



Airplane Maintenance Manual

for

SportStar^{RTC}

Airplane Type:	SportStar
Model:	RTC
Airplane Serial No.:	
Airplane Registration No.:	
Document No.:	ERTC022-10-AS
Date of Issue:	22.12.2017 / Edition 02

Section 4 – Airworthiness Limitations in Issue 01 of this manual was approved by European Aviation Safety Agency on 24.5. 2012.

Issue 02 of this manual is approved by the manufacturer under the DOA privilege EASA.21J.057 on 26.1. 2018.

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CHAPTER

01

INTRODUCTION



CHAPTER 01

INTRODUCTION

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GENERAL

1. COVERAGE

In compliance with requirements of CS-LSA, Subpart G2, the manufacturer of SportStar RTC provides instructions for continued airworthiness of this airplane. The instructions are given in the following manuals issued by the airplane manufacturer and manufacturers of the equipment used in the airplane:

- Pilot's Operating Handbook for SportStar RTC (Doc. No. ERTC020-10-AS).
- Airplane Maintenance Manual for SportStar RTC (Doc. No. ERTC022-10-AS).
- SportStar RTC Illustrated Parts Catalogue (Doc. No. SPORTSTAR-0396G-02172-00).
- Operators Manual for Rotax Engine Type 912 Series (Ref. No. OM-912, Part. No. 899649).
- Maintenance Manual (Line Maintenance) for Rotax Engine Type 912 Series (Ref. No. MML-912, Part. No. 899191).
- Maintenance Manual (Heavy Maintenance) for Rotax Engine Types 912 and 914 Series (Ref. No. MMH-912 MMH-914, Part. No. 899603).
- Installation Manual for Rotax Engine Type 912 Series (Ref. No. IM-912, Part. No. 898643).
- User Manual Klassic 170/3 Aircraft propeller (Doc. No. UM-07 EN).
- User Manual KW-31 Electrical variable aircraft propeller (Doc. No. UM-05 EN).
- Instruction Manual SWIRL-3 propeller (Doc. No. DH_SW3_BE_02_B).
- Ballistic rescue parachute systems series Magnum; Installation and user's manual, Edition: 02 – 2014/04.
- Others manuals of the installed equipment issued by the equipment manufacturers.



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AIRPLANE CLASSIFICATION

1. AIRPLANE DESCRIPTION

SportStar RTC airplane is single-engine, two-seat low-wing monoplane with fixed landing gear and steerable nose wheel. The airframe is a combination of classic all-metal primary construction with some composite parts.

The power plant standardly consists of four-cylinder, four-stroke Rotax 912 ULS2 or S2 engine and on-ground adjustable, three-bladed, composite propeller Woodcomp Klassic 170/3/R; optionally airplane can be equipped with the in-flight adjustable, three-bladed, propeller Woodcomp KW-31 033 or DUC SWIRL-3-L propeller.

Airplane is designed especially for recreational and touring flying, as well as for flight training with the limitation to non-aerobatic operation and VFR day / night rules.



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MANUFACTURERS

1. AIRPLANE MANUFACTURER

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2. ENGINE MANUFACTURER

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3. PROPELLER MANUFACTURER

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4. EMERGENCY PARACHUTE SYSTEM MANUFACTURER

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MANUAL DESCRIPTION

1. GENERAL

Airplane Maintenance Manual of the SportStar RTC is prepared in accordance with GAMA No. 2 Specification, which provides instructions for preparation and publication of manuals for general aviation airplanes. GAMA No. 2 Specification is compatible with ATA 100 Specification.

2. ARRANGEMENT OF CHAPTERS

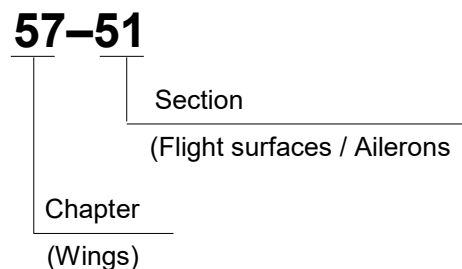
Chapters in this Manual are arranged and divided in accordance with GAMA No. 2 Specification. Chapters are arranged in the following groups:

- **INTRODUCTION** (Chapter 01)
- **AIRPLANE** (Chapters 04 to 12)
- **AIRFRAME SYSTEMS** (Chapters 20 to 39)
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- **PROPELLER** (Chapter 61)
- **POWER PLANT** (Chapters 71 to 79)
- **WIRING DIAGRAMS** (Chapter 91)
- **SUPPLEMENTS** (Chapter 95)

A. Numbering of Chapters - Sections

Due of the relative simplicity of the airplane and its system was at chapter numbering omitted the third level numbering, as it allows GAMA No. 2 Specification; numbering is therefore two levels

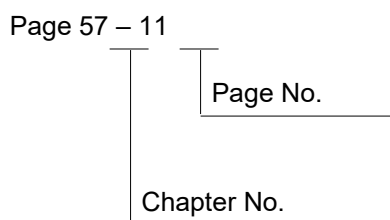
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**B. Numbering of Pages, Figures and Tables**

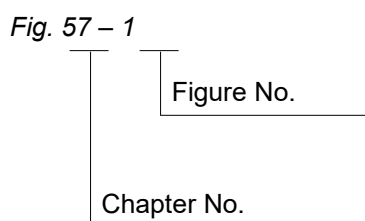
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Example:



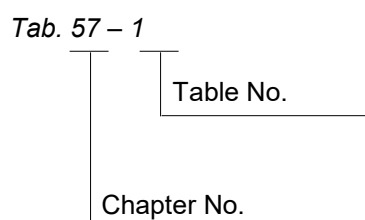
(2) Numbering of figure

Example:



(3) Numbering of tables

Example:

**NOTE**Numbers and names of figures and tables are written in *italic*.



3. WARNINGS, CAUTIONS AND NOTES

Warnings, cautions and notes are of the following meaning in this manual:

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.

4. EQUIPMENT LIST

Refer to the Supplement No. 1 Equipment List (Doc. No. ERTC 020-10-AS-001) of the Pilot's
Operating Handbook for SportStar RTC for actual equipment.

5. SOURCE TO PURCHASE PARTS

Spare parts can be ordered from airplane manufacturer by means of the SportStar RTC Illustrated
Parts Catalogue (Doc. No. SPORTSTAR-0396G-02172-00).

6. LIST OF DISPOSABLE REPLACEMENT PARTS

Part:	P/N:
Tyre	Cheng Shin 15x6.00-6
Tyre	Goodyear FLC 6 PR 15x6.00-6
Tube	Cheng Shin 15x6.00-6
Tube	Goodyear 6.00-6 TR 20 15x6.00-6
Fuel filter	HENG H102WK
Air filter	ROTAX P/N 825 750
Oil filter	ROTAX P/N 825 012
Spark plugs	ROTAX P/N 297 940 (DCPR 8E)
V-belt	ROTAX P/N 980 400 (V-belt 9,5x675)
Brake pad	765210
Brake disc	765105
Brake lining	090185 (WHLM66-106 - Matco P/N)
Brake disc	090205 (WHLD164-017 - Matco P/N)



7. 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.
- Hand Protection – gloves – do not use gloves when working on machine tools, as there is a danger of being caught by rotating parts!
- Hearing protection – ear plugs or muffs.
- Foot protection – work shoes with anti-slip sole.

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 EPS rocket (if installed).
- Switch off the ignition switch and master switch prior performing maintenance or repair.
- Do not eat, drink, smoke and do not use open flame while working on an airplane.
- When starting the engine, no person must stand in the vicinity of the rotating propeller.
- Do not use amateur-made lights and lamps as they may cause fire.
- 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 airplane unless it is properly supported.



8. ABBREVIATIONS

ACI	Stall warning system
AD	Airworthiness Directive
ADAHRS	Air Data and Attitude Heading Reference System
ADF	Automatic Direction Finder
AHRS	Attitude Heading Reference System
AKU	Accumulator
ATIS	Automatic Terminal Information Service
AUX, Aux	Auxiliary
BAT, Bat	Battery
C	Carbon, Carbon fibre
CDI	Course Deviation Indicator
CHT	Cylinder Heat Temperature
COM, Com	Communication
CS-LSA	Certification Specification for Light Sport Aeroplanes
CT	Coolant Temperature
EASA	European Aviation Safety Agency
EIS	Engine Information System
EGT	Exhaust Gas Temperature
ELT	Emergency Locator Transmitter
EMS	Engine Monitoring System
EPS	Emergency Parachute recovery System
EXT	External
FWD	Forward
G	G-load
G	Glass, Glass fibre
GEN	Generator
GS	Ground Speed
GS	Glide Slope
GPS	Global Positioning System
HTU	Horizontal Tail Surface
K	Kevlar (para-aramid synthetic fibre)
L	Left
LCD	Liquid Crystal Display
LED	Light-Emitting Diode
LOC	Localizer
LRU	Line Replaceable Unit
M	Metric
MAC	Mean Aerodynamic Chord
Max, max	Maximal
MEK	Metyletylketon
MFD	Multi-Functional Display
Min, min	Minimal
N/A	Not applicable



NACA	National Advisory Committee for Aeronautics (meant NACA inlet)
NAV, Nav	Navigation
OAT	Outside Air Temperature
OHV	Overhead Valve
R	Right
PC	Polycarbonate
PE	Polyethylene (foil)
PFD	Primary Flight Display
POH	Pilot Operating Handbook
P/N	Part Number
PMMA	Polymethylmethacrylate
PP	Polypropylen
P/S	Pitot static
PTT	Push to Talk
SAE	Society of Automotive Engineers
S/N	Serial Number
SQ	Squelch
SR	Safety Related
VFR	Visual Flight Rules
VOR	VHF Omnidirectional Radio range
VTU	Vertical Tail Surfaces
XPDR	Transponder



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REVISIONS

1. MANUAL REVISIONS

CAUTION

THE MANUAL OWNER IS RESPONSIBLE FOR KEEPING IT
UP-TO-DATE.

A. Procedure

All Revisions / Temporary revisions of this Manual are made as follows:

- (1) The airplane manufacturer will send the Revision / Temporary revision with new Manual pages:
 - (a) free of charge to the Authority
 - (b) for a charge to the other Manual holders who ask for sending them.
- (2) The Manual owner is obliged to:
 - (a) carry out revisions according to the text Revision / Temporary revisions (replace old pages of the Manual with new ones).
 - (b) confirm revision in the LOG OF REVISION (Section 01-62) / LOG OF TEMPORARY REVISION (Section 01-61).

2. MARKED OF REVISIONS

Each page that includes a revised or completed material is marked Rev. ... / Temp. Rev. ... at the footer of the page, together with the date of Revision / Temporary revision.

Revisions are marked by a solid revision bar along the outside margin.

Pages with a Temporary Revision are printed on a yellow paper.



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LOG OF TEMPORARY REVISIONS

Temp. Rev. No.	Affected Pages	Description / Effectivity	Date of Issue	Inserted by / Date



Temp. Rev. No.	Affected Pages	Description / Effectivity	Date of Issue	Inserted by / Date



LOG OF REVISIONS

Rev. No.	Affected Pages	Description / Effectivity	Date of Approval	Inserted by / Date
1	Title page, 01-3, 01-5, 01-7, 01-11, 01-14, 01-17, 01-18, 01-19, 01-20, 01-21, 01-22, 01-24, 01-25, 01-26, 01-29, 01-30, 01-31, 01-32, 01-33, 01-39, 01-40 04-4, 04-5 05-1, 05-6, 05-7, 05-9, 05-12, 05-13, 05-14, 05-16, 05-22, 05-25, 05-29, 05-30, 05-33, 05-34, 05-36, 05-37, 05-39, 05-42, 05-46, 05-47 06-1, 06-3, 06-4, 06-8, 06-9, 06-10 11-9 to 11-16, 11-18 12-15 to 12-17, 12-19, 12-20, 12-24 24-1 to 24-44 25-4, 25-14, 25-15, 25-16, 25-22	Added information concerning NVFR operation, added VFR definition, corrected airplane manufacturer address, updated List of Disposable Replacement Parts, corrected doc. no. of prop. user manual Added R 912 S engine, TBO of propellers increased to 72 months, added EPS rocket check every 6 years Changed title of Bulletin, corrected Flight hours (tolerance per 50 hours), added capacity test of backup batteries, added reference 79-20, added min. values of brake pad and brake disc thickness at Matco brakes, propellers – corrected doc. no. of prop. user manual, time of medium repair increased to 36 months, TBO increased to 72 months, added tools check after inspection Added drawing with new engine cowlings, added cover F10 and W8R Added placards concerning NVFR operation Added information concerning brake fluid level in Matco brakes, unified Lubrication chart, added Note concerning installation of winterization kit on new engine cowlings Added informations concerning F3A external alternator Added informations concerning seat heating, added new version of left control rod cover, corrected reference to ELT manual	EASA Major Change Approval 10069567 09.04.2019	Evektor 12.04.2019



Rev. No.	Affected Pages	Description / Effectivity	Date of Approval	Inserted by / Date
1	26-4, 26-5, 26-6 27-6 31-17 32-35, 32-36, 32-43, 32-46, 32-54, 32-55, 32-56, 32-57, 32-58 33-1, 33-3 to 33-11, 33-22, 33-24 to 33-28 61-4, 61-7 to 61-11 71-1, 71-11 to 71-14, 71-20, 71-21 79-8, 79-10 to 79-12 91-4, 91-5, 91-6, 91-32, 91-64, 91-65, 91-66, 91-84, 91-85, 91-86, 91-87, 91-89, 91-90, 91-91, 91-93, 91-102, 91-103, 91-105, 91-106, 91-107, 91-108, 91-109, 91-111, 91-112	Changed fire extinguisher location Changed Dwg. No. of elevator control pull rod Changed color of signaling lamp, added information concerning P/S tube heating signalization with G3X system Added new GoldFren parking brake valve, corrected length of S5 20-01 01 pump piston Added airplane lighting for NVFR operation Added Note concerning length of prop. attachment bolts, corrected doc. no. of prop. user manual, KW-31 removal / installation procedures changed, CS-5 governor automatic mode description specified Added new engine cowlings Added informations concerning smaller oil cooler Added wiring diagrams E7 59-11 99, S7 00-16 01, S7 00-17 01, S6 00-76 01, S7 66-24 99, S7 68-31 01, S7 68-31 99, S7 68-99 99, S7 69-02 01, S7 87-15 99, S7 91-01 99, S7 91-10 99, S7 91-11 99, S7 99-51 01, S7 99-51 99, S7 99-81 01	EASA Major Change Approval 10069567 09.04.2019	Evektor 12.04.2019
2	01-17, 01-18, 01-19, 01-23 to 01-34, 01-40, 01-41 05-09 11-9 to 11-20 28-7, 28-8, 28-19, 28-23 to 28-52 32-54 to 32-62	Overtyping Added placards concerning traffic avoidance system Air Avionics Air Traffic AT-1 Added Facet electrical fuel pump and pulsation damper for both engine options. Added VDO fuel level sensor Added Tost parking brake valve including signaling	Approved under the authority of DOA ref. EASA. 21J.057 05.11.2021	Evektor 05.11.2021



Rev. No.	Affected Pages	Description / Effectivity	Date of Approval	Inserted by / Date
2	34-1 to 34-104 55-8 to 55-20 78-3 to 78-14 91-95, 91-96, 91-106, 91-107 95 – Form No. QS-649/f-084-EN_mm	Added Garmin Aera 660 GPS receiver, traffic avoidance system Air Avionics Air Traffic AT-1 and Garmin GTX 335 transponder. Added stabilizer ballast Added new version of exhaust system Added wiring diagrams S7 69-21 01, S7 70-10 01 S7 87-19 01 Change the value of distance between control stick fully pulled and instrument panel	Approved under the authority of DOA ref. EASA. 21J.057 05.11.2021	Evektor 05.11.2021
3	01-03, 01-05, 01-07, 01-17 to 01-19, 01-21, 01-24, 01-25, 01-30, 01-41 04-05, 04-06 05-01, 05-02, 05-10, 05-14, 05-25, 05-30, 05-31, 05-34, 05-37, 05-43 08-08 09-04 11-09, 11-10 24-7 28-31 32-39, 32-42, 32-48, 32-52, 32-54, 32-56 61-1, 61-3, 61-5, 61-11 to 61-16 95 – Form No. QS-649/F-08A-EN_mm	Added DUC SWIRL 3 L propeller Added DUC SWIRL 3 L propeller Added DUC SWIRL 3 L propeller Specified the record of the tolerance of the CG of an empty aircraft. Corrected information about turning the front wheel when towing Added DUC SWIRL 3 L propeller Changed capacitance unit for capacitor Corrected translation Assembly procedures completed for draining and brake replenishing fluid. Added DUC SWIRL 3 L propeller Corrected translation	EASA Major Change Approval 10080106 09.09.2022	Evektor 12.09.2021



Rev. No.	Affected Pages	Description / Effectivity	Date of Approval	Inserted by / Date

CHAPTER

04

**AIRWORTHINESS
LIMITATIONS**



CHAPTER 04

AIRWORTHINESS LIMITATIONS

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AIRWORTHINESS LIMITATIONS

1. GENERAL

The Chapter “Airworthiness Limitations” is approved by the European Aviation Safety Agency (EASA) in accordance with the applicable certification procedures and the type certification basis. This Chapter includes specification of the airworthiness restrictions required by the Certification Specification CS-LSA.

This Chapter determines the maximum replacement intervals and/or maintenance requirements for parts of the airplane, systems and structures determined to be life limited and/or parts which require monitoring of the schedule maintenance.

NOTE

All time limits and requirements listed in this section are also covered in Chapter 5.

The following airworthiness limitations and requirements are separated into these groups:

A. Maintenance limitations

Component and system checks required to be performed during airplane scheduled maintenance.

B. Replacement limitations

Listing of time limits for replacement of specific components.

C. Structure limitations

Limitations of the airplane structure on the basis of certification calculations and tests.



2. DESCRIPTION

A. Maintenance limitations

The scheduled maintenance requirements are included in Section 05-20 „Scheduled Maintenance“.

B. Replacement limitations

Unless otherwise specified, the following components must be replaced with new components, overhauled components, or components, which have life remaining, at the intervals specified:

Item	Service life	Replacement	Overhaul	Note
Engine Rotax 912 ULS	1200 hours or 10 years, whichever comes first		X	Up to and including S/N 4,427.532
	1500 hours or 12 years, whichever comes first			From S/N 4,427.533 up to and including S/N 6,775.789
	2000 hours or 15 years, whichever comes first			From S/N 6,775.790
Engine Rotax 912 S	1200 hours or 10 years, whichever comes first		X	Up to and including S/N 4,922.776
	1500 hours or 12 years, whichever comes first			From S/N 4,922.777 up to and including S/N 4,923.889
	2000 hours or 15 years, whichever comes first			From S/N 4,923.890
	Detailed information about the engine service is provided in Maintenance Manual (Line Maintenance) for Rotax Engine Type 912 Series (Ref. No. MML-912, Part. No. 899191).			
Rubber parts of the engine	5 years	X		List of parts is included in Maintenance Ma- nual (Line Mainten- ance) for Rotax Engine Type 912 Series (Ref. No. MML-912, Part. No. 899191).
Engine drive fuel pump	5 years	X		
Propeller Klassic 170/3/R	1000 hours or 72 months, whichever comes first		X	See Wodcomp Servi- ce Bulletin No. 01/04
Propeller KW-31-033	1400 hours or 72 months whichever comes first		X	See Wodcomp Servi- ce Bulletin No. 01/04

Table 04-1 List of parts with limited life (page 1 of 3)



Item	Service life	Replacement	Overhaul	Note
Propeller DUC SWIRL-3-L	2000 hours or 5 years		X	See DUC SWIRL 3 Instruction Manual DUC SWIRL-3-L (Doc. No. DH_SW3_BE_02_B)
Auxiliary generator SD- 20 or BC 425-H	1700 hours		X	
Rubber fuel hoses in the airframe	5 years	X		
EPS Magnum 601S-LSA	18 years	X		Repack of parachute and rocket check every 6 years.
Battery in the unit of ELT AK- 451	5 years	X		Additional information about the service life is provided in Installation and Operation Manual for Model AK-451 -() Series 406 MHz ELT Emergency Locator Transmitter, Doc. No. IM-451, rev. NC-4.1h or latest valid issue.
Battery in the remote control of ELT AK-451	5 years	X		
Battery in the unit of ELT Kannad Integra AF	7 years	X		Additional information about the service life is provided in Operation Manual AF INTEGRA / AF-H INTEGRA ELT With built-in GPS & Integral Antenna, Doc. No. DOC09078E, rev. 04 or latest valid issue.
Battery in the unit of ELT Artex ME406	6 years	X		Additional information about the service life is provided in ME 406 Series Emergency Locator Transmitter Description, Operation, Installation and Maintenance Manual, Doc. No. 570-1600, rev. Y or latest valid issue.
Battery in the clock SC-5	10 years	X		

Table 04-2 List of parts with limited life (page 2 of 3)



Item	Service life	Replacement	Overhaul	Note
Hand fire extinguisher	5 years		X	

Table 04-3 List of parts with limited life (page 3 of 3)

CAUTION

INSTALL ONLY ORIGINAL PARTS PURCHASED FROM THE HOLDER OF TYPE CERTIFICATE FOR THE AIRPLANE OR PARTNERS APPROVED BY THE HOLDER.

C. Structure restrictions

- (1) The service life of the airframe is 7,000 flight hours.
- (2) The initial service life of the airframe 2,100 flight hours applies to airplane S/N 20121601, if the bulletin No. RTC-002b was not implemented.

CHAPTER

05

**TIME LIMITS /
MAINTENANCE
CHECKS**



CHAPTER 05

TIME LIMITS / MAINTENANCE CHECKS

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GENERAL

1. INTRODUCTION

This Chapter includes the TC holder's recommended time limits, maintenance checks and inspections (both scheduled and unscheduled).

For the scheduled inspection program and special inspection program refer to Section 05-20 and 05-30. This section contains those scheduled inspection which are required to maintain the airplane in an airworthy conditions.

The Section 05-50 contains unscheduled inspection program information. This section consists of maintenance check covering abnormal airplane operation (i.e. hard landing inspection).

2. DEFINITIONS

ON CONDITION

The necessary inspections and/or checks to determine that a malfunction or failure will not occur prior to the next scheduled inspection.

FUNCTIONAL TEST

A quantitative check to determine if one or more functions of an item performs within specified limits.

CALENDAR TIME

The time from the date on the original airworthiness certificate, which is issued with each new airplane, to be used as the basis for all TBO or of replacement components.

CORROSION

Pitting, or a surface breakdown of a material due to chemical or electro-chemical attack by atmosphere, moisture or other agents.

FLIGHT TIME

Flight time shall mean the total time from the moment the airplane first moves under its own power for the purpose of flight until the moment it comes to rest at the next point of landing (Chock - to - Chock time).

UNSCHEDULED MAINTENANCE CHECK

Inspections and checks for damage after operating the airplane in conditions which could require unscheduled maintenance, i.e. hard landing, lightning strike etc.

WEAR

Material or part consumed as a result of exposure to operation or usage.

SCHEDULED MAINTENANCE

Preventative maintenance tasks scheduled to be accomplished at specified intervals.

ITEM

Any component or its sets of parts (including the components itself) isolated as an entity for inspection.

DAMAGED

Rendered unusable for its intended purpose.



INSPECTION

An examination of an item.

OPERATIONAL TEST

A task to determine that an item is fulfilling its intended purpose. Does not require quantitative tolerances. This is a failure finding task. The purpose of operational test is to ascertain that a system or a unit are operable. This test requires no special equipment. The operational test is comparable to the test performed out by the flight crew. The purpose of the operational test is not to verify if the system or the unit meet requirements of the technical conditions and if they work in specified tolerances.

SPECIAL INSPECTION

An inspection of components or systems based on calendar time, hours or cycles which do not coincide with the scheduled inspection.

MAINTENANCE

Means overhaul / repair / inspection / replacement / modification or combination thereof, or elimination the failure of the airplane, engine, propeller, or other airplane products.

CONDITION

An inspection for, but not limited to, cleanliness, cracks, deformation, corrosion, wear, and loose or missing fasteners.

VISUAL CHECK

An observation to determine that item is fulfilling its intended purpose. Does not require quantitative tolerances. This is a failure finding task.



TIME LIMITS / INSPECTION PROGRAM

1. INSPECTION REQUIREMENTS

The inspection program is based on number of flight hours (time in service), cycles of operation and / or calendar time. Calendar time for each airplane begins with the original certification date (Airworthiness Issue Date) recorded in the original Log Book for that airplane. Airplane Log Book can be used for determining when inspections and maintenance based on flight hours will be due. The method chosen for recording flight hours should remain consistent throughout the life of the airplane. The airplane manufacturer requires that operators or owners must record the number of flight hours, number of cycles and time of operation used at periods for purpose of complying with inspection based on cycle count (for the maintenance accomplishment).

2. INSPECTION PROGRAM

The manufacturer inspection program has been developed to enable an owner or operator to accomplish requested inspections and maintenance with Civil Aviation Authorities regulations.

The airplane inspections program consists in accomplishment of 100 hour and annual inspections (each 12 calendar months).

CAUTION

THE RECOMMENDED PERIODS DO NOT CONSTITUTE A
GUARANTEE THE ITEM WILL REACH THE PERIOD
WITHOUT MALFUNCTION.

A. Airplane flown less than 100 flight hours per year

At the airplane with less than 100 flight hours flown per year, an annual inspection must be done.

B. Influence of environmental condition (abnormal conditions)

All time periods for scheduled maintenance checks, replacement and overhaul schedule and special inspections schedule noted in this Manual are based on average usage and average environmental conditions. Airplanes operated in abnormal environments (i.e. tropic, humid or cold climates, i.e. dusty environment, etc.) may be worn, corroded, etc. more. Operation in abnormal environments can influence inspections, overhauls, lubrication, etc. frequency.



3. SERVICE BULLETINS

Manufacturer issues service information for owners or operators in the form of following classes of service bulletins.

NOTE

The current list of service bulletins issued for the SportStar RTC airplane is available on the website of the airplane TC holder.

A. Mandatory Service Bulletin ("Safety Related")

The numbering is indicated by the index "a SR"; is issued in these cases

- (1) Failure to meet airworthiness requirements - for repair of structural deficiencies, the inspection of critical parts, replacement of critical parts of the airplane's structure and parts used in airplane assemblies.
- (2) Necessary airworthiness conditions changes concerning actions having a direct impact on the safety, changes in the Pilot's Operating Handbook (Chapters Limitations, Normal Procedures, Emergency Procedures), changes in the time limits and content maintenance tasks that have an impact on safety.

The issue of this bulletin is always followed by the issuance of an Airworthiness Directive issued by the competent Aviation Authority of the country of the airplane operator.

B. Service Bulletin

The numbering is indicated by the index "a"; is issued in these cases:

- (1) Increasing the level of safety concerning airplane equipment, changes in the time limits and maintenance tasks content, changes in the Pilot's Operating Handbook.

C. Notification Bulletin

The numbering is indicated by the index "b". These bulletins contain information technical-economic nature; the implementation is not required for airworthiness.

The owner or operator should be to ensure that all applicable bulletins are complied with.

4. PUBLICATIONS, REFERENCES

All inspections listed in this Chapter, should be accomplished with reference to the SportStar RTC Airplane Maintenance Manual, Airworthiness Directives, Service Bulletins, Service Instructions, Service Letters and applicable vendors publications.



SCHEDULED MAINTENANCE

1. RESPONSIBILITY OF OWNER OR OPERATOR

The airplane owner or operator is responsible for maintaining the airplane in an airworthy condition, including compliance with all applicable Airworthiness Directives.

The owner or operator must ensure that the maintenance is done by qualified personnel.

The owner or operator should ensure that the airframe, airplane systems and power plant mechanic inspecting the airplane has access to all necessary manuals and service information.

The owner or operator is responsible to obtain specific approval from EASA for any alternation to the inspect program.

The owner or operator is responsible to ensure that all service bulletins which are pertinent to his particular operation are complied with.

2. INSPECTION MINIMUM REQUIREMENTS

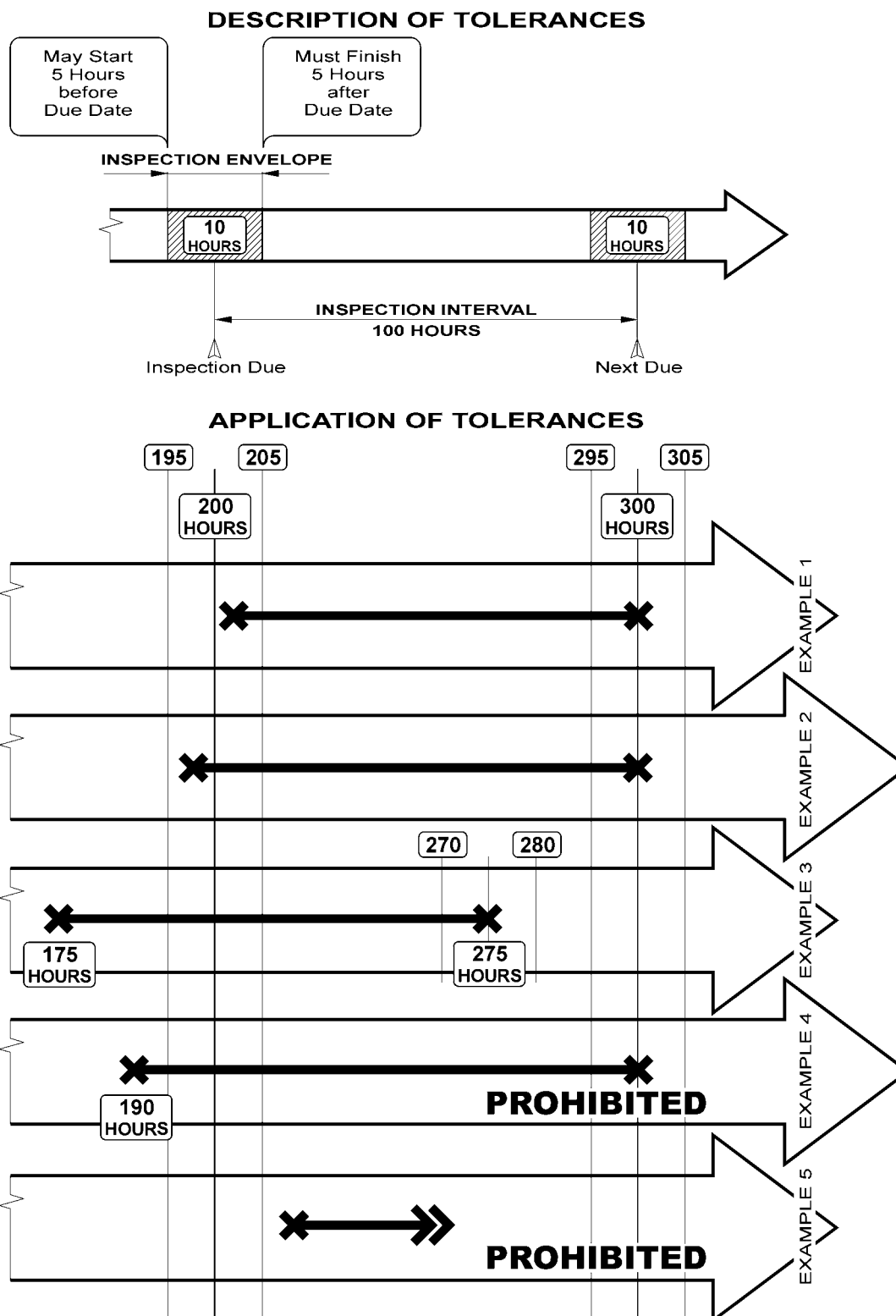
The described requirements on inspections accomplishment must be understood a minimum requirements coming out from normal operation experience at a common operator.

3. INSPECTION TOLERANCES

The owner's or operator's inspection intervals shall not deviate from the inspection time limits shown in table of inspection tolerances (see Tab. 05-1).

Data	Tolerance	Inspection envelope	Start	Finish
Flight hours (tolerance per 100 hours)	±5 hours	10 hours	5 hours before due date	5 hours after due date
Flight hours (tolerance per 50 hours)	±3 hours	6 hours	3 hours before due date	3 hours after due date
Flight hours (tolerance per 25 hours)	±2 hours	4 hours	2 hours before due date	2 hours after due date
Date (tolerance per 12 calendar months)	±2 weeks	4 weeks	2 weeks before due date	2 weeks after due date

Tab. 05-1 Inspection tolerances





4. INSPECTION INTERVALS

Each inspection interval can be exceeded by allowed tolerances or can be performed early at anytime prior to the regular interval as provided bellow:

- In the even of late compliance of any operational scheduled (within permitted tolerances of inspections), the next operational in sequence retains a due point from the time to the late operational was originally scheduled.
- In the event of early compliance of any operational scheduled (within permitted tolerances of inspections), that occurs inspection tolerances or less ahead of schedule, the next phase due point may remain where originally set.
- In the event of early compliance of any operational scheduled, that occurs more than inspection tolerances ahead of schedule, the next phase due point must be rescheduled to establish a new due point from the time of early accomplishment.

If the two inspection requirements are listed for one inspection item, one hourly and the other yearly, both apply and whichever requirement occurs first determines the time limits.

The 100 hours period can be exceeded by 5 hours at maximum on condition that the above exceeding will be used only to finish the flight which started before the 100 hours were reached or for a flight intended to reach the place where the inspection will be done.

EXAMPLE:

Inspection, due at 100 hours, must be accomplished anytime between 95 and 105 hours, next inspection, must be accomplished anytime between 195 and 205 hours, etc.

NOTE

Tolerances specified by vendors, Airworthiness Directives etc. take precedence over inspection intervals and tolerances authorized by manufacturer.

Scheduled overhaul and replacement, scheduled servicing and scheduled special inspections which corresponds to the inspection interval in this section are to be accomplished concurrently.

5. ENGINE INSPECTIONS

The intervals and range of the engine inspections are defined in the document Maintenance Manual (Line Maintenance) for Rotax Engine Type 912 Series (Ref. No. MML-912, Part. No. 899191).

6. PROPELLER INSPECTIONS

A. Klassic 170/3/R propeller inspections

The intervals and range of the propeller inspections are defined in the document User Manual Klassic 170/3 Aircraft propeller (Doc. No UM-07 EN).

B. KW-31-033 propeller inspections

The intervals and range of the propeller inspections are defined in the document User Manual KW-31 Electrical variable aircraft propeller (Doc. No. UM-05 EN).

**C. DUC SWIRL 3 L propeller inspections**

The intervals and range of the propeller inspections are defined in the document Instruction Manual SWIRL-3 propeller, (Doc. No DH_SW3_BE_02_B).

7. INSPECTIONS OF PARTS – GENERAL

MOVABLE PARTS: Inspect for lubrication, attachments, security of attachments, excessive wear, safetying, proper operation, proper adjustment, correct travel, cracked fittings, security of hinges, defective bearings, cleanliness, corrosion, deformation, sealing and tension.

FLUID LINES AND HOSES: Inspect for leaks, cracks, structure, collapsed, twisted, dents, kinks, chafing, proper radius, security, discoloration, deterioration, proper routing; rubber hoses for hardness or flexibility and metal lines for corrosion, check service life of hoses.

METAL PARTS: Inspect for safety of attachments, cracks, metal distortion, broken spot-welds, condition of paints (especially clips at seams and around fasteners for onset of corrosion) and any other apparent damage.

STRUCTURAL FASTENERS: Inspect for correct torque in accordance with applicable torque values (when visual inspection indicates the need for a torque check).

FILTERS, SCREENS AND FLUIDS: Inspect for cleanliness and the need for replacement at specified intervals.

WIRING: Inspect for security, chafing, burning, arcing, defective insulation, loose and broken terminals, heat deterioration and corroded terminals.

In the text of individual operations, where the check for condition is required, dominant activities carried out at checking for condition can be mentioned in brackets, e.g. "check fuselage skin for condition (damage, deformation, cracks, loosened or missing rivets)".

8. INSPECTION GUIDELINES

The list of inspection requirements are given in Table SCHEDULED INSPECTION AFTER 100 FH OR ANNUAL INSPECTION.

Detailed inspection procedures of systems and components in the airplane will be found in various chapters of this Airplane Maintenance Manual (par. Inspection / check) and pertinent publication.


SCHEDULED INSPECTION AFTER 100 FH OR ANNUAL INSPECTION

Page: 2 of 12

Ref.	Prescribed works	Made by	Checked by
2. POWER PLANT AND ENGINE COMPARTMENT			
	Engine cowlings		
71-10	Check cowlings for condition, cracks, deformation and other damage.		
71-10	Check quick closing locks and cowlings for condition and attachment.		
71-10	Check inside fireproof primer paint – repaint as required; white color T 50, Standard V1000 N 56582, thermal protection.		
	Engine mount		
71-20	Check bolts: engine-engine mount, engine mount-firewall for condition, attachment, security of attachment.		
71-20	Check rubber silentblocks for condition; replace those cracked and excessively deformed.		
	Engine air intake		
71-60 MML-912	Check air filter for condition, attachment and security; impure filter clean acc. to the engine manual, replace damaged filter.		
71-60	Check airbox for condition and attachment.		
76-10	Check carburetor control for condition, control cables attachment, thermal protection.		
	Battery		
24-30	Check battery for condition, attachment and security.		
24-30	Check level of battery charge; charge as required.		
24-30	Check cables for condition and attachment; replace damaged cables.		
24-30	Do the battery capacity test – min. 80 % capacity (applied for annual inspection only).		
24-30	Do the SV-BAT-320 or IBBS-12v-3ah backup batteries capacity test (applied for annual inspection only).		
	Wiring of engine		
	Check wires and harness for condition, integrity, connections, attachment and grounding.		
Notes:			
Date: Signature:			



SCHEDULED INSPECTION AFTER 100 FH OR ANNUAL INSPECTION

Page: 3 of 12

Ref.	Prescribed works	Made by	Checked by
	Fuel system		
28-20	Check hoses and tubes for condition, integrity, attachment and security; replace damaged hoses.		
28-20	Check fuel system for leaks.		
	Cooling system		
75-00	Check water cooler for condition and leaks.		
75-00 79-20	Check hoses and tubes for condition, attachment, leaks and security. Cooler left hose clearance from exhaust pipe approx. 20 mm.		
75-00	Check and tighten hose clamps as required.		
12-10	Check coolant quantity in the expansion tank; add or change coolant as required.		
75-00	Check overflow bottle for condition and attachment.		
	Oil system		
79-10	Check oil tank for condition and attachment.		
79-20	Check oil cooler for condition, attachment and leaks.		
79-20	Check hoses for condition, leaks, attachment and security; replace damaged hoses.		
12-10	Check oil quantity; add or change oil as required.		
	Exhaust system		
78-10	Check exhaust pipes for condition, cracks, deformations or damage; as required repair or replace.		
78-20 21-40	Check muffler and heat exchanger for condition, cracks, deformations or damage; repair or replace as required.		
78-10 78-20	Check exhaust system fasteners for security.		
Notes:			
Date: Signature:			


SCHEDULED INSPECTION AFTER 100 FH OR ANNUAL INSPECTION

Page: 4 of 12

Ref.	Prescribed works	Made by	Checked by
	Heating and venting system		
21-20 78-20	Check hoses for condition, integrity, attachment and security.		
21-00	Check heating / venting chambers for condition, cracks, deformation and damage.		
21-60	Check heating / venting control for condition and function.		
	Engine		
MML-912	Do the maintenance acc. to the engine maintenance manual.		
	Propeller		
UM-05 / 07 CZ / DH_S W3_BE _02_B	Do the maintenance acc. to the propeller manual.		
3. NOSE LANDING GEAR			
	Nose landing gear leg		
32-20	Check nose landing gear leg for condition and attachment.		
32-20	Check depression of nose wheel shock absorber.		
32-20	Check joints for tightening and security.		
	Wheel fairing		
32-20	Check wheel fairing for condition, cracks, deformation and damage; repair as required.		
	Tire		
32-41	Check tire for condition, damage, uneven or excessive wear and slippage; replace as required.		
12-10	Check pressure; inflate to required pressure as required.		
	Wheel		
32-41	Check wheel for cracks, permanent deformations; replace if damaged.		
Notes:			
Date: Signature:			



SCHEDULED INSPECTION AFTER 100 FH OR ANNUAL INSPECTION

Page: 5 of 12

Ref.	Prescribed works	Made by	Checked by
	Wheel (continued)		
32-41	Check valve for condition around the hole in the rim. Beware of cutting the valve when the tire slippage.		
32-41	Check bearings for condition, free rotation and play.		
	Steering control system		
32-50	Check control rods for condition, rod ends for security.		
32-50	Check nose wheel control lever covers for condition, wear; repair damage.		
4. MAIN LANDING GEAR			
07-10	Jack the airplane.		
	Main landing gear legs		
32-10	Check fiberglass legs for condition, cracks; repaint damaged areas. Contact airplane manufacturer if cracks were found.		
32-10	Check leg attachment into the fuselage (no play) – move the leg forward / backward, upward / downward; at the same time check wheel play on the axle; tighten attachment bolts if the leg has a play.		
32-10	Check joints for tightening and security.		
32-10	Check cloth cover which covers the leg – fuselage input hole.		
-	Check grounding for condition.		
	Wheel fairings		
32-10	Check wheel fairings for condition, cracks, deformation and damage; repair as required.		
	Tires		
32-41	Check tire for condition, damage, uneven or excessive wear and slippage; replace as required.		
12-10	Check pressure; inflate to required pressure as required.		
Notes:			
Date: Signature:			


SCHEDULED INSPECTION AFTER 100 FH OR ANNUAL INSPECTION

Page: 6 of 12

Ref.	Prescribed works	Made by	Checked by
	Wheels		
32-41	Check wheels for cracks, permanent deformations; replace if damaged.		
32-41	Check valve for condition around the hole in the rim. Beware of cutting the valve when the tire slippage.		
32-41	Check bearings for condition, free rotation and play.		
	Brakes		
32-42	Check attachment of brake system plastic hoses to the main landing gear leg.		
32-42	Check brake pads for condition, equal and symmetry abrasion; replace pads as required. Min. admissible thickness of brake pad is 0,5 mm (S5 10-03 01 / S5 10-03 02 brakes) or 2,54 mm (Matco brakes).		
32-42	Check brake disc for condition, wear and overheating. Min. admissible thickness of brake disc is 3,2 mm (S5 10-03 01 / S5 10-03 02 brakes) or 3,3 mm (Matco brakes)		
12-10	Check brake system for leaks; add brake fluid and bleed the system if a brake pedal has soft movement.		
	Lower the airplane.		
5. WING			
	Wing		
57-10 57-20 57-30	Check wing structure / skin for condition, loosened rivets, deformation, cracks, corrosion and some other damage; contact airplane manufacturer if any damage were found.		
57-20 33-40	Check wing tips including position / strobe light for condition and attachment.		
57-10	Check integral tank riveted joints for leakage.		
28-10	Check fuel tank drain valve for condition and function.		
27-10	Check control system joints inside the wing for security.		
34-10	Check stall speed warning sensor for condition.		
	Check wires for integrity and grounding.		
Notes:			
Date: Signature:			



SCHEDULED INSPECTION AFTER 100 FH OR ANNUAL INSPECTION

Page: 7 of 12

Ref.	Prescribed works	Made by	Checked by
	Aileron		
57-51	Check aileron structure / skin for condition.		
57-51	Check aileron for free movement.		
57-51	Check aileron hinge for condition and play.		
27-10	Check control rod joint for security.		
	Wing flap		
57-52	Fully extend the flaps and check flaps structure / skin for condition.		
57-52	Check flap hinge for condition and play.		
57-52	Check flap control pin for condition and wear of the groove at the flap root. Check the play between the drive lever with the pin and the nearest area of the guide in the flap rib. Check this play for the left flap and for the right flap, always at the full flap deflection (deflection of 50°). The play mustn't exceed the value of 17 mm.		
	Pitot-static system		
34-10	Check pitot-static tube for condition and attachment.		
34-10	Check pitot-static system hoses for condition.		
	Wing attachments		
57-40	Check wing attachments for condition, corrosion, deformation and wear; apply grease on the attachments.		
57-40	Check play of wing attachments – move the wing tip upward / downward, frontward / rearward; contact airplane manufacturer if play exceeded allowable value.		
57-40	Check attachment fasteners for security.		

Notes:

Date:

Signature:


SCHEDULED INSPECTION AFTER 100 FH OR ANNUAL INSPECTION

Page: 8 of 12

Ref.	Prescribed works	Made by	Checked by
6. FUSELAGE			
	Fuselage surface		
53-10 53-30	Check fuselage structure / skin for condition, loosened rivets, deformation, cracks, corrosion and some other damage; repair small damage or contact airplane manufacturer if any damage were found.		
53-10	Check rivets near the landing gear attachment.		
Ch. 23 Ch. 34	Check equipment (antennas, etc.) for condition and attachment.		
53-20	Check tail skid for condition and attachment.		
53-50	Check fiberglass wing fairings for condition.		
	Cockpit canopy		
52-10	Check canopy for condition, cracks, scratches, attachments and any other damage.		
52-10	Check canopy lock for condition, function and signalization.		
52-10	Check eye-ball vents for condition and function.		
52-10	Check gas struts for condition and function; replace if not operate properly.		
52-10	Check canopy silicone rubber packing for condition.		
52-10	Check canopy water drainage.		
7. HORIZONTAL TAIL UNIT			
55-10 55-20	Check HTU structure / skin for condition, loosened rivets, deformation, cracks, corrosion and some other damage; contact airplane manufacturer if any damage were found.		
55-10 55-20	Check tips for condition and attachment.		
55-20	Check elevator for free movement.		
55-20	Check elevator hinge for condition.		
Notes:			
Date: Signature:			



SCHEDULED INSPECTION AFTER 100 FH OR ANNUAL INSPECTION

Page: 9 of 12

Ref.	Prescribed works	Made by	Checked by
	HORIZONTAL TAIL UNIT (continued)		
55-10	Check play of attachments – move the stabilizer upward/downward, frontward/rearward; contact airplane manufacturer if play exceeded allowable value.		
27-30	Check joints at elevator lever for security.		
	Trim tab		
55-20	Check tab for condition.		
55-20	Check tab hinge for condition and play.		
27-30	Check tab control rods for condition and security of control rod ends.		
8. VERTICAL TAIL UNIT			
55-40	Check VTU structure / skin for condition, loosened rivets, deformation, cracks, corrosion and some other damage; contact airplane manufacturer if any damage were found.		
55-40	Check tip for condition and attachment.		
55-40	Check rudder for free movement.		
55-40	Check rudder attachment for condition.		
55-40	Check play – move the rudder upward/downward; contact airplane manufacturer if play exceeded allowable value.		
27-20	Check joints for security.		
9. COCKPIT			
76-10	Check throttle and choke levers for free movement and lock.		
	Check heating / venting and carburetor preheating controllers for condition and function.		
28-20	Check fuel filter for condition; replace contaminated filter.		
25-60	Check emergency parachute and rocket for condition, attachment and security.		
25-60	Check emergency system cables for condition and attachment of (must not be loose).		
Notes:			
Date: Signature:			


SCHEDULED INSPECTION AFTER 100 FH OR ANNUAL INSPECTION

Page: 10 of 12

Ref.	Prescribed works	Made by	Checked by
	COCKPIT (continued)		
25-60	Check EPS activation handle for condition, attachment and security.		
34-10	Check drain sumps of the pitot-static system for condition; dry them as required.		
26-10	Check hand fire extinguisher for condition, attachment and capacity.		
	Instrument panel		
39-10	Check instrument panel for condition and attachment.		
Ch. 23 Ch. 34	Check individual instruments and COMM/NAV equipment for condition and attachment.		
POH, Ch. 2	Check analog instruments color marking for condition.		
34-20	Do compensation of compass – applied for annual inspection only.		
	Check wires and harness for condition, integrity, connections, attachment and grounding.		
	Seats and safety harness		
25-10	Check seat upholstery for condition.		
25-10	Check seats and backrests for condition.		
	Check seats for loose rivets or any other damage.		
32-10	Check main landing gear legs attachment inside the fuselage for condition.		
25-10	Check safety harness for condition, attachment and security of; check safety harness lock for function.		
	Hand control		
27-10 27-30	Check hand control for free movement and play.		
27-10 27-30	Check joints for security.		
27-10 27-30	Check control column stops for condition.		

Notes:

Date:

Signature:



SCHEDULED INSPECTION AFTER 100 FH OR ANNUAL INSPECTION

Page: 11 of 12

Ref.	Prescribed works	Made by	Checked by
	Rudder control		
27-20	Check control for stiffness of movement.		
27-20	Check joints for security.		
27-20	Check stops at rudder control cables for condition.		
27-20	Check rudder cables for condition and security.		
27-20	Check hydraulic brake system for leaks; add brake fluid as required.		
	Wing flap control		
27-50	Check control lever for free movement.		
27-50	Check operation of flap control lever lock (push button).		
10. OPERATIONAL TEST			
33-40 33-10	Interior and exterior lighting – check function.		
34-10	Pitot-static tube heating – check function.		
34-10	Stall speed warning sensor – check function.		
27-30	Pitch trim – check function.		
31-50	Acoustical and optical signaling elements – check function.		
	Check all instruments for function.		
61-20	Propeller governor CS 3-5 and propeller KW-31 – check function.		
	Radiocommunication and radionavigation equipment – check function.		
Notes:			
Date: Signature:			


SCHEDULED INSPECTION AFTER 100 FH OR ANNUAL INSPECTION

Page: 12 of 12

Ref.	Prescribed works	Made by	Checked by
11. FINISHING WORKS			
	Check the completeness of tools and instruments used during the inspection.		
12-20	Lubricate all items according to the lubrication chart.		
25-10	Install upholstery and seats.		
06-40	Install and close all covers and hatches.		
	Do the engine test.		
	Do the brake test.		
	After engine test, test and Check the fuel, oil and cooling system for leakage and their security of all components.		
	Check the removal of all detected defects.		
	Fill out the required logbook entries.		

Notes:

Date:

Signature:



SCHEDULED SPECIAL MAINTENANCE CHECKS

1. SCHEDULED SPECIAL MAINTENANCE CHECKS REQUIREMENTS

For scheduled special maintenance checks specified in other intervals than 100 hours or annual see INSPECTION AFTER FIRST 25 FH and SPECIAL INSPECTION. Scheduled special maintenance checks are a part of scheduled maintenance program.

2. INFLUENCE OF ENVIRONMENTAL CONDITIONS (ABNORMAL CONDITIONS)

The time periods for the scheduled special maintenance checks noted in this manual are based on normal usage under average environmental conditions. Airplanes operated in abnormal conditions (tropics, humid or cold climates, in dusty conditions etc.) may more wear, corrode etc. Operation in abnormal conditions may influence frequent intervals of special inspections, lubrication etc.

3. SCHEDULED SPECIAL MAINTENANCE CHECKS TOLERANCES

The owner's or operator's inspection intervals shall not deviate from the inspection time limits shown in Tab. 05-2.

Data	Tolerance	Inspection envelope	Start	Finish
Inspections				
Flight hours	±10 %	20 %	10 % before due date	10 % after due date
Date	±10 %	20 %	10 % before due date	10 % after due date
Cycles	±10 %	20 %	10 % before due date	10 % after due date

Tab. 05-2 3. Scheduled special maintenance checks tolerances

CAUTION

IF IS PUBLIC WORD "MAX." (SEE BELLOW MENTIONED TABLES) DO NOT USE TOLERANCE +10%.



INSPECTION AFTER FIRST 25 FH

Page: 2 of 6

Ref.	Prescribed works	Made by	Checked by
	Cooling system		
75-00	Check water cooler for condition and leaks.		
75-00 79-20	Check hoses and tubes for condition, attachment, leaks and security. Cooler left hose clearance from exhaust pipe approx. 20 mm.		
12-10	Check coolant quantity in the expansion tank; add or change coolant as required.		
	Oil system		
79-20	Check oil cooler for condition, attachment and leaks.		
79-20	Check hoses for condition, leaks, attachment and security.		
12-10	Check oil quantity; add or change oil as required.		
	Exhaust system		
78-10	Check exhaust pipes for condition, cracks, deformations or damage.		
78-20 21-40	Check muffler and heat exchanger for condition, cracks, deformations or damage.		
78-10 78-20	Check exhaust system fasteners for security.		
	Engine		
MML-912	Do the maintenance acc. to the engine maintenance manual.		
	Propeller		
UM-05/ 07 CZ/ DH_S W3_BE _02_B	Do the maintenance acc. to the propeller manual.		

Notes:

Date:

Signature:


INSPECTION AFTER FIRST 25 FH

Page: 3 of 6

Ref.	Prescribed works	Made by	Checked by
3. NOSE LANDING GEAR			
	Nose landing gear leg		
32-20	Check nose landing gear leg for condition and attachment.		
32-20	Check joints for tightening and security.		
	Tire		
12-10	Check pressure; inflate to required pressure as required.		
	Steering control system		
32-50	Check control rods for condition, rod ends for security.		
4. MAIN LANDING GEAR			
	Main landing gear legs		
32-10	Check fiberglass legs for condition, cracks; repaint damaged areas. Contact airplane manufacturer if cracks were found.		
32-10	Check joints for tightening and security.		
	Tires		
12-10	Check pressure; inflate to required pressure as required.		
	Brakes		
12-10	Check brake system for leaks; add brake fluid and bleed the system if a brake pedal has soft movement.		
4. WING			
	Wing		
57-10 57-20 57-30	Check wing structure / skin for condition, loosened rivets, deformation, cracks, corrosion and some other damage; contact airplane manufacturer if any damage were found.		
27-10	Check control system joints inside the wing for security.		
	Aileron		
57-51	Check aileron structure / skin for condition.		
Notes:			
Date: Signature:			



INSPECTION AFTER FIRST 25 FH

Page: 4 of 6

Ref.	Prescribed works	Made by	Checked by
	Aileron (continued)		
57-51	Check aileron for free movement.		
57-51	Check aileron hinge for condition and play.		
27-10	Check control rod joint for security.		
	Wing flap		
57-52	Fully extend the flaps and check flaps structure / skin for condition.		
57-52	Check flap hinge for condition and play.		
	Wing attachments		
57-40	Check wing attachments for condition, corrosion, deformation and wear; apply grease on the attachments.		
57-40	Check attachment fasteners for security.		
5. FUSELAGE			
	Fuselage surface		
53-10 53-30	Check fuselage structure / skin for condition, loosened rivets, deformation, cracks, corrosion and some other damage; repair small damage or contact airplane manufacturer if any damage were found.		
	Cockpit canopy		
52-10	Check canopy for condition, cracks, scratches, attachments any other damage.		
52-10	Check canopy lock for condition, function and signalization.		
6. HORIZONTAL TAIL UNIT			
55-10 55-20	Check HTU structure / skin for condition, loosened rivets, deformation, cracks, corrosion and some other damage; contact airplane manufacturer if any damage were found.		
55-20	Check elevator for free movement.		
55-20	Check elevator hinge for condition.		
27-30	Check joints at elevator lever for security.		
Notes:			
Date: Signature:			



INSPECTION AFTER FIRST 25 FH

Page: 5 of 6

Ref.	Prescribed works	Made by	Checked by
	Trim tab		
55-20	Check tab for condition.		
27-30	Check tab control rods for condition and security of control rod ends.		
7. VERTICAL TAIL UNIT			
55-40	Check VTU structure / skin for condition, loosened rivets, deformation, cracks, corrosion and some other damage; contact airplane manufacturer if any damage were found.		
55-40	Check rudder for free movement.		
55-40	Check rudder attachment for condition.		
27-20	Check joints for security.		
8. COCKPIT			
76-10	Check throttle and choke levers for free movement and lock.		
28-20	Check fuel filter for condition; replace contaminated filter.		
	Hand control		
27-10 27-30	Check hand control for free movement and play.		
27-10 27-30	Check joints for security.		
	Rudder control		
27-20	Check control for stiffness of movement.		
27-20	Check joints for security.		
27-20	Check cables for condition and security.		
27-20	Check hydraulic brake system for leaks; add brake fluid as required.		
Notes:			
Date: Signature:			



INSPECTION AFTER FIRST 25 FH

Page: 6 of 6

Ref.	Prescribed works	Made by	Checked by
	Wing flap control		
27-50	Check control lever for free movement.		
27-50	Check operation of flap control lever lock (push button).		
9. FINISHING WORKS			
	Check the completeness of tools and instruments used during the inspection.		
12-20	Lubricate all items according to the lubrication chart.		
06-40	Install and close all covers and hatches.		
	Do the engine test.		
	After engine test, test and Check the fuel, oil and cooling system for leakage and their security of all components.		
	Check the removal of all detected defects.		
	Fill out the required logbook entries.		

Notes:

Date:

Signature:



SPECIAL INSPECTIONS

Serial Number: Total flight hours:
 Registration: Total cycles:

Page: 1 of 2

Ref.	Prescribed works	Period	Made by	Checked by
08-20	Weigh the airplane.	72 months or acc. to appropriate national regulations		
34-10	Pitot-static system – check and inspect in accordance with applicable regulations, check the tightness of the pitot-static system, check the correctness of the data and the tightness of the barometric instruments.	max. 24 months or acc. to appropriate national regulations		
34-50	Transponder and equipment for altitude automatic transmitting – check in accordance with valid regulations.	max. 24 months		
25-60	ELT AK-451 – check function.	1 month		
25-60	ELT Kannad AF Integra – check function.	6 months		
25-60	ELT Artex ME406 – check function.	12 months		
12-10	Replace the brake fluid, clean and repack the brake cylinders.	24 months		
12-10	Replace the coolant.	24 months		

Notes:

Date:

Signature:



SPECIAL INSPECTIONS

Serial Number: **Total flight hours:**
Registration: **Total cycles:**

Page: 2 of 2

Ref.	Prescribed works	Period	Made by	Checked by
MML-912	Engine – do the maintenance according to the Maintenance Manual (Line Maintenance) for Rotax Engine Type 912 Series (Ref. No. MML-912, Part. No. 899191).	25, 50, 200, 400, 600, 800, 1000, 1200, 1400, 1600, 1800 hours		
UM-07 EN	Klassic 170/3/R propeller – do the maintenance according to the User Manual Klassic 170/3 aircraft propeller	25 hours, 500 hours or 36 months, 1000 hours or 72 months		
UM-05 EN	KW-31-033 propeller – do the maintenance according to the User Manual KW-31 Electrical variable aircraft propeller.	25 hours, 700 hours or 36 months, 1400 hours or 72 months		
DH_SW3_BE_02_B	DUC SWIRL -3 -L propeller - do the maintenance according to the User Manual DH_SW3_BE_02_B. Aircraft propeller Typ DUC SWIRL -3-L	1 hour of operation after propeller installation		

Notes:

Date:

Signature:



UNSCHEDULED MAINTENANCE CHECKS

1. GENERAL

Unscheduled maintenance checks are necessary after abnormal operational situations that could cause damage to the airplane or deterioration of its flight characteristics.

The following procedures may be in the details amended or supplemented according to the extent of damage. If necessary, please consult the airplane manufacturer.



HARD LANDING INSPECTION

Page: 2 of 3

Ref.	Prescribed works	Made by	Checked by
3. WING			
57-10 57-30	Check wing structure / skin for condition, especially in the area of attachments.		
57-10	Check integral tank riveted joints for leakage.		
57-40	Check wing attachments for condition.		
57-40	Check play of wing attachments – move the wing tip upward/downward, frontward/rearward.		
57-51 57-52	Check ailerons and wing flaps structure / skin for condition.		
57-51 57-52	Check ailerons and wing flaps hinges for condition and free movement.		
Ch. 27	Check control, brackets and bellcranks for condition.		
27-50	Check wing flaps control for condition.		
27-50	Check wing flaps for play.		
4. POWER PLANT AND ENGINE COMPARTMENT			
71-10	Check quick closing locks and cowlings for condition and attachment.		
71-10	Check attachment engine mount-firewall for condition.		
71-10	Check rubber silentblocks for condition.		
	Check battery, wires / harness and other electric plants for condition, integrity, connections and attachment.		
Ch. 28	Check hoses / tubes and other fuel system plants for condition, integrity, attachment and security.		
76-10	Check engine control for condition.		
79-20 75-00	Check water and oil cooler for condition and leaks.		
61-10	Check propeller fastener and propeller-engine fasteners for condition.		
UM-05 / 07 CZ / DH_S W3_BE _02_B	Check propeller blades for condition.		
Notes: Date: Signature:			



HARD LANDING INSPECTION

Page: 3 of 3

Ref.	Prescribed works	Made by	Checked by
5. COCKPIT			
Ch. 27	Check all control systems for function and free movement.		
Ch. 27	Check control stops for condition and security.		
76-10	Check engine control for function and free movement.		
Ch. 23 Ch. 34	Check individual instruments and COMM/NAV equipment for condition and attachment.		
6. FUSELAGE			
53-10 53-30	Check fuselage structure / skin for condition, especially in the area of landing gear and wing attachments and in the rear part of the fuselage.		
53-20	Check tail skid for condition and attachment.		
Ch. 27	Check control, pulleys and levers for condition.		
27-20	Check rudder cables for condition.		
Ch. 28	Check fuel system hoses, tubes and other fuel system plants for condition.		
7. TAIL UNIT			
Ch. 55	Check tail unit structure / skin for condition.		
55-10	Check attachment stabilizer-fuselage for condition.		
55-10	Check play of attachments – move the stabilizer upward/downward, forward/rearward.		
55-20 55-40	Check rudder and elevator hinges for condition and free movement.		
8. FINISHING WORKS			
	Check the completeness of tools and instruments used during the inspection.		
06-40	Install and close all covers and hatches.		
	Lower the airplane.		
	Fill out the record about a hard landing inspection in the logbook. Contact airplane manufacturer if permanent deformation, cracks or exceeded allowable value of play were found.		
Notes:			
Date:		Signature:	



3. EXCEEDING OF LOAD FACTORS / FLIGHT IN SEVERE TURBULENCE

Exceeding the maximum flight load factors can occur when improperly performed flight maneuvers or from gust at flight through turbulence.

Load factor summary

Max. maneuvering load factors:

$n_{max} = + 4$

$n_{min} = - 2$

Max. load factors for flight in severe turbulence:

$n_{max} = + 4$

$n_{min} = - 2$

After every exceeding of load factors / flight in severe turbulence inspect the airplane in the following range:

EXCEEDING OF LOAD FACTORS / FLIGHT IN SEVERE TURBULENCE INSPECTION			
Page: 1 of 3			
Ref.	Prescribed works	Made by	Checked by
1. GENERAL – PREPARATORY WORKS			
06-40	Remove an open all required covers and hatches.		
07-10	Jack the airplane.		
08-30	Do the airplane leveling; contact airplane manufacturer if any permanent deformation were found.		
2. POWER PLANT AND ENGINE COMPARTMENT			
71-10	Check quick closing locks and cowlings for condition and attachment.		
71-10	Check attachment engine mount-firewall for condition.		
71-10	Check rubber silentblocks for condition.		
	Check battery, wires / harness and other electric plants for condition, integrity, connections and attachment.		
Ch. 28	Check hoses / tubes and other fuel system plants for condition, integrity, attachment and security.		
76-10	Check engine control for condition.		
79-20 75-00	Check water and oil cooler for condition and leaks.		
Notes: Date: Signature:			



EXCEEDING OF LOAD FACTORS / FLIGHT IN SEVERE TURBULENCE INSPECTION			
Page: 2 of 3			
Ref.	Prescribed works	Made by	Checked by
POWER PLANT AND ENGINE COMPARTMENT (continued)			
61-10	Check propeller fastener and propeller-engine fasteners for condition.		
UM-05 / 07 CZ / DH_S W3_BE _02_B	Check propeller blades for condition.		
3. COCKPIT			
Ch. 27	Check all control systems for function and free movement.		
Ch. 27	Check control stops for condition and security.		
76-10	Check engine control for function and free movement.		
Ch. 23 Ch. 34	Check individual instruments and COMM/NAV equipment for condition and attachment.		
4. FUSELAGE			
53-10 53-30	Check fuselage structure / skin for condition, especially in the area of wing attachments and in the rear part of the fuselage.		
Ch. 27	Check control, pulleys and levers for condition.		
27-20	Check rudder cables for condition.		
Ch. 28	Check fuel system hoses, tubes and other fuel system plants for condition.		
5. TAIL UNIT			
Ch. 55	Check tail unit structure / skin for condition.		
55-10	Check attachment stabilizer-fuselage for condition.		
55-10	Check play of attachments – move the stabilizer upward/downward, frontward/rearward.		
55-20 55-40	Check rudder and elevator hinges for condition and free movement.		
Notes:			
Date: Signature:			



EXCEEDING OF LOAD FACTORS / FLIGHT IN SEVERE TURBULENCE INSPECTION

Page: 3 of 3

Ref.	Prescribed works	Made by	Checked by
6. WING			
57-10 57-30	Check wing structure / skin for condition, especially in the area of attachments.		
57-10	Check integral tank riveted joints for leakage.		
57-40	Check wing attachments for condition.		
57-40	Check play of wing attachments – move the wing tip upward/downward, frontward/rearward.		
57-51 57-52	Check ailerons and wing flaps structure / skin for condition.		
57-51 57-52	Check ailerons and wing flaps hinges for condition and free movement.		
Ch. 27	Check control, brackets and bellcranks for condition.		
27-50	Check wing flaps control for condition.		
27-50	Check wing flaps for play.		
7. FINISHING WORKS			
	Check the completeness of tools and instruments used during the inspection.		
06-40	Install and close all covers and hatches.		
	Lower the airplane.		
	Fill out the record about an exceeding of load factors / flight in severe turbulence inspection in the logbook. Contact airplane manufacturer if permanent deformation, cracks or exceeded allowable value of play were found.		
Notes:			
Date:		Signature:	



5. LIGHTNING STRIKE

If flown through a region of the atmosphere where electrical discharge is occurring, the airplane may become part of the discharge path. During a lightning strike, the current enters the airplane at one point and exits another, usually at opposite extremities. It is in these entrance and exit points where damage is most likely to occur. Burning and/or eroding of small surface areas of the skin and structure may be detected during inspection. In most cases, the damage is obvious. In some cases, however, hidden damage may result.

Expected mechanical damage of a lightning strike:

- On metallic skin, eroded metal and local buckles in attachment points may appear.
- On composite skin, burned holes in the metal foil and local delamination in attachment points may appear.
- On propellers local burns, especially in the tips of the propeller blades, may appear.
- On antennas burns and delamination may appear.
- Static dischargers (if installed) may be damaged or missing completely.
- Improper function to electrical/electronic units may appear.

Inspect the airplane in following range when it is suspected or known that the airplane has been struck by lightning:



LIGHTNING STRIKE INSPECTIONS

Page: 1 of 6

Ref.	Prescribed works	Made by	Checked by
1. GENERAL – PREPARATORY WORKS			
	Determine where the lightning struck the airplane and inspect the surrounding area carefully for damage.		
	Determine where the lightning exited the airplane and inspect the surrounding area carefully for damage.		
	From the determination of the entry and exit points, a probable electrical path of the lightning through the airplane can be established. The airplane structure along this path should be carefully inspected.		
06-40	Remove an open all required covers and hatches.		
2. POWER PLANT AND ENGINE COMPARTMENT			
	Engine cowlings		
71-10	Check cowlings for condition and evidence of damage.		
	Engine mount		
71-20	Check engine mount for condition.		
71-20	Check rubber silentblocks for condition.		
	Engine air intake		
71-60	Check airbox for condition.		
76-10	Check carburetor control for condition.		
	Battery		
24-30	Check battery for condition and evidence of damage.		
24-30	Check cables for condition and evidence of damage.		
	Wiring of engine		
	Check wires and harness for condition, integrity, connections and evidence of damage.		
	Fuel system		
28-20	Check hoses and tubes for condition and evidence of damage.		
28-20	Check fuel system for leaks.		
Notes:			
Date: Signature:			



LIGHTNING STRIKE INSPECTIONS

Page: 2 of 6

Ref.	Prescribed works	Made by	Checked by
	Cooling system		
75-00	Check water cooler for condition and leaks.		
75-00	Check hoses and tubes for condition and evidence of damage.		
	Oil system		
79-10	Check oil tank for condition.		
79-20	Check oil cooler for condition and leaks.		
79-20	Check hoses for condition, leaks and evidence of damage.		
	Exhaust system		
78-10	Check exhaust pipes for condition and evidence of damage.		
78-20 21-40	Check muffler and heat exchanger for condition and evidence of damage.		
	Engine		
MML-912	Do the maintenance acc. to the engine maintenance manual.		
	Propeller		
UM-05/ 07 CZ/ DH_S W3_BE _02_B	Do the maintenance according to the propeller manual.		
3. NOSE LANDING GEAR			
	Nose landing gear leg		
32-20	Check nose landing gear leg for condition.		
	Wheel fairing		
32-20	Check wheel fairing for condition and evidence of damage.		
	Wheel		
32-41	Check bearings for condition, free rotation and play.		
	Steering control system		
32-50	Check control rods for condition.		
Notes:			
Date: Signature:			



LIGHTNING STRIKE INSPECTIONS

Page: 3 of 6

Ref.	Prescribed works	Made by	Checked by
4. MAIN LANDING GEAR			
07-10	Jack the airplane.		
	Main landing gear legs		
32-10	Check fiberglass legs for condition, cracks; repaint damaged areas. Contact airplane manufacturer if cracks were found.		
	Check grounding for condition.		
	Wheel fairings		
32-10	Check wheel fairings for condition and evidence of damage.		
	Wheels		
32-41	Check bearings for condition, free rotation and play.		
	Brakes		
32-43	Check condition and attachment of brake system plastic hoses to the main landing gear leg.		
12-10	Check brake system for leaks.		
	Lower the airplane.		
5. WING			
	Wing		
57-10 57-20 57-30	Check wing structure / skin for condition and evidence of damage; contact airplane manufacturer if any damage were found.		
57-20 33-40	Check wing tips including position / strobe light for condition and evidence of damage.		
57-10	Check integral tank riveted joints for leakage.		
34-10	Check stall speed warning sensor for condition.		
	Check wires for integrity and grounding.		
	Aileron		
57-51	Check aileron structure / skin for condition.		
57-51	Check aileron for free movement.		
Notes:			
Date:		Signature:	



LIGHTNING STRIKE INSPECTIONS

Page: 4 of 6

Ref.	Prescribed works	Made by	Checked by
	Wing flap		
57-52	Fully extend the flaps and check flaps structure / skin for condition.		
57-52	Check flap hinge for condition and play.		
57-52	Check flap control pin for condition and wear of the groove at the flap root.		
	Pitot-static system		
34-10	Check pitot-static tube for condition.		
34-10	Check pitot-static system hoses for condition.		
	Wing attachments		
57-40	Check wing attachments for condition.		
6. FUSELAGE			
	Fuselage surface		
53-10 53-30	Check fuselage structure / skin for condition and evidence of damage; contact airplane manufacturer if any damage were found.		
Ch. 23 Ch. 34	Check equipment (antennas, etc.) for condition and evidence of damage.		
53-50	Check fiberglass wing fairings for condition and evidence of damage		
	Cockpit canopy		
52-10	Check canopy for condition and evidence of damage.		
7. HORIZONTAL TAIL UNIT			
55-10 55-20	Check HTU structure / skin for condition and evidence of damage; contact airplane manufacturer if any damage were found.		
55-10 55-20	Check tips for condition and evidence of damage.		
55-20	Check elevator for free movement.		
55-20	Check elevator hinge for condition.		
Notes:			
Date: Signature:			



LIGHTNING STRIKE INSPECTIONS

Page: 5 of 6

Ref.	Prescribed works	Made by	Checked by
	Trim tab		
55-20	Check tab for condition.		
8. VERTICAL TAIL UNIT			
55-40	Check VTU structure / skin for condition and evidence of damage; contact airplane manufacturer if any damage were found.		
55-40	Check tip for condition and evidence of damage.		
55-40	Check rudder for free movement.		
55-40	Check rudder attachment for condition.		
9. COCKPIT			
76-10	Check throttle and choke levers for free movement.		
25-60	Check emergency parachute and rocket for condition.		
	Instrument panel		
Ch. 23 Ch. 34	Check individual instruments and COMM/NAV equipment for condition and attachment.		
34-20	Do compensation of compass.		
	Check wires and harness for condition, integrity, connections, attachment and grounding.		
	Hand control		
27-10 27-30	Check hand control for free movement and play.		
	Rudder control		
27-20	Check control for stiffness of movement.		
27-20	Check rudder cables for condition.		
	Wing flap control		
27-50	Check control lever for free movement.		

Notes:

Date:

Signature:



LIGHTNING STRIKE INSPECTIONS

Page: 6 of 6

Ref.	Prescribed works	Made by	Checked by
10. OPERATIONAL TEST			
33-40 33-10	Interior and exterior lighting – check function.		
34-10	Pitot-static tube heating – check function.		
34-10	Stall speed warning sensor – check function.		
27-30	Pitch trim – check function.		
31-50	Acoustical and optical signaling elements – check function.		
	Check all instruments for function.		
61-20	Propeller governor CS 3-5 and propeller KW-31 – check function.		
	Radiocommunication and radionavigation equipment – check function.		
10. FINISHING WORKS			
	Check the completeness of tools and instruments used during the inspection.		
06-40	Install and close all covers and hatches.		
	Do the engine test.		
	Do the brake test.		
	After engine test, test and Check the fuel, oil and cooling system for leakage and their security of all components.		
	Fill out the record about a lightning strike inspection in the logbook. Contact airplane manufacturer if lightning strike damage was found.		
Notes:			
Date: Signature:			



6. EXCEEDING OF ENGINE / PROPELLER LIMITATIONS

A. Exceeding of engine limitations

If the engine limitations have been exceeded during the airplane operation, follow instructions in the Maintenance Manual (Line Maintenance) for Rotax Engine Type 912 Series (Ref. No. MML-912, Part. No. 899191).

B. Exceeding of propeller limitations

If the propeller limitations have been exceeded during the airplane operation, follow instructions mentioned in:

- User Manual Klassic 170/3 Aircraft propeller (Doc. No UM-07 EN),
- User Manual KW-31 Electrical variable aircraft propeller (Doc. No. UM-05 EN).

7. AIRPLANE IMMERSING

Do the following procedure when the airplane has been immersed:

- Dry and clean the interior / exterior of the airplane.
- Clean engine compartment.
- Remove the engine (Section 71-00) and follow instructions in the Maintenance Manual (Line Maintenance) for Rotax Engine Type 912 Series (Ref. No. MML-912, Part. No. 899191).
- Remove the propeller (Section 61-10) and send it to the propeller manufacturer or authorized repair center.
- Remove the instruments and COMM/NAV equipment and send them to the authorized repair center.
- Check fuel system for contamination.
- Do the annual inspection of the airplane (Section 05-20).

8. FUEL CONTAMINATION

In case of fuel contamination, flush the fuel system according with the procedure mentioned in the Section 28-00.

9. TIRE BURST

If the tire burst occurs during the airplane operation, do the 100 FH inspection relating to the landing gear and brakes.

CHAPTER

06

**DIMENSIONS
AND AREAS**



CHAPTER 06

DIMENSIONS AND AREAS

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3. Ailerons		06-5
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AIRPLANE 3-VIEW DRAWING

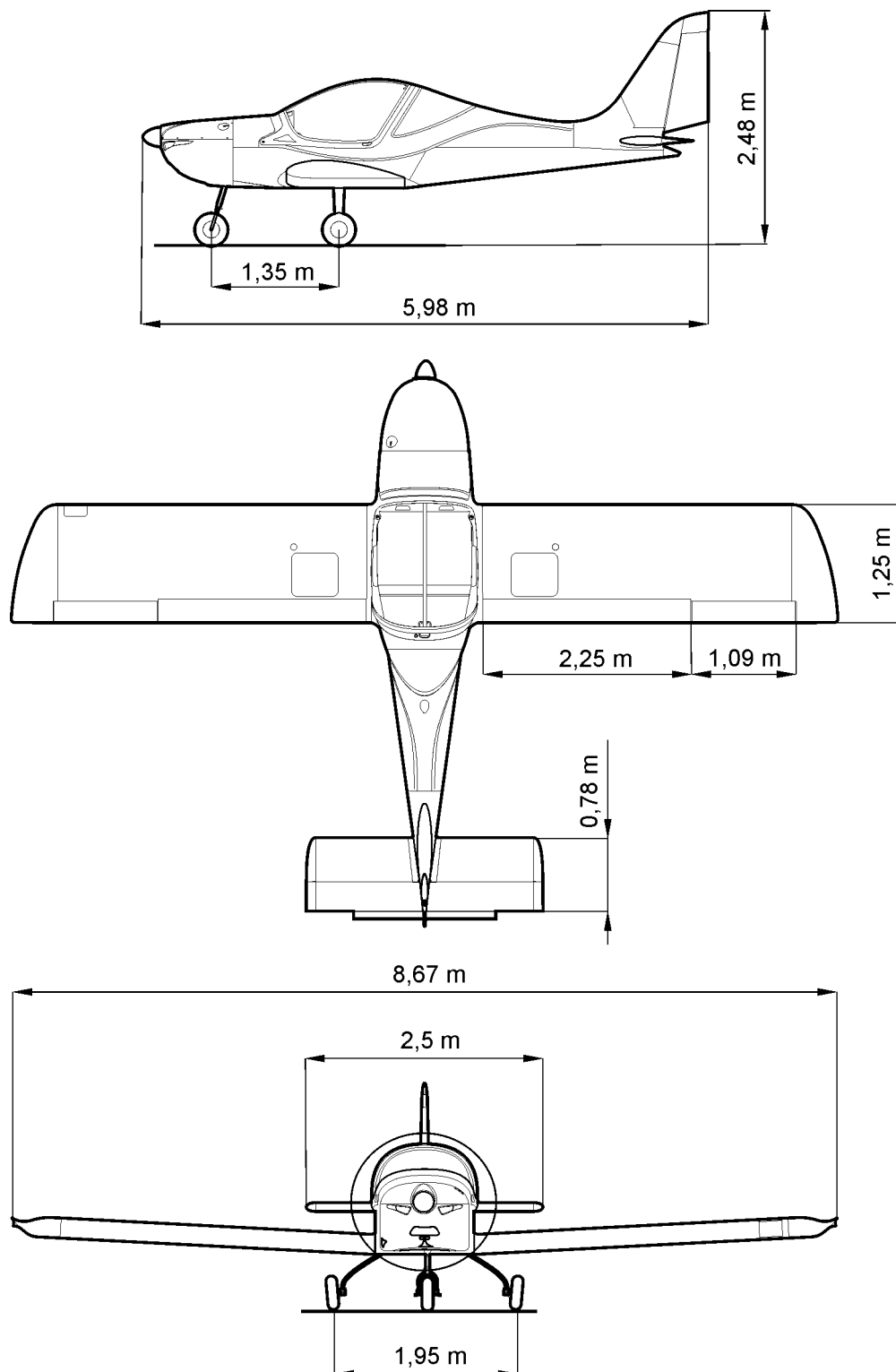


Figure 06-1 3-view drawing of the airplane SportStar RTC (page 1 of 2)

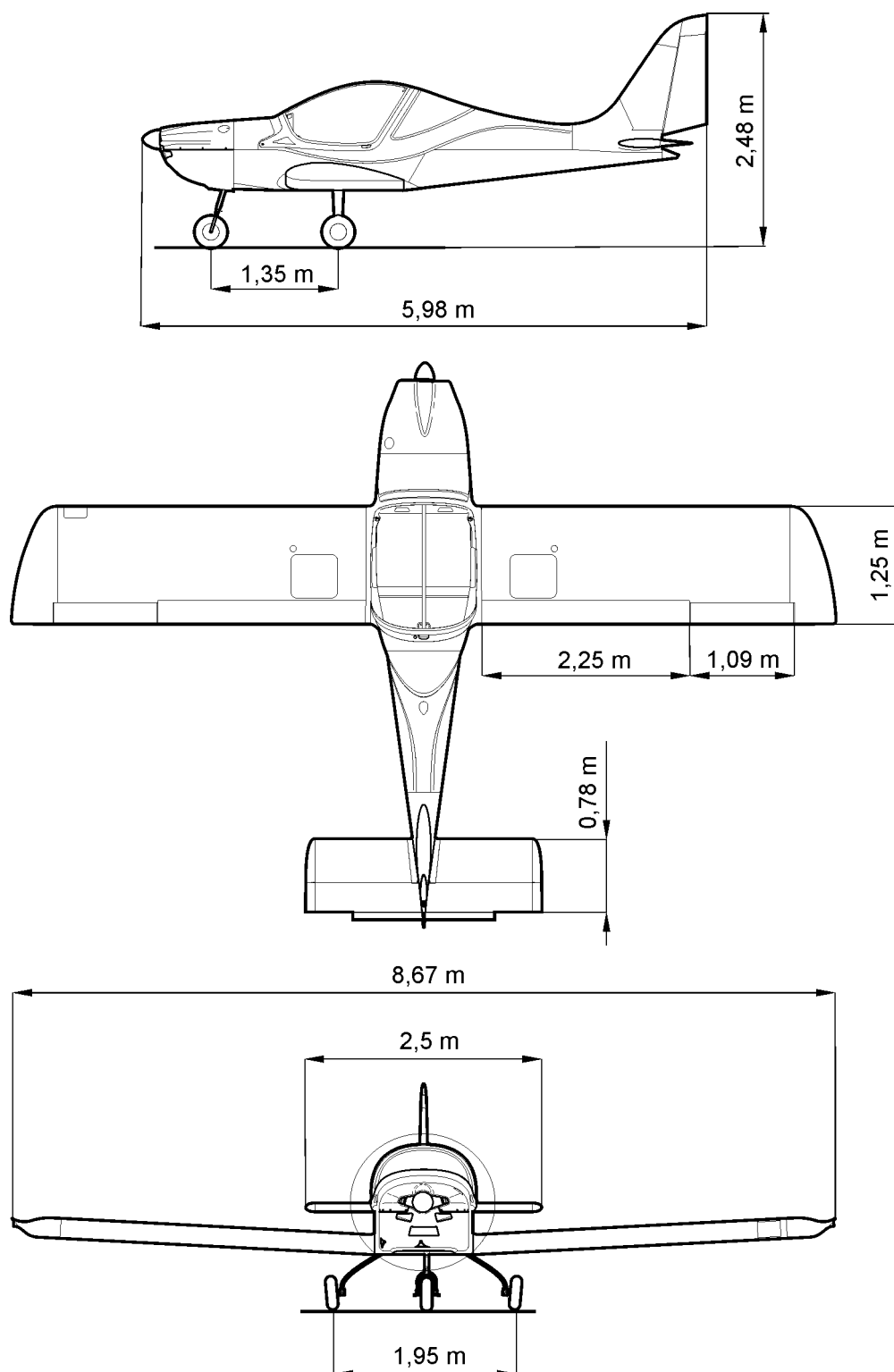


Figure 06-1 3-view drawing of the airplane SportStar RTC (page 2 of 2)



DIMENSIONS AND AREAS

1. EXTERNAL DIMENSIONS

Length	5,98 m
Wing Span	8,67 m
Height	2,48 m

2. WING

Span	8,67 m
MAC depth	1,25 m
Area	10,6 m ²
Wing loading	56,60 kg/m ²

3. AILERONS

Upward deflection	20°
Downward deflection	15°
Span (of one aileron)	1,09 m
Area (of one aileron)	0,25 m ²

4. FLAPS

Up position	0°
Take off position	15°
Landing position I	30°
Landing position II	50°
Span (of one flap)	2,25 m
Area (of one flap)	0,52 m ²

5. HORIZONTAL TAIL UNITS

HTU span	2,5 m
HTU area	1,95 m ²
Elevator area	0,80 m ²
Elevator upward deflection	25°
Elevator downward deflection	20°
Elevator trim upward deflection	5°
Elevator trim downward deflection	25°

**6. VERTICAL TAIL UNITS**

VTU height	1,39 m
VTU area	1,05 m ²
Rudder area	0,43 m ²
Rudder deflection	±30°

7. LANDING GEAR

Wheel track	1,95 m
Wheel base	1,35 m
Diameter of main and nose landing gear wheels	380 mm
Nose landing gear steering range	±10°

8. COCKPIT

Length including baggage compartment	2,08 m
Max. width	1,18 m
Height (from the seat cushion)	1,00 m



LIDS AND COVERS ON THE AIRPLANE

1. GENERAL

Lids and covers on the airplane are shown in Figure 06-2. Legends of these figures include description of attachment of the lids / covers and the areas which can be accessed after they are open / removed.

If the legend of the figure does not include description of attachment of the lids / covers, the following rule applies:

- lids are secured with lever locks or flat springs
- covers are attached with bolts or screws.



2. LIST OF COVERS AND LIDS ON THE AIRPLANE

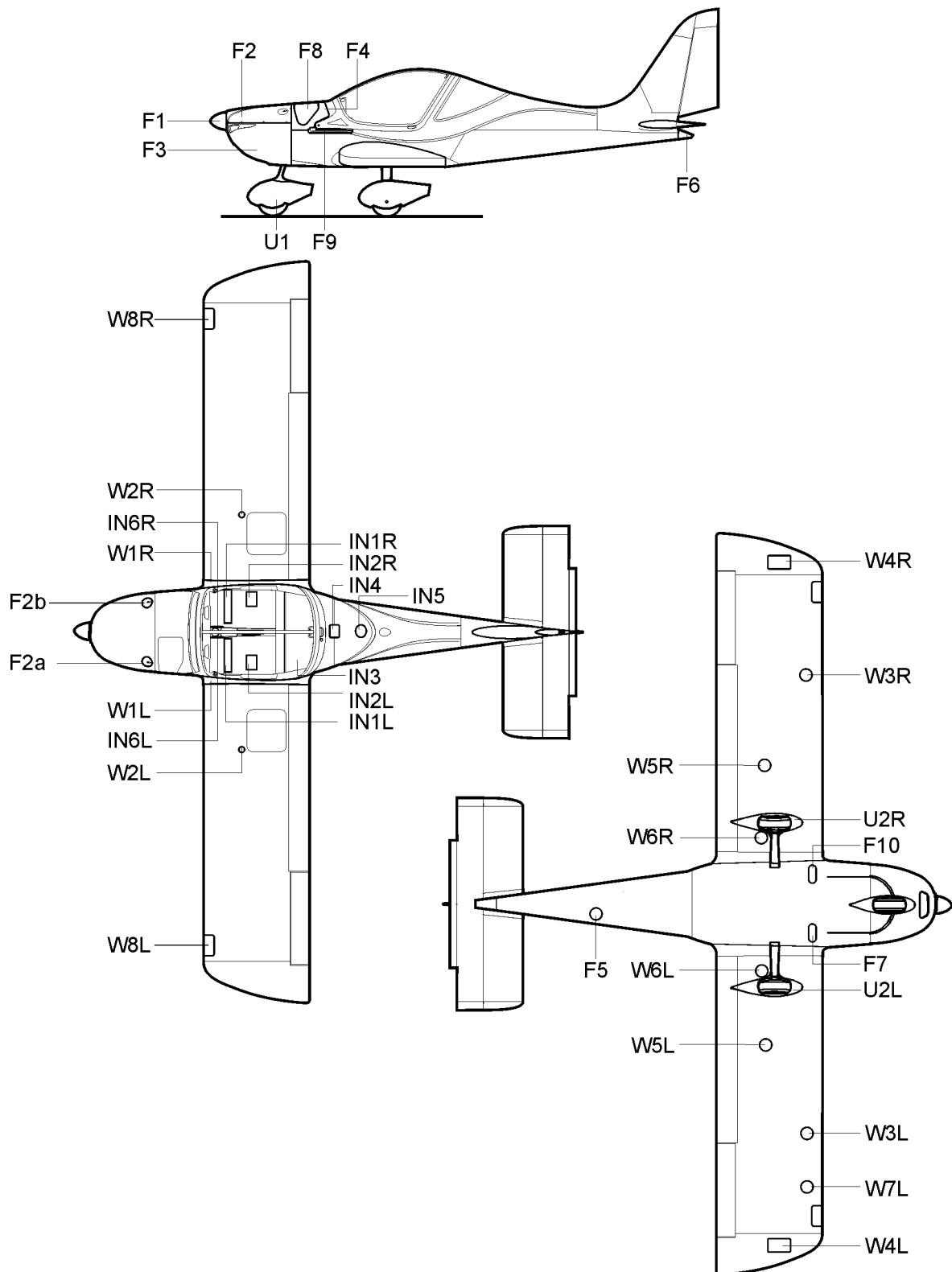


Figure 06-2 Lids and covers on the airplane



Designation	Description
F1	Propeller spinner
F2	Engine upper cowling
F2a	Cap for oil level check
F2b	Cap for coolant level check
F3	Engine lower cowling
F4	Upper cover of the fuselage front section
F5	Inspection cap on the fuselage lower part
F6	Cover of the rear part of the fuselage
F7	Cover for access to the Pitot-static system drain sumps
F8	Rocket cover (if the emergency parachute system is installed; riveted)
F9	Cable cover (if the emergency parachute system is installed; riveted)
F10	Cover for access to the Pitot-static system drain sump (only if two Pitot-static tubes installed)
W1L / W1R	Fairing between wing and fuselage
W2L / W2R	Fuel tank caps
W3L / W3R	Cover on the wing lower surface for access to the aileron control rods
W4L / W4R	Cover on the wingtip lower surface for access to the venting hose of the fuel tank
W5L / W5R	Cover on the wing lower surface for access to the venting hose of the fuel tank
W6L / W6R	Cover on the wing lower surface for access to connection of the fuel tanks to the fuel system in the airplane fuselage
W7L	Cover on the wing lower surface for access to hoses of the Pitot-static system
W8L	Cover of the landing / taxi light
W8R	Cover of the taxi light
IN1L / IN1R	Cover of the control rod in the cockpit
IN2L / IN2R	Cover of the main landing gear hinge
IN3	Floor of the baggage compartment
IN4	Cover for access to ADAHRS (if the Dynon SkyView system or Garmin G3X system is installed)
IN5	Cover for access to the antenna installation
IN6L / IN6R	Cover for access to the fuel cock
U1	Aerodynamic fairing of the nose wheel
U2L / U2R	Aerodynamic fairings of the main landing gear wheels



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CHAPTER

07

**LIFTING AND
SHORING**



CHAPTER 07

LIFTING AND SHORING

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D. Lifting of the airplane with jacks.....		07-6



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GENERAL

1. INTRODUCTION

This Chapter includes description of procedures and technical equipment which are necessary for lifting and shoring of the airplane. The airplane is lifted during weighing, leveling, repairs, replacement of parts, performance of maintenance procedures on the landing gear, etc.

You can lift the airplane with full fuel tanks.

If possible, the airplane must stand on a level surface. The place where you lift the airplane must be protected against the effects of wind (preferably in a hangar).



LIFTING

1. AIRPLANE LIFTING

A. General

CAUTION

DO NOT LIFT THE AIRPLANE OUTDOORS OR IN AN OPEN HANGAR, IF THE WIND EXCEEDS THE VALUE OF 5 m/s.

Because the empty weight of the airplane is relatively low, it is easy to lift it with the aid of two persons.

Use four appropriate supports (Fig. 07-1) or jacks and supports (Fig. 07-2) to lift the airplane. Support the airplane fuselage at the main spar and near the tail skid at the firewall. Align two supports under the wing at the ribs.

The supports must consist of a solid construction; the upper part of the supports under wings must be at least 100 mm wide and 1000 mm long. The upper part of the supports must be covered with a soft, 20 mm thick felt padding, which shall allow to spread the weight of the supported part of the airplane to its entire surface.

Maintenance type: Line

Personnel qualification: Independent verification personnel qualified in accordance with Part 66 or higher

Recommended tools and material:

Item	Designation / Size	Quantity	Note
Supports under wings	-	2 pcs.	
Support under the rear of the fuselage	-	1 pc.	
Support under fuselage	-	1 pc.	
Jack	-	3 pcs.	
Pad for jacks	E9 00-11 03	3 pcs.	

B. Principles for lifting of the airplane

- Use appropriate supports with sufficient load capacity.
- Take care of equal use of all supports - prevent tilting of the airplane, which could impair its stability.
- Do not lift the airplane higher than necessary for performance of maintenance procedures.
- During alignment of supports under the lifting points, take care of planar position of the support base and correct vertical alignment.



C. Lifting of the airplane with supports

(1) Procedure

- (a) Press-down on the rear of the fuselage in front of the fin to lift the front part of the fuselage and then support it at the main transverse spar of the fuselage.
- (b) Grab the rear of the fuselage near the tail skid and lift it upward and then support the rear of the fuselage with a support.
- (c) Push on the wings lower surface at the main spar; do not lift the airplane by the wing tip.

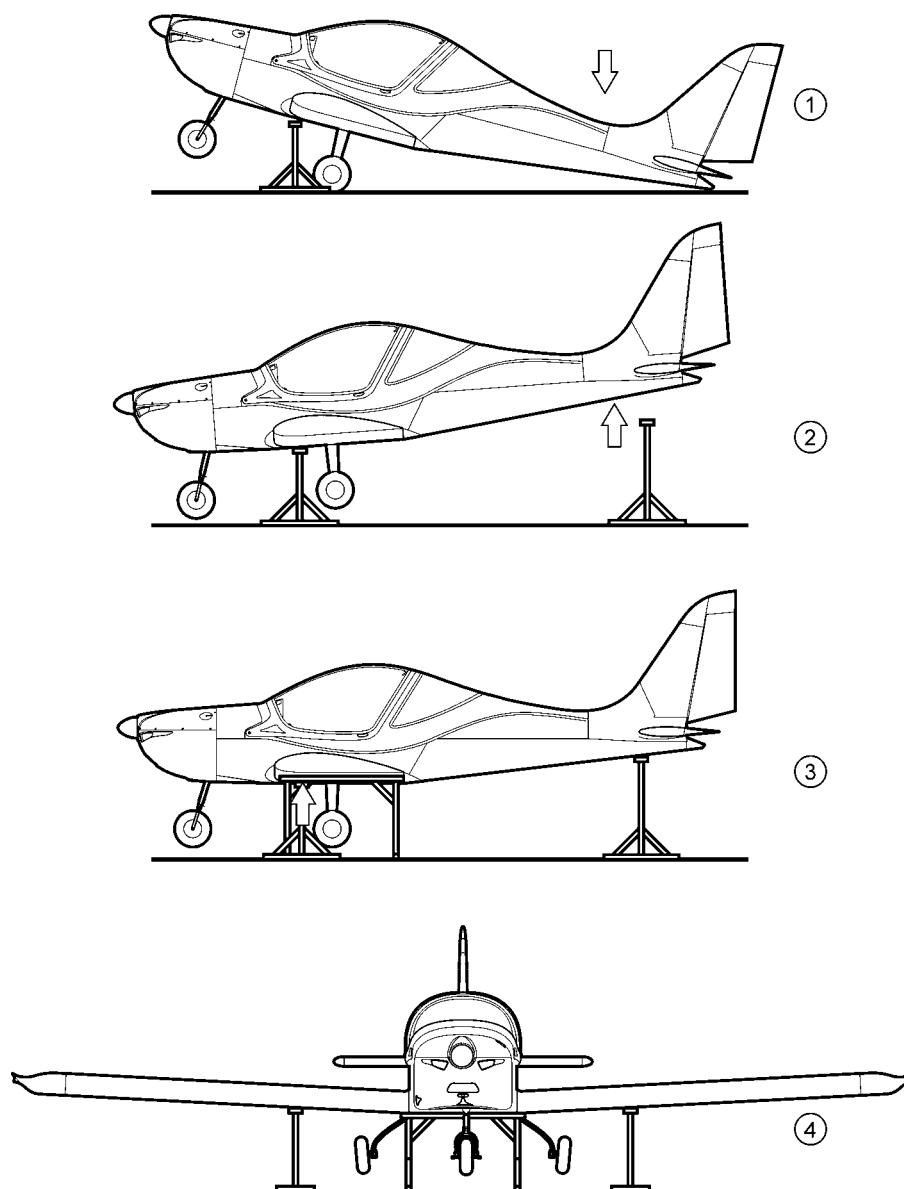


Figure 07-1 Lifting and shoring of the airplane with supports

**D. Lifting of the airplane with jacks****(1) Procedure**

- (a) Screw the pads for jacks to the lifting points on the airplane (on the right side behind the firewall and near the main transverse spar of the fuselage).
- (b) Place the appropriate jacks under the lifting points and raise the lifting screw by turning the nut so that the jack head touches the pad on the fuselage; perform the procedure with all three jacks.
- (c) Gradually turn the nuts of all three jacks to lift the airplane. Take care of equal use of all jacks during lifting. Prevent tilting of the airplane, which could impair its stability on the jacks.
- (d) Support the airplane at the rear part of the fuselage at the firewall.
- (e) Support the wings with supports at the ribs.

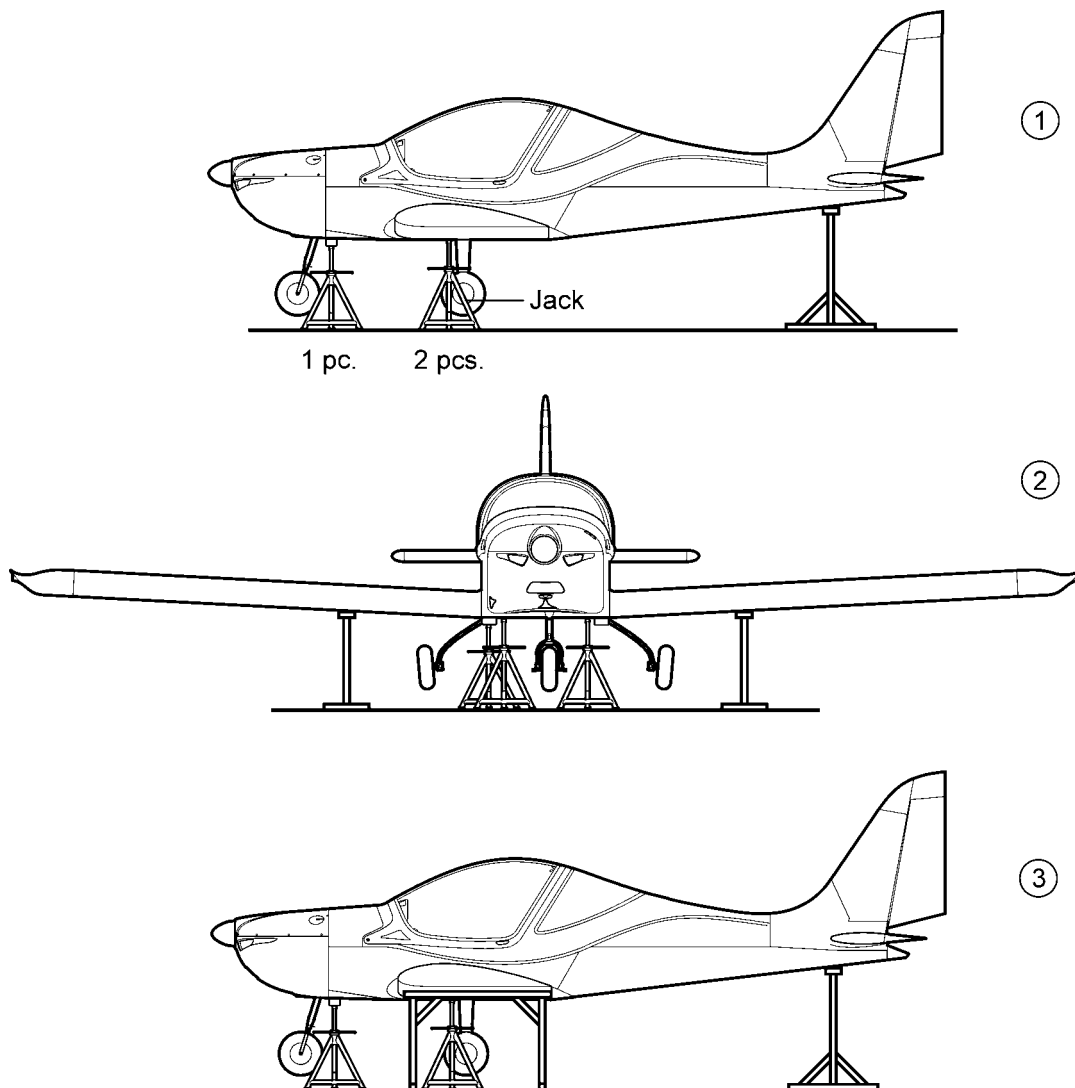


Figure 07-2 Lifting and shoring of the airplane with jacks

CHAPTER

08

**LEVELING AND
WEIGHING**



CHAPTER 08

LEVELING AND WEIGHING

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A. Leveling.....		08-9



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GENERAL

1. INTRODUCTION

This Chapter includes instructions which are necessary for correct alignment of the airplane in a horizontal position in all cases, in cases when it is required due to maintenance and it also provides the instructions related to the procedures during recording, storing, or calculation of data concerning weight and centre of gravity position.



ALIGNMENT IN A HORIZONTAL POSITION

1. AIRPLANE ALIGNMENT

During some procedures related to maintenance and repairs of the airplane, alignment of the airplane in a horizontal position is required. You can align the airplane in a horizontal position with a leveling instrument.

Maintenance type: Line

Personnel qualification: Independent verification personnel qualified in accordance with Part 66 or higher

Recommended tools and material:

Item	Designation / Size	Quantity	Note
Leveling instrument	-	1 pc.	
Rests under the wheels	-	As necessary	

2. AIRPLANE ON SUPPORTS

A. Measurement with the leveling instrument

In order to perform measurements during alignment of the airplane, use an appropriate leveling instrument, which shall enable reading of distance of leveling points on the airplane from the leveling plane created by the leveling instrument. Location of leveling points is shown in Fig. 08-1.

(1) Procedure:

- (a) Lift the airplane (Section 07-10).
- (b) First align the airplane in a horizontal position in lateral direction and then in longitudinal direction.
- (c) In order to align the airplane in lateral direction, use the leveling points NiB 5-7 (Fig. 08-1), which are located on the wings. Change the height of the supports under the wings to align the airplane.
- (d) In order to align the airplane in longitudinal direction, use the leveling points NiB 1-2, which are located on the fuselage on the leveling plane. Change the height of the supports under the fuselage to level the airplane.

3. AIRPLANE ON WHEELS

CAUTION

AFTER COMPLETION OF WORKS ON THE AIRPLANE,
INFLATE THE TYRES TO THE REQUIRED PRESSURE
(SECTION 12-10).



A. Measurement with the leveling instrument

For measurement during alignment of the airplane, use an appropriate leveling instrument, which shall enable reading of distance of leveling points on the airplane from the leveling plane created by the leveling instrument. Location of leveling points is shown in Fig. 08-1.

(1) Procedure

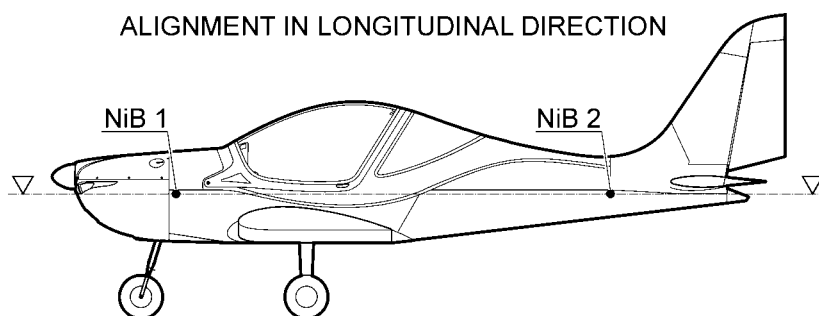
- (a) First align the airplane in a horizontal position in lateral direction and then in longitudinal direction.
- (b) In order to align the airplane in lateral direction, use the leveling points NiB 5-7 (Fig. 08-1), which are located on the wings. In order to leveling the airplane, you can use appropriate rests which shall be placed under the main landing gear wheels, or discharge the air from the tyres of the main landing gear wheels.

NOTE

Discharge the air from the tyres slowly and in small increments
– consider inertia of the system. Prevent inappropriate deformation of the tyre when you discharge the air.

- (c) In order to align the airplane in longitudinal direction, use the leveling points NiB 1-2, which are located on the fuselage on the levelling plane. In order to align the airplane, it is possible to use appropriate rests which shall be placed under the landing gear wheels, or discharge the air from the tyre of the nose landing gear wheel.

ALIGNMENT IN LONGITUDINAL DIRECTION



ALIGNMENT IN LATERAL DIRECTION

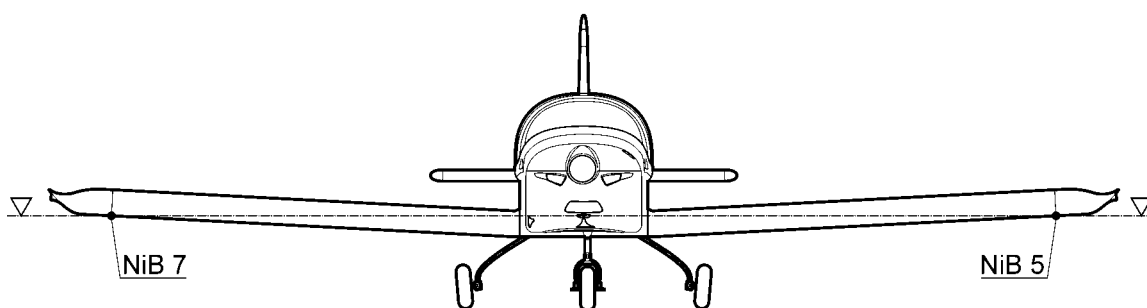


Fig. 08-1 Alignment of the airplane in a horizontal position



WEIGHING

1. GENERAL

You can find the data concerning the empty weight of the airplane and the centre of gravity position, determined by the manufacturer during completion of the airplane, in the Pilot's Operating Handbook for SportStar RTC (Doc. No. ERTC020-10-AS) (Chapter 6) and on the placard **LOAD LIMITS**.

Additional installation or removal of any parts will affect this default data. During installation of a compact equipment which allows to determine "arm", i.e. distance between the centre of gravity of the equipment and the reference plane with sufficient accuracy, it is possible to recalculate the default data on the basic weight and centre of gravity as a simple sum of the initial moment (product of the weight multiplied by the arm) and the moment of the installed equipment. Determine the new arm by dividing the new moment by the new weight (defined as the sum of the original weight and the weight of the new equipment). Similarly, in case of disassembly, subtract the moment of the removed equipment from the original moment of the empty airplane mass.

The wing leading edge constitutes the reference plane. Any mass added in front of the wing decreases the moment, removed mass increases the moment, any mass added behind the wing increases the moment, removed mass decreases the moment.

In case of a complex modification of the airplane, extensive repair, during which parts of the airplane were replaced, renewal of the outer coating, etc., it is necessary to determine the new weight and centre of gravity of the empty airplane.

2. WEIGHING OF THE AIRPLANE

Maintenance type: Line

Personnel qualification: Independent verification personnel qualified in accordance with Part 66 or higher

Recommended tools and material:

Item	Designation / Size	Quantity	Note
Scales	-	3 pcs.	

A. Preparation of the airplane for weighing

- (1) Preparation procedure
 - (a) Assembly of the airplane is complete and final coating is finished.
 - (b) Remove all dirt, snow, ice, water and other unwanted objects (covering sheets, etc.) from the airplane.
 - (c) Inflate the tyres to the recommended operating pressure.
 - (d) Empty the fuel from the fuel system (Section 12-10).
 - (e) Refill oil, coolant and hydraulic fluid to the prescribed maximum quantities.
 - (f) Secure controls of the airplane in neutral position and retract the flaps.
 - (g) Close the cockpit canopy, other covers and make sure that all lids are closed.
 - (h) Prepare and adjust the scales.
 - (i) Perform weighing in a closed building to eliminate the effects of wind on the value readings.



- (j) Align the airplane in a horizontal position (Section 08-10).

B. Weighing

(1) Procedure

- (a) Record the following values in the Weight Record (Fig. 08 2):
- 1 Results of weighing (average values from three weighings):
 - NW_N front reaction
 - NW_L left rear reaction
 - NW_P right rear reaction.
 - 2 Weights of the individual rests.
 - T_N front rest
 - T_L left rear rest
 - T_R right rear rest
 - 3 Distances of a, b supporting points
 - 4 Calculate the net weight values NW_i
- (b) Based on the above values, calculate in accordance with the relations, specified in the Weight Record (Figure 08-2):
- Total weight of the weighed airplane.
 - Centre of gravity position.
- (c) Record the calculated values (TW ; C.G.; $\overline{C.G.}$) in the Weight Record (Fig. 08 2).
- (d) Compare the calculated values with the values of "Permitted tolerance", indicated in the Weight Record (Fig. 08-2); record the calculated values in the Flight Manual for the airplane SportStar RTC (Chapter 6).
- (e) Calculate and record the permitted crew weight for fueling and baggage – see the Pilot's Operating Handbook for SportStar RTC, par. 6.3.
- (f) Update the placard (create a new one) **LOAD LIMITS** and place it in the airplane cockpit (Section 11-30).

CAUTION

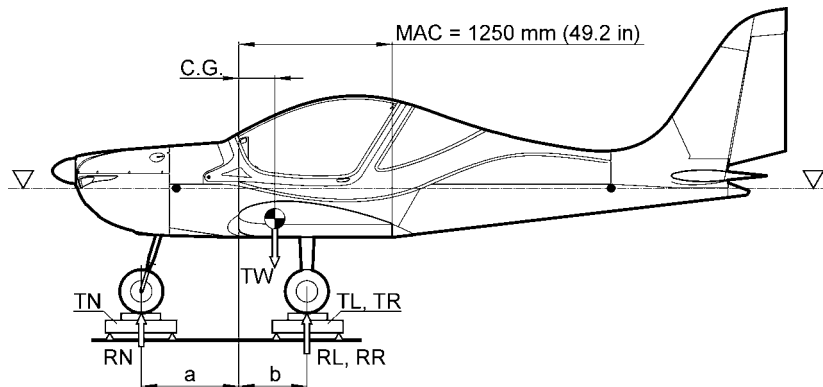
IF THE VALUES OF PERMITTED TOLERANCE OF WEIGHT AND CENTRE OF GRAVITY OF THE EMPTY AIRPLANE ARE EXCEEDED, CONTACT THE AIRPLANE MANUFACTURER.

NOTE

After weighing, renew the pressure in the tyres of the nose and main landing gear to the operating values.



Model:	SportStar RTC	Registration:		S/N	
Configuration:					



Item	Unit	Value reading R_i	Weight of rests T_i	Net weight $NW = R_i - T_i$
Nose wheel	kg/lbs	$R_N =$	$T_N =$	$NW_N =$
Left main wheel	kg/lbs	$R_L =$	$T_L =$	$NW_L =$
Right main wheel	kg/lbs	$R_R =$	$T_R =$	$NW_R =$
Measured distances	mm/in	$a =$		
	mm/in	$b =$		

Basic weight and centre of gravity of the empty airplane			
Item	Unit	Formula	Calculated value
Total weight	kg	$TW = NWN + NWL + NWR$	
Centre of gravity position	mm/in	$C.G. = \frac{(NW_L + NW_R) \times b - NW_N \times a}{TW}$	
Centre of gravity position	%MAC	$\overline{C.G.} = \frac{C.G.}{MAC} \cdot 100$	
Permitted tolerance	$\overline{C.G.} = 20 \pm 2 \% \text{ MAC}$		
	$TW = 335 \text{ kg} \pm 2 \%$		
Carried out by:		Signature:	Date:

Fig. 08-2 Weight Record



LEVELING

1. AIRPLANE LEVELING

Purpose of the airplane leveling is to check alignment of the individual parts of the airplane against each other.

Airplane leveling is carried out during replacement of parts, which can affect the measurement results, after bumpy landing, exceedance of max. load factors and in other cases, when the values checked during levelling could change. The purpose of leveling is to verify whether the airplane geometry was not changed.

The airplane must stand on a flat surface and the place where you perform the airplane levelling must be protected from the effects of wind (preferably in a hangar).

In serious cases it is necessary to contact the airplane manufacturer.

Maintenance type: Line

Personnel qualification: Independent verification personnel qualified in accordance with Part 66 or higher

Recommended tools and material:

Item	Designation / Size	Quantity	Note
Ruler for measurement of vertical distances	-	1 pc.	
Leveling instrument	-	1 pc.	

A. Leveling

NOTE

Perform all measurements three times and record the average values from three measurements in the Leveling Record.

(1) Procedure

- (a) Lift the airplane and align it in a horizontal position (Section 08-10).
- (b) Position the leveling instrument so that you can measure the vertical distances on both sides of the airplane.
- (c) Set the height of the leveling plane (i.e. distance of the plane in which the leveling instrument axis lies) from the fuselage reference plane so that it is possible to read the vertical distances of the levelling points from the levelling plane.
- (d) Align the leveling instrument in a horizontal position and record the following data in the Leveling Record (Fig. 08-3):
 - 1 Vertical measurements – distances of NiB 1 to 17 (both on left and right side of the airplane) from the leveling plane; compare the measured values with the theoretical values.
 - 2 Direct measurements - distance between the individual leveling points (both on left and right side of the airplane); compare the measured values with the theoretical values.
 - 3 Compare the calculated differences between NiB (both on left and right side of the airplane) with the theoretical values.



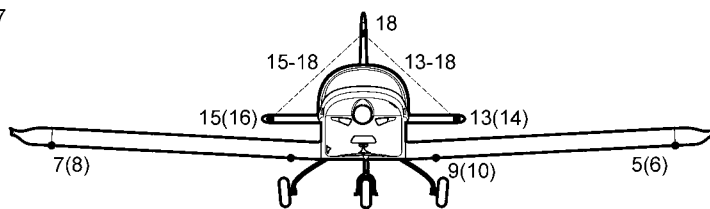
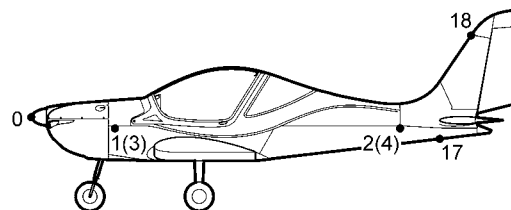
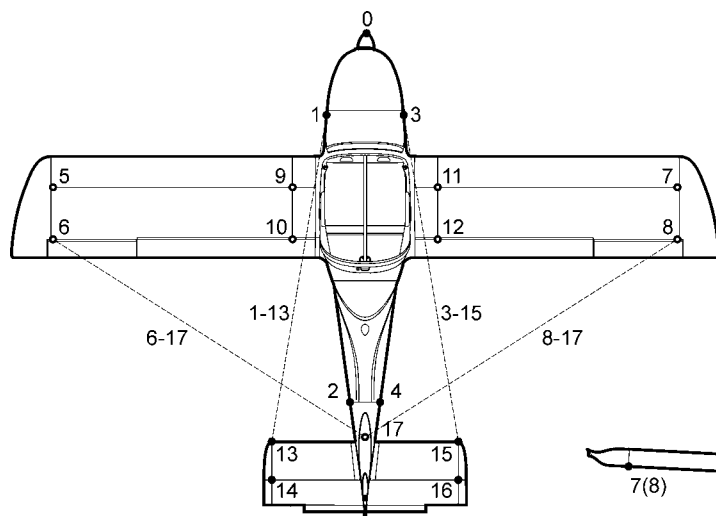
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- (e) Record the inspection evaluation in the form. If you identify any permanent deformations, consult further steps with the airplane manufacturer.



Model: SportStar RTC

Registration:

S/N



Vertical Measurement Distance [mm]

Point	Measure Xi	Specified	Tol.	Real Zi	Compliance?
0		77	±10		
1		-50	±2		
2		-50	±2		
3		-50	±2		
4		-50	±2		
5		-283	±10		
6		-283	±10		
7		-283	±10		
8		-283	±10		
9		-444	±3		
10		-441	±3		
11		-444	±3		
12		-441	±3		
13		49	±5		
14		11	±5		
15		49	±5		
16		11	±5		
17		-184	±3		

Real value of leveling point

$$Z_i = X_i - Y$$
$$Y = X_1 + 50$$
$$Y =$$

Values of the leveling points are related to fuselage reference plane (ZRT). Airplane position is set according to leveling points 1 and 2 (longitudinal position), 5 and 7 (lateral position).

Adjust bank indicator on the instrument panel.

Leveling compliance: **YES** **NO**

Straight Measurement Distance [mm]

Points	Specified	Tol.	Real distance	Compliance?
1-13	3995	±10		
3-15				
6-17				
8-17	4585	±15		
6-13				
8-15				
13-18	3710	±10		
15-18				
13-18	1614	±10		
15-18				
14-18	1540	±10		
16-18				

Differences Left/Right Side [mm]

Points	Difference	Tol.	Real distance	Compliance?
1-3	0	±2		
2-4				
1-2	0	±2		
3-4				
5-6	0	±5		
7-8				
9-10	-3	±5		
11-12				
5-9	161	±10		
7-11				
6-10	158	±10		
8-12				
13-15	0	±10		
14-16				
1-13	0	±20		
3-15				
6-17	0	±20		
8-17				
13-18	0	±10		
15-18				

Carried out by:

Signature:

Date:

Fig. 08-3 Leveling Record

Effectivity: All

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CHAPTER

09

**TOWING AND
TAXIING**



CHAPTER 09

TOWING AND TAXIING

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GENERAL

1. INTRODUCTION

Towing is used to tow the airplane to the desired location.

When you move the airplane for short distances, the airplane is pushed by the ground personnel and its direction is controlled by the tow bar which is connected to the nose landing gear.

When you move the airplane for long distances, you can tow the airplane behind the motor vehicle (tractor) with the tow bar connected to the nose landing gear.

When you tow or move the airplane near the obstacles (buildings, other airplanes), it is appropriate to ensure monitoring of the airplane by a person who walks beside the airplane and appropriately conveys information about the risk of collision of the airplane with the obstacles to the driver of the motor vehicle (tractor) or the brake operator in the cockpit.



TOWING

1. TOWING WITH THE TOW BAR

A. General

In order to tow the airplane out of the hangar, etc. use the tow bar. The tow bar is used to steer the nose landing gear wheel and to control the direction during manipulation with the airplane. If the tow bar is connected, it is possible to steer the nose landing gear wheel within $\pm 10^\circ$ from the centre position.

Moving the airplane by holding the propeller blade root must be done in accordance with the limitations stated in the propeller user manual.

You can move the airplane by holding the rear part of the fuselage in front of the fin, or by holding the wing roots.

Never push the airplane at places labelled **DO NOT PUSH HERE**. Do not push and pull the airplane by holding the propeller blade tips and control surfaces.

CAUTION

WHEN YOU MOVE THE AIRPLANE MANUALLY, TAKE EXTREME CAUTION IN ORDER TO PREVENT DAMAGE OF WINGS, TAIL UNIT OR OTHER PARTS OF THE AIRPLANE.

NEVER TOW THE AIRPLANE WITH OPEN COCKPIT CANOPY.

WHEN YOU TOW THE AIRPLANE, YOU SHALL NOT EXCEED MAXIMUM PERMITTED DEFLECTION OF THE NOSE LANDING GEAR WHEEL $\pm 10^\circ$. THE NOSE LANDING GEAR IS EQUIPPED WITH THE STOPS AND IF THIS ANGLE IS EXCEEDED, IT WILL BE DAMAGED. IF YOU EXCEED THE PERMITTED ANGLE DURING TOWING, CHECK THE NOSE LANDING GEAR LEG.

Maintenance type: Line

Personnel qualification: Pilot / Owner qualified in accordance with M.A.803.

Recommended tools and material:

Item	Designation / Size	Quantity	Note
Tow bar	S9 05-00 01	1 pc.	
Wheel chocks	E9 40-00 01	2 pcs.	



B. Manipulation with the tow bar

- (1) Procedure
 - (a) Connect the tow bar to the nose landing gear (see Fig. 09-1).
 - (b) Remove the wheel chocks.
 - (c) Move the airplane to the desired location.
 - (d) Brake the airplane with the wheel chocks. Place the wheel chocks in front and behind the main landing gear wheels or behind the one main landing gear wheel and in front the nose landing gear wheel.
 - (e) Disconnect the tow bar from the airplane.

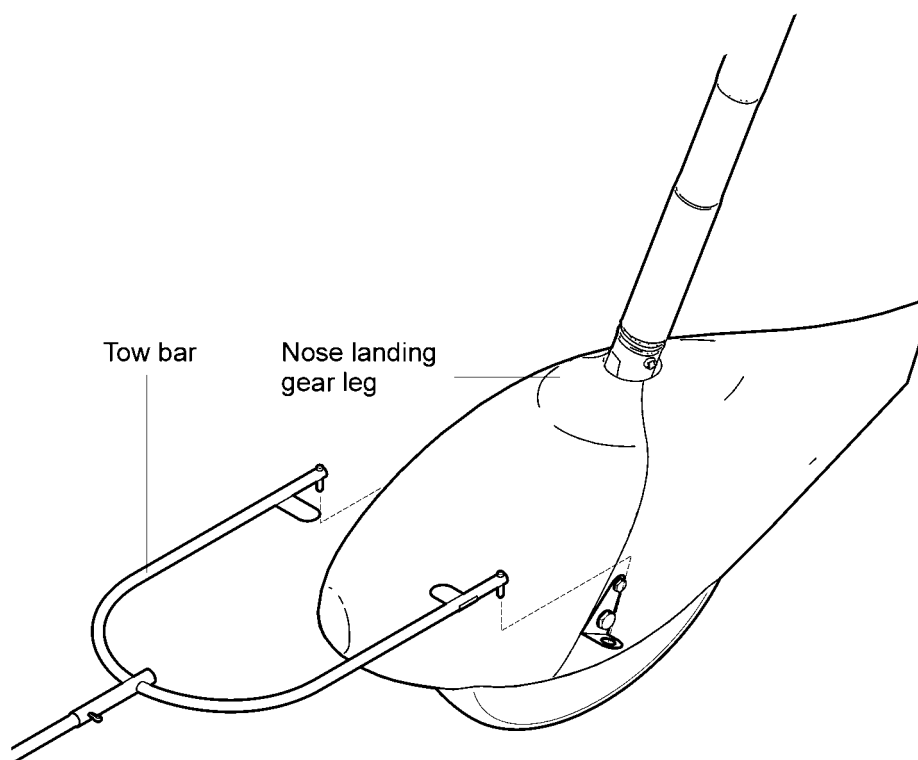


Figure 09-1 Towing with the tow bar



2. TOWING BEHIND THE MOTOR VEHICLE (TRACTOR)

A. General

CAUTION

WHEN YOU MOVE THE AIRPLANE MANUALLY, TAKE EXTREME CAUTION IN ORDER TO PREVENT DAMAGE OF WINGS, TAIL UNIT OR OTHER PARTS OF THE AIRPLANE.

DO NOT USE THE TOW BAR TO TOW THE AIRPLANE BEHIND THE MOTOR VEHICLE (TRACTOR).

NEVER TOW THE AIRPLANE WITH OPEN COCKPIT CANOPY.

WHEN TOWING, YOU SHALL NOT EXCEED MAXIMUM PERMITTED DEFLECTION OF THE NOSE LANDING GEAR WHEEL $\pm 10^\circ$. THE NOSE LANDING GEAR IS EQUIPPED WITH THE STOPS AND IF THIS ANGLE IS EXCEEDED, IT WILL BE DAMAGED. IF YOU EXCEED THE PERMITTED ANGLE DURING TOWING, CHECK THE NOSE LANDING GEAR LEG.

Maintenance type: Line

Personnel qualification: Pilot / Owner qualified in accordance with M.A.803.

Recommended tools and material:

Item	Designation / Size	Quantity	Note
Tow bar	-	1 pc.	
Wheel chocks	E9 40-00 01	2 pcs.	

B. Airplane towing

(1) Procedure

- (a) Connect the tow bar to the nose landing gear.
- (b) Remove the wheel chocks.
- (c) Move the airplane to the desired location:
 - 1 Pilot or member of the ground personnel who knows how to operate the airplane brakes must sit in the airplane cockpit (on the pilot seat).
 - 2 The driver of the motor vehicle (tractor) which tows the airplane must avoid abrupt steering wheel movements and rapid braking. He must adjust the speed of towing to surface of the area, obstacles and meteorological conditions.
 - 3 When you tow the airplane at reduced visibility, turn on the position lights of the airplane (if the airplane is equipped with them)
 - 4 Never tow the airplane tail unit first. In necessary cases (e.g. pushing in a row of standing airplanes), you can push the airplane by the tow bar.
- (d) Brake the airplane with the wheel chocks. Place the wheel chocks in front and behind the main landing gear wheels or behind the one main landing gear wheel and in front the nose landing gear wheel.
- (e) Disconnect the tow bar from the airplane and the tractor.



TAXIING

1. GENERAL

Taxiing is a way to move the airplane with thrust of the airplane power unit.

Procedures for taxiing of the airplane are described in the Pilot's Operating Handbook for SportStar RTC (Doc. No. ERTC020-10-AS) (Chapter 4).

Rotation of the nose landing gear is connected to the rudder control. Deflection of the nose landing gear wheel $\pm 10^\circ$ is achieved at full deflection of the pedal. You can do turns with a small radius with differential braking of the main landing gear wheels. Use differential braking only at low forward speed.

NOTE

Only the qualified personnel may start the engine and taxi the airplane.

Adjust the speed of taxiing to the terrain condition, obstacles, traffic at the airport, wind speed and direction.



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CHAPTER

10

**PARKING AND
MOORING**



CHAPTER 10

PARKING AND MOORING

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GENERAL

1. INTRODUCTION

This Chapter establishes instructions which are necessary for parking and mooring of the airplane during all expected weather conditions which can have effect on the airplane. You must apply the procedures for mooring of the airplane every time a strong wind is expected or during long term parking of the airplane. This Chapter also includes instructions which are applied during grounding of the airplane.



PARKING

1. GENERAL

The airplane is parked on reinforced surface of the stand, where anchors for the airplane mooring are built-in (Section 10-20).

The procedures for parking depend on the expected weather and the climatic conditions in which the airplane is parked. In case that bad weather is expected (very strong wind, torrential rains, etc.), park the airplane in a hangar. During parking in the hangar, apply the same procedures as during parking.

In case of parking on a surface without sufficient load-bearing capacity, e.g. asphalt surface at high air temperatures or sludgy unreinforced surface, there is a risk of sinking of the wheels into the ground. Do not park on the surface without sufficient load-bearing capacity.

2. PARKING

Maintenance type: Line

Personnel qualification: Pilot / Owner qualified in accordance with M.A.803.

Recommended tools and material:

Item	Designation / Size	Quantity	Note
Wheel chocks	E9 40-00 01	2 pcs.	
Mooring strap	729151	3 pcs.	Airplane mooring
Anchor	901702	3 pcs.	Airplane mooring
Canopy cover	769100	1 pc.	
Pitot tube cover	S9 01-10 01	1 pc.	
Propeller blade cover	-	3 pcs.	

A. Parking

(1) Procedure

- (a) Position the airplane against the wind (if possible).
- (b) Make sure that the fuel cock is closed and all switches and circuit breakers are turned off.
- (c) Check retraction of flaps.
- (d) Brake the airplane with wheel chocks. Place the wheel chocks in front and behind the main landing gear wheels or behind the one main landing gear wheel and in front the nose landing gear wheel.
- (e) Close the ventilation windows.
- (f) Close and lock the cockpit canopy.
- (g) Install the pitot tube cover.

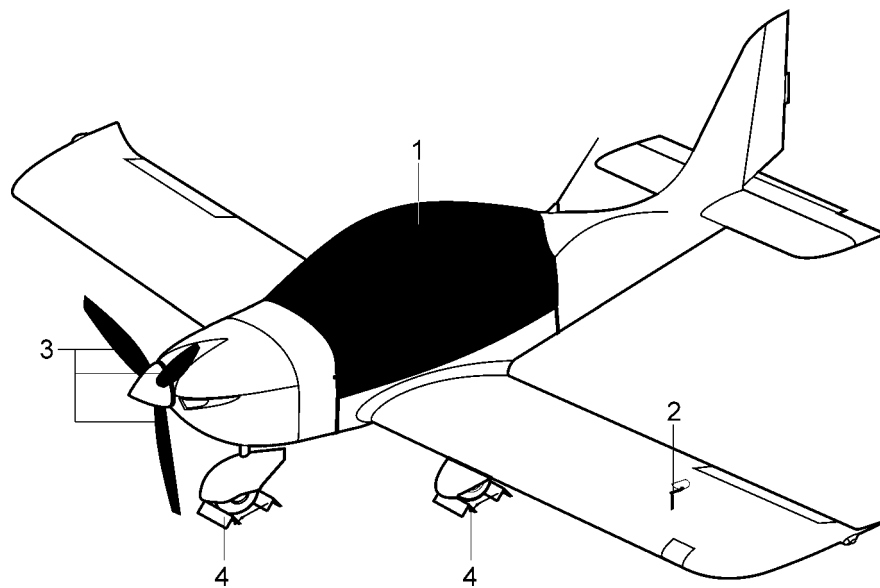


B. Extension of procedures during parking under bad weather conditions

- (1) Procedure
 - (a) Block the manual controls e.g. with the safety belts, or by tying the control stick to the pedals with a suitable rope.
 - (b) Connect the grounding cable to the airplane.
 - (c) Moor the airplane (Section 10-20).
 - (d) Install the canopy cover.
 - (e) Install the propeller blade covers.

C. Extension of procedures during parking under snow or arctic conditions, when formation of icing or snow is expected

- (1) Procedure
 - (a) Remove the battery and store it in an appropriate area outside the airplane.
 - (b) The airplane manufacturer recommends to cover the airplane with protective covers.



Legend to Fig. 10-1

1 Canopy cover	3 Propeller blade cover
2 Pitot tube cover	4 Wheel chocks

Figure 10-1 Securing the airplane during parking



3. GROUNDING

A. General

The following procedures are intended for protection of the airplane, if its storage is expected. The main objective is to prevent corrosion and damage to the parts of the airplane which are exposed to weather conditions.

Depending on the period during which the airplane will be out of operation, storage is divided to:

- Temporary storage (30 to 90 days)
- Long term storage (more than 91 days).

If possible, park the airplane in a hangar during storage.

Maintenance type: Line

Personnel qualification: Independent verification personnel qualified in accordance with Part 66 or higher

Recommended tools and material:

Item	Designation / Size	Quantity	Note
Wheel blocks	E9 40-00 01	2 pcs.	
Mooring strap	729151	3 pcs.	Airplane mooring
Anchor	901702	3 pcs.	Airplane mooring
Canopy cover	769100	1 pc.	
Pitot tube cover	S9 01-10 01	1 pc.	
Propeller blade cover	-	3 pcs.	

B. Temporary storage (30 to 90 days)

(1) Parking

Do the procedure for parking (see par. 2 A.).

(2) Airplane exterior

- (a) Clean the airplane (Section 12-20).
- (b) Lubricate the airplane in accordance with Lubricating Chart (Section 12-20).
- (c) Clean the cockpit canopy (Section 12-20).
- (d) Install the canopy cover.

(3) Airplane interior

- (a) Clean and cover COMM/NAV equipment and flight instruments with an appropriate cover.
- (b) Clean the airplane cockpit.

(4) Electrical system

Remove and store the battery (Section 24-30).



- (5) Fuel system
 - (a) Fill the fuel tanks (Section 12-10).
 - (b) Drain the fuel each month (Section 12-10).
- (6) Landing gear
 - (a) Inflate the tires (Section 12-10).
 - (b) Check the tire pressure, inflate the tires in case of leakage (Section 12-10).
 - (c) Turn the wheels regularly (three to four revolutions every 30 days) in order to prevent corrosion.
- (7) Power plant

Service the engine in accordance with the preservation procedure for the operated engine specified in the document Operators Manual for Rotax Engine Type 912 Series, Doc. No. OM912, 899649.

C. Restoration into operation after temporary storage

- (1) Parking
 - (a) Remove all covers, caps and control surface locking.
 - (b) Remove the airplane mooring.
- (2) Airplane exterior
 - (a) Remove the canopy cover.
 - (b) Clean the airplane (Section 12-20).
 - (c) Clean the cockpit canopy (Section 12-20).
 - (d) Lubricate the airplane in accordance with Lubricating Chart (Section 12-20).
- (3) Airplane interior

Remove the cover of COMM/NAV equipment and flight instruments.
- (4) Electrical system

Check condition of the battery, install the battery (Section 24-30).
- (5) Power plant

Service the engine in accordance with the procedure for restoration into operation specified in the document Operators Manual for Rotax Engine Type 912 Series, Doc. No. OM912, 899649.
- (6) Do the preflight inspection (Pilot's Operating Handbook for SportStar RTC (Doc. No. ERTC020-10-AS), Chapter 4).
- (7) Do the operational tests (Section 05-20).

**D. Long term storage (more than 91 days)**

- (1) Parking
Do the procedure for parking (see par. 2 A.).
- (2) Airplane exterior
 - (a) Clean the airplane (Section 12-20).
 - (b) Lubricate the airplane in accordance with Lubricating Chart (Section 12-20).
 - (c) Clean the cockpit canopy (Section 12-20).
 - (d) Install the canopy cover.
 - (e) Cover the exterior lighting (if installed) with foil and secure it with an adhesive tape.
- (3) Airplane interior
 - (a) Clean and cover COMM/NAV equipment and flight instruments with an appropriate cover.
 - (b) Cover the instrument panel with foil and secure it with an adhesive tape.
 - (c) Clean the airplane cockpit.
- (4) Electrical system
Remove and store the battery (Section 24-30).
- (5) Fuel system
Drain fuel system (Section 12-10).
- (6) Landing gear
 - (a) Inflate the tires (Section 12-10).
 - (b) Check the tire pressure, inflate the tires in case of leakage (Section 12-10).
 - (c) Clean and preserve the brakes with the lubricating grease.
 - (d) Turn the wheels regularly (three to four revolutions every 30 days) in order to prevent corrosion.
- (7) Power plant
Service the engine in accordance with the preservation procedure for the operated engine specified in the document Operators Manual for Rotax Engine Type 912 Series, Doc. No. OM912, 899649.

E. Restoration into operation after long term storage

- (1) Parking
 - (a) Remove all covers, caps and control surface locking.
 - (b) Remove the airplane mooring.
- (2) Airplane exterior
 - (a) Remove the canopy cover.
 - (b) Remove foil from exterior lighting.
- (3) Airplane interior
 - (a) Remove cover of COMM/NAV equipment and flight instruments.
 - (b) Remove foil from the instrument panel.



-
- (4) Electrical system
Check condition of the battery, install the battery (Section 24-30).
 - (5) Fuel system
Fill the fuel tanks (Section 12-10).
 - (6) Landing gear
Clean the brakes.
 - (7) Power plant
Service the engine in accordance with the procedure for restoration into operation specified in the document Operators Manual for Rotax Engine Type 912 Series, Doc. No. OM912, 899649.
 - (8) Do the annual inspection of the airplane (Section 05-20).



MOORING

1. GENERAL

The airplane is moored during parking outdoors (on the stand). The mooring method is shown in Fig. 10-2. Correct airplane mooring is important especially when a strong wind is expected or during long term parking of the airplane. If a very strong wind has an effect on the airplane on the stand (e.g. during storm), it may damage the airplane structure. If a strong wind is expected, place the airplane in a hangar – if it is not possible, it is necessary to moor the airplane.

2. MOORING

CAUTION

DO NOT CONNECT THE MOORING ROPES DIRECTLY TO THE AIRPLANE STRUCTURE – ALWAYS USE THE DESIGNATED MOORING POINTS.

The airplane includes these mooring points for attachment of the airplane to the ground anchors:

- Wings – eyes on the lower surface at the rib no. 11.
- Nose landing gear leg.
- Eye on the auxiliary tail skid on the rear part of the fuselage – if installed.

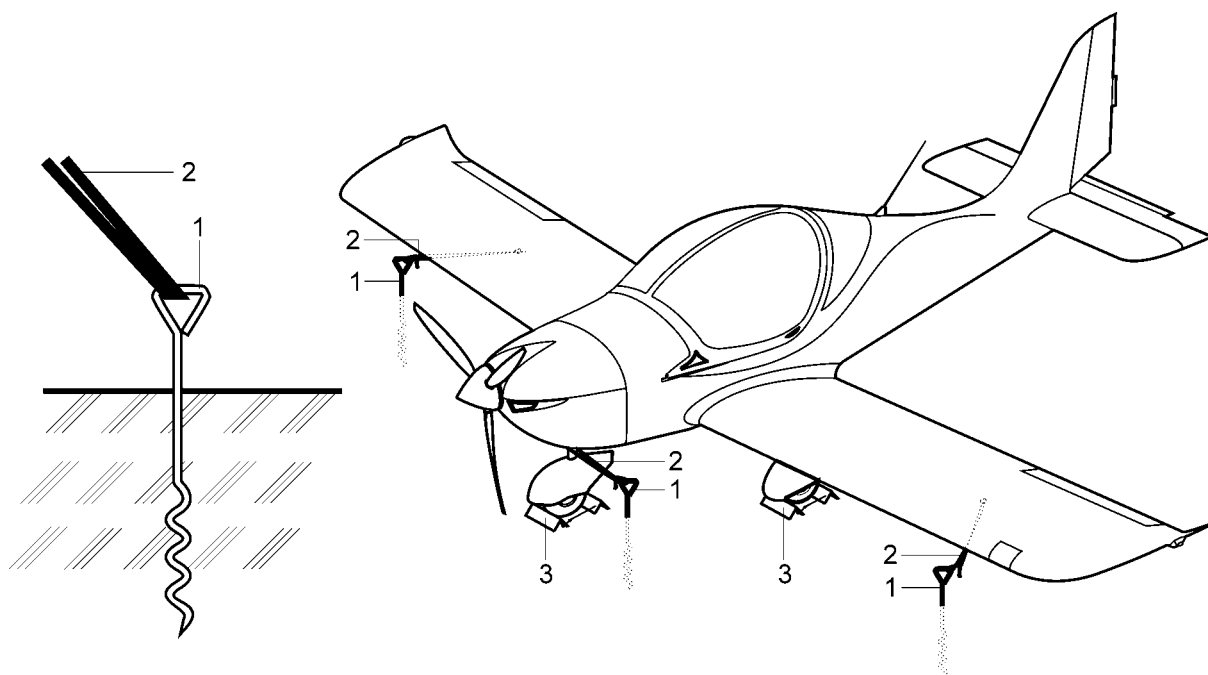
Use the supplied mooring straps.

Maintenance type: Line

Personnel qualification: Pilot / Owner qualified in accordance with M.A.803.

Recommended tools and material:

Item	Designation / Size	Quantity	Note
Wheel chocks	E9 40-00 01	2 pcs.	
Mooring strap	729151	3 pcs.	Airplane mooring
Anchor	901702	3 pcs.	Airplane mooring



Legend to Fig. 10-2

- 1 Anchor
- 2 Mooring strap

- 3 Wheel chocks

Figure 10-2 Airplane mooring



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CHAPTER

11

**REQUIRED
PLACARDS**



CHAPTER 11

REQUIRED PLACARDS

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GENERAL

1. INTRODUCTION

Placards are used for identification and designation. They depict function, controls and operational limits of systems and devices.

This chapter shows location of internal and external placards and markings.

All placards are made of self-adhesive plastic foil except for the metallic nameplate and the placard which depicts the baggage weight limit.

Missing or damaged placards must be replaced.



2. MAINTENANCE PRACTICES

Maintenance type: Line

Personnel qualification: Pilot / Owner qualified in accordance with M.A.803.

Recommended tools and material:

Item	Designation / Size	Quantity	Note
Hot air gun	-	1 pc.	
Technical alcohol	-	-	
Lint-free fabric	-	-	

A. Replacement of the damaged placard

- (1) Remove the original placard:
 - (a) Carefully increase the temperature of the placard with a hot air gun.
 - (b) Lift one corner of the placard.
 - (c) Remove the placard.
- (2) Carefully clean the place for the new placard.
- (3) Remove the protective foil from the new placard.
- (4) Place the new placard to the appropriate place in the correct position.

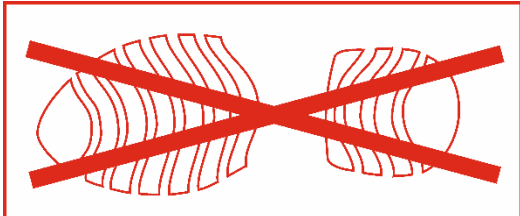


EXTERIOR PLACARDS AN MARKINGS

1. LIST OF EXTERIOR PLACARDS AND MARKINGS

SERIAL NO.	PLACARD	COLOUR	LOCATION	FIG.
1.	TYRE 120+20kPa/17+3psi	Black	L and R main landing gear leg (if Shen Shing tyres are installed).	11-1
2.	TYRE 80+20kPa/12+3psi	Black	L and R main landing gear leg (if Good Year tyres are installed).	11-1
3.	DO NOT PUSH HERE	Black	Ailerons, wing flaps, stabilizer, rudder, elevator, trim tab.	11-1
4.	DRAIN VALVE  ON BOTTOM	Black	L and R wing trailing edge at the root.	11-1
5.	HOLD HERE	Black	L and R rear side of canopy frame.	11-1
6.	CANOPY IS UNLOCKED IF A LATCH IS VISIBLE UNDER THE GLASS 	Black	On the rear side of the canopy frame near the lock.	11-1
7.	FUEL TANK VENT KEEP CLEAR	Black	Lower side of the L and R wingtip.	11-1
8.	DO NOT TOUCH	Black	L wing leading edge at the stall warning flap.	11-1
9.	AUTOMOTIVE ENGINE OIL API: SF, SG or higher e.g. SAE 15 W - 40 (see ENGINE MANUAL)	Black	L cover on the upper engine cowling.	11-1
10.	LIQUID COOLANT SEE ENGINE MANUAL	Black	R cover on the upper engine cowling.	11-1
11.	EXT. POWER DC 12V	Black	R front fuselage side at the socket of the external power supply.	11-1



SERIAL NO.	PLACARD	COLOUR	LOCATION	FIG.
12.	TYRE 120+20kPa /17+3psi	Black	Nose landing gear leg (if Shen Shing tyres are installed).	11-1
13.	TYRE 80+20kPa /12+3psi	Black	Nose landing gear leg (if Good Year tyres are installed).	11-1
14.	ELT	Red	L side of the fuselage below the fixed canopy.	11-1
15.	TO GROUND USE EXHAUST	Red	L and R wing at the fuel tank cap.	11-1
16.	UNLEADED FUEL 95 RON (see ENGINE MANUAL) 60 Litres	Red	L and R wing at the fuel tank cap.	11-1
17.	MAX STEP LOAD 130kg / 290Lbs	Red	L and R wing trailing edge at the root.	11-1
18.	DO NOT STEP ON THE WING SIMULTANEOUSLY ON BOTH SIDES. THERE IS A RISK OF AIRPLANE TURNOVER .	Red	L and R wing trailing edge at the root.	11-1
19.	DO NOT STEP HERE!	Red	L and R wing trailing edge and the central section at the root.	11-1
20.		Green	L side of the fuselage below the fixed canopy.	11-1
21.		Red	L and R wing trailing edge at the root.	11-1
22.	CAUTION ! FINGERS OFF WHEN CLOSING THE CANOPY!	Red	L and R rear inner side of the canopy frame.	11-1



SERIAL NO.	PLACARD	COLOUR	LOCATION	FIG.
23.		Black /red	L side of the fuselage below the fixed canopy.	11-1
24.		Red	L front side of the fuselage on the cover of the parachute rescue system.	11-1

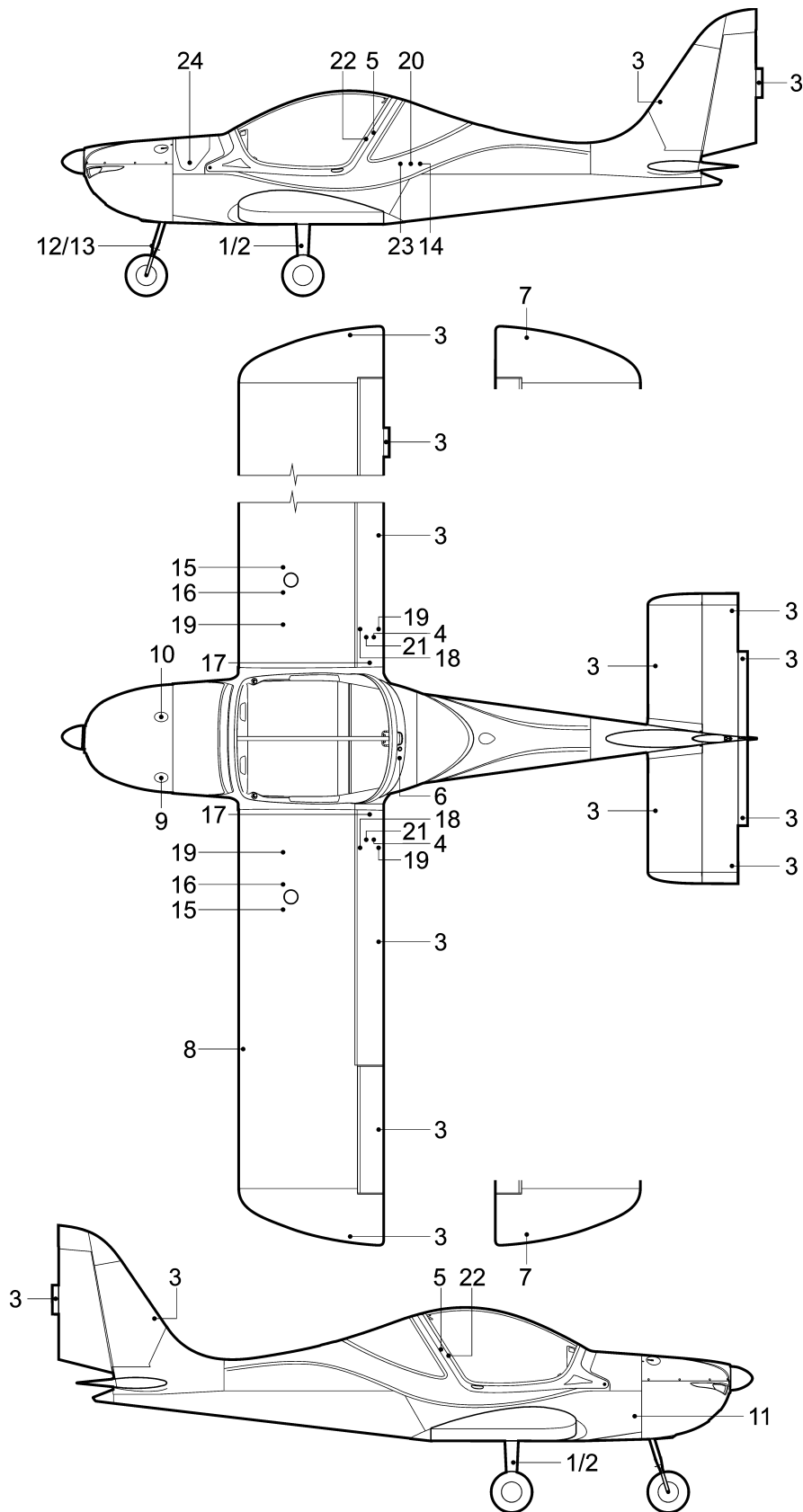


Fig. 11-1 Exterior placards and markings



INTERIOR PLACARDS AND MARKINGS

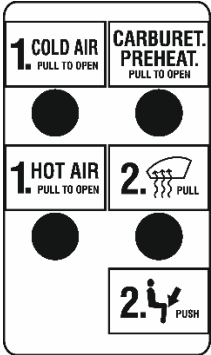
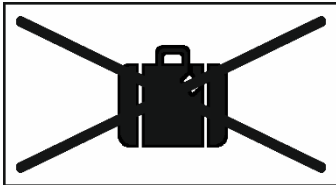
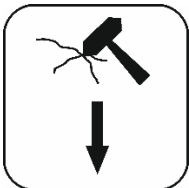
1. LIST OF INTERIOR PLACARDS AND MARKINGS

SERIAL NO.	PLACARD	COLOUR	LOCATION	FIG.
1.	This Light Sport Aircraft has been approved only for VFR day flights under no icing conditions. Aerobatics and intentional spins are prohibited! AIRSPPEED IAS Never exceed V_{ne} 146 kts Design Manoeuvring V_a 88 kts Max. Flap Extended V_{fe} 70 kts Stalling V_{st} 39 kts ENGINE SPEED Max. Take-off (max. 5 min.) 5800 rpm Max. Continuous 5500 rpm Min. Idling 1400 rpm Unusable quantity of fuel 2 litres This Light Sport Aircraft has been approved only for VFR day flights under no icing conditions. Aerobatics and intentional spins are prohibited! AIRSPPEED IAS Never exceed V_{ne} 270 km/h Design Manoeuvring V_a 167 km/h Max. Flap Extended V_{fe} 130 km/h Stalling V_{st} 73 km/h ENGINE SPEED Max. Take-off (max. 5 min.) 5800 rpm Max. Continuous 5500 rpm Min. Idling 1400 rpm Unusable quantity of fuel 2 litres	Black	R inner side of the cockpit in front of the ventilation window (airplane equipped with the Klassic 170/3/R or DUC SWIRL-3-L propeller).	11-2
1.	This Light Sport Aircraft has been approved only for VFR day flights under no icing conditions. Aerobatics and intentional spins are prohibited! AIRSPPEED IAS Never exceed V_{ne} 146 kts Design Manoeuvring V_a 88 kts Max. Flap Extended V_{fe} 70 kts Stalling V_{st} 41 kts ENGINE SPEED Max. Take-off (max. 5 min.) 5800 rpm Max. Continuous 5500 rpm Min. Idling 1400 rpm Unusable quantity of fuel 2 litres This Light Sport Aircraft has been approved only for VFR day flights under no icing conditions. Aerobatics and intentional spins are prohibited! AIRSPPEED IAS Never exceed V_{ne} 270 km/h Design Manoeuvring V_a 163 km/h Max. Flap Extended V_{fe} 130 km/h Stalling V_{st} 76 km/h ENGINE SPEED Max. Take-off (max. 5 min.) 5800 rpm Max. Continuous 5500 rpm Min. Idling 1400 rpm Unusable quantity of fuel 2 litres	Black	R inner side of the cockpit in front of the ventilation window (airplane equipped with the KW-31-033 propeller).	11-2
1.	This Light Sport Aircraft has been approved for VFR day / night flights under no icing conditions. Use GPS system for situational awareness only. The pilot should always maintain external visual reference! Aerobatics and intentional spins are prohibited! AIRSPPEED IAS Never exceed V_{ne} 146 kts Design Manoeuvring V_a 90 kts Max. Flap Extended V_{fe} 70 kts Stalling V_{st} 39 kts ENGINE SPEED Max. Take-off (max. 5 min.) 5800 rpm Max. Continuous 5500 rpm Min. Idling 1400 rpm Unusable quantity of fuel 2 litres This Light Sport Aircraft has been approved for VFR day / night flights under no icing conditions. Use GPS system for situational awareness only. The pilot should always maintain external visual reference! Aerobatics and intentional spins are prohibited! AIRSPPEED IAS Never exceed V_{ne} 270 km/h Design Manoeuvring V_a 167 km/h Max. Flap Extended V_{fe} 130 km/h Stalling V_{st} 73 km/h ENGINE SPEED Max. Take-off (max. 5 min.) 5800 rpm Max. Continuous 5500 rpm Min. Idling 1400 rpm Unusable quantity of fuel 2 litres	Black	R inner side of the cockpit in front of the ventilation window (airplane equipped with the Klassic 170/3/R or DUC SWIRL-3-L propeller and NVFR capability).	11-2
1.	This Light Sport Aircraft has been approved only for VFR day flights under no icing conditions. Aerobatics and intentional spins are prohibited! AIRSPPEED IAS Never exceed V_{ne} 146 kts Design Manoeuvring V_a 90 kts Max. Flap Extended V_{fe} 70 kts Stalling V_{st} 39 kts ENGINE SPEED Max. Take-off (max. 5 min.) 5800 rpm Max. Continuous 5500 rpm Min. Idling 1400 rpm Unusable quantity of fuel 2 litres AIR Traffic AT-1 TAS is only to be used as an aid to situational awareness. This Light Sport Aircraft has been approved only for VFR day flights under no icing conditions. Aerobatics and intentional spins are prohibited! AIRSPPEED IAS Never exceed V_{ne} 270 km/h Design Manoeuvring V_a 167 km/h Max. Flap Extended V_{fe} 130 km/h Stalling V_{st} 73 km/h ENGINE SPEED Max. Take-off (max. 5 min.) 5800 rpm Max. Continuous 5500 rpm Min. Idling 1400 rpm Unusable quantity of fuel 2 litres AIR Traffic AT-1 TAS is only to be used as an aid to situational awareness.	Black	R inner side of the cockpit in front of the ventilation window (airplane equipped with the Klassic 170/3/R or DUC SWIRL-3-L propeller and traffic avoidance system Air Avionics AirTraffic AT-1).	11-2
1.	This Light Sport Aircraft has been approved only for VFR day flights under no icing conditions. Aerobatics and intentional spins are prohibited! AIRSPPEED IAS Never exceed V_{ne} 146 kts Design Manoeuvring V_a 88 kts Max. Flap Extended V_{fe} 70 kts Stalling V_{st} 41 kts ENGINE SPEED Max. Take-off (max. 5 min.) 5800 rpm Max. Continuous 5500 rpm Min. Idling 1400 rpm Unusable quantity of fuel 2 litres AIR Traffic AT-1 TAS is only to be used as an aid to situational awareness. This Light Sport Aircraft has been approved only for VFR day flights under no icing conditions. Aerobatics and intentional spins are prohibited! AIRSPPEED IAS Never exceed V_{ne} 270 km/h Design Manoeuvring V_a 163 km/h Max. Flap Extended V_{fe} 130 km/h Stalling V_{st} 76 km/h ENGINE SPEED Max. Take-off (max. 5 min.) 5800 rpm Max. Continuous 5500 rpm Min. Idling 1400 rpm Unusable quantity of fuel 2 litres AIR Traffic AT-1 TAS is only to be used as an aid to situational awareness.	Black	R inner side of the cockpit in front of the ventilation window (airplane equipped with the KW-31-033 propeller and traffic avoidance system Air Avionics AirTraffic AT-1).	11-2

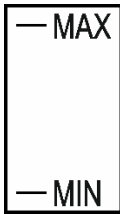
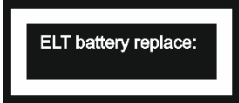


SERIAL NO.	PLACARD	COLOUR	LOCATION	FIG.
1.	This Light Sport Aircraft has been approved for VFR day / night flights under no icing conditions. Use GPS system for situational awareness only. The pilot should always maintain external visual reference! Aerobatics and intentional spins are prohibited! AIRSPPEED IAS Never exceed V_{ne} 146 kts Design Manoeuvring V_a 90 kts Max. Flap Extended V_{fe} 70 kts Stalling V_{st} 39 kts ENGINE SPEED Max. Take-off (max. 5 min.) 5800 rpm Max. Continuous 5500 rpm Min. Idling 1400 rpm Unusable quantity of fuel 2 litres AIR Traffic AT-1 TAS is only to be used as an aid to situational awareness. This Light Sport Aircraft has been approved for VFR day / night flights under no icing conditions. Use GPS system for situational awareness only. The pilot should always maintain external visual reference! Aerobatics and intentional spins are prohibited! AIRSPPEED IAS Never exceed V_{ne} 270 km/h Design Manoeuvring V_a 167 km/h Max. Flap Extended V_{fe} 130 km/h Stalling V_{st} 73 km/h ENGINE SPEED Max. Take-off (max. 5 min.) 5800 rpm Max. Continuous 5500 rpm Min. Idling 1400 rpm Unusable quantity of fuel 2 litres AIR Traffic AT-1 TAS is only to be used as an aid to situational awareness. Black R inner side of the cockpit in front of the ventilation window (airplane equipped with the Klassic 170/3/R or DUC SWIRL-3-L propeller and NVFR capability and traffic avoidance system Air Avionics AirTraffic AT-1). 11-2			
2.	LOAD LIMITS Max. take-off weight 600 kg Empty weight kg Max. baggage weight 25 kg PERMITTED CREW WEIGHT [kg] Fuel quantity ltr. 120100755025 max. 25 kg 1/2 12 kg No baggage Fuel reserve (1/8 on the fuel indicator) 8 litres Black L inner side of the cockpit in front of the ventilation window. 11-2			
3.	LEFT TANK - read in level flight Indication 1/4 1/2 3/4 1 Fuel (ltr.) RIGHT TANK - read in level flight Indication 1/4 1/2 3/4 1 Fuel (ltr.) White R part of the instrument panel on the fuel quantity indicators. 11-2			
4.	For N 30 60 E 120 150 Steer For S 210 240 W 300 330 Steer Date: Black Canopy frame below the magnetic compass. 11-2			
5.	RETRACTED FLAPS TAKE OFF LANDING RETRACTED FLAPS TAKE OFF LANDING Black / white Central panel at the flap control lever. 11-2			
6.	</			



SERIAL NO.	PLACARD	COLOUR	LOCATION	FIG.
9.	NOT TO BE USED FOR ADDITIONAL STOWAGE	Black / white	Bulkhead of the area behind the baggage compartment.	11-2
10.		Black / white	Central panel below the controls of ventilation / heating and preheating of the carburetors.	11-2
11.	FUEL QUANTITY INDICATION IS ACCURATE ONLY IN LEVEL FLIGHT ATTITUDE	Black / white	R part of the instrument panel below the fuel quantity indicators / EMS display unit.	11-2
12.		Black / white	Central part of the instrument panel at the parachute rescue system activation handle.	11-2
13.	LIQUID COOLANT SEE ENGINE MANUAL	Black	Engine compartment on the expansion bottle of the cooling system.	11-2
14.		Black / white	L part of the instrument panel at the selector valve.	11-2
15.		Black / white	Bulkhead of the area behind the baggage compartment.	11-2
16.		Black / white	Central panel at the emergency hammer.	11-2



SERIAL NO.	PLACARD	COLOUR	LOCATION	FIG.
17.		Black	Baggage compartment, on the fire extinguisher.	11-2
18.		Black	Engine compartment on the brake fluid reservoir.	11-2
19.		Black	Below the left seat on the parking brake handle.	11-2
20.		Black	Engine compartment on the brake fluid reservoir.	11-2
21.		White	Behind the baggage compartment on ELT unit.	11-2
22.		Metal, etched	Baggage compartment.	11-2
23.		Black	Central part of the instrument panel, on the upper part of the canopy frame.	11-2
24.		Black / white	L part of the instrument panel.	11-2
25.		Black / white	L part of the instrument panel at the dimmer.	11-2



SERIAL NO.	PLACARD	COLOUR	LOCATION	FIG.
26.		Black / white	L part of the instrument panel at the canopy signalling light.	11-2
27.		Black / white	L part of the instrument panel at the generator signalling light.	11-2
28.		Black / white	Central part of the instrument panel above the throttle handle.	11-2
29.		Black / white	Central part of the instrument panel above the choke handle.	11-2
30.		Black / white	R part of the instrument panel at the audio connector.	11-2
31.		Black / white	Right part of the instrument panel at the 12 V socket.	11-2
32.		Black / white	L part of the instrument panel at the external power supply signalling light.	11-2
33.		Black	L part of the instrument panel at the parking brake signalling light.	11-2
34.		Black / white	L part of the instrument panel at the auxiliary generator signalling light.	11-2
35.		Black / white	R part of the instrument panel at USB connectors.	11-2



SERIAL NO.	PLACARD	COLOUR	LOCATION	FIG.
36.		Black / white	L part of the instrument panel at switches and circuit breakers.	11-2
SOCKET IC FUEL PUMP LDG LIGHT POS. LIGHTS BEACONS DIR. GYRO HORIZON TURN IND. AVIONICS SWITCH MASTER SWITCH STALL WARNING UNUSED UNUSED TRIM SIGNAL. FUEL PUMP LDG LIGHT POS. LIGHTS BEACONS DIR. GYRO HORIZON TURN IND. GEN CLOCK ACCU NOTE: The above specified layout of the placards applies to the standard design of the airplane, it may vary depending on the installed equipment.				
37.		Black / white	R part of the instrument panel at circuit breakers.	11-2
UNUSED UNUSED RPM IND. ENG. INSTR. FUEL IND. COMM NAV ALT ENCOD. GPS UNUSED UNUSED UNUSED UNUSED UNUSED UNUSED NOTE: The above specified layout of the placards applies to the standard design of the airplane, it may vary depending on the installed equipment.				
38.		Various	L part of the instrument panel at circuit breakers and circuit breakers.	11-2
SOCKET IC FUEL PUMP LDG LIGHT POS. LIGHTS BEACONS AVIONICS SWITCH AUX. GEN GEN MASTER SWITCH STALL WARNING TRIM DISPLAY 2 DISPLAY 1 SIGNAL. PROP. FUEL PUMP LDG LIGHT POS. LIGHTS BEACONS AUX. GEN FIELD AUX. GEN GEN GEN - REF. ACCU NOTE: The above specified layout of the placards applies to the standard design of the airplane, it may vary depending on the installed equipment.				
39.		Black / white	R part of the instrument panel at circuit breakers.	11-2
UNUSED UNUSED COMM NAV XPDR ALT ENCOD. UNUSED UNUSED UNUSED UNUSED UNUSED UNUSED UNUSED UNUSED UNUSED NOTE: The above specified layout of the placards applies to the standard design of the airplane, it may vary depending on the installed equipment.				
40.	AVIONICS RELAY	Black	Relay behind the instrument panel.	-



SERIAL NO.	PLACARD	COLOUR	LOCATION	FIG.
41.		Black	Fuse holder behind the instrument panel.	-
42.		Black	Fuse holder behind the instrument panel.	-
43.		Black	L part of the instrument panel at the signalling light of the flaps.	11-2
44.		Black / white	L part of the instrument panel at the signalling light of the pitot tube heating.	11-2
45.	ADAHRS DO NOT COVER!	It depends on the padding	Baggage compartment on the cover (inscription is embroidered on the padding).	11-2
46.		Red	Rocket of the parachute rescue system.	11-2
47.	ADJUSTABLE PEDALS LEVER PULL TO UNLOCK PEDALS. WARNING! DO NOT ADJUST IN FLIGHT OR WITH ENGINE RUNNING! REFER TO THE POH FOR INSTRUCTIONS.	Red	L and R side of the canopy frame.	11-2
48.		Black	L and R adjustable pedals lever.	11-2



SERIAL NO.	PLACARD	COLOUR	LOCATION	FIG.
49.	EMS	Black / white	L part of the instrument panel at the signalling light of the EMS.	11-2
50.		Various	L part of the instrument panel at circuit breakers and circuit breakers.	11-2
SOCKET IC FUEL PUMP LDG LIGHT POS. LIGHTS BEACONS BATTERY G3X AVIONICS SWITCH AUX. GEN GEN MASTER SWITCH EMS ADAHRS 2 ADAHRS 1 MDF PDF FUEL PUMP LDG LIGHT POS. LIGHTS BEACONS BATTERY G3X AUX. GEN FIELD AUX. GEN GEN GEN - REF. ACCU NOTE: The above specified layout of the placards applies to the standard design of the airplane, it may vary depending on the installed equipment.				
51.		Black / white	R part of the instrument panel at circuit breakers.	11-2
SIGNAL. STALL WARNING TRIM COMM NAV XPDR ALT ENCOD. UNUSED UNUSED UNUSED UNUSED UNUSED UNUSED UNUSED UNUSED NOTE: The above specified layout of the placards applies to the standard design of the airplane, it may vary depending on the installed equipment.				
52.	MASTER SWITCH	Black / white	L part of the instrument panel at master switch.	11-2
53.	AVIONICS SWITCH	Black / white	L part of the instrument panel at avionics switch.	11-2
54.	INSTR. PANEL DIM 	Black / white	L part of the instrument panel at the dimmer.	11-2
55.	DAY	Black / white	L part of the instrument panel bellow the switch.	11-2
56.	NIGHT	Black / white	L part of the instrument panel above the switch.	11-2



SERIAL NO.	PLACARD	COLOUR	LOCATION	FIG.
57.		Black / white	L part of the instrument panel at circuit breakers and circuit breakers.	11-2
SOCKET IC PITOT HEATING FUEL PUMP COCKPIT LIGHT TAXI LIGHT LDG LIGHT POS. LIGHTS BEACONS BATTERY G3X AUX. GEN GEN TRIM SIGNAL. FUEL PUMP INSTR. LIGHTING COCKPIT LIGHT TAXI LIGHT LDG LIGHT POS. LIGHTS BEACONS BATTERY G3X AUX. GEN FIELD AUX. GEN GEN GEN - REF. ACCU				
NOTE: The above specified layout of the placards applies to the standard design of the airplane, it may vary depending on the installed equipment.				
58.		Black / white	R part of the instrument panel at circuit breakers.	11-2
UNUSED PFD MFD ADAHRS 1 ADAHRS 2 EMS STALL WARNING PITOT HEATING UNUSED SEAT HEATING COMM NAV XPDR ALT ENCOD. UNUSED				
NOTE: The above specified layout of the placards applies to the standard design of the airplane, it may vary depending on the installed equipment.				
59.	AMP. SHUNT 1A + 1A	Black / white	Amp. shunt behind the instrument panel.	
60.	COMM1	Black / white	Central part of the instrument panel at the transceiver 1.	11-2
61.	COMM2	Black / white	Central part of the instrument panel at the transceiver 2.	11-2
62.	TAS AUDIO	Black / white	L part of the instrument panel above the switch.	11-2
63.	OFF	Black / white	L part of the instrument panel below the switch.	11-2
64.	AIR Traffic AT-1 TAS is only to be used as an aid to situational awareness.	Black / white	R inner side of the cockpit in front of the ventilation window.	11-2

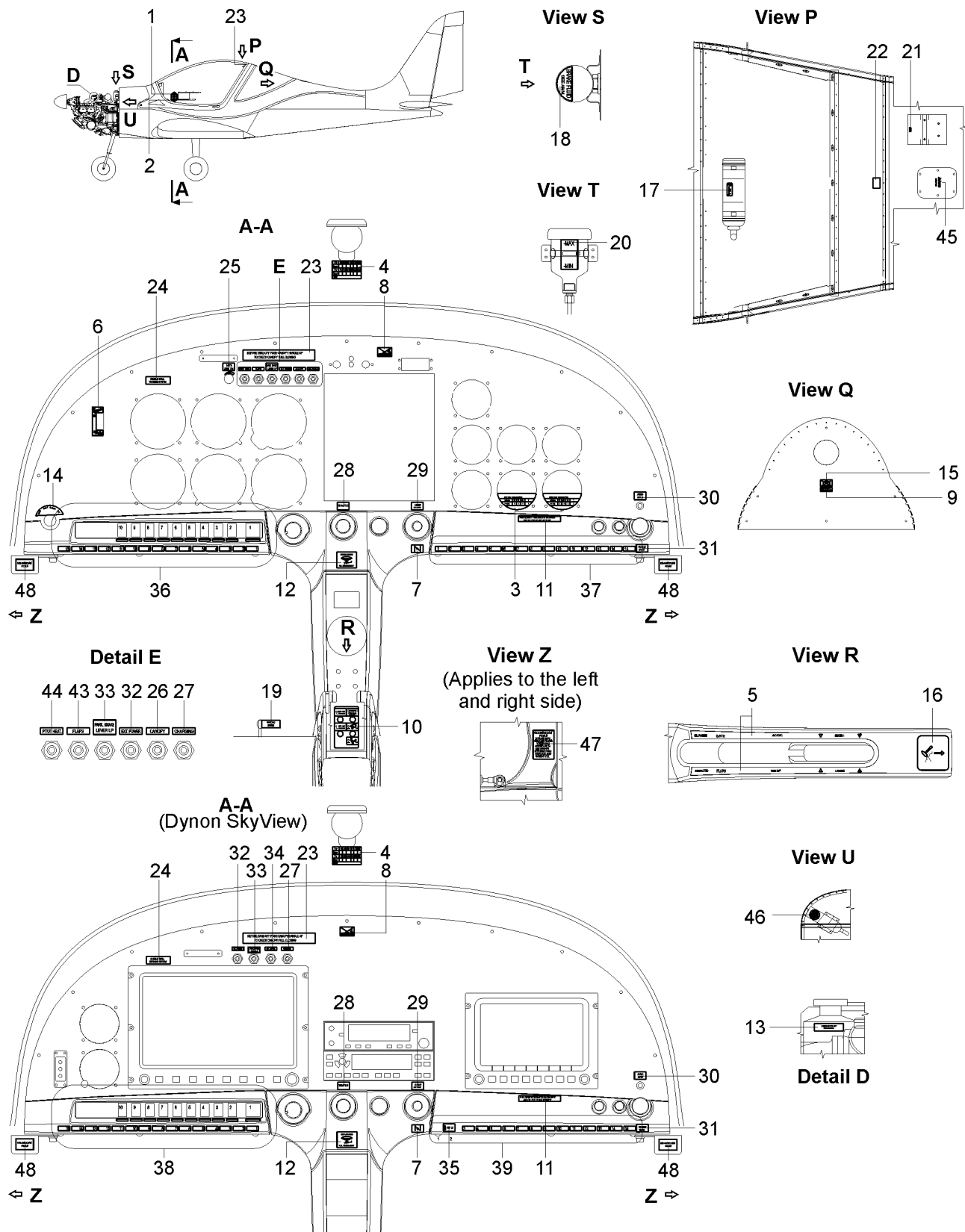


Fig. 11-2 Interior placards and markings (page 1 of 2)

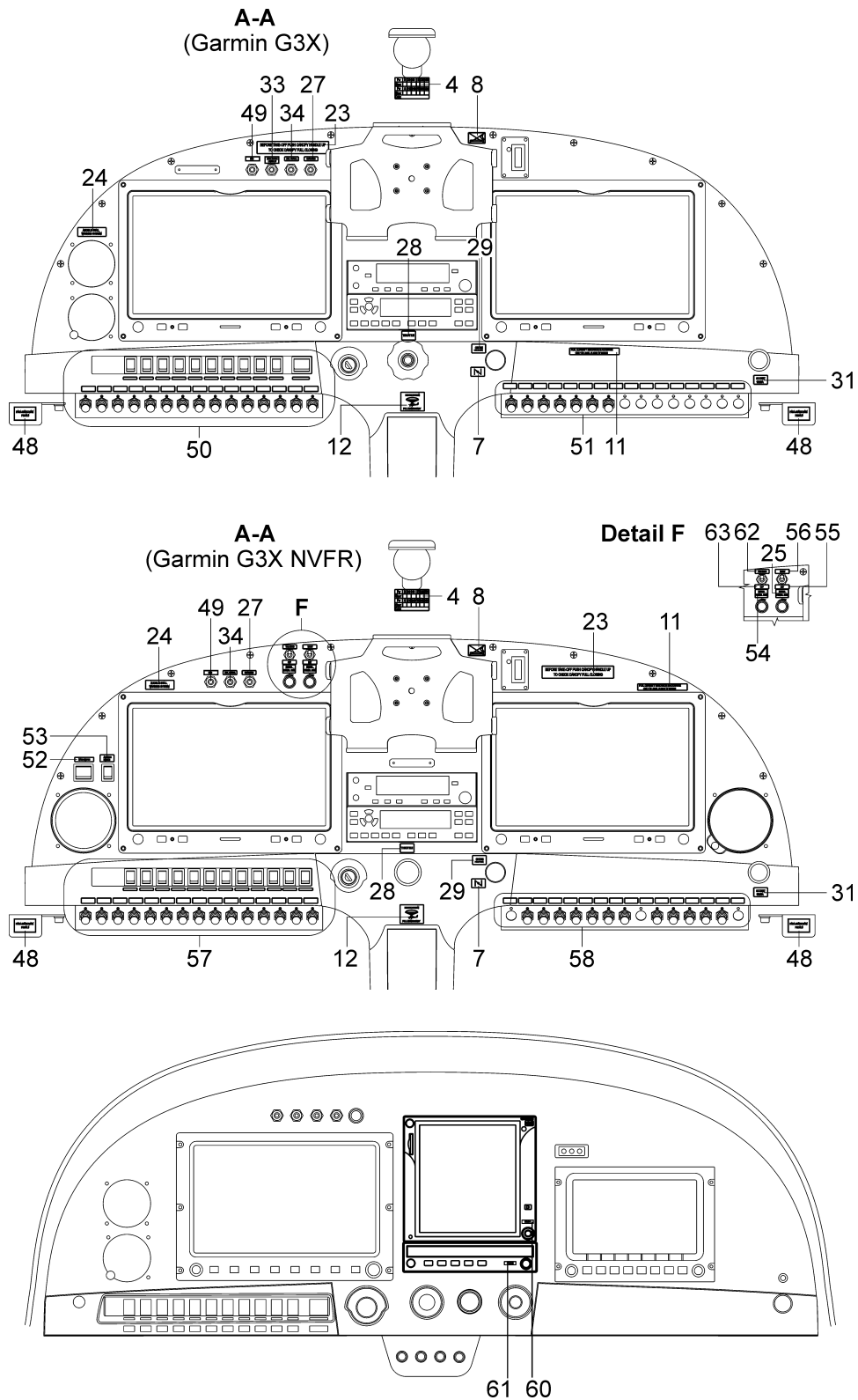


Fig. 11-2 Interior placards and markings (page 2 of 2)



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CHAPTER

12

SERVICING



CHAPTER 12

SERVICING

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GENERAL

1. INTRODUCTION

This Chapter includes instructions for filling and emptying or change of operating fluids and also instructions for scheduled maintenance, non-scheduled maintenance and overview of operating fluids.

2. OPERATING FLUIDS

Operating fluids are specified in Tab. 12-1, including the required specifications, recommended by the airplane manufacturer or the engine manufacturer. You can use any products with the same specifications. The products listed in Tab. 12-1, were tested and approved for use on SportStar RTC airplane.

Operating Fluid	Designation	Specification	Note
Fuel	MOGAS	EN 228 Super EN 228 Super plus CAN/CGSB-3.5 ASTM-D4814	More detailed information about applicable fuels is given in Rotax Service Instruction No. SI-912-016 – latest valid issue.
	AVGAS 100 LL UL91	ASTM-D910 ASTM-D7547	
Oil	AeroShell Oil Sport Plus 4	RON 424	More detailed information about applicable oils is given in Rotax Service Instruction No. SI-912-016 - latest valid issue.
Coolant	BASF Glysantin G48 Protect Plus	ASTM D 3306 ASTM D 4985 SAE J1034 AFNOR NF R 15-601 ÖNORM V 5123 BS 6580:1992	More detailed information about applicable fluids is given in Rotax Service Instruction No. SI-912-016 – latest valid issue.
Hydraulic fluid	Syntol HD 265 Plus	FMVSS 571.116 DOT 3 and DOT 4 ISO 4925 SAE J 1703 and 1704	Brake system S5 00-51 01
Hydraulic fluid	Aeroshell Fluid 41	MIL-PRF-5606H	Brake system S5 00-61 01 (Matco components)

Tab. 12-1 Recommended operating fluids



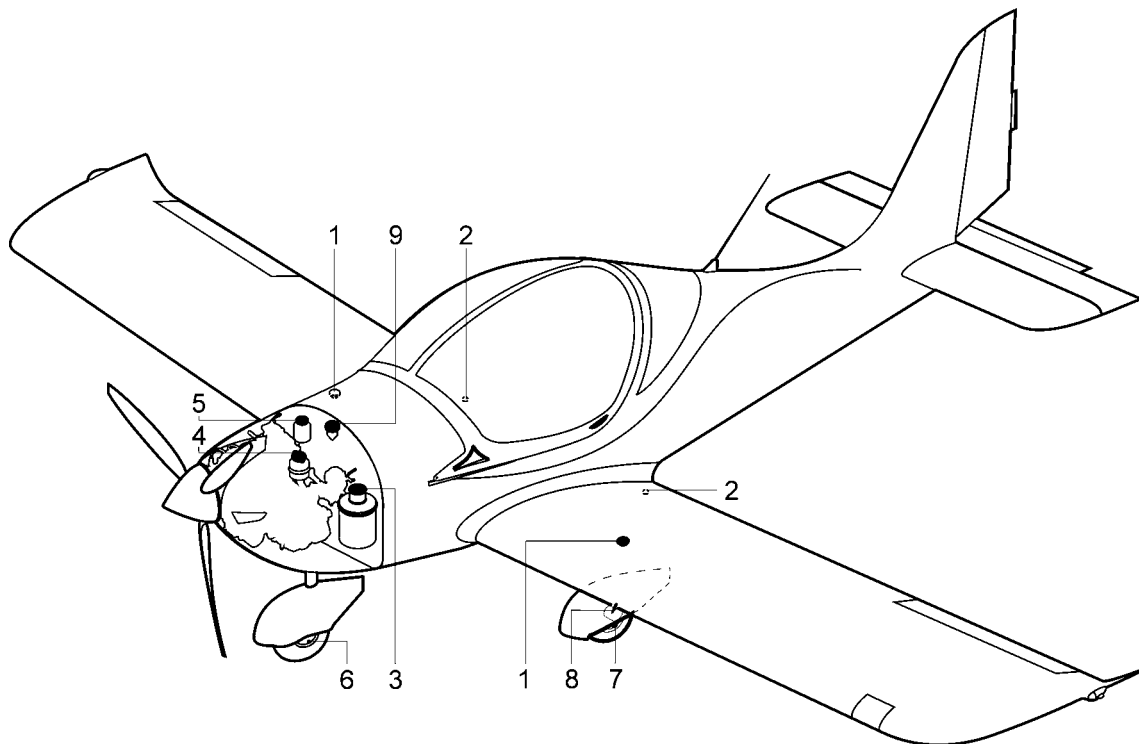
REPLENISHING

1. GENERAL

This Section includes instructions for:

- filling and draining of the fuel system
- check / refilling and change of the engine oil
- check / refilling and change of the engine coolant
- check / refilling and change of the brake fluid.

General overview of maintenance points is shown in Fig. 12-1.



Legend to Fig. 12-1

1	Filler neck with a cap	6	Valve of the nose landing gear wheel
2	Drain valve	7	Valve of the main landing gear wheel
3	Oil tank cap	8	Air bleed valve of the brake
4	Cap of the expansion tank of the engine cooling system	9	Cap of the brake fluid expansion tank
5	Cap of overflow bottle of the engine cooling system		

Fig. 12-1 Maintenance servicing points



2. FUEL SYSTEM

Maintenance type: Line

Personnel qualification: Pilot / Owner qualified in accordance with M.A.803.

Recommended tools and material:

Item	Designation / Size	Quantity	Note
Fire extinguisher	-	1 pc.	
Draining fixture	335105	1 pc.	
Lint-free cloth	-	-	
Vessel for fuel	-	1 pc.	

Total volume of the fuel tanks is specified in Tab. 12-2.

Name	Left Wing	Right Wing	Total
	I	I	I
Total volume of fuel	60	60	120
Usable volume of fuel	59	59	118
Unusable volume of fuel	1	1	2

Tab. 12-2 Volume of the fuel tanks

All hydrocarbon fuels contain dissolved and extracted water. The quantity of water contained in the fuel depends on temperature and type of the fuel. The extracted water collects at the bottom of the fuel tanks and it may be drained through the drain valves. The dissolved water is more dangerous because it is dissipated in the fuel and it cannot be removed by the fuel filter which can stop only microscopic solid particles. The risk of detrimental effects of the dissolved water is increased by the airplane operation in humid and hot climate. When the temperature falls, absorption capacity of the fuel decreases and the excess dissolved water may form ice crystals. The ice crystals, however, do not settle on the bottom of the fuel tanks, but they float in the fuel, because they have approximately the same specific weight as the fuel. The ice crystals may cause blockage of the fuel filter.

Obey these procedures to reduce the risk of operation with contaminated fuel:

- Keep the filling devices and filters of these devices clean.
- Store the fuel correctly (storage in cold areas is recommended, for example in underground tanks).
- Drain the fuel regularly. Before you drain the fuel, always wait until the unwanted material and dissolved water settles.
- Monitor the signs which indicate the fuel contamination regularly, e.g. clogging of the fuel filter cartridge, samples after draining, visual inspection of the inner space of the tank during maintenance, etc.

**A. Safety principles for fuel handling**

- (1) Safety principles for filling, emptying, draining and other fuel handling
 - (a) Always place a fire extinguisher near the airplane.
 - (b) Always electrically bond the filling device with the airplane. The exhaust pipe is a grounding point of the airplane.
 - (c) Always make sure that the airplane is grounded during work with the fuel (e.g. filling, draining, emptying).
 - (d) Never fill the fuel tanks:
 - during a rain
 - during a storm
 - in enclosed, poorly ventilated areas (e.g. in a hangar)
 - if there is a person in the cockpit
 - with the engine running
 - when the electrical installation is enabled.
 - (e) The person who handles the fuel must not wear clothes made from nylon material or material which generates static electricity.
 - (f) Never smoke, or use open fire.
 - (g) Do not leave any object in the filler neck.

B. Filling of the fuel tanks

- (1) Fueling
 - (a) Before you fill the tanks, always make sure that you fill the correct type of fuel (Tab. 12-1).
 - (b) Electrically bond the filling device with the airplane. Connect grounding clamps of the filling device to the exhaust pipe.
 - (c) Make sure that the airplane is grounded.
 - (d) Open the filler neck of the fuel tank (1, Fig. 12-1) on the upper side of the wing.
 - (e) Fill the fuel from the filling device into the fuel tank.
 - (f) Wipe the residual fuel from the filler neck of the fuel tank and close it.
 - (g) Sequence of the filled fuel tanks is not important.

NOTE

If you refill only one fuel tank, make sure that both fuel tanks contain the same quantity of fuel.

- (h) Disconnect grounding clamps of the filling device from the exhaust pipe.
- (i) Drain the fuel tanks (see par. 2 C(1)).
- (j) After you fill the fuel tanks always check quantity of the filled fuel.



C. Draining of fuel

Drain the fuel tank after each fueling and before the first flight at the beginning of the flight day.

When you drain the fuel, the fuel contaminated by water (or unwanted material) which accumulates in the lowest points of the fuel system is drained.

Both tanks are equipped with drain valves which open on the lower surface of the wings (2, Fig. 12-1).

- (1) Procedure for draining of the tanks
 - (a) Put the draining fixture below the drain valves.
 - (b) Push down the valve.
 - (c) Drain the required quantity of fuel.

NOTE

Drain until pure fuel flows from the drain valve.

- (d) Apply the same procedure to the second fuel tank.

D. Emptying of fuel

You can empty the fuel through the drain valves (2, Fig. 12-1).

- (1) Procedure for emptying of fuel
 - (a) Before you empty the fuel, open the filler neck of the fuel tank to prevent damage of the fuel tank due to the negative pressure which may arise in the fuel tank during emptying of fuel.
 - (b) Empty the fuel through the drain valves (see par. 2 C(1)).
 - (c) Close the drain valves.
- (2) Procedure for filling of fuel after its emptying

WARNING

AIR MAY ENTER THE FUEL SYSTEM DURING EMPTYING OF FUEL. IF THERE IS A POSSIBILITY THAT THE FUEL SYSTEM CONTAINS AIR, START THE ENGINE AFTER YOU FILL THE FUEL TANKS AND LET IT RUN FOR A FEW MINUTES FOR EACH FUEL TANK UNTIL ALL AIR IS REMOVED FROM THE FUEL SYSTEM.

- (a) Fill the fuel tanks with fuel (see par. 2 B(1)).
- (b) Check the fuel system to detect any signs of leakage points. If found, repair the leakage points.
- (c) Start the engine in accordance with the procedure described in the Pilot's Operating Handbook for SportStar RTC (Doc. No. ERTC020-10-AS) and bleed all air from the fuel system.
- (d) Check the fuel system again to detect any signs of leakage points; If found, repair the leakage points.



3. OIL SYSTEM

Maintenance type: Line

Personnel qualification: Pilot / Owner qualified in accordance with M.A.803. (Oil level check / refilling)

Independent verification personnel qualified in accordance with Part 66 or higher

Recommended tools and material:

Item	Designation / Size	Quantity	Note
Torque wrench	8 – 50 Nm	1 pc.	
Socket wrench	No. 19	1 pc.	
Sealing ring $\varnothing$ 18x12	P/N 250010	1 pc.	
Lint-free cloth	-	-	
Vessel for oil	-	1 pc.	
Stainless lockwire	$\varnothing$ 0,8 mm		

WARNING

BEFORE STARTING TO WORK, COOL DOWN THE ENGINE TO THE AMBIENT TEMPERATURE. NON-COMPLIANCE WITH THE PROCEDURE MAY RESULT IN BURNS.

SWITCH OFF THE IGNITION AND TAKE OUT THE KEY!

Total volume of oil in the oil system is given in Tab. 12-3.

Name	Volume
	l
Mark "min" on dipstick	2,5
Mark "max" on dipstick	3,0

Tab. 12-3 Volume of oil

A. Oil level check / refilling

- (1) Oil level check

NOTE

Before the oil level check, make sure that the crankcase does not contain residual oil.

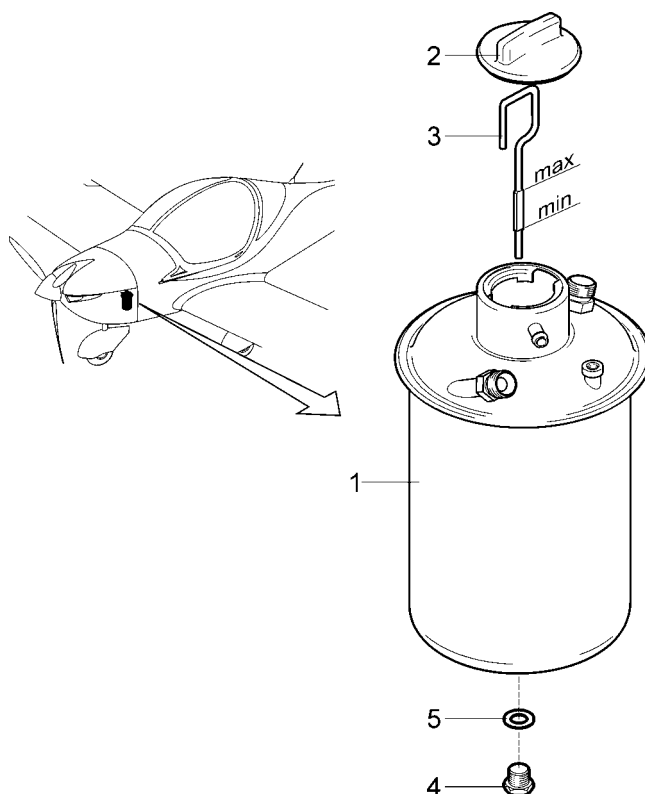
- (a) Align the airplane in a horizontal position (Section 08-10).
- (b) Make sure that the ignition is switched off and remove the key from the ignition switch.
- (c) Open the lid F2a (Fig. 06-2).
- (d) Remove the oil tank cap (2, Fig. 12-2).



WARNING

DO NOT TURN THE PROPELLER AGAINST THE DIRECTION OF ENGINE ROTATION.

- (e) Turn the propeller by hand several times in the direction of propeller rotation to pump the oil from the engine to the fuel tank.
- (f) Complete the procedure when you can hear a noise (gurgles) after you remove the cap. It means that the air flows into the oil tank.
- (g) Remove the dipstick (3) and wipe it.
- (h) Put the dipstick (3) back into the tank and wait a few seconds.
- (i) Remove the dipstick (3) and check the oil quantity; the oil level must be between marks (max / min) and it must not fall below mark "min".
- (j) Attach the oil tank cap (2).
- (k) Close the lid F2a (Fig. 06-2).



Legend to Fig. 12-2

1	Oil tank	4	Drain screw M12x12
2	Oil tank cap	5	Sealing ring $\varnothing$ 18x12
3	Dipstick		

Fig. 12-2 Check of the oil level



(2) Oil refilling

CAUTION

ALWAYS REFILL THE SAME TYPE OF OIL, AS THAT IN THE OIL SYSTEM.

BEFORE A LONG FLIGHT, REFILL THE MAXIMUM QUANTITY OF OIL TO MAKE SURE THAT THE OIL RESERVE IS SUFFICIENT.

- (a) Remove the upper engine cowling (Section 71-10).
 - (b) Unscrew the oil tank cap (2, Fig. 12-2).
 - (c) Refill the oil (see Tab. 12-1).
 - (d) During normal operation of the engine, the oil level must be in the middle between both marks (see Fig. 12-2) because when the level is higher, large quantity of oil may leak during bleeding.
 - (e) Difference between marks "max" and "min" is 0,45 l.
 - (f) Install the oil tank cap (2).
 - (g) Install the upper engine cowling (Section 71-10).
 - (h) Do the engine test:
 - Start the engine in accordance with the procedure specified in the Pilot's Operating Handbook for SportStar RTC (Doc. No. ERTC020-10-AS) and let it run for approx. 5 minutes, until the temperatures are stabilized (oil temperature must be between 50 – 70 °C).
 - Switch off the engine and wait until its temperature decreases.
 - Make sure that there are no leakage points in the oil system.
 - Check the oil level and refill the oil as necessary.
- (3) Oil change
- Time intervals for oil change are specified in the document Maintenance Manual (Line Maintenance) for Rotax Engine Type 912 Series, Doc. No.. MML912, 899191. Replace the oil filter during each change of oil.

WARNING

WHEN YOU DRAIN THE HOT ENGINE OIL, IT MAY RESULT IN BURNS! DISCARD OIL AND FILTER IN ACCORDANCE WITH REGULATIONS.

CAUTION

FOLLOW THESE PROCEDURES TO PREVENT SPONTANEOUS EMPTYING OF THE OIL SYSTEM, WHICH CAN LEAD TO DAMAGE OF DRIVE OF THE VALVES.

NOTE

Remove the oil within 30 minutes after the engine stops. The hot oil flows better from the engine housing.



Procedure for oil change:

Prevent complete emptying of suction manifold, oil cooler and return fuel manifold because it can let air into the oil system.

You must change the oil and the oil filter quickly and without interruption to prevent emptying of the oil system and the system of hydraulic valve lifters.

- (a) Check the oil level (see par. 3 A.(1)).
- (b) Remove the engine cowlings (Section 71-10).
- (c) Remove the lockwire and loosen the drain screw (4, Fig. 12-2) on the oil tank (1); drain the used oil into the prepared vessel and discard it in accordance with regulations.
- (d) Remove the oil filter.
- (e) After you empty the oil, attach the drain screw (4) with a new seal (5) to the oil tank again; tighten the screw with torque 25 Nm.
- (f) Secure the joints with a lockwire (Section 20-20).
- (g) Install a new oil filter (Section 79-20).
- (h) Fill approximately 3 liters of new engine oil (Tab. 12-1) into the tank.

CAUTION

DO NOT TURN THE ENGINE WHEN THE OIL SYSTEM IS OPEN.

- (i) After the oil change, turn the engine by hand in the direction of engine rotation (approx. 20 rotations) to completely fill the whole oil circuit again.
- (j) Check the oil level.
- (k) Never clean the oil system by pressurized air.
- (l) Install the oil tank cap (2).
- (m) Install the engine cowlings (Section 71-10).
- (n) Check the oil filter (Section 79-20).



4. COOLING SYSTEM

Maintenance type: Line

Personnel qualification: Pilot / Owner qualified in accordance with M.A.803. (Coolant level check / refilling)

Independent verification personnel qualified in accordance with Part 66 or higher

Recommended tools and material:

Item	Designation / Size	Quantity	Note
Lint-free cloth	-	-	
Vessel for coolant	-	1 pc.	
Phillips screwdriver	No. 2	1 pc.	

WARNING

BEFORE STARTING TO WORK, COOL DOWN THE ENGINE TO THE AMBIENT TEMPERATURE. NON-COMPLIANCE WITH THE PROCEDURE MAY RESULT IN BURNS.

SWITCH OFF THE IGNITION AND TAKE OUT THE KEY!

NEVER REMOVE THE CAP OF THE HOT COOLING SYSTEM QUICKLY. COVER THE CAP WITH A CLOTH AND OPEN IT SLOWLY. SUDDEN REMOVAL OF THE CAP MAY CAUSE GEYSER OF THE BOILING FLUID AND THE SUBSEQUENT SCALDING.

Total volume of the coolant in the cooling system is given in Tab. 12-4.

Name	Volume
	l
Total volume	1,5

Tab. 12-4 Volume of the coolant

A. Coolant level check / refilling

- (1) Check of the coolant level
 - (a) Align the airplane in a horizontal position (Section 08-10).
 - (b) Make sure that the ignition is switched off and remove the key from the ignition switch.
 - (c) Remove the upper engine cowling (Section 71-10).
 - (d) Open the cap of the expansion tank (4, Fig. 12-1) and check the coolant level. Maximum fluid level should be at the upper edge of the expansion tank.
 - (e) Check the coolant quantity in the overflow bottle; the coolant level must be between marks min. and max.



(2) Coolant refilling

CAUTION

ALWAYS REFILL THE SAME TYPE OF COOLANT AS THAT
IN THE COOLING SYSTEM.

- (a) Refill the coolant (refer to Tab. 12-1) into the expansion tank (4, Fig. 12-1). Maximum fluid level should be at the upper edge of the expansion tank.
- (b) Install the cap on the expansion tank (4).
- (c) Open the cap of the overflow bottle (5) and refill the coolant (refer to Tab. 12-1) into the overflow bottle (5); fluid level must be between marks min. and max.
- (d) Install the cap of the overflow bottle (5).
- (e) Install the engine cowlings (Section 71-10).

B. Coolant change

NOTE

Period for the coolant replacement is mentioned in Section 05-30.

- (1) Procedure for change
 - (a) Make sure that the ignition is switched off and remove the key from the ignition switch.
 - (b) Remove the engine cowlings (Section 71-10).
 - (c) Open the cap of the expansion tank (4, Fig. 12-1).
 - (d) Disconnect the hose (4, Fig. 75-02) which leads from the cooler to the pump (in the lowest part of the cooling system); empty the coolant from the engine to the prepared vessel and discard it in accordance with regulations.
 - (e) Connect the hose (4) to the cooler.
 - (f) Pour the newly mixed coolant (refer to Tab. 12-1) into the expansion tank (4, Fig. 12-1) and the overflow bottle (5, Fig. 12-1, the coolant level must be between marks min. and max.) and attach the caps.
 - (g) Check the cooling system to detect any signs of leakage points. If found, repair the leakage points.
 - (h) Install the engine cowlings (Section 71-10).
 - (i) Start the engine in accordance with the procedure specified in the Pilot's Operating Handbook for SportStar RTC (Doc. No. ERTC020-10-AS) and let it run briefly; refill the undiluted coolant if needed.



5. LANDING GEAR

Maintenance type: Line

Personnel qualification: Pilot / Owner qualified in accordance with M.A.803. (Pressure check and inflation of tyres)

Independent verification personnel qualified in accordance with Part 66 or higher

Recommended tools and material:

Item	Designation / Size	Quantity	Note
Manometer	-	1 pc.	
Source of pressurized air	-	1 pc.	
Adapter for filling of the nose landing gear wheel	769002	1 pc.	
Vessel for brake fluid	-	1 pc.	
Transparent hose	Inner ø 5 mm	0,5 m	

A. Inflation of tyres

Wheels with dimensions 15 x 6 which are installed on main and nose landing gear of SportStar RTC airplane can be equipped with these tyres:

- tyres Cheng Shin 15 x 6.00 – 6 and tubes Cheng Shin 15 x 6.00 – 6
- tyres Goodyear FLC 6 PR 15 x 6.00 – 6 and tubes 6.00 – 6 TR20 15 x 6.00 – 6.

During the airplane operation, keep the required pressure (Tab. 12-5) in the tyres of the landing gear wheels to ensure maximum service life and to reduce damage which results from landing on unpaved runway covered with small stones with sharp edges. During inflation or pressure check, make sure that the tyres are not excessively worn or cut and that they do not include abraded spots. Replace them if needed.

Name	Required Pressure	
	Cheng Shin tyres	Goodyear tyres
	kPa	kPa
Nose landing gear wheel	120 +20	80 +20
Main landing gear wheel	120 +20	80 +20

Tab. 12-5 Pressure in tyres



B. Pressure check and inflation of tyres of the landing gear wheels

Check and inflate the tyres of the landing gear wheels when the weather conditions are calm and the airplane stands on a flat and level surface.

(1) Procedure

- (a) Brake the airplane with wheel blocks.
- (b) Clean the area around the wheel valve (7; 8, Fig. 12-1).
- (c) Remove the dustcap from the wheel valve.
- (d) Use the manometer to check pressure in the tyre:
 - if the pressure is low, inflate the tyre, use an adapter to inflate the nose landing gear wheel
 - if the pressure is high, press the valve plug to release pressure from the tyre.
- (e) Check the valves for leakage. Cover the valve opening with soapy water and make sure that bubbles do not form; tighten the valve plug or replace it.
- (f) Attach the dustcap.
- (g) Remove the wheel blocks.

C. Filling of the brake system

(1) Brake fluid check / refilling

Refilling of the brake fluid is necessary when fuel leakage decreases efficiency of the brake system.

- (a) Align the airplane in a horizontal position (Section 08-10).
- (b) Remove the upper engine cowling (Section 71-10).
- (c) Check quantity of the brake fluid in the expansion tank (9, Fig. 12-1):
 - 1 S5 00-51 01 standard brake system - the brake fluid level must be between both marks.
 - 2 S5 00-61 01 Matco brake system - the brake fluid level must be approximately 6 mm from the top of the brake fluid expansion tank.
- (d) Remove the cap of the tank as needed and refill the fluid (refer to Tab. 12-1).
- (e) During refilling of fluid repeatedly step on the foot control pedal.
- (f) After you refill the fluid, bleed the system (see par. 5 D(1)).
- (g) Install the cap on the brake fluid expansion tank (9).
- (h) Install the upper engine cowling (Section 71-10).

**D. Bleeding of the brake system**

If the brake efficiency is reduced or the brake pumps don't return, it is probable that air penetrated into the brake system. The air must be eliminated in order to ensure a correct braking efficiency. Each of the brake circuits must be vented individually. It is important to thoroughly bleed the brake system. Otherwise the system function may be very unreliable and the brakes may fail. There are two main reasons why the air enters the brake system:

- Disconnected or loose hoses
- Insufficient quantity of brake fluid.

(1) Procedure

- Remove the upper engine cowling (Section 71-10).
- Verify whether the brake fluid expansion tank on the firewall contains a sufficient volume of brake fluid:
 - 1 S5 00-51 01 standard brake system - the brake fluid level must be between both marks.
 - 2 S5 00-61 01 Matco brake system - the brake fluid level must be approximately 6 mm from the top of the brake fluid expansion tank.
- Release the parking brake.
- Put the hose from transparent plastic on the air bleeding screw (Fig. 12-3). Loosen the air bleeding screw and catch the flowing brake fluid into a suitable receptacle.
- Depress the brake pump pedal several times, gradually on the left side as well as on the right side of control.
Watch the outflowing brake fluid and at the moment when it doesn't contain the air bubbles, tighten the air bleeding screw. Apply the same procedure for the other circuit of brakes.
- Check the function of the brake system and the brake fluid volume in the expansion tank.
- Repeat the procedure several times until the pedal offers resistance against motion (feels firm).
- Install the upper engine cowling (Section 71-10).

NOTE

If the brake efficiency remains unsatisfactory after bleeding or if the pedal motion is excessive, refill the brake system with brake fluid and bleed it again. Continue until all the air is out of the system.



S5 10-03 01/02 brake

Matco brake

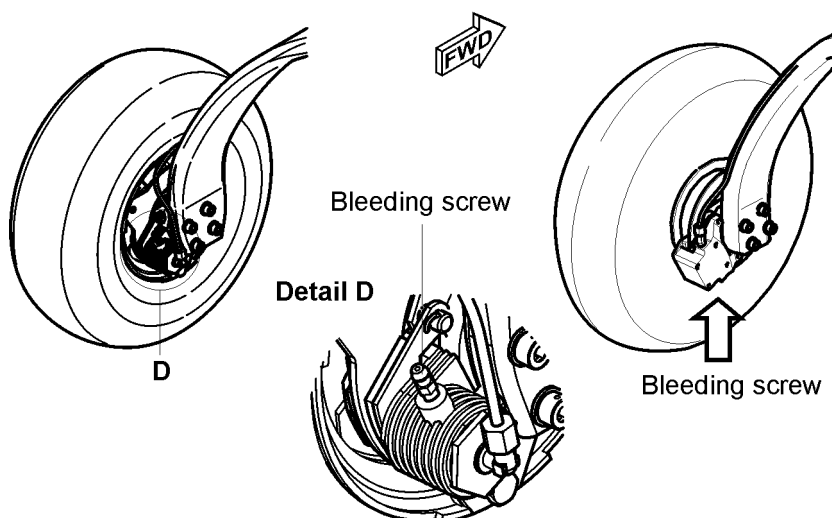


Fig. 12-3 Bleeding screw

E. Brake fluid change

Brake fluid thickens during operation of the airplane and absorbs water. This condition causes malfunctions of the brake system. It is not possible to determine when the malfunction occurs. Period for the brake fluid replacement is mentioned in Section 05-30.

(1) Procedure

- (a) Align the airplane in a horizontal position (Section 08-10).
- (b) Remove the upper engine cowling (Section 71-10).
- (c) Remove cap from the brake fluid tank (9, Fig. 12-1).
- (d) Unscrew the brake hoses on brake cylinders of the landing gear wheels.
- (e) Put a suitable vessel below the brake cylinders.
- (f) Step repeatedly on the pedals to remove the brake fluid from the system.
- (g) Attach the brake hoses to the brake cylinders.
- (h) Loosen the bleeding screw in the brake cylinder (Fig. 12-3).
- (i) Fill the system with brake fluid (see par. 5 C(1)).
- (j) Install the cap on the brake fluid tank (9).
- (k) Install the upper engine cowling (Section 71-10).



SCHEDULED SERVICING

1. INTRODUCTION

This Section includes information which is necessary for regular maintenance of the airplane. This Section includes the Lubricating Chart and instructions for cleaning of the airplane exterior and interior including the necessary material.

2. LUBRICATING CHART

A. Lubrication fundamentals

Lubricate the movable or revolving parts of the airplane in specified time intervals (Tab. 12-7). Regular lubrication decreases frictional forces in the movable joints and protects the lubricated points against corrosion. Use the recommended lubricants (Tab. 12-6). Lubricants must not be contaminated by water or unwanted materials and they must not have expired storage period or usability. After you complete lubrication, clean the residual grease from the lubricated points. The area in which you do the lubrication must be dust free.

Some points (e.g. landing gear) are exposed to environmental influences and variable load. You must monitor these points during periodical inspections and preflight inspections and lubricate them as often as circumstances require, but at least in specified time intervals (Tab. 12-7).

After you clean the airplane with a pressurized stream of water, lubricate the points which came into contact with the stream of water again (hinges of control surfaces, flaps, nose landing gear, etc.).

B. Recommended greases

Greases are mineral oils thickened with calcic, sodium, lithium or any other thickeners of aliphatic acids.

The greases do not have SAE classification and it is necessary to mark them with a brand name of the manufacturer for the individual use. Grease may be applied during all year.

Use greases of soft or semi-solid consistency, butyraceous, water resistant, intended for use at very low temperatures (to -30 °C) and at high temperatures (120 °C). The airplane manufacturer recommends these lubricants and lubricating oils (refer to Tab. 12-6):

Oils	Greases
WD-40 (or equivalent)	MOGUL MOLYKA G
	AEROSHELL GREASE 22
	AEROSHELL GREASE 11MS
	AEROSHELL GREASE 23C
	SHELL RETINAX HDX2
	SHELL RETINAX EPX2
	(or equivalent)

Tab. 12-6 Recommended lubricants and lubricating oils



C. Lubricating points

Unit	Lubricating point	Every 100 hours or annual	Lubricant
Engine	Oil change in accordance with the Engine Manual		
	Carburettor control cable at inlet into the bowden (in the engine compartment)	X	Oil WD-40 or equivalent
	Choke control cable at inlet into the termination (in the engine compartment)	X	Oil WD-40 or equivalent
Nose landing gear	Landing gear leg in the area of bushing	X	Oil WD-40 or equivalent
	Bearings in pull rod terminals of the nose landing gear control	X	Oil WD-40 or equivalent
Main landing gear	Pins of brake pads holders	X	MOGUL MOLYKA G, or equivalent
Ailerons	Hinges (piano hinges)	X	Oil WD-40 or equivalent
	Control hinge pin	X	MOGUL MOLYKA G, foreign lubricants
	Two-armed aileron control levers inside the wing	X	MOGUL MOLYKA G, foreign lubricants
	Hinge joint of rods under the wing fillet	X	MOGUL MOLYKA G, foreign lubricants
Flaps	Hinges (piano hinges)	X	Oil WD-40 or equivalent
	All movable joints under the quadrant cover between the seats	X	MOGUL MOLYKA G, or equivalent
	All movable joints under the baggage compartment bottom cover	X	MOGUL MOLYKA G, or equivalent
	Flaps control pins (at a flap root)	X	MOGUL MOLYKA G, or equivalent
VTU	Elevator hinge	X	Oil WD-40 or equivalent
	Swivel bearing in the elevator control rod termination	X	MOGUL MOLYKA G, or equivalent
HTU	Rudder suspensions	X	MOGUL MOLYKA G, or equivalent
	Rudder control cables at attachment to the rudder	X	MOGUL MOLYKA G, or equivalent
Trim tab	Trim tab hinge	X	Oil WD-40 or equivalent
	Ends of trim tab control levers	X	MOGUL MOLYKA G, or equivalent
Stick control	All movable joints in the cockpit	X	MOGUL MOLYKA G, or equivalent



Unit	Lubricating point	Every 100 hours or annual	Lubricant
Rudder control	All movable joints in the cockpit	X	MOGUL MOLYKA G, or equivalent
	The passages of rudder control cables	X	MOGUL MOLYKA G, or equivalent
	Brake system control cables at inlets in the bowdens (at brake pedals)	X	MOGUL MOLYKA G, or equivalent

Tab. 12-7 Lubricating Chart

3. CLEANING OF THE AIRPLANE

Maintenance type: Line

Personnel qualification: Pilot / Owner qualified in accordance with M.A.803.

Recommended tools and material:

Item	Designation / Size	Quantity	Note
Lint-free cloth	-	-	
Autoshampoo	-	-	
Car wax	-	-	
Plastic cleaner	PLEXUS	-	Spray
Degreasing agent	Technical benzine	-	
Detergent	-	-	
Buckskin	-	-	
Flannel cloth	-	-	
Display cleaner	-	-	
Sponge	-	-	
Brush	-	-	

A. Cleaning of the airplane surface

The exterior surface of the airplane (especially leading edges of wings) and the propeller must be kept clean in order to maintain the flight characteristics of the airplane

The exterior surface of metallic and fiberglass parts of the airplane has a durable coat which keeps good gloss characteristics under normal conditions and it does not require frequent polishing. During normal operation (e.g. after the end of the flight day) use water with cleaning agent to rinse the dirty airplane surface (especially insects). After you rinse it with clean water, wipe the airplane surface dry.

Thoroughly clean the airplane and renew the preservation of the painted surface of the airplane at least twice a year (e.g. before and after winter operation). The quality preservative coat will protect the painted surface of the airplane from sun rays and it will prevent its oxidation. You can use a quality car wax.



- (1) Cleaning procedure
 - (a) Close all the lids and the cockpit canopy.
 - (b) Cover the tyres. Never let the tyres stand in pools of the cleaning solution longer than necessary.
 - (c) Cover the total and static air pressure sensors and the lubricated parts (to prevent ingress of water and cleaning solution).

CAUTION

DO NOT WIPE THE DUST WITH A DRY CLOTH. IT REDUCES QUALITY OF THE PAINTED AIRPLANE SURFACE.

- (d) Remove dust and mud from the airplane surface with a stream of cold water.

CAUTION

WHEN YOU CLEAN THE AIRPLANE WITH WATER WITH CLEANING AGENT, PREVENT REMOVAL OF LUBRICANT FROM THE LUBRICATED POINTS. FAILURE TO COMPLY WITH THESE PROCEDURES MAY LEAD TO EARLY WEAR OF THESE POINTS.

- (e) Remove dirt from the painted surface with a sponge and cold water with cleaning agent (e.g. autoshampoo).
- (f) Remove the oil and grease with a cloth soaked in degreaser agent.
- (g) Thoroughly rinse the surface with clean cold water to remove all cleaning agent.
- (h) Thoroughly dry the washed surfaces with buckskin to prevent formation of traces of dried water.
- (i) Apply the suitable wax to the cleaned and dry airplane surface, spread it and polish it with a soft flannel cloth.

NOTE

When you use preservative agents, refer to the instructions given on the package of these agents.

- (j) Remove covers from the total and static air pressure sensors and the lubricated parts.

WARNING

MAKE SURE THAT THE HOLES OF TOTAL AND STATIC AIR PRESSURE SENSORS DO NOT INCLUDE ANY OBSTACLES. IF YOU FIND THEM, REMOVE THEM IMMEDIATELY.

**B. Cleaning of the cockpit canopy**

Rinse the dirty cockpit canopy with stream of clean water. Thoroughly wash the glass. Add antistatic agent if possible. Use only special paste designed for acrylic glass to polish glass of the cockpit canopy.

(1) Cleaning procedure

- (a) Prevent scratching of the glass surface. Before you clean the cockpit canopy, remove your watch and rings.
- (b) Remove dust from the surface of the cockpit canopy with a stream of cold water.

CAUTION

DO NOT USE GASOLINE, ACETONE, ALCOHOL, CARBON TETRACHLORIDE, OR COMMON WINDOW CLEANING AGENT TO REMOVE DIRT FROM THE COCKPIT CANOPY. THESE SUBSTANCES MAY DAMAGE THE ACRYLIC GLASS.

NEVER CLEAN THE COCKPIT CANOPY WITH A DRY CLOTH WITHOUT PASTE. ACRYLIC GLASS IS SOFT AND IT MAY BE SCRATCHED BY THE SETTLED DUST.

- (c) Remove the oil and grease with a cloth soaked in water with detergent or use a special cleaning agent for acrylic glass, then rinse glass of the cockpit canopy with a stream of clean water.
- (d) Thoroughly dry the washed surface with buckskin to prevent formation of traces of dried water.
- (e) Apply a thin layer of paste for acrylic glass with a soft cloth and wipe the glass surface with a slight pressure until all dirt disappears. After the paste dries, polish the window again.

NOTE

If you use the paste, refer to the instructions on the package.

C. Cleaning of the cockpit interior

The cockpit interior must be vacuumed in specified time intervals to remove dirt and dust. Use a soft brush to remove dirt particles.

(1) Cleaning procedure

- (a) Remove large dirt particles from the cloth coverings with a brush. Remove small dirt particles with a vacuum cleaner.
- (b) Remove the stains from the cloth coverings with a cleaning agent with detergent. If you are not able to remove some stains with a detergent, remove them with a suitable cleaning agent designed for fabrics.
- (c) Wipe fiberglass panels and covers, leatherette coverings, handles and buttons with a cloth soaked in detergent.



D. Cleaning of display units and avionics hardware

Use cleaning agents specially designed for display surfaces which are safe for antireflective layers. Use a soft, lint-free cloth to apply the agent.

E. Cleaning of the engine

CAUTION

WHEN YOU CLEAN THE ENGINE, DO NOT USE HIGHLY FLAMMABLE LIQUIDS AND THINNERS!

If necessary, clean the engine with due diligence. Before you clean the engine, find the leakage points. Clean the engine only when it is cold.

It is recommended to use the common cold cleaning agents (refer to Maintenance Manual (Line Maintenance) for Rotax Engine Type 912 Series, Doc. No.. MML912, 899191).

Never clean the engine with a high pressure cleaner. It is dangerous for electrical installation and crankshaft seals. Oxidation of various elements may cause a malfunction of the engine!

After each cleaning, use air flow to clean all electrical installation components, such as battery, ignition, spark plug terminals, connectors, etc., to prevent formation of stray currents.

CAUTION

WHEN YOU CLEAN THE ENGINE, RESIDUES OF FUEL, OIL AND OTHER ENVIRONMENTALLY HARMFUL SUBSTANCES ARE WASHED AWAY. THEREFORE, THE WATER MUST BE COLLECTED AND DISCARDED IN AN ENVIRONMENTALLY FRIENDLY WAY.

F. Cleaning of the propeller

If the propeller is dirty, wash the surface with a cloth soaked in lukewarm water with ordinary detergent.

CAUTION

DO NOT CLEAN THE PROPELLER WITH AGGRESSIVE CLEANING AGENTS. THIS MAY LEAD TO THE FORMATION OF INTERNAL CORROSION OF PARTS OF THE PROPELLER.

PREVENT THE CLEANING AGENT FROM ENTERING THE PROPELLER HUB AREA. ALWAYS TURN THE PROPELLER SO THAT THE WASHED BLADE POINTS DOWNWARD.



UNSCHEDULED SERVICING

1. WINTER OPERATION

A. General

It is considered a winter operation, if the outside temperature falls below +5 °C.

B. Preparing the airplane for winter operation

(1) Airplane airframe

- (a) Lubricate the airplane in accordance with the Lubricating Chart in the scope of inspection after 100 hours of operation, if the last inspection was not within 6 months (Section 12-20).
- (b) Check and adjust rudder control cable prestress (Section 27-20).
- (c) Check the cockpit canopy rubber packing. If it is damaged, replace it.
- (d) Check the fuel tank bleeding.
- (e) Check attachment of wings, ailerons, flaps and tail units; lubricate in accordance with the Lubricating Chart.

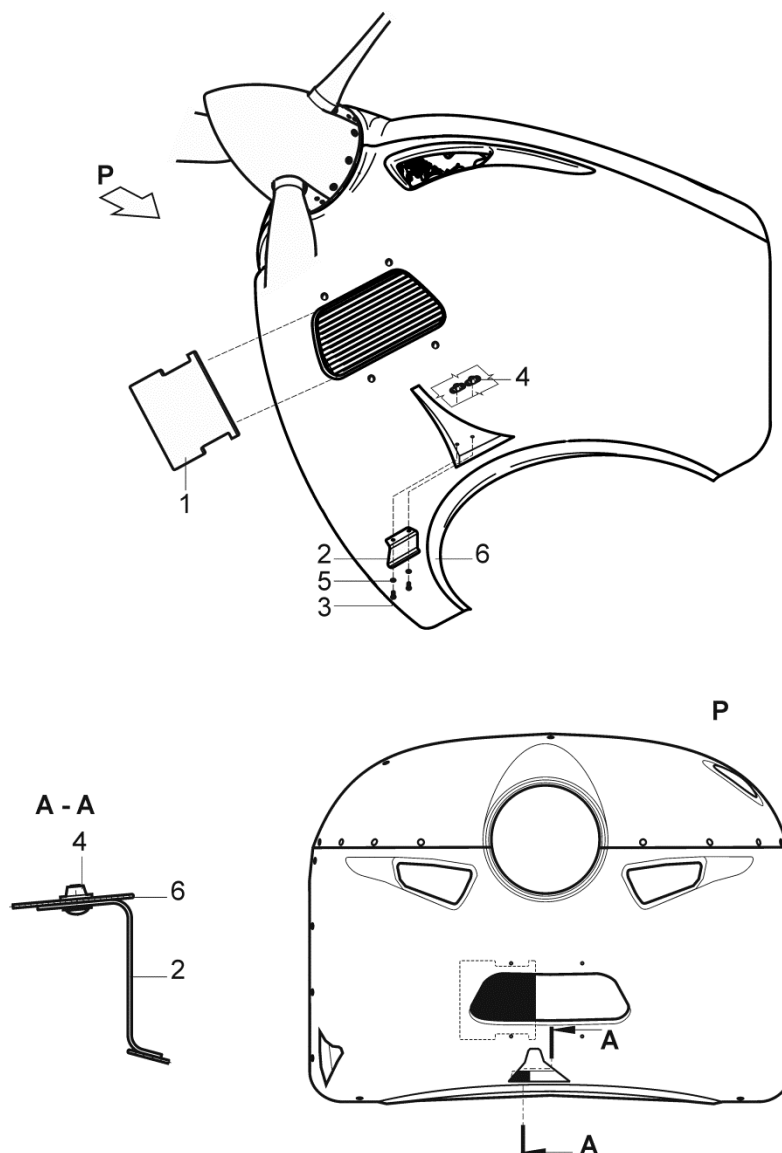
(2) Engine

Do procedures mentioned in the Operators Manual for Rotax Engine Type 912 Series, Doc. No. OM912, 899649):

- (a) Add Anti-freeze to the cooling system as required (usually a 50/50 mix) (Section 12-10).
- (b) Change the oil (Section 12-10).
- (c) Check the spark plug gaps (refer to Maintenance Manual (Line Maintenance) for Rotax Engine Type 912 Series, Doc. No. MML912, 899191).
- (d) If low coolant (cylinder heads) and oil temperatures occur during operation under low outside temperature, then do these procedures:
 - 1 Install the coolant cooler screen (1, Fig. 12-04).
 - 2 Install the oil cooler screen (2).

NOTE

Installation of the winterization kit is the same for new engine cowlings.



Legend to Fig. 12-4 Fig. 12-2

1	Screen S9 25-00 21	4	Anchor nut M4 (2 pcs.)
2	Screen S9 25-01 21	5	Washer (2 pcs.)
3	Screw M4 (2 pcs.)	6	Lower engine cowling

Fig. 12-4 Winterization kit installation

C. Operation

(1) Preflight inspection

In addition to the preflight inspection described in Pilot's Operating Handbook for SportStar RTC (Doc. No. ERTC020-10-AS) do these procedures:



- (a) Remove snow from the airplane surface, use hot air to remove icing.
 - (b) Make sure that the control surfaces move freely. Check the slots of the control surfaces and flaps; remove snow or ice.
 - (c) Before each flight, check the fuel tank vent hose for openness.
 - (d) Check the fuel installation (fuel filter) for ice crystals. If found, empty the fuel tank and refill it with fresh fuel.
 - (e) Prior to fueling, check the fuel for water (it is recommended to use a water separator / filter).
 - (f) Drain the fuel system (Section 12-10) and check for water and other unwanted material. The fuel must be clean.
- (2) Increase of engine and oil temperature
- If the ambient temperature is not below +5 °C, it is possible to start the engine without increase of its temperature. If the temperature of the ambient air falls below +5 °C, it is recommended to increase the temperature of the engine and oil before starting. Use a suitable air heater or dryer.

WARNING

NEVER USE OPEN FIRE TO INCREASE THE ENGINE TEMPERATURE!

- (a) Blow hot air from the front into the holes in the lower engine cowling.

CAUTION

THE TEMPERATURE OF HOT AIR MUST NOT EXCEED 100 °C OF AT THE THE AIR HEATER OUTPUT.

- (b) Increase the temperature of the oil tank together with the oil in the engine
 - (c) Increase the temperature of the engine until the temperature of the cylinder heads and oil exceeds +20 °C.
- (3) The engine start
- Start the engine in accordance with the procedure given in the Pilot's Operating Handbook for SportStar RTC (Doc. No. ERTC020-10-AS).
- (4) Parking and taxiing
- (a) Make sure that the wheel brakes are not frozen when the airplane is parked outside and the temperature is below zero.
 - (b) If the brakes are frozen, increase their temperature with hot air to melt snow or ice; never stretch the frozen brakes by force.
 - (c) Before taxiing, check free rotation of wheels (hold the root of the propeller blade near the propeller hub and pull the airplane).

D. Termination of winter operation

- (1) Procedures after termination of winter operation
 - (a) Thoroughly clean the airplane (pins, especially hinges) (Section 12-20).
 - (b) Lubricate the airplane in accordance with the Lubricating Chart (Section 12-20).

CHAPTER

20

**STANDARD PRACTICES
- AIRFRAME**



CHAPTER 20

STANDARD PRACTICES – AIRFRAME

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GENERAL

1. INTRODUCTION

This chapter describes the standard maintenance practices for maintaining items of the airframe and systems that are typical to more than one area or system, in an airworthy condition.

Maintenance practices that are unique to a particular system or subject are described in the appropriate chapter and section in the maintenance manual.

Maintenance practices in a particular chapter and section supersede the general information in this chapter.

The information is broken down into several sections. The following is a list of the information contained in each section.

20-10 Torque data

This section contains general information and provides maintenance practices for torque of fasteners.

20-20 Safetying

This section contains general information and provides maintenance practices for the installation of lockwire, cotter pins, self-locking nuts, lock washers, and Loctite.



TORQUE DATA

1. FASTENERS INSTALLATION

A. Bolts

When installing bolts, ensure that the threads are free of foreign material.

Do not use anti-seize compounds or lubricant unless specified in the specific instructions.

B. Nuts

When installing castellated nuts for use with safety wire or cotter pin, align holes by tightening nut to low torque range and continue to tighten until holes align. If holes cannot be aligned without exceeding the maximum torque value, a washer of different thickness may be used or another washer added.

When installing a new self-locking nut, always use the same type nut as removed. Self-locking nuts are for one-time use only and must not be reused. Self-locking nuts should not be substituted for castellated nuts secured by safety wire or cotter pin. Fiber or nylon self-locking nuts should not be used in areas subject to high temperature. Do not use self-locking nuts at joints which are subject to rotation by either the nut or bolt.

C. Washers

When installing a lock washer against aluminum alloy, a cadmium plated flat washer should be installed between lock washer and aluminum alloy.

Use of the wrong type or number of washers can result in improper preloading of the bolts when torqued.

When bolts are used which have a radius under bolt head, a countersunk washer must be used with the countersink next to the bolt radius, under the bolt head. Reversing a counter-sunk washer or installing a standard washer can result in bolt failure (Fig. 20-1).

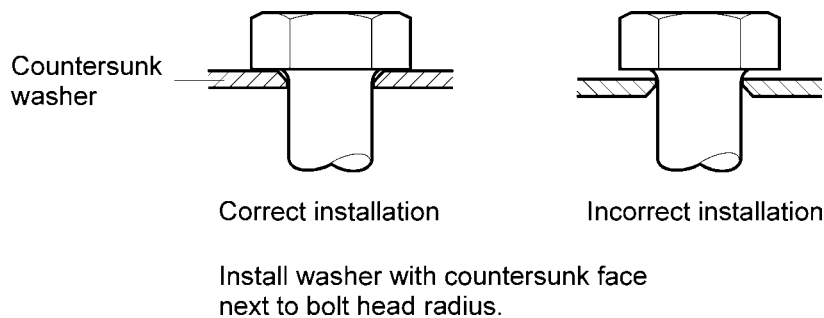


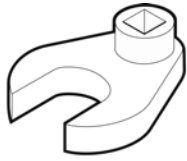
Fig. 20-1 Washer installation – close tolerance bolts



D. Torque wrenches

Whenever possible, use the torque wrench when tightening of threaded fasteners.

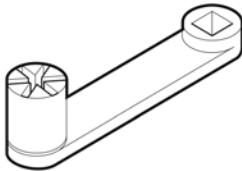
- (1) Practices for the use of a torque wrench
 - (a) Whenever possible, the nut shall be torqued. When is necessary to torque the bolt head, the bolt shall be torqued to the high torque value plus shank friction, if any.
 - (b) Calibrate torque wrenches periodically to ensure accuracy.
 - (c) Take final torque reading while nut is rotating. If highest torque value is reached without rotating the nut, the nut must be backed off and retorqued.
 - (d) When torquing requires the use of an adapter, the torque value must be computed using Fig. 20-2.



Short open end adapter

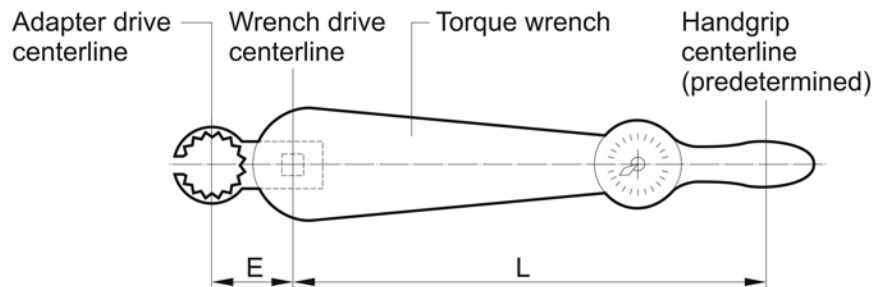


Setscrew adapter



Hose clamp adapter

NOTE: When using a torque wrench adapter which changes the distance from the torque wrench drive to the adapter drive, apply the following formulas to obtain the corrected torque reading.



$$\text{Formula } \frac{T \times L}{L + E} = Y$$

Example (with "E" as plus dimension)

T = 15,3 Nm (135 lb in)

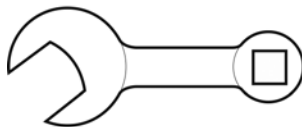
Y = Unknown

L = 254 mm (10 in)

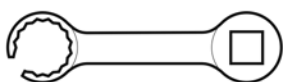
E = 38 mm (1,5 in)

$$Y = \frac{15,3 \times 254}{254 + 38}$$

Y = 13,3 Nm (117 lb in)



Open-end wrench adapter



Flare nut wrench adapter



Spanner wrench adapter

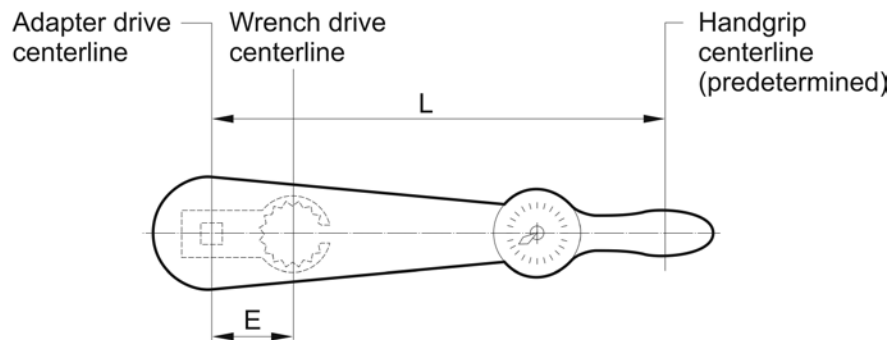
Legend:

T = Actual (desired) torque

Y = Apparent (indicated) torque

L = Effective length lever

E = Effective length of extension



$$\text{Formula } \frac{T \times L}{L - E} = Y$$

Example (with "E" as minus dimension)

T = 15,3 Nm (135 lb in)

Y = Unknown

L = 254 mm (10 in)

E = 38 mm (1,5 in)

$$Y = \frac{15,3 \times 254}{254 - 38}$$

Y = 18 Nm (159 lb in)

Fig. 20-2 Torque wrench and adapter formulas



2. TORQUE VALUE

The torque values have been calculated on the assumption that no lubrication is used on the bolted joints and that cadmium plating is a standard surface finish.

Metric thread		Strength class				
		4.8	5.8	8.8	10.9	12.9
M4	Nm kgm	-	1,67 0,17	-	-	-
M5	Nm kgm	-	3,45 0,35	-	-	-
M6	Nm kgm	5,39 0,55	6,86 0,70	9,80 1,00	13,72 1,40	16,67 1,70
M7	Nm kgm	8,82 0,90	10,78 1,10	14,70 1,50	20,59 2,10	25,49 2,60
M8	Nm kgm	12,74 1,30	15,69 1,60	22,55 2,30	32,36 3,30	38,24 3,90
M10	Nm kgm	24,51 2,50	31,38 3,20	44,12 4,50	61,78 6,30	73,54 7,50
M12	Nm kgm	42,16 4,30	52,95 5,40	74,53 7,60	104,93 10,70	125,52 12,80
M14	Nm kgm	66,68 6,80	78,54 8,00	117,67 12,00	164,75 16,80	196,13 20,00
M16	Nm kgm	93,16 9,50	107,87 11,50	164,75 16,80	225,55 23,00	274,58 28,00
M18	Nm kgm	137,29 14,00	171,61 17,50	245,16 25,00	343,23 35,00	411,87 42,00
M20	Nm kgm	176,51 18,00	225,55 23,00	313,81 32,00	441,29 45,00	539,36 55,00
M22	Nm kgm	225,55 23,00	284,39 29,00	392,26 40,00	558,97 57,00	676,65 69,00
M24	Nm kgm	313,81 32,00	392,26 40,00	549,17 56,00	755,11 77,00	970,85 99,00
Ultimate strength (MPa)		420	500	880	1040	1220
ϕ in %		(14)	7	12	8	8
Yield point (MPa)		330	400	640	940	1100

Tab. 20-1 Recommended fastener torque value



SAFETYING

1. GENERAL

This chapter contains the general information and provides the standard technological methods for use of safety wire, cotter pins, lock washers, self-locking nuts, and Loctite. Using of each safetying method depends on the type of safe parts, their stresses and must prevent the release of the fasteners subject to vibration, torque, tension, etc.

All attachment points for control surfaces should be attached with castellated nuts, cotter pins or lock wire and drilled bolt shanks. The use of self-locking nuts is not permitted on rotating joints.

If the locking effect of a component is limited, always replace it with a new component.

Every non-locked nut or bolt (without cotter pin, self-locking nut, serrated locking washer...), must be locked using some kind of Loctite.

During installation, always use the following new parts:

- Self-locking nut
- Cotter pin
- Roll pin
- Tab washer
- Serrated locking washer
- Rivet
- Safety clamp
- Cable tie
- Sealing adhesive tape
- Lockwire
- Pyrosil tape
- Shrink cable
- Sealing ring

2. LOCKWIRE

Lockwire comes in two types, which are identified by size:

- Zinc plated and Tin-plated steel wire. Used for general lock wiring procedures.
- Corrosion resistant steel wire. This wire is to be used in areas with high temperature and chemical corrosion.

For general-purpose lockwiring, 0,5 mm diameter wire is used on treads from M4 to M10, and 0,8 mm diameter wire is used on threads M12 and up.



A. Lockwire installation

(1) Method

The double-twist method of lockwiring should be used as the common method of lockwiring (Fig. 20-3; Fig. 20-4). The single wire method of lockwiring may be used in closely spaced, closed geometrical pattern (triangle, square, circle, etc.), on parts in electrical systems, and in places that would make the single wire method more advisable. Closely spaced should be considered a maximum of 50 mm between centers.

CAUTION

SCREWS IN CLOSELY SPACED GEOMETRICAL PATTERNS WHERE USED IN CRITICAL AREAS, SHOULD USE THE DOUBLE-TWIST METHOD OF LOCKWIRING.

(2) Spacing

- (a) When lockwiring is widely spaced in multiple groups using the double-twist method, three units should be the maximum number in series.
- (b) When lockwiring is closely spaced in multiple groups, the number of units that can be lockwired by 600 mm length of wire should be the maximum number in series.
- (c) Widely spaced multiple groups should mean those in which the fastenings are from 100 to 150 mm apart. Lockwiring should not be used to secure fasteners or fittings which are spaced more than 150 mm apart, unless tie points are provided on adjacent parts to shorten the span of the lock wire to less than 150 mm.

(3) Tension

- (a) Parts should be lockwired in such a manner that the lockwire should be put in tension when the parts tend to loosen. The lockwire should always be installed and twisted so the loop around the head stays down and does not tend to come up over the bolt head and leave a stacked loop.

NOTE

This does not necessarily apply to the castellated nuts when the slot is close to the top of the nut, the wire will be more secure if it is made to pass along the side of the stud.

- (b) Care should be exercised when installing lockwire to ensure it is tight but not overstressed.



(4) Use of lockwire

Practices for the use of a lockwire

- (a) When removing lockwire ensure that all pieces are removed.
- (b) Use only new lockwire of the same type and diameter as that which was removed. Never reuse lockwire.
- (c) A pigtail 12 mm or six twist should be made at end of the wiring. This pigtail should be bent back or under to prevent it from becoming a snag.
- (d) When castellated nuts are to be secured with lock wire, tighten the nut to the low side of the selected torque range otherwise specified, and, if necessary, continue tightening until a slot aligns with the hole. In no case should you exceed the high side torque range.
- (e) Drain plugs and cocks may be safetied to a bolt, nut or other part having a free lock hole in accordance with the instruction described in this section.
- (f) When locking is required on electrical connectors (Fig. 20-5) which use threaded couplings, or on plugs which employ screws or rings to fasten the individual parts of the plug together, they should be lockwired with 0,5 mm diameter wire in accordance with the locking principles in this section. It is preferable to lockwire all electrical connectors individually. Do not lockwire one connector to another unless it is necessary to do so.
- (g) Lockwire shall not be used on emergency devices that would depend on fracture of lockwire for operation. However, where existing structural equipment or safety-of-flight emergency devices require shear wire to secure equipment while not in use (e.g. emergency extending lever of the landing gear), but which are dependent upon shearing or breaking the lockwire for successful emergency operation of equipment, particular care should be exercised to assure that wiring under these circumstances will not prevent emergency operations of these devices.

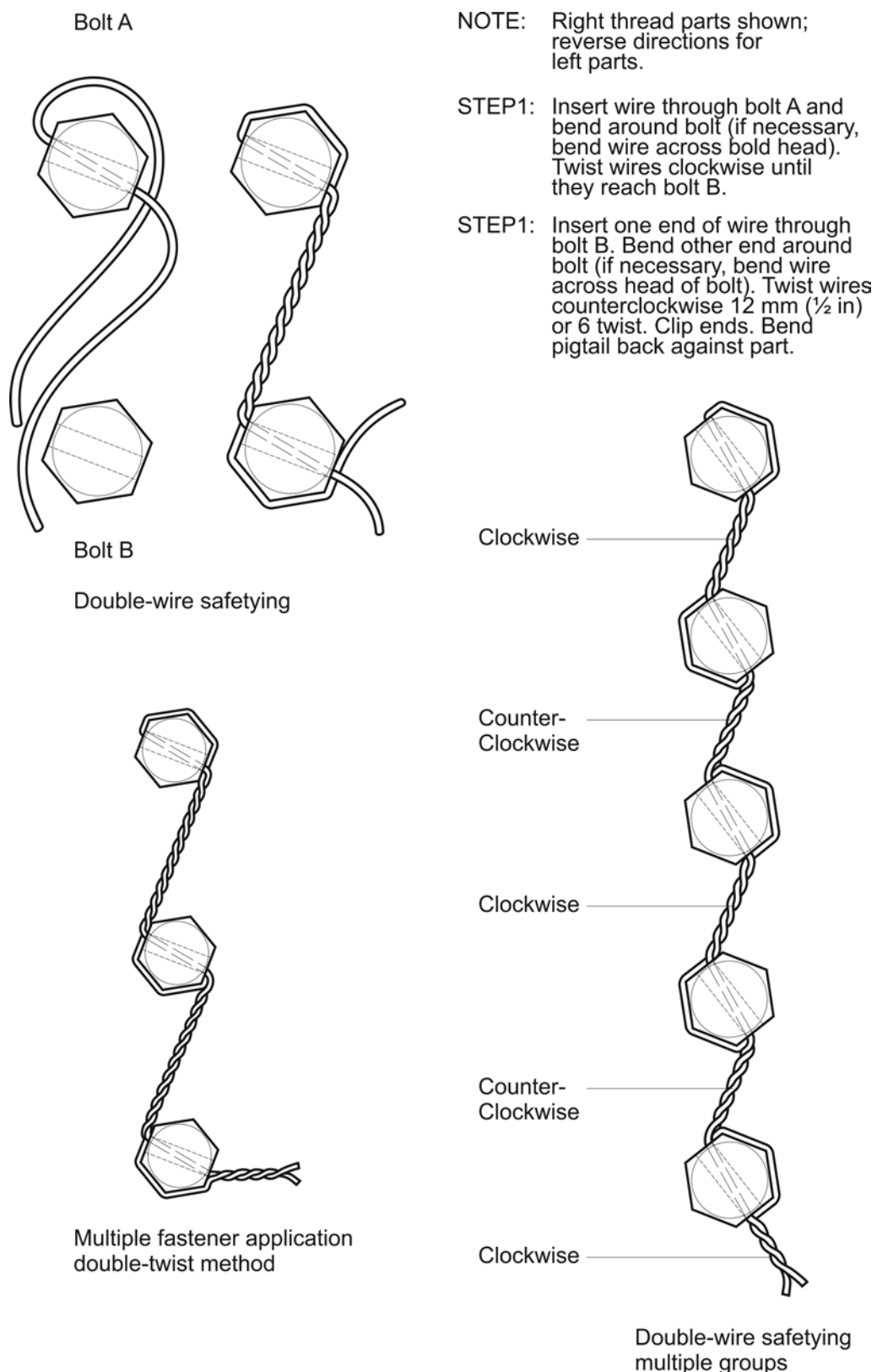
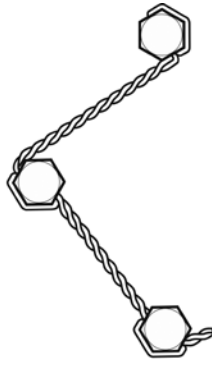


Fig. 20-3 Lockwire safetying



Example 1



Example 2



Example 3

Bolts, fillister head screws, square head plugs, and other similar parts are wired so that the loosening tendency of either part is counteracted by the tightening of the other part.

The direction of twist from the second to the third unit is counter-clockwise to keep the loop lower wire and by making a counter-clockwise twist after it leaves the hole. The loop will be secured in place around the head of that bolt.



Example 4



Example 5

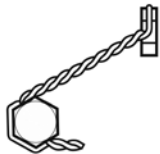


Example 6



Example 7

Methods for wiring various standard items. Wire may be wrapped over the unit rather than around it when wiring castellated nuts or on other items when there is clearance problem.



Example 8

The method for wiring bolts in different planes. Note that wire should always be applied so that tension is in the tightening direction.



Example 9

Hollow head plugs wired with the tab bent inside the hole to avoid snags and possible injury to personnel.



Example 10

Correct application of single wire to closely spaced multiple group.

Fig. 20-4 RH thread lockwiring examples

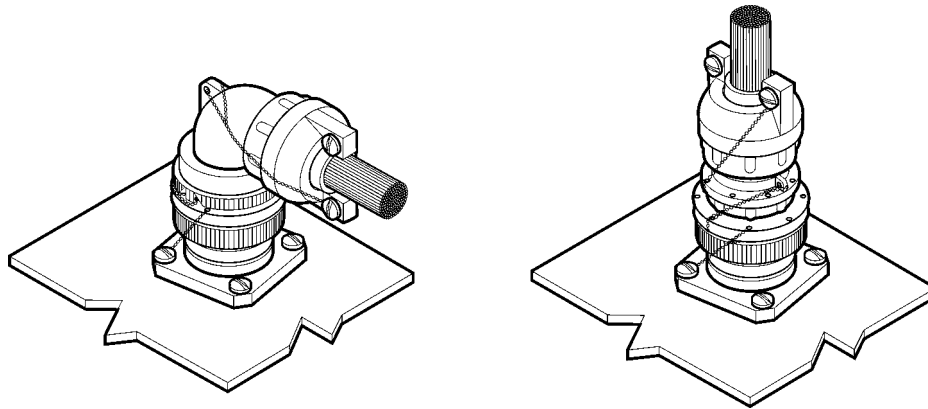


Fig. 20-5 Electrical connectors lockwiring examples

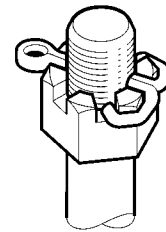
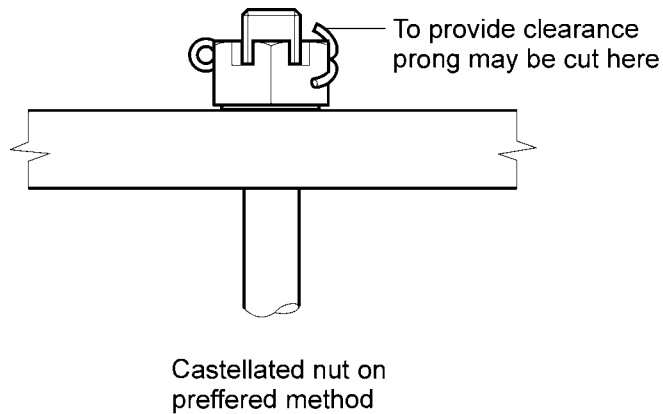
3. COTTER PINS

A. Cotter pins installation

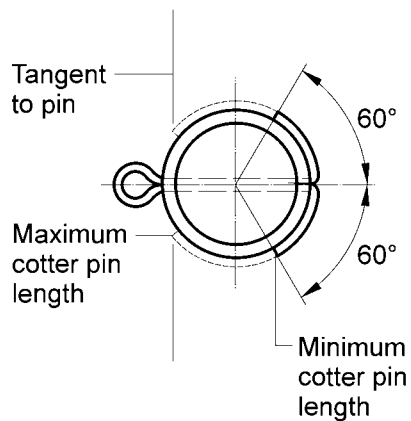
- (1) Practices for the use of cotter pins
 - (a) Select cotter pins in accordance with atmosphere and service limitations.
 - (b) Use only a new cotter pin of the same type as the one removed. Never reuse cotter pins.
 - (c) When nuts are to be secured to the fastener with cotter pins, tighten the nut to the low side of applicable specified or selected torque range, unless otherwise specified, and if necessary, continue tightening until the slot aligns with the hole. In no case should you exceed the high side torque range.
 - (d) Castellated nuts mounted on bolts may be safetied with cotter pins or lock wire. The preferred method is with a cotter pin, bent parallel to the axis of the bolt (Fig. 20-6). The alternate method, where the cotter pin is mounted normal to the axis of the bolt, may be used when the cotter pin in the preferred method may become a snag.
 - (e) In the event that the cotter pin diameter is above the nut castellation, a washer should be used under the nut or a shorter fastener should be used. A maximum of two washers is permitted under the nut.
 - (f) Use the largest nominal diameter cotter pin that the hole and slots will accommodate. No application of cotter pin to any nut or fastener is permitted if the fastener hole size is less than the required hole and slot size for the cotter pin.
 - (g) Install the cotter pin with the head firmly in the slot of the nut with the axis of eye at right angles to the bolt shank. Bend prongs so the head and upper prong are firmly seated against the bolt.
 - (h) In pin applications, install the cotter pin with the axis of eye parallel to the shank of pin. Bend prongs around the shank of the pin.
 - (i) Install the cotter pins (if it is possible)::
 - from above-downwards
 - from the front-backwards.



- (j) Cadmium plated cotter pins should not be used in applications bringing them in contact with fuel, hydraulic fluid or synthetic lubricant.
- (k) If using a castellated nut and new bolt, screw the castellated nut to operating position and use diameter 1,6 mm drill to drill a hole for the cotter pin.



Castellated nut on alternate method



Pin application

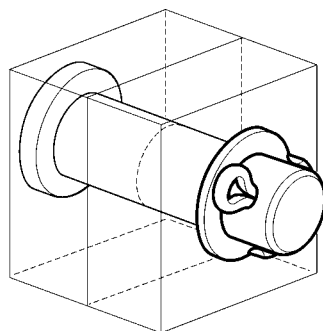


Fig. 20-6 Cotter pin safetying



4. SELF-LOCKING NUTS

Self-locking nuts may be used in some applications. The following guidelines must be followed when using self-locking nuts.

A. Self-locking nuts installation

- (1) Practices for the use of self-locking nuts
 - (a) Self-locking nuts must be installed so at least two threads of bolt, stud or screw are visible.
 - (b) Self-locking nuts, which are attached to the structure, will be attached in a positive manner to eliminate the possibility of their rotation or misalignment when tightening the bolt and screw.
 - (c) Self-locking nuts are for one-time use only and must not be reused.
 - (d) Use only a new self-locking nut of the same type as the one removed.

5. LOCK WASHERS

A. Lock washers installation

Lock washers may be used provided the following conditions are met.

- (1) Conditions for the use of lock washers
 - (a) When self-locking feature cannot be provided in externally or internally threaded parts.
 - (b) When a cotter pin cannot be used to prevent rotation of internal threads with respect to external threads.
 - (c) When lockwire cannot be used to prevent loosening of threaded parts.
 - (d) When loosening of threaded parts will not endanger the safety of the airplane or occupants.
 - (e) When corrosion is encouraged by the gouging of aluminum by edges of teeth on tooth locked washers, this will cause malfunction of parts being fastened together.
- (2) The following guidelines must be followed when using lock washers
 - (a) Use only new washer for each assembly.
 - (b) When bending or setting the washer tabs, do not use sharp pointed tools. Use of such tools can lead to subsequent failure of the locking tabs that, upon becoming detached, can cause extensive damage.



6. LOCTITE

NOTE

Loctite type and suitable cleaner is listed in the relevant chapter in the „Recommended tools and material“.

A. Use of Loctite

- (1) Practices for the use of Loctite
 - (a) Loctite is used on the airplane when it is impossible to cotter pins / lockwire a fastener or if cotter pins / lockwire is impractical.
 - (b) Use only Loctite of the same type as that which was originally used.
 - (c) Application of Loctite should be accomplished at temperature above 15°C to ensure proper curing.

B. Applying Loctite

- (1) Prepare surface
 - (a) Clean all parts to which Loctite is to be applied.
 - (b) Surfaces must be clean and free of dust, oil, grease, condensation, moisture, and other contaminations.
- (2) Apply Loctite to threaded fasteners
 - (a) Select correct type of Loctite.
 - (b) Clean threaded surfaces with suitable degreaser.
 - (c) Apply Loctite to threads by brushing, dipping, or running applicator over threads.

NOTE

Loctite may be applied to either the nut or bolt; however, for blind hole applications, coat the sides of the blind hole and first two threads of the male fastener.

- (d) Assemble parts and torque using normal torque (Section 20-10).
- (e) Excessive Loctite may be removed using a cotton cloth dampened with cleaner.

CHAPTER

21

**ENVIRONMENTAL
SYSTEMS**



CHAPTER 21

ENVIRONMENTAL SYSTEMS

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GENERAL

1. INTRODUCTION

SportStar RTC airplane is equipped with venting and heating system that ensures supply of the cold ambient air and heating of the airplane cockpit.

Two eye-ball vents on the sides of the inner frame of the cockpit canopy provide ventilation of the cockpit. Cold air moves to the eye-ball vents through two NACA inlets placed on the sides of the cockpit canopy.

Furthermore, the cockpit can be ventilated through the side or front ventilation windows (Section 52-10).

The cockpit heating is connected to the heat exchanger on the exhaust muffler. The hot air moves through the hoses to the feet of pilots and to the heating of the front part of the cockpit canopy.

Temperature, quantity, and distribution of air are regulated by the controls on the central console. These controls are connected to the individual chambers.

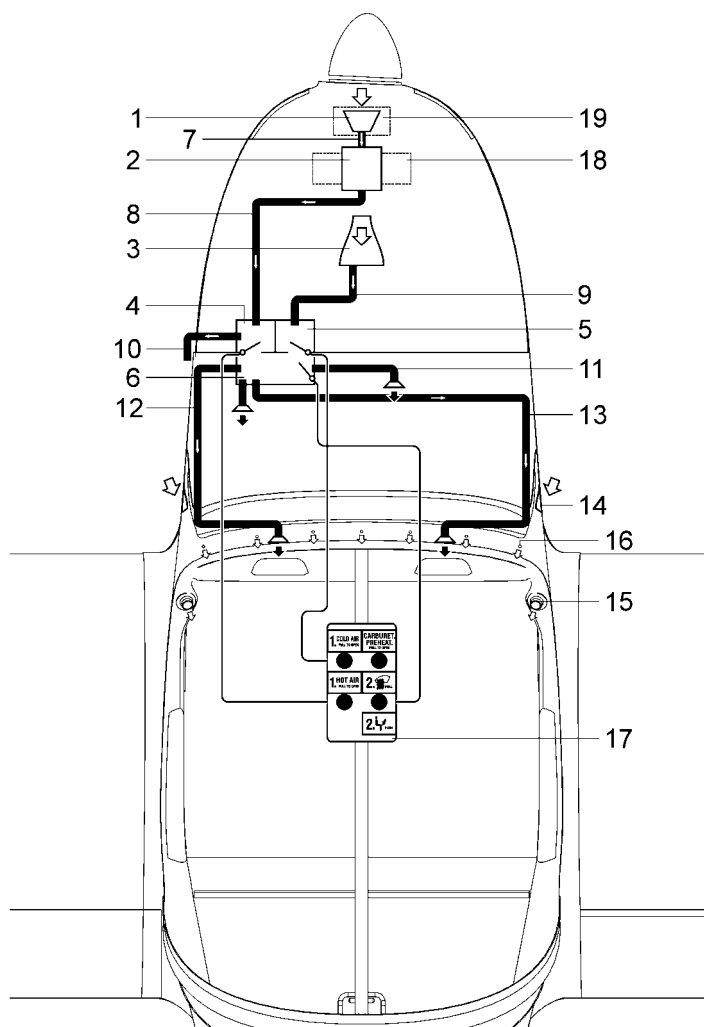


Fig. 21-1 Scheme of venting and heating (page 1 of 2)



Legend to Fig. 21-1

1	Air inlet	11	Hose
2	Heat exchanger	12	Hose
3	NACA inlet	13	Hose
4	Hot air chamber	14	NACA inlet
5	Cold air chamber	15	Eye-ball vent
6	Mixing chamber	16	Air outlets
7	Hose	17	Controls
8	Hose		For information:
9	Hose	18	Exhaust muffler
10	Hose	19	Water cooler

Fig. 21-1 Scheme of venting and heating (page 2 of 2)



DISTRIBUTION

1. DESCRIPTION AND OPERATION

The ambient air is suctioned through two NACA inlets (14, Fig. 21-1), on the sides of the cockpit canopy. In the cockpit, the air is distributed through the cockpit canopy frame. The sides of the canopy includes two adjustable eye-ball vents (15). You can turn the eye-ball vents to regulate quantity of air that flows into the cockpit.

The air that flows to the glass through a row of holes (16) in the cockpit canopy frame ensures demisting of the front part and the sides of the cockpit canopy.



HEATING

1. DESCRIPTION AND OPERATION

The air enters the heating system through the water cooler (19, Fig. 21-1) into the air inlet (1). It moves through the hose (7) to the heat exchanger (2) on the exhaust muffler (18). The hot air moves through the hose (8) to the chamber (4) on the firewall (in the engine compartment). If the valve in the chamber is closed, the air moves through the hose (10) below the airplane. The cold air is collected through NACA inlet (3) on the lower engine cowl and it moves through the hose (9) to the chamber (5).

If position of the valves of the two chambers (4; 5) changes, the air enters the mixing chamber (6), where cold and hot air mix to reach the required temperature.

The air moves through two hoses (12, 13) from the mixing chamber to the instrument panel cover. It flows through the vents in the cover to the canopy glass, or it moves through the hose (11) to the air outlet at the feet of the flight crew.

Use control knobs on the central console (Section 21-60) to control the valves for hot and cold air and the valve in the mixing chamber.



2. MAINTENANCE PRACTICES

A. Air inlet

Maintenance type: Line

Personnel qualification: Independent verification personnel qualified in accordance with Part 66 or higher

Recommended tools and material:

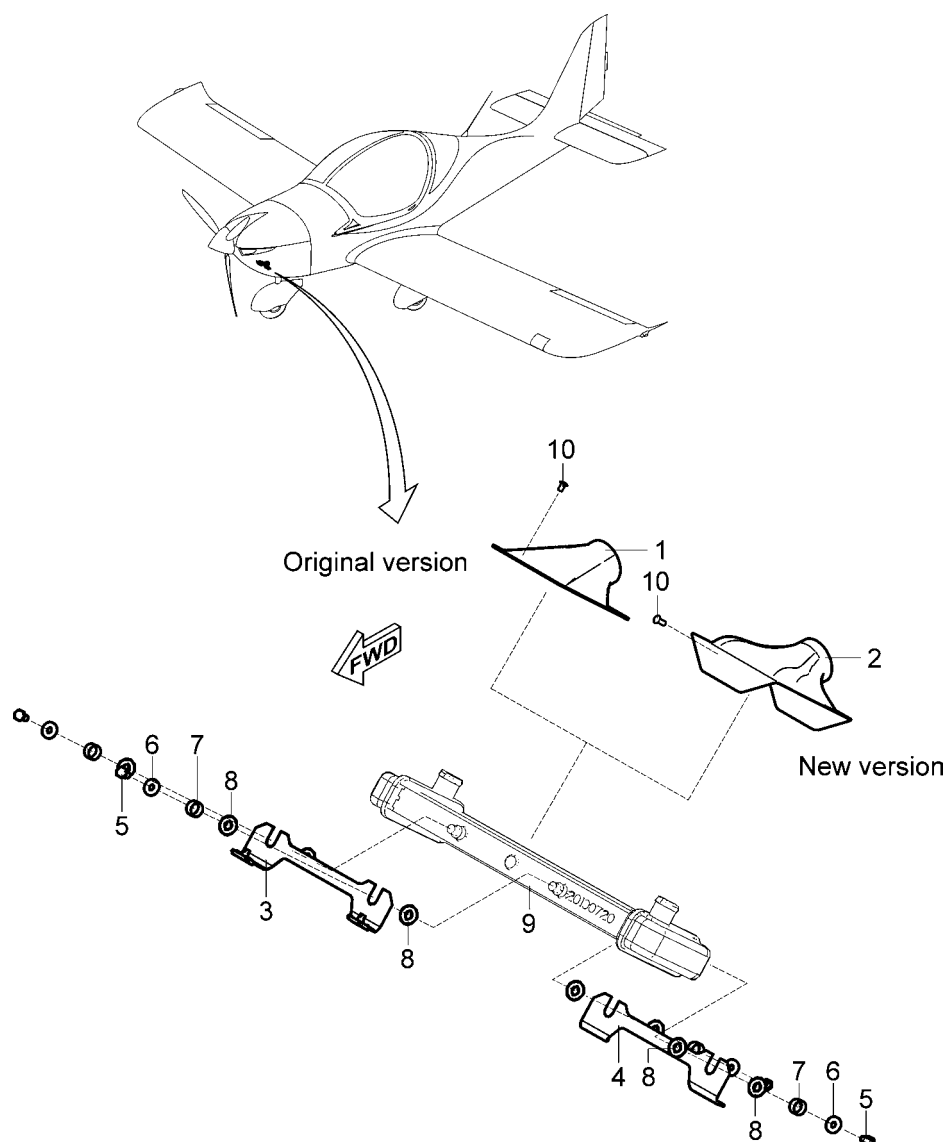
Item	Designation / Size	Quantity	Note
Wrench	No. 10	1 pc.	
Drill		1 pc.	
Drill bit	ø 3,2 mm	1 pc.	
Hand riveting tool		1 pc.	
Rivet	3,2x6,4	4 pcs. for the original version; 6 pcs. for the new version	
Stainless lockwire	ø 0,8 mm	-	

(1) Removal – air inlet

- (a) Remove the water cooler (Section 75-00).
- (b) Remove the rivets (10, Fig. 21-2) with a drill and remove the air inlet (1; 2).
- (c) Remove the holders from the cooler, if necessary:
 - 1 Remove the lockwire between the bolts (5) and the holders of the cooler (3; 4).
 - 2 Remove the bolts (5), washers (6; 8), and spacers (7). Remove the holders of the cooler (3; 4).

(2) Installation – air inlet

- (a) Attach the holders to the cooler, if necessary:
 - 1 Attach the holders (3; 4, Fig. 21-2) to the cooler (1) with bolts (5), washers (6; 8) and spacers (7).
 - 2 Secure the bolts (5) and the holders of the cooler (3; 4) with a lockwire (Section 20-20).
- (b) Attach the air inlet (1; 2) with rivets.
- (c) Install the water cooler (Section 75-00).



Legend to Fig. 21-2

1 Air inlet	7 Spacer
2 Air inlet	8 Washer 10,5
3 Upper cooler holder	For information:
4 Lower cooler holder	9 Cooler
5 Bolt	10 Rivet
6 Washer 6,4	

Fig. 21-2 Air inlet – removal / installation



B. Heat exchanger

Maintenance type: Line

Personnel qualification: Independent verification personnel qualified in accordance with Part 66 or higher

Recommended tools and material:

Item	Designation / Size	Quantity	Note
Flat screwdriver	-	1 pc.	
Wrench	No. 8	1 pc.	
Wrench	No. 10	2 pc.	
Pincers	-	1 pc.	
Stainless lockwire	ø 0,8 mm	-	

WARNING

BEFORE STARTING TO WORK, COOL DOWN THE ENGINE TO THE AMBIENT TEMPERATURE. NON-COMPLIANCE WITH THE PROCEDURE MAY RESULT IN BURNS.

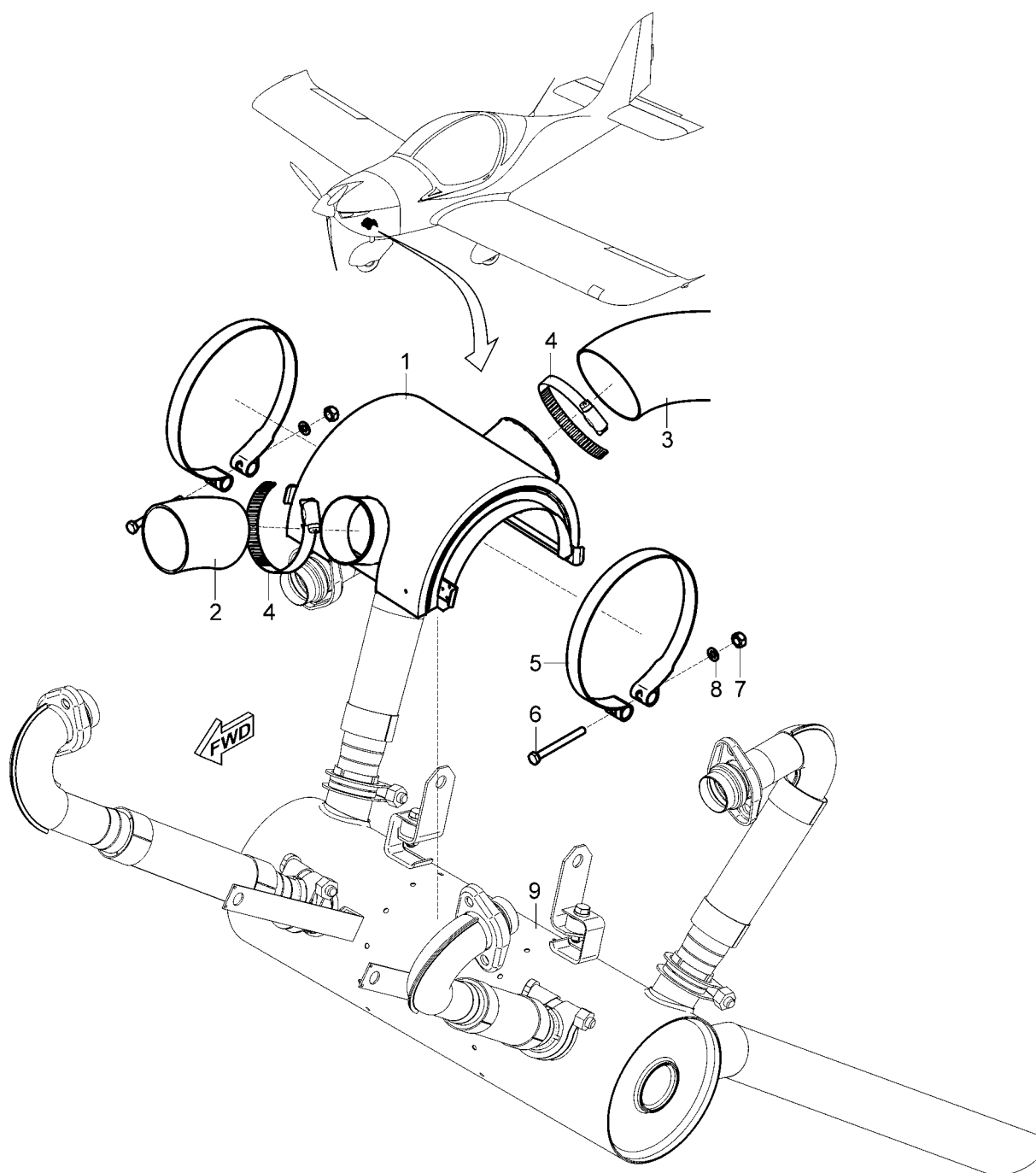
SWITCH OFF THE IGNITION AND TAKE OUT THE KEY!

