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AIRCRAFT MAINTENANCE AND INSPECTION PROCEDURES FOR

Sport Star

LIGHT SPORT AIRCRAFT

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Serial Number:

Registration:

Owner: .....

.....

.....

The manufacturer invites suggestions and reminders concerning this manual, and appreciates proposals for corrections.
We invite you to share your experiences with us during operation of your

1. GENERAL

1.1 Information source

Aircraft manufacturer issues information and mandatory bulletins to ensure continued airworthiness of the Light Sport Aircraft (LSA). The bulletins are provided to all known owners and dealers of the SPORTSTAR aircraft.

All bulletins may be downloaded from:
http://www.evektor.cz/at/en/index.htm#sportstar

You can also contact us via mail, telephone, fax or e-mail mentioned on the title page.

1.2 Record of revisions

Any revisions or amendments to these instructions shall be issued in the form of bulletins with attached new pages. It is in the interests of every user to enter such revision into the table of revisions and to replace the existing page by the new one. The revised or corrected text shall be indicated by a vertical line on the page fore-edge and the page shall bear a revision number and date of its issue.

Rev. No.	Affected Section	Affected Pages	Date of Issue	Bulletin No.	Date of Approval	Date Inserted	Signature
1	1, 2	1-3, 1-4, 2-2	Apr 24, 2006	-	-		

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1.4 Contents

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2. TECHNICAL DESCRIPTION

2.1 Basic and general information

The ***SPORTSTAR*** is a single engine, all metal, low-wing monoplane of semimonocoque construction with two side-by side seats. The aircraft is equipped with fixed, tricycle landing gear. The standard power plant consists of the four-cylinder, 4 stroke, ROTAX 912 UL (80 hp) or optionally ROTAX 912 S resp ULS (100 hp) engine and on-ground adjustable, 3 bladed, composite, WOODCOMP KLASSIC 170/3/R prop.
For concrete engine type see Supplement No. 1 – Description of actual airplane.

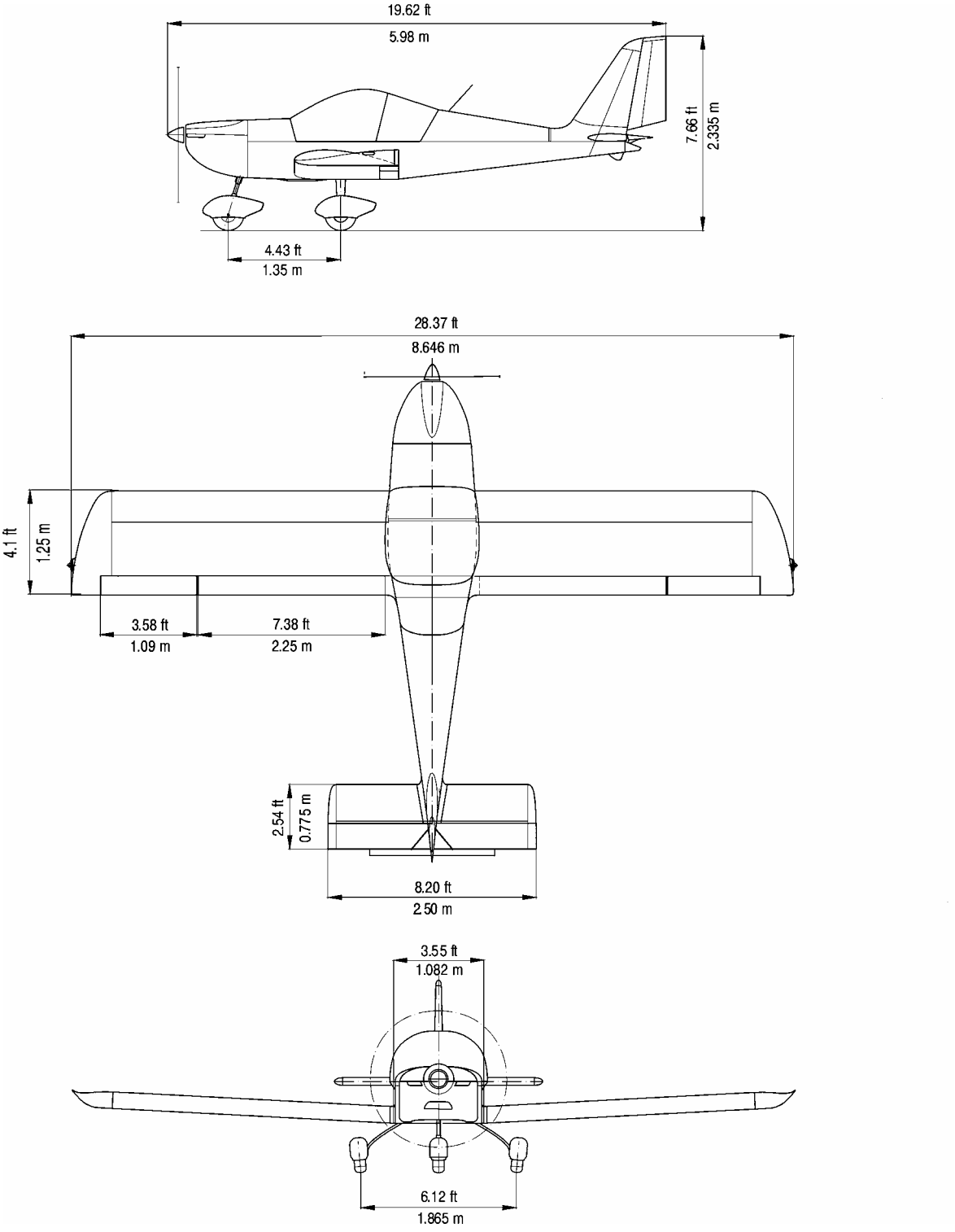
2.1.1 Designation

SPORTSTAR is an aircraft especially intended for recreational and cross-country flying with a limitation to non-aerobatic operation.

2.2 Basic technical data

2.2.1 Airplane views

2.2.2 Three-view drawing



2.2.3 Basic dimensions

Wing		
span	28.37 ft	8.646 m
area	112.7 sq.ft	10.47 sq.m
MAC	4.1 ft	1.25 m
Loading	10.76 lbs/sq.ft	52.53 kg/sq.m
Aileron		
area	2.62 sq.ft	0.25 sq.m
Flap		
area	5.60 sq.ft	0.52 sq.m
Fuselage		
length	19.62 ft	5.98 m
width	3.55 ft	1.082 m
height	7.66 ft	2.335 m
cockpit canopy max. width	3.87 ft	1.180 m
HTU		
span	8.20 ft	2.5 m
HTU area	20.88 sq.ft	1.94 sq.m
elevator area	8.4 sq.ft	0.8 sq.m
VTU		
height	4.07 ft	1.24 m
VTU area	10.76 sq.ft	1.0 sq.m
rudder area	4.31 sq.ft	0.4 sq.m
Landing gear		
wheel track	6.12 ft	1.865 m
wheel base	4.43 ft	1.350 m
main wheel diameter	14 in	350 mm
nosewheel diameter	14 in	350 mm

2.2.4 Weight

Empty weight (standard equipment)	695 lbs ± 2%	315 kg ± 2%
Maximum Take-off weight	1213 lbs	550 kg
Maximum Landing weight	1213 lbs	550 kg
Maximum weight in Baggage Compartment	55 lbs	25 kg

NOTE

Actual empty weight is stated on the placard "LOAD LIMITS," located on the cockpit canopy.

2.2.5 Center of gravity

Empty weight CG (standard equipment) .....20±2 % MAC

Operating CG ..... 20-34 % MAC

(MAC...Mean Aerodynamic Chord)

2.2.6 Operating limitations

Refer to the AIRCRAFT OPERATING INSTRUCTIONS (AOI), Section 2 for more details about the following operating limits:

- Airspeed limits
- Weight limits
- CG Range limits
- Approved maneuvers

Additional rules are of a more common character and result from generally valid flight regulations. It is in every user's interest to be familiar with these regulations, rules and restrictions.

2.3 Technical description of the airplane

2.3.1 General

The ***SPORTSTAR*** airframe is of semi-monocoque construction formed with metal reinforcements, bulkheads and duralumin cover. Pop-rivets are used for joints and some non-supporting parts are made from fiberglass.

2.3.2 Fuselage

The fuselage has a semi-monocoque construction formed with reinforcements and duralumin covers. The fuselage cross-section is rectangular in the lower section and elliptical in the upper one. The tail fin is an integral part of the fuselage. In the middle section of the fuselage there is a two-man cockpit which is accessible by unfolding the one-part perspex overlap canopy. The engine section in the nose is separated from the crew by a firewall, which the engine mount is attached to.

2.3.3 Wing

The rectangular wing is of a monospar construction with an auxiliary spar for the ailerons and flap attachments. All the elements are riveted together. Fiberglass wing tips are riveted to the ends of the wings and the wings can be equipped with an optional folding mechanism for convenient storing.

2.3.3.1 Ailerons

The ailerons are of rectangular shape on each half of the wing and are attached to the wing with hinges. An aileron is formed with the ribs and cover, which forms a hollow section.

2.3.3.2 Flaps

Two-third's of each half of the wing is fitted with a flap. The flaps are of rectangular shape and are formed with the ribs and cover, which forms a hollow section. The flap is attached to the wing with a hinge.

2.3.4 Horizontal tail unit

The rectangular HTU consists of a stabilizer and elevator with a trim tab. The semi-monocoque construction of the HTU consists of duralumin ribs, spar and cover. The width of 8.20 ft (2.5 m) enables transport without dismantling.

2.3.4.1 Stabilizer

The stabilizer is rectangular in shape and formed with a duralumin cover and ribs. The stabilizer is attached to the fuselage with two pins at the leading edge and secured with two screws at the stabilizer trailing edge.

2.3.4.2 Elevator

The elevator is rectangular in shape and formed with a duralumin cover and ribs. The elevator is attached to the stabilizer with a hinge. There is also a hinged trim tab at the elevator trailing edge.

2.3.4.3 Trim tab

Each elevator is equipped with the one trim tab of rectangular shape. The tab is formed with duralumin cover which forms a hollow section. The span of the trim tab is 2/3 of the elevator spanwise.

2.3.5 Vertical tail unit

The trapezoidal VTU consists of the fin and rudder. The rudder is attached on the fin by two hinges. The frame of the VTU is composed of a metal sheet spar and a duralumin cover.

2.3.5.1 Fin

The fin is an integral part of the fuselage rear section and is formed with a duralumin spar and cover. The fin tip is formed with a fiberglass cover, where the anticollision beacon can be installed. The fillet between the fin and rear upper fuselage part is formed with a fiberglass fillet cover.

2.3.5.2 Rudder

The rudder is of trapezoidal shape and formed with a duralumin spar and cover and attached by two hinges at the fin. The rudder upper tip is formed with a fiberglass cover.

2.3.6 Landing gear

2.3.6.1 General description

The aircraft is equipped with fixed nosewheel landing gear. The nosewheel is steerable.

Fig. SPORTSTAR
1 - Steerable nosewheel
2 - Main landing gear

2.3.6.2 Main landing gear

2.3.6.2.1 Description

The main landing gear consists of the left and right landing gear legs. The legs are formed from fiberglass springs and are fixed by means of screws in the fuselage casing under the seats. Wheel axis is screwed at the lower part of the main landing gear legs. The main wheels on both legs are equipped with hydraulic disc brakes controlled with toe brake pedals mounted on the rudder pedals. The wheels can be covered with the fiberglass fairings (wheel pants) or mudguards.

2.3.6.3 Nosewheel landing gear

2.3.6.3.1 Description

Steerable nose landing gear consists of front landing gear leg, rubber rope suspension unit and suspension stop. The nose leg is made of a bent steel tube, attached to the firewall by two bearings. The axle, with wheel attached, is connected to the welded bushing in the bottom part of the leg. Two rods are used for the leg steering by the control pedals.

2.3.6.3.2 Main landing gear layout

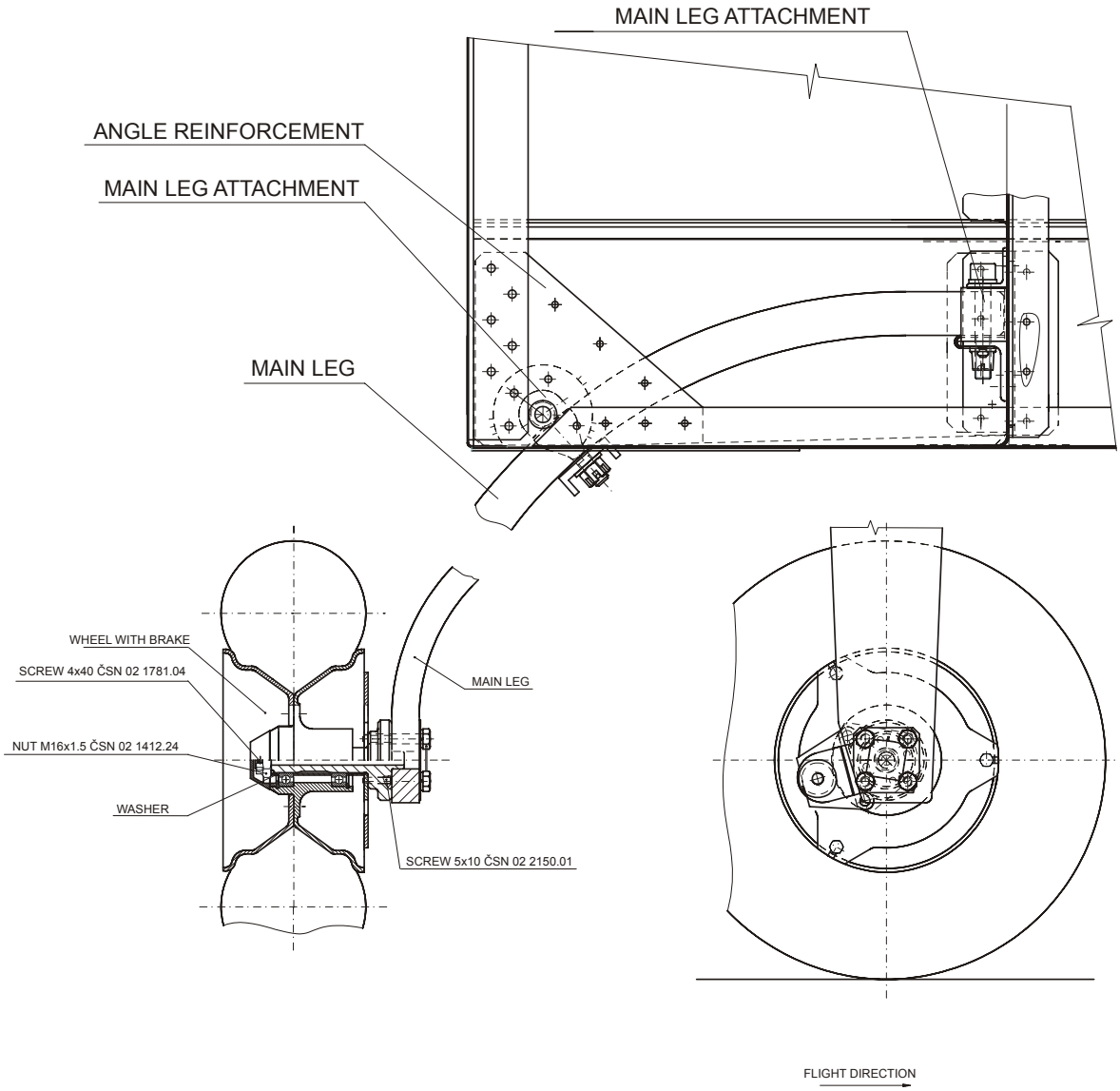
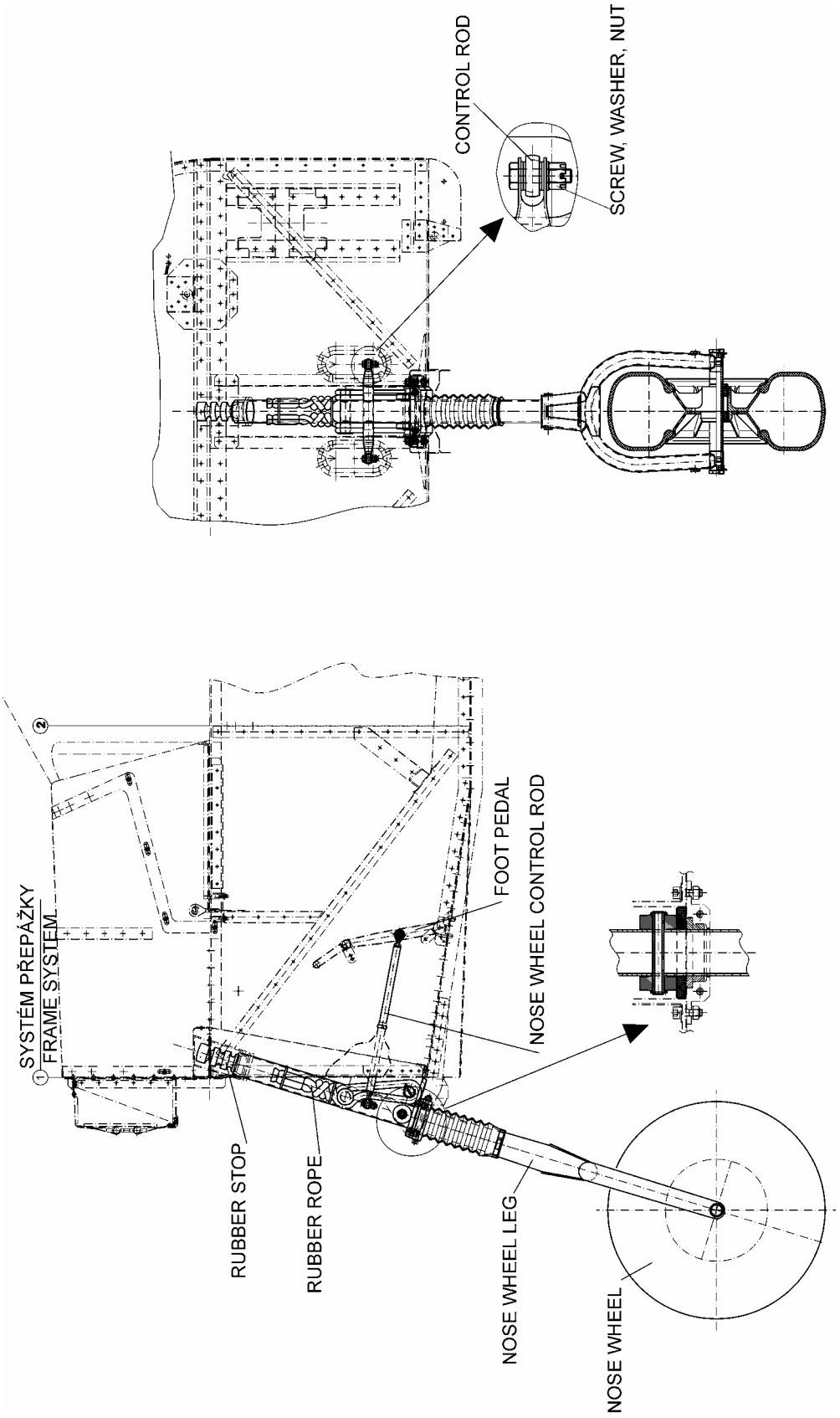


Fig. Main leg attachment into fuselage

2.3.6.3.3 Steerable nosewheel landing gear layout



2.3.6.4 Auxiliary tail skid

2.3.6.4.1 Description

The auxiliary tail skid is attached at the lower rear part of the fuselage and protects the aircraft from inadvertent damage during tail-down landing conditions. The tail skid is formed from duralumin sheet.

Fig. Auxiliary tail skid

2.3.6.5 Wheel brakes

2.3.6.5.1 Description

Both wheels on the main landing gear are equipped with hydraulic disc brakes. The brake system consists of the brake pedals (pilot standard, co-pilot as an option), hydraulic brake master cylinders, plastic hoses, brake caliper with the hydraulic brake cylinder, brake pads and the brake disc which is bolted onto the inner part of the rim.

Fig. The brake on the left wheel
1- brake caliper with the hydraulic cylinder,
2 - brake disc
3 - brake fluid hose,
4 - terminal,
5 - air bleed screw

2.3.6.5.2 Brake control

The brakes on both wheels are controlled independently by toe brake pedals mounted on the pilot's rudder pedals (the brake pedals for the co-pilot are optional).

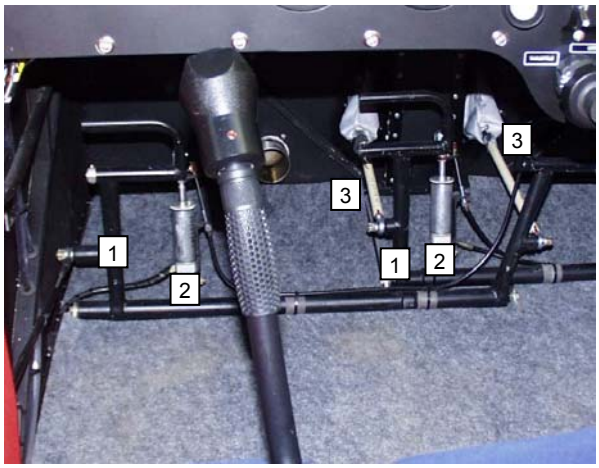
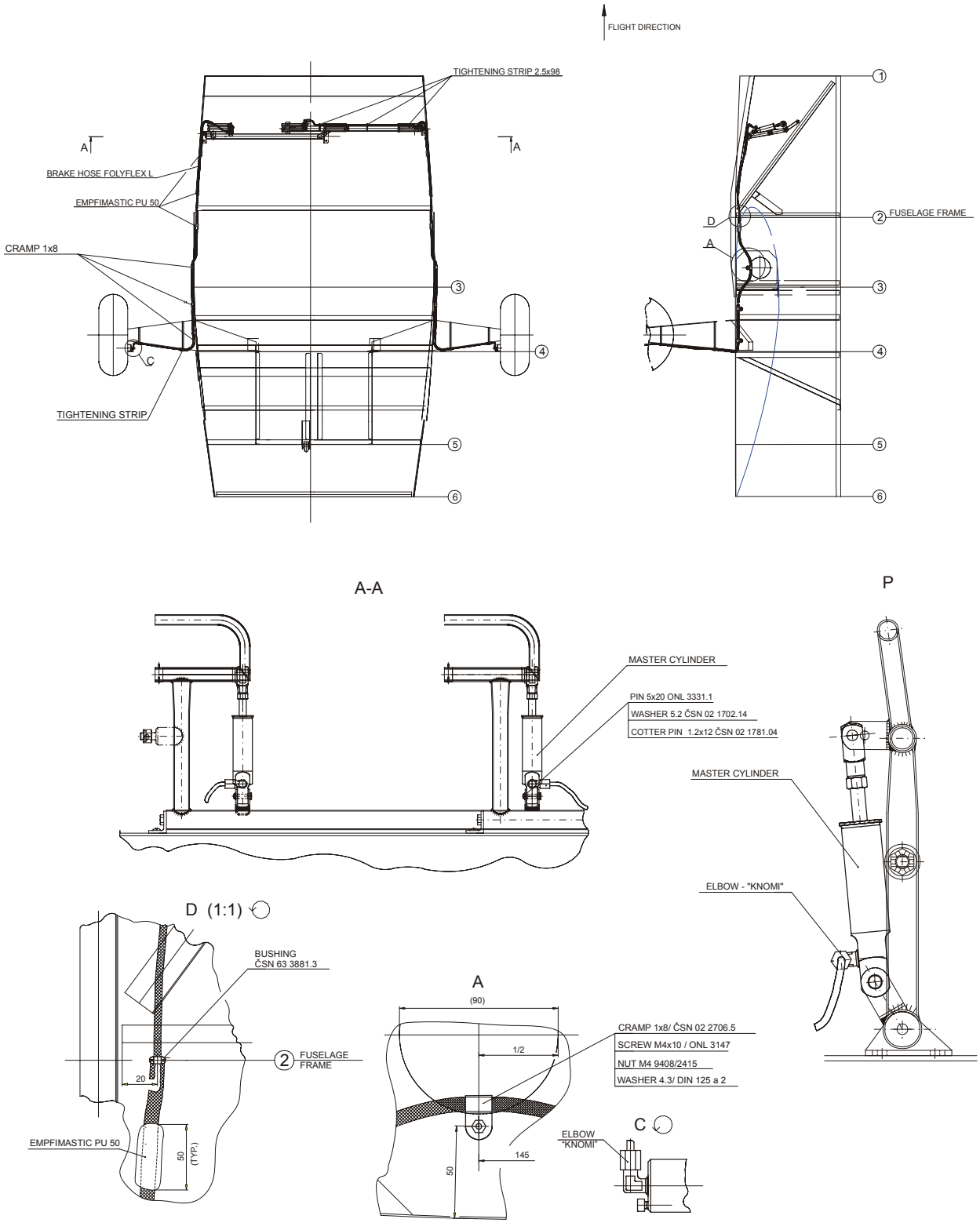


Fig. The brake control with toe brake pedals

1 – ruder pedals, 2 – brake cylinder, 3 – nose wheel steering rod

2.3.6.5.3 Brake system layout

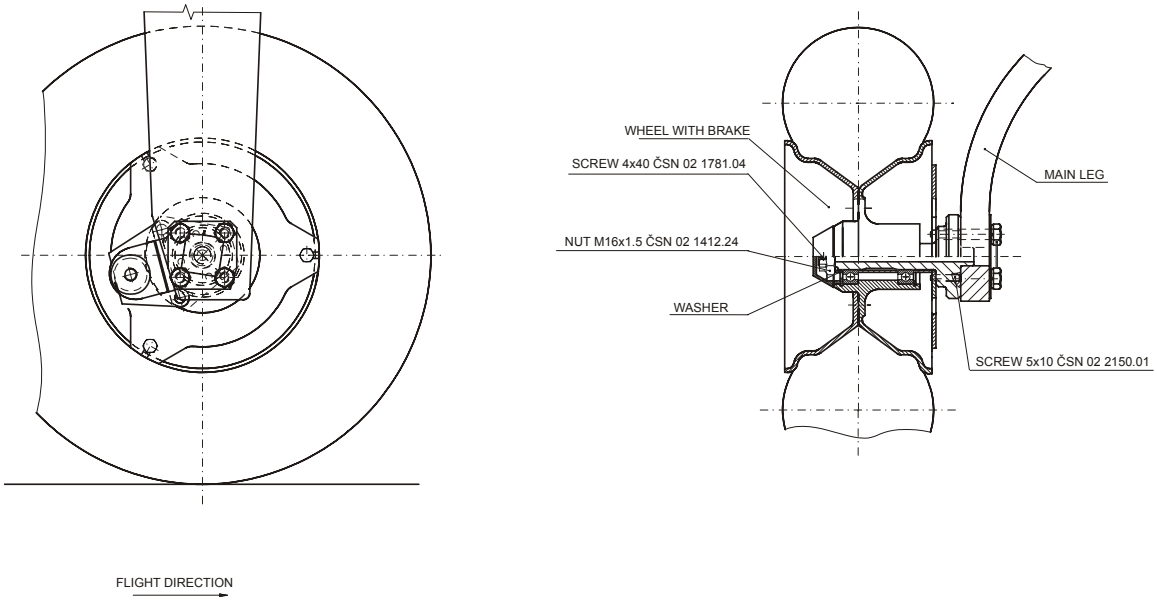


2.3.6.6 Wheels

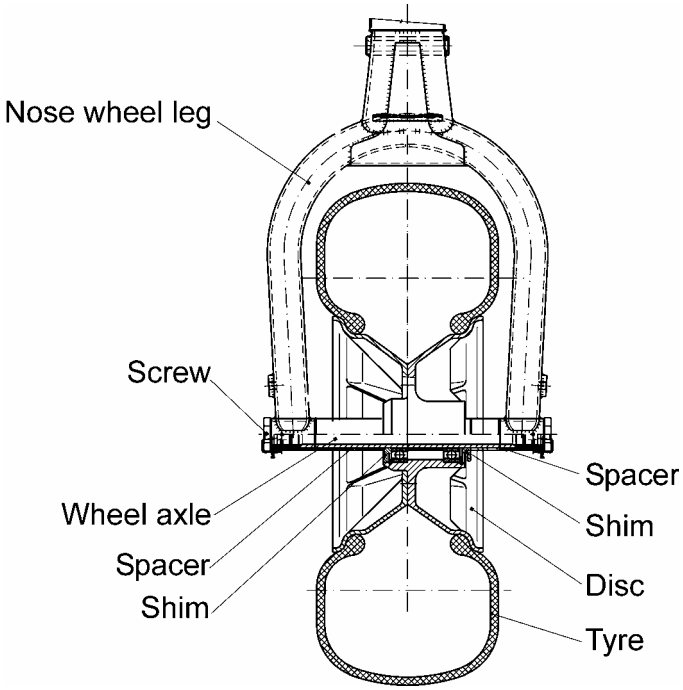
2.3.6.6.1 Description

All the wheels consist of a two-part casting rim with a tire and tube. The main wheels are on an axle attached to the main gear leg, fastened by the nuts.

2.3.6.6.2 Main undercarriage wheel layout



2.3.6.6.3 Nosewheel layout



2.3.6.7 Tires

Main landing gear ..... CHENG SHIN 15 x 6.00 – 6 (standard) or optional:
GOOD YEAR 15 x 6.00 – 6
SAVA 14x4

Nose landing gear ..... CHENG SHIN 13 x 5.00 – 6

2.3.7 Cockpit

2.3.7.1 Description

The comfortable cockpit has a side-by-side, dual control arrangement, which provides the crew with an excellent view and comfort. It protects the crew from adverse weather conditions, and allows easy access to the controls and instruments.
The instrument panel is located in front of the crew. The flap control lever, elevator trim tab lever and optional towing mechanism release lever are located on the quadrant between seats. A baggage compartment is situated behind the seats.
The cockpit floor is covered with a removable carpet and the seats are also covered with a thin upholstery. The interior cockpit sides are covered with padded panels containing pockets.
The actual cockpit controls and instrument arrangement is described later.

Fig.: Cockpit of the SPORTSTAR

2.3.7.2 Cockpit controls

The standard cockpit control arrangement is shown in the following figure. A detailed instrument panel is shown in par. 2.3.9.

