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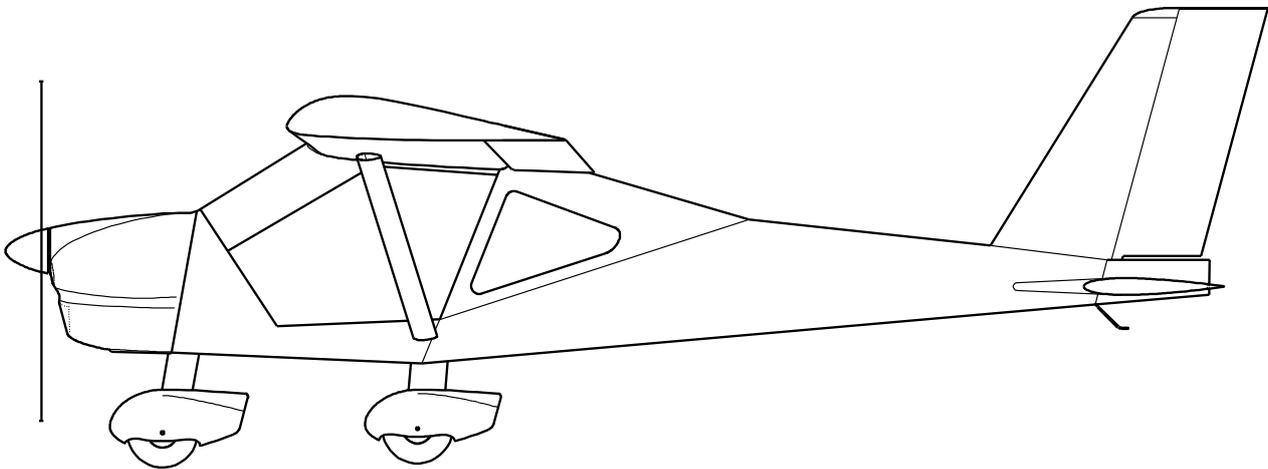
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## AEROPRAKT-A32 Airplane Maintenance Manual A32-002-AMM



<b>Airplane Model:</b>	<b>AEROPRAKT-32 (A-32)</b>
<b>Airplane Registration Number:</b>	
<b>Airplane Serial Number:</b>	<b>002</b>
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<b>Position:</b>	<b>Chief designer</b>
<b>Date of approval:</b>	<b>07.04.2015</b>



***This manual must be carried in the airplane at all times.***

***This airplane is to be serviced and maintained in compliance with information and instructions contained herein.***

**RECORD OF REVISIONS**

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Any revision of the present manual must be recorded by the Manual holder in the following table according to information from the Manufacturer.

New or amended text in the revised pages must be marked by a black vertical line on the left hand margin. The Revision No. and the date must be shown on the bottom left hand side of the page.

Rev. No.	Notice/Bulletin No.	Affected Pages	Date Issued	Date Inserted	Signature

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# 1 General

**NOTE:** This manual is subject to change by the notifications or safety bulletins published at the official website of Aeroprakt company <http://www.aeroprakt.kiev.ua>.

This manual describes the procedures of proper aircraft handling and servicing recommended by the aircraft manufacturer. It also specifies the requirements to inspection and maintenance that are required for keeping the flight performance and reliability at a level of a new airplane. It is recommended to adhere to the scheduled periods of greasing/lubrication and preventive maintenance taking into account the climate and operating conditions.

Each of the inspection or service/maintenance action outlined in this manual specifies:

- recommended special tools (if any) to accomplish the task,
- the parts needed to perform the task,
- type of maintenance, for example, line, heavy, or overhaul,
- the level of certification needed to accomplish the task, for example, owner, A&P, LSA repairman with inspection (or maintenance) rating, and repair station,
- detailed instructions and diagrams as needed to perform the task,
- method to test/inspect to verify the task was accomplished properly.

The types of the maintenance (**TM**) tasks specified in this manual are marked with the following **one-letter** abbreviation and are defined as follows:

**Line maintenance (L)** – any repair, maintenance, scheduled checks, servicing, inspections, or alterations not considered heavy maintenance that is approved by the manufacturer and is specified in this maintenance manual.

**Heavy maintenance (H)** – any maintenance, inspection, repair, or alteration which manufacturer has designated that requires specialized training, equipment, or facilities.

**Overhaul (O)** – maintenance, inspection, repair, or alterations that are only to be accomplished by the manufacturer or a facility approved by the original manufacturer of the product.

The levels of certification (**LC**) needed to accomplish the maintenance tasks specified in this manual are marked with the following **three-letter** abbreviation and are defined as follows:

**OWN (owner)** – items that can be expected to be completed by a responsible owner who holds a pilot certificate but who has not received any specific authorized training.

**LRI (LSA repairman inspection)** – items that can be expected to be completed on an ELSA by a responsible owner, which holds an FAA repairman certificate (light sport aircraft), with an inspection rating or equivalent.

**LRM (LSA repairman maintenance)** – items that can be expected to be completed on a SLSA by a responsible individual, which holds a FAA repairman certificate (light sport aircraft), with a maintenance rating or equivalent.

**A&P (airframe and powerplant mechanic)** – items that can be expected to be completed by a responsible individual who holds a mechanic certificate with airframe or powerplant ratings, or both, or equivalent.

**TSP (task specific)** – items that can be expected to be completed by a responsible individual who holds either a mechanic certificate or a repairman certificate and has received task specific training to perform the task.

## 1.1 Sources to purchase parts

For purchasing any parts or spares for this airplane contact your local dealer/distributor or address the aircraft Manufacturer: Aeroprakt Ltd., Polyova str. 24, 03056, Kyiv, UKRAINE, e-mail: [air@prakt.kiev.ua](mailto:air@prakt.kiev.ua) or [aeroprakt.kiev@gmail.com](mailto:aeroprakt.kiev@gmail.com), web: [www.aeroprakt.kiev.ua](http://www.aeroprakt.kiev.ua).

## 1.2 Equipment list

This aircraft has the following equipment:

### Flight instruments:

- BK-3 airspeed indicator
- BG-3E altimeter
- Dynon SkyView system

### Engine instruments:

- Dynon SkyView system
- two VAZ-2104 fuel level indicators

### Radio equipment:

- Dynon radio SV COM 425
- Dynon intercom SV 2S

### Miscellaneous equipment

- Strobe & navigation lights
- Landing light

## 1.3 Disposable replacement parts

The manual (see Sections 3 through to 16) contains the check lists with information about check periods, recommended change out (RCO) times as well as references to inspection and servicing/maintenance instructions for the airplane components and systems.

Before expiration of the recommended change out time of separate airplane parts or when it is not specified their operation shall be performed on condition (OC). Such parts must be inspected and replaced, if necessary, before expiration of the RCO (if specified).

If inspections and checks arouse any issues not covered in this manual contact the Manufacturer for additional information.

Upon detecting corrosion on airplane structural elements contact the Manufacturer for the required technical support. In this case further operation of the airplane may be dangerous!

## 1.4 Engine specifications

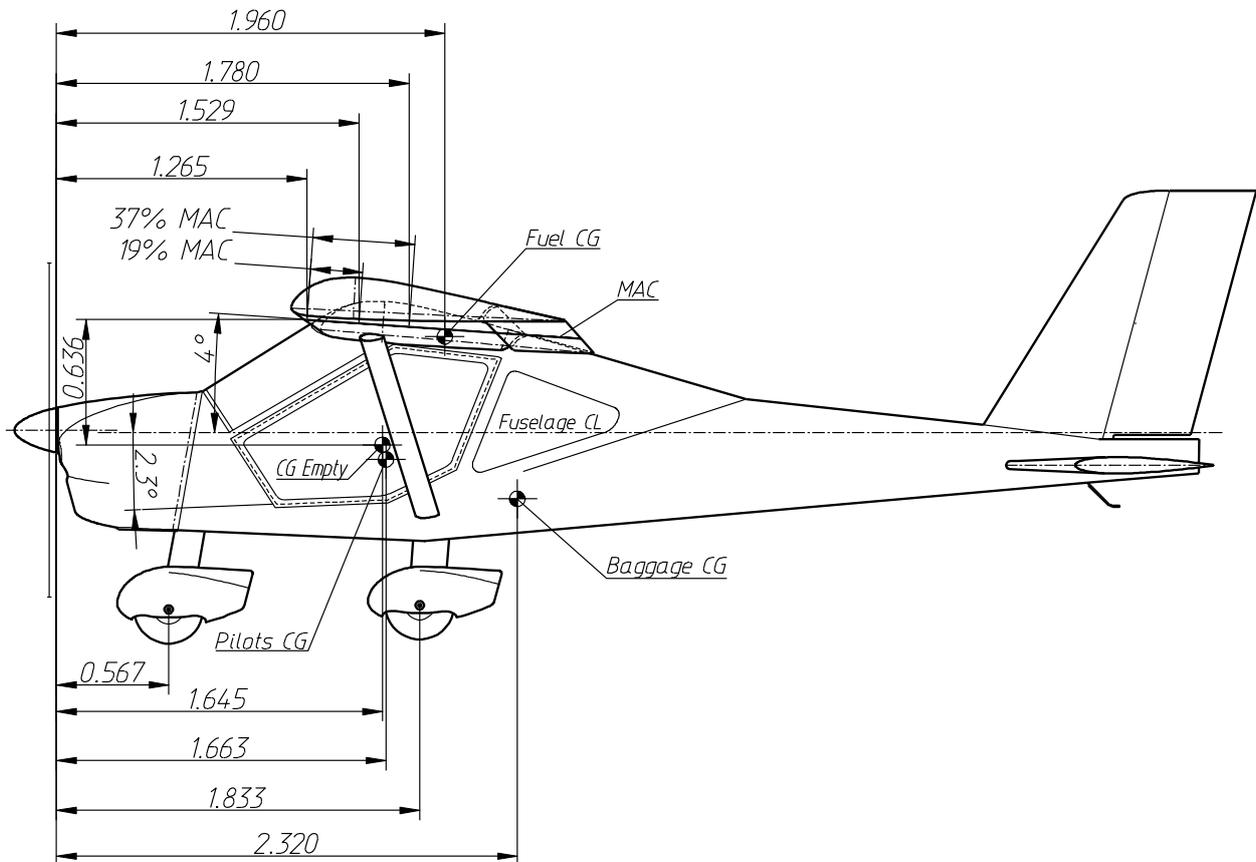
**WARNING! On all issues of engine operation see Rotax engine Operator's Manual. Follow its instructions to ensure safe and efficient operation of the engine.**

Engine data and operational limitations are given in the table below:

Engine manufacturer:	BOMBARDIER-Rotax-GmbH (Austria)	
Engine model:	Rotax-912UL	Rotax-912ULS
Engine type:	Flat-four, four-stroke	
Maximum takeoff power:	80 h.p.	100 h.p.
Time limit at full power:	5 min (5800 rpm)	
Max. revolutions (no time limit)	5500 rpm	
Min. revolutions at idle	1400 rpm	
Maximum coolant temperature at pick-up point:	120 °C (248 °F)	
Oil temperature, normal minimum maximum	90-110 °C (190-250 °F) 50 °C (120 °F) 140 °C (285 °F)	90-110 °C (190-250 °F) 50 °C (120 °F) 130 °C (266 °F)
Exhaust gas temperature: - maximum at takeoff - maximum - normal	880 °C (1620 °F) 850 °C (1560 °F) 800 °C (1470 °F)	
Oil pressure, normal minimum maximum	2,0-5,0 bar (29-73 psi) (above 3500 RPM) 0,8 bar (12 psi) (below 3500 RPM) 7 bar (100 psi) (at cold start, allowed for a short time)	
Fuel pressure, normal maximum	0,15-0,4 bar (2,2-5,8 psi) 0,4 bar (5,8 psi)	
Ambient air temperature range	from -25 °C to +50 °C	

### 1.5 Weight and balance information

The airplane CG position must be between 1.53 m and 1.78 m or between 19% and 37% of the wing MAC (mean aerodynamic chord) see Fig. 1.



**Fig. 1 CG location of the empty airplane, pilots, fuel and baggage**

Compute the airplane C.G. position using the example in the table below (for the maximum take-off weight):

Item	Weight, kg	×	Arm, m	=	Moment, kg·m
Empty aircraft	332.5	×	1.645	=	547.0
Crew (2×90 kg)	180.0	×	1.663	=	299.3
Baggage	22.7	×	2.320	=	52.7
Full fuel (90 l, 0.72 kg/l)	64.8	×	1.960	=	127.0
<b>Total:</b>	<b>600.0</b>				<b>1026.0</b>
$X_{CG} = \text{Total moment} / \text{Total weight}$		=	1.710 m		

### 1.6 Tire inflation pressure

Normal inflation pressure for both main and nose wheels is 1.6 kg/cm<sup>2</sup> (22.8 psi).

## 1.7 Approved fuel, oils and capacities

**WARNING! On all issues of engine operation see Rotax engine Operator's Manual. Follow its instructions to ensure safe and efficient operation of the engine.**

### Fuel

Approved grade: unleaded MOGAS min. RON 95 or AVGAS 100LL

Maximum capacity of the fuel tanks:  $2 \times 45 = 90$  liters

“Fuel Low” warning light at: approx. 6 liters per tank

Unusable fuel: approx. 0.5 liter

### Oil

Approved grade: any automotive oil of API classification “SG” or higher

Oil tank capacity: 3 liters (NOTE: check correct oil level in the tank using the oil probe.)

### Coolant

Approved grade: TELKO Polar Premium Long Life Antifreeze

Quantity: 3 liters (NOTE: check the correct level using the overflow bottle marks.)

### Braking fluid

Approved grade: Mobil ATF 220

Quantity: 0.2 liter (NOTE: check the correct level using the overflow bottle marks.)

## 1.8 Recommended fastener torque values

In A-32 all fasteners in front of the firewall and in the electrical system is metric and rear of the firewall – inch. The torque of the screws and nuts (unless specified otherwise) are as follows:

1. For the static joints joints with spacing inserts (spacers, spherical bearings, etc.) according to the table:

Metric fasteners	Inch fasteners	Torque, Nm (lb·ft)
<b>M5</b>	<b>10-32</b>	<b>6 (4.4)</b>
<b>M6</b>	<b>1/4</b>	<b>10 (7.4)</b>
<b>M8</b>	<b>5/16</b>	<b>15 (11.0)</b>
<b>M10</b>	<b>3/8</b>	<b>25 (18.4)</b>

2. For the movable joints where bolts serve as hinge axle the nuts tightening must be done only to remove the axial play (gap) while preserving the rotational freedom in the joint.

**WARNING!** All bolts, nuts (except for self-locking ones), pins, turnbuckles must be locked reliably.

## **1.9 General safety information**

### **Aircraft owner/operator responsibilities:**

Each owner/operator of the Aeroprakt LSA must read and comply with the maintenance and continued airworthiness information and instructions provided by the Manufacturer.

Each owner/operator of the Aeroprakt LSA is responsible for providing the Manufacturer with current contact information where the Manufacturer may send the owner/operator supplemental notification bulletins.

The owner/operator of the Aeroprakt LSA is responsible for notifying the Manufacturer of any safety of flight issue or significant service difficulty upon discovery.

The owner/operator of the Aeroprakt LSA is responsible for complying with all notices of corrective action issued by the Manufacturer and for complying with all applicable aviation authority regulations in regard to maintaining the airworthiness of the LSA.

The owner/operator of the Aeroprakt LSA must ensure that any needed corrective action be completed as specified in a notice, or by the next scheduled annual inspection.

Should the owner/operator of the Aeroprakt LSA not comply with any mandatory service requirement, the LSA shall be considered not in compliance with applicable ASTM standards and may be subject to regulatory action by the presiding aviation authority.

## **1.10 Reporting maintenance, service, and safety difficulties**

In case of encountering any maintenance or service or safety difficulties not covered by this Manual report about it to the aircraft Manufacturer by e-mail or by fax using the Feedback Form (see Appendix A). If necessary enclose sketches or photos showing the problem items in sufficient detail.

## 2 Inspections

This section contains the instructions and checklist for inspection and servicing for the completion of periodic and annual condition/100-h inspections with references to the sections containing detailed instructions for the inspection/servicing action.