- (1) Removal – heat exchanger
 - (a) Switch the electrical network off and disconnect the battery.
 - (b) Remove the engine cowlings (Section 71-10).
 - (c) Loosen the hose clamps (4, Fig. 21-3) and disconnect the hoses (2; 3).
 - (d) Remove the locking wire, nuts (7), washers (8), bolts (6) and then remove the clamps (5) and the heat exchanger (1).
- (2) Installation – heat exchanger

WARNING

CHECK THE EXHAUST SYSTEM THOROUGHLY. THE EXHAUST GASES MAY PERVADE THROUGH DAMAGED MUFFLER INTO THE COCKPIT. THIS MAY CAUSE DEATH OR INJURY OF PERSONS, ENGINE POWER LOSS, OR FIRE.

- (a) Make sure that the individual parts of the exhaust system are not damaged, burned or cracked.
- (b) Attach the heat exchanger (1, Fig. 21-3) to the muffler with clamps (5), bolts (6), nuts (7), and washers (8).
- (c) Connect the hoses (2; 3) and attach them with hose clamps (4).
- (d) Connect the battery.
- (e) Install the engine cowlings (Section 71-10).



Legend to Fig. 21-3

1 Heat exchanger	6 Bolt M5x50 (2 pcs.)
2 Hose	7 Nut M5
3 Hose	8 Washer 5,3 (2 pcs.)
4 Hose clamp 50-70/9	For information:
5 Clamp	9 Muffler

Fig. 21-3 Heat exchanger – removal / installation



TEMPERATURE CONTROL

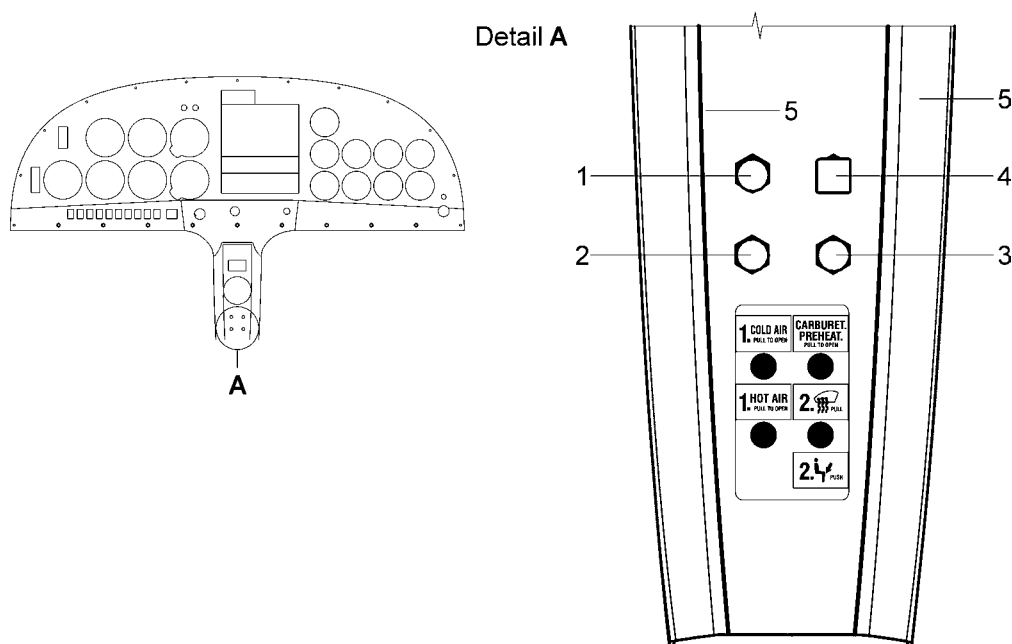
1. DESCRIPTION AND OPERATION

Heating control knobs are located on the central console. Use the control knob **1. COLD AIR** (1, Fig. 21-4) to move the cold air into the mixing chamber. Use the control knob **1. HOT AIR** (2) to move the hot air into mixing chamber. Use the control knob (3) to distribute the quantity of air to the line for the windshield heating, or to the line for the cockpit heating. Use the control knob **CARBURET. PREHEAT.** (4) to activate carburettor preheating (Section 71-60).

Use the control knob **1. COLD AIR** (1) to control the valve of the cold air chamber that regulates quantity of cold air that enters the mixing chamber. If the control knob is fully pulled, all cold air flows into the mixing / chamber. If the control knob is fully pushed, inlet of cold air into the mixing chamber is closed.

Use the control knob **1. HOT AIR** (2) to control the valve of the hot air chamber that regulates quantity of hot air that enters the mixing chamber. If the control knob is fully pulled, all hot air flows into the mixing chamber. If the control knob is fully pushed, inlet of the hot air to mixing chamber is closed.

Use the control knob (3) to control the valves of the mixing chamber. If the control knob is fully pulled, the air from the mixing chamber moves only to the line for the windshield heating. If the control knob is fully pushed, all air moves from the mixing chamber to the line for the cockpit heating to the feet of the flight crew.



Legend to Fig. 21-4

1 Cold air control knob (blue)	4 Carburettor preheating control knob (yellow)
2 Hot air control knob (red)	5 Central console
3 Windshield / feet heating control knob (black)	

Fig. 21-4 Heating / venting control



2. MAINTENANCE PRACTICES

A. Heating / venting control

Maintenance type: Line

Personnel qualification: Independent verification personnel qualified in accordance with Part 66 or higher

Recommended tools and material:

Item	Designation / Size	Quantity	Note
Wrench	No. 7	2 pcs.	
Wrench	No. 10	1 pc.	
Hex wrench	No. 2,5	1 pc.	
Hex wrench	No. 3	1 pc.	

WARNING

SWITCH OFF THE IGNITION AND TAKE OUT THE KEY!

NOTE

The procedures for removal / installation are identical for all heating and venting controls. Carburettor preheating control removal / installation is described in the Section 71-60. This description of the cold air control is an example:

- (1) Removal – heating / venting control
 - (a) Switch the electrical network off and disconnect the battery.
 - (b) Remove the engine cowlings (Section 71-10).
 - (c) Remove the cover of the fuselage upper part F4 (Section 53-30).
 - (d) Unscrew the screw (6, Fig. 21-5) and remove the control knob (3).
 - (e) Unscrew the nut (5) and pull the bowden (1) from the hole in the central console (12).
 - (f) Unscrew the screw (7) and remove the terminal (4).
 - (g) Unscrew and remove the nut (10), washer (11), screw (9) and remove the clamp (8) from the bowden.
 - (h) Disconnect the fork (2) from the lever (15) and remove it from the bowden.
 - (i) Remove the bowden (1).
- (2) Installation – heating / venting control
 - (a) Lead the bowden (1, Fig. 21-5) through the firewall (14).
 - (b) Screw the fork (2) to the bowden and attach it to the lever (15).
 - (c) Attach the clamp (8) to the bowden and attach it with screw (9), nut (10) and washers (11) to the steel angle (13).
 - (d) Put the terminal (4) on the bowden and attach it with a screw (7).
 - (e) Push the terminal (4) into the hole in the central console (12) and attach it with a nut (5).



- (f) Put the control knob (3) to the bowden and attach with the screw (6).
- (g) Check the function of the heating control.
- (h) Connect the battery.
- (i) Install the cover of the fuselage upper part F4 (Section 53-30).
- (j) Install the engine cowlings (Section 71-10).

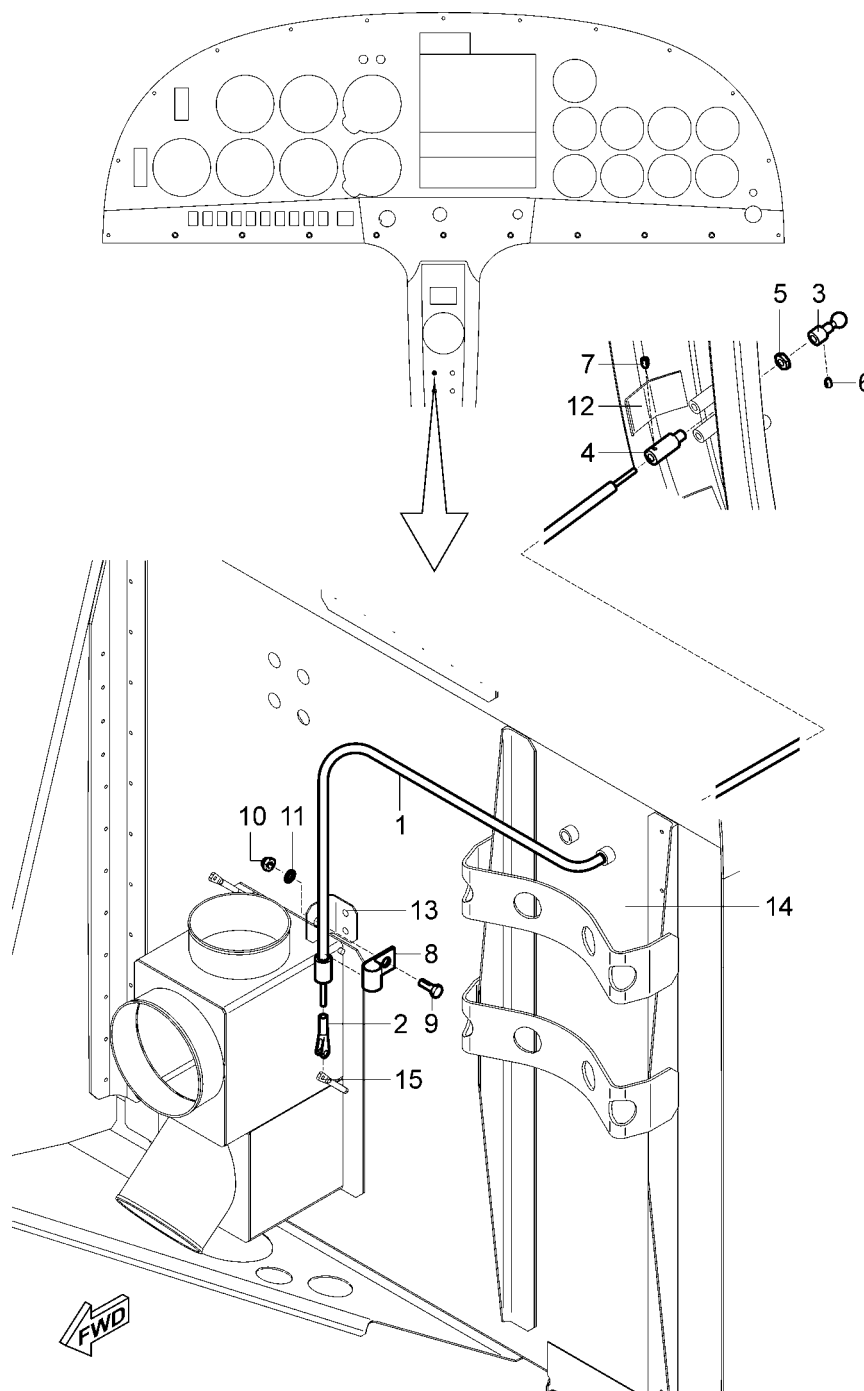


Fig. 21-5 Heating / venting control – removal / installation (page 1 of 2)



Legend to Fig. 21-5

1 Bowden	9 Screw M4x16
2 Fork	10 Nut M4
3 Control knob	11 Washer 4,3
4 Terminal	For information:
5 Nut M6	12 Central console
6 Screw M3x4	13 Angle
7 Screw M4x4	14 Firewall
8 Clamp	15 Flap lever

Fig. 21-5 Heating / venting control – removal / installation (page 2 of 2)

CHAPTER

23

COMMUNICATIONS



CHAPTER 23

COMMUNICATIONS

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GENERAL

1. INTRODUCTION

This Chapter includes description of the individual devices and components which enable communication inside the airplane, communication between the airplane or between the airplane and the land station and related systems:

- Chapter 23-10 – Speech communication
- Chapter 23-50 – Audio integrating
- Chapter 23-60 – Static discharging

This Chapter describes only the data on systems, devices, and components which are installed on the airplane. You can find data on the specific devices in the relevant manuals supplied by the device manufacturer.

Electrical circuits of the communication and navigation equipment are switched by the main **AVIONICS SWITCH**.

Control panels of the individual communication and navigation equipment devices include dedicated switches (**ON** / **OFF**) for the individual switching on and off.

Wiring diagrams for the communication and navigation equipment are given in Chapter 91.



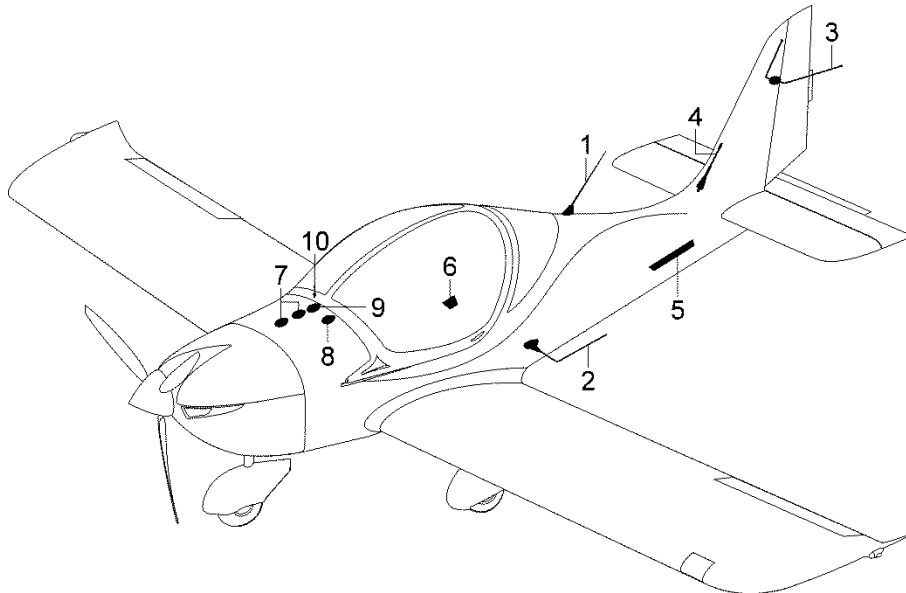
SPEECH COMMUNICATION

1. INTRODUCTION

The airplane may be equipped with these communication units:

- Garmin SL 30
- Garmin SL 40
- Garmin GTR 225A
- Garmin GNC 255A
- Garmin GTN 750
- Becker AR6201

AV-530 communication antenna is also standardly installed on the airplane. If a second transceiver is installed, AV-17 antenna is installed as a second communication antenna.



Legend to Fig. 23-1

1 Antenna COM 1	6 XPDR antenna
2 Antenna COM 2	7 GPS antenna (instrumental equipment SkyView)
3 VOR/LOC/GS antenna	8 GPS antenna (external, e.g. Area 500)
4 ELT antenna	9 GPS antenna for data logger V5 or GTN 750
5 Marker antenna	10 GSM antenna for data logger V5

Fig. 23-1 Location of antennas on the airplane



2. DESCRIPTION AND OPERATION

A. Garmin SL 30 COM/NAV unit

Garmin SL30 unit includes FM transceiver and navigation antenna (Section 34-50). The transceiver enables voice communication of the crew with other objects in the frequency range 118,000 MHz to 136,975 MHz in 25,0 kHz increments (760 channels).

SL 30 unit is located in the central part of the instrument panel and it is interconnected with the communication antenna AV-530, navigation antenna CI 158C-2 and CDI (Section 34-50) and intercom PM 3000 (Section 23-50).

Press the **PTT** button on the control stick to start the transmission of the transceiver. Symbol **TX** is lighted on the unit display during transmission. The front panel of the unit with controls is shown in Fig. 23-2.

Features:

- 760 communication channels
- Frequency range: 118 to 136,975 MHz
- 200 navigation channels
- Frequency range VOR: 108 to 117,95 MHz
- Frequency range LOC: 108 to 111,95 MHz
- Frequency range GS: 328,60 to 335,40 MHz
- Active and standby flip/flop frequencies
- Digital decoding of the setting of OBS selection of manual or automatic waypoint sequencing
- Volume control
- 1-line by 32-character display
- Frequency monitoring function
- Voice-activated intercom
- Dedicated emergency channel selector

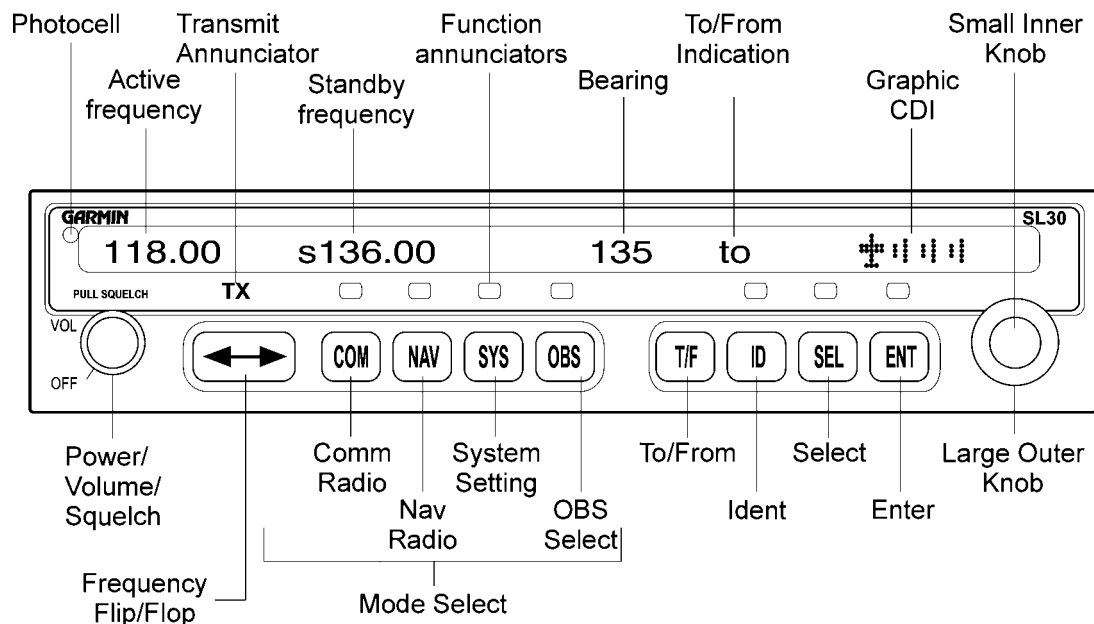


Fig. 23-2 Front panel of the Garmin SL 30 unit

Controls of the Garmin SL30 unit:

Power On/Off – Volume – Squelch knob

Use the control knob to switch the transceiver on and off and to set the volume level. Press the control knob to enable / disable squelch.

Large / small knobs

Use the dual concentric knobs to select frequencies and functions or set parameters in various modes.

Frequency flip/flop button

Press the button to switch between the active and standby frequency.

COM

Press the button to select the communication mode. When you press the button, the annunciator above the button is lighted. Press the button again to activate monitoring of the standby frequency.

NAV

Press the button to select the navigation mode. When you press the button, the annunciator above the button is lighted. Press the button again to activate monitoring of the standby frequency.

SYS

Press the button to select the system mode. The annunciator above the button will be lighted when you are in the system mode.

OBS

Press the button to see the current OBS setting and graphic CDI. If the annunciator above the button is lighted, you can use the large / small knob to change the displayed OBS values. OBS radial of CDI indicator will be decoded and displayed on the unit display.



T/F

Press the button to toggle between the bearing TO or radial FROM the active VOR. The button does not operate for the localizer frequencies.

ID

Press the button to set the radio beacon identifier. You can also switch between VOICE or IDENT. Press the button to cancel the VOR Monitoring function. The active monitoring function suspends the ID function.

SEL

Press the button to set the selection with the list of types or the changes of values. If you press the button in COMM or NAV mode, you can select frequencies from the available lists. Press the button again to cancel the selection. When you press the button, the annunciator above the button is lighted.

ENT

Use the button to confirm actions, enter data or store the standby frequency.

NOTE

For detailed description and information about the operation and control of the unit, refer to the document Model SL 30 NAV/COMM Installation Manual 560-0404-03D, dated July 2012 or later valid issue.

B. Garmin SL 40 transceiver

The Garmin SL40 transceiver enables voice communication of the crew with other objects in the frequency range 118,000 MHz to 136,975 MHz in 25,0 kHz increments (760 channels).

SL 40 transceiver is located in the central part of the instrument panel and it is interconnected with the communication antenna AV-530 and the intercom PM 3000 (Section 23-50).

Press the **PTT** button on the control stick to start transmission of the transceiver. Symbol **TX** is lighted on the unit display during transmission. The transceiver front panel with controls is shown in Fig. 23-3.

Features:

- 760 communication channels
- Frequency range: 118 to 136,975 MHz
- Active and standby flip/flop frequencies
- Volume control
- 1-line by 16-character display
- Frequency monitoring function
- Voice-activated intercom
- Dedicated emergency channel selector

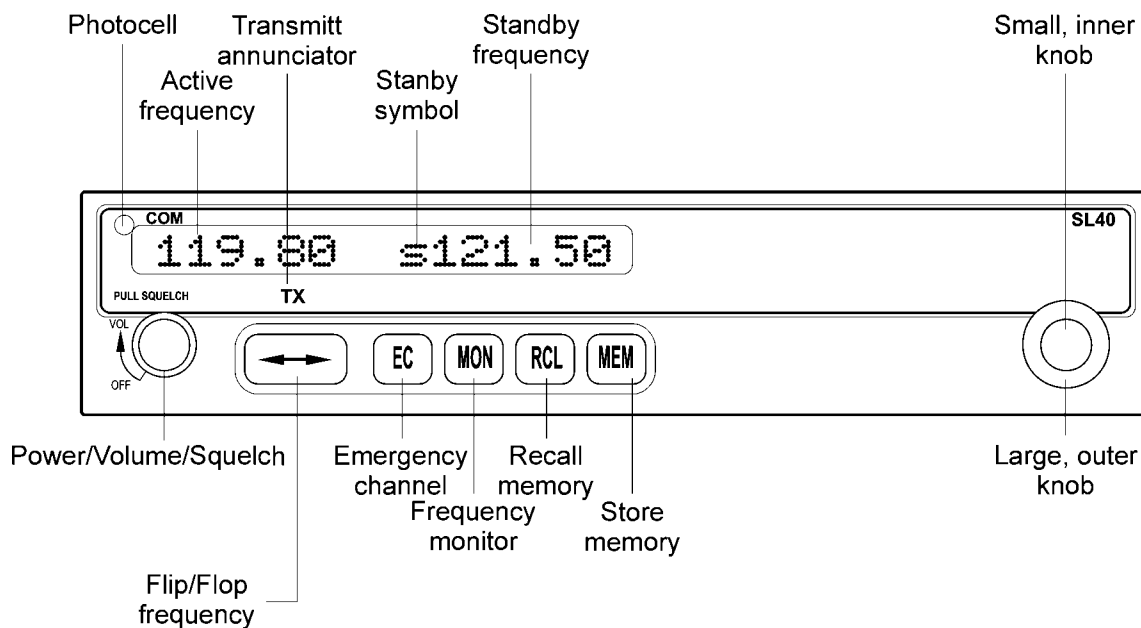


Fig. 23-3 Front panel of the Garmin SL 40 transceiver

Controls of the Garmin SL40 transceiver:

Power On/Off – Volume – Squelch knob

Use the control knob to switch the transceiver on and off and to set the volume level. Press the control knob to enable / disable squelch.

Large / small knobs

Use the dual concentric knobs to select frequencies and functions or set parameters in various modes.

Frequency flip/flop knob

Press the button to switch between the active and standby frequency.

EC

Press the button to load the emergency channel 121,5 MHz as the standby frequency.

Frequency monitoring function is automatically enabled.

MON

Press the button to listen to the standby frequency. When the active frequency receives a signal, the device will switch automatically to the active frequency.

RCL

Press the button to retrieve stored frequencies.

MEM

Press the button to store the displayed standby frequency in memory.

NOTE

For detailed description and information about the operation and control of the transceiver, refer to the document Model SL 40 VHF/COMM Transceiver Installation Manual 560-0956-03 Rev. C, dated June 2008, or later valid issue.



C. Garmin GTR 225A transceiver

The GTR 225A transceiver enables voice communication of the crew with other objects in the frequency range 118,000 MHz to 136,975 MHz in 25,0 kHz increments (760 channels). You can also toggle the transceiver to 8,33 kHz spacing (frequency range 118,000 MHz to 136,992 MHz; 2280 channels).

The GTR 225A transceiver is located in the central part of the instrument panel and it is interconnected with the communication antenna AV-530.

Press the **PTT** button on the control stick to start transmission of the transceiver. Symbol TX is lighted on the unit display during transmission. The transceiver front panel with controls is shown in Fig. 23-4.

Features:

- 760 communication channels in 25 kHz increments; frequency range: 118 to 136,975 MHz
- 2280 communication channels in 8,33 kHz increments ; frequency range: 118 to 136,992 MHz
- Active and standby flip/flop frequencies
- Volume control with graphic display
- High resolution LCD display and automatic or manual brightness level adjustment
- Alphanumeric display of frequency types (ATIS, GND, TWR, etc.)
- Frequency monitoring function
- Station identification frequency database reverse look-up and the use of frequencies (ATIS, TWR, etc.)
- Recalling of frequency from the database on the basis of name and type
- Squelch test function
- Voice-activated intercom
- Dedicated emergency channel selector

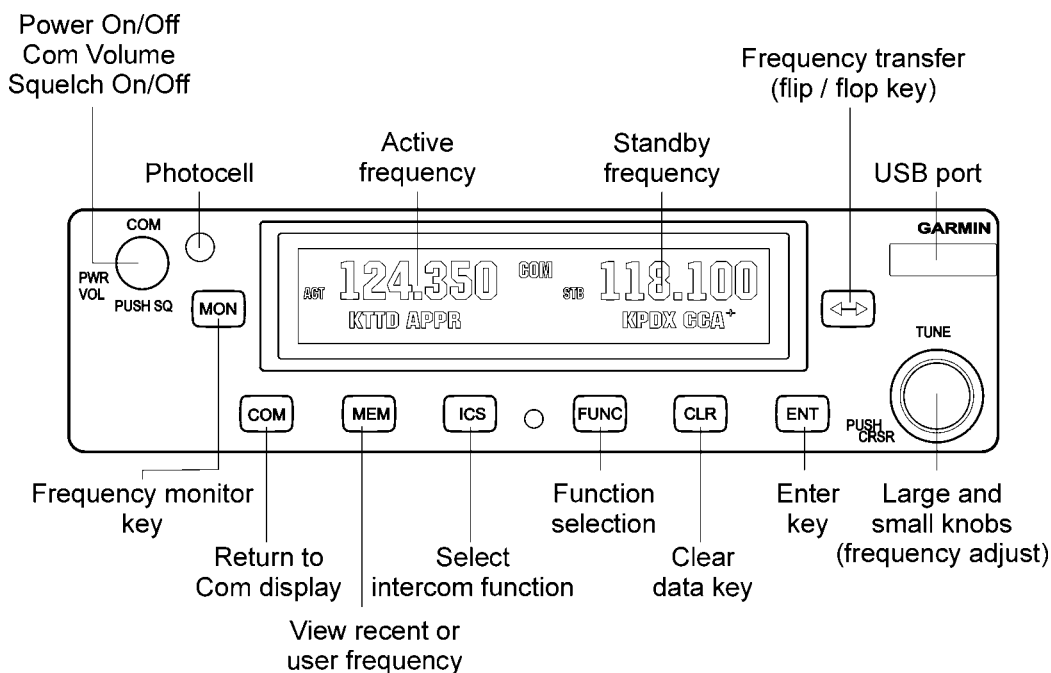


Fig. 23-4 Front panel of the Garmin GTR 225A transceiver



Controls of the Garmin GTR 225A transceiver:

COM, PWR VOL, PUSH SQ

Use the control knob to switch the transceiver on and off and to set the volume level. Press the control knob to enable / disable squelch.

TUNE, PUSH CSRS

Use large and small knobs to tune frequencies and enter data.

Frequency flip/flop knob

Press the button to switch between the active and standby frequency.

MON

Press the button to listen to the standby frequency. When the active frequency receives a signal, the device will switch automatically to the active frequency.

COM

Use the button to return to the communication mode.

MEM

Press the button to retrieve and switch between the last and the user frequency list.

ICS

Press the button to toggle display of the Internal Communication System (ICS) settings.

FUNC

Press the button to select these functions: COMM radio, ICS configuration, system configuration and timer.

CLR

Press the button to erase information, cancel entries and reset the timer.

ENT

Press the button to save the selected values, confirm prompts or save the standby frequency.

USB Port

Use the USB port to update the transceiver frequency database.

NOTE

For detailed description and information about the operation and control of the transceiver, refer to the document GTR 225/GNC 255 TSO Installation Manual 190-01182-02 Rev. D, dated December 2013, or later valid issue.



D. Garmin GNC 255A COM/NAV unit

The Garmin GNC 255A unit includes the FM transceiver and navigation receiver (Section 34-50). The transceiver enables voice communication of the crew with other objects in the frequency range 118,000 MHz to 136,975 MHz in 25,0 kHz increments (760 channels). You can also toggle the transceiver to 8,33 kHz spacing (frequency range 118,000 MHz to 136,992 MHz; 2280 channels).

GNC 255A unit is located in the central part of the instrument panel and it is interconnected with the communication antenna AV-530, navigation antenna CI 158C-2 and CDI.

Press the **PTT** button on the control stick to start transmission of the transceiver. Symbol **TX** is lighted on the unit display during transmission. The front panel of the unit with controls is shown in Fig. 23-5.

Features:

- 760 communication channels in 25 kHz increments; frequency range: 118 to 136,975 MHz
- 2280 communication channels in 8,33 kHz increments; frequency range: 118 to 136,992 MHz
- 200 navigation channels
- Frequency range VOR: 108 to 117,95 MHz
- Frequency range LOC: 108 to 111,95 MHz
- Frequency range GS: 328,60 to 335,40 MHz
- Digital decoding of the setting of OBS selection of manual or automatic waypoint sequencing
- Active and standby flip/flop frequencies
- Volume control with graphic display
- High resolution LCD display and brightness level adjustment
- Alphanumeric display of frequency types (ATIS, GND, TWR, etc.)
- Frequency monitoring function
- Frequency database reverse look-up (ATIS, TWR, etc.)
- Recalling of the frequency from the database on the basis of name and type
- Squelch test function
- Voice-activated intercom
- Dedicated emergency channel selector

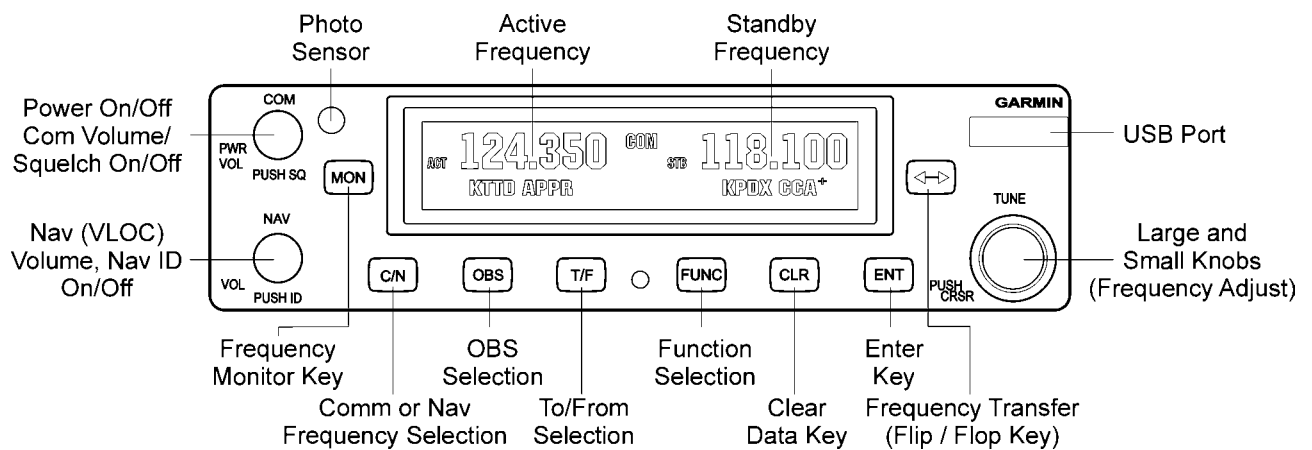


Fig. 23-5 Front panel of the Garmin GNC 255A unit

Controls of the Garmin GNC 255A unit:

COM, PWR VOL, PUSH SQ

Use the control knob to switch the unit on and off and to set the volume level of the transceiver. Press the knob to enable / disable squelch.

NAV, VOL, PUSH ID

Use the control knob to adjust of the radio beacon signals. Press the control knob to enable / disable reception of the radio beacon identifiers.

TUNE, PUSH CSRS

Use the large and small knobs to tune frequencies and to enter data.

Frequency flip/flop button

Press the button to switch between the active and standby frequency.

MON

Press the button to listen to the standby frequency. When the active frequency receives a signal, the device will switch automatically to the active frequency.

C/N

Press the button to select the communication or navigation mode.

OBS

Press the button to see the current setting of OBS and graphic CDI.

T/F

Press the button to toggle between the bearing TO or radial FROM the active VOR. The page also shows Distance/Speed/Time information. The button does not operate for the localizer frequencies.

FUNC

Press the button to select these functions: COMM radio, NAV radio, ICS configuration, system configuration and timer.

CLR

Press the button to delete information, cancel the entered data and reset the timer.

ENT

Press the button to store the selected values, confirm prompts or store the standby frequency.



USB Port

Use the USB port to update the unit frequency database.

NOTE

For detailed description and information about the operation and control of the unit, refer to the document GTR 225/GNC 255 TSO Installation Manual 190-01182-02 Rev. D, dated December 2013, or later valid issue.

E. Garmin GTN 750 COM/NAV/GPS unit

Garmin GTN 750 unit is a fully integrated system which includes the FM transceiver, GPS receiver (Section 34-40) and navigation receiver (Section 34-50). The transceiver enables the voice communication of the crew with other objects in the frequency range 118,000 MHz to 136,975 MHz in 25,0 kHz increments (760 channels). You can also toggle the transceiver to 8,33 kHz spacing (frequency range 118,000 MHz to 136,992 MHz; 2280 channels).

GTN 750 unit is located in the central part of the instrument panel and it is interconnected with the communication antenna AV-530, navigation antenna CI 158C-2 (Section 34-50), GPS antenna GA-35 (Section 34-40), with GMA 35 audio panel (Section 23-50) and GTX33 transponder.

Press the **PTT** button on the control stick to start transmission of the transceiver. The front panel of the unit with controls is shown in Fig. 23-6.

Features:

- 760 communication channels in 25 kHz increments; frequency range: 118 to 136,975 MHz
- 2280 communication channels in 8,33 kHz increments; frequency range: 118 to 136,992 MHz
- 200 navigation channels
- Frequency range VOR: 108 to 117,95 MHz
- Frequency range LOC: 108 to 111,95 MHz
- Frequency range GS: 328,60 to 335,40 MHz
- GPS and GPS SBAS.
- Interface for the remotely controlled GMA 35 audio panel
- Interface for the remotely controlled GTX 33 transponder
- Graphical Flight Plan editing

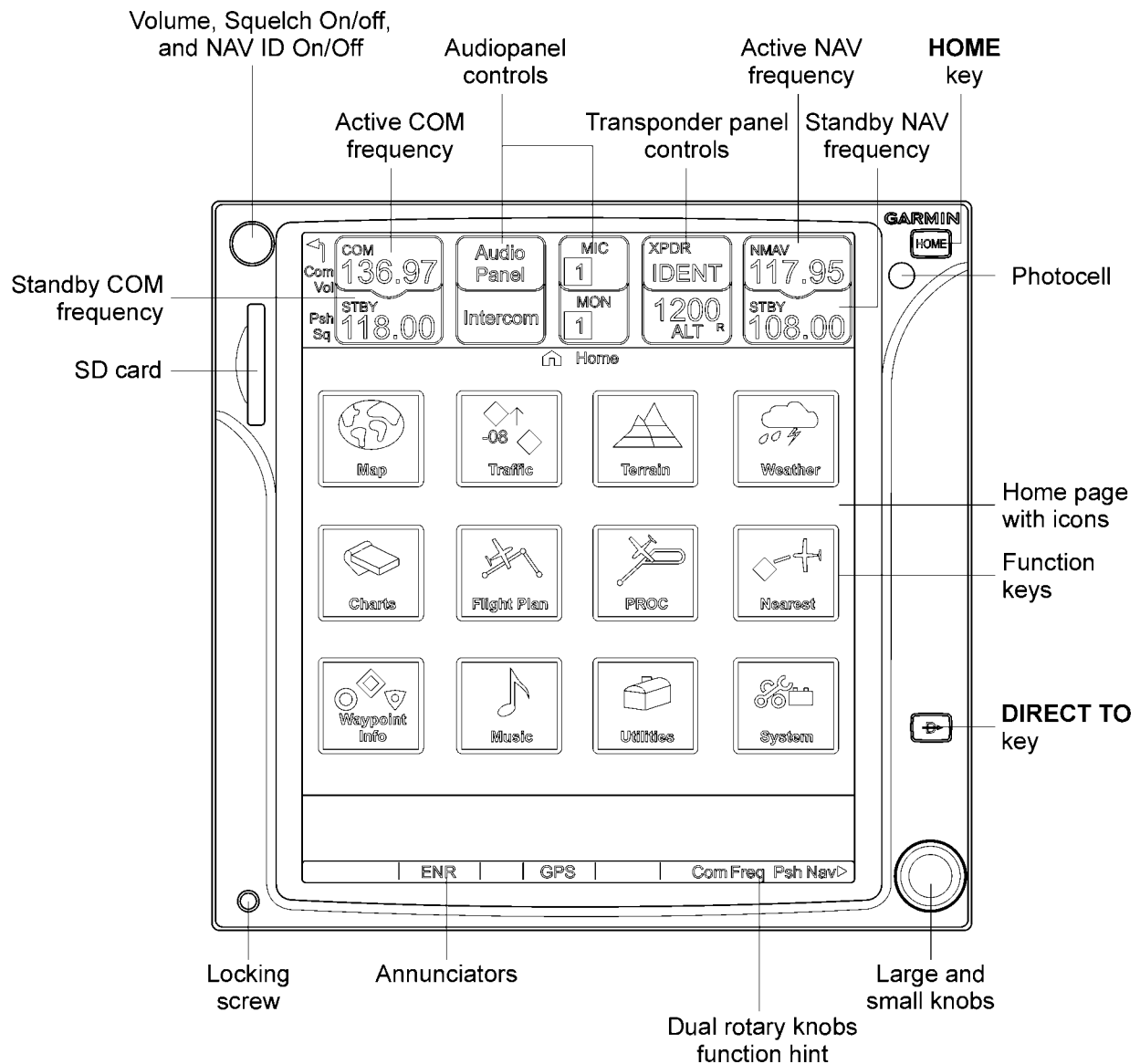


Fig. 23-6 Front panel of the Garmin GTN 750 unit

Controls of the Garmin GTN 750 unit:

Volume and squelch control knob

Use the knob to adjust the volume level of the transceiver or VOR/LOC signal, volume level of the external devices, devices which are controlled via GTN interface (audio panel). When the transceiver is activated, press the knob to enable / disable squelch. When the Nav radio is activated, press the knob to switch the signal tone on and off.

Dual concentric control knob

Use it to enter data, e.g. when you use the Waypoint or Direct-To features and to set the COM or NAV frequency.

HOME

Press the button to return to the Main Page to access the unit features. Press and hold the button while on any page to display the default MAP page.



DIRECT TO

Press the button to quickly navigate directly to a selected waypoint.

Touchscreen buttons

The buttons vary in accordance with the selected page. Press the button to implement the feature or to access the described information.

NOTE

For detailed description and information about the operation and control of the unit, refer to the document GTN 725/750 TSO Installation Manual 190-01007-02 Rev. H, dated August 2013 or later valid issue.

F. Becker AR6201 transceiver

The AR6201 transceiver enables voice communication of the crew with other objects in the frequency range 118,000 MHz to 136,990 MHz in 25,0 kHz increments (760 channels). You can also toggle the transceiver to 8,33 kHz spacing (frequency range 118,000 MHz to 136,992 MHz; 2280 channels).

The AR6201 transceiver is located in the central part of the instrument panel. It is interconnected with the communication antenna AV-530 and with intercom PM 3000 (Section 23-50).

Press the **PTT** button on the control stick to start transmission of the transceiver. Symbol TX is lighted on the unit display during transmission. The transceiver front panel with controls is shown in Fig. 23-7

Features:

- 760 communication channels in 25 kHz increments; frequency range: 118 to 136,975 MHz
- 2280 communication channels in 8,33 kHz increments; frequency range: 118 to 136,9916 MHz
- Active and standby flip/flop frequencies
- Volume control
- 2-line LCD display
- Frequency monitoring function
- Possibility to store and retrieve 99 frequencies in the transceiver memory and repeatedly recall them

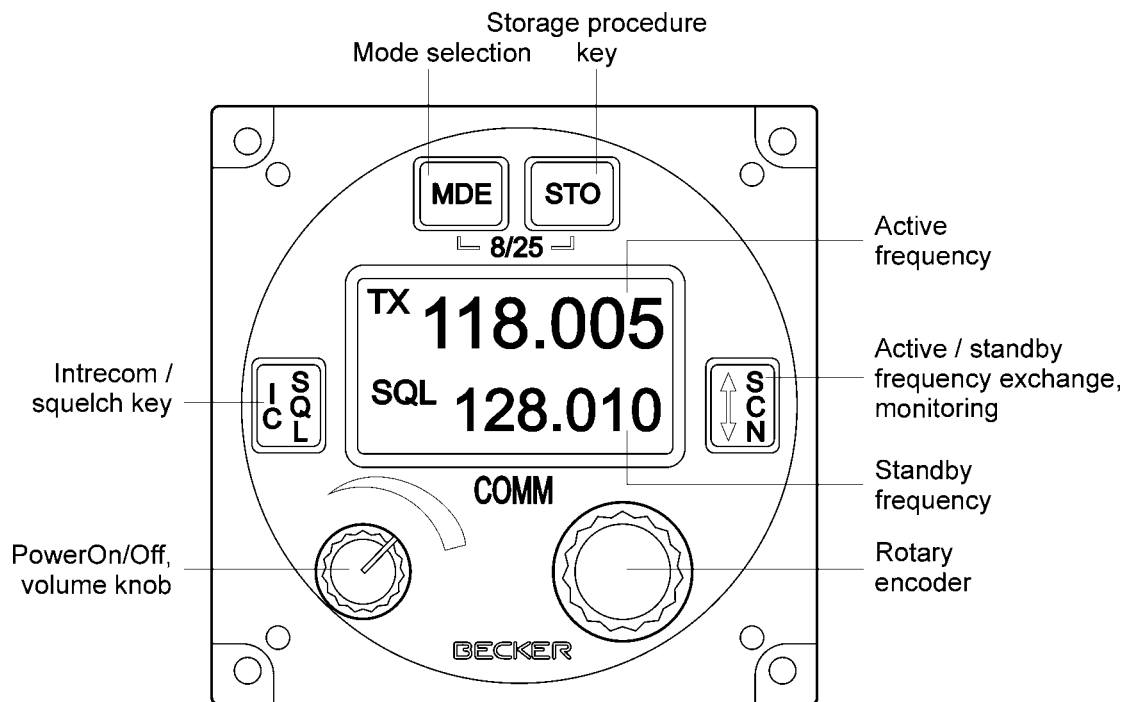


Fig. 23-7 Front panel of the Becker AR6201 transceiver

Controls of the Becker AR6201 transceiver:

MDE

Press the button to change the frequency selection mode. Press and hold the button to activate the pilot menu.

STO

Press the button to store the frequency in memory.

IC/SQL

Press the button to enable / disable squelch. Press and hold the button to activate the intercom menu.

Frequency flip/flop button, SCN

Press the button to switch between the active and standby frequency. Press and hold the button to activate the frequency monitoring mode.

ON / OFF and volume level control knob

Use the knob to switch the transceiver on and off and to set the volume level.

Rotary encoder

Turn the knob to change settings of several parameters (frequency, intercom volume level, etc.). Press the knob to toggle between digits and use it as an enter key.

NOTE

For detailed description and information about the operation and control of the unit, refer to the document VHF Transceiver AR6201-(XXX) Installation and Operation Manual DV 14300.03 Issue 4, dated May 2011 or later valid issue.



G. Communication antennas

Antenna AV-530 is designed for broadband communication in the frequency range 118 - 137 MHz. Antenna is designed for the operation up to speed 350 mph and altitude 50.000 ft.

Antenna AV-17 is designed for installation on the lower side of the airplane which provides excellent radiation characteristics for the air-ground communication. Antenna is designed for broadband communication in the frequency range 118 - 137 MHz. Antenna is designed for operation up to speed 350 mph and altitude 50.000 ft.

Location of antennas is given in Fig. 23-1.



3. MAINTENANCE PRACTICES

A. Garmin SL-30 COM/NAV unit

The maintenance procedures for the Garmin SL-30 unit are described in Section 34-50.

B. Garmin SL-40 transceiver

Maintenance type: Line

Personnel qualification: Independent verification personnel qualified in accordance with Part 66 or higher

Recommended tools and material:

Item	Designation / Size	Quantity	Note
Hex wrench	3/32"	1 pc.	

(1) Removal – SL-40 transceiver

- (a) Switch the electrical network off and disconnect the battery.
- (b) Put the wrench in the hole (2, Fig. 23-8) in the front panel of the transceiver (1) and put it in the head of the locking screw.
- (c) Turn the locking screw counterclockwise until the transceiver (1) releases in the holder.

CAUTION

DO NOT PULL THE CONTROL KNOBS. DO NOT TRY TO HOLD THE FRONT SIDE OF THE TRANSCEIVER AND RELEASE IT BY FORCE. THE DEVICE MAY BE DAMAGED.

DO NOT TOUCH THE CONNECTOR ON THE REAR SIDE OF THE TRANSCEIVER. THE ELECTROSTATIC CHARGE OF YOUR BODY MAY DAMAGE THE DEVICE.

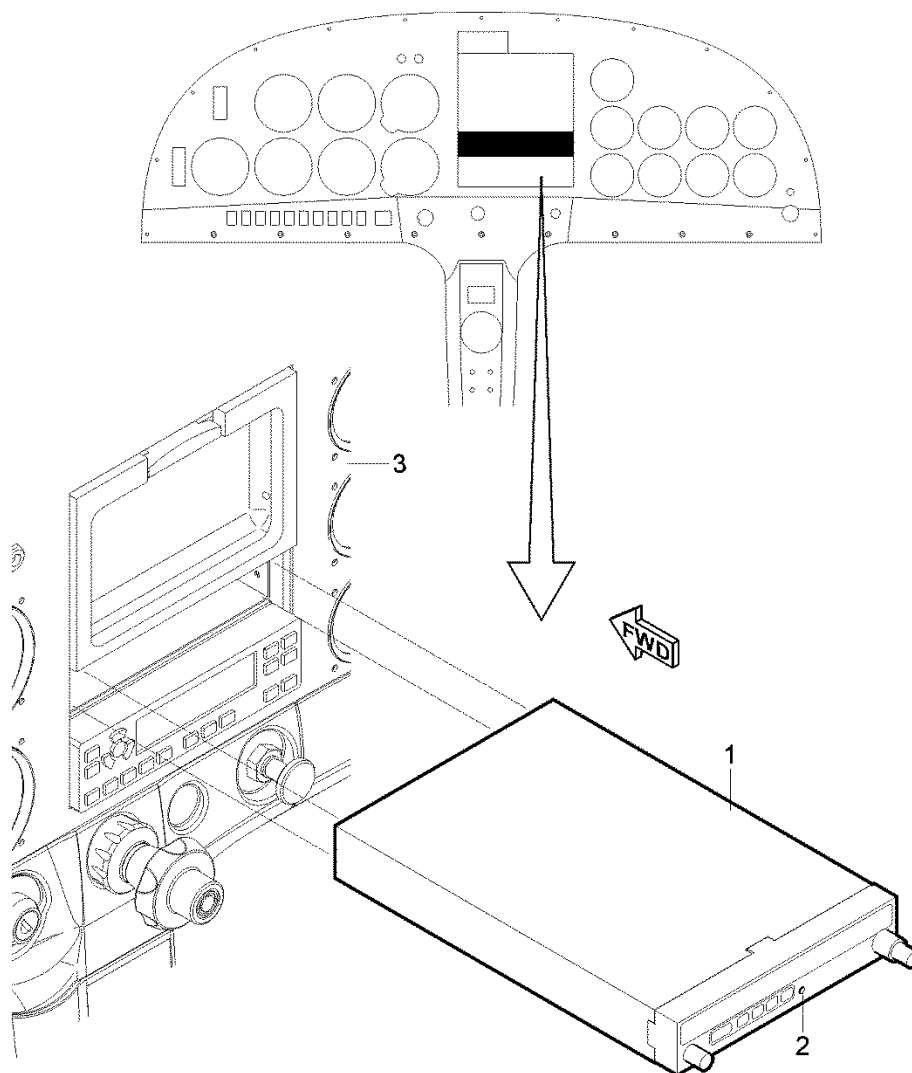
- (d) Carefully remove the transceiver (1). Hold the sides of the device and pull it from the mounting holder.
 - (e) Put caps on the connectors on the rear part of the transceiver.
- ##### (2) Installation – SL-40 transceiver
- (a) Remove the caps from the connectors on the rear part of the transceiver.
 - (b) Look at the lower part of the device to check if the front latch of the locking mechanism is in a vertical position.
 - (c) Put the transceiver (1, Fig. 23-8) in the mounting holder. Adjust the locking screw (2) so that the front latch touches the mounting holder.
 - (d) Turn the locking screw (2) clockwise so that the rear latch moves into the mounting holder.



CAUTION

DO NOT TIGHTEN THE LOCKING SCREW TOO MUCH. THE LOCKING MECHANISM MAY BE DAMAGED.

- (e) Turn the screw until the transceiver is firmly fixed in the mounting holder.
- (f) Connect the battery, switch the electrical network on and do the function test of the transceiver.



Legend to Fig. 23-8

1 SL-40 transceiver

2 Hole with the locking screw

For information:

3 Instrument panel

Fig. 23-8 SL-40 transceiver – removal / installation


C. Garmin GTR 225A transceiver

Maintenance type: Line

Personnel qualification: Independent verification personnel qualified in accordance with Part 66 or higher

Recommended tools and material:

Item	Designation / Size	Quantity	Note
Hex wrench	3/32"	1 pc.	

(1) Removal – GTR 225A transceiver

- (a) Switch the electrical network off and disconnect the battery.
- (b) Put the wrench in the hole (2, Fig. 23-9) in the front panel of the transceiver (1) and put it in the head of the locking screw.
- (c) Turn the locking screw counterclockwise until the transceiver (1) releases in the holder.

CAUTION

DO NOT PULL THE CONTROL KNOBS. DO NOT TRY TO HOLD THE FRONT SIDE OF THE TRANSCEIVER AND RELEASE IT BY FORCE. THE DEVICE MAY BE DAMAGED.

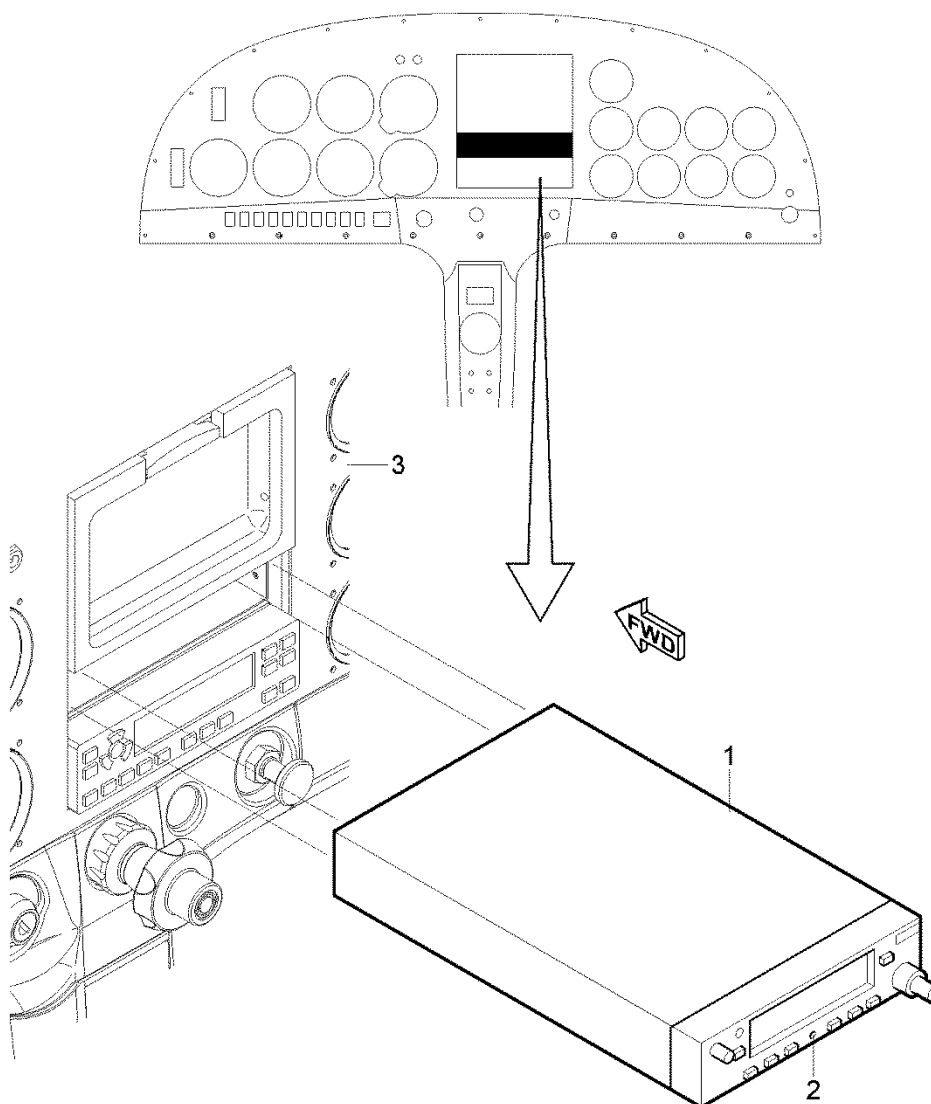
DO NOT TOUCH THE CONNECTOR ON THE REAR SIDE OF THE TRANSCEIVER. THE ELECTROSTATIC CHARGE OF YOUR BODY MAY DAMAGE THE DEVICE.

- (d) Carefully remove the transceiver (1). Hold the sides of the device and pull it from the mounting holder.
 - (e) Put caps on the connectors on the rear part of the transceiver.
- (2) Installation – GTR 225A transceiver
- (a) Remove the caps from the connectors on the rear part of the transceiver.
 - (b) Look at the lower part of the device to check if the front latch of the locking mechanism is in a vertical position.
 - (c) Put the transceiver (1, Fig. 23-9) into the mounting holder; adjust the locking screw (2) so that the front latch touches the mounting holder.
 - (d) Turn the locking screw (2) clockwise so that the rear latch moves into the mounting holder.
 - (e) Turn the screw until the transceiver is firmly fixed in the mounting holder.

CAUTION

DO NOT TIGHTEN THE LOCKING SCREW TOO MUCH. THE LOCKING MECHANISM MAY BE DAMAGED.

- (f) Connect the battery, switch the electrical network on and do the function test of the transceiver.



Legend to Fig. 23-9

1 Transceiver GTR 225A

For information:

2 Hole with the locking screw

3 Instrument panel

Fig. 23-9 GTR 225A transceiver – removal / installation

D. Garmin GNC 255A COM/NAV unit

The maintenance procedures for the Garmin GNC 225A are described in Section 34-50.

E. Garmin GTN 750 COM/NAV/GPS unit

The maintenance procedures for Garmin GTN 750 are described in Section 34-50.


F. Becker AR6201 transceiver

Maintenance type: Line

Personnel qualification: Independent verification personnel qualified in accordance with Part 66 or higher

Recommended tools and material:

Item	Designation / Size	Quantity	Note
Phillips screwdriver	No. 2	1 pc.	
Wrench	No. 7	1 pc.	

(1) Removal – AR6201 transceiver

- (a) Switch the electrical network off and disconnect the battery.
- (b) Remove the cover of the fuselage upper part F4 (Section 53-30).
- (c) Disconnect the connectors with cables (3; 4, Fig. 23-10) from the transceiver.
- (d) Remove the nut (6) with washer (7) and disconnect the grounding wire (5).

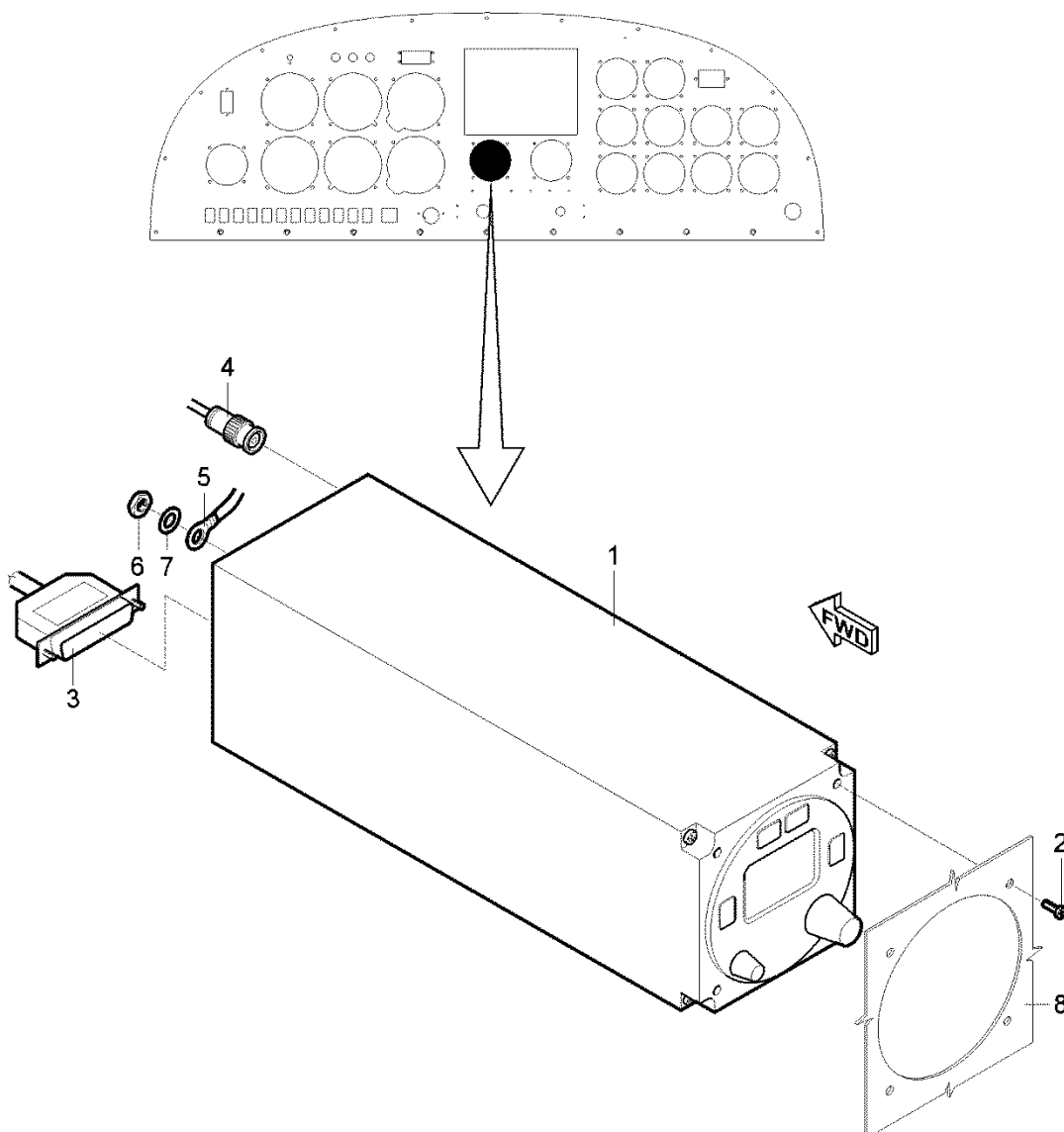
CAUTION

DO NOT TOUCH THE CONNECTOR ON THE REAR SIDE OF THE TRANSCEIVER. THE ELECTROSTATIC CHARGE OF YOUR BODY MAY DAMAGE THE DEVICE.

- (e) Remove the screws (2) and remove the transceiver (1).
- (f) Put caps on the connectors on the rear part of the transceiver.

(2) Installation – AR6201 transceiver

- (a) Remove the caps from the connectors on the rear part of the transceiver.
- (b) Insert the transceiver (1, Fig. 23-10) from the rear side of the instrument panel (8) and attach it with screws (2).
- (c) Use nut (6) and washer (7) to attach the grounding wire (5) to the screw which is located on the rear side of the transceiver.
- (d) Attach the connectors with cables (3, 4) to the transceiver.
- (e) Attach the cover of the fuselage upper part F4 (Section 53-30).
- (f) Connect the battery, switch the electrical network on and do the function test of the transceiver.



Legend to Fig. 23-10

- 1 AR6201 transceiver
- 2 Screw (4 pcs.)
- 3 Connector with cable
- 4 Connector with cable
- 5 Grounding wire

- 6 Nut M4
- 7 Washer 4
- For information:
- 8 Instrument panel

Fig. 23-10 AR6201 transceiver – removal / installation


G. Rami AV-530 COMM antenna

Maintenance type: Line

Personnel qualification: Independent verification personnel qualified in accordance with Part 66 or higher

Recommended tools and material:

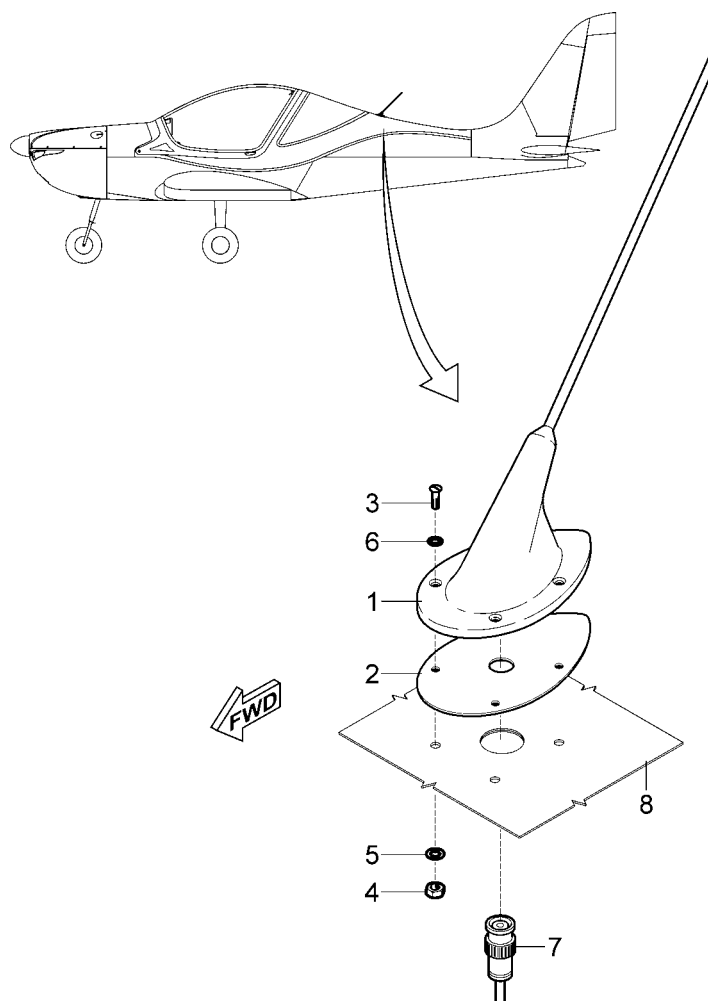
Item	Designation / Size	Quantity	Note
Phillips screwdriver	No. 2	1 pc.	
Wrench	1/4"	1 pc.	

(1) Removal – AV-530 antenna

- (a) Switch the electrical network off and disconnect the battery.
- (b) Remove the antenna installation lid IN4 (Fig. 06-2).
- (c) Disconnect the connector with cables (7, Fig. 23-11) from the antenna.
- (d) Remove the nuts (4) and washers (5).
- (e) Remove the screws (3) with washers (6), remove the antenna (1) and gasket (2).
- (f) Put a cap on the antenna connector.

(2) Installation – AV-530 antenna

- (a) Remove the cap from the antenna connector.
- (b) Put the antenna (1, Fig. 23-11) with gasket (2) and screws (3) with washers (6) on the correct place on the fuselage.
- (c) Put washers (5) on screws from the inside of the fuselage, attach and tighten the nuts (4).
- (d) Attach the connector with cable (7) to the antenna.
- (e) Attach the antenna installation lid IN4 (Fig. 06-2).
- (f) Connect the battery and switch the electrical network on.
- (g) Switch the transceiver on and do the function test.



Legend to Fig. 23-11

1	AV-530 antenna	5	Washer (4 pcs.)
2	Gasket	6	Washer (4 pcs.)
3	Screw (4 pcs.)	7	Connector with cable
4	Nut (4 pcs.)	8	Fuselage

Fig. 23-11 AV-530 antenna – removal / installation


H. Rami AV-17 COMM antenna

Maintenance type: Line

Personnel qualification: Independent verification personnel qualified in accordance with Part 66 or higher

Recommended tools and material:

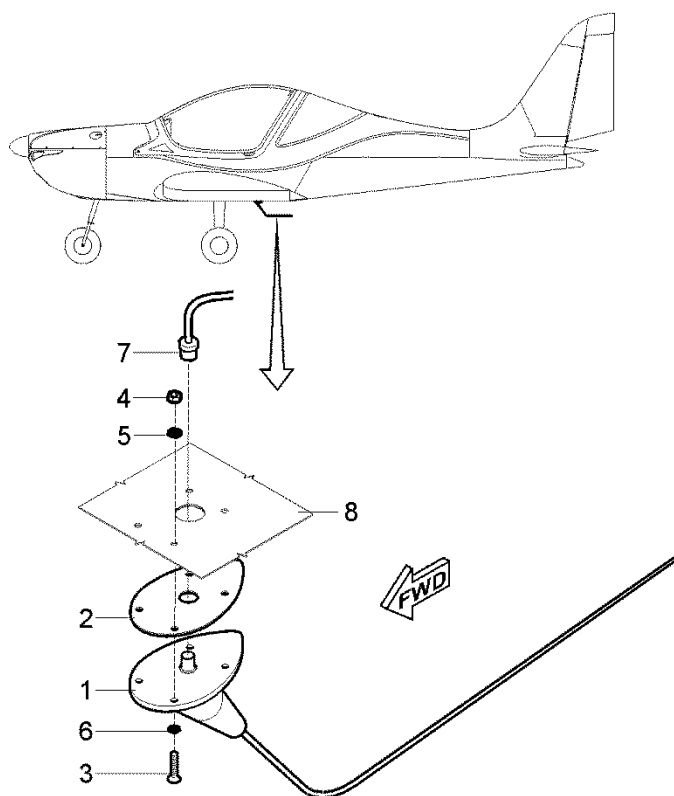
Item	Designation / Size	Quantity	Note
Phillips screwdriver	No. 2	1 pc.	
Wrench	1/4"	1 pc.	

(1) Removal – AV-17 antenna

- (a) Switch the electrical network off and disconnect the battery.
- (b) Remove the baggage compartment floor IN3 (Fig. 06-2)
- (c) Disconnect the connector with cable (7, Fig. 23-12) from the antenna.
- (d) Remove the nuts (4) and washers (5).
- (e) Remove the screws (3) with washers (6), remove the antenna (1) and gasket (2).
- (f) Put a cap on the antenna connector.

(2) Installation – AV-17 antenna

- (a) Remove the cap from the antenna connector.
- (b) Put the antenna (1, Fig. 23-12) with gasket (2) and screws (3) with washers (6) on the correct place on the fuselage.
- (c) Put washers (5) on screws from the inside of the fuselage, attach and tighten the nuts (4).
- (d) Connect the connector to the antenna with cable (7).
- (e) Attach the baggage compartment floor IN3 (Fig. 06-2)
- (f) Connect the battery and switch the electrical network on.
- (g) Switch the transceiver on and do the function test.



Legend to Fig. 23-12

1 AV-17 antenna	5 Washer (4 pcs.)
2 Gasket	6 Washer
3 Screw (4 pcs.)	7 Connector with cable
4 Nut (4 pcs.)	8 Fuselage

Fig. 23-12 AV-17 antenna – removal / installation



AUDIO INTEGRATION

1. INTRODUCTION

The airplane may be equipped with these intercoms:

- PM 3000
- Garmin GMA 35

PTT button and headphone connectors for the pilot and the co-pilot are standardly installed on each control stick knob.



2. DESCRIPTION AND OPERATION

A. PM 3000 intercom

PM 3000 is a voice-activated active intercom which enables interconnection of up to 4 headsets. It is equipped with volume level controls and intercom squelch level controls. To enable a transmission via the transceiver, you must press and hold the **PTT** button on the control stick.

Intercom PM 3000 is located in the central part of the instrument panel and it is interconnected with the Garmin SL-40 transceiver or the Garmin SL-30 unit. The intercom output is routed to the receptacles of the headphones which are located behind the pilot seats. The intercom front panel with controls is shown in Fig. 23-13.

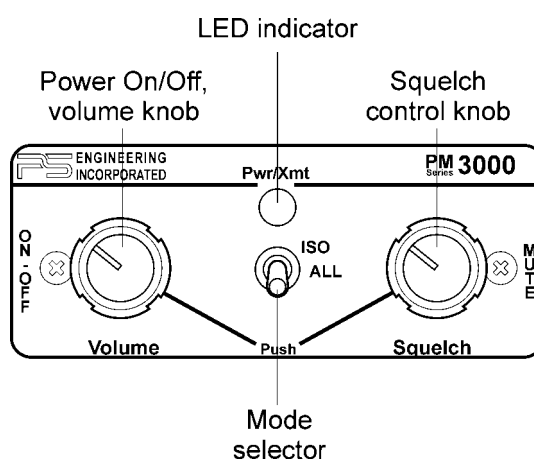


Fig. 23-13 Front panel of the PM 3000 intercom

Controls of the PM 3000 intercom:

ON - OFF Volume control knob

Use the control knob to switch the intercom on and off and set its volume level.

MUTE Squelch control knob

Use the control knob to set the intercom squelch level.

ISO / ALL switch

Intercom can operate in two modes:

ISO – pilot is disconnected from the voice communication with the second crew member and he is connected directly with the transceiver

ALL – the two crew members are connected to the transceiver reception and they can communicate with each other.

**NOTE**

For detailed description and information about the operation and control of the unit, refer to the document High-fidelity Stereo Intercom System Part Number 11931A: 4-Place Standard and Part Number 11932: 6-Place with CREW Mode Operation and Installation Manual, P/N 200-193-005, Rev. 5, dated December 2006 or later valid issue.

B. Garmin GMA 35 audio panel

Garmin GMA 35 audio panel is designed for co-operation with the GTN 750 unit. You can use the interface to control the settings with touchscreen buttons after you touch the icon "Audio Panel" or "Intercom" on the GTN 750 unit touchscreen. The audio panel includes a marker beacon receiver (refer to Section 34-30).

GMA 35 audio panel is equipped with stereo input for connection of the external audio signal source. The Auto Squelch function automatically adjusts the volume to the noise level in the cockpit without causing the communication deterioration. The GMA 35 audio panel operates also as an intercom for the pilot and the co-pilot.

GMA 35 audio panel is installed in the mounting frame behind the GTN 750 unit.

NOTE

For detailed description and information about the operation and control of the audio panel, refer to the document GTN 725/750 TSO Installation Manual 190-01007-02 Rev. H, dated August 2013 or later valid issue.



3. MAINTENANCE PRACTICES

A. PM3000 intercom

Maintenance type: Line

Personnel qualification: Independent verification personnel qualified in accordance with Part 66 or higher

Recommended tools and material:

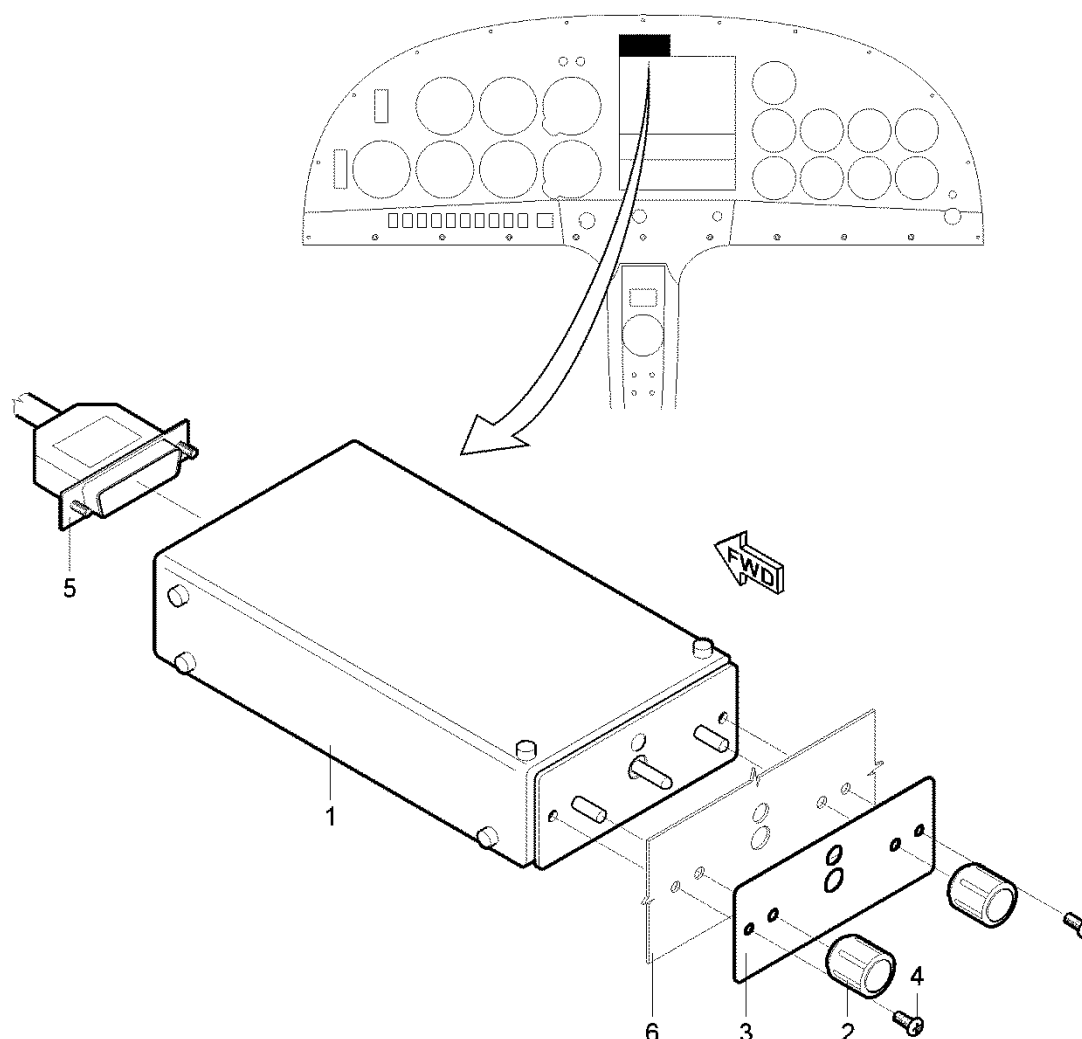
Item	Designation / Size	Quantity	Note
Phillips screwdriver	No. 2	1 pc.	

(1) Removal – PM3000 intercom

- (a) Switch the electrical network off and disconnect the battery.
- (b) Remove the cover of the fuselage upper part F4 (Section 53-30).
- (c) Disconnect the connector with cable (5, Fig. 23-14) from the intercom.
- (d) Remove the volume controls and squelches (2) from the shafts.
- (e) Remove the screws (4) and the front label (3) and hold the intercom (1).
- (f) Carefully remove the intercom (1).

(2) Installation – PM3000 intercom

- (a) Insert the intercom (1, Fig. 23-14) from the rear side of the instrument panel. Align it with the holes for the shafts, LED and the switch. Hold the intercom (1).
- (b) Attach the front label (3) to the shafts of the control knobs and attach the intercom with screws (4).
- (c) Attach the volume controls and squelches to the shafts.
- (d) Connect the connector to the intercom with cable (5).
- (e) Attach the cover of the fuselage upper part F4 (Section 53-30).
- (f) Connect the battery, switch the electrical network on and do the function test of the intercom.



Legend to Fig. 23-14

1 Intercom PM3000	5 Connector with cable
2 Outer and inner control knob	For information:
3 Front label	6 Instrument panel
4 Screw 4-40 (2 pcs.)	

Fig. 23-14 PM3000 intercom – removal / installation



B. Garmin GMA 35 audio panel

Maintenance type: Line

Personnel qualification: Independent verification personnel qualified in accordance with Part 66 or higher

Recommended tools and material:

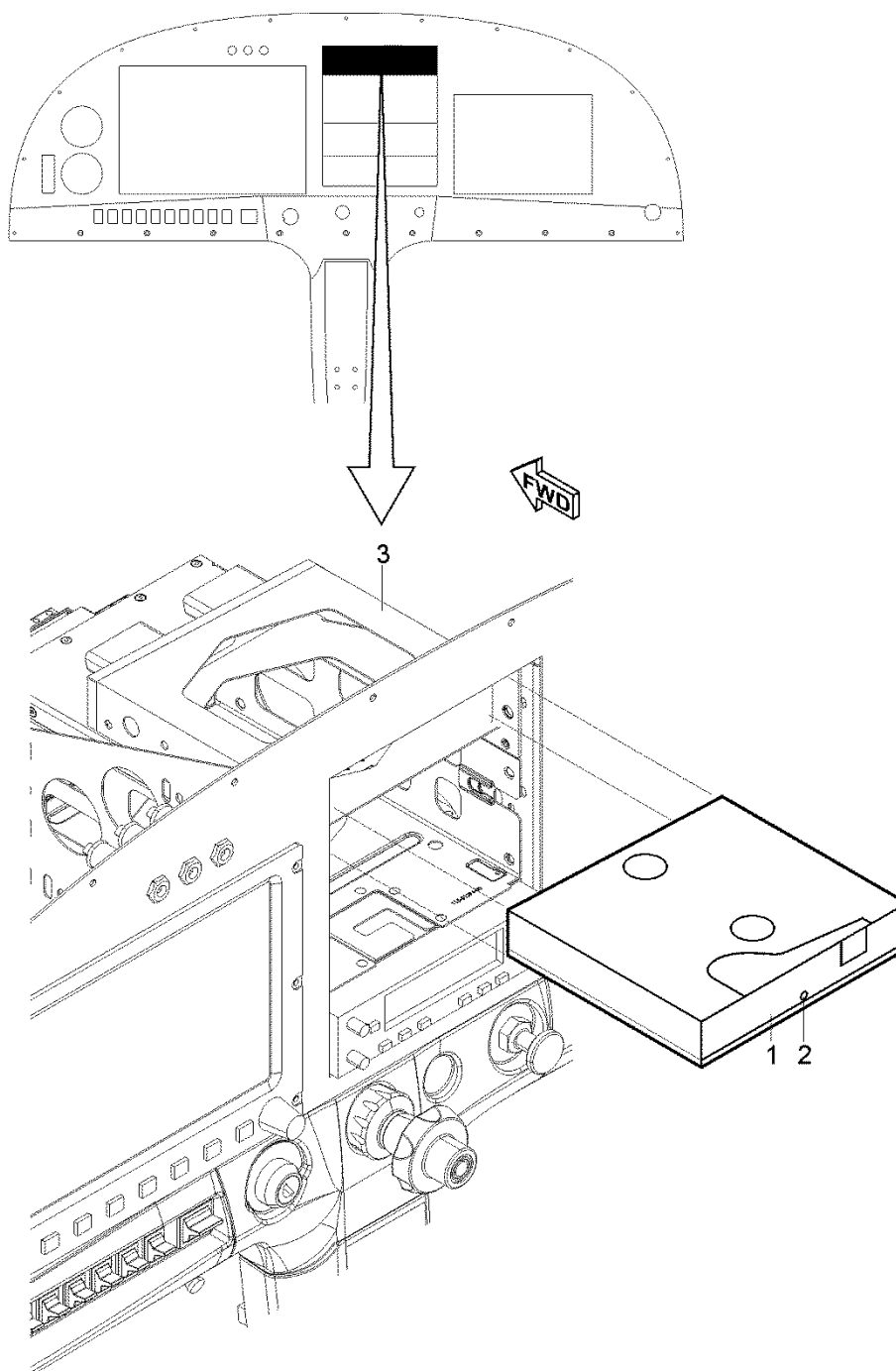
Item	Designation / Size	Quantity	Note
Hex wrench	3/32"	1 pc.	

- (1) Removal – GMA 35 audio panel
 - (a) Switch the electrical network off and disconnect the battery.
 - (b) Remove the cover of the fuselage upper part F4 (Section 53-30).
 - (c) Remove the the GTN 750 unit (Section 34-20).
 - (d) Put the wrench in the hole (2, Fig. 23-15) in the front part of the audio panel (1) and put it in the head of the locking screw.
 - (e) Turn the locking screw counterclockwise until the audio panel (1) releases in the holder.
 - (f) Carefully remove the audio panel (1) from the mounting holder.
 - (g) Put caps on the connectors on the rear part of of the audio panel.
- (2) Installation – GMA 35 audio panel
 - (a) Remove the caps from the connectors on the rear part of the audio panel.
 - (b) Look at the lower part of the device to check if the front latch of the locking mechanism is in a vertical position.
 - (c) Put the audio panel (1, Fig. 23-15) into the mounting holder. Adjust the locking screw (2) so that the front latch touches the mounting holder.
 - (d) Turn the locking screw (2) clockwise so that the rear latch moves into the mounting holder.
 - (e) Turn the screw until the audio panel is firmly fixed in the mounting holder.

CAUTION

DO NOT TIGHTEN THE LOCKING SCREW TOO MUCH. THE LOCKING MECHANISM MAY BE DAMAGED.

- (f) Install the GTN 750 unit (Section 34-20).
- (g) Attach the cover of the fuselage upper part F4 (Section 53-30).
- (h) Connect the battery, switch the electrical network on and do the function test of the intercom of the GTN 750 unit.



Legend to Fig. 23-15

1 GMA 35 audio panel

2 Hole with the locking screw

For information:

3 Mounting frame

Fig. 23-15 GMA 35 audio panel – removal / installation



STATIC DISCHARGING

1. DESCRIPTION AND OPERATION

Dischargers of the static electricity are installed on the trailing edges of wings and tail surfaces on demand. The dischargers are attached with screws to nuts which are riveted to the control surface coverings. Each aileron, left and right ends of the elevator and the rudder all include one discharger (Fig. 23-16).

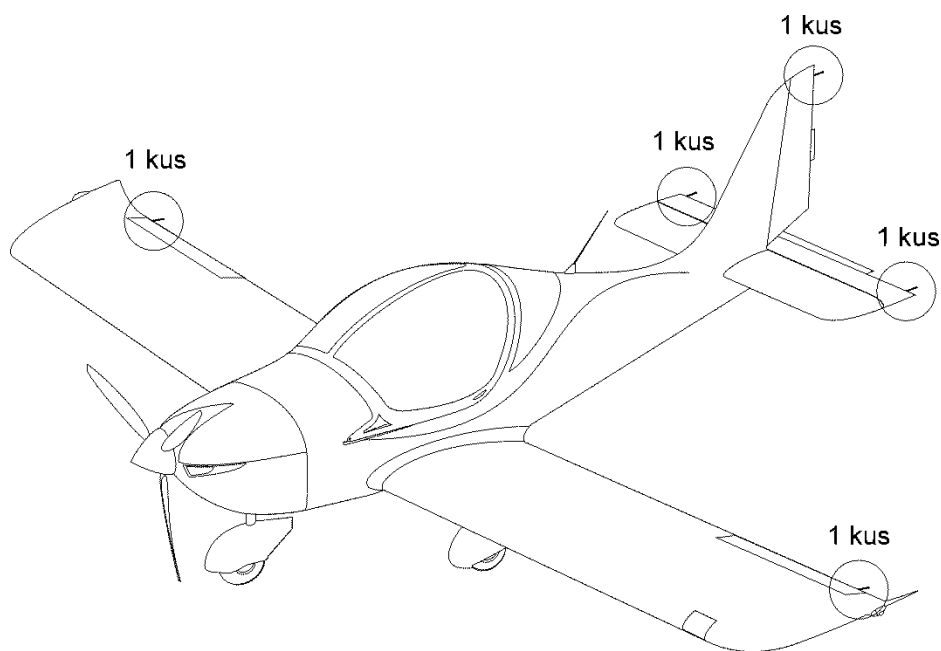


Fig. 23-16 Dischargers



2. MAINTENANCE PRACTICES

A. Dischargers

Maintenance type: Line

Personnel qualification: Independent verification personnel qualified in accordance with Part 66 or higher

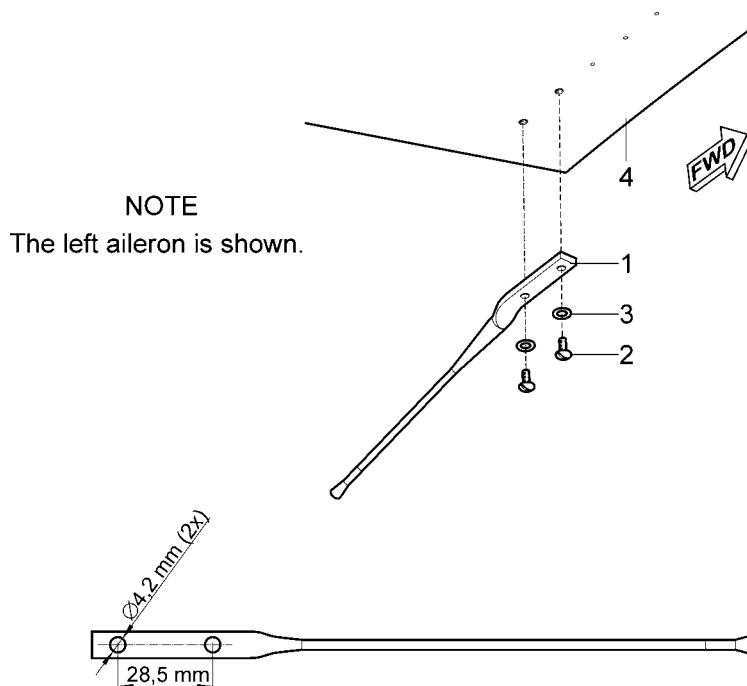
Recommended tools and material:

Item	Designation / Size	Quantity	Note
Phillips screwdriver	No. 2	1 pc.	
Adhesive	Loctite 243	-	
Cleaning agent	Aceton	-	

NOTE

The removal / installation procedure is identical for all dischargers.

- (1) Removal – discharger
 - (a) Remove the screws (2, Fig. 23-17) with washers (3).
 - (b) Remove the discharger (1).
- (2) Installation – discharger
 - (a) If you install a new discharger, calibrate the holes in the discharger to 4,2 mm diameter and 28,5 mm spacing (refer to Fig. 23-17).
 - (b) Use a cloth with cleaning agent to thoroughly clean the contact surface of the discharger (1) and the contact surface on the control surface.
 - (c) Apply Loctite 243 to the screw threads.
 - (d) Align the discharger (1) with the control surface and attach it with screws (2) and washers (3).



Legend to Fig. 23-17

- 1 Discharger
- 2 Screw M4x12 (2 pcs.)
- 3 Washer 4,3 (2 pcs.)

For information:

- 4 Control surface

Fig. 23-17 Dischargers – removal / installation



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CHAPTER

24

**ELECTRICAL
POWER**



CHAPTER 24

ELECTRICAL POWER

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GENERAL

1. INTRODUCTION

The electrical system of the aircraft is of a single-wire DC type. It works with a voltage of 14 V and the negative pole on the airframe.

Optionally, the electrical system can be equipped with the auxiliary generator or the external alternator and the external power source socket.

The wiring diagrams of the source system are shown in Fig. 24-1, Fig. 24-2 and Fig. 24-3.

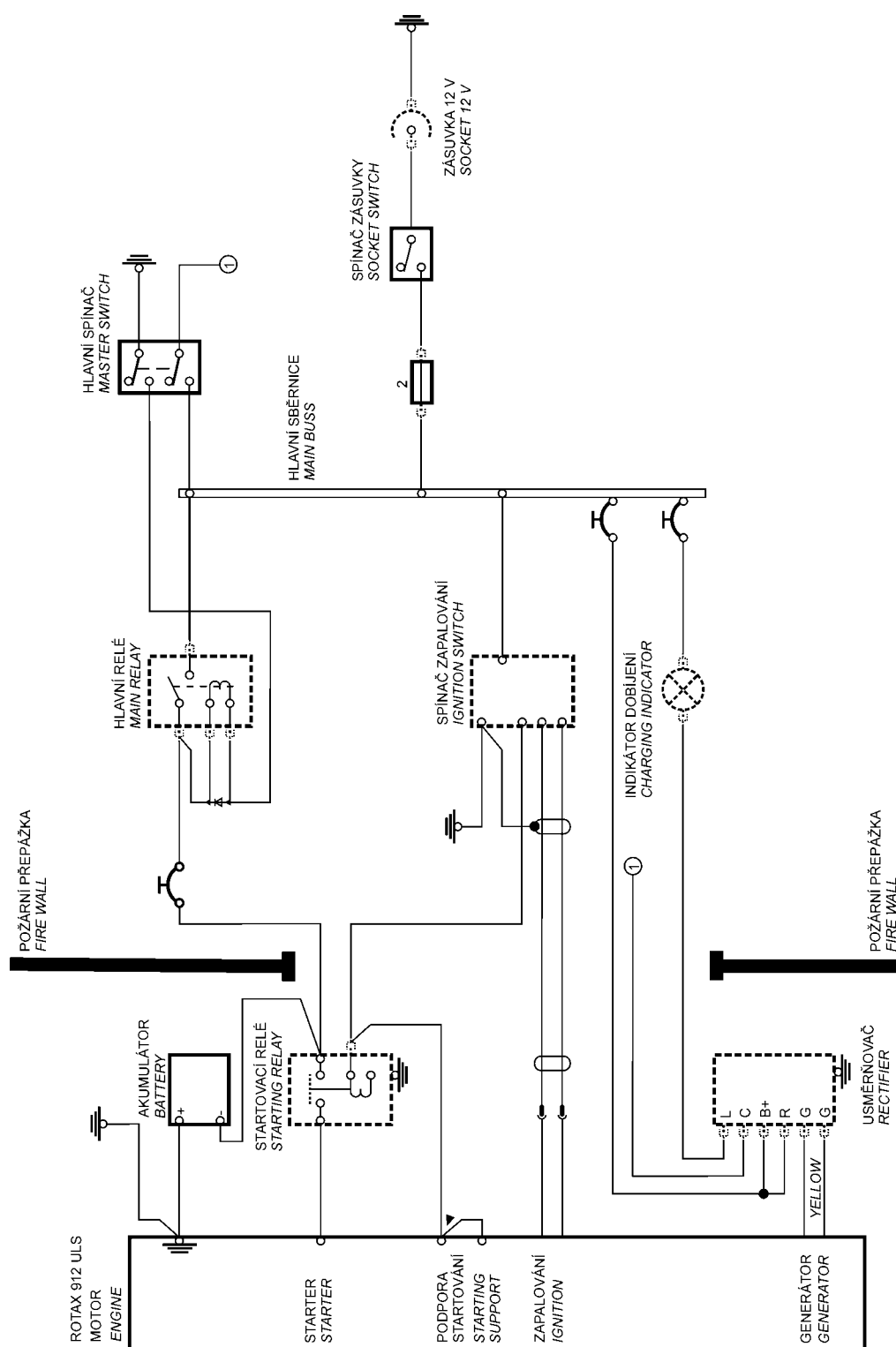


Fig. 24-1 Source system without auxiliary generator

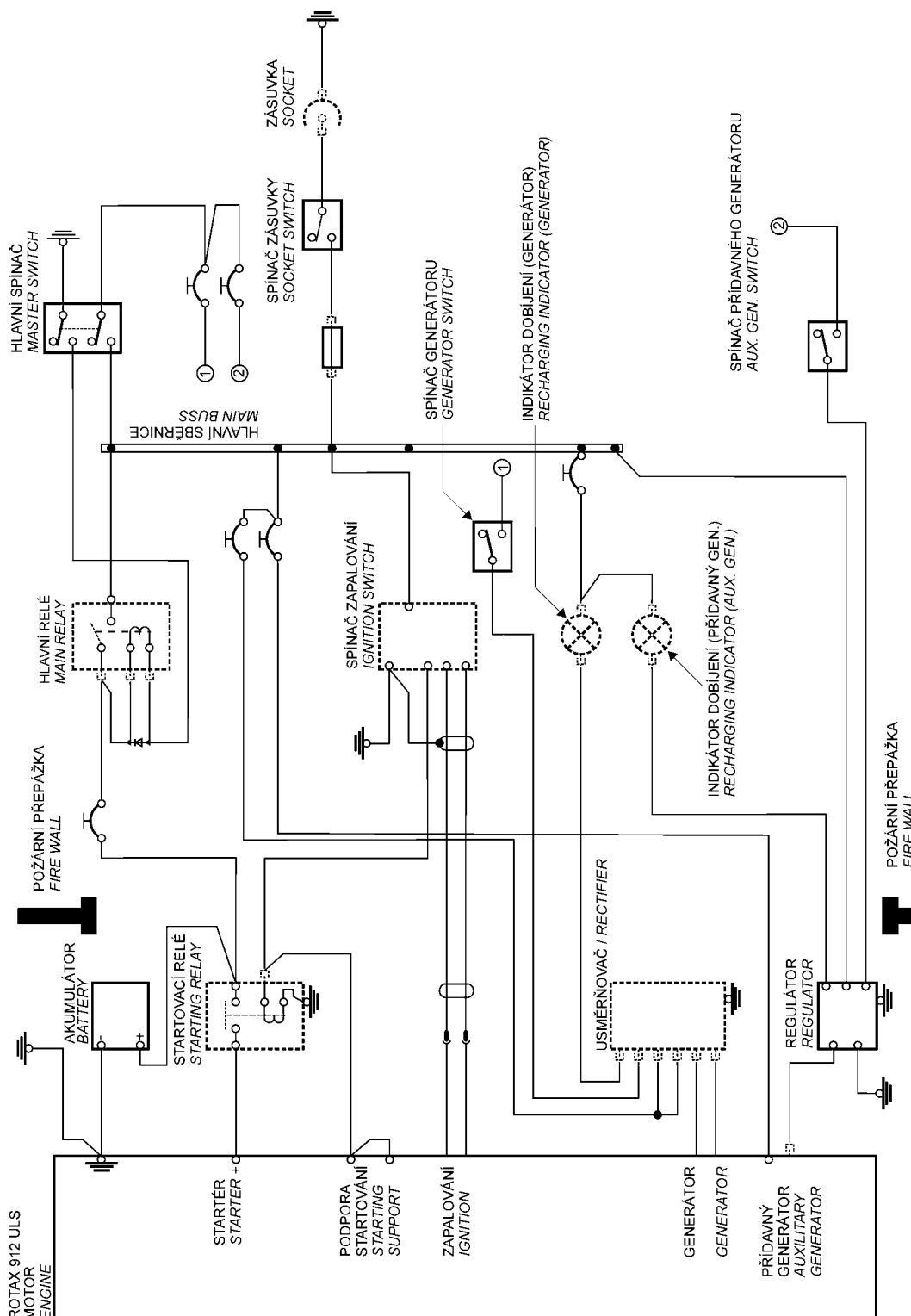


Fig. 24-2 Source system with auxiliary generator

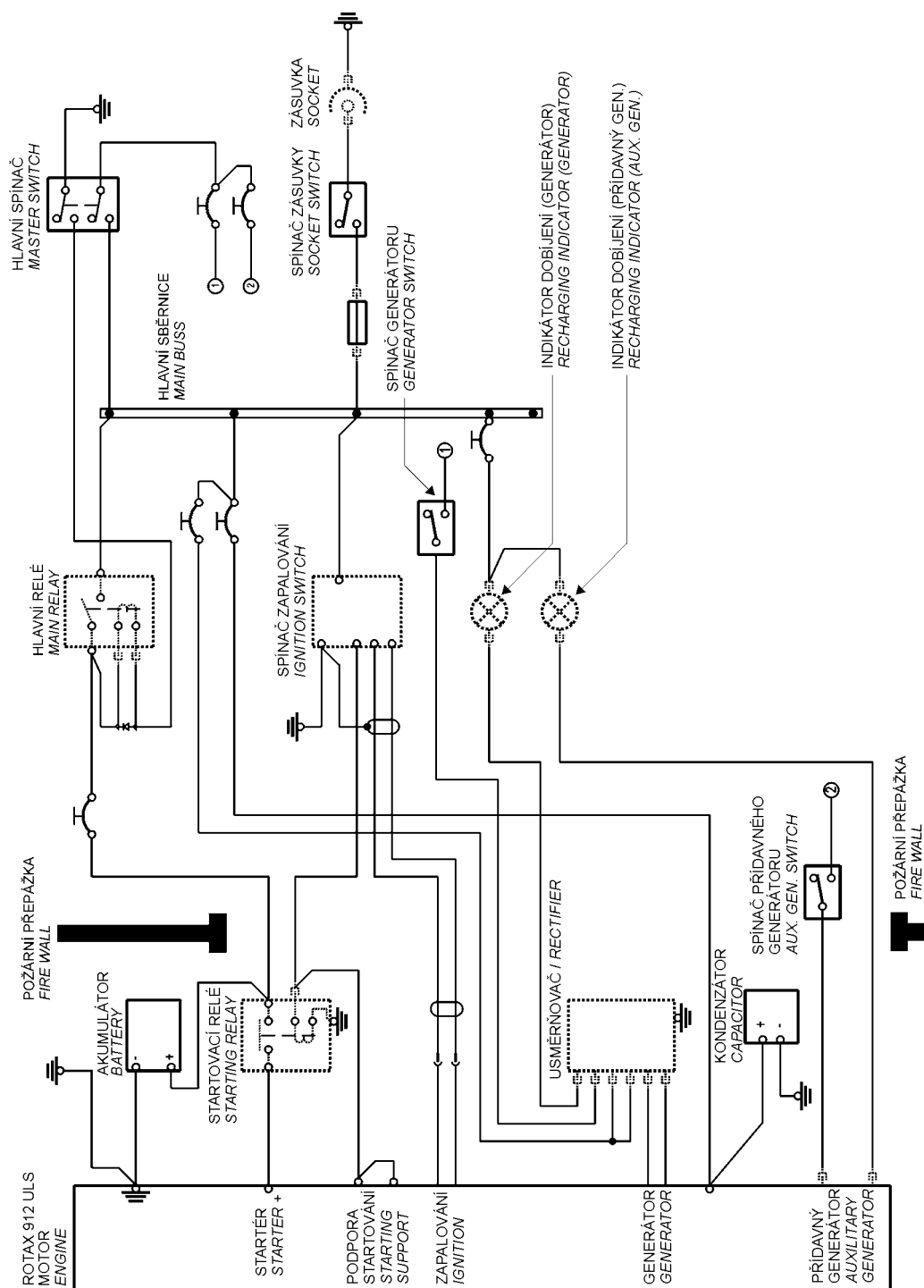


Fig. 24-3 Source system with external alternator



DC GENERATION

1. DESCRIPTION AND OPERATION

The primary source of electrical energy is the generator with a power of 250 W with an external rectifier. The secondary source of electrical energy is the battery FG Forte 12150 (12 V / 15 Ah) that is located in the engine compartment on the firewall. The battery is used for starting the engine and in the case of a generator failure it serves as an emergency source of electrical energy. Optionally, it is possible to install the battery FG Forte 12200 (12 V / 20 Ah).

After switching the **MASTER SWITCH** and by turning the key in the switch box to the **START** position, the starter is activated. The starter is electrically powered from the battery. After starting the engine and reaching the idle, the generator starts supplying electrical current to the on-board network.

A. Indication of electrical system

- (1) Airplanes equipped with analog instruments
The value of electrical system voltage is indicated on the analog voltmeter (if installed – an optional installation).
- (2) Airplanes equipped with the Dynon SkyView system or Garmin G3X system
The values of voltage and current of the electrical system are indicated on the EMS screen of the Dynon SkyView system or on the EIS screen of the G3X system. The sensor of electrical current (a shunt) is located on the right behind the instrument panel in the harness bracket.
The knife fuses (1 A) that protect the shunt circuits are located on the right behind the instrument panel in the harness bracket (next to the shunt).

B. Signalization of electrical system

The condition of the generators **GEN** and **AUX. GEN** (if installed) is indicated by means of the red signaling lights **CHARGING** and **AUX. CHARG.** (if installed) in the left upper part of the instrument panel (Section 31-50). The red signaling light **CHARGING** indicates generator failure, the red signaling light **AUX. CHARG.** indicates auxiliary generator failure (if installed).

NOTE

The indication of **AUX. CHARG.** occurs also as a consequence of a low engine speed (less than 2500 RPM). The signaling lights **CHARGING** and **AUX. CHARG.** indicate a failure correctly only in the case when the switches **GEN**, **AUX. GEN** are on (if installed).

C. Generator

The generator is part of the engine and is located in its rear section. The rectifier is located on the firewall. The capacitor 22 000 µF / 25 V is parallelly connected to the outlet of the rectifier.

- (1) Technical parameters of the generator:

Maximum output voltage / current	14 V / 20 A at 5000 RPM



(2) Technical parameters of the regulator:

Type	electronical
Output voltage	$14 \pm 0,3 \text{ V}$ (from $1000 \pm 250 \text{ RPM}$)
Range of operating temperatures	Min. $-25 \text{ }^{\circ}\text{C}$, Max. $+90 \text{ }^{\circ}\text{C}$
Weight	0,3 kg

D. Auxiliary generator

The auxiliary generator can be optionally installed on the airplane; the previously used type SD-20 or a newer type BC 425-H. The auxiliary generator is installed on the rear flange of the engine propeller gearbox.

The auxiliary generator is protected by the circuit breaker **AUX. GEN**, it is switched on / off by the switch **AUX. GEN** which is located in the left half of the instrument panel. The generator excitation is protected by the circuit breaker **AUX. GEN FIELD** located below the lower edge of the instrument panel.

The auxiliary generator is controlled by the regulator LR3C-14 located on the firewall. It includes the detection circuit that illuminates the signaling light of **AUX. CHARG.** in the case of a generator failure.

(1) Technical parameters of the generator:

Maximum output voltage / current	14,4 V / 22 A at 5500 RPM

(2) Technical parameters of the rectifier:

Type	electronical
Output voltage	$14 \pm 0,4 \text{ V}$
Weight	0,59 kg

E. External alternator

The F3A external alternator can be optionally installed on the airplane. The alternator is mounted on the forward left side of the engine. It is mounted via brackets on the propeller gear case and is belt driven from the propeller hub.

The external generator is protected by the circuit breaker **AUX. GEN**, it is switched on / off by the switch **AUX. GEN** which is located in the left half of the instrument panel. The alternator excitation is protected by the circuit breaker **AUX. GEN FIELD** located below the lower edge of the instrument panel.

The external alternator is controlled by the integrated regulator. It includes the detection circuit that illuminates the signaling light of **AUX. CHARG.** in the case of a alternator failure.

(1) Technical parameters of the generator:

Maximum output	600 W at 6000 RPM
Output voltage	$14,2 \div 14,8 \text{ V}$
Range of operating temperatures	Min. $-30 \text{ }^{\circ}\text{C}$, Max. $+90 \text{ }^{\circ}\text{C}$
Weight	3 kg

F. Battery FG Forte 12150 / FG Forte 12200

The battery is located in the engine compartment on the firewall. It is located in the holder and is attached by the metal strip with the buckle and the lock, secured by lockwire.

The older version of the battery attachment has the strip attached by means of the screw turnbuckle secured by lockwire.



(1) Technical parameters:

Battery type	FG12150	FG12200
Voltage	12 V	12 V
Design service life	3 – 5 years	3 – 5 years
Maximum discharging current	(25 °C) 225 A (5 s)	(25 °C) 300 A (5 s)
Kind of charging Range Max. charging current	Constant voltage (25 °C) 14,5 – 14,9 V 6 A	Constant voltage (25 °C) 14,5 – 14,9 V 8 A
Operating temperatures Charging Discharging Storage	-20 – 60 °C -10 – 60 °C -20 – 60 °C	-20 – 60 °C -10 – 60 °C -20 – 60 °C
Weight	4,75 kg	5,9 kg

Battery discharging (hours)	Current (A)	Voltage (V)	Capacity (Ah)
FG12150			
20	0,75	10,5	15
10	1,4	10,5	14
5	2,5	10,5	12,5
1	10,3	9,6	10,3
FG12200			
20	1,0	10,5	20
10	1,85	10,5	18,5
5	3,45	10,5	17,25
1	13,4	9,6	13,4

Table 24-1 Battery discharging

G. Battery SV-BAT-320

The standby battery SV-BAT-320 serves for feeding the Dynon SkyView system in the case of an on-board network failure. It doesn't require any maintenance in the operation, the battery is tested once a year only. After the test, the system itself evaluates whether it is still possible to use the battery in the operation. Replace the battery in the case when the test result is negative.

H. Battery IBBS-12v-3ah

The standby battery IBBS-12v-3ah serves for feeding the Garmin G3X system in the case of an on-board network failure. It doesn't require any maintenance in the operation, the battery is tested once a year only. Replace the battery in the case when the test result is negative.

**CAUTION**

CHARGE THE BATTERY ONLY VIA THE ONBOARD NETWORK OF AIRPLANE. DO NOT ATTEMPT TO RECHARGE THE BATTERY BY USING AN EXTERNAL BATTERY CHARGER DIRECTLY CONNECTED TO THE INPUT OF THE BATTERY.

I. Socket for 12 V appliances

The socket for 12 V appliances is located in the right lower corner of the instrument panel. It is switched on/off by means of the switch **SOCKET 12V/2A**. It is protected by the 2 A fuse that is located below the instrument panel in the harness bracket on the left.



2. MAINTENANCE PRACTICES

A. Generator

When removing / installing the generator, follow the engine manufacturer manual – Maintenance Manual (Heavy Maintenance) for Rotax Engine Type 912 Series, Doc. No. MMH-912/MMH-914, 899603.

B. Generator rectifier

Maintenance type: Line

Personnel qualification: Independent verification personnel qualified in accordance with Part 66 or higher

Recommended tools and material:

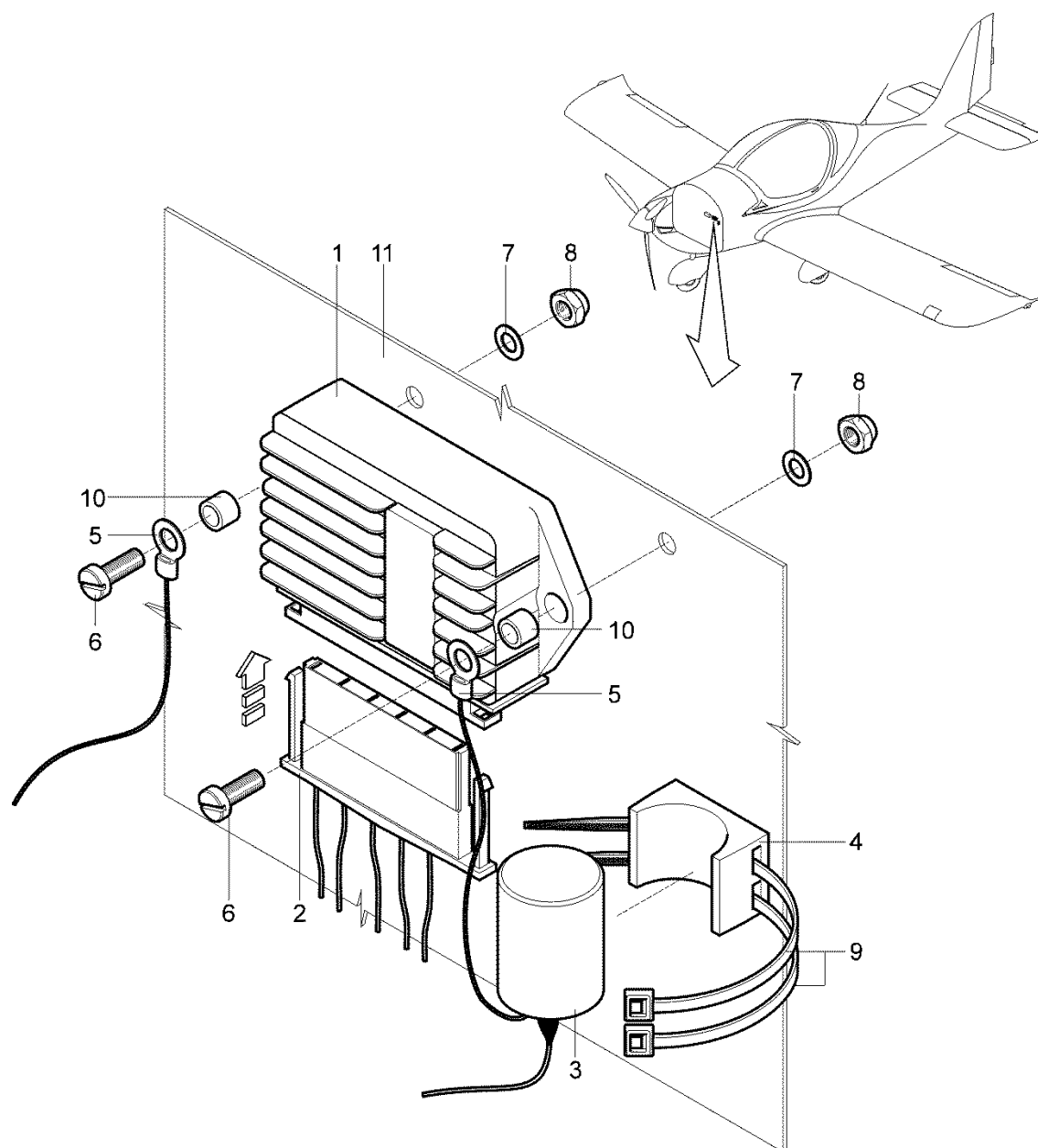
Item	Designation / Size	Quantity	Note
Material according to the engine manufacturer manual	-	-	
Nippers	-	1 pc.	
Flat screwdriver	-	1 pc.	
Wrench	No. 10	1 pc.	
Cable tie	3,6x142 mm	2 pcs.	

(1) Removal – generator rectifier

- Switch the electrical network off and disconnect the battery.
- Remove the engine cowlings (Section 71-10).
- Disconnect the connector (2) from the rectifier (1, Fig. 24-4).
- Unscrew and remove the nuts (8) and the washers (7) from the rear part of the firewall (10).
- Unscrew the screws (6) with the cable eyes of the wires (5).
- Remove the rectifier (1); as needed, remove the inserts (10).
- As needed, cut the cable ties (9) and remove the capacitor (3).

(2) Installation –generator rectifier

- Put the rectifier (1, Fig. 24-4) with the inserts (10) to the appropriate position on the firewall (11).
- Slide the cable eyes of the wires (5) on the screws (6), insert the screws into the corresponding holes in the rectifier (1), put on the washers (7), screw on and tighten the nuts (8).
- Connect the connector (2) to the rectifier (1).
- As needed, attach the capacitor (3) by means of the cable ties (9).
- Install the engine cowlings (Section 71-10).
- Connect the battery, switch the electrical network on.
- Start the engine, do the engine test and check the function of the generator.



Legend to Fig. 24-4

1 Generator rectifier	7 Washer 5,3
2 Connector	8 Nut M5
3 Capacitor	9 Cable tie
4 Holder of capacitor	10 Spacing insert
5 Wire with cable eye	For information
6 Screw M5x16	11 Firewall

Fig. 24-4 Generator rectifier – removal / installation



C. Auxiliary generator

Maintenance type: Line

Personnel qualification: Independent verification personnel qualified in accordance with Part 66 or higher

Recommended tools and material:

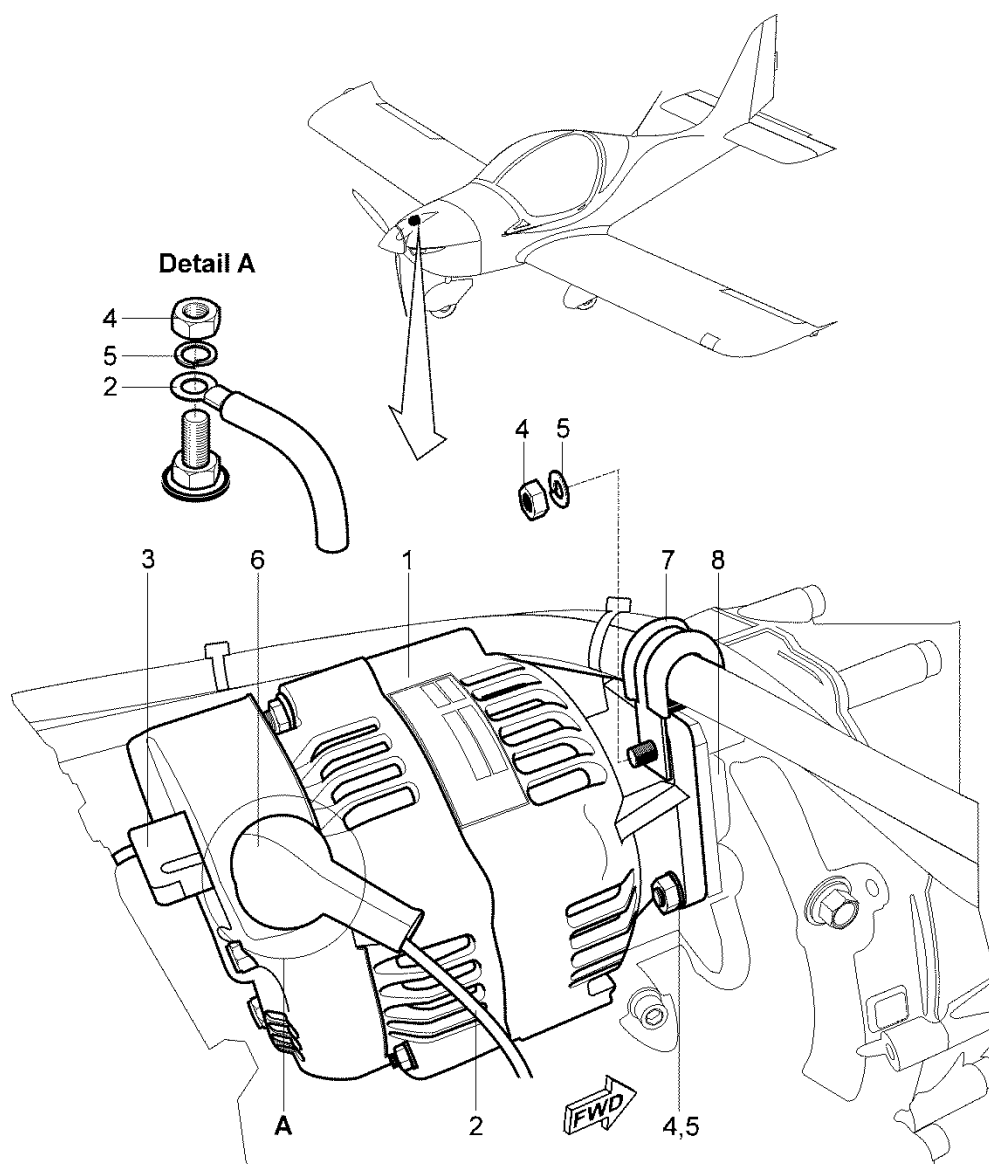
Item	Designation / Size	Quantity	Note
Wrench	No. 10	1 pc.	
Phillips screwdriver	No. 2	1 pc.	

(1) Removal – auxiliary generator

- (a) Switch the electrical network off and disconnect the battery.
- (b) Remove the engine cowlings (Section 71-10).
- (c) Pull down the rubber cover of the contact (6, Fig. 24-5).
- (d) Unscrew the nut (4) and remove the nut (5) attaching the cable (2) to the generator (1) and disconnect the connector (3) of the line to the regulator; the connector (3) is equipped with a safety lock. After pressing down the safety lock, it is possible to take it out from the socket.
- (e) Unscrew and remove the nuts (4) and the washers (5) of the generator attachment (1) on the propeller gearbox (8).
- (f) Remove the hose fastener (7).
- (g) Remove the auxiliary generator (1).

(2) Installation – auxiliary generator

- (a) Place the auxiliary generator (1, Fig. 24-5) on the screws on the propeller gearbox (8).
- (b) Slide the hose fastener (7) on the right upper screw.
- (c) Put the washers (5) on the screws (4), screw on and tighten the nuts (4).
- (d) Connect the connector (3); push the connector safety lock before inserting it into the socket.
- (e) Slide the cable eye (2) on the screw of the contact on the auxiliary generator (1).
- (f) Put on the washer (5) and screw on the nut (4); install the rubber cover (6) over the contact.
- (g) Install the engine cowlings (Section 71-10).
- (h) Connect the battery, switch the electrical network on.
- (i) Start the engine, do the engine test and check the function of the generator.



Legend to Fig. 24-5

1 Auxiliary generator	5 Washer
2 Cable	6 Rubber cover of contact
3 Regulator connector	7 Hose fastener
4 Nut	8 Propeller gearbox

Fig. 24-5 Auxiliary generator – removal / installation



D. Auxiliary generator regulator

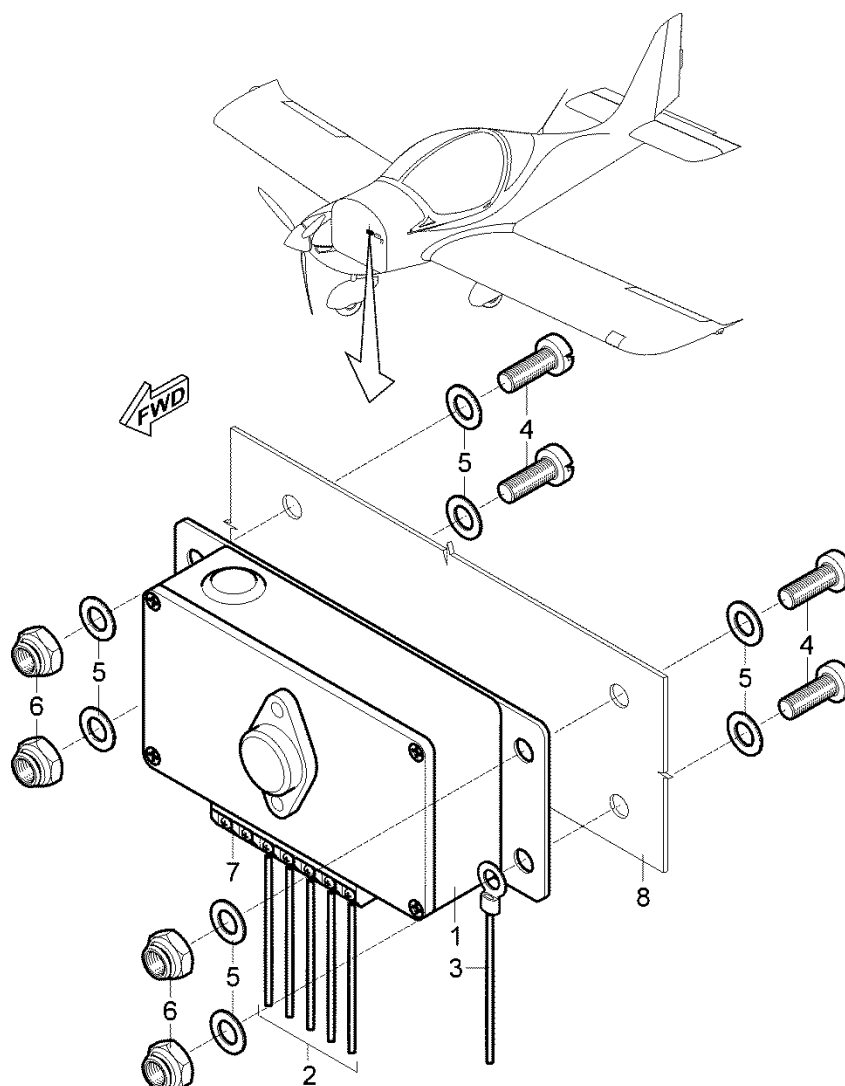
Maintenance type: Line

Personnel qualification: Independent verification personnel qualified in accordance with Part 66 or higher

Recommended tools and material:

Item	Designation / Size	Quantity	Note
Wrench	No. 10	1 pc.	
Phillips screwdriver	No. 2	1 pc.	

- (1) Removal – auxiliary generator regulator
 - (a) Switch the electrical network off and disconnect the battery.
 - (b) Remove the engine cowlings (Section 71-10).
 - (c) Loosen the screw and disconnect the wires (2, Fig. 24-6) from the terminal strip (7). Note down the position of individual wires on the terminal strip.
 - (d) Unscrew the nuts (6) of the regulator attachment (1) on the firewall (8), remove the washers (5), remove the eye of the ground wire (3) and remove the screws (4) with the washers (5).
- (2) Installation – auxiliary generator regulator
 - (a) Put the regulator (1, Fig. 24-6) to the appropriate position on the firewall (8) and insert the screws (4) with the washers (5) into the holes.
 - (b) Slide the cable eye of the ground wire (3) and the washers (5) on the protruding ends of the screws (4).
 - (c) Screw on and tighten the nuts (6).
 - (d) Insert the wires (2) into the terminal strip (7) and tighten the screws.
 - (e) Install the engine cowlings (Section 71-10).
 - (f) Connect the battery, switch the electrical network on.
 - (g) Start the engine, do the engine test and check the function of the generator.



Legend to Fig. 24-6

1 Auxiliary generator regulator	6 Nut M5
2 Wires	7 Terminal strip of regulator
3 Ground wire	For information:
4 Screw M5	8 Firewall
5 Washer 5,3	

Fig. 24-6 Auxiliary generator regulator – removal / installation



E. External alternator

Maintenance type: Line

Personnel qualification: Independent verification personnel qualified in accordance with Part 66 or higher

Recommended tools and material:

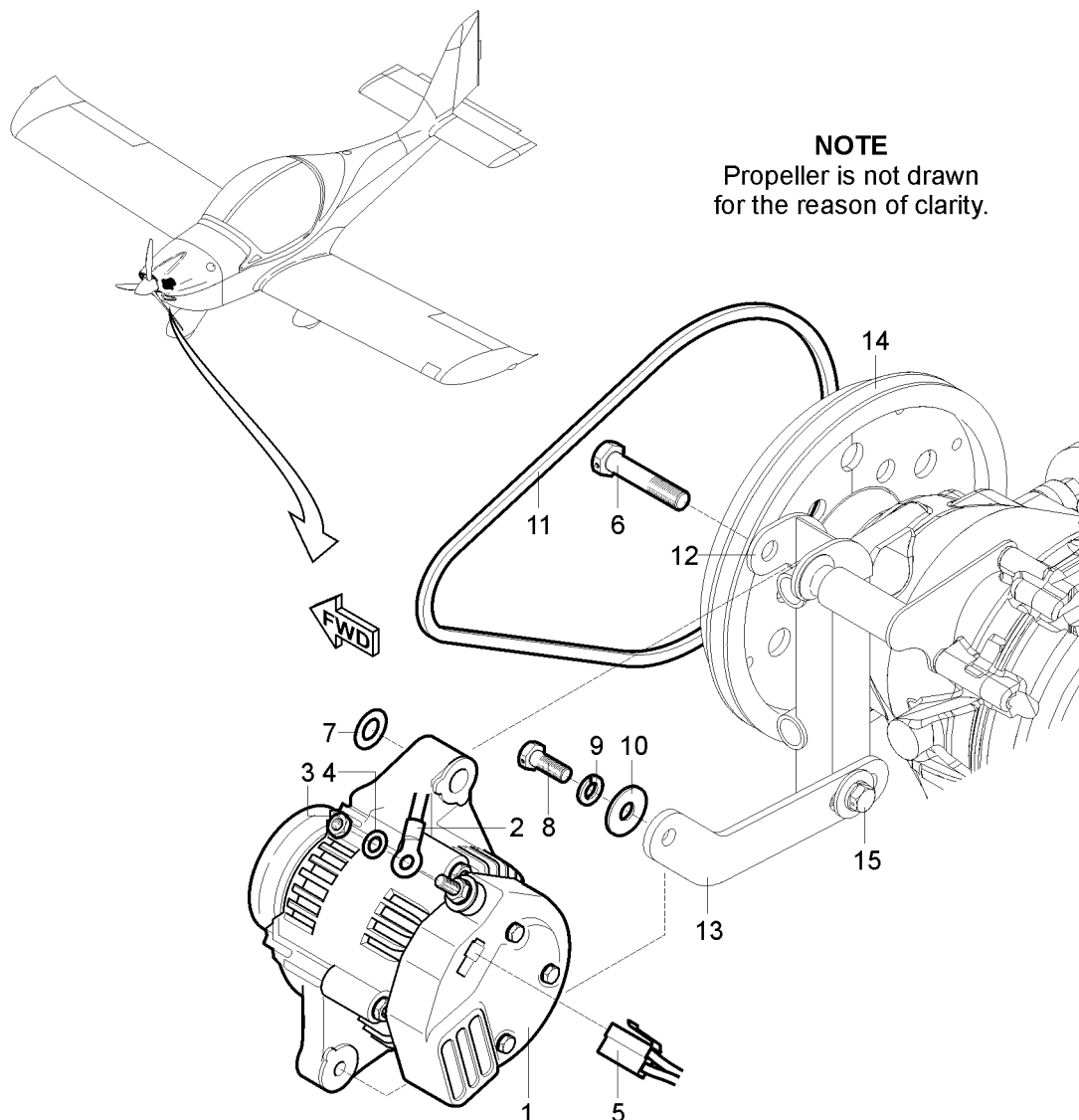
Item	Designation / Size	Quantity	Note
Wrench	No. 10	1 pc.	
Socket wrench	No. 13	1 pc.	
Socket wrench	No. 17	1 pc.	
Hex wrench	No. 6	1 pc.	
Torque wrench	2 – 24 Nm	1 pc.	
Torque wrench	8 – 50 Nm	1 pc.	

(1) Removal – external alternator

- (a) Switch the electrical network off and disconnect the battery.
- (b) Remove the engine cowlings (Section 71-10).
- (c) Unscrew and remove the nut (3, Fig. 24-7) with the washer (4) attaching the cable (2) to the alternator (1) and disconnect the connector (5); the connector is equipped with a safety lock. After pressing down the safety lock, it is possible to take it out from the socket.
- (d) Loosen the bolts (6; 8; 15) and release the belt (11).
- (e) Unscrew and remove the bolt (6) and the washers (9; 10).
- (f) Hold the alternator, unscrew the bolt (6) and remove the alternator (1) and the washer (7).

(2) Installation – external alternator

- (a) Place the alternator (1, Fig. 24-7) with the washer (7) to the bracket (12) and screw the bolt (6).
- (b) Put the tension bar (16) to the alternator (1) and screw the bolt (8) with the washers (9; 10).
- (c) Install the belt (11).
- (d) Tension the belt (see par. 2 E. (3)).
- (e) Connect the connector (5); push the connector safety lock before inserting it into the socket.
- (f) Slide the cable eye (2) on the screw of the contact on the alternator (1).
- (g) Put on the washer (5) and screw on the nut (4); tighten the nut using a torque of 4 Nm.
- (h) Install the engine cowlings (Section 71-10).
- (i) Connect the battery, switch the electrical network on.
- (j) Start the engine, do the engine test and check the function of the alternator.

**NOTE**

Propeller is not drawn
for the reason of clarity.

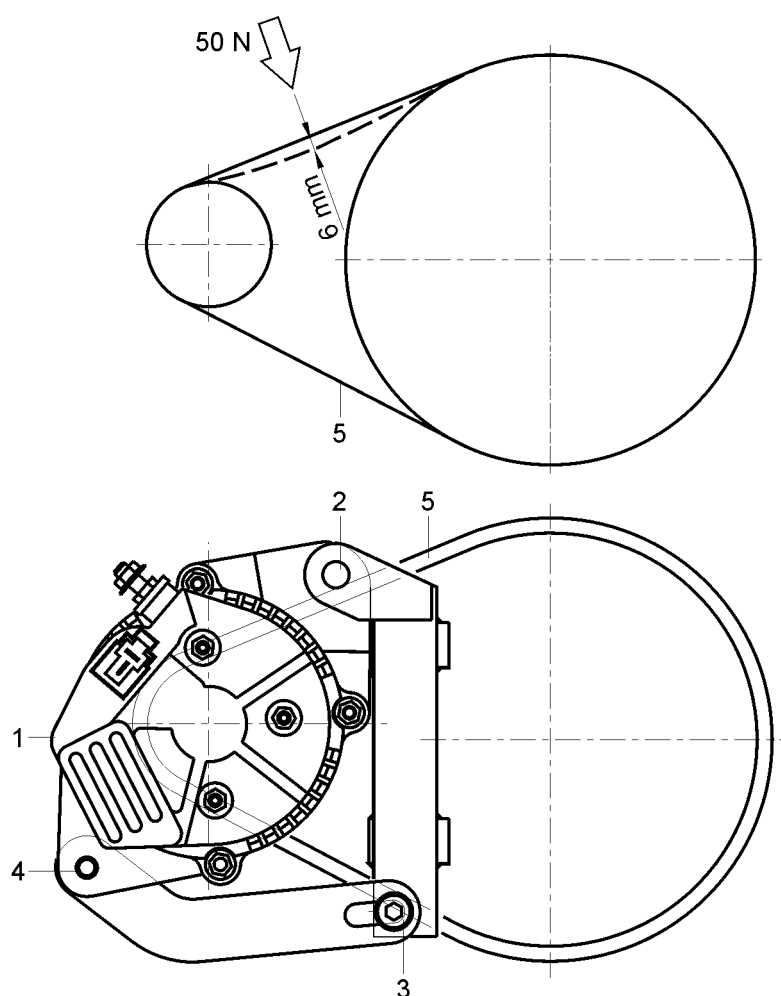
Legend to Fig. 24-7

1 External alternator	9 Lock washer
2 Cable	10 Washer 8,4
3 Nut M5	11 V-belt
4 Washer 6	For information:
5 Connector	12 Bracket
6 Bolt M10x45	13 Tension bar
7 Washer 10,1	14 V-belt pulley
8 Bolt M8x20	15 Bolt M8x20

Fig. 24-7 External alternator – removal / installation



- (3) Adjustment / test – V-belt tensioning
- (a) Switch the electrical network off and disconnect the battery.
 - (b) Remove the engine cowlings (Section 71-10).
 - (c) Push the belt with a force of 50 N; the deflection can be max. 6 mm (see Fig. 24-8).
If the deflection is larger, tension the belt:
 - 1 Loose the bolts (2; 3; 4).
 - 2 Press the alternator (1) upwards and tighten the bolt (4).
 - 3 Tighten the bolt (2) using a torque of 40 Nm and bolt (3) using a torque of 22 Nm.
 - (d) Install the engine cowlings (Section 71-10).



Legend to Fig. 24-8

1 External alternator	4 Bolt M8x20
2 Bolt M10x45	5 V-belt
3 Bolt M8x20	

Fig. 24-8 V-belt – checking and tensioning


F. External alternator V-belt / V-belt pulley

Maintenance type: Line

Personnel qualification: Independent verification personnel qualified in accordance with Part 66 or higher

Recommended tools and material:

Item	Designation / Size	Quantity	Note
Wrench	No. 17	1 pc.	
Hex bit	No. 6	1 pc.	
Bolt M10x25	440 240	2 pcs.	Installation aid
Nut M10	242 091	2 pcs.	Installation aid
Washer 10,5	927 410	2 pcs.	Installation aid
Torque wrench	2 – 24 Nm	1 pc.	

- (1) Removal – external alternator V-belt pulley
 - (a) Switch the electrical network off and disconnect the battery.
 - (b) Remove the engine cowlings (Section 71-10).
 - (c) Loosen the bolts (6; 8; 15, Fig. 24-7) and release the belt (2, Fig. 24-9).
 - (d) Remove the propeller (Section 61-10).
 - (e) Remove the V-belt (2).
 - (f) As necessary remove the V-belt pulley:
 - 1 Unscrew and remove the screws (4) with the washers (5).
 - 2 Remove the V-belt pulley (1) and two pulley carrier plates (3).
- (2) Installation – external alternator V-belt pulley
 - (a) Thoroughly clean the engine flange (6, Fig. 24-9).
 - (b) Slide the pulley (1) fully over the propeller flange (6) and insert the V-belt (2) loosely in the V-belt pulley.
 - (c) Place both halves of pulley carrier plate (3) with centering towards inside of propeller flange (6) and attach loosely with bolts M10x25, washers and nuts (installation aids).

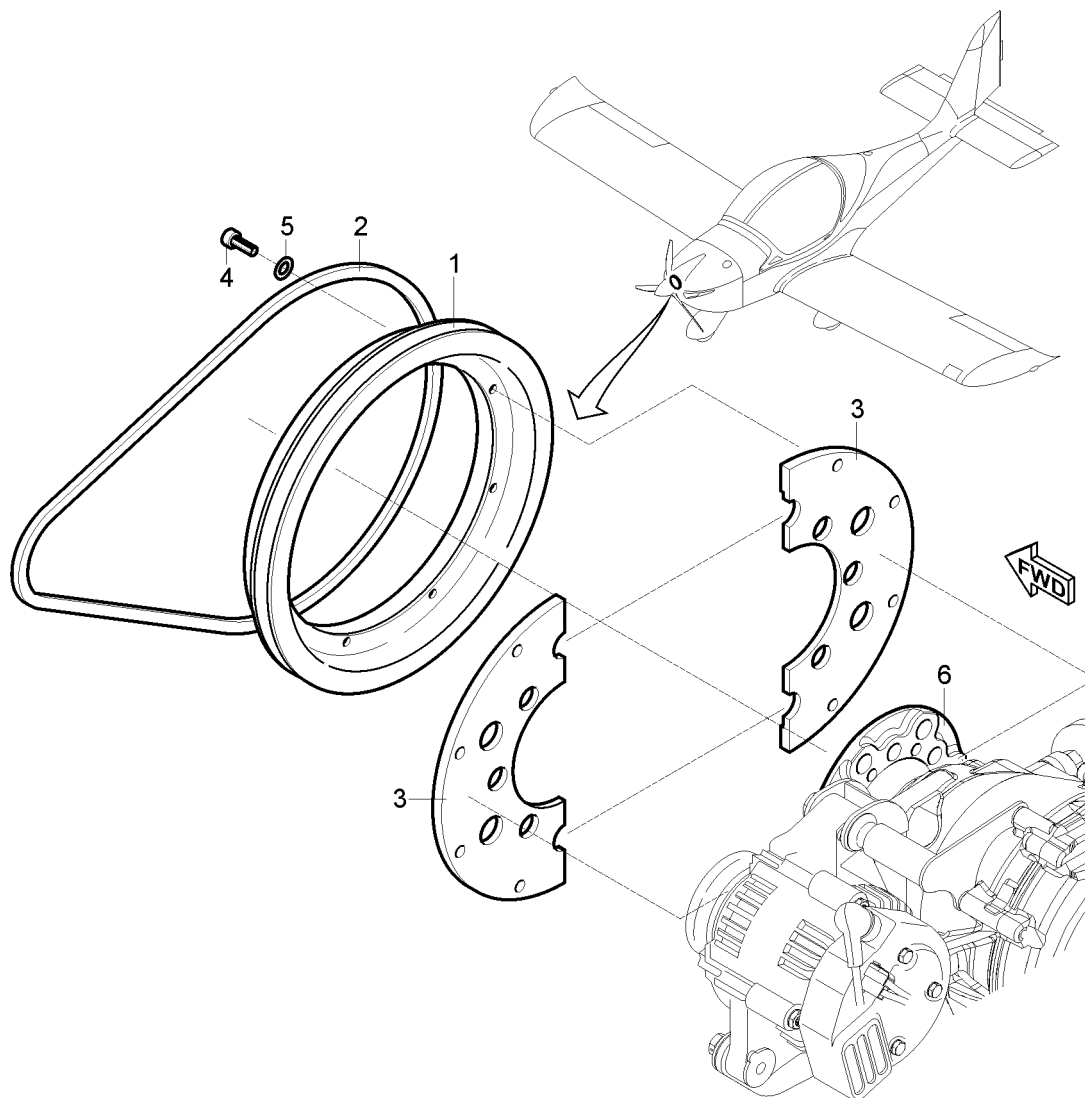
CAUTION

THE TWO PULLEY CARRIERS MUST BE POSITIONED
PRECISELY WITH THE CENTERING EXACTLY ON THE
INSIDE OF THE PROPELLER FLANGE.

- (d) Push the V-belt pulley (1) onto the two V-belt pulley carriers (3) and attach with the screws (4) with washers (5); tighten the screws using a torque of 6 Nm.
- (e) Remove the bolts M10x25, washers and nuts (installation aids).
- (f) Install the propeller (Section 61-10).
- (g) Install the belt (2).
- (h) Tension the belt (see par. 2 E. E(3)).



- (i) Install the engine cowlings (Section 71-10).
- (j) Connect the battery, switch the electrical network on.
- (k) Start the engine, do the engine test and check engine parameters.



Legend to Fig. 24-9

1 V-belt pulley	4 Screw M5x16 (8 pcs.)
2 V-belt	5 Lock washer 5 (8 pcs.)
3 Pair of pulley carrier halves	6 Engine flange

Fig. 24-9 External alternator V-belt / V-belt pulley – removal / installation


G. Battery FG Forte 12150 / FG Forte 12200

Maintenance type: Line

Personnel qualification: Independent verification personnel qualified in accordance with Part 66 or higher

Recommended tools and material:

Item	Designation / Size	Quantity	Note
Tester capacity	Aircraft Battery Charger / Analyzer 1550 CML	1 pc.	Check of battery capacity
Socket wrench	No. 10	1 pc.	
Torque wrench	2 – 20 Nm	1 pc.	
Phillips screwdriver	No. 2	1 pc.	
Stainless lockwire	Ø 0,8 mm	-	
Grease	Aeroshell Grease 22	As needed	

- (1) Safety principles during the maintenance and other handling the battery
 - (a) Before handling the battery, put on a rubber apron, rubber gloves, protective glasses or other aids for eye protection. Don't have any metal objects with you, such as jewels.
 - (b) Handle the battery carefully and avoid chocks when moving it.
 - (c) Smoking or handling an open flame in a vicinity of the battery are strictly prohibited.
 - (d) Prevent short circuits of the battery. The battery is charged and a short circuit could cause a damage of the equipment or could cause a damage to the health.
 - (e) Connect the screws to the end terminals correctly, otherwise a sparking could occur or the terminals could be damaged.
 - (f) It is prohibited to smoke or handle an open flame.
 - (g) Clean the battery with a wet cloth. Don't use a dust cloth or a dry cloth in order to prevent static electricity and sparks. It is prohibited to use organic dissolvents because it may cause a damage of the battery body.
 - (h) During a common operation, there isn't any dissociative electrolyte on the battery body after its sealing. However, if the battery body is damaged, a leakage of dissociative sulfuric acid may occur. In the case when the eyes, skin or clothing get in contact with the electrolyte, rinse the affected area by an abundant quantity of water. If the acid gets in contact with the eyes, contact the doctor immediately after their rinsing by water.
 - (i) Verify whether the positive (+ / red) and negative (- / black) connectors are connected correctly, otherwise the battery or the charger could be damaged.
 - (j) The plates, terminals and the connecting parts of the battery contain lead or leaded mixtures and other chemical compounds that are dangerous to health.
 - (k) Wash your hands after the contact with the battery!



(2) Servicing – charging the battery FG Forte

CAUTION

THE RECOMMENDED TEMPERATURE FOR CHARGING THE BATTERY IS IN A RANGE OF +5 TO +30 °C. AT A LOWER TEMPERATURE THAN 5 °C OR HIGHER THAN 30 °C, THE BATTERY ISN'T FULLY CHARGED OR IS OVERHEATED, WHICH REDUCES THE BATTERY SERVICE LIFE.

At a temperature of 5 to 30 °C, the charging voltage reaches a value of 2,25 V to 2,30 V / cell. The batteries for a cyclical application use the method of constant voltage with a limited current for charging. At a temperature of 20 to 25 °C, the charging voltage of the battery must be 2,40 V per a cell; the initial charging current mustn't be higher than 0,2 C / 10 A and the battery is fully charged in about 24 hours. If the value of a charging current remains unchanged for 3 hours in the final phase of charging, it means that the battery is fully charged.

The discharging capacity of the battery is related to the temperature. At a lower temperature, the discharged capacity is lower, at a higher temperature, the discharged capacity is higher. Too high temperature may cause a reduction of the battery service life. The ideal operating temperature of the battery is between 20 to 25 °C.

If the airplane isn't in the operation more than one month, remove the battery and keep it in an appropriate place. Always store a fully charged battery at a temperature of 20 °C. The daily discharging rate is less than 0,1% of the nominal capacity of the battery. Regularly charge the battery up to the full capacity of charging once a month.

Procedure of battery charging:

- (a) Switch the electrical network off and remove the battery (see par. 2. G (3)).
 - (b) Clean the battery contacts and connect the charging device. Be careful with the polarity! Avoid the inversion of power supply polarity of the battery!
 - (c) Charging voltage at a constant temperature of 25 °C is:
 - 1 Operating cycle from 14,5 to 14,9 V.
 - 2 Emergency cycle from 13,6 to 13,8 V.
 - 3 Maximum charging current is 6 A (FG12150) or 8 A (FG12200).
 - (d) Disconnect the charging device.
 - (e) Install the battery (see par. 2 G.(4)).
- (3) Removal – battery FG Forte
- (a) Switch off the master switch.
 - (b) Remove the engine cowlings (Section 71-10).

CAUTION

MAKE SURE THAT YOU DISCONNECTED THE NEGATIVE POLE AT FIRST.

- (c) Disconnect the cables (3, Fig. 24-10) from the battery contacts (1). At first disconnect the negative pole:



- 1 Pull down the rubber cover of contact (6) and unscrew the screw (2).
 - 2 Remove the washers (4) and (5).
 - 3 In a suitable way, insulate the cable end.
 - 4 In the same way, disconnect the cable (3) of the positive pole.
- (d) Cut the lockwire of the lock of buckle (6) or turnbuckle (7).
- (e) Unlock the strip attaching the battery (1).
- (f) Remove the battery (1) from the holder.

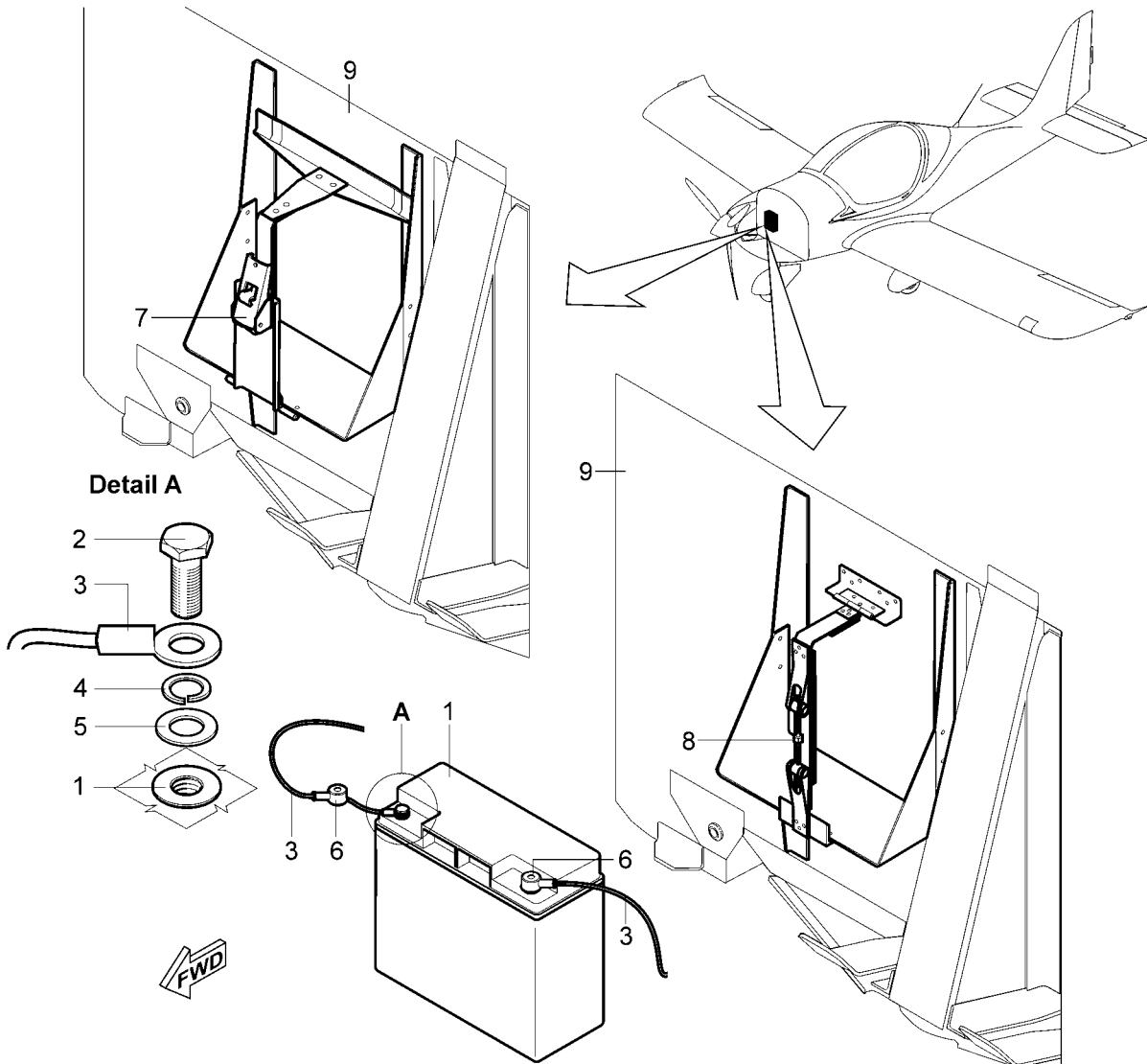


Fig. 24-10 Battery FG Forte – removal / installation (page 1 of 2)



Legend to Fig. 24-10

1 Battery	6 Rubber cap of contacts
2 Screw M5	7 Holder of battery with buckle
3 Cable	8 Holder of battery with turnbuckle
4 Spring washers	For information:
5 Washer	9 Firewall

Fig. 24-10 Battery FG Forte – removal / installation (page 2 of 2)

- (4) Installation – battery FG Forte

NOTE

The battery you are installing on the aircraft must be charged.

- (a) Insert the battery (1, Fig. 24-10) into the holder (6) or (7) on the firewall (9).
- (b) Connect the strip for the battery attachment, using the lock (6) or the screw turnbuckle (7).
- (c) Secure the lock or the turnbuckle of the strip for the battery attachment (6), (7), using the lockwire.

CAUTION

WHEN INSTALLING THE BATTERY, CONNECT THE POSITIVE POLE AT FIRST.

- (d) Connect the battery contacts to the cables (3). At first, connect the positive cable to the positive pole of the battery (1):
 - 1 Position the cable eye of the cable (3), marked as plus, to the positive pole of the battery (1).
 - 2 Install the screw (2) with the washers (4) and (5); tighten the screw using a torque of 6 – 7 Nm.
 - 3 Use the same procedure for the negative pole of the battery.
 - (e) Slightly lubricate the battery contacts by means of grease and protect it by the rubber caps (6).
 - (f) Install the engine cowlings (Section 71–10).
- (5) Adjustment / test – capacity test of the battery FG Forte

NOTE

The values in the parentheses are valid for the battery FG12200.

- (a) Charge the battery with a current of 1 A to a minimum end voltage of 14,5 V – charging with constant current.
- (b) The battery is considered charged if the voltage value of the battery doesn't increase during 3 hours of charging.
- (c) Set the end discharging voltage of 10,4 V on the testing equipment.
- (d) Set the discharging current of 15 A (20 A) on the testing equipment.



- (e) Check the discharging time of 24 minutes:
- 1 If the voltage of the battery doesn't decrease after 24 minutes of discharging below 10,4 V, it is considered as complying.
 - 2 If the voltage of the battery decreases sooner than in 24 minutes of discharging below 10,4 V, it is considered as non-complying.

NOTE

The airplane manufacturer uses the Aircraft Battery Charger / Analyzer 1550 CML for testing the batteries.

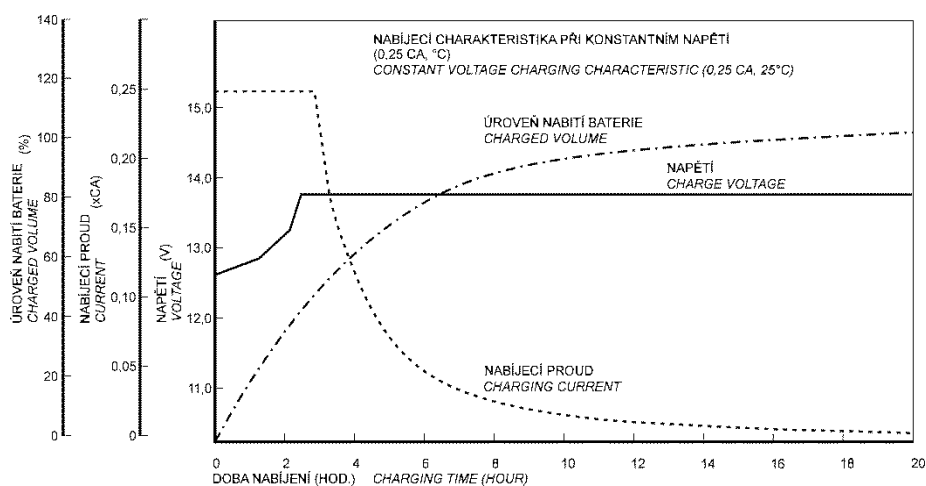


Fig. 24-11 Charging characteristics of battery at constant voltage

- (6) Inspection / check – battery FG Forte
- (a) Visually check the battery:
- 1 Appearance of the battery (terminals, connectors, eventual corrosion of the battery holder).
 - 2 Contact surfaces between the battery and the battery holder.
 - 3 Any cracks or leakage, deformation of the battery, deformation of the battery holder.
- (b) Clean the battery.

H. Battery SV-BAT-320

Maintenance type: Line

Personnel qualification: Independent verification personnel qualified in accordance with Part 66 or higher

Recommended tools and material:

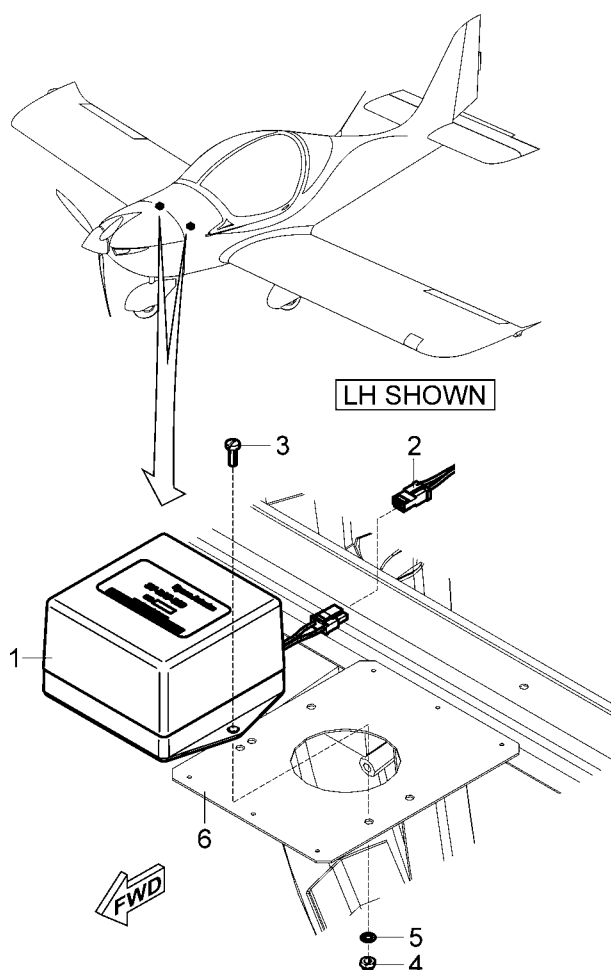
Item	Designation / Size	Quantity	Note
Wrench	No. 7	1 pc.	
Flat screwdriver	-	1 pc.	
Cable tie	2,5x99	As needed	



NOTE

The procedure for removal / installation is identical for the left battery and also for the right battery.

- (1) Removal – battery SV-BAT-320
 - (a) Switch the electrical network off and disconnect the battery.
 - (b) Remove the cover of the upper part of fuselage F4 (Section 53-30).
 - (c) Disconnect the connector (2, Fig. 24-12) from the harness.
 - (d) Unscrew and remove the nuts (4), washers (5) and the screws (3).
 - (e) Remove the battery (1).



Legend to Fig. 24-12

1 Battery SV-BAT-320	5 Washer 4.3 (2 pcs.)
2 Wires with connector	For information:
3 Screw M4x10 (2 pcs.)	6 Bracket
4 Nut M4 (2 pcs.)	

Fig. 24-12 Battery SV-BAT-320 – removal / installation



- (2) Installation – battery SV-BAT-320
 - (a) Place the battery (1, Fig. 24-12) on the bracket (6) and attach it by means of the screws (3), washers (5) and the nuts (4).
 - (b) Connect the connector (2) to the harness.
 - (c) Install the cover of the upper part of the fuselage F4 (Section 53-30).
 - (d) Connect the battery.
- (3) Adjustment / test – test of battery SV-BAT-320
 - (a) When the yellow symbol of the battery with the exclamation mark (!) appears, it means that it is necessary to carry out the test. The battery symbol with the exclamation mark is indicated in the upper part of the display next to the hours indicator.
 - (b) By pressing down the MESSAGE button or the CAUTION / WARNING button located in the right lower corner of the display, the message BATTERY TEST NEEDED appears.
 - (c) Check the condition of battery charging:
 - 1 Press down button No. 7 on the display and simultaneously switch on the **MASTER SWITCH**.
The system enters the Setup Menu.
 - 2 Using the rotary switch, select:
LOCAL DISPLAY SETUP > BATTERY BACKUP (SV-BAT-320) STATUS
--- CHARGE STATUS must be "CHARGED" ---
 - 3 In the case when the system indicates other status than "CHARGED", charge the battery.
After switching on the display, the battery is charged automatically if the voltage of the network is higher than 12,5 V.
A partly discharged battery may result in an unsuccessful test.
The page Setup menu also shows the test result – TEST RESULT = PASS / FAIL.
Check the condition of the battery charging for both displays.
 - 4 A valid GPS signal is necessary for the performance of the battery test.
After switching off the master switch, the TEST BAT (button No. 8) appears in the right corner.
The test is initiated by pressing down this button.
Other instructions for the test are indicated on the display during the test.
The test takes 60 minutes and for a correct performance of the test, the battery must have an endurance of 45 minutes at least.
 - 5 An unsuccessful test is indicated by the red cross in the X form across the battery symbol in the upper part of the display.
 - 6 After performing the battery test, recharge the batteries up to 100%.
The switched on displays automatically recharge batteries if the voltage of the on-board network is higher than 12,5 V.
 - 7 The detailed description of the activities related to the performance of the battery is shown in the document Dynon SkyView System Installation Guide, Document 101320-022, Revision W, dated January 2016 or a later valid issue.



I. Battery IBBS-12v-3ah

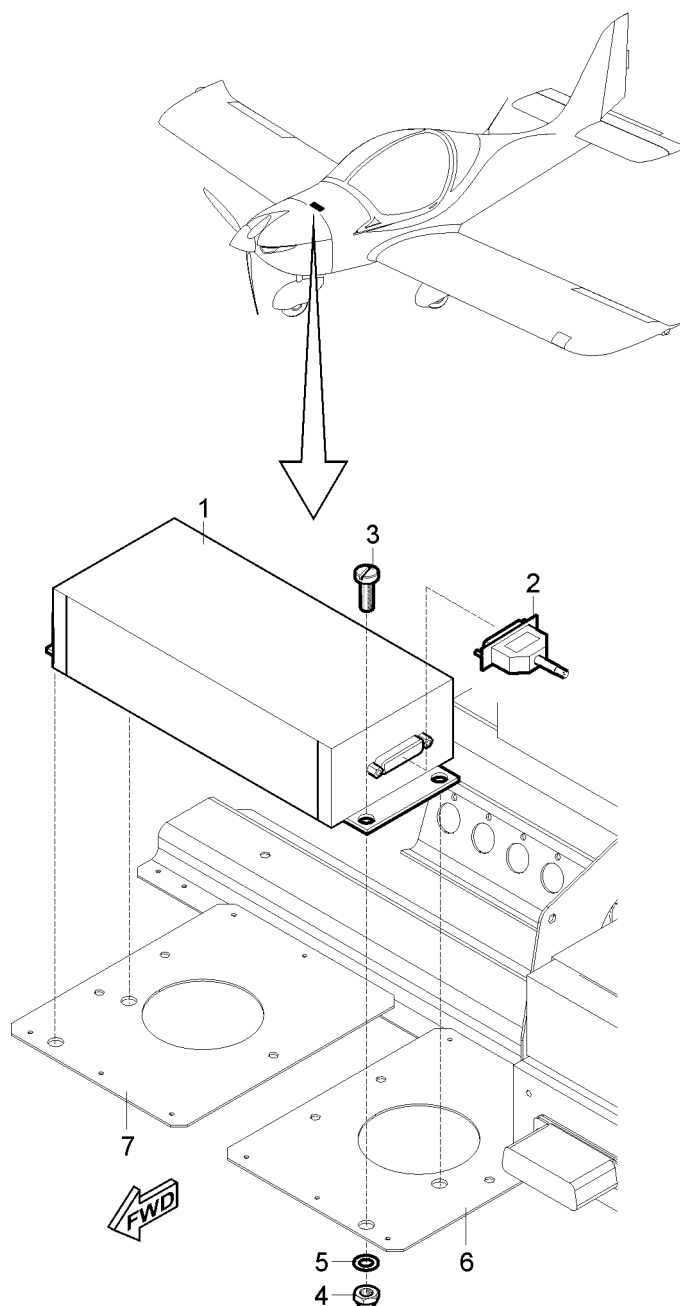
Maintenance type: Line

Personnel qualification: Independent verification personnel qualified in accordance with Part 66 or higher

Recommended tools and material:

Item	Designation / Size	Quantity	Note
Wrench	No. 7	1 pc.	
Flat screwdriver	-	1 pc.	
Cable tie	2,5x99	As needed	

- (1) Removal – battery IBBS-12v-3ah
 - (a) Switch the electrical network off and disconnect the battery.
 - (b) Remove the cover of the upper part of fuselage F4 (Section 53-30).
 - (c) Disconnect the connector (2, Fig. 24-13) from the harness.
 - (d) Unscrew and remove the nuts (4), washers (5) and the screws (3).
 - (e) Remove the battery (1).
- (2) Installation – battery IBBS-12v-3ah
 - (a) Place the battery (1, Fig. 24-13) on the brackets (5; 6) and attach it by means of the screws (3), washers (5) and the nuts (4).
 - (b) Connect the connector (2) to the harness.
 - (c) Install the cover of the upper part of the fuselage F4 (Section 53-30).
 - (d) Connect the battery.



Legend to Fig. 24-13

1 Battery IBBS-12v-3ah	5 Washer 4.3 (4 pcs.)
2 Wires with connector	For information:
3 Screw M4x10 (4 pcs.)	6 Bracket
4 Nut M4 (4 pcs.)	7 Bracket

Fig. 24-13 Battery IBBS-12v-3ah – removal / installation



- (3) Adjustment / test – capacity test of the battery IBBS-12v-3ah
 - (a) Turn off the **MASTER SWITCH**.
 - (b) Turn on the **BATTERY G3X** switch.
 - (c) Both screens must be in operation including all displayed data (PFD, MFD, GPS).
 - (d) Monitor and record whether any of the connected devices (PFD, MFD, ADAHRS 1 and EIS) will fail to function within 30 minutes of starting the test, or until the output voltage of the backup battery drops to 9,5V.

CAUTION

AVOID ALLOWING THE BACKUP BATTERY VOLTAGE TO FALL BELOW 9 VOLTS.

- (e) Replace the backup battery if the test fails.
- (f) In the case of a successful test, charge the backup battery to 13,8 – 14 V from the airplane's electrical network before the next flight. To charge the battery, it is necessary to provide 13,9 – 14 V onboard voltage.

J. Socket for 12 V appliances

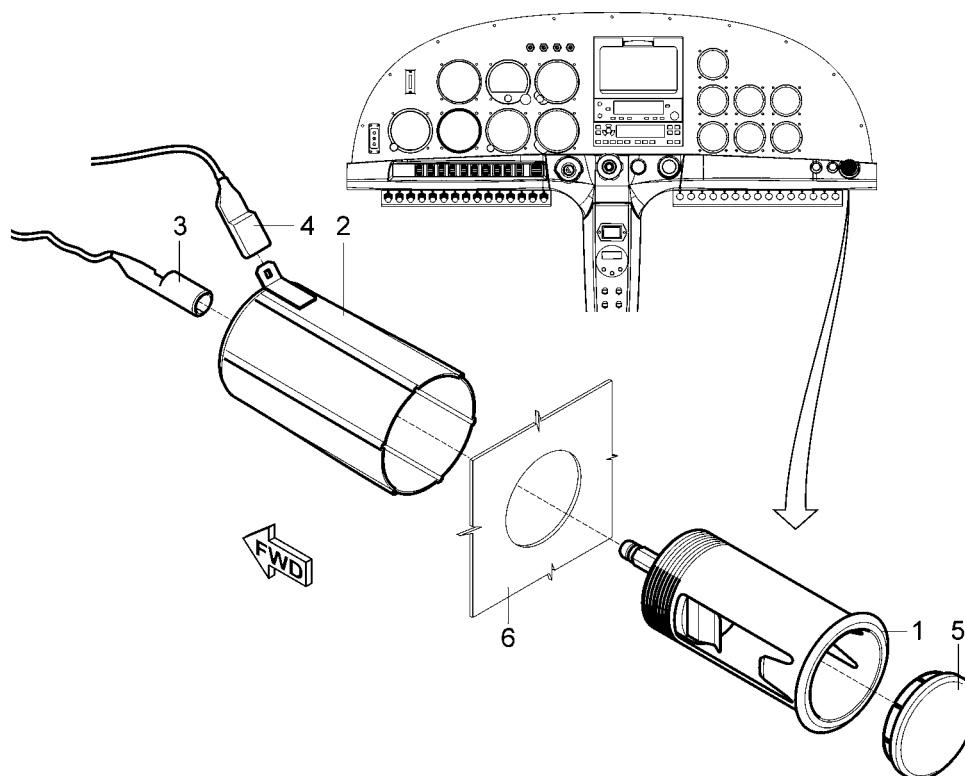
Maintenance type: Line

Personnel qualification: Independent verification personnel qualified in accordance with Part 66 or higher

Recommended tools and material:

Item	Designation / Size	Quantity	Note
Adjustable wrench	-	1 pc.	

- (1) Removal – 12 V socket
 - (a) Switch the electrical network off and disconnect the battery.
 - (b) Disconnect the connectors (3; 4, Fig. 24-14).
 - (c) Unscrew the nut (2).
 - (d) Remove the socket (1) from the hole in the instrument panel (6).
- (2) Installation – 12 V socket
 - (a) Insert the socket body (1, Fig. 24-14) into the hole in the instrument panel (6).
 - (b) Screw on and tighten the nut (2).
 - (c) Connect the connectors of the wires (3; 4).
 - (d) Connect the battery, switch the electrical network on and check the function of the socket.
 - (e) As needed, put on the cap (5).



Legend to Fig. 24-14

1 Socket body	5 Cap
2 Nut	For information:
3 Wire with connector	6 Instrument panel
4 Wire with Faston connector	

Fig. 24-14 12 V socket – removal / installation



K. Relay

Maintenance type: Line

Personnel qualification: Independent verification personnel qualified in accordance with Part 66 or higher

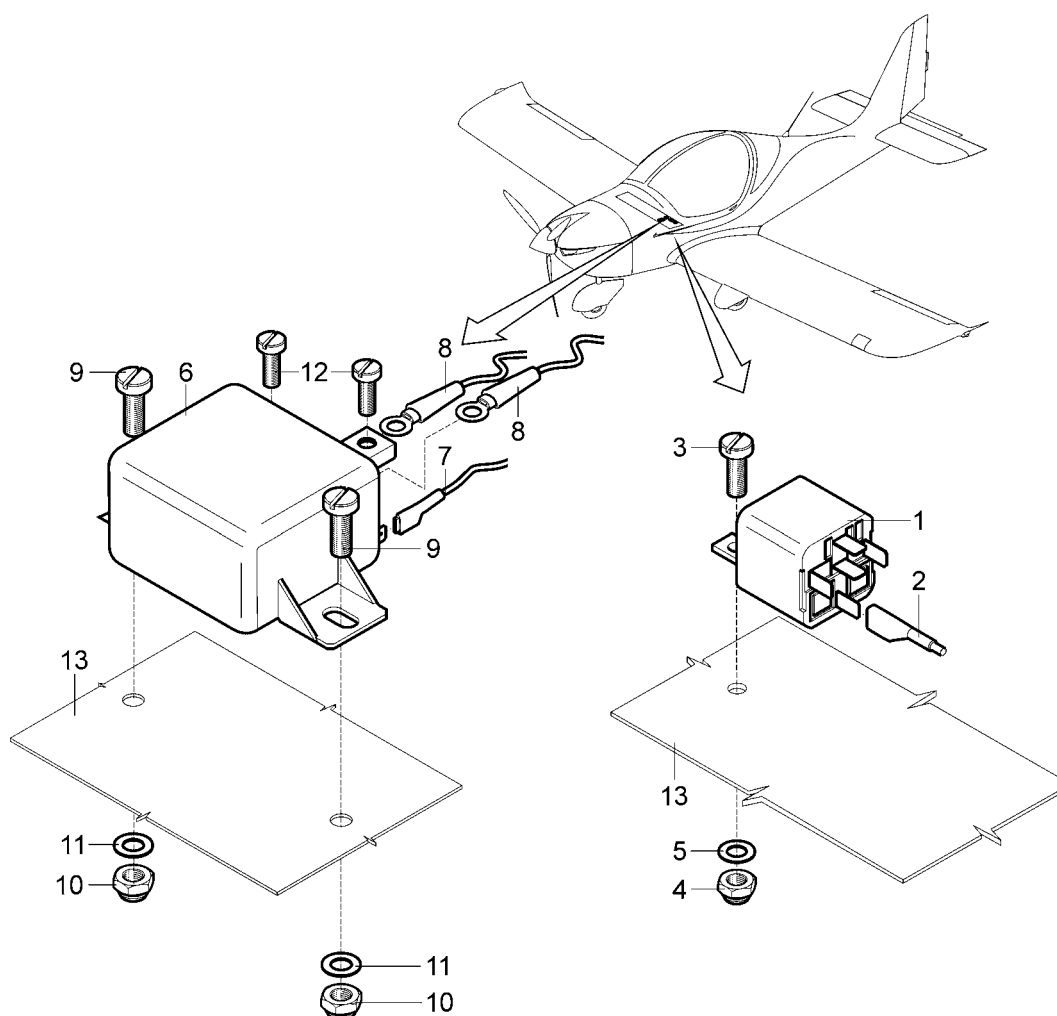
Recommended tools and material:

Item	Designation / Size	Quantity	Note
Flat screwdriver	Small	1 pc.	
Flat screwdriver	Middle	1 pc.	
Wrench	No. 7	1 pc.	
Wrench	No. 8	1 pc.	

NOTE

The relay Bosch 12 V / 75 A is installed on the airplane in the case when the auxiliary generator is used. The relay 12 V / 30 A is installed on the airplane as a standard. The procedure of installation and removal is typical for all relays.

- (1) Removal – relay 12 V / 30 A
 - (a) Switch the electrical network off and disconnect the battery.
 - (b) Remove the cover of the upper part of fuselage F4 (Section 53-30).
 - (c) Disconnect the connectors (2, Fig. 24-15) from the relay contacts (1).
 - (d) Unscrew and remove the nut (4), washer (5) and the screw (3).
 - (e) Remove the relay (1).
- (2) Installation – relay 12 V / 30 A
 - (a) Place the relay (1, Fig. 24-15) on the bracket in the upper part of the fuselage.
 - (b) Insert the screw (3) into the appropriate hole, put on the washer (5), screw on and tighten the nut (4).
 - (c) Connect the connectors (2).
 - (d) Install the cover of the upper part of the fuselage F4 (Section 53-30).
 - (e) Connect the battery, switch the electrical network on and check the function of the relay.



Legend to Fig. 24-15

1 Relay 12 V / 30 A	8 Wire with cable eye
2 Wire with connector	9 Screw M5
3 Screw M4	10 Nut M5
4 Washer 4,3	11 Washer 5,3
5 Nut M4	12 Screw
6 Relay 12 V / 75 A	For information
7 Wire with connector	13 Bracket

Fig. 24-15 Relay – removal / installation (typical)



-
- (3) Removal – relay 12 V / 75 A
 - (a) Switch the electrical network off and disconnect the battery.
 - (b) Remove the cover of the upper part of fuselage F4 (Section 53-30).
 - (c) Unscrew the screws (12, Fig. 24-15) attaching the cable eyes (8) to the relay contacts (6).
 - (d) Disconnect the connectors (7).
 - (e) Unscrew and remove the nuts (10) with the washers (11).
 - (f) Slide out the screws (9) and remove the relay (6).
 - (4) Installation – relay 12 V / 75 A
 - (a) Position the relay (6, Fig. 24-15) on the bracket in the upper part of the fuselage.
 - (b) Insert the screws (9), put the washers (11), screw on and tighten the nut (10).
 - (c) Using the screws (9), connect the cable eyes (8).
 - (d) Connect the connectors (7).
 - (e) Install the cover of the upper part of the fuselage F4 (Section 53-30).
 - (f) Connect the battery, switch the electrical network on and check the function of the relay.



EXTERNAL POWER

1. DESCRIPTION AND OPERATION

Optionally, the socket of 12 V external source of Piper 11-041 type may be installed on the airplane.

The socket is located on the right front part of the fuselage behind the firewall. After opening the socket cap, it is possible to connect the 12 V ground source of electrical energy provided with the corresponding plug (Piper).

The external power source connection is signaled by the blue **EXT. POWER** signaling light located on the instrument panel (Section 31-50).

The connection of the external source serves only as a support of the on-board battery for starting the engine. The external source doesn't serve as a source of electrical energy for the electrical network.

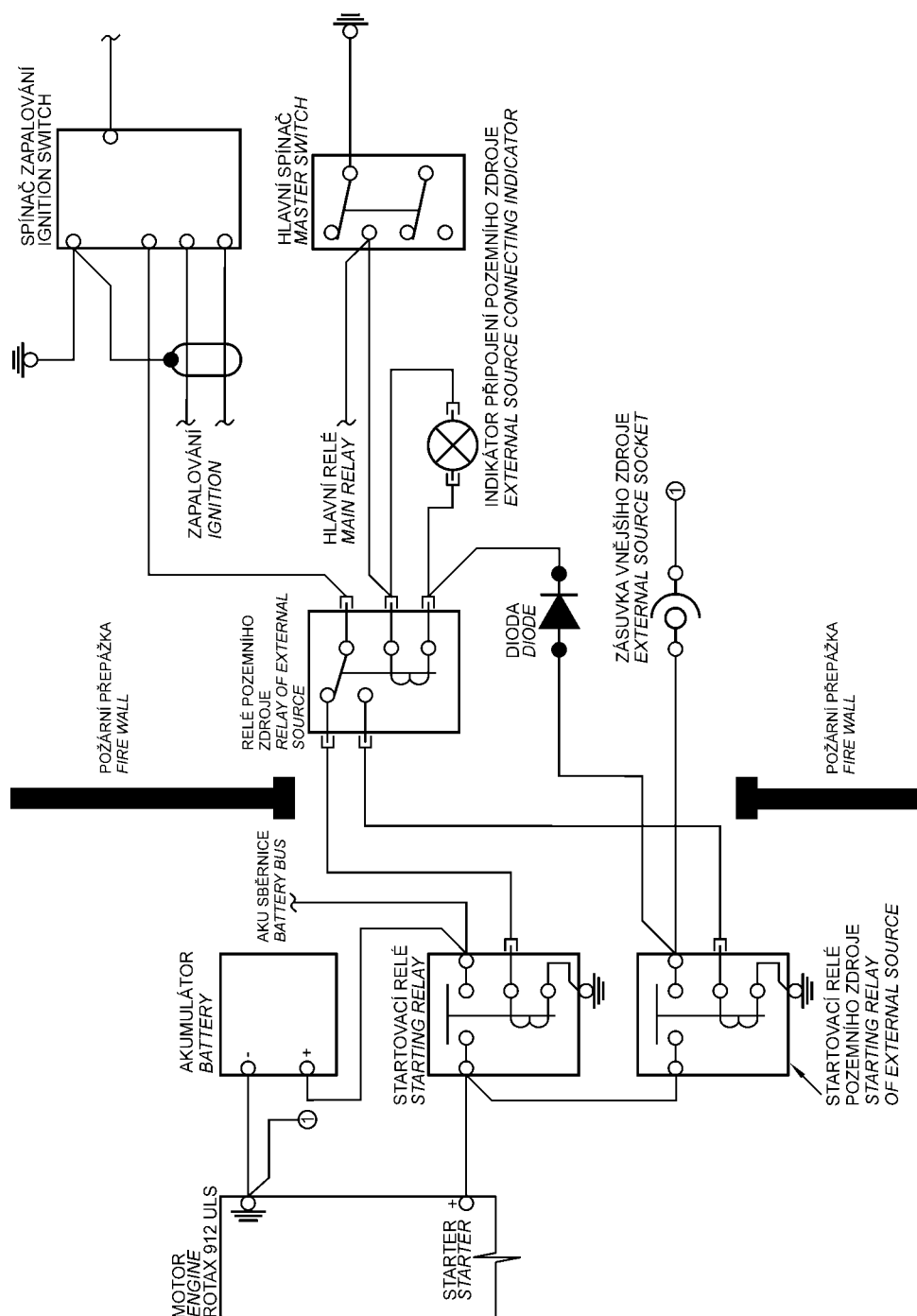


Fig. 24-16 Source system with socket for ground source of electrical energy

NOTE

Fig. 24-16 supplements Fig. 24-1, Fig. 24-2 and Fig. 24-3.



2. MAINTENANCE PRACTICES

A. Socket of external power source

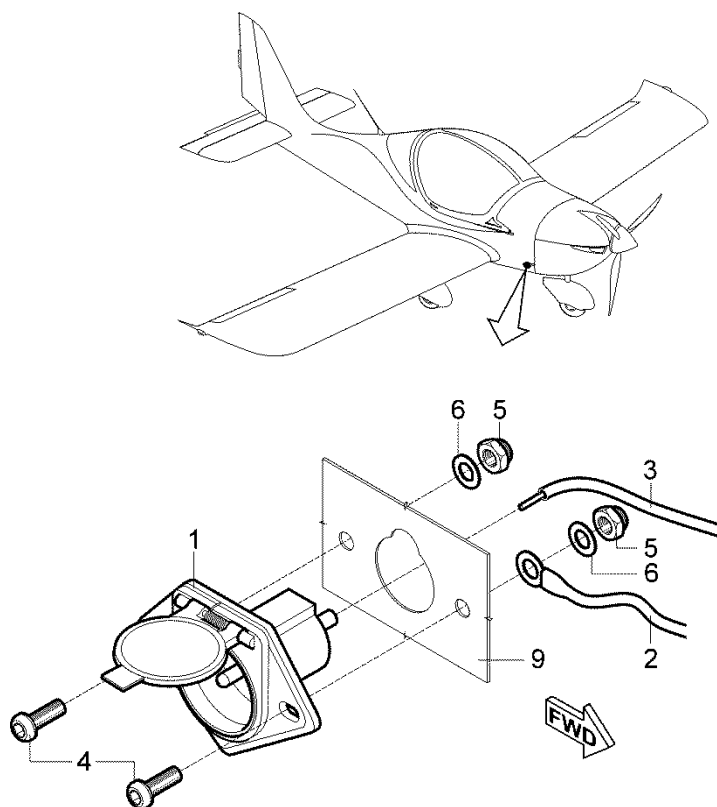
Maintenance type: Line

Personnel qualification: Independent verification personnel qualified in accordance with Part 66 or higher

The recommended tools and material:

Item	Designation / Size	Quantity	Note
Hex key	No. 5	1 pc.	
Wrench	No. 13	1 pc.	
Electrical soldering iron	300 W	1 pc.	
Solder wire	-	As needed	

- (1) Removal – socket of external power source
 - (a) Switch the electrical network off and disconnect the battery.
 - (b) Remove the cover of the upper part of fuselage F4 (Section 53-30).
 - (c) Unsolder the positive pole of the cable (3, Fig. 24-17)
 - (d) Unscrew the nuts (5), remove the washers (6) and the eye of ground cable (2).
 - (e) Slide out the screws (4) and remove the socket (1).
- (2) Installation – socket of external power source
 - (a) Place the socket (1, Fig. 24-17) into the hole in the side skin of the fuselage (9).
 - (b) Solder the free end of the cable (3) into the positive pole connector of the socket (1).
 - (c) Insert the screws (4) into the appropriate holes. In accordance with Fig. 24-17, slide on the eye of the electrical bonding cable (2) and the washers (6).
 - (d) Screw on and tighten the nuts (5).
 - (e) Install the cover of the upper part of the fuselage F4 (Section 53-30).
 - (f) Connect the battery, switch the electrical network on and check the function of the socket.



Legend to Fig. 24-17

1 Socket	5 Nut M8
2 Cable of electrical bonding (-)	6 Washer 8,4
3 Cable (+)	For information:
4 Screw M8	9 Right side skin of fuselage

Fig. 24-17 Socket of external power source – removal / installation



ELECTRICAL LOAD DISTRIBUTION

1. DESCRIPTION AND OPERATION

The electrical system of the airplane is of a single-wire type, DC. It works with a voltage of 14 V and the minus pole on the airframe. The electrical energy is distributed to the individual systems by the main busbar and by the avionics busbar. Each of the systems is protected by the permanently switched on circuit breaker. If any of the circuits is overloaded, then the circuit is disconnected by the circuit breaker.

A. Switches

The switches serve for switching on / off of individual electrical circuits. Each of the switches is labelled with the circuit specification. The switches are located on the left side of the instrument panel.

Designation	Description
MASTER SWITCH	Switches on / off the electrical network
AVIONICS SWITCH	Switches on / off the avionics power supply
TURN IND.	Switches on / off the turn indicator
HORIZON	Switches on / off the attitude horizon
DIR. GYRO	Switches on / off the directional gyro
BEACONS	Switches on / off the strobe lights
POS. LIGHTS	Switches on / off the position lights
LDG LIGHT	Switches on / off the landing light
FUEL PUMP	Switches on / off the electrical fuel pump
IC	Switches on / off the intercom
SOCKET	Switches on / off the 12 V socket power supply

Table 24-2 Switches – analog instruments, typical layout (from the right)

Designation	Description
MASTER SWITCH	Switches on / off the electrical network
GEN	Switches on / off the generator
AUX. GEN	Switches on / off the auxiliary generator
AVIONICS SWITCH	Switches on / off avionics power supply
BEACONS	Switches on / off the strobe lights
POS. LIGHTS	Switches on / off the position lights
LDG LIGHT	Switches on / off the landing light
FUEL PUMP	Switches on / off the electrical fuel pump
IC	Switches on / off the intercom
SOCKET	Switches on / off the 12 V socket power supply

Table 24-3 Switches – Dynon SkyView system, typical layout (from the right)



Designation	Description
MASTER SWITCH	Switches on / off the electrical network
GEN	Switches on / off the generator
AUX. GEN	Switches on / off the auxiliary generator
AVIONICS SWITCH	Switches on / off avionics power supply
BATTERY G3X	Switches on / off the power supply of all devices connected to the backup battery
BEACONS	Switches on / off the strobe lights
POS. LIGHTS	Switches on / off the position lights
LDG LIGHT	Switches on / off the landing light
FUEL PUMP	Switches on / off the electrical fuel pump
IC	Switches on / off the intercom
SOCKET	Switches on / off the 12 V socket power supply

Table 24-4 Switches – Garmin G3X system, typical layout (from the right)

B. Circuit breakers

The circuit breakers protect the individual electrical circuits from overloading and they are located in two blocks on the left side and on the right side below the instrument panel. The circuit breakers are permanently switched on.

The sequence of the circuit breakers in the tables shows the typical installation of the circuit breakers for the airplanes equipped with analog instruments and for the airplanes equipped with the Dynon SkyView system. The optional equipment isn't included. The Pilot's Operating Handbook for SportStar RTC airplane shows the layout of circuit breakers corresponding to particular airplane.

Designation	Value (A)	Description
ACCU	30	Circuit breaker of battery
CLOCK	1	Circuit breaker of clock
GEN	25	Circuit breaker of generator
TURN IND.	2	Circuit breaker of turn indicator
HORIZON	3	Circuit breaker of attitude horizon
DIR. GYRO	3	Circuit breaker of directional gyro
BEACONS	7,5	Circuit breaker of strobe lights
POS. LIGHTS	2	Circuit breaker of position lights
LDG LIGHT	4	Circuit breaker of landing light
FUEL PUMP	3	Circuit breaker of electrical fuel pump
SIGNAL.	1	Circuit breaker of signalization
TRIM	1	Circuit breaker of pitch trim
Not used	-	-
Not used	-	-
STALL WARNING	1	Circuit breaker of stall warning system

Table 24-5 Left panel of circuit breakers – analog instruments, typical layout (from the right)



Designation	Value (A)	Description
Not used	-	-
Not used	-	-
RPM IND.	1	Circuit breaker of engine speed indicator
ENG. INSTR.	1	Circuit breaker of engine instruments
FUEL IND.	1	Circuit breaker of fuel gauges + fuel pressure indicator
COMM	10	Circuit breaker of transceiver
NAV	4	Circuit breaker of navigation equipment
ALT. ENCOD.	2	Circuit breaker of altitude encoder
GPS	3	Circuit breaker of GPS receiver

Table 24-6 Right panel of circuit breakers – analog instruments, typical layout (from the left)

Designation	Value (A)	Description
ACCU	50	Circuit breaker of battery
GEN - REF.	1	Circuit breaker of generator excitation
GEN	25	Circuit breaker of generator
AUX. GEN	30	Circuit breaker of auxiliary generator
AUX. GEN. FIELD	5	Circuit breaker of auxiliary generator excitation
BEACONS	7,5	Circuit breaker of strobe lights
POS. LIGHTS	2	Circuit breaker of position lights
LDG LIGHT	4	Circuit breaker of landing light
FUEL PUMP	3	Circuit breaker of electrical fuel pump
PROPELLER	7,5	Circuit breaker of propeller KW-31-033 (if installed)
SIGNAL.	1	Circuit breaker of signalization
DISPLAY 1	7,5	Circuit breaker of SV-D1000 display
DISPLAY 2	7,5	Circuit breaker of SV-D700 display
TRIM	1	Circuit breaker of pitch trim
STALL WARNING	1	Circuit breaker of stall warning system

Table 24-7 Left panel of circuit breakers – Dynon SkyView system, typical layout (from the right)

Designation	Value (A)	Description
Not used	-	-
Not used	-	-
COMM	10	Circuit breaker of transceiver
NAV	4	Circuit breaker of navigation equipment
XPDR	5	Circuit breaker of transponder
ALT. ENCOD.	2	Circuit breaker of altitude encoder

Table 24-8 Right panel of circuit breakers – Dynon SkyView system, typical layout (from the left)



Designation	Value (A)	Description
ACCU	50	Circuit breaker of battery
GEN - REF.	1	Circuit breaker of generator excitation
GEN	25	Circuit breaker of generator
AUX. GEN	30	Circuit breaker of auxiliary generator
AUX. GEN. FIELD	5	Circuit breaker of auxiliary generator excitation
BATTERY G3X	5	Circuit breaker of backup battery IBBS-12v-3ah
BEACONS	7,5	Circuit breaker of strobe lights
POS. LIGHTS	2	Circuit breaker of position lights
LDG LIGHT	4	Circuit breaker of landing light
FUEL PUMP	3	Circuit breaker of electrical fuel pump
PFD	5	Circuit breaker of MFD display
MFD	5	Circuit breaker of PFD display
ADAHRS 1	2	Circuit breaker of main ADAHRS unit
ADAHRS 2	2	Circuit breaker of backup ADAHRS unit
EMS	2	Circuit breaker of EIS unit

Table 24-9 Left panel of circuit breakers – Garmin G3X system, typical layout (from the right)

Designation	Value (A)	Description
SIGNAL.	1	Circuit breaker of signalization
STALL WARNING	1	Circuit breaker of stall warning system
TRIM	1	Circuit breaker of pitch trim
COMM	10	Circuit breaker of transceiver
NAV	4	Circuit breaker of navigation equipment
XPDR	5	Circuit breaker of transponder
ALT. ENCOD.	2	Circuit breaker of altitude encoder

Table 24-10 Right panel of circuit breakers – Garmin G3X system, typical layout (from the left)

CAUTION

DON'T USE THE CIRCUIT BREAKERS FOR STANDARD SWITCHING OFF THE ELECTRICAL APPLIANCES.



2. MAINTENANCE PRACTICES

A. Switches

Maintenance type: Line

Personnel qualification: Independent verification personnel qualified in accordance with Part 66 or higher

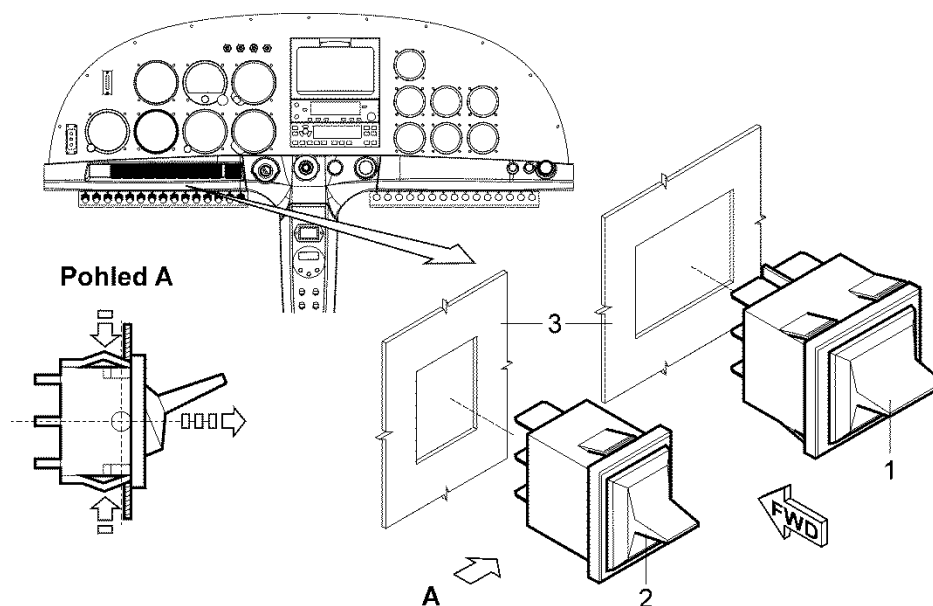
Recommended tools and material:

Item	Designation / Size	Quantity	Note
Flat screwdriver		1 pc.	

NOTE

Removal / installation procedure of switches is identical for the type 1 PST, 2 PST and as well as for the illuminated rocker switches type R13-66 and S7 68-72 01.

- (1) Removal – switches
 - (a) Switch the electrical network off and disconnect the battery.
 - (b) Disconnect the wires from the switch contacts.
 - (c) According to detail A, press down the flexible detents in the direction of short arrows and slide out the switch (1; 2, Fig. 24-18) in the direction of the long arrow from the instrument panel (3).



Legend to Fig. 24-18

1 Switch 2 PST (master switch)	For information:
2 Switch 1 PST	3 Instrument panel

Fig. 24-18 Switches – removal / installation



- (2) Installation – switches
 - (a) Insert the switch (1; 2, Fig. 24-18) into the appropriate hole in the instrument panel (3) until the flexible detents fit in.
 - (b) Connect the wires to the switch.
 - (c) Connect the battery, switch the electrical network on and check the function of the switch.

B. Circuit breakers

Maintenance type: Line

Personnel qualification: Independent verification personnel qualified in accordance with Part 66 or higher

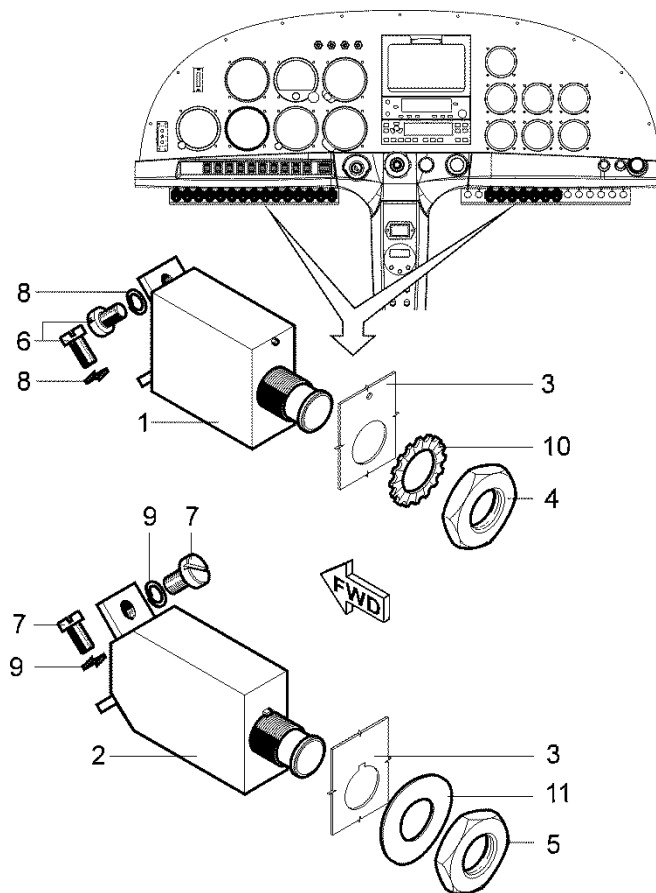
Recommended tools and material:

Item	Designation / Size	Quantity	Note
Flat screwdriver		1 pc	
Wrench	No. 14	1 pc	

NOTE

Removal / installation procedure of circuit breakers 2TC2 and ETA is similar.

- (1) Removal – circuit breakers
 - (a) Switch the electrical network off and disconnect the battery.
 - (b) Unscrew the screws (6; 7, Fig. 24-19) with washers (8; 9) and disconnect the wire and the jumper.
 - (c) Unscrew the nuts (4; 5).
 - (d) Remove the spring washers (10; 11)
 - (e) Remove the circuit breakers (1; 2).
- (2) Installation – circuit breakers
 - (a) Place the circuit breaker (1; 2, Fig. 24-19) in the corresponding hole in the circuit breakers holder.
 - (b) Put on the spring washer (10; 11).
 - (c) Screw on and tighten the nut (4; 5).
 - (d) By means of screws (6; 7) with washers (8; 9), connect the wire and the jumper to the circuit breaker.
 - (e) Connect the battery, switch the electrical network on and check the function of the circuit breaker.



Legend to Fig. 24-19

1	Circuit breaker 2TC2	7	Screw
2	Circuit breaker ETA	8	Spring washer
3	Holder of circuit breakers	9	Spring washer
4	Nut	10	Spring washer
5	Nut	11	Spring washer
6	Screw		

Fig. 24-19 Circuit breakers – removal / installation (typical)

CHAPTER

25

**EQUIPMENT /
FURNISHING**



CHAPTER 25

EQUIPMENT / FURNISHINGS

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GENERAL

1. INTRODUCTION

The equipment and furnishings of the airplane includes the seats for the crew, safety harnesses, baggage compartment, interior panels, carpets on the airplane cabin floor and emergency equipment (first aid kit, emergency hammer, ELT and optionally installed emergency parachute system).



FLIGHT COMPARTMENT

1. DESCRIPTION AND OPERATION

The cockpit is equipped with two seats for the pilot and the second crewmember. Each seat is equipped with adjustable safety harnesses.

A. Pilot seat

The pilot seat (1; 2, Fig. 25-1) consists of a seat (4; 5) and a backrest (3).

The seat consists of the metal sheet, which covers the main wing spar. The backrest is made of plywood. It is attached with bolts to the bulkhead, which separates the cockpit from the baggage compartment. The seats are non-adjustable. The seat is covered with upholstery, which is attached with Velcro fasteners.

Optionally every seat can be equipped with the seat heater, which increases the comfort in winter or cold season. Every seat heater is controlled by the switches, which afford three levels of heating. The thermostat maintains an optimal temperature that automatically turns on and off the heating, according to the preset heating level. Both switches are located on the central console.

Wiring diagram for the seat heating is given in Chapter 91.

B. Safety harness

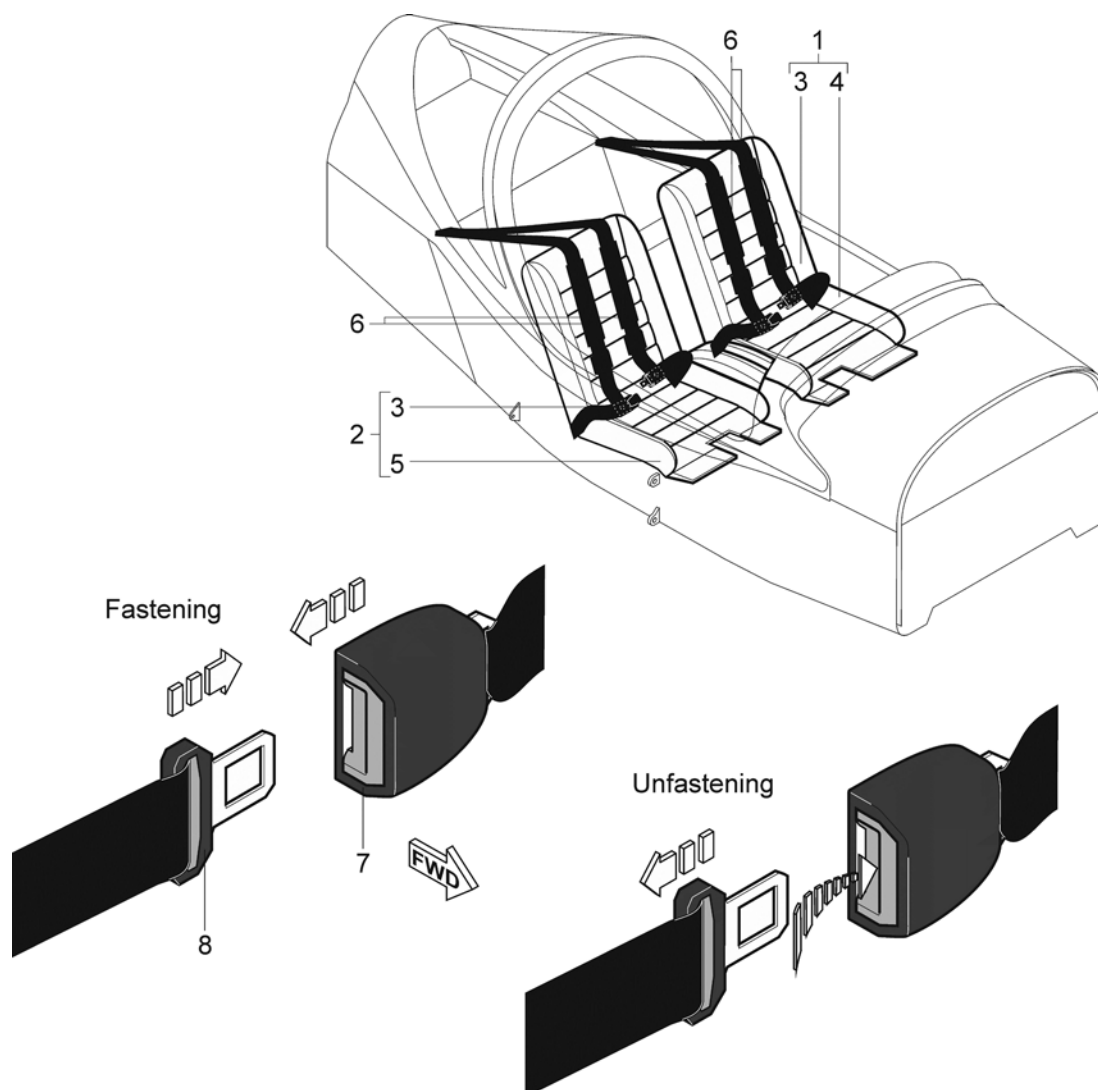
Each seat is equipped with four point safety harnesses (6, Fig. 25-1). The safety harnesses are anchored to the fuselage structure.

(1) Fastening of the safety harness

- (a) Put the shoulder belts on your shoulders. Adjust the length as necessary so that the belts correspond to the body height. Use the adjustment buckles of the belt to adjust the length.
- (b) Adjust the length of the lap belt as necessary.
- (c) Put the clasp into the buckle so that the latch of the buckle fits into the hole in the clasp (see Fig. 25-1).

(2) Unfastening of the safety harness

- (a) Press the button on the front of the buckle housing until the clasp is released (see Fig. 25-1). Remove the clasp from the buckle.
- (b) Remove the belts from the shoulders.



Legend to Fig. 25-1

- 1 Left pilot seat
- 2 Right pilot seat
- 3 Seat backrest
- 4 Left seat

- 5 Right seat
- 6 Safety harness
- 7 Buckle
- 8 Clasp

Fig. 25-1 Seats and safety harness

**C. Interior panels****(1) Left side and right side panel**

The side panel (1; 2, Fig. 25-2) is made of metal sheet. It is upholstered. The upper part is slidded under the cabin frame; the lower part is attached with Velcro fasteners. There is a patch pocket on the side panel. The right side panel is a mirror image of the left side panel.

(2) Left and right control rod cover

The roll control rods are covered with composite covers (3; 4, Fig. 25-2). The front side consists of a pocket and a bottle/cup holder. The right cover is a mirror image of the left cover.

(3) Instrument panel

The instrument panel (5, Fig. 25-2) is made of sheet metal. It is attached with bolts along the perimeter to the fuselage structure. It is used for attachment of the flight and engine instruments, navigation and communication equipment (see Section 39-10). The upper and side parts of the instrument panel are covered with a composite cover. The lower edge of the instrument panel is covered with a three-piece ledge.

(4) Three-piece ledge of the instrument panel

The ledge of the instrument panel (6, Fig. 25-2) consists of three parts, which are made of composite. The central ledge includes the power unit controls. The lower edge of the central ledge may include the emergency system activation handle, if it is installed.

(5) Central panel

The central panel (7, Fig. 25-2) is made of composite. It includes the controls of carburettor preheating, windscreen heating and heating at the pilots' feet.

(6) Central console

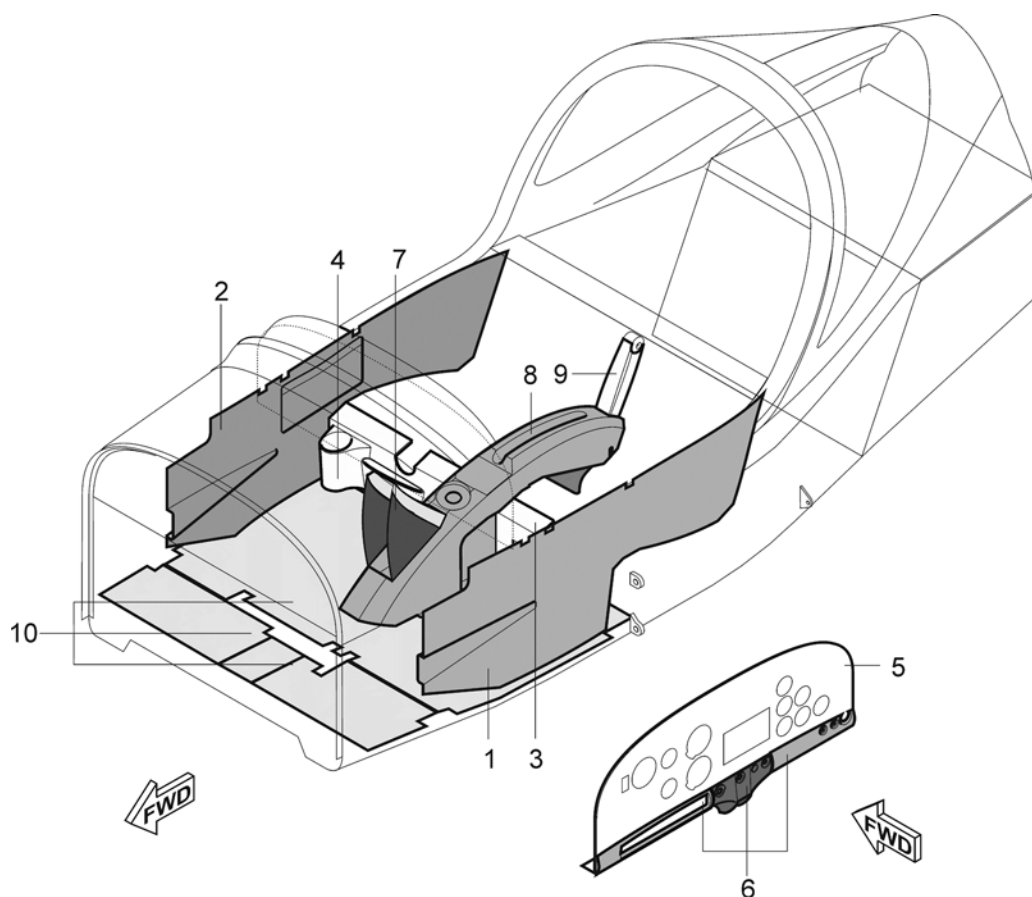
The central console (8, Fig. 25-2) is made of composite. The central console includes the fuel valve control and the flap control lever.

(7) Armrest

The folding armrest (9, Fig. 25-2) is installed on the bulkhead, which separates the cockpit from the baggage compartment, between the seat backrests. The emergency hammer is located below the armrest.

(8) Carpets

The carpets (10, Fig. 25-2) on the cockpit and the baggage compartment floor are attached with Velcro fasteners.



Legend to Fig. 25-2

1 Left side panel	6 Ledge of the instrument panel
2 Right side panel	7 Central panel
3 Left control rod cover	8 Central console
4 Right control rod cover	9 Armrest
5 Instrument panel	10 Carpets

Fig. 25-2 Interior panels



2. MAINTENANCE PRACTICES

A. Pilot seat

Maintenance type: Line

Personnel qualification: Independent verification personnel qualified in accordance with Part 66 or higher

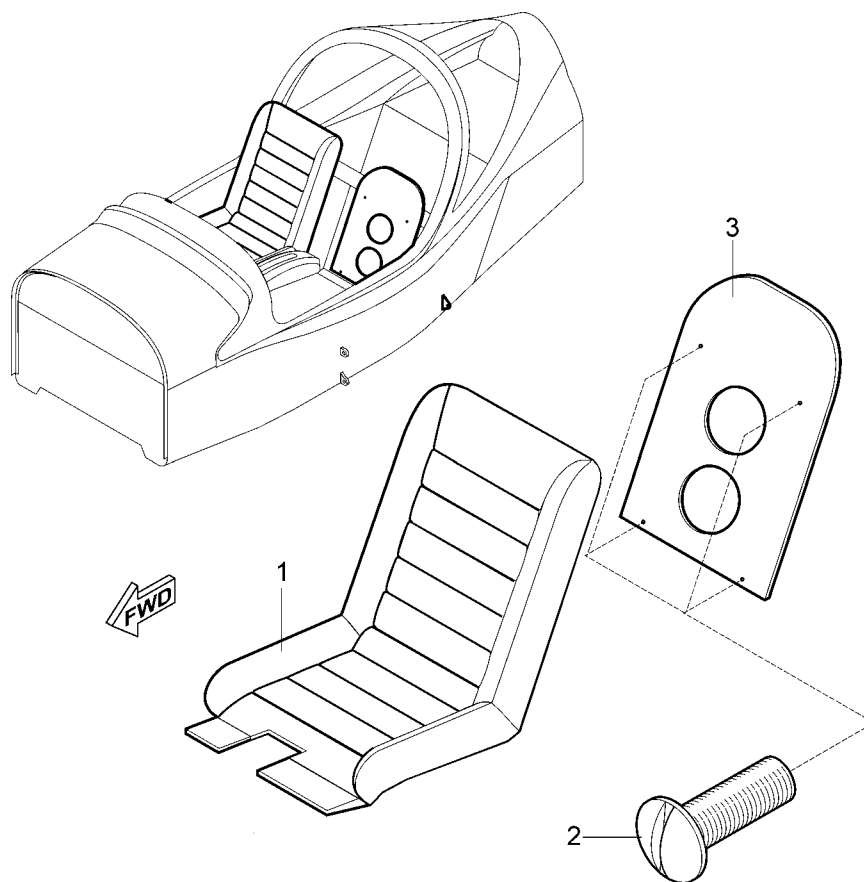
Recommended tools and material:

Item	Designation / Size	Quantity	Note
Flat screwdriver	-	1 pc.	

WARNING

BEFORE YOU START THE WORKS RELATED TO DISASSEMBLIES IN THE COCKPIT, MAKE SURE THAT THE THE EMERGENCY SYSTEM ACTIVATION HANDLE IS SECURED.

- (1) Removal – backrest
 - (a) Remove the upholstery of the pilot seats (1, Fig. 25-3); the upholstery is attached with Velcro fasteners.
 - (b) Remove the bolts (2) of the backrest (3) and remove the backrest.
- (2) Installation – backrest
 - (a) Align the backrest (3, Fig. 25-3) with the fuselage.
 - (b) Screw the bolts (2) and tighten them.
 - (c) Attach the upholstery of the pilot seat (1).
- (3) Inspection / check – seat
 - (a) Visually check the pilot seat upholstery. Pay attention to dirt, cracks, wear and tear.
 - (b) Visually check the seat of the pilot seat for tears, corrosion and deformations.
 - (c) Visually check the plywood backrest of the pilot seat for tears, cracks or other mechanical damage.



Legend to Fig. 25-3

- 1 Seat upholstery
- 2 Bolt M4 (4 pcs.)

- 3 Backrest of the pilot seat

Fig. 25-3 Seat backrest – removal / installation



B. Safety harness

Maintenance type: Line

Personnel qualification: Independent verification personnel qualified in accordance with Part 66 or higher

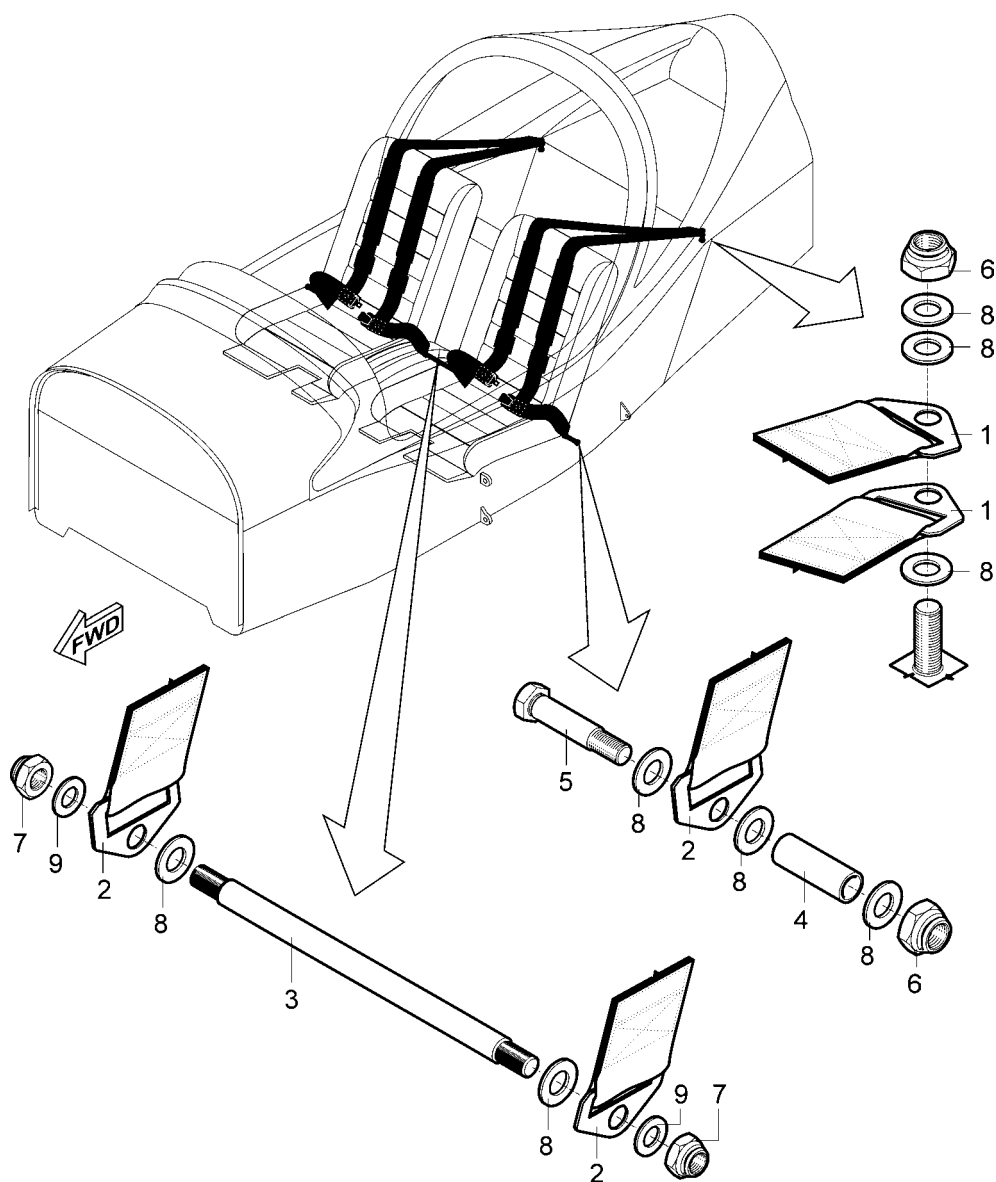
Recommended tools and material:

Item	Designation / Size	Quantity	Note
Wrench	No. 8	2 pcs.	
Wrench	No. 10	1 pc.	
Hex wrench	No. 5	1 pc.	
Mild soap	-	-	Harness cleaning
Detergent	-	-	
Isopropyl alcohol	-	-	
Lint-free cloth	-	-	
Sponge or soft brush	-	-	

WARNING

BEFORE YOU START THE WORKS RELATED TO DISASSEMBLIES IN THE COCKPIT, MAKE SURE THAT THE THE EMERGENCY SYSTEM ACTIVATION HANDLE IS SECURED.

- (1) Removal – safety harness
 - (a) Remove the upholstery of the pilot seat (1, Fig. 25-3); the upholstery is attached with Velcro fasteners.
 - (b) Unscrew and remove the nut (6, Fig. 25-4), washers (8) and shoulder belts (1).
 - (c) Unscrew and remove the nut (6) of the lap belt (2), bolt (5) and bushing (4).
 - (d) Unscrew and remove the nuts (7), washers (9), lap belts (2), washers (8) and bolt (3).
- (2) Installation – safety harness
 - (a) Put the bolt (3, Fig. 25-4) into the hole in the bracket of the safety belts in the axis of the fuselage.
 - (b) Put the washers (8), belts (2), washers (9) on the bolt (3), screw and tighten the nuts (7).
 - (c) Put the bushing (4) in the side bracket of the lap belts.
 - (d) Put the washer (8), belt (2) and second washer (8) to the bolt (5) and put the bolt into the correct hole in the bracket; put the washer (8), screw and tighten the nut (6).
 - (e) Put the washer (8), shoulder belts (1) and washers (8) to the vertical hinge in the baggage compartment and attach and tighten the nut (6).
 - (f) Install the upholstery of the pilot seat.



Legend to Fig. 25-4

- 1 Shoulder belts
- 2 Lap belts
- 3 Bolt of the belt
- 4 Bushing
- 5 Bolt M6

- 6 Nut M6
- 7 Nut M5
- 8 Washer 6,4
- 9 Washer 5,3

Fig. 25-4 Safety harness – removal / installation



- (3) Adjustment / test – safety harness
- (a) Check function of the buckle mechanism:
- 1 Fasten and unfasten the buckle of the safety harness at least four times. The buckle must operate absolutely reliably and smoothly.
 - 2 When the safety harness is fastened, the clasp must be reliably fixed in the buckle.
 - 3 The button, which opens the buckle, must operate reliably. It must return to the original position after the clasp is released. When you press the button, the clasp must be smoothly released from the buckle.
- (4) Inspection / check – safety harness
- (a) Check the safety harness for:
- Cut or frayed edges
 - Damaged stitches
 - Yarn breaks
 - Tears
 - Excessive traces of abrasion
 - Excessive wear and tear
 - Correct function of the buckle, clasp and adjustment buckles
 - Corrosion or tears of the buckle, clasp or adjustment buckles.
 - Check readability of labels.
- (b) Replace the safety harness in any of these cases:
- Frayed belt. It is defined as yarn breaks in a longitudinal or transverse direction.
 - The belt has cut or torn edges
 - Stitches are torn
 - Buckle or clasp does not work or does not work properly
 - Buckle, clasp or adjustment buckles show signs of corrosion or tears
- (5) Cleaning / painting – safety harness

CAUTION

NEVER USE A WASHING MACHINE TO CLEAN THE SAFETY HARNESS, BECAUSE ITS UTILITY PARAMETERS MAY CHANGE SIGNIFICANTLY.

YOU CAN CLEAN THE SAFETY HARNESS CHEMICALLY BUT THE CHEMICALLY CLEANED BELT LOSES ITS ABRASION RESISTANCE AFTER EACH CLEANING, THEREFORE ITS SERVICE LIFE WILL BE SHORTENED.



WHEN YOU CLEAN THE SAFETY HARNESS, MAKE SURE THAT THE CLEANING AGENTS WILL NOT COME INTO CONTACT WITH MECHANICAL PARTS OF THE SAFETY HARNESS. DO NOT USE SOAP OR WATER WHEN YOU CLEAN THE METAL PARTS.

(a) Safety harness

- 1 Clean the belt chemically or carefully clean the belt with a soft brush and cold soap solution.
- 2 Do not dry the safety harness in the sun or near a heat source. Visually check the dried safety harness.
- 3 After you clean the the safety harness, protect it against moisture, dirt or other unwanted material. Keep it protected until the visual inspection and return of the safety harness to the operation.

(b) Mechanical parts

WARNING

USE ISOPROPYL ALCOHOL IN ACCORDANCE WITH INSTRUCTIONS AND WARNINGS OF THE MANUFACTURER. PREVENT A CONTACT OF THE BELT AND ISOPROPYL ALCOHOL.

- 1 Clean the mechanical parts with a lint-free cloth soaked in isopropyl alcohol.

(6) Approved repairs – safety harness

Understand the term “repair” as a replacement of the safety harness.

Never perform partial removal of parts of the safety harness. Only the manufacturer of the safety harness or an authorized service centre may perform such disassemblies and replacements of parts of the safety harness.



C. Interior panels

Maintenance type: Line

Personnel qualification: Independent verification personnel qualified in accordance with Part 66 or higher

Recommended tools and material:

Item	Designation / Size	Quantity	Note
Flat screwdriver	-	2 pcs.	
Wrench	No. 5,5	1 pc.	
Wrench	No. 7	2 pcs.	
Wrench	No. 10	2 pcs.	

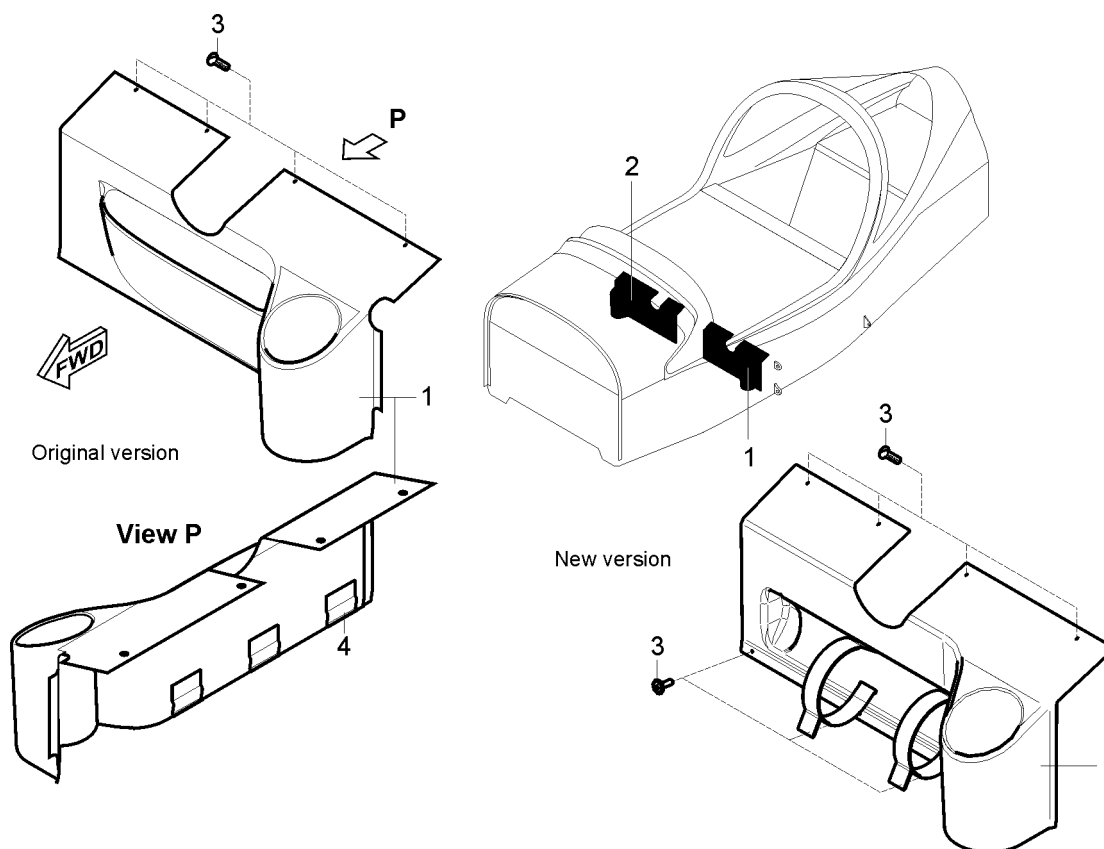
- (1) Removal – left and right side panel
 - (a) Release the Velcro fasteners in the the lower part of panel and pull the panel (1; 2, Fig. 25-2) toward the cockpit interior.
 - (b) Remove the panel from the airplane.
- (2) Installation – left and right side panel
 - (a) Slide the upper part of the panel (1; 2, Fig. 25-2) under the cabin frame.
 - (b) Lower part of the panel attach by Velcro fasteners.
- (3) Removal – left and right control rod cover
 - (a) Remove the upholstery of the pilot seat (1, Fig. 25-3); the upholstery is attached with Velcro fasteners.
 - (b) As necessary, remove the handgrip of the parking brake valve (Section 32-42).
 - (c) Valid for the original version of the control rod covers:
 - 1 Unscrew the bolts (3, Fig. 25-5) which attach the control rod cover (1; 2).
 - 2 Pull the control rod cover (1; 2) upward; lower part of the cover is attached with flexible clamps (4).
 - (d) Valid for the new version of the left control rod cover:
 - 1 Remove the fire extinguisher (Section 26-20).
 - 2 Unscrew the bolts (3) which attach the control rod cover (1).
 - 3 Remove the control rod cover (1).
- (4) Installation – left and right control rod cover
 - (a) Put the control rod cover (1; 2, Fig. 25-5) on the cockpit floor.
 - (b) Screw and tighten the bolts (3).
 - (c) As necessary, install the handgrip of the parking brake valve (Section 32-42).
 - (d) For the new version of the left control rod cover, install the fire extinguisher (Section 26-20).
 - (e) Install the upholstery of the pilot seat.
- (5) Removal – instrument panel

The removal procedure for the instrument panel is described in Section 39-10.



(6) Installation – instrument panel

The installation procedure for the instrument panel is described in Section 39-10.



Legend to Fig. 25-5

1 Left control rod cover	3 Bolt M4 (4 pcs. + 4 pcs. / 8 pcs.)
2 Right control rod cover	4 Flexible clamp

Fig. 25-5 Control rod cover - removal / installation

(7) Removal – ledges of the instrument panel

- Disable the board network and disconnect the battery.
- Before you remove the ledges of the instrument panel, remove the ignition switch (Section 74-30), throttle and choke control (Section 76-10) and the emergency parachute system activation handle (if the EPS is installed) (Section 25-60).
- Uncscrew and remove the nuts (7, Fig. 25-6) and washers (9) which attach the ledge (1).
- Unscrew the bolts (5) and remove the ledge (1); when removing the ledge, hold the circuit breakers panel.
- Uncscrew and remove the nuts (7) and washers (9) which attach the ledge (3).
- Unscrew the bolts (5) and remove the ledge (3); when removing the ledge, hold the circuit breakers panel.



- (g) Unscrew and remove the nuts (6), washers (8) and bolts (4) which attach the central ledge (2) to the central panel (10).
- (h) Remove the central ledge (2).
- (8) Installation – ledges of the instrument panel
 - (a) Align the ledge (1, Fig 25-6) with the instrument panel and attach it by the nuts (7) with washers (9).
 - (b) Between the instrument panel angle and the ledge (1) insert the circuit breakers panel and attach them by bolts (5).
 - (c) Align the ledge (3) with the instrument panel and attach it by the nuts (7) with washers (9).
 - (d) Between the instrument panel angle and the ledge (3) insert the circuit breakers panel and attach them by bolts (5).
 - (e) Align the central ledge (2) and put the bolts (4) which attach the central ledge into the central panel (10).
 - (f) Screw the nuts (6) with washers (8).
 - (g) Tighten all bolts and nuts.
 - (h) Install the ignition switch (Section 74-30), throttle and choke control (Section 76-10) and the emergency parachute system activation handle (if the EPS is installed) (Section 25-60)
 - (i) Connect the battery, activate the board network.

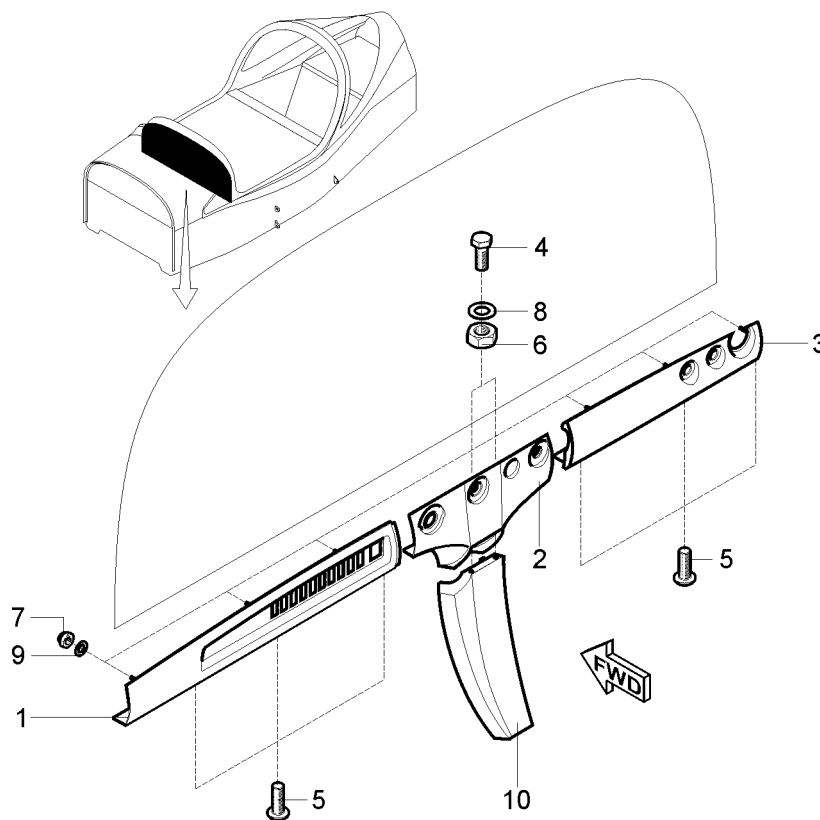


Fig. 25-6 Ledges of the instrument panel – removal / installation (page 1 of 2)



Legend to Fig. 25-6

1 Left ledge	7 Nut M3
2 Central ledge	8 Washer 4,3
3 Right ledge	9 Washer 3,2
4 Bolt M4x12	For information:
5 Bolt M4x12	10 Central panel
6 Nut M4	

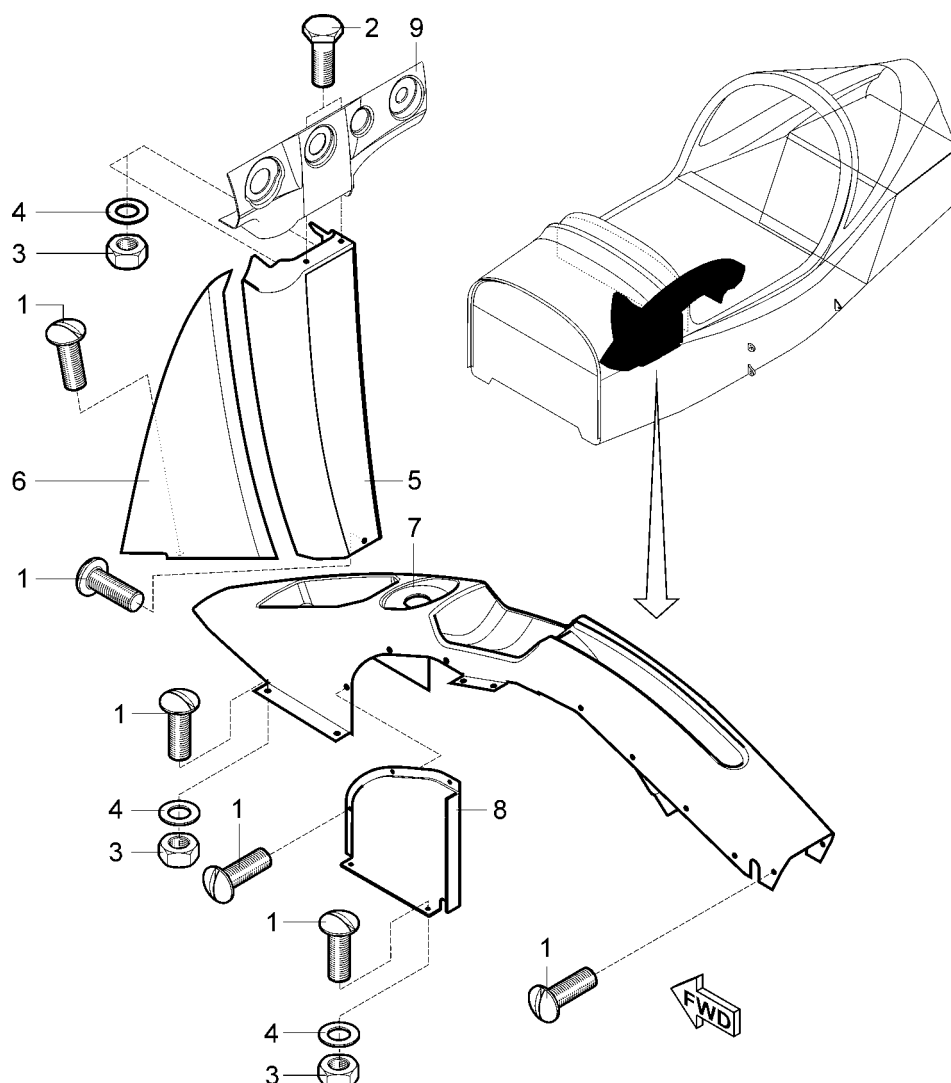
Fig. 25-6 Ledges of the instrument panel – removal / installation (page 2 of 2)

(9) Removal – central panel

- (a) Disable the board network and disconnect the battery.
- (b) Remove the controls of heating and ventilation (Section 21-60), the carburettor preheating control (Section 71-60) and the propeller regulator (if an adjustable propeller is installed) (Section 61-20).
- (c) Unscrew the bolt (1, Fig. 25-7) which attach the left panel (6) of the central panel (5); remove the left panel (6) from the central console (7). Removal of the right panel is identical.
- (d) Unscrew and remove the nuts (3), washers (4) and bolts (2) which attach the central ledge (9) to the central panel (5).
- (e) Unscrew the bolt (1) which attaches the central panel (5) to the central console (7); remove the central panel (5) from the central console (7).

(10) Installation – central panel

- (a) Put the central panel (5, Fig. 25-7) in the recess in the central console (7) and attach it by the bolt (1).
- (b) Align the left panel (6) with the central panel (5) and attach it by the bolt (1). Apply this procedure to the right panel.
- (c) Align the central ledge of the instrument panel (9) with the central panel (5), put the bolts (2) into the appropriate holes install washers (4), screw and tighten the nuts (3).
- (d) Install the controls of heating and ventilation (Section 21-60), the carburettor preheating control (Section 71-60) and the propeller regulator (if an adjustable propeller is installed) (Section 61-20).
- (e) Connect the battery, activate the board network.



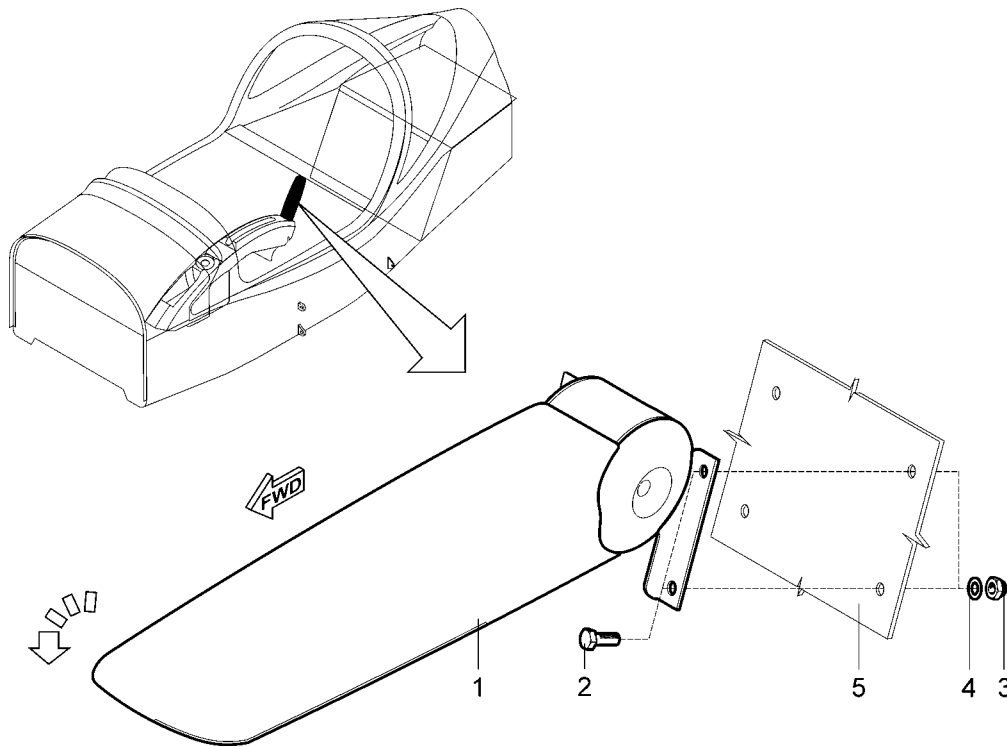
Legend to Fig. 25-7

1 Bolt M4	6 Left panel of the central channel
2 Bolt M4	7 Central console
3 Nut M4	8 Cover IN6L
4 Washer 4,2	For information:
5 Central panel	9 Central ledge of the instrument panel

Fig. 25-7 Central panel and central console – removal / installation



- (11) Removal – central console
 - (a) Drain the fuel from the fuel system (Section 12-10).
 - (b) Remove the central panel (see par. 2 C.(9)).
 - (c) Remove the fuel cock (Section 28-20) and the flap control lever (Section 27-50).
 - (d) Unscrew and remove the nuts (3, Fig. 25-7), washers (4) and bolts (1) which attach the left cover (8) of the central console (7).
 - (e) Unscrew the bolts (1) which attach the cover (8) to the central console (7); remove the cover (8).
Removal of the right cover is identical to the removal of the left cover (8).
 - (f) Unscrew and remove the nuts (3), washers (4) and bolts (1) which attach the central console (7).
 - (g) Unscrew the bolts (1) which attach the rear part of the central console (7); remove the central console (7).
- (12) Installation – central console
 - (a) Put the central console (7, Fig. 25-7) to the fuselage and attach it with the bolts (1).
 - (b) Put the bolts (1) into the appropriate holes install washers (4), screw and tighten the nuts (3).
 - (c) By means of the bolts (1), washers (4) and nuts (3) attach the left cover (8).
Installation of the right cover is identical to the removal of the left cover (8).
 - (d) Install the fuel cock (Section 28-20) and the flap control lever (Section 27-50).
 - (e) Remove the central panel (see par. 2 C.(10)).
 - (f) Fill the fuel system with fuel (Section 12-10).
- (13) Removal – armrest
 - (a) Unscrew and remove the nuts (3, Fig. 25-8), washers (4) and bolts (2)
 - (b) Remove the armrest (1).
- (14) Installation – armrest
 - (a) Align the holes for bolts in the brackets of the armrest (1, Fig. 25-8) with the holes in the bulkhead (5).
 - (b) Put the bolts (2) into the correct holes, install the washers (4), screw and tighten the nuts (3).



Legend to Fig. 25-8

1 Armrest	4 Washer 6,4 (4 pcs.)
2 Bolt M6x16 (4 pcs.)	5 Bulkhead
3 Nut M6 (4 pcs.)	

Fig. 25-8 Armrest – removal / installation

- (15) Removal – carpets on the cockpit floor
 - (a) Release the Velcro fasteners on the cockpit floor.
 - (b) Remove carpets (10, Fig. 25-2) from the airplane.
- (16) Installation – carpets on the cockpit floor
 - (a) Put the carpet (10, Fig. 25-2) on the appropriate place of the cockpit floor.
 - (b) Attach it by Velcro fasteners.



CARGO COMPARTMENTS

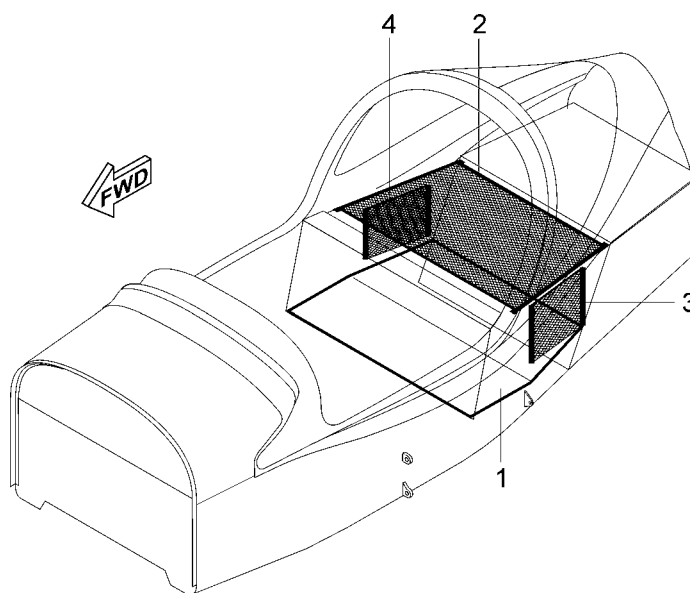
1. DESCRIPTION AND OPERATION

The baggage compartment is located in the cabin behind the pilot seats (see Fig. 25-9). It is equipped with a net which prevents unwanted baggage movement. Both sides of the baggage compartment include mesh pockets (3; 4) for the hand baggage. The carpet (1) in the baggage compartment is attached with Velcro fasteners to the floor. You can access the baggage compartment after you tilt the cockpit canopy.

Maximum baggage weight is mentioned on the placard on the rear wall of the baggage compartment.

WARNING

THE SPACE BEHIND THE BAGGAGE COMPARTMENT, WHERE THE ELT AND THE FIRST AID KIT ARE LOCATED, IS NOT INTENDED AS AN ADDITIONAL BAGGAGE COMPARTMENT! DO NOT PUT ANY HEAVY OBJECTS THERE! AIRPLANE REAR C.G. MAY BE EXCEEDED IN SUCH CASE!



Legend to Fig. 25-9

1 Carpet

2 Net

3 Left pocket

4 Right pocket

Fig. 25-9 Baggage compartment



EMERGENCY

1. DESCRIPTION AND OPERATION

The airplane emergency equipment includes the Emergency Locator Transmitter (2, Fig. 25-10), first aid kit (1), and emergency hammer (3). Optionally may be installed the emergency parachute system (4).

A. Emergency Locator Transmitter

The Emergency Locator Transmitter (ELT) is designed to identify the airplane position after the emergency landing or crash.

The ELT is located on the right side of the plate behind the baggage compartment. You can control the ELT with a remote switch or directly on the unit panel. The panel of the ELT remote switch is located on the left part of the instrument panel or in the central part of the instrument panel.

The external antenna is located on the bracket in the plane of the upper fuselage longeron (in front of the bulkhead No. 9). The external antenna is covered with the composite fairing between the fuselage top and the fin which is riveted to the fuselage. The portable antenna is attached to the mounting bracket of the ELT.

Normal position of the switch on the control panel is **ARM**, when the transmitter is ready for an automatic activation.

The ELT operation starts automatically (switch on the unit in the **ARM** position), when the ELT is activated by the switch which senses the airplane acceleration in the longitudinal direction.

When the airplane exceeds the value of the longitudinal acceleration, the ELT unit is automatically activated and it starts to transmit the emergency radio signal on the emergency frequency.

In order to activate the ELT manually, press the **ON** button on the control panel, or toggle the switch on the unit to the **ON** position.

In order to switch the activated ELT off, press the **RESET** button on the control panel, or toggle the switch on the unit to the **OFF** position.

NOTE

For detailed description and information about operation and installation of the ELT, refer to these documents which are supplied by the manufacturers:

Installation and Operation Manual for Model AK-451-() Series 406 MHz ELT Emergency Locator Transmitter, Doc. No. IM-451, revision NC-4.1h, or later valid issue, or

Operation Manual AF INTEGRA / AF-H INTEGRA ELT With built-in GPS & Integral Antenna, Doc. No. DOC09078E, rev. 04 or latest valid issue.

DESCRIPTION, OPERATION, INSTALLATION AND MAINTENANCE MANUAL ME 406 ELT 570 – 1600 Rev.G, or later valid issue.



B. First aid kit

The first aid kit is located on the left in the space behind the baggage compartment. It is attached with strips with Velcro fasteners.

The first aid kit is marked with a green cross and sealed. The first aid kit includes a mandatory numerical list of medical material. The medical material bears adhesive labels with numbers (in accordance with the numerical list).

C. Emergency hammer

Use the emergency hammer to break the acrylic glass of the cockpit canopy if you are not able to open the cockpit canopy in a normal manner.

The emergency hammer is located below the folding armrest in the holder between the seats.

D. Emergency parachute system

The emergency parachute system Magnum 601 may be installed on demand. The system is designed to rescue the crew in emergency situations.

The parachute softpack container and the rocket housing is located below the cover of the fuselage upper part.

The cover of the fuselage upper part is modified in order to enable of the correct function of the emergency parachute system. The area, which is supposed to be pierced by the rocket, is weakened.

The parachute softpack container is attached to the grid between the stiffener of the firewall and the diagonal stiffener.

The anchoring points of the rocket housing are located on the left below the upper cover, on the upper diagonal stiffener of the firewall.

The anchoring points of the front straps of the emergency parachute system are located at the connection of the side fuselage panels with the firewall on the upper fuselage in front of the instrument panel.

The rear anchoring point is located behind the baggage compartment in front of the oblique bulkhead 6a, on the upper left fuselage longeron.

The emergency system activation handle is located in the upper part of the central panel of the instrument panel. It is connected with the ignition mechanism of the rocket of the emergency parachute system with a Bowden cable. The emergency system activation handle is within the reach of both crewmembers.

When the airplane is on the ground, the emergency system activation handle is always secured against the accidental system activation with a locking pin.

You must remove this locking pin which is marked with a red flag before the flight.

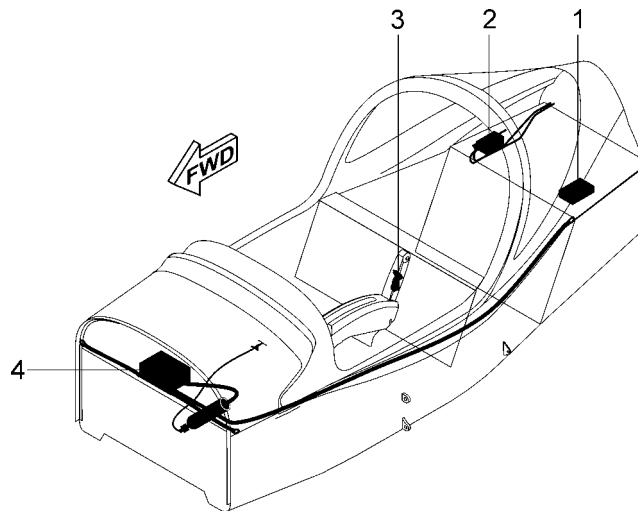
In an emergency situation, pull the armed handle from the instrument panel towards yourself. There will be approximately 30 – 50 mm of movement during which nothing happens followed by a resistance, which will increase, to about 8 kg. This motion pulls a Bowden cable which is connected to the rocket ignition mechanism. The force transferred by the pull cable winds up a mechanical device. When the mechanism reaches top dead center and the internal spring exerts a maximum force, it is released, and the firing pin sets off two incendiary cartridges which initiate the combustion of solid propellant in the combustion chamber of the rocket engine (the solid propellant burn time is 0,86 sec). The engine thrust propels the rocket out of the rocket housing through the weakened spot on the cover of the front part of the fuselage. The rocket leaves its housing and pulls the parachute out with a cord, which is attached to it. The rocket



gradually pulls out the canopy, which is protected by the canopy deployment sleeve, the risers and suspension lines are unfolded, stretched, and the canopy is filled. The time required to open the parachute at the speed of 290 km/h is 3 sec.

NOTE

For detailed description and information about operation and installation of the emergency parachute system, refer to the document supplied by the manufacturer: Ballistic rescue parachute systems series Magnum; Installation and user's manual, Issue: 02-2014/04, or later valid issue.



Legend to Fig. 25-10

1 First aid kit	3 Emergency hammer
2 ELT	4 Emergency parachute system

Fig. 25-10 Emergency equipment



2. MAINTENANCE PRACTICES

A. Emergency Locator Transmitter

Maintenance type: Line

Personnel qualification: Independent verification personnel qualified in accordance with Part 66 or higher

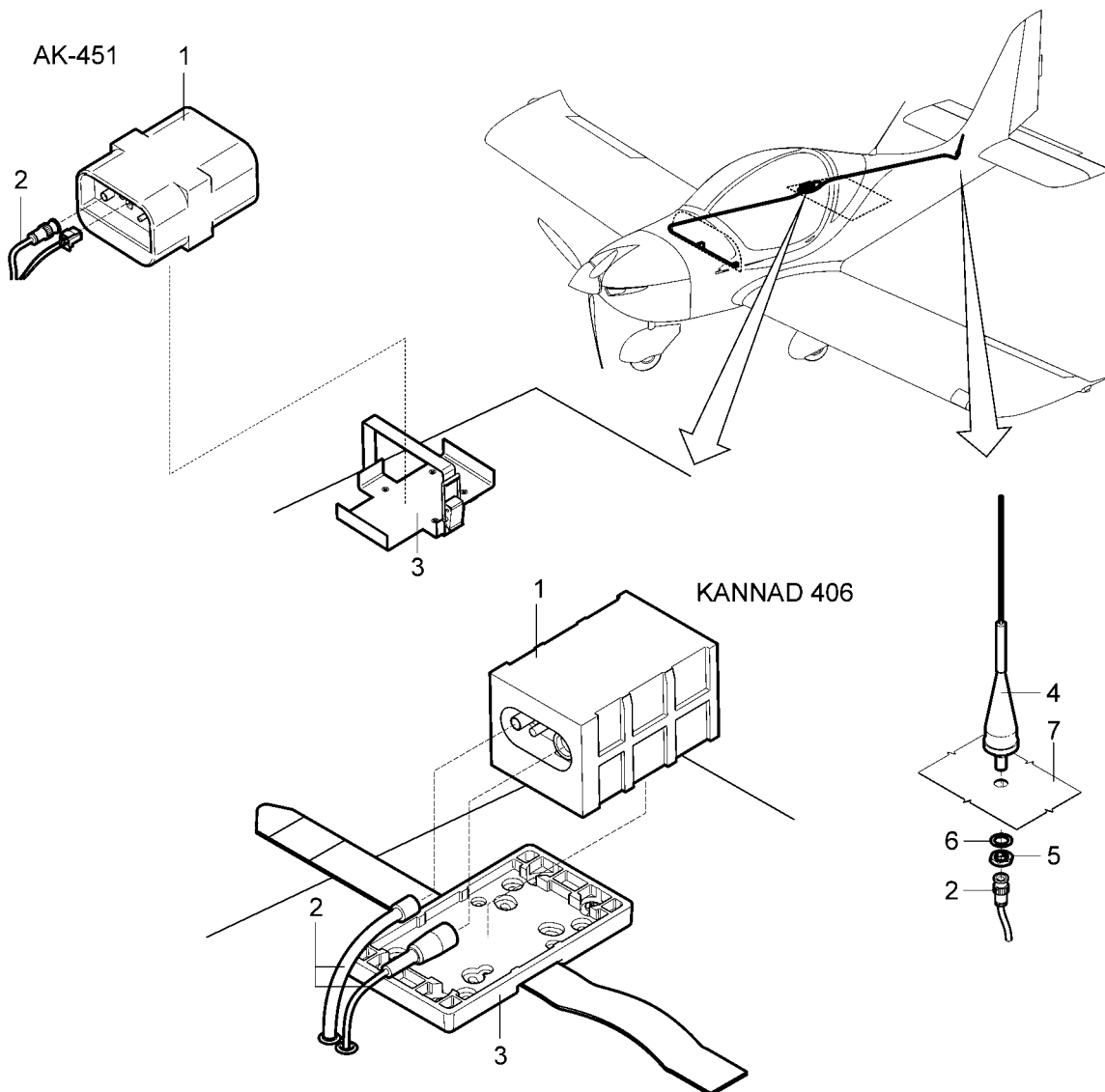
Recommended tools and material:

Item	Designation / Size	Quantity	Note
Phillips screwdriver	No. 2	1 pc.	
Wrench	No. 19	1 pc.	

- (1) Removal – Emergency Locator Transmitter
 - (a) Toggle the ELT unit switch to the **OFF** position.
 - (b) Disconnect the connectors (2, Obr. 25-11) from the ELT unit (1).
 - (c) Unfasten the clamp holder or remove the strips with Velcro fasteners on the holder (3).
 - (d) Remove the ELT unit (1) from the mounting bracket.
 - (e) Remove the ELT remote switch as necessary:
 - 1 Remove the screws, which attach of the remote switch to the instrument panel.
 - 2 Disconnect the connector.
 - 3 Remove the ELT remote switch.
- (2) Installation – Emergency Locator Transmitter
 - (a) Put the ELT unit (1, Obr. 25-11) in the mounting bracket (3) (switch in the **OFF** position).
 - (b) Connect the connectors (2) to the ELT unit.
 - (c) Fasten the clamp holder or fasten the strips with Velcro fasteners on the holder (3).
 - (d) Install the ELT remote switch:
 - 1 Put the ELT remote switch in the correct hole in the instrument panel.
 - 2 Use the screws to attach the box of the ELT remote switch.
 - 3 Connect the connector of the ELT remote switch to the box of the remote switch.

NOTE

Unfasten the strips with Velcro fasteners to remove the portable antenna of the ELT.



Legend to Fig. 25-11

1 ELT unit	For information
2 Connectors	5 Nut
3 Mounting bracket	6 Serrated washer
4 Fixed antenna	7 Bracket of the antenna in the fuselage

*Fig. 25-11 Emergency Locator Transmitter - removal / installation***NOTE**

The ELT ARTEX ME 406 installation is not shown. For detailed information, refer to the Installation Manual Operation Manual supplied by the manufacturer.

Remove the fixed antenna of the ELT unit only if absolutely necessary. Items 5; 6; 7 in Fig. 25-11 are given for information.



B. First aid kit

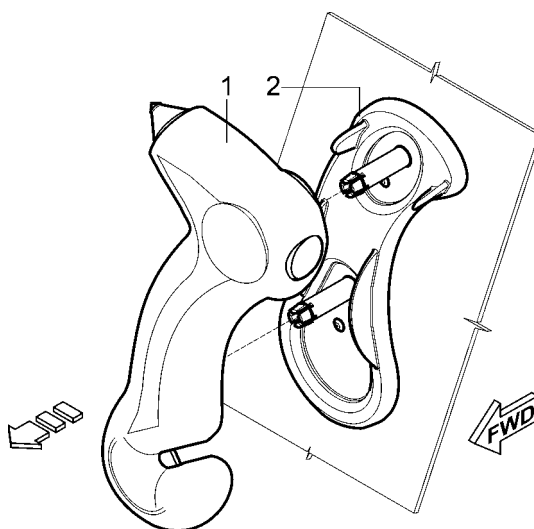
- (1) Inspection / check – first aid kit
 - (a) Unfasten the strips with Velcro fasteners and remove the first aid kit.
 - (b) Check the first aid kit attachment.
 - (c) Open the first aid kit; check the cover and content of the first aid kit:
 - 1 The first aid kit must include a numerical list and all medical material, which is included in the numerical list.
 - 2 The medical material must bear adhesive labels with numbers (in accordance with the numerical list).
 - 3 Check the shelf life of the medical material.
 - 4 Close the complete first aid kit and put it back.
 - 5 Connect the strips with Velcro fasteners.

CAUTION

THE FIRST AID KIT MUST NOT INCLUDE THE MEDICAL MATERIAL WITH EXPIRED SERVICE LIFE.

C. Emergency hammer

- (1) Inspection / check – emergency hammer
 - (a) Lift the armrest between the seats.
 - (b) Remove the emergency hammer (1, Fig. 25-12).
 - (c) Check the emergency hammer and holder.
 - (d) Put the emergency hammer (1) back into the holder (2).



Legend to Fig. 25-12

1 Emergency hammer

Holder

Fig. 25-12 Emergency hammer


D. Emergency parachute system

Maintenance type: Line

Personnel qualification: Independent verification personnel qualified in accordance with Part 66 or higher

Recommended tools and material:

Item	Designation / Size	Quantity	Note
Wrench	No. 8	2 pcs.	
Wrench	No. 10	2 pcs.	
Wrench	No. 13	2 pcs.	
Wrench	No. 22	1 pc.	
Steel bar	ø 10, l = 300 mm	1 pc.	Without sharp edges
Adhesive	Loctite 243	-	Blue
Cable tie	3,6x142 mm	4 pcs.	
Degreasing agent	Acetone	-	

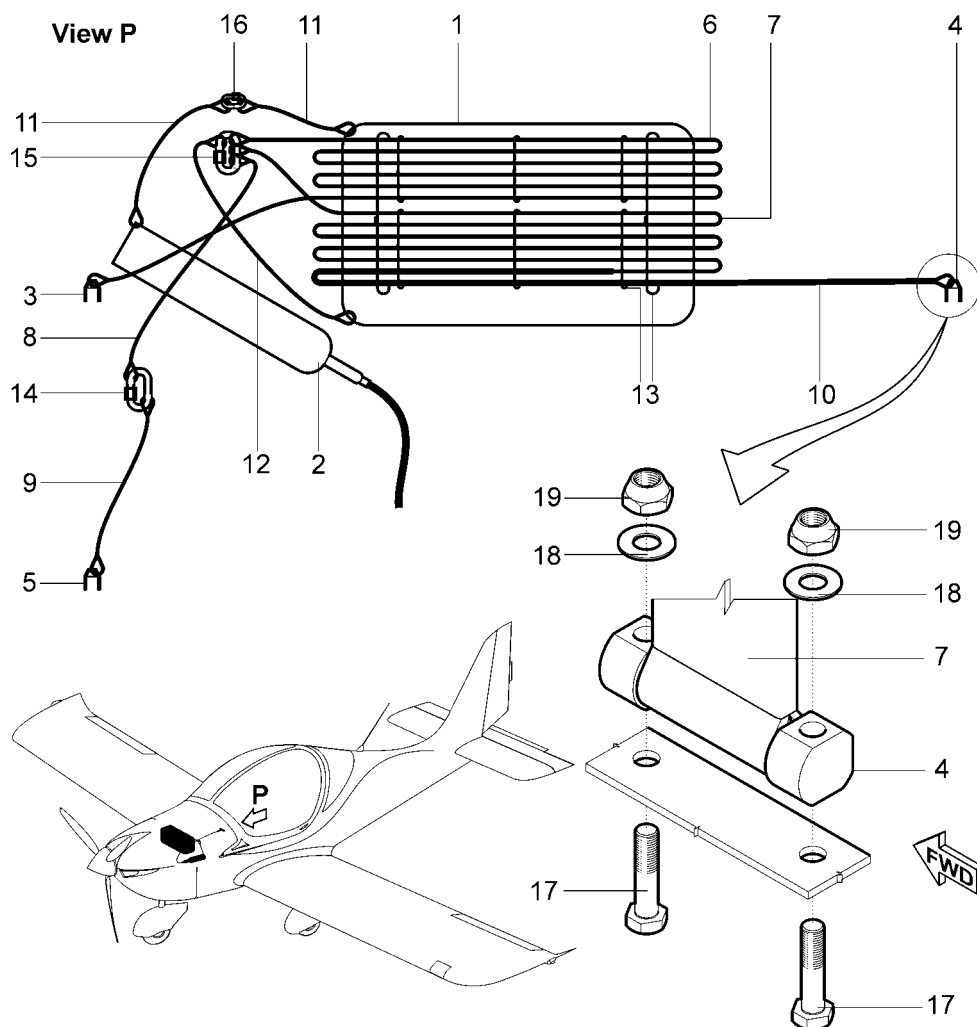
WARNING

BEFORE YOU START THE WORKS RELATED TO DISASSEMBLIES OF THE EMERGENCY PARACHUTE SYSTEM, ALWAYS MAKE SURE THAT THE EMERGENCY SYSTEM ACTIVATION HANDLE IS PROPERLY SECURED WITH A LOCKING PIN.

- (1) Removal – emergency parachute system
 - (a) Remove the cover of the upper part of the fuselage F4 (Section 53-30).
 - (b) Release the screw-lock of the carabiner (15, Fig. 25-13) which connects the suspension straps (6; 7; 8) with the connecting strap (12) and remove the lugs of the straps from the carabiner (15).
 - (c) Release the screw-lock of the carabiner (16) and remove the lug of the steel cable (11) which connects the deployment line of the parachute with the rocket. The Screw-lock of the carabiner is secured with the Loctite 243 adhesive. Release the screw-lock of the carabiner in accordance with Fig. 25-16. Put the bar into the the carabiner to block the carabiner movement. The bar must not touch the straps in the carabiner or the parachute softpack container.
 - (d) Unscrew and remove the nuts (19, Fig. 25-13), washers (18) and bolts (17) of the lanyard hinge (4).
 - (e) Apply the procedure described in point (d) to the lanyard hinge (3).
 - (f) Release the screw-lock of the carabiner (14) and remove the rear strap (8).
 - (g) Remove the straps from the airplane.
 - (h) Unscrew and remove the nuts (3, Fig. 25-14) with washers (4).
 - (i) Remove the parachute (1) including the brackets (2).
 - (j) Remove the brackets (2) from the straps, which are sewn onto the parachute softpack container.



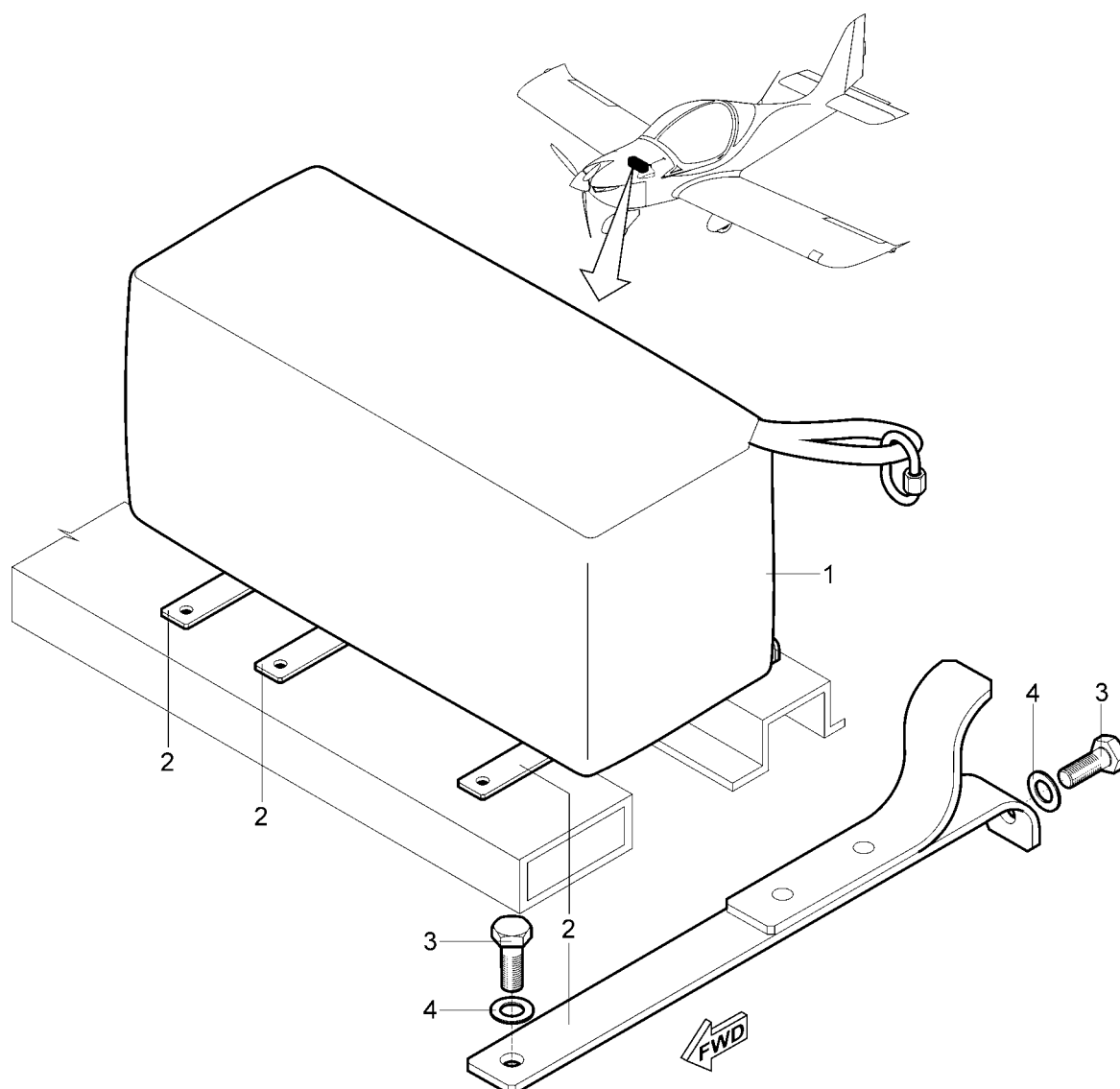
- (k) Unscrew the bolts (5, Fig. 25-15).
- (l) Unscrew and remove the nuts (9) and the washers (7). Use a riveting nut instead of one of the nuts (9) in an inaccessible area.
- (m) Unscrew and remove the bolts (4) nuts (6) and washers (6).
- (n) Make sure that the activation handle is secured with a locking pin (10).
- (o) Remove the rocket housing (1) together with the Bowden cable (3) and the handle (2), from the airplane.
- (2) Installation – emergency parachute system
 - (a) Put the parachute (1, Fig. 25-14) with attached brackets (2) on the parachute mount in the front part of the fuselage.
 - (b) Screw and tighten the bolts (3) with washers (4) to the brackets (2).
 - (c) Arrange the straps tied with plastic cable ties in accordance with Fig. 25-13.
 - (d) Connect both parts of the deployment line of the parachute (11, Fig. 25-13) with a carabiner with the screw-lock (16).
 - (e) Attach the lugs of the straps (6; 7 and 8) to the carabiner with the screw-lock (15).
 - (f) Put the bolts (17) in the holes in the fuselage structure, screw the lanyard hinges (3; 4) with nuts (19) with washers (18).
 - (g) Use the carabiner with the screw-lock (14) to connect the lug of the line (9) with the lug of the strap (8).
 - (h) Put the rocket housing (1) in the fuselage. The rocket housing is connected by the Bowden cable (3) with the handle (2), secured with the locking pin (10).
 - (i) Align the rocket housing (1) with the bracket on the fire wall and screw the bolt (5) with the washer (7) in the hole with the riveted nut.
Put the bolts (5) in the other three holes, install the washers (7) and screw the nuts (9); tighten the bolts and the nuts.
 - (j) Align the bracket of the handle (2) with the handle bracket behind the instrument panel.
Put the bolts (4) in the correct holes, install the washers (6) and screw the nuts (8); tighten the bolts and the nuts.
 - (k) Tighten all screw joints in the entire emergency parachute system including the screw-locks of the carabiners.
Secure the screw-locks of the carabiners with the Loctite 243 (blue) adhesive.
 - (l) Install the cover of the upper part of fuselage F4 (Section 53-30).
 - (m) Remove the locking pin (10) of the emergency system activation handle shortly before the flight.