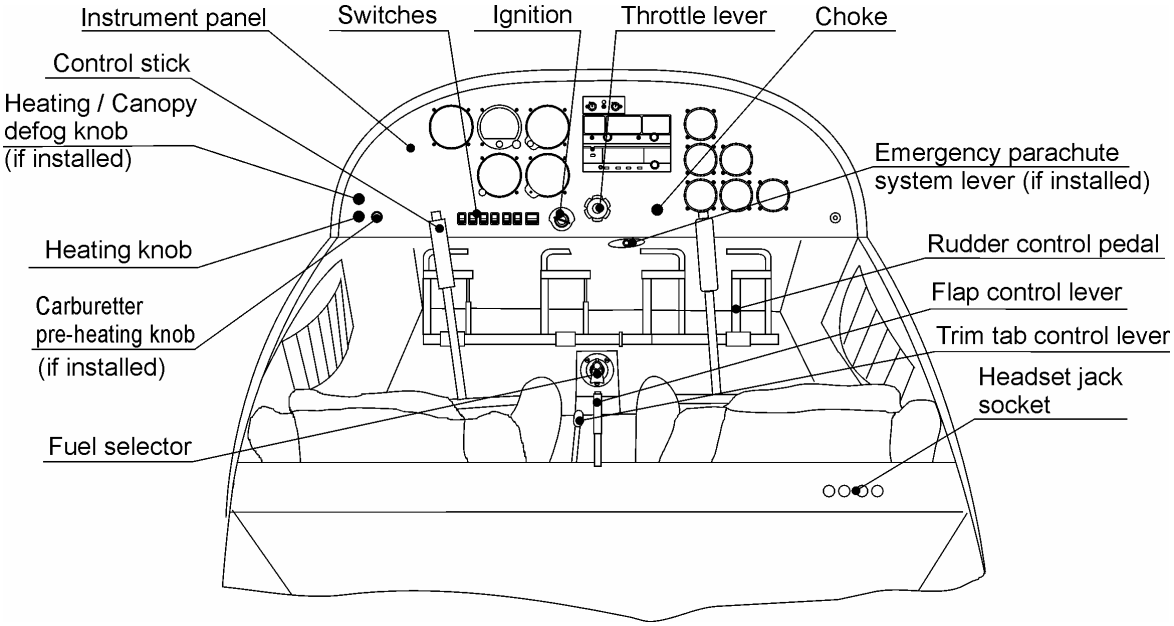


Fig. quadrant between the seats
1- flaps control lever, *2* - elevator trim tab control lever

2.3.7.3 Cockpit canopy

The bubble canopy consists of two parts. The front perspex portion can be tilted forward and is attached to a steel frame. The fixed rear portion can be made of either Al-alloy sheet or perspex. The canopy is attached to the nose section of the fuselage by two pins which make it possible for the canopy to be tilted forward. For easier manipulation, the weight of the canopy is counterbalanced by two gas struts which allow effortless opening. The lower frame has handles outside the canopy for lifting and the canopy is equipped with a lock on the upper rear section of the frame. Placards are attached to the canopy showing the lock/unlock directions of movement.

Fig. Two-parts cockpit canopy
1- front tilted canopy, *2* - rear fixed canopy, *3* - side vent window, *4* - canopy lock,

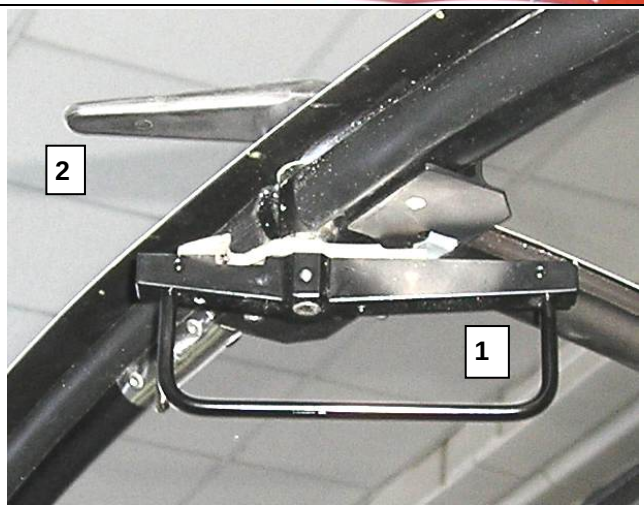


Fig. Cockpit canopy lock
1- inside lever
2 - outside lever (with a lock)

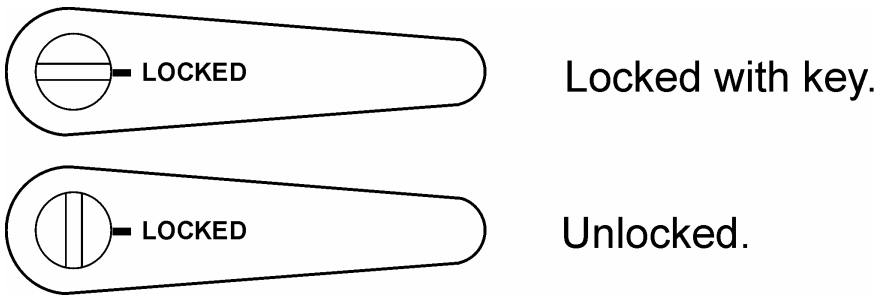


Fig. Cockpit canopy lever Keyway positon for locked and unlocked position

2.3.8 Equipment

2.3.8.1 Seats and safety harness

The plane has two side-by-side seats which are fixed and covered with upholstery, each equipped with four-point seatbelts. Adjustable rudder pedals are optional. The seatbelts are attached alongside the seat and in the middle of the bulkhead behind the baggage compartment.

2.3.8.2 Baggage compartment

The baggage compartment is situated behind the seats.
Maximum baggage weight is stated on a placard located near the compartment.
There are pockets on both cockpit interior sides for small objects (maps, pencils, keys etc.).

Fig. Cockpit interior
1- seat upholstery, *2* - safety seat belts, *3* - baggage compartment

2.3.9 Instrument panel

See supplement No. 1 to this Airplane Maintenance and Inspection Procedures.

2.3.10 Avionics

See supplement No. 1 to this Airplane Maintenance and Inspection Procedures.

2.3.11 Additional equipment

See supplement No. 1 to this Airplane Maintenance and Inspection Procedures.

2.3.12 Control system

2.3.12.1 Longitudinal control system description

The airplane is equipped with a classic dual control system. The elevator is controlled by a control stick, with connecting rods and arms. A control stick push/pull movement is transmitted, by a rod inside the quadrant between the seats to the elevator through a two-armed lever located underneath the baggage compartment floor cover. The angular displacement of the two-armed lever is transferred by a longitudinal motion of two rods, connected with a single arm lever, inside the middle rear part of the fuselage. The rear rod is connected to the elevator single-arm lever.
A control stick motion is limited by two stops. Both control sticks have a common "push-down" stop on the center-section and each control stick has a "pull-up" stop formed with a reinforcement riveted on the front edge of each seat. The rods have adjustable ends and swivel bearings to adjust the elevator deflections.

2.3.12.2 Lateral control system description

The ailerons are controlled by control sticks, connecting rods and arms. A control stick lateral motion is transferred by a short rod in the cockpit to a longitudinal movement of a longer rod in the wing. This in turn transfers to the angular displacement of a two-armed lever attached to the wing main spar. The two-armed lever angular movement is transferred to the ailerons by short rods. The rods have adjustable ends to adjust the aileron deflections. The control stick has a termination stop.

CAUTION
To adjust an aileron deflection, never use the adjustable end of the short rod which is accessible when wing fillet (covering the space between the wing and fuselage) is removed. See Figure in 2.3.12.7.1.

2.3.12.3 Directional control system description

The rudder control system is dual. The rudder is controlled by cables attached at the rudder pedals and guided alongside the fuselage sides to the rudder. The rudder control cable is equipped with adjusting stops located in the cockpit (see figure on page 2-24). The rudder pedals are attached to the cockpit floor. There are toe brake pedals on the pilot's rudder pedals to operate the main wheel brakes (co-pilot toe brake pedals optional). The cables are connected to the hinges in the lower part of the rudder leading edge. The cables are prestressed by means of nose wheel control rods. The rudder control is connected to the nosewheel landing gear to control the nosewheel by the adjustable rods.

2.3.12.4 Flap control system description

The wing flaps are controlled by a control lever in a changing gate. The lever push/pull movement is transferred to a longitudinal movement of a rod guided inside the quadrant between the seats. Then to an angular displacement of a two-armed lever welded onto a tube connecting left and right flap. The flap control lever is located in the quadrant between the seats. When a lock button located on the upper end of the lever is pressed, the lock pin is pulled out of the groove in the changing gate. The flaps can then be extended to a position for takeoff or landing. The flap position is locked when the lock button is released.

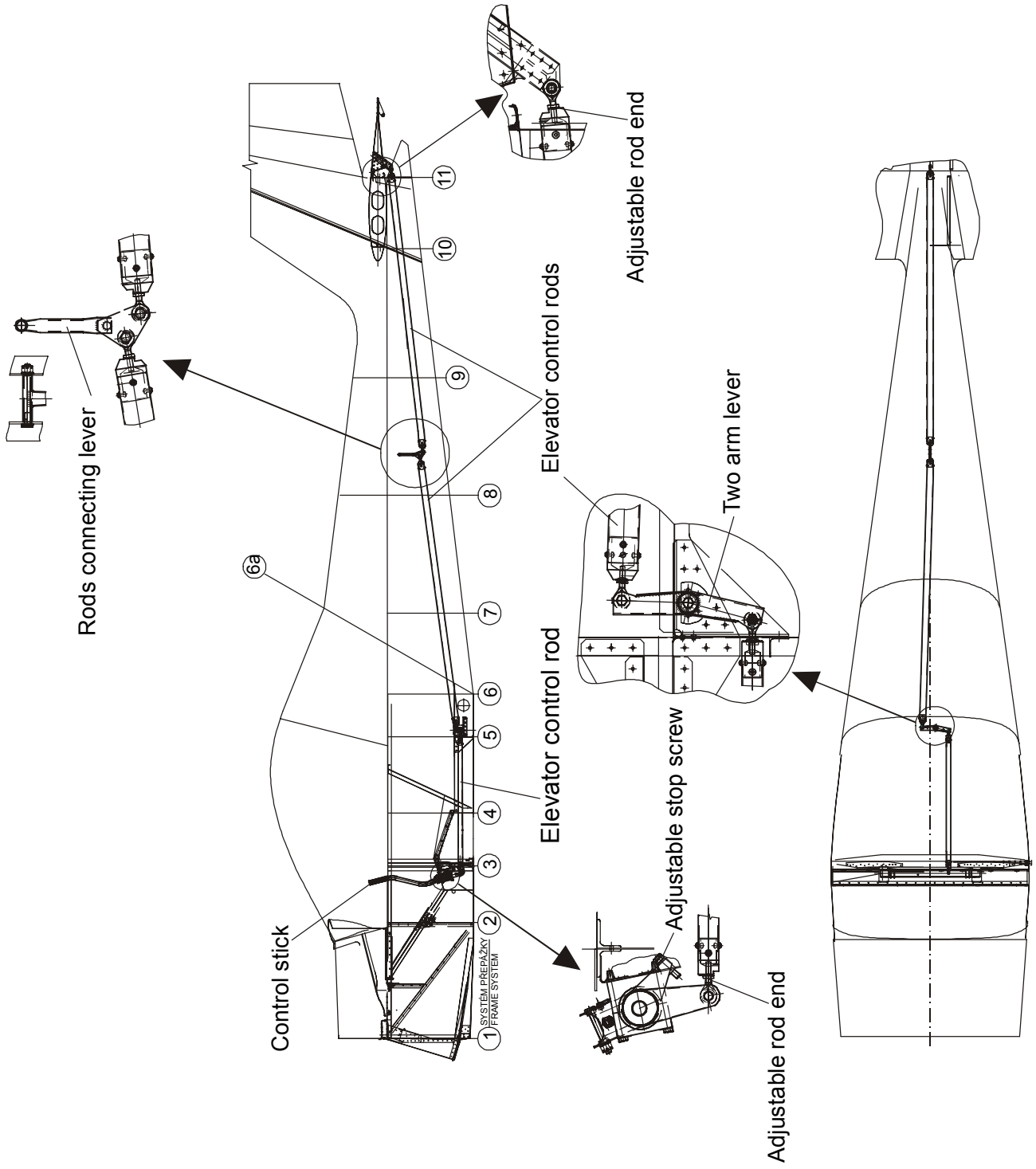
2.3.12.5 Trim tab control system description

The elevator trim tab is controlled by the control lever located in the quadrant between the seats. The trim tab control lever movement is transmitted to the trim tab displacement by bowden cables. Maximum trim tab deflections can be adjusted by means of adjusting screws on the upper or lower tab surface.

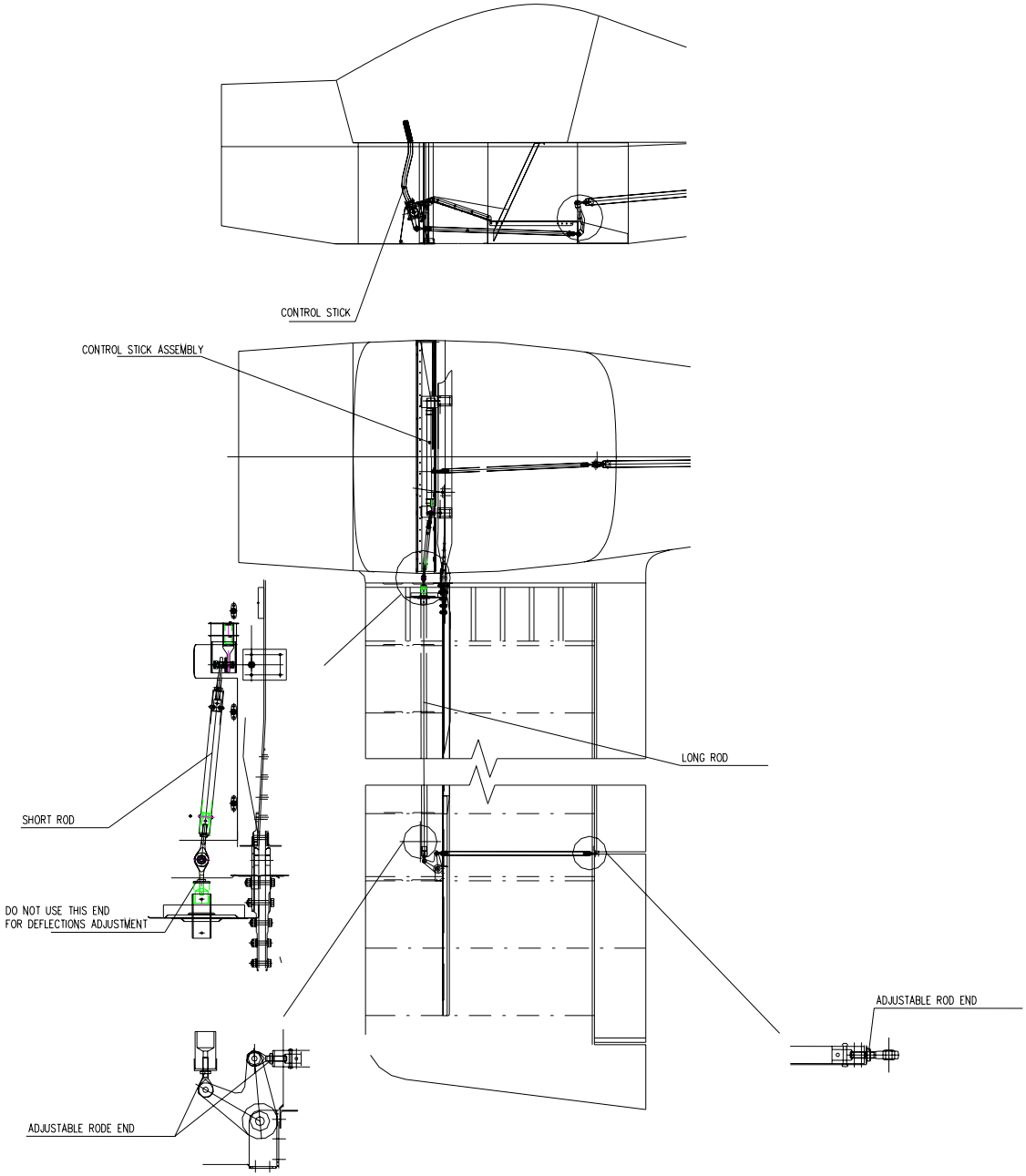
2.3.12.6 Nosewheel control system description

The aircraft is equipped with steerable nosewheel landing gear. In this case the wheel control system is connected to the rudder pedals. The nosewheel control system consists of the rods, connecting pedals and a two-armed lever welded to the nose landing gear leg.

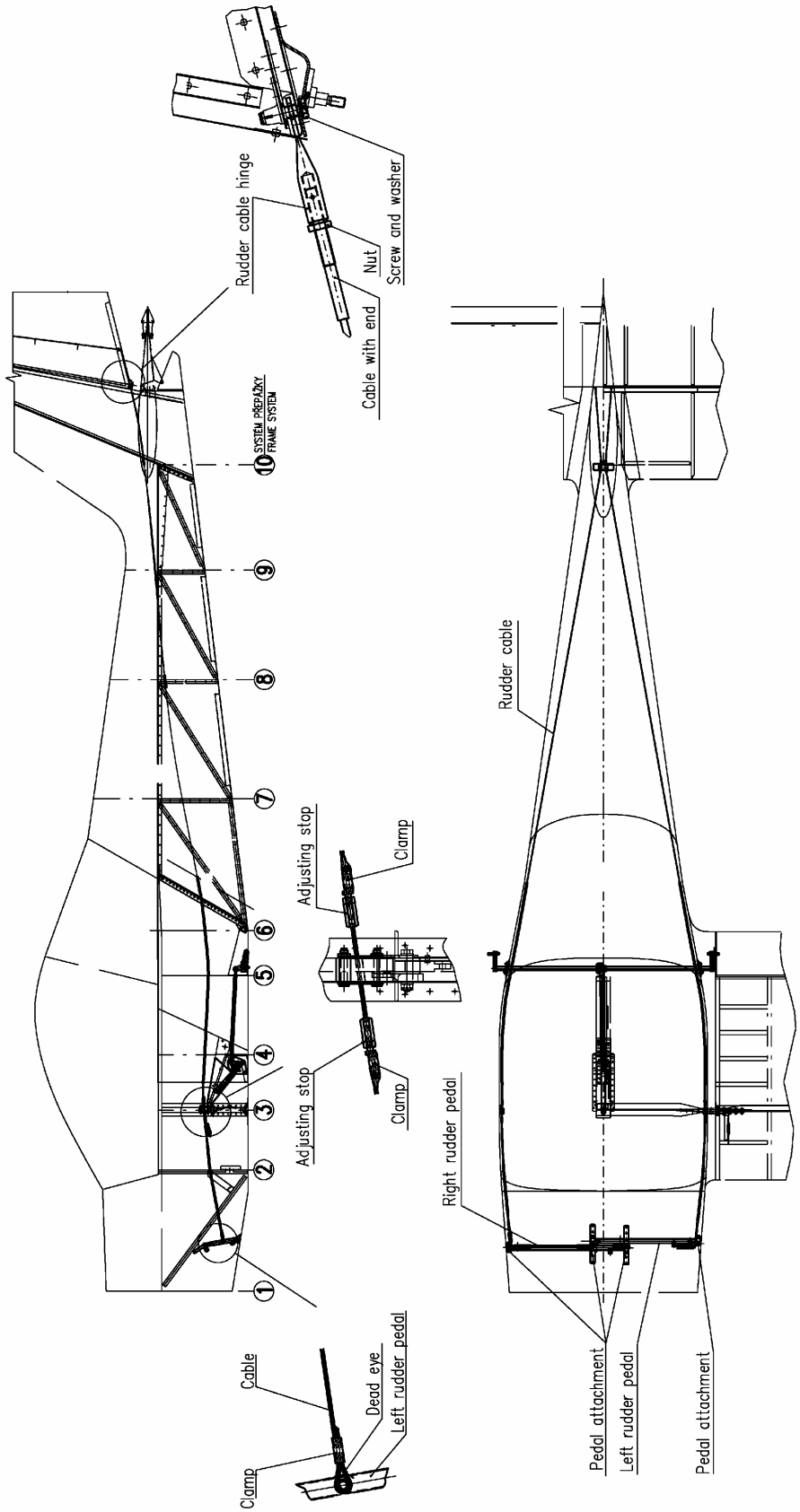
2.3.12.7 Longitudinal control system layout



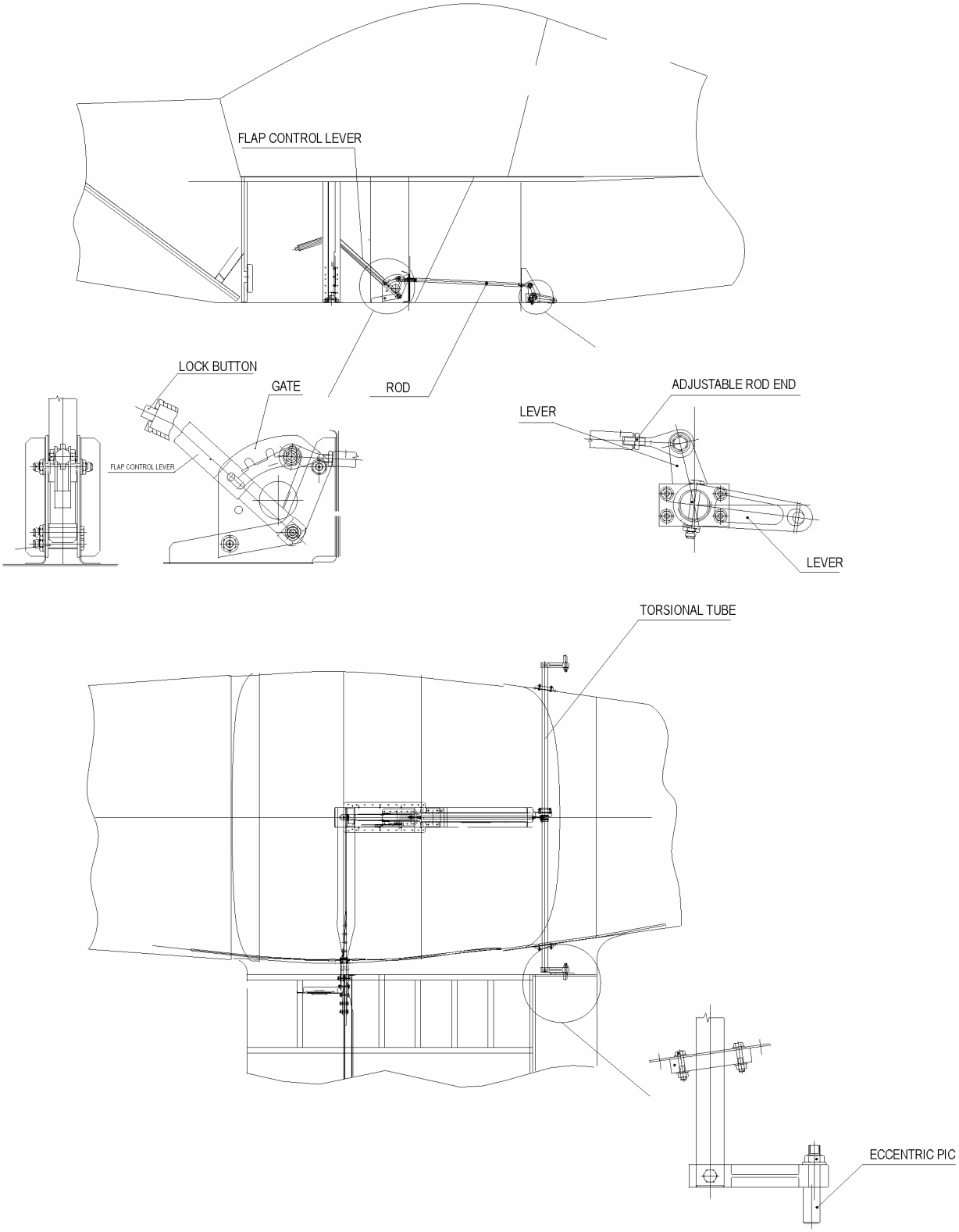
2.3.12.7.1 Lateral control system layout



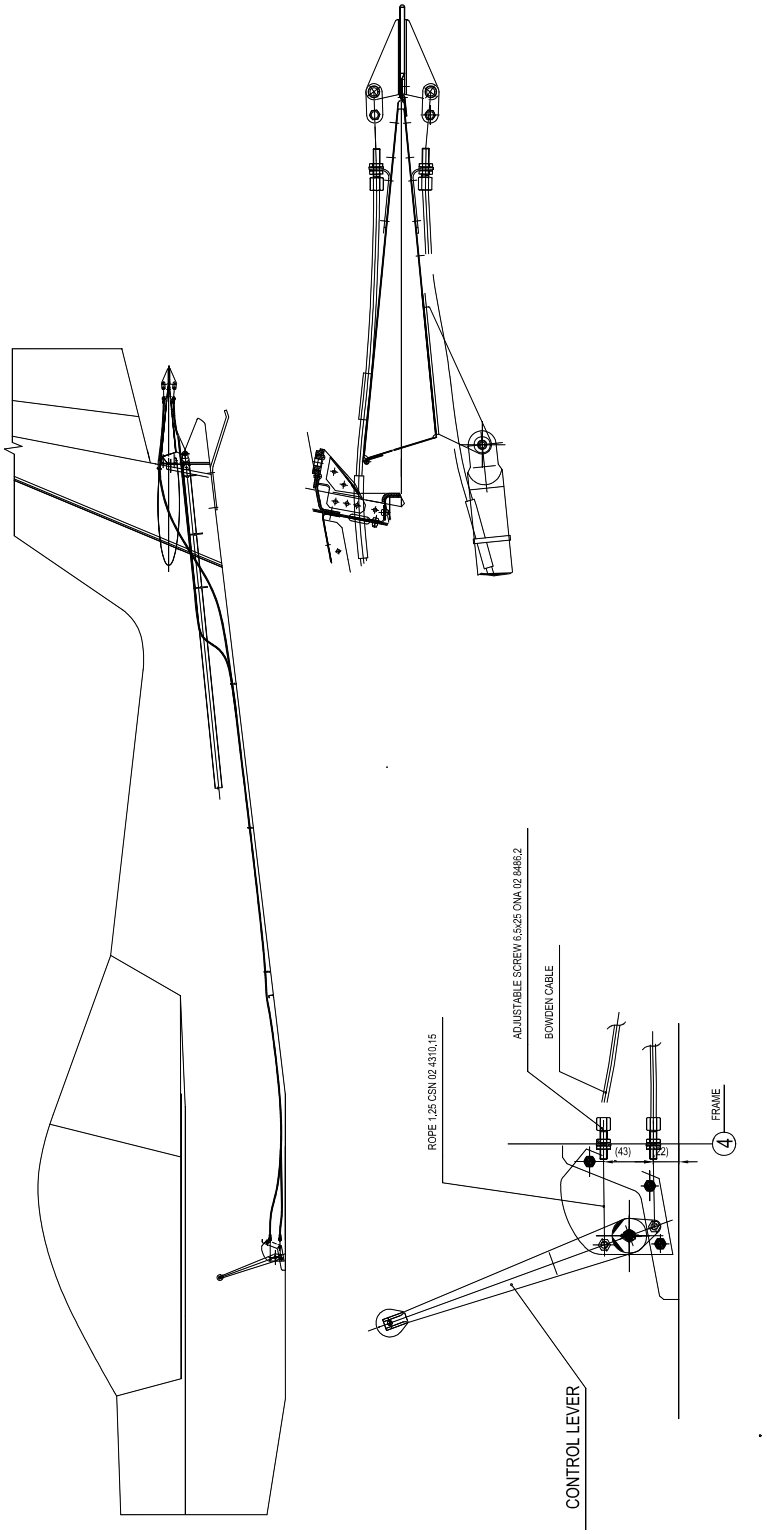
2.3.12.8 Directional control system layout



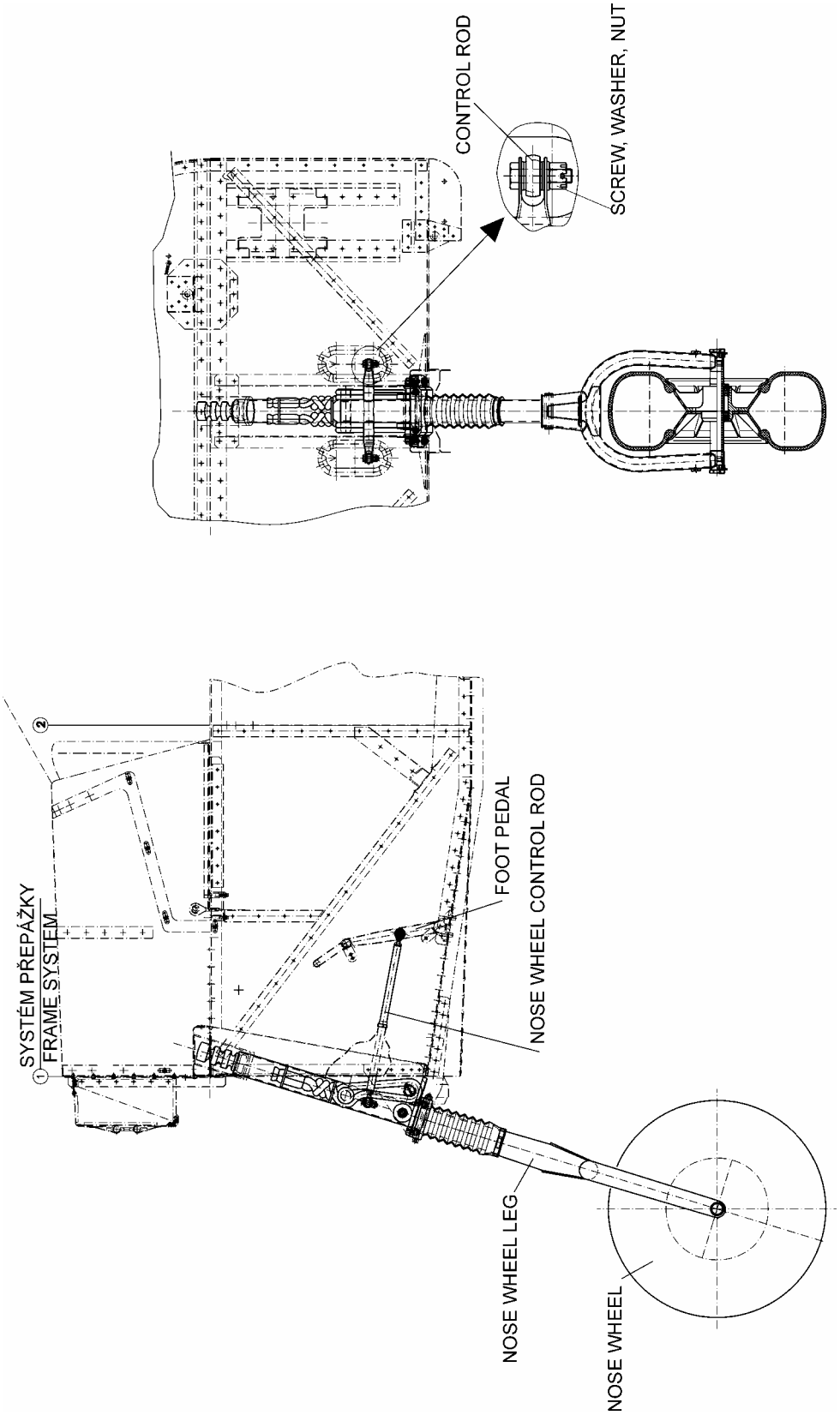
2.3.12.9 Flap control system layout



2.3.12.10 Trim tab control system layout



2.3.12.11 Nosewheel control system layout



2.3.13 Powerplant

2.3.13.1 Brief description

The standard powerplant consists of the four-cylinder, 4 stroke, ROTAX 912 UL (80 hp) or optionally ROTAX 912 S resp. ULS (100 hp) engine and on-ground adjustable, 3 bladed, composite, WOODCOMP KLASSIC 170/3/R prop.
The engine data is scanned by an analog instruments or by integrated digital engine monitoring system EMS (optional).
Other props are optional.
The standard powerplant is shown in the following figure:

Fig. SPORTSTAR Powerplant (standard powerplant)

2.3.13.2 Engine

2.3.13.2.1 Description

The Rotax 912UL or 912S (ULS) is a 4-stroke, 4 cylinder, horizontally opposed, spark ignition engine and has one central camshaft-push-rods-OHV.
Liquid cooled cylinder heads, ram air cooled cylinders.
Dry sump forced lubrication.
Dual breakerless capacitor discharge ignition.
The engine is fitted with electric starter, AC generator and mechanical fuel pump. Prop drive via reduction gear with integrated shock absorber.
Refer to the Rotax documentation for more details about different versions.