Inspection/Servicing action ↓ and its interval in hours →	50	100	200	500	1000	2000
<b>Structures (section 3)</b>						
Inspect fuselage for damage (fatigue cracks, loose rivets, etc.)		X				
Inspect fuselage glazing for damage (silvering, cracks, etc.)		X				
Inspect wings for damage (fatigue cracks, loose rivets, torn fabric covering, etc.)				X		
Inspect wing attachment points for play				X		
Remove the wings and inspect its spherical bearings for play and hinge brackets for cracks						X
Inspect the wing struts for fatigue cracks, deformation and loose rivets				X		
Inspect the sealing fabric tape of the wing strut fairings			X			
Check the wing attachment bolts' torque and locking		X				
Inspect the all-flying horizontal tail (AFHT) for fatigue cracks, deformation, loose rivets and play in joints		X				
Check the AFHT attachment bolts/nuts torque and locking		X				
Inspect the tail wheel for damage and play		X				
Check the tail wheel attachment bolt/nut torque and locking		X				
Inspect engine cowlings for damage (cracks, ruptures, damaged paint, etc.)		X				
<b>Landing gear (section 4)</b>						
Inspect the nose leg for fatigue cracks, deformation and play		X				
Check the nose leg bellcrank bolt/nut torque and locking		X				
Check the shock absorber condition		X				
Inspect the MLG springs and attachment beam for fatigue cracks <sup>1</sup> , deformation and play		X				
Check the MLG spring attachment bolts/nuts torque and locking		X				
Inspect the wheel tires for cracks, cuts and wear.			X			
Inspect the wheel fairings for cracks, ruptures and damaged paint	X					
Check the torque and locking of the fairings attachment bolts/nuts	X					
Inspect the mud-screens for fatigue cracks and deformation <sup>2</sup>	X					
Check the torque and locking of the mud-screen attachment bolts/nuts <sup>2</sup>	X					
Inspect the skis for damage <sup>3</sup>		X				
Check the torque and locking of the ski attachment bolts/nuts <sup>3</sup>		X				
<b>Brake system (section 5)</b>						
Inspect expansion tank for leaks, cracks, secure attachment. Check fluid level.		X				
Inspect the master cylinder for leaks of braking fluid			X			
Inspect the parking brake valve for leaks of the braking fluid			X			
Inspect the brake unit for the leaks of the braking fluid			X			
Measure the brake disks' wear			X			
Inspect the brake system tubing and joints for leaks and damage			X			
<b>Engine and its control system (section 6)</b>						
Inspect the engine mount for fatigue cracks and deformation			X			

<sup>1</sup> After 5000 landings the MLG springs must be removed and inspected carefully for fatigue cracks

<sup>2</sup> For an aircraft version on wheels with mud-screens

<sup>3</sup> For an aircraft version on skis

Inspection/Service action ↓ and its interval in hours →	50	100	200	500	1000	2000
Check the torque of the engine mount attachment bolts			X			
Inspect the rubber mounts for damage (deep cracks, etc.)				X		
Check the intake airbox function, condition and attachment <sup>4</sup>			X			
Inspect the throttle and choke cables and cable sheath for wear, damage, kinks		X				
Check the torque of the throttle lever bolt (axle)		X				
<b>Cooling system (section 7)</b>						
Check the radiator attachment grommets condition		X				
Inspect the overflow tank for leaks of coolant, cracks; check coolant level		X				
Inspect lines for leaks, damage (chaffing, cracks), loose joints		X				
<b>Lubrication system (section 8)</b>						
Inspect the oil tank plug for oil leaks; verify vent line is intact and secured		X				
Inspect lines for leaks and damage (chaffing, cracks), loose joints		X				
<b>Fuel system (section 9)</b>						
Remove fuel tanks and inspect them for fuel leaks and damage				X		
Inspect the shut-off and drain fuel valves for leaks of fuel		X				
Check condition and replace fuel filter (if necessary)		X				
Inspect fuel lines for leaks, damage (chaffing, cracks), loose joints		X				
Check condition and replace fuel lines (if necessary)					X	
<b>Exhaust system (section 10)</b>						
Inspect exhaust pipes and muffler for cracks		X				
Verify attachment springs are intact		X				
<b>Propeller (section 11)</b>						
Inspect propeller hub for fatigue cracks; check pitch angles			X			
Check torque and locking of the propeller bolts/nuts			X			
Check torque of the spinner bolts			X			
<b>Airplane control system (section 12)</b>						
Inspect control surfaces for fatigue cracks, deformation, loose rivets, torn fabric		X				
Check the play in the hinges of control surfaces/linkages		X				
Check tightness/locking of the nuts of control surfaces/linkages		X				
Check tightness/locking of the nuts and play in hinges of control rods/shafts		X				
Inspect AFHT control cable for wear, check cable tension			X			
Inspect flaperons control cable for wear, check cable tension		X				
Inspect rudder control cables for wear, check cable tension			X			
Extend flaps and inspect flap extension (play in hinges, nuts tightness/locking)		X				
Grease the slide bearings of all control surfaces/linkages (where necessary)		X				
Inspect rudder pedals for fatigue cracks and deformation		X				
Check condition of the control cable pulleys and fairleads				X		
Check trim tab attachment bolts/nuts for corrosion, replace if necessary			X			
Inspect the trim tab control cables and sheath for damage (wear, kinks, etc.)			X			
<b>Electrical system (section 13)</b>						
Verify battery charges/discharges properly, otherwise replace		X				
Clean starter terminals and starter relay connector of corrosion, if any		X				
Verify starter relay and cables are connected and attached reliably		X				
Verify power cables have good contact with battery, starter and ground		X				

<sup>4</sup> For an aircraft version equipped with intake airbox

Inspection/Service action ↓ and its interval in hours →	50	100	200	500	1000	2000
Clean rectifier-regulator and condenser terminals/connectors of corrosion, if any		X				
Check condition of electric switches and warning lights		X				
Clean fuse block terminals of corrosion, if any. Check fuses		X				
Verify correct function of the fuel level sensors/indicators (check readings)			X			
Check landing light function and attaching nut torque		X				
Clean engine sensors' terminals and connectors of corrosion, if any		X				
Inspect electrical harness for damage (chaffing, broken wires, bad insulation)		X				
<b>Cockpit heating system(section 14)</b>						
Inspect warm air shutter and its hinges for play/wearing. Repair or replace if necessary		X				
Check condition and operation of the warm air shutter actuator. Replace if necessary		X				
<b>Instruments and Avionics (section 15)</b>						
Check condition of the switches and lights. Replace defective ones, if any		X				
Check operation of the instruments and avionics. Replace defective ones, if any		X				
Check condition of the full and static pressure system		X				
<b>Pilot seats and harness belts (section 16)</b>						
Inspect the seats framework for the fatigue cracks and loose rivets		X				
Inspect the seat cushions upholstery for damage		X				
Verify harness belts' locks function properly		X				
<b>Cockpit doors (section 17)</b>						
Inspect door glass, framework and sealing for damage		X				
Verify the gas struts function properly		X				
<b>Recovery system (section 19)</b>						
Check attachment of the suspension cables to fuselage and parachute lanyard				X		

### 3 Structures

The airframe of A-32 airplane includes the following parts: fuselage with polycarbonate glass windscreen, wings, wing struts, all-flying horizontal tail (AFHT), vertical tail unit, wing fillets, strut fairings and engine cowling. Fuselage with fin and wing struts are made of aluminum alloys. Wing framework including leading edge section and top skin are all-metal and bottom skin is fabric. Framework of flaperons, elevator and AFHT is all-metal, their rear skin (aft of spar) is fabric. The rear fuselage skin panels (top and two side ones) include windows of PVC glass. The aft wing fillets and engine cowling are made of fiberglass.

When servicing the airplane a special care shall be taken to protect the airframe from corrosion and to protection of the paint coating. Protection of the airframe parts from corrosion consists mainly of keeping the protective coatings intact. Care of the fabric skin consists mainly of care of its paint coating. Correct care of the paint coating is one of the conditions of preserving the airplane strength and aerodynamic characteristics. To keep the paint coating of the airplane in good condition the dust and moisture must be removed in time, the paint must be protected from scratches, and spilling oil products, solvents, alkalis and acids on paint must be avoided.

#### INSPECTION CHART

Part No.	Description	Interval	RCO	Instr. No.	TM	LC
A32-0-530000-00-000	Fuselage	100 h	OC	3.1	L	LRI
A32-0-561000-01-000	Windscreen glass	100 h	OC	3.2	L	OWN
A32-0-530000-12-000	Rear fuselage skin panel, top	100 h	OC			
A32-0-530000-08-001	Rear fuselage skin panel, right	100 h	OC			
A32-0-530000-08-002	Rear fuselage skin panel, left	100 h	OC			
A32-0-572000-00-000	Wing	500 h	OC	3.3	L	OWN
A32-0-531200-00-001	Aft wing fillet, right	200 h	OC	3.10		LRI
A32-0-531200-00-002	Aft wing fillet, left	200 h	OC			
COM-5T	Spherical bearings, 4 pcs.	2000 h	OC	3.4	L	LRI
A32-0-579000-00-001	Wing strut, right	500 h	OC	3.5	L	LRI
A32-0-579000-00-002	Wing strut, left	500 h	OC			
A32-0-579120-00-001	Wings strut fairing, top, right	200 h	OC	3.6	L	LRI
A32-0-579120-00-002	Wings strut fairing, top, left	200 h	OC			
A32-0-579110-00-001	Wings strut fairing, bottom, right	200 h	OC			
A32-0-579110-00-002	Wings strut fairing, bottom, left	200 h	OC			
AN 175-16	Wing front attachment bolts, 2 pcs.	100 h	OC	1.8	L	OWN
AN 175-12	Wing aft attachment bolts, 2 pcs.	100 h	OC			
A32-0-530000-63-000	Tail skid	100 h	OC	3.8	L	LRI
AN 3-6	Top tail skid bolt, 2 pcs.	100 h	OC	1.8	L	OWN
AN 4-7	Bottom tail skid bolt, 2 pcs.	100 h	OC	1.8	L	OWN
A32-3-711020-00-000	Engine cowling panel, top	100 h	OC	3.9	L	LRI
A32-3-711010-00-000	Engine cowling panel, bottom	100 h	OC			

**Instructions:**

- 1.1 Remove the engine cowling, doors, wing strut fairings (undo the screws fixing the fairings and 'slide' them along the strut), pilot seats, and rugs. Inspect the fuselage for cracks and deformation, paying special attention to primary structural elements, areas of their connection and rivet joints (frames No. 1, 4, 5, 6, longitudinal, transverse and vertical beams of the cockpit, undercarriage beam, fuselage tubes, tail boom and fin skin).

**Inspection for fatigue cracks.** Use torch or any other suitable source of light. When detecting very thin cracks remove the paint in the area of the suspected crack for a closer flaw detection. If possible apply load in this area in a manner that will 'open up' the crack. If the closer inspection confirmed the crack existence contact the manufacturer for required technical support. If the suspected crack was not detected repaint this area.

**Inspection for loose rivets.** When inspecting rivet joints look at the area around rivet heads. The paint around the rivet heads must have no cracks or black stains that indicate on loose and corroded rivet joint. When detecting such flaws contact the manufacturer for the required technical support.

If no flaws were detected reinstall everything in the reversed order. Apply Loctite 222 on the thread of the attachment screws of the wing strut fairings before reinstalling them.

**Recommended special tools:** magnifying glass, electric torch.

**Necessary parts/materials:** paint, Loctite 222.

- 1.2 Inspect the glass for 'silvering' (micro cracks) and cracks in the attachment areas. When detecting a crack shorter than 50 mm (2 in) carefully cut a hole at its end with a Ø3 mm (0.12 in) drill to stop the crack propagation. If the crack is longer than 50 mm (2 in) the glass must be replaced. Contact the manufacturer for glass replacement instructions.

**WARNING!** The glazing material is not resistant to fuels, oils and solvents. Spilling those liquids on glazing may cause its dimness and cracking.

**Recommended special tools:** electric drill, 3 mm drill.

**Necessary parts/materials:** none.

- 1.3 Drain fuel from the fuel tanks. Remove the wing strut fairings and fuel tanks. Inspect the wing for fatigue cracks, deformation and loose rivets as described in 1.1 (2<sup>nd</sup> and 3<sup>rd</sup> paragraph). Pay special attention to the strut-to-wing attachment points, rivet joints of the wing leading edge section and top skin.

Inspect the fabric skin for damage and detachment from the wing framework. It is allowed to repair small cuts/ruptures (shorter 50 mm or 2 in) covering them with ORACAL permanent sticking film. Upon detecting bigger damages and delaminating of the fabric skin from the framework contact manufacturer for the required technical support.

Verify that there is no play in attachment points of the wing and strut by holding the wingtip gently and moving it up and down with an amplitude of 300 mm (1 ft). The movement in the attachment points due to loose joint (play) is not allowed. When detecting insignificant radial play (less than 0.2 mm or 0.01 in) in the strut attachment points it must be eliminated by tightening its bolt joint. In case if the play is more than 0.2 mm (0.01 in) contact the manufacturer for the required technical support.

In case if no defects are found re-assemble everything in the reversed order. Before re-installing the screws attaching the fuel tanks and strut fairings apply Loctite 222 on the thread.

**Recommended special tools:** magnifying glass, electric torch.

**Necessary parts/materials:** ORACAL permanent sticking film, Loctite 222.

#### 1.4 Detach the wings by doing the following:

- detach the doors;
- drain fuel from the fuel tanks;
- disconnect the fuel lines from the fuel valves, close the valves, plug the fuel lines and pull them out of cockpit through the rubber sealing rings in fuselage beams;

**CAUTION!** Be careful while working with the fuel system, the fuel remaining in the fuel lines is highly fire-hazardous and when spilled on the cockpit glass may cause glass dimness and cracking.

- disconnect the electric connectors of the navigation lights and fuel level probes at wing root and take the cables out of fuselage;
- detach the strut fairings (undo the screws attaching the fairings and slide fairings along the struts);
- detach the Cardan rings from the flaperon shafts by removing the vertical bolts;
- remove the split pins and undo the nuts from wing and strut attachment points;
- while holding the wing by the tip and strut carefully take out the strut attachment bolts and remove the struts;
- while holding the wing by the tip and at the root take out the wing attachment bolts and slowly move the wing away from fuselage carefully pulling the navigation light from the wing fillets;

Inspect the wing and strut attachment fittings for fatigue cracks. Check the spherical bearing for axial and radial play. When detecting play in bearings, as well as corrosion and fatigue cracks in the attachment fittings contact the manufacturer for the required technical support.

If no defects were detected re-assemble everything in the reversed order. Before reinstalling the screws attaching the fuel tanks and strut fairings apply Loctite 222 on the thread.

**Recommended special tools:** magnifying glass, electric torch.

**Necessary parts/materials:** screw clamps, Loctite 222.

#### 1.5 Remove the strut fairings (undo the screws attaching the fairings and slide fairing along the strut). Inspect the struts for fatigue cracks, deformation (bend) and loose rivets as described in 1.1 (2<sup>nd</sup> and 3<sup>rd</sup> paragraph).

If no defects were found re-install the fairing applying Loctite 222 on the thread of the attaching screws.

**Recommended special tools:** none.

**Necessary parts/materials:** none.

#### 1.6 Undo the screws attaching the fairings and slide the fairings along the strut. Inspect the sealing fabric tape in the inner side. If necessary use double-sided sticking tape to fix the tape.

Re-install the fairings applying Loctite 222 on the thread of the attaching screws.

- 1.7 Inspect the tail skid for damage and cracks. When detecting a serious damage replace the cracks.

**Recommended special tools:** none.

**Necessary parts/materials:** none.

- 1.8 Remove the top and bottom engine cowling and inspect for cracks, ruptures, as well as damaged paint coating. When detecting damaged paint coating sand the damaged area with sandpaper and re-paint. When detecting cracks and ruptures sand the damaged area from inside with sandpaper and cover it with a patch of fiberglass cloth with epoxy resin. After the resin solidifies properly, sand the damaged area outside with sandpaper and re-paint.

**Recommended special tools:** rubber gloves.

**Necessary parts/materials:** fiberglass cloth, epoxy adhesive, paint.

- 1.9 Undo the screws attaching the aft wing fillets and remove. Inspect for cracks, ruptures, as well as damaged paint coating. When detecting damaged paint coating sand the damaged area with sandpaper and re-paint. When detecting cracks and ruptures sand the damaged area from inside with sandpaper and cover it with a patch of fiberglass cloth with epoxy resin. After the resin solidifies properly, sand the damaged area outside with sandpaper and re-paint. Inspect the sealing fabric tape in the inner side along outer edge. If necessary use double-sided sticking tape to fix the tape.

Re-install the the aft wing fillets applying Loctite 222 on the thread of the attaching screws.

## 4 Landing gear

A-32 may have the landing gear (LG) of one of the following three types: wheels, skis or floats. This manual contains the information for servicing the wheel LG. The float and skis type LG is not included in this manual. For obtaining additional information contact the manufacturer.

When put on wheels the airplane is equipped with wheels of Matco mfg.

**NOTE!** When installing wheels tighten the axle nut as follows: first tighten the nut to remove the axial play, then turn it back until its slots align with the hole for the split pin in the axle. Then lock the nut using the split pin.

The nose LG leg is steerable, telescoping type with spring shock absorber. The leg structure consists of the strut, trailing link, bellcrank, wheel fork, spring shock absorber, axle, spacing sleeves, wheel and fairing/mud-screen. The steering is achieved using the rudder pedals via the rods connected to the bellcrank on the strut. The leg is attached to the firewall at two points – lower and upper supports. The upper support is made of aluminum alloy plate, the lower support is an assembly. The supports contain bronze bearings.

Main landing gear (MLG) is of cantilever spring type. The MLG leg consists of the spring, axle, wheel, brake unit with supporting plate, and fairing (or mud-screen). The MLG spring is made of aluminum alloy. It is bolted at two points to the lower beam of the frame No.2.

Maintenance of the brake unit with supporting plate is described in "Brake system" section.

### INSPECTION CHART

Part No.	Description	Interval	RCO	Instr. No.	TM	LC
A32-0-321000-00-000	Nose leg	100 h	OC	4.1	L	LRI
AN 4-22A	Bellcrank bolt	100 h	OC	1.8	L	OWN
165x50 mm	Spring shock absorber «ROCK SHOX»	100 h	OC	4.2	L	LRM
A22LS-3-4110-00	Main leg, right	100 h	OC	4.3	H	LRM
A22LS-3-4110-00	Main leg, left	100 h	OC	4.3		
AN 6-37	Spring bolts, upper, 2 pcs.	100 h	OC	1.8	L	OWN
AN 7-41	Spring bolts, lower, 2 pcs.	100 h	OC			
See Matco P/N	Nose wheel assembly	200 h	OC	4.4	L	LRI
See Matco P/N	Right wheel assembly	200 h	OC	4.4		
See Matco P/N	Left wheel assembly	200 h	OC	4.4		
A22LS-0-4410-00	Nose wheel fairing	50 h	OC	4.5	L	LRI
A22LS-0-4420-01	Right wheel fairing	50 h	OC	4.5		
A22LS-0-4420-02	Left wheel fairing	50 h	OC	4.5		

#### Instructions:

Remove the nose wheel fairing. Inspect the nose leg for fatigue cracks, deformation and play. When inspecting follow the instructions of 1.1 (2 and 3 paragraph) of "Structures" section. Pay special attention to the areas of the nose leg attachment near its upper and lower supports as well as weld seams of the nose leg.

Check the nose leg supports for play. The radial play in the supports may not exceed 1 mm (0.04 in). No axial play is allowed.

If the radial play in the upper support exceeds the above specified value then the bronze bearing in the support must be replaced. If the radial play in the lower support exceeds the above specified value then the support with bearing must be replaced. Contact manufacturer to obtain the instructions on replacement of the bearing and support.

Upon detecting axial play in the supports tighten the upper support nut until play is eliminated, if necessary, insert a washer of an appropriate thickness.

**WARNING!** Tightening the nut must eliminate the play while ensuring free rotation of the leg in the supports. Do not over-tighten the nut!

Check the torque of all bolted joints with self-locking nuts.

Lubricate all surfaces of the nose leg trailing link subjected to friction depending on their condition as follows:

- set parking brake to ON;
- disconnect the control rods from the nose leg bellcrank;
- remove the split pin and undo the nut of the upper support of the nose leg;
- undo the nut and take out the bellcrank bolt;
- while holding the nose leg carefully push down the airplane tail near the stabilizer attachment points till the airplane sets on the tail wheel and hold it in this position till the nose leg is re-installed back (this operation must be done by two persons);
- carefully take out the nose leg from the supports simultaneously removing the bellcrank from it;

**CAUTION!** Do not lower the fuselage nose while the nose leg is removed! This may cause damage to the airframe and propeller.

- remove the old grease from the surfaces of the nose leg trailing link subjected to friction;
- apply thin layer of new grease;
- re-install the leg in the reversed order;
- squirt grease into the nose leg hinge till grease comes out;
- remove the excessive grease with rags.

Any lubricating grease for bearings may be used for the nose leg.

After servicing the nose leg re-install the nose wheel fairing.

**Recommended special tools:** none.

**Necessary parts/materials:** grease gun, grease.

If the spring shock absorber is seriously damaged, then it must be removed for repair or replacement.