Legend to Fig. 25-13

1 Parachute softpack container	11 Deployment line of the parachute
2 Rocket housing	12 Connecting strap of the parachute
3 Left front lanyard hinge	13 Plastic tightening strap
4 Right front lanyard hinge	14 Carabiner with a screw-lock
5 Rear lanyard hinge	15 Carabiner with a screw-lock
6 Left strap	16 Carabiner with a screw-lock
7 Right strap	17 Bolt M8
8 Front strap	18 Washer 8,4
9 Rear steel cable	19 Nut M8
10 Protective sleeve of the strap	

Fig. 25-13 Emergency parachute system – removal / installation



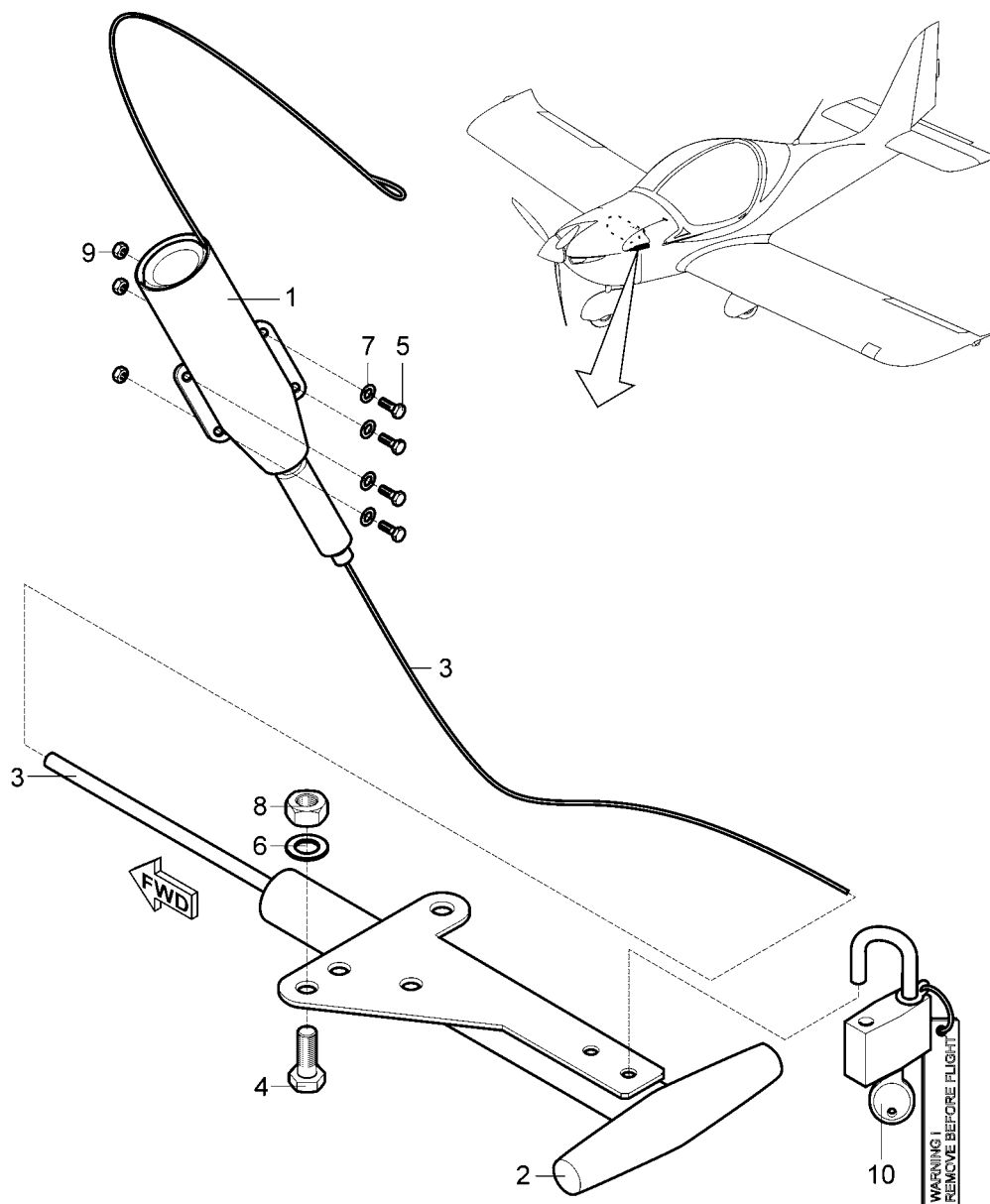
Legend to Fig. 25-14

1 Parachute softpack container	3 Bolt M6
2 Bracket	4 Washer 6,4

Fig. 25-14 Emergency parachute – removal / installation

(3) Inspection / check – emergency parachute system

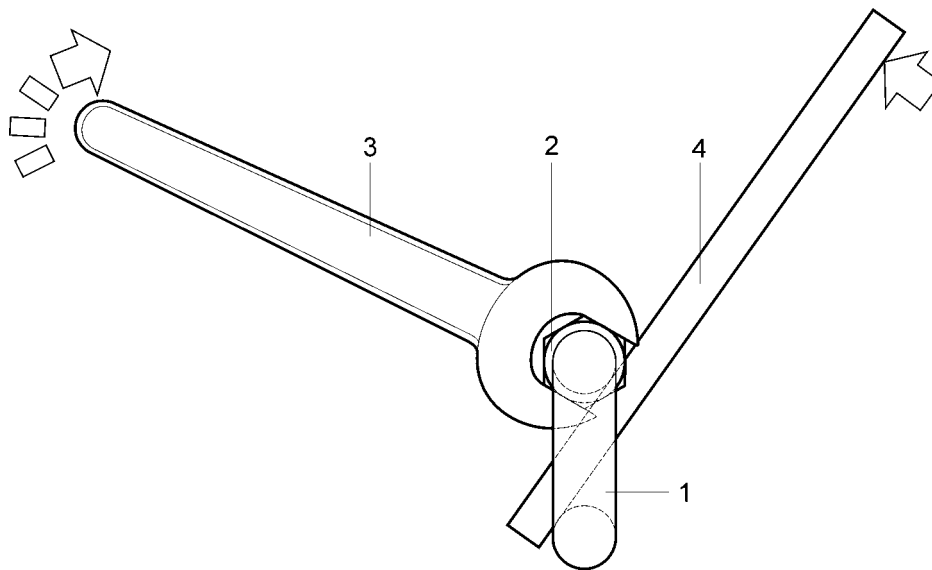
Make sure that the Bowden cable, which connects the activation handle with the rocket housing is not mechanically damaged and its bend radius is large enough. If the Bowden cable is damaged, you can replace it at the manufacturer. Defects of the Bowden cable also include a visible crack on the outer protective spiral hose. Visually check the straps and the parachute softpack container. For detailed description of the maintenance procedures, refer to the Installation and user's manual supplied by the manufacturer (Ballistic rescue parachute systems series Magnum).



Legend to Fig. 25-15

1 Rocket housing	6 Washer 5
2 Activation handle	7 Washer 6,4
3 Bowden cable	8 Nut M5
4 Bolt M5	9 Nut M6
5 Bolt M6	10 Locking pin (lock)

Fig. 25-15 Emergency system activation handle – removal / installation



Legend to Fig. 25-16

1 Carabiner	3 Nut wrench
2 Screw-lock	4 Bar

Fig. 25-16 Loosening of the screw-lock of the carabiner which connects the straps

CAUTION

THE BAR, WHICH BLOCKS THE CARABINER MOVEMENT,
MUST NOT HAVE SHARP EDGES.



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CHAPTER

26

**FIRE
PROTECTION**



CHAPTER 26

FIRE PROTECTION

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GENERAL

1. INTRODUCTION

This chapter describes equipment of the airplane which is used to extinguish fire. Fire protection is provided by a hand fire extinguisher, mounted in the cockpit.

Passive fire protection is provided as follows:

- On the inner surface of the engine cowlings is applied fire resistant coating (Section 71-10).
- Hoses of the fuel and oil system in the engine compartment are fitted with fire resistant sleeves (Section 28-10 and 79-20).



EXTINGUISHING

1. DESCRIPTION AND OPERATION

The Sportstar RTC airplane is equipped with a portable fire extinguisher (1, Fig. 26-1) mounted within a quick-release holder (5) attached on the bulkhead (4) separating the cockpit and baggage compartment. In a new version, the extinguisher (1) is located on the left control rod cover (5).

The extinguishing agent is Halotron. Description of operation is mentioned on the placard of the fire extinguisher. The fire extinguisher must be replaced after each use.



2. MAINTENANCE PRACTICES

A. Hand fire extinguisher

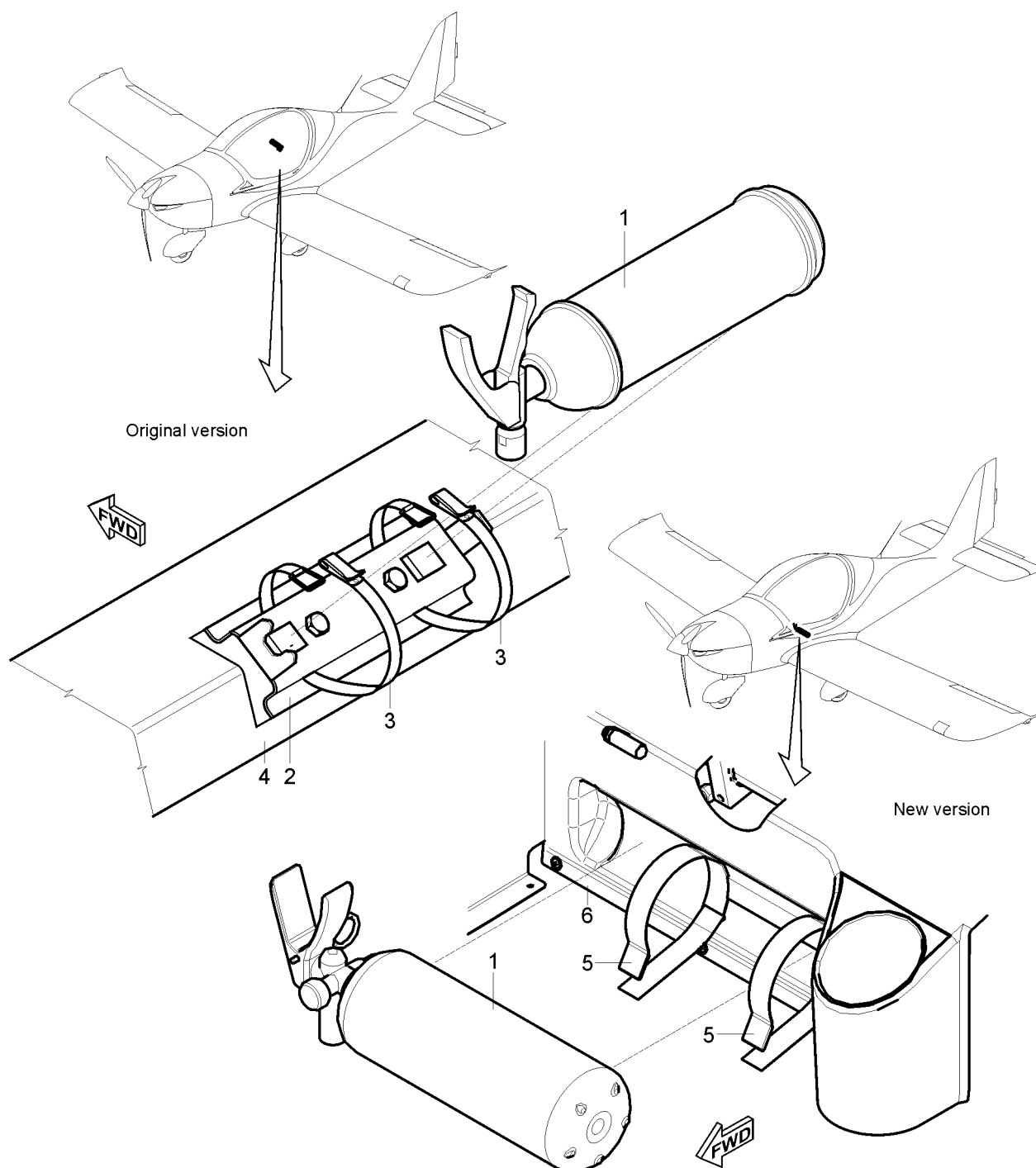
Maintenance type: Line

Personnel qualification: Pilot / Owner qualified in accordance with M.A.803.

Recommended tools and material:

Item	Designation / Size	Quantity	Note
Scale	-	1 pc.	-

- (1) Removal – hand fire extinguisher
 - (a) Release quick-release clamps (3, Fig. 26-1) / Velcro fasteners (5) on the straps.
 - (b) Remove the fire extinguisher (1) from the holder (2) / cover (6).
- (2) Installation – hand fire extinguisher
 - (a) Position the fire extinguisher (1, Fig. 26-1) in the holder (2) / cover (6).
 - (b) Secure with quick-release clamps (3) / Velcro fasteners (5) on the straps.
- (3) Inspection / check – hand fire extinguisher
 - (a) Thoroughly examine fire extinguisher for signs of leakage, corrosion, or other damage.
 - (b) At annual inspection, weigh fire extinguisher. The weigh compare with the data listed on the label. If extinguisher weighs less than that specified, replace immediately.
 - (c) If the fire extinguisher is installed on the control rod cover, check the Velcro fasteners on the straps. In case of damage or insufficient connection of the Velcro fasteners, replace the straps.



Legend to Fig. 26-1

1 Hand fire extinguisher	4 Bulkhead
2 Holder	5 Strap with Velcro fasteners
3 Strap with quick-release clamp	6 Left control rod cover

Fig. 26-1 Hand fire extinguisher – removal / installation

CHAPTER

27

**FLIGHT
CONTROLS**



CHAPTER 27

FLIGHT CONTROLS

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GENERAL

1. INTRODUCTION

The airplane control is doubled - left and right - which allows performing the pilot training. The control system consists of the aileron control (roll control), elevator control (pitch control), rudder control (yaw control), wing flap control and the elevator trim tab control (pitch trim).

The ailerons and the elevator are controlled by the control sticks. The rudder and the nose landing gear are controlled by the pedals of foot control. The wing flaps are controlled by the hand operated lever of wing flap control that is located between the pilot seats. The elevator trim tab is electrically controlled by means of the electromechanical strut.

2. TROUBLESHOOTING

Trouble	Possible Cause	Remedy
Excessive play in the roll control system.	Worn out bearings.	Replace the bearings.
Excessive play in the pitch control system.	Worn out bearings.	Replace the bearings.
Excessive play in the trim tab control.	Play in the servomechanism of trim tab control.	Replace / repair the servomechanism.
Excessive play on the trailing edge of wing flap.	Wear and tear of guiding groove.	Replace the wing flap rib with the guiding groove.
	Wear and tear of the control pin.	Replace the pin.



3. MAINTENANCE PRACTICES

A. Flight control

- (1) Removal / installation of control system – general principles

WARNING

ALWAYS USE NEW AND UNDAMAGED SECURING ELEMENTS TO SECURE THE ELEMENTS IN CONTROL SYSTEMS – COTTER PINS, LOCKING WASHERS AND LOCKING WIRE. THE RE-USE IS NOT ALLOWED. IT IS PROHIBITED TO USE SELF-LOCKING NUTS IN THE MOVABLE JOINTS IN CONTROL SYSTEMS.

- (a) The bearing (with the exception of self-lubricating bearings), fitted bolts, joint and the friction surfaces of control system must be lubricated with grease (Section 12-20).
- (b) The cables must be saturated with grease and tightened. The cables supplied by the airplane manufacturer are already treated this way.
- (c) Remove the preservation agents from the new parts of control system just before installing them on the airplane. For removing the preservation agents, use benzine or its equivalent.
Wash out the old contaminated lubricants from the bearings by means of benzine. Blow the bearings out by compressed air and fill them with new lubricant.
- (d) The threads of adjustable end pieces (eyes, forks) must be screwed on sufficiently so that they overlap the check holes in the pull-rods. Secure the nuts of adjustable end pieces only after setting the control surface deflections.
- (e) Before installing the new adjustable pull-rods, set their lengths in accordance with the original ones.
- (f) Movement of all the pull-rods, levers and cables of control system must be continuous without any signs of rubbing.
- (g) The tightening of the joints whose elements are mutually movable, can only be such that will guarantee the maintenance of their looseness with a minimum necessary play.
- (h) The general principle for installing the bolted joints is to insert the bolts oriented top-down eventually front to back, in relation to the flight direction. The exceptions are the cases when the manufacturer directly determines the method of bolted joint installation for design, technological or operation reasons.
- (i) Within the whole range of control system travel, the movable parts of control system mustn't get in contact with the surrounding structure of the airplane. The distance of movable elements in the critical positions must be at least 1 mm mutually in the same group of the movable mechanism, at least 3 mm from the fixed parts of the structure and at least 5 mm from the other (movable) parts of the structure.
- (j) A conductive interconnection of the parts of control system, if used, must be maintained even after the reinstallation of original parts as well as new parts.



- (k) After finishing all the work related to installations and Removal of parts of control system, check the securing of all the elements in the control systems and their functionality.

(2) Adjustment / check – adjustment of deflections

Maintenance type: Heavy

Personnel qualification: Independent verification personnel qualified in accordance with Part 66 or higher

Recommended tools and material:

Item	Designation / Size	Quantity	Note
Protractor	-	1 pc.	Measurement of deflections of ailerons, wing flaps, elevator and elevator trim tab.
Measuring jig (protractor) of VTU	1710S3000401	1 pc.	Measurement of rudder deflections; it also serves as a centering jig of rudder.
Measuring jig (protractor) of HTU	1710E4008001	1 pc.	Measurement of elevator deflections.
Strain gauge	-	1 pc.	Measurement of stress in cables.
Blocking of elevator	-	1 pc.	Check of the play in the control system.
Blocking of ailerons	-	1 pc.	Check of the play in the control system.

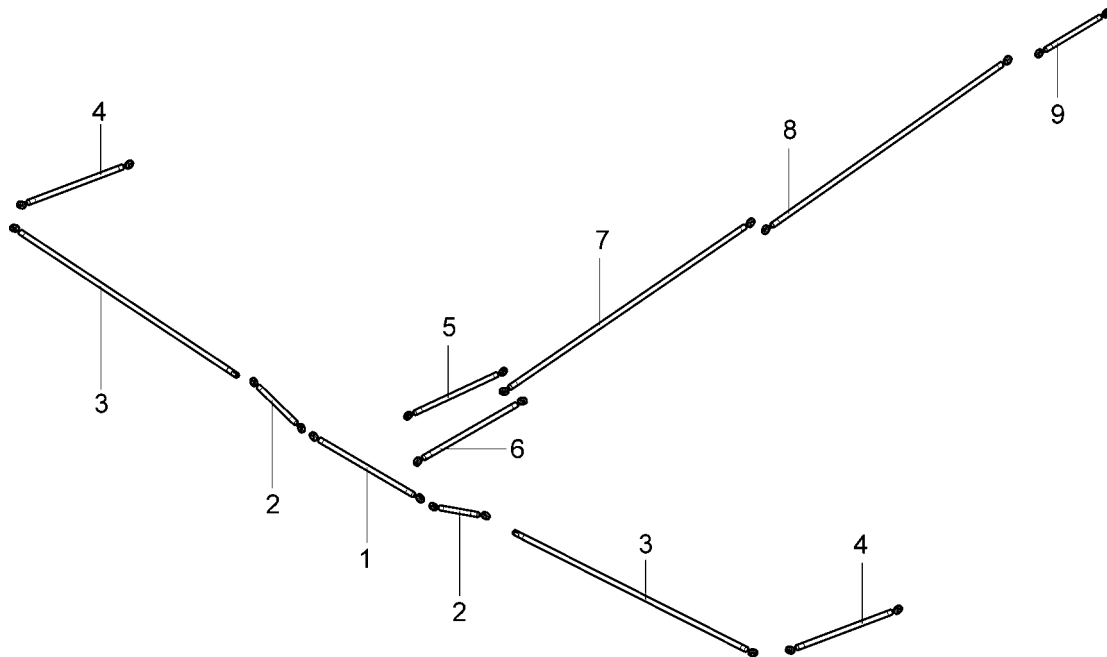
WARNING

NON-OBSERVANCE OF PRESCRIBED DEFLECTIONS OF CONTROL SURFACES, WING FLAPS OR TRIM TAB NEGATIVELY AFFECTS THE FLIGHT CHARACTERISTICS OF AIRPLANE.

- (a) After the replacement of the parts of control system, adjustment of cable tightening or in other cases where needed, it is necessary to check the deflections of the control surfaces, wing flaps and the trim tab. If a difference is detected between the condition on the airplane and the specified values, perform its adjustment.
- (b) The procedures for the adjustment of control surfaces, wing flaps and trim tab are shown in the corresponding Sections that describe individual control systems.
- (c) The adjustment values of the deflections of control surfaces, wing flaps and trim tab are shown in Tab. 27-1.
- (d) The length of pull-rod means the distance between the central axes of bearings in the end pieces of pull-rod or between the central axis of end piece bearing and the central axis of the hole in the pull-rod fork.



- (e) The adjustability means a possibility to regulate the length of pull-rod within the specified range (Fig. 27-1).
- (f) When adjusting the lengths of pull-rods, the adjustable end piece must never be unscrewed below the level of the check hole in the pull-rod. The checking needle or mandrel, with a diameter capable of passing through the check hole, must always hit the threaded part of end piece (Fig. 27-2).



Item	Drawing No.	Length of Pull Rod [mm]	Adjustability [mm]
1	S4 01-04 01	500	+/- 8
2	S4 01-13 01	268	+/- 8
3	S4 01-14 01	2370	+/- 4
4	S4 01-15 01	717	+/- 8
5	S4 01-20 01	470	Not specified
6	S4 01-09 01	747	+/- 8
7	S4 01-12 01	1479	+/- 8
8	S4 01-10 01	1479	+/- 8
9	N/A	~208	Not specified

NOTE

The pull-rod 9 is part of the electromechanical strut of pitch trim control.

Fig. 27-1 Lengths of control pull-rods

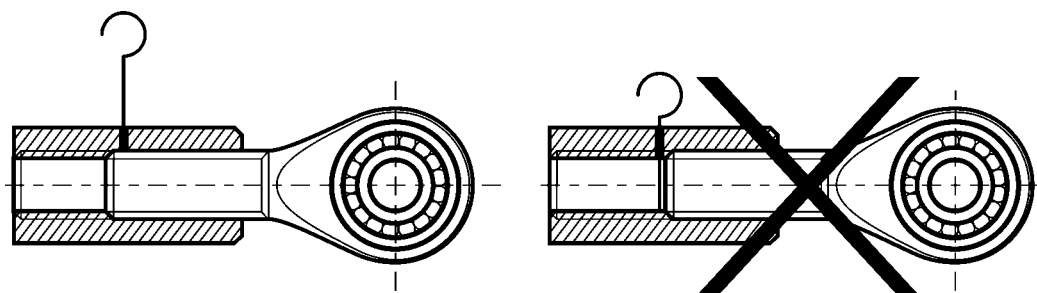


Fig. Fig. 27-2 Setting of adjustable end pieces of pull-rod

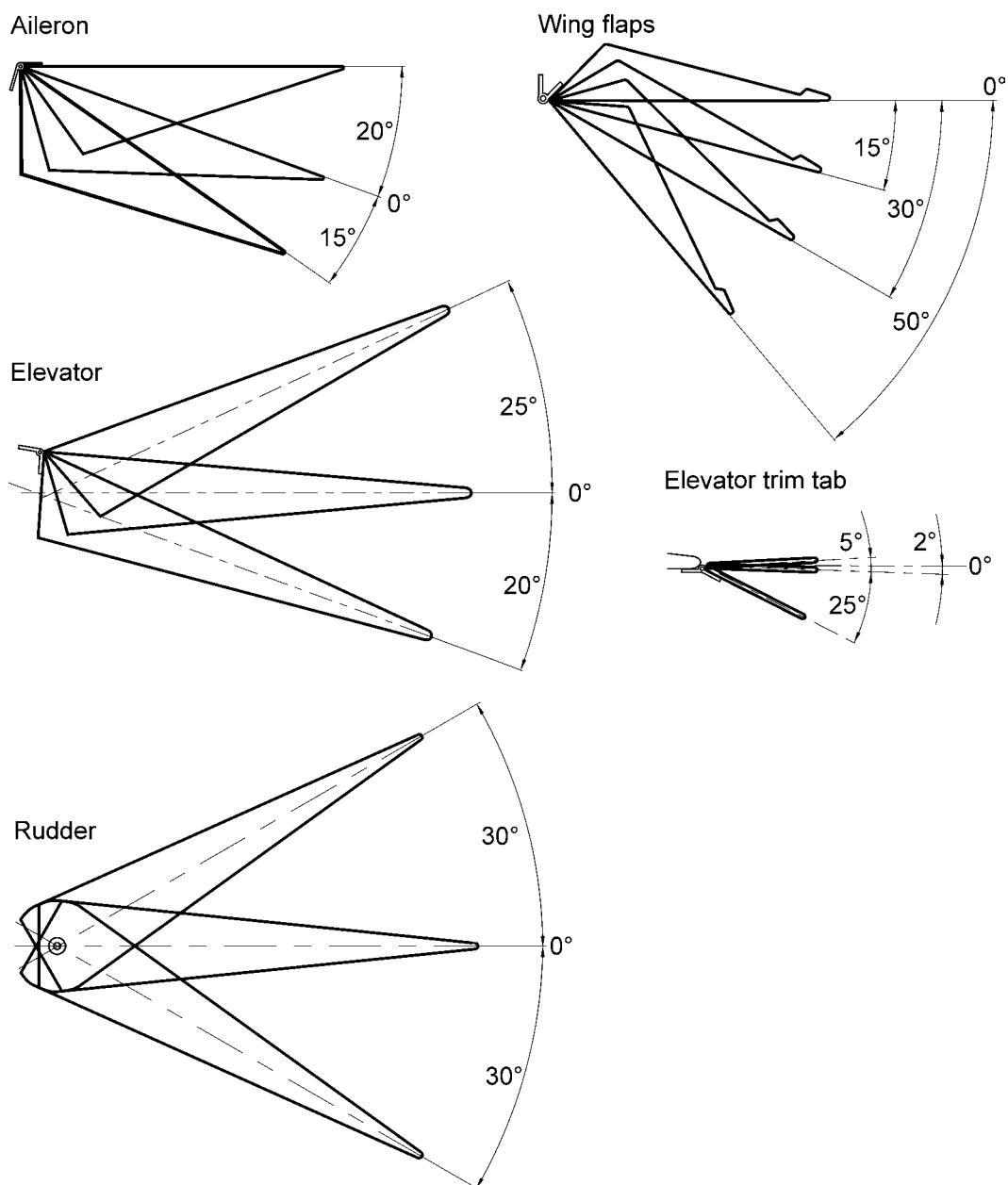


Fig. Fig. 27-3 Deflections of control surfaces, wing flaps and trim tab



Name		Allowed Value	Tolerance
Control surface	Sense of deflection	[degrees]	[degrees]
Aileron	Left	Up	± 1
		Down	
	Right	Up	
		Down	
Rudder	Left	30	± 2
	Right	30	
Elevator	Up	25	± 1
	Down	20	
Elevator trim tab	Up	5	± 2
	Neutral (down)	-2	± 2
	Down	25	± 5
Wing flap	Left	Retracted	0
		Takeoff	± 2
		Landing	± 3
		Landing II	± 3
	Right	Retracted	0
		Takeoff	± 2
		Landing	± 3
		Landing II	± 3

Tab. 27-1 Deflections of control surfaces, wing flaps and trim tab

- (3) Inspection / check – check of the plays in the control system
- (a) The wear and tear of control elements occurs during operation. The wear and tear leads to an increase of plays in the control system.

WARNING

THE MAX ALLOWED PLAYS MUSTN'T BE EXCEEDED IN OPERATION.

- (b) If the maximum allowed play in operation is detected (Fig. 27-3), the worn out parts must be replaced.



- (c) The procedures for checking the plays in the control system and in the trim are shown in the corresponding Sections that describe individual control systems.

Name	Max. Operation Plays
Roll control (on the control stick)	3 mm
Pitch control (on the control stick)	5 mm
Pitch trim (on the trim tab trailing edge)	3 mm
Control of wing flaps in all positions (on the wing flap trailing edge)	5 mm

Tab. 27-2 Maximum operation plays in the control system



AILERON & TAB

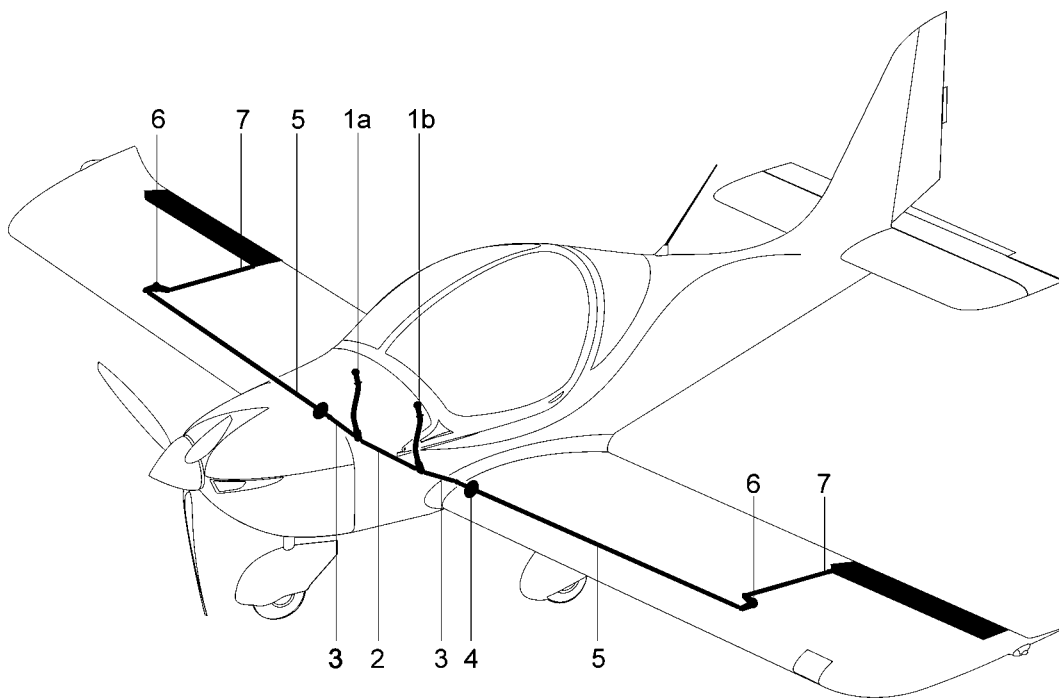
1. DESCRIPTION AND OPERATION

The roll control is doubled - left and right.

The roll control is controlled by the left control stick (1b, Fig. 27-4) or by the right control stick (1a) attached to the countershaft of manual control. The size of lever swing to the left or to the right from the vertical position determines the size of the aileron deflection. The movement of the control stick is transferred by the system of pull-rods and by the angular lever to the pull-rod of aileron.

The control elements are located on the main spar brackets. The control sticks (1a; 1b) are mutually connected by the pull-rod (2). The pull-rods (3) connected with the pull-rods (5) are attached to the control sticks. The pull-rods (5) pass through the grommets in ribs No. 1 and are connected with the angular levers (6). The angular levers (6) transfer the movement to the pull-rods (7) connected with the levers on the ailerons. The bellcranks (6) are pivoted in the brackets in the wing.

The aileron deflections are differentiated. The values of aileron deflections are shown in Tab. 27-1. The adjustment of aileron deflections, differentiation (the difference between the upper deflection and the lower deflection) and the neutral position is carried out by setting the stops and the lengths of pull-rods. The stops of roll control are located on the countershaft of manual control.



Legend to Fig. 27-4

1a	Control stick – right	4	Grommet
1b	Control stick – left	5	Pull-rod
2	Connecting pull-rod	6	Bellcrank
3	Pull-rod	7	Pull-rod

Fig. 27-4 Roll control



2. MAINTENANCE PRACTICES

A. Roll control

Maintenance type: Heavy

Personnel qualification: Independent verification personnel qualified in accordance with Part 66 or higher

Recommended tools and material:

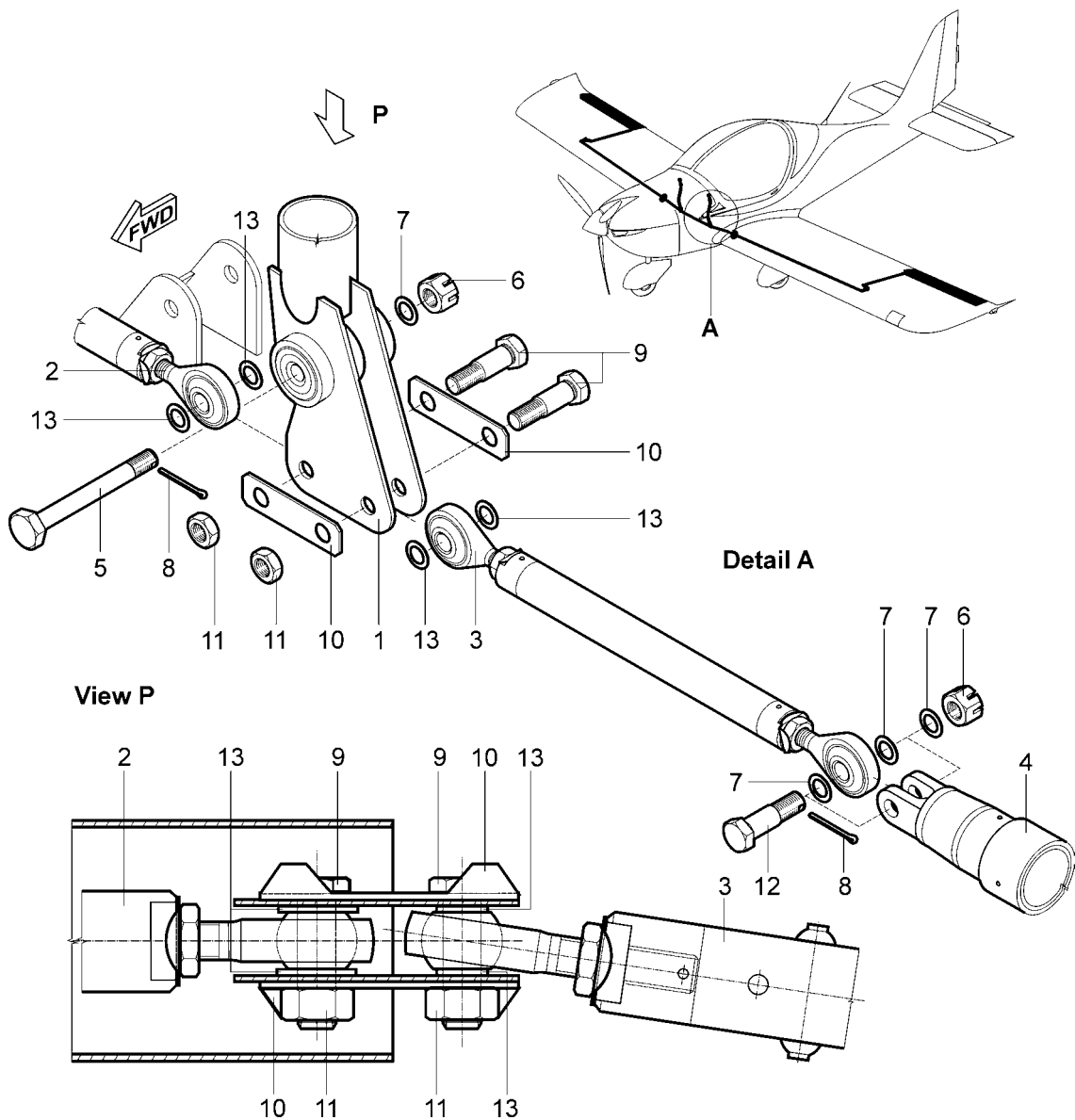
Item	Designation / Size	Quantity	Note
Flat screwdriver	-	1 pc.	
Wrench	No. 9	1 pc.	
Wrench	No. 10	1 pc.	
Cutting pliers	-	1 pc.	
Locking washer	S4 01-28 21	2 + 2 pcs.	
Cotter pin	1,6x16	2 + 2 pcs.	
Cable tie	3,6x142	1 + 1 pc.	
Degreaser agent	Technical benzine	-	
Grease	AeroShell Grease 22	-	
Adhesive	Loctite 243	-	

(1) Removal – pull-rod of roll control in the cockpit

NOTE

The procedure of removal is identical for the right pull-rod as well as for the left pull-rod. The right pull-rod is a mirror image of the left pull-rod.

- (a) Remove the cover of control IN1L / IN1R (Section 25-10) in the cockpit and the appropriate fairing between the wing and the fuselage (Section 53-50).
- (b) Cut off the cable tie that holds the canvas cover on the pull-rod.
- (c) Unlock the locking washers (10, Fig. 27-5).
- (d) Unscrew the nuts (11) and remove the bolts (9) connecting the control sticks (1) with the pull-rods (2; 3); replace the spacing rings (13) and the locking washers (10).
- (e) Remove the cotter pin (8), unscrew the nut (6), and remove the washers (7) and the bolt (12) connecting the pull-rods (3; 4).
- (f) Remove the pull-rod (3).



Legend to Fig. 27-5

1 Control stick	8 Cotter pin 1,6x16
2 Connecting pull-rod	9 Modified bolt
3 Pull-rod	10 Locking washer
4 Pull-rod	11 Nut M6
5 Bolt M6x49	12 Bolt M6x27
6 Nut M6	13 Spacing ring
7 Washer 6x1	

Fig. 27-5 Pull-rod of roll control in the cockpit – removal / installation



- (2) Installation – pull-rod of roll control in the cockpit

NOTE

The procedure of installation is identical for the right pull-rod as well as for the left pull-rod. The right pull-rod is a mirror image of the left pull-rod.

- (a) Lubricate all the bearings and the friction surfaces with grease.
 - (b) Position the locking washers (10, Fig. 27-5) to the fork on the control stick (1) along with the end pieces of pull-rods (2; 3). It is convenient to use the guiding mandrels for precise setting and centering the bearings of pull-rods, spacing rings, washers and holes in the control stick.
 - (c) From each side of the bearing on the eye of pull-rod (2), position the spacing rings (13) between the fork of control stick (1) and the bearing of pull-rod (2).
 - (d) From each side of the bearing on the eye of pull-rod (3), position the spacing rings (13) between the fork of control stick (1) and the bearing of pull-rod (3).
 - (e) Pull out the guiding mandrels, insert the bolts (9), apply the adhesive on the bolts, screw on the nuts (11) and tighten them.
 - (f) Secure the washers (10).
 - (g) Position the eye of pull-rod (3) into the fork of pull-rod (4) along with the washers (7) and insert the bolt (12).
 - (h) Put the washer (7) on the bolt (12) and screw on the castle nut (6); tighten the nut by the wrench so that it is possible to insert the cotter pin (8) into the nearest possible notch of the castle nut and secure the cotter pin (Section 20-20).
 - (i) Check, eventually adjust the deflections of ailerons (see par. 2 A.(11)).
 - (j) Using the cable tie, secure the cloth cover to the pull rod.
 - (k) Install the fairing between the wing and the fuselage (Section 53-50).
 - (l) Install the cover of control IN1L / IN1R (Section 25-10) in the cockpit.
- (3) Removal – pull-rod in the wing leading edge

NOTE

The procedure of removal is identical for the right pull-rod as well as for the left pull-rod. The right pull-rod is a mirror image of the left pull-rod.

- (a) Remove the appropriate fairing between the wing and the fuselage (Section 53-50), covers W3L / W3R on the lower side of wing (Fig. 06-2) and the cover of control IN1L / IN1R in the cockpit (Section 25-10).
- (b) Remove the wing (Section 57-40).
- (c) Remove the cotter pin (8, Fig. 27-5), unscrew the nut (6), remove the washer (7) and the bolt (12) connecting the pull-rods (3; 4).
- (d) Remove the cotter pin (11, Fig. 27-6), unscrew the nut (8), remove the washers (9) and the bolt (7) connecting the lever (3) and the pull-rod (1).
- (e) Remove the pull-rod (1) from the wing by its root part through the grommet in the rib No. 1.

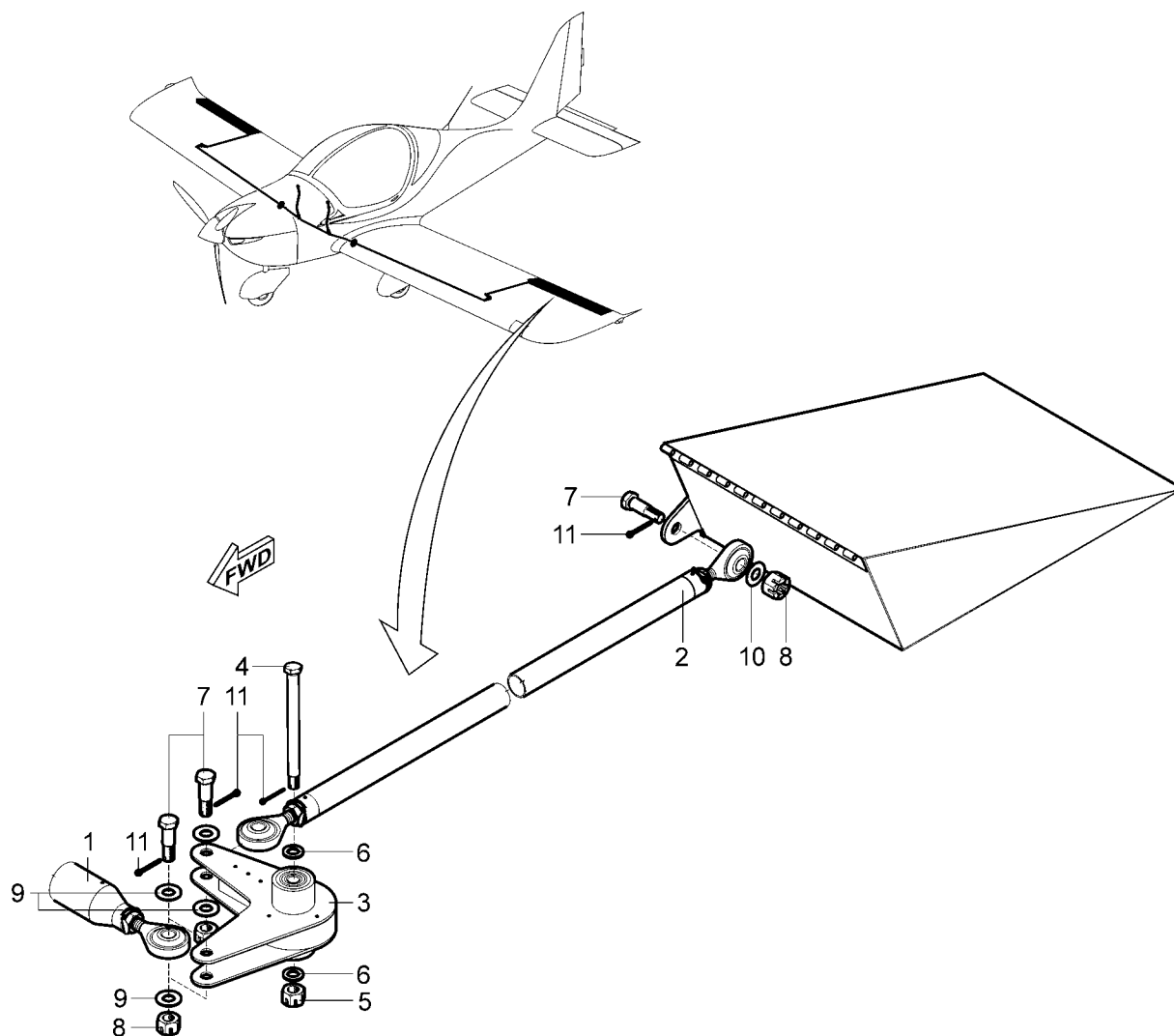


- (4) Installation – pull-rod in the wing leading edge
 - (a) Lubricate all the bearings and the friction surfaces with grease.
 - (b) Insert the pull-rod (1, Fig. 27-6) through the grommet into the cavity in the leading edge of the wing.
 - (c) Position the eye of pull-rod (1) into the fork of angular lever (3) and insert the bolt (7) with the washer (9).
 - (d) Put the washer (9) on the bolt (7) and screw on the castle nut (8); tighten the nut by the wrench so that it is possible to insert the cotter pin (11) into the nearest possible notch of the castle nut and secure the cotter pin (Section 20-20).
 - (e) Install the wing (Section 57-40).
 - (f) Position the eye of pull-rod (3, Fig. 27-5) into the fork of pull-rod (4) along with the washers (7) and insert the bolt (12).
 - (g) Put the washer (7) on the bolt (12) and screw on the castle nut (6); tighten the nut by the wrench so that it is possible to insert the cotter pin (8) into the nearest possible notch of the castle nut and secure the cotter pin (Section 20-20).
 - (h) Check, eventually adjust the deflections of ailerons (see par. 2 A.(11)).
 - (i) Install the appropriate fairing between the wing and the fuselage (Section 53-50), covers W3L / W3R on the lower side of the wing (Fig. 06-2), and the cover of control IN1L / IN1R in the cockpit (Section 25-10).
- (5) Removal – pull-rod of aileron

NOTE

The procedure of removal is identical for the right pull-rod as well as for the left pull-rod. The right pull-rod is a mirror image of the left pull-rod.

- (a) Remove the cover W3L / W3R on the lower side of the wing (Fig. 06-2).
- (b) Remove the cotter pin (11, Fig. 27-6), unscrew the nut (8), remove the washers (9) and the bolt (7) connecting the bellcrank (3) and the pull-rod (2).
- (c) Remove the cotter pin (11), unscrew the nut (8), remove the washer (10) and the bolt (7) connecting the pull-rod (2) and the bellcrank of aileron.
- (d) Remove the pull-rod (2) from the wing.



Legend to Fig. 27-6

1 Pull-rod	7 Bolt M6x23
2 Pull-rod	8 Nut M6
3 Bellcrank	9 Washer 6x1
4 Bolt M6x55	10 Washer 6x0,5
5 Nut M6	11 Cotter pin 1,6x16
6 Washer 6,4	-

Fig. 27-6 Pull-rod and the bellcrank of aileron – removal / installation



(6) Installation – pull-rod of aileron

NOTE

The procedure of installation is identical for the right pull-rod as well as for the left pull-rod. The right pull-rod is a mirror image of the left pull-rod.

- (a) Lubricate all the bearings and friction surfaces with grease.
 - (b) Position the pull-rod (2, Fig. 27-6) into the fork of bellcrank (3) in the wing and insert the bolt (7) with the washer (9).
 - (c) Put the washer (9) on the bolt (7) and screw on the castle nut (8); tighten the nut by the wrench so that it is possible to insert the cotter pin (11) into the nearest possible notch of the castle nut and secure the cotter pin (Section 20-20).
 - (d) Position the eye of pull-rod (2) to the lever on the aileron and insert the bolt (7).
 - (e) Put the washer (10) on the bolt (7) and screw on the castle nut (8); tighten the nut by the wrench so that it is possible to insert the cotter pin (11) into the nearest possible notch of the castle nut and secure the cotter pin (Section 20-20).
 - (f) Check, eventually adjust the deflections of ailerons (see par. 2 A.(11)).
 - (g) Install the cover W3L / W3R on the lower side of the wing (Fig. 06-2).
- (7) Removal – control stick

NOTE

The procedure of removal is identical for the right control stick as well as for the left control stick. The right control stick is a mirror image of the left control stick.

- (a) Disable the board network and disconnect the battery.
- (b) Remove the cover of control IN1L / IN1R in the cockpit (Section 25-10).
- (c) Remove the head of control stick. Note down the connection of electrical wires and solder off the harness from the contacts of electrical switches. Pull out the wiring harness from the control stick.
- (d) Unlock the locking washers (10, Fig. 27-5).
- (e) Unscrew the nuts (11) and remove the bolts (9) connecting the control sticks (1) with the pull-rods (2; 3); pull out the spacing rings (13) and the locking washers (10).
- (f) Remove the cotter pin (8), unscrew the nut (6), pull out the washer (7) and remove the bolt (5).
- (g) Remove the control stick (1) from the fuselage.



(8) Installation – control stick

NOTE

The procedure of installation is identical for the right control stick as well as for the left control stick. The right control stick is a mirror image of the left control stick.

- (a) Lubricate all the bearings and friction surfaces with grease.
 - (b) Position the control stick (1, Fig. 27-5) to the fork of manual control countershaft, and insert the bolt (5).
 - (c) Put the washer (7) on the bolt (5) and screw on the castle nut (6); tighten the nut by the wrench so that it is possible to insert the cotter pin (8) into the nearest possible notch of the castle nut and secure the cotter pin (Section 20-20).
 - (d) Position the locking washers (10) to the fork on the control stick (1) along with the end pieces of pull-rods (2; 3). It is convenient to use the guiding mandrels for precise setting and centering the bearings of pull-rods, spacing rings, washers and holes in the control stick.
 - (e) From each side of the bearing on the eye of pull-rod (2), position the spacing rings (13) between the fork of control stick (1) and the bearing of pull-rod (2).
 - (f) From each side of the bearing on the eye of pull-rod (3), position the spacing rings (13) between the fork of control stick (1) and the bearing of pull-rod (3).
 - (g) Pull out the guiding mandrels, insert the bolts (9), apply the adhesive on the bolts, screw on the nuts and tighten them (11).
 - (h) Secure the washers (10).
 - (i) Pull the cable harness through the control stick and solder it to the contacts of electrical switches in the head of control stick (see the wiring diagram in Chapter 91).
 - (j) Check, eventually adjust the deflections of ailerons (see par. 2 A.(11)).
 - (k) Install the cover of control IN1L / IN1R in the cockpit (Section 25-10).
 - (l) Connect the battery, activate the board network and do a function test of the transceiver and the intercom.
- (9) Removal – bellcrank in the wing

NOTE

The Removal procedure is identical for the right bellcrank as well as for the left bellcrank. The right bellcrank is a mirror image of the left bellcrank.

- (a) Remove the cover W3L / W3R on the lower side of the wings (Fig. 06-2).
- (b) Pull out the cotter pin (11, Fig. 27-6), unscrew the nut (8), remove the washers (9) and the bolt (7) connecting the bellcrank (3) and the pull-rod (1).
- (c) Pull out the cotter pin (11), unscrew the nut (8), remove the washer (10) and the bolt (7) connecting the pull-rod (2) and the bellcrank.
- (d) Pull out the cotter pin (11), unscrew the nut (5), and remove the washers (6) and the bolt (4).
- (e) Remove the bellcrank (3) from the wing.



- (10) Installation – bellcrank in the wing
- (a) Lubricate all the bearings and friction surfaces with grease.
 - (b) Position the bellcrank (3, Fig. 27-6) into the wing, and insert the bolt (4) with the washer (6).
 - (c) Put the washer (6) on the bolt (4) and screw on the castle nut (5); tighten the nut by the wrench so that it is possible to insert the cotter pin (11) into the nearest possible notch of the castle nut and secure the cotter pin (Section 20-20).
 - (d) Position the eye of pull-rod (1) into the fork of bellcrank (3) and insert the bolt (7) with the washer (9).
 - (e) Put the washer (9) on the bolt (7) and screw on the castle nut (8); tighten the nut by the wrench so that it is possible to insert the cotter pin (11) into the nearest possible notch of the castle nut and secure the cotter pin (Section 20-20).
 - (f) Position the pull-rod (2) into the fork of bellcrank (3) and insert the bolt (7) with the washer (9).
 - (g) Put the washer (9) on the bolt (7) and screw on the castle nut (5); tighten the nut by the wrench so that it is possible to insert the cotter pin (11) into the nearest possible notch of the castle nut and secure the cotter pin (Section 20-20).
 - (h) Check, eventually adjust the deflections of ailerons (see par. 2 A.(11)).
 - (i) Install the cover W3L / W3R on the lower side of the wing (Fig. 06-2).
- (11) Adjustment / check – adjustment of aileron deflections

CAUTION

FOR SETTING THE VALUES OF AILERON DEFLECTIONS,
NEVER USE THE END PIECE OF SHORT PULL-ROD IN THE
COCKPIT THAT IS ACCESSIBLE AFTER REMOVING THE
FAIRINGS BETWEEN THE WING AND THE FUSELAGE!

- (a) Preparatory work
 - 1 Check the plays in the roll control.
 - 2 Make sure whether there is no rubbing and excessive friction in the aileron control system.
 - 3 During the replacement of pull-rods, set the lengths in accordance with the original ones.
- (b) Adjustment of the range of deflections

Set the range of deflections by means of the setting screws of stops of roll control that are located on the console of the left control stick and the right control stick.
- (c) Adjustment of the position of ailerons

The position of ailerons in the neutral position can be adjusted by means of the adjustable end piece of the short pull-rod located in the cockpit or by means of the adjustable end piece of the long pull-rod located on the leading edge of the wing after removing the cover W3L / W3R on the lower side of the wing (Fig. 06-2).



(d) Adjustment of aileron differentiation

A differentiation, it means the difference between the upper deflection and the lower deflection of aileron, can be adjusted by means of the end piece of pull-rod that leads from the two-armed angular lever in the wing up to the attachment on the aileron.

The adjustable end piece is accessible on the lower side of aileron after deflecting the aileron upwards.

(e) Check of plays in roll control

- 1 Lock the aileron movement by means of blocking.
- 2 By moving the control stick to sides, determine the play in the roll control.
- 3 Eliminate an excessive play in the roll control system by repairing or replacing the parts that have excessive plays.



RUDDER & TAB

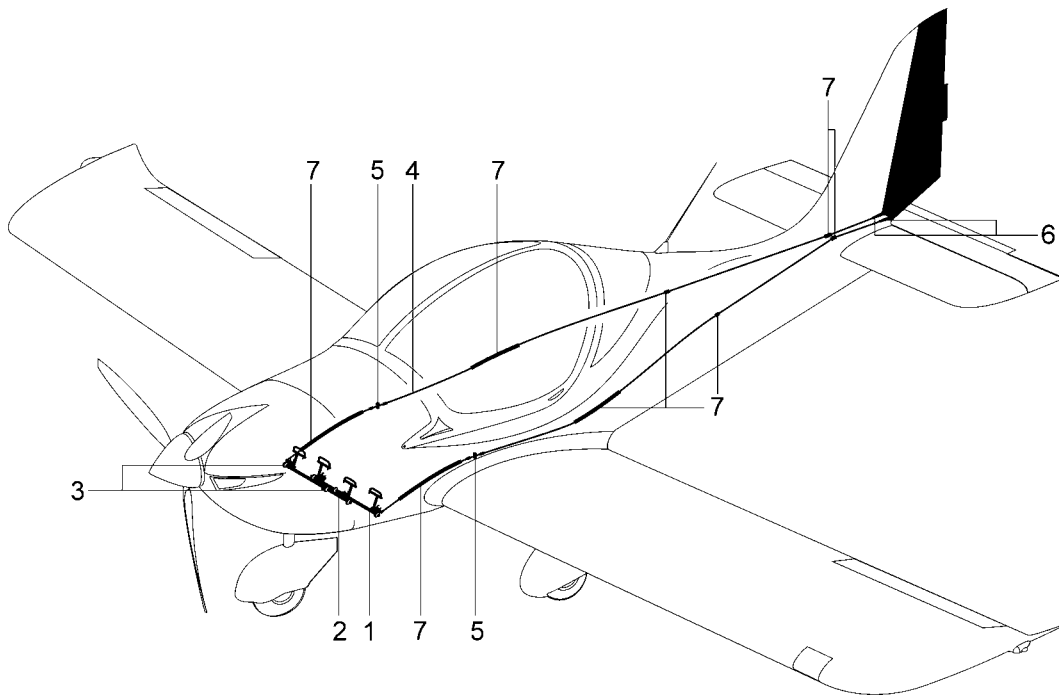
1. DESCRIPTION AND OPERATION

The yaw control is doubled - left and right.

The movement of the pedals is transferred to the rudder by the steel cables (4, Fig. 27-7). The cables are attached to the left pedal of left foot control, to the right pedal of right foot control and to the attachments on the rudder. The route of cables of rudder control is led along the sides of the fuselage. The cables are led in the plastic guiding tubes (7) in the exposed places. The stops of cables are located in the area of fuselage frame No. 3.

The pedals of yaw control are connected with the nose landing gear by means of the adjustable pull-rods (Section 32-50). The rudder deflecting and the nose landing gear steering are controlled via the movement of foot control pedals. The hydraulic pumps of brakes are also controlled by the foot control pedals.

The yaw control can be set in three positions. In the older version, the setting and locking mechanism of foot control pedals is located on the countershafts of foot control (1; 2). In the newer version, the setting and locking mechanism of foot control pedals is controlled via the bowden cables by means of the levers **ADJUSTABLE PEDALS LEVER** located on the left side and on the right side of the fuselage below the instrument panel.



Legend to Fig. 27-7

1	Rear countershaft	5	Grommet
2	Front countershaft	6	End piece
3	Bearing	7	Tube
4	Cable		

Fig. 27-7 Yaw control



The deflections of rudder control are shown in Tab. 27-1. The prestressing of the cables (150 ± 50 N) is solved by the turnbuckles at the suspensions of cables on the rudder. The control cable consists of the steel cable $\varnothing 3.15$ mm, one end of which is pressed-in into the steel pull-rod. The turnbuckle is composed of the cable pull-rod with M6 thread and the end piece of cable with inner thread. After setting the prestressing of the cable, the end piece is secured by the counter nut.



2. MAINTENANCE PRACTICES

A. Yaw control

Maintenance type: Heavy

Personnel qualification: Independent verification personnel qualified in accordance with Part 66 or higher

Recommended tools and material:

Item	Designation / Size	Quantity	Note
Flat screwdriver	-	1 pc.	
Wrench	No. 9	1 pc.	
Wrench	No. 10	1 pc.	
Hex wrench	No. 3	1 pc.	
Cutting pliers	-	1 pc.	
Pliers NICOPRESS	64-CGMP OVAL	1 pc.	
Checking gauge	OVAL M	1 pc.	Nominal size of 9 mm
Cotter pin	1,6x16	2 + 2 pcs.	
Cable tie	2,5x99	2 pcs.	
Sleeves NICOPRESS	TOST 217283 28-3-M	2 pcs.	
Locking washer	5,3	8 pcs.	
Degreaser agent	Technical benzine	-	
Grease	AeroShell Grease 22	-	
Lubricating paste	Molyka R	-	
Adhesive	Loctite 243	-	

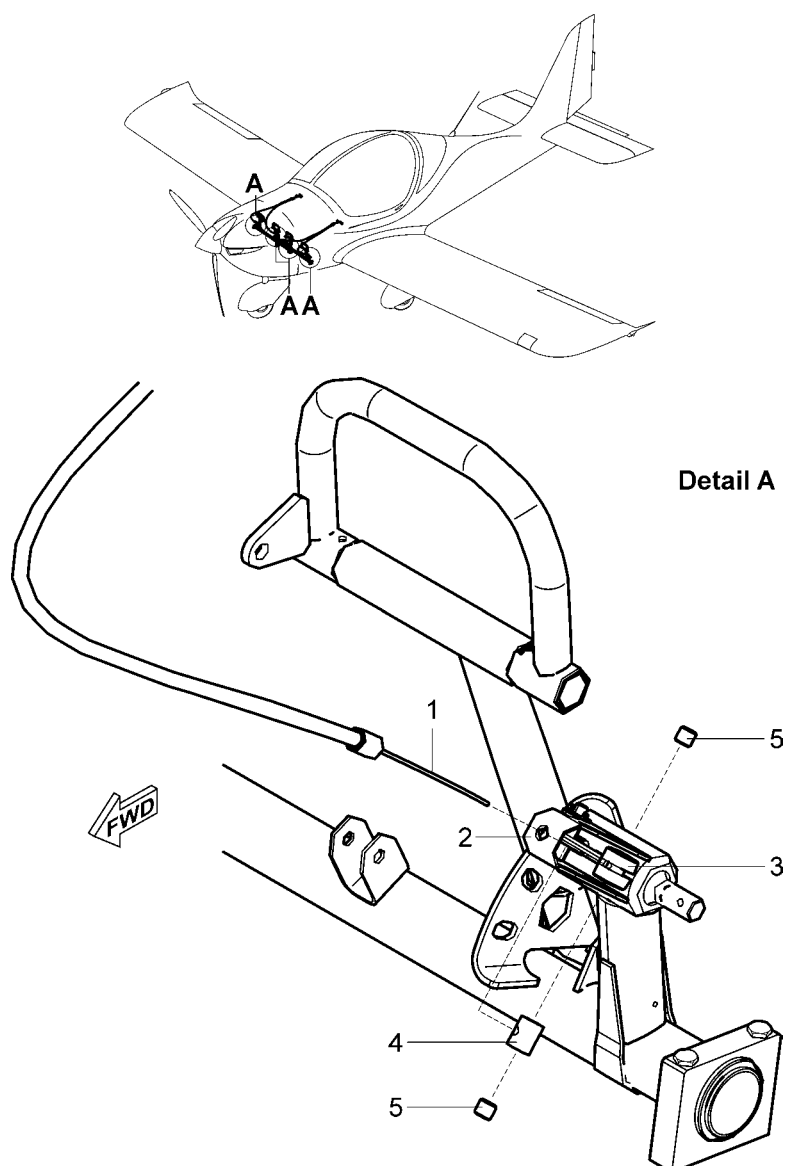
NOTE

It is necessary to perform work by two persons when removing and installing the bearings of countershafts of foot control pedals.

- (1) Removal – countershaft with the pedals of foot control
 - (a) Cut off the cable ties on the fuselage bottom side, that hold the canvas covers on the countershaft levers.
 - (b) Disconnect the pull-rods of nose landing gear control from the countershafts (Section 32-50).
 - (c) Remove the brake pumps (Section 32-40).
 - (d) If the manual control of position setting is installed on the airplane, loosen the screws (5, Fig. 27-8) and pull out the cable (1) from the lever (3) and from the suspension (2); carry it out for all four pedals.
 - (e) Pull out the cotter pin (12, Fig. 27-9), unscrew the nut (10), pull out the washer (11), bush (9) and disconnect the cable (8) from the bolt of countershaft (1; 2).



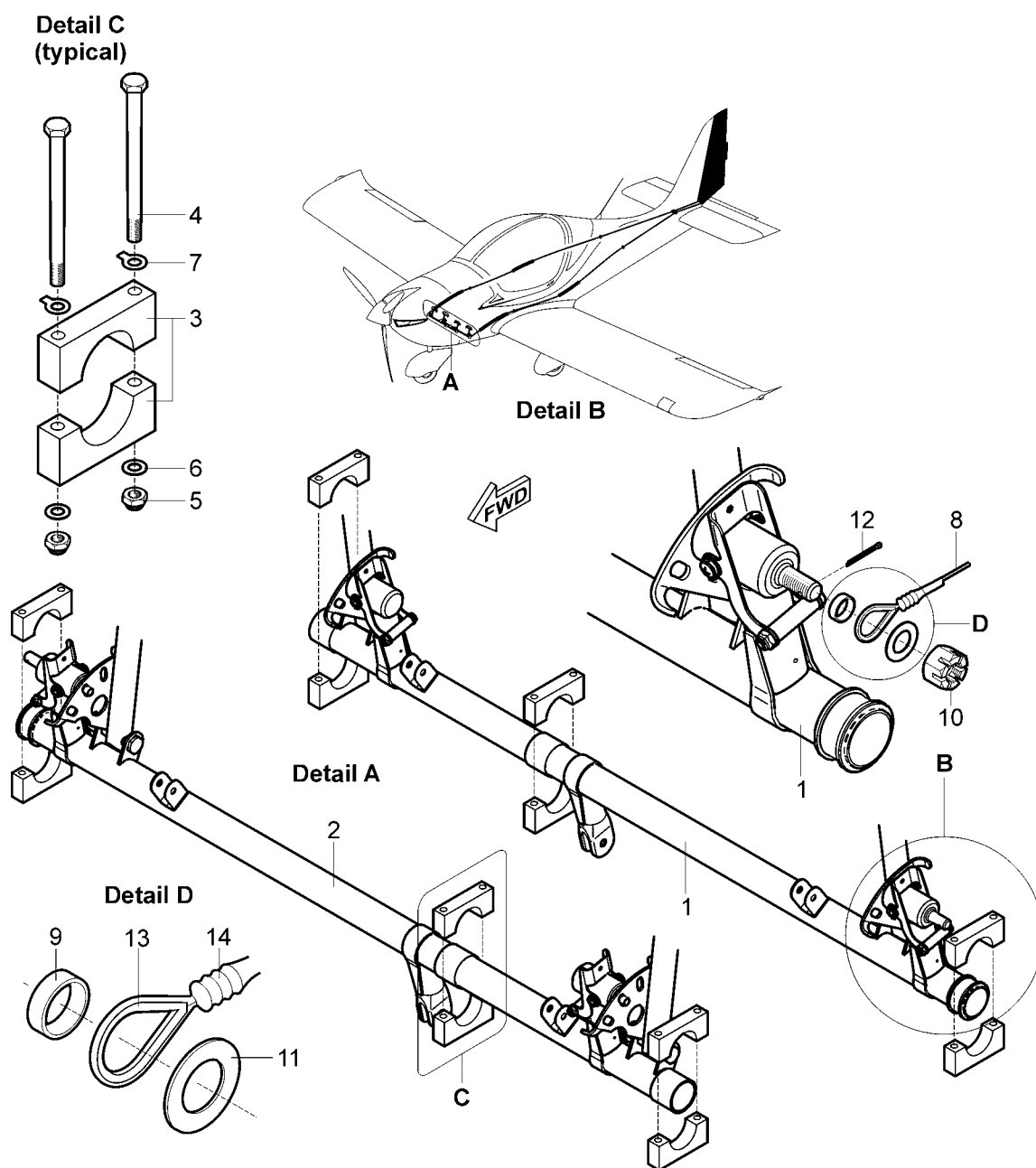
- (f) Unlock the locking washers (7), unscrew the nuts (5) and remove the washers (6; 7) and the bolts (4).
- (g) Remove the bearings (3).
- (h) Remove the countershafts (1; 2) from the cockpit.
- (2) Installation – countershaft with the foot control pedals
 - (a) Lubricate all the bearings and friction surfaces with grease.
 - (b) Position the countershafts (1; 2, Fig. 27-9) of foot control on the cockpit floor.
 - (c) Put the new locking washers (7) on the bolts (4) and insert the bolts into the holes in the bearings (3).
 - (d) Put the washers (6), from the outer side of the fuselage, on the protruding parts of the bolts (7), screw on the nuts (5) and tighten them.
 - (e) Secure the locking washers (7) under the bolt heads (4).
 - (f) Put the bush (9) and the cable (8) on the bolt of the countershaft (1; 2).
 - (g) Put the washer (11) on the bolt and screw on the castle nut (10); tighten the nut by the wrench so that it is possible to insert the cotter pin (12) into the nearest possible notch of the castle nut and secure the cotter pin (Section 20-20).
 - (h) If the manual control of position setting is installed on the airplane, insert the cable (1, Fig. 27-8) into the suspension (2) and the end piece (4) in the lever (3) and tighten the screws (5); carry it out for all four pedals.
 - (i) Attach the pull-rods of nose landing gear control to the countershafts (Section 32-50).
 - (j) Using the cable ties, secure the cloth covers to the countershaft levers.
 - (k) Install the brake pumps (Section 32-40).
 - (l) Check the stress in the cables.
 - (m) Check, eventually adjust the deflections of rudder (see par. 2 A.(7)).



Legend to Fig. 27-8

1 Cable	4 End piece of cable
2 Suspension	5 Screw M6x5 (2 pc.)
3 Lever	

Fig. 27-8 Manual control of position setting – disconnection / connection of the cable



Legend to Fig. 27-9

1	Rear countershaft	8	Cable
2	Front countershaft	9	Bush
3	Bearing	10	Nut M8
4	Bolt M5x50	11	Washer 8,4
5	Nut M5	12	Cotter pin 2x10
6	Washer 5,3	13	Thimble of cable
7	Locking washer 5,3	14	Clamp NICOPRESS

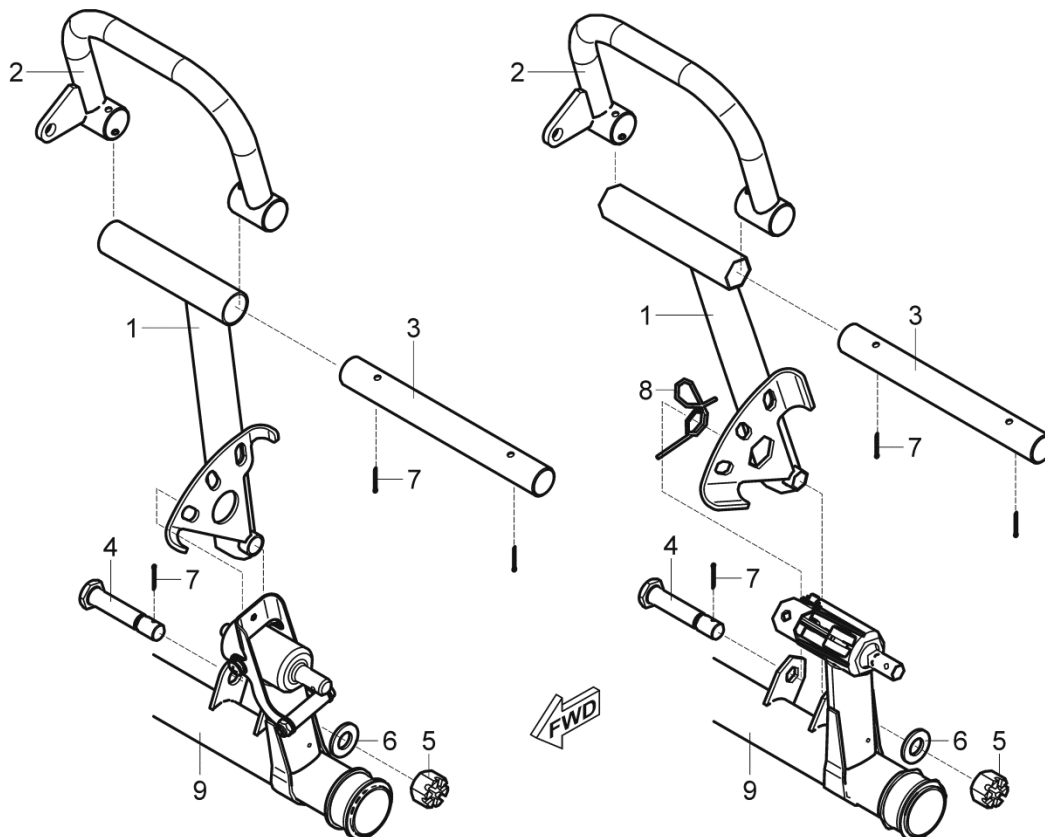
Fig. 27-9 Countershaft and cable attachment – removal / installation



- (3) Removal – pedals and brake plates
- (a) Remove the cotter pin (7, Fig. 27-10), unscrew (5) and remove the bolt (4); pull out the spring (8) in the case of installation of pedals with manual adjustment of position.
 - (b) Remove the pedal (1).
 - (c) Pull out the cotter pins (7), pull out the axis (3) and remove the brake plates (2).

Pedal without manual adjustment of position

Pedal with manual adjustment of position



Legend to Fig. 27-10

1 Pedal	6 Washer 8.4
2 Brake pedal	7 Cotter pin 2x20
3 Tube	8 Return spring
4 Bolt M8x41	9 Countershaft
5 Nut M8	

Fig. 27-10 Foot control pedal – removal / installation



- (4) Installation – pedals and the brake plates
 - (a) Lubricate all the bearings and friction surfaces with grease.
 - (b) Position the attachments of the brake plate (2, Fig. 27-10) to the attachments on the pedal of foot control (1).
 - (c) Insert the axis (3) lubricated with grease into the mounting in the attachments and secure it by cotter pins (7).
 - (d) Insert the bolt (4) lubricated with grease into the corresponding holes in the countershaft (9) and in the pedal (1); if the manual control of position setting is installed on the airplane, insert the spring (8) between the pedal (1) and the fork of countershaft (9).
 - (e) Put the washer (6) on the bolt (4) and screw on the castle nut (5); tighten the nut by the wrench so that it is possible to insert the cotter pin (7) into the nearest possible notch of the castle nut and secure the cotter pin (Section 20-20).
 - (f) Check, eventually adjust the deflections of rudder (see par. 2 A.(7)).
- (5) Removal – cable of yaw control

CAUTION

THE CONTROL CABLE CANNOT BE REMOVED WITHOUT ITS DAMAGING. REMOVE THE CABLES OF YAW CONTROL ONLY WHEN REPLACING THEM WITH NEW ONES.

NOTE

The procedure of removal is identical for the left as well as for the right cable of yaw control.

- (a) Loosen the nut (2, Fig. 27-12) and the turnbuckle of yaw control cable; the turnbuckle consists of the cable end with thread and the end piece (1).
- (b) Tin the cables in the cockpit in the position after the rear stops and prepare them for cutting off.
- (c) Tin the ends of new cables (3) on the side without a threaded part.
- (d) Pull out the cotter pin (12, Fig. 27-9), unscrew the nut (10), pull out the washer (11), bush (9) and disconnect the cable (8) from the bolt of countershaft (1; 2).
- (e) Unscrew the bolt (4, Fig. 27-12) with the washer (5), remove the spacing washers (6) and disconnect the cable from the rudder (12).
- (f) Tie up the cables (3) with wire, so that they cannot fall into the fuselage.
- (g) Cut off the cable (3) after the rear stops and solder a sufficiently long wire (about 3 – 3,5 m) on the tin-coated ends.
- (h) Pull out the cables (3) along with the wire through the rear part of the fuselage so that a sufficient part of the wire is protruding to the cockpit. Cut off the cables with scissors and let the wire protrude from the rear part of the fuselage.
- (i) Cut off the parts of the cable before the front stops and pull out the cables in the direction towards the pedals of foot control.
- (j) Cut the cable short part with the stop. Pull the cable out of teflon bushing at the fuselage frame. Store the stop parts for another installation of the new cables.



(6) Installation – cable of foot control

NOTE

The procedure of installation is identical for the left as well as for the right cable of yaw control.

- (a) Put the measuring jig on the vertical tail unit.
- (b) Lock the rudder position in the neutral position; lock the pedals of foot control in the neutral position.
- (c) Tin the free ends of cables (3, Fig. 27-12) (without pressed-in end pieces).
- (d) Solder the wire protruding from the end of the fuselage to the tin-coated part of the cable (3).
- (e) Pull the wire with the cable (3) into the fuselage; tie up the threaded end pieces of cables by the wire so that the cable ends (3) cannot fall in the fuselage.
- (f) Cut off the lockwire.
- (g) Put all the necessary parts of stop (2; 7; 8; 9; 10; 11) on the cable (3).
- (h) Pass the cable end (3) through the teflon bushing at the frame No.3 and put on the parts of stop (2; 7; 8; 9; 10; 11).
- (i) Pass the cable end (3, Fig. 27-7) through the plastic tube (7) to the pedals of foot control.
- (j) Screw on the nut (2, Fig. 27-12) on the threaded part of cable and screw it into the end piece (1) so that the thread reaches the position beyond the check hole in the threaded part of the end piece (1), approximately up to a half of the thread length.
- (k) Mount the end piece (1) with the cable (3) onto the rudder; insert the end piece (1) with the washers (6) into the attachment on the rudder (12).
- (l) Put the washer (5) on the bolt (4) and screw it on the rudder attachment.
- (m) Put the bush (9, Fig. 27-9), cable thimble (13), washer (11) on the bolt of countershaft (1; 2) and screw the nut (10).
- (n) Insert the cable (8) into the thimble (13) and by pulling tighten the free end up to the value of 150 ± 50 N. Mark together both parts of the cable in the nearest possible position to the cable thimble (13), for example by a marker pen. Remove the cable thimble (13) from the bolt of the countershaft (1; 2). Put the NICOPRESS clamp (144) and the shrinkable hose on the free end of cable. Route the cable through the thimble (13) and lock it in such a way that the marks on the cable match.
- (o) By means of the NICOPRESS pliers, press in the clamps three times (Fig. 27-11) as close to the cable thimble as possible (max. 0.5 of cable diameter) and check the pressing-in by the gauge; cracks or misalignment of cables are unacceptable!

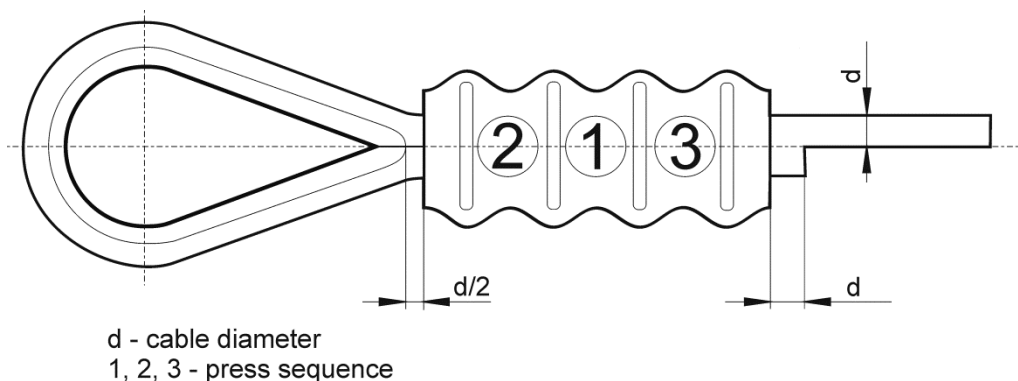


Fig. 27-11 Pressing-in of NICOPRESS end piece

- (p) Put the shrinkable hose on the clamp and also on the overlapping part of cable (min. 1 diameter of cable) and tighten it by application of heat.
- (q) Repeat the same procedure for the other cable.
- (r) Put the bush (9, Fig. 27-9) and the cable (8) with the thimble on the bolt of countershaft (1; 2).
- (s) Put the washer (11) on the bolt and screw on the castle nut (10); tighten the nut by the wrench so that it is possible to insert the cotter pin (12) into the nearest possible notch of the castle nut and secure the cotter pin (Section 20-20).
- (t) Tighten the cable to the specified value of 150 ± 50 N.
- (u) Screw on the bolt of the stop (8, Fig. 27-12) by a half of the thread length into the nut of the stop (7); don't tighten the nut (2) - by this you will allow the subsequent fine tuning of deflections.
- (v) Unlock the nose landing gear, pedals of foot control and the rudder.
- (w) By deflecting the rudder to both extreme positions (Tab. 27-1), determine the position for the pressing-in of stops.
- (x) Mark the position of individual stops on the left as well as on the right cable by a marker pen. Successively, position the faces of the stop nuts (7) on the marks, and position the short part of the cable (10) to the shoulder on the bolt (8).
- (y) Put the NICOPRESS sleeve (9) on the cables and press it in. The procedure is the same as for the thimbles of cables.
- (z) Check the pressing-in, put the shrinkable hose (11) and tighten it by application of heat; carry it out gradually for all four stops.
- (aa) Check the deflections, adjust the stops and tighten the nuts (2).
- (bb) Lock the pedals of foot control and verify the neutral position of the rudder. As needed, adjust the turnbuckles of cables within the scope of the tolerance of cable tightening.

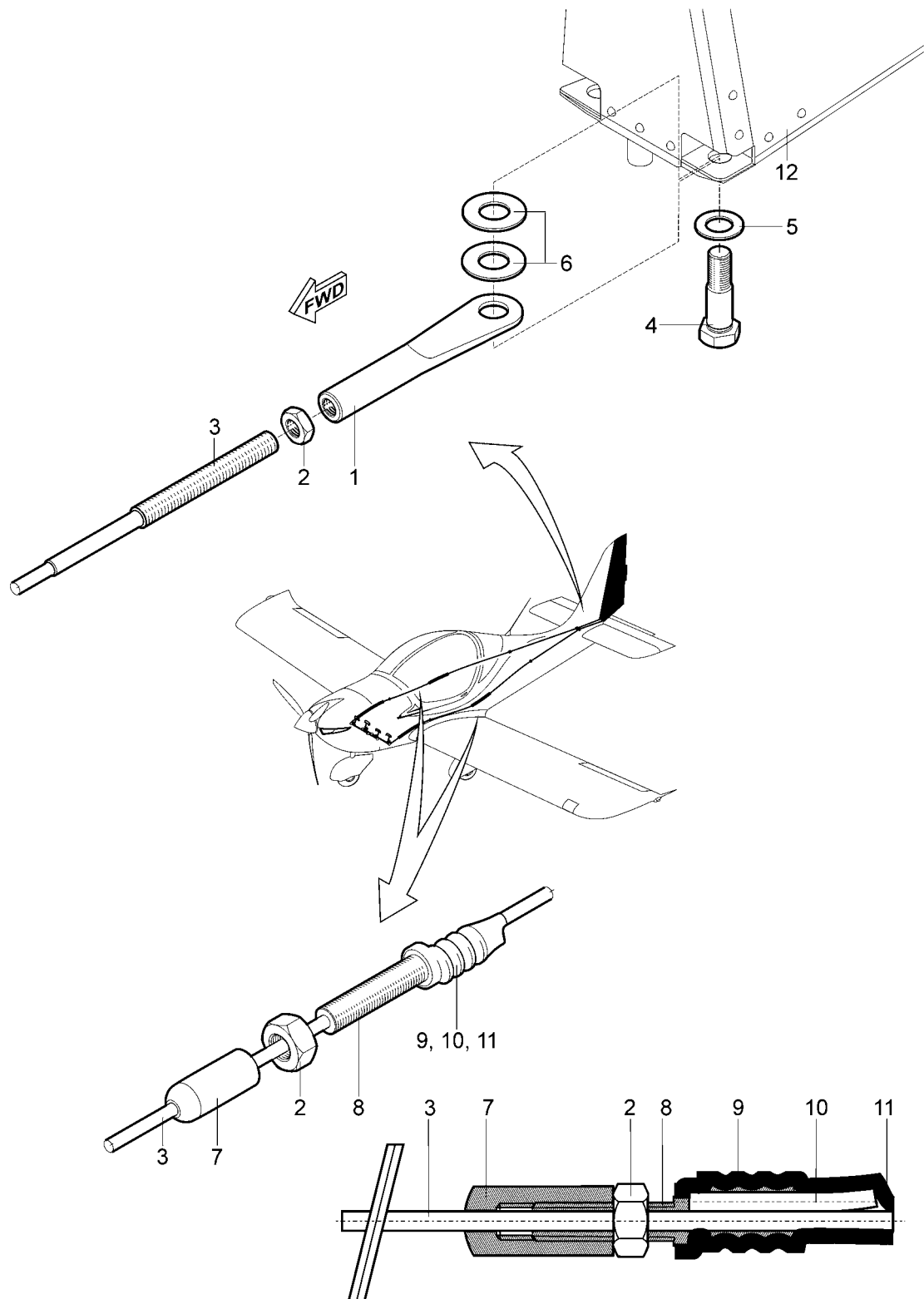


Fig. 27-12 Yaw control – cable suspension on the rudder – left side (page 1 of 2)



Legend to Fig. 27-12

1	End piece	8	Bolt
2	Nut M6	9	Clamp NICOPRESS
3	Cable	10	Cable
4	Bolt M6x23	11	Shrinkable hose
5	Washer 8,4		For information:
6	Washer 6,4	12	Rudder
7	Nut		

Fig. 27-12 Yaw control – cable suspension on the rudder – left side (page 2 of 2)

- (7) Adjustment / check – the adjustment of rudder deflections
- (a) Lift up the airplane in order to unload the wheel of nose landing gear.
 - (b) Lock the pedals of nose control in the neutral position.
 - (c) Position the measuring jig on the vertical tail unit and measure the deflection of rudder. The measuring jig also serves for centering the rudder in the neutral position.
 - (d) Adjust the tightening of cables and the neutral position of rudder.
 - 1 Measure the tightening of cables by means of strain gauge.
 - 2 By means of the turnbuckles located on the cables of foot control, set the tightening of cables to the value of 150 ± 50 N.
 - 3 Check the neutral position of rudder and carry out adjustment by means of the turnbuckles on the cables of foot control. The tightening of cables must be within the specified tolerance.
 - (e) Adjust the deflections of rudder.
 - 1 Unlock the pedals of foot control.
 - 2 Check the extreme deflections of rudder (Tab. 27-1).
 - 3 Set the deflections of control surface by means of the adjustable stops on the cables of rudder control.



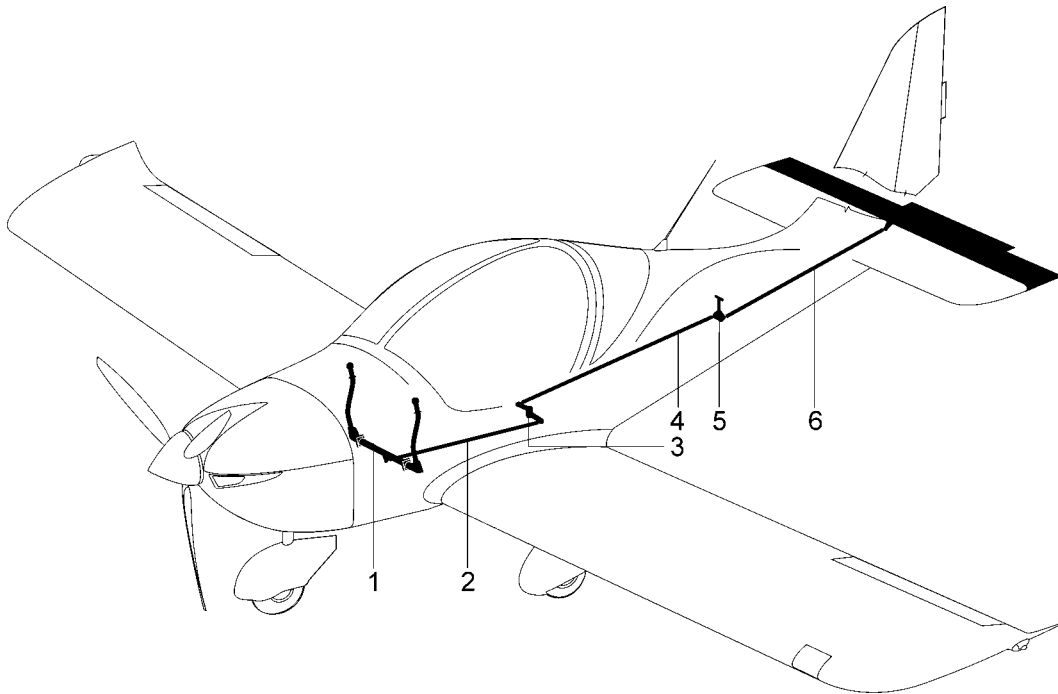
ELEVATOR & TAB

1. DESCRIPTION AND OPERATION

A. Pitch control

The pitch control is doubled, left and right.

The pitch control is operated by the left control stick or the right control stick that are attached to the countershaft of manual control (1, Fig. 27-13). The movement of the control stick is transferred from the countershaft by the pull-rod (2), led via the central channel (between the seats) in the cockpit, to the deflection of the two-armed lever (3) located under the floor in the baggage compartment. An angular deflection of the two-armed lever is transferred to a longitudinal movement of two pull-rods (4; 6) connected with the rocker arm (5) in the middle of the rear part of the fuselage. The rear pull-rod (6) is attached to the elevator lever.



Legend to Fig. 27-13

1 Countershaft of manual control	4 Pull-rod
2 Pull-rod	5 Rocker arm
3 Two-armed lever	6 Pull-rod

Fig. 27-13 Pitch control

The movement of the control stick is limited by two stops. The joint stop of both control sticks in the sense of control "pushed" is located on the console of manual control levers; in the sense of control "pulled" each control stick has a stop on the stiffened front part of the seat. The pull-rods have adjustable eyes with the self-aligning bearings on the ends that allow adjusting the elevator deflections.

The values of elevator deflections are shown in Tab. 27-1.



B. Pitch trim

The elevator trim tab is located on the elevator trailing edge. It is controlled by the electromechanical strut connected with the angular lever on the trim tab via the pull-rod. The deflections of the trim tab are set by the manufacturer. In the upper part of both control sticks, there is a head with control buttons that serve for setting the trim tab deflections. The sense of control is: forwards (heavy on nose) or backwards (heavy on tail).

The electromechanical strut is mounted inside the elevator; the connector is attached to the bracket on the pull-rod of elevator control. The relative position of the trim tab is, in the case of the installation of analog instruments, indicated by the indicator on the instrument panel. The neutral position is located between the marks on the indicator.

In the case, that Dynon SkyView system is installed, a trim tab position is digitally indicated on the display EFIS / EMS as a column with four signs.

The upper sign indicates the "nose heavy" position.

The second sign from above indicates the "neutral" position.

The lower sign indicates the "tail heavy" position.

The triangle mark indicates the position of the trim tab.

In the case, that Garmin G3X system is installed, a trim tab position is digitally indicated on the display PFD as a column with following signs.

The upper sign **UP** indicates the "nose heavy" position.

The second sign from above indicates the "neutral" position.

The lower sign **DN** indicates the "tail heavy" position.

The triangle mark **E** indicates the position of the trim tab.

The values of deflections and the neutral positions of the trim tab of pitch trimming are shown in Tab. 27-1. The electromechanical strut and the indicator in the cockpit are set by the manufacturer.

C. System of stall warning

The sensor of stall warning system, that works on the principle of a pressure change on the leading edge of wing at a change of the angle of attack, is located on the leading edge of the left wing. A small flap, that is during a normal flight in the lower position, protrudes from the sensor of stall speed. When the critical angle of attack is approached (stall speed proximity), the flap is displaced due to a change of pressure differences acting on the upper part and the lower part of the flap, and the electrical circuit is connected. This connection activates acoustic signalization. The acoustic signalization is based on the sound module located on the bracket before the instrument panel (Section 31-50).

The wiring diagram of the stall warning system is shown in Chapter 91.



2. MAINTENANCE PRACTICES

A. Pitch control

Maintenance type: Heavy

Personnel qualification: Independent verification personnel qualified in accordance with Part 66 or higher

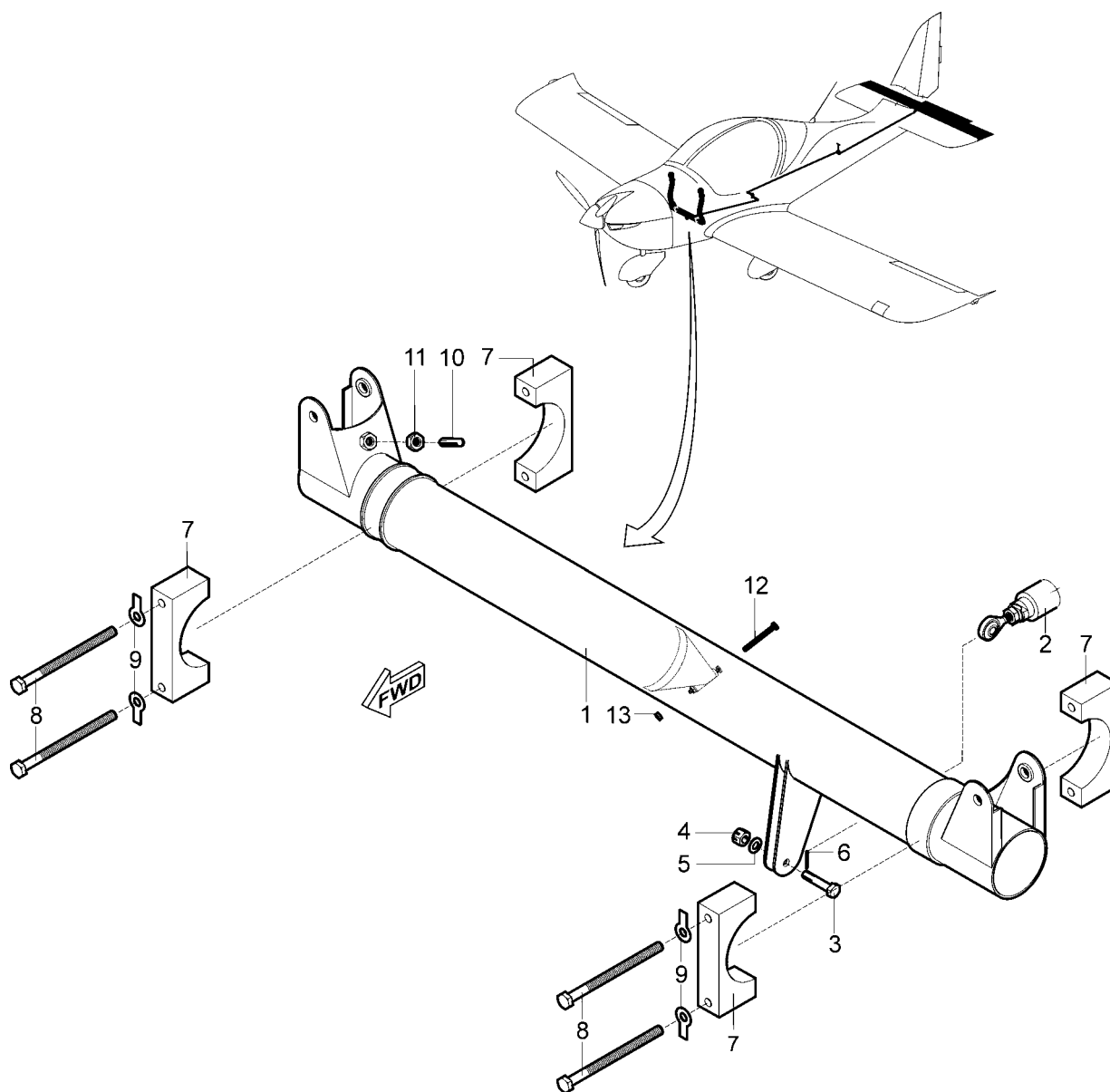
Recommended tools and material:

Item	Designation / Size	Quantity	Note
Flat screwdriver	-	1 pc.	
Wrench	No. 9	1 pc.	
Wrench	No. 10	1 pc.	
Cutting pliers	-	1 pc.	
Cable tie	3,6x142	1 pc.	
Cotter pin	1,6x16	2 + 2 pcs.	
Locking washer	5,3	4 pcs.	
Degreaser agent	Technical benzine	-	
Grease	AeroShell Grease 22	-	
Lubricant paste	Molyka R	-	
Adhesive	Loctite 243	-	

- (1) Removal – pull-rod in the cockpit
 - (a) Remove the floor of the baggage compartment IN3 (Fig. 06-2).
 - (b) Pull out the cotter pin (6, Fig. 27-14), unscrew the nut (4), remove the washer (5) and the bolt (3) connecting the pull-rod (2) with the fork of the countershaft (1).
 - (c) Pull out the cotter pin (7, Fig. 27-16), unscrew the nut (5), remove the washers (6) and the bolt (8) connecting the pull-rod (2) with the lever in the fuselage (1).
 - (d) Remove the pull-rod (2) from the fuselage.
- (2) Installation – pull-rod in the cockpit
 - (a) Lubricate all the bearings and the friction surfaces with grease.
 - (b) Position the pull-rod eye (2, Fig. 27-14) to the fork on the countershaft of control system (1) and insert the bolt (3).
 - (c) Put the washer (5) on the bolt (3) and screw on the castle nut (4); tighten the nut by the wrench so that it is possible to insert the cotter pin (6) into the nearest possible notch of the castle nut and secure the cotter pin (Section 20-20).
 - (d) From each side of the bearing on the eye of pull-rod (2, Fig. 27-16), position the washers (6) between the fork of the lever (1) and the bearing of pull-rod (2) and insert the bolt (8) with the washer (6).
 - (e) Put the washer (6) on the bolt (8) and screw on the castle nut (5); tighten the nut by the wrench so that it is possible to insert the cotter pin (6) into the nearest possible notch of the castle nut and secure the cotter pin (Section 20-20).
 - (f) Check, eventually adjust the deflections of elevator (see par. 2 A.(13)).



- (g) Install the floor of the baggage compartment IN3 (Fig. 06-2).



Legend to Fig. 27-14

1	Countershaft of manual control	8	Bolt M5x70
2	Pull-rod	9	Locking washer 5,3
3	Bolt M6x23	10	Bolt M6x20
4	Nut M6	11	Nut M6
5	Washer 6x0,5	12	Stop bolt
6	Cotter pin 1,6x16	13	Nut M6
7	Two-piece bearing		

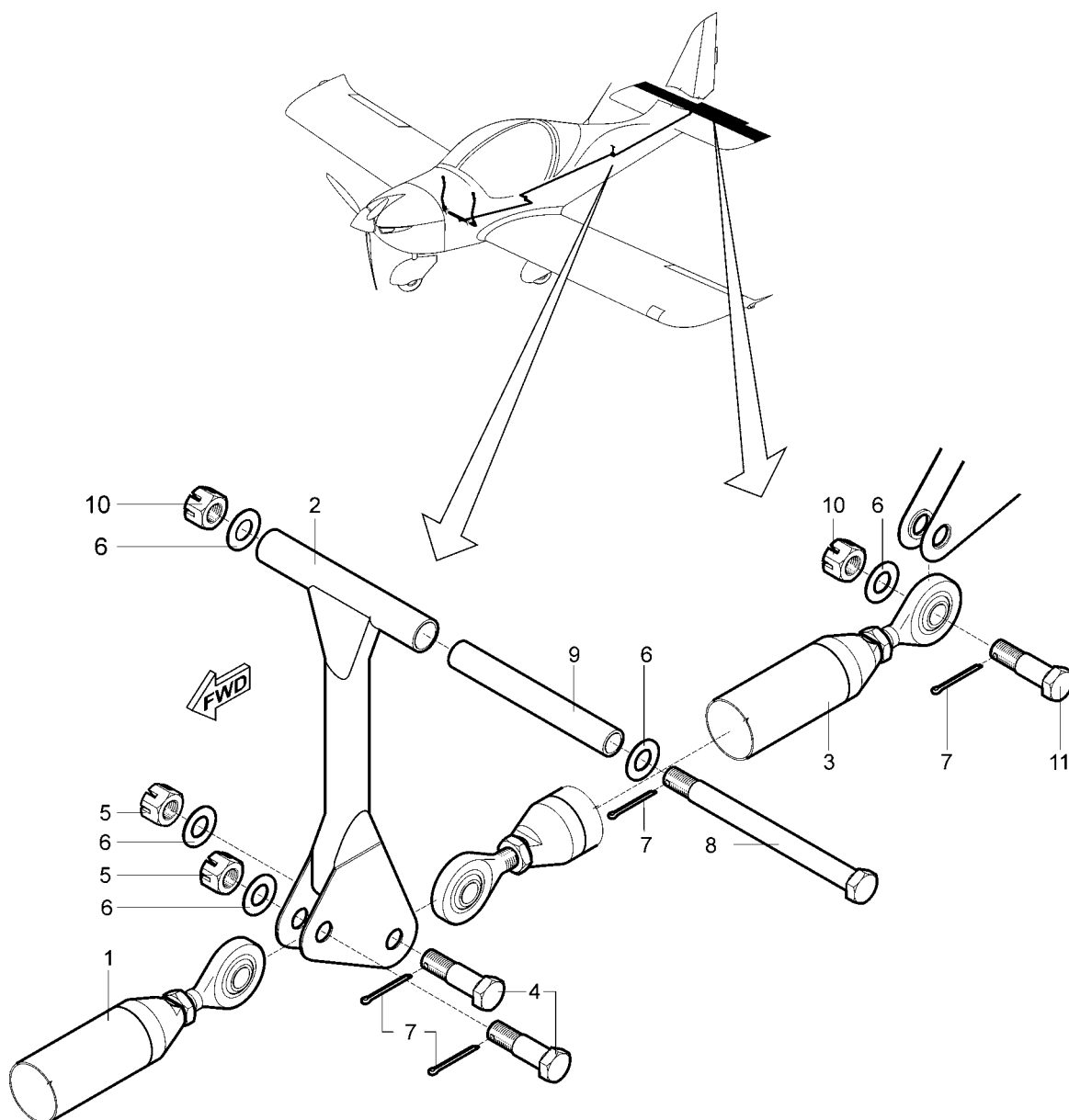
Fig. 27-14 Manual control countershaft – removal / installation



- (3) Removal – pull-rod in the fuselage.
 - (a) Remove the floor of the baggage compartment IN3 and the cap F5 (Fig. 06-2).
 - (b) Cut off the cable tie that holds the canvas cover on the pull-rod.
 - (c) Pull out the cotter pin (7, Fig. 27-16), unscrew the nut (5), remove the washers (6) and the bolt (8) connecting the pull-rod (3) with the lever (1) in the fuselage.
 - (d) Pull out the cotter pin (7, Fig. 27-15), unscrew the nut (5), remove the washer (6) and the bolt (4) connecting the pull-rod (1) with the rocker arm (2) in the fuselage.
 - (e) Remove the pull-rod (1) from the fuselage.
- (4) Installation – pull-rod in the fuselage
 - (a) Lubricate all the bearings and the friction surfaces with grease.
 - (b) From each side of the bearing on the eye of pull-rod (3, Fig. 27-16), position the washers (6) between the fork of lever (1) and the bearing of pull-rod (3) and insert the bolt (8) with the washer (6).
 - (c) Put the washer (6) on the bolt (8) and screw on the castle nut (5); tighten the nut by the wrench so that it is possible to insert the cotter pin (6) into the nearest possible notch of the castle nut and secure the cotter pin (Section 20-20).
 - (d) Position the eye of pull-rod (1, Fig. 27-15) into the fork of rocker arm (2) and insert the bolt (4).
 - (e) Put the washer (6) on the bolt (4) and screw on the castle nut (5); tighten the nut by the wrench so that it is possible to insert the cotter pin (7) into the nearest possible notch of the castle nut and secure the cotter pin (Section 20-20).
 - (f) Check, eventually adjust the elevator deflections (see par. 2 A.(13)).
 - (g) Using the cable tie, secure the cloth cover to the pull rod.
 - (h) Install the floor of the baggage compartment IN3 and the cap F5 (Fig. 06-2).
- (5) Removal – countershaft of manual control
 - (a) Remove the control sticks (Section 27-10).
 - (b) Remove the parking brake valve (Section 32-42).
 - (c) Remove the floor of the baggage compartment IN3 (Fig. 06-2).
 - (d) Disconnect the pull-rod (2, Fig. 27-14) of pitch control from the countershaft (1).
 - (e) Unlock the locking washers (9) and unscrew the bolts (8).
 - (f) Remove the bearings (7) and the countershaft (1) from the fuselage.
- (6) Installation – countershaft of manual control
 - (a) Lubricate all the bearings and the friction surfaces with grease.
 - (b) Position the countershaft (1, Fig. 27-14) into the fuselage, including the bearings (7).
 - (c) Screw on the bolts (8) with the new locking washers (9); tighten the bolts (8) in such a way that the clamping of the parts of bearings (7) allows swinging movement of the countershaft (1) of manual control.
 - (d) Secure the bolts (8) with washers (9).
 - (e) Attach the pull-rod (2) of pitch control to the countershaft (1).
 - (f) Install the control sticks (Section 27-10).
 - (g) Install the parking brake valve (Section 32-42).



- (h) Install the floor of the baggage compartment IN3 (Fig. 06-2).
- (i) Check, eventually adjust the elevator deflections (see par. 2 A.(13)).



Legend to Fig. 27-15

1 Pull-rod	7 Cotter pin 1,6x16
2 Rocker arm	8 Bolt M6x63
3 Pull-rod	9 Tube
4 Bolt M6x23	10 Nut M6
5 Nut M6	11 Bolt M6x25
6 Washer 6x1	

Fig. 27-15 Rocker arm of manual control – removal / installation



- (7) Removal – pull-rod in the rear part of the fuselage
 - (a) Drill off the rivets of skin and remove the skin sheet on the side of the fuselage (Section 53-30). It is recommended to perform this only in the cases when it is really necessary.
 - (b) Disconnect the connector (3, Fig. 27-18) on the pull-rod of pitch control. Cut the cable ties fastening the wires onto pull - rod
 - (c) Pull out the cotter pin (7, Fig. 27-15), unscrew the nut (5), remove the washer (6) and the bolt (4) connecting the pull-rod (3) with the rocker arm (2) in the fuselage.
 - (d) Pull out the cotter pin (7), unscrew the nut (10), remove the washer (6) and the bolt (11) connecting the pull-rod (3) with the fork of elevator lever.
 - (e) Remove the pull-rod (3) from the fuselage.
- (8) Installation – pull-rod in the rear part of the fuselage
 - (a) Lubricate all the bearings and the friction surfaces with grease.
 - (b) Position the eye of pull-rod (3, Fig. 27-15) into the fork of rocker arm (2) and insert the bolt (4).
 - (c) Put the washer (6) on the bolt (4) and screw on the castle nut (5); tighten the nut by the wrench so that it is possible to insert the cotter pin (7) into the nearest possible notch of the castle nut and secure the cotter pin (Section 20-20).
 - (d) Position the eye of pull-rod (3) into the fork of elevator lever and insert the bolt (11).
 - (e) Put the washer (6) on the bolt (11) and screw on the castle nut (10); tighten the nut by the wrench so that it is possible to insert the cotter pin (7) into the nearest possible notch of the castle nut and secure the cotter pin (Section 20-20).
 - (f) Attach the connector (3, Fig. 27-18) on the pull-rod of pitch control. Fasten the wirings onto the pull – rod by the cable ties.
 - (g) Check, eventually adjust the elevator deflections (see par. 2 A.(13)).
 - (h) Rivet the skin sheet on the side of the fuselage (Section 53-30).
- (9) Removal – the control lever in the fuselage
 - (a) Pull out the cotter pins (7, Fig. 27-16), unscrew the nuts (5), remove the washers (6), bolts (8) and disconnect the pull-rods (2; 3).
 - (b) Pull out the cotter pin (7), unscrew the nut (5), and remove the washer (6) and the bolt (4).
 - (c) Remove the lever (1) from the fuselage.
- (10) Installation – the control lever in the fuselage
 - (a) Lubricate all the bearings and the friction surfaces with grease.
 - (b) Position the lever (1, Fig. 27-16) into the fuselage and insert the bolt (4).
 - (c) Put the washer (6) on the bolt (4) and screw on the castle nut (5); tighten the nut by the wrench so that it is possible to insert the cotter pin (7) into the nearest possible notch of the castle nut and secure the cotter pin (Section 20-20).
 - (d) Connect the pull-rods (2; 3) by means of the bolts (8), washers (6) and the nuts (5); tighten the nuts by the wrench so that it is possible to insert the cotter pins (7) into the nearest possible notch of the castle nut and secure the cotter pins (Section 20-20).
 - (e) Check, eventually adjust the deflections of elevator (see par. 2 A.(13)).

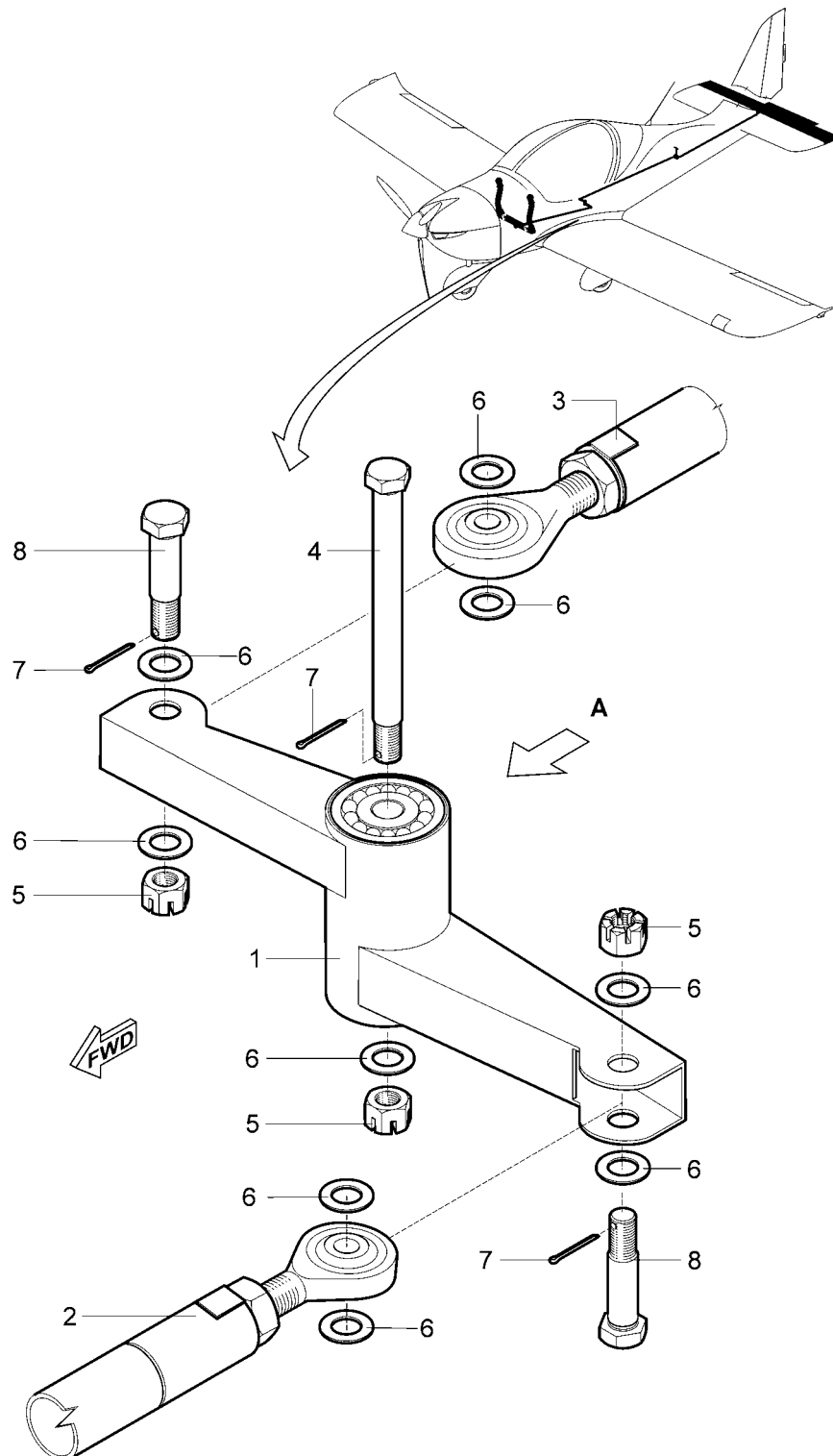
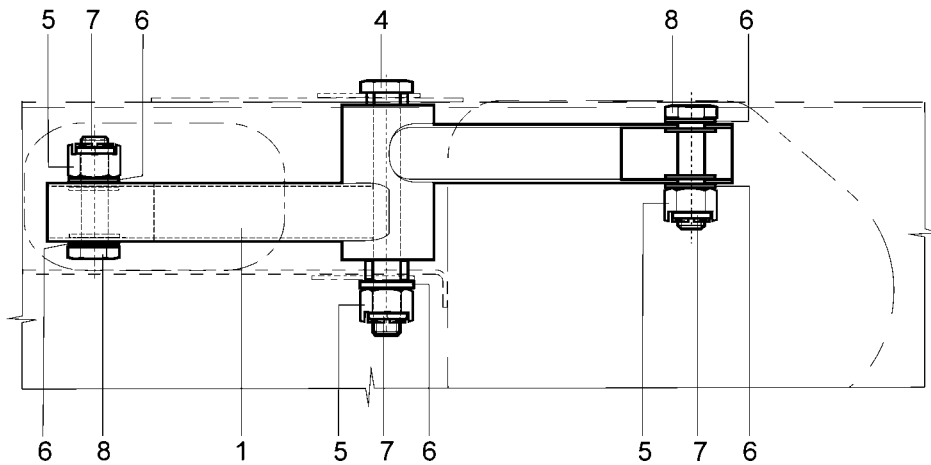


Fig. 27-16 Manual control lever – removal / installation (page 1 of 2)



View A



Legend to Fig. 27-16

1	Two-armed lever	5	Nut M6
2	Pull-rod	6	Washer 6x1
3	Pull-rod	7	Cotter pin 1,6x16
4	Bolt M6x63	8	Bolt M6x25

Fig. 27-16 Manual control lever – removal / installation (page 2 of 2)

- (11) Removal – rocker arm in the fuselage
- Drill off the rivets of skin and remove the skin sheet on the side of the fuselage (Section 53-30). It is recommended to carry out this only in the cases when it is really necessary.
 - Pull out the cotter pins (7, Fig. 27-15), unscrew the nuts (5), remove the washers (6), bolts (4) and disconnect the pull-rods (1; 3).
 - Pull out the cotter pin (7), unscrew the nut (10), and remove the washer (6) and the bolt (8).
 - Remove the rocker arm (2) from the fuselage.
 - Remove the tube (9) from the rocker arm (2).
- (12) Installation – rocker arm in the fuselage
- Lubricate all the bearings and the friction surfaces with grease.
 - Apply the paste MOLYKA on the tube (9, Fig. 27-15) and insert the rocker arm into the attachment (2).
 - Position the assembled rocker arm (2) to the fuselage and insert the bolt (8).
 - Put the washer (6) on the bolt (4) and screw on the castle nut (10); tighten the nut by the wrench so that it is possible to insert the cotter pin (7) into the nearest possible notch of the castle nut and secure the cotter pin (Section 20-20).
 - Connect the pull-rods (1; 3) by means of the bolts (4), washers (6) and nuts (5); tighten the nuts by the wrench so that it is possible to insert the cotter pins (7) into the nearest possible notch of the castle nut and secure the cotter pins (Section 20-20).
 - Check, eventually adjust the elevator deflections (see par. 2 A.(13)).



- (g) Rivet the skin sheet on the side of the fuselage (Section 53-30).
- (13) Adjustment / check – adjustment of elevator deflections
 - (a) Preparatory work
 - 1 When measuring the elevator deflections, take as a starting point the neutral position of control stick and elevator. The control stick neutral position is set by the manufacturer by means of the jig.
 - 2 For setting the neutral position, it is also possible to use the distance of 228 mm between the control stick and the instrument panel (Fig. 27-17) and the measurement of the distance from the fuselage sidewall.
 - 3 Set the elevator to the neutral position by means of the measuring jig.
 - (b) Check and adjustment of deflections
 - 1 Position the measuring jig or the protractor with a pointer on the horizontal tail unit.
 - 2 Set the elevator to the neutral position and reset the protractor.
 - 3 Pull and push the control stick to the extreme positions and read the deflection.
 - 4 Compare the measured values with Tab. 27-1.
 - 5 The range of elevator deflections is given by setting the stops on the control stick. The stop in the “pushed” direction can be finely tuned by the setting screw.
 - 6 When setting deflections, fully pull the control stick and measure the upper deflection of the elevator in order to find out whether it corresponds with the specified value; if not, adjust the deflection by means of the adjustable end piece of the pull-rod at the elevator.
 - 7 For setting the lower deflection of elevator, push the control stick and adjust the stop in the “pushed” direction so that the lower deflection of elevator corresponds to the value shown in Tab. 27-1.

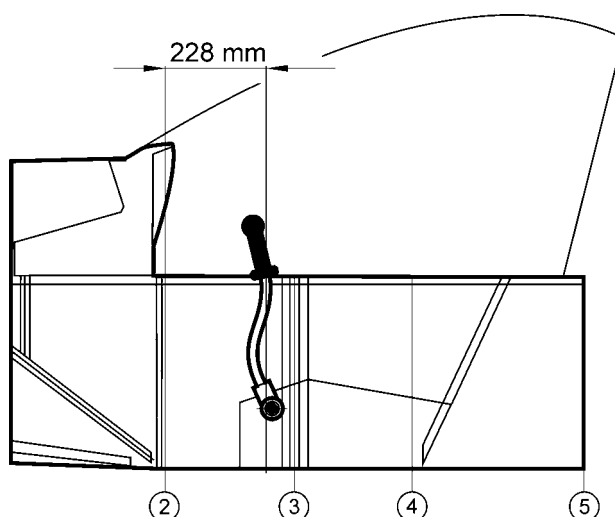


Fig. 27-17 Distance of the control stick from the system of frame 2



B. Pitch trim

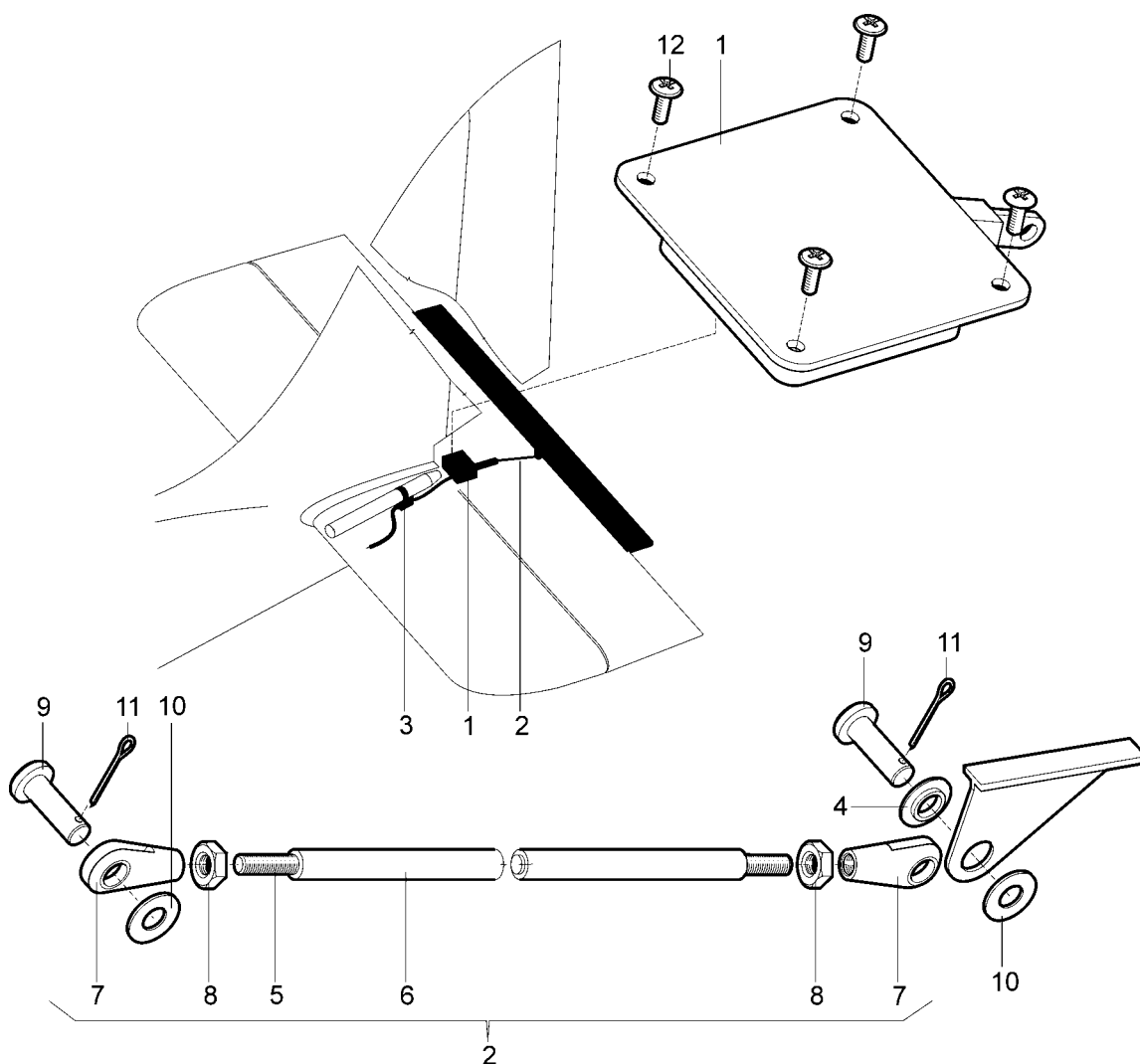
Maintenance type: Heavy

Personnel qualification: Independent verification personnel qualified in accordance with Part 66 or higher

Recommended tools and material:

Item	Designation / Size	Quantity	Note
Phillips screwdriver	No. 2	1 pc.	
Cutting pliers	-	1 pc.	
Soldering iron	-	1 pc.	
Solder	-	-	
Hot air gun	-	1 pc.	
Shrinkable plastic hose	ø 2,4x1.2	-	
Cotter pin	0,6x10	2 pcs.	
Degreaser agent	Technical benzine	-	
Grease	AeroShell Grease 22	-	

- (1) Removal – electromechanical strut and the pull-rod of pitch trim
 - (a) Disable the board network and disconnect the battery.
 - (b) Disconnect the connector (3, Fig. 27-18) on the pull-rod of pitch control.
 - (c) Unscrew the bolts (12) of electromechanical strut attachment.
 - (d) Pull out the cotter pin (11), washer (10) and pull out the pin (9) from the bush (4) on the angular lever of trim tab.
 - (e) Remove the electromechanical strut (1) with the pull-rod (2) from the elevator.
 - (f) Carefully cut with scissors the shrinkable hose for connecting the wires to the electric motor, carefully note down the positions of individual wires on the contacts and solder off the wires.
- (2) Installation – electromechanical strut and the pull-rod of pitch trim
 - (a) Pull the wires through the grommet to the elevator.
 - (b) Put the shrinkable hose on the cable.
 - (c) Solder the wires to the original position in accordance with the wiring diagram in Chapter 91.
 - (d) By means of the hot air gun, tighten the shrinkable plastic hose in the position of the cable connection to the electric motor.
 - (e) Insert the electromechanical strut (1, Fig. 27-18) with the pull-rod (2) into the elevator and attach it by means of bolts (12).
 - (f) Position the free end of the pull-rod (2) to the angular lever on the trim tab, insert the pin (9) and attach the connector (3).
 - (g) Connect the battery, activate the board network.
 - (h) Check the deflections of trim tab (see par. 2 B.(3)); after checking the deflections of trim tab, put on the washer (10) and secure the cotter pin (11).



Legend to Fig. 27-18

1 Electromechanical strut	7 End piece of pull-rod
2 Complete pull-rod	8 Nut
3 Bracket with connector	9 Pin
4 Bush	10 Washer
5 Pull-rod	11 Cotter pin 0,6x10
6 Tube of pull-rod stiffening	12 Bolt

Fig. 27-18 Pitch trim – removal / installation



- (3) Adjustment / check – adjustment of elevator trim tab deflections
 - (a) Preparatory work
 - 1 Position the protractor with a pointer on the trailing edge of trim tab.
 - 2 Block the elevator in the neutral position (0°).
 - 3 Set the trim tab to the position 0° (note: it isn't identical with the neutral position). In this position, set 0° on the protractor.
 - (b) Check and adjustment of deflections
 - 1 By controlling the trim tab, go to the extreme positions and check the deflection values.
 - 2 Set the neutral position of trim tab (-2°) on the indicator on the instrument panel (plate or display).
 - 3 Check the value of deflection in the neutral position.
 - 4 Set the deflections by the adjustable end pieces of pull-rod of trim tab control within the tolerance in accordance with Tab. 27-1.
 - (c) Calibration of pitch trim tab deflections on the airplanes equipped with the Dynon SkyView system. During the calibration, monitor the trim tab deflection and adjust it as needed.
 - 1 Switch the electrical network off.
 - 2 Press and hold the seventh button from the left on the lower bar of the SkyView system display.
 - 3 Simultaneously, switch on the **MASTER SWITCH**.
 - 4 Entry into the SET UP MENU is indicated.
 - 5 By the rotary selector, choose the item HARDWARE CALIBRATION -> EMS CALIBRATION -> ELEV. CALIBRATION.
 - 6 Press the RECALL.
 - 7 By controlling the trim on the head of the control stick, go to the lower extreme position (SET TRIM FULL DOWN INDIC.) and press down the SET. The value FULL DOWN is indicated in the table.
 - 8 By controlling the trim on the head of the control stick, go to the upper extreme position (SET TRIM FULL UP INDIC.) and press down the SET. The value FULL UP is indicated in the table.
 - 9 By controlling the trim on the head of the control stick, go to the neutral position (SET TRIM TAKE OFF INDIC.) and press down the SET. The value TAKE OFF is indicated in the table.
 - 10 Press the DONE (TO FINISH) and leave the SET UP MENU.
 - (d) Calibration of analog indicator
 - 1 By controlling the trim on the control stick, set the upper position of trim tab.
 - 2 Go to the value of neutral and measure the trim tab deflection.
 - 3 Go to the lower position of trim tab and measure the trim tab deflection.
 - 4 On the protractor, monitor the value of real deflection of the trim tab and adjust it as needed.
 - 5 Set the values of deflections in individual positions by means of the adjustable end piece of pull-rod.



- 6 Carry out setting in such a way that the values of trim tab deflections are within the tolerances specified in Tab. 27-1.
- (e) Calibration of pitch trim tab deflections on the airplanes equipped with the Garmin G3X system. During the calibration, monitor the trim tab deflection and adjust it as needed.
 - 1 Enter the Configuration Mode of the PFD GDU 460:
 - Press down and hold the button **MENU**.
 - Switch on the **MAIN SWITCH**, until the Configuration Mode is activated.
 - 2 In the Configuration Mode, select the Engine & Airframe page.
 - 3 In the GEA 24 Inputs menu, select Pos1 / GP1 - Elevator Trim.
 - 4 Use Calibrate button to enter the calibration page.
 - 5 By controlling the trim on the head of the control stick, go to the lower extreme position (Full Down) and press the Store Calibration Point.
 - 6 By controlling the trim on the head of the control stick, go to the neutral position (Neutral) and press the Store Calibration Point.
 - 7 By controlling the trim on the head of the control stick, go to the upper extreme position (Full Up) and press the Store Calibration Point. A chart table is created.
 - 8 After finishing, save with the Save button.
 - 9 Exit the Configuration Mode using the Save & Reboot button.


C. Stall speed sensor

Maintenance type: Heavy

Personnel qualification: Independent verification personnel qualified in accordance with Part 66 or higher

Recommended tools and material:

Item	Designation / Size	Quantity	Note
Phillips screwdriver	No. 2	1 pc.	
Hex wrench	No. 2	1 pc.	
Colored adhesive tape	-	-	Replacement by a permanent felt-tip pen

- (1) Removal – stall speed sensor
 - (a) Switch the electrical network off and disconnect the battery.
 - (b) Remove the cover W7L (Fig. 06-2).
 - (c) Remove the fairing between the wing and the fuselage W1L (Section 53-50).
 - (d) Using an adhesive tape or a permanent felt-tip pen, mark the position of the sensor (1, Fig. 27-19) on the leading edge (5).
 - (e) Disconnect the connector connecting the wires between the sound module and the sensor of stall speed warning – the connector is located under the fairing W1L.
 - (f) Unscrew and remove the screws (3), washers (4) and remove the sensor (1) with wire (3).
- (2) Installation – stall speed sensor
 - (a) Set the sensor (1, Fig. 27-19) to position so that it corresponds to the marked position and attach it by means of screws (3) and washers (4).
 - (b) Connect the connector (2) inside the wing.
 - (c) Install the cover W7L (Fig. 06-2).
 - (d) Install the fairing between the wing and the fuselage W1L (Section 53-50).
 - (e) Connect the battery, switch the electrical network on and check the function of the stall speed warning system – slightly lift up the flap of the stall speed warning; the acoustic signal must be audible.
 - (f) Do the verification flight and check the function of the stall speed warning system (see par. 2 C (3)).
- (3) Adjustment / test – stall speed sensor
 - (a) Do the flight at a safe altitude with the airplane with MTOW, front CG position and retracted wing flaps. This airplane configuration has a narrowest range of stall speed.
 - (b) Record the flight speed at which the stall speed warning is activated versus the known stall speed of the airplane. This boundary should be approximately 10 kts. If this is not the case, continue as follows:
 - (c) Loosen the screws (3, Fig. 27-19).
If the stall speed warning comes too late:



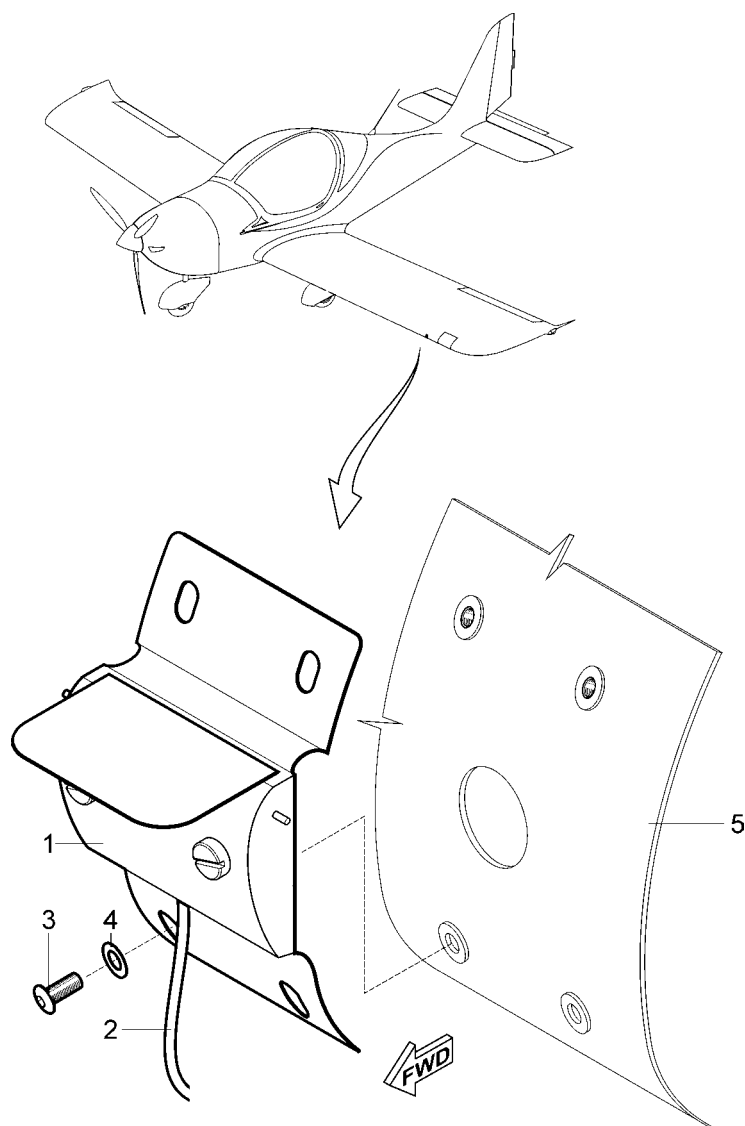
- 1 Move the stall speed sensor upwards. Movement the sensor up allows the activation of warning at a higher speed. By movement the sensor of stall speed warning by 3.2 mm (1/8 in), the point of warning activation is changed approximately by 10 kts.

If the stall speed warning comes too early:

- 2 Move the stall speed sensor downwards. Movement the sensor down allows the activation of warning at a lower speed. By movement the stall speed sensor by 3.2 mm (1/8 in), the point of warning activation is changed approximately by 10 kts.
- (d) Tighten the screws (3).
 - (e) As soon as the modifications are finished, fly in the whole range of CG positions in order to verify that the tolerance of stall speed warning is at least as at the front CG position.

NOTE

The maintenance procedures of the sound module are shown in Section 31-50.



Legend to Fig. 27-19

1	Stall speed sensor	4	Washer (4 pcs.)
2	Wire		For information:
3	Screw (4 pcs.)	5	Leading edge of left wing

Fig. 27-19 Stall speed sensor – removal / installation

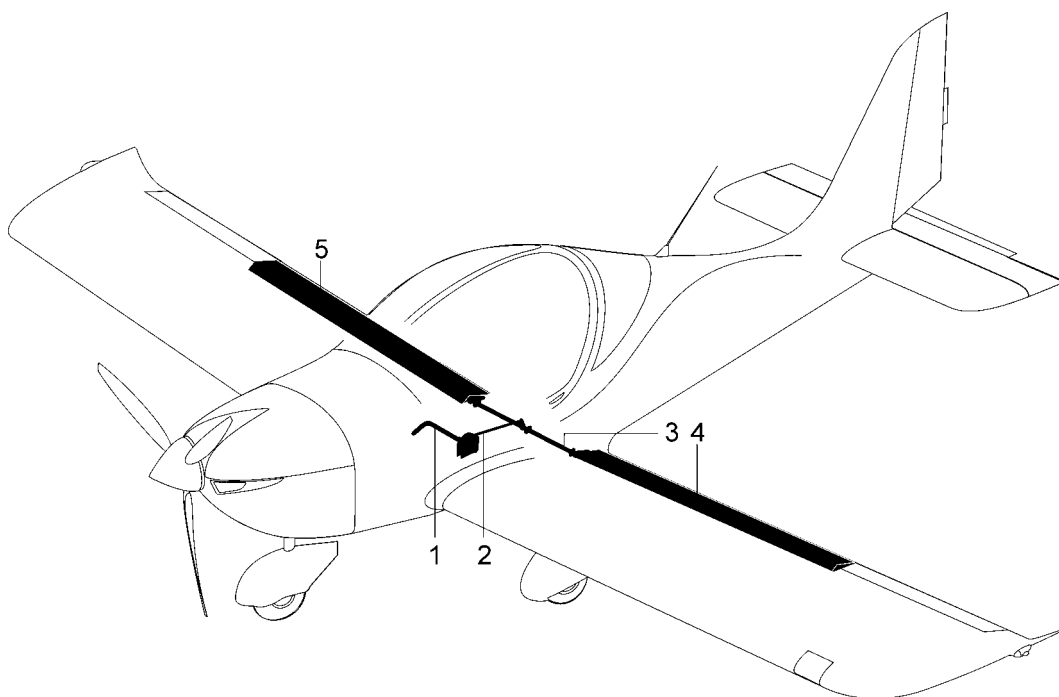


FLAPS

1. DESCRIPTION AND OPERATION

The wing flaps are controlled by the manual lever **WING FLAPS** (1, Fig. 27-20) that is located in the cockpit between the seats. The left wing flap (4) and the right wing flap (5) are connected by means of the torsion shaft (3). The pins on both ends of the torsion shaft fit in the guiding grooves in the end ribs of wing flaps. The deflection of the manual lever is transferred by the pull-rod (2) to the deflection of the angular lever on the torsion shaft. By swiveling the torsion shaft, the eccentric pins on the lever perform a circular movement and by the guiding grooves of the root ribs, they carry the wing flaps. The wing flaps are opened and closed by a sliding movement of the eccentric pins inside the grooves. The eccentricity of the pins allows the adjustment of wing flap setting by swiveling the pins.

The position of the lever of wing flap control is locked by the pin in the slots of the slotted link mechanism. By pressing the button on the upper end of the lever, the locking pin slides out of the cutouts in the slotted piece. The wing flaps are locked and can be set to the required position. The position of wing flaps is locked by releasing the locking button when the pin fits in the cutout in the slotted piece.



Legend to Fig. 27-20

1 Lever	4 Wing flap L
2 Pull-rod	5 Wing flap R
3 Torsion shaft	

Fig. 27-20 Wing flaps control



The wing flaps can be set to four positions.

RETRACTED	0°
TAKEOFF	15°
LANDING (1 st position)	30°
LANDING (2 nd position)	50°

The wing flap deflections are given by the position of cutouts in the slotted link mechanism in which the control lever of wing flaps moves in the cockpit.

The extended flap switch is installed on the torsion shaft. If the flaps are in the **TAKEOFF** or **LANDING** position, in the case of airplanes equipped with analogue instruments, the orange signaling light **FLAPS** lights up. In the case of airplane equipped with the Dynon SkyView system this is indicated on the EMS display (Section 31-50). In the case of airplane equipped with the Garmin G3X system, the flap position is indicated on the PDF display - when the flaps are closed, the green light is illuminated, when the flap is opened, the indicator changes to yellow. The position is displayed with sign **Flaps OPEN**.



2. MAINTENANCE PRACTICES

A. Wing flaps control

Maintenance type: Heavy

Personnel qualification: Independent certifying staff qualified in compliance with Part 66 or subsequent parts

Recommended tools and material:

Item	Designation / Size	Quantity	Note
Phillips screwdriver	No. 2	1 pc.	
Wrench	No. 7	2 pc.	
Wrench	No. 10	2 pc.	
Wrench	No. 13	2 pc.	
Cotter pin	1,6x12	2 pcs.	
Locking washer 5,3	6,4	2 pcs.	
Degreaser agent	Technical benzine	-	
Grease	AeroShell Grease 22	-	

(1) Removal – wing flap control lever

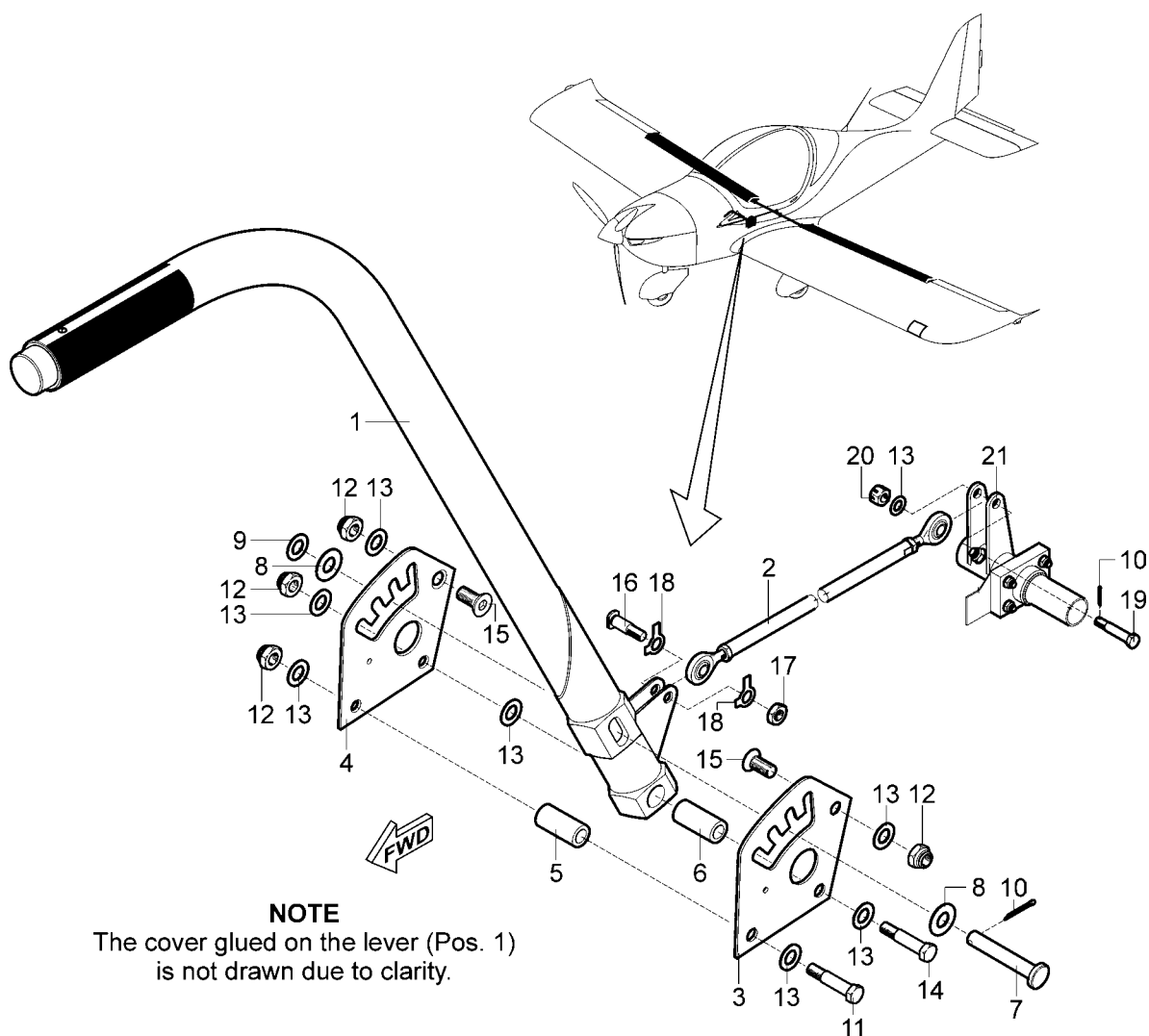
- Remove the seats (cushion) and the middle console between the pilot seats (Section 25-10).
- Pull out the cotter pin (10, Fig. 27-21), washers (8; 9) and pull out the pin (7) with the washer (8).
- Unscrew the nuts (12), remove the washers (13), bolts (11; 14; 15) with the washers (13), slotted pieces (3; 4) and the spacers (5; 6).
- Unlock the locking washers (18).
- Unscrew the nut (17), remove the washer (18), bolt (16) with the lock washer (18) and disconnect the pull-rod (2) from the fork of lever (1).
- Remove the control lever of wing flaps (1) from the fuselage.

(2) Installation – wing flap control lever

- Lubricate all the bearings and the friction surfaces with grease.
- Position the eye of pull-rod (2, Fig. 27-21) into the fork on the lever (1) and insert the bolt (16) with the lock washer (18); put the lock washer (18) on the bolt (16), screw on the nut (17) and tighten it. Bend tabs of the washers (18) over the edge of the fork on the wing flaps lever (1) and head of the bolt (16) and nut (17).
- Into the lower attachment of lever (1), insert the spacer (6) lubricated with grease.
- Set both parts of the locking slotted pieces (3; 4) to the position against the holes in the fuselage console; insert the bolt (15) into the upper holes in the slotted pieces, put on the washers (13) and screw on the nuts (12); don't tighten the nuts.
- Position the lever (1) to the middle hole in the slotted pieces and in the console in the fuselage; insert the bolt (14) with the washer (13) into the hole and screw on the nut (12); don't tighten the nut.



- (f) Position the spacer (5) between the front (lower) holes and insert the bolt (14) with the washer (13), put on the washer (13) and screw on the nut (12); don't tighten the nut.
- (g) Gradually tighten all the nuts (12) in such a way that the lever (1) remains movable.
- (h) Insert the pin (7) with the washer (8) into the piston in the lever of wing flap control, put on the washers (8; 9) and secure with the cotter pin (10).
- (i) Check, eventually adjust the deflections of wing flaps (see par. 2 A.(7)).
- (j) Install the middle console between the pilot seats and the seats (Section 25-10).
- (3) Removal – wing flap control pull-rod
 - (a) Remove the lever of wing flap control (see par. 2 A.(1)).
 - (b) Pull out the cotter pin (10, Fig. 27-21), unscrew the nut (20), remove the washer (13) and the bolt (19) connecting the pull-rod (2) and the fork on the torsion shaft (21).
 - (c) Remove the pull-rod (2) from the fuselage.
- (4) Installation – wing flap control pull-rod
 - (a) Lubricate all the bearings and the friction surfaces with grease.
 - (b) Install the lever of wing flaps (see par. 2 A.(2)).
 - (c) Position the eye of pull-rod (2, Fig. 27-21) into the fork of torsion shaft (21) and insert the bolt (19).
 - (d) Put the washer (13) on the bolt (19) and screw on the castle nut (20); tighten the nut by the wrench so that it is possible to insert the cotter pin (10) into the nearest possible notch of the castle nut and secure the cotter pin (Section 20-20).
 - (e) Check, eventually adjust the deflections of wing flaps (see par. 2 A.(7)).



Legend to Fig. 27-21

1	Lever of wing flaps	8	Washer 6,4	15	Bolt M6x12
2	Pull-rod	9	Washer 6,4	16	Pin
3	Slotted piece L	10	Cotter pin 1,6x12	17	Nut M6
4	Slotted piece R	11	Bolt M6 x 43	18	Locking washer 6,4
5	Spacer	12	Nut M6	19	Bolt M6x23
6	Spacer	13	Washer 6,4	20	Nut M6
7	Pin	14	Bolt M6x41	21	Torsion shaft

Fig. 27-21 Wing flap control lever – removal / installation



- (5) Removal – torsion shaft of wing flap drive
 - (a) Switch the electrical network off and disconnect the battery.
 - (b) Remove the floor of the baggage compartment IN3 (Fig. 06-2).
 - (c) Remove the left wing (Section 57-40).
 - (d) Remove the clamp of the wing flaps position signalization (see par. 2 B(1)).
 - (e) Unscrew the nuts (6, Fig. 27-22), remove the washers (7), bolts (8) and remove the levers (3), including the eccentric pins (4).
 - (f) Disconnect the pull-rod from the fork of lever.
 - (g) Unscrew the nut (6), remove the washer (7), bolt (5) and release the lever (2).
 - (h) Unscrew the nuts (13), remove the washers (14) and the bolts (12) and remove the bearing (11) on the left sidewall of the fuselage.
 - (i) Pull out the shaft (1) from the fuselage through the left side.
- (6) Installation – torsion shaft of wing flap drive

NOTE

During the installation of the new bearings (11; 15, Fig. 27-22),
boil them in oil.

- (a) Lubricate all the bearings and the friction surfaces with grease.
- (b) The torsion shaft (1, Fig. 27-22) has a welded collar on one side; insert the torsion shaft into the fuselage from the left side so that the smooth part of the collar (without a weld) is seated on the bearing in the middle part of the fuselage (see the detail in Fig. 27-22).
- (c) Insert the torsion shaft (1) by its half into the fuselage so that the right end reaches beyond the bearing (15) in the middle part of the fuselage.
- (d) Position the lever (2) on the torsion shaft (1), insert the bolt (5) from the lower side, put on the washer (7), screw on the nut (6) and tighten it.
- (e) By means of the bolts (12), nuts (13) and washers (14), attach the bearing (1) to the left sidewall of the fuselage.
- (f) Position the levers (3) on the shaft, insert the bolts (8) into the holes with the washers (7), put on the washers (7), screw on the nuts and tighten them (6).
- (g) Check for a free travel of the control lever and that of the torsion shaft.
- (h) Install the clamp of the wing flaps position signalization (see par. 2 B(2)).
- (i) Install the floor of the baggage compartment IN3 (Fig. 06-2).
- (j) Install the left wing (Section 57-40).
- (k) Check, eventually adjust the deflections of wing flaps (see par. 2 A.(7)).
- (l) Connect the battery, switch the electrical network on and check function of the signalization.

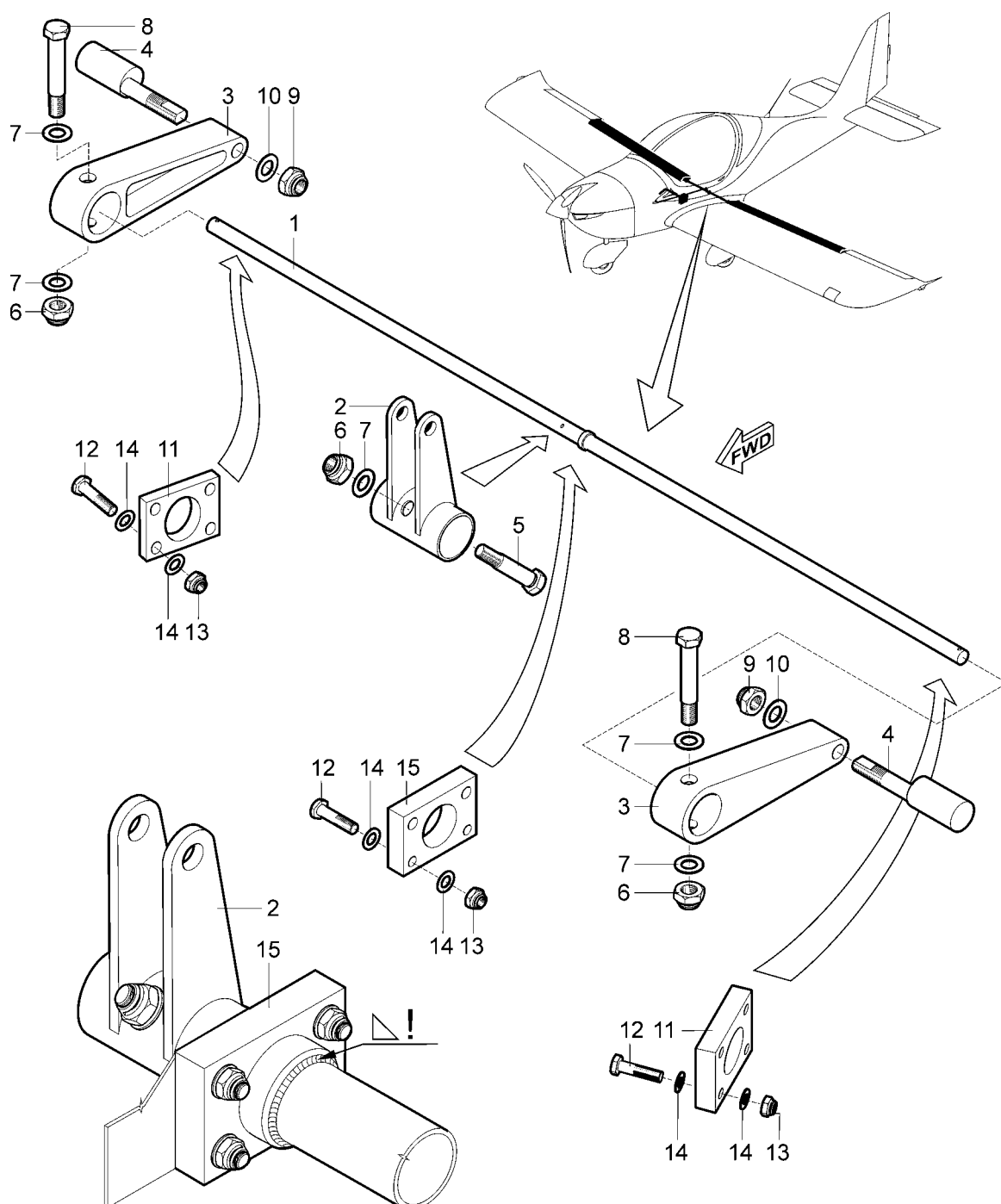


Fig. 27-22 Torsion shaft - removal / installation (page 1 of 2)



Legend to Fig. 27-22

1	Torsion shaft	9	Nut M8
2	Lever	10	Washer 8,4
3	Lever	11	Bearing
4	Cam	12	Bolt M4x20
5	Bolt M6x33	13	Nut M4
6	Nut M6	14	Washer 4,3
7	Washer 6,4	15	Bearing
8	Bolt M6x41		

Fig. 27-22 Torsion shaft - removal / installation (page 2 of 2)

(7) Adjustment / check – the adjustment of wing flap deflections

(a) Preparatory work

- 1 Carry out the measurement by means of the jig that is mounted on the lower skin of the wing flap.
- 2 Mount the sheet metal jig by the bolts M4 to the riveted nuts in the position of rib No. 8 (about 1000 mm from the outer edge of the wing flap).
- 3 Position the protractor with a pointer on the protruding part of the jig and reset it.
- 4 Remove the lower cover in the baggage compartment IN3 (Section 06-40).

(b) Check and adjustment of deflections

- 1 Extend the wing flaps to the required position and read the deflection on the protractor.
- 2 Carry out the measuring on the left wing flap as well as on the right wing flap in all positions.
- 3 Compare the measured values with the data shown in Tab. 27-1.
- 4 Set the wing flap positions by means of the adjustable end piece of the control pull-rod connecting the lever of wing flap control and the torsion tube.
- 5 The position **RETRACTED** (0°) can be set by means of the eccentric pins in such a way that the wing flaps don't protrude from the contour of the wing profile. Set the deflections of wing flaps towards each other by turning the eccentric pins (control pins) which are inserted in the guiding grooves in the root ribs of the wing flaps.



B. Switch of wing flaps position

Maintenance type: Heavy

Personnel qualification: Independent certifying staff qualified in compliance with Part 66 or subsequent parts

Recommended tools and material:

Item	Designation / Size	Quantity	Note
Wrench	No. 4	1 pc.	
Wrench	No. 7	1 pc.	
Flat screwdriver	-	1 pc.	
Textile self-adhesive tape	20x10000	1 pc.	Black
Soldering iron	-	1 pc.	
Solder	-	-	
Heat gun	-	1 pc.	
Shrinkable tube	ø 3x1 mm	-	

- (1) Removal – switch of wing flap position
 - (a) Switch the electrical network off and disconnect the battery.
 - (b) Remove the floor of the baggage compartment IN3 (Fig. 06-2).
 - (c) Disconnect the wires (11, Fig. 27-23) from the switch (1) using the soldering iron.
 - (d) Unscrew and remove the nuts (3), washers (4) and screws (2) with washers (4).
 - (e) Remove the switch (1).
 - (f) As necessary, unscrew and remove the nut (8), washer (9), screw (7) and the lever (5).
 - (g) Remove the clamp (6); as necessary remove the adhesive tape (10).
 - (h) Remove the control lever of wing flaps (1) from the fuselage.
- (2) Installation – switch of wing flap position
 - (a) As necessary, stick the adhesive tape (10, Fig. 27-23) on the torsion shaft (12) and install the clamp (6).
 - (b) Insert the lever (5) into the clamp (6) and fasten it with the screw (7), nut (8) and washer (9); tighten the nut slightly.
 - (c) Put the switch (1) on the beam (13) and fasten it with screws (2), nuts (3) and washers (4).
 - (d) Put a new shrinkable tube on cables (11). Use the soldering iron and solder to attach it to the switch.

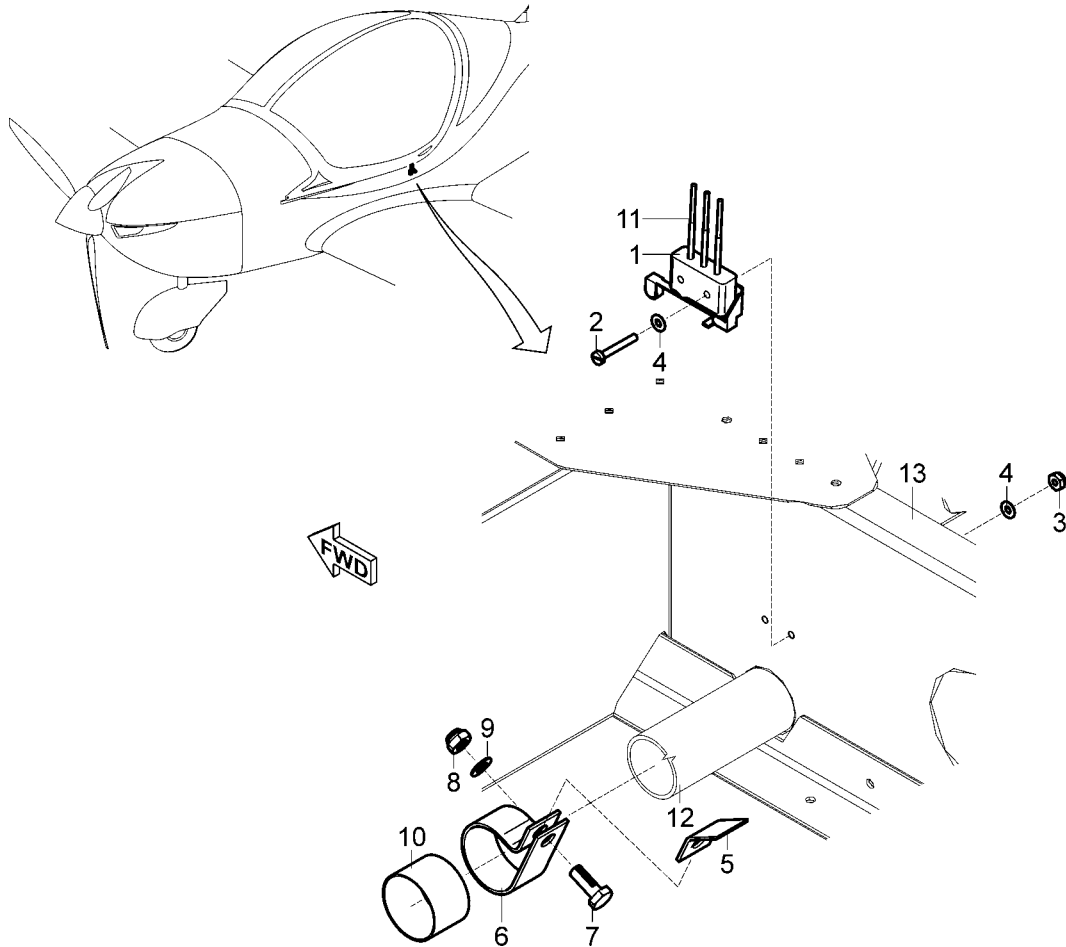
NOTE

Use the wiring diagram in Chapter 91.

- (e) Cover the joints with a shrinkable tube and carefully heat it with a heat gun.



- (f) Adjust the mutual position of the switch and clamp with the lever:
 - 1 When the flaps are in **RETRACTED** position, the switch is on.
 - 2 When the flaps are in **TAKEOFF** position, the switch is off.
 - 3 Tighten the nut (8).
- (g) Install the floor of the baggage compartment IN3 (Fig. 06-2).
- (h) Connect the battery, switch the electrical network on and check function of the signalization.



Legend to Fig. 27-23

1	Switch	8	Nut M4
2	Screw M2x12 (2 pcs.)	9	Washer 4,3
3	Nut M2 (2 pcs.)	10	Textile self-adhesive tape
4	Washer 2,2 (4 pcs.)	11	Cable
5	Lever	For information:	
6	Clamp	12	Torsion shaft
7	Screw M4x12	13	Beam

Fig. 27-23 Switch of wing flap position – removal / installation

CHAPTER

28

FUEL



CHAPTER 28

FUEL

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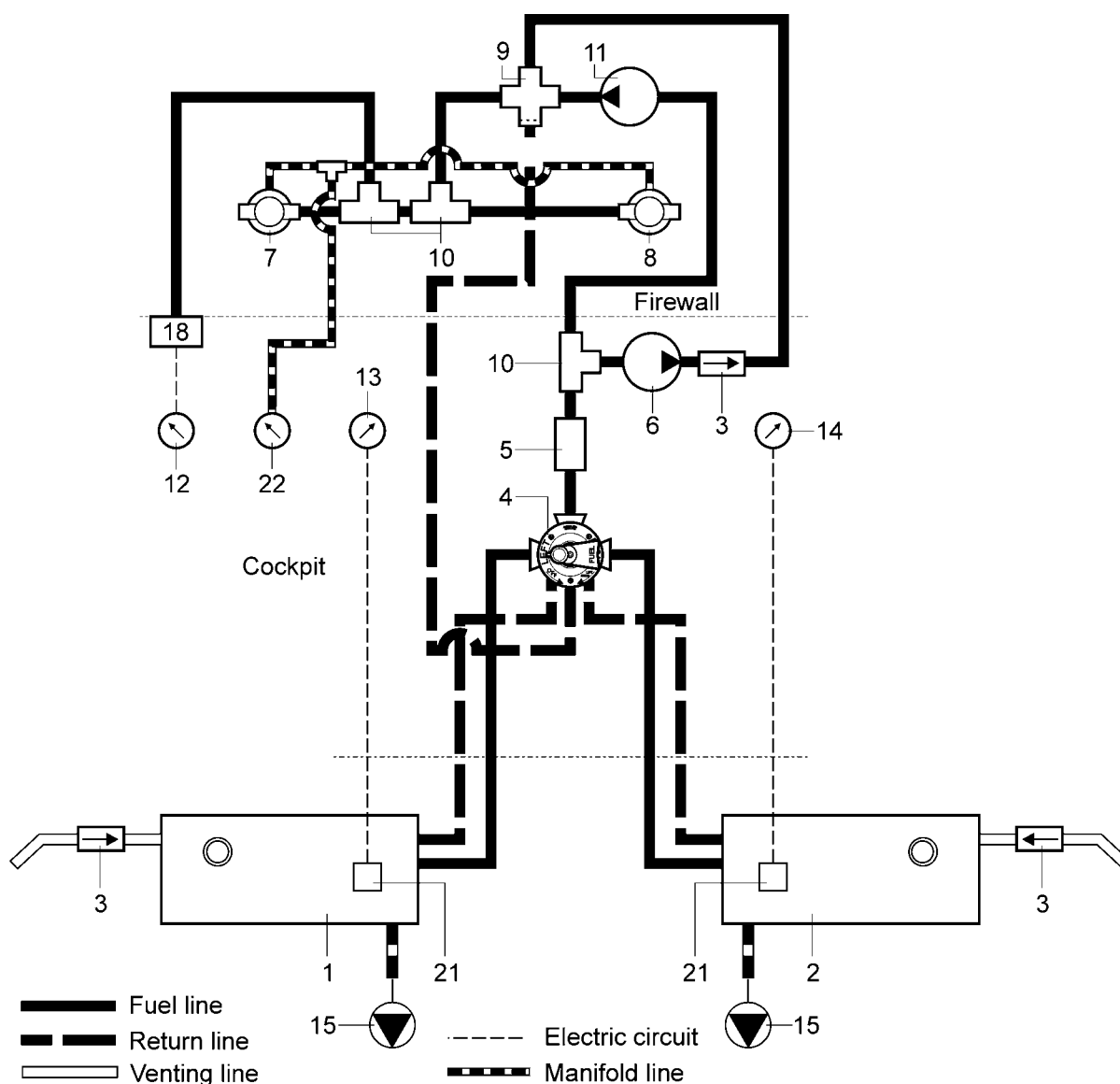
GENERAL

1. INTRODUCTION

The fuel system of the SportStar RTC airplane serves for fuel storage in the airplane and to its transport in required quantity and quality to the engine.

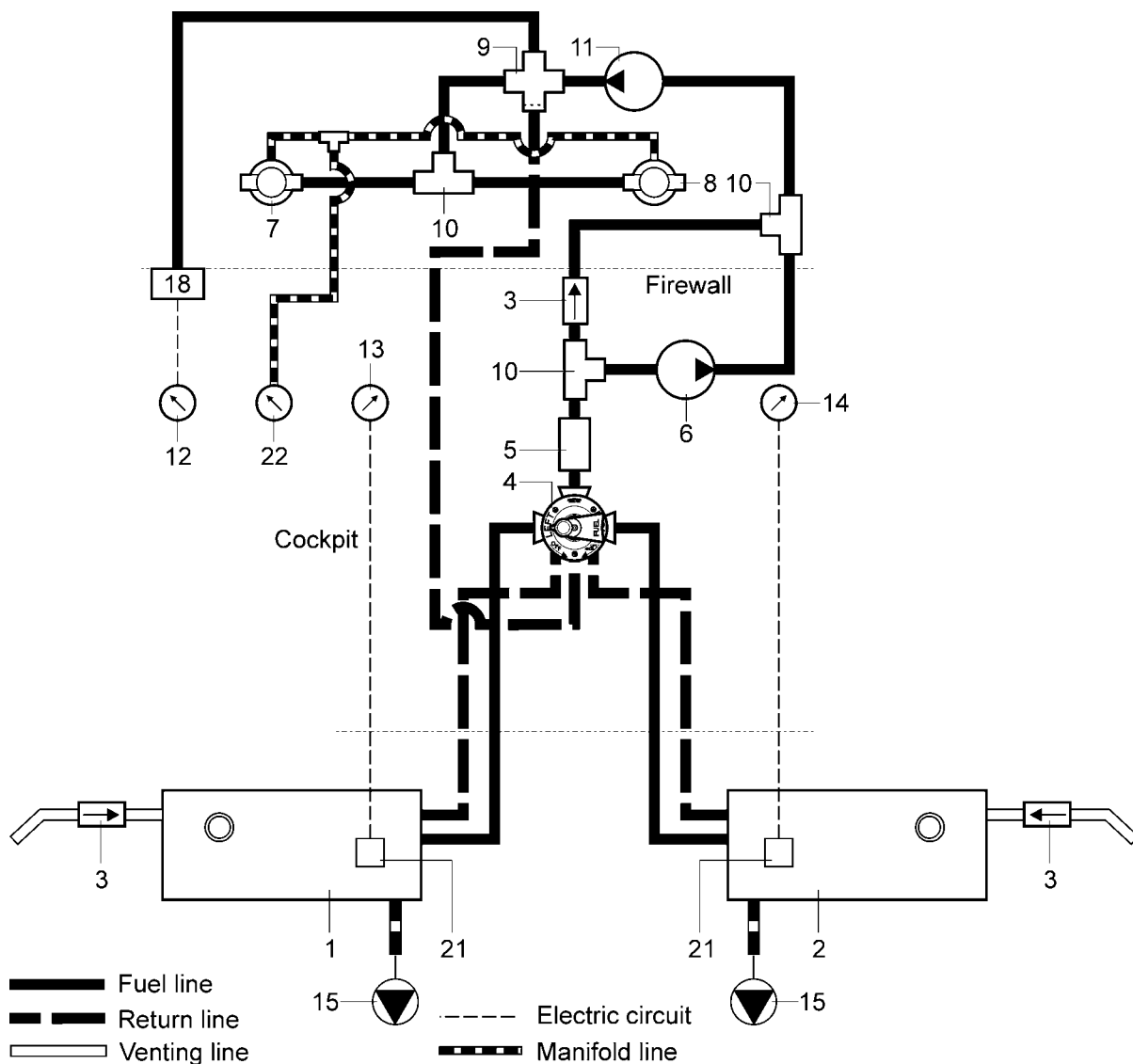
The part of the fuel system that is part of the engine and ensures engine running and control is described in Chapter 73. The fuel system handling is shown in Section 12-10; kinds of fuel are shown in Section 12-00.

The fuel system diagram of the airplane is shown in Fig. 28-1.



Airplanes with analog instruments – the original version

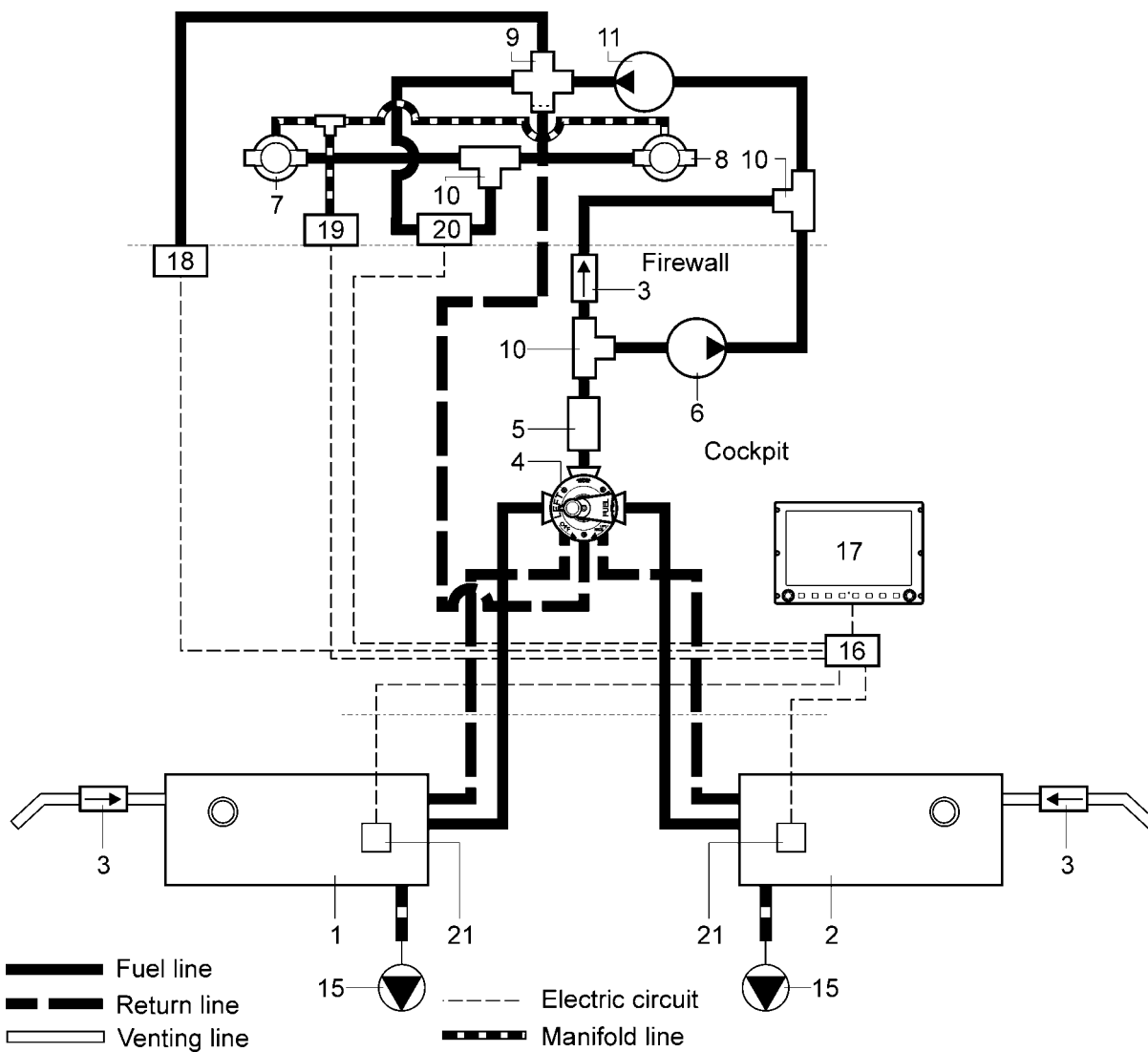
Fig. 28-1 Diagram of fuel system (page 1 of 6)



Airplanes with analog instruments – the new version

Fig. 28-1 Diagram of fuel system (page 2 of 6)





Airplanes with the Dynon SkyView system – the new version

Fig. 28-1 Diagram of fuel system (page 4 of 6)



Fig. 28-1 Diagram of fuel system (page 5 of 6)



Legend to Fig. 28-1

1 Left fuel tank	14 Fuel quantity indicator of right tank
2 Right fuel tank	15 Drain valve
3 Check valve	16 SV-EMS-220 module
4 Fuel cock	17 SV-D1000/D700 display
5 Fuel filter	18 Fuel pressure sensor
6 Electric fuel pump	19 Manifold pressure sensor (only if the adjustable propeller installed)
7 Left carburetor	20 Flow meter
8 Right carburetor	21 Fuel level sensor in tank
9 Four-way distributor	22 Manifold pressure indicator (only if the adjustable propeller installed)
10 Three-way distributor	23 EIS GEA-24 unit
11 Engine fuel pump	24 MFD GDU 460
12 Fuel pressure indicator	25 Pulsation damper
13 Fuel quantity indicator of left tank	

Fig. 28-1 Diagram of fuel system (page 6 of 6)



2. MAINTENANCE PRACTICES

In case of fuel contamination, flush the fuel system.

Carry out work with assistants and follow the safety precautions when handling fuel mentioned in Chapter 12.

A. Fuel system

Maintenance type: Line

Personnel qualification: Independent verification personnel qualified in accordance with Part 66 or higher

Recommended tools and material:

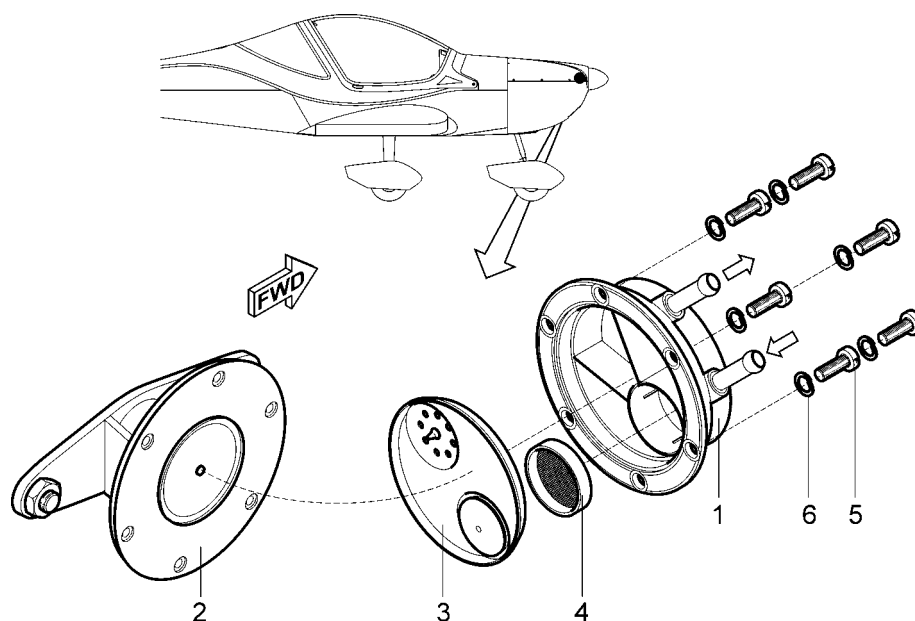
Item	Designation / Size	Quantity	Note
Fuel can	-	1 pc.	
Compressed air source	-	1 pc.	
Nonferrous wire	Diameter up to 0,3 mm	-	
Gripping pliers	Cobra	1 pc.	

(1) Fuel system flushing

- (a) Ground the airplane (Section 12-10).
- (b) Remove the engine cowlings (Section 71-10).
- (c) Set the fuel cock to **OFF** position.
- (d) Drain the fuel from the fuel system (Section 12-10).
- (e) Fill the fuel system with the clean fuel (Section 12-10); fuel fill through a suitable filter (filter can be a part of the filling device).
- (f) Drain the fuel from the fuel system (Section 12-10).
- (g) Again fill the fuel system with the clean fuel (Section 12-10) and repeat the procedure until the draining fuel is clean (min. 3 times).
- (h) After draining fuel is clean, fill the fuel system with the clean fuel (Section 12-10).
- (i) Disconnect hoses from the carburetors:
 - 1 Release the clamps by means of pliers and pull off the hoses from the necks of the carburetors.
 - 2 Fuel spilled from the hoses catch to the vessel.
- (j) Visually check condition of the fuel filter; contaminated filter replace (Section 28-20).
- (k) Switch on the **MAIN SWITCH**.
- (l) Set the fuel cock to **LEFT** position.
- (m) Start the electric fuel pump by the **FUEL PUMP** switch and drain at least 3 litres of the fuel; check cleanness of the fuel. Continue draining as long as the fuel is clean.
- (n) Switch off the electric fuel pump.
- (o) Set the fuel cock to **RIGHT** position and repeat procedure acc. to par. (m) and (n).



- (p) Set the fuel cock to **OFF** position.
 - (q) Switch off the **MAIN SWITCH**.
- If it fails to clean up the fuel system as described above, proceed as follows:
- (r) As necessary, replace the fuel filter (Section 28-20).
 - (s) As necessary, clean the filter screen in the electric fuel pump:
 - 1 Release the clamp (8, Fig. 28-7) by means of pliers and pull off the hose (4) from the neck of the pump (1).
 - 2 Remove the filter screen from the inlet neck of the pump (1).
 - 3 Clean the filter screen.
 - 4 Put the filter screen to the inlet neck of the pump.
 - 5 Connect the hose (4) on the neck of the pump (1); secure the hose by the clamp (8) by means of pliers.
 - (t) As necessary, clean the filter screen in the engine fuel pump:
 - 1 Unscrew the screws (5, Fig. 28-2) with washers (6) and remove the pump cover (1).
 - 2 Remove the circular valve baffle (3).
 - 3 Remove the filter screen (4) from the pump cover (1).
 - 4 Clean the filter screen.
 - 5 Put the filter screen to the inlet chamber of the pump cover (1); make sure to correct orientation (see Fig. 28-2).
 - 6 Put the circular valve baffle (3) with the gasket ring into the pump cover (1); carefully press down.
 - 7 Put the pump cover (1) with the circular valve baffle (3) on the pump body, screw on the screws (5) with washers (5); tighten the screws crosswise.
 - (u) As necessary, clean the four-way distributor with the nozzle:
 - 1 Release the clamps by means of pliers and pull off the hoses from the four-way distributor (see Fig. 28-3).
 - 2 Check clearness of the nozzle (Fig. 28-3, Det. A); clogged nozzle carefully blow out with the compressed air or purge by means of the nonferrous wire with diameter up to 0,3 mm.
 - 3 Connect the hoses on the four-way distributor, hose of the return line connect on the neck with nozzle marked with the letter **V**; secure the hose by the clamps by means of pliers.
 - (v) As necessary, clean the fuel cock:
 - 1 Remove the fuel cock (Section 28-20).
 - 2 The fuel cock repeatedly flush with the clean fuel.
 - 3 Install the fuel cock back (Section 28-20).
 - (w) Connect the hoses on the neck of the carburetors; secure the hoses by the clamps by means of pliers.
 - (x) Do the tightness check of the fuel system (Section 28-10).



Legend to Fig. 28-2

1 Fuel pump cover	4 Filter screen
2 Fuel pump body	5 Screw (6 pcs.)
3 Circular valve baffle	6 Washer (6 pcs.)

Fig. 28-2 Filter screen in the engine fuel pump

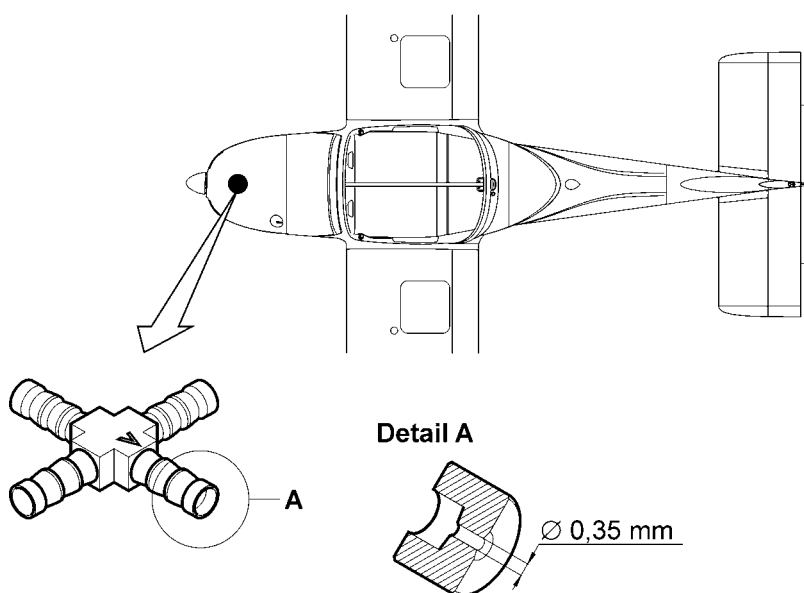


Fig. 28-3 Four-way distributor with the nozzle



STORAGE

1. DESCRIPTION AND OPERATION

The fuel in the airplane is stored in two integral tanks (1; 2, Fig. 28-1) in the right half and in the left half of the wing. The total volume of fuel tanks is 120 l, it means 60 l in each tank.

Each half of the wing includes an integral fuel tank. The tank is located between the middle parts of ribs No. 2 and 4, it is bounded by the upper skin and the lower skin of the wing, by the front spar and the rear spar. The filler with the cap is located on the upper side of the wing at rib No. 4. The place of fuel offtake is located at the tank bottom on rib No. 2 and is formed by the grommet riveted on the rib. The cylindrical part of the grommet is provided with drilled holes that prevent gross impurities from entering the fuel system. The middle part of rib No. 3 is provided with a hole and serves, among others, as an obstacle preventing fuel from overflowing in the tank. All the spaces of the tank, i.e. rivets, covers and so on, are sealed by special sealants TM 2 and TM 3.

Each fuel tank has its own drain valve (15), installed on the lower side of the wing. The drain valve can be also used for total fuel draining from the tank. The procedure for fuel draining is shown in Section 12-10.

The tank is vented by the tube that is led through the wing and has an outlet on the lower side of the wing tip. In the tube, there is a check valve (3) that prevents fuel from flowing from the tanks through the venting line.



2. MAINTENANCE PRACTICES

A. Drain valve

Maintenance type: Line

Personnel qualification: Independent verification personnel qualified in accordance with Part 66 or higher

Recommended tools and material:

Item	Designation / Size	Quantity	Note
Flat screwdriver	-	1 pc.	
Degreasing agent	Acetone	-	
Adhesive	Loctite 577	-	
Lint-free cloth	-	-	

NOTE

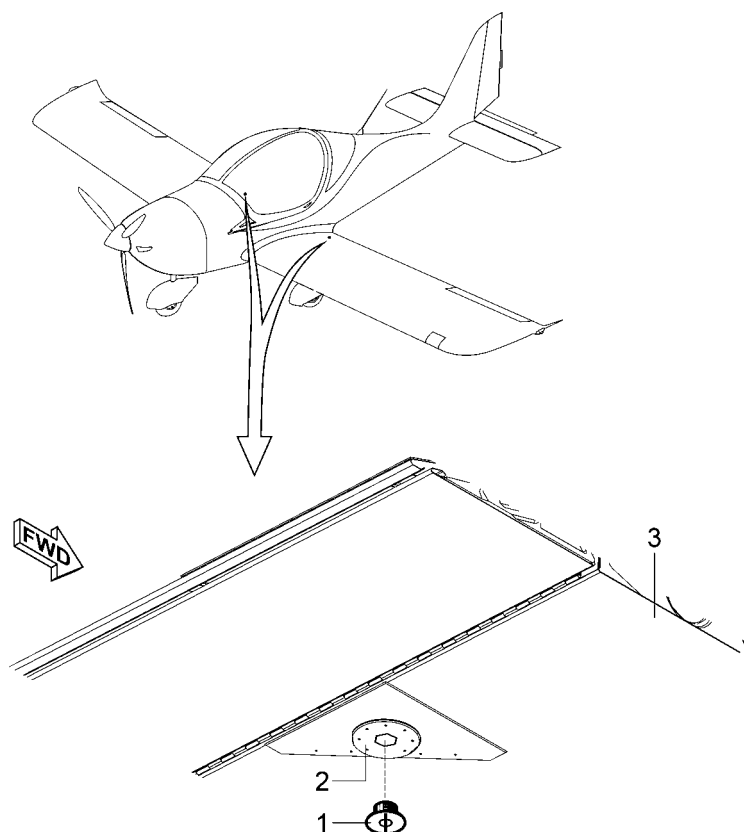
The procedure of removal / installation is identical for the drain valve on the left half as well as for the right half of the wing.

- (1) Removal – drain valve
 - (a) Drain the fuel from the fuel system (Section 12-10).
 - (b) Unscrew and remove the drain valve (1, Fig. 28-4).
 - (c) If the drain valve isn't immediately mounted back, close the hole on the lower skin by means of the blind plug.
- (2) Installation – drain valve
 - (a) Remove the blind plug from the hole on the lower skin of the wing.
 - (b) Clean thoroughly the seating surfaces of the drain valve (1, Fig. 28-4) and the flange (2) with a cloth soaked in degreasing agent.
 - (c) Apply adhesive onto the valve thread (1).

CAUTION

DURING ADHESIVE BONDING, PAY ENHANCED ATTENTION TO MAINTAIN PASSABILITY OF THE HOLES IN THE FLANGE AND FUNCTIONALITY OF THE VALVE.

- (d) Screw the valve (1) into the flange (2) and tighten it.
- (e) Check the fuel system tightness (see par. 2. C(1)).
- (f) Fill the fuel system with fuel (Section 12-10) and check the valve function.



Legend to Fig. 28-4

1 Drain valve

2 Flange

For information:

3 Lower skin of wing

Fig. 28-4 Drain valve – removal / installation



B. Vent check valve

Maintenance type: Line

Personnel qualification: Independent verification personnel qualified in accordance with Part 66 or higher

Recommended tools and material:

Item	Designation / Size	Quantity	Note
Gripping pliers	Cobra	1 pc.	
Cutting pliers	-	1 pc.	
Cable tie	2,5x99	1 pc. + 1 pc.	

NOTE

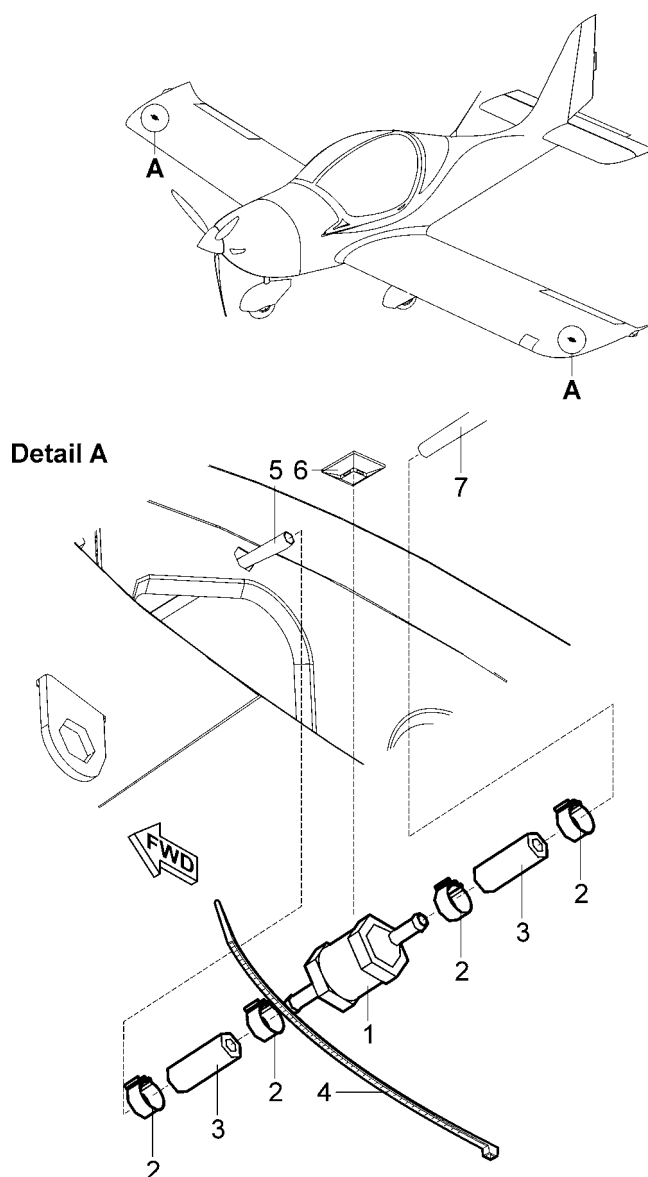
The procedure of removal / installation is identical for the check valve on the left half as well as on the right half of the wing.

- (1) Removal – vent check valve
 - (a) Remove the cover W4L / W4R (Fig. 06-2) on the lower side of the wing tip.
 - (b) Release the clamps by means of pliers (2, Fig. 28-5) and pull off the hoses (3) from the necks of the check valve (1).
 - (c) Cut off the cable tie (4) and remove the check valve (1).
 - (d) Close the hoses and necks of check valve using blind plugs.
- (2) Installation – vent check valve
 - (a) Remove the blind plugs from the hoses and the check valve necks.
 - (b) Connect the hoses (3) on the necks of the check valve (1, Fig. 28-5); secure the hoses with the clamps (2) by means of pliers.

NOTE

The check valve must be installed in such a way that the arrow on the valve is oriented to the tank.

- (c) Set the check valve (1) to position and fix it to the cable tie mount (6) using the cable tie (4).
- (d) Install the cover W4L / W4R (Fig. 06-2) to the lower side of the wing tip.



Legend to Fig. 28-5

- 1 Check valve
- 2 Clamp Cobra 11/7
- 3 Hose
- 4 Cable tie

For information:

- 5 Tube
- 6 Cable tie mount
- 7 Tube

Fig. 28-5 Vent check valve – removal / installation



C. Integral fuel tanks

Maintenance type: Line

Personnel qualification: Independent verification personnel qualified in accordance with Part 66 or higher

Recommended tools and material:

Item	Designation / Size	Quantity	Note
Pressurization device	-	1 pc.	

- (1) Adjustment / check – check of tightness of integral tanks and fuel system by air

The check of integral tank tightness of integral tanks and the check of fuel system are performed in the case when it is needed to verify the fuel system tightness, including the tightness of integral tanks.

Perform the check in a suitable and exactly defined space. In this this space and in its vicinity don't carry out, in the course of the check, any other work than the work necessary for performing the check.

WARNING

USE THE STANDARD SAFETY PRECAUTIONS DURING THE CHECK OF TIGHTNESS WHEN WORKING WITH FLAMMABLE MATERIALS. OXYGEN MUSTN'T BE USED FOR CHECKING THE FUEL SYSTEM TIGHTNESS – DANGER OF EXPLOSION.

CAUTION

SPEED OF AIR PRESSURE INCREASE IN THE TESTED TANK DURING GENERATING THE REQUIRED OVERPRESSURE MUSTN'T BE HIGHER THAN 5 kPa/min.

SPEED OF AIR PRESSURE DECREASE IN THE TESTED TANK DURING ELIMINATING OR REDUCING THE OVERPRESSURE MUSTN'T BE HIGHER THAN 5 kPa/min.

IF THERE IS AN AIR OVERPRESSURE IN THE INTEGRAL TANK, IT IS PROHIBITED TO CARRY OUT ANY OTHER WORK ON THE FUEL INSTALLATION LOCATED IN THE WING. ABOVE ALL, IT IS PROHIBITED TO REPAIR LEAKAGES, TIGHTEN AND LOOSEN BOLTS, REMOVE BLIND PLUGS, COVERS, SLUDGE VALVE, ETC.

- (a) Drain the fuel from the fuel system (Section 12-10).
- (b) Disconnect the fuel hoses from the engine carburetors, close the hoses using the blind plugs that allow the check of fuel system installation tightness by air, close the carburetor sockets by means of blind plugs.
- (c) Connect the hoses of the pressurization device to the venting line of the integral tank of left wing, set the fuel cock to the **LEFT** position, create an air overpressure of 10 kPa in the fuel system, close the overpressure in the fuel system.



- (d) After 10 minutes, adjust again the air overpressure in the fuel system to a value of 10 kPa. Let act the mentioned air overpressure closed in the fuel system for 10 minutes and then check its value. A pressure drop isn't allowed. The fuel system of the airplane must be absolutely tight. In the case of a pressure drop, identify the place of leakage by means of soap bubbles, cancel the overpressure in the fuel system, eliminate the leakage and repeat the check of tightness of fuel system.
- (e) Disconnect the hoses of the pressurization device from the venting line of the integral tank of left wing.
- (f) Connect the hoses of the pressurization device to the venting line of the integral tank of right wing, set the fuel cock to the **RIGHT** position, create an air overpressure of 10 kPa in the fuel system, close the overpressure in the fuel system.
- (g) After 10 minutes, adjust again the air overpressure in the fuel system to a value of 10 kPa. Let act the mentioned air overpressure closed in the fuel system for 10 minutes and then check its value. A pressure drop isn't allowed. The fuel system of the airplane must be absolutely tight. In the case of a pressure drop, identify the place of leakage by means of soap bubbles, cancel the overpressure in the fuel system, eliminate the leakage and repeat the check of tightness of fuel system.
- (h) Disconnect the hoses of the pressurization device from the venting line of the integral tank of right wing; connect the fuel system hoses to the carburetor.



DISTRIBUTION

1. DESCRIPTION AND OPERATION

The fuel is taken from the tanks via the grommet riveted on rib No. 2, and is led by means of tubes to the fuel cock (4, Fig. 28-1). The fuel cock is controlled by the **FUEL** selector located on the center console between the seats. The **FUEL** selector has three positions: **LEFT**, **RIGHT** and **OFF**. If the selector is in the **LEFT** / **RIGHT** position, then the fuel supplied to the engine is taken from the left / right tank. If the selector is in the **OFF** position, then the fuel supply to the engine is closed. Before setting the **FUEL** selector to the **OFF** position / from the **OFF** position, it is necessary to lift slightly the button on the selector.

The fuel is led from the fuel cock through the piping to the fuel filter (5) located on the left side of the cockpit.

In the original version of fuel distribution, the fuel from the fuel filter (5) is led by one line to the engine fuel pump (11) that transport it via the fuel distributors (9, 10) to the carburetors (7; 8). In the case of a fuel pump (11) failure, the fuel is led by the second line by means of the electric fuel pump (6) through the check valve (3) and the fuel distributors (9, 10) to the carburetors (7; 8) (see Section 73-10).

In the new version of fuel distribution, the fuel from the fuel filter (5) is led by one line via the distributor (10) to the electric fuel pump (6) and further via the distributor (10) to the engine fuel pump (11) that transports it via the distributors (9, 10) to the carburetors (7; 8). In the case of an electric fuel pump (6) failure (6), the fuel is led by the second line via the check valve (3) to the engine fuel pump (11), to the distributors (9, 10) and further to the carburetors (7; 8) (see Section 73-10).

The electric fuel pump is controlled by the **FUEL PUMP** switch located on the left part of the instrument panel near the switches and circuit breakers.

The hose of the return line of fuel is led from the distributor (9) via the fuel cock (4) to both fuel tanks.

On some aircraft, a pulsation damper (25) is inserted between the engine fuel pump (11) and the four-way distributor (9). This damper limits the oscillation of the fuel pressure below the lower limit.



2. MAINTENANCE PRACTICES

A. Fuel cock

Maintenance type: Line

Personnel qualification: Independent verification personnel qualified in accordance with Part 66 or higher

Recommended tools and material:

Item	Designation / size	Quantity	Note
Socket wrench	No. 12	1 pc.	
Wrench	No. 17	1 pc.	
Hex wrench	No. 2	1 pc.	
Phillips screwdriver	No. 2	1 pc.	
Degreasing agent	Acetone	-	
Adhesive	Loctite 577	-	
Lint-free cloth	-	-	

(1) Removal – fuel cock

- (a) Switch the electrical network off and disconnect the battery.
- (b) Drain the fuel from the fuel system (Section 12-10).
- (c) Depending on a version of the center console:
 - 1 Remove the cover of control IN1L / IN1R (Fig. 06-2) and the center console (Section 25-10) in the pilot cockpit, or
 - 2 Remove the cover IN6L (Fig. 06-2) on the center console.
- (d) Loosen the bolt (4, Fig. 28-6) on the selector; remove the selector (3) from the fuel cock shaft (1).
- (e) Unscrew and remove the bolts (5) and the plate (2).
- (f) Release the clamps (10) by means of pliers and pull off the hoses (11; 12; 13; 14; 15; 16) of the connections (6; 9).
- (g) Remove the fuel cock body (1).
- (h) Close the hoses and, if needed, the connections on the fuel cock using the blind plugs.
- (i) As needed, unscrew the banjo bolts (7) from the body (1), remove the washers (8), connections (6); unscrew the connections (9).
- (j) Close the necks on the fuel cock body by means of blind plugs.

(2) Installation – fuel cock

- (a) Remove the blind plugs from the hoses and from the necks / connections on the fuel cock body.
- (b) As needed, install the connections (6; 9) on the body (1, Fig. 28-6):
 - 1 Thoroughly clean the bolts (7) and the connections (9) by a cloth soaked in degreasing agent.



- 2 Put the washers (8) and the connection (9) on the bolts (7).
 - 3 Apply adhesive onto the bolts thread (7), screw the bolts into the body (1) and tighten it; care must be taken that the connections (9) are oriented downwards and are parallel with the shaft.
 - 4 Apply adhesive onto the threads of connections (9); screw the connections into the body (1) and tighten it.
- (c) Connect the connections (9) in accordance with the figure of the hose (14; 15; 16); secure the hoses by means of the clamps (10) using pliers.
 - (d) Connect the hoses to the connections (6) in accordance with the figure of the hose (11; 12; 13); secure the hoses by the clamps (10) using pliers.
 - (e) Position the body of fuel cock (1) from below to the center console (17) so that the fuel line from the left tank and the fuel line to the pump are oriented in forward direction.
 - (f) Position the plate (2) (the words **LEFT** and **RIGHT** forward) and attach it by means of bolts (5).
 - (g) Set the selector (3) to position on the shaft and attach it by the bolt (4).
 - (h) Check the fuel system tightness (Section 28-10).
 - (i) Fill the fuel system with fuel (Section 12-10) and check the function of fuel cock.
 - (j) Depending on a version of the center console:
 - 1 Install the cover of control IN1L / IN1R (Fig. 06-2) and the center console (Section 25-10) in the cockpit, or
 - 2 Install the cover IN6L (Fig. 06-2) on the center console.
 - (k) Install the center console (Section 25-10), or
 - (l) Install the cover of control IN1L / IN1R (Fig. 06-2) in the cockpit.
 - (m) Connect the battery.

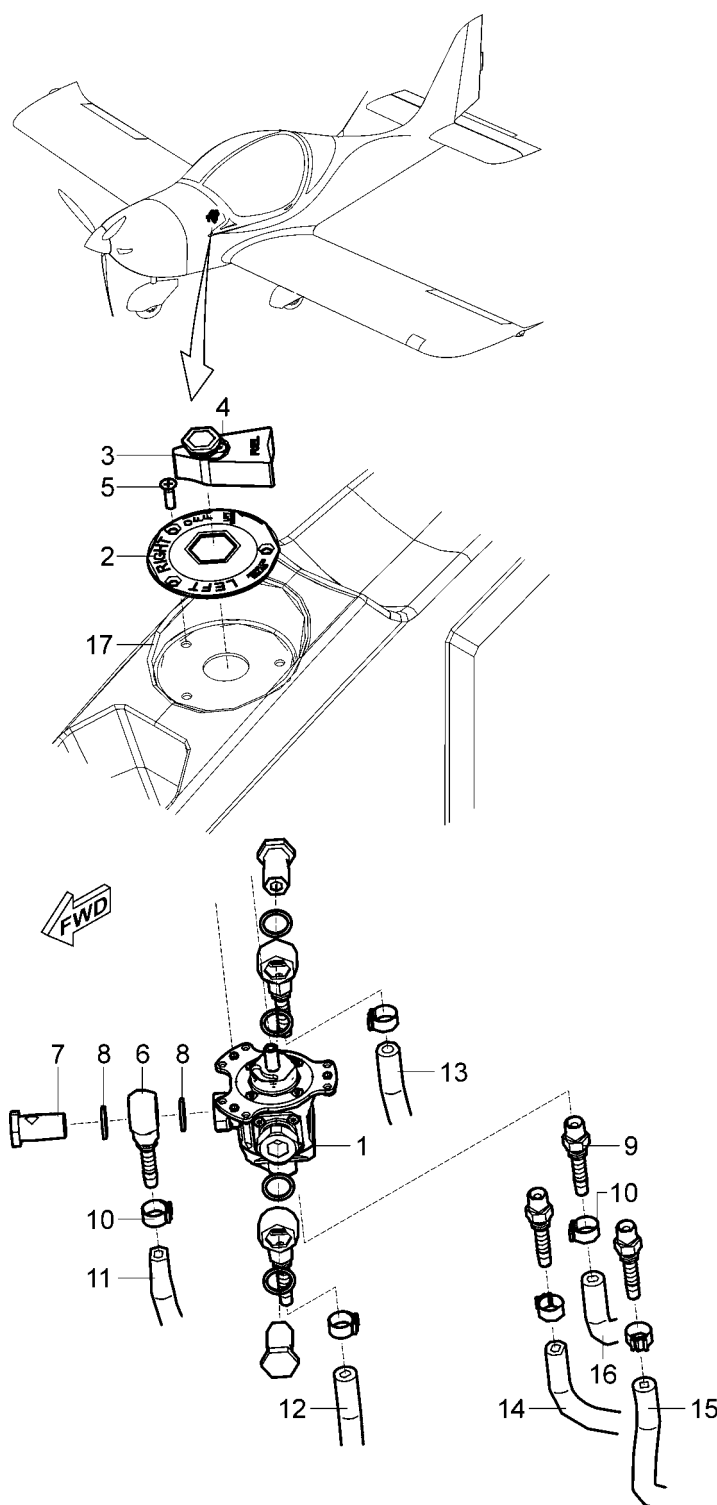


Fig. 28-6 Fuel cock – removal / installation (page 1 of 2)



Legend to Fig. 28-6

1 Fuel cock body	10 Clamp Cobra 11/7 (6 pcs.)
2 Plate of controller	11 Hose (fuel from the left tank)
3 Selector	12 Hose (fuel from the right tank)
4 Bolt	13 Hose (fuel to the fuel pump)
5 Bolt (3 pieces)	14 Hose (return fuel to the left tank)
6 Connection (3 pcs.)	15 Hose (return fuel from the engine)
7 Banjo bolt (3 pcs.)	16 Hose (return fuel to the right tank)
8 Gasket (6 pcs.)	For information:
9 Connection (3 pcs.)	17 Center console

Fig. 28-6 Fuel cock – removal / installation (page 2 of 2)

B. Electric fuel pump

Maintenance type: Line

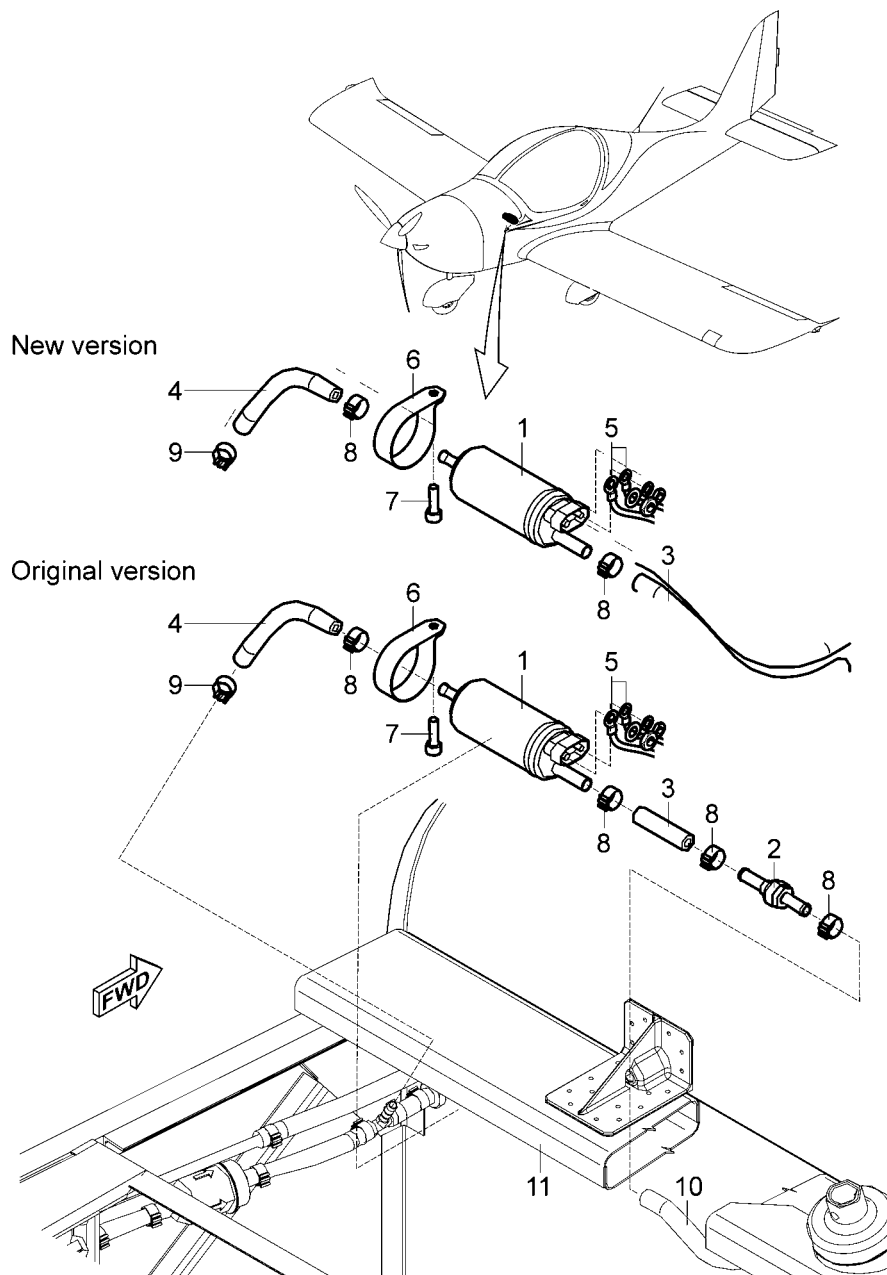
Personnel qualification: Independent verification personnel qualified in accordance with Part 66 or higher

Recommended tools and material:

Item	Designation / size	Quantity	Note
Gripping pliers	Cobra	1 pc.	
Wrench	No. 7	1 pc.	
Wrench	No. 8	1 pc.	
Hex wrench	No. 5	1 pc.	
Degreasing agent	Acetone	-	
Adhesive	Loctite 243	-	
Lint-free cloth	-	-	

(1) Removal – Pierburg electric fuel pump

- (a) Switch the electrical network off and disconnect the battery.
- (b) Drain the fuel from the fuel system (Section 12-10).
- (c) Release the clamps (8, Fig. 28-7) by pliers and pull off the hoses (3; 4) from the necks of the pump (1).
- (d) Unscrew and remove the nuts with washers and disconnect the wires (5).
- (e) Unscrew and remove the bolt (7) and the pump (1) with the sleeve (6).
- (f) Close the hoses and the necks of pump by means of the blind plugs.


Legend to Fig. 28-7

1 Electric fuel pump	7 Bolt M6x20
2 Check valve	8 Clamp Cobra 11/7
3 Hose	9 Clamp Cobra 12/8
4 Hose	10 Hose
5 Wires	For information:
6 Sleeve	11 Strut

Fig. 28-7 Pierburg electric fuel pump and check valve – removal / installation

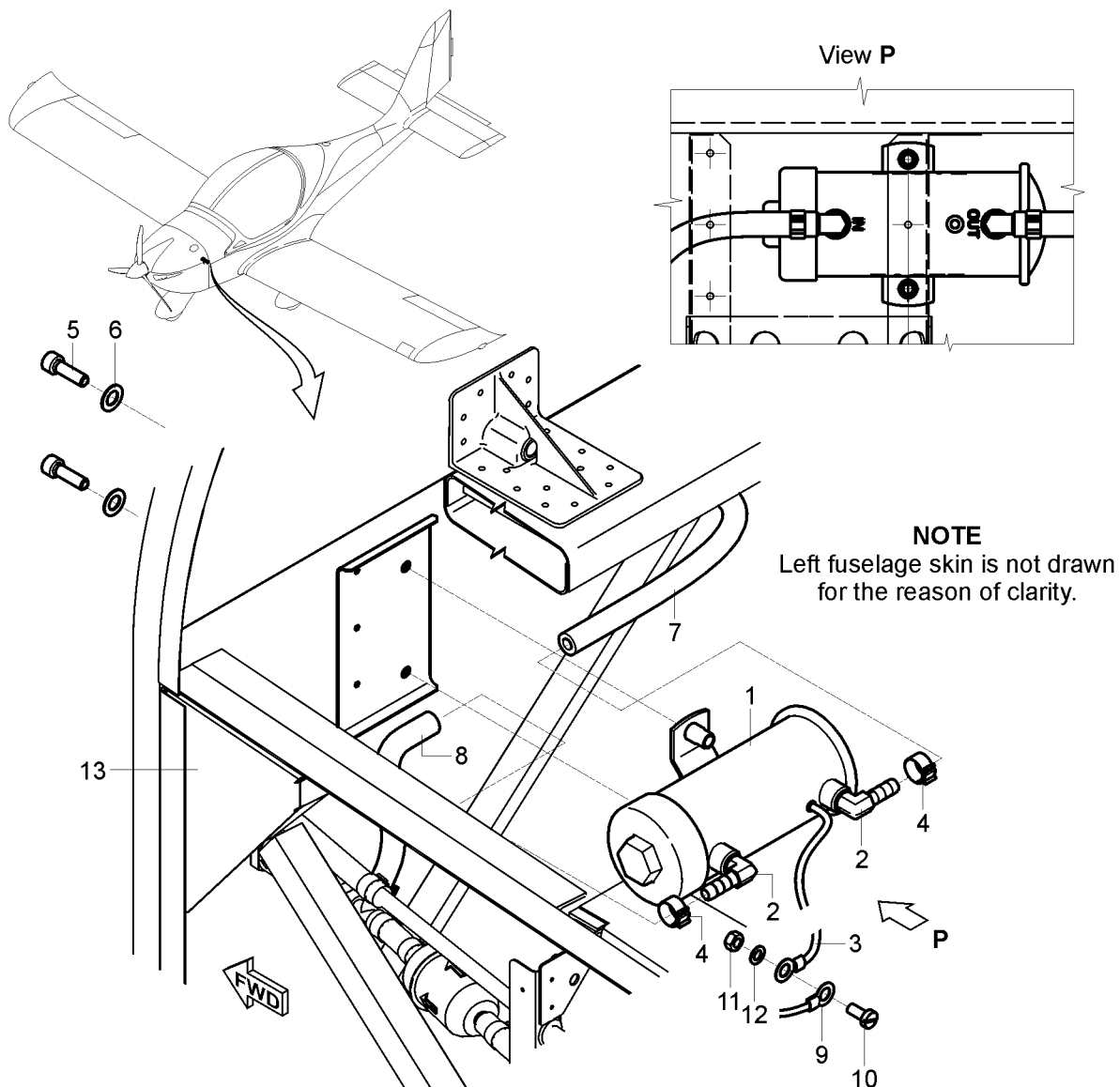


- (2) Installation – Pierburg electric fuel pump
 - (a) Remove the blind plugs from the hoses and from the necks of the pump (if installed).
 - (b) Thoroughly clean the bolt (7, Fig. 28-7) using a cloth soaked in degreasing agent.
 - (c) Apply adhesive onto the bolt thread (7).
 - (d) Position the pump (1) with the sleeve (6) to the anchor nut on the strut (9) and attach it by means of bolt (7); tighten the bolt.

NOTE

The pump must be installed in such a way that the arrow on the pump is oriented to the engine.

- (e) Put the eyes of wires (5) on the corresponding terminals of the pump, screw on and tighten the nuts with washers.
 - (f) Connect the hoses (3; 4) on the necks of the pump (1); secure the hoses by the clamps (8) by means of pliers.
 - (g) Check the fuel system tightness (Section 28-10).
 - (h) Fill the fuel system with fuel (Section 12-10).
 - (i) Connect the battery, switch the electrical network on and check the function of the pump.
- (3) Removal – Facet electric fuel pump
 - (a) Switch the electrical network off and disconnect the battery.
 - (b) Drain the fuel from the fuel system (Section 12-10).
 - (c) Remove the upper and lower engine cowlings (Section 71-10).
 - (d) Remove cover of the upper part of the fuselage (Section 53-30).
 - (e) Release the clamps (4, Fig. 28-8) by pliers and pull off the hoses (7; 8) from the necks of the pump (1).
 - (f) Unscrew and remove the screws, nuts and washers (10; 11; 12).
 - (g) Disconnect the wires (3, 9).
 - (h) Unscrew and remove the screws (5) and washers (6).
 - (i) Remove the pump (1) carefully.
 - (j) Close the hoses and the necks of pump by means of the blind plugs.



Legend to Fig. 28-8

1 Electric fuel pump	8 Inlet hose
2 Elbow	9 Wire
3 Wire	10 Screw M4x10
4 Clamp Cobra 12/8	11 Washer 4,3
5 Screw M6x20	12 Nut M4
6 Washer 6,4	13 Firewall
7 Outlet hose	

Fig. 28-8 Facet electric fuel pump – removal / installation



- (4) Installation – Facet electric fuel pump
 - (a) Remove the blind plugs from the hoses and from the necks of the pump (if installed).
 - (b) Thoroughly clean the screws (5, Fig. 28-8) and washers (6) using a cloth soaked in degreasing agent. Place the washers on the screws.
 - (c) Apply adhesive onto the screw thread (5).
 - (d) Position the pump (1) on the firewall (13) and attach it by means of bolts (5) and washers (6).

NOTE

Make sure that the pump is oriented correctly refer to Fig. 28-8).

- (e) Connect the hoses (7; 8) on the necks (2) of the pump ; secure the hoses by the clamps (8) by means of pliers.
- (f) Secure the hoses by the clamps (4) by means of pliers.
- (g) Connect the wires (3; 9) with the screw (10), washer (12) and nut (11).
- (h) Install cover of the upper part of the fuselage (Section 53-30).
- (i) Install the upper and lower engine cowlings (Section 71-10).
- (j) Check the fuel system tightness (Section 28-10).
- (k) Fill the fuel system with fuel (Section 12-10).
- (l) Connect the battery, switch the electrical network on and check the function of the pump.

C. Check valve

Maintenance type: Line

Personnel qualification: Independent verification personnel qualified in accordance with Part 66 or higher

Recommended tools and material:

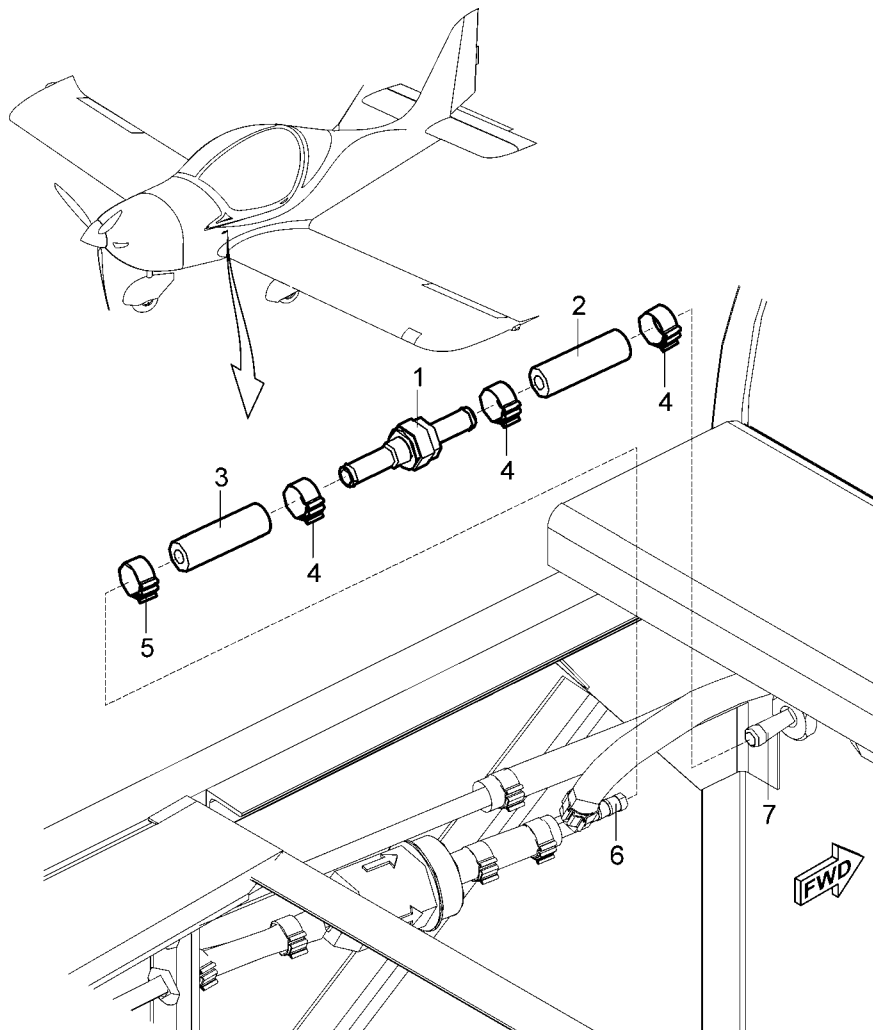
Item	Designation / size	Quantity	Note
Gripping pliers	Cobra	1 pc.	

- (1) Removal – check valve (the original version of fuel distribution)
 - (a) Switch the electrical network off and disconnect the battery.
 - (b) Drain the fuel from the fuel system (Section 12-10).
 - (c) Release the clamps (8, Fig. 28-7) by pliers and pull off the hoses (3; 10) from the necks of the valve (2).
 - (d) Remove the valve (2).
 - (e) Close the hoses and the necks of the valve by means of blind plugs.
- (2) Installation – check valve (the original version of fuel distribution)
 - (a) Remove the blind plugs from the hoses and necks of the valve.
 - (b) Connect the hoses (3; 10) on the necks of the valve (2, Fig. 28-7); secure the hoses by the clamps (8) using the pliers.note

**NOTE**

The valve must be installed in such a way so that the arrow on the valve is oriented to the engine.

- (c) Check the fuel system tightness (Section 28-10).
- (d) Connect the battery.



Legend to Fig. 28-9

1 Check valve	5 Clamp Cobra 12/8
2 Hose	For information:
3 Hose	6 Three-way distributor
4 Clamp Cobra 11/7	7 Leadthrough

Fig. 28-9 Check valve – removal / installation



- (3) Removal – check valve (the new version of fuel distribution)
 - (a) Drain the fuel from the fuel system (Section 12-10).
 - (b) Release the clamps (4; 5, Fig. 28-9) using pliers and pull off the hoses (2; 3) from the necks of the valve (1).
 - (c) Remove the valve (1).
 - (d) Close the necks of the three-way distributor, leadthrough and valve by means of blind plugs.
- (4) Installation – check valve (the new version of fuel distribution)
 - (a) Remove the blind plugs from the necks of the three-way distributor, leadthrough and valve.
 - (b) Connect the hoses (2; 3) on the necks of the valve (1, Fig. 28-9); secure the hoses by the clamps (4; 5) using pliers.

NOTE

The valve must be installed in such a way that the arrow on the valve is oriented to the engine.

- (c) Check the fuel system tightness (Section 28-10).
- (d) Connect the battery.

D. Fuel filter

Maintenance type: Line

Personnel qualification: Independent verification personnel qualified in accordance with Part 66 or higher

Recommended tools and material:

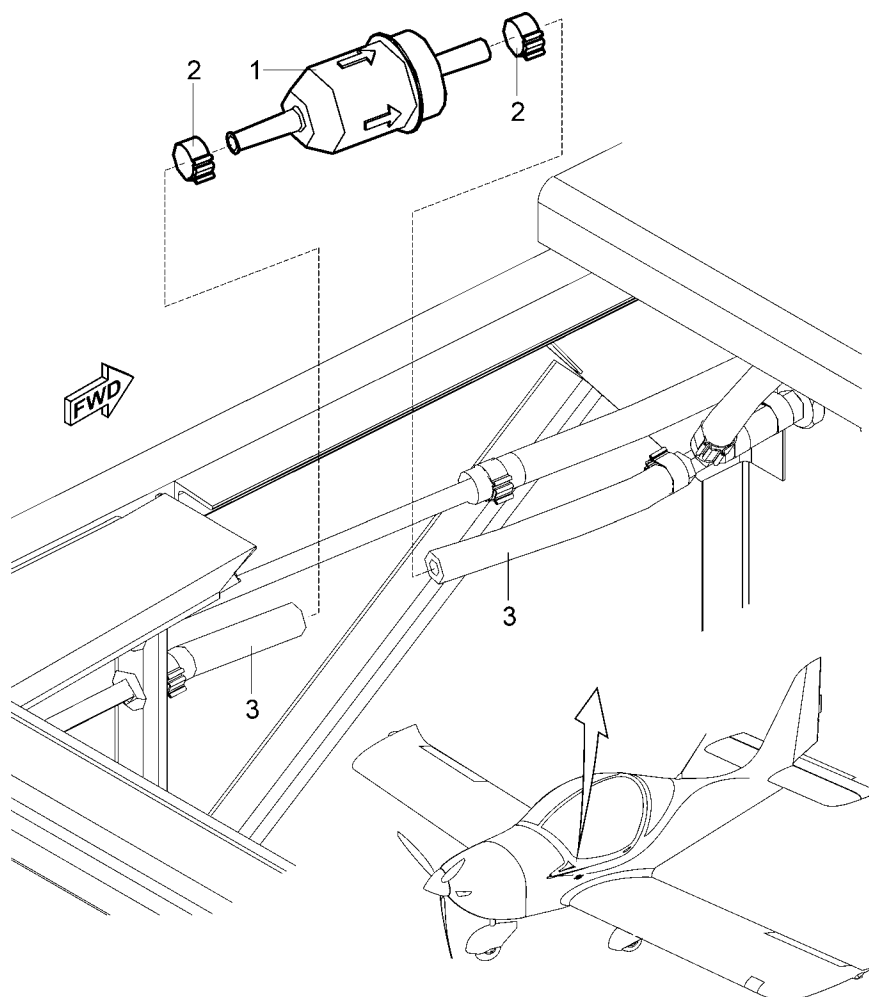
Item	Designation / size	Quantity	Note
Gripping pliers	Cobra	1 pc.	

- (1) Removal – fuel filter
 - (a) Switch the electrical network off and disconnect the battery.
 - (b) Drain the fuel from the fuel system (Section 12-10).
 - (c) Remove the left sidewall of cabin (Section 25-10).
 - (d) Release the clamps (2, Fig. 28-10) using pliers and pull off the hoses (3) from the necks of the filter (1).
 - (e) Remove the filter (1).
 - (f) Close the hoses and the necks of the filter (if reinstalled) using blind plugs.
- (2) Installation – fuel filter
 - (a) Remove the blind plugs from the hoses and the necks of the filter.
 - (b) Connect the hoses (3) on the necks of the filter (1, Fig. 28-10); secure the hoses by means of the clamps (2) using pliers.

**NOTE**

The filter must be installed in such a way that the arrow on the filter is oriented to the engine.

- (c) Check the fuel system tightness (Section 28-10).
- (d) Install the left sidewall of cabin (Section 25-10).
- (e) Connect the battery.



Legend to Fig. 28-10

1 Fuel filter

2 Clamp Cobra 11/7

3 Hose

Fig. 28-10 Fuel filter – removal / installation



E. Pulsation damper

Maintenance type: Line

Personnel qualification: Independent verification personnel qualified in accordance with Part 66 or higher

Recommended tools and material:

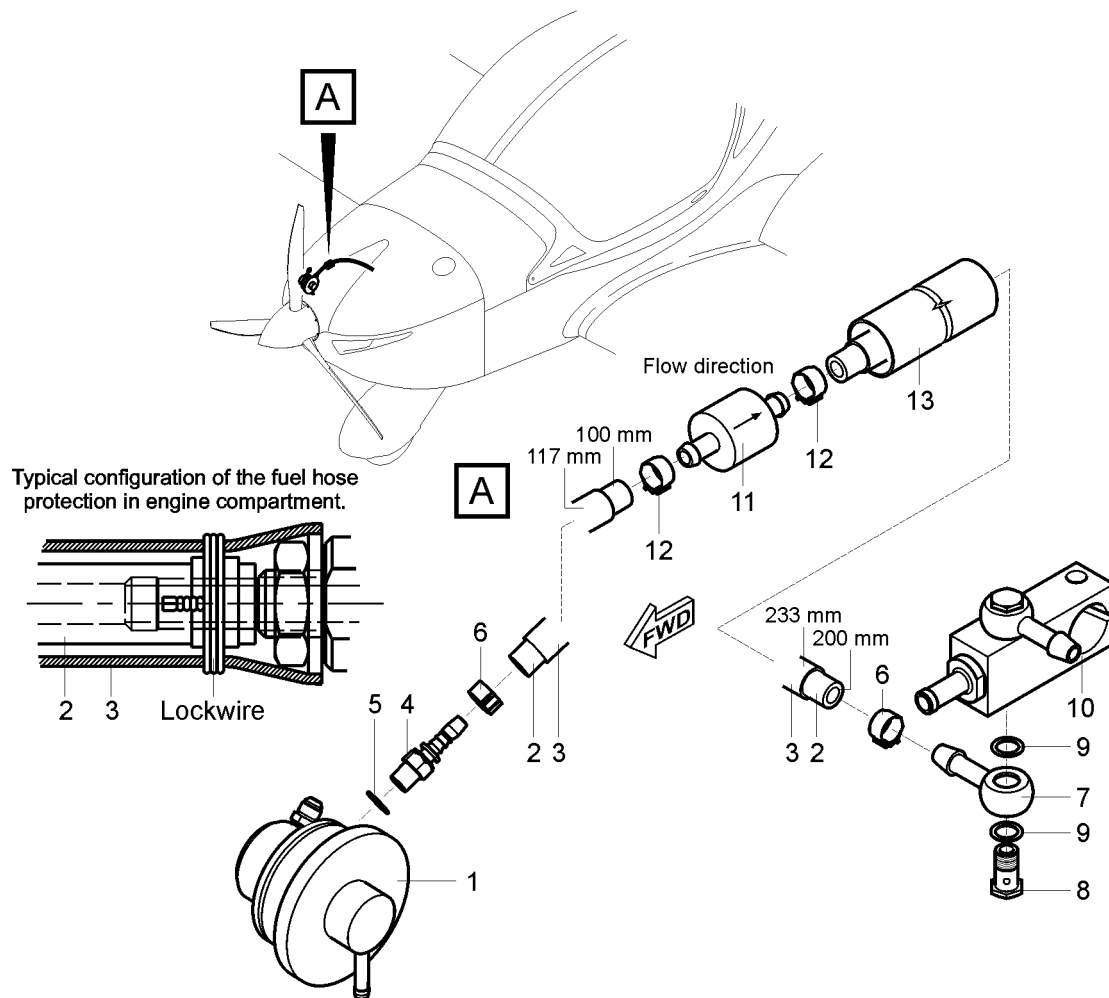
Item	Designation / size	Quantity	Note
Pliers	-	1 pc.	
Gripping pliers	Cobra	1 pc.	
Lockwire	Diameter 0,81 mm	As needed	
Cable tie	4,8x368 mm	10 pcs.	
Lint-free cloth	-	-	

(1) Removal – pulsation damper for Rotax 912S engine

- Switch the electrical network off and disconnect the battery.
- Set the fuel cock to OFF position.
- Remove the upper engine cowling (Section 71-10).
- Cut the binding lockwire at the ends of the pyrojacket (13, Obr.28-11).
- Cut the cable ties off securing the hose with pulsation damper to the other elements.
- Pull the pyrojacket (13) toward to fuel distribution block (10).
- Cut the binding lockwire at the ends of the pyrojackets (3).
- Release the clamps (12) by means of pliers and pull off the hoses (11) from the necks of the pulsation damper (11).
- Remove the pulsation damper (11) carefully.

(2) Installation – pulsation damper for Rotax 912S engine

- Pull the pyrojackets (3, Fig. 28-11) on fuel hoses (2).
- Connect both fuel hoses (2) to the pulsation damper necks (11) and secure the hoses with clamps (12) by means of pliers.
- Secure the pyrojackets (3) at the ends with lockwire by means of pliers.
- Unroll the pyrojacket (9) and adjust the ends to cover the hose from the fuel pump to the fuel distribution block. Secure the ends with a lockwire by means of pliers.
- Secure the hose to the other elements with cable ties.
- Do the engine test, check fuel pressure and fuel system tightness (Section 28-10).
- Install the upper engine cowling (Section 71-10).



Legend to Fig. 28-11

1	Engine fuel pump	8	Screw fitting
2	Fuel hose	9	O-ring
3	Pyrojacket PJA-08	10	Fuel distribution block
4	Nipple 9/5,7	11	Pulsation damper
5	O-ring	12	Cobra clamp 14/8
6	Cobra clamp 13/8	13	Pyrojacket PJA-16
7	Fitting		

Fig. 28-11 Fuel damper for Rotax 912 S engine— removal / installation



-
- (3) Removal – pulsation damper for Rotax 912 ULS engine
- (a) Switch the electrical network off and disconnect the battery.
 - (b) Set the fuel cock to OFF position.
 - (c) Remove the upper engine cowling (Section 71-10).
 - (d) Cut the binding lockwire at the ends of the pyrojacket (9, Obr.28-12).
 - (e) Cut the cable ties off securing the hose with pulsation damper to the other elements.
 - (f) Pull the pyrojacket (9) toward to fuel distribution block (10).
 - (g) Cut the binding lockwire at the ends of the pyrojackets (3).
 - (h) Release the clamps (12) by means of pliers and pull off the hoses from the necks of the pulsation damper (11).
 - (i) Remove the pulsation damper (11) carefully.
- (4) Installation – pulsation damper for Rotax 912 ULS engine
- (a) Pull the pyrojackets (3, Fig. 28-12) on fuel hoses (2).
 - (b) Connect both fuel hoses (2) to the pulsation damper necks (11) and secure the hoses with clamps (12) by means of pliers.
 - (c) Secure the pyrojackets (3) at the ends with lockwire by means of pliers.
 - (d) Unroll the pyrojacket (9) and adjust the ends to cover the hose from the fuel pump to the fuel distribution block. Secure the ends with a lockwire by means of pliers.
 - (e) Secure the hose to the other elements with cable ties.
 - (f) Do the engine test, check fuel pressure and fuel system tightness (Section 28-10).
 - (g) Install the upper engine cowling (Section 71-10).



INDICATING

1. DESCRIPTION AND OPERATION

The fuel measurement system measures the following parameters:

- fuel quantity
- fuel pressure
- fuel flow rate.

A. Measurement of fuel quantity

Quantity of fuel is measured in each tank by the float type fuel level sensor coupled with the variable resistor – potentiometer. The signal from the potentiometer is led to the fuel quantity indicators with the airplane equipped with analog instruments. For the airplane equipped with the Dynon SkyView system, the signal is led to the module SV-EMS-220 and the value is indicated on the displays of the system; for the airplane equipped with the Garmin G3X system, the signal is led to the EIS unit GEA-24 and the value is indicated on the MFD.

In the case of analog fuel quantity indicators, the fuel quantity is calibrated in these levels: empty tank 0, 1/4, 1/2, 3/4 and full tank 1/1. For the airplane equipped with the Dynon SkyView / Garmin G3X system, the calibration is performed in liters and is indicated on the displays of the systems.

The wiring diagram of measurement of fuel quantity is shown in Chapter 91.

B. Measurement of fuel pressure

The fuel pressure is measured after the fuel pump (11, Fig. 28-1); from there it is led via the hose to the fuel pressure sensor (18). The fuel pressure sensor is located on the firewall. The value of fuel pressure is converted into an electrical signal in the fuel pressure sensor. The signal from the sensor is led to the fuel pressure indicator with the airplane equipped with the analog instruments. For the airplane equipped with the Dynon SkyView system, the signal is led to the module SV-EMS-220 and the value is indicated on the displays of the system; for the airplane equipped with the Garmin G3X system, the signal is led to the EIS unit GEA-24 and the value is indicated on the MFD.

The wiring diagram of fuel pressure sensor is shown in Chapter 91.

C. Measurement of fuel flow rate

The airplane equipped with the Dynon SkyView / Garmin G3X system have the fuel flow meter (20, Fig. 28-1) installed on the firewall in the engine compartment. The flow meter is inserted between the pump (11) and the three-way distributor (10) ensuring the fuel supply to the carburetors. For the airplane equipped with the Dynon SkyView system, the signal from the flow meter is led to the module SV-EMS-220 and the value is indicated on the displays of the system; for the airplane equipped with the Garmin G3X system, the signal is led to the EIS unit GEA-24 and the value is indicated on the MFD.

The wiring diagram of fuel flow meter is shown in Chapter 91.



2. MAINTENANCE PRACTICES

A. Fuel level sensor

Maintenance type: Line

Personnel qualification: Independent verification personnel qualified in accordance with Part 66 or higher

Recommended tools and material:

Item	Designation / size	Quantity	Note
Socket wrench	No. 8	1 pc.	
Wrench	No. 7	1 pc.	
Wrench	No. 8	1 pc.	
Flat screwdriver	-	1 pc.	
Calibrated vessel	-	1 pc.	Volume of 5 or 10 liters
Ohmmeter	-	-	Calibration of fuel indicators
USB disk	min. 4 GB	1 pc.	Calibration of fuel indicators on the airplane equipped with Dynon SV system
SD card	min. 8 GB	1 pc.	Calibration of fuel indicators on the airplane equipped with G3x system

(1) Removal – Road fuel level sensor

- (a) Switch the electrical network off and disconnect the battery.
- (b) Drain the fuel from the fuel system (Section 12-10).
- (c) Remove the wing (Section 57-40).
- (d) Remove the cover W6L / W6R (Fig. 06-2) on the lower side of the wing.
- (e) Disconnect the wires (5; 6, Fig. 28-13) from the flange of fuel sensor – remove the nuts (7) with the washers (8) and disconnect the wires.
- (f) Unscrew the bolts (3) with washers (4) by means of which the fuel sensor flange is attached to the flange on rib No. 2.
- (g) Carefully remove the fuel level sensor (1) from the flange and remove the gasket (2).
- (h) Close the hole in the flange by means of the blind plug.

(2) Installation – Road fuel level sensor

- (a) Remove the blind plug from the hole in the flange.
- (b) Carefully position the fuel level sensor (1, Fig. 28-13) with the gasket (2) to the flange (9); pay attention to a correct position of the fuel sensor so that the plane of float movement is perpendicular to the fuselage reference plane.



CAUTION

TIGHTEN THE BOLTS CROSSWISE – THE GASKET BETWEEN THE FUEL INDICATOR AND THE FLANGE MUST BE UNIFORMLY COMPRESSED!

- (c) Attach the flange of the fuel sensor to the flange on rib No. 2 – screw on and carefully tighten the bolts (3) with the washers (4).
- (d) Put the eyes of wires (5; 6) on the corresponding terminals of the fuel sensor; screw on and tighten the nuts (7) with the washers (8).
- (e) Install the cover W6L / W6R (Fig. 06-2) on the lower side of the wing.
- (f) Install the wing (Section 57-40).
- (g) Check the fuel system tightness (Section 28-10).
- (h) Fill the fuel system with fuel (Section 12-10).
- (i) Connect the battery, switch the electrical network on.
- (j) Check the function of the fuel level sensor; calibrate the fuel indicator system as needed (see par. 2 A.(5)).

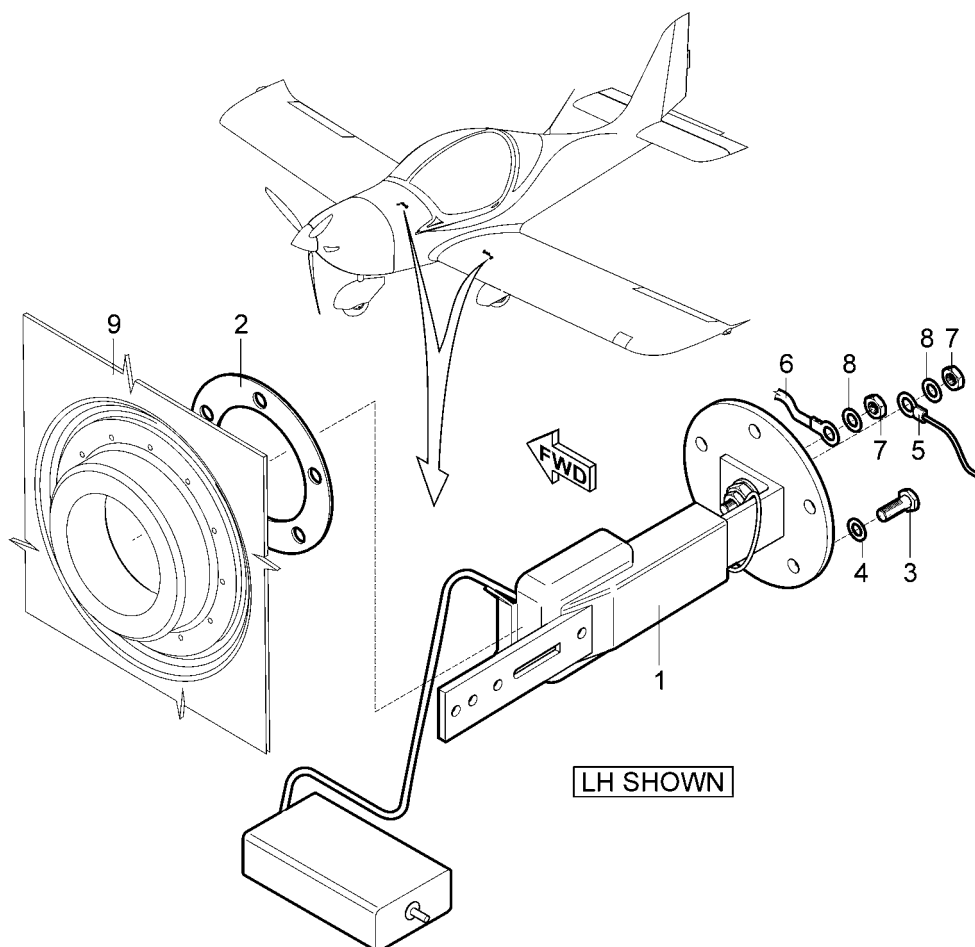


Fig. 28-13 Road fuel level sensor – removal / installation (page 1 of 2)



Legend to Fig. 28-13

1 Fuel level sensor	6 Wire
2 Gasket	7 Nut
3 Bolt M5x16 (6 pcs.)	8 Washer
4 Washer 5,3 (6 pcs.)	For information:
5 Wire	9 Rib No. 2 with fuel indicator flange

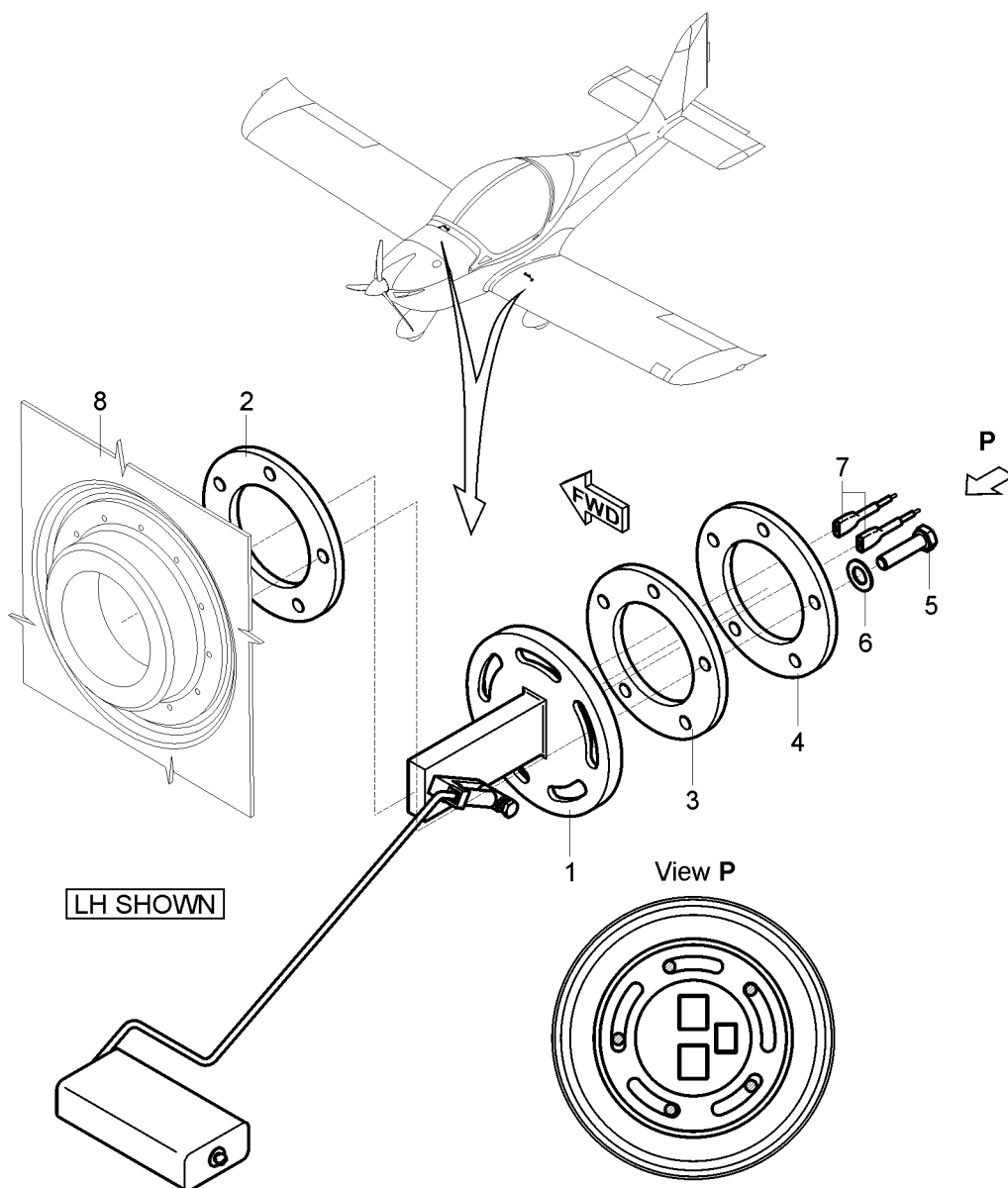
Fig. 28-13 Road fuel level sensor – removal / installation (page 2 of 2)

- (3) Removal – VDO fuel level sensor
 - (a) Switch the electrical network off and disconnect the battery.
 - (b) Drain the fuel from the fuel system (Section 12-10).
 - (c) Remove the wing (Section 57-40).
 - (d) Remove the cover W6L / W6R (Fig. 06-2) on the lower side of the wing.
 - (e) Disconnect the wires (7, Fig. 28-14) from the flange of fuel sensor.
 - (f) Unscrew the bolts (5) with washers (6) and washer (4).
 - (g) Carefully remove the fuel level sensor (1) from the flange and remove the gaskets (2, 3).
 - (h) Close the hole in the flange by means of the blind plug.
- (4) Installation – VDO fuel level sensor
 - (a) Remove the blind plug from the hole in the flange.
 - (b) Carefully position the fuel level sensor (1, Fig. 28-14) with the gaskets (2, 3) and washer (4) to the flange (8); pay attention to a correct position of the fuel sensor so that the plane of float movement is perpendicular to the fuselage reference plane.

CAUTION

TIGHTEN THE BOLTS CROSSWISE – THE GASKET BETWEEN THE FUEL INDICATOR AND THE FLANGE MUST BE UNIFORMLY COMPRESSED!

- (c) Attach the flange of the fuel sensor to the flange on rib No. 2 – screw on and carefully tighten the bolts (5) with the washers (6).
- (d) Put the wires (7) on the corresponding terminals of the fuel sensor.
- (e) Install the cover W6L / W6R (Fig. 06-2) on the lower side of the wing.
- (f) Install the wing (Section 57-40).
- (g) Check the fuel system tightness (Section 28-10).
- (h) Fill the fuel system with fuel (Section 12-10).
- (i) Connect the battery, switch the electrical network on.
- (j) Check the function of the fuel level sensor; calibrate the fuel indicator system as needed (see par. 2 A.(5)).



Legend to Fig. 28-14

- 1 Fuel level sensor
- 2 Gasket
- 3 Gasket
- 4 Washer
- 5 Bolt M5x20 (5 pcs)

- 6 Washer 5.3 (5 pcs.)
- 7 Wires

For information:

- 8 Rib No. 2 with fuel indicator flange

Fig. 28-14 VDO fuel level sensor – removal / installation



- (5) Adjustment / check – calibration and check of a correct function of the measurement system and indication of fuel quantity.

Carry out this check on the airplane with completely finished fuel installation.

Perform the check in a suitable and exactly defined space. In this this space and in its vicinity don't carry out, in the course of the check, any other work than the work necessary for performing the check.

As working and test medium for this exam, use motor gasoline Natural 95 or aviation gasoline Avgas 100LL.

During this check, perform the tank filling with fuel by means of the calibration device or the calibration vessel so that it is possible to determine a precise quantity of added fuel. For the same reason, use the calibration device or the calibration vessel also when draining fuel from the tank. When handling fuel, use the clothing that doesn't contain artificial clothes.

The airplane with analog instruments:

- (a) Level the airplane (Section 08-10).
- (b) Electrically ground the airplane (for example using the exhaust pipe of the airplane) to the grounding point.
- (c) Verify whether both wing tanks are empty (by means of ohmmeter, measure a fuel indicator value of 2 – 3 Ohm); otherwise, drain the fuel (Section 12-10).
- (d) Check the closing of the drain valves of both tanks and remove the tank filler caps.
- (e) Activate the board network of airplane.
- (f) Slowly add fuel into the left tank and monitor at which quantity of the fuel added into the tank the first reaction of the pointer of the left tank fuel indicator occurred. Record this measured quantity of fuel (in liters).
- (g) In accordance with the readout of fuel indicator of the left tank, fill the left tank with fuel to the level that is indicated on the fuel indicator as 1/4. Record the readout of fuel indicator and the actual quantity of fuel in the left tank.
- (h) In accordance with the readout of fuel indicator of the left tank, fill the left tank with fuel to the level that is indicated on the fuel indicator as 1/2. Record the readout of fuel indicator and the actual quantity of fuel in the left tank.
- (i) In accordance with the readout of fuel indicator of the left tank, fill the left tank with fuel to the level that is indicated on the fuel indicator as 3/4. Record the readout of fuel indicator and the actual quantity of fuel in the left tank.
- (j) In accordance with the readout of fuel indicator of the left tank, fill the left tank with fuel to the level that is indicated on the fuel indicator as 1/1. Record the readout of fuel indicator and the actual quantity of fuel in the left tank.
- (k) Fill the left tank with fuel up to the full level (up to the neck); record the actual quantity of fuel in the left tank.
- (l) Repeat the procedure in accordance with par. (f) up to (k) for the right tank.
- (m) Add the values of fuel quantity in the corresponding labels (3, Fig. 11-2) and glue them onto the corresponding fuel indicators.
- (n) Disable the board network of airplane.
- (o) Disconnect the electrical grounding of the airplane.



The airplane equipped with the Dynon SkyView system:

WARNING

UNAUTHORIZED ENTRY TO THE SYSTEM SETTING AND NON-OBSERVANCE OF THE DEFINED CALIBRATION PROCEDURES CAN CAUSE AN INCORRECT FUNCTION OR A TOTAL FAILURE OF THE WHOLE DYNON SKYVIEW SYSTEM!

NOTE

A detailed description and information about the Dynon SkyView system operation are shown in the document Dynon SkyView System Installation Guide, Document 101320-022, Revision W, dated January 2016 or a latest valid issue.

- (a) Level the airplane (Section 08-10).
- (b) Electrically ground the airplane (for example, using the exhaust pipe of the airplane) to the grounding point.
- (c) Check whether both wing tanks are empty (by means of ohmmeter, measure a fuel indicator value of 2 – 3 Ohm), otherwise, drain the fuel (Section 12-10).
- (d) Check whether the drain valves of both tanks are closed and remove the tank filler caps.
- (e) Enter the SETUP MENU of the display Dynon D1000 / D700:
 - 1 Press down and hold the button No. 7 (counted from the left).
 - 2 Switch on the **MAIN SWITCH**.
 - 3 Hold button No. 7 pressed throughout the Dynon SkyView system launching – then the system automatically enters the locked SETUP MENU.
- (f) By turning the rotary switch, find **HARDWARE CALIBRATION**.
- (g) Turn the rotary switch to the right and find **EMS CALIBRATION**.
- (h) By turning the rotary switch, select the calibrated tank – **FUEL TANK LEFT / RIGHT** (1 or 2) and then turn the rotary switch to the right.
- (i) If you want to edit the calibration, select **EDIT**; if you want to do a recalibration, select **RECAL**.

EDIT editing of the calibrated values in the table – for fine-tuning.
RECAL tank re-calibration – new calibration, the original values will be deleted!
- (j) Set the tank volume (the integral tank of 60 liters) by the rotary switch; press the **NEXT** button to continue.
- (k) Calibrate zero:
 - 1 By means of ohmmeter, measure a value of about 2 – 3 Ohm on the fuel level sensor.
 - 2 If this value is higher, slightly slap with the hand on the lower skin of the wing between rib No. 2 and 3 after the spar (in the flight direction) and let the float fall on the larger side (has form of a rectangular parallelepiped).
 - 3 Press down the **START** button = calibration of zero.



- (l) Calibrate the tank:
- The table shows calibration step No. 1 for 0 liters – calibrated zero.
- Follow the instructions on the display; the system itself determines the number of calibration steps and the quantity of added fuel.
- An example for the integral tank:
- The value of added fuel is shown in the left upper corner.
- ADD 5 LITERS (add 5 liters)
- The set volume of tank is shown in the right upper corner.
- TANK CAPACITY ENTERED (LITERS) = 60
- It means that for a 60-liter tank, the calibration will have 12 steps; 1 step is 5 liters.
- 1 Add the fuel quantity into the tank that is required by the system (ADD xxx LITERS).
 - 2 Wait for about 5 minutes because of spill and stabilization of fuel level in the tank – the airplane must be at rest.
 - 3 After stabilization of fuel level, press the ADD button.
 - 4 Repeat par. 1 up to 3 – the table CALIBRATION RESULT will be filled out automatically step by step.
 - 5 After the tank filling with fuel (the last filling step), press the FULL button.
 - 6 Finish and save the calibration by the DONE button.
- (m) As needed, repeat the procedure shown in par. (g) up to (l) for the other tank.
- (n) Create a backup:
- 1 Connect the USB flash disk to the port USB1 – the backup from the left display.
 - 2 In Setup Menu of the left display, find SYSTEM SOFTWARE by means of the rotary switch.
 - 3 Turn the rotary switch to the right and find EXPORT SETTINGS.
 - 4 Turn the rotary switch to the right and by means of the rotary switch set the name of the file (for the serviced airplane it is its serial number).
 - 5 Press down the EXPORT button.
 - 6 Save the data from the USB disk (files .dgc a .sgf) for archiving.
 - 7 Send the data to the manufacturer to the following e-mail address:
service@evektor.cz
- (o) Disable the board network of airplane.
- (p) Disconnect the electrical grounding of the airplane.
- The airplane equipped with the Garmin G3X system:



WARNING

UNAUTHORIZED ENTRY TO THE SYSTEM SETTING AND NON-OBSERVANCE OF THE DEFINED CALIBRATION PROCEDURES CAN CAUSE AN INCORRECT FUNCTION OR A TOTAL FAILURE OF THE WHOLE GARMIN G3X SYSTEM!

NOTE

A detailed description and information about the Garmin G3X system operation are shown in the document Garmin G3X/G3X Touch Installation Manual, Document 190-01115-01, Revision AC, dated July 2017 or a latest valid issue.

- (a) Level the airplane (Section 08-10).
- (b) Electrically ground the airplane (for example, using the exhaust pipe of the airplane) to the grounding point.
- (c) Check whether both wing tanks are empty; otherwise drain the fuel (Section 12-10).
- (d) Check whether the drain valves of both tanks are closed and remove the tank filler caps.
- (e) Enter the Configuration Mode of the PFD GDU 460:
 - 1 Press down and hold the button **MENU**.
 - 2 Switch on the **MAIN SWITCH**, until the Configuration Mode is activated.
- (f) Select the calibrate tank:
 - 1 In the Configuration Mode, select the Engine & Airframe page.
 - 2 Calibration of individual tanks is done in the FUEL 1 menu for the left tank and FUEL 2 menu for the right tank
 - 3 Press the Calibrate button to enter the calibration page of the selected tank (L or R).
- (g) Empty the tank:
 - 1 By means of ohmmeter, measure a value of about 2 – 3 Ohm on the fuel level sensor.
 - 2 If this value is higher, slightly slap with the hand on the lower skin of the wing between rib No. 2 and 3 after the spar (in the flight direction) and let the float fall on the larger side (has form of a rectangular parallelepiped).
- (h) Calibrate the tank:
 - 1 Add 5 liters of fuel into the empty tank and set the 5 liter value also in the field Actual Fuel Quantity.
 - 2 Wait for about 2 minutes because of spill and stabilization of fuel level in the tank – the airplane must be at rest.
 - 3 After stabilization of fuel level, press the Calibrate button.
 - 4 Repeat for all calibrated fuel quantities - see following table:



Left tank	Right tank
litres	litres
5	5
10	10
15	15
20	20
25	25
30	30
35	35
40	40
45	45
50	50
55	55
60	60

- 5 Finish the calibration when the tank is full.
- (i) As needed, repeat the procedure shown in par. (f) up to (h) for the other tank.
- (j) Create a backup:
 - 1 Insert the SD card disk to the SD card slot on the PFD.
 - 2 To display the calibration data save menu, press the **MENU** button on the PFD (the Fuel Quantity Calibration Page calibration page must be displayed on the PFD).
 - 3 To save, press Write Calibration File, the data is stored on the SD card under: / Garmin / cal /.
 - 4 The saving of the calibration data must be done for each tank separately.
 - 5 Send the data to the manufacturer to the following e-mail address:
service@evektor.cz
- (k) Disable the board network of airplane.
- (l) Disconnect the electrical grounding of the airplane.



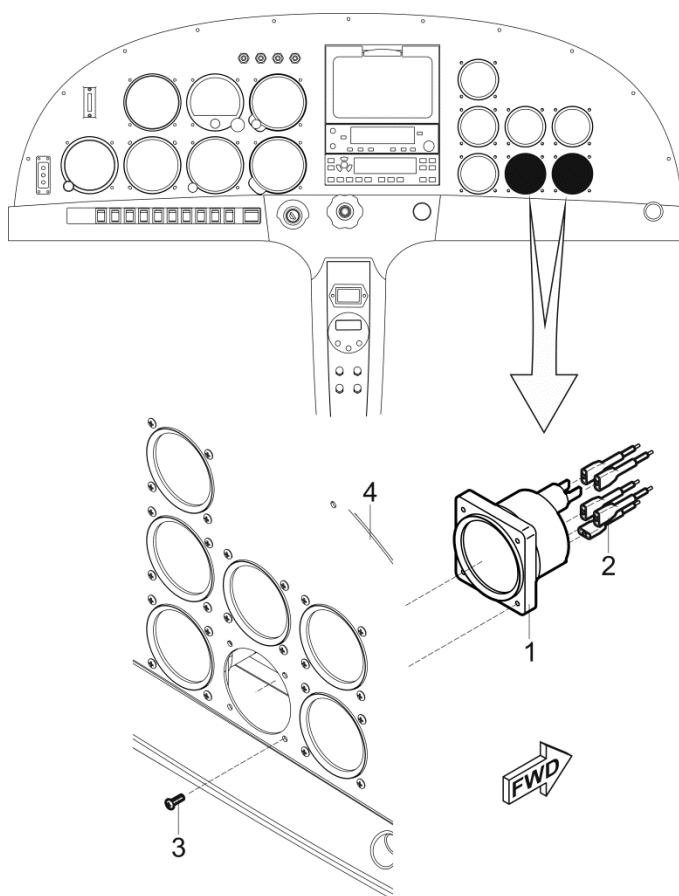
B. Fuel quantity indicator

Maintenance type: Line

Personnel qualification: Independent verification personnel qualified in accordance with Part 66 or higher

Recommended tools and material:

Item	Designation / size	Quantity	Note
Phillips screwdriver	No. 2	1 pc.	



Legend to Fig. 28-15

- 1 Fuel quantity indicator
- 2 Wires
- 3 Screw (4 pcs.)

For information:

- 4 Instrument panel

Fig. 28-15 Fuel quantity indicator – removal / installation



- (1) Removal – fuel quantity indicator
 - (a) Switch the electrical network off and disconnect the battery.
 - (b) Remove the cover of the upper part of the fuselage F4 (Section 53-30).
 - (c) Disconnect the wires (2, Fig. 28-15).
 - (d) Unscrew the screws (3) and remove the fuel indicator (1).
- (2) Installation – fuel quantity indicator
 - (a) Insert the fuel indicator (1, Fig. 28-15) into the hole in the instrument panel (4); screw on the screws and tighten them (3).
 - (b) Connect the wires (2).
 - (c) Install the cover of the upper part of the fuselage F4 (Section 53-30).
 - (d) Connect the battery, switch the electrical network on.
 - (e) Check the fuel quantity indicator function; as needed, calibrate the fuel system (see par. 2 A.(5)).

C. Fuel pressure sensor

Maintenance type: Line

Personnel qualification: Independent verification personnel qualified in accordance with Part 66 or higher

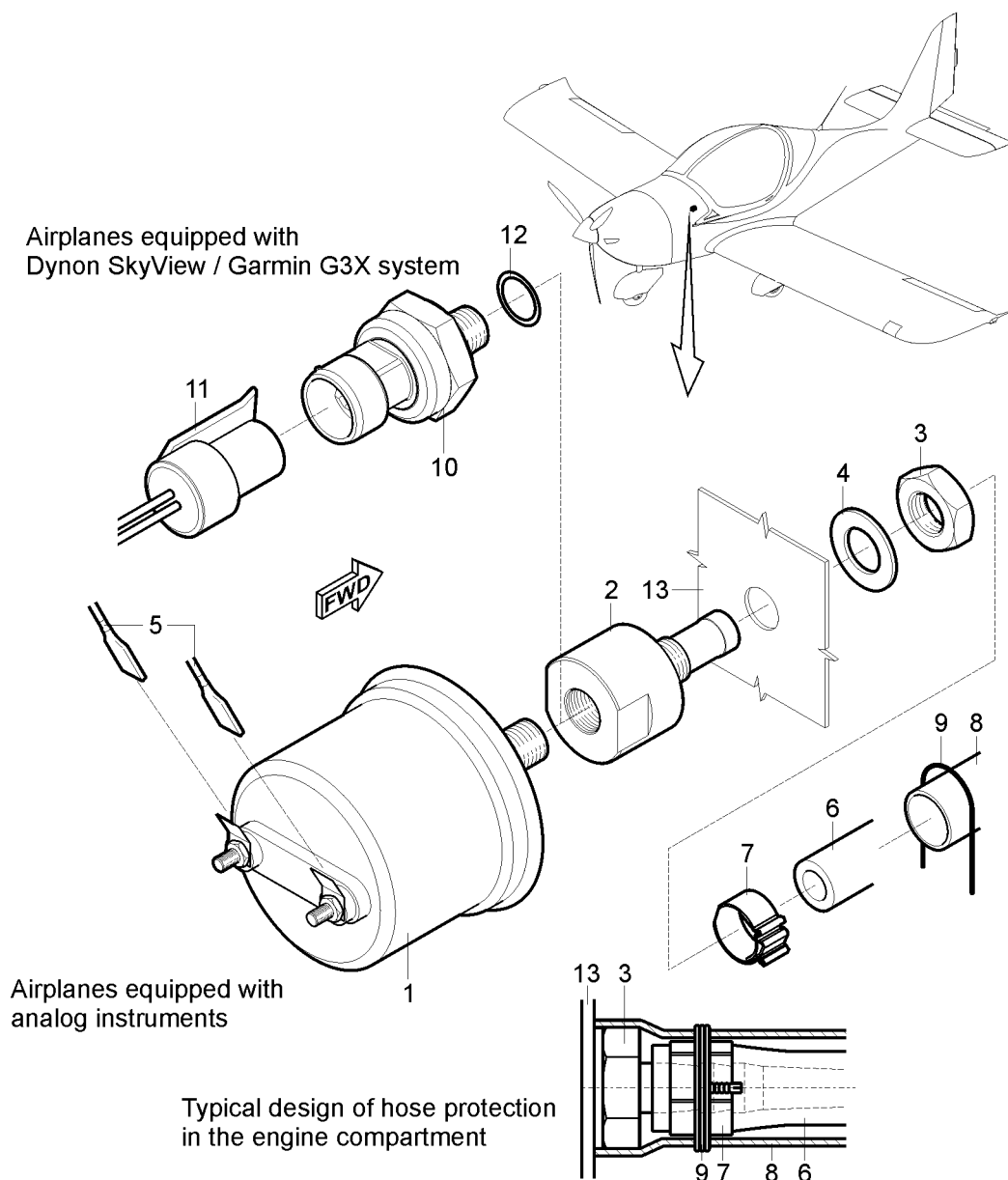
Recommended tools and material:

Item	Designation / size	Quantity	Note
Wrench	No. 8	1 pc.	
Wrench	No. 17	1 pc.	
Wrench	No. 24	1 pc.	
Gripping pliers	Cobra	1 pc.	
Degreasing agent	Acetone	-	
Adhesive	Loctite 577	-	
Lint-free cloth	-	-	
Stainless lockwire	Ø 0,8 mm	-	
Fuel can	-	-	

- (1) Removal – fuel pressure sensor
 - (a) Switch the electrical network off and disconnect the battery.
 - (b) Drain the fuel from the fuel system (Section 12-10).
 - (c) Remove the cover of the upper part of the fuselage F4 (Section 53-30).
 - (d) For the airplane equipped with analog instruments:
 - 1 Disconnect the wires (5, Fig. 28-16)
 - 2 Unscrew and remove the fuel pressure sensor (1).
 - (e) For the airplane equipped with the Dynon SkyView / Garmin G3X system:
 - 1 Disconnect the connector (11).
 - 2 Unscrew and remove the fuel pressure sensor (10).