2.3.13.2.2 Technical data

Engine Model:		**ROTAX 912UL**		**ROTAX 912S** (or ULS)	
Engine Manufacturer:		Bombardier-Rotax GMBH			
Power	Max Take-off:	59.6 kW / 80 hp at 5800 rpm, max.5 min.		73.5 kW / 100 hp at 5800 rpm, max.5 min.	
	Max. Continuous:	37.7 kW / 50.6 hp at 5500 rpm		69 kW / 93.8 hp at 5500 rpm	
	Cruising:	53 kW / 71 hp at 4800 rpm		44.6 kW / 59.8 hp at 4800 rpm	
Engine speed	Max. Take-off:	5800 rpm, max. 5 min.			
	Max. Continuous:	5500 rpm			
	Cruising:	4800 rpm			
	Idling:	1400 rpm			
Cylinder head temperatu re	Minimum:	60 °C	*140 °F*	60 °C	*140 °F*
	Maximum:	150 °C	*302 °F*	135 °C	*275 °F*
Oil temperatu re	Minimum:	50 °C	*122 °F*	50 °C	*122 °F*
	Maximum:	140 °C	*284 °F*	130 °C	*266 °F*
	Optimum:	90 °C - 110 °C	*194 - 230°F*	90 °C - 110 °C	*194 - 230°F*
Oil pressure:	Minimum:	0,8 bar / 12 PSI			
	Maximum:	7,0 bar / 102 PSI			
	Optimum:	2,0-5,0 bar / 29-73 PSI			
Fuel:		see 2.13			
Propeller and Manufacturer		KLASSIC 170/3/R WOODCOMP s.r.o, Czech Republic			
Type:		three blade, composite, on-ground adjustable propeller			
Propeller diameter:		1700 mm		*68 in*	

Fuel

- automotive petrol with min RON 95
- EN 228 Premium
- EN 228 Premium plus
- AVGAS 100 LL
  Due to higher lead content in AVGAS, the wear of valve seats and deposits in the combustion chamber and lead sediments in the lubrication system will increase. Therefore, use AVGAS only if you encouter problem with vapour lock or if the other fuel types are not available.
- Refer to the Engine Operator's Manual for more fuel brands

Oil

Automotive engine oil of a registered brand with gear additives, but not aircraft oil (refer to Engine Operator's and Manual Service Information). API classification "SF" or "SG".
Refer to para 4.6.1 and the Engine Operator's Manual and Service Information.

2.3.13.3 Propeller

2.3.13.3.1 Description

The WOODCOMP KLASSIC 170/3/R prop is installed in the SPORTSTAR standardly. The prop is attached to the propeller hub with 6 bolts. A fiberglass spinner is used.
Refer to the manuals supplied with the prop for more information.

Propeller Technical Data

Diameter 67	in	1700	mm
Pitch	on-ground adjustable, pitch 6-17°		
Weight 8.2	lbs	3.7	kg
Propeller blade clearance from ground ..... 11.8 ± 1.2	in	300 ± 30	mm
Manufacturer	WOODCOMP, s.r.o. Kremen Sport Prop Junkers Czech Republic Vodolská 4 250 70 Odolena Voda		

NOTE

The exact pitch/performance of the prop supplied with each airplane may differ slightly, therefore the exact performance of your airplane may be different.

NOTE

If installed other propeller see data in Supplement No. 1 to this Aircraft Maintenance and Inspection Procedures.

2.3.13.4 The EMS - engine monitoring system (if installed)

The Rotax 912UL or 912S (ULS) engine parameters can be monitored by the engine monitoring system
EMS 3712.

The following parameters are displayed:

- Engine speed
- Engine hours
- Exhaust gases temperature
- Cylinder head temperature
- Oil temperature
- Oil pressure
- Overrun of data limits

Each of the mentioned items (except engine hours) has a set limit in the memory of the instrument. The instrument informs pilot, if any measured value starts to approach the set limit. If any limit value is exceeded, the instrument displays this fact before the next engine start-up. In this case, the pilot can recall the highest values, measured during last flight, by mere push of the control button EMS MEMORY on the instrument panel.

Signalization

An actual value of each measured item (except engine hours) is continuously compared to its allowed maximum limit that is set in the instrument memory.

For each measured item there are two limit values:

A/WARNING – If the first (lower) limit value is exceeded, the pilot is informed by the flashing warning light EMS SIGN. on the instrument panel, a message OVER and flashing of the measured value. The exceeding of this limit is recorded into the operational memory. The SERVICE MESSAGE is not applied.

B/ALARM – If the maximum limit is exceeded, the pilot is informed by the flashing warning light EMS SIGN. on the instrument panel, a message OVER and flashing of the measured value. The exceeding of this limit is recorded into one of the 14 blocks. Prior to next engine start-up, the SERVICE MESSAGE is displayed.

Limit values of each item are shown in Chapter 4 of the EMS 3712 User's Manual.

2.3.13.5 Analog engine instruments

If analog engine instruments are installed then the instruments limit indicators should show the following:

Function		Minimum Limit (red line)	Normal Operating (green arc)	Caution Range (yellow arc)	Maximum Range (red line)
Engine speed [RPM]		1400	1400-5500	5500-5800	5800
Cylinder Head Temp. (CHT)	R 912 UL (80 hp)	60 °C *140 °F*	60-100 °C *140-212 °F*	100-150 °C *212-302 °F*	150 °C *302 °F*
	R 912 S (ULS) (100 hp)			100-135 °C *212-275 °F*	135 °C *275 °F*
Exhaust Gases Temp. (EGT)					880 °C *1616 ° F*
Oil Temp.	R 912 UL (80 hp)	50 °C *122 °F*	90-110 °C *194-230 °F*	50-90 °C *122-194 °F* 110-140 °C *230-284 °F*	140 °C *284 °F*
	R 912 S (ULS) (100 hp)			50-90 °C *122-194 °F* 110-130 °C *230-266 °F*	130 °C *266 °F*
Oil Pressure		0.8 bar *12 psi*	2 - 5 bar *29 – 73 psi*	0.8 - 2 bar *12 - 29 psi* 5 – 7 bar *73 – 102 psi*	7.0 bar *102 psi* cold engine starting

The following analog powerplant instruments are generally installed:

MITCHELL
Engine speed indicator.....MITCHELL P/N D1-211-5021
Oil press indicator.....MITCHELL P/N D1-211-5054
Oil temperature indicator.....MITCHELL P/N D1-211-5091
Cylinder head temperature indicator.....MITCHELL P/N D1-211-5082

2.3.13.6 Engine bed

2.3.13.6.1 Description

The engine bed is welded from chrome-molybdenum tubes and is attached to the firewall with 4 bolts. The bed is spring-mounted with four rubber silentblocks.

Fig. Engine bed
1- bed, *2* - rubber silentblock

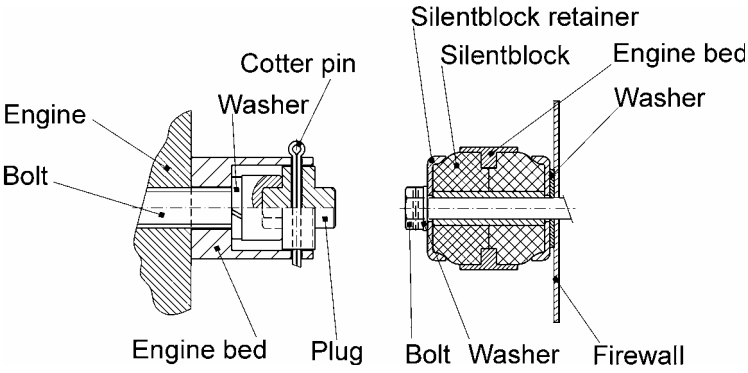


Fig. Engine bed suspensions

2.3.13.7 Engine cowlings

2.3.13.7.1 Description

There are two fiberglass cowlings (upper and lower) attached to the engine mount which cover the engine. The interior sides of the cowlings are protected with fireproof paint, exterior sides are painted with aircraft paint. The upper cowling is connected to the lower cowling with quick-closing locks and is usually removed for preflight inspections.
Removed engine cowlings are shown in the following figure.

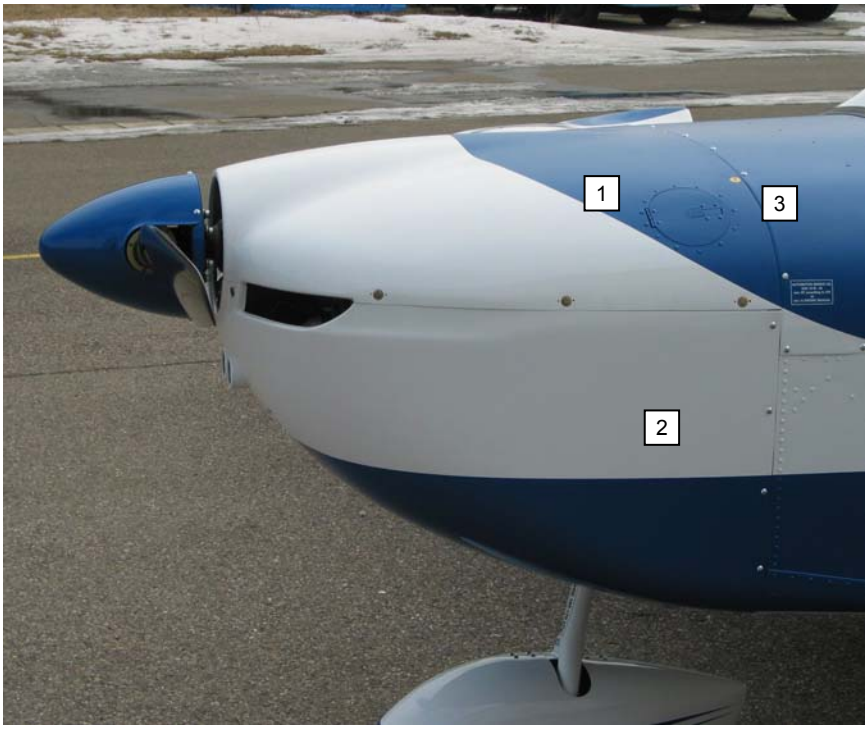


Fig. Rotax 912UL or 912S (ULS) engine cowlings
1- upper cowling, *2* - lower cowling with cut-out for the radiator,
3 – cap for oil level check (optional)

2.3.13.7.2 Engine cowlings disassembly and assembly

Type of maintenance: line.
Authorization to perform: - Aircraft owner (only for ELSA)
- Sport pilot or higher
Tools needed: flat screwdriver
Parts needed: none
Instructions:

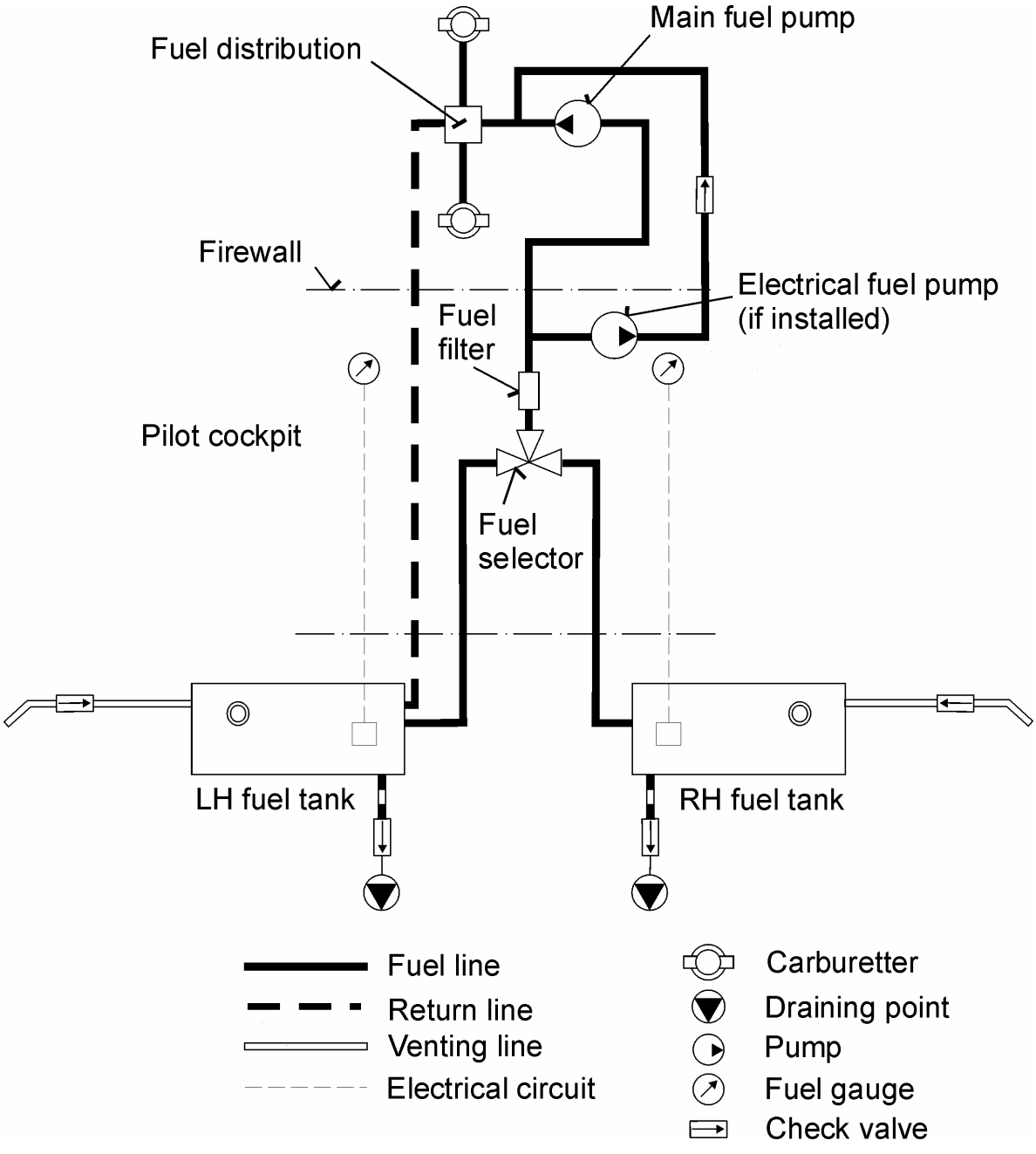
- The upper cowling: The disassembly and assembly are both easy -just release the quick-closing locks (or screws). The upper cowling is usually removed during engine pre-flight inspection to check the engine compartment, operating fluids quantity (oil, coolant) and to check the engine installation.
- The lower cowling: To remove it, un-screw the attachment screws connecting the cooler to the cowling face side, then un-screw the attachment screws connecting the cowling to the firewall border.

It is highly recommended to protect the removed cowlings so as to prevent them from inadvertent damage.
The cowling assembly is the reverse of disassembly.
Task proper accomplishment: check: check the screws are tight,
visually check the camlocks position.

2.3.14 Fuel system

2.3.14.1 Fuel system description

Fuel is contained in the wing integral tanks having volume 60 l (15.85 U.S. gallons) each. Each tank is fitted with air venting (output is under the wing tip) and draining valve on the bottom side of the wing. Fuel is led from the tanks through the hoses to the fuel selector located on a central console under the instrument panel and then through a fuel filter to the engine pump and carburetors. Fuel return hose goes from the fuel pump into the left tank, which is due to considered as a primary" tank. See figure below for Scheme of fuel system.
The fuel tanks filler necks are placed on the upper side of the each wing. Fuel quantity is indicated by an electric fuel gauges.
The drain valves are located on the bottom side of the each wing.



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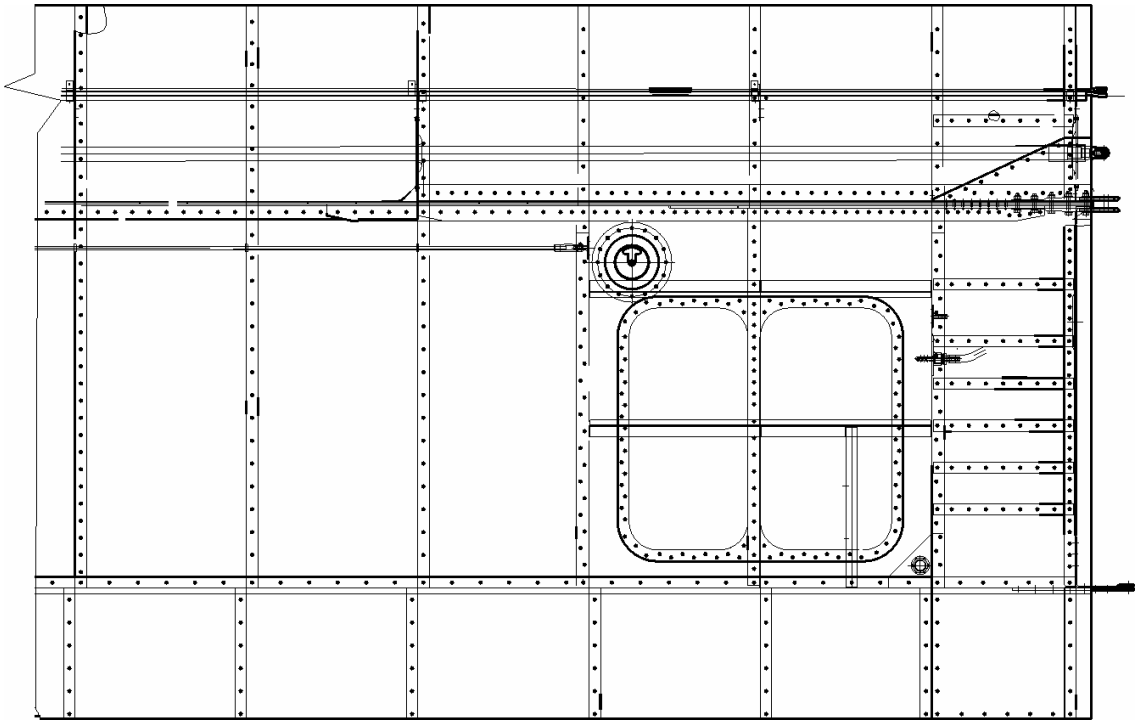
2.3.14.2 Standard fuel system layout



2.3.14.3 Fuel tank draining

Type of maintenance: line.
Authorization to perform: - Aircraft owner (only for ELSA)
- Sport pilot or higher
Tools needed: flat screwdriwer
fuel resisting transparent bottle
Parts needed: none
Instructions:
The drain points of the fuel tanks are located at the bottom side of the wing.

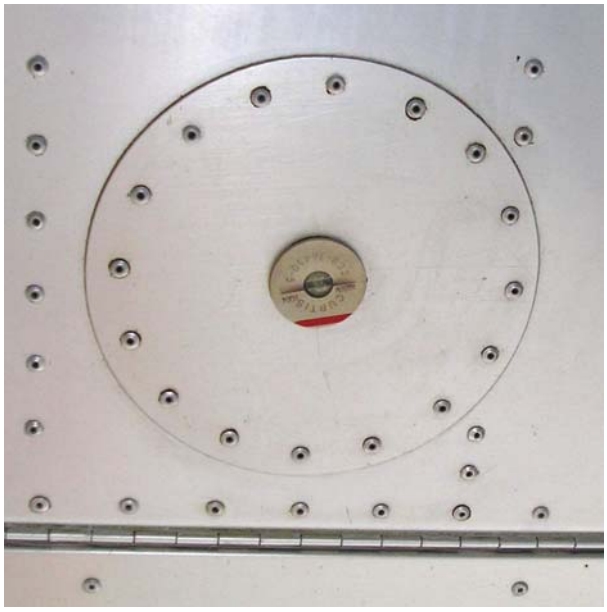


Fig. Fuel drain valve

Procedure:
1. Put the suitable vessel or transparent cup under the drain valve.
2. Using screwdriver (or appropriate jig) press and turn draining valve to the left to open it.
3. Drain required quantity of fuel.

NOTE
Draining serves to elimination of impurities and deposits from the fuel. Drain until clean fuel flows from the drain valve.

4. Using screwdriver (or appropriate jig) turn draining valve to the right to close it.
5. Repeat procedure for the opposite tank.

WARNING
Do not smoke or have open any flame during draining!

Task proper accomplishment check: visually check of drain cock closing.

2.3.15 Engine lubrication system scheme

2.3.15.1 Lubrication system description

The Rotax 912UL or 912S (ULS) engine is provided with a dry sump forced lubrication system. The oil pump pulls the motor oil from the oil tank attached to the firewall via the oil cooler. Then forces it through the oil filter to the lubrication points in the engine.
The surplus oil emerging from the lubrication points accumulates on the bottom of the crankcase and is forced back to the oil tank by the blow-by gases.
The oil tank is equipped with a vent hose.
The engine lubrication system is further described in documentation supplied with the engine.

2.3.16 Cooling system description

2.3.16.1 Cooling system description

The cooling system uses two forms of cooling. The cylinder heads are liquid cooled and the cylinders ram air cooled. The radiator is located in the front of the lower engine cowling. The coolant is forced through the radiator by a water pump, driven from the crankshaft to the cylinder heads. From the top of the cylinder heads the coolant passes on to the expansion tank which allows for coolant expansion. The expansion tank is closed by a pressure cap with an excess pressure valve and return valve. When the temperature rises the coolant creates excess pressure, a relief valve opens and the coolant flows through a thin hose to the overflow bottle mounted on the firewall.

The engine cooling system is more completely described in documentation supplied with the engine.

Check the coolant level in the expansion tank (installed on the engine body) before the first flight of the day - replenish as required up to max. 2/3 of the expansion tank volume.

Check the coolant level in the overflow bottle (installed on the firewall) – coolant level should be between MIN. and MAX. mark.

2.3.17 Heating

A cockpit heating system is optional.

2.3.17.1 Description

Air is preheated by the passage through a water cooler. Then an air collector leads the preheated air to the heat exchanger in the exhaust system, then through the valve at the firewall directly to the cockpit. The heating valve is operated with a cable from the heating valve/flap to a small push/pull handle located on the instrument panel. Pull the handle to open the heating valve and bring hot air into the cockpit.

The cockpit heating system is shown in the following figure:

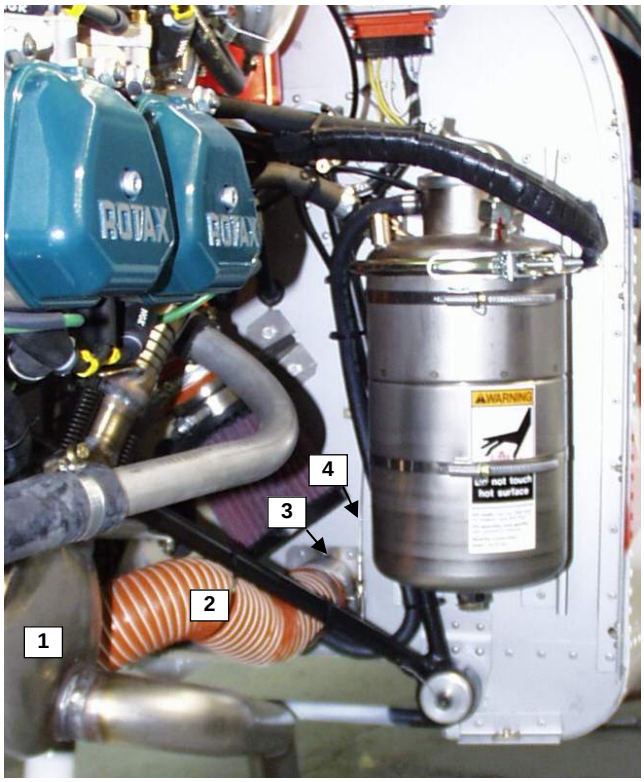


Fig. Cockpit heating system
1- muffler, *2* - air hose,
3 - on the firewall mounted heating flap, *4* - heating valve control cable

2.3.18 Ventilation

2.3.18.1 Description

Canopy vent windows:

- The windshield air window - turn the window to open two air holes. It is highly recommended to close the window while the aircraft is parked to prevent water seeping onto the instrument panel.

- The side sliding window (standard on the left-hand side of the canopy, optional on the right-hand side) with a vent air flap. This window may be equipped with a lock. The nut should be tightened slightly from time to time to prevent the air flap from accidently opening at high airspeeds.

Fig. Windshield air window

Fig. Side sliding window
1 - window, *2* - vent air flap,
3 - window lock

2.3.19 Wiring

2.3.19.1 Wiring description

The electric system is a single-wire type with the negative side connected to the chassis. The power source is a single-phase generator integral to the engine. A 12V/16Ah maintenancefree battery is located on the firewall. The system is protected by the main 30 Amp circuit breaker. The circuits of the particular sections are each guarded individually by circuit breakers.
The dual engine ignition is a separate part of the electrical system.

2.3.19.2 Wiring diagram

The wiring system will vary and depends on the instrumentation, electronic equipment, and electric accessories of your aircraft.
See supplement No. 1 to this Airplane Maintenance and Inspection Procedures to find wiring diagrams of your airplane.

2.3.19.3 Circuit breakers

The circuit breakers are located on the lower edge of instrument panel.
See supplement No. 1 to this Airplane Maintenance and Inspection Procedures for circuit breakers detailed description of your airplane.

2.3.20 Pitot-static system

2.3.20.1 Pitot-static system description

The Pitot-static tube, located under the left wing near the aileron root, provides both total and static air pressure.
Pressure distribution to individual instruments is done through flexible plastic hoses.
Keep the system clear to ensure its correct function.
Both hose systems (Total and Static) are equipped with dirt pockets. The dirt pockets are located inside the cockpit in front of the pilot's seat.

2.3.20.1.1 Pitot system draining

Type of maintenance: line, preventive
Authorization to perform: - Aircraft owner (only for ELSA)
- Sport pilot or higher
Tools needed: none
Parts needed: none
Instructions:
If water gets inside the system, unscrew the covers from the dirt pockets and slightly blow into the Pitot-static head. Then screw the covers back and check the packings.

CAUTION
Avoid blowing into the Pitot-static system with the dirt pocket cover is closed - it may cause an instrument malfunction.

Task proper accomplishment check: Check the dirt pocket covers are tight

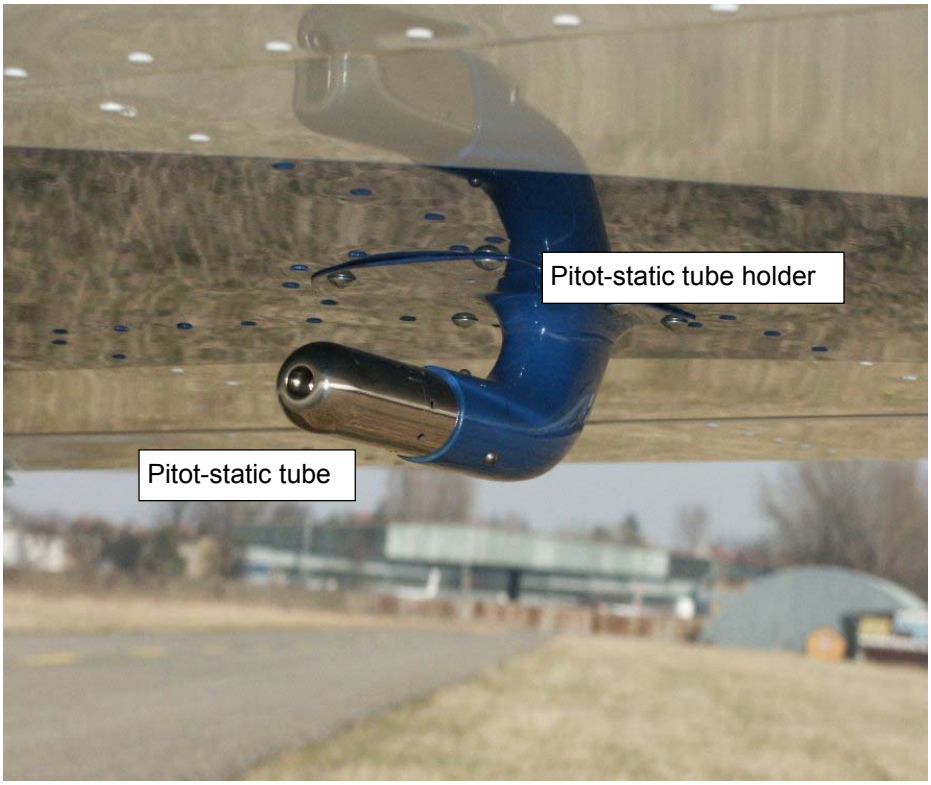


Fig. Pitot-static tube under the left wing

2.3.21 Placards

A new aircraft is equipped with placards supplied by the airplane manufacturer.
These placards explain the purpose of controls, instruments, airspeed limits, weight limits, etc. Placards with supplemetal information such as a direction of handles are also supplied.
The placards are usually attached to the appropriate instruments and controls. Limitation placards are attached to the canopy, external placards are attached on the appropriate aircraft part, however placards may vary slightly from plane to plane.

CAUTION
The owner (aircraft operating agency) of the aircraft is responsible for the readability of placards during the aircraft service life.

2.3.21.1 Placards renewal

Type of maintenance: minor.
Authorization to perform: - Aircraft owner (only for ELSA)
- Sport pilot or higher
Tools needed: scissors
Parts needed: placards
Instructions:
In case of placard damage or unreadibility, it is permissible to copy placards enclosed in the Appendices of these Procedures (copy on suitable adhesive tape) to replace the damaged placard.
Task proper accomplishment check: Check the new placards shows proper information, check it is properly attached.

3. OPERATION

3.1 Operation outlines

During operation of the ***SPORTSTAR*** it is required to have in the following documentation in the plane (or according to appropriate aviation authority requirements):

- Aircraft Operating Instructions for ***SPORTSTAR*** Light Sport Aircraft
- Aircraft Station Licence
- Certificate of Registration
- Certificate of Airworthiness
- Insurance Certificates
- Log Book (recommended)
- Other documents required by valid regulations and rules

However it is recommended to have on board other supplied manuals and documents e.g.:

- Aircraft Maintenance and Inspection Procedures for ***SPORTSTAR*** Light Sport Aircraft
- Engine Operator's Manual
- Propeller Operator's Manual
- Additional documents supplied with instruments or equipment

The airworthiness and operational readiness of the airplane depends upon the careful adherence to the recommended procedures and regulations. Climate, aerodrome conditions, dustiness, manner of hangaring and other factors, such as the corrosive effects of industrial or seaside areas, should be considered.
The procedures given in this manual suit average operational conditions, more harsh environments may require more frequent maintenance intervals.

3.2 Airplane assembly

3.2.1 Wing

3.2.1.1 Wing assembly

The wing assembly procedure for an aircraft not-equipped with the optional wing folding mechanism is the following (3 persons are needed to accomplish this task):

3.2.1.1.1 Task information

Type of maintenance: heavy.
Authorization to perform:

- Repairman (LS-M) or Mechanic (A&P) – both with the minimum level of certification to perform heavy maintenance of SLSA in the U.S.
- FAA approved Part 145 Repair station

Tools needed:

- a hammer to move the wing suspension pins
- a screwdriver to attach wing fillets
- wrenches to tighten the rear wing suspension bolt nut

Parts needed: recommended grease

3.2.1.1.2 Wing-to-fuselage assembly procedure

The assembly procedure of one half of the wing is the following.
The procedure for both halves is similar.