To remove the shock absorber do the following:

- set the parking brake to ON;
- remove the nose wheel fairing;
- remove the split pins and undo the nuts of the shock absorber attachment;
- carefully push down the airplane tail near the AFHT attachment points till the airplane sets on the tail skid and remove the shock absorber (this operation must be done by two persons);

- set the airplane level on a wooden support under its bottom as close to the frame No. 1 (firewall) as possible (the support width must be equal or bigger than the fuselage width).

To re-install the spring shock absorber perform the above actions in the reversed order. Before installation of the spring shock absorber lubricate its attachment bolts with bearing grease.

**WARNING!** When installing the shock absorber tighten the nuts as follows: first tighten to remove the axial play, then rotate a little back to align the nearest slot of the castle nut with the hole for the split pin and secure it with a split pin. Tightening of the shock absorber bolts must not restrict its free motion.

**Recommended special tools:** none.

**Necessary parts/materials:** none.

- 1.10 Remove the pilot seat and wheel fairing. Inspect the MLG attachment beam and spring for fatigue cracks, deformation and play following the instructions of 1.1 (2<sup>nd</sup> and 3<sup>rd</sup> paragraph) of "Structures" section. Pay special attention to the areas of the spring attachment to the beam and wheel axle attachment to the spring.

If axial play is detected in the MLG attachment, check the attachment bolts' torque. If radial play is detected, contact the manufacturer to obtain the required technical support.

After 5000 landings careful inspection of the MLG spring is required. The MLG leg must be removed for that.

To remove the MLG leg do the following:

- put the wheel chokes under the nose and opposite main wheel;
- remove the pilot seats;
- remove the wheel fairing;
- cut the plastic cable ties fixing the brake system tube to the MLG spring;
- lift the airplane using a jack placed under a special plate near the opening in the fuselage bottom skin for the MLG spring;
- remove the safety wire and undo the brake disk screws and wheel axle nut;
- remove the wheel and brake disk;
- leaving the braking system tube assembled, disconnect the braking unit from the supporting plate (undo two bolts and three screws of the braking unit and move the brake unit with the tube aside);

**WARNING!** When handling the brake pads and disk avoid smearing their working surfaces with any lubricating materials. Do not use braking system with a braking disk removed.

- remove the split pins and undo the nuts of the upper and lower bolts of the MLG spring attachment and carefully force the bolts out of the holes;
- remove the spring.

Inspect carefully the spring and fittings of the MLG attachment beam for fatigue cracks. Pay special attention to the areas around the attachment holes in the beam and spring. Upon detecting fatigue cracks in the MLG spring or MLG attachment beam contact the manufacturer to obtain the required technical support.

If no defects were detected, install the MLG leg back by doing the above actions in the reversed order.

Before re-installing the attachment screws of the brake disk and pilot seats apply Loctite 222 on their thread.

**Recommended special tools:** none.

**Necessary parts/materials:** plastic cable ties.

- 1.11 Remove the wheel fairing. Inspect the tire for cracks and cuts. Determine the nature and degree of the tire wear. In case of normal operation the wear will be uniform over entire operating surface of the tire. Tire operation is allowed until exposure of its cord. In case if exposed cord or deep cuts are detected the tire must be replaced.

To replace the nose wheel tire do the following:

- set the parking brake to ON;
- remove the split pin of the nose wheel axle nut and undo it;
- carefully push down the airplane tail near the stabilizer attachment points till the airplane sets on the tail wheel and remove the nose wheel (this operation must be done by two persons);
- put the airplane's nose down placing a wooden support under the nose wheel fork;
- replace the tire;
- inflate the wheel (1.6 bar) and install it back on the airplane making the above actions in the reversed order.

To replace a main wheel tire do the following:

- put wheel chokes under the opposite main wheel and nose wheel;
- remove the split pin of the main wheel axle nut and undo it;
- lift the airplane using a jack placed under a special plate near the opening in the fuselage bottom skin for the MLG spring;
- remove the safety wire and undo the brake disk screws and wheel axle nut;
- remove the wheel;
- replace the tire;
- inflate the wheel (1.6 bar) and install it back on the airplane making the above actions in the reversed order.

Before re-installing the attachment screws of the brake disk apply Loctite 222 on their thread.

If no defects were found, check the wheel pressure and inflate if necessary. The pressure must be equal to 1.6 bar. Install the wheel fairing after servicing.

For more detailed information regarding the servicing (repairing) the wheels visit the manufacturer's web site <http://www.matcomfg.com>.

**Recommended special tools:** none.

**Necessary parts/materials:** none.

- 1.12 Inspect the fairing for cracks, ruptures and paintwork damage. If damaged paint is detected, remove the fairing, clean the damaged area with sand paper and repaint. If cracks and ruptures were detected, remove the fairing, clean the damaged area with sand paper from inside, and apply a patch of fiberglass cloth with epoxy resin. After the resin solidifies properly, sand the damaged area outside with sandpaper and re-paint.

Check the torque of the fairing attachment bolts/nuts.

**Recommended special tools:** torque wrench, rubber gloves.

**Necessary parts/materials:** fiberglass cloth, epoxy adhesive, paint.

## 5 Brake system

The main wheels are equipped with Matco mfg hydraulic disk brakes. The brake system includes: expansion tank, master cylinder with lever, parking brake valve, brake units with supporting plates, brake disks, copper tubes, fittings and reinforced rubber hose. The brake system is filled with transmission fluid ATF, one of the fluids recommended by Matco mfg. The amount of the fluid in the system can be checked by its level in the expansion tank that must be not less than half of the tank.

When servicing the brake system it may be necessary to disconnect its tubes. After such disconnection air gets into its cavities which is inadmissible. After such action it is necessary to fill the brake system with fluid to force all air out.

To fill the brake system with braking fluid in the airplane version with yokes, do the following:

- check the level of the braking fluid in the expansion tank and refill if necessary;

**WARNING!** Use only the fluid that is recommended by Matco mfg. Do not mix up the fluids of different grade. This may cause damage to the components and failure of the brake system.

- remove the cover set the parking brake valve to "OFF";
- remove protecting cap from the brake unit nipple and put on it a transparent PVC tube with the inner diameter of 3 mm (1/8 in) and minimum length of 300 mm (1 ft). The other end of the tube put into a container with the braking fluid so that it is completely submerged into the fluid;
- while holding the tube loosen the nipple by ½ turn;
- pump the braking fluid through the system with the braking lever till air bubbles stop appearing completely in the transparent tube (they may start appearing after some time of such pumping); while doing it do not forget to add braking fluid into the expansion tank to avoid air inflow into the system;
- after air bubbles disappear, tighten the braking unit nipple, remove the PVC tube and put on the protecting cap;
- repeat above actions for the other wheel.

**WARNING!** When filling the brake system it is necessary to pump through it braking fluid in the amount of 1 to 2 volumes of the expansion tank.

For more detailed information about maintenance (repair) of the brake system components visit its manufacturer web site: <http://www.matcomfg.com>.

**Recommended special tools:** none.

**Necessary parts/materials:** 300 mm of Ø3.0 mm PVC tubing, brake fluid.

### INSPECTION CHART

Part No.	Description	Interval	RCO	Instr. No.	TM	LC
-	Expansion tank	100 h	OC	5.1	L	LRM
See Matco P/N	Master cylinder	200 h	OC	5.2	L	LRM
See Matco P/N	Parking brake valve	200 h	OC	5.3	L	LRM
See Matco P/N	Brake unit assembly, right	200 h	OC	5.4	L	LRM
See Matco P/N	Brake unit assembly, left	200 h	OC	5.4		
See Matco P/N	Brake disk, right	200 h	OC	5.5	L	LRM
See Matco P/N	Brake disk, left	200 h	OC	5.5		

-	Copper tubes	200 h	OC	5.6	L	LRM
-	Reinforced rubber hose	200 h	OC	5.6		

**Instructions:**

- 1.13 Remove the top engine cowling. Inspect the expansion tank for leaks of braking fluid, cracks in its housing and cap. If the tank is damaged it must be replaced, then the brake system must be filled with braking fluid, following the instructions described in the beginning of this section.

Check the fluid level in the tank and refill if necessary. The required level is at least half of the tank. Make sure the tank attachment to the firewall is secure. Replace the plastic cable ties if necessary.

**Recommended special tools:** none.

**Necessary parts/materials:** none.

- 1.14 Remove handles from the control levers of the throttle, trim tab, brake and remove the horizontal panel. Inspect the master cylinders for leaks of braking fluid. If leaks are detected, it must be removed for repair or replacement.

In order to remove the master cylinders, do the following:

- remove the left seat;
- remove the panel between pilot seats;
- disconnect the control cables of the engine and AFHT trim tab (first from the engine and trim tab ends, and then from the control levers);
- undo the screws of the control lever unit (9 pcs.);
- block the reinforced rubber hose near the master cylinders by squeezing it with a clamp and disconnect it from the master cylinders;
- disconnect the copper tube connecting the parking brake valve with brake units;

**WARNING!** When disconnecting the brake system tubes some amount of braking fluid may spill out.

- remove the control lever unit assembled with the master cylinder;
- detach the master cylinder from the control lever unit;

To install the master cylinder perform the above actions in the reversed order. After re-assembling fill the brake system following the instructions given in the beginning of this section. Then adjust the control systems of the engine and elevator trim tab as described in the corresponding sections of this manual.

If no defects were detected in the master cylinder re-assemble everything in the reversed order.

**Recommended special tools:** none.

**Necessary parts/materials:** none.

- 1.15 Remove the handles from the control levers of the throttle, elevator trim tab, brakes and the horizontal panel. Inspect the parking brake valve for leaks of the braking fluid.

If any leak is detected the valve must be removed for repair or replacement.

In order to remove the parking brake valve do the following:

- block the reinforced rubber hose connecting the expansion tank with the master cylinder by squeezing the hose with a clamp;

- cut the plastic cable ties fixing the valve;
- undo the screws attaching the valve;
- disconnect the copper tubes from the valve.

To install the parking brake valve back perform the above actions in the reversed order. After assembling fill the brake system with the braking fluid following the instructions described in the beginning of this section.

If no defects are detected in the parking brake valve, re-assemble everything in the reversed order.

**Recommended special tools:** none.

**Necessary parts/materials:** none.

- 1.16 Remove the wheel fairing. Inspect the brake unit for the leaks of the braking fluid. If any leak is detected the brake unit must be removed for repair or replacement.

To remove the brake unit, do the following:

- put the wheel chokes under the nose and opposite main wheel;
- lift the airplane using a jack placed under a special plate near the opening in the fuselage bottom skin for the MLG spring;
- unlock and undo the brake disk screws and wheel axle nut;
- remove the wheel and brake disk;
- disconnect the copper tube from the brake unit;
- disconnect the brake unit from the supporting plate (undo two bolts and three screws of the brake unit) and remove the braking pads from it.

To re-install the brake unit perform the above actions in the reversed order. After assembling fill the brake system following the instructions described in the beginning of this section.

Check the brake pads for integrity and wear. The minimum thickness of the pad is 2.54 mm (0.1 in). The wear may be checked using a special depression in the butt of the braking pad. In case of serious wear or loss of integrity the pads must be replaced. In order to do that, detach the brake unit as described above and replace the brake pads (the braking system tubes need not to be disconnected from the brake unit). For more detailed instructions on servicing and replacement of the brake pads contact the manufacturer (Matco mfg).

If the wear is within the permissible limits, re-assemble everything in the reversed order. Before re-installing the attachment screws of the brake disk apply Loctite 222 on their thread.

**Recommended special tools:** none.

**Necessary parts/materials:** Loctite 222.

- 1.17 Define the nature and degree of the brake disk wear. For that remove the brake disk as described in 0. Measure the brake disk thickness at its working surface. It must be at least 3.3 mm (0.13 in). If the disk thickness is less than that, the brake disk must be replaced. For more detailed instructions on servicing and replacement of the brake disk contact the manufacturer (Matco mfg).

If the wear is within the permissible limits, re-assemble everything in the reversed order. Before re-installing the attachment screws of the brake disk apply Loctite 222 on their thread.

**Recommended special tools:** none.

**Necessary parts/materials:** Loctite 222.

- 1.18 Remove the handles from the control levers of the throttle, elevator trim tab and brakes, horizontal panel, main wheel fairings and pilot seats. Inspect the tubing of the brake system for leaks and damage. Pay special attention to the joints. If leaks and damage is detected replace the corresponding portion of the tubing. To obtain additional technical support contact the manufacturer.

After re-assembly fill the brake system following the instructions described in the beginning of this section.

After inspection (repair) re-assemble everything in the reversed order. Before re-installing the pilot seats apply Loctite 222 on the thread of the attaching bolts.

**Recommended special tools:** none.

**Necessary parts/materials:** Loctite 222.

## 6 Engine and its control system

A-32 is equipped with a 100 hp Rotax-912ULS four-cylinder four-stroke engine with combined cooling system manufactured by Rotax GmbH (Austria).

**WARNING!** Maintenance of the engine must be performed according to the current documentation of ROTAX company on operation and maintenance of Rotax 912 engine. For more detailed information visit the engine manufacturer's web site: <http://www.rotax-aircraft-engines.com>.

Arrangement and design of the engine systems (fuel, electric, oil, cooling, control, exhaust) complies with the requirements of the "Installation Manual for Rotax-912 aircraft engine".

The engine is installed on a mount (truss) with two pairs of brackets. The mount (truss) is attached to fuselage structure (firewall). Inner pair of the brackets is faced to the engine, while the outer pair is distanced with four sleeves. To damp the vibrations produced by the engine the brackets and mount are connected via rubber mounts. Four rubber mounts are installed on the outer pair of brackets, and two on the inner one.

The throttle lever is located between the pilot seats. In the airplane equipped with a central stick the throttle levers are located outboard of the pilot seats. Two cables run from the throttle lever(s) to the left and right carburetors. The engine control system also includes engine start mixture control. The mixture control lever is located between the pilot seats. It is connected to the carburetors' chokes with cables.

The engine may be equipped with an intake air box of Aeroprakt design that improves the engine operating conditions, prevents carburetor icing and increases the engine power output in hot climate.

### INSPECTION CHART

Part No.	Description	Interval	RCO	Instr. No.	TM	LC		
Rotax 912 ULS	Engine	*	OC	6.1	H	TSP		
A32-1-712000-01-000	Inner bracket, 2 pcs.	200 h	OC	6.2	L	LRI		
A32-1-712000-03-001	Outer bracket right	200 h	OC	6.2				
A32-1-712000-03-002	Outer bracket left	200 h	OC	6.2				
A32-1-712010-00-000	Engine mount (truss)	200 h	OC	6.2				
See Gumokov P/N	Rubber mounts, 6 psc.	500 h	OC	6.3	H	LRM		
A22L-0-6571-00	Intake airbox bottom part	200 h	OC	6.4	H	LRM		
A32-0-754020-00-000	Intake airbox top part	200 h	OC	6.4	H	LRM		
A32-0-761150-00-001	Throttle cable right	100 h	OC	6.5				
A32-0-761150-00-002	Throttle cable left	100 h	OC	6.5				
A32-0-761220-00-001	Choke cables right	100 h	OC	6.5				
A32-0-761220-00-002	Choke cables left	100 h	OC	6.5				
A32-0-761140-00-001	Throttle cable sheath right	100 h	OC	6.6				
A32-0-761140-00-002	Throttle cable sheath left	100 h	OC	6.6				
A32-0-761210-00-001	Choke cable sheath right	100 h	OC	6.6				
A32-0-761210-00-002	Choke cable sheath left	100 h	OC	6.6				
A32-0-761120-00-000	Throttle lever	100 h	OC	6.7			L	OWN

\* - see "Maintenance Manual for Rotax Engines. Rotax-912 Serie"

**Instructions:**

1.19 The engine servicing must be performed according to "Maintenance Manual for Rotax Engines. Rotax-912 Serie". When servicing and repairing the engine it may be necessary to dismantle it. The plastic cable ties securing the engine system components must be cut. When disconnecting the tubes and hoses it is recommended to plug the holes and fittings. When installing the engine back secure the cables and tubes of the engine systems with the plastic cable ties.

To dismantle the engine, do the following:

- set the fuel valves to CLOSED;
- switch OFF the battery using the battery switch or (if it is not available) disconnect one of the power lines from the battery;
- remove the top and bottom engine cowlings;
- disconnect the fuel line at its joint behind the firewall;

**WARNING!** Be careful when working with the fuel system, as remains of fuel in the fuel lines are highly fire hazardous.

- remove the muffler and exhaust pipes (see "Exhaust system" section);
- disconnect the throttle and choke control cables from the carburetors;
- remove the intake air box;
- drain the coolant from the cooling system (see "Cooling system" section);
- disconnect the cooling system hose from the water pump;
- disconnect the cooling system hoses from the expansion tank outlet and overflow sleeve;
- disconnect the oil system hose from the oil tank inlet and drain the remaining oil from the crank case;
- disconnect the oil system hose from the oil inlet and drain the remaining oil from the system;
- drain oil from the oil tank, if necessary;
- take out the senders of oil temperature and cylinder head temperature (or disconnect the cables from them if possible) and detach the cables from the engine;
- disconnect the cables from the oil pressure sender and untie the cables;
- disconnect the cables from the starter;
- take out the shielded cables of the ignition switches from the ignition system connector and untie the cables;
- take out the shielded cable of generator from the rectifier-regulator connector and untie the cable;
- disconnect the tachometer connector from the engine and untie the cable;
- take out inlet cooling houses of 2-nd and 3-rd cyl. from outer brackets;
- put a support of an appropriate size under the tail wheel (with the engine removed the airplane will tend to lower the tail);
- undo the bolts of engine attachment to the inner brackets (4 pcs.), use engine hoist for that;
- undo the bolts which attach the aft rubber mounts on the inner brackets to the truss;
- remove the engine with inner brackets, use engine hoist for that.

Engine installation is performed in the reversed order following the instructions of the "Installation Manual for Rotax-912 Aircraft Engine". After engine installation the cooling and oil system must be refilled and engine control system must be re-adjusted.

**WARNING!** When adjusting the throttle cables ensure 1 mm clearance between the throttle valve control arm and the idle RPM stop (special feature of A-32). When not

installing the airbox do not let vent tubes of the carburetors protrude out of the engine cowling as this may cause unstable operation of the engine in flight.

**Recommended special tools:** none.

**Necessary parts/materials:** fuel line plugs, oil line plugs

- 1.20 Remove the top and bottom engine cowling. Inspect the engine mount for fatigue cracks and deformation. Pay special attention to the weld seams. If any defects were detected contact the manufacturer for the required technical support.