- (f) Remove the screw fitting as needed:
 - 1 Remove the engine cowlings (Section 71-10).
 - 2 Cut off the lockwire (9) and pull off the pyrojacket (8).
 - 3 Release the clamp (7) by means of pliers and pull off the hose (6) from the neck of the screw fitting (2).
 - 4 Unscrew and remove the nut (3), washer (4) and remove the screw fitting (2).
- (g) Close the hose and the neck of the sensor by means of blind plugs.
- (2) Installation – fuel pressure sensor
 - (a) Remove the blind plugs from the hose and the neck of the sensor.
 - (b) Install the screw fitting as necessary:
 - 1 Insert the screw fitting (2, Fig. 28-16) into the hole in the firewall (10) and attach it by means of the nut (3) and the washer (4).
 - 2 Connect the hose (6) on the neck of the screw fitting (2); secure the hose by the clamp (7) using pliers.
 - 3 Pull the pyrojacket (3) over the screw fitting and secure it by lockwire (9) (Section 20-20).
 - (c) For the airplane equipped with analog instruments:
 - 1 Thoroughly clean the screw fitting on the sensor by means of a cloth soaked in degreasing agent.
 - 2 Apply adhesive onto the screw fitting thread on the sensor (1).
 - 3 Connect the wires (5).
 - (d) For the airplane equipped with the Dynon SkyView / Garmin G3X system:
 - 1 Check the condition of the sealing ring (12); replace the damaged ring.
 - 2 Screw the sensor (10) with the sealing ring (12) into the screw fitting (2) and tighten it.
 - 3 Connect the connector (11).
 - (e) Check the fuel system tightness (Section 28-10).
 - (f) Install the engine cowlings (Section 71-10).
 - (g) Install the cover of the upper part of the fuselage F4 (Section 53-30).
 - (h) Fill the fuel system with fuel (Section 12-10).
 - (i) Connect the battery, switch the electrical network on.
 - (j) Do the engine check and check the function of the fuel pressure sensor.



Legend to Fig. 28-16

1 Fuel pressure sensor	8 Pyrojet
2 Screw fitting	9 Lockwire
3 Nut M10	10 Fuel pressure sensor
4 Washer 10,5	11 Connector
5 Wires	12 Sealing ring
6 Hose	For information:
7 Clamp Cobra 11/7	13 Firewall

Fig. 28-16 Fuel pressure sensor – removal / installation



D. Fuel pressure indicator

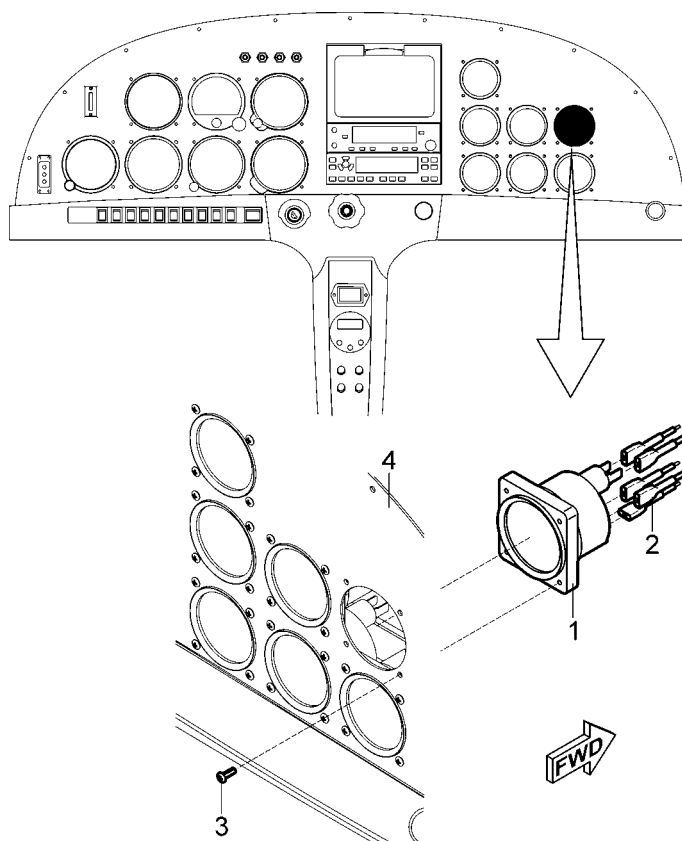
Maintenance type: Line

Personnel qualification: Independent verification personnel qualified in accordance with Part 66 or higher

Recommended tools and material:

Item	Designation / size	Quantity	Note
Phillips screwdriver	No. 2	1 pc.	

- (1) Removal – fuel pressure indicator
 - (a) Switch the electrical network off and disconnect the battery.
 - (b) Remove the cover of the upper part of the fuselage F4 (Section 53-30).
 - (c) Disconnect the wires (2, Fig. 28-17).
 - (d) Unscrew the screws (3) and remove the fuel pressure indicator (1).



Legend to Fig. 28-

- 1 Fuel pressure indicator
- 2 Wires
- 3 Screw (4 pcs.)

For information:

- 4 Instrument panel

Fig. 28-17 Fuel pressure indicator – removal / installation



- (2) Installation – fuel pressure indicator
 - (a) Insert the fuel pressure indicator (1, Fig. 28-17) into the hole in the instrument panel (4); screw on and tighten the screws (3).
 - (b) Connect the wires (2).
 - (c) Install the cover of the upper part of the fuselage F4 (Section 53-30).
 - (d) Connect the battery, switch the electrical network on.
 - (e) Do the engine test and check the function of the fuel pressure indicator.

E. Fuel flow meter

Maintenance type: Line

Personnel qualification: Independent verification personnel qualified in accordance with Part 66 or higher

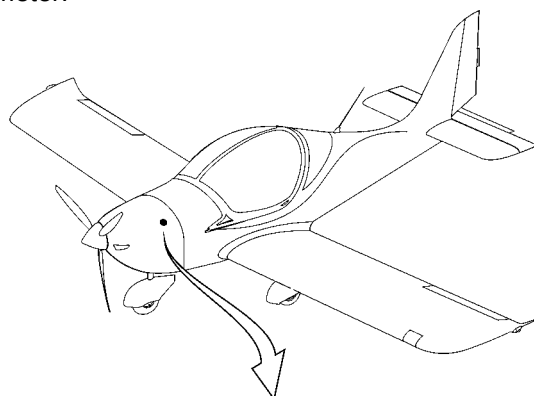
Recommended tools and material:

Item	Designation / size	Quantity	Note
Wrench	No. 17	1 pc.	
Hex wrench	No. 5	1 pc.	
Gripping pliers	Cobra	1 pc.	
Stainless lockwire	ø 0,8 mm	-	

- (1) Removal – fuel flow meter
 - (a) Switch the electrical network off and disconnect the battery.
 - (b) Drain the fuel from the fuel system (Section 12-10).
 - (c) Remove the engine cowlings (Section 71-10).
 - (d) Disconnect the wire (3, Fig. 28-18).
 - (e) Cut off the lockwire (10) and pull off both pyrojackets (9).
 - (f) Release the clamps (8) by means of pliers and pull off the hoses (7) from the screw fitting (2).
 - (g) Unscrew and remove the nuts (5), washers (6) and bolts (4).
 - (h) Remove the flow meter (1).
 - (i) As needed, unscrew the screw fitting (2) from the flow meter.
 - (j) Close the hoses and the holes in the flow meter (if reinstalled) by means of blind plugs.
- (2) Installation – fuel flow meter
 - (a) Remove the blind plugs from the hoses and the holes in the flow meter.
 - (b) As needed, screw the screw fitting (2) into the flow meter (1, Fig. 28-18).
 - (c) Position the flow meter (1) between the angle pieces on the firewall (11) and fasten them by means of bolts (4), washers (6) and nuts (5).
 - (d) Connect the hoses (7) to the neck of the screw fitting (2); secure the hoses by the clamps (8) by means of pliers.
 - (e) Pull the pyrojacket (9) over the screw fitting and secure it with lockwire (10) (Section 20-20).



- (f) Connect the wires (3).
- (g) Check the system tightness (Section 28-10).
- (h) Install the engine cowlings (Section 71-10).
- (i) Fill the fuel system with fuel (Section 12-10).
- (j) Connect the battery, switch the electrical network on.
- (k) Do the engine check and check the function of flow meter.



Typical design of fuel hose protection
in the engine compartment

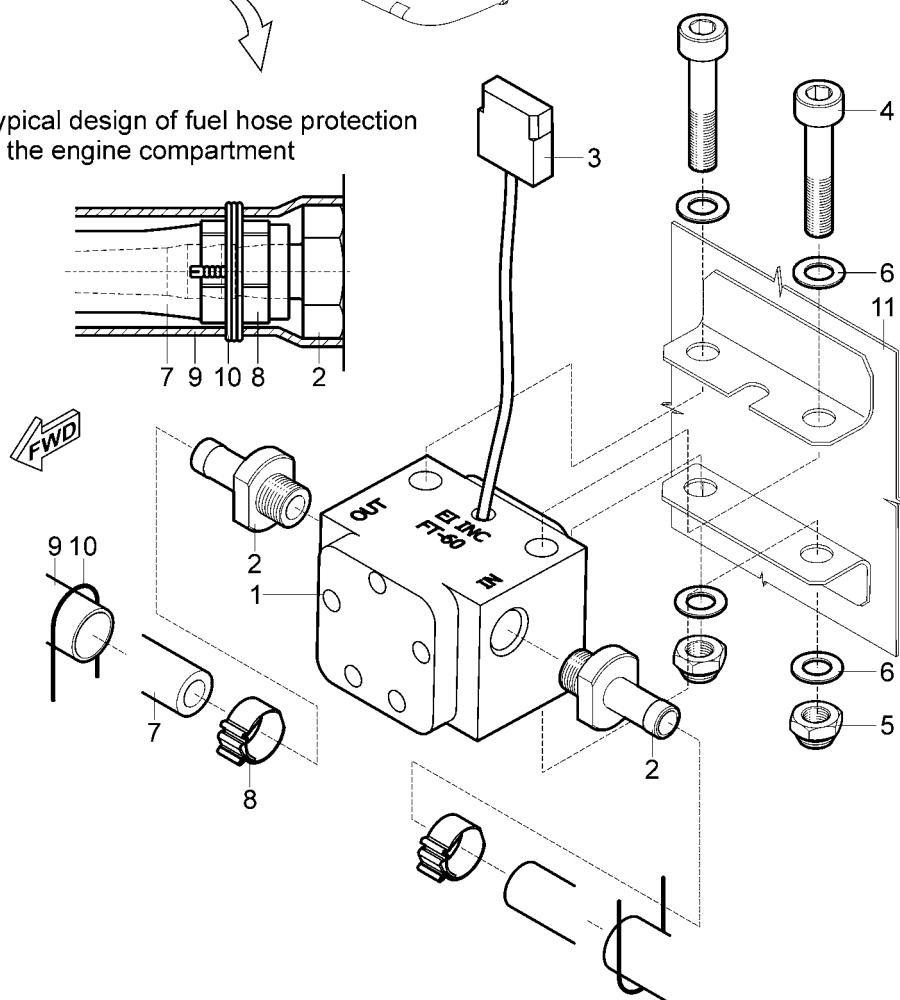


Fig. 28-18 Fuel flow meter – removal / installation (page 1 of 2)



Legend to Fig. 28-18

1 Fuel flow meter	7 Hose
2 Screw fitting	8 Clamp Cobra 11/7
3 Wire with connector	9 Pyrojacket
4 Bolt M6x50 (2 pcs.)	10 Lockwire
5 Nut M6 (2 pcs.)	For information:
6 Washer 6,4 (2 pcs.)	11 Firewall

Fig. 28-18 Fuel flow meter – removal / installation (page 2 of 2)

CHAPTER

31

**INDICATING /
RECORDING SYSTEMS**



CHAPTER 31

INDICATING / RECORDING SYSTEMS

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GENERAL

1. INTRODUCTION

The flight clock and the engine hours meter are installed on the airplane with analog instrumentation. The data logger may also be installed optionally.

The airplane is equipped with optical and acoustic signalization, which informs the crew about unusual situations.



FLIGHT CLOCK

1. DESCRIPTION AND OPERATION

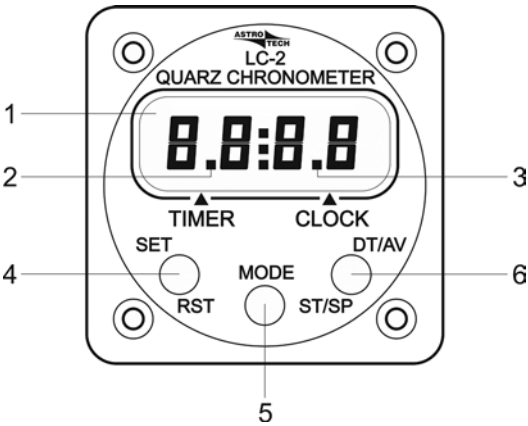
The flight clock LC-2 (Fig. 31-1) or flight clock SC-5 (Fig. 31-2) is installed on the SportStar RTC airplane with analog instrumentation.

A. Flight clock LC-2

The flight clock operates in two modes: **CLOCK** Mode and **TIMER** Mode. The flight clock displays the time in both 12 and 24 hour format in accordance with the internal switch setting. The active mode is indicated by the annunciator, which appears on the display. In the 24 hour mode, the Clock Mode annunciator will not appear on the display.

The flight clock is standardly installed on the central console below the instrument panel. The flight clock is powered directly from the battery.

For the wiring diagram of the flight clock, refer to Chapter 91.



Legend to Fig. 31-1

1 Display	4 Setting (Clock Mode) / resetting (Timer Mode) key
2 Timer Mode annunciator	5 Mode selection key
3 Clock Mode annunciator	6 Key for date and time setting (Clock Mode) / timer starting and stopping

Fig. 31-1 Flight clock LC-2

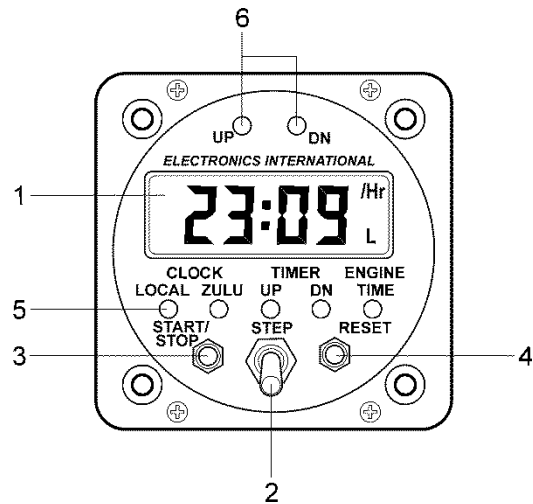
B. Flight clock SC-5

The SC-5 clock has the following display modes – **CLOCK LOCAL**, in this mode the SC-5 will display Local Time; **CLOCK ZULU**, in this mode the SC-5 will display Zulu Time; **TIMER UP**, in this mode the SC-5 will display "UP" timer; **TIMER DN**, in this mode the SC-5 will display "DN" timer and **ENGINE TIME**, in this mode the SC-5 acts as a Hobbs Meter. The flight clock displays the time in both 12 and 24 hour format in accordance with the setting. The relevant mode indicator indicates the actual mode; chosen time mode is also indicated by the symbol that appears on the display.

The flight clock is standardly installed on the central console below the instrument panel. The flight clock is powered directly from the battery. Clock has installed an internal battery to maintain memory.



For the wiring diagram of the flight clock, refer to Chapter 91.



Legend to Fig. 31-2

1 Display	4 RESET button
2 STEP switch	5 Green display mode indicator
3 START/STOP button	6 Yellow timer warning indicator

Fig 31-2 Flight clock SC-5



2. MAINTENANCE PRACTICES

A. Flight clock LC-2

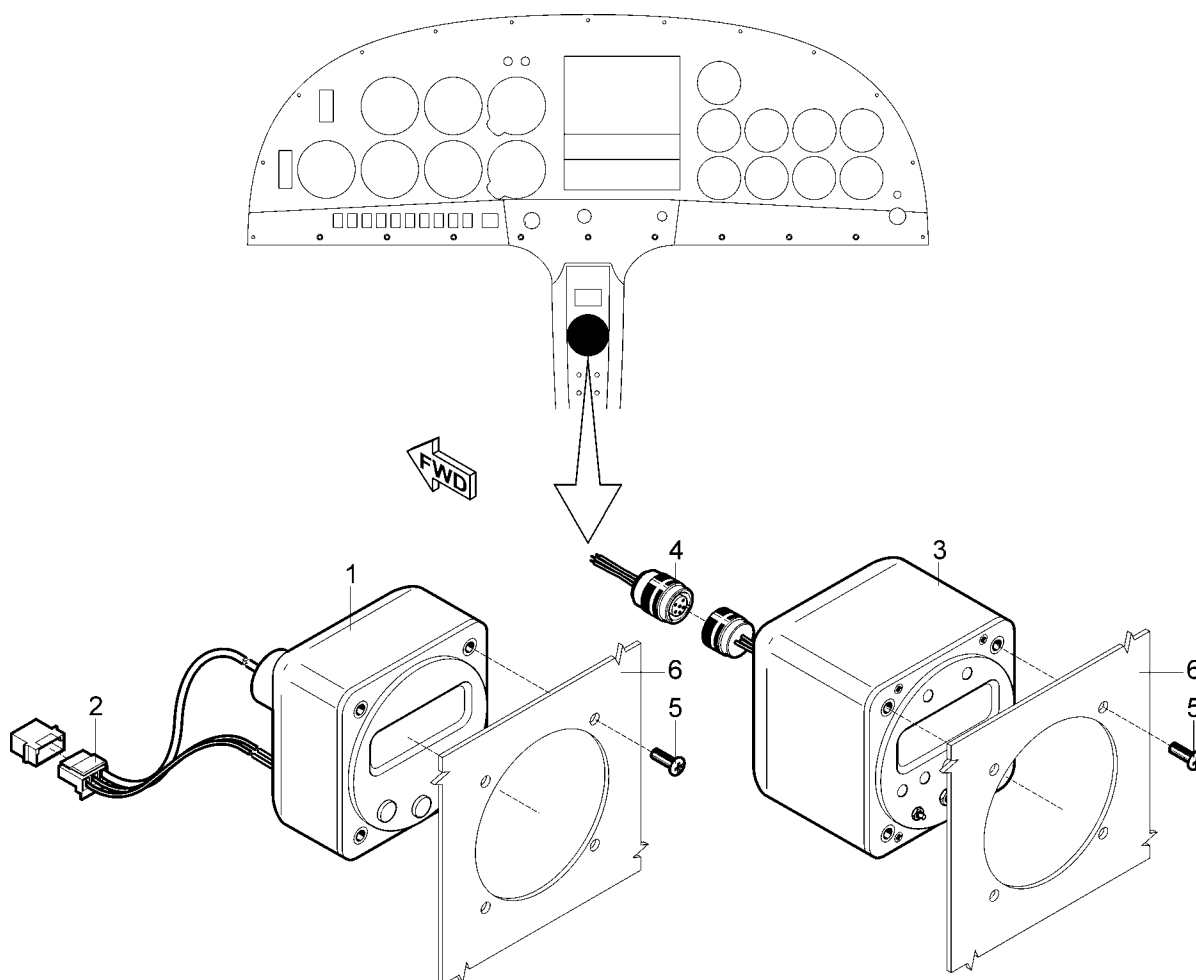
Maintenance type: Line

Personnel qualification: Independent verification personnel qualified in accordance with Part 66 or higher

Recommended tools and material:

Item	Designation / Size	Quantity	Note
Phillips screwdriver	No. 2	1 pc.	

- (1) Removal – flight clock LC-2
 - (a) Switch the electrical network off and disconnect the battery.
 - (b) Disconnect the connector with cables (2, Fig. 31-3).
 - (c) Remove the screws (5) and remove the flight clock (1).
- (2) Installation – flight clock LC-2
 - (a) Put the flight clock (1, Fig. 31-3) into the hole in the console (6); screw and tighten the screws (5).
 - (b) Connect the connector with cables (2).
 - (c) Connect the battery, switch the electrical network on and check the clock function (set the flight clock).
- (3) Adjustment / test – flight clock LC-2
 - (a) Mode selection
 - 1 Use the **MODE** key to select the mode (Clock Mode or Timer Mode).
 - 2 In the Timer Mode, the annunciator (2, Fig. 31-1) will appear above the word **TIMER**.
 - 3 In the Clock Mode, the annunciator (3, Fig. 31-1) will appear above the word **CLOCK** (this annunciator will not appear, if the time is displayed in 24 hour format).
 - (b) Display Test
 - 1 Switch the device to the Timer Mode (refer to par. 2 A.(3) (a)).
 - 2 Press the **SET** and **DT/AV** keys at the same time. Make sure that all display segments and annunciators are activated. After you release both keys, the device will return to the Timer Mode.
 - (c) Timer Mode
 - 1 Switch the device to the Timer Mode (refer to par. 2 A.(3) (a)).
 - 2 Press the **RST** key to reset the timer.
 - 3 Press the **ST/SP** key to start or stop the timer counting.
 - 4 Timer Mode will initially count in minutes and seconds. The colon between the digits will flash every second. After 59 minutes and 59 seconds, the timer will start to count in hours and minutes (the colon between the digits will flash every 10 seconds) up to a maximum 23 hours and 59 minutes.



Legend to Fig. 31-3

1 Flight clock LC-2	5 Screw (4 pcs.)
2 Connector with cables	For information:
3 Flight clock SC-5	6 Console below the instrument panel
4 Connector with cables	

Fig. 31-3 Flight clock - removal / installation

(d) Clock Mode

- 1 Switch the device to the Clock Mode (refer to par. (a)). In the Clock Mode, the colon between the digits will flash every 10 seconds.
- 2 After you press the **DT/AV** key in the Clock Mode, the date will appear on the display.

(e) Date setting

- 1 Press the **SET** key.
- 2 The month digit will start to flash.
- 3 Repeatedly press the **DT/AV** key to advance to the desired month.
- 4 Press the **SET** key.



- 5 The day digit will start to flash.
 - 6 Repeatedly press the **DT/AV** key to advance to the desired day.
 - 7 Press the **SET** key to confirm the date setting.
- (f) Time setting
- 1 Press the **SET** key.

NOTE

Before you set the time, you must always set the date. If the date is set correctly, press the **SET** key four times and then you can directly set the time.

- 2 The hour digit will start to flash.
- 3 Repeatedly press the **DT/AV** key to set hours.
- 4 Press the **SET** key.
- 5 The minute digit will start to flash.
- 6 Repeatedly press the **DT/AV** key to set minutes.
- 7 Press the **SET** key to confirm the time setting.
- 8 Press the **DT/AV** key to start the flight clock function.

NOTE

If the minutes are not advanced when they flash in the set mode, the **SET** key will switch the device to the Clock Mode without altering the minutes (you can use this feature to change the time zones).

B. Flight clock SC-5

Maintenance type: Line

Personnel qualification: Independent verification personnel qualified in accordance with Part 66 or higher

Recommended tools and material:

Item	Designation / Size	Quantity	Note
Phillips screwdriver	No. 2	1 pc.	

- (1) Removal – flight clock SC-5
 - (a) Switch the electrical network off and disconnect the battery.
 - (b) Disconnect the connector with cables (4, Fig. 31-3).
 - (c) Remove the screws (5) and remove the flight clock (3)
- (2) Installation – flight clock SC-5
 - (a) Put the flight clock (3, Fig. 31-3) into the hole in the console (6); screw and tighten the screws (5).
 - (b) Connect the connector with cables (4).



- (c) Connect the battery, switch the electrical network on and check the clock function (set the flight clock).
- (3) Servicing – flight clock SC-5
- The SC-5 uses a clock IC incorporating a 10 year lithium battery. Before the expiry of battery life, contact the clock manufacturer (Electronic International Inc.) for further action.
- (4) Adjustment / test – flight clock SC-5
- (a) Power-up programming:
- During power-up you may enter the Power-up Programming Mode. In this mode you can set the Local and Zulu Clock Time. To enter the Power-up Programming mode perform the following steps:
- 1 Check, if **MASTER SWITCH** is OFF.
 - 2 Push and hold both the **START/STOP** and **RESET** buttons.
 - 3 Switch the **MASTER SWITCH** to ON.
 - 4 The far left hours digits will be blinking. An **L** will be showing in the lower right corner of the display indicating you are setting the Local Clock.
The Local and Zulu Clocks are always set in a 24-hour format.
 - 5 Set the Local Clock using the following procedure:
 - Select the digit to be programmed.
 - Move the **STEP** switch to the right to increase selected digit by one; move the **STEP** switch to the left to decrease selected digit by one.
 - Push the **START/STOP** button to select the next digit to the left or push the **RESET** button to select the next digit to the right.
 - 6 Change Functions (Local to Zulu):
 - Push and hold **RESET** button, until the **L** in the lower right corner disappears, to display and set the Zulu clock
 - Use the **STEP** switch to increase or decrease a flashing digit.
 - To go back to programming the Local clock, continue to push the **START/STOP** button until the **L** in the lower right corner of the display appears.
- (b) Local Clock Format Setting:
- 1 Select the Local clock display mode.
 - 2 Momentarily push both the **START/STOP** and **RESET** buttons at the same time. The display will show "12: F" or "24: F".
 - 3 Push the **STEP** switch to left or right to toggle the display between "12:F" and "24:F".
 - 4 Momentarily push both the **START/STOP** and **RESET** buttons at the same time to exit this mode.
- (c) Recurring Alarm Programming:
- 1 Select the **UP** Timer display mode.
 - 2 Momentarily push both the **START/STOP** and **RESET** buttons at the same time. The far left digit will start flashing.
 - 3 Increase or decrease a flashing digit:
 - Move the **STEP** switch to the right to increase selected digit by one; move the **STEP** switch to the left to decrease selected digit by one.



- 4 Push the **START/STOP** button to select the next digit to the left or push the **RESET** button to select the next digit to the right.
 - 5 Momentarily push both the **START/STOP** and **RESET** buttons at the same time to exit this programming mode.
- (d) Start Time Programming:
- 1 Select the **DN** Timer display mode.
 - 2 Momentarily push both the **START/STOP** and **RESET** buttons at the same time. The far left digit will start flashing.
 - 3 Increase or decrease a flashing digit:
- Move the **STEP** switch to the right to increase selected digit by one;
move the **STEP** switch to the left to decrease selected digit by one.
 - 4 Push the **START/STOP** button to select the next digit to the left or push the **RESET** button to select the next digit to the right.
 - 5 Momentarily push both the **START/STOP** and **RESET** buttons at the same time to exit this programming mode.

NOTE

For detailed description and information about the operation and control of the clock, refer to the documents Altitude Allert and Super Clock (ASC-5A and SC-5) Installation Instructions II1105962, dated RevB: 4/1/98 or later valid issue and Super Clock (SC-5) Operating Instructions OI0313961, dated RevA: 7/14/97 or later valid issue.



RECORDERS

1. DESCRIPTION AND OPERATION

A. Engine hours meter

The device which records the engine operation (operating hours) is installed on the Sportstar RTC airplane with analog devices.

The engine hours meter is installed on the console below the instrument panel.

The engine hours meter is switched via the voltage output of the voltage regulator. It is protected by a fuse in the bundle behind the instrument panel.

The wiring diagram of engine hours meter is shown in Chapter 91.

B. Data logger Safetyplane V5

The data logger Safetyplane V5 (refer to Fig. 31-4) may be installed on the Sportstar RTC airplane on demand.

Safetyplane is an airplane management system, which includes the flight data recording, analysis of the performance data, software for the airplane fleet management which includes a web interface.

The system consists of an electronic unit, which is installed on the instrument panel. It includes an interface with GPS, pitot-static system and engine hours meter. The unit also includes an integrated accelerometer and it is connected to its own GPS antenna and GSM antenna.

The data is recorded in the internal memory. After the flight, it is automatically transmitted to the central server via the integrated WiFi and GSM modem.

Data transfer starts automatically after the engine is switched off when the **MASTER SWITCH** is in ON position. The relevant message will appear on the data logger display – WIFI SENDING DATA or GSM TRANSMIT. After the data transfer stops, the message SHUT DOWN GOOD BY will appear on the data logger display.

The recorded information is then available to the authorized user through the secured Internet connection. Information about the flight is given in a graphic form.

System features:

- Internet booking.
- Premises access control.
- Airplane access control.
- Automatic flight time upload.
- Safety management, technical flight data upload and supervision interface for limits exceeding.
- Evaluation of the flight trajectory on Google 2D and 3D maps, display of the official airspace and flight parameters at any point of the flight trajectory.
- Display of the landing place of each airplane at nationwide level.
- Centralized information about the pilot: contact information, type ratings, medical examination, licence validity, etc.
- Updated flight logbook available online permanently even after departure from the club.
- Centralized information about the airplane: technical data, pricing categories, etc.
- Updated airplane logbook available online permanently even after a change of the owner.



- Maintenance management and TSO upload to the maintenance organisation.
- Extended maintenance records which include G-load, engine overspeed and other warnings.
- Special cost rate for preheating of engine, taxiing, flight, etc.
- Special cost rate in accordance with the pilot profile (instructor, owner, etc.).
- Special cost rate in accordance with the flight type (maintenance, demonstration, etc.).
- Cashless payment from the pilot's account immediately after the flight, improvement of the cash flow management.
- Automatic invoicing, prepaid account management, cashless payment management and credit on the pilot's account.
- Accounting in accordance with the actual airplane usage.
- Customized message generation.

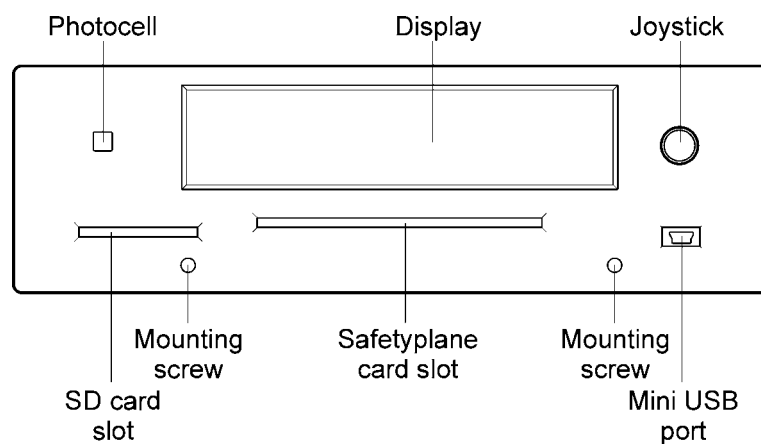


Fig. 31-4 Front panel of the data logger Safetyplane V5

The data logger Safetyplane V5 control and display elements:

Display

The display shows information and messages from the operator.

SD card slot

Removable SD card is used for data recording.

Safetyplane card slot

Use the slot to insert the Safetyplane ID card.

Mini USB port

Use it to update the software or set the configuration.

Joystick

Use it for the display menu navigation.

The wiring diagram of data logger Safetyplane V5 is shown in Chapter 91.

NOTE

For detailed description and information about the data logger operation and controls, refer to the document INSTALLATION FILE PROJECT 10006460, dated 17/08/10, rev. 02, or later valid issue.



2. MAINTENANCE PRACTICES

A. Engine hours meter

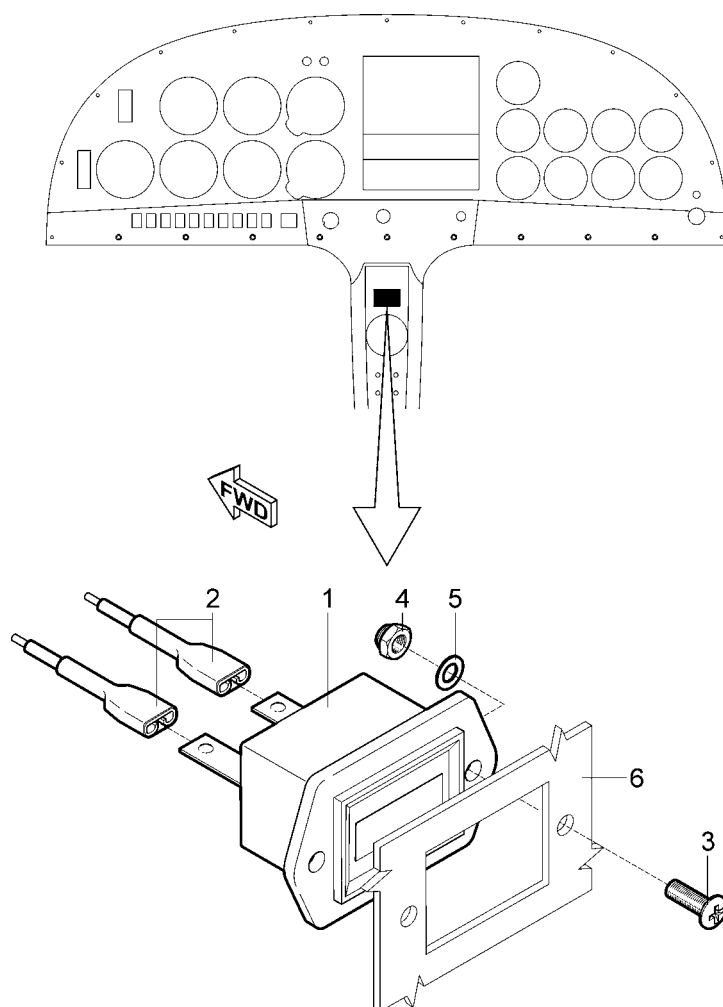
Maintenance type: Line

Personnel qualification: Independent verification personnel qualified in accordance with Part 66 or higher

Recommended tools and material:

Item	Designation / Size	Quantity	Note
Phillips screwdriver	No. 2	1 pc.	
Wrench	No. 7	1 pc.	

- (1) Removal – engine hours meter
 - (a) Switch the electrical network off and disconnect the battery.
 - (b) Disconnect the connectors with cables (2, Fig. 31-5).
 - (c) Remove the nuts (4) and screws (3) with washers (5) and remove the engine hours meter (1).
- (2) Installation – engine hours meter
 - (a) Put the engine hours meter (1, Fig. 31-5) into the slot in the console (6); install the screws (3), attach and tighten the nuts (4) with washers (5).
 - (b) Connect the connectors with cables (2).
 - (c) Connect the battery, switch the electrical network on and check function of the engine hours meter.



Legend to Fig. 31-5

1 Engine hours meter	5 Washer (2 pcs.)
2 Connector with cables	For information:
3 Screw (2 pcs.)	6 Console below the instrument panel
4 Nut (2 pcs.)	

Fig. 31-5 Engine hours meter – removal / installation



B. Data logger Safetyplane V5

Maintenance type: Line

Personnel qualification: Independent verification personnel qualified in accordance with Part 66 or higher

Recommended tools and material:

Item	Designation / Size	Quantity	Note
Hex wrench	No. 2,5	1 pc.	

(1) Removal – data logger Safetyplane V5

- (a) Switch the electrical network off and disconnect the battery.
- (b) Remove the cover of the fuselage upper part F4 (Section 53-30).
- (c) Put the wrench in the holes (2, Fig. 31-) in the front panel of the data logger (1) and put it in the head of the locking screws.
- (d) Turn the locking screws counterclockwise, until the data logger (1) releases in the holder.

CAUTION

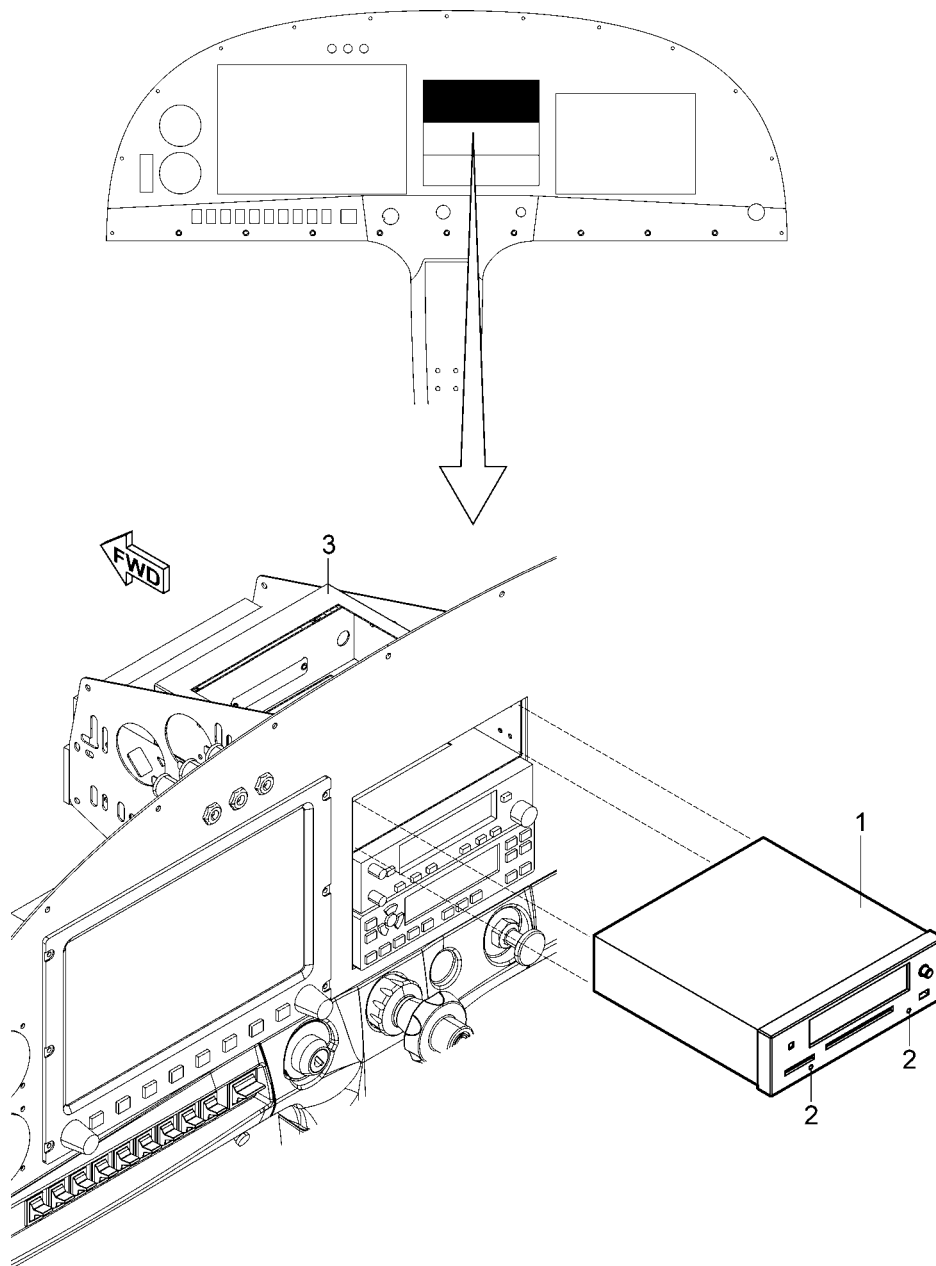
DO NOT PULL THE CONTROLS. DO NOT TRY TO HOLD THE FRONT SIDE OF THE DATA LOGGER AND RELEASE IT BY FORCE. THE DEVICE MAY BE DAMAGED.

DO NOT TOUCH THE CONNECTOR ON THE REAR SIDE OF THE DATA LOGGER. THE ELECTROSTATIC CHARGE OF YOUR BODY MAY DAMAGE THE DEVICE.

- (e) Hold the data logger (1) sides and carefully pull it from the mounting bracket.
- (f) Put caps on the connector and the fitting on the rear side of the data logger.

(2) Installation – data logger Safetyplane V5

- (a) Remove caps from the connector and the fitting on the rear part of the data logger.
- (b) Push the data logger (1, Fig. 31-) to the end of the mounting bracket (3).
- (c) Attach and tighten the locking screws (2) symmetrically.
- (d) Attach the cover of the fuselage upper part F4 (Section 53-30).
- (e) Connect the battery, switch the electrical network on and check function of the data logger.



Legend to Fig. 31-

1 Data logger

2 Hole with the locking screw

For information:

3 Mounting bracket

Fig. 31-6 Data logger Safetyplane V5 – removal / installation



CENTRAL WARNING SYSTEM

1. DESCRIPTION AND OPERATION

The airplane is equipped with optical and acoustic signalization, which informs the crew about unusual situations.

A. Optical signalization

The upper left section of the instrument panel includes signaling lights. Red signaling lights with the highest priority display failure states of the airplane systems. Orange signaling light displays the emergency system activation, green and blue signaling light informs the crew about the system state.

The combination of signaling lights depends on the airplane equipment. Fig. 31-7 displays the maximum number of signaling lights for basic versions of the instrumental equipment.

Meaning of the individual signaling lights:

Signaling Light	Colour	Meaning	Note
CHARGING	red	Generator failure.	
AUX. CHARG.	red	Auxiliary generator failure.	Applies only to the airplanes with an auxiliary generator.
CANOPY	red	Unsecured cockpit canopy.	Applies only to the airplanes with analog instrumentation.
EMS	red	Exceeding of the engine limit parameters.	Applies to the airplanes with G3X system.
PARK BRAKE LEVER UP	orange	Park brake is activated.	Applies to the airplanes with the park brake signalization.
FLAPS	orange	Flaps are in take-off or landing position.	Applies only to the airplanes with analog instrumentation.
EXT. POWER	blue	External power source is connected.	Applies only to the airplanes with a socket of the external power source.
PITOT HEAT.	green	Heating of the pitot-static tube is activated.	Applies only to the airplanes with analog devices and pitot-static tube heating.

NOTE

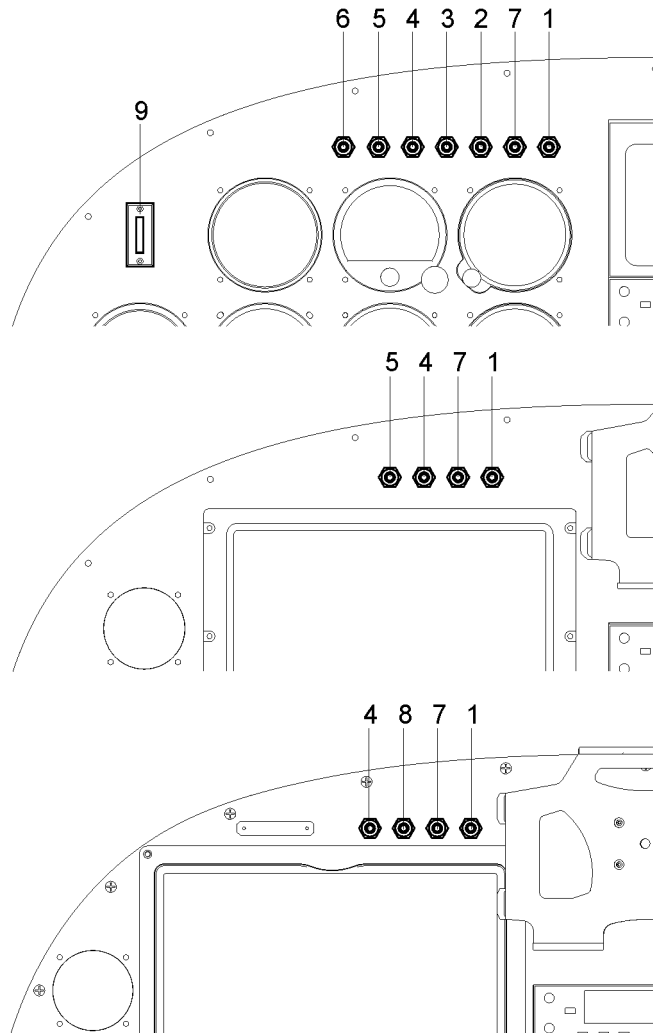
Signalization of the unsecured cockpit canopy, extended flaps and activated Pitot-static tube heating of the airplane with the Dynon SkyView system is indicated on the EMS display.

Signalization of the unsecured cockpit canopy, extended flaps and activated Pitot-static tube heating of the airplane with the Garmin G3X system is indicated on the MFD.



The deflection of trim tabs of the airplane with analog devices is displayed on the pitch trim indicator (8, Fig. 31-7) which is installed in the left section of the instrument panel.

For the wiring diagram of the optical signalization, refer to Chapter 91.



Legend to Fig. 31-7

1 Signaling light CHARGING	6 Signaling light PITOT HEAT.
2 Signaling light CANOPY	7 Signaling light AUX. CHARG.
3 Signaling light FLAPS	8 Signaling light EMS
4 Signaling light PARK BRAKE LEVER UP	9 Pitch trim indicator
5 Signaling light EXT. POWER	

Fig. 31-7 Layout of signalling lights (typical)



B. Acoustic signalization

The sensor of the stalling speed signaling system is installed on the left wing leading edge (Section 27-30). When you approach the stalling angle, the change of the difference between the pressure, which acts on the upper, and the lower part of the flap will cause its adjustment and the electric circuit interconnection. The stalling speed signaling system will activate acoustic signalization, which will continue throughout the entire duration of the event.

The sound module is located on the console in front of the instrument panel.

For the wiring diagram of the stalling speed signaling system, refer to Chapter 91.

C. Signalization on the SkyView system displays

The SkyView system displays important notifications on the display, in the box reserved for messages.

(1) Loss of information

SkyView will alert the user with a large red X and a descriptive box in case of a serious malfunction, which prevents the information display. The red X may cover the entire screen, if a data source (e.g. EMS module) fails, or just the individual control element, e.g. if one engine sensor fails, or it is not connected.

(2) System of alert notifications

The display section directly above the key 8 is reserved for important notifications which the SkyView system may present to the user. All important notifications are divided into three categories in accordance with their importance – **Messages**, **Caution** and **Warning**.

For the complete overview of important notifications, refer to the document SkyView Pilot's User Guide, Document 101321-022, Rev. W, dated January 2016, or later valid issue.

D. Signalization on the Garmin G3X system displays

The Garmin G3X system displays annunciations and alerts on the display.

(1) G3X system annunciations

When an LRU or an LRU function fails, a large red 'X' is typically displayed over the instrument(s) or data experiencing the failure. Upon G3X system power-up, certain instruments remain invalid as equipment begins to initialize. All instruments should be operational within one minute of power-up. If any instrument remains flagged, the G3X system should be serviced.

For the complete overview of annunciations and alerts, refer to the document G3X Touch Pilot's Guide, Document 190-01754-00 Rev. H, dated December 2016 or latest valid issue.



2. MAINTENANCE PRACTICES

A. Signaling light

Maintenance type: Line

Personnel qualification: Independent verification personnel qualified in accordance with Part 66 or higher

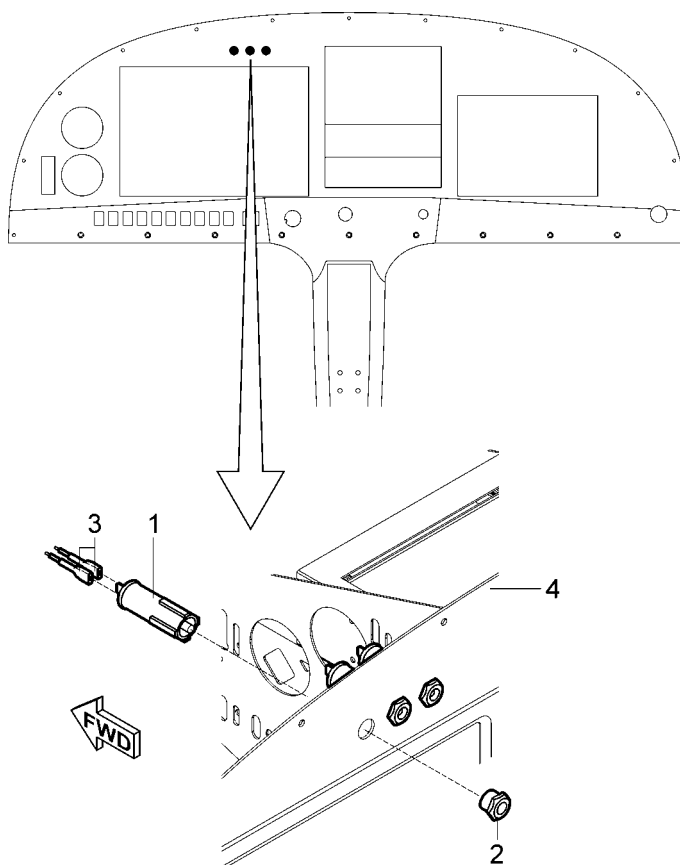
Recommended tools and material:

Item	Designation / Size	Quantity	Note
Wrench	No. 14	1 pc.	

NOTE

Removal and installation procedure applies to all signaling lights.

- (1) Removal – signaling light
 - (a) Switch the electrical network off and disconnect the battery.
 - (b) Remove the cover of the fuselage upper part F4 (Section 53-30).
 - (c) Disconnect the connectors with cables (3, Fig. 31-).
 - (d) Remove the cap nut (2) and remove the body of the signaling light (1).
- (2) Installation – signaling light
 - (a) Put the body of the signaling light (1, Fig. 31-) into the correct hole in the instrument panel (4); attach and tighten the cap nut (2).
 - (b) Connect the connectors with cables (3).
 - (c) Attach the cover of the fuselage upper part F4 (Section 53-30).
 - (d) Connect the battery, switch the electrical network on and check function of the signaling light.



Legend to Fig. 31-

- 1 Body of the signaling light
- 2 Cap nut
- 3 Connector with cables

For information:

- 4 Instrument panel

Fig. 31-8 Signaling light – removal / installation



B. Sound module

Maintenance type: Line

Personnel qualification: Independent verification personnel qualified in accordance with Part 66 or higher

Recommended tools and material:

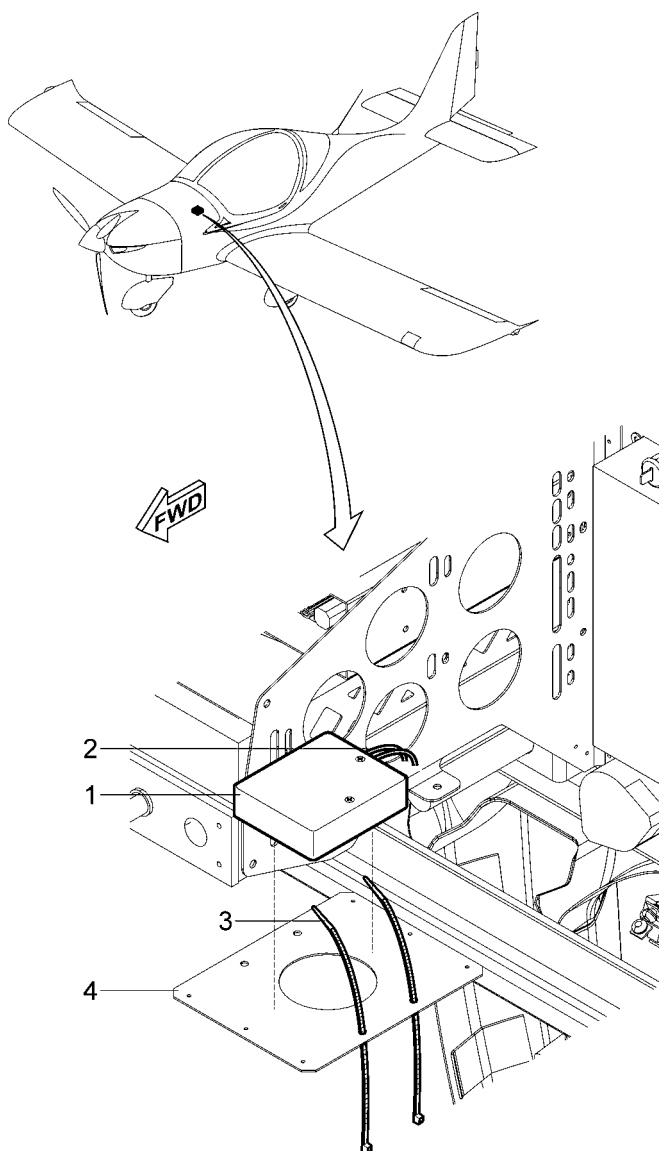
Item	Designation / Size	Quantity	Note
Pincers	-	1 pc.	
Cable tie	3,6x142	2 pcs.	

(1) Removal – sound module

- (a) Switch the electrical network off and disconnect the battery.
- (b) Remove the cover of the fuselage upper part F4 (Section 53-30).
- (c) Remove the fairing between the wing and the fuselage W1L (Section 53-50).
- (d) Disconnect the connector, which connects the cables between the sound module and the sensor of the stalling speed signaling system. You can find the connector below the fairing W1L.
- (e) Cut the cable ties (3, Fig. 31-) and other ties, which attach the cables of the sound module (2) to the bundle or the airframe.
- (f) Remove the sound module (1).

(2) Installation – sound module

- (a) Align the sound module (1, Fig. 31-) with the console (4) and attach it with cable ties (3).
- (b) Route the cables (2) to the space between the fuselage and the left wing and appropriately attach them to the bundle or the airframe.
- (c) Connect the connector, which connects the cables between the sound module and the sensor of the stalling speed signaling system.
- (d) Install the fairing between the wing and the fuselage W1L (Section 53-50).
- (e) Install the cover of the fuselage upper part F4 (Section 53-30).
- (f) Connect the battery, switch the electrical network on and check function of the stalling speed signaling system – carefully lift the flap of the sensor of the stalling speed signaling system. The acoustic signal must be audible.



Legend to Fig. 31-

- 1 Sound module
- 2 Cables
- 3 Cable ties

For information:

- 4 Bracket

Fig. 31-9 Sound module – removal / installation


C. Pitch trim indicator

Maintenance type: Line

Personnel qualification: Independent verification personnel qualified in accordance with Part 66 or higher

Recommended tools and material:

Item	Designation / Size	Quantity	Note
Phillips screwdriver	No. 2	1 pc.	
Nut wrench	No. 5	1 pc.	
Pincers	-	1 pc.	
Soldering iron	-	1 pc.	
Solder	-	-	
Heat gun	-	1 pc.	
Shrinkable tube	ø 2,4x1,2 mm	-	

(1) Removal – pitch trim indicator

- (a) Switch the electrical network off and disconnect the battery.
- (b) Remove the cover of the fuselage upper part F4 (Section 53-30).
- (c) Remove the nuts (4, Fig. 31-) and the screws (3) with washers (5) and slightly pull the indicator (1).
- (d) Cut the cables (2) and remove the indicator (1).

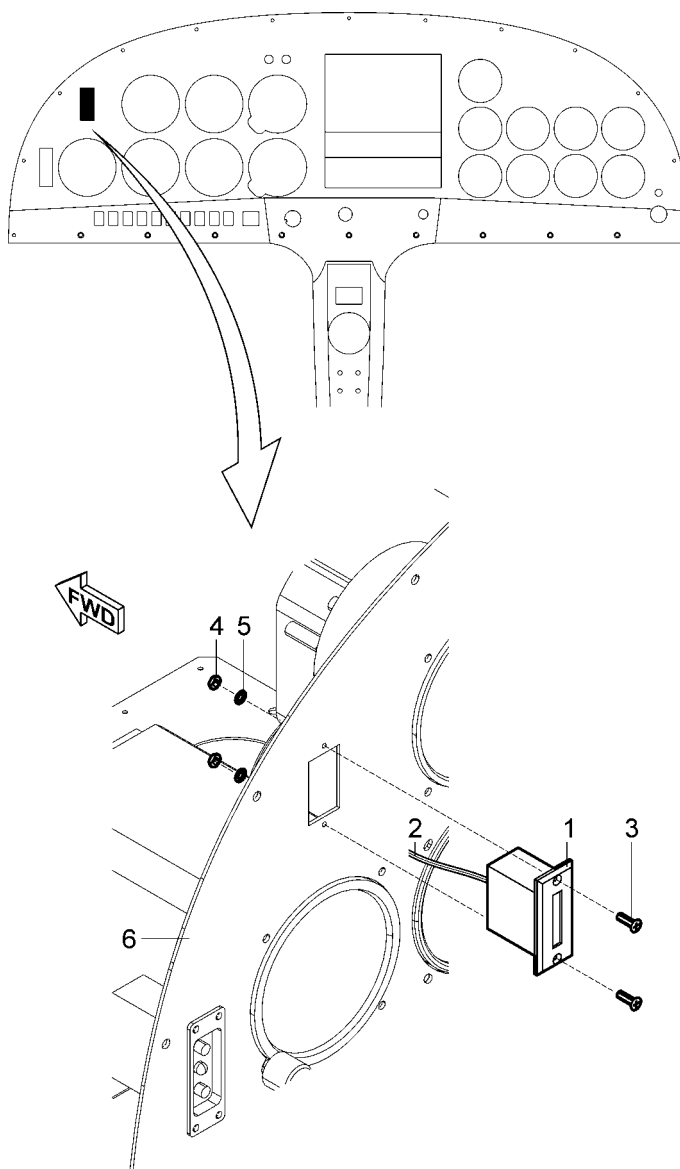
(2) Installation – pitch trim indicator

- (a) Put the indicator (1, Fig. 31-) into the slot in the instrument panel (6); attach the screws (3), attach and tighten the nuts (4) with washers (5).
- (b) Put a new shrinkable tube on cables (2). Use the soldering iron and solder to attach it to the bundle.

NOTE

Use the wiring diagram in Chapter 91.

- (c) Cover the joints with a shrinkable tube and carefully heat it with a heat gun.
- (d) Install the cover of the fuselage upper part F4 (Section 53-30).
- (e) Connect the battery, switch the electrical network on and check function of the indicator.



Legend to Fig. 31-

- 1 Pitch trim indicator
- 2 Cables
- 3 Screw (2 pcs.)
- 4 Nut (2 pcs.)

- 5 Washer (2 pcs.)

For information:

- 6 Instrument panel

Fig. 31-10 Pitch trim indicator – removal / installation



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CHAPTER

32

LANDING GEAR



CHAPTER 32

LANDING GEAR

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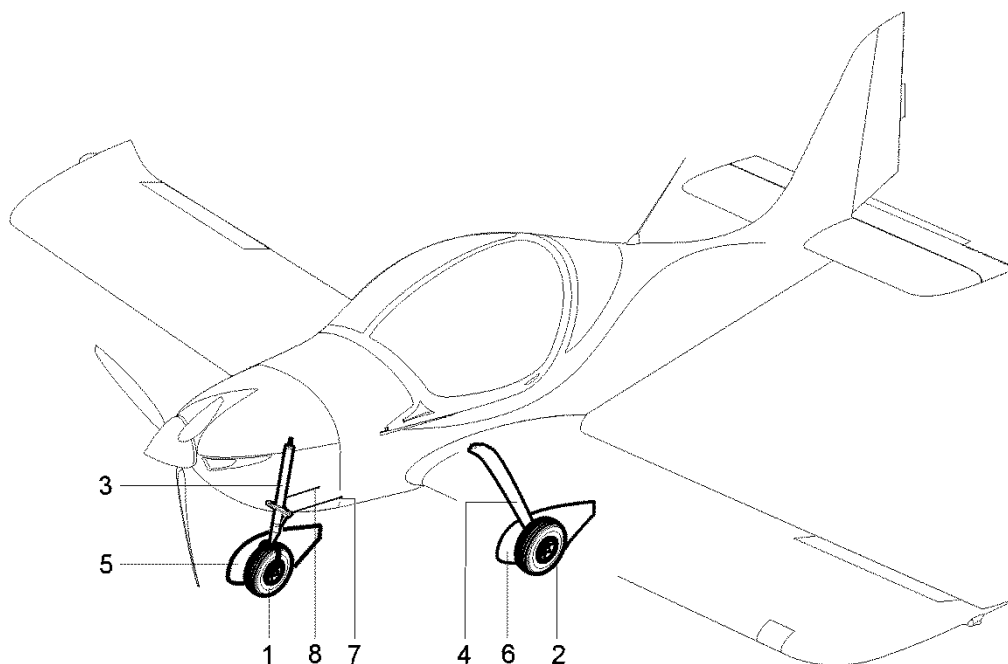


GENERAL

1. INTRODUCTION

The fixed three-wheel landing gear with a nose wheel, composed of the legs of the main landing gear and the leg of the nose landing gear, is installed on the airplane. The airplane landing gear allows moving on the ground, taking off, landing and it absorbs shocks that occur during these manoeuvres.

The airplane can be optionally equipped with the wheel fairings.



Legend to Fig. 32-1

1 Nose landing gear wheel	5 Nose landing gear wheel fairing
2 Main landing gear wheel with brake	6 Main landing gear wheel fairing
3 Nose landing gear leg	7 Left pull-rod of nose landing gear control
4 Main landing gear leg	8 Right pull-rod of nose landing gear control

Fig. 32-1 Landing gear



2. MAINTENANCE PRACTICES

A. Landing gear

(1) Adjustability of pull-rods

Position	Dwg. No.	Length of pull-rod [mm]	Adjustability [mm]
5	G4 01-18 01	300	+/- 5
4	G4 01-20 01	338	+/- 5

NOTE

By the pull-rod length is meant the "A" value in Fig. 32-6.



MAIN GEAR AND DOORS

1. DESCRIPTION AND OPERATION

The main landing gear is composed of the main landing gear leg, wheel (Section 32-41) and the brake (Section 32-42).

The main landing gear leg is designed as a flat laminate spring. The eye with the metallic bushing serves for the attachment to the fuselage. The lower end serves for the wheel axis installation. The laminate spring absorbs the kinetic energy of the shocks generated during aircraft landing, taxiing on a surface with irregularities and so on.

The mount for the main landing gear legs is located in the fuselage, under the seats, before frame No. 4. It is composed of the attachment and the yoke. The main landing gear leg is fastened to the attachment in the fuselage by means of a bolt and in the outlet from the fuselage it is fastened by means of the yoke. The design of the yoke attachment enables a swinging movement and thus a springing of the main landing gear leg at loading.

The fairing holder and the hydraulic brake are attached to the leg.

The main landing gear wheels can be optionally equipped with fairings. The fairing is formed by the laminate monocoque. The fairing is attached from the inside on the sheet metal holder on the wheel axis and from the outside it is attached by the screw to the extended nut of the wheel.

2. TROUBLESHOOTING

Trouble	Probable cause	Remedy
Upper attachment play.	Bushing deformation caused by bearing.	Replace the landing gear leg.
Yoke play.	Loosened joint.	Tighten the nuts.



3. MAINTENANCE PRACTICES

A. Main landing gear leg

Maintenance type: Heavy

Personnel qualification: Independent verification personnel qualified in accordance with Part 66 or higher

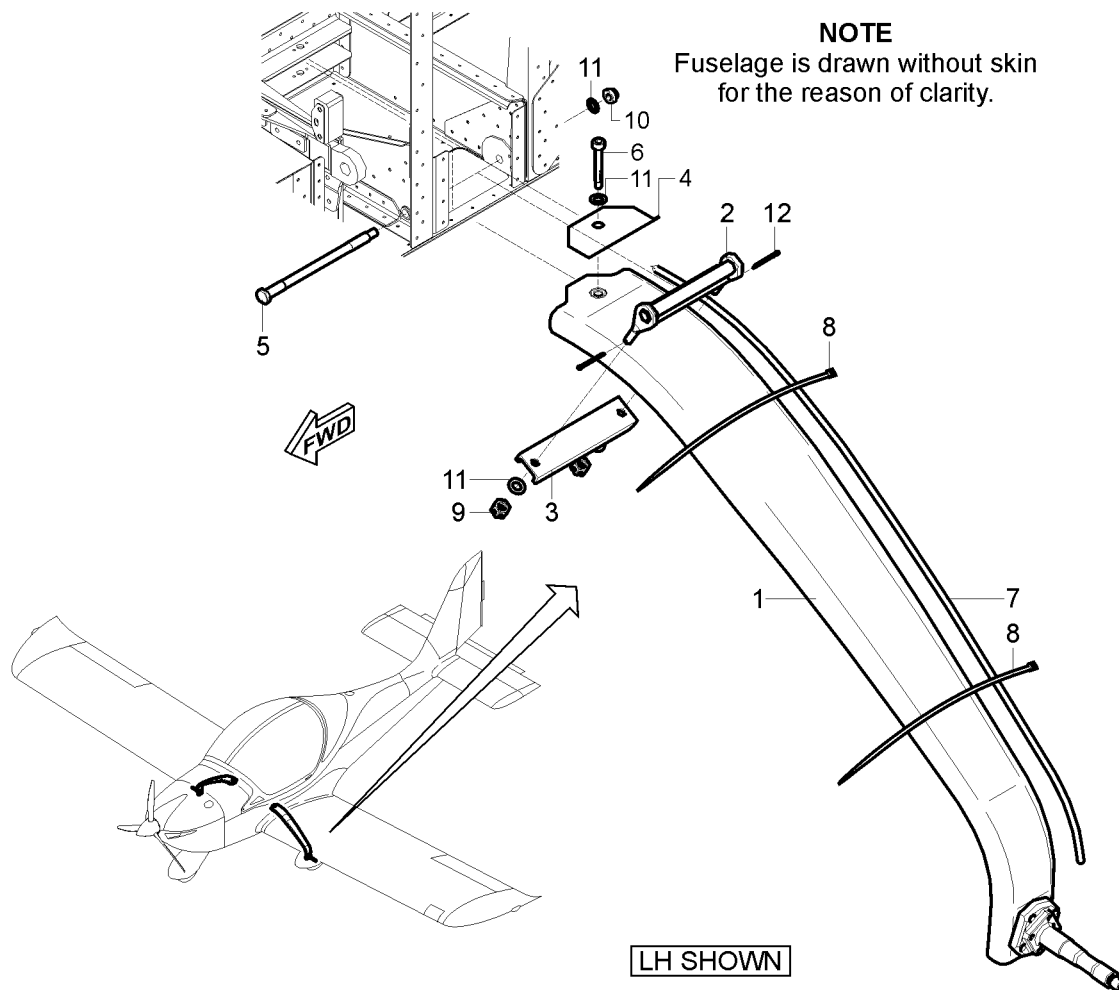
Recommended tools and material:

Item	Designation / Size	Quantity	Note
Wrench	No. 11	1 pc.	
Wrench	No. 12	1 pc.	
Wrench	No. 13	1 pc.	
Hex wrench	No. 6	1 pc.	
Nippers	-	1 pc.	
Cotter pin	2x20	4 pcs.	
Cable tie	4,8x368	4 pcs.	
Grease	AeroShell Grease 22	-	
Cleaning agent	Benzine	-	

- (1) Removal – main landing gear leg
 - (a) Remove the impurities from the landing gear, using a suitable cleaning agent (Section 12-20).
 - (b) Lift the airplane (Section 07-10).
 - (c) Disconnect the plastic hoses of the hydraulic fluid line from the screw fitting on the brake body and close them by blind plugs (Section 32-42).
 - (d) Remove the covers IN2L / IN2R (Section 06-40).
 - (e) Cut off the cable ties (8, Fig. 32-2) of the attachment of the hydraulic fluid line hoses on the landing gear leg (1).
 - (f) Unscrew and remove the bolt (6) with the washer (11) attaching the landing gear leg in the fuselage.
 - (g) Remove the washer (4).
 - (h) Remove the cotter pins (12) and unscrew the nuts (9).
 - (i) Remove the splice plate from the yoke (3).
 - (j) Slide out the leg (1) from the mount in the fuselage.
- (2) Installation – the main landing gear leg
 - (a) Insert the landing gear leg (1, Fig. 32-2) into the mount in the fuselage.
 - (b) Position the splice plate of the yoke (3) and screw on the nuts (9) with the washers (11); don't tighten the nuts.
 - (c) Position the landing gear leg (1) with the washer (4), while the eye is positioned on the attachment in the fuselage.
 - (d) Install the bolt (6) with the washer (11) in the attachment.



- (e) Check the position of the landing gear leg in the mount and tighten the screw (6) of the attachment and tighten the nuts (9) of the yoke; tighten the screw (6) in such a way that the rivets of the rivet nut cannot be torn off.
- (f) Secure the nuts (9) by means of new cotter pins (12).
- (g) As needed, connect the hoses of the hydraulic fluid line to the brakes (Section 32-42), attach the hoses to the landing gear leg and mount the covers IN2L / IN2R, (Section 06-40).
Use the cable ties (8) to attach the hoses to the landing gear leg.
- (h) Lower the airplane.



Legend to Fig. 32-2

1 Main landing gear leg	5 Yoke bolt	9 Castle nut M8
2 Yoke	6 Bolt	10 Self locking nut M8
3 Splice plate of yoke	7 Hose	11 Washer 8,4
4 Washer	8 Cable tie	12 Cotter pin 2x20

Fig. 32-2 Main landing gear leg – removal / installation



(3) Inspection / check – the main landing gear leg

(a) Check of the condition

In addition to the removal of impurities (Section 12-20) and the repair of painting, visually check the landing gear spring condition, focusing on cracks, fissures and other defects of the laminate surface. If the above mentioned defects are detected, contact the airplane manufacturer.

(b) Check of the plays

Check the plays in the mount of the main landing gear legs.

- 1 Lift the airplane (Section 07-10) so that the landing gear is lightened and the wheels are above the support level.
- 2 Move the landing gear by the hand in the directions as shown in Fig. 32-3, this way you can detect the play in the attachment of the landing gear leg and also in the wheel bearings. The allowed play in the operation is 3 mm in all directions. A slightly increased play may indicate that the yoke attaching the landing gear leg has been loosened. This can be eliminated by tightening the joint.
- 3 An increase of plays above the set down tolerance may indicate cracks in the landing gear leg mount, wear and tear of wheel bearings and so on. In the case of excessive plays, remove the landing gear legs and find the cause.

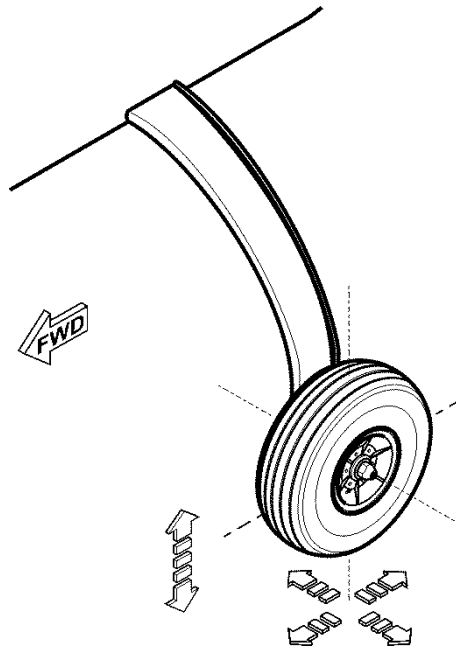


Fig. 32-3 Check of main landing gear plays



B. Main wheel fairing

Maintenance type: Line

Personnel qualification: Independent verification personnel qualified in accordance with Part 66 or higher

Recommended tools and material:

Item	Designation / Size	Quantity	Note
Nippers	-	1 pc.	
Hex wrench	No. 6	1 pc.	
Phillips screwdriver	No. 2	1 pc.	
Grease	AeroShell Grease 22	-	
Cleaning agent	Benzine	-	
Stainless lockwire	ø 0,8 mm	-	

NOTE

The removal / installation procedures for left and right wheel fairings are identical.

(1) Removal – main landing wheel fairing

(a) S5 00-05 01 main landing gear

- 1 Cut off the lockwire (7, Fig. 32-4), unscrew and remove the bolt (3) with the washer (6) and remove the spacer (4).
- 2 Unscrew and remove the screws (5) with the washers (8) of the attachment to the holder (2) on the wheel axis.
- 3 Slide out the fairing (1) upwards.

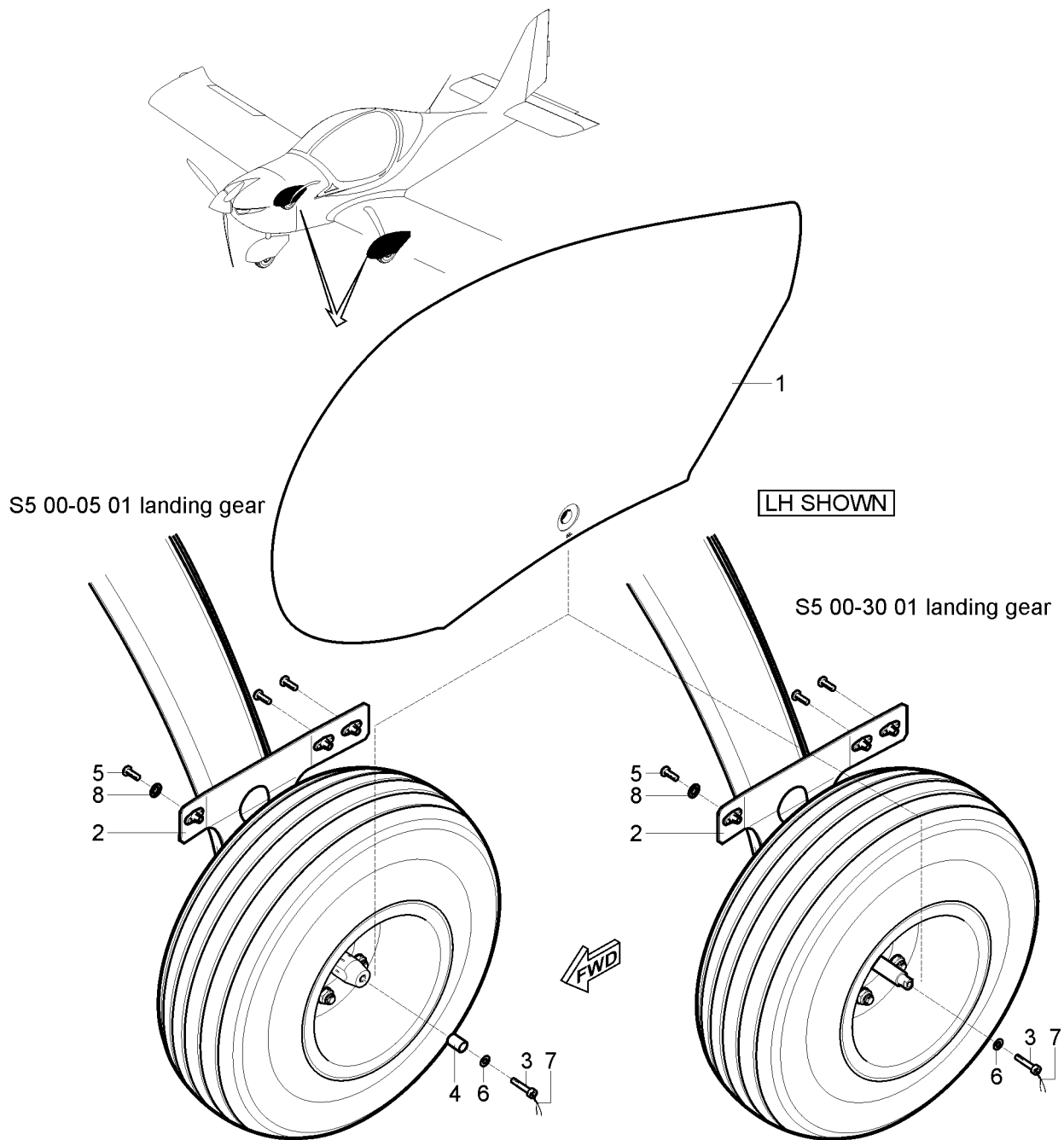
(b) S5 00-30 01 main landing gear (Matco)

- 1 Cut off the lockwire (7), unscrew and remove the bolt (3) with the washer (6).
- 2 Unscrew and remove the screws (5) with the washers (8) of the attachment to the holder (2) on the wheel axis.
- 3 Slide out the fairing (1) upwards.

(2) Installation – main landing wheel fairing

(a) S5 00-05 01 main landing gear

- 1 From above, place the fairing (1, Fig. 32-4) to the holder (2) on the wheel axis.
- 2 Screw the screws (5) with the washers (8); don't tighten the screws.
- 3 Place the spacer (4) between the wheel axis and the fairing (1) and screw the bolt (3) with the washer (6).
- 4 Check the position of the fairing and tighten the bolt (3) and screw (5).
- 5 Secure the bolt (3) by means of lockwire (7) (Section 20-20).



Legend to Fig. 32-4

1 Wheel fairing	5 Screw M5 (3 pcs.)
2 Fairing holder	6 Washer 8,4
3 Bolt M8	7 Lockwire
4 Spacer	8 Polyamide washer 5,3 (3 pcs.)

Fig. 32-4 Main landing gear wheel fairing – removal / installation



- (b) S5 00-30 01 main landing gear (Matco)
- 1 From above, place the fairing (1, Fig. 32-4) to the holder (2) on the wheel axis.
 - 2 Screw the screws (5) with the washers (8); don't tighten the screws.
 - 3 Attach the fairing (1) to the axis by the bolt (3) with the washer (6).
 - 4 Check the position of the fairing and tighten the bolt (3) and screw (5).
 - 5 Secure the bolt (3) by means of lockwire (7) (Section 20-20).



NOSE GEAR AND DOORS

1. DESCRIPTION AND OPERATION

The nose landing gear is composed of the landing gear steel leg, landing gear wheel and the control mechanism.

The load carrying part of the nose landing gear leg is formed by the steel tube with the welded fork. The nose landing gear leg also forms the body of the mechanical shock absorber in which the polyurethane flexible elements, mutually separated by means of metallic guiding washers, are mounted. The flexible elements in the shock absorber absorb the kinetic energy of shocks caused by the moving aircraft. This energy is transferred to the shock absorber by means of the piston connected with the upper attachment of the landing gear leg on the firewall. The nose landing gear wheel is attached in the fork by the pass-through axis and is secured from both sides by means of screws.

The nose landing gear is directionally controllable (Section 32-50).

The nose landing gear wheel can be optionally equipped with the fairing. The fairing is a two-part laminate monocoque, connected by means of screw in the place of separation. It is attached by two screws to the landing gear leg in the upper part of the fairing and from the sides by the screws in the wheel axis.

2. TROUBLESHOOTING

Trouble	Probable cause	Remedy
The landing gear leg is insufficiently extended.	Tired flexible elements in the shock absorber.	Replace the flexible elements.



3. MAINTENANCE PRACTICES

A. Nose landing gear leg

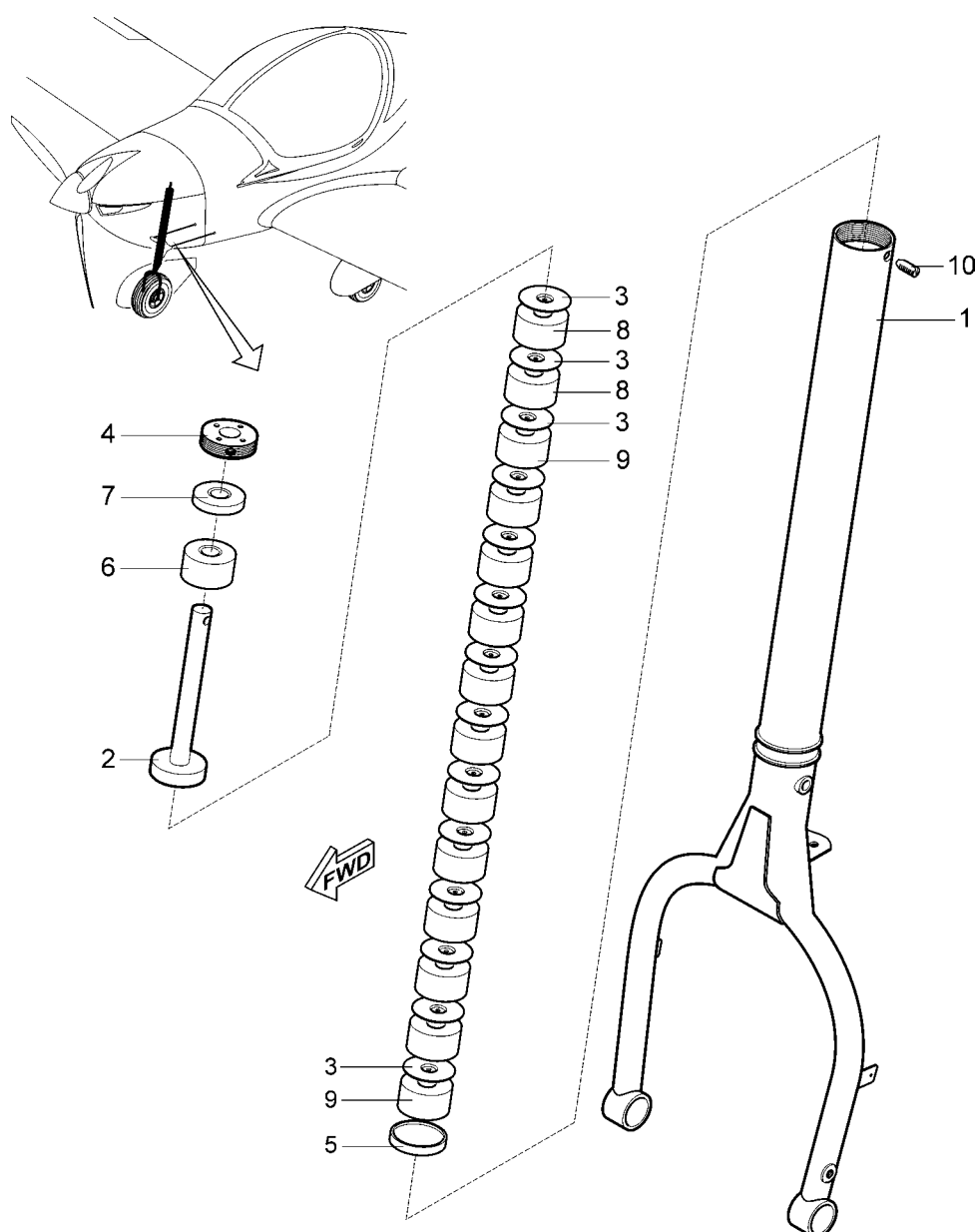
Maintenance type: Heavy

Personnel qualification: Independent verification personnel qualified in accordance with Part 66 or higher

Recommended tools and material:

Item	Designation / Size	Quantity	Note
Flat screwdriver	-	1 pc.	
Wrench	No. 10	2 pcs.	
Wrench	No. 10	2 pcs.	
Adjustable pin wrench ELORA 892-5	DIN 3116	1 pc.	Replacement of the flexible elements of shock absorber
Flexible element	4032 CR	2 pcs.	Black
Flexible element	4032 U 90	12 pcs.	Red
Cotter pin	1,6x20	3 pcs.	
Cotter pin	2x20	2 pcs.	

- (1) Servicing – replacement of the flexible elements in the shock absorber
 - (a) Remove the wheel (Section 32-41) and the nose landing gear leg from the airplane (see par. 3 A.(2)).
 - (b) Unscrew the setting screw (10, Fig. 32-5).
 - (c) Unscrew the nut (4) and remove the stop (2) with the blocks (6) and (7).
 - (d) Remove the flexible elements (8; 9) and the inserts (3) from the tube of the shock absorber (1).
 - (e) Put the new flexible elements (9; 8) into the tube of the shock absorber and put the inserts (3) between them.
 - (f) Insert the stop (2) with the blocks (6) and (7) and screw on the nut (4).
 - (g) Tighten the nut (7) so that the hole for the setting screw (10) is coaxial with the thread in the tube of the shock absorber.
 - (h) Screw the setting screw (10).
 - (i) Install the nose landing gear leg (see par. 3 A.(3)) and the wheel (Section 32-41) on the airplane.



Legend to Fig. 32-5

1	Shock absorber body	6	Block
2	Stop	7	Small block
3	Insert	8	Flexible element (black) (2 pcs.)
4	Nut	9	Flexible element (red) (12 pcs.)
5	Plug	10	Stop screw

Fig. 32-5 Replacement of flexible elements of shock absorber



- (2) Removal – nose landing gear leg
 - (a) Lift the airplane (Section 07-10).
 - (b) Remove the pull-rods of the nose landing gear control (4; 5, Fig. 32-6) (Section 32-50).
 - (c) Remove the cotter pins (21), unscrew and remove the nuts (14), washers (19) and bolts (9).
 - (d) As needed, remove the nose landing gear wheel (Section 32-41).
 - (e) Unscrew and remove the nut (17), washer (18) and bolt (11).
 - (f) Unscrew and remove the nuts (16), washers (19) and bolts (13).
 - (g) Remove the landing gear leg from the mount on the firewall.
- (3) Installation – nose landing gear leg
 - (a) Place the nose landing gear leg in the fuselage and insert the bolt (11, Fig. 32-6) into the upper attachment, put the washer (18) and screw on the nut (17).
 - (b) Insert the bolts (13) into the holes in the lower attachment.
 - (c) Put the washers (19) on the bolts and screw on the nuts (16).
 - (d) Position the pull-rods (4) and (5) to the lever (2), put the bolts (9) with the washers (19).
 - (e) Put the washers (19) on the bolts (9) and screw on the nuts (14) and secure them by new cotter pins (21).
 - (f) As needed, mount the wheel of the nose landing gear (Section 32-41).
 - (g) Lower the airplane.

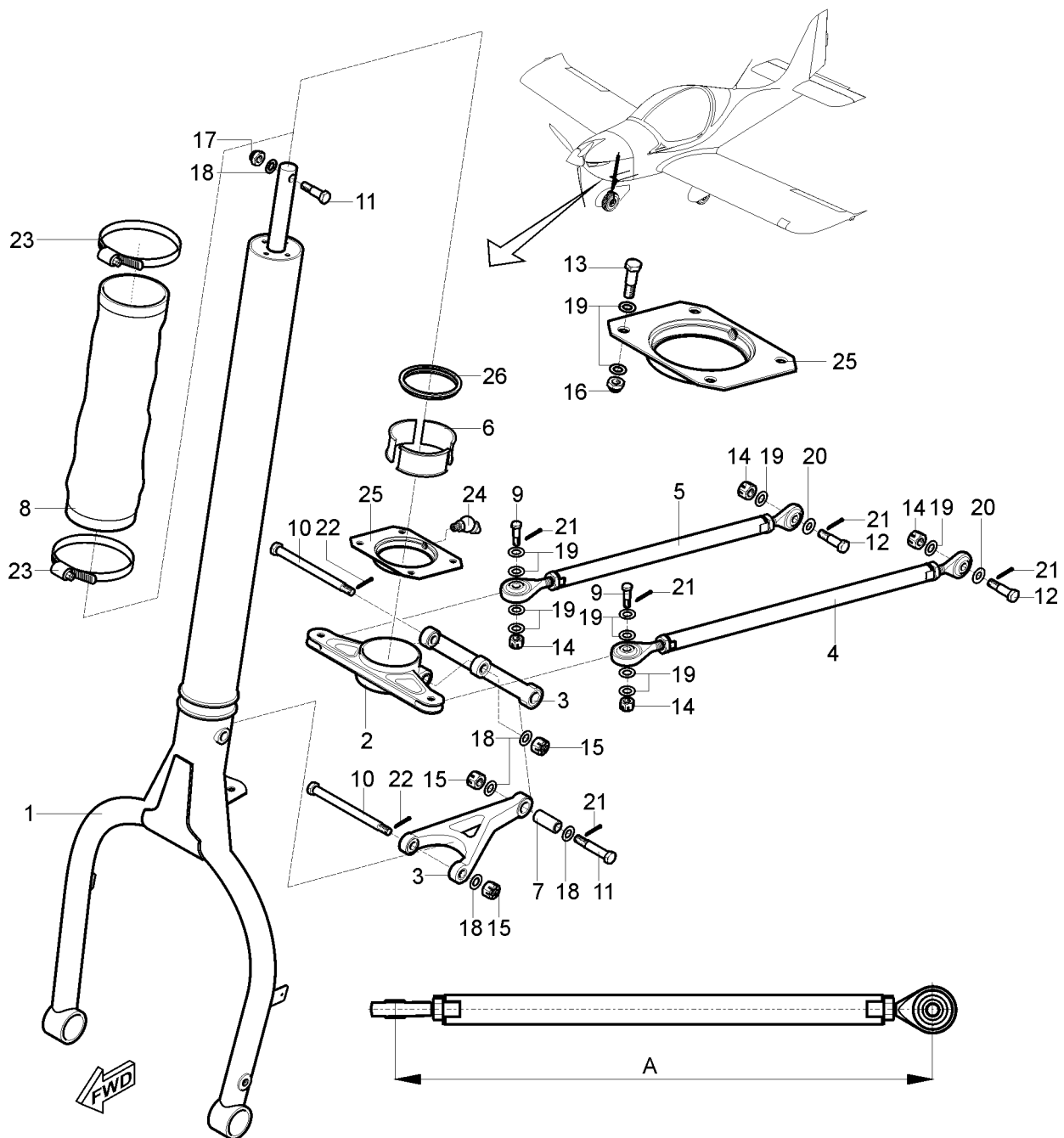


Fig. 32-6 Nose landing gear leg – removal / installation (page 1 of 2)



Legend to Fig. 32-6

1	Nose landing gear leg	14	Castle nut M6
2	Nose landing gear lever	15	Castle nut M8
3	Scissors	16	Self locking nut M6
4	Pull-rod G4 01-20 01 (long)	17	Self locking nut M8
5	Pull-rod G4 01-18 01 (short)	18	Washer 8,4
6	Bushing	19	Washer 6,4
7	Bushing	20	Washer 6,4
8	Cover	21	Cotter pin 1,6x20
9	Bolt 6x31	22	Cotter pin 2x20
10	Bolt 8x94	23	Torro buckle
11	Bolt 8x42	24	Lubricating head
12	Bolt 6x23	25	Bushing G5 00-01 21
13	Bolt M6	26	Bushing G5 00-03 21

Fig. 32-6 Nose landing gear leg – removal / installation (page 2 of 2)

(4) Inspection / check – the nose landing gear leg

(a) Check of the condition

In addition to the removal of impurities (Section 12-20) and repairing the painting, visually check the condition of the landing gear leg with the focus on cracks, deformations and plays.

(b) Check of the plays

- 1 Lift the airplane (Section 07-10), so that the nose wheel gets above the support level.
- 2 Move the landing gear by the hand in all directions. This way you can find the play in the attachment of the landing gear leg and in the wheel bearings. The allowed play in the operation is 3 mm. A slightly increased play may indicate the loosened bolts of the attachment, which can be eliminated by tightening the joint.
- 3 Increased plays in the mount of the landing gear leg may indicate cracks in the mount of the landing gear leg, worn wheel bearings and so on. In the case when excessive plays are detected, remove the landing gear leg and find out the reason.

(c) Check of shock absorber function

- 1 Repeatedly unload and load the nose landing gear by pressing and lightening the rear part of the fuselage. This way you can delimit the effect of friction in the shock absorber.
- 2 Measure the distance between the axes of the attachment bolts of the torque link (see Fig. 32-7). The minimum distance X between the bolt axes is 155 mm.
- 3 Repeat the whole procedure several times in order to eliminate the measurement error.



- 4 If the measured value of the extension is repeatedly non-conforming (less than 155 mm), replace the flexible elements of the shock absorber.

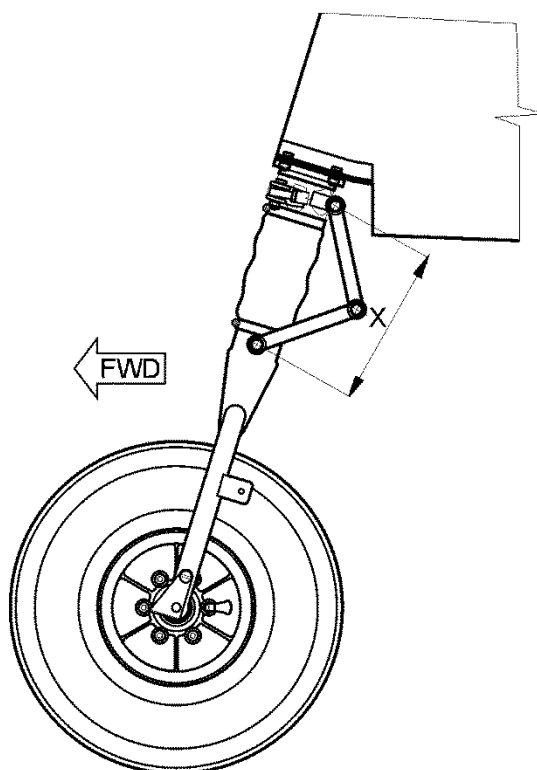


Fig. 32-7 Check of shock absorber extension

B. Nose wheel fairing

Maintenance type: Line

Personnel qualification: Independent verification personnel qualified in accordance with Part 66 or higher

Recommended tools and material:

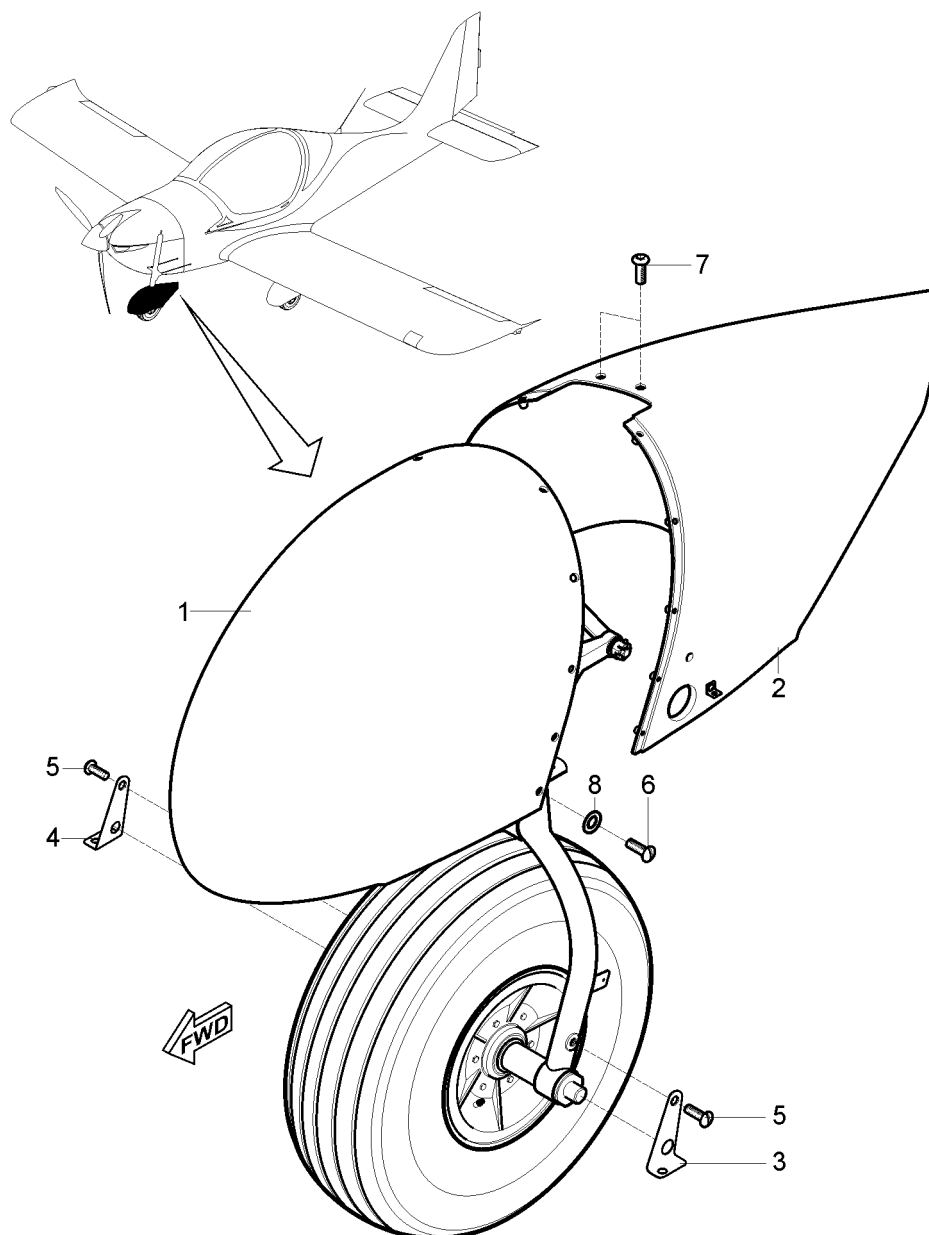
Item	Designation / Size	Quantity	Note
Nippers	-	1 pc.	
Flat screwdriver	-	1 pc.	
Phillips screwdriver	No. 2	1 pc.	
Stainless lockwire	ø 0,8 mm	-	

(1) Removal – nose wheel fairing

- Unscrew and remove the screws (6, Fig. 32-8) with the washers (8) connecting the front (1) and the rear (2) part of the fairing.
- Remove the front part of the fairing (1).
- Remove the drawbar eyes (3) and (4) attached by means of screws (5).
- Unscrew the screws (7) on the upper side of the fairing.



- (e) Remove the rear part of the fairing.



Legend to Fig. 32-8

1	Front part of fairing	5	Screw M6x12
2	Rear part of fairing	6	Screw M4x12 (10 pcs.)
3	Left drawbar eye	7	Screw M6x20
4	Right drawbar eye	8	Polyamide washer 3,7 (10 pcs.)

Fig. 32-8 Nose wheel fairing – removal / installation



-
- (2) Installation – nose wheel fairing
- (a) Place the rear part of the fairing (2, Fig. 32-8) to the bracket on the nose landing gear leg.
 - (b) Install the screws (7); don't tighten the screws.
 - (c) Position the front part of the fairing (1) by means of screws (6) with the washers (8); don't tighten the screws.
 - (d) Check the mutual position of the fairing parts (1) and (2) and also the position in relation to the nose landing gear leg.
 - (e) Tighten the screws (6; 7).
 - (f) Attach the drawbar eyes (3; 4) by means of screws (5).



WHEELS AND BRAKES

1. DESCRIPTION AND OPERATION

The wheels are made from light alloy and are equipped with the tyres with inner tubes. The brake disks are attached on the inner side of the main wheel disks.

The brakes of the main landing gear are of a single disk hydraulic type. The friction elements are controlled by one hydraulic piston.

The brake circuit is opened, the low pressure section leads the brake fluid from the receptacle on the firewall to the brake pumps on the foot control.

The high pressure section leads the brake fluid from the foot brake pumps to the hydraulic pistons of the brakes on the main landing gear wheels.

Optionally, the airplane can be equipped with the main wheels and the brake system from the manufacturer Matco.



2. TROUBLESHOOTING

Trouble	Probable cause	Remedy
Wheels		
Disk deformation or cracks.	A damage caused by an obstacle during takeoff, landing or taxiing.	Replace the wheel disk.
	Landing with a flat tyre.	Replace the wheel disk.
	Landing with crosswind.	Replace the wheel disk.
	Disk corrosion.	Replace the wheel disk.
	Unsuitable procedure during tyre removal.	Replace the wheel disk.
Brakes		
It is not possible to achieve a sufficient pressure in the brakes.	Air in the hydraulic system of brakes.	Vent the system.
	Clogged venting hole in the expansion receptacle.	Clean the venting hole.
	Leaking system, fluid leakage.	Find out the cause and the place of leakage and repair it.
	Defective foot pump.	Repair the pump or replace it.
	Defective hoses.	Replace the hoses.
Brake rubbing.	Foreign material in the brake.	Clean the brake.
	Water or ice in the hydraulic system.	Melt the ice and clean and vent the brake system.
	Piston doesn't return back.	Vent the brake system.
	Piston is getting jammed.	Replace the brake.
	Corroded guide pins.	Eliminate the corrosion or replace the guide pins.
	A tired or broken spring in the brake pump.	Replace the spring.
Rapid wear and tear of the lining of brake pads and disk.	Brake is rubbing.	See "Brake rubbing"
	Defective brake disk (grooves, corrosion).	Replace the brake disk.
Low efficiency of brakes.	Greasy or otherwise contaminated brake lining or brake disk.	Clean and degrease the brake pad lining and the brake disk.
	Excessively worn brake lining.	Replace the brake pads.
	Excessively worn brake disk.	Replace the brake disk.



WHEELS

1. DESCRIPTION AND OPERATION

The main landing gear wheels and the nose landing gear wheel are of the identical type.

Optionally, the airplane can be equipped with the main wheels from the manufacturer Matco.

The tyres Cheng Shin 15 x 6.00-6 and the inner tube Cheng Shin 15 x 6.00-6 or the tyres Goodyear FLC 6 PR 15 x 6.00-6 and the inner tube 6.00-6 TR20 15 x 6.00-6 are installed on the wheels.

A. S5 10-00 01 / S5 10-00 02 main landing gear wheels

The main landing gear wheel is installed on the axis attached to the main landing gear leg by means of the nut secured by cotter pin. The wheel is formed by the two-part casting from light alloy. Both parts are connected by six bolts. This enables the removal and installation of the inner tube and the tyre of the wheel. On the inner part of the wheel disk, there are three bosses with the thread on the outer circumference. These bosses serve for the attachment of the brake disk by means of three bolts. In the wheel hub, there are two ball bearings secured by locking rings and their inner rings are strutted by the spacer.

B. S5 00-31 01 / S5 00-31 02 main landing gear wheels (Matco)

The main landing gear wheel is installed on the axis attached to the main landing gear leg by means of the nut secured by cotter pin. The wheel is formed by the two-part workpiece from light alloy. Both parts are connected together with the hub by six bolts. This enables the removal and installation of the inner tube and the tyre of the wheel. The brake disk is attached to the wheel hub by means of three bolts. In the wheel hub, there are two taper roller bearings.

C. Nose landing gear wheel

The nose landing gear wheel is installed in the fork with the continuous axis by means of two spacers of a different length that compensate the wheel disk asymmetry. The wheel is formed by the two-part casting from light alloy. Both parts are connected by six bolts. This enables the removal and installation of the wheel inner tube and the wheel tyre. The nose wheel isn't braked. In the wheel hub, there are two ball bearings secured by the locking rings and their inner rings are strutted by the spacer.



2. MAINTENANCE PRACTICES

Maintenance type: Line

Personnel qualification: Independent verification personnel qualified in accordance with Part 66 or higher

Recommended tools and material:

Item	Designation / Size	Quantity	Note
Nippers	-	1 pc.	
Wrench	No. 13	1 pc.	
Wrench	No. 21	2 pcs.	
Wrench	No. 22	1 pc.	
Socket wrench	1 1/2 in	1 pc.	Matco wheel
Torx bit	T27	1 pc.	Matco wheel
Hex wrench	3/16 in	1 pc.	Matco wheel
Hex wrench	No. 5	1 pc.	
Hex wrench	No. 6	1 pc.	
Torque wrench	5 – 25 Nm	1 pc.	
Flat screwdriver	-	1 pc.	
Lock washer	8.4	6 pcs.	
Stainless lockwire	Ø 0,8 mm	-	
Cotter pin	4x40	2 pcs.	
Cotter pin	MSC.125X2	2 pcs.	Matco wheel
Grease	AeroShell Grease 22	-	
Cleaning agent	Benzine	-	

A. S5 10-00 01 / S5 10-00 02 main landing gear wheels

- (1) Removal – main landing gear wheel
 - (a) Lift the airplane (Section 07-10).
 - (b) Remove the wheel fairings if installed (Section 32-10).
 - (c) Unlock the lock washer (20, Fig. 32-9) and unscrew the bolts (17) of the brake disk attachment (10).
 - (d) Remove the cotter pin (22), unscrew the nut of the wheel attachment on the axis (1) and remove the washer (11).
 - (e) Remove the wheel from the axis of the landing gear (4) and remove the spacer (2).

WARNING

BEFORE THE INITIATION OF THE WHEEL DISMANTLING, RELEASE THE AIR FROM THE INNER TUBE. NEVER LOOSEN THE CONNECTING SCREWS OF THE DISK HALVES IF THERE IS PRESSURE IN THE TYRE. THE BREACH OF THIS PRINCIPLE MAY RESULT IN A SERIOUS



INJURY. BEFORE REMOVING THE TYRE VALVE, MAKE SURE THAT THERE IS NO PRESSURE IN THE TYRE.

- (f) Release the pressure from the inner tube of the tyre (15) and remove the tyre valve.
 - (g) Cut off the lockwires of the bolts (18).
 - (h) Unscrew six bolts (18) with the washers (21) connecting the parts of the disk (7; 8).
 - (i) Push the tyre beads (14) away from the wheel. This activity can be effectively carried out by means of a hand-operated press and a suitable jig. Be careful in order not to damage (cut off) the tyre valve.
 - (j) Remove the parts of the wheel (7; 8) and the inner tube (15).
- (2) Removal – wheel bearings

WARNING

WHEN HANDLING THE WARMED WHEEL DISK, USE THE PROTECTIVE GLOVES AGAINST BURNS. DON'T USE FLAME FOR WARMING THE DISK (BURNER, GAS COOKER AND SO ON).

CAUTION

THE BEARINGS MAY BE REMOVED DURING THEIR REPLACEMENT ONLY. IT IS NECESSARY TO WARM THE PART OF THE DISK WITH BEARINGS TO A TEMPERATURE OF 90 UP TO 100 °C. IT IS SUITABLE TO CARRY OUT WARMING IN AN ELECTRICAL FURNACE WITH TEMPERATURE REGULATION.

- (a) Remove the locking rings (12, Fig. 32-9).
 - (b) Warm the disk (8) with the bearings (13) to a maximum temperature of 90 up to 100 °C for max. 15 minutes.
 - (c) Put the disk on a straight support and carefully hammer out the bearings along with the spacer (9).
- (3) Installation – wheel bearings

WARNING

WHEN HANDLING THE WARMED WHEEL DISK, USE THE PROTECTIVE GLOVES AGAINST BURNS. DON'T APPLY FLAME FOR WARMING THE DISK (BURNER, GAS COOKER AND SO ON). WHEN WORKING WITH DRY ICE, USE THE PROTECTIVE GLOVES.

- (a) Wash the bearings by means of benzine and dry them up by compressed air.
- (b) Visually check the condition.
- (c) Warm the wheel disk for max 15 minutes to a maximum temperature of 90 up to 100 °C.



- (d) Cool down the bearings in a low temperature environment (–32 up to –54 °C) for 4 hours at least. Prolong the time of cooling if the ambient temperature is lower. The bearing can be cooled down also by inserting it in dry ice for a time of 15 minutes at least.
- (e) Remove the disk (8, Fig. 32-9) of the wheel from the furnace and remove the bearing (13) from a cold environment. Dry up the bearings.
- (f) Insert the cooled bearing (13) into the hole for the outer ring of the bearing in the wheel disk (8), slightly tap using a fibre washer so that the outer ring of the bearing fits perfectly in the hole. Prevent the bearing ring from getting stuck in the disk hole. If the ring isn't seated perfectly, repeat the whole process of bearing dismantling and installation.
- (g) Put the locking ring (12).
- (h) Before the pressing-in of the other bearing, insert the spacer (9) into the wheel disk (8).
- (i) Press the other bearing using the same procedure.
- (j) Put the locking ring (12).
- (4) Installation – the main landing gear wheel
 - (a) Insert the inner tube (15, Fig. 32-9) in the tyre (14). As needed, sprinkle the tyre with talc from inside. Slightly inflate the inner tube (15) by air and position it along with the tyre (14) on the wheel disk (8).
 - (b) Place the outer part of the wheel (7) to the inner part (8) so that the holes for the connecting screws (18) are mutually aligned and insert the tyre valve of the inner tube through the grommet in the outer part.
 - (c) Install the six connecting bolts (18) with the washers (21) into the threads in the inner part of the wheel (8) until both parts of the wheel fit in. Gradually tighten the screws (18) in a crosswise pattern, using a torque of 10 Nm. Secure the screws (18) by means of lockwire (Section 20-20).
 - (d) Inflate the inner tube of the wheel to the specified pressure.
 - (e) Put the spacer (2), landing gear wheel and the washer (11) on the wheel axis.
 - (f) Screw on the nut (1) and install a new cotter pin (22).
 - (g) Lower the airplane.

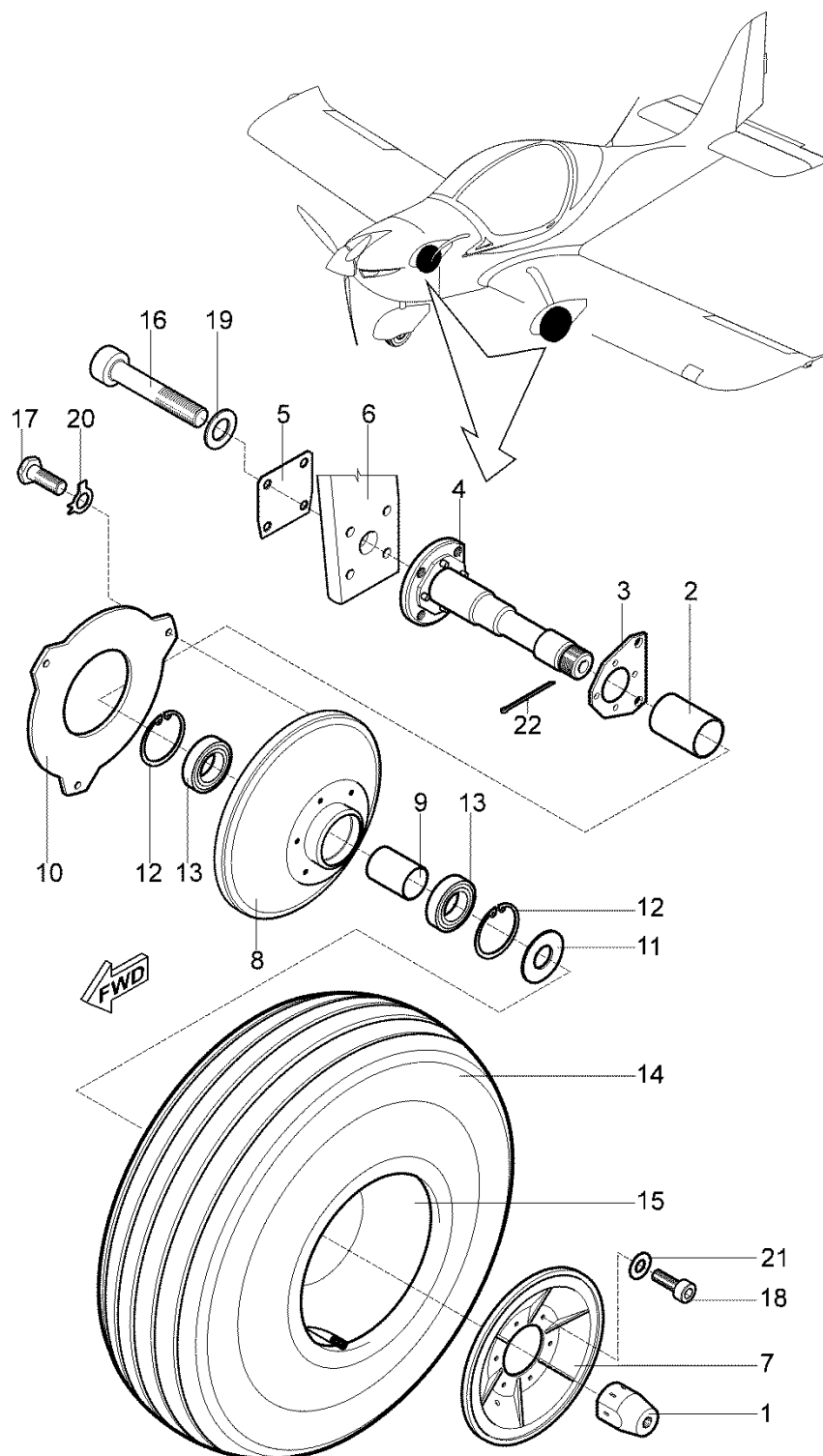


Fig. 32-9 Main landing gear wheel – removal / installation (page 1 of 2)



Legend to Fig. 32-9

1 Nut	12 Locking ring
2 Spacer	13 Bearing
3 Brake holder	14 Tyre
4 Axis of main wheel	15 Inner tube
5 Washer	16 Bolt M8
6 Leg of main landing gear	17 Bolt M8
7 Outer disk of wheel	18 Bolt M6
8 Inner disk of wheel	19 Washer 8,4
9 Spacer	20 Lock washer
10 Brake disk	21 Washer 6,4
11 Washer	22 Cotter pin 4x40

Fig. 32-9 Main landing gear wheel – removal / installation (page 2 of 2)

B. S5 00-31 01 / S5 00-31 02 main landing gear wheels (Matco)

- (1) Removal – main landing gear wheel
 - (a) Lift the airplane (Section 07-10).
 - (b) Remove the wheel fairings if installed (Section 32-10).
 - (c) Unscrew and remove the bolts (5, Fig. 32-10) with the washers (6).
 - (d) Remove the cotter pin (4), unscrew the nut (2) and remove the washer (3).
 - (e) Remove the wheel (1) with the spacer (7) from the axis of the landing gear.

WARNING

BEFORE THE INITIATION OF THE WHEEL DISMANTLING, RELEASE THE AIR FROM THE INNER TUBE. NEVER LOOSEN THE CONNECTING SCREWS OF THE DISK HALVES IF THERE IS PRESSURE IN THE TYRE. THE BREACH OF THIS PRINCIPLE MAY RESULT IN A SERIOUS INJURY. BEFORE REMOVING THE TYRE VALVE, MAKE SURE THAT THERE IS NO PRESSURE IN THE TYRE.

- (f) Release the pressure from the inner tube of the tyre (13) and remove the tyre valve.
- (g) Unscrew and remove the nuts (16), bolts (14; 15) and the washers (17) connecting the parts of the disk (9; 10) and hub (11).
- (h) Push the tyre beads (12) away from the wheel. This activity can be effectively carried out by means of a hand-operated press and a suitable jig. Be careful in order not to damage (cut off) the tyre valve.
- (i) Remove the parts of the wheel (9; 10) and the inner tube (13).

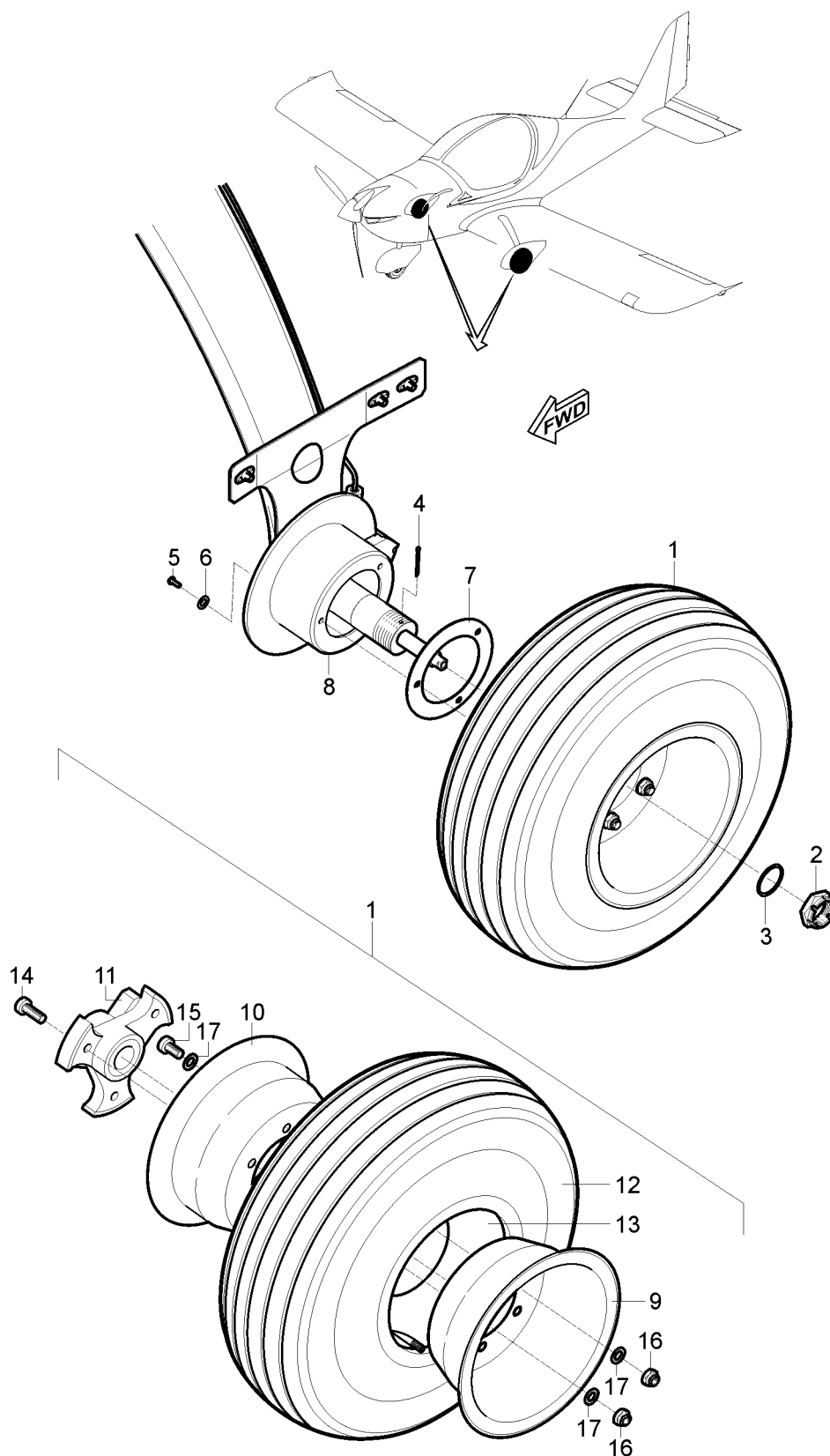


Fig. 32-10 Matco main landing gear wheel – removal / installation (page 1 of 2)



Legend to Fig. 32-10

1 Matco main wheel	10 Inner part of wheel
2 Nut	11 Wheel hub
3 Washer	12 Tyre
4 Cotter pin	13 Inner tube
5 Bolt (3 pcs.)	14 Bolt (3 pcs.)
6 Lock washer (3 pcs.)	15 Bolt (3 pcs.)
7 Spacer	16 Nut (6 pcs.)
8 Brake disk	17 Washer (9 pcs.)
9 Outer part of wheel	

Fig. 32-10 Matco main landing gear wheel – removal / installation (page 2 of 2)

(2) Installation – the main landing gear wheel

- (a) Insert the inner tube (13, Fig. 32-10) in the tyre (12). As needed, sprinkle the tyre with talc from inside. Slightly inflate the inner tube (13) by air and position it along with the tyre (14) on the wheel part (10).
- (b) Place the parts of the wheel (9; 10) and the hub (11) so that the holes for the connecting screws (14; 15) are mutually aligned and insert the tyre valve of the inner tube through the grommet in the wheel outer part.
- (c) Connect the wheel parts (9; 10) and the hub (11) by means of the bolts (14; 15), washers (17) and the nuts (16); gradually tighten the nuts in a crosswise pattern, using a torque of 11,3 Nm.
- (d) Inflate the inner tube of the wheel to the specified pressure.
- (e) Connect the disk (8) to the hub (11) by means of the bolts (5) with the washers (6).
- (f) Put the spacer (7), landing gear wheel (1) and the washer (3) on the wheel axis.
- (g) Screw on the nut (1) and tighten as follows:
 - 1 Tighten the axis nut until all play is out of the assembly. Rotate the wheel back and forth while tightening the nut to help seat the bearings
 - 2 When all play is out and the wheel rotates freely, tighten to the next slot and insert new cotter pin (4).
 - 3 Check that the wheel rotate freely.
- (h) Lower the airplane.

C. Nose landing gear wheel

(1) Removal – nose landing gear wheel

- (a) Lift the airplane (Section 07-10).
- (b) Remove the wheel fairing if installed (Section 32-20).
- (c) Cut off the lockwire securing the screw (6, Fig. 32-11) of the wheel axis (5).
- (d) Unscrew the screws (10) of the attachment of the drawbar eyes (8) and (9).
- (e) Slide out the wheel axis (5) from the fork of the nose landing gear (1).
- (f) Remove the wheel (2), washers (7) and the spacers (3) and (4).



WARNING

BEFORE THE INITIATION OF THE WHEEL DISMANTLING, RELEASE THE AIR FROM THE INNER TUBE. NEVER LOOSEN THE CONNECTING SCREWS OF THE DISK HALVES IF THERE IS PRESSURE IN THE TYRE. THE BREACH OF THIS PRINCIPLE MAY RESULT IN A SERIOUS INJURY. BEFORE REMOVING THE TYRE VALVE, MAKE SURE THAT THERE IS NO PRESSURE IN THE TYRE.

- (g) Release the pressure from the inner tube of the tyre (10, Fig. 32-12) and remove the tyre valve.
 - (h) Unscrew six bolts (7) with washers (8) that are connecting both parts of the wheel (1; 2).
 - (i) Push the tyre beads (9) away from the wheel part. This activity can be effectively carried out by means of a hand-operated press and a suitable jig. Be careful in order not to damage (cut off) the tyre valve.
 - (j) Remove both parts of the wheel (1; 2) and the inner tube (10).
- (2) Removal – wheel bearing

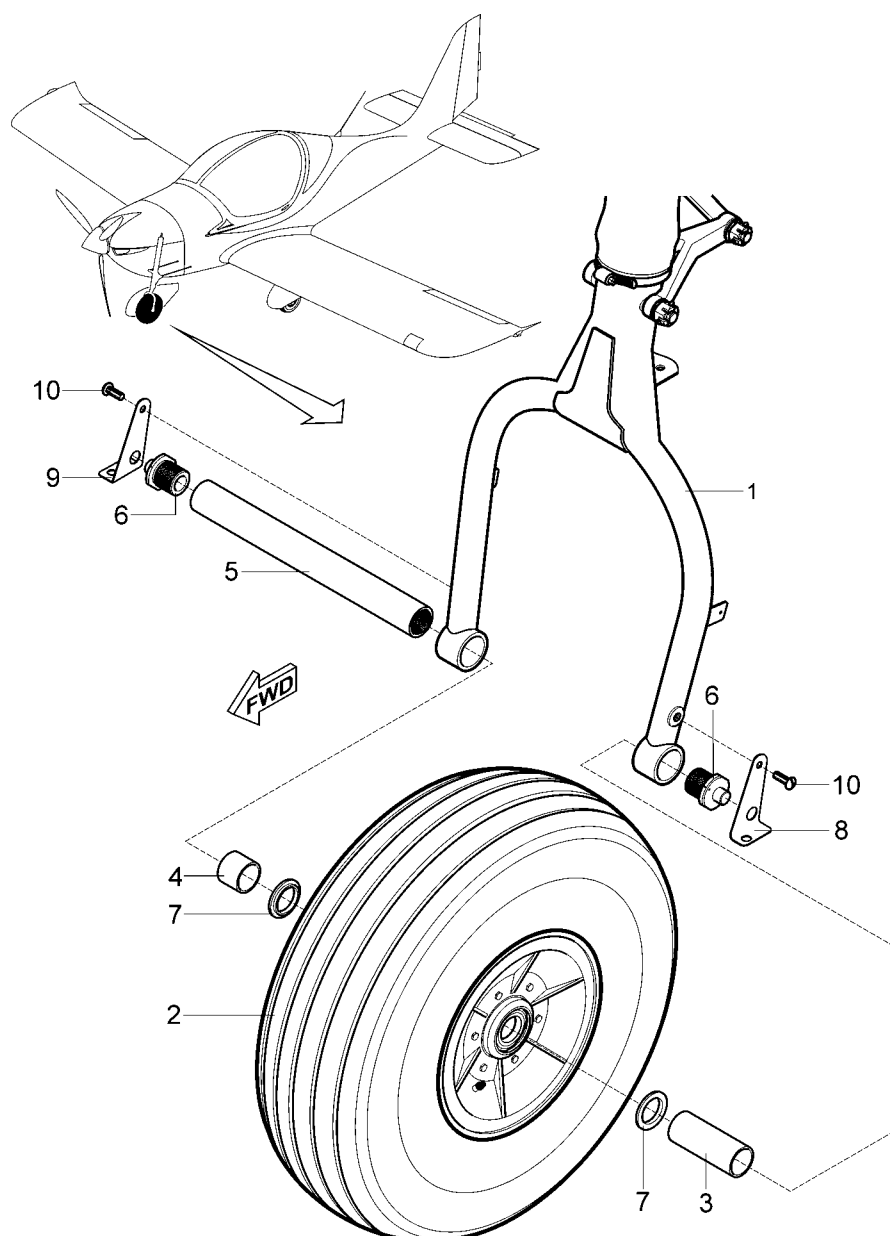
WARNING

WHEN HANDLING THE WARMED WHEEL DISK, USE THE PROTECTIVE GLOVES AGAINST BURNS. FOR WARMING THE DISK, DON'T USE FLAME (BURNER, GAS COOKER AND SO ON).

CAUTION

THE BEARINGS MAY BE REMOVED DURING THEIR REPLACEMENT ONLY. IT IS NECESSARY TO WARM THE PART OF THE DISK WITH BEARINGS TO A TEMPERATURE OF 90 UP TO 100 °C. IT IS SUITABLE TO CARRY OUT WARMING IN AN ELECTRICAL FURNACE WITH TEMPERATURE REGULATION.

- (a) Remove the locking rings (6, Fig. 32-12).
- (b) Warm the disk (2) with the bearings (5) to a maximum temperature of 90 up to 100 °C for max. 15 minutes.
- (c) Put the disk on the straight support and carefully hammer out the bearings along with the spacer (3).



Legend to Fig. 32-11

1 Fork of nose landing gear leg	6 Screw
2 Nose landing gear wheel	7 Washer
3 Spacer	8 Left eye
4 Small spacer	9 Right eye
5 Wheel axis	10 Screw M6

Fig. 32-11 Nose landing gear wheel – removal / installation



(3) Installation – wheel bearing

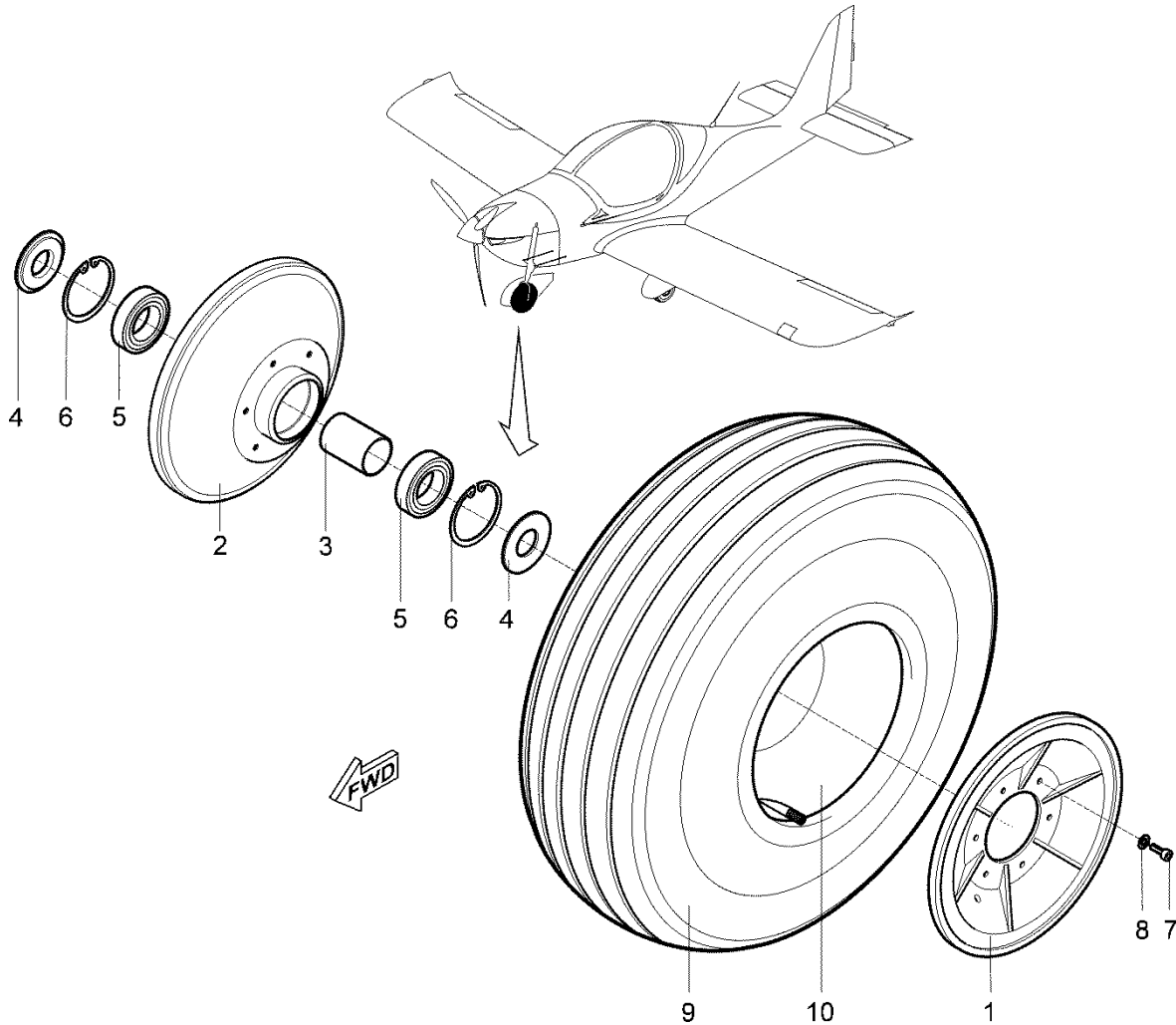
WARNING

WHEN HANDLING THE WARMED WHEEL DISK, USE THE PROTECTIVE GLOVES AGAINST BURNS. FOR WARMING THE DISK, DON'T USE FLAME (BURNER, GAS COOKER AND SO ON). WHEN WORKING WITH DRY ICE, USE THE PROTECTIVE GLOVES.

- (a) Clean the bearings by means of benzine and dry them by means of compressed air.
 - (b) Visually check the condition.
 - (c) Warm the wheel disk for max 15 minutes to a temperature of 90 up to 100 °C.
 - (d) Cool down the bearing in a low temperature environment (–32 up to –54 °C) for at least 4 hours. Prolong the time of cooling if the ambient temperature is lower. The bearing can be cooled down also by inserting it into dry ice for at least 15 minutes.
 - (e) Remove the wheel disk from the furnace and the bearing from a cold environment. Dry up the bearing.
 - (f) Insert the cooled down bearing (5) into the hole for the outside ring of the bearing in the wheel disk (2, Fig. 32-12), slightly tap, using a fiber washer, so that the ring perfectly fits in the hole. Prevent the bearing ring from getting stuck in the disk hole. If the ring doesn't fit in perfectly, repeat the whole process of bearing dismantling and bearing installation.
 - (g) Put the locking ring (6).
 - (h) Before the pressing-in of the other bearing, insert the spacer (3) into the wheel.
 - (i) Apply the same procedure to press the other bearing.
 - (j) Put the locking ring (6).
- (4) Installation – nose landing gear wheel
- (a) Insert the inner tube (10, Fig. 32-12) into the tyre (9). As needed, sprinkle the tyre with talc from inside. Slightly inflate the inner tube (10) by air and position it on the wheel disk (2) along with the tyre (9).
 - (b) Position the outer part of the disk (1) to the inner part (2) so that the holes for the connecting holes are aligned and insert the tyre valve of the inner tube through the grommet in the outer disk.
 - (c) Install six connecting bolts (7) with washers (8) into the threads in the inner part of the disk (2) until the both parts of the disk are mutually seated. Gradually tighten the screws (7) in a crosswise manner, using a torque of 10 Nm.
 - (d) Insert the inner tube of the wheel to the specified pressure.
 - (e) Insert the wheel axis (5, Fig. 32-11) into one of the eyes of the nose landing gear fork.
 - (f) Put the corresponding spacer, washer (7) and the landing gear wheel on the wheel axis.
 - (g) Then put the other washer (7) on the wheel axis (5), position the other spacer and insert the axis into the opposite eye of the fork (1).



- (h) Install the drawbar eyes (8) and (9) and the screws (6) on the landing gear leg; secure the screws (6) by means of lockwire (Section 20-20).
- (i) Lower the airplane.



Legend to Fig. 32-12

1 Outer disk of wheel	6 Locking ring
2 Inner disk of wheel	7 Bolt M6
3 Spacer	8 Washer 6,4
4 Washer	9 Tyre
5 Bearing	10 Inner tube

Fig. 32-12 Nose landing gear wheel – disassembling / assembling



BRAKES

1. DESCRIPTION AND OPERATION

A. General

The airplane is equipped with the opened hydraulic brake system S5 00-51 01. Optionally, the airplane can be equipped with the S5 00-61 01 brake system, which is assembled from the Matco manufacturer components. The brake system scheme is mentioned on Fig. 32-13.

The brake system is equipped in both cases with the disk brakes on the main wheels. The brakes serve for reducing the speed of aircraft movement on the ground and for its permanent stopping during parking or standing.

The brake system is composed of the foot brake pumps (1), distribution of brake fluid (5; 6; 7; 8), expansion tank (2), parking brake valve (9), disks of brakes and the brakes themselves 3; 4).

The pressure in the brake system is generated by the brake pumps (1) that are controlled by the foot control pedals. The low pressure section of the circuit is composed of the expansion tank for brake fluid (2) that is connected by the hoses (8) with the brake pumps. The high pressure section continues from the brake pumps and the brake fluid is lead through the hoses (5; 6) to the parking brake valve (9) and from there through the hoses to the pistons of brakes that act on the brake shoes. The expansion tank (2) is attached in the engine compartment on the firewall. The brake hoses are attached in the front section of the cabin by Emfimastic sealant and then by the screwed fasteners.

The parking brake valve (9) is incorporated in the brake system. The airplane can be equipped with the Matco or GoldFren parking brake valve. The parking brake serves for braking the airplane at short-term standing or parking. The lever of parking brake valve control is located on the right side of the left seat. The valve is located on the frame under the left seat. By depressing the pedals of the brake pumps and by simultaneous pulling the control lever of parking brake, the parking state is achieved. By this, the pressure generated by the brake pumps is closed in the brake circuit and the wheel brakes are permanently activated. By shifting the parking brake lever to the position of brake off, the parking brake valve releases the pressure from the system of brakes and the wheels can turn freely.

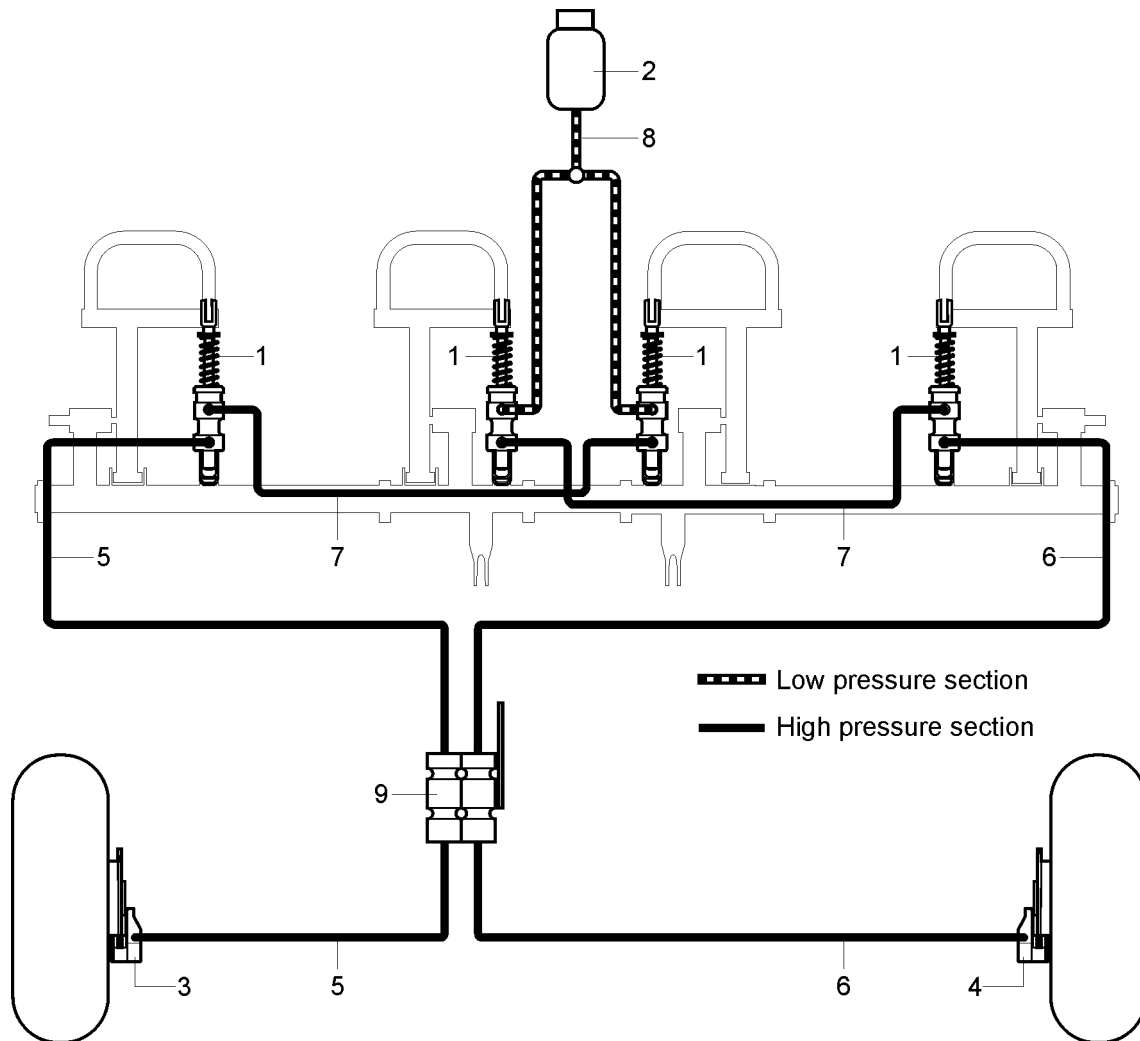
The switch of the activated parking brake indication is installed under the lever of parking brake valve control. If the parking brake is activated, the yellow signaling light **PARK BRAKE LEVER UP** is on (Section 31-50).

B. S5 10-03 01 / S5 10-03 02 brakes

The main part of the brake is the cylinder. The cylinder body is a casting from aluminum alloy. The piston sealed by the rubber ring and the rubber collar are inserted into the cylinder. The piston in the cylinder along with the collar form the pressure body to which the brake fluid is led through the inlet located in the cylinder cap. The cylinder body is provided with bosses. One of the bosses always serves as a venting channel. The venting channel is drilled in the area in front of the piston and in the upper part it is provided with the thread for the air bleeding screw.



The brake is provided with two brake pads, one of them serves as a pushing pad and the other one as a supporting pad. The brake pads are connected by means of two guide pins with the brake holder. The brake holder is attached on the axis of the main landing gear wheel by means of four pins. The length of guide pins connecting the brake pads allows the sliding movement that is necessary for the brake function. By depressing the brake pedal, the pressure in the brake fluid is generated that is led from the brake pump through the plastic hoses to the brake cylinder. The pressure of brake fluid shifts the piston that carries the push brake pad and pushes it onto the brake disk. Simultaneously, the supporting brake pad is pulled from the opposite side.



Legend to Fig. 32-13

1 Pump	6 Line of hoses to the right brake
2 Expansion tank	7 Line of connecting hoses
3 Left brake	8 Line of low pressure hoses
4 Right brake	9 Parking brake valve
5 Line of hoses to the left brake	

Fig. 32-13 Brake system



C. Matco brakes

The main part of the brake is the cylinder. The cylinder body is a casting from aluminum alloy. The piston sealed by the rubber ring is inserted into the cylinder. The piston in the cylinder forms the pressure body to which the brake fluid is led through the channel in the cylinder. On one side of the cylinder is mounted the hydraulic fluid fitting, on the other side, the air bleeding screw.

Two guide bolts are installed in the cylinder. The pushing pad moves on the guide screws. The supporting pad is mounted on the opposite side of the brake disk. The brake lining is riveted on both the pushing and the supporting pad. The brake holder is attached on the axis of the main landing gear wheel by means of four bolts. It serves to hold the brake by means of guide bolts which move together with the cylinder assembly in the brake holder bushings. The hydraulic pressure generated by the brake pumps enters the cylinder and pushes the piston against the pushing pad. The cylinder assembly, freely movable in the brake holder bushings, allows contact of the brake lining on the pushing and supporting pads with the rotating brake disk exactly at the same time.



2. MAINTENANCE PRACTICES

A. S5 10-03 01 / S5 10-03 02 brakes

Maintenance type: Line

Personnel qualification: Independent verification personnel qualified in accordance with Part 66 or higher

Recommended tools and material:

Item	Designation / Size	Quantity	Note
Wrench	No. 7	1 pc.	
Wrench	No. 8	2 pcs.	
Wrench	No. 9	1 pc.	
Wrench	No. 12	1 pc.	
Wrench	No. 13	1 pc.	
Wrench	No. 24	1 pc.	
Wrench	No. 32	1 pc.	
Hex wrench	No. 2,5	1 pc.	
Nippers	-	1 pc.	
Combined pliers	-	1 pc.	
Flat screwdriver	-	1 pc.	
Phillips screwdriver	No. 2	1 pc.	
Cotter pin	1,6x12	-	
Cable tie	2,5x99	5 pcs.	
Ring U	11x3x4,5	2 pcs.	
Sealing ring	ø 7,3x2,4	4 pcs.	
Sealing ring	ø 20x1,5	2 pcs.	
Sealing ring	ø 4x2	2 pcs.	
Sealing ring	ø 11,3x2,4	2 pcs.	
Sealing ring	ø 5,6x2,4	2 pcs.	
Adhesive	Loctite 243	-	
Adhesive	Loctite 406	-	
Adhesive	Loctite 648	-	
Sealant	Emfimastic PU 50	-	
MS polymeric adhesive – sealant	SABA Sealtack 750	-	
Lubricant for sealing rings	Dow Corning 55 O-Ring Lubricant	-	MIL-G-4343



CAUTION

THE BRAKE BODY IS SUSCEPTIBLE TO CORROSION ON THE INNER SURFACE. NEGLECTED CORROSION MAY CAUSE A FAILURE OF THE BRAKE FUNCTION OR EVEN A STRUCTURAL FAILURE OF THE BRAKE.

- (1) Removal – brake
 - (a) Lift the airplane (Section 07-10).
 - (b) Drain the brake fluid (Section 12-10).
 - (c) Remove the main wheels (Section 32-41).
 - (d) Disconnect the hose (9) that is tightened by the nut (11) from the angular coupling (4). Close the hose by the blind plug.
 - (e) Straighten one end of the wire safety lock (15) and slide out the safety lock.
 - (f) Remove the pins (14) of the attachment of the brake shoes (13).
 - (g) Remove the brake disk (10).
- (2) Disassembling – brake
 - (a) Remove the plug (1, Fig. 32-14) and remove the sealing ring (6).
 - (b) Slide out the piston (3) along with the collar (5) from the brake body (2).
 - (c) Remove the sealing ring (7) from the brake body (2).
- (3) Assembling – brake
 - (a) Perfectly clean all the parts and check for evident damage, wear and tear, corrosion before installation.
 - (b) Apply the lubricant for sealing rings on the sealing ring (7, Fig. 32-14). Insert the sealing ring (7) into the groove in the brake body (2).
 - (c) Insert the piston (3) and the collar (5), without excessive force, into the brake body (2).
 - (d) Slide on the sealing ring (6) on the plug (1) and apply lubricant on the sealing rings. Install the plug (1) into the brake body (2) and tighten it.
- (4) Installation – brake

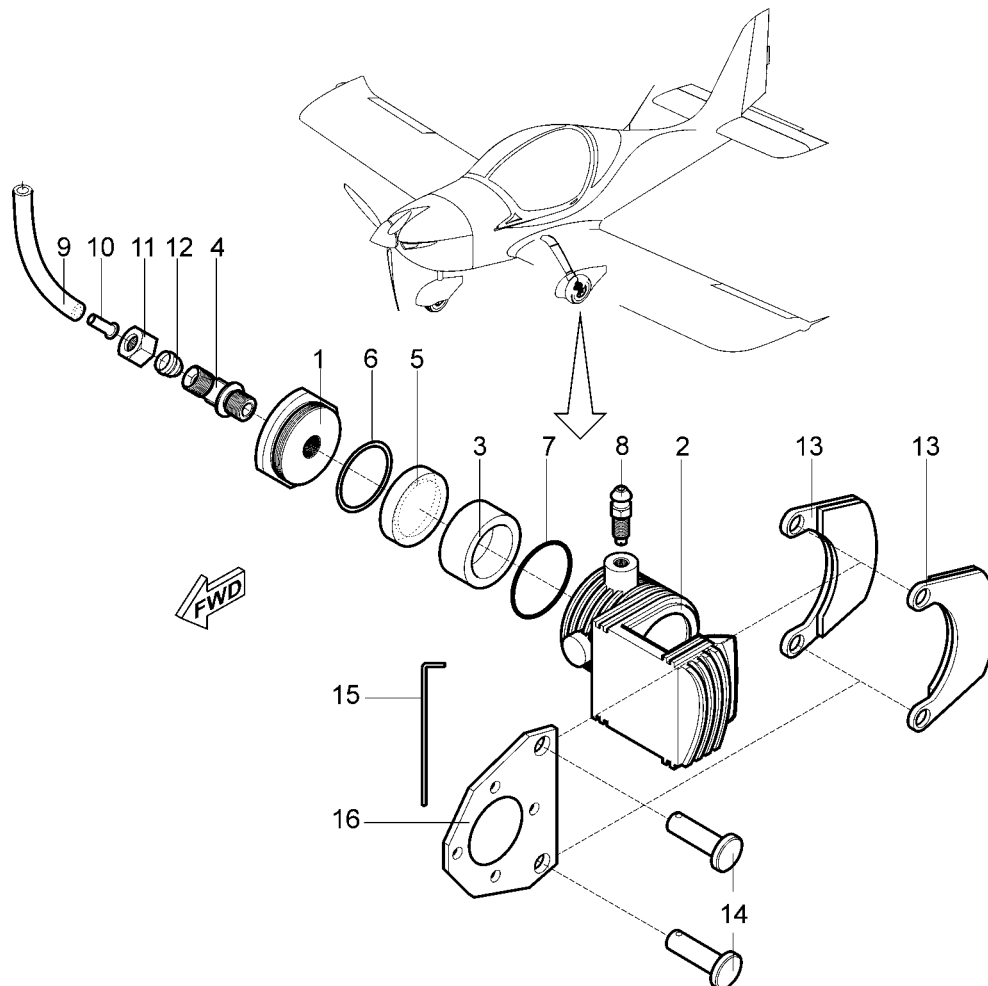
CAUTION

FOR THE INSTALLATION OF THE BRAKE CYLINDER, USE NEW SEALING RINGS. WHEN INSERTING THE PISTON INTO THE BRAKE CYLINDER BODY, VERIFY THAT THE SEALING RING ISN'T BEING DAMAGED.

- (a) Place the brake disk (10, Fig. 32-9) and the brake shoes (13, Fig. 32-14) to the yoke of the brake body (2).
- (b) Position the brake holder (16) between the brake shoes (13) and insert the pins (14) into the corresponding holes.
- (c) Insert the wire safety lock (15) into the holes in the pins (14) and secure it.
- (d) Slide on the brake assembly on the main wheel axis (4, Fig. 32-9) and position the corresponding pins on the main wheel axis.



- (e) To the angular coupling (4, Fig. 32-14), connect the hose (9) with the inserted hollow rivet (10) by means of the swivel nut (11) and the sealing cone (12)
- (f) Replenish brake fluid, bleed the brake circuit (Section 12-10) and do the function check and the leakage test.
- (g) Lower the airplane.



Legend to Fig. 32-14

1 Plug	9 Brake hose
2 Brake body	10 Tube rivet
3 Piston	11 Swivel nut
4 Angular connection	12 Sealing cone
5 Collar	13 Brake shoe
6 Sealing ring $\varnothing$ 24x3	14 Pin
7 Sealing ring $\varnothing$ 25x2	15 Wire safety lock
8 Air bleeding screw	16 Brake holder

Fig. 32-14 Brake – disassembling / assembling



- (5) Adjustment / test – brakes
 - (a) Depress and release the brakes several times (at least five times).
 - (b) Visually check the whole system of brakes for leakage – no penetration of brake fluid is allowed in the joints and at the brake cylinders.
 - (c) Park using the control lever of the parking brake and for a time of 15 minutes there mustn't be any reduction of pressure.
 - (d) Visually check for brake fluid leakage from the system.
 - (e) Repeat and check for a free travel of wheels.
- (6) Inspection / check – brakes
 - (a) Lift the airplane (Section 07-10).
 - (b) Remove the brake from the airplane and disassemble it (see par. 2 A.(1),(2)).
 - (c) Clean and dry individual parts of the brake.
 - (d) Check the condition of the brake cylinder body – corrosion, cracks, surface scratches, evidence of rubbing and bearing. Check the condition of threads in the body.
 - (e) Replace the sealing rings.
 - (f) Check the condition of the piston surface – corrosion, surface scratches, evidence of rubbing and bearing.
 - (g) Replace the rubber collar.
 - (h) Check the condition of the plug - corrosion, thread condition.
 - (i) Check the condition of the air bleeding screw – thread, contact surface, hexagon and corrosion.
 - (j) Check the condition of the guide pins – corrosion, grooves, bearing and evidence of rubbing.
 - (k) Check the inlet elbow – the condition of threads, passability and corrosion.
 - (l) Replace the damaged parts.
 - (m) Check the brake disk and the lining:
 - 1 Brake disk
Check the condition of the brake disk.
Check the cracks, corrosion, wear and tear, surface scratches and deformation.
Replace the disk if its thickness is less than 3,2 mm in the whole section.
 - 2 Brake shoes
Check the condition of the lining of brake shoes.

Minimum thickness of the lining is 0,5 mm. Replace the brake shoes if the lining thickness is less than 0,5 mm in the whole section.
 - (n) Assemble the brake and install it on the aircraft (see par. 2 A.(3),(4)).
 - (o) Lower the airplane.

**B. E5 10-20 01, E5 10-40 01 / 02 brake pumps**

- (1) Removal – brake pump

NOTE

The removal procedure is the same for all pumps.

- (a) Drain the brake fluid (Section 12-10).
 - (b) Unscrew the swivel nuts (8, Fig. 32-15).
 - (c) Disconnect the hoses (9) of the brake fluid line from the angular connections (12) and close the free ends by means of blind plugs.
 - (d) Unlock the locks of fork pins (7) at the brake pump control pedals and remove the pins.
 - (e) Remove the cotter pins (5) and the washers (6) and remove the pins (4).
 - (f) Remove the brake pumps (1; 2; 3) from the airplane.
- (2) Disassembling – brake pump E5 10-20 01

NOTE

The double complete left/right brake pump, designated as E5 10-40 01 / E5 10-40 02, is the double pump E5 10-20 01 supplemented by the inlet screw fitting. By the assembly of the inlet fitting it is differentiated whether it is a right or left pump. The right one is a mirror image of the left one.

- (a) Remove the fork (10, Fig. 32-16).
 - (b) Unscrew the securing nut (4) and remove the spring (9).
 - (c) Remove the securing ring (11) and the cylinder closure (3).
 - (d) Slide out the assembly of the pistons (2) and (5) along with the packing (6).
 - (e) Unscrew the screw (7) with the piston (5) and remove the packing (6).
 - (f) Remove the spring (8).
 - (g) As needed, remove the inlet screw fitting from the body (1).
 - (h) Remove the sealing rings (12), (13), (14) and (15).
- (3) Assembling – brake pump E5 10-20 01

NOTE

The double complete left/right brake pump designated as E5 10-40 01 / E5 10-40 02, is the double pump E5 10-20 01 supplemented by the inlet screw fitting. By the assembly of the inlet screw fitting it is differentiated whether it is a right or left pump. The right one is a mirror image of the left one.

For the installation of the brake pump, use new sealing rings. Lubricate all the sealing rings before their installation, this facilitates their installation.



- (a) Put the sealing ring on the piston (5, Fig. 32-16). Insert the screw (7) into the piston (5) and put the sealing O-ring (12) on the screw shank (7).
- (b) Insert the spring (8) into the body of the brake pump (1).
- (c) Assemble the pistons (2) and (5) and insert them into the brake pump body (1). The screw (7) is adhesively bonded into the piston (2) by adhesive Loctite243.
- (d) Put the sealing ring (14) on the packing (6).
- (e) Slide on the brake cylinder packing (6) and the sealing ring (13) on the piston (2).
- (f) Insert the brake cylinder packing (6) into the brake pump body (1).
- (g) Put the cylinder closure (3) on the piston (2), insert it into the cylinder body (1) and secure it by the locking ring (11).
- (h) Put the spring (9) on the piston (2), screw on the locking nut (4) and the fork (10).
- (4) Disassembling – brake pump S5 20-01 01
 - (a) Dismantle the fork (7, Fig. 32-17).
 - (b) Unscrew the securing nut (4) and remove the spring (5).
 - (c) Unscrew the cap (2).
 - (d) Slide out the piston (3) with the U-collar (6).
 - (e) As needed, remove the inlet screw fitting from the body (1).
 - (f) Remove the sealing rings (8) and (9).
- (5) Assembling – brake pump S5 20-01 01

CAUTION

THE LENGTH OF THE PISTONS (3, FIG. 32-16) DESIGNATED AS “L” DIFFERS IN THE THREADED SECTION FOR THE LEFT AND FOR THE RIGHT SIDE OF FOOT CONTROL. THE TOTAL LENGTH OF THE PISTON (3) FOR THE LEFT SIDE IS 90 mm (a, FIG. 32-16). THE TOTAL LENGTH OF THE PISTON (3) FOR THE RIGHT SIDE IS 94 mm (b, FIG. 32-16).

NOTE

For the installation of the brake pump, use new rubber sealing rings and the U-collar. Lubricate all the sealing rings and the U-collar before their installation, this facilitates their installation.

- (a) Put the U-collar (6) on the piston (3, Fig. 32-17).
- (b) Insert the sealing ring (8) into the inner recess in the body of the cap (2).
- (c) Insert the piston (3) with the U-collar (6) into the brake pump body (1).
- (d) Put the sealing ring (9) on the outer recess on the cap (2). Put the cap (2) on the piston (3) and screw it into the brake pump body (1).
- (e) Slide the spring (5) on the piston (3) and install the securing nut (4).
- (f) Install the fork (7).



- (6) Installation – brake pump

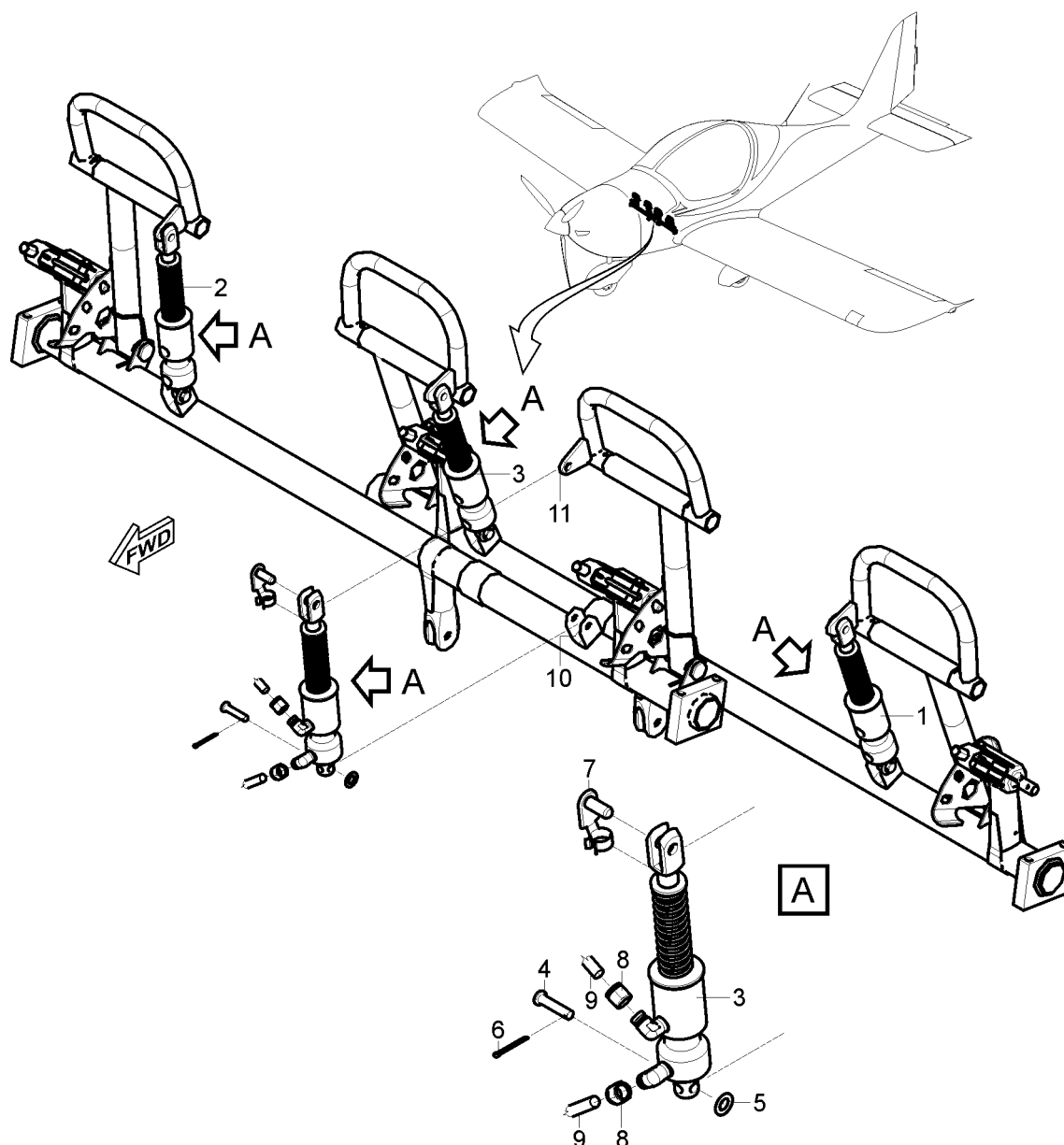
CAUTION

BEFORE THE INSTALLATION OF THE ASSEMBLED BRAKE PUMPS ON THE AIRPLANE, DO THE FUNCTION CHECK.

NOTE

The installation procedure is the same for all pumps.

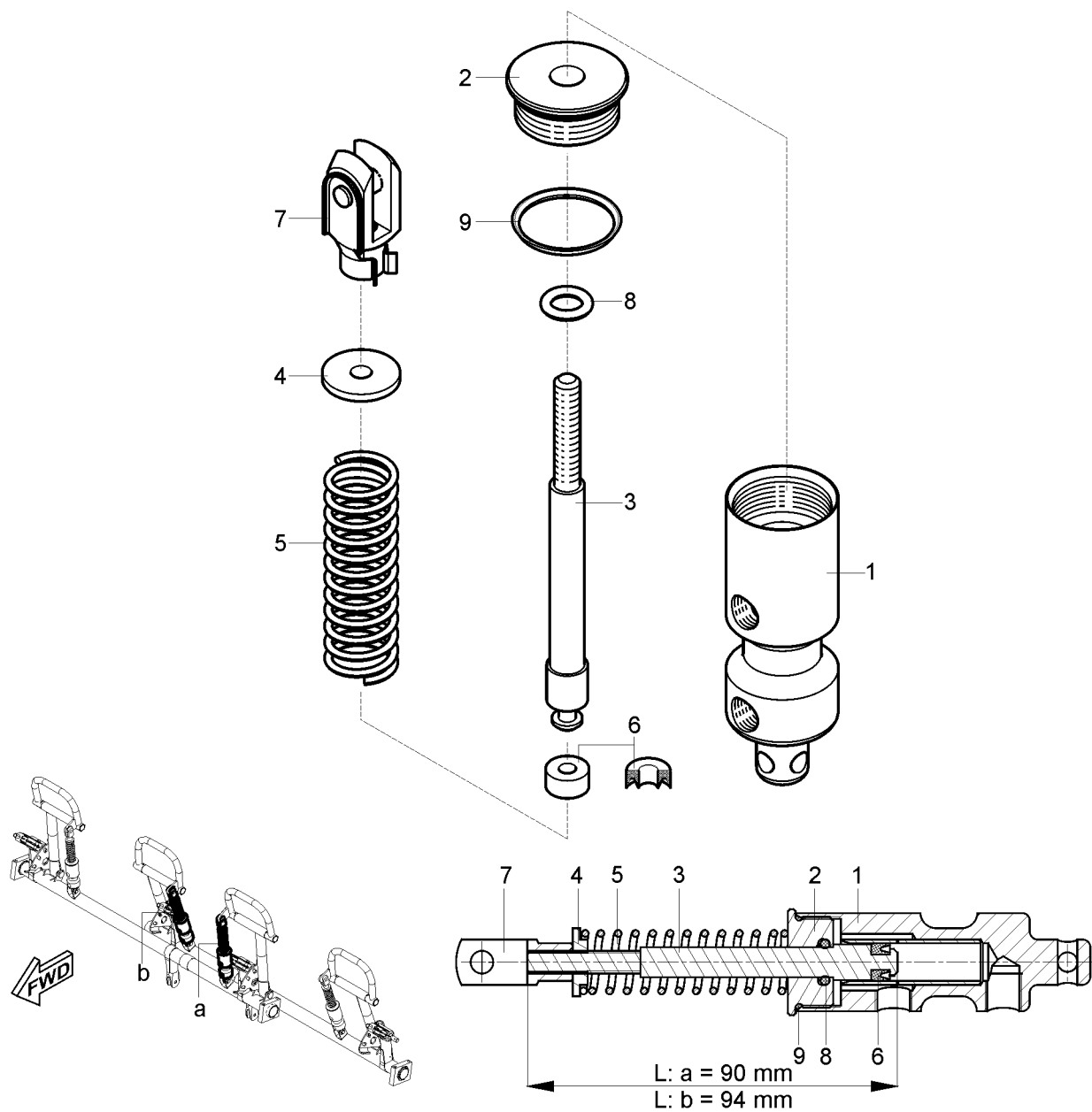
- (a) Position the brake pumps (1; 2; 3, Obr. 32-16) into the forks (10) on the intermediate shaft of the foot control.
- (b) Insert the pins (4) into the corresponding holes. Put the washers (6) on the pins (10) and secure them by the new cotter pins (6).
- (c) Insert the pins (7) into the joints of the forks of the brake pumps with pedals (11) and secure them by safety locks.
- (d) Connect the hoses (9) of the brake fluid line and tighten the nuts (8).
- (e) Replenish brake fluid, bleed the brake circuit (Section 12-10) and do the function check and the leakage test.



Legend to Fig. 32-15

1 Brake pump E5 10-40 01	7 Fork pin
2 Brake pump E5 10-40 02	8 Swivel nut
3 Brake pump S5 20-40 01	9 Hose
4 Pin 5x20	10 Intermediate shaft fork
5 Washer 5,3	11 Pedal lever
6 Cotter pin 1,6x12	

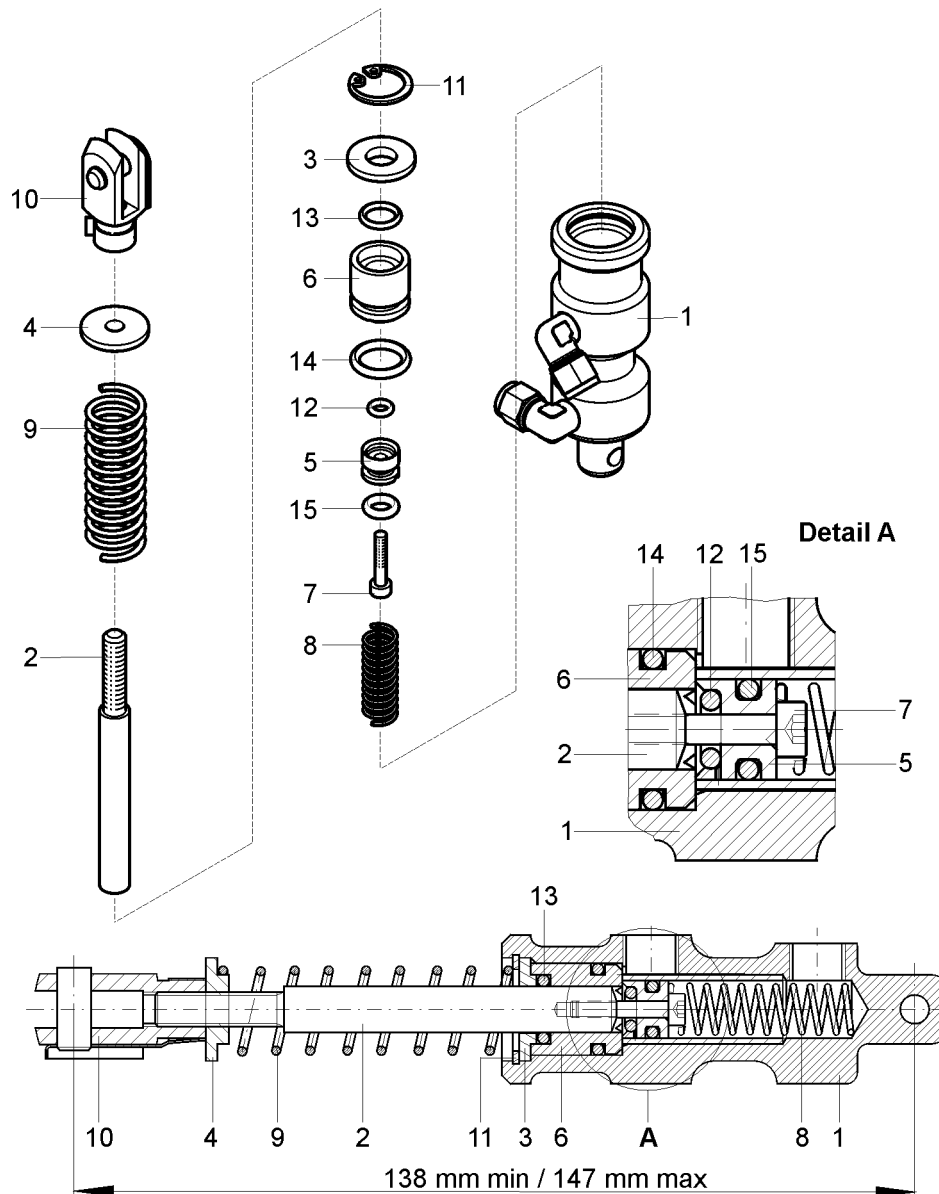
Fig. 32-15 Brake pump – removal / installation



Legend to Fig. 32-16

1	Pump body	6	Ring U
2	Cap	7	Fork with pin
3	Piston	8	Sealing ring ø 6x12
4	Securing nut	9	Sealing ring ø 7,3x2.4
5	Spring		

Fig. 32-16 Brake pump S5 20-01 01 – disassembling / assembling



Legend to Fig. 32-17

1	Brake pump body	9	Spring
2	Piston	10	Fork with pin
3	Cylinder closure	11	Locking ring
4	Securing nut	12	Sealing ring $\varnothing$ 4x2
5	Piston	13	Sealing ring $\varnothing$ 7,3x2,4
6	Brake cylinder packing	14	Sealing ring $\varnothing$ 11,3x2,4
7	Screw	15	Sealing ring $\varnothing$ 5,6x2,4
8	Spring		

Fig. 32-17 Brake pump E5 10-20 01 – disassembling / assembling



C. Matco brakes

Maintenance type: Line

Personnel qualification: Independent verification personnel qualified in accordance with Part 66 or higher

Recommended tools and material:

Item	Designation / Size	Quantity	Note
Wrench	7/16 in	1 pc.	Alternative No. 11
Socket wrench	No. 10	1 pc.	
Hex wrench	No. 5	1 pc.	
Drill	# 25	1 pc.	Alternative ø 3,8 mm
Electric drill	-	1 pc.	
Torque wrench	5 – 25 Nm	1 pc.	
Wrench	No. 32	1 pc.	
Brake relining tool	W404	1 pc.	Alternative pneumatic press
Nippers	-	1 pc.	
Adhesive	Loctite 243	-	
Cleaning agent	Benzine	-	
Stainless lockwire	ø 0,8 mm	-	
Brass rivet	4-4	6 + 6 pcs.	
Cotter pin	1,6x12	8 pcs.	2 pcs. per pupm

(1) Removal – brake

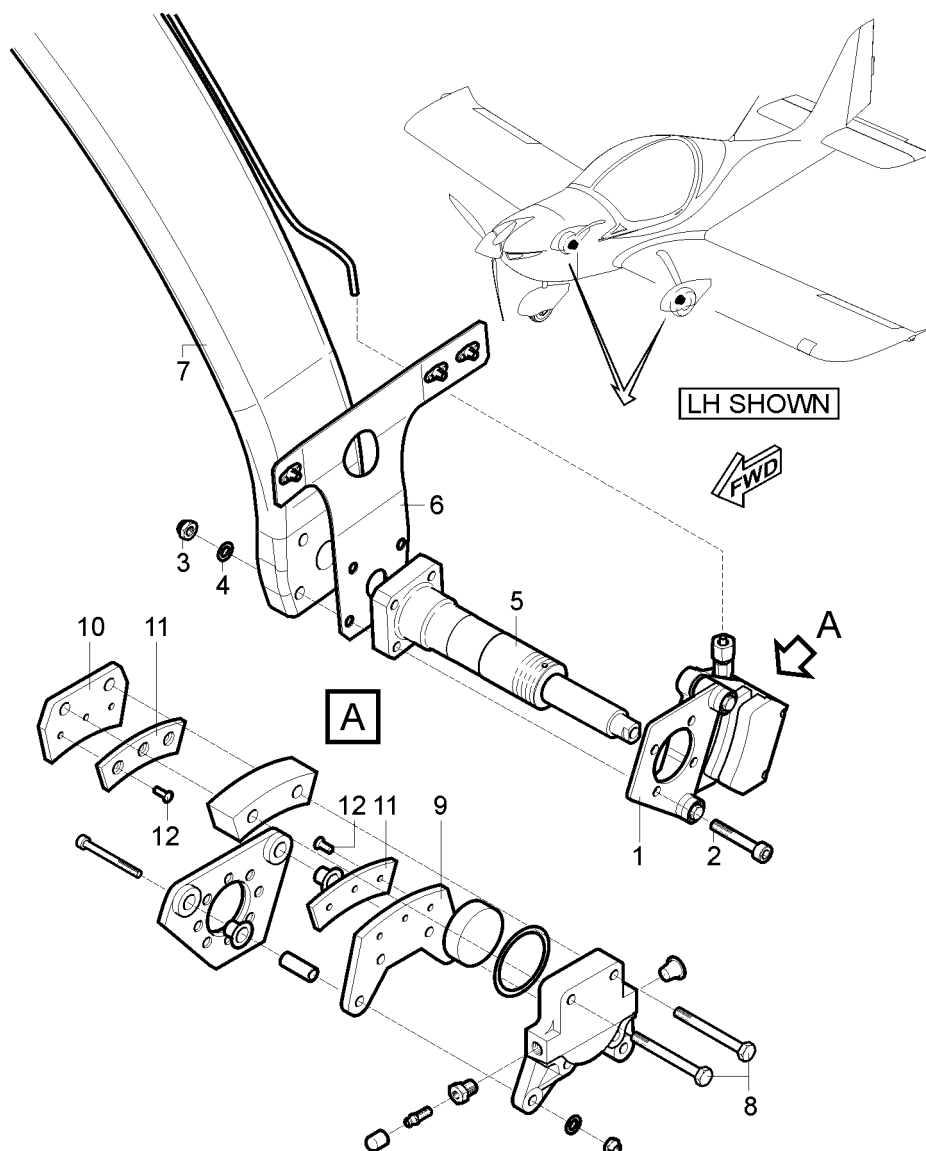
- (a) Lift the airplane (Section 07-10).
- (b) Drain the brake fluid (Section 12-10).
- (c) Remove the main wheels (Section 32-41); remove the brake disk.
- (d) Disconnect the hose from the brake (1, Fig. 32-18). Close the hose by the blind plug.
- (e) Unscrew and remove the nuts (3) and washers (4).
- (f) Push out the bolts (2), remove the brake (1); wheel axis (5) and fairing holder (6).

(2) Installation – brake

- (a) Before installation clean all parts thoroughly and check for damage, wear and corrosion.
- (b) Position the fairing holder (6, Fig. 32-18), the wheel axis (5), the brake (1) on the leg (7) and insert the bolts (2) to the holes.
- (c) Apply adhesive to bolt threads (2), insert the washers (4) and screw nuts (3); tighten the nuts with torque 10 Nm.
- (d) Insert the brake disk into the brake calliper (1) and install the main landing gear wheels (Section 32-41).
- (e) Connect the hose to the brake (1).



- (f) Replenish brake fluid, bleed the brake circuit (Section 12-10) and do the function check and the leakage test.
- (g) Lower the airplane.



Legend to Fig. 32-18

1 Brake	7 Main landing gear leg
2 Bolt M6x60 (4 pcs.)	8 Bolt
3 Mut M6 (4 pcs.)	9 Pushing pad
4 Washer 6,5x10,8 Nord-Lock	10 Supporting pad
5 Wheel axis	11 Brake lining
6 Fairing holder	12 Rivet (3 pcs. for each lining)

Fig. 32-18 Matco brake – removal / installation



(3) Adjustment / test – brake lining conditioning

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. In this case, the brake lining must be re-conditioned according to the following procedure

NOTE

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

- (a) Start the engine, apply brake pressure during high throttle static run-up. Note RPM at creep if any occurs.
- (b) 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.
- (c) 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) to (c) if necessary to produce glaze.

NOTE

Forward movement of the airplane during static run-up could be caused by the wheels skidding and not brake malfunction.

(4) Inspection / check – brake

- (a) Lift the airplane (Section 07-10).
- (b) Check the condition of the brake – corrosion, cracks, surface scratches.
- (c) Check the condition of the air bleeding screw.
- (d) Check the condition of the guide bolts – corrosion, grooves, bearing and evidence of rubbing.
- (e) Check the inlet elbow – the condition, passability and corrosion.
- (f) Replace the damaged parts.
- (g) Check the brake disk and the lining:

1 Brake disk

Check the condition of the brake disk.

Check the cracks, corrosion, wear and tear, surface scratches and deformation.

Replace the disk if its thickness is less than 3,3 mm in the whole section.

Replace the disk if its coning is beyond 0,38 mm in the whole section.

Isolated grooves up to 0,76 mm deep should not be cause for replacement.

Any grooving of the disk however, will reduce the service life of the linings.

Remove the corrosion with a wire brush and sandpaper with a 220 grit.



2 Brake lining

Check the condition of the brake lining.

The M66 series lining shall be replaced when the thickness of the remaining wear material reaches 2,54 mm. The M66 lining has a visible wear notch located on the end of the lining. The lining requires replacement when the wear indicator is no longer visible (Fig. 32-19).

(h) Lower the airplane.

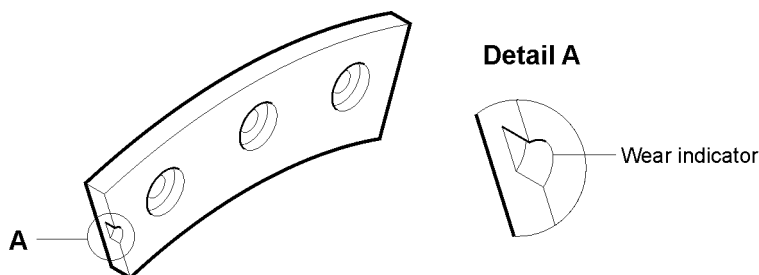


Fig. 32-19 Matco brake lining wear indicator

(5) Approved repairs – brake lining change

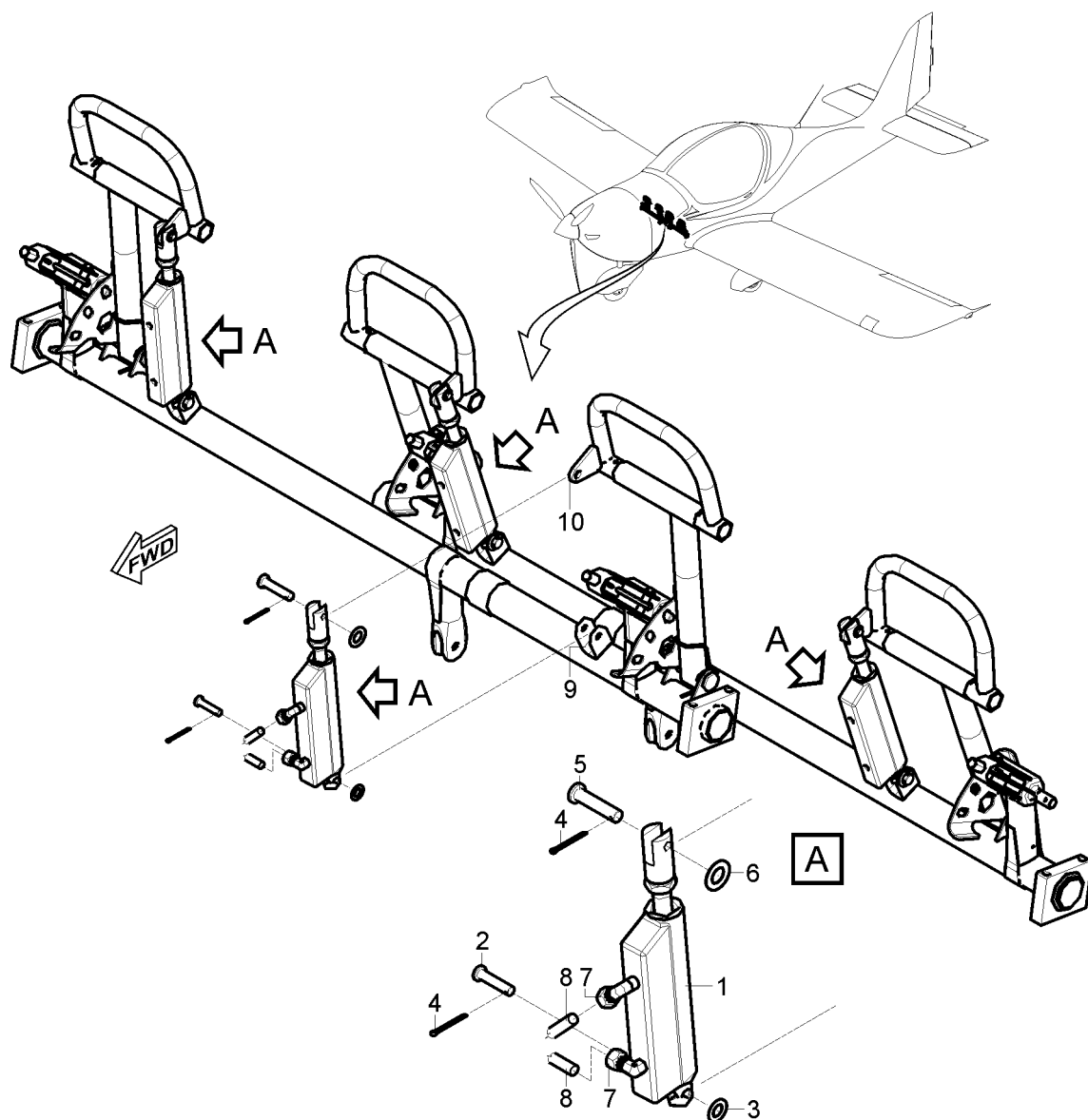
CAUTION

EXCHANGE ALWAYS BOTH BRAKE LININGS!

- (a) Lift the airplane (Section 07-10).
- (b) Remove the main landing gear wheel (Section 32-41); remove the brake disk.
- (c) Remove the lockwire, remove the caliper from the wheel by removing the two bolts (8, Fig. 32-18) that hold in on.
- (d) Remove old linings (4) by drilling the crimped side of the rivet (Do not use punch and hammer). Drill through rivet taking care to avoid damaging the rivet hole.
- (e) After drilling crimped edge off rivets, lift old lining and remaining rivet pieces from the brake pads.
- (f) Inspect the brake pad (9; 10) for any bending or other damage that may have occurred during service. A pad with more than 0,25 mm bend should be replaced. Inspect rivet holes to ensure that no damage has occurred during removal.
- (g) Using a brake relining tool or pneumatic press, replace the lining (11) using brass rivet (12).
- (h) Insert the brake disc and screw them with the caliper by means of bolts (8); tighten the bolts with torque 11,3 Nm.
- (i) Secure the bolt heads (8) with a lockwire (Section 20-20).
- (j) Reinstall the main landing gear wheel (Section 32-41).
- (k) As necessary replenish brake fluid, bleed the brake circuit (Section 12-10) and do the function check and the leakage test.
- (l) Do the brake lining condition procedure (see par. 2 C.(3)).

**D. Matco brake pumps**

- (1) Removal – brake pump
 - (a) Drain the brake fluid (Section 12-10).
 - (b) Unscrew the swivel nuts on the angular connections (7, Fig. 32-20).
 - (c) Disconnect the hoses (8) of the brake fluid line from the angular connections (7) and close the free ends by means of blind plugs.
 - (d) Remove the cotter pins (4) and the washers (3; 6) and remove the pins (2; 5).
 - (e) Remove the brake pumps (1) from the airplane.
- (2) Installation – brake pump
 - (a) Position the brake pumps (1, Obr. 32-20) into the forks (9) on the intermediate shaft of the foot control.
 - (b) Insert the pins (2) into the corresponding holes. Put the washers (3) on the pins and secure them by the new cotter pins (4).
 - (c) Position the brake pumps forks (1) into the pedals (10).
 - (d) Insert the pins (5) into the corresponding holes. Put the washers (6) on the pins and secure them by the new cotter pins (4).
 - (e) Connect the hoses (8) of the brake fluid line and tighten the nuts.
 - (f) Replenish brake fluid, bleed the brake circuit (Section 12-10) and do the function check and the leakage test.



Legend to Fig. 32-20

1 Brake pump	6 Washer 6,4
2 Pin 5x20	7 Angular connection
3 Washer 5,3	8 Hose
4 Cotter pin 1,6x12	9 Intermediate shaft fork
5 Pin 6x20	10 Pedal lever

Fig. 32-20 Matco brake pump – removal / installation

**E. Parking brake valve**

- (1) Removal – Matco / GoldFren parking brake valve
 - (a) Drain the brake fluid (Section 12-10).
 - (b) Remove the upholstery of the left pilot seat (Section 25-10).
 - (c) Remove the handgrip (4, Fig. 32-21) of the lever (1) attached by the screw (9) with the locking washer (14).
 - (d) Remove the left cover of the control pull-rod IN1L (Section 25-10).
 - (e) Remove the switch of parking brake signaling (see par. 2 F(1)).
 - (f) Unscrew and remove the nuts (19), washers (20), screws (17; 18/23) and remove the parking brake bracket (15).
 - (g) Disconnect and close with blind plugs the hoses of the brake fluid line.
 - (h) Unscrew the screws (8) of the attachment of the two-part guide pin (2) and (3). Remove the parts of the guide pin (2) and (3) with the washers (12) from the guiding groove in the control lever (1).
 - (i) Remove the lever of the parking valve control (1) that is attached by the screw (6) with the washers (11) and the nut (10).
 - (j) Unscrew and remove the nuts (10), washers (13/22) and remove the valve (5).
 - (k) Remove the screws (7/21) and at the Matco valve also the washers (13; 16).
- (2) Installation – Matco / GoldFren parking brake valve
 - (a) Position the valve (5, Fig. 32-21) on the bracket (15); at the Matco valve insert the washers (16) between the bracket and the valve.
 - (b) Attach the valve (5) by means of the screws (7/21), washers (13/22) and nuts (10).
 - (c) Attach the control lever (1) on the parking valve (5) by means of the screw (6), washer (11) and nut (10).
 - (d) Clean the screws (8) and apply the Loctite 243 on the threads (only at the GoldFren valve).
 - (e) Install the two-part guide pin (2) and (3) of control lever (1) by means of the screws (8) and washers (20) (only at the GoldFren valve).
 - (f) Install the bracket (15) with the parking valve by means of the screws 17; 18/23), washers (20) and nuts (19).
 - (g) Connect the hoses of the brake fluid line.
 - (h) Install the switch of parking brake signaling (see par. 2 F(2)).
 - (i) Replenish brake fluid, bleed the brake circuit (Section 12-10) and do the function check and the leakage test.
 - (j) Install the left cover of the control pull-rod IN1L (Section 25-10).
 - (k) Install the handgrip (4) attached by the screw (9) and the locking washer (14).
 - (l) Insert the upholstery of the pilot seat (Section 25-10).

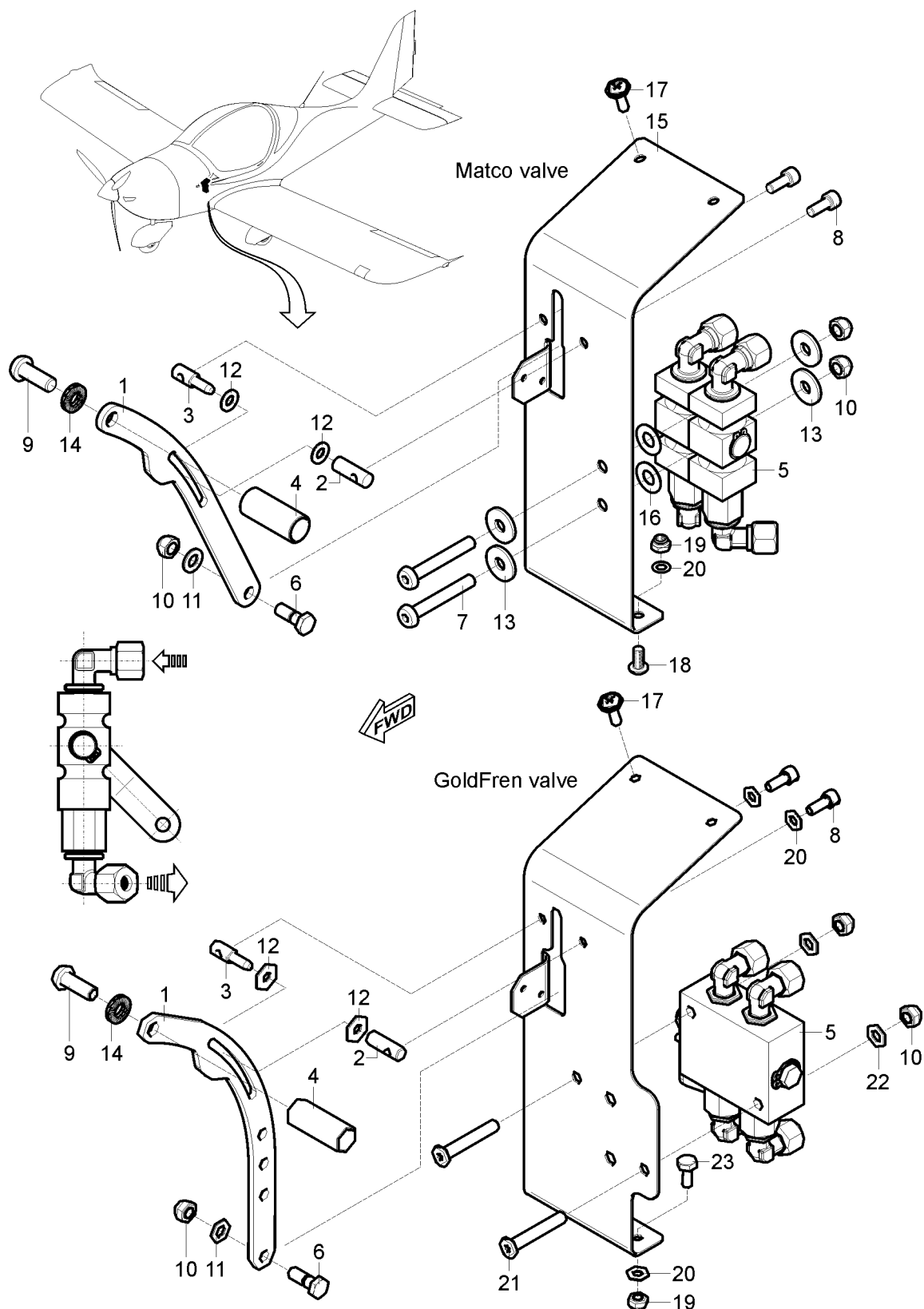


Fig. 32-21 Matco and GoldFren parking brake valves – removal / installation (page 1 of 2)


Legend to Fig. 32-21

1	Lever	13	Washer 5,3 (4 pcs.)
2	Bushing	14	Washer 6,5 Nord-Lock
3	Axis	15	Bracket
4	Handgrip	16	Rubber washer (2 pcs.)
5	Valve of parking brake	17	Screw M4x12 (2 pcs.)
6	Screw M5x14	18	Screw M4x8 (2 pcs.)
7	Screw M5x35	19	Nut M4 (2 pcs.)
8	Screw M4x10 (2 pcs.)	20	Washer 4,3 (2 pcs.)
9	Screw M6x16	21	Screw M5x30 (2 pcs.)
10	Nut M5 (3 pcs.)	22	Washer 5,3 (2 pcs.)
11	Washer 5,3	23	Screw M4x10 (2 pcs.)
12	Nylon washer 4,3 (2 pcs.)		

Fig. 32-21 Matco and GoldFren parking brake valves– removal / installation (page 2 of 2)

(3) Removal – Tost parking brake valve

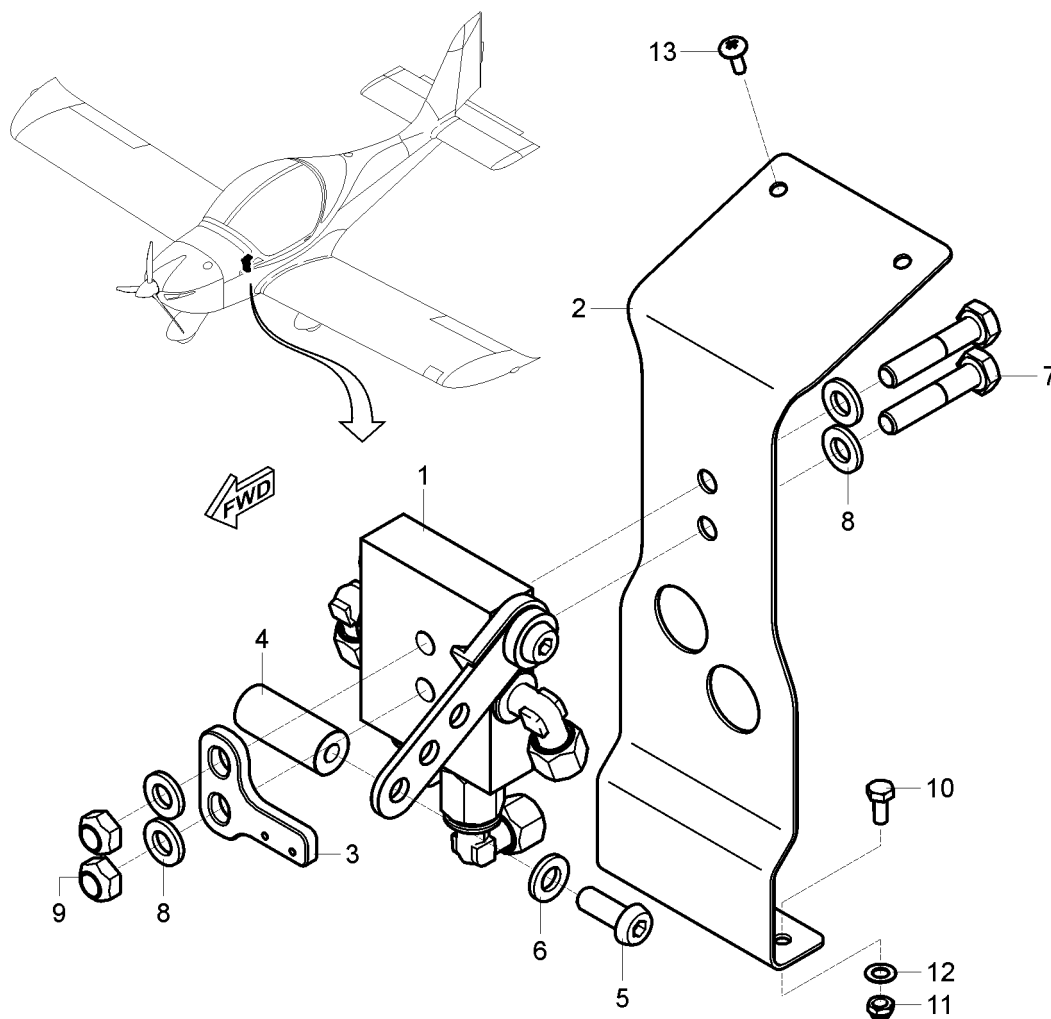
- (a) Drain the brake fluid (Section 12-10).
- (b) Remove the upholstery of the left pilot seat (Section 25-10).
- (c) Remove the handgrip (4, Fig. 32-22) of the lever attached by the screw (5) with the locking washer (6).
- (d) Remove the left cover of the control pull-rod IN1L (Section 25-10).
- (e) Remove the switch of parking brake signaling (see par. 2 F(1)).
- (f) Unscrew and remove the nuts (11), washers (12), screws (10, 13) and remove the parking brake bracket (2).
- (g) Disconnect and close with blinds plugs the hoses of the brake fluid line.
- (h) Unscrew the screws (7) and remove the nuts (9), washers (8) and microswitch base (3).
- (i) Remove the parking brake valve (1).

(4) Installation – Tost parking brake valve

- (a) Position the valve (1, Fig. 32-22) and microswitch base (3) on the bracket (2).
- (b) Attach the valve (1) and microswitch base (3) by means of the screw (7), the washers (8) and the nuts (9).
- (c) Attach the parking brake valve bracket (2) by means of the screw (10,13), washers (12) and nuts (11).
- (d) Install the switch of parking brake signaling (see par. 2 F(2)).
- (e) Connect the hoses of the brake fluid line.
- (f) Replenish brake fluid, bleed the brake circuit (Section 12-10) and do the function check and the leakage test.
- (g) Install the left cover of the control pull-rod IN1L (Section 25-10).
- (h) Install the handgrip (4) attached by the screw (5) and the washer (6).



- (i) Insert the upholstery of the pilot seat (Section 25-10).



Legend to Fig. 32-22

1	Valve of parking brake	8	Washer 6,4
2	Bracket	9	Nut M6
3	Microswitch base	10	Screw M4x10
4	Handgrip	11	Nut M4
5	Screw M6x16	12	Washer 4,3
6	Washer 6,5	13	Screw M4x12
7	Screw M6x30		

Fig. 32-22 Test parking brake valve – removal / installation


F. Switch of parking brake signaling

Maintenance type: Line

Personnel qualification: Independent verification personnel qualified in accordance with Part 66 or higher

Recommended tools and material:

Item	Designation / Size	Quantity	Note
Wrench	No. 4	1 pc.	
Flat screwdriver	-	1 pc.	
Soldering iron	-	1 pc.	
Solder	-	-	
Hot air gun	-	1 pc.	
Shrinkable hose	ø 3x1 mm	-	
Locking paint	C2001/8140	-	

- (1) Removal – switch of Matco / GoldFren parking brake valve signaling
 - (a) Switch the electrical network off and disconnect the battery.
 - (b) Remove the handgrip (4, Fig. 32-21) of the lever (1) attached by the screw (9) with the locking washer (14).
 - (c) Remove the left cover of the control pull-rod IN1L (Section 25-10).
 - (d) Using the soldering iron, disconnect the wires (5, Fig. 32-22) from the switch (1).
 - (e) Unscrew and remove the nuts (3), washers (4) and the screws (2) with the washers (4).
 - (f) Remove the switch (1).
- (2) Installation – switch of Matco / GoldFren parking brake valve signaling
 - (a) Position the switch (1, Fig. 32-22) to the bracket (7) and attach it by means of screws (2), nuts (3) and the washers (4).
 - (b) Slide the new shrinkable hose on the wires (5), connect them to the switch by means of the soldering iron and solder.

NOTE

Use the wiring diagram shown in Chapter 91.

- (c) Cover the joints by the shrinkable hose and carefully warm it up using the gun.
- (d) Adjust the mutual position of the switch and the lever:
 - 1 In the area “opened”, the switch must be mechanically connected and electrically disconnected.
 - 2 In the transitional area and in the area “closed” the switch must be mechanically disconnected and electrically connected.
 - 3 Drop the paint on the screw heads (2).
- (e) Install the left cover of the control pull-rod IN1L (Section 25-10).
- (f) Install the handgrip (4, Obr. 32-21) attached by the screw (9) and the locking

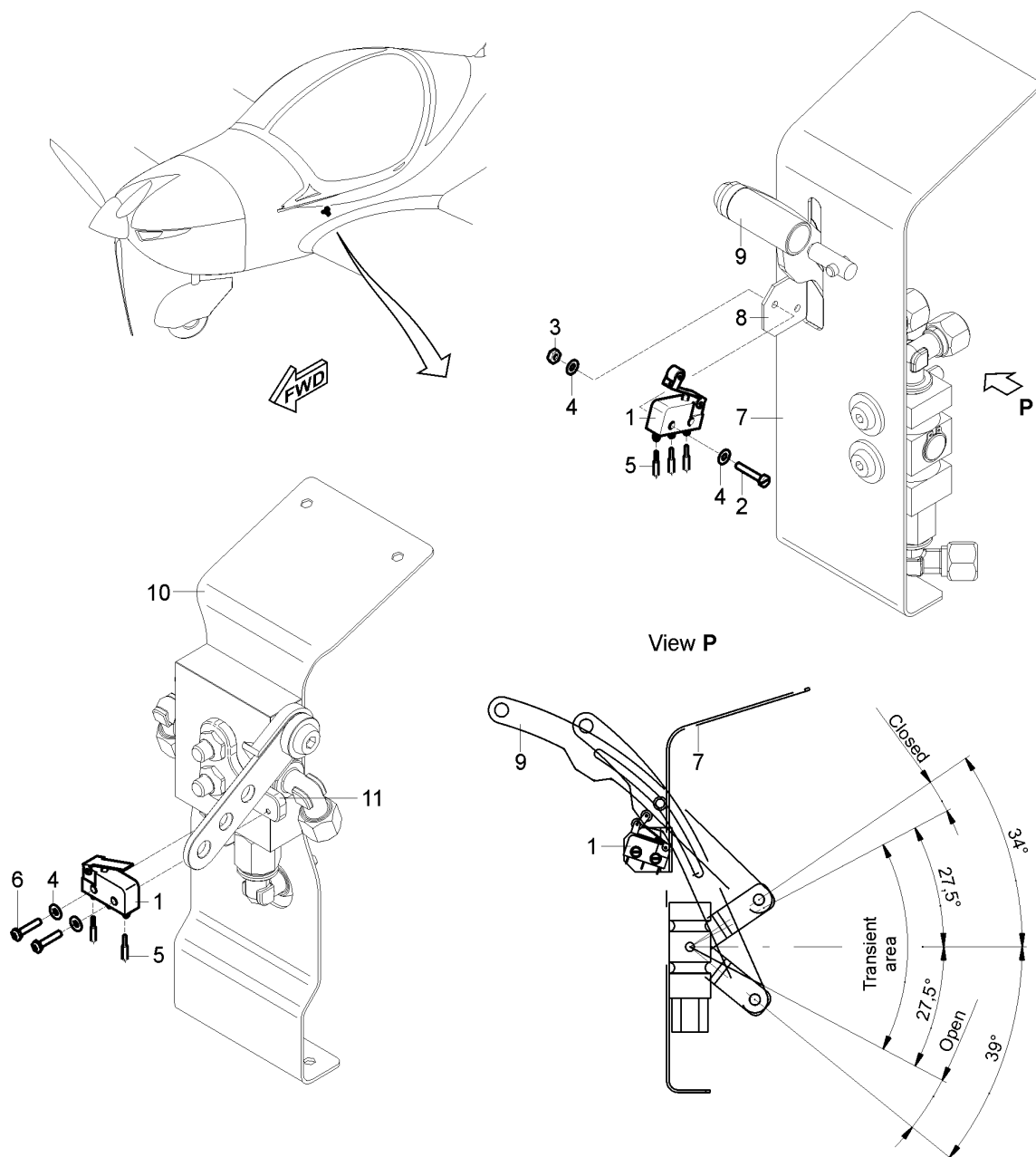


- washer (14).
- (g) Connect the battery, switch the electrical network on and check the signaling function.
- (3) Removal – switch of Tost parking brake signaling
- (a) Switch the electrical network off and disconnect the battery.
 - (b) Remove the handgrip (4, Fig. 32-22) of the lever attached by the screw (5) with the locking washer (6).
 - (c) Remove the left cover of the control pull-rod IN1L (Section 25-10).
 - (d) Using the soldering iron, disconnect the wires (5, Fig. 32-23) from the switch (1).
 - (e) Unscrew and remove the nuts (6) with washers (4).
 - (f) Remove the switch (1).
- (4) Installation – switch of Tost parking brake signaling
- (a) Position the switch (1, Fig. 32-23) to the bracket (10) and attach it by means of screws (6) and the washers (4).
 - (b) Slide the new shrinkable hose on the wires (5), connect them to the switch by means of the soldering iron and solder.

NOTE

Use the wiring diagram shown in Chapter 91.

- (c) Cover the joints by the shrinkable hose and carefully warm it up using the gun.
- (d) Adjust the mutual position of the switch and the lever:
 - 1 In the area “opened”, the switch must be mechanically connected and electrically disconnected.
 - 2 In the transitional area and in the area “closed” the switch must be mechanically disconnected and electrically connected.
 - 3 Drop the paint on the screw heads (2).
- (e) Install the left cover of the control pull-rod IN1L (Section 25-10).
- (f) Install the handgrip (4, Obr. 32-22) attached by the screw (5) and the locking washer (6).
- (g) Connect the battery, switch the electrical network on and check the signaling function.



Switch of Tost parking brake valve

Switch of Matco / GoldFren parking brake valve

Legend to Fig. 32-23

1	Switch	For information:	
2	Screw M2x12	7	Bracket
3	Nut M2	8	Bracket
4	Washer 2,2	9	Lever
5	Wires	10	Bracket
6	Screw M2x10	11	Microswitch base

Fig. 32-23 Switch of Tost parking brake signaling – removal / installation



STEERING

1. DESCRIPTION AND OPERATION

The nose landing gear is directionally controllable. The control of the nose landing gear is solved by the pull-rods connected with the intermediate shanks of the foot control pedals (Section 32-50). The pedal movement is transferred to the two-arm lever that is pivoted on the lower suspension of the nose landing gear leg. The rotary movement of the two-arm lever is transferred through the scissors of the landing gear to the nose landing gear leg. The upper lever of the scissors is connected with the two-arm lever, the lower lever is connected with the pivoted landing gear leg. The deflection of the nose landing gear wheel is limited by the stops on the yaw control cables.



2. MAINTENANCE PRACTICES

A. Control pull-rods

Maintenance type: Heavy

Personnel qualification: Independent verification personnel qualified in accordance with Part 66 or higher

Recommended tools and material:

Item	Designation / Size	Quantity	Note
Wrench	No. 9	2 pcs.	
Nippers	-	1 pc.	
Cotter pin	1,6x20	4 pcs.	
Grease	AeroShell Grease 22	-	
Cleaning agent	Benzine	-	

(1) Removal – control pull-rods

- (a) Remove the cotter pins (21, Fig. 32-6), unscrew the nuts (14) and remove the washers (19) and the screws (12) with the washers (20).
- (b) Remove the cotter pins (21), unscrew the nuts (14) and remove the washers (19), screws (12) with the washers (19) from the nose landing gear lever (2).
- (c) Remove the washers (19) from the forks of the two-arm lever (2).
- (d) Remove the pull-rods (4) and (5).

(2) Installation – control pull-rods

- (a) Position the pull-rods (4, Fig. 32-6) and (5) into the forks on the intermediate shafts of the foot control, insert the screws (12) with the washers (20), put the washers (19) and screw on the nuts (14).
- (b) Position the pull-rods (4) and (5) with the washers (19) into the forks of the two-arm lever (2) of the nose landing gear, insert the screws (9) and put the washers (19).
- (c) Screw on the nuts (14).
- (d) Tighten the nuts (14) so that the articulated joints remain movable and secure the joints by new cotter pins (21).

CHAPTER

33

LIGHTS



CHAPTER 33

LIGHTS

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GENERAL

1. INTRODUCTION

The system of interior (optionally) and exterior lighting is installed on the SportStar RTC airplane.

The interior lighting includes the cockpit lighting which includes the instrument lighting and the instrument panel lighting. The exterior lighting includes position lights, strobe lights, landing / taxi light and optional taxi light.



FLIGHT COMPARTMENT

1. DESCRIPTION AND OPERATION

A. VFR day

The cockpit is illuminated by an adjustable lamp on the cockpit canopy frame. Use the switch **COCKPIT LIGHT** to control the lamp. This switch is located in the row of switches.

Use the switch **POS. LIGHTS** in the row of switches to switch the instrument lighting on together with the position lights. The circuit of the instrument lighting is powered by the controlled power source. The power source is located on the rear right side of the firewall. You can regulate the intensity of the instrument lighting with the potentiometer **INSTR. LIGHT DIM** in the left upper section of the instrument panel.

B. VFR day / night

The cockpit is illuminated by an adjustable lamp on the cockpit canopy frame. Use the switch **COCKPIT LIGHT** to control the lamp. This switch is located in the row of switches. All the switches on the instrument panel have integrated internal illumination.

The instrument lighting and switches are switched on by switching the **DAY-NIGHT** switch to the **NIGHT** position. The switch is located in the left upper section of the instrument panel. The circuit of the instrument lighting is powered by the controlled power source. The power source is located on the rear right side of the firewall. You can regulate the intensity of the instrument lighting with the potentiometer **INSTR. LIGHT DIM** in the left upper section of the instrument panel.

Instrument panel lighting is made of the LED strip located on the bottom part of the instrument panel cover. The instrument panel lighting is switched on by switching the **DAY-NIGHT** switch to the **NIGHT** position. You can regulate the intensity of the instrument panel lighting with the PWM dimmer **INSTR. LIGHT DIM** in the left upper section of the instrument panel.

For the interior lighting wiring diagram, refer to Chapter 91.



2. MAINTENANCE PRACTICES

A. Cockpit lighting

Maintenance type: Line

Personnel qualification: Independent verification personnel qualified in accordance with Part 66 or higher

Recommended tools and material:

Item	Designation / Size	Quantity	Note
Hex wrench	No. 2,5	1 pc.	
Cable tie	2,5x99	23 pcs.	
Pincers	-	1 pc.	
Soldering iron	-	1 pc.	
Solder	-	-	
Heat gun	-	1 pc.	
Shrinkable tube	ø 3x1 mm	-	

(1) Removal – cockpit lighting

- Switch the electrical network off and disconnect the battery.
- Cut the cable ties which attach wires of the lamp (2, Fig. 33-1) to the sunshade. (apply for the cockpit canopy equipped with the sunshade).
- Slightly pull the wires from the bushing (5) and remove the shrinkable tubes.
- Use the soldering iron to disconnect the wires.
- Unscrew the screws (4) and remove the lamp (1).

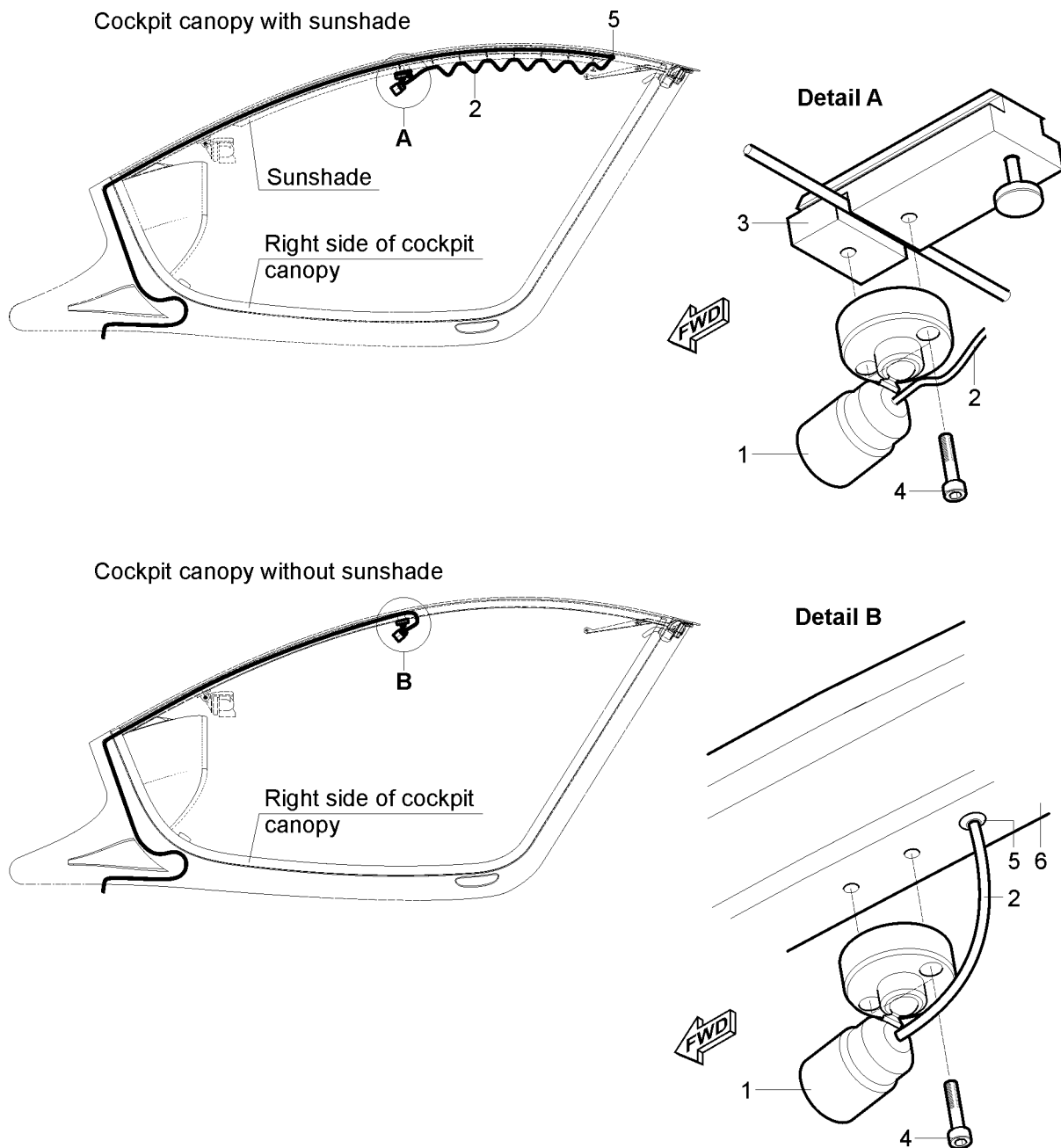
(2) Installation – cockpit lighting

- Align the lamp (1, Fig. 33-1) with the guide rail (3) / middle column (6) and attach it with screws (4).
- Put a new shrinkable tube on the wires (2), use the soldering iron and solder to attach them to the harness; cover the joints with a shrinkable tube and carefully heat it with a heat gun.

NOTE

Refer to the wiring diagram in Chapter 91.

- Put the joints into the middle column of the canopy (6).
- Use cable ties to attach wires of the lamp (2) to the sunshade (apply for the cockpit canopy equipped with the sunshade).
- Connect the battery, switch the electrical network on and check function of the lamp.



Legend to Fig. 33-1

1 Lamp	4 Screw M3x16 (2 pcs.)
2 Wires	5 Bushing
3 Guide rail	6 Middle column

Fig. 33-1 Cockpit lighting – removal / installation



B. Controlled power source

Maintenance type: Line

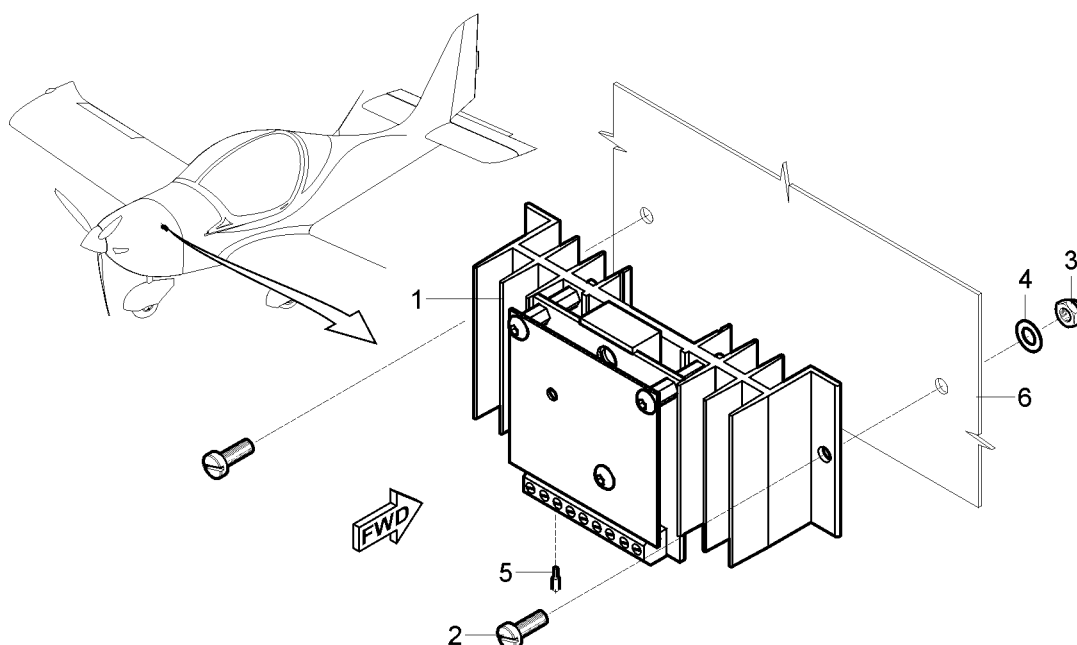
Personnel qualification: Independent verification personnel qualified in accordance with Part 66 or higher

Recommended tools and material:

Item	Designation / Size	Quantity	Note
Flat screwdriver	-	1 pc.	
Phillips screwdriver	No. 2	1 pc.	
Wrench	No. 7	1 pc.	

(1) Removal – controlled power source

- (a) Switch the electrical network off and disconnect the battery.
- (b) Remove the cover of the fuselage upper part F4 (Section 53-30).
- (c) Disconnect the wires (5, Fig. 33-2).
- (d) Unscrew the nuts (3) and remove the washers (4) and screws (2).
- (e) Remove the power source (1).



Legend to Fig. 33-2

1	Controlled power source	5	Wire
2	Screw M4x10 (2 pcs.)	For information:	
3	Nut M4 (2 pcs.)	6	Firewall
4	Washer 4,3 (2 pcs.)		

Fig. 33-2 Controlled power source – removal / installation



- (2) Installation – controlled power source
 - (a) Put the power source (1, Fig. 33-2) on the appropriate place on the firewall (6) and attach it with screws (2), washers (4) and nuts (3).
 - (b) Connect the wires (5). Refer to the wiring diagram in Chapter 91.
 - (c) Install the cover of the fuselage upper part F4 (Section 53-30).
 - (d) Connect the battery, switch the electrical network on and do function test of the instrument lighting.

C. PWM dimmer

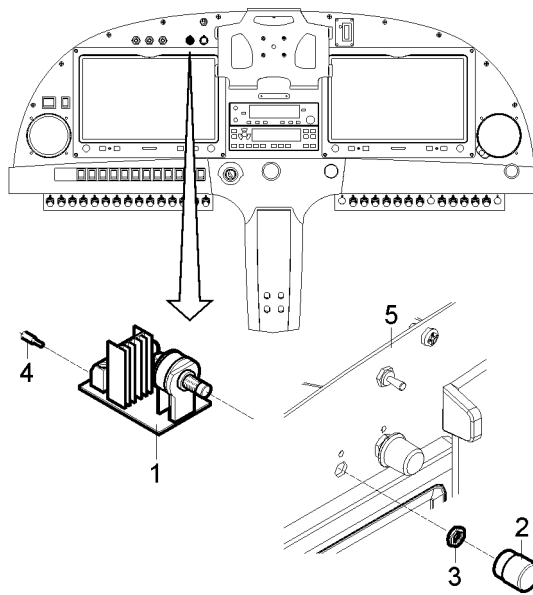
Maintenance type: Line

Personnel qualification: Independent verification personnel qualified in accordance with Part 66 or higher

Recommended tools and material:

Item	Designation / Size	Quantity	Note
Flat screwdriver	-	1 pc.	
Phillips screwdriver	No. 2	1 pc.	
Wrench	No. 11	1 pc.	

- (1) Removal – PWM dimmer
 - (a) Switch the electrical network off and disconnect the battery.
 - (b) Remove the cover of the fuselage upper part F4 (Section 53-30).
 - (c) Disconnect the wires (4, Fig. 33-3).
 - (d) Remove the knob (2), unscrew the nut (3) and remove the dimmer (1).
- (2) Installation – PWM dimmer
 - (a) Insert the dimmer (1, Fig. 33-3) to the appropriate hole on the instrument panel (5) and attach it with nut (3).
 - (b) Install the knob (2) on the dimmer shaft.
 - (c) Connect the wires (4). Refer to the wiring diagram in Chapter 91.
 - (d) Install the cover of the fuselage upper part F4 (Section 53-30).
 - (e) Connect the battery, switch the electrical network on and do function test of the instrument panel lighting.



Legend to Fig. 33-3

- 1 PWM dimmer
- 2 Knob
- 3 Nut

- 4 Wire

For information:

- 5 Instrument panel

Fig. 33-3 PWM dimmer – removal / installation



EXTERIOR

1. DESCRIPTION AND OPERATION

The exterior lighting consists of position / anti-collision lights and landing / taxi light (see Fig. 33-4). Optionally, the taxi light can be installed on the airplane. Standardly the airplane is equipped with Whelen 9034001 (green) and 9034002 (red) position / strobe lights and. Optionally can be installed the OR60001G (green) and OR60001R (red) position / anti-collision lights.

A. 90340 series position / strobe lights

The 90340 series LED position and strobe light consist of one block, which is located on left and right wingtips. The position light is designed with three forward LED's and two aft LED's. The strobe light is provided by the flashtube. The power source of the strobe lights is located below the baggage compartment.

Use the switch **POS. LIGHTS** to switch the position lights on. Use the switch **BEACONS** to switch the strobe lights on. The two switches are located in the row of switches.

B. Orion 600 series position / anti-collision lights

The Orion 600 series LED position and anti-collision light consist of one block, which is located on left and right wingtips. The position light is designed with six forward LED's and two aft LED's. The anti-collision light is designed with 24 white LED's.

Use the switch **POS. LIGHTS** to switch the position lights on. Use the switch **BEACONS** to switch the strobe lights on. The two switches are located in the row of switches.

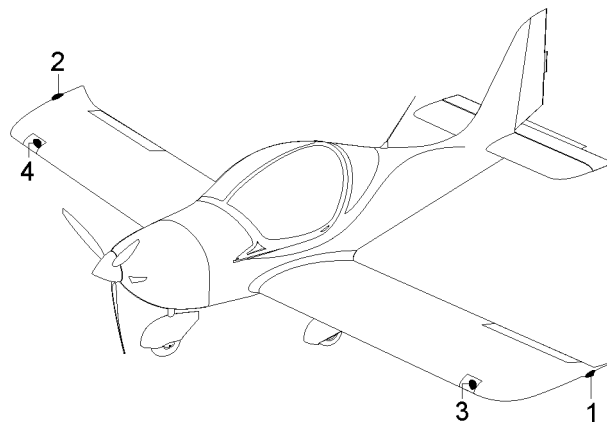
C. 7114112 landing / taxi light

The airplane is equipped with the LED landing / taxi-light in the left wing leading edge. Use the switch **LDG LIGHT** in the row of switches to switch the light on.

D. 7114112 taxi light

Optionally, the airplane is equipped with the LED taxi-light in the right wing leading edge. Use the switch **TAXI LIGHT** in the row of switches to switch the light on.

For the exterior lighting wiring diagram, refer to Chapter 91.



Legend to Fig. 33-4

1 Left position and strobe light	3 Landing / taxi light
2 Right position and strobe light	4 Taxi light

Fig. 33-4 Exterior lighting



2. MAINTENANCE PRACTICES

A. 90340 series position / strobe lights

Maintenance type: Line

Personnel qualification: Independent verification personnel qualified in accordance with Part 66 or higher

Recommended tools and material:

Item	Designation / Size	Quantity	Note
Philips screwdriver	No. 2	1 pc.	
Flat screwdriver	-	1 pc.	
Pincers	-	1 pc.	
Soldering iron	-	1 pc.	
Solder	-	-	
Heat gun	-	1 pc.	
Shrinkable tube	ø 3x1 mm	-	
Cleaning agent	Technical benzine	-	
Sealant	Transparent sanitary silicone	-	
Lint free cloth	-	-	

NOTE

The removal / installation procedures for left and right lights are identical.

- (1) Removal – flashtube of the strobe light

WARNING

THE STROBE LIGHTS ARE HIGH-VOLTAGE DEVICE. DO NOT REMOVE OR TOUCH THE FLASHTUBE DURING OPERATION. AFTER YOU SWITCH THE SYSTEM OFF, WAIT 5 MINUTES, BEFORE YOU START THE WORK.

- (a) Switch the electrical network off and disconnect the battery.
- (b) Remove the cover W4L or W4R (Fig. 06-2).
- (c) Disconnect the connector with wires (13, Fig. 33-5) from the harness.
- (d) Unscrew the screws (9) and remove the flashtube cover (2) including the lens (4).



CAUTION

DO NOT TOUCH THE FLASHTUBE WITH BARE FINGERS. WHEN YOU HANDLE THE FLASHTUBE, WEAR SOFT GLOVES OR USE A CLEAN CLOTH. MOISTURE AND GREASE FROM YOUR FINGERS MAY CAUSE MALFUNCTION OF THE FLASHTUBE.

- (e) Remove the flashtube (3) and the seal (10).
- (2) Installation – flashtube of the strobe light

CAUTION

DO NOT TOUCH THE FLASHTUBE WITH BARE FINGERS. WHEN YOU HANDLE THE FLASHTUBE, WEAR SOFT GLOVES OR USE A CLEAN CLOTH. MOISTURE AND GREASE FROM YOUR FINGERS MAY CAUSE MALFUNCTION OF THE FLASHTUBE.

- (a) Put a functional flashtube (3, Fig. 33-5) with seal (10) into the light body (1).
- (b) Put the flashtube cover (2) including the lens (4) on the light body, attach and tighten the screws (9).
- (c) Connect the connector with wires (13) to the harness.
- (d) Install the cover W4L or W4R (Fig. 06-2).
- (e) Connect the battery, switch the electrical network on and check function of the strobe light.
- (3) Removal – position / strobe light

WARNING

THE STROBE LIGHTS ARE HIGH-VOLTAGE DEVICE. DO NOT REMOVE OR TOUCH THE FLASHTUBE DURING OPERATION. AFTER YOU SWITCH THE SYSTEM OFF, WAIT 5 MINUTES, BEFORE YOU START THE WORK.

- (a) Switch the electrical network off and disconnect the battery.
- (b) Remove the cover W4L or W4R (Fig. 06-2).
- (c) Disconnect the connector with wires (13, Fig. 33-5) from the harness.
- (d) Unscrew the screws (9) and remove the flashtube cover (2) including the lens (4).

**CAUTION**

DO NOT TOUCH THE FLASHTUBE WITH BARE FINGERS. WHEN YOU HANDLE THE FLASHTUBE, WEAR SOFT GLOVES OR USE A CLEAN CLOTH. MOISTURE AND GREASE FROM YOUR FINGERS MAY CAUSE MALFUNCTION OF THE FLASHTUBE.

- (e) Remove the flashtube (3) and the seal (10).
- (f) Remove the lenses (5; 7) with seals (6; 8).
- (g) Remove the sealant from the gap between the light body (1) and the wingtip (14).
- (h) Unscrew the screws (11) and slightly pull the light body (1) out.
- (i) Cut the wires (12; 14) and remove the light body (1).
- (4) Installation – position / strobe light
 - (a) Use a scraper to remove the old sealant from the wingtip (14, Fig. 33-5), respectively the light body (1) and thoroughly clean the contact surfaces with a cleaning agent.
 - (b) Put a new shrinkable tube on wires (12; 14). Use the soldering iron and solder to attach them to the harness.

NOTE

Refer to the wiring diagram in Chapter 91.

- (c) Cover the joints with a shrinkable tube and carefully heat it with a heat gun.
- (d) Put the connector with wires (13) into the holes in the wingtip (14), align the light body (1) with the wingtip and attach it with screws (11).
- (e) Connect the connector with wires (13) to the harness.

CAUTION

DO NOT TOUCH THE FLASHTUBE WITH BARE FINGERS. WHEN YOU HANDLE THE FLASHTUBE, WEAR SOFT GLOVES OR USE A CLEAN CLOTH. MOISTURE AND GREASE FROM YOUR FINGERS MAY CAUSE MALFUNCTION OF THE FLASHTUBE.

- (f) Put a functional flashtube (3) with seal (10) into the light body (1).
- (g) Put the lenses (5; 7) with seals (6; 8) into the light body.
- (h) Put the flashtube cover (2) including the lens (4) on the light body, attach and tighten the screws (9).
- (i) Use the cleaning agent to remove the grease from the contact surface intended for application of sealant.
- (j) Seal the gap between the light body (1) and the wing tip (14) with sealant.
- (k) Install the cover W4L or W4R (Fig. 06-2).
- (l) Connect the battery, switch the electrical network on and check function of the position lights and the strobe light.



- (5) Inspection / check – position / strobe lights
 - (a) Inspect the LED's. If any one LED fails, the unit must be repaired or replaced.

NOTE

To reduce eye strain use an optical filter such as dark glasses or a blue covering dome during LED inspection.

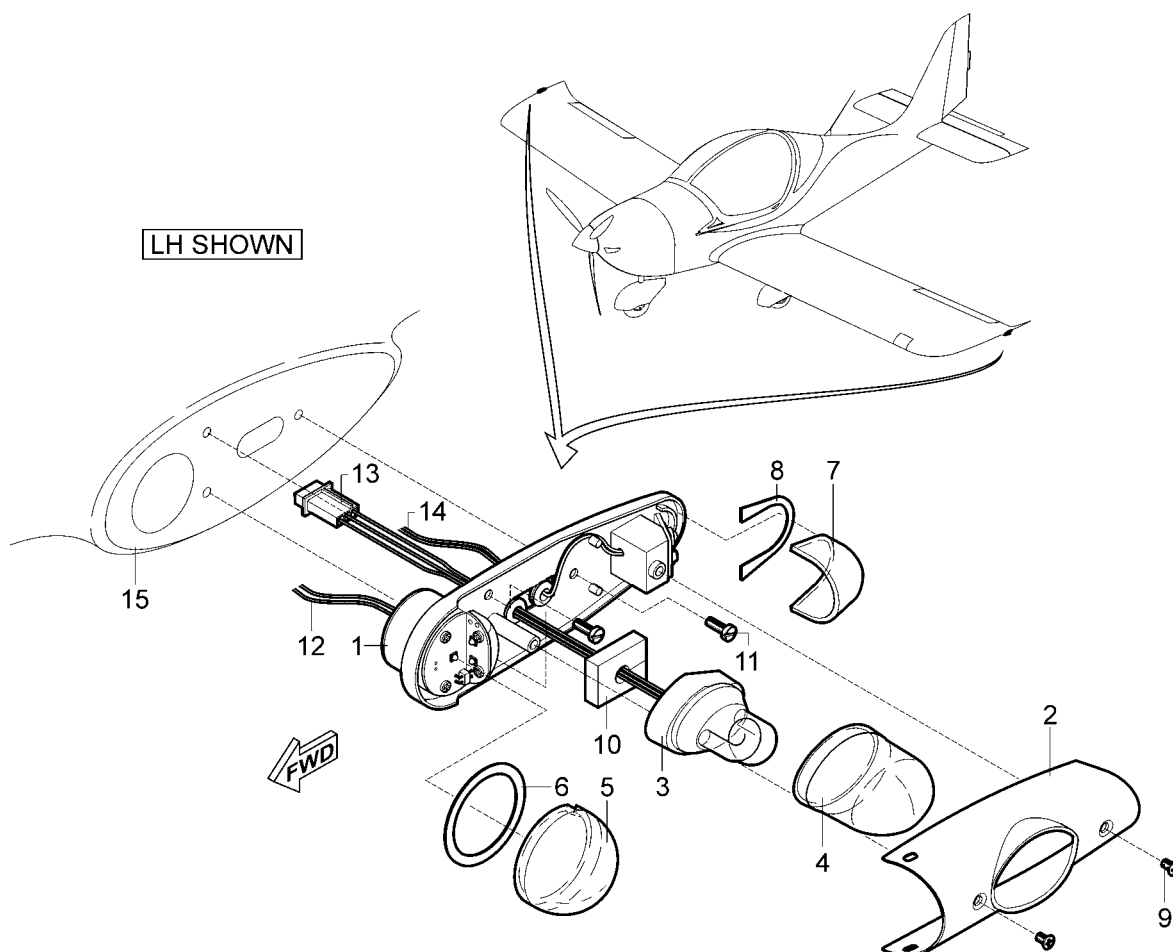
- (b) Inspect the lens. Replace if there is excessive scratching, discoloration or cracking.
- (c) Inspect the flashtubes of the strobe lights:

If the flashtube of the strobe light shows signs of any of these conditions, replace it.

- 1 The flashtube operates normally during daylight but it is difficult to switch it on in the dim light. The flashtube may be photosensitive.
- 2 As a result of aging of the flashtube or exposure to a very high temperature, the flashtube may be difficult to switch on. The flashtube, which is sometimes difficult to switch on, starts to shine when the engine runs (the lights are powered by the generator) but the light fades if the flashtube is powered by a low battery.
- 3 The flashtubes may show signs of leakage through the glass tube of the flashtube or around the seal of the wire on the glass. This leakage is caused by rapid heating when the normally operating system of the strobe lights is switched on, and slow cooling when the normally operating system of the strobe lights is switched off.
- 4 The flashtubes may show signs of self-ionization (permanent blue light emission) which means that the entire system of the strobe lights is not functional until the respective flashtube is replaced. The self-ionization will occur most likely when the input voltage is very high. This may be verified by this procedure: switch the system of the strobe lights off and switch it on again. After you switch the system on, it will usually operate normally during several flashes before the self-ionization occurs again.

NOTE

Installation of one new flashtube in any multi-element system of strobe lights sometimes causes the remaining old flashtubes to fail or skip flashes. This may mean that the old flashtubes approach the end of the service life. When you check the problematic flashtubes, use reduced voltage - approximately 20 % at the input to the power source of strobe lights. If the flashtube operates at this reduced voltage, the service life has not expired yet.



Legend to Fig. 33-5

1 Light body	9 Screw 6-32 5/16 (2 pcs.)
2 Flashtube cover	10 Seal
3 Flashtube	11 Screw M4x16 (3 pcs.)
4 Flashtube lens	12 Wires of the front pos. light
5 Lens of the front light	13 Connector with wires
6 Seal	14 Wires of the rear pos. light
7 Lens of the rear light	For information:
8 Seal	15 Wingtip

Fig. 33-5 Position / strobe lights – removal / installation



B. Power source of the strobe lights

Maintenance type: Line

Personnel qualification: Independent verification personnel qualified in accordance with Part 66 or higher

Recommended tools and material:

Item	Designation / Size	Quantity	Note
Phillips screwdriver	No. 2	1 pc.	
Wrench	No. 7	1 pc.	

- (1) Removal – power source of the strobe lights

WARNING

THE POWER SOURCE OF THE STROBE LIGHTS IS A HIGH-VOLTAGE DEVICE. AFTER YOU SWITCH IT OFF, WAIT 10 MINUTES, BEFORE YOU START THE WORK.

- (a) Switch the electrical network off and disconnect the battery.
- (b) Remove the carpet from the baggage compartment floor.
- (c) Remove the baggage compartment floor IN3 (Fig. 06-2).
- (d) Disconnect the connectors with wires (2, Fig. 33-6) from the power source (1).

NOTE

The power source removal must be performed by two persons.

- (e) Remove the nuts (4), washers (5) and screws (3) and remove the power source (1).
- (2) Installation – power source of the strobe lights

NOTE

The power source installation must be performed by two persons.

- (a) Put the power source (1, Fig. 33-6) on the appropriated place on the skin (7), and attach it with screws (3), nuts (4) and washers (5). Put the eye of the grounding wire (6) on one screw.

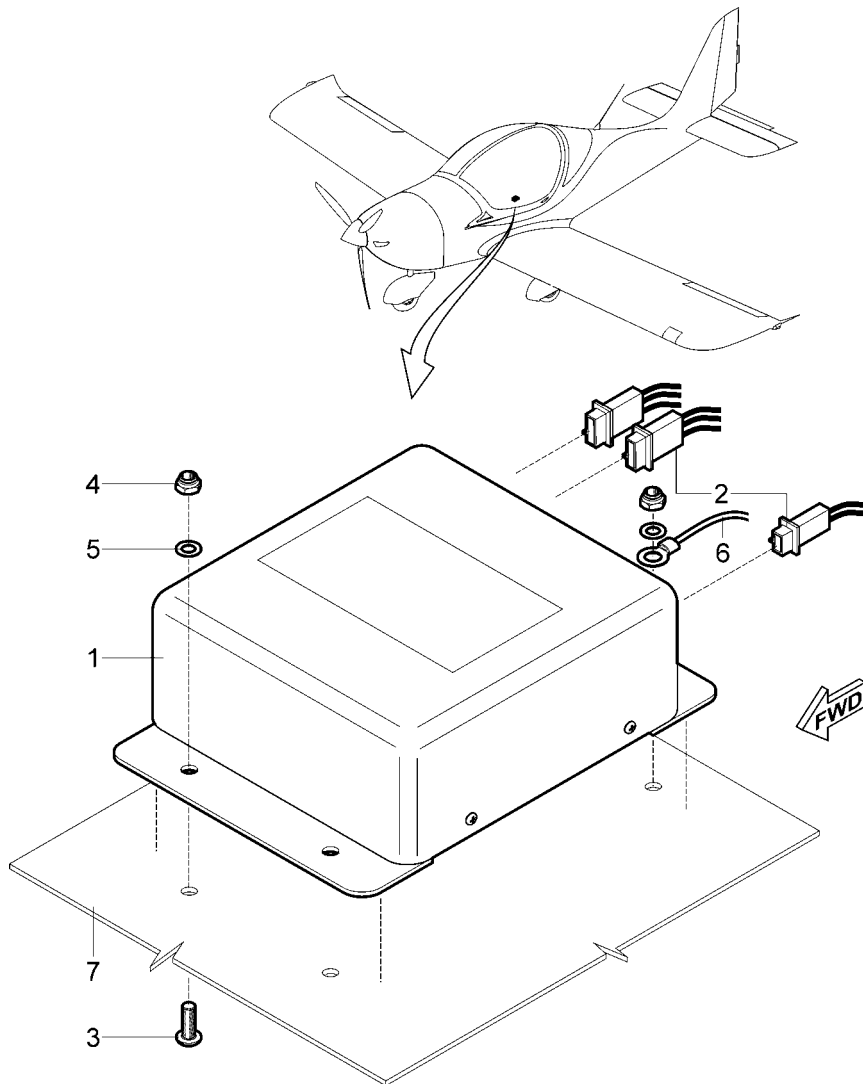
CAUTION

THE POWER SOURCE IS SENSITIVE TO POLARITY CHANGE. SWAPPED POLARITY ON THE POWER SOURCE CONNECTOR WILL CAUSE SEVERE DAMAGE TO THE POWER SOURCE.

- (b) Connect the connectors with wires (2).
- (c) Install the baggage compartment floor IN3 (Fig. 06-2).
- (d) Put the carpet on the baggage compartment floor.



- (e) Connect the battery, switch the electrical network on and check function of the strobe lights.



Legend to Fig. 33-6

1 Power source of the lights	5 Washer 4,3 (4 pcs.)
2 Connector with wires	6 Grounding wire
3 Screw M4x16 (4 pcs.)	For information:
4 Nut M4 (4 pcs.)	7 Skin of the fuselage lower part

Fig. 33-6 Power source of the strobe lights – removal / installation



C. Orion 600 series position / anti-collision lights

Maintenance type: Line

Personnel qualification: Independent verification personnel qualified in accordance with Part 66 or higher

Recommended tools and material:

Item	Designation / Size	Quantity	Note
Philips screwdriver	No. 2	1 pc.	
Crimping pliers	-	1 pc.	
Connector	P/N 1-480426-0	1 pc.	
Contact	P/N 163305-2	4 pcs.	
Cleaning agent	Technical benzine	-	
Sealant	Transparent sanitary silicone	-	
Lint free cloth	-	-	

NOTE

The removal / installation procedures for left and right lights are identical.

- (1) Removal – position / anti-collision light
 - (a) Switch the electrical network off and disconnect the battery.
 - (b) Remove the cover W4L or W4R (Fig. 06-2).
 - (c) Disconnect the connector with wires (8, Fig. 33-7) from the harness.
 - (d) Carefully unscrew the screws (7) and remove the retainer (2).

CAUTION

DO NOT TOUCH THE LED LENS SURFACE WITH EITHER FINGERS OR SHARP OBJECTS. THIS COULD SOIL AND/OR DAMAGE THE LENS AND AFFECT THE OPTICAL PERFORMANCE OF THE LEDS.

- (e) Remove the lens (4) from the light body by lifting the rear of the lens approximately 12 mm, now slide the lens rearward approximately 12 mm and lift upwards to remove.
 - (f) Remove the sealant from the gap between the baseplate (3) and the wingtip (9).
 - (g) Unscrew the screws (5) and remove the light body (1).
 - (h) Unscrew the screws (6) and remove the baseplate (3).
- (2) Installation – position / anti-collision light
 - (a) Use a scraper to remove the old sealant from the wingtip (9, Fig. 33-7), respectively the light body (1) and thoroughly clean the contact surfaces with a cleaning agent.



- (b) If you install a new light, insert on the wires of the light the baseplate (3), crimp new contacts and install the connector (refer to the table Recommended tools and material).

NOTE

Refer to the wiring diagram in Chapter 91.

- (c) Put the connector with wires (8) into the holes in the wingtip (9), align the baseplate (3) with the wingtip and attach it with screws (6).
- (d) Align the body (1) with the baseplate (3) and attach it with screws (5).

CAUTION

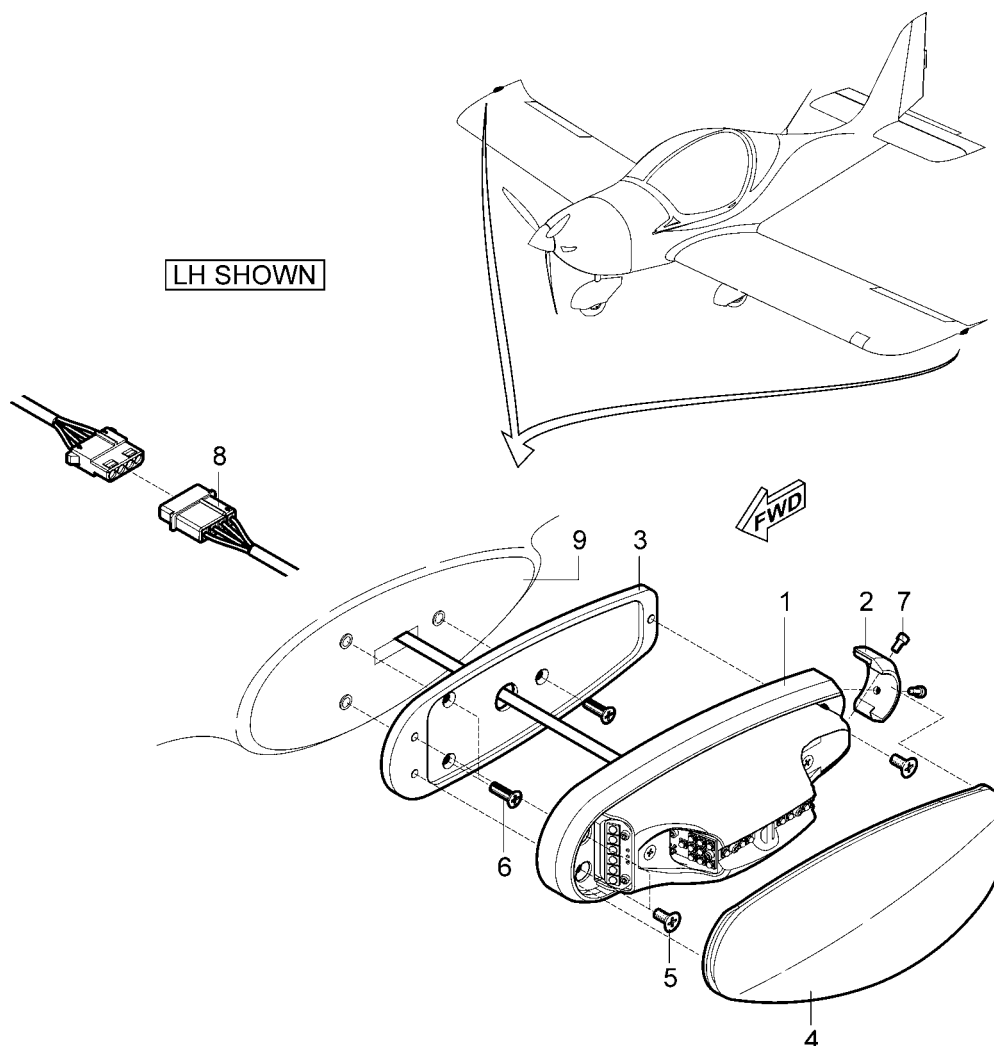
DO NOT TOUCH THE LED LENS SURFACE WITH EITHER FINGERS OR SHARP OBJECTS. THIS COULD SOIL AND/OR DAMAGE THE LENS AND AFFECT THE OPTICAL PERFORMANCE OF THE LEDS.

- (e) Put the lens (4) on the body (1).
 - (f) Align the retainer (2) with the body (1) and lens (3) and attach it with screws (7).
 - (g) Connect the connector with wires (8) to the harness.
 - (h) Use the cleaning agent to remove the grease from the contact surface intended for application of sealant.
 - (i) Seal the gap between the baseplate (3) and the wing tip (9) with sealant.
 - (j) Install the cover W4L or W4R (Fig. 06-2).
 - (k) Connect the battery, switch the electrical network on and check function of the position lights and the strobe light.
- (3) Inspection / check – position / strobe lights
- (a) Inspect the LED's. If any one LED fails, the unit must be repaired or replaced.

NOTE

To reduce eye strain use an optical filter such as dark glasses or a blue covering dome during LED inspection.

- (b) Inspect the lens. Replace if there is excessive scratching, discoloration or cracking.



Legend to Fig. 33-7

1 Light body	6 Screw M3x16 (3 pcs.)
2 Retainer	7 Screw 2-56 3/16 (2 pcs.)
3 Baseplate	8 Connector with wires
4 Lens	For information:
5 Screw 4-40 5/16 (3 pcs.)	9 Wingtip

Fig. 33-7 Position / anti-collision lights – removal / installation


D. 7114112 landing / taxi light

Maintenance type: Line

Personnel qualification: Independent verification personnel qualified in accordance with Part 66 or higher

Recommended tools and material:

Item	Designation / Size	Quantity	Note
Test jig	7810E2550001	1 pc.	Light adjustment
Jig with magnifier	7910S7911099	1 pc.	Light adjustment
Flat screwdriver	-	1 pc.	
Phillips screwdriver	No. 2	1 pc.	
Wrench	No. 7	1 pc.	
Wrench	No. 10	2 pc.	
Hex wrench	No. 3	1 pc.	
Crimping pliers	-	1 pc.	
Pincers	-	1 pc.	
Connector	P/N 1-480319-0	1 pc.	
Contact	P/N 163305-2	2 pcs.	

(1) Removal – landing / taxi light

- (a) Switch the electrical network off and disconnect the battery.
- (b) Remove the light cover W8L (Fig. 06–2).
- (c) Unscrew the bolts (17, Fig. 33-8) and remove the cover (16).
- (d) Remove the nut (9), washer (10), bolt (8) and slightly pull the light out including the bracket (3).
- (e) Disconnect wires with the connector (2) from the harness and remove the light including the bracket (3).
- (f) Remove the nuts (9), washers (10), bolts (8) and remove the bracket (3).
- (g) Remove the nuts (13), washers (14; 15), spacers (11), bolts (12) as necessary and remove the bracket (7).

(2) Installation – landing / taxi light

- (a) Adjust the bracket (7, Fig. 33-8) between the holders (18; 19) as necessary and attach it with bolts (12), spacers (11), nuts (13) and washers (14; 15). Slightly tighten the nuts.
- (b) If you install a new light, crimp new contacts on wires of the light and install the connector (refer to the table Recommended tools and material).

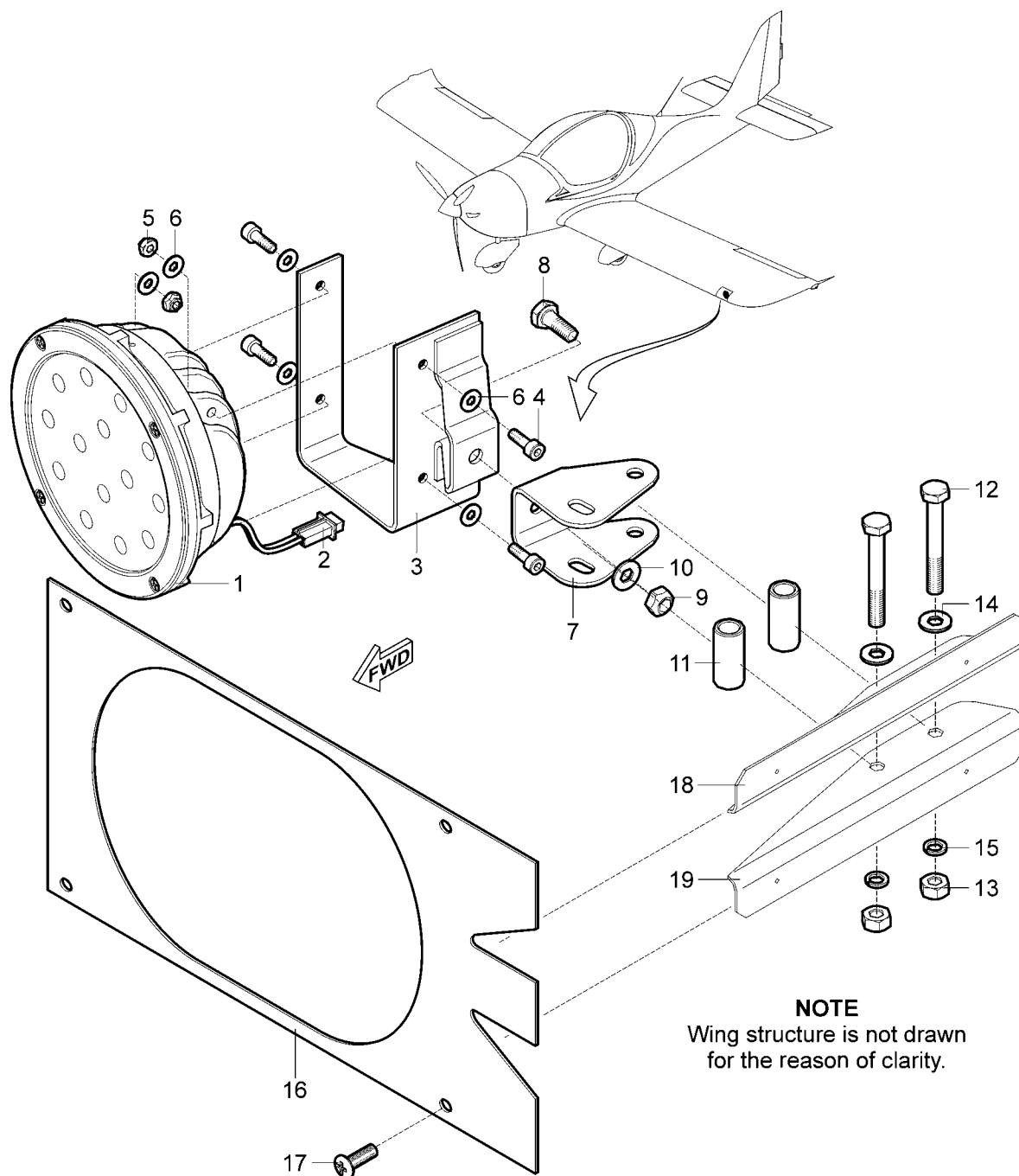


Fig. 33-8 Landing / taxi light – removal / installation (page 1 of 2)



Legend to Fig. 33-8

1	Landing / taxi light	11	Spacer (2 pcs.)
2	Wires with connector	12	Bolt M6x45 (2 pcs.)
3	Bracket	13	Nut M6 (2 pcs.)
4	Bolt M4x12 (4 pcs.)	14	Washer 6,4 (2 pcs.)
5	Nut M4 (4 pcs.)	15	Washer 6,1 (2 pcs.)
6	Washer 4,3 (8 pcs.)	16	Cover
7	Bracket	17	Bolt M4x12 (4 pcs.)
8	Bolt M6x16		For information:
9	Nut M6	18	Upper holder
10	Washer 6,4	19	Lower holder

Fig. 33-8 Landing / taxi light – removal / installation (page 2 of 2)

- (c) Align the light (1) with the bracket (3) and attach it with bolts (4), nuts (5) and washers (6).
 - (d) Connect wires with the connector (2) to the harness.
 - (e) Put the light including the bracket (3) on the bracket (7) and attach it with the bolt (8), nut (9) and washer (10). Slightly tighten the nut.
 - (f) Adjust the light (refer to par. 2 D.(3)).
 - (g) Install the light cover W8L (Fig. 06-2).
- (3) Adjustment / test – landing / taxi light
- (a) Lift the airplane and align it in a horizontal position (Section 08-10) so that the leveling point NiB 2 is approx. 980 mm from the floor.
 - (b) Remove the light cover W8L (Fig. 06-2), remove the bolts (17, Fig. 33-8) and remove the cover (16).
 - (c) Put the test jig 7810E2550001 in front of the airplane to a position defined by the distance from the leveling point NiB 1 and the edge of the skin at cutout for the light in accordance with Fig. 33-9.
 - (d) Put the jig 7910S7911099 on the light.
 - (e) Switch the electrical network and the switch **LDG LIGHT** on.
 - (f) Make sure that the cone of light falls to the center of the appropriate sighting cross on the jig (see Fig. 33-9).
 - (g) Remove the jig, switch the switch **LDG LIGHT** and the electrical network off. If the cone of light does not falls to the center of the appropriate sighting cross on the jig, adjust the light in accordance with this procedure:
 - 1 Switch the electrical network and the switch **LDG LIGHT** on.
 - 2 Use the adjusting screws (8; 12) to set vertical and horizontal position of the light so that the cone of light falls to the center of the appropriate sighting cross on the jig.
 - 3 Repeat steps (d) to (g).
 - 4 Switch the switch **LDG LIGHT** and the electrical network off.
 - (h) Install the cover (16) and the light cover W8L (Fig. 06-2) again.

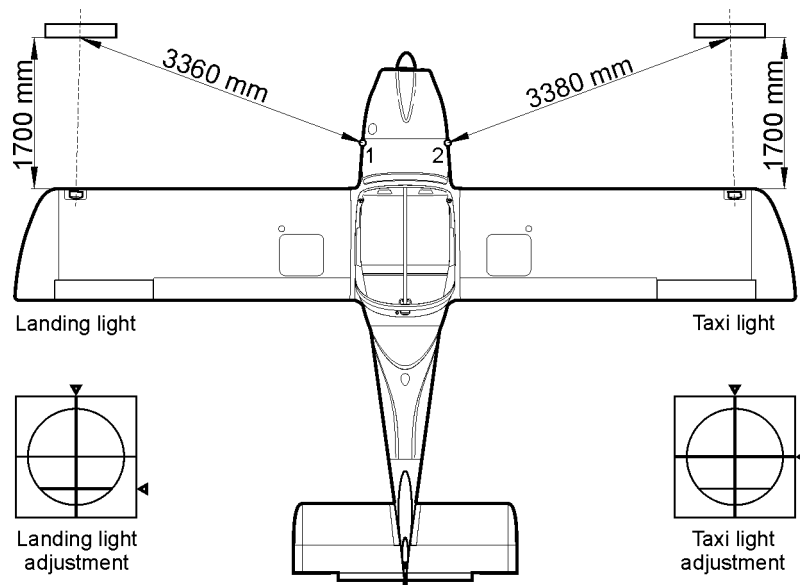


Fig. 33-9 Adjustment of the landing and taxi light

E. 7114112 taxi light

Maintenance type: Line

Personnel qualification: Independent verification personnel qualified in accordance with Part 66 or higher

Recommended tools and material:

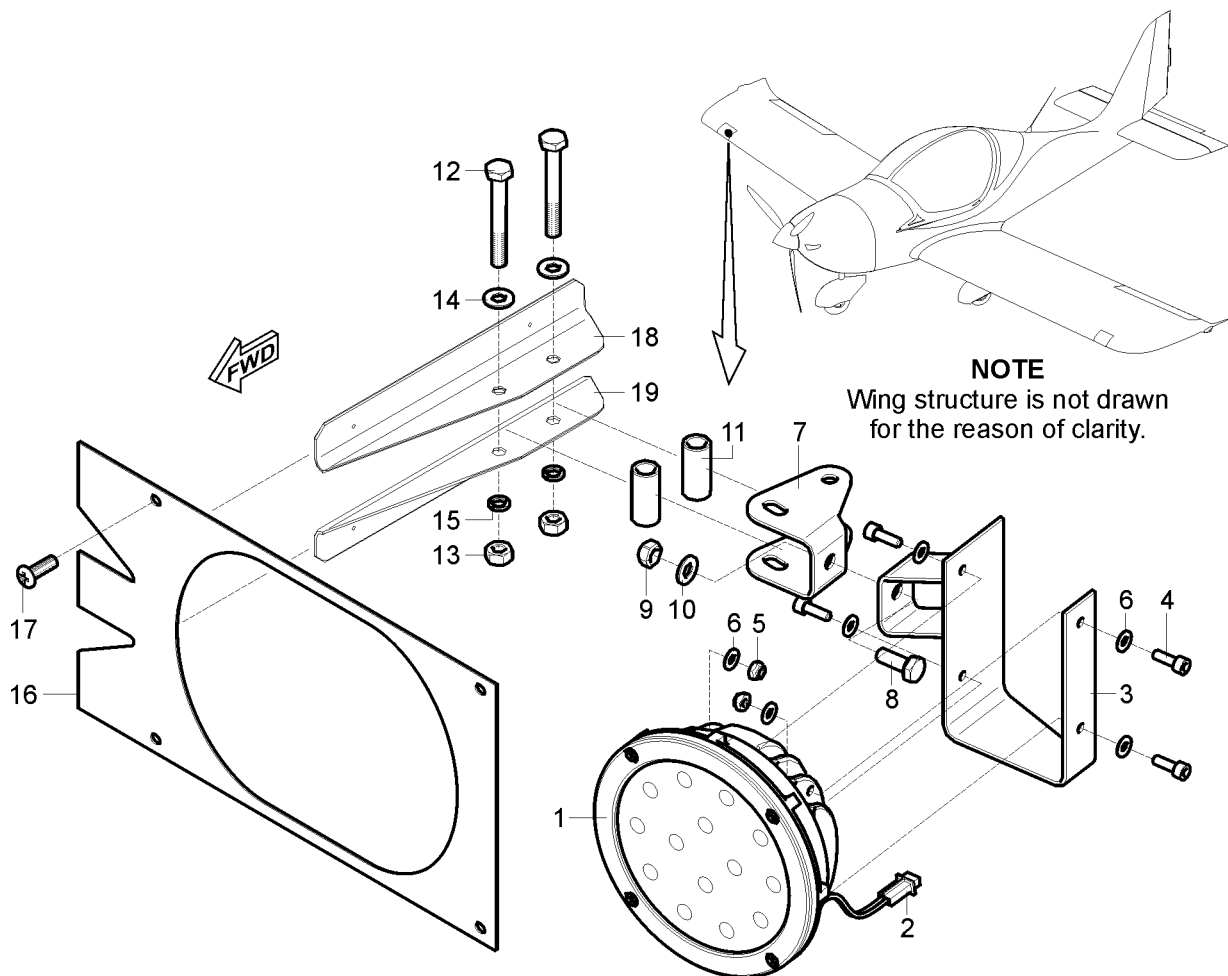
Item	Designation / Size	Quantity	Note
Test jig	7810E2550001	1 pc.	Light adjustment
Jig with magnifier	7910S7911099	1 pc.	Light adjustment
Flat screwdriver	-	1 pc.	
Phillips screwdriver	No. 2	1 pc.	
Wrench	No. 7	1 pc.	
Wrench	No. 10	2 pc.	
Hex wrench	No. 3	1 pc.	
Crimping pliers	-	1 pc.	
Pincers	-	1 pc.	
Connector	P/N 1-480319-0	1 pc.	
Contact	P/N 163305-2	2 pcs.	