1. Thoroughly clean and lubricate all the wing suspensions and bolts with a suitable lubricant before the assembly. Also lubricate the flap root groove.
2. The first person holds the wing tip, the second person holds the wing root leading edge, while the third holds the wing root trailing edge.

CAUTION
Take care of the pitot-static tube when handling the left wing.

3. Set the wing carefully on the wing attachments on the fuselage in such a way that the wing flap is set with the slot on the control pin. When sliding the wings on the attachments take increased care so that damage to hoses of pitotstatic system (left half of the wing) and electric system cables cannot occur.
4. Set the wing so that the attachments on the wing and on the fuselage are concentric.
5. The person keeping the wing on the leading edge will insert the pin into the upper main attachment (the pin head is in flight direction) and will insert the spacer with connected safety pin inside wing suspension (between rear eye and fuselage suspension). Shift pin by means of slight hammering to the stop (shifting can be facilitated by slight moving the wing tip up and down). Thereafter insert the pin into the lower main attachment and shift it by slight hammering to the stop.
6. Insert the bolt into the rear attachment of the wing and push it by slight hammering to the stop. Put the washer on the bolt and screw the nut on it. Secure the nut by means of the safety pin.
7. Put on the washers on the wing main attachment pins and secure the pins by cotter pins.
8. Connect the aileron control pull rod, secure the joint.
9. Connect fuel hoses to beaks on the fuselage and secure it with hose clip. Keep hose connection according to placards on the left side of the fuselage.
10. Connect wiring.
11. Install pitotstatic system and carry out leakage test of the pitotstatic system.
12. Install wing fairings.

Task proper accomplishment check: Visually check that all pins are inserted and secured properly. Visually check the all control system joints are connected

3.2.1.2 Wing disassembly

3.2.1.2.1 Task information

Type of maintenance: heavy.
Authorization to perform:

- Repairman (LS-M) or Mechanic (A&P) – both with the minimum level of certification to perform heavy maintenance of SLSA in the U.S.
- FAA approved Part 145 Repair station

Tools needed:

- a hammer to tap the wing suspension pins out
- a screwdriver to unscrew the wing fillet connection screws
- wrenches to unscrew the rear wing suspension bolt nut
- a drift made from duralumin round or other suitable material (diameter 10-12 mm) to drive out the wing suspension pins

Parts needed: none

3.2.1.2.2 Wing-from-fuselage disassembly

1. Remove the fuselage-wing fairings.
2. Drain all fuel from tanks. Push airplane tail down (almost to the ground) to allow drain of the all unusable fuel.
3. In case of dismatling the left half of the wing disconnect hoses of pitotstatic system.
4. Disconnect fuel hoses from beaks on the fuselage
5. Disconnect cable plugs and sockets of electrical system.
6. Disconnect aileron control pull rod.
7. The first person will lay hold on the wing tip, the second person by the root on the leading edge, the third person by the root on the trailing edge.
8. Push out the safety pin securing the crown nut of the rear pin and dismantle the rear pin of the wing attachment.
9. Release pins (push out the cotter-pins) on the main atatchments of the wings.
10. Releave the wing by slight lifting the wing tip upwards.
11. By meas of hammer and round timber knock out the lower and the upper pin from the main wing attachments.
12. By pulling the wing in direction from the fuselage, disconnect the wing from the fuselage.
13. Position the disconnected wing in such a way that its damaging cannot occur.

Task proper accomplishment check: Check that nothing was damaged on the airplane due to wing removal.

3.2.2 Horizontal tail unit

Type of maintenance: heavy.
Authorization to perform:
- Repairman (LS-M) or Mechanic (A&P) – both with the minimum level of certification to perform heavy maintenance of SLSA in the U.S.
- FAA approve d Part 145 Repair station

Tools needed:
- a wrench for M8 nuts
- a screwdriver for the tail unit/fuselage fairing

Parts needed: recommended grease

3.2.2.1 HTU-from-fuselage disassembly

1. Unscrew attachment bolts of HTU-fuselage fiberglass cover.
2. Disconnect the trim tab control cables.
3. Disconnect the elevator control rod.
4. Remove the safety pins securing the castle nuts on the bolts of the stabilizer rear suspensions. Screw off the nuts and remove the washers.
5. Draw the HTU out of the fuselage.
6. Put connecting components in a safe place to avoid loosing them.

3.2.2.2 HTU-to-fuselage assembly

3.2.2.2.1 Necessary tools

3.2.2.2.2 HTU-to-fuselage assembly

1. Make the connecting components ready, clean and lubricate HTU suspensions.
2. Insert the HTU from the rear into the fuselage as far as the stabilizer will go into the two pins in the front, and the two bolts (M8) in the rear. Take care of the trim tab control cables.
3. Put the washers on the M8 bolts. Screw on the castle nuts, and secure with a safety pins.
4. Attach the HTU/fuselage fairing using screws.
5. Insert the M8 bolt to connect the elevator control hinge with the control rod. Put on a washer, and self-locking nut.
6. Connect trim tab control cables.
7. Adjust the elevator and trim tab deflections (see 3.4.6)

Task proper accomplishment check:
- check proper attachment of trim control cables (upper cable to trim upper surface)
- check HTU proper attachment and securing of all joints
- check elevator and trim tab deflection

3.2.3 Vertical tail unit

3.2.3.1 Assembly and Disassembly of the rudder

3.2.3.1.1 Task information

Type of maintenance: heavy.
Authorization to perform:

- Repairman (LS-M) or Mechanic (A&P) – both with the minimum level of certification to perform heavy maintenance of SLSA in the U.S.
- FAA approved Part 145 Repair station

Tools needed:

- a wrench to tighten/remove the M5 nut

Parts needed: none

3.2.3.1.2 Rudder-from-fuselage disassembly

1. Disconnect the rudder control cables, attach the ends of the cables together to keep the cables from slipping inside the fuselage.
2. Remove the safety pin from the lower suspension bolt. Remove the castle nut and washer.
3. Lift and remove the rudder from suspensions

3.2.3.1.3 Assembly procedure

1. Put the rudder on the fin suspensions from above. Use care not to move the spherical bearings in the rudder suspensions.
2. If necessary insert a washer to adjust lower suspension clearance.
3. Put the washer on the lower suspension bolt, tighten the castle nut and secure with a safety pin.

Attach the rudder control cables. Use tab washers to secure bolt heads.

Task proper accomplishment check: check securing of all joints.

3.2.4 Landing gear

Type of maintenance: line.
Authorization to perform: - Aircraft owner (only for ELSA)
- Sport pilot or higher

Tools needed:
- flat screwdriwer
- allen wrench No. 6

Parts needed: none

3.2.4.1 Disassembly of wheel pants

Instructions:
Main wheel pants are attached from inner side by means of the holder with 8 bolts to the main landing gear leg and with one bolt from outside to the wheel axle.

1. Remove 8 bolts attaching the wheel pant from inner side to the holder.
2. Remove the bolt attaching the wheel pant to the wheel axle.
3. The nose landing gear wheel pant consists of two parts. The rear part is attached by two bolts to the brace on the landing gear leg and by another two bolts to the braces on the landing gear fork. The front part of the wheel pant is bolted by 10 bolts to the rear part of the wheel pant. Remove 10 bolts connecting both parts of the wheel pant.
4. First remove two side bolts on the rear wheel pant and then two bolts on the upper side of the wheel pant.

3.2.4.2 Assembly of wheel pants

When assembling the main landing gear wheel pant, proceed as follows:

1. Set the wheel pant to position and bolt it with 8 bolts to the holder.
2. From outside insert the bolt with washer into the hole in the wheel pant. From inner side of the wheel pant shift the spacing tube on the bolt and screw the bolt into nut hole in the wheel center. Secure the bolt head with locking wire in order to prevent from its turning.
3. At assembling the nose wheel pant proceed in the following way:
4. By using two bolts with washers attach the rear part of the wheel pant to the brace on the nose landing gear leg. Attach the wheel pant on the sides with two remaining bolts with washers to the braces on the landing gear fork.
5. Shift the front part on the rear part of the wheel pant and join both parts using 10 bolts with washers.

Task proper accomplishment check: check tightening of bolts and securing of bolt head by wire

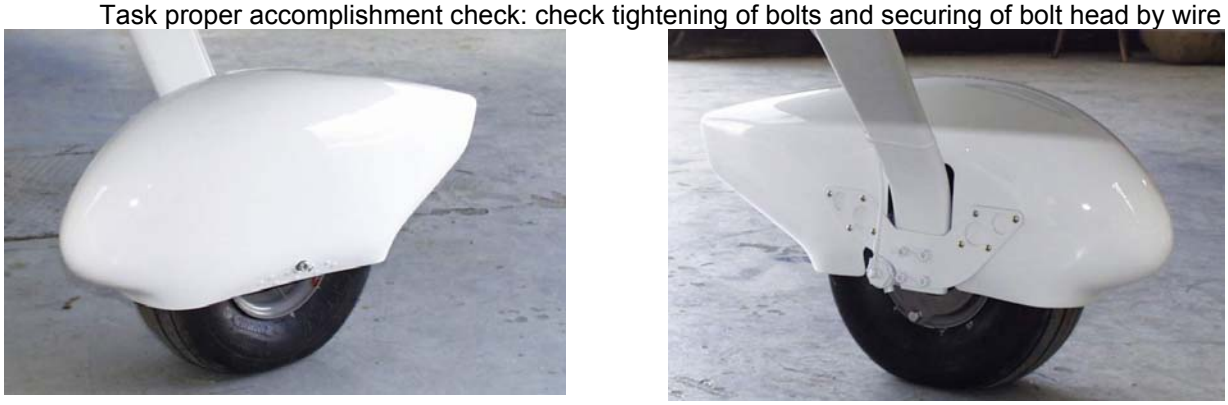


Fig. Main wheel pants

Fig. Nosewheel pant

3.2.4.3 Disassembly of nose landing gear wheel

Type of maintenance: heavy.
Authorization to perform:

- Repairman (LS-M) or Mechanic (A&P) – both with the minimum level of certification to perform heavy maintenance of SLSA in the U.S.
- FAA approved Part 145 Repair station

Tools needed:

- a support
- cut pliers
- flat screwdriver
- allen wrench No. 6

Parts needed: recommended grease
locking wire

Instruction

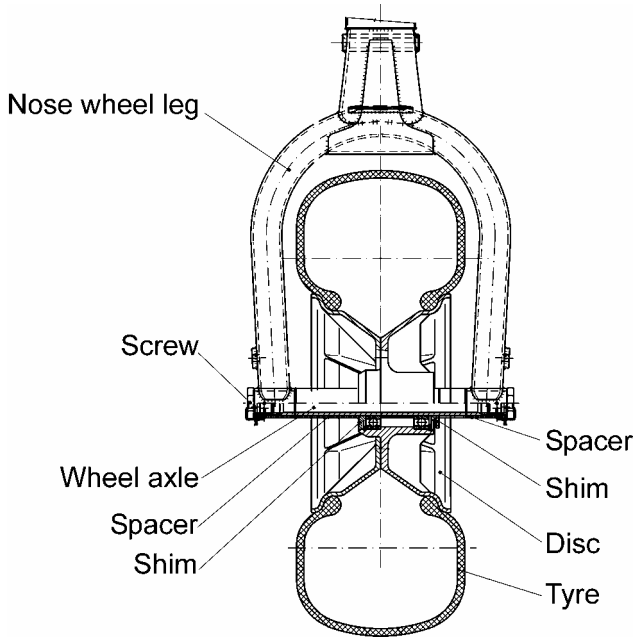
1. Jack and support the airplane.
2. Disassemble the nose landing gear wheel pant.
3. Cut the locking wire securing side screws.
4. Disassemble one side screw.
5. Release the wheel axle from the wheel hub and the fork eyes.

3.2.4.4 Assembly of nose landing gear wheel

Instruction:

1. Clear the wheel axle of impurities and grease it slightly.
2. From one side shift the axle into the landing gear leg fork eye.
3. Gradually put on the long spacer, shim, nose wheel, shim and short spacer on the wheel axle according to the figure (from the right in the flight direction).
4. From both sides screw and tighten screw in the wheel axle.
5. Check for free turning of the nose wheel (turning must be continual without catching).
6. Secure side screw with locking wire to prevent from their releasing according to figure.
7. Reassemble the wheel pant.

Task proper accomplishment check: check free rotation, no clearance, securing of screw heads.



3.2.4.5 Disassembly of main landing gear wheel

Type of maintenance: heavy.
Authorization to perform:
- Repairman (LS-M) or Mechanic (A&P) – both with the minimum level of certification to perform heavy maintenance of SLSA in the U.S.
- FAA approved Part 145 Repair station

Tools needed:
- a support
- flat screwdriver
- nut wrench

Parts needed:
- recommended grease
- locking wire

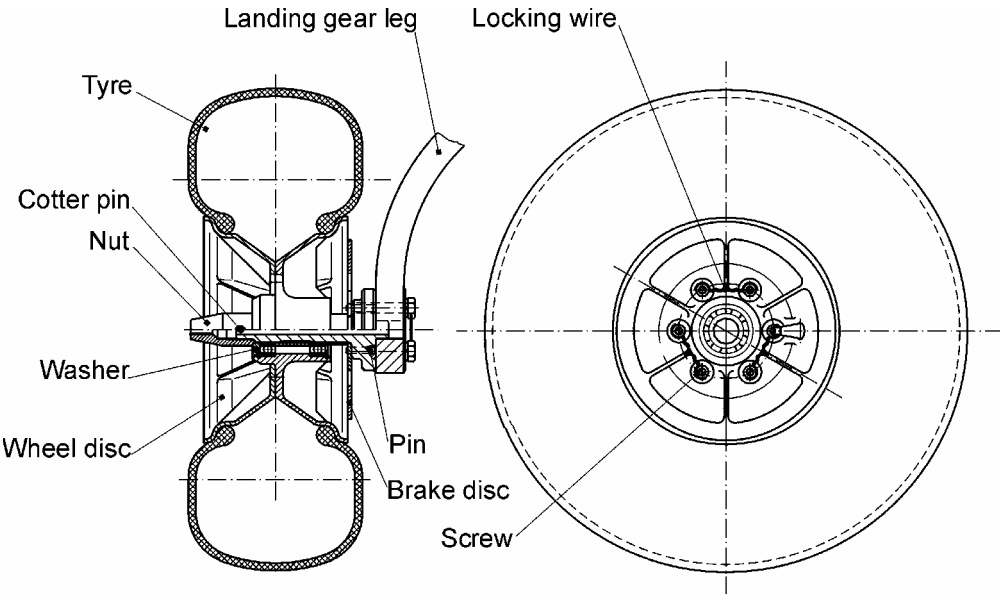
The main landing gear wheel assembly consists of the brake disk and the brake. At assembling proceed according to Fig. – see below:

1. Jack and support the airplane
2. Disassemble the main landing gear wheel pant (see paragraph 3.2.4.1)
3. Unscrew 3 bolts connecting the brake plate with the wheel disc.
4. Disassemble the cotter-pin of the securing nut
5. Unscrew the nut.
6. Remove the washer from the wheel axle.
7. Release the wheel from the shaft

3.2.4.6 Assembly of main landing gear wheel

1. Clear the wheel axle of impurities and apply slight layer of grease on it.
2. Shift the wheel on the axle.
3. Put the washer on the wheel axle.
4. Screw and tighten the nut on the wheel axle.
5. Secure the nut with the new cotter pin.
6. Reassemble the brake plate, secure bolts with the washer.
7. Reassemble the wheel pant (see 3.2.4.2).

Task proper accomplishment check: check free rotation of wheel, no clearance, securing of screws.



3.2.4.7 Removal and replacement of mudguards

Type of maintenance: line.
Authorization to perform:
- Aircraft owner (only for ELSA)
- Sport pilot or higher

Tools needed:
- a support to lift the plane
- cut pliers
- nut wrench
- allen wrench

Parts needed: securing wire

The aircraft may be equipped with optional mudguards to prevent wing lower surface pollution.

3.2.4.7.1 Main landing gear wheel mudguard

Demounting

1. Support the airplane to lift the main wheel with the mudguard to be removed
2. Cut the safety wire securing the screw that attaches the mudguard to the axle (1 screw) and the safety wires securing the screws at internal leg side (two screws)
3. Remove the screw attaching the mudguard to the axle
4. Remove the two screws attaching the mudguard to the main landing gear leg from the inner side
5. Remove washers
6. Remove the mudguard

Mounting

Use the following procedure to mount a mudguard on an airplane not equipped with mudguards by the manufacturer (use the opposite procedure to the demounting one (see above) to mount a mudguard back on a main leg)

1. Support the airplane to lift a main wheel on which a mudguard would be mounted on
2. Remove the cotter pin securing the castle nut on the wheel axle
3. Remove the castle nut and washer
4. Put the new castle nut, supplied with mudguards, on the wheel axle, tighten
5. Secure the nut with a cotter pin
6. Mount a mudguard on the wheel
7. Attach the mudguard to the main leg with two screws (use washers), slightly tighten.

8. Use the screw and washer to attach the mudguard to the castle nut on the axle, slightly tighten
9. Adjust mudguard position
10. Tighten all the screws
11. Secure all screws with safety wires
12. Remove the airplane from supports

3.2.4.7.2 Nose- wheel mudguard

1. Lift and support aircraft middle section
2. Dismount and remove the nosewheel axle
3. Remove the nosewheel
4. Unscrew the screws attaching the mudguard to the nosewheel fork

Task proper accomplishment check: check proper attachmentof mudgards, securing of screws by securing wire

3.2.5 Cockpit canopy

Type of maintenance: line.
Authorization to perform:
- Aircraft owner (only for ELSA)
- Sport pilot or higher

Tools needed:
- flat screwdriver
- nut wrench No. 9 and 10

Parts needed: none

3.2.5.1 Canopy demounting

The front portion of the canopy can be removed, while the rear portion is fixed. The front section of the canopy is attached to the fuselage with two screws. The weight of canopy is counter-balanced with two gas struts inside the cockpit. Use the following procedure to remove the front canopy:

1. Unscrew and remove canopy cover sheets (this cover has an "ear" shape)
2. Lift the canopy
3. Remove the screws from the console that holds the gas strut ball ends at the canopy frame
4. Carefully remove the canopy attachment screws. Caution: The front canopy hinges, and the canopy should be supported
5. Remove the canopy

3.2.5.2 Canopy mounting

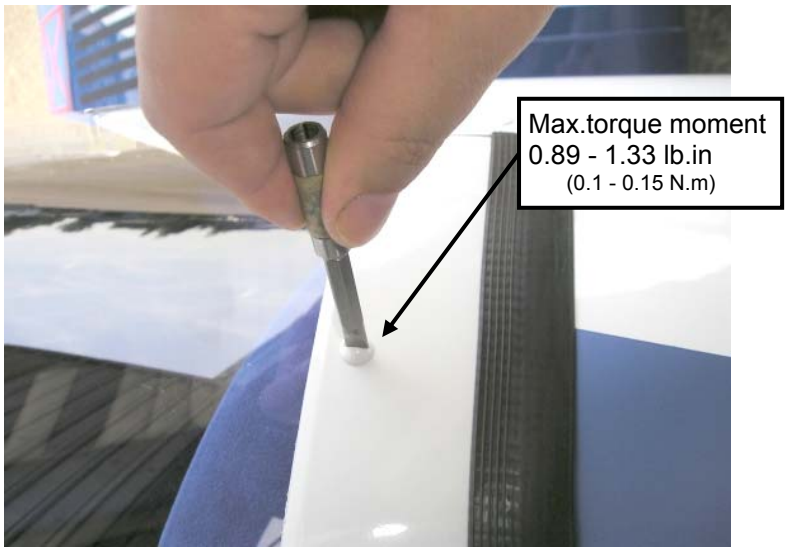
The Mounting procedure is the reverse.

Task proper accomplishment check: Check proper attachment of canopy, open and close it. Check if it may be locked in closed position.

3.2.5.3 Tilting canopy glass crack prevention

CAUTION
Do not tighten fully the canopy glass attachment screws!
There is specified the torque moment 0.89 to 1.33 lb.in (0.1 to 0.15 N.m) for these screws.
Canopy glass cracks may occur if the screws are overtightened.

Note: The airplane manufacturer does apply Emfimastic PU 50 sealant between the canopy frame and glass. This sealant protects the screws from loosening.



3.2.6 *Installation and reinstallation of instruments*

Type of maintenance for the pitot static instruments: heavy.
Authorization to perform:

- Repairman (LS-M) or Mechanic (A&P) – both with the minimum level of certification to perform heavy maintenance of SLSA in the U.S.
- FAA approved Part 145 Repair station

Type of maintenance for the other instruments: line.
Authorization to perform:

- Aircraft owner (only for ELSA)
- Sport pilot or higher

Tools needed:

- flat screwdriver
- other tools according to installed instruments

Parts needed: Refer to manuals supplied with particular instruments

Insructions:
The installation procedure will depend on the instrument being installed. Follow the manufacturer recommendations (manuals supplied with particular instruments).
Ordinarily, there is no need to remove the instrument panel when installing or removing an instrument. Remove the instrument attaching screws and remove the instrument from the back of the instrument panel (after disconnection of appropriate wires or hoses). If it is necessary to gain access to the instrument wiring, remove the sheet cover over the instrument panel.

Task proper accomplishment check: Refer to manuals supplied with particular instruments

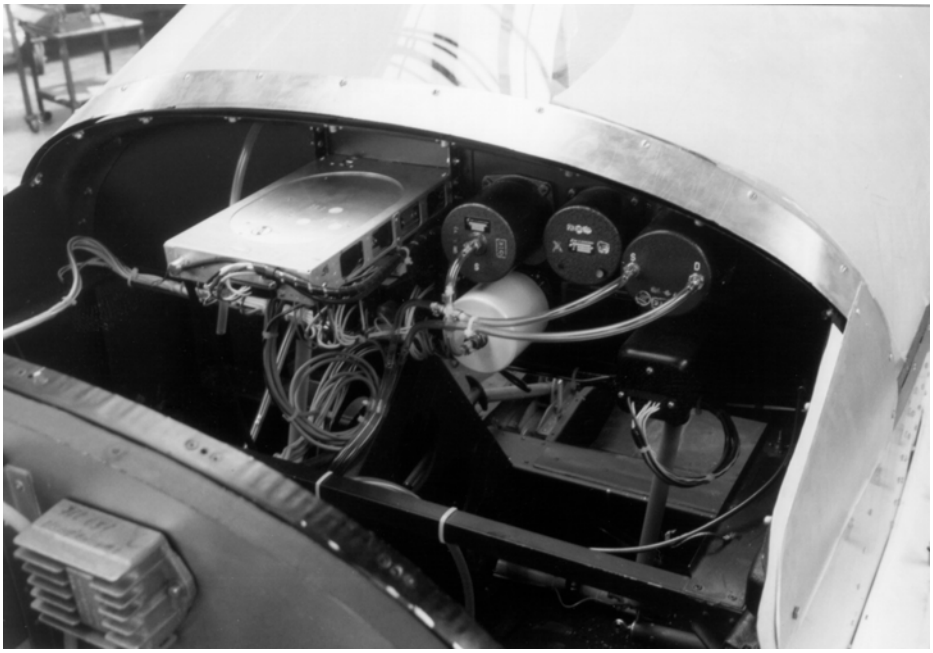


Fig. Access to the instruments mounted on the instrument panel after removal of the cover

3.3 Leveling

Type of maintenance: heavy.
Authorization to perform:

- Repairman (LS-M) or Mechanic (A&P) – both with the minimum level of certification to perform heavy maintenance of SLSA in the U.S.
- FAA approved Part 145 Repair station

Tools needed:

- jacks to lift and level the aircraft
- level instrument
- roll meter

Parts needed: none
Instructions:
Leveling is used to check the airframe alignment.
First set the aircraft in a horizontal position (use boards) according to leveling points. The leveling points are the rivets on the aircraft which are (generally) marked with red paint. The location of the points is shown in the Leveling Record. Use the leveling points 1(3) and 2(4) to set the airplane in a horizontal position in longitudinal direction, and leveling points 5 and 7 in lateral direction.
Boards, under the main or nosewheel, may be used to level the airplane. The best way to measure a leveling point height is to use a level. Alternatively a running meter is sufficient for approximate measurement.
Measured values should be recorded in the Leveling Record (see Appendices). Height differences between corresponding leveling points have to be calculated. A check must than be carried out to prove that any differences do not exceed the tolerances permitted in the Leveling Record.
If any difference exceeds the permitted tolerance, the aircraft assembly, plays in hinges and eventual permanent deformations, should be inspected.
The aircraft manufacturer should be contacted in serious cases.

Task proper accomplishment check: Compare measured values with those ones prescribed in leveling record.

3.4 Measurement of control surfaces deflections

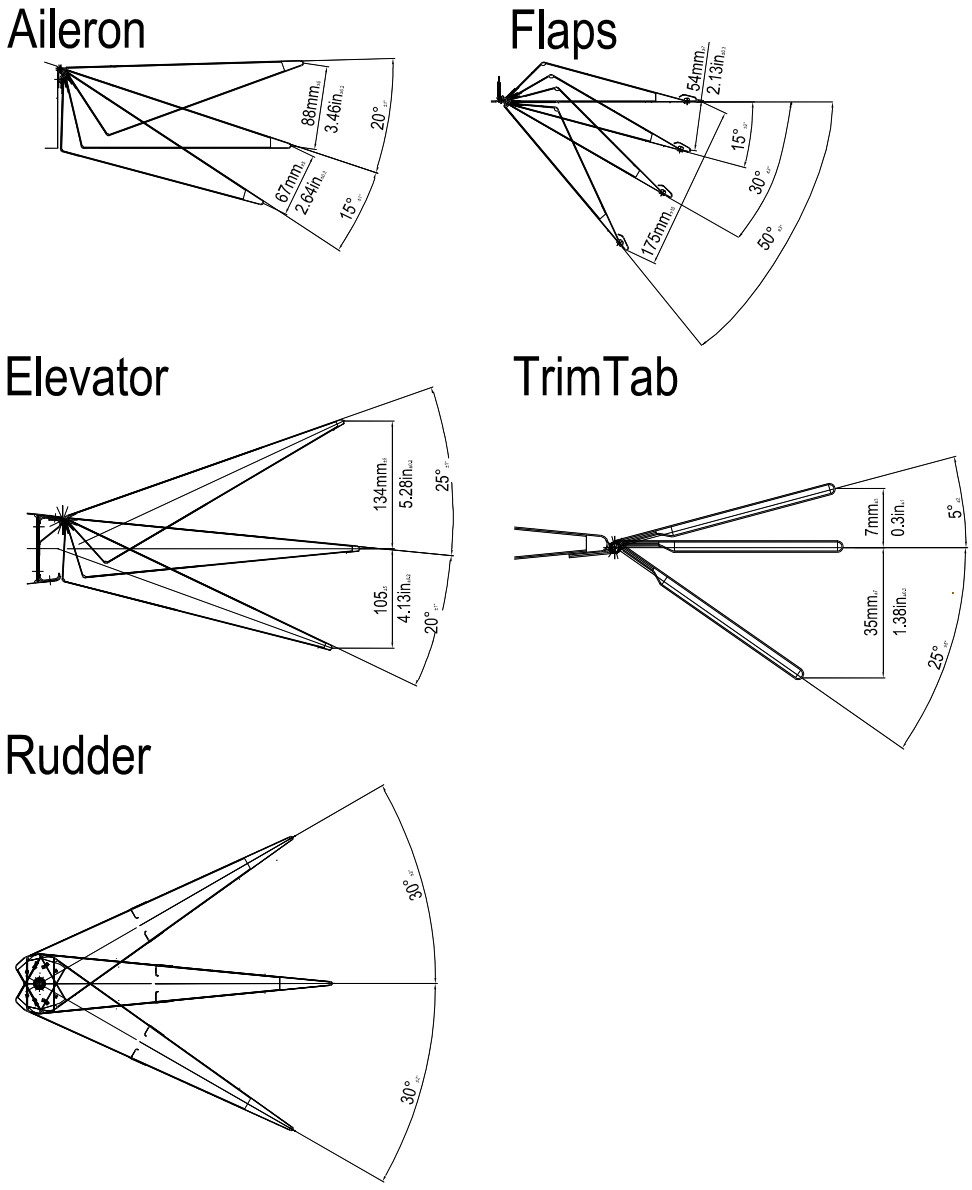
Type of maintenance: line.
Authorization to perform: - Aircraft owner (only for ELSA)
- Sport pilot or higher

Tools needed:
- protractor with deflecting hand
- a clamp to fix protractor on control surface

Parts needed: none
Task proper accomplishment check: Compare measured deflections with those ones prescribed in Control surfaces deflection record.

3.4.1 Required deflections

The deflection of the control surfaces are specified in the Control Surfaces Deflection Record (see Appendices of this Manual) and in the following Figure. A protractor with deflecting hand is used by the airplane manufacturer to measure deflections. The protractor is attached to a control surface with a hand clamp. There are also alternative procedures in the following text.



3.4.2 Aileron deflection measurement

Measurement procedure:

1. Attach a protractor with a deflection hand at the aileron upper surface by means of a clamp.
2. Set the aileron in neutral position (the aileron must fit the wing profile).
3. Zero the protractor - starting position for measurement .
4. Deflect the aileron fully down/up and note the deflections.
5. Compare, the measured deflections with the ones specified in the Control Surfaces Deflection Record. If required - adjust the aileron deflection according to par. 4.11.1 .

If a protractor is not available, the following procedure may be substituted:

1. Insert a stiff cardboard sheet of paper in the space between the aileron and the flap. Hold the drawing paper against the flap.
2. Put the aileron in a neutral position. Then trace its profile (upper surface from the hinge to the trailing edge). Then trace the profile of the aileron fully deflected in both directions.
3. Remove the drawing paper and measure the deflection from the neutral position using a protractor.
4. Compare the measured deflections with those specified in the Control Surfaces Deflection Record. If required - adjust the aileron deflection according to 4.11.1.

3.4.3 Flap deflection measurement

The wing flaps can be set in 4 positions: RETRACTED, TAKEOFF, LANDING (2 positions).
Measurement procedure:

1. Cut a strip of aluminium sheet 2 inches (50 mm) wide. The strip is than attached to the flap lower surface with two bolts (somewhere in the middle of the flap span where two nuts are riveted). The strip should overhang the flap trailing edge.
2. Attach a protractor with a deflection hand at the strip using a clamp.
3. Zero the protractor - this will be the starting position for measurement with the flaps retracted
4. Extend the flap to the required position using the flap control lever and read the deflection
5. Compare the measured deflections with those specified in the Control Surfaces Deflection Record. If required - adjust flap deflection according to the par. 4.11.2.

If a protractor is not available, the following procedure may be substituted:

1. Insert a stiff cardboard sheet of paper in the space between the aileron and the flap. Hold the drawing paper against the flap.
2. Trace the profile of the retracted flap on the lower surface from the hinge to the flap trailing edge)
3. Move the flap to an extended position and trace the lower surface profile again
4. Remove the drawing paper and measure the deflection from the "RETRACTED" position using a protractor
5. Compare the measured deflections with those specified in the Control Surfaces Deflection Record. If required - adjust flap deflection according to the par. 4.11.2.

3.4.4 *Elevator deflections measurement*

The starting position to measure the elevator deflections is the neutral positions of the control stick and elevator. The neutral position of the control stick is set by the aircraft manufacturer, by means of a jig. The distances between the control stick and instrument panel, and between the control stick and fuselage side can be used to set the neutral position. When the elevator is in the neutral position, the chord of the Horizontal tail unit will be parallel to upper edge of the fuselage side (lower frame of the cockpit).

Measurement procedure:

1. Attach a protractor with a deflection hand at the elevator trailing edge
2. Set the elevator to the neutral position
3. Zero the protractor
4. Fully pull or push the control stick to deflect the elevator and read the deflection
5. Compare the measured deflections with those specified in the Control Surfaces Deflection Record. If required - adjust elevator deflection according to the par. 4.11.3.

If a protractor is not available, the following procedure may be substituted:

1. Support the airplane under the tail skid and firewall and set the airplane in a horizontal position (a level set on the canopy lower frame can be used to set the airplane in horizontal position)
2. Stand a suitable staff close to the elevator trailing edge and mark the neutral position of the elevator.
3. Move the control stick and fully deflect the elevator. Mark the positions of the elevator while fully deflected
4. Measure the distances between marks on the staff
5. Compare the distances with those specified in Fig. 3.4.1. If required - adjust elevator deflection according to the par. 4.11.3.

3.4.5 *Rudder deflection measurement*

The rudder deflections are set by the aircraft manufacturer. If necessary the rudder deflections can be adjusted by adjustable stops located on the rudder control cable in the cockpit (see figure on page 2-24).

A measuring instrument is used by the aircraft manufacturer to measure the rudder deflections. The instrument is put on the vertical tail unit and a rudder deflection may be read directly.

The rudder deflection may be measured however, when the set the rudder is set to the neutral position. Stand a suitable staff at the ruder trailing edge and mark lower edge of the rudder. Fully deflect the rudder and measure using a ruler between the mark on the staff and the lower edge of the rudder. Compare the measured distance with that specified in 3.4.1.

3.4.6 *Trim tab deflections measurement*

The trim tab deflection is measured from the neutral position. When the trim tab profile does not protrude from the elevator profile with elevator set in neutral position.
Measurement procedure:

1. Attach a protractor with a deflection hand at the trim tab
2. Neutralize the trim tab and the elevator
3. Zero the protractor
4. Set the trim tab in maximum lower or upper position using the trim tab control lever and read the deflection from the protractor scale.
5. Compare the deflection with that specified in the Control Surfaces Deflection Record. If required - adjust trim tab deflection according to the par. 4.11.5.
6. Check tension of trim tab control cables according to the following procedures:
   Block elevator against to movement and trim tab control lever set to the neutral position. Apply a load of 20 N (preferably according to a dynamometer) to the trim tab trailing edge. The trim tab deflection must not exceed value of 5^{+2} mm from the original position. If the trim tab deflection exceeds this value, then it is necessary to adjust trim tab cable preload by adjusting screws.

If a protractor is not available, the following procedure may be substituted:

1. Insert a stiff cardboard sheet of paper in the space between the elevator and the trim tab and hold the cardboard against the elevator.
2. Trace the profile of the neutralized trim tab
3. Move the trim tab to the maximum (both directions) using the trim tab control lever and trace the profile again
4. Remove the cardboard and measure the deflection from the neutral position using a protractor
5. Compare the deflection with that specified in the Control Surfaces Deflection Record. If required - adjust trim tab deflections according to the par. 4.11.5.
6. Check tension of trim tab control cables according to the following procedures:
   Block elevator against to movement and trim tab control lever set to the neutral position. Apply a load of 20 N (preferably according to a dynamometer) to the trim tab trailing edge. The trim tab deflection musn't exceed value of 5^{+2} mm from the original position. If the trim tab deflection exceeds this value, then it is necessary to adjust trim tab cable preload by adjusting screws.

3.5 Permissible Tolerances

Type of maintenance: clearance finding - line.
play compensation - heavy

Authorization to perform:

clearance finding - Aircraft owner (only for ELSA)
- Sport pilot or higher

play compensation – Repairman (LS-M) or Mechanic (A&P) – both with the minimum level of certification to perform heavy maintenance of SLSA in the U.S.
– FAA approved Part 145 Repair station

Tools needed: no special tools to find excessive play

Parts needed: swivel bearing, pins if replacement is necessary to be consulted with aircraft manufacturer.

The following table indicates the permissible tolerances for critical parts of the airplane. These values should not be exceeded in operation.

It is expected that an operator will take steps if excessive plays are found on/in part not listed below.

System	Procedure to find a play	Procedure to remedy a play	Max. product. play	Max. operat. play
Ailerons control system	Block ailerons up to the wing and move the control stick to the left and right	Check condition of bearings and replace if needed	*0.08 in* 2 mm	*0.2 in* 5 mm
Elevator control system	Block elevator up to the stabilizer, pull and push the control	Check condition of bearings and replace if needed	*0.08 in* 2 mm	*0.2 in* 5 mm
Flaps control system	Set the flaps in all position by degrees and then handle the flap trailing edge near the flap root, move the trailing edge up/downward to find possible plays	Check the part with oval hole for the control pin in the flap root rib and replace the worn-out pin or the part with oval hole.	*0.08 in* 2 mm	*0.2 in* 5 mm
Trim tab control system	Block the tab up to the elevator, move the trim tab control lever to find a play in a control system	Check cable tension	*0.08 in* 2 mm	*0.2 in* 5 mm
Wing-Fuselage attachment	Move the wing tip and note play in wing suspensions (play is measured on the wing tip).	Check wing suspensions, replace pins	*0.08 in* 2 mm	*0.16 in* 4 mm
HTU attachment	Move the stabilizer tip forward-rearward	Replace bearings in suspension points and bearings in control system	0	*0.08 in* 2 mm
Rudder hinges	Lift the rudder	Change swivel bearing or insert a washer under the lower hinge pin	*0.04 in* 1 mm	*0.08 in* 2 mm
Nose wheel	Push the rear part of the fuselage down (use a weight) to lift the nosewheel, then move the wheel forward- rearward	Remove the wheel, remove the rim and tire and replace the bearings	*0.04 in* 1 mm	*0.12 in* 3 mm
Main landing gear	Lift the wing tip (hold the wing under the main spar) to lift a main leg, then move the wheel forward-rearward and note play in bearings or leg attachment	Check the leg attachment, wheels attachment, replace the bearings, if necessary	*0.04 in* 1 mm	*0.12 in* 3 mm

Task proper accomplishment check: check replaced parts are properly installed,
check plays after replacement

3.6 Weighing the airplane and C.G. calculation

WARNING
Never exceed the maximum takeoff weight and c.g. range for any configuration of crew, fuel and baggage as shown in the Aircraft Operating Instructions.

The removal or addition of equipment may result in changes to the center of gravity and empty weight of the aircraft. The permissible useful load can also be affected. In such case a new weight and balance is necessary to determine the new empty weight and center-of-gravity position. The new empty weight and C.G. position should be recorded in the Aircraft Operating Instructions, Section 6., Weight and Balance Record / Permitted Payload Range. Then a new permitted crew weight f or fueling and baggage must be computed and recorded. The cockpit placard "Load Limits" should also be up-dated.

3.6.1 Empty weight determination

Type of maintenance: line.
Authorization to perform: - Aircraft owner (only for ELSA)
- Sport pilot or higher

Tools needed:
- scales
- ramp boards
- rests under wheels to level the aircraft

Parts needed: Weight and Balance Record
Instructions:
The empty weight of an aircraft includes all operating equipment that has a fixed location and is actually installed in the airplane. It includes the weight of the painted airplane, accumulator, standard and optional equipment, full engine coolant, hydraulic fluid, brake fluid, oil and unusable fuel (2.0 liters / 0.5 USGal). The aircraft is weighed without crew and baggage.

The following weighing procedure is recommended:
1. Remove excessive dirt, grease, moisture from the airplane before weighing
2. Weigh the airplane inside a closed building to prevent errors due to wind
3. Place the scales, calibrate zero
4. Place the airplane on the scales (use boards to run on the scales or lift the airplane - see airplane jacking)
5. Place the airplane in a level flight position (use suitable rests under the wheels)
6. Check the configuration for weighing (e.g. empty weight);
7. Weigh the airplane and record the values in Weight and Balance Record (make a copy of standard Record included in section 6 Appendices).
8. Compute the weight and C.G. position according to the formula Weight and Balance Record
9. Compute and record permitted crew weight for fueling and baggage - see Aircraft Operating Instructions par. 6.2.
10. Up-date the placard "Load Limits" (make a new one) and attach in the cockpit.

Task proper accomplishment check: push a wing down to rock the aircraft and then repeat weighing. You should get the same results like before.

3.6.2 *Operating C.G. Range calculation*

On the basis of knowledge of arms, weights of items, airplane empty weight and the C.G. position it is possible to calculate weight and C.G. position according to below given formula:

Item	**Arm to the Datum (Leading edge) C.G.$_i$**		**Weight W$_i$**	**Moment M$_i$**
	[in]	**[mm]**	***[lbs]*** or **[kg]**	***[lbs.in]*** or **[kg.mm]**
Empty airplane				
Crew	*19.69*	500		
Fuel (0.72 kg/ltr.)	*26.77*	680		
Baggage	*50.00*	1270		
			Total Weight TW=ΣW$_i$ ***[lbs]*** or **[kg]**	**Total Moment TM=ΣM$_i$** ***[lbs.in]*** **or [kg.mm]**

C.G. position from Datum (Leading edge):

$$C.G. = \frac{Total\ Moment}{Total\ Weight} = \frac{\qquad\qquad}{\qquad\qquad} = \ldots\ldots\ldots\ldots\ldots [in]\ or\ [mm]$$

C.G. position in % MAC

(MAC ...Mean Aerodynamic Chord = *49.2 in* i.e.1250 mm):

$$\overline{C.G.} = \frac{C.G.}{MAC} \cdot 100 = \frac{\qquad\qquad}{\qquad\qquad} \cdot 100 = \ldots\ldots\ldots\ldots\ldots\ [\%\ \mathrm{MAC}]$$

C.G. range limits

Empty weight C.G. range (standard equipment) ..... 20±2 % MAC
Operating C.G. range..... 20÷34 % MAC

3.7 Ground handling

All ground handling activities described below are concidered as Line Maintenace and may be performed by Sport Pilot or higher (or Aircraft owner for ELSA).

3.7.1 Towing the airplane

It is easy to tow the airplane a short distance by holding the blade root, since the empty weight of this airplane is relatively low.
Suitable surfaces to hold the aircraft airframe, are the rear part of the fuselage before the fin and the wing roots.
A tow bar may be used to tow the aircraft over long distances. Steerable nose wheel is equipped with the stops, it is impossible to turn it around.

CAUTION

Avoid excessive pressure on the aircraft airframe - especially at the wing tips, elevator, rudder, trim etc.
Handle the propeller by holding the blade root - never the blade tip! When starting the engine manually - always handle the propeller on a blade surface i.e. do not hold only an edge.

3.7.2 Parking the airplane

It is advisable to park the aircraft inside a hangar, or eventually inside a other weather proof space (such as a garage) with stable temperature, good ventilation, low humidity and a dust-free environment.
It is necessary to tie-down the aircraft when parking outside.
On occasions when the plane must be tied-down outdoors for extended periods, it is advisable to cover the cockpit canopy, and if possible, the entire aircraft using a suitable cover.
The space requirements in the case of long-term hangaring may be reduced by removing or folding the wings. We recommend removing the battery in winter and storing it at indoor temperature.

3.7.3 Tieing-Down

The airplane is usually tied-down when parked outside a hangar. The tie-down is necessary to protect the aircraft against possible damage caused by wind gusts.
For this reason the aircraft is equipped with tie-down eyes, located on the wing lower surface.
Procedure:

1. Check: Fuel valve off, Circuit breakers and Master switch off, Switch box off.
2. Block the control stick up e.g. by means of safety harness or connect the control stick with rudder pedals by means of a suitable rope.
3. Shut all the ventilation windows
4. Close and lock cockpit
5. Tie-down the aircraft to the ground by means of a mooring rope passed through the eyes, located on the wing lower surface. It is also necessary to tie the nose wheel landing gear and the tail skid to the ground.

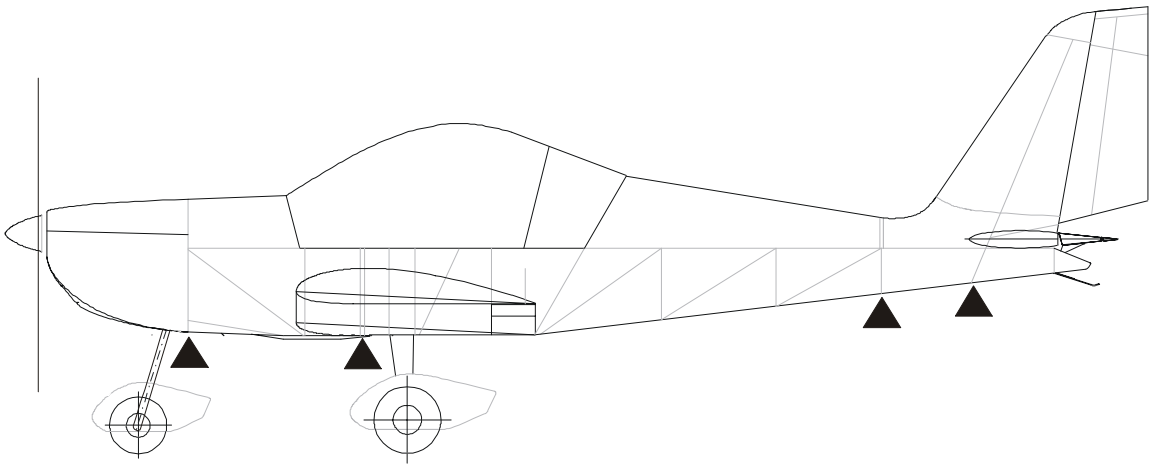
NOTE

It is advisable to cover cockpit canopy, if possible the whole airplane, by means of a suitable covering material attached to the airframe for long term outside parking..

3.7.4 Jacking the airplane

Because the empty weight of this airplane is relatively low it is easy to lift the airplane using 2 people.
First prepare two suitable jacks or supports to support the aircraft. Aircraft fuselage can be supported on the places marked by the black triangles in the figure below.
The aircraft should be lifted by the following parts:

- Press-down on the rear of the fuselage in front of the fin to lift the front and then support under the firewall.
- To jack the rear of the fuselage, grab the fuselage near the auxiliary tail skid, lift it upward and then support.
- To lift the wings, push on the wings lower surface at the main spar. Do not lift by the wing tips.



3.8 Road transport

The aircraft may be transported in a suitable trailer. It is necessary to remove the wings before loading. The aircraft and removed wings should be fastened down securely to ensure against possible damage.

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4. MAINTENANCE

4.1 Overall maintenance survey

Airplane maintenance is required to maintain its airworthiness. Periodical events are performed (periodical and pre-flight inspections) along with irregular events e.g. a repair of a damage as required.

The owner/operator of an LSA airplane shall be responsible for notifying the manufacturer of any safety of flight issue or significant service difficulty upon discovery.

The latest safety of flight information developed by the manufacturer are available on the manufacturer web site http://www.evektor.cz (mandatory bulletins) or by post on request. Contact the manufacturer if in doubt.

Contact address:

Evektor-Aerotechnik a.s.
Letecká 1384
686 04 Kunovice
Czech Republic

tel.: +420 572 537 111
fax: +420 572 537 900
e-mail: marketing@evektor.cz

Owner/Operator Responsibilities:

- Each owner/operator of an LSA airplane shall read and comply with the maintenance and continued airworthiness information and instructions provided by the manufacturer.
- Each owner/operator of an LSA airplane shall be responsible for providing the manufacturer with current contact information where the manufacturer may send the owner/operator supplemental notification bulletins.
- The owner/operator of an LSA airplane shall be responsible for notifying the manufacturer of any safety of flight issue or significant service difficulty upon discovery.
- The owner/operator of an LSA airplane shall be responsible for complying with all manufacturer issued notices of corrective action and for complying with all applicable aviation authority regulations in regard to maintaining the airworthiness of the LSA airplane.
- An owner of an LSA airplane shall ensure that any needed corrective action must be completed as specified in a notice, or by the next scheduled annual inspection.
- Should an owner/operator not comply with any mandatory service requirement, the LSA airplane shall be considered not in compliance with applicable ASTM Standards and may be subject to regulatory action by the presiding aviation authority.

4.1.1 Terminology

A&P: A US FAA certificated Mechanic as defined by 14 CFR Part 65.

LSA Repairman Inspection: A US FAA certificated repairman (light-sport aircraft) with and inspection rating as defined by14 CFR part 65, authorized to perform the annual condition inspection on experimental light-sport aircraft, which the repairman owns. 1Yote: Experimental LSA do not require the individual performing maintenance to hold any FAA airman certificate.

LSA Repairman Maintenance: A US FAA certificated repairman (light-sport aircraft) with a maintenance rating as defined by 14 CFR part 65, authorized to perform line maintenance on aircraft certificated as special LSA aircraft. Authorized to perform the annual condition/100 inspection on special and experimental light-sport aircraft,

LSA Aircraft (Light Sport Aircraft) - An aircraft designed per ASTM F2245 (airplanes) and complies with the U.S. Code of Federal Regulations Chapter 14 Part 1 definition for a light sport aircraft and will be certificated in the US as SLSA or ELSA.

FAA: United States Federal Aviation Administration

14 CFR: Code of federal regulations chapter 14 Aeronautics and Space also know as the ”FARs” or federal aviation regulations.

Manufacturer – Any entity engaged in the production of a SLSA or ELSA or component used on an LSA.

Maintenance Manual(s) – A manual provided by a SLSA or ELSA manufacturer (this manual) or supplier that specifies all maintenance, repairs and alterations authorized by the manufacturer.

Line Maintenance – Any unscheduled maintenance resulting from unforeseen events, or scheduled checks that contain servicing and/or inspections not considered heavy maintenance that is approved by the manufacturer and is specified in the manufacturer’s maintenance manual.

Authorization to perform: The holder of a LSA Repairman certificate, with either an inspection or maintenance rating is generally considered the minimum level of certification to perform line maintenance of LSA in the U.S..
Note: Many of the tasks listed are also authorized, by the FAA, to be performed by the owner of the SLSA which holds a sport pilot certificate. The examples listed below should not be considered as restrictions against the performance of the tasks by an owner that is authorized to perform said task by the FAA.

Typical tasks considered as line maintenance for LSA ’s include:
1. 100 hour inspection
2. Annual Condition Inspection
3. Servicing of fluids
4. Removal and replacement of components for which instructions are provided in the maintenance manual such as:
    - Fuel pumps
    - Batteries
    - Instruments, switches, lights and circuit breakers
    - Starters/generators/alternators
    - Exhaust manifolds/mufflers
    - Wheel and brake assemblies
    - Propellers
    - Sparkplugs, ignition wires and electronic ignition models/components limited to the use of mechanical connections
    - Hoses and lines
    - Sailcloth covering
    - Ballistic Recovery System
5. Repair of components and structure for which instructions are provided in the maintenance manual and which do not require additional specialized training such as:
    - Patching of a hole in a fabric, metal or composite non-structural component.
    - Stop-drilling of cracks
6. Alterations for which specific instruction are provided in the maintenance manual such as:
    - Installation of a communications radio, GPS and antenna
    - Installation of a strobe light system
    - Compliance with a manufacturer service directive when the repairman is listed as an authorized person to accomplish the alteration.

Heavy Maintenance – Any maintenance, inspection, repair or alteration that requires specialized training, equipment, or facilities.

Authorization to perform: The holder of an FAA Mechanic certificate with Airframe and or Powerplant rating(s); or a LSA Repairman maintenance that has received additional task specific training for the function to ’,”be performed is generally considered the minimum level of certification to perform heavy maintenance of SLSA in the U.S..

Typical tasks considered as heavy maintenance for SLSA 's include:

1. Removal and replacement of components for which instructions are provided in the maintenance manual or service directive instructions such as:
   - Complete engine removal and reinstallation in support of an engine overhaul or to install a new engine.
   - Remove and replacement of engine cylinders, pistons, and or valve assemblies
   - Primary flight control cables/components
   - Landing gear assemblies
2. Repair of components and or aircraft structure for which instructions are provided in the maintenance manual or service directive instructions such as:
   - Repainting of control surfaces
   - Structural repai rs
   - Recovering of a dope and fabric covered aircraft
3. Alterations of components and or aircraft structure which instruction are provided in the maintenance manual or service directive instruction such as:
   - Installation of skis
   - Installation of new additional pitot static instruments

Overhaul – Maintenance, inspection, repair or alterations that are only to be accomplished by the original manufacturer or a facility approved by the original manufacture of the product.

Authorization to perform: Only the manufacturer of a SLSA or the component to be overhauled on a SLSA may perform or authorize to be performed the overhaul of a SLSA or SLSA component. No FAA certification is given to be a SLSA approved overhaul facility.

Overhaul manual: A separate overhaul manual, not the manufacturers maintenance manual, is required to perform the overhaul of a SLSA or SLSA component. The form and content of such a manual is not governed by this standard or by any FAA regulation. Note: Specific form and content guidelines have not been promulgated here as type specific training and authorization is required from the manufacturer in order to overhaul a SLSA or component.

Typical components that are overhauled include:

- Engines
- Carburetors/fuel injection systems
- Starters/alternators/generators
- Instruments

Overhaul Facility – A facility specifically authorized by the aircraft or component manufacturer to overhaul the product originally produced by that manufacturer.

Annual Condition Inspection – A detailed inspection accomplished once a year on a SLSA or ELSA in accordance with instructions provided in the maintenance manual (refer to 4.4.1. Periodical inspection intervals) supplied with the aircraft. The purpose of the inspection is to look for any wear, corrosion, or damage that would cause an aircraft to not be in a condition for safe operation.

100 Hour Inspection – Same as an annual condition inspection except the interval of inspection is 100 hours of operation instead of 12 calendar months. This inspection is utilized when the SLSA or ELSA is being used for commercial operations such as flight instruction and or rental.

4.1.2 Qualification requirements

Maintenance and Repairs of LSA

The factory-built Sportstar belongs to Special-Light Sport Aircraft category, while the Sportstar built from a kit to Experimental-Light Sport Aircraft category.
This fact determines the conditions for aircraft maintenance and repairs, as explained hereafter:

Special-Light Sport Aircraft

A special LSA is a factory-built, ready-to-fly aircraft. They must be maintained and inspected by a certificated repairman with a LSA maintenance rating, an A&P, or an FAA authorized repair station. Pilots can perform preventive maintenance on S-LSA.

Experimental-Light Sport Aircraft (New Kit-Built)

The builder must perform all maintenance in accordance with the manufacturer maintenance manuals.
Builders can perform the annual condition inspection if they hold an FAA repairman certificate-inspection, otherwise an A&P or FAA authorized repair station must perform the inspection.

Earning a Repairman Certificate-Base Requirements
To earn an FAA repairman certificate of any type, you must be:

- 18 years old
- Speak, read, and understand English
- Demonstrate the requisite skill to determine whether a LSA is in a condition for safe operation
- U.S. citizen or legal permanent resident

Repairman Certificate—Inspection
In addition to meeting the base requirements, to earn an FAA repairman certificate-inspection you must complete an FAA-approved 16-hour training course on inspecting light sport aircraft. This certificate enables you to perform the annual condition inspection on the Experimental-LSA you own.

Repairman Certificate-Maintenance
In addition to meeting the base requirements, to earn an FAA repairman certificate-maintenance you must complete an FAA-approved 80- to 120-hour training course on inspecting and maintaining light sport aircraft (time depends on LSA type). This certificate allows you to maintain, repair, and perform the annual condition inspection on all Special - LSAs and condition inspections on Experimental - LSAs. What repairs and maintenance you can perform are specifically authorized in the aircraft manufacturer's maintenance manual. A&Ps or FAA authorized repair stations must perform all major modifications.

Review of the required ground staff qualification for maintenance and inspections:

	Sportstar built from a kit (ELSA under §21.191 (i) 1,320 pounds MTOW)	**Factory-built Sportstar** (SLSA under §21.190 1,320 pounds MTOW)
Maintenance	Owner- maintained	Maintenance-- • Repairman (LS-M) • Mechanic (A&P) • Part 145 Repair station Preventive maintenance Sport pilot or higher
Inspections	Annual condition • Repairman LS –I and LS-M • Mechanic (A & P) • Part 145 Repair station 100-hour condition • Repairman LS-M • Mechanic (A & P) • Part 145 Repair station	Annual condition • Repairman LS - M • Mechanic (A & P) • Part 145 Repair station 100-hour condition • Repairman LS-M • Mechanic (A & P) • Part 145 Repair station

REVIEW MAINTENANCE TYPE VERSUS REQUIRED QUALIFICATION

LINE MAINTENANCE	**HEAVY MAINTENANCE**	**OVERHAUL**
Authorization to perform: • Aircraft owner (only for ELSA) • Sport pilot or higher • Repairman (LS-M) • Mechanic (A&P) • Part 145 Repair station	Authorization to perform: • Repairman (LS-M) or Mechanic (A&P) – both with the minimum level of certification to perform heavy maintenance of SLSA in the U.S.. • FAA approved Part 145 Repair station	Authorization to perform: • manufacturer of a SLSA / ELSA or the component • facility specifically authorized by the aircraft or component manufacturer
Typical tasks: 1. 100 hour inspection 2. Annual Condition Inspection 3. Servicing of fluids 4. Removal and replacement of components for which instructions are provided in the maintenance manual such as: • Fuel pumps • Batteries • Instruments, switches, lights and circuit breakers • Starters /generators /alternators • Exhaust manifolds/mufflers • Wheel and brake assemblies • Propellers • Sparkplugs, ignition wires and electronic ignition	Typical tasks: 1. Removal and replacement of components for which instructions are provided in the maintenance manual or service directive instructions such as: • Complete engine removal and reinstallation in support of an engine overhaul or to install a new engine. • Remove and replacement of engine cylinders, pistons, and or valve assemblies • Primary flight control cables/components • Landing gear assemblies 2. Repair of components and or aircraft structure for which instructions are provided in the	Typical tasks: Overhaul of the: • Engines • Carburetors/fuel injection systems • Starters/alternators/generators • Instruments

LINE MAINTENANCE	HEAVY MAINTENANCE	OVERHAUL
models/components limited to the use of mechanical connections • Hoses and lines • Sailcloth covering • Ballistic Recovery System 5. Repair of components and structure for which instructions are provided in the maintenance manual and which do not require additional specialized training such as: • Patching of a hole in a fabric, metal or composite non-structural component. • Stop-drilling of cracks 6. Alterations for which specific instruction are provided in the maintenance manual such as: • Installation of a communications radio, GPS and antenna • Installation of a strobe light system • Compliance with a manufacturer service directive when the repairman is listed as an authorized person to accomplish the alteration.	maintenance manual or service directive instructions such as: • Repainting of control surfaces • Structural repai rs • Recovering of a dope and fabric covered aircraft 3. Alterations of components and or aircraft structure which instruction are provided in the maintenance manual or service directive instruction such as: • Installation of skis • Installation of new additional pitot static instruments	
Refer to particular maintenance action for authorized person to perform maintenance.		

4.2 Pre-flight inspection

Type of maintenance: line.
Authorization to perform:
- Aircraft owner (only for ELSA)
- Sport pilot or higher

Tools needed: flat screwdriver to remove upper engine cowling
Parts needed: none
Instructions: refer to Aircraft Operating Instructions section 4, item 4.4.4.
A pre-flight inspection is performed prior to the beginning of each flight. A pre-flight inspection should be repeated prior to each flight even during the same day.
The Pre-flight inspection is a visual check of the aircraft for deformations, surface damage, fuel and oil system leaks, prop damage, released locks, covers and cowlings etc.
Any damage or failure should be repaired immediately if the airworthiness is affected or when the aircraft can not be put out of operation.
It is important to perform a pre-flight inspection carefully to prevent problems from arising.
Refer to the Aircraft Operating Instructions for more details.

4.3 Post-flight inspection

Type of maintenance: line.
Authorization to perform:
- Aircraft owner (only for ELSA)
- Sport pilot or higher

Tools needed: flat screwdriver to remove upper engine cowling
Parts needed: none
Instructions: refer to Aircraft Operating Instructions section 4, item 4.4.4.

Post-flight inspection is performed at the end of each flight day; the post-flight inspection events are the same as the preflight ones. If possible failures, damages and malfunctions should be recorded and repaired immediately. It is recommended to clean and/or wash the airplane and check that the fuel and oil consumption are in the normal range.
Lastly record all hours flown and other data in appropriate documentation (Log Book etc.).

4.4 Periodical inspections

4.4.1 Periodical inspection intervals

Type of maintenance: line.
Authorization to perform:
- Aircraft owner (only for ELSA)
- Sport pilot or higher

Tools needed: set of basic metric tools, no specials tools required.
Parts needed: Refer to 4.4.3.
Instructions: Refer to 4.4.3.
Task proper accomplishment check: Refer to 4.4.3.

The periods for overall checks and contingent maintenance will depend on the conditions of the operation and the overall condition of the airplane. The manufacturer recommends maintenance checks and periodic inspections in the following periods:

1) after the first 25 ± 2 flight hours
2) after every 50 ± 3 flight hours
3) after every 100 ± 5 flight hours or annual inspection

Refer to the Rotax 912 Operator's Manual for engine maintenance.
Refer to the Propeller Maintenance Manual for propeller maintenance.

4.4.2 Periodical inspection actions

The following Periodical Inspection Checklists are intended for copying and serve as the Maintenance Records. It is also recommended to include small repairs, damages and their remedy or replacement.
Some parts of the airplane (engine, propeller etc.) may have special time limits - refer to the appropriate manuals for maintenance time limits and procedures.