**Recommended special tools:** magnifying glass, electric torch, torque wrench.

**Necessary parts/materials:** none.

- 1.21 Remove the top and bottom engine cowling. Inspect the rubber mounts for deep cracks and other damage. If any such defects were detected the rubber mounts must be replaced.

To replace the rubber mounts do the following:

- perform dismantle the engine as described in 6.1;
- replace aft rubber mounts on the inner brackets;

**WARNING!** The shock absorbers are asymmetric about their attachment plate. They must be installed with their bigger halves towards engine mount inner strut;

- take out outer brackets and replace rubber mounts;

**WARNING!** The shock absorbers are asymmetric about their attachment plate. They must be installed with their bigger halves towards inside;

- re-assemble everything in the reversed order.

**Recommended special tools:** magnifying glass, electric torch, hoist, torque wrench.

**Necessary parts/materials:** plastic ties, safety pins.

- 1.22 Remove top and bottom cowling. Check if the shutter actuator functions properly and the shutter fits tight at its extreme position, adjust if necessary.

To adjust the shutter actuator, do the following:

- set the shutter to ON;
- loosen the cable sheath fixing screws;
- push the shutter to the extreme position with the cable sheath and tighten the screws.

If the cable sheath travel is insufficient for the adjustment, the shutter must be re-installed. Remove the top half of the airbox for that (see installation of the airbox below).

Check the torque of the airbox screws and tighten them if necessary applying Loctite 222 on the thread.

Check the attachment of the shutter actuator, vent tube and corrugated hose and replace the plastic cable ties if necessary.

Check the integrity and reliable attachment of the sealing ring of the intake manifold. Install new ring if necessary, using any suitable glue.

It may be necessary to remove the airbox when servicing and repairing the engine.

To remove the airbox do the following:

- remove the carburetor vent tubes;
- undo the screws connecting the airbox halves;

- remove the top half of the airbox pushing the engine forward if necessary;
- set the airbox shutter to ON;
- unfix and remove the shutter;
- remove the carburetor air filters;
- cut the plastic cable ties fixing the corrugated hose and airbox vent tube;
- loosen the cable sheath clamp screws and take it out from the airbox;
- remove the bottom half of the airbox.

Airbox installation shall be performed in the reversed order. Then while installing the shutter, set the carburetor heating knob to OFF, place the shutter on the lower flange and fix it. After assembling the airbox the shutter can be adjusted by loosening the cable sheath clamp. When assembling the airbox apply Loctite 222 on the thread of its fixing screws.

**Recommended special tools:** torque wrench.

**Necessary parts/materials:** Loctite 222.

- 1.23 Remove the top cowling. Remove the handles from the control levers of throttle,, chock, brake, elevator trim tab and horizontal panel. Inspect the cables for wear. In case of significant wear the cables must be replaced. Use 1x19 Ø1.5 mm (0.075 in) cable cut to the length of the old one. Tin the cable ends before its installation.

**WARNING!** Using the cable with broken wires is not allowed.

After replacement or disconnection of the cables the engine control system must be re-adjusted (see Installation Manual for Rotax 912 aircraft engine).

**WARNING!** When adjusting the throttle cables ensure 1 mm clearance between the throttle valve control arm and the idle RPM stop (special feature of A-32).

**Recommended special tools:** soldering iron.

**Necessary parts/materials:** none.

- 1.24 Remove the top cowling. Inspect the control cables for kinks and damage of their sheath, paying special attention to the areas where it goes through the firewall.

A damaged portion of the cable sheath may be repaired by setting over it a piece of thermoshrinkable tube.

If significant kinks in cable sheath were detected that hamper the cable motion, the sheath must be replaced. After replacement or repair of the cable sheath the engine control system must be re-adjusted. (see Installation Manual for Rotax-912 aircraft engine).

**WARNING!** When adjusting the throttle cables ensure 1 mm clearance between the throttle valve control arm and the idle RPM stop (special feature of A-32).

**Recommended special tools:** heat gun.

**Necessary parts/materials:** thermoshrinkable tube.

- 1.25 Check the torque of the bolt serving as the axle of the throttle lever and adjust if necessary. The adjustment must ensure that the lever remains at IDLE when engine is running and the force to move the throttle is not too high.

**Recommended special tools:** torque wrench.

**Necessary parts/materials:** none.

## 7 Cooling system

Rotax-912 has cooling system of a combined type. The cylinders are air-cooled and the cylinder heads are liquid-cooled.

The liquid cooling system consists of a water pump, expansion tank – accumulator, radiator, overflow tank and hoses.

Its servicing consists of systematic inspection of its components, timely replacement of the coolant and system cleaning, as well as replacement of its parts with expired service life (hoses, sealing, etc.).

**WARNING!** Servicing of the cooling system must be performed in accordance with the latest documentation of Rotax company on operation and maintenance of Rotax 912 engine.

Cooling system capacity is about 3 l (0.8 US gal). Amount of the coolant in the system must be checked by the coolant level in the expansion and overflow tanks.

**WARNING!** When the cooling system is filled with coolant, air lock may be formed within the top portion of the radiator. To remove it from the system, loosen the clamp of the upper hose and carefully let air out.

To drain coolant from the system remove the top and bottom cowlings, disconnect the lower hose from the radiator and let coolant out.

### INSPECTION CHART

Part No.	Description	Interval	RCO	Instr. No.	TM	LC
See Rotax P/N	Overflow tank	100 h	OC	7.1	L	LRI
-	Hoses	100 h	OC	7.2	L	LRM

#### Instructions:

1.26 Remove the top cowlings. Inspect the tank for leaks of coolant, cracks in its housing and cap. If any damage is detected the tank must be replaced.

Check the level of coolant in the tank and refill if necessary. Check the required level using the marks on the tank.

Make sure the tank is attached reliably to the firewall. Replace the plastic cable ties if necessary.

**Recommended special tools:** none.

**Necessary parts/materials:** coolant.

1.27 Remove the top and bottom cowlings. Inspect the hoses for leaks and any damage (chaffing, cracks). Pay special attention to the areas of hose attachment and passing close to structural elements of engine and its mount.

Damaged hoses must be replaced. Drain coolant before replacing the hoses and refill the cooling system with coolant as described in the beginning of this section.

Check torque of the clamps on joints and tighten if necessary. Pay special attention to tightness of the joints before beginning operation in cold season.

**Recommended special tools:** torque wrench.

**Necessary parts/materials:** none.

## 8 Lubrication system

The engine lubrication system is of closed type with dry crankcase and forced circulation of oil. The lubrication system consists of oil pump, oil tank, radiator, filter and connecting lines.

Servicing of the lubrication system consists of systematic inspection of its components, timely replacement of oil and oil filter, as well as replacement of the parts with expired service life (connecting lines, sealing, etc.).

**WARNING!** Servicing of the lubrication system must be performed in accordance with the latest documentation of Rotax company on operation and maintenance of Rotax 912 engine.

The lubrication system must be filled with high quality oil for gasoline four-stroke engines, recommended by Rotax company. Lubrication system capacity is 3 l (0.8 US gal).

### INSPECTION CHART

Part No.	Description	Interval	RCO	Instr. No.	TM	LC
See Rotax P/N	Oil tank	100 h	OC	8.1	L	LRI
-	Connecting lines	100 h	1000 h/OC	8.2	H	TSP

#### Instructions:

1.28 Remove top and bottom cowling. Inspect the oil tank plug for oil leaks. If leaks are detected, tighten and lock the plug with safety wire.

Make sure that the vent line has no kinks, is intact and secured reliably. If the line is damaged it must be replaced.

**Recommended special tools:** none.

**Necessary parts/materials:** safety wire.

1.29 Remove top and bottom cowling. Inspect the connecting lines for leaks of oil and damage (chaffing, cracks). Pay special attention to the areas of connecting lines binding and passing close to engine, its mount and cowling. If damaged connecting lines are detected, they must be replaced.

**WARNING!** When disconnecting the lines some oil may be spilled out.

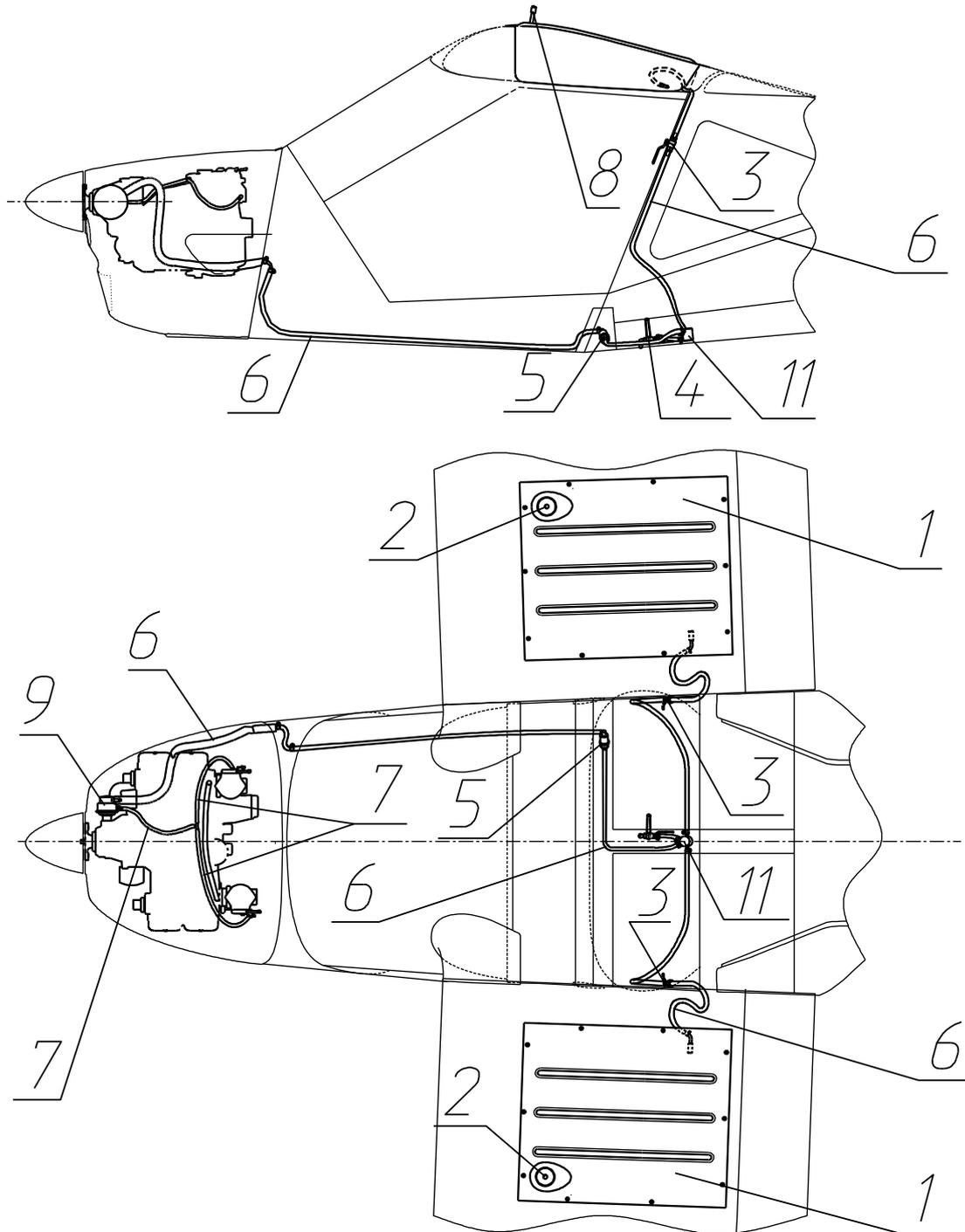
Check torque of the clamps on joints and tighten if necessary. Pay special attention to tightness of the joints before beginning operation in cold season.

**Recommended special tools:** torque wrench.

**Necessary parts/materials:** none.

## 9 Fuel system

The fuel system of A-32 (see **Fig. 2**) includes two wing fuel tanks 1 (each 45 l capacity) with filler inlets (2) and fuel lines d8 (6) connecting the tanks to each other and to the engine fuel pump (9) via two fuel valves (3), mud box (11) and fuel filter (5). The fuel pumps feeds fuel to the engine carburetors via fuel lines d6 (7). Fuel can be drained from the tanks using the drain valve (4). The fuel tanks are connected with the atmosphere via the vent lines (8) in inlet covers (2).



**Fig. 2 Fuel system schematic**

Servicing of the fuel system consists of systematic inspection of its components, timely replacement of the fuel filter, as well as replacement of the parts with expired service life (connecting lines, sealing, etc.).

**WARNING!** Be careful when working with the fuel system, as the remains of fuel are highly fire hazardous and when spilled on glass may cause its dimness and cracking.

### INSPECTION CHART

Part No.	Description	Interval	RCO	Instr. No.	TM	LC
A22LS-1-6120-01	Fuel tank, right	500 h	OC	9.1	L	LRM
A22LS-1-6120-02	Fuel tank, left	500 h	OC	9.1		
	Fuel valve x2	100 h	OC	9.2	L	LRM
	Drain fuel valve	100 h	OC	9.2		
	Fuel filter	100 h	200 h/OC	-	L	LRM
	Connecting lines	100 h	1000 h/OC	9.3	L	LRM

#### Instructions:

##### 1.30 Drain fuel from the tanks.

Remove the tank and inspect it for leaks of fuel. In case of suspected damage of the tank a more thorough check is necessary. Contact manufacturer for the required technical support.

If no defects were detected, re-install the tank, applying Loctite 222 on the tread of the attaching screws.

**Recommended special tools:** magnifying glass, electric torch.

**Necessary parts/materials:** Loctite 222.

##### 1.31 Inspect the fuel valve for leaks of fuel. If fuel leaks under fuel valve fittings, do the following:

- drain fuel from the fuel tanks;
- remove the valve after disconnecting handle and fuel lines from it;
- take out the fittings from the valve and clean their thread from old sealing material;
- put the fitting back after applying Loctite 243 sealing material on their thread;
- install the fuel valve back.

If any other defect, causing leaks of fuel, was detected, the valves must be replaced.

**Recommended special tools:** none.

**Necessary parts/materials:** Loctite 243.

##### 1.32 Remove the top cowling. Inspect the fuel lines for leaks of fuel and damage (chaffing, cracks). Pay special attention to the areas of fuel line binding and passing through the fuselage structure. If damaged fuel lines are found, they must be replaced. For replacement of fuel lines use reinforced rubber hoses resistant to fuels and oils with inside diameter Ø6 mm, Ø8 mm and Ø12 mm (drain).

Check torque of the clamps on joints and tighten if necessary. Pay special attention to tightness of the joints before beginning operation in cold season.

Make sure the fuel lines are fixed to fuselage structure reliably and replace the plastic cable ties if necessary.

**Recommended special tools:** none.

**Necessary parts/materials:** none.

## 10 Exhaust system

The exhaust system of A-32 airplane is arranged and installed in accordance with the recommendations of "Installation manual for Rotax-912 aircraft engine".

The system comprises of the exhaust pipes and muffler. Depending on configuration the exhaust pipes may be fitted with exhaust gas temperature (EGT) sensors.

Each exhaust pipe is fixed to the engine with two studs and secured with M8 self-locking nuts. The exhaust muffler is attached to the exhaust pipes via spherical joints and secured with springs.

**WARNING!** Servicing of the exhaust system must be performed in accordance with the current documentation of Rotax company on operation and maintenance of Rotax-912 engine.

### INSPECTION CHART

Part No.	Description	Interval	RCO	Instr. No.	TM	LC
A32-1-780005-00-000	Muffler	100 h	OC	10.1	L	LRM
A32-1-780001-00-000	Exhaust pipe of cylinder 1	100 h	OC	10.1		
A32-1-780002-00-000	Exhaust pipe of cylinder 2	100 h	OC	10.1		
A32-1-780003-00-000	Exhaust pipe of cylinder 3	100 h	OC	10.1		
A32-1-780004-00-000	Exhaust pipe of cylinder 4	100 h	OC	10.1		
See Rotax P/N	Springs, 8 pcs.	100 h	OC	10.2	L	OWN

#### Instructions:

1.33 Remove the top and bottom cowling. Inspect the exhaust system for fatigue cracks. Pay special attention to the weld seams and the areas around them. Use electric torch any other suitable source of light for the inspection.

In case of suspicion for fatigue crack the exhaust system must be dismantled for more thorough flaw detection. In case of a confirmed crack, contact the aircraft manufacturer for the required technical support.

To dismantle the exhaust system, do the following:

- remove the springs retaining the muffler;
- undo the nuts securing the exhaust pipes;
- carefully take out the exhaust pipes and the EGT sensors (if the latter are fitted).

To install the exhaust system, do the following:

- put in place the EGT sensors (if fitted);
- put in place the exhaust pipes and nuts attaching them;
- attach the exhaust muffler and tighten the exhaust pipe nuts.

**WARNING!** When installing the exhaust pipes follow the requirements of "Installation manual for Rotax-912 aircraft engine".

**Recommended special tools:** magnifying glass, electric torch.

**Necessary parts/materials:** none.

1.34 Remove the top and bottom cowling. Inspect the springs for integrity. Broken springs must be replaced.

**Recommended special tools:** magnifying glass, electric torch.

**Necessary parts/materials:** none.

## 11 Propeller

A-32 airplane may be fitted with three-blade on-ground adjustable propeller of 1.71 m (67 in) diameter manufactured by KievProp company (e-mail: [kievprop@i.ua](mailto:kievprop@i.ua), web: <http://www.kievprop.com>).

Propeller servicing comprises of its systematic inspection and timely repair (or replacement) of the parts with expired service life in accordance with the requirements of its manufacturer.

### INSPECTION CHART

Part No.	Description	Interval	RCO	Instr. No.	TM	LC
-	Propeller hub	200 h	4 years/OC	11.1	L	LRM
-	Bolts, 6 pcs.	200 h	4 years/OC	1.8	L	OWN
A32-0-610002-00-000	Spinner	200 h	OC	11.2	L	LRI

#### Instructions:

1.35 Remove the propeller spinner. Inspect the propeller hub for fatigue cracks. If any cracks are detected, contact propeller manufacturer (KievProp, Ukraine, Kyiv, 04128, Tupolev str. 19, tel./fax: +38 (044) 443-79-91, e-mail: [kievprop@i.ua](mailto:kievprop@i.ua)) for necessary technical support.

Check the pitch angles of the blades and re-adjust the propeller if necessary.

If no defects are detected install the spinner in place applying Loctite 222 on the thread of the attachment screws.

**Recommended special tools:** propeller blade angle gauge, torque wrench.

**Necessary parts/materials:** Loctite 222.

1.36 Check the torque of the screws attaching the spinner. Tighten if necessary using Loctite 222.

**Recommended special tools:** none.

**Necessary parts/materials:** Loctite 222.

## 12 Airplane control system

The A-32 airplane control system consists of control systems of ailerons, all-flying horizontal tail (AFHT), AFHT trim tab, and aileron drooping mechanism. Control systems of ailerons and elevator may be with either yokes or central stick. The control system of AFHT trim tab is mechanical one.

Control system linkage for ailerons, AFHT and its trim tab is combined (rigid and made of cables), for rudder is made of cables.

Servicing of the airplane control system comprises of its systematic inspection, lubrication, detection of worn components, repair and timely replacement of the parts with the expired service life and check cables tension according with following table:

Control system	Tension	
	kg	lb
ailerons	21	46
rudder	21	46
AFHT	50	110
AFHT trim tab	10	22

The control system must operate smoothly without jamming and significant play. The clearances between the movable parts of the control system and fixed structural elements must be at least 5 mm (0.2 in).

Main components of the system to be checked are:

- fabric covering of the control surfaces;
- spherical bearings;
- slide bearing;
- fairleads;
- cables;
- pulleys;
- fasteners.

The fabric covering must be inspected for damage and delamination from the framework of the control surfaces. Minor ruptures (less than 50 mm or 2 in) may be repaired by covering them with ORACAL permanent sticking film. In case of significant damage and delamination of the fabric covering from the framework contact aircraft manufacturer for the required technical support.

The spherical bearings are installed in hinge brackets of the control surfaces, in control rods and control system supports. The used hinges do not require any servicing. Their wear must be checked by their radial and axial play. Maximum radial play is 0.25 mm (0.01 in) maximum axial play – 0.5 mm (0.02 in). If the play is exceeding the above specified values contact the manufacturer for the required technical support.

Slide bearings are used in hinge brackets of the control surfaces and in control system supports. They consist of a sleeve and an axle. The sleeves used in this airplane are either off bronze or off steel. In the hinge brackets the sleeve is press-fitted into the bracket, fixed to the airframe structure, and the axle is component of the movable control surface. In the Cardan joints and in the control system supports the sleeves are installed both in fixed and movable parts, and bolts (or pins) are used as axles. Slide bearing wear must be checked by the radial play. The maximum radial play is 0.5 mm (0.02 in). If the play exceeds the specified value contact the manufacturer for the required technical support.

Slide bearings require periodic lubrication. They may be lubricated by any grease for bearings every 200 hours or on condition.

The fairleads are used in the control systems of AFHT and its trim tab and serve to retain the cables. The fairleads are made of polyamide. The fairlead wear must be checked by the depth of the slot created due to cable friction against them. The slot depth must not exceed double diameter of the cable. If the wear is exceeding the specified value contact the manufacturer for the required technical support.

The cables are used in the control systems of the AFHT, AFHT trim tab, ailerons and rudder. The cables must be inspected for broken wires. Special attention must be paid to the areas where cables pass through the fairleads, pulleys and to the cable terminations. If broken cable wires are found then the cable must be replaced. Contact the manufacturer for the required technical support.

Pulleys, which are used in the control systems do not require any servicing. The pulley must rotate without jamming and play. If jamming or play appears the pulley must be replaced.

**WARNING!** When servicing the control system avoid over-tightening the bolts serving as slide bearing axles. The tightening must eliminate the axial play however it must allow unrestricted motion of the movable part of the joint. All bolts, nuts (except for self-locking ones), pins, turnbuckles must be locked reliably.

Adjustment of the aileron control system (cable tension and outer bellcranks position) is achieved using the turnbuckles located near the inner bellcranks. Proper position of the flaperons is achieved by changing the length of the outer pushrods.

**WARNING!** To increase the length of a control rod, loosen the locking nut and screw the rod end OUT (all threads are right-hand!), to reduce the length – screw it DOWN. After adjusting the rod length tighten the locking nut applying the Loctite 222 on the thread.

Adjustment of the AFHT control system (cable tension and position) is achieved by using the turnbuckles located forward of the bellcrank, installed inside tail portion of the fuselage.

Adjustment of the rudder control system (cable tension and position) is achieved using the turnbuckles of the rudder control cables.

Adjustment of the AFHT trim tab control system (cable tension and position) is achieved using the adjustable forward stops of the sheaths, located aft of the seat beam.

**WARNING!** Loosen the locking nut and screw the forward stop of the sheath OUT (all threads are right-hand!) to increase cable tension, to reduce cable tension – screw the forward stop of the sheath DOWN. After adjusting the rod length tighten the locking nut applying the Loctite 222 on the thread

Adjustment of the control system must ensure the deflection angles of the control surfaces specified in the "Pilot Operating Handbook A-32".

### INSPECTION CHART

Part No.	Description	Interval	RCO	Instr. No.	TM	LC
	Aileron control system					
A32-0-576000-00-001	Aileron, right	100 h	OC	12.1	L	LRI
A32-0-576000-00-002	Aileron, left	100 h	OC	12.1		
A32-0-271100-00-000	Outer pushrod, 2 pcs.	100 h	OC	12.2	L	LRI
A32-0-271070-00-000	Outer bellcrank, 2 pcs.	100 h	OC	12.2		

Part No.	Description	Interval	RCO	Instr. No.	TM	LC
A32-0-271090-00-000	Inner pushrod, 2 pcs.	100 h	OC	12.2		
A32-0-271060-00-000	Inner bellcrank, 2 pcs.	100 h	OC	12.2	L	LRI
A32-0-271120-00-000	Pushrod 2 pcs.	100 h	OC	12.2		
A32-0-271140-00-000	Cable, 2 pcs.	100 h	OC	12.3		
A32-0-271130-00-000	Pulley, 8 pcs.	500 h	OC	12.2	L	LRI
A32-0-271040-00-001	Yoke, right	100 h	OC	12.2		
A32-0-271040-00-002	Yoke, left	100 h	OC	12.2	L	LRI
A32-0-271030-00-001	Yoke end, right	100 h	OC	12.2	L	LRI
A32-0-271030-00-002	Yoke end, left	100 h	OC	12.2		
A32-0-271080-00-000	Rod	100 h	OC	12.2	L	LRI
A32-0-271050-00-000	Bellcrank	100 h	OC	12.2	L	LRI
A32-0-271020-00-000	Control yoke column	100 h	OC	12.2	L	LRI
A32-0-275000-00-000	Aileron drooping mechanism	100 h	OC	12.4	L	LRI
	AFHT control system					
A32-1-556000-00-000	AFHT	100 h	OC	12.5	L	LRI
AN 175-11	AFHT attachment bolt, 2 pcs.	100 h	OC	1.8	L	OWN
AN 310-5	AFHT attachment nut, 2 pcs.	100 h	OC			
A32-0-273030-00-000	Rod	100 h	OC	12.2	L	LRI
A32-0-273020-00-000	Bellcrank assy.	100 h	OC	12.2		
A32-0-273050-00-000	Cable assy.	200 h	OC	12.3	L	LRI
A32-0-273000-03-000	Fairlead	500 h	OC	12.5	L	LRI
A32-0-273040-00-000	Pulley, 2 pcs.	500 h	OC	12.3		
	Rudder control system					
A32-0-554100-00-000	Rudder	100 h	OC	12.6	L	LRI
A32-0-272060-00-001	Rudder cable, right	200 h	OC	12.3	L	LRI
A32-0-272060-00-002	Rudder cable, left	200 h	OC	12.3		
A32-0-272020-00-000	Pedals	100 h	OC	12.7	L	LRI
A32-0-272050-00-000	Rods, 2 pcs.	100 h	OC	12.2	L	LRI
A22LS.0.5226.00CB	Pulleys, 4 pcs.	500 h	OC	12.2	L	LRI
	AFHT trim tab control system					
A32-0-556200-00-000	Trim tab	200 h	OC	12.8	L	LRI
A32-0-274020-00-000	Lever assy.	200 h	OC	12.2	L	LRI
A32-0-274030-00-000	Bellcrank assy.	200 h	OC	12.2	L	LRI
A32-0-274040-00-000	Cable sheath	200 h	OC	12.10	L	LRI
A32-0-274050-00-000	Rod	200 h	OC	12.2		
A32-0-274060-00-000	Cable	200 h	OC	12.9	L	LRI
A32-0-274001-00-000	Fairlead	200 h	OC	12.9	L	LRI

**Instructions:**

- 1.37 Inspect aileron for fatigue cracks, deformation, loose rivets, as described in 1.1 (paragraphs 2 and 3). Pay special attention to the areas near the aileron hinge brackets.

Check the play in the aileron hinge brackets. Grease the slide bearings if necessary.

Check tightness and locking of the nut of the aileron root hinge bracket.

Inspect the fabric covering as described in the beginning of this section.

**Recommended special tools:** magnifying glass, electric torch.

**Necessary parts/materials:** ORACAL permanent sticking film.

- 1.38 Check tightness and locking of the nuts and play in hinged joints. Grease the slide bearings if necessary.

**Recommended special tools:** none.

**Necessary parts/materials:** none.

- 1.39 Inspect the cable for wear in the areas where it passes through fairleads and pulleys. If any cable wire is broken the cable must be replaced. Contact the manufacturer for the required technical support.

Check the cable tension. If necessary adjust the cable tension using the turnbuckles. Lock the turnbuckles with safety wire after that.

**Recommended special tools:** magnifying glass, electric torch, cable tension gauge.

**Necessary parts/materials:** none.

- 1.40 Inspect ileron drooping mechanism for fatigue cracks, deformation, loose rivets, as described in 1.1 (paragraphs 2 and 3). Check tightness and locking of the nuts and play in hinged joints. Grease the slide bearings if necessary.

**Recommended special tools:** none.

**Necessary parts/materials:** none.

- 1.41 Inspect the AFHT for fatigue cracks, deformation, loose rivets, as described in 1.1 (paragraphs 2 and 3). Pay special attention to the its attachment points. Verify that the play in the AFHT attachment spherical bearings not exceed 0.2 mm. Do this by gently moving the stabilizer by its tip up and down with an amplitude not more than 50 mm (2 in).

**WARNING!** The applied load may not exceed 30 N (7 lb).

If there is some radial play, which not exceed 0.2 mm, tighten the attachment bolts.

If radial play exceed 0.2 mm contact manufacturer for further technical support.

Inspect the fairlead by check the depth of the slot created due to cable friction against them. The slot depth must not exceed double diameter of the cable. If the wear is exceeding the specified value contact the manufacturer for the required technical support.

Grease the slide bearings if necessary.

Inspect the fabric covering as described in the beginning of this section.

**Recommended special tools:** magnifying glass, electric torch.

**Necessary parts/materials:** ORACAL permanent sticking film.

- 1.42 Inspect the rudder for fatigue cracks, deformation, loose rivets, as described in 1.1 (paragraphs 2 and 3). Pay special attention to the areas near the rudder control arms and hinge brackets.

Check play in the rudder hinges. Grease the slide bearings if necessary.

Check tightness and locking of the lower hinge nut and locking of the attachment pins of the control cables.

Inspect the fabric covering as described in the beginning of this section.

**Recommended special tools:** magnifying glass, electric torch.

**Necessary parts/materials:** ORACAL permanent sticking film.

- 1.43 Inspect the pedals for fatigue cracks and deformation. Pay special attention to the weld seams. In case of detecting cracks contact the manufacturer for the required technical support.

Check tightness and locking of the nut of the nose wheel control rods.

Check locking of the pins and pedal supports.

Check play in the supports and hinged joints. Grease slide bearings if necessary.

**Recommended special tools:** none.

**Necessary parts/materials:** none.

- 1.44 Check the trim tab fasteners for corrosion. Replace corroded fasteners. Grease slide bearings if necessary.

**Recommended special tools:** none.

**Necessary parts/materials:** none.

- 1.45 Remove the handles from the control levers of throttle, trim tab, brakes and horizontal panel. Inspect the cable for wear in the areas where it passes fairleads, cable sheath and near its attachment to the control lever and trim tab control arm.

If any cable wire is broken the cable must be replaced. Contact the manufacturer for the required technical support.

Inspect the fairlead by check the depth of the slot created due to cable friction against them. The slot depth must not exceed double diameter of the cable. If the wear is exceeding the specified value contact the manufacturer for the required technical support.

After inspection assemble everything in the reversed order.

**Recommended special tools:** none.

**Necessary parts/materials:** none.

- 1.46 Inspect the cable sheath for kinks and damage. A damaged portion of the cable sheath may be repaired by setting over it a piece of thermoshrinkable tube.

If significant kinks in cable sheath were detected that hamper the cable motion, the sheath must be replaced. After replacement or repair of the cable sheath the trim tab control system must be re-adjusted.

**Recommended special tools:** heat gun.

**Necessary parts/materials:** thermoshrinkable tube.

## 13 Electrical system

The major components of the electrical system of A-32 airplane are: battery (12 V, minimum 16 Ah), starter relay, rectifier-regulator, condenser (22000  $\mu$ F, 25 V), warning light (12 V, 2 W), master switch, ignition and consumer switches, fuse block, electric harness, fuel level senders and indicators and analog engine instruments. Optionally the airplane may be also equipped with ground switch, landing light and miscellaneous consumers.

The battery is located on the left side behind the frame No. 3. The starter relay, rectifier-regulator and condenser are located on the left side of the firewall. The switches, fuses, and fuel level indicators – on the lower part of the instrument panel. The warning light – on the left side of the instrument panel. Fuel level sensors are installed in the fuel tanks. The landing light – on the lower part of the engine mount.

The electrical system arrangement complies with the requirements of the "Installation manual of Rotax-912 aircraft engine". Electric system wiring depends on the electric equipment/instruments installed in the aircraft and therefore have main and additional (optional) portions. The respective wiring diagrams are shown on **Fig. 3** to **Fig. 8**.

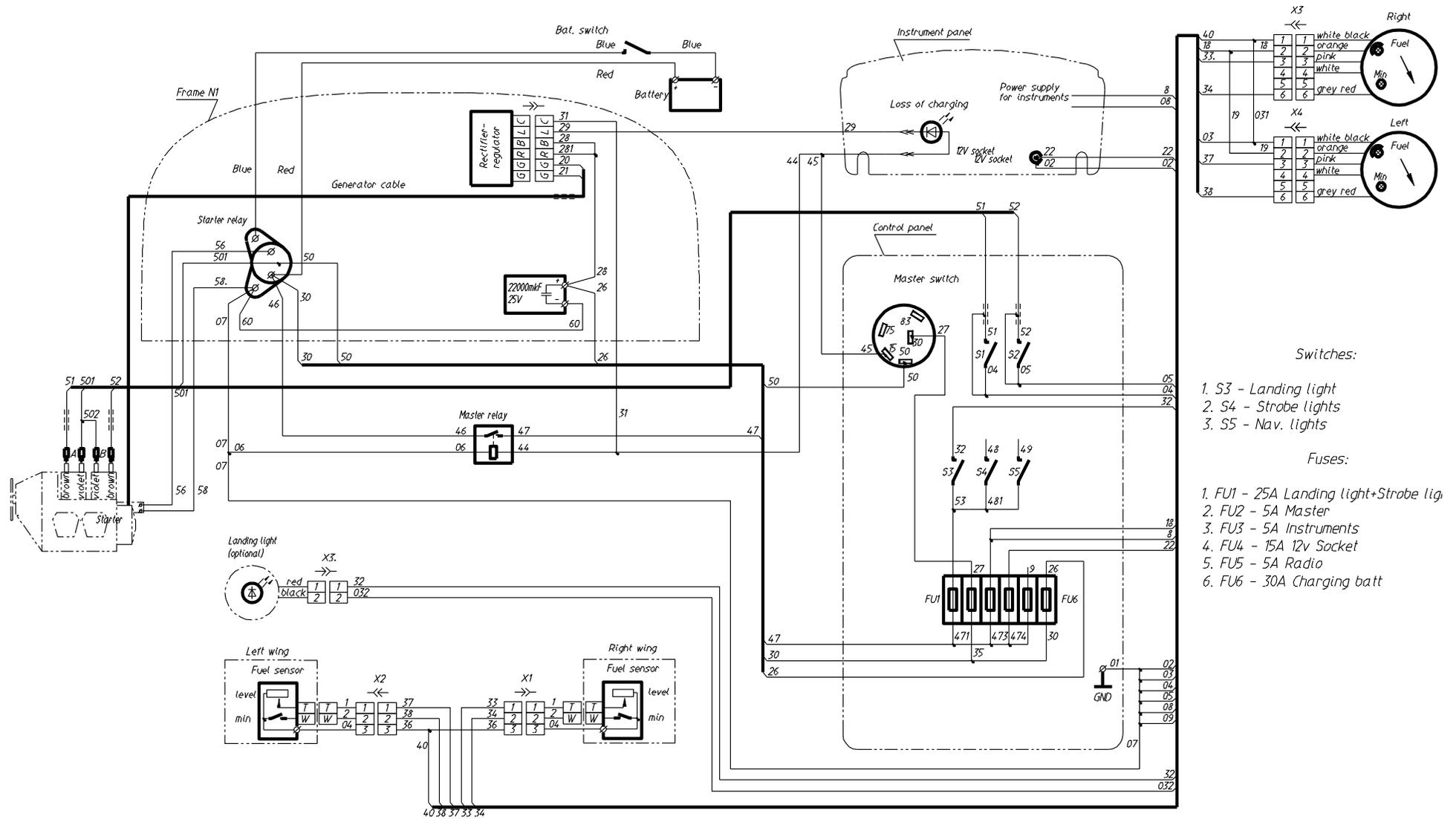
**WARNING!** Checking the electrical system components belonging to the engine electrical system (rectifier-regulator, condenser, engine instruments) shall be performed in accordance with the current documentation of Rotax company on operation and maintenance of Rotax-912 engine.

Depending to airplane configuration, the electrical system may include miscellaneous consumers (radio, transponder, engine instruments, navigation lights, etc.). Servicing those consumers shall be performed in accordance with the current documentation on their operation and maintenance of their respective manufacturers.

The electrical system of the airplane requires minimum servicing. The main problems that may arise in the electrical system is corrosion of contacts and chaffing of wires.

To prevent oxidation of the connectors and terminals they must be covered with some Lithium-based grease.

To minimize the probability of chaffing and prevent breaking (or short circuit) of wiring the reliable fixation (binding) of harnesses must be ensured. Special attention must be paid to the areas where wiring is located close to the movable parts of airplane. To fix the wiring use plastic cable ties.



- Switches:
1. S3 - Landing light
  2. S4 - Strobe lights
  3. S5 - Nav. lights
- Fuses:
1. FU1 - 25A Landing light+Strobe lig
  2. FU2 - 5A Master
  3. FU3 - 5A Instruments
  4. FU4 - 15A 12v Socket
  5. FU5 - 5A Radio
  6. FU6 - 30A Charging batt

Fig. 3 Wiring diagram of A-22LS electric system (main)

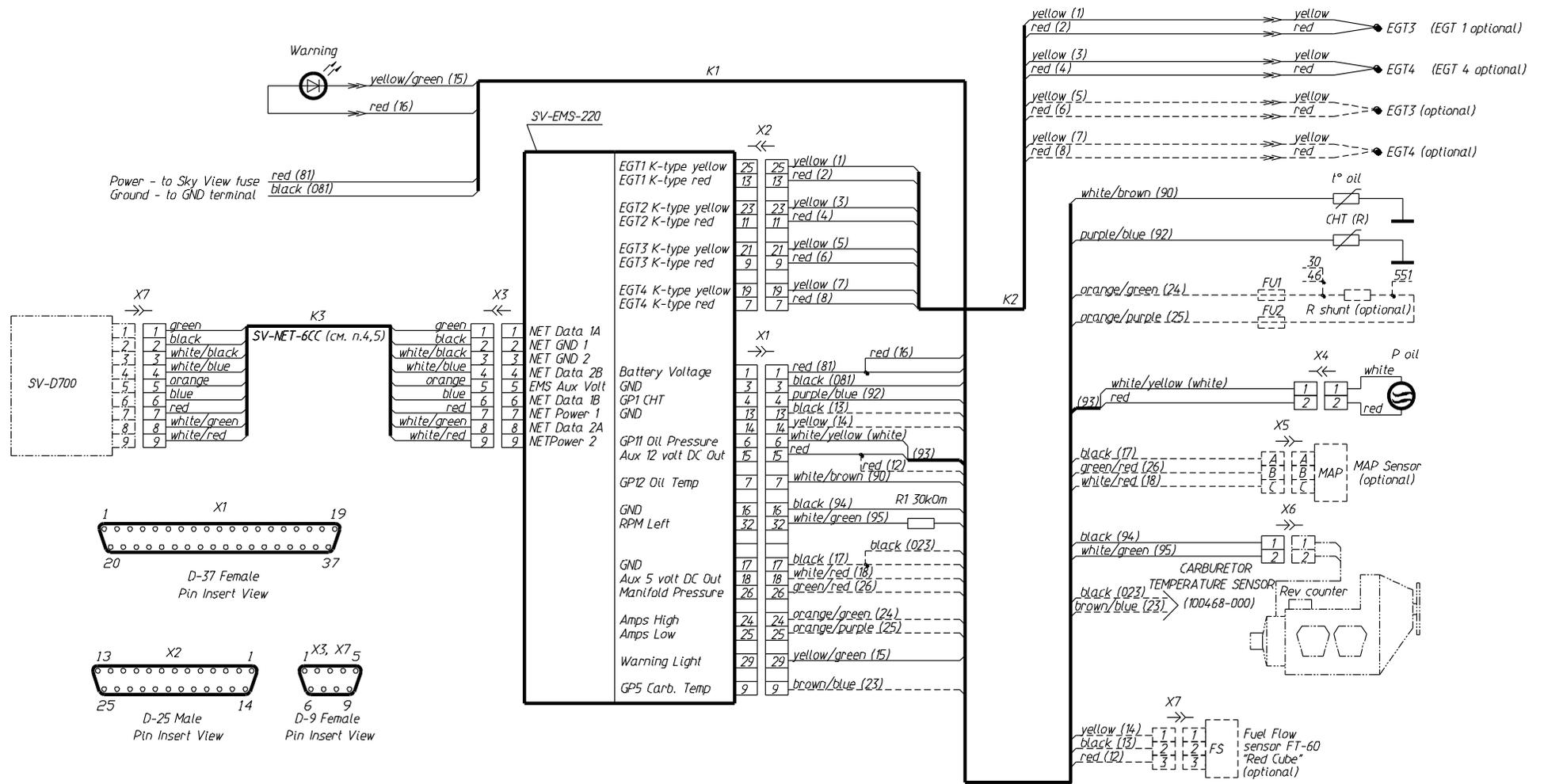


Fig. 4. Wiring diagram for installation of SV-EMS-220

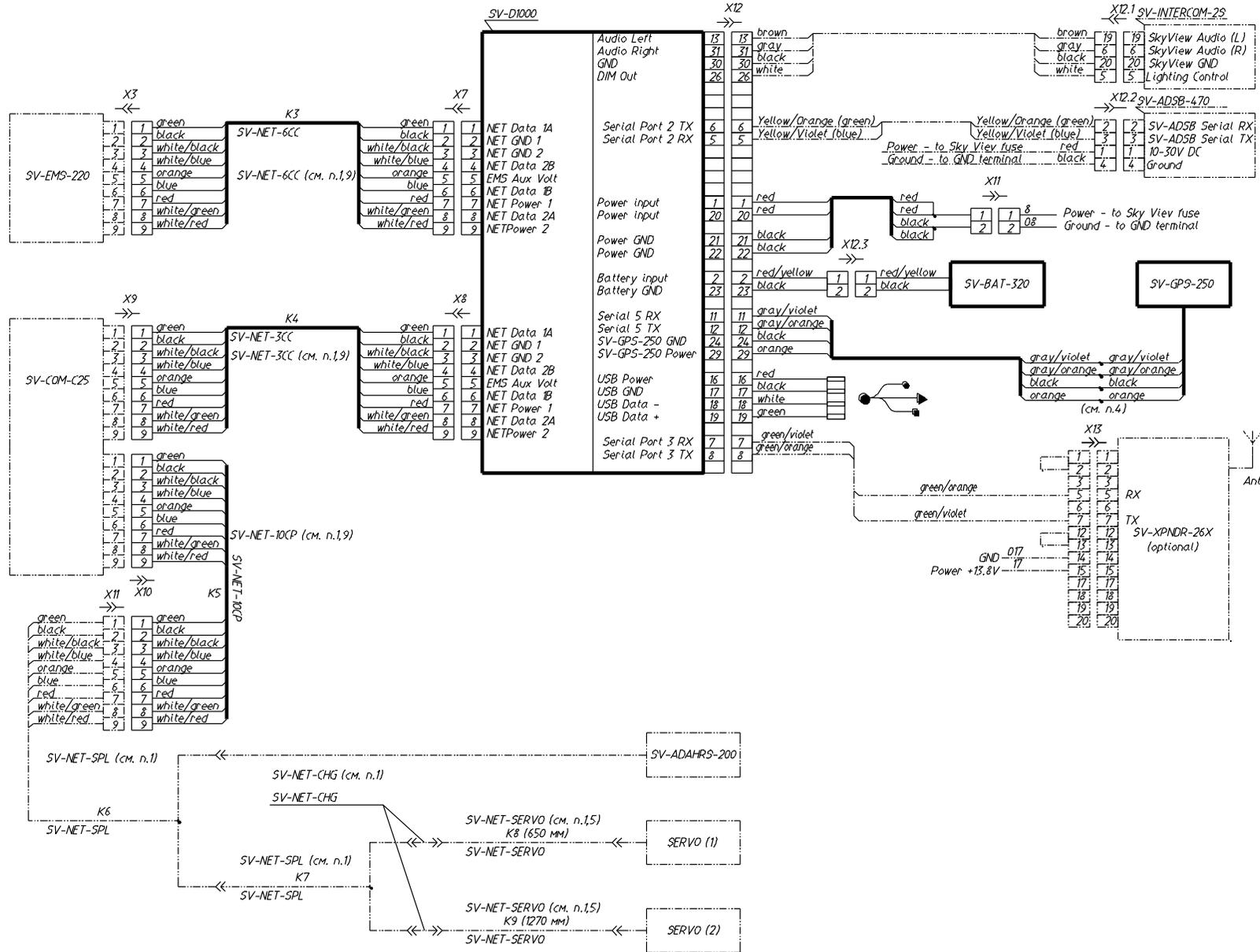


Fig. 5. Wiring diagram for installation of SV-D1000, SV-GPS-250, SV-BAT-320, SV-ADAHRS-200

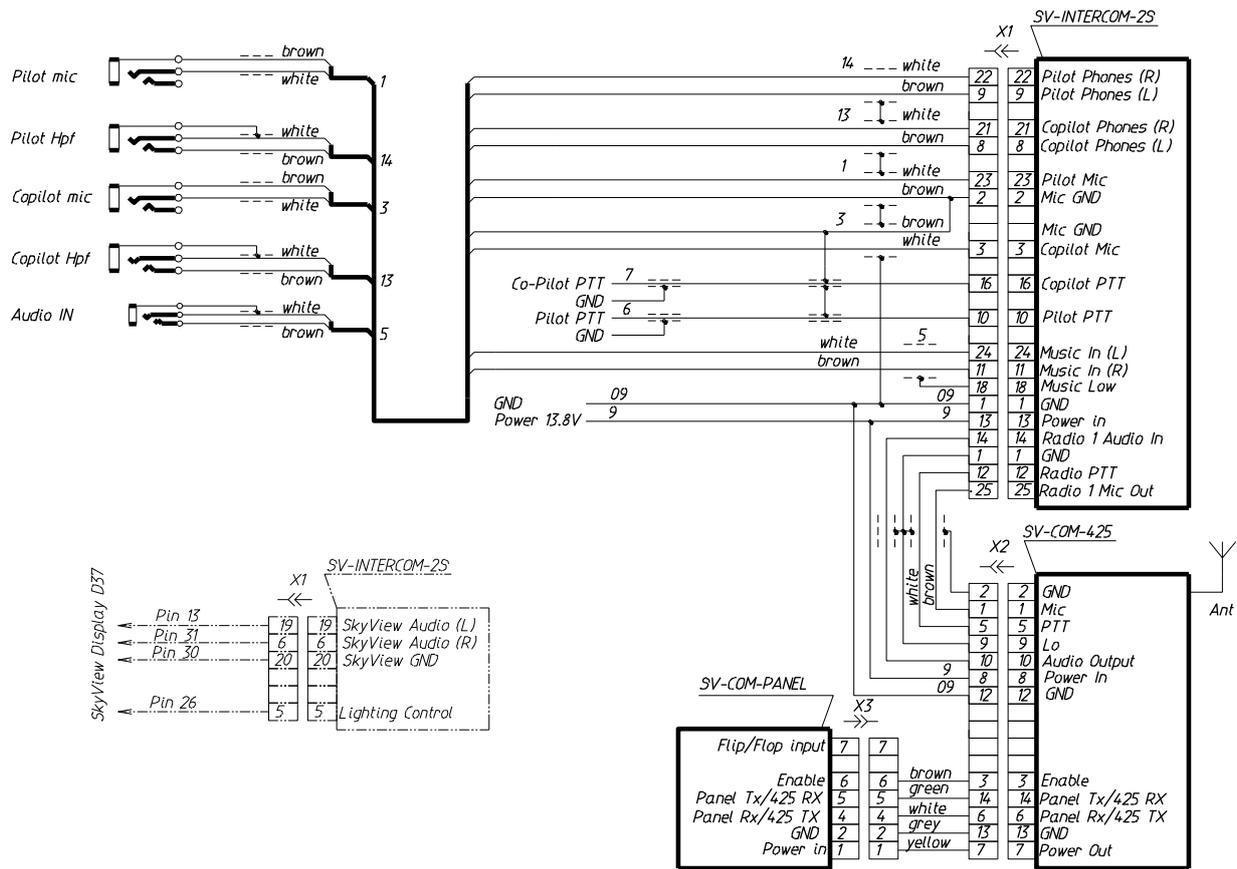


Fig. 6 Wiring diagram for Dynon SkyView radio

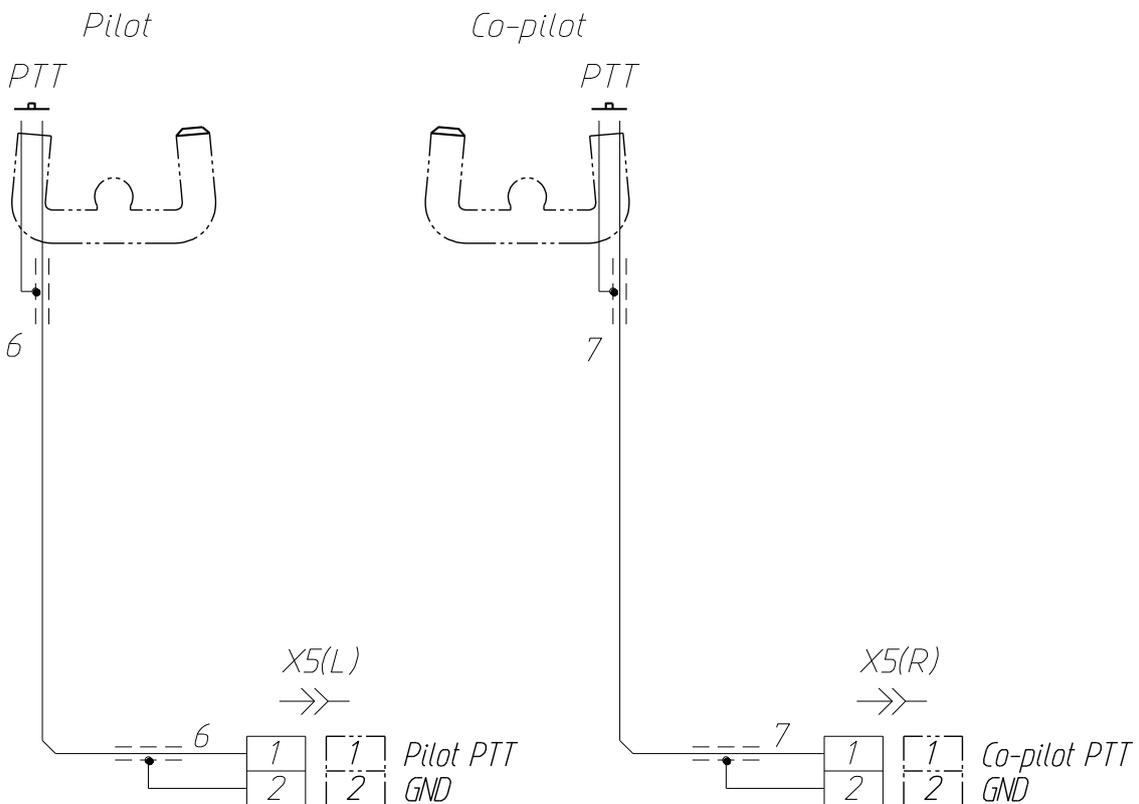
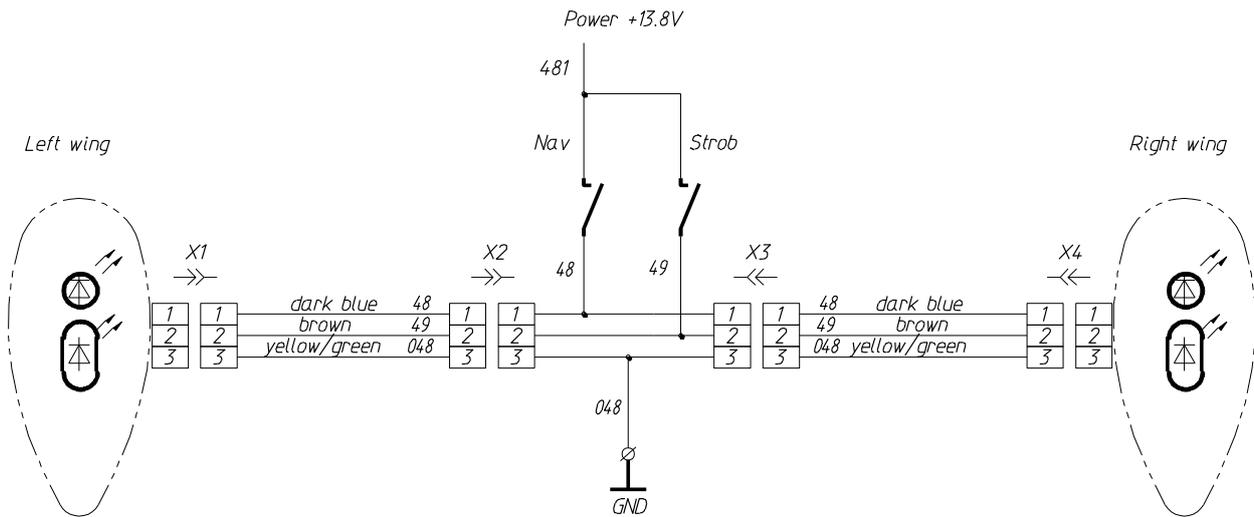


Fig. 7. Wiring diagram for installation of PTT and trimmer control button



**Fig. 8. Wiring diagram for installation of strobes**

## INSPECTION CHART

Part No.	Description	Interval	RCO	Instr. No.	TM	LC
-	Battery	100 h	OC	13.1	L	LRM
See Rotax P/N	Starter relay	100 h	OC	13.2	L	LRM
-	Power cables	100 h	OC	13.3	L	LRM
See Rotax P/N	Rectifier-regulator	100 h	OC	13.4	L	LRM
-	Condenser	100 h	OC	13.4		
-	Warning light	100 h	OC	-	L	OWN
-	Master switch	100 h	OC	-	L	OWN
-	Ignition switches, 2 pcs.	100 h	OC	-	L	OWN
-	Consumer switches	100 h	OC	-	L	OWN
-	Fuse block	100 h	OC	13.5	L	LRM
-	Fuses	100 h	OC	13.5		
-	Fuel level sensors, 2 pcs.	200 h	OC	13.6	L	LRM
-	Fuel level indicators, 2 pcs.	200 h	OC	13.6		
-	Landing light	100 h	OC	13.7	L	LRM
-	Engine instruments	100 h	OC	13.8	L	LRM
-	Main harness	100 h	OC	13.9	L	LRM
-	Harness for engine instruments	100 h	OC	13.10	L	LRM

**Instructions:**

1.47 Replace the battery when it does not charge or discharge properly. Keep the battery terminals clean; do not allow corrosion to appear on its surfaces.

**Recommended special tools:** none.

**Necessary parts/materials:** none.

1.48 Inspect terminals and connector of the starter relay for corrosion and clean them if necessary.

**WARNING!** To prevent starter from inadvertent engagement or short circuit switch OFF the ground switch (if installed) or disconnect one of the power cables from the battery.

Make sure the relay and cables connected to it are attached reliably.

**Recommended special tools:** none.

**Necessary parts/materials:** none.

1.49 Inspect the terminals of the power cables connecting the battery to the starter and airplane ground for corrosion and damage at cable terminations. If necessary clean the terminals from corrosion. Bad contact will cause cable overheating and difficult engine start.

If the cables are damaged, contact manufacturer for the required technical support.

**Recommended special tools:** none.

**Necessary parts/materials:** none.

1.50 Inspect terminals and connectors for corrosion and clean if necessary.

**Recommended special tools:** none.

**Necessary parts/materials:** none.

1.51 Remove the fuse block cover. Take out the fuses and inspect their sockets. If corrosion is detected the fuses and sockets must be cleaned. After servicing put in place the fuses and fuse block cover.

**Recommended special tools:** none.

**Necessary parts/materials:** none.

1.52 Verify correctness of the fuel level indicators' readings. For that do the following:

- close the fuel valves;
- fill a fuel tank fully (45 l or 11.9 US gal);
- switch ON the master switch;
- open the valve of the full fuel tank;
- drain fuel through the drain valve and compare the fuel level indicator readings against the fuel remaining in the tank:

45 l (11.9 US gal) – «4/4»

22.5 l (5.9 US gal) – «1/2»

6 l (1.6 US gal) – “reserve fuel remains” light ignites

1 l (0.3 US gal) – «0»;

**WARNING!** Be careful while working with the fuel system, the fuel is highly fire-hazardous.

- switch OFF the master switch;
- perform the check of the other fuel level sensor and indicator;  
If the “reserve fuel remains” light does not ignite it must be replaced. If after replacement the light still does not ignite, contact the manufacturer for the required technical support.

If at «4/4» and «1/2» readings the remaining fuel differs from the reading for more than 5 l (1.3 US gal) and the fuel remaining at ignition of “reserve fuel remains” light differs for more than 2 l (0.5 US gal), contact the manufacturer for the required technical support.

**Recommended special tools:** none.

**Necessary parts/materials:** none.

1.53 Remove top cowling. Check torque of the screws attaching the landing light and tighten it if necessary using Loctite 222.

Check landing light functioning and replace the lamp if necessary.

**Recommended special tools:** none.

**Necessary parts/materials:** none.

1.54 Inspect the terminals and connectors of the sensors for corrosion and clean if necessary.

**Recommended special tools:** none.

**Necessary parts/materials:** none.

- 1.55 Remove top cowling. Inspect the electrical harness for damage (chaffing, broken wires). Restore damaged insulation by setting a piece of thermoshrinkable tube over it. Connect broken wires by soldering with following insulation of the soldered areas with thermoshrinkable tube.

Special attention must be paid to the areas where harness comes through the firewall and near the airbox.

After every 1000 hours of flight time the harness must be freed from its fixation inside the fuselage (cut the plastic cable tie fixing the harness and preventing the harness extraction and inspection) and moved carefully to 10-15 mm (0.4-0.6 in) away from its place for inspection. The abraded insulation of wires detected during the inspection must be restored by covering it with insulating tape or thermoshrinkable tubing. After that put the harness in its place and fix with plastic cable ties.

Check the integrity of the protective rubber insert in the area where harness passes close to the airbox and replace the insert if necessary.

**Recommended special tools:** heat gun, soldering iron.

**Necessary parts/materials:** thermoshrinkable tube, soldering alloy, cable ties.

- 1.56 Remove the top cowling. Inspect the electrical harness for damage (chaffing, broken wires). Restore damaged insulation by setting a piece of thermoshrinkable tube over it. Connect broken wires by soldering with following insulation of the soldered areas with thermoshrinkable tube.

Inspect the terminals and connectors of the sensors for corrosion and clean if necessary.

**Recommended special tools:** heat gun, soldering iron.

**Necessary parts/materials:** thermoshrinkable tube, soldering alloy, cable ties.

## 14 Cockpit heating system

Cockpit heating system of A-32 airplane consists of air tunnel (where the water and oil radiators are installed), two warm air ducts, two warm air shutters which are kinematic linked to the air throttle, and its actuator. The control handle of the actuator (No. 4 on Fig. 9) is located in the right-upper corner of the lower instrument panel. The throttle actuator comprises a thick wire and a flexible conduit.

When cockpit heating handle is in the "OFF" the throttle is positioned along air tunnel and air shutters are full closed. Warm air is not getting into the cockpit. When cockpit heating handle is in the "ON", the throttle closes outlet of the air tunnel, opens the air shutters with two linkage and warm air is going into the cockpit via two air ducts and windows in the firewall.

### INSPECTION CHART

Part No.	Description	Interval	RCO	Instr. No.	TM	LC
A32-1-214010-00-000	Air tunnel	200 h	OC	14.1	L	OWN
A32-1-214011-00-000	Air throttle	200 h	OC	14.2	L	LRI
A32-1-214021-00-000	Air throttle actuator	200 h	OC	14.3	L	LRM

#### Instructions:

1.57 Remove the top and bottom engine cowling. Inspect air tunnel for fatigue cracks, deformation, loose rivets, as described in 1.1 (paragraphs 2 and 3). Check the torque of the screws attaching the air tunnel to the firewall. Tighten if necessary.

**Recommended special tools:** magnifying glass, electric torch.

**Necessary parts/materials:** none.

1.58 Remove the top and bottom engine cowling. Set the throttle actuator in the "OFF". Make sure that the throttle is aligned with upper wall of the air tunnel, so that its outlet is full opened while the shutters are full closed. Adjust the actuator cable with the throttle bellcrank if necessary.

**Recommended special tools:** electric torch.

**Necessary parts/materials:** none.

1.59 Remove the top engine cowling. Check the condition of the air shutter actuator in the engine compartment and in the cockpit (remove the instrument panel if necessary).

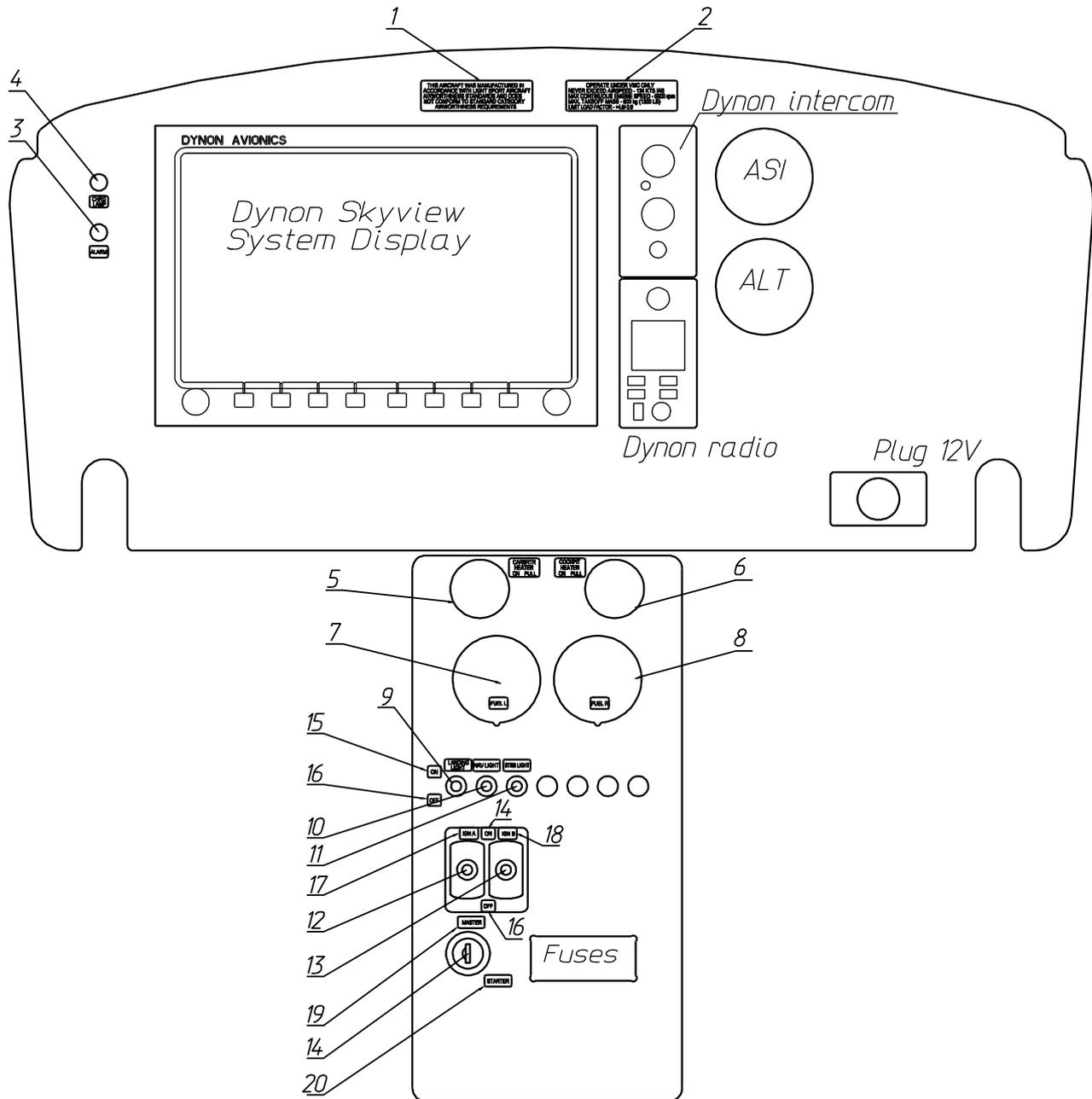
**Recommended special tools:** electric torch.

**Necessary parts/materials:** none.

## 15 Instruments and Avionics

Instrument panel is shown on Fig. 9 below. The list of instruments and avionics are installed in the airplane is in subsection 1.2 Equipment list.

The instruments and avionics of A-32 are located on the main and additional (lower) instrument panels in the cockpit.



**Fig. 9 Instrument panel**

Numbers in **Fig. 9** denote the following:

1. Placard with passenger warning: "THIS AIRCRAFT WAS MANUFACTURED IN ACCORDANCE WITH LIGHT SPORT AIRCRAFT AIRWORTHINESS STANDARDS AND DOES NOT CONFORM TO STANDARD CATEGORY AIRWORTHINESS REQUIREMENTS"

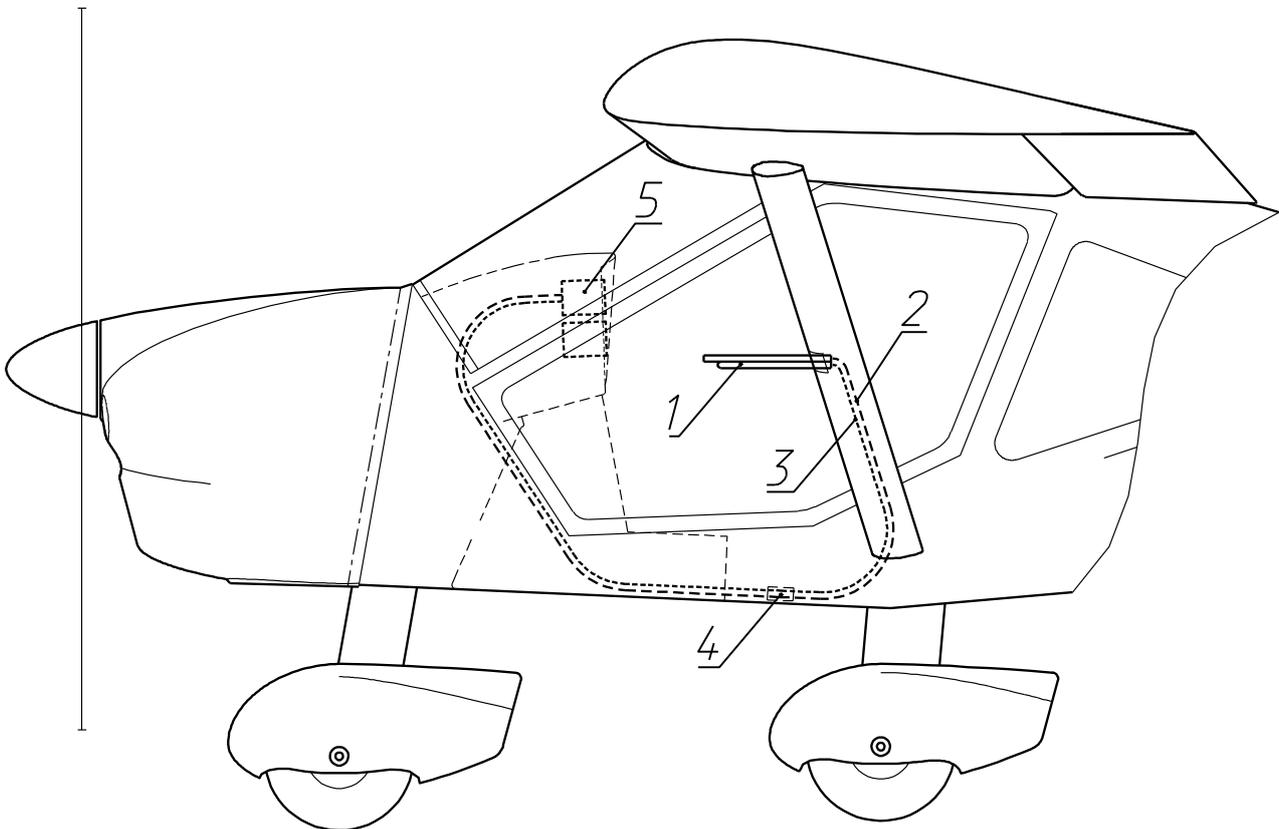
2. Placard with operating limitations: OPERATE UNDER VFR ONLY  
NEVER EXCEED SPEED = 124 KTS IAS  
MAX CONTINUOUS ENGINE SPEED = 5500 RPM  
MAX TAKEOFF MASS = 600 KG (1320 LB)  
LIMIT LOAD FACTOR = +4.0 / -2.0
3. NO CHARGE indicator and marking
4. ALARM indicator and marking
5. Carburetor heating control knob and marking
6. Cockpit heating control knob and marking
7. Left tank fuel level indicator and marking "FUEL R"
8. Right tank fuel level indicator and marking "FUEL L"
9. Landing light marking and switch
10. Navigation lights switch and marking
11. Strobe lights switch and marking
12. IGN A switch
13. IGN B switch
14. Master and starter key
15. ON marking for electric and ignition switches
16. OFF marking for electric and ignition switches
17. IGN A marking
18. IGN B marking
19. Master marking
20. Starter marking

## 16 Full and static pressure system

The full and static pressure system (see Fig. 10) supplies the full (dynamic) and static pressure of the outside air to the instruments measuring the flight parameters: airspeed, rate of climb and altitude. The system consists of the full and static pressure probe (1) and full (2) and static (3) pressure lines connecting the probe to the instruments. Full and static pressure lines have joints (4) for disconnecting the lines when the left wing is removed during aircraft disassembly.

The full and static pressure probe (1) is located on the left wing strut. The full and static pressure lines are connected to the airspeed indicator. The altimeter and vertical speed indicator are connected to the static pressure line.

Good condition of the full and static pressure system is important for correct measurement of the flight parameters and therefore for flight safety. Pilots must take all measures necessary to keep the system in good condition. During the preflight check pilot must remove the cover from the full and static pressure probe and inspect the probe and lines to make sure that they are not damaged or blocked (by water, ice, dirt, etc.). After flight pilot must put the cover back on the probe.



**Fig. 10 Full and static pressure system**

Maintenance and repair of the instruments together with the full and static pressure system and avionics consists in periodic checks of its operation and replacement of the components that failed.

## INSPECTION CHART

Part No.	Description	Interval	RCO	Instr. No.	TM	LC
-	Switches	100 h	OC	15.1	L	LRM
-	Lights	100 h	OC	15.2	L	LRM
-	Instruments and avionics	100 h	OC	15.3	L	LRM
-	Full and static pressure system	100 h	OC	15.4	L	LRM

**Instructions:**

1.60 Switch on the master switch. Check operation of the switches, by switching them ON one by one. Replace the ones that are not functioning properly. To replace a switch detach the lower panel, remove the switch and replace it for a new one of the same model/type. Put the panel in place.

**Recommended special tools:** none.

**Necessary parts/materials:** none.

1.61 Switch on the master switch. Check operation of the lights. Replace defective ones. To replace a light detach the main instrument panel to get access to the light to be replaced. After replacing the light put the instrument panel in place and fix it properly with its attaching screws.

**Recommended special tools:** none.

**Necessary parts/materials:** none.

1.62 Inspect the instrument panel, make sure that arrows of analog instruments are set to zero. Switch on the master switch. Check indications of the electronic instruments. If necessary start the engine and check if the instruments are functioning properly. If an instrument is defective replace it. To replace the instrument detach the instrument panel to which it is fixed and move it to get access to the instrument to be replaced. Take care not to damage any wiring behind the instrument panel. If necessary cut the plastic cable ties, disconnect and put carefully aside the cables that do not allow removal of the instrument to be replaced. Replace the instrument and fix the electric cables with cable ties to hold them away from the movable parts of the flight control system. Put the instrument panel in place.

**Recommended special tools:** none.

**Necessary parts/materials:** none.

1.63 Inspect the Pitot tube. Check condition of the full and static pressure lines and of their joints in the cockpit. The lines must be intact and have no water, dirt or any foreign objects trapped inside. Replace damaged lines. To remove water, dirt or foreign objects from the lines disconnect the lines from the instruments and clean them with compressed air.

**Recommended special tools:** none.

**Necessary parts/materials:** none.

## 17 Pilot seats and harness belts

The pilot seats of A-32 airplane are adjustable (they have 4 fixed settings) with pivoted seatback and consist of an aluminum framework and a cushion.

The harness system is of four-point type. It consists of two sets of harness belts.

### INSPECTION CHART

Part No.	Description	Interval	RCO	Instr. No.	TM	LC
A32-0-251121-00-000	Pilot seat frameworks, 2 pcs.	100 h	OC	17.1	L	LRM
A32-0-251122-00-000	Pilot seatback frameworks, 2 pcs.	100 h	OC	17.1	L	LRM
A32-0-251123-00-000	Pilot seat cushions, 2 pcs.	100 h	OC	17.2	L	OWN
A32-0-251400-00-000	Harness belts set, 2 pcs.	100 h	OC	17.3	L	LRI

#### Instructions:

1.64 Remove the cushions from the seat framework. Inspect the framework for the fatigue cracks and loose rivets.

Upon detecting cracks with length less than 10 mm (0.4 in) stop the crack propagation by drilling carefully a Ø3 mm (0.12 in) hole at its end. If the crack is longer than 10 mm (0.4 in), the framework must be replaced (repaired). To obtain the instructions on repair of the framework contact the manufacturer.

If loose rivets are detected they must be replaced. For that do as follows:

- remove the pilot seat framework;
- remove the cores from the loose pop-rivets;
- drill out the rivets with a Ø3 mm (0.12 in) drill;
- install new Ø3×6 rivets;
- install the seat framework in place.

If no defects are detected install the seats back. Apply Loctite 222 on the thread of the attaching bolts.

**Recommended special tools:** electric drill, Ø3 mm drill.

**Necessary parts/materials:** Ø3×6 rivets, Loctite 222.

1.65 Inspect the seat cushions for damage of the upholstery and repair it if necessary.

**Recommended special tools:** none.

**Necessary parts/materials:** none.

1.66 Check functioning of the harness belts' locks. For that apply a 300 N (67 lb) tension to the waist belts. The lock must not unlock spontaneously under the load. Otherwise the lock must be replaced.

Inspect the belts for damage (cuts, chaffing). Upon detecting any damage contact the manufacturer for the required technical support.

**Recommended special tools:** none.

**Necessary parts/materials:** none.

## 18 Cockpit doors

The cockpit doors are made in form of a PVC glass on a fiberglass framework. The doors may be fitted optionally with locks. The doors are retained in their open position with a gas strut. The forward part of each door is fitted with a ventilation air scoop.

The doors can be removed quickly. To remove the doors do the following:

- while holding the door open detach the gas strut from fuselage (remove the securing clamp and move the strut away);
- while holding the door outside remove the pins from the door hinges (first the aft than the front one);
- remove the door.

To install the door repeat above actions in the reversed order.

### INSPECTION CHART

Part No.	Description	Interval	RCO	Instr. No.	TM	LC
A32-0-521000-00-001	Door, right	100 h	OC	18.1	L	LRI
A32-0-521000-00-002	Door, left	100 h	OC	18.1		
-	Gas struts, 2 pcs.	100 h	OC	18.2	L	LRI

#### Instructions:

1.67 Inspect the door glass as described in 1.2.

Inspect and if necessary replace the door sealing. To do that carefully clean the door from the old sealing and fix the new one.

**Recommended special tools:** none.

**Necessary parts/materials:** none.

1.68 Check the functioning of the gas strut. Its cylinder rod must move smoothly and without jamming. The gas strut must retain the door in open position. If not than the gas strut must be replaced.

**Recommended special tools:** none.

**Necessary parts/materials:** none.

## 19 Recovery system

A-32 airplane can optionally be equipped with a parachute recovery system for the maximum take-off weight of 600 kg (1320 lb).

The recovery system is installed behind the luggage container. The system actuation handle is installed on the panel between the pilot seats.

The system suspension cables are fixed to fuselage in three locations (at firewall and near the rear attachment points of the wings).

System servicing must be performed in accordance with the current documentation of the recovery system manufacturer.

**WARNING!** Before any servicing of the system install the safety pin into its actuation mechanism.

### INSPECTION CHART

Part No.	Description	Interval	RCO	Instr. No.	TM	LC
-	Container with parachute	*		-	L	TSP
-	Actuation handle with cable	*		-	L	TSP
A32-0-950001-00-000	Suspension cable, front	500 h	OC	19.1	L	LRI
A32-0-950002-00-000	Suspension cable, right	500 h	OC	19.1		
A32-0-950002-00-000	Suspension cable, left	500 h	OC	19.1		

\* see Maintenance Manual of the respective recovery system

#### Instructions:

1.69 Check attachment of the suspension cables to the parachute lanyard and to fuselage structure. If necessary, replace the plastic cable ties fixing the cables.

**Recommended special tools:** none.

**Necessary parts/materials:** none.

## 20 Structural repair

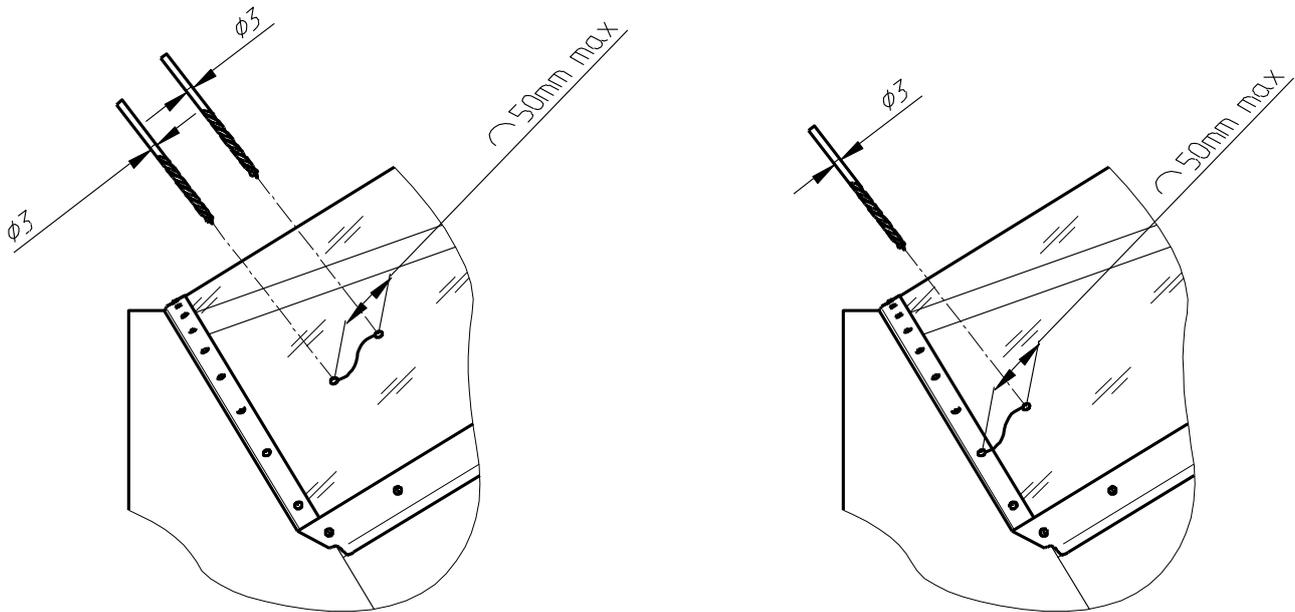
### 20.1 General

This section describes the repairs that can be performed by aircraft owners, LSA repairmen or aircraft and powerplant mechanics without further consultation with the aircraft manufacturer. However when planning to perform the particular repair work it is recommended to consult the aircraft manufacturer in order to verify that the necessary repair was correctly identified and properly prepared. Before commencing to perform the repairs described in this section study carefully this section and prepare all necessary tools, parts and materials. Make sure that the level of certification requirements are met. In case of doubt consult your local dealer or aircraft manufacturer.

### 20.2 Fuselage glazing repair

Fuselage glazing (windscreen, door glass, rear windows) is fragile and prone to cracking due to internal stress, vibration, shock loads and other factors that are likely to occur during aircraft operation. If any cracks in fuselage glazing were detected when performing the inspection or maintenance operations described in this manual their propagation must be stopped by drilling the 3 mm holes at the crack ends as shown on Fig. 11 below.

Typically cracks start from the rivets attaching the glass to the framework (as shown on the right side of Fig. 11). In that case only one end of the crack has to be stop-drilled. In case of a crack is located away from the rivet holes then both ends of the crack must be stop-drilled (as shown on the left side of Fig. 11).



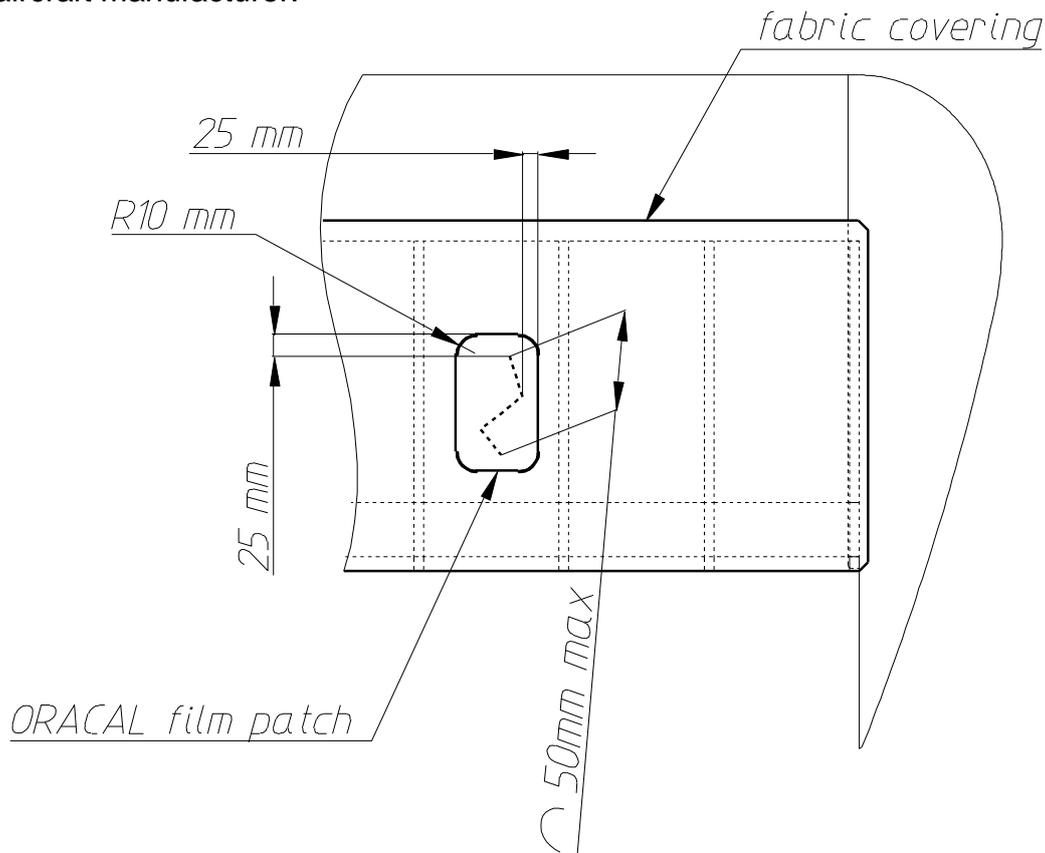
**Fig. 11 Fuselage glass crack stop-drilling**

**Note:** detailed instructions for inspection and repair are given in Section 3 (paragraph 3.2).

### 20.3 Fabric covering repair

The fabric covering of the wing, flaperons, elevator and rudder is soft and therefore it may be damaged accidentally in operation. If minor damage (holes, cuts or rupture of size less than 50 mm) of the fabric covering is detected during inspection it must be repaired by covering the damaged area with a patch of ORACAL permanent sticking film of suitable color, shape and size as shown on Fig. 12 below.

**WARNING:** this repair is allowed for fabric skin damage (holes, cuts, rupture, etc.) less than 50 mm in size and located away from the fabric covering edges and airframe parts to which the fabric covering is attached with adhesive. In case if the damage is greater than 50 mm in size or if the attachment of the fabric covering to airframe parts is damaged contact aircraft manufacturer.



**Fig. 12 Fabric covering repair**

This repair operation must be performed indoor (in the workshop or hangar) at a temperature not below 15°C for the film to stick properly to the fabric covering and dry air. Before repairing the fabric covering wash the damaged area from any contamination (dust, greasy stains, etc.) with a piece of soft cloth soaked with warm soapy water, then wipe away the water and soap with a clean wet cloth and let it dry. Cut a patch of ORACAL film of suitable color, shape and size and apply it on the damaged area so that the minimum distance from any edge of the damage to the patch edge is at least 25 mm as shown on Fig. 12. Apply the patch to the fabric covering evenly over entire damaged area without wrinkles and bubbles. Make sure that all patch edges stuck reliably to the fabric covering.

**Type of maintenance:** line.

**Level of Certification:** owner.

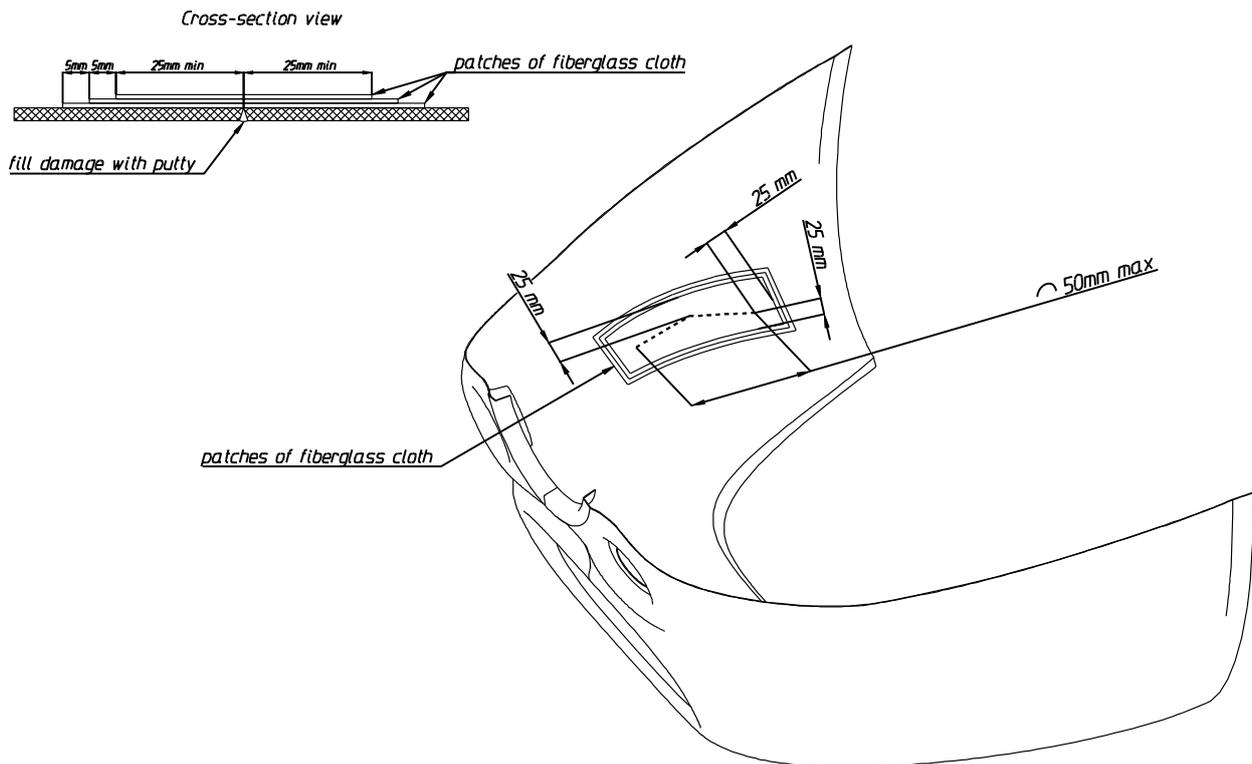
**Recommended special tools:** none.

**Necessary parts/materials:** ORACAL permanent sticking film.

## 20.4 Composite parts' repair

Some parts of the aircraft such as engine cowlings, wheel fairings, wing tips, fin tip, wing root fairings are made of composite materials. Those parts may be damaged in operation accidentally. If during inspection any damage of those parts such as cracks, dents, etc. is found it can be repaired as described below.

**WARNING:** this repair is allowed for the composite parts' damage (holes, cracks, dents, etc.) less than 50 mm in size and located away from the attachment points (bolt holes, quick-release locks, etc.). In case if the damage is greater than 50 mm in size or if the attachment of the composite parts to airframe is damaged contact aircraft manufacturer.



**Fig. 13 Composite parts repair**

Repair of damaged composite parts must be performed in a premise with temperature not below 15°C (for the epoxy resin to solidify properly) and some kind of air ventilation (for health protection). The composite part to be repaired must be removed from the airplane. The composite parts such as wing root fairings, wing tips, fin tip that are riveted to airframe structure can not be removed from the airplane and therefore must be brought into the repair premise together with the airframe component to which they are riveted (wing, fuselage).

After removing the composite part to be repaired clean and degrease the damaged area with soapy water and let it dry completely. Sand the damaged area from inside or from outside (if the inner surface of the part is inaccessible) with sand paper of a medium grain size and clean thoroughly the damaged area from dust and chips created by sanding. When sanding the outer surface of the parts with inaccessible inner surface (wing tips, wing root fairings) make sure to remove the paint from entire area where the repair patches will be applied later.

**WARNING!** use protective means (rubber gloves, respirator, protective glasses and clothes) when sanding or working with epoxy adhesive. Make sure the air in the working area is ventilated properly.

Cut several patches of fiberglass cloth of suitable shape and size that cover the damaged area as shown on Fig. 13 above (at least 25 mm to the damaged spot from any edge of the patch). The number of the patches should be such that the total thickness of the patches is approximately equal to the thickness of the repaired part in the damaged area. The size of each following patch should be slightly less to form a pack with gradual increase of the thickness at the edges as shown on Fig. 13.

Prepare the necessary amount of epoxy adhesive by mixing its components in proper ratio, impregnate the preliminarily cut patches of fiberglass cloth and apply them on the damaged area as necessary (inside or outside). Apply the patches evenly over entire damaged area without wrinkles and bubbles. Make sure that all edges of the patches stuck reliably to the part surface. Fill the cavities of the damaged spot (holes, dents, cracks) with putty made of the preliminarily prepared epoxy adhesive mixed with some powder filler.

After applying the patches over the damaged spot let the epoxy resin to solidify completely. Then sand the solidified patches to obtain a smooth surface and restore the damaged paint on the outer surface of the repaired part.

**Type of maintenance:** line.

**Level of Certification:** LSA repairman maintenance.

**Recommended special tools:** respirator, protective glasses, rubber gloves, sanding paper.

**Necessary parts/materials:** fiberglass cloth, epoxy adhesive, putty, paint.

## 20.5 Restoring of damaged paint/coating

It is recommended to restore the damaged paint/coating in a closed room with ventilation and temperature sufficient for the paint/coating to dry. The parts/components requiring restoring of the paint/coating must be removed from the airplane.

**WARNING!** use protective means (gloves, respirator, protective glasses and clothes) when sanding or painting. Make sure the air in the working area is ventilated properly.

Restoring of the damaged paint/coating shall be done as follows:

1. Remove the delaminated paint/coating in the damaged area and degrease the area using tissue and solvent.
2. Sand the damaged area using the sand paper with the grain of not bigger than R360.
3. Small scratches and nicks of paint/coating may be filled with nitro putty. Big scratches and nicks of paint/coating must be filled with polyether putty. Smooth the surfaces with dried putty using sand paper. Maximum layer of the putty should not exceed 1 mm.
4. Using a spray gun apply epoxy (for metal parts) or acrylic (for composite parts) primer on the damaged area.
5. When the primer is dry finish the surface with sand paper. If necessary apply cover with nitro putty again.
6. Remove the sanding dust and degrease the repaired area.
7. Cover undamaged surface of the part/component with paper/film and sticking tape.
8. Using spray gun apply the paint on the repaired area and let it dry.
9. When the paint is dry remove the protecting paper/film. Polish the repaired area if necessary.

**Type of maintenance:** line.

**Level of Certification:** LSA repairman maintenance.

**Recommended special tools:** respirator, spray gun, protective glasses and clothes, gloves, sanding paper.

**Necessary parts/materials:** tissue, solvent, epoxy or acrylic putty, paint, sticking tape, paper or polyethylene film.