- (1) Removal – taxi light
 - (a) Switch the electrical network off and disconnect the battery.
 - (b) Remove the light cover W8R (Fig. 06-2).
 - (c) Unscrew the bolts (17, Fig. 33-10) and remove the cover (16).
 - (d) Remove the nut (9), washer (10), bolt (8) and slightly pull the light out including the bracket (3).
 - (e) Disconnect wires with the connector (2) from the harness and remove the light including the bracket (3).
 - (f) Remove the nuts (9), washers (10), bolts (8) and remove the bracket (3).
 - (g) Remove the nuts (13), washers (14; 15), spacers (11), bolts (12) as necessary and remove the bracket (7).
- (2) Installation – taxi light
 - (a) Adjust the bracket (7, Fig. 33-10) between the holders (18; 19) as necessary and attach it with bolts (12), spacers (11), nuts (13) and washers (14; 15). Slightly tighten the nuts.
 - (b) If you install a new light, crimp new contacts on wires of the light and install the connector (refer to the table Recommended tools and material).
 - (c) Align the light (1) with the bracket (3) and attach it with bolts (4), nuts (5) and washers (6).
 - (d) Connect wires with the connector (2) to the harness.
 - (e) Put the light including the bracket (3) on the bracket (7) and attach it with the bolt (8), nut (9) and washer (10). Slightly tighten the nut.
 - (f) Adjust the light (refer to par. 2 E.(3)).
 - (g) Install the light cover W8R (Fig. 06-2).
- (3) Adjustment / test – taxi light
 - (a) Lift the airplane and align it in a horizontal position (Section 08-10) so that the leveling point NiB 2 is approx. 980 mm from the floor.
 - (b) Remove the light cover W8R (Fig. 06-2), remove the bolts (17, Fig. 33-10) and remove the cover (16).
 - (c) Put the test jig 7810E2550001 in front of the airplane to a position defined by the distance from the leveling point NiB 3 and the edge of the skin at cutout for the light in accordance with Fig. 33-9.
 - (d) Put the jig 7910S7911099 on the light.
 - (e) Switch the electrical network and the switch **TAXI LIGHT** on.
 - (f) Make sure that the cone of light falls to the center of the appropriate sighting cross on the jig (see Fig. 33-9).
 - (g) Remove the jig, switch the switch **TAXI LIGHT** and the electrical network off. If the cone of light does not falls to the center of the appropriate sighting cross on the jig, adjust the light in accordance with this procedure:



- 1 Switch the electrical network and the switch **TAXI LIGHT** on.
 - 2 Use the adjusting screws (8; 12) to set vertical and horizontal position of the light so that the cone of light falls on the centre of the crosshair on the test jig.
 - 3 Repeat steps (d) to (g).
 - 4 Switch the switch **TAXI LIGHT** and the electrical network off.
- (h) Install the cover (16) and the light cover W8R (Fig. 06-2) again.

**NOTE**

Wing structure is not drawn
for the reason of clarity.

Legend to Fig. 33-10

1 Taxi light	11 Spacer (2 pcs.)
2 Wires with connector	12 Bolt M6x45 (2 pcs.)
3 Bracket	13 Nut M6 (2 pcs.)
4 Bolt M4x12 (4 pcs.)	14 Washer 6,4 (2 pcs.)
5 Nut M4 (4 pcs.)	15 Washer 6,1 (2 pcs.)
6 Washer 4,3 (8 pcs.)	16 Cover
7 Bracket	17 Bolt M4x12 (4 pcs.)
8 Bolt M6x16	For information:
9 Nut M6	18 Upper holder
10 Washer 6,4	19 Lower holder

Fig. 33-10 Taxi light – removal / installation

CHAPTER

34

**NAVIGATION AND
PITOT/STATIC**



CHAPTER 34

NAVIGATION AND PITOT/STATIC

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GENERAL

1. INTRODUCTION

This chapter describes the systems that provide the pilot with information needed for airplane control. It means the pitot-static system connected, in accordance with the airplane equipment, to analog flight instruments, to the Dynon SkyView system or Garmin G3X system, GPS, compass and navigation system.

The pitot-static system senses the conditions of ambient environment of airplane and depending on the instrument equipment provides the pilot with the data on flight speed, flight altitude, vertical speed of flight and outside air temperature (Section 34-10 Flight Environmental Data / Pitot Static).

Section 34-20 Attitude & Position describes the system that use magnetic, gyroscopic and inertial forces. It includes the ADAHRS units of the Dynon SkyView system Garmin G3X system, attitude horizon, turn and bank indicator, directional gyro and the magnetic compass.

Section 34-30 Landing and Taxiing Aids describes the systems that guide the airplane in the course of approaching and landing. It includes the system of glide slope guidance (GS) and the marker beacon receiver.

Section 34-40 Independent Position Determining describes the systems determining the position data from the sources primarily independent on land stations. It includes the installations of satellite navigation system receivers (GPS).

Section 34-50 Dependent Position Determining describes the systems determining the position data from the sources primarily dependent on land stations. It includes the radionavigation devices and the transponder.



FLIGHT DATA

1. DESCRIPTION AND OPERATION

A. Pitot-static system

The pitot-static system senses total pressure and static pressure of air around the airplane. The pitot-static system differs based on the applied airplane instruments (see Fig. 34-1); it is composed of these parts: pitot-static tube (1), two drain sumps (4), tubes and hoses that are connected to the instruments in the airplane cockpit. In the case when the second pitot-static tube (2) is installed that senses only static pressure, this pressure is led via the drain sump to the selector valve (3) by which it is possible to switch over the source of static pressure.

The pitot-static tube senses static pressure and total pressure. The total pressure is sensed in the front part of pitot-static tube and the static pressure is sensed through the holes on the circumference of the tube. The pressure distributions to individual instruments are carried out by means of flexible plastic hoses. The transparent drain sumps (4) that catch water and impurities in the line are installed in the line of static pressure and in the line of total pressure.

The heated pitot-static tube is controlled by the **PITOT HEATING** switch, located on the left part of the instrument panel near the switches and circuit breakers. Switching on is signaled by the blue signaling light **PITOT HEAT.**, located on the left upper section of the instrument panel (Section 31-50).

The line of total pressure is connected based on airplane instruments, with:

- airspeed indicator (5)
- backup airspeed indicator (6)
- main ADAHRS unit (11)
- backup ADAHRS unit (12)
- data logger Safetyplane V5 (not shown).

The line of static pressure is connected, based on airplane instruments, with:

- airspeed indicator (5)
- backup airspeed indicator (6)
- altimeter (7)
- backup altimeter (8)
- variometer (9)
- altitude encoder (10)
- backup airspeed indicator (6)
- main ADAHRS unit (11)
- backup ADAHRS unit (12)
- data logger Safetyplane V5 (not shown).

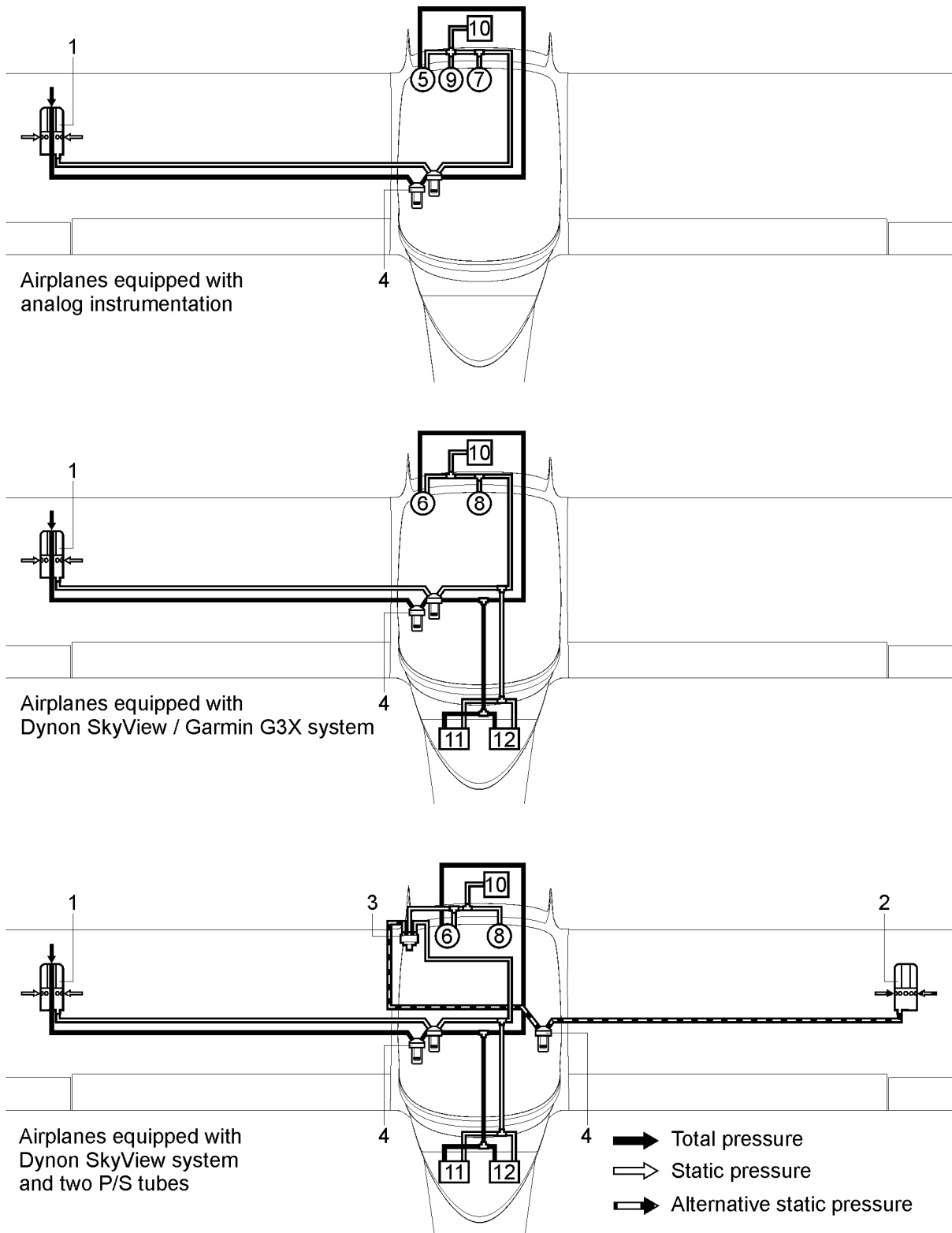


Fig. 34-1 Diagram of pitot-static system (page 1 of 2)



Legend to Fig. 34-1

1	Left pitot-static tube	7	Altimeter
2	Right pitot-static tube	8	Backup altimeter
3	Selector valve of static pressure	9	Variometer
4	Drain sump	10	Altitude encoder
5	Airspeed indicator	11	Main ADAHRS unit
6	Backup airspeed indicator	12	Backup ADAHRS unit

Fig. 34-1 Diagram of pitot-static system (page 2 of 2)

B. Flight instruments

The airplane Sportstar RTC can be equipped either with analog instrumentations, with the Dynon SkyView system or Garmin G3X system.

The airplane with analog instrumentations are stadardly equipped with the airspeed indicator, altimeter, variometer, altitude encoder and optionally with the outside temperature thermometer.

(1) Airspeed indicator

The airspeed indicator indicates airplane speed on the basis of a comparison of total and static pressure of air around the airplane. The airspeed indicator indicates speed in knots (nautical miles) or in kilometers per hour and is located on the left side of the instrument panel.

(2) Altimeter

The altimeter indicates absolute or relative flight altitude of airplane based on a change of barometric pressure. The altimeter indicates altitude in feet and is located on the left side of the instrument panel.

(3) Variometer

The variometer indicates the speed with which the airplane changes its altitude. The instrument function is based on measurement of speed of static presure change of airplane ambient air and its trend. The variometer indicates speed of climb/ descend in feet per minute and is located on the left side of the instrument panel.

(4) Altitude encoder

The altitude encoder A-30 provides encoded information on flight altitude to the transponder, inquired by the ground radar in the mode C. In addition, it provides the altitude data for the GPS. The altitude encoder is located on the base between the instrument panel and the firewall on the right side.

The wiring diagram of the altitude encoder is shown in Chapter 91.

NOTE

The detailed description and information concerning encoder unit operation are shown in the document Model A-30 Altitude Digitizer Operational Manual Installation Manual P/N A30M, dated 2012/02/05 or in a latest valid issue.



(5) Outside air thermometer

The electrical outside air thermometer can be optionally installed on the airplanes equipped with analog instruments. The thermometer is located on the right side of the instrument panel. The temperature sensor is located on the right side of fuselage between the wing and the fuselage, near the torsion shaft of wing flap control.

The airplanes equipped with the Dynon SkyView system have installed two sensors of temperature; each of them is connected with a corresponding ADAHRS module. The sensors are located on the right side of the fuselage, between the wing and the fuselage, near the torsion shaft of wing flap control. The data of outside air temperature is indicated on the displays SV-D1000 and SV-D700.

The airplanes equipped with the Garmin G3X system have installed one sensor of temperature, which is connected with a main ADAHRS unit. The sensor is located on the right side of the fuselage, between the wing and the fuselage, near the torsion shaft of wing flap control. The data of outside air temperature is indicated on the PFD.

The wiring diagram of OAT thermometers is shown in Chapter 91.

The airplanes with the Dynon Skyview system are equipped with the displays SV-D1000 and SV-D700 having a function of flight instruments; in addition, they are equipped with the backup airspeed indicator, altimeter and the outside air thermometer (part of Dynon SkyView system).

The airplanes with the Garmin G3X system are equipped with the MFD and MFD having a function of flight instruments; in addition, they are equipped with the backup airspeed indicator, altimeter and the outside air thermometer (part of Garmin G3X system).

(6) Dynon SkyView system

The Dynon SkyView system represents a new generation of glass panels of avionic systems for light sports airplane. The system is composed of the following parts:

- SV-D1000 display
- SV-D700 display
- SV-ADAHRS-200 main module and SV-ADAHRS-201 backup module, including air data computer and gyroscopic system of airplane position and heading determination (Section 34-20)
- SV-EMS-220 module monitoring the monitors engine parameters (Section 77-10)
- SV-ARINC-429 module connecting the advanced navigation equipment (the GTN 750 unit)
- SV-GPS-250 antennas (Section 34-40)
- SV-BAT-320 backup batteries that serve for supplying displays in the case of a failure of the airplane electrical system (Section 24-10)
- SV-OAT-340 outside air temperature sensors (for each ADAHRS module)
- Connecting cables, USB connectors, etc.

The diagram of the system is shown in Fig. 34-2.

The displays SV-D1000 and SV-D700 are equipped with the high-resolution screens and contain the main control processor, graphic processor and the databases. The displays can work as a primary flight display (PFD) with a possibility of Synthetic Vision indication,



as a system of engine parameter monitoring (EMS) and as a Moving Map (MAP) in various customizable layouts of screens.

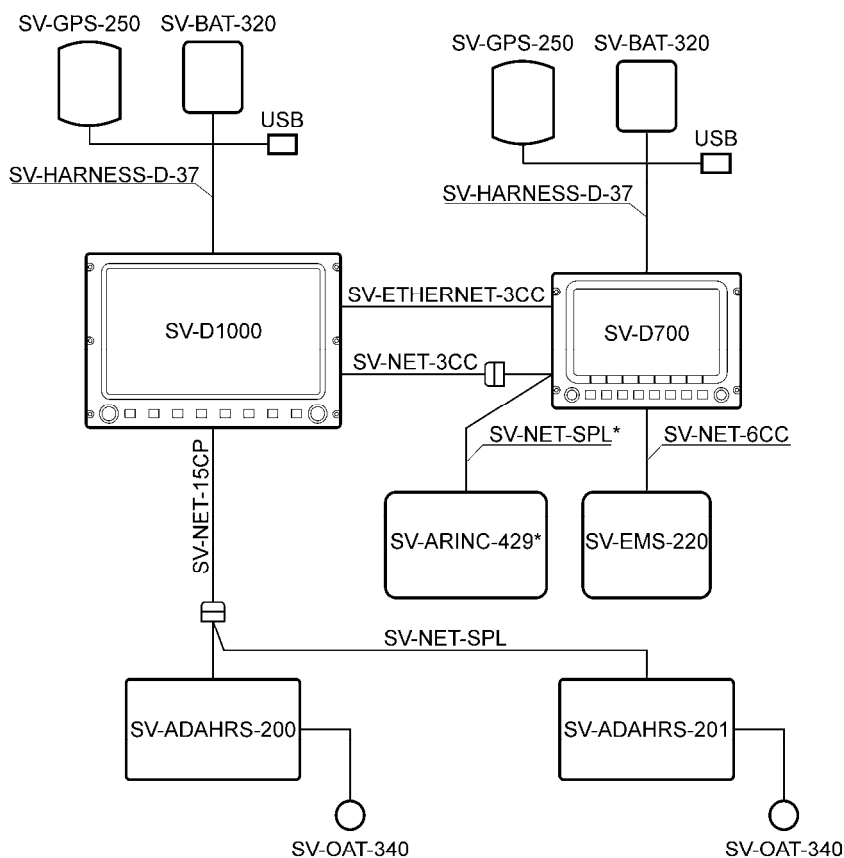
The most frequently used functions are accessible via two rotary joysticks. All the other flight control commands are available through eight buttons.

Each display and module of SkyView system is connected by means of two independent power and data busbars. A failure of any busbar or module connection leads to automatic switching to an operating busbar or module.

A Dynon SkyView system upgrade is provided after verification and approval by the airplane manufacturer via a bulletin.

The system is secured against unauthorized entry by password.

The wiring diagram of the Dynon SkyView system is shown in Chapter 91.



* Only when Garmin GTN 750 unit is installed

Fig. 34-2 Diagram of Dynon SkyView system

The PFD indicates the following information:

- Synthetic Vision
- Airspeed indicator with the speed mark and indication of speed change
- Gyro horizon with indication of alert in the extreme longitudinal positions
- Mark of flight path



- Altimeter with the altitude mark, indicator of altitude change, barometric setting and pressure altitude
- Variometer with the mark of vertical speed
- Directional gyro with the heading mark
- Turn and slip indicator
- Outside air temperature
- Wind data

WARNING

THE DYNON SKYVIEW SYSTEM IS PROTECTED BY A PASSWORD AND ANY PASSWORD CRACKING ATTEMPT IS PROHIBITED!

UNAUTHORIZED NETRY TO THE SYSTEM SETTING AND NON-OBSERVANCE OF THE SET DOWN PROCEDURES OF SYSTEM UPDATING CAN CAUSE INCORRECT FUNCTION OR A TOTAL FAILURE OF THE WHOLE DYNON SKYVIEW SYSTEM!

NOTE

The detailed description and information concerning the operation of Dynon SkyView system are shown in the document Dynon SkyView System Installation Guide, Document 101320-022, Revision W, dated January 2016 or in a latest valid issue.

(7) Garmin G3X system

The Garmin G3X system represents a new generation of glass panels of avionic systems for light sports airplane. The system is composed of the following parts:

- GDU 460 PFD
- GDU 460 MFD
- PFD configuration module. The GDU 460 PFD uses a configuration module designated as the master system configuration module. The master system configuration module stores configuration data identical to the PFD configuration data stored in the PFD memory. The PFD cross-checks the configuration module data against internal PFD memory and self-configures to match the master system configuration module. The PFD also maintains control of other LRUs' configuration and calibration settings. This allows critical data to be retained with the airframe even if the PFD 1 display is replaced.
- GSU 25 main and backup ADAHRS unit, including air data computer and in connection with the GMU 22 magnetometer also gyroscopic system of airplane position and heading determination (Section 34-20)
- GMU 22 magnetometer
- GEA 24 EIS unit monitoring the monitors engine parameters (Section 77-10)



- GAD 29 ARINC 429 Adapter connecting the advanced navigation equipment
- GA 26C GPS antennas (Section 34-40)
- IBBS-12v-3ah backup battery that serves for supplying PFD, MFD, EIS and ADAHRS 1 in the case of a failure of the airplane electrical system (Section 24-10)
- GTP 59 outside air temperature sensor (for ADAHRS 1 unit)
- Connecting cables, etc.

The diagram of the system is shown in Fig. 34-3.

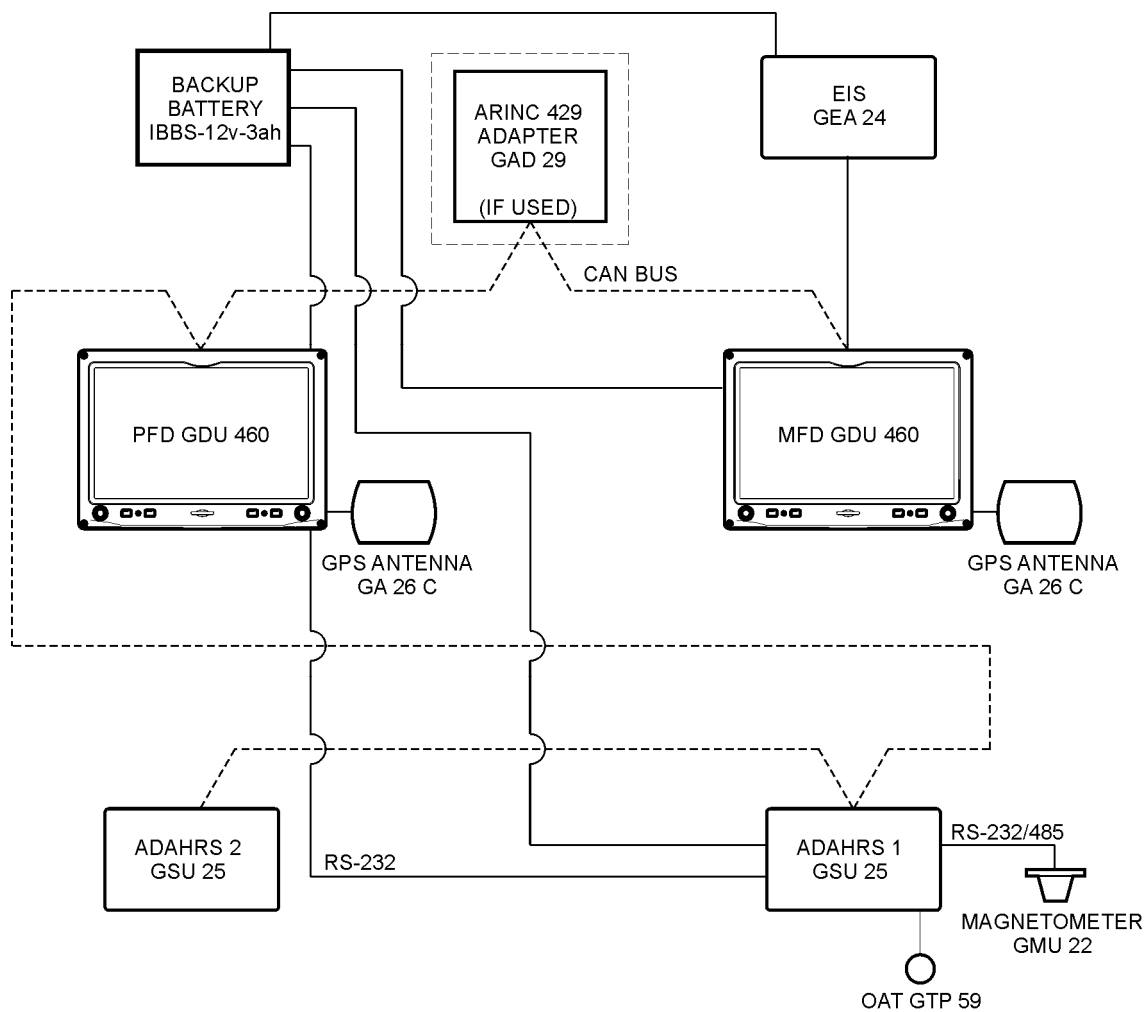


Fig. 34-3 Diagram of Garmin G3X system

The PFD and MFD are equipped with the high-resolution screens and contain the main control processor, graphic processor and the databases. The displays can work as a primary flight display with a possibility of Synthetic Vision indication, as a system of engine parameter monitoring etc., in various customizable layouts of screens. The displays are controlled by two rotary knobs and four buttons.



Each display and unit of G3X system is connected by means of two independent power and data busbars. A failure of any busbar or module connection leads to automatic switching to an operating busbar or module.

A Garmin G3X system upgrade is provided after verification and approval by the airplane manufacturer via a bulletin.

The system is secured against unauthorized entry by password.

The wiring diagram of the Garmin G3X system is shown in Chapter 91.

The PFD indicates the following information:

- Synthetic Vision
- Airspeed indicator with the speed mark and indication of speed change
- gyro horizon with indication of alert in the extreme longitudinal positions
- mark of flight path
- altimeter with the altitude mark, indicator of altitude change, barometric setting and pressure altitude
- variometer with the mark of vertical speed
- directional gyro with the heading mark
- turn and slip indicator
- outside air temperature
- wind data

WARNING

THE GARMIN G3X SYSTEM IS PROTECTED BY A PASSWORD AND ANY PASSWORD CRACKING ATTEMPT IS PROHIBITED!

UNAUTHORIZED NETRY TO THE SYSTEM SETTING AND NON-OBSERVANCE OF THE SET DOWN PROCEDURES OF SYSTEM UPDATING CAN CAUSE INCORRECT FUNCTION OR A TOTAL FAILURE OF THE WHOLE GARMIN G3X SYSTEM!

NOTE

The detailed description and the information concerning the operation of the Garmin G3X system are available in the document Garmin G3X/G3X Touch Installation Manual, Document 190-01115-01, Revision AC, dated July 2017 or in a later valid issue.



2. MAINTENANCE PRACTICES

A. Pitot-static system

Maintenance type: Line

Personnel qualification: Independent verification personnel qualified in accordance with Part 66 or higher

Recommended tools and material:

Item	Designation / Size	Quantity	Note
Test device	Air Data Tester ADTS 542 F	1 pc.	Or equivalent
Reduction for the P/S tube	-	1 pc.	According to the P/S tube type

- (1) Adjustment / test – check of pitot-static system tightness
 - (a) Do the test of pitot-static tube tightness in the intervals shown in Section 05-30 and after every disconnection and reconnection of the system.
 - (b) Do the test of system tightness at an ambient temperature of $20 \pm 5^{\circ}\text{C}$.
 - (c) Before the test of the system tightness, verify whether the passability of the system wasn't disturbed by captured humidity and by obstacles.
 - (d) The testing instrument is connected via the reduction to the pitot-static tube.

NOTE

Ensure that the drain holes on the lower side of the heated pitot-static tube don't affect the generation of overpressure in the line of total pressure.

If the selector valve **STATIC SOURCE** is installed (on the left side of the instrument panel), it must be set to the position **MAIN** in the course of test.

- (e) Slowly and continuously, create overpressure and undepressure in the system.
- (f) The procedure of test:
 - 1 By means of the test device, create underpressure corresponding to the altitude of 1 000 ft in the line of static pressure (in Tab. 34-1 column "Reached [ft]"). A decline of altitude indication per 1 minute mustn't exceed 100 ft.
 - 2 By means of the test device, create overpressure corresponding to the speed of 108 kts in the line of total pressure (in Tab. 34-1 column "Reached [kts]"). A decline of speed per 3 minutes mustn't exceed 0 kts.



LINE OF STATIC PRESSURE				
Underpressure – altitude 1000 ft	Reached [ft]	Decline [ft] per 1 minute	Allowed decline	Assessment
			100 ft	conforming / non-conforming

LINE OF TOTAL PRESSURE				
Overpressure – speed 108 kts	Reached [kts]	Decline [kts] per 3 minutes	Allowed decline	Assessment
			0 kts	conforming / non-conforming

Tab. 34-1 Check of pitot-static system tightness

B. Pitot-static tube

Maintenance type: Line

Personnel qualification: Independent verification personnel qualified in accordance with Part 66 or higher

Recommended tools and material:

Item	Designation / Size	Quantity	Note
Stainless lockwire	ø 0,8 mm	-	
Flat screwdriver		1 pc.	
Adhesive	Loctite 243	-	
Degreasing agent	Acetone	-	
Lint-free cloth	-	-	

(1) Removal – pitot-static tube

- Unscrew the screws (3, Fig. 34-4) and pull the tube (1) up a little.
- Remove the lockwire (6).
- Disconnect the hoses (4; 5) from the pitot-static tube.
- Remove the pitot-static tube (1).
- Close the hoses and the outlets on the tube by means of blind plugs.
- Unscrew the screws (7) as needed and remove the holder (2).

(2) Installation – pitot-static tube

- Remove the blind plugs from the hoses and the outlets on the tube.
- As needed, hold the holder (2, Fig. 34-4) under the assembly hole and pull the hoses (4; 5) through the holder.
- Thoroughly clean the screws (7) with a cloth soaked in cleaning agent.
- Apply adhesive onto screw threads (7).
- Set the holder (2) to the corresponding place and attach it by means of screws (7).

**WARNING**

WHEN CONNECTING THE HOSES TO THE OUTLETS OF PITOT-STATIC TUBE, PAY AN ENHANCED ATTENTION IN ORDER TO PREVENT FROM AN INCORRECT CONNECTION! CONNECT THE HOSE MARKED AS STATIC TO THE OUTLET MARKED WITH THE LETTER S AND CONNECT THE HOSE MARKED AS PITOT TO THE OUTLET MARKED WITH THE LETTER T.

- (f) Connect the hoses (4; 5) to the outlets on the tube (1).
- (g) Secure the hoses with lockwire (6) (Section 20-20).
- (h) Insert the tube (1) into the holder (2) and attach it by means of screws (3).
- (i) Check the tightness of pitot-static system (see par. 2 A(1)).

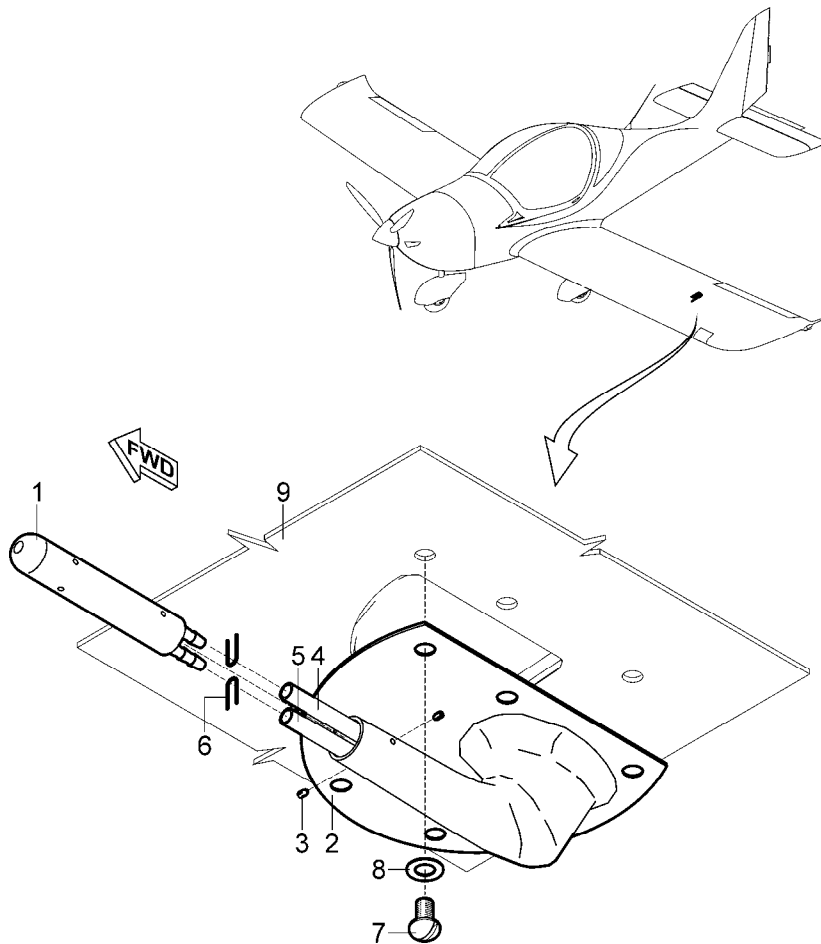


Fig. 34-4 Pitot-static tube – removal / installation (page 1 of 2)



Legend to Fig. 34-4

1	Pitot-static tube	6	Lockwire
2	Holder of pitot-static tube	7	Screw M4x12 (5 pcs.)
3	Screw M3x6 (2 pcs.)	8	Polyamide washer 3,7 (5 pcs.)
4	Pitot hose		For information:
5	Static hose	9	Lower skin of wing

Fig. 34-4 Pitot-static tube – removal / installation (page 2 of 2)

C. Heated pitot-static tube

Maintenance type: Line

Personnel qualification: Independent verification personnel qualified in accordance with Part 66 or higher

Recommended tools and material:

Item	Designation / Size	Quantity	Note
Flat screwdriver	-	1 pc.	
Phillips screwdriver	No. 2	1 pc.	
Gripping pliers	Cobra	1 pc.	

- (1) Removal – heated pitot-static tube
 - (a) Switch the electrical network off and disconnect the battery.
 - (b) Unscrew the tube screws (3, Fig. 34-5) and the screws (8) of the holder (2).
 - (c) Tilt off the holder slightly and disconnect the connector with wires (7).
 - (d) Pull the pitot-static tube (1) up a little, release the clamps (6) by means of pliers and disconnect the hoses (5) from the outlets on the rear wall of the tube.
 - (e) Remove the pitot-static tube (1) – be careful in order not to damage the wires.
 - (f) Close the hoses and the outlets on the tube by means of blind plugs.
- (2) Installation – heated pitot-static tube
 - (a) Remove the blind plugs from the hoses and the outlets on the tube.
 - (b) Pull the wires of heating element power supply (7, Fig. 34-5) through the holder of pitot-static tube (2) (in the meantime, don't insert the tube into the holder).
 - (c) Hold the holder (2) under the assembly hole and pull the hoses (5) through the holder.

WARNING

WHEN CONNECTING THE HOSES TO THE OUTLETS OF PITOT-STATIC TUBE, PAY AN ENHANCED ATTENTION IN ORDER TO PREVENT FROM AN INCORRECT CONNECTION! CONNECT THE HOSE MARKED AS STATIC TO THE OUTLET MARKED WITH THE LETTER S AND CONNECT THE HOSE MARKED AS PITOT TO THE OUTLET MARKED WITH THE LETTER D.

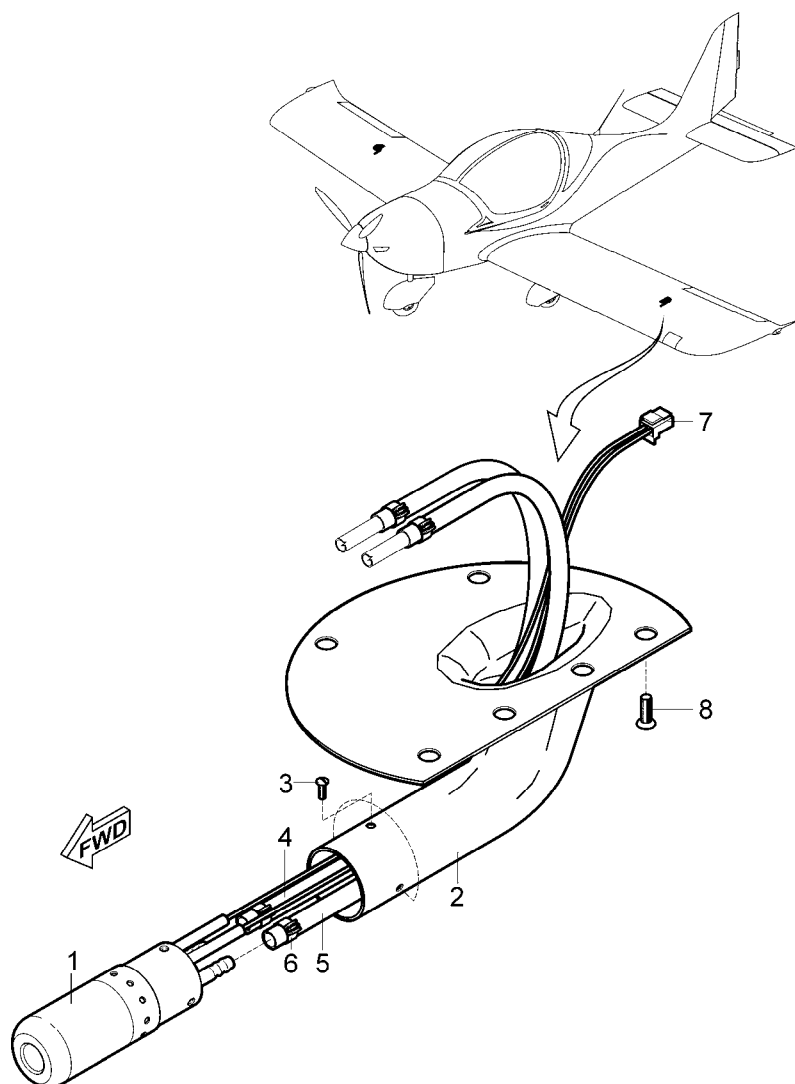


- (d) Connect the hoses (3) to the outlets on the tube (1); secure the hoses by the clamps (6) using the pliers.
- (e) Insert the tube (1) into the holder (2) and attach it by means of screws (3).

NOTE

Three small drain holes that are located in the front part of the pitot-static tube must be on the lower side.

- (f) Connect the connector with wires (7).
- (g) Set the holder (2) to the corresponding place and attach it by means of screws (8).
- (h) Check the tightness of pitot-static system (see par. 2 A(1)).
- (i) Connect the battery, switch the electrical network on.
- (j) Check the pitot-static tube heating.



Legend to Fig. 34-5

1	Pitot-static tube	5	Pitot hose
2	Holder of pitot-static tube	6	Cobra clamp
3	Screw (3 pcs.)	7	Connector with wires
4	Static hose	8	Screw M4x12 (6 pcs.)

Fig. 34-5 Heated pitot-static tube – removal / installation


D. Drain sump

Maintenance type: Line

Personnel qualification: Independent verification personnel qualified in accordance with Part 66 or higher

Recommended tools and material:

Item	Designation / Size	Quantity	Note
Gripping pliers	Cobra	1 pc.	
Nippers	-	1 pc.	
Cable tie	18x2	As needed	
Gasket of drain sump	335104	-	Delivered by the airplane manufacturer

(1) Servicing – emptying the drain sumps

CAUTION

IN THE CASE WHEN WATER OR IMPURITIES ARE DETECTED IN THE DRAIN SUMP OF PITOT-STATIC SYSTEM, EMPTY THE SUMPS.

- (a) Remove the cover F7 (Fig. 06-2); if the airplane doesn't have the cover, remove the left / right seat and the cover of control IN1L / IN1R (Fig. 06-2).
- (b) Push out the drain sump (1, Fig. 34-6) from the grommet (8).
- (c) Holding the sump head (2), unscrew the nut (4) and remove the transparent receptacle (3) with the gasket (5).
- (d) Pour the water out of the receptacle (3), clean and dry up the receptacle.

NOTE

In the case when large amount of water is detected in the drain sump, blow through the system lines by means of compressed air. During this activity, the hoses of the system must be disconnected from all the instruments of the system.

- (e) Clean and dry up the receptacle.
- (f) Check the condition of the sump gasket (5), replace the damaged gasket.
- (g) Insert the transparent receptacle (3) and the gasket (5) into the sump nut (4).
- (h) Holding the sump head (2), screw on the nut (4); carefully tighten the nut by hand.
- (i) Check the tightness of pitot-static system (see par. 2 A(1)).
- (j) Insert the drain sump (1) into the grommet (8).
- (k) Install the cover F7 (Fig. 06-2); if the airplane doesn't have the cover, install the cover of control IN1L / IN1R (Fig. 06-3) and the left / right seat.

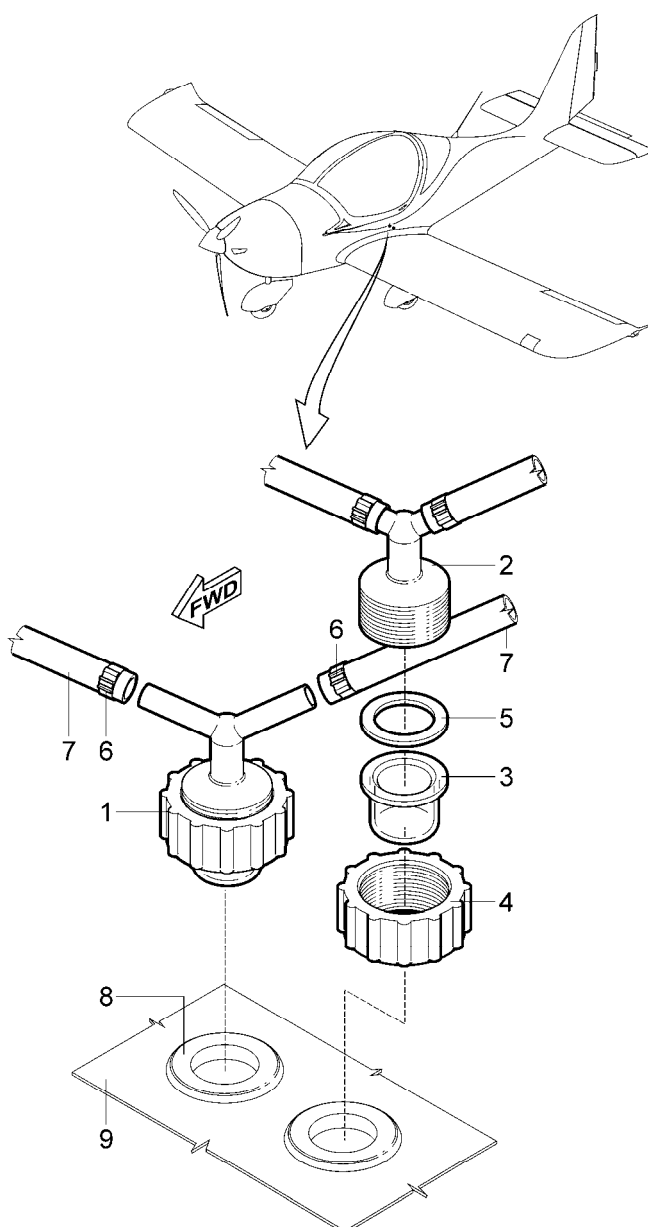


- (2) Removal – drain sump
 - (a) Remove the cover F7 (Fig. 06-2); if the airplane doesn't have the cover, remove the left / right seat and the cover of control IN1L / IN1R (Fig. 06-2).
 - (b) Push out the drain sump (1, Fig. 34-6) from the grommet (8).
 - (c) As needed, cut off the cable ties connecting the hoses.
 - (d) Release the clamps (6) by pliers and disconnect the hoses (7) from the outlets on the head of drain sump.
 - (e) Mark the hoses in a suitable way, so that they can be connected to correct outlets of the sump during installation.
 - (f) Close the outlets on the sump and the hoses by means of blind plugs.
- (3) Installation – drain sump
 - (a) Remove the blind plugs from the hoses and from the outlets on the sump.

WARNING

**WHEN CONNECTING THE HOSES TO THE OUTLETS OF
DRAIN SUMP, PAY AN ENHANCED ATTENTION IN ORDER
TO PREVENT FROM AN INCORRECT CONNECTION!**

- (b) In compliance with the record, connect the hoses (7) to the outlets on the drain sump head (1, Fig. 34-6); secure the hoses by clamps (6) using the pliers.
- (c) As needed, fasten the hoses by cable ties.
- (d) Check the tightness of pitot-static system (see par. 2 A(1)).
- (e) Insert the drain sump (1) into the grommet (8).
- (f) Install the cover F7 (Fig. 06-2); if the airplane doesn't have the cover, install the cover of control IN1L / IN1R (Fig. 06-2) and the left / right seat.



Legend to Fig. 34-6

1	Drain sump	6	Cobra clamp
2	Sump head	7	Pitot-static hose
3	Sump receptacle		For information:
4	Sump nut	8	Grommet
5	Sump gasket	9	Cover F7 or lower part of fuselage

Fig. 34-6 Drain sump – removal / installation



E. Selector valve

Maintenance type: Line

Personnel qualification: Independent verification personnel qualified in accordance with Part 66 or higher

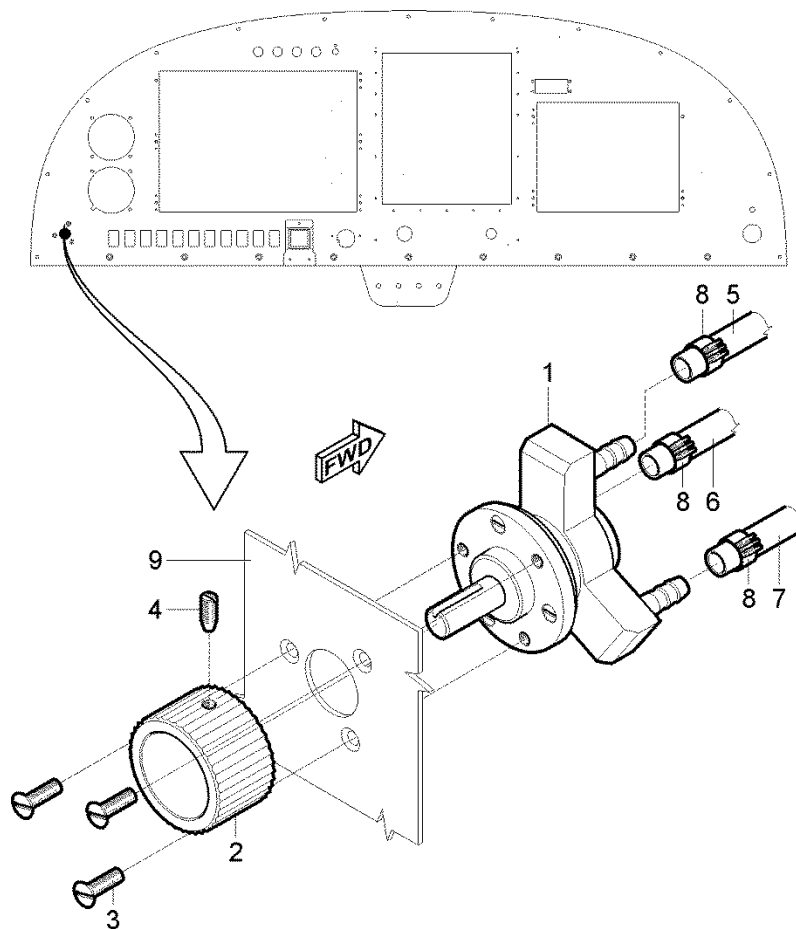
Recommended tools and material:

Item	Designation / Size	Quantity	Note
Gripping pliers	Cobra	1 pc.	
Hex wrench	No. 2	1 pc.	
Flat screwdriver	-	1 pc.	

NOTE

The selector valve is installed in the case when the second pitot-static tube is installed.

- (1) Removal – selector valve
 - (a) Remove the cover of the upper part of fuselage F4 (Section 53-30).
 - (b) Release the clamps by means of pliers (6, Fig. 34-7) and disconnect the hoses (5) from the outlets of the valve (1).
 - (c) Mark the hoses and the outlets of the valve in a suitable way, so that they can be connected to the correct outlets during installation.
 - (d) Close the outlets on the valve and the hoses by means of blind plugs.
 - (e) Loosen the screw (4) and remove the knob (2) from the shaft of the valve.
 - (f) Unscrew the screws (3) and remove the selector valve (1).
 - (g) Mark the arms of the selector valve in a suitable way, so that they can be mounted to the instrument panel in the same position during installation.
- (2) Installation – selector valve
 - (a) Set the selector valve (1, Fig. 34-7) to the corresponding position on the left side of the instrument panel (7); turn the arms of the valve to the correct position (in accordance with the marking).
 - (b) Screw on and tighten the screws (3).
 - (c) Put the knob (2) on the shaft of the selector valve and secure it by the screw (4).
 - (d) Remove the blind plugs and connect (in accordance with the marking) the hoses (5) to the outlets of the selector valve (1); secure the hoses by the clamps (6) using the pliers.
 - (e) Check the tightness of pitot-static system (see par. 2 A(1)) and the valve function.
 - (f) Install the cover of the upper part of fuselage F4 (Section 53-30).



Legend to Fig. 34-7

1	Selector valve	6	Hose of alternative source of static pressure
2	Knob	7	Hose of static pressure
3	Screw M3x10 (3 pcs.)	8	Cobra clamp
4	Screw		For information:
5	Hose of main source of static pressure	9	Instrument panel

Fig. 34-7 Selector valve – removal / installation



F. Airspeed indicator

Maintenance type: Line

Personnel qualification: Independent verification personnel qualified in accordance with Part 66 or higher

Recommended tools and material:

Item	Designation / Size	Quantity	Note
Gripping pliers	Cobra	1 pc.	
Phillips screwdriver	No. 2	1 pc.	

NOTE

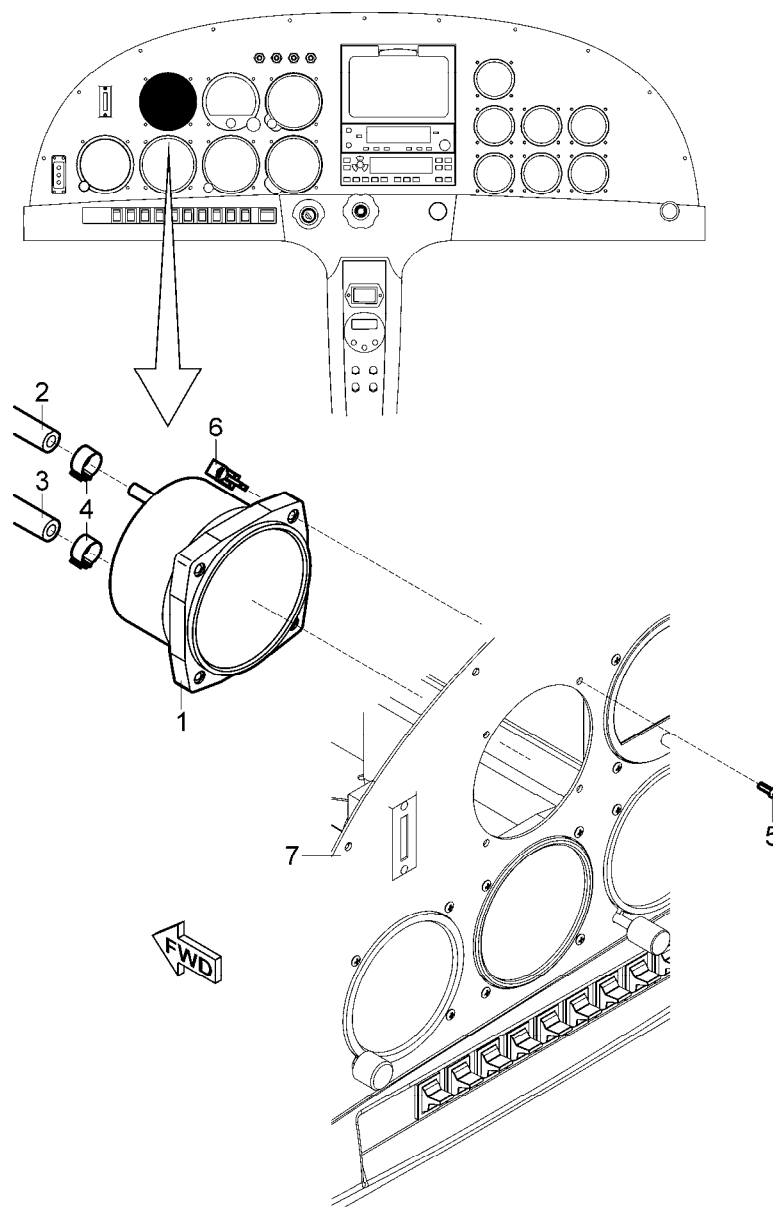
The below mentioned procedure of removal / installation also applies to the backup airspeed indicator with the airplane equipped with the Dynon SkyView system.

- (1) Removal – airspeed indicator
 - (a) Remove the cover of the upper part of fuselage F4 (Section 53-30).
 - (b) Release the clamps (4, Fig. 34-8) by means of pliers and disconnect the hoses (2; 3) from the outlets of airspeed indicator (1).
 - (c) Holding the airspeed indicator, unscrew and remove the screws (5), nuts (6) and carefully remove the airspeed indicator (1).
 - (d) Close the hoses and the outlets on the airspeed indicator by means of blind plugs.
- (2) Installation – airspeed indicator
 - (a) Remove the blind plugs from the hoses and outlets on the airspeed indicator.
 - (b) Insert the airspeed indicator (1, Fig. 34-8) into the hole in the instrument panel (7) and holding it, attach it by means of screws (5) and nuts (6).

WARNING

WHEN CONNECTING THE HOSES TO THE OUTLETS OF AIRSPEED INDICATOR, PAY AN ENHANCED ATTENTION IN ORDER TO PREVENT FROM AN INCORRECT CONNECTION! CONNECT THE HOSE MARKED AS STATIC TO THE OUTLET MARKED WITH THE LETTER AND CONNECT THE HOSE MARKED AS PITOT TO THE OUTLET MARKED WITH THE LETTER P.

- (c) Connect the hoses (2; 3) to the outlets on the airspeed indicator (1); secure the hoses by the clamps (4) using the pliers.
- (d) Check the tightness of the pitot-static system (see par. 2 A(1)).
- (e) Install the cover of the upper part of fuselage F4 (Section 53-30).



Legend to Fig. 34-8

1	Airspeed indicator	5	Screw (4 pcs.)
2	Hose of total pressure	6	Instrument mounting nut (4 pcs.)
3	Hose of static pressure		For information:
4	Cobra clamp	7	Instrument panel

Fig. 34-8 Airspeed indicator – removal / installation



G. Altimeter

Maintenance type: Line

Personnel qualification: Independent verification personnel qualified in accordance with Part 66 or higher

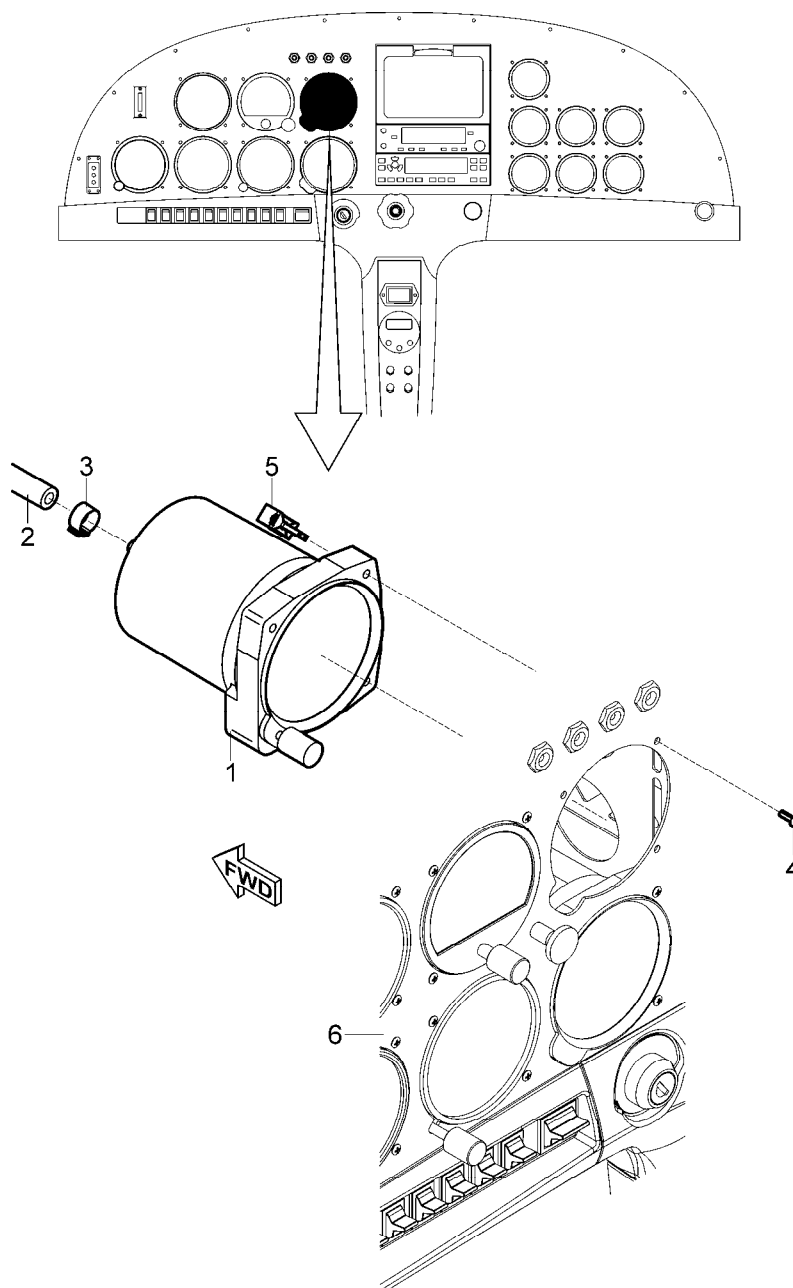
Recommended tools and material:

Item	Designation / Size	Quantity	Note
Cobra pliers	-	1 pc.	
Phillips screwdriver	No. 2	1 pc.	

NOTE

The below mentioned procedure of removal / installation also applies to the backup altimeter with the airplane equipped with the Dynon SkyView or Garmin G3X system.

- (1) Removal – altimeter
 - (a) Remove the cover of the upper part of fuselage F4 (Section 53-30).
 - (b) Release the clamp (3, Fig. 34-9) by means of pliers and disconnect the hose (2) from the outlet of altimeter (1).
 - (c) Holding the altimeter, unscrew and remove the screws (4), nuts (5) and carefully remove the altimeter (1).
 - (d) Close the hose and the outlet on the altimeter by means of blind plugs.
- (2) Installation – altimeter
 - (a) Remove the blind plugs from the hose and from the outlet on the altimeter.
 - (b) Insert the altimeter (1, Fig. 34-9) into the hole in the instrument panel (6) and holding it, attach it by means of screws (4) and nuts (5).
 - (c) Connect the hose (2) to the outlet on the altimeter (1); secure the hose by the clamp (3) using the pliers.
 - (d) Check the tightness of pitot-static system (see par. 2 A(1)).
 - (e) Install the cover of the upper part of fuselage F4 (Section 53-30).



Legend to Fig. 34-9

1	Altimeter	5	Instrument mounting nut (3 pcs.)
2	Hose of static pressure	For information:	
3	Cobra clamp	6	Instrument panel
4	Screw (3 pcs.)		

Fig. 34-9 Altimeter – removal / installation



H. Variometer

Maintenance type: Line

Personnel qualification: Independent verification personnel qualified in accordance with Part 66 or higher

Recommended tools and material:

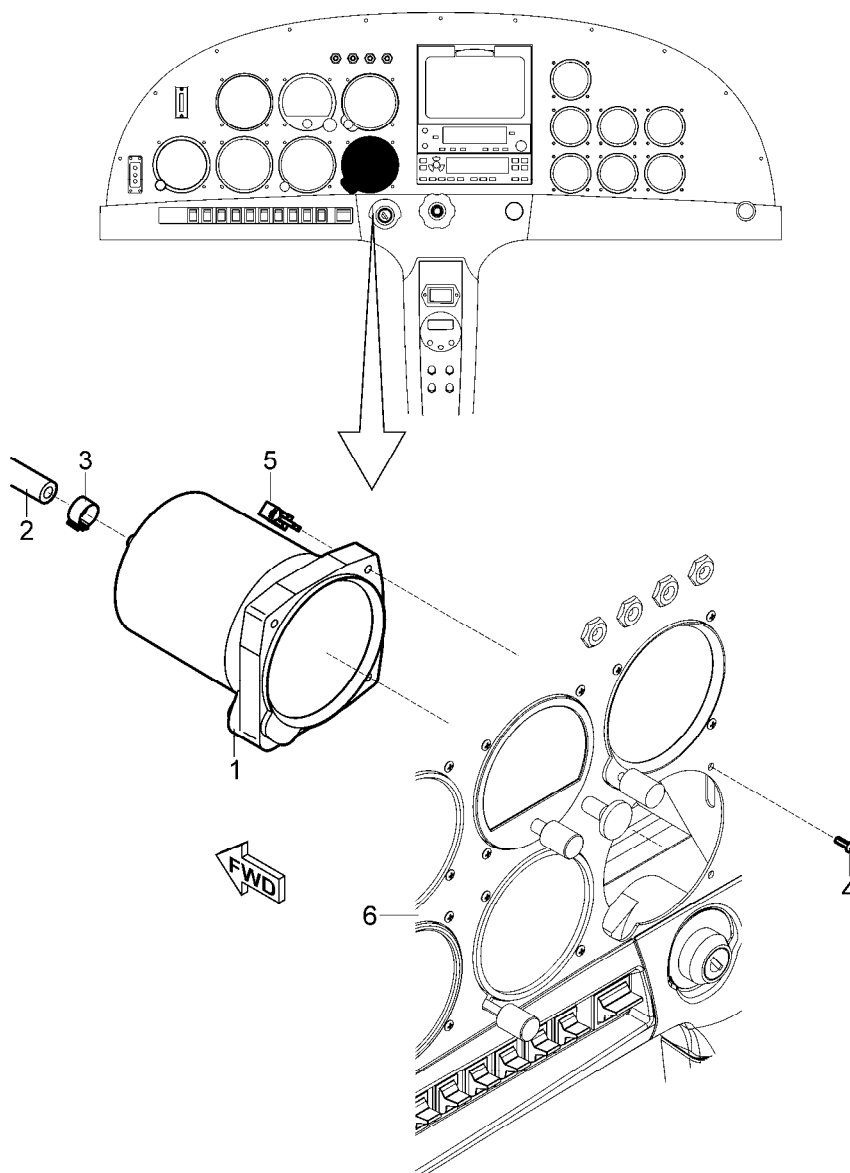
Item	Designation / Size	Quantity	Note
Cobra pliers	-	1 pc.	
Phillips screwdriver	No. 2	1 pc.	

(1) Removal – variometer

- (a) Remove the cover of the upper part of fuselage F4 (Section 53-30).
- (b) Release the clamp (3, Fig. 34-10) by pliers and disconnect the hose (2) from the outlet of variometer (1).
- (c) Holding the variometer, unscrew and remove the screws (4), nuts (5) and carefully remove the variometer (1).
- (d) Close the hose and the outlet on the variometer by means of blind plugs.

(2) Installation – variometer

- (a) Remove the blind plugs from the hose and from the outlet on the variometer.
- (b) Insert the variometer (1, Fig. 34-10) into the hole in the instrument panel (6) and holding it, attach it by means of screws (4) and nuts (5).
- (c) Connect the hose (2) to the outlet on the variometer (1); secure the hose by the clamp (3) using the pliers.
- (d) Check the tightness of pitot-static system (see par. 2 A(1)).
- (e) Install the cover of the upper part of fuselage F4 (Section 53-30).



Legend to Fig. 34-10

1	Variometer	5	Instrument mounting nut (3 pcs.)
2	Hose of static pressure		For information:
3	Cobra clamp	6	Instrument panel
4	Screw (3 pcs.)		

Fig. 34-10 Variometer – removal / installation



I. Altitude encoder

Maintenance type: Line

Personnel qualification: Independent verification personnel qualified in accordance with Part 66 or higher

Recommended tools and material:

Item	Designation / Size	Quantity	Note
Pliers	-	1 pc.	
Phillips screwdriver	No. 2	1 pc.	
Stainless lockwire	Ø 0,8 mm	-	

(1) Removal – altitude encoder

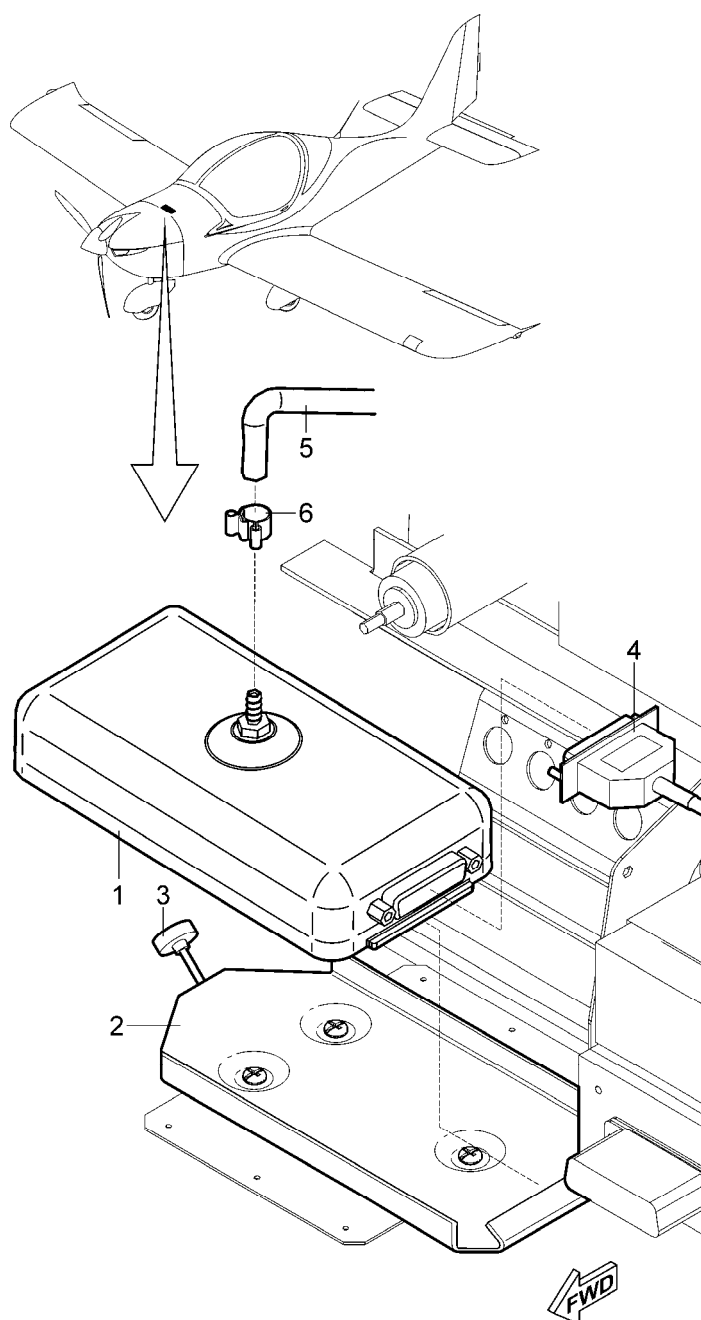
- (a) Switch the electrical network off and disconnect the battery.
- (b) Remove the cover of the upper part of fuselage F4 (Section 53-30).
- (c) Release the clamp (6, Fig. 34-11) by pliers and disconnect the hose (5) from the outlet of encoder (1).
- (d) Disconnect the connectors with wires (4).
- (e) Remove the lockwire from the nut (3) of the mounting holder; loosen the nut and carefully push out the altitude encoder (1) from the mounting holder (2).
- (f) Close the hose and the outlet on the encoder by means of blind plugs.

(2) Installation – altitude encoder

- (a) Remove the blind plug from the hose and from the outlet on the encoder.
- (b) Carefully insert the altitude encoder (1, Fig. 34-11) into the mounting holder (2) and fasten it by tightening the nut (3); secure the nut by mean of lockwire (Section 20-20).
- (c) Connect the hose (5) to the outlet on the encoder (1); secure the hose by the clamp (6) using the pliers.
- (d) Connect the connectors with wires (4).
- (e) Check the tightness of pitot-static system (see par. 2 A(1)).
- (f) Install the cover of the upper part of fuselage F4 (Section 53-30).
- (g) Connect the battery, switch the electrical network on.
- (h) Check the altitude encoder function, do the calibration as needed.

NOTE

The calibration procedure is shown in the document Model A-30 Altitude Digitizer Operational Manual Installation Manual P/N A30M, dated 2012/02/05 or in a latest valid issue.



Legend to Fig. 34-11

1	Altitude encoder	4	Connector with wires
2	Mounting holder	5	Hose of static pressure
3	Nut of mounting holder	5	Clamp

Fig. 34-11 Altitude encoder – removal / installation



J. SV-D1000 display

NOTE

The maintenance procedures of SV-D700 display are shown in Section 77-10.

Maintenance type: Line

Personnel qualification: Independent verification personnel qualified in accordance with Part 66 or higher

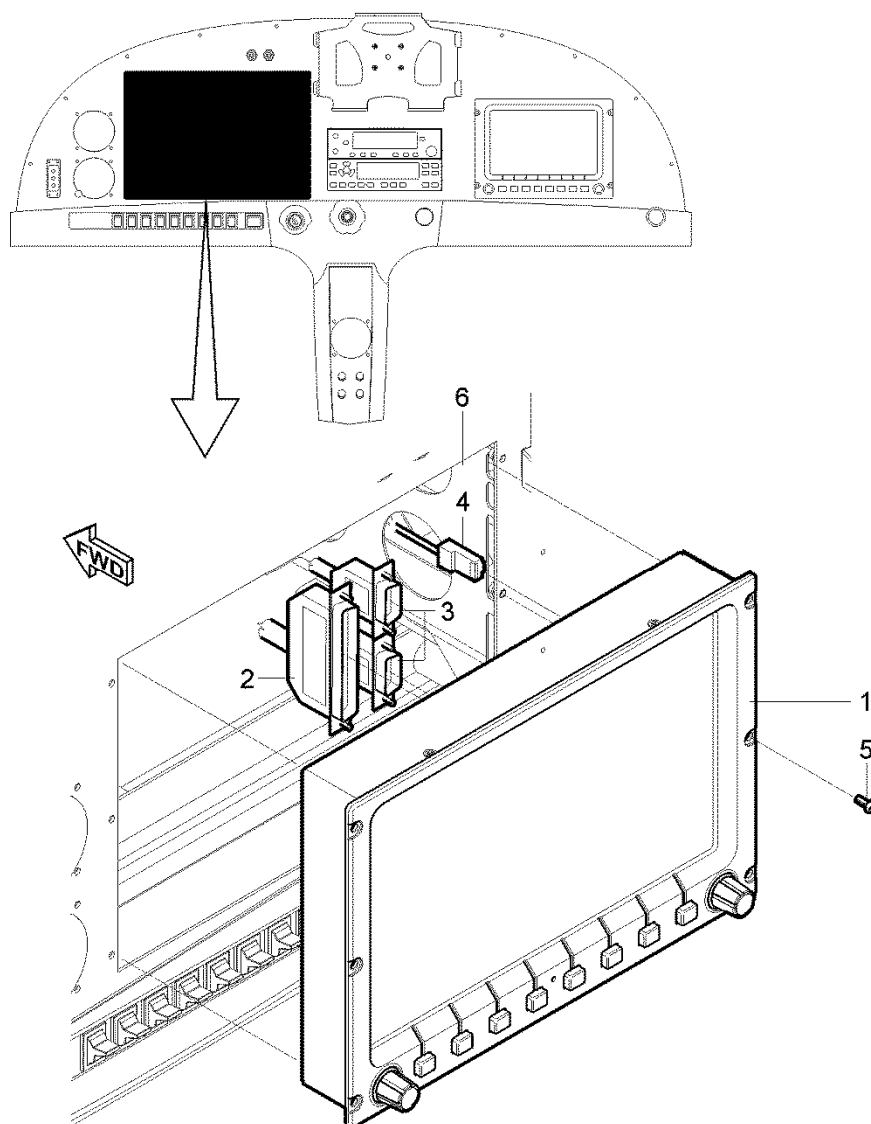
Recommended tools and material:

Item	Designation / Size	Quantity	Note
Hex wrench	5/64"	1 pc.	
Phillips screwdriver	No. 2	1 pc.	
Flat screwdriver	-	1 pc.	

WARNING

UNAUTHORIZED ENTRY TO THE SYSTEM SETTING AND NON-OBSERVANCE OF SET DOWN PROCEDURES OF SYSTEM UPDATING CAN CAUSE INCORRECT FUNCTION OR A TOTAL FAILURE OF THE WHOLE DYNON SKYVIEW SYSTEM!

- (1) Removal – SV-D1000 display
 - (a) Create a backup of the system setting (see Information Bulletin RTC-013b, the latest valid issue).
 - (b) Switch the electrical network off and disconnect the battery.
 - (c) Remove the cover of the upper part of fuselage F4 (Section 53-30).
 - (d) Unscrew the screw (5, Fig. 34-12) and release the display (1).
 - (e) Disconnect the connectors (2; 3; 4).
 - (f) Remove the display.
- (2) Installation – SV-D1000 display
 - (a) Connect the connectors (2; 3; 4, Fig. 34-12) to the display (1).
 - (b) Insert the display (1) into the hole in the instrument panel (6) and attach it by means of screws (5).
 - (c) Install the upper part of fuselage F4 (Section 53-30).
 - (d) Connect the battery, switch the electrical network on.
 - (e) In the case of display replacement, follow the Information Bulletin RTC-013b, the latest valid issue.



Legend to Fig. 34-12

1	SV-D1000 display	5	Screw (6 pcs.)
2	DB37 connector		For information:
3	DB9 network connector	6	Instrument panel
4	Ethernet connector		

Fig. 34-12 SV-D1000 display – removal / installation



K. GDU 460 PFD

NOTE

The maintenance procedures for the MFD are shown in Section 77-10.

Maintenance type: Line

Personnel qualification: Independent verification personnel qualified in accordance with Part 66 or higher

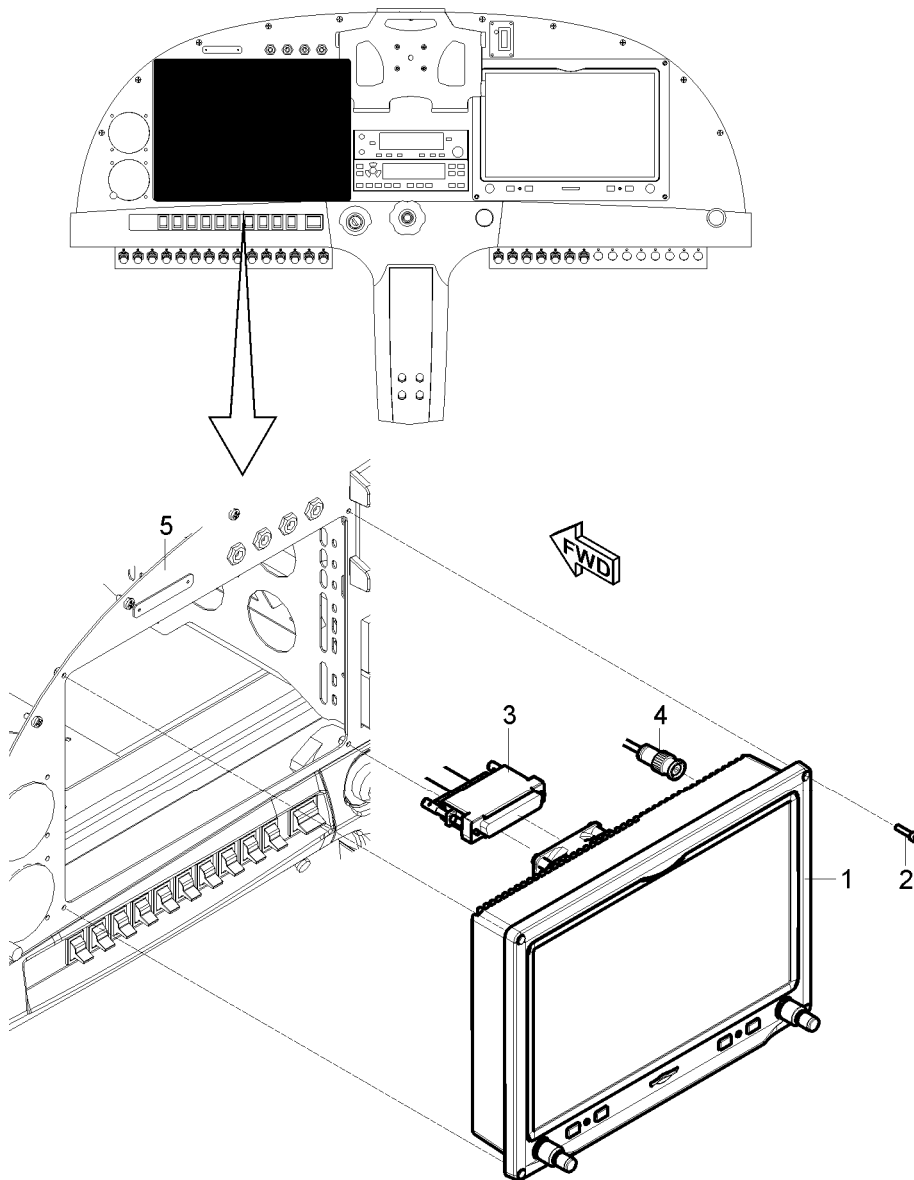
The recommended tools and material:

Item	Designation / Size	Quantity	Note
Hex wrench	3/32"	1 pc.	
Phillips screwdriver	No. 2	1 pc.	

WARNING

UNAUTHORIZED ENTRY TO THE SYSTEM SETTING AND NON-OBSERVANCE OF SET DOWN PROCEDURES OF SYSTEM UPDATING CAN CAUSE INCORRECT FUNCTION OR A TOTAL FAILURE OF THE WHOLE GARMIN G3X SYSTEM!

- (1) Removal – GDU 460 PFD
 - (a) Switch the electrical network off and disconnect the battery.
 - (b) Remove the cover of the upper part of the fuselage F4 (Section 53-30).
 - (c) Unscrew the screws (2, Fig. 34-13) and release the display (1).
 - (d) Disconnect the connectors (3; 4).
 - (e) Remove the display.
- (2) Installation – GDU 460 PFD
 - (a) Connect the connectors (3; 4, Fig. 34-13) to the display (1).
 - (b) Insert the display (1) into the hole in the instrument panel (5) and attach it by means of the screws (2).
 - (c) Install the upper part of the fuselage F4 (Section 53-30).
 - (d) Connect the battery, switch the electrical network on.
 - (e) Check the PFD function.



Legend to Fig. 34-13

1	GDU 460 PFD	4	GPS antenna connector
2	Screw (4 pcs.)		For information:
3	P4602 connector	5	Instrument panel

Fig. 34-13 GDU 460 PFD – removal / installation



L. Outside air thermometer

Maintenance type: Line

Personnel qualification: Independent verification personnel qualified in accordance with Part 66 or higher

Recommended tools and material:

Item	Designation / Size	Quantity	Note
Phillips screwdriver	No. 2	1 pc.	

- (1) Removal – outside air thermometer
 - (a) Switch the electrical network off and disconnect the battery.
 - (b) Remove the cover of the upper part of fuselage F4 (Section 53-30).
 - (c) Disconnect the wires (2, Fig. 34-14).
 - (d) Unscrew the screws (3) and remove the thermometer (1).

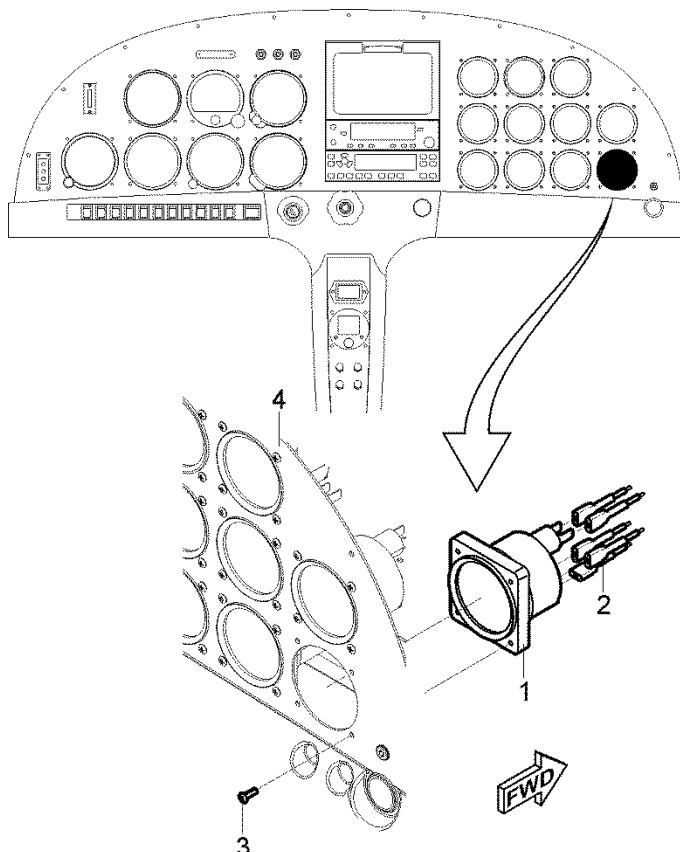


Fig. 34-14 Outside air thermometer – removal / installation (page 1 of 2)



Legend to Fig. 34-14

1 OAT thermometer	For information:
2 Wires	4 Instrument panel
3 Screw (4 pcs.)	

Fig. 34-14 Outside air thermometer – removal / installation (page 2 of 2)

- (2) Installation – outside air thermometer
- (a) Insert the indicator (1, Fig. 34-14) into the hole in the instrument panel (4); screw on and tighten the screws (3).
 - (b) Connect the wires (2).
 - (c) Install the cover of the upper part of fuselage F4 (Section 53-30).
 - (d) Connect the battery, switch the electrical network on.
 - (e) Check the OAT indicator function.

M. SV-OAT-340 sensor

NOTE

The sensor is installed in the case of Dynon SkyView system installation.

Maintenance type: Line

Personnel qualification: Independent verification personnel qualified in accordance with Part 66 or higher

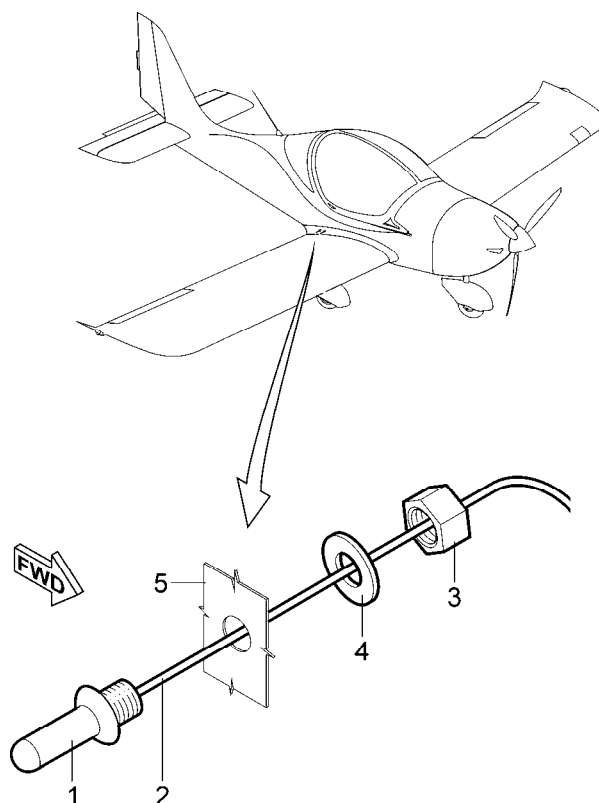
Recommended tools and material:

Item	Designation / Size	Quantity	Note
Wrench	9/16"	1 pc.	Alternatively No. 14
Cable tie	3,6x142	5 pcs.	

NOTE

Removal / installation procedure is identical for both OAT sensors.

- (1) Removal – SV-OAT-340 sensor
- (a) Switch the electrical network off and disconnect the battery.
 - (b) Remove the cover IN4 and the floor of baggage compartment IN3 (Fig. 06-2).
 - (c) Disconnect the sensor connector from the SV-ADAHRS 200 / 201 module.
 - (d) Cut off the cable ties fastening the sensor cable (2, Fig. 34-15) to the harness or to the airframe.
 - (e) Remove the connector from cable (2); pull out the cable from the tube in the fuselage.
 - (f) Unscrew and remove the nut (3) and the washer (4).
 - (g) Remove the sensor (1) with cable (2).



Legend to Fig. 34-15

1	Sensor SV-OAT-340	4	Washer
2	Cable		For information:
3	Nut	5	Right side skin of fuselage

Fig. 34-15 SV-OAT-340 sensor – removal / installation

(2) Installation – SV-OAT-340 sensor

- (a) Insert the sensor (1, Fig. 34-15) with cable (2) into the corresponding hole in the skin (5).
- (b) Put the washer (4) and the nut (3) on the cable (2); screw the nut on the sensor (1) and tighten it by hand.
- (c) Pull the cable (2) through the tube in the fuselage.
- (d) Put the connector on the cable (2).

NOTE

Use wiring diagram shown in Chapter 91.

- (e) Connect the connector to the SV-ADAHRS 200 / 201 module.
- (f) Install the cover IN4 and the floor of baggage compartment IN3 (Fig. 06-2).
- (g) Connect the battery, switch the electrical network on.
- (h) Check the OAT sensor function; set the OAT offset as needed.



NOTE

The procedure for setting the OAT offset is shown in the document Dynon SkyView System Installation Guide, Document 101320-022, Revision W, dated January 2016 or in a latest valid issue.

N. OAT Mitchell D1-211-5122 sensor

NOTE

The sensor is installed in the case of OAT analog indicator installation.

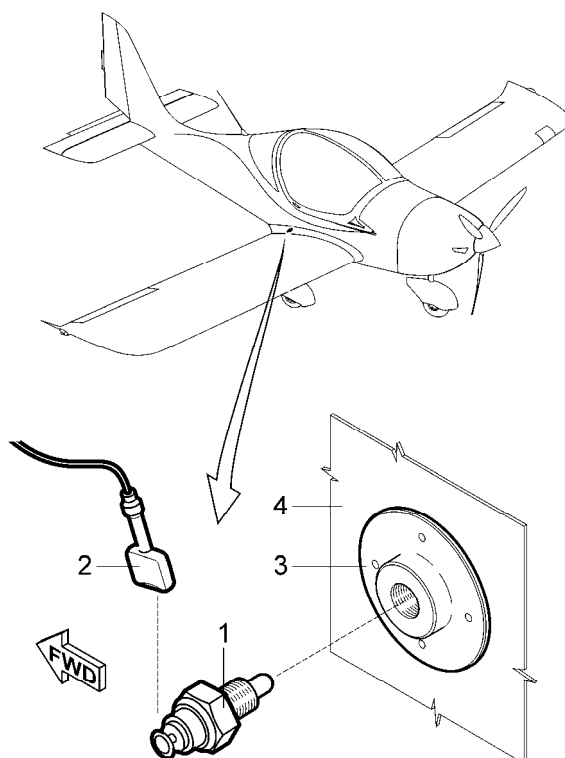
Maintenance type: Line

Personnel qualification: Independent verification personnel qualified in accordance with Part 66 or higher

Recommended tools and material:

Item	Designation / Size	Quantity	Note
Socket wrench	No. 12	1 pc.	

- (1) Removal – OAT Mitchell D1-211-5122 sensor
 - (a) Switch the electrical network off and disconnect the battery.
 - (b) Remove the cover IN4 and the floor of baggage compartment IN3 (Fig. 06-2).
 - (c) Push out the connector (2, Fig. 34-16) upwards.
 - (d) Unscrew and remove the sensor (1).
- (2) Installation – OAT Mitchell D1-211-5122 sensor
 - (a) Screw the sensor (1, Fig. 34-16) into the holder (3).
 - (b) Connect the connector (2) to the sensor (1).
 - (c) Install the cover IN4 and the floor of baggage compartment IN3 (Fig. 06-2).
 - (d) Connect the battery, switch the electrical network on.
 - (e) Check the sensor function.



Legend to Fig. 34-16

1	OAT sensor	For information	
2	Connector with wires	4	Right side skin of fuselage
3	Holder		

Fig. 34-16 OAT Mitchell D1-211-5122 sensor – removal / installation

A. GTP 59 OAT sensor

NOTE

The sensor is installed in the case of Garmin G3X system installation.

Maintenance type: Line

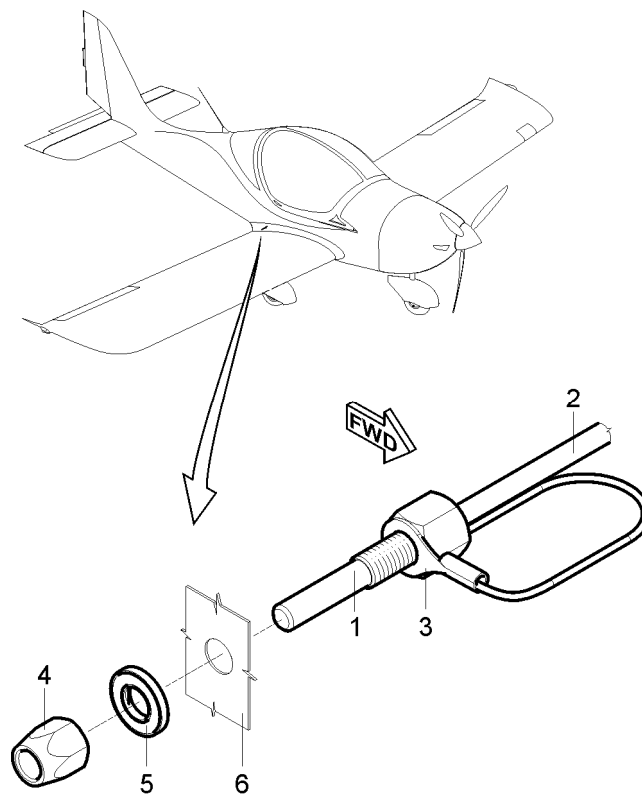
Personnel qualification: Independent verification personnel qualified in accordance with Part 66 or higher

Recommended tools and material:

Item	Designation / Size	Quantity	Note
Wrench	1/2"	1 pc.	Alternatively No. 12
Torque wrench	0 – 10 Nm	1 pc.	
Cable tie	3,6x142	5 pcs.	



- (1) Removal – GTP 59 OAT sensor
 - (a) Switch the electrical network off and disconnect the battery.
 - (b) Remove the cover IN4 and the floor of baggage compartment IN3 (Fig. 06-2).
 - (c) Disconnect the sensor connector from the GSU 25 ADAHRS main unit.
 - (d) Cut off the cable ties fastening the sensor cable (2, Fig. 34-17) to the harness or to the airframe.
 - (e) Remove the connector from cable (2); pull out the wires from the tube in the fuselage.
 - (f) Unscrew and remove the nut (3) and the washer (4).
 - (g) Remove the sensor (1) with cable (2).



Legend to Fig. 34-17

1	GTP 59 OAT sensor	5	Washer
2	Cable		For information:
3	Ring terminal	6	Right side skin of fuselage
4	Nut		

Fig. 34-17 GTP 59 OAT sensor – removal / installation



- (2) Installation – GTP 59 OAT sensor
 - (a) Place the ring terminal (3, Fig. 34-17) over the end of the sensor (1).
 - (b) Insert the sensor (1) with cable (2) into the corresponding hole in the skin (6).
 - (c) Put the washer (5) and screw the nut (3) on sensor (1); tighten the nut with torque 11 ± 2 Nm (100 ± 20 lb in) screw and the nut on the sensor (1) and tighten it by hand.
 - (d) Pull the cable (2) through the tube in the fuselage.
 - (e) Put the connector on the cable (2).

NOTE

Use wiring diagram shown in Chapter 91.

- (f) Connect the connector to the GSU 25 ADAHRS main unit.
- (g) Install the cover IN4 and the floor of baggage compartment IN3 (Fig. 06-2).
- (h) Connect the battery, switch the electrical network on.
- (i) Check the OAT sensor function.



ATTITUDE AND DIRECTION

1. DESCRIPTION AND OPERATION

On the airplane with analog instruments, the position and direction of flight is indicated on the electric attitude horizon, directional gyro and the turn and bank indicator.

On the airplane equipped with the Dynon SkyView system, the position and direction of flight is indicated on the displays of the system where the data from the SV-ADAHRS-200 / 201 modules are indicated.

On the airplane equipped with the Garmin G3X system, the position and direction of flight is indicated on PFD, where the data from the GSU 25 ADAHRS unit are indicated.

The airplane magnetic course is indicated on the magnetic compass that is part of both instrument variants.

A. Attitude horizon

The electric attitude horizon is a gyroscopic instrument with direct indication that is used for indication of airplane pitching and banking in relation to the horizontal plane. The attitude horizon function is based on the principle of a flywheel with the vertical axis of rotation that is mounted in the gimbal suspension. After switching on, the flywheel starts spinning and keeps the device always in the same position in relation to the Earth's surface. The horizon is located on the left part of the instrument panel.

The wiring diagram of the horizon is shown in Chapter 91.

B. Directional gyro

The electrical directional gyro is a gyroscopic device indicating the actual direction of the airplane axis in relation to the reference direction, i.e. to the geographic north pole. The direction gyro function is based on the principle of a flywheel with the horizontal axis of rotation that is mounted in the gimbal suspension. The directional gyro is located on the left part of instrument panel.

The wiring diagram of the directional gyro is shown in Chapter 91.

C. Turn and bank indicator

The turn and bank indicator is a gyroscopic instrument that indicates the angle speed of airplane turning around the vertical axis. The turn and bank indicator function is based on the principle of a flywheel with the horizontal axis of rotation, across the instrument that is mounted in the attachment with one degree of freedom. The liquid turn and slip indicator for indication of banking at turning is part of the turn and bank indicator. The turn and bank indicator is located in the left part of instrument panel.

The wiring diagram of the turn and bank indicator is shown in Chapter 91.

D. SV-ADAHRS-200 / 201 modules

The modules SV-ADAHRS-200 (main) and SV-ADAHRS-201 (backup) are part of the Dynon SkyView system and represent the air data computer and the gyroscopic system of determination of airplane position and heading.

The air data computer collects data for the displays of the SkyView system. It includes the digital sensors for calculation of pressure altitude and flight speed. The modules are connected



to the lines of static pressure and total pressure (see Fig. 34-1). The gyroscopic system of determination of airplane position and heading is a 9-axis measuring system that uses angular speed sensors, accelerometers and gyro-induction magnetometers for determination of precise airplane position in the space. The processed data is then handed over to the displays of the SkyView system. The modules are located under the floor in the baggage compartment.

The wiring diagram of the SkyView system is shown in Chapter 91.

NOTE

The detailed description and information concerning the Dynon SkyView system operation are shown in the document Dynon SkyView System Installation Guide, Document 101320-022, Revision W, dated January 2016 or in a latest valid issue.

E. GSU 25 ADAHRS units

The GSU 25 provides AHRS and Air Data information in a single mechanical package. The GSU 25 interfaces to a remote mounted magnetometer for heading information and also computes OAT and TAS from inputs provided by the OAT sensor. The air data computer collects data for the PDF. It includes the digital sensors for calculation of pressure altitude and flight speed. The units are connected to the lines of static pressure and total pressure (see Fig. 34-1). The processed data is then handed over to the displays of the G3X system. The modules are located under the floor in the baggage compartment.

F. GMU 22 magnetometer

The GMU 22 magnetometer is a remote mounted device that interfaces with the GSU 25 ADAHRS to provide flight attitude and heading data for flight instrumentation. An attitude and heading reference system combines the functions of a vertical gyro and a directional gyro to provide measurement of roll, pitch, and heading angles. The magnetometer is located at the aft part of the fuselage.

The wiring diagram of the Garmin G3X system is shown in Chapter 91.

NOTE

The detailed description and the information concerning the operation of the Garmin G3X system are available in the document Garmin G3X/G3X Touch Installation Manual, Document 190-01115-01, Revision AC, dated July 2017 or in a later valid issue.

G. Magnetic compass

The liquid magnetic compass serves for indication of airplane magnetic heading. The magnetic compass function is based on the principle of Earth's magnetic field action on the magnetic needle that is always set to the direction towards the magnetic pole. It indicates the airplane axis direction in relation to the magnetic north.

The magnetic compass is equipped with the compensation device that allows minimization of magnetic errors created by mechanical and electrical characteristics of the airplane.

The compass is located on the middle column of the cockpit canopy. Optionally can be installed the lighted magnetic compass.



2. MAINTENANCE PRACTICES

A. Attitude horizon

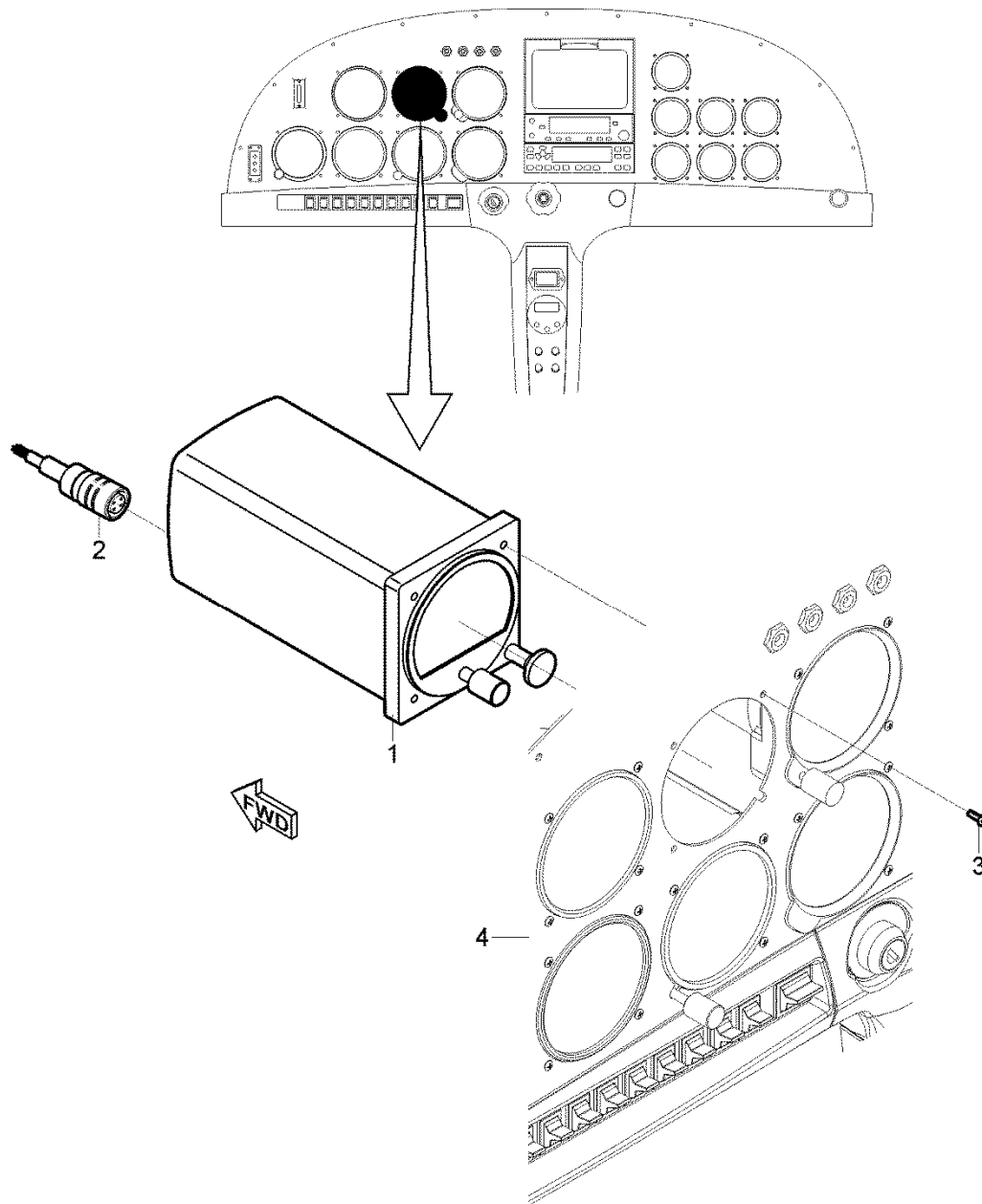
Maintenance type: Line

Personnel qualification: Independent verification personnel qualified in accordance with Part 66 or higher

Recommended tools and material:

Item	Designation / Size	Quantity	Note
Phillips screwdriver	No. 2	1 pc.	

- (1) Removal – attitude horizon
 - (a) Switch the electrical network off and disconnect the battery.
 - (b) Remove the cover of the upper part of the fuselage F4 (Section 53-30).
 - (c) Disconnect the connector (2, Fig. 34-18).
 - (d) Unscrew the screws (3) and remove the horizon (1).
- (2) Installation – attitude horizon
 - (a) Insert the attitude horizon (1, Fig. 34-18) into the hole in the instrument panel (4); screw on and tighten the screws (3).
 - (b) Connect the connector (2).
 - (c) Install the cover of the upper part of the fuselage F4 (Section 53-30).
 - (d) Connect the battery, switch the electrical network on.
 - (e) Do the verification flight and check the instrument function.



Legend to Fig. 34-18

- 1 Attitude horizon
- 2 Connector with wires
- 3 Screw (4 pcs.)

For information:

- 4 Instrument panel

Fig. 34-18 Attitude horizon – removal / installation

**B. Directional gyro**

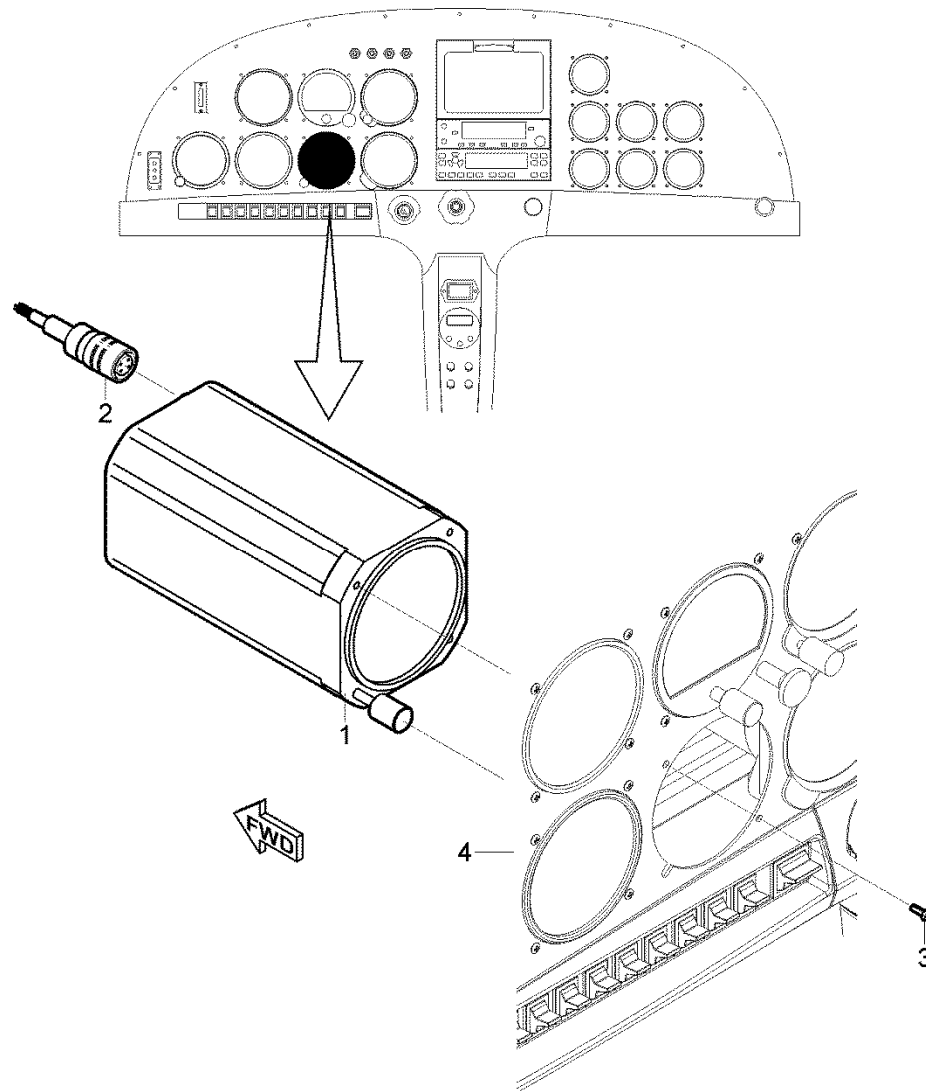
Maintenance type: Line

Personnel qualification: Independent verification personnel qualified in accordance with Part 66 or higher

Recommended tools and material:

Item	Designation / Size	Quantity	Note
Phillips screwdriver	No. 2	1 pc.	

- (1) Removal – directional gyro
 - (a) Switch the electrical network off and disconnect the battery.
 - (b) Remove the cover of the upper part of the fuselage F4 (Section 53-30).
 - (c) Disconnect the connector (2, Fig. 34-19).
 - (d) Unscrew the screws (3) and remove the directional gyro (1).
- (2) Installation – directional gyro
 - (a) Insert the directional gyro (1, Fig. 34-19) into the hole in the instrument panel (4); screw on and tighten the screws (3).
 - (b) Connect the connector (2).
 - (c) Install the cover of the upper part of the fuselage F4 (Section 53-30).
 - (d) Connect the battery, switch the electrical network on.
 - (e) Do the verification flight and check the instrument function.



Legend to Fig. 34-19

- 1 Directional gyro
- 2 Connector with wires
- 3 Screw (3 pcs.)

For information:

- 4 Instrument panel

Fig. 34-19 Directional gyro – removal / installation


C. Turn and bank indicator

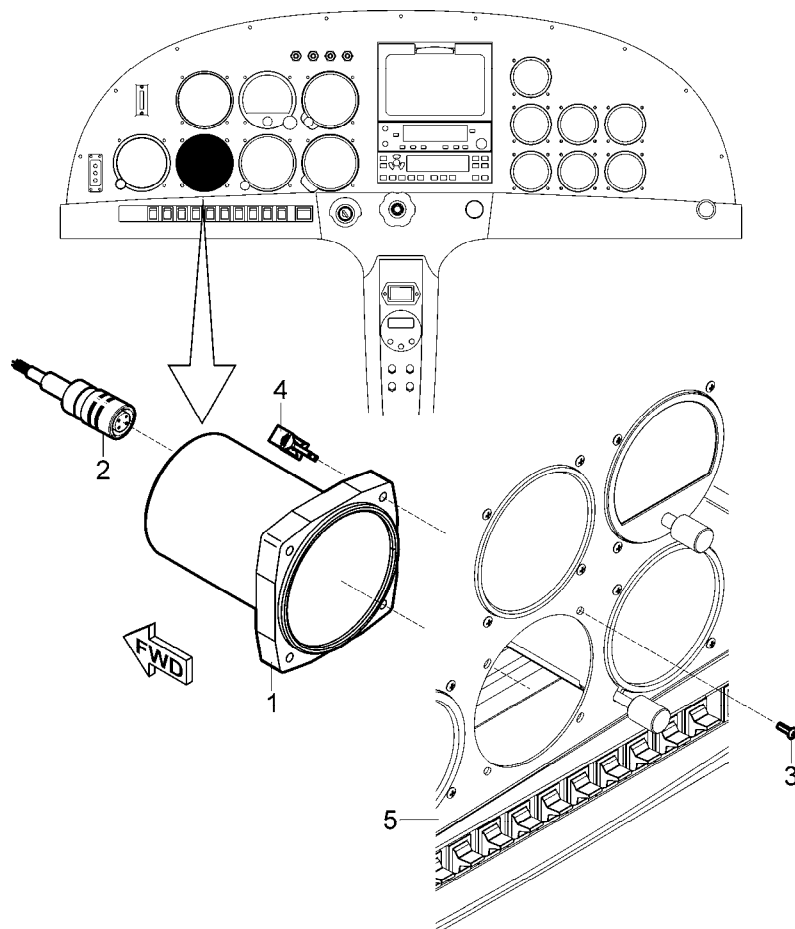
Maintenance type: Line

Personnel qualification: Independent verification personnel qualified in accordance with Part 66 or higher

Recommended tools and material:

Item	Designation / Size	Quantity	Note
Phillips screwdriver	No. 2	1 pc.	

- (1) Removal – turn and bank indicator
 - (a) Switch the electrical network off and disconnect the battery.
 - (b) Remove the cover of the upper part of the fuselage F4 (Section 53-30).
 - (c) Disconnect the connector (2, Fig. 34-20).
 - (d) Unscrew and remove the screws (3), nuts (4) and remove the turn and bank indicator (1).
- (2) Installation – turn and bank indicator
 - (a) Insert the turn and bank indicator (1, Fig. 34-20) into the hole in the instrument panel (5), attach it by means of screws (3) and nuts (4).
 - (b) Connect the connector (2).
 - (c) Install the cover of the upper part of the fuselage F4 (Section 53-30).
 - (d) Connect the battery, switch the electrical network on.
 - (e) Do the verification flight and check the instrument function.



Legend to Fig. 34-20

1	Turn and bank indicator	4	Instrument mounting nut (4 pcs.)
2	Connector with wires	For information:	
3	Screw (4 pcs.)	5	Instrument panel

Fig. 34-20 Turn and bank indicator – removal / installation


D. SV-ADAHRS-200 / 201 modules

Maintenance type: Line

Personnel qualification: Independent verification personnel qualified in accordance with Part 66 or higher

Recommended tools and material:

Item	Designation / Size	Quantity	Note
Wrench	No. 7	1 pc.	
Wrench	No. 8	1 pc.	
Wrench	No. 12	1 pc.	
Phillips screwdriver	No. 2	1 pc.	
Gripping pliers	Cobra	1 pc.	

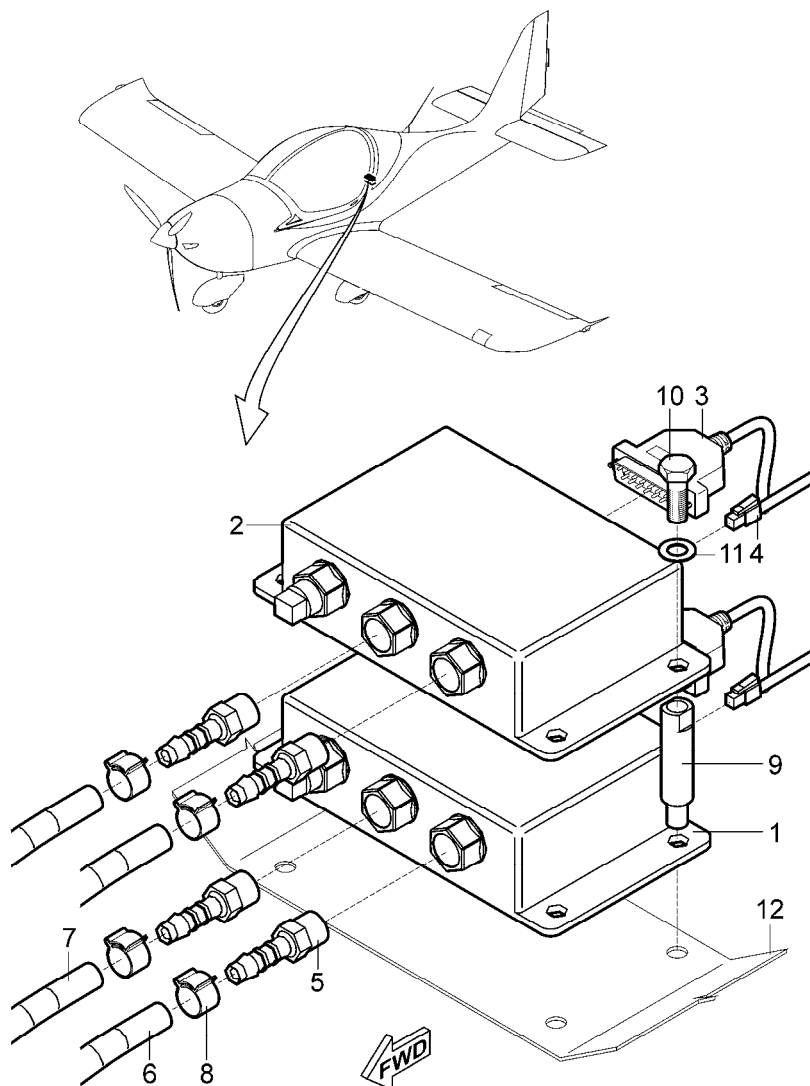
WARNING

UNAUTHORIZED ENTRY TO THE SYSTEM SETTING AND NON-OBSERVANCE OF THE SET DOWN PROCEDURES OF SYSTEM UPDATING CAN CAUSE INCORRECT FUNCTION OR A TOTAL FAILURE OF THE WHOLE DYNON SKYVIEW SYSTEM!

- (1) Removal – SV-ADAHRS-201 backup module
 - (a) Switch the electrical network off and disconnect the battery.
 - (b) Remove the cover IN4 (Fig. 06-2).
 - (c) Release the clamps (8, Fig. 34-21) by pliers and disconnect the hoses (6; 7) from the outlets of the module.
 - (d) Disconnect the connectors with cable (3; 4).
 - (e) Unscrew and remove the screws (10) with washers (11).
 - (f) Remove the module (2).
 - (g) As needed, unscrew the outlets (5) from the module.
 - (h) Close the hoses and the outlets or the screw fittings on the module by means of blind plugs.
- (2) Installation – SV-ADAHRS-201 backup module
 - (a) Remove the blind plugs from the hoses and outlets or screw fittings on the module.
 - (b) As needed, screw the outlets (5, Fig. 34-21) into the module (2) and tighten them.
 - (c) Set the module (2) to position on the columns (9) and attach it by means of screws (10) with washers (11).
 - (d) Connect the connectors with cable (3; 4).
 - (e) Connect the hoses (6; 7) to the outlets on the module (1); secure the hoses by clamps (8) by means of pliers.
 - (f) Check the pitot-static system tightness (Section 34-10).
 - (g) Connect the battery, switch the electrical network on.



- (h) In the case of module replacement, proceed in accordance with Information Bulletin RTC-013b, the latest valid issue.
- (i) Install the cover IN4 (Fig. 06-2).
- (3) Removal – SV-ADAHRS-200 main module
 - (a) Switch the electrical network off and disconnect the battery.
 - (b) Remove the cover IN4 (Fig. 06-2).
 - (c) Remove the backup module (2, Fig. 34-21) (see par. 2 D (1)).
 - (d) Release the clamps (8) by pliers and disconnect the hoses (6; 7) from the module outlets.
 - (e) Disconnect the connectors with cables (3; 4).
 - (f) Unscrew and remove the columns (9).
 - (g) Remove the module (1).
 - (h) As needed, unscrew the outlets (5) from the module.
 - (i) Close the hoses and the outlets or the screw fitting on the module by means of blind plugs.
- (4) Installation – SV-ADAHRS-200 main module
 - (a) Remove the blind plugs from the hoses and outlets or the screw fitting on the module.
 - (b) As needed, screw the outlets (5, Fig. 34-21) into the module (1) and tighten them.
 - (c) Set the module (1) to position on the bracket (12) and attach it by means of columns (9).
 - (d) Connect the connectors with cables (3; 4).
 - (e) Connect the hoses (6; 7) to the outlets on the module (1); secure the hoses by the clamps (8) using the pliers.
 - (f) Install the backup module (2) (see paragraph 2 D.(2)).
 - (g) Check the pitot-static system tightness (Section 34-10).
 - (h) Connect the battery, switch the electrical network on.
 - (i) In the case of module replacement, proceed in accordance with Information Bulletin RTC-013b, the latest valid issue.
 - (j) Install the cover IN4 (Fig. 06-2).



Legend to Fig. 34-21

1	Main module SV-ADAHRS-200	8	Cobra clamp
2	Backup module SV-ADAHRS-201	9	Column (4 pcs.)
3	DB9 network connector	10	Screw M4x10 (4 pcs.)
4	Connector of OAT sensor	11	Washer 4,3 (4 pcs.)
5	Outlet	For information:	
6	Hose of static pressure	12	Bracket
7	Hose of total pressure		

Fig. 34-21 SV-ADAHRS-200 / 201 modules – removal / installation



E. GSU 25 ADAHRS unit

Maintenance type: Line

Personnel qualification: Independent verification personnel qualified in accordance with Part 66 or higher

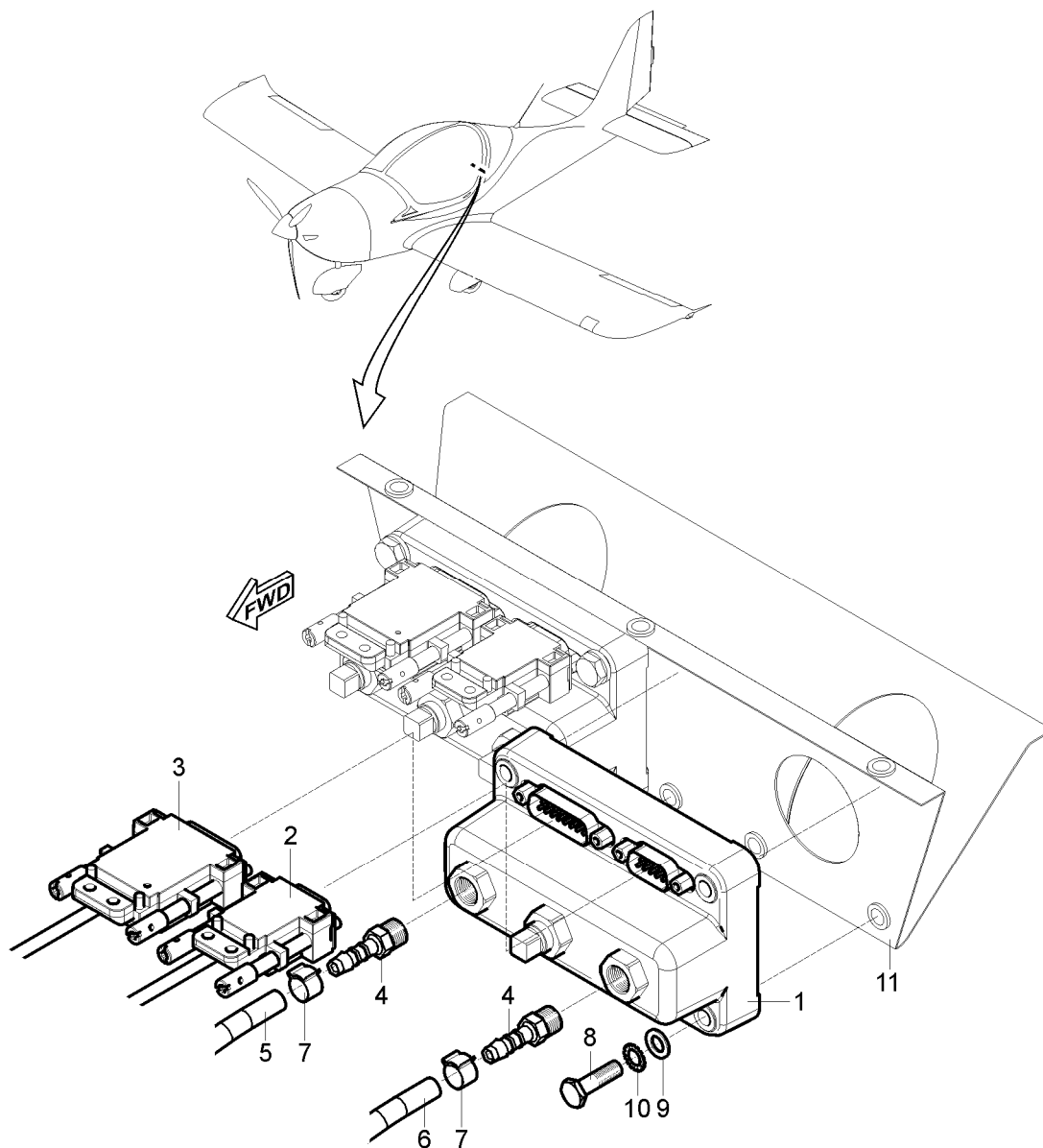
Recommended tools and material:

Item	Designation / Size	Quantity	Note
Wrench	3/8"	1 pc.	Alternatively No. 12
Wrench	No. 12	1 pc.	
Phillips screwdriver	No. 2	1 pc.	
Gripping pliers	Cobra	1 pc.	

NOTE

Removal / installation procedure is identical for both units.

- (1) Removal – GSU 25 ADAHRS unit
 - (a) Switch the electrical network off and disconnect the battery.
 - (b) Remove the cover IN4 (Fig. 06-2).
 - (c) Release the clamps (7, Fig. 34-22) by pliers and disconnect the hoses (5; 6) from the outlets of the unit.
 - (d) Disconnect the connectors with cables (2; 3).
 - (e) Unscrew and remove the bolts (8) with washers (9; 10).
 - (f) Remove the unit (1).
 - (g) As needed, unscrew the outlets (4) from the unit.
 - (h) Close the hoses and the outlets or the screw fittings on the unit by means of blind plugs.
- (2) Installation – GSU 25 ADAHRS unit
 - (a) Remove the blind plugs from the hoses and outlets or screw fittings on the unit.
 - (b) As needed, screw the outlets (4, Fig. 34-22) into the unit (1) and tighten them.
 - (c) Set the unit (1) to position on the bracket (11) and attach it by means of bolts (8) with washers (9; 10).
 - (d) Connect the connectors with cables (2; 3).
 - (e) Connect the hoses (5; 6) to the outlets on the unit (1); secure the hoses by clamps (7) by means of pliers.
 - (f) Check the pitot-static system tightness (Section 34-10).
 - (g) Install the cover IN4 (Fig. 06-2).
 - (h) Connect the battery, switch the electrical network on and .
 - (i) Check the ADAHRS unit function.



Legend to Fig. 34-22

1	GSU 25 ADAHRS unit	7	Cobra clamp
2	P251 connector	8	Bolt (4 pcs.)
3	P252 connector	10	Washer (4 pcs.)
4	Outlet	11	Lockwasher (4 pcs.)
5	Hose of static pressure		For information:
6	Hose of total pressure	12	Bracket

Fig. 34-22 GSU 25 ADAHRS unit – removal / installation



F. GMU 22 magnetometer

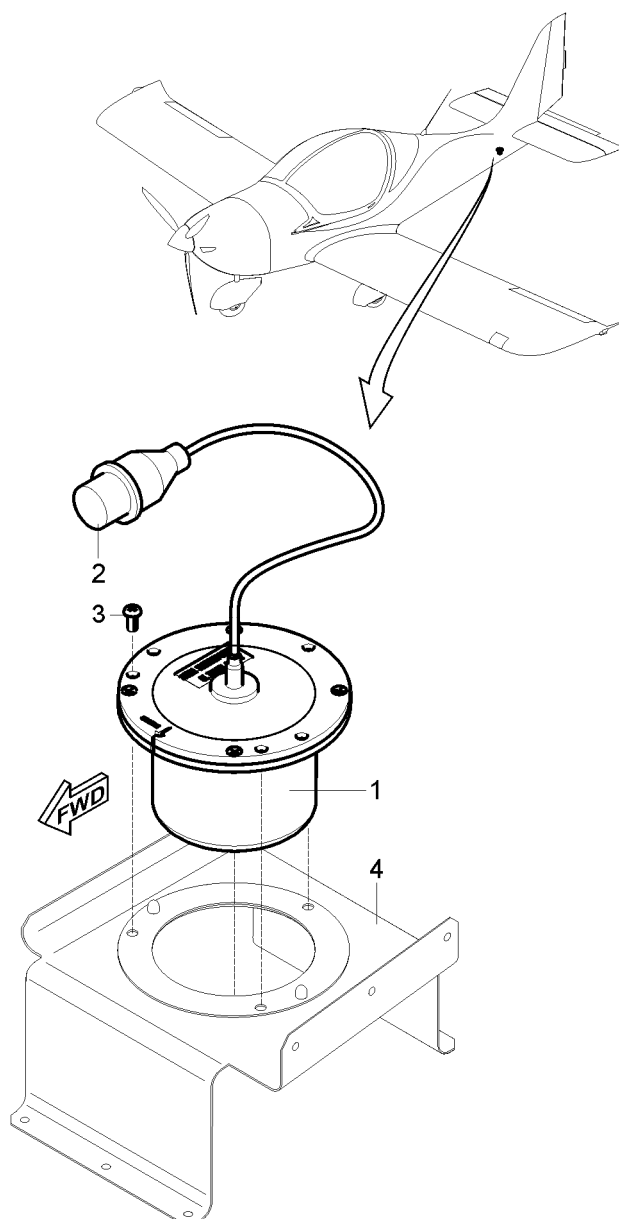
Maintenance type: Line

Personnel qualification: Independent verification personnel qualified in accordance with Part 66 or higher

Recommended tools and material:

Item	Designation / Size	Quantity	Note
Phillips screwdriver	No. 2	1 pc.	Non-magnetic

- (1) Removal – GMU 22 magnetometer
 - (a) Switch the electrical network off and disconnect the battery.
 - (b) Remove the cover F5 (Fig. 06-2).
 - (c) Disconnect the connector with cables (2, Fig. 34-23).
 - (d) Unscrew and remove the screws (3).
 - (e) Remove the magnetometer (1).
- (2) Installation – GMU 22 magnetometer
 - (a) Set the magnetometer (1, Fig. 34-23) to position on the bracket (4) and attach it by means of screws (3).
 - (b) Connect the connector with cables (2; 3).
 - (c) Install the cover IN4 (Fig. 06-2).
 - (d) Connect the battery, switch the electrical network on.
 - (e) Check the ADAHRS unit function.



Legend to Fig. 34-23

- 1 GMU 22 magnetometer
- 2 Connector
- 3 Screw (4 pcs.)

For information:

- 4 Bracket

Fig. 34-23 GMU 22 magnetometer – removal / installation



G. Magnetic compass

Maintenance type: Line

Personnel qualification: Independent verification personnel qualified in accordance with Part 66 or higher

Recommended tools and material:

Item	Designation / Size	Quantity	Note
Phillips screwdriver	No. 2	1 pc.	
Non-magnetic screwdriver	-	1 pc.	Compass compensation
Deviation plate	-	1 pc.	Compass compensation

- (1) Removal – magnetic compass
 - (a) Holding the compass, unscrew the screws (3, Fig. 34-24).
 - (b) Remove the compass (1).
- (2) Installation – magnetic compass
 - (a) Set the compass (1, Fig. 34-24) to position on the middle column (4).
 - (b) Screw on and tighten the screws (3).
 - (c) Do the compass compensation (see par. 2 G.(3)).
- (3) Adjustment / check – compass compensation
 - (a) General
 - 1 The magnetic compass is compensated:
 - During a regular inspection of the airplane (Section 05-20)
 - After additional installation of instruments, electric devices or avionic instruments that can affect the compass deviation
 - After magnetic compass replacement or after engine replacement
 - In the other cases as needed.
 - 2 Perform the magnetic compass compensation on the compensation circle (with marked magnetic directions) that is at least at a distance of 100 m (330 ft) from ferrous structures, electrical lines or from other above-ground or underground ferrous objects and devices.
 - 3 The persons performing the compensation mustn't have any objects made from magnetic materials with them (tools, wrenches, knife, etc.).
 - 4 Perform the compensation with the airplane in a similar configuration as is used for cruising flight, i.e. with operating engine, with switched on electrical appliances and with the switched on avionic instruments. On the board of the airplane, there mustn't be any other devices that could cause magnetic field interferences. The cockpit canopy must be closed.
 - 5 Don't perform the compensation in the interval of 30 minutes before the sunrise and 30 minutes after the sunrise and in the interval of 30 minutes before the sunset and 30 minutes after the sunset. The Earth's magnetic field is disturbed in this period of time.

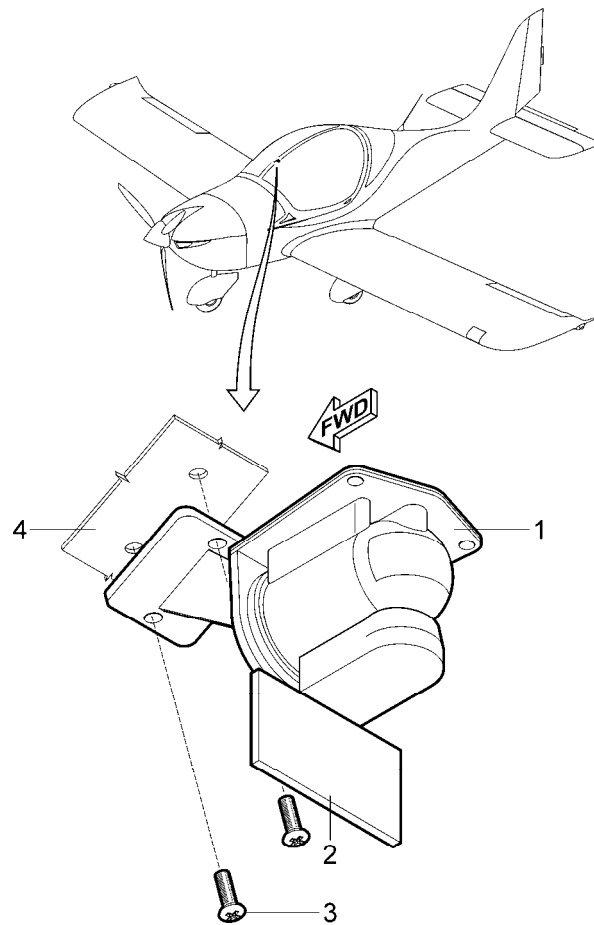


- 6 The screws of the compensation device for B and C correction are accessible from the front part of the compass. For eliminating the deviation, use a screwdriver made from non-magnetic material.
 - 7 Perform A correction (resulting from a wrong installation of the compass) by slight turning the compass after loosening the fixation bolts.
 - 8 Record the deviations with corresponding signs:
 - If the compass north is located on the west from magnetic north, the deviation is west, it means it is negative.
 - If the compass north is located on the east from the magnetic north, the deviation is east, it means it is positive.
- (b) The compensation procedure if the initial deviation is more than 10°:
- 1 Turn the airplane to the N heading (north), eliminate the deviation by means of the screw "C".
 - 2 Turn the airplane to the S heading (south), reduce the found out deviation to half by means of the screw "C" and record the rest of the deviation.
 - 3 Turn the airplane to the E heading (east), eliminate the deviation by means of the screw "B".
 - 4 Turn the airplane to the W heading (west), reduce the found out deviation to half by means of the screw "B" and record the rest of the deviation.
- (c) The compensation procedure if the initial compensation is less than 10°:
- 1 Turn the airplane to the N and E headings, record the found out deviations, don't compensate.
 - 2 Turn the airplane to the S and W headings and reduce the deviation on these headings to the value calculated from the deviations in the opposite directions:

$$\text{for S heading: } \frac{\delta N + \delta S}{2}$$

$$\text{for W heading: } \frac{\delta E + \delta W}{2}$$
- (d) Another common procedure:
- 1 Gradually turn the airplane to N, NE, E, ES, S, SW, W and NW headings and record the found out deviations.
 - 2 From the found out deviations, calculate the A correction as the arithmetic mean of deviations:

$$A = \frac{\delta N + \delta NE + \delta E + \delta ES + \delta S + \delta SW + \delta W + \delta NW}{8}$$
 - 3 Perform the A correction by slight turning the compass, tighten the attaching bolts.
 - 4 Turn the airplane by the degrees shown on the deviation plate (4, Fig. 11-2) and record individual deviations (the so-called residual deviations) in the deviation plate.
Position the deviation plate near the magnetic compass.
 - 5 Do the flight check in accordance with the direction of takeoff and landing runway and in accordance with the orientation points determined according to the map.



Legend to Fig. 34-24

- 1 Magnetic compass
- 2 Deviation plate
- 3 Screw M3x12 (2 pcs.)

For information:

- 4 Middle column

Fig. 34-24 Magnetic compass – removal / installation



LANDING AND TAXIING AIDS

1. DESCRIPTION AND OPERATION

A. Marker

The marker beacon receiver is part of the GMA 35 audio panel (see Section 23-50). The marker serves for accurate identification of 75 MHz beacon overflight. The setting can be controlled through the interface by means of corresponding touch buttons after opening the "Audio Panel" icon on the touch panel of the GTN 750 unit. The color of signaling light and the type of tone are determined by the type of the beacon that is being overflown.

The marker antenna CI-118 is located between the frames No. 8 and 9, located on the lower part of the fuselage (see Fig. 23-1).

NOTE

The detailed description and information concerning the operation and control of the audiopanel are shown in the document GTN 725/750 TSO Installation Manual 190-01007-02 Rev. H, dated August 2013 or in a latest valid issue.

The wiring diagram of the GMA 35 audiopanel is shown in Chapter 91.

B. Receiver of GS signal

The description of the receiver of GS signal is shown in Section 34-50.



2. MAINTENANCE PRACTICES

A. Garmin GMA 35 audiopanel

The maintenance procedures of GMA 35 audiopanel are shown in Section 23-50; the maintenance procedures of GTN 750 unit are shown in Section 34-50.

B. Commant CI 118 marker antenna

Maintenance type: Line

Personnel qualification: Independent verification personnel qualified in accordance with Part 66 or higher

Recommended tools and material:

Item	Designation / Size	Quantity	Note
Phillips screwdriver	No. 2	1 pc.	

(1) Removal – CI 118 antenna

- (a) Switch the electrical network off and disconnect the battery.
- (b) Remove the cover F5 (Fig. 06-2).
- (c) Disconnect the connector (3, Fig. 34-25).

NOTE

The antenna removal must be performed by two persons.

- (d) Holding the antenna, unscrew and remove the screws (4) and washers (5).
- (e) Remove the antenna (1) with the gasket (2); close the connector by means of blind plug.

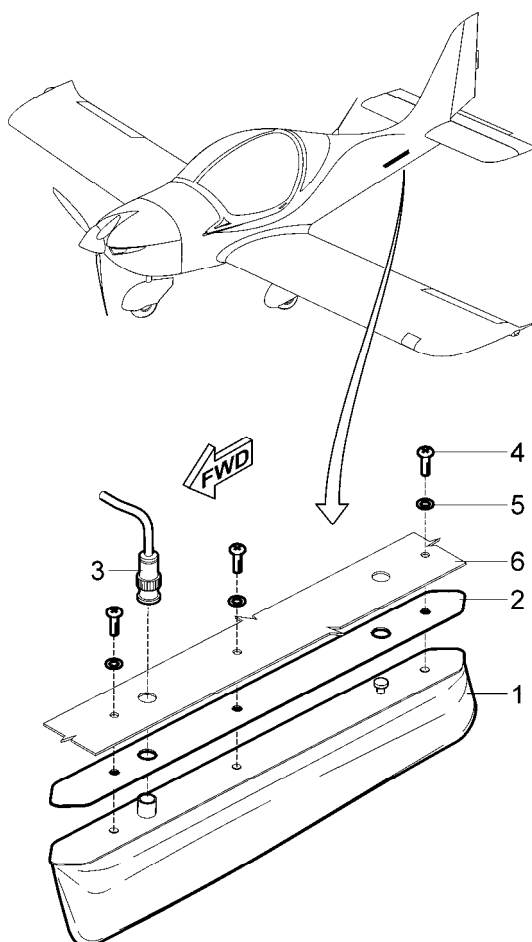
(2) Installation – CI 118 antenna

- (a) Remove the blind plug from the connector.

NOTE

The antenna installation must be performed by two persons.

- (b) Set the antenna (1, Fig. 34-25) with the gasket (2) on the lower part of the fuselage, screw on and tighten the screws (4) with washers (5).
- (c) Connect the connector with cable (3).
- (d) Install the cover F5 (Fig. 06-2).
- (e) Connect the battery, switch the electrical network on.
- (f) Do the verification flight and check the marker function.



Legend to Fig. 34-25

1	Marker antenna	5	Washer (3 pcs.)
2	Gasket		For information
3	Connector	6	Lower skin of fuselage
4	Screw (3 pcs.)		

Fig. 34-25 CI 118 antenna – removal / installation



INDEPENDENT POSITION DETERMINING

1. DESCRIPTION AND OPERATION

The Sportstar RTC airplane can be equipped, depending on the instruments, with the GPS Garmin Aera 500 receiver, Garmin GTN 750 unit (Section 34-50) and the Dynon SkyView system, (Section 34-10) including the SV-GPS-250 antennas. The instruments use the worldwide satellite network GPS for airplane position determination (longitude, latitude and altitude).

The wiring diagram of individual instruments is shown in Chapter 91.

A. Garmin Aera 500 GPS receiver

The Garmin Aera 500 is a compact GPS receiver that is controlled by means of the touch screen with high resolution and graphic user interface. In the flight mode, the receiver indicates the map and vertical indication of terrain and collision warning and contains the database of airplane data and information.

The signals from the GPS satellites are received by the antenna GA 25 (8, Fig. 23-1), located on the upper part of the cover F4 (Fig. 06-2) in front of the cockpit.

The GPS Garmin Aera 500 receiver is located in the holder in the middle part of the instrument panel and is interconnected with the GA 25 antenna; with the airplane equipped with the Dynon SkyView system, the receiver is interconnected with this system.

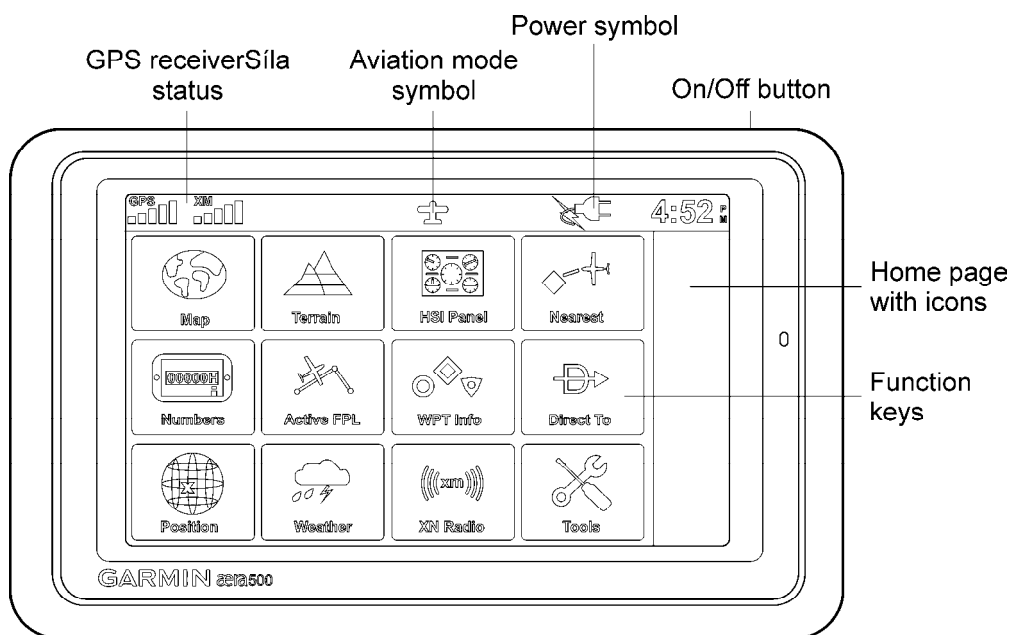


Fig. 34-26 Front panel of GPS Garmin Aera 500 receiver

The Garmin Aera 500 receiver has the following controls:

On/Off button

This button serves for switching on and switching off the receiver or for setting the screen brightness.



Touch keys on the screen

The keys differ depending on the chosen page. Press the key to perform a function or to access the described data.

NOTE

The detailed description and information concerning the operation and control of the unit are shown in the document Garmin Aera Pilot's Guide, doc. No. 190-01117-02 rev. C, dated August 2012 or in a latest valid issue.

B. Garmin Aera 660 GPS receiver

The Garmin Aera 660 is a compact GPS receiver that is controlled by means of the touch screen with high resolution and graphic user interface. In the flight mode, the receiver indicates the map and vertical indication of terrain and collision warning and contains the database of airplane data and information.

The signals from the GPS satellites are received by the antenna GA 25 (8, Fig. 23-1), located on the upper part of the cover F4 (Fig. 06-2) in front of the cockpit.

The GPS Garmin Aera 660 receiver is located in the holder in the middle part of the instrument panel and is interconnected with the GA 25 antenna; with the airplane equipped with the Dynon SkyView system, the receiver is interconnected with this system.

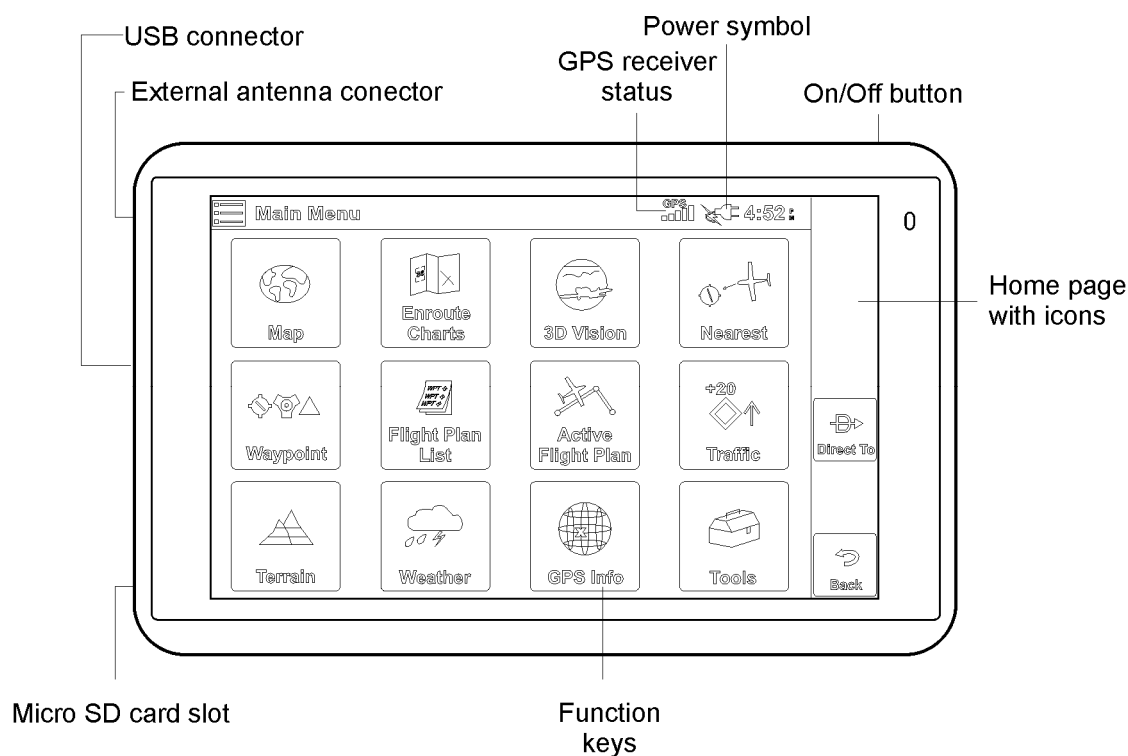


Fig. 34-27 Front panel of GPS Garmin Aera 660 receiver



The Garmin Aera 660 receiver has the following controls:

On/Off button

This button serves for switching on and switching off the receiver or for setting the screen brightness.

Touch keys on the screen

The keys differ depending on the chosen page. Press the key to perform a function or to access the described data.

NOTE

Detailed operating instructions are stated in the Pilot's Guide, doc. No. 190-02017-20 rev. H, rev. date February 2020 or later valid version.

C. COM/NAV/GPS Garmin GTN 750 unit

The Garmin GTN 750 unit is a fully integrated system that includes the VHF transceiver (Section 23-50), GPS receiver and the navigation receiver including the VOR/LOC and GS signal receivers (Section 34-50).

The signals from the GPS satellites are received by the GA 35 antenna (9, Fig. 23-1), located on the upper part of cover F4 (Fig. 06-2) before the cockpit.

The GTN 750 unit is located in the middle part of instrument panel and is interconnected with the navigation antenna CI 158C-2 (Section 34-50), communication antenna AV530, antenna GPS GA 35, with the GMA 35 audiopanel (Section 23-50) and the GTX33 transponder (Section 34-50).

The front panel of the Garmin GTN 750 unit and the description of controls are shown in Fig. 23-6 in Section 23-10.

NOTE

The detailed description and information concerning the operation and control of the unit are shown in the document GTN 725/750 TSO Installation Manual 190-01007-02 Rev. H, dated August 2013 or in a subsequent valid issue.

D. SV-GPS-250 antenna

The airplanes with the Dynon Skyview system (Section 34-10) are equipped with the SV-GPS-250 antennas receiving the signals from GPS satellites. The antennas include the system for making the GPS code measurement more precise (WAAS) improving the position accuracy. The antennas (7, Fig. 23-1) are located on the upper part of the cover F4 (Fig. 06-2) before the cockpit.

NOTE

The detailed description and information concerning the operation of Dynon SkyView system are shown in the document Dynon SkyView System Installation Guide, Document 101320-022, Revision W, dated January 2016 or in a latest valid issue.

**E. Garmin GA 26C GPS antenna**

The airplanes with the Garmin G3X system (Section 34-10) are equipped with the GA 26C GPS antennas receiving the signals from GPS satellites.

The antennas are located on the brackets under the cover F4 (Fig. 06-2) before the cockpit.

F. Traffic Avoidance System Air Avionics Air Traffic AT - 1

AT-1 is a small, lightweight traffic / electronic conspicuity system based on FLARM and ADS-B technology. It detects the position of surrounding air traffic and transmits the own position to other airplanes that are equipped with compatible systems. It transfers traffic data and warning messages to the compactible cockpit display systems (Garmin Aera 660 GPS or GDU 460 Displays of G3X system, depending on airplane equipment).

The TAS system consist of AT-1 unit and antennas. AT-1 unit is installed on the right side of the avionics rack. FLARM antenna lower is installed on the left lower side of the fuselage, FLARM antenna upper is installed on the cover of the fuselage upper part. ADS-B antenna is installed on the right lower side of the fuselage. GPS antenna is installed under the cover of the fuselage upper part.

NOTE

Detailed operating instructions are stated in the Pilot's Manual, doc. No. MAN0070A0002, Version 4.0, date 2020/01/09 or later valid version



2. MAINTENANCE PRACTICES

A. Garmin Aera 500 GPS receiver

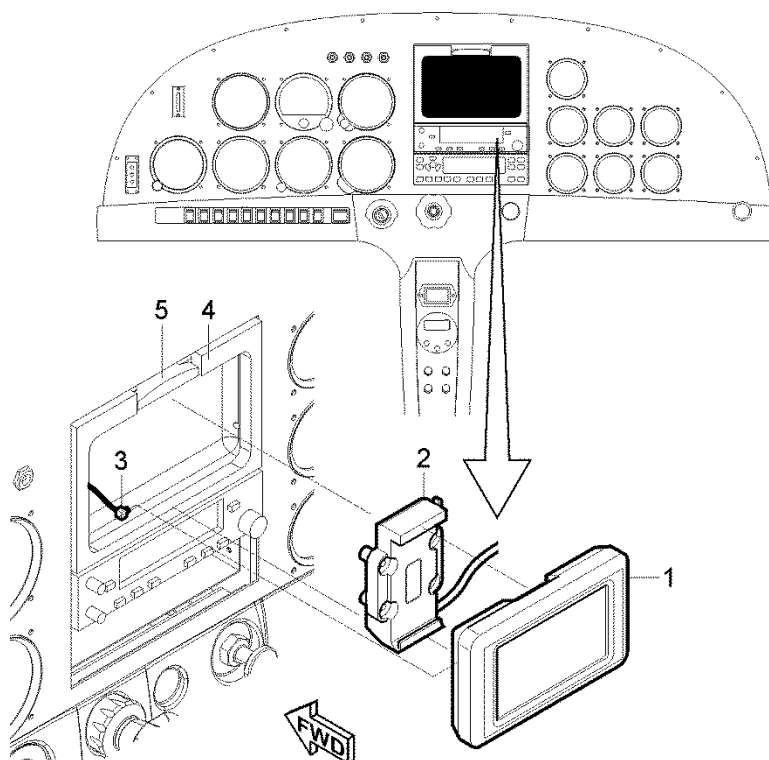
Maintenance type: Line

Personnel qualification: Independent verification personnel qualified in accordance with Part 66 or higher

Recommended tools and material:

Item	Designation / Size	Quantity	Note
-	-	-	-

- (1) Removal – Aera 500 GPS receiver
 - (a) Switch the electrical network off and disconnect the battery.
 - (b) Press the button (5, Fig. 34-28) and tilt out the receiver from the frame (4).
 - (c) Disconnect the antenna cable (3) from the receiver.
 - (d) Remove the receiver (1) from the holder (2).



Legend to Fig. 34-28

1	Aera 500 GPS receiver	For information:	
2	Holder	4	Frame
3	Cable of antenna	5	Button

Fig. 34-28 Aera 500 GPS receiver – removal / installation



- (2) Installation – Aera 500 GPS receiver
 - (a) Insert the receiver (1, Fig. 34-28) into the holder (2).
 - (b) Connect the antenna cable (3) to the receiver.
 - (c) Insert the receiver (1) with the holder (2) into the frame (4) and push it until it snaps in.
 - (d) Connect the battery, switch the electrical network on and check the GPS receiver function.

B. Garmin aera 660 GPS receiver

The receiver maintenance procedures is the same as for the Garmin GPS aera 500.

C. Garmin GA 25 GPS antenna

Maintenance type: Line

Personnel qualification: Independent verification personnel qualified in accordance with Part 66 or higher

Recommended tools and material:

Item	Designation / Size	Quantity	Note
Nippers	-	1 pc.	-
Cable tie	2,5 x 99	5 pcs.	
Double sided adhesive tape	-	1 pc.	

- (1) Removal – GA 25 antenna
 - (a) Switch the electrical network off and disconnect the battery.
 - (b) Remove the cover of the upper part of the fuselage F4 (Section 53-30).
 - (c) Remove the receiver (see par. 2 A(1)) and disconnect the antenna connector.
 - (d) Cut off the cable ties fastening the cable and remove the antenna.
- (2) Installation – GA 25 antenna
 - (a) Stick the antenna to the corresponding position by means of double-sided adhesive tape and fasten the cable by means of cable ties.
 - (b) Connect the antenna connector to the receiver and install it (see par. 2 A(2)).
 - (c) Install the cover of the upper part of the fuselage F4 (Section 53-30).
 - (d) Connect the battery, switch the electrical network on and check the GPS receiver function.



D. Garmin GA 35 GPS antenna

Maintenance type: Line

Personnel qualification: Independent verification personnel qualified in accordance with Part 66 or higher

Recommended tools and material:

Item	Designation / Size	Quantity	Note
Phillips screwdriver	No. 2	1 pc.	
Wrench	No. 7	1 pc.	

(1) Removal – GA-35 antenna

- (a) Switch the electrical network off and disconnect the battery.
- (b) Remove the cover of the upper part of the fuselage F4 (Section 53-30).
- (c) Disconnect the connector (2, Fig. 34-29).
- (d) Holding the antenna, unscrew and remove the nuts (4), screws (4) and washers (5).
- (e) Remove the antenna (1); close the connector by means of blind plug.

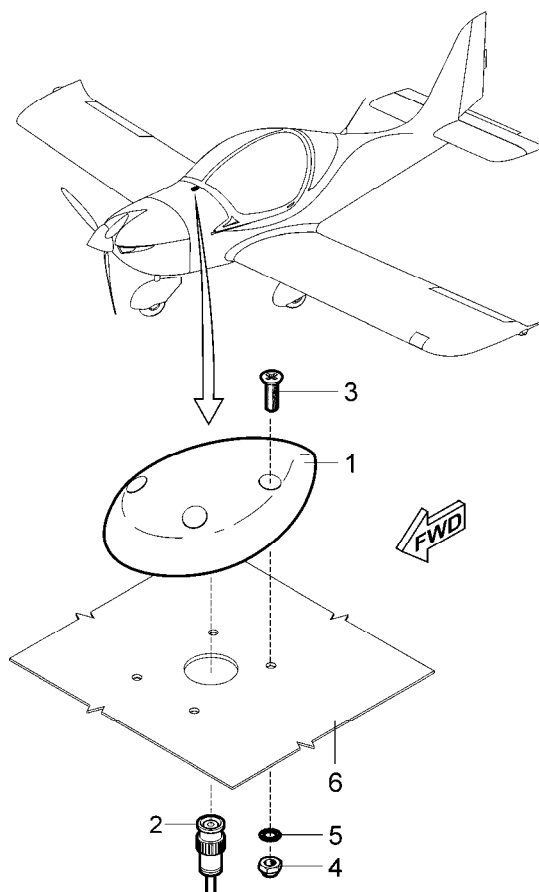


Fig. 34-29 GPS GA-35 antenna – removal / installation (page 1 of 2)



Legend to Fig. 34-28

1 GPS antenna	5 Washer (4 pcs.)
2 Connector	For information:
3 Screw (4 pcs.)	6 Cover of the upper part of the fuselage F4
4 Nut (4 pcs.)	

Fig. 34-29 GPS GA-35 antenna – removal / installation (page 2 of 2)

- (2) Installation – GA 35 antenna
- Remove the blind plug from the connector.
 - Put the antenna (1, Fig. 34-29) to the corresponding position on the cover (6) of the fuselage and attach it by means of screws (3), nuts (4) and washers (5).
 - Connect the connector with cable (2).
 - Install the cover of the upper part of the fuselage F4 (Section 53-30).
 - Connect the battery, switch the electrical network on and check the GPS receiver function.

E. SV-GPS-250 antenna

Maintenance type: Line

Personnel qualification: Independent verification personnel qualified in accordance with Part 66 or higher

Recommended tools and material:

Item	Designation / Size	Quantity	Note
Phillips screwdriver	No. 2	1 pc.	
Wrench	No. 7	1 pc.	
Cable tie	2,5 x 99	5 pcs.	

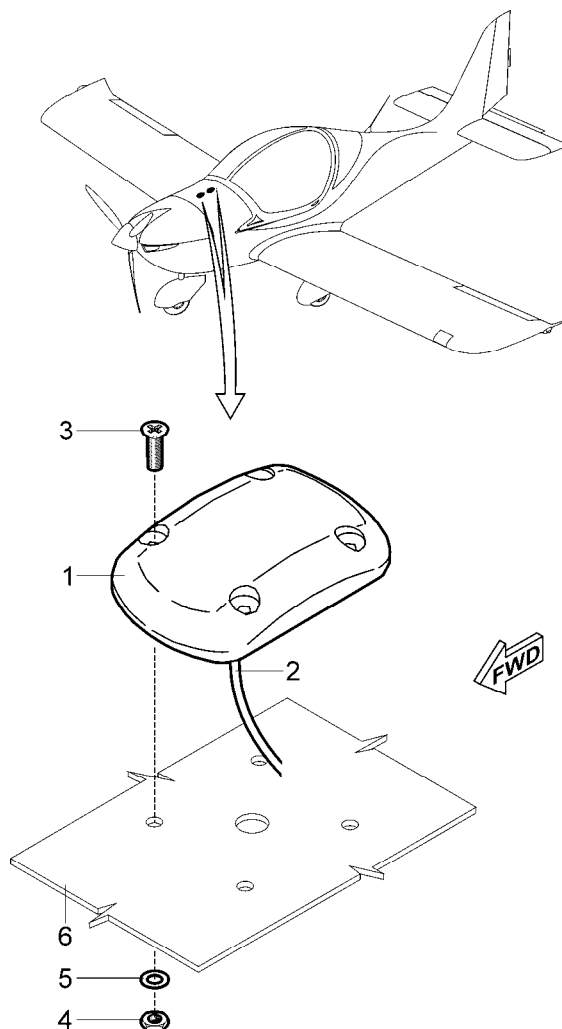
NOTE

Removal and installation procedure is identical for both antennas.

- (1) Removal – SV-GPS-250 antenna
- Switch the electrical network off and disconnect the battery.
 - Remove the cover of the upper part of the fuselage F4 (Section 53-30).
 - Disconnect the connector of antenna cable on the right side of the fuselage.
 - Cut off the cable ties fastening the cable.
 - Unscrew and remove the screws (3, Fig. 34-30), nuts (4), washers (5) and remove the antenna (1).
- (2) Installation – SV-GPS-250 antenna
- Put the antenna (1, Fig. 34-30) to the corresponding position on the cover (6) and attach it by means of screws (3), nuts (4) and washers (5).
 - Fasten the antenna cable by means of cable ties.
 - Connect the connector of antenna cable on the right side of the fuselage.



- (d) Install the cover of the upper part of the fuselage F4 (Section 53-30).
- (e) Connect the battery, switch the electrical network on and check the SkyView system function.



Legend to Fig. 34-30

- 1 SV-GPS-250 antenna
- 2 Connector
- 3 Screw (4 pcs.)
- 4 Nut (4 pcs.)

- 5 Washers

For information:

- 6 Cover of the upper part of the fuselage F4

Fig. 34-30 SV-GPS-250 antenna – removal / installation


F. Garmin GA 26C GPS antenna

Maintenance type: Line

Personnel qualification: Independent verification personnel qualified in accordance with Part 66 or higher

Recommended tools and material:

Item	Designation / Size	Quantity	Note
Phillips screwdriver	No. 2	1 pc.	
Cable tie	2,5 x 99	As needed.	

NOTE

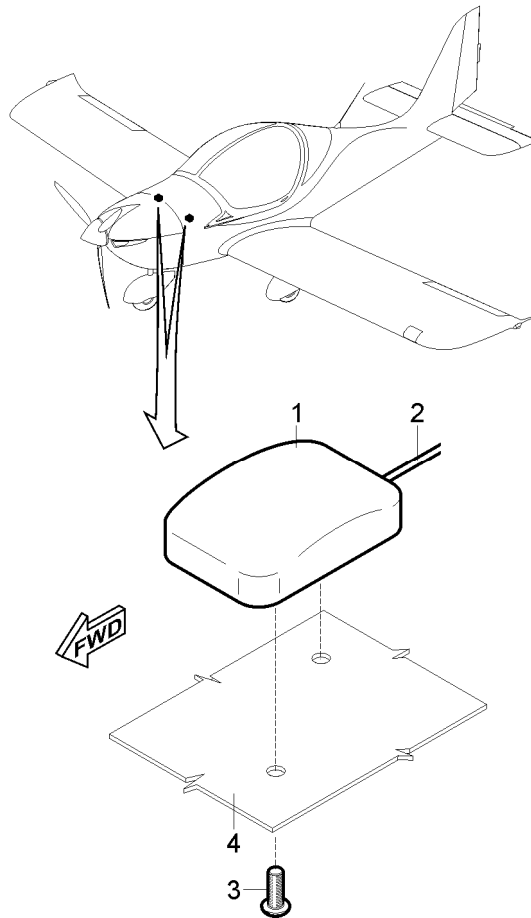
Removal and installation procedure is identical for both antennas.

(1) Removal – GA 26C antenna

- (a) Switch the electrical network off and disconnect the battery.
- (b) Remove the cover of the upper part of the fuselage F4 (Section 53-30).
- (c) Disconnect the antenna connector (4, Fig. 34-13 / 4, Fig. 77-3) from the PFD / MFD.
- (d) Cut off the cable ties fastening the cable (2, Fig. 34-31).
- (e) Unscrew and remove the screws (3) and remove the antenna (1).

(2) Installation – GA 26C antenna

- (a) Put the antenna (1, Fig. 34-31) to the corresponding position on the bracket (4) and attach it by means of screws (3).
- (b) Fasten the antenna cable (2) by means of cable ties.
- (c) Connect the antenna connector (4, Fig. 34-13 / 4, Fig. 77-3) to the PFD / MFD.
- (d) Install the cover of the upper part of the fuselage F4 (Section 53-30).
- (e) Connect the battery, switch the electrical network on and check the G3X system function.



Legend to Fig. 34-31

- 1 GA 26C antenna
- 2 Cable with connector
- 3 Screw (2 pcs.)

For information:

- 4 Bracket

Fig. 34-31 GA 26C antenna – removal / installation


G. Traffic avoidance system Air Avionics AirTraffic AT – 1

Maintenance type: Line

Personnel qualification: Independent verification personnel qualified in accordance with Part 66 or higher

Recommended tools and material:

Item	Designation / Size	Quantity	Note
Phillips screwdriver	No. 2	1 pc.	
Cable tie	2,5 x 99	As needed.	
Pliers		1 pc.	
Wrench	9/16"		Alternatively No. 14
Gripping pliers	Cobra	1 pc.	

(1) Removal – Air Traffic AT-1

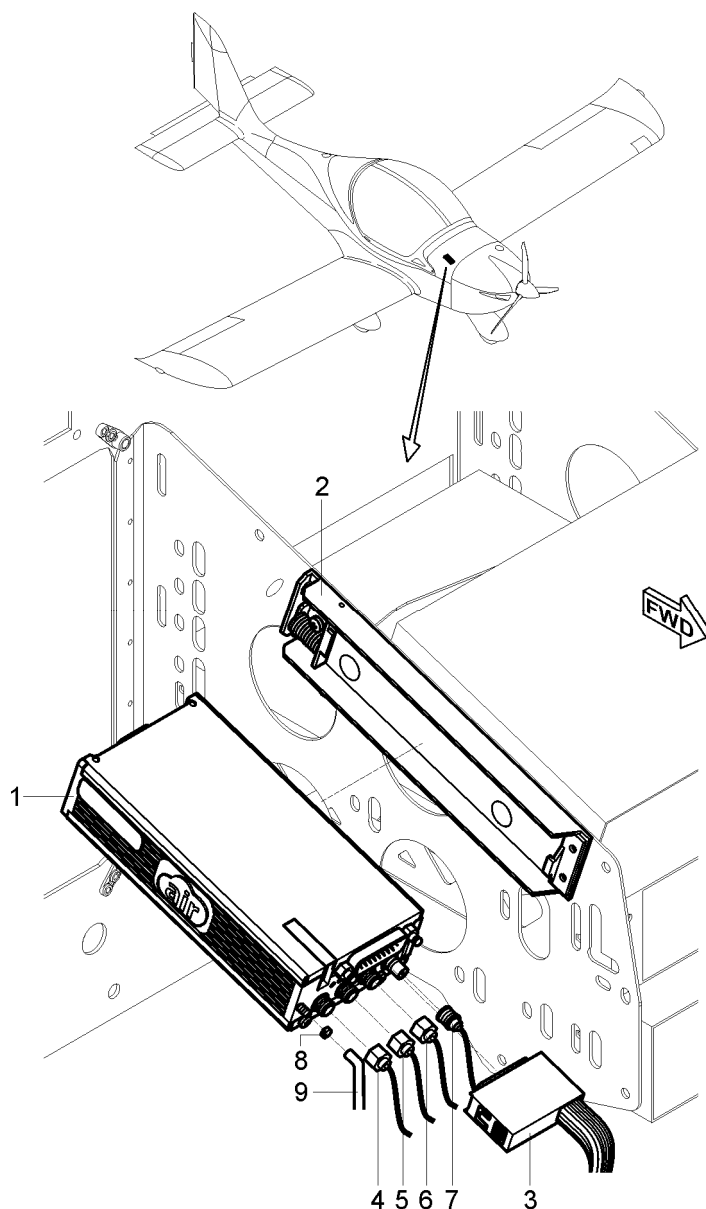
- (a) Switch the electrical network off and disconnect the battery.
- (b) Remove the cover of the upper part of the fuselage F4 (Section 53-30).
- (c) Disconnect the antenna connectors (4; 5; 6; 7, Fig. 34-32).
- (d) Release the clamp (8) and disconnect the static hose (9).
- (e) Disconnect the data connector (3).
- (f) Push the instrument AT-1 (1) back slightly and tilt it to the side and carefully remove it.

(2) Installation – Air Traffic AT - 1

- (a) Insert the AT-1 instrument (1, Fig. 34-32) into the rack (2) and push it back slightly. Make sure that the integrated latch has been locked correctly.
- (b) Connect the antenna connectors (4; 5; 6; 7) .
- (c) Connect the data connector (3).
- (d) Connect the static hose (9) and secure the hose by clamp (8) by means of pliers.
- (e) Install the cover of the upper part of the fuselage F4 (Section 53-30).
- (f) Connect the battery, switch the electrical network on and check the AT-1 system function.

(3) Removal – FLARM A antenna

- (a) Switch the electrical network off and disconnect the battery.
- (b) Remove the cover of the upper part of the fuselage F4 (Section 53-30).
- (c) Disconnect FLARM A antenna connector.
- (d) Cut off the cable ties fastening the antenna cable.
- (e) Hold the antenna (4, Fig. 34-33) and unscrew the nut (7).
- (f) Remove the FLARM A antenna from the upper part of the fuselage F4.



Legend to Fig. 34-32

1	AT-1	6	FLARM B antenna connector
2	AT-1 rack	7	GPS antenna connector
3	Data connector	8	Cobra clamp
4	ADS-B antenna connector	9	Static hose
5	FLARM A antenna connector		

Fig. 34-32 AT-1 traffic avoidance system – removal / installation



- (4) Installation – FLARM A antenna
 - (a) Insert the antenna (4, Fig. 34-33) to the corresponding position on the upper part of the fuselage F4 and attach it by mean of the nut (7).
 - (b) Connect the FLARM A antenna connector and fasten the antenna cable by means of cable ties.
 - (c) Install the cover of the upper part of the fuselage F4 (Section 53-30).
 - (d) Connect the battery, switch the electrical network on and check the AT-1 system function.
- (5) Removal – FLARM B antenna
 - (a) Switch the electrical network off and disconnect the battery.

NOTE

The antenna removal must be performed by two persons.

- (b) Remove the right control rod cover IN1R (Section 25-10).
 - (c) Disconnect the FLARM B antenna connector.
 - (d) Cut off the cable ties fastening the antenna cable.
 - (e) Hold the antenna (2, Fig. 34-33) and unscrew the nut (7).
 - (f) Remove the FLARM B antenna from the the lower fuselage skin.
- (6) Installation – FLARM B antenna

NOTE

The antenna installation must be performed by two persons.

- (a) Insert the antenna (2, Fig. 34-33) to the corresponding position on the lower fuselage skin and attach it by mean of the nut (7).
 - (b) Connect the FLARM B antenna connector and fasten the antenna cable by means of cable ties.
 - (c) Install the right control rod cover IN1R (Section 25-10).
 - (d) Connect the battery, switch the electrical network on and check the AT-1 system function.
- (7) Removal – ADS-B antenna
 - (a) Switch the electrical network off and disconnect the battery.

NOTE

The antenna removal must be performed by two persons.

- (b) Remove the left control rod cover IN1L (Section 25-10).
- (c) Disconnect the ADS-B antenna connector.
- (d) Cut off the cable ties fastening the antenna cable.
- (e) Hold the antenna (3, Fig. 34-33) and unscrew the nut (7).
- (f) Remove the FLARM B antenna from the the lower fuselage skin.



(8) Installation – ADS-B antenna

NOTE

The antenna installation must be performed by two persons.

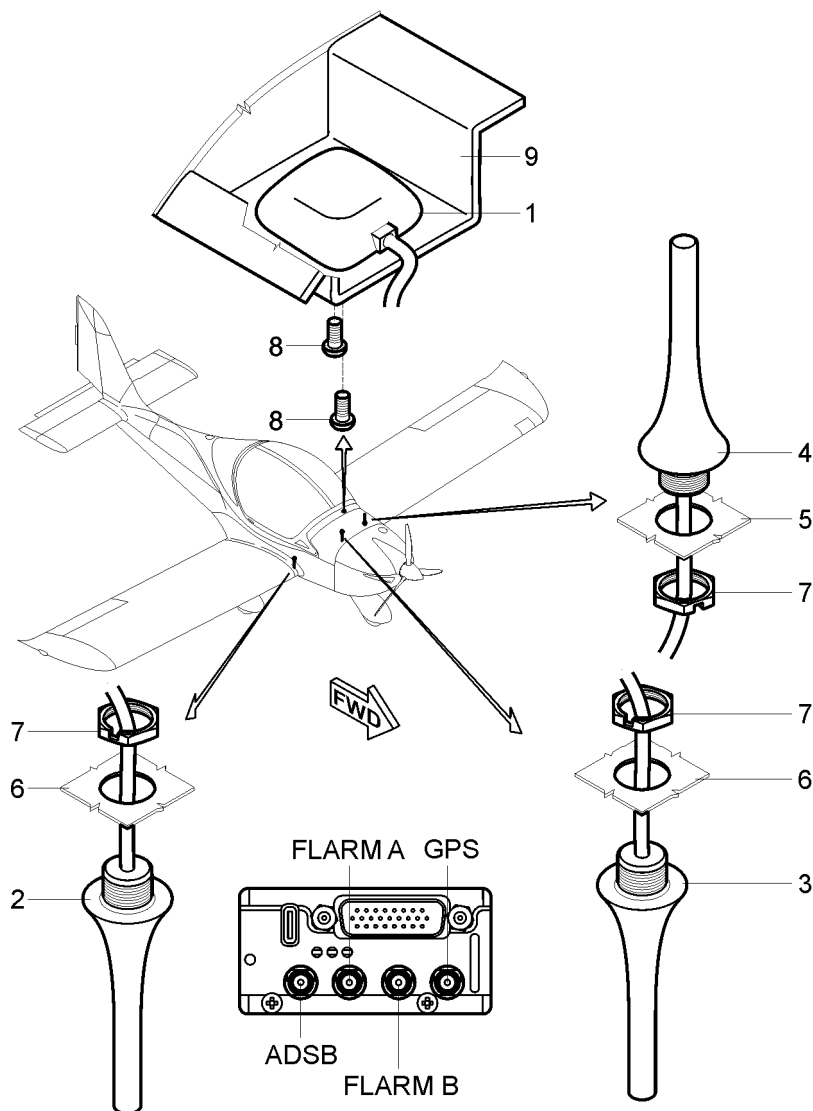
- (a) Insert the antenna (3, Fig. 34-33) to the corresponding position on the lower fuselage skin and attach it by mean of the nut (7).
- (b) Connect the ADS-B antenna connector and fasten the antenna cable by means of cable ties.
- (c) Install the left control rod cover IN1R (Section 25-10).
- (d) Connect the battery, switch the electrical network on and check the AT-1 system function.

(9) Removal – GPS antenna

- (a) Switch the electrical network off and disconnect the battery.
- (b) Remove the cover of the upper part of the fuselage F4 (Section 53-30).
- (c) Disconnect GPS antenna connector.
- (d) Cut off the cable ties fastening the antenna cable.
- (e) Unscrew the screws (8, Fig. 34-33) and remove the GPS antenna (1) out of antenna bracket (9).

(10) Installation – GPS antenna

- (a) Put the GPS antenna (1, Fig. 34-33) to the corresponding position on the antenna bracket (7).
- (b) Connect the FLARM A antenna connector and fasten the antenna cable by means of cable ties.
- (c) Install the cover of the upper part of the fuselage F4 (Section 53-30).
- (d) Connect the battery, switch the electrical network on and check the AT-1 system function.



Legenda k Obr. 34-33

1	GPS antenna	6	Lower fuselage skin
2	FLARM B antenna	7	Nuts (3 pcs)
3	ADS-B antenna	8	Screws (2 pcs)
4	FLARM A antenna	9	Antenna bracket
5	Cover of the upper part of the fuselage F4		

Fig. 34-33 AT-1 antennas – removal / installation



DEPENDENT POSITION DETERMINING

1. DESCRIPTION AND OPERATION

The airplane Sportstar RTC can be equipped with the Garmin SL 30, Garmin GNC 255A navigation and communication units or with the Garmin GTN 750 unit.

In addition, the Garmin GTX 328 transponder, Becker BXP 6401-2 transponder or, at the installation of GTN 750 unit, the GTX 33 transponder can be installed on the airplane. The transponder serves for airplane identification by ground radars.

The wiring diagram of the communication and navigation equipment is shown in Chapter 91.

A. Garmin SL 30 COM/NAV unit

The Garmin SL 30 unit includes the VHF transceiver (Section 34-50) and the navigation receiver including the receivers of VOR/LOC and GS signals.

The VOR/LOC and GS signals are received by the VOR/LOC/GS antenna (3, Fig. 23-1) located on the fin.

The VOR receiver receives signals with a frequency from 108 to 117.95 MHz. The LOC receiver receives signals with a frequency from 108 to 111.95 MHz. The GS signal is received in a frequency range from 328.60 to 335.40 MHz.

The SL 30 unit is located in the middle part of the instrument panel and is interconnected with the navigation antenna CI-158C-2 and CDI, communication antenna AV530 (Section 23-10), and with the PM 3000 intercom (Section 23-50).

The front panel of the Garmin SL 30 unit and the description of controls are shown in Fig. 23-2 in Section 23-10.

NOTE

The detailed description and information concerning the operation and control of the unit are shown in the document Model SL 30 NAV/COMM Installation Manual 560-0404-03D, dated July 2012 or in a latest valid issue.

B. Garmin GNC 255A COM/NAV unit

The Garmin GNC 255A unit includes the VHF transceiver (Section 34-50) and the navigation receiver including the receivers of VOR/LOC and GS signals.

The VOR/LOC and GS signals are received by the VOR/LOC/GS antenna (3, Fig. 23-1), located on the fin.

The VOR receiver receives signals with a frequency from 108 to 117.95 MHz. The LOC receiver receives signals with a frequency from 108 to 111.95 MHz. The GS signal is received within a frequency range from 328.60 to 335.40 MHz.

The GNC 255A unit is located in the middle part of instrument panel and is interconnected with the navigation antenna CI-158C-2 a CDI, communication antenna AV-530 (Section 23-10).

The front panel of the Garmin GNC 255A unit and the description of controls is shown in Fig. 23-5 in Section 23-10.



NOTE

The detailed description and information concerning the operation and control of the unit are shown in the document GTR 225/GNC 255 TSO Installation Manual 190-01182-02 Rev. D, dated December 2013 or in a latest valid issue.

C. Garmin GTN 750 COM/NAV/GPS unit

The Garmin GTN 750 unit is a fully integrated system that includes the VHF transceiver (Section 23-50), GPS receiver (Section 34-40) and the navigation receiver including the receivers of VOR/LOC and GS signals.

The VOR/LOC and GS signals are received by the VOR/LOC/GS antenna (3, Fig. 23-1) located on the fin.

The VOR receiver receives signals with a frequency from 108 to 117.95 MHz. The LOC receiver receives signals with a frequency from 108 to 111.95 MHz. The GS signal is received in a frequency range from 328.60 to 335.40 MHz.

The GTN 750 unit is located in the middle part of instrument panel and is interconnected with the navigation antenna CI-158C-2 (Section 34-50), communication antenna AV-530, antenna GPS GA-35 (Section 34-40), with the GMA 35 audiopanel (Section 23-50) and the GTX 33 transponder.

The front panel of the Garmin GTN 750 unit and the description of controls are shown in Fig. 23-6 in Section 23-10.

NOTE

The detailed description and information concerning the operation and control of the unit are shown in the document GTN 725/750 TSO Installation Manual 190-01007-02 Rev. H, dated August 2013 or in a latest valid issue.

D. Garmin GI 106A course deviation indicator

The indicator of course deviation GI 106A is designed for the operation with the navigation receiver that provides VOR, LOC and GS data.

The CDI GI 106A indicates a deviation from the course and from the glide slope.

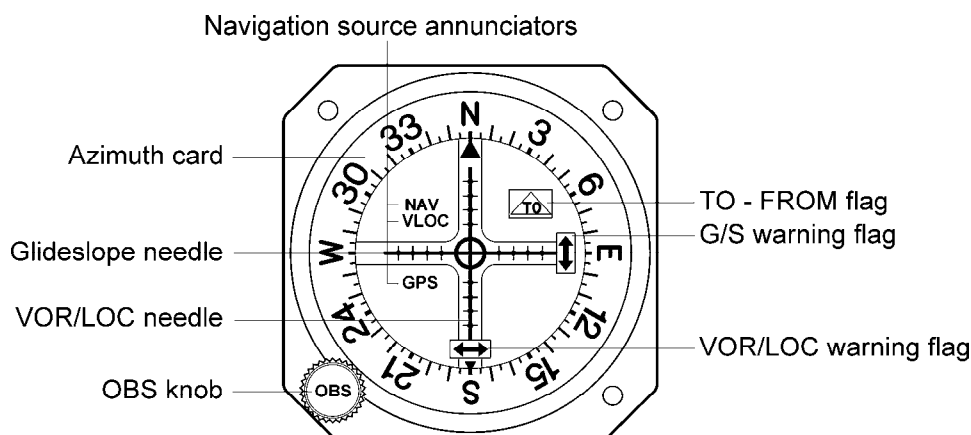


Fig. 34-34 CDI GI 106A



E. Becker BXP 6401-2 transponder

The BXP 6401-2 is a compact transponder working in the modes A, A/C and A/C/S. On a request or automatically, it transmits the identification code and flight altitude. It can transmit the airplane address (assigned by the national aviation authority) and the data on the maximum airplane speed.

The Becker BXP 6401-2 transponder is located in the middle part of instrument panel and is interconnected with the AV-74 antenna located on the lower part of the fuselage and with the A-30 altitude encoder (Section 34-10).

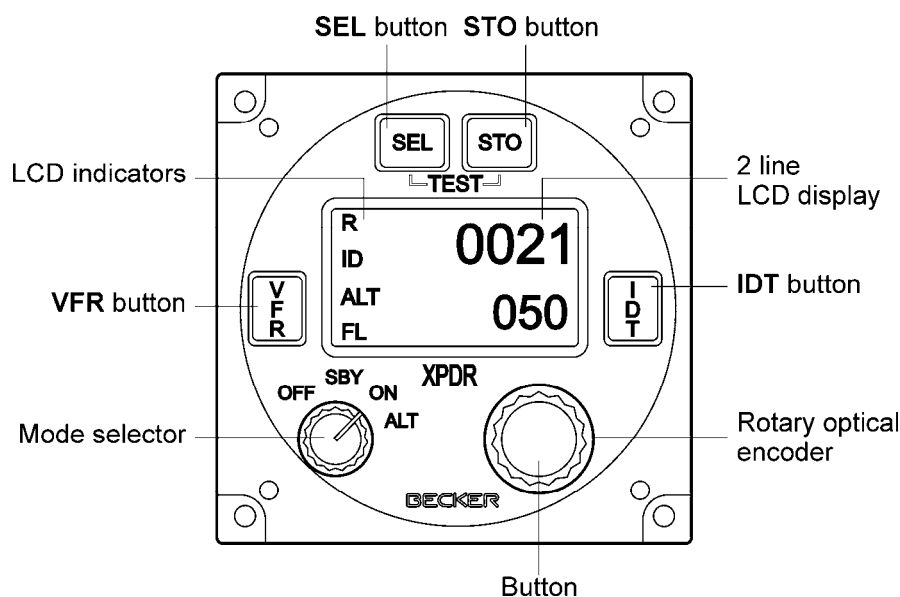


Fig. 34-35 Front panel of BXP 6401-2 transponder

The Becker BXP 6401-2 transponder has the following controls:

Mode selector

The selected mode is indicated by the letters on the left side of the display:

OFF By turning it clockwise, the transponder is switched on.

SBY The backup mode. The last active identification code is indicated on the display.

In the **SBY** mode, the transponder doesn't transmit any code. This is the standard mode of the transponder when the airplane is moving on the ground.

ON The transponder is in the mode for code transmitting in the mode A/S. The last active identification code is selected. In this mode the transponder responds to the requests for code transmitting in the mode A/C/S, however, the transmitted code doesn't include the altitude data.

ALT By pressing it, the transponder is switched over to the transmission of identification codes in the modes A and C.

In this mode, the transponder responds the request for transmitting the identification code and transmits the pressure altitude data of flight.

SEL

The button to call up the menu.

STO

The button for saving values in the device memory.

**VFR**

The button for VFR code activation. By pressing the **VFR** button, the preset code for the VFR operation is set on the transponder (no code is preset by the manufacturer). By the second pressing the button within 3 seconds from the first pressing, the originally set code is restored.

IDT

The button for transmitting the code. By pressing the button **IDT**, the identification code is transmitted that takes 18 seconds. During this time, the sign **R** is lighted on the display.

Rotary optical encoder, button of inserting

By turning the encoder the setting of several parameters is changed; by pressing the button, it is possible to switch over between numbers and it acts as the enter button.

NOTE

The detailed description and information concerning the operation and control of the transponder are shown in the document Mode S Transponder Level 2es BXP 6401-1-(XX) Class 1, BXP 6401-2-(XX) Class 2 Installation and Operation Manual DV 69801.03 PN 0584.053-071 Rev. 2, dated April 2008 or in a latest valid issue.

F. Garmin GTX 328 transponder

The Garmin GTX 328 transponder works in the modes A and A/C and A/C/S. On the request or automatically, it transmits seconds the identification code and flight altitude. It can transmit the airplane address (assigned by the national aviation authority) and the data on maximum airplane speed.

The Garmin GTX 328 transponder is located in the assembly frame in the middle part of the instrument panel and is interconnected with the AV-74 antenna located on the lower part of the fuselage and with the A-30 altitude encoder (Section 34-10).

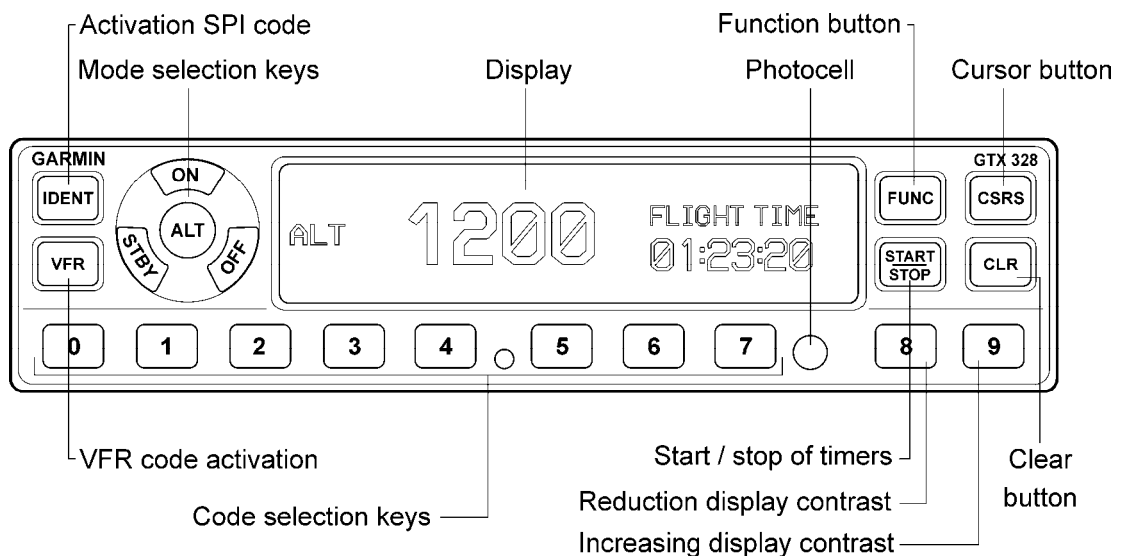


Fig. 34-36 Front panel of GTX 328 transponder



The Garmin GTX 328 transponder has the following controls:

The buttons for mode selection:

The selected mode is indicated by letters on the left side of the display.

OFF By pressing it, the transponder is switched off.

STBY The backup mode. The last active identification code is indicated on the display.

In the **STBY** mode, the transponder doesn't transmit any code. This is the standard mode of the transponder if the airplane is moving on the ground.

ON The transponder is in the mode for code transmitting in the mode A/S. The last active identification code is selected. In this mode, the transponder responds on the requests for code transmitting in the mode A/C/S, however, the transmitted code doesn't contain the data on altitude.

ALT By pressing the transponder is switched over for transmitting the identification codes in the modes A and C. In this mode the transponder responds to the request for identification code transmitting and transmits the pressure altitude data of flight.

Buttons for setting the code **0 - 7**

By means of the buttons, it is possible to select any of 4096 possible codes. The selected code must be in accordance with the instructions for the flights according to the IFR and VFR conditions.

IDENT

The button for code transmitting. By pressing the **IDT** button, the identification code is transmitted that takes 18 seconds. During this time, the sign **R** is lighted on the display.

VFR

By pressing the **VFR** button, the preset code is set on the transponder for the **VFR** operation (the code preset by the manufacturer is 7000). By the second pressing, the code that was set before the first pressing the **VFR** button is restored.

FUNC

By pressing the **FUNC** button, the data on the right side of the display is changed. By repeated pressing the button, another data is entered. The following data is activated: PRESSURE ALT, FLIGHT TIME, COUNT UP TIMER, COUNT DOWN TIMER.

In the configuration mode, it goes through the function pages.

START/STOP

starts and stops the altitude monitoring and individual timers. In the configuration mode, it goes through the functions in the opposite order.

CSRS

starts setting the initial time for timer countdown and cancels the input code of the transponder. In the configuration mode, it selects the variable field.

CLR

resets individual timers. In cancels the previous button pressing during the selection of code and countdown. It is used in the configuration mode.

Button 8

reduces display contrast and brightness when corresponding fields are indicated and inserts number 8 in the countdown. It is used in the configuration mode.

Button 9

increases display contrast and brightness when corresponding fields are indicated and inserts number 9 in the countdown. It is used in the configuration mode.

**NOTE**

The detailed description and information concerning the operation and control of the transponder are shown in the document Model Garmin GTX 328 Installation Manual 190-00420-04, dated March 2007, revision C or in a latest valid issue.

G. Garmin GTX 33 transponder

The Garmin GTX 33 transponder works in the modes A, A/C and A/C/S. On the request or automatically it transmits the identification code and flight altitude. It can transmit the airplane address (assigned by the national aviation authority) and the data on maximum airplane speed.

The Garmin GTX 33 is designed for cooperation with the GTN 750 unit. The setting can be controlled through the interface by means of corresponding touch buttons after expanding the "XPDR" icon on the touch panel of the GTN 750 unit.

The GTX 33 transponder is located in the assembly frame behind the firewall and is interconnected with the AV-74 antenna located on the lower part of the fuselage and with the altitude encoder A-30 (Section 34-10) and with the GTN 750 unit (Section 34-50).

NOTE

The detailed description and information concerning the operation and control of the transponder are shown in the document GTX 33 Transponder Installation Manual 190-00906-00 Rev. H, dated September 2012 or in a latest valid issue.

H. Garmin GTX 335 transponder

The Garmin GTX 328 transponder works in the modes A and A/C and A/C/S. On the request or automatically, it transmits seconds the identification code and flight altitude. It can transmit the airplane address (assigned by the national aviation authority) and the data on maximum airplane speed.

The Garmin GTX 328 transponder is located in the assembly frame in the middle part of the instrument panel and is interconnected with the AV-74 antenna located on the lower part of the fuselage and with the A-30 altitude encoder (Section 34-10),

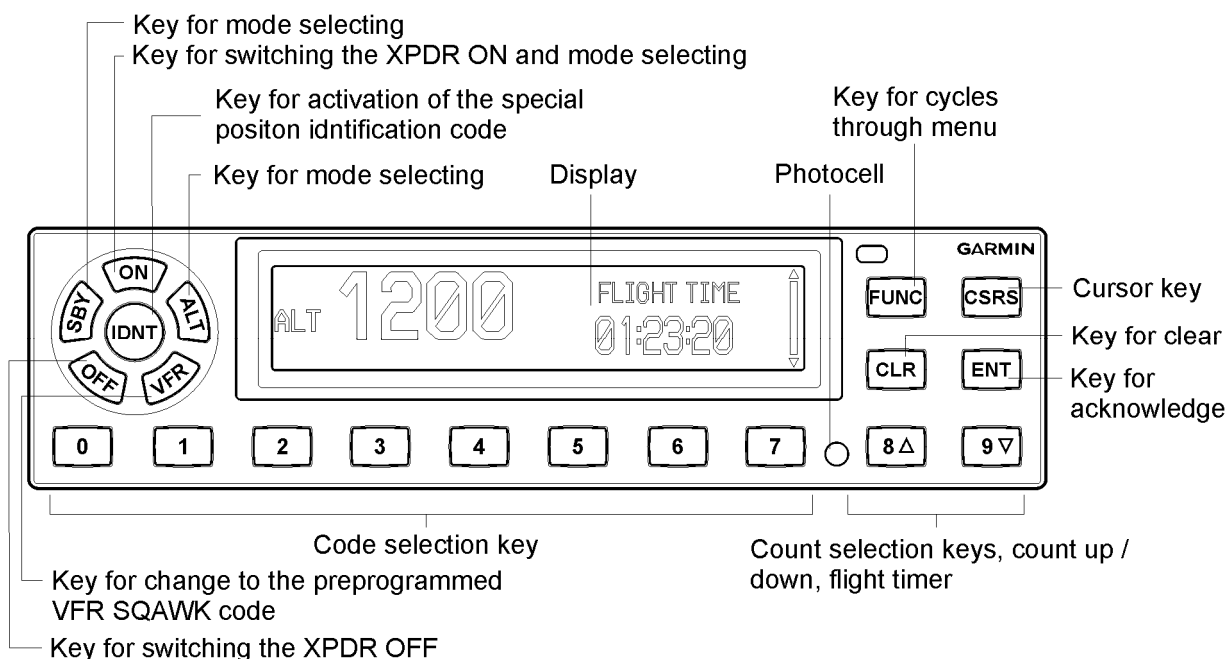


Fig. 34-37 Front panel of GTX 335 transponder

The Garmin GTX 335 transponder has the following controls:

The buttons for mode selection:

The selected mode is indicated by letters on the left side of the display.

OFF By pressing it, the transponder is switched off.

STBY The backup mode. The last active identification code is indicated on the display.

In the **STBY** mode, the transponder doesn't transmit any code. This is the standard mode of the transponder if the airplane is moving on the ground.

ON The transponder is in the mode for code transmitting in the mode A/S. The last active identification code is selected. In this mode, the transponder responds on the requests for code transmitting in the mode A/C/S, however, the transmitted code doesn't contain the data on altitude.

ALT By pressing the transponder is switched over for transmitting the identification codes in the modes A and C. In this mode the transponder responds to the request for identification code transmitting and transmits the pressure altitude data of flight.

Buttons for setting the code **0 - 7**

By means of the buttons, it is possible to select any of 4096 possible codes. The selected code must be in accordance with the instructions for the flights according to the IFR and VFR conditions.

IDENT

The button for code transmitting. By pressing the **IDT** button, the identification code is transmitted that takes 18 seconds. During this time, the sign **R** is lighted on the display.

VFR

By pressing the **VFR** button, the preset code is set on the transponder for the **VFR** operation (the code preset by the manufacturer is 7000). By the second pressing, the code that was set before the first pressing the **VFR** button is restored.

**FUNC**

By pressing the **FUNC** button, the data on the right side of the display is changed. By repeated pressing the button, another data is entered. The following data is activated: PRESSURE ALT, FLIGHT TIME, COUNT UP TIMER, COUNT DOWN TIMER.

In the configuration mode, it goes through the function pages.

CSRS

starts setting the initial time for timer countdown and cancels the input code of the transponder. In the configuration mode, it selects the variable field.

CLR

resets individual timers. It cancels the previous button pressing during the selection of code and countdown. It is used in the configuration mode.

Button 8

reduces display contrast and brightness when corresponding fields are indicated and inserts number 8 in the countdown. It is used in the configuration mode.

Button 9

increases display contrast and brightness when corresponding fields are indicated and inserts number 9 in the countdown. It is used in the configuration mode.

NOTE

Detailed operating instructions are stated in the Garmin GTX 335/345 All-In-One ADS-B Transponder Pilot's Guide, P/N 190-01499-00 (revision F or later).



2. MAINTENANCE PRACTICES

A. Garmin SL 30 COM/NAV unit

Maintenance type: Line

Personnel qualification: Independent verification personnel qualified in accordance with Part 66 or higher

Recommended tools and material:

Item	Designation / Size	Quantity	Note
Hex wrench	3/32"	1 pc.	

(1) Removal – SL-30 unit

- (a) Switch the electrical network off and disconnect the battery.
- (b) Remove the cover of the upper part of fuselage F4 (Section 53-30).
- (c) Insert the Hex wrench into the hole (2, Fig. 34-38) in the front panel of the unit (1) and insert it in the securing screw head.
- (d) Turn the securing screw counterclockwise until the unit (1) is released from the holder.

CAUTION

DON'T PULL THE CONTROLS. DON'T TRY TO RELEASE THE UNIT BY PRYING THE FRONT SIDE. THIS COULD DAMAGE THE DEVICE.

DON'T TOUCH THE CONNECTOR ON THE REAR SIDE OF THE UNIT. THE ELECTROSTATIC CHARGE OF YOUR BODY COULD DAMAGE THE DEVICE.

- (e) Carefully take out the unit (1) of the mounting holder by pulling on the sides of the device.
 - (f) Install the caps on the connectors in the rear part of the unit.
- #### (2) Installation – SL-30 unit

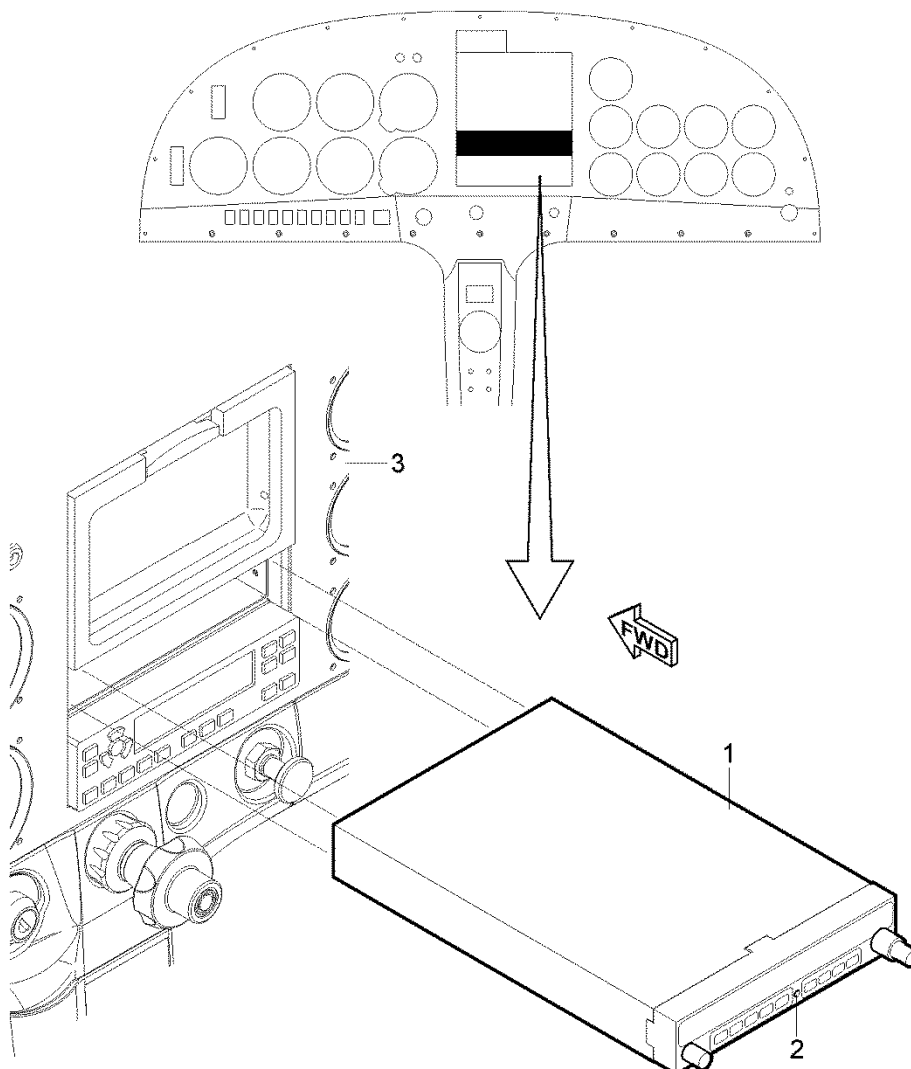
- (a) Remove the caps from the connectors in the rear part of the unit.
- (b) Looking at the lower part of the device, check whether the front detent of the locking mechanism is in the vertical position.
- (c) Insert the unit (1, Fig. 34-38) into the mounting holder; set the securing screw (2) so that the front detent touches the mounting holder.
- (d) Turn the securing screw (2) clockwise so that the rear detent is inserted in the mounting holder.
- (e) Keep turning the screw until the unit is firmly fixed in the mounting holder.

CAUTION

DON'T TIGHTEN THE SECURING SCREW EXCESSIVELY. THE SECURING MECHANISM COULD BE DAMAGED.



- (f) Install the cover of the upper part of fuselage F4 (Section 53-30).
- (g) Connect the battery, switch the electrical network on and do the function test of the unit.



Legend to Fig. 34-38

1 SL-30 unit

2 Hole with securing screw

For information:

3 Instrument panel

Fig. 34-38 SL-30 unit – removal / installation



B. Garmin GNC 255A COM/NAV unit

The maintenance procedures of GNC 255A unit are identical with the SL-30 unit (see par. 2 A.).

C. Garmin GTN 750 COM/NAV/GPS unit

Maintenance type: Line

Personnel qualification: Independent verification personnel qualified in accordance with Part 66 or higher

Recommended tools and material:

Item	Designation / Size	Quantity	Note
Hex wrench	3/32"	1 pc.	

(1) Removal – GTN 750 unit

- (a) Switch the electrical network off and disconnect the battery.
- (b) Insert the hex wrench into the hole (2, Fig. 34-39) in the front panel of the unit (1) and insert it in the securing screw head.
- (c) Turn the securing screw counterclockwise until the unit (1) is released from the holder.
- (d) Carefully take out the unit (1) of the mounting holder by pulling on the sides of the device.
- (e) Install the caps on the connectors in the rear part of the unit.

CAUTION

DON'T PULL THE CONTROLLER. DON'T TRY TO RELEASE THE UNIT BY PRYING THE FRONT SIDE. THIS COULD DAMAGE THE DEVICE.

DON'T TOUCH THE CONNECTORS ON THE REAR SIDE OF THE UNIT. THE ELECTROSTATIC CHARGE OF YOUR BODY COULD DAMAGE THE DEVICE.

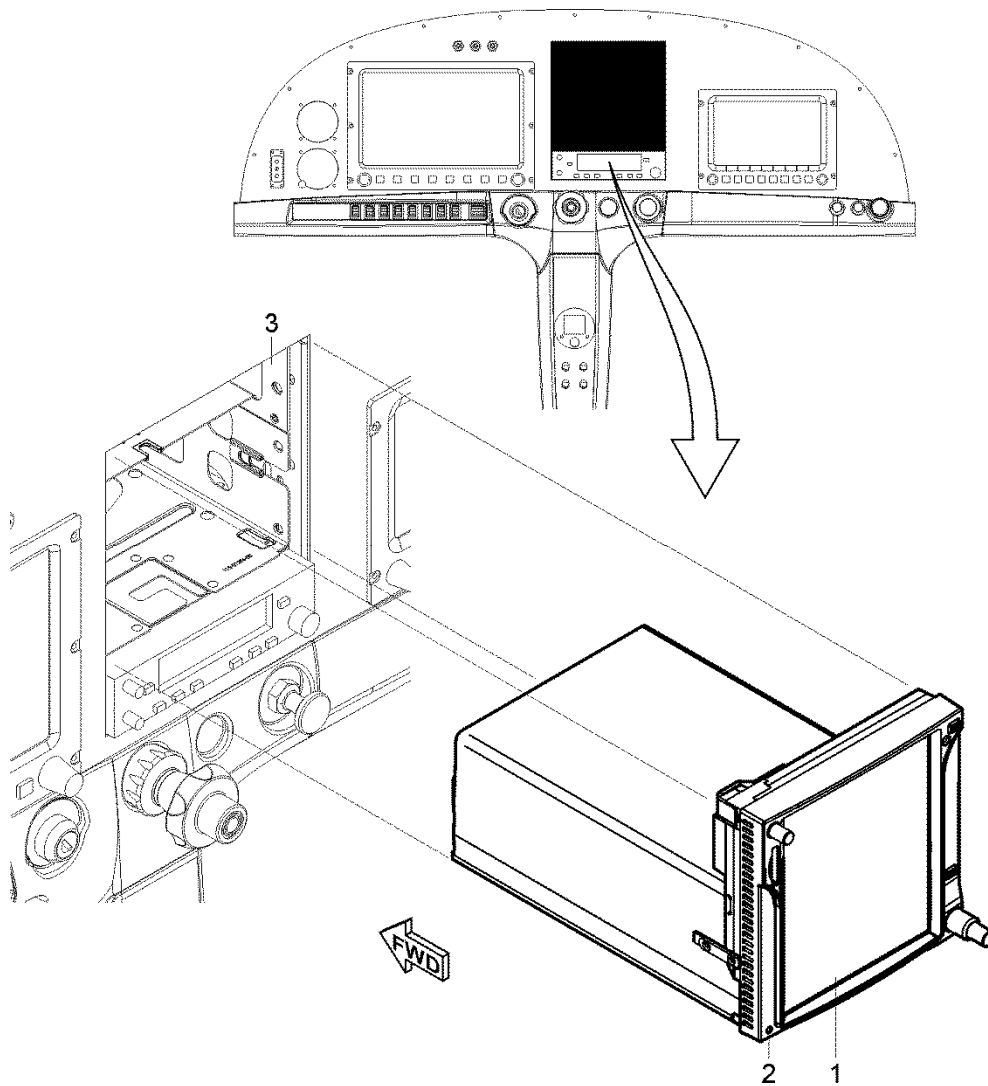
(2) Installation – GTN 750 unit

- (a) Remove the caps from the connectors in the rear part of the unit.
- (b) Looking at the lower part of the device, check whether the front detent of the locking mechanism is in the vertical position.
- (c) Insert the unit (1, Fig. 34-39) into the mounting holder; set the securing screw so that the front detent touches the mounting holder.
- (d) Turn the securing screw clockwise so that the rear detent is inserted in the mounting holder.
- (e) Keep turning the screw until the unit (1) is firmly fixed in the mounting holder.

**CAUTION**

DON'T TIGHTEN THE SECURING SCREW EXCESSIVELY.
THE SECURING MECHANISM COULD BE DAMAGED.

- (f) Connect the battery, switch the electrical network on and do the function test of the unit.



Legend to Fig. 34-39

- 1 GTN 750 unit
2 Hole for securing screw

For information:

- 3 Mounting holder

Fig. 34-39 GTN 750 unit – removal / installation



D. GI 106A course deviation indicator

Maintenance type: Line

Personnel qualification: Independent verification personnel qualified in accordance with Part 66 or higher

Recommended tools and material:

Item	Designation / Size	Quantity	Note
Phillips screwdriver	No. 2	1 pc.	

- (1) Removal – GI 106A CDI
 - (a) Switch the electrical network off and disconnect the battery.
 - (b) Remove the cover of the upper part of fuselage F4 (Section 53-30).
 - (c) Disconnect the connector (2, Fig. 34-40).
 - (d) Unscrew the screws (3) and remove the CDI (1).

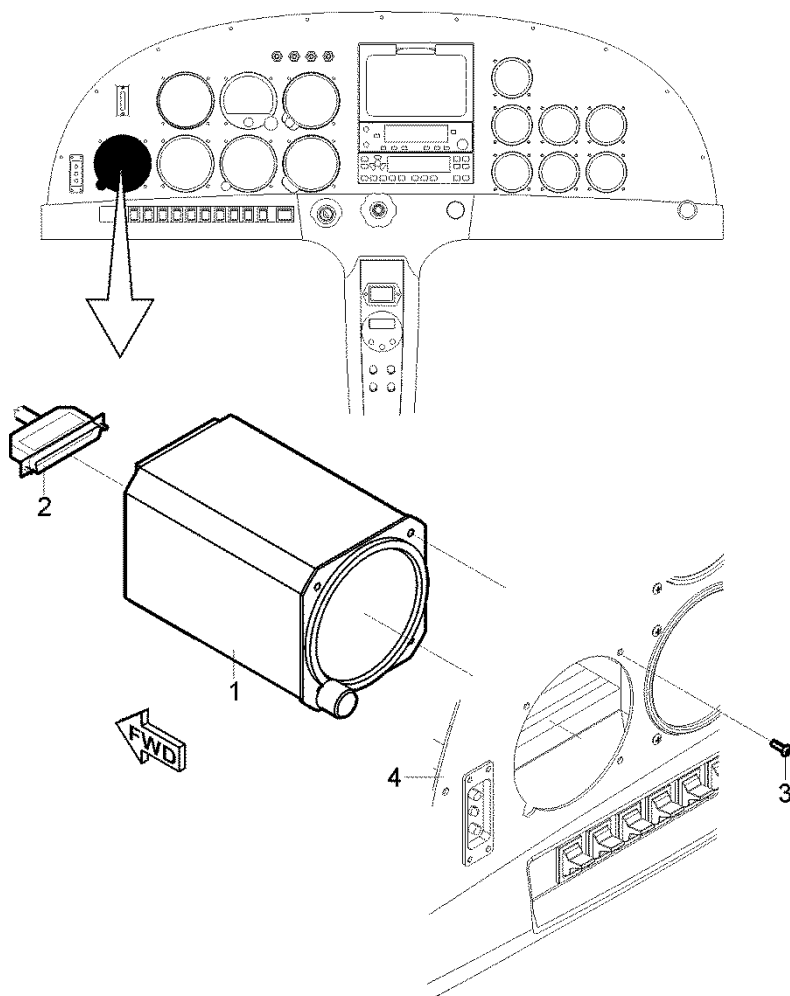


Fig. 34-40 GI 106A CDI – removal / installation (page 1 of 2)



Legend to Fig. 34-40

1 GI 106A CDI	For information:
2 Connector with wires	4 Instrument panel
3 Screw (3 pcs.)	

Fig. 34-40 GI 106A CDI – removal / installation (page 2 of 2)

- (2) Installation – GI 106A CDI
- (a) Insert the CDI (1, Fig. 34-40) into the hole in the instrument panel (4); screw on and tighten the screws (3).
 - (b) Connect the connector (2).
 - (c) Install the cover of the upper part of fuselage F4 (Section 53-30).
 - (d) Connect the battery and activate the board network.
 - (e) Do the verification flight and check the instrument function.

E. Becker BXP 6401-2 transponder

Maintenance type: Line

Personnel qualification: Independent verification personnel qualified in accordance with Part 66 or higher

Recommended tools and material:

Item	Designation / Size	Quantity	Note
Phillips screwdriver	No. 2	1 pc.	
Wrench	No. 7	1 pc.	

- (1) Removal – BXP 6401-2 transponder
- (a) Switch the electrical network off and disconnect the battery.
 - (b) Remove the cover of the upper part of the fuselage F4 (Section 53-30).
 - (c) Disconnect the connectors with cables (3; 4, Fig. 34-41) from the transponder.
 - (d) Unscrew and remove the nut (6) with the washer (7) and disconnect the ground wire (5).

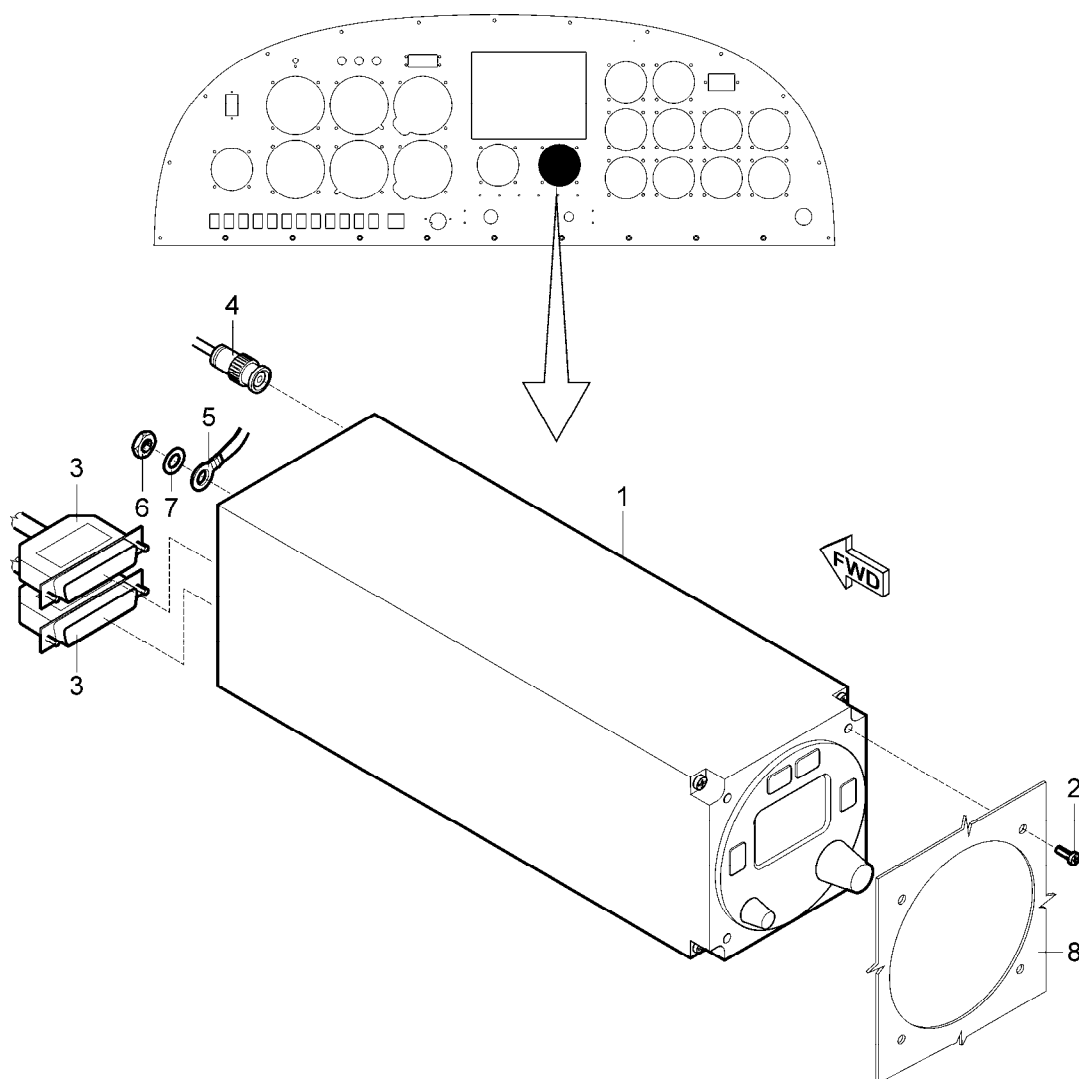
CAUTION

DON'T TOUCH THE CONNECTOR ON THE REAR SIDE OF THE TRANSPONDER. THE ELECTROSTATIC CHARGE OF YOUR BODY COULD DAMAGE THE DEVICE.

- (e) Unscrew the screws (2) and remove the transponder (1).
 - (f) Install suitable caps on the connectors in the rear part of the transponder.
- (2) Installation – BXP 6401-2 transponder
- (a) Remove the caps from the connectors in the rear part of the transponder.
 - (b) Insert the transponder (1, Fig. 34-41) from the rear side of the instrument panel (8) and attach it by means of screws (2).



- (c) By means of the nut (6) and the washer (7), attach the ground wire (5) on the screw located on the rear side of the transponder.
- (d) Connect the connectors with cables (3, 4) to the transponder.
- (e) Install the cover of the upper part of fuselage F4 (Section 53-30).
- (f) Connect the battery, switch the electrical network on and do the function test of the transponder.



Legend to Fig. 34-41

1	BXP 6401-2 transponder	6	Nut M4
2	Screw (4 pcs.)	7	Washer 4
3	Connector with cable		For information:
4	Connector with cable	8	Instrument panel
5	Ground wire		

Fig. 34-41 BXP 6401-2 transponder – removal / installation


F. Garmin GTX 328 transponder

Maintenance type: Line

Personnel qualification: Independent verification personnel qualified in accordance with Part 66 or higher

Recommended tools and material:

Item	Designation / Size	Quantity	Note
Hex wrench	3/32"	1 pc.	

- (1) Removal – the GTX 328 transponder
 - (a) Switch the electrical network off and disconnect the battery.
 - (b) Remove the cover of the upper part of fuselage F4 (Section 53-30).
 - (c) Insert the hex wrench into the hole (2, Fig. 34-42) in the front panel of the transponder (1) and insert it in the securing screw head.
 - (d) Turn the securing screw counterclockwise until the transponder (1) is released from the holder.

CAUTION

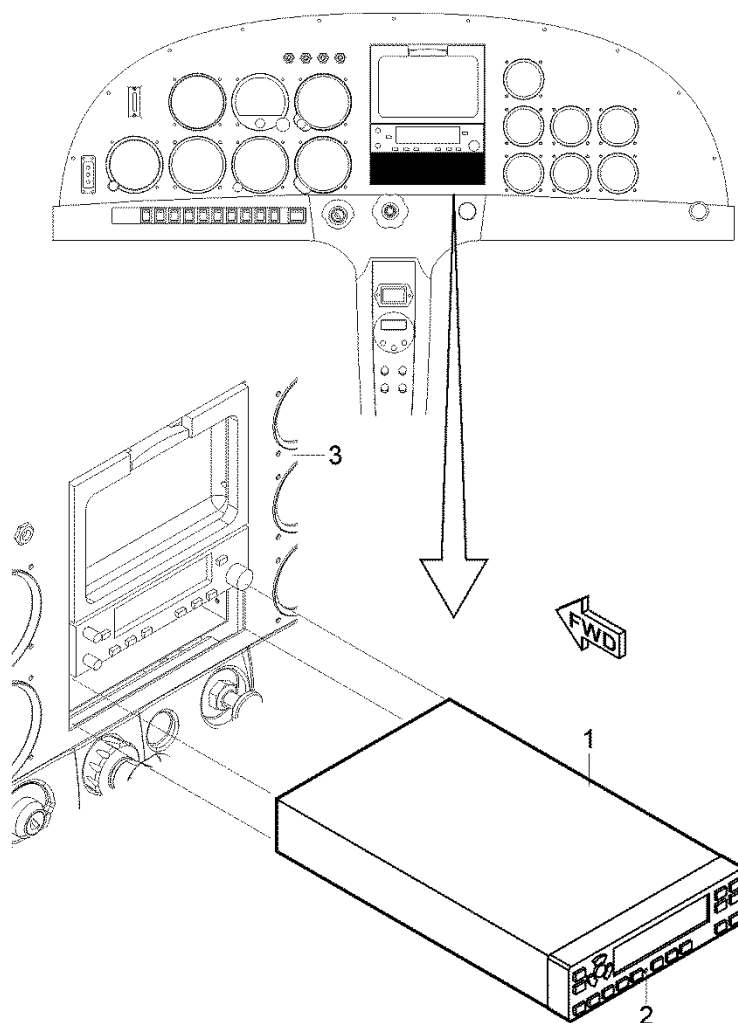
DON'T TOUCH THE CONNECTOR ON THE REAR SIDE OF THE TRANSPONDER. THE ELECTROSTATIC CHARGE OF YOUR BODY COULD DAMAGE THE DEVICE.

- (e) Carefully take out the transponder (1) of the mounting holder by pulling on the sides of the device.
 - (f) Install the caps on the connectors in the rear part of the transponder.
- (2) Installation – the GTX 328 transponder
 - (a) Remove the caps from the connectors in the rear part of the transponder.
 - (b) Looking at the lower part of the device, check whether the front detent of the locking mechanism is in the vertical position.
 - (c) Insert the transponder (1, Fig. 34-42) into the mounting holder; set the securing screw (2) so that the front detent touches the mounting holder.
 - (d) Turn the securing screw (2) clockwise so that the rear detent is inserted in the mounting holder.
 - (e) Keep turning the screw until the transponder is firmly fixed in the mounting holder.

CAUTION

DON'T TIGHTEN THE SECURING SCREW EXCESSIVELY. THE SECURING MECHANISM COULD BE DAMAGED.

- (f) Install the cover of the upper part of fuselage F4 (Section 53-30).
 - (g) Connect the battery, switch the electrical network on and do the function test of the transponder.



Legend to Fig. 34-42

- 1 GTX 328 transponder
- 2 Hole with securing screw

For information:

- 3 Instrument panel

Fig. 34-42 Garmin GTX 328 transponder – removal / installation


G. Garmin GTX 33 transponder

Maintenance type: Line

Personnel qualification: Independent verification personnel qualified in accordance with Part 66 or higher

Recommended tools and material:

Item	Designation / Size	Quantity	Note
Wrench	No. 7	1 pc.	
Phillips screwdriver	No. 2	1 pc.	

- (1) Removal – the GTX 33 transponder
 - (a) Switch the electrical network off and disconnect the battery.
 - (b) Remove the cover of the upper part of the fuselage F4 (Section 53-30).
 - (c) Disconnect the connectors (5; 6, Fig. 34-43).
 - (d) Unscrew and remove the screws (7) with washers (8) and remove the holder (2) including the transponder (1).
 - (e) Unscrew the screw (4) and remove the lever (3).

CAUTION

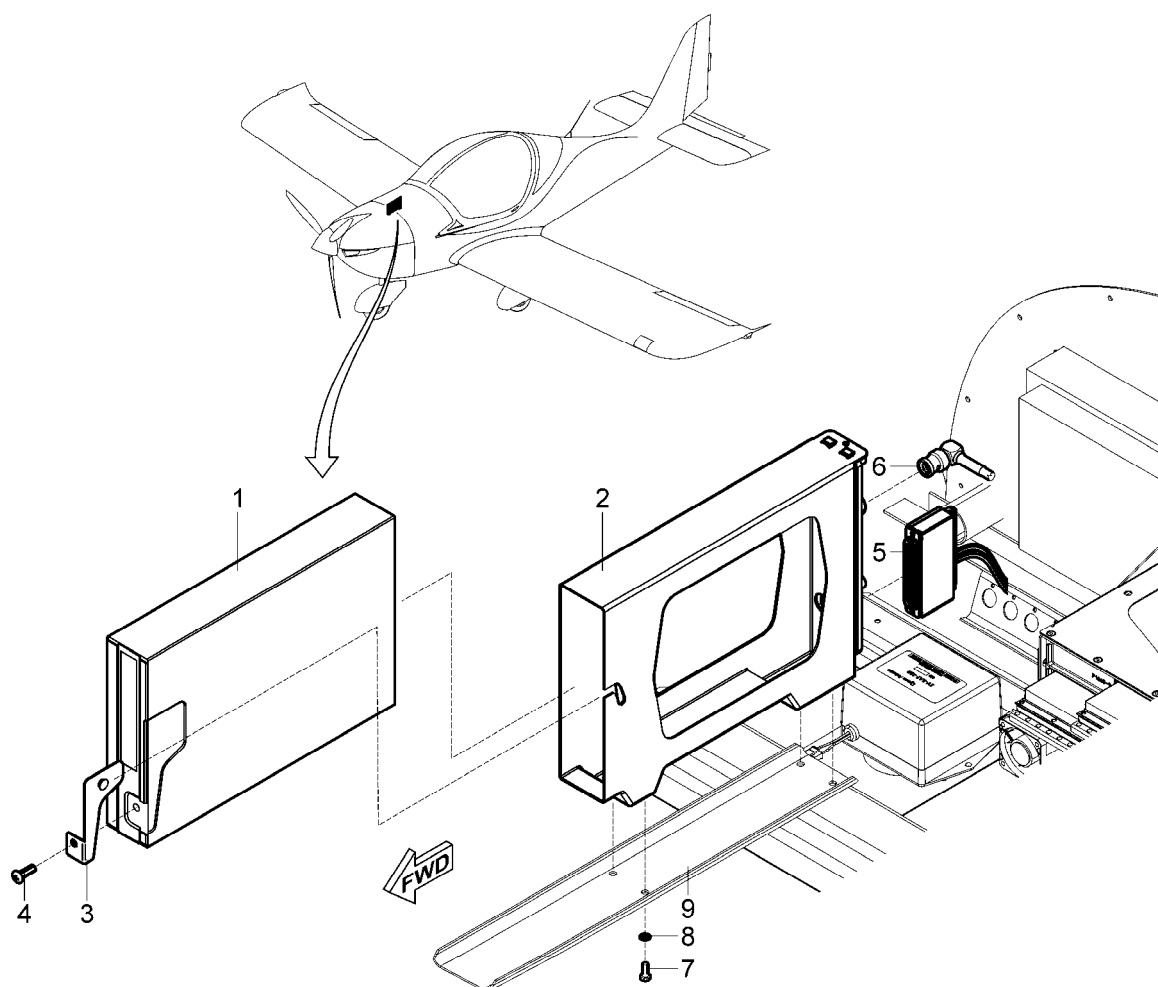
DON'T TOUCH THE CONNECTORS ON THE REAR SIDE OF THE TRANSPONDER. THE ELEKTROSTATIC CHARGE OF YOUR BODY COULD DAMAGE THE DEVICE.

- (f) Carefully take out the transponder (1) of the mounting holder.
 - (g) Install the caps on the connectors in the rear part of the transponder.
- (2) Installation – the GTX 33 transponder
 - (a) Remove the caps from the connectors in the rear part of the transponder.

CAUTION

DON'T APPLY EXCESSIVE FORCE WHEN INSERTING THE TRANSPONDER INTO THE HOLDER. THIS COULD DAMAGE THE CONNECTORS, UNIT AND/OR THE HOLDER. IF YOU ARE FEELING A STRONG RESISTANCE DURING THE INSTALLATION, STOP! REMOVE THE TRANSPONDER AND IDENTIFY THE SOURCE OF RESISTANCE.

- (b) Insert the transponder (1, Fig. 34-43) into the mounting holder (2) and secure it by means of lever (3); attach the lever by means of screw (4).
 - (c) Set the holder (2) including the transponder (1) to the corresponding position on the bracket (9) and attach it by means of screws (7) with washers (8).
 - (d) Connect the connectors (5; 6).
 - (e) Install the cover of the upper part of the fuselage F4 (Section 53-30).
 - (f) Connect the battery, switch the electrical network on and do the function test of the transponder.



Legend to Fig. 34-43

1	GTX 33 transponder	6	Connector with cable
2	Mounting holder	7	Screw M4x16 (4 pcs.)
3	Lever with pin	8	Washer 4,3 (4 pcs.)
4	Screw		For information:
5	Connector with wires	9	Bracket

Fig. 34-43 GTX 39 transponder – removal / installation

H. Garmin GTX 335 transponder

The maintenance procedures of Garmin GTX 335 unit are identical with the GTX 328.


I. Commant CI-158 C2 VOR/LOC/GS antenna

Maintenance type: Line

Personnel qualification: Independent verification personnel qualified in accordance with Part 66 or higher

Recommended tools and material:

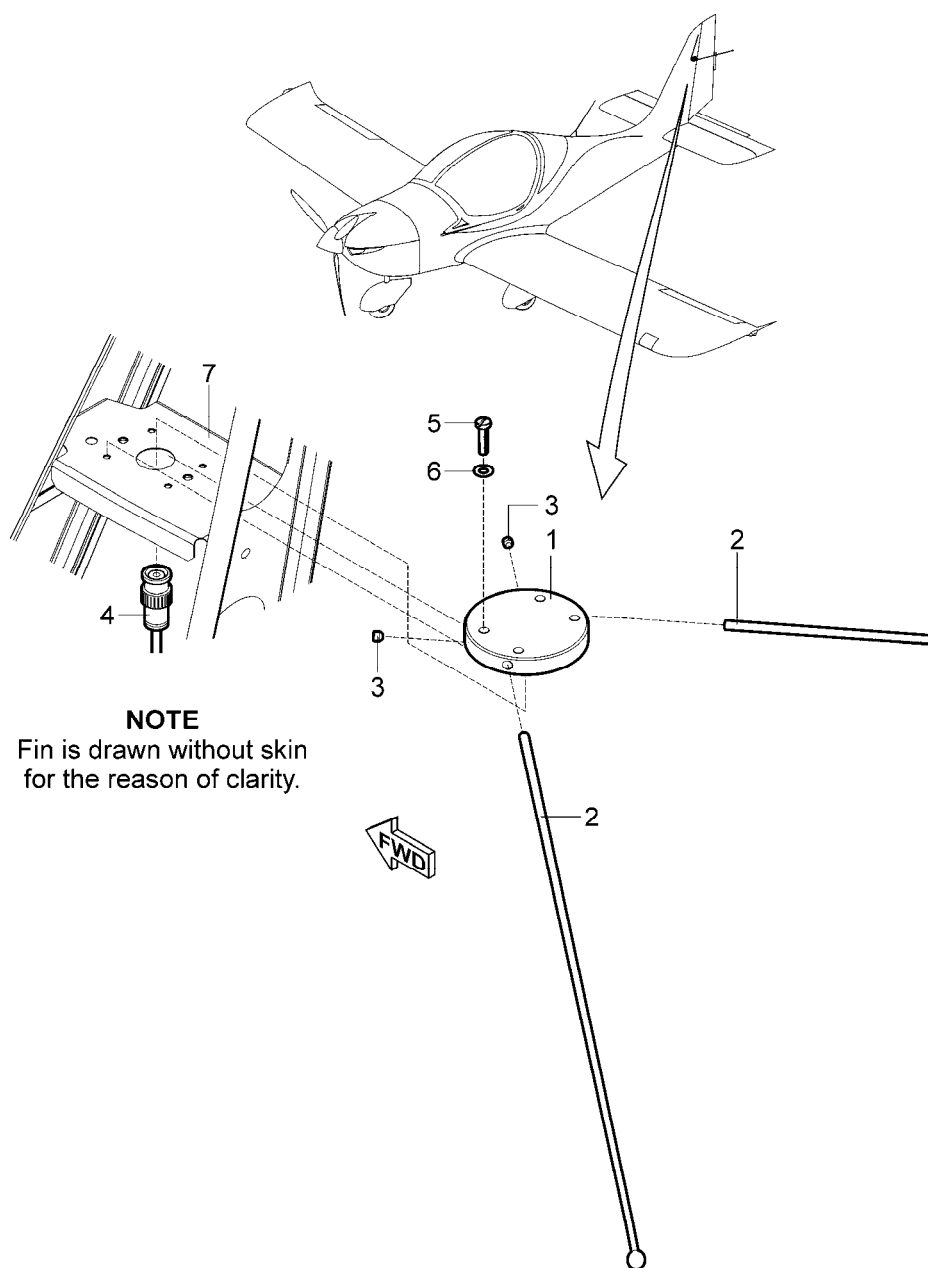
Item	Designation / Size	Quantity	Note
Wrench	No. 7	1 pc.	
Hex wrench	5/64"	1 pc.	
Self-adhesive tape	-	-	Color in accordance with the fin paint coat.

(1) Removal – CI 158 C2 antenna

- (a) Switch the electrical network off and disconnect the battery.
- (b) Unstick the tape covering the assembly holes on both sides of the fin.
- (c) Insert the hex wrench into the holes in the fin and loosen the screws (3, Fig. 34-44).
- (d) Unscrew the antenna rods (2) from the body (1).
- (e) Remove the rudder (Section 55-40).
- (f) Disconnect the connector (4).
- (g) Unscrew and remove the screws (5), washers (6) and the antenna body (1).

(2) Installation – CI 158 C2 antenna

- (a) Set the antenna body (1, Fig. 34-44) to the corresponding position on the rib (7) and attach it by means of screws (5) with washers (6).
- (b) Connect the connector (4).
- (c) Install the rudder (Section 55-40).
- (d) Screw the antenna rods (2) into the body (1).
- (e) Insert the hex wrench into the holes in the fin surface and tighten the screws (3).
- (f) Close the assembly holes on both sides of the fin surface by means of adhesive tape.
- (g) Connect the battery, switch the electrical network on and do the function test of the COM /NAV unit.



Legend to Fig. 34-44

1	Antenna body	5	Screw (4 pcs.)
2	Antenna rod	6	Washer (4 pcs.)
3	Screw (2 pcs.)		For information:
4	Connector with wire	7	Rib of fin

Fig. 34-44 CI 158 C2 antenna – removal / installation


J. Rami AV-74 XPDR antenna

Maintenance type: Line

Personnel qualification: Independent verification personnel qualified in accordance with Part 66 or higher

Recommended tools and material:

Item	Designation / Size	Quantity	Note
Wrench	No. 11/32"	1 pc.	
Phillips screwdriver	No. 2	1 pc.	

(1) Removal – AV-74 antenna

- (a) Switch the electrical network off and disconnect the battery.
- (b) Remove the carpet on the floor of the baggage compartment.
- (c) Remove the floor of the baggage compartment IN3 (Fig. 06-2).
- (d) Disconnect the connector with wires (3, Fig. 34-45).

NOTE

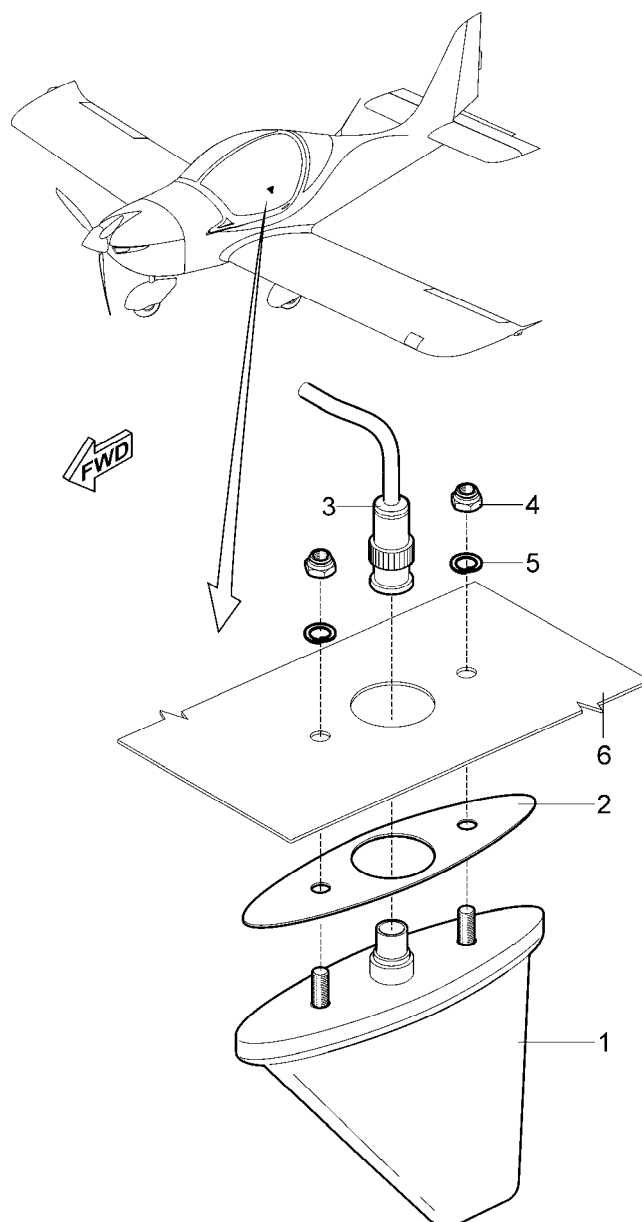
The antenna removal must be performed by two persons.

- (e) Holding the antenna, unscrew the nuts (4) with washer (5).
 - (f) Remove the antenna (1) and the gasket (2).
 - (g) Close the connector by the blind plug.
- (2) Installation – AV-74 antenna
- (a) Remove the blind plug from the connector.

NOTE

The antenna installation must be performed by two persons.

- (b) Position the antenna (1, Fig. 34-45) with the gasket (2) on the lower part of the fuselage and attach it by means of nuts (4) with washers (5).
- (c) Connect the connector with wires (3).
- (d) Install the floor of baggage compartment IN3 (Fig. 06-2).
- (e) Install the carpet on the floor of the baggage compartment.
- (f) Connect the battery, switch the electrical network on and do the function test of the transponder.



Legend to Fig. 34-45

1	AV-74 antenna	5	Locking washer (2 pcs.)
2	Gasket	For information:	
3	Connector with wires	6	Lower skin of fuselage
4	Nut (2 pcs.)		

Fig. 34-45 AV-74 antenna – removal / installation



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CHAPTER

39

**ELECTRICAL/
ELECTRONICS PANELS &
MULTIPURPOSE PARTS**



CHAPTER 39

ELECTRICAL/ELECTRONIC PANELS & MULTIPURPOSE PARTS

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GENERAL

1. INTRODUCTION

This chapter describes the instruments and electrical equipment that is installed on the panels in the airplane cockpit (the instrument panel, panels of circuit breakers, center panel, center console between the pilot seats and the panels of control sticks).



INSTRUMENT AND CONTROL PANELS

1. DESCRIPTION AND OPERATION

A. Instrument panel

The instrument panel is attached to the fuselage structure.

The airplane can be equipped with analog instruments (Fig. 39–1) or with the Dynon SkyView system (Fig. 39–2) or Garmin G3X system (Fig. 39–3).

The analog instrumentation consists of flight control instruments, engine control instruments and communication / navigation equipment.

The digital instrumentation features Dynon SkyView / Garmin G3X displays and communication / navigation equipment.

The switches are located in the left lower part of the instrument panel. The 12V socket is located in the right lower part of the instrument panel. The brackets of circuit breakers are located under the instrument panel on the left and also on the right side. The ignition switch, throttle and choke control are located in the middle part of the instrument panel.

On the center panel (Section 25-10) below the instrument panel, there is an engine-hour meter, flight clock and controllers of carburetor preheating and a ventilation / heating.

In the case of adjustable propeller installation, the governor of the propeller control is also located on the center panel.

NOTE

The layout of the instruments on the instrument panel depends on the airplane equipment in accordance with the request of the customer. Due to this, the instrument panels of individual airplane vary from case to case. The maximum possible equipment of the instrument panel, including the alternative locations of equipment, is shown in the manual.

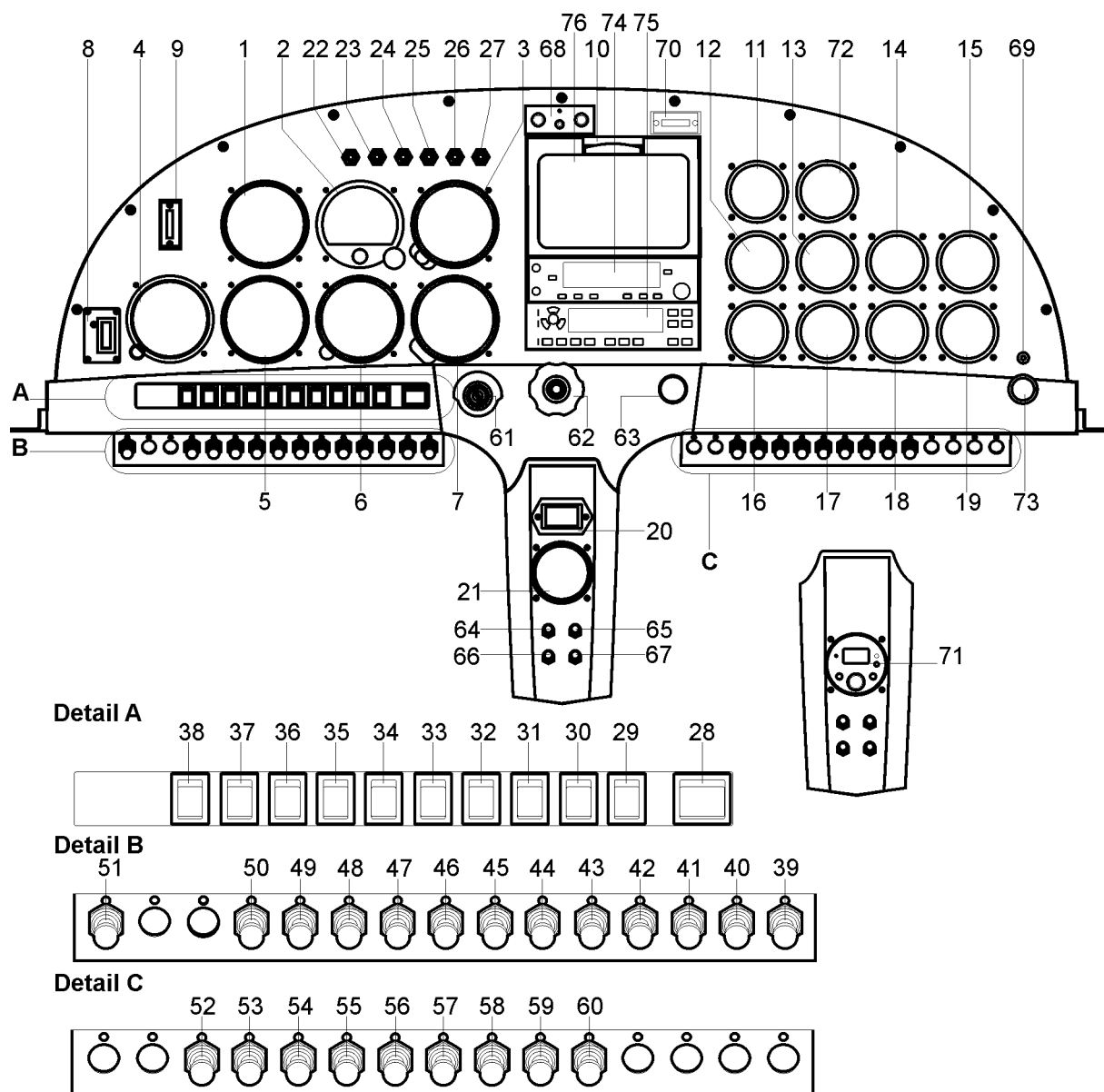


Fig. 39-1 Analog instrument panel (page 1 of 2)



Legend to Fig. 39–1

1	Airspeed indicator	39	Accumulator circuit breaker
2	Attitude horizon	40	Flight clock circuit breaker
3	Altimeter	41	Generator circuit breaker
4	CDI/GS indicator	42	Turn indicator circuit breaker
5	Turn and bank indicator	43	Attitude horizon circuit breaker
6	Directional gyro	44	Directional gyro circuit breaker
7	Variometer	45	Strobe lights circuit breaker
8	ELT remote control	46	Position lights circuit breaker
9	Pitch trim indicator	47	Landing light circuit breaker
10	COMM/NAV equipment	48	Fuel pump circuit breaker
11	Engine speed indicator	49	Signalization circuit breaker
12	Oil thermometer	50	Pitch trim circuit breaker
13	Coolant thermometer	51	Stall speed warning circuit breaker
14	Fuel pressure indicator	52	Engine speed indicator circuit breaker
15	Voltmeter	53	Engine instruments circuit breaker
16	Oil pressure indicator	54	Fuel quantity / pressure indicator circuit breaker
17	Fuel quantity indicator	55	V-meter / OAT circuit breaker
18	Fuel quantity indicator	56	Transceiver circuit breaker
19	Outside air thermometer	57	Navigation equipment circuit breaker
20	Engine hour meter	58	Transponder circuit breaker
21	Flight clock	59	Altitude encoder circuit breaker
22	P/S tube heating signaling light	60	GPS circuit breaker
23	Ext. source connection signal. light	61	Ignition switch
24	Parking brake position signal. light	62	Throttle controller
25	Wing flap position signaling light	63	Choke controller
26	Cockpit closing signaling light	64	Cold air control knob
27	Generator failure signaling light	65	Carburetor preheating control knob
28	Master switch	66	Hot air control knob
29	Master avionics switch	67	Windshield / feet heating control knob
30	Turn indicator switch	68	Intercom control
31	Attitude horizon switch	69	Audio input
32	Directional gyro switch	70	Alter. location of ELT remote control
33	Strobe lights switch	71	Adjustable propeller governor
34	Position lights switch	72	Manifold pressure indicator
35	Landing light switch	73	12 V socket
36	Fuel pump switch	74	Transceiver
37	Intercom switch	75	Transponder
38	12 V socket switch	76	GPS holder

Fig. 39–1 Analog instrument panel (page 2 of 2)

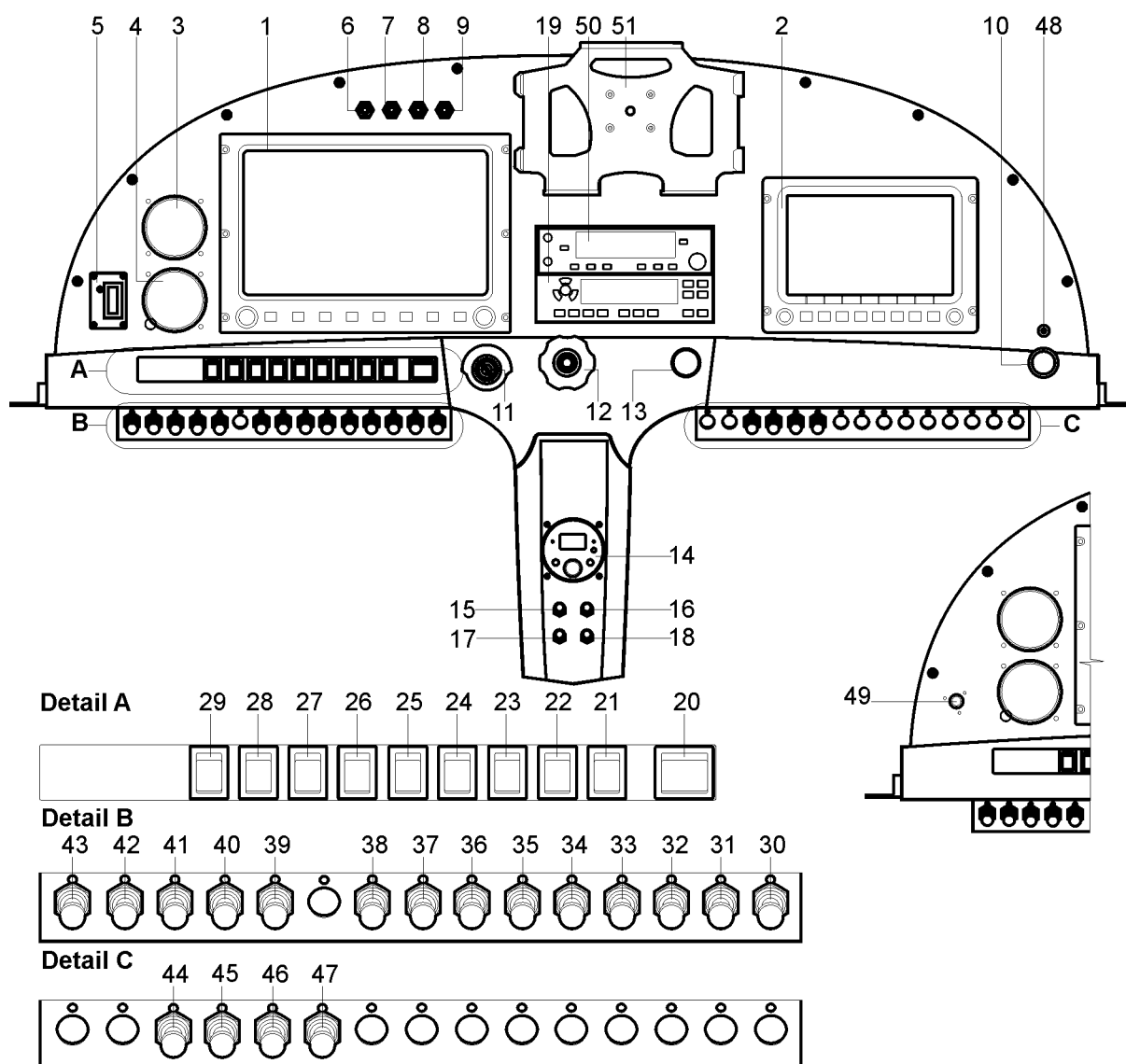


Fig. 39–2 Dynon SkyView instrument panel (page 1 of 2)



Legend to Fig. 39–2

1	Display SV-D1000	27	Fuel pump switch
2	Display SV-D700	28	Intercom switch
3	Airspeed indicator	29	12 V socket switch
4	Altimeter	30	Accumulator circuit breaker
5	ELT remote control	31	Reference generator circuit breaker
6	Ext. source connection signaling light	32	Generator circuit breaker
7	Parking brake position signal. light	33	Auxiliary generator circuit breaker
8	Aux. generator failure signaling light	34	Aux. generator excitation circuit breaker
9	Generator failure signaling light	35	Strobe lights circuit breaker
10	12 V socket	36	Position lights circuit breaker
11	Ignition switch	37	Landing light circuit breaker
12	Throttle controller	38	Fuel pump circuit breaker
13	Choke controller	39	Signalization circuit breaker
14	Adjustable propeller governor	40	SV-D1000 display circuit breaker
15	Cold air control knob	41	SV-D700 display circuit breaker
16	Carburetor preheating control knob	42	Pitch trim circuit breaker
17	Hot air control knob	43	Stall speed warning circuit breaker
18	Windshield / feet heating control knob	44	Transceiver circuit breaker
19	Transponder	45	Navigation equipment circuit breaker
20	Master switch	46	Transponder circuit breaker
21	Generator switch	47	Altitude encoder circuit breaker
22	Auxiliary generator switch	48	Audio input
23	Master avionics switch	49	Selector valve of static pressure
24	Strobe lights switch	50	Transceiver
25	Position lights switch	51	iPad holder
26	Landing light switch		

Fig. 39–2 Dynon SkyView instrument panel (page 2 of 2)

NOTE

The selector valve of static pressure (49, Fig. 39–2) is installed on the airplane with two pitot-static tubes.

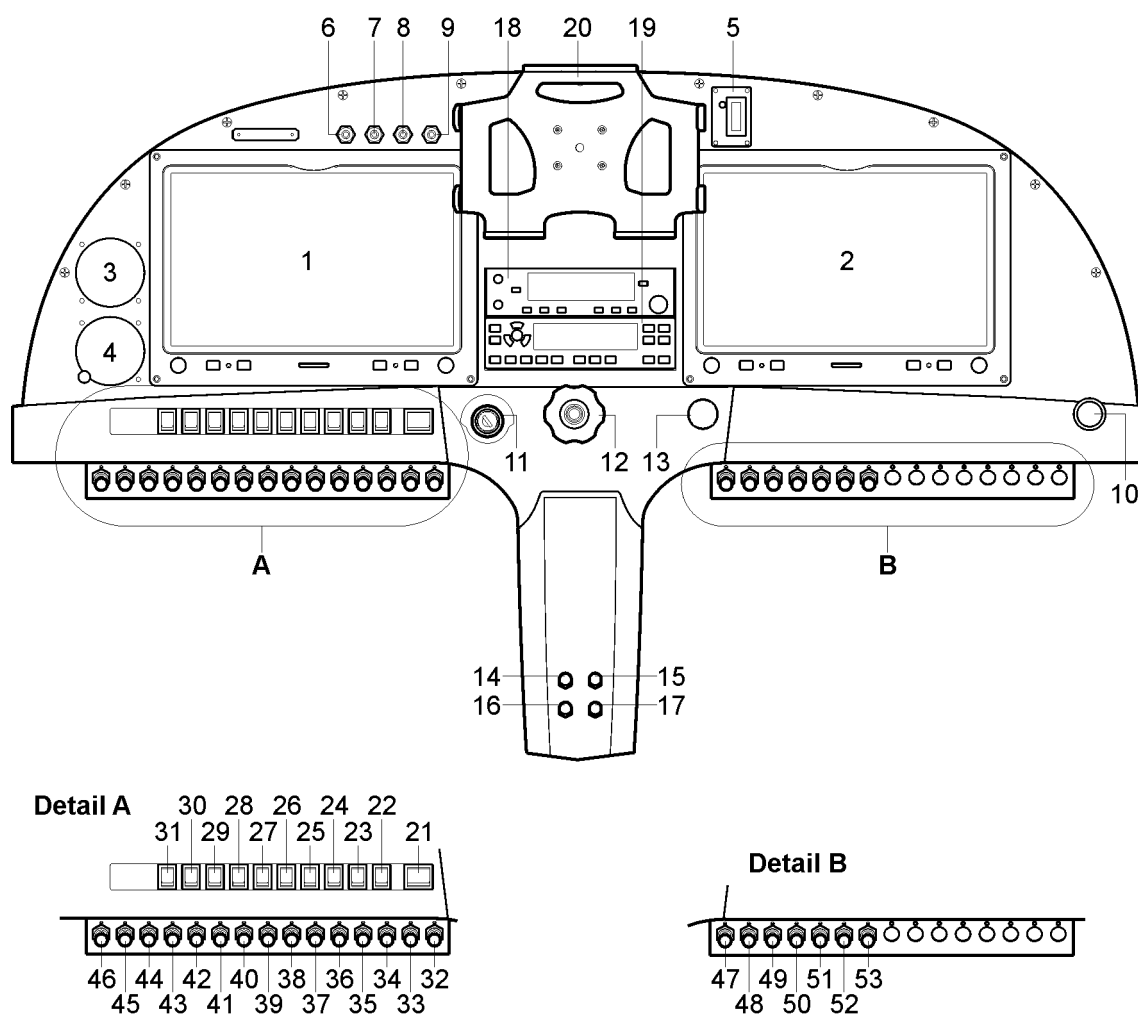


Fig. 39-3 Garmin G3X instrument panel (page 1 of 2)



Legend to Fig. 39–3

1	PFD GDU 460	28	Landing light switch
2	MFD GDU 460	29	Fuel pump switch
3	Airspeed indicator	30	Intercom switch
4	Altimeter	31	12 V socket switch
5	ELT remote control	32	Accumulator circuit breaker
6	Parking brake position signal. light	33	Reference generator circuit breaker
7	Exceeding limit engine parameters sig. light	34	Generator circuit breaker
8	Aux. generator failure signaling light	35	Auxiliary generator circuit breaker
9	Generator failure signaling light	36	Aux. generator excitation circuit breaker
10	12 V socket	37	Backup battery G3X system circuit breaker
11	Ignition switch	38	Strobe lights circuit breaker
12	Throttle controller	39	Position lights circuit breaker
13	Choke controller	40	Landing light circuit breaker
14	Cold air control knob	41	Fuel pump circuit breaker
15	Carburetor preheating control knob	42	PFD circuit breaker
16	Hot air control knob	43	MFD circuit breaker
17	Windshield / feet heating control knob	44	ADAHRS 1 circuit breaker
18	Transceiver	45	ADAHRS 2 circuit breaker
19	Transponder	46	EIS unit circuit breaker
20	iPad holder	47	Signalization circuit breaker
21	Master switch	48	Stall speed warning circuit breaker
22	Generator switch	49	Pitch trim circuit breaker
23	Auxiliary generator switch	50	Transceiver circuit breaker
24	Master avionics switch	51	Navigation equipment circuit breaker
25	Backup battery G3X system switch	52	Transponder circuit breaker
26	Strobe lights switch	53	Altitude encoder circuit breaker
27	Position lights switch		

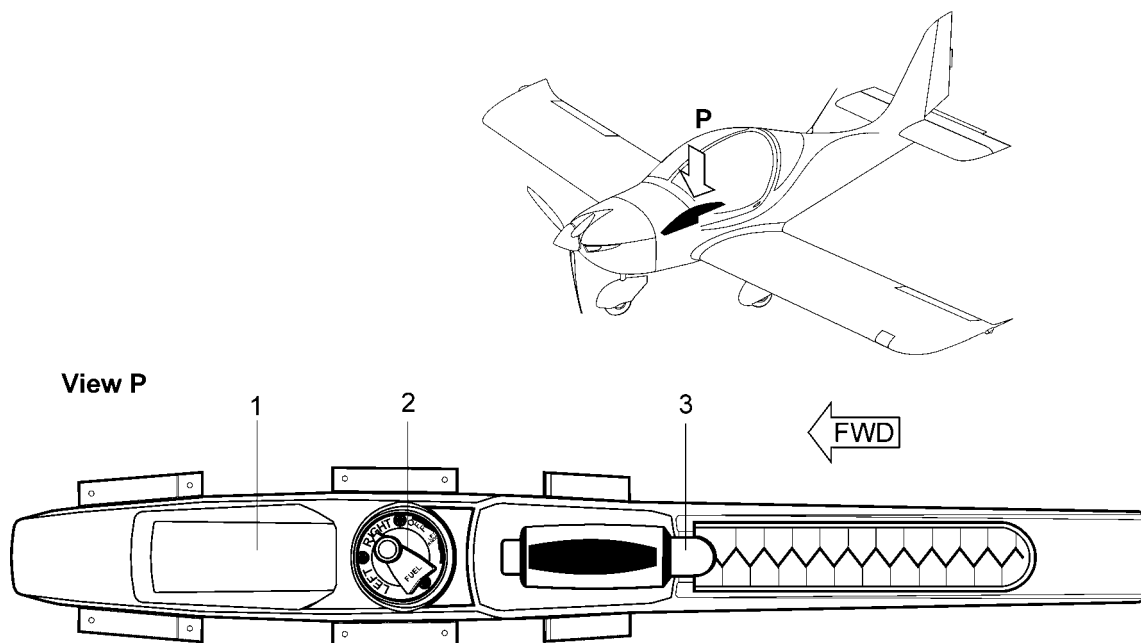
Fig. 39–3 Garmin G3X instrument panel (page 2 of 2)



B. Central console

The fuel cock (2, Fig. 39-04) and the lever of wing flap control (3) are located on the central console (1).

The central console is attached by means of screws to the central panel of the instrument panel and to the cockpit floor.



Legend to Fig. 39-4

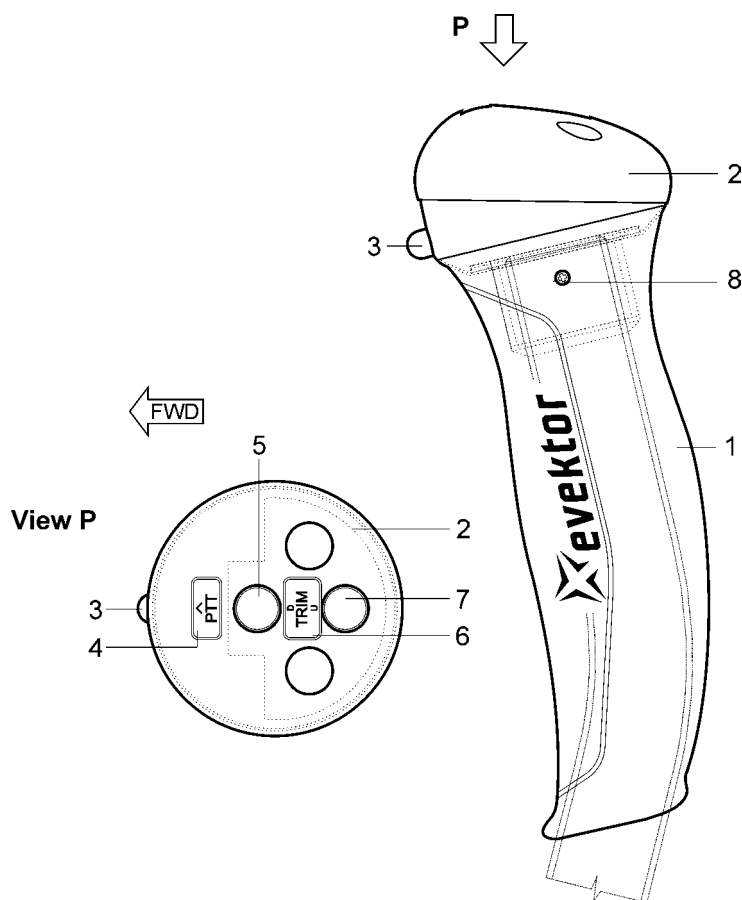
1	Central console	3	Lever of wing flap control
2	Fuel cock controller		

Fig. 39-4 Central console

C. Head of control stick

On the head of the control stick, there are two switches of the pitch trim control marked by the placard **TRIM** (Fig. 39-05).

The front switch marked as **D** serves for the trim tab setting to the “nose heavy” position. The rear switch marked as **U** serves for the trim tab setting to the “tail heavy” position. On the front part of the control stick head, there is a button marked by the placard **PTT** (push to talk transceiver).



Legend to Fig. 39–5

1	Control stick grip	5	Switch TRIM D (nose heavy)
2	Head of grip	6	TRIM placard
3	PTT button	7	Switch TRIM U (tail heavy)
4	PTT placard	8	Screw M3

*Fig. 39–5 Head of control stick***D. Jacks of headsets**

The jacks of the headsets are located behind the right pilot seat on the bracket formed by the transversal sheet metal stiffener of the fuselage.

The earphones and the microphone have individual jacks which differ by the diameter of the hole for the cable pin. This prevents from their eventual confusion.

The left headset and the right headset have individual jacks.

E. Panels of circuit breakers

The circuit breakers are located on one panel, eventually on two panels that are mounted on the angle pieces on the lower edge of the left and right part of the instrument panel.



2. MAINTENANCE PRACTICES

A. Instrument panel

Maintenance type: Heavy

Personnel qualification: Independent verification personnel qualified in accordance with Part 66 or higher

Recommended tools and material:

Item	Designation / Size	Quantity	Note
Flat screwdriver	-	1 pc.	
Phillips screwdriver	No. 2	1 pc.	
Gripping pliers	Cobra	1 pc.	

- (1) Removal – instrument panel

WARNING

SWITCH OFF THE IGNITION AND TAKE OUT THE KEY!

CAUTION

CLOSE THE HOSES OF P/S SYSTEM BY MEANS OF BLIND PLUGS IMMEDIATELY AFTER THEIR DISCONNECTION. BY MEANS OF BLIND PLUGS, CLOSE THE OUTLETS ON THE INSTRUMENTS AND ON THE EQUIPMENT CONNECTED TO THE P/S SYSTEM.

NOTE

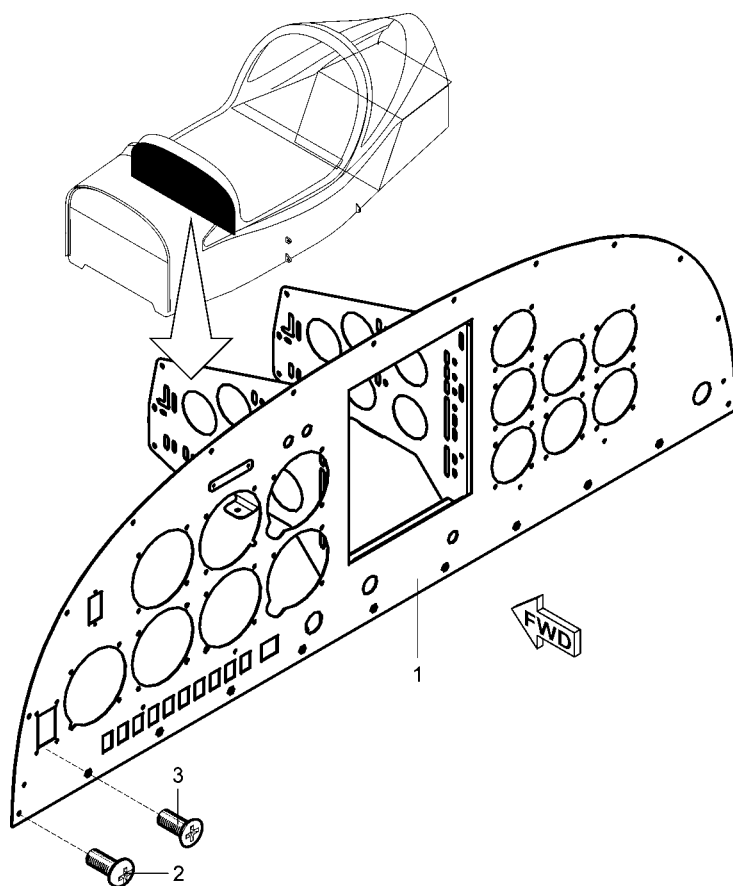
Before starting the work related to the removing of the instruments on the instrument panel, carefully note down and mark the individual lines and connections of the instruments and units on the instrument panel. This will facilitate the reinstallation of the equipment on the instrument panel.

The procedure for removal / installation shows the possible equipment of the instrument panel for the analog version and for the digital version, including the optional equipment. For the particular airplane, it is necessary to choose the procedure of the currently installed equipment (for example one of three possible types of a transponder).

- (a) Switch the electrical network off and disconnect the battery.
- (b) Remove the cover of the upper part of fuselage F4 (Section 53-30).
- (c) Remove the instruments, controllers and other equipment of the instrument panel:
 - 1 Transceiver (Section 23-10).
 - 2 Intercom, audiopanel (Section 23-50).
 - 3 12 V socket (Section 24-30).



- 4 Switches (Section 24-60).
- 5 Remote control of ELT (Section 25-60).
- 6 Fuel quantity indicators, fuel pressure indicator (Section 28-40).
- 7 Signaling lights, pitch trim indicator (Section 31-50).
- 8 Selector valve of P/S system, airspeed indicator, altimeter, variometer, display SV-D1000, outside air thermometer (Section 34-10).
- 9 Attitude horizon, directional gyro, turn and bank indicator (Section 34-20).
- 10 GPS receiver Area 500 (Section 34-40).
- 11 Unit COMM/NAV SL 30, unit COMM/NAV/GPS GTN 750, indicator CDI GI 106 A, transponder BXP 6401-2, transponder GTX 328, transponder GTX 33 (Section 34-50).
- 12 Ignition switch (Section 74-30).
- 13 Throttle and choke control (Section 76-10).
- 14 Engine speed indicator, display SV-D700, manifold pressure indicator (Section 77-10).
- 15 Cylinder head thermometer (Section 77-20).
- 16 Oil thermometer, oil pressure indicator (Section 79-30).
- (d) Remove the three-part ledge of the instrument panel (Section 25-10).
- (e) Unscrew the screws (2; 3, Fig. 39–6) of the instrument panel attachment; remove the instrument panel (1) from the fuselage.
- (2) Installation – instrument panel
 - (a) Check whether the electrical network of the airplane is switched off and whether the battery is disconnected.
 - (b) Remove the blind plugs of the P/S system hoses and the outlets on the instruments and equipment of the instrument panel.
 - (c) Position the instrument panel (1, Fig. 39–5) in the frame in the fuselage and attach it by means of screws (2; 3).
 - (d) Install the three-part ledge of the instrument panel (Section 25-10).
 - (e) Install the instruments, controllers and other equipment of the instrument panel.
 - 1 Transceiver (Section 23-10).
 - 2 Intercom, audiopanel (Section 23-50).
 - 3 12V socket (Section 24-30).
 - 4 Switches (Section 24-60).
 - 5 Remote control of ELT (Section 25-60).
 - 6 Fuel quantity indicators, fuel pressure indicator (Section 28-40).
 - 7 Signaling lights, pitch trim indicator (Section 31-50).
 - 8 Selector valve of P/S system, airspeed indicator, altimeter, variometer, display SV-D1000, outside air thermometer (Section 34-10).
 - 9 Attitude horizon, directional gyro, turn and bank indicator (Section 34-20).
 - 10 GPS receiver Area 500 (Section 34-40).



1	Instrument panel	3	Screw M4x12
2	Screw M4x12		

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B. Central console

The maintenance procedures for the central console are shown in Section 25-10.

C. Head of control stick

Maintenance type: Line

Personnel qualification: Independent verification personnel qualified in accordance with Part 66 or higher

Recommended tools and material:

Item	Designation / Size	Quantity	Note
Phillips screwdriver	No. 2	1 pc.	
Soldering iron	-	1 pc.	
Solder	-	As needed	

(1) Removal – control stick head

NOTE

Before removing the head of the control stick grip, note down and mark the position of the individual wires in order to facilitate the reinstallation.

- (a) Switch the electrical network off and disconnect the battery.
 - (b) Unscrew the screws (8, Fig. 39–5) attaching the control stick head (2).
 - (c) Unsolder the wires of the switches.
- (2) Installation – the control stick head
- (a) Solder the wires to the switches located in the head (2, Fig. 39–5) of the control stick grip.
 - (b) Position the head (2) on the grip and attach it by means of screws (8).
 - (c) Connect the battery, switch the electrical network on and do the function test of the transceiver and the intercom.



D. Jacks of headsets

Maintenance type: Line

Personnel qualification: Independent verification personnel qualified in accordance with Part 66 or higher

Recommended tools and material:

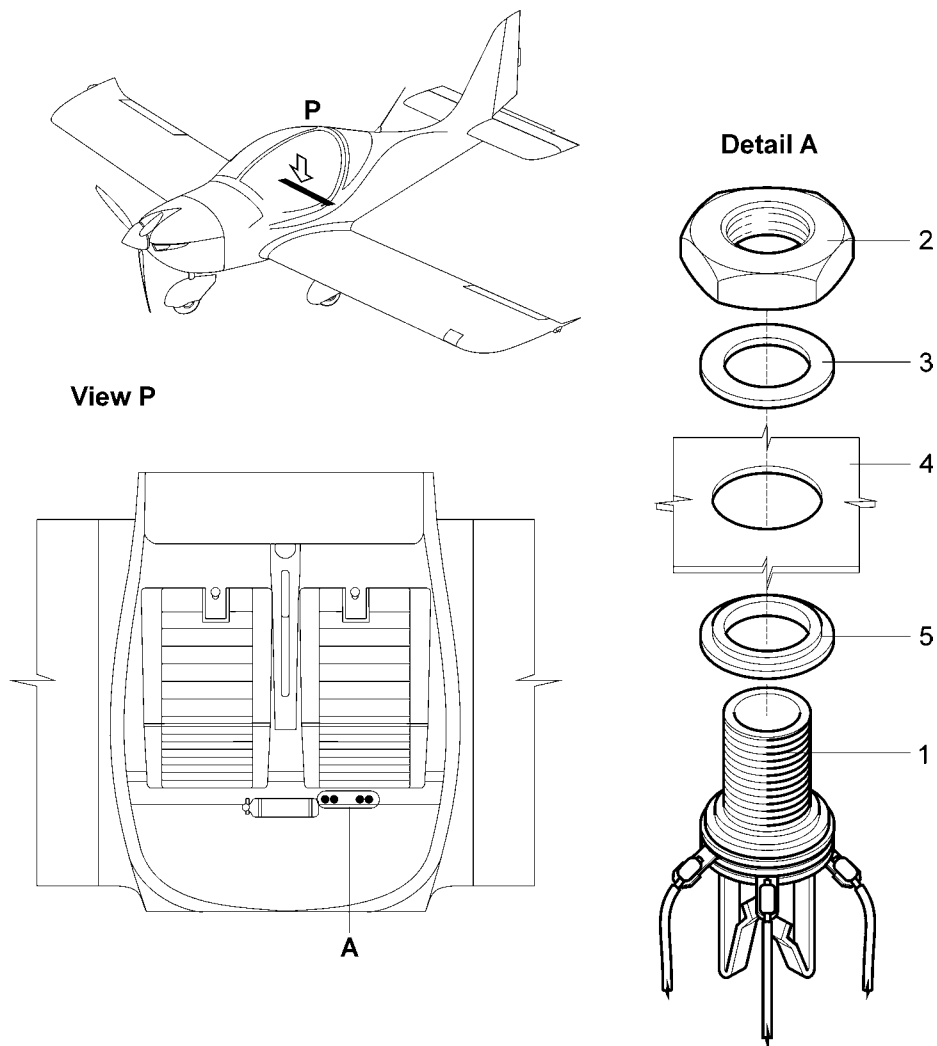
Item	Designation / Size	Quantity	Note
Wrench	No. 13	1 pc.	
Soldering iron		1 pc.	
Solder		As needed	

- (1) Removal – jack of headset

NOTE

Note down and mark the position of individual wires in order to facilitate the reinstallation.

- (a) Switch the electrical network off and disconnect the battery.
 - (b) Unscrew the nut (2, Fig. 39–7) and remove the washer (3).
 - (c) Eject the socket (1) from the hole in the bracket (4).
 - (d) Unsolder the wires from the contacts of the socket (1); remove the socket.
- (2) Installation – jack of headset
- (a) Solder the wires to the contacts of the socket (1, Fig. 39–7).
 - (b) Insert the socket (1) into the hole in the bracket (4).
 - (c) Put the washer (3), screw on and tighten the nut (2).
 - (d) Connect the battery, switch the electrical network on and do the function test of the transceiver and the intercom.



Legend to Fig. 39-7

1	Jack of earphones / microphone	4	Bracket
2	Nut	5	Insulation plastic washer
3	Washer		

Fig. 39-7 Jack of headset – removal / installation

NOTE

The typical removal / installation of the jack of earphones / microphone is shown in Fig. 39-7.



E. Panels of circuit breakers

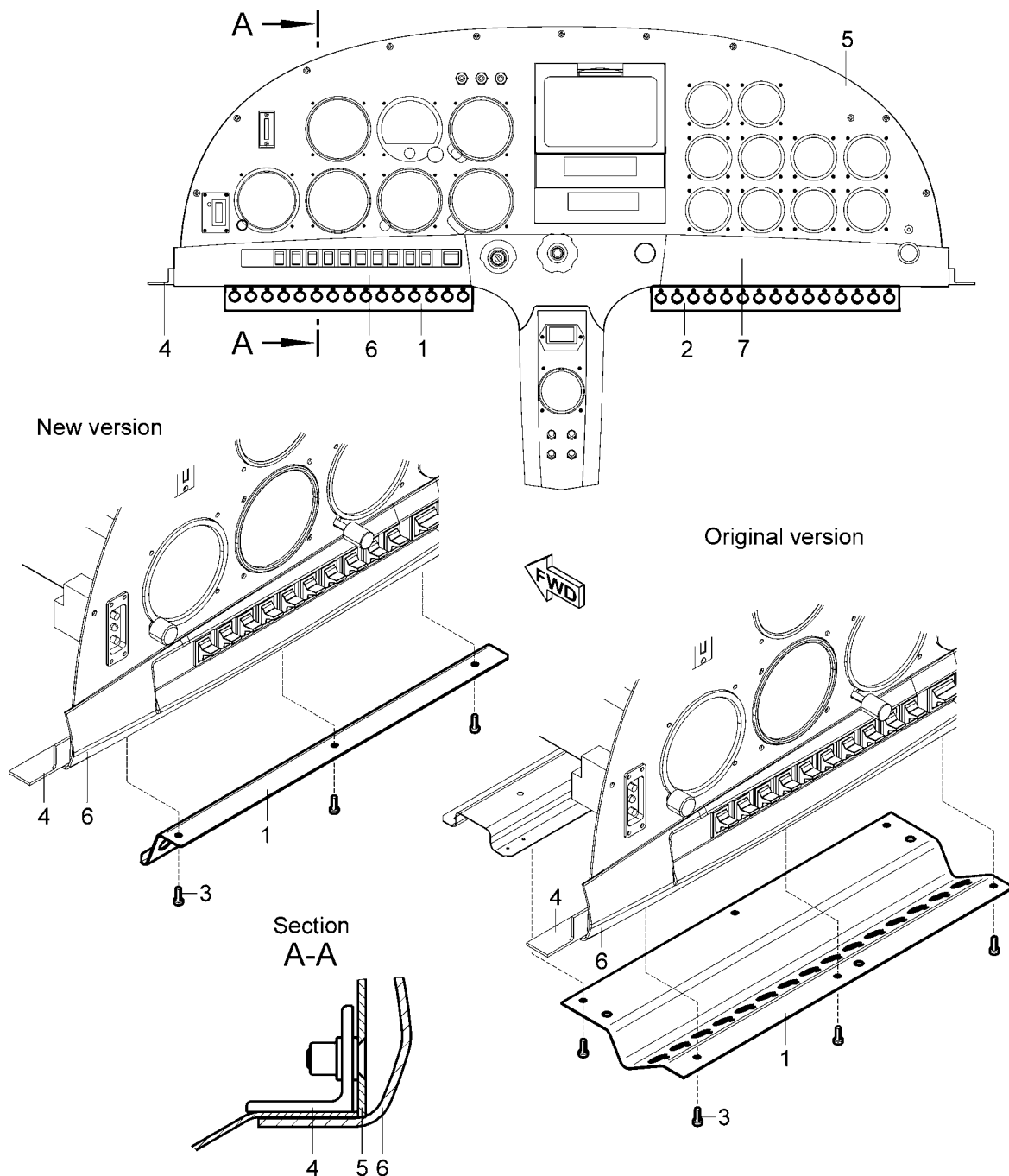
Maintenance type: Line

Personnel qualification: Independent verification personnel qualified in accordance with Part 66 or higher

Recommended tools and material:

Item	Designation / Size	Quantity	Note
Phillips screwdriver	No. 2	1 pc.	

- (1) Removal – panel of circuit breakers
 - (a) Switch the electrical network off and disconnect the battery.
 - (b) Remove the circuit breakers (Section 24-60).
 - (c) Unscrew the screws (3, Fig. 39–8) attaching the panels of the circuit breakers (1; 2).
 - (d) Remove the panels of circuit breakers (1; 2).
- (2) Installation – panel of circuit breakers
 - (a) Between the left / right ledge (6; 7, Fig. 39–8) and the angle piece (4) of the instrument panel, insert the panel of the circuit breakers (1; 2) and attach them by means of screws (3).
 - (b) Install the circuit breakers (Section 24-60).
 - (c) Connect the battery, switch the electrical network on and check the function of individual circuits.



Legend to Fig. 39–8

1	Panel of circuit breakers, L	4	Angle piece
2	Panel of circuit breakers, R	5	Panel of instrument panel
3	Screw M4 (3 or 6 pcs)	6	Ledge of instrument panel, L
For information:		7	Ledge of instrument panel, R

Fig. 39–8 Panels of circuit breakers – removal / installation

CHAPTER

51

STRUCTURES



CHAPTER 51

STRUCTURES

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REPAIRS

1. INSTRUCTIONS FOR REPAIRS

Dents, cracks and loose rivets are the most common problems that occur during the operation of all-metal airplane.

The following instructions must be taken into consideration during repair:

1. The strength in any cross-section of the repaired area must be, as a minimum, equal to the strength of the original undamaged area of the part. The repaired area isn't assessed as a whole, but it is considered to be:
 - An original structural unit
 - A stiffener or a patch

If the cross-section of the repaired area is such as in the original element at least in all considered cross-sections, and if the stiffening element or the patch has a similar shape or design and if the same material is used, there is no danger of reducing the airframe strength.

2. The loading must be transferred via a stiffening element or via a patch from one side of the repaired area to the other one.
In some cases, it is necessary to transfer the load via another design element, before returning to the undamaged part of the original structure.
3. The length of overlapping between the reinforcement (a stiffening element or a patch) and the undamaged part of the original structure must be sufficient to allow a reliable connection. The length of joint overlapping is very important in order to guarantee that there is no concentration of loading.

2. CLASSIFICATION OF DAMAGE

During airplane operation, various kinds of damage can occur. It is essential to classify damage in a correct way according to its character and size, and especially it is needed to specify which part of the airplane was damaged.

The important parts include the engine, engine mount, propeller, wing spars, center wing section in the fuselage, elevator, control system and the landing gear.

Minor damage can be repaired by the operator/owner. The operator can repair major damage by replacing the damaged part or have it repaired in an authorized repair shop. The damaged parts can be replaced by new ones that are supplied by the airplane manufacturer.

Any damage and its repair must be recorded in the airplane logbook.

3. USED MATERIALS

List of skin sheets:

AL-clad duralumin sheets are used for skins.

The following thicknesses are used:

0,4 mm
0,5 mm
0,6 mm



1	Czech standard		Z 424253.61
			Al Cu Mg 1
2	Mechanical properties (Min)	Yield point Rp 0,2	260 MPa
		Tensile strength Rm	400 MPa
		Ductility [%]	15 (A10)
3	Chemical composition [%]	Al	Rest
		Fe max.	0,3
		Mn	0,3 – 0,9
		Cu	3,8 – 4,9
		Zn max.	0,3
		Mg	1,2 – 1,8
		Si max.	0,3
4	Semi-finished products		Al-clad sheets Al thickness max. 10 mm
5	Equivalent standards	USA	Al-clad 2024
		Germany	DIN 1745
		Russia	D16AT

Tab. 51-1 Material properties

Thickness	Airplane part
0,4 mm	Skin of elevator (excluding the leading edge)
	Skin of trim tab
	Skin of rudder
0,5 mm	Skin of wing between ribs 7 and 11
	Skin of wing flaps
	Skin of ailerons
	Skin of upper rear part of fuselage
0,6 mm	Skin of wing between ribs 1 and 7
	Leading edge of elevator
	Skin of front, rear and lower part of fuselage

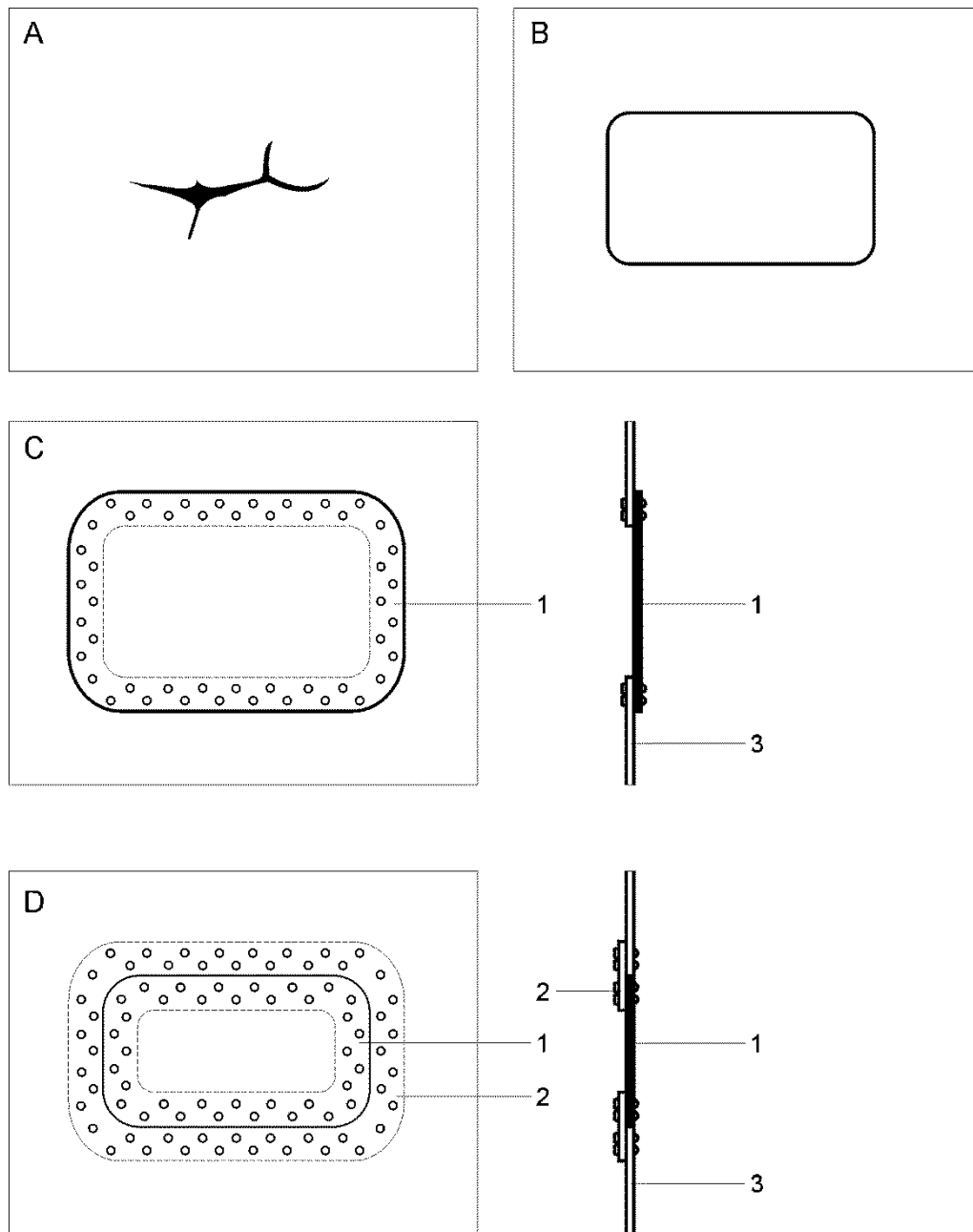
Tab. 51-2 List of skin sheets

4. REPAIRS OF SKINS

In order to prevent small cracks (max. 5 mm) from spreading, drill a hole with a diameter of 1,5 mm at the end of the crack.

Small holes (up to a diameter of 4 mm) can be repaired by means of pop rivets.

More extensive damage of skin can be repaired by a patch. It is possible to use countersunk or surface patches (see Fig. 51-1).



Legend to Fig. 51-1

- 1 Patch
- 2 Frame
- 3 Skin

- A Puncture of skin
- B Cutting out and deburring of damage area
- C Repair by surface patch
- D Repair by countersunk patch

Fig. 51-1 Repair of skins



Use the sheet metal of the same thickness as the repair skin for a patch and a frame.

Use single-row riveting for small patches (up to 50 cm²). For larger patches, use the double-row riveting (see Fig. 51-1). The frame as well as the patches must be protected by inner paint coat before riveting. Renew the outside paint coat after riveting.

5. RIVETING

Pop rivets are used in most cases. Standard rivets are used only for wing spars and for the center wing section inside the fuselage and for some airplane parts that transfer high loading. These parts must be repaired by an authorized repair shop.

Remove the pop rivets by drilling off the die head of rivet and by punching out the rivet shank by means of a mandrel. Use the drill of the same size as the rivet. The rest of original rivet must be removed from inner part of the structure.

The joints carried out by pop rivets are provided with a thin layer of sealant. If the joint must be separated after the removal of rivets by drilling off, use a cutter to cut off the sealant and mechanically remove the sealant from the joint. "Cutting off" adhesively bonded joints can be facilitated by short-time warming by hot air (180 - 200°C).

Pop rivets AVEX					
1. Material: Al Mg 2,5					
2. Material of shank: steel, surface with a zinc chromate layer					
Rivet No.:	Diameter	Length	Hole diameter	Max. riveting thickness	Head
	[mm]	[mm]	[mm]	[mm]	
1691-0410	3,2	7,9	3,3-3,5	0,8-4,8	half-round
1691-0414	3,2	11,2	3,3-3,5	4-7,9	
1691-0512	4	9,5	4,1-4,3	1,2-6,3	
1691-0516	4	12,7	4,1-4,3	4-9,6	
1604-0412	3,2	9,5	3,3-3,4	2,4-6,3	countersunk

Tab. 51-3 Pop rivets and their characteristics

After the riveting of parts and elimination of chips, one of the parts is coated with sealant (Emfimastik PU50). Use a spatula to create a uniform layer (about 0,1 mm).

Carry out riveting before the sealant hardening starts (about half an hour).

During the riveting of new rows of rivets, it is necessary to take as the starting point the spacing of the surrounding structure, about 20 mm to 40 mm and keep the minimum edge distance of 8 mm.



6. REPAIRS OF FIBREGLASS PARTS

A. Classification of damage

Any damage of the parts made from reinforced plastic materials with the epoxy matrix, leads to an increased saturation of the matrix by humidity and this subsequently leads to a loss of its properties. Therefore, we recommend carrying out their repairs as soon as possible after the occurrence of damage.

Two kinds of parts are manufactured from these materials for the airplane:

- Structural, load bearing parts (landing gear legs).
- Visual parts, non-load-bearing parts (aerodynamic fairings).

Depending on the size of damage, it is possible to classify repairs as follows:

- Minor damage (surface defects, not affecting the reinforcements).
- Medium damage (not more than 2/3 of thickness of damaged reinforcement).
- Major damage.

We recommend carrying out repairs by means of epoxy materials and glass reinforcements.

B. General

Epoxy materials are prepared in a given mass ration by means of weighing (scales accuracy 1 g).

C. Visual parts

(1) Minor damage

Damage is repaired only by application of sealant and varnish coat.

(a) Preparatory grinding

For a good adhesion of repair layers, grind the surface maximally up to the depth of the contact with the reinforcement (don't damage it). Carry out surface grinding with an overrun of about 50 mm from the area of damaging continuously up to the top layer. It is suitable to carry out grinding with the abrasive with a grain size of 160. Carry out dry grinding with the suction from the place of grinding. The grinding material can be Al_2O_3 (artificial corundum).

(b) Elimination of dust

Wipe by a clean and dry brush or use a vacuum cleaner.

(c) Application of smoothing layer.

After preparation of the mixture (for the recommended material, see the table below) and its eventual thickening for a higher viscosity (for applications on vertical or lower surfaces), apply it on the area of the repair by means of a spatula. For a better distribution of the applied material on uneven surfaces, it is possible to form it easily by means of a transparent PE or PP foil. After correct application, the layer is free of bubbles. The thickness of deposited layer is given by the needed thickness of surrounding layers (leveling) and ranges from 0,2 to 1 mm in one deposited layer.



Producer, name	Type	Mixing ratio	Time of application	Degree of curing	Time of curing	Temperature	Filler
HUNTSMAN, VANTICO, Araldite 2011 (AW106 + HV953U)	epoxy	A:B = 100:80	To be processed within 100 min (for a mixture of 0,1 kg)	40%	24 hrs (32 hrs)	20 - 35°C (17 - 20°C)	thickening: Aerosil, microballoons
				100%	48 hrs (72 hrs) (3 hrs)	20 - 35°C (17 - 20°C) (60°C)	

Tab. 51-4 Recommended materials for preparation of mixture for application of leveling layer

(d) Grinding

After mixture curing and eventually after tearing off the used foil, grind or if needed apply the sealant on the surface. It is suitable to start grinding with a grain size of 160 as a maximum and finish with a grain size of 400 at least. Carry out dry grinding with the suction from the area of grinding. The grinding material can be also Al₂O₃ (artificial corundum). During grinding, it is important not to reduce the basic material.

NOTE

Especially in the case of C/K reinforcement in the basic part, during the grinding it is not allowed to grind through to the reinforcement (complications – see the Note about the preparatory grinding in the case of medium damage).

(e) Finishing

See Par. 7 – Repairs of paint coats.

(2) Medium damage

Repair of damage by replacing a part of reinforcement, by sealing and repairing the paint coat. In the case of such repair, it is needed to differentiate the type of the used reinforcement (especially for grinding):

- C/K (carbon/Kevlar), rovings from a woven fabric of black color (C) alternate with yellowish ones (K).
- G (glass), rovings from milk-white up to transparent ones.

(a) Preparatory grinding

For a good adhesion of repair layers, grind up to the depth of damage. Carry out surface grinding from the damaged area with a minimum overrun of 25 mm for each damaged layer of reinforcement, grind gradually up to the upper layer and then about 50 mm for finishing and sealing. It is suitable to grind with abrasive having a grain size of 160. Carry out dry grinding with the suction from the place of grinding. The grinding material can be Al₂O₃ (artificial corundum).

NOTE

In case of C/K reinforcement, the K rovings tend to rise up from the surface at grinding – it is difficult to grind them, we recommend using a diamond grinding tool and unidirectional grinding.



- (b) Elimination of dust
Wipe by a clean and dry brush or use a vacuum cleaner.
- (c) Preparation of reinforcement
For this type of repairs, the manufacturer recommends the reinforcement G (glass) with plain weave, 150 g/m², with surface treatment (dressing) for epoxides.

Number of needed layers of reinforcement depends on the depth of damage. It is possible to say that each layer of the mentioned fabric represents, at proper saturation by matrix resin, the thickness of 0,5 mm.

The reinforcement layers must be prepared (cut out) gradually from the smallest (the lowest) ones up to bigger (the upper) ones, each with an overlapping of 20 mm.
- (d) Laying layers
After lamination mixture preparation (see Tab. 51-4), apply it to the place of repair by means of a rigid brush. Put the first reinforcement into the deposit and saturate it again by brush. Put another layer of reinforcement and saturate it again by brush. When laying the last layer, it is necessary to pay attention to a proper saturation and compression of the reinforcements so that they cannot “come up” to the surface and be subsequently damaged at final grinding. For a better saturation of the surface by resin and securing against curtaining, it is possible to put a PE or PP transparent foil across the surface. When applied properly, the layer is without bubbles. The repair thickness should exceed the surrounding surface in this phase by about 0,5 to 1 mm for finishing.
- (e) Grinding
Carry out grinding and eventually apply sealant on the surface after mixture curing, eventually after tearing off the applied foil (see the Minor damage). It is suitable to begin grinding by abrasive with a grain size of 160 as a maximum and finish with a grain size of 400 at least. Use a dry grinding device with the suction from the grinding area. The grinding material can be Al₂O₃ (artificial corundum). During grinding, it is important not to reduce the basic material of the part.

NOTE

Especially in the case of C/K reinforcement in the basic part, during the grinding it is not allowed to grind through to the reinforcement (complications – see the Note about preparatory grinding in the case of medium damage).

- (f) Finishing
See Par. 7 – Repairs of paint coats.
- (3) Major damage
- In the case of such damage, the manufacturer recommends replacing the part or carrying out the repair in a professional facility. As a recommendation for the used materials, use the instructions in Par. (2) Medium damage.

**D. Structural parts**

For these parts, the manufacturer doesn't recommend to perform other repairs than minor damage repairs. For the other cases of damage, contact the manufacturer.

CAUTION

WHEN REPAIRING, PAY CAREFUL ATTENTION TO A PROMPT REPAIR (SEE THE TEXT ABOUT A LOSS OF CHARACTERISTICS DUE TO ACTION OF HUMIDITY AT THE BEGINNING OF PARAGRAPH 6 A.)!

(1) Minor damage

Repairs are carried out in accordance with the instructions indicated for the visual parts.

CAUTION

WHEN REPAIRING, BE VERY CAREFUL IN ORDER NOT TO DAMAGE THE REINFORCEMENTS!

7. REPAIRS OF PAINT COATS**A. Safety rules**

Observe the following safety rules for working with paints, thinners and solvents:

- Observe the safety rules for working with flammable and volatile substances.
- Working space must be well-ventilated.
- Smoking and any manipulation with an open fire is prohibited in the working space.
- Use personal protective working aids: goggles, gloves, respirator, etc.

B. Recommendations for repairs of paint coats

Owing to a large proportion of fiberglass in the airplane structure, the manufacturer recommends:

- To use the catalog of paint coats issued by the manufacturer – available at the dealers and at www.evektoraircraft.com in the dealer section.
- Not to park the airplane for a long time in intense sunshine or in the rain. Use the covers offered by the manufacturer or park the airplane in a hangar.
- Not to use dark shades for paint coat – above all in the area of fiberglass cockpit and landing gear leg.
- To perform painting in a specialized paint shop.
- In the case of paint coat repairs, use the same paint coat system or the equivalent of the manufacturer's system.
- By application of permanent protective coats, the airplane weight is increased and the center of gravity position is therefore changed. The increase in weight depends on a type of the coat and its thickness.



CAUTION

NOT OBSERVING THESE RECOMMENDATIONS REDUCES
THE SERVICE LIFE OF AIRPLANE!

(1) Washing and degreasing

It is possible to use both organic solvents and water-based solvents.

(a) Organic solvents – acetone, methyl ethyl ketone (MEK), benzine, toluene, BASF Glasurit 360-4.

- Apply by spraying on the washed surfaces (e.g. by a mechanical sprayer or jet ejector) or by wiping with a moistened textile wad (by pouring, not by dipping, because it would contaminate the whole volume of solvent). After applying, wipe off the agent by a clean absorbing material before solvent evaporation.
- Advantages: fast and reliable evaporation, even from 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 well-ventilated areas and with application of personal protective aids); waste (including dripping from the area) must be eliminated in incinerating plants.
- Use: For the surfaces of Al-alloys, epoxy fiberglass.

CAUTION

THESE AGENTS MUSTN'T BE USED FOR DEGREASING
PARTS MADE FROM PLASTIC MATERIALS (PC – LEXAN,
PMMA – PLEXIGLASS).

(b) Water-based agents – emulsifying substances, wetting agents

- Apply by spraying onto washed surfaces or by wiping with a moistened (by pouring and dipping) textile wad. After applying it, let it act for some time (see the manufacturer's recommendations) and then rinse it with clean water (by means of a sponge dipped in ample amount of water or by water jet).
- Advantages: Different according to the type of product - it is possible to highly dilute with water (cheap); environment friendly - waste (including dripping from the surface – due to an ample amount of water it is necessary to contain it) can be generally eliminated after its additional dilution with water in the public sewerage; the least detrimental to health.
- Disadvantages: slow and unreliable evaporation from corners and borders, additional warming (drying) mostly required – imperfect elimination of water results in a bad adhesion of paint coats; imperfect degreasing of fiberglass parts (not possible to use)
- Use: For the surfaces of AL-alloys and plastic materials.



- (2) Sealing of rivet heads, big irregularities and material transitions

CAUTION

IN THE CASE THAT THE AIRPLANE SURFACE REMAINS WITHOUT A TOP COAT, SEAL THE RIVET HEADS.

After perfect degreasing, carry out the sealing of rivet heads, big irregularities and transitions of fiberglass parts with Al-sheet.

Epoxide and polyester sealants for car bodies are suitable for the transitions between two types of material even with increased elasticity. The recommended sealants are shown in Tab. 51-5.

Apply polyester sealants with a plastic spatula after mixed with the initiator. After drying, grind with sandpaper with a grain size of 240 until achieving a smooth surface. Remove dust after grinding and clean with a degreasing agent.

Apply epoxy sealant from the special jet with the static mixer by means of the extruding pistol. Wipe off the excessive material with a spatula to the final appearance before curing (slight recess is not a defect) – do not grind!

Surface	Producer, name	Type	Other components	Curing (sandable) [min] / 20°C
Al-alloys	BASF Glasurit 839-10 (base)	polyester	BASF Glasurit 948-36 (initiator)	30
Transitions between epoxy fiberglass and Al-alloys	BASF Glasurit 839-45 (base)	polyester	BASF Glasurit 948-36 (initiator)	150
Rivet heads	3M DP-190 (base + hardener)	epoxy (elastic)		360

Tab. 51-5 Recommended sealants

- (3) Application of primer coat

In order to reach a uniform resistance to corrosion and a smooth surface, the manufacturer recommends carrying out application by spraying (a standard air gun with the upper vessel, air HVLP gun, airless electric gun). The adjustment of the used gun (specified by the manufacturer of paint) differs according to a type – air pressure, nozzle diameter. The paint is always applied in several spray coats (the total thickness is not reached in one go) with a defined maximum dwell and total drying time until further treatment or handling.

The primer coat serves especially for anchoring (adhesion to the substrate) top coats and it can serve for eliminating irregularities of the surface (a function of filler, for grinding).

For the surfaces from Al-alloys, the manufacturer recommends reactive primer coats for light metals based on alkyd or epoxy-based materials or polyurethane-based materials (two-component paints); for specific recommendations, see Tab. 51-6.



Surface	Producer, name	Type	Other components	Weight [g/μm/m ²]	Recommended thickness [μm]	Curing (between sprayings/ total) /20°C
Al-alloys	BASF Glasurit 801-1871 (base)	epoxy	BASF Glasurit 965-32/2 (hardener) Glasurit 965-50 (thinner)	1,62	25 (with 50 it can be used also as sealant)	15 min / 12 hrs
Epoxy fiberglass						
PC (Lexan), PMMA (Plexiglas)						

Tab. 51-6 Recommended primers

(4) Sealing

After total drying of basic coat, the manufacturer recommends to carry out total sealing of unevenness, including repairs of sealing. The recommended sealants are shown in Tab. 51-5.

After drying, grind with a sandpaper with a grain size of 240 to achieve a smooth surface. After grinding, remove the dust, wipe off by degreasing agent and apply a basic coat by repair spraying (1/3 of coat thickness is sufficient).

(5) Application of top coat

In order to get a smooth surface, we recommend again applying a coat (see Par. 7 B.(3)).

The top coat serves especially for creating a coat layer resistant to weather and external effects and for aesthetic rendering of the unit as a whole. Considering a higher loading by external effects, the manufacturer recommends to use top materials, exclusively two-component ones, on the acrylic-polyurethane or polyurethane basis, always with guaranteed adhesiveness to the used primer coat (according to the manufacturer). It is possible to use some of the coat systems used for car repairs. Tab. 51-7 shows two types of paints: 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 paint coat, it is possible to reach a wide spectrum of colors, but it is difficult to carry out metallic paint coats (not recommended).



Type of paint coat	Producer, name	Type	Other items	Weight [g/μm/m ²]	Recommended thickness [μm]	Curing (between sprayings/ total) /20°C
Single coat	BASF Glasurit R-18/ shade (primer)	acrylic-polyurethane	BASF Glasurit 922-18 (standard hardener) Glasurit 352-91 (standard thinner)	1,0-1,6 (depending on shade)	20-40	15 min / 16 hrs
Double coat	Colored primer: BASF Glasurit R-55/ shade (primer)	acrylic-polyurethane	BASF Glasurit 352-216 (thinner with delayed evaporation)	1,2-1,4 (depending on shape)	15-20	10 min / 20 min
	Top coat, gloss: BASF Glasurit 923-155 (primer)	acrylic-polyurethane	BASF Glasurit 929-73 (standard hardener) Glasurit 352-91 (standard thinner)	0,92	30-40	5 min / 5 hrs

Tab. 51-7 Recommended paints

C. Minor damage

(1) General

Minor damage is a deterioration of corrosion resistance. When repairing, 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 all coats of surface protection (after grinding), not all of which are suitable for (in a cured condition) for a good adhesion of paint coats. Therefore, the manufacturer recommends carrying out such repairs by a well-proven system.

Before repairing, it is necessary to differentiate the type of the existing top coat – a single coat and a double-coat (with a top coat). It is needed to maintain this used type of paint for repairing.

It is suitable to choose a bounded area (e.g. connection of sheets, wing edge) for the scope of the place that is to be repaired – the transition is then better blended. In the case that it is not possible to choose an area in this way, it is necessary to take into consideration a higher difficulty of the procedure as for a uniformity of shade and a rendering of coat transitions.

(2) Grinding

For a good adhesion of the repair coats, it is necessary to carry out grinding of the old paint coat at least up to such depth, as is the depth of damage. With a two-coat type of the top coat, it is necessary to add at least 50 mm for the overrun of the top coat. It is suitable to start grinding with the abrasive with a grain size of 160 as a maximum and finish with a grain size of 400. It is performed by a grinding device with the suction from the area of grinding or by manual grinding under water.



CAUTION

THE ANODIZED LAYER ON THE AL-ALLOY SHEET
MUSTN'T BE DAMAGED BY GRINDING.

(3) Degreasing

It is performed in the same way as for the overall spray coat – see Par. 7 B(1).

(4) Application of primer

To achieve a complying uniform adhesion, the manufacturer recommends carrying out spray coat of the area that is to be repaired, by an adhesive interlayer (see Tab. 51-8).

Surface	Producer, name	Type	Weight [g/μm/m ²]	Recommend ed thickness [μm]	Curing (total) /20°C
Al-alloys	BASF Glasurit 934-0	One component	0,8	5-10	max. 15 min
Epoxy fiberglass					
Old paint coats					

Tab. 51-8 Interlayer of adhesive

Subsequently apply the basic paint coat according to Tab. 51-6. The thickness of paint coat is given by the needed thickness of surrounding coats (leveling).

CAUTION

IN THE CASE THAT THE BASIC COAT WASN'T REMOVED
BY THE PREVIOUS STEP, IT IS NOT NECESSARY TO
REAPPLY THE BASIC COAT - THE REGROUND ORIGINAL
BASIC COAT WITH AN ADHESIVE INTERLAYER IS
SUFFICIENT.

The basic coat is applied in the same way as for the overall spray coat (see Par. 7 B(3)).

(5) Application of top coat

CAUTION

FOR REPAIRING, IT IS NECESSARY TO CHOOSE AN
IDENTICAL TYPE (SINGLE LAYER COAT, TWO-LAYER
COAT) OF REPAIR PAINT COAT, AS USED ON THE
ORIGINAL SURFACE.

Spray the top coat in the same way as for the overall spray coat (see Par. 7 B(3)) with exception of the used thinners and hardeners. In view of the need to create a continuous transfer to the original surface, use the so-called spraying to area, using longer times of starts of drying in order to get a good result of work. The recommended material is shown in Tab. 51-9.



Type of paint coat	Producer, name	Type	Other components	Weight [g/μm/m ²]	Recommended thickness [μm]	Curing (between sprayings / total) /20°C
Single coat	BASF Glasurit R-18/ shade (primer)	Acrylic - polyurethane	BASF Glasurit 922-18 (standard hardener) Glasurit 352-319 (thinner with especially delayed evaporation)	1,0-1,6 (depending on shade)	20-40	15 min / 19 hrs
Double coat	Basic color code: BASF Glasurit R-55/ shade (primer)	Acrylic - polyurethane	BASF Glasurit 352-216 (thinner with delayed evaporation)	1,2-1,4 (depending on shade)	15-20	10 min / 20 min
	Gloss top coat: BASF Glasurit 923-155 (primer)	Acrylic - polyurethane	BASF Glasurit 929-73 (standard hardener) Glasurit 352-400 (thinner with especially delayed evaporation)	0,92	30-40	5 min / 6 hrs

Tab. 51-9 Recommended paint coats

8. ASSEMBLY OF AIRPLANE AND LEVELING AFTER REPAIR

In the case of repairing large damage, perform the following activities:

- Technical inspection by a qualified person focused on the check of electrical wiring, tightening and securing of all appropriate joints, the check of plays in the control system and in the travel of control surfaces
- Leveling of airplane
- Weighing; changes in balancing
- Measurement of deflections of control surfaces
- Engine test
- Test flight
- Repair of found defects.



9. FIRST FLIGHT AFTER REPAIR

CAUTION

THE FLIGHT TEST CAN BE PERFORMED BY QUALIFIED PILOTS ONLY!

The following information is intended for the airplane owner.

The flight test is obligatory in the following cases:

After the repair or replacement of fixed surfaces – wings, fin surface, stabilizer or control surfaces, i.e., elevator, ailerons or wing flaps. After replacement and adjustment of these parts, the flight characteristics of airplane and its stability can be changed. That's why it is necessary to check the flight characteristics, adjustment of control surfaces, controllability and stability and stall characteristics of the airplane. Check the airplane characteristics at taxiing, taking off, climbing, cruising, descending, approaching and landing (all modes of flight)!

Use the Flight Test Protocol (see the Annexes to this manual) to record the data gained during the test flight.

Time of test flight

The test flight takes approximately 40 minutes if it is performed in compliance with the Test Flight Protocol.

Airplane inspection before the test flight

Before the test flight, the airplane must be carefully checked by a qualified person, weighed and the found defects must be eliminated. Only then, it is possible to prepare the airplane for flight.

Test flight crew

Only qualified persons (test pilots) can perform the test flight.

Any defects found during the flight must be repaired immediately after the test flight.

10. ORDERING OF SPARE PARTS

Use the form Order of Spare Parts (see Chapter 95) for ordering the spare parts of the airplane for the damaged and worn-out parts.

If needed, contact the manufacturer (by phone or fax) to specify the required parts.

The additional information in the form Order of Spare Parts serves for monitoring and for analyzing the reliability of the airplane.



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CHAPTER

52

DOORS



CHAPTER 52

DOORS

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GENERAL

1. INTRODUCTION

The cockpit canopy, intended for embarkation of persons into the airplane cabin, is installed on the SportStar RTC airplane over the cockpit.

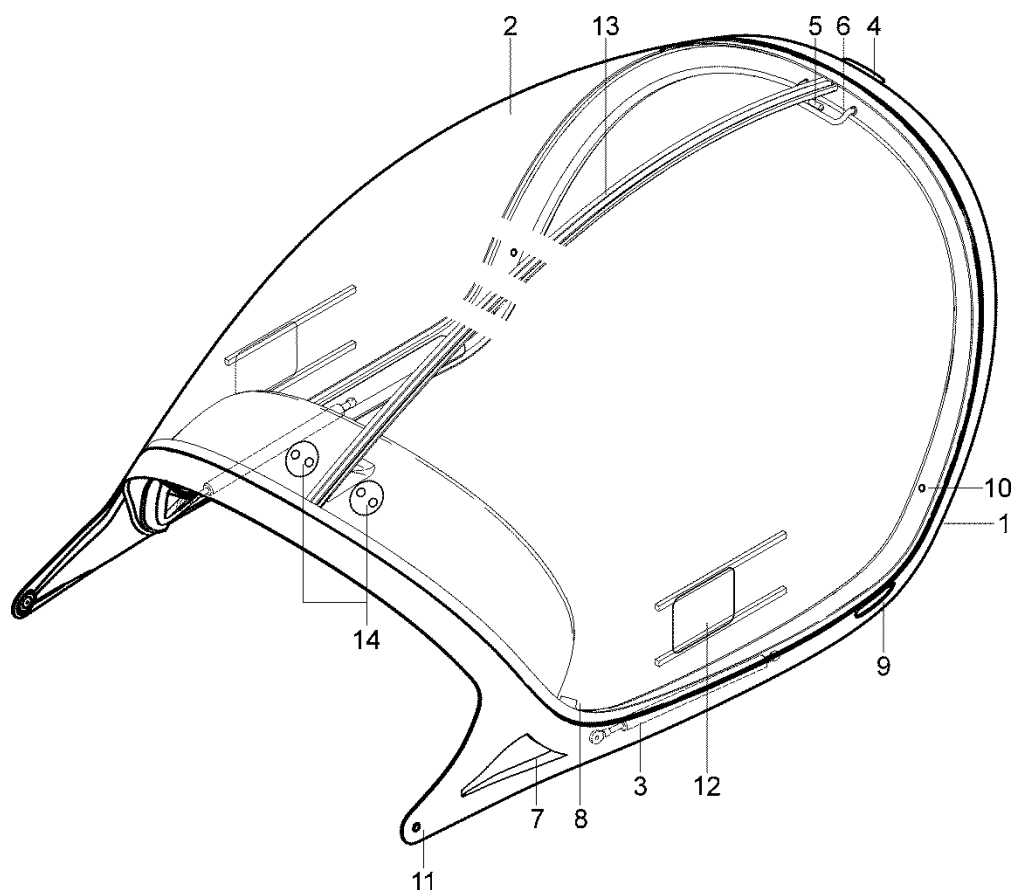


PASSENGER / CREW

1. DESCRIPTION AND OPERATION

The cockpit canopy allows the crew to enter the airplane cabin. The cockpit canopy is located over the middle part of the fuselage.

The cockpit canopy is composed of the composite frame (1, Fig. 52-1), window (2), gas struts (3) and the lock.



Legend to Fig. 52-1

1	Frame	8	Eye-ball vent
2	Window	9	Handle
3	Gas strut	10	Guide pin
4	Outside lock handle	11	Attachment
5	Inside lock handle	12	Side venting window
6	Handle	13	Middle column
7	NACA inlet	14	Front venting window

Fig. 52-1 Cockpit canopy



The forward-tilting canopy is fastened to the attachments on the upper fuselage longerons between frames No. 1 and 2 on two pins. For better handling, the proper weight of the canopy is balanced by means of two gas struts; and for easier handling, the handles (9) are pressed-in on the lower frame of the canopy. The canopy lock with the levers (4; 5) and the handle (6) are installed in the rear upper part of the frame. The window with a thickness of 3 mm is adhesively bonded in the canopy frame from the external side (Section 56-30). The sliding venting windows (12) are installed on both side parts of the window. On the rear side of the frame, there are guide pins (10) that serve during the canopy closing for its guiding and placing. The middle column (13) is adhesively bonded to the frame and to the window in the canopy axis. Along its whole perimeter, the canopy is sealed with a silicone packing.

The NACA inlets (7) are located on both sides of the front part of the frame. These inlets ensure the fresh air supply for the eye-ball vents (8) that are located on the sides of the inner frame of the cockpit canopy. The inner frame of the cockpit is provided in the front part with the air vents that serves for the window demisting (Section 21-00).

Optionally, it is possible to install two swivel venting windows (14) in the front part of glazing. In addition, a sunshade can be optionally installed in the upper part of the canopy.

The switch of the unlocked cockpit canopy indication is installed in the base of the cockpit canopy lock. When the canopy is unlocked in the case of the airplane equipped with analog instruments, the red signaling light **CANOPY** is illuminated; in the case of the airplane equipped with the Dynon SkyView system, it is indicated on the EMS display (Section 31-50).

On the fixed dorsal part of the fuselage, there is a lock that serves for cockpit canopy locking.

A. Procedure for cockpit canopy opening

- (1) From the outside
 - (a) Unlock by the key.

NOTE

The cockpit canopy is unlocked when the lock latch is visible under the glass, otherwise it is locked.

- (b) Pull the outside handle upwards.
 - (c) Open the cockpit canopy, lifting it upwards.
- (2) From the cabin of the airplane
 - (a) Pull the inside handle downwards.
 - (b) Open the cockpit canopy, lifting it upwards.



2. MAINTENANCE PRACTICES

A. Cockpit canopy

Maintenance type: Line

Personnel qualification: Independent verification personnel qualified in accordance with Part 66 or higher

Recommended tools and material:

Item	Designation / Size	Quantity	Note
Wrench	No. 9	1 pc.	
Tweezers	-	1 pc.	

CAUTION

THE REMOVAL AND THE INSTALLATION OF THE COCKPIT CANOPY MUST BE PERFORMED BY TWO PERSONS.

BE CAREFUL WHEN REMOVING AND INSTALLING THE COCKPIT CANOPY IN ORDER NOT TO SCRATCH THE CANOPY GLASS.

(1) Removal – cockpit canopy

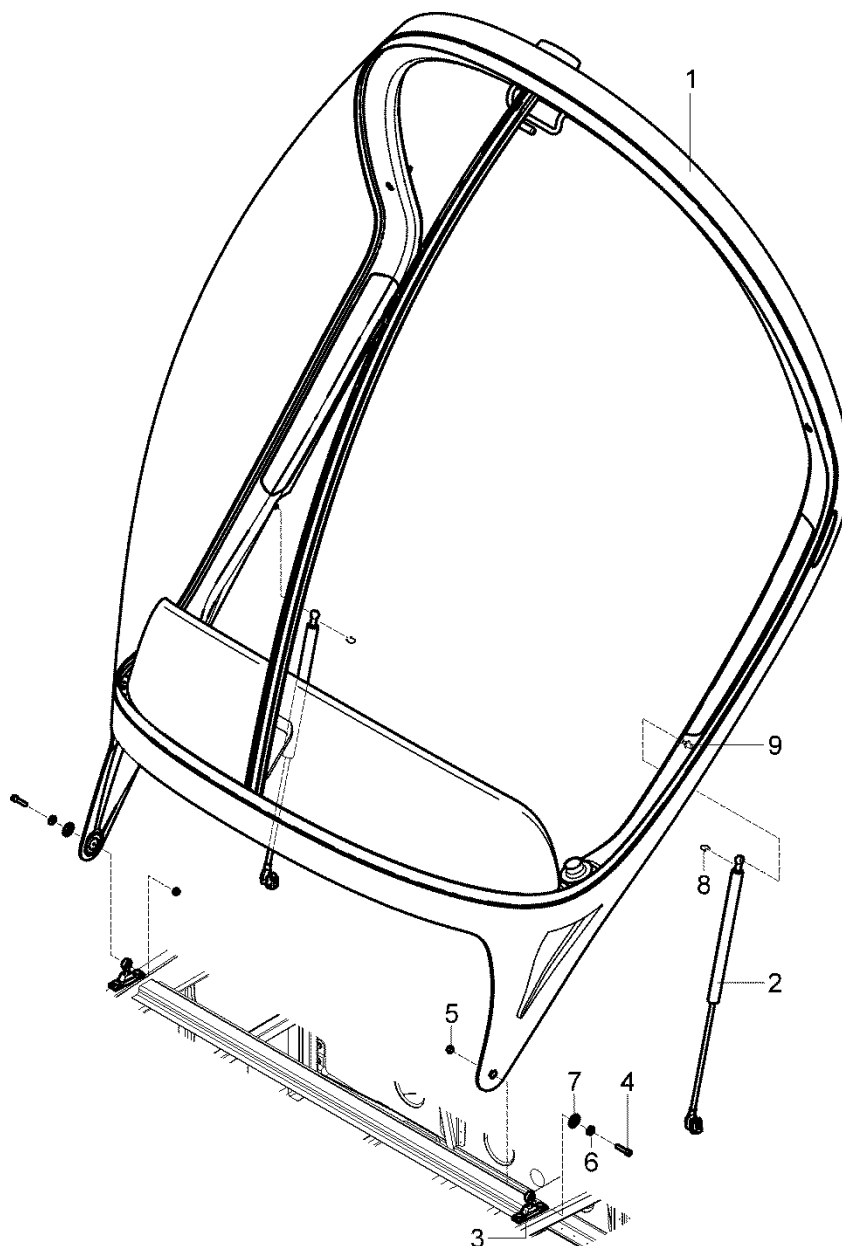
- (a) Switch the electrical network off and disconnect the battery.
- (b) Remove the cover of the upper part of the fuselage F4 (Section 53-30).
- (c) Disconnect the connector of the unsecured cockpit canopy indication wires (on the left side) and as needed the connector of the compass lighting wires (on the right side).
- (d) Fully open the canopy (1, Fig. 52-2) and fasten it or keep it in the opened position.
- (e) Using tweezers, remove the locking wire (8) from the spherical ends of the gas struts.
- (f) Unscrew and remove the nuts (5) and the screws (4) with the washers (6; 7).
- (g) Carefully remove the canopy (1) and put it in a safe place to prevent from its damaging.

(2) Installation – the cockpit canopy

- (a) Position the canopy (1, Fig. 52-2) on the frame and to the attachments (3).
- (b) Attached it by means of the screws (4), washers (6, 7) and the nuts (5).
- (c) Open the canopy (1) and install the struts (2) on the pins (9).
- (d) Install the lockwire (8) on the spherical ends of the gas struts.
- (e) Connect the connector of the unsecured cockpit canopy indication wires (on the left side) and as needed the connector of the compass lightning wires (on the right side).
- (f) Install the cover of the upper part of the fuselage F4 (Section 53-30).
- (g) Check for a correct attachment of the canopy, open and close it.
- (h) Check whether it is possible to lock the canopy in the closed position.



- (i) Connect the battery, switch the electrical network on and check the function of the unsecured canopy indication.



Legend to Fig. 52-2

- 1 Cockpit canopy
2 Gas strut
3 Attachment
4 Screw
5 Nut

- 6 Washer
7 Spacing washer
7 Locking wire
8 Spherical pin

Fig. 52-2 Cockpit canopy – removal / installation

**B. Sunshade**

Maintenance type: Line

Personnel qualification: Independent verification personnel qualified in accordance with Part 66 or higher

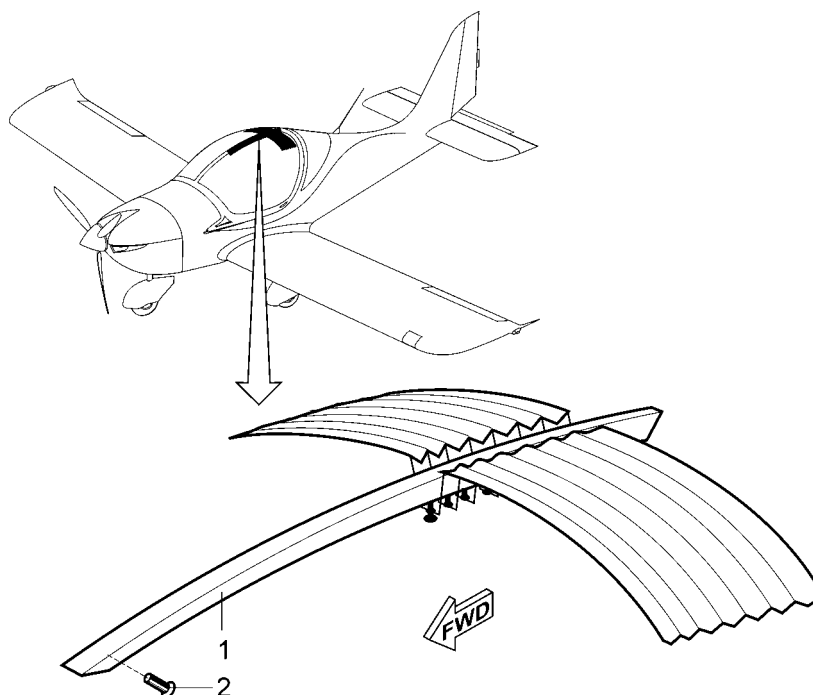
Recommended tools and material:

Item	Designation / Size	Quantity	Note
Phillips screwdriver	No. 2	1 pc.	

CAUTION

BE CAREFUL WHEN REMOVING AND INSTALLING THE SUNSHADE IN ORDER NOT TO SCRATCH THE CANOPY GLASS.

- (1) Removal – sunshade
 - (a) Remove the screws (2, Fig. 52-3) attaching the rails of the sunshade.
 - (b) Remove the sunshade (1).
- (2) Installation – sunshade
 - (a) Align the sunshade assembly (1, Fig. 52-3) with the cockpit canopy.
 - (b) Screw and tighten the screws (2) which attach the rail of the sunshade to the cockpit canopy.



Legend to Fig. 52-3

1 Sunshade

2 Screw M3 (5 pcs.)

Fig. 52-3 Sunshade – removal / installation



C. Switch of unsecured cockpit canopy

Maintenance type: Line

Personnel qualification: Independent verification personnel qualified in accordance with Part 66 or higher

Recommended tools and material:

Item	Designation / Size	Quantity	Note
Phillips screwdriver	No. 2	1 pc.	
Flat screwdriver	-	1 pc.	
Wrench	No. 4		
Hex wrench	No. 7	1 pc.	
Hex wrench	No. 10	1 pc.	
Adhesive	Loctite 243	-	
Degreasing agent	Acetone	-	
Soldering iron	-	1 pc.	
Solder	-	-	
Heat gun	-	1 pc.	
Shrinkable tube	ø 3x1 mm	-	
Lint-free cloth	-	-	

CAUTION

BE CAREFUL WHEN REMOVING AND INSTALLING THE CANOPY LOCK IN ORDER NOT TO SCRATCH THE CANOPY GLASS.

- (1) Removal – switch of unsecured cockpit canopy
 - (a) Switch the electrical network off and disconnect the battery.
 - (b) Remove the cover of the upper part of the fuselage F4 (Section 53-30).
 - (c) Disconnect the connector of the unsecured cockpit canopy indication wires (on the left side).
 - (d) Fully open the canopy (15, Fig. 52-4).
 - (e) A suitable way protect the surface of the inner handle portions (4) and use the pliers to unscrew.
 - (f) Unscrew and remove the bolts (6; 7) and the handle (3).
 - (g) Slightly pull the lock assembly (1), disconnect the wires from the switch (11) using the soldering iron and remove the lock assembly (1).
 - (h) Unscrew and remove the bolts (8), washers (9), nut (3), spring (14) and remove the lock (4).
 - (i) Unscrew and remove the nuts (3), washers (12), screws (10) and remove the switch (11).

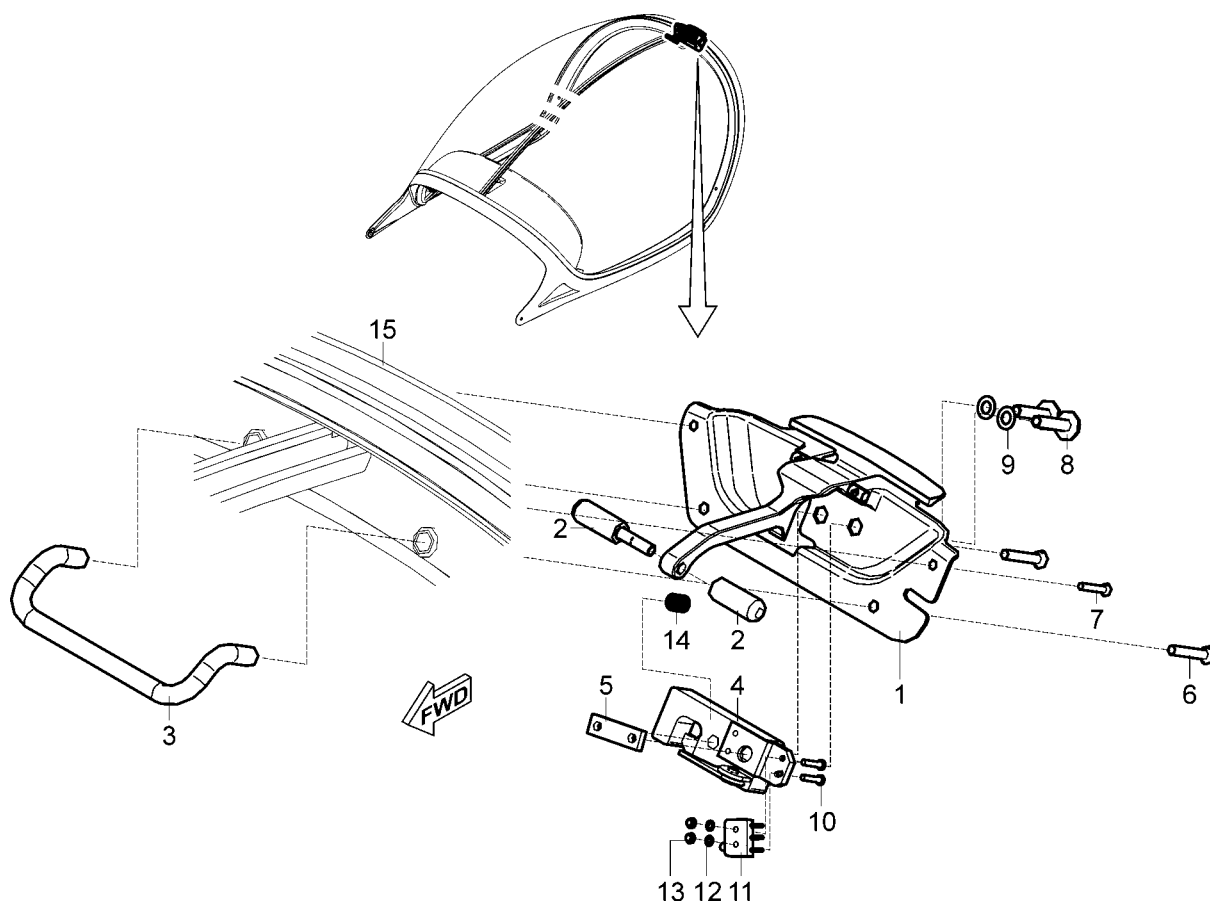


- (2) Installation – switch of unsecured cockpit canopy
 - (a) Put a new shrinkable tube on cables. Use the soldering iron and solder to attach it to the switch (11, Fig. 52-4).

NOTE

Use the wiring diagram in Chapter 91.

- (b) Cover the joints with a shrinkable tube and carefully heat it with a heat gun.
- (c) Put the switch (11) on the lock (4) and fasten it with screws (10), nuts (13) and washers (12).
- (d) Put the lock (4) with the spring (14) on the lock assembly (1) and fasten it with bolts (8) and washers (9); tighten the screws slightly.
- (e) Align the lock assembly (1) and the handle (3) on the cockpit canopy frame (15) and fasten them with the bolts (6; 7).
- (f) Clean thoroughly the threaded surfaces of the both parts of the inside lock handle (2) with a cloth soaked in degreasing agent.
- (g) Apply adhesive onto the inside lock handle thread (2).
- (h) Insert one part of the inside lock handle (2) into the lock assembly lever (1), screw and tighten the other part of the handle.
- (i) Adjust the lock (4) position and tighten the screws (8).
- (j) Connect the connector of the unsecured cockpit canopy indication wires (on the left side).
- (k) Install the cover of the upper part of the fuselage F4 (Section 53-30).
- (l) Check whether it is possible to lock the canopy in the closed position.
- (m) Connect the battery, switch the electrical network on and check the function of the unsecured canopy indication.



Legend to Fig. 52-4

1 Lock assembly	9 Screw M3 (5 pcs.)
2 Inside lock handle	10 Screw M2x12 (2 pcs.)
3 Handle	11 Switch
4 Lock	12 Washer 2,2 (2 pcs.)
5 Nut	13 Nut M2 (2 pcs.)
6 Bolt M5x30 (2 pcs.)	14 Spring
7 Bolt M4x16 (2 pcs.)	For information:
8 Bolt M6x25 (2 pcs.)	15 Cockpit canopy

Fig. 52-4 Switch of unsecured cockpit canopy – removal / installation



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CHAPTER

53

FUSELAGE



CHAPTER 53

FUSELAGE

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GENERAL

1. INTRODUCTION

The fuselage structure is a metal semi-monocoque supplemented with the large composite parts in the dorsal part.

The fuselage semi-monocoque is formed by the frames, longerons, stiffeners and the skin sheet metals. From a design point of view, it is composed of the front part that is formed by the engine mount with the engine and engine cowlings, the middle part that includes the crew compartment, and by the rear part of the fuselage. The vertical fin is part of the rear part of the fuselage. The middle part and the rear part are connected by rivets.

The composite parts include the engine covers, shaped body of the upper part of the fuselage and the fairings of wing and tail units.

The fuselage section is rectangular in the lower part and becomes semi-elliptical in the upper part.

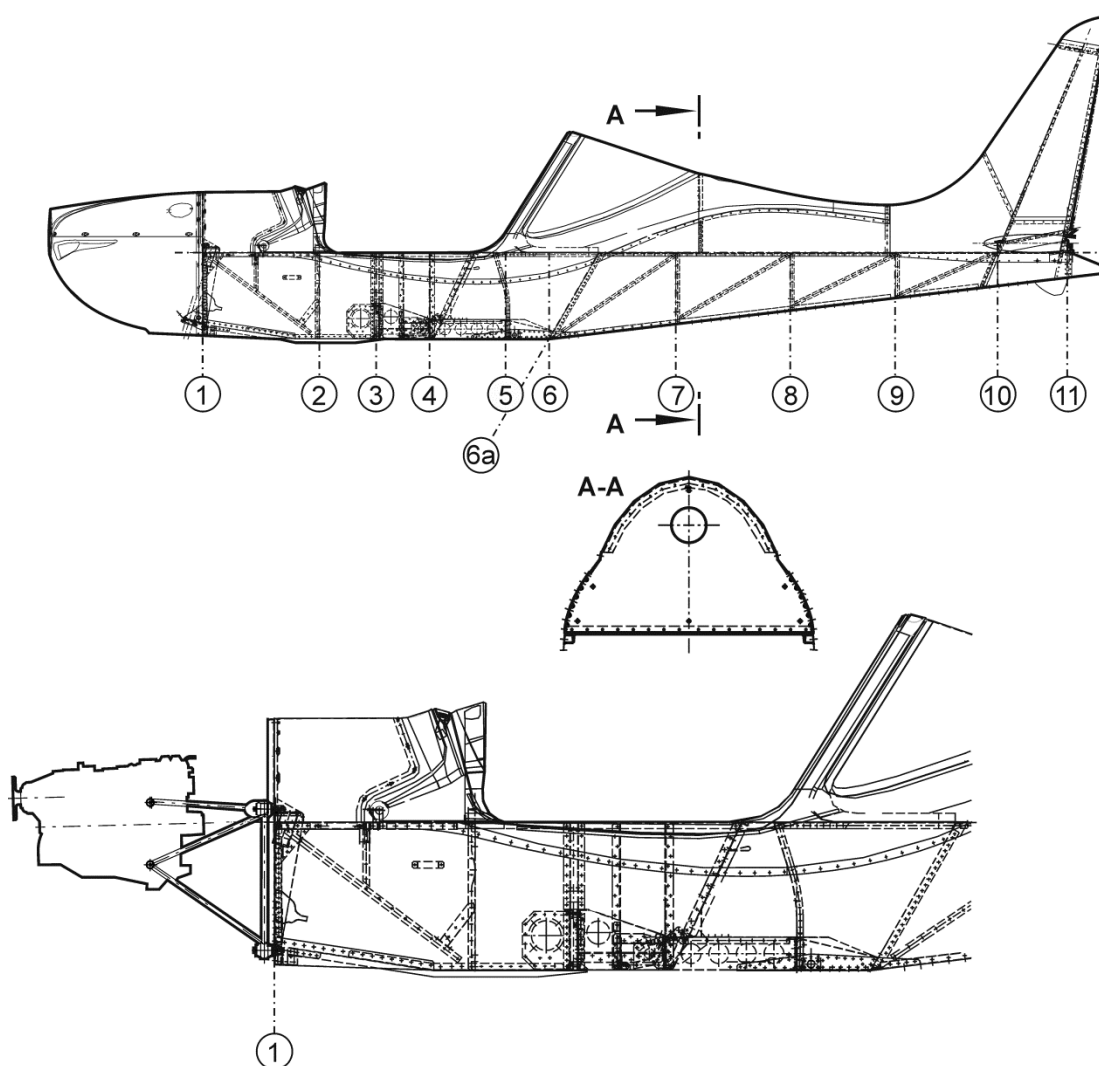


Fig. 53-1 Fuselage



MAIN FRAME

1. DESCRIPTION AND OPERATION

A. Middle part of fuselage

The middle part of the fuselage is formed by the structure between frames No. 1 and 6a.

Frame No. 1 from a zinc-coated steel sheet serves as a fire frame. On the front side of the firewall, there are four attachments of the engine mount and an attachment of the nose landing gear leg, brackets and holders for attaching the battery, oil tank, receptacle with brake fluid and other equipment in the engine compartment. The attachment of the nose landing gear and the space for the emergency parachute are located on the rear side of the firewall in the upper part.

The bearings of the foot control intermediate shafts are attached to the floor by means of screws in the front section of the cockpit. The left and right attachments of the tilting canopy are located on the upper fuselage longerons between frames No. 1 and 2. The floor stiffeners of the lower skin of the fuselage are riveted in the front part from the outer side of the fuselage. The transversal stiffeners of the fuselage serve for attaching the instrument panel and the control elements of the engine. The main fuselage spar with the main attachments of the wing is riveted in the position of frame No. 3.

The main spar in the fuselage is riveted and is formed by the web, upper and lower spar caps and the main wing attachments made of steel. The main attachments of the wing on the fuselage are connected with the spar by means of screws. The sheet metal bracket for the fixation of the intermediate shaft bearings of the manual control is created from the front part of the spar. The grid that is formed by two longitudinal reinforcements, auxiliary spars, fuselage frames and the floors is linked to the main spar in the fuselage. This grid ends at the level of frame No. 7 in the rear part of the fuselage. The mount of the attachment of the main landing gear legs and the bracket of the wing flap control lever are located between the main spar and the auxiliary spar of the landing gear in the position of frame No. 4. The fixation of the main landing gear leg (L / R) is formed by the main attachment with the riveted nut and the yoke. The auxiliary spar is located in the position of frame No. 5. The auxiliary spar is formed by the sheet metal pressed part with the riveted attachments for the fixation of the rear attachments of the wing.

The baggage compartment that is ended by skew frame No. 6a is located between frames No. 5 and 6.

The rear part of the fuselage continues from frame No. 6a.

B. Rear part of fuselage

The rear part of the fuselage is formed by the structure made from frames, longerons and stiffeners, between frames No. 6a and 11. The bracket for the fixation of the rocker arm of the pitch control is located between frames No. 8 and 9 in the upper part of the fuselage.

Frames No. 10 and 11 in the end part are formed by the pressed parts made from a sheet metal that form the front and rear spars of the fin of the vertical tail unit in an extension.

The attachments of the stabilizer are located on frames No. 10 and 11.



AUXILIARY STRUCTURE

1. DESCRIPTION AND OPERATION

The auxiliary structure of the fuselage is formed by the floors, central panel, footboards and the auxiliary tail skid.

A. Floors

The floor of the front part of the fuselage is formed by the skin sheet metal of the lower part of the fuselage with the stiffeners that are riveted on the outer side of the fuselage up to fuselage frame No. 3.

The covering sheet of the main spar in the fuselage, that also forms the pilot seats, is linked to the floor. In the sheet metal of the seat, there are assembly holes, covered by the caps attached by screws, for the installation of the landing gear legs.

Behind the pilot seat, there is a floor of the baggage compartment that is attached by screws to the grid. The floor of the baggage compartment also serves as an access lid to a part of the control system. The baggage compartment is ended by fuselage frame No. 6a.

The upper part of the fuselage from frame No. 6a up to frame No. 7 and beyond is formed by the auxiliary floor for attaching the ELT. The space is closed by the auxiliary semi-frame.

The inspection lid is located on the lower part of the fuselage between frames No. 8 and 9. The floor panels are made from a duralumin sheet, in the front part of the pilot compartment they are riveted, in the rear part they are attached by screw and riveted.

B. Central panel

The central panel is formed by the fuel cock bracket. The fuel cock bracket that is bolted from a duralumin sheet is located before the main spar in the fuselage in the axis of symmetry. The front part of the fuel cock bracket is riveted to the floor, the rest is bolted to the angle pieces riveted on the floor and on the front part of the seat. The upper part of the bracket is pulled over the angle piece of the upper spar cap and attached by screws. The central panel is covered by the composite cover that is part of the interior (Section 25-10).

C. Auxiliary tail skid

The auxiliary tail skin protects the end part of the fuselage from damaging during takeoff and landing.



2. MAINTENANCE PRACTICES

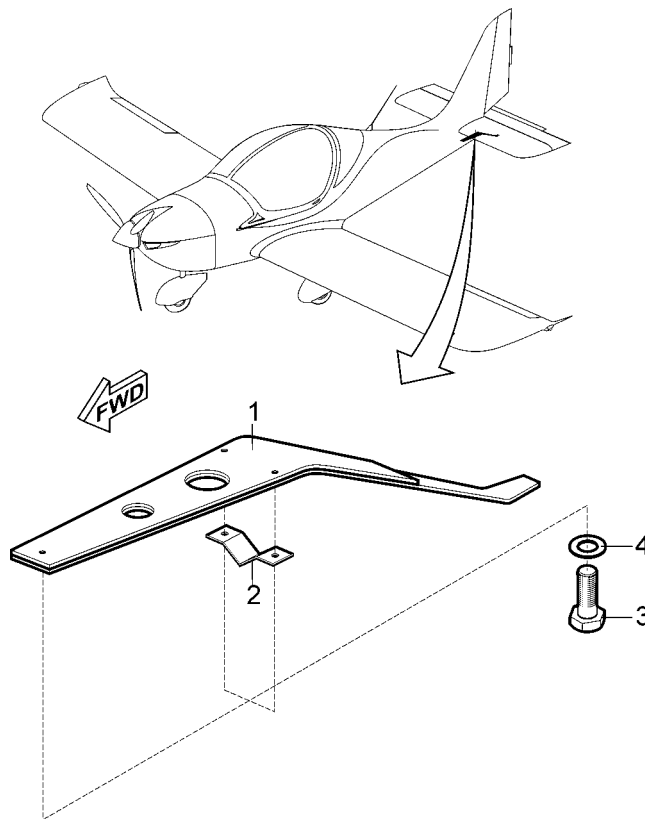
A. Auxiliary tail skid

Maintenance type: Line

Personnel qualification: Independent verification personnel qualified in accordance with Part 66 or higher

Recommended tools and material:

Item	Designation / Size	Quantity	Note
Wrench	No. 8	1 pc.	
Flat screwdriver	-	1 pc.	
Phillips screwdriver	No. 2	1 pc.	
Grease	AeroShell Grease 22	-	
Cleaning agent	Technical benzine	-	



Legend to Fig. 53-2

1 Auxiliary tail skid	3 Screw M5 (3 pcs.)
2 Anchoring eye	4 Washer 5,3 (3 pcs.)

Fig. 53-2 Auxiliary tail skid – removal / installation



-
- (1) Removal – auxiliary tail skid
 - (a) Unscrew the screws (3, Fig. 53-2) with the washers (4).
 - (b) Remove the anchoring eye (2) and the auxiliary tail skid (1).
 - (2) Installation – auxiliary tail skid
 - (a) Put the auxiliary tail skid (1, Fig. 53-2) and the anchoring eye (2) to position on the fuselage.
 - (b) Screw on and tighten the screws (3) with the washers (4).



PLATES / SKIN

1. DESCRIPTION AND OPERATION

The skin of the lateral parts and the skin of the lower part of the fuselage are formed by the skin panels from aluminum alloy; the dorsal part of the fuselage is formed by the shaped composite parts supplemented with the panels from aluminum alloy.

The skin of the lower middle part of the fuselage is formed by the panel from a duralumin sheet with a thickness of 0,6 mm. The side skins of the middle part of the fuselage are formed by the panels from a duralumin sheet with a thickness of 0,6 mm.

The upper part of the fuselage is covered by the sheet metal panel – by the cover from duralumin sheet with a thickness of 0,6 mm and further by the composite part of the fixed frame of the cockpit, lengthened over the rear part of the fuselage up to the fairing of the vertical fin. The cover of the upper part of the fuselage is attached by means of screws to the fuselage structure.

The skin of the rear part of the fuselage is formed, in the lower section and in the lateral section, by the left skin panel and the right skin panel from a duralumin sheet with a thickness of 0,6 mm.

The dorsal part of the fuselage is covered by the composite part of the fixed frame of the cockpit, supplemented with the left panel and the right panel from a duralumin sheet with a thickness of 0,5 mm. It is necessary to dismantle (drill off) these panels in order to ensure an access to the control elements.

The composite fairing between the fuselage and the fin of the vertical tail unit is connected with the composite fixed frame of the cockpit. The vertical fin of the vertical tail unit is integral part of the fuselage. The end of the rear part of the fuselage is covered by the composite cover.

The check hole that is covered by the cap is located in the lower rear part of the fuselage on the left side (Section 06-40).



2. MAINTENANCE PRACTICES

A. Side panel

Maintenance type: Heavy

Personnel qualification: Independent verification personnel qualified in accordance with Part 66 or higher

Recommended tools and material:

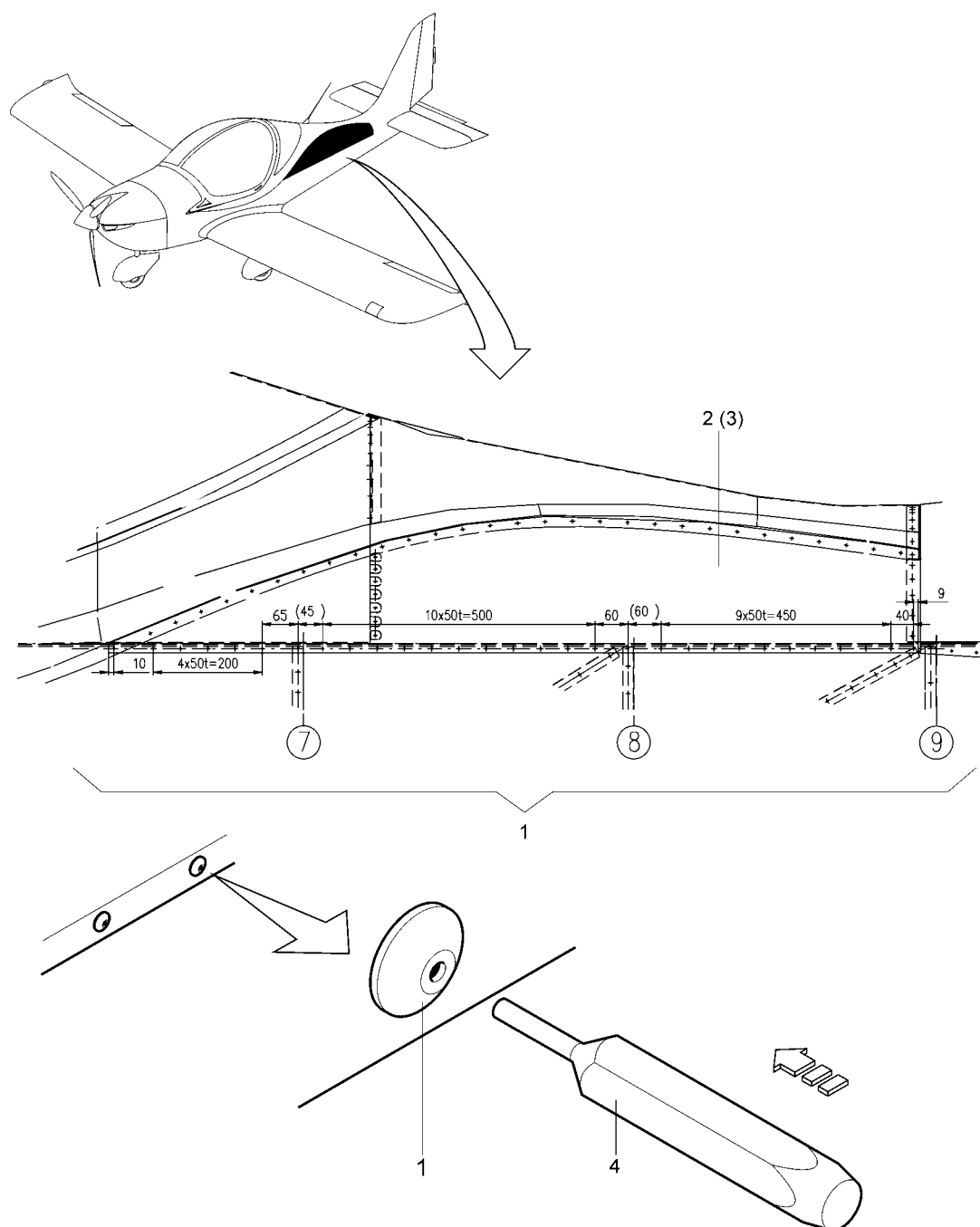
Item	Designation / Size	Quantity	Note
Ejector	Ø 1,6 mm	1 pc.	
Electrical drilling machine	-	2 pcs.	
Drill bit	Ø 3,2 mm	1 pc.	
Clecos	-	As needed	
Cleco pliers	-	1 pc.	
AVDEL rivets	3,2x7,9	74 pcs.	
Grease	AeroShell Grease 22	-	
Cleaning agent	Technical benzine	-	

(1) Removal – side panel

- (a) Switch the electrical network off and disconnect the battery.
- (b) Using the ejector (4, Fig. 53–3), eject the mandrels from the rivets (1) before drilling them off.
- (c) Drill off the rivet heads (1).
- (d) Remove the panels of side skin (2) or (3).

(2) Installation – side panel

- (a) Position the panels of the side skin (2, Fig. 53–3) and (3) on the fuselage and fasten them by means of clecos.
- (b) Attach the panels by means of rivets (1).
- (c) Connect the battery.



Legend to Fig. 53-3

1	Rivet 3,2x7,9	3	Panel of skin (R)
2	Panel of skin (L)	6	Ejector

Fig. 53-3 Side panel – removal / installation



B. Cover of upper part of fuselage

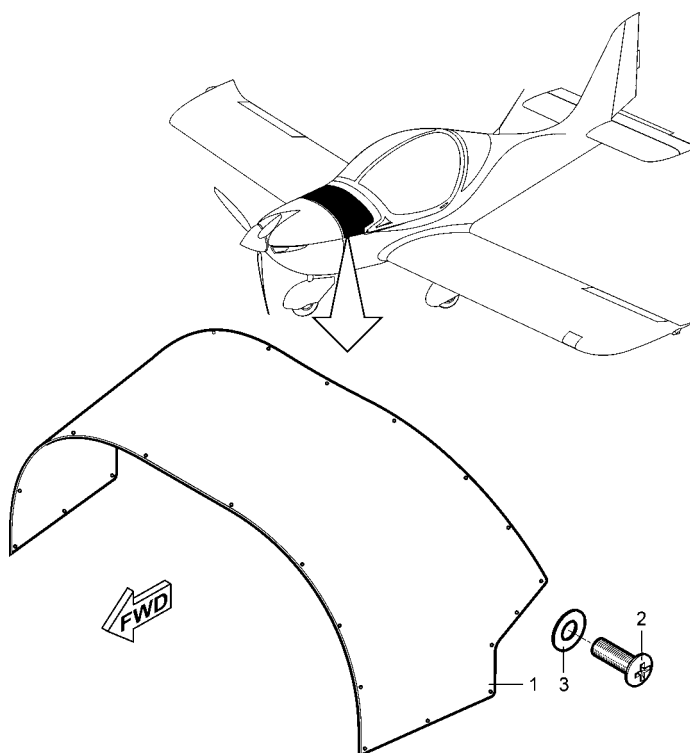
Maintenance type: Line

Personnel qualification: Independent verification personnel qualified in accordance with Part 66 or higher

Recommended tools and material:

Item	Designation / Size	Quantity	Note
Phillips screwdriver	No. 2	1 pc.	

- (1) Removal – cover of the upper part of the fuselage
 - (a) Switch the electrical network off and disconnect the battery.
 - (b) Unscrew the screws (2, Fig. 53–4).
 - (c) Remove the cover of the upper part of the fuselage (1).
- (2) Installation – cover of the upper part of the fuselage
 - (a) Position the cover of the upper part of the fuselage (1, Fig. 53–4) on the fuselage.
 - (b) Screw on and tighten the screws (2).
 - (c) Connect the battery



Legend to Fig. 53-4

1	Upper part of fuselage	3	Polyamide washer 3,7 (29 pcs.)
2	Screw M4 (29 pcs.)		

Fig. 53-4 Cover of upper part of fuselage – removal / installation



ATTACH FITTINGS

1. DESCRIPTION AND OPERATION

The attachments of the engine mount (1, Fig. 53-5), wings, stabilizer, tilting canopy and the landing gear are located on the fuselage.

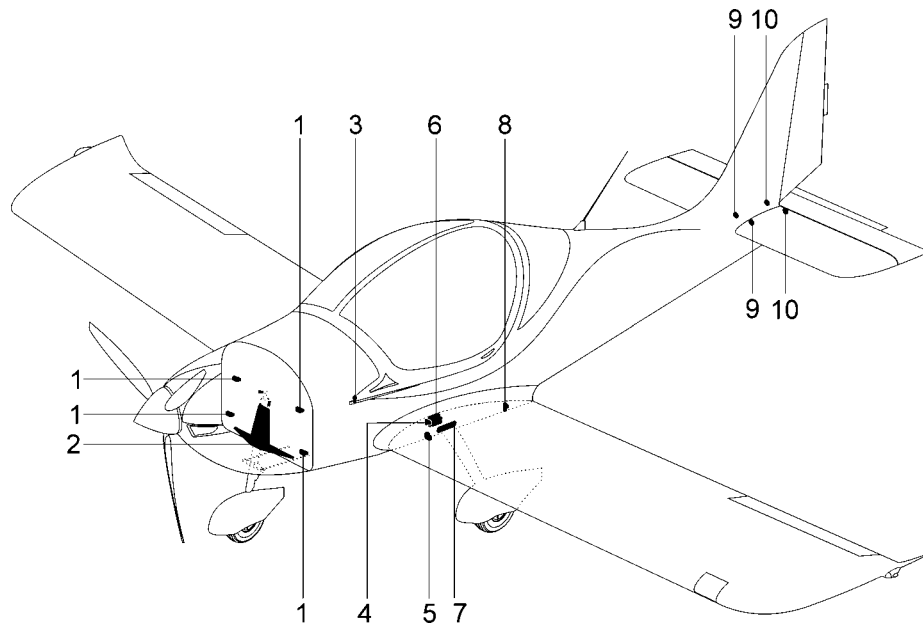
The left half and the right half of the wing are attached to the fuselage by means of three attachments. The main attachments (4; 5) are made of steel and are part of the main spar in the fuselage. The rear attachments (8) are made from light alloy and are attached to the auxiliary spar in the position of frame No. 5.

The stabilizer is attached on two front attachments (9) and on two rear attachments (10). The front attachments are formed by two pins with a guiding conical part that are riveted on the bracket in the position of fuselage frame No. 10. The rear attachments are formed by the fitting in form of a screw welded on a steel plate. This unit is riveted to the bracket in the position of fuselage frame No. 11.

The attachments of the legs of the main landing gear (6) are formed by two angle pieces made from light alloy. They are riveted to the fuselage between the main spar of the fuselage and the auxiliary spar of the landing gear in the position of frame No. 4. The nut of the screw of the landing gear leg attachment is riveted to the lower angle piece. The yokes of the attachments of main landing gear legs (7) are welded, riveted to the fuselage grid. The front attachment is located in the position of the transversal stiffener of the lower skin between frames No. 3 and 4; the rear attachment is located in the position of frame No. 4.

The upper attachment of the nose landing gear leg is located behind the firewall. The attachment is formed by the welded landing gear leg guiding, riveted with the transversal reinforcement of the fuselage. The lower attachment of the leg of the nose landing gear (2) is formed by the bracket with the flange on the front lower edge of the firewall.

The attachments of the tilting canopy (3) are located on the upper longerons of the fuselage between frames No. 1 and 2. The attachment is formed by the eye with a bearing and a threaded part that is screwed in the base – the nut of the attachment. The nut of the attachment is attached to the upper longeron of the fuselage by means of screws and nuts. The attachment eye is height-adjustable by screwing and is secured by the clamping nut.



Legend to Fig. 53-5

1 Attachment of engine mount	6 Attachment of main landing gear leg
2 Attachment of nose landing gear	7 Yoke of main landing gear leg attachment
3 Attachment of cockpit canopy	8 Auxiliary attachment of wing
4 Main attachment of wing, upper	9 Front attachment of stabilizer
5 Main attachment of wing, lower	10 Rear attachment of stabilizer

Fig. 53-5 Attachments on fuselage



AERODYNAMIC FAIRINGS

1. DESCRIPTION AND OPERATION

The fairings between the wing and the fuselage are formed by two composite pressed parts that are attached by means of screws. The left fairing as well as the right fairing are composed of two parts, the joints are located on the lower side of the wing. The right fairing is a mirror image of the left one.

The fairing of the fuselage and tail unit is formed by the shaped composite part riveted to the fuselage and to the fin of the vertical tail unit.

The end of the fuselage is formed by the composite cover that is attached by screws to the fuselage structure.



2. MAINTENANCE PRACTICES

A. Fuselage-to-wing fairings

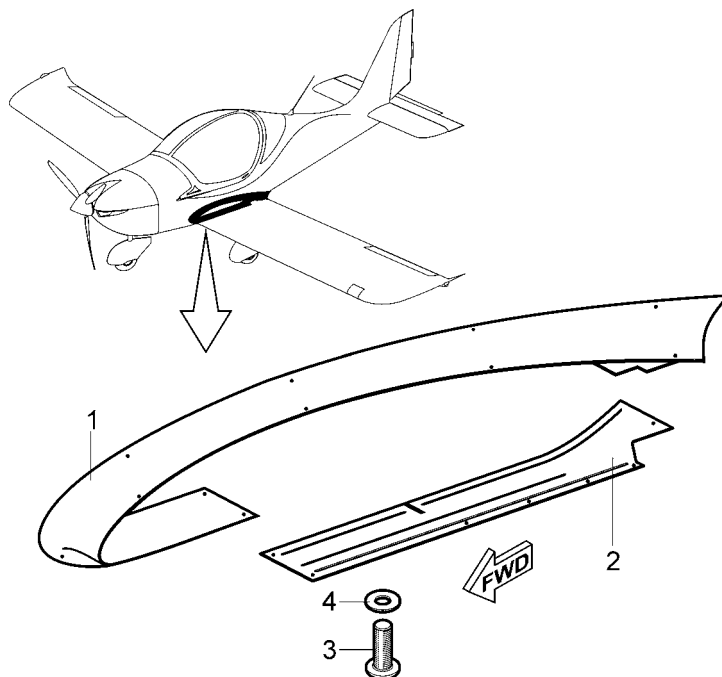
Maintenance type: Line

Personnel qualification: Independent verification personnel qualified in accordance with Part 66 or higher

Recommended tools and material:

Item	Designation / Size	Quantity	Note
Phillips screwdriver	No. 2	1 pc.	

- (1) Removal – fuselage-to-wing fairing
 - (a) Unscrew the screws (3, Fig. 53–6) and remove the washers (4).
 - (b) Remove the lower fairing (2) and the upper fairing (1).
- (2) Installation – fuselage-to-wing fairing
 - (a) Position the upper cover (1, Fig. 53–6) on the corresponding holes, install the screws (3) with the washers (4).
 - (b) Position the lower cover (2), install the screws (3) with the washers (4).
 - (c) Tighten the screws (3).



Legend to Fig. 53-6

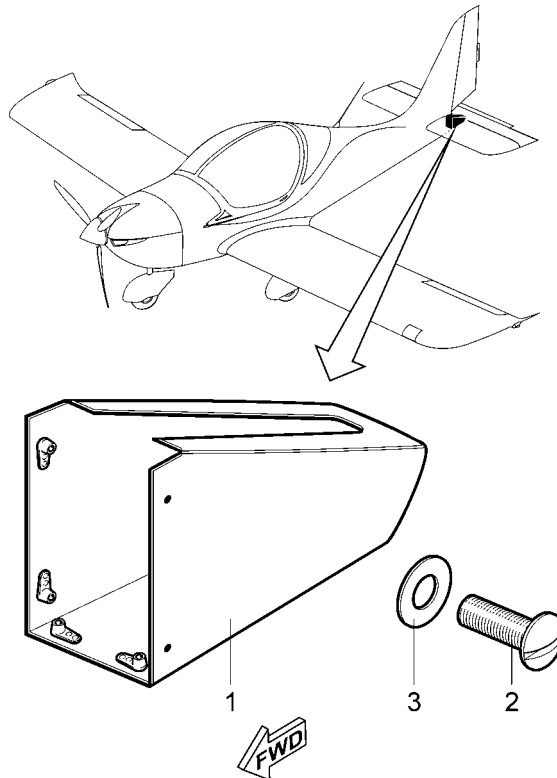
- 1 Upper fairing
- 2 Lower fairing

- 3 Screw M4 (18 + 18 pcs.)
- 4 Polyamide washer 3,7 (18 + 18 pcs.)

Fig. 53-6 Fuselage-to-wing fairings – removal / installation

**B. End cover of fuselage**

- (1) Removal – end cover of the fuselage
 - (a) Unscrew the screws (2, Fig. 53–7) and remove the washers (3).
 - (b) Remove the end cover of the fuselage (1).
- (2) Installation – end cover of the fuselage
 - (a) Position the end cover of the fuselage (1, Fig. 53–7) on the fuselage, install and tighten the screws (2) with the washers (3).



Legend to Fig. 53-7

1 End cover of fuselage	3 Polyamide washer 3,7 (6 pcs.)
2 Screw M4 (6 pcs.)	

Fig. 53-7 End cover of fuselage – removal / installation

CHAPTER

55

STABILIZERS



CHAPTER 55

STABILIZERS

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GENERAL

1. INTRODUCTION

The tail unit is composed of the stabilizer with the elevator and the vertical fin with the rudder. The tail unit is of an all metal structure, consisting of the ribs and the spars made from duralumin sheet by pressing. The tail unit skin is formed by a duralumin sheet.



HORIZONTAL STABILIZERS

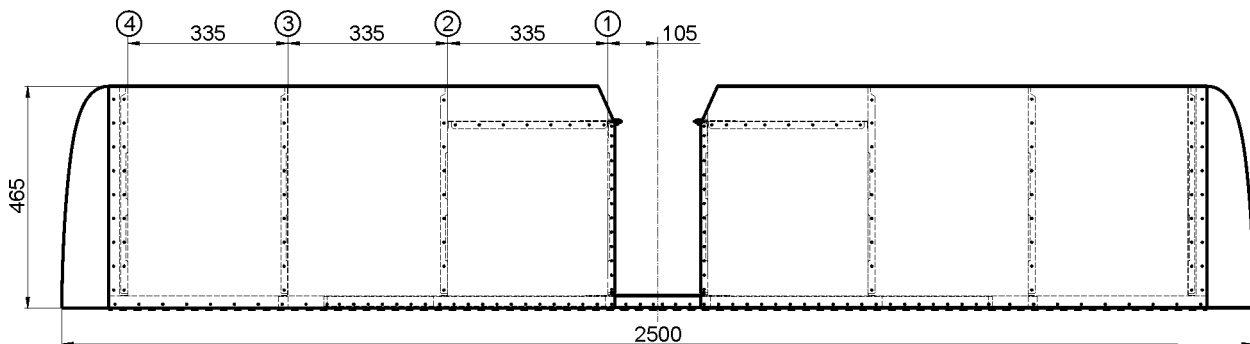
1. DESCRIPTION AND OPERATION

The horizontal stabilizer consists of the rear spar, front spar, ribs No. 1 to 4, skin and the stiffeners. The stabilizer skin is formed by a sheet metal with a thickness of 0,4 mm.

The front spar of the stabilizer is a split (the left part and the right part) pressed part made from a duralumin sheet with lightening holes. The front attachments of the stabilizer are riveted to the front spar. The front spar of the stabilizer is riveted between the ribs No. 1 and 2.

The rear spar of the stabilizer is continuous and is formed by the pressed part from a duralumin sheet with lightening holes. The rear attachments of the stabilizer and the piano hinge of the elevator attachment are riveted to the rear spar. The spar is reinforced by means of riveted stiffening profiles.

The wing tips are formed by the composite parts that are riveted to the duralumin sheet overlapping the edge rib. All the joints are adhesively bonded and riveted.



NOTE:
Dimensions in millimeters.

Fig. 55-1 Horizontal stabilizer



2. MAINTENANCE PRACTICES

A. Horizontal stabilizer

Maintenance type: Heavy

Personnel qualification: Independent verification personnel qualified in accordance with Part 66 or higher

Recommended tools and material:

Item	Designation / Size	Quantity	Note
Socket wrench	No. 12	1 pc.	
Ratchet wrench	1/2"	1 pc.	
Flat screwdriver	-	1 pc.	
Cleaning agent	Technical benzine	-	
Grease	Mogul Molyka G	-	
Cotter pin	2x20	2 pcs.	
Lint-free cloth	-	-	

(1) Removal – horizontal stabilizer

- As needed, remove the elevator (Section 55-20).
- Unscrew and remove the screws (5, Fig. 55-2) with the washers (6).
- Remove the cotter pins (4).
- Unscrew the nuts (2) and remove the washers (3).

CAUTION

THE STABILIZER REMOVAL MUST BE PERFORMED BY TWO PERSONS.

- Slide out the stabilizer (1) from the attachments rearwards and put it in the stand.
- Clean the attachments and protect them with grease.

(2) Installation – horizontal stabilizer

- Check the condition of the attachments on the stabilizer and on the fuselage; check the condition of the connecting material.
- Apply grease on the pins of the front and rear attachments of the stabilizer on the fuselage.

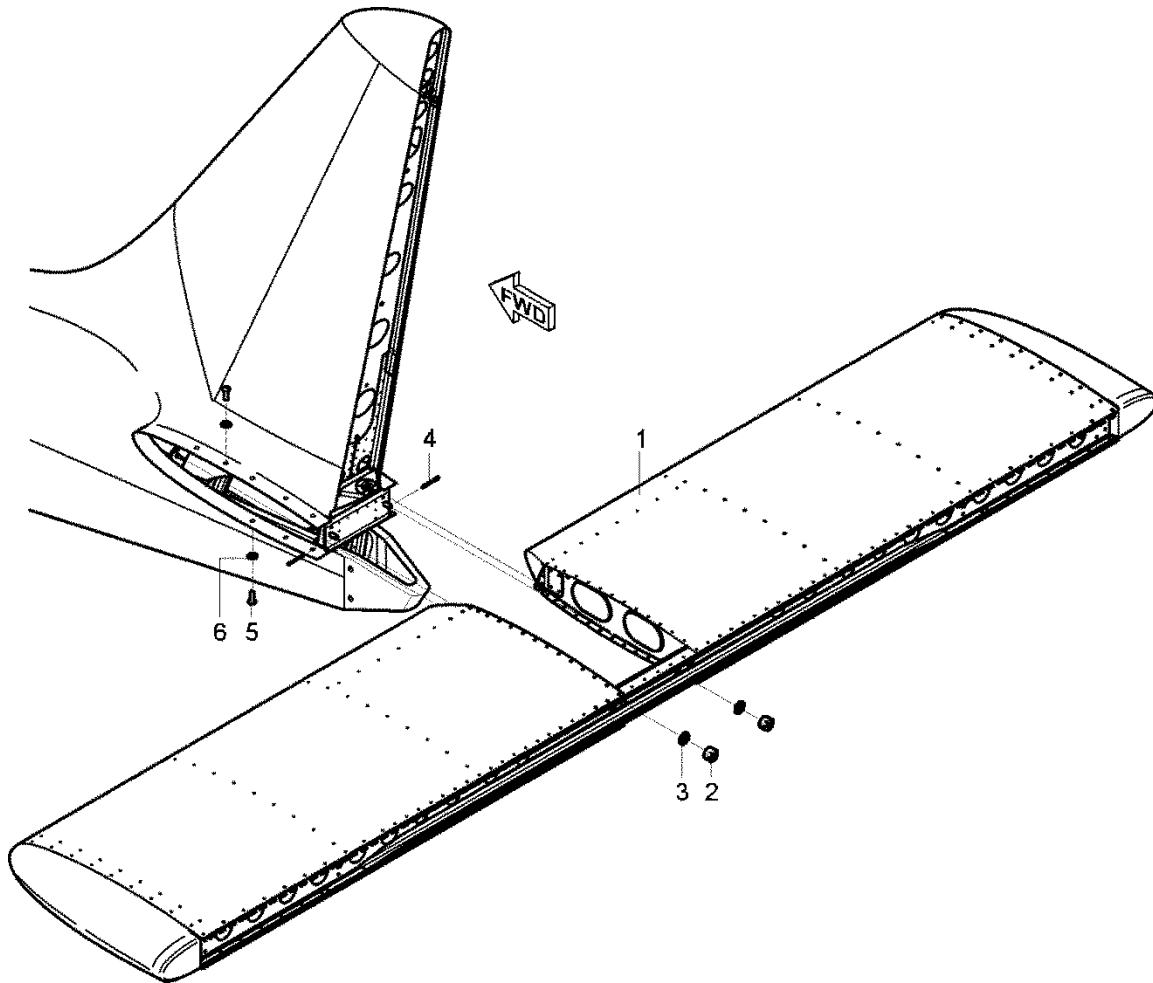
CAUTION

THE STABILIZER INSTALLATION MUST BE PERFORMED BY TWO PERSONS.

- Simultaneously, slide the front holes of the stabilizer attachments (1, Fig. 55-2) on the front pins and the rear holes of the stabilizer attachments on the rear pins of the attachments on the fuselage; check whether the front pins are inserted correctly.



- (d) Put the washers (3) on the rear pins and screw on the nuts (2); tighten the nuts by means of the ratchet wrench so that it is possible to insert new cotter pins (4) into the nearest notch of the castle nut.
- (e) Secure the cotter pins (4) (Section 20-20).
- (f) Fasten the fairing by means of the screws (5) with the washers (6).
- (g) As needed, check the stabilizer setting (Section 08-30).
- (h) As needed, install the elevator (Section 55-20).



Legend to Fig. 55-2

1 Stabilizer	4 Cotter pin 2x20 (2 pcs.)
2 Castle nut M8 (2 pcs.)	5 Screw M4x16 (16 pcs.)
3 Washer 8,4 (2 pcs.)	6 Washer 3,7 (16 pcs.)

Fig. 55-2 Horizontal stabilizer – removal / installation



(3) Inspection / check – horizontal stabilizer

Due to the operation, the plays in the stabilizer suspension arise. Check the plays by moving the stabilizer forwards and rearwards, upwards and downwards; the maximum allowed operating clearance is 2 mm. In the case when the plays are exceeding the set tolerances, contact the airplane manufacturer.

WARNING

THE MAXIMUM ALLOWED PLAYS MUSTN'T BE EXCEEDED IN THE OPERATION.

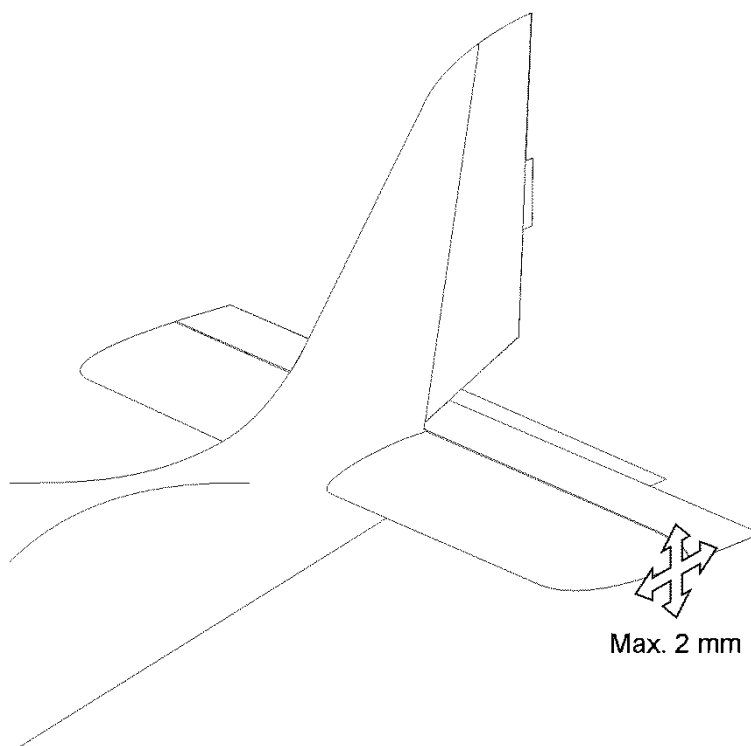


Fig. 55-3 Check of stabilizer plays


B. Ballast

Maintenance type: Heavy

Personnel qualification: Independent verification personnel qualified in accordance with Part 66 or higher

Recommended tools and material:

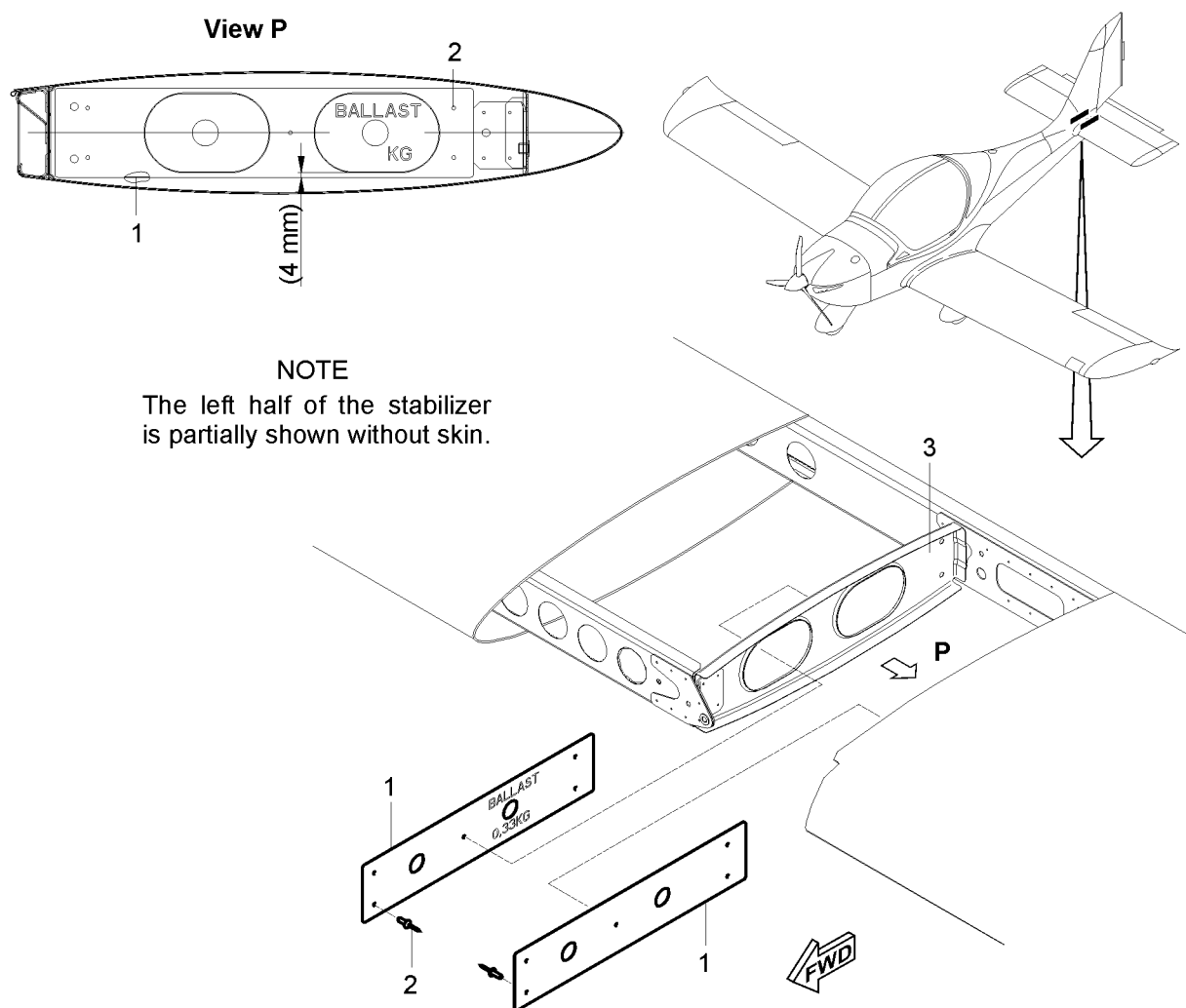
Item	Designation / Size	Quantity	Note
Ejector mandrel	ø 2 mm	1 pc.	
Hammer	-	1 pc.	
Combined pliers	-	1 pc.	
Electrical drilling machine	-	1 pc.	
Drill bit	ø 2 mm, ø 3,2 mm	1 + 1 pc.	
Riveting tool	-	1 pc.	
Rivet	3,2x7,9 1691-0410	5 + 5 pcs.	
Rivet	3,2x11,9 1691-0410	5 + 5 pcs	
Sealant	ENFIMASTICS PU - 50	-	
Cleaning agent	Acetone	-	
Lint-free cloth	-	-	

(1) Removal – ballast

- (a) Remove the stabilizer (see par. 2 A).
- (b) Drill the rivets (2, Fig. 55-4) and carefully peel the ballast (1) off the stabilizer rib.
- (c) Remove the ballast through the oval hole.
- (d) Repeat steps (b) and (c) on the opposite rib of the stabilizer.

(2) Installation – ballast

- (a) Place the appropriate type of ballast (1, Fig. 55 4) on the rib No. 1 of the stabilizer.
- (b) Drill rivet holes ø 3.2mm (2); deburr the holes.
- (c) Apply EMFIMASTICS PU - 50 sealant on the ballast at three points.
- (d) Insert the ballast into the inner space behind the rib through the oval hole in the rib. Pay attention the location of the label on the ballast.
- (e) Place the weight on the rib from the inside, fix it properly and gradually rivet with the rib. Use rivets of appropriate length according to the type of ballast.
- (f) Repeat steps (b) and (c) on the opposite rib of the stabilizer.
- (g) Install the stabilizer back on the plane. (see par. 2 A)
- (h) Check the position of the center of gravity of the empty airplane (Section 08-20).



Legend to Fig. 55-4

1 Ballast	3 Rib No. 1
2 Rivet 3,2 (5 + 5 pcs.)	

Fig. 55-4 Stabilizer ballast removal / installation



ELEVATOR

1. DESCRIPTION AND OPERATION

The elevator (Fig. 55-5) is of a semi-monocoque structure made from a duralumin sheet, and is formed by twelve ribs and the skin. The ribs are made from a duralumin sheet by means of pressing and are riveted to the skin. The levers of the elevator control and the stiffening angle pieces are riveted to the left and right ribs No. 1. The levers form a fork for the elevator control pull-rod. In the left rib No. 1, there are two holes with the grommets for the wiring of the electromechanical strut of the elevator trim. On the left from the left rib No. 1 in the upper section of the skin, there is a space for the electromechanical strut of the trim tab control. In the lower section of the skin, there is an oval hole bordered by a stiffening sheet metal through which the pull-rod of the trim tab control passes.

The skin is formed by a duralumin sheet with a thickness of 0,4 mm.

The piano hinge of the elevator attachment is riveted to the skin of the leading edge. The piano hinge of the trim tab attachment is riveted on the skin that forms the trailing edge of the stabilizer.

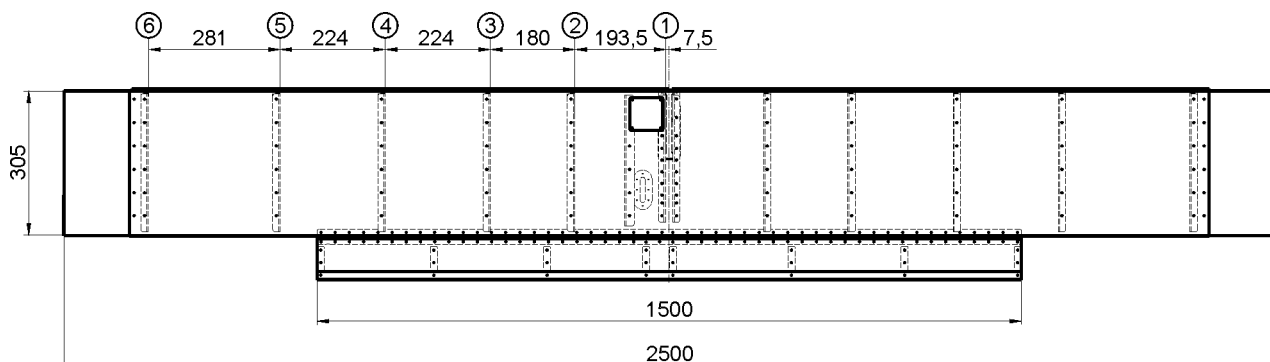
The elevator tips are formed by the composite parts that are riveted to the skin overlapping the end ribs of the elevator.

The trim tab is formed by the bent skin from a duralumin sheet with a thickness of 0.4 mm, stiffened by the cotton-phenolic sheet reinforcements. The piano hinge of the trim tab attachment is riveted to the front part.

The trim tab is controlled by the electromechanical strut located in the elevator. The trim tab control lever is riveted via the lower skin and the reinforcement in the middle section of the trim tab. The L profiles are riveted to the trailing edge from the upper side as well as from the lower side.

All the joints are adhesively bonded and also riveted.

Optionally, the static dischargers that are attached by means of anchor nuts in the position of ribs No. 6 can be installed (Section 23-60).



NOTE:
Dimensions in millimeters.

Fig. 55-5 Elevator



2. MAINTENANCE PRACTICES

A. Elevator

Maintenance type: Heavy

Personnel qualification: Independent verification personnel qualified in accordance with Part 66 or higher

Recommended tools and material:

Item	Designation / Size	Quantity	Note
Ejector mandrel	ø 2 mm	1 pc.	
Hammer	-	1 pc.	
Combined pliers	-	1 pc.	
Center punch	-	1 pc.	
Straight grinder	Dremel 3000	1 pc.	Or equivalent
Grinding disc	ø 32 mm	1 pc.	
Drilling machine	-	1 pc.	
Drill bit	ø 2 mm	1 pc.	
Piano hinge wire (stainless)	118830 (ø 3 h9)	1 pc.	Original version
Piano hinge wire ø 0,098 in	MS20235 P 2–59,06	1 pc.	New version
Cleaning agent	Technical benzine	-	
Greaser	Mogul Molyka G	-	
Lint-free cloth	-	-	

NOTE

The conductive connection of the elevator can be optionally installed on the airplane. If installed, disconnect it before the control surface removal; after the control surface installation, connect it.

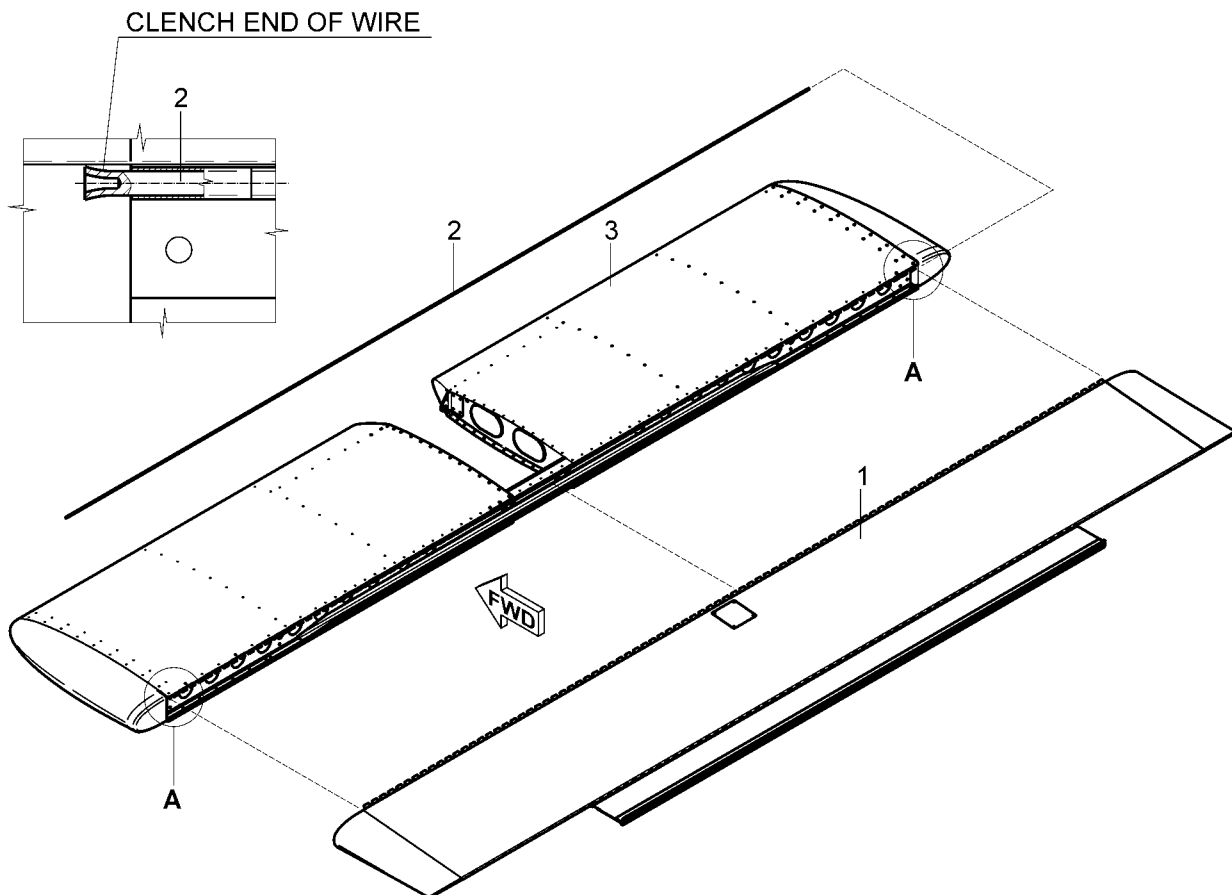
- (1) Removal – elevator
 - (a) Switch the electrical network off and disconnect the battery.
 - (b) Disconnect the connector of electrical wires on the pull-rod of the elevator control (Section 27-30).
 - (c) Disconnect the elevator control pull-rod (Section 27-30).
 - (d) Using the grinder with the grinding disc, carefully cut off the riveted edge on one end of the piano hinge wire.

CAUTION

THE ELEVATOR REMOVAL MUST BE PERFORMED BY TWO PERSONS.



- (e) By means of the ejector mandrel and the hammer, stick out the piano hinge wire a bit (2, Fig. 55-6), swinging slightly by the elevator (1); after that, pull out the whole wire by means of the pliers.
- (f) Put the elevator (1) in the stand.
- (g) As needed, remove the electromechanical strut (Section 27-30).
- (h) Clean the piano hinge and protect it by grease.

Detail A

Legend to Fig. 55-6

1 Elevator	3 Stabilizer
2 Piano hinge wire	

Fig. 55-6 Elevator – removal / installation



(2) Installation – elevator

- (a) Check the condition of the piano hinge on the elevator and on the stabilizer.
- (b) Drill and rivet the new wire (2, Fig. 55-6) on one end - see Detail A; just drill the other end.

CAUTION

THE ELEVATOR INSTALLATION MUST BE PERFORMED BY TWO PERSONS.

- (c) Position the elevator (1) in the piano hinge on the stabilizer (3).
- (d) Apply grease on the wire (2) and insert the unriveted end into the piano hinge.
- (e) Rivet the other end of the piano hinge wire - see Detail A.
- (f) Connect the elevator control pull-rod (Section 27-30).
- (g) Connect the connector of the electrical wires on the elevator control pull-rod (Section 27-30).
- (h) Connect the battery, switch the electrical network on.
- (i) Check the function of the pitch control and the control surface deflections (Section 27-30).

B. Trim tab

Maintenance type: Heavy

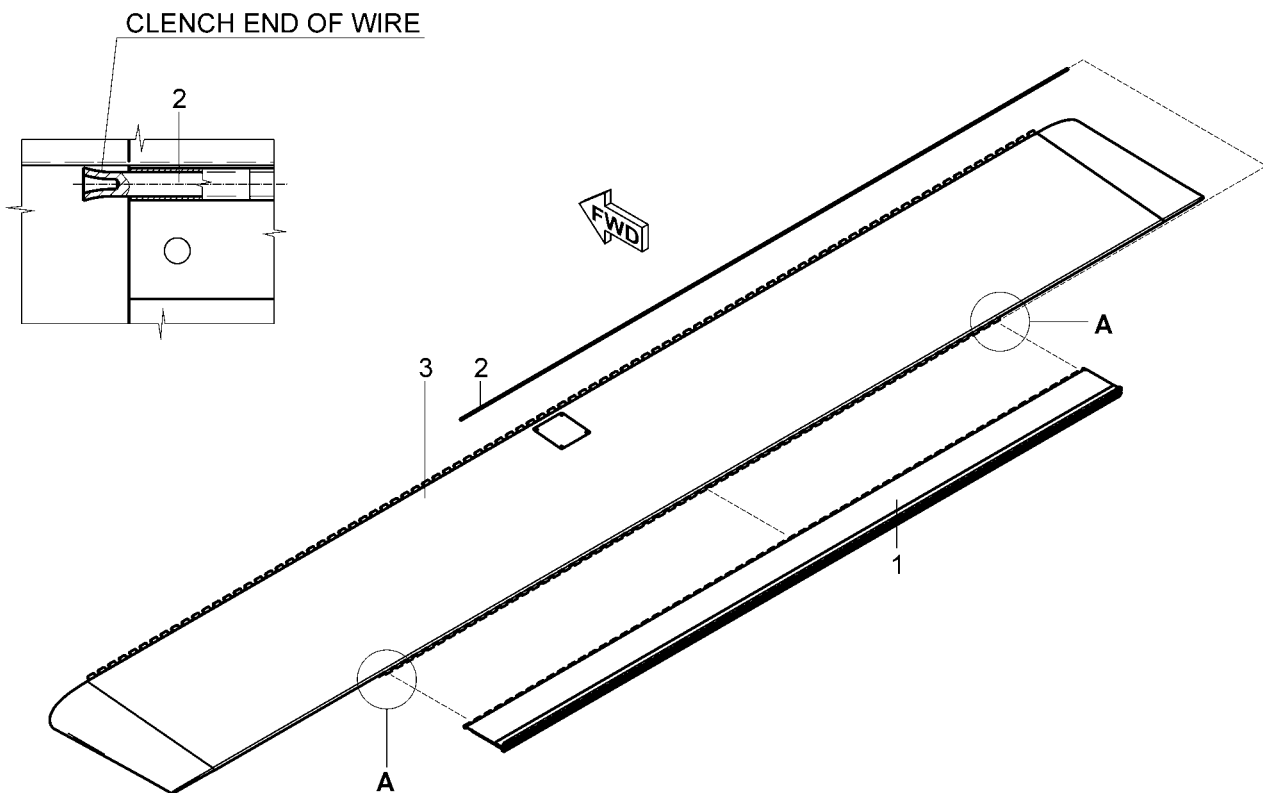
Personnel qualification: Independent verification personnel qualified in accordance with Part 66 or higher

Recommended tools and material:

Item	Designation / Size	Quantity	Note
Ejector mandrel	ø 2 mm	1 pc.	
Hammer		1 pc.	
Combined pliers	-	1 pc.	
Center punch	-	1 pc.	
Straight grinder	Dremel 3000	1 pc.	Or equivalent
Grinding disc	ø 32 mm	1 pc.	
Drilling machine	-	1 pc.	
Drill bit	ø 2 mm	1 pc.	
Piano hinge wire (stainless)	118830 (ø 3 h9)	1 pc.	
Cleaning agent	Technical benzine	-	
Grease	Mogul Molyka G	-	
Lint-free cloth	-	-	



- (1) Removal – trim tab
 - (a) Switch the electrical network off and disconnect the battery.
 - (b) Disconnect the pull-rod of the electromechanical strut from the lever on the trim tab (Section 27-30).
 - (c) Using the grinder with the grinding disc, carefully cut off the riveted edge on one end of the piano hinge wire.
 - (d) By means of the ejector mandrel and the hammer, stick out the piano hinge wire a bit (2, Fig. 55-7), swinging slightly by the trim tab (1); after that, pull out the whole wire by means of the pliers.
 - (e) Put the trim tab (1) in the stand.
 - (f) Clean the piano hinge and protect it by grease.

Detail A


Legend to Fig. 55-7

1 Trim tab of elevator	3 Elevator
2 Piano hinge wire	

Fig. 55-7 Trim tab of elevator – removal / installation



-
- (2) Installation – trim tab
 - (a) Check the condition of the piano hinge on the trim tab and on the elevator.
 - (b) Drill and rivet the new wire (2, Fig. 55-7) on one end - see Detail A; just drill the other end.
 - (c) Position the trim tab (1) in the piano hinge on the control surface (3).
 - (d) Apply grease on the wire (2) and insert the unriveted end into the piano hinge.
 - (e) Rivet the other end of the piano hinge wire - see Detail A.
 - (f) Connect the pull-rod of the electromechanical strut to the lever on the trim tab (Section 27-30).
 - (g) Connect the battery, switch the electrical network on.
 - (h) Check the function and the trim tab deflections (Section 27-30).



VERTICAL STABILIZER

1. DESCRIPTION AND OPERATION

The vertical fin is integral part of the rear section of the airplane.

The vertical fin is formed by the front spar and the rear spar, reinforcements and the skin. The rear spar is connected to fuselage frame No. 11. The spar is formed by a duralumin sheet part with lightening holes made by pressing. The front spar is formed by a duralumin sheet part with lightening holes made by pressing that is connected to frame No. 10. Three ribs are riveted to the spars. The upper rib and the lower rib are formed by sheet metal pressed parts with lightening holes. The rib of the antenna with riveted nuts and assembly holes serves for attaching the VOR, LOC, GS antenna.

The leading edge of the fin is formed by the skin made from a sheet metal with a thickness of 0,4 mm, reinforced by means of longitudinal stiffeners. The lateral surfaces of the fin are covered by a sheet metal with a thickness of 0,63 mm.

The rudder hinges are attached to the rear spar of the stabilizer, the upper hinge is attached by screws and the lower one is riveted.

The fin is ended by the composite tip that is riveted to the skin overlapping the upper rib. The fairing between the fuselage and the vertical fin is a composite shaped part.

All the joints are adhesively bonded and riveted.



RUDDER

1. DESCRIPTION AND OPERATION

The rudder (Fig. 55-8) is of a semi-monocoque structure that is formed by the front skin and the rear skin, reinforcements and the ribs.

The rear skin is formed by the torsion box from a sheet metal with a thickness of 0,4 mm. The sheet metal, that is bent to form a wedge shape, is riveted in the front section and forms the spar. The reinforcement rib is riveted in the cavity formed by the rear skin. The front skin that is bent from a sheet metal with a thickness of 0,4 mm is riveted to the rear skin. The front section (i.e. the leading part) of skin is reinforced by two longitudinal reinforcements. The lower rib is riveted together with the skin and carries the riveted lower hinge of the rudder and closes the cavity of the control surface. In the corners in the reinforcement of the front section of the lower rib, there are attachments of the rudder control cables. The middle rib reinforces the rear skin. The rib carrying the upper hinge passes through the hole in the spar to the trailing edge of the control surface. The upper rib closes the front cavity and also the rear cavity of the rudder.

The fixed trim tab is riveted to the trailing edge. The rudder is ended with the rudder tip made from composite material. The rudder tip is riveted via the skin and the upper rib of the rudder.

Optionally, the static discharger that is attached by means of anchor nut to the skin of the trailing edge in the upper section of the rudder can be installed (Section 23-60).

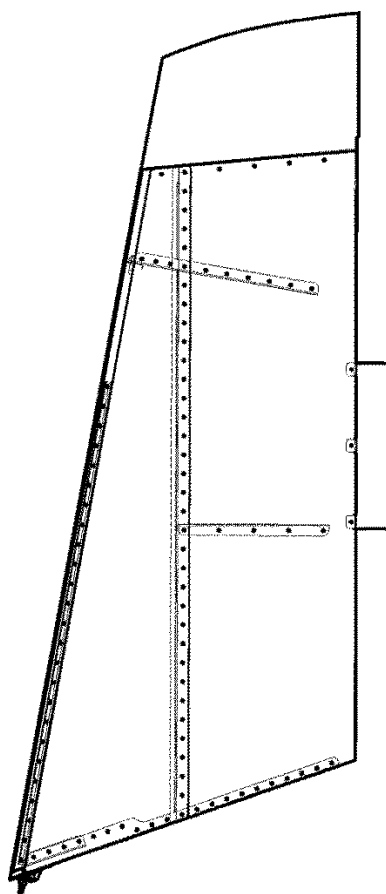


Fig. 55-8 Rudder



2. MAINTENANCE PRACTICES

A. Rudder

Maintenance type: Heavy

Personnel qualification: Independent verification personnel qualified in accordance with Part 66 or higher

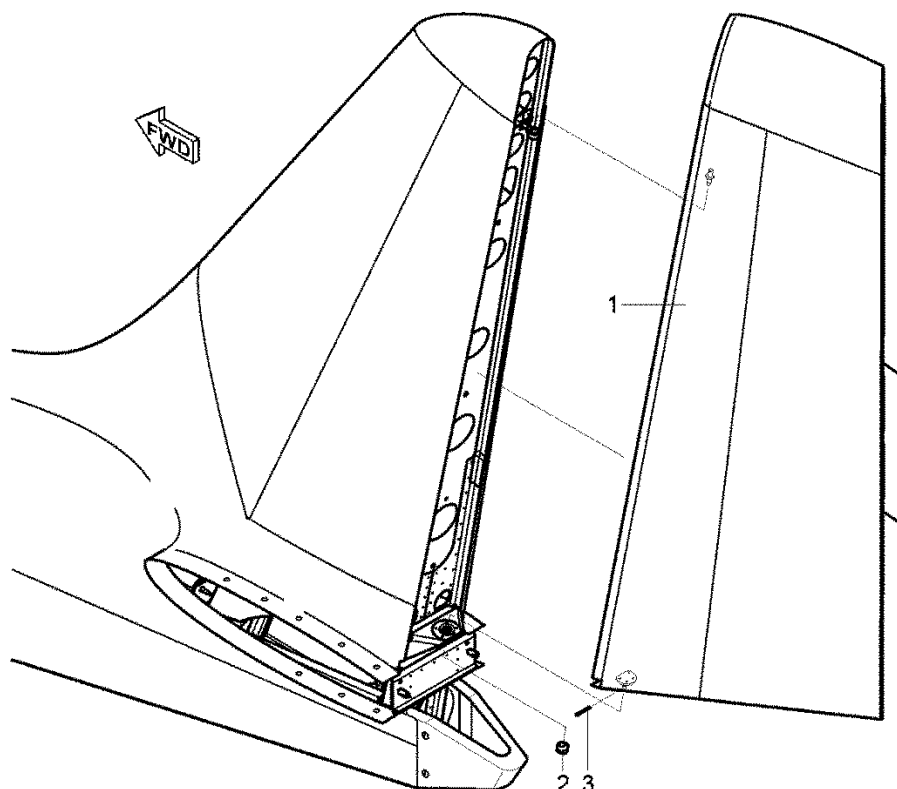
Recommended tools and material:

Item	Designation / Size	Quantity	Note
Wrench	No. 8	1 pc.	
Flat screwdriver	-	1 pc.	
Cleaning agent	Technical benzine	-	
Grease	Mogul Molyka G	-	
Cotter pin	1x12	1 pc.	
Lint-free cloth	-	-	

NOTE

The conductive connection of the rudder can be optionally installed on the airplane. If installed, disconnect it before the control surface removal; after the control surface installation, connect it.

- (1) Removal – rudder
 - (a) Disconnect the rudder control cables (Section 27-20).
 - (b) Remove the cotter pin (3, Fig. 55-9) at the lower hinge of the rudder.
 - (c) Unscrew and remove the nut (2) at the lower hinge of the rudder.
 - (d) Lift the rudder (1) upwards and after releasing it from the hinges, move it away from the vertical fin and put it in the stand.
 - (e) Clean the hinges by means of cleaning agent and protect them by grease.
- (2) Installation – rudder
 - (a) Check the condition of the hinges on the rudder and on the vertical fin; check the condition of the connecting material.
 - (b) Position the upper hinge pin and the lower hinge pin of the rudder (1, Fig. 55-9) to the hinges on the vertical fin.
 - (c) Simultaneously insert the both pins into the hinges.
 - (d) Screw the nut (2) on the lower pin; tighten the nut by means of the wrench so that it is possible to insert the new cotter pin (3) into the nearest notch of the castle nut.
 - (e) Secure the cotter pin (3) (Section 20-20).
 - (f) Connect the rudder control cables (Section 27-20).
 - (g) Check the function of the rudder control, rudder deflections and the tension of the rudder control cables (Section 27-20).



Legend to Fig. 55-9

1 Rudder	3 Cotter pin 1x12
2 Castle nut M5	

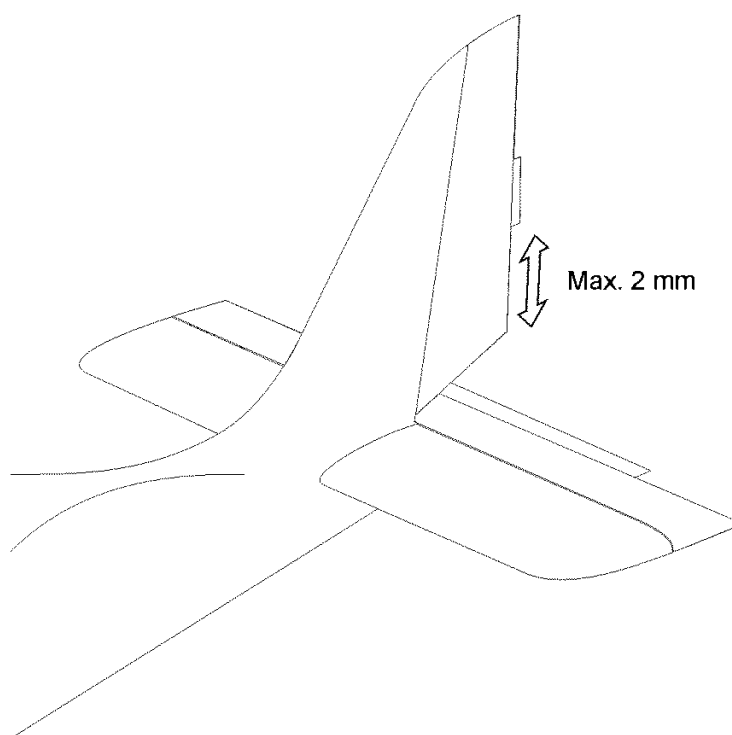
Fig. 55-9 Rudder – removal / installation

(3) Inspection / check – rudder

Due to the operation, the plays in the rudder suspension arise. Check the plays by moving the rudder upwards and downwards; the maximum allowed operating clearance is 2 mm. In the case when the plays are exceeding the set tolerances, exchange the self-aligning bearing or insert a shim under the pin of the lower hinge.

WARNING

THE MAXIMUM ALLOWED PLAYS MUSTN'T BE EXCEEDED IN THE OPERATION



;Fig. 55-10 Check of rudder plays

CHAPTER

56

WINDOWS



CHAPTER 56

WINDOWS

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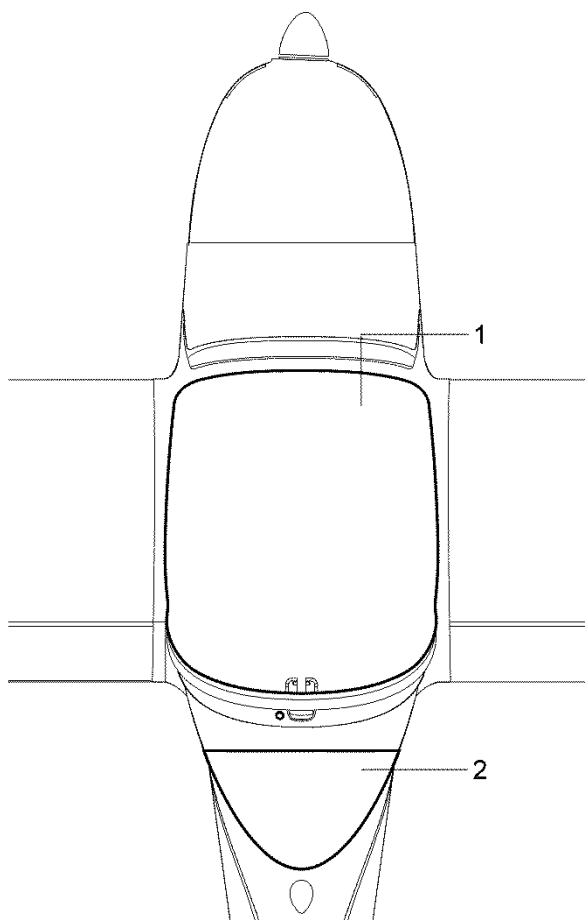
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GENERAL

1. INTRODUCTION

The cockpit canopy of the airplane is equipped with the plexiglas window (1, Fig. 56-1) and the plexiglas window (2) is installed in the fixed frame on the fuselage. The windows are adhesively bonded into the cockpit canopy structure or in the fuselage frame. All the windows are fixed and cannot be opened.



Legend to Fig. 56-1

1	Window of cockpit canopy	2	Window of fixed frame

Fig. 56-1 Cockpit windows



FLIGHT COMPARTMENT

1. DESCRIPTION AND OPERATION

The cockpit canopy window (1, Fig. 56-1) is produced from shaped plexiglas GS241 (transparent) or GS 2929 (brown) with a thickness of 3 mm and is adhesively bonded into the cockpit canopy frame.

The window in the fixed frame of the cockpit (2) is produced from shaped plexiglas GS241 (transparent) or GS 2929 (brown) with a thickness of 2 mm and is adhesively bonded into the window frame, riveted on the fuselage skin.



2. MAINTENANCE PRACTICES

A. Window of cockpit canopy

Maintenance type: Heavy

Personnel qualification: Independent verification personnel qualified in accordance with Part 66 or higher

Recommended tools and material:

Item	Designation / Size	Quantity	Note
Angle grinder	-	1 pc.	
Grinder disc	No. 829957	1 pc.	
Hot air gun	-	1 pc.	With temperature regulation
Knife	-	1 pc.	
Plastic scraper	-	1 pc.	
Electrical drilling machine	-	1 pc.	
Drill	ø 3 mm	1 pc.	
Cleco fastener	-	2 pcs.	
Red adhesive tape	-	1 pc.	
Paper masking tape	-	1 pc.	
Cotton gloves	White or light-colored, thin	1 pair	
Degreaser agent	Alcohol	-	
MS polymeric adhesive – sealant	SABA Sealtack 750	-	
Lint-free cloth	-	-	

(1) Removal – cockpit canopy window

- (a) Remove the cover of the upper part of the fuselage F4 (Section 53-30).
- (b) Remove the cockpit canopy (Section 52-10).
- (c) Remove the sunshade (if installed) and the magnetic compass (Section 34-20).
- (d) Remove the venting windows.
- (e) Remove the middle column:
 - 1 Carefully warm up the window by means of the gun to a temperature of about 70 to 90 °C that will reduce the strength of the adhesively bonded joint.
 - 2 Using the knife point gradually cut off the adhesive between the column and the window, while warming it up. When cutting off, push the window away from the column.
- (f) Fixate the cockpit dimension – width.

**CAUTION**

CUT OFF THE WINDOW VERY CAREFULLY IN ORDER NOT TO DAMAGE THE COCKPIT CANOPY FRAME.

- (g) Using the angle grinder with a disc, cut off the window at a distance of about 50 to 100 mm from the frame.
- (h) From the outside, carefully warm up the window to a temperature of about 70 to 90 °C, using the hot air gun.
- (i) Using the knife point gradually cut off the adhesive between the frame and the window, while warming it up. When cutting off, push the window away from the frame.

CAUTION

WHEN REMOVING THE ADHESIVE ON THE PERIMETER OF THE FRAME, BE VERY CAREFUL IN ORDER NOT TO DAMAGE THE FRAME.

- (j) Using the plastic scraper, remove the rests of the adhesive from the frame.
- (2) Installation – cockpit canopy window

CAUTION

NEVER USE ORGANIC DISSOLVING AGENTS, ACETONE, THINNERS, ETC., FOR THE WINDOW. NEVER USE ABRASIVE CLEANERS FOR REMOVING IMPURITIES. NEVER USE THE SCRAPERS FOR REMOVING THE ICE. DON'T STORE THE WINDOW ON THE DIRECT SUN LIGHT IF IT IS PROTECTED BY A COVERING FOIL – IT IS VERY DIFFICULT TO REMOVE THE FOIL AND THE WINDOW MAY BE DAMAGED

- (a) Inspect the frame of the cockpit canopy and check whether all rests of adhesive and impurities have been eliminated
- (b) Make sure that the window isn't damaged, eventually that it doesn't have any defects. Never install a window with defects.
- (c) Install the cockpit canopy without the window (Section 52-10) and cover the areas inside the cockpit.
- (d) Position the new window on the frame and fixate it:
 - 1 Up and down in the axis of the frame, drill holes with a diameter of 3 mm for cleco fasteners.
 - 2 Insert the rubber gasket between the window and the frame.
 - 3 Secure the window by means of cleco fasteners.
- (e) In the area of cutting, remove the protective foil from the window.
- (f) Using a felt-tip marker, mark the end of the window according to the edge of the frame.



CAUTION

CUT OFF THE WINDOW VERY CAREFULLY IN ORDER NOT TO DAMAGE THE COCKPIT CANOPY FRAME.

- (g) Gradually cut off the window to the frame from the top down, cut off the lower edge as the last one; cut smaller pieces in order not to overheat the window; clean and deburr the cut edges of the window.

NOTE

The gap between the window and the frame edge must be 1 mm.

- (h) Mark the end (the edge) of the frame on the inner side of the window by means of a felt-tip marker (the adhesively bonded area)
- (i) Stick the red adhesive tape around the edge of the frame where the window will be adhesively bonded
- (j) Over the red adhesive tape (approximately in the middle of its width), stick the paper masking tape that will protect the area about the frame from staining by the adhesive.
- (k) On the inner side of the window, unstick the covering foil on the perimeter up to the marked outline and attach the unstuck ends of the foil by adhesive tape

CAUTION

DON'T TOUCH THE UNPROTECTED AREA ON THE PERIMETER OF THE WINDOW.

- (l) By means of suction, remove all the impurities from the adhesively bonded edge of the window and cockpit canopy frame

CAUTION

ON THE FRAME, THERE MUSTN'T BE ANY MARKS MADE BY A GREASY PENCIL, ETC. BEFORE APPLYING THE ADHESIVE, THE FRAME MUST BE THOROUGHLY CLEANED AND DRIED

- (m) Make sure whether the maximum shelf life of the adhesive didn't expire.
- (n) Degrease the cockpit canopy frame by means of alcohol; before adhesive bonding, a minimum dwell time of 8 minutes is needed for deaeration of alcohol.
- (o) Use clean cotton gloves.
- (p) Apply the adhesive in a layer with a thickness of 1 up to 1.5 mm on the degreased cockpit canopy frame, using the applicator on the tube.

CAUTION

DON'T APPLY THE ADHESIVE ON THE WINDOW.

**NOTE**

A dwell time for adhesive deaeration isn't necessary before adhesive bonding. The maximum dwell time is 10 minutes.

- (q) Press the window down to the frame and make sure that the external surface of the window is fitting with the external surface of the frame.
- (r) If the adhesive is missing in the gap between the window and the frame, squeeze it by means of the applicator so that the gap is fully filled.
- (s) Remove the masking tape from the frame; leave the covering foil on the window.

NOTE

Pull off the masking tape towards the adhesive in the gap before its drying, so that the adhesive on the surface cannot be damaged

- (t) Fixate the window against its movement. A 24-hour dwell time, as a minimum, is needed for adhesive curing
- (u) Apply the adhesive in a layer with a thickness of 1 up to 1.5 mm on the degreased middle column, using the applicator on the tube, fixate it against its movement. A 24-hour dwell time, as a minimum, is needed for adhesive curing.
- (v) Carefully clean/eliminate eventual run-offs by means of the cut off parts of the window from cutting.
- (w) Using a blunt drill with a diameter of 3 mm, drill the holes for the front venting windows, deburr the holes.
- (x) Install the venting windows, slightly tighten up the screw joints.
- (y) Install the sunshade (if installed) and the magnetic compass (Section 34-20).
- (z) Connect the connector of the wires of the unsecured cockpit canopy signaling (on the LH side) and, as needed, the connector of the compass lighting wires (on the RH side).
- (aa) Install the cover of the upper part of the fuselage F4 (Section 53-30).



B. Window of fixed frame

Maintenance type: Heavy

Personnel qualification: Independent verification personnel qualified in accordance with Part 66 or higher

Recommended tools and material:

Item	Designation / Size	Quantity	Note
Angle grinder	-	1 pc.	
Grinder disc	No. 829957	1 pc.	
Hot air gun	-	1 pc.	With temperature regulation
Knife	-	1 pc.	
Plastic scraper	-	1 pc.	
Electrical drilling machine	-	1 pc.	
Drill	ø 3 mm	1 pc.	
Cleco fastener	-	2 pcs.	
Red adhesive tape	-	1 pc.	
Paper masking tape	-	1 pc.	
Cotton gloves	White or light-colored, thin	1 pair	
Degreaser agent	Alcohol	-	
MS polymeric adhesive – sealant	SABA Sealtrack 750	-	
Lint-free cloth	-	-	

(1) Removal – window of the fixed frame

- (a) Open the cockpit canopy and fixate it.
- (b) Cover the areas inside of the cockpit.

CAUTION

CUT OFF THE WINDOW VERY CAREFULLY IN ORDER NOT TO DAMAGE THE COCKPIT CANOPY FRAME.

- (c) Using the angle grinder with a disc, cut off the window at a distance of about 50 to 100 mm from the frame.
- (d) From outside, heat up the window carefully, using the hot air gun, up to a temperature of about 70 to 90 °C.
- (e) Using the knife point gradually cut off the adhesive between the frame and the window, while warming it up. When cutting off, push the window away from the frame.

**CAUTION**

WHEN REMOVING THE ADHESIVE ON THE FRAME PERIMETER, BE CAREFUL IN ORDER NOT TO DAMAGE THE FRAME.

- (f) Using the plastic scraper and cleaning agent, remove the rests of the adhesive from the frame.
- (2) Installation – window of the fixed frame

CAUTION

NEVER USE ORGANIC DISSOLVING AGENTS, ACETONE, THINERS, ETC., FOR THE WINDOW. NEVER USE ABRASIVE CLEANERS FOR REMOVING IMPURITIES. NEVER USE THE SCRAPERS FOR REMOVING THE ICE. DON'T STORE THE WINDOW ON THE DIRECT SUN LIGHT IF IT IS PROTECTED BY A COVERING FOIL – IT IS VERY DIFFICULT TO REMOVE THE FOIL AND THE WINDOW MAY BE DAMAGED.

- (a) Inspect the frame and check whether all rests of adhesive and impurities have been eliminated.
- (b) Make sure that the window isn't damaged, eventually that it doesn't have any defects. Never install a window with defects.
- (c) Position the new window into the frame and fixate it:
 - 1 Up and down in the axis of the frame, drill holes with a diameter of 3 mm for cleco fasteners.
 - 2 Insert the rubber gasket between the window and the frame.
 - 3 Secure the window by means of cleco fasteners.
- (d) In the position of cutting, remove the protective foil from the window.
- (e) Using a felt-tip marker, mark the end of the window according to the edge of the frame.

CAUTION

CUT OFF THE WINDOW VERY CAREFULLY IN ORDER NOT TO DAMAGE THE COCKPIT CANOPY FRAME.

- (f) Gradually cut off the window to the frame from the top down, cut off the lower edge as the last one; cut smaller pieces in order not to overheat the window; clean and deburr the cut edges of the window.

NOTE

The gap between the window and the frame edge must be 1 mm.

- (g) Mark the end (the edge) of the frame on the inner side of the window by means of a felt-tip marker (the adhesively bonded area).



- (h) Stick the red adhesive tape around the edge of the frame where the window will be adhesively bonded.
- (i) Over the red adhesive tape (approximately in the middle of its width), stick the paper masking tape that will protect the area about the frame from staining by the adhesive.
- (j) On the inner side of the window, unstick the covering foil on the perimeter up to the marked outline and attach the unstuck ends of the foil by adhesive tape.

CAUTION

DON'T TOUCH THE UNPROTECTED AREA ON THE PERIMETER OF THE WINDOW.

- (k) By means of suction, remove all the impurities from the adhesively bonded edge of the window and cockpit canopy frame.

CAUTION

ON THE FRAME, THERE MUSTN'T BE ANY MARKS MADE BY A GREASY PENCIL, ETC. BEFORE APPLYING THE ADHESIVE, THE FRAME MUST BE THOROUGHLY CLEANED AND DRIED.

- (l) Make sure whether the maximum shelf life of the adhesive didn't expire.
- (m) Degrease the cockpit canopy frame by means of alcohol and before adhesive bonding, a minimum dwell time of 8 minutes is needed for deaeration of alcohol.
- (n) Use clean cotton gloves.
- (o) Apply the adhesive in a layer with a thickness of 1 up to 1.5 mm on the degreased cockpit canopy frame, using the applicator on the tube.

CAUTION

DON'T APPLY THE ADHESIVE ON THE WINDOW.

NOTE

A dwell time for adhesive deaeration isn't necessary before adhesive bonding. The maximum dwell time is 10 minutes.

- (p) Press the window down to the frame and make sure that the external surface of the window is fitting with the external surface of the frame.
- (q) If the adhesive is missing in the gap between the window and the frame, squeeze it by means of the applicator so that the gap is fully filled.
- (r) Remove the masking tape from the; leave the covering foil on the window.

NOTE

Pull off the masking tape towards the adhesive in the gap before its drying, so that the adhesive on the surface cannot be damaged.



-
- (s) Fixate the window against its movement. A 24-hour dwell time, as a minimum, is needed for adhesive curing.
 - (t) Carefully clean / eliminate eventual run-offs by means of the cut off parts of the window from cutting.

CHAPTER

57

WINGS



CHAPTER 57

WINGS

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GENERAL

1. INTRODUCTION

The wing is of a self-supporting all-metal structure, of a rectangular shape and is split in a left half and a right half. Each half of the wing is attached to the fuselage by means of three attachments.

The wing structure is composed of the main spar and the rear spar, ribs and the skin. The structure elements form a spar semi-monocoque. The wing frame is composed of the main spar, rear spar and 12 ribs. The wing ribs are divided in the leading section – from the leading edge of the wing up to the main spar of the wing, middle section – between the main spar and the rear spar and the trailing section – from the rear spar up to the trailing edge of the wing. The leading and middle sections of ribs are located along the whole wing span. The trailing sections of ribs are located in the area starting from the system of rib No. 1 up to the auxiliary rib between the system of ribs No. 8 and 9.

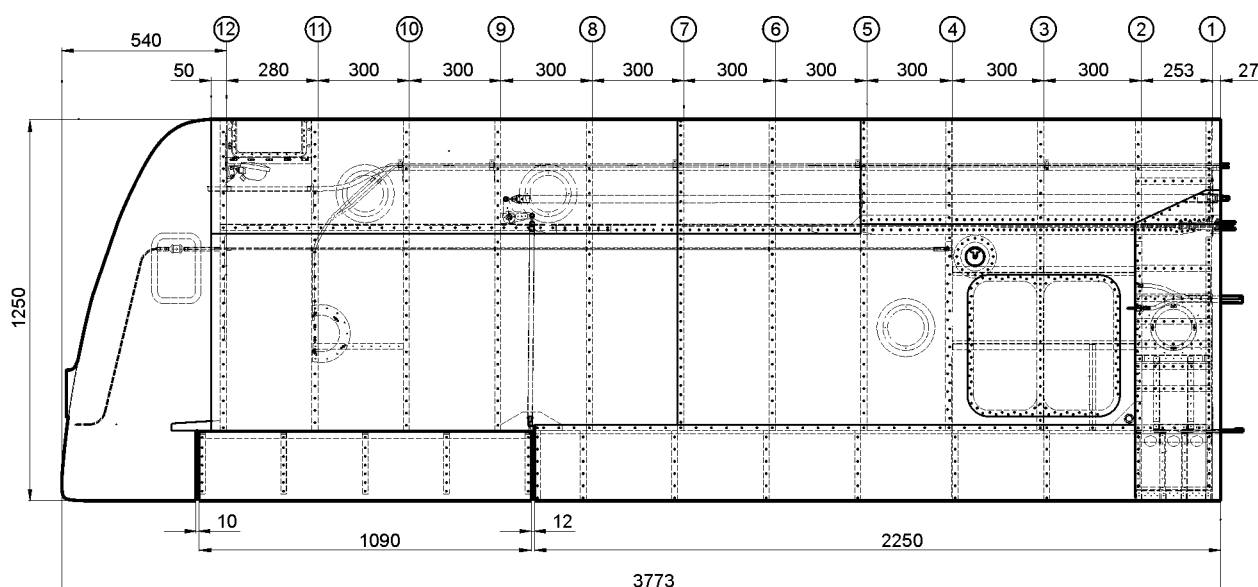
The skin panels are adhesively bonded and riveted to the wing frame. The wing frame and the skin are produced from an Al-alloy sheet metal.

The main attachments of the wing are made from steel. The rear attachment of the wing is made from Al-alloy.

In the wing, there are auxiliary structures (brackets, attachments, etc.) for attaching the elements of the equipment and installations of the wing (control, pitot-static system and fuel system, wirings).

On the lower part of the wing, there are assembly holes providing access to the wing equipment. The list of the covers and caps of all assembly holes is shown in Section 06-40.

The wing is equipped with the ailerons and the hinged wing flaps.



NOTE:
Dimensions in millimeters.

Fig. 57-1 Left wing



MAIN FRAME

1. DESCRIPTION AND OPERATION

The primary structure of the wing is composed of the main spar and the rear spar, middle ribs No. 1 up to 12 and the main attachment and the rear attachment of the wing.

The main spar of the wing is composed of the spar caps, web, stiffening spacer, splice plate and the main attachments of the wing. The spar caps are made from L profiles made from Al-alloy. The spar caps are riveted to the web from the rear side. The web is made from Al-alloy sheet strip and is provided with lightening holes.

The rear spar is formed by the bent parts of skin sheets, overlapped, locally reinforced by means of the splice plates and angle pieces and riveted to the rear parts of the middle ribs. The hinges of the aileron attachments, wing flaps attachments and the rear attachment of the wing are riveted to the rear spar. The wing flap attachment is located between ribs No. 1 up to 9, the aileron attachment is located between ribs No.8 up to 12.

The wing ribs are made from sheet metal by means of pressing and they are provided with lightening holes. The holders of the venting pipelines of the fuel tank and pitot-static system are riveted on the wing ribs. In the position of rib No. 11 from the inner side of the lower part of the wing skin, there is a reinforcement for the installation of the pitot-static tube holder. The anchoring eye is riveted to rib No. 12.

The space between the front spar and the rear spar and ribs No. 2 and 4 is tightly sealed and serves as a fuel tank. All the spaces for the tanks, rivets, covers and others are similarly sealed by special sealants TM 2 and TM 3. The fuel gauge is attached to rib No. 2 in the tank. The drain valve and the sludge valve of fuel are located on the lower side of the wing next to rib No. 2, before the rear spar. The fuel filler cap of the tank is located on the upper side of the wing in the position of rib. 4.



AUXILIARY STRUCTURE

1. DESCRIPTION AND OPERATION

The auxiliary structure of the wing is composed of the leading edge, trailing edge and the wing tip.

The leading edge is formed by ribs No.1 up to 12. The ribs of the leading edge are made by pressing from sheet metal and they are provided with lightening holes. The ribs are riveted from the front to the main spar. The holders of the pitot-static system line and the holders of wiring in the wing tip are riveted on the leading edge ribs. The guiding grommet of the aileron control pull-rod is riveted to the rib No. 1. The bracket of the angular lever of roll control is riveted to rib No. 9 and to the web in the area between ribs No. 8 and 9 in the leading edge part of the wing. The web is stiffened by the spacer in this position. The holder of the landing light is riveted on rib No. 12 from the inner side.

The trailing edge is formed by ribs No. 1 to 8 and the auxiliary rib between the system of ribs No. 8 and 9. The ribs of the leading edge are pressed from sheet metal and riveted to the rear spar.

The aerodynamically shaped wing tip forms the end part of the wing from rib No. 12. The wing tip is produced from composite and is riveted to the end rib of the wing. The position light and the strobe light are installed on the wing tip (Section 33-40). The assembly hole, closed by the cover, is located on the lower side of the wing tip. The cover is attached to the wing tip by means of screws.



SKIN

1. DESCRIPTION AND OPERATION

The wing skin is composed of eight main parts. All parts of the wing skin are made from Al-plated duralumin sheet metal.

In the area between the main spar and the rear spar from rib No. 1 up to rib. No. 7, the wing is covered by sheet metal with a thickness of 0,6 mm from the upper side and by the sheet metal with a thickness of 0,81 mm from the lower side. In the skin of the upper part in the area of the integral tank between ribs No. 2 and 4, there is a hole that serves for a hermetic sealing of the inner part of the tank. The hole is closed by the cover that is riveted to the upper skin, made from sheet metal with a thickness of 0,81 mm. The filling hole of the fuel tank is located on the upper side of skin, behind the main spar, between ribs No. 3 and 4. The sludge valve and the drain valve of fuel are located from the external side of rib No. 2 in the corner stiffened by sheet metal with a thickness of 1 mm, between the rib and the rear spar of the wing. Between ribs No. 7 and 12, the skin is made from sheet metal with a thickness of 0,5 mm on the upper as well as on the lower side. The inspection and assembly holes are located on the lower side of skin between ribs No. 1 and 2, No. 4 and 5. The hole that serves as a flange for the attachment of the holder of the Pitot-static tube is located on the inner side of rib No. 11. The rear spar of the wing is formed by the skin on the end part of middle ribs No. 1 to 12.

The leading edge skin of the wing is composed of three fields.

The inner field of skin, between ribs No. 1 to 5 is produced from sheet metal with a thickness of 0,6 mm. The middle field of skin, between ribs 5 to 7, is produced from sheet metal with a thickness of 0,5 mm. The external field of skin, between ribs No. 7 to 12, is produced from sheet metal with a thickness of 0,5 mm. The inspection and assembly holes are located in the lower part of leading edge skin between ribs No. 8, 9 and 10, 11. The trailing edge skin of the wing is produced from one piece of sheet metal with a thickness of 0,5 mm. The upper skin is re-riveted by the stiffening tread sheet metal with a thickness of 1,2 mm between ribs No. 1 and 2. The reinforcing sheet metal is riveted between ribs No. 8 and 9 under the skin, before the rear spar, on the upper as well as on the lower part of the wing. The lower skin is reinforced in the area of the main attachment and the rear attachment of the wing, in the position of the inspection hole and the assembly hole, and in the position of the sludge valve. The inspection and assembly holes and the flange of the holder of the Pitot-static tube are reinforced by means of the frame.



ATTACH FITTINGS

1. DESCRIPTION AND OPERATION

The wing structure is provided with the attachments that serve for the fastening of wings to the fuselage, for the fastening of the ailerons and wing flaps.

The main attachments of the wing are milled from steel, they are bolted to the main spar of the wing through the spar caps, web and the web stiffener. The main attachments of the wing are connected with the fuselage by the two steel pins with the washers that are secured by the securing pins.

The rear Al-alloy attachment of the wing is riveted to the auxiliary spar. The rear attachment of the wing is connected with the attachment on the fuselage by the bolt with the washer and the castle nut and is secured by the securing pin.



2. MAINTENANCE PRACTICES

A. Wing

Maintenance type: Heavy

Personnel qualification: Independent verification personnel qualified in accordance with Part 66 or higher

Recommended tools and material:

Item	Designation / Size	Quantity	Note
Duralumin mandrel	ø 7x150 mm	1 pc.	
Duralumin mandrel	ø 15x150 mm	1 pc.	
Rubber mallet or hammer	-	1 pc.	
Cobra pliers	-	1 pc.	
Cleaning agent	Technical benzine	-	
Grease	Mogul Molyka G	-	
Lint-free cloth	-	-	

NOTE

The procedure of removal and installation is identical for the left wing and for the right wing.

- (1) Removal – wing
 - (a) Switch the electrical network off and disconnect the battery.
 - (b) Drain the fuel (Section 12-10).
 - (c) Remove the fairings between the wing and the fuselage (Section 53-50).
 - (d) Release the hose clamps (14, Fig. 57-2), disconnect and close the hoses (10) and the screw fitting of the fuel system.

NOTE

Depending on the airplane equipment, the hoses of the pitot-static system can be located just on the left wing or also on the right wing.

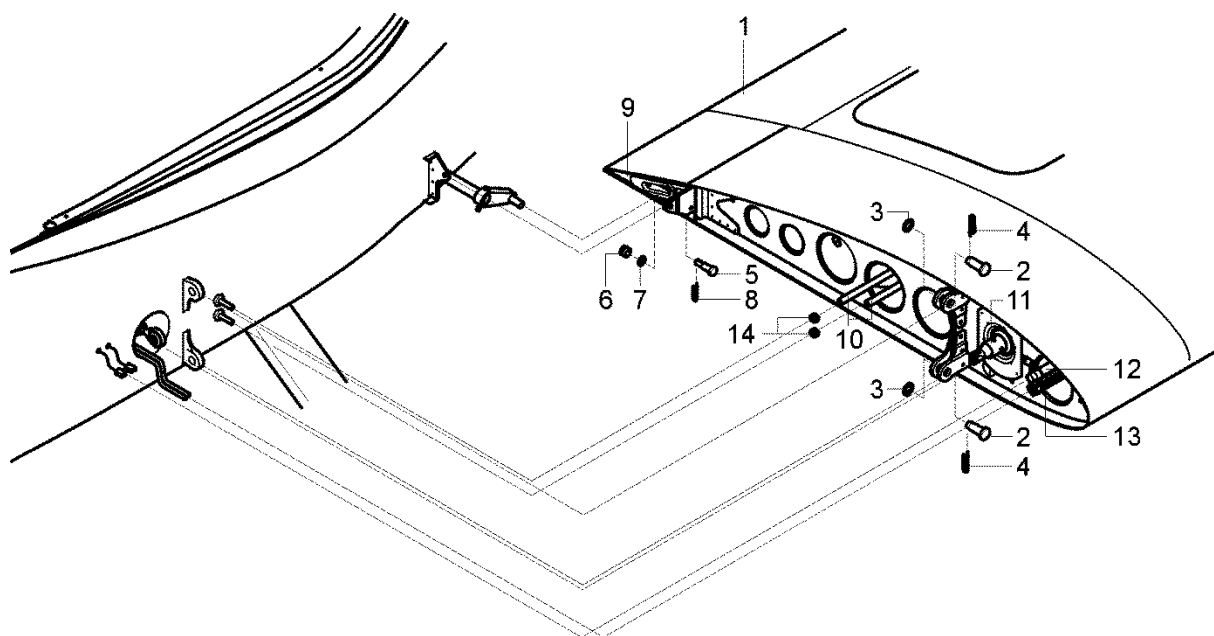
- (e) Disconnect the pull-rod of the roll control (11) (Section 27-10).
- (f) Disconnect the electrical wires (13).
- (g) Remove the securing pins (4) and the washers (3) of the main attachment pins (2).
- (h) Remove the securing pin (8), unscrew the nut (6) of the rear attachment and remove the washer (7).
- (i) Disconnect the bridging between the main attachments and the rear attachment (not shown).



CAUTION

THE WING REMOVAL MUST BE PERFORMED BY THREE PERSONS (AT LEAST) – ONE PERSON AT THE END OF THE WING AND TWO PERSONS AT THE ROOT.

- (j) By means of the duralumin mandrel (ø 7 mm) and the rubber mallet or hammer, knock out the bolt (5) from the rear attachment.
- (k) By means of the duralumin mandrel (ø 15 mm) and the rubber mallet or hammer, knock out the upper pin and the lower pin (2) from the main attachments.
- (l) Move away the wing (1) from the fuselage with regard to the pin of the wing flap control.
- (m) Put the wing on a suitable storage rack so that it cannot be damaged.
- (n) Clean the attachments by means of cleaning agent and protect it by grease.



Legend to Fig. 57-2

1	Wing	8	Securing pin
2	Pin	9	Guiding rib of wing flap
3	Washer	10	Hoses of fuel system
4	Securing pin	11	Pull-rod of roll control
5	Bolt M8x23	12	Tubes of pitot-static system
6	Castle nut M8	13	Electrical wires
7	Washer 8.4	14	Hose clamp

Fig. 57-2 Wing – removal / installation



- (2) Installation – wing
- (a) Check the condition of the attachments on the wing and on the fuselage; check the condition of the connecting material.
 - (b) Remove the blind plugs from the hoses and screw fittings of the fuel system and from the hoses of the pitot-static system.
 - (c) Apply grease on the main pins (2, Fig. 57-2), bolt (5), eyes of attachments and in the groove of the rib (9).

CAUTION

THE WING INSTALLATION MUST BE PERFORMED BY THREE PERSONS (AT LEAST) – ONE PERSON AT THE END OF THE WING AND TWO PERSONS AT THE ROOT.

CHECK WHETHER THE PIN IS INSERTED THROUGH THE WHOLE THICKNESS OF THE GROOVE OF THE ROOT RIB OF THE WING FLAP WITH THE WING FLAPS FULLY EXTENDED. DURING THE WING INSTALLATION BE CAREFUL IN ORDER NOT TO DAMAGE THE HOSES OF THE PITOT-STATIC SYSTEM AND THE ELECTRICAL WIRES.

- (d) Position the wing to the attachments on the fuselage and insert the pin of the wing flap control into the groove in the rib. For the wing positioning, it is possible to use the centering pins of a corresponding diameter.
- (e) Insert the upper main pin (2) into the attachments and as needed, knock it slightly by the rubber mallet or by the hammer using a duralumin mandrel.
- (f) Insert the lower main pin (2) into the attachments and as needed, knock it slightly by the rubber mallet or by the hammer using a duralumin mandrel.
- (g) Insert the bolt (5) into the attachment and as needed, knock it slightly by the rubber mallet or by the hammer using a duralumin mandrel.
- (h) Put the washers (3) on the main pins (2) and secure them by the securing pins (4).
- (i) Put the washer (7) on the bolt (5) and screw on the castle nut (6); tighten the nut by the wrench so that it is possible to insert the securing pin (8) into the nearest possible notch of the castle nut.
- (j) Connect the bridging between the main attachments and the rear attachment (not shown).
- (k) Connect the electrical wires (13).
- (l) Connect the pull-rod of the roll control (11) (Section 27-10).

CAUTION

PAY ATTENTION TO A CORRECT CONNECTION OF THE TUBES AND THE HOSES OF STATIC AND TOTAL PRESSURE. AN INCORRECT INSTALLATION COULD CAUSE AN AIRCRAFT ACCIDENT!

- (m) Connect the hoses and the tubes of pitot-static system (12) and attach them by means of the clamps.



- (n) Connect the hoses (10) and the screw fitting of the fuel system and attach them by means of the clamps (14).
 - (o) Check the tightness of the pitot-static system (Section 34-10).
 - (p) Check the tightness of the fuel system (Section 28-10).
 - (q) Install the fairings between the wing and the fuselage (Section 53-50).
 - (r) Connect the battery.
- (3) Inspection / check – wing

Due to the operation, the plays in the wing suspension arise. Check the plays by moving the wing forwards and rearwards, upwards and downwards; the maximum allowed operating clearance is 4 mm. In the case when the plays are exceeding the set tolerances, contact the airplane manufacturer.

WARNING

THE MAXIMUM ALLOWED PLAYS MUSTN'T BE EXCEEDED IN THE OPERATION.

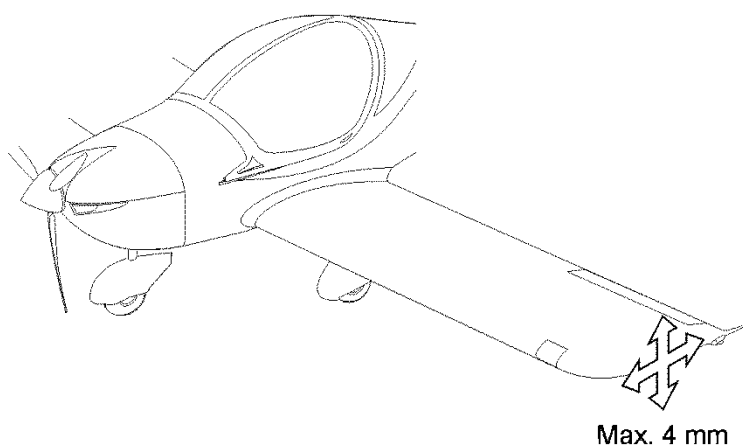


Fig. 57-3 Check of wing plays



AILERONS

1. DESCRIPTION AND OPERATION

The aileron is attached on the hinge that is riveted on the outside part of the wing.

From the design point of view, it is formed by the metal semi-monocoque structure composed of five ribs and the skin.

The axis of aileron rotation is located on the leading edge of the aileron that is a continuation of the upper skin of the wing.

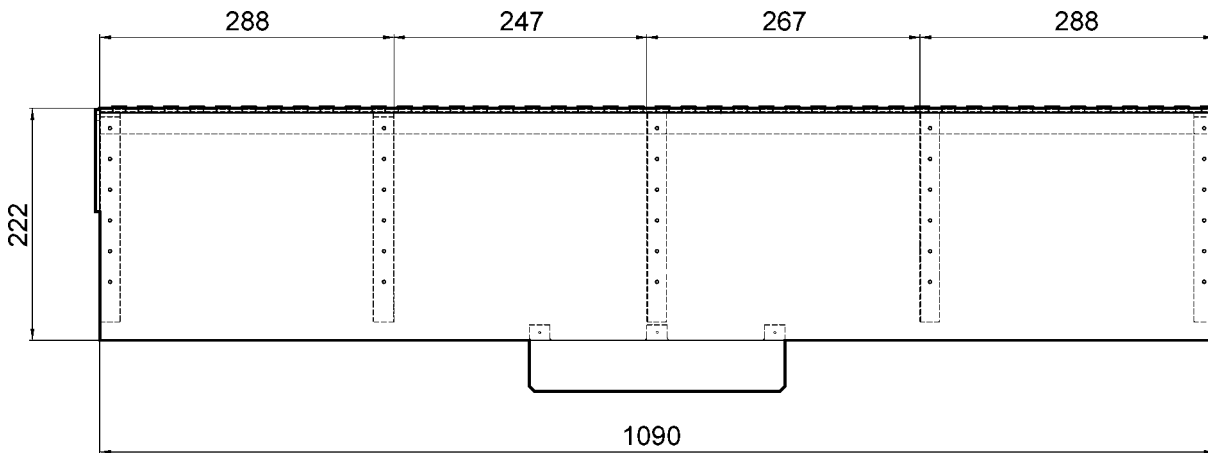
The aileron ribs are pressed from sheet metal.

The half of the hinge, that is connected by the hinge wire with the half of the hinge located on the rear spar of the wing, is riveted to the leading edge of the aileron.

The trim tab is riveted to the skin sheet of the trailing edge of the right aileron.

The attachment (lever) of the roll control pull-rod is riveted to the inner rib of the aileron.

The static discharger can be optionally installed on the external rib of the aileron.



NOTE:
Dimensions in millimeters.

Fig. 57-4 Right aileron



2. MAINTENANCE PRACTICES

A. Ailerons

Maintenance type: Heavy

Personnel qualification: Independent verification personnel qualified in accordance with Part 66 or higher

Recommended tools and material:

Item	Designation / Size	Quantity	Note
Ejector mandrel	ø 2 mm	1 pc.	
Hammer	-	1 pc.	
Combined pliers	-	1 pc.	
Straight grinder	Dremel 3000	1 pc.	Or equivalent
Grinding disc	ø 32 mm	1 pc.	
Drilling machine	-	1 pc.	
Drill bit	ø 2 mm	1 pc.	
Rivet	3,2x7,9 1671-0410	1 pc.	
Cleaning agent	Technical benzine	-	
Grease	Mogul Molyka G	-	
Lint-free cloth	-	-	

NOTE

The procedure of removal / installation is identical with for the left aileron and for the right aileron.

The conductive connection of the ailerons can be optionally installed on the airplane. If installed, disconnect it before the control surface removal; after the control surface installation, connect it.

(1) Removal – aileron

CAUTION

THE AILERON REMOVAL MUST BE PERFORMED BY TWO PERSONS.

- (a) Manually deflect the aileron up and disconnect the pull-rod of the roll control (6, Fig. 57-5) (Section 27-10).
- (b) This is applied to the original version of the hinge wire attachment:
 - 1 Drill off the rivet (4) and remove the attachment (3).
 - 2 By means of the pliers, take out the hinge wire (2), slightly swinging the aileron (1).

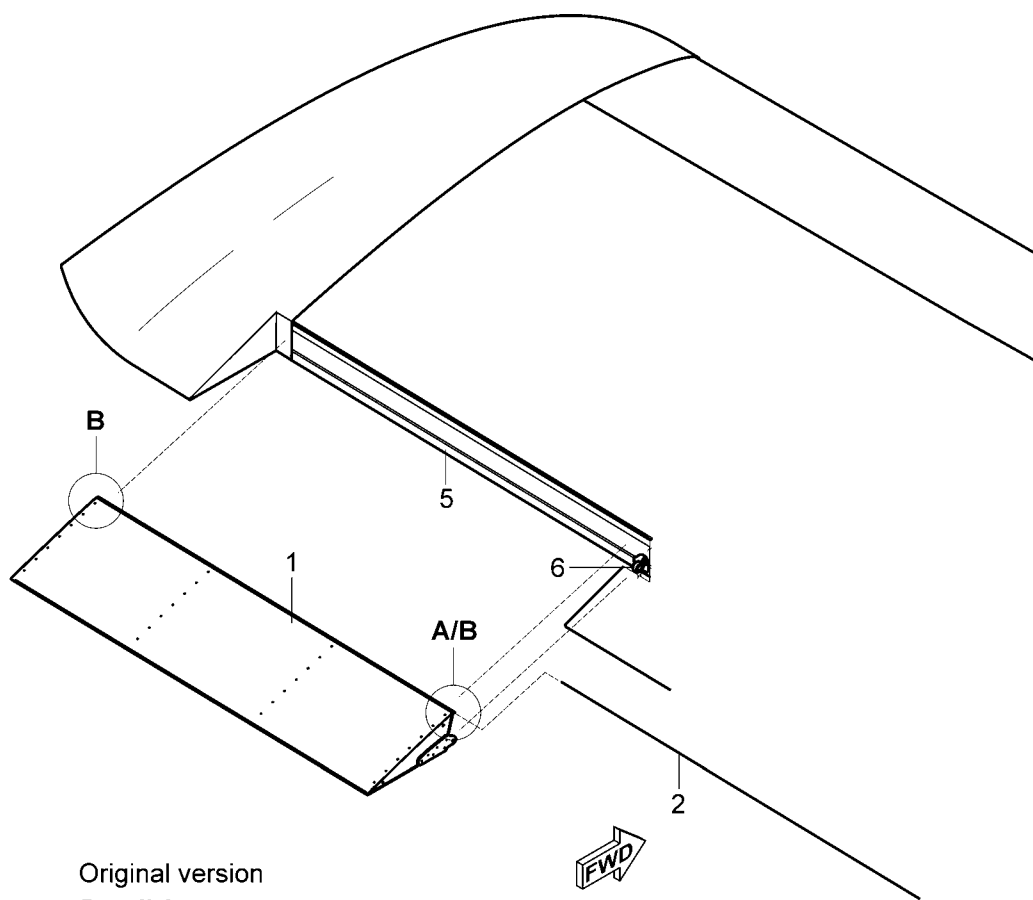


- (c) This is applied to the new version of the hinge wire attachment:
 - 1 Using the grinder with the grinding disc, carefully cut off the bent edge on one end of the hinge.
 - 2 By means of the ejector mandrel and the hammer, stick out the hinge wire (2) a bit, swinging slightly by the aileron (1); after that, pull out the whole wire by means of the pliers.
- (d) Put the aileron in the stand.
- (e) Clean the hinge and protect it by grease.
- (2) Installation – aileron

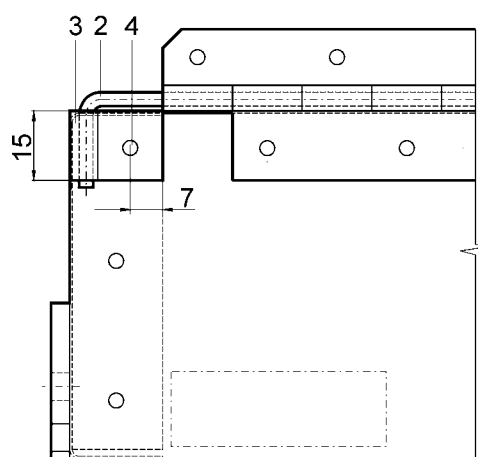
CAUTION

THE AILERON INSTALLATION MUST BE PERFORMED BY TWO PERSONS.

- (a) Check the condition of the hinge on the aileron and on the wing.
- (b) This is applied to the original version of the hinge wire attachment:
 - 1 Set the aileron (1, Fig. 57-5) to position in the hinge on the wing (5).
 - 2 Grease the wire (2) and insert it in the hinge.
 - 3 Put the attachment (3) on the bent end of the wire and fasten it by means of the rivet (4) - see Detail A.
- (c) This is applied to the new version of the hinge wire attachment:
 - 1 Set the aileron (1) to position in the hinge on the wing (5).
 - 2 Grease the wire (2) and insert it in the hinge.
 - 3 Bend the end of the hinge inwards - see Detail B.
- (d) Rivet the other end of the hinge wire - see Detail A.
- (e) Connect the pull-rod of the aileron control (6) (Section 27-10).
- (f) Check the function of roll control and the function of aileron deflection (Section 27-10).



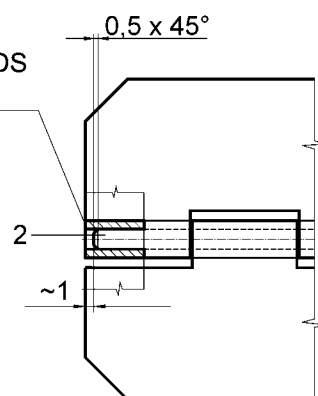
Original version
Detail A



New version

Detail B

EDGE LOCALLY BEND INWARDS
TO SECURE THE WIRE



NOTE:
Dimensions in millimeters

Legend to Fig. 57-5

1	Aileron	4	Rivet
2	Hinge wire	5	Wing
3	Attachment	6	Pull-rod of roll control

Fig. 57-5 Aileron – removal / installation



WING FLAPS

1. DESCRIPTION AND OPERATION

The wing flaps are hinged on the inner part of the wing on the auxiliary spar. The wing flaps occupy approximately 2/3 of the wing trailing edge span, from the system of rib No. 1 up to the auxiliary span between the system of ribs No. 8 and 9. The wing flaps are suspended on the hinge attachment. The axis of rotation is on the level of the lower edge of the auxiliary spar.

From the design point of view, the wing flaps are formed by the metal semi-monocoque composed of ribs No. 1 up to 11, and the skin. The wing flap attachment is formed by the half of the hinge that is riveted to the nose part of the flap and is connected by means of the hinge wire with the half that is riveted to the auxiliary spar of the wing.

The ribs are pressed from sheet metal, with the exception of rib No. 1 that is milled. In rib No. 1 (at the root of the wing) there is a milled guiding groove for the pin of the wing flap control lever. The nuts that serve for the attachment of the jig for the measurement of deflections are riveted through the lower skin in the position of rib No. 8.

The wing flaps can be locked in four positions – closed 0°, take-off 15°, landing 30° and landing 50°.



NOTE:
Dimensions in millimeters.

Fig. 57-6 Left flap



2. MAINTENANCE PRACTICES

A. Wing flaps

Maintenance type: Heavy

Personnel qualification: Independent verification personnel qualified in accordance with Part 66 or higher

Recommended tools and material:

Item	Designation / Size	Quantity	Note
Ejector mandrel	ø 2 mm	1 pc.	
Hammer	-	1 pc.	
Combined pliers	-	1 pc.	
Straight grinder	Dremel 3000	1 pc.	Or equivalent
Grinding disc	ø 32 mm	1 pc.	
Drilling machine	-	1 pc.	
Drill bit	ø 3,2 mm	1 pc.	
Rivet	3,2x7,9 1671-0410	1 pc.	
Cleaning agent	Technical benzine	-	
Grease	Mogul Molyka G	-	
Lint-free cloth	-	-	

NOTE

The procedure of removal / installation is identical for the left flap and for the right flap.

The conductive connection of the wing flaps can be optionally installed on the airplane. If installed, disconnect it before flap dismantling; connect it after flap installation.

(1) Removal – wing flap

CAUTION

THE WING FLAP REMOVAL MUST BE PERFORMED BY TWO PERSONS.

- (a) Open the wing flaps to the position for landing (50°).
- (b) This is applied for the original version of the hinge wire attachment:
 - 1 Drill off the rivet (4, Fig. 57-7) and remove the attachment (3).
 - 2 Pull out the hinge wire (2) by means of the pliers.
- (c) This is applied for the new version of the hinge wire attachment:
 - 1 Carefully cut the bend edge on one end of the hinge by means of the grinder with the grinding disc.
 - 2 By means of the ejector mandrel and hammer, slightly stick out the hinge wire (2); after that, pull out the whole wire by means of the pliers.



- (d) Move the wing flap away from the wing with regard to the pin of the control lever in the guiding groove.
 - (e) Put the wing flap in the stand.
 - (f) Clean the hinge and protect it by grease.
- (2) Installation – wing flap

CAUTION

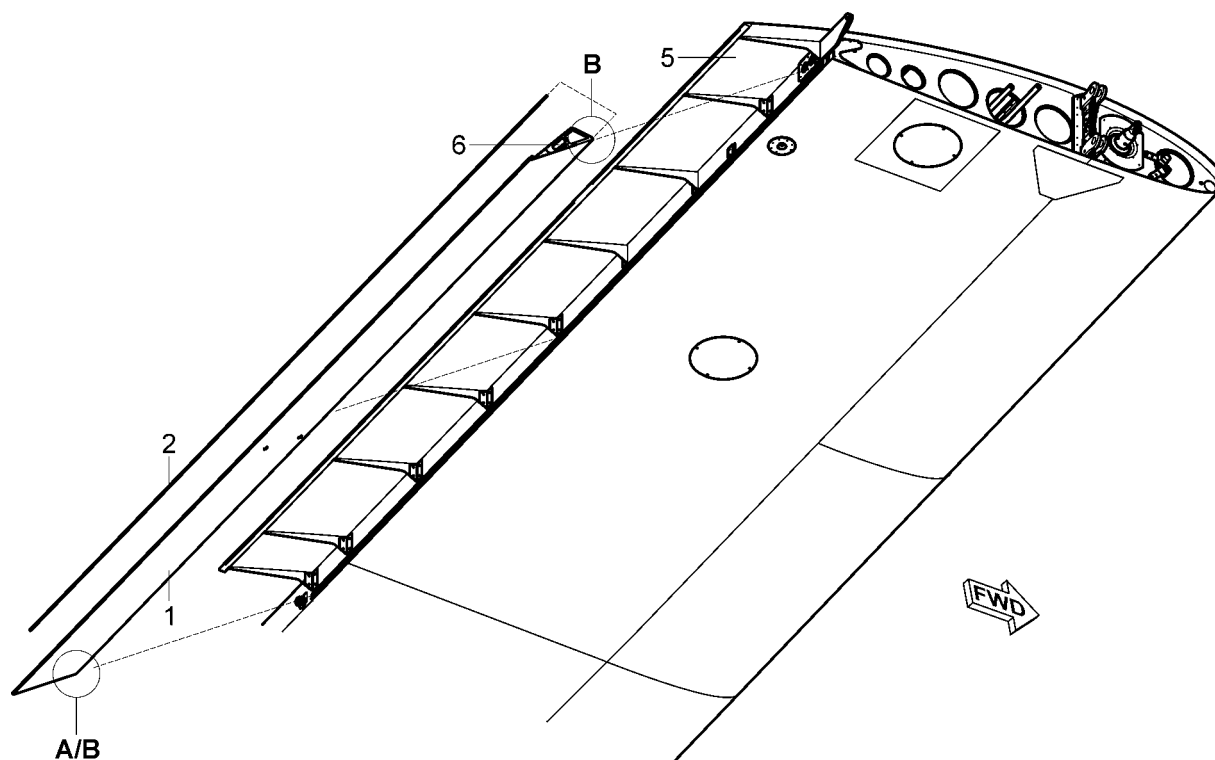
THE WING FLAP INSTALLATION MUST BE PERFORMED BY TWO PERSONS.

- (a) Check for the condition of the hinge on the aileron and on the wing.
- (b) Apply grease in the groove of the rib (6, Fig. 57-7).

WARNING

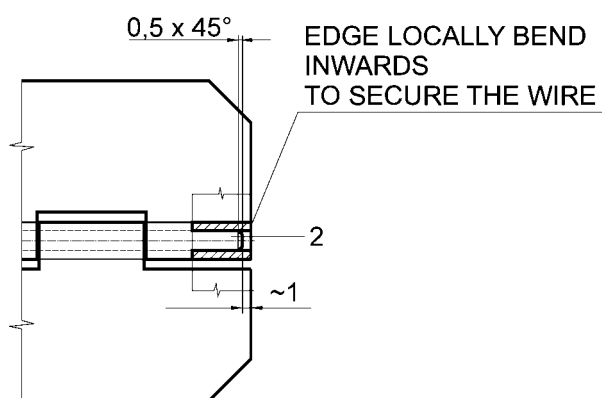
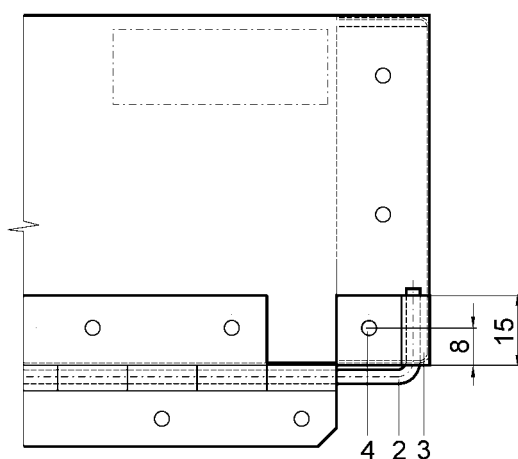
CHECK WHETHER THE PIN IS INSERTED THROUGH THE WHOLE THICKNESS OF THE GROOVE OF THE ROOT RIB OF THE FLAP WITH THE WING FLAPS FULLY EXTENDED.

- (c) Position the wing flap to the fuselage in such a way that the control lever pin fits in the guiding groove in the end rib of the wing flap.
- (d) This is applied for the original variant of the hinge wire attachment:
 - 1 Set the flap (1) to position into the hinge on the wing (5).
 - 2 Grease the wire (2) and insert it in the hinge.
 - 3 Put the attachment (3) on the bent end of the wire and fasten it by means of the rivet (4) - see Detail A.
- (e) This is applied for the new variant of the hinge wire attachment:
 - 1 Set the flap (1) to position into the hinge on the wing (5).
 - 2 Bend the end of the hinge inwards - see Detail B.
- (f) Check the function of the wing flaps and the wing flap deflections (Section 27-50).



Original version
Detail A

New version
Detail B



NOTE:
Dimensions in millimeters

Legend to Fig. 57-7

1 Flap	4 Rivet
2 Hinge wire	5 Wing
3 Attachment	6 Guiding rib of wing flap

Fig. 57-7 Flap – removal / installation



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CHAPTER

61

PROPELLERS



CHAPTER 61

PROPELLERS

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GENERAL

1. INTRODUCTION

SportStar RTC airplane may be equipped with Woodcomp Klassic 170/3/R propeller, Woodcomp KW-31-033 propeller or DUC SWIRL-3-L propeller.



PROPELLER ASSEMBLY

1. DESCRIPTION AND OPERATION

A. Woodcomp Klassic 170/3/R propeller

Woodcomp Klassic 170/3/R is a three-blade, right-hand, on-ground adjustable propeller with rated diameter 1708 mm.

The propeller consists of these parts:

- Propeller hub
- Propeller blades
- Propeller spinner

The two-piece propeller hub is made of aluminium alloy. Propeller blades are made of wood. The blade surface is covered with composite coating and paint. Root section of the blade is fitted with a composite tube which sustains axial and radial forces.

The propeller blade pitch of the SportStar RTC airplane is set to 17°30'.

The composite propeller spinner is made of one piece. It is attached to the backplate with bolts. The backplate is installed between the engine flange and the propeller hub.

NOTE

For more detailed information about the propeller, refer to the document User Manual Klassic 170/3 Aircraft propeller (Doc. No UM-07 EN), date of issue 01.09. 2015, or later valid issue.

B. Woodcomp KW-31-033 propeller

Woodcomp Klassic KW-31-033 is a three-blade, right-hand, electrically adjustable propeller with rated diameter 1726 mm. The propeller may operate either in manual control mode, or automatically as a constant-speed propeller.

The propeller consists of these parts:

- Propeller hub
- Propeller spacer
- Propeller blades
- Propeller spinner
- Pitch setting mechanism and control unit.

The propeller hub is made of aluminium alloy. Propeller blades are made of wood. The blade surface is covered with composite coating and paint. The root section of the blade is fitted with a duralumin hub with bearings, plain bearings and securing rings which sustain axial and radial forces.

The propeller blade pitch setting is enabled by a servomotor. It may be smoothly changed in the range from a minimum angle to a maximum angle. Power supply for the servomotor is secured by the collector with slip rings. The propeller type is push-pull – both minimum and maximum propeller blade pitch is set only by the servomotor. The pitch setting mechanism is self-locking, if the power is not supplied to the servomotor, the blades remain at the last achieved angle. Power of the electric motor is transferred by an epicyclic gearbox to the motion screw.



The thread of the motion screw moves the link mechanism which turns the propeller blades. The end positions of minimum and maximum angle are controlled by microswitches.

The composite propeller spinner is made of one piece. It is mounted on the propeller hub with two backplates. It is attached with bolts to the rear backplate which is installed on the propeller hub.

The propeller is controlled by the electronic propeller governor CS 3-5 (Section 61-20).

NOTE

For more detailed information about the propeller, refer to the document User Manual KW-31 Electrical variable aircraft propeller (Doc. No. UM-05 EN), date of issue 21.01. 2014, or later valid issue.

Propeller wiring diagram is given in Chapter 91.

C. DUC SWIRL-3-L propeller

DUC SWIRL-3-L is a three-blade, right-hand, on-ground adjustable propeller with rated diameter 1730 mm.

The propeller consists of these parts:

- Propeller hub
- Propeller blades
- Propeller spinner

The three-piece propeller hub is made of aluminium alloy and carbon composite. Propeller blades are made of carbon composite with shielding leading edges made of nickel alloy Inconel. Root section of the blade is made of aluminium alloy that sustains axial and radial forces.

The propeller blade pitch of the SportStar RTC airplane is set to 22°12'.

The composite propeller spinner is made of one piece. It is attached to the backplate with bolts. The backplate is installed between the engine flange and the propeller hub.

NOTE

For more detailed information about the propeller, refer to the document Instruction SWIRL-3 propeller, Doc. No. DH_SW3_BE_02_B, date of issue 28.07. 2020, or later valid issue.



2. MAINTENANCE PRACTICES

A. Woodcomp Klassic 170/3/R propeller

Maintenance type: Line

Personnel qualification: Independent verification personnel qualified in accordance with Part 66 or higher

Recommended tools and material:

Item	Designation / Size	Quantity	Note
Flat screwdriver	-	1 pc.	
Hex wrench	No. 6	1 pc.	
Torque wrench	5 – 30 Nm	1 pc.	
Stainless lockwire	ø 0,5 mm	-	
Adhesive	Loctite 243	-	
Cleaning agent	Technical benzine	-	
Lint-free cloth	-	-	

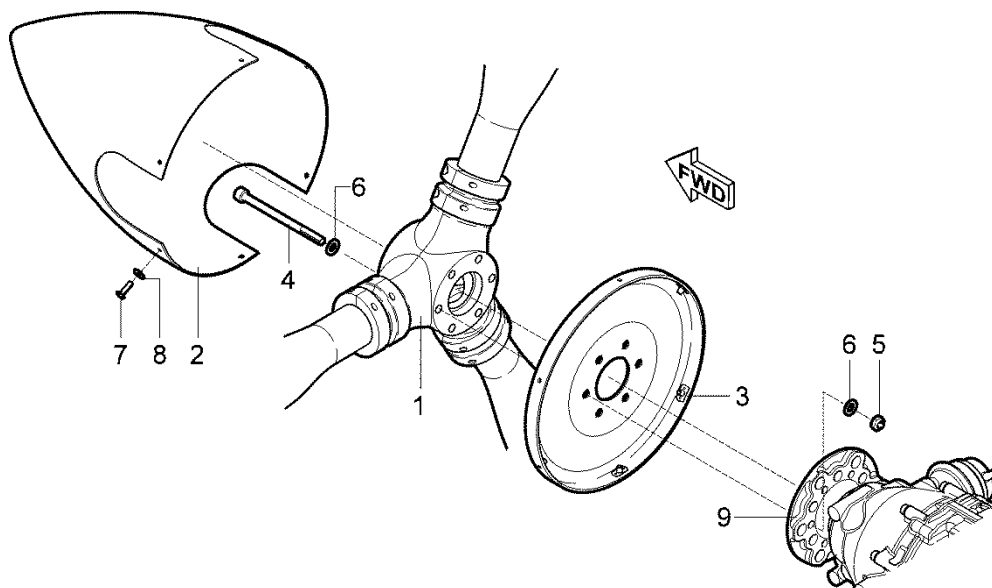
WARNING

SWITCH OFF THE IGNITION AND TAKE OUT THE KEY!

- (1) Removal – Klassic 170/3/R propeller
 - (a) Switch the electrical network off and disconnect the battery.
 - (b) Remove the engine cowlings (Section 71-10).
 - (c) Unscrew the bolts (7, Fig. 61-1) with washers (8) and remove the spinner (2).
 - (d) Remove the lockwire from the bolt heads (4).
 - (e) Unscrew and remove the nuts (5) with washers (6).
 - (f) Remove the propeller (1) from the engine flange and remove the backplate (3).
 - (g) Remove the bolts (4) with washers (6) from the propeller hub.
 - (h) Put protective covers on the propeller blades and put it in a horizontal position on a pad which supports the propeller hub, or use the fixing holes in the propeller hub to hang the propeller.
- (2) Installation – Klassic 170/3/R propeller
 - (a) Remove the protective covers from the propeller blades.
 - (b) Thoroughly clean the flange of engine and propeller.
 - (c) Put the bolts (4, Fig. 61-1) with washers (6) in the propeller hub, put the backplate (3) on the bolts.
 - (d) Put the propeller (1) to the engine flange (9); install the nuts (5) with washers (6) to the bolts (4).
 - (e) Tighten the nuts (5) in the sequence in accordance with Fig. 61-2 with torque 22 Nm.
 - (f) Secure the bolt heads (4) with a lockwire in couples (Section 20-20).



- (g) Put the spinner (2) to the backplate (3) in the position marked by red dots on the circumference. Never install the spinner in other position.
- (h) Attach the spinner with the bolts (7) with washers (8); secure the bolts with Loctite 243 adhesive.
- (i) Install the engine cowlings (Section 71-10).
- (j) Connect the battery, switch the electrical network on.
- (k) Start the engine, do the engine test and check engine parameters.



Legend to Fig. 61-1

1	Propeller	6	Washer 8,4 (12 pcs.)
2	Propeller spinner	7	Bolt M4x16 (9 pcs.)
3	Backplate	8	Washer 4,3 (9 pcs.)
4	Bolt M8x105 (6 pcs.)	9	Engine flange
5	Nut M8 (6 pcs.)		

Fig. 61-1 Classic 170/3/R propeller – removal / installation

NOTE

If the external alternator V-belt pulley (Section 24-30) is installed on the engine flange, the bolts (4, Fig. 61-1) have size M8x108.

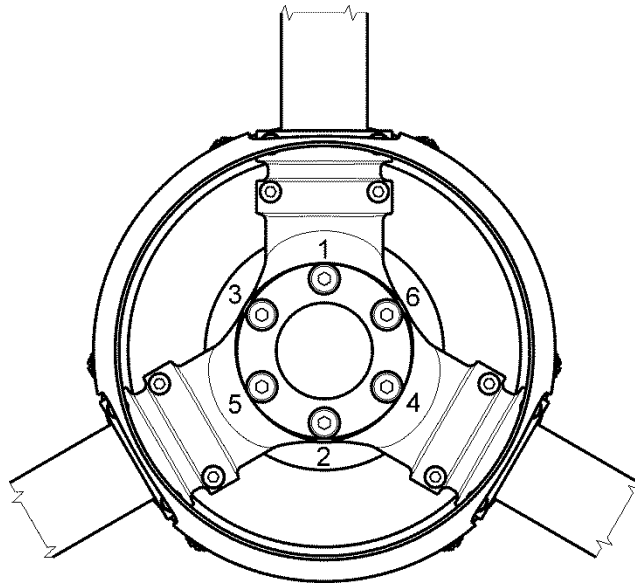


Fig. 61-2 Bolt tightening sequence

- (3) Check / inspection – Klassic 170/3/R propeller

For information about the inspections of the propeller, refer to the document User Manual Klassic 170/3 Aircraft propeller (Doc. No UM-07 EN), date of issue 01.09. 2015, or later valid issue.

- (4) Approved repairs – Klassic 170/3/R propeller

For information about the approved repairs of the propeller, refer to the document User Manual Klassic 170/3 Aircraft propeller (Doc. No UM-07 EN), date of issue 01.09. 2015, or later valid issue.



B. Woodcomp KW-31-033 propeller

Maintenance type: Line

Personnel qualification: Independent verification personnel qualified in accordance with Part 66 or higher

Recommended tools and material:

Item	Designation / Size	Quantity	Note
Hex wrench	No. 6	1 pc.	
Wrench	No. 13	1 pc.	
Torque wrench	5 – 30 Nm	1 pc.	
Cleaning agent	Technical benzine	-	
Lint-free cloth	-	-	

WARNING

SWITCH OFF THE IGNITION AND TAKE OUT THE KEY!

- (1) Removal – KW-31-033 propeller
 - (a) Switch the electrical network off and disconnect the battery.
 - (b) Remove the engine cowlings (Section 71-10).
 - (c) Unscrew and remove the nuts (2, Fig. 61-3).
 - (d) Remove the propeller (1) from the engine flange.
 - (e) Put protective covers on the propeller blades and put it in a horizontal position on a pad which supports the spacer.
- (2) Installation – KW-31-033 propeller

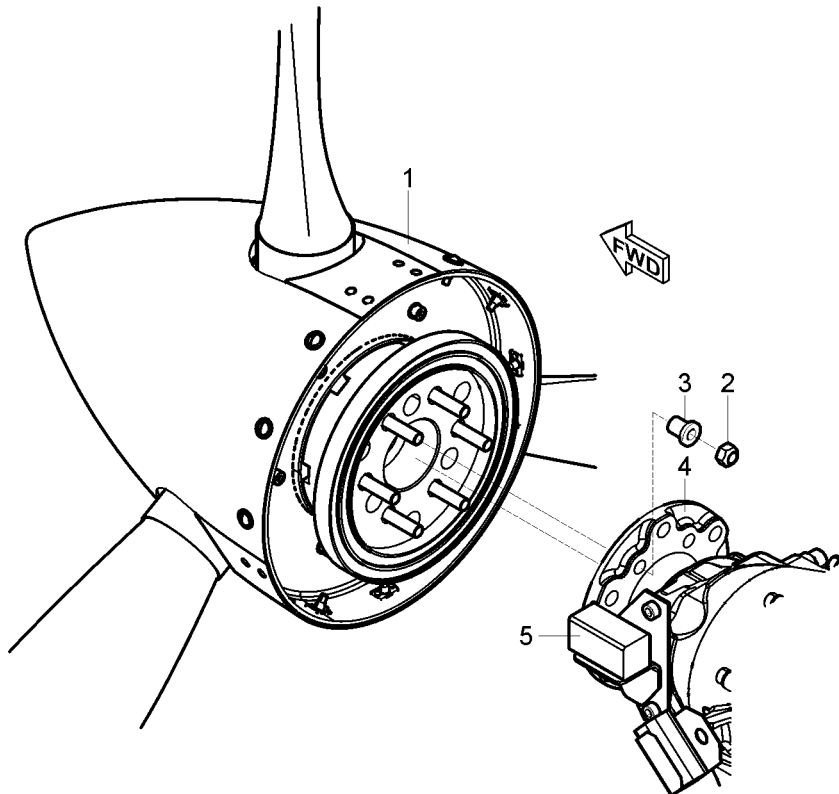
CAUTION

WHEN INSTALL THE PROPELLER, MAKE SURE THAT THE CARBON BRUSHES ARE NOT DAMAGED.

- (a) Remove protective covers from the propeller blades.
- (b) Thoroughly clean the flange of engine and propeller.
- (c) Release the carbon brush block (5, Fig. 61-3).
- (d) Check that the bushings (3) are inserted in the mounting holes in the engine flange (4); the bushings are inserted into the holes from the engine side.
- (e) Insert the propeller (1) bolts into the bushings (3) in the engine flange (4) and install the nuts (2); during screwing nuts, check touchdown of bushings shoulder on the engine flange – the bushings shoulder must touch down on the engine flange.
- (f) Press the propeller spinner by hand and tighten the nuts (2) in the sequence in accordance with Fig. 61-2 with torque 22 Nm.
- (g) Adjust and tighten the carbon brush block (5, Fig. 61-3).



- (h) Turn the propeller by hand and check the correct alignment of the carbons with the collector. The carbons must abut with the whole contact surface in the middle of the collector.
- (i) Connect the battery, switch the electrical network on.
- (j) Install the engine cowlings (Section 71-10).
- (k) Start the engine, do the engine test and check engine parameters and function of the propeller (Section 61-20).



Legend to Fig. 61-3

1	Propeller	4	Engine flange
2	Nut M8 (6 pcs)	5	Carbon brush
3	Bushing (6 pcs)		

Fig. 61-3 KW-31-033 propeller – removal / installation

- (3) Check / inspection – KW-31-033 propeller

For information about the propeller inspections, refer to the document User Manual KW-31 Electrical variable aircraft propeller (Doc. No. UM-05 EN), date of issue 21.01. 2014, or later valid issue.

- (4) Approved repairs – KW-31-033 propeller

For information about approved repairs of the propeller, refer to the User Manual KW-31; Electrical variable aircraft propeller (Doc. No. UM-05 EN), date of issue 21.01. 2014, or later valid issue.



C. DUC SWIRL-3-L propeller

Maintenance type: Line

Personnel qualification: Independent verification personnel qualified in accordance with Part 66 or higher

Recommended tools and material:

Item	Designation / Size	Quantity	Note
Phillips screwdriver	No. 2	1 pc.	
Hex wrench	No. 6	1 pc.	
Wrench	No. 13	1 pc.	
Torque wrench	5 – 30 Nm	1 pc.	
Paint	red	-	Marking relative positions, only
Adhesive	Loctite 243	-	
Cleaning agent	Technical benzine	-	
Lint-free cloth	-	-	

WARNING

SWITCH OFF THE IGNITION AND TAKE OUT THE KEY!

- (1) Removal – DUC SWIRL-3-L propeller
 - (a) Switch the electrical network off and disconnect the battery.
 - (b) Remove the engine cowlings (Section 71-10).
 - (c) Unscrew the bolts (7, Fig. 61-4) with washers (8) and remove the spinner (6).
 - (d) Unscrew and remove the nuts (5) with washers (6).
 - (e) Remove the propeller (1) from the engine flange and remove the backplate.
 - (f) Remove the bolts (4) with washers (6) from the propeller hub.
 - (g) Put the propeller in a horizontal position on a pad, which supports the propeller hub, or use the fixing holes in the propeller hub to hang the propeller.
- (2) Installation – DUC SWIRL-3-L propeller
 - (a) Thoroughly clean the flange of engine and propeller.
 - (b) Put the hub clamping washer (3, Fig. 61-4) to the propeller hub and bolts (4) with the new washers (6) in the propeller hub, put the backplate (3) on the bolts.
 - (c) Check if the housings (10) are inserted in the mounting holes of the engine flange (9); the housings are inserted into the holes on the engine side.
 - (d) Put the propeller (1) to the engine flange (9); install the new self-locking nuts (11) with the new lock washers (6) to the bolts (4).
 - (e) Tighten the self-locking nuts (11) in the sequence in accordance with Fig 61-2 with torque 25 Nm.
 - (f) Mark the relative position of the self-locking nuts (11) and bolts in red.
 - (g) Put the spinner (6) to the backplate (2) in the position marked by red dots on the circumference. Never install the spinner in other position.



- (h) Attach the spinner with the bolts (7) with washers (8); secure the bolts with Loctite 243 adhesive.
- (i) Install the engine cowlings (Section 71-10).
- (j) Connect the battery, switch the electrical network on.
- (k) Start the engine, do the engine test and check engine parameters.

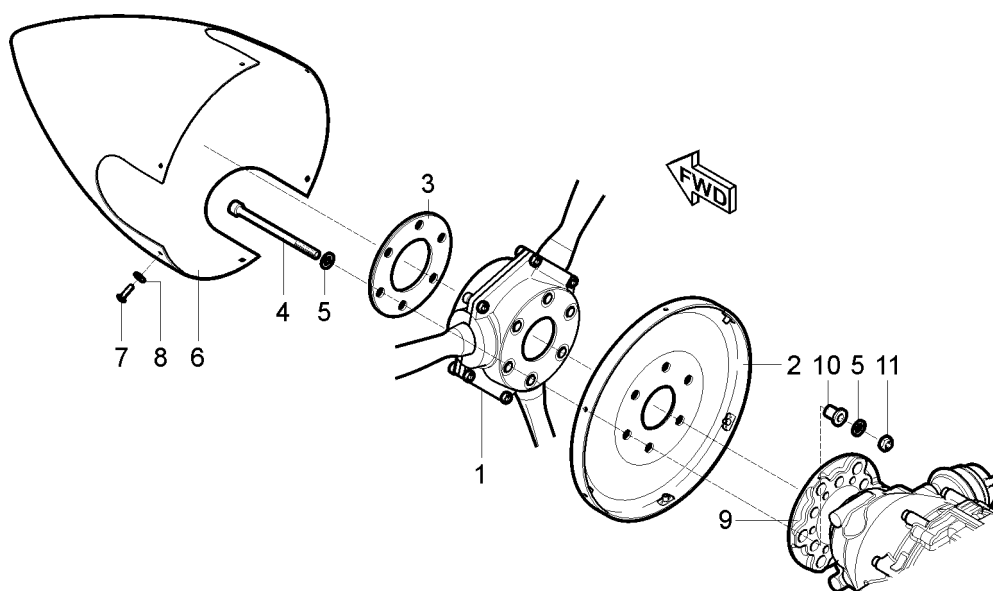


Fig. 61-4 DUC SWIRL 3 L propeller – removal / installation

Legend to Fig. 61-4

1	Propeller	7	Screw M5x15 (9 pcs.)
2	Backplate	8	Washer 5,3 (9 pcs.)
3	Hub clamping washer	9	Engine flange
4	Bolt M8x130 (6 pcs.)	10	Bushing (6 pcs.)
5	Lock washer (6 + 6 pcs.)	11	Self-locking nut M8 (6 pcs.)
6	Propeller spinner	12	

(3) Check / inspection – DUC SWIRL 3 L propeller

For information about the propeller inspections, refer to the document Instruction SWIRL-3 propeller Doc. No. DH_SW3_BE_02_B, date of issue 28.07. 2020, or later valid issue.

(4) Approved repairs – DUC SWIRL 3 L propeller

For information about approved repairs of the propeller, refer to the Intruction Manual SWIRL- 3 propeller; Doc. No. DH_SW3_BE_02_B, date of issue 28.07. 2020, or later valid issue.



CONTROLLING

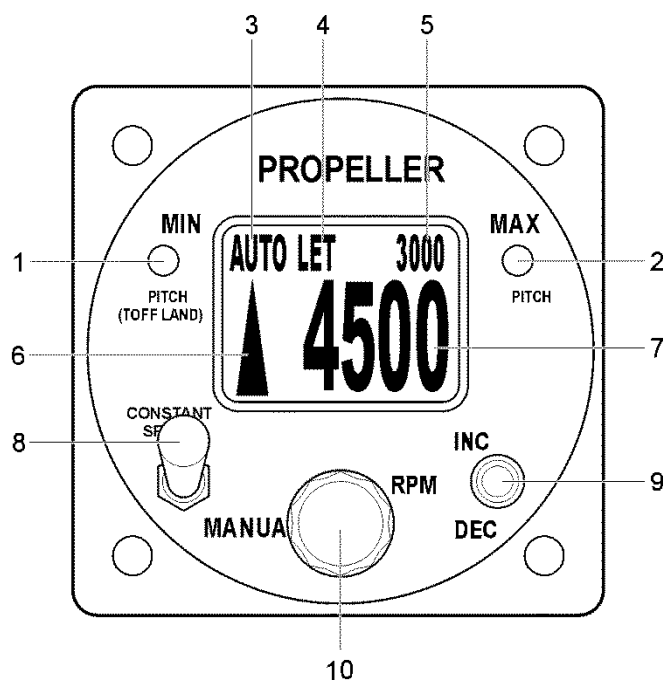
1. DESCRIPTION AND OPERATION

KW-31-033 propeller blade pitch setting is enabled by a servomotor which is controlled by the electronic propeller governor CS 3-5 (Fig. 61-4). The propeller governor is standardly located on the central console below the instrument panel.

The propeller governor operates in two modes:

- automatic – the instrument evaluates actual engine speed, compares the value with pre-set value, and keeps the actual engine speed within pre-set tolerance. The propeller is operated in constant speed mode.
- manual – pilot controls the propeller blades adjustment in accordance with the specific flight modes.

Propeller wiring diagram is given in Section 91.



Legend to Fig. 61-5

1	Min. pitch annunciator	6	Symbol of the signal to change the pitch
2	Max. pitch annunciator	7	Set (required) engine speed
3	Automatic mode annunciator	8	Mode selector
4	Mode selection annunciator	9	Propeller control switch
5	Current engine speed	10	Value setting control knob

Fig. 61-5 Electronic propeller governor CS 3-5



Controls of the CS 3-5 propeller governor:

CONSTANT SPEED / MANUAL

Use the mode selector to switch between automatic mode and manual mode.

Value setting control knob

Turn the control knob to scroll through the menu and adjust the values.

RPM INC / DEC

In manual mode: position **INC** - speed will increase, position **DEC** - speed will decrease.

In automatic mode: quick choice between the modes FLIGHT and TAKE-OFF.



2. MAINTENANCE PRACTICES

A. Propeller governor CS 3-5

Maintenance type Line

Personnel qualification: Independent verification personnel qualified in accordance with Part 66 or higher

Recommended tools and material:

Item	Designation / Size	Quantity	Note
Phillips screwdriver	No. 2	1 pc.	

- (1) Removal – propeller governor CS 3-5
 - (a) Switch the electrical network off and disconnect the battery.
 - (b) Disconnect the connector (2, Fig. 61-5).
 - (c) Unscrew the screws (3) and remove the propeller governor (1).
- (2) Installation – propeller governor CS 3-5
 - (a) Insert the propeller governor (1, Fig. 61-5) into the hole in the console (4); screw on and tighten the screws (3).
 - (b) Connect the connector (2).
 - (c) Connect the battery, switch the electrical network on, adjust the regulator as necessary (see par. 2 A.(3)) and check function of the propeller governor (see par. 2 A.(4)).
- (3) Adjustment / test – propeller governor CS 3-5

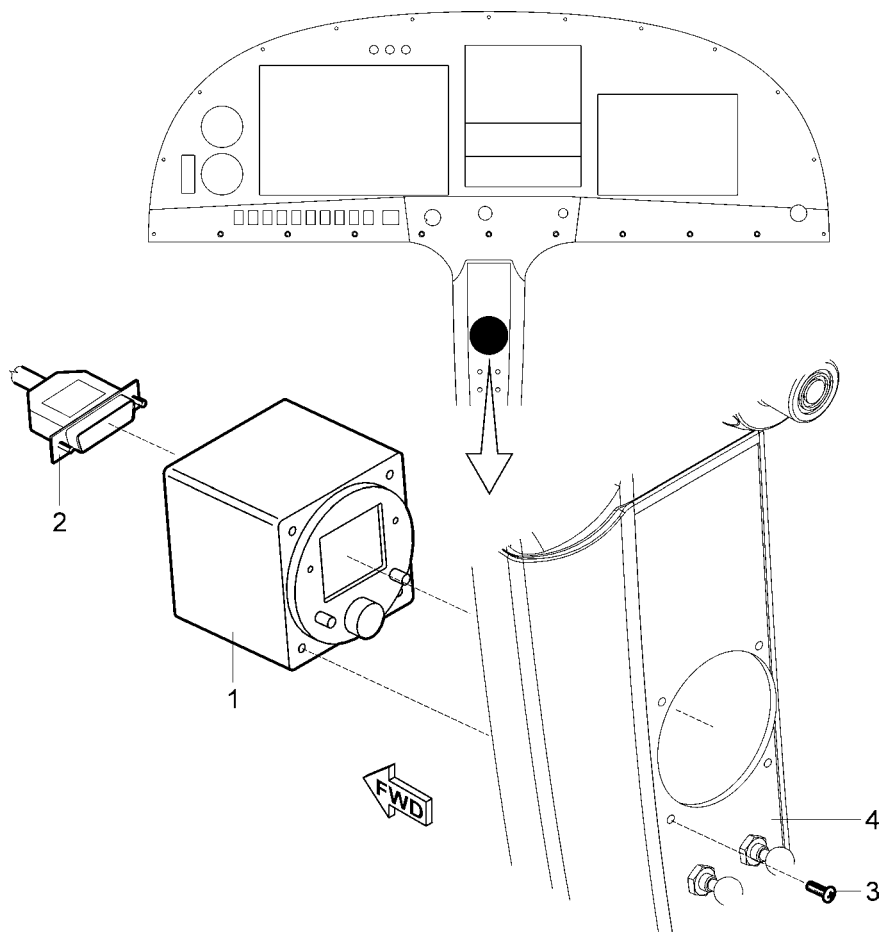
For information about the propeller governor setting, refer to the document User Manual KW-31 Electrical variable aircraft propeller (Doc. No. UM-05 EN), date of issue 01. 09. 2015, or later valid issue.
- (4) Inspection / check – propeller governor CS 3-5
 - (a) Switch the electrical network on.
 - (b) Check function of the mode selector **CONSTANT SPEED / MANUAL**.
 - (c) Check function of the propeller end position stops and the propeller blade pitch setting annunciation:
 - 1 When you set a small angle, annunciator **MIN** flashes.
 - 2 After the propeller stops in the end position after the achievement of a small angle, it is lighted.
 - 3 When you set a large angle, annunciator **MAX** flashes
 - 4 After the propeller stops in the end position after the achievement of a large angle, it is lighted.



WARNING

**IF A FAILURE OF THE MAIN STOP SYSTEM OCCURS,
REMOVE THE PROPELLER AND SEND IT TO THE
MANUFACTURER, OR TO THE AUTHORISED SERVICE
CENTRE FOR REPAIR.**

- (d) Check the main stop system. Switch the engine off and set the propeller from one end position to the other. If the propeller pitch setting stops normally in the end positions, the main stop system works correctly.
- (e) Start the engine in accordance with the procedure specified in the POH for SportStar RTC airplane.
- (f) Set approximately the middle propeller blade pitch and do the ground engine test. Make sure that there are no unusual vibrations or noise during the engine test.



Legend to 61-6

1	Electronic propeller governor	For information	
2	Connector with wires	4	Central console
3	Screw (4 pcs.)		

Fig. 61-6 Electronic propeller governor CS 3-5 – removal / installation

CHAPTER

71

POWER PLANT



CHAPTER 71

POWER PLANT

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GENERAL

1. INTRODUCTION

The Sportstar RTC airplane is equipped with the engine ROTAX 912 ULS2 or ROTAX 912 S2.

The ROTAX 912 is a four-cylinder four-stroke engine with opposed cylinders and one camshaft. Valve trains: OHV engine. Cylinder bore of the engine 84 mm, stroke 61 mm. Engine displacement 1352 cm³. The compression ratio 11:1.

The engine is cooled by air and liquid; the cylinders are cooled by ram air; the cylinder heads are cooled by liquid.

The engine lubrication system is designed with a dry-sump.

The recommended kinds of oil are shown in Section 12-00.

The ignition is doubled, contactless, of a condenser type.

For a uniform distribution of mixture, the engine is equipped with two constant depression carburetors BING and with a mechanical fuel pump. Mixture charging: atmospheric pressure. The recommended kinds of fuel are shown in Section 12-00.

The engine is started electrically, using a starter (12 V; 0,7 kW).

The engine is equipped with the generator of alternate current with the 12 V / 20 A regulator (rectifier). Optionally the engine can be equipped with an auxiliary generator driven from the reduction gear case (see Section 24-30).

The propeller is driven by the crankshaft via the reducer with a gear ratio of 2,43:1. The sense of propeller rotation (the output shaft of the reducer) is clockwise. The speed reducer of the crankshaft is equipped with the torsional vibration damping and depending on a manufactured version it is also equipped with a slipping coupling.

The monitored parameters of the fuel system and the oil system are described in Chapters 28, 77 and 79.

NOTE

The more detailed information concerning the engine maintenance are shown in the document Maintenance Manual (Line Maintenance) for Rotax Engine Type 912 Series, doc. No. MML-912, 899191.


A. Operational and technical data

Type of engine: ROTAX 912 ULS2 / S2			
Power	Max. takeoff	100 hp / 73.5 kW (5800 RPM)	
	Max. continuous	93,8 hp / 69 kW (5500 RPM)	
	Cruising	71 hp / 53 kW (4800 RPM)	
Engine speed	Max. takeoff	5800 RPM (for a time of 5 min as a maximum)	
	Max. continuous	5500 RPM	
	Cruising	4800 RPM	
	Idle	Min. 1400 RPM	
Load factor		-0.5 G (max. 5 sec)	
Oil pressure	Max.	7 bar	102 PSI
	Min.	0,8 bar	12 PSI
	Operational	2 – 5 bar	29 – 73 PSI
Oil temperature	Max.	130 °C	266 °F
	Min.	50 °C	120 °F
	Operational	90 – 110 °C	190 – 230 °F
Exhaust gas temperature		880 °C	1616 °F
Cylinder head temperature (max.)		128 °C	262 °F
Output temperature of coolant containing water		120 °C	248 °F
Ambient temperature during the engine start (min. / max.)		-25 / +50 °C	-13 / +77 °F
Fuel pressure	Max.	0,4 bar	5,8 PSI
	Min.	0,15 bar	2,1 PSI

Tab. 71–1 Technical data of engine Rotax 912 ULS2 / S2
NOTE

The temperature of coolant (the position of cylinder head temperature) is measured on the engines 912 ULS from S/N 6 781 410, on the engines 912 S from S/N 4 924 544 or on the engines with the cylinder heads P/N 413185 (cylinder heads No. 2 and 3) and P/N 413195 (cylinder heads No. 1 and 4).



CAUTION

ALL THE DATA NECESSARY FOR ROTAX ENGINE OPERATION AND HANDLING INSTALLED IN THE SPORTSTAR RTC AIRCRAFT IS INCLUDED IN THE ACCOMPANYING DOCUMENTATION PROVIDED BY THE ENGINE MANUFACTURER, AS AMENDED. IF THERE IS ANY DISCREPANCY BETWEEN THIS MANUAL AND THE DATA PROVIDED BY THE ENGINE MANUFACTURER, THE ENGINE MANUFACTURER'S DATA AND VALUES ARE VALID. THE EXCEPTION IS THE MAXIMUM TEMPERATURE OF CYLINDER HEADS THAT HAS BEEN REDUCED (128 °C / 262 °F), COMPARED TO THE DATA PROVIDED BY THE ENGINE MANUFACTURER.

2. TROUBLESHOOTING

Defects, their possible causes and their elimination are discussed in Chapter 4.7 of the Operators Manual for Rotax Engine Type 912 Series, doc. No. OM-912, 899649.



3. MAINTENANCE PRACTICES

A. Engine

Maintenance type: Heavy

Personnel qualification: Independent verification personnel qualified in accordance with Part 66 or higher

Recommended tools and material:

Item	Designation / Size	Quantity	Note
Cable tie	4,8x368	As needed	
Cable tie	2,5x99	As needed	
Stainless lockwire	Ø 0,8 mm	As needed	
Adjustable pliers	-	1 pc.	
Hex key	No. 5	1 pc.	
Flat screwdriver	-	1 pc.	
Nippers	-	1 pc.	
Gripping pliers	Cobra	1 pc.	
Workshop crane	-	1 pc.	Load capacity min. 250 kg
Suspension straps	-	3 pcs.	Load capacity min. 250 kg

WARNING

BEFORE STARTING THE WORK, COOL DOWN THE ENGINE UP TO THE AMBIENT TEMPERATURE. NON-COMPLIANCE WITH THE PROCEDURE MAY RESULT IN BURNS AND SCALDS.

SWITCH OFF THE IGNITION AND TAKE OUT THE KEY!

CAUTION

BEFORE THE ENGINE INSTALLATION, SUPPORT THE REAR PART OF THE AIRCRAFT FUSELAGE BY MEANS OF A SUITABLY DIMENSIONED SUPPORT (SECTION 07-02).

NOTE

By installation of suitable covers, blind plugs, etc., protect the uncovered holes arisen as a result of removal or disconnecting, so that water, impurities or foreign objects cannot enter them.

Observe the procedures relating to engine removal, as specified by the engine manufacturer.



- (1) Removal – engine from the airplane
 - (a) Switch the electrical network off and disconnect the battery.
 - (b) Switch the fuel cock control to the **OFF** position.
 - (c) Remove the upper part of the engine cowling (Section 71-10).
 - (d) Unscrew and remove the screws (3, Fig. 71-2) with the washers (5) that attach the liquid cooler to the lower cowling of the engine (2).
 - (e) Disconnect the inlet air hoses of the airbox (Section 71-60).
 - (f) Disconnect the flap control of the airbox (Section 71-60).
 - (g) Remove the lower part of the engine cowling (Section 71-10).
 - (h) Disconnect the battery (Section 24-30).
 - (i) Remove the propeller (Section 61-10).
 - (j) Remove the engine control (Section 76-10).
 - (k) Drain the coolant (Section 12-10).
 - (l) Drain the oil (Section 12-10).
 - (m) Disconnect the wires of electrical installation of the engine.
 - (n) Remove the engine exhaust system (Section 78-20).
 - (o) Disconnect and close the fuel inlet hoses (Section 28-20).
 - (p) Disconnect and close the oil system hoses (Section 79-20).
 - (q) Disconnect the hoses of the engine cooling system, including the liquid cooler (Section 75-00).
 - (r) Suspend the engine (10, Fig. 71-1) on the workshop crane (8).
 - (s) Remove the engine from the airplane:
 - 1 Release the bolts (1).
 - 2 Remove the bolts (1) for suspending the engine mount (11) on the firewall.
 - 3 Take out the bolts (1) along with the washers (2) and a part of upper and lower silentblocks, washers and cups.
 - (t) Close the holes on the engine arisen as a result of removal.
 - (u) Put the engine in a suitable stand.
 - (v) Remove the strut between the airbox and the engine mount (Section 71-60).
 - (w) As needed, remove the engine mount from the engine (Section 71-20).
- (2) Installation – engine on the airplane

CAUTION

THE THREADS OF SCREWS AND NUTS TIGHTENED BY TORQUE WRENCH MUSTN'T BE LUBRICATED!

NOTE

When installing the engine on the aircraft, observe the procedures prescribed by the engine manufacturer.

- (a) As needed, install the engine mount on the engine (Section 71-20).



- (b) Install the strut between the engine mount and the airbox (Section 71-60).
- (c) Suspend the engine with the engine mount on the workshop crane (Fig. 71-1).
- (d) Install the silentblocks:
 - 1 Insert both parts of the silentblock (4) into the eye of the upper attachment (detail A, Fig. 71-1) and install the insert (5).
 - 2 Slide the washers (2) and (7) on the bolt (1) and insert it into the hole in the insert (5).
 - 3 Slide the cup (3) and the washer (6) on the protruding shank of the bolt (1).
 - 4 Insert both parts of the silent block (4) into the eye of the lower attachment (detail B, Fig. 71-1) and install the insert (5).
 - 5 Slide the washer (2) and the cup (3) on the bolt (1) and insert it into the hole in the insert (5).
 - 6 Slide the cup (3) and the washer (6) on the protruding shank of the bolt (1).
- (e) Position the engine with the installed engine mount to the attachment points on the firewall.
- (f) Install the engine on the airplane:
 - 1 Install the bolts (1) for suspending the engine mount (11) to the attachments on the firewall (Section 71-20).
 - 2 Tighten the bolts using a torque of 23 Nm.
 - 3 Secure the bolts by means of lockwire (Section 20-20).
- (g) As need, gradually remove the blind plugs.
- (h) Install the engine control (Section 76-10).
- (i) Install the liquid cooler (Section 75-00).
- (j) Connect the hoses of the engine cooling system (Section 75-00).
- (k) Connect the fuel inlet hoses (Section 28-20).
- (l) Install the exhaust system (Section 78-20).
- (m) Connect the wires of engine electrical installation.
- (n) Install the propeller (Section 61-10).
- (o) As needed, but at the latest before the engine start, replenish the operation liquids of the engine (Section 12-10).
- (p) Mount the lower cowling of the engine (Section 71-10).
- (q) Using the screws (3, Fig. 71-2) with the washers (5), attach the liquid cooler to the lower cowling of the engine (2).
- (r) Connect the hoses to the airbox (Section 71-60).
- (s) Connect the flap control of the airbox (Section 71-60).
- (t) Connect the battery, switch the electrical network on.
- (u) Do the engine test; check the tightness of the fuel system, oil system and the engine cooling system.
- (v) Install the upper cowling of the engine (Section 71-10).

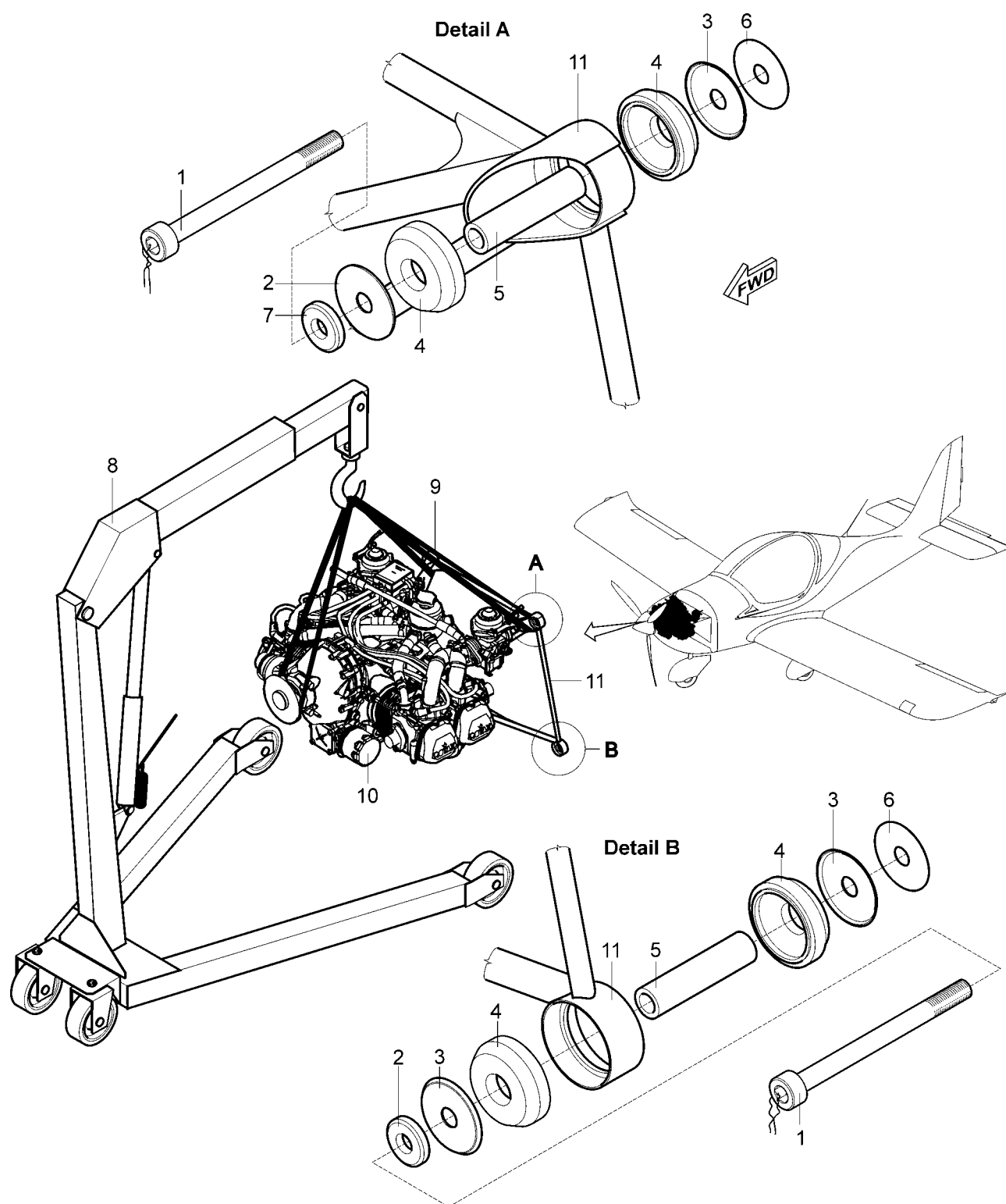


Fig. 71-1 Engine – removal / installation (page 1 of 2)



Legend to Fig. 71-1

1	Bolt (4 pcs.)	7	Washer (2 pcs.)
2	Washer (2 + 2 pcs.)	8	Crane
3	Cup (2 + 2 pcs.)	9	Straps
4	Silent block (8 pcs.)	10	Engine
5	Insert (4 pcs.)	11	Engine mount
6	Washer (4 pcs.)		

Fig. 71-1 Engine – removal / installation (page 2 of 2)



COWLING

1. DESCRIPTION AND OPERATION

The engine cowlings serve as an aerodynamic cover of the engine.

The cowlings are designed as a two-piece composite pressed part; on the inner side, the cowlings are provided with a non-flammable coating.

In the front part of the original engine cowlings, there is a circular cut-out for the flange and the propeller shaft. In the new engine cowlings, there are larger air intakes at the front to increasing the amount of cooling air. Both side inlets are equipped with a grille and on the inside part of the upper engine cowling the deflectors are located. These elements serve to streamline the cooling air. The lower part of the engine cowling is provided with holes that allow air supply into the engine compartment. The outlet of air from the engine compartment is solved by a semielliptical cut-out located in the rear part of the cowling. The exhaust pipe and the engine drains also lead to this hole.

The upper part of the engine cowling is provided on the left side with a cap for oil level check. The cap for oil level check is provided with a Camlock. Optionally, the coolant control cap can be installed on the right part of upper cowling.

The lower part of the cowling is attached by means of screws to the border of the firewall. The upper part of the cowling is attached to the firewall by means of Camlocks. Both parts of the engine cowling are mutually connected by means of Camlocks.

The attachment of the upper part of the engine cowling is designed with regard to an easy removal during the preflight preparation.

After removing the upper engine cowling, it is possible to check the quantity of coolant and brake fluid, refill oil, to perform a preflight check of the engine, etc.

The original and new versions of the engine cowlings are mutually interchangeable.

If the new engine cowlings are installed, the airplane is equipped with a smaller oil cooler (Section 79-20).



2. MAINTENANCE PRACTICES

A. Engine cowlings

Maintenance type: Line

Personnel qualification: Independent verification personnel qualified in accordance with Part 66 or higher

Recommended tools and material:

Item	Designation / Size	Quantity	Note
Phillips screwdriver	No. 2	1 pc.	

WARNING

SWITCH OFF THE IGNITION AND TAKE OUT THE KEY!

NOTE

The removal / installation procedures for original and new wheel engine cowlings are identical.

- (1) Removal – engine cowlings
 - (a) Switch the electrical network off and disconnect the battery.
 - (b) By turning counter-clockwise, release all the Camlocks (6, Fig. 71–2) on the perimeter of the upper engine cowling (1); remove the released engine cowling (1) from the airplane.
 - (c) Remove the screws (3) with the washers (5) that attach the liquid cooler to the lower cowling of the engine (2).
 - (d) Remove the screws (4) with the washers (5) that attach the lower cowling of the engine (2) to the border of the firewall.
- (2) Installation – engine cowlings
 - (a) Position the lower cowling of the engine to the firewall (2, Fig. 71–2).
 - (b) Install the screws (4) with the washers (5), but don't tighten them.
 - (c) Position the lower cowling of the engine (2) on the rivet nuts of the liquid cooler brackets; screw the screws (3) with the washers (5) into the relevant holes in the lower cowling of the engine (2); tighten the screws.
 - (d) Position the upper engine cowling (1) on the holes for the Camlocks (6) in the lower engine cowling (2) and in the firewall.
 - (e) By turning clockwise, lock the Camlocks (6).
 - (f) Connect the battery, switch the electrical network on.

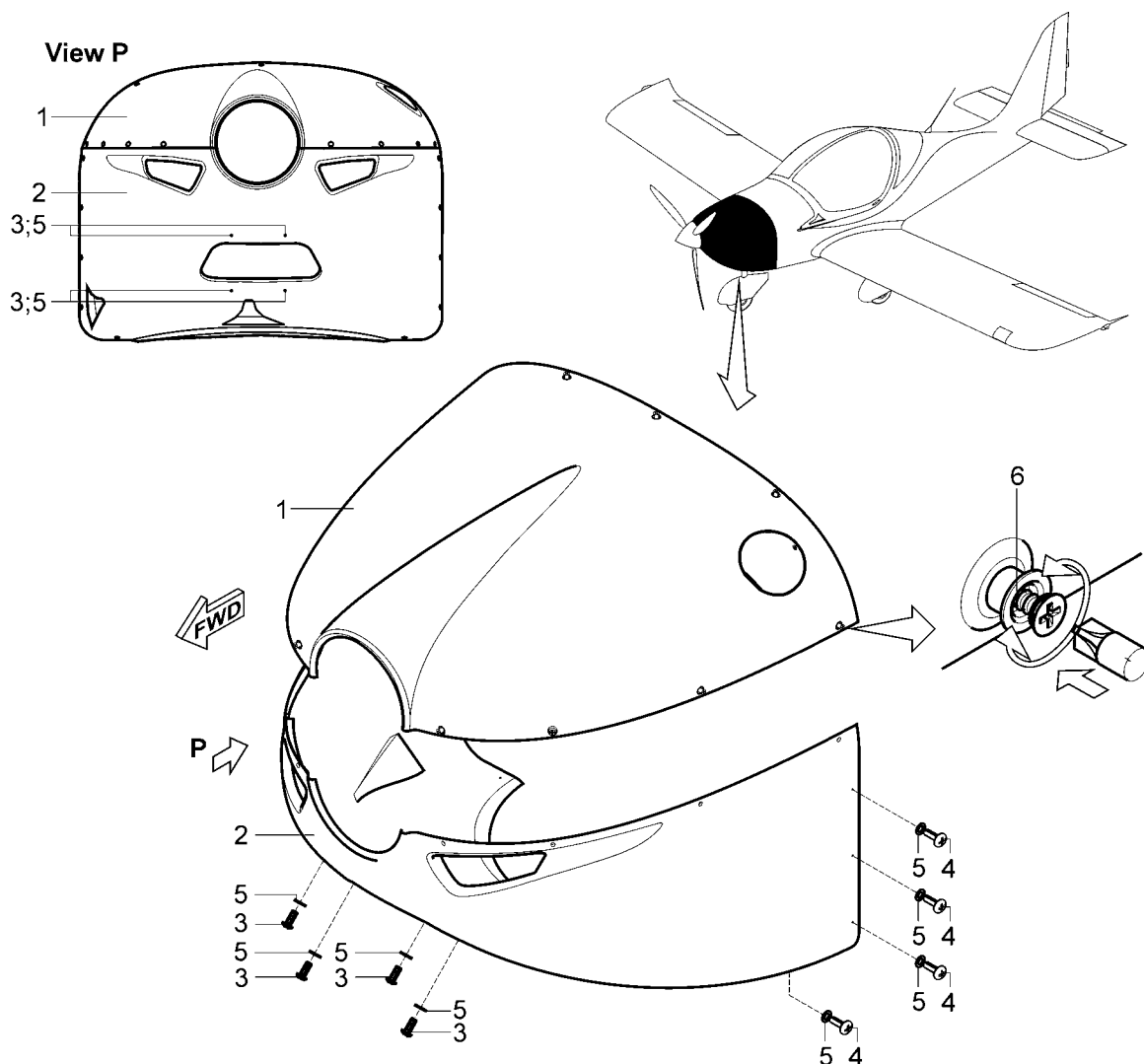
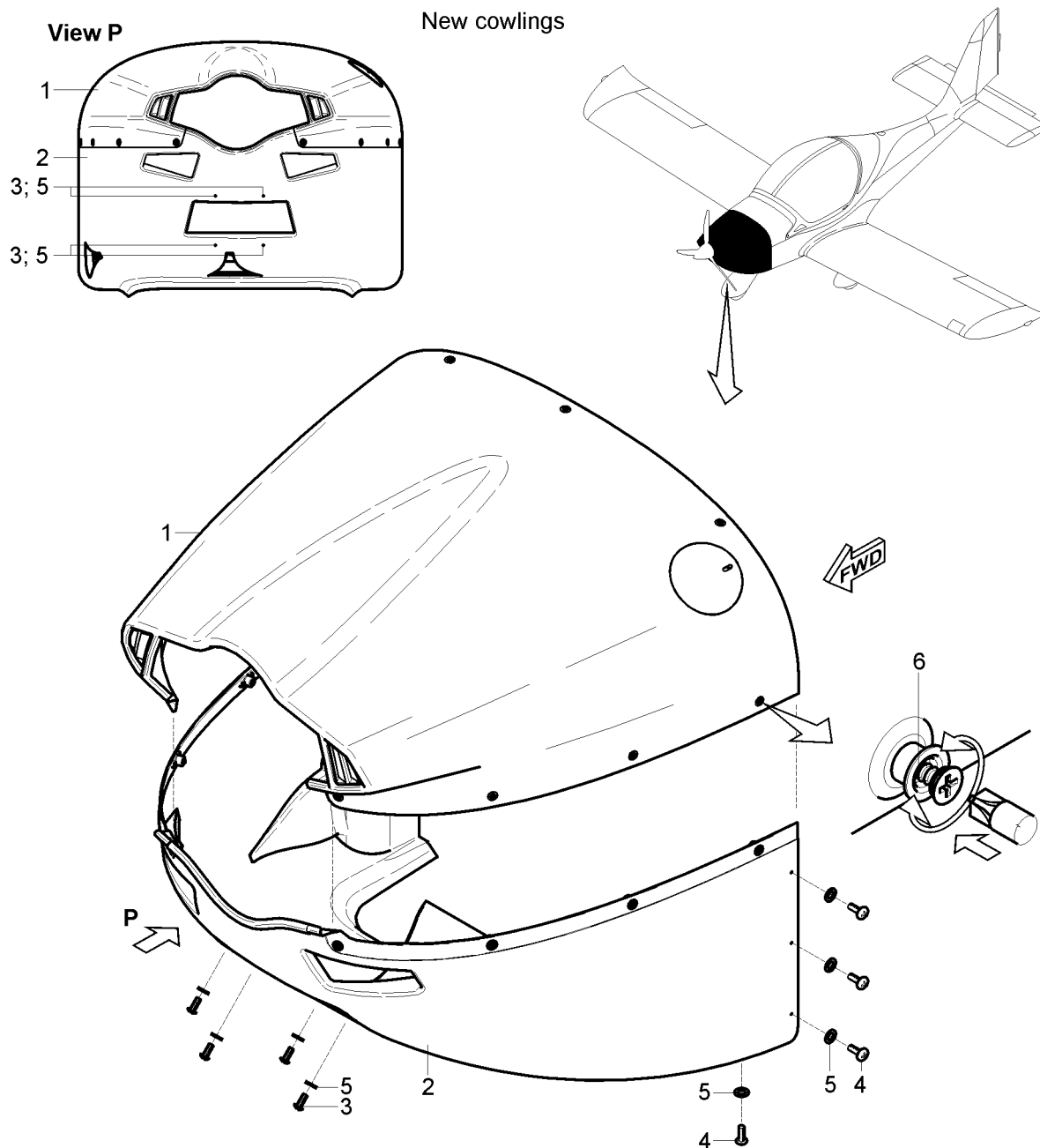


Fig. 71-2 Engine cowlings – removal / installation (page 1 of 2)



Legend to Fig. 71-2

1	Upper engine cowl	4	Screw M4x12 (4 pcs.)
2	Lower engine cowl	5	Polyamide washer 3,7 (12 pcs.)
3	Screw M4x16 (4 pcs.)	6	Camlock

Fig. 71-2 Engine cowlings – removal / installation (page 2 of 2)



MOUNTS

1. DESCRIPTION AND OPERATION

The engine is suspended on the engine mount in the airplane. The engine mount is composed of the spatial part welded from steel, Cr-Mo tubes. The engine mount is formed by a trapezoidal frame and the attachment eyes are welded on its tops. The eyes of attachments are modified for the installation of silent blocks.

The engine mount is attached by means of screws, through the silent blocks, to the attachments on the firewall. The tube frames run out from the peaks of the trapezoidal frame of the engine mount to the attachments on the engine. The upper frames are single tubes, the lower frames are tubes of V shape. The frames have on their ends suspension eyes for screws for attachment to the engine block. The screws of lower attachments on the engine block carry the brackets for attaching the exhaust muffler.

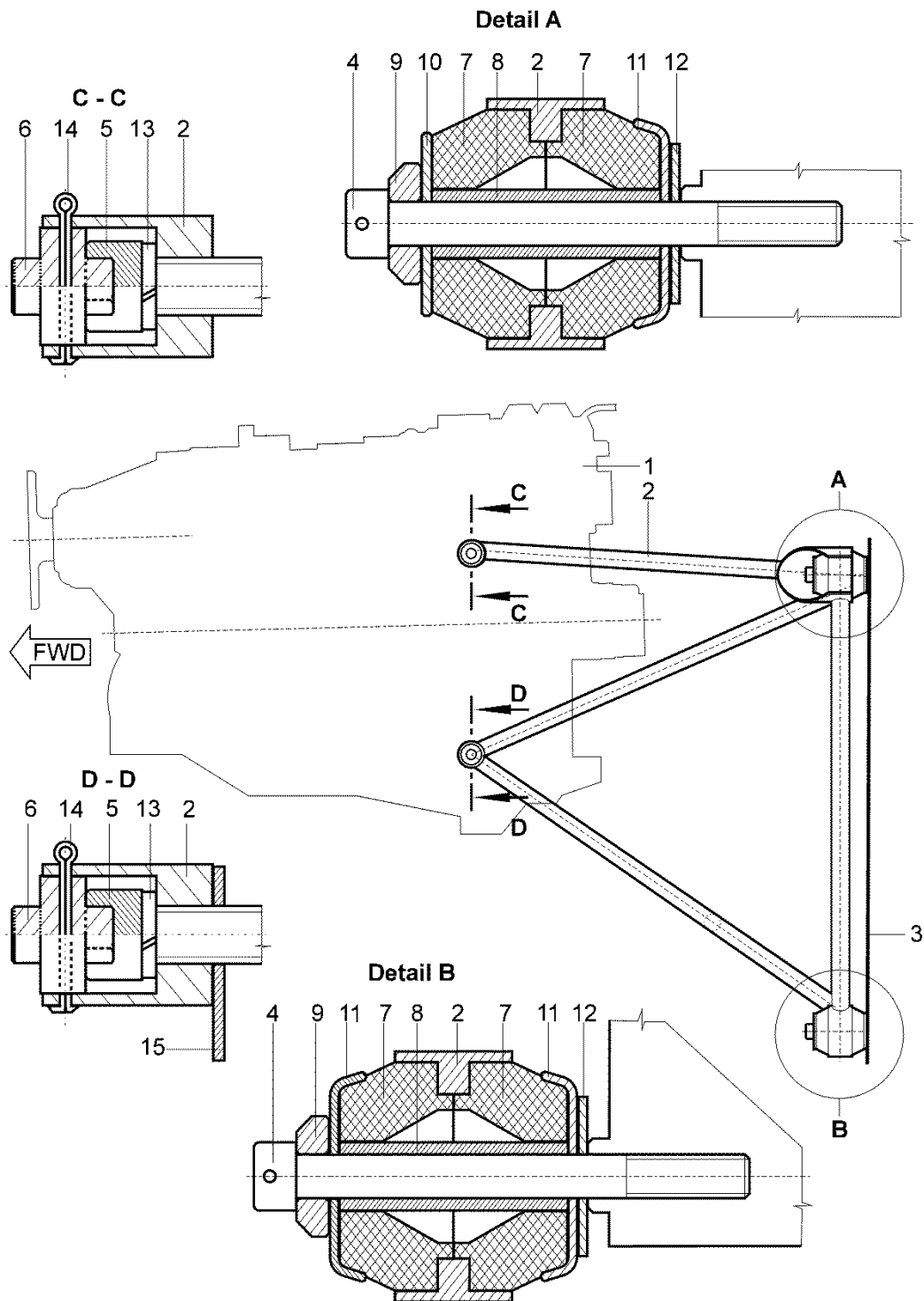


Fig. 71-3 Engine mount (page1 of 2)



Legend to Fig. 77–3

1	Engine	9	Washer
2	Engine mount	10	Washer
3	Firewall	11	Cup
4	Screw	12	Washer
5	Screw	13	Locking washer
6	Safety plug	14	Cotter pin
7	Silent block	15	Bracket for attachment of exhaust pipe muffler
8	Washer		

Fig. 71-3 Engine mount (page 2 of 2)

NOTE

The details A and B (Fig. 71–3) are shown in section view for clarity. The engine block isn't shown in sections C-C and D-D. The screws (4) are secured by means of lockwire.



2. MAINTENANCE PRACTICES

A. Engine mount

Maintenance type: Heavy

Personnel qualification: Independent verification personnel qualified in accordance with Part 66 or higher

Recommended tools and material:

Item	Designation / Size	Quantity	Note
Torque wrench	-	1 pc.	
Hex key	No. 8	1 pc.	
Cotter pin	2x32	4 pc.	
Grease	AeroShell Grease 22	-	

NOTE

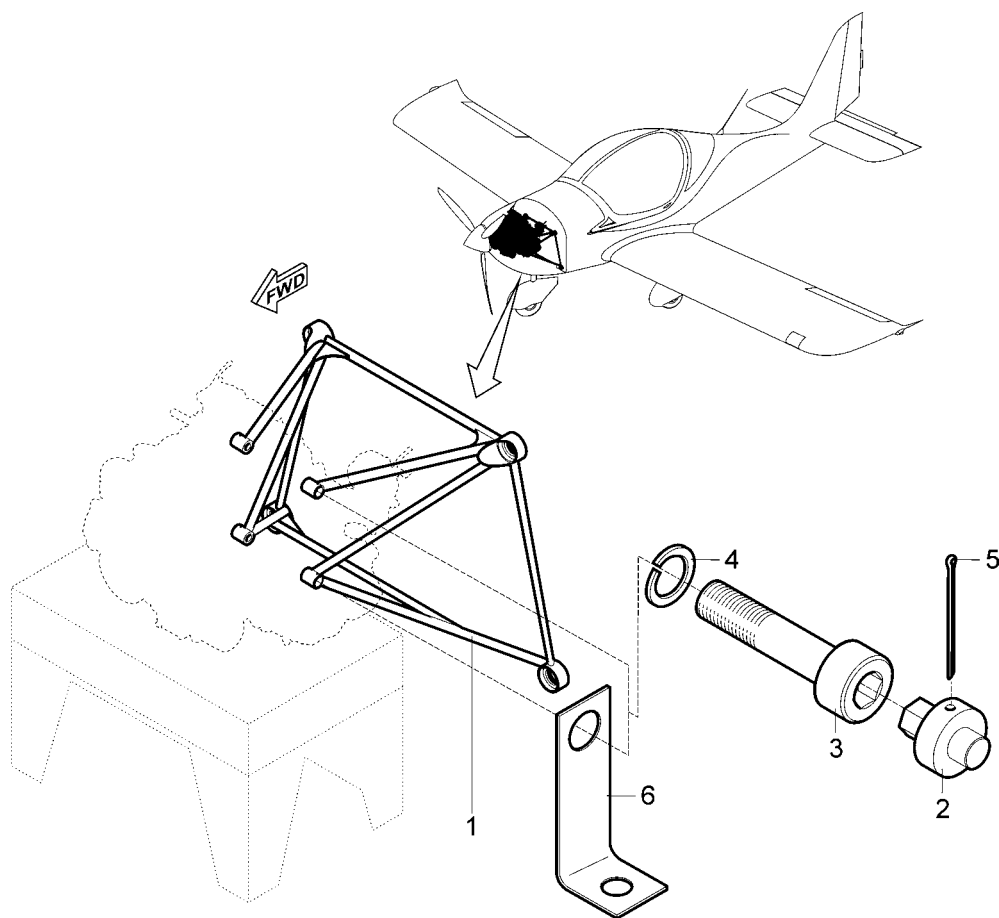
Due to the absence of suspension points for the crane, the engine is dismantled as a whole with the engine mount. The way of removal and installation of the engine mount and the silent blocks from the airplane is described in Section 71-00.

- (1) Removal – engine mount
 - (a) After removing the engine from the aircraft (Section 71-00), put the engine in a suitable place in order to prevent from its damaging.
 - (b) Remove the cotter pins (5, Fig. 71-4).
 - (c) Remove the safety plugs (2).
 - (d) Remove the screws (3) of engine suspension and take out the spring washers (4); remove the screws of the lower suspensions, including the brackets of exhaust pipe muffler (6).
 - (e) Remove the engine mount (1).
- (2) Installation – engine mount
 - (a) Position the engine mount (1, Fig. 71-4) on the attachment points on the engine block.

CAUTION

THE THREADS OF SCREWS AND NUTS TIGHTENED BY TORQUE WRENCH MUST BE DRY DURING INSTALLATION.

- (b) Install the screw (3) with the spring washers (4), put the brackets for attaching the exhaust pipe muffler (6) on the lower screws; tighten the screws using a torque of 35 Nm.
- (c) Insert the safety plugs (2).
- (d) Install and secure the cotter pins (5).
- (e) Install the engine with the engine mount on the airplane (Section 71-00).



Legend to Fig. 71-4

1	Engine mount	4	Locking washer
2	Safety plug	5	Cotter pin
3	Screw of suspension	6	Bracket for attachment of exhaust pipe muffler

Fig. 71-4 Engine mount – removal / installation



AIR INTAKES

1. DESCRIPTION AND OPERATION

A. Original engine cowlings

The lower part of engine cowling is provided with the air inlets.

The two upper holes in the lower part of engine cowling serve as an air inlet for cylinder cooling (A, Fig. 71–5). The central hole, below the hole for the propeller flange, serves as an air inlet for the liquid cooler (B, Fig. 71–5). The NACA inlet in the middle of the lower part of engine cowling serves as an inlet of cooling air into the oil cooler (C, Fig. 71–5). The NACA inlet on the right side of the lower part of engine cowling serves as an air offtake for the engine air intake (D, Fig. 71–5).

B. New engine cowlings

The upper and lower part of engine cowling is provided with the air inlets, that serve as an air inlet for cylinder cooling (A, Fig. 71–5). The central hole serves as an air inlet for the liquid cooler (B, Fig. 71–5). The NACA inlet in the middle of the lower part of engine cowling serves as an inlet of cooling air into the oil cooler (C, Fig. 71–5). The NACA inlet on the right side of the lower part of engine cowling serves as an air offtake for the engine air intake (D, Fig. 71–5).

The air from the airbox enters into the air intake necks of carburetors. The airbox of a cylindrical shape and is equipped with the flanges for connection to the carburetors, inlet necks for cold and hot air and with the regulation flaps located in the inlet necks. The inlet of cold air is designed as the NACA inlet (D, Fig. 71–5). The air flows from the NACA inlet through the air filter via the hose into the airbox.

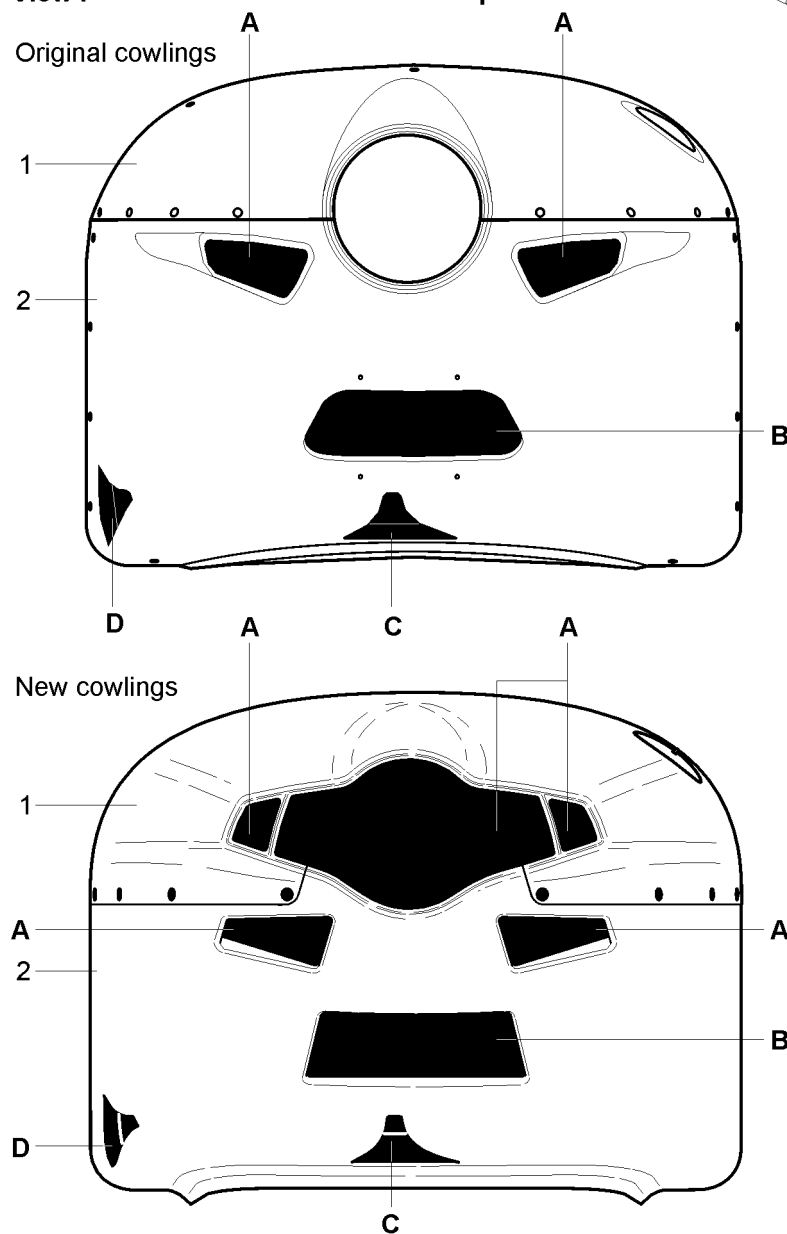
The inlet of hot air serves for carburettor preheating under the conditions specified in the POH of Sportstar RTC airplane, Chapter 4.

The air entering the exchanger on the exhaust pipe muffler is heated here and then the air flows through the hose into the neck for hot air intake located on the airbox. The inlet neck of the airbox are provided with the regulation flaps. These regulation flaps allow setting the optimum ratio of hot and cold air for carburettor preheating. The regulation flap are of a rotary type and the protruding parts of small shafts are provided with the levers that are mutually connected by the pull-rod. The leverage is provided with the return spring. The spring pulls the leverage of flaps to the fully opened preheating. The right lever (inlet of hot air) is connected with the bowden string of the control. The basic setting is a fully opened flap in the cold air inlet. By pulling the **CARBURET. PREHEAT.** controller on the middle panel, the flap in the supply of cold air is being closed and simultaneously the flap in the supply of hot air is being opened. The heated air prevents from inlet neck freezing of the carburettor, but at the same time it reduces the engine power.



- A - ENGINE COOLING INLET
- B - LIQUID COOLER INLET
- C - OIL COOLER INLET
- D - AIR INTAKE OF ENGINE

View P



Legend to Fig. 71-5

1 Upper engine cowling

2 Lower engine cowling

Fig. 71-5 Air inlets



2. MAINTENANCE PRACTICES

A. Air system of engine

Maintenance type: Line

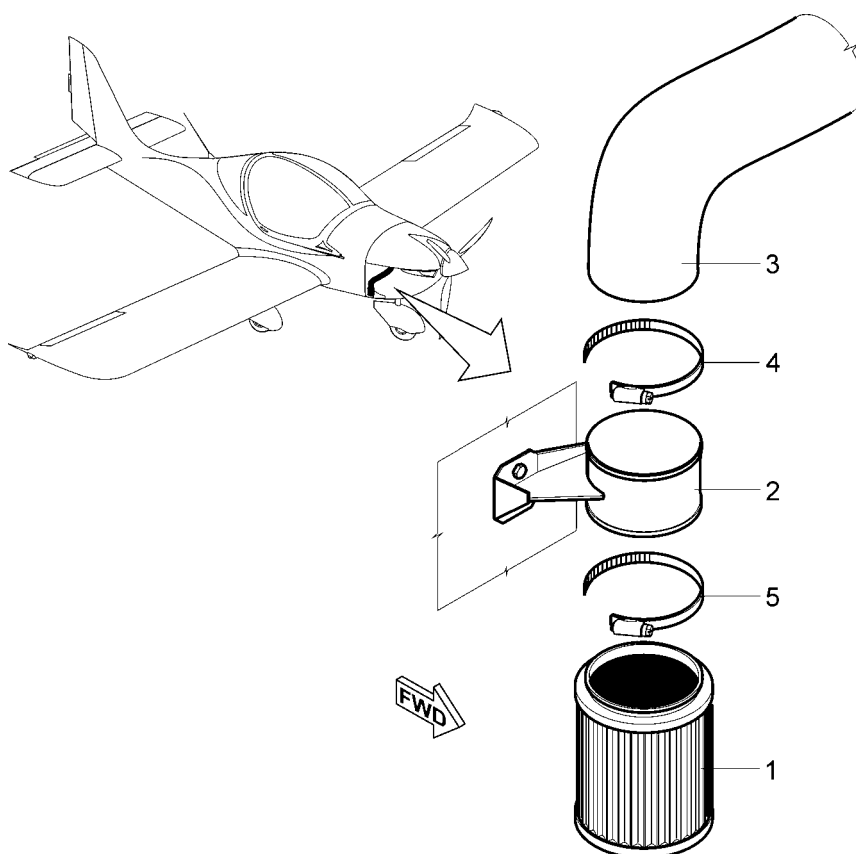
Personnel qualification: Independent verification personnel qualified in accordance with Part 66 or higher

Recommended tools and material:

Item	Designation / Size	Quantity	Note
Phillips screwdriver	No. 2	1 pc.	
Air filter	ROTAX P/N 825 750	1 pc.	
Wrench	No. 7	1 pc.	
Wrench	No. 8	1 pc.	
Wrench	No. 10	1 pc.	
Hex key	No. 5	1 pc.	
Flat screwdriver	-	1 pc.	

(1) Servicing – air filter replacement

- (a) Switch the electrical network off and disconnect the battery.
- (b) Remove the engine cowlings (Section 71-10).
- (c) Release the sleeve (5, Fig. 71–6) and take out the filter (1).
- (d) Set the new filter (1) to position to the filter bracket (2) and install the sleeve (5).
- (e) Install the engine cowlings (Section 71-10).
- (f) Connect the battery, switch the electrical network on.



Legend to Fig. 71-6

1	Air filter	4	Sleeve
2	Filter bracket	5	Sleeve
3	Air hose		

Fig. 71-6 Replacement of air filter

(2) Removal – airbox

- (a) Switch the electrical network off and disconnect the battery.
- (b) Remove the engine cowlings (Section 71-10).
- (c) Remove the clamps (23, Fig. 71-7) of the connecting hoses (6; 7).
- (d) Remove the wire (24) attaching the hoses (19) and (20) to the airbox (1); pull down the hoses from the outlets on the airbox (1).
- (e) Remove the nut (35) and remove the washer (34) connecting the silent block (5) with the strut of the airbox (4).
- (f) Remove the clamps (23) for attachment of the inlet hoses of cold air (8) and hot air (9).
- (g) Pull down the inlet air hoses (8) and (9) from the necks of the airbox (1).
- (h) Unlock the clamps (22) of the drain hose (16) of the left sump (2). Use the same procedure for the drain hose of the right sump (3). The right hose isn't shown and it is a mirror image of the hose (16). Pull down the hoses from the outlets of the drain sumps (2) and (3).



- (i) Unlock the clamps (22) of the drain hoses (17) and (18) of the airbox (1). Pull down the hoses (17) and (18) from the outlets on the airbox (1).
 - (j) Remove the nut (30) and take out the washer (32); when removing the nut (30), hold the screw (26) by means of wrench, thus preventing it from slipping.
 - (k) Slide out the string (12) from the hole in the screw (26). Slide out the screw (26) from the hole in the lever (38) along with the washers (31).
 - (l) Remove the nut (37).
 - (m) Release the nut (29) and slide out the bowden hose (13) from the bowden attachment (10). Remove the end piece of the bowden cable (11) with the nut (36).
 - (n) Pull down the connecting hoses (6) and (7) from the necks on the airbox (1); remove the airbox (1) from the engine compartment.
- (3) Installation – airbox
- (a) Position the airbox (1, Fig. 71–7) in the engine compartment. Slide the hoses (6) and (7) onto the appropriate necks of the airbox (1) and install the hose clamps (23).
 - (b) Slide the venting hoses of the carburetors (19) and (20) on the appropriate outlets of the airbox (1) and secure them by lockwire (24).
 - (c) Connect the drain hoses to the left sump (2) and to the right sump (3) by means of the clamps (22). The hose for the right drain sump isn't shown for better clarity – it is a mirror image of the left one.
 - (d) Connect the drain hoses (17) and (18) to the airbox outlets (1) by means of the clamps (22).
 - (e) Connect the air hoses (8) and (9) to the necks on the airbox (1) by means of the hose clamps (23).
 - (f) Install the nut (36) on the end piece of the bowden cable (11). Insert the whole unit into the hole in the airbox bracket (1) and install the nut (37).
 - (g) Insert the string (12) with the bowden hose (13) into the attachment (10) and at the same time pass the string (12) through the end piece of the bowden cable (11).
 - (h) Put the washer (31) on the screw (26) and insert the string (12) into the hole in the screw shank (26).
Put the washer (31) on the screw (26) and insert the screw (26) into the hole in the lever (38).
Put the washer (32) and install the nut (30). Tighten the nut slightly and check the function of the flaps.
 - (i) As needed, adjust the length of bowden cable and tighten the nuts (36) and (37).
 - (j) Tighten the nut (30). When tightening the nut (30), hold the screw (26) by means of wrench, thus preventing it from slipping.
 - (k) Check again the function of the airbox flaps.
 - (l) Install the silent block (5) and slide the strut (4) and the washer (34) on the free threaded part and install the nut (35); don't tighten the nut.
 - (m) Position the free eye of strut (4) to the attachment (21), to the hole in the attachment (21) and insert the screw (25) into the strut eye (4) and screw the nut (28).
 - (n) Tighten the nuts (28) and (35).



- (o) Install the engine cowlings (Section 71-10).
- (p) Connect the battery, switch the electrical network on.

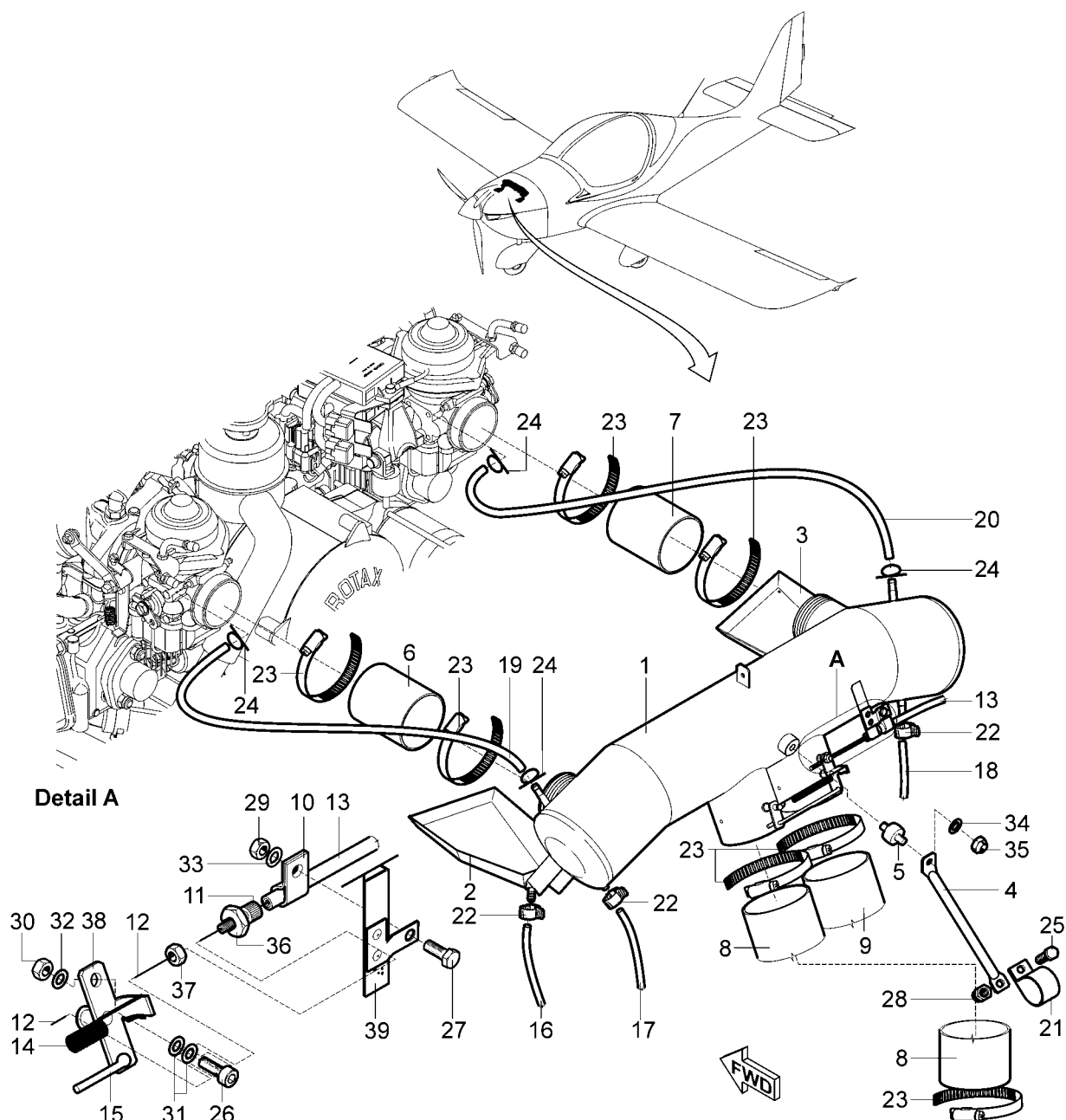


Fig. 71-7 Airbox – removal / installation (page 1 of 2)



Legend to Fig. 71–7

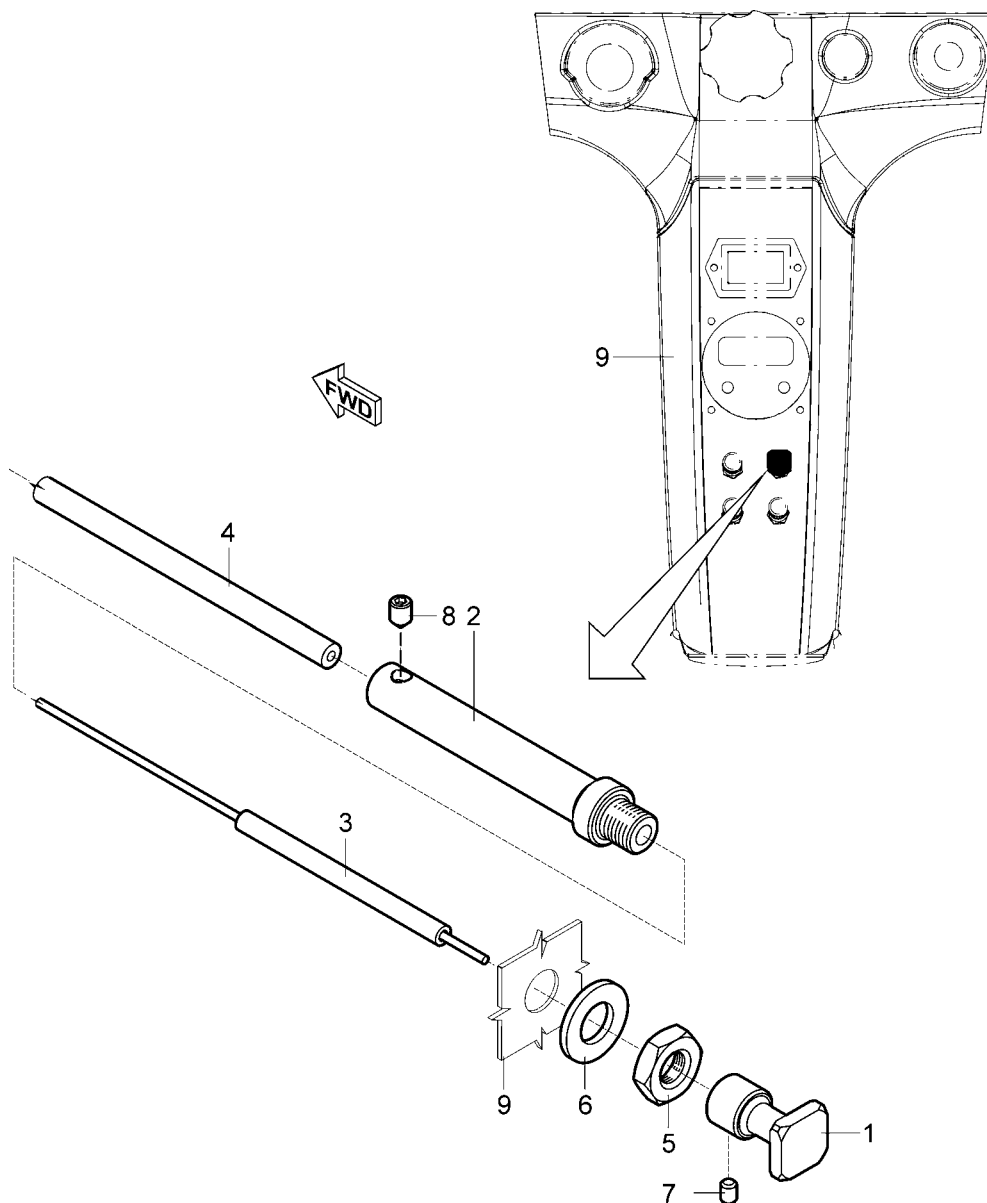
1	Airbox	21	Strut attachment
2	Left sump of carburettor	22	Cobra clamp
3	Right sump of carburettor	23	Hose clamp
4	Strut	24	Wire
5	Silent block	25	Screw M4
6	Left connecting hose	26	Screw M5
7	Right connecting hose	27	Screw M4
8	Inlet hose – cold air	28	Nut M4
9	Inlet hose – hot air	29	Nut M4
10	Attachment of bowden cable	30	Nut M5
11	Setting end piece of bowden cable	31	Washer 5,3
12	Bowden string	32	Washer 5,3
13	Bowden hose	33	Washer 4,3
14	Return spring	34	Washer 6,4
15	Connecting pull-rod	35	Nut M6
16	Drain hose of left sump of carburettor	36	Nut M5
17	Left drain hose of airbox	37	Nut M5
18	Right drain hose of airbox	38	Lever of right regulation flap of airbox
19	Venting hose of carburettor	39	Bracket of bowden cable
20	Venting hose of carburettor		

Fig. 71-7 Airbox – removal / installation (page 2 of 2)

- (4) Removal – carburettor preheating control
 - (a) Switch the electrical network off and disconnect the battery.
 - (b) Loose the screw (7, Fig. 71–8) and remove the handle (1).
 - (c) Unscrew the nut (5) and remove the washer (6).
 - (d) Remove the carburettor preheating control on the airbox (see par. 2 A.(2)).
 - (e) Slide out the string with tube (3) from the terminal (2).
 - (f) Loose the screw (8) and remove the bowden hose (4).
 - (g) Remove the terminal (2).
- (5) Installation – carburettor preheating control
 - (a) Insert the bowden hose (4, Fig. 71–8) into the terminal (2) and secure it by means of the screw (8).
 - (b) Insert the terminal (2) with bowden hose into the appropriate hole in the central console (9), insert the washer (6), screw and tighten the nut (5).
 - (c) Insert the string with tube (3) into the body (2).
 - (d) Instal the carburettor preheating control on the airbox (see par. 2 A.(3)).



- (e) Put the handle (1) on the protruding part of the string (3) and secure it by means of the screw (7).
- (f) Check the function of the carburettor preheating control.



Legend to Fig. 71-8

1	Handle	6	Washer 8,4
2	Terminal	7	Screw M3x4
3	Bowden string with tube	8	Screw M4x4
4	Bowden hose		For information:
5	Nut M6	9	Central console

Fig. 71-8 Carburettor preheating control – removal / installation



ENGINE DRAINS

1. DESCRIPTION AND OPERATION

The engine drainage is composed of the carburettor venting, outlet from the condensate sumps under the carburettors and from the outlet from the airbox.

The carburettors are vented by means the hoses interconnecting the draining outlets of the carburettors with the outlets on the front, upper part of the airbox.

The condensate sumps are installed under the carburettors. These sumps serve also as a heat shield of carburettors.

The condensate sumps are drained by the hoses led along the tubes of the engine mount supporting structure.

The airbox is drained by means of the hoses from the outlets on the lower rear part of the airbox, led parallelly with the venting hoses of the carburettor condensate sumps.

The drain hoses lead in the opening in the lower engine cowl, through which the heated air leaves the engine compartment.



2. MAINTENANCE PRACTICES

A. Engine drains

Maintenance type: Line

Personnel qualification: Independent verification personnel qualified in accordance with Part 66 or higher

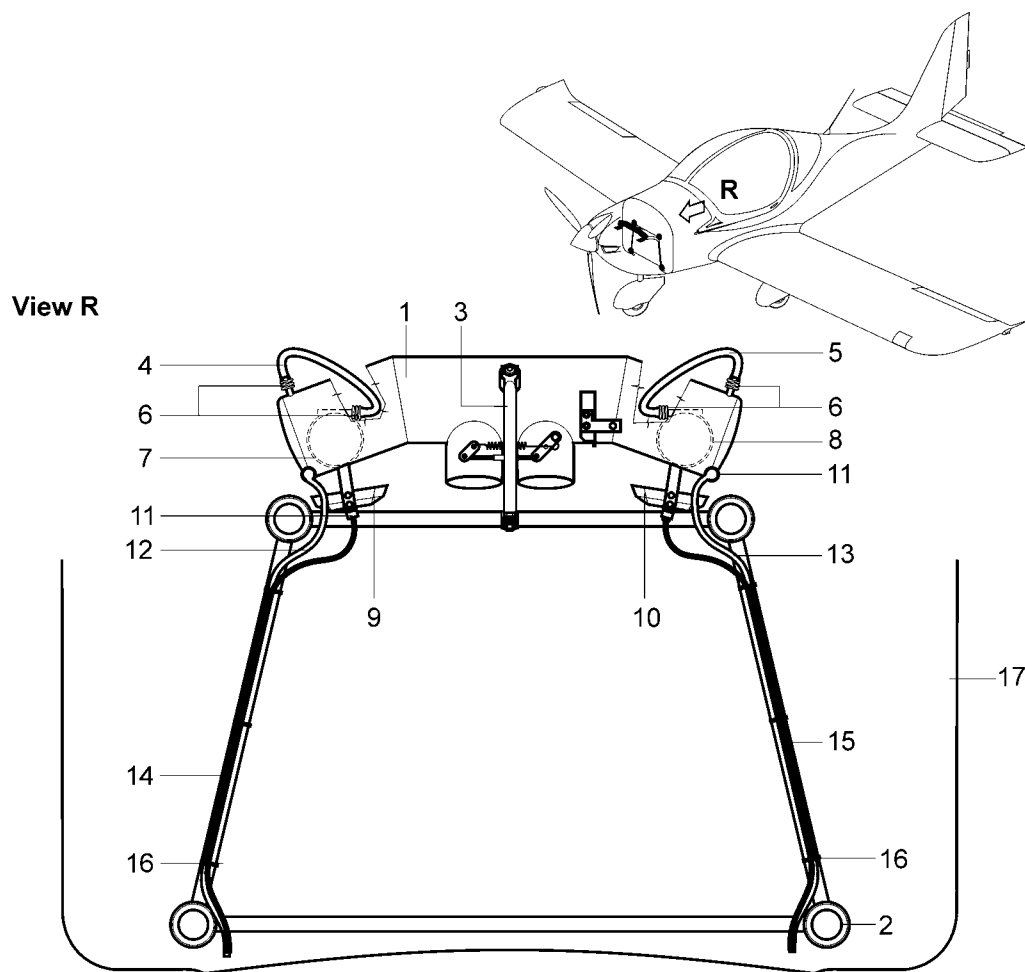
Recommended tools and material:

Item	Designation / Size	Quantity	Note
Gripping pliers	Cobra	1 pc.	
Nippers	-	1 pc.	
Cable tie	3,6x142	6 pcs.	
Stainless lockwire	ø 0,8 mm		

WARNING

SWITCH OFF THE IGNITION AND TAKE OUT THE KEY!

- (1) Removal – drain hoses
 - (a) Switch the electrical network off and disconnect the battery.
 - (b) Remove the engine cowlings (Section 71-10).
 - (c) Cut the wire by nippers (6, Fig. 71– 9) and pull down the venting hoses of carburettors (4) and (5).
 - (d) Remove the clamps (11) for attachment of the hoses (12) and (13) of the airbox drains (1).
 - (e) Using the nippers, cut the cable ties (16).
 - (f) Pull down the hoses (12) and (13) from the outlets on the airbox (1).
 - (g) In the same way as the previous ones, remove the hoses (14) and (15) of the sump drains (9) and (10).
- (2) Installation – drain hoses
 - (a) Slide the hoses (12, Fig. 71–9), (13), (14) and (15) onto the appropriate outlets from the airbox (1) and from the condensate sumps (9) and (10).
 - (b) Install the clamps (11) and secure them.
 - (c) Attach the hoses (12), (13), (14) and (15) to the tubes of the engine mount supporting structure by means of cable ties (16).
 - (d) Slide the venting hoses of carburettors (4) and (5) onto the outlets from the carburettors (7) and (8) and from the airbox (1).
 - (e) Secure the venting hoses of carburettors (4) and (5) by winding the lockwire (6).
 - (f) Install the engine cowlings (Section 71-10).
 - (g) Connect the battery, switch the electrical network on.



Legend to Fig. 71-9

1	Airbox	9	Condensate sump of L carburettor
2	Engine mount	10	Condensate sump of R carburettor
3	Strut	11	Cobra clamp
4	Venting hose of L carburettor	12	Left drain hose of airbox
5	Venting hose of R carburettor	13	Right drain hose of airbox
6	Lockwire	14	Left drain hose of condensate sump
7	Carburettor L	15	Right drain hose of condensate sump
8	Carburettor R	16	Cable tie

Fig. 71-9 Engine drains – removal / installation

CHAPTER

74

IGNITION



CHAPTER 74

IGNITION

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GENERAL

1. INTRODUCTION

This Chapter includes description of the unit and the parts which supply, distribute and control the electric current for ignition of the mixture of air and fuel in the engine cylinders. The ignition parts include coils, electronic modules, ignition cables, ignition plugs and ignition switch.

The wiring diagram of the ignition system is shown in Chapter 91.



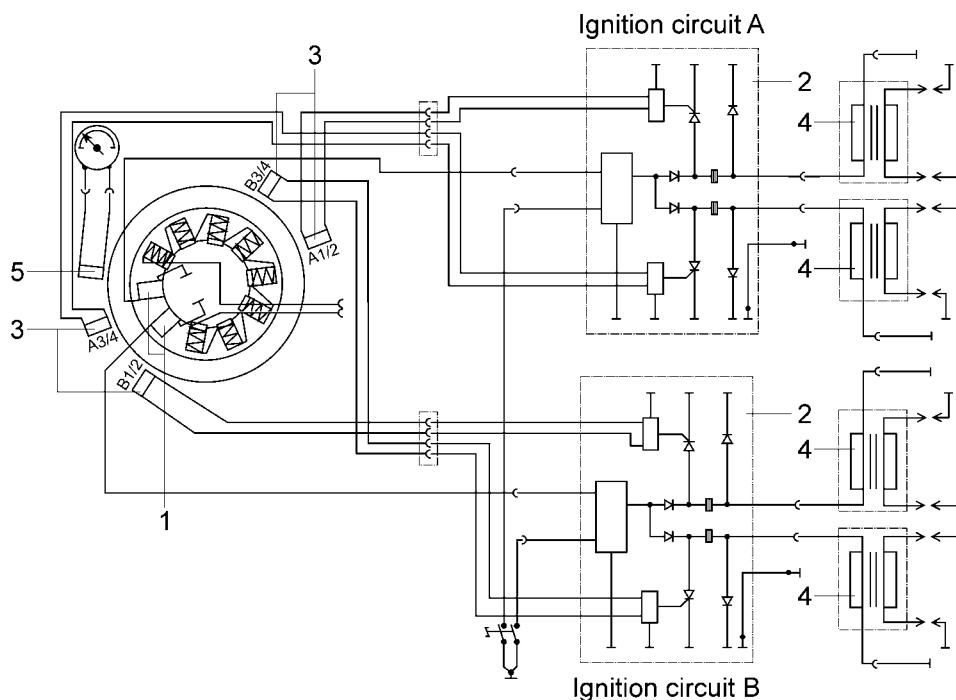
ELECTRICAL POWER SUPPLY

1. DESCRIPTION AND OPERATION

The engine is equipped with dual contactless ignition DCDI with integrated generator (Section 24-10).

The ignition is maintenance-free and it does not require an external power source.

Two independent coils (1, Fig. 74-1) located on the stator supply both ignition circuits, each separately. The power is collected in the capacitors of the electronic modules (2). The ignition point is always controlled by two of the four outwardly disposed sensors (3), which send an impulse for discharge of the capacitors through primary windings of the dual high voltage coils (4). The sensor (5) is used to connect the engine speed indicator (Section 77-10).



Legend to Fig. 74-1

1 Coil	4 High voltage coil
2 Electronic module	5 Engine speed sensor
3 Ignition point sensor	

Fig. 74-1 Ignition system



Firing order: 1-4-2-3 (refer to Fig. 74-2).

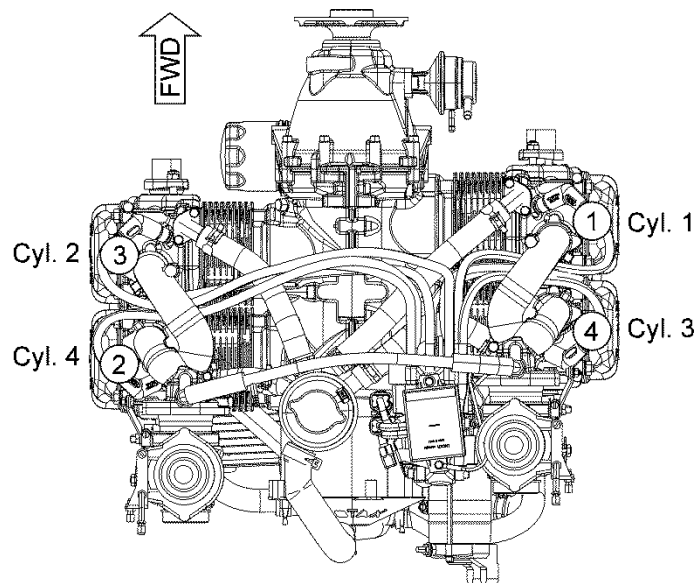


Fig. 74-2 Firing order

2. MAINTENANCE PRACTICES

Maintenance procedures for the ignition system are specified in the document Maintenance Manual (Line Maintenance) for Rotax Engine Type 912 Series, doc. no. MML-912, 899191.



DISTRIBUTION

1. DESCRIPTION AND OPERATION

This section includes description of the part of the ignition system which conducts high voltage current from the electronic modules to the ignition plugs. Shielded high voltage cables enable connection between electronic modules and ignition plugs. Each engine cylinder includes two ignition plugs; one plug in the upper part, one plug in the lower part of the engine cylinder head. Ignition circuit A controls the upper ignition plugs on the cylinders no. 1 and 2; lower ignition plugs on the cylinders no. 3 and 4. Ignition circuit B controls the upper ignition plugs on the cylinders no. 3 and 4; the lower ignition plugs on the cylinders no. 1 and 2.

2. MAINTENANCE PRACTICES

Maintenance procedures for the ignition system are specified in the document Maintenance Manual (Line Maintenance) for Rotax Engine Type 912 Series, doc. no. MML-912, 899191.

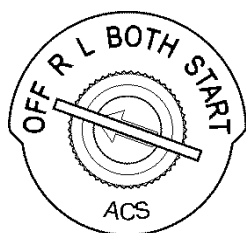


SWITCHING

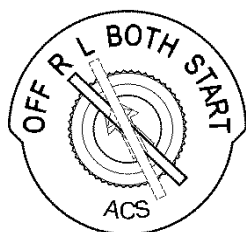
1. DESCRIPTION AND OPERATION

Ignition circuits are controlled by the ignition switch which is located on the left lower section of the instrument panel.

The ignition switch has these positions:

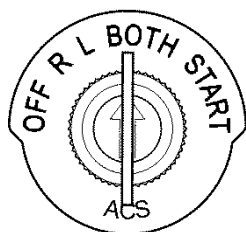


OFF - ignition is switched off

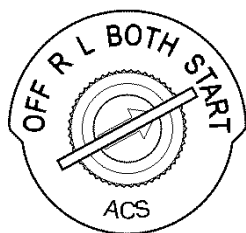


R - only the right ignition circuit is switched on

L - only the left ignition circuit is switched on



BOTH – both circuits are switched on



START – both circuits are switched on and starter turns the engine.

Fig. 74-3 Positions of the ignition switch



2. MAINTENANCE PRACTICES

A. Ignition switch

Maintenance type: Line

Personnel qualification: Independent verification personnel qualified in accordance with Part 66 or higher

Recommended tools and material:

Item	Designation / Size	Quantity	Note
Flat screwdriver	-	1 pc.	
Safety colour	C 2001/8140	-	

WARNING

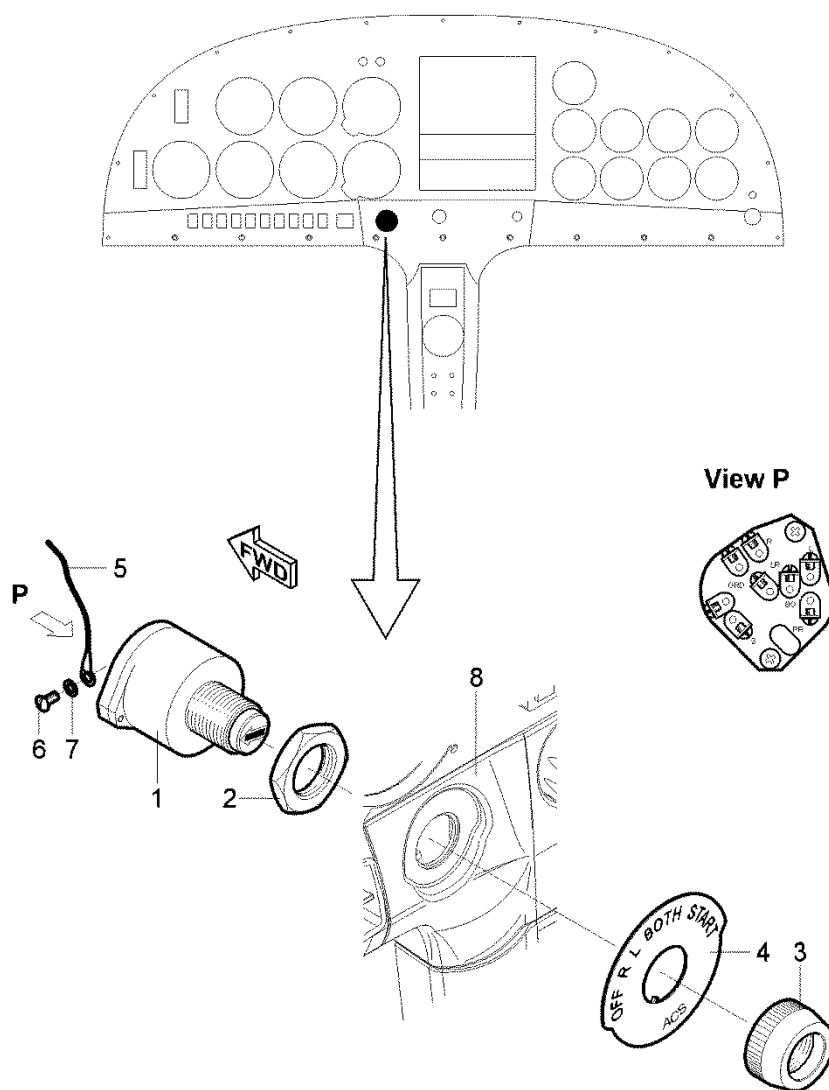
SWITCH THE IGNITION OFF AND REMOVE THE KEY!

- (1) Ignition switch – removal
 - (a) Switch the electrical network off and disconnect the battery.
 - (b) Remove the screws (6, Fig. 74-4) with washers (7) and disconnect the wires (5).

NOTE

Make note of connection of wires to the ignition switch.

- (c) Unscrew the ring (3), remove the placard (4) and the ignition switch (1); remove the nut (2) if necessary.
- (2) Ignition switch – installation
 - (a) Attach the nut (2) to the ignition switch (1, Fig. 74-4) as necessary, put the switch box into hole in the instrument panel (8), slide the placard (4), screw and tighten the ring (3).
 - (b) In accordance with the record (or in accordance with the wiring diagram in Chapter 91) put wires (5) to the related connectors and attach them with screws (6) with washers (7).
 - (c) Secure the crews (6) with safety colour.
 - (d) Connect the battery, switch the electrical network on.
 - (e) Start the engine and check function of the ignition switch.



Legend to Fig. 74-4

- 1 Ignition switch
- 2 Nut
- 3 Ring
- 4 Placard
- 5 Wires

- 6 Screw
- 7 Washer

For information:

- 8 Instrument panel

Fig. 74-4 Ignition switch – removal / installation



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CHAPTER

75

AIR



CHAPTER 75

AIR

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ENGINE COOLING

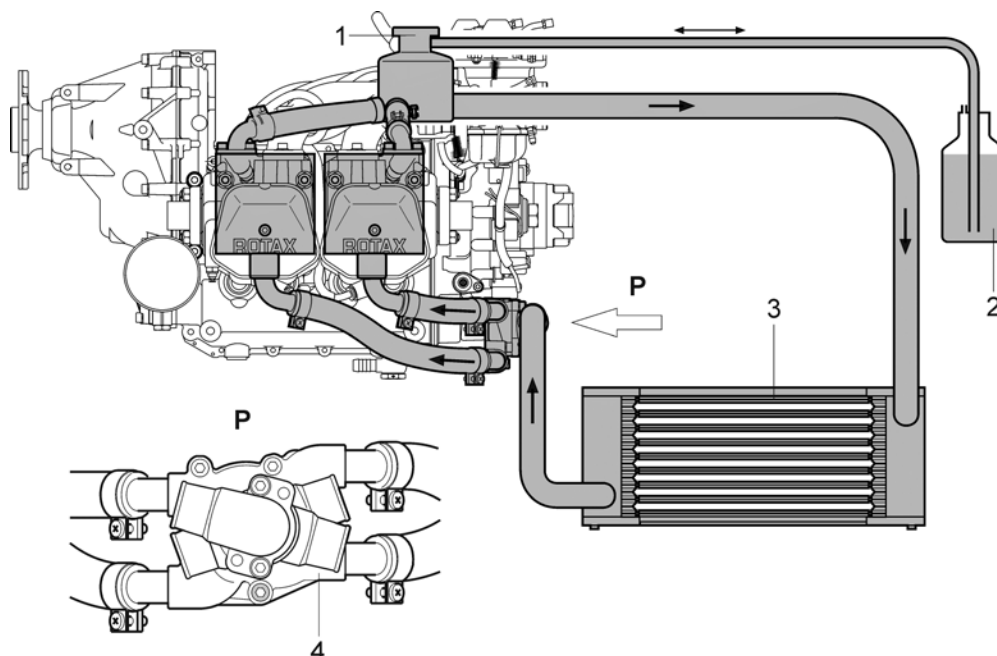
1. DESCRIPTION AND OPERATION

Rotax 912 engine cooling is combined, cylinder heads are liquid cooled and cylinders are air cooled. The liquid cooling of cylinder heads form a closed circuit with the expansion tank (1, Fig. 75-1) and the overflow bottle (2).

The coolant is forced through the cooler (3) by the pump (4), driven by the engine crankshaft, located below the engine, to the individual cylinder heads. The coolant flows from the cylinder heads up to the expansion tank (1). The tank allows the coolant expansion.

The expansion tank (1) is closed by a pressure cap (with excess pressure valve and return valve). When the temperature rises and the volume increases, the coolant creates excess pressure, the relief valve opens and the coolant can flow through a hose to the overflow bottle (2), located on the firewall. When the temperature decreases, the is coolant sucked back into the cooling circuit.

The coolant temperature sensors are located on heads 2 and 3 (Section 77-20).



Legend to Fig. 75-1

- 1 Expansion tank
- 2 Overflow bottle

- 3 Water cooler
- 4 Pump

Fig. 75-1 Cooling system diagram

NOTE

You can find more detailed information about the engine cooling system in the document Maintenance Manual (Line Maintenance) for Rotax Engine Type 912 Series, doc. no. MML-912, 899191.



2. MAINTENANCE PRACTICES

A. Water cooler

Maintenance type: Line

Personnel qualification: Independent verification personnel qualified in accordance with Part 66 or higher

Recommended tools and material:

Item	Designation / Size	Quantity	Note
Flat screwdriver	-	1 pc.	
Wrench	No. 7	1 pc.	
Wrench	No. 10	1 pc.	
Pincers	-	1 pc.	
Stainless lockwire	ø 0,8 mm	-	

WARNING

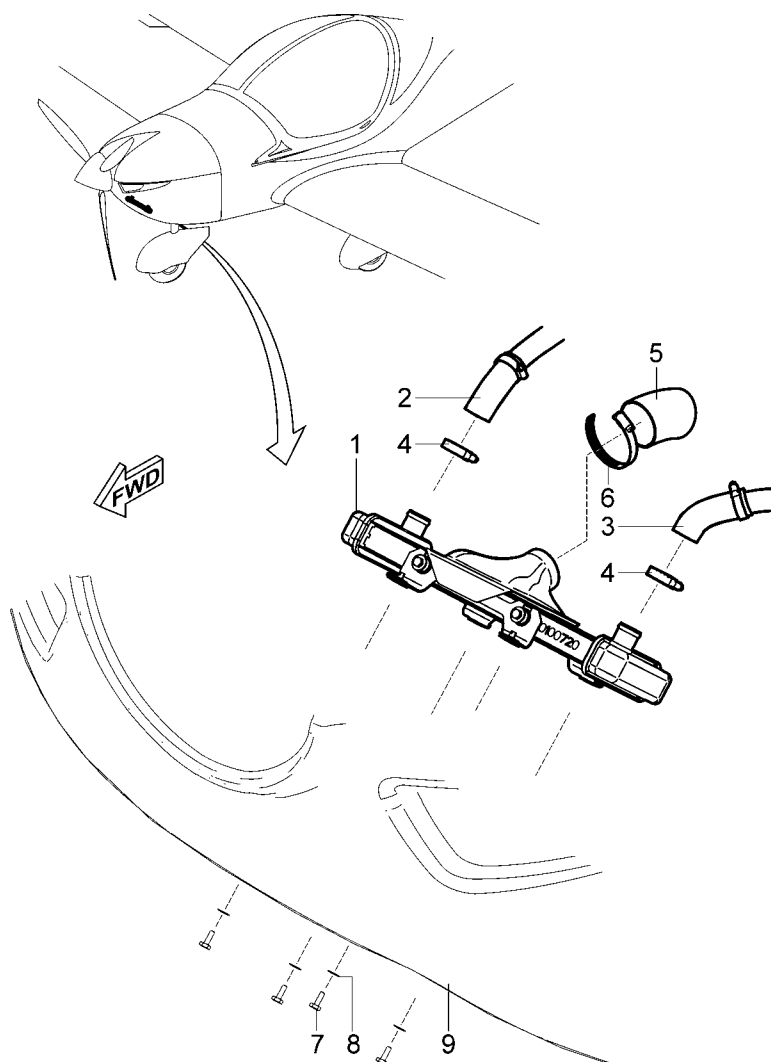
BEFORE STARTING TO WORK, COOL DOWN THE ENGINE TO THE AMBIENT TEMPERATURE. NON-COMPLIANCE WITH THE PROCEDURE MAY RESULT IN BURNS.

SWITCH OFF THE IGNITION AND TAKE OUT THE KEY!

- (1) Removal – water cooler
 - (a) Switch the electrical network off and disconnect the battery.
 - (b) Remove the engine cowlings (Section 71-10).
 - (c) Drain the coolant (Section 12-10).
 - (d) Loosen the hose clamp (6, Fig. 75-2), and disconnect the heating system hose (5) from the air inlet on the cooler.
 - (e) Loosen the hose clamps (4), disconnect the hoses (2; 3) and remove the cooler (1).
 - (f) Put applicable caps on openings of the cooler and the hose.
 - (g) As necessary, remove the air inlet and the holders from the cooler (Section 21-40).
- (2) Installation – water cooler
 - (a) As necessary, install the holders and the air inlet on the cooler (Section 21-40).
 - (b) Remove the caps from the openings of the cooler and the hoses.
 - (c) Slide the hoses (2; 3, Fig. 75-2) on the related necks of the cooler and attach them with clamps (4).
 - (d) Slide the heating system hose (5) on the neck of the air inlet and attach it with a clamp (6).
 - (e) Install the lower engine cowling (Section 71-10).
 - (f) Fill the cooling system with the coolant (Section 12-10).
 - (g) Connect the battery, switch the electrical network on.
 - (h) Do the engine test and check the tightness.



- (i) Install the upper engine cowling (Section 71-10).



Legend to Fig. 75-2

1 Water cooler	6 Hose clamp
2 Outlet hose	For information:
3 Inlet hose	7 Screw M4x16 (4 pcs.)
4 Hose clamp 20-32	8 Washer 3,7 (4 pcs.)
5 Hose	9 Lower engine cowling

Fig. 75-2 Water cooler – removal / installation


B. Overflow bottle

Maintenance type: Line

Personnel qualification: Independent verification personnel qualified in accordance with Part 66 or higher

Recommended tools and material:

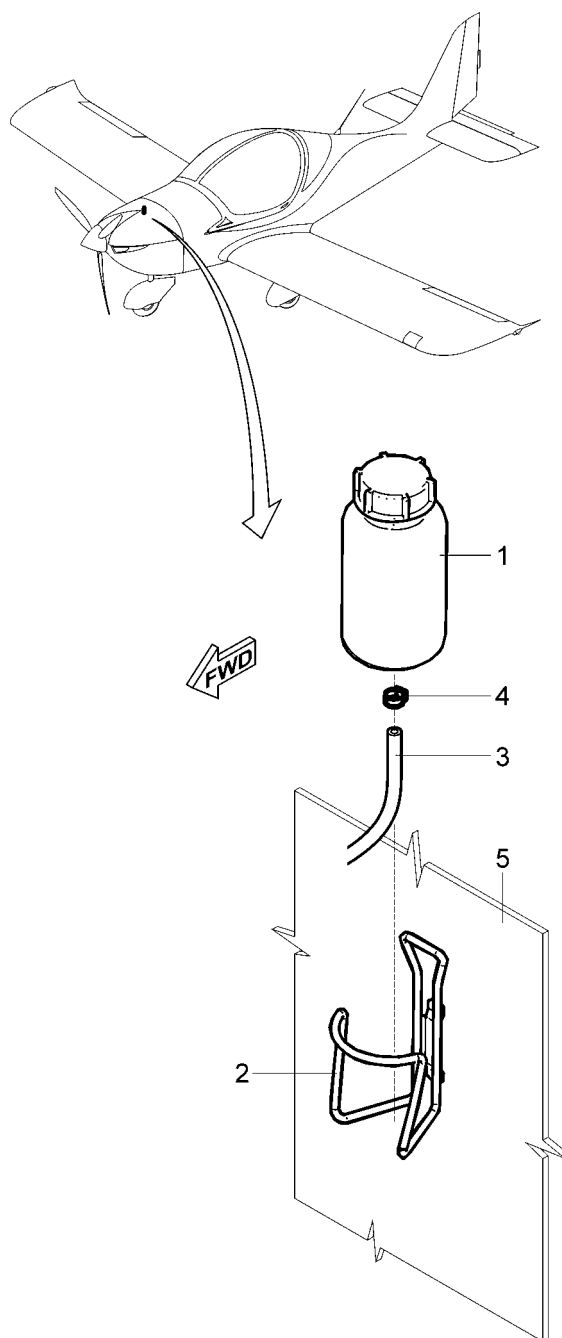
Item	Designation / Size	Quantity	Note
Gripping pliers	Cobra	1 pc.	

WARNING

BEFORE STARTING TO WORK, COOL DOWN THE ENGINE TO THE AMBIENT TEMPERATURE. NON-COMPLIANCE WITH THE PROCEDURE MAY RESULT IN BURNS.

SWITCH OFF THE IGNITION AND TAKE OUT THE KEY!

- (1) Removal – overflow bottle
 - (a) Switch the electrical network off and disconnect the battery.
 - (b) Remove the engine cowlings (Section 71-10).
 - (c) Drain the coolant (Section 12-10).
 - (d) Loosen the clamp (4, Fig. 75-3) and disconnect the hose (3).
 - (e) Remove the bottle (1) from the holder (2).
 - (f) Put an applicable cap on the hose.
- (2) Installation – overflow bottle
 - (a) Remove the cap from the hose (3, Fig. 75-3).
 - (b) Put the bottle (1) into the holder (2).
 - (c) Slide the hose (3) on the bottle neck and attach it with a clamp (4).
 - (d) Refill the cooling system with the coolant (Section 12-10).
 - (e) Connect the battery, switch the electrical network on.
 - (f) Do the engine test and check the tightness.
 - (g) Install the engine cowlings (Section 71-10).



Legend to Fig. 75-3

- 1 Overflow bottle
- 2 Bottle holder
- 3 Hose

- 5 Clamp Cobra 12/18

For information:

- 7 Firewall

Fig. 75-3 Overflow bottle – removal / installation



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CHAPTER

76

**ENGINE
CONTROLS**



CHAPTER 76

ENGINE CONTROLS

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GENERAL

1. INTRODUCTION

This chapter describes the systems that ensure the engine control. The engine control is ensured by the throttle controller and the choke controller.



POWER CONTROL

1. DESCRIPTION AND OPERATION

The airplane is equipped with the E6 04-06 01 throttle control as standard. Optionally, it can be equipped with S6 04-07 01 throttle control.

A. E6 04-06 01 throttle control

The throttle controller **THROTTLE** (1, Fig. 76-1) allows setting the engine power from the idle up to the maximum takeoff power. The front position of the controller corresponds with maximum power; the rear position of the controller corresponds with the idle speed. Rapid changes in the setting of engine power can be performed by pressing the button that is located in the middle part of the controller and by its pushing or pulling. Small changes in the setting of engine power can be performed by turning the controller (power increases in the clockwise direction). The throttle controller is equipped with the locking ring; by its turning in the clockwise direction, the controller is secured in a required position.

The throttle controller is connected by means of bowden cables with the throttle lever on the carburetors. The throttle controller is located in the middle part of the instrument panel.

B. S6 04-07 01 throttle control

The throttle controller **THROTTLE** (1, Fig. 76-1) allows setting the engine power from the idle up to the maximum takeoff power. The front position of the controller corresponds with maximum power; the rear position of the controller corresponds with the idle speed. Rapid changes in the setting of engine power can be performed by its pushing or pulling. Small changes in the setting of engine power can be performed by turning the controller (power increases in the clockwise direction). The throttle controller is equipped with the friction nut; by its turning in the clockwise direction, the controller is secured in a required position.

The throttle controller is connected by means of bowden cables with the throttle lever on the carburetors. The throttle controller is located in the middle part of the instrument panel.

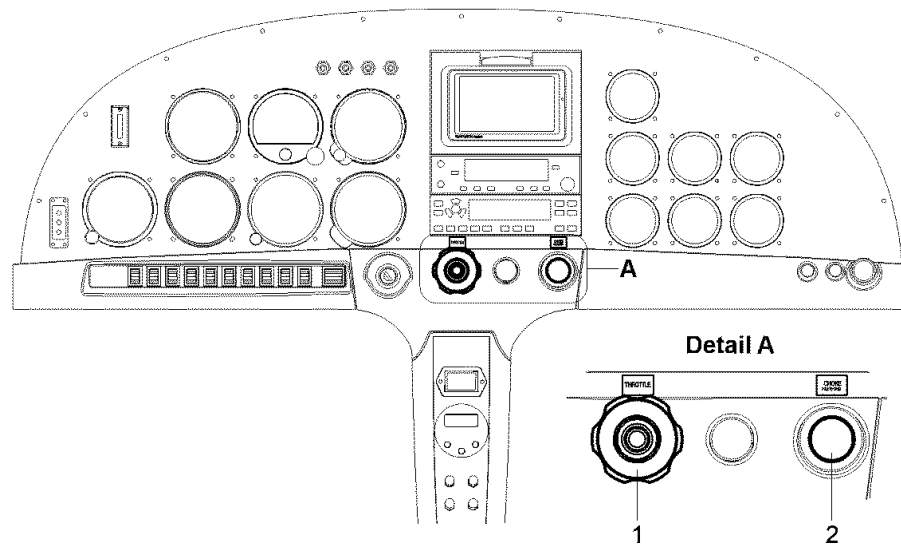
C. Choke control

The choke controller **CHOKE** (2, Fig. 76-1) allows controlling the choke valve on the carburetor. If the controller is in the front position, the choke is switched off; if the controller is in the rear position, the choke is switched on.

The choke controller is connected by means of bowden cables with the lever of choke valve on the carburetors. The choke controller is located in the middle part of the instrument panel.

NOTE

The control of adjustable propeller in flight is described in Section 61-20, the control of carburetor heating is described in Section 71-60.



Legend to Fig. 76-1

1 Throttle controller

2 Choke controller

Fig. 76-1 Engine power controller



2. MAINTENANCE PRACTICES

A. E6 04-06 01 throttle control

Maintenance type: Line

Personnel qualification: Independent verification personnel qualified in accordance with Part 66 or higher

The recommended tools and material:

Item	Designation / Size	Quantity	Note
Wrench	No. 19	1 pc.	
Wrench	No. 9	1 pc.	
Wrench	No. 8	1 pc.	
Flat screwdriver	-	1 pc.	
Nippers	-	-	
Adhesive	Loctite 577	-	
Cleaning agent	Acetone	-	
Grease	AeroShell Grease 22	-	
Cable tie	2,5x99	As needed	
Stainless lockwire	Ø 0,8 mm	-	
Lint-free cloth	-	-	

WARNING

SWITCH OFF THE IGNITION AND TAKE OUT THE KEY!

- (1) Removal – throttle control
 - (a) Switch the electrical network off and disconnect the battery.
 - (b) Remove the engine cowlings (Section 71-10).
 - (c) Remove the lockwire at the end piece (17, Fig. 76-2) and the cable ties attaching the bowden cables to the structure.
 - (d) Release the nut (15) and remove the cable (12) from the hole in the screw (16).
 - (e) Unscrew the nut (4); hold the guide (11) and unscrew the controller (1) from it.
 - (f) Pull up the controller (1), disconnect from the nut (7) and remove it along with the nut (4), washer (3) and the insert (8).
 - (g) Unscrew and remove the screw (13), remove the guide (5) with the ring (6).
 - (h) Pull up the nut (7) with the screw (9) and unscrew the assembly from the nut (10).

NOTE

The nut (7) and the screw (9) are mutually connected by adhesive bonding.

- (i) Remove the nut (10) with the cable (12) and the guide (11).



NOTE

The nut (10) and the cable (12) are mutually connected by soldering.

- (j) Remove the bowden sleeves (14).
- (2) Installation – throttle control
 - (a) Remove the adhesive residues from the nut (10, Fig. 76-2) and the screw (13).
 - (b) Apply the grease on the moving parts of the control.
 - (c) Pull the bowden sleeves (14) through the grommets (19) and insert the ends into the end pieces (17) on the engine.
 - (d) Insert the controller (1) into the hole in the instrument panel (21), put the insert (8) on it, insert it completely, put the washer (3) and screw on the nut (4); don't tighten the nut.
 - (e) Insert the guide (5) with the ring (6) and the nut (10) with the cable (12) into the guide (11).
 - (f) Screw the assembly of the nut (7) with the screw (9) into the nut (10).
 - (g) Connect the controller (1) with the nut and screw the assembled guide (11) on the controller (1).
 - (h) Screw the screw (13) into the nut (10); don't tighten the screw.
 - (i) Press the button on the controller face and press down the controller completely – the nut (10) with the screw (13) must be on the face of the groove in the guide (11); if this is not the case, remove the controller and adjust the position of the nut (10) on the screw (9).
 - (j) After the adjustment, apply the adhesive on the screw (13) and screw it into the nut (10).
 - (k) Insert the cable ends (12) into the bowden sleeves (14) and insert the sleeves into the holes in the guide (11).
 - (l) Pull the cable (12) through, insert it into the hole in the screw (16) and tighten the nut (15).
 - (m) Check the free movement of the controller, and check whether the end positions of the controller correspond with the end positions of the lever on the carburetor – if this is not the case, adjust the positions by means of the end piece (17); after adjusting, tighten the nut (18) and secure the bowden cable by means of lockwire (Section 20-20) and attach it by means of cable ties to the structure.
 - (n) Install the engine cowlings (Section 71-10).
 - (o) Connect the battery, switch the electrical network on.
 - (p) Do the engine test and check the engine control.

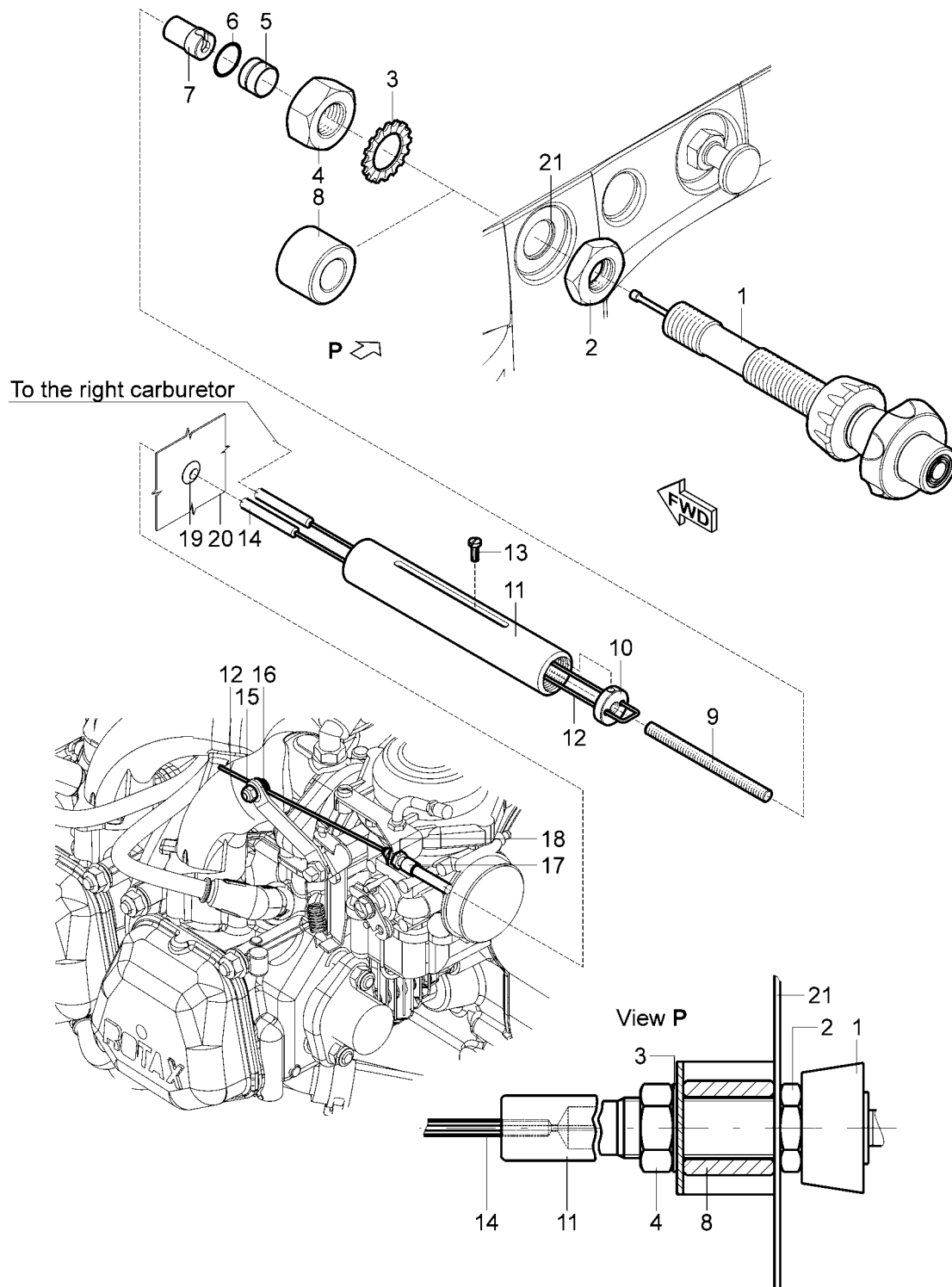


Fig. 76-2 E6 04-06 01 throttle control – removal / installation (page 1 of 2)



Legend to Fig. 76-2

1	Throttle controller	12	Bowden cable
2	Nut	13	Screw M4x10
3	Washer	14	Bowden sleeve
4	Nut	15	Nut
5	Guide	16	Screw
6	Ring	17	End piece of bowden cable
7	Nut	18	Nut
8	Insert	19	Grommet
9	Screw		For information:
10	Nut	20	Firewall
11	Cable guide	21	Instrument panel

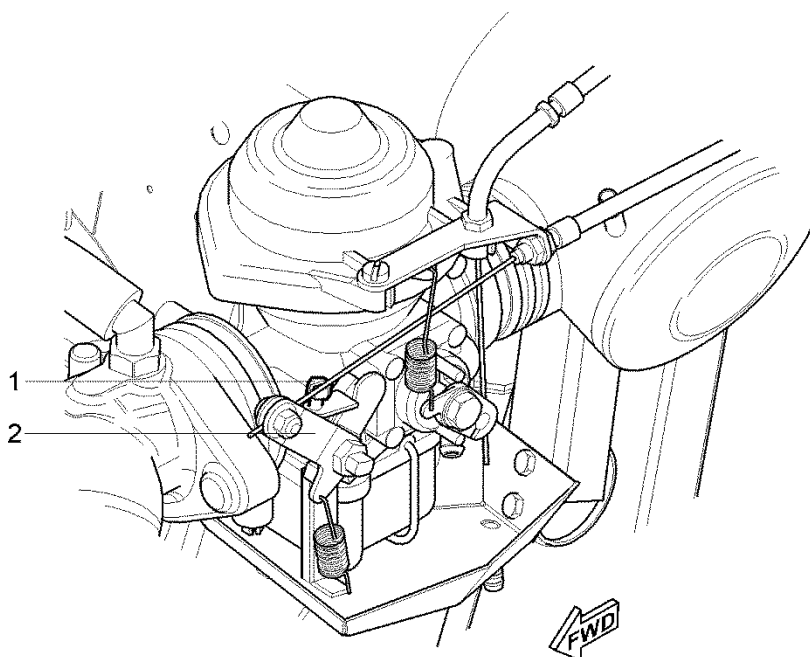
Fig. 76-2 E6 04-06 01 throttle control – removal / installation (page 2 of 2)

- (3) Adjustment / test – adjustment of idle

WARNING

THE IDLE IS ADJUSTED WHEN THE ENGINE IS RUNNING, THEREFORE PAY A MAXIMUM ATTENTION TO THE SAFETY OF THE PERSONS MOVING IN THE VICINITY OF THE ROTATING PROPELLER.

- (a) Anchor the airplane (Section 10-20).
- (b) Remove the upper cowling of the engine (Section 71-10).
- (c) Start the engine.
- (d) By means of the screw on the carburetor (1, Fig. 76-3), adjust the idle speed so that it corresponds with the value of about 1400 RPM.
- (e) Switch off the engine.
- (f) Install the upper cowling of the engine (Section 71-10).



Legend to Fig. 76-3

1 Setting screw

2 Throttle lever

*Fig. 76-3 Adjustment of idle***B. S6 04-07 01 throttle control**

Maintenance type: Line

Personnel qualification: Independent verification personnel qualified in accordance with Part 66 or higher

The recommended tools and material:

Item	Designation / Size	Quantity	Note
Wrench	1 1/8 in	2 pcs.	
Wrench	No. 10	1 pc.	
Hex wrench	No. 1,5	1 pc.	
Cable tie	2,5x99	As needed	
Nippers	-	-	

WARNING**SWITCH OFF THE IGNITION AND TAKE OUT THE KEY!**

- (1) Removal – throttle control
 - (a) Switch the electrical network off and disconnect the battery.
 - (b) Remove the engine cowlings (Section 71-10).
 - (c) Remove the the cable ties attaching the bowden cables to the structure.
 - (d) Release the screw (16, Fig. 76-4) and loose the stop (15).



- (e) Release the screw (12) and loose the bowden sleeve (8).
 - (f) Release the nut (18) and remove the cable (5) from the hole in the screw (17).
 - (g) Unscrew the nut (9) and remove the complete controller assembly (1; 2; 3; 4; 5; 6; 7; 8) together with the nut (9) and the washer (10).
- (2) Installation – throttle control

CAUTION

AT ALL TIMES DURING THE INSTALLATION PROCESS, THE
PUSH ROD (4, FIG. 76-4) MUST REMAIN INSERTED
COMPLETELY THROUGH THE PIN CAGE (3).

- (a) Remove the jam nut (9) and lock washer (10) as necessary. Unthread the friction nut (2) from the panel bolt (6) and carefully remove the panel bolt (6), housing (7), bowden sleeves (8) assembly.

CAUTION

THE PUSH ROD (4) MUST ALWAYS BE ENGAGED IN THE
PIN CAGE (3) OR THE CONTROL MAY BE PERMANENTLY
DAMAGED.

- (b) Insert the panel bolt (6), housing (7) and bowden sleeves (8) assembly through the hole in the instrument panel (22) put the lock washer (10) and screw on the jam nut (9).
- (c) Pull the bowden sleeves (8) through the grommets (20) and insert the ends into the end pieces (11) on the engine. Route the bowden sleeves as directly as possible. Bowden sleeves bends should be at the maximum possible radius.
- (d) Carefully feed the bowden cables (5) into the panel bolt (6) and thread the friction nut (2) into the panel bolt (6). Tighten the lock washer (10) and jam nut (9) to secure the control to the instrument panel. Remember, the push rod (4) must always remain engaged in the pin cage (3) to avoid damage.
- (e) Insert the stop (15) at the ends of the cable (5); do not tighten the screw (16).
- (f) Insert the cable (5) into the hole in the screw (17) and tighten the nut (18).

CAUTION

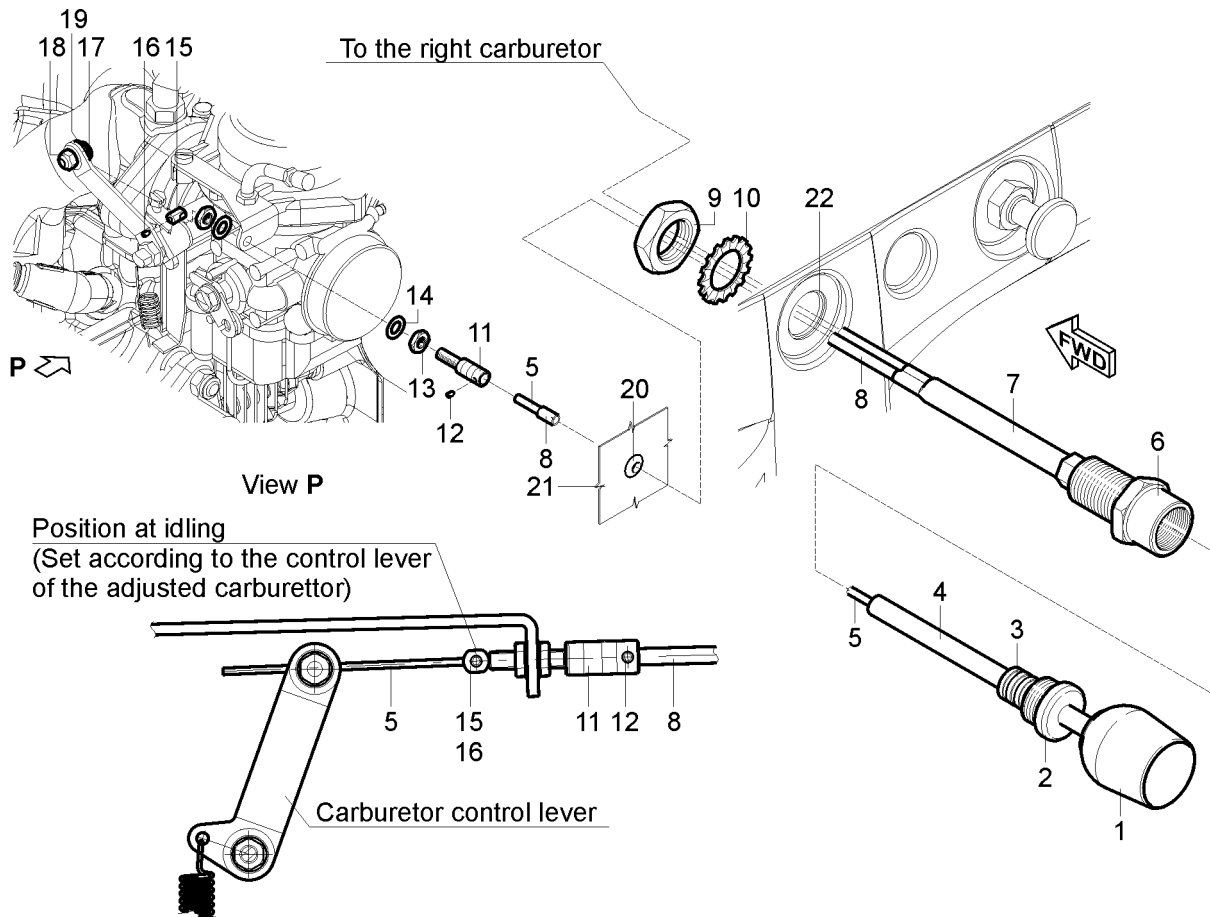
CONTROL TRAVEL MUST NOT EXCEED 89 MM OR THE
CONTROL WILL BE PERMANENTLY DAMAGED.

- (g) Check the free movement of the controller, and check whether the end positions of the controller correspond with the end positions of the lever on the carburetor – if this is not the case, adjust the positions by means of the end piece (11); after adjusting, tighten the nuts (13), the screws (12; 16) and attach bowden cables by means of cable ties to the structure.
- (h) Install the engine cowlings (Section 71-10).
- (i) Connect the battery, switch the electrical network on.
- (j) Do the engine test and check the engine control.



(3) Adjustment / test – adjustment of idle

See par. 2 A.(3).



Position at idling
(Set according to the control lever
of the adjusted carburettor)

Legend to Fig. 76-4

1 Throttle knob	13 Nut (2 pcs.)
2 Friction nut	14 Washer (2 pcs.)
3 Pin cage	15 Stop
4 Push rod	16 Screw
5 Bowden cable	17 Screw
6 Panel bolt	18 Nut
7 Housing	19 Washer
8 Bowden sleeve	20 Grommet
9 Jam nut	For information:
10 Lock washer	21 Firewall
11 End piece of bowden cable	22 Instrument panel
12 Screw	

Fig. 76-4 S6 04-07 01 throttle control – removal / installation



C. Choke control

Maintenance type: Line

Personnel qualification: Independent verification personnel qualified in accordance with Part 66 or higher

The recommended tools and material:

Item	Designation / Size	Quantity	Note
Wrench	No. 19	1 pc.	
Wrench	No. 9	1 pc.	
Hex wrench	No. 2	1 pc.	
Flat screwdriver	-	1 pc.	
Pliers	-	1 pc.	
Copper / aluminum sheet metal	20x10x1 mm	1 pc.	Handle dismantling
Stainless lockwire	ø 0,8 mm	-	
Grease	AeroShell Grease 22	-	
Cleaning agent	Acetone	-	
Sealant	Emfimastic PU 40	-	
Lint-free cloth	-	-	

WARNING

SWITCH OFF THE IGNITION AND TAKE OUT THE KEY!

- (1) Removal – choke control
 - (a) Switch the electrical network off and disconnect the battery.
 - (b) Remove the engine cowlings (Section 71-10).
 - (c) Remove the lockwire at the end piece (9, Fig. 76-5) and the cable ties attaching the bowden cables to the structure.
 - (d) Remove the sealant that secures the bowden sleeves (9) on the stop (6).
 - (e) Release the screw (15) and remove the cable (8) from the insert (13).
 - (f) Pull up the controller, grip the pull-rod (4) through a copper/aluminum sheet metal, and unscrew the handle (1).
 - (g) Unscrew the nut (2) and dismantle the assembly of choke control.
 - (h) Unscrew the screws (7) and remove the body (3) with the pull-rod (4) and the stop (6).
 - (i) Remove the pull-rod (4) with the cable (8).

NOTE

The cable (8) is beaded in the pull-rod (4).

- (j) Remove the bowden sleeves (9).



- (2) Installation – choke control
 - (a) Remove the adhesive residues from the body (3, Fig. 76-5) and from the screws (7); remove the sealant residues from the bowden sleeves (9) and from the stop.
 - (b) Apply grease on the movable parts of the control.
 - (c) Pull the bowden sleeves (9) through the grommets (10) and insert the ends into the end pieces (11) on the engine.
 - (d) Pull the cable end pieces (8) through the stop (6) and insert the pull-rod (4) into the body (3).
 - (e) Set the body (3) to position in the stop (6), apply adhesive on the screw threads (7) and screw them into the body.
 - (f) Insert the choke control assembly into the hole in the instrument panel (15), screw the nut (2) and tighten it.
 - (g) Insert the end pieces of the cable (8) into the bowden sleeves (9), set the sleeves to position to the stop (6) and secure them by sealant.
 - (h) Pull the cable ends (12) through, put them into the insert (13) and tighten the screw (15).
 - (i) Check the free movement of the controller and whether the end positions of the controller correspond with the end positions of the lever on the carburetor – if this is not the case, adjust the positions by means of the end piece (11); after checking, tighten the nut (18) and secure the bowden cable by means of lockwire (Section 20-20) and attach it by means of cable ties to the structure.
 - (j) Install the engine cowlings (Section 71-10).
 - (k) Connect the battery, switch the electrical network on.
 - (l) Do the engine test and check the choke control.

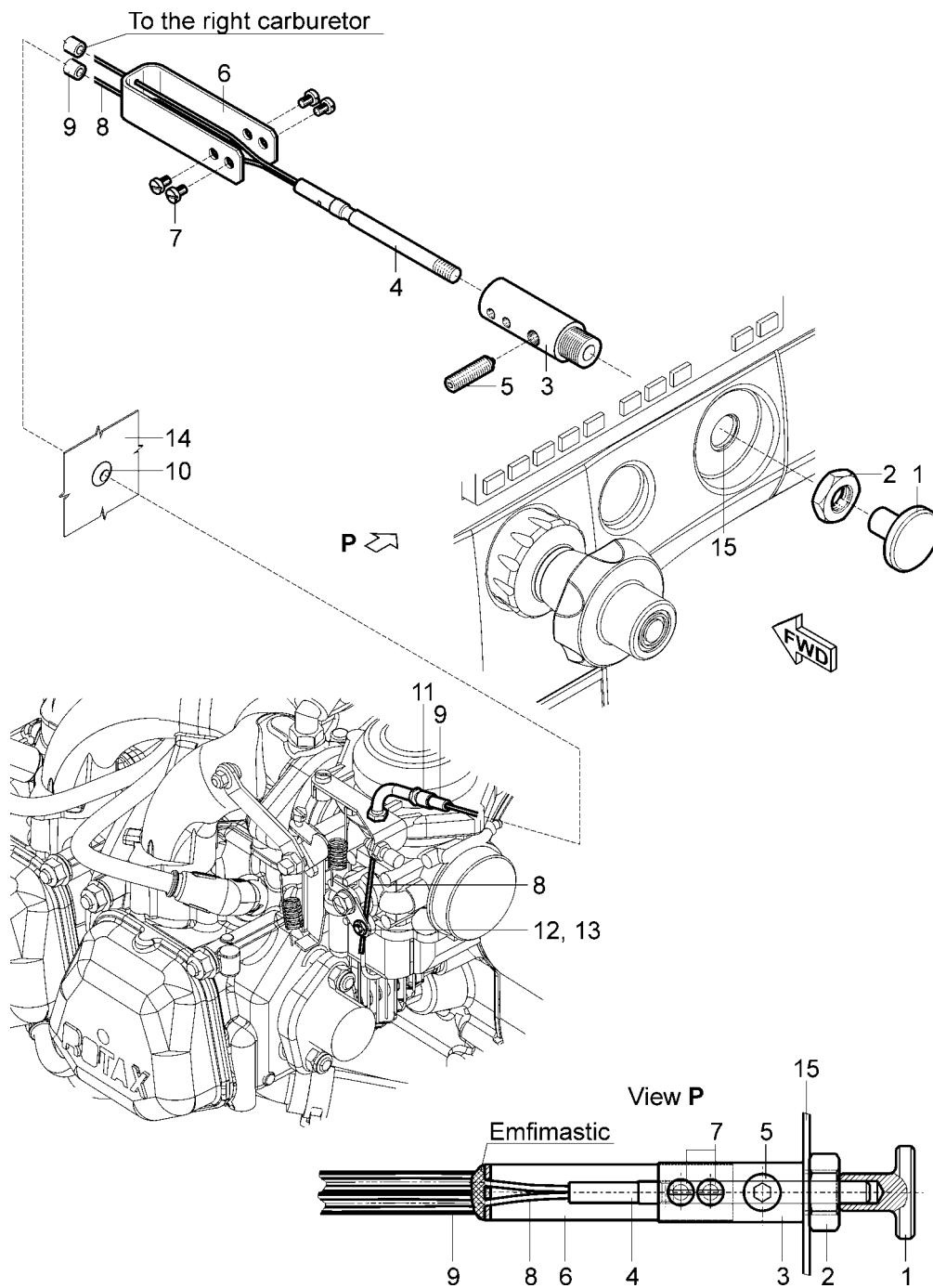


Fig. 76-5 Choke control – removal / installation (page 1 of 2)



Legend to Fig. 76-5

1	Handle	9	Bowden sleeve
2	Nut M12	10	Grommet
3	Body	11	End piece of bowden cable
4	Assembled pull-rod	12	Insert
5	Flexible pin	13	Screw M4x16
6	Stop		For information:
7	Screw M4x5	14	Firewall
8	Bowden cable	15	Instrument panel

Fig. 76-5 Choke control – removal / installation (page 2 of 2)

CHAPTER

77

**ENGINE
INDICATING**



CHAPTER 77

ENGINE INDICATING

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GENERAL

1. INTRODUCTION

The components that monitor the engine operation are described in this chapter. Depending on the airplane instruments, the components include the indication of engine speed, manifold pressure, cylinder head temperature or coolant temperature and the exhaust gases temperature.

The monitored parameters of the fuel system and the oil system parameters are described in Chapters 28 and 79.



POWER

1. DESCRIPTION AND OPERATION

The following parameters of engine power are monitored and indicated on the airplane:

- engine speed
- manifold pressure.

A. Engine speed

The sensor of engine speed (5, Fig. 74-1) is part of the installed engine generator. The output from the sensor is formed by an alternating electrical signal whose pulse corresponds to one revolution of engine. For the airplanes equipped with analog instruments, the signal from the sensor is led to the engine speed indicator. For the airplane equipped with the Dynon SkyView system, the signal is led to the module SV-EMS-220 and the value is indicated on the displays of the system; for the airplane equipped with the Garmin G3X system, the signal is led to the EIS unit GEA-24 and the value is indicated on the MFD.

The wiring diagram is shown in Chapter 91.

B. Manifold pressure

The pressure is led from the compensation tube between the carburetors. For the airplanes equipped with analog instruments, the pressure is led to the manifold pressure indicator that is located on the instrument panel. For the airplanes equipped with the Dynon SkyView system or Garmin G3X system, the pressure is led to the sensor that is located on the firewall. The output from the sensor is formed by an electrical signal. For the airplane equipped with the Dynon SkyView system, the signal is led to the module SV-EMS-220 and the value is indicated on the displays of the system; for the airplane equipped with the Garmin G3X system, the signal is led to the EIS unit GEA-24 and the value is indicated on the MFD.

The wiring diagram is shown in Chapter 91.

C. SV-EMS-220 module

The SV-EMS-220 module that monitors the engine parameters is part of the Dynon SkyView system (Section 34-10). The engine parameters, sensed by the sensors on the engine, are sent to the SV-EMS-220 module for processing and from there they are sent to the display SV-D700 or to the display SV-D1000 on which they are indicated. The module is located on the left on the inner side of the firewall.

The EMS module indicates the following data:

- engine speed
- manifold pressure
- temperature and pressure of oil (Section 79-30)
- exhaust gases temperature (Section 77-20)
- cylinder heads temperature or coolant temperature (Section 77-20)
- quantity of fuel in the tanks, pressure and flow rate of fuel (Section 28-40)
- electric voltage and current
- position of wing flaps, pitch trim tab and closing of cockpit



- information on exceeding some of the monitored engine parameters.

The wiring diagram of the Dynon SkyView system is shown in Chapter 91.

NOTE

The detailed description and the information concerning the operation of the Dynon SkyView system are available in the document Dynon SkyView System Installation Guide, Document 101320-022, Revision W, dated January 2016 or in a later valid issue.

D. GEA 24 EIS unit

The EIS unit GEA 24 unit that monitors the engine parameters is part of the Garmin G3X system (Section 34-10). The engine parameters, sensed by the sensors on the engine, are sent to the EIS GE3A 24 unit for processing and from there they are sent to the MFD on which they are indicated. The unit is located on the left on the inner side of the firewall.

The EIS unit indicates the following data:

- engine speed
- manifold pressure
- temperature and pressure of oil (Section 79-30)
- exhaust gases temperature (Section 77-20)
- coolant temperature (Section 77-20)
- quantity of fuel in the tanks, pressure and flow rate of fuel (Section 28-40)
- electric voltage and current
- position of wing flaps, pitch trim tab and closing of cockpit
- information on exceeding some of the monitored engine parameters.

The wiring diagram of the Garmin G3X system is shown in Chapter 91.

NOTE

The detailed description and the information concerning the operation of the Garmin G3X system are available in the document Garmin G3X/G3X Touch Installation Manual, Document 190-01115-01, Revision AC, dated July 2017 or in a later valid issue.



2. MAINTENANCE PRACTICES

A. Engine speed sensor

The procedures of maintenance are shown in the document Maintenance Manual (Line Maintenance) for the Rotax Engine Type 912 Series, doc. No. MML-912, 899191.

B. Engine speed indicator

Maintenance type: Line

Personnel qualification: Independent verification personnel qualified in accordance with Part 66 or higher

The recommended tools and material:

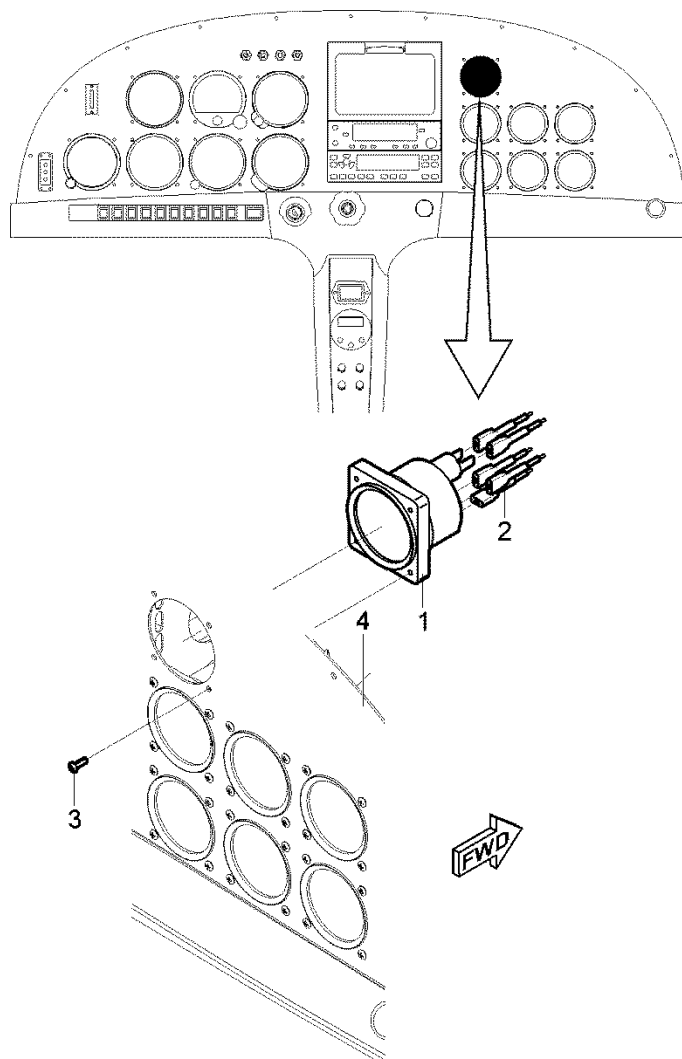
Item	Designation / Size	Quantity	Note
Phillips screwdriver	No. 2	1 pc.	

(1) Removal – engine speed indicator

- (a) Switch the electrical network off and disconnect the battery.
- (b) Remove the cover of the upper part of the fuselage F4 (Section 53-30).
- (c) Disconnect the wires (2, Fig. 77-1).
- (d) Unscrew the screws (3) and remove the engine speed indicator (1).

(2) Installation – engine speed indicator

- (a) Insert the engine speed indicator (1, Fig. 77-1) into the hole in the instrument panel (4); screw on and tighten the screws (3).
- (b) Connect the wires (2).
- (c) Install the cover of the upper part of the fuselage F4 (Section 53-30).
- (d) Connect the battery, switch the electrical network on.
- (e) Do the engine test and check the function of the engine speed indicator.



Legend to Fig. 77-1

- 1 Engine speed indicator
- 2 Wires
- 3 Screw (4 pcs.)

- For information:
- 4 Instrument panel

Fig. 77-1 Engine speed indicator – removal / installation


C. SV-D700 display
NOTE

The maintenance procedures for the SV-D1000 display are shown in Section 34-10.

Maintenance type: Line

Personnel qualification: Independent verification personnel qualified in accordance with Part 66 or higher

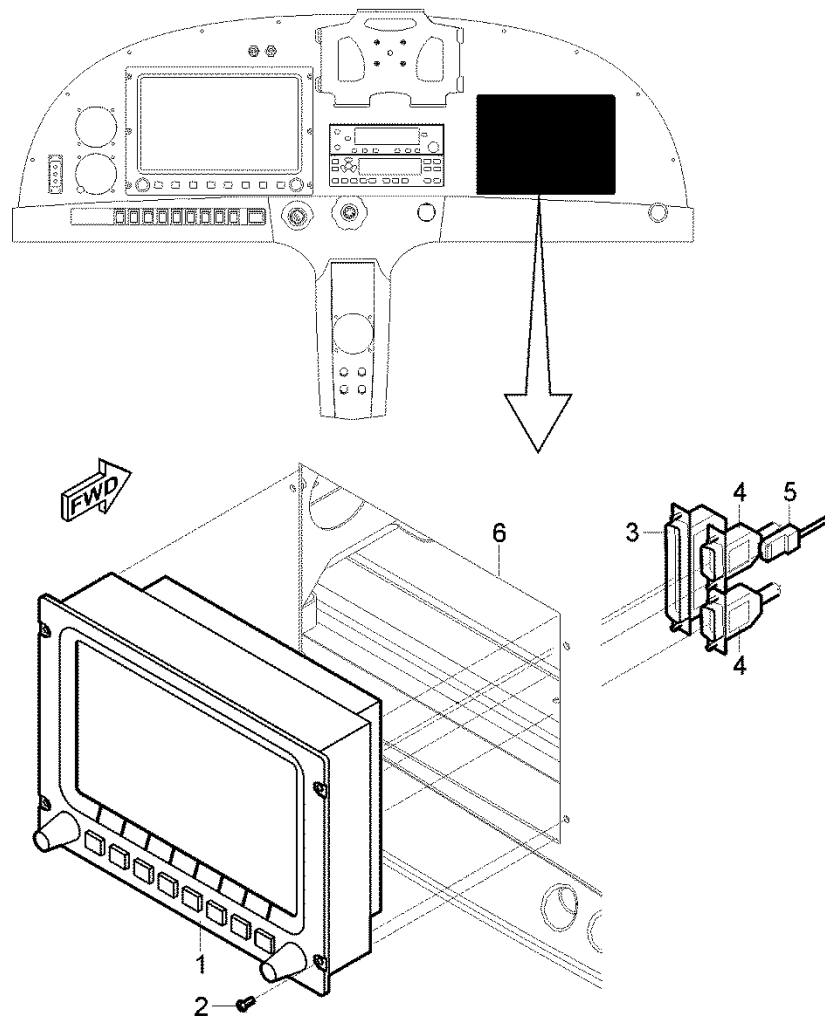
The recommended tools and material:

Item	Designation / Size	Quantity	Note
Hex wrench	5/64"	1 pc.	
Phillips screwdriver	No. 2	1 pc.	
Flat screwdriver	-	1 pc.	

WARNING

UNAUTHORIZED ENTRY TO THE SYSTEM SETTING AND NON-OBSERVANCE OF SET DOWN PROCEDURES OF SYSTEM UPDATING CAN CAUSE INCORRECT FUNCTION OR A TOTAL FAILURE OF THE WHOLE DYNON SKYVIEW SYSTEM!

- (1) Removal – SV-D700 display
 - (a) Create the backup of the system setting (see Information Bulletin RTC-013b, the latest valid issue).
 - (b) Switch the electrical network off and disconnect the battery.
 - (c) Remove the cover of the upper part of the fuselage F4 (Section 53-30).
 - (d) Unscrew the screws (2, Fig. 77-2) and release the display (1).
 - (e) Disconnect the connectors (3; 4; 5).
 - (f) Remove the display.
- (2) Installation – SV-D700 display
 - (a) Connect the connectors (3; 4; 5, Fig. 77-2) to the display (1).
 - (b) Insert the display (1) into the hole in the instrument panel (6) and attach it by means of the screws (2).
 - (c) Install the upper part of the fuselage F4 (Section 53-30).
 - (d) Connect the battery, switch the electrical network on.
 - (e) In the case of a display replacement, follow the Information Bulletin RTC-013b, the latest valid issue.



Legend to Fig. 77-2

1	SV-D700 display	5	Ethernet connector
2	Screw (4 pcs.)	For information:	
3	DB37 connector	6	Instrument panel
4	DB9 network connector		

Fig. 77-2 SV-D700 display – removal / installation


D. GDU 460 MFD
NOTE

The maintenance procedures for the PFD are shown in Section 34-10.

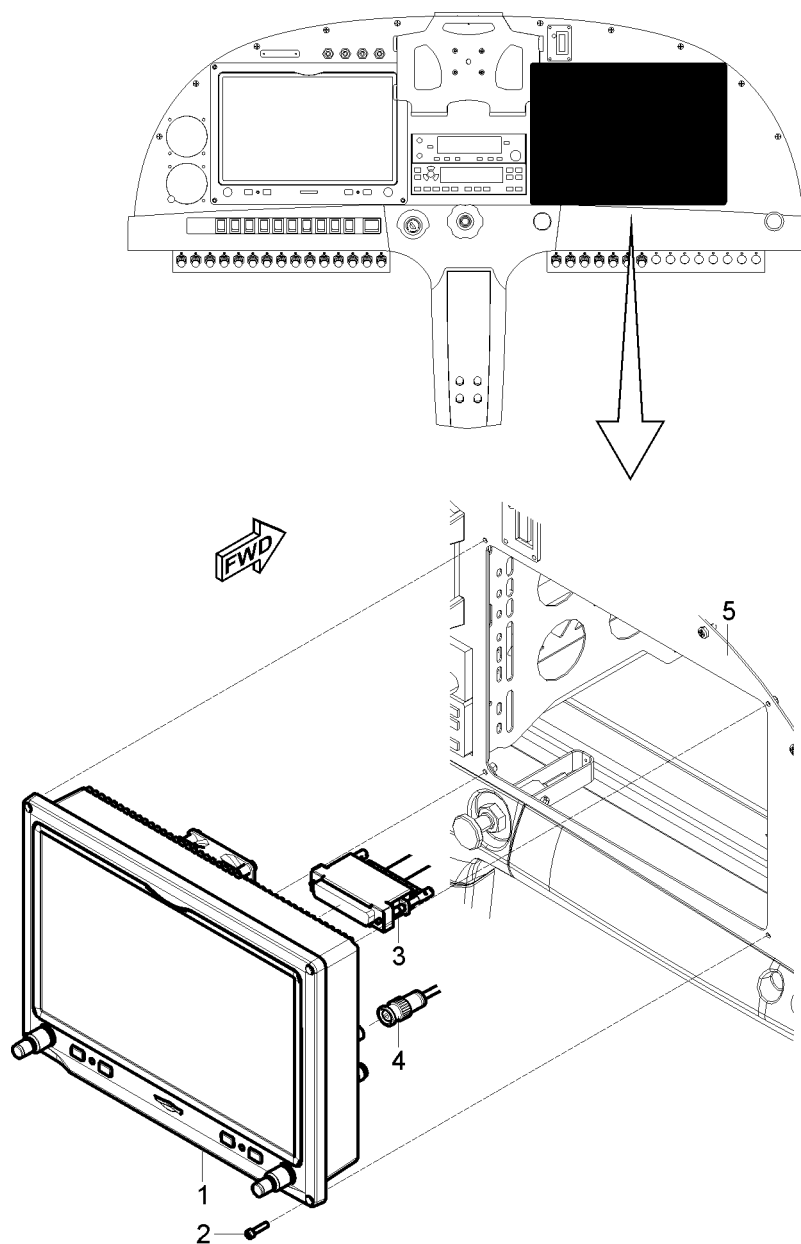
Maintenance type: Line

Personnel qualification: Independent verification personnel qualified in accordance with Part 66 or higher

The recommended tools and material:

Item	Designation / Size	Quantity	Note
Hex wrench	3/32"	1 pc.	
Phillips screwdriver	No. 2	1 pc.	

- (1) Removal – GDU 460 MFD
 - (a) Switch the electrical network off and disconnect the battery.
 - (b) Remove the cover of the upper part of the fuselage F4 (Section 53-30).
 - (c) Unscrew the screws (2, Fig. 77-3) and release the display (1).
 - (d) Disconnect the connectors (3; 4).
 - (e) Remove the display.
- (2) Installation – GDU 460 MFD
 - (a) Connect the connectors (3; 4, Fig. 77-3) to the display (1).
 - (b) Insert the display (1) into the hole in the instrument panel (5) and attach it by means of the screws (2).
 - (c) Install the upper part of the fuselage F4 (Section 53-30).
 - (d) Connect the battery, switch the electrical network on.



Legend to Fig. 77-3

1 GDU 460 MFD

2 Screw (4 pcs.)

3 P4602 connector

4 GPS antenna connector

For information:

5 Instrument panel

Fig. 77-3 GDU 460 MFD – removal / installation


E. SV-EMS-220 module

Maintenance type: Line

Personnel qualification: Independent verification personnel qualified in accordance with Part 66 or higher

The recommended tools and material:

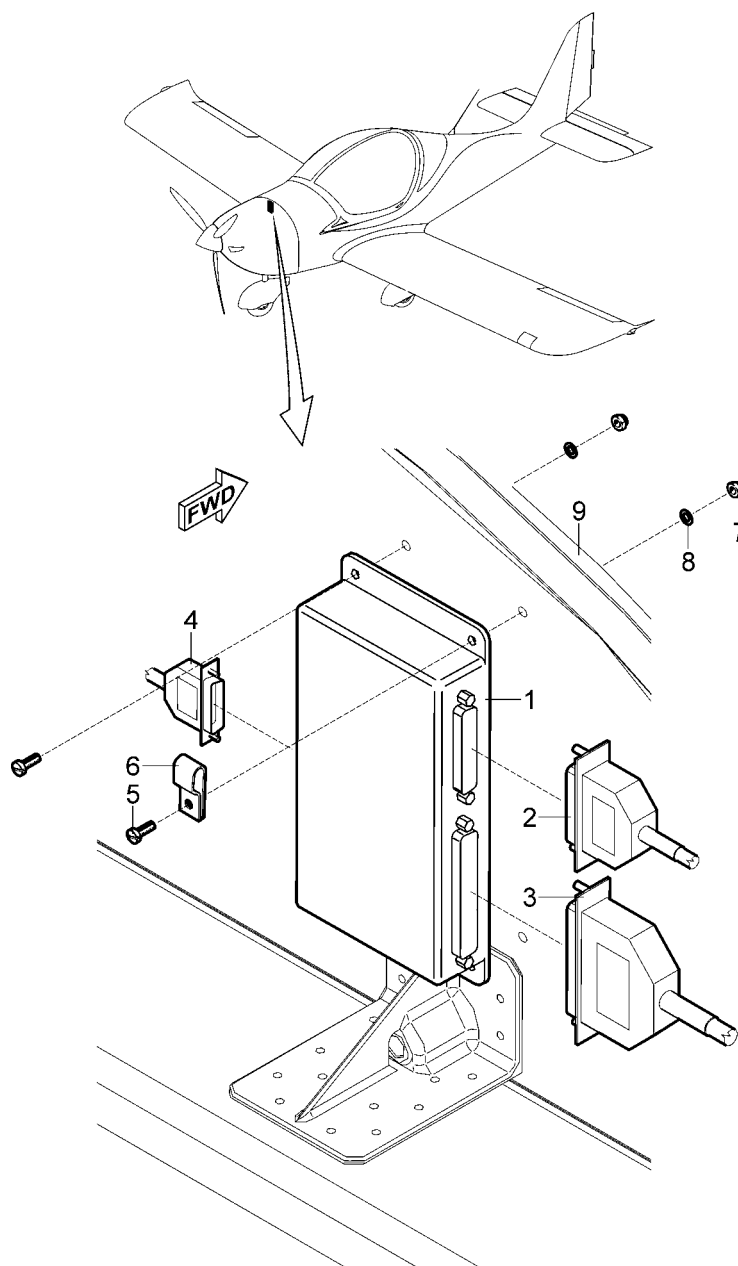
Item	Designation / Size	Quantity	Note
Flat screwdriver	-	1 pc.	
Phillips screwdriver	No. 2	1 pc.	
Wrench	No. 7	1 pc.	

(1) Removal – SV-EMS-220 module

- (a) Switch the electrical network off and disconnect the battery.
- (b) Remove the cover of the upper part of the fuselage F4 (Section 53-30).
- (c) Disconnect the connectors (2; 3; 4, Fig. 77-4).
- (d) Unscrew and remove the nuts (7), washers (8), screws (5) and the clamp(6).
- (e) Remove the module (1).

(2) Installation – SV-EMS-220 module

- (a) Put the module (1, Fig. 77-4) to the appropriate position on the firewall (9) and attach it by means of the screws (5), washers (6) and the nuts (7); put the clamp (6) with the connector wires (4) on the upper right screw.
- (b) Connect the connectors (2; 3; 4).
- (c) Install the cover of the upper part of the fuselage F4 (Section 53-30).
- (d) Connect the battery, switch the electrical network on.
- (e) In the case of a module replacement, follow the Information Bulletin RTC-013b, the latest valid issue.



Legend to Fig. 77-4

1	SV-EMS-220 module	6	Clamp
2	DB25 connector	7	Nut M4 (4 pcs.)
3	DB37 connector	8	Washer 4,3 (4 pcs.)
4	DB9 network connector		For information:
5	Screw M4x10 (4 pcs.)	9	Firewall

Fig. 77-4 SV-EMS-220 module – removal / installation


F. GEA 24 EIS unit

Maintenance type: Line

Personnel qualification: Independent verification personnel qualified in accordance with Part 66 or higher

The recommended tools and material:

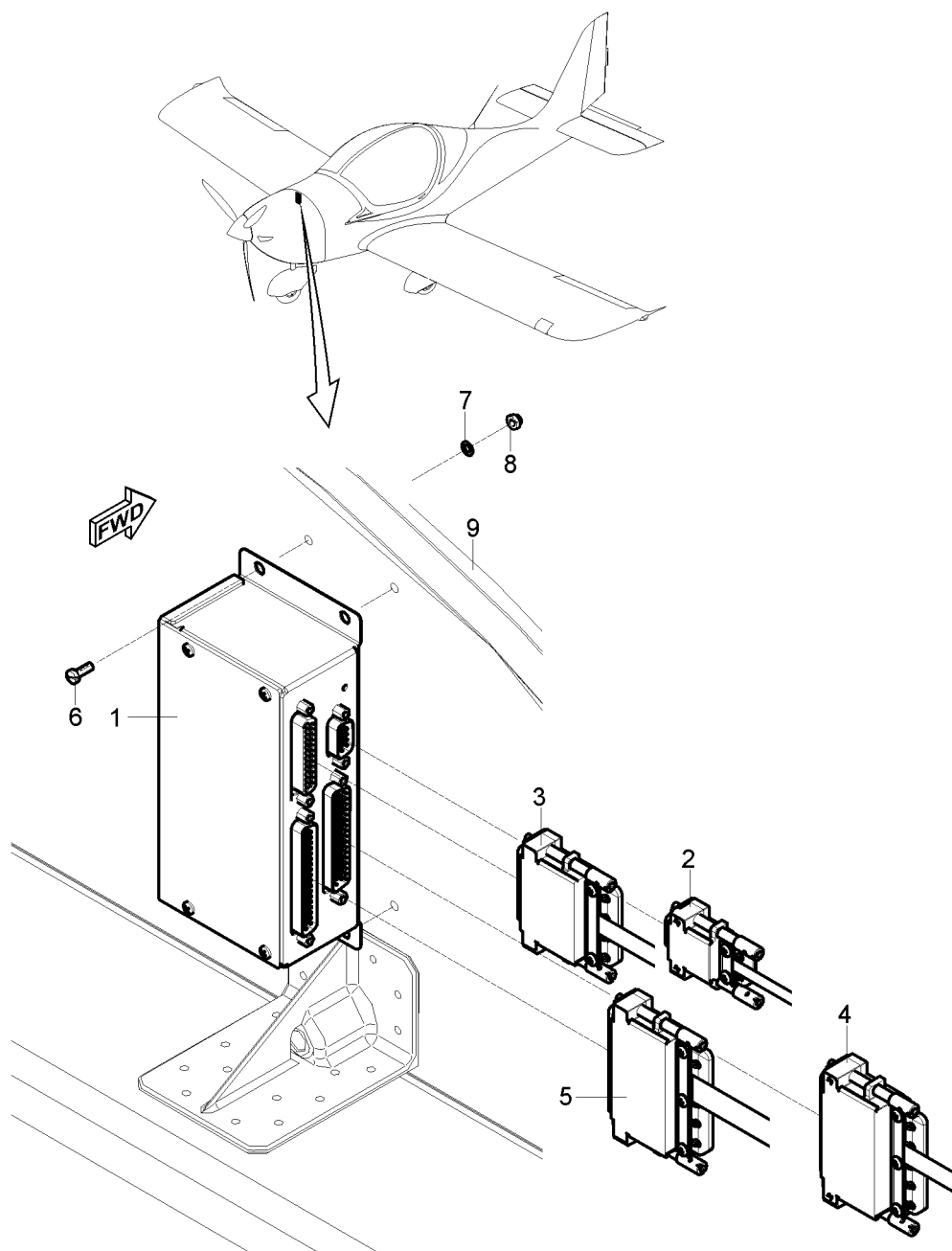
Item	Designation / Size	Quantity	Note
Flat screwdriver	-	1 pc.	
Phillips screwdriver	No. 2	1 pc.	
Wrench	No. 7	1 pc.	

(1) Removal – GEA 24 EIS unit

- (a) Switch the electrical network off and disconnect the battery.
- (b) Remove the cover of the upper part of the fuselage F4 (Section 53-30).
- (c) Disconnect the connectors (2; 3; 4; 5, Fig. 77-5).
- (d) Unscrew and remove the nuts (7), washers (8) and screws (5).
- (e) Remove the unit (1).

(2) Installation – GEA 24 EIS unit

- (a) Put the unit (1, Fig. 77-5) to the appropriate position on the firewall (9) and attach it by means of the screws (5), washers (6) and the nuts (7).
- (b) Connect the connectors (2; 3; 4; 5).
- (c) Install the cover of the upper part of the fuselage F4 (Section 53-30).
- (d) Connect the battery, switch the electrical network on.



Legend to Fig. 77-5

1	GEA 24 EIS unit	6	Screw M4x10 (4 pcs.)
2	J241 connector	7	Nut M4 (4 pcs.)
3	J242 connector	8	Washer 4,3 (4 pcs.)
4	J243 connector		For information:
5	J244 connector	9	Firewall

Fig. 77-5 GEA 24 EIS unit – removal / installation


G. Manifold pressure sensor

Maintenance type: Line

Personnel qualification: Independent verification personnel qualified in accordance with Part 66 or higher

The recommended tools and material:

Item	Designation / Size	Quantity	Note
Flat screwdriver	-	1 pc.	
Gripping pliers	Cobra	1 pc.	
Wrench	No. 7	1 pc.	
Wrench	No. 8	1 pc.	
Wrench	No. 17	1 pc.	
Wrench	No. 24	1 pc.	
Stainless lockwire	Ø 0,8 mm	-	

(1) Removal – manifold pressure sensor

- (a) Switch the electrical network off and disconnect the battery.
- (b) Remove the engine cowlings (Section 71-10).
- (c) For the airplane equipped with the SkyView system:
 - 1 Release the clamp (4, Fig. 77-6) by means of pliers and pull down the hose (3) from the sensor socket (1).
 - 2 Disconnect the connector (2).
 - 3 Unscrew and remove the nuts (6), washers (7) and screws (5).
 - 4 Remove the sensor (1).
 - 5 Close the hose and the socket on the sensor (if reinstalled) by means of blind plugs.
- (d) For the airplane equipped with the Garmin G3X system:
 - 1 Remove the cover of the upper part of the fuselage F4 (Section 53-30).
 - 2 Disconnect the connector (9).
 - 3 Unscrew and remove the fuel pressure sensor (8).
 - 4 Close the screw connection on the sensor (if reinstalled) and screw fitting by means of blind plugs.

Remove the screw fitting as necessary:

- 5 Cut off the lockwire (17) and pull off the pyrojacket (16).
- 6 Release the clamp (15) by means of pliers and pull off the hose (14) from the neck of the screw fitting (10).
- 7 Unscrew and remove the nut (12), washer (13) and remove the screw fitting (10).
- 8 Close the hose by means of blind plug.



- (2) Installation – manifold pressure sensor
- (a) For the airplane equipped with the SkyView system:
- 1 Remove the blind plugs from the hose and from the socket on the sensor.
 - 2 Put the sensor (1, Fig. 77-6) to the appropriate position on the firewall (8) and attach it by means of the screws (5), washers (7) and the nuts (6).
 - 3 Connect the connector (2).
 - 4 Connect the hose (3) to the socket on the sensor (1); secure the hose by means of the clamp (4) using the pliers.
- (b) For the airplane equipped with the Garmin G3X system:
- 1 Remove the blind plugs.
 - 2 Insert the screw fitting (10) into the hole in the firewall (18) and attach it by means of the nut (12) and the washer (13).
 - 3 Connect the hose (14) on the neck of the screw fitting (10); secure the hose by the clamp (15) using pliers.
 - 4 Pull the pyrojacket (16) over the screw fitting and secure it by lockwire (17) (Section 20-20).
- Install the sensor:
- 5 Remove the blind plugs.
 - 6 Check the condition of the sealing ring (11); replace the damaged ring.
 - 7 Screw the sensor (8) with the sealing ring (11) into the screw fitting (10) and tighten it.
 - 8 Connect the connector (9).
 - 9 Install the cover of the upper part of the fuselage F4 (Section 53-30).
- (c) Install the engine cowlings (Section 71-10).
- (d) Connect the battery, switch the electrical network on.
- (e) Do the engine test and check the function of the sensor.

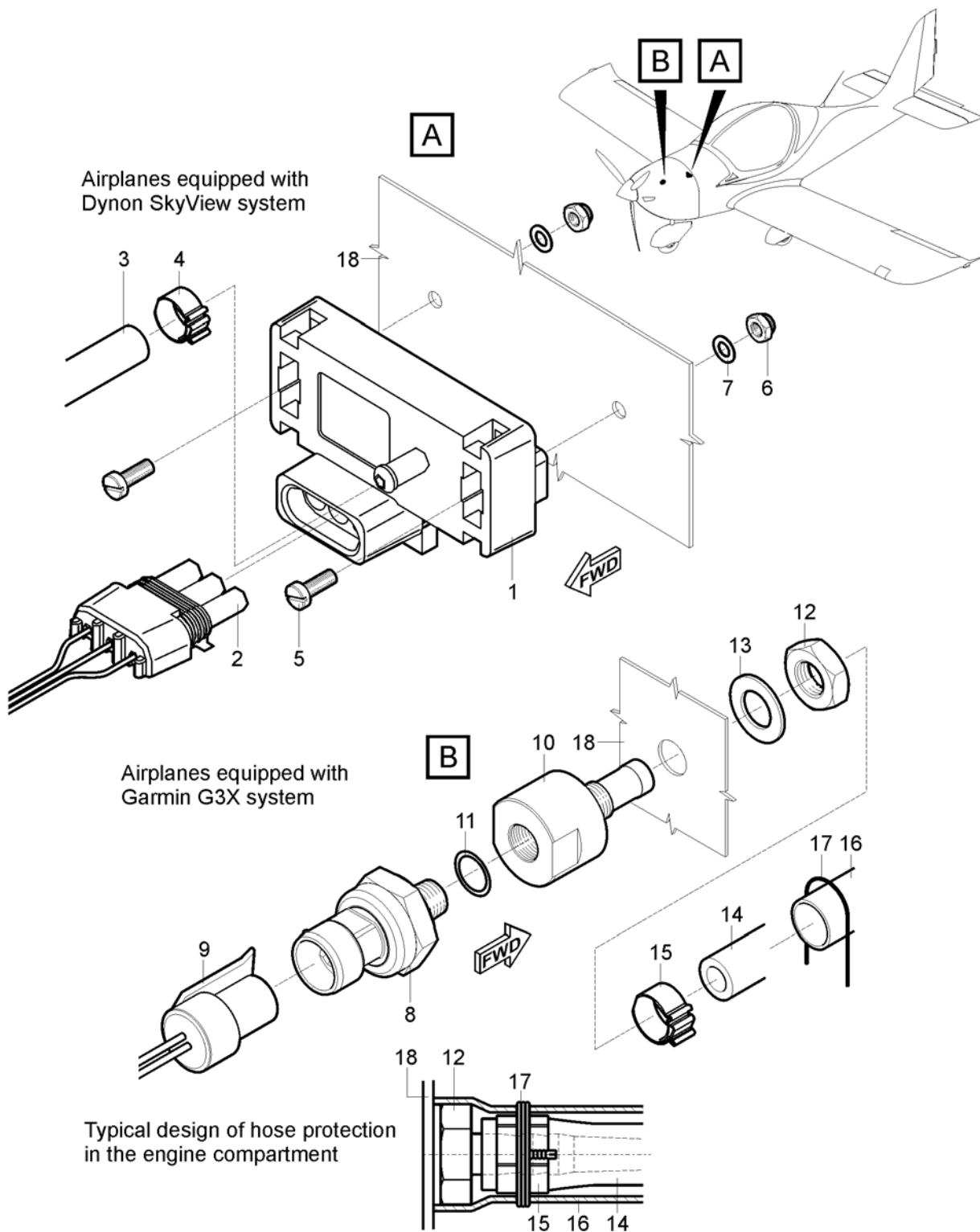


Fig. 77-6 Manifold pressure sensor – removal / installation (page 1 of 2)



Legend to Fig. 77-6

1	Manifold pressure sensor	11	Sealing ring
2	Connector with wires	12	Nut M10
3	Hose	13	Washer 10,5
4	Clamp Cobra 11/7	14	Hose
5	Screw M4x10 (2 pcs.)	15	Clamp Cobra 11/7
6	Nut M4 (2 pcs.)	16	Pyrojacket
7	Washer 4,3 (2 pcs.)	17	Lockwire
8	Manifold pressure sensor		For information:
9	Connector with wires	18	Firewall
10	Screw fitting		

Fig. 77-6 Manifold pressure sensor – removal / installation (page 2 of 2)

H. Manifold pressure indicator

Maintenance type: Line

Personnel qualification: Independent verification personnel qualified in accordance with Part 66 or higher

The recommended tools and material:

Item	Designation / Size	Quantity	Note
Phillips screwdriver	No. 2	1 pc.	
Wrench	No. 10	1 pc.	
Gripping pliers	Cobra	1 pc.	

(1) Removal – manifold pressure indicator

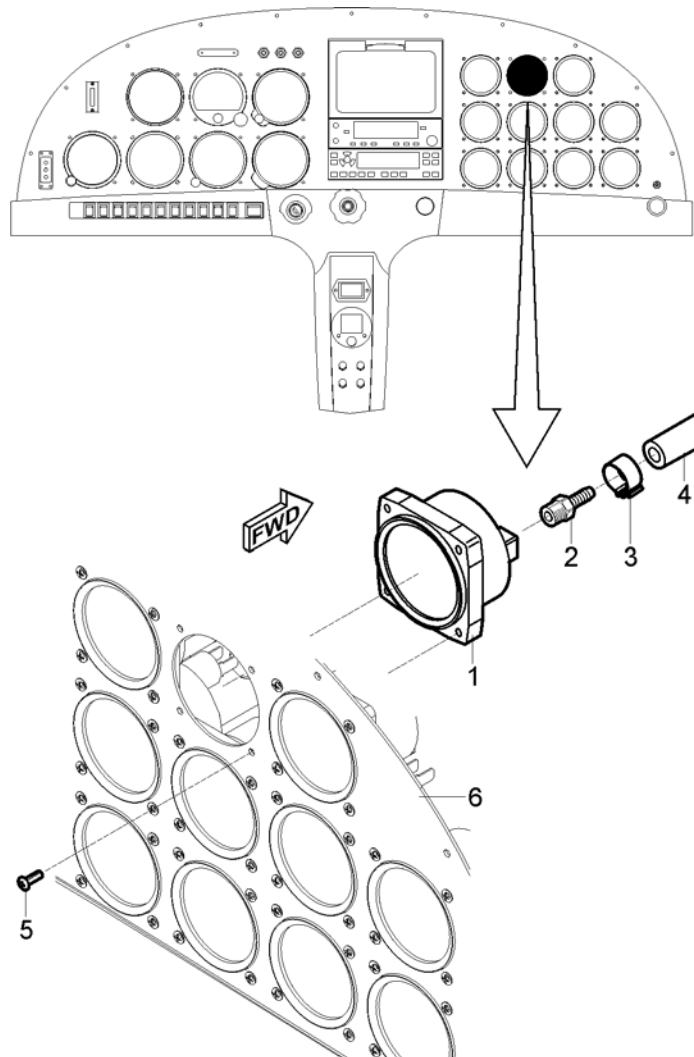
- Switch the electrical network off and disconnect the battery.
- Remove the cover of the upper part of the fuselage F4 (Section 53-30).
- Release the clamp (3, Fig. 77-7) by means of pliers and pull down the hose (4) from the bushing (2).
- Unscrew the screws (5) and remove the manifold pressure indicator (1).
- Where appropriate, unscrew the bushing (2) from the indicator.
- Close the hose and the hole or the bushing on the indicator (if reinstalled) by means of blind plugs.

(2) Installation – manifold pressure indicator

- Remove the blind plugs from the hose and the hose or the bushing on the indicator.
- Where appropriate, screw the bushing (2) into the manifold pressure indicator (1, Fig. 77-7).
- Insert the sensor of filling pressure (1) into the hole in the instrument panel (6); screw on and tighten the screws (5).



- (d) Connect the hose (4) to the bushing (2); secure the hose by means of the clamp (3) using the pliers.
- (e) Install the cover of the upper part of the fuselage F4 (Section 53-30).
- (f) Connect the battery, switch the electrical network on.
- (g) Do the engine test and check the function of the manifold pressure indicator.



Legend to Fig. 77-7

1	Indicator of filling pressure	5	Screw (4 pcs.)
2	Bushing		For information:
3	Clamp Cobra 11/7	6	Instrument panel
4	Hose		

Fig. 77-7 Manifold pressure indicator – removal / installation



TEMPERATURE

1. DESCRIPTION AND OPERATION

The following engine temperatures are monitored and indicated on the airplane:

- cylinder head temperature
- coolant temperature
- exhaust gas temperature
- oil temperature (Section 79-30).

A. Cylinder head temperature

The temperature of cylinder head is measured on the engines up to S/N 6 781 409. The sensors are located on the heads of cylinders No. 2 and 3.

The sensor of temperature is formed by a thermocouple made from bimetal. The electrical voltage in the thermocouple is generated as a result of temperature. With the airplanes equipped with analog instruments, the signal from the sensor is led to the cylinder head thermometer; with the airplanes equipped with the Dynon SkyView system, the signal is led to the SV-EMS-220 module and the value is indicated on the displays of the system.

B. Coolant temperature

The temperature of coolant is measured on the engines with the serial numbers starting from 6 781 410 (including this S/N) or on the engines with the installed cylinder head P/N 413185 (on the heads of cylinders No. 2 and 3) and 413195 (on the heads of cylinders No. 1 and 4).

The sensor of temperature is formed by a thermocouple made from bimetal. The electrical voltage in the thermocouple is generated as a result of temperature. For the airplanes equipped with analog instruments, the signal from the sensor is led to the thermometer of coolant. For the airplane equipped with the Dynon SkyView system, the signal is led to the module SV-EMS-220 and the value is indicated on the displays of the system; for the airplane equipped with the Garmin G3X system, the signal is led to the EIS unit GEA-24 and the value is indicated on the MFD.

The wiring diagram is shown in Chapter 91. The wiring diagram is shown in Chapter 91

C. Exhaust gas temperature

The temperature of exhaust gas is sensed only in the airplanes equipped with the Dynon SkyView system or the Garmin G3X system. The temperature is measured by four (SkyView system) or by two (Garmin G3X system, on the heads of cylinders No. 3 and 4) sensors of exhaust gas temperature that are located in the individual exhaust pipe headers of the engine.

The sensor of temperature is formed by a thermocouple made from bimetal. The electrical voltage is generated in the thermocouple as result of temperature. For the airplane equipped with the Dynon SkyView system, the signal is led to the module SV-EMS-220 and the value is indicated on the displays of the system; for the airplane equipped with the Garmin G3X system, the signal is led to the EIS unit GEA-24 and the value is indicated on the MFD.

The wiring diagram is shown in Chapter 91.



2. MAINTENANCE PRACTICES

A. Cylinder head temperature sensor

Maintenance type: Line

Personnel qualification: Independent verification personnel qualified in accordance with Part 66 or higher

The recommended tools and material:

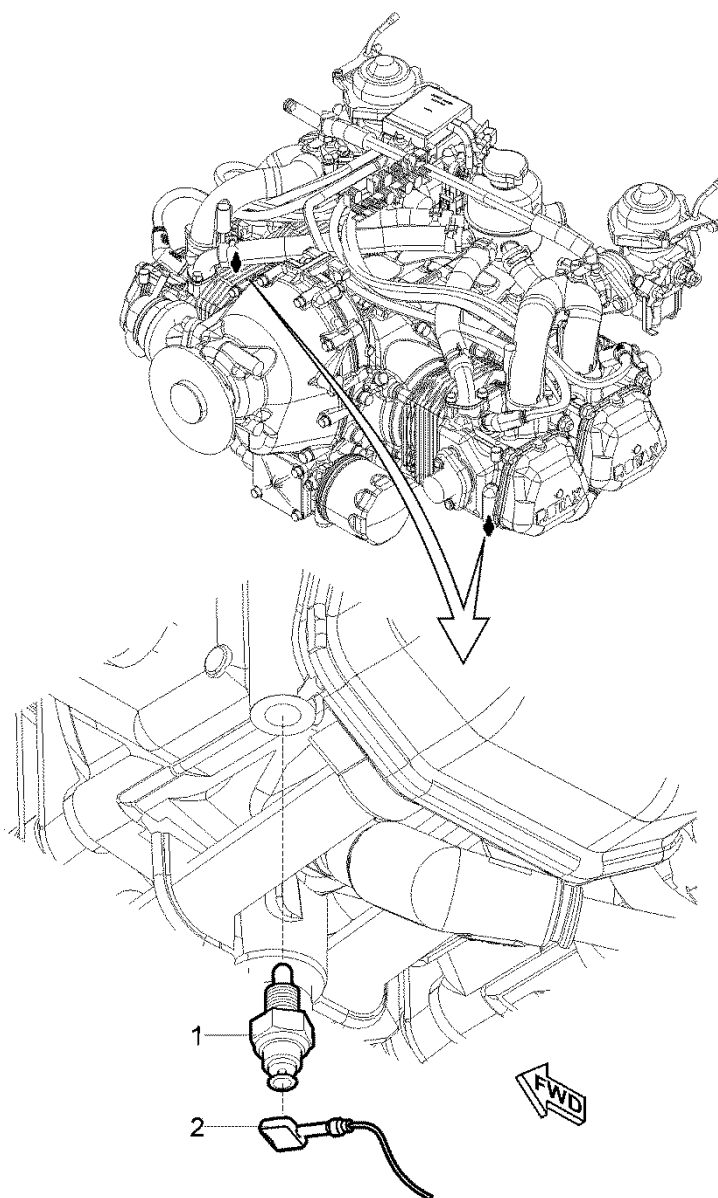
Item	Designation / Size	Quantity	Note
Socket wrench	No. 12	1 pc.	

WARNING

BEFORE STARTING TO WORK, COOL DOWN THE ENGINE TO THE AMBIENT TEMPERATURE. NON-COMPLIANCE WITH THE PROCEDURE MAY RESULT IN BURNS.

SWITCH OFF THE IGNITION AND TAKE OUT THE KEY!

- (1) Removal – cylinder head temperature sensor
 - (a) Switch the electrical network off and disconnect the battery.
 - (b) Remove the engine cowlings (Section 71-10).
 - (c) Slide out the connector (2, Fig. 77-8).
 - (d) Unscrew and remove the sensor (1).
 - (e) Close the hole for the cylinder head temperature sensor using a suitable blind plug.
- (2) Installation – cylinder head temperature sensor
 - (a) Remove the blind plug from the hole for the cylinder head temperature sensor.
 - (b) Screw the cylinder head temperature sensor (1, Fig. 77-8) into the engine block.
 - (c) Connect the connector (2) to the sensor (1).
 - (d) Install the engine cowlings (Section 71-10).
 - (e) Connect the battery, switch the electrical network on.
 - (f) Do the engine test and check the function of the sensor.



Legend to Fig. 77-8

1	Cylinder head temperature sensor	2	Connector with wires

Fig. 77-8 Cylinder head temperature sensor – removal / installation


B. Coolant temperature sensor

Maintenance type: Line

Personnel qualification: Independent verification personnel qualified in accordance with Part 66 or higher

The recommended tools and material:

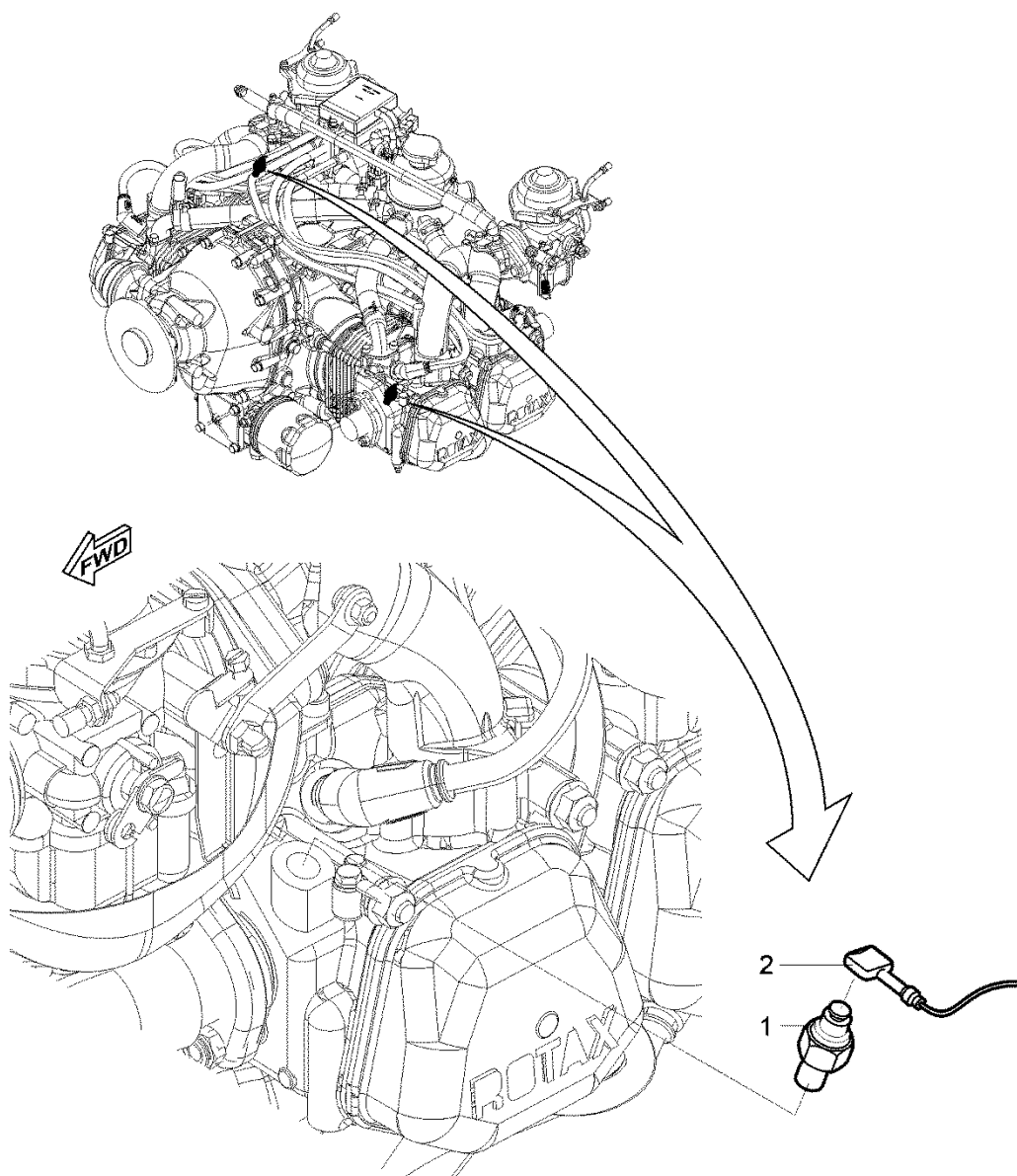
Item	Designation / Size	Quantity	Note
Socket wrench	No. 12	1 pc.	

WARNING

BEFORE STARTING TO WORK, COOL DOWN THE ENGINE TO THE AMBIENT TEMPERATURE. NON-COMPLIANCE WITH THE PROCEDURE MAY RESULT IN BURNS.

SWITCH OFF THE IGNITION AND TAKE OUT THE KEY!

- (1) Removal – coolant temperature sensor
 - (a) Switch the electrical network off and disconnect the battery.
 - (b) Remove the engine cowlings (Section 71-10).
 - (c) Slide out the connector (2, Fig. 77-9).
 - (d) Unscrew and remove the sensor (1).
 - (e) Close the hole for the coolant temperature sensor using a suitable blind plug.
- (2) Installation – coolant temperature sensor
 - (a) Remove the blind plug from the hole for the coolant temperature sensor.
 - (b) Screw the coolant temperature sensor (1, Fig. 77-9) into the engine block.
 - (c) Connect the connector (2) to the sensor (1).
 - (d) Install the engine cowlings (Section 71-10).
 - (e) Connect the battery, switch the electrical network on.
 - (f) Do the engine test and check the function of the sensor.



Legend to Fig. 77-9

- 1 Coolant temperature sensor 2 Connector with wires

Fig. 77-9 Coolant temperature sensor – removal / installation



C. Cylinder head thermometer

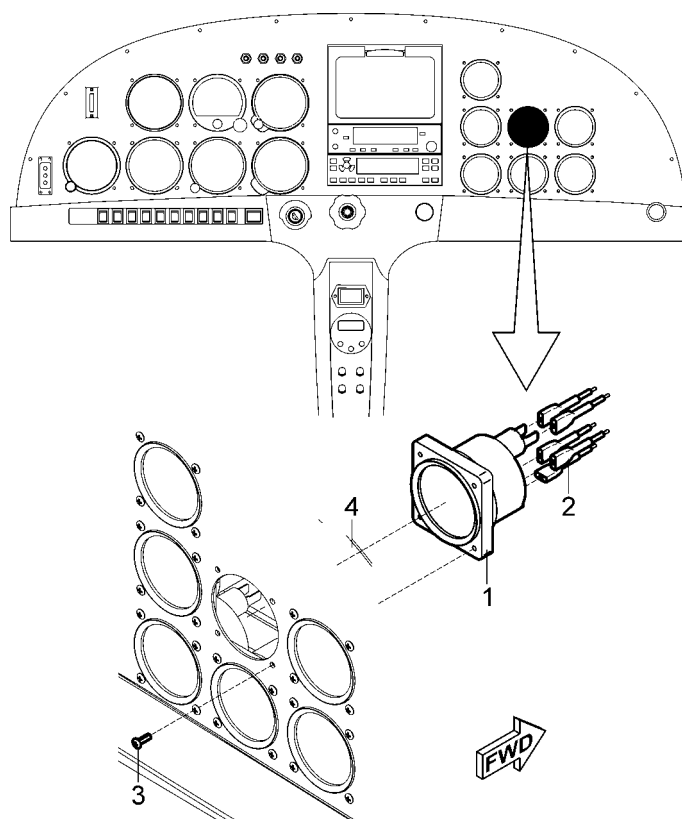
Maintenance type: Line

Personnel qualification: Independent verification personnel qualified in accordance with Part 66 or higher

The recommended tools and material:

Item	Designation / Size	Quantity	Note
Phillips screwdriver	No. 2	1 pc.	

- (1) Removal – cylinder head thermometer
 - (a) Switch the electrical network off and disconnect the battery.
 - (b) Remove the cover of the upper part of the fuselage F4 (Section 53-30).
 - (c) Disconnect the wires (2, Fig. 77-10).
 - (d) Unscrew the screws (3) and remove the cylinder head thermometer (1).



Legend to Fig. 77-10

- 1 Cylinder head thermometer
- 2 Wires
- 3 Bolt (4 pcs.)

- For information:
- 4 Instrument panel

Fig. 77-10 Cylinder head thermometer – removal / installation



- (2) Installation – cylinder head thermometer
 - (a) Insert the cylinder head thermometer (1, Fig. 77-10) into the hole in the instrument panel (4); screw on and tighten the screws (3).
 - (b) Connect the wires (2).
 - (c) Install the cover of the upper part of the fuselage F4 (Section 53-30).
 - (d) Connect the battery, switch the electrical network on.
 - (e) Do the engine test and check the function of the cylinder head thermometer.

D. Exhaust gas temperature sensor

Maintenance type: Line

Personnel qualification: Independent verification personnel qualified in accordance with Part 66 or higher

The recommended tools and material:

Item	Designation / Size	Quantity	Note
Flat screwdriver	-	1 pc.	
Phillips screwdriver	No. 2	1 pc.	
Wrench	No. 13	1 pc.	
Pin extractor	DRK 145	1 pc.	
Cable tie	2,5x99	As needed	

WARNING

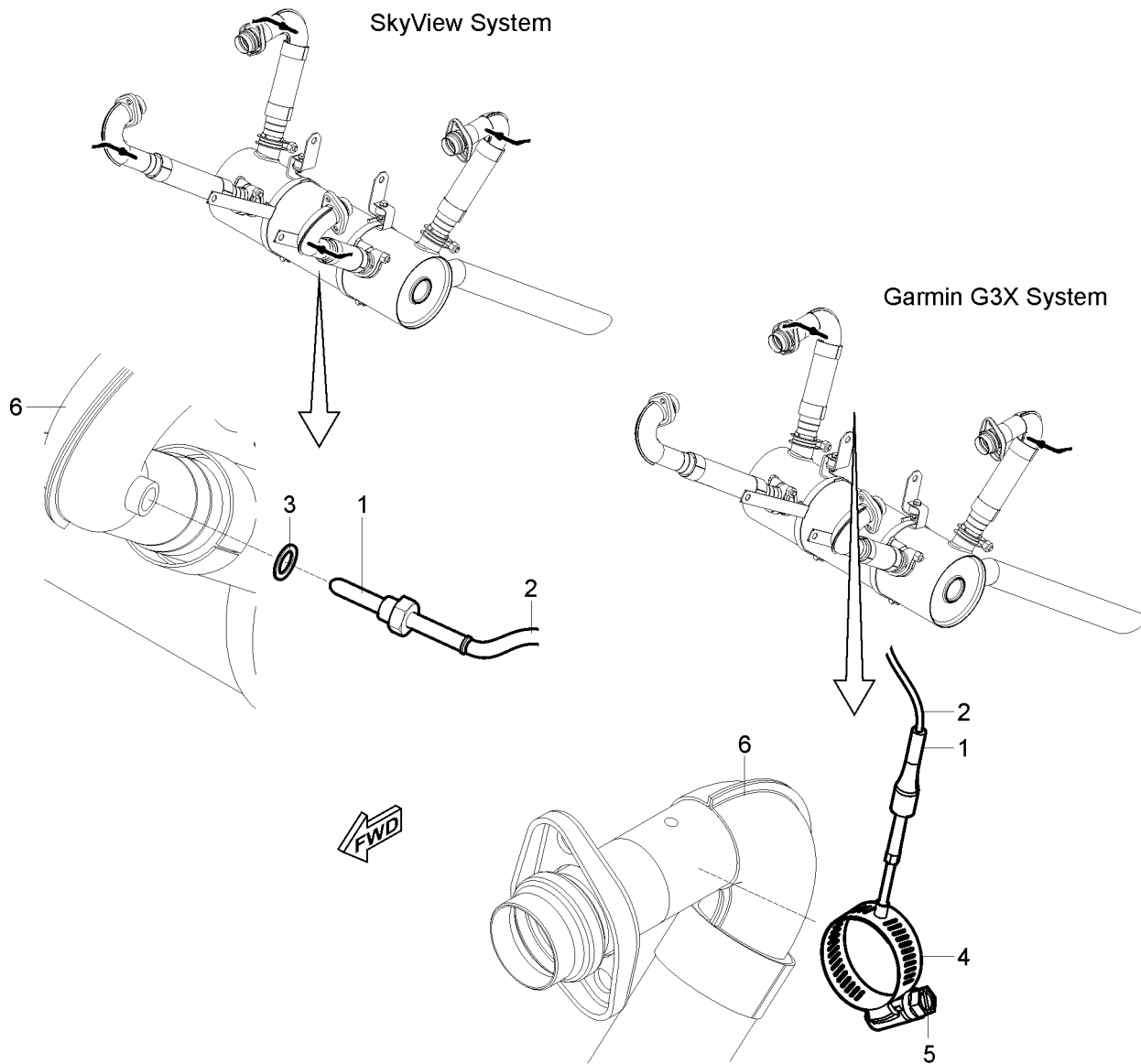
BEFORE STARTING TO WORK, COOL DOWN THE ENGINE TO THE AMBIENT TEMPERATURE. NON-COMPLIANCE WITH THE PROCEDURE MAY RESULT IN BURNS.

SWITCH OFF THE IGNITION AND TAKE OUT THE KEY!

- (1) Removal – exhaust gas temperature sensor
 - (a) Switch the electrical network off and disconnect the battery.
 - (b) Remove the engine cowlings (Section 71-10).
 - (c) Remove the cover of the upper part of the fuselage F4 (Section 53-30).
 - (d) For the airplane equipped with the SkyView system:
 - 1 Disconnect the connector (2, Fig. 77-4) from the module (1).
 - 2 Remove all the elements attaching the appropriate wire (2, Fig. 77-11) to the airplane structure; note down the way of attaching.
 - 3 By means of the extractor, remove the relevant pins with the wires (2) from the connector (2, Fig. 77-4).
 - 4 Remove the wire carefully.
 - 5 Unscrew and remove the sensor (1, Fig. 77-11) with the washer (3).
 - (e) For the airplane equipped with the Garmin G3X system:



- 1 Disconnect the screw connection at the cable eye near the sensor (1).
- 2 Loose screw (5) and disconnect sensor (1).



Legend to Fig. 77-11

1 Exhaust gas temperature sensor	5 Screw
2 Wire	For information:
3 Washer	6 Elbow
4 Clamp	

Fig. 77-11 Exhaust gas temperature sensor – removal / installation



- (2) Installation – exhaust gas temperature sensor
 - (a) For the airplane equipped with the SkyView system:
 - 1 Screw the sensor (1, Fig. 77-11) with the washer (3) into the socket on the elbow (6).
 - 2 Carefully pull the wire (2) through the firewall.
 - 3 Fasten the wire to the airplane structure.
 - 4 Install the wire pins to the corresponding place in the connector (2, Fig. 77-4).
 - 5 Connect the connector (2, Fig. 77-11) to the module (1).
 - (b) For the airplane equipped with the Garmin G3X system:
 - 1 Connect the screw connection at the cable eye near the sensor (1).
 - 2 Install sensor (1) into hole in elbow (6); tighten the screw (5).
 - (c) Install the cover of the upper part of the fuselage F4 (Section 53-30).
 - (d) Install the engine cowlings (Section 71-10).
 - (e) Connect the battery, switch the electrical network on.
 - (f) Do the engine test and check the function of the sensor.



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CHAPTER

78

EXHAUST



CHAPTER 78

EXHAUST

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GENERAL

1. INTRODUCTION

The exhaust system ensures the transfer of combustion gases from the engine into the ambient atmosphere and the airplane noise reduction so that it complies with the related noise limits.

The exhaust system consists of four pipes (2; 3; 4, Fig. 78-1) which move the exhaust gases from the exhaust valves to the muffler (1), from which they are moved through pipe into the ambient atmosphere. The entire exhaust system is made of stainless steel sheets and pipes and it is attached with brackets (6; 7) and clamps (5) from the engine block.

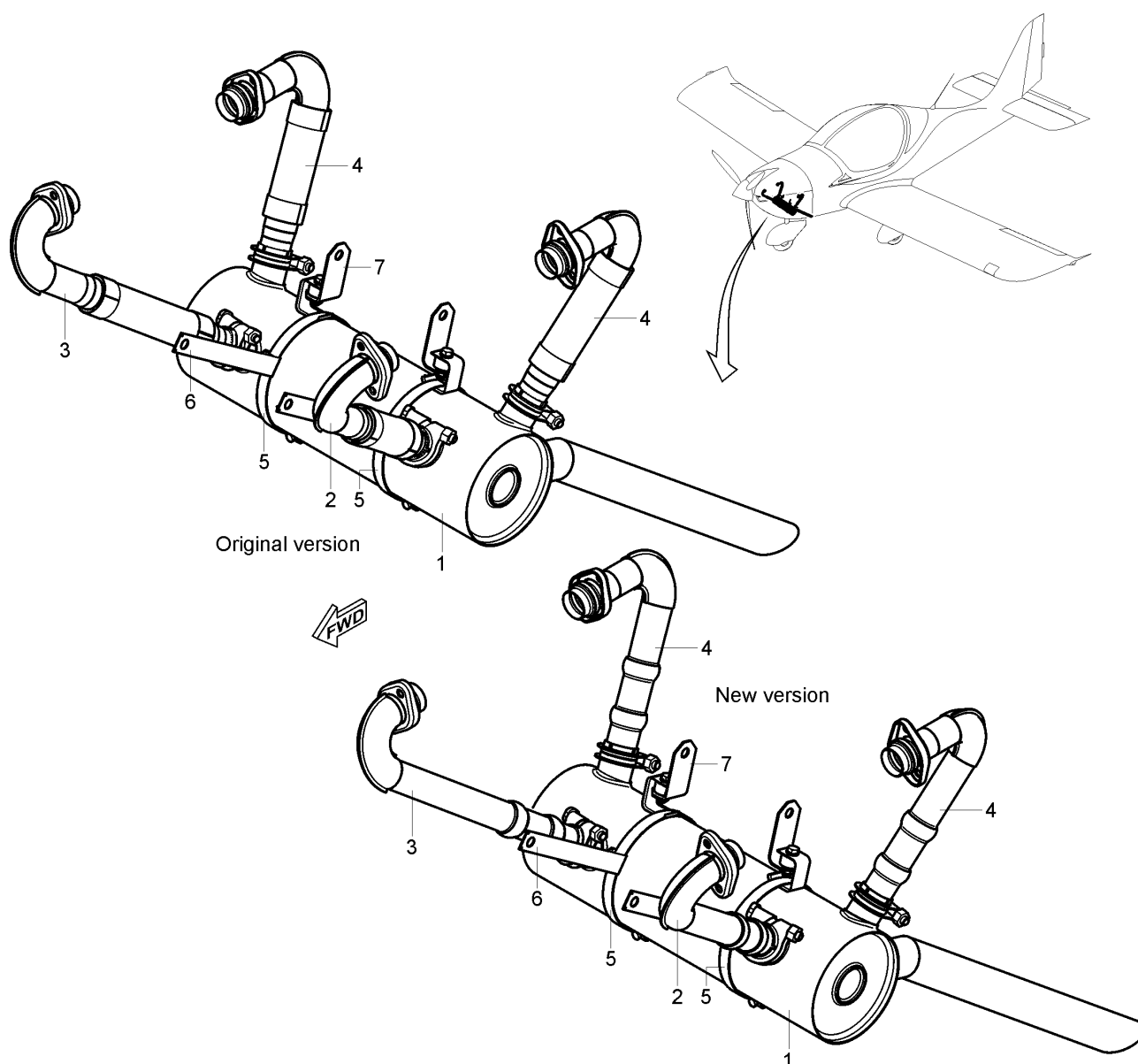


Fig. 78-1 Exhaust system (page 1 of 2)



Legend to Fig. 78-1

1 Muffler	5 Clamp
2 Left front pipe	6 Front bracket
3 Right front pipe	7 Rear bracket
4 Rear pipe	

Fig. 78-2 Exhaust system (page 2 of 2)



COLLECTOR / NOZZLE

1. DESCRIPTION AND OPERATION

Four pipes move the exhaust gases from the exhaust valves of the individual engine cylinders to the muffler.

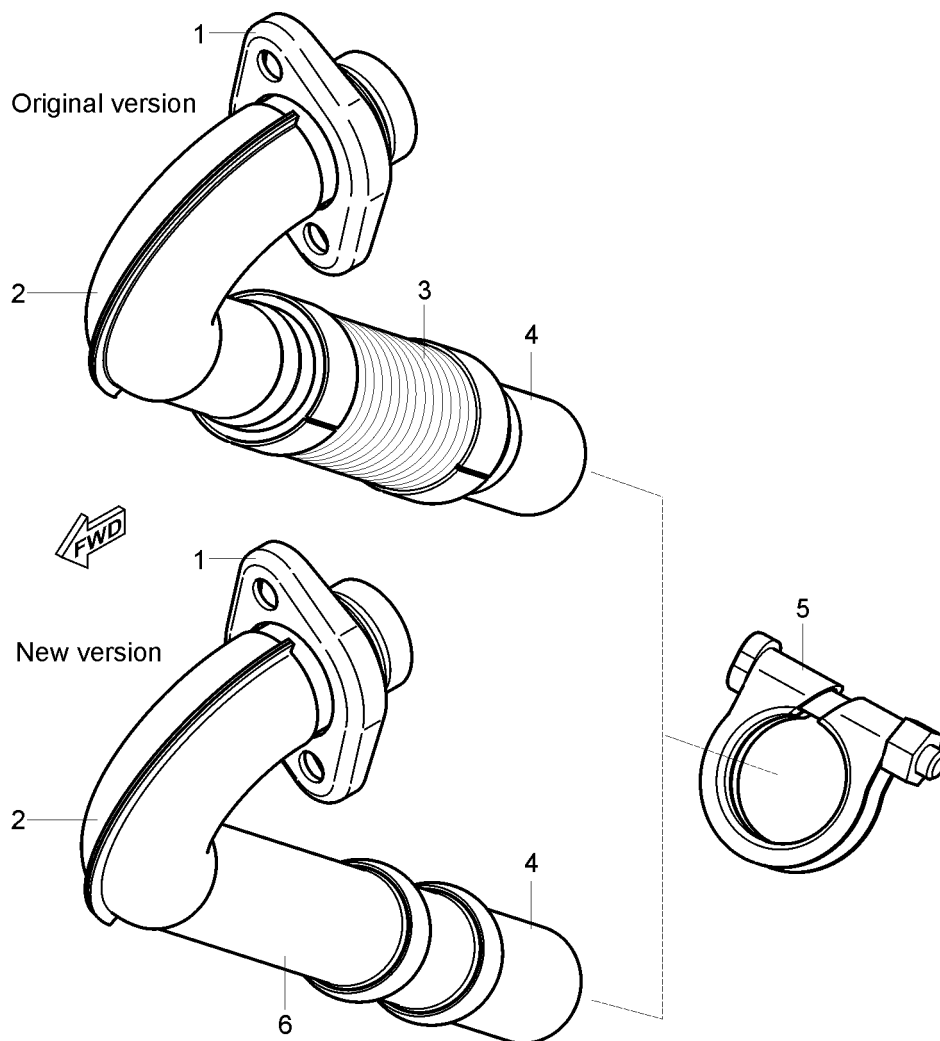
A. Original version

Each pipe (2; 3; 4, Fig. 78-1) consists of the flange (1, Fig. 78-2), elbows (2), metal hose (3) and the end pipe (4). The parts are welded together except for the flange. The pipes are attached with nuts to the bolts on the engine cylinders; the pipes are attached to the socket pipes of the muffler with sleeves (5).

B. New version

Each pipe (2; 3; 4, Fig. 78-1) consists of the flange (1, Fig. 78-2), elbows (2), flexible joint pipe (6) and the end pipe (4). The parts are welded together except for the flange. The pipes are attached with nuts to the bolts on the engine cylinders; the pipes are attached to the socket pipes of the muffler with sleeves (5).

If the airplane is equipped with the Dynon SkyView or Garmin G3X system, the exhaust temperature sensors are attached to all pipes (Section 77-20).



Legend to Fig. 78-2

1 Flange	4 End pipe
2 Elbow	5 Sleeve
3 Metal hose	6 Flexible joint pipe

Fig. 78-3 Exhaust pipe



2. MAINTENANCE PRACTICES

The maintenance procedures are specified in Section 78-20.



NOISE SUPPRESSOR

1. DESCRIPTION AND OPERATION

The muffler (1, Fig. 78-1) consists of casing and four pipes which move the exhaust gases from the exhaust collectors to the muffler body. The casing contains two perforated partition and the tube which ensures noise reduction. The pipe which moves the exhaust gases from the muffler below the airplane is welded to the casing. The muffler is connected to the exhaust collectors with sockets (5, Fig. 78-2).

The heat exchanger is attached to the muffler. The heat exchanger provides supply of hot air for the cockpit heating system (Section 21-40) and preheating of carburettors (Section 71-60).



2. MAINTENANCE PRACTICES

A. Exhaust system

Maintenance type: Line

Personnel qualification: Independent verification personnel qualified in accordance with Part 66 or higher

Recommended tools and material:

Item	Designation / Size	Quantity	Note
Flat screwdriver	-	1 pc.	
Hex wrench	No. 8	1 pc.	
Wrench	No. 8	1 pc.	
Wrench	No. 10	2 pcs.	
Wrench	No. 12	1 pc.	
Wrench	No. 13	1 pc.	
Torque wrench	8 – 50 Nm	1 pc.	
Socket wrench	No. 13	1 pc.	
Pincers	-	1 pc.	
Stainless lockwire	Ø 0,8 mm	-	

WARNING

BEFORE STARTING TO WORK, COOL DOWN THE ENGINE TO THE AMBIENT TEMPERATURE. NON-COMPLIANCE WITH THE PROCEDURE MAY RESULT IN BURNS.

SWITCH OFF THE IGNITION AND TAKE OUT THE KEY!

NOTE

Removal and installation procedure applies to both versions.

- (1) Removal – exhaust system
 - (a) Switch the electrical network off and disconnect the battery.
 - (b) Remove the engine cowlings (Section 71-10).
 - (c) As necessary, remove the exhaust temperature sensors (Section 77-20).
 - (d) Remove the nuts (15, Fig. 78-3) and loosen the sleeves (5).
 - (e) Remove the muffler (1) and the pipes (2; 3; 4).
 - (f) Put end caps on the openings in the cylinder heads.
 - (g) Remove the lockwire, unscrew and remove the nuts (17), washers (18), screws (16) and remove the clamps (6).
 - (h) Remove the heat exchanger (Section 21-40).



- (i) As necessary, remove the lockwire, unscrew the screws (14) and remove the front brackets (7).
- (j) As necessary, unscrew and remove the nuts (12), washers (13), screw (11) and the lower rear brackets (9).

NOTE

You cannot disassemble the upper rear brackets (8) until you remove the engine from the engine bed.

- (2) Installation – exhaust system

WARNING

CHECK THE EXHAUST SYSTEM THOROUGHLY. THE EXHAUST GASES MAY PERVADE THROUGH DAMAGED MUFFLER INTO THE COCKPIT. THIS MAY CAUSE DEATH OR INJURY OF PERSONS, ENGINE POWER LOSS, OR FIRE.

- (a) Check the individual parts of the exhaust system to make sure that they are not damaged, burnt or torn.
- (b) As necessary, install the shock-absorbers (10, Fig. 78-3) between the brackets (8; 9) and attach them with screws (11), nuts (12) and bushings (13); do not tighten the nuts.
- (c) As necessary, attach the front brackets (7); slightly tighten the screws (14).
- (d) Remove the end caps from the openings in the cylinder heads.
- (e) Attach the heat exchanger to the muffler (Section 21-40).
- (f) Attach the muffler (1) to the brackets (7; 9) with clamps (6), screws (16), nuts (17) and washers (18); do not tighten the nuts.
- (g) Put the sleeves (5) on the muffler socket pipes (1).

CAUTION

FIT THE MUFFLER BY ROTATION AND BY SHIFT THAT THE METAL HOSE OF THE EXHAUST PIPE MUST NOT BE DEFORMED AND COMPLETELY STRAIGHT AFTER SLIDE INTO MUFFLER SOCKET PIPES AND AT THE SAME TIME INTO THE ENGINE CYLINDERS.
YOU MUST SLIDE THE PIPES INTO THE MUFFLER SOCKET PIPES SO THAT YOU CANNOT SEE THE GAP IN THE GROOVE OF THE MUFFLER SOCKET PIPE.

- (h) Slide the individual pipes (2; 3; 4) on the muffler socket pipes (1); align the flanges on the cylinder heads, screw and tighten the nuts (15) with torque 15 Nm (133 lb in).
- (i) Adjust the exhaust pipe clearance from the radiator hose and the oil filter. Clearance from the radiator hose must be min. 20 mm and clearance from the oil filter must be approximately 5 mm (see Fig. 79-5; valid up to S/N 4200).
- (j) Tighten the sockets (5), nuts (12; 17) and screws (14).



- (k) Secure the screws (14) and fasteners of the clamps (16; 17) with a lockwire (Section 20-20).
- (l) As necessary, install the exhaust temperature sensors (Section 77-20).
- (m) Connect the battery and switch the electrical network on.
- (n) Start the engine, do the engine test and check the exhaust system for leakage points, the exhaust temperature measurement function.
- (o) Install the engine cowlings (Section 71-10).

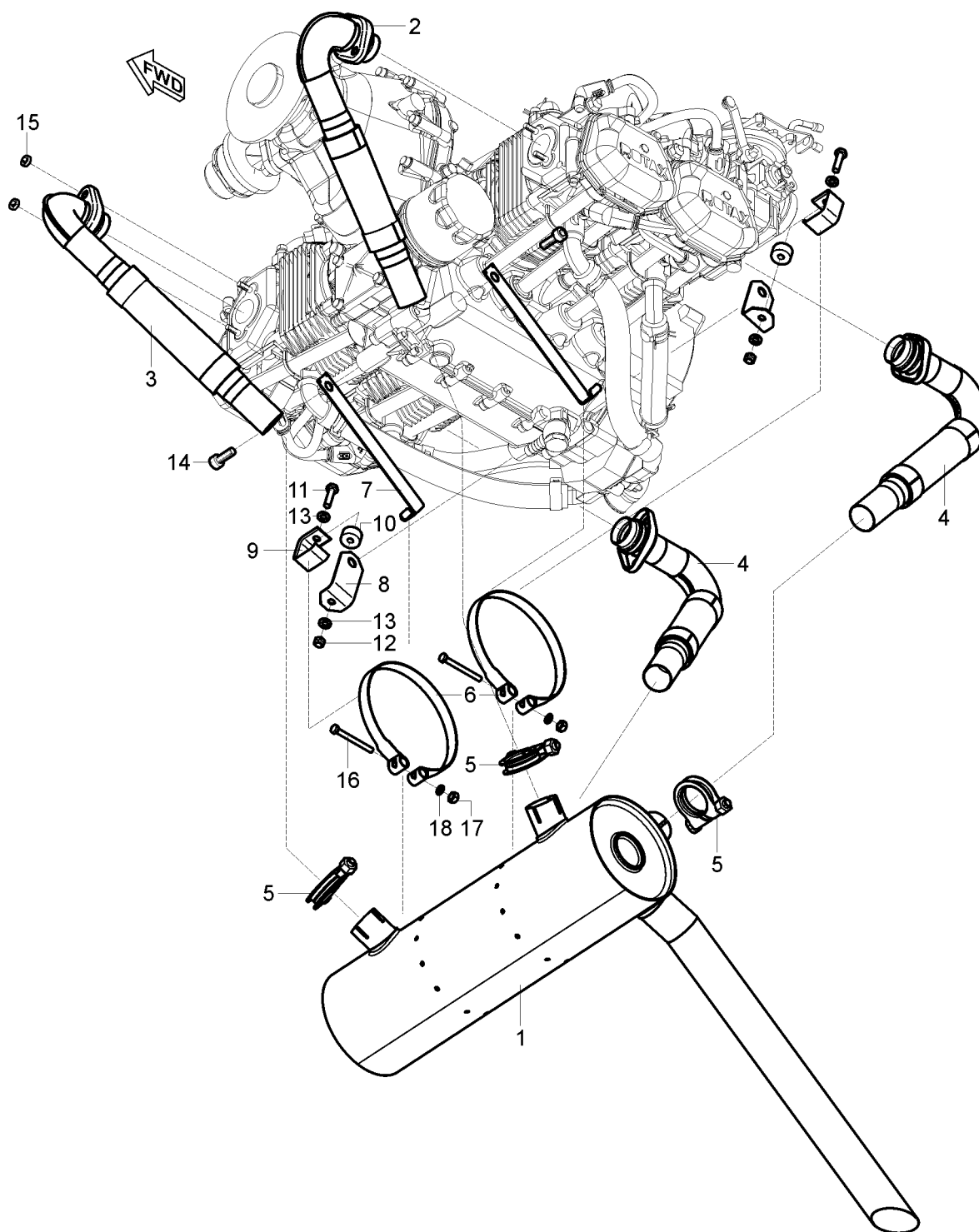


Fig. 78-4 Exhaust system – removal / installation (page 1 of 2)



Legend to Fig. 78-3

1 Muffler	10 Shock-absorber (2 pcs.)
2 Left front pipe	11 Screw M6x25 (2 pcs.)
3 Right front pipe	12 Nut M6 (2 pcs.)
4 Rear pipe	13 Washer 6,4 (4 pcs.)
5 Sleeve	14 Screw M10x25 (2 pcs.)
6 Clamp	15 Nut M8 (8 pcs.)
7 Front bracket (2 pcs.)	16 Screw M5x50 (2 pcs.)
8 Rear upper bracket (2 pcs.)	17 Nut M5
9 Rear lower bracket (2 pcs.)	18 Washer 5,3 (2 pcs.)

Fig. 78-3 Exhaust system – removal / installation (page 2 of 2)



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CHAPTER

79

OIL



CHAPTER 79

OIL

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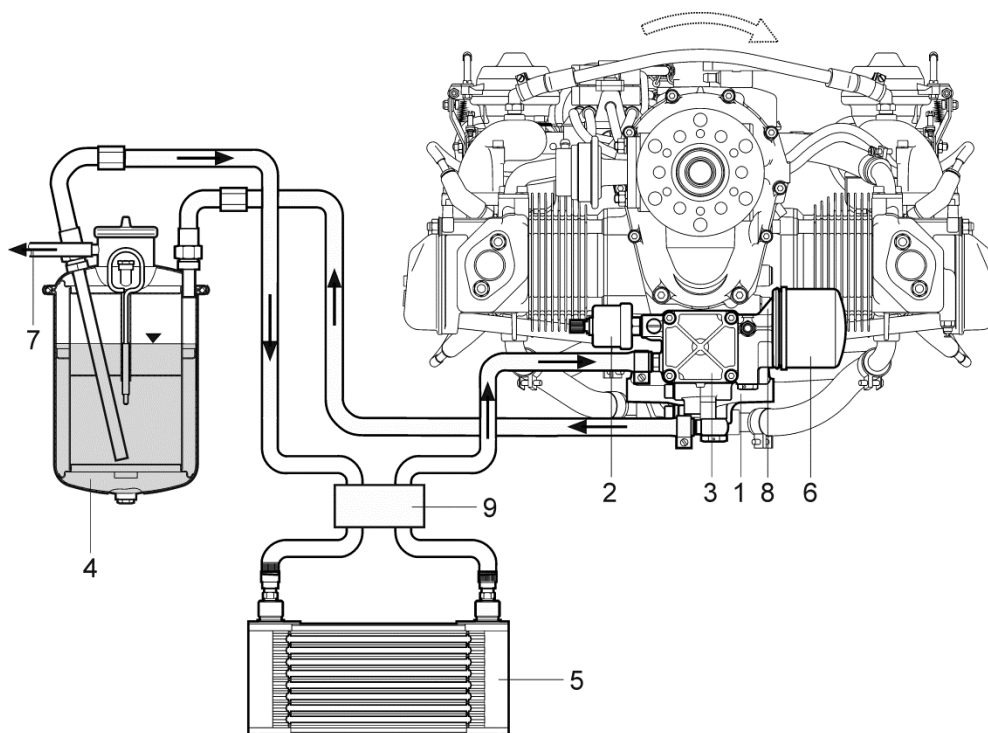


GENERAL

1. INTRODUCTION

The engine is equipped with the lubrication system with the dry sump and the oil pump that has a built-in pressure reducing valve (1, Fig. 79-1) and a sensor of oil pressure (2). The oil pump (3), that is driven by the camshaft, takes the engine oil from the tank (4) through the thermostat (9), oil cooler (5) and the oil is forced through the oil filter (6) to the individual lubrication points in the engine. The oil flows down from the lubrication points to the bottom of the crankcase, and from there it is forced to the oil tank by means of the pressure shocks from the pistons. The venting of the system is realized by the outlet (7) on the oil tank.

The sensor of oil temperature (8) is located on the pump body and it measures the oil temperature on the inlet; the sensor of oil pressure (2) is installed along with the pressure reducing valve in the oil pump (Section 79-30).



Legend to Fig. 79-1

1 Reduction valve	6 Oil filter
2 Sensor of oil pressure	7 Venting of oil system
3 Oil pump	8 Sensor of oil temperature
4 Oil tank	9 Thermostat
5 Oil cooler	

Fig. 79-1 Oil system diagram



NOTE

The detailed information concerning the oil system of engine is shown in the document Maintenance Manual (Line Maintenance) for Rotax Engine Type 912 Series, Doc. No. MML-912, 899191.



STORAGE

1. DESCRIPTION AND OPERATION

The oil tank is located in the engine compartment; it is attached to the bracket on the left side of the firewall by means of the clamps. The filler neck with a cap, inlet and outlet screw fittings are located on the upper side of the tank; the drain bolt is located on the lower side of the tank. When checking quantity of oil, the tank filler cap is accessible after opening the cover F2a (see Fig. 06-2).

Volume of oil in the system: about 3,5 l.

Oil consumption: max. 0,06 l/h.

NOTE

The maintenance procedures for checking, oil replenishment and oil change are shown in Section 12-10.

The recommended kinds of oil are shown in Section 12-00.



2. MAINTENANCE PRACTICES

A. Oil tank

Maintenance type: Line

Personnel qualification: Independent verification personnel qualified in accordance with Part 66 or higher

Recommended tools and material:

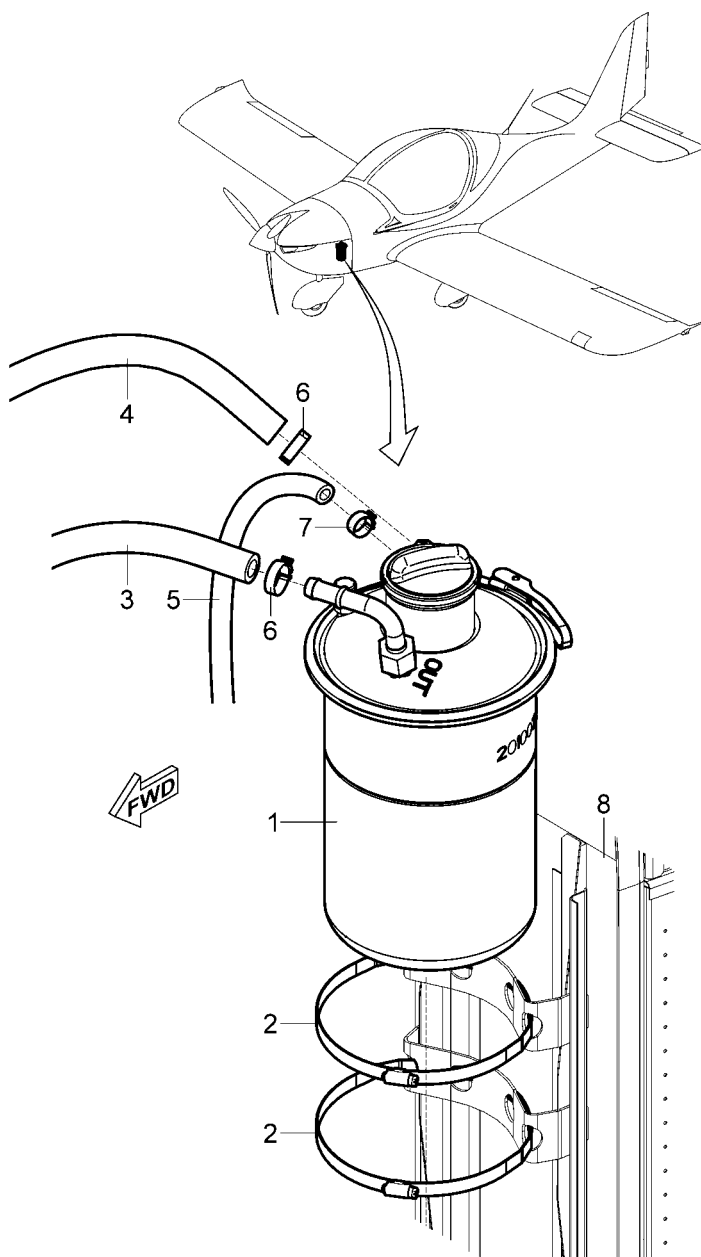
Item	Designation / Size	Quantity	Note
Flat screwdriver	No. 2	1 pc.	
Wrench	No. 7	1 pc.	
Nippers	-	1 pc.	
Gripping pliers	Cobra	1 pc.	
Stainless lockwire	ø 0,8 mm	-	

WARNING

BEFORE STARTING THE WORK, COOL DOWN THE ENGINE UP TO THE AMBIENT TEMPERATURE. NON-COMPLIANCE WITH THE PROCEDURE MAY RESULT IN BURNS AND SCALDS.

SWITCH OFF THE IGNITION AND TAKE OUT THE KEY!

- (1) Removal – oil tank
 - (a) Switch the electrical network off and disconnect the battery.
 - (b) Remove the engine cowlings (Section 71-10).
 - (c) Drain the oil (Section 12-10).
 - (d) Release the clamp (7, Fig. 79-2) and disconnect the hose (5).
 - (e) Release the clamps (6) and disconnect the hoses (3; 4).
 - (f) Remove the lockwire and release the clamps (2) and remove the tank (1).
 - (g) Close the tank necks and the hoses by means of appropriate blind plugs.
- (2) Installation – oil tank
 - (a) Remove the blind plugs from the tank necks and from the hoses.
 - (b) Position the oil tank (1, Fig. 79-2) on the firewall and fasten it by means of the clamps (2); secure the clamps with lockwire (Section 20-20).
 - (c) Put the hoses (3; 4) on the corresponding tank necks and fasten them by means of the clamps (6).
 - (d) Put the hose (5) on the tank neck and fasten it by means of the clamp (7).
 - (e) Fill the system with oil (Section 12-10).
 - (f) Connect the battery, switch the electrical network on.
 - (g) Do the engine test and check the tightness.
 - (h) Install the engine cowlings (Section 71-10).



Legend to Fig. 79-2

1 Oil tank	5 Venting hose
2 Clamp 140-160	6 Clamp Rotax 853725
3 Hose to oil pump	7 Clamp 14/7
4 Return hose from engine	8 Firewall

Fig. 79-2 Oil tank – removal / installation



DISTRIBUTION

1. DESCRIPTION AND OPERATION

This Section describes those parts of the oil system that are used for transporting the oil from and to the engine. These items include the oil cooler, thermostat and the oil filter.

The oil cooler is located under the engine; the upper part of the cooler is attached by means of the brackets to the firewall, the lower part of the cooler is suspended on the engine mount by means of the strut. If the new engine cowlings are installed on the airplane (Section 71-10), the airplane is equipped with a smaller oil cooler which is only attached by means of the brackets to the firewall.

The thermostat is installed in the system in order to regulate the oil temperature. In the course of operation, it keeps the oil temperature within a range of 85 to 95 °C regardless of the flight mode and the ambient temperature. Depending on the oil temperature, the oil flows into the oil pump directly or through the oil cooler. The thermostat is installed directly on the hoses between the oil tank, cooler and the oil pump.

The oil filter is located before cylinder No. 2 on the left side of the engine.

The oil distribution is ensured by the hoses with a fireproof sleeve.



2. MAINTENANCE PRACTICES

A. Oil cooler

Maintenance type: Line

Personnel qualification: Independent verification personnel qualified in accordance with Part 66 or higher

Recommended tools and material:

Item	Designation / Size	Quantity	Note
Wrench	No. 30	1 pc.	
Wrench	No. 22	1 pc.	
Wrench	No. 16	1 pc.	
Wrench	No. 10	1 pc.	
Wrench	No. 8	1 pc.	

WARNING

BEFORE STARTING TO WORK, COOL DOWN THE ENGINE TO THE AMBIENT TEMPERATURE. NON-COMPLIANCE WITH THE PROCEDURE MAY RESULT IN BURNS.

SWITCH OFF THE IGNITION AND TAKE OUT THE KEY!

(1) Removal – oil cooler

- (a) Switch the electrical network off and disconnect the battery.
- (b) Remove the engine cowlings (Section 71-10).
- (c) Drain the oil (Section 12-10).
- (d) Valid for the original version of the cooler installation:
 - 1 Unscrew and remove the nut (9, Fig. 79-3), washer (10), bolt (8) and disconnect the lower strut (11) from the cooler (1).
 - 2 Unscrew and remove the screw fitting (3), reductions (4) and the sealing (5).
 - 3 Unscrew and remove the nuts (6) and remove the cooler (1) with the cover (2) and the washers (7).
 - 4 Close the cooler necks and the hoses with suitable blind plugs.
- (e) Valid for the new version of cooler installation:
 - 1 Unscrew and remove the upper nut (15) and the washer (16) and disconnect the cooler strut from the shock absorber (12).
 - 2 Unscrew and remove the screw fitting (3), reductions (4) and the sealing (5).
 - 3 Unscrew and remove the nuts (6) and remove the cooler (1) with the cover (2) and the washers (7).
 - 4 Close the cooler necks and the hoses with suitable blind plugs.



- (f) Valid for the smaller oil cooler P/N 886027:
 - 1 Unscrew and remove the screw fitting (3), reductions (4) and the sealing (5).
 - 2 Unscrew and remove the nuts (6) and remove the cooler (1) with the cover (2) and the washers (7).
 - 3 Close the cooler necks and the hoses with suitable blind plugs.
- (2) Installation – oil cooler
 - (a) Remove the blind plugs from the cooler necks and from the hoses.
 - (b) Position the cooler (1, Fig. 79-3) with the cover (2) and the washers (7) to the holder (18) on the firewall and attach it by means of the nuts (6).
 - (c) Set the sealing rings (5) on the reductions (4) and screw them into the cooler necks.
 - (d) Valid for the original version of the cooler installation:
 - 1 Position the lower strut (11) to the suspension on the cooler and attach it by means of the bolt (10), nut (9) and the washer (10).
 - 2 Screw the screw fittings (3) on the reductions and tighten them.
 - 3 Fill the system with oil (Section 12-10).
 - 4 Do the engine test and check the tightness.
 - 5 Install the engine cowlings (Section 71-10).
 - (e) Valid for the new version of cooler installation:
 - 1 Set the cooler strut on the shock absorber (12) and tighten it by means of the nut (15) and the washer (16).
 - 2 Screw the screw fittings (3) on the reductions and tighten them.
 - 3 Fill the system with oil (Section 12-10).
 - 4 Connect the battery, switch the electrical network on.
 - 5 Do the engine test and check the tightness.
 - 6 Install the engine cowlings (Section 71-10).
- (f) Valid for the smaller oil cooler P/N 886027:
 - 1 Screw the screw fittings (3) on the reductions and tighten them.
 - 2 Fill the system with oil (Section 12-10).
 - 3 Connect the battery, switch the electrical network on.
 - 4 Do the engine test and check the tightness.
 - 5 Install the engine cowlings (Section 71-10).

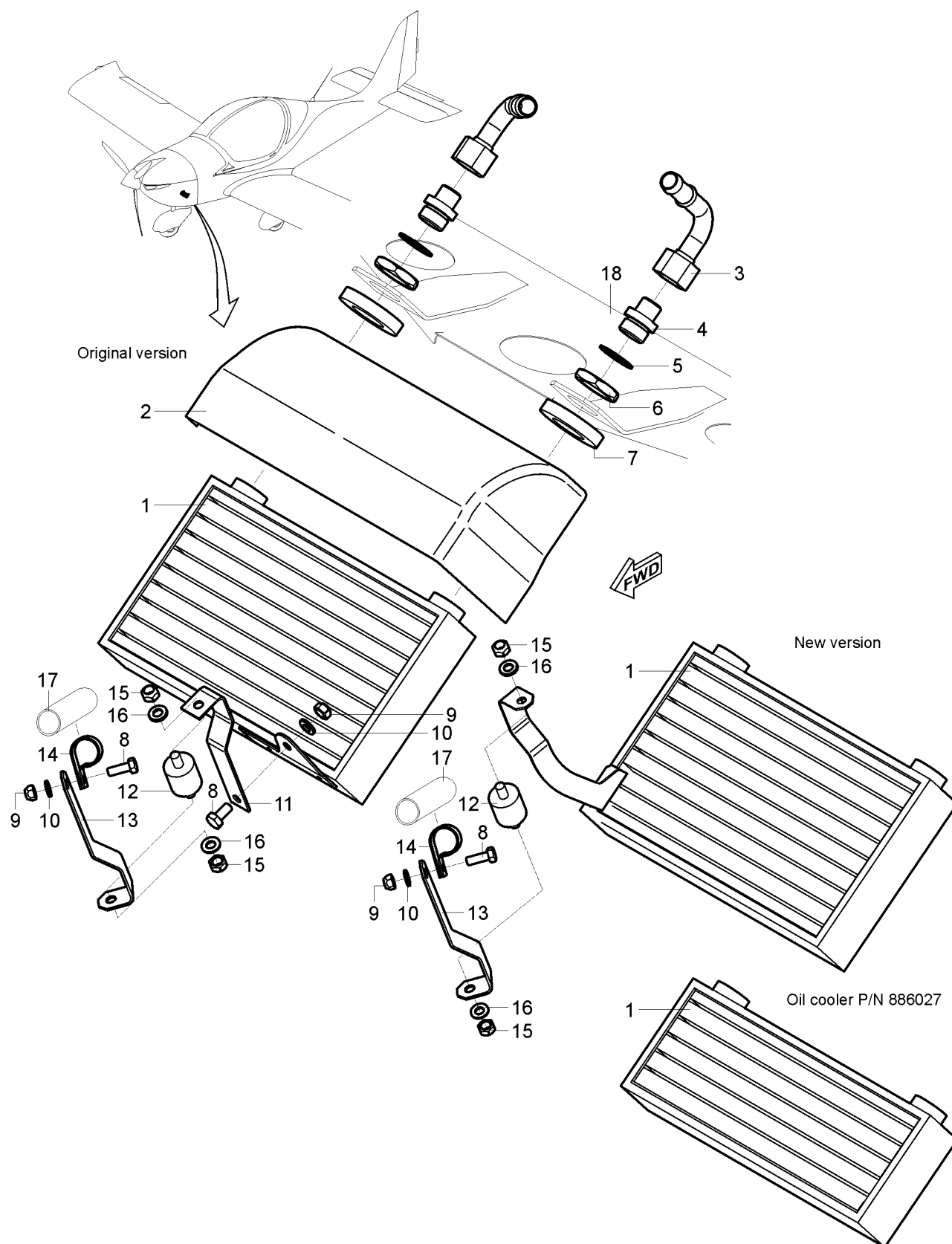


Fig. 79-3 Oil cooler – removal / installation (page 1 of 2)



Legend to Fig. 79-3

1 Oil cooler	11 Lower strut
2 Cooler cover	12 Shock absorber
3 Screw fitting	13 Upper strut
4 Reduction 14–18	14 Attachment 1x16
5 Sealing ring 14x18	15 Self-locking nut M6
6 Nut	16 Washer 6
7 Washer	For information:
8 Bolt M5x14	17 Engine mount
9 Self-locking nut M5	18 Cooler holder
10 Washer 5	

Fig. 79-3 Oil cooler – removal / installation (page 2 of 2)

B. Cooler strut

Maintenance type: Line

Personnel qualification: Independent verification personnel qualified in accordance with Part 66 or higher

Recommended tools and material:

Item	Designation / Size	Quantity	Note
Wrench	No. 10	1 pc.	
Wrench	No. 8	1 pc.	

NOTE

If the oil cooler P/N 886027 is installed, the cooler strut is not mounted.

(1) Removal – cooler strut

- (a) Switch the electrical network off and disconnect the battery.
- (b) Remove the engine cowlings (Section 71-10).
- (c) Disconnect the strut from the cooler (see par. 2 A.(c)1 or (d)1).
- (d) Valid for the original version of the strut:
 - 1 Unscrew and remove the nuts (15, Fig. 79-3), washers (16); remove the shock absorber (12) and disconnect the strut.
 - 2 Unscrew and remove the nut (9), washer (10), bolt (8) and disconnect the upper strut (13) from the attachment (14).
- (e) Valid for the new version of the strut:
 - 1 Unscrew and remove the lower nut (15, Fig. 79-3), washer (16) and (8) and remove the shock absorber (12).
 - 2 Unscrew and remove the nut (9), washer (10), bolt (8) and disconnect the upper strut (13) from the attachment (14).



- (2) Installation – cooler strut
- (a) Position the upper strut (13, Fig. 79-3) to the attachment (14) and fasten it by means of the bolt (10), nut (9) and the washer (10); don't tighten the nut.
- (b) Valid for the original version of the strut:
- 1 Install the shock absorber (12) between the struts (11; 13) and attach it by means of the nuts (15) and the washers (16); don't tighten the nuts.
 - 2 Connect the strut to the cooler (see par. 2 A(2)(d)1).
 - 3 Tighten all the joints.
 - 4 Install the engine cowlings (Section 71-10).
- (c) Valid for the new version of the strut:
- 1 Install the shock absorber (12) on the strut (13) and fasten it by means of the nut (15) and the washer (16); don't tighten the nut.
 - 2 Connect the strut to the cooler (see par. 2 A(2)(e)1).
 - 3 Tighten all the joints.
 - 4 Install the engine cowlings (Section 71-10).

C. Thermostat

Maintenance type: Line

Personnel qualification: Independent verification personnel qualified in accordance with Part 66 or higher

Recommended tools and material:

Item	Designation / Size	Quantity	Note
Flat screwdriver	No. 2	1 pc.	
Nippers	-	1 pc.	
Cable tie	3,6x142	10 pcs.	
Cleaning agent	Technical benzine	-	
Lint-free cloth	-	-	
Adhesive	Loctite 577	-	

WARNING

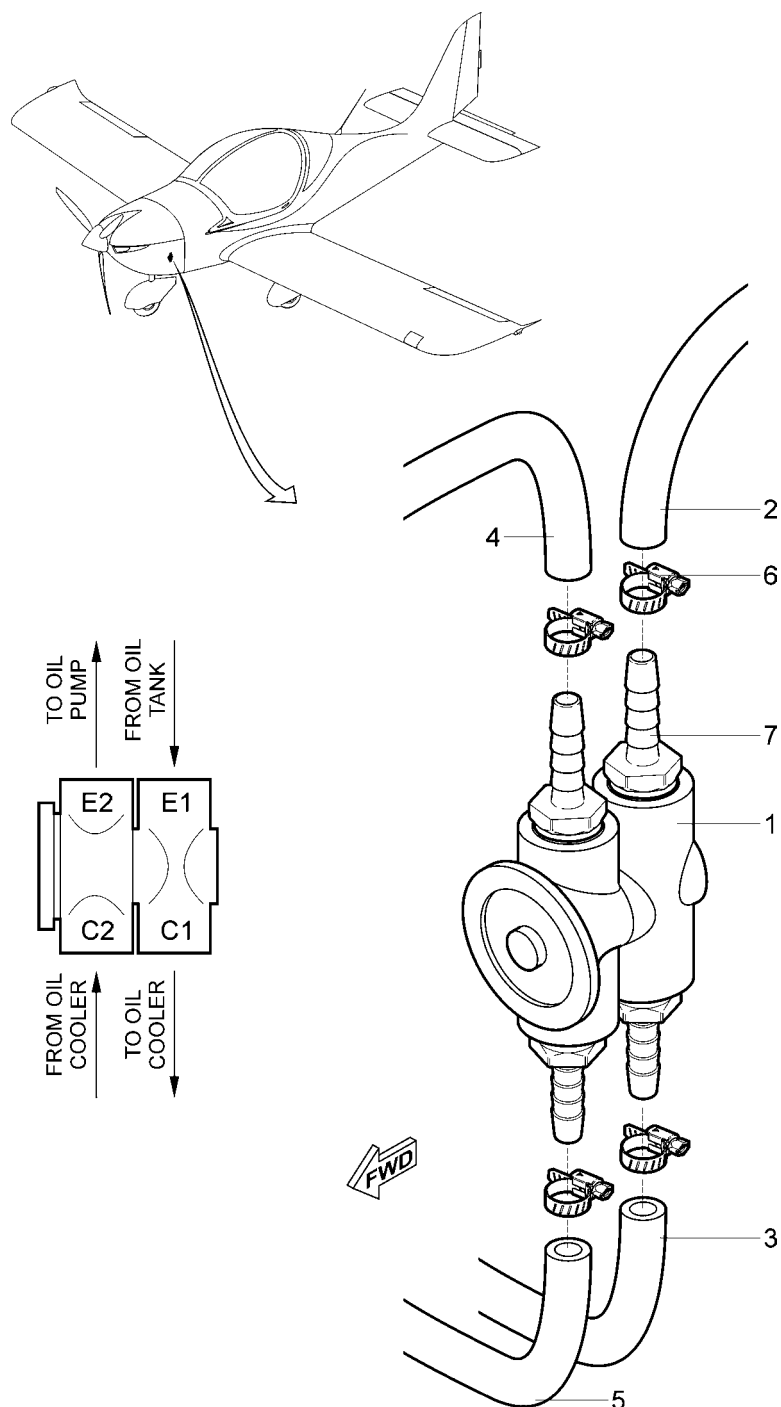
BEFORE STARTING THE WORK, COOL DOWN THE ENGINE UP TO THE AMBIENT TEMPERATURE. NON-COMPLIANCE WITH THE PROCEDURE MAY RESULT IN BURNS AND SCALDS.

SWITCH OFF THE IGNITION AND TAKE OUT THE KEY!

- (1) Removal – thermostat
- (a) Switch the electrical network off and disconnect the battery.
- (b) Remove the engine cowlings (Section 71-10).
- (c) Drain the oil (Section 12-10).
- (d) Remove the cable ties attaching the hoses to the structure.



- (e) Release the clamps (6, 79-4) and disconnect the hoses (2; 3; 4; 5) from the thermostat.
- (f) Remove the thermostat (1).
- (g) As needed, remove the screw fitting (7) from the thermostat.
- (h) Close the thermostat necks and the hoses with suitable blind plugs.
- (2) Installation – thermostat
 - (a) Remove the blind plugs from the thermostat necks and from the hoses.
 - (b) As needed, remove the rests of adhesive and clean the threads of screw fitting (7, 79-4) and thermostat (1) by means of a cleaner.
 - (c) Apply the adhesive on the threads of screw fittings (7), screw them in the thermostat and tighten them.
 - (d) Put the hoses (2; 3; 4; 5) on the corresponding thermostat necks and attach them by means of the clamps (6).
 - (e) Attach the thermostat hoses to the surrounding structure.
 - (f) Fill the system with oil (Section 12-10).
 - (g) Connect the battery, switch the electrical network on.
 - (h) Do the engine test and check the tightness.
 - (i) Install the engine cowlings (Section 71-10).



Legend to Fig. 79-4

1 Thermostat	5 Inlet hose from oil cooler
2 Inlet hose from oil tank	6 Clamp 19/9 (4 pcs.)
3 Outlet hose to oil cooler	7 Screw fitting (4 pcs.)
4 Outlet hose to oil pump	

Fig. 79-4 Thermostat – removal / installation



D. Oil filter

Maintenance type: Line

Personnel qualification: Independent certifying staff qualified in compliance with Part 66 or subsequent parts

Recommended tools and material:

Item	Designation / Size	Quantity	Note
Wrench	No. 12	1 pc.	
Wrench	No. 13	1 pc.	
Wrench for filter	P/N 877620	1 pc.	Or equivalent
Torque wrench	8 – 50 Nm	1 pc.	
Socket wrench	No. 13	1 pc.	

WARNING

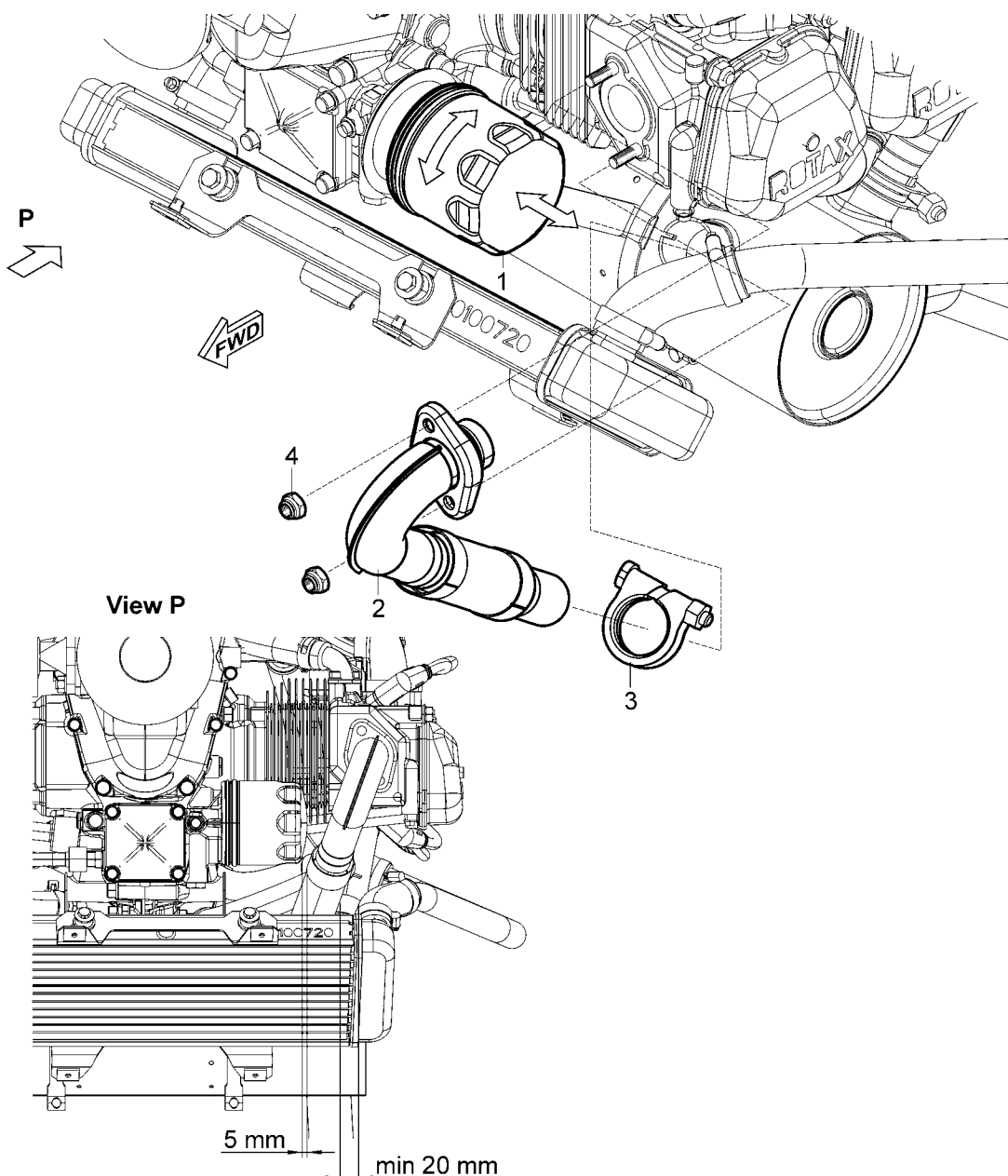
BEFORE STARTING TO WORK, COOL DOWN THE ENGINE TO THE AMBIENT TEMPERATURE. NON-COMPLIANCE WITH THE PROCEDURE MAY RESULT IN BURNS.

SWITCH OFF THE IGNITION AND TAKE OUT THE KEY!

- (1) Removal – oil filter
 - (a) Switch the electrical network off and disconnect the battery.
 - (b) Remove the engine cowlings (Section 71-10).
 - (c) Drain the oil (Section 12-10).
 - (d) Unscrew the nuts (4, Fig. 79-5).
 - (e) Release the sleeve (3).
 - (f) Slide out the elbow (2) from the engine and slightly bend away the exhaust pipe in the direction from the oil filter.
 - (g) Remove the oil filter (1) in accordance with the instructions shown in the document Maintenance Manual (Line Maintenance) for Rotax Engine Type 912 Series, Doc. No. MML-912, 899191.
 - (h) Check the oil filter in accordance with the instructions shown in the document Maintenance Manual (Line Maintenance) for Rotax Engine Type 912 Series, Doc. No. MML-912, 899191.
- (2) Installation – oil filter
 - (a) Install the new oil filter (1, Fig. 79-5) in accordance with the instructions shown in the document Maintenance Manual (Line Maintenance) for Rotax Engine Type 912 Series, Doc. No. MML-912, 899191.
 - (b) Connect the exhaust pipe elbow (2) to the engine, install the nuts (4) and tighten them slightly by hand.
 - (c) Set the distance of the exhaust pipe from the cooler hose and from the oil filter – the distance from the cooler hose must be at least 20 mm and the distance from the oil filter must be about 5 mm (see Fig. 79-5; valid up to S/N 4200).



- (d) After setting the distance, tighten the elbow (2) and the sleeve (3); tighten the nuts (4) using a torque of 15 Nm (133 lb in).
- (e) Fill the system with oil (Section 12-10).
- (f) Connect the battery, switch the electrical network on.
- (g) Do the engine test and check the tightness.
- (h) Install the engine cowlings (Section 71-10).



Legend to Fig. 79-5

1 Oil filter	3 Sleeve
2 Exhaust pipe elbow	4 Nut (2 pcs.)

Fig. 79-5 Oil filter – removal / installation



INDICATING

1. DESCRIPTION AND OPERATION

A. Oil dipstick

The oil dipstick serves for checking the quantity of oil in the engine. The oil dipstick is part of the cap of the tank filler neck. The filler neck is part of the oil tank cover.

B. Oil temperature sensor

The oil temperature sensor is located on the pump body and measures the oil temperature on the inlet. The oil temperature on the inlet into the engine is measured by the sensor that is located behind the oil pump. The working range of the oil thermometer is 50 to 150°C. For the airplanes equipped with the analog instruments, the signal from the sensor is led to the oil thermometer. For the airplane equipped with the Dynon SkyView system, the signal is led to the module SV-EMS-220 and the value is indicated on the displays of the system; for the airplane equipped with the Garmin G3X system, the signal is led to the EIS unit GEA-24 and the value is indicated on the MFD.

The wiring diagram of oil temperature sensor and oil thermometer is shown in Chapter 91.

C. Oil pressure sensor

The sensor of oil pressure is installed along with the pressure reducing valve in the oil pump of the engine. The oil pressure on the inlet into the engine is measured by means of the sensor that is located behind the oil filter. The working range is 0 to 10 bars. For the airplanes equipped with analog instruments, the signal from the sensor is led to the oil pressure indicator. For the airplane equipped with the Dynon SkyView system, the signal is led to the module SV-EMS-220 and the value is indicated on the displays of the system; for the airplane equipped with the Garmin G3X system, the signal is led to the EIS unit GEA-24 and the value is indicated on the MFD.

The wiring diagram of oil pressure sensor and oil pressure indicator is shown in Chapter 91.



2. MAINTENANCE PRACTICES

A. Oil dipstick

The more details concerning the oil system filling are shown in Section 12-10.

B. Oil temperature sensor

Maintenance type: Line

Personnel qualification: Independent certifying staff qualified in compliance with Part 66 or subsequent parts

Recommended tools and material:

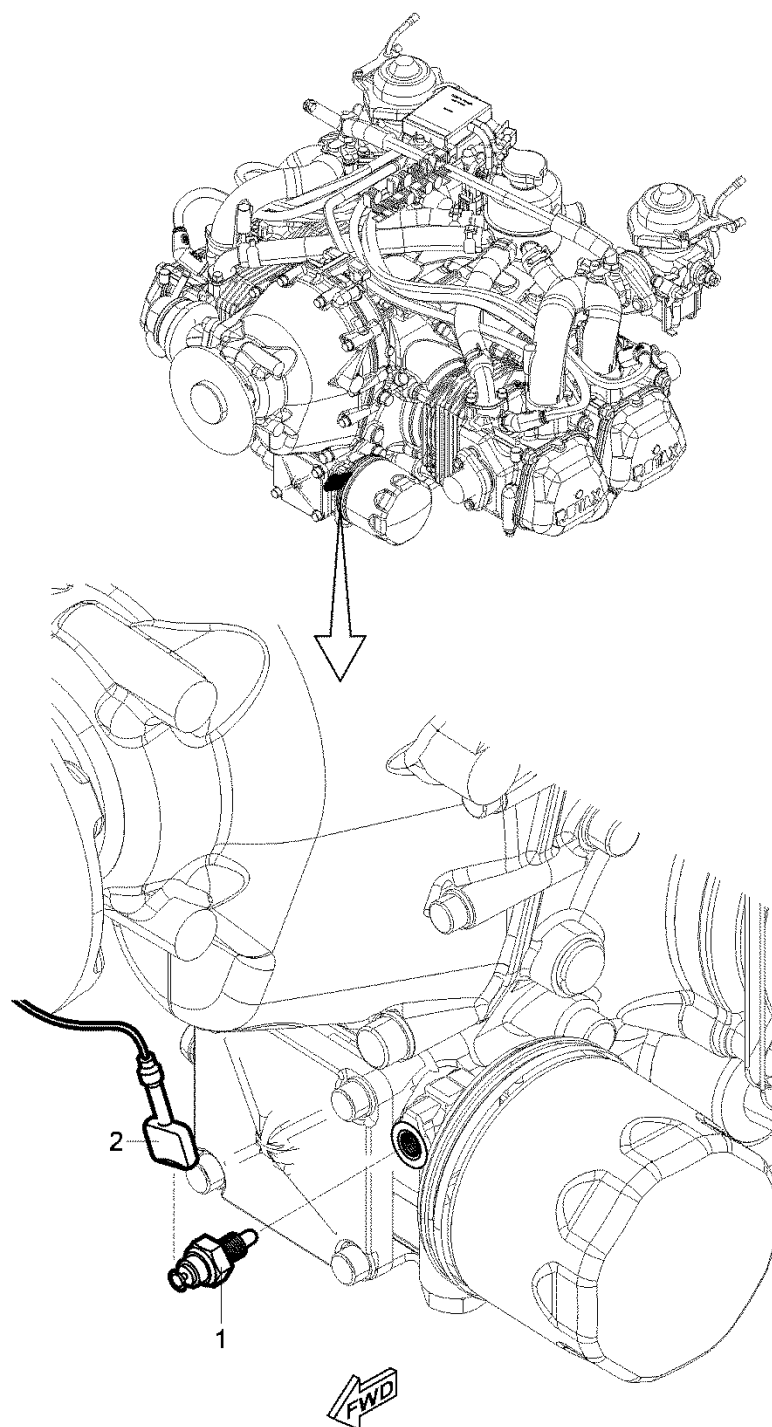
Item	Designation / Size	Quantity	Note
Socket wrench	No. 12	1 pc.	

WARNING

BEFORE STARTING TO WORK, COOL DOWN THE ENGINE TO THE AMBIENT TEMPERATURE. NON-COMPLIANCE WITH THE PROCEDURE MAY RESULT IN BURNS.

SWITCH OFF THE IGNITION AND TAKE OUT THE KEY!

- (1) Removal – oil temperature sensor
 - (a) Remove the engine cowlings (Section 71-10).
 - (b) Switch the electrical network off and disconnect the battery.
 - (c) Pull out the connector (2, **Chyba! Nenalezen zdroj odkazů.**) upwards and disconnect it.
 - (d) Unscrew and remove the sensor of oil temperature (1).
 - (e) Close the hole for the oil temperature sensor using a suitable blind plug.
- (2) Installation – oil temperature sensor
 - (a) Remove the blind plug from the hole for the oil temperature sensor.
 - (b) Screw the sensor of oil temperature (1, **Chyba! Nenalezen zdroj odkazů.**) into the engine block.
 - (c) Connect the connector (2) to the sensor of oil temperature (1).
 - (d) Install the engine cowlings (Section 71-10).
 - (e) Connect the battery, switch the electrical network on.
 - (f) Do the engine test and check the function of the sensor.



Legend to Fig. 79-56

1 Oil temperature sensor

2 Connector with wires

Fig. 79-6 Oil temperature sensor – removal / installation



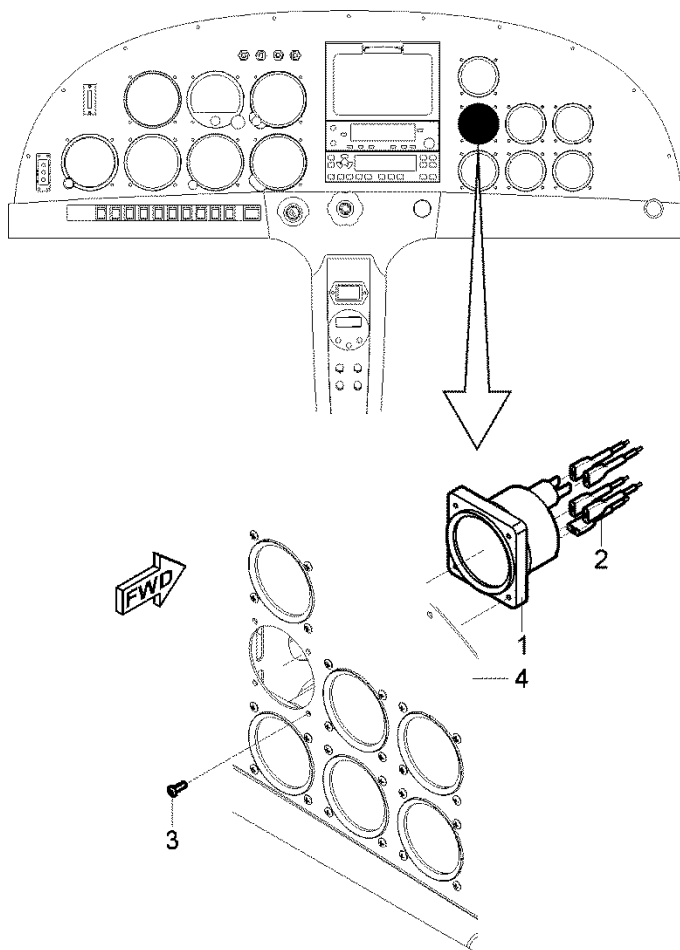
C. Oil thermometer

Maintenance type: Line

Personnel qualification: Independent certifying staff qualified in compliance with Part 66 or subsequent parts

Recommended tools and material:

Item	Designation / Size	Quantity	Note
Phillips screwdriver	No. 2	1 pc.	



Legend to Fig. 79-7

- 1 Oil thermometer
- 2 Wires
- 3 Screw (4 pcs.)

For information:

- 4 Instrument panel

Fig. 79-7 Oil thermometer – removal / installation



- (1) Removal – oil thermometer
 - (a) Switch the electrical network off and disconnect the battery.
 - (b) Remove the cover of the fuselage upper part F4 (Section 53-30).
 - (c) Disconnect the wires (2, Fig. 79-7).
 - (d) Unscrew the screws (3) and remove the oil thermometer (1).
- (2) Installation – oil thermometer
 - (a) Insert the oil thermometer (1, Fig. 79-7) into the hole in the instrument panel (4); screw on and tighten the screws (3).
 - (b) Connect the wires (2).
 - (c) Install the cover of the upper part of the fuselage F4 (Section 53-30).
 - (d) Connect the battery, switch the electrical network on.
 - (e) Do the engine test and check the function of the oil thermometer.

D. Oil pressure sensor

Maintenance type: Line

Personnel qualification: Independent certifying staff qualified in compliance with Part 66 or subsequent parts

Recommended tools and material:

Item	Designation / Size	Quantity	Note
Socket wrench	No. 19	1 pc.	
Cable tie	2,5x99	1 pc.	

WARNING

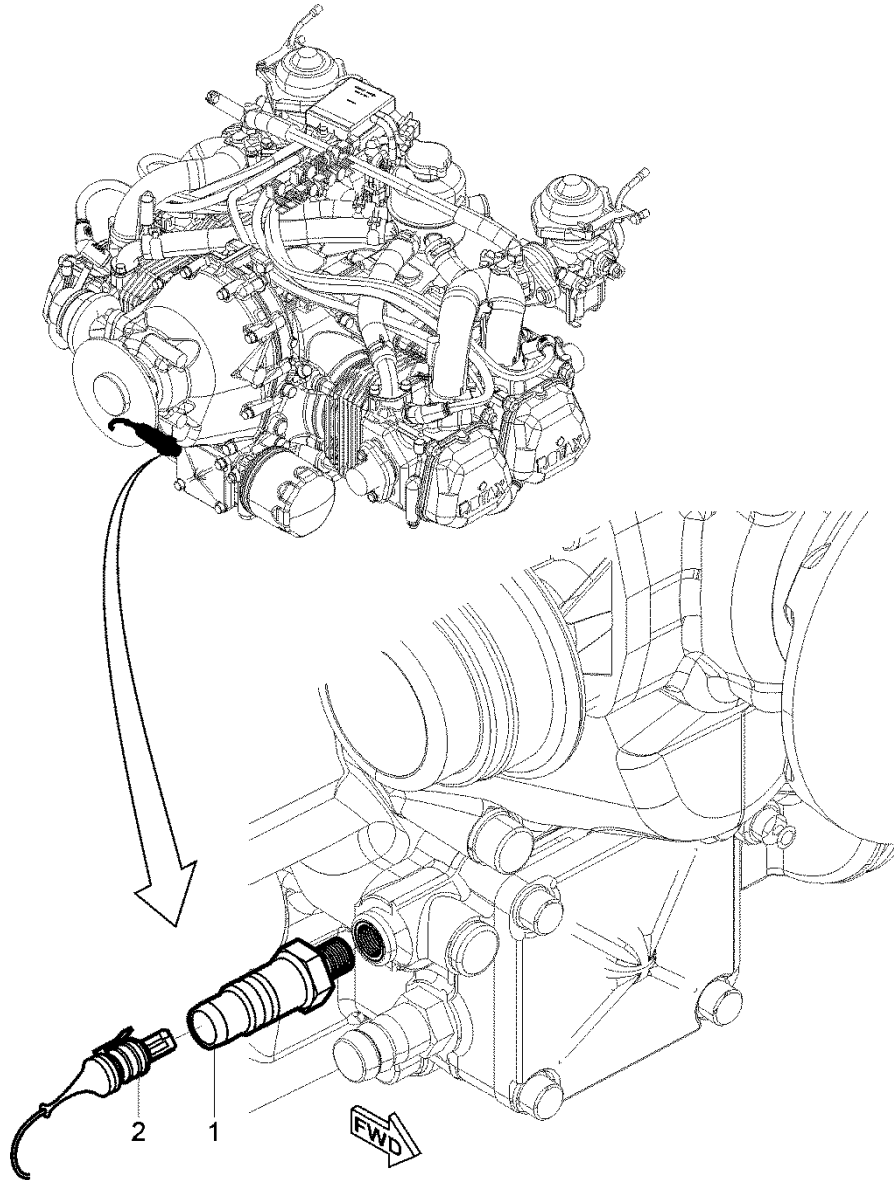
BEFORE STARTING THE WORK, COOL DOWN THE ENGINE UP TO THE AMBIENT TEMPERATURE. NON-COMPLIANCE WITH THE PROCEDURE MAY RESULT IN BURNS AND SCALDS.

SWITCH OFF THE IGNITION AND TAKE OUT THE KEY!

- (1) Removal – oil pressure sensor
 - (a) Remove the engine cowlings (Section 71-10).
 - (b) Switch the electrical network off and disconnect the battery.
 - (c) Remove the tie-wrap from the sensor of oil pressure (1, Fig. 79-8).
 - (d) Pull up the connector safety lock (2) of the oil pressure sensor and slide out the connector.
 - (e) Unscrew and remove the sensor of oil pressure (1).
 - (f) Close the hole for the oil pressure sensor by means of a suitable blind plug.
- (2) Installation – oil pressure sensor
 - (a) Remove the blind plug from the hole for the oil pressure sensor.
 - (b) Screw the pressure sensor (1, Fig. 79-8) into the body of the oil pump.
 - (c) Connect the connector (2) to the sensor of oil pressure (1).



- (d) Fasten the wire by means of the cable tie.
- (e) Install the engine cowlings (Section 71-10).
- (f) Connect the battery, switch the electrical network on.
- (g) Do the engine test and check the function of the sensor.



Legend to Fig. 79-8

1 Oil pressure sensor

2 Connector with wires

Fig. 79-8 Oil pressure sensor – removal / installation

**E. Oil pressure indicator**

Maintenance type: Line

Personnel qualification: Independent certifying staff qualified in compliance with Part 66 or subsequent parts

Recommended tools and material:

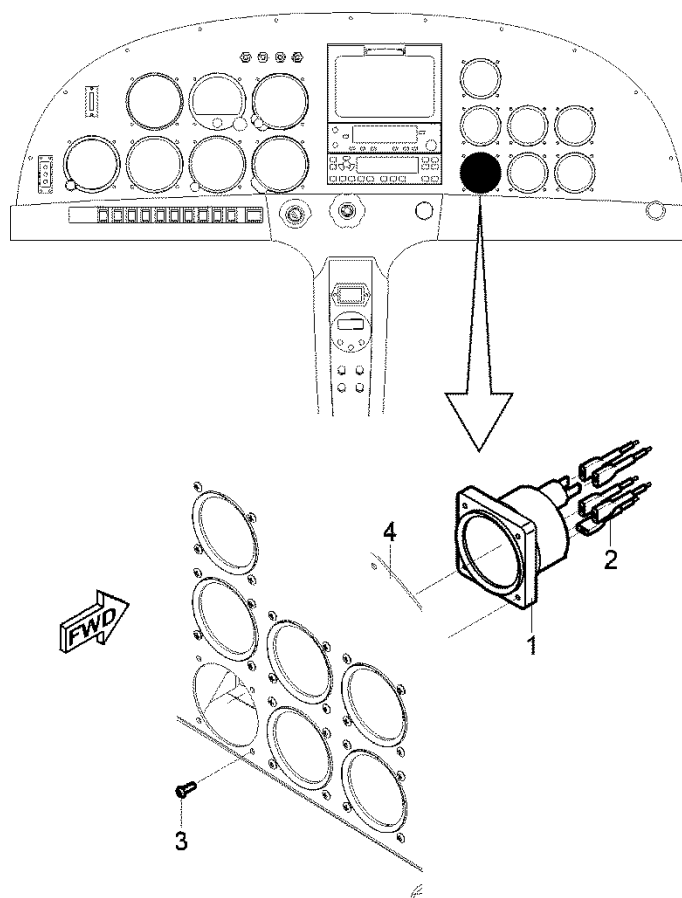
Item	Designation / Size	Quantity	Note
Phillips screwdriver	No. 2	1 pc.	

(1) Removal – oil pressure indicator

- (a) Switch the electrical network off and disconnect the battery.
- (b) Remove the cover of the upper part of the fuselage F4 (Section 53-30).
- (c) Disconnect the wires (2, Fig. 79-9).
- (d) Unscrew the screws (3) and remove the oil pressure indicator (1).

(2) Installation – oil pressure indicator

- (a) Insert the oil pressure indicator (1, Fig. 79-9) into the hole in the instrument panel (4); screw on and tighten the screws (3).
- (b) Connect the wires (2).
- (c) Install the cover of the upper part of the fuselage F4 (Section 53-30).
- (d) Connect the battery, switch the electrical network.
- (e) Do the engine test and check the function of the oil pressure indicator.



Legend to Fig. 79-9

- 1 Oil pressure indicator
- 2 Wires
- 3 Screw (4 pcs.)

For information:

- 4 Instrument panel

Fig. 79-9 Oil pressure indicator – removal / installation



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CHAPTER

91

**CHARTS & WIRING
DIAGRAMS**



CHAPTER 91

CHARTS & WIRING DIAGRAMS

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GENERAL

1. INTRODUCTION

Chapter 91 contains wiring diagrams of the SportStar RTC airplane.

The wiring diagrams covers interconnection of the components, instruments and electronic systems on the SportStar RTC airplane.

The wiring diagram contain the name of part of the electricity system, identification number and wires parameters and other details required to install the system on the airplane. If the wiring diagram consists of multiple sheets, the sheet number indicated in the drawing title block.



WIRING DIAGRAMS

This Section contains the list of wiring diagrams and own wiring diagrams of the SportStar RTC airplane.

1. LIST OF WIRING DIAGRAMS

Title	Dwg. No.	Sheets
Standard equipment		
Hobbs hourmeter	E7 19-10 01	1
Turn coordinator BZW 4B	E7 30-01 01	1
Horizon RCA 26AK	E7 34-01 01	1
Directional gyro RCA15AK	E7 38-01 01	1
Chronometer LC2	E7 40-01 01	1
Canopy closing signalization	E7 47-01 01	1
Stall warning (ACI)	E7 48-01 01	1
Dual trim tab control	E7 52-10 01	1
Fuel pressure indicator (Mitchell)	E7 65-10 01	1
Power supply	E7 68-01 01	1
Rectifier capacitor	E7 68-20 01	1
Avionics switch	E7 68-99 01	1
Garmin GPS Aera 500 + Airgizmos	E7 86-10 01	1
SL40 + PM3000 + GTX328 + A30	E7 88-30 01	2
Strobe lights Whelen LED 90340	E7 91-10 01	1
Landing light Whelen LED 71141	E7 95-10 01	1
Fuel system RTC	S6 00-69 01	1
Engine instruments (Mitchell)	S7 65-01 01	1
Optional equipment		
Compass S.I.R.S. (lighted)	E7 26-45 01	1
Turn coordinator RCA82	E7 31-01 01	1
Canopy closing signalization - ver. DYN. EMS	E7 47-10 01	1
Flaps closing signalization	E7 47-50 01	1
Flaps closing signalization - ver. D	E7 47-60 01	1
Dual trim control - ver. D	E7 52-20 01	1
Flight instruments (LUN) - ver. USA	E7 59-11 99	1
OAT indicator (Mitchell)	E7 65-20 01	1
Voltmeter (Mitchell)	E7 65-30 01	1
Power supply with auxiliary generator	E7 68-31 01	1
External power socket	E7 68-91 01	1
D10+D7+ADAHRS+ADAHRS+EMS+GPS+GPS	E7 70-01 01	3



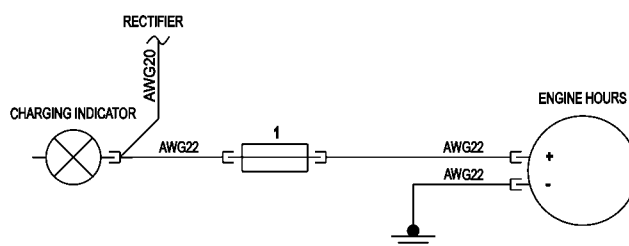
Title	Dwg. No.	Sheets
Flight instruments (Winter) - ver. D	E7 70-01 05	1
GTN750+GMA35+GTX33+SL40+A30+SV-ARINC429	E7 70-01 06	4
D10+D7+ADAHRS+ADAHRS+EMS+GPS	E7 70-01 07	4
Becker AR6201+BXP6401+BE6400	E7 77-81 01	2
SL30+GI106A+PM3000+GTX328+A30	E7 89-30 01	3
GNC255A+GI106A+GTX328+A30	E7 89-50 01	3
GNC255A+GTX328+A30+DYNON CDI	E7 89-70 01	2
GTR225A+GTX328+ACK30	E7 89-72 01	2
Instrument lighting with regulator	E7 99-10 01	1
Propeller KW-31	S6 00-41 01	2
Pitot-static tube heating	S7 00-16 01	1
Heat seats	S7 00-17 01	1
Fuel system 912S NVFR	S6 00-76 01	1
ELT Artex ME406	S7 01-20 01	1
ELT Kannad Integra	S7 01-28 01	1
Chronometer Mitchell	S7 40-01 01	1
Clock SC-5	S7 40-02-01	1
Canopy closing signalization - ver. G3X	S7 47-10 01	1
Flaps closing signalization - ver. G3X	S7 47-11 01	1
Signalization – parking brake	S7 47-60 01	1
Dual trims control (PITCH) - ver. G3X	S7 52-49 01	1
D10+D7+2xADAHRS+EMS+2xGPS ver. RTC	S7 66-01 01	5
Garmin G3X+460+460+2xADAHRS+EMS-RTC	S7 66-24 01	4
Garmin G3X 460+460+2xADAHRS+EMS-NVFR	S7 66-24 99	4
Garmin G3X Audio	S7 66-50 00	1
Power supply with alt. F3A	S7 68-31 01	1
Power supply with alt. F3A - ver. NVFR	S7 68-31 99	1
Avionics switch - NVFR	S7 68-99 99	1
Flight data recorder - ver. Dynon	S7 69-01 01	1
Flight data recorder - ver. G3X	S7 69-02 01	1
Flight data recorder - ver. analog	S7 69-10 01	1
Traffic avoidance system AT-1	S7 69-21 01	1
Garmin GPS Aera 660 + Airgizmos	S7 70-10 01	1
GTN750+GMA35+GTX33+A30+GTR225+ARINC429	S7 87-00 01	4
Bose headset - jacks	S7 87-12 01	1
GNC255A+GTX328+A30 – G3X	S7 87-15 01	2



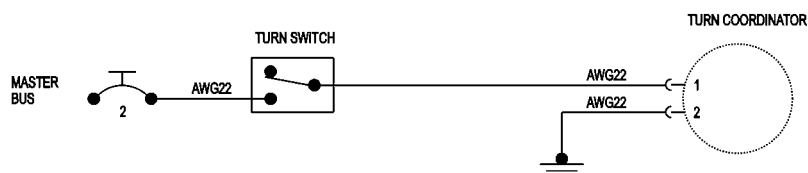
Title	Dwg. No.	Sheets
GNC255A+GTX328+ G3X CDI-NVFR	S7 87-15 99	2
GNC255A+GTX335+A30 - G3X CDI	S7 87-19 01	2
Strobe lights Whelen LED Orion 600	S7 91-01 01	1
Strobe lights Whelen LED Orion 600 NVFR	S7 91-01 99	1
Taxi light Whelen LED 71141 NVFR	S7 91-10 99	1
Landing light Whelen LED 71141 NVFR	S7 91-11 99	1
Cockpit light	S7 99-51 01	1
Cockpit light NVFR	S7 99-51 99	1
Cockpit light (Koger)	S7 99-61 01	1
Interior lighting with regul.	S7 99-81 01	1



A. Standard equipment

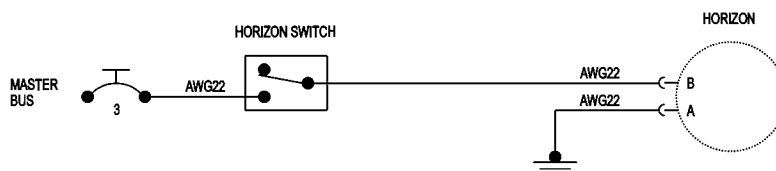


	NÁZEV: HOBBS HOURMETER	
	ČÍSLO VÝKRESU: E7 19-10 01	

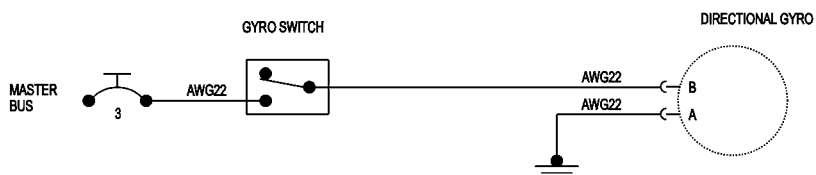


NÁZEV: ZATÁČKOMĚR BZW 4B
TURN COORDINATOR BZW 4B

ČÍSLO VÝKRESU: E7 30-01 01

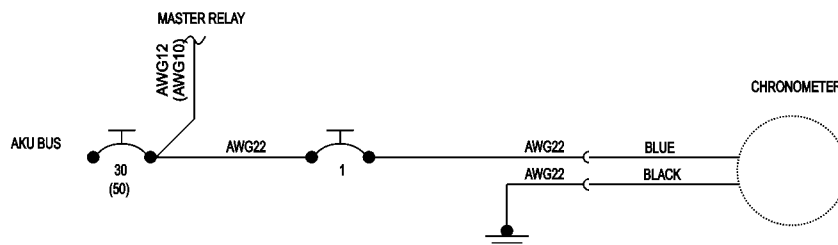


NÁZEV: HORIZONT RCA26AK
HORIZON RCA26AK
ČÍSLO VÝKRESU: E7 34-01 01

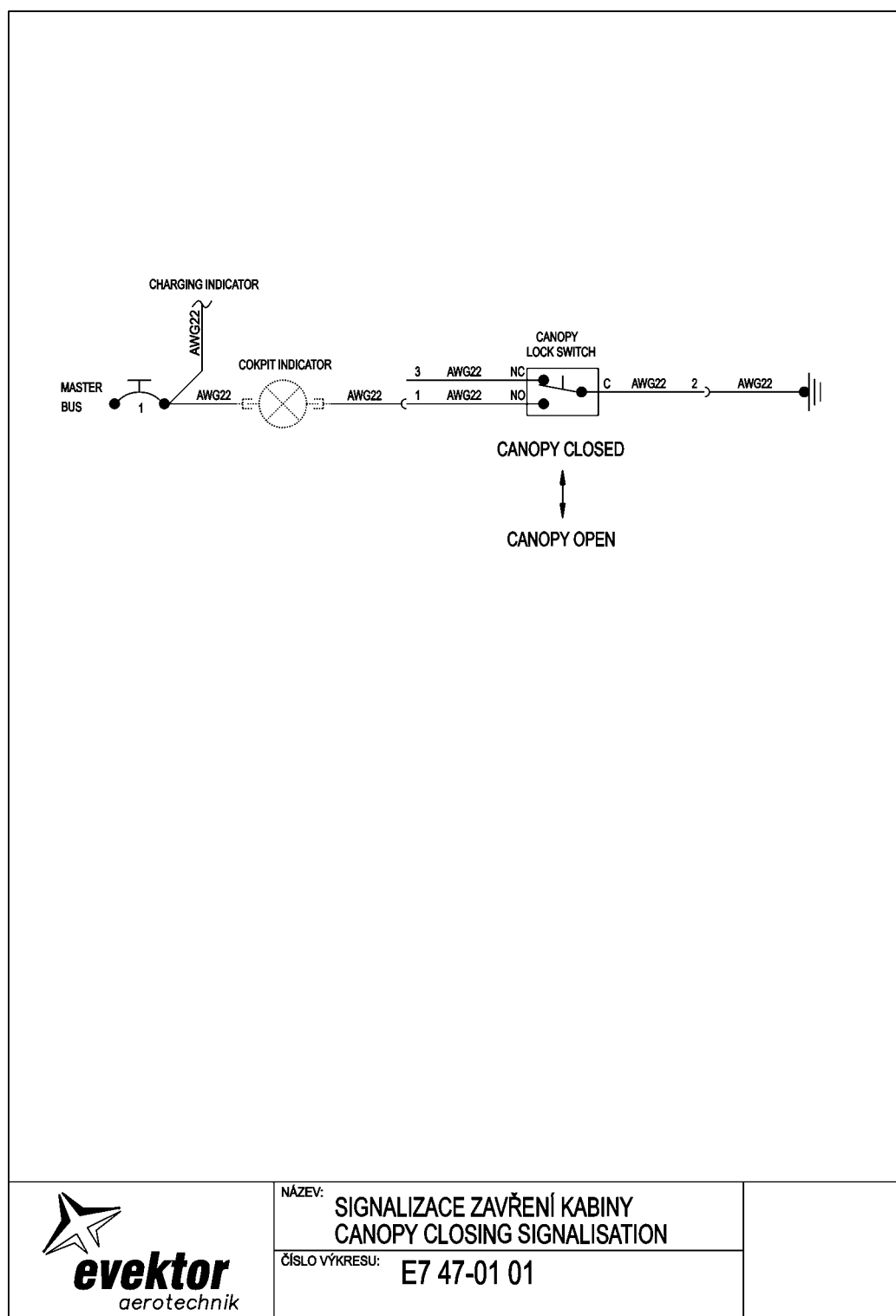


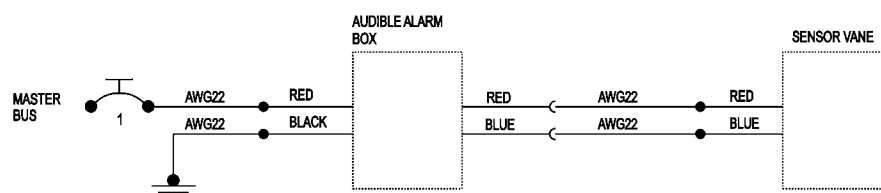
NÁZEV: SMĚROVÝ SETRVAČNÍK RCA15AK
 DIRECTIONAL GYRO RCA15AK

ČÍSLO VÝKRESU: E7 38-01 01

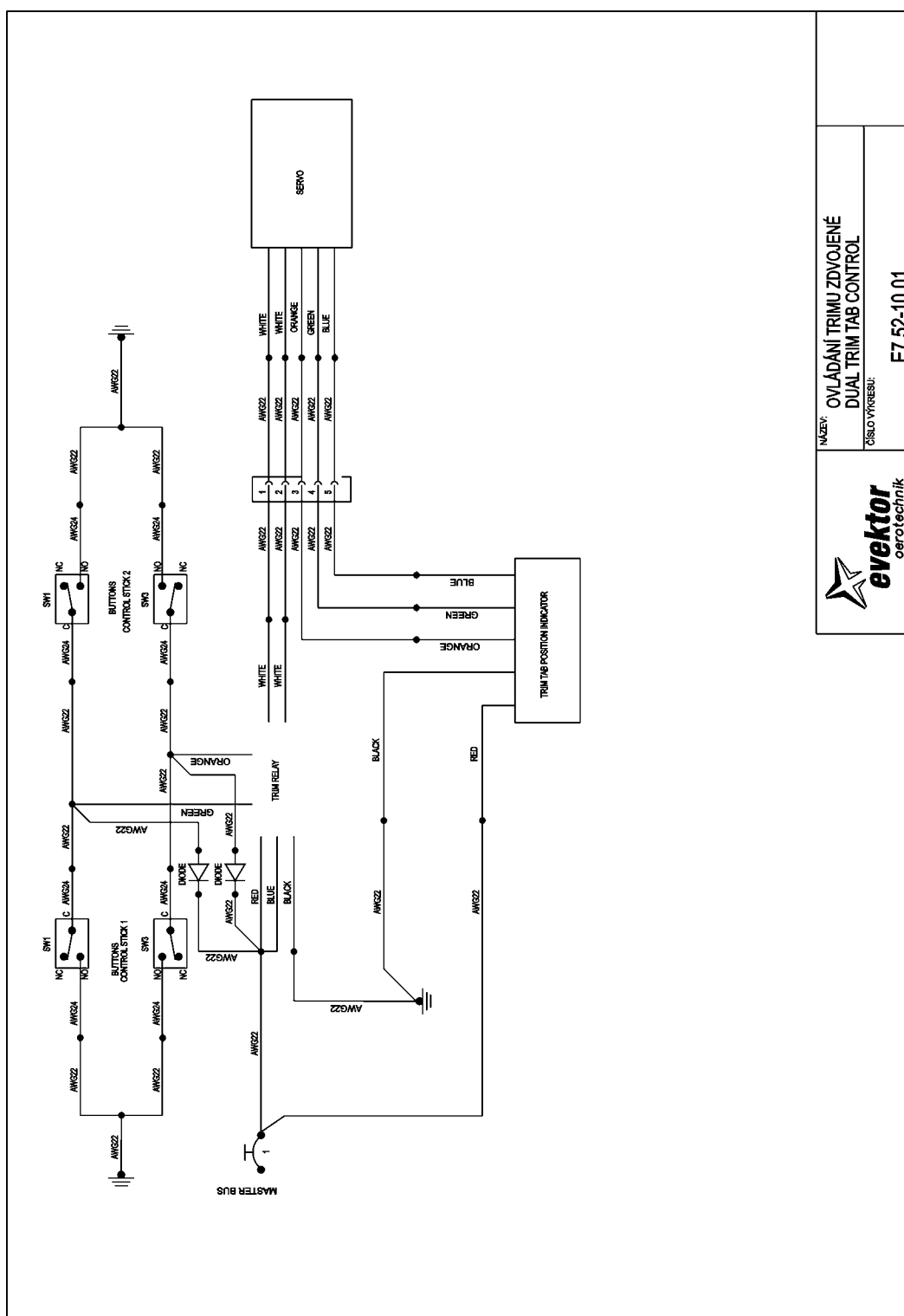


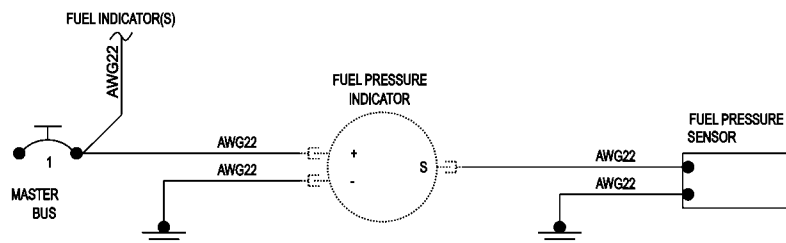
NÁZEV: PALUBNÍ HODINY LC2
CHRONOMETER LC2
ČÍSLO VÝKRESU: E7 40-01 01



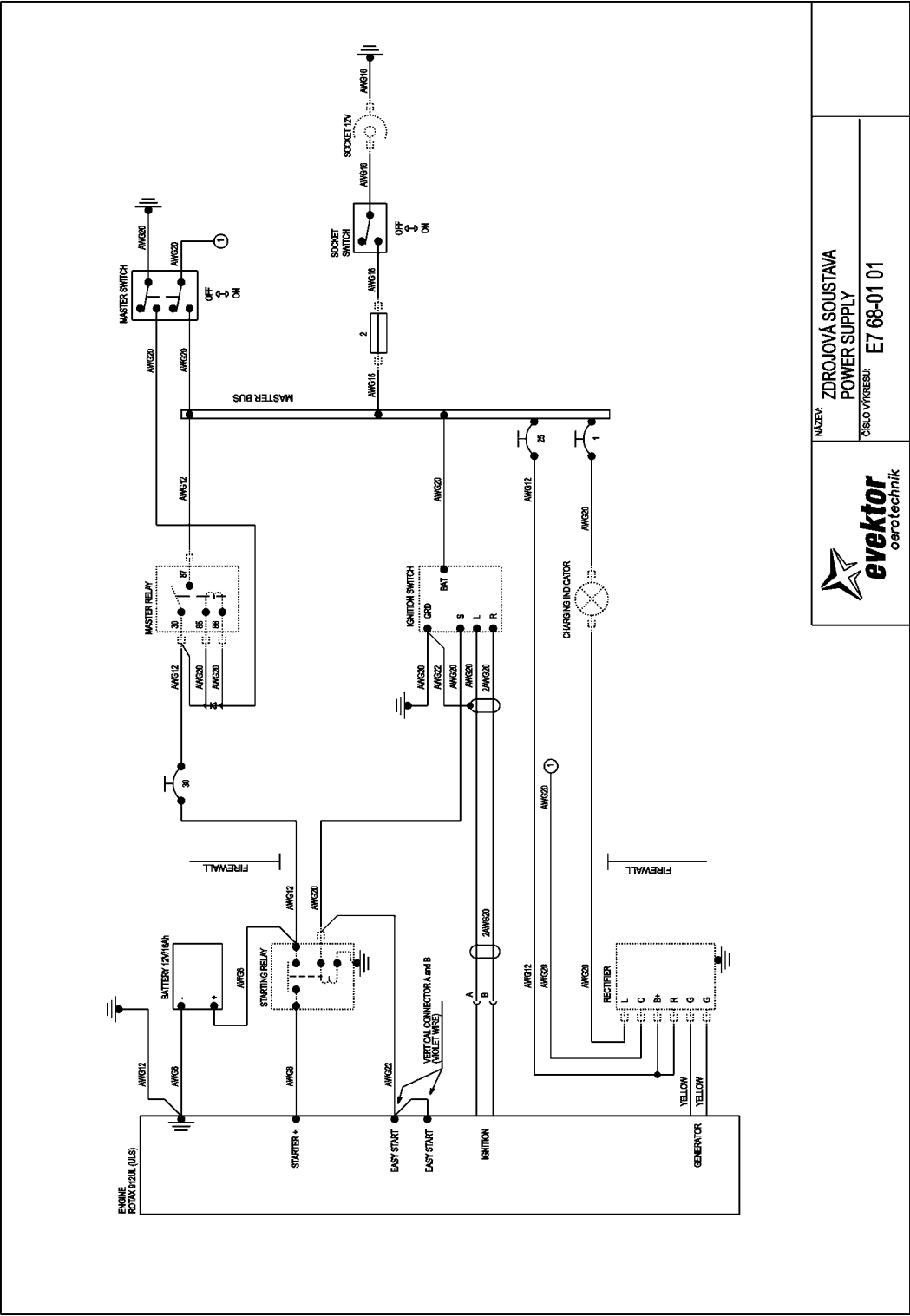


NÁZEV: SYST. VAROVÁNÍ PŘED PÁDEM (ACI)
STALL WARNING (ACI)
ČÍSLO VÝKRESU: E7 48-01 01



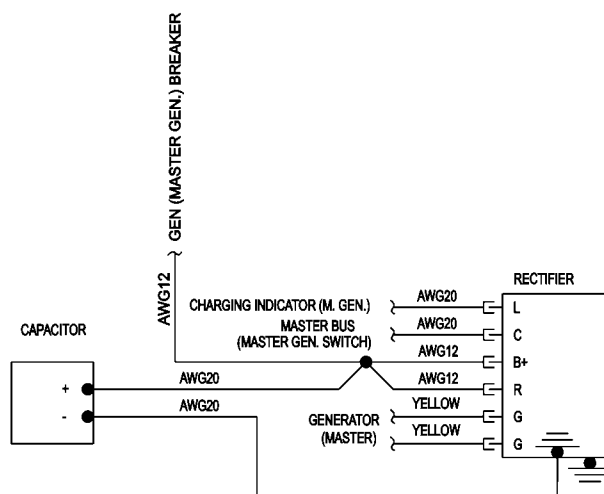


NÁZEV: TLAKOMĚŘ PALIVA (MITCHELL)
FUEL PRESS. INDICATOR (MITCHELL)
ČÍSLO VÝKRESU: E7 65-10 01



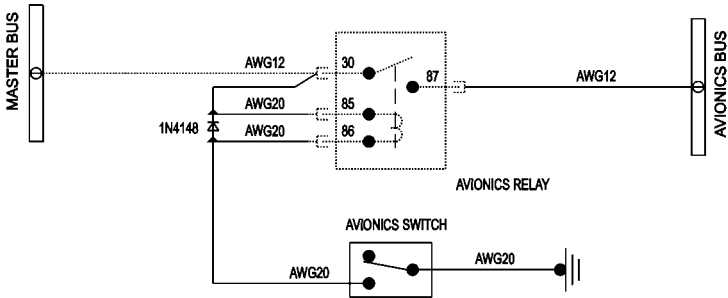
NAZEV: ZDROJOVÁ SOUSTAVA
POWER SUPPLY
ČÍSLO VÝKRESU: E7 68-01 01



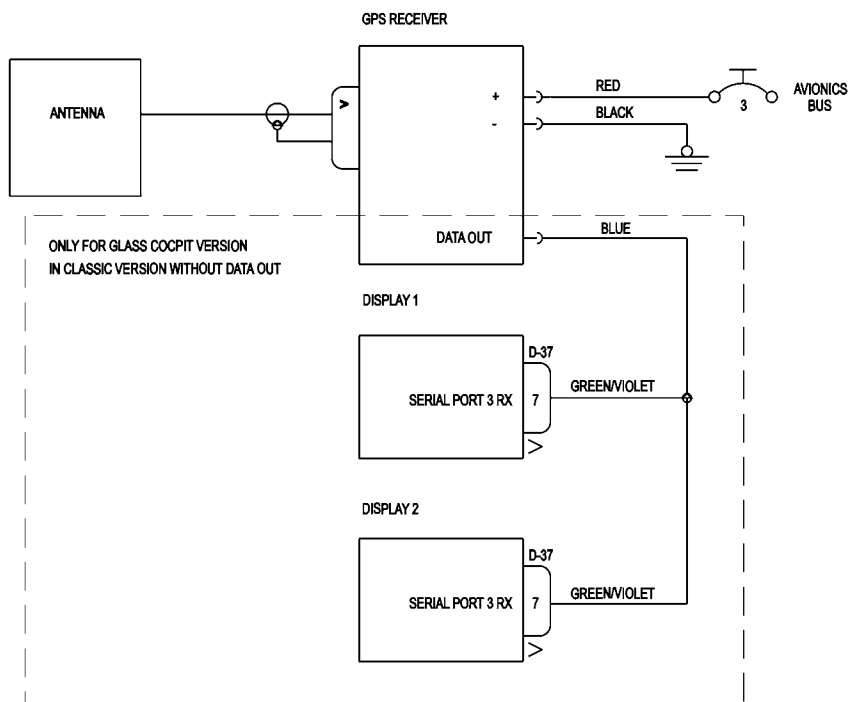


NÁZEV: KONDENZÁTOR USMĚRŇOVAČE
RECTIFIER CAPACITOR

ČÍSLO VÝKRESU: **E7 68-20 01**



NÁZEV: VYPÍNAČ AVIONIKY
AVIONICS SWITCH
ČÍSLO VÝKRESU: E7 68-99 01

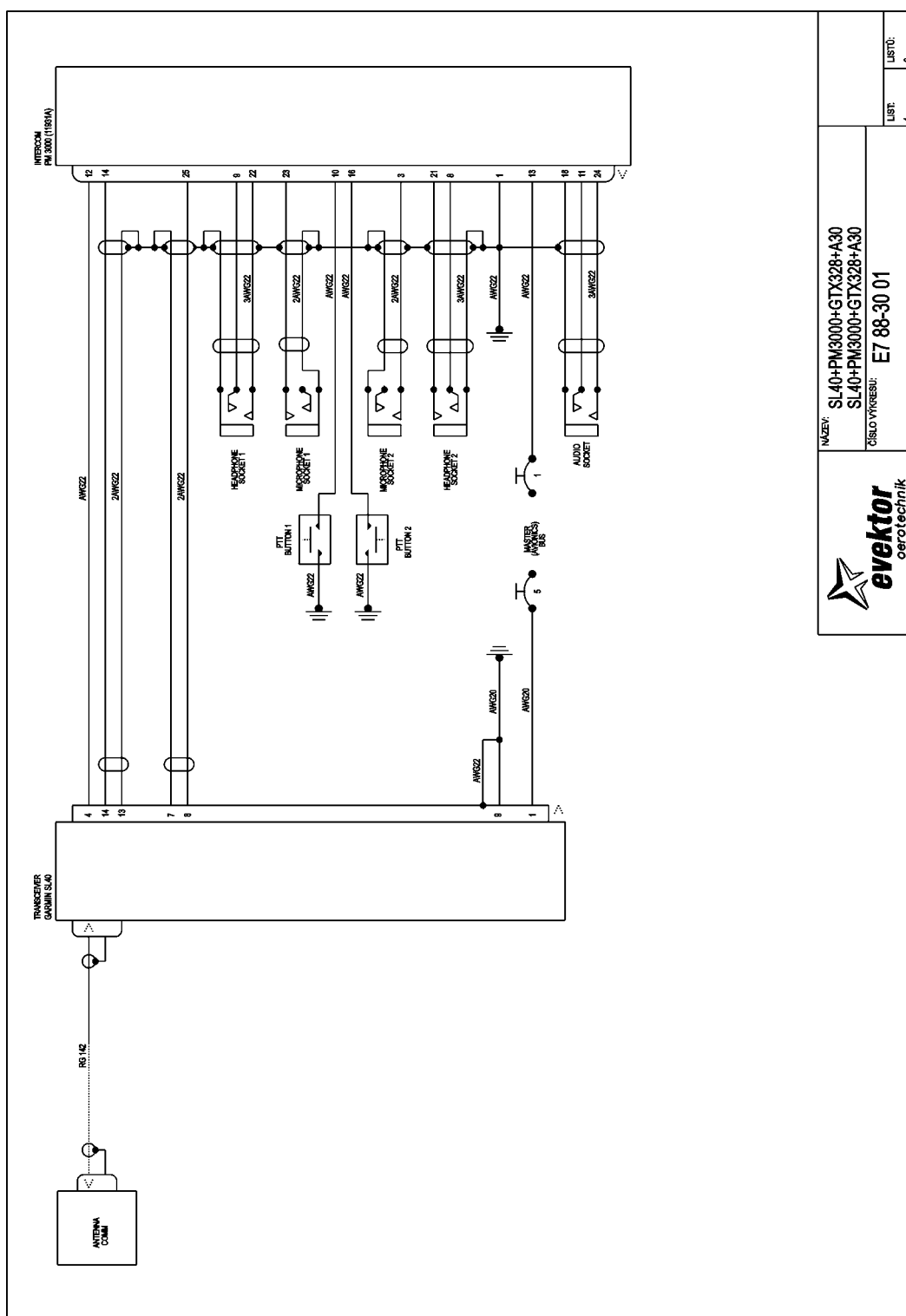


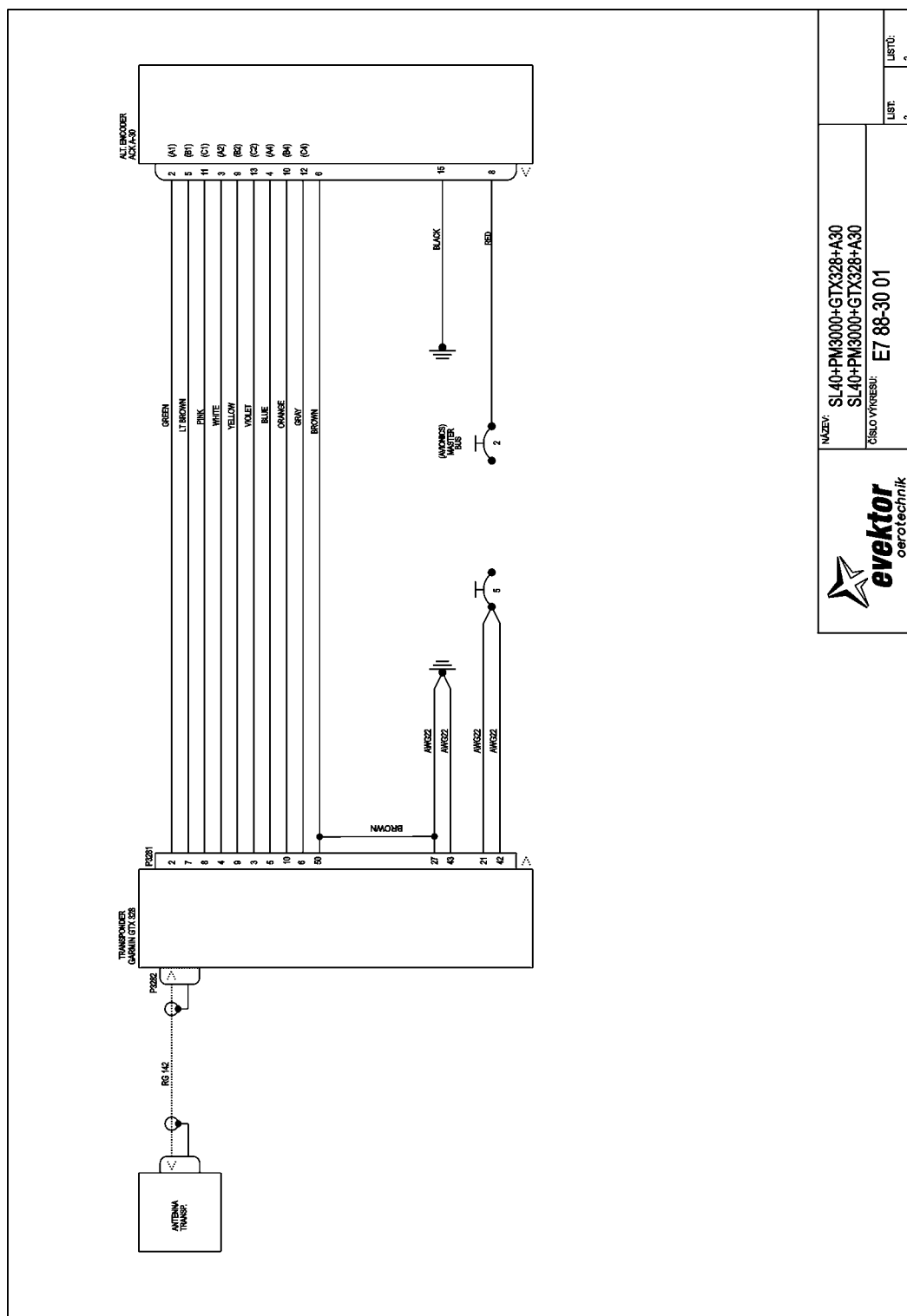
NÁZEV:

GARMIN GPS aera 500+AIRGIZMOS

ČÍSLO VÝKRESU:

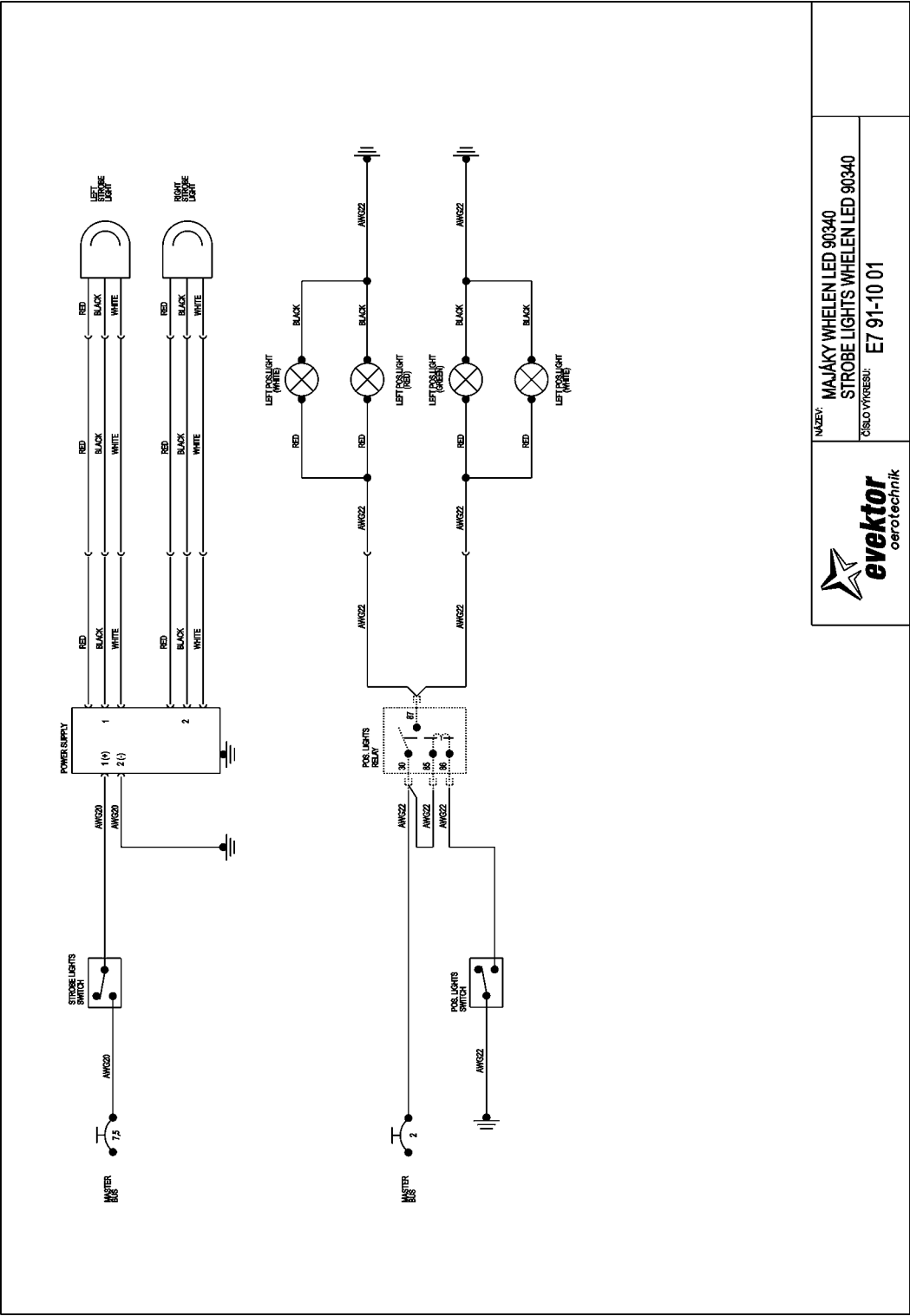
E7 86-10 01



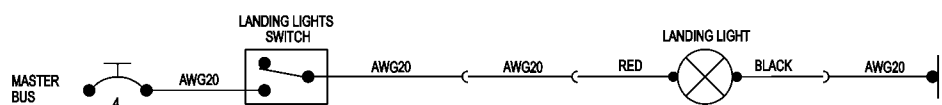


NAZEV: SL40+PM3000+GTX328+A30
SL40+PM3000+GTX328+A30
ČÍSLO VÝKRESU: E7 88-30 01

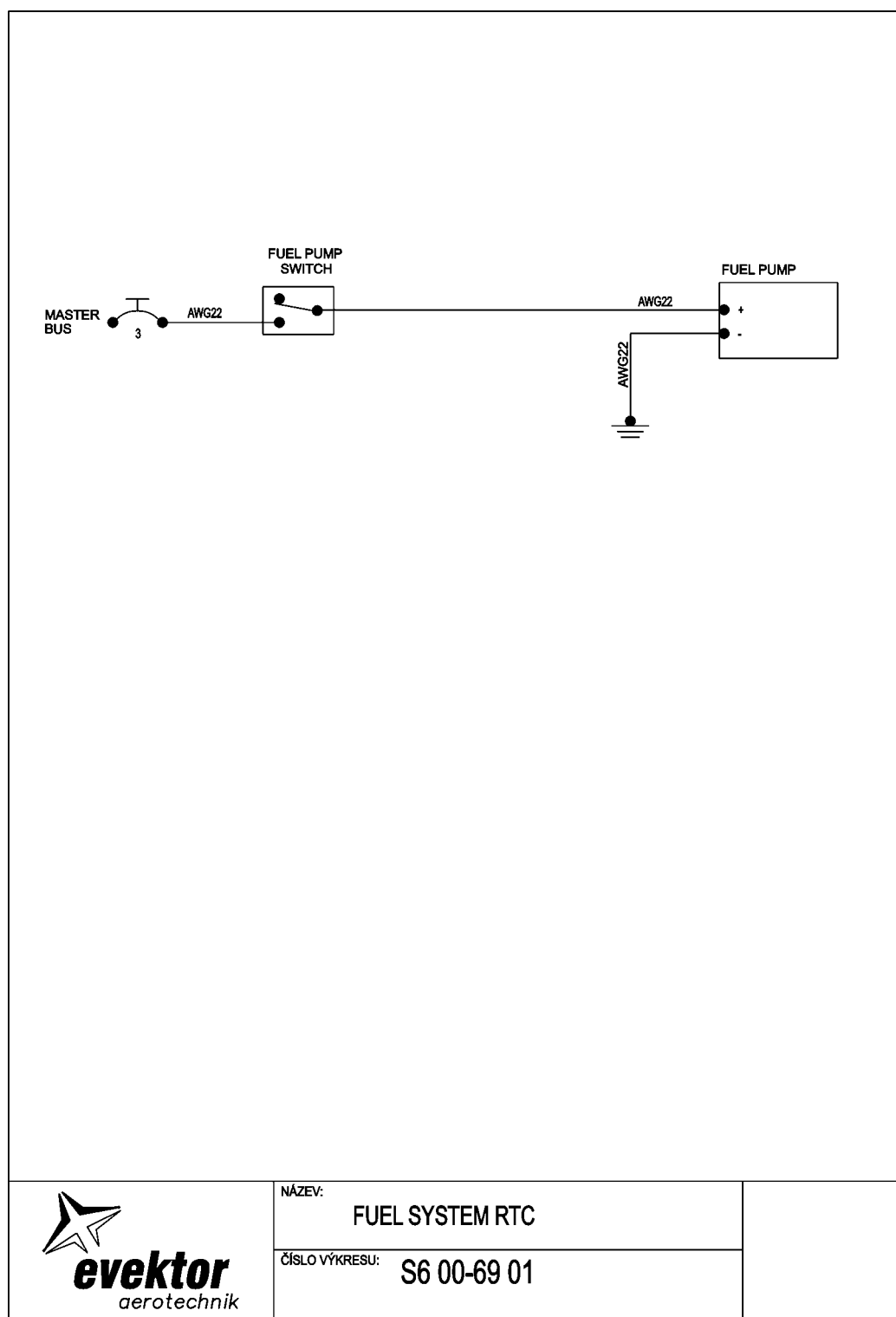
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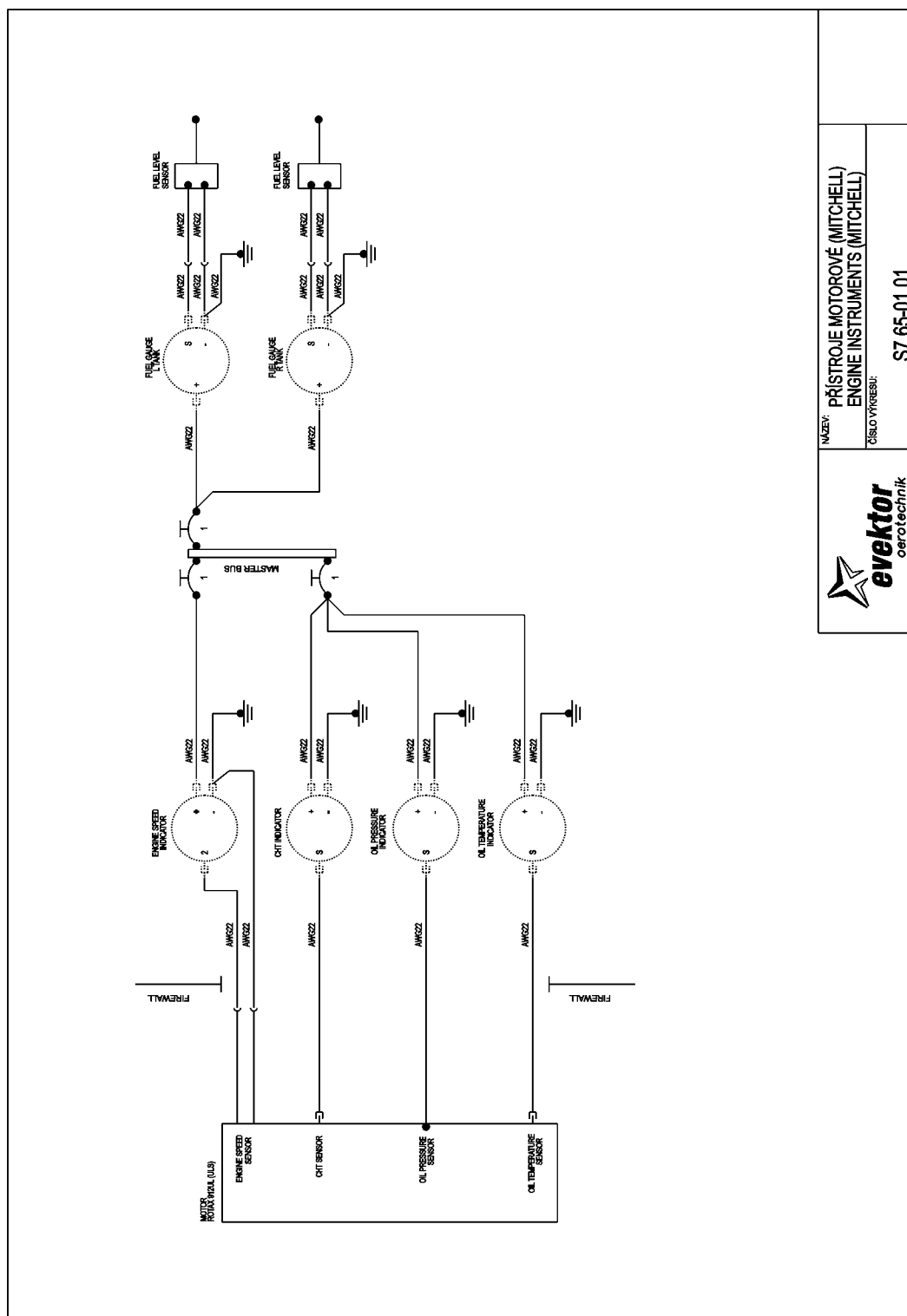


NAZEV: MAJÁKY WHELEN LED 90340
STROBE LIGHTS WHELEN LED 90340
ČÍSLO VÝKRESU: E7 91-10 01



NÁZEV: REFLEKTOR WHELEN LED 71141
LANDING LIGHT WHELEN LED 71141
ČÍSLO VÝKRESU: E7 95-10 01





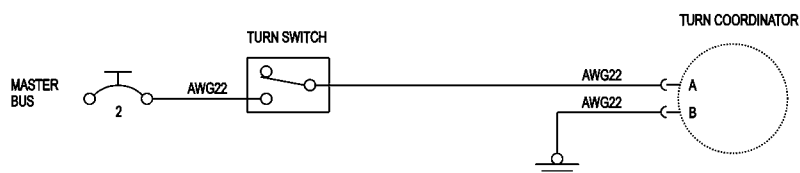
NÁZEV: PŘÍSTROJE MOTOROVÉ (MITCHELL)
ENGINE INSTRUMENTS (MITCHELL)

ČÍSLO VÝKRESU: S7 65-01 01

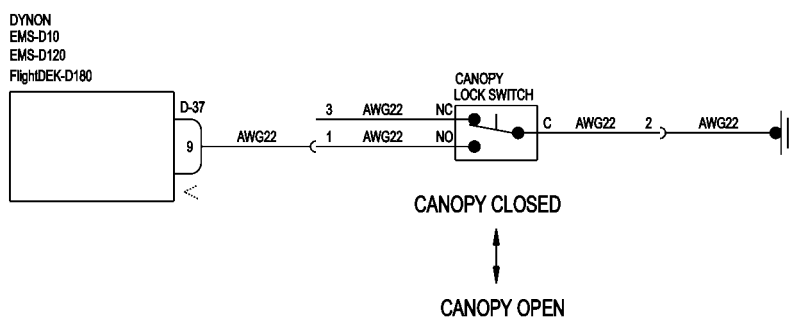

B. Optional equipment


NÁZEV: KOMPAS S.I.R.S. (S OSVĚTLENÍM)
COMPASS S.I.R.S. (LIGHTED)

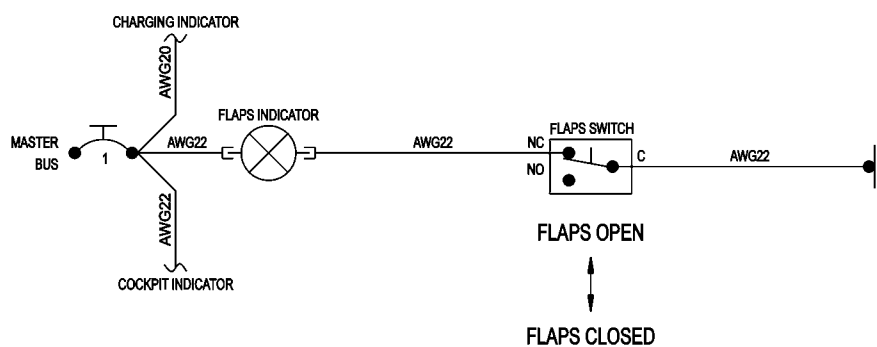
ČÍSLO VÝKRESU: E7 26-45 01



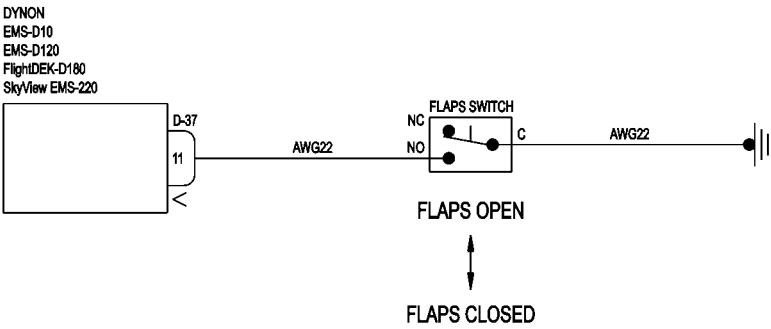
NÁZEV: ZATÁČKOMĚŘ RCA82
TURN COORDINATOR RCA82
ČÍSLO VÝKRESU: E7 31-01 01



NÁZEV: SIG. ZAVŘ. KABINY-VER. DYN. EMS
 CANOPY CLOS. SIG.-VER. DYN. EMS
 ČÍSLO VÝKRESU: E7 47-10 01

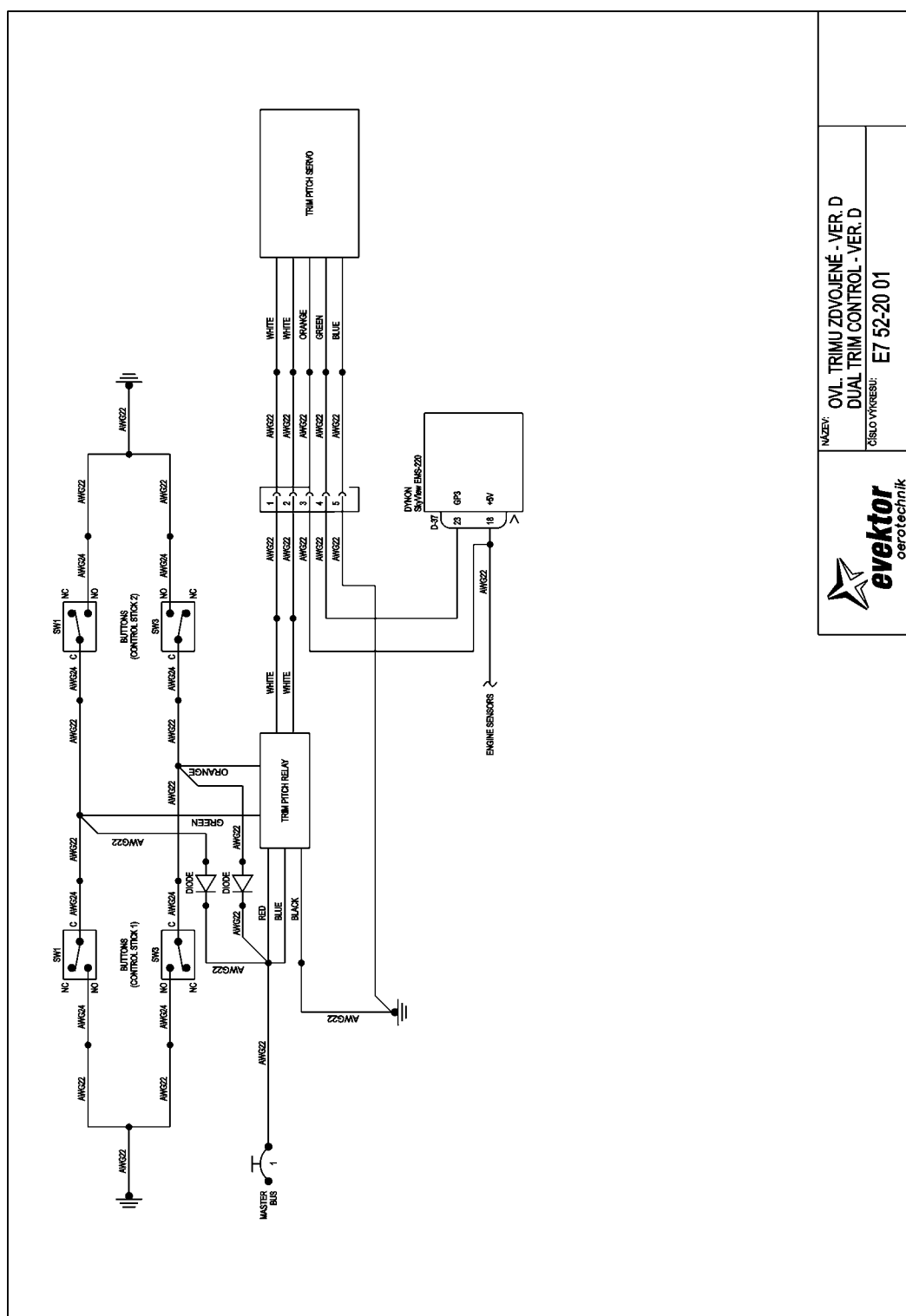


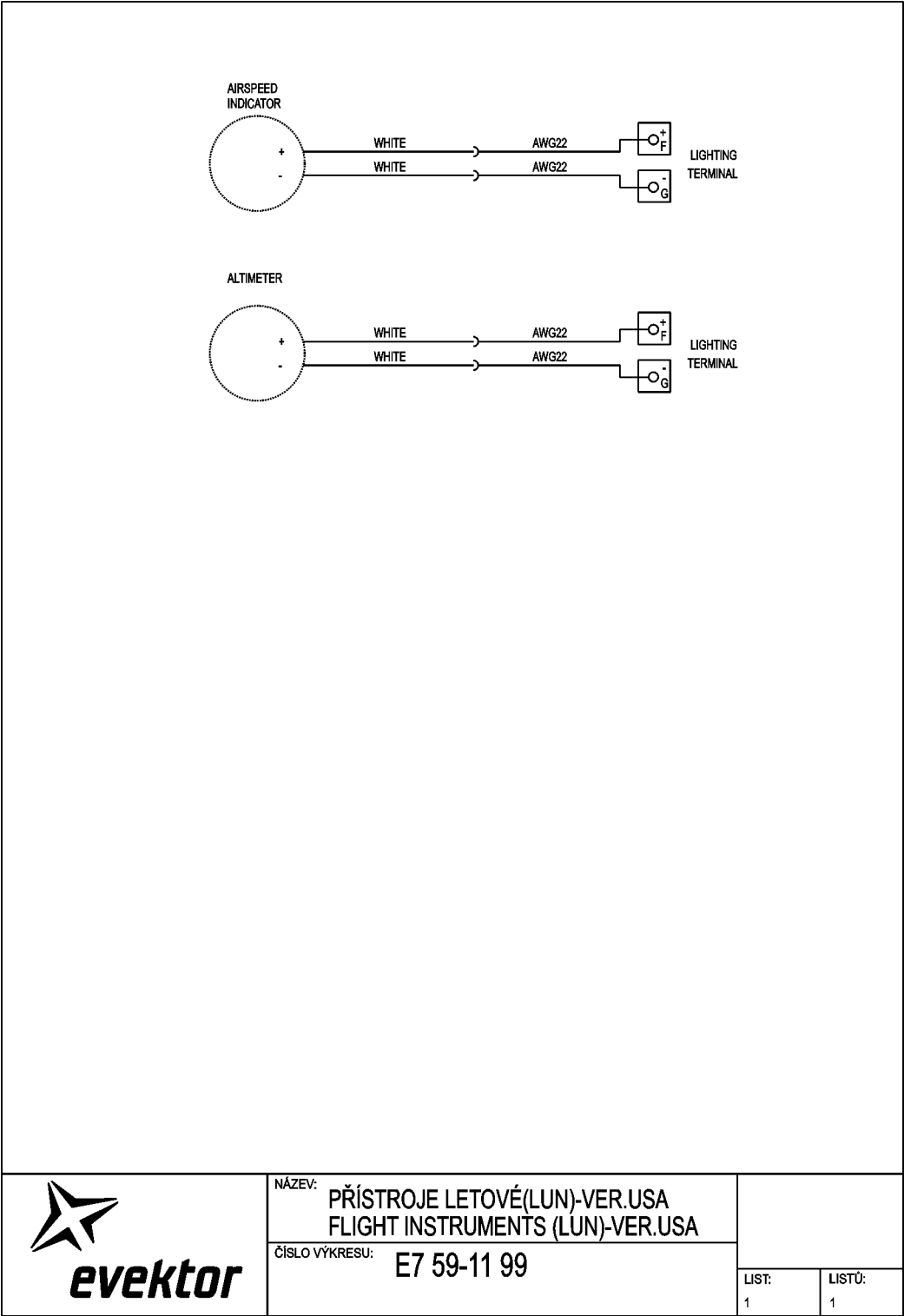
NÁZEV: SIGNALIZACE ZAVŘENÍ KLAPEK
FLAPS CLOSING SIGNALIZATION
ČÍSLO VÝKRESU: E7 47-50 01

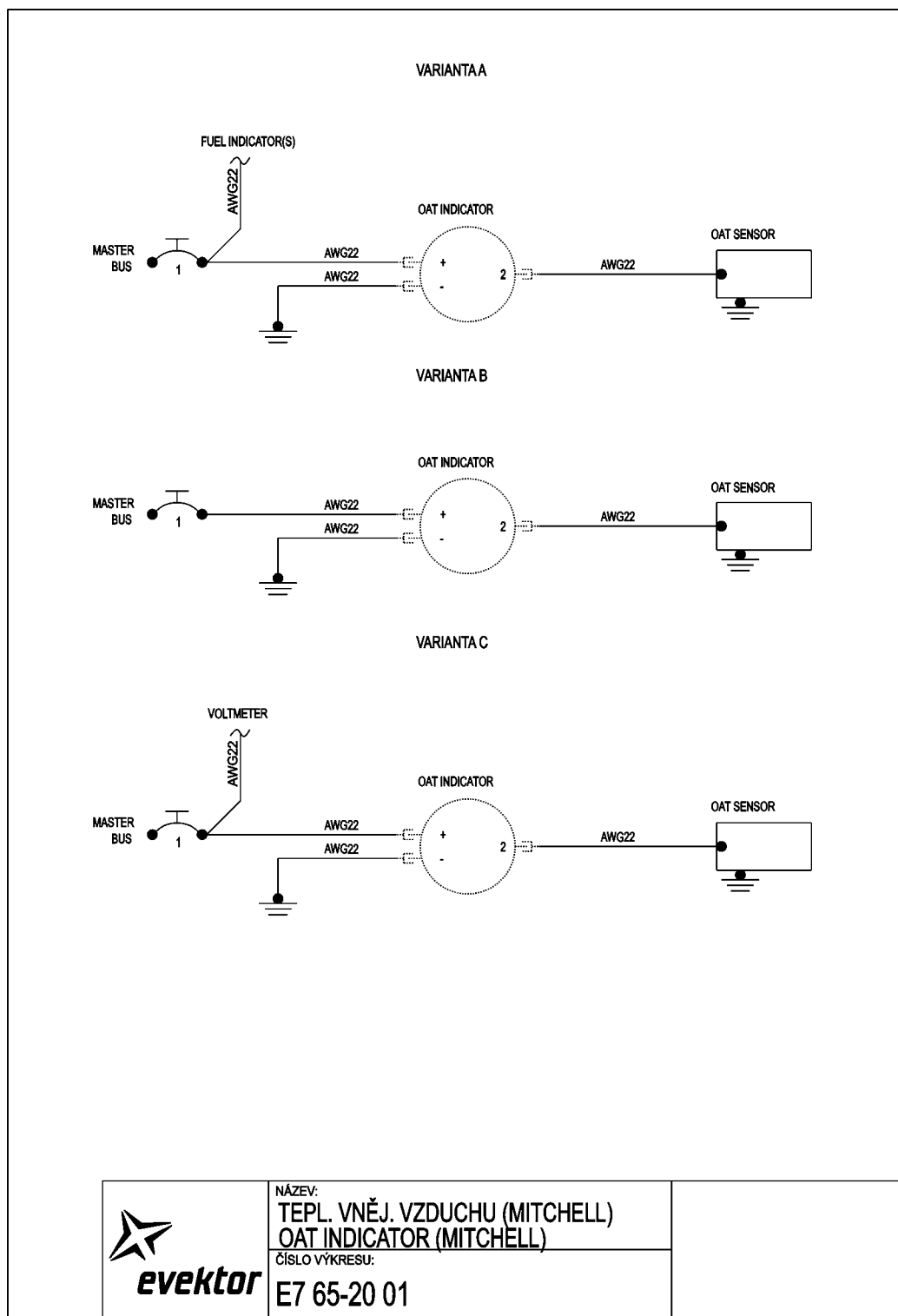


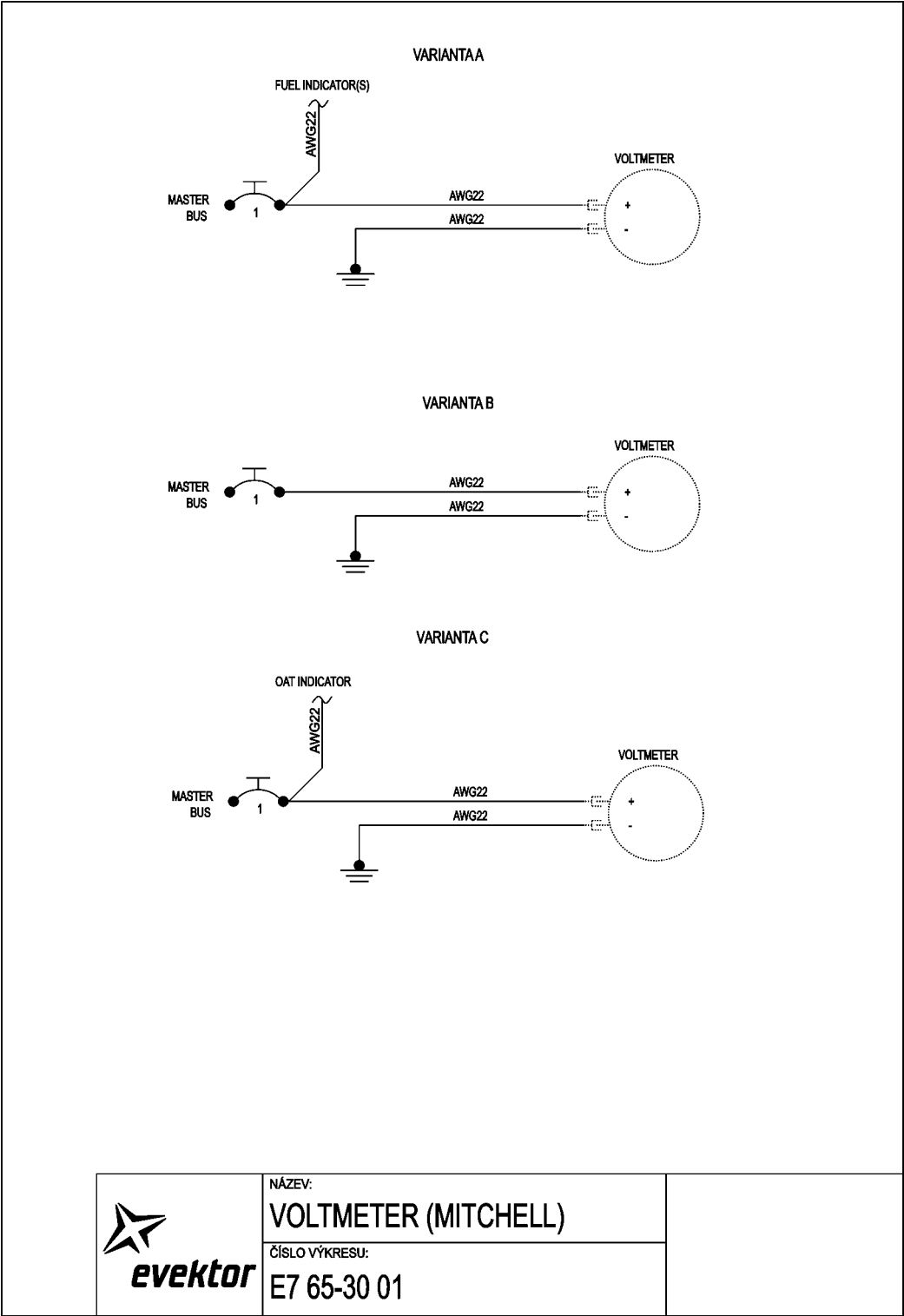
NÁZEV:
SIGNAL. ZAVŘENÍ KLAPEK - VER. D
FLAPS CLOSING SIGNAL. - VER. D

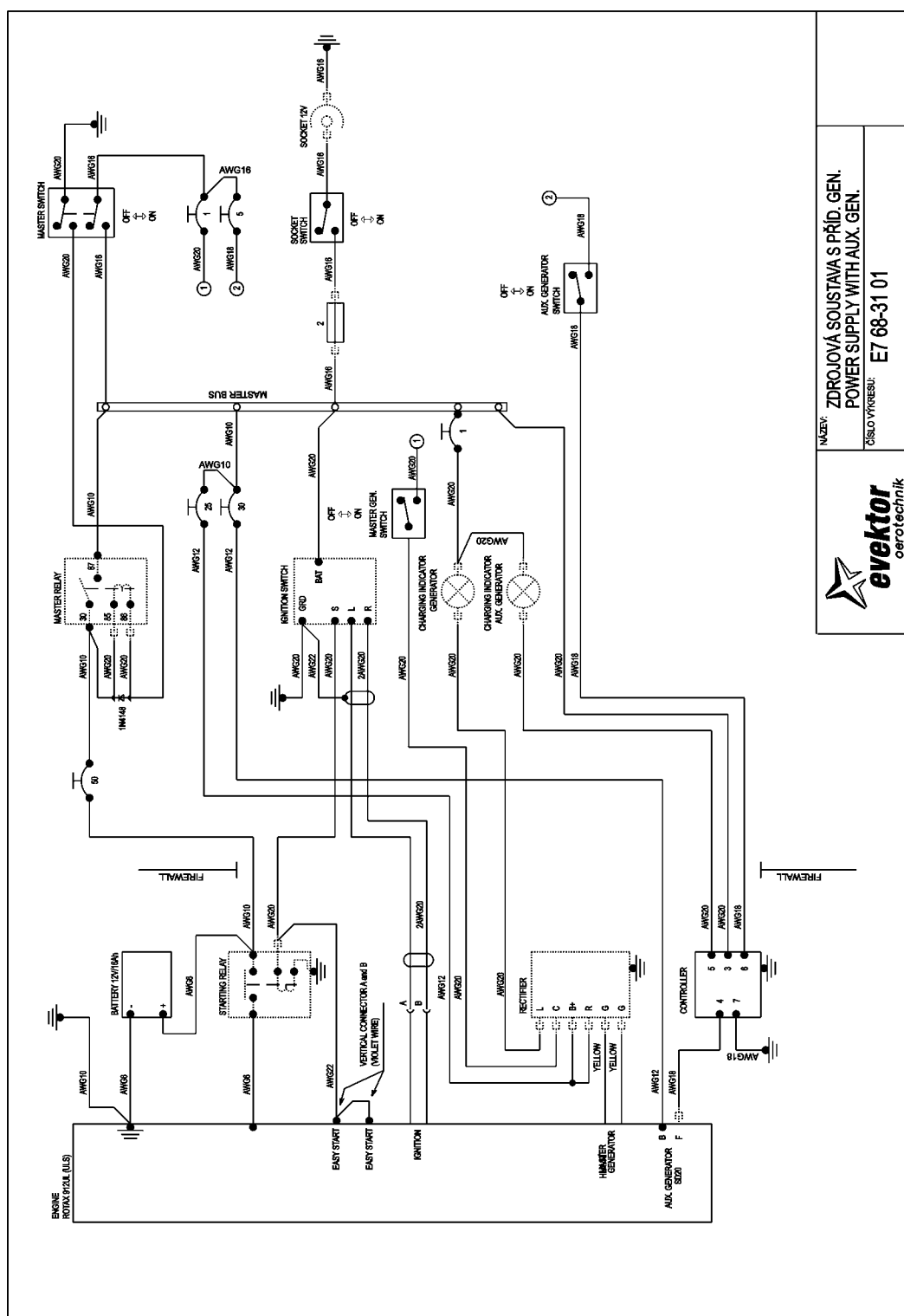
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E7 47-60 01



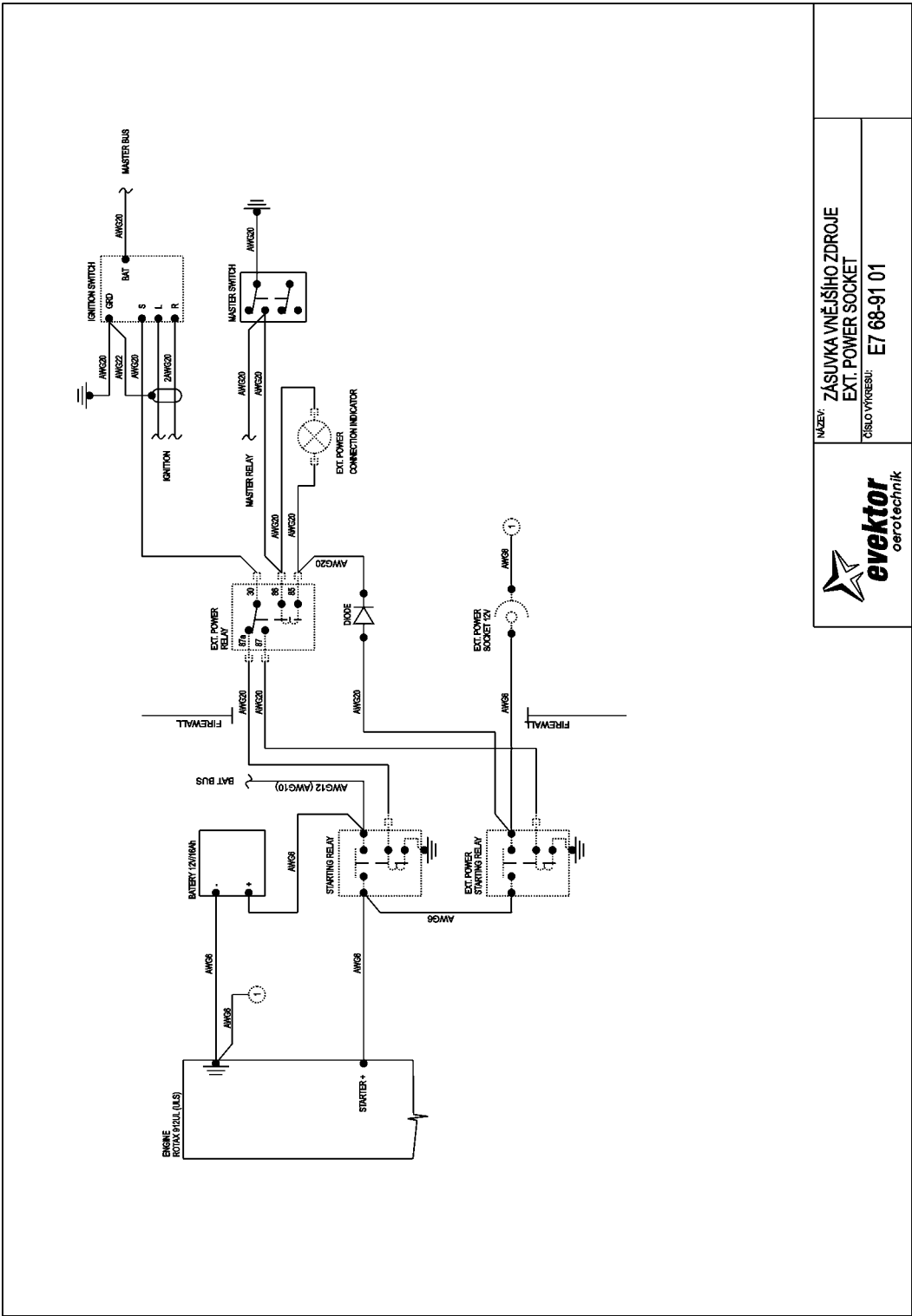








NÁZEV: ZDROJOVÁ SOUSTAVA S PŘÍD. GEN.
POWER SUPPLY WITH AUX. GEN.
ČÍSLO VÝKRESU: E7 68-31 01

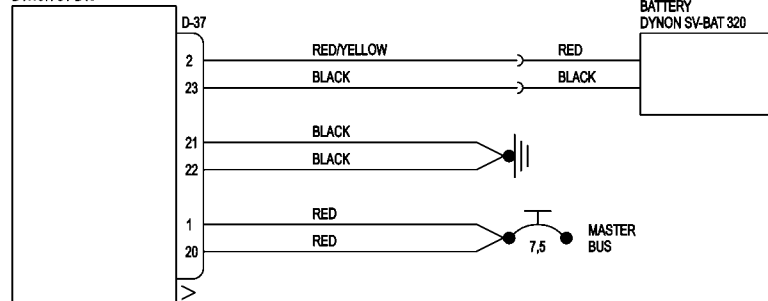


NAZEV: ZÁSUVKA VNĚJŠÍHO ZDROJE
EXT. POWER SOCKET
ČÍSLO VÝKRESU: E7 68-91 01

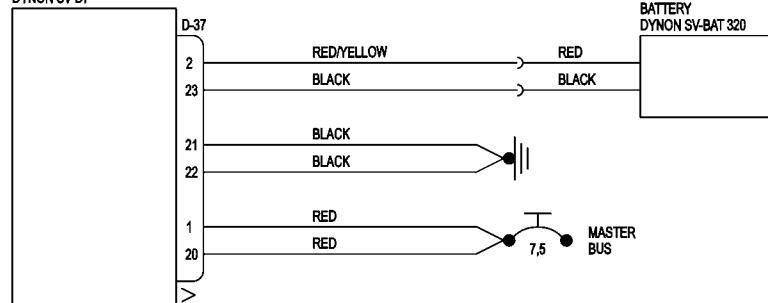




DISPLAY 1
DYNON SV-D10



DISPLAY 2
DYNON SV-D7



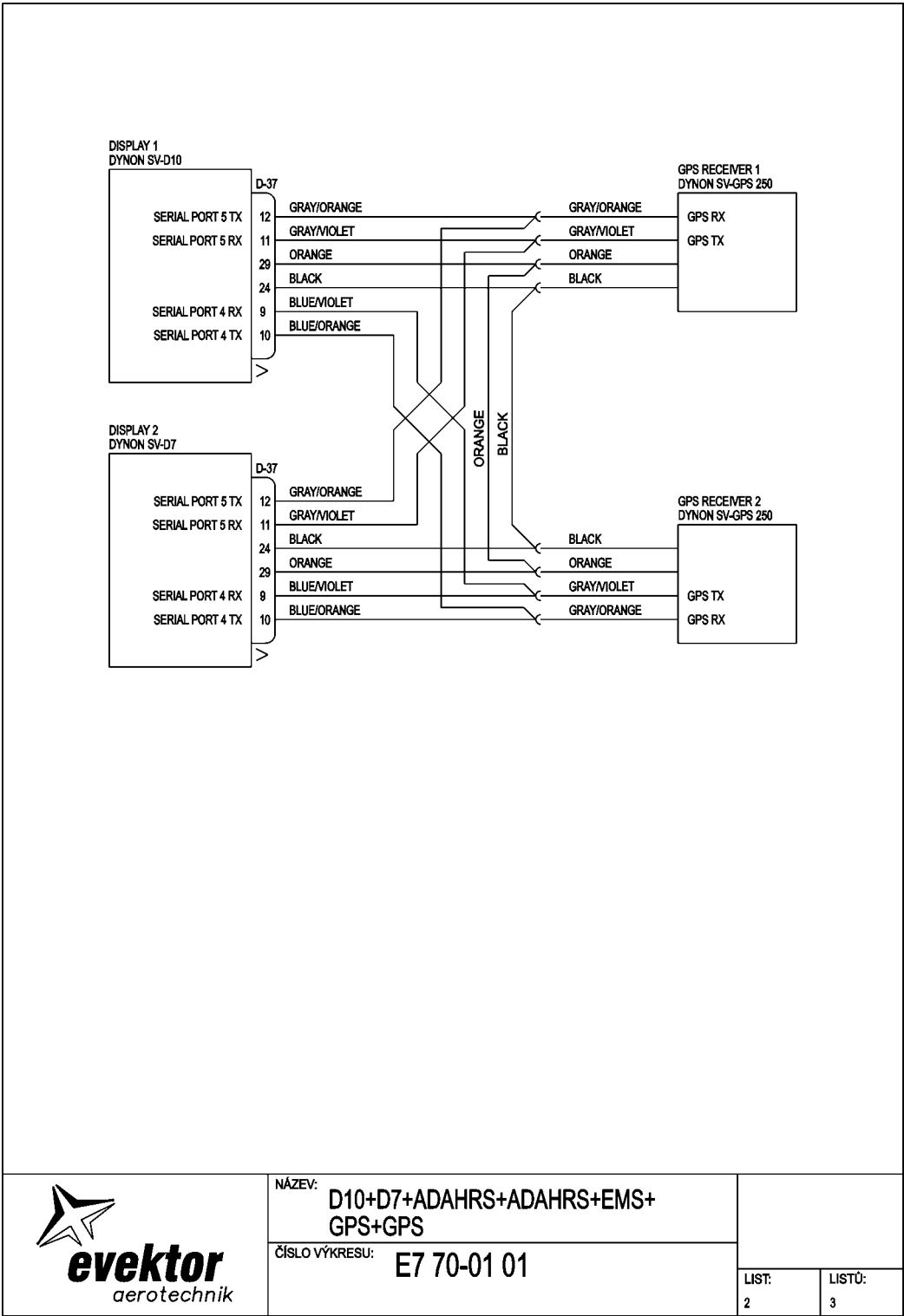
evektor
aerotechnik

NÁZEV: D10+D7+ADAHRS+ADAHRS+EMS+
GPS+GPS

ČÍSLO VÝKRESU: E7 70-01 01

LIST:
1

LISTŮ:
3



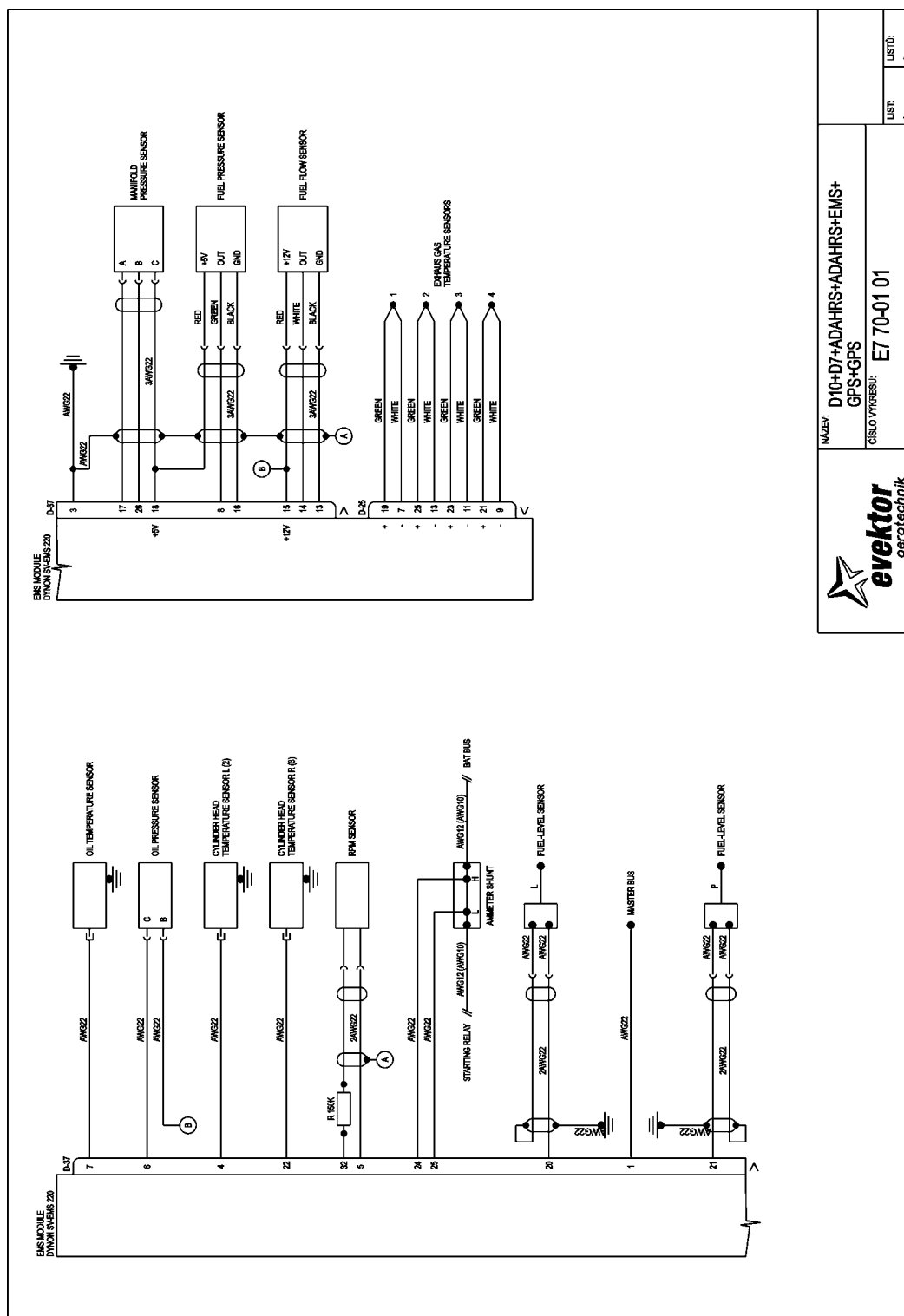
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ČÍSLO VÝKRESU: E7 70-01 01

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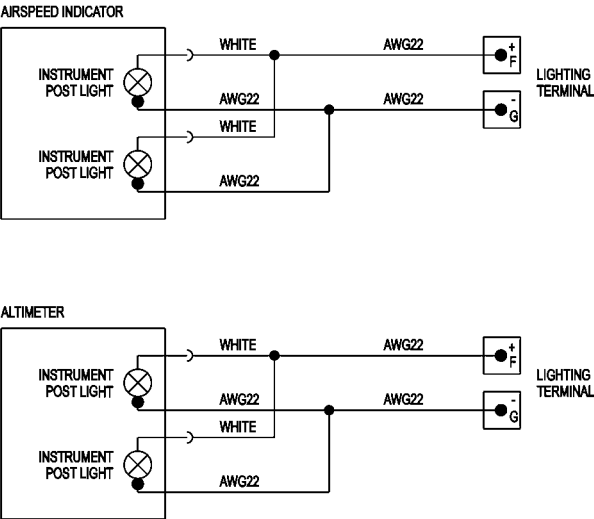
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Effectivity: All



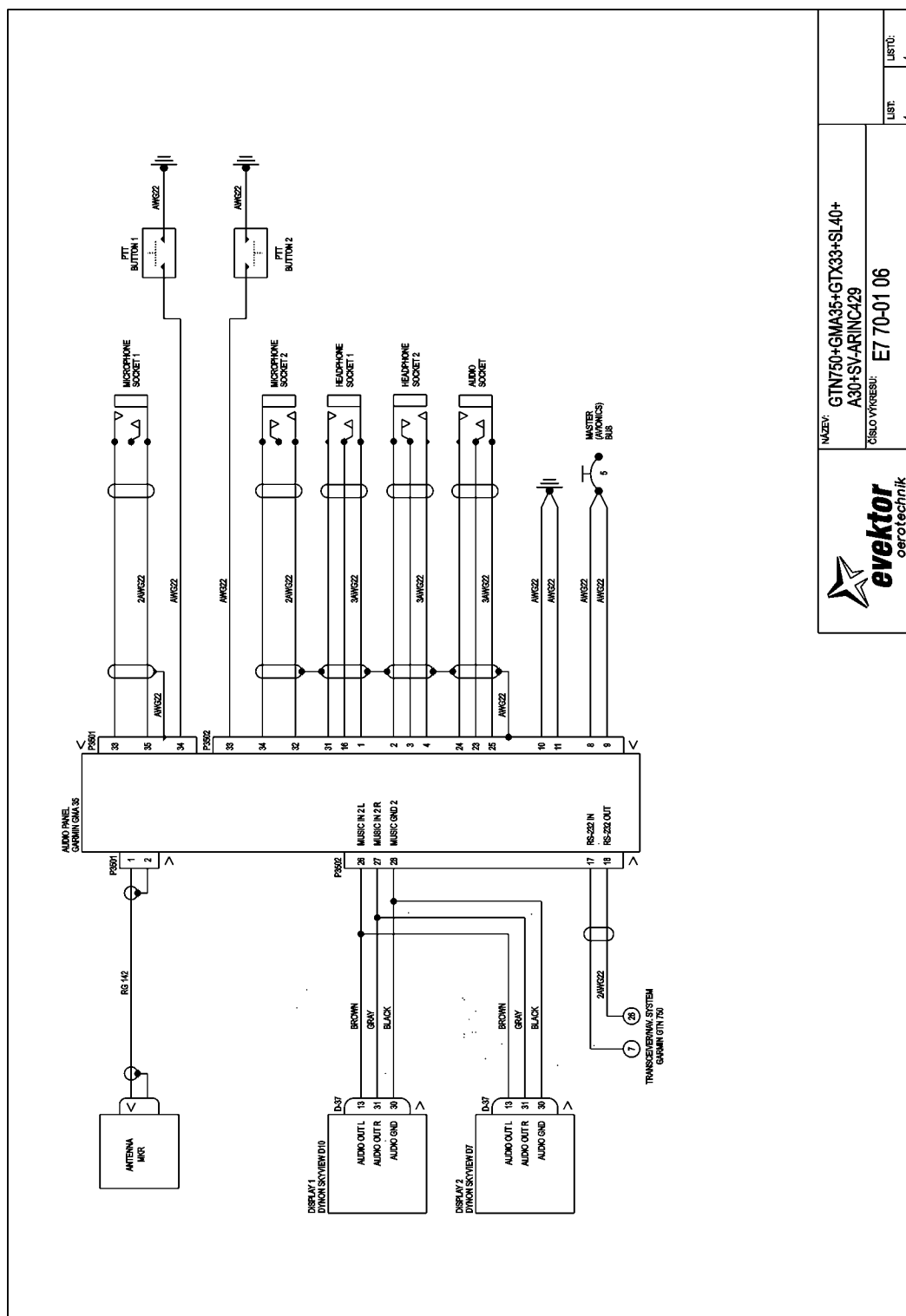
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GPS+GPS
ČÍSLO VÝKRESU: E7 70-01 01

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LISTO: 3



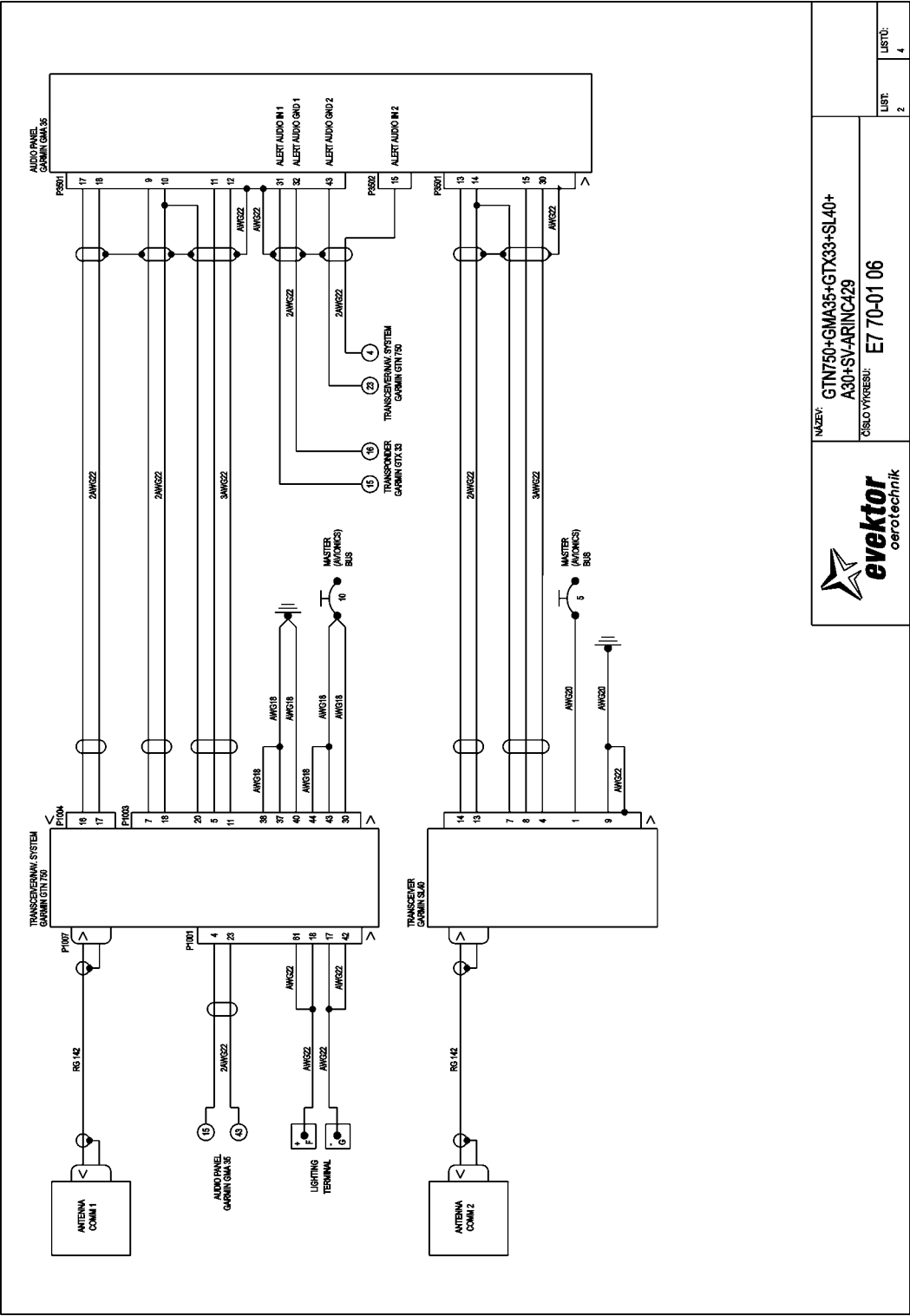
NÁZEV: **PŘÍSTROJE LETOVÉ (WINTER)-VER.D.
FLIGHT INSTRUMENTS (WINTER)-V.D.**

ČÍSLO VÝKRESU: **E7 70-01 05**



NAZEV: GTN750+GMA35+GTx33+SL40+
A30+SV-ARINC429
ČÍSLO VÝKRESU: E7 70-01 06

LIST: 1
LISTO: 4



NAZEV: GTN750+GMA35+GTX33+SL40+
A30+SV-ARINC429

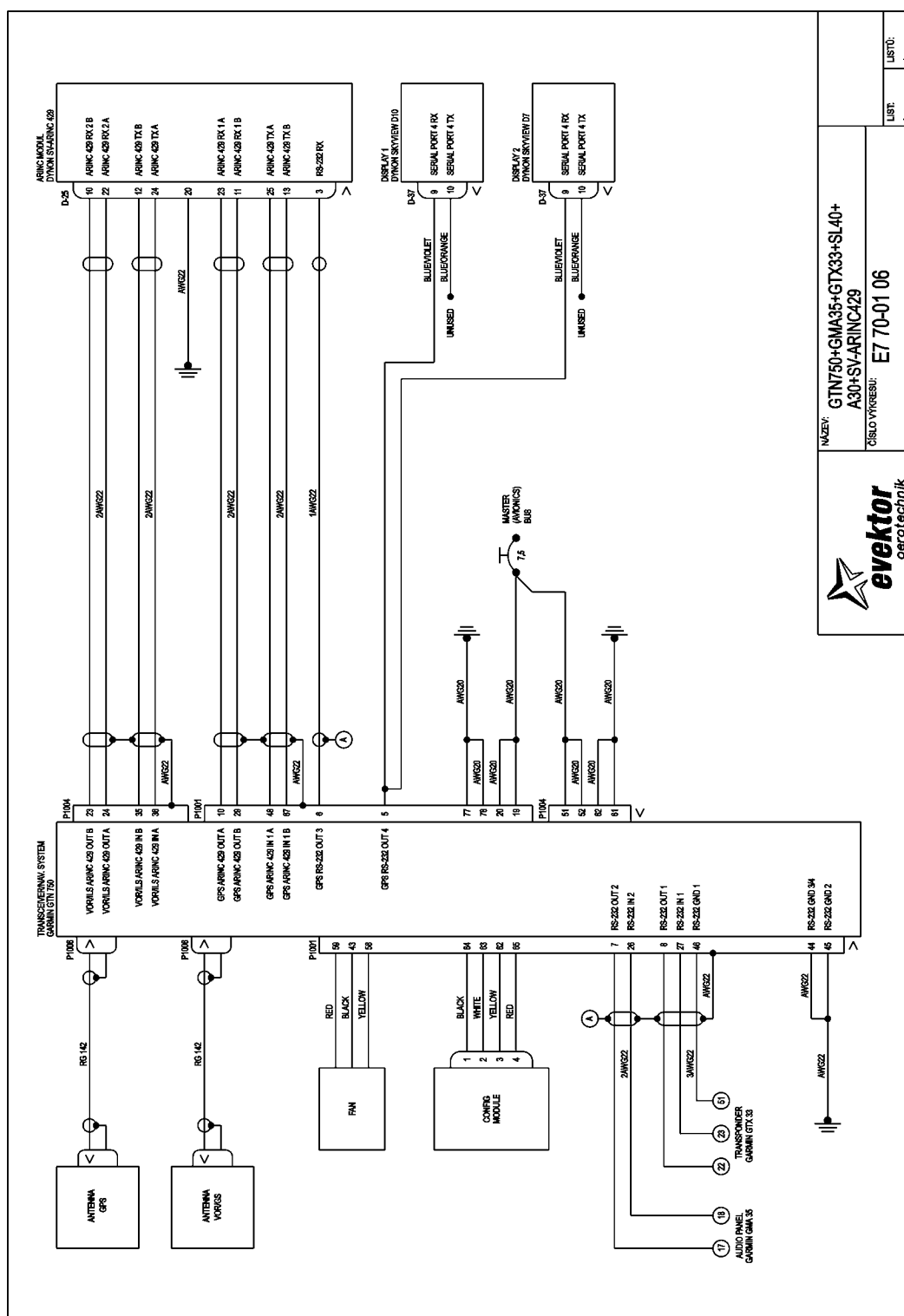
ČÍSLO VÝKRESU: E7 70-01 06

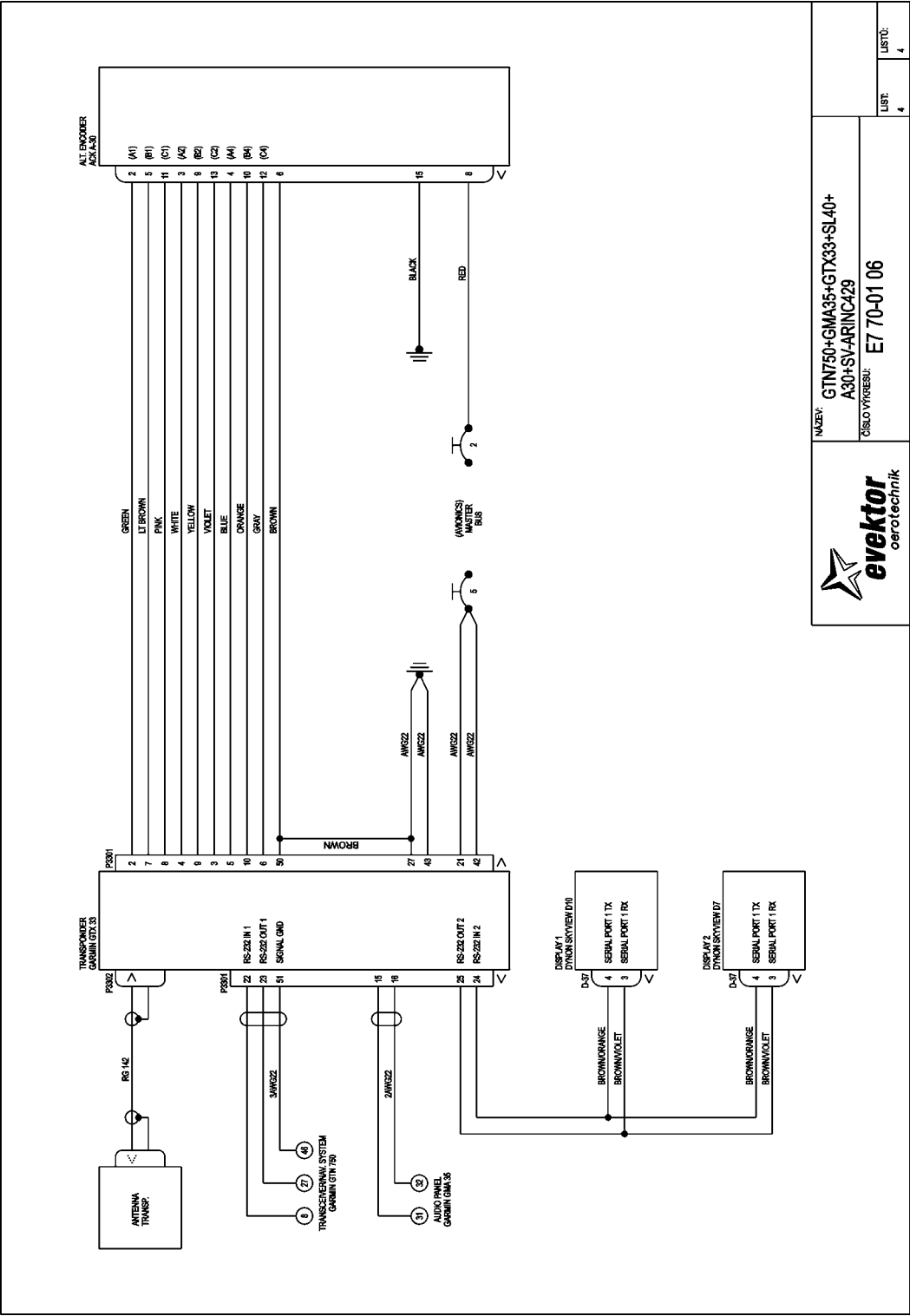
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2

LISTO:

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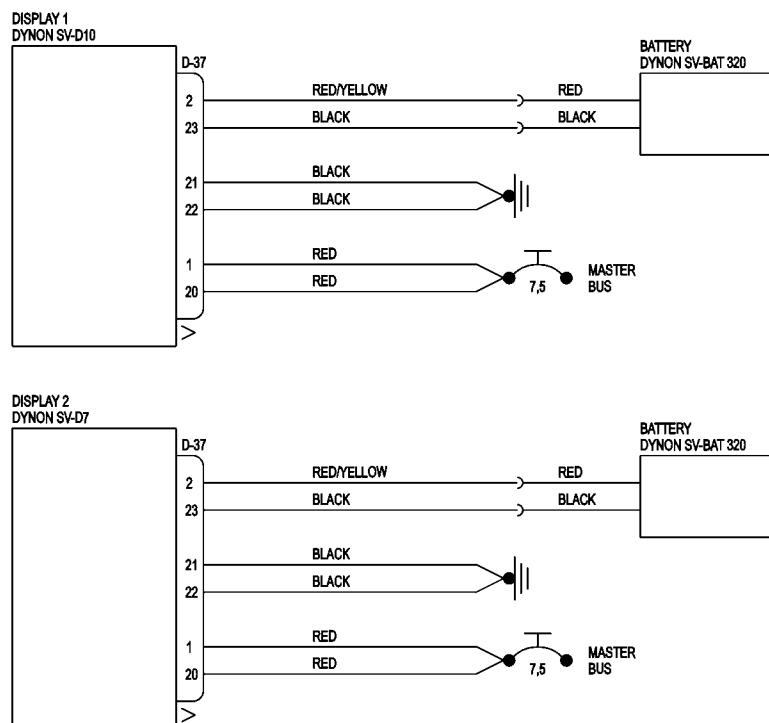




NAZEV: GTN750+GMA35+GTX33+SL40+
A30+SV-ARINC429

Číslo výkresu: E7 70-01 06

LIST:	4
LISTO:	4

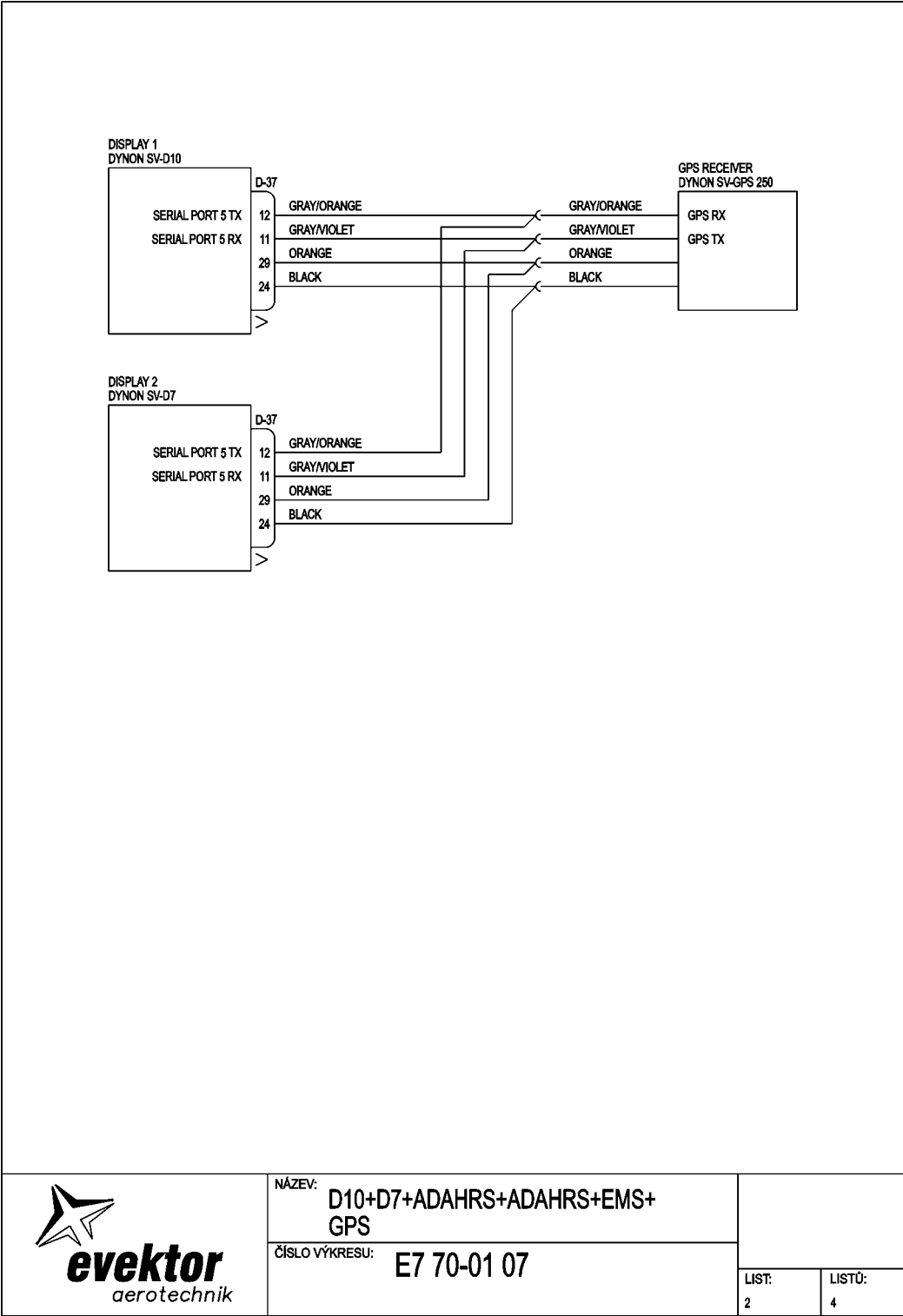


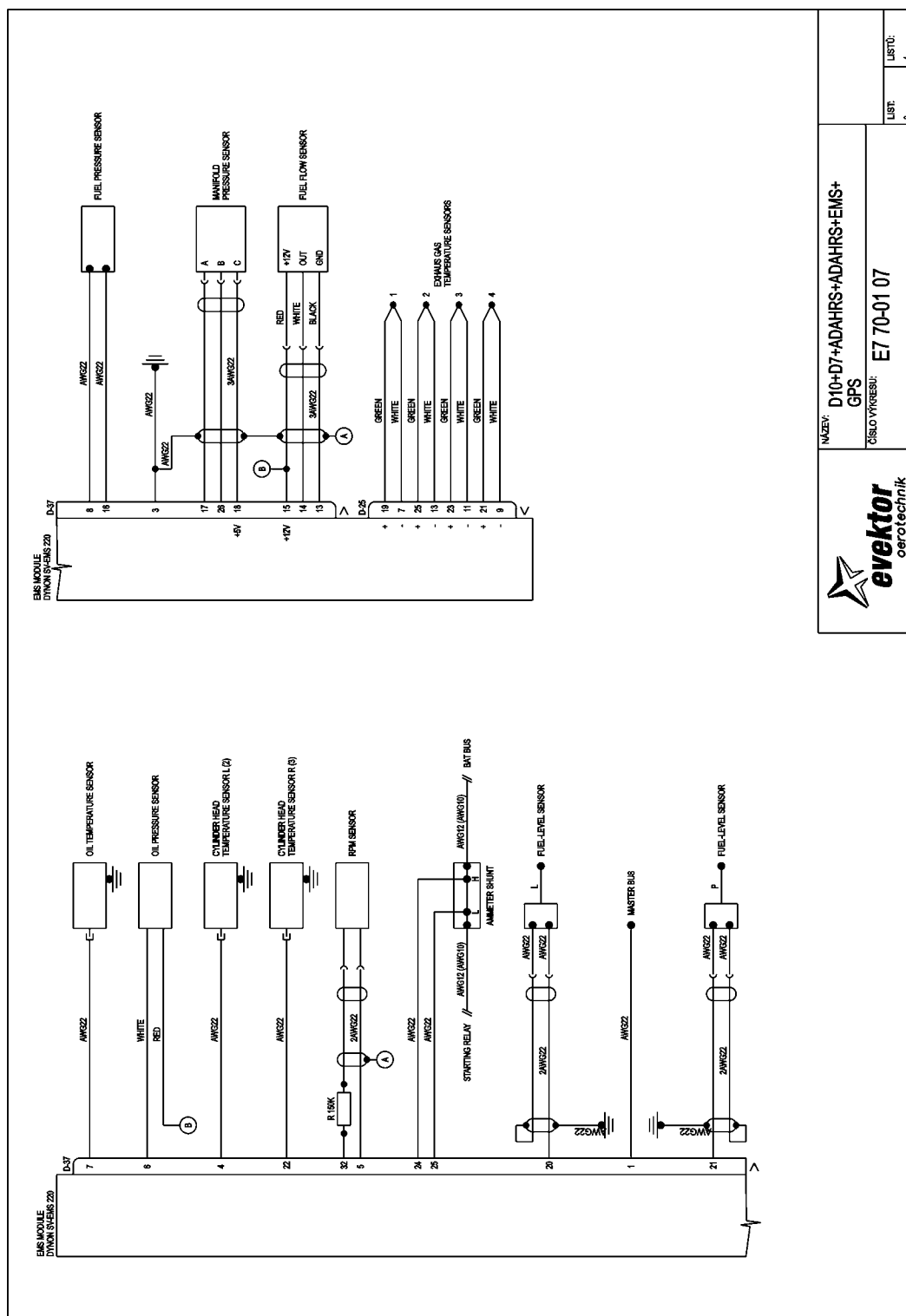
NÁZEV: D10+D7+ADAHRS+ADAHRS+EMS+GPS

ČÍSLO VÝKRESU: E7 70-01 07

LIST:
1

LISTŮ:
4





NAZEV: D10+D7+ADAHRS+ADAHRS+EMS+GPS

ČÍSLO VÝKRESU: E7 70-01 07

LIST: 3

LISTO: 4



ADAHRS MODULE 1
DYNON SV-ADAHRS 200



ADAHRS MODULE 2
DYNON SV-ADAHRS 201

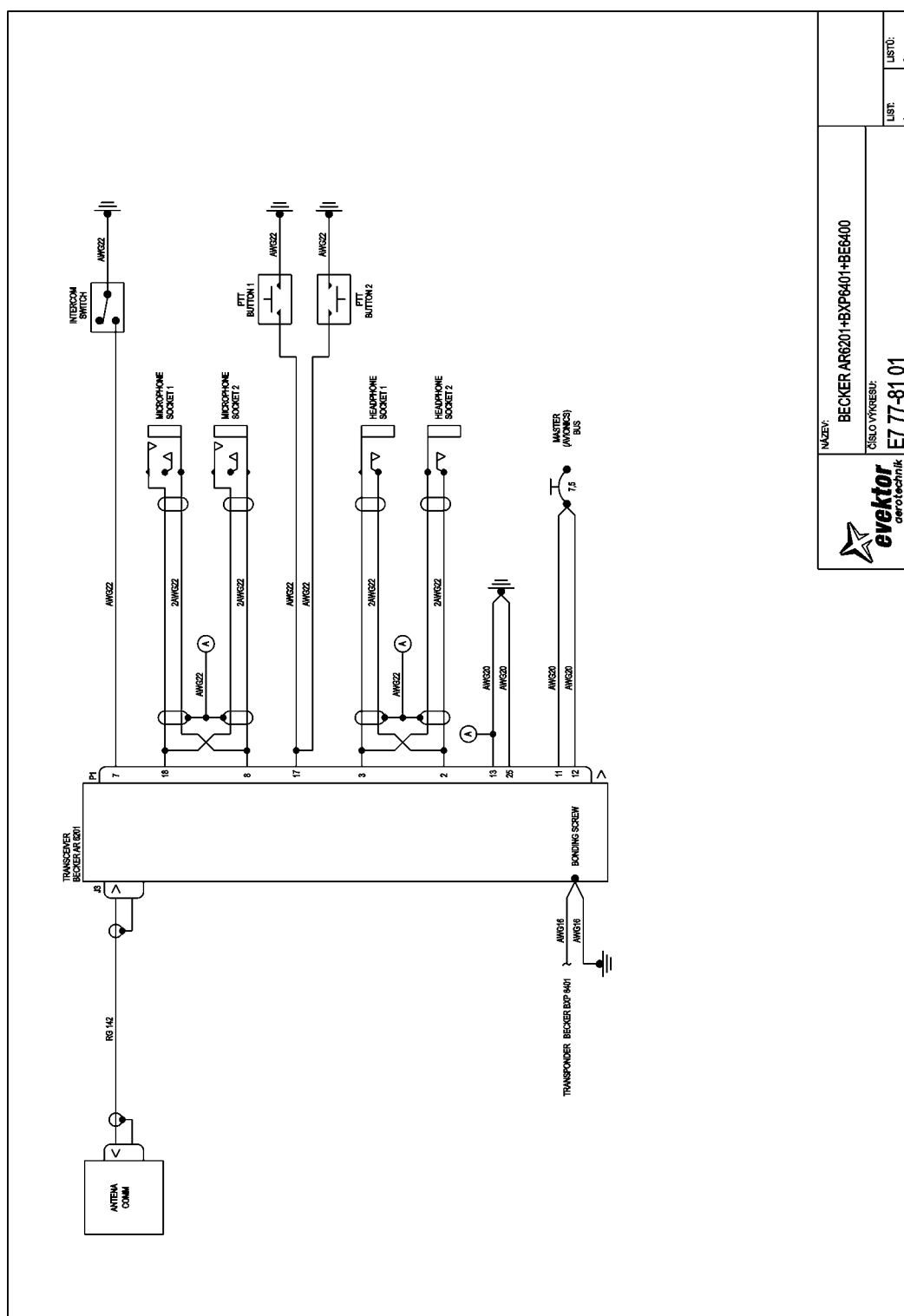


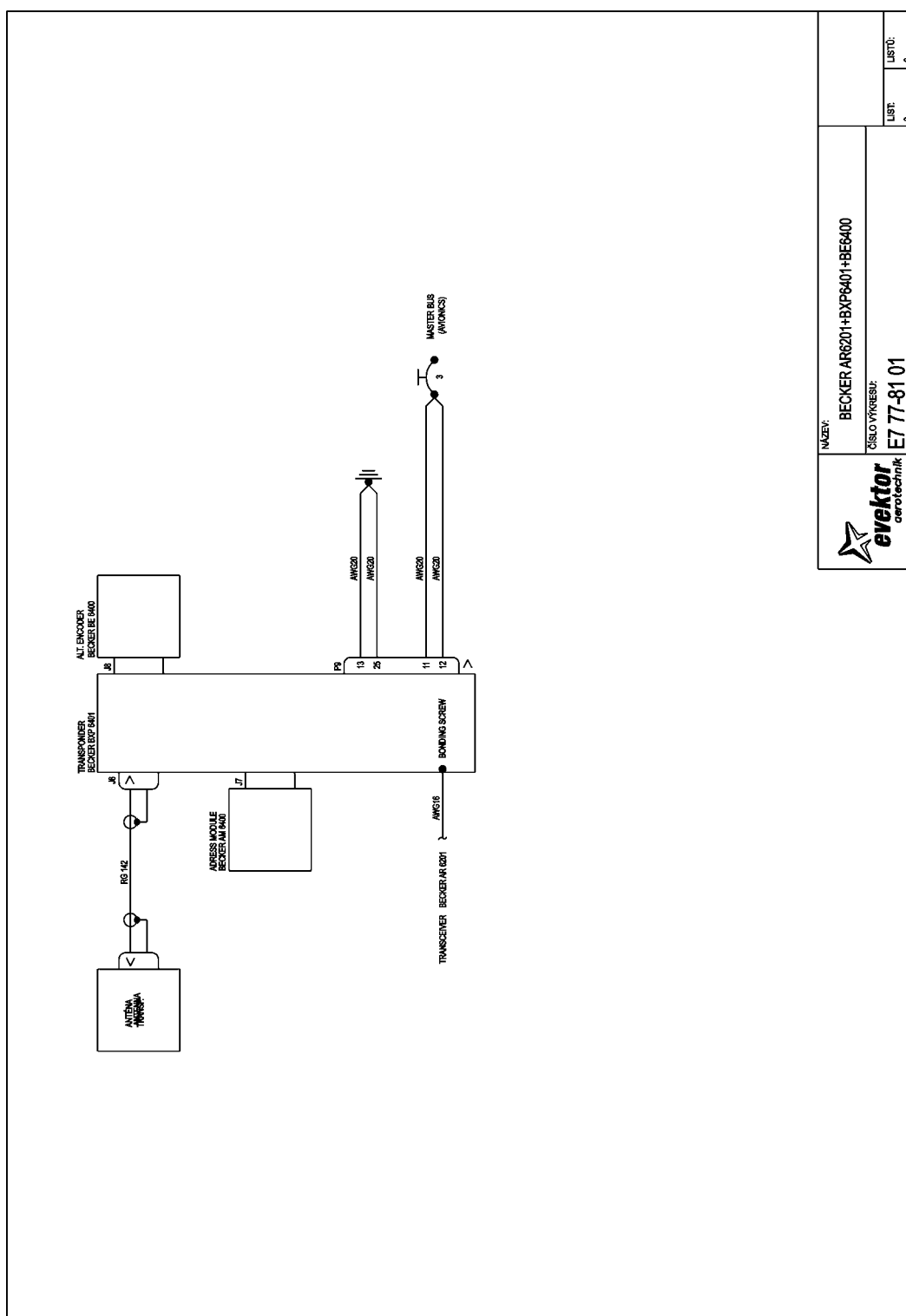
NÁZEV: D10+D7+ADAHRS+ADAHRS+EMS+
GPS

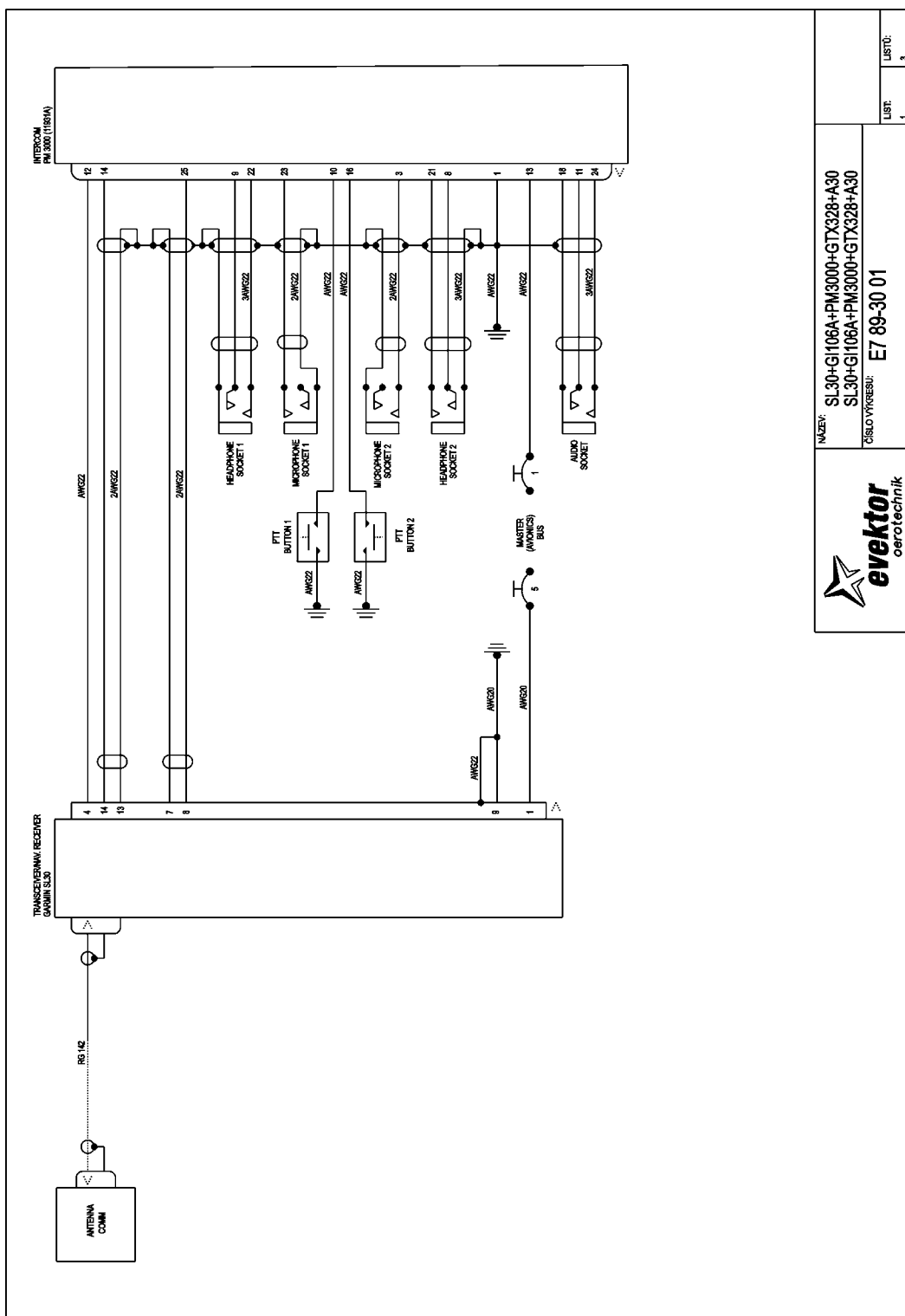
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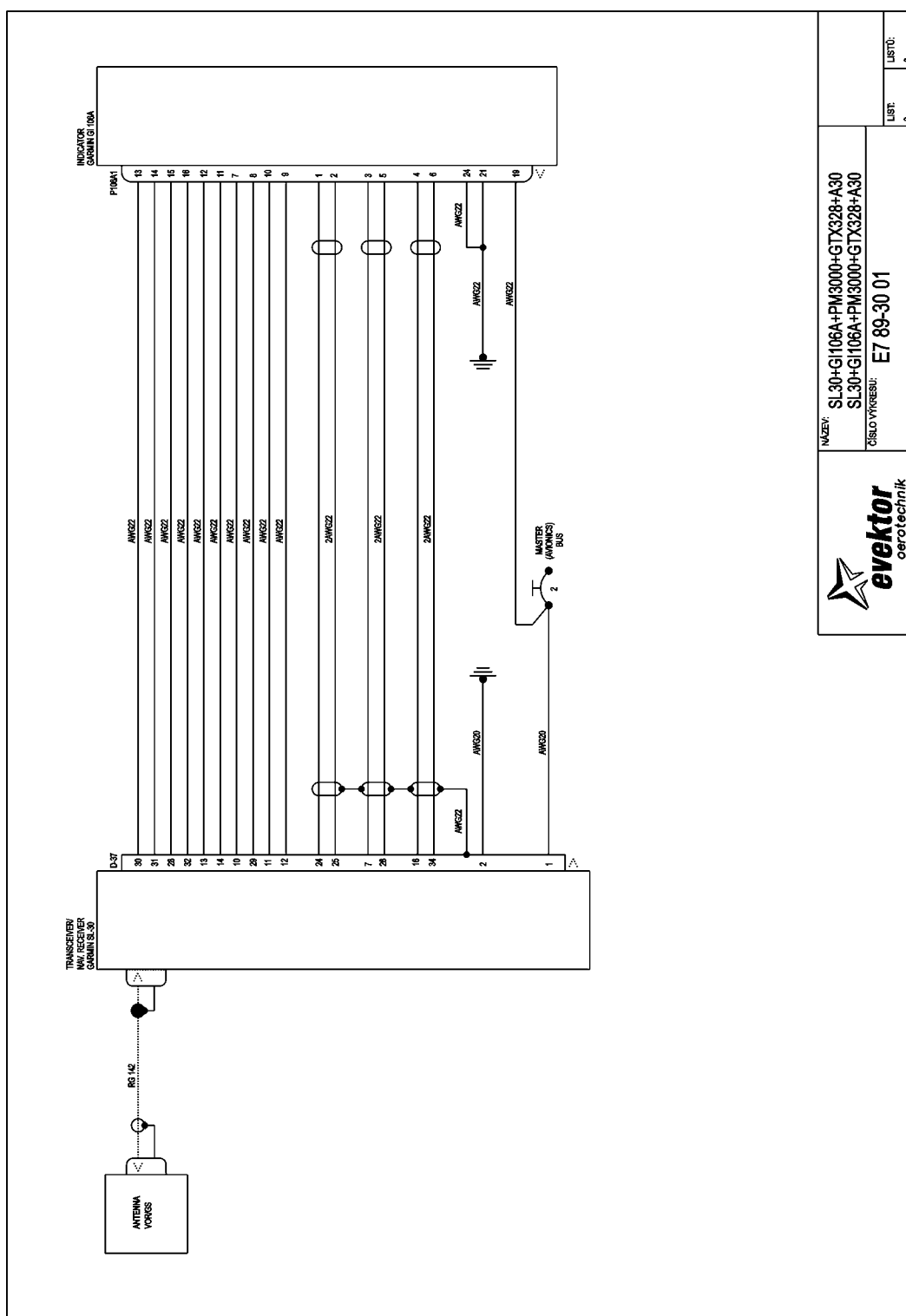
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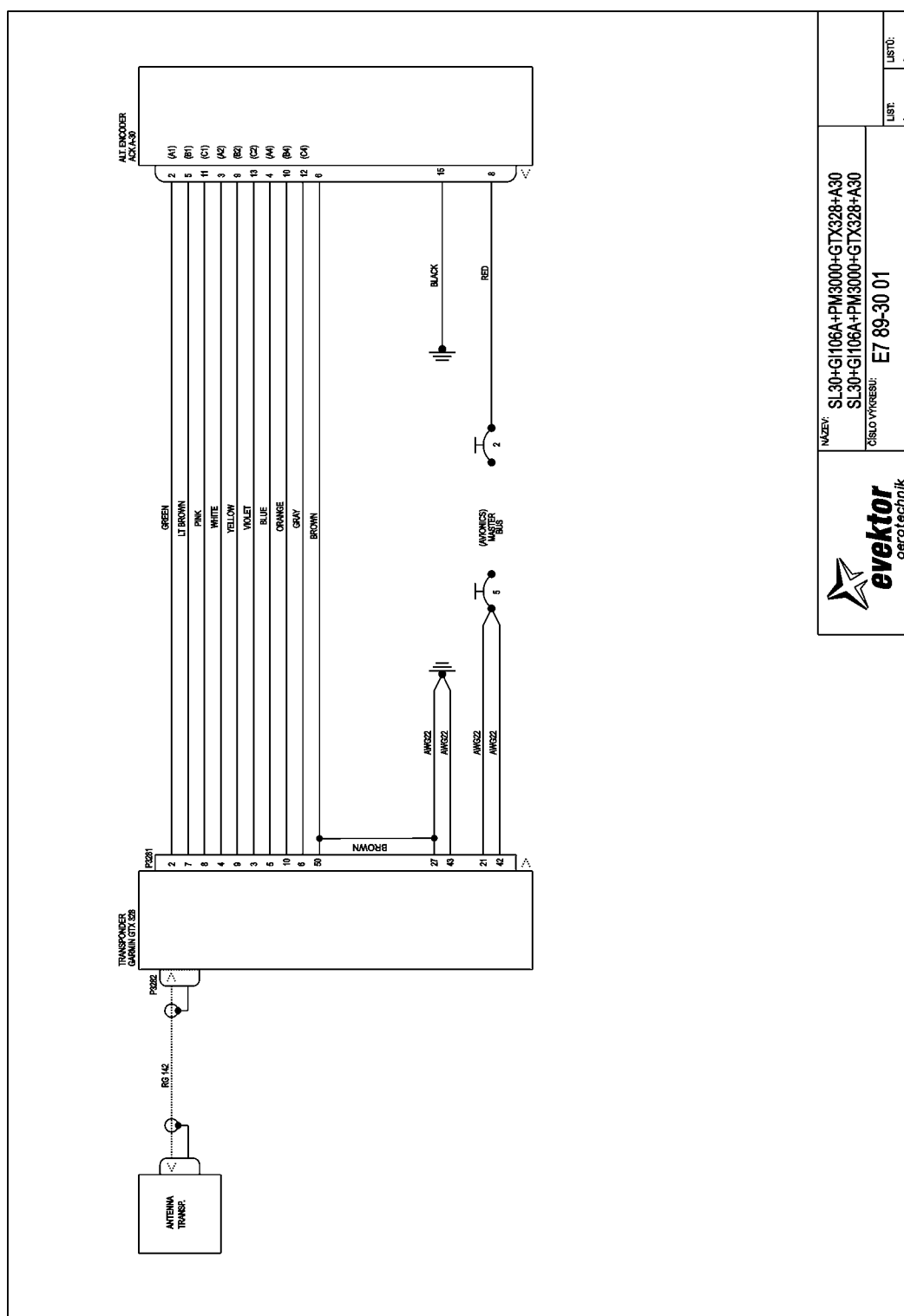
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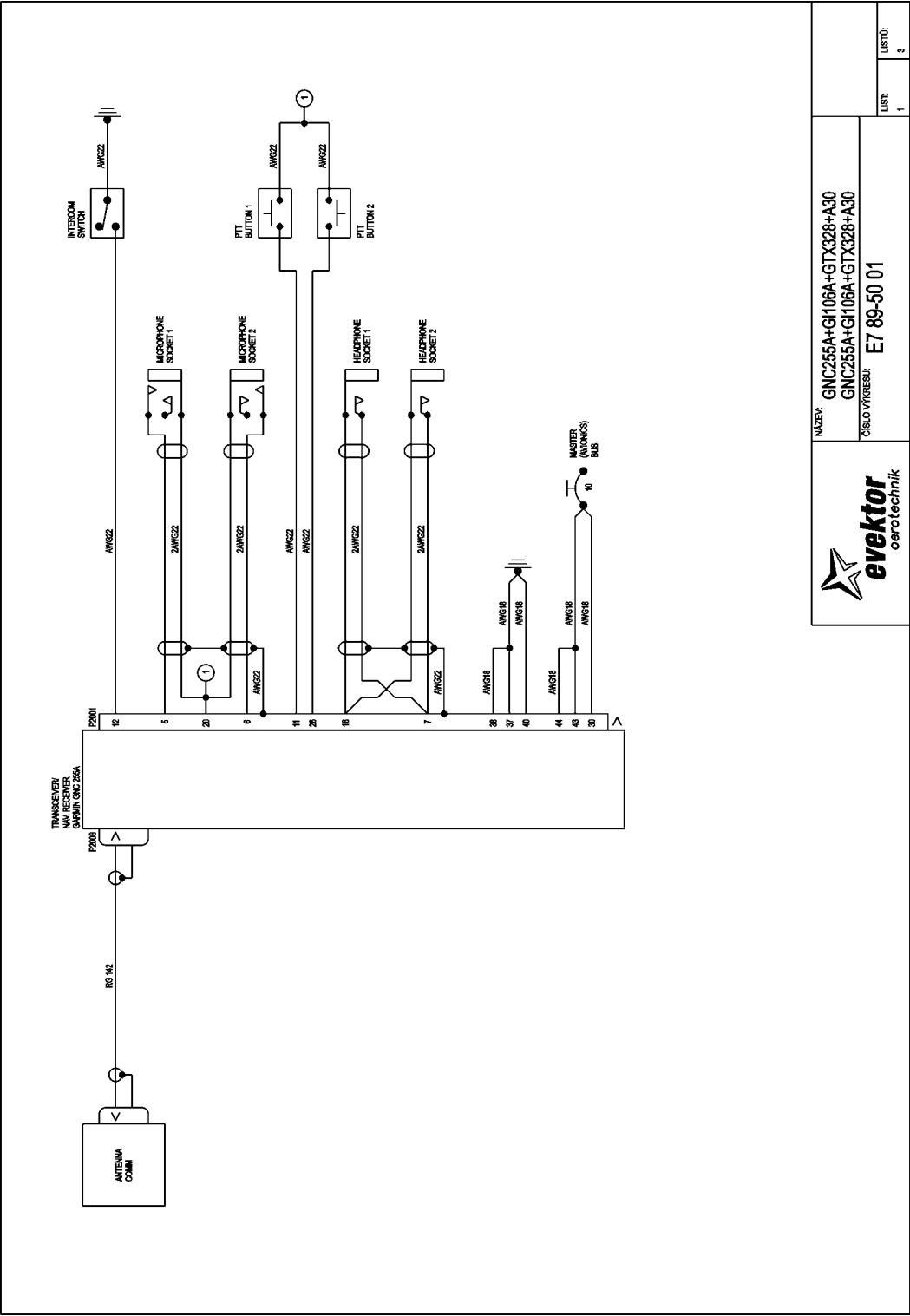






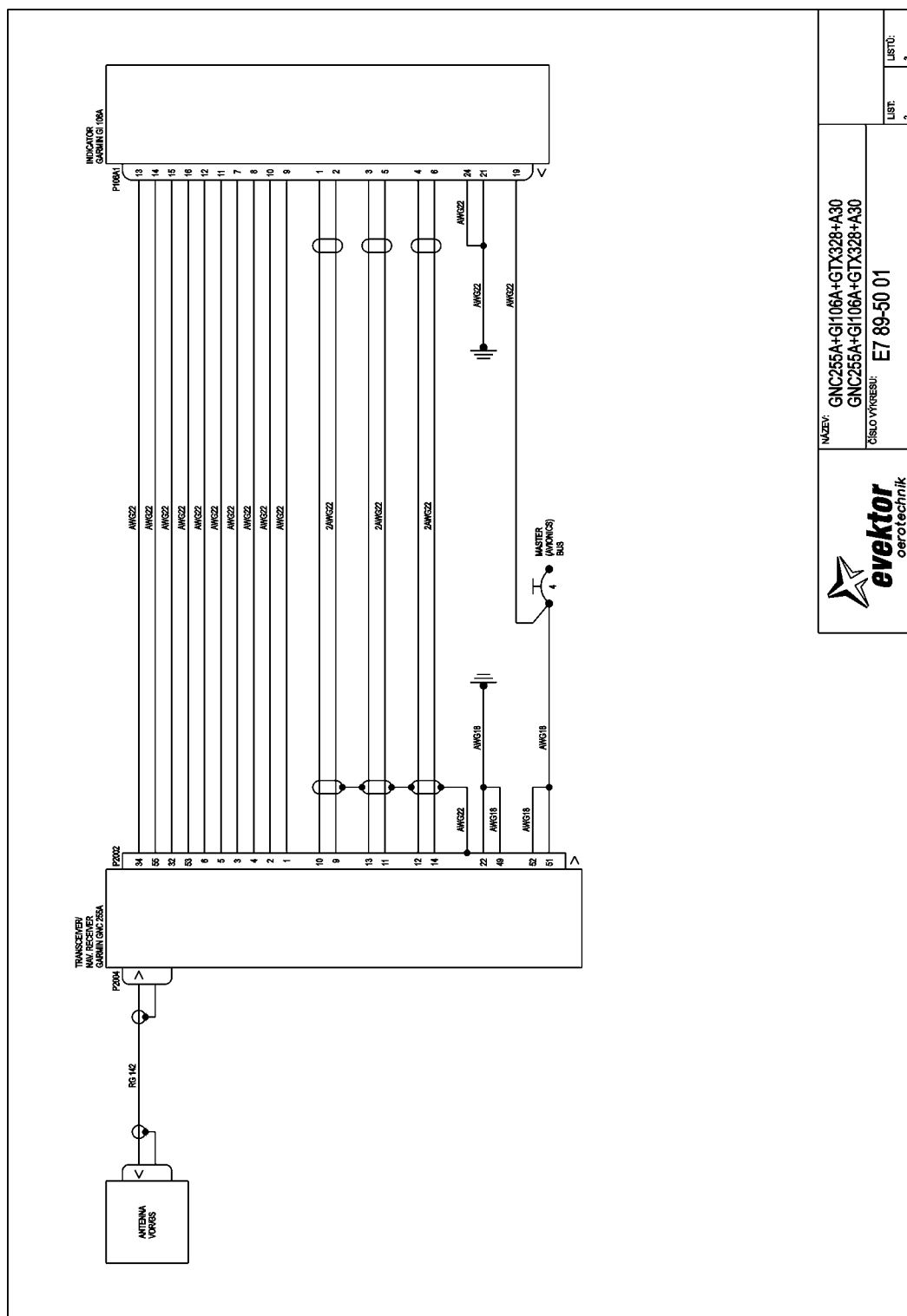






NAZEV: GNC255A-G1106A+GTX328+A30
GNC255A-G1106A+GTX328+A30
ČÍSLO VÝKRESU: E7 89-50 01

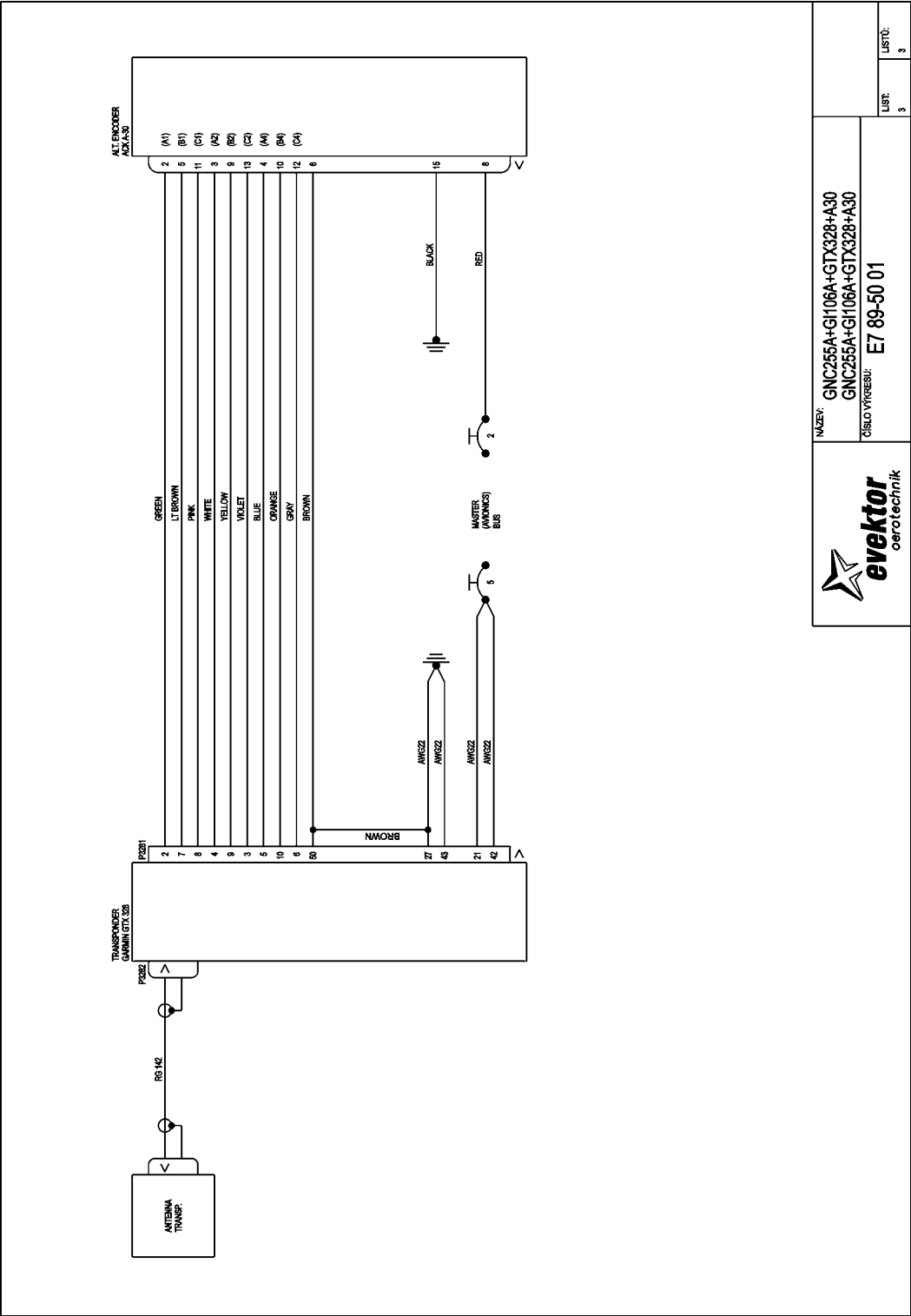
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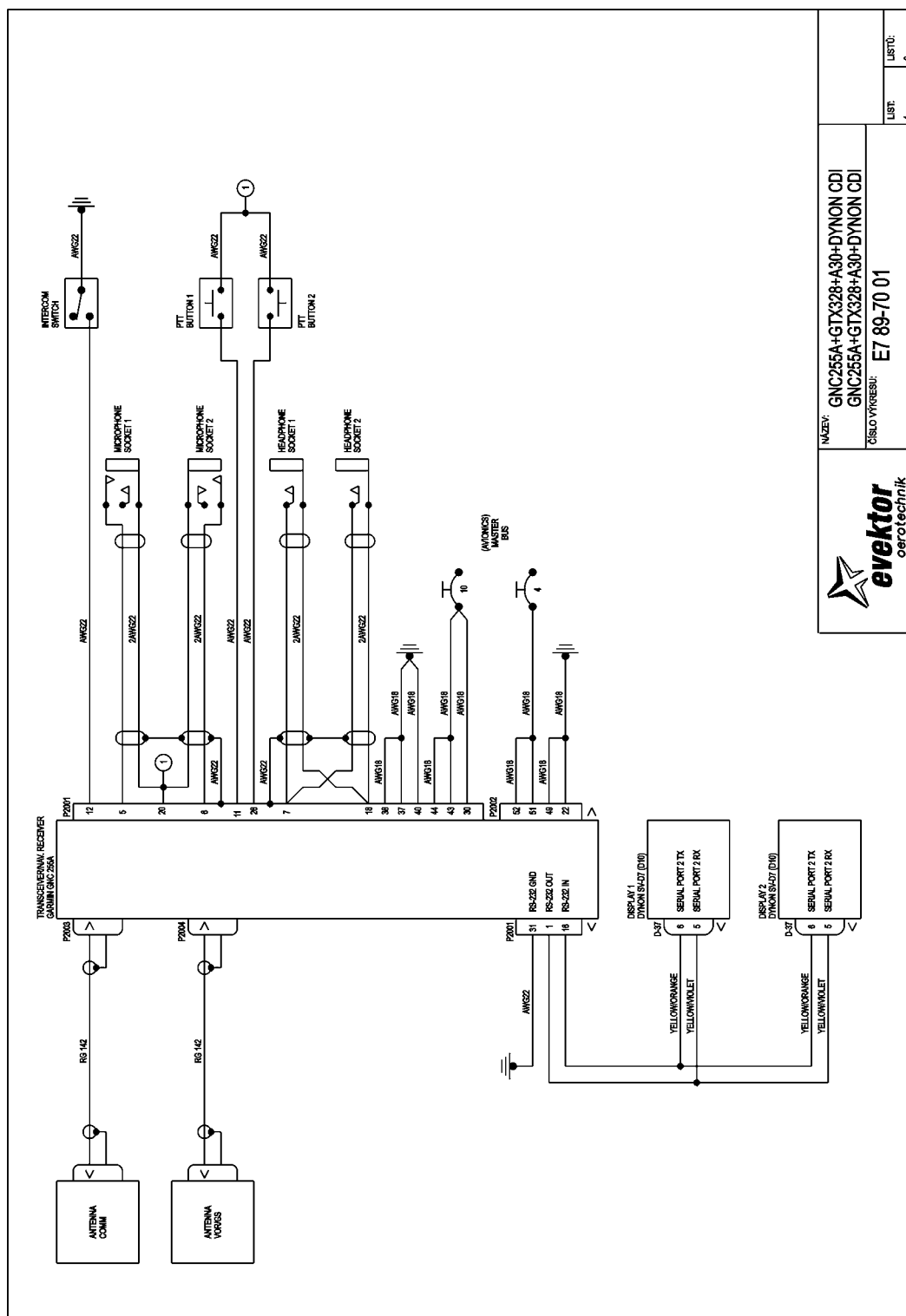


NAZEV: GNC255A+G1106A+GTX328+A30
GNC255A+G1106A+GTX328+A30
ČÍSLO VÝKRESU: E7 89-50 01

LIST:
2

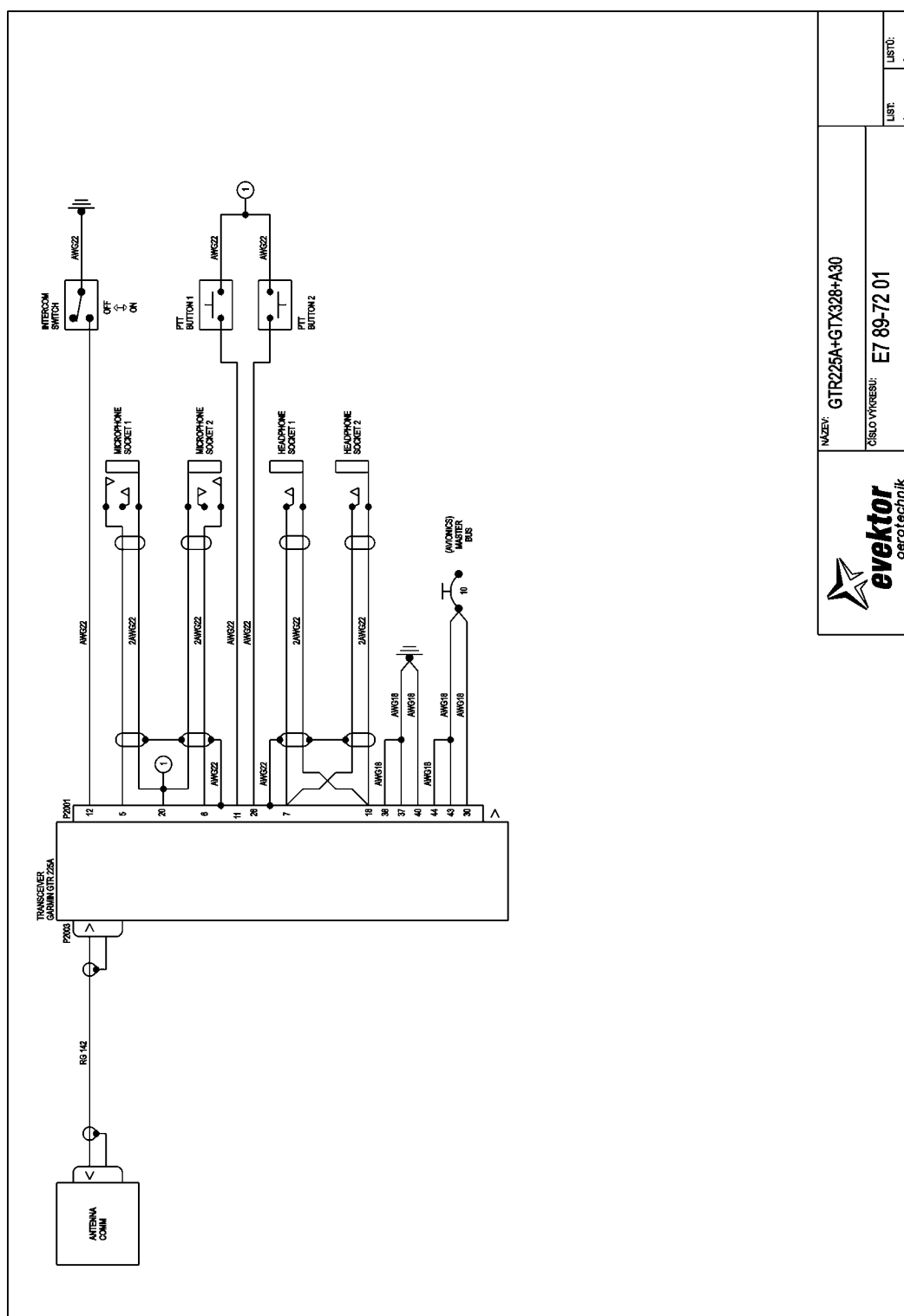
LISTO:
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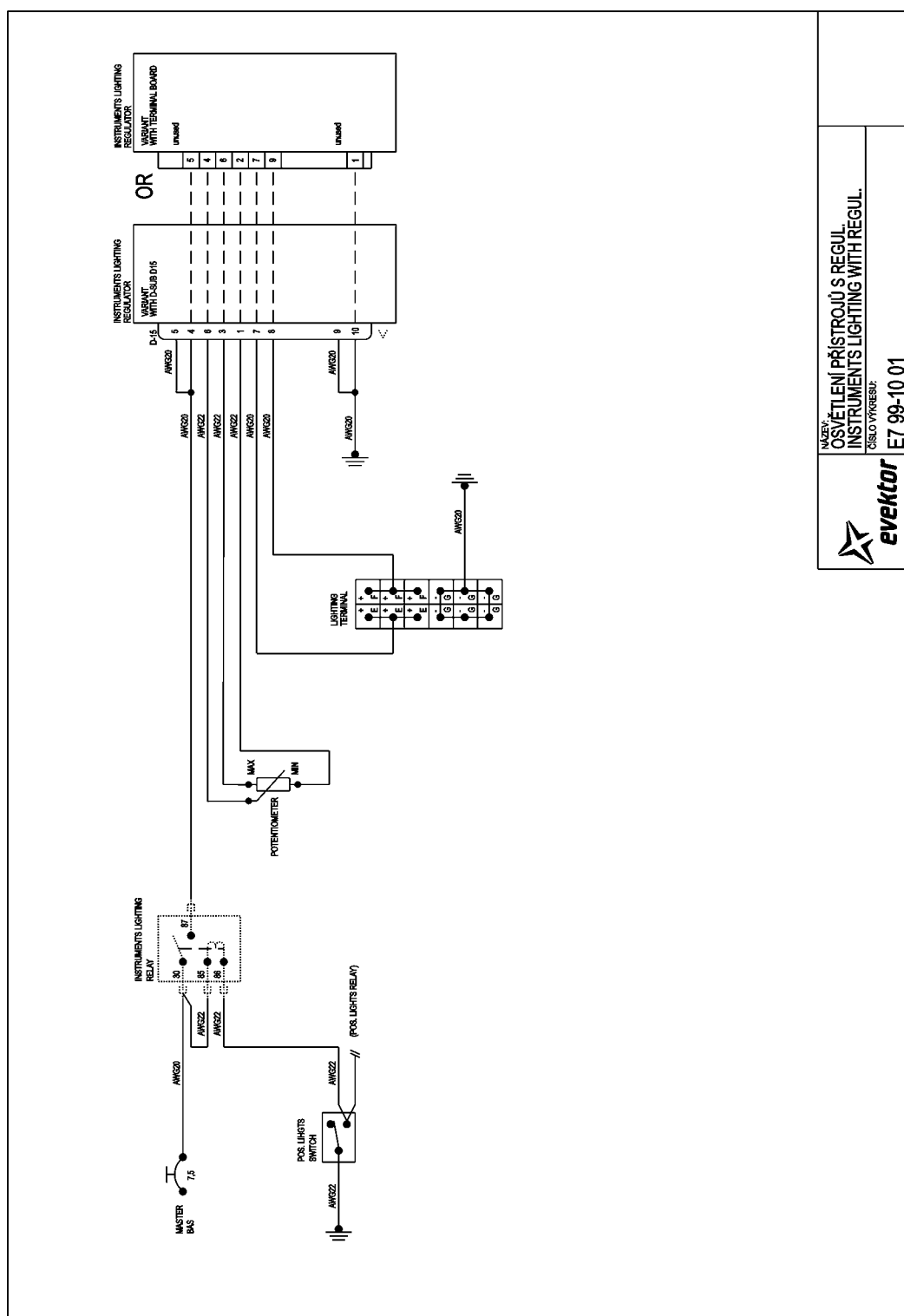


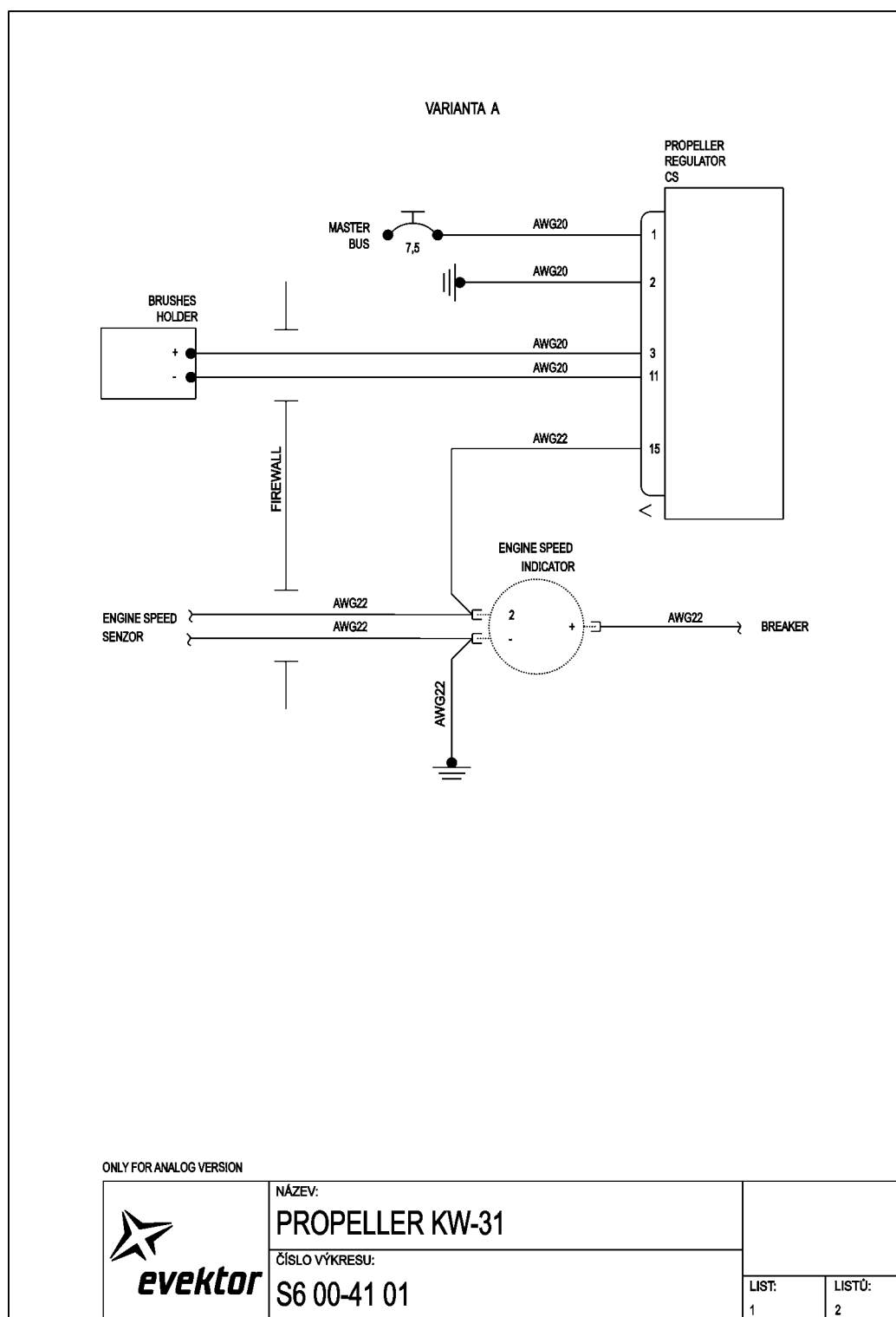


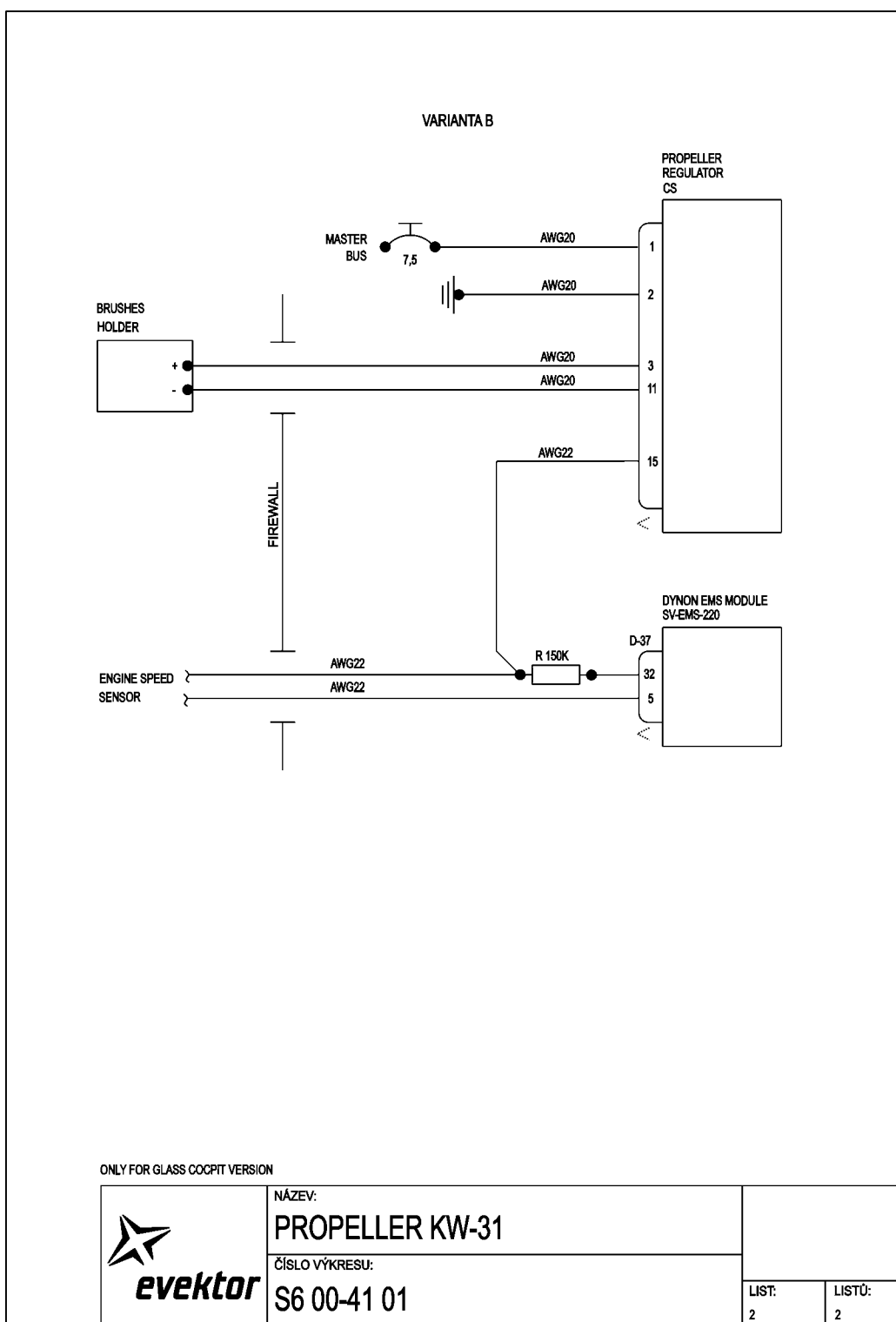
NÁZEV: GNC255A+GTX328+A30+DYNON CDI GNC255A+GTX328+A30+DYNON CDI		LIST: 1	
ČÍSLO VÝKRESU: E7 89-70 01		LISTO: 2	

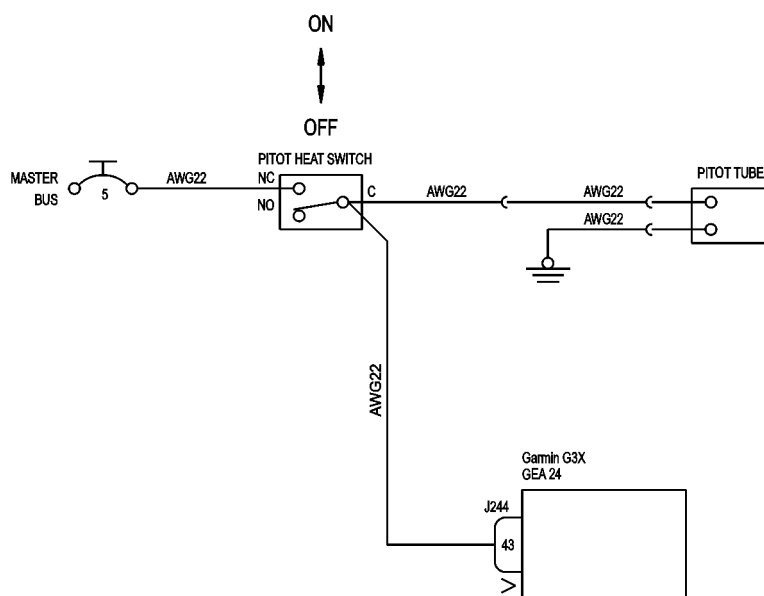




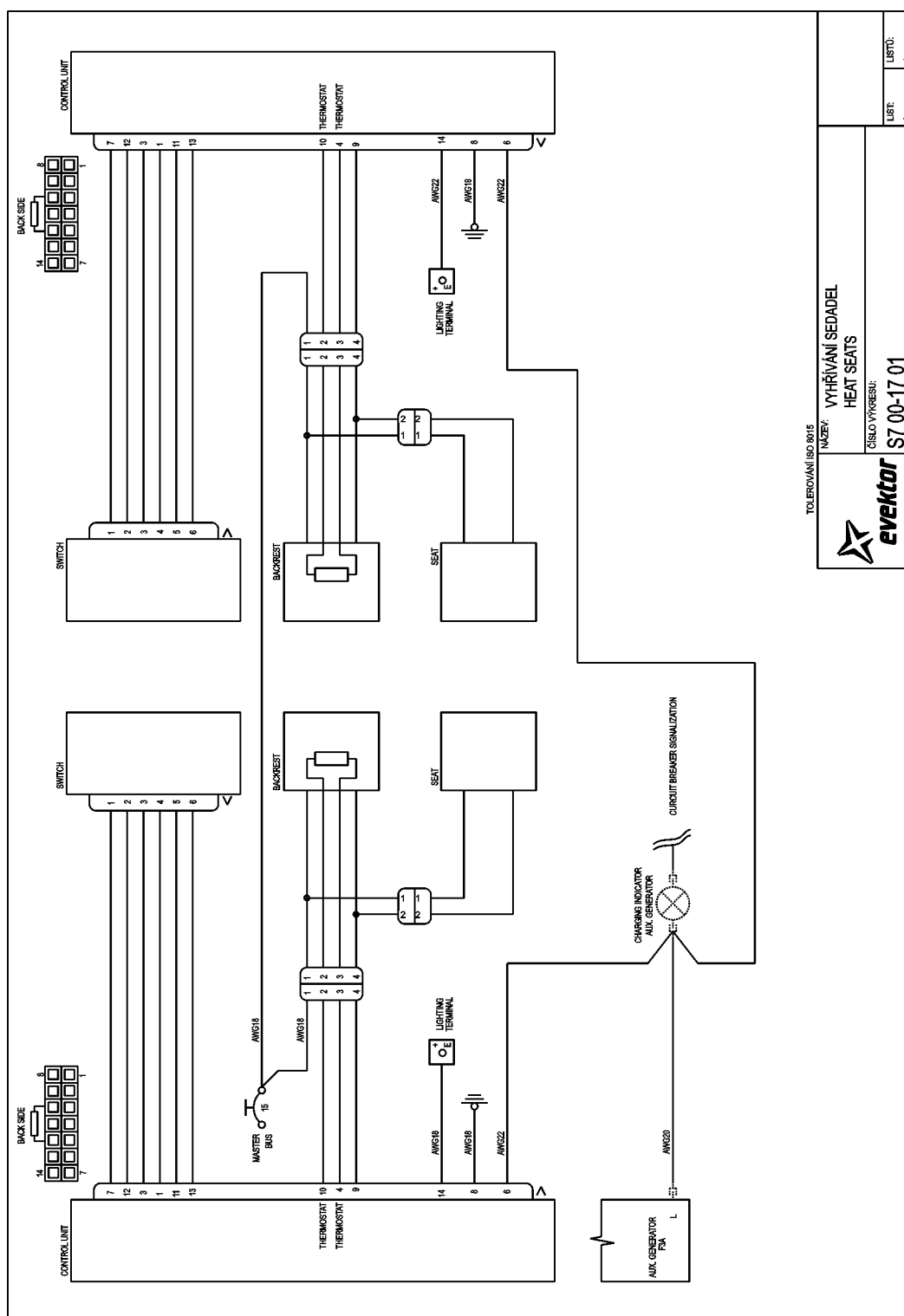


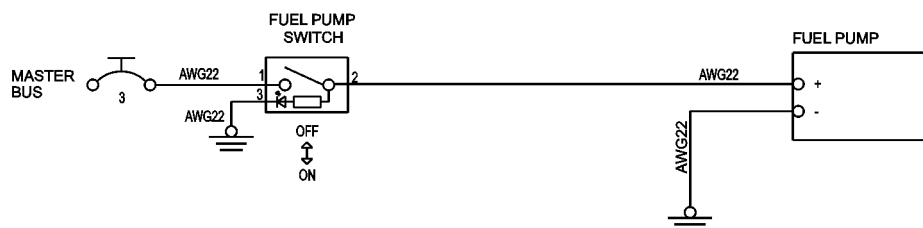




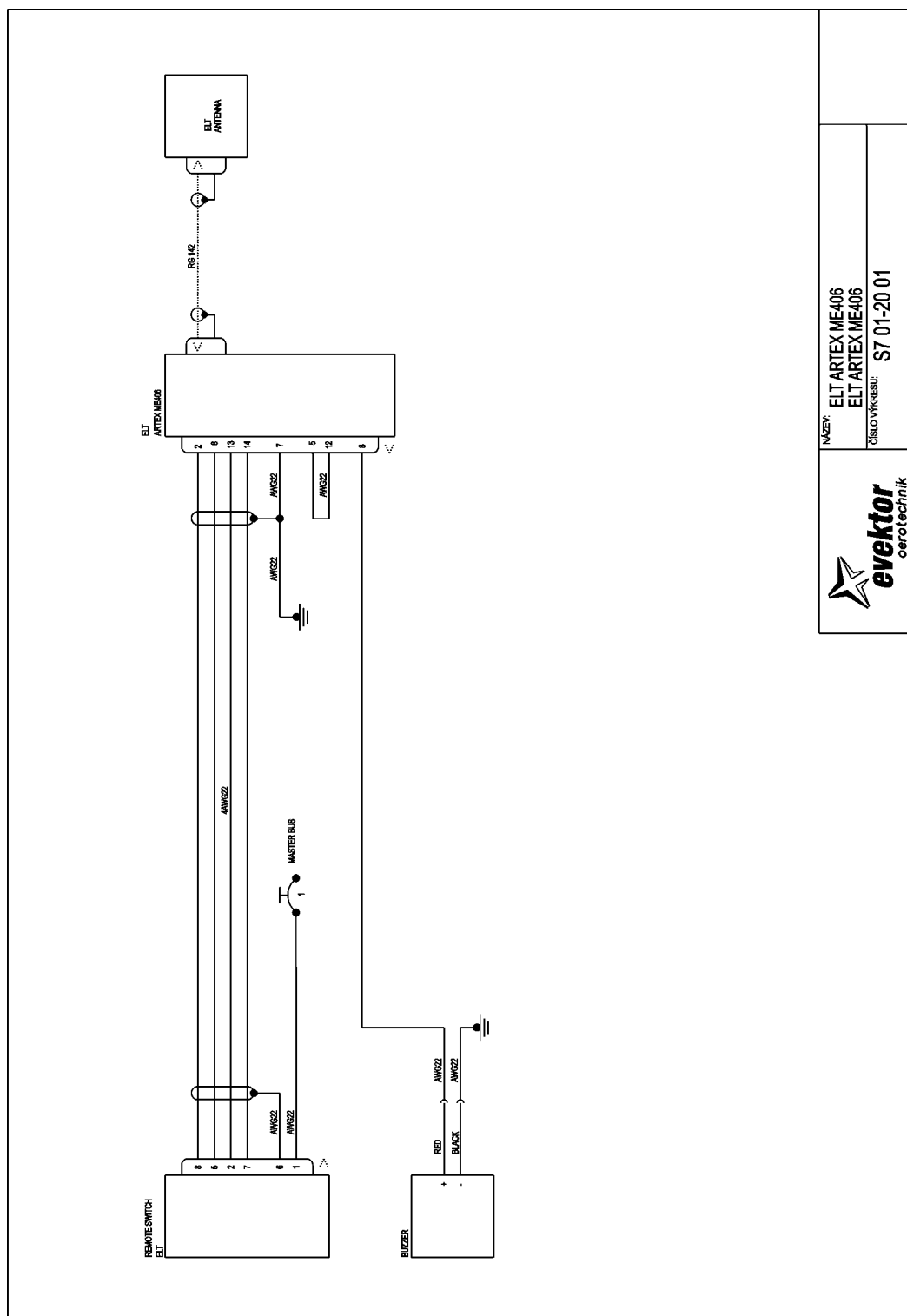


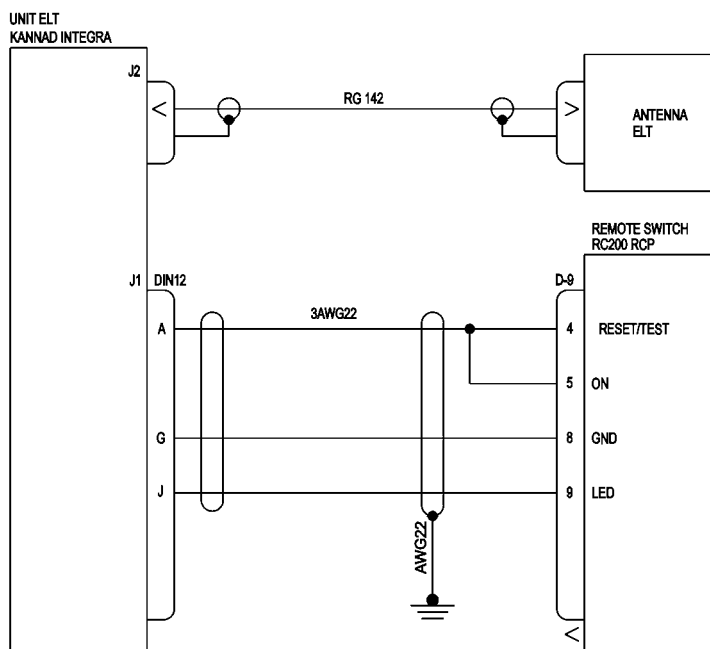
	NÁZEV:	PITOT-STATIC TUBE HEATING	
	ČÍSLO VÝKRESU:	S7 00-16 01	
	LIST:	1	LISTŮ:
			1





	NÁZEV: PALIVOVÁ INSTALACE 912S NVFR FUEL SYSTEM 912S NVFR		
	ČÍSLO VÝKRESU: S6 00-76 01	LIST:	LISTŮ:



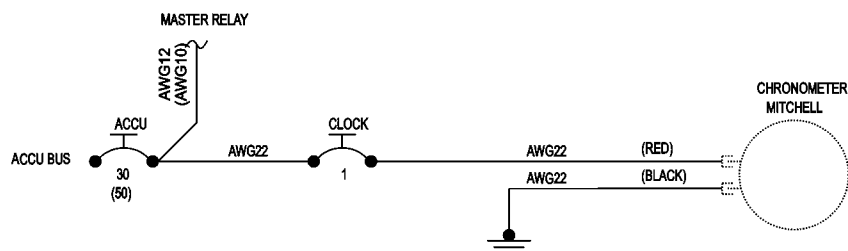

evektor

NÁZEV:

ELT Kannad Integra

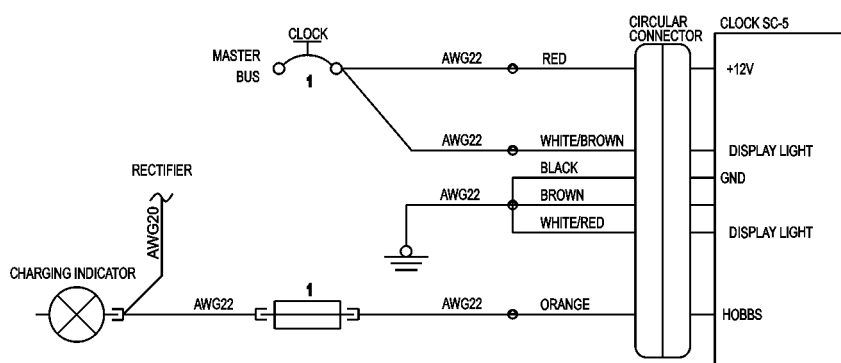
ČÍSLO VÝKRESU:

S7 01-28 01

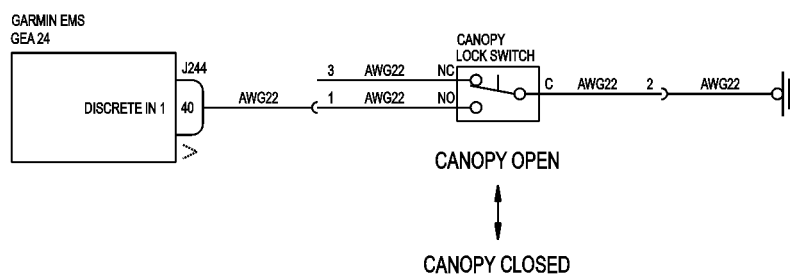


NÁZEV:
CHRONOMETER MITCHELL

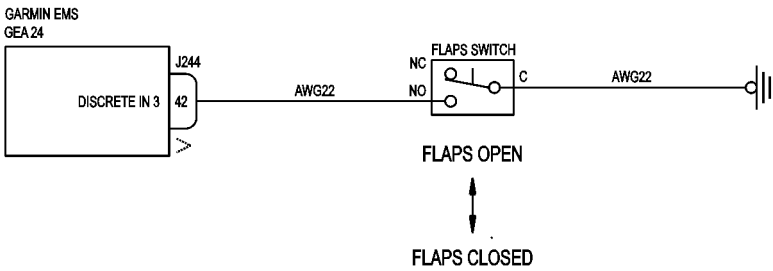
ČÍSLO VÝKRESU:
S7 40-01 01



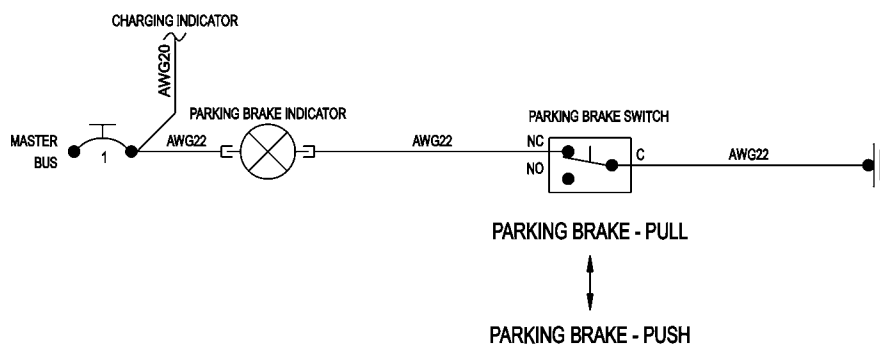
	NÁZEV:	CLOCK SC-5	
	ČÍSLO VÝKRESU:	S7 40-02 01	
	LIST:	1	LISTO: 1



	NÁZEV: SIG. ZAVŘENÍ KABINY-VER. G3X CANOPY CLOS. SIGNAL.-VER. G3X		
	ČÍSLO VÝKRESU: S7 47-10 01	LIST: 1	LISTŮ: 1



	NÁZEV: SIG. ZAVŘENÍ KLAPEK-VER. G3X FLAPS CLOS. SIGNAL.-VER. G3X		
	ČÍSLO VÝKRESU: S7 47-11 01	LIST: 1	LISTŮ: 2

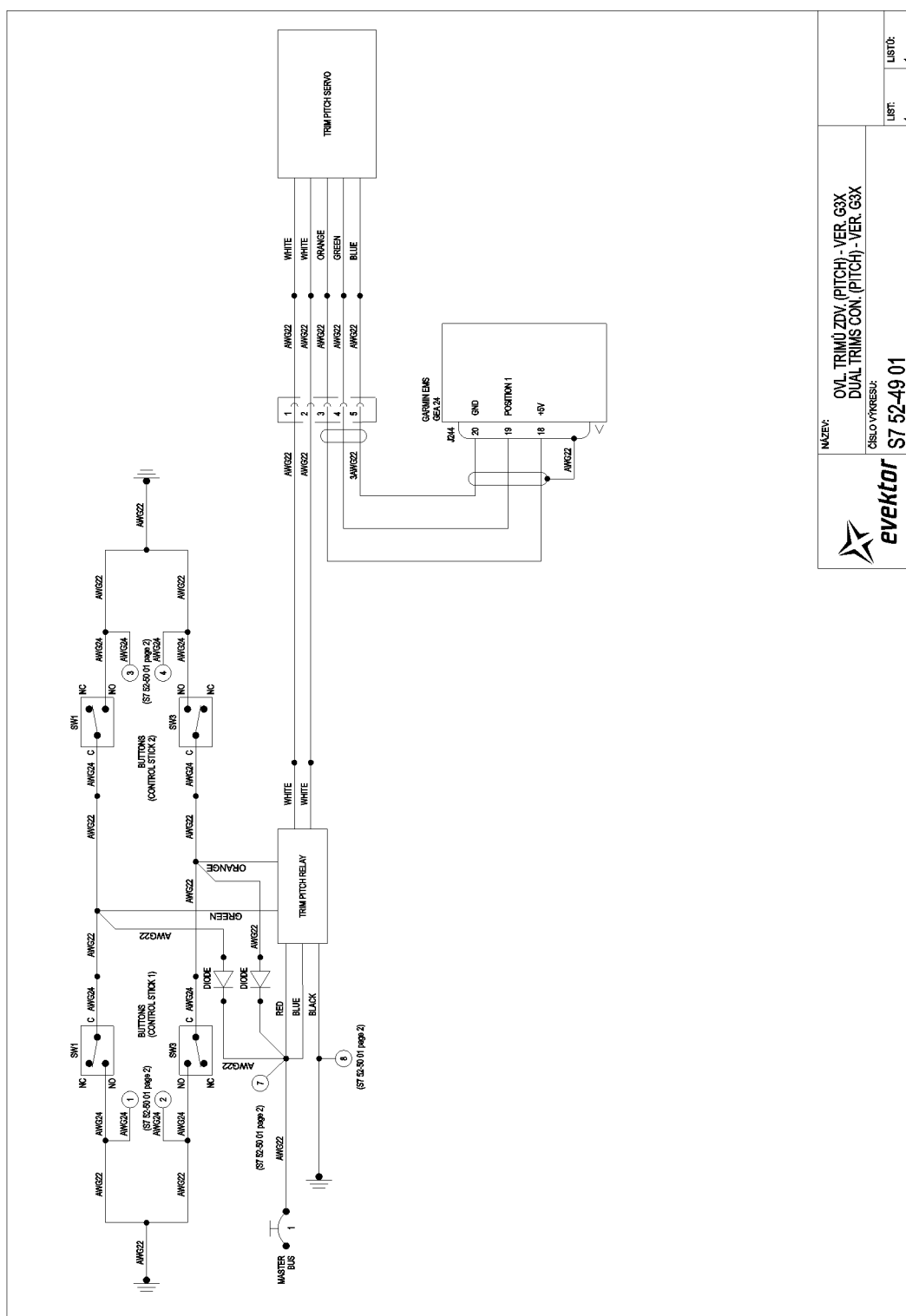


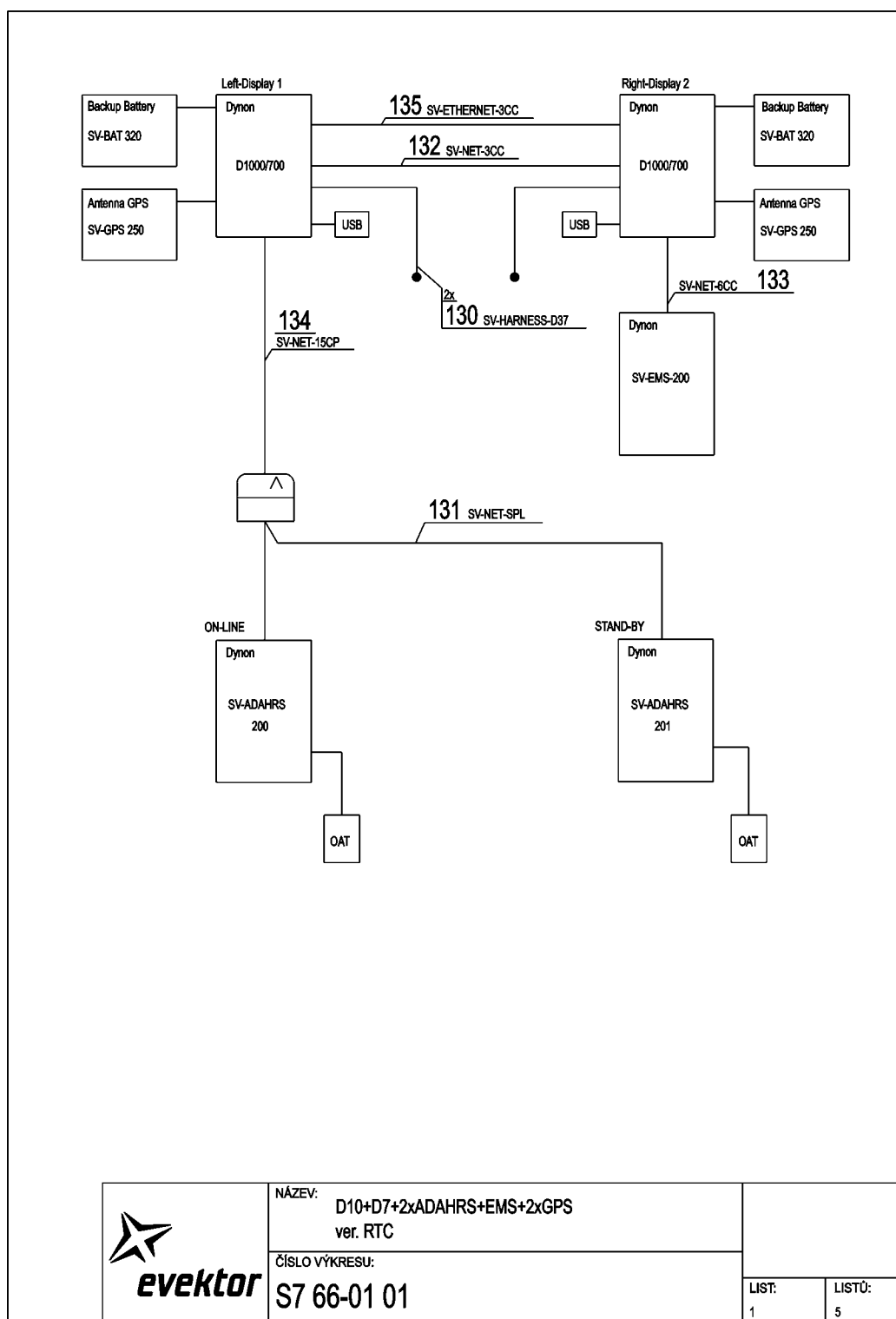
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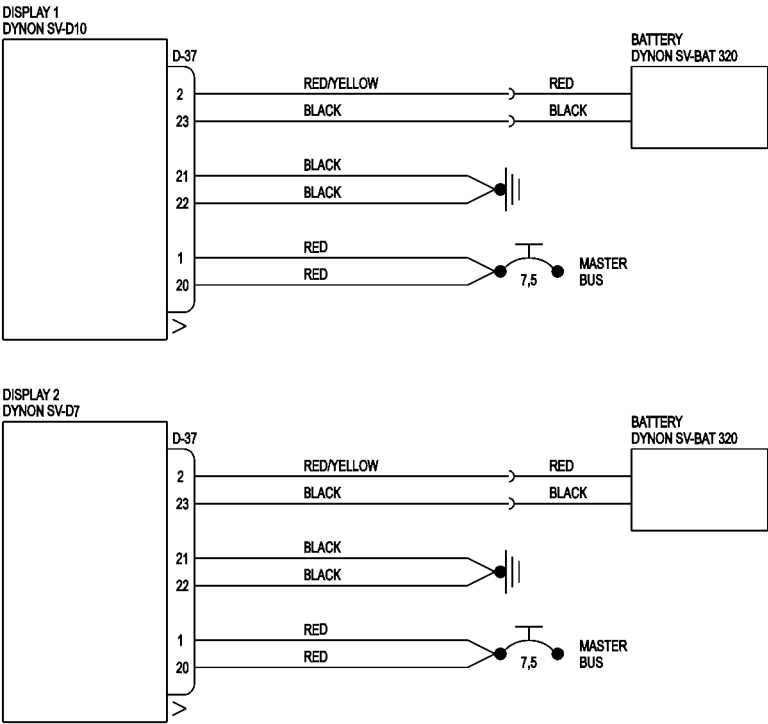
SIGNALIZATION-PARK.BRAKE

ČÍSLO VÝKRESU:

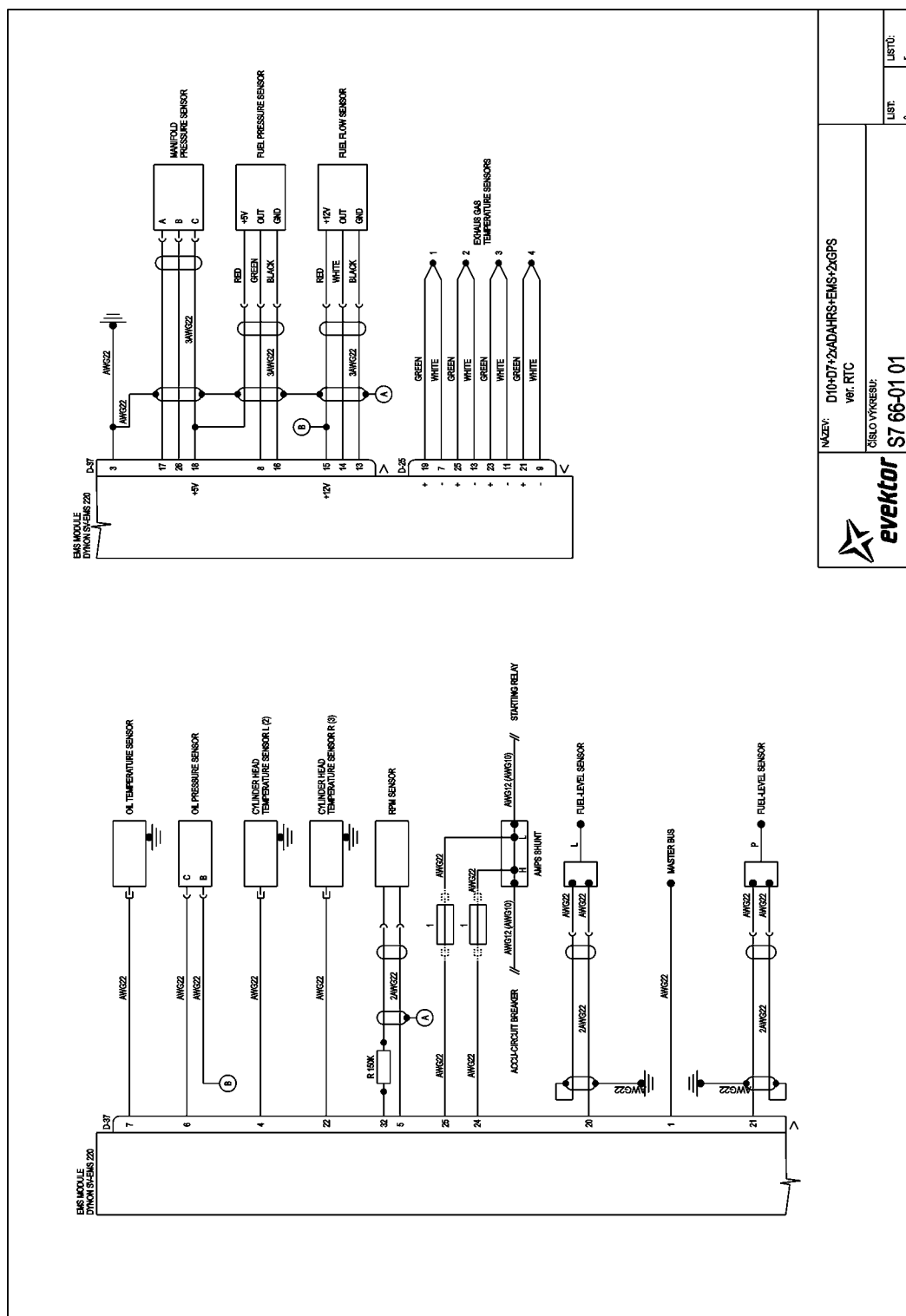
S7 47-60 01







	NÁZEV: D10+D7+2xADAHRS+EMS+2xGPS ver. RTC		
	ČÍSLO VÝKRESU: S7 66-01 01	LIST: 2	LISTŮ: 5

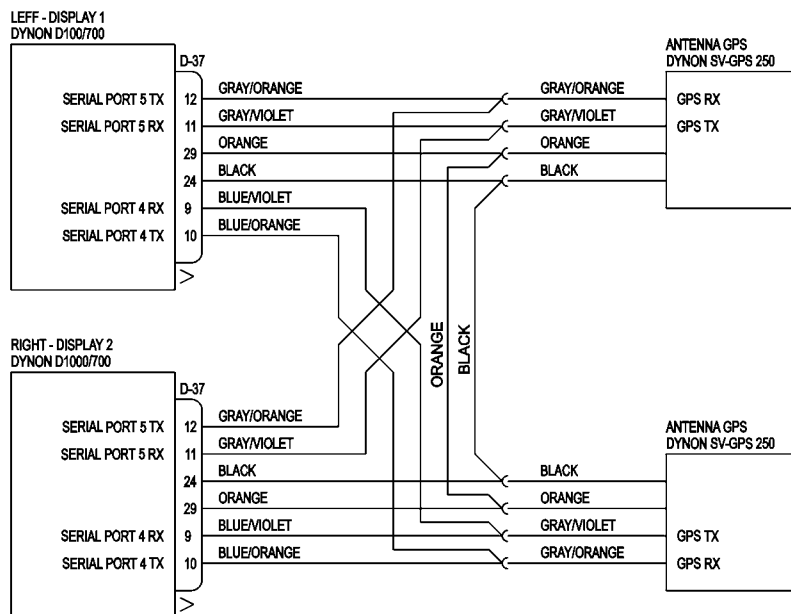


NÁZEV: D10+DT+2ADAHRS+EMS+2GPS ver: RTC		LIST:	
ČÍSLO VÝKRESU: S7 66-01 01		LISTO: 5	

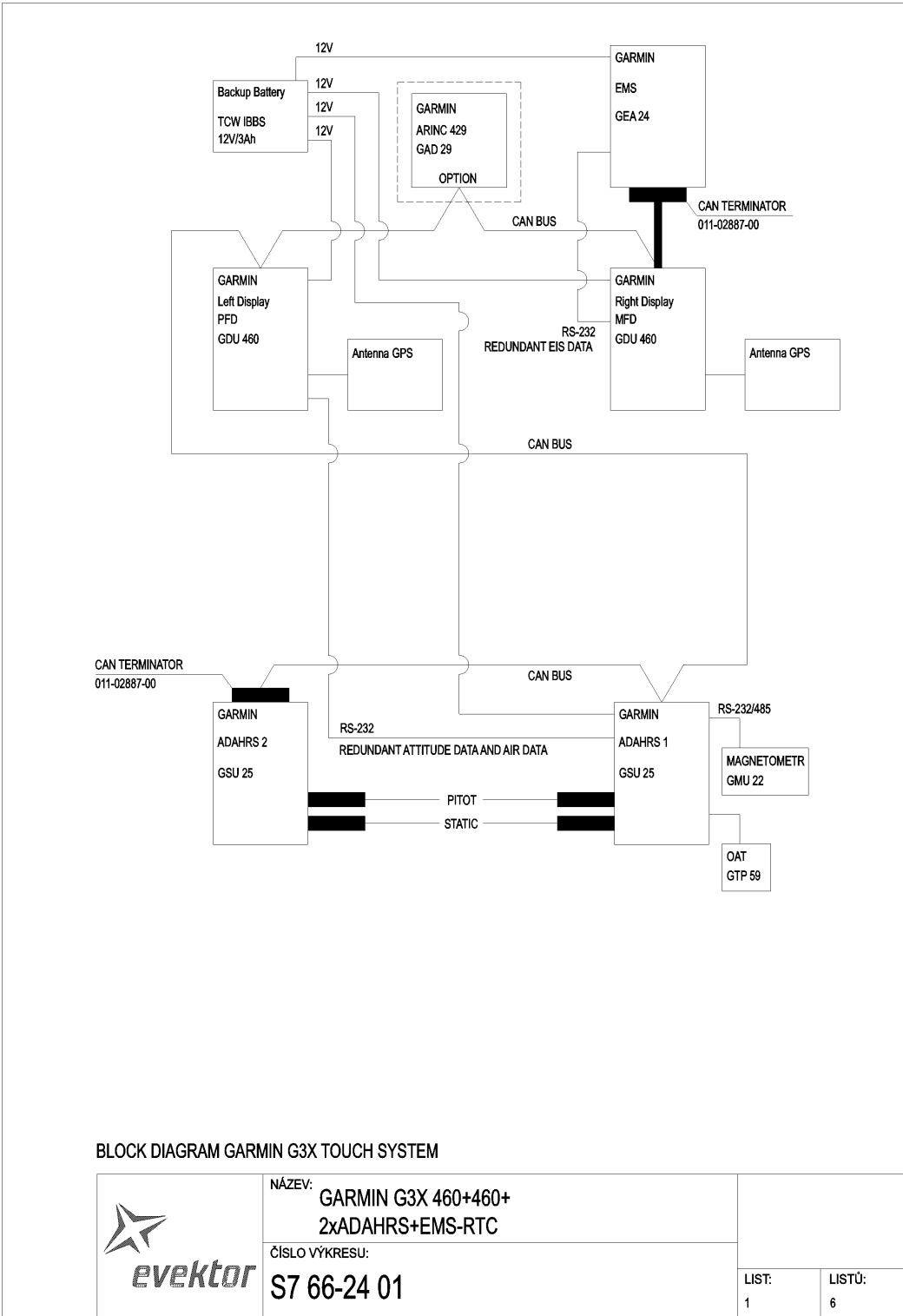

 ADAHRS ON-LINE
 DYNON SV-ADAHRS 200

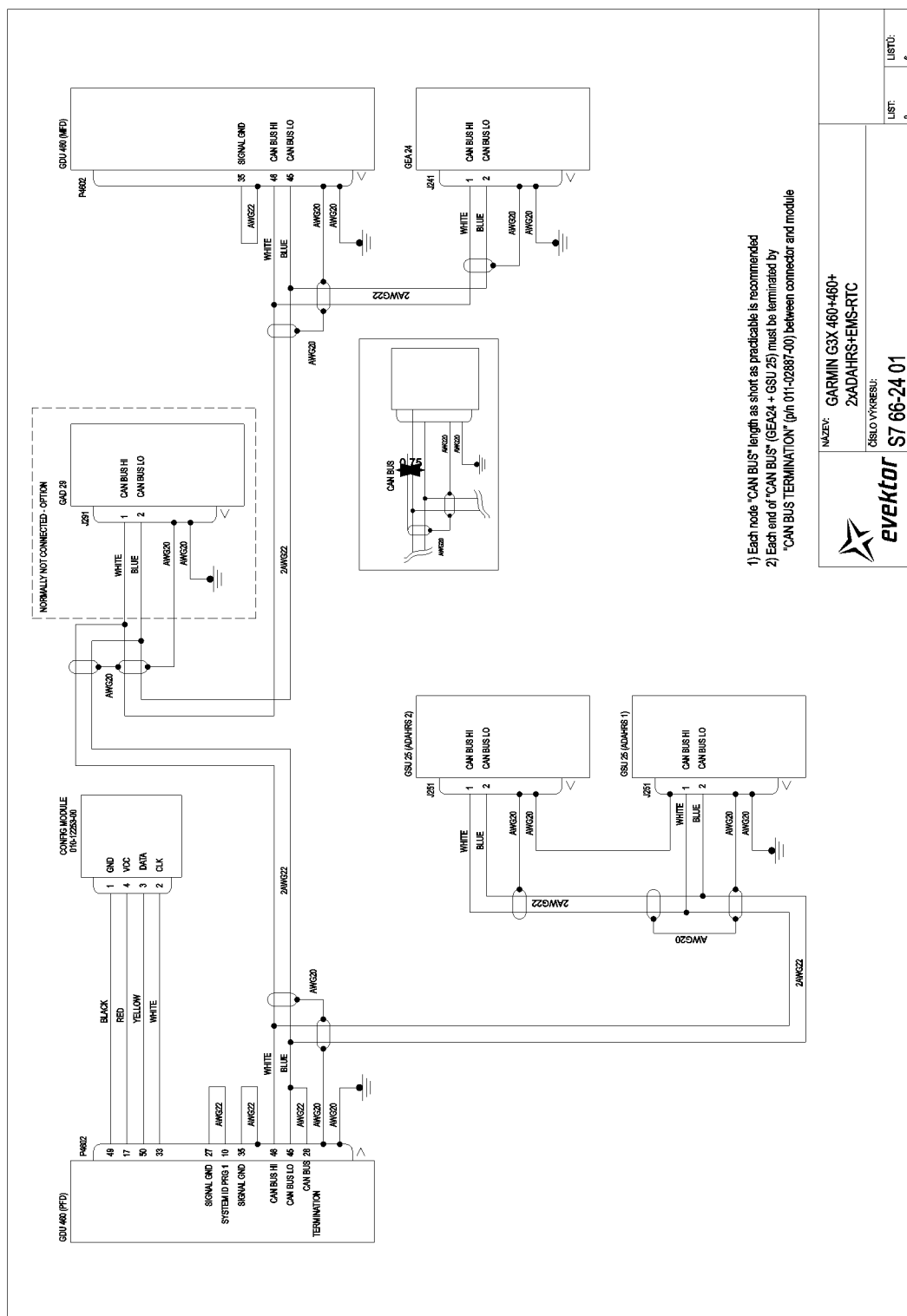
 ADAHRS STAND-BY
 DYNON SV-ADAHRS 201


	NÁZEV: D10+D7+2xADAHRS+EMS+2xGPS ver. RTC		
	ČÍSLO VÝKRESU: S7 66-01 01	LIST: 4	LISTŮ: 5



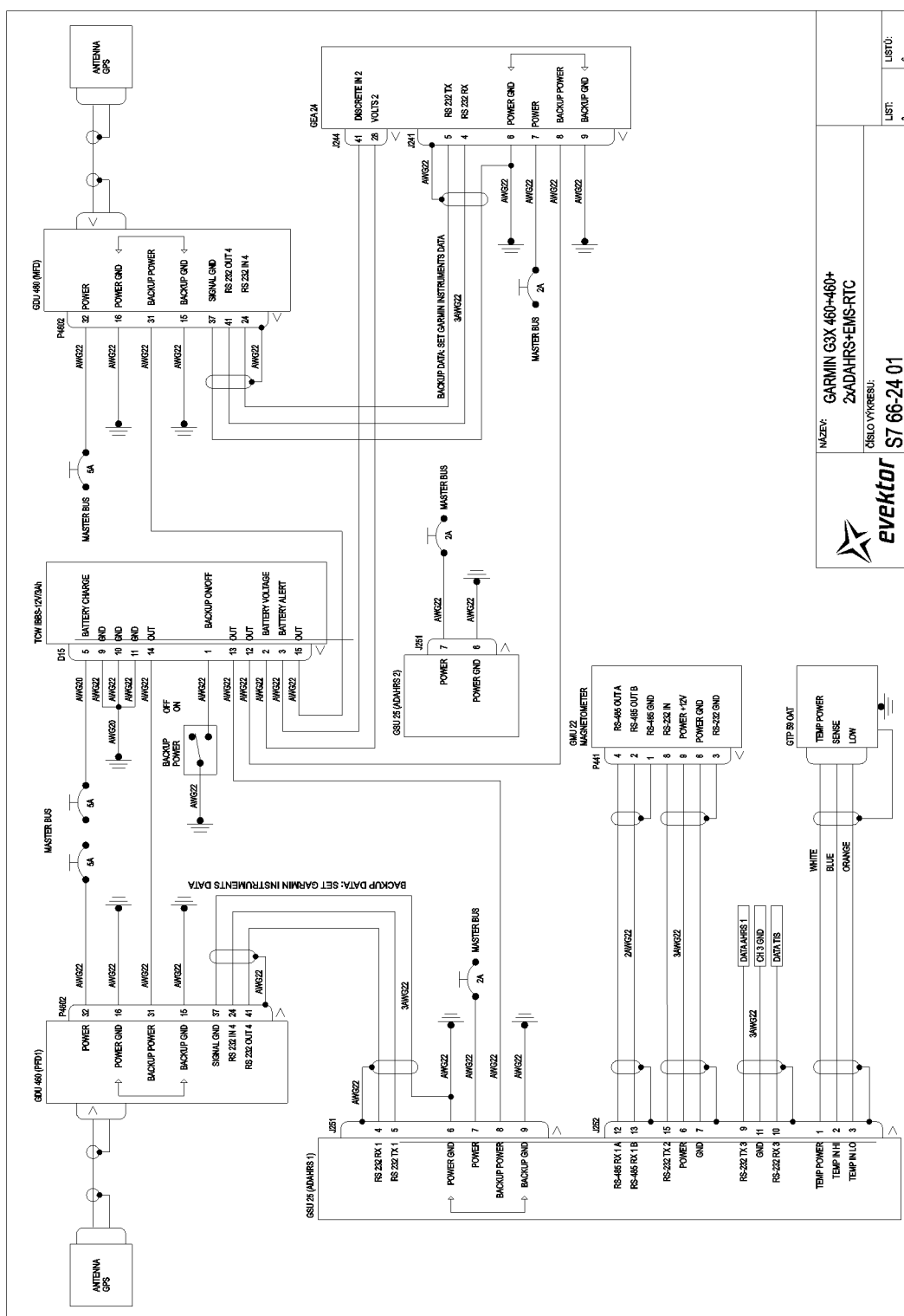
	NÁZEV: D10+D7+2xADAHRS+EMS+2xGPS ver. RTC		
	ČÍSLO VÝKRESU: S7 66-01 01	LIST: 5	LISTŮ: 5





NAZEV: GARMIN G3X 460+460+
2xDAHRS+EMS-RTC
ČÍSLO VÝKRESU: S7 66-24 01

LIST: 2
LISTU: 6



NAZEV:
GARMIN G3X 460-460+
2xADAHS+EMS-RTC

ČÍSLO VÝKRESU:

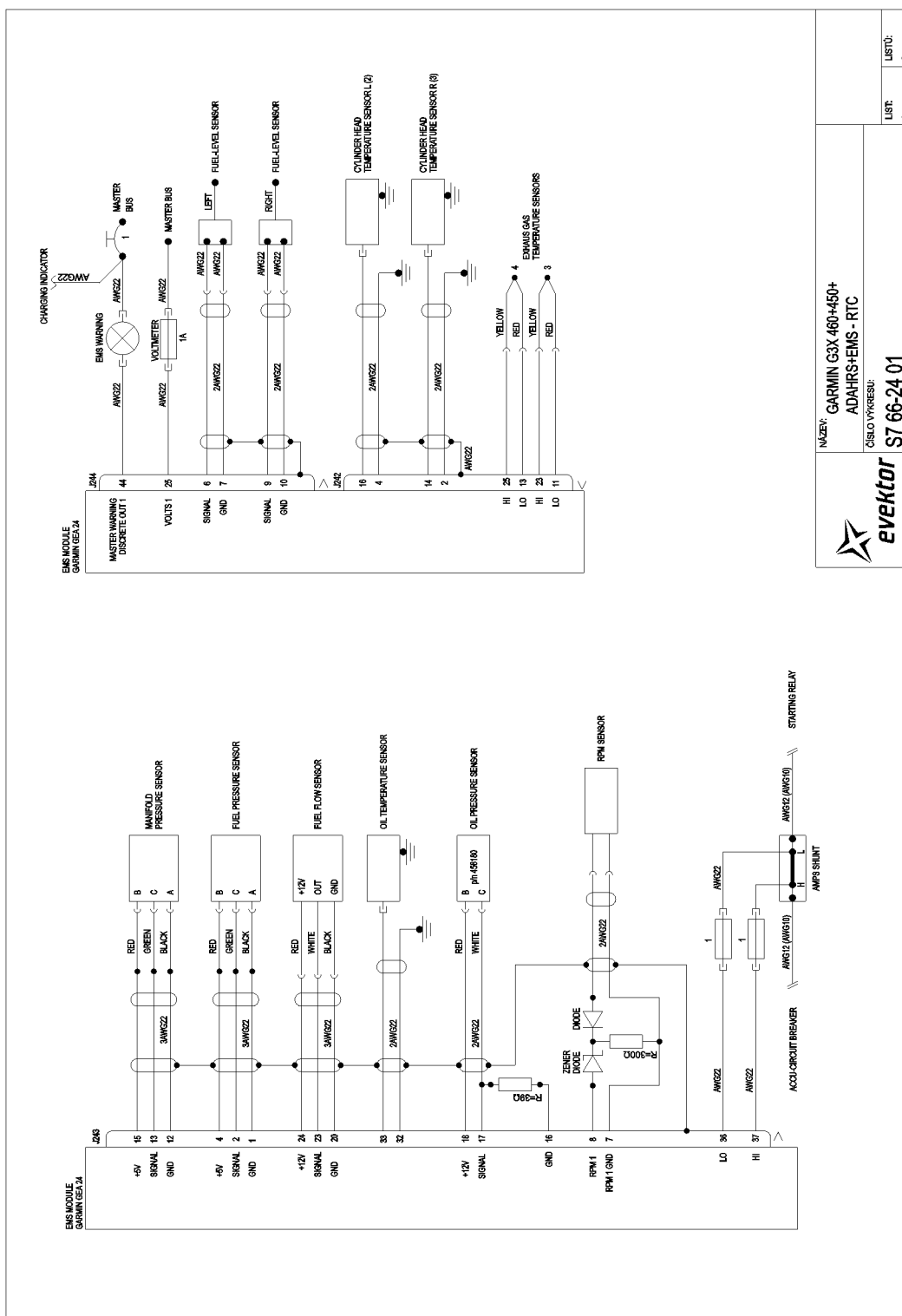
S7 66-24 01

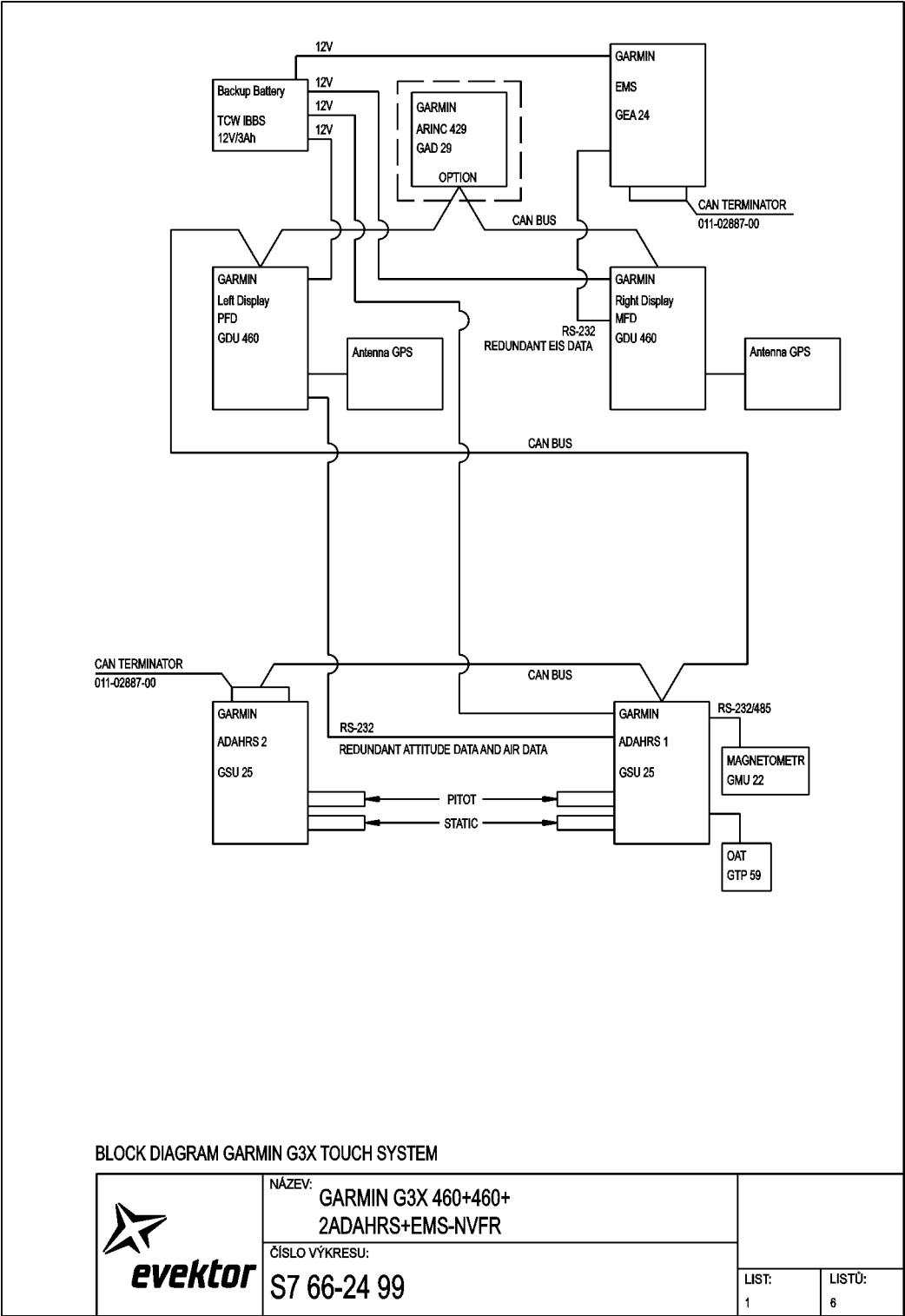


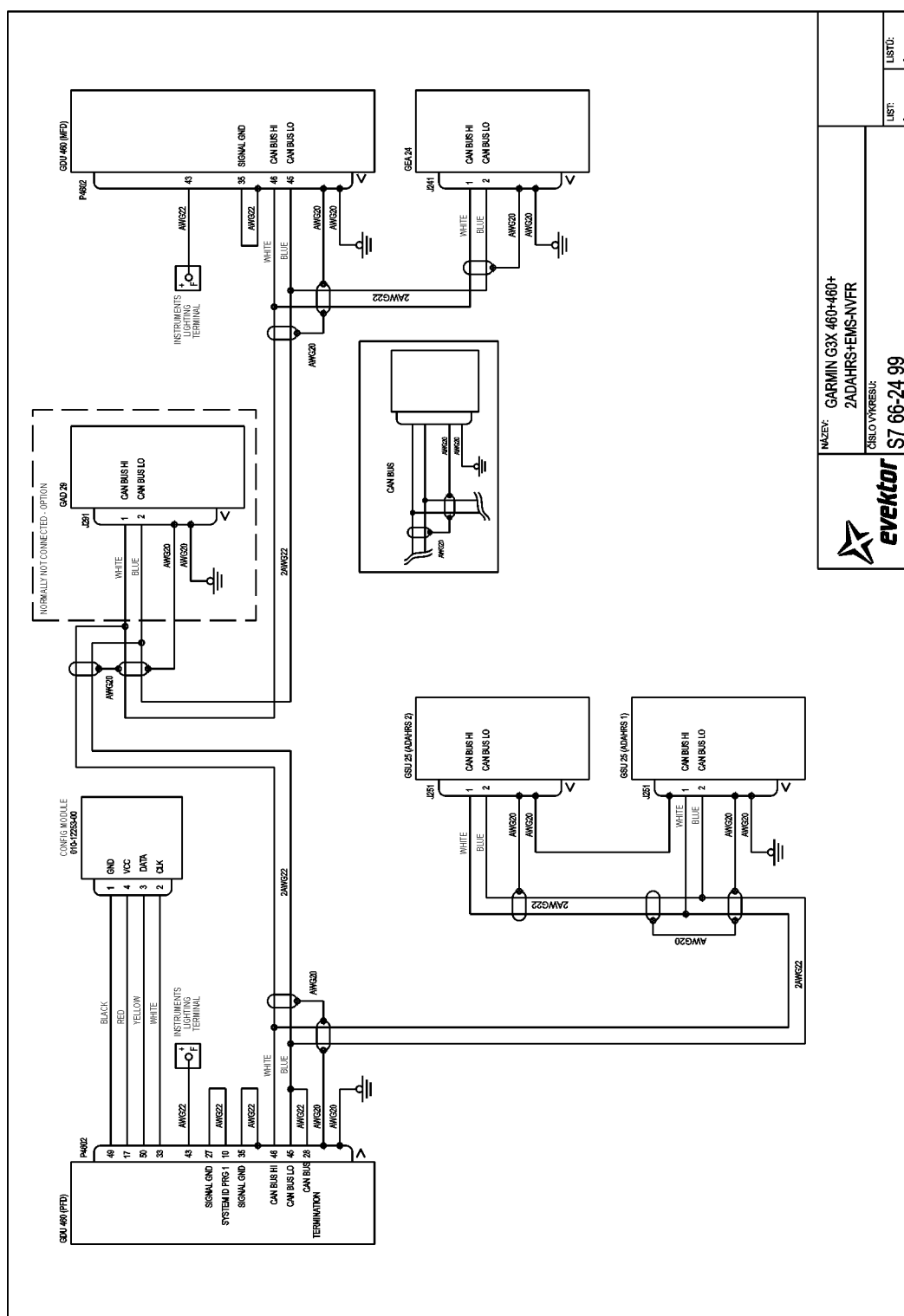
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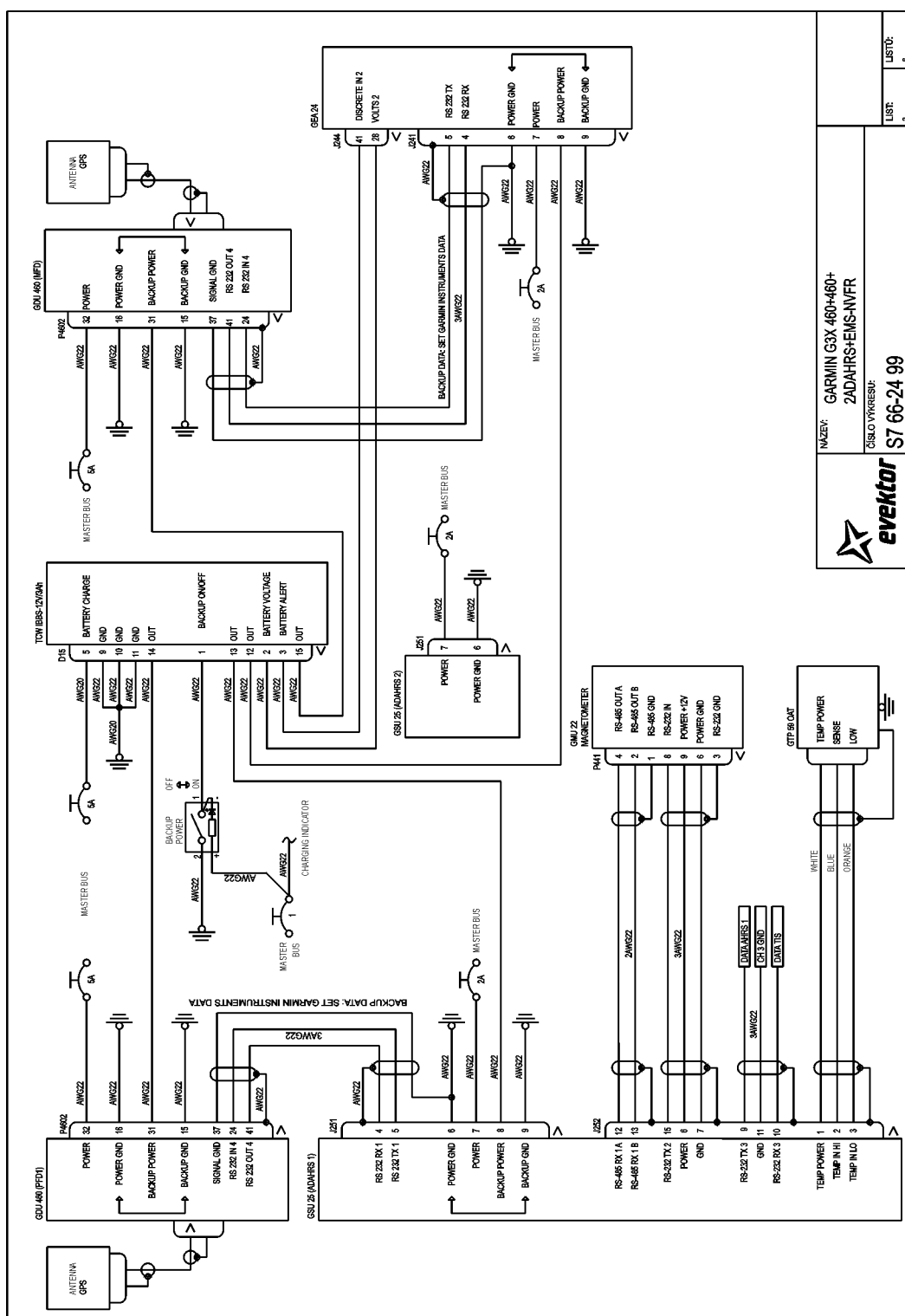
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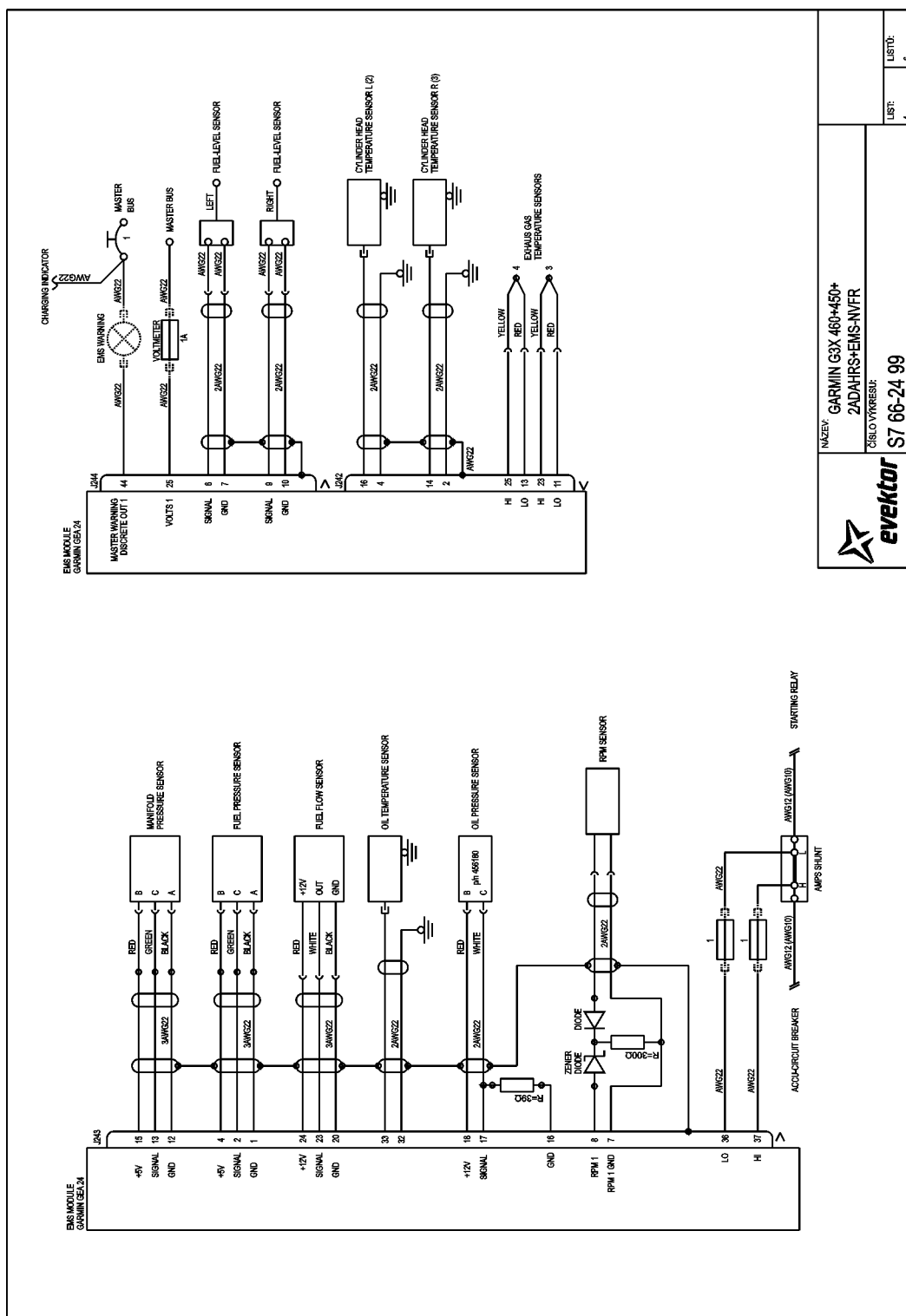
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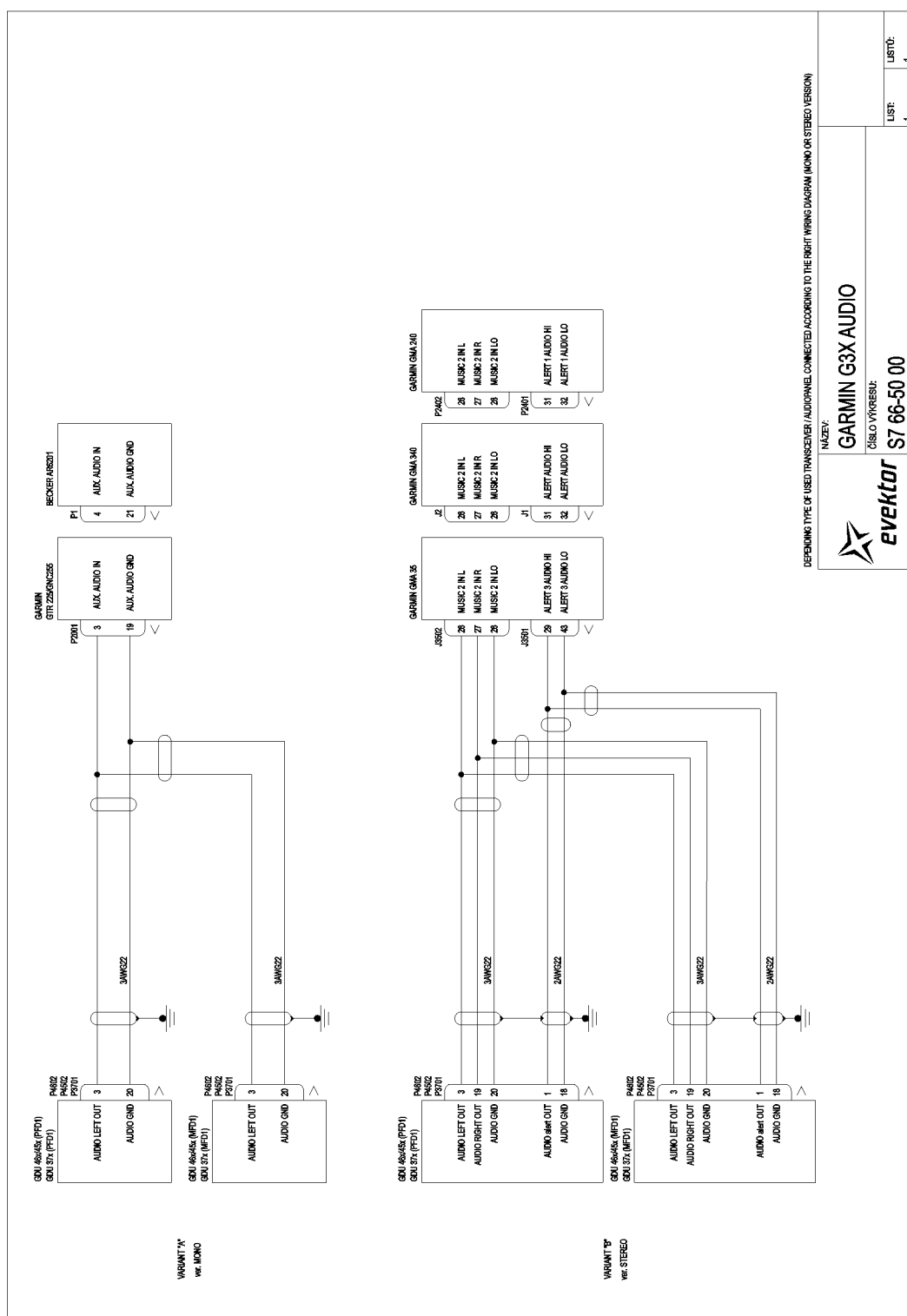


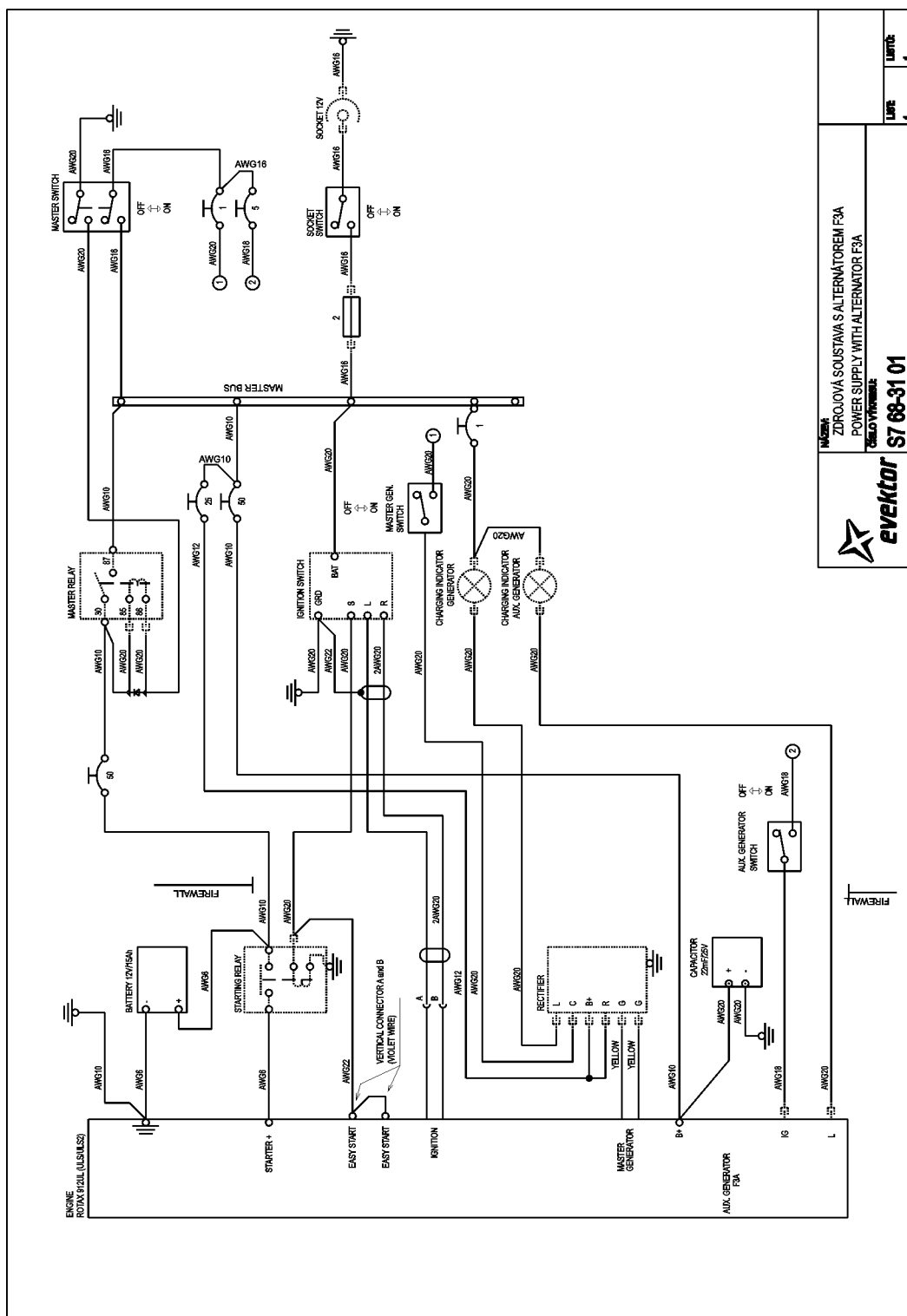










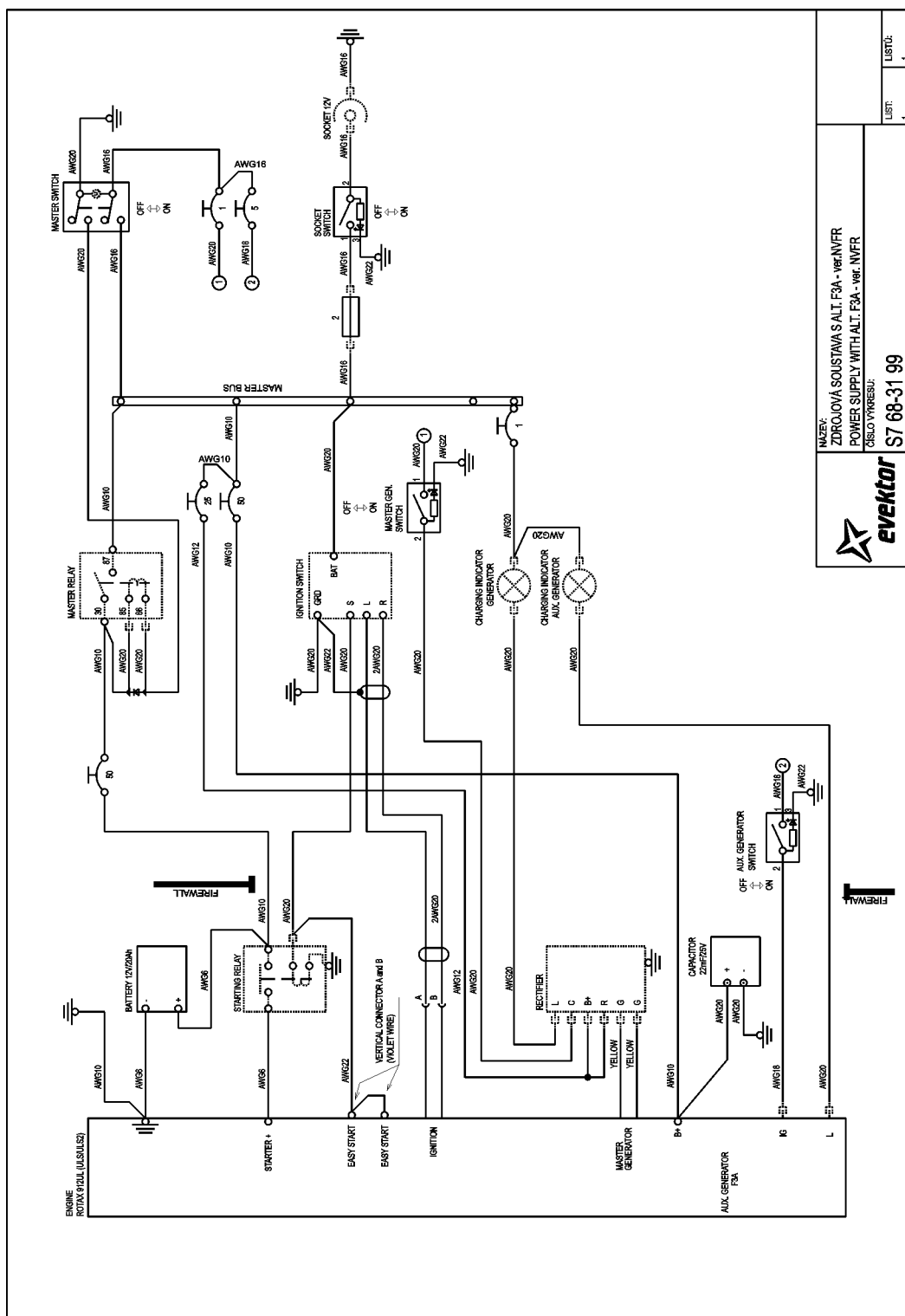


ZDROJOVÁ SOUSTAVA S ALTERNÁTOREM F3A
POWER SUPPLY WITH ALTERNATOR F3A

S7 68-31 01

LIFE 1

LIFE 1



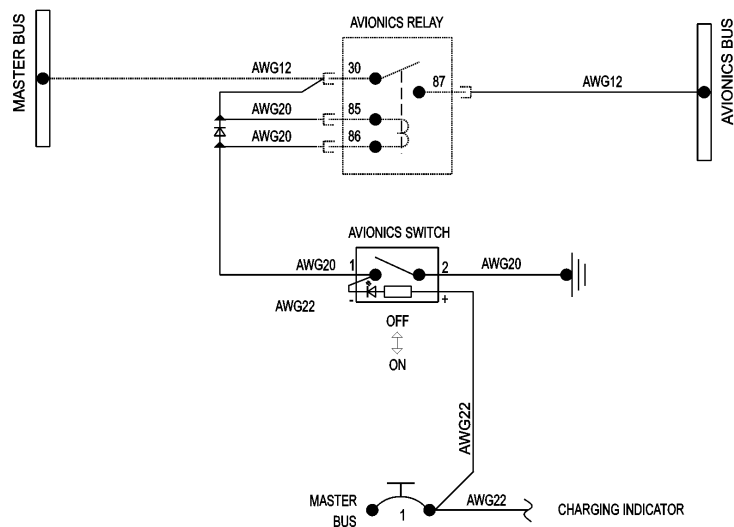
MASTRA:
ZDROJOVÁ SOUSTAVA S ALI. FSA - ver. NVFR
POWER SUPPLY WITH ALI. FSA - ver. NVFR
ČÍSLO VÝKRESU:



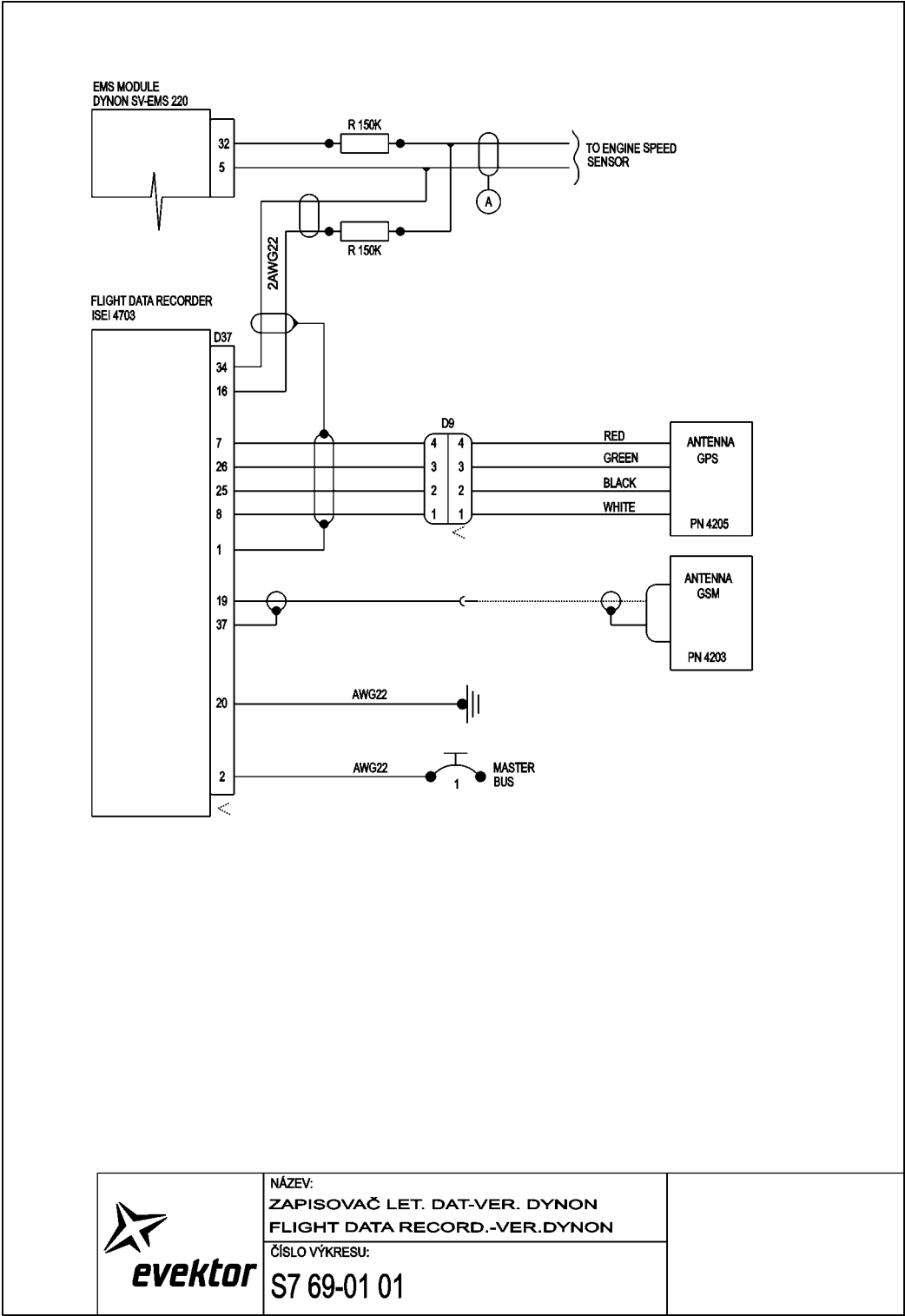
S7 68-31 99

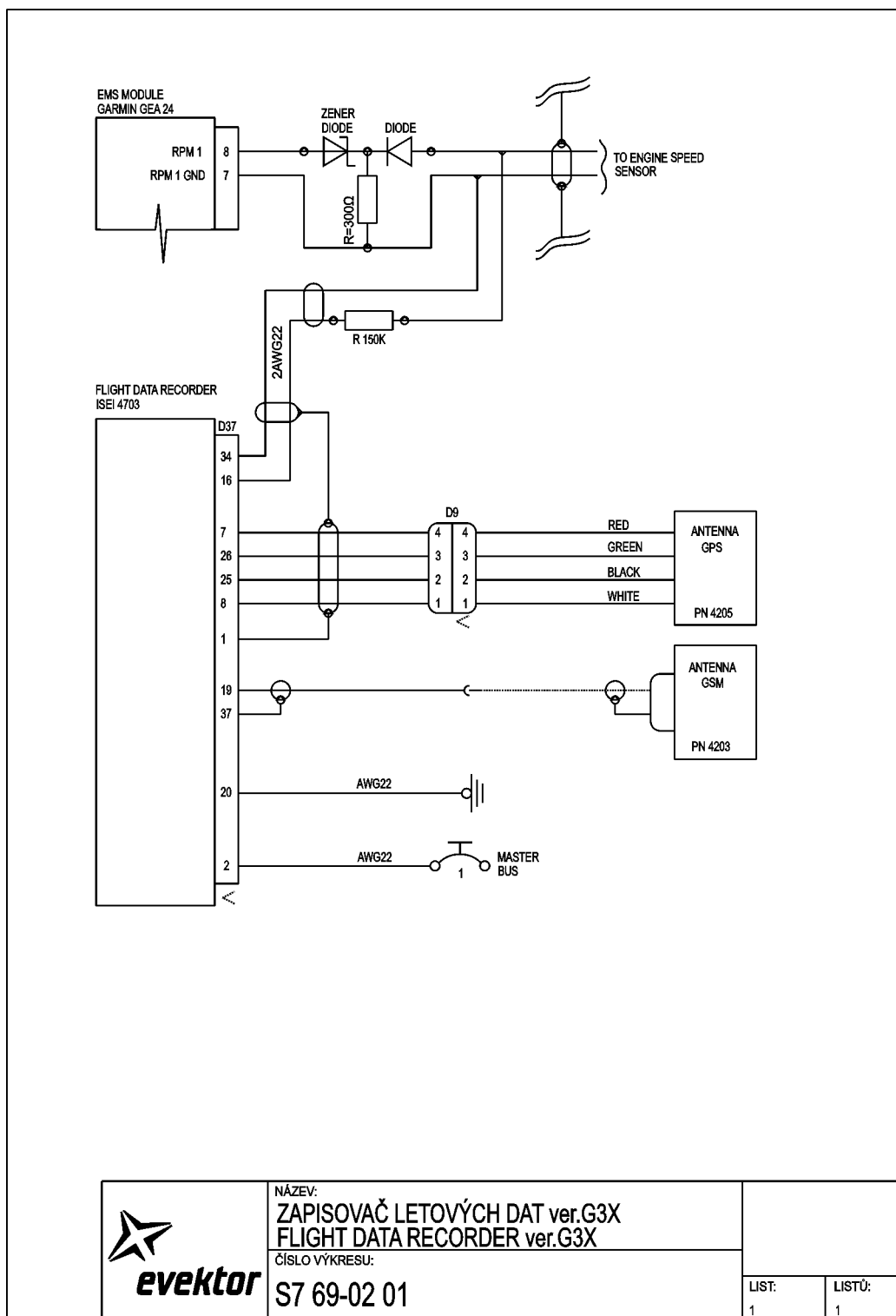
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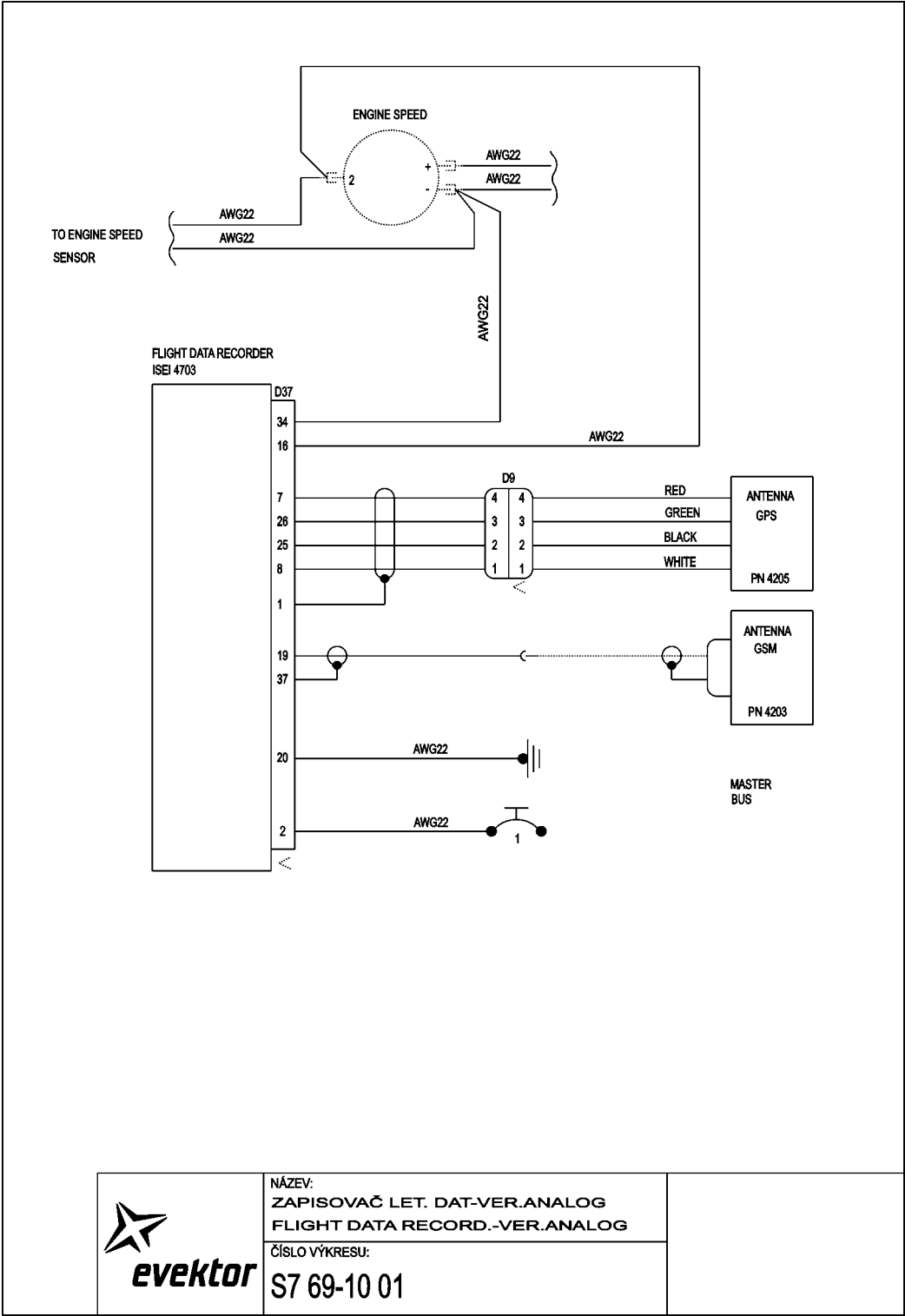
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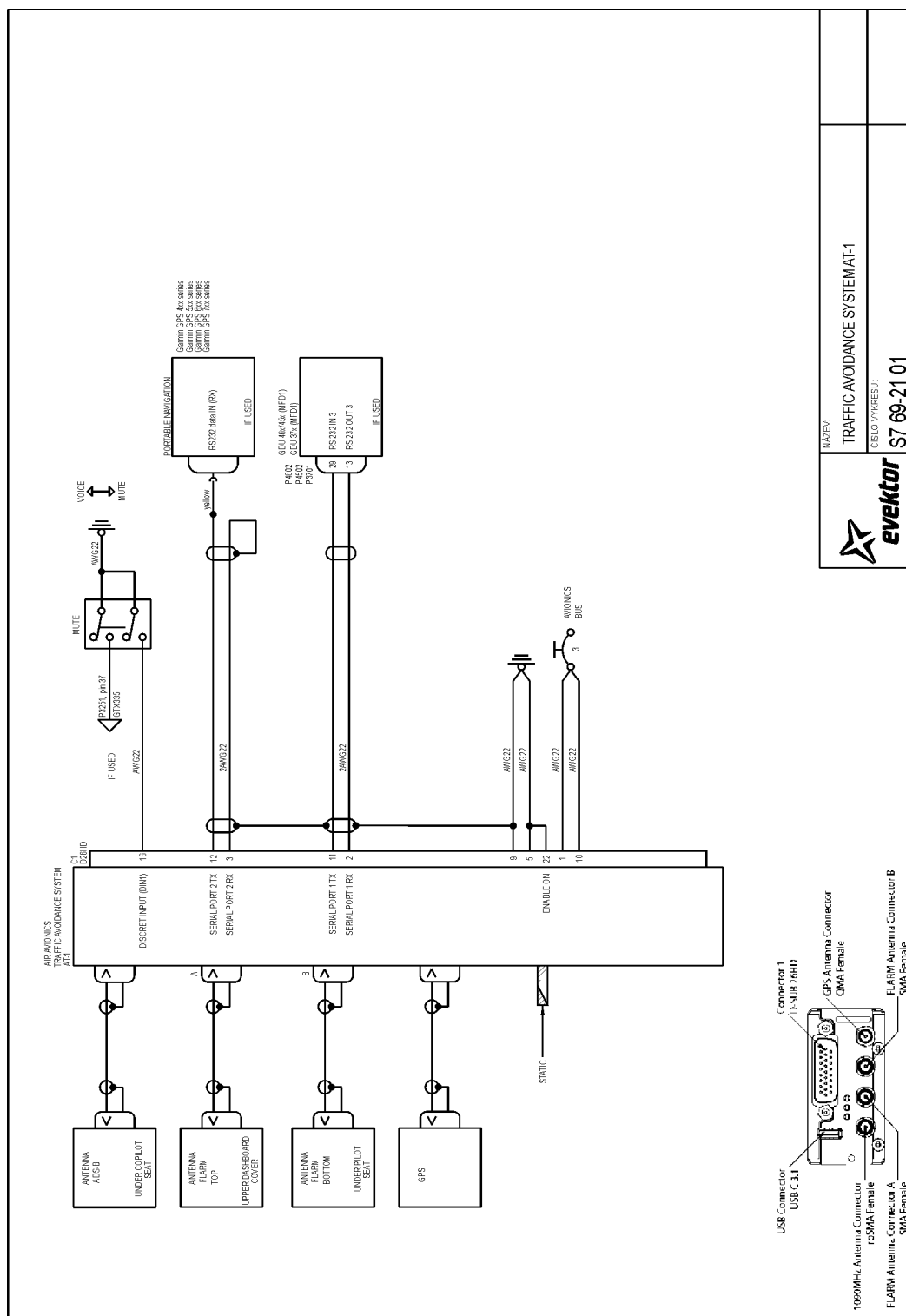


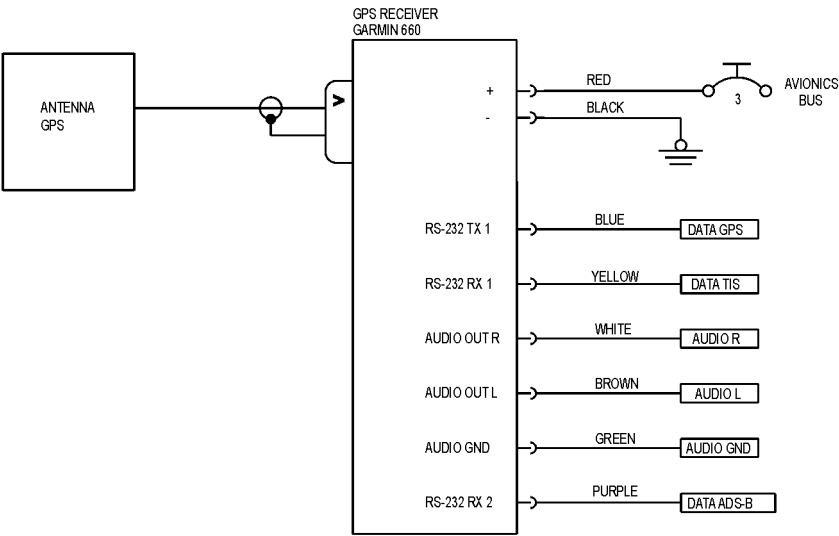
	NÁZEV: VYPÍNAČ AVIONIKY - NVFR AVIONICS SWITCH - NVFR		
	ČÍSLO VÝKRESU: S7 68-99 99	LIST: 1	LISTŮ: 1



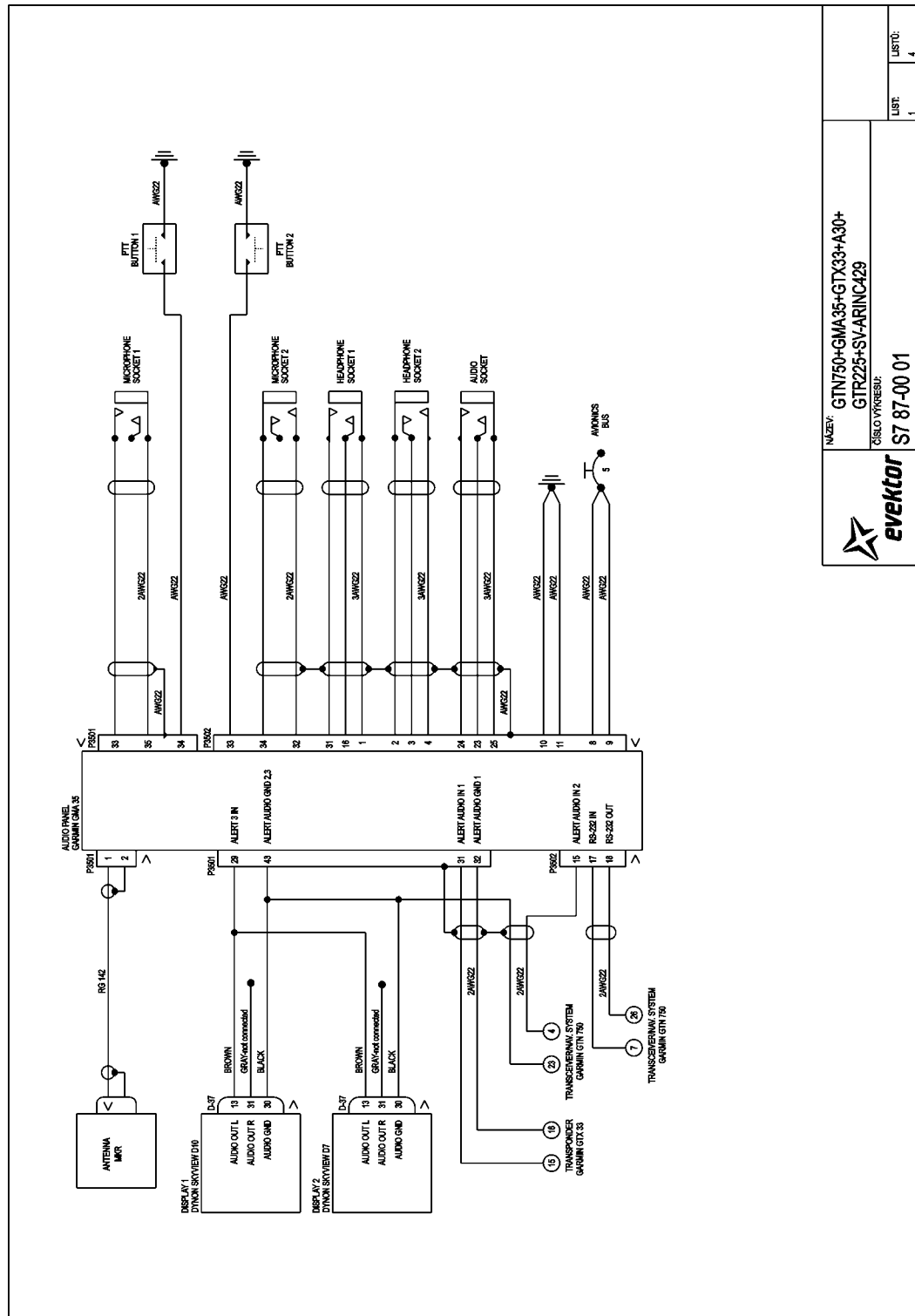


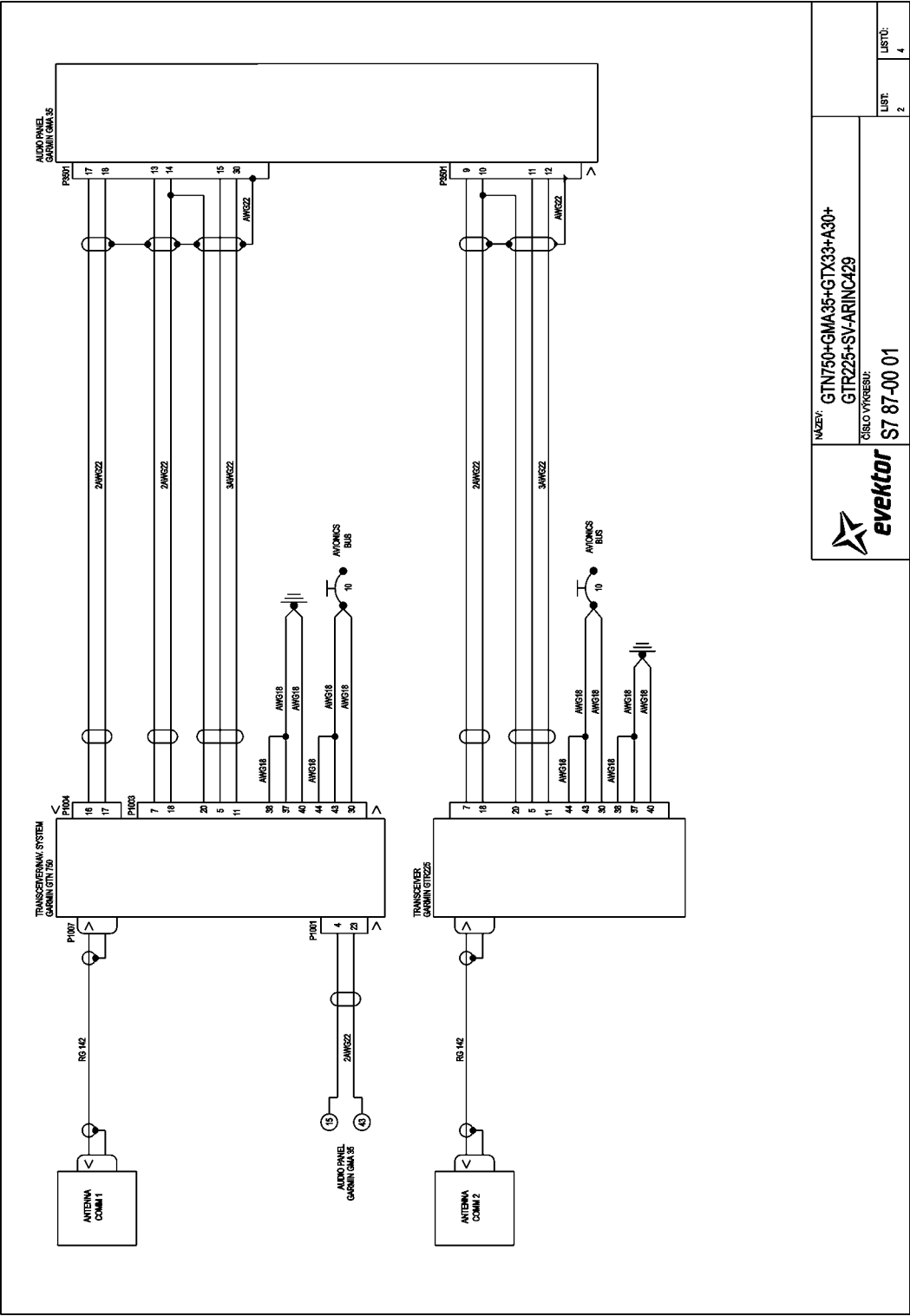




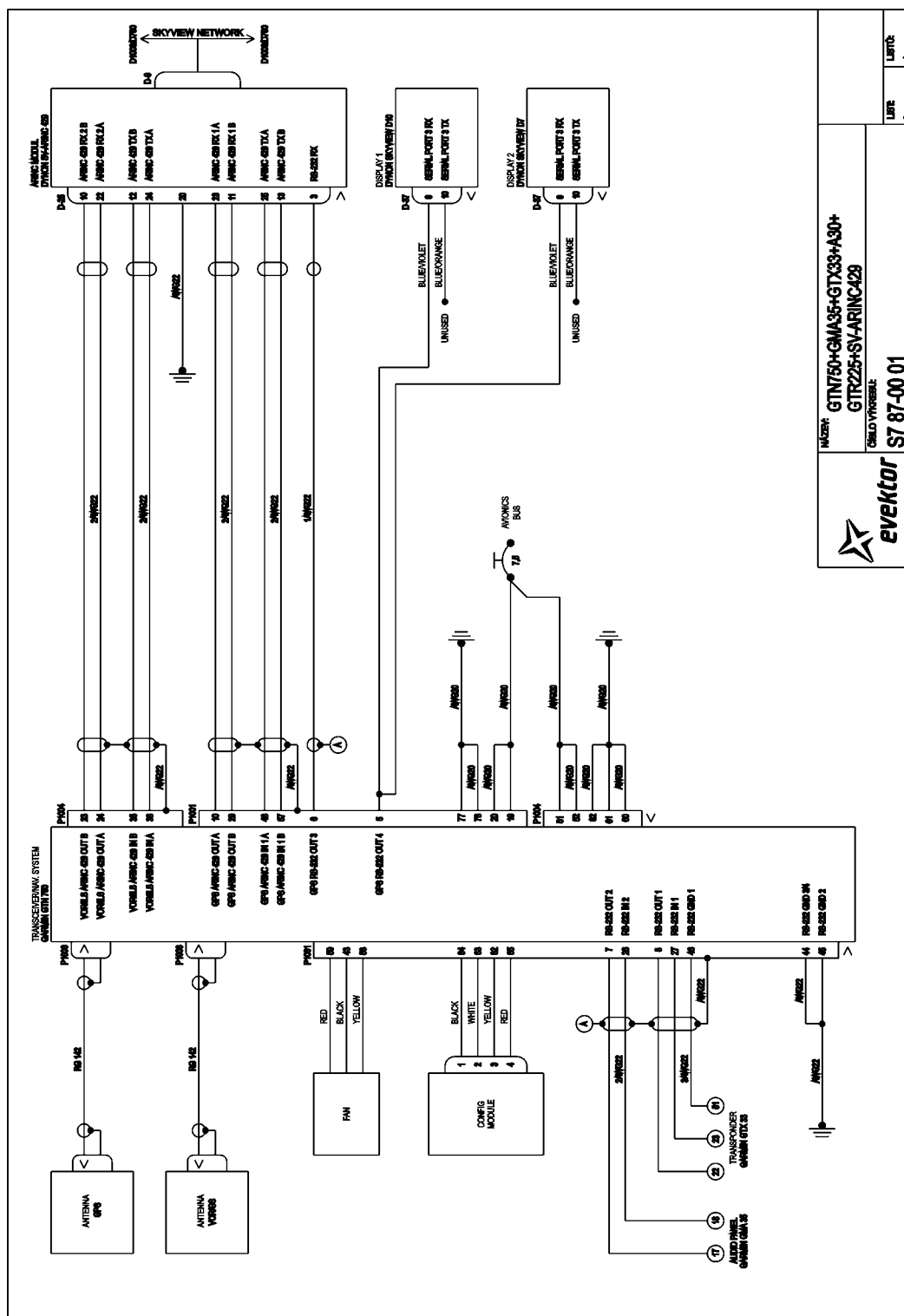


	NÁZEV:	
	GARMIN GPS aera 660 + AIRGIZMOS	
	ČÍSLO VÝKRESU:	
	S7 70-10 01	

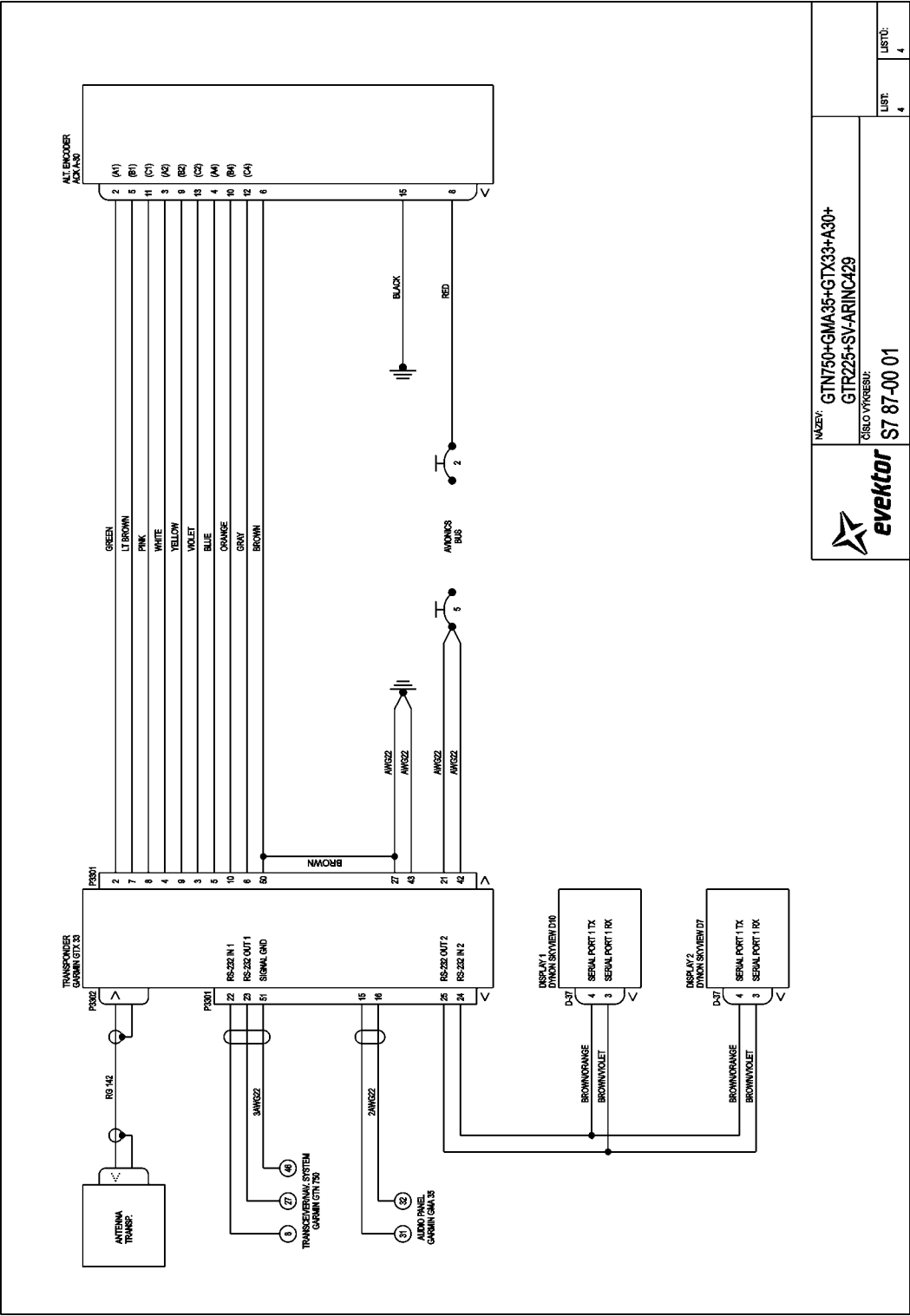




NAZEV: GTN750+GMA35+GTX33+A30+ GTR225+SV-ARINC429	ČÍSLO VÝKRESU: S7 87-00 01	evector	LIST: 2	LISTO: 4



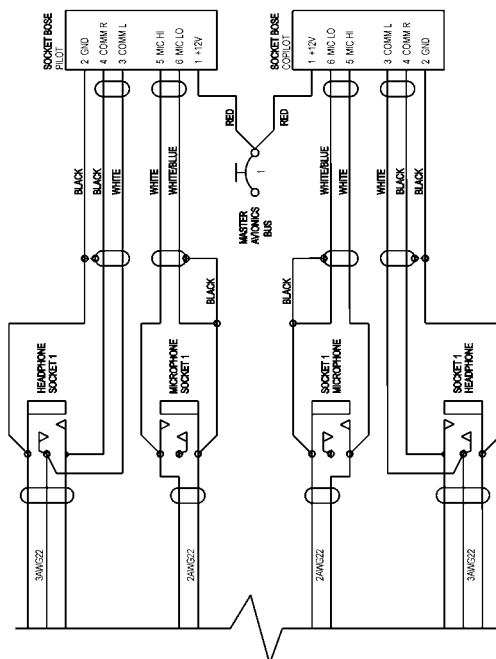
PARTS	GTN750-GMA35+GT33+A30+
	GTR225+SV-ARINC429
CABLES	GTN750-GMA35+GT33+A30+
	GTR225+SV-ARINC429
S7 87-00 01	GTN750-GMA35+GT33+A30+
	GTR225+SV-ARINC429
LIFE	3
	4



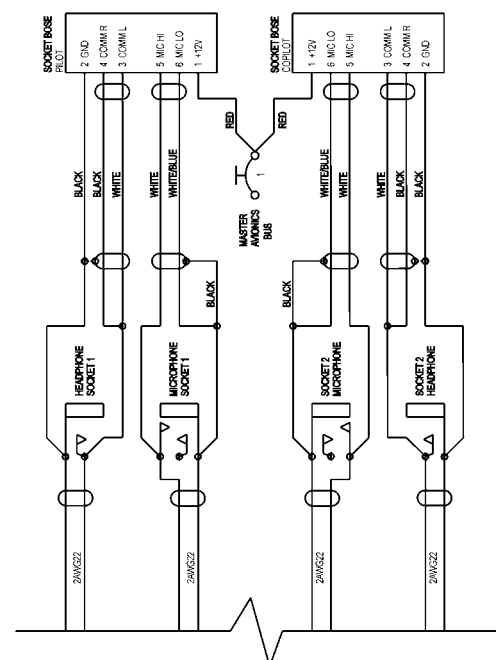
NAZEV: GTN750+GMA35+GTX33+A30+ GTR225+SV-ARINC429	CISLO VÝKRESU: S7 87-00 01	LSTF: 4	LSTO: 4



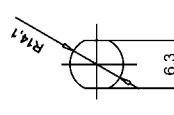
CONNECTION TO THE STEREO INSTALLATION



CONNECTION TO THE MONO INSTALLATION

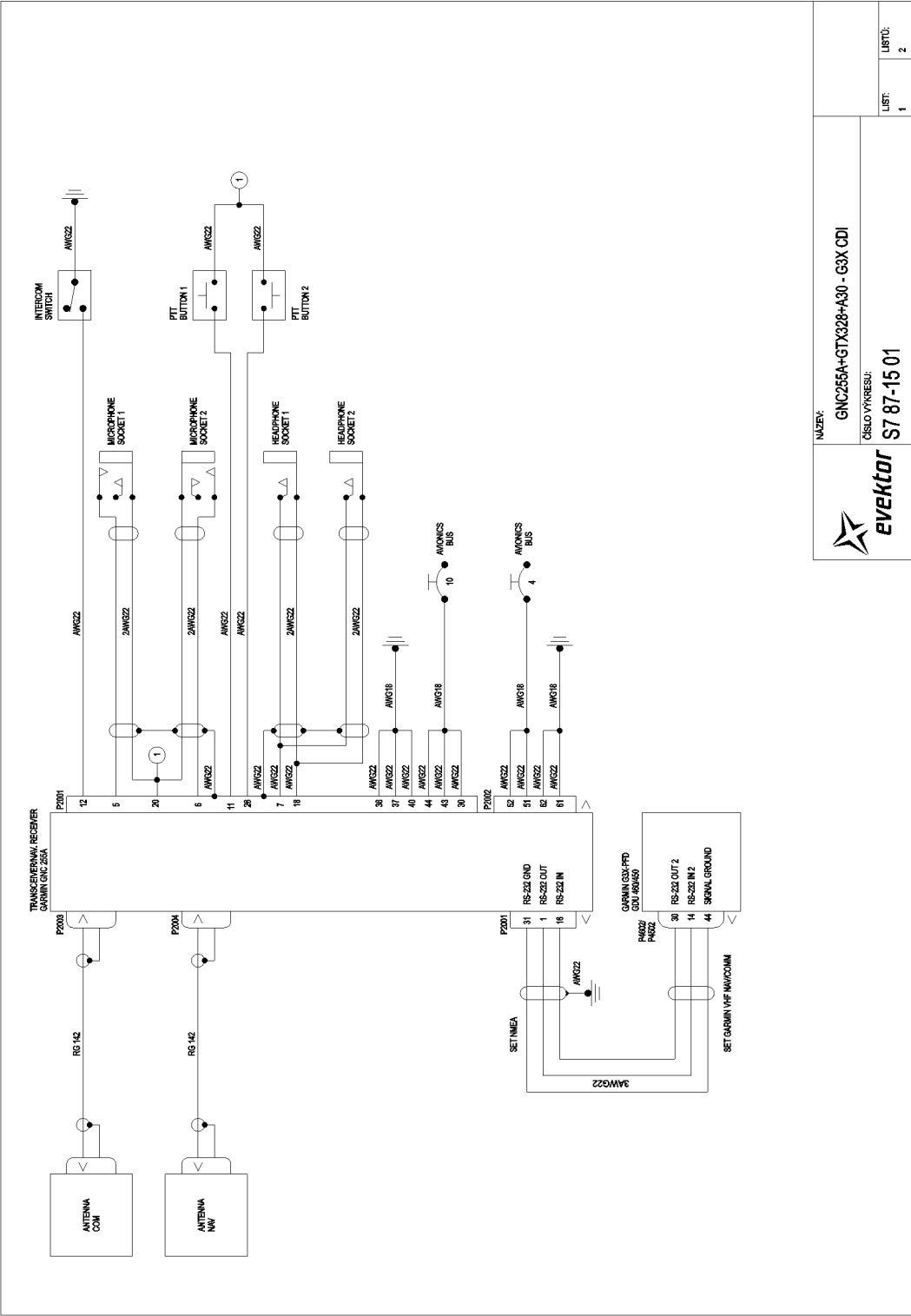


MOUTING HOLE



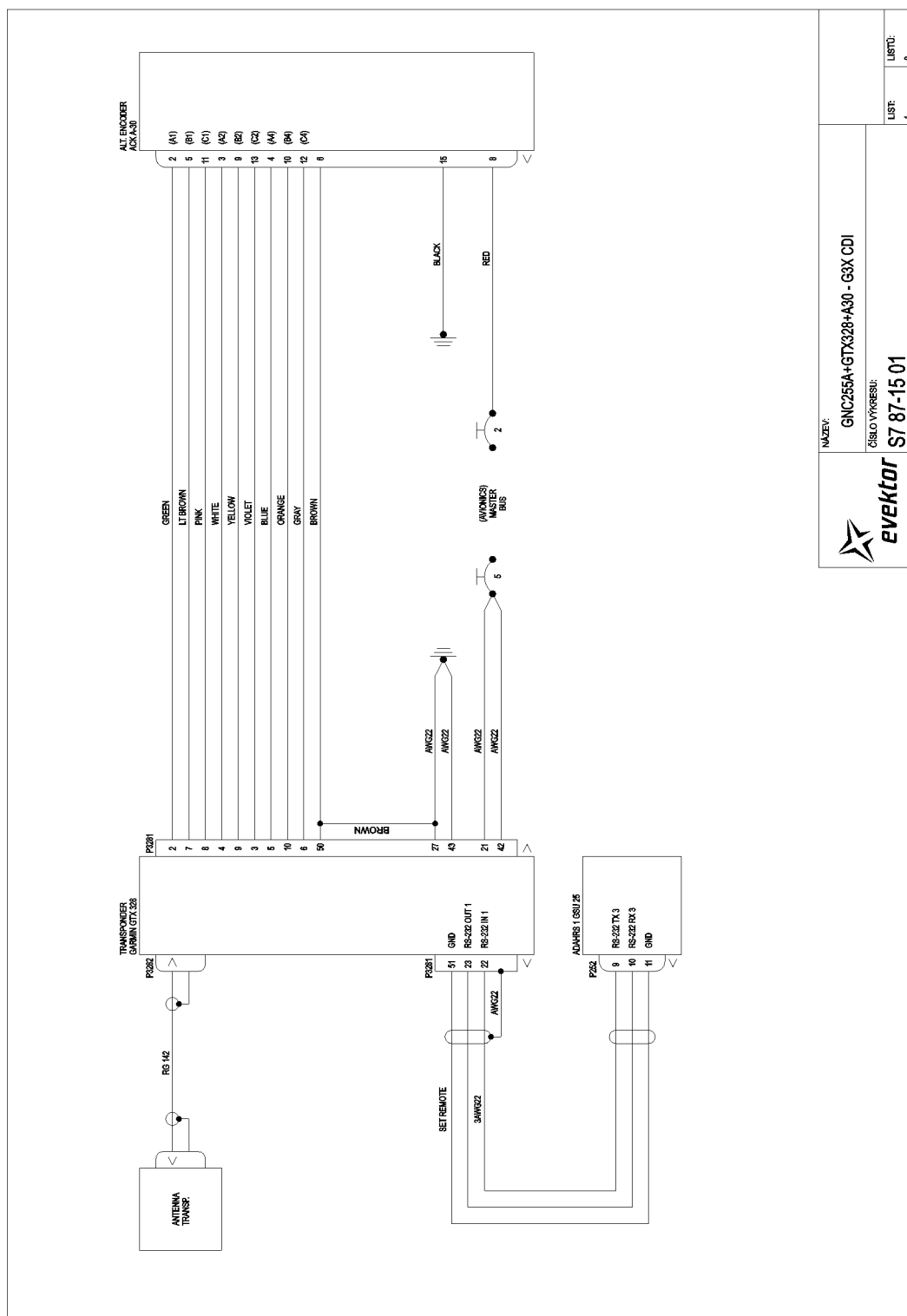
CONNECTION BOSE SOCKET TO THE STANDART AVIATION SOCKET FOR HEADSET

	NÁZEV:	
	BOSE HEADSET - JACKS	
	ČÍSLO VÝROBU:	
	S7 87-12 01	
		

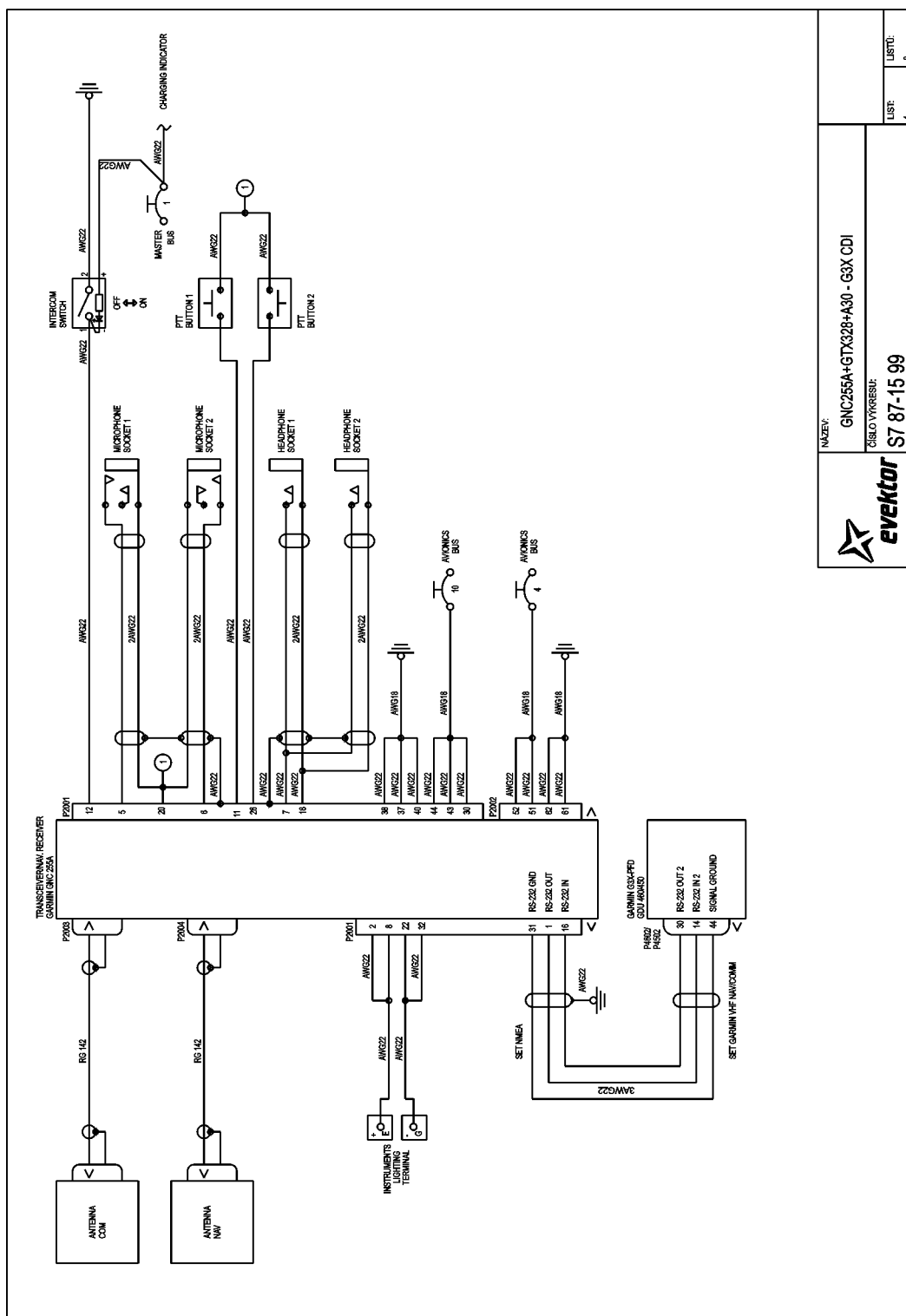


	NAZEV:	GNC255A-GTX328-A30 - G3X CDI	LIST:	1	LISTO:	2
	ČÍSLO VÝKRESU:					





NÁZEV: GNC255A+GTX328+A30 - G3X CDI		LIST: 1		LISTU: 2	
ČÍSLO VÝKRESU: S7 87-15 01					



NAZEV:

GNC255A+GTX328+A30 - G3X CDI

ČÍSLO VÝKRESU:

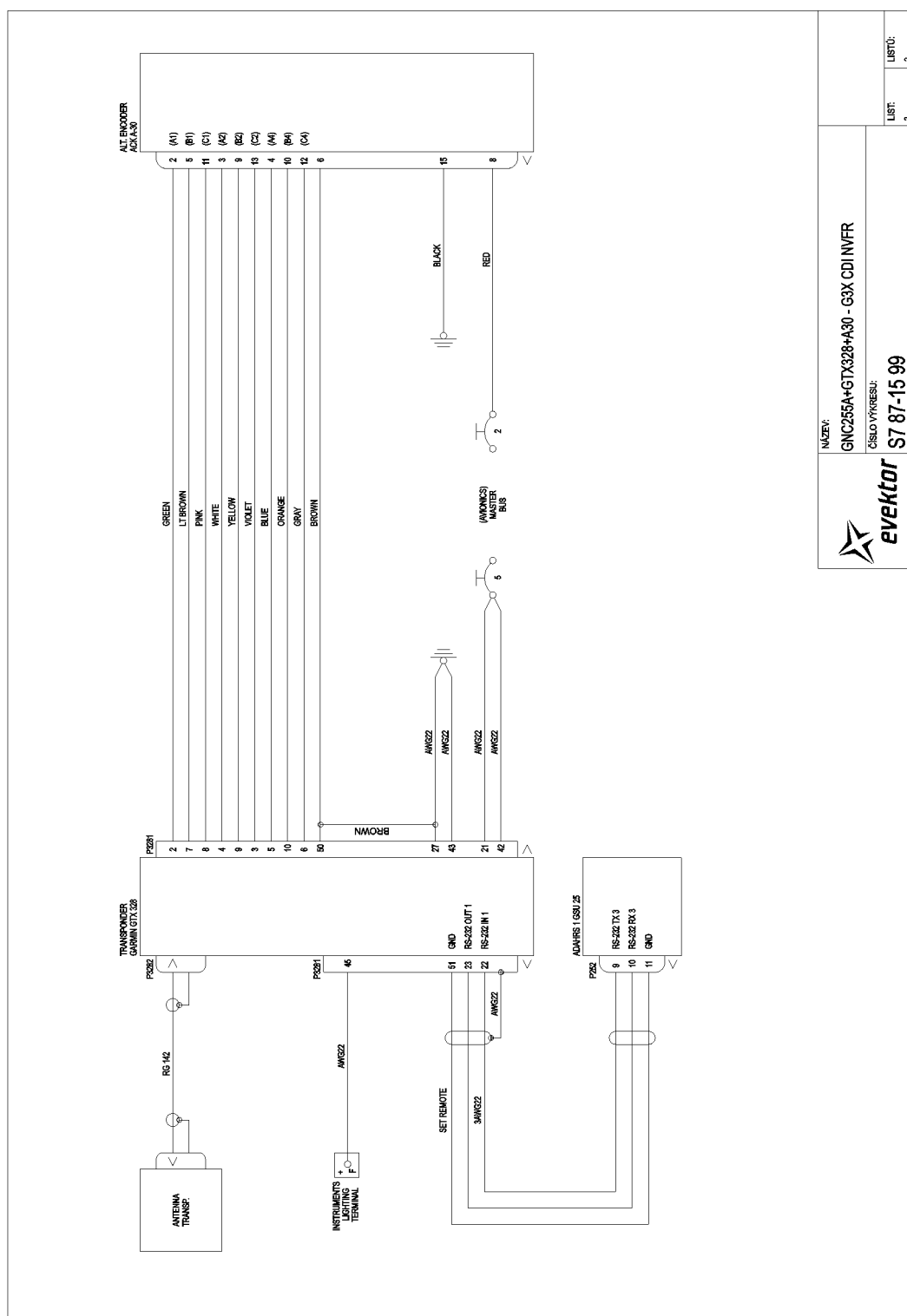
S7 87-15 99

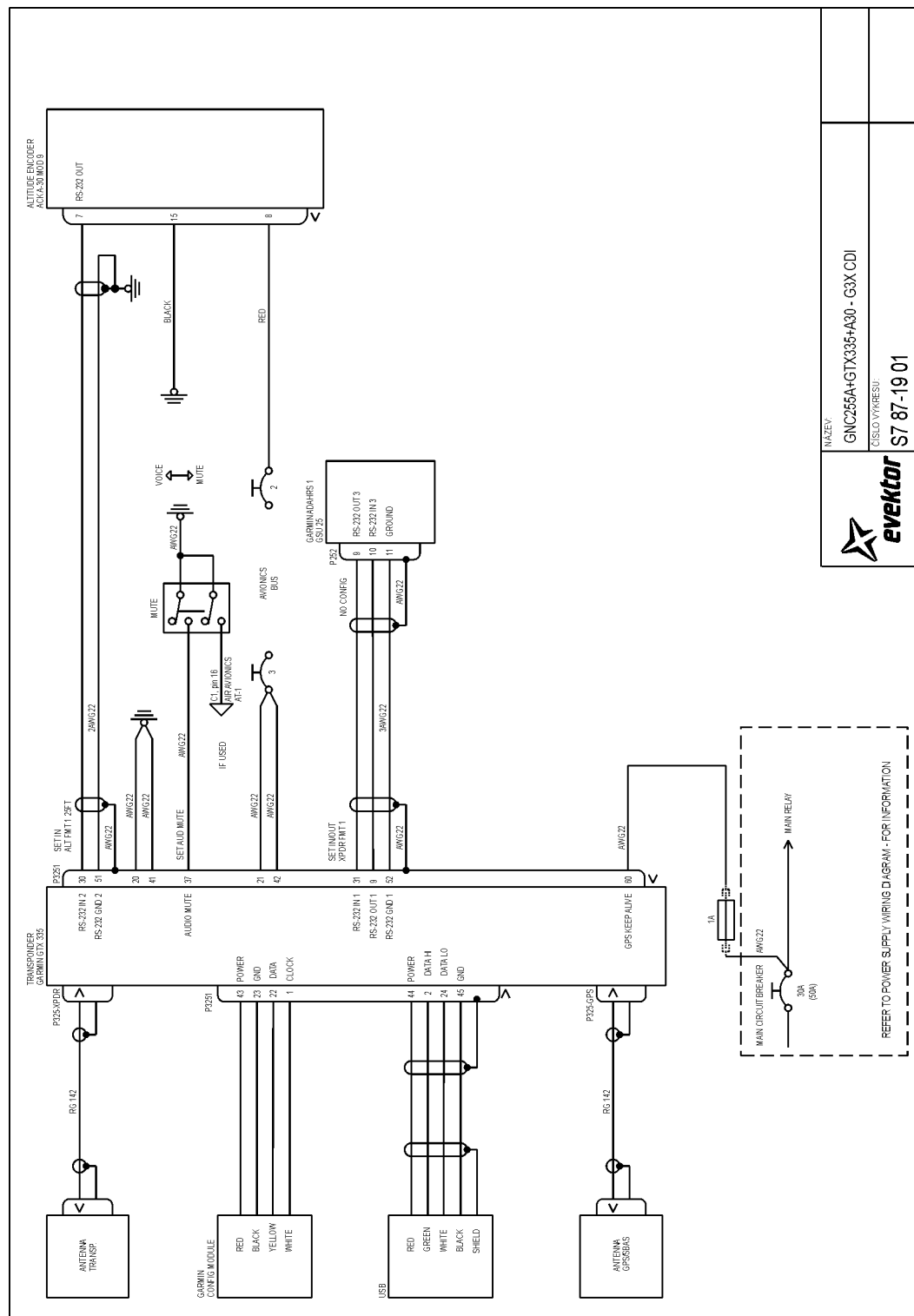


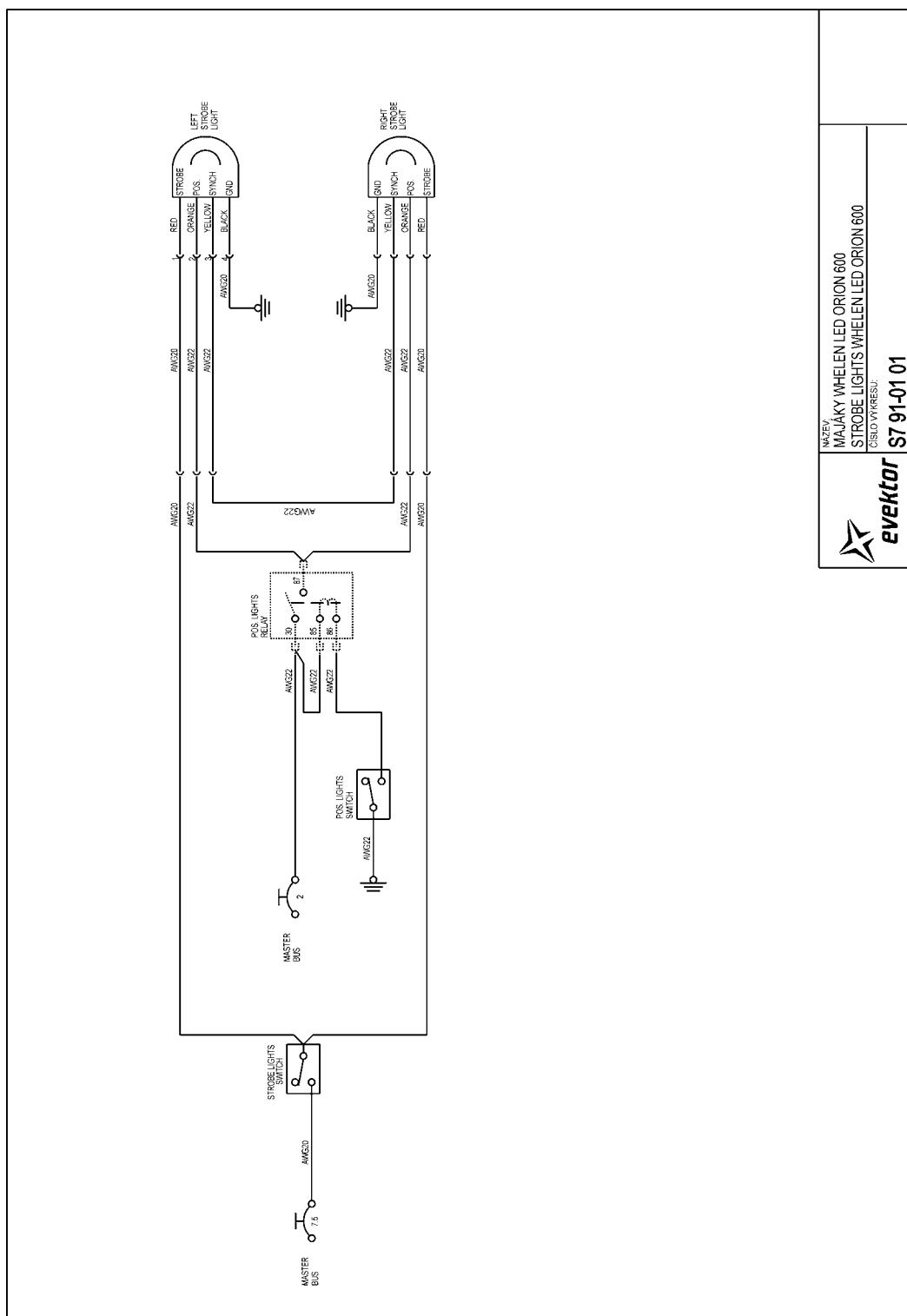
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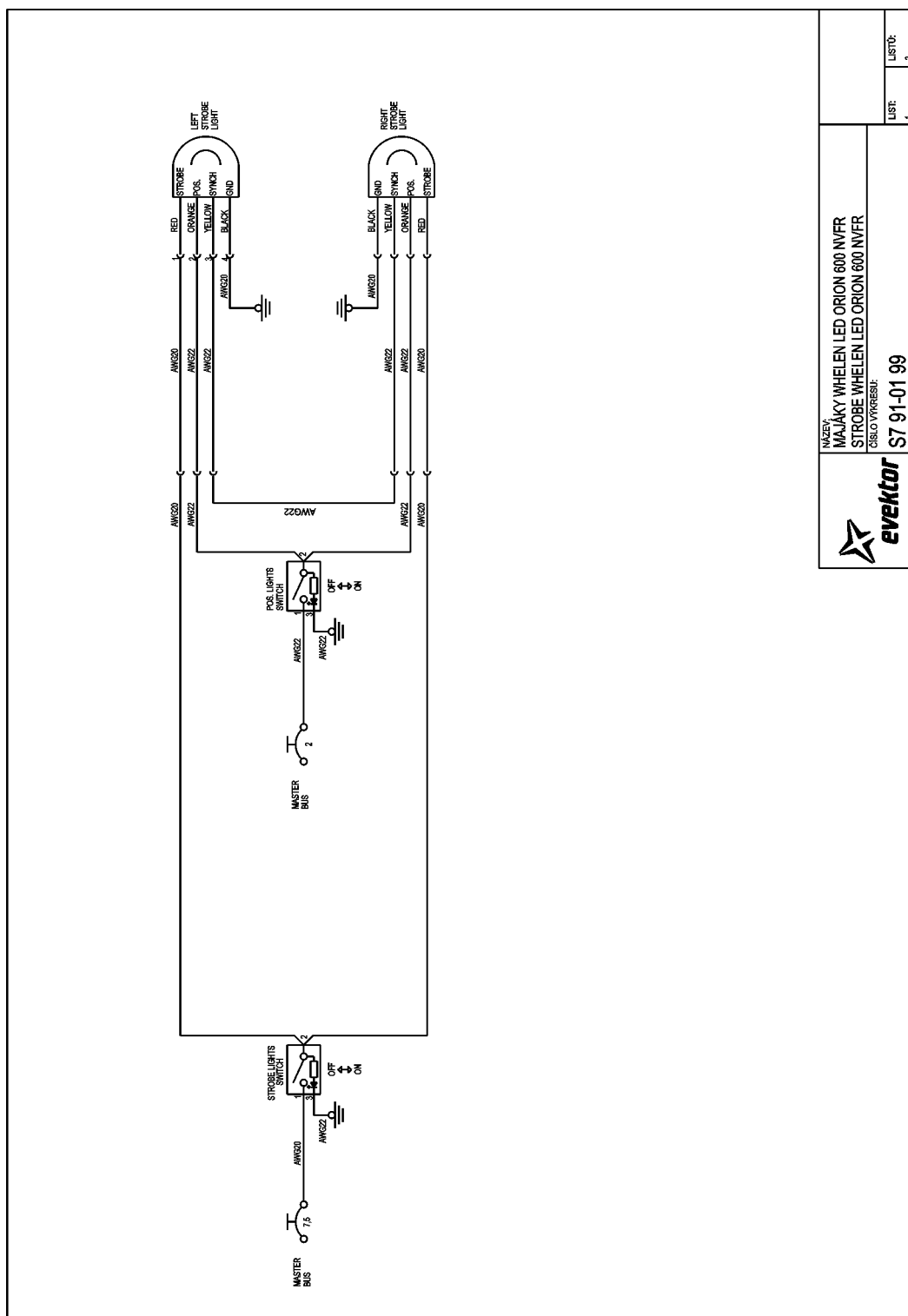
1

2



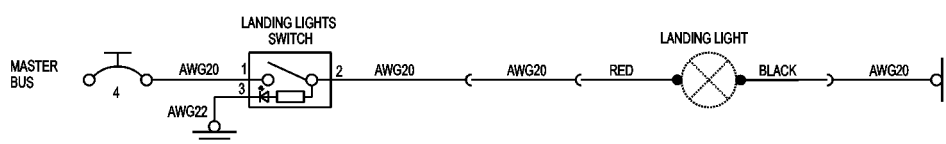




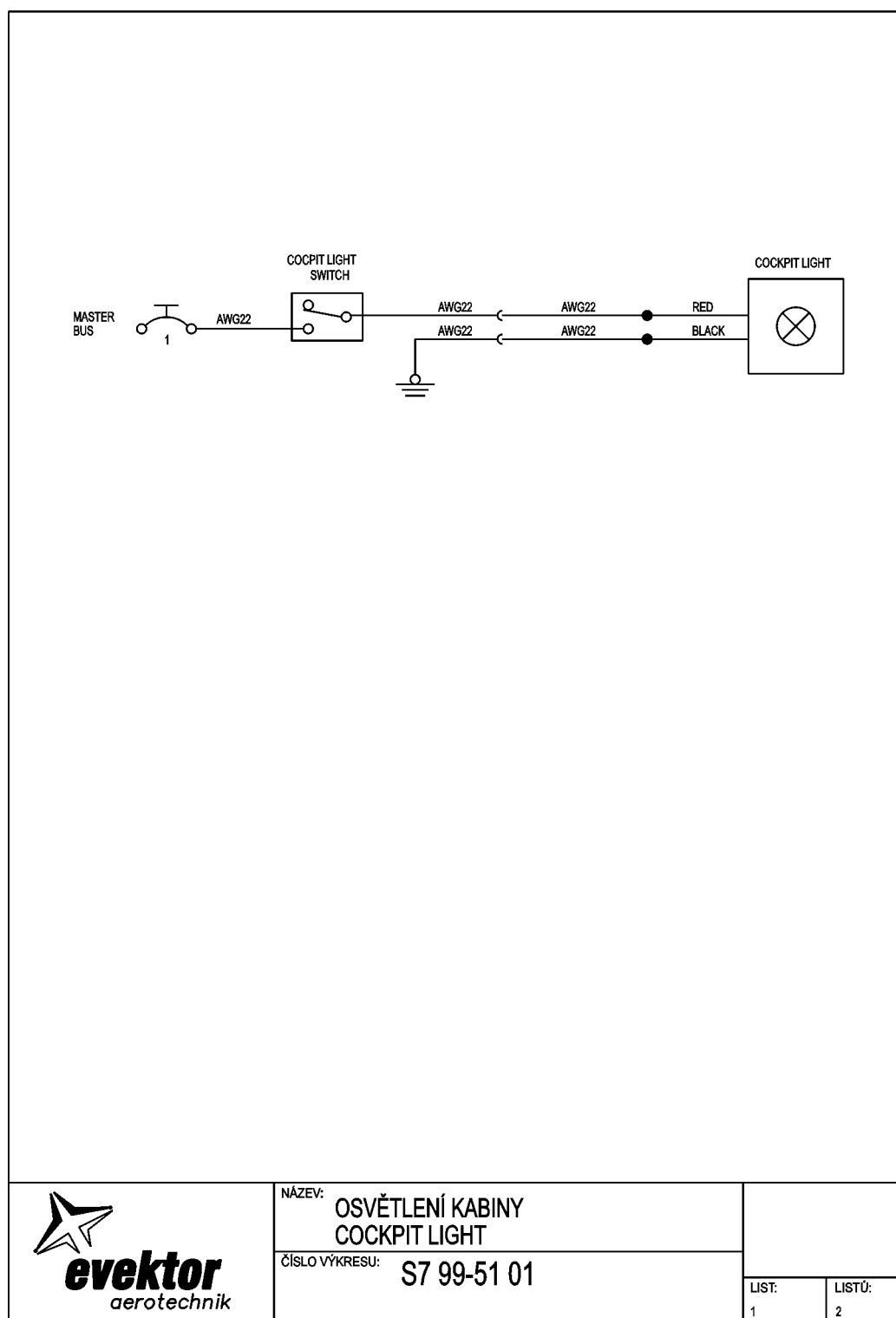


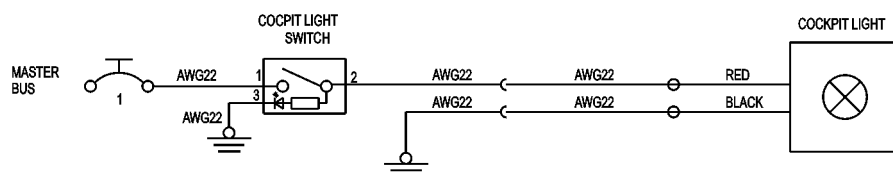


	NÁZEV:		
	REFLEKTOR TAXI WHELEN LED 71141 NVFR TAXIING LIGHT WHELEN LED 71141 NVFR		
	ČÍSLO VÝKRESU:		
	S7 91-10 99	LIST:	LISTŮ:
		1	2

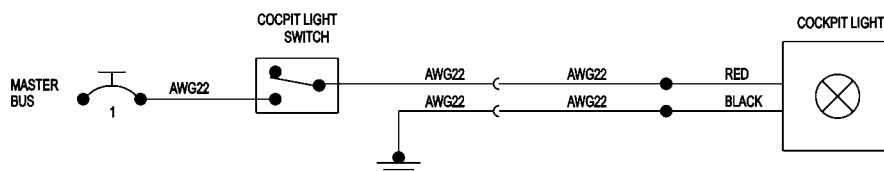


	NÁZEV: REFLEKTOR WHELEN LED 71141 LDG NVFR LANDING LIGHT WHELEN LED 71141 NVFR		
	ČÍSLO VÝKRESU: S7 91-11 99	LIST: 1	LISTŮ: 2



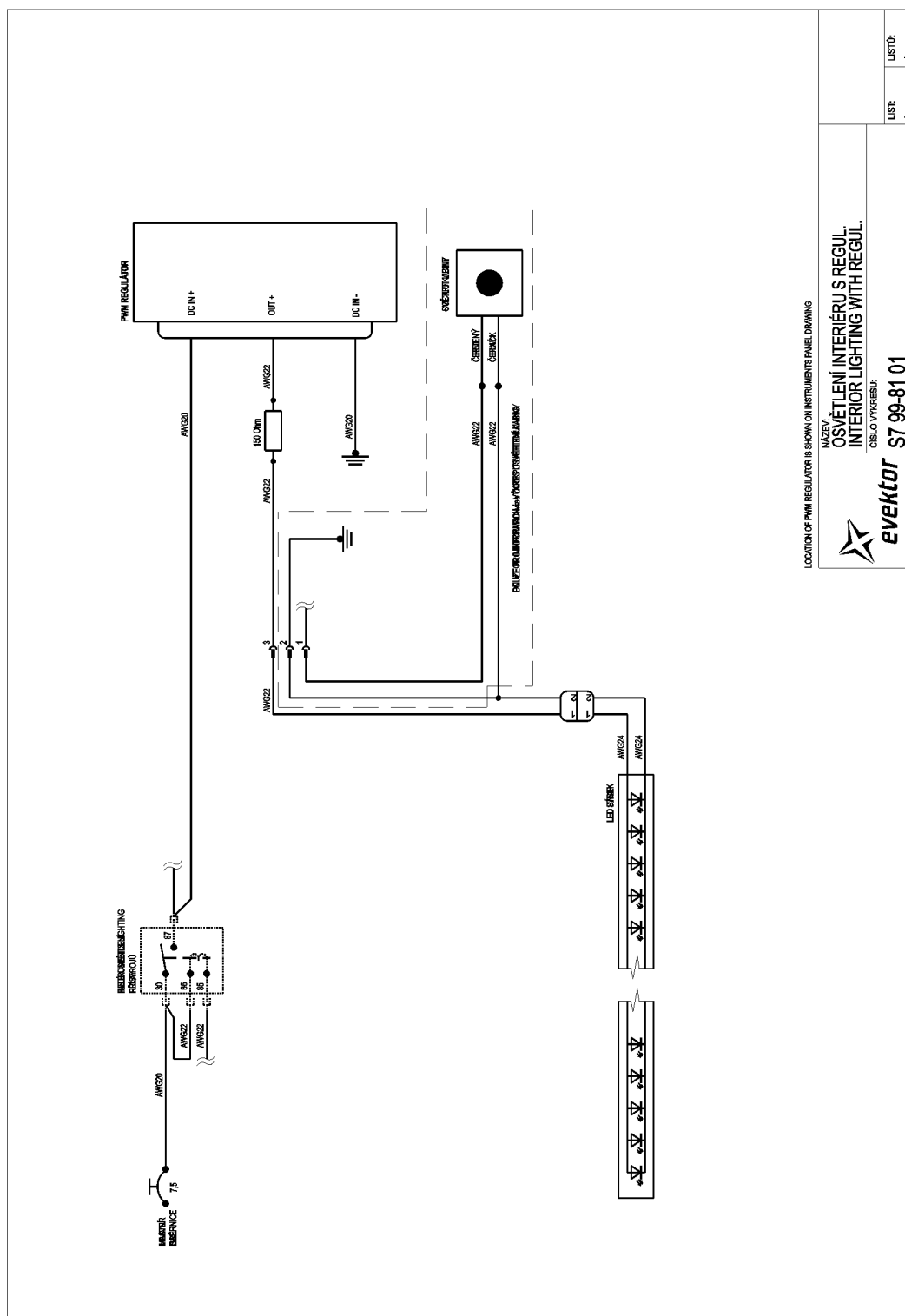


	NÁZEV: OSVĚTLENÍ KABINY NVFR COCPIT LIGHT NVFR		
	ČÍSLO VÝKRESU: S7 99-51-99	LIST: 1	LISTŮ: 2



NÁZEV: OSVĚTLENÍ KABINY (KOGER)
 COCKPIT LIGHT (KOGER)

ČÍSLO VÝKRESU: S7 99-61 01





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CHAPTER

95

SUPPLEMENTS



CHAPTER 95

SUPPLEMENTS

TABLE OF CONTENTS

Title	Section	Page
Supplements	95-00	95-3
1. Control surfaces deflection record		95-3
2. Test flight record		95-4
3. Airplane failure card		95-6



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SUPPLEMENTS

1. CONTROL SURFACES DEFLECTION RECORD

 CONTROL SURFACES DEFLECTION RECORD of SportStar RTC Aircraft			
Serial Number :		Registration :	Order :
		Specified deflection	Actual deflection
Longitudinal control	Distance between neutralized control stick and instrument panel	228±15 mm	
	Distance between control panel and stick at each elevator stop	55±10 mm	
		424±10 mm	
	HTU upward deflection	25°±1°	
	HTU downward deflection	20°±1°	
Lateral control	Distance between neutralized control stick and fuselage side frame	250±10 mm	
	Distance between control stick moved fully to the left/right and fuselage side frame	158±15 mm	
		340±15 mm	
	Left aileron upward deflection	20°±1°	
	Left aileron downward deflection	15°±1°	
	Right aileron upward deflection	20°±1°	
	Right aileron downward deflection	15°±1°	
Rudder control	Rudder left deflection	30°±2°	
	Rudder right deflection	30°±2°	
Wing flaps	Left flap deflection in "TAKEOFF" position	15°±2°	
	Left flap deflection in "LANDING" 1 st position	30°±3°	
	Left flap max. deflection in "LANDING" 2 nd position	50°±3°	
	Right flap deflection in "TAKEOFF" position	15°±2°	
	Right flap deflection in "LANDING" 1 st position	30°±3°	
	Right flap max. deflection in "LANDING" 2 nd position	50°±3°	
	Max. difference between left and right flap deflections	2°	
HTU trim tab	Max. upward trim tab deflection (HTU neutralized)	5°±2°	
	Max. downward trim tab deflection (HTU neutralized)	25°±5°	
	Neutral trim tab position (HTU neutralized, trim tab control lever in neutral position)	- 2°±2°	
Aileron electric trim tab	Max. upward trim tab deflection (aileron neutralized)	25°±3°	
	Max. downward trim tab deflection (aileron neutralized)	25°±3°	
Control Surfaces Deflection compliance: YES - NO Message for the pilot :			
Carried out by :		Signature :	Date :

2. TEST FLIGHT RECORD

 TEST FLIGHT RECORD of SportStar RTC Aircraft			
TAKE-OFF WEIGHT 600 kg / 1320 lbs			Page: 1
Model: SportStar RTC	S/N:	Registration:	
Engine: Rotax 912 ULS2	S/N:	Hours flown:	
Prop.: Klassic 170/3/R	S/N:	Order:	
RESULTS: (Airspeeds are IAS)			
Regime		Test	
Meteorological conditions		On ground pressure (QNH)	
		On ground temperature (QMU)	
		Wind direction/velocity (°/knots)	
Engine check	Full throttle	Engine max. (rpm)	
		Oil temperature min. 50°C (122°F)	
		Coolant temp. max. 120°C (248°F)	
		Oil pressure 2,0-5,0 bar (29-73 psi)	
	Ignition check	4000 rpm R 912 ULS RPM drop max 300 rpm with R or L off (max. 115 rpm difference)	L: — R: —
	Idle	Aprox. 1400 rpm	
Take-off and climbing to 3300 ft (1000 m ISA) IAS = 120 km/h (65 KIAS, 75 mph)		Engine speed max. 5500 rpm	
		Oil temperature max. 130°C (266°F)	
		Coolant: max. 135°C (275 °F) Evans coolant max. 120°C (248°F) 50/50 glycol coolant	
		Oil pressure 2,0-5,0 bar (29-73 psi)	
		Fuel pressure 0,15-0,5 bar (2,2-7,26 psi)	
		Time of climb 1000-3300 ft ISA (300-1000 m ISA)	
Stalling speed at idle 600 kg km/h (KIAS, mph)		Landing config. V _{SO} (flaps fully extended) V _{SO} : 72 km/h / 39 KIAS / 45 mph	
		Cruise config. V _{SI} (flaps retracted) V _{SI} : 77 km/h / 42 KIAS / 48 mph	
Steep turns		max. 45°	
Never exceed speed V _{NE}		V _{NE} = 270 km/h, 146 KIAS, 168 mph IAS	
		Engine speed max. 5800 rpm	
Cruising speed at engine speed Altitude 2000 ft (600 m ISA)		Airspeed at 5000 rpm: km/h (KIAS, mph)	
		Oil temp. 90-110°C (190-230°F)	
		Coolant: max. 135°C (275 °F) Evans coolant max. 120°C (248°F) 50/50 glycol coolant	
		Oil pressure 2,0-5,0 bar (29-73 psi)	
		Fuel pressure 0,15-0,5 bar (2,2-7,26 psi)	
Max. horizontal speed Altitude 2000 ft (600 m ISA)		Airspeed at 5750 rpm: km/h (KIAS, mph)	
		Oil temp. 90-110°C (190-230°F)	
		Coolant: max. 135°C (275 °F) Evans coolant max. 120°C (248°F) 50/50 glycol coolant	
		Oil pressure 2,0-5,0 bar (29-73 psi)	
		Fuel pressure 0,15-0,5 bar (2,2-7,26 psi)	
Landing		Touch-down speed km/h (KIAS, mph)	

Date: _____ Pilot's signature: _____
Report: Flight Test Results comply with the type/model specification



TEST FLIGHT RECORD of SportStar RTC Aircraft

TAKE-OFF WEIGHT 600 kg / 1320 lbs			Page: 1	Pages: 1
Model: SportStar RTC	S/N:	Registration:		
Engine: Rotax 912 ULS2	S/N:	Hours flown:		
Prop.: WOODCOMP KW-31	S/N:	Order:		
RESULTS: (Airspeeds are IAS)				
Regime		Test		
Meteorological conditions		On ground pressure (QNH)		
		On ground temperature (QMU)		
		Wind direction/velocity (°/knots)		
Engine check	Full throttle	Engine max. (rpm)		
		Oil temperature min. 50°C (122°F)		
		Coolant temp. max. 120°C (248°F)		
		Oil pressure 2,0-5,0 bar (29-73 psi)		
	Ignition check	4000 rpm R 912 ULS RPM drop max 300 rpm with R or L off (max. 115 rpm difference)	L - R -	
	Idle	Aprox. 1400 rpm		
Take-off and climbing to 3300 ft (1000 m ISA) IAS = 120 km/h (65 KIAS, 75 mph)		Engine speed max. 5500 rpm		
		Oil temperature max. 130°C (266°F)		
		Coolant: max. 135°C (275 °F) Evans coolant max. 120°C (248°F) 50/50 glycol coolant		
		Oil pressure 2,0-5,0 bar (29-73 psi)		
		Fuel pressure 0,15-0,5 bar (2,2-7,26 psi)		
		Time of climb 1000-3300 ft ISA (300-1000 m ISA)		
Stalling speed at idle 600 kg km/h (KIAS, mph)		Landing config. V _{SO} (flaps fully extended) 76 km/h / 41 KIAS / 47 mph		
		Cruise config. V _{SO} (flaps retracted) 79 km/h / 43 KIAS / 49 mph		
		V _{SI}		
Steep turns		max. 45°		
Never exceed speed V _{NE}		V _{NE} = 270 km/h, 146 KIAS, 168 mph IAS		
		Engine speed max. 5800 rpm		
Cruising speed at engine speed: Altitude 2000 ft (600 m ISA)		Airspeed at 5000 rpm: km/h (KIAS, mph)		
		Oil temp. 90-110°C (190-230°F)		
		Coolant: max. 135°C (275 °F) Evans coolant max. 120°C (248°F) 50/50 glycol coolant		
		Oil pressure 2,0-5,0 bar (29-73 psi)		
		Fuel pressure 0,15-0,5 bar (2,2-7,26 psi)		
Max. horizontal speed Altitude 2000 ft (600 m ISA)		Airspeed at 5750 rpm: km/h (KIAS, mph)		
		Oil temp. 90-110°C (190-230°F)		
		Coolant: max. 135°C (275 °F) Evans coolant max. 120°C (248°F) 50/50 glycol coolant		
		Oil pressure 2,0-5,0 bar (29-73 psi)		
		Fuel pressure 0,15-0,5 bar (2,2-7,26 psi)		
Landing		Touch-down speed km/h (KIAS, mph)		

Date:

Pilot's signature:

Report: Flight Test Results comply with the type/model specification

3. AIRPLANE FAILURE CARD

		SPORTSTAR RTC AIRPLANE FAILURE 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 following address: Evektor, spol. s r.o., Office of Airworthiness, 686 04 Kunovice- Letecká 1008, Czech Republic. By sending us the card, you provide us with valuable data which enable us to improve reliability of your airplane as well.			
Reference Information			
1. Organization name:		2. Organization country:	
4. Name of submitter		5. Telephone number:	
6. E-mail address		3. Organization approval Reference:	
7. Internal Reference number:		8. Issue Number:	
9. Date of report:		11. Report Status:	
10. Report Type ☐ Initial ☐ Follow-up		Initial Report Date: ☐ Open ☐ Closed	
12. Parties Informed ☐ State of Registry ☐ Design Approval Holder(s) ☐ Operator(s) ☐ NAA ☐ CAMO			
13. Name(s) of Design Approval Holder(s) informed (if relevant)			
Obligatory Data			
Airplane Information			
14. Airplane Manufacturer and Type/Model:		15. Registration mark:	
16. Airplane Serial No.:		17. Operator:	
18. Owner:		19. Airplane total hours:	
20. Airplane total cycles:			
Occurrence Summary			
21. Occurrence Title:		22. Date/Place of Finding:	
23. ATA Chapter:		24. Location:	
25. The failure has been detected at:		☐ a) Manufacturing	
		☐ i) Descent	
		☐ b) Schedule Maintenance	
		☐ j) Approach	
		☐ c) Non-schedule Maintenance	
		☐ k) Landing	
		☐ d) Standing	
		☐ l) Manoeuvring	
☐ e) Taxi		☐ m) Unknown	
☐ f) Take-off		☐ n) Other, Specify	
☐ g) Climb			
☐ h) En-route			

26. Cause of occurrence: (multiple choice is possible)	☐ a) Design	☐ h) Humans factors					
	☐ b) Production	☐ i) Operational					
	☐ c) Maintenance	☐ j) Unknown					
	☐ d) Repair	☐ k) Other, Specify					
	☐ e) Fatigue						
	☐ f) Corrosion						
	☐ g) Unapproved parts						
27. Consequences for operation:	☐ a) No consequences	☐ d) Flight with damaged aggregates					
	☐ b) Airplane put out of operation	☐ e) Emergency landing					
	☐ c) Airplane returned from take-off	☐ f) Other					
28. Failure description:							
29. Occurrence Attachments:							
Component Information (Identification of the damage part)							
Component Manufacturer Name and Country	Part Number	Serial Number	Date of manufacture	(E)TSO Reference	Illustrated Part Catalogue (IPC) Name	Component total time(hours)/cycles from new	Component total time(hours)/cycles since overhaul
30. Nature of failure, defect or malfunction:					31. Defect Rectification, Corrective Actions (Completion by TC/STC, Type Approval holder only):		
Additional Data							
32. Claimed:		☐ YES	☐ NO	Number of claim:			
33. Order of spare parts:		☐ YES	☐ NO				
Item	Name of the part			Catalogue part number		Number of pieces	

Every operator and holder of the Maintenance Certificate is obliged to report the following occurrences to the holder of the Type Certificate or the Supplementary Type Certificate and to the NAA:

- a) Fire caused by failure, defect or incorrect activity
- b) Failures, defects or inappropriate activity of the engine output system which will cause damage to the engine, adjoining structure of the airplane or its equipment.
- c) Accumulation and circulation of poisonous or noxious gases in the cockpit or in the passenger compartment.
- d) Incorrect function, failure or defect of the propeller control system.
- e) Failure of propeller structure, propeller blade or carrying rotor head.
- f) Flammable liquid leakage in the area where the inflammable sources can usually be expected.
- g) Braking system failure caused by structural or material failure during operation.
- h) Essential primary defect or carrying airplane structure failure caused by fatigue, insufficient strength, corrosion etc.
- i) Any, unusual vibration or buffeting caused by failure or defect of the structure, possibly by incorrect activity, failure or defect of the system.
- j) Failure of the engine structure and engine shutdown in flight.
- k) Failure, defect or incorrect activity of each system of the structure or airplane control which prevents from usual controlling the airplane or deteriorates its flight characteristics.
- l) Total loss of two systems of electric and hydraulic energy sources during one flight of the airplane.
- m) Failure or incorrect activity of more than one instrument indicating flight attitude, height or flight speed during one flight.

Explanation:

- 1. Organisation Name** – Name of the reporting organisation or person (mandatory field).
- 2. Organisation Country** – Pick the appropriate value in the embedded list of Countries (mandatory field).
- 3. Organisation Approval Reference** – EASA or Others Approval Reference of the reporting organisation, when relevant, e.g. **EASA.21J.xxxx**, **EASA.45.xxxx** – or a national Approval Reference of the reporting organisation.
- 4. Name of submitter** – The point of contact within the reporting organisation for this occurrence.
- 5. Telephone number** – The telephone number, including country code, e.g. +49 221 8990 WXYZ.
- 6. E-mail address** – Complete e-mail address.
- 7. Internal Reference number** – The internal reference number for this occurrence as assigned by the reporting organisation (mandatory field).
- 8. Issue Number** – The issue number of the present report, when the reporting organisation manages updated reports through issue numbers.
- 9. Date of the Report** – The date of the present occurrence report.
- 10. Report Type** – This block contains information on whether this report is an initial notification or a follow-up report:
Initial – Mark this box if the report is the first notification of the occurrence to EASA or Others.
Follow-up – Mark this box in case the report is a follow-up of an earlier notification. Please indicate the date of the initial report.
- 11. Report Status (of the reporting organisation)** – If relevant, indicate whether from the point of view of the reporting organisation, the occurrence status is Open or Closed. A "closed" status would mean that no further investigation, analysis or corrective actions are planned, at the level of the reporting organisation.
- 12. Parties Informed** - Indicate who has been informed of this occurrence: State of Registry, Design Approval Holder(s), Operator (or Owner), NAA (Competent Authority of the Reporting Organisation), and/or the CAMO (Continuing Airworthiness Management Organisation, as defined in Part M Subpart G).
- 13. Name(s) of Design Approval Holder(s) informed** – When relevant, indicate here the name(s) of all design approval holders (aircraft/engine/propeller (S)TC Holder, equipment approval holder) that have been informed.
- 14. Airplane Manufacturer and Type/Model** – Pick the appropriate value in the embedded list.
- 15. Registration mark** – If the aircraft is registered then this mark will be the registration mark. If the aircraft is not registered then this will be such a mark that is accepted by the competent authority.
- 16. Airplane Serial number** – The serial number of the aircraft.
- 17 and 18. Operator/Owner** – The name of the Operator or the owner of the involved aircraft, if applicable.
- 19 and 20. Airplane total hours/cycles** – This block should contain information on the usage details of the aircraft in total time (hours) and total cycles. The total time is the elapsed calendar time in hours since new.
- 21. Occurrence Title** – A title that summarises the narrative of the occurrence. The title should be

explicit, without acronyms, and could be structured following below scheme (from general to detailed):

System Name – Sub-system or Sub-sub-system name – Occurrence summary

22. Date/flight ordinal number (f.o.n.) of finding – The date and flight ordinal number of occurrence or finding. The flight ordinal number means flight ordinal number in a given day. (for example 06.01.2012/3).

23. ATA Chapter – The ATA Chapter (2 digits) describing which area predominantly contributes to the occurrence.

24. Location – The geographical location of the occurrence

25. Detection phase – One of the boxes in this block should be marked to indicate when the detection of the failure, malfunction, defect or other occurrence took place.

26. Cause of occurrence – Mark the box(es) that best summarises the current knowledge available on the cause of occurrence. Multiple choice is possible.

27. Consequences for operation - Mark the box(es) that best summarises the current knowledge available on the consequences for operation

28. Failure description - This block should contain detail information about failure occurred.

29. Occurrence Attachments – This block should contain list of attachments (e.g. figures, ...)

Component Manufacturer Name and Country – The name and country (Pick the appropriate value in the embedded list of Countries) of the component manufacturer.

Part Number – The Part Number of the component. Specify also the amendment level, when relevant.

Serial Number – The serial number of the component.

Date of manufacture– The date of manufacture of the component.

(E)TSO Reference – The reference of the TSO or ETSO approval of the component, or the reference of another national equipment approval, when relevant.

Illustrated Part Catalogue (IPC) Name – The name of the component, as provided in the Illustrated Part Catalogue or other manufacturer documentation.

Component total time (hours)/cycles from new and since overhaul – This block should contain information on the usage details of the component in total time (hours) and total cycles. The total time is the elapsed calendar time in hours since new or since overhaul.

30. Nature of failure, defect or malfunction - This block should contain detail information about failure occurred.

31. Defect Rectification, Corrective Actions (Completion by TC/STC, Type Approval holder only) - This block should contain detail information about corrective actions.

32. Claimed – Encircle claim of failure components YES - NO

Claimed Number – Actual claimed number

33. Order of spare parts - Encircle claim of spare parts order YES - NO