4.4.3 Periodical Inspections Checklists

Model:	**S/N.:**	**Hours flown:**	**Date of inspection**:
SPORTSTAR	**Registration:**	**No. of Takeoffs:**	

Event #	**Event description**	**Inspection** ☑ Tick off performed inspection			**Carried out by:**	**Inspected by:**
		after the first **25** hrs.	every **50** hrs.	every **100** hrs.		
1.	Prior to the inspection clean and wash the airplane surfaces, if needed.	☒	☒	☒		
2.	**ENGINE**	see engine manufacturer´s instructions				
3.	**ENGINE COMPARTMENT**					
3.1.	**Fiberglass engine cowlings**					
3.1.1.	Check condition of cowlings and quick closing locks - repair any damage			☒		
3.1.2.	Remove engine cowling	☒	☒	☒		
3.1.3.	Visually check inside fireproof primer paint - Repaint if needed - White color T 50, Norm V1000 N 56582		☒	☒		
3.2.	**Engine mount**					
3.2.1.	Visually check condition, attachment, security of attachment bolts: engine-engine mounting, engine mounting-firewall	☒	☒	☒		
3.2.2.	Visually check condition of rubber silentblocks - replace those cracked and excessively deformed			☒		
3.3.	**Suction system**					
3.3.1.	Visually check condition, attachment and security of air filter at carburetor inlet - clean filter acc. to the engine manual	☒	☒	☒		
3.3.2.	Visually check condition of suction tubing	☒	☒	☒		
3.3.3.	Check carburetor - condition, control cables attachment, lubricate cables at inlet to the bowdens	☒	☒	☒		
3.4.	**Battery**					
3.4.1.	Visually check attachment and security		☒	☒		
3.4.2.	Check charging - charge if needed			☒		
3.4.3.	Visually check condition and attachment of wire leads - replace those damaged	☒	☒	☒		
3.5.	**Wiring**					
3.5.1.	Visually check condition and integrity of wires, connections, security of wires	☒	☒	☒		
3.6.	**Fuel system**					
3.6.1.	Visually check condition, integrity, attachment and security of hoses - replace those damaged	☒	☒	☒		
3.6.2.	Visually check fuel filter condition - replace stopped up filter	☒	☒	☒		
3.6.3.	Visually check system for leaks	☒	☒	☒		

Event #	Event description	Inspection ☑ Tick off performed inspection			Carried out by:	Inspected by:
		after the first **25** hrs.	every **50** hrs.	every **100** hrs.		
3.7.	**Cooling system**					
3.7.1.	Visually check radiator for condition and leaks			☒		
3.7.2.	Visually check condition, attachment of hoses; radiator left hose clearance from exhaust pipe approx. 0.8 in (20 mm), check system for leaks	☒	☒	☒		
3.7.3.	Tighten hose clips if needed		☒	☒		
3.7.4.	Check coolant quantity in the expansion tank - add or change coolant acc. to the engine manual if needed	☒	☒	☒		
3.7.5.	Visually check condition and attachment of overflow bottle on the firewall			☒		
3.8.	**Lubrication system**					
3.8.1.	Visually check condition and attachment of oil tank			☒		
3.8.2.	Check oil cooler for condition, attachment and leaks	☒	☒	☒		
3.8.3.	Visually check hoses for condition, leaks, attachment and security - replace damaged hoses	☒	☒	☒		
3.8.4.	Check oil quantity - add or change oil acc. to the engine manual if needed	☒	☒	☒		
3.9.	**Exhaust system**					
3.9.1.	Visually check exhaust system for condition, cracks, deformations or damage - repair / replace. Check left front pipe clearance from radiator hose - approx. 0.8 in (20 mm),	☒	☒	☒		
3.9.2.	Visually check condition and attachment of the muffler - repair / replace	☒	☒	☒		
3.9.3.	Check joint security	☒	☒	☒		
3.10.	**Heating**					
3.10.1.	Visually check hose leading hot air into the cockpit - check hose for condition, integrity, attachment and security		☒	☒		
3.10.2.	Check condition, function and control of the heating flap		☒	☒		
3.11.	**Reinstall lower engine cowling** Reinstall Upper engine cowling when the inspection is completed and engine test run performed	☒	☒	☒		
3.12.	**Lubricate per Lubricating Chart**	☒	☒	☒		
4.	**PROPELLER**	see manufacturer instructions +				
4.1.	**Blades**					
4.1.1.	Inspect blades for abrasions, cracks, paint damage, condition of blades leading edges and tips - repair according to the propeller manual	☒	☒	☒		
4.2.	**Spinner**					
4.2.1.	Visually check spinner for condition, abrasions, cracks, paint damage - repair large damage		☒	☒		
4.2.2.	Remove spinner		☒	☒		

Event #	Event description	Inspection ☑ Tick off performed inspection			Carried out by:	Inspected by:
		after the first **25** hrs.	every **50** hrs.	every **100** hrs.		
4.3.	**Propeller**	see manufacturer instructions +				
4.3.1.	Check prop attachment, security of bolts		☒	☒		
4.3.2.	Check run-out			☒		
4.3.3.	Install spinner			☒		
4.3.4.	Pitch change mechanism (if controllable pitch prop is mounted) Check condition and function according to the prop manufacturer´s instructions	see manufacturer instructions				
5.	**LANDING GEAR NOSEWHEEL LANDING GEAR**					
5.1.	**Nosewheel leg**					
5.1.1.	Check condition and attachment of the nosewheel leg (lift airplane nose)	☒	☒	☒		
5.2.	**Wheel pants**					
5.2.1.	Visually check wheel pants or mudguards condition - repair damages and cracks		☒	☒		
5.2.2.	Remove fairing (reinstall when nosewheel inspection is completed)			☒		
5.3.	**Rubber rope and rubber suspension stop**					
5.3.1.	Visually check rubber rope a suspension stop for deformation, cracks, excessive wear - replace if needed		☒	☒		
5.4.	**Tire**					
5.4.1.	Check tires for condition, cuts, uneven or excessive wear and slippage - replace if needed		☒	☒		
5.4.2.	Check pressure - inflate to required pressure	☒	☒	☒		
5.5.	**Wheel**					
5.5.1.	Visually check for cracks, permanent deformations - if damaged, replace			☒		
5.5.2.	Check valve condition around the hole in the rim			☒		
5.5.3.	Check condition of bearings, wheel free rotation, play			☒		
5.6.	**Joints**					
5.6.1.	Check torque and security of fixed joints	☒	☒	☒		
5.6.2.	Check nosewheel free rotation inside the leg - the rotation should not be too free to prevent shimmy		☒	☒		
5.7.	**Nosewheel control system**					
5.7.1.	Check control rods condition, rod ends security		☒	☒		
5.7.2.	Check condition of nosewheel control lever covers for wear through - repair damage			☒		
5.8.	**Lubricate per Lubricating Chart**	☒	☒	☒		
6.	**LANDING GEAR MAIN LANDING GEAR**					
6.1.	**Fiberglass legs**					
6.1.1.	Visually check condition of fiberglass legs - repaint damaged areas, contact airplane manufacturer if cracks were found	☒	☒	☒		

Event #	Event description	Inspection ☑ Tick off performed inspection			Carried out by:	Inspected by:
		after the first **25** hrs.	every **50** hrs.	every **100** hrs.		
6.1.2.	Inspect leg attachment into the fuselage (no play) - Lift the landing gear and move a leg forward-backward, upward-downward; at the same time check wheel play on the axle - tighten attachment bolts if the leg has a play		☒	☒		
6.1.3.	Check torque and security of fixed joints	☒	☒	☒		
6.1.4.	Check cloth cover which covers the leg-fuselage input hole			☒		
6.2.	**Wheel pants or mudguards**					
6.2.1.	Visually check wheel pants / mudguards condition - repair damage and cracks		☒	☒		
6.3.	**Tires**					
6.3.1.	Check tires for condition, cuts, uneven or excessive wear and slippage - replace if needed	☒	☒	☒		
6.4.	**Wheel**					
6.4.1.	Visually check wheel rims for cracks, permanent deformations - replace wheel rim in case of cracks			☒		
6.4.2.	Check valve condition around the hole in the disc			☒		
6.4.3.	Check condition of bearings, wheel free rotation, play		☒	☒		
6.5.	**Brakes**					
6.5.1.	Check attachment of brake system plastic hoses to the main leg			☒		
6.5.2.	Visually check condition of pads - steady and symmetry abrasion of pads - replace pads if needed		☒	☒		
6.5.3.	Check wear of the disc			☒		
6.5.4.	Check brake system for leaks - add brake fluid and bleed the system if a brake pedal has soft movement	☒	☒	☒		
7.	**WING**					
7.1.	**Wing**					
7.1.1.	Visually check condition - no loose rivets, deformations, cracks or any other damage - contact the airplane manufacturer	☒	☒	☒		
7.1.2.	Check play of wing suspensions - move the wing tip upward-downward, frontward-rearward			☒		
7.1.3.	Check condition and attachment of fiberglass wing tips			☒		
7.2.	**Aileron**					
7.2.1.	Visually check condition	☒	☒	☒		
7.2.2.	Check free movement	☒	☒	☒		
7.2.3.	Check aileron hinge	☒	☒	☒		
7.2.4.	Check play		☒	☒		
7.2.5.	Check security of control rod ends	☒	☒	☒		
7.2.6.	Lubricate per Lubricating Chart	☒	☒	☒		

Event #	Event description	Inspection ☑ Tick off performed inspection			Carried out by:	Inspected by:
		after the first 25 hrs.	every 50 hrs.	every 100 hrs.		
7.2.7.	Remove inspection covers from the lower wing surface to inspect security of control system joints			☒		
7.2.8.	Lubricate per Lubricating Chart and reinstall covers	☒	☒	☒		
7.3.	**Flap**					
7.3.1.	Fully extend the flaps and visually check condition	☒	☒	☒		
7.3.2.	Check flap hinge	☒	☒	☒		
7.3.3.	Check play		☒	☒		
7.3.4.	Check condition of flap control pin and wear of the groove at the flap root			☒		
7.3.5.	Lubricate per Lubricating Chart	☒	☒	☒		
7.4.	**Pitotstatic tube**					
7.4.1.	Check pitotstatic tube attachment			☒		
7.4.2.	Check pitostatic system for leaks - the airplane manufacturer uses KPU 3 instrument			☒		
7.5.	**Wing suspensions**					
7.5.1.	Remove wing fillets	☒	☒	☒		
7.5.2.	Visually check condition of wing suspensions (wing folding mechanism), cleanness of folding system, lubrication	☒	☒	☒		
7.5.3.	Check wear, corrosion			☒		
7.5.4.	Check security of joints	☒	☒	☒		
7.6.	**Lubricate per Lubricating Chart**	☒	☒	☒		
8.	**FUSELAGE**					
8.1.	**Fuselage surface**					
8.1.1.	Visually check condition - no loose rivets, deformations, cracks or any other damage - repair small damage or contact the airplane manufacturer	☒	☒	☒		
8.1.2.	Visually check rivets near the landing gear attachment			☒		
8.1.3.	Check condition and attachment of equipment - antenna, beacon etc.			☒		
8.1.4.	Check tail skid attachment			☒		
8.1.5.	Visually check condition, attachment and operation of towing mechanism (if installed)		☒	☒		
8.1.6.	Visually check condition of fiberglass wing fillets			☒		
8.2.	**Cockpit canopy**					
8.2.1.	Visually check canopy condition for - cracks, scratches, any other damage - drill end of cracks	☒	☒	☒		
8.2.2.	Check canopy lock for condition and operation	☒	☒	☒		
8.2.3.	Check vent windows for condition and operation			☒		
8.2.4.	Check gas struts operation - replace those functionless			☒		
8.2.5.	Check canopy rubber packing			☒		
9.	**HORIZONTAL TAIL UNIT**					

Event #	Event description	Inspection ☑ Tick off performed inspection			Carried out by:	Inspected by:
		after the first 25 hrs.	every 50 hrs.	every 100 hrs.		
9.1.	**Visually check condition** - no loose rivets, deformation, cracks, scratches and any other damage - contact the airplane manufacturer	☒	☒	☒		
9.2.	**Visually check condition and attachment of fiberglass tips**			☒		
9.3.	**Check elevator free movement**	☒	☒	☒		
9.4.	**Check elevator hinge**	☒	☒	☒		
9.5.	**Check play** - move the stabilizer frontward-rearward, upward-downward - contact the airplane manufacturer if play exceeded tolerances		☒	☒		
9.6.	**Check security of joints at control column**	☒	☒	☒		
9.7.	**Trim tab**					
9.7.1.	Visually check condition		☒	☒		
9.7.2.	Check hinge		☒	☒		
9.7.3.	Check control cables condition			☒		
9.7.4.	Check tension of trim tab control cables and check securing the adjusting screws			☒		
9.8.	**Lubricate per Lubricating Chart**	☒	☒	☒		
10.	**VERTICAL TAIL UNIT**					
10.1.	**Visually check condition** - no loose rivets, deformation, cracks, scratches and/or other damage - contact the airplane manufacturer	☒	☒	☒		
10.2.	**Visually check condition and attachment of fiberglass tips**			☒		
10.3.	**Check rudder free movement**	☒	☒	☒		
10.4.	**Check rudder suspensions**	☒	☒	☒		
10.5.	**Check play** - move rudder upward-downward			☒		
10.6.	**Check joints security**	☒	☒	☒		
10.7.	**Lubricate per Lubricating Chart**	☒	☒	☒		
11.	**COCKPIT**					
11.1.	**Instrument panel**					
11.1.1.	Visually check condition and attachment of the instrument panel		☒	☒		
11.1.2.	Check condition and attachment of individual instruments		☒	☒		
11.1.3.	Check function of instruments			☒		
11.1.4.	Check throttle and choke levers free movement and lock	☒	☒	☒		
11.1.5.	Inspect completeness and readability of placards			☒		
11.2.	**Seats**					
11.2.1.	Visually check seat upholstery, remove upholstery			☒		
11.2.2.	Visually check seats and backrests condition			☒		
11.2.3.	Check for loose rivets or any other damage on the seats			☒		
11.2.4.	Visually check main landing gear legs attachment inside the fuselage			☒		
11.3.	**Safety harness**					

Event #	Event description	Inspection ☑ Tick off performed inspection			Carried out by:	Inspected by:
		after the first **25** hrs.	every **50** hrs.	every **100** hrs.		
11.3.1.	Visually check condition, attachment and security			☒		
11.4.	**Hand control**					
11.4.1.	Remove aileron rod covers inside the cockpit		☒	☒		
11.4.2.	Check hand control free movement	☒	☒	☒		
11.4.3.	Check play	☒	☒	☒		
11.4.4.	Check joints security	☒	☒	☒		
11.4.5.	Check control column stops for condition			☒		
11.4.6.	Pitostatic system drainage, see 2.3.20			☒		
11.4.7.	Lubricate per Lubricating Chart	☒	☒	☒		
11.5.	**Rudder control**					
11.5.1.	Check stiffness of movement	☒	☒	☒		
11.5.2.	Check joints security	☒	☒	☒		
11.5.3.	Check stops at pedal control cables			☒		
11.5.4.	Check condition and security of cables	☒	☒	☒		
11.5.5.	Check hydraulic brake system for leaks - add brake fluid if needed	☒	☒	☒		
11.5.6.	Lubricate per Lubricating Chart	☒	☒	☒		
11.6.	**Flap and trim control, Towing mechanism control**					
11.6.1.	Check free movement of levers	☒	☒	☒		
11.6.2.	Check operation of flap control lever lock (push button)		☒	☒		
11.6.3.	Lubricate per Lubricating Chart	☒	☒	☒		
11.7.	**Complete lubricating per Lubricating Chart**	☒	☒	☒		
11.8.	**Install seats upholstery and covers**					
11.9.	**Engine Test Run (see FM)** • idling • throttle and choke levers operation • acceleration - deceleration • r.p.m. drop with either magneto switched off • max. r.p.m. • test brake system efficiency	☒	☒	☒		
11.10.	**Test flight**	☒	☒	☒		
11.11.	**Clean the airplane surface** (only for service station)	☒	☒	☒		

4.5 Fluids

The fluids are: fuel, engine oil, liquid coolant and brake fluid.
Filling locations can be seen in the Figure below. Fuel and Brake fluid filling locations are described in 4.5.4 and 4.5.3 respectively.

Fig. Filling locations in engine compartment
1- oil tank,
2 - liquid coolant tank

4.5.1 Engine oil

4.5.1.1 Recommended brands

The recommended oil brands are listed in Service Instruction SI-18-1997, which is enclosed with this Maintenance manual.

4.5.1.1.1 Table of oils

see Engine Operator's manual for suitable oil grades.

4.5.1.2 Oil quantity

The total oil quantity in the Rotax 912UL or 912S (ULS) lubricating system amounts to 0.9 U.S. gall (3.5 liters). Prior to oil check, turn the propeller by hand (ignition switched off!) several times to pump oil from the engine into the oil tank, or leave the engine idle for 1 minute. The oil level in the oil tank should be between the min. and max. marks and should not be below min. mark.

4.5.1.3 Oil filling

Type of maintenance: line.
Authorization to perform: - Aircraft owner (only for ELSA)
- Sport pilot or higher

Tools needed:
- flat screwdriver to remove upper engine cowling
- suitable funnel

Parts needed: recommended brand of oil
Instructions:
1. Remove upper cowling.
2. Unscrew oil tank cap.
3. Insert funnel and fill oil.
4. Remove funnel, screw oil tank cap, check cap proper attachment.
5. Mount upper cowling

The oil tank is located in the engine compartment and is accessible when engine upper cowling is removed. Oil quantity is measured by wire-gauge in the oil tank - see previous paragraph.
Task proper accomplishment check: check the oil tank cap is fitted properly.

4.5.1.4 Oil emptying

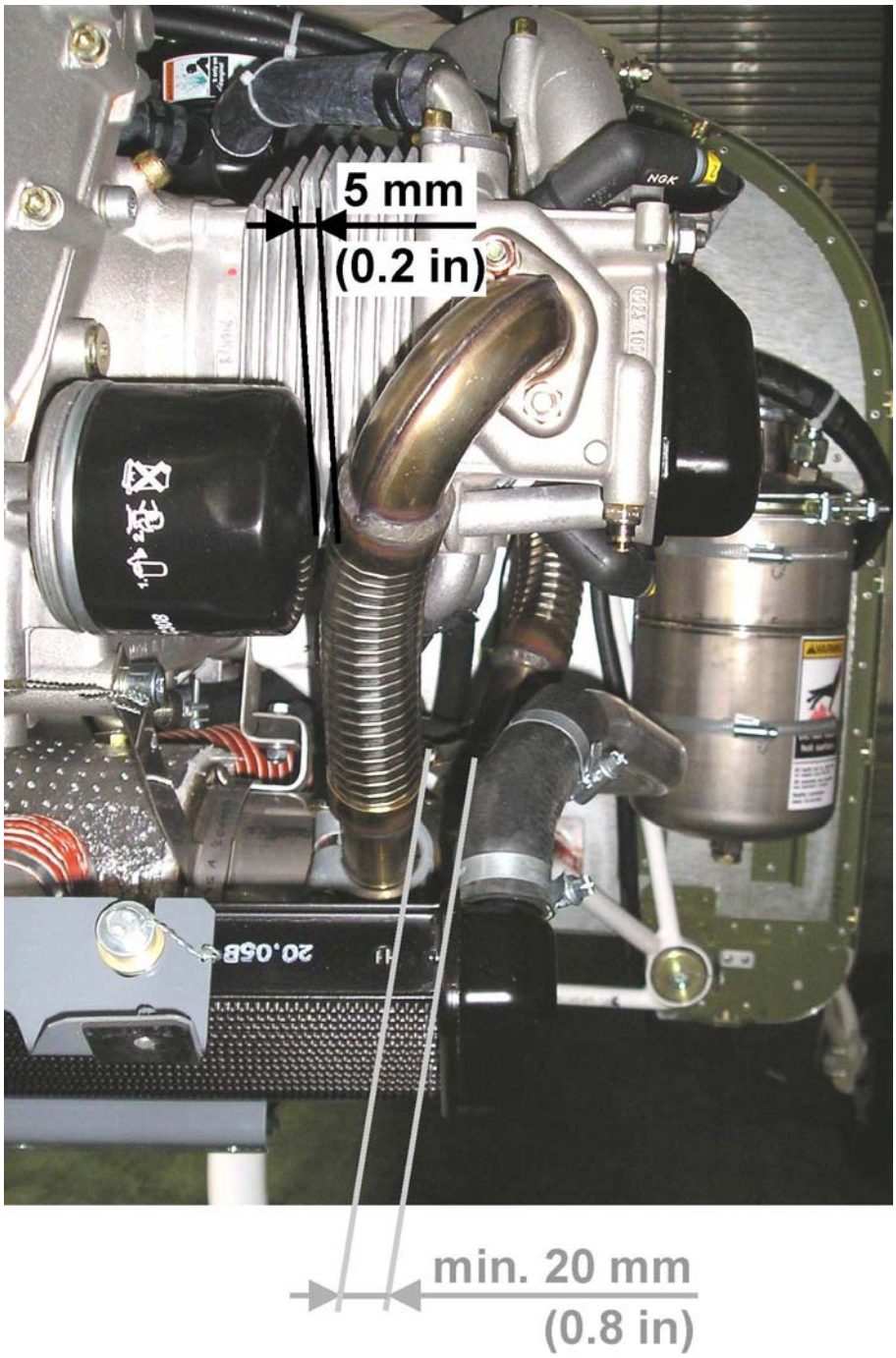
Type of maintenance: line.
Authorization to perform: - Aircraft owner (only for ELSA)
- Sport pilot or higher

Tools needed:
- flat screw driver to remove upper engine cowling
- Philips tip screw driver
- nut wrench No. 17
- a suitable oil can or sump

Parts needed: recommended brand of oil
Instructions:
Unscrew the plug located on the bottom of the oil tank to empty out the oil.
To empty oil from the engine, pull out the return hose located on the bottom of the engine from oil tank (relase hose clip first) and lower hose end to oil can.
It is recommended to empty oil when the engine is warm.
Task proper accomplishment check: none

4.5.1.5 Oil filter replacement

Remove engine cowlings. Unscrew the elbow on the left front (as viewed in flight direction) exhaust pipe using nut wrench size 12. Loose a clamp of that pip on the exhaust muffler using wrench 13. Disconnect the elbow from the engine and turn the exhaust pipe slightly to move it from the oil filter. Replace oil filter by a new one. See Maintenance Manual (Line Maintenance) for ROTAX Engine Type 912 Series for replacement instructions. Connect the elbow to the engine and tighten the nuts slightly by fingers. Set exhaust pipe clearance from the radiator hose and oil filter. Clearance from the radiator hose must be min. 0.8 in (20 mm) and approximately 0.2 in (5 mm) from oil filter. When clearances are set, tighten the elbow and clamp. Re-install the engine cowlings after oil re-filling.



4.5.2 Coolant

4.5.2.1 Recommended types

Refer to the Rotax 912 Operator's Manual for recommended coolant types. The "BASF Glysantin Anticorrosion", "FRIDEX G 48" or "Glysantin Protect Plus (produced by BASF)" is recommended by the engine manufacturer. The engine manufacturer also recommends the use of antifreeze concentrate during cold weather operation.

4.5.2.2 Coolant quantity

Total coolant quantity is about 0.4 U.S. gall (1.5 liters).

4.5.2.3 Coolant refilling

Type of maintenance: line.
Authorization to perform:
- Aircraft owner (only for ELSA)
- Sport pilot or higher

Tools needed:flat screw driver
Parts needed: recommended type of coolant
Instructions:
1. Remove upper engine cowling.
2. Unscrew coolant expansion tank cap.
3. Check coolant quantity and fill some amount if needed.
4. Screw tank cap back
5. Mount upper cowling back.

The expansion tank located in the engine compartment is used for filling. In addition to that, an overflow bottle is attached on the firewall to absorb coolant in the case of engine overheating.

Task proper accomplishment check: check proper attachment of coolant tank cap after refilling,
check proper attachment of the upper engine cowling.

4.5.2.4 Coolant emptying

Type of maintenance: line.
Authorization to perform:
- Aircraft owner (only for ELSA)
- Sport pilot or higher

Tools needed:flat screw driver
suitable container for coolant
Parts needed: none
Instructions:
1. Remove upper engine cowling.
2. Place suitable container under the engine.
3. Check coolant quantity and fill some amount if needed.
4. Disconnect the hose going from the radiator into the pump (on the lowest part of the cooling system)
5. Empty coolant into a container.
6. Mount hose back.
7. Mount upper cowling back.

Task proper accomplishment check: check proper hose attachment
check proper attachment of the upper engine cowling.

4.5.3 Brake fluid

4.5.3.1 Recommended types

Only brake fluid of J 1703c classification should be used for hydraulic brake system (type for middle hard or hard operation).

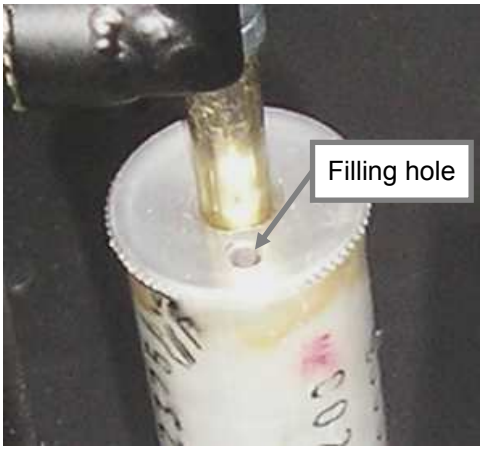
Czech Rep.	Foreign
• Syntol HD 205 or • Syntol HD 260	• ATE Blau • STOP SP 19 • MOBIL Hydraulic Brake Fluid 550 • BP Brake Fluid • PENTOSIN Super Fluid • AGIP F. 1 Brake Fluid Super HD • NAFTAGAS AT-2 • INA UK-2.

These brake fluid types may be blended as required and refilled in any mixing proportion.

4.5.3.2 Brake fluid refilling

Type of maintenance for the other instruments: line.
Authorization to perform:
- Aircraft owner (only for ELSA)
- Sport pilot or higher

Tools needed: syringe
Parts needed: recommended brake fluid
Instructions:
Brake fluid refilling is necessary when a low brake system efficiency occurs due to a fluid leak.
A brake fluid filling hole is drilled in the brake master cylinder attached to a brake pedal (see fig.). It is recommended to use a syringe to refill the brake cylinder. See table for the suitable brake fluid types to use for refilling the brake system. Step repeatedly on the pedal during refilling. Bleed the system after refilling.



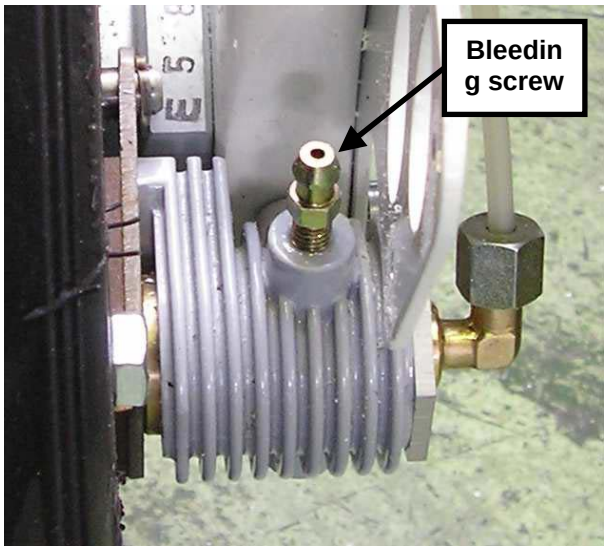
Task proper accomplishment check: no brake fluid leak from filling hole
check eficiency of brake system

4.5.3.3 Brake fluid emptying

Type of maintenance: line.
Authorization to perform:
- Aircraft owner (only for ELSA)
- Sport pilot or higher

Tools needed:
- wrench No. 7
- hose with inner diameter suitable for bleeding screw
- suitable cup for brake fluid

Parts needed: recommended brake fluid



Instructions:
Brake fluid thickens during aircraft operation and absorbes water. This condition causes brake system failures. It is not possible to determine when this may occur. The best way to prevent trouble is to change the brake fluid every year.

1. Insert hose on the bleeding screw and hold hose end in suitable cup.
2. Release bleeding screw and let flow brake fluid into cap.
3. Step repeatedly on the pedal during emptying.
4. Tighten bleeding screw and remove hose from it.
5. Repeat above procedure for the other brake.

Task proper accomplishment check no brake fluid flow during item No. 3 executing.

4.5.4 Fuel

4.5.4.1 Recommended brands

Refer to the ROTAX 912 Operator's Manual.

4.5.4.2 Fuel quantity

The standard aircraft is equipped with a 15.85 U.S.galls (60 liters) in each integral fuel tank.
Total fuel capacity is 31.7 U.S. gallons (120 litres).
Keep the maximum permitted take-off weight in mind when fueling.

4.5.4.3 Fueling

Type of maintenance: line.
Authorization to perform: - Aircraft owner (only for ELSA)
- Sport pilot or higher
Tools needed: funnel (for filling from petrol can)
Parts needed: none

Instructions:

Precaution
The following precautions should be maintained during fueling to prevent fire.

WARNING
• No smoking or open flames during fueling! • Fire extinguisher should be within reach! • Under no circumstances add fuel with the engine running! • Connect the aircraft to ground prior fueling. • No person in the cockpit during fueling!

A fuel tank filler is located on the upper side of the each wing (see photo).

CAUTION
It is highly recommended to pour gasoline through a filter if it was not tested for water content. After fueling, allow 20 min. for water to settle out on the bottom. Drain off some fuel and look for water.

Fig. Fuel tank filler neck

1. Connect the aircraft to the ground.
2. Open fuel tank filler
3. Insert fuel delivery nozzle or a funnel into the filler.
4. Fill required quantity of fuel.
5. Remove nozzle.
6. Close fuel tank filler by its cap.

Task proper accomplishment check: check the fuel tank cap is home screwed and required amount of fuel is in the tank (according to fuel gauge).

4.5.4.4 Fuel emptying

Type of maintenance: line.
Authorization to perform: - Aircraft owner (only for ELSA)
- Sport pilot or higher
Tools needed: none
Parts needed: a petrol can to be placed under the aircraft

Instructions:

Precaution
Use the same precautions as during fueling.

Draining procedure
1. Put the vessel under the drain valve.
2. Open fuel tank cap to speed up draining.
3. Using screwdriver (or appropriate jig) press and turn draining valve to the left to open it.
4. Drain fuel. If it is necessary to drain all fuel, push airplane tail down (almost to the ground) to allow drain of the all unusable fuel.
5. Using screwdriver (or appropriate jig) turn draining valve to the right to close it.
6. Close fuel tank cap.
7. Repeat procedure for the opposite tank.

WARNING
Do not smoke or have open any flame during draining!

Task proper accomplishment check: check the drain valve closing

4.6 Lubrication

Type of maintenance: line.
Authorization to perform:
- Aircraft owner (only for ELSA)
- Sport pilot or higher

Authorized person can lubricate the aircraft in all lubricating points according to 4.6.2.2.

4.6.1 Lubrication fundamentals

There are some generally inaccessible joints and control system parts inside the wings and fuselage, which have been cleaned and lubricated during airplane assembly. Lubrication of these will be performed during a periodic inspection.
There are some parts, e.g. landing gear, which are exposed to external conditions and to varying loads. These parts will be inspected during pre-flight and during periodical inspections. These should be lubricated as is necessary, but at least in the intervals specified below.

4.6.2 Recommended lubricants

4.6.2.1 Greases

Greases are mineral oils thickened with calcic, sodium, lithium or any other thickeners of aliphatic acids.
The greases do not SAE classification and their usage is recommended by manufacturer. Grease may be applied all the year round.

The following greases are recommended:

- waxy, semi-solid or butyraceous consistency and water resistant. They are used at very low temperatures (*-22 °F,* -30 °C) and at high temperatures (*248 °F*, 120 °C)
-

Czech	Foreign
MOGUL MOLYKA G (or equivalent)	AEROSHELL GREASE 22
	AEROSHELL GREASE 11MS
	AEROSHELL GREASE 23C
	SHELL RETINAX HDX2
	SHELL RETINAX EPX2
	(or equivalent)

4.6.2.2 Lubricating points

Unit	Lubricating point	after the first 25 hrs.	Every 50 hrs.	Every 100 hrs	Lubricant
Prop	• Adjustable props acc. to Prop Manual				
Engine	• oil change acc. to Engine Manual				
	• carburetor control cable at inlet into the bowden (in engine compartment)	x	x		oil
	• choke control cable at inlet into the termination (in engine compartment)	x	x		oil
Nosewheel landing gear	• landing gear leg in the area of bushing	x	x	x	oil
	• bearings in pull rod terminals of landing gear control	x	x	x	oil
Main landing gear	• pins of brake pads holders		x		MOGUL MOLYKA G, foreign greases
Wing	• all movable joints of wing folding mechanism (if mounted)	x	x	x	MOGUL MOLYKA G, foreign greases
Ailerons	• hinges		x		oil
	• control hinge pin			x	MOGUL MOLYKA G, foreign greases
	• two-armed aileron control levers inside the wing			x	MOGUL MOLYKA G, foreign greases
	• hinge joint of rods under the wing fillet			x	MOGUL MOLYKA G, foreign greases
Flaps	• hinges	x	x		oil
	• all movable joints under the quadrant cover between the seats			x	MOGUL MOLYKA G, foreign greases
	• All movable joints under the baggage compartment bottom cover			x	MOGUL MOLYKA G, foreign greases
	• Flaps control pins (at a flap root)		x		MOGUL MOLYKA G, foreign greases
HTU	• elevator hinge		x		oil
	• swivel bearing in the elevator control rod termination			x	MOGUL MOLYKA G, foreign greases
VTU	• rudder suspensions			x	MOGUL MOLYKA G, foreign greases
	• rudder control cables at attachment to the rudder			x	MOGUL MOLYKA G, foreign greases
Trim tab	• trim tab hinge	x	x		oil
	• control cables at inlets in the terminations			x	MOGUL MOLYKA G, foreign greases
Stick control	• All movable joints in the cockpit			x	MOGUL MOLYKA G, foreign greases
Rudder control	• All movable joints in the cockpit			x	MOGUL MOLYKA G, foreign greases
	• The passages of rudder control cables			x	MOGUL MOLYKA G, foreign greases
	• Brake system control cables at inlets in the bowdens (at brake pedals)			x	MOGUL MOLYKA G, foreign greases

4.7 Mechanism adjustments

4.7.1 Torque moments

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

Conversion: 1 N.m = 0.74 lb.ft

Torque moment formula (valid for all bolt sizes):

$$M_{kmax} = 1{,}065 \times \frac{d \cdot \sigma \cdot S}{1000 \cdot m}$$

Legend:

Mk.....	torque moment	N.m
d.....	bolt shank diam.	mm
σ	min. yield point	MPa
m.....	safety factor	(m=1,25 for σ<500 MPa; m=1,43 for σ>500 MPa)
s.....	lead of helix	mm

4.8 Necessary maintenance tools

No special tools are needed for the ***SPORTSTAR*** maintenance. Tools used for automobile maintenance are suitable.
As the ***SPORTSTAR*** is European design, metric tools are recommended for its maintenance. The aircraft manufacturer can provide a set of such metric tools.

4.9 Access holes

The following are the inspection and access holes:

- Screw caps on the wings lower surface - access to the aileron control rods and levers and to the pitot/static installation in the left half of the wing
- Screw cap on the fuselage lower surface under the baggage compartment close to the fuel tank - access to the fuel tank installation
- Screw cap on the fuselage lower surface in the middle of the rear section - access to the elevator control rods and a lever
- Wing fillets which cover space between the fuselage and wing - access to the wing-fuselage suspensions (wing folding mechanism)
- Cover sheet of Control stick system in the cockpit

4.10 Brake system efficiency adjustment

4.10.1 Brake pad replacement

Type of maintenance for the other instruments: line.
Authorization to perform:

- Aircraft owner (only for ELSA)
- Sport pilot or higher

Tools needed:

- jacks or supports
- pliers to remove cotter pins
- nut wrench No. 16 and 6
- flat screw driver

Parts needed:

1. Brake pads	4	pcs		Nom.	765 195
2. Cotter pin	4	pcs	ϕ 2x14mm	Czech Stand.	021781.04
				Nom.	039 300
3. Cotter pin	2	pcs	ϕ 4x40mm	Czech Stand.	021781.04
				Nom.	040 350
4. Washer	6	pcs	6x2mm	Works Stand.	3288.2
				Nom.	038 160

5. LOCTITE (e.g. 638) to secure the screws

Instructuions:
Brake pad replacement is only performed when a pad is worn-out.

CAUTION
Due to the possibility of brake fluid leaking, it is advisable not to loosen the hose cup nut during brake pad removal. In the case of a leak in the brake system, filling and bleeding is necessary.

Brake pad replacement procedure

1. Jack the airplane
2. Remove the cotter pin, unscrew the slotted nut M16, remove the washer from the axle
3. Bend small tabs on the 3 washers and unscrew the M6 screws connecting the brake disc to the wheel rim
4. Remove the wheel and the distance ring from the axle
5. Take the brake disc off (leave the brake on a main leg)
6. Remove the cotter pins, shift the pins out and remove the brake pads
7. Mount a new brake pad, secure the pins with cotter pins (diam. 2mm, length14mm) (part. No.: 039 300)
8. Put the brake disc on the wheel
9. Put the distance ring and the wheel on the axle (adjust the distance ring between bearings)
10. Set tab washers on the screws, apply Loctite and attach the brake disc to the inner part of the rim. Bend the tabs of the washers to secure the screw heads.
11. Put the washer on the axle, tighten the slotted nut and secure with a cotter pin

Task proper accomplishment check: check securing of all joints after replacement
check efficiency of brakes

4.10.2 Bleeding

Type of maintenance: line.
Authorization to perform: - Aircraft owner (only for ELSA)
- Sport pilot or higher
Tools needed: nut wrench No. 7 to release bleeding screw
Parts needed: none
Instructions:
It is important to thoroughly bleed the brake system. Otherwise the system function may be unreliable and the brakes may fail. There are two main reasons for air entering the brake system:

1. Disconnected or loose hoses
2. Insufficient quantity of brake fluid

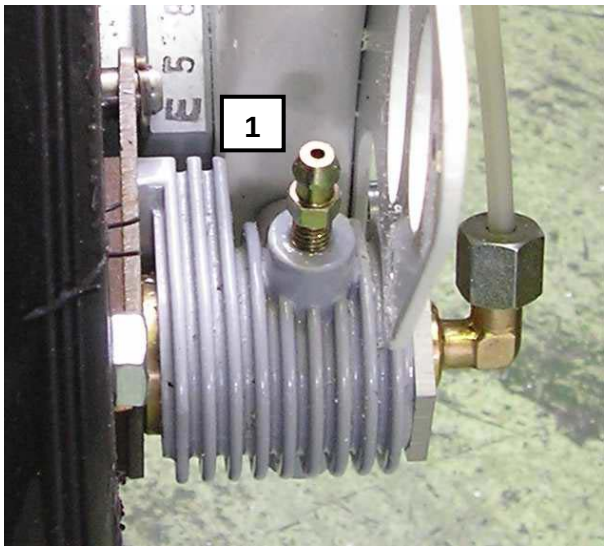


Fig. Brake system bleeding
1- Bleeding screw

Procedure:

1. Loosen the bleeding screw in the brake cylinder
2. Step repeatedly on the pedal to bleed the brake system
3. Tighten the screw
4. Repeat several times or until the pedal offers resistance against motion (feels firm)

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

Task proper accomplishment check: check tightening of the bleeding screw
check function and efficiency of brakes

4.11 Control surfaces deflection setting

Type of maintenance: line.
Authorization to perform: - Aircraft owner (only for ELSA)
- Sport pilot or higher
Tools needed: refer to paragraphs below
Parts needed:
- a bevel protractor
- a clip to attach protractor to measured control surface
- cotter pin 1.6 x 16 to secure some nuts

Instructions: refer to paragraph below
Task proper accomplishment check: check securing of all joints
check proper tightening of all screws
check the deflections comply with Control Surfaces Deflection Record

Control surface deflections of a new aircraft are set by the manufacturer. Deflections are adjusted to values specified in the Control Surfaces Deflection Record enclosed in this Manual.
A neutral position of the control surfaces and controls is used as a base for adjustment of deflections.

4.11.1 Aileron deflection adjustment

Tools needed:
- wrench No. 9, 10, 13,
- allen wrench No. 3,
- flat screw driver
- pliers

Instructions:
A range of deflections are set using adjustment screws on lateral control stops located on a console of the left/right control column.
The aileron neutral position can be adjusted with the adjustable end of the short rod inside the cockpit. Or with the adjustable end of the longer rod inside the wing (when the screw cap on the lower wing surface is removed).
The aileron differential (difference between a lower and upper deflection) can be adjusted with the adjustable end of the rod connecting the two-armed lever inside the wing and the hinge. The adjustable rod end is accessible when an aileron is deflected upward.

4.11.2 Flap deflection adjustment

Tools needed:
- wrench No. 5.5, 9 (2x), 10, 13,
- pliers

Instructions:
Flaps deflection is determined by cut-outs in a changing gate on the flap control lever inside the cockpit. Use the following procedure to adjust flap deflection:
Remove the baggage compartment bottom cover which will allow access to a rod connecting the flap control lever and a lever welded on a tube connecting the left and right flap. Use the adjustable rod end to adjust the flaps in the position "RETRACTED" Or you can use eccentric pin to set retracted position – see below.
The deflection of the left flap against the right flap may be adjusted when the eccentric pin is moved a slight amount. The pin is inserted into the groove of the flap root.
See Figure in par. 2.3.12.9 for adjustment points.

4.11.3 Elevator deflection adjustment

Tools needed:

- wrench No. 9 (2x), 13
- pliers

Instructions:

The range of elevator deflection is determined by the control stick stops setting. The "Push in" stop may be adjusted with an adjustment screw. To adjust an upward deflection, fully pull the control stick rearward. Then measure the elevator upward deflection and compare it with the one specified – if required adjust the deflection with the adjustable end of the elevator control rod or with the adjustable end of the rod below the baggage compartment cover. When the upward elevator deflection is adjusted, fully push the control stick and adjust a stop so that an elevator downward deflection corresponds with that one specified.

See Figure in par. 2.3.12.7 for adjustment points.

4.11.4 Rudder deflection adjustment

Tools needed:

- wrench No. 8, 10

Instructions:

The rudder deflections are set by the aircraft manufacturer. If necessary the rudder deflections can be adjusted by adjustable stops located on the rudder control cable in the cockpit (see para. 2.3.12.8). Side cockpit upholstery must be removed first.

4.11.5 Trim tab adjustment

Tools needed:

- wrench No. 10 (2x)
- allen wrench No. 4
- pliers

Instructions:

The following may be adjusted:

a) The position of the trim tab control lever may be adjusted against a groove in the quadrant between the seats.
   Loosen the bolts which clamp the ends of the trim tab control cables on the upper/lower tab surface. Then set the trim tab control lever in the desired position, slightly tighten the cables and retighten the bolts.
b) Trim tab deflections
   Trim tab deflection may be adjusted using the adjustment bolts which clamp the ends of the control cables. The adjustment bolts are on the upper/lower tab surface – see Fig. in par. 2.3.12.10.

4.12 Steerable nosewheel landing gear adjustment

Type of maintenance: line.
Authorization to perform: - Aircraft owner (only for ELSA)
- Sport pilot or higher
Tools needed:
- wrench No. 9, 10,
- pliers
Parts needed: cotter pin 1.6 x 16

Instructions:
A steerable nosewheel adjustment is necessary so the airplane tracks during straight taxiing with engine idling (to eliminate prop turning moment) with rudder pedals held in neutral position (no crosswind!).

Procedure:
1. Lift the nosewheel and neutralize wheel and rudder pedals
2. Adjust the nosewheel control using the adjustable rod ends.

Task proper accomplishment check: check straight taxiing at idle with rudder pedals neutralized.

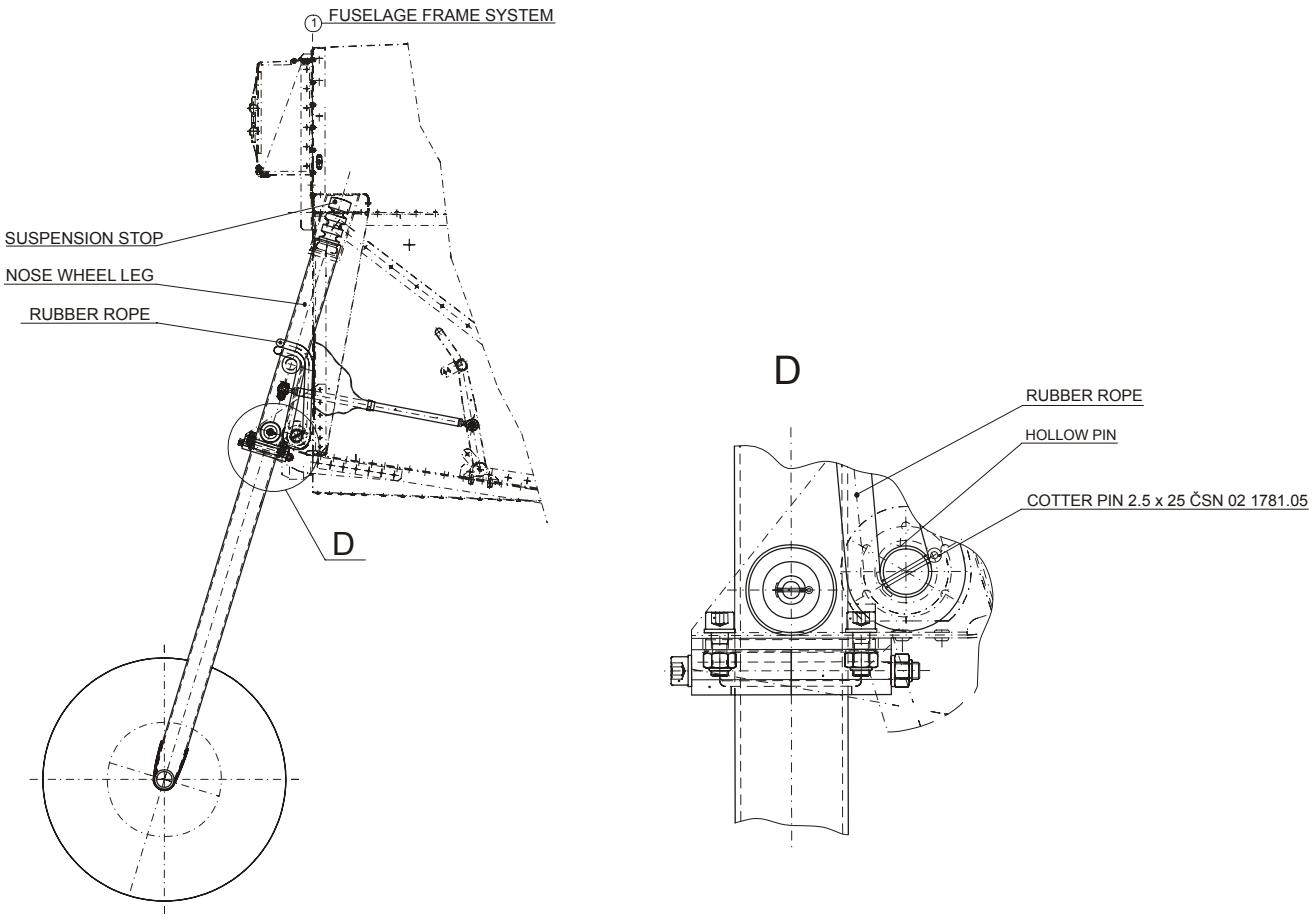
4.12.1 Rubber shock absorber replacement

Type of maintenance: line.
Authorization to perform: - Aircraft owner (only for ELSA)
- Sport pilot or higher
Tools needed: pliers to remove cotter pin
Parts needed: new rubber rope (bungees),
cotter pins

Instructions:
Perform rubber shock absorber replacement when rubber rope is damaged or excessively worn down.

Procedure:
1. Remove cotter pins from the hollow pin attaching a rubber rope
2. Remove hollow pin
3. Remove rubber rope from the nose landing gear leg
4. Mount a new rubber rope at the leg, sling over pin
5. Insert a hollow pin back
6. Secure by two cotter pins

Task proper accomplishment check: check function of nose wheel shock absorbing.



4.13 Engine idle adjustment

Type of maintenance: line.
Authorization to perform:

- Aircraft owner (only for ELSA)
- Sport pilot or higher

Tools needed: flat screw driver
Parts needed: none
Instructions:

1. Remove upper engine cowling.
2. Use chocks under main wheels.
3. Start engine, set idle.
4. A mechanic shall go alongside the wing leading edge, very carefully considering rotating propeller .
5. Mechanic adjusts the engine run at idle to increase / decrease engine speed Use adjustment screw on the carburetors to set engine speed approximately 1400 R.P.M.

WARNING
BECAUSE THE ENGINE IDLE IS ADJUSTED ON A RUNNING ENGINE, USE EXTREME CAUTION NEAR THE PROPELLER.

6. Stop the engine

Task proper accomplishment check: check engine run at he idle, it must be smooth

4.14 Tire inflation pressure

Type of maintenance: line.
Authorization to perform:
- Aircraft owner (only for ELSA)
- Sport pilot or higher

Tools needed:
- tire valve adapter
- air pump or compressor
- manometer

Parts needed: none
Instructions:
Tire pressures are noted on placards located on the aircraft. Use the adapter supplied with the aircraft to inflate the nosewheel. A car tire pump or compressor, or pressure bottle may be used for inflating the wheels.

Nose wheel pressure:

Cheng Shin 13 x 5.00 – 6..... 160 + 20 kPa / 23 + 3 psi
Sava tire 14x4..... 160 + 20 kPa / 23 + 3 psi

Main wheel pressure:

Sava tire 14x4..... 180 + 20 kPa / 26 + 3 psi
Cheng Shin 15 x 6.00 – 6..... 120 + 20 kPa / 17 + 3 psi
GOOD YEAR 15 x 6.00 – 6..... 80 + 20 kPa / 12 + 3 psi

Task proper accomplishment check: check tire pressure.

4.15 Cleaning and care

Cleaning and care may be performed by Aircraft owner (only for ELSA) or Sport pilot or higher.

4.15.1 Airplane care outlines

Use mild detergents to clean the exterior surfaces. Oil spots on the surfaces (except the canopy!) may be cleaned with gasoline or strong detergents such as 409.
Upholstery covers can be removed from the cockpit, brushed or washed in lukewarm water with a laundry detergent. Dry the upholstery before reinstalling.

4.15.2 External surfaces cleaning

The external metal surfaces and fiberglass parts (cowlings, wingtips etc.) of the airplane are protected with weather-proof paint. Wash the airplane surface with lukewarm water and car wash type detergents. Then wash the airplane with water and sponge dry. It is recommended to protect painted external surfaces twice a year, by applying an automotive type polish. Use only on a clean and dry surface, and polish with a soft flannel rag.

CAUTION

- Never wipe a dry surface – the surface may be scratched by dusts and dirt
- Never apply any chemical solvents
- Repair a damaged painted surface (see par. 5.6) as soon as possible to prevent corrosion

4.15.3 Interior cleaning

Keep in mind the following:

- Remove any loose objects from the cockpit
- Vacuum the interior, upholstery and carpets
- Wipe the upholstery using a rag with in lukewarm water and mild laundry detergent. Then dry or remove the seat upholstery, side panels, carpets and clean with lukewarm water and/or carpet cleaners, upholstery cleaners. Dry thoroughly before reinstallation.
- Clean the cockpit canopy interior surface (see par.4.15.4) below.

4.15.4 Cockpit canopy cleaning

The canopy may be cleaned by washing it with lukewarm water and car or laundry type detergents. Use a clean, soft cloth. Then use a suitable polisher on the canopy such as WEISS POLIERPASTE, WEIS SPEZIAL-SPRUHREININGER, WEIS SPEZIAL TUCHTER.

CAUTION

- Never clean dry canopy
- Never apply gasoline or chemical solvents!
- Cover the canopy with a cover sheet

4.15.5 Engine maintenance

Refer to the engine manufacturer's instructions for engine maintenance.

4.15.6 Propeller maintenance

Refer to the propeller manufacturer's instructions for engine maintenance.

4.15.7 Winter operation

4.15.7.1 General

It is considered a winter operation, if the outside temperature falls below 41°F (+5 °C).

4.15.7.2 Preparing the aircraft for winter operation

Type of maintenance: line.
Authorization to perform: - Aircraft owner (only for ELSA)
- Sport pilot or higher

Aircraft airframe

- Lubricate the aircraft per Lubricating Chart (100 hr. Inspection) if the last inspection was not within 6 months
- Check and adjust rudder control cable prestress
- Check cockpit canopy rubber packing – replace if damaged
- Check fuel tank venting
- Check attachment of wing, ailerons, flaps and tail units; lubricate per Lubricating Chart

Engine

Refer to the Engine Manual for more details.
The following should be done:

- Add Anti-freeze to the cooling system as required (usually a 50/50 mix.)
- Change the oil (see Engine Manual or Service instructions)
- Check the spark plug gaps

If low cylinder head or oil temperatures occur during operation under low outside temperature, then do the following:

- Cover a portion of the radiator face using an aluminium sheet, insert it between the radiator and the lower engine cowling.
- Cover the oil cooler face (or a part of face) using an aluminum sheet attached with a suitable adhesive tape.
- Cover the Reduction gear unit by means of a car engine cover
- Cover the oil filter (see instructions for Reduction gear unit)
- Cover the oil tank (see instructions for Reduction gear unit)

4.15.7.3 Operation

Preflight inspection

In addition to the Pre-flight inspection described in the AOI, the following must be done:

- Remove all snow from the airplane surfaces, and remove any icing using hot air
- Check the control surfaces for free movement. Check the slots of the control surfaces and flaps. Remove any snow or ice
- Check the fuel tank vent hose for openness before each flight
- Check fuel system (fuel filter) for debbris, if found, empty the fuel tank and refill with fresh fuel
- Check fuel for water prior filling (use of water separator/filter is recommended)
- Drain fuel tank (drain valves are located on the bottom side of the each wing), drain a small quantity of fuel; check for water and other contaminates untill fuel is clean and clear.
-

Pre-heating engine and oil

It is permissible to start an engine without pre-heating if the outside air temperature is not below +5 °C. Pre-heat the engine and oil if air temperature falls below 41°F (+5 °C). Use suitable air heater or a dryer.

WARNING

Never use open fire to pre-heat an engine!

Blow hot air from the front into the hole around the prop (engine covered with fiberglass cowlings). The temperature of the hot air should not exceed 212°F (100°C) at air heater output. Warm up the oil tank along with the oil in the engine. Pre-heat until cylinder head and oil temperatures exceed 68°F (+20° C).

Engine starting

1. Turn the propeller by hand (ignition switched off!)
2. Set the fuel selector to LEFT position
3. Set throttle lever to idle
4. Open the choke
5. Master switch to "ON"
6. Switch on ignition to "START" after starting to “BOTH”
7. Adjust engine RPM after starting
8. Close the choke
9. Warm up the engine

CAUTION

If the cylinder head and oil temperatures fall during parking. Start and warm up engine from time to time between flights. Do not open choke when starting a hot engine.

Parking and taxiing

Check wheel brakes for freezing when parked outside and temperature is below zero. Check wheels free rotation prior to taxiing (Grasp the propeller and pull the airplane). Heat the brakes with hot air (to melt snow or ice). Frozen materials should not be removed by forced towing.

After winter operation

- Clean the airplane thoroughly (hinges, especially the suspensions)
- Lubricate airplane per Lubricating Chart
- Check and adjust the control system

5. REPAIRS

5.1 Repair guidelines

5.1.1 Repair clasification

Major repair, alteration or maintenance – Any repair, alteration or maintenance for which instructions to complete the task are excluded from the maintenance manual(s) supplied to the consumer are considered major.

Minor repair, alteration or maintenance – Any repair, alteration or maintenance for which instructions are provided for in the maintenance manual(s) supplied to the consumer of the product are considered minor.

Overhaul – Maintenance, inspection, repair or alterations that are only to be accomplished by the original manufacturer or a facility approved by the original manufacture of the product.

Repair Facility – A facility specifically authorized by the aircraft or component manufacturer to repair the product originally produced by that manufacturer.

5.1.2 Repair guidelines

NOTE

Repairs must be performed only by qualified persons – see 4.1.1 Qualification requirements.

Dents, cracks and loose rivets are the most frequent problems encountered during the operation of an all-metal airplane.
The following guidelines should be considered during repair:

1. The Strength in any cross-section of a repaired area/part should at a minimum be the same as the strength of the original undamaged area or part. The repaired area is not considered as a whole, but is considered as:
   - an original assembly unit
   - a stiffener or a patch

   If the cross-section of a repaired area is (in all directions), at a minimum, the same as the one on the original part, or if a stiffener or a patch shape and design is similar, and the same materials are used, then there is no risk that the airframe will be weakened.
2. The load has to be transferred by a stiffener or a patch from one side of a repaired area to another.
   In some cases, the load transmission should be carried out at another structural member and then back to an undamaged part of the original structure.
3. The length of overlapping between a reinforcement (stiffener or patch) and the undamaged part of the original structure should be enough to assure a good joint. The length of overlapping is very important to assure no load concentration.

5.2 Damage classification

Various types of damage may occur during aircraft operation. It is important to correctly classify damage according to its character, size and especially, which part of the airplane has been damaged.
The important parts are the engine, engine mount, propeller, wing spar, wing box in the fuselage, elevator, control system, and landing gear.
Any damage must be repaired only by person/repair station qualified in accordance with 4.1.1 Qualification requirements. The damaged parts may be replaced in their entity by new ones supplied by the aircraft manufacturer.
Any damage and its repair should be recorded in the Log Book.

5.3 Materials used

5.3.1 List of skin sheets

Duralumin sheets plated by aluminum are used for skins.
The following thickness are used: 0.016 in 0.4 mm
0.020 in 0.5 mm
0.024 in 0.6 mm

Material qualities are shown in the following table :

1	Czech Standard		Z 424253.61 Al Cu Mg 1
2	Mechanical properties (Minimum)	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	Half-finished products		by Al plated Sheets Al thickness max.10 mm *0.4 in*
5	Equivalent Standards	U.S.A. Germany Russia	Alclad 2024 DIN 1745 D16AT

List of Skin Sheets:

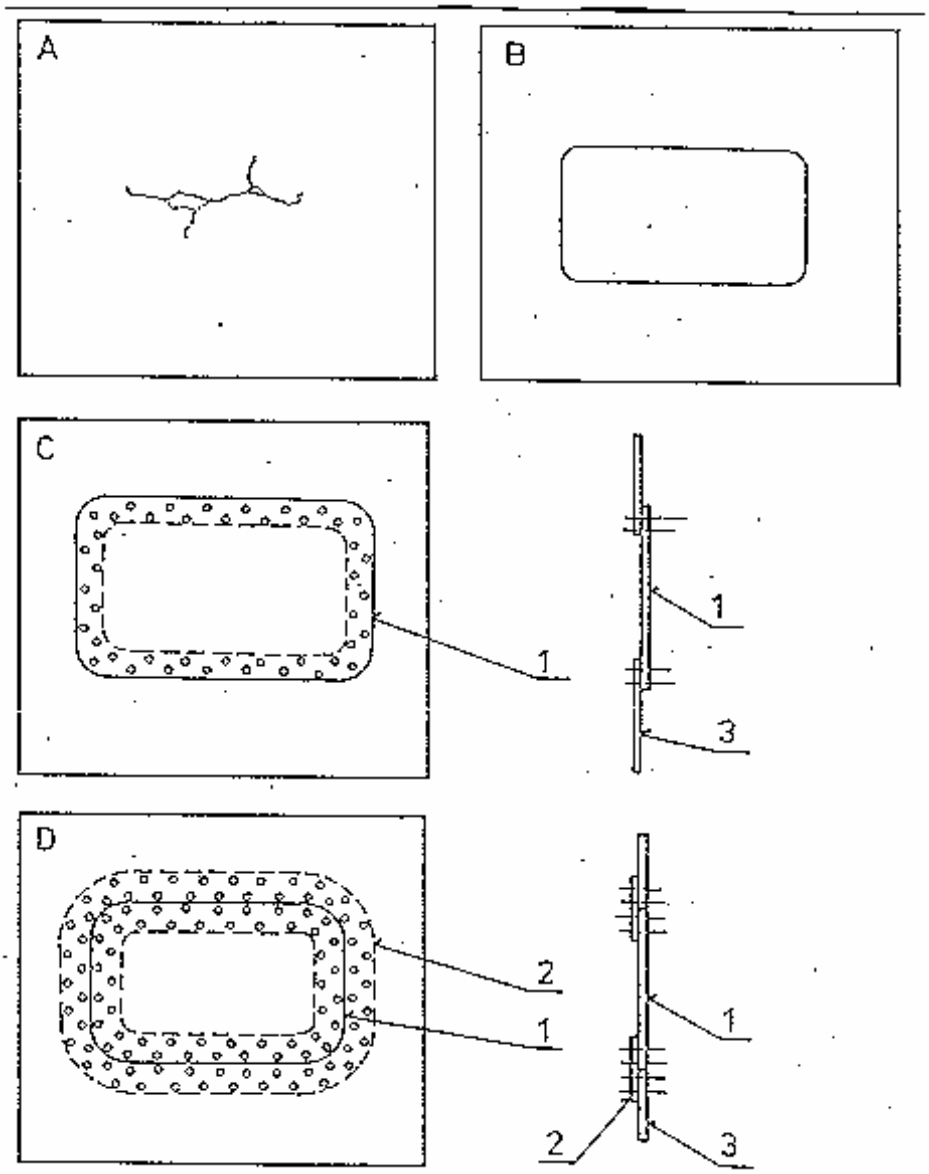
Thickness	Airplane part
0.016 in (0.4 mm)	Elevator skin (except L.E.) Trim tab skin Rudder skin
0.020 in (0.5 mm)	Wing skin between rib 7 and 11 Flaps skin Ailerons skin Skin of upper rear part of a fuselage
0.024 in (0.6 mm)	Wing skin between rib 1 and 7 Elevator leading edge Skin of front, rear and bottom part of the fuselage

5.4 Skin repair

Type of maintenance: line.
Authorization to perform:

- Aircraft owner (only for ELSA)
- Sport pilot or higher
- Repairman (LS-M)
- Mechanic (A&P)
- Part 145 Repair station

1. To prevent small cracks (max. 0.2 in (5 mm)) from spreading, drill a hole of 0.06 in (1.5 mm), diameter at the end of the crack
2. Small holes (up to ∅ 0.16 in (4 mm)) can be repaired by a "POP" rivets
3. More extensive skin damage is repaired by means of a patch. A flush or surface patch may be used, as shown on the following figure:



1-Patch
2-Frame
3-Skin

A-Punctured skin
B-Cutting out and deburring the damaged spot
C-Surface patch repair
D-Flush patch repair

Use a sheet of the same thickness as the repaired skin for the patch and frame.
A single row of rivets is used to rivet a small patch (patch area max. *7.75 sq in*. 50 cm^2). Use a double row for greater patches as shown on figure. Paint the internal side of the patch and frame before riveting and then paint the outside surface.

5.4.1 Riveting

"POP" rivets are used in most cases. Aircraft solid rivets are used only on wing spars, the wing box inside the fuselage and on some airplane parts with high loads. These parts must be repaired only by an authorized repair station.
When pop-rivets are to be removed, weaken the rivet head by drilling and then carefully drive out with a drift. Use a drill of the same size as the rivet. The rest of the rivet may be removed from the underside.
Pop-rivet joints are sealed. If necessary use a suitable knife to cut out the sealing compound and then clean the joint. Warm up shortly the sealed joint using hot air gun 356-392°F (180-200 °C) to make it easier to cut.

In the following table lists the pop-rivets and characteristics:

AVEX Pop-rivets supplied by AVDEL Company

1. material : Al Mg 2.5
2. Shank material: steel, zinc-chromate coating surface

Rivet No.:	Diameter		Length		Hole diameter		Max. riveting thickness		Head
	[in]	[mm]	*[in]*	[mm]	*[in]*	[mm]	*[in]*	[mm]	
1691-0410 1691-0414 1691-0512 1691-0516	*0.126* *0.126* *0.157* *0.157*	3.2 3.2 4 4	*0.3110* *0.441* *0.374* *0.050*	7.9 11.2 9.5 12.7	*0.130-0.138* *0.130-0.138* *0.161-0.170* *0.161-0.170*	3.3-3.5 3.3-3.5 4.1-4.3 4.1-4.3	*0.031-0.189* *0.157-0.311* *0.047-0.248* *0.157-0.378*	0.8-4.8 4-7.9 1.2-6.3 4-9.6	button
1604-0412	*0.126*	3.2	*0.374*	9.5	*0.130-0.134*	3.3-3.4	*0.094-0.248*	2.4-6.3	counter-sunk

After drilling and deburring the holes apply Emfimastic PU50 sealing compound or equiv. on either part. Use a spatula to make a homogenous layer (*0.004 in*, 0.1mm).
Riveting should be done before the sealing compound hardenes (approximately half an hour).
For rivets spacing see surrounding skin; usually *0.8-1.6 in* (20-40 mm) and keep a minimum distance of *0.3 in* (8 mm) from the edge.

5.5 Fiberglass parts repairs

Type of maintenance: line.
Authorization to perform:
- Aircraft owner (only for ELSA)
- Sport pilot or higher

5.5.1 Damage classification

Any damage of parts from reinforces plastics with epoxy matrix leads to increased saturation of the matrix with humidity and subsequently to loss of properties. Therefore we recommend to carry out their repair as soon as possible after the damage has occurred.

Two kinds of parts are made from these materials in the airplane:

- structural, load-bearing parts (landing gear legs)
- design appearance, non load-bearing parts (fairings)

According to the damage size we can divide repairs into:

- small damage (surface defects, not affecting the stiffeners)
- medium damage (not more than 2/3 of stiffener thickness damaged)
- big damage

We recommend to carry out repairs by means of epoxy materials and glass stiffeners.

5.5.2 General

Epoxy mixtures are prepared in a given mass ratio by means of weighing (accurecy of scales 1g)

5.5.3 Parts of external appearance

5.5.3.1 Small damage

Repair of damage just by application of mastic and by varnish repair.

Preparatory grinding

For a good adhesion of repair layers it is necessary to carry out surface grinding at the utmost up to the depth of contact with the stiffener (do not damage). It is necesary to do surface grinding with overrun of 50 mm from the damage location smoothly to the top layer. It is suitable to do grinding with grain size of 160. Dry grinding equipment with suction from the grinding area is used. Al2O3 (fused corundum) can be used as grinding material.

Dust removing

It is made by wiping with clean and dry brush or by a vacuum cleaner.

Application of smoothing layer

After preparation of mixture (for material recommendation see tab below) and its eventual thickening to enhance the non curtaining capability (for vertical or lower areas) is performed its application onto the repair area by means of a spatula. For better disribution of deposited material on irregular surface it is possible to form it through the laid PE or PP transparent folie. After proper application the layer is without bubbles. Deposit thicknessis given by necessary thickness of surrounding layers (levelling) and ranges from 0.2 to 10 mm (0.0079 – 0.394 in) in one deposit.

Recommended materials for mixture preparation for application of levelling layer

manufacturer, name	type	míxing ration	dwelling	rate of setting	time of setting	temperature	fillers
HUNTSMAN, VANTICO, Araldite 2011 (AW106 + HV953U)	epoxy	A:B = 100:80	to be processed within 100min (for 0.1 kg mixture)	40%	24 hours (32hrs)	20 - 35°C (17 - 20°C)	thickening: Aerosil, microballs
				100%	48 hrs (72 hrs) (3 hrs)	20 - 35°C (17 - 20°C) (60°C)	

Grinding

Grinding or eventually sealing the surface is made after setting the mixture and possible tearing off the the used folie. It is suitable to start grinding with grain size up to 160 and finish with grain size of at least 400. It is carried out by dry grinding equipment with suction from the grinding area. Al2O3 (fused corundum) can be used as grinding material. Basic material of the part must not be diminished at grinding.

NOTE

Especially in case of C/K stiffener in the basic part, grinding through up to the stiffener must not occur (complication - see note about preparatory grinding at medium damage).

Finishing

See para 5.6 - Paint repairs.

5.5.3.2 Medium damage

Repair of damage by replacing the stiffener part, by mastic and varnish repair. At such repair it is necessary to distinguish type of used stiffener (especially for grinding):

- C/K (carbon/kevlar), rovings of fabric of black colour (C) take turns with yellowish (K)
- G (glass), rovings from milky white to transparent

Preparatory grinding

For good adhesion of repair layers it is necessary to do grinding up to the depth of damage. It is necessary to do surface grinding from the damage area with overrun at the least 25 mm (1 in) for every damaged stiffener layer smoothly up to the top layer and then about 50 mm (2 in) for finishing and mastic aplication. It is convenient to do grinding with grinding material having grain size of 160. It is carried out by dry grinding equipment with suction from grinding area. Al203 (fused corundum) ca be used as grinding material.

NOTE

In case of C/K stiffener K rovings tend to rise up from the surface at grinding - it is difficult to grind them, we recommend to use diamond grinding tool and one-way grinding.

Dust removing

Dust is removed by wiping with a clean and dry brush or by a vacuum cleaner.

Stiffener preparation

For this kind of repairs we recommend the stiffener G (glass) with plain weave, 150g/m^2, with surface protection (drewwing) for epoxides.

Number of needed stiffener layers depends on depth of damage. It is possible to say that each layer of the mentioned fabric represents at proper saturation by matrix resin thickness of 0.5 mm (0.02 in).

Stiffener layers must be prepared (cut out) gradually from the smallest (the lowest) upto the bigger (upper), each with overrun of 20 mm (0.78 in).

Putting layers

After preparing lamination mixture (for recommendation of material see the Tab. on page 5-6), it is applied to the place of repair by means of rigid brush. The first stiffener is laid into the deposit and it is again saturated by brush. Another layer of stiffener is laid and saturated. When putting the last layer it is necessary to pay attention to a proper saturation and compression of stiffeners so that they cannot “come up” tothe surface and subsequent useless damage at final grinding. For better saturation of the surface by resin and securing against curtaining it is possible to put PE or PP transparent foil across the surface. When applied properly, the layer is without bubbles. Repar thickness shold exceed surrounding surface in this phase by about 0.5 to 1 mm (0.02 – 0.04 in) for finishing.

Grinding

Carry out grinding and evetually apply mastick on the surface after setting, eventually tearing off the folie (see small damage). It is suitable to begin grinding by abrasive with grain size of 160 and finish by grain size of at least 400. Dry grinding equipment is used with suction from the grinding area. Al2O3 can be used as grinding material. It is important not to diminish basic material of the part at grinding.

NOTE

Especialy in case of C/K stiffener in the basic part there must not be any grinding through up to the stiffener (complication -see the note about preparatory grinding).

Finishing

See para 5.6 - Paint repairs.

5.5.3.3 Big damage

At such damage we recommend to change the part or to do this repair in a professional facility. Use instructions in chapter about medium damage as recommendation for used materials.

5.5.4 Structural parts

With these parts we do not recommend to do othe repairs than small damage repairs. In case of the other damage we recommend to contact manufacturer.

CAUTION

When repairing, it is necessary to pay attention to timely repair (see the text about low of properties at humidity effect at the begining of paragraph 5.5.1)!

Small damage

Repairs are made according to instructions with appearance parts.

CAUTION

When repairing, it is necessary to carefully pay attention not to damage the stiffeners!

Cracks, permanent deformations and breaks are the most relevant type of damage.
Prior to undertaking the repair, clean the area to be repaired thoroughly, with soap and water. Remove any paint by wet or dry sanding. Superficial scars, scratches, surface abrasions, or erosion can generally be repaired by applying one or more coats of epoxy resin. The number of coats required (2 generally) depends upon the type of resin and severity of damage. The layers should have an overlap of *1.5-2 in* (30-50 mm). After the resin has cured, sand off any excess and prepare the area for primming and painting.

If the area to be repaired is large, use a temporary block or mold coated with PVC or PE foil to support the repaired area.

5.6 Paint repairs

Type of maintenance: line.
Authorization to perform:
- Aircraft owner (only for ELSA)
- Sport pilot or higher

5.6.1 Safety rules

When working with paints, thinners and solvents follow the following safety rules:

- it is necessary to follow safety rules for working with flammable and volatile substances
- working area must be properly aerated
- it is prohibited to smoke and anyway handle with free fire in a working area
- use protective working means such as goggles, gloves, respirator, etc.

5.6.2 Recommendation for paint repairs

CAUTION

By applying paints weight of airplane is increased and centre of gravity position is changed. Increase in weight depends on type of coat and its thickness.

5.6.2.1 Washing and degreasing

It is possible to use both organic solvents and solvents based on water.

(a) **Organic solvents -** acetone, metyetylketone (MEK), benzine, toluene, BASF Glasurit 360-4

- Applied by spraying on washed surfaces (e.g. mechanical sprayer, jet ejector) or by wiping with wet (by pouring, not by dipping because it would contaminate the whole volume of solvent) textile wad. After applying it, the agent is wiped off by clean absorbing material before solvent evaporation.
- **Advantages**: fast and reliable evaporation even from the corners and borders without additional warming.
- **Disadvantages**: it must be used without other dilution (expensive); not ecological (danger of water contamination); detrimental to health (must be carried out in an aerated area with personal protective means); waste (including dripping from the area) must be eliminated in the incinerating plants.
- **Use**: for Al-alloys surfaces, epoxide fibreglass

CAUTION

These agents must not be used for degreasing parts from plastics (PC - Lexan, PMMA - Plexiglas)

(b) **Water-based** agents - emulgation substances, wetting agents

- Applied also by spraying onto washed surfaces or by wiping with wet (by pouring and dipping) textile wad. After applying it, let it act for some time (see manufacturers recommendation) and then it is rinsed with clear water (by means of sponge dipped in ample amount of water or water jet).
- **Advantages:** (different according to the type of product: it is possible to highly dilute with water (cheap); ecological - waste (including dripping from the surface - due to ample amount of water it is necessary to contain it) can be generally eliminated after its additional dilution with water in public sewerage; the least detrimental to health.
- **Disadvantages:** slow and unreliable evaporating from corners and borders, additional warming (drying) mostly required - imperfect elimination of water results in wrong adhesion of paint coats; imperfect degreasing of fibreglass parts (not possible to use)

- **Use:** for Al-alloys surfaces and plastics

5.6.2.2 Bonding rivet heads, big irregularities and material transitions

CAUTION
In case that airplane surface remains without top coat, carry out just rivet head bonding.

After perfect degreasing carry out bonding of rivet heads, big irregularities and transitions of fibreglass parts with Al-sheet.

Epoxide and polyester bonding agents for car bodies are suitable; moreover for transitions between two types of material with increased elasticity. Recommended bonding agents are shown in the following tables.

Polyester bonding agents are applied with plastic spatula after being mixed with initiator. Grinding with grinding paper with grain size of 240is made to smooth surface after drying .Remove dust after grinding and clean with degreasing agent.

Epoxide bonding agent is applied from the special jet with static mixer by means of extruding pistol. Excessive material is wiped off with spatula to final appearance before setting (slight recess is not a defect) - **do not grind!**

Recommended bonding agents:

surface	manufacturer, name	type	other components	drying (grindable) [min] / 20°C
Al-alloys	BASF Glasurit 839-10 (base)	polyester	BASF Glasurit 948-36 (initiator)	30
transitions epoxide-fibreglass + Al-alloys	BASF Glasurit 839-45 (base)	polyester	BASF Glasurit 948-36 (initiator)	150
Rivet heads	3M DP-190 (base+ hardener)	epoxide (elastic)		360

5.6.2.3 Application of primer (paint)

In order to reach a uniform resistance to corrosion and smooth surface, we recommend to carry out application by means of spraying (air standard gun with the upper vessel, air HVLP gun, airless electric gun). The adjusting of the used gun (given by manufacturer) differs according to the type - air pressure, jet diameter. Primer should be applied in several sprayings (total thickness is not reached at a blow) with defined maximum dwell and total drying time till further treatment or handling.

Primer serves especially for anchoring (adhesion to the substrate) the top coats and can serve also for eliminating irregularities of the surface (function of filler, for grinding).

For surfaces from Al-alloys we recommend to use the etch-primers for light metals based on alkyd or materials based on epoxides or polyurethans (2-component paints); specific recommendations according to the table on the next page.

Recommended primers

Surface	Manufacturer, name	Type	Further components	Surface mass [g/µm/m2]	Recommended thickness [µm]	Drying (between spraying/total) /20°C
Al-alloys epoxy-fibreglass PC (Lexan), PMMA (Plexiglas)	BASF Glasurit 801-1871 (base)	epoxide	BASF Glasurit 965-32/2 (hardener) Glasurit 965-50 (thinner)	1.62	25 (at 50 it can be also used as filler)	15min / 12hour

5.6.2.4 Bonding

After total drying of basic coat we recommend to carry out total bonding of irregularities including repairs of bonding. Recommended binders are shown in the table - Recommended bonding agents.
After drying perform grinding with emery paper with grain size of 240 until the surface is smooth. After grinding clean dust and wipe off with grease remover and perform repairing paint coat by primer (1//3of coat thickness)

5.6.2.5 Application of top coat

In order to reach smooth surface we recommend again to carry out the paint coat by spraying (see para 5.6.2.3).
Top coat serves especially for creating the coat resistant to weather and external effects for aesthetic rendering of the unit. Considering the higher loading by external effects we recommend to use top materials, exclusively two-component ones, on the acrylic-polyurethan or polyurethan basis, always with guaranteed adhesiveness to the used base coat (according to manufacturer). It is possible to use some of the coat systems for car repairs. In our recommendation (see the tab. 3) there are two types of colours: single coat (colour shade and protection in one), double coat (one-component colour shade is formed by the substrate and protection is ensured by two-component transparent top coat). By single coat paint coat it is possible to reach the wide spectrum of colours, but it is difficult to do metallic paint coats (we do not recommend them).

Recommended colours

type of colour	manufacturer name	type	other items	surface weight [g/µm/m2]	recommended thickness [µm]	drying time (beween spray-coats / total) /20°C
single coat	BASF Glasurit R-18/ shade (base)	acrylic-polyurethan	BASF Glasurit 922-18 (standard hardener) Glasurit 352-91 (standard thinner)	1.0-1.6 (by shade)	20-40	15 min / 16 hrs
Double-coat	base colour coat: BASF Glasurit R-55/ shade (base)	acrylic-polyurethan	BASF Glasurit 352-216 (thinner, long)	1.2-1.4 (by shade)	15-20	10 min / 20 min

type of colour	manufacturer name	type	other items	surface weight [g/µm/m2]	recommended thickness [µm]	drying time (beween spray-coats / total) /20°C
	top coat, bright:: BASF Glasurit 923-155 (base)	acrylic-polyure than	BASF Glasurit 929-73 (standard hardener) Glasurit 352-91 (standard thinner)	0.92	30-40	5 min / 5 hrs

5.6.3 Small damage

5.6.3.1 General

Small damage is a deterioration of corrosion resistance. At repair the situation is made more difficult by the fact that the substrate for repair coats is not a compact surface of basic material but mostly all coats of surface protection (after grinding), of which not all are suitable for (in ageing stage) for good adhesion of paint coats. Therefore we recommend to carry out such repairs by a verified system.

Before repairing it is necessary to differentiate the type of the existing top coat, single coat and two-coat (with the top coat). For repair it is necessary to follow the used type of colour.

It is suitable to choose the delimited area (e.g. connection of sheets, wing edge) for the scope of the place which is being repaired transition is then better blended. In the case that it is not possible to choose the area in this way, it is necessary to take into consideration the higher difficulty of the procedure as for the uniformity of shade and elaboration of coat transition.

5.6.3.2 Grinding

For 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 the depth of damage. With two-coat type of the top coat it is necessary to add at least 50 mm (2 in) for the run-out of the top coat. Grinding can be started with abrasive having grain size of max. 160 and to finish with grain size of 400. It is made by the grinding equipment with the suction from the area of grinding or by manual grinding under water.

CAUTION

Anodized coat must not be destroyed by grinding on the Al-alloy sheet.

5.6.3.3 Degreasing

It is carried out in the same way as in the case of the total spray coat - see para 5.6.2.1

5.6.3.4 Aplication of primer

For reaching the satisfactory equal adhesion we recommend to carry out a spray coat of the place to be repaired by adhesive interlayer (see the tab. below).

Adhesive interlayer

surface	manufacturer, name	type	surface weight [g/µm/m^2]	recommended thickness [µm]	drying (total) /20°C
Al-alloys Epoxy fibreglass Old paint coats	BASF Glasurit 934-0	single-component	0.8	5-10	max. 15 min

Subsequently the primer is applied according to the table **Recommended primers**. Paint coat thickness is given by necessary thickness of surrounding coats (levelling).

CAUTION

In case that the primer was not removed by the previous step, it is not necessary to apply the primer again. The original ground primer with adhesive intercoat is enough.

Actual application of primer will be carried out in the same way as for the total spray-coat (see 5.6.2.3).

5.6.3.5 Application of top coat

CAUTION

For repairing it is necessary to choose the identical type (single coat, double coat) of the repair colour as on the original surface.

Application of the top coat will be carried out by spraying as for the total spray coat (see 5.6.2.3) with the exception of used thinners and hardeners. Due to the need of smooth transition to the basic surface and it is necessary to use so called “spraying into the surface” using longer time of drying initiations for a good result of work. The recommended material is shown in the table below.

Recommended colours

type of color	manufacturer, name	type	other components	surface weight [g/µm/m^2]	recommended thickness [µm]	drying (between spray coats/ total) /20°C
single coat	BASF Glasurit R-18/ shade (base)	acrylic-polyurethan	BASF Glasurit 922-18 (standard hardener) Glasurit 352-319 (extra long thinner)	1.0-1.6 (accordingto shade)	20-40	15 min / 19 hrs
double coat	basic colour code: BASF Glasurit R-55/ shade (base)	acrylic-polyurethan	BASF Glasurit 352-216 (long thinner)	1.2-1.4 (according to shade)	15-20	10 min / 20 min

type of color	manufacturer, name	type	other components	surface weight [g/µm/m^2]	recommended thickness [µm]	drying (between spray coats/ total) /20°C
	Glossy top coat : BASF Glasurit 923-155 (base)	acrylic-polyurethan	BASF Glasurit 929-73 (standard hardener) Glasurit 352-400 (extra long thinner)	0.92	30-40	5 min / 6 hrs

5.7 Airplane assembly and leveling after a repair

Type of maintenance for the pitot static instruments: heavy.
Authorization to perform:

- Repairman (LS-M) or Mechanic (A&P) – both with the minimum level of certification to perform heavy maintenance of SLSA in the U.S.
- FAA approved Part 145 Repair station

When major damage is repaired the following should be performed:

- Technical inspection by qualified person with attention to wiring, tightening and securing of appropriate joints, clearances in the control systems and control surfaces movement.
- Leveling
- Weight; Balance changes
- Control surfaces deflections measurement
- Engine test run
- Test flight
- Remedy of the defect

5.8 First flight after a repair

CAUTION
Only qualified pilots may perform the test flight.

The following information is intended for the aircraft owner.
A test flight is mandatory in the following cases:
After repair or replacement of fixed surfaces - wing, fin, stabilizer, or control surfaces i.e. elevator, aileron or flap. The flight characteristics and stability can be affected when any of these parts are replaced or adjusted. Therefore a test flight should be performed to check the airplane flight characteristics, control surfaces setting, maneuverability, stability and stall characteristics. These characteristics are to be check during taxiing, takeoff, climbing, cruise, descent, approach and landing. In other words all flight modes!
Use the Flight Test Record (see Appendices of this Procedures) to record data obtained during a test flight.

Test flight flying time
A test flight, if carried out in accordance with Sportstar Test Flight Record provided in appendices of this Manual, would take approximately one hour.

Aircraft inspection before a Test flight
Prior to the test flight the aircraft should be thoroughly inspected, weighed, faults corrected by qualified personell. Then and only then the airplane be prepared for the flight.

Test crew
Only qualified persons (test pilots) are permitted to perform a test flight.

Any failures found during test flight should be removed prior to next flight.

5.9 Spare parts order

Use the "Spare Parts Order" form to order a replacement for a damaged or worn-out part. Do not hesitate to contact the airplane manufacturer (phone or fax) to request a required part.
On the Spare Part Order form additional information is necessary for systematic monitoring and analysis of our planes reliability.

5.10 Recommended reading

Many useful information you can find in the document :
Acceptable Methods,Techniques, and Practices – Aircraft Inspections, Repair & Alternations
AC 43.13-1B, AC 43.13-2A

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6. APPENDICES

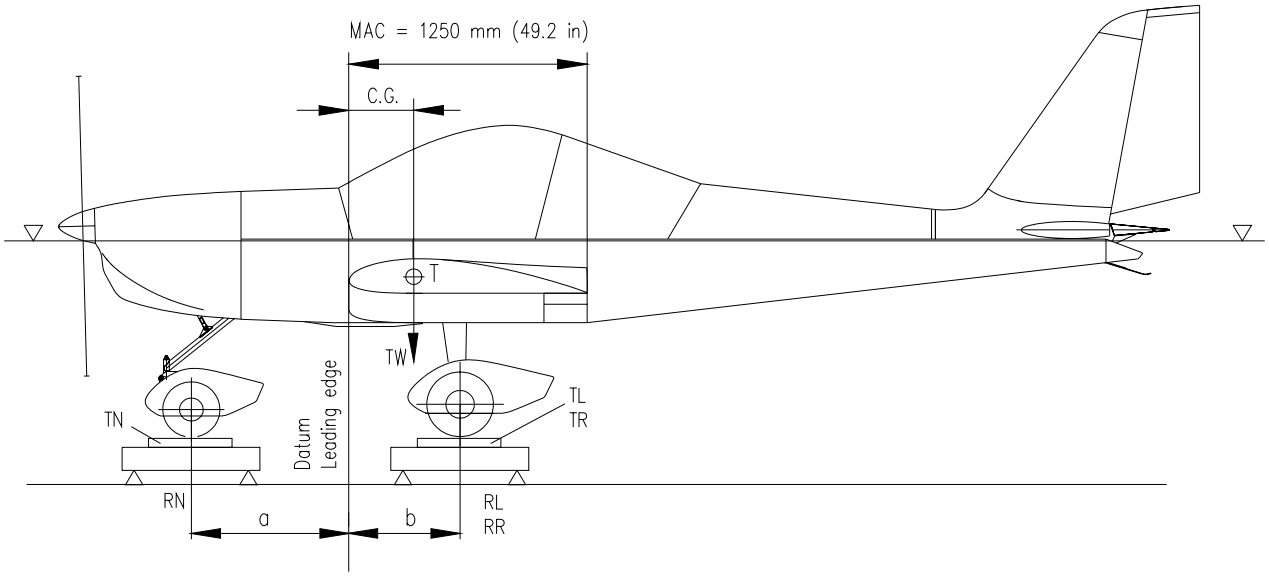
6.1 List of Appendices

- Description of actual airplane
- Weight and Balance Record
- Control Surfaces Deflection Record
- Leveling Record
- Sportstar Test Flight Record
- Spare Parts Order
- Airplane Failure Card
- Airplane Placards
- Airplane Wiring diagrams
- Service Instruction SI-18-1997 R5, issue September 2004

  For actual ROTAX information you can visit http://www.rotax-owner.com/ or http://www.kodiakbs.com/4intro.htm
- EAA Quick guides
- Sonnenschein A500 batteries operating instructions (used type - A512/16.0 G5)
- Cleanining, polishing and tips for repairing little crazing in a plexiglas glazing – Weiss plexiglas
- Color scheme of actual airplane

Weight and Balance Record

Model : SPORTSTAR	**Registration :**	**S/N :**
Configuration :		



Weighing Point	**Scale Reading** R_i **[lbs] or[kg]**	**Tare** T_i **[lbs] or [kg]**	**Net Weight** $NW_i = R_i - T_i$ **[lbs] or [kg]**
Nosewheel	R_N =	T_N =	NW_N =
Left wheel	R_L =	T_L =	NW_L =
Right wheel	R_R =	T_R =	NW_R =
Total Weight [lbs] or [kg] $TW=NW_N+NW_L+NW_R=$..... +.....+.....			**TW =** permitted empty weight (standard equipment): *695 lbs ± 2%* 315 kg ± 2%
C.G. position from Datum (Leading edge) [in] or [mm] $C.G._= \frac{(NW_L + NW_R) \times b - NW_N \times a}{TW} = \frac{(.....+.....)\times.....-.....\times.....}{.....}$			**C.G.=**
C.G. position [% MAC] $\overline{C.G.} = \frac{C.G.\ \text{[in] or [mm]}}{MAC\ \text{[in] or [mm]}} \times 100 = \frac{.....}{} \times 100$			$\overline{C.G.}$ [% MAC] = permitted C.G. range of empty airplane (standard equipment):: 20 ± 2 % MAC

Weighing carried out by: Date:

Record elaborated	Ing.Javorský	Record approved	Ing.Surý	Change					
Date:	3.5.1999	Date:	3.5.1999						

Control Surfaces Deflection Record

Model: SPORTSTAR	**Registration:**	**S/N:**

		Specified deflection	Real deflection
Longitudinal control	Distance between neutralized control stick and instrument panel		
	Distance between control stick fully pulled and instrument panel		
	HTU upward deflection	25°±1°	
	HTU downward deflection	20°±1°	
Lateral control	Distance between neutralized control stick and fuselage side frame		
	Distance between control stick moved fully to the left/right and fuselage side frame		
	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" 1st position	30°±3°	
	Left flap max. deflection in "LANDING" 2nd position	50°±3°	
	Right flap deflection in "TAKEOFF" position	15°±2°	
	Right flap deflection in "LAND ING" 1st position	30°±3°	
	Right flap max. deflection in "LANDING" 2nd 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)	0°	

Control Surfaces Deflection compliance: YES - NO

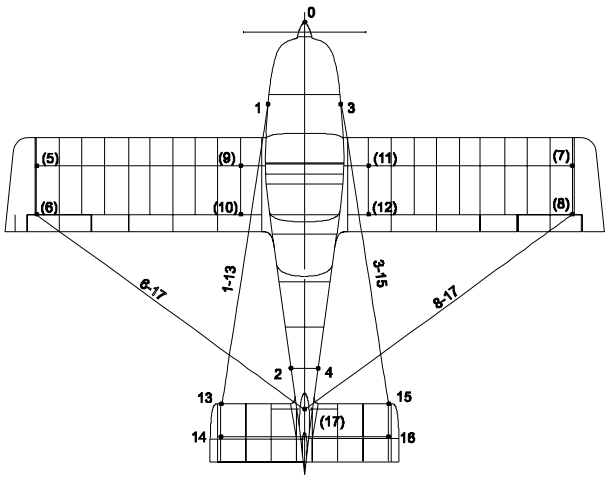
Message for the pilot :

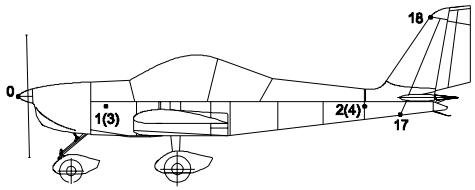
Measurements carried out by: Date:

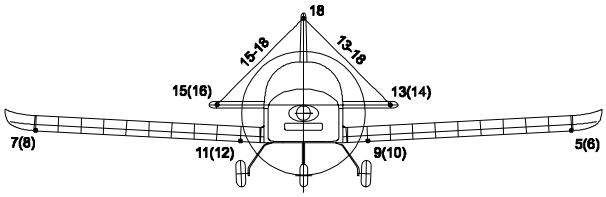
Record elaborated	Ing.Javorský	Record approved	Ing.Surý	Change					
Date:	3.5.1999	Date:	3.5.1999						

Leveling Record

Model:	SPOTSTAR	**Registration:**		**S/N:**	







Vertical measurement

Point	Measure
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	
16	
17	

Straight measurement

Points	Measure
1-13	
3-15	
6-17	
8-17	
13-18	
15-18	

Differences left / right side

Specified values			Real Difference
Points	Difference	Tolerance	
1-3	0	*±0.08 in*	
2-4		±2 mm	
1-2	0	*±0.08 in*	
3-4		±2 mm	
5-6	0	*±0.2 in*	
7-8		±5 mm	
9-10	0	*±0.1 in*	
11-12		±3 mm	
5-9	-	-	
7-11			
6-10			
8-12			
13-15	0	*±0.4 in*	
14-16		±10 mm	
1-13	0	*±0.8 in*	
3-15		±20 mm	
6-17	0	*±0.8 in*	
8-17		±20 mm	
13-18	0	*±0.4 in*	
15-18		±10 mm	

Leveling carried out by: Date:

Record elaborated	Ing.Javorský	Record approved	Ing.Surý	Change					
Date:	3.5.1999	Date:	3.5.1999						

Spare Parts Order

Please, do not complete gray-shaded areas.

Date:

From:

EVEKTOR–AEROTECHNIK a.s.
686 04 KUNOVICE
CZECH REPUBLIC
Tel.: +420 572 537 111
Fax.: +420 572 537 900

1	1.Registration..... 2.S/N..... 3.Number of Take-offs.....		4.Type..... 5.Tot. hours flown..... 6. Date of Failure detection.....		
2	Damaged part ..... NOM		Total oper. hrs. logged.....		
3	Failure detected during		1-Flight	2-Taxying	3-Daily Mainten. 4-Periodic insp.
4	Failure consequence	1-Flight completed	2-Flight interrupted	3-Take-off possible	4-Take-off impossible
5	Failure description:				
6	Repair carried out by:		1-Own means	2-Suppliers service	3-Ordering repair
7	Failure cause:				
8	We order - part(s) stated in par. 2 *) We order - a repair of part(s) stated in par.2 We order - necessary material according to the list enclosed, Number of Pages:.....				

Please, use the following format to the list of ordered parts:

Item No.	Pcs	NOM	Description	Standard, Draw. No.	Note

Other date:

Signature:.....
Date:.....

*) cancel inappropriate

9	Received by:

Airplane Failure Card

Dear customer,
We´d like to ask you for your cooperation in obtaining information required for systematic improvement of our planes reliability. Please, send or transmit completed card to the following address:

EVEKTOR-

AEROTECHNIK a.s.

Quality Control Department
686 04 Kunovice
CZECH REPUBLIC

Airplane:	SPORTSTAR	**Registration:**		**S/N:**	

1.	Failure Description:							
2.	Failure Detection Date: DD-MM-YY							
3.	Damaged Part Title:							
4.	Damaged Part Nomenclature:							
5.	Damaged Part Serial Number:							
6.	Damaged Part Working hours: Hours flown - Number of Take-offs							
7.	Part accessability:	1. Easy	2. Relative easy	3. Difficult	4.Very difficult	5.Dissasembly is necessary		
8.	Spare Part Title + Serial number:					.....		
9.	Spare part is:	1. New	2. Repaired	3. From another airplane				
10.	Classification	1. No CfA or Flight accident	2. Conditions for accident (CfA)	3. Damage	4. Accident	5. Crash		
11.	Failure detected during:	1. Periodical insp. 2. Taxiing 3. Take-off run	4. Take-off 5. Flight 6. Touch down	7. Landing run 8. Cross country flight 9. Pattern flight	10. Accident 11. Other			
12.	General Cause of Failure:	1. Constructional 2. Service 3. Wear due to operation	4. Unskilled repair 5. Manuf. Maintenance 6. Resulting	7. Objective cause 8. Air Personnel 9. Not determined				
13.	Consequences of service:	1. No consequences 2. Airplane put out of operation 3. Take-off interrupted	4. Flight with failured units 5. Emergency landing 6. On ground incident	7. Other				
14.	Repair Technique:	1. Adjustment 2. Part replacement 3. Unit replacement	4. Engine exchange 5. Unit repair 6. Airplane repaired	7. Airplane destroyed 8. Other				
15.	Repair lifetime - working hours							
16.	Last inspection before the failure + date							
17.	The airplane used for:							
18.	Total hours flown and Take-offs until failure occured:							
19.	Remarks, additional information:							
20.	Claimed: Claim No.:					yes	no	
Owner:								
Operator:								

Signature: Date: