covers from the propeller blades and carry out visual check of the propeller integrity and condition.
- Check out possibly adjust the blades pitch of propeller according to the propeller manual.

NOTE: Propeller pitch is factory set to $17.5^\circ \pm 0.5^\circ$.

- Attach the propeller (1) and the spinner flange (9) to the spacer (3) on the engine flange (6) by means of the bolts (7) with washers (10).
- Secure the airplane against its movement (see 14.5).
- Tighten the bolts (7) using a star pattern (Fig.10-13) with torque 22 Nm (16.2 ft.lb.), and measure the difference in distance of individual blade tips from marking (see Fig. 10-14).

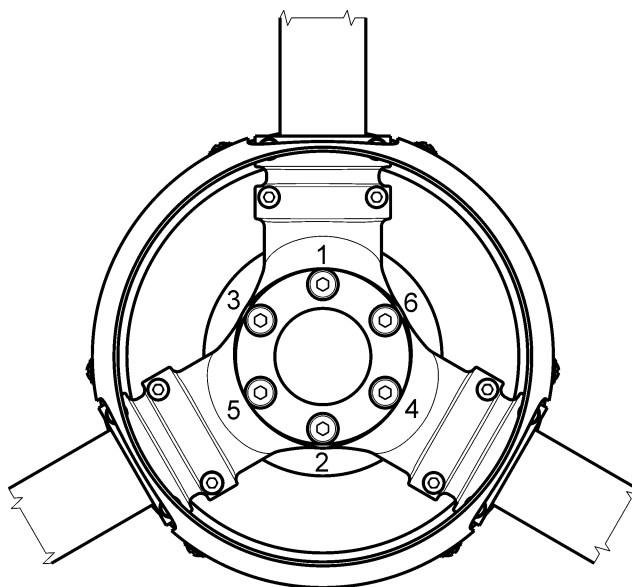


Fig. 10-13: Bolt tightening sequence



- (h) The difference can be max. 1.5 mm (0.06 in). Possible bigger differences can be corrected by repetition the procedure from point (d) or (f).

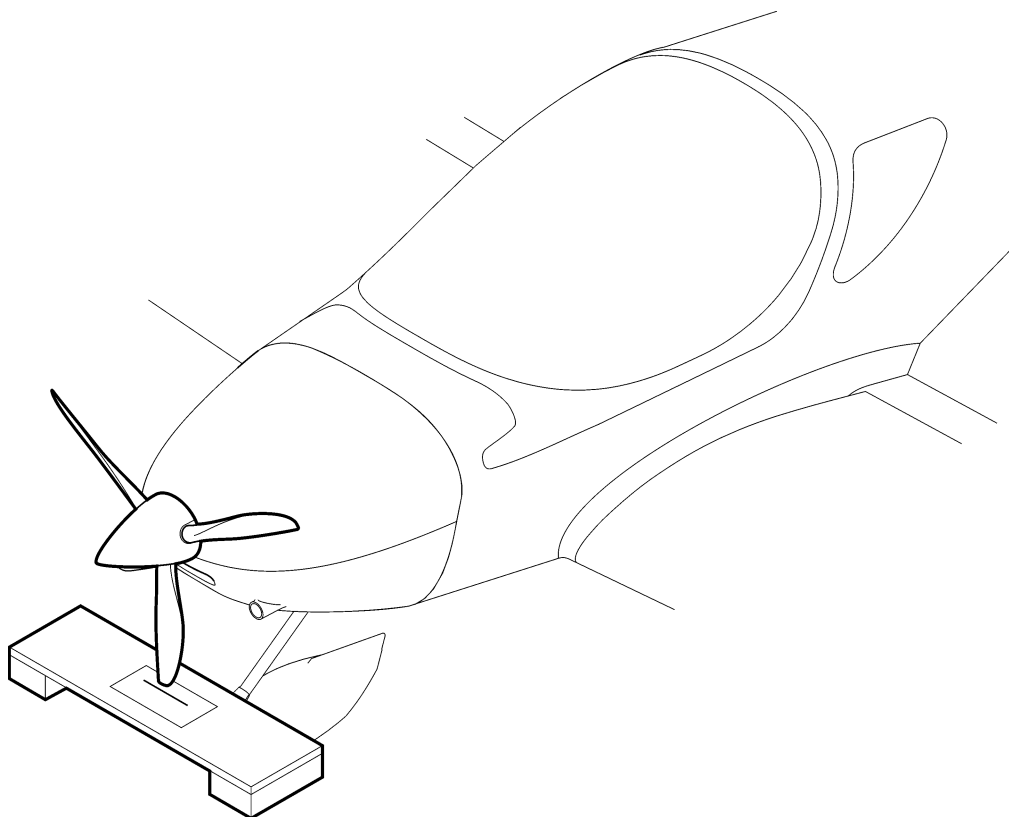


Fig. 10-14: Check of axial propeller running-out

- (i) Secure bolt heads (7, Fig. 10-12) by lockwire (see 15.8.2).
- (j) Put the propeller spinner (1) on the propeller and attach it with bolts (11) with washers (12).
- (k) Install spark plugs to the engine. Tighten up with torque 20 Nm (15 ft.lb.); connect the battery.

10.3.5 SR3000 propeller removal

Type of maintenance: line

Authorization to perform:

- See 2.5.1

Tools needed:

- wrench size No.13
- screwdriver

WARNING: ENGINE IGNITION MUST BE SWITCHED OFF!

- (a) Disconnect the battery and remove upper line of spark plugs from the engine.
- (b) As necessary, unscrew the screws (4, Fig. 10-15) with the washers (5) and remove the propeller spinner (3).



- (c) Unscrew and remove the nuts (8) and take out the propeller from the propeller flange (9).
- (d) Put the protective covers on the propeller blades and store the propeller on a safe place so that no damage can occur.

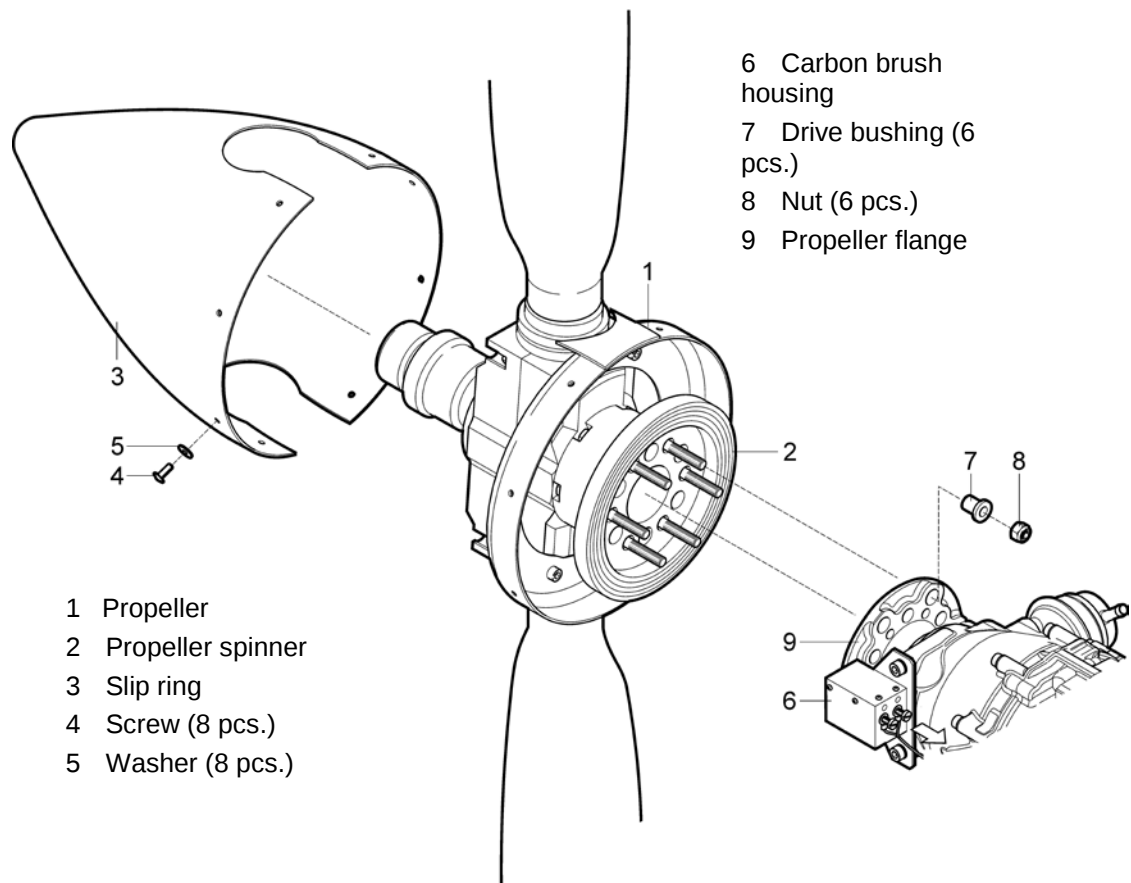


Fig. 10-15: SR 3000 propeller removal / installation

10.3.6 SR3000 propeller installation

Type of maintenance: line

Authorization to perform:

- See 2.5.1

Tools needed:

- wrench size No.13
- screwdriver

NOTE: For detailed information refer to Operator's Manual Electrical Adjustable Aircraft Propeller SR 3000.

WARNING: ENGINE IGNITION MUST BE SWITCHED OFF!

- (a) Disconnect the battery and remove upper line of spark plugs from the engine.
- (b) Check the contacting areas of the propeller flange (9, Fig. 10-15) and the propeller. Clear of all impurities.



- (c) Remove protective covers from the propeller blades and carry out visual check of the propeller integrity and condition.
- (d) Loose the screws of the carbon brush housing flange and shift the carbon brush housing (6) to its rear position.
- (e) Gently push the propeller (1) to the propeller flange (9) by hand and screw the nuts (8).
- (f) Secure the airplane against its movement (see 14.5).
- (g) Tighten the nuts (7) using a star pattern (see Fig.10-13) with torque 22 Nm (16.2 ft.lb.).
- (h) Adjust the carbon brush housing according to Fig. 10-16. Turn the propeller by hand and check that the carbon brushes seat properly in the centers of the slip ring, and makes contact with its entire surfaces.

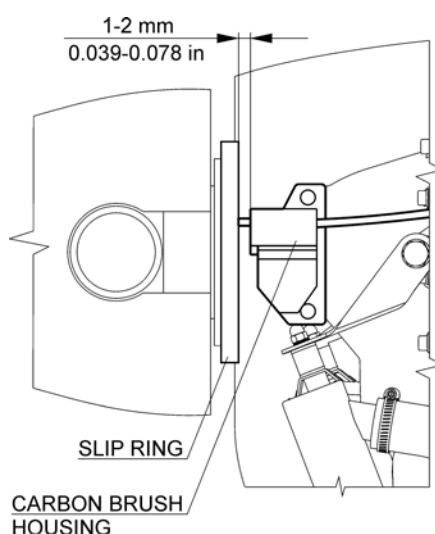


Fig. 10-16: Carbon brush housing adjustment

- (i) As necessary, put the propeller spinner (3, Fig. 10-15) on the propeller and attach it with bolts (4) with washers (5).
- (j) Install spark plugs to the engine. Tighten up with torque 20 Nm (15 ft.lb); connect the battery.

10.3.7 2A0R5R70EN propeller removal

Type of maintenance: line

Authorization to perform:

- See 2.5.1

Tools needed:

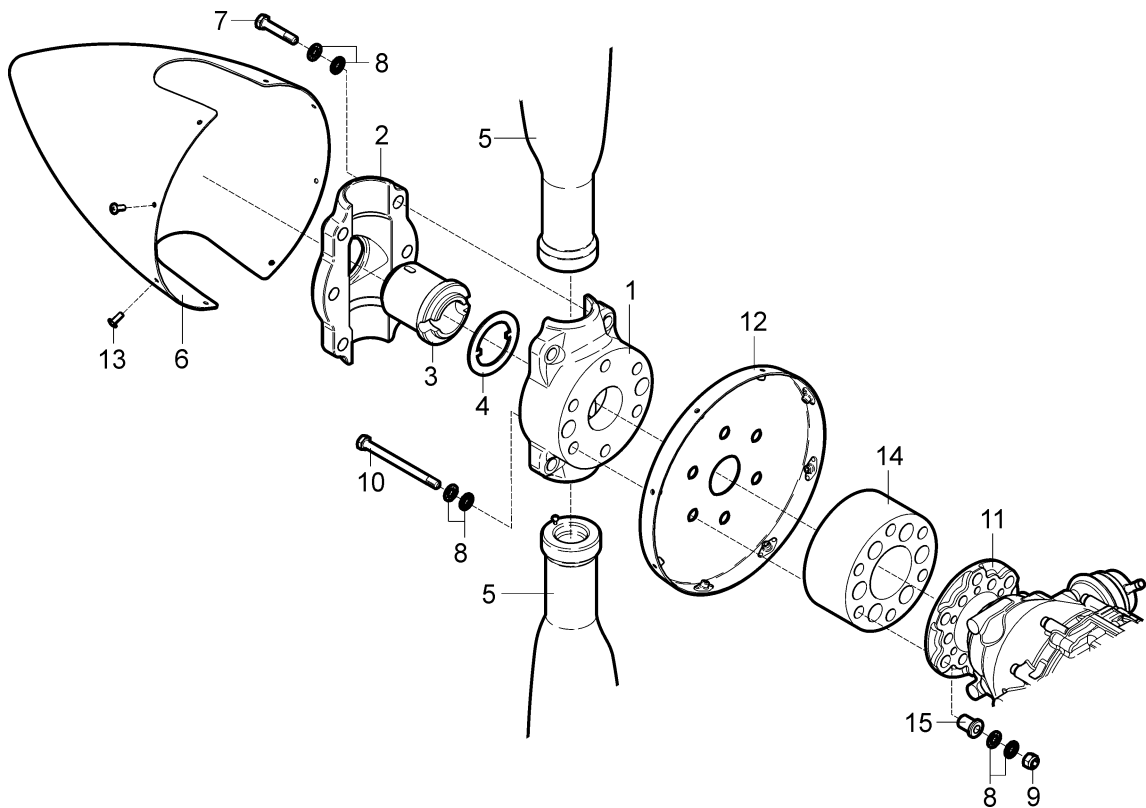
- wrench size No.13, No. 16 (5/8")
- Allen wrench size No. 6
- screwdriver
- cutting pliers, pliers



WARNING: ENGINE IGNITION MUST BE SWITCHED OFF!

NOTE: For propeller removal two persons are requested.

- (a) Disconnect the battery and remove upper line of spark plugs from the engine.
- (b) Unscrew the screws (13, Fig. 10-17) and remove the propeller spinner (6).
- (c) Hold the blade (5); unscrew and remove the bolts (7), washers (8), hub clamp half (2), blades (5) and pitch cylinder (3).
- (d) Put the protective covers on the propeller blades and store the blades on a safe place so that no damage can occur.
- (e) Unscrew the nuts (16), remove the washers (8) bolts (10), bushings (9; 15), hub mount half (1), spinner flange (1) and spacer (14).



- | | |
|-------------------------|---------------------------|
| 1 Hub mount half | 9 Locknut (6 pcs.) |
| 2 Hub clamp half | 10 Bolt (6 pcs.) |
| 3 Pitch cylinder | 11 Propeller flange |
| 4 Pitch stop | 12 Spinner flange |
| 5 Propeller blade | 13 Screw (6 pcs.) |
| 6 Propeller spinner | 14 Spacer |
| 7 Bolt (6 pcs.) | 15 Drive bushing (6 pcs.) |
| 8 Lock washer (36 pcs.) | |

Fig. 10-17: 2A0R5R70EN propeller removal / installation



10.3.8 2A0R5R70EN propeller installation

Type of maintenance: line

Authorization to perform:

- See 2.5.1

Tools needed:

- wrench size No.13, No. 16 (5/8")
- Allen wrench size No. 6
- screwdriver
- cutting pliers, pliers

NOTE: For detailed information refer to EZ-Pitch Composite Aircraft Propeller Installation and Operation Instructions (Doc. No. comp-ac-cf-rev-1a).

WARNING: ENGINE IGNITION MUST BE SWITCHED OFF!

NOTE: For propeller removal two persons are requested.

- Disconnect the battery and remove upper line of spark plugs from the engine.
- Check the contacting areas of the spacer (14, Fig. 10-17), propeller flange (11) and hub halves (1; 2). Clear of all impurities.
- Remove protective covers from the propeller blades and carry out visual check of the propeller part condition.
- Place the spinner flange (12), the hub mount half (1) and spacer (14) on the engine propeller flange (11) (vertical orientation of the hub is recommended).
- Insert drive bushings (15) through the back face of the propeller flange and into the hub mount half (1). Check for proper bushing and pilot stub fit into the hub mount half. The hub must sit flush on the mounting flange.
- Place washers (8) on bolts (10) and insert into the mounting holes inside the hub mount half (1). Place lock washers (8) and nuts (9) on the bolt and tighten the bolts using a star pattern with torque 22 Nm (16.2 ft.lb) (see Fig. 10-18).

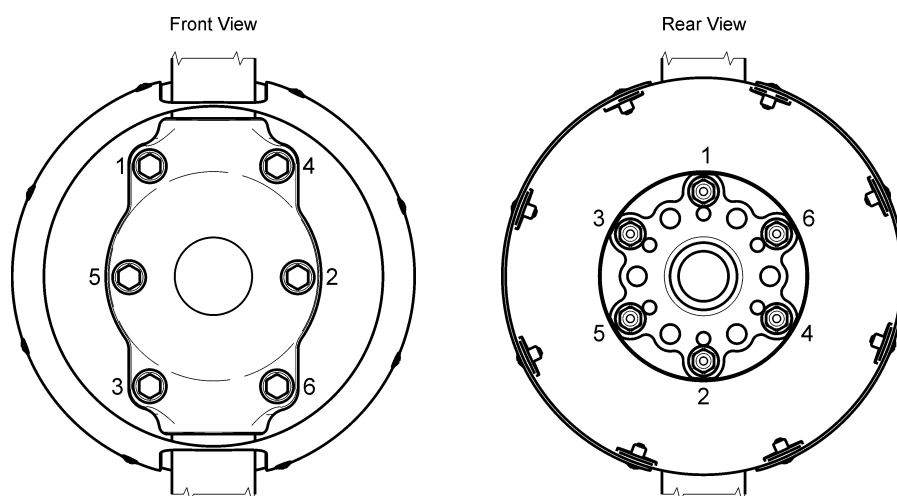


Fig. 10-18: Bolt tightening sequence



CAUTION: THE HUB MUST SIT FLUSH AGAINST THE MOUNTING FLANGE. BOLT BREAKAGE WILL OCCUR IF NOT FLUSH.

- (g) Insert the pitch cylinder (3, Fig. 10-17) into the hub mount half (1), aligning the blade pin slots with the hub barrels. Each blade has a round side and a flat side, with the round side facing forward into the wind. Insert one blade (5) at a time into the hub mounting half (1), taking care to insert the blade pitch pin into the blade pin slot, then rotating the blade shank fully into the hub.
- (h) Place the hub cover half (2) over the blades. Place washers (8) on bolts (7) and insert into the hub cover half (2). Hands tighten the bolts (7) into the threaded clamp bushings, taking care to maintain an even gap between hub halves on all sides. Grasp each blade shank and firmly pull outwards to seat each blade in the hub.
- (i) Set blade pitch by grasping each blade shank and twisting the blades in opposite directions. Align the index mark on the pitch cylinder with the appropriate pitch setting (1, 2, 5) on the hub, as indicated the propeller manual.
- (j) Using a torque wrench and rotating from bolt to bolt, tighten the bolts the bolts using a star pattern with torque 22 Nm (16.2 ft.lb.) (see Fig. 10-18), Check the blade pitch setting for rotation away from your desired pitch setting. Once properly torqued, a small gap may remain between hub halves. Check the propeller blades for track (see Fig. 10-14). The blades should track within 1/8" (3.175 mm) of each other at the tip. Setting the pitch accurately is more important than track from blade to blade.
- (k) Install spark plugs to the engine. Tighten up with torque 20 Nm (15 ft.lb.); connect the battery.
- (l) Run the propeller for approximately 5 minutes at 50% of the desired rpm. Check the clamping bolts to see if they have lost torque. If they have, it is because the blades have firmly seated themselves. Tighten again to the proper torque.

Note: This torque value should be checked after the first 5 hours of operation and every 25 hours thereafter.

- (m) Put the propeller spinner (6, Fig. 10-17) on the propeller and attach it with bolts (13).

10.3.9 3B0R5R68C propeller removal

Type of maintenance: line

Authorization to perform:

- See 2.5.1

Tools needed:

- wrench size No.13
- Allen wrench size No. 6
- screwdriver

WARNING: ENGINE IGNITION MUST BE SWITCHED OFF!

- (a) Disconnect the battery and remove upper line of spark plugs from the engine.



- (b) Unscrew the screws (10, Fig. 10-19) with the washers (11) and remove the propeller spinner (2).
- (c) Unscrew and remove the nuts (6), the washers (7) and take out the propeller (1) along with the spinner flange (9) and spacer (3) from the propeller flange (12).
- (d) Put the protective covers on the propeller blades and store the propeller on a safe place so that no damage can occur.

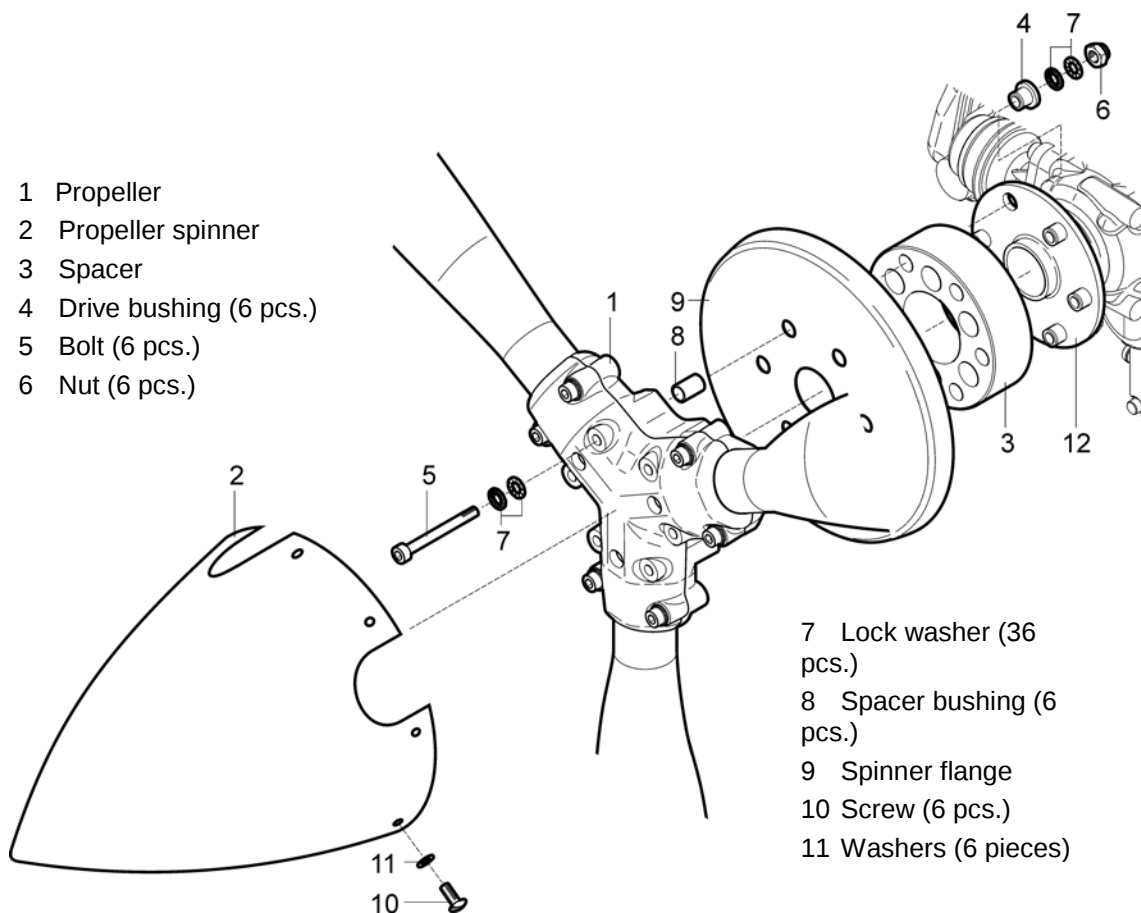


Fig. 10-19: 3B0R5R68C propeller removal / installation

10.3.10 3B0R5R68C propeller installation

Type of maintenance: line

Authorization to perform:

- See 2.5.1

Tools needed:

- wrench size No.13
- Allen wrench size No. 6
- screwdriver

NOTE: For detailed information refer to Sensenich Three Blade Composite Aircraft Propeller Installation and Operation Instructions for Rotax Engines (Doc. No. 3b0r5).

**WARNING: ENGINE IGNITION MUST BE SWITCHED OFF!**

- (a) Disconnect the battery and remove upper line of spark plugs from the engine.
- (b) Check the contacting areas of the propeller flange (12, Fig. 10-19), propeller (1) and spacer (3). Clear of all impurities.
- (c) Remove protective covers from the propeller blades and carry out visual check of the propeller integrity and condition.
- (d) Check out possibly adjust the blades pitch of propeller according to the propeller manual.

NOTE: Propeller pitch is factory set to No. 4.

- (e) Insert bushings (8) into the propeller hub from the back side.
- (f) Place washers (7) on the bolts (5) and insert the bolts through the assembled propeller hub.

NOTE: Each washer (7) works in pairs with the “ramped” sides facing each other. No other washers may be used in combination with those washers.

- (g) Insert bushings (4) into the engine flange (12) from the back side, protruding into the spacer.
- (h) Place spinner flange (9), spacer (3) and the assembled propeller (1) on the propeller mounting flange (12). The hub must sit flush on the mounting flange.

CAUTION: THE HUB MUST SIT FLUSH AGAINST THE MOUNTING FLANGE. BOLT BREAKAGE WILL OCCUR IF NOT FLUSH.

- (i) Place washers (7) on the bolt threads (5) and hand thread the nuts (6) up to the plastic stops.
- (j) Using a calibrated torque wrench, torque the bolts (5) evenly using a star pattern. Tighten the bolts in several increments up to full torque, such as 50 %, 75 %, and full torque 24 – 27 Nm (18 – 20 *ft.lb.*).
- (k) Check the propeller blades for track. The blades should track within 3/16” (4.8 mm) of each other at the tip (see Fig. 10-14). Setting the pitch accurately is more important than track from blade to blade.
- (l) Install spark plugs to the engine. Tighten up with torque 20 Nm (15 *ft.lb.*); connect the battery.
- (m) Run the propeller for approximately 5 minutes at 50% of the desired rpm. Check the clamping bolts to see if they have lost torque. If they have, it is because the blades have firmly seated themselves. Tighten again to the proper torque.

Note: This torque value should be checked after the first 5 hours of operation and every 25 hours thereafter.

- (n) Put the propeller spinner (2, Fig. 10-19) on the propeller and attach it with screws (10) and washers (11).



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10.3.11 Air intake system removal

Type of maintenance: line

Authorization to perform:

- Sport pilot, Repairman (LS-M) or Mechanic (A&P)

Tools needed:

- wrench size No.8, No.10
- screwdriver

WARNING: ENGINE IGNITION MUST BE SWITCHED OFF!

- Remove the upper engine cowling.
- Disconnect the control cable (13, Fig. 10-20) from the air intake changeover lever (14) and from the holder.
- Remove the hose fasteners (4; 5; 16) and disconnect hoses (2; 3), drain hoses (6; 7), and air hoses (8; 15).
- Unscrew nut (12), remove washer (11), silentblock (9), and disconnect the bracket (10).
- Remove the airbox from the engine and store it.

10.3.12 Air intake system installation

Type of maintenance: line

Authorization to perform:

- Sport pilot, Repairman (LS-M) or Mechanic (A&P)

Tools needed:

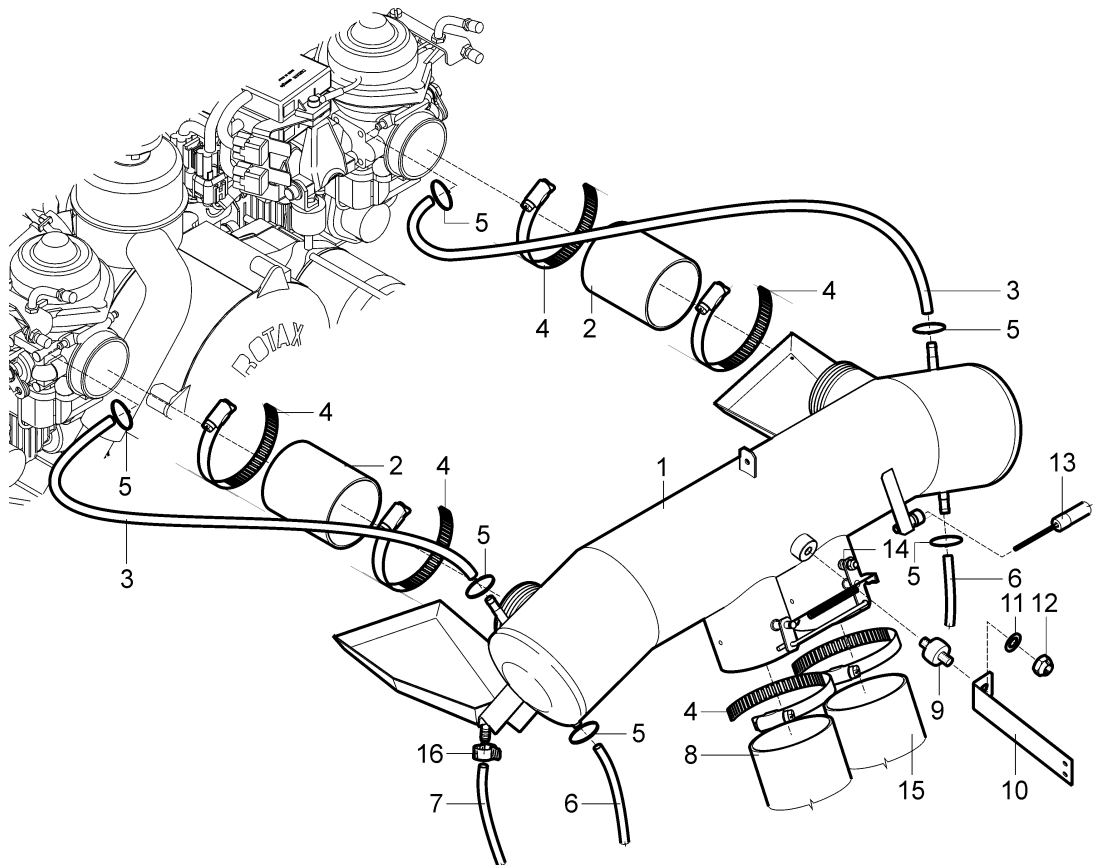
- wrench size No.8, No.10
- screwdriver

WARNING: ENGINE IGNITION MUST BE SWITCHED OFF!

- Attach the outlet pipe of the airbox (1, Fig. 10-20) to the hoses (2) on the carburetor inlet necks; secure it by means of the hose clamps (4).
- Fix the airbox by means of the bracket (10), silentblock (9), nut (12) and washer (11) to the firewall.
- Connect the air intake hoses to the airbox (1), one (8) from the air filter on the lower engine cowling and the other (15) from the heat exchanger; secure them by hose clamps (4).

CAUTION: DO NOT CONFUSE THESE HOSES!

- Connect drain hoses (6) to the airbox (1) and the drain hoses (7) to the drip trays under carburetors - lead them on the engine mount in direction down the airplane and secure them by hose fasteners (5; 16). (fix them by cable ties on the engine mount).
- Connect the carburetors control cable of (13) to the lever (14); adjust function of carburetors heating knob.
- Install the upper engine cowling.



- | | |
|---------------------------------------|--------------------------------|
| 1 Airbox | 9 Silentblock |
| 2 Hose connecting airbox / carburetor | 10 Bracket |
| 3 Hose | 11 Washer |
| 4 Hose clamp | 12 Nut |
| 5 Cable tie | 13 Control cable |
| 6 Drain hose | 14 Air intake changeover lever |
| 7 Drain hose | 15 Air hose – preheated air |
| 8 Air hose – cold air | 16 Hose clamp |

Fig. 10-20: Air intake system removal / installation

10.3.13 Exhaust system removal

Type of maintenance: line

Authorization to perform:

- See 2.5.1

Tools needed:

- wrench size No.13
- pliers
- small wire hook (spring removal/assembly jig)

WARNING: ENGINE IGNITION MUST BE SWITCHED OFF!

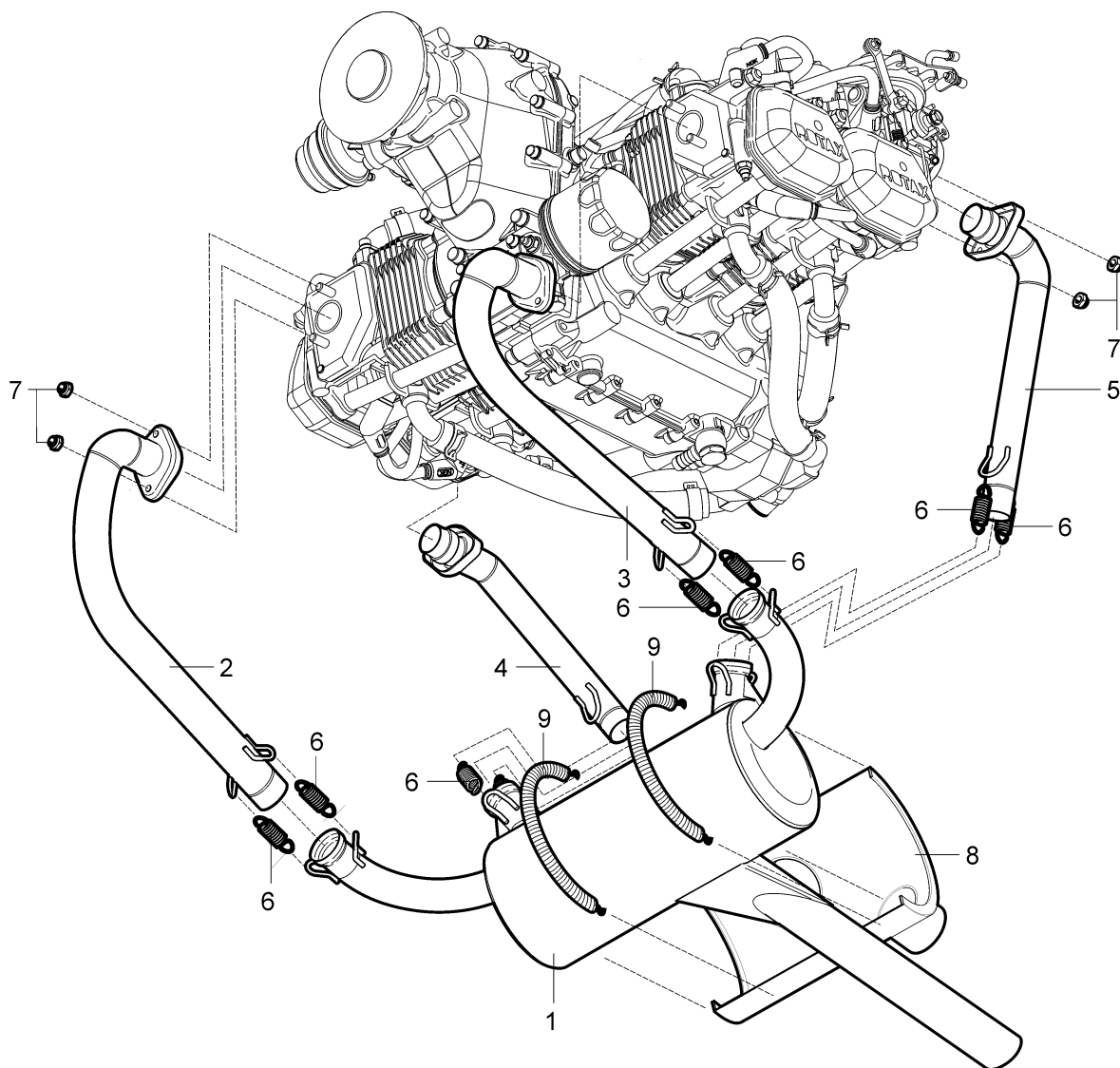
(a) Remove engine cowlings.

(b) Disconnect air hoses from the heat exchanger (8, Fig. 10-20) (see 10.3.11).



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- (c) Remove lockwire securing the springs (9, Fig. 10-21).
- (d) Remove the springs (9) and dismantle the heat exchanger (8) from the muffler (1).
- (e) Remove the springs (6) from the individual exhaust tubes (2; 3; 4; 5) and carefully remove muffler (1).
- (f) Unscrew nut (7) and remove exhaust tubes (2; 3; 4; 5) from the necks on the engine.



- 1 Muffler
- 2 Exhaust tube 1
- 3 Exhaust tube 2
- 4 Exhaust tube 3
- 5 Exhaust tube 4

- 6 Spring
- 7 Locknut
- 8 Heat exchanger
- 9 Spring

Fig. 10-21: Exhaust system removal / installation



10.3.14 Exhaust system installation

Type of maintenance: line

Authorization to perform:

- See 2.5.1

Tools needed:

- wrench size No.13
- pliers
- small wire hook (spring removal/assembly jig)

WARNING: ENGINE IGNITION MUST BE SWITCHED OFF!

- (a) Install the exhaust tubes (2; 3; 4; 5, Fig. 10-21) to the engine necks.

Mind a proper arrangement, each tube is designed for specific necks.

Screw the nuts (7) on the bolts of the engine exhaust necks, do not tighten the nuts.

- (b) To all muffler ball joints apply heat resistant lubricant (e.g. Loctite Antiseize).

- (c) Install the muffler (1) to the exhaust tubes (2; 3; 4; 5) and secure the tubes by means of the springs (6); secure springs with the lockwire (see 15.8.2).

- (d) Gradually tighten all nuts (7) of the flanges on the engine necks – tightening torque 12 – 20 Nm (9 – 14 ft.lb)..

NOTE: Ensure the sufficient space between the exhaust pipes and the other installed parts.

- (e) Put on muffler (1) heat exchanger (8) and secure it by means of springs (9).

- (f) Install air hoses on the heat exchanger (see 10.3.12).

- (g) Install engine cowlings.

10.3.15 Oil cooler removal

Type of maintenance: line

Authorization to perform:

- Sport pilot, Repairman (LS-M) or Mechanic (A&P)

Tools needed:

- wrench size No.19, No.30

WARNING: ENGINE IGNITION MUST BE SWITCHED OFF!

- (a) Remove the upper and lower engine cowling.

- (b) Drain oil from the oil system (see 10.5.1).

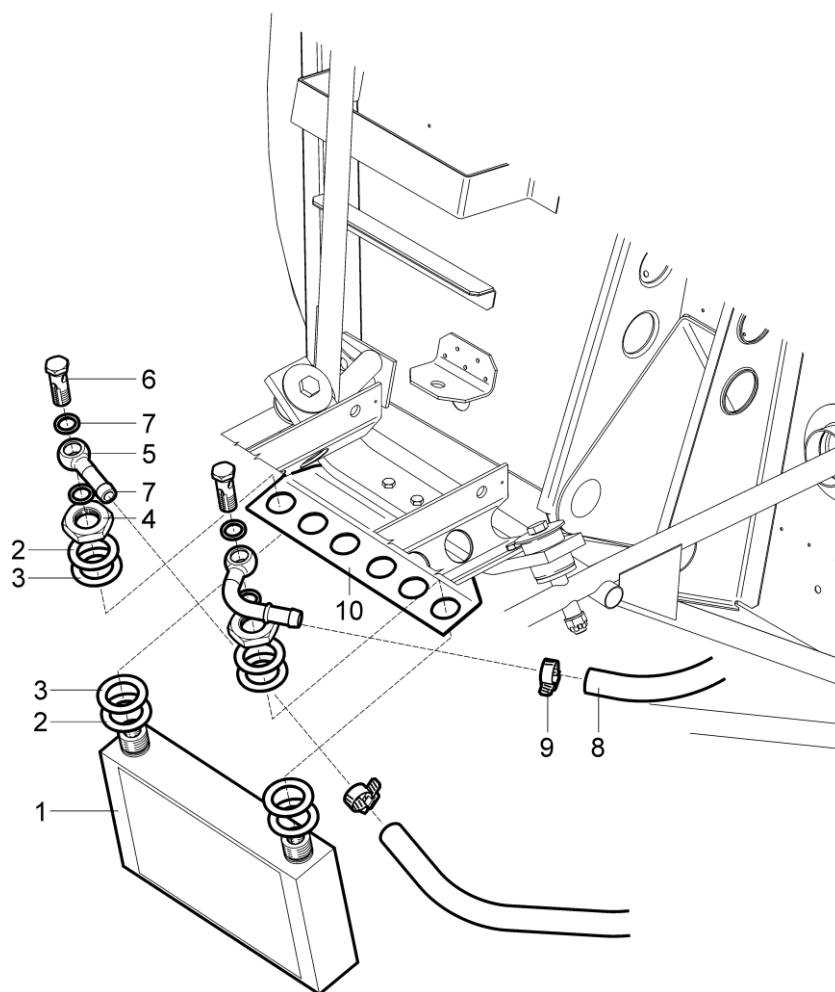
NOTE: It is also possible to pump oil from the cooler to the oil tank. You can do it by manual running the engine by means of the propeller, whereas from the oil tank you will remove the hose leading to the oil cooler.

- (c) Remove lockwire securing banjo bolts (6, Fig. 10-22).

- (d) Loose hose clamps (9), and disconnect hoses (8) from the banjo fittings (5).

- (e) Remove banjo bolts (6), banjo fittings (5), and sealing rings (7) from the oil cooler necks.

- (f) Unscrew nuts (4), remove the upper pairs of washers (2; 3), and cooler (1).



- | | |
|-----------------|----------------|
| 1 Oil cooler | 6 Banjo bolt |
| 2 Washer | 7 Sealing ring |
| 3 Rubber washer | 8 Hose |
| 4 Nut | 9 Hose clamp |
| 5 Banjo fitting | |

Fig. 10-22: Oil cooler removal / installation

10.3.16 Oil cooler installation

Type of maintenance: line

Authorization to perform:

- Sport pilot, Repairman (LS-M) or Mechanic (A&P)

Tools needed:

- wrench size No.19, No.30

WARNING: ENGINE IGNITION MUST BE SWITCHED OFF!

- Set the oil cooler (1, Fig. 10-22) to the bracket (10) and on the cooler necks install the upper pairs of washers (2; 3), and gradually tight the nuts (4).
- Install the banjo fittings (5), screw the banjo bolts (6) with sealing rings (7) and secure these bolts with the lockwire (see 15.8.2).



- (c) Install hoses (8) on the banjo fittings (5) and secure them with hose clamps (9).
- (d) Fill the oil system with oil (see 10.5.1) and check oil system tightness.
- (e) Install the lower and upper engine cowling.

10.3.17 Water cooler removal

Type of maintenance: line

Authorization to perform:

- Sports pilot, Repairman (LS-M) or Mechanic (A&P)

Tools needed:

- wrench size No.10, No.17
- screwdriver

WARNING: ENGINE IGNITION MUST BE SWITCHED OFF!

- (a) Remove the upper and lower engine cowling.
- (b) Drain the cooling liquid from the cooling system (see 10.5.2).
- (c) Remove the hose clamps (9, Fig. 10-23) and disconnect hoses (10; 12) from the cooler outlets.
- (d) Loose the bolts (7).
- (e) Remove four nuts (5), washers (6) and cooler (1).
- (f) As necessary, remove the silentblocks (4) from the cooler.

10.3.18 Water cooler installation

Type of maintenance: line

Authorization to perform:

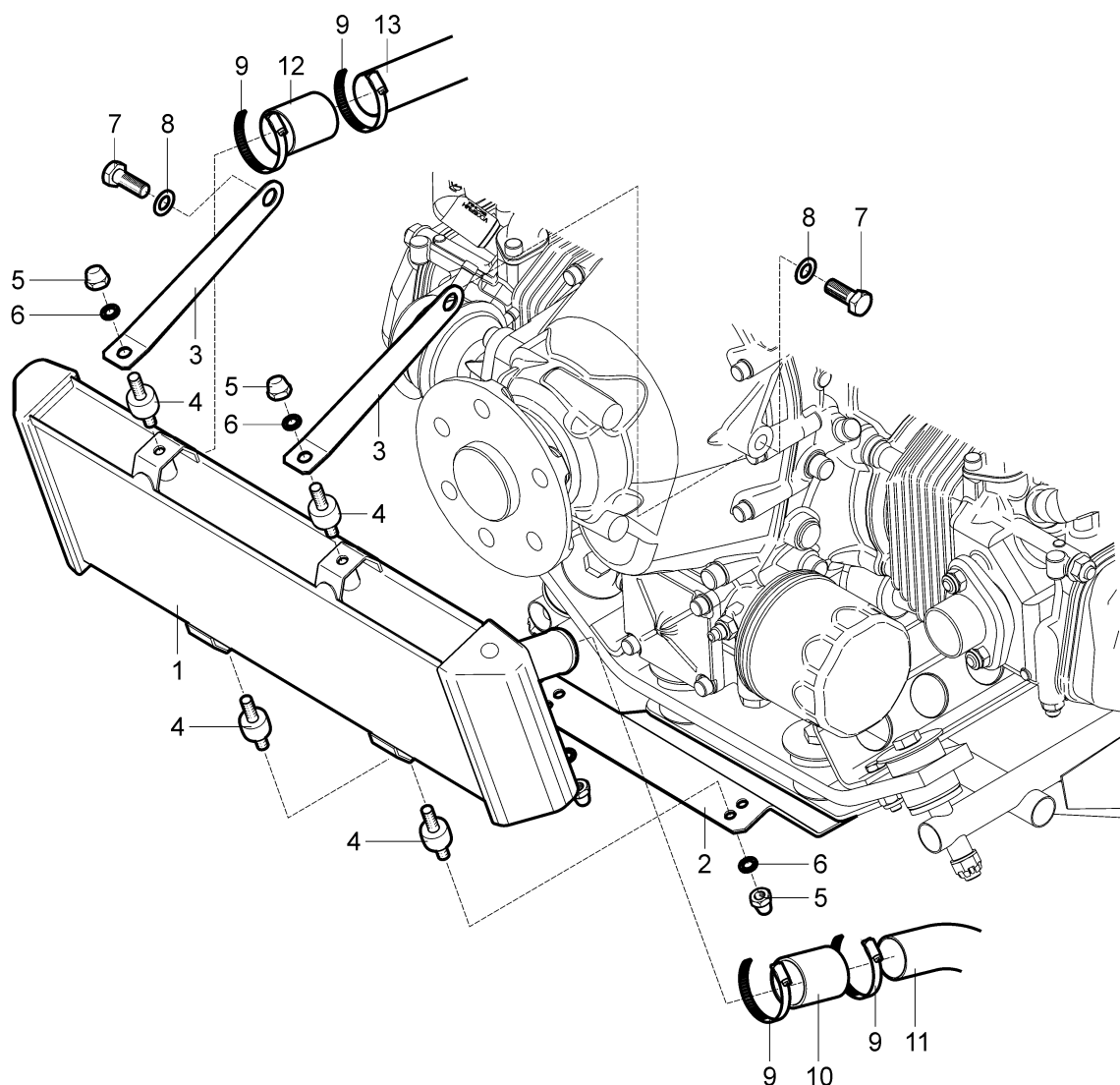
- Sports pilot, Repairman (LS-M) or Mechanic (A&P)

Tools needed:

- wrench size No.10, No.17
- screwdriver

WARNING: ENGINE IGNITION MUST BE SWITCHED OFF!

- (a) As necessary, screw the silentblocks (4, Fig. 10-23) to the cooler.
- (b) Put the cooler on the lower (2) and the upper brackets (3).
- (c) Install the washers (6), screw and tighten the nuts (5); tighten the bolts (7).
- (d) Install hoses (10) on the cooler outlets and secure them with hose clamps (9).
- (e) Fill the cooling system with cooling liquid (see 10.5.2) and check system tightness.
- (f) Install the lower and upper engine cowling.



- | | |
|-----------------|--------------|
| 1 Cooler | 8 Washer |
| 2 Lower bracket | 9 Hose clamp |
| 3 Upper bracket | 10 Hose |
| 4 Silentblock | 11 Tube |
| 5 Cap nut | 12 Hose |
| 6 Lock washer | 13 Tube |
| 7 Bolt | |

Fig. 10-23: Water cooler removal / installation

10.3.19 Throttle and choke control levers removal

Type of maintenance: line

Authorization to perform:

- See 2.5.1

Tools needed:

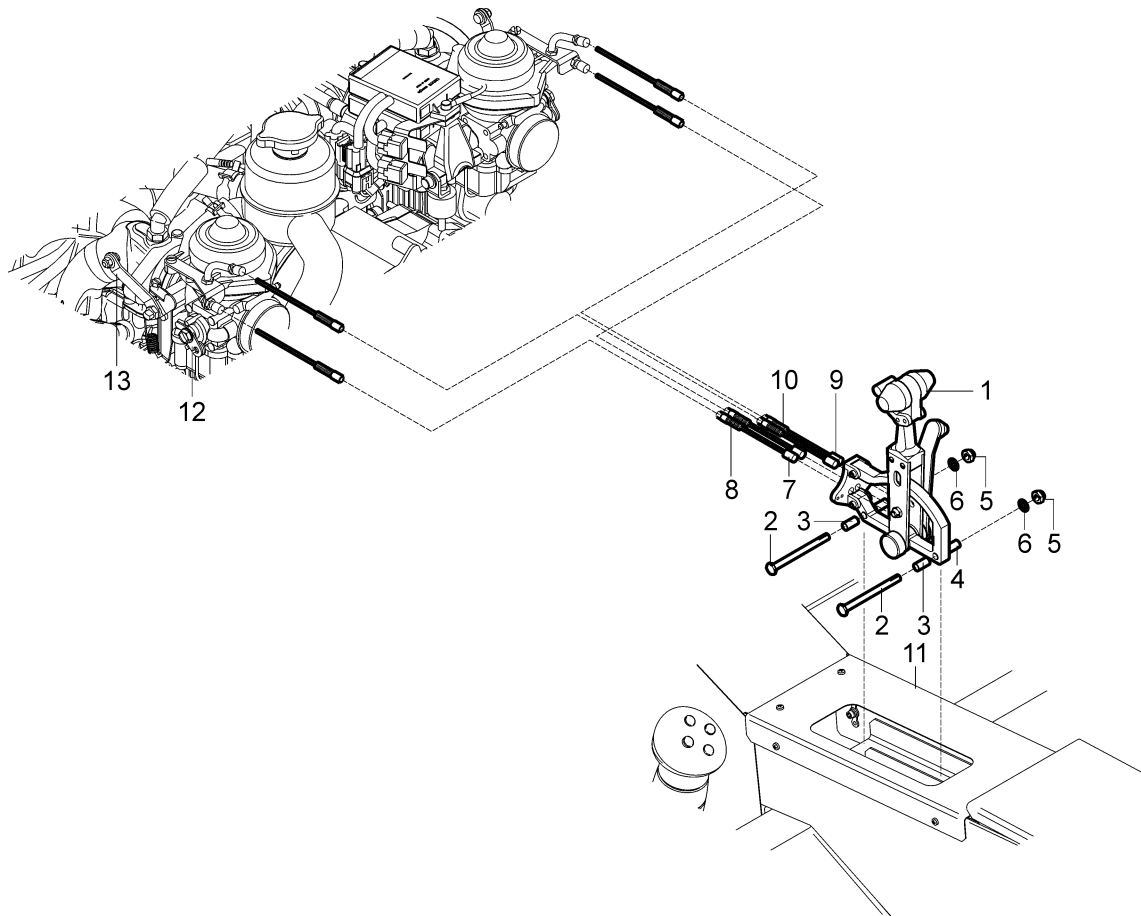
- wrench size No.14
- Allen wrench size No. 2



- screwdriver
- cutting pliers

WARNING: ENGINE IGNITION MUST BE SWITCHED OFF!

- Remove the cover (11, Fig. 10-24) from the middle channel.
- Remove the upper engine cowling.
- Disconnect the throttle (7) and choke (9) cables from carburetor levers (12; 3) and from the throttle and choke control levers (1).
- Unscrew the nuts (5), remove washers (6), bolts (2), bushings (3; 4) and the throttle control lever with choke (1) from the middle channel.



- | | |
|-------------------------------------|-------------------|
| 1 Throttle control lever with choke | 8 Throttle bowden |
| 2 Bolt | 9 Choke cable |
| 3 Bushing | 10 Choke bowden |
| 4 Bushing | For information: |
| 5 Nut | 11 Cover |
| 6 Washer | 12 Choke lever |
| 7 Throttle cable | 13 Throttle lever |

Fig. 10-24: Throttle control lever



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10.3.20 Throttle and choke control levers installation

Type of maintenance: line

Authorization to perform:

- See 2.5.1

Tools needed:

- wrench size No.14
- Allen wrench size No. 2
- screwdriver
- cutting pliers

WARNING: ENGINE IGNITION MUST BE SWITCHED OFF!

- Set the throttle control lever with choke (1, Fig, 10-24) into the middle channel.
- From one side shift the bolts (2) into the holes on the middle channel side.
- Gradually put first bushings (3), throttle control lever with choke (1) and second bushings (4) on the wheel bolts (2) according to the figure.
- Install washers (6), screw and tighten nuts (5).
- Connect the throttle (7) and choke (9) cables to the throttle control lever with choke (1), and to the carburetor levers (12; 13).
- Install the cover (11) on the middle channel.
- Install the upper engine cowling.
- Check for continuous travel of the throttle and choke control lever.
- Adjust the throttle / choke control (see 10.4.8, 10.4.9).

10.3.21 Carburetors heating knob removal

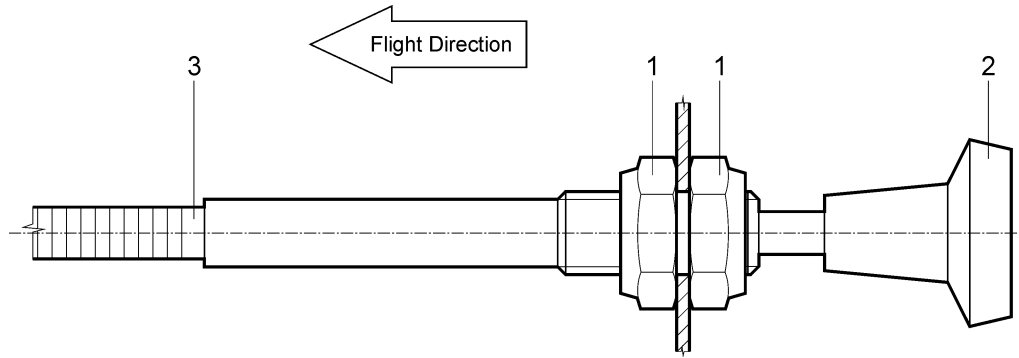
Type of maintenance: line

Authorization to perform:

- Sports pilot, Repairman (LS-M) or Mechanic (A&P)

Tools needed:

- wrench size No.8, No.14
 - screwdriver
 - cutting pliers
- Remove the upper engine cowling.
 - Disconnect the control cable (13 Fig. 10-20) on the changeover lever (14) of the air intake.
 - Remove the inner nut (1, Fig. 10-25) and pull out the knob (2) with the flexible housing (3) from the firewall and instrument panel.



- 1 Nut
- 2 Heating control knob
- 3 Flexible housing

Fig. 10-25: Carburetors heating knob

10.3.22 Carburetors heating knob installation

Type of maintenance: line

Authorization to perform:

- Sports pilot, Repairman (LS-M) or Mechanic (A&P)

Tools needed:

- wrench size No.8, No.14
- screwdriver
- cutting pliers

- (a) Put the flexible housing (3, Fig. 10-25) with knob (2) into the hole in the instrument panel and firewall from behind and fasten it from both sides of the instrument panel by the nuts (6).
- (b) Fasten the knob from both sides of the instrument panel by the nuts (1).
- (c) Connect the control cable (13 Fig. 10-20) on the changeover lever (14) of the air intake.
- (d) Adjust carburetors heating control (see 10.4.10).



10.4 Check / Adjustment

10.4.1 Engine test

CAUTION: THE PERSON PERFORMING THE ENGINE TEST MUST BE REPAIRMAN/ A&P WITH A VALID CERTIFICATE AND WITH REGISTERED ENGINE TYPE ROTAX 912 ULS.

- (a) Perform the test out of the buildings at the place assigned for performing engine tests in broad daylight.
- (b) Test place must be equipped with extinguisher which is suitable for extinguishing burning liquids and electrical installation.
- (c) Brake the airplane and put the chocks under the landing gear wheels.
- (d) Before performing engine test, carry out engine and propeller preflight check in the range shown in the POH, Section 4.1, and the Rotax Operator's Manual, Section 3.
- (e) Start the engine according to the POH, Section 4.2 and the Rotax Operator's Manual, Section 3.
 - activate starter for max.10 sec. only, followed by a cooling period of 2 min.
 - as soon as engine runs, adjust throttle to achieved smooth running at approximate 2,500 rpm
 - check if oil pressure has risen within 10 sec. and monitor oil pressure

NOTE: If oil pressure do not rise within 10 sec. above min. pressure 0.8 bar (12 psi), switch off the engine. Is admissible max. oil pressure 7 bar (102 psi) for a short period at cold start. Fuel pressure has been in range from 0.15 to 0.4 bar (2.2 to 5.8 psi).

- (f) Engine warm up according to the POH, Section 4.2.3 and the Rotax Operator's Manual, Section 3.

As soon as oil pressure will be in range from 2 to 5 bar (29 to 73 psi) start warming up period at 2,000 rpm for approx. 2 minutes, continue at 2,500 rpm, duration depending on ambient temperature, until oil temperature reaches 50°C (122°F).

- (g) Choke – during engine warm up - **OFF**.

NOTE: Watch engine instruments and record the values of oil pressure, oil temperature and head cylinder temperature into the Engine test report, see the Tab. 10-1.

- (h) Ignition check:

Engine speed..... 4,000 rpm

Ignition switch switch from position **BOTH** to **L**, record rpm drop

Ignition switch switch from position **BOTH** to **R**, record rpm drop

NOTE: rpm drop between position **BOTH** and **L** or **R** must not exceed 300 rpm. Mutual difference between ignition circuits **L** and **R** must not exceed 115 rpm. Write down results into the engine test report, see Tab. 10-1.

- (i) Test of max. RPM on the ground:

Throttle **MAX**

NOTE: Record max. rpm into the engine test report, see Tab. 10-1



ENGINE TEST REPORT					
Aircraft		Registration		Serial No.	
Engine	ROTAX	Type	912 ULS2	Serial No.	
Propeller		Type		Serial No.	
	Activity	Set down values		Measured values	
	Starting up the engine				
1.	Min. oil pressure up to 10 sec.	0.8 bar (12 psi)			
2.	Max. oil pressure*	7 bar (102 psi)			
3.	Min. fuel pressure	0.15 bar (2.2 psi)			
4.	Increase rpm as soon as oil pressure reaches	2 bar (29 psi)			
5.	Warming up the engine at 2,000 – 2,500 rpm	smooth running			
6.	Voltage	12.4 – 14.4 V			
	Engine test				
7.	Min. oil temperature	50°C (122°F)			
8.	Oil pressure	2-5 bar (29-73 psi)			
9.	Max. cylinder head temperature CHT	135°C (275°F)			
10.	Max. coolant temperature CT ****	120°C (248°F)			
11.	Rpm drop between ignition position BOTH and L/R at 4,000 rpm	max. 300 (115 rpm**)			
12.	Acceleration	2 – 3 sec.			
13.	Max. ground engine speed	***			
14.	Idle	***			
Defects:					
*	During cold start for a short term only				
**	RPM drop between ignition position BOTH and position L or R must not exceed 300 rpm. Mutual difference between left (L) and right (R) ignition circuit must not exceed 115 rpm.				
***	Max. ground engine speed and idle varies according to the type of propeller: Klassic 170/3/R max. 5,000 ± 100 rpm; idle 1,650 ± 5 rpm SR3000/2W max. 5,700 ± 100 rpm; idle 1,700 ± 5 rpm 3B0RTR68C max. 4,950 ± 100 rpm; idle 1,650 ± 5 rpm				
****	With the change to a new cylinder heads design (applicable for ROTAX 912 ULS2 engines from S/N 6 781 410 inclusive and for 912 S2 engines from S/N 4 924 544 inclusive, or on all engines with type designation followed by suffix-01, or on all engines which have been later equipped with the new cylinder heads design of P/N 413185 at cylinder head position 2/3), no longer the cylinder head temperature is measured, but the coolant temperature. Coolant temperature is displayed as “CHT” on Dynon EMS-120 display.				
Conclusion		Complying – Non-complying			
		Complying if the measured values are not out of the range of the prescribed values.			
Elaborated by:		Signature:		Date:	
Checked by:		Signature:		Date:	

Tab. 10-1: Engine test report



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10.4.2 Klassic 170/3/R propeller - inspections, repairs, works**10.4.2.1 Summary of propeller periodical inspection:** (see also 2.3.2. for details)

- Inspection of propeller after the first 25 hours of operation.
- Inspection of propeller after 100 hours or 12 months of operation*,
- Medium repairs of propeller after 500 hours or 36 months of operation*,
- Overhauls of propeller after 1000 hours or 72 months of operation*,

*) whichever condition occurs first.

Note: Inspection/overhaul of propeller must also be performed in the following cases:

- The propeller has contacted the ground and/or foreign object,
- The propeller has been subject to over speed (see max operating RPM in User's Manual),
- The propeller has been damaged
- The propeller has no record of operating hours and/or calendar months.

10.4.2.2 Prescribed inspection works:

Note: Inspection of propeller after the first 25 hours and after 100 hours of operation may be performed by aircraft engineer or certifying staff, see 2.5.1.

Medium repair / overhaul after 500 and 1000 hours of operation may be performed by manufacturer or his authorized service organization only.

All works/operations must be performed in accordance with the respective maintenance manuals. Contact the propeller OEM or authorized service organization for details.

Inspection of the propeller after the first 25 hours of operation (see also the Operator's manual UM-07 or relevant instructions at the Woodcomp company web site for more details)

- Remove the propeller spinner.
- Visually check of propeller surface – propeller must not have apparent damages, breakings and deformations.
- Check the propeller blades pitch setting and correct if needed, see 10.4.2.3.
- Cut off the lock wire securing the fixing bolt heads.
- Tighten the fixing bolts (Fig. 10-26) M8 by moment 22 Nm (16.2 ft.lb.). Tighten also the fixing bolts of spacer In case it is used..
- Tighten the bolts M6 on spokes of the hub by moment 10 Nm (7.4 ft.lb.).

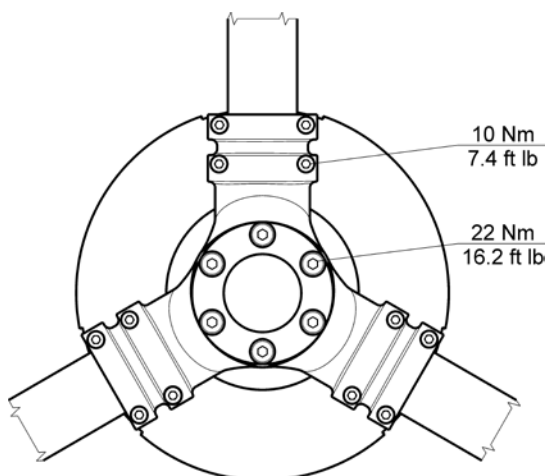


Fig. 10-26: Torque moments



- (g) Secure fixing bolt heads by lock wire (see 15.8.2).
- (h) Install the propeller spinner.

Inspection of the propeller after 100 hours or 12 months of operation, whichever condition occurs first

- (a) Remove the propeller spinner.
- (b) Cut off the lock wire securing the fixing bolt heads.
- (c) Check the propeller blades pitch setting and correct if needed, see 10.4.2.3.
- (d) Tighten the fixing bolts (Fig. 10-26) M8 by moment 22 Nm (16.2 ft.lb.)
- (e) Tighten the bolts M6 on spokes of the hub by moment 10 Nm (7.4 ft.lb.).
- (f) Inspect firm seating of all blades, - blades must not show any signs of movement or play in the hub.
- (g) Visually inspect the blades for damage due to a direct strike (rock, bolt, etc.) or traces of damage or deformation. As a damage, it is not mentioned the usual operational wear (by friction, operation, washing, etc). Relevant findings of failures must not be of a higher extent than stated in the Operator's manual UM-07, see the latest issue at the Woodcomp company web site. The small failures stated in the Operator's manual UM-07 or relevant instructions can be repaired by the aircraft engineer (AML ICAO, AML Part 66, etc.).
- (h) If the inspection doesn't bring satisfactory results, stop using the propeller immediately and have the propeller inspected/repared by authorized service organization or by the manufacturer.
- (i) If the inspection is without findings, secure fixing bolt heads by lock wire (see 15.8.2).
- (j) Install the propeller spinner.

Inspection of the propeller after 500 hours or 36 months of operation

Remove the propeller and send it to the manufacturer or his authorized service organization

Inspection of the propeller after 1,000 hours or 72 months of operation

Remove the propeller and send it to the manufacturer or his authorized service organization

Small repairs of blades which can be performed by aircraft engineer (AML ICAO, AML part 66, etc.), or by certifying staff (EU 1321 / 2014) for aircraft operating under EASA rules. . See the Woodcomp Operator's manual UM-07 before repair.

Repair of blades.

It is allowed to repair the failures like small scratches and notches appearing on the propeller blade in area ranging from radius R=250 mm towards the blade tip, not more than 5 pieces in one blade. Failures in the root blade area are allowed to be repaired by the manufacturer or authorized service organization only.

Maximum acceptable depth of damaged leading or trailing propeller edge is 2 mm, while the distance between the repaired spots may be not less than 80 mm. The spots length shall be not more than 30 mm.

Maximum acceptable depth of damaged sucking or pressure blade side is 0,7 mm, while the distance between the repaired spots may be not less than 100 mm and the spots may be not larger than 1 cm².



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Instructions for repair of the blades:

1. Clean and dry the damaged area carefully.
2. Grind the damaged place with help of a soft rasp or sand paper.
3. Seal the repaired area with cement on the epoxy basis.
4. Grind the surface after the cement is cured.
5. Re-paint the affected surface with polyurethane paint.

Repair of propeller hub and metal parts.

Any repairs of the propeller hub and metal parts are strictly prohibited!!!

Repair of spinner and spinner plate.

Only repairs relating to small surface grooves on the outside spinner part or spinner plate with max. depth of 0,5 mm are allowed.

Repairs of damaged or corrosion affected rivet nuts on the spinner plate are not allowed.

Instructions for repair of spinner or spinner plate:

1. Clean and dry the damaged area carefully.
2. Grind the damaged place with help of a soft rasp or sand paper.
3. Re-paint locally the groove with polyurethane paint

Replacement of self-adhesive polyurethane tape.Instructions for replacement:

1. Tear down the original tape carefully (a moderate pre-heating of the tape with help of hair dryer is recommended)
2. Use technical petrol and clean and degrease the blade leading edge. It is very important to remove all the rests of adhesive from the old tape.
3. Strip off the protective foil from the new tape carefully, so that you do not touch or contaminate the gluing side of the tape.
4. Touch the tape to the prepared blade surface.
5. Squeeze out air bubbles with help of a plastic spatula or perforate the tape with a pin and apply a roller or fingers to push the air away. Do not use a blade or knife to perforate the tape!!
6. In terms of operation the propeller is ready for use not sooner than after 24 hours since the tape was touched to the surface and the adhesive has become hardened.

10.4.2.3 Klassic 170/3/R propeller blades pitch setting

- (a) Pull out each blade to its outer limit away from the hub as there is an 1.5 mm (1/16") movement range in its lock for expansion.
- (b) Use protractor to blades pitch adjustment (digital with an alternative zero or ordinary bubble type). Place protractor 50 mm (2 in) from the tip of each blade. You can also use wedges and set the pitch on a flat level table before mounting the propeller on engine.
- (c) Set blades pitch to $17.5^\circ \pm 0.5^\circ$.
- (d) Tighten the bolts in this sequence: first tighten the bolts M6 on spokes of the hub by moment 10 Nm (7.4 ft.lb.) then tighten the fixing bolts M8 by moment 22 Nm (16.2 ft.lb.) (see Fig. 10-26).
- (e) Secure fixing bolt heads by lock wire (see 15.8.2).



10.4.3 SR3000 propeller inspections, works.

10.4.3.1 Summary of propeller periodical inspection:

- Inspection of propeller after 25 hours of operation.
 - Inspection of propeller after each 100 hours of operation or 12 months*,
 - Inspections after each 300 hours of operation or 60 months *– see Operator's Manual - Electrical Adjustable Aircraft Propeller SR 3000.
- *) whichever comes first

Note: Inspection of propeller after the first 25 hours and after 100 hours of operation must be performed by aircraft engineer or certifying staff, see 2.5.1.
Overhaul after 300 hours of operation or 60 months must be performed by manufacturer or his authorized service organization only.

10.4.3.2 Prescribed inspection works:

Inspection of propeller after the first 25 and after each 100 hours of operation or 12 months, whichever comes first.

NOTE: In order to inspect perfectly all items, it is necessary at first to carry out the complete cleaning or washing of the all parts surfaces of the propeller.

(a) Check propeller blades for:

- Surface damage of varnish, including evaluation of the further operational capability.
- Damage of protective strips on leading edges.
- Mechanical damage of blades influencing the propeller safety operation.
- Occurrence of cracks at propeller root.

(b) Remove propeller spinner and check surface with attention to cracks at bottom holes for attaching screws.

(c) Check slip ring for:

- Attachment.
- Damage and el. conductivity of the slipways.
- Strength of joint of MK with a hub checked by moment 25 Nm (18.4 ft.lb.).

(d) Check propeller hub for:

- Common state of surface.
- Strength of connection of the upper part of hub to its lower part joint by bolts M6 checked by moment 10 Nm (7.4 ft.lb.).
- Fixation of body to hub by bolts M5
- Occurring permeability of grease in joint and around the blades roots.
- Determine the axial clearance of blades by means of expanding cone.

(e) Check electrical equipment for:

- Attachment and isolation of cables.
- Check by hearing the operation of complete power unit.
- Attachment of working and nonworking cams.
- Wear of electrical switches.



- (f) Check by means of laser or electronic (digital) protractor the mechanical radial clearance on the individual blades. This clearance must not exceed 2 degrees.
- (g) According to the data of protocol for given propeller check the function of:
 - End switches and their operation at specified angles; the difference must not exceed ± 20 angle minutes.
- (h) Set the mean values of the angle range as a mean value for static balancing.
- (i) Unconditionally eliminate the shortcomings, which could be a potential danger for the safe operation of the propeller.
- (j) Evaluate the capability of propeller for further operation.
- (k) Install propeller spinner.

10.4.4 Sensenich 3B0R5R68C / 2A0R5R70EN propeller inspections

10.4.4.1 Summary of propeller periodical inspection:

- Inspection of propeller after the first 25 hours of operation
- Inspection of propeller after 100 hours or 12 months, whichever comes first
- Major periodic inspection after 2,000 hours of operation

NOTE: Inspections are described in the propeller manufacturer documentation - Sensenich Three/Two Blade Composite Aircraft Propeller - Installation and Operation Instructions for Rotax Engines, Instructions for Continued Airworthiness.

10.4.5 Adjusting throttle control

- (a) Pull the throttle control to the stop. The throttle lever on the carburetor (5, Fig. 10-11) must be on the stop. The bowden must be supported in the terminals.
- (b) Release the nut on the control lever (5) and take up any slack on the cable and tighten up the nut.

CAUTION: CONTROL CABLE SHOULD NOT BE TOO TIGHT FOR THE REASON OF A POSSIBLE DEFORMATION OF THE CONTROL LEVER ON THE CARBURETOR.

- (c) Check again whether the controller and the lever on the carburetor are on the stops. If not, perform adjusting by means of adjustable terminals on bowdens.
- (d) In order to prevent the bowdens at the carburetor from shifting out from the terminals, secure the bowdens with lockwire. Mark all bolted joints with red paint.

10.4.6 Adjusting choke control

- (a) Set the choke lever to the stops position and put it back about 3 mm ($1/8$ in). The lever of choke control on the carburetor (6, Fig. 10-11) must be on the stop. The bowden must rest on the terminals.
- (b) Release the bolt on the lever of choke control (6), slightly loosen the cable and tighten up the bolt.
- (c) Check again if the choke lever and the lever on the carburetor are on the stops. If not, carry out adjustment by adjustable bowden terminals.



- (d) To prevent the bowdens at the carburetor from shifting out of the terminal, secure the bowdens with lockwire. Mark all bolted joints with red paint.

10.4.7 Adjusting carburetors heating control

- (a) Push in the carburetor heating knob to the stop and pull it out by about 3 mm ($1/8$ in). The changeover lever (14, Fig. 10-20) on the air intake must be on the stop. The bowden must rest on the terminal.
- (b) Release the bolt on the changeover lever (14), slightly stretch the cable and tighten up the bolt.
- (c) Check again whether the knob and the lever on the air intake are on the stops. If not, carry out adjustment by adjustable bowden terminals.
- (d) To prevent the bowdens from shifting out of the terminal, secure the bowdens with lockwire. Mark all bolted joints with red paint.

10.4.8 Checking exhaust system

WARNING: CHECK OF EXHAUST SYSTEM VERY CAREFULLY. THE BURST OR LEAKY EXHAUST CAN EXPOSE THE CREW TO DANGER PRESENTED BY CARBON MONOXIDE OR CAN RESULT IN ENGINE POWER LOSS, POSSIBLY FIRE.

Check the exhaust system for cracks. Pay special attention to the following areas:

- muffler in the area of the input and the output pipe and the collector head
- all welds and their immediate surrounding
- carefully check all areas showing local overheating caused by exhaust gases
- remove the heat exchanger and check muffler area located under it
- check the whole exhaust pipe between the engine and the muffler including its attachment to the engine
- check outlet pipe from the muffler
- check retaining springs for cracks.



10.5 Exchanges / Service information

10.5.1 Exchange / Refilling oil

Refer to the Rotax Maintenance Manual, Chapter 12-20-00, Section 11 Lubrication.

NOTE: Recommended kinds of oil are mentioned in the Rotax Operator's Manual, Section 2.5 Operating media – Lubricants and Rotax Service Instructions SI-912-016, latest revision.

Type of oil used by aircrafts manufacturer is shown in section 17.5 Operating Liquids.

Oil volume

Total oil volume in the lubrication system of Rotax 912 ULS2 engine is approximately 3.8 litres (1 US gallon).

Check oil volume preferably after running the propeller by hand in the sense of engine rotation so that oil can fill in the engine space or operate the engine for 1 minute in idle mode.

WARNING: SWITCH OFF IGNITION BEFORE MANUALLY TURNING THE ENGINE!

The oil tank is located in the engine compartment and oil dipstick is accessible after opening the lid on the upper engine cowling (see 10.2.1.2). Oil level must lie between min and max marks (flattening) on the dipstick and must not drop below min mark.

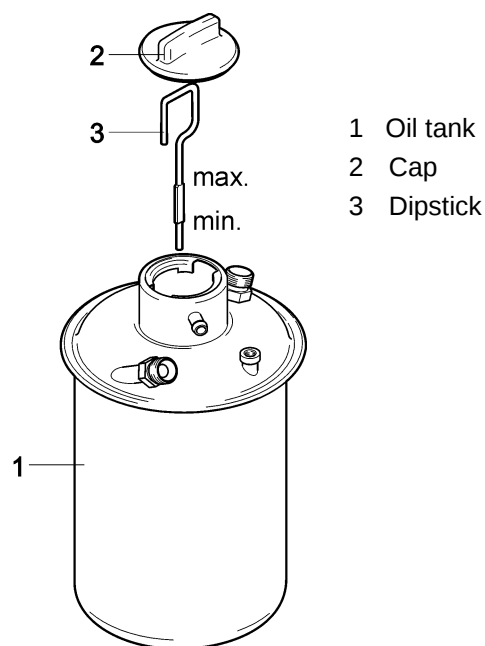


Fig. 10-30: Oil volume check

Oil draining

Drain oil from the oil tank by unscrewing the plug (wrench size No.17) on the lower side of the oil tank. It is possible to drain oil from the engine after unscrewing the plug in the lower part of the engine at the hose of the return branch of oil flow. It is recommended to drain oil immediately after engine test or after finishing the operation when oil is sufficiently hot and



better flows both from the engine and from the tank. Clean the tank before filling it with new oil - see the Rotax Maintenance Manual.

Refilling oil

Refill oil in the oil tank that is located on the firewall.

Venting of the lubrication system

After short idling, stop engine and replenish oil to max. mark on dipstick. Never overfill otherwise oil would escape through the vent tube during operation. At oil level inspect, do not exceed the max. mark.

10.5.2 Exchange / Refilling cooling liquid

Refer to the Rotax Maintenance Manual - Cooling System.

NOTE: Recommended types of coolant are shown in the Rotax Operator's Manual, Section 2.3 Coolant, Rotax Installation Manual – Cooling System, Rotax Service Instructions SI-912-016.

Type of coolant used by aircrafts manufacturer is shown in Section 17.5 Operating liquids.

Cooling liquid volume

Total volume of coolant in the engine is approximately 2.5 litres (0.7 US gallons).

Drainage of cooling liquid

Disconnect the hose supplying liquid from the radiator to the pump (at the lowest point of the system) and drain cooling liquid into the prepared vessel.

Refilling cooling liquid

Refill cooling liquid into the expansion tank in the engine compartment. In addition to this there is a overflow bottle which collects cooling liquid in case of engine overheating and is attached to the fire wall.

10.5.3 Exchange / Check of oil filter

Refer to the Rotax Maintenance Manual, 12-20-00, Section 11 Lubrication.

NOTE: Carry out at every oil exchange.

Tools needed:

- wrench size No.10, No.17
- screwdriver
- oil filter wrench

(a) Remove engine cowling.

(b) Cut off the cable ties fastening the oil cooler tubes to the engine.

(c) Remove the nuts (2, Fig. 10-31) and the washers (3).

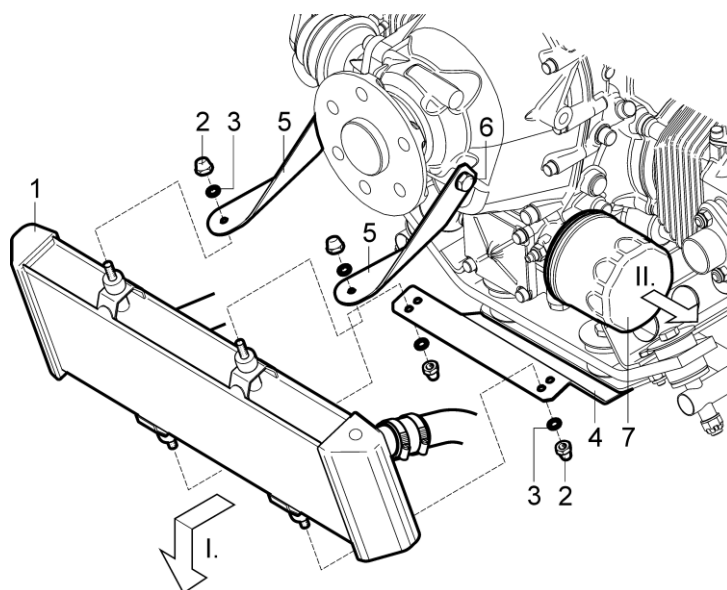
(d) Loosen the bolts (6) and lift up the brackets (5).

NOTE: For oil filter removal two persons are requested.

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- (e) Pull the cooler (1) so that you obtain access to the oil filter (see Fig. 10-31); hold the cooler.
- (f) Remove used oil filter (7) with oil filter wrench.
- (g) Clean the contact surface of the oil pump housing with a clean cloth.
- (h) Apply a thin film of engine oil on the gasket of the new oil filter (1).
- (i) Install the new oil filter on the engine:
 - screw on filter until oil filter gasket is seated solidly
 - tighten oil filter with 3/4 turn (270°).
- (j) Put the cooler on the lower bracket (4), fit the upper brackets on the cooler; install the washers (3), screw and tighten the nuts (2) and the bolts (6).
- (k) Attach the oil cooler tubes to the engine by means of the cable ties.
- (l) Remove the filter insert, cut of the upper and the lower lid of the insert. Remove the middle part of the insert, disassemble and check for metal chips, foreign corpuscles and contamination.

CAUTION: IF YOU DETECT AN INCREASED QUANTITY OF METAL PARTICLES (BRASS OR BRONZE CHIPS OR BEARING ABRASIVE), FIND OUT THE REASON AND ELIMINATE IT.



- | | |
|-----------------|-----------------|
| 1 Cooler | 5 Upper bracket |
| 2 Cap nut | 6 Bolt |
| 3 Lock washer | 7 Oil filter |
| 4 Lower bracket | |

Fig. 10-31: Exchange of oil filter

10.5.4 Purging the oil system

Refer to the Rotax Maintenance Manual, Chapter 12-20-00, Section 11 Lubrication and Rotax Service Instructions SI-912-018 Purging the lubrication system, latest issue.

**10.5.5 Exchange / Check of air filter**

- (a) Remove the hose fastener and the bracket attaching the air filter to the left side lower engine cowling and remove the air filter.
- (b) Inspect the air filter and if contaminated, clean it according to instructions in the Rotax Maintenance Manual, Chapter Chapter 12-20-00, Section 2.
- (c) Attach the cleaned or the new filter to the hole on the left side of lower engine cowling by means of the bracket and hose fastener.



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11.1 General

Electrical system of the SportCruiser / PiperSport airplane serves for supplying electrical current to the instruments.

11.2 Description and operation

The airplane is equipped with 14 VDC electrical installations with grounded negative pole (see Fig. 11-1). Primary source of electrical energy is formed by the generator. The secondary source of electrical energy is the battery 12 V, which is located on the firewall. It is used for starting the engine and in the case of generator failure as a back-up source of electric energy.

DC voltage is distributed to the individual systems by means of the main busbar. Systems are protected by circuit breakers which are permanently ON and switches-circuit breakers which are turning ON as needed. If some of the circuit is overloaded, then the circuit breaker disconnects the circuit. Some circuits are protected by the fuses.

After switching the **MASTER BAT / MASTER** switch ON and by turning the ignition key to the position **START** the starter is activated. The starter is supplied from the battery before starting the engine. After starting up the engine and reaching the idle rpm and switching the **MASTER GEN** switch ON, the generator starts supplying current to the electrical network (SportCruiser airplanes from S/N C0416 only).

Information about voltage in the main busbar is indicated by EMS or by the analog voltmeter on the instrument panel.

NOTE: Valid wiring diagrams are mentioned in SportCruiser or PiperSport Wiring Manual. For the early SportCruiser airplanes wiring diagrams refer to Chapter 16.

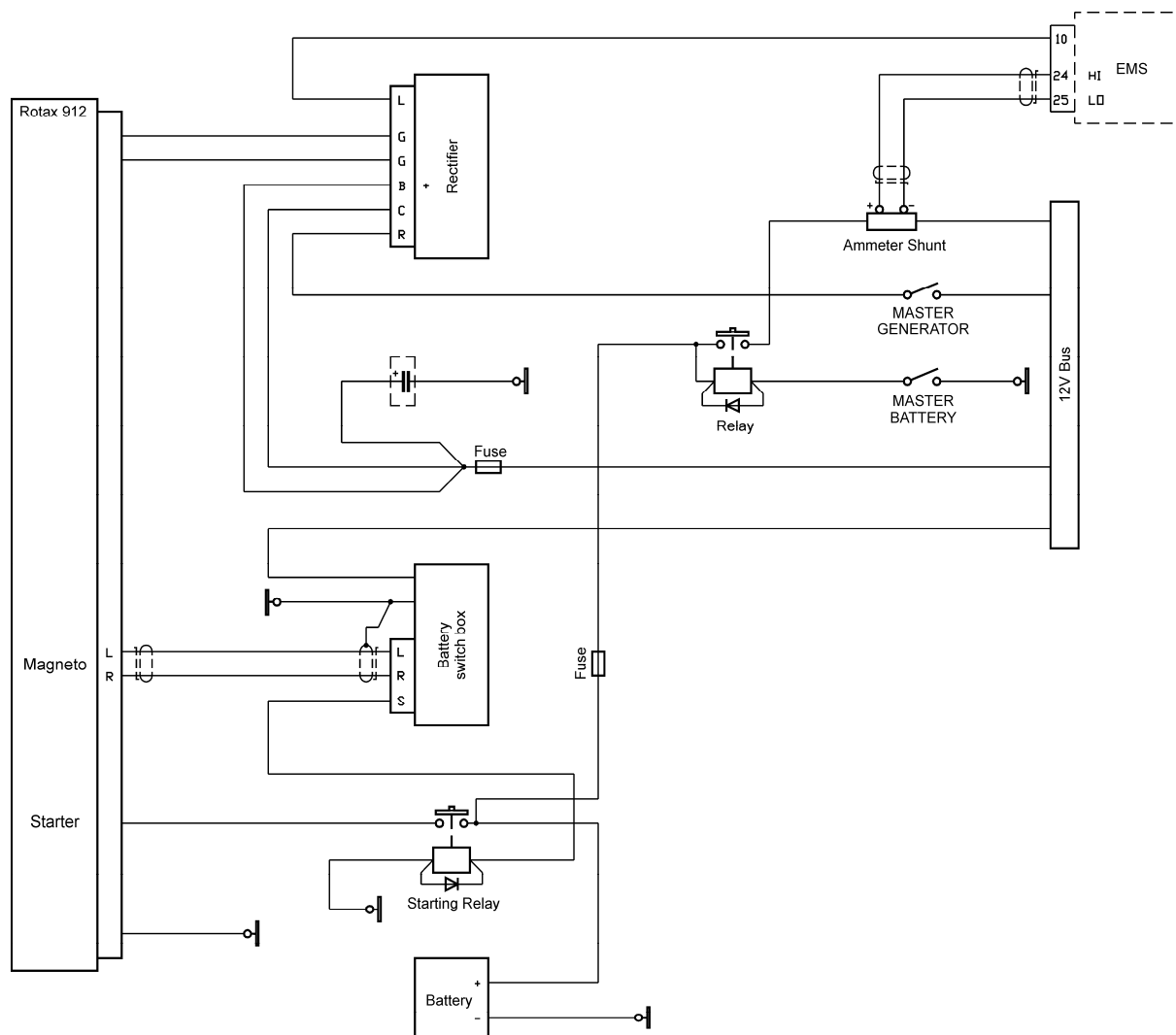
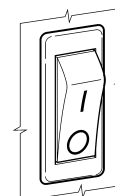


Fig. 11-1: Electrical system scheme (from S/N C0416)

**CHAPTER 11 – ELECTRICAL SYSTEM****11.2.1 Switches**

The switches serve for switching (ON/OFF) individual electrical circuits. Every switch is marked with a placard with designation of the circuit. The switches are located on the left instrument panel and on the middle channel. The buttons for ailerons and elevator trim are on the grip of the control stick.

NOTE: Position of the switch:
I (ON) The upper half of the switch pushed.
O (OFF) The bottom half of the switch pushed.



Switches – instrument panel with the EFIS/EMS	
Designation	Description
MASTER BAT	Main switch - switch of battery, VHF transceiver, intercom
MASTER GEN	Main switch - switch of generator
EMS	Switch of engine monitoring instrument
AVIONICS	Switch of EFIS, NAV/COM, GPS, XPDR
FUEL P	Switch of electric fuel pump
NAV L	Switch of position lights
STROBE	Switch of strobe lights
LDG L.	Switch of landing light
COCKPIT L	Rotary switch of cockpit lamp (with dimmer)
INSTR L	Rotary switch of instrument lighting (with dimmer)
FLAPS UP/DOWN	Switch of flaps control
AUTOPILOT DISCONNECT	Quick disconnects of autopilot (momentary switch, optional)
Switches – instrument panel with the analog instruments	
MASTER BAT	Main switch - switch of battery, VHF transceiver, intercom
MASTER GEN	Main switch - switch of generator
ENG INST	Switch of engine instruments
FLT INST	Switch of flight instruments
AVIONICS	Switch of VHF transponder, GPS and other optional avionics
FUEL P	Switch of electric fuel pump
NAV L	Switch of position lights
STROBE	Switch of strobe lights
LDG L	Switch of landing light
COCKPIT L	Switch of cockpit lamp
INSTR L	Switch of instrument lighting
DIM	Instrument lighting dimmer
NIGHT POS IND DAY	Switch of instrument lighting intensity
FLAPS UP/DOWN	Switch of flaps control

Tab.11-1: Switches (page 1 of 2)



Switches – instrument panel with the Skyview	
Designation	Description
MASTER BAT	Main switch - switch of battery, VHF transceiver, intercom
MASTER GEN	Main switch - switch of generator
EFIS1	Switch of EFIS 1 display
EFIS2	Switch of EFIS 2 (EMS) display
AVIONICS	Switch of EFIS, NAV/COM, GPS, XPDR
FUEL P	Switch of electric fuel pump
NAV L	Switch of position lights
STROBE	Switch of strobe lights
LDG L.	Switch of landing light
COCKPIT L	Rotary switch of cockpit lamp (with dimmer)
INSTR L	Rotary switch of instrument lighting (with dimmer)
FLAPS UP/DOWN	Switch of flaps control
AUTOPILOT DISCONNECT	Quick disconnects of autopilot (momentary switch, optional)
Switches – PiperSport / SportCruiser up to S/N C0416	
Designation	Description
INSTR	Switch of engine monitoring instruments (toggle switch)
AVIONICS	Switch of radio, intercom, transponder, GPS and other optional avionics (toggle switch)
AUTOPILOT	Switch of optional autopilot (toggle switch)
AUTOPILOT DISCONNECT	Quick disconnects of autopilot (momentary switch)
FLAPS	Switch of flaps control (rocker switch)
TRIM	Switch of trim control (button switch)

Tab.11-1: Switches (page 2 of 2)

11.2.2 Switches – circuit breakers

The switches – circuit breakers serve for switching (ON/OFF) and protecting individual electrical circuits from overloading together. The switches - circuit breakers are located on the left instrument panel.

Switches – circuit breakers		
Designation	Value	Description
EFIS1	5A	Switch - circuit breaker of EFIS 1 display
EFIS2	5A	Switch - circuit breaker of EFIS 2 (EMS) display
FUEL P	3A	Switch - circuit breaker of electric fuel pump
NAV L	5A	Switch - circuit breaker of position lights
STROBE	3A	Switch - circuit breaker of strobe lights
LDG L	5A	Switch - circuit breaker of landing light
LDG L	3A	Switch - circuit breaker of landing light (Trail Tech D112-SX)

Tab.11-2: Switches – circuit breakers (page 1 of 3)



Switches – circuit breakers – PiperSport / SportCruiser up to S/N C0416		
Designation	Value	Description
MASTER	25A	Main switch
STROBE	10A	Switch - circuit breaker of strobe lights
NAV L.	5A	Switch - circuit breaker of position lights
INSTR L	5A	Switch - circuit breaker of optional lighting of instruments on the instrument panel
LDG L	5A	Switch - circuit breaker of landing light
LDG L	3A	Switch - circuit breaker of landing light (Trail Tech D112-SX)
FUEL P.	5A	Switch - circuit breaker of electric fuel pump

Tab.11-2: Switches – circuit breakers (page 2 of 3)

Switches – circuit breakers – SV-HDX1100		
Designation	Value	Description
HDX 1	7,5A	Switch - circuit breaker of EFIS 1 display
HDX 2	7,5A	Switch - circuit breaker of EFIS 2 (EMS) display
FUEL P	3A	Switch - circuit breaker of electric fuel pump
NAV L	5A	Switch - circuit breaker of position lights
STROBE	5A	Switch - circuit breaker of strobe lights
LDG L	3A	Switch - circuit breaker of landing light

Tab.11-2: Switches – circuit breakers (page 3 of 3)

11.2.3 Circuit breakers

Circuit breakers serve for protecting individual electrical circuits from overloading. Every circuit breaker is marked by the placard with a circuit designation. Circuit breakers are located on the right instrument panel.

Circuit breakers – instrument panel with the EFIS/EMS		
Designation	Value	Description
COMM	5A	Circuit breaker of VHF transceiver
IC	1A	Circuit breaker of intercom
EMS	2A	Circuit breaker of engine monitoring system display
NAV	2A	Circuit breaker of optional navigation device
EFIS	3A	Circuit breaker of flight instrument system display
HS34	1A	Circuit breaker of HSI navigation interface
GPS	4A	Circuit breaker of GPS
XPDR	5A	Circuit breaker of transponder
FUEL P	3A	Circuit breaker of electric fuel pump
FLAPS	3A	Circuit breaker of flaps
TRIM	1A	Circuit breaker of trims
NAV L	5A	Circuit breaker of position lights
STROBE	5A	Circuit breaker of strobe lights
LDG L	4A	Circuit breaker of landing light



LDG L	3A	Switch - circuit breaker of landing light (Trail Tech D112-SX)
INT L	2A	Circuit breaker of instrument lighting and cockpit lamp
12V	5A	Circuit breaker of 12V socket
AP	2A	Circuit breaker of optional autopilot control unit
ROLL SERVO	2A	Circuit breakers of optional autopilot servo
PITCH SERVO	2A	Circuit breakers of optional autopilot servo
PROP	5A	Circuit breaker of electrical adjustable propeller

Tab.11-2: Circuit breakers (page 1 of 4)

Circuit breakers – instrument panel with the analog instruments		
COMM	5A	Circuit breaker of VHF transceiver
IC	1A	Circuit breaker of intercom
ENG INSTR	1A	Circuit breaker of engine instruments
NAV	2A	Circuit breaker of optional navigation device
GPS	3A	Circuit breaker of GPS
XPDR	5A	Circuit breaker of transponder
ATT	1A	Circuit breaker of attitude indicator
DG	2A	Circuit breaker of directional gyro
TURN IND	1A	Circuit breaker of turn & bank indicator
FUEL P	3A	Circuit breaker of electric fuel pump
FLAPS	3A	Circuit breaker of flaps
TRIM	2A	Circuit breaker of trims
STROBE	5A	Circuit breaker of strobe lights
NAV L	5A	Circuit breaker of position lights
LDG L	4A	Circuit breaker of landing light
LDG L	3A	Switch - circuit breaker of landing light (Trail Tech D112-SX)
INT L	2A	Circuit breaker of instrument lighting and cockpit lamp
12V	5A	Circuit breaker of 12V socket
PROP	5A	Circuit breaker of electrical adjustable propeller
Circuit breakers – instrument panel with the Skyview		
Designation	Value	Description
COMM	5A	Circuit breaker of VHF transceiver
IC	1A	Circuit breaker of intercom
NAV	2A	Circuit breaker of optional navigation device
EFIS1	5A	Circuit breaker of EFIS 1 display
EFIS2	5A	Circuit breaker of EFIS 2 (EMS) display
FUEL P	3A	Circuit breaker of electric fuel pump
FLAPS	3A	Circuit breaker of flaps
TRIM	1A	Circuit breaker of trims
STROBE	5A	Circuit breaker of strobe lights
GPS	4A	Circuit breaker of GPS
XPDR	5A	Circuit breaker of transponder
PITCH SERVO	2A	Circuit breakers of autopilot servo
ROLL SERVO	2A	Circuit breakers of autopilot servo
NAV L	5A	Circuit breaker of position lights



LDG L	4A	Circuit breaker of landing light
LDG L	3A	Switch - circuit breaker of landing light (Trail Tech D112-SX)
INT L	2A	Circuit breaker of instrument lighting and cockpit lamp
PROP	5A	Circuit breaker of electrical adjustable propeller

Tab.11-2: Circuit breakers (page 2 of 4)

Circuit breakers – PiperSport / SportCruiser up to S/N C0416		
Designation	Value	Description
PWR	20A	Circuit breaker of DC rectifier
EMS	2A	Engine monitoring system display
EFIS	3A	Flight instrument system display
COMM	5A	Circuit breaker of radio
IC	1A	Circuit breaker of intercom
NAV	2A	Circuit breaker of optional navigation device
XPDR	5A	Circuit breaker of transponder
GPS	2A	Circuit breaker of GPS
FLAPS	5A	Circuit breaker of flaps
12V	7A	Circuit breaker of 12V socket
TRIM	1A	Circuit breaker of trims
AP	2A	Circuit breaker of optional autopilot control unit
AP SERVO 1/2	2A	Circuit breakers of optional autopilot servos
PROP	3A	Circuit breaker of electrical adjustable propeller

Tab.11-2: Circuit breakers (page 3 of 4)

Circuit breakers – instrument panel with the SV-HDX1100		
Designation	Value	Description
COMM	10A	Circuit breaker of VHF transceiver
IC	1A	Circuit breaker of intercom
NAV	4A	Circuit breaker of optional navigation device
HDX 1	7,5A	Circuit breaker of EFIS 1 display
HDX 2	7,5A	Circuit breaker of EFIS 2 (EMS) display
FUEL P	3A	Circuit breaker of electric fuel pump
FLAPS	3A	Circuit breaker of flaps
TRIM	1A	Circuit breaker of trims
STROBE	5A	Circuit breaker of strobe lights
GPS	4A	Circuit breaker of GPS
XPDR	5A	Circuit breaker of transponder
PITCH SERVO	2A	Circuit breakers of autopilot servo
ROLL SERVO	2A	Circuit breakers of autopilot servo
NAV L	5A	Circuit breaker of position lights
LDG L	3A	Circuit breaker of landing light
INT L	2A	Circuit breaker of instrument lighting and cockpit lamp
PROP	5A	Circuit breaker of electrical adjustable propeller



12V	5A	Circuit breaker of 12V socket
AP	2A	Circuit breaker of optional autopilot control unit

Tab.11-2: Circuit breakers (page 4 of 4)

11.2.4 Fuses

Fuses serve for protecting individual electrical circuits from overloading. The box with the fuses is located on the firewall in the engine compartment (valid for SportCruiser airplanes from S/N C0416).

Fuses – instrument panel with the EFIS/EMS	
Designation	Description
1A SIGN. DOOR	Fuse of unlocked canopy signaling system
25A DC GEN	Fuse of generator
25 A BATTERY	Fuse of battery
Fuses – instrument panel with the analog instruments	
Designation	Description
1A SIGN. DOOR	Fuse of unlocked canopy signaling system
1A VOLTMETER	Fuse of voltmeter
1A ENGIN. INSTR.	Fuse of engine instruments
25A DC GEN	Fuse of generator
25 A BATTERY	Fuse of battery
Fuses – instrument panel with the Skyview	
Designation	Description
1A SIGN. DOOR	Fuse of unlocked canopy signaling system
25A DC GEN	Fuse of generator
25 A BATTERY	Fuse of battery

Tab.11-3: Fuses



11.2.5 Generator

The generator is a part of the engine which supplies electric current through the rectifier. Regulator supplies electric current of 14 V voltage to onboard network.

Technical parameters of generator:

Maximum output power: 12 V / 20 A at 5,000 rpm

Technical parameters of rectifier - regulator:

Type: electronic
Output voltage: 14 ± 0.3 V (from $1,000 \pm 250$ rpm)
Range of operation temperatures: min. -25 °C (-13 °F)
max. $+90$ °C ($+194$ °F)
Weight: 0.3 kg (0.66 lbs)

11.2.6 Battery

Lead-acid battery

Lead-acid maintenance-free battery is installed on firewall. Battery can be charged directly in the airplane after its disconnecting from the onboard electrical system.

Technical parameters:

Voltage 12 V
Nominal capacity 20 Ah
Max. discharge current 300 A (5 s)
Short circuit current 1,000 A
Range of operation temperatures -20 to $+60$ °C (-4 to $+140$ °F)
Service life is about 3 - 5 years or at capacity drop below 80 %
Weight: 6 kg (13 lbs)

If the airplane is not operated for more than one month, then remove the battery from the airplane and store it.

Always store the battery fully charged at temperature of 20 °C (68 °F). Daily discharging is less than 0.1 % of battery nominal capacity.

Regularly recharge it up to the full capacity of charging once a month.

LiFePo4 battery

LiFePo4 maintenance-free battery is installed on firewall. Battery can be charged directly in the airplane after its disconnecting from the onboard electrical system.

Technical parameters:

Nominal voltage 13.2 V
Capacity 9.2 Ah
Pulse discharge current 480 A (10 s)



CCA Current	400 A
Continuous discharge current	280A"
Nominal charging current	12 A @ 25 ° C
Max charging current	20 A @ 25 ° C
Duration	1000 cycles @ 100% Dod / 10C 2000 cycles @ 80% Dod / 10C
Life expectancy	Up to 5 – 7 years
Charging voltage	14.4 V
Maximum charging voltage	14.6 V
Weight	c. 1.62 kg
Dimensions [mm]	L 148 x P 67 x H 140
Ambient temperature	-30 ° C / +60 ° C [Operating and storage]
Maximum operating altitude	5,000 m
Capacity equivalent Pb	up to 18 Ah

If the airplane is not operated for more than one month, then remove the battery from the airplane and store it.

Always store the battery fully charged at temperature of 20 °C (68 °F).

Regularly recharge it up to the full capacity of charging once a month.

11.2.7 Lighting

External lighting consists of the position / strobe lights which are located in the wing tips and of the landing light which is located in the lower engine cowling. Position lights are switched by the switch **NAV L** and strobe lights are switched by the switch **STROBE**. The landing light is switched by the switch **LDG L**.

Internal lighting consists of the instrument lighting and of the cockpit lamp, which is located on the instrument panel or on the canopy frame between pilots. The instrument lighting (illumination of the altimeter and the airspeed indicator) is switched / controlled by the switch **INSTR L**. The cockpit lamp is switched / controlled by the switch **COCKPIT L**.



11.3 Removal / Installation

11.3.1 Electrical Safety

The aircraft has a low-voltage DC electrical system. When correctly maintained it is safe to work on. But the battery can supply heavy current through low-resistance circuits (for example, if you ground the positive output with a wrench by accident).

Always follow the usual safety practices for working on electrical equipment. Allow only qualified persons to maintain the electrical system.

CAUTION: DISCONNECT THE BATTERY BEFORE DOING MAINTENANCE ON THE ELECTRICAL SYSTEM. MAKE SURE TO DISCONNECT THE NEGATIVE LEAD FIRST.

CAUTION: USE ONLY AIRCRAFT SPARE PARTS APPROVED BY THE MANUFACTURER.

11.3.2 Battery removal

Type of maintenance: line

Authorization to perform:

- Sport pilot, Repairman (LS-M) or Mechanic (A&P)

Tools needed:

- screwdriver
- wrench size No.8

(a) Set the **MASTER BAT / MASTER, MASTER GEN** switches to OFF.

(b) Remove engine cowlings.

(c) Unscrew the bolts (5, Fig. 11-2) with washers (6) and disconnect the wires (2; 3; 4) from the battery contacts; make sure to disconnect the negative lead first. In the case of installation LiFePo4 battery remove the nuts (12) from the battery contacts.

(d) Unscrew the bolts (8) with washers (9), disconnect the battery strap (7) and remove the battery (1 / 11) from the airplane.

11.3.3 Battery installation

Type of maintenance: line

Authorization to perform:

- Sports pilot, Repairman (LS-M) or Mechanic (A&P)

Tools needed:

- screwdriver
- wrench size No.8

(a) Install the battery (1 / 11 Fig. 11-2) into the bracket on the firewall (10).

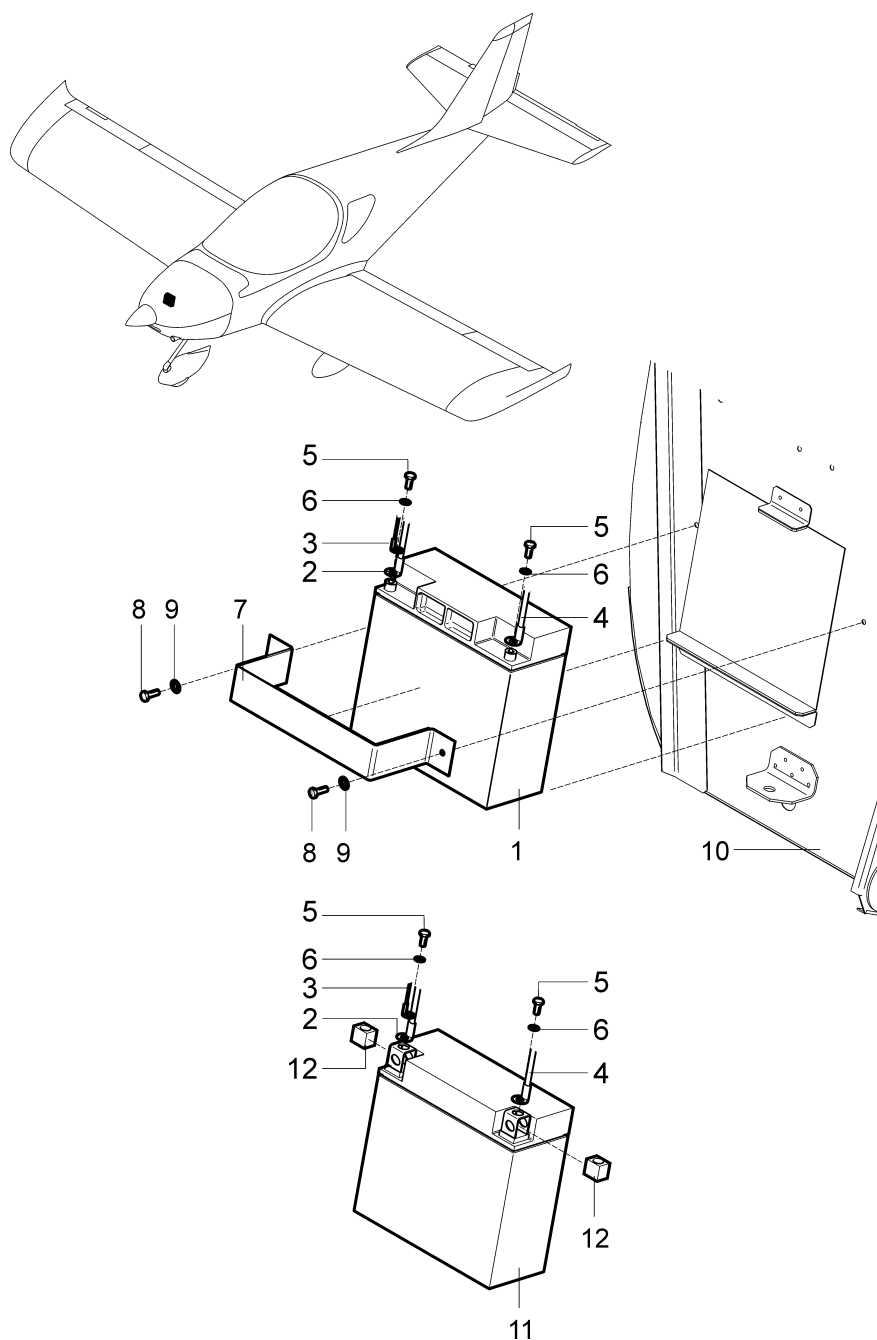
(b) Fasten it with battery strap (7), bolts (8), and washers (9); tighten bolts so that the battery cannot move in the bracket.

(c) In the case of installation LiFePo4 battery insert the nuts (12) into the battery contacts.

(d) Install the wires (2; 3; 4) by means of bolts (5) with washers (6); make sure you connect the positive lead first.



- (e) Grease the battery contacts with lubricating grease.
- (f) Install the engine cowlings.



- | | |
|---------------------|--------------------|
| 1 Lead-acid battery | 7 Battery strap |
| 2 Wire | 8 Bolt |
| 3 Wire | 9 Washer |
| 4 Wire | 10 Firewall |
| 5 Bolt | 11 LiFePo4 battery |
| 6 Washer | 12 Nut |

Fig. 11-2: Battery removal / installation



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11.3.4 Position / strobe light removal**11.3.4.1 SportCruiser / PiperSport airplanes up to S/N C0416**

Type of maintenance: line

Authorization to perform:

- Sports pilot, Repairman (LS-M) or Mechanic (A&P)

Tools needed:

- screwdriver

(a) Set the **MASTER**, **NAV L**, and **STROBE** switches to OFF.

(b) Unscrew the screws (6, Fig. 11-6) and remove the cover glass (4).

(c) Remove screws (5) attaching the light housing (1) to the wing tip (7), thus releasing the light housing.

(d) Remove strobe/position light housing (1) and disconnect the wires (3).

11.3.4.2 SportCruiser airplanes from S/N C0416

Type of maintenance: line

Authorization to perform:

- Sports pilot, Repairman (LS-M) or Mechanic (A&P)

Tools needed:

- screwdriver

(a) Set the **MASTER BAT**, **NAV L**, and **STROBE** switches to OFF.

(b) Unscrew the screw (4, Fig. 11-3) and carefully release the light (1).

(c) Disconnect the wires (3) and remove position / strobe light (1) with the gasket (2).

11.3.5 Position / strobe light installation**11.3.5.1 SportCruiser / PiperSport airplanes up to S/N C0416**

Type of maintenance: line

Authorization to perform:

- Sports pilot, Repairman (LS-M) or Mechanic (A&P)

Tools needed:

- screwdriver

(a) Thoroughly clean the contacting surfaces on the light and on the wing tip of the putty residues.

(b) Connect the strobe/position lights wires (3, Fig. 11-3).

(c) Set the strobe/position light housing (1) to the wing tip (7) and fasten it with screws (5).

(d) Set the cover glass (4) to the light housing (1) and fasten it with screws (6).

(e) Seal the strobe/position light edges by polyurethane sealer to prevent water from in leaking under the strobe/position light.

(f) Set the **MASTER**, **NAV L**, and **STROBE** switches to ON and check the correct function of position / strobe lights.

(g) Set the **MASTER**, **NAV L**, and **STROBE** switches to OFF.



11.3.5.2 SportCruiser airplanes from S/N C0416

Type of maintenance: line

Authorization to perform:

- Sports pilot, Repairman (LS-M) or Mechanic (A&P)

Tools needed:

- screwdriver

- Pass the wires (3, Fig. 11-3) through the appropriate hole in the gasket (2).
- Connect the position / strobe light wires (3) (see Wiring Manual).
- Set the position light (1) with the gasket (2) to the wing tip (5) and fasten it with screw (4).
- Set the **MASTER BAT**, **NAV L**, and **STROBE** switches to ON and check the correct function of position / strobe lights.
- Set the **MASTER BAT**, **NAV L**, and **STROBE** switches to OFF.

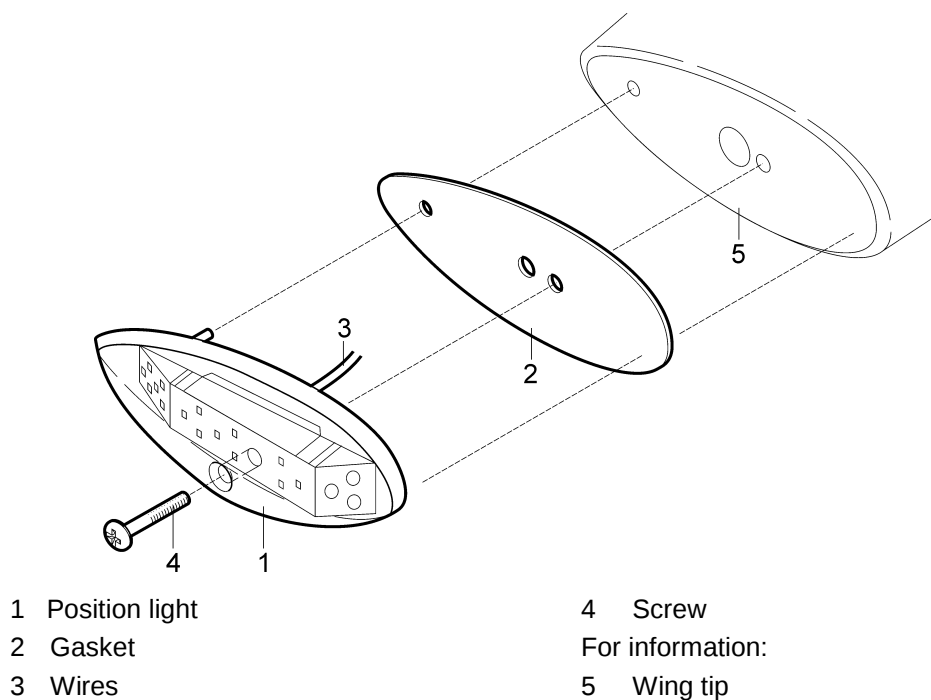


Fig. 11-3: Position light removal / installation

11.4 Exchanges / Service information

11.4.1 Charging the battery

Lead-acid battery

- Disconnect the battery from the onboard electrical network.
- Clean the battery contacts and connect the charging device on them. Mind the polarity!
- Charging voltage at temperature of 25 °C (77 °F) is:
 - Cycle use 14.5-14.9 V
 - Standby use 13.6 to 13.8 V. Maximum charging current is 8 A.



CHAPTER 11 – ELECTRICAL SYSTEM

- (d) After charging grease the battery contacts with lubricating grease and reconnect the battery to the onboard electrical network.

LiFePo4 battery

CAUTION: FOR BATTERY CHARGING USE ONLY ALIANT CB1210 OR CB1213 CHARGER.

- (a) Disconnect the battery from the onboard electrical network.
- (e) Clean the battery contacts and connect the charging device on them. Mind the polarity!
- (f) After charging grease the battery contacts with lubricating grease and reconnect the battery to the onboard electrical network.

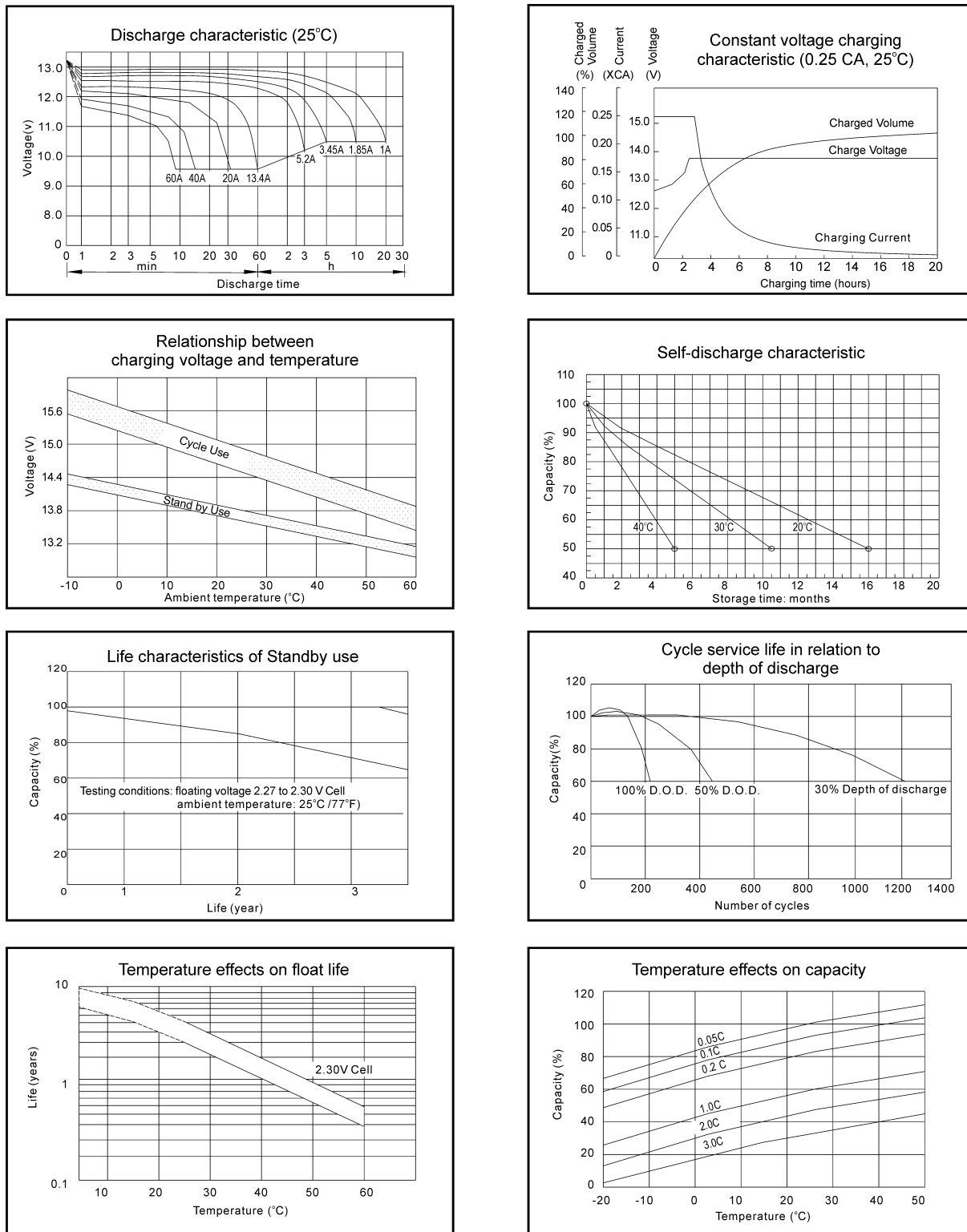


Fig. 11-4: Lead-acid battery characteristics



11.4.2 Adjusting the optional wing landing light

NOTE: Valid for some SportCruiser airplanes up to S/N C0416.

- Remove the plexiglass cover from the wing leading edge between ribs No.8 and 9.
- Do adjustment per securing bolts in the vertical direction in such a way that the light axis is directed 5° below the reference plane of the wing.
- Do adjustment in the horizontal direction according to the Fig.11-5 in such a way that the light axis is directed towards the airplane axis about 45m (150 ft) before the fuselage nose.
- Install the plexiglass cover on the leading edge of the wing

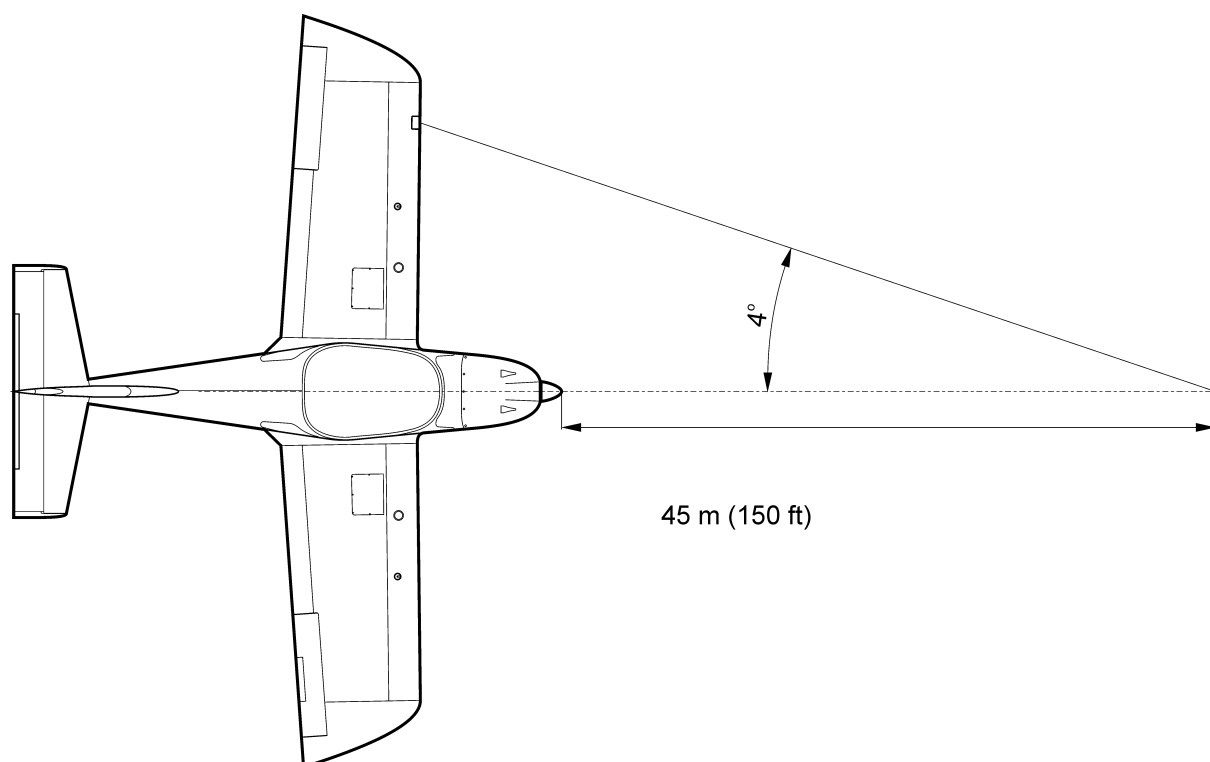


Fig. 11-5: Setting the optional wing landing light

11.4.3 Exchange of the strobe light discharge tube

NOTE: Valid for SportCruiser / PiperSport airplanes up to S/N C0416.

Type of maintenance: line

Authorization to perform:

- Sports pilot, Repairman (LS-M) or Mechanic (A&P)

Tools needed:

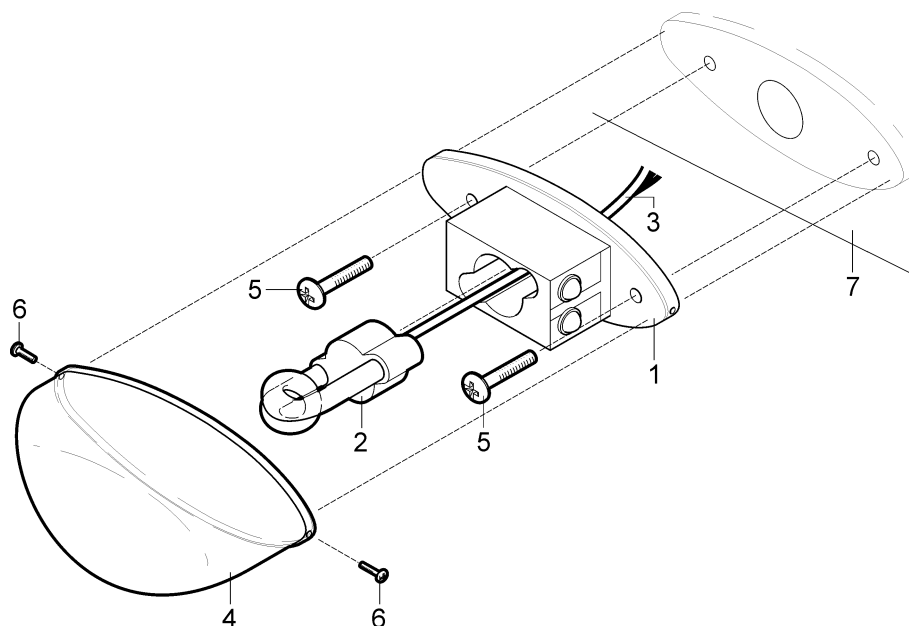
- screwdriver

CAUTION: DO NOT TOUCH THE NEW DISCHARGING TUBE WITH BARE HANDS. USE THE CLOTH GLOVES OR A CLOTH.

- Switch off electrical power of the airplane.
- Unscrew the screws (6, Fig. 11-6) and remove the cover glass (4).



- (c) Carefully remove the discharge tube (2), disconnect wires (3).
- (d) Exchange the discharge tube for the same type; connect wires.
- (e) Set the cover glass (4) to the light housing (1) and fasten it with screws (6).



- | | | | |
|---|---------------------------------|------------------|----------|
| 1 | Position / strobe light housing | 5 | Screw |
| 2 | Discharge tube | 6 | Screw |
| 3 | Wires | For information: | |
| 4 | Cover glass | 7 | Wing tip |

Fig. 11-6: Exchange of the strobe light discharge tube



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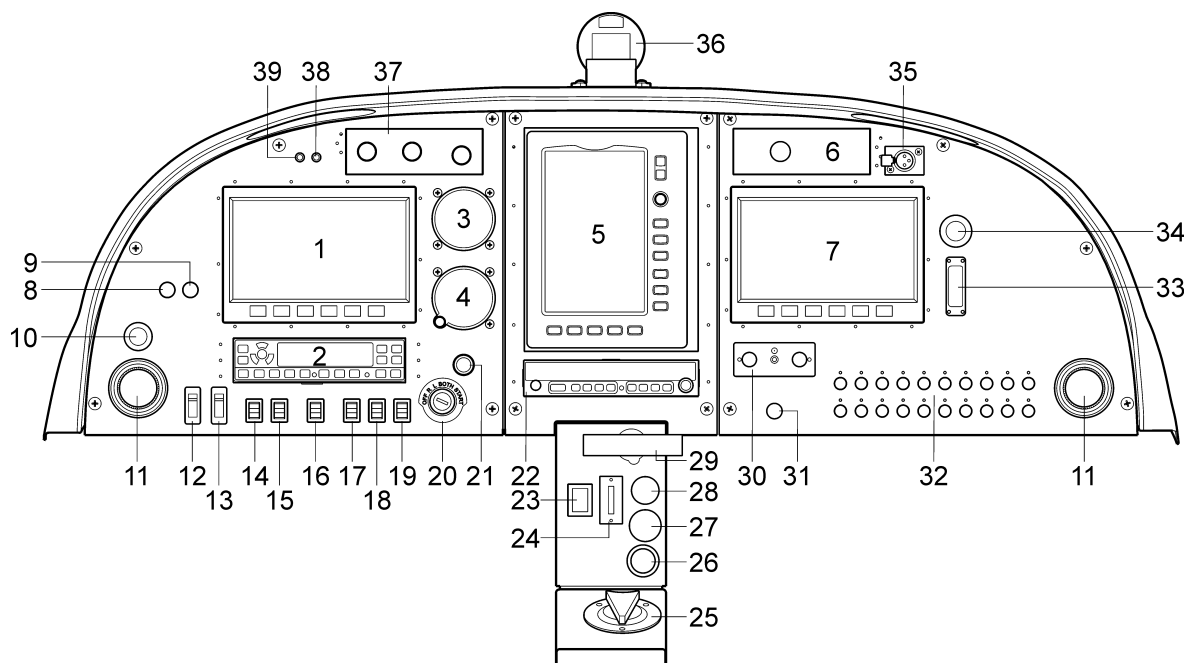


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12.1 General

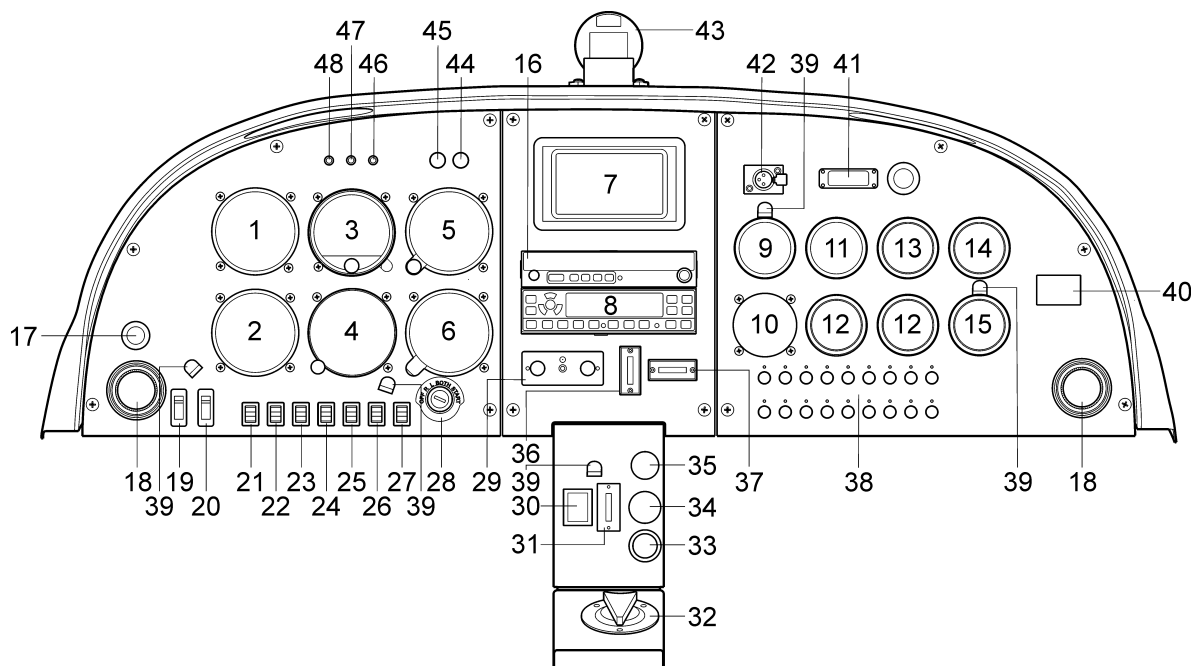
This chapter provides information about pitot-static system, instruments and avionics. The airplane is equipped with the instrument panel that contains all flight, navigation, and engine instruments that are required for VFR operations. Figures 12-1 to 12-8 show the typical instrument panels used for SportCruiser / PiperSport airplane.



- | | |
|-----------------------------------|--|
| 1 EFIS D100 | 21 AUTOPILOT DISCONNECT button |
| 2 GTX 328 transponder | 22 SL30 NAV/COMM |
| 3 Airspeed indicator | 23 FLAPS UP/DOWN switch |
| 4 Altimeter | 24 WING FLAP UP/DOWN position indicator |
| 5 GPSMAP® 695 | 25 FUEL selector valve |
| 6 AP74 Autopilot interface module | 26 Socket 12 V |
| 7 EMS D120 | 27 CARBURETOR HOT AIR knob |
| 8 COCKPIT L dimmer | 28 CABIN HEATER knob |
| 9 INSTR L dimmer | 29 BRS activation handle |
| 10 PARKING BRAKE knob | 30 PM3000 intercom |
| 11 Air vent | 31 VOLUME Dynon alerts control |
| 12 MASTER BAT switch | 32 Circuit breakers |
| 13 MASTER GEN switch | 33 ELT remote switch |
| 14 EMS switch | 34 ELT remote audio buzzer |
| 15 AVIONICS switch | 35 Cockpit light connector |
| 16 FUEL P switch | 36 Magnetic compass |
| 17 NAV L switch | 37 HS34 HSI expansion module |
| 18 STROBE switch | 38 EMS ALARM yellow warning light |
| 19 LDG L switch | 39 CABIN OPENED red warning light |
| 20 Keyed ignition switch | |

NOTE: In case the engine is equipped with new cylinder heads (P/N 413185 2/3 cylinder head) the coolant temperature is measured and is displayed as "CHT" on the Dynon EMS-D120 screen.

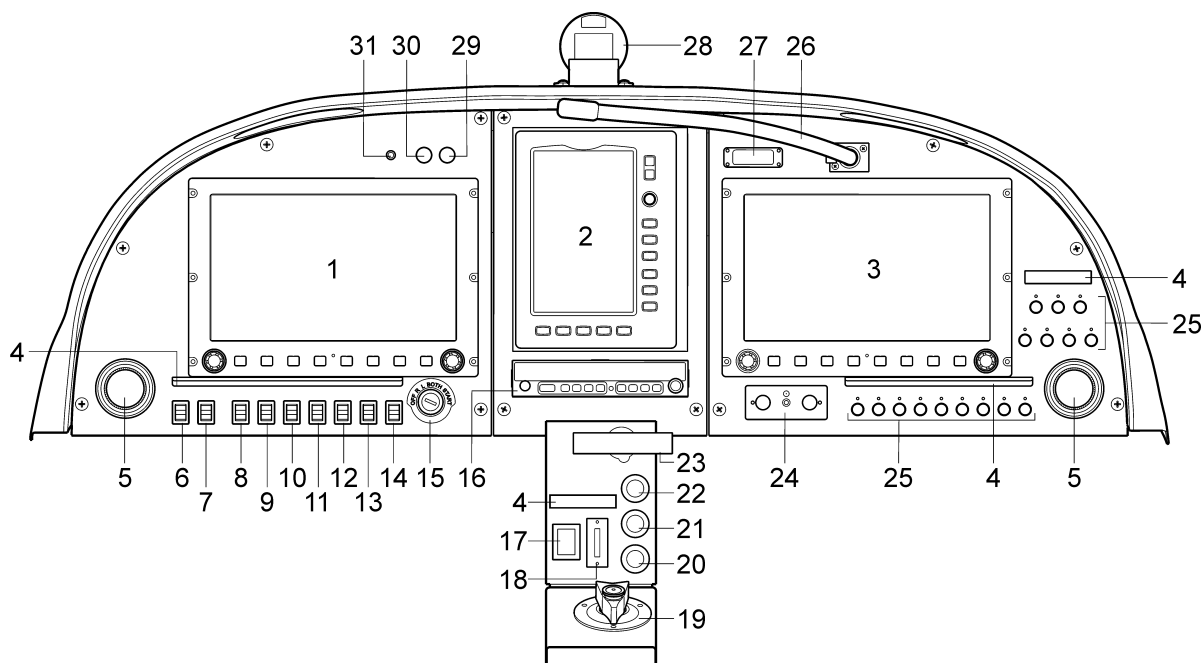
Fig. 12-1: SportCruiser typical instrument panel with EFIS / EMS



- | | |
|------------------------------|--|
| 1 Airspeed indicator | 25 NAV L switch |
| 2 Turn and bank indicator | 26 STROBE switch |
| 3 Artificial horizon | 27 LDG L switch |
| 4 Directional gyro | 28 Keyed ignition switch |
| 5 Altimeter | 29 PM3000 intercom |
| 6 Vertical speed indicator | 30 FLAPS UP/DOWN switch |
| 7 Aera 510 GPS | 31 WING FLAP UP/DOWN position indicator |
| 8 GTX 327 transponder | 32 FUEL selector valve |
| 9 Engine speed indicator | 33 Socket 12 V |
| 10 Fuel pressure indicator | 34 CARBURETOR HOT AIR knob |
| 11 Oil pressure indicator | 35 CABIN HEATER knob |
| 12 Fuel quantity indicator | 36 Elevator TRIM UP/DOWN |
| 13 Oil temperature indicator | 37 AILERON TRIM L/R |
| 14 CHT/CT* indicator | 38 Circuit breakers |
| 15 Voltmeter | 39 Instrument lighting |
| 16 SL40 VHF transceiver | 40 Hourmeter |
| 17 PARKING BRAKE knob | 41 ELT remote switch |
| 18 Air vent | 42 Cockpit light connector |
| 19 MASTER BAT switch | 43 Magnetic compass |
| 20 MASTER GEN switch | 44 COCKPIT L switch |
| 21 ENG INSTR switch | 45 INSTR L dimmer |
| 22 FLT INSTR switch | 46 GEN red warning light |
| 23 AVIONICS switch | 47 FUEL PUMP green signaling light |
| 24 FUEL P switch | 48 CABIN OPENED red warning light |

* CT indicator in case the engine is equipped with new cylinder heads, (P/N 413185 for 2/3 cylinder head)

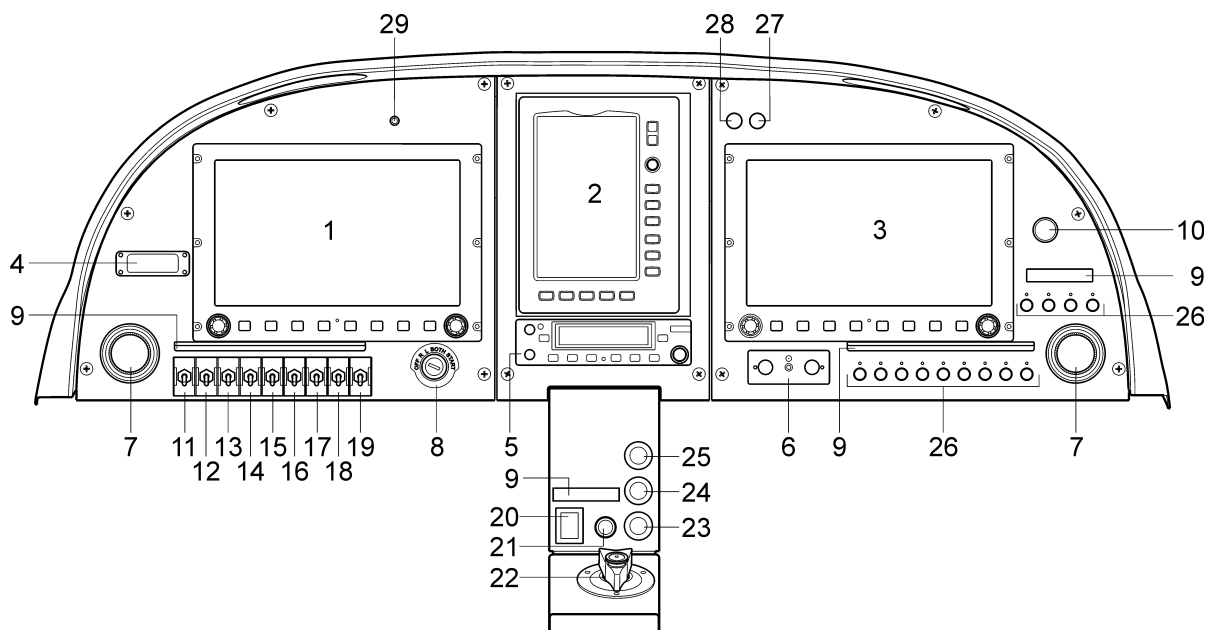
Fig. 12-2: SportCruiser typical instrument panel with analog instruments



- | | |
|----------------------------|--|
| 1 PFD SV-D1000 | 17 FLAPS UP/DOWN switch |
| 2 GPSMAP® 695 | 18 WING FLAP UP/DOWN position indicator |
| 3 EMS SV-D1000 | 19 FUEL selector valve |
| 4 Lighting cover | 20 PARKING BRAKE knob |
| 5 Air vent | 21 CARBURETOR HOT AIR knob |
| 6 MASTER BAT switch | 22 CABIN HEATER knob |
| 7 MASTER GEN switch | 23 BRS activation handle (option) |
| 8 EFIS 1 switch | 24 PM3000 intercom |
| 9 EFIS 2 switch | 25 Circuit breakers |
| 10 AVIONICS switch | 26 Cockpit light |
| 11 FUEL P switch | 27 ELT remote switch |
| 12 NAV L switch | 28 Magnetic compass |
| 13 STROBE switch | 29 INSTR L dimmer |
| 14 LDG L switch | 30 COCKPIT L dimmer |
| 15 Keyed ignition switch | 31 EMS ALARM yellow warning light |
| 16 SL30 NAV/COMM | |

NOTE: In case the engine is equipped with new cylinder heads (P/N 413185 2/3 cylinder head) the coolant temperature (CT) instead of Cylinder Head temperature (CHT) is measured.

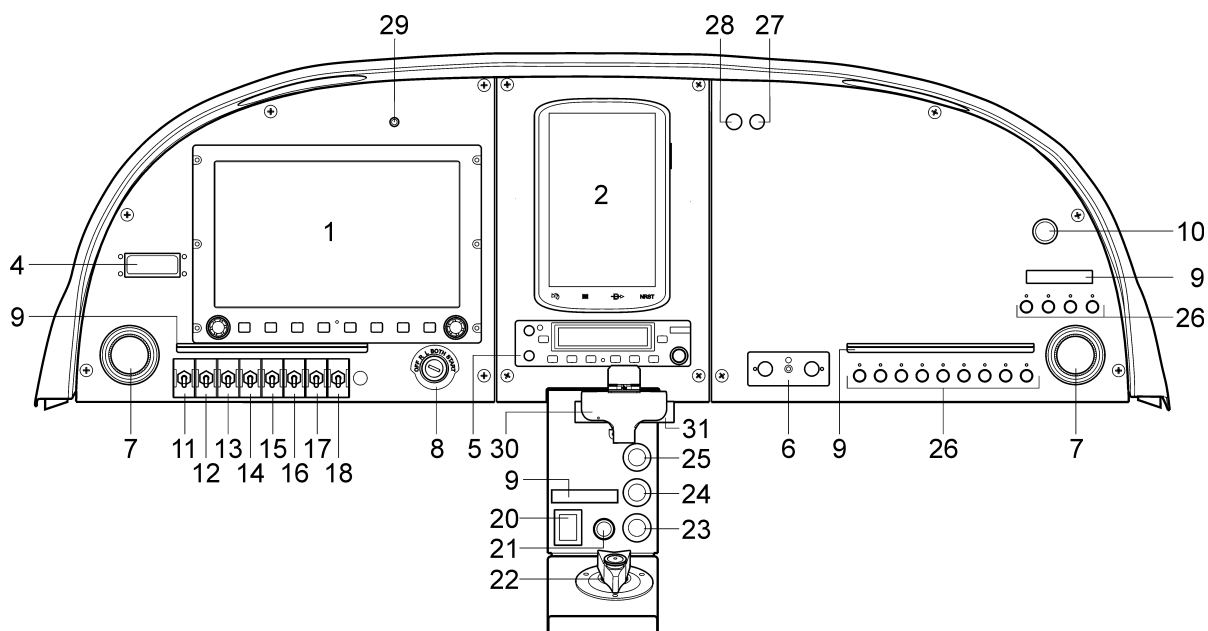
Fig. 12-3: SportCruiser typical instrument panel with Skyview system



- | | |
|----------------------------------|--|
| 1 PFD SV-D1000 | 17 NAV L circuit breaker |
| 2 GPSMAP® 695 | 18 STROBE circuit breaker |
| 3 EMS SV-D1000 | 19 LDG L circuit breaker |
| 4 ELT remote switch | 20 FLAPS UP/DOWN switch |
| 5 GNC 255A NAV/COMM | 21 AUTOPILOT DISCONNECT button |
| 6 PM3000 intercom | 22 FUEL selector valve |
| 7 Air vent | 23 PARKING BRAKE knob |
| 8 Keyed ignition switch | 24 CARBURETOR HOT AIR knob |
| 9 Lighting cover | 25 CABIN HEATER knob |
| 10 12V socket | 26 Circuit breakers |
| 11 MASTER BAT switch | 27 INSTR L dimmer |
| 12 MASTER GEN switch | 28 COCKPIT L dimmer |
| 13 EFIS 1 circuit breaker | 29 EMS ALARM yellow warning light |
| 14 EFIS 2 circuit breaker | |
| 15 AVIONICS switch | |
| 16 FUEL P circuit breaker | |

NOTE: In case the engine is equipped with new cylinder heads (P/N 413185 2/3 cylinder head) the coolant temperature (CT) instead of Cylinder Head temperature (CHT) is measured.

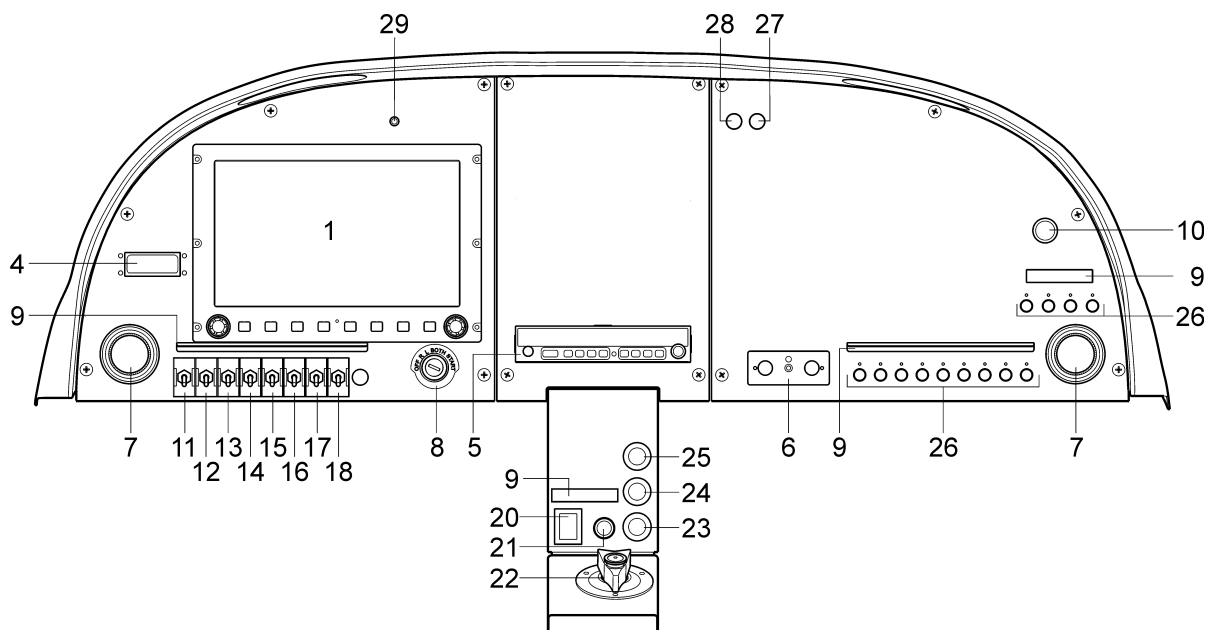
Fig. 12-4: SportCruiser typical instrument panel with Skyview system (from S/N C0416)



- | | |
|-----------------------------------|--|
| 1 PFD SV-D1000 | 17 STROBE circuit breaker |
| 2 GPS Aera 795 | 18 LDG L circuit breaker |
| 3 <i>Intentionally left blank</i> | 19 <i>Intentionally left blank</i> |
| 4 ELT remote switch | 20 FLAPS UP/DOWN switch |
| 5 GNC 255A NAV/COMM | 21 AUTOPILOT DISCONNECT button |
| 6 PM3000 intercom | 22 FUEL selector valve |
| 7 Air vent | 23 PARKING BRAKE knob |
| 8 Keyed ignition switch | 24 CARBURETOR HOT AIR knob |
| 9 Lighting cover | 25 CABIN HEATER knob |
| 10 12V socket | 26 Circuit breakers |
| 11 MASTER BAT switch | 27 INSTR L dimmer |
| 12 MASTER GEN switch | 28 COCKPIT L dimmer |
| 13 EFIS 1 circuit breaker | 29 EMS ALARM yellow warning light |
| 14 AVIONICS switch | 30 BRS activation handle cover |
| 15 FUEL P circuit breaker | 31 BRS activation handle |
| 16 NAV L circuit breaker | |

NOTE: In case the engine is equipped with new cylinder heads (P/N 413185 2/3 cylinder head) the coolant temperature (CT) instead of Cylinder Head temperature (CHT) is measured.

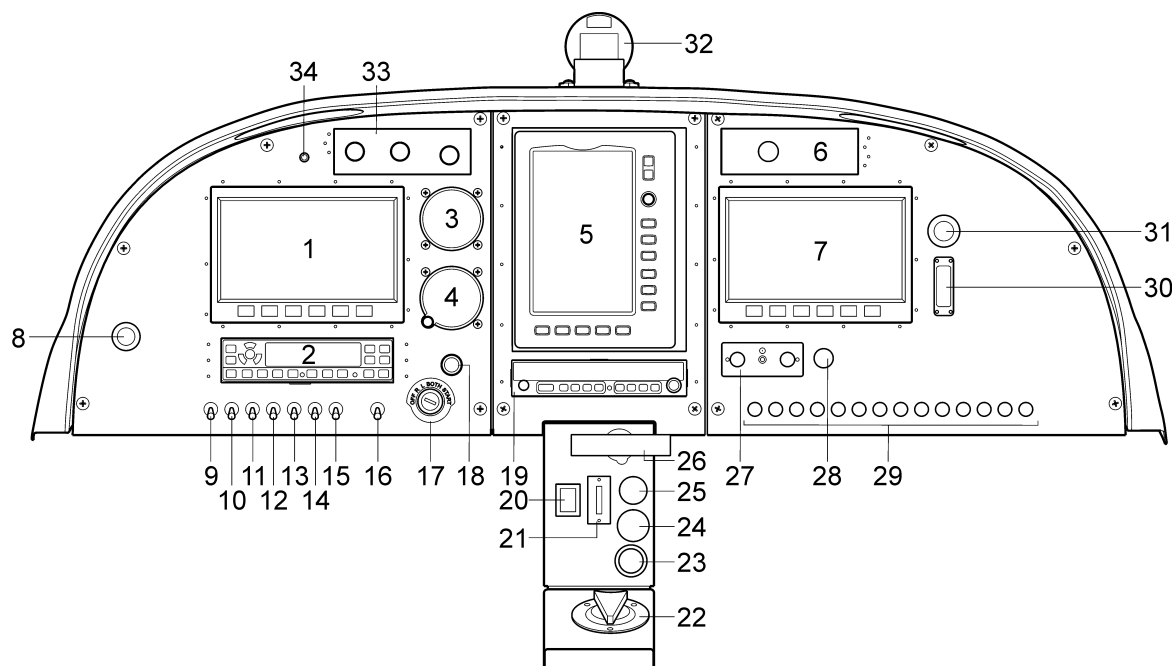
Fig. 12-5: SportCruiser typical instrument panel with Skyview system (from S/N C0416)



- | | |
|-----------------------------------|--|
| 1 PFD SV-D1000 | 17 STROBE circuit breaker |
| 2 <i>Intentionally left blank</i> | 18 LDG L circuit breaker |
| 3 <i>Intentionally left blank</i> | 19 <i>Intentionally left blank</i> |
| 4 ELT remote switch | 20 FLAPS UP/DOWN switch |
| 5 SL30 NAV/COMM | 21 AUTOPILOT DISCONNECT button |
| 6 PM3000 intercom | 22 FUEL selector valve |
| 7 Air vent | 23 PARKING BRAKE knob |
| 8 Keyed ignition switch | 24 CARBURETOR HOT AIR knob |
| 9 Lighting cover | 25 CABIN HEATER knob |
| 10 12V socket | 26 Circuit breakers |
| 11 MASTER BAT switch | 27 INSTR L dimmer |
| 12 MASTER GEN switch | 28 COCKPIT L dimmer |
| 13 EFIS 1 circuit breaker | 29 EMS ALARM yellow warning light |
| 14 AVIONICS switch | |
| 15 FUEL P circuit breaker | |
| 16 NAV L circuit breaker | |

NOTE: In case the engine is equipped with new cylinder heads (P/N 413185 2/3 cylinder head) the coolant temperature (CT) instead of Cylinder Head temperature (CHT) is measured.

Fig. 12-6: SportCruiser typical instrument panel with Skyview system (from S/N C0416)

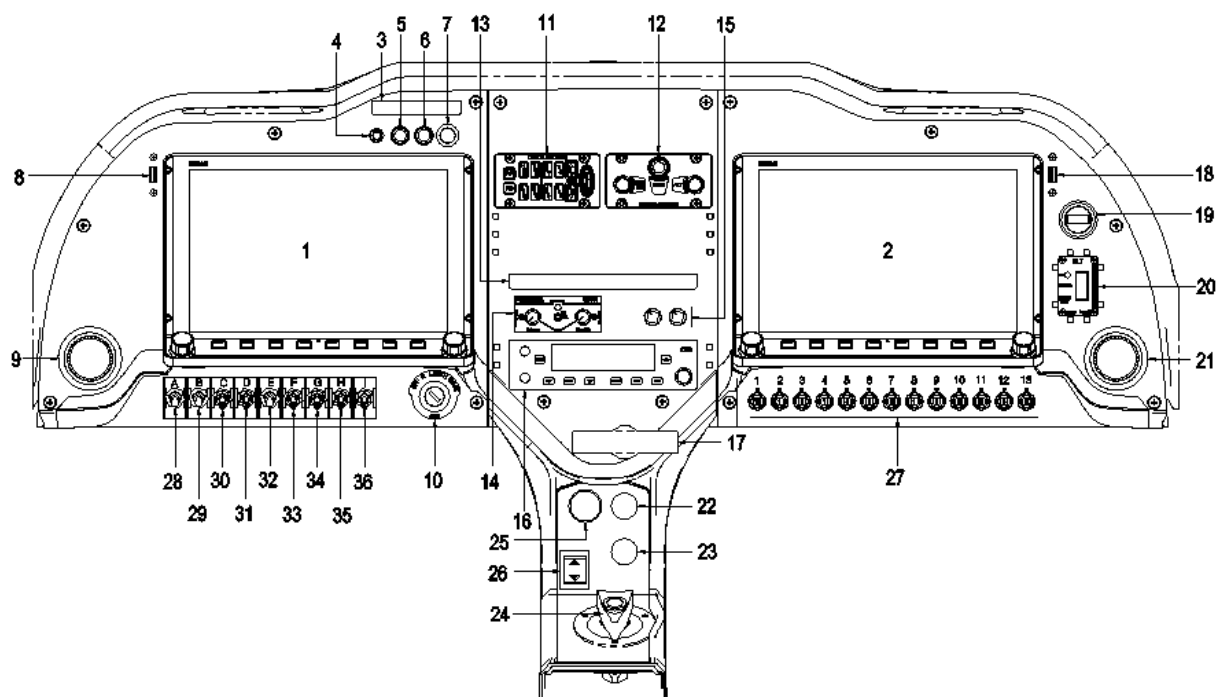


- | | |
|-----------------------------------|---|
| 1 EFIS D100 | 18 AUTOPILOT DISCONNECT button |
| 2 GTX 328 transponder | 19 SL30 NAV/COMM |
| 3 Airspeed indicator | 20 FLAPS UP/DOWN switch |
| 4 Altimeter | 21 WING FLAP UP/DOWN position indicator |
| 5 GPSMAP® 695 | 22 FUEL selector valve |
| 6 AP74 Autopilot interface module | 23 Socket 12 V |
| 7 EMS D120 | 24 CARBURETOR HOT AIR knob |
| 8 PARKING BRAKE knob | 25 CABIN HEATER knob |
| 9 MASTER switch | 26 BRS activation handle |
| 10 INSTR switch | 27 PM3000 intercom |
| 11 AVIONICS switch | 28 VOLUME Dynon alerts control |
| 12 AUTOPILOT switch | 29 Circuit breakers |
| 13 STROBE switch | 30 ELT remote switch |
| 14 NAV L switch | 31 ELT remote audio buzzer |
| 15 LDG L switch | 32 Magnetic compass |
| 16 FUEL P switch | 33 HS34 HSI expansion module |
| 17 Keyed ignition switch | 34 EMS ALARM yellow warning light |

NOTE: In case the engine is equipped with new cylinder heads (P/N 413185 2/3 cylinder head) the coolant temperature is measured and is displayed as "CHT" on the Dynon EMS-D120 screen.

Fig. 12-7a: PiperSport instrument panel with EFIS / EMS

NOTE: Current instrument panel arrangement is stated in the Pilot's Operation Handbook, Supplement No. 2.



- | | |
|---------------------------------------|------------------------------------|
| 1 Dynon SV-HDX1100 | 19 Socket 12V |
| 2 Dynon SV-HDX1100 | 20 ELT remote switch |
| 3 Instrument light | 21 Vent-Air outlet |
| 4 STALL WARNING TEST button | 22 CABIN HEATER knob |
| 5 STALL WARNING light | 23 PARKING BRAKE knob |
| 6 EMS ALARM warning light | 24 FUEL selector valve |
| 7 AUTOPILOT DISCONNECT button | 25 CARBURETOR HOT AIR knob |
| 8 USB port EFIS 1 | 26 FLAPS UP/DOWN switch |
| 9 Vent-Air Outlet | 27 Circuit breakers |
| 10 Ignition switch | 28 MASTER BATT switch |
| 11 Dynon SV-AP-PANEL | 29 MASTER GEN switch |
| 12 Dynon SV-KNOB-PANEL | 30 EFIS 1 switch/circuit breaker |
| 13 Instrument light | 31 EFIS 2 switch / circuit breaker |
| 14 PM 3000 intercom | 32 AVIONICS switch |
| 15 COCKPIT L and INSTRUMENT L dimmers | 33 FUEL P switch/circuit breaker |
| 16 Garmin GNC 255 NAV/COM | 34 NAV L switch/circuit breaker |
| 17 BRS activation handle | 35 STROBE switch/circuit breaker |
| 18 USB port EFIS 2 | 36 LDG L switch /circuit breaker |

Fig. 12-7b: SportCruiser instrument panel with SV-HDX1100
- valid for SportCruiser S/N C0596 and C0600

NOTE: Current instrument panel arrangement is stated in the Pilot's Operation Handbook, Supplement No. 2



12.2 Description and operation

12.2.1 Pitot-static system

The pitot-static tube for sensing static and total pressure is located under the left half of the wing close to the rib No. 4. Total pressure is sensed through the hole in the pitot-tube face and static pressure is sensed through the holes on the tube circumference. Pressure distribution to individual instruments is performed by means of flexible plastic hoses (see Fig. 12-9).

Airplanes equipped with analog instruments:

Static pressure is lead to the ALT, ASI, VSI and altitude encoder. Total pressure is connected to the ASI only.

Airplanes equipped with EFIS:

Static pressure is lead to the ALT, ASI and EFIS. Total pressure is connected to the ASI and EFIS.

Airplanes equipped with Skyview:

Static and total pressure is lead to the double ADAHRS. The drain sumps are installed on the both flexible hoses.

12.2.2 Stall warning system

The airplane can be optionally equipped with a vane-type lift detector. The lift detector is located on the bottom of the left wing's leading edge. Should the critical angle of attack be approached (close to stall speed), the vane is actuated by the differences in pressures acting on its front and the rear surfaces. Actuation of the vane triggers the stall warning system's electrical circuit. When the stall warning system is triggered, an audio alert is activated (through the horn located behind the cabin) and the red **STALL WARNING** light (1, Fig. 12-8) will illuminate on the left instrument panel. The audio and visual alerts will remain on throughout the event.

The proper function of the system can be checked by pressing **STALL WARNING TEST** button (2) located on the left instrument panel.

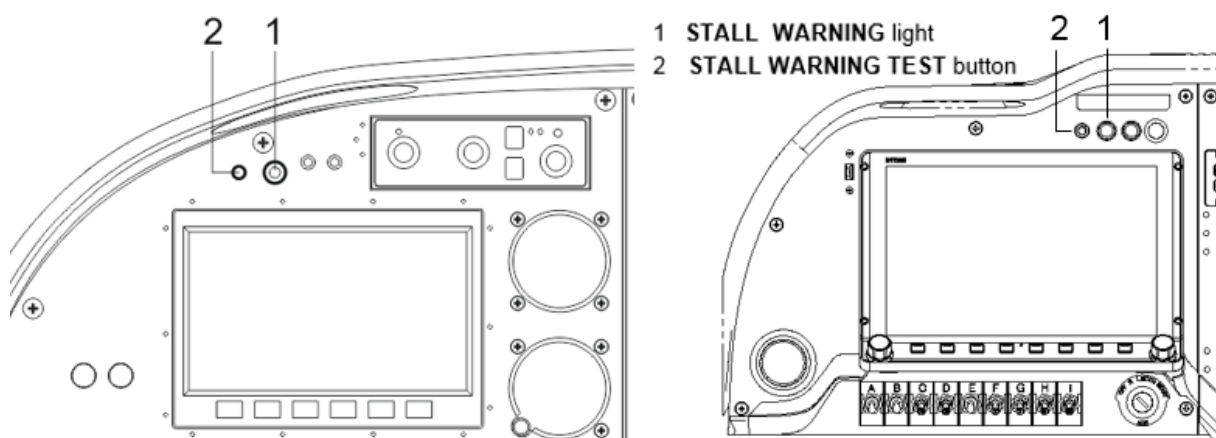


Fig. 12-8: Location of the stall warning light and test button

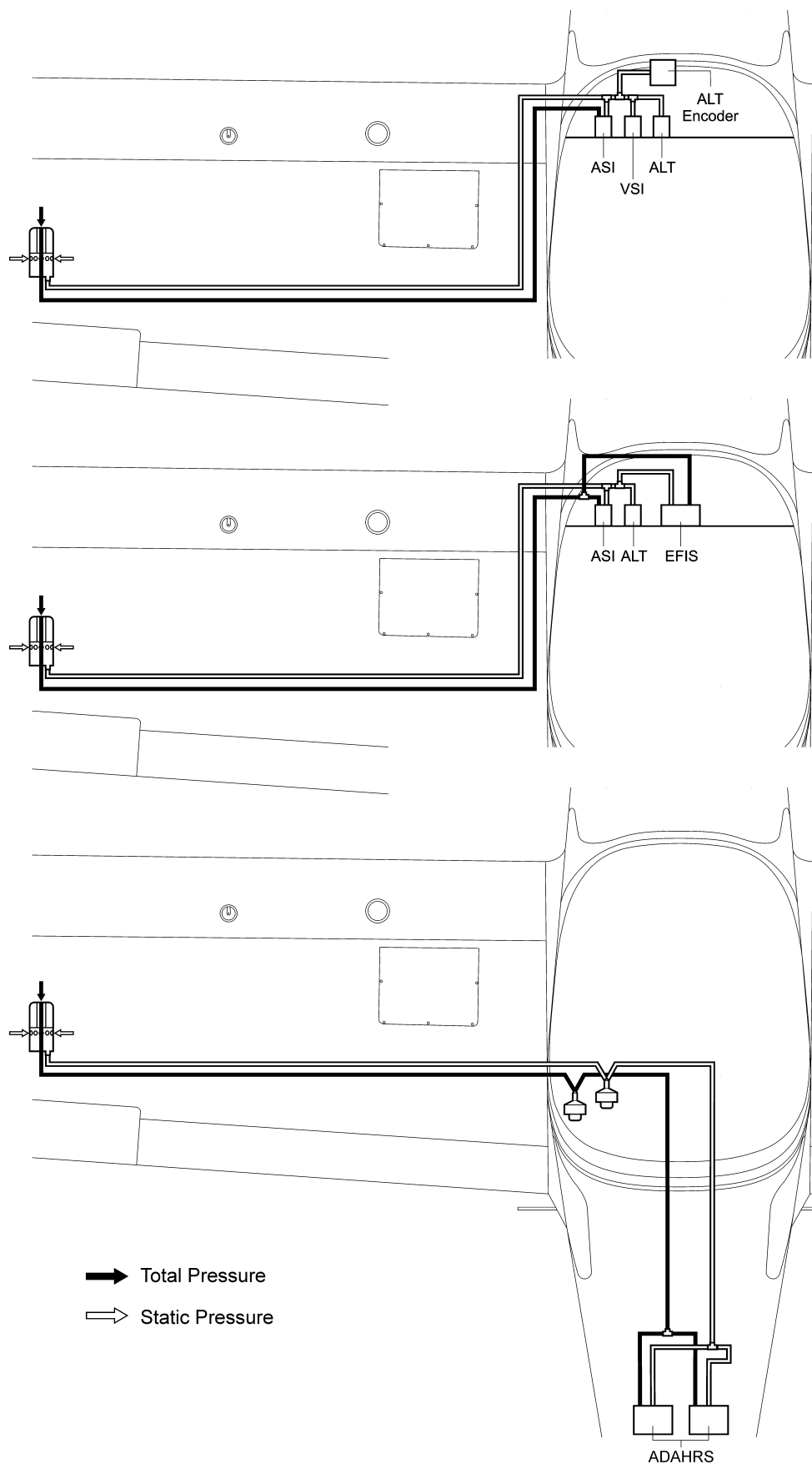


Fig. 12-9: Pitot-static system scheme



12.2.3 Flight instruments

Airspeed indicator - ASI

The airspeed indicator located on the left side of instrument panel is classical analogue round pressure gauge.

The airspeed indicator color range marking is shown in Tab.12-1.

Marking	IAS value or range			Significance
	knot	km/h	mph	
Early SportCruiser, PiperSport				
White arc	32-75	59-139	37-86	Flap Operating Range.
Green arc	39-108	72-200	45-124	Normal Operating Range.
Yellow arc	108-138	200-255	124-158	Maneuvers must be conducted with caution and only in smooth air.
Red line	138	255	158	Maximum speed for all operations.
SportCruiser from S/N C0416				
White arc	31-75	57-139	36-86	Flap Operating Range.
Green arc	37-108	69-200	43-124	Normal Operating Range.
Yellow arc	108-138	200-256	124-158	Maneuvers must be conducted with caution and only in smooth air.
Red line	138	256	159	Maximum speed for all operations.

Tab.12-1: ASI color range marking

Altimeter - ALT

The altimeter located on the left side of instrument panel is classical analogue round pressure gauge. Range of measure is up to 20,000 ft.

Magnetic compass

The magnetic compass is designed to determine magnetic course of the airplane. The magnetic compass (if installed) is positioned on the upper edge of the instrument panel and consists of the vessel filled with nonfreezing liquid with the little window in the front wall. The compass rose is positioned on the rotary and swinging pivot inside the compass.

EFIS D100

The Dynon D100 is a panel-mounted Electronic Flight Instrument System (EFIS). The instrument integrates multiple flight instruments, including airspeed, altitude, magnetic compass, turn rate, slip/skid ball, bank angle, and vertical speed. Other useful functions include a clock/timer, GPS data, outside air temperature and elevator trim indicator.

NOTE: For detailed information refer to EFIS D100 Installation Guide (P/N 100487-000, latest edition).



12.2.4 Engine instruments

Engine parameters (RPM, CHT, EGT, oil pressure and temperature, fuel pressure, manifold pressure) are displayed either on the EMS D120 or on the classical analog instruments. A typical example of the EMS display is shown in the Figure 10-3. The EMS D120 is located on the right side of instrument panel. The engine parameters color marking is shown in Tab.12-2.

NOTE: For detailed information refer to EMS D120 Installation Guide (P/N 100591-000, latest edition).

Value	Minimum Limit (red line)	Caution Range (yellow arc)	Normal Operating Range (green arc)	Caution Range (yellow arc)	Maximum Range (red line)
Engine speed [RPM]	-	0 – 1,400	1,400 – 5,500	5,500 – 5,800	5,800
Oil Pressure	0.8 bar (12 psi)	0.8 – 2 bar (12 – 29 psi)	2 – 5 bar (29 – 73 psi)	5 – 7 bar (73 – 102 psi)	7 bar (102 psi)
Oil Temperature	50 °C (122°F)	50 – 90 °C (122 – 194 °F)	90 – 110 °C (194 – 230 °F)	110 – 130 °C (230 – 266 °F)	130 °C (266 °F)
Cylinder Head Temperature (CHT)	-	to 50 °C (to 122 °F)	50 – 135 °C (122 – 275°F)	-	135 °C (275 °F)
Coolant Temperature (CT)***	-	-	50 – 120 °C (122 – 248°F)	-	120 °C (248 °F)
Exhaust Gas Temp. (EGT)	-	to 300 °C (to 572 °F)	300 – 850 °C (572 – 1,562 °F)	850 – 880 °C (1,562 – 1,616 °F)	880 °C (1,616 °F)
Fuel Pressure	0.15 bar (2.2 psi)	-	0.15 – 0.4 bar (2.2 – 5.8 psi) 0.15 – 0.5 bar* (2.2 – 7.25 psi)	-	0.4 bar (5.8 psi) 0.5 bar* (7.25 psi)
	0.14 bar** (2.0 psi)	0.14 - 0.15 bar** (2.0 – 2.2 psi)	0.15 - 0.50 bar** (2.2 – 7.25 psi)	0.50 - 0.51 bar** (7.25 – 7.4 psi)	0.51 bar** (7.4 psi)
Manifold pressure	-	-	10 – 35 in Hg		

* Applicable only for fuel pump from S/N 11.0036.

** Applicable for Dynon SkyView system.

*** Applicable for ROTAX 912 ULS2 engines from S/N 6 781 410 inclusive and for 912 S2 engines from S/N 4 924 544 inclusive, equipped with new cylinder heads, P/N 413185 for 2/3 cylinder head. The coolant temperature instead of cylinder head temperature is measured. On Dynon EMS D120 screen the coolant temperature is displayed as “CHT”.

Tab.12-2: The engine instruments colour marking

12.2.5 Avionics

COMM, COMM/NAV system

The Apollo SL-30 includes a 760-channel VHF Comm transceiver and 200-channel VOR/LOC/GS navigation receiver with DME display.

NOTE: For detailed information refer to SL-30 Installation Manual (P/N 560-0404-03a, latest edition) and Pilot's Guide (P/N 560-0403-01, latest edition).



Fig. 12-10: SL-30 COMM/NAV



The Apollo SL-40 is a 760-channel VHF Comm transceiver.

NOTE: For detailed information refer to SL-40 Installation Manual (P/N 560-0956-02a, latest edition) and Pilot's Guide (P/N 560-0954-02, latest edition).



Fig. 12-11: SL-40 VHF transceiver

GNC 255A includes a 760-channel (w/ 25 kHz spacing) and 2280-channel (w/ 8.33 kHz spacing) VHF Comm transceiver and 200-channel VOR/LOC/GS navigation receiver.

NOTE: For detailed information refer to GTR 225 / GNC 255 TSO Installation Manual (P/N 190-01182-02, latest edition) and GNC 255A/255B Pilot's Guide (P/N 190-01182-01, latest edition).



Fig. 12-12: GNC 255A COMM/NAV

GTR 225A includes a 760-channel (w/ 25 kHz spacing) and 2280-channel (w/ 8.33 kHz spacing) VHF Comm transceiver..

NOTE: For detailed information refer to GTR 225 / GNC 255 TSO Installation Manual (P/N 190-01182-02, latest edition) and GTR 225/225A/225B Pilot's Guide (P/N 190-01182-00, latest edition).



Fig. 12-13: GNC 255A COMM/NAV



The PM3000 is a panel mounted, 4-place high-fidelity stereo intercom system that allows the pilot and copilot/passenger to communicate and listen to music.

NOTE: For detailed information refer to PM3000 Installation Manual (P/N 200-193-0005, latest edition) and Pilot's Guide (P/N 202-193-0001, latest edition).



Fig. 12-14: PM3000 intercom

Navigation system

The panel-mounted GTX 327 is a TSO-certified Mode A/C digital transponder with the addition of altitude reporting and timing functions such as flight time and count-up and count-down timers, as well as current pressure altitude.

NOTE: For detailed information refer to GTX 327 Installation Manual (P/N 190-00187-02, latest edition) and Pilot's Guide (P/N 190-00187-00, latest edition).



Fig. 12-15: GTX 327 transponder

The panel-mounted GTX 328 is a TSO-certified Mode S digital transponder. In addition to displaying the code, reply symbol and mode of operation, the GTX 328 screen displays pressure altitude, density altitude, temperature, and timer functions, depending on equipment connections and configuration selection. The unit also features an altitude monitor and flight timers. A voice or tone audio output announces altitude deviation and count down timer expiration.

NOTE: For detailed information refer to GTX 328 Maintenance Manual (P/N 190-00420-05, latest edition) and Pilot's Guide (P/N 190-00420-03, latest edition).



Fig. 12-16: GTX 328 transponder



The panel-mounted GTX 330 is a TSO-certified Mode S digital transponder. In addition to displaying the code, reply symbol and mode of operation, the GTX 330 screen displays pressure altitude, density altitude, temperature, and timer functions, depending on equipment connections and configuration selection. The unit also features an altitude monitor, TIS traffic advisories and flight timers. A voice or tone audio output announces altitude deviation, TIS traffic advisory and count down timer expiration.

NOTE: For detailed information refer to GTX 330 Installation Manual (P/N 190-00207-02, latest edition) and Pilot's Guide (P/N 190-00207-00, latest edition).



Fig. 12-17: GTX 330 transponder

The GPSMAP 695/696 is the ultimate portable MFD. This portable GPS navigator presents GPS-derived analog flight instrumentation, position, navigation, and hazard avoidance information to the pilot using a bright 7-inch diagonal high-definition sunlight readable color display.

NOTE: For detailed information refer to GPS 695/696 Owner's Manual (P/N 190-00919-00, latest edition).



Fig. 12-18: GPSMAP 695/696



The Aera 510 presents GPS-derived analog flight instrumentation, position, navigation, and hazard avoidance information to the pilot using a bright 4.3-inch diagonal high-definition sunlight readable color display with touch screen.

NOTE: For detailed information refer to Aera Models 500, 510, 550, 560 Owner's Manual (P/N 190-01117-00, latest edition).



Fig. 12-19: GPS Aera 510

The GTN 650 unit is a panel mounted GPS / NAV / COM navigator. The GTN 650 unit is 6.25 in wide and 2.65 in tall. It features a 600 by 266 pixel color LCD touchscreen. The GTN 750 is a GPS / SBAS unit that meets requirements TSO-C146c and may be approved for IFR en route, terminal, oceanic, non precision and precision approach operations. The GTN 650 unit includes an airborne VHF communications transceiver and airborne VOR / LOC and G / S receivers.

NOTE: For detailed information refer to GTN 6XX/ 7XX AML STC Installation Manual (P/N 190-01007-A3, latest edition) and Pilot's Guide (P/N 190-01004-03, latest edition).



Fig. 12-20: GPS / NAV / COM GTN 650



CHAPTER 12 – INSTRUMENTS AND AVIONICS

The GTN 750 unit is a panel mounted GPS / NAV / COM navigator. The GTN 750 unit is 6.25 in wide and 6.00 in tall. It features a 600 by 708 pixel color LCD touchscreen which provides a rich and intuitive user interface. The GTN 750 is a GPS / SBAS unit that meets requirements TSO-C146c and may be approved for IFR en route, terminal, oceanic, non precision and precision approach operations. The GTN 750 unit includes an airborne VHF communications transceiver and airborne VOR / LOC and G / S receivers.

NOTE: For detailed information refer to GTN 6XX/ 7XX AML STC Installation Manual (P/N 190-01007-A3, latest edition) and Pilot's Guide (P/N 190-01007-03, latest edition).



Fig. 12-21: GPS / NAV / COM GTN 750



The Aera 795/796 GPS is the ultimate MFD and incorporates the features of the Garmin GPSMAP 695/696, while adding new capabilities such as a touchscreen interface, selectable screen orientation (landscape or portrait), and 3-D Vision. The Aera 795/796 also takes the pilot one step closer to a paperless cockpit with a digital document viewer, scratch pad and pre-loaded geo-referenced AeroNav IFR and VFR enroute charts. The aera 796 is XM-weather capable.

NOTE: For detailed information refer to Aera models: 795 and 796 Owner's Manual (P/N 190-01194-00, latest edition).



Fig. 12-22: GPS Aera 795/796



Antennas

Fig. 12-23 shows the antenna locations. The COMM antenna (1) is installed on the upper part of the fuselage behind the canopy. The ELT antenna (3) is installed directly in the rear of the COMM antenna. The NAV antenna (2) is installed on the top of the fin. The transponder antenna (4) is installed on the bottom part of the fuselage. The GPS antenna (for GPSMAP 695/696 and GPS Aera 510) is attached to the upper side of the instrument panel cover; GPS antenna (5) for GTN 750 GPS / NAV / COM is installed on the upper part of the fuselage in front of canopy.

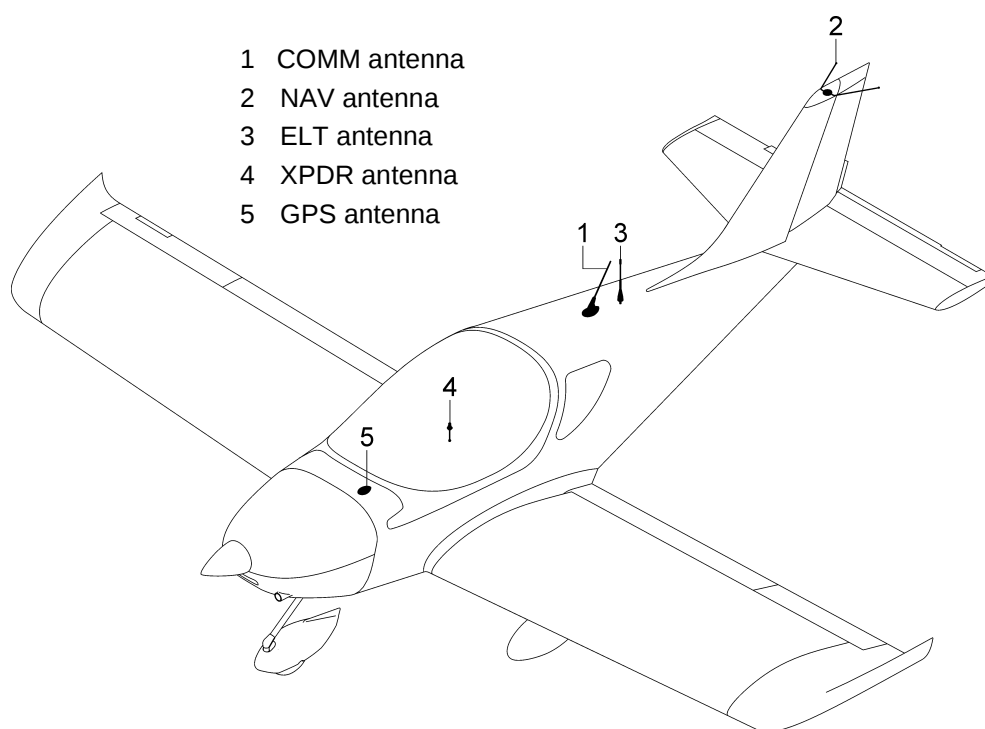


Fig. 12-23: Antenna locations

12.2.6 Dynon SkyView system

Dynon SkyView system is the next generation of glass panel avionics for light sport aircraft. The system architecture is shown on Fig. 12-24.

The SV-D1000 / D1000T / HDX ¹⁾ displays are very bright, high-resolution screens and contain the main control CPU, graphics processor, and terrain data-base. Displays can act as a Primary Flight Display (PFD) with Synthetic Vision, an Engine Monitoring System (EMS), and a Moving Map in a variety of customizable screen layouts.

The most used functions are accessed via two rotary/multi-direction joysticks. Almost all other in flight commands are all available via eight buttons.

Every SkyView system display and module is connected by two independent power and data buses. The failure of any bus connection or module results in automatic fail-over to a working bus or module.

1) D100T and HDX 1100 are touch technology displays



Two SV-BAT-320 Backup Batteries provides over an hour of backup power to displays and modules.

SV-EMS-220 engine module measures engine parameters - engine speed, manifold pressure, oil temperature and pressure, exhaust gas temperature, cylinder head/coolant* temperature, fuel quantity, voltage, current, fuel pressure, fuel flow, flap and trim position.

The SV-ADAHRS-200 and SV-ADAHRS-201 is a complete MEMS-based attitude reference and air data computer, integrated with a digital compass. This allows easier mounting and higher accuracy calibration between the system components.

* Coolant temperature in case the engine is equipped with new cylinder heads; P/N 413185 for 2/3 cylinder head.

SV32 servos enable SkyView to operate as an autopilot.

The SV-XPNDR-261 is a Class 1 Mode S transponder is controlled using the SkyView's on-screen menu system. This allows the transponder to be mounted separately from the instrument panel, and reduces the amount of panel space taken by the transponder. SkyView also provides pressure altitude directly to the transponder, eliminating the need for a separate altitude encoder.

NMEA compatible GPS receiver is connected to the SkyView system.

Convenient program and data updates via USB memory stick.

NOTE: For detailed information refer to SkyView System Installation Guide (Document 101320-013, latest revision) and SkyView Pilot's User Guide (Document 101321-012, latest revision).

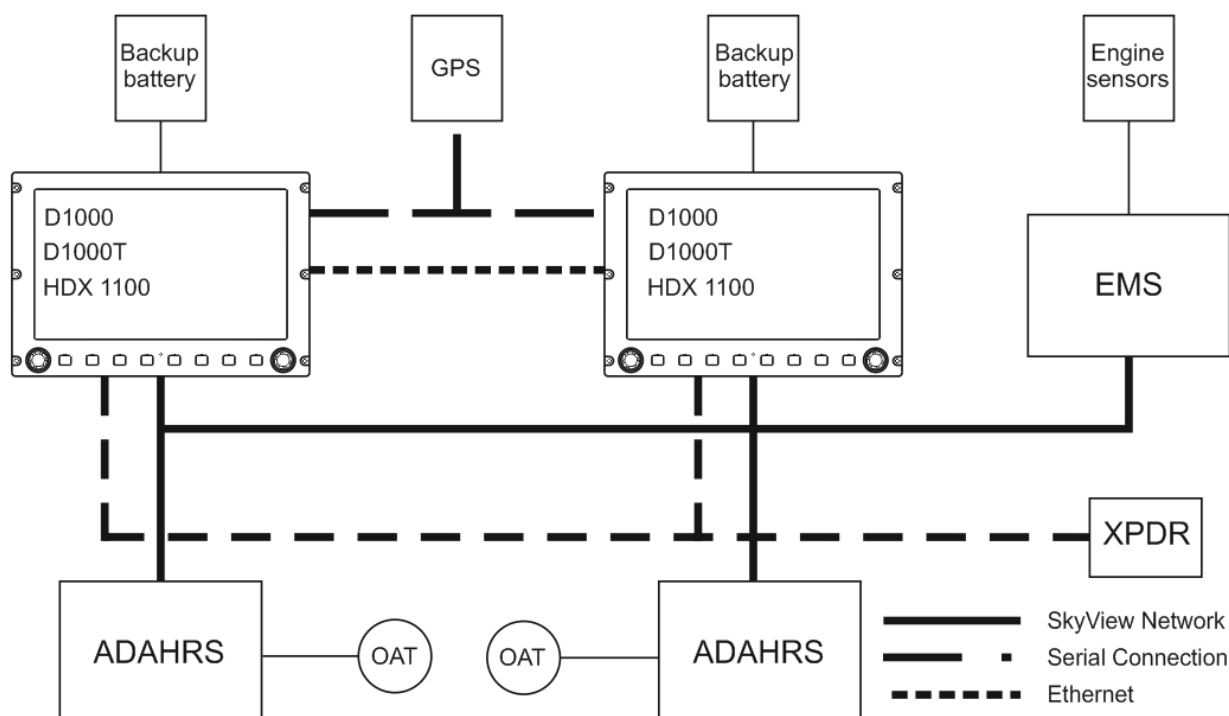


Fig. 12-24: SkyView system architecture



12.3 Removal / Installation

12.3.1 Removal of the pitot-static tube

Type of maintenance: line

Authorization to perform:

- Repairman (LS-M) or Mechanic (A&P)

Tools needed:

- Phillips PH1 screwdriver
- pliers, cutting pliers

- (a) Loose securing bolt (4, Fig. 12-25) in the pitot-static tube bracket (2) and pull out a bit the pitot-static tube (1) with hoses from the bracket.
- (b) Remove the cable ties from hoses (3). The hose and tube for static pressure line mark by **S** letter and for total pressure mark by **T** letter.
- (c) Disconnect the transparent hoses (3) of static and total pressure from the ports on the pitot-static tube (1).

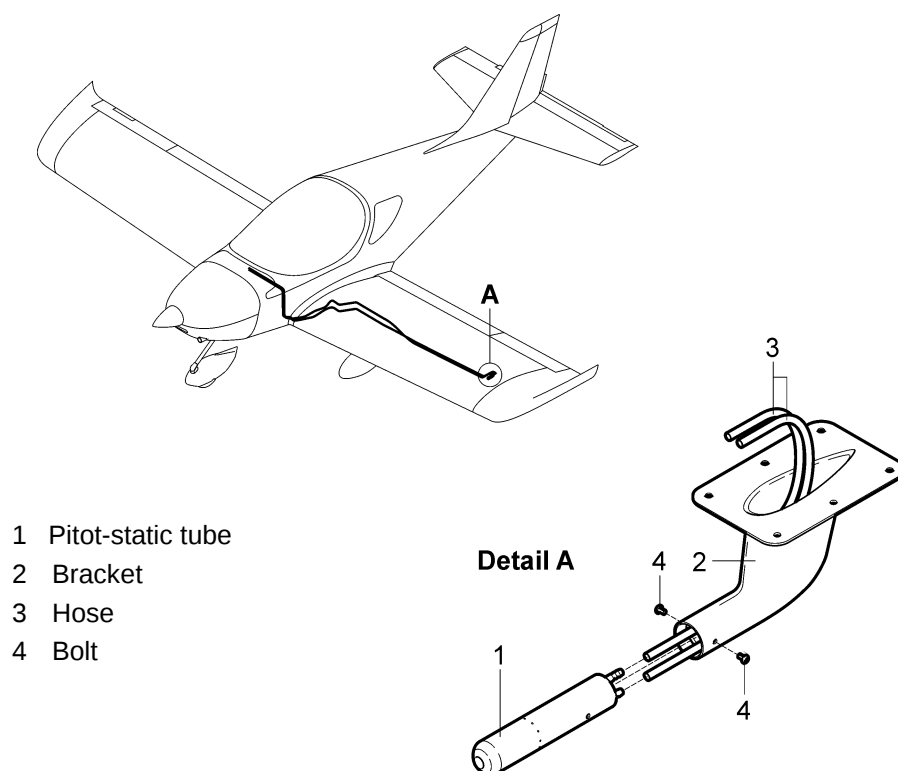


Fig. 12-25: Removal / installation of the pitot-static tube

12.3.2 Installation of the pitot-static tube

Type of maintenance: line

Authorization to perform:

- Repairman (LS-M) or Mechanic (A&P)



Tools needed:

- Phillips PH1 screwdriver
- pliers, cutting pliers

- (a) Connect the hoses (3, Fig. 12-25) to the ports on the pitot-static tube (1) and secure them with cable ties.

WARNING: WHEN CONNECTING THE PITOT-STATIC SYSTEM HOSES PAY INCREASED ATTENTION. THERE MUST NOT BE ANY INCORRECT CONNECTION! CONNECT THE HOSE MARKED S LETTER TO THE PORT MARKED BY S LETTER AND THE HOSE MARKED T LETTER TO THE PORT MARKED BY T LETTER.

- (b) Insert the pitot-static tube (1) in the bracket (2).
- (c) Secure pitot-static tube by means of securing bolt (4).
- (d) Carry out check of pitot-static system tightness / Dynon avionics pitot / static test (see 12.4.1, 12.4.2).
- (e) Check, that pitot-tube is parallel to bottom wing skin.

12.3.3 Removal of the stall warning system lift detector

Type of maintenance: line

Authorization to perform:

- Repairman (LS-M) or Mechanic (A&P)

Tools needed:

- Phillips PH2 screwdriver, screwdriver
- (a) Set the **MASTER BAT, AVIONICS** switches to OFF.
 - (b) Remove the cover on the underside of the wing near the lift detector.
 - (c) Remove the screws (4, Fig. 12-26) and carefully pull the lift detector (1).
 - (d) Remove the screws (3) and disconnect the wires (2).

12.3.4 Installation of the stall warning system lift detector

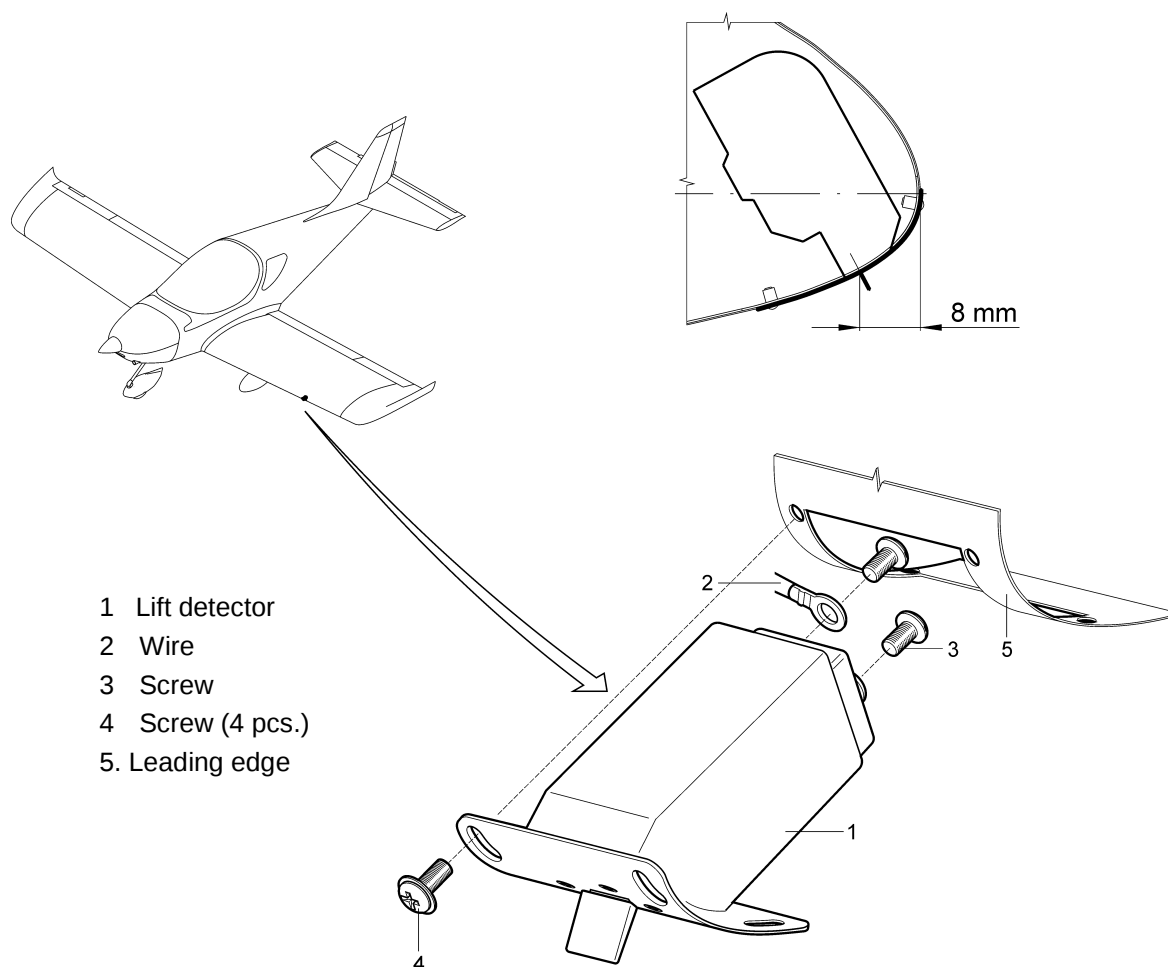
Type of maintenance: line

Authorization to perform:

- Repairman (LS-M) or Mechanic (A&P)

Tools needed:

- Phillips PH2 screwdriver, screwdriver
- (a) Connect the wires (2, Fig. 12-26) to the appropriate points on the lift detector (see Wiring Manual); screw and tighten the screws (3).
 - (b) Insert the lift detector (1) into the hole in the wing leading edge (5).
 - (c) Align the detector (1) so that the tab was located 8 mm from the leading edge (see Fig. 12-22); screw and tighten the screws (4).
 - (d) Set the **MASTER BAT, AVIONICS** switches to ON, press **STALL WARNING TEST** button and check test of the system.
 - (e) Carry out flight test, verify stall warning speed (see 12.4.8.).

**Fig. 12-26:** Lift detector removal / installation

12.3.5 Removal of the flight instruments

Type of maintenance: line

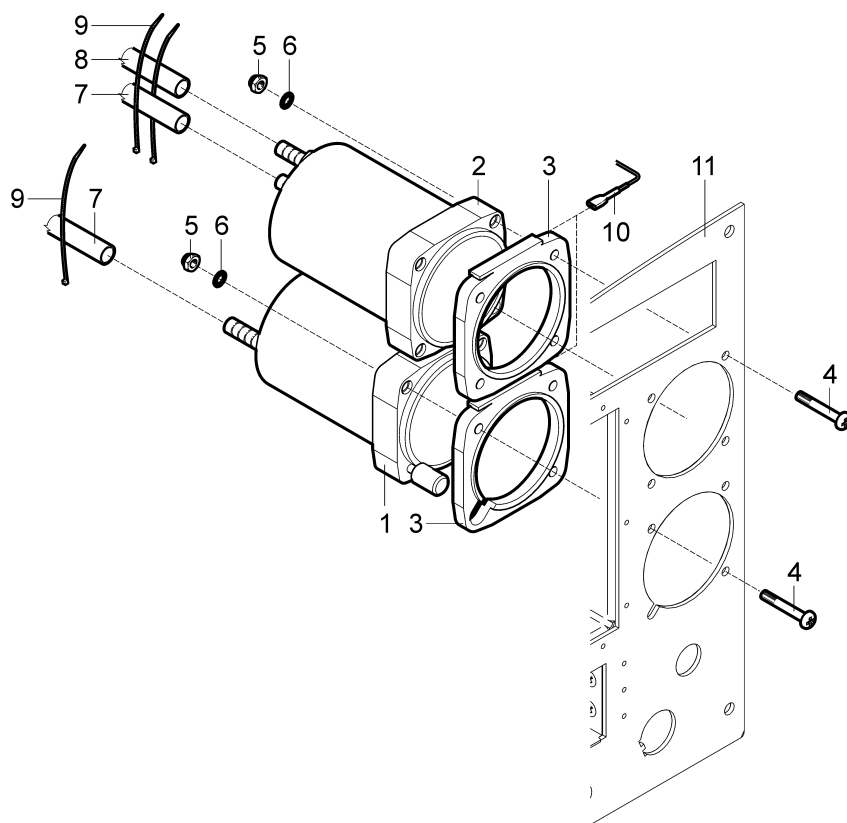
Authorization to perform:

- Repairman (LS-M) or Mechanic (A&P)

Tools needed:

- Phillips PH1 screwdriver
- pliers, cutting pliers

- Remove bolts securing the left instrument panel and carefully pull out and hold the instrument panel.
- Remove the cable ties (9, Fig. 12-27) from the hoses (7; 8).
- Disconnect the hoses (7; 8) of static and total pressure from the rear ports on the appropriate indicator (1; 2).
- Disconnect the wires (10) from the illuminator (3).
- Unscrew the nuts (5), remove the washers (6) and bolts (4).
- Remove the instrument (1; 2) and illuminator (3) from the panel.
- Install the protective cover on the rear ports of the instrument.



- 1 Altimeter
- 2 Airspeed indicator
- 3 Illuminator
- 4 Screw
- 5 Nut
- 6 Washer

- 7 Hose
- 8 Hose
- 9 Cable tie
- 10 Wires
- For information:
- 11 Instrument panel

Fig. 12-27: Flight instruments removal / installation

12.3.6 Installation of the flight instruments

Type of maintenance: line

Authorization to perform:

- Repairman (LS-M) or Mechanic (A&P)

Tools needed:

- Phillips PH1 screwdriver

(a) Remove the protective covers from the rear ports of the instrument.

(b) Connect the hoses (7; 8, Fig. 12-27) to the rear ports on the instrument (1; 2) and secure them with the cable ties (9).

WARNING: WHEN CONNECTING THE PITOT-STATIC SYSTEM HOSES PAY INCREASED ATTENTION. THERE MUST NOT BE ANY INCORRECT CONNECTION! CONNECT THE HOSE MARKED S LETTER TO THE PORTS MARKED BY S LETTER AND THE HOSE MARKED T LETTER TO THE PORT MARKED BY T LETTER.



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NOTE: The hose for static pressure line mark by **S** letter and for total pressure mark by **T** letter.

- (c) Connect the wires (10) to the illuminator (3).
- (d) Put the instrument (1; 2) and illuminator (3) in position in the panel (11).
- (e) Attach the instrument (1; 2) with the illuminator (3) by means of the bolts (4), nuts (5) and washers (6).
- (f) Install the left instrument panel (10).
- (g) Carry out check of pitot-static system tightness / Dynon avionics pitot / static test (see 12.4.1, 12.4.2)

12.3.7 Removal of the EFIS D100

Type of maintenance: line

Authorization to perform:

- Repairman (LS-M) or Mechanic (A&P)

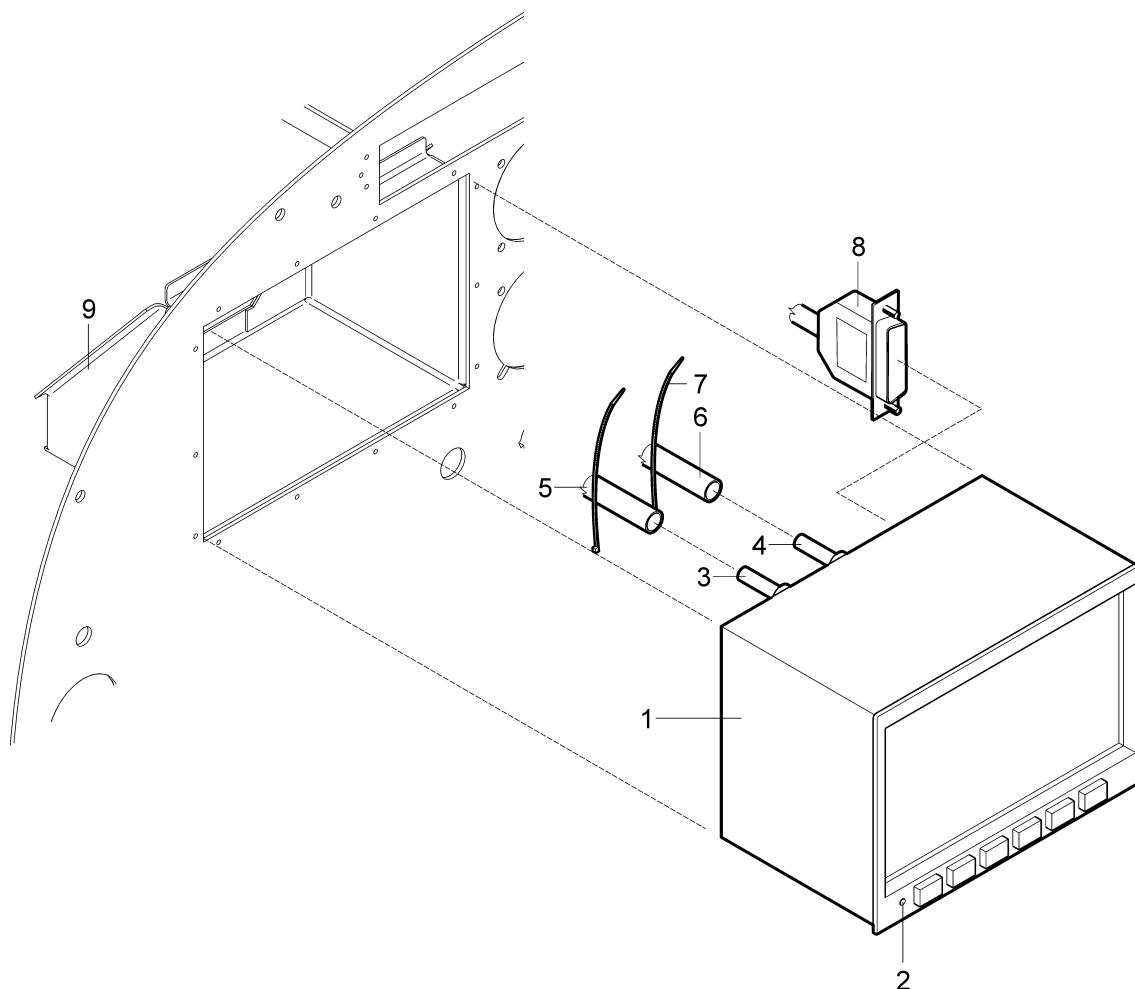
Tools needed:

- 7/64 Allen wrench
- cutting pliers

- (a) Set the **MASTER BAT / MASTER, AVIONICS** switches to OFF.
- (b) Put a 7/64 Allen wrench into the access hole (2, Fig. 12-28) for the locking screw; engage the screw.
- (c) Turn the screw counter-clockwise until the unit disengages from the mounting rack.

CAUTION: DO NOT PRY THE FACE-PLATE. YOU CAN DAMAGE THE UNIT.

- (d) Pull gently on the sides of the unit (1) to remove it from the mounting rack (9).
- (e) Remove the cable ties (7) from hoses (5; 6).
- (f) Disconnect the hoses (5; 6) of static and total pressure from the rear ports (3; 4) on the unit.
- (g) Disconnect the connector (4) from the unit.
- (h) Install the protective cover on the rear ports (3; 4) of the unit.



- | | |
|------------------------------------|------------------|
| 1 EFIS D100 | 6 Hose |
| 2 Access hole of the locking screw | 7 Cable tie |
| 3 Static port | 8 Connector |
| 4 Pitot port | For information: |
| 5 Hose | 9 Mounting rack |

Fig. 12-28: EFIS D100 removal / installation



12.3.8 Installation of the EFIS D100

Type of maintenance: line

Authorization to perform:

- Repairman (LS-M) or Mechanic (A&P)

Tools needed:

- 7/64 Allen wrench

- Remove the protective covers from the rear ports on the unit.
- Connect the hoses (5; 6, Fig. 12-28) to the rear ports (3; 4) on the unit (1) and secure them with cable ties (7).

WARNING: WHEN CONNECTING THE PITOT-STATIC SYSTEM HOSES PAY INCREASED ATTENTION. THERE MUST NOT BE ANY INCORRECT CONNECTION! CONNECT THE HOSE MARKED S LETTER TO THE PORTS MARKED BY STATIC AND THE HOSE MARKED T LETTER TO THE PORT MARKED BY PITOT.

NOTE: The hose for static pressure line mark by **S** letter and for total pressure mark by **T** letter.

- Connect the connector (4) to the unit.
- Slide the unit (1) into the rack (9). Engage the locking screw so that the latch front lobe touches the rack.
- Turn the locking screw clockwise so that the rear lobe engages the mounting rack.

CAUTION: DO NOT OVER-TIGHTEN THE LOCKING SCREW. YOU CAN DAMAGE THE LOCKING MECHANISM.

- Continue to turn the screw until the unit is fully installed in the mounting rack.
- Carry out check of pitot-static system tightness / Dynon avionics pitot / static test (see 12.4.1, 12.4.2).
- Set the **MASTER BAT / MASTER** switches to ON and do an operational test of the system.

12.3.9 Removal of EDC-10A remote compass module

Type of maintenance: line

Authorization to perform:

- Repairman (LS-M) or Mechanic (A&P)

Tools needed:

- screwdriver

CAUTION: DO NOT USE STANDARD MOUNTING HARDWARE. ALL MOUNTING HARDWARE IS MADE FROM BRASS – NON FERROUS MATERIAL.

- Set the **MASTER BAT / MASTER, AVIONICS** switches to OFF.
- Remove the cover on the bottom of the fuselage rear part.
- Disconnect the connector (2, Fig. 12-29) from the compass module.
- Unscrew the screws (3) with the washers (4) and remove the compass module (1).

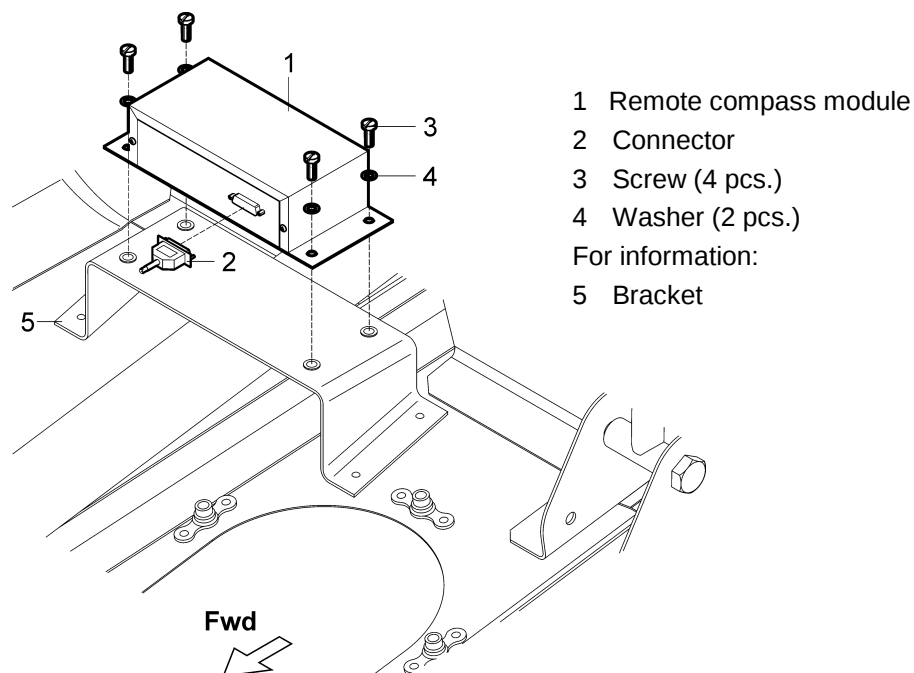


Fig. 12-29: NAV antenna removal / installation

12.3.10 Installation of EDC-10A remote compass module

Type of maintenance: line

Authorization to perform:

- Repairman (LS-M) or Mechanic (A&P)

Tools needed:

- screwdriver

CAUTION: DO NOT USE STANDARD MOUNTING HARDWARE. ALL MOUNTING HARDWARE IS MADE FROM BRASS – NON FERROUS MATERIAL.

- Place the compass module (1, Fig. 12-29) on the bracket (5) and fasten it by means of the screws (3) with the washers (4).
- Connect the connector (2) to the compass module.
- Install the cover on the bottom of the fuselage rear part.
- Perform EFIS compass heading calibration (see Chapter 12.4.4).

12.3.11 Removal of the EMS D120

Type of maintenance: line

Authorization to perform:

- Repairman (LS-M) or Mechanic (A&P)

Tools needed:

- 7/64 Allen wrench
- cutting pliers

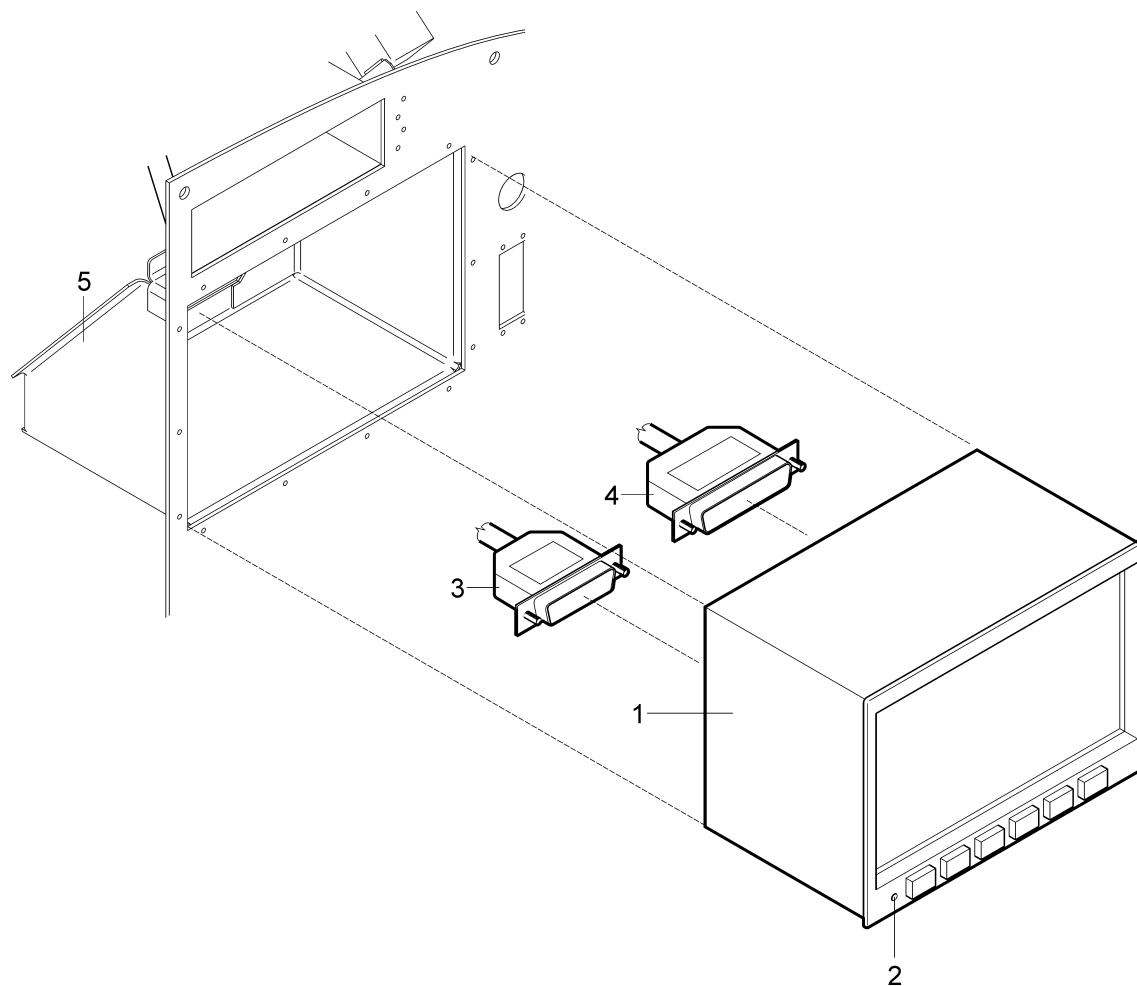


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- (a) Set the **MASTER BAT / MASTER, EMS / INSTR** switches to OFF.
- (b) Put a 7/64 Allen wrench into the access hole (2, Fig. 12-30 for the locking screw; engage the screw.
- (c) Turn the screw counter-clockwise until the unit disengages from the mounting rack.

CAUTION: DO NOT PRY THE FACE-PLATE. YOU CAN DAMAGE THE UNIT.

- (d) Pull gently on the sides of the unit (1) to remove it from the mounting rack (5).
- (e) Disconnect the connectors (3; 4) from the unit.



1 EMS D120

2 Access hole of the locking screw

3 Connector

4 Connector

For information:

5 Mounting rack

Fig. 12-30: EMS D120 removal / installation



12.3.12 Installation of the EMS D120

Type of maintenance: line

Authorization to perform:

- Repairman (LS-M) or Mechanic (A&P)

Tools needed:

- 7/64 Allen wrench

- (a) Connect the connectors (3; 4, Fig. 12-30) to the unit (1).
- (b) Slide the unit (1) into the rack (5). Engage the locking screw so that the latch front lobe touches the rack.
- (c) Turn the locking screw clockwise so that the rear lobe engages the mounting rack.

CAUTION: DO NOT OVER-TIGHTEN THE LOCKING SCREW. YOU CAN DAMAGE THE LOCKING MECHANISM.

- (d) Continue to turn the screw until the unit is fully installed in the mounting rack.
- (e) Set the **MASTER BAT / MASTER, EMS / INSTR** switches to ON and do an operational test of the system.

12.3.13 Removal of transponder

Type of maintenance: line

Authorization to perform:

- Repairman (LS-M) or Mechanic (A&P)

Tools needed:

- 3/32 Allen wrench

- (a) Set the **MASTER BAT / MASTER, AVIONICS** switches to OFF.
- (b) Put a 3/32 Allen wrench into the access hole (2, Fig. 12-31) for the locking screw; engage the screw.
- (c) Turn the screw counter-clockwise until the transponder (1) disengages from the mounting rack.

CAUTION: DO NOT TOUCH THE CONNECTOR CARD AT THE REAR OF THE UNIT. THE ELECTROSTATIC CHARGE ON YOUR BODY CAN DAMAGE THE UNIT.

- (d) Pull gently on the sides of the transponder (1) to remove it from the mounting rack (3).
- (e) Install the protective covers on the rear connectors of the transponder.

12.3.14 Installation of transponder

Type of maintenance: line

Authorization to perform:

- Repairman (LS-M) or Mechanic (A&P)

Tools needed:

- 3/32 Allen wrench

- (a) Remove the protective covers from the connectors on the transponder.



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- (b) Looking at the bottom of the unit, make sure the front lobe of the locking mechanism is in a vertical position.
- (c) Slide the transponder (1, Fig. 12-31) into the rack (3). Engage the locking screw so that the latch front lobe touches the rack.
- (d) Turn the locking screw clockwise so that the rear lobe engages the mounting rack.

CAUTION: DO NOT OVER-TIGHTEN THE LOCKING SCREW. YOU CAN DAMAGE THE LOCKING MECHANISM.

- (e) Continue to turn the screw until the transponder is fully installed in the mounting rack.
- (f) Set the **MASTER BAT / MASTER, AVIONICS** switches to ON and do an operational test.

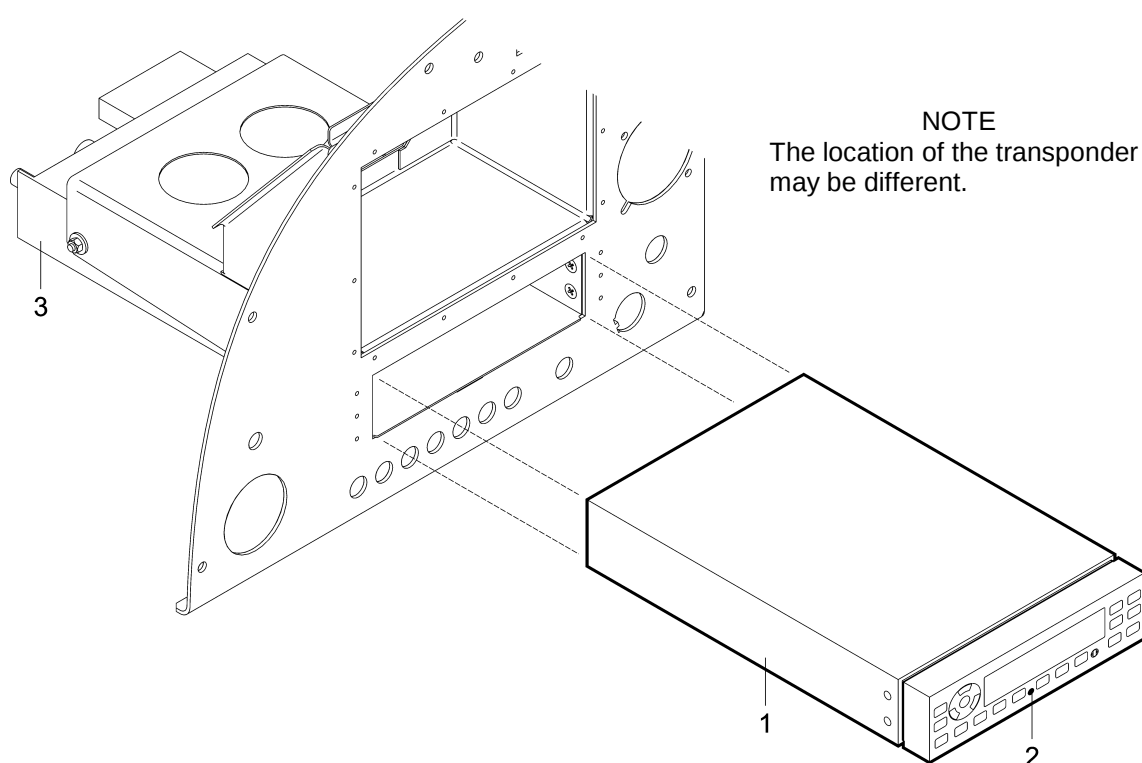


Fig. 12-31: Transponder removal / installation

12.3.15 Removal of COMM, COMM / NAV

Type of maintenance: line

Authorization to perform:

- Repairman (LS-M) or Mechanic (A&P)

Tools needed:

- 3/32 Allen wrench

- (a) Set the **MASTER BAT / MASTER, AVIONICS** switches to OFF.



(b) Put a 3/32 Allen wrench into the access hole (2, Fig. 12-32) for the locking screw; engage the screw.

(c) Turn the screw counter-clockwise until the unit (1) disengages from the mounting rack.

CAUTION: DO NOT PULL ON THE KNOBS. DO NOT PRY THE FACE-PLATE. YOU CAN DAMAGE THE UNIT.

DO NOT TOUCH THE CONNECTOR CARD AT THE REAR OF THE UNIT. THE ELECTROSTATIC CHARGE ON YOUR BODY CAN DAMAGE THE UNIT.

(d) Pull gently on the sides of the unit (1) to remove it from the mounting rack (3).

(e) Install the protective covers on the rear connectors of the unit.

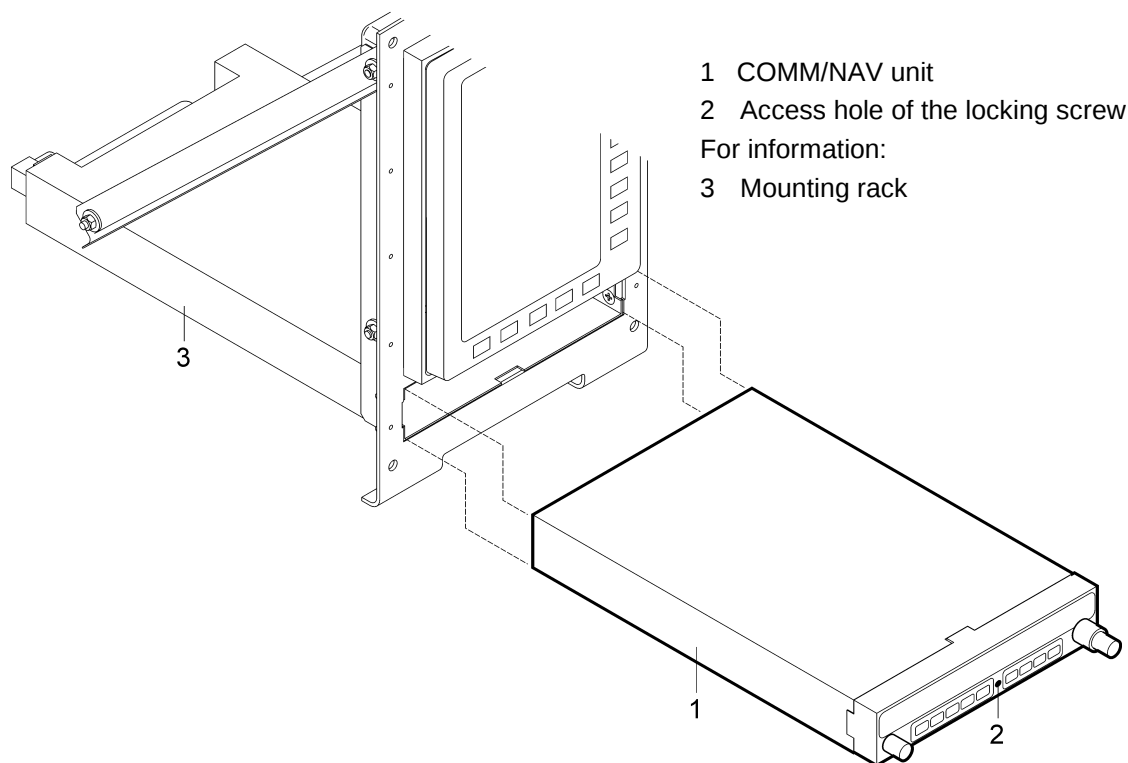


Fig. 12-32: COMM / NAV unit removal / installation

12.3.16 Installation of COMM, COMM / NAV

Type of maintenance: line

Authorization to perform:

- Repairman (LS-M) or Mechanic (A&P)

Tools needed:

- 3/32 Allen wrench

(a) Remove the protective covers from the connectors on the unit.

(b) Looking at the bottom of the unit, make sure the front lobe of the locking mechanism is in a vertical position.



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- (c) Slide the unit (1, Fig. 12-32) into the rack (3). Engage the locking screw so that the latch front lobe touches the rack.
- (d) Turn the locking screw clockwise so that the rear lobe engages the mounting rack.
- (e) Continue to turn the screw until the unit is fully installed in the mounting rack.

CAUTION: DO NOT OVER-TIGHTEN THE LOCKING SCREW. YOU CAN DAMAGE THE LOCKING MECHANISM.

- (f) Set the **MASTER BAT / MASTER, AVIONICS** switches to ON and do an operational test.

12.3.17 Removal of intercom

Type of maintenance: line

Authorization to perform:

- Repairman (LS-M) or Mechanic (A&P)

Tools needed:

- Phillips PH1 screwdriver

- (a) Set the **MASTER BAT / MASTER, AVIONICS** switches to OFF.
- (b) Disconnect the connector (5, Fig. 12-33) from the unit.
- (c) Remove the knobs (2) from the volume and squelch control shafts.
- (d) Unscrew the screws (4) and remove the faceplate (3).
- (e) Carefully remove the unit (1).

CAUTION: DO NOT TOUCH THE CONNECTOR CARD AT THE REAR OF THE UNIT. THE ELECTROSTATIC CHARGE ON YOUR BODY CAN DAMAGE THE UNIT.

- (f) Install the protective cover on the rear connector of the unit.

12.3.18 Installation of intercom

Type of maintenance: line

Authorization to perform:

- Repairman (LS-M) or Mechanic (A&P)

Tools needed:

- Phillips PH1 screwdriver

- (a) Remove the protective cover from the connector on the unit.
- (b) Insert the unit (1, Fig. 12-33) from behind the instrument panel, aligning the holes for the knobs, LED, and switch.
- (c) Place the faceplate (3) over the knob shafts and secure it by means of the two screws (4).
- (d) Install the knobs (2) over the volume and squelch control shafts.
- (e) Connect the connector (5) to the unit (1).
- (f) Set the **MASTER BAT / MASTER, AVIONICS** switches to ON and do an operational test.

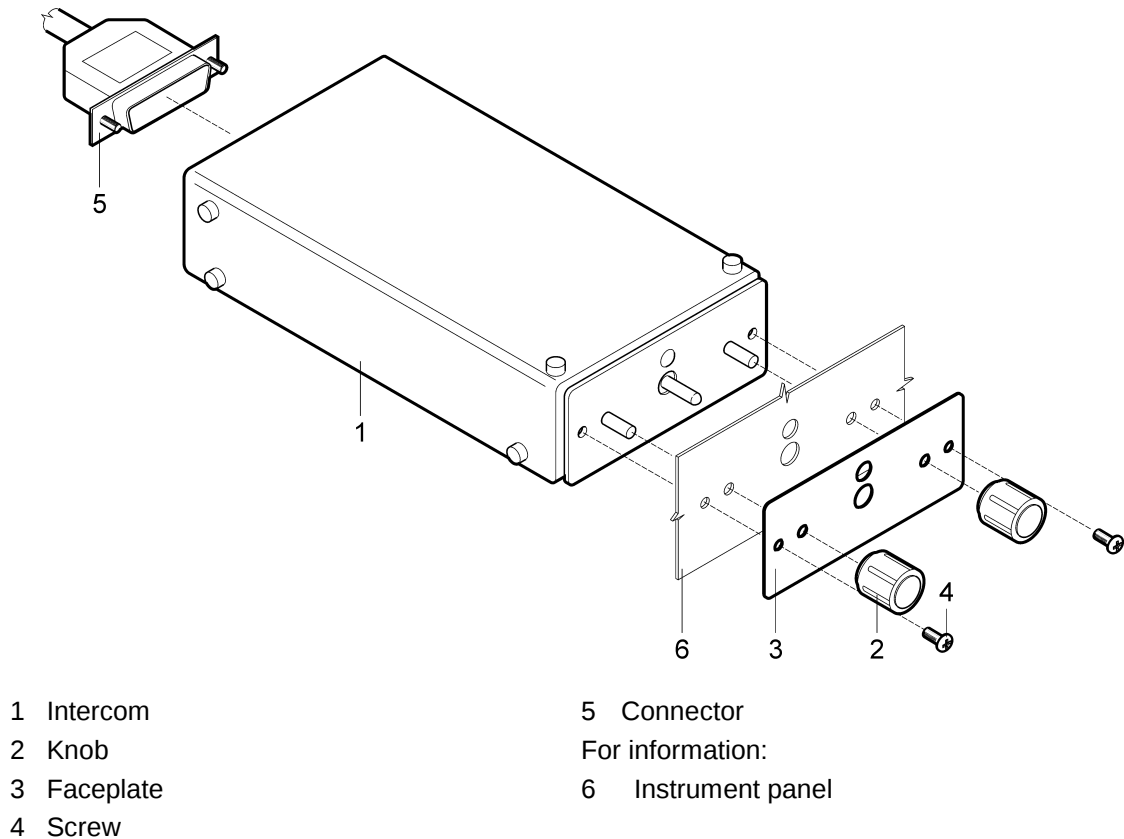


Fig. 12-33: Intercom removal / installation

12.3.19 Removal of GPS / NAV COM

Type of maintenance: line

Authorization to perform:

- Repairman (LS-M) or Mechanic (A&P)

Tools needed:

- 3/32 Allen wrench

NOTE: The procedure of removal / installation is the same for both units (GTN 650 and GTN 750).

- Set the **MASTER BAT / MASTER, GPS** switches to OFF.
- Put a 3/32 Allen wrench into the access hole (2, Fig. 12-34) for the locking screw; engage the screw.
- Turn the screw counter-clockwise until the unit (1) is forced out about 9.5 mm (3/8 in) and can be freely pulled from the mounting rack.

CAUTION: DO NOT PULL ON THE KNOBS. DO NOT PRY THE FACE-PLATE. YOU CAN DAMAGE THE UNIT.

DO NOT TOUCH THE CONNECTOR CARD AT THE REAR OF THE UNIT. THE ELECTROSTATIC CHARGE ON YOUR BODY CAN DAMAGE THE UNIT.

- Pull gently on the sides of the unit (1) to remove it from the mounting rack (3).
- Install the protective covers on the rear connectors of the unit.

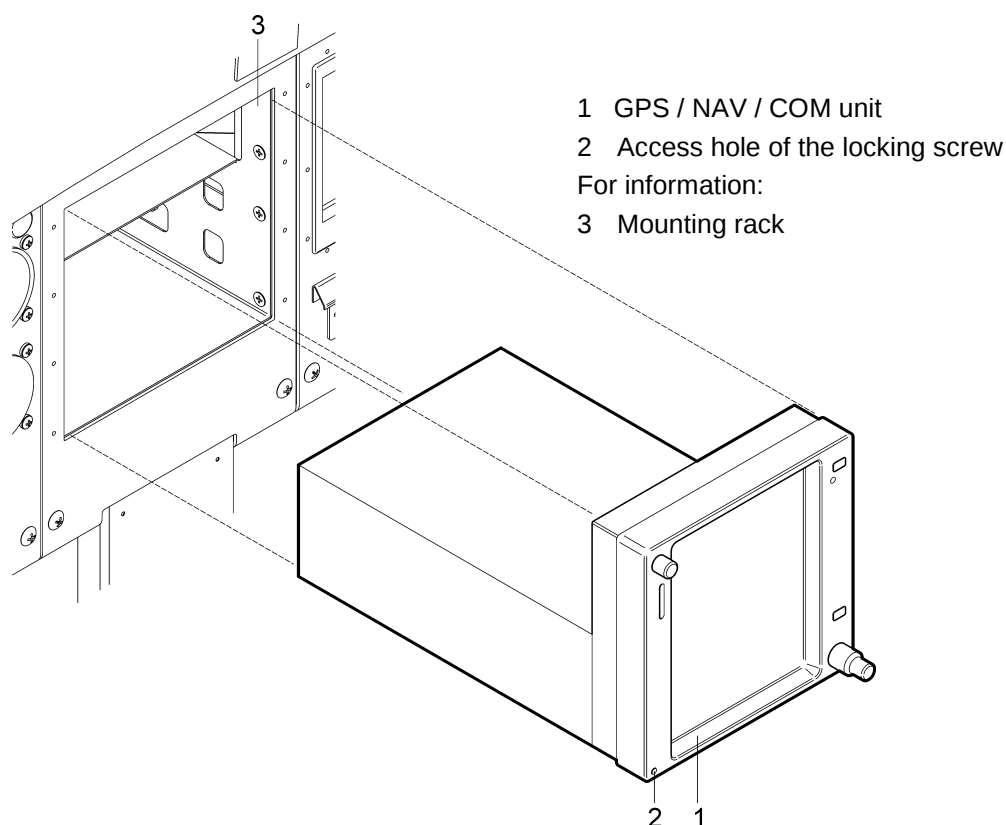


Fig. 12-34: GPS / NAV / COM unit removal / installation

12.3.20 Installation of GPS / NAV COM

Type of maintenance: line

Authorization to perform:

- Repairman (LS-M) or Mechanic (A&P)

Tools needed:

- 3/32 Allen wrench

NOTE: The procedure of removal / installation is the same for both units (GTN 650 and GTN 750).

- Remove the protective covers from the connectors on the unit.
- Looking at the bottom of the unit, make sure the front lobe of the locking mechanism is in a vertical position.
- Slide the unit (1, Fig. 12-34) straight in the rack until it stops about 25 mm (1 in) short of the final position.
- Insert Allen wrench into access hole (2).
- Turn the locking screw clockwise while press on the left side of the bezel unit until the unit is firmly seated in the rack the mounting rack.

CAUTION: DO NOT OVER-TIGHTEN THE LOCKING SCREW. THE APPLICATION OF THE ALLEN WRENCH TORQUE EXCEEDING 0.01 Nm (15 lb in) CAN DAMAGE THE LOCKING MECHANISM.



- (f) Set the **MASTER BAT / MASTER, GPS** switches to ON and do a post installation (see 17.6) and operational test.

12.3.21 Removal of COMM antenna

Type of maintenance: line

Authorization to perform:

- Repairman (LS-M) or Mechanic (A&P)

Tools needed:

- screwdriver
- wrench No. 7

- (a) Set the **MASTER BAT / MASTER, AVIONICS** switches to OFF.
- (b) Disconnect the connector (4, Fig. 12-35) from the antenna.
- (c) Remove the nuts (4) with the washers (5)
- (d) Remove the antenna (1) with the gasket (2), screws (3) and washers (6).
- (e) Install the protective cover on the antenna connector.

-
- 1 COMM antenna
2 Gasket
3 Screw (4 pcs.)
4 Nut (4 pcs.)
5 Washer (4 pcs.)
6 Tooth washer (4 pcs.)
7 Cable connector
For information:
8 Fuselage upper part

Fig. 12-35 COMM antenna removal / installation



12.3.22 Installation of COMM antenna

Type of maintenance: line

Authorization to perform:

- Repairman (LS-M) or Mechanic (A&P)

Tools needed:

- screwdriver
- wrench No. 7

(a) Remove the protective cover from the antenna connector.

(b) Place the antenna (1, Fig. 12-35) with the gasket (2) on the fuselage (8).

(c) Insert the screws (3) with washers (6) to the holes in the antenna body (1); install the washers (5), screw and tighten the nuts (4).

(d) Connect the connector (7) to the antenna (1).

(e) Set the **MASTER BAT / MASTER, AVIONICS** switches to ON and do an operational test.

12.3.23 Removal of NAV antenna

Type of maintenance: line

Authorization to perform:

- Repairman (LS-M) or Mechanic (A&P)

Tools needed:

- Phillips PH2 screwdriver
- wrench No. 8

(a) Set the **MASTER BAT / MASTER, AVIONICS** switches to OFF.

(b) Unscrew the screws (7, Fig. 12-36) and remove the fin tip (6).

(c) Remove the nuts (4) and disconnect the cables (5) from antenna studs.

(d) Unscrew the screws (2) with the washers (3) and remove the antenna (1).



- 1 NAV antenna
 - 2 Screw (2 pcs.)
 - 3 Washer (2 pcs.)
 - 4 Nut (2 pcs.)
 - 5 Cable (2 pcs.)
 - 6 Fin tip
 - 7 Screw (8 pcs.)
- For information:
- 8 Fin

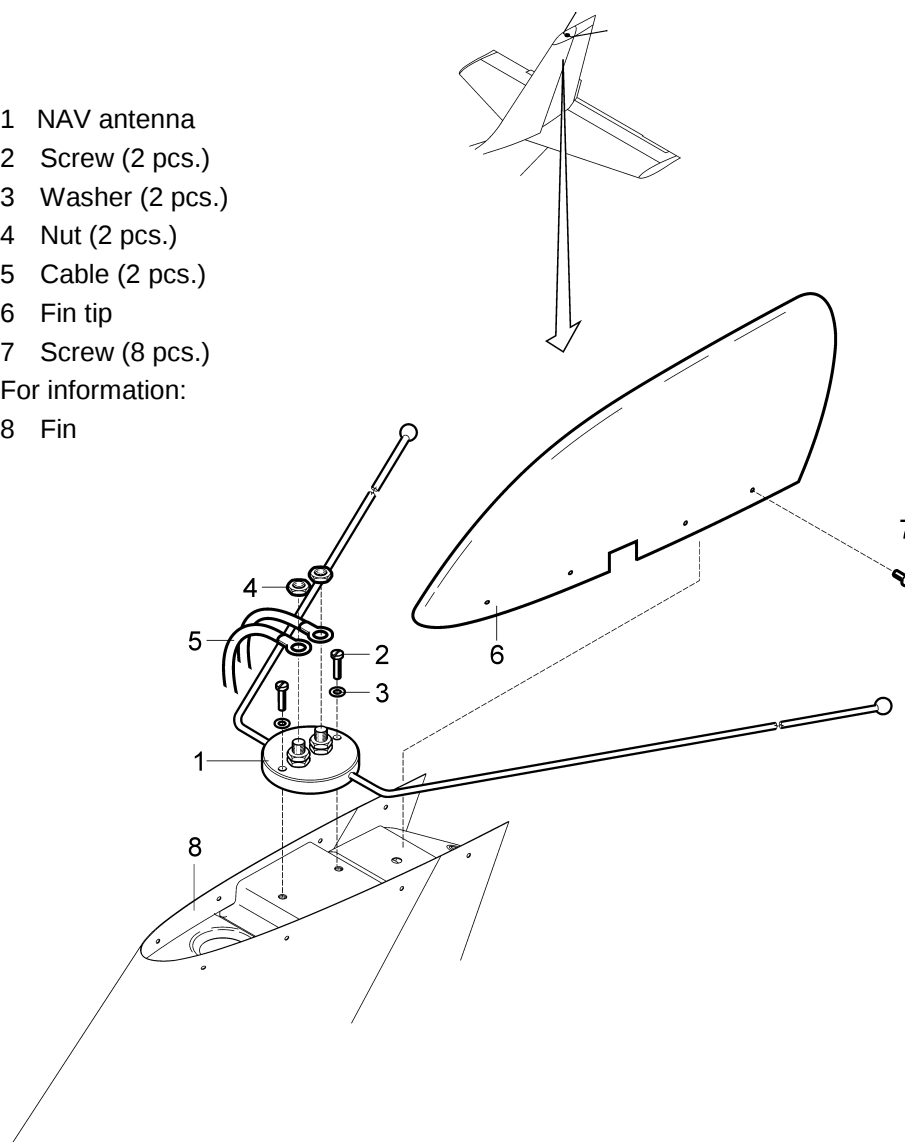


Fig. 12-36: NAV antenna removal / installation

12.3.24 Installation of NAV antenna

Type of maintenance: line

Authorization to perform:

- Repairman (LS-M) or Mechanic (A&P)

Tools needed:

- Phillips PH2 screwdriver
- wrench No. 8

- (a) Place the antenna (1, Fig. 12-36) on the bracket and fasten it by means of the screws (2) with the washers (3).
- (b) Connect the cables (5) to the antenna studs; screw and fasten the nuts (4).
- (c) Place the fin tip (6) on the fin (8) and fasten it by means of the screws (7).
- (d) Set the **MASTER BAT / MASTER, AVIONICS** switches to ON and do an operational test.



12.3.25 Removal of transponder antenna

Type of maintenance: line

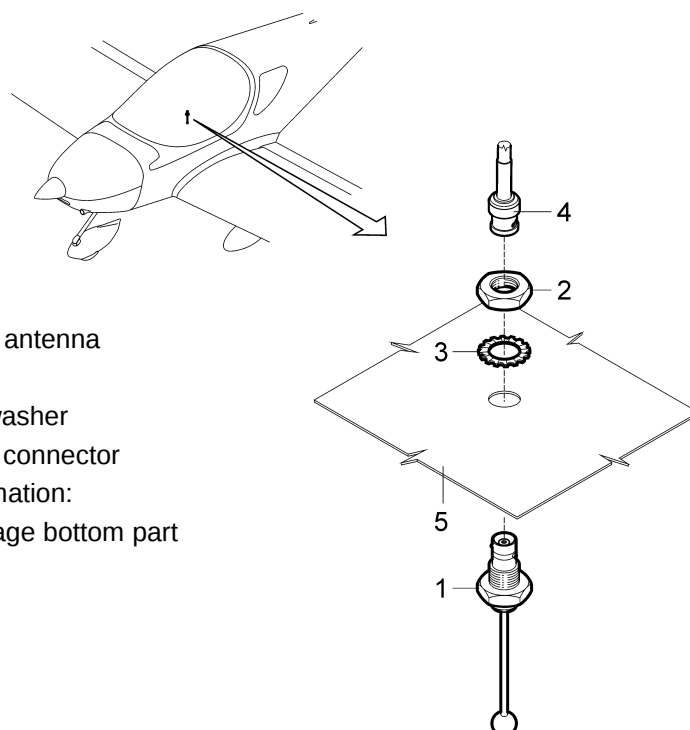
Authorization to perform:

- Repairman (LS-M) or Mechanic (A&P)

Tools needed:

- wrench No. 3/4 in

- Tilt forward the right seat back.
- Set the **MASTER BAT / MASTER, AVIONICS** switches to OFF.
- Disconnect the connector (4, Fig. 12-37) from the antenna.
- Unscrew the nut (2), remove the washer (3) and the antenna (1).
- Install the protective cover on the antenna connector.



1 XPDR antenna

2 Nut

3 Lockwasher

4 Cable connector

For information:

5 Fuselage bottom part

Fig. 12-37: Transponder antenna removal / installation

12.3.26 Installation of transponder antenna

Type of maintenance: line

Authorization to perform:

- Repairman (LS-M) or Mechanic (A&P)

Tools needed:

- wrench No. 3/4 in

- Remove the protective cover from the antenna connector.
- Insert the antenna (1, Fig. 12-37) to the hole in the fuselage bottom part (5).
- Insert the washer (3), screw and tighten the nut (2).
- Connect the connector (4) to the antenna (1).



- (e) Place the fin tip (6) on the fin (8) and fasten it by means of the screws (7).
- (f) Tilt backward the right seat back.
- (g) Set the **MASTER BAT / MASTER, AVIONICS** switches to ON and do an operational test.

12.3.27 Removal of GPS antenna

NOTE: This type of antenna is used when GPS / NAV / COM unit is installed.

Type of maintenance: line

Authorization to perform:

- Repairman (LS-M) or Mechanic (A&P)

Tools needed:

- Phillips PH2 screwdriver

- (a) Set the **MASTER BAT / MASTER, GPS** switches to OFF.
- (b) Disconnect the connector (4, Fig. 12-38) from the antenna.
- (c) Remove the sealant around the antenna.
- (d) Remove the screws (2) with and the antenna (1).
- (e) Clean sealant residues.
- (f) Install the protective cover on the antenna connector.

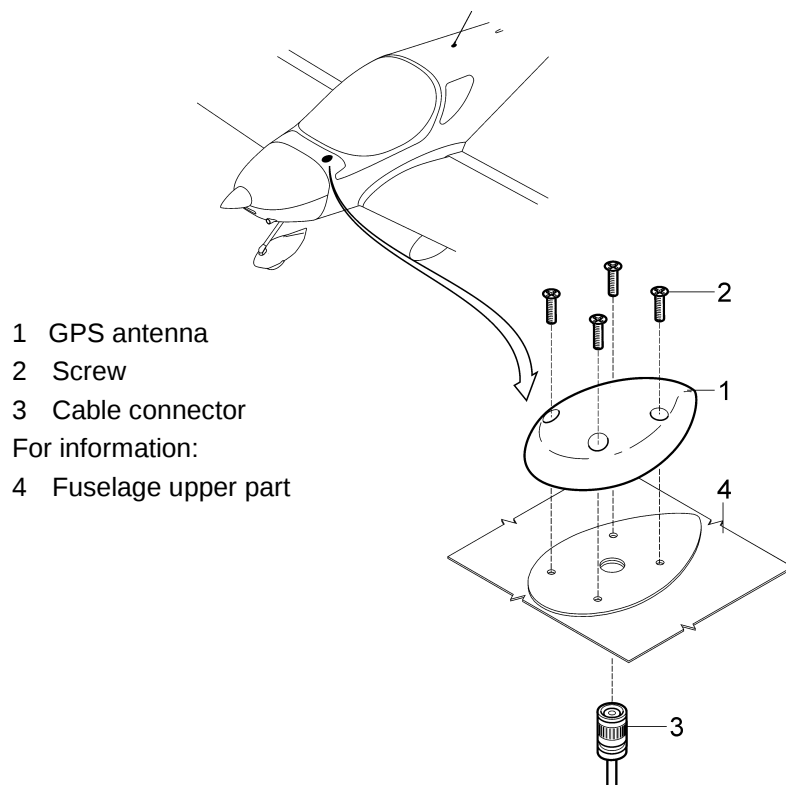


Fig. 12-38: GPS antenna removal / installation

**12.3.28 Installation of GPS antenna**

NOTE: This type of antenna is used when GPS / NAV / COM unit is installed.

Type of maintenance: line

Authorization to perform:

- Repairman (LS-M) or Mechanic (A&P)

Tools needed:

- Phillips PH2 screwdriver

- (a) Remove the protective cover from the antenna connector.
- (b) Place the antenna (1, Fig. 12-38) on the fuselage (4).
- (c) Insert the screws (3) to the holes in the antenna body (1); screw and tighten the screws.
- (d) Apply sealant (Emfimastic PU-50, white) around the antenna.
- (e) Connect the connector (3) to the antenna (1).
- (f) Set the **MASTER BAT / MASTER, GPS** switches to ON and do an operational test.

12.3.29 Removal of the SV-D1000 display

NOTE: Removal is the same for both displays.

Type of maintenance: line

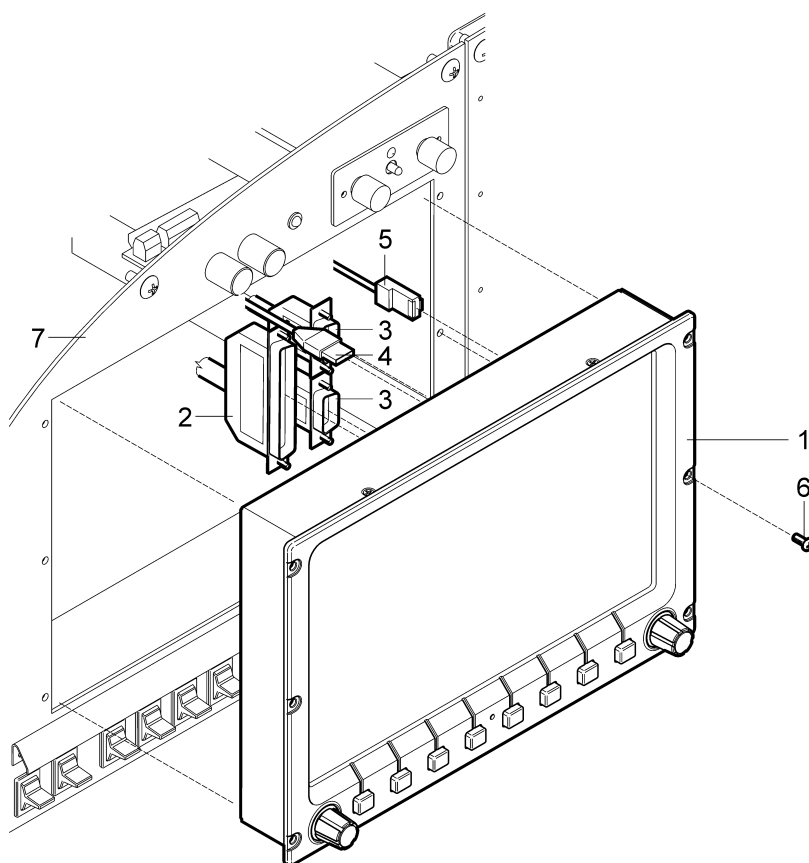
Authorization to perform:

- Repairman (LS-M) or Mechanic (A&P)

Tools needed:

- 5/64" hex drive tool
- screwdriver

- (a) Set the **MASTER BAT, EFIS1 / EFIS 2** switches to OFF.
- (b) Unscrew the screws (6, Fig. 12-39) and release the display (1).
- (c) Pull gently on the sides of the display (1) and carefully remove it.
- (d) Disconnect the connectors (2; 3; 4; 5) from the display.
- (e) Install the protective covers on the rear connectors of the display



- | | |
|-----------------------------|----------------------|
| 1 SV-D1000 display | 5 Ethernet connector |
| 2 DB37 display connector | 6 Screw (6 pcs.) |
| 3 SkyView network connector | For information: |
| 4 USB connector | 7 Instrument panel |

Fig. 12-39: SV-D1000 display removal / installation

12.3.30 Installation of SV-D1000 display

NOTE: Installation is the same for both displays.

Type of maintenance: line

Authorization to perform:

- Repairman (LS-M) or Mechanic (A&P)

Tools needed:

- 5/64" hex drive tool
- screwdriver

- Connect the connectors (2; 3; 4; 5, Fig. 12-39) to the display (1).
- Slide the display (1) to the panel (7) and fasten it by means of the screws (6).
- Set the **MASTER BAT**, **EFIS1 / EFIS 2** switches to ON and do an operational test of the system.

**12.3.31 Removal of EFIS D1100**

Type of maintenance: line

Authorization to perform:

- Repairman (LS-M) or Mechanic (A&P)

Tools needed:

- 7/64 Allen wrench
- cutting pliers

- (a) Set the MASTER BAT / MASTER, AVIONICS switches to OFF.
- (b) Unscrew the mounting screws (6) attaching the HDX1100 (1) to the instrument panel
- (c) Slide the HDX1100 (1) out of the instrument panel
- (d) Disconnect the connectors (2,3,4,5) from the HDX1100 (1)

12.3.32 Installation of EFIS D1100

Type of maintenance: line

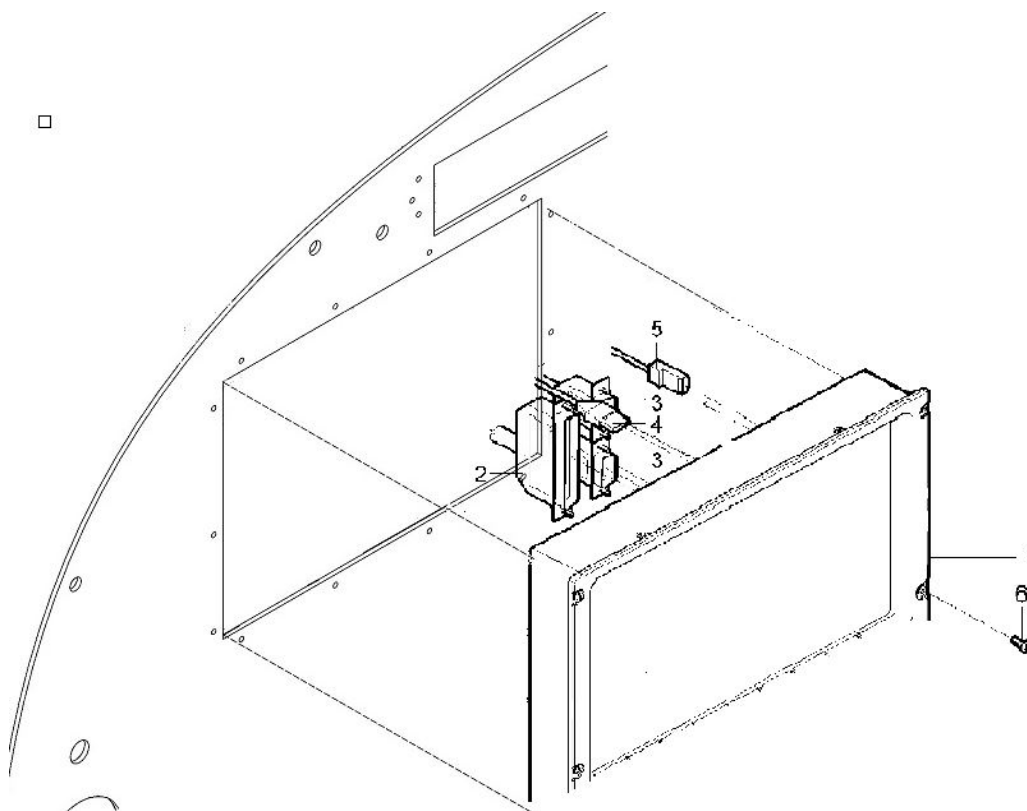
Authorization to perform:

- Repairman (LS-M) or Mechanic (A&P)

Tools needed:

- 7/64 Allen wrench

- (e) Connect the connectors (2,3,4,5) to the unit HDX1100 (1).
- (f) Insert the HDX1100 (1) into the instrument panel hole
- (g) Attach the HDX1100 (1) to the instrument panel with the screws (6).
- (h) Set the MASTER BAT / MASTER switches to ON and do an operational test of the system.



- | | |
|-----------------------------|----------------------|
| 1 SV-HDX1100 display | 4 USB connector |
| 2 DB37 display connector | 5 Ethernet connector |
| 3 SkyView network connector | 6 Screw (4 pcs.) |

Fig. 12-40: EFIS D1100 removal / installation

12.3.33 Removal of SV-BAT-320 backup battery / batteries

Type of maintenance: line

Authorization to perform:

- Repairman (LS-M) or Mechanic (A&P)

Tools needed:

- Phillips PH2 screwdriver

- Set the **MASTER BAT**, **EFIS1** / **EFIS 2** switches to OFF.
- Remove the instrument panel cover (valid for airplanes manufactured before June 2013).
- Disconnect the connector (7, Fig. 12-41) from the backup battery (6).
- Unscrew the screws (8) and remove the backup battery (6).

12.3.34 Installation of of SV-BAT-320 backup battery / batteries

Type of maintenance: line

Authorization to perform:

- Repairman (LS-M) or Mechanic (A&P)



Tools needed:

- Phillips PH2 screwdriver
- (a) Place the backup battery (6, Fig. 12-41) on the bracket (10 or 12) and fasten it by means of the screws (8).
- (b) Connect the connector (7) to the backup battery.
- (c) Install the instrument panel cover (valid for airplanes manufactured before June 2013).
- (d) Set the **MASTER BAT**, **EFIS1** / **EFIS 2** switches to ON and check backup battery function.

12.3.35 Removal of SV-EMS-220 module

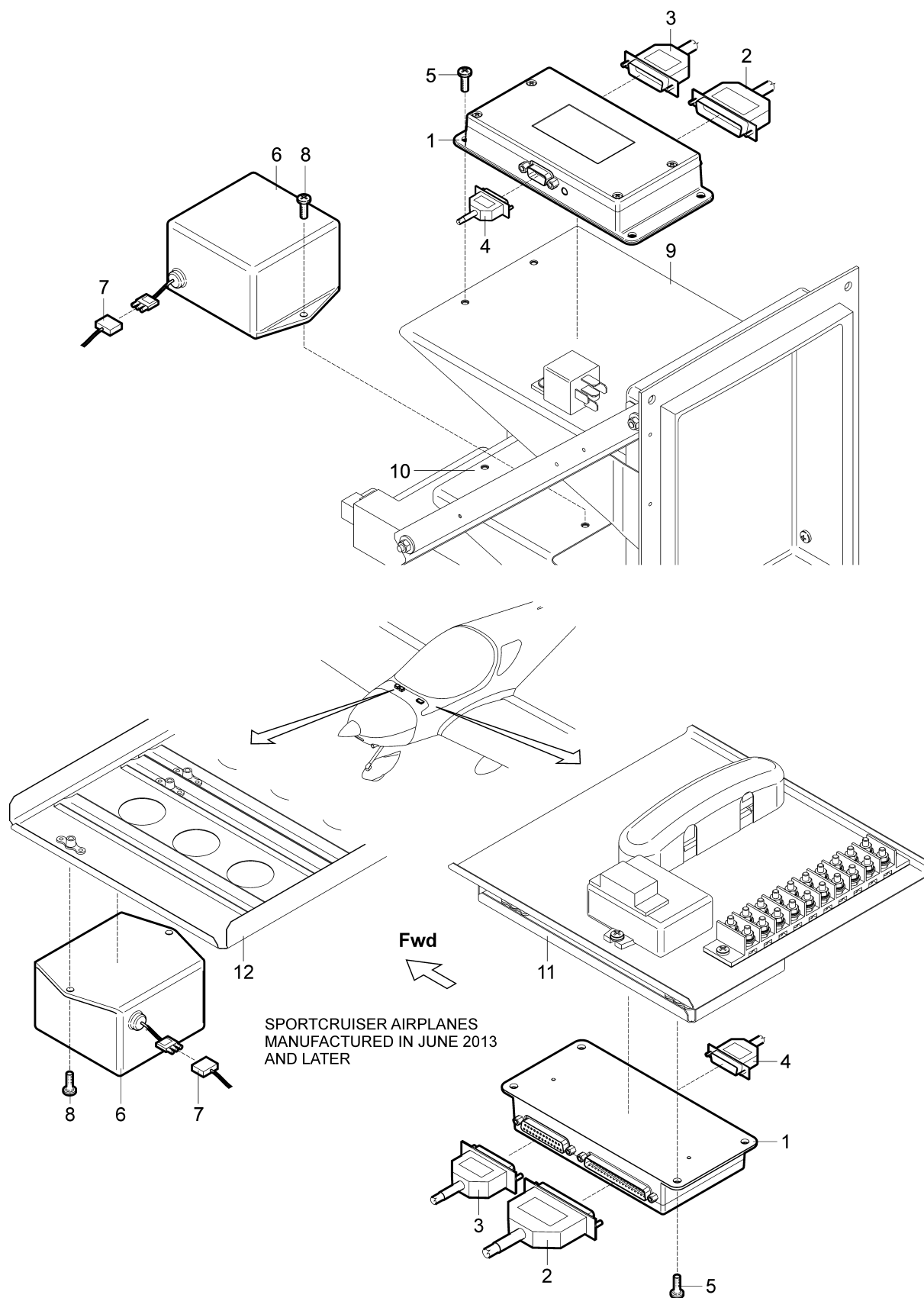
Type of maintenance: line

Authorization to perform:

- Repairman (LS-M) or Mechanic (A&P)

Tools needed:

- Phillips PH2 screwdriver
- (a) Set the **MASTER BAT**, **EFIS1** / **EFIS 2** switches to OFF.
- (b) Remove the instrument panel cover (valid for airplanes manufactured before June 2013).
- (c) Disconnect the connectors (2; 3; 4, Fig. 12-41) from the EMS module (1).
- (d) Unscrew the screws (5) and remove the EMS module (1).





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- | | |
|-------------------------------------|------------------|
| 1 SV-EMS-220 module | 8 Screw (2 pcs.) |
| 2 DB37 main sensor connector | For information: |
| 3 DB25 CHT/CT*/EGT sensor connector | 9 Bracket |
| 4 SkyView network connector | 10 Bracket |
| 5 Screw (4 pcs.) | 11 Bracket |
| 6 SV-BAT-320 backup battery | 12 Bracket |
| 7 Connector | |

* Applicable in case the engine is equipped with new cylinder heads;
P/N 413185 for 2/3 cylinder head.

Fig. 12-41: SV-EMS-220 engine module and SV-BAT-320 backup battery removal / installation)

12.3.36 Installation of SV-EMS-220 module

Type of maintenance: line

Authorization to perform:

- Repairman (LS-M) or Mechanic (A&P)

Tools needed:

- Phillips PH2 screwdriver
- Place the EMS module (1, Fig. 12-41) on the bracket (9 or 11) and fasten it by means of the screws (5).
 - Connect the connectors (2; 3; 4) to the EMS module.
 - Install the instrument panel cover (valid for airplanes manufactured before June 2013).
 - Set the **MASTER BAT**, **EFIS1 / EFIS 2** switches to ON and do operational test of the system.

12.3.37 Removal of SV-ADAHRS-200 / 201 module

NOTE: Removal the same for both ADAHRS modules.

Type of maintenance: heavy

Authorization to perform:

- Repairman (LS-M) or Mechanic (A&P)

Tools needed:

- wrench No. 7
- Cobra hose clip pliers

CAUTION: DO NOT USE STANDARD MOUNTING HARDWARE. ALL MOUNTING HARDWARE IS MADE FROM BRASS – NON FERROUS MATERIAL.

- Set the **MASTER BAT**, **EFIS1 / EFIS 2** switches to OFF.
- Remove the covers on the bottom of the fuselage rear part.
- Disconnect the connectors (2; 3, Fig. 12-42) from the ADAHRS module (1).
- Remove the hose clips (7) from hoses (5; 6).
- Disconnect hoses (6) of static and total pressure from the ports (4; 5) on the ADAHRS module.
- Loose nuts (9), unscrew and remove the screws (8), nuts (9), washers (10) and the ADAHRS module (1).
- Install the protective cover on the ports (4; 5) of the module.



12.3.38 Installation of SV-ADAHRS-200 / 201 module

NOTE: Removal the same for both ADAHRS modules.

Type of maintenance: heavy

Authorization to perform:

- Repairman (LS-M) or Mechanic (A&P)

Tools needed:

- wrench No. 7
- Cobra hose clip pliers

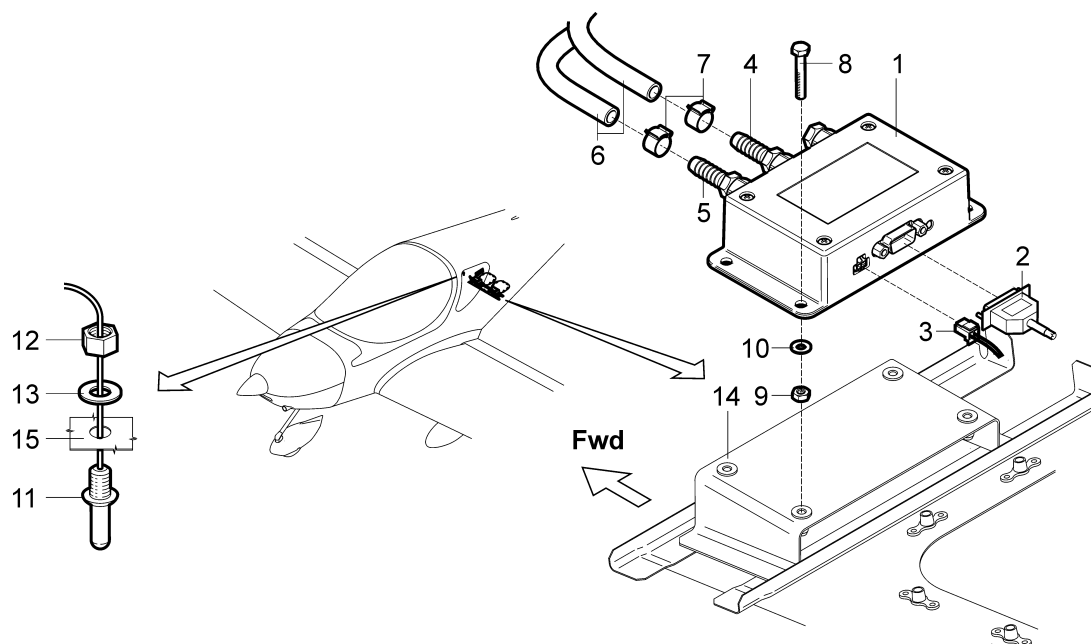
CAUTION: DO NOT USE STANDARD MOUNTING HARDWARE. ALL MOUNTING HARDWARE IS MADE FROM BRASS – NON FERROUS MATERIAL.

- Remove the protective covers from the ports on the module.
- Insert the screws (8, Fig. 12-42) into ADAHRS module (1) mounting holes, place washers (10) and screw the nuts (9); do not tighten it.
- Place the ADAHRS module (1) on the bracket (14) and fasten it by means of the screws (8).
- Set the module (1) using the screws (8) so that the module is parallel to the fuselage basic level, tighten the nuts (9). An ADAHRS module should be mounted within one degree of parallel to all three aircraft axes.
- Connect the hoses (6) to the ports (3; 4) on the ADAHRS module (1) and secure them with hose clips (7).

WARNING: WHEN CONNECTING THE PITOT-STATIC SYSTEM HOSES PAY INCREASED ATTENTION. THERE MUST NOT BE ANY INCORRECT CONNECTION! CONNECT THE HOSE MARKED S LETTER TO THE PORTS MARKED BY STATIC AND THE HOSE MARKED T LETTER TO THE PORT MARKED BY PITOT.

NOTE: The hose for static pressure line mark by **S** letter and for total pressure mark by **T** letter.

- Connect the connectors (2; 3) to the ADAHRS module.
- Install the covers on the bottom of the fuselage rear part.
- Carry out check of pitot-static system tightness / Dynon avionics pitot / static test (see 12.4.1, 12.4.2).
- Set the **MASTER BAT**, **EFIS1** / **EFIS 2** switches to ON and do operational test of the system.



- | | |
|-----------------------------|---------------------|
| 1 SV-ADAHRS-200 module | 9 Nut (4 pcs.) |
| 2 SkyView network connector | 10 Washer (4 pcs.) |
| 3 OAT probe connector | 11 SV-OAT-340 probe |
| 4 Pitot port | 12 Nut |
| 5 Static port | 13 Washer |
| 6 Hose | For information: |
| 7 Hose clip | 14 Bracket |
| 8 Screw (4 pcs.) | 15 Fuselage skin |

Fig. 12-42: SV-ADAHRS-200 module and SV-OAT-340 probe removal / installation

12.3.39 Removal of SV-OAT-340 probe

Type of maintenance: line

Authorization to perform:

- Repairman (LS-M) or Mechanic (A&P)

Tools needed:

- wrench No. 9/16 in

- Set the **MASTER BAT**, **EFIS1** / **EFIS 2** switches to OFF.
- Remove the covers on the bottom of the fuselage rear part.
- Disconnect connector (3, Fig. 12-42) from the ADAHRS module (1).
- Remove fastening members of the probe wires.
- Remove the connector (3) and pins from the probe wires
- Unscrew the nut (12), remove the washer (13) and pull out the probe (11).



12.3.40 Installation of SV-OAT-340 probe

Type of maintenance: line

Authorization to perform:

- Repairman (LS-M) or Mechanic (A&P)

Tools needed:

- wrench No. 9/16 in

NOTE: Do not insert the pins on the ends of the OAT probe wires into the connector until you are done running probe wires through the aircraft.

- (a) On the outside of the fuselage, insert the wires and the probe (1, Fig. 12-42) through the hole on the fuselage bottom skin (15).
- (b) On the inside of the fuselage, insert the washer (13) and the nut (12) over the wires.
- (c) Hand-thread the nut (12) onto the probe (11). At this point, the washer (13) should be sandwiched between the nut (12) and the fuselage bottom skin (15); then carefully tighten the nut using the wrench.
- (d) Route and secure the probe wires to the location of the ADAHRS module.
- (e) Carefully insert the pins on the wires into the connector. Pins are not polarized and lock into place when inserted correctly.
- (f) Connect the connector (3) to the ADAHRS module (1).
- (g) Install the covers on the bottom of the fuselage rear part.
- (h) Set the **MASTER BAT**, **AVIONICS** switches to ON and do an operational test.

12.3.41 Removal of SV-XPDR-261 transponder

Type of maintenance: line

Authorization to perform:

- Repairman (LS-M) or Mechanic (A&P)

Tools needed:

- screwdriver

- (a) Set the **MASTER BAT**, **AVIONICS** switches to OFF.
- (b) Tilt forward the right seat back (valid for airplanes manufactured before June 2013).
- (c) Disconnect the connectors (2; 3, Fig. 12-43) from the transponder (1).
- (d) Unlock the retaining wire (5) and remove the transponder (1) from the mounting tray (4). (airplanes manufactured in June 2013 and later have mounting tray installed from below the bracket (16)).
- (e) Install the protective cover on the antenna connector.

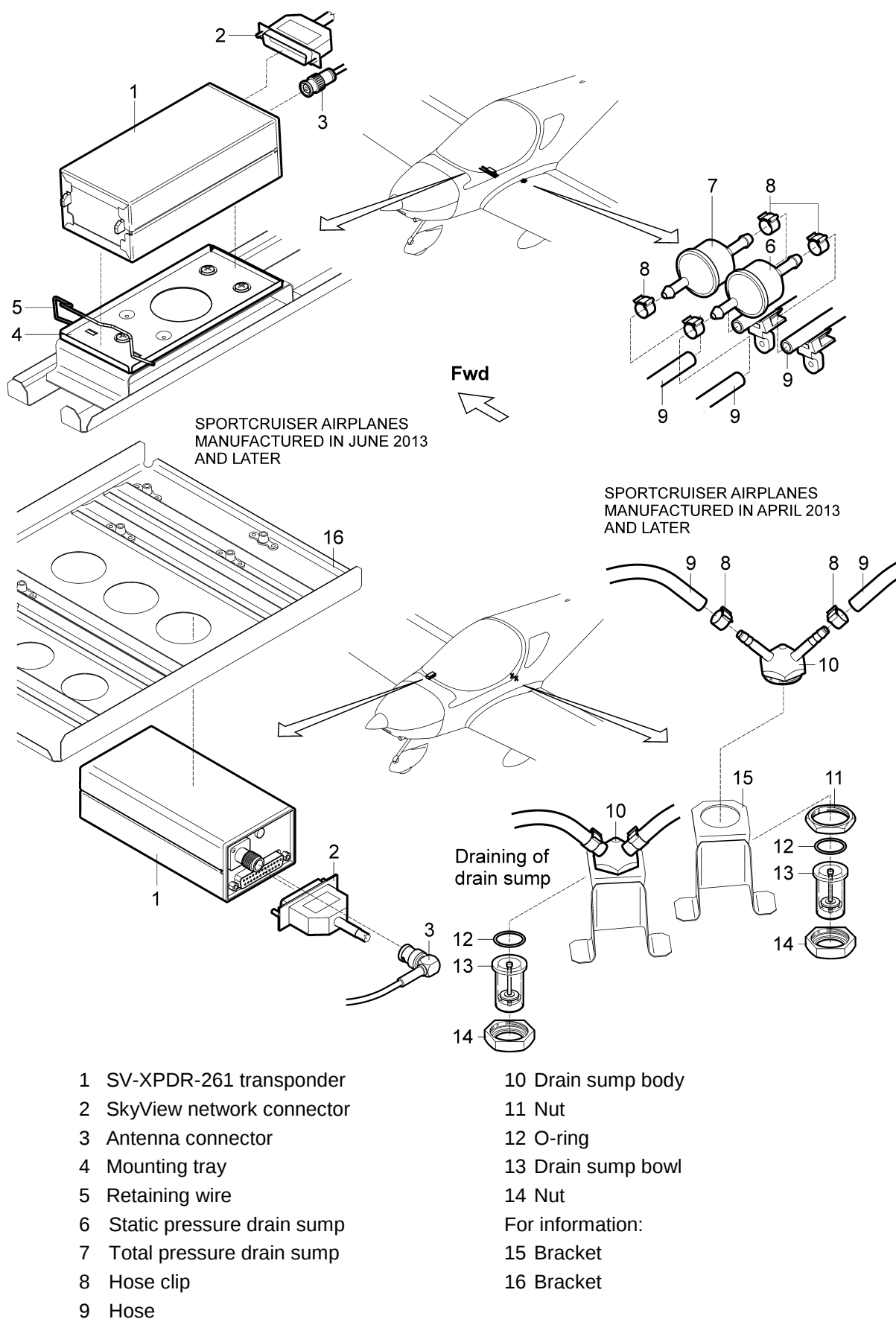


Fig. 12-43: SV-XPDR-261 transponder and drain sumps removal / installation



12.3.42 Installation of SV-XPDR-261 transponder

Type of maintenance: line

Authorization to perform:

- Repairman (LS-M) or Mechanic (A&P)

Tools needed:

- screwdriver
- (a) Remove the protective cover from the antenna connector
- (b) Put the transponder (1, Fig. 12-43) into the mounting tray (4) by hooking the connector end under the lip on the tray.
- (c) Lock the transponder (1) into the mounting tray (4) by clipping the retaining wire (5) over the lugs on the opposite end (airplanes manufactured in June 2013 and later have mounting tray installed from below the bracket (16)).
- (d) Connect the connectors (2; 3) to the transponder.
- (e) Tilt backward the right seat back (valid for airplanes manufactured before June 2013).
- (f) Set the **MASTER BAT**, **AVIONICS** switches to ON and do an operational test.

12.3.43 Removal of drain sump

NOTE: Following procedure valid for the airplanes manufactured after April 2013.

Type of maintenance: line

Authorization to perform:

- Repairman (LS-M) or Mechanic (A&P)

Tools needed:

- Cobra hose clip pliers
- wrench No. 27
- (a) Tilt forward the left seat back.
- (b) Remove the hose clips (8, Fig. 12-43) from hoses (9).
- (c) Disconnect hoses (9) of from the drain sump body (10); install protective covers on the hoses and hose ports of the drain sump body.
- (d) Unscrew and remove the nut (14) with the drain sump bowl (13); unscrew and remove the nut (11) and remove the drain sump body (10) from the bracket (15).

12.3.44 Installation of drain sump

NOTE: Following procedure valid for the airplanes manufactured after April 2013.

Type of maintenance: line

Authorization to perform:

- Repairman (LS-M) or Mechanic (A&P)

Tools needed:

- Cobra hose clip pliers
- wrench No. 27
- (a) Tilt forward the left seat back.



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- (b) Insert the drain sump body (10, Fig. 12-43) into the hole in the bracket (15) and fasten it with the nut (11).
- (c) Check the condition of the o-ring (12) a transparent drain sump bowl (13) - replace damaged parts.
- (d) Insert the O-ring (12) to the drain sump body (10), set the drain sump bowl (13) to the drain sump body, screw and carefully tighten the nut (14).

CAUTION: DURING INSTALLATION OF THE DRAIN SUMP AVOID INCORRECT SEATING OF THE O-RING BETWEEN THE DRAIN SUMP BODY AND THE DRAIN SUMP BOWL.

- (e) Remove the protective covers from the hoses and hose sockets of the drain sump body.
- (f) Connect the hoses (9) to the ports on the drain sump body (10) and secure them with hose clips (8).
- (g) Carry out check of pitot-static system tightness test (see 12.4.1).

12.3.45 Draining of drain sumps

NOTE: If you find impurities or water in pitot-static system drain sumps, these sumps must be drain.

12.3.43.1 SportCruiser airplanes manufactured before April 2013

Tools needed:

- Cobra hose clip pliers
- (a) Tilt forward the left seat back.
- (b) Remove the hose clips (8, Fig. 12-43) from hoses (9).
- (c) Disconnect hoses (9) of static and total pressure from the drain sumps (6; 7).
- (d) Clean and dry the sumps.
- (e) Connect the hoses (9) to the drain sumps (6; 7) and secure them with cable clips (8).
- (f) Tilt backward the left seat back and carry out check of pitot-static system tightness test (see 12.4.1).

12.3.43.2 SportCruiser airplanes manufactured after April 2013

Tools needed:

- wrench No. 27
- (a) Tilt forward the left seat back.
- (b) Unscrew and remove the nut (14, Fig. 12-43) with the drain sump bowl (13).
- (c) Clean and dry the drain sump bowl (13).
- (d) Check the condition of the o-ring (12) a transparent drain sump bowl (13) - replace damaged parts.
- (e) Insert the O-ring (12) to the drain sump body (10), set the drain sump bowl (13) to the drain sump body, screw and carefully tighten the nut (14).

CAUTION: DURING INSTALLATION OF THE DRAIN SUMP AVOID INCORRECT SEATING OF THE O-RING BETWEEN THE DRAIN SUMP BODY AND THE DRAIN SUMP BOWL.



- (f) Tilt backward the left seat back and carry out check of pitot-static system tightness test (see 12.4.1).

12.3.46 Removal of SV-ADSB-470 module

Type of maintenance: line

Authorization to perform:

- Repairman (LS-M) or Mechanic (A&P)

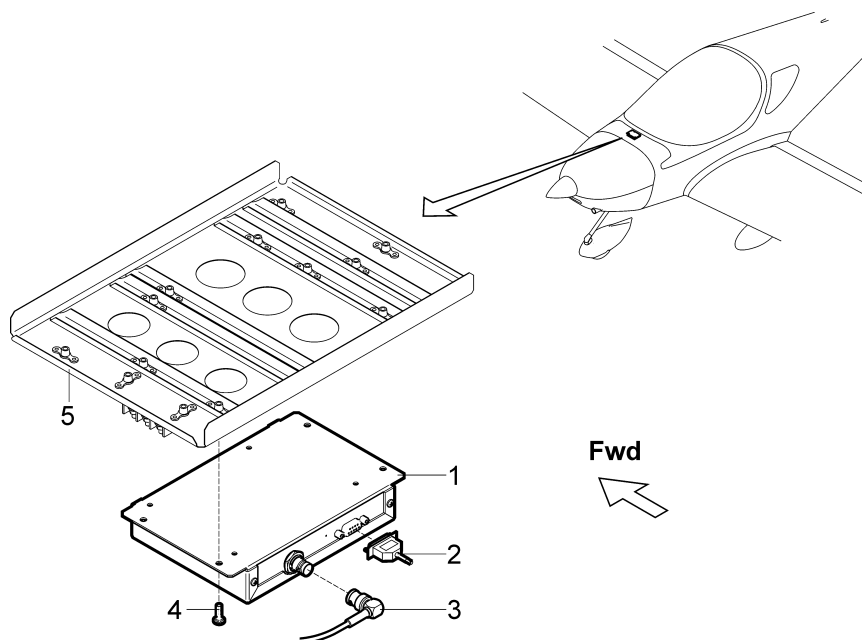
Tools needed:

- Phillips PH2 screwdriver

(a) Set the **MASTER BAT**, **EFIS1** switches to OFF.

(b) Disconnect the connectors (2; 3, Fig. 12-44) from the ADSB module (1).

(c) Unscrew the screws (4) and remove the ADSB module (1).



1 SV-ADSB-470 module

2 Serial connector

3 Antenna connector

4 Screw (4 pcs.)

For information:

5 Bracket

Fig. 12-44: SV-ADSB transponder removal / installation

12.3.47 Installation of SV-ADSB-470 module

Type of maintenance: line

Authorization to perform:

- Repairman (LS-M) or Mechanic (A&P)

Tools needed:

- Phillips PH2 screwdriver

(a) Place the ADSB module (1, Fig. 12-44) on the bracket (5) and fasten it by means of the screws (4).

(b) Connect the connectors (2; 3) to the ADSB module.



- (c) Set the **MASTER BAT**, **EFIS1** switches to ON and do operational test of the system.

12.4 Check / Adjustment

12.4.1 Check of pitot-static system tightness

- (a) In the static pressure system create the under pressure by means of an appropriate instrument corresponding to altitude of 1,000 ft. Drop in the indicated altitude per one minute must not exceed 100 ft.
- (b) In the system of total pressure create the overpressure corresponding to speed of 140 knots (260 km/h, 161 mph) by means of a suitable instrument. Drop in speed during 3 minutes must not exceed 2.3 knots (4.4 km/h, 2.7 mph).

12.4.2 Dynon avionics pitot / static test

Dynon ADAHRS / EFIS units use airspeed (or GPS ground speed when airspeed is unavailable) in the calculation of attitude. The internal rate sensors that are used to determine attitude are monitored and calibrated in-flight by using feedback from the accelerometers and from airspeed to achieve a highly accurate attitude solution.

When a pitot or static test is performed, the ADAHRS / EFIS is being exposed to dynamics that are impossible to achieve in a real airplane flight environment – namely, there are large airspeed changes without the accompanying accelerations and rotations. This false condition will cause a well-calibrated unit to incorrectly adjust its calibration. Furthermore, when a unit is in a test situation a change in applied pitot or static pressure will cause the attitude to pitch up or down. This is expected.

Performing the Dynon prescribed pitot and static test procedure to a Dynon ADAHRS or EFIS will prevent problems with the unit's performance in flight.

Dynon pitot / static test Instructions

Basic principles:

- Ensure unit is warmed up during each test reading.
- Unit should be powered off when changing pressures.
- Keep aircraft still (do not move) when pressure is applied.

Steps:

- (a) The airplane itself should be temperature stable. For example, if the aircraft is moved from outside in the sun to a hangar for testing, tests should not be started until the airplane has stabilized at the hangar temperature.
- (b) Turn EFIS on and let it warm up until the altitude reading is stabilized. This period should be at least 5 minutes, but may take longer depending on environmental conditions.
- (c) Turn EFIS off.
- (d) While the EFIS is off, apply the pressure required by your test to pitot and / or static port via your test equipment.



- (e) Turn on EFIS (external or internal battery power is acceptable). Keep airplane still while EFIS is powered on. Do not adjust the pitot or static pressures being applied to the EFIS / ADAHRS while it is powered on.
- (f) Verify airspeed and/or altitude reading.
- (g) Turn EFIS off (using button 1 is a good option for this operation).
- (h) Repeat steps 4-7 for each required pressure point in the test.

12.4.3 Magnetic compass compensation

Rules for doing compensation of the compasses:

- (a) Compass compensation must be performed on the approved compass bases, which are at least 100 m (300 ft) from steel structures, electric leading or other over ground or underground steel equipment or objects.
- (b) If the compass north is westward from magnetic north, the deviation is westward, i.e. negative. If the compass north is eastward from magnetic north, the deviation is eastward, i.e. positive.

Compensation procedure:

- (a) Turn the airplane to "N" heading; eliminate the deviation by "C" screw.
- (b) Turn the airplane to "S" heading; reduce the found out deviation to the half-value by "C" screw and write down the rest of the deviation.
- (c) Turn the airplane to "E" heading; eliminate the deviation by "B" screw.
- (d) Turn the airplane to "W" heading; reduce the found out deviation to the half-value by "B" screw and write down the rest of the deviation.
- (e) Turn the airplane by grades indicated in the compensation report (see Tab. 12-3; 12-4) and write down individual deviations in the table.
- (f) After finishing compensation of the magnetic compass fill out the deviation card (see Fig. 12-45) and position it in the airplane near the magnetic compass.

12.4.4 EFIS compass heading calibration

Procedures are mentioned in EFIS D100 Installation Guide (P/N 100487-000, latest edition).

12.4.5 ADHRS magnetic heading calibration

Procedures are mentioned in SkyView System Installation Guide (P/N 101320-008, latest edition).

COURSE	N	030	060	E	120	150	S	210	240	W	300	330
COMPASS												
TYPE	S/N			COMPENSATED W/ COMM				DATE		CARRY OUT BY		
				W/O COMM								

Fig. 12-45: Example of the deviation card



REPORT OF MAGNETIC COMPASS SWING				
Aircraft			Aircraft S/N	
Compass type			Compass S/N	
Check 1.	All electrical equipment ON and operating			
	The engine running, idle			
	Fuselage placed in flying attitude			
	XPDR ON, XCVR receiving			
Check 2.	Switched ON just those instruments, which are necessary for VFR flight. COM, NAV, XPDR, lights - switched OFF			
	The engine running, idle			
	Fuselage placed in flying attitude			
Heading	Measured		Deviation	
	1.	2.	1.	2.
N 000				
030				
060				
E 090				
120				
150				
S 180				
210				
240				
W 270				
300				
330				
Maximal allowed deviation $\pm 10^\circ$				
If the compass deviations are not identical for both checks, two separate compass correction cards should be done.				
Note:				
General evaluation		Complied		Failed
Performed by:		Elaborated by:		Date:

Tab. 12-3: Report of magnetic compass compensation



REPORT OF EFIS COMPASS SWING				
Aircraft				Aircraft S/N
Compass type		EDC-D10A		Compass S/N
EFIS type		DYNON D100		EFIS S/N
Check 1.	All electrical equipment ON and operating			
	The engine running, idle			
	Fuselage placed in flying attitude			
	XPDR ON, XCVR receiving			
Check 2.	Switched ON just those instruments, which are necessary for VFR flight. COM, NAV, XPDR, lights - switched OFF			
	The engine running, idle			
	Fuselage placed in flying attitude			
Heading	Measured		Deviation	
	1.	2.	1.	2.
N 000				
030				
060				
E 090				
120				
150				
S 180				
210				
240				
W 270				
300				
330				
Maximal allowed deviation $\pm 10^\circ$				
If the compass deviations are not identical for both checks, two separate compass correction cards should be done.				
Note:				
General evaluation	Complied		Failed	
Performed by:		Elaborated by:		Date:

Tab. 12-4: Report of magnetic compass compensation



12.4.6 EFIS D100 internal emergency battery check

EFIS-D100 has a rechargeable internal emergency battery, it is necessary to ensure that the battery capacity is such that it will last at least 2 hours on a full charge. Once per year, perform the battery capacity test. Procedure and replacing the battery pack is mentioned in EFIS D100 Installation Guide (P/N 100487-000, latest edition).

12.4.7 EFIS D100, EMS D120 firmware upgrade

Dynon Avionics provides free firmware updates for all its products, and continues to add new features periodically.

Each Dynon EMS or EFIS must be individually upgraded by connecting a PC to that instrument's serial port (see Fig. 12-46). The HS34 also must be individually upgraded via its Serial 1 port. Firmware upgrades to EDC-D10A is performed automatically during firmware upgrades of the attached EFIS product.

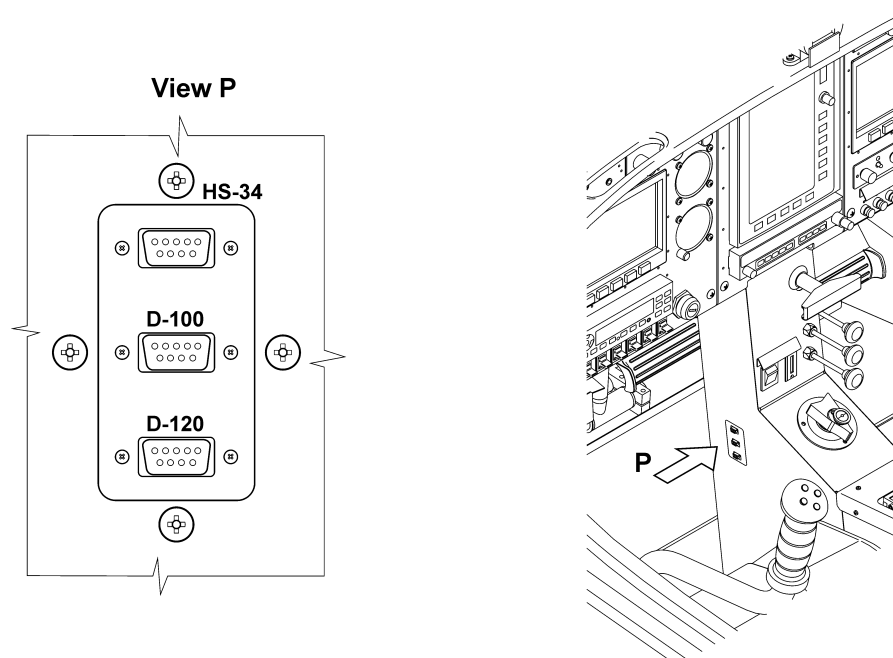


Fig. 12-46: Points for computer connection

- Check Dynon Avionics web pages for latest Dynon firmware.
- Download the appropriate firmware version from downloads.dynonavionics.com
- Install software according EFIS-D100 Installation Guide.
- Check correct function of instruments and avionics.



12.4.8 Flight test for the verification of the stall warning system

Fly the airplane at a safe altitude in a heavy / forward CG configuration, since this configuration has the narrowest stall margin. The airplane should have flaps retracted.

Note the airspeed at which the stall warning is activated vs the known stall speed of the aircraft. The stall margin should be approximately 5 kts. If it is not, proceed as follows.

- If the stall warning is too late:
If stall warning comes on too late, the position of the lift detector should be moved forward if possible. Moving the detector forward will allow the detector to be activated at a faster speed. A 6.3 mm (1/4 in) movement of the lift detector will change the stall warning activation point approximately 5 knots.
- If the stall warning is too early:
If stall warning comes on too early, the position of the lift detector should be moved backward, if possible. Moving the detector backward will allow the detector to be activated at a slower speed. A 6.3 mm (1/4 in) movement of the lift detector will change the stall warning activation point approximately 5 knots.

When the adjustments are complete, fly the aircraft in heavy / aft, light / forward and light aft to ensure that the stall warning margin is at least that which was obtained in the heavy / forward configuration. Finally, ensure that no false warnings occur during a normal, stabilized approach.



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13.1 General

This chapter contains information on crew compartment heating and ventilation system.

13.2 Description and operation

13.2.1 Venting system

Cockpit ventilation is ensured by two regulated air vents located on the cockpit sides under the instrument panel (see Fig.13-5) or on the instrument panel (see Fig.13-6). NACA type air inlets are located on the fuselage sides in front of the canopy frame. Quantity of inlet air is controlled by flaps which are movable in all directions which allow adjusting the air volume and air flow direction together. It is also possible to ventilate the cabin through sliding side windows located on the canopy (if installed).

For cleaning the canopy and sliding windows use warm water and soft cloth.

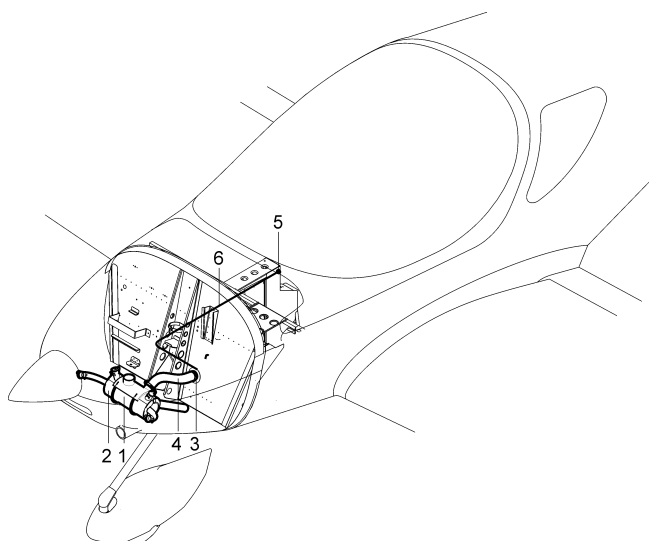
!!! NEVER use solution based on spirit or acid !!! Using those liquids may lead to failure and cracking of the glass and sliding windows.

Be careful when opening the cabin windows. If the movement is too hard, spread the sliding surfaces with a small amount of soap or paraffin.

13.2.2 Heating system

13.2.2.1 Standard heating system

Cockpit heating is ensured by hot air from the heat exchanger. The heat exchanger (1, Fig. 13-1) is located on the muffler (2). Ambient inlet air taken by the muffler (2) is heated in the heat exchanger (1) and supplied through control flap (3) into the cockpit by air hoses (4). Quantity of hot air is regulated by **CABIN HEATING** knob (5) on the instrument panel.



- 1 Heat exchanger
- 2 Muffler
- 3 Control flap

- 4 Air hose
- 5 **CABIN HEATING** knob

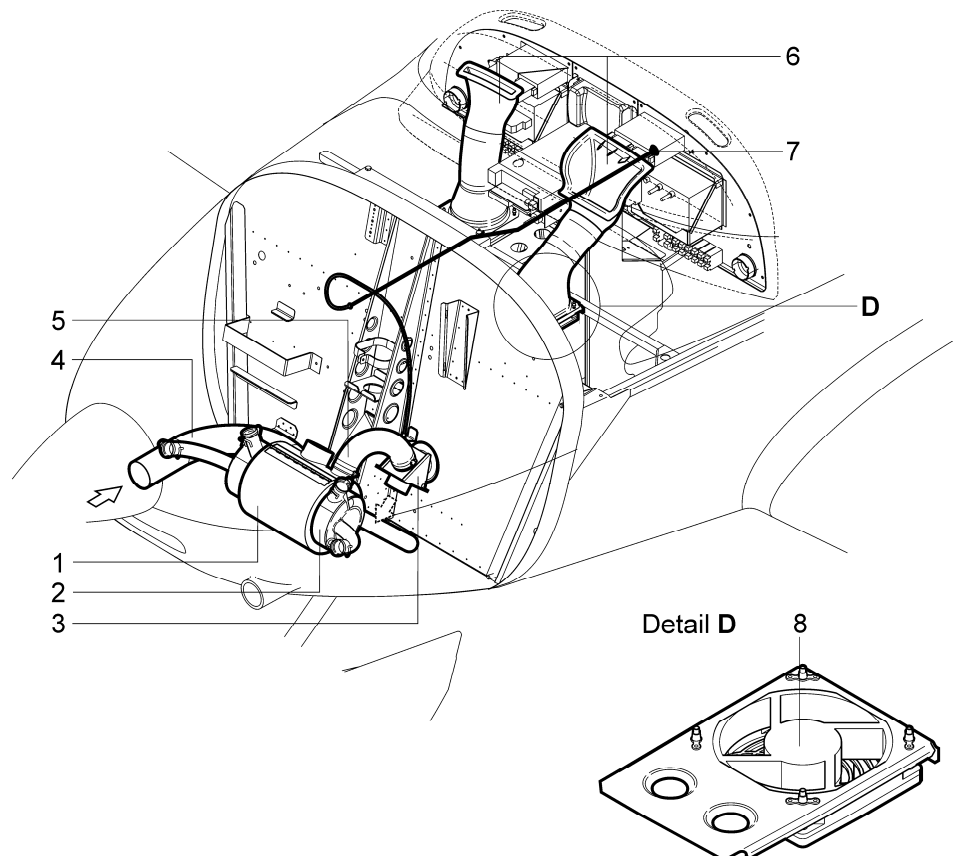
Fig. 13-1: Standard heating system



13.2.2.2 Efficient heating system

Cockpit heating is ensured by hot air from the heat exchanger (1, Fig. 13-2). This heat exchanger has a larger area compared with standard heat exchanger. The heat exchanger is located on the muffler (2). Ambient air is supplied to the heat exchanger via air hose (4) from the NACA inlet located on the right side of the lower engine cowling. Air is heated in the heat exchanger (1) and supplied through control box (3) into the cockpit by air hose (5). Quantity of hot air is regulated by **CABIN HEATING** knob (7) located on the central panel. If the control flap in the control box is closed, the warm air flows through the hole in the box body under the airplane.

Furthermore is installed defogging of the windshield by means of two electric blowers that supply the air from the cockpit compartment via two air channels (6) on the windshield. The blowers are not connected to the supply air from the heat exchanger and switch on by means of the **BLOWERS** circuit breaker located on the right part of the instrument panel (see Fig. 13-3).



- 1 Heat exchanger
- 2 Muffler
- 3 Control box
- 4 Cold air hose

- 5 Hot air hose
- 6 Air channel
- 7 **CABIN HEATING** knob
- 8 Blower

Fig. 13-2: Efficient heating system



13.2.3 Carbon monoxide detector

The airplane is equipped with Quantum Eye carbon monoxide (CO) detector, if the efficient heating system is installed.

The Quantum Eye is a multi-level carbon monoxide detector. It provides a visual indication of carbon monoxide contamination. Each detector is packaged in a protective bag then when opened activates it. Once activated the minimum product lifetime is 18 months. The detector is installed on the instrument panel.

Condition color: Normal - Yellow
 Caution - Green
 Danger - Dark blue.

Sensor regeneration:

from caution - 2 hours

from danger - 6 hours

CAUTION: WATCH THE DATE ON THE DETECTOR AND WHEN NECESSARY REPLACE IT. MARK THE DATE WHEN INSTALL THE NEW ONE.

NOTE: For details information refer to the detector manufacturer website www.qginc.com.

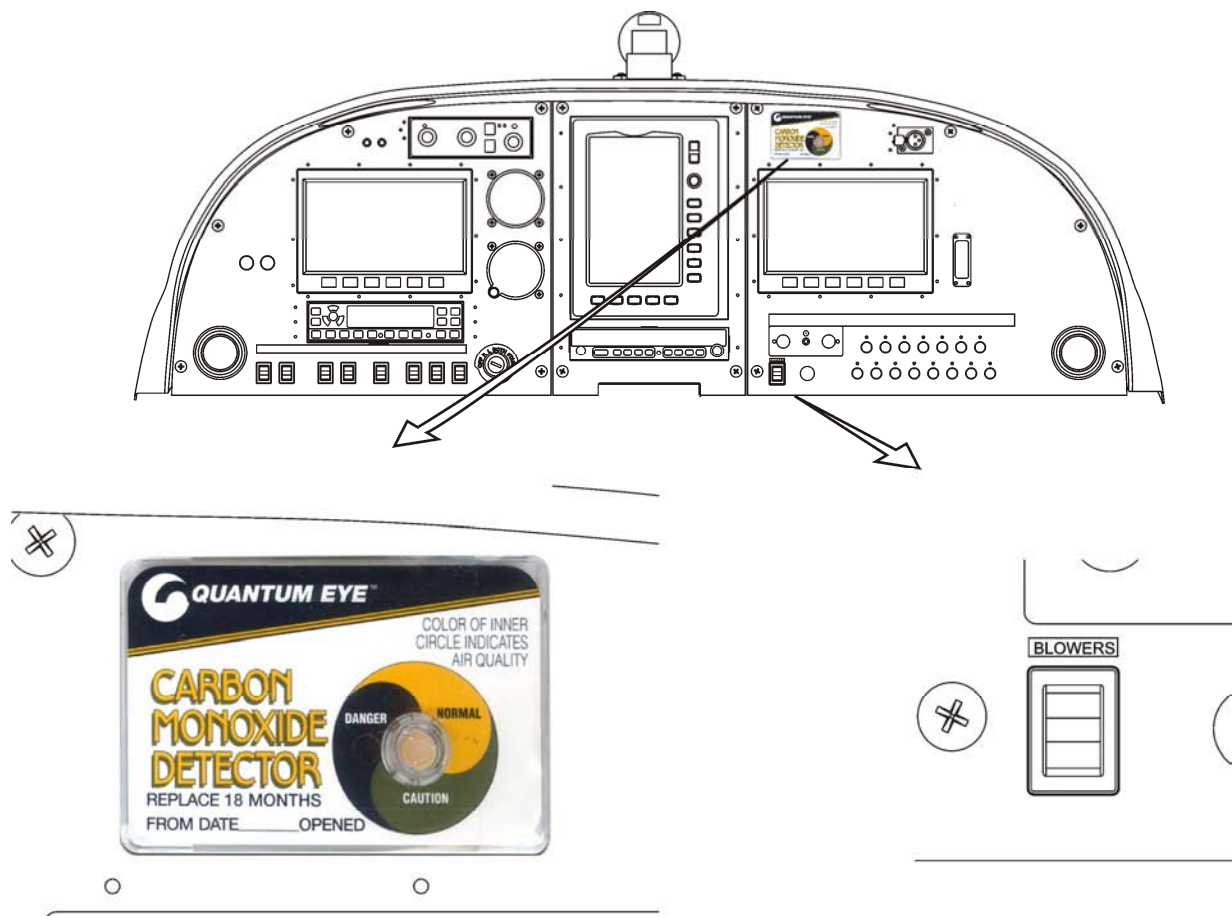


Fig. 13-3: Quantum Eye CO detector / blowers switch typically location



13.3 Removal / Installation

13.3.1 Heating control knob removal

Type of maintenance: line

Authorization to perform:

- Sport pilot, Repairman (LS-M) or Mechanic (A&P)

Tools needed:

- wrench size No. 14, 9/16"
- pliers, cutting pliers

(a) Disconnect the control cable on the control flap lever (3, Fig. 13-1, 13-2).

(b) Remove the nuts (1, Fig 13-4) thus releasing the flexible housing (3) with the heating control knob (2).

(c) Remove the heating control knob with cable from the flexible housing (3).

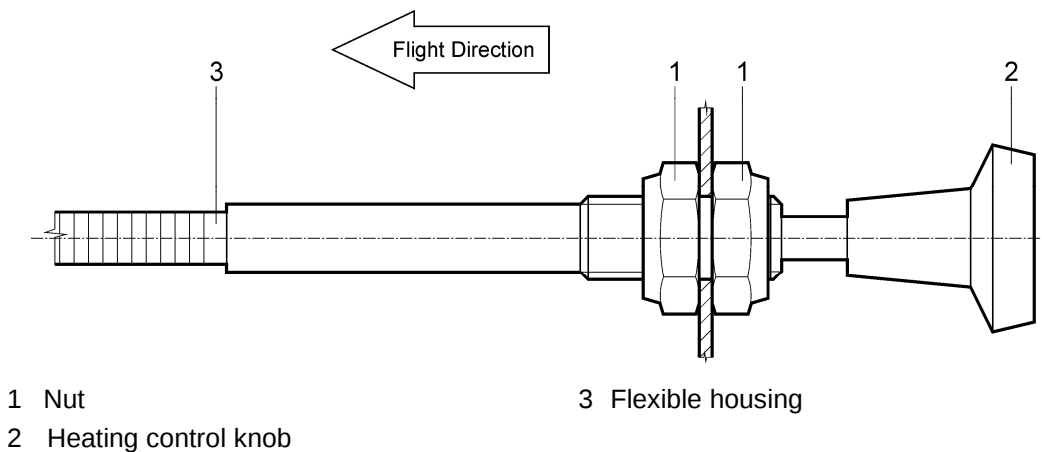


Fig. 13-4: Heating control knob

13.3.2 Heating control knob installation

Type of maintenance: line

Authorization to perform:

- Sport pilot, Repairman (LS-M) or Mechanic (A&P)

Tools needed:

- wrench size No. 14, 9/16"
- pliers, cutting pliers

(a) Insert the heating control knob (2, Fig. 13-4) into the flexible housing and fasten it from both sides of the instrument panel by means of nuts (1).

(b) Connect the control cable with control flap lever (3, Fig. 13-1, 13-2).

(c) Adjust heating control (see 13.4.1).



13.3.3 Air vents

13.3.3.1 Early SportCruiser / PiperSport airplane air vents removal

- (a) Open the control flap (1, Fig. 13-5) 90 degree and pull the vent (2) out from the housing (3).

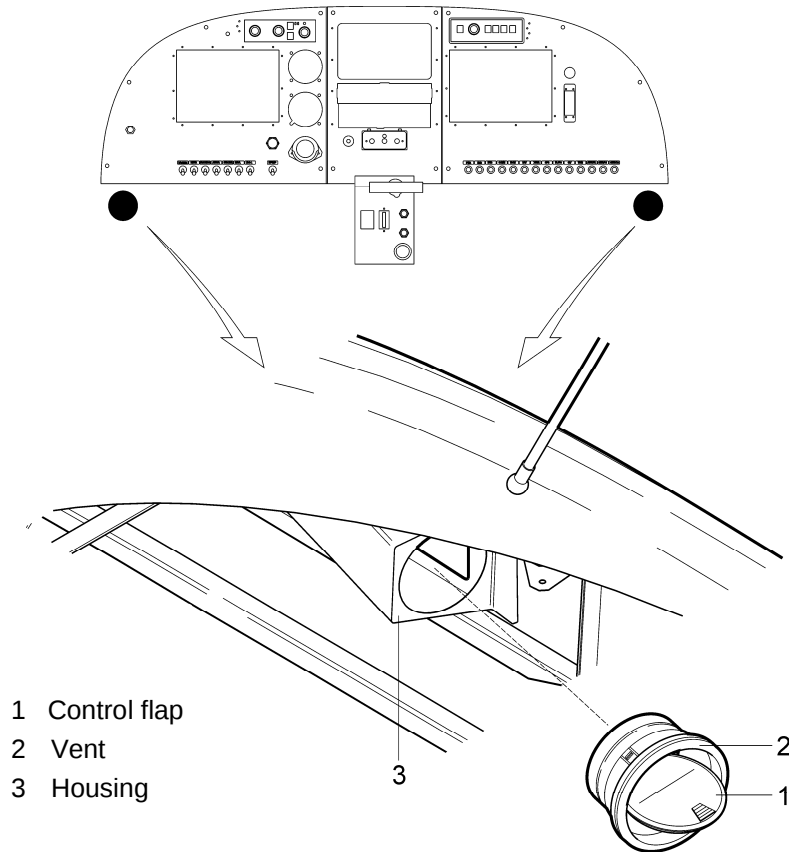


Fig. 13-5: Air vents removal / installation

13.3.3.2 Early SportCruiser / PiperSport airplane air vents installation

- (a) Plug the vent (2, Fig. 13-5) into the housing (3) under the instrument panel.
(b) Check the control flap (1) movement.

13.3.3.3 SportCruiser airplane air vents removal (from S/N C0416)

- (a) Unscrew the vent (1, Fig. 13-6) and remove it.
(b) Push back the tube (2), remove the cable tie (4) and pull the hose (3) out from the tube (2).

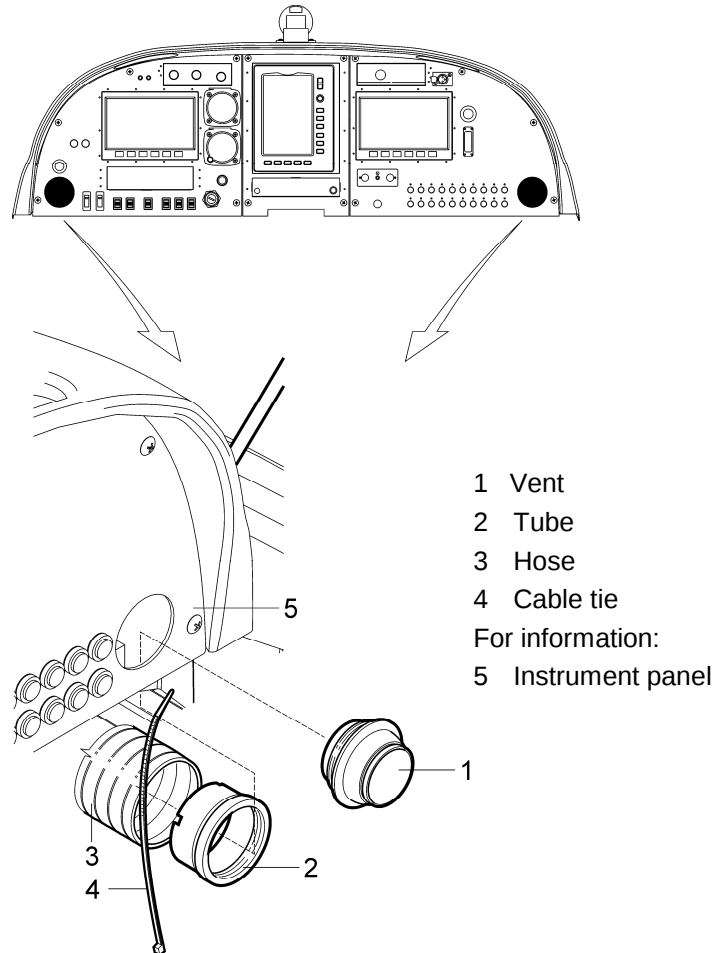


Fig. 13-6: Air vents removal / installation

13.3.3.4 SportCruiser airplane air vents installation (from S/N C0416)

- Put the hose (3, Fig. 13-6) to the tube (2) and secure with the cable tie (4).
- Insert the tube (2) to the hole in the instrument panel (5), screw and tighten the vent (1).
- Check the vent (1) movement.

13.3.4 Heat exchanger removal

NOTE: Removal of the standard heat exchanger is shown in Section 10.3.13.

Type of maintenance: line

Authorization to perform:

- Sport pilot, Repairman (LS-M) or Mechanic (A&P)

Tools needed:

- Screwdriver, pliers, cutting pliers

- Remove engine cowlings; during removal of the lower engine cowlings disconnect the hose (5, Fig. 13-7) from the NACA inlet.
- Remove the hose clamps (8; 9, 10) and disconnect hoses (5; 6; 7).
- Cut off lockwires (4) securing wires (3) and remove wires from the both piano hinges.
- Carefully remove both halves (1; 2) of the heat exchanger from the muffler.



13.3.5 Heat exchanger installation

NOTE: Installation of the standard heat exchanger is shown in Section 10.3.14.

Type of maintenance: line

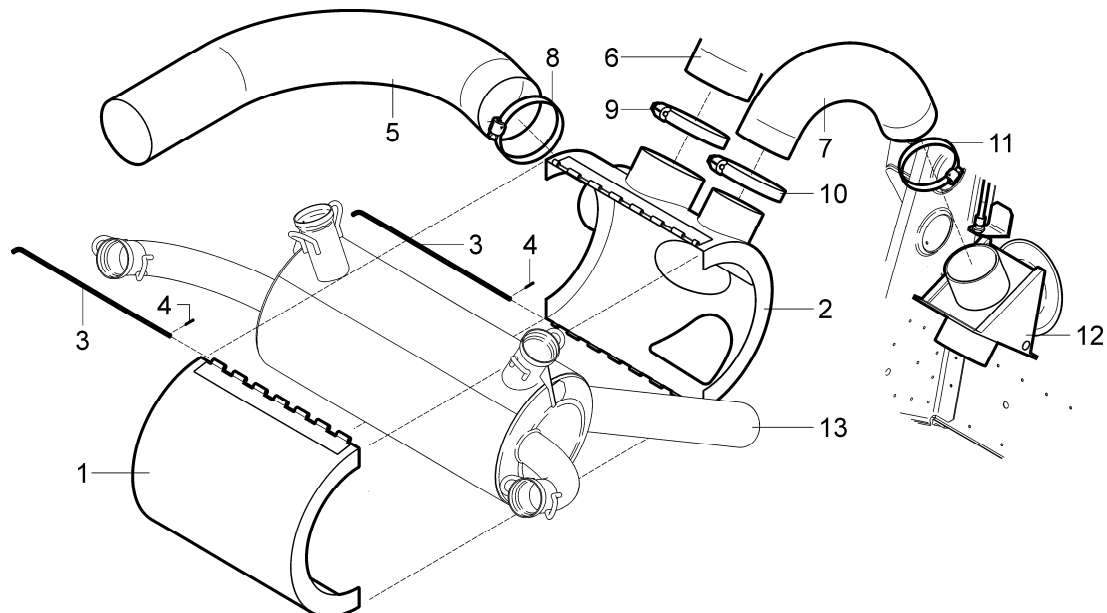
Authorization to perform:

- Sport pilot, Repairman (LS-M) or Mechanic (A&P)

Tools needed:

- Screwdriver, pliers, cutting pliers

- Carefully install both halves (1; 2, Fig. 13-7) of the heat exchanger on the muffler (13).
- Insert the wire (3) into each piano hinge; secure the wires with the lockwires (4).
- Connect the air hoses (5; 6; 7) to the heat exchanger; secure them by hose clamps (8; 9, 10).
- Install engine cowlings; during installation of the lower engine cowling connect the hose (5) to the NACA inlet.



- | | |
|-----------------------------|------------------|
| 1 Heat exchanger front part | 8 Hose clamp |
| 2 Heat exchanger aft part | 9 Hose clamp |
| 3 Piano hinge wire | 10 Hose clamp |
| 4 Lockwire | 11 Hose clamp |
| 5 Inlet air hose | 12 Control box |
| 6 Air hose from airbox | For information: |
| 7 Air hose | 13 Muffler |

Fig. 13-7: Heat exchanger removal / installation



13.3.6 Defogging blowers removal

Type of maintenance: line

Authorization to perform:

- Sport pilot, Repairman (LS-M) or Mechanic (A&P)

Tools needed:

- Screwdriver, pliers, cutting pliers
- (a) Set the **MASTER BAT, BLOWERS** switches to OFF.
 - (b) As required, remove the instrument panel cover (9) and hoses (5; 6).
 - (c) Disconnect the blower wires from the wiring harness.
 - (d) Unscrew and remove the screws (4, Fig. 13-8), blower guard (2), spacers (3); and remove the blower (1).

13.3.7 Defogging blowers installation

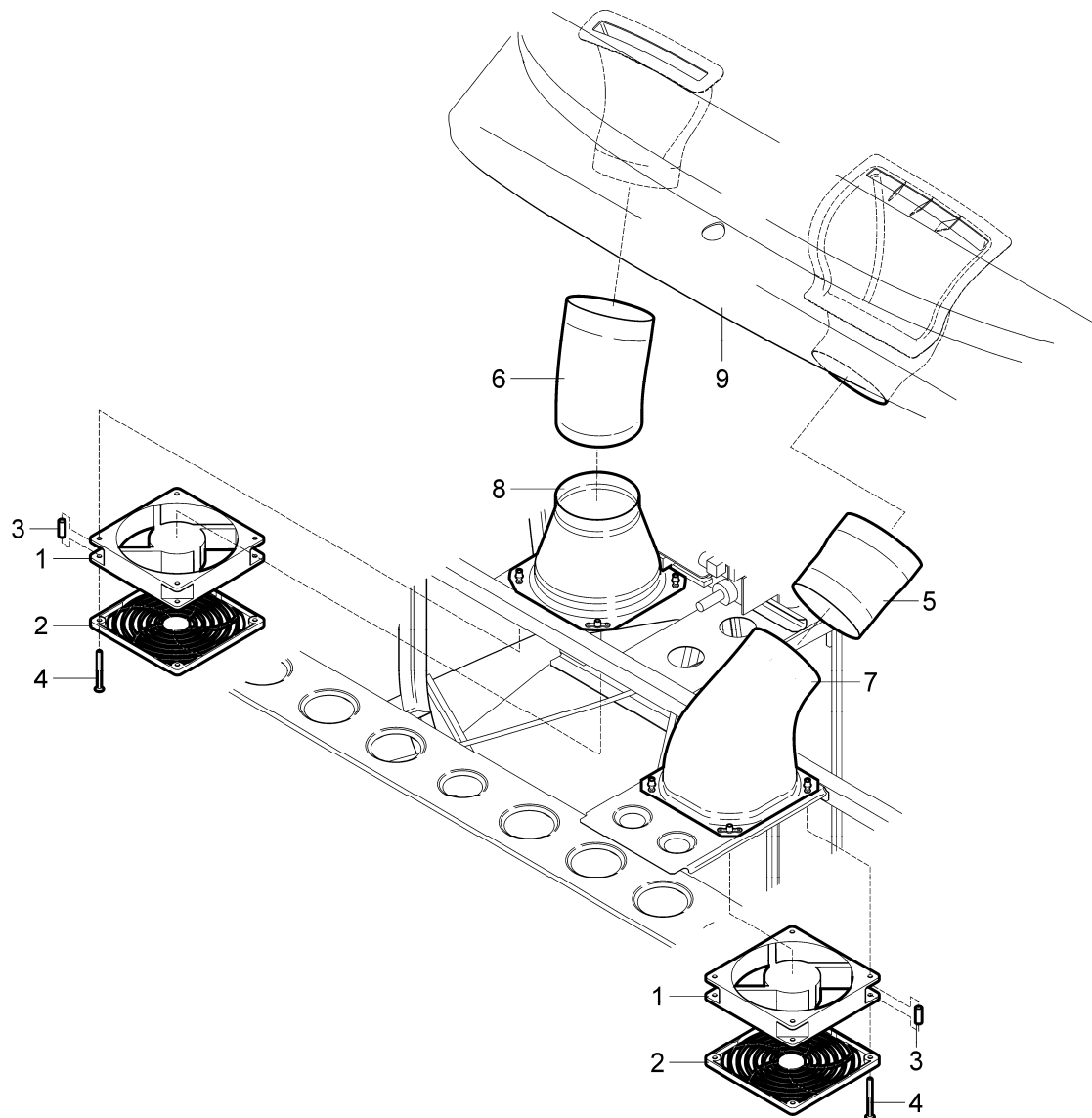
Type of maintenance: line

Authorization to perform:

- Sport pilot, Repairman (LS-M) or Mechanic (A&P)

Tools needed:

- Screwdriver, pliers, cutting pliers
- (a) Align the guard (2, Fig. 13-8) on the blower (1), insert the screws (4) into the holes and install the spacers (3).
 - (b) Parts align to the appropriate place and tighten the screws (4).
 - (c) Connect the blower wires to the wiring harness (see Wiring Manual).
 - (e) As required, install hoses (5; 6) and the instrument panel cover (9).
 - (f) Set the **MASTER BAT, BLOWERS** switches to ON and carry out operational test.



- 1 Blower
- 2 Blower guard
- 3 Spacer (4 + 4 pcs.)
- 4 Screw (4 + 4 pcs.)
- 5 Hose

- 6 Hose
- 7 Blower diffuser, left
- 8 Blower diffuser, right
- For information:
- 9 Instrument panel cover

Fig. 13-8: Defogging blowers removal / installation



13.4 Check / Adjustment

13.4.1 Adjusting the heating control

- (a) Adjust the control by screwing or unscrewing the control cable terminal from the control flap.
- (b) After adjustment of the control, mark the mutual position of the control cable terminal and the flap controller with red color.

13.5 Exchanges / Service information

13.5.1 Carbon monoxide detector replacement

The Quantum Eye has an 18-month product life once it has been activated. Excessive dosages, multiple exposures, or use after the expiration date may cause the sensor to turn permanently dark. If the sensor turns any color other than those shown, it has been contaminated and must be replaced.

Keep the sensor away from water, grease, solvents, dirt, hot surfaces, cleaning solutions, and other contaminants, which may destroy or shorten the life of the sensor. Carbon monoxide (CO) is an insidious and cumulative poison. It is a colorless, odorless and tasteless gas produced by the incomplete combustion of fuel.

Instructions:

- (a) Activate detector by removing it from the plastic bag.
- (b) Attach the detector on the instrument panel.
- (c) If carbon monoxide is present the sensor changes color (see Chapter 13.2.3).
- (d) When the air freshens, the sensor will regenerate to its original color and will be ready to use again (unless it has been overexposed).



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14.1 General

This chapter contains information on airplane handling - jacking, parking and anchoring.

14.2 Jacking and supporting the airplane

Due to the relatively low empty weight, the airplane jacking can be carried out by two persons.

There are two supporting points (see Fig.14-1). Front point (1) is positioned on main spar of the wing center section. Aft point (2) is positioned on the tail skid.

For the front supports make two bedplates (e.g. from hardwood) according Fig. 14-1.

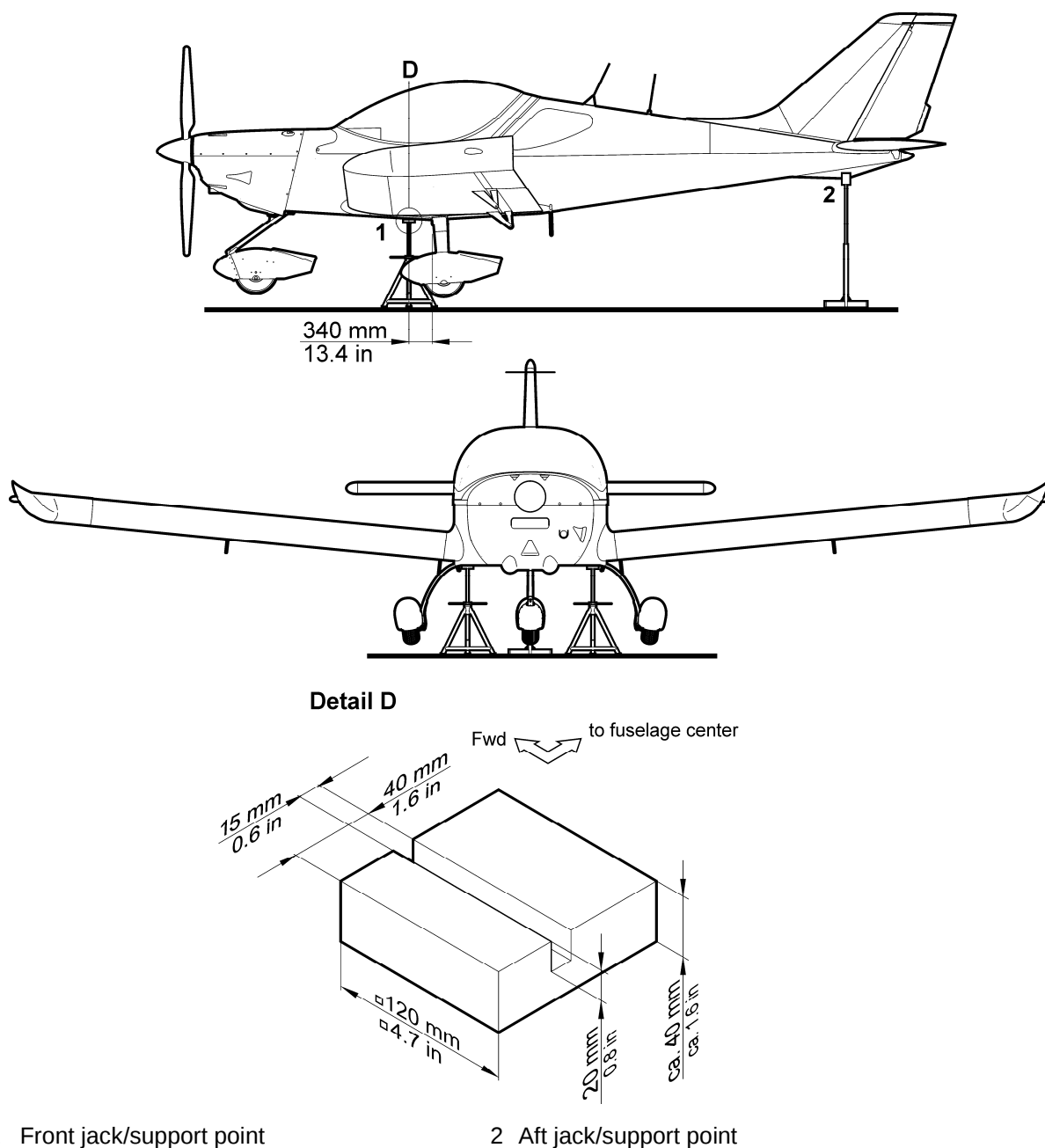


Fig. 14-1: The airplane jack/support points



14.3 Airplane towing

The airplane can be moved by tow bar inserted into the bracket mounted on nose wheel fork, by main gear legs, or pushing on the wing root.

WARNING: SWITCH OFF THE IGNITION BEFORE HANDLING THE AIRPLANE ON THE GROUND!

CAUTION: AVOID EXERTING EXCESSIVE PRESSURE ON THE AIRFRAME STRUCTURE, ESPECIALLY ON THE WING ENDS, FLAPS, AILERONS, HTU, VTU, ETC.

CAUTION: DO NOT USE THE PROPELLER AS TOW BAR TO MOVE AIRPLANE.

14.4 Airplane parking

The airplane should be preferably placed in the hangar, possibly in another covered space with stable temperature, good ventilation, low humidity and dust free environment. In case of parking outside the hangar it is necessary to anchor the airplane and to cover the canopy or the whole airplane with suitable tarpaulins for long-term parking.

CAUTION: USE THE PARKING BRAKE ONLY FOR SHORT-TERM PARKING BETWEEN FLIGHTS DURING THE DAY. WHEN THE FLIGHT DAY IS OVER OR UNDER LOW AIR TEMPERATURES, DO NOT USE THE PARKING BRAKE AND APPLY THE WHEEL CHOCKS INSTEAD.

14.5 Airplane anchoring

When parking, the airplane outside the hangar after flight day, the airplane should be anchored to the ground. It is necessary to anchor the airplane in order to protect it from a possible damaging caused by wind and gusts. For this reason the airplane is equipped with anchoring eyes on the lower side of wings and on rear part of fuselage.

Procedure:

- check the fuel selector valve is **OFF**, switch OFF all switches, remove key from the ignition switch
- block the control stick, e.g. by using safety harnesses
- release the parking brake if it was braked
- close the vents
- close and lock the canopy
- park the aircraft into wind
- insert the wheel chocks
- anchor the airplane to the ground by means of cables pulled through the anchoring eyes on the lower side of the wings and on the rear part of fuselage; as necessary anchor the airplane at the nose landing gear leg (see Fig. 14-2).

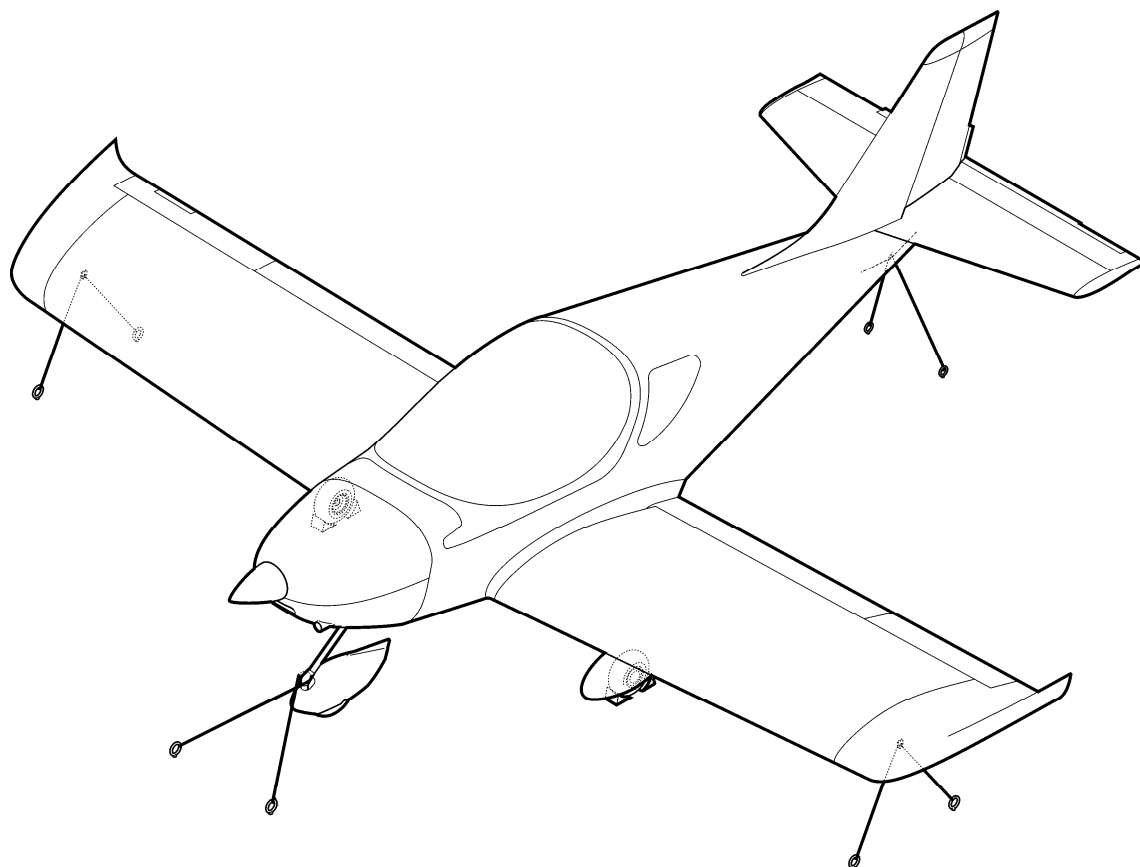


Fig. 14-2: Airplane anchoring



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CHAPTER 15 – AIRPLANE REPAIRS

15.1 General

This chapter contains information about standard procedures for performing common repairs of the airplane. These repairs can be made by an authorized organization. Other procedures for repairing individual airplane systems you can find in the appropriate chapter describing the system. Unless specified otherwise in this Chapter all airplane repairs shall be done in accordance to the most current edition of FAA AC 43.13-1B and AC 43.13-2A, Acceptable Methods, Techniques, and Practices - Aircraft Inspection and Repair.

CAUTION: BEFORE CARRYING OUT ANY STRUCTURAL REPAIRS TO CONTACT THE RELEVANT AIRWORTHINESS AUTHORITY FOR APPROVAL.

This chapter describes the following procedures:

- Removing rivets
- Riveting
- Repair of skins
- Repair of fiberglass parts
- Recommendation for repairing surface protection of the airplane
- Torque moments
- Securing bolt joints and screwed fittings
- Repairs of bonding
- Installing clamps by Nicopress pliers

15.2 Removing rivets

Remove rivets from the side of the rivet, which is more accessible. Drill out the rivet head and drive out the shank.

NOTE: Center-dot heads of solid rivets, which shall be drilled off.

Use a drill bit by 0.6 mm (0.025 in) diameter smaller than the rivet shank and drill up to the depth of 2/3 of the total depth riveted parts. Remove the drilled heads with a sharp cutter. Drive out the shank with the soft material mandrel diameter by 0.1 mm (0.004 in) smaller than rivet shank diameter. The rivets, which cannot be driven out should be drilled out full depth. When removing rivets be careful that chips and rivets do not fall down to areas where sensitive mechanisms are located, e.g. guides, control bearings etc.

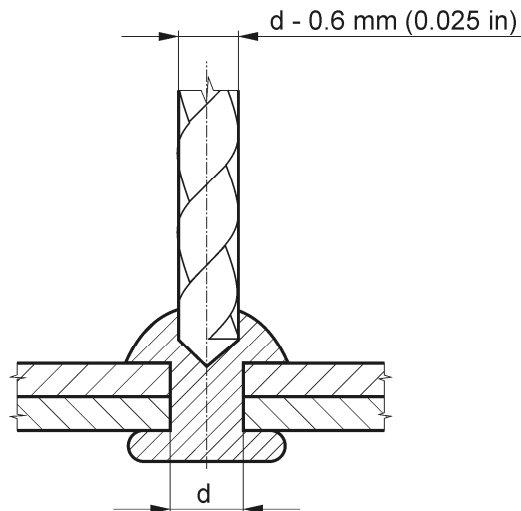


Fig. 15-1: Drilling of rivets (solid rivet displayed)

15.3 Riveting

15.3.1 General

Riveted parts are used in design of SportCruiser / PiperSport airplane for whole fuselage, wings, flaps, ailerons and tail unit.

In the following table there is a survey of rivets that are used on SportCruiser / PiperSport airplane structure.

Type of rivets	Designation	Use
AVEX	Aluminium rivet on steel stem	Fuselage, wing, stabilizer, elevator, rudder, flaps, ailerons
MS20426AD	Aluminium rivet with countersunk head	
MS20470AD	Aluminium rivets with universal head	

Tab. 15-1: Survey of rivets used in airplane structure

In case that different replacement rivets are used than shown in the Tab. 15-1 then rivet dimensions must be identical with originally used rivets and material of rivets must fulfill the same material characteristics.

15.3.2 Riveting procedure

- (a) Fit the parts being connected and drill them together. Hole diameter must be by 0.1 mm (0.004 in) bigger than rivet shank diameter.

NOTE: When drilling, fix by clamps or clecos mutual position of assembled parts. Holes of higher diameters pre-drill with a drill bit of smaller diameter and then redrill them to the final size.

- (b) Disassemble the parts and deburr the holes.

NOTE: For sunken rivets perform conical countersinking of the rivet head by 5° smaller apex angle (e.g. the head with angle of 100° will have countersinking of 95°±1°). After countersinking, the cylindrical part of hole with min. length of 0.3 mm (0.012 in) must remain in material. Countersinking must be performed in such a way that the rivets head



CHAPTER 15 – AIRPLANE REPAIRS

overruns the area before riveting max. by 0.2 mm (0.008 in), the rivet head must not be under the surface level (sunk).

- (c) Before applying the bonding sealant carefully clean the connected parts of impurities and degrease contact surfaces by appropriate agent, e.g. industrial spirit.

NOTE: For cleaning and degreasing use a clean paper towel or cloth. After wiping, the towel or cloth must not show any contamination. For perfect degreasing the whole surface, clean always smaller part of surface, after its perfect cleaning continue on. Cleaning liquid always apply on the cloth only and wipe it off from the surface before its evaporating.

- (d) Apply bonding sealant on one of the surfaces, which should be sealed together. Apply the adhesive directly from the packing by means of the extrusion gun, plastic spatula or paintbrush in such a way that the layer of sealant is equally thick and integral, without bubbles or uncovered areas. The optimum thickness of the applied coat is 0.25 mm (0.01 in).

NOTE: The surfaces that are to be connected must be dry and clean before application of bonding sealant.

- (e) After applying bonding sealant connect both parts together, fix them by clecos and rivet them.

NOTE: After proper riveting the continual bur of adhesive is created on the edge of connected surfaces. If this bur is big, it is possible to wipe it off with the plastic spatula and finally with cloth dipped in degreasing agent.

- (f) After riveting, seal rivet heads, there, where are used pop rivets - see 15.6.2.2

15.4 Skin repairs

15.4.1 Removing damaged skins

In case that it is necessary to remove bigger part of the skin, ensure reliable support of the structure. Appropriately support the damaged part of the fuselage monocoque or the wing by supports located in the area of fuselage frames or wing ribs. The shape of supports must correspond with the shape of supported place and must be supplemented by cushion (or with other suitable material), so that airplane skin surface cannot be damaged. Remove rivets according to Section 15.2.

15.4.2 Division of damaging into groups

To determine way of repair, find out by inspection the scope of structural damage, also in case of possible unriveting the skin.

Damage can be divided into the following groups:

- (a) Little damage, which do not have to be repaired, such as local small impacts, scratches in the skin not exceeding thickness of the zinc chromated layer, appearance defects of paint coat etc.
- (b) Damage, which can be eliminated by airplane operator. Methods of elimination are describer further in the text.



- (c) Damage with disturbance of basic structural elements of the aircraft. (Deformation of wing and stabilizer spar, deformation of wing ribs, fuselage bulkheads etc.). These repairs can be made only by Czech Sport Aircraft a.s. as producer or by authorized repair shop - for more detailed information contact Czech Sport Aircraft a.s.

15.4.3 Principles for repair method determination

When repairing the damaged skin or airplane structure keep the following principles:

- (a) Drill of the loose or damaged rivets and replace them with new rivets (see 15.2).
- (b) Strength in any section of the repaired place must be as a minimum equal to the strength of the original part.
- (c) Use the same material for repairs as the material of a defective area (for survey of used materials see Section 17.3).
- (d) Carry out repair of skin damaging by means of patches having the same thickness as the original skin or higher.
- (e) Repair the angle defects with inserted angles with the section by 10 to 20% higher than the section of the damaged angle (see 15.4.4).
- (f) Loading from one side of the repaired area must be carried through the repair element directly to the other side.
- (g) Length of overlapping in the area of repair must be satisfactorily big so that loading can be equally distributed to nondefective part of the structure.
- (h) Exist holes are, if possible, used for riveted joints. If these rivets are not able to transfer loading, drill other holes. Rivets around of the repaired area are a criterion for rivet size selection.
- (i) Minimum distances of rivets from the edge of sheet metals or inserted bands are shown in the Table 15-3:

Rivet diameter	Distance of rivet axis from the edge of the sheet metal (angle)	
	minimum	recommended
2.4 mm (3/32 in)	5 mm (0.2 in)	7 mm (0.27 in)
3.2 mm (1/8 in)	6 mm (0.24 in)	7 mm (0.27 in)
4.0 mm (5/32 in)	7 mm (0.27 in)	8 mm (0.31 in)

Tab. 15-2: Minimum distance of rivets from the edge

15.4.4 Angle repair

Repair method consists in stiffening the damaged angle by means of the new one. When repairing observes the following instructions:

- (a) Determine the section area of the damaged angle S_1 .
- (b) Choose $S_2 = 1.1 S_1$ as section area of the stiffening angle.
- (c) Thickness $t_2 = (1 \text{ to } 1.3) t_1$.
- (d) Drill of rivets in the area of repair.
- (e) Choose the same rivet diameter as in the damaged place.



- (f) Use at least two rivets on each side from the crack.
- (g) At riveting follow Section 15.3.

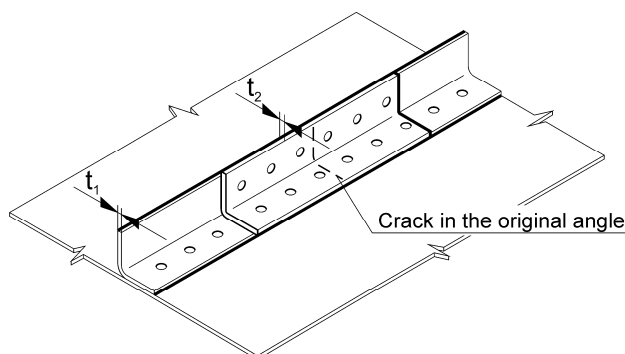


Fig. 15-2: Scheme of angle repair

15.4.5 Skin repair

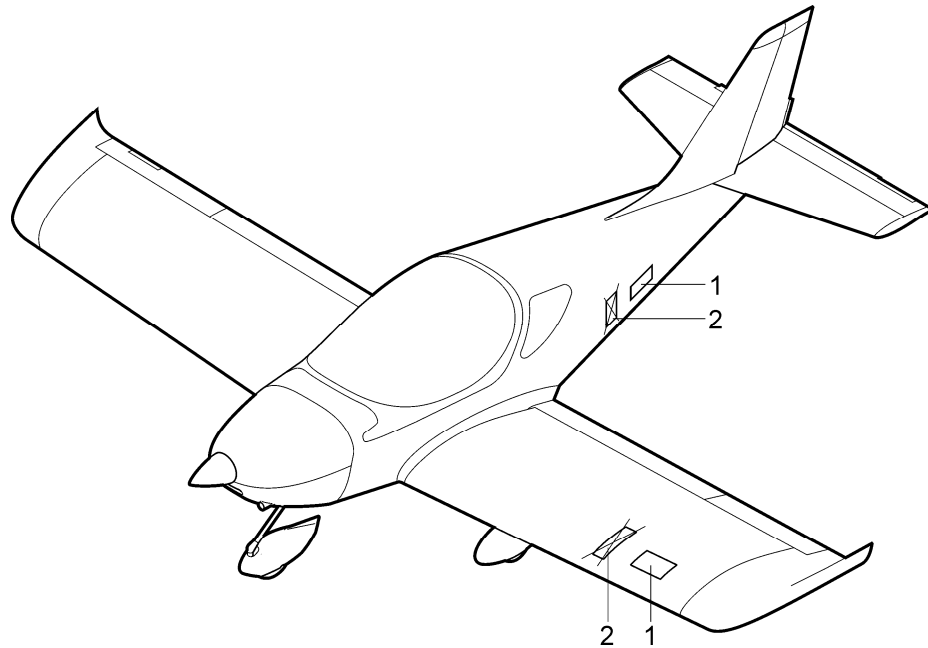
15.4.5.1 Stopping cracks and blinding small holes

Enlarging of small cracks can be stopped by drilling a hole with the drill bit of dia 3.2 mm ($1/8$ in) at the utmost end of the crack. If enlarging continues, repeat the drilling. Support the place of drilling with a wooden block at drilling thin skin and use the sharp drill bit so that it will not drift and will not cause another damage to the skin. Check in the operation whether the crack was successfully stopped.

At drilling the crack of the skin in the area of the flange, supporting stiffener etc., protect these parts before drilling by supporting the drilled place by means of the thin steel band. If the crack still enlarges after repeated drilling, cut out the affected area and repair the skin by means of the patch - see next paragraph.

15.4.5.2 Repairing the skins with patches

CAUTION: THE FOLLOWING PROCEDURE IS INTENDED FOR SKIN REPAIRS ONLY WITH MAX. AREA OF THE PATCH UP TO 200 cm² (31 sq in) (AREA OF THE CUT OUT SKIN). BEFORE RIVETING THE PATCH CHECK THE ADJACENT PART OF THE INNER STRUCTURE IN THE DAMAGED AREA AND FIND OUT WHETHER ITS REPAIR IS NEEDED. PLACE PATCHES ON THE FUSELAGE SO, THAT THE LONGER PATCH SIDE LIES IN THE LONGITUDINAL PLANE OF THE AIRPLANE (IN FLIGHT DIRECTION), SEE FIG.15-3. PLACE PATCHES ON THE WING SO, THAT THE LONGER PATCH SIDE LIES IN DIRECTION OF TRANSVERSAL AXIS OF THE AIRPLANE (PARALLEL WITH THE WING LEADING EDGE), SEE FIG. 15-3.



1 Correctly located patch

2 Incorrectly located patch

Fig. 15-3: Location of patches on the airplane skin

Mark the damaged surface area (preferably by spirit felt tip) and cut out the most suitable geometrical shape (circle, square, rectangle).

Be careful that all cracks as well as adjacent corroded areas are cut out. Corners of cut out holes in the skin must have minimum radius of 12.7 mm (0.5 in) and their edges must be smoothly filed off.

Size of patch overlapping depends on the cut out of skin area:

- (a) **Patch up to the area of 51.6 cm² (8 in²)** - rivet by one row of rivets, the patch edge must overlap the edge of the cut out hole by minimum 19 mm (0.75 in).
- (b) **Patch with the area over 51.6 cm² (8 in²)** - rivet by two rows of rivets, the patch edge must overlap the cut out hole by minimum 32 mm (1.25 in).

Both ways of patching are shown on Fig. 15-5.

If the damaged area is located near the spars and frames, choose such patch dimension so that it covers all these elements of structure and it is possible to rivet it (Fig.15-4).

Types of patches, according to their position on the airframe structure.

- (a) **Surface patches** - These can be used in the areas where surface smoothness is not important
- (b) **Sunk patches** - Use for patches on the wing, tail unit and control surfaces.
- (c) **Surface patches across obstacles and stiffeners in the skin** - pay special attention to drilling the patch together with the surrounding structure. Attach the patch in several points and then drill holes for rivets from inner side (if possible). Use original holes in frames and stiffeners.

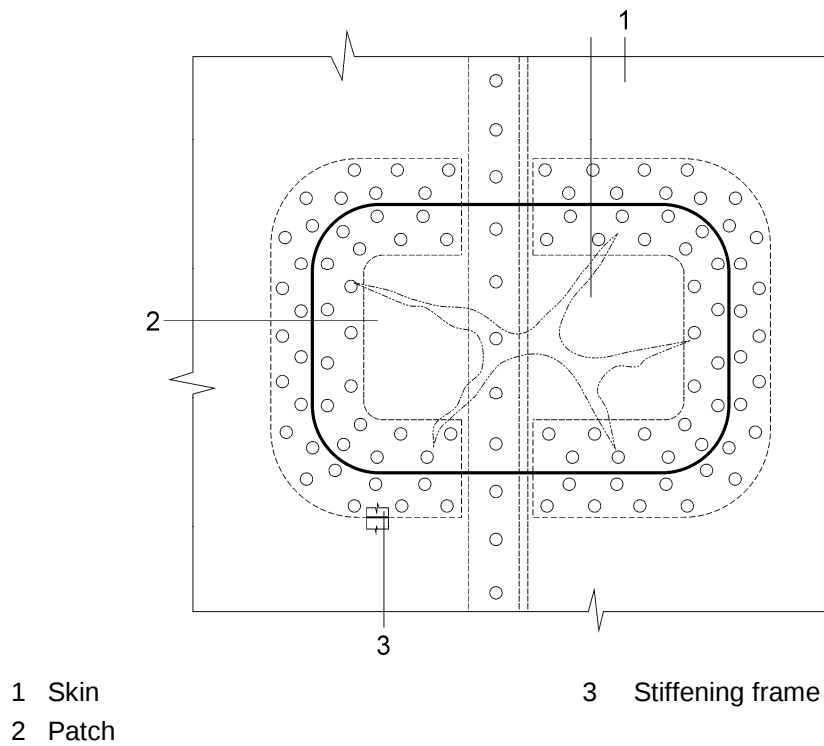


Fig. 15-4: Repair of the punctured skin in the frame area

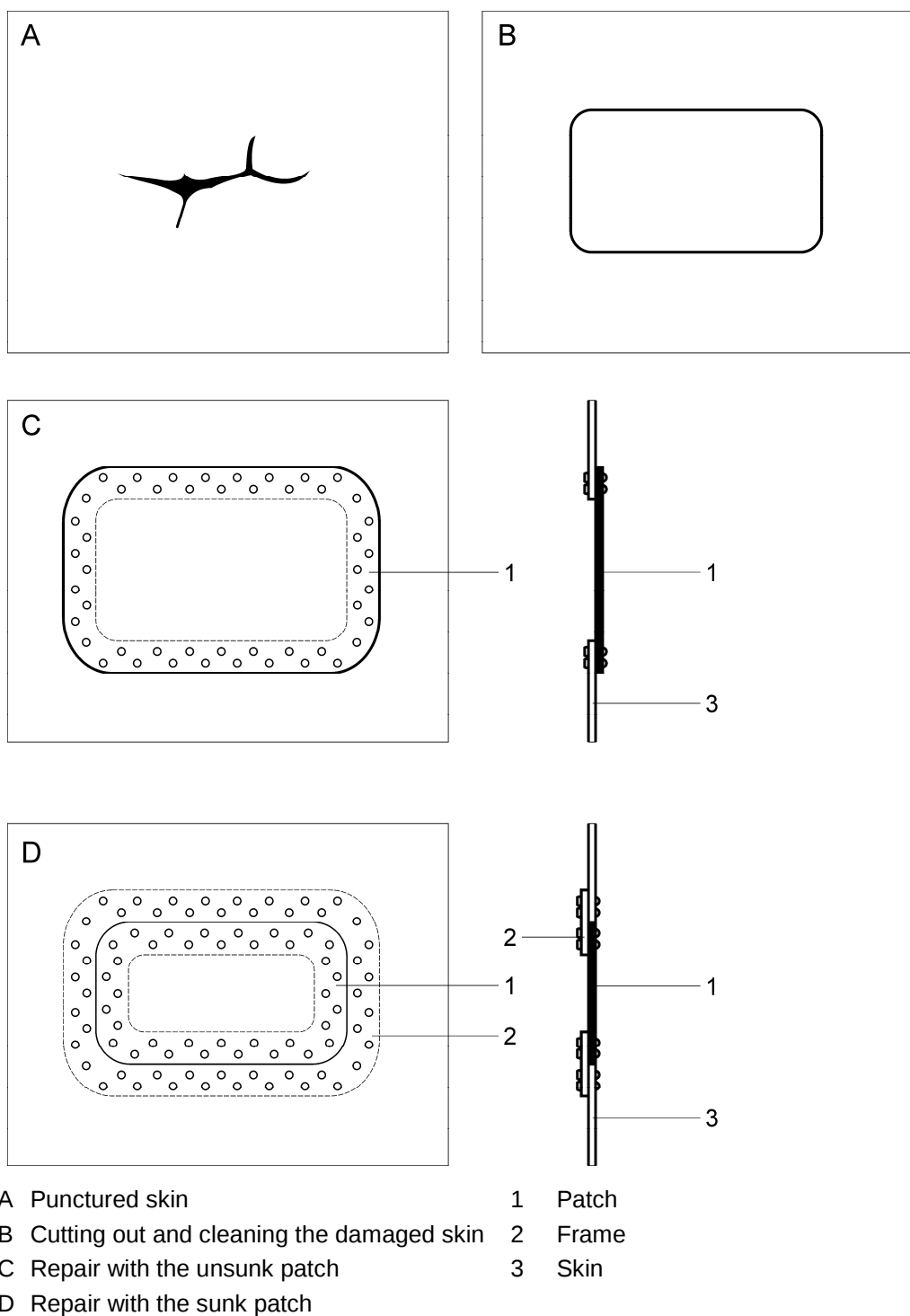


Fig. 15-5: Repair of the punctured skin

**15.5 Repair of fiberglass parts****15.5.1 Damage classification**

Any damage of parts from reinforced plastics with epoxy matrix leads to increased saturation of the matrix with humidity and subsequently to loss of properties. Therefore we recommend carry out their repair as soon as possible after the damage has occurred.

Two kinds of parts are made from these materials in the airplane:

- structural, load-bearing parts (canopy frame)
- design appearance, non load-bearing parts (fairings)

According to the damage size we can divide repairs into:

- small damage (surface defects, not affecting the stiffeners)
- medium damage (not more than 2/3 of stiffener thickness damaged)
- big damage

We recommend carry out repairs by means of epoxy resin and glass or carbon stiffeners.

15.5.2 General

Epoxy resin mixtures are prepared in a given mass ratio by means of weighing (accuracy of scales 1 gram (0.002 lbs)).

15.5.3 Parts of external appearance**15.5.3.1 Small damage**

Repair of damage just by application of mastic and by varnish repair.

Preparatory grinding

For a good adhesion of repair layers it is necessary to carry out surface sanding at the utmost up to the depth of contact with the stiffener (do not damage). It is necessary to do surface sanding with overrun of 51 mm (2 in) from the damage location smoothly to the top layer. It is suitable to do sanding with grain size of 160. Dry sanding equipment with suction from the sanding area is used. Al_2O_3 or equivalent (fused corundum) can be used as sanding material.

Dust removing

It is made by wiping with clean and dry brush or by a vacuum cleaner.

Application of smoothing layer

After preparation of mixture (for material recommendation see the Tab. 15-4) and its eventual thickening, to enhance the noncurtaining capability (for vertical or lower areas) is performed its application onto the repair area by means of a plastic spatula. For better distribution of deposited material on irregular surface it is possible to form it through the laid PE or PP transparent polyethylene. After proper application the layer is without bubbles. Deposit thickness is given by necessary thickness of surrounding layers (leveling) and ranges from 0.2 to 12.7 mm (0.008 to 0.5 in) in one deposit.



Manufacturer, name	Type	Mixing ratio	Delay	Rate of setting	Time of setting	Temperature	Fillers
MGS, A: L285 B: Hardener 285	epoxy	A:B 100:40	to be processed within 50 min (for 0.2 kg (0.44lbs) mixture)	40%	16 FH (32 FH)	20-35°C (17-20°C) 68-95°F (62-68°F)	thickening: Aerosil, microballs
				100%	26 FH (72 FH) (2 FH)	20-35°C (17-20°C) 68-95°F (62-68°F) (80°C) (176°F)	

Tab. 15-3: Recommended materials for mixture preparation for application of leveling layer

Sanding

Sanding or eventually sealing the surface is made after setting the mixture and possible tearing of the used polyethylene. It is suitable to start sanding with grain size up to 160 and finish with grain size of at least 400. It is carried out by dry sanding equipment with suction from the sanding area. Al_2O_3 or equivalent (fused corundum) can be used as sanding material. Basic material of the part must not be diminished at sanding.

NOTE: Especially in case of C/K (carbon/Kevlar) stiffener in the basic part, sanding through up to the stiffener must not occur (complication - see note about preparatory sanding at medium damage).

Finishing

See section 15.6 - Paint repairs

15.5.3.2 Medium damage

Repair of damage by replacing the stiffener part, by mastic and varnish repair. At such repair it is necessary to distinguish type of used stiffener (especially for sanding):

- C/K (carbon/Kevlar), roving of fabric of black color (C) take turns with yellowish (K)
- G (glass), rovings from milky white to transparent

Preparatory sanding

For good adhesion of repair layers it is necessary to do sanding up to the depth of damage. It is necessary to do surface sanding from the damage area with overrun at the least 25 mm (1 in) for every damaged stiffener layer smoothly up to the top layer and then about 51 mm (2 in) for finishing and mastic application. It is convenient to do sanding with sanding material having grain size of 160. It is carried out by dry sanding equipment with suction from sanding area. Al_2O_3 or equivalent (fused corundum) can be used as sanding material.

NOTE: In case of C/K stiffener K roving tend to rise up from the surface at sanding - it is difficult to sand them, we recommend using diamond sanding tool and one-way sanding.

Dust removing

Dust is removed by wiping with a clean and dry brush or by a vacuum cleaner.

**Stiffener preparation**

For this kind of repairs we recommend the stiffener G (glass) with plain weave 150 g/m² (0.037 lb/ft²), with surface protection for epoxy resins. Number of needed stiffener layers depends on depth of damage. It is possible to say that each layer of the mentioned fabric represents at proper saturation by matrix resin thickness of 0.5 mm (0.020 in).

Stiffener layers must be prepared (cut out) gradually from the smallest (the lowest) up to the bigger (upper), each with overrun of 19 mm (0.75 in).

Putting layers

After preparing lamination mixture (for recommendation of material see the Tab. 15-4), it is applied to the place of repair by means of rigid brush. The first stiffener is laid into the deposit and it is again saturated by brush. Another layer of stiffener is laid and saturated. When putting the last layer it is necessary to pay attention to a proper saturation and compression of stiffeners so that they cannot „come up" to the surface and subsequent useless damage at final grinding. For better saturation of the surface by resin and securing against curtaining it is possible to put PE or PP transparent foil across the surface. When applied properly, the layer is without bubbles. Repair thickness should exceed surrounding surface in this phase by about 0.5 to 1 mm (0.02 in to 0.04 in) for finishing.

Sanding

Carry out sanding and eventually apply mastic on the surface after setting, eventually tearing of the foil (see small damage). It is suitable to begin sanding by abrasive with grain size of 160 and finish by grain size of at least 400. Dry sanding equipment is used with suction from the sanding area. Al₂O₃ or equivalent can be used as sanding material. It is important not to diminish basic material of the part at sanding.

NOTE: Especially in case of c/k stiffener in the basic part there must not be any sanding through up to the stiffener (complication - see the note about preparatory sanding).

Finishing

See Section 15.6 - Paint repairs

15.5.3.3 Major damage

At such damage we recommend to change the part or to do this repair in a professional facility. Use instructions in chapter about medium damage as recommendation for used materials.



15.5.4 Structural parts

On these parts we do not recommend to do other as small damages repair. In case of the other damage we recommend to contact Czech Sport Aircraft a.s. as manufacturer.

CAUTION: WHEN REPAIRING, IT IS NECESSARY TO PAY ATTENTION TO TIMELY REPAIR (SEE THE TEXT ABOUT LOW OF PROPERTIES AT HUMIDITY EFFECT AT THE BEGINNING OF 15.5.1)!

Small damage

Repairs are made according to instructions with appearance parts.

CAUTION: WHEN REPAIRING, IT IS NECESSARY TO CAREFULLY PAY ATTENTION NOT TO DAMAGE THE STIFFENERS!

15.6 Paint repairs

15.6.1 Safety rules

When working with paints, thinners and solvents follow the following safety rules:

- it is necessary to follow safety rules for working with flammable and volatile substances
- working area must be properly aerated
- it is prohibited to smoke and anyway handle with free fire in a working area
- use protective working means such as goggles, gloves, respirator, etc.

15.6.2 Recommendation for additional surface treatment of the airplane surface

CAUTION: BY APPLYING PERMANENT PROTECTIVE COATS WEIGHT OF AIRPLANE IS INCREASED AND GRAVITY CENTER POSITION IS CHANGED. INCREASE IN WEIGHT DEPENDS ON TYPE OF COAT AND ITS THICKNESS.

15.6.2.1 Washing and degreasing

It is possible to use both organic solvents and solvents based on water.

(a) **Organic solvents** acetone, metyetylketone (MEK), benzine, toluene,
BASF Glasurit 360-4

- Applied by spraying on washed surfaces (e.g. mechanical sprayer, jet ejector) or by wiping with wet (by pouring, not by dipping because it would contaminate the whole volume of solvent) textile wad. After applying it, the agent is wiped of by clean absorbing material before solvent evaporation.
- **Advantages:** fast and reliable evaporation even from the corners and borders without additional warming
- **Disadvantages:** it must be used without other dilution (expensive); not ecological (danger of water contamination); detrimental to health (must be carried out in an aerated area with personal protective means); waste (including dripping from the area) must be eliminated in the incinerating plants.
- **Use:** for Al-alloys surfaces, epoxy fiberglass



CAUTION: THESE AGENTS MUST NOT BE USED FOR DEGREASING PARTS FROM PLASTICS (PC -LEXAN, PMMA PLEXIGLASS).

(b) **Water-based agents** - emulsion substances, wetting agents

- Applied also by spraying onto washed surfaces or by wiping with wet (by pouring and dipping) textile wad. After applying it, let it act for some time (see manufacturers recommendation) and then it is rinsed with clear water (by means of sponge dipped in ample amount of water or water jet).
- **Advantages:** (different according to the type of product: it is possible to highly dilute with water (cheap); ecological - waste (including dripping from the surface due to ample amount of water it is necessary to contain it) can be generally eliminated after its additional dilution with water in public sewerage; the least detrimental to health.
- **Disadvantages:** slow and unreliable evaporating from corners and borders, additional warming (drying) mostly required imperfect elimination of water results in wrong adhesion of paint coats; imperfect degreasing of fiberglass parts (not possible to use)
- **Use:** for Al-alloys surfaces and plastics

15.6.2.2 Bonding rivet heads, big irregularities and material transitions

CAUTION: IN CASE THAT AIRPLANE SURFACE REMAINS WITHOUT TOP COAT, CARRY OUT JUST RIVET HEAD BONDING.

After perfect degreasing, carry out bonding of rivet heads, big irregularities and transitions of fiberglass parts with Al-sheet.

Epoxy and polyester bonding agents for car bodies are suitable; moreover for transitions between two types of material with increased elasticity. Recommended bonding agents are shown in the Tab. 15-5.

Polyester bonding agents are applied with plastic spatula after being mixed with initiator. Sanding with sanding paper with grain size of 240 is made to smooth surface after drying. Remove dust after sanding and clean with degreasing agent.

Epoxy bonding agent is applied from the special jet with static mixer by means of extruding pistol. Excessive material is wiped off with spatula to final appearance before setting (slight recess is not a defect) - **do not sand!**

Surface	Manufacturer, name	Type	Other components	Drying (grindable) [min]/18°C (65°F)
Al-alloys	BASF Glasurit 801-703 (base)	polyester	BASF Glasurit 965-53 (initiator)	20
Transitions epoxide – fiberglass + Al-alloys	BASF Glasurit 801-703 (base)	polyester	BASF Glasurit 965-53 (initiator)	20
Rivet heads	BASF Glasurit	polyester + styren		20

Tab. 15-4: Recommended bonding agents



15.6.2.3 Application of primer (paint)

In order to reach a uniform resistance to corrosion and smooth surface, we recommend carry out application by means of spraying (air standard gun with the upper vessel, air HVLP gun, airless electric gun). The adjusting of the used gun (given by manufacturer) differs according to the type - air pressure, jet diameter. Primer should be applied in several sprayings (total thickness is not reached at a blow) with defined maximum dwell and total drying time till further treatment or handling. Primer serves especially for anchoring (adhesion to the substrate) the topcoats and can serve also for eliminating irregularities of the surface (function of filler, for sanding). For surfaces from Al-alloys we recommend to use the etch-primers for light metals based on alkyd or materials based on epoxy or polyurethane (2-component paints); specific recommendations according to the table 15-6.

Surface	Manufacturer, name	Type	Further components	Surface mass	Recom. thickness	Drying (between spraying / total) 18°C (65°F)
Al-alloys	BASF Glasurit 801-1880 (base)	epoxy	BASF Glasurit 965-35/2 (hardener)	1.6 [kg/mm/m ²]	0.025 mm (0.00098")	15 min / 12 FH
epoxy – fiberglass					(at 0.05 mm (0.00197")	
PC (Lexan), PMMA (Plexiglass)			Glasurit 965-50 (thinner)	8.49 [lb/in/sq.ft]	it can be also used as filler)	

Tab. 15-5: Recommended primers

15.6.2.4 Bonding

After total drying of basic coat we recommend to carry out total bonding of irregularities including repairs of bonding. Recommended binders are shown in the table 15-5. After drying perform sanding with emery paper with grain size of 240 until the surface is smooth. After sanding clean dust and wipe off with grease remover and perform repairing paint coat by primer (1/3 of coat thickness).

15.6.2.5 Application of top coat

In order to reach smooth surface we recommend again carry out the paint coat by spraying (see 15.6.2.3).

Topcoat serves especially for creating the coat resistant to weather and external effects for aesthetic rendering of the unit. Considering the higher loading by external effects we recommend to use top materials, exclusively two-component ones, on the acrylic-polyurethane or polyurethane basis, always with guaranteed adhesiveness to the used base coat (according to manufacturer). It is possible to use to advantage some of the coat system for car repairing. In our recommendation (see Tab. 15-7)

there are two types of colors: single coat (color shade and protection in one) double coat (one-component color shade is formed by the substrate and protection is ensured by two-component transparent top coat). By single coat paint it is possible to reach the wide



spectrum of colors, but it is difficult to do metallic paint coats (we do not recommend them).

Color type	Manufacturer, name	Type	Other items	Surface mass	Recom. thickness	Drying (between spraying / total) 18°C (65°F)
Single coat	BASF Glasurit R-68 / shade (base)	acrylic – polyurethane	BASF Glasurit 922-36 (standard hardener) Glasurit 352-91 (standard thinner)	1-1.6 [kg/mm/m ²] 5.24-8.38 [lb/inch/ft ²] (by shade)	0.02-0.04 mm (0.00078-0.00157")	15 min / 16 hrs
Double coat	base color coat: BASF Glasurit R-55 / shade (base)	acrylic – polyurethane	BASF Glasurit 352-216 (thinner, long)	1.2-1.4 [kg/mm/m ²] 6.29-7.33 [lb/inch/ft ²] (by shade)	0.015-0.02 mm (0.00059-0.00078")	10 min / 20 min
	Top coat, bright: BASF Glasurit 923-155 (base)	acrylic – polyurethane	BASF Glasurit 929-93 (standard hardener) Glasurit 352-91 (standard thinner)	0.9 [kg/mm/m ²] 4.82 [lb/inch/ft ²]	0.03-0.04 mm (0.00118-0.00157")	5 min / 5 hrs

Tab. 15-6: Recommended paints

15.6.3 Small damage

15.6.3.1 General

Small damage is a deterioration of corrosion resistance. At repair the situation is made more difficult by the fact that the substrate for repair coats is not a compact surface of basic material but mostly al coats of surface protection (after sanding), of which not al are suitable for (in ageing stage) for good adhesion of paint coats. Therefore we recommend to carry out such repairs by a verified system.

Before repairing it is necessary to differentiate the type of the existing topcoat, single coat and two-coat (with the top coat). For repair it is necessary to follow the used type of color. It is suitable to choose the delimited area (e.g. connection of sheets, wing edge) for the scope of the place, which is being repaired transition, is then better blended. In the case that it is not possible to choose the area in this way, it is necessary to take into consideration the higher difficulty of the procedure as for the uniformity of shade and elaboration of coat transition.



15.6.3.2 Sanding

For good adhesion of the repair coats it is necessary to carry out sanding of the old paint coat at least up to such depth as the depth of damage. Ground area must be larger from 51 to 102 mm (2 to 4 in) than damaged area. With two-coat type of the topcoat it is necessary to add at least 51 mm (2 in) for the run-out of the top coat. Sanding can be started with abrasive having grain size of max. 160 and finish with grain size of 400. It is made by the sander equipped with the suction from the area of sanding or by manual sanding under water.

CAUTION: ANODIZED COAT CAN NOT BE DESTROYED BY SANDING ON THE AL-ALLOY SHEET.

15.6.3.3 Degreasing

It is carried out in the same way as in the case of the total spray coat - see 15.6.2.1

15.6.3.4 Application of primer

For reaching the satisfactory equal adhesion we recommend to carry out a spray coat of the place to be repaired by adhesive interlayer (see Tab. 15-8).

Surface	Manufacturer, name	Type	Surface weight	Recomm. thickness	Drying (total) 18°C (65°F)
Al-alloys	BASF Glasurit 934-0	single-component	0.8 [kg/mm/m ²]	0.005-0.01 mm (0.00019-0.00039")	max 15 min
Epoxy fiberglass					
Old paint coats			4.19 [lb/inch/ft ²]		

Tab. 15-7: Adhesive interlayer

Subsequently the primer is applied according to the Table 15-6. Paint coat thickness is given by necessary thickness of surrounding coats (leveling).

CAUTION: IN CASE THAT THE PRIMER WAS NOT REMOVED BY THE PREVIOUS STEP, IT IS NOT NECESSARY TO APPLY THE PRIMER AGAIN. THE ORIGINAL GROUND PRIMER WITH ADHESIVE INTERCOAT IS ENOUGH.

Actual application of primer will be carried out in the same way as for the total spray-coat (see 15.6.2.3).

15.6.3.5 Application of top coat

CAUTION: FOR REPAIRING IT IS NECESSARY TO CHOOSE THE IDENTICAL TYPE (SINGLE COAT, DOUBLE COAT) OF THE REPAIR COLOR AS ON THE ORIGINAL SURFACE.

Application of the top coat will be carried out by spraying as for the total spray coat (see 15.6.2.3) with the exception of used thinners and hardeners. Due to the need of smooth transition to the basic surface it is necessary to use so called „spraying into the surface" using longer time of drying initiations for a good result of work. The recommended material is shown in the Table 15-9.



Color type	Manufacturer, name	Type	Other components	Surface mass	Recomm. thickness	Drying (between spray coats / total) 18°C (65°F)
single coat	BASF Glasurit R-68 / shade (base)	acrylic – polyurethane	BASF Glasurit 922-36 (standard hardener) Glasurit 352-319 (extra long thinner)	1-1.6 [kg/mm/m ²] 5.24-8.38 [lb/inch/ft ²] (according to shade)	0.02-0.04 mm (0.00078-0.00157")	15 min / 19 hrs
double coat	basic color code: BASF Glasurit R- 55 / shade (base)	acrylic – polyurethane	BASF Glasurit 352-216 (long thinner)	1.2-1.4 [kg/mm/m ²] 6.29-7.33 [lb/inch/ft ²] (according to shade)	0.015-0.02 mm (0.00059-0.00078")	10 min / 20 min
	Glossy top coat: BASF Glasurit 923-155 (base)	acrylic – polyurethane	BASF Glasurit 929-93 (standard hardener) Glasurit 352-400 (extra long thinner)	0.9 [kg/mm/m ²] 4.82 [lb/inch/ft ²]	0.03-0.04 mm (0.00118-0.00157")	5 min / 6 hrs

Tab. 15-8: Recommended colors

15.7 Torque moments

Unless otherwise prescribed, the torque moments shown in the following table can be used. When tightening follows several rules:

- Unless specifically stated do not grease neither nut nor bolt.
- If possible always tighten the nut. If for some space reasons it is necessary to tighten the bolt head and the scope of tightening moment is defined. Use higher moment for tightening.
- Maximum moments are used only for the materials and surfaces, which have a sufficient thickness, area and strength resistant to bursting, warping or other damage. Maximum tightening moments must not be exceeded.



Bolt size	Torque limits recommended		Max. allowable torque limits	
	Nm	in lb	Nm	in lb
AN3	2.3 - 2.8	20 - 25	4.5	40
AN4	5.7 - 7.9	50 - 70	11.3	100
AN5	11.3 - 15.8	100 - 140	25.4	225
AN6	18.1 - 21.5	160 - 190	44.1	390
AN7	50.9 - 56.5	450 - 500	94.9	840
AN8	54.2 - 78	480 - 690	124.3	1100
AN9	90.4 - 113	800 - 1000	180.8	1600

Tab. 15-9: Recommended torque values for oil-free, cadmium-plated threads

15.8 Securing the bolt joints

15.8.1 General

Bolt joint securing is used in order to prevent from their loosening due to vibration or force action on the connected parts, which could result in the damage of the connected parts. Three ways of bolt joint securing are used on the airplane: locking wire, cotter pin and locking washer.

15.8.2 Bolt joint securing by locking wire

Procedure of bolt joint securing is shown on the Fig.15-6 and Fig.15-7. The zinc-coated or stainless steel wire having diameter of 0.8 mm (0.032in) is used for securing.

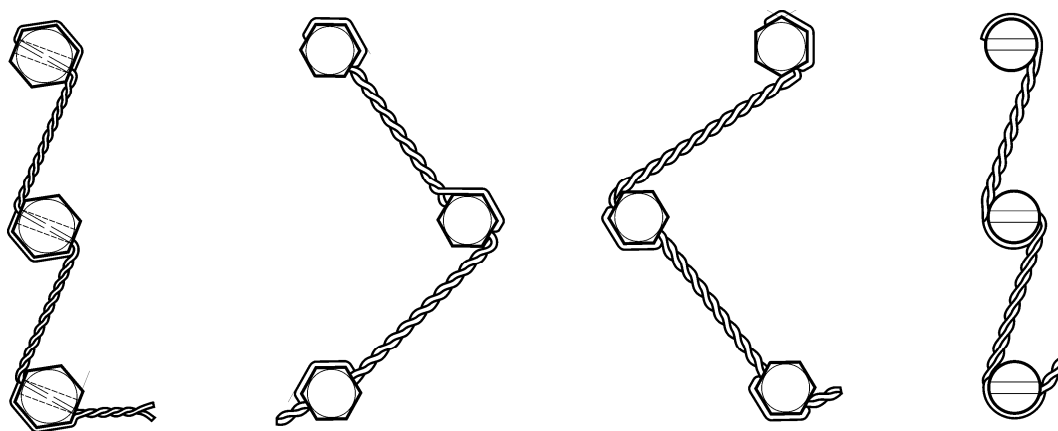


Fig. 15-6: Ways of bolt joint securing



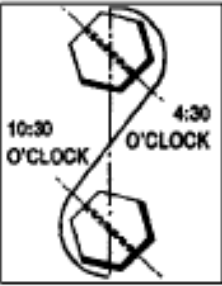
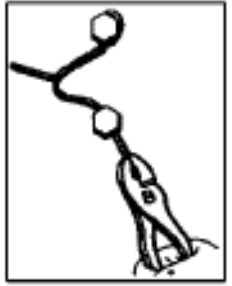
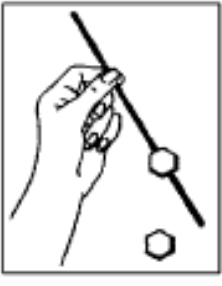
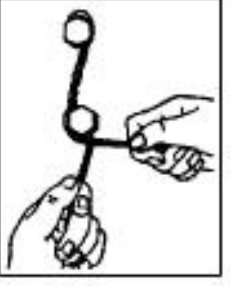
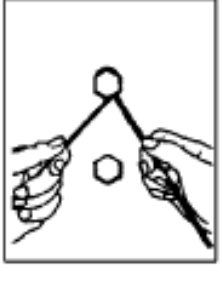
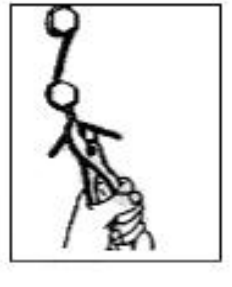
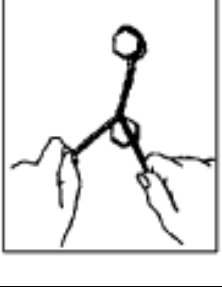
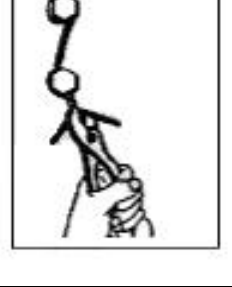
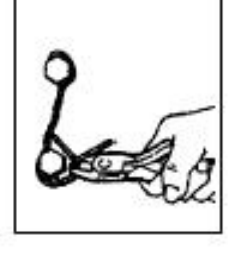
	1. Adjust the correct position of holes for locking wire.		6. Pull the upper wire through the hole in the other bolt. Hold the wire end by pliers and tighten it firm.
	2. Pull the locking wire through the hole in one bolt to be secured.		7. Hold the free end of wire by hand, bend it around the bolt head and along with the other end twist it counterclockwise.
	3. Hold the upper end of the wire and wind it around the bolt head and then by the other end of the wire. Make sure that the wire is properly tightened around the head.		8. Hold the twisted end by pliers and twist it tight.
	4. Twist the wire to the hole in the next bolt so tight as possible.		9. Bend the end of the wire under the bolt head.
	5. Tighten the wire and at the same time continue its twisting unless perfectly tightened. The twisted wire can have approximately from 3 to 4 threads on the length of 10 mm (0,4 in).		10. Cut off the surplus wire.

Fig. 15-7: Procedure for securing the bolt joint with locking wire



15.8.3 Bolt joint securing by cotter pin

Securing by cotter pin is used for independent bolt joints where securing by locking wire could not be used. It is used for securing castle nuts. Cotter pin removal is very easy: by means of a flat screwdriver straighten up the bent ends of the cotter pin and take out the cotter pin of the hole by means of pliers.

CAUTION: WHEN SECURING JOINTS ALWAYS USE NEW COTTER PINS.

Shift the new cotter into the hole in the bolt and bent the cotter pin ends according the Fig.15-8.

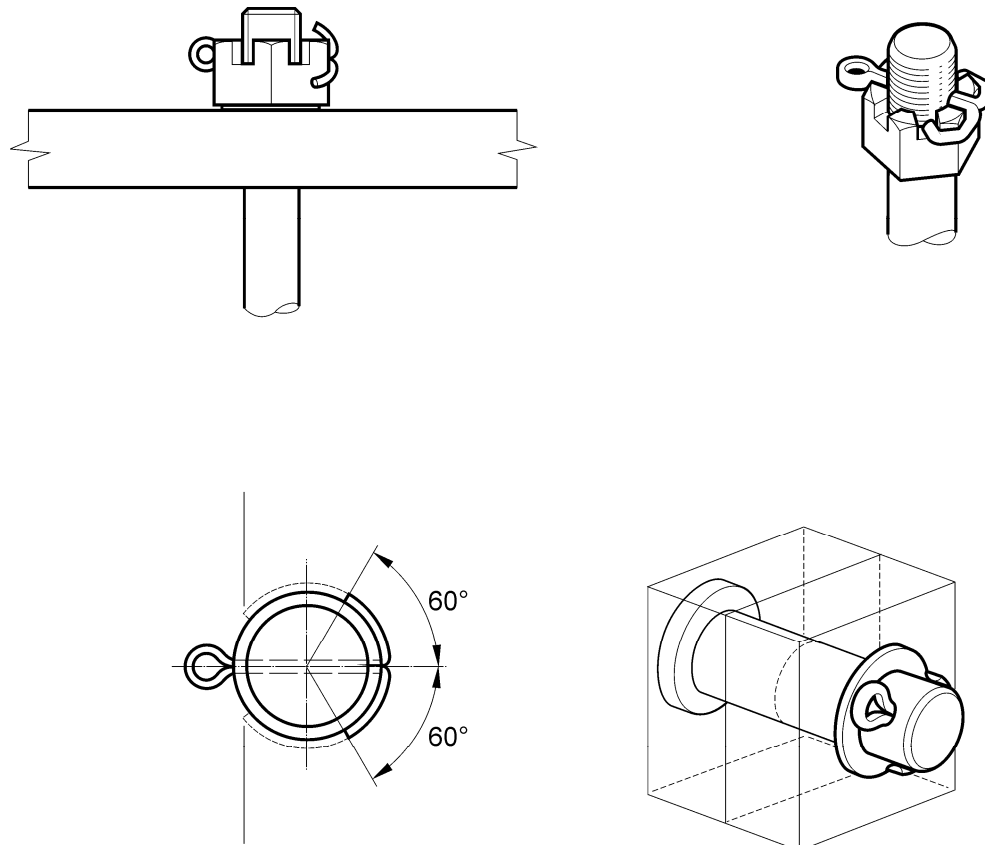


Fig. 15-8: Securing by using the cotter pin.

15.9 Bonding repairs

15.9.1 General

In order to keep the set down values of the transition resistances between some structural parts of the SportCruiser / PiperSport airplane structure, the bonding (conductive interconnection) is installed between all important parts of the fuselage structure.

**15.9.2 Removal and installation**

Before installing the bonding remove the paint coat which protects the joint. Principles for repeated installation of the bonding:

- (a) Carefully clean the whole bonding including the washers, bolts and nuts from all impurities, if necessary degrease the contacting surfaces on the connecting material.
- (b) Carefully check whether wires of bonding band are not torn off. Change the damaged band.
- (c) Carefully clean and degrease contacting surfaces on the airplane structure. Clean corroded surfaces with emery paper to the metallic luster.

CAUTION: IF A NEW PART WAS INSTALLED INTO THE AIRPLANE, ITS SURFACE IS PROVIDED BY NON-CONDUCTIVE SURFACE PROTECTION (FOR EXAMPLE ANODIZING), THIS SURFACE PROTECTION MUST BE REMOVED FROM THE AREA OF BONDING INSTALLATION.

- (d) The threaded joints, which fulfill a function of bonding, cannot be lubricated.
- (e) On the same areas of the airplane structure install the same type of bonding which you removed.
- (f) After repeated bonding installation coat the remaining metallically clean surface of the contact area, as well as protruding heads of bolts and nuts with protective paint.

15.10 Installing clamps by Nicopress pliers

Procedure of clamp installation by Nicopress pliers is shown on the Fig. 15-10.

First pull the cable through the clamp, make a loop around the thumb and pull the cable end back through the clamp. The cable end should overlap by about 32 mm (1.25 in) from the clamp after its pulling through. The overlapping will ensure that the cable end will not be pulled back into the clamp during the clamp squeezing. Before actual squeezing the clamp it is also necessary to verify which cable terminal will be used, whether thimble or suspension eye, because some terminals must be put into the cable before actual clamp squeezing.

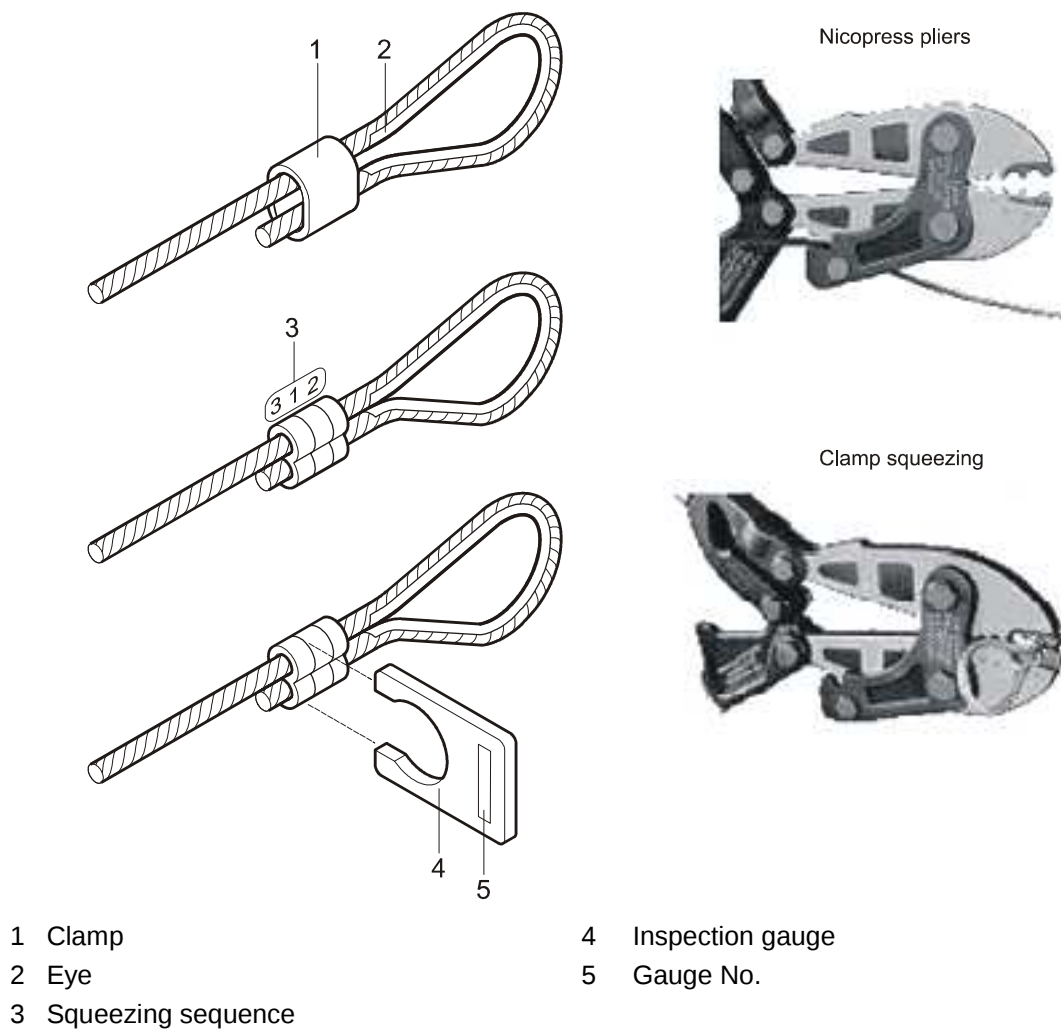


Fig. 15-9: Installation of clamps by Nicopress pliers



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**16.1 General**

This chapter contains typical wiring diagrams of SportCruiser airplane systems, navigation and communication means. Further wiring diagrams, relating to additional equipment of the airplane, are the part of additional equipment description which is mentioned in Chapter 17 - Appendices.

NOTE: PiperSport airplanes and SportCruiser airplanes (S/N P1102012, P1102014, P1102015, P1102016, P1102019, P1102027, P1102031, P1102034, C0416 and up) wiring diagrams are included in the Wiring Manual (see 1.1).



16.2 Wiring diagram of the DC power system

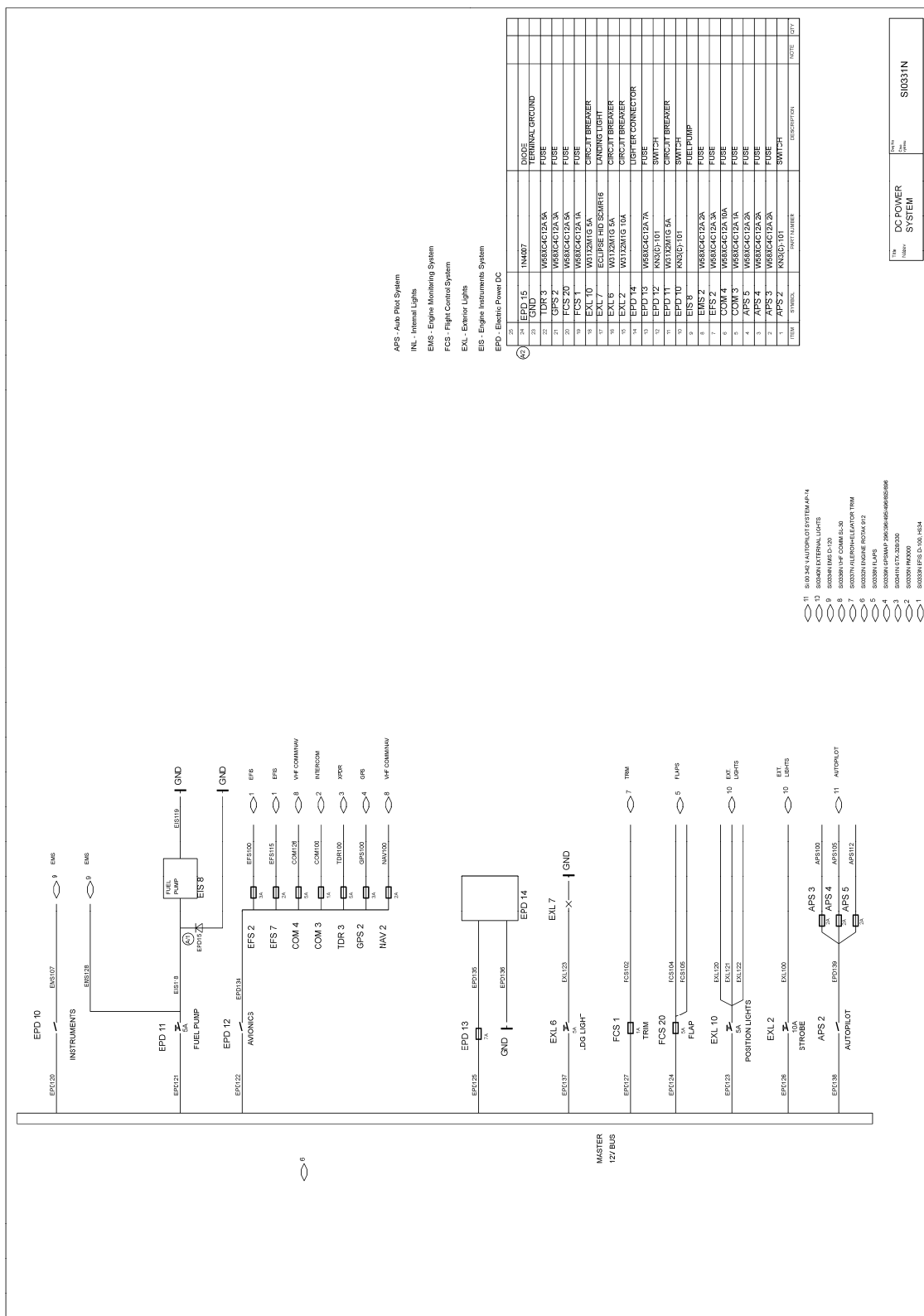


Fig. 16-1: Wiring diagram of the DC power system



CHAPTER 16 – WIRING DIAGRAMS

16.3 Wiring diagram of the Rotax 912 engine

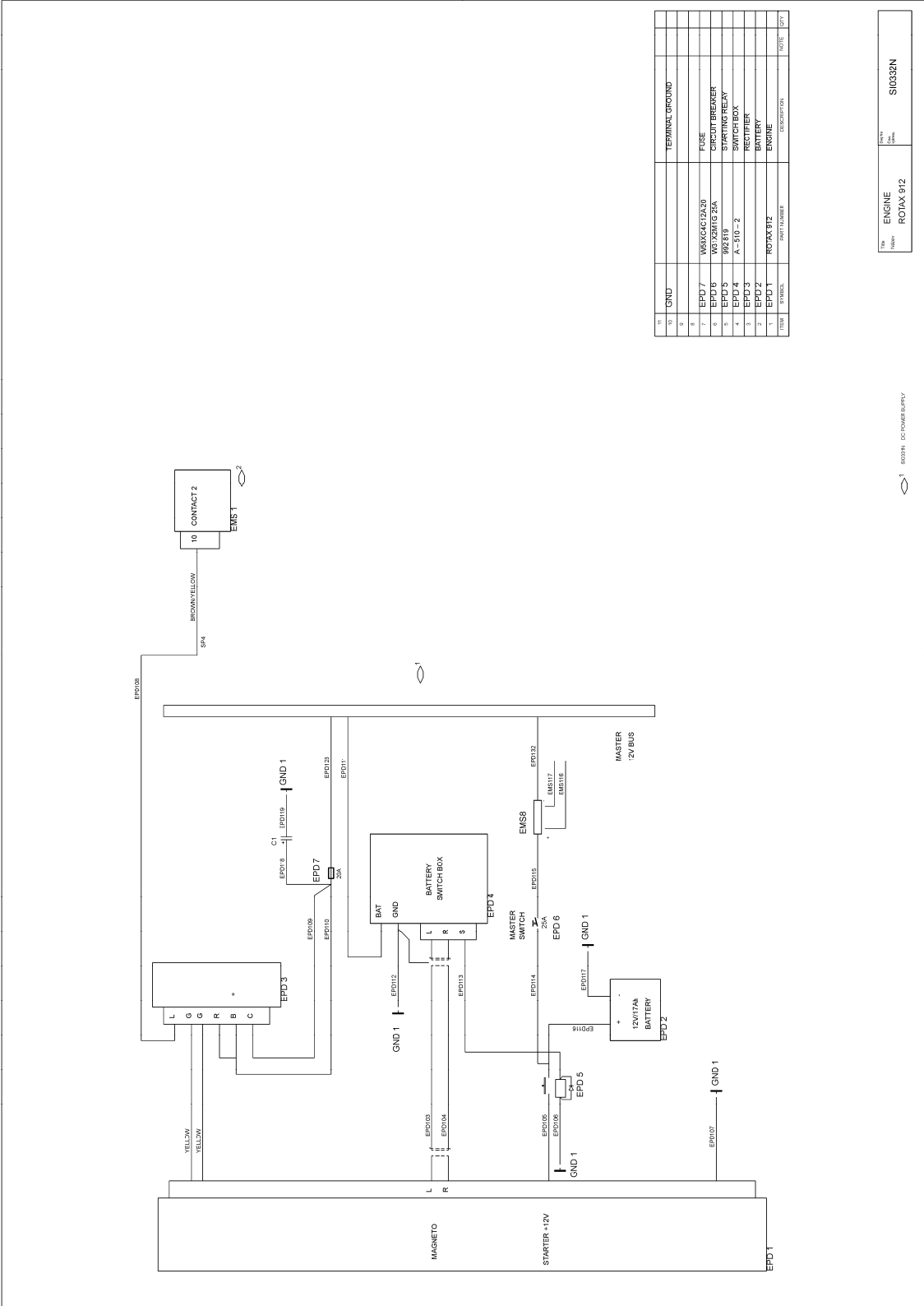


Fig. 16-2: Wiring diagram of the Rotax 912 engine



16.4 Wiring diagram of the EFIS D100, HS34

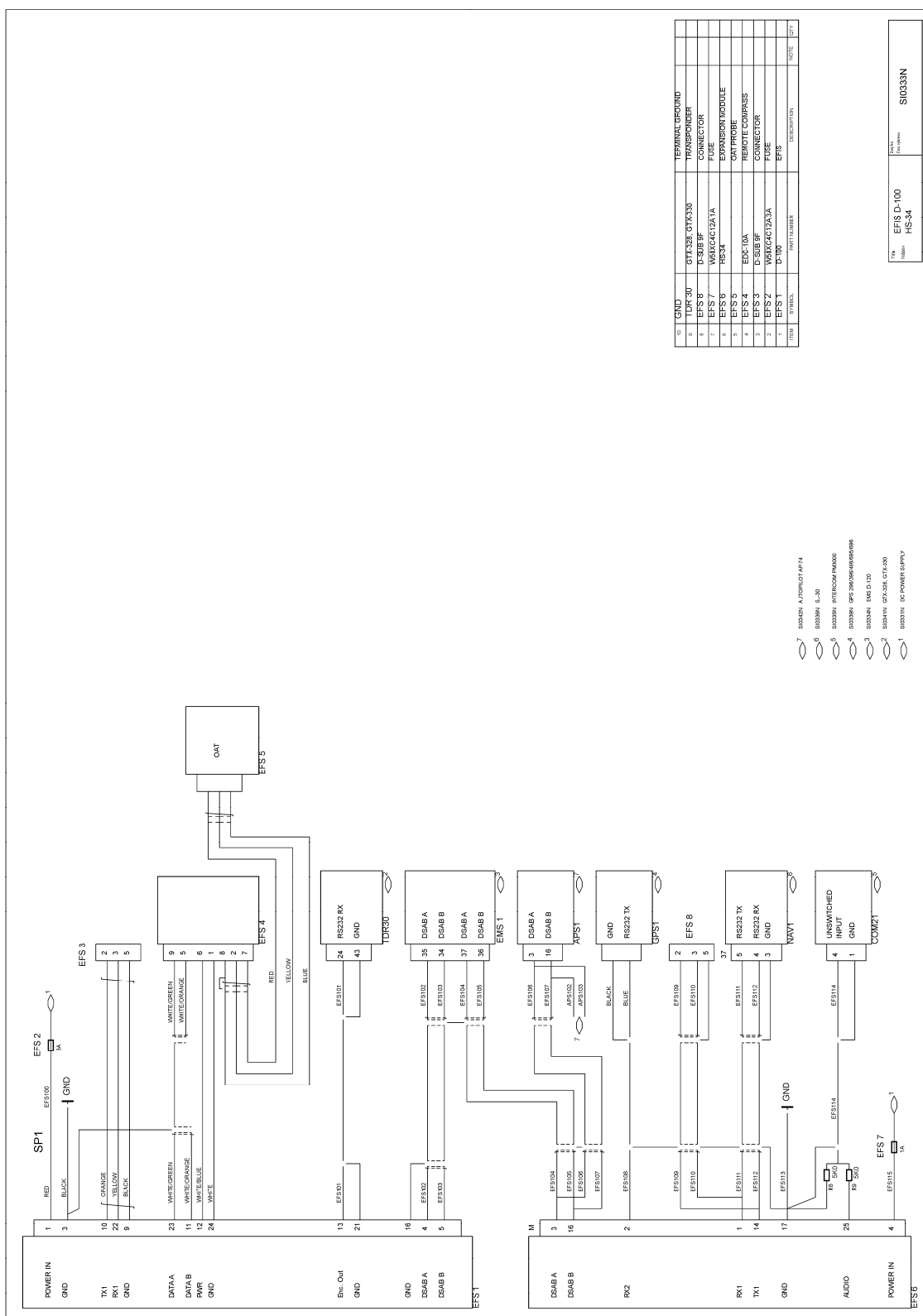


Fig. 16-3: Wiring diagram of the EFIS D100, HS34



16.5 Wiring diagrams of the EMS D120

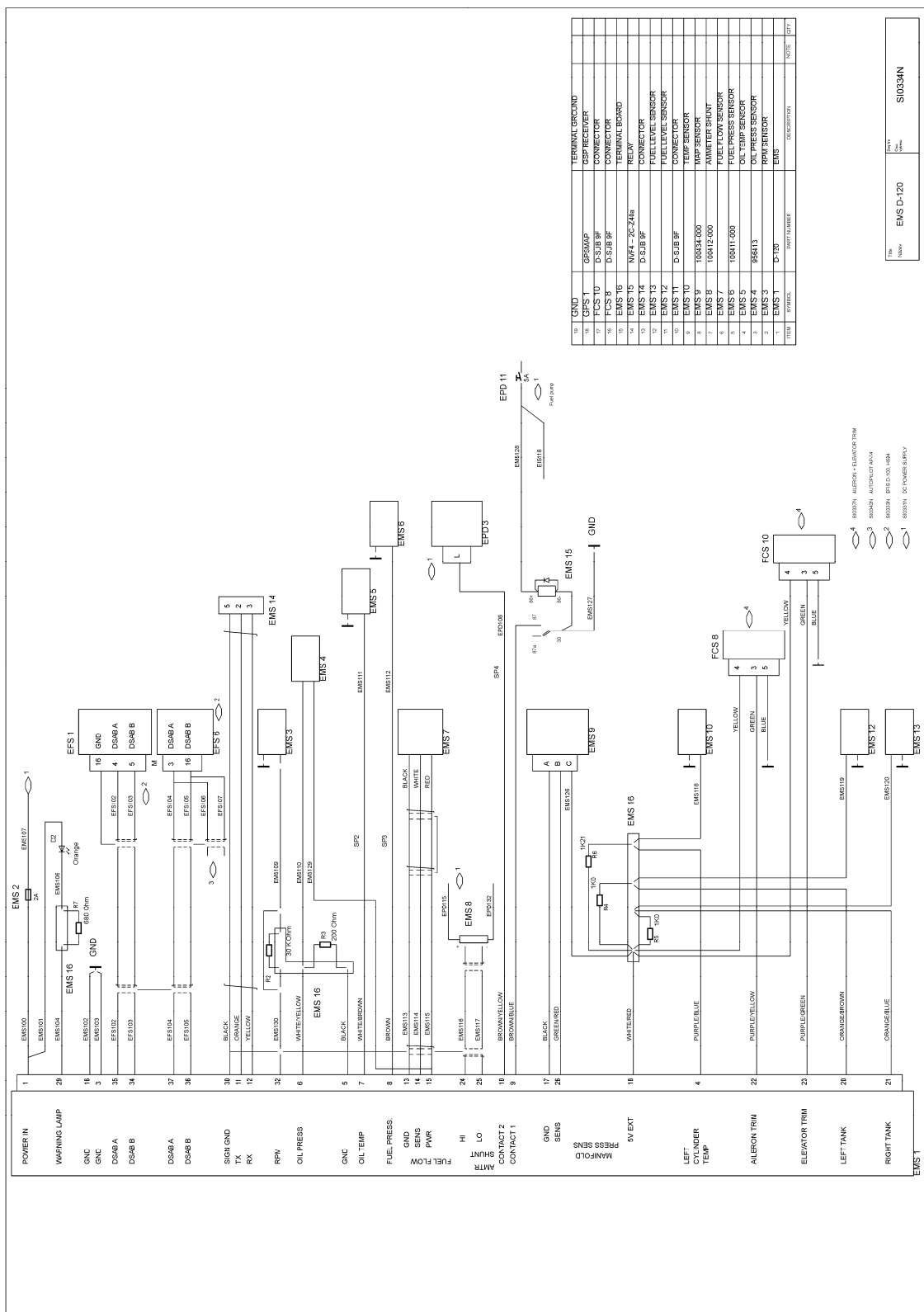


Fig. 16-4: Wiring diagram of the EMS D120



16.6 Wiring diagram of the intercom PM3000

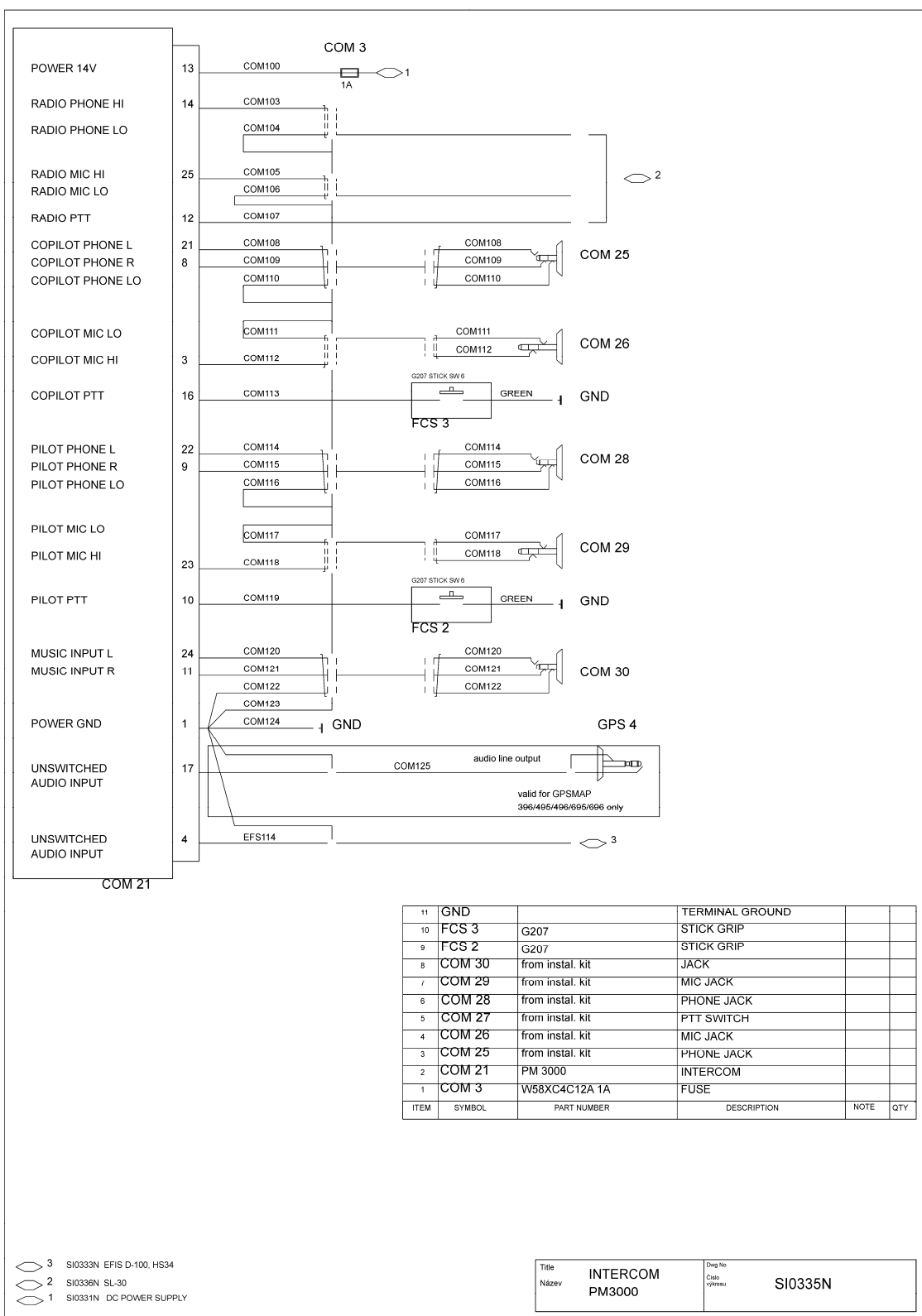


Fig. 16-5: Wiring diagram of the intercom PM3000



16.7 Wiring diagram of the NAV/COMM SL-30

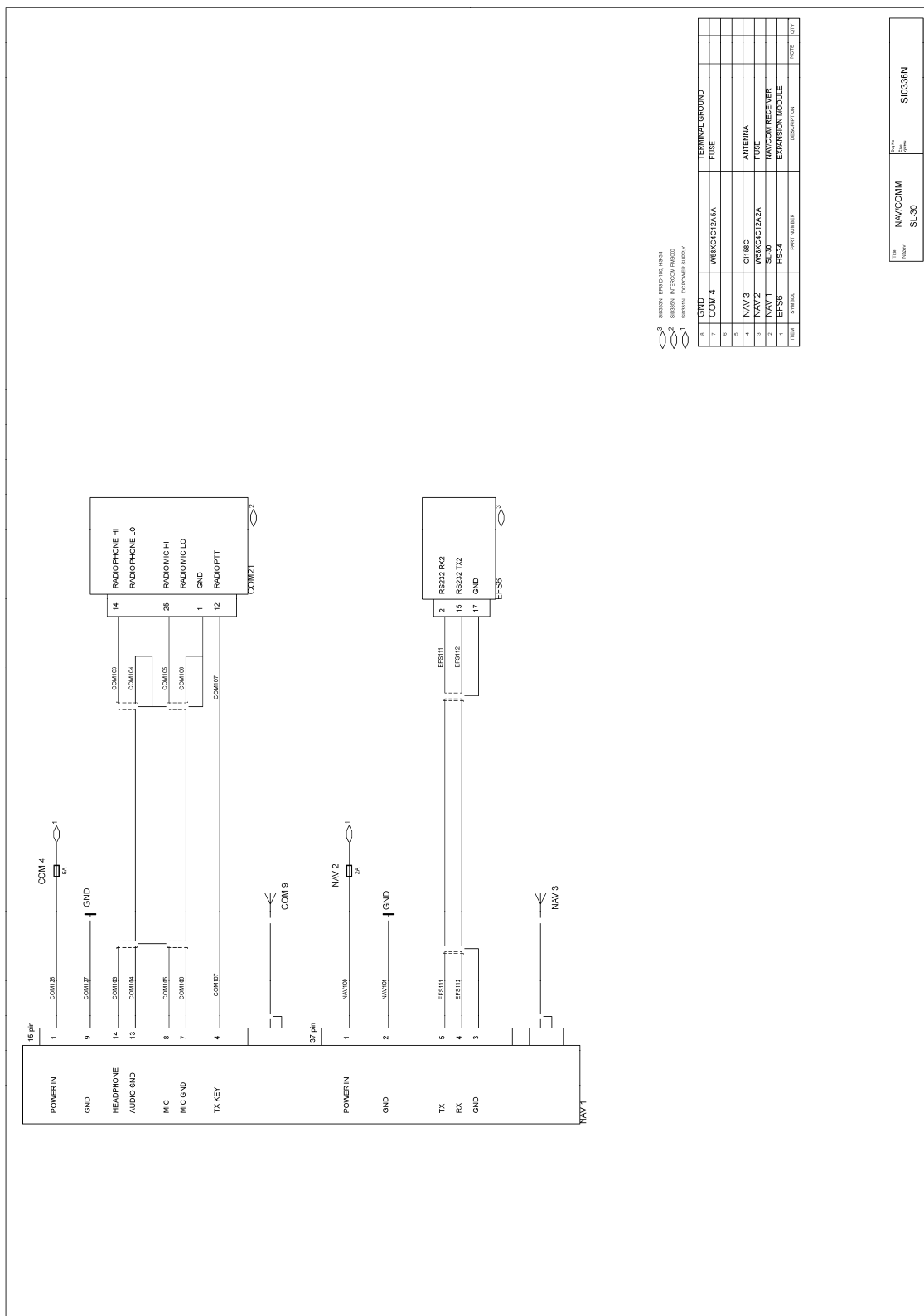


Fig. 16-6: Wiring diagram of the NAV/COMM SL-30



16.8 Wiring diagram of the aileron and elevator trim

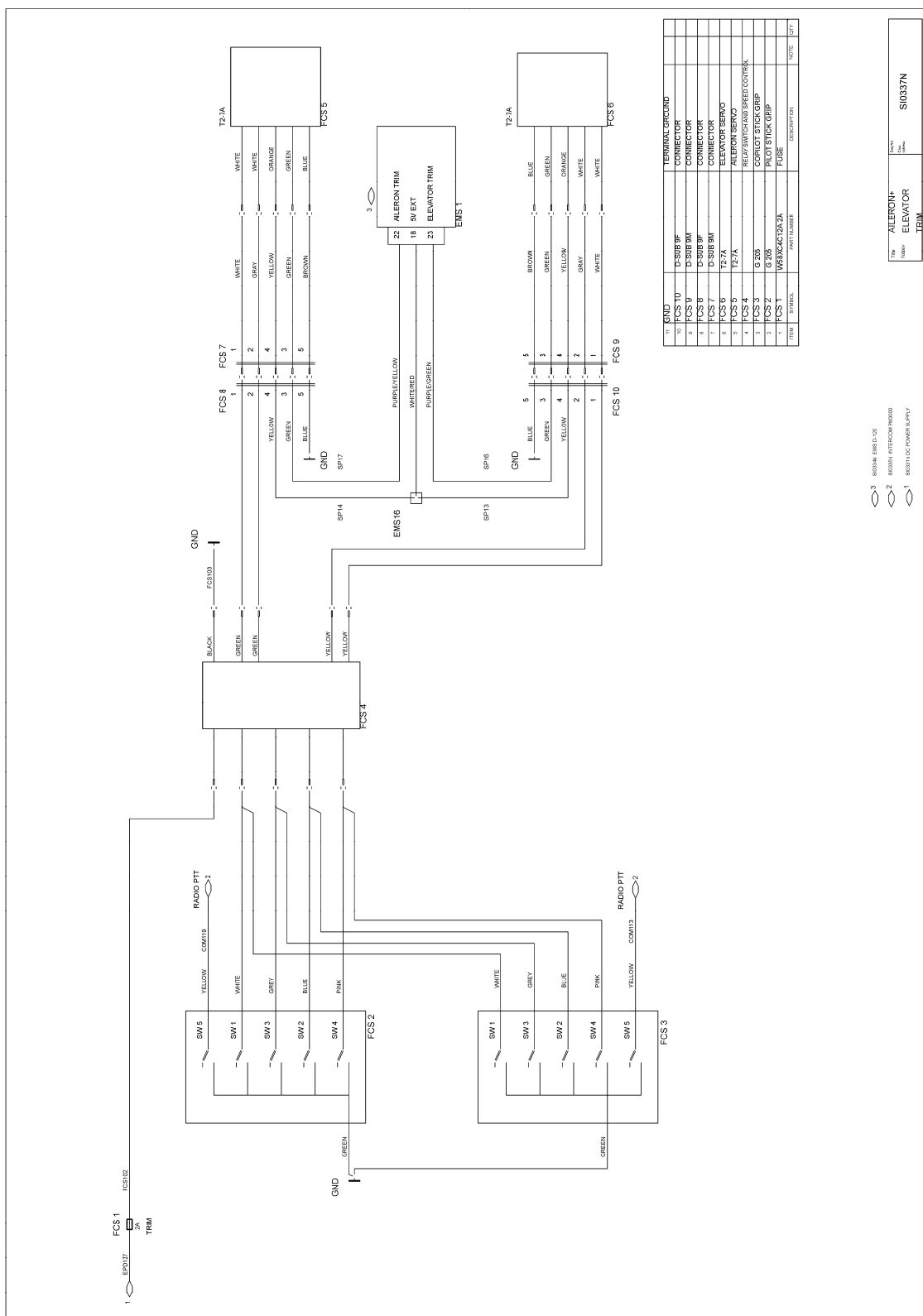


Fig. 16-7: Wiring diagram of the aileron and elevator trim



16.9 Wiring diagram of the flaps

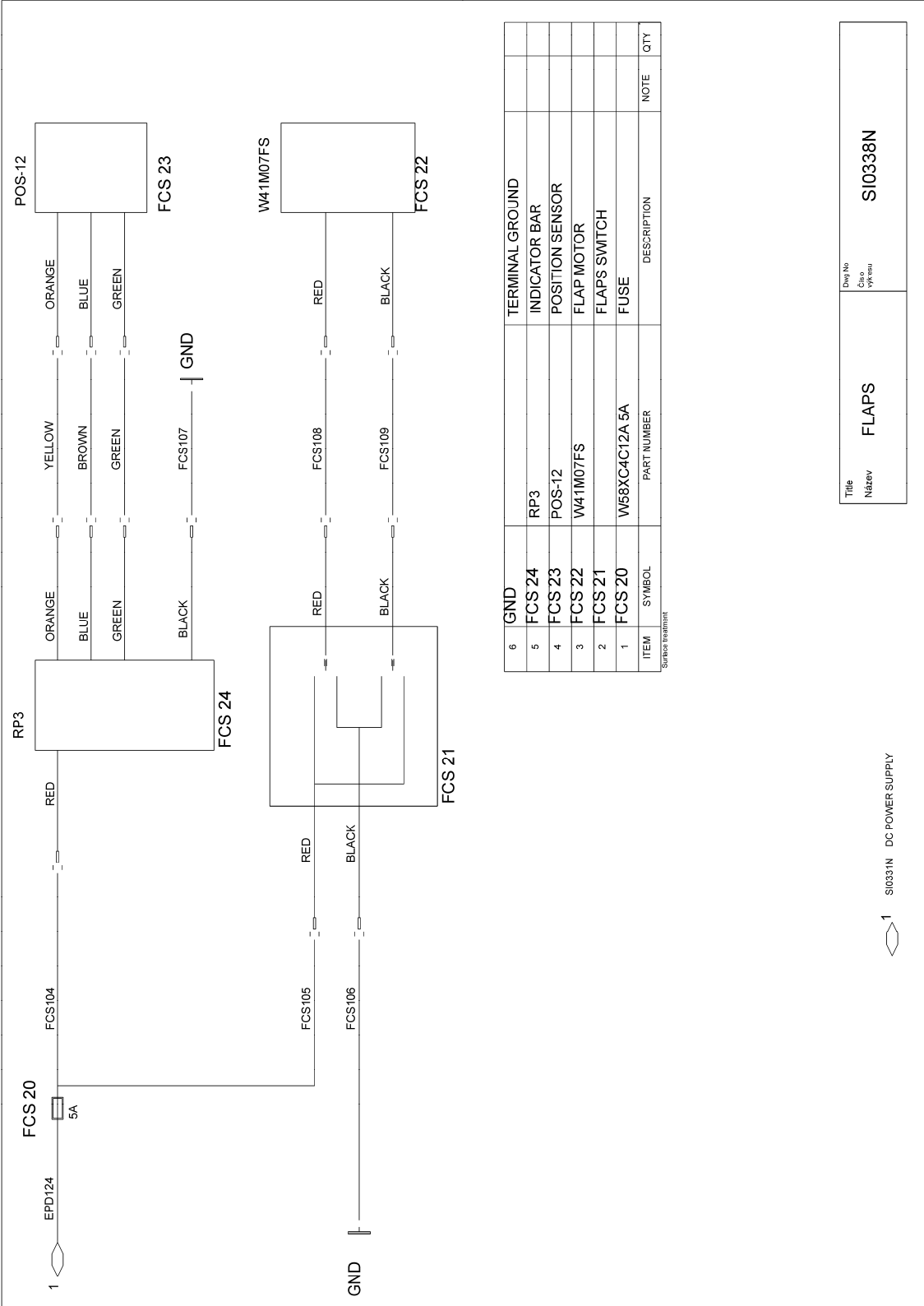


Fig. 16-8: Wiring diagram of the flaps



16.10 Wiring diagram of the GPSMAP 296/396/495/496/695/696

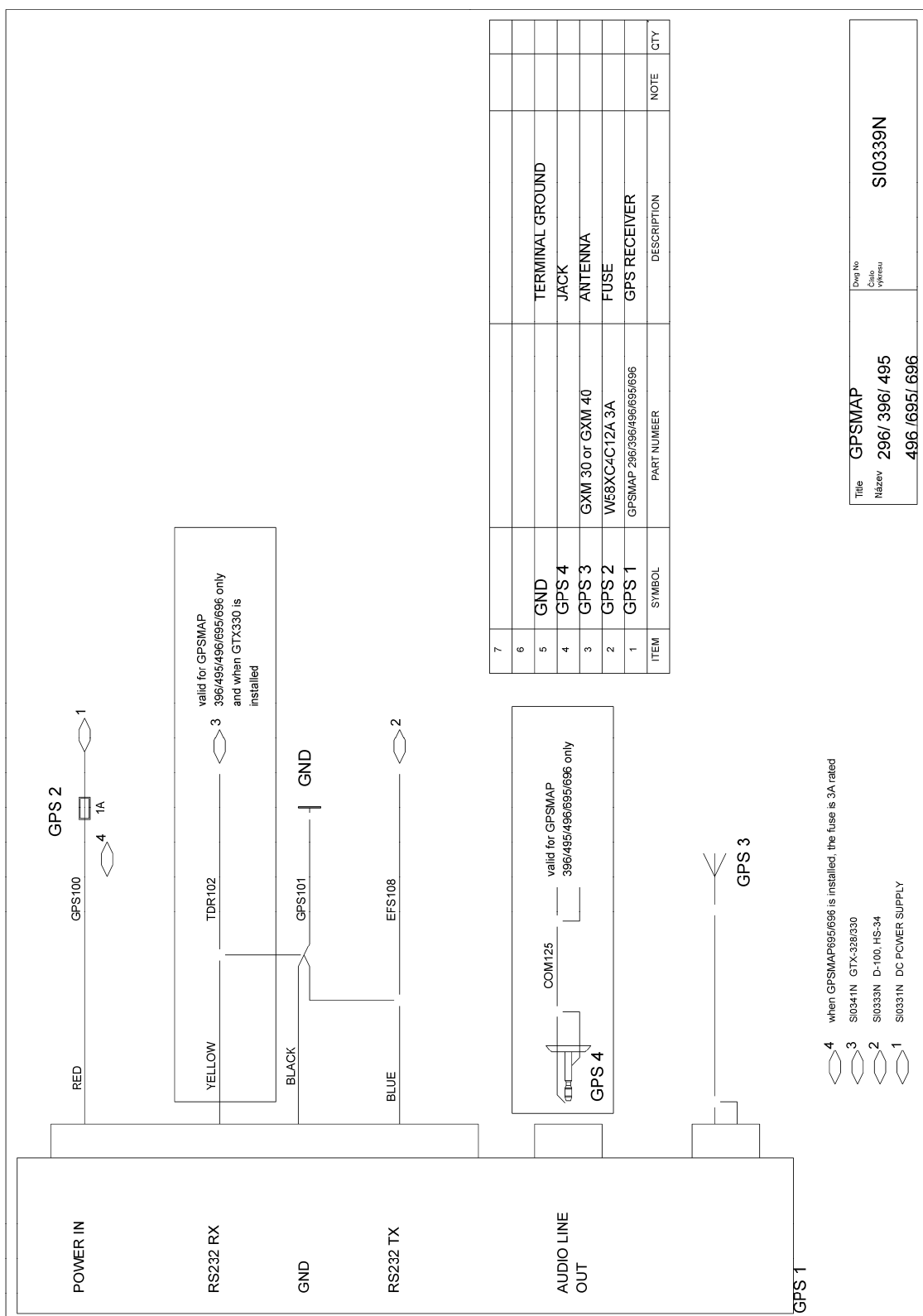


Fig. 16-9: Wiring diagram of the GPSMAP 296/396/495/496/695/696



16.11 Wiring diagram of the external lights Kuntzleman

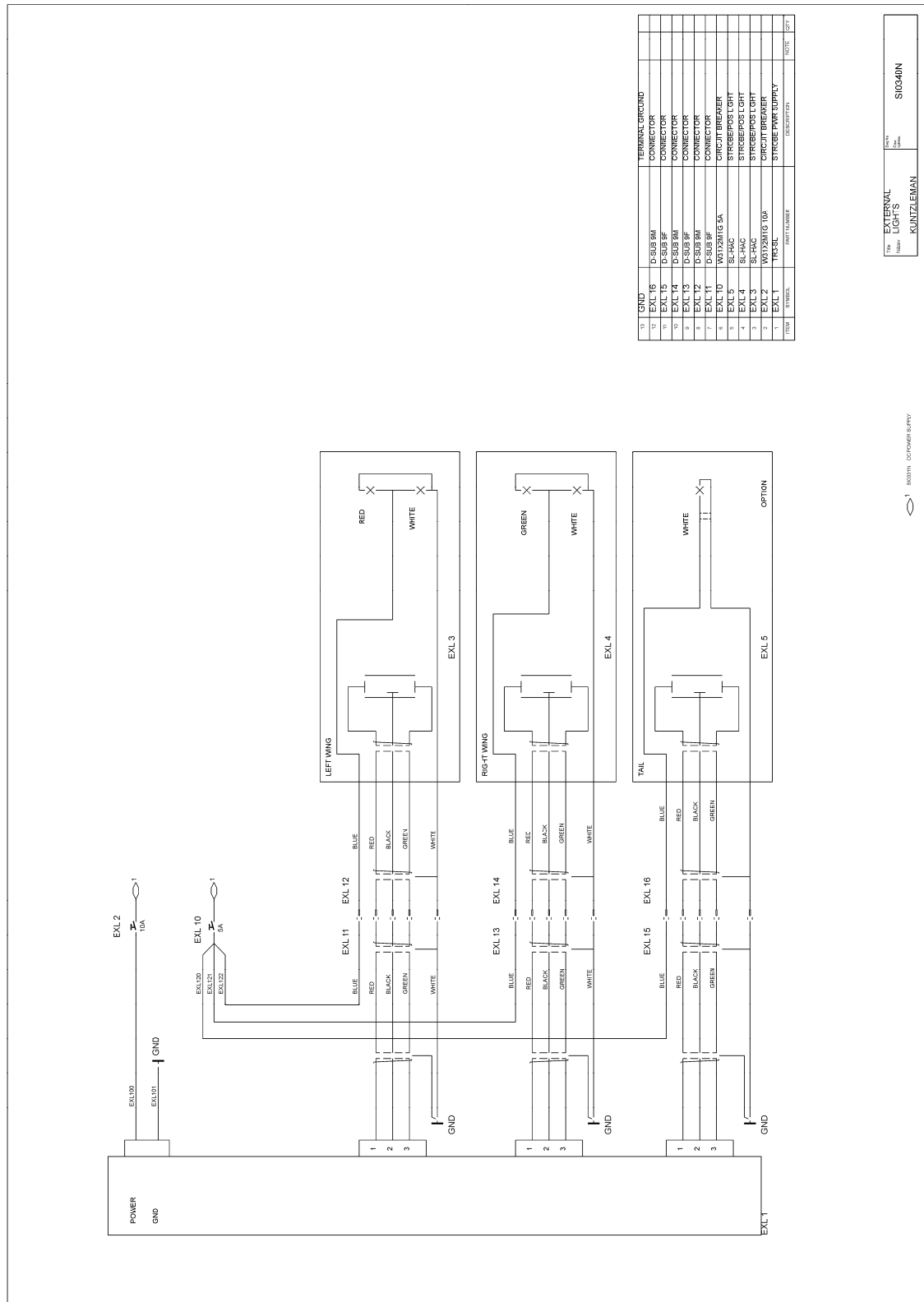


Fig. 16-10: Wiring diagram of the external lights Kuntzleman



16.12 Wiring diagram of the XPDR GTX-328/330

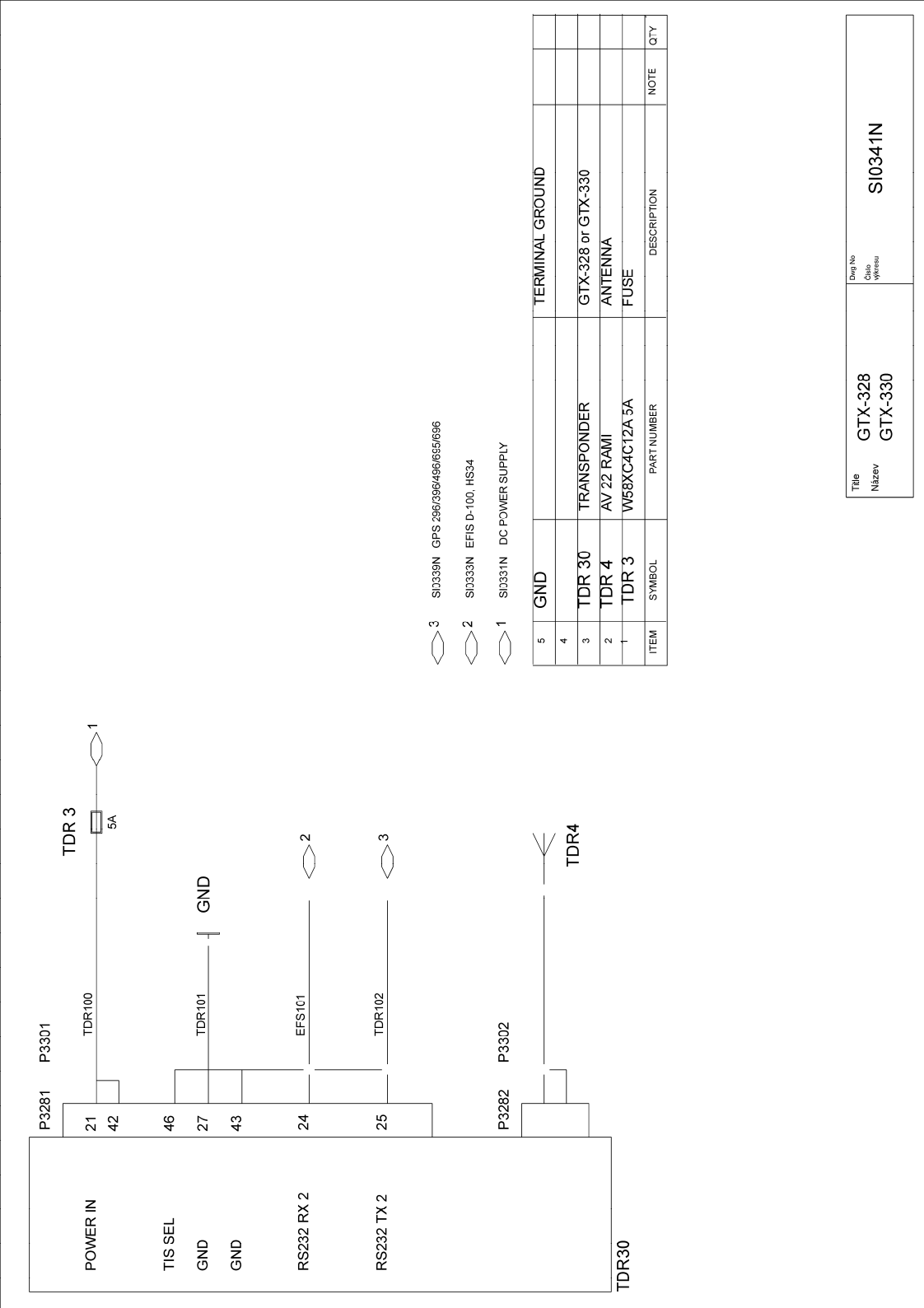


Fig. 16-11: Wiring diagram of the XPDR GTX-328/330



16.13 Wiring diagram of the autopilot AP-74

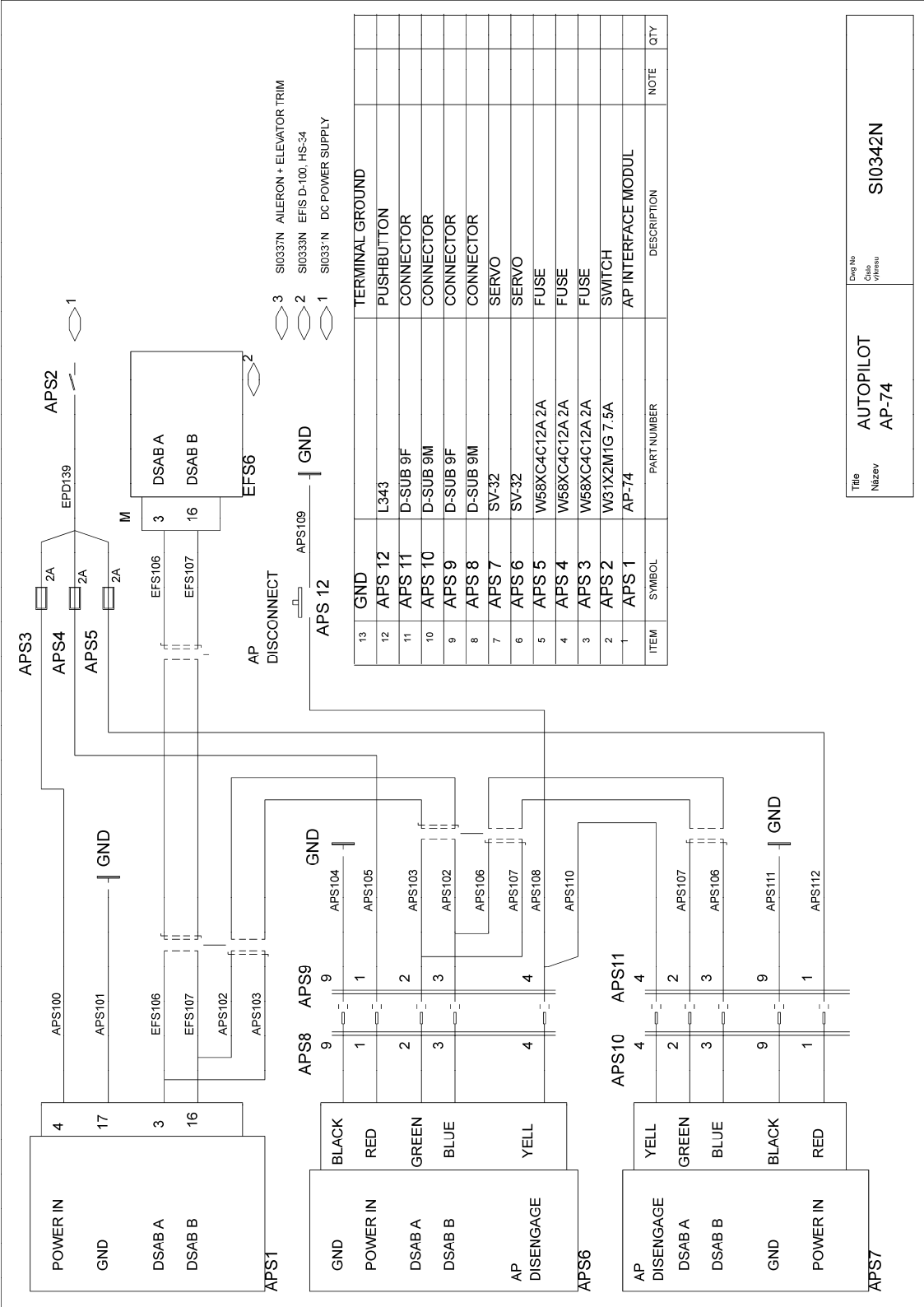


Fig. 16-12: Wiring diagram of the autopilot AP-74



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**17.1 General**

This chapter contains other information necessary to maintain the SportCruiser / PiperSport airplane in the form of appendices.

17.2 List of appendices

No.	Title
17.3	List of used materials
17.4	Airplane failure card
17.5	Operating liquids
17.6	GTN 650 / 750 Post-Installation Checkout Log



17.3 List of used materials for airframe production

Prescribed material	
2024 T351	Duraluminium
6061 T6	Duraluminium
4130 N	Steel
15 130	Steel
11 353	Steel
17 240.4	Stainless steel
D 671	Stainless steel

**17.4 Airplane failure card**

CZECH SPORT AIRCRAFT a.s.		Na Záhonech 1177/212, 686 04 Kunovice, Czech Republic	
Airplane Failures Card			
Dear customer, We would like to ask you for your assistance at obtaining information for continuous increasing reliability of airplanes produced by our company. Please fill out the card in case of any failure on your airplane. After filling out, send it to the address mentioned above. By sending us the card, you provide us with valuable data, which enable us to improve reliability of your airplane as well.			
Mandatory data			
Airplane type:		Registration mark:	Airplane S/N:
1.	Flight units: FH – number of landing : -		
2.	Failure detection date: day – month – year (format: “dd mm yy”)		
3.	Failure has been detected at: (encircle appropriate number)	1. Flight 2. Taxiing 3. Take-off run 4. Take-off 5. Touch down 6. Landing run 7. Daily inspection 8. Periodical inspection 9. Other	
4.	Consequences for operation: (encircle appropriate number)	1. No consequences 2. Airplane put out of operation 3. Airplane returned from take-off 4. Flight with damaged aggregates 5. Emergency landing 6. Occurrence on the ground 7. Other	
5.	Failure description:		
6.	Identification of the damaged part		
	Failed part name	Catalogue number of failed part	Worked out operation units
	Note: State maximum detectable data		* fill out if required
7.	Notes, additional data (kind of failure, defect, incorrect activity):		
Additional data			
8.	Claimed (encircle what applicable): YES - NO		No. of claim:
9.	Order of spare parts (encircle what applicable): YES - NO		
	Item	Name of part	Catalogue part No.
	Owner:		Home airport:
	Operator:		Date:
			Elaborated by:



17.5 Operating liquids

Airplane manufacturer used these operating liquids:

Engine oil

AeroShell Oil Sport Plus 4 (SAE 10W-40, API SL)

Coolant

Coolant type depends on cylinder head design as follows:

Old cylinder head design

(CHT measurement method, engine type marking **without** suffix -01)

In principle, 2 different types of coolant are permitted:

- Conventional coolant based on ethylene glycol (with 50% of water)
- Waterless coolant based on propylene glycol

WARNING: THE COOLANT CONCENTRATE (*PROPYLENE GLYCOL*) MAY NOT BE MIXED WITH CONVENTIONAL (*GLYCOL/WATER*) COOLANT OR WITH ADDITIVES! NON OBSERVANCE CAN LEAD TO DAMAGES TO THE COOLING SYSTEM AND ENGINE!

CAUTION: THE CONVENTIONAL *GLYCOL/WATER* COOLANT REDUCE TO APPLY MAXIMUM PERMISSIBLE COOLANT EXIT TEMPERATURE.

New cylinder head design

(CT measurement method, engine type marking **with** suffix -01, P/N 413185 for 2/3 cylinder head)

Only one type of coolant is permitted:

- Conventional coolant based on ethylene glycol (with 50% of water)

CAUTION: Waterless coolant are not allowed to be used for Rotax engines with new cylinder head design.

Refer to the Rotax Operator's Manual, Section 2.2 Operating limits, and Section 2.3 Operating media - Coolant; the Rotax Installation Manual - Cooling System; Rotax Service Instruction SI-912-016.

Coolant used by manufacturer:

Specification ASTM D 3306, VW TL 744C-G11,
Mixture ratio coolant/water 50/50 [%]

Max. coolant temperature:

120°C

Hydraulic (brake) fluid

AeroShell Fluid 41 (MIL-H-5606, DOT5)



17.6 GTN 650 / 750 Post-Installation Checkout Log



Table 5-14. GTN Post-Installation Checkout Log

Sheet 1 of 4

GTN Post-Installation Checkout Log			
INSTALLATION INFORMATION:		Aircraft Model: <u>PS-28</u>	Aircraft Serial #: _____
		Unit P/N: _____	Mod Level: _____
		Unit Model: _____	Serial #: _____
		GPS Antenna P/N: _____	GPS Ant Model: _____
EXTERNAL ANNUNCIATION REQUIREMENT (See Section 2.10.1.1)			
CDI/HSI SOURCE SELECTION ANNUNCIATION: Annunciation: ☐ Required ☒ Not Required ☐ ☒ N/A] Annunciator Installed		GPS NAVIGATION ANNUNCIATION: Annunciation: ☐ Required ☒ Not Required ☐ ☒ N/A] Annunciators Installed	
CONNECTOR ENGAGEMENT CHECK ☐ Connector engagement checked			
CONFIGURATION ITEMS			
Main ARINC 429 Configuration		Main RS-232 Configuration (RX/TX)	
In 1: ☐ High ☒ Low <u>AIR DATA / AHRS</u>		Chnl 1 _____ / _____	
In 2: ☐ High ☒ Low <u>OFF</u>		Chnl 2 _____ / _____	
In 3: ☐ High ☒ Low <u>OFF</u>		Chnl 3 _____ / _____	
In 4: ☐ High ☒ Low <u>OFF</u>		Chnl 4 _____ / _____	
Out 1: ☐ High ☒ Low <u>GAMA FORMAT 1</u>		Chnl 5 _____ / _____	
Out 2: ☐ High ☒ Low <u>ARINC 429</u>		Chnl 6 _____ / _____	
Out 3: ☐ High ☒ Low <u>OFF</u>			
SDI: ☒ Common ☐ LNAV 1 ☐ LNAV 2			
HSDB Ethernet Configuration		Interfaced Equipment Configuration	
Ethernet Port 1: ☐ Connected ☐ Not Connected		Cross-Side Navigator: ☐ Present ☐ Not Present	
Ethernet Port 2: ☐ Connected ☐ Not Connected		GDL 69/69A: ☐ Present ☐ Not Present	
Ethernet Port 3: ☐ Connected ☐ Not Connected		Transponder #1: ☐ Present ☐ Not Present	
Ethernet Port 4: ☐ Connected ☐ Not Connected		Transponder #2: ☐ Present ☐ Not Present	
Main CDI/OBS Configuration		Lighting Configuration	
CDI Key: ☐ Enabled ☐ Disabled		Display Keys	
SEL CRS for GPS: ☐ Allow ☐ Ignore		Source: <u>PHOTO</u> <u>PHOTO</u>	
SEL CRS for VLOC: ☐ Allow ☐ Ignore		Response Time	
V-Flag State: ☐ Normal ☐ Declutter		(Minimum): <u>2</u> / <u>2</u>	
Audio Configuration		Slope / Offset: <u>50</u> / <u>50</u> _____ / _____	
Alert Volume Level: _____ %		Photo Transition: <u>25 %</u> [☐ N/A]	
		Photo Slp/Ofst: _____ / _____ [☒ N/A]	
		Key Backlight Cutoff: [☒ N/A] _____	



Table 5-14. GTN Post-Installation Checkout Log

Sheet 2 of 4

CONFIGURATION ITEMS (CONTINUED)

Main System Configuration

Air/Ground Discrete: ☐ Active Air ☒ Active GndGPS Antenna Height Above Ground: 5 ftFuel Type: AVGASSynchro Hdg Input: ☒ Connected ☐ Not ConnectedGPS Select: ☒ Auto ☐ PromptTAWS Audio Configuration [☐ N/A]☒ Terrain Proximity ☐ TAWS B

NCR – Caution: Don't Sink

EDR – Caution: Sink Rate

PDA – Caution: Too Low – Terrain

Connected Radios to GMA 35 Configuration

COM 2: ☐ Present ☐ Not PresentCOM 3: ☐ Present ☐ Not PresentNAV 1: ☐ Present ☐ Not PresentNAV 2: ☐ Present ☐ Not PresentRCVR 3: ☐ Present ☐ Not PresentRCVR 4: ☐ Present ☐ Not PresentRCVR 5: ☐ Present ☐ Not PresentTEL: ☐ Present ☐ Not PresentMusic 1: ☐ Present ☐ Not PresentMusic 2: ☐ Present ☐ Not PresentMarker Beacon: ☐ Present ☐ Not Present

Airport Criteria Configuration

Runway Surface: _____

Minimum Length: _____

Chart Config: ☐ None ☐ FliteCharts ☐ ChartViewCOM Xmit Power Config: ☐ Normal ☐ 16W COM

NAV 1 and NAV 2 Squelch Threshold: _____ dB

ADF1 Squelch Threshold: _____ dB

DME1 Squelch Threshold: _____ dB

AUX1 Squelch Threshold: _____ dB

WARN1 Squelch Threshold: _____ dB

RING1 Squelch Threshold: _____ dB

ALERT 1-3 Squelch Threshold: _____ dB

Marker Beacon high sense threshold: _____ dB

Marker Beacon low sense threshold: _____ dB

Marker external lamp lighting offset: _____ dB

Traffic Configuration

GTN Control of Traffic System: ☐ Yes ☒ No

COM Configuration:

COM Radio: [☐ N/A] ☒ Enabled ☐ DisabledCOM RF Squelch: 56 %MIC 1 Gain: +6 dBSide tone Volume: +50 dBVOR/LOC/GS Configuration (GTN 650/750) [☐ N/A]Nav Radio: ☒ Enabled ☐ DisabledARINC 429 Config: TX Speed: ☐ High ☒ LowSDI: ☒ Common ☐ VOR/ILS 1 ☐ VOR/ILS 2DME Mode: ☒ Directed Freq 1 ☐ Directed Freq 2DME Channel Mode: PARALLEL 2x5GMA 35 Audio Panel Configuration [☒ N/A]

Mute PASS-CREW intercom during alerts:

☐ True ☐ FalseDisable PA functionality: ☐ True ☐ FalseMute PASS music during intercom: ☐ True ☐ FalsePassengers hear alerts: ☐ True ☐ FalseMute sec radios on pri radio recep: ☐ True ☐ False

Audio Processor generates COM1 internal side tone:

☐ True ☐ False

Audio Processor generates COM2 internal side tone:

☐ True ☐ False

Audio Processor generates COM3 internal side tone:

☐ True ☐ FalseCOM 1 connected as COM 2: ☐ True ☐ FalseAmbient Noise Mic On: ☐ True ☐ False

Alert 1 thru 4 input audio volume: _____ dB

Failsafe warn input audio volume: _____ dB

Marker volume: _____ dB

Music 1 and Music 2 Volume: _____ dB

Telephone Volume: _____ dB

Pilot PA: _____ dB

Copilot PA: _____ dB

Crew Audio: _____ dB

Alert Audio Sum: _____ dB

COM 1-3 Squelch Threshold: _____ dB

After completing configuration and prior to checkout, restart unit for changes to take effect.



Table 5-14. GTN Post-Installation Checkout Log

Sheet 3 of 4

SYSTEM CHECKOUT

Ground Checks (Configuration Mode)

ANNUNCIATOR OUTPUTS **N/A**

- ☐ ☒ N/A] OBS Annunciate
- ☐ ☒ N/A] GPS Annunciate
- ☐ ☒ N/A] Waypoint Annunciate
- ☐ ☒ N/A] Terminal Annunciate
- ☐ ☒ N/A] TAWS Audio Active Annunciate
- ☐ ☒ N/A] VLOC Annunciate
- ☐ ☒ N/A] LOI Annunciate
- ☐ ☒ N/A] Message Annunciate
- ☐ ☒ N/A] Approach Annunciate
- ☐ ☒ N/A] ILS/GPS Approach Annunciate
- ☐ ☒ N/A] TAWS/Terrain Inhibit Annunciate
- ☐ ☒ N/A] TAWS Warning Annunciate
- ☐ ☒ N/A] Terrain Not Available Annunciate
- ☐ ☒ N/A] TAWS Caution Annunciate
- ☐ ☒ N/A] GPS Select Annunciate
- ☐ ☒ N/A] Traffic Test Annunciate
- ☐ ☒ N/A] Traffic Standby/Operate Annunciate
- ☐ ☒ N/A] NAV ILS Energize

MAIN ANALOG INDICATOR: ☒ N/A]

- ☐ CDI (left, centered, right)
- ☐ VDI (down, centered, up)
- ☐ TO/FROM flag (OFF, TO, FROM)
- ☐ Valid flags
- ☐ OBS (Selected Course)

ALTITUDE ENCODER:

- ☐ ☒ N/A] Altitude Encoder (serial)

LIGHTING BUS:

- ☐ ☒ N/A] Aircraft Lighting Bus

DISCRETE INPUTS **N/A**

- ☐ ☒ N/A] OBS Mode Select
- ☐ ☒ N/A] TAWS Audio Inhibit
- ☐ ☒ N/A] TAWS Inhibit
- ☐ ☒ N/A] Air/Ground
- ☐ ☒ N/A] CDI Source Select
- ☐ ☒ N/A] System ID Program
- ☐ ☒ N/A] MIC1 Transmit
- ☐ ☒ N/A] COM Remote Transfer
- ☐ ☒ N/A] COM Remote Tune Up
- ☐ ☒ N/A] COM Remote Tune Down
- ☐ ☒ N/A] NAV Remote Transfer
- ☐ ☒ N/A] Synchro Valid-High (GTN 7XX)
- ☐ ☒ N/A] Synchro Valid-Low (GTN 7XX)

VOR/ILS INDICATOR: ☐ N/A]

- ☒ CDI (left, centered, right)
- ☒ VDI (down, centered, up)
- ☒ TO/FROM flag (OFF, TO, FROM)
- ☒ Valid flags

AHRS/IRU/ADC:

- ☐ ☒ N/A] Air Data Computer
- ☐ ☒ N/A] AHRS/IRU

TAWS AUDIO: ☐ N/A]

- ☒ Audio checked
- ☒ Audio level adjusted

GAD 42:

- ☐ ☒ N/A] GAD 42 Interface Adapter



Table 5-14. GTN Post-Installation Checkout Log

Sheet 4 of 4

SYSTEM CHECKOUT (Continued)

GROUND CHECKS (NORMAL MODE)

SIGNAL ACQUISITION CHECK:

- ☒ Position checked
- ☒ Signal reception checked
- ☒ Interference from other avionics checked

ADC / ENCODER / FUEL / F/ADC:

- ☐ ☒ N/A] Air Data Computer
- ☐ ☒ N/A] Altitude Encoder (serial)
- ☐ ☒ N/A] Fuel Sensor
- ☐ ☒ N/A] Fuel / Air Data Computer

VHF COM INTERFERENCE ☐ N/A]

- ☒ VHF COM interference checked

VHF NAV CHECKOUT (GTN 650/750) ☐ N/A]

- ☒ VOR reception checked
- ☒ Localizer reception checked
- ☒ Deviation needle and flag checked

GMA 35 CHECKOUT (GTN 7XX ONLY) ☒ N/A]

- ☐ COM Transceiver check
- ☐ Alert audio check
- ☐ Intercom system check
- ☐ Music system check
- ☐ Failsafe operation check
- ☐ NAV audio check
- ☐ Receiver audio check
- ☐ Aircraft receivers check

TVS ASSEMBLY CHECKS ☒ N/A]

- ☐ TVSs checked in accordance with Section 8.2.1.1.

DATABASE CHECKS

- ☒ Databases checked

AFMS CHECKS

- ☒ ☐ N/A] Autopilot Mode transitions checked
- ☒ Completed AFMS inserted in AFM/POH
- ☐ ☒ N/A] Autopilot coupling limitations checked
- ☐ Antenna type checked

TAWS SYSTEM: ☐ N/A]

- ☐ TAWS System Test OK

ICA CHECKS

- ☒ Aircraft Make, Model, Reg # & Serial # filled in
- ☐ Completed ICA in aircraft permanent records
- ☒ Wire routing information filled in

INTERFACE CHECKS

- ☐ ☒ N/A] Honeywell EFS 40/50
- ☐ ☒ N/A] EHSI Deviation scaling
- ☐ ☒ N/A] Sandel SN3308
- ☐ ☒ N/A] Sandel SN3500/4500
- ☐ ☒ N/A] ARINC 429 Traffic System
- ☐ ☒ N/A] L-3 Communications Stormscope
- ☐ ☒ N/A] Garmin GMX 200 / MX20
- ☐ ☒ N/A] TIS (GTN 33/330)
- ☐ ☒ N/A] Garmin GDL 69/69A
- ☐ ☒ N/A] Crossfill check
- ☒ ☐ N/A] External RMI
- ☐ ☒ N/A] Transponder
- ☐ ☒ N/A] GMA 35 Audio Panel
- ☐ ☒ N/A] DME Tuning
- ☐ ☒ N/A] HSDB Wiring
- ☒ ☐ N/A] Fan wiring
- ☐ ☒ N/A] XM Satellite radio weather

VHF COM CHECKOUT (GTN 635/650/750) ☐ N/A]

- ☒ Receiver / Transmitter operation checked
- ☒ Antenna checked VSWR _____ 1:8 _____

MAGNETIC COMPASS CHECK

- ☒ Compass swing performed

FLIGHT CHECKS

- ☐ GPS checked
- ☐ ☐ N/A] COM checked (GTN 635/650/750 Only)
- ☐ ☐ N/A] VOR checked (GTN 650/750 Only)
- ☐ ☒ N/A] GMA 35 Audio Panel checked (GTN 7XX)
- ☐ ☐ N/A] ILS checked (GTN 650/750 Only)
- ☐ ☒ N/A] Autopilot checked
- ☐ ☐ N/A] TAWS audio level checked
- ☐ ☒ N/A] Marker beacon receiver checked

SOFTWARE CHECKS

- ☐ Software versions ~~verified~~ ☒ N/A] filled to match GTN STC Equipment List, 005-00533-C1

COMMENTS: