

AEROPRAKT SERVICE BULLETIN

No. SB A32-11

RELOCATION OF THE FUEL PUMP OF ROTAX 912 iS ENGINE ON A32 AIRCRAFT

Repeating symbols:

Please, pay attention to the following symbols throughout this document marking important information.

- ▲ **WARNING:** Identifies an instruction, which if not followed may cause serious injury or even death.
- **CAUTION:** Denotes an instruction, which if not followed, may cause severe damage.
- ◆ **NOTE:** Information useful for better handling.

Release date: 19.07.2021

Effective date: 19.07.2021

Completion date:

Superseded notice: none

Model: A32

Serial number(s) affected: A32 aircraft serial No. 129, 144, 147, 151, 153, 156, 163, 169, 171, 172, 176, 179, and 183

1) Planning information**1.1) Aircraft affected**

A32 aircraft serial No. 129, 144, 147, 151, 153, 156, 163, 169, 171, 172, 176, 179, and 183.

1.2) Reason

Experience of operation of A22LS and A32 aircraft with Rotax iS engine demonstrated that placing the fuel pump inside the engine compartment is possible, however it can, in hot climate conditions, cause certain problems with fuel supply to the engine. To prevent those problems it was decided to re-locate the fuel pump in A32 aircraft with Rotax 912 iS engine from the engine compartment to the cockpit where hot air cannot reach the pump.

1.3) Subject

Re-locating the fuel pump of Rotax 912 iS engine from the engine compartment to the cockpit.

1.4) Compliance

- Compliance with this Service Bulletin is obligatory for flight safety reasons!

1.5) Approval

The technical content of this Service Bulletin has been approved by Aeroprakt.

1.6) Manpower

Estimated work: modification according to the paragraph 3 can be done within 6 hours.

1.7) Mass data

Mass change – insignificant.

1.8) Revision of other documents

Section 7.6 “Fuel system” of the Pilot Operation Handbook shall read as follows:

The fuel system (see **Fig.3**) includes two wing fuel tanks 1 and 2 with filler inlets 3 and 4. Fuel comes from left and right fuel tanks via fuel lines 5 and 6 to double fuel valves 7 and 8, each opening/closing the feed and return line simultaneously. Then fuel is fed through fuel lines 9 and 10 to sediment separator 11. From the sediment separator through the fuel line 12, coarse filter 13 and then through the fuel line 14 the fuel is fed to inlet of the 1st (main) fuel pump 15 and then to the inlet of the 2nd (auxiliary) fuel pump 17. The 1st and 2nd fuel pumps together with the return valves 16 comprise a single module, located under the right pilot seat. From the outlet of the 2nd fuel pump the fuel is supplied with pressure via fuel line 18, then, through the fine fuel filter 19, to the rail injectors 21 of the cylinders 1 and 3. Then through the tube 22 – to the rail injectors 23 of the cylinders 2 and 4, outlet of which is joined with fuel pressure regulator 24. The fuel pressure regulator ensures constant fuel pressure in the range of 2.8-3.2 bar (42-45 psi) in rail injectors with regard to the air pressure in the intake manifold. From the outlet of the fuel pressure regulator the excessive fuel is returned through the low pressure return line 25 and T-connector to the fuel tank 1 or 2 through the fuel line 27 or 28 depending upon which of the fuel valves 7 or 8 is opened. Fuel pressure before the engine is controlled using the fuel pressure sensor 20, installed immediately after the fine filter 19. The fuel tanks have vent tubes 31 and 32 installed in the fuel tank inlet caps. Fuel can be drained from the tanks on the ground via the drain valve 29, handle of which is accessible outside fuselage.

	Standard	Optional
Capacity of tanks:	2×45 l (11.9 US gal)	2×57 l (2×15.05 US gal)
Total fuel capacity:	90 l (23.8 US gal)	114 l (30.1 US gal)
Total usable fuel:	88 l (23.3 US gal)	112 l (29.6 US gal)
Non-usable fuel:	2 l (0.5 US gal)	2 l (0.5 US gal)

CAUTION! If air gets to the fuel lines then starting the engine may take quite a long time (several dozens of seconds). For that reason it is strictly not allowed to empty completely any of the fuel tanks in flight.

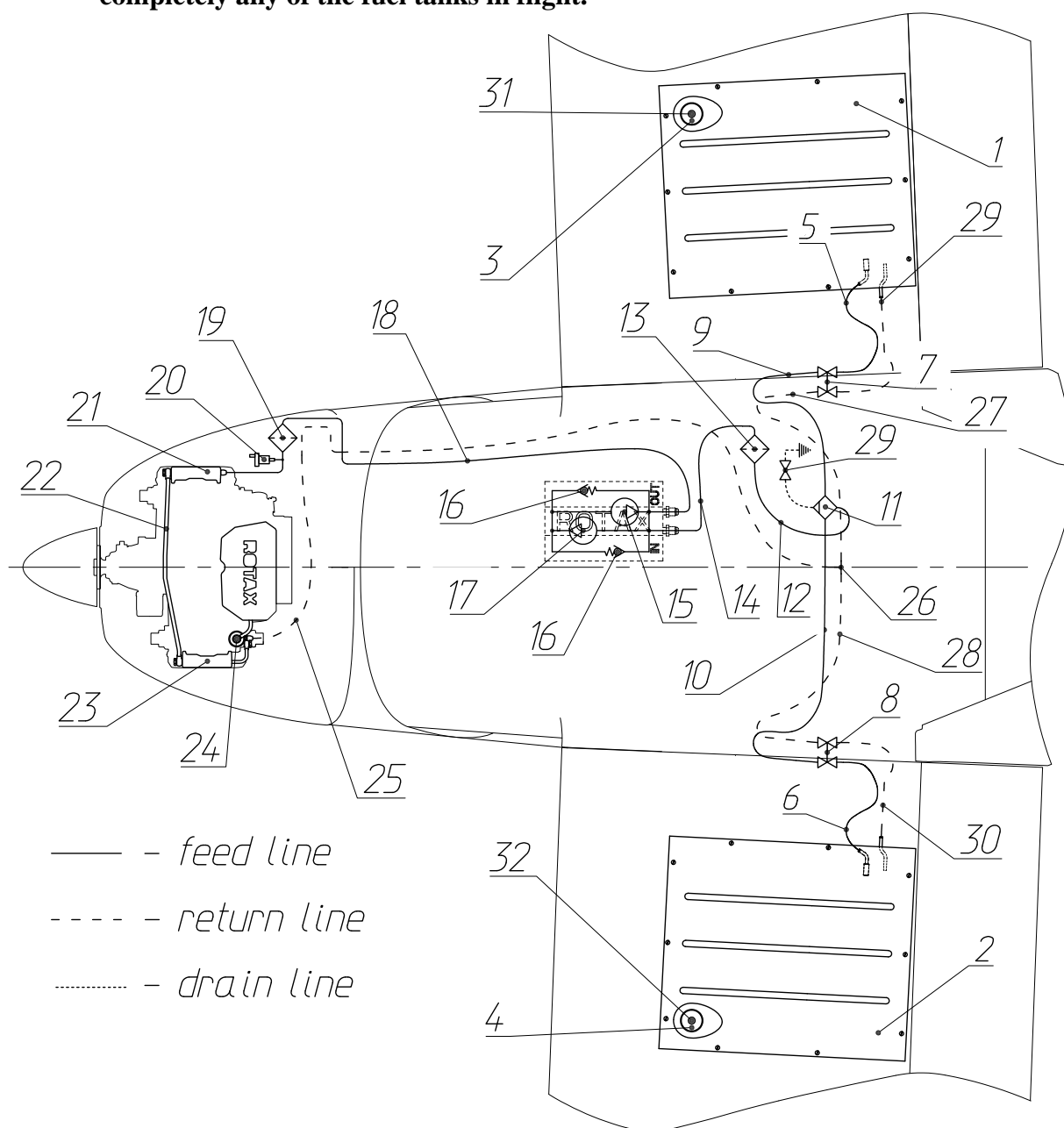


Fig. 3. Fuel system schematic

Fuel pressure: maximum permissible — 7 bar (101.5 psi);
 Fuel pumps: nominal voltage — 12 V;
 capacity — approx. 120 l/h (31.7 gal/h);
 pressure — min. 4.5 bar (65.3 psi) (absolute pressure).

Section 9 "Fuel system" of the Airplane Maintenance Manual shall read as follows:

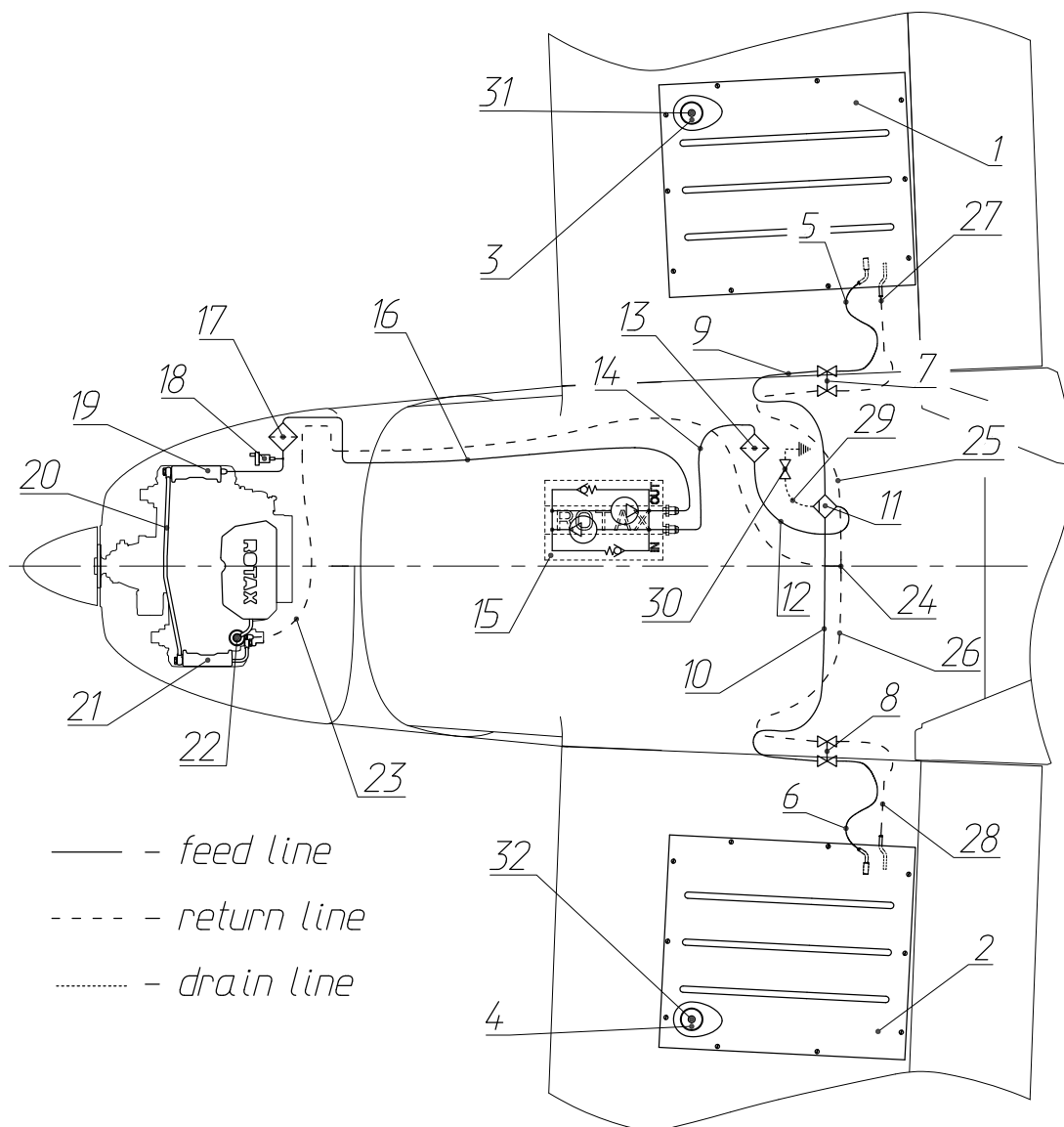


Fig. 2. Fuel system schematic

The fuel system (see **Fig. 2**) includes:

- two wing fuel tanks (1, 2) with filler inlets (3, 4);
- fuel lines d8 mm. (5, 6, 9, 10, 12, 14, 16, 23, 25, 26, 27, 28);
- two fuel valves (7, 8);
- sediment separator (11);
- coarse fuel filter (13);
- fuel pumps module (15);
- fuel pressure sensor (18);
- fine fuel filter (17);
- the tube (20);
- rail injectors (19, 21);
- pressure regulator (22);
- T-connector (26);
- drain fuel line d12 (29);
- drain valve (30);
- vent tubes (31, 32).

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

Description	Inspection interval	RCO	Service reference
Fuel tank, right	500 h	OC	9.1
Fuel tank, left	500 h	OC	9.1
Fuel valve x2	100 h	OC	9.2
Fuel pumps assembly.	1000 h	OC	9.7
Fuel line assembly between fuel pump and bulkhead adapter at the firewall	100 h	5 years /OC	9.6
Fuel line assembly from bulkhead adapter at the firewall to the fine fuel filter fitting	100 h	5 years /OC	9.5
Fuel line assembly between the fine fuel filter and engine	100 h	5 years /OC	9.5
Fuel line assembly (return line) between the engine and bulkhead adapter at the firewall	100 h	5 years /OC	9.5
Drain fuel valve	100 h	OC	9.2
Coarse fuel filter	100 h	200 h /OC	-
Fine fuel filter	-	200 h (first 100 h) / 2 years / OC	9.4
Connecting lines	100 h	5 years /OC	9.3

Instructions:

- 1.1 Drain fuel from the tanks.
- 1.2 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.
- 1.3 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.

- 1.4 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.

- 1.5 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 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: screwdriver.

Necessary parts/materials: none.

1.6 To replace the fine fuel filter do the following:

- verify that the high pressure fuel line has zero fuel pressure;
- close both fuel valves;
- remove the top and bottom engine cowlings;
- remove the hose connecting the engine with fuel filter;
- remove the fuel filter attachment clamp;
- disconnect the filter from the fuel pressure sensor attachment fitting;
- disconnect the connecting fitting between the filter and the hose;
- install the new filter in the reversed order. Replace the copper sealing rings with new ones. The tightening torque moment of filter attachment to the fuel pressure sensor fitting (M14×1.5 thread) – 21...27 Nm, for the connecting fitting of the hose (M12×1.5 thread) – 30...40 Nm.

Recommended special tools: screwdriver, torque wrench.

Necessary parts/materials: fuel filter.

1.7 Remove the top and bottom cowling. If necessary tighten the fuel line end nuts (M14×1.5 thread, UNF 9/16-18) in the following order:

A: Manual assembly with termination when force increases noticeable;

B: Tighten to seal 90° (1/4 turn).

Recommended special tools: none.

Necessary parts/materials: none.

1.8 Remove the right pilot seat. If necessary tighten the fuel line end nuts (M14×1.5 thread, UNF 9/16-18) in the following order:

A: Manual assembly with termination when force increases noticeable;

B: Tighten to seal 90° (1/4 turn).

1.9 Inspection of the fuel pumps:

- remove the right pilot seat;
- then follow instructions of the "Maintenance Manual for Rotax Engine Type 912 i Series "

Recommended special tools: none.

Necessary parts/materials: none.

1.9) Spare parts

The modification parts kit is supplied by local dealer.

2) Spare parts information

2.1) Spare parts price

The modification parts kit is supplied to the local dealer free of charge.

2.2) Special tools / primer

None

3) Accomplishment / Instructions

1. Drain the fuel completely from the aircraft fuel system.
2. Remove the top and bottom engine cowlings.
3. Disconnect the 3 fuel hoses (see photo 1).
4. Remove the fine fuel filter together with the fuel pressure sensor fitting, after disconnecting the sensor connector.
5. Re-install the fine filter, fuel flow direction upwards (see photo. 2). Do not tighten the clamps completely. Connect the fuel pressure sensor connector.

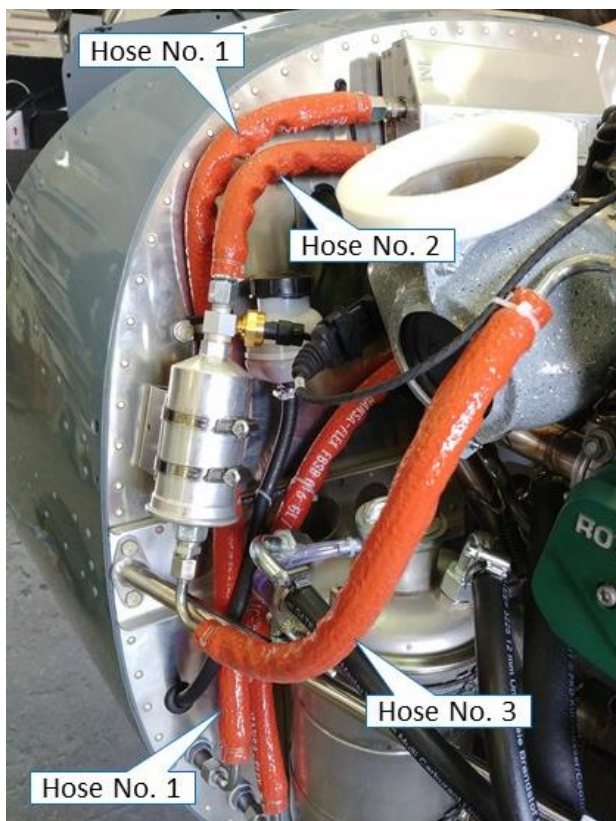


Photo 1



Photo 2

6. Remove the fuel pump cover by unscrewing 4 M5 screws. Disconnect the pump power cable and remove it together with the rubber seal. Remove the rubber seal.
7. Remove the fuel pump by unscrewing the 4 M6 screws from the inside of the engine frame (see photo 3).
8. Glue aluminium foil over the 4 M6 screw vacated holes in the firewall. See photo 4.
9. Remove the right pilot seat.
10. Remove the plastic ties attaching the rug to the cabin floor. Fold aside the rug on the right side to give access to the fuel lines.
11. Disconnect the return line with hose fitting from the bulkhead (firewall) fitting on the inner side of the firewall. Disconnect the feed fuel line with hose fitting from the bulkhead fitting. Remove both hose fittings from the feed and return lines. Remove the plastic ties fixing the fuel lines to fuselage structure on their entire length to landing gear beam. Take out the fuel lines from the go-through hole in the seat beam.

12. Using the template from the modification kit mark and enlarge with a suitable tool the go-through hole (see photos 5, 6).

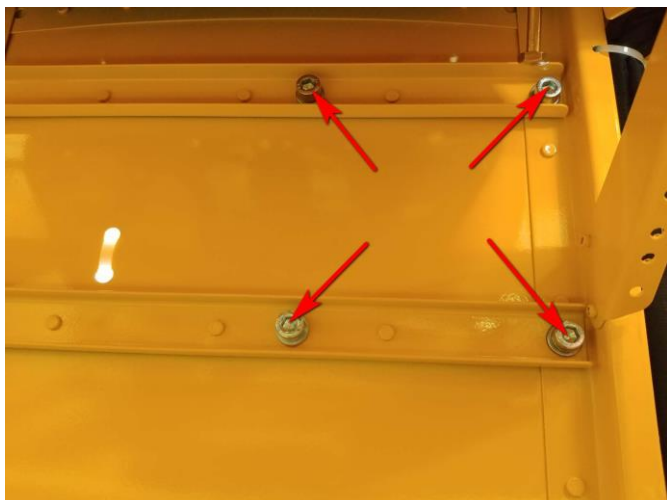


Photo 3

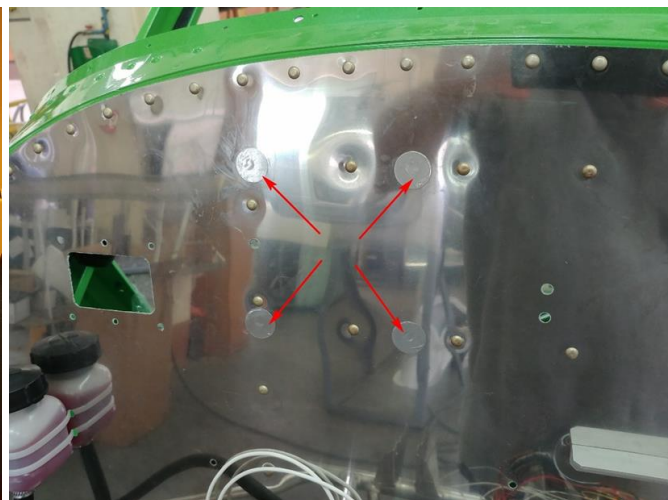


Photo 4



Photo 5



Photo 6

13. Install the doubler on the outer side of the cabin floor between the landing gear and seat beams (see photos 7, 8, 9, 10). Using the $\varnothing 4$ mm guide holes in the doubler make $\varnothing 6.1$ mm holes for the fuel pump attachment.
14. Make $\varnothing 4$ mm holes in the beam web under the right pilot seat (see photo 11).
15. Remove the grommet holders for engine electric cables from the firewall by undoing six 6-32 screws (see photo 12).
16. Put the grommet from the modification kit on the fuel pump power supply lines and pass the lines with the terminals inside the cockpit between the engine electric cables. Install the new grommet holders from the modification kit with six 6-32 screws. Fix the fuel pump power supply lines with the plastic cable ties to the engine electric cables (see photos 13, 14).
17. Install the two 105 mm long edge protectors from the modification kit as show on photo 15.
18. Pass the return fuel line along the longitudinal beam flange on the OUTBOARD side. Connect the line to the hose fitting using the Norma 8-16 screw clamp from the modification kit (see photo 16). Connect the hose fitting to the respective bulkhead fitting.

19. Pay special attention to the place shown on photo 17, ensure smooth bend of the return line without the hose kinking. Do NOT fix the return fuel line with a plastic tie to the longitudinal beam flange in this place.

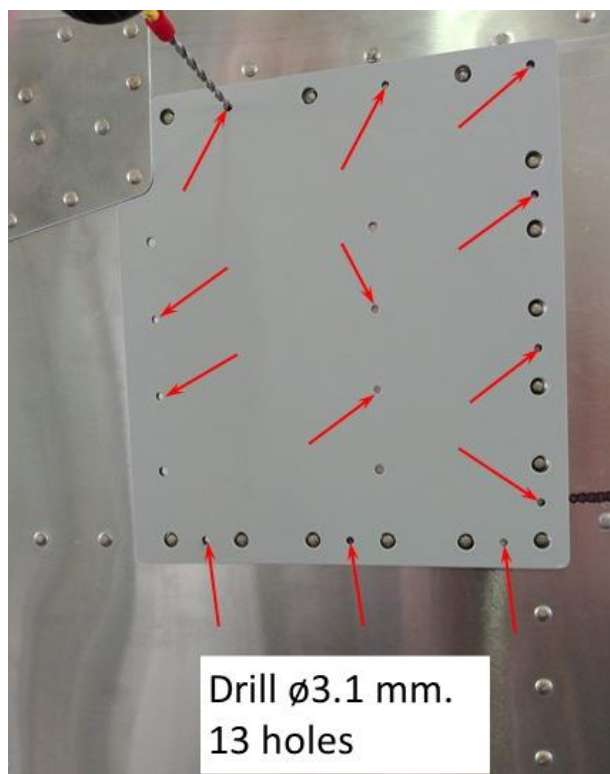


Photo 7

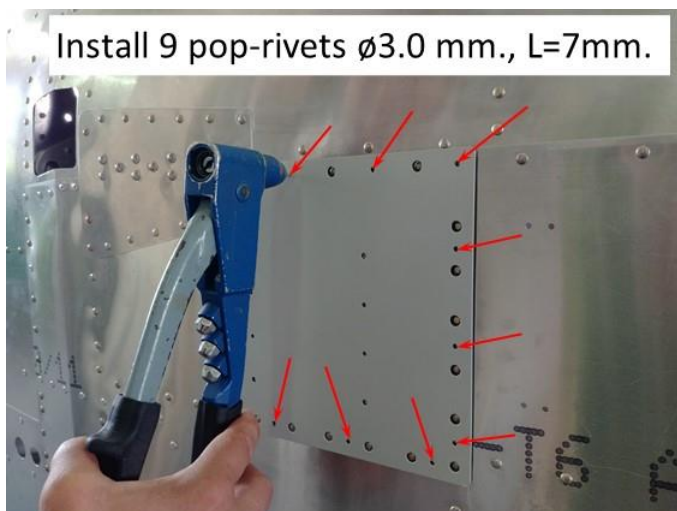


Photo 8

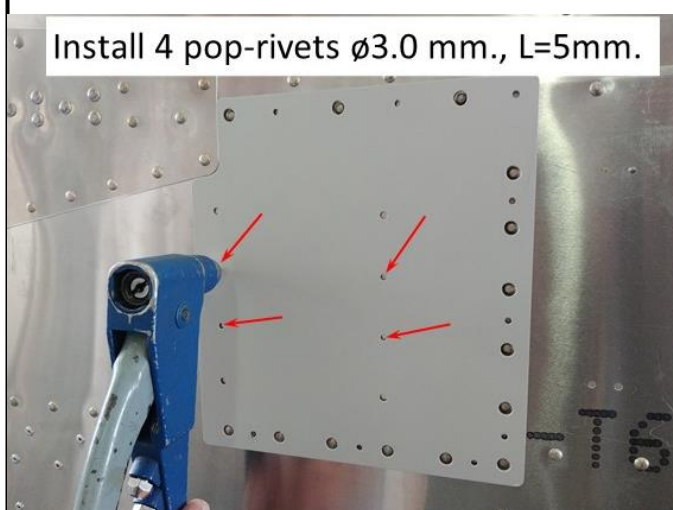


Photo 9

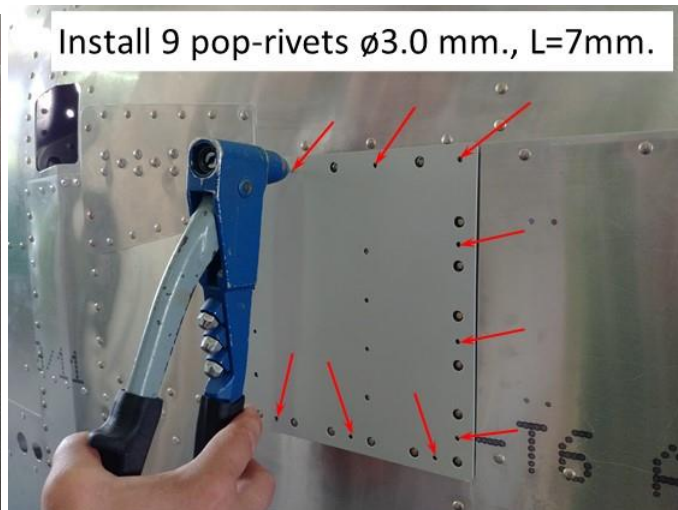


Photo 10

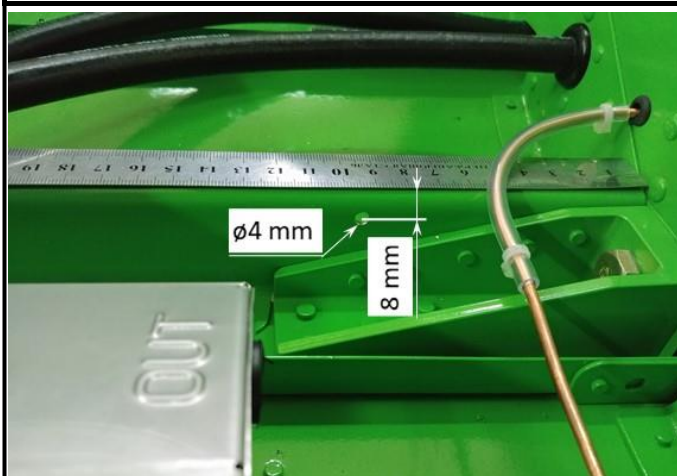


Photo 11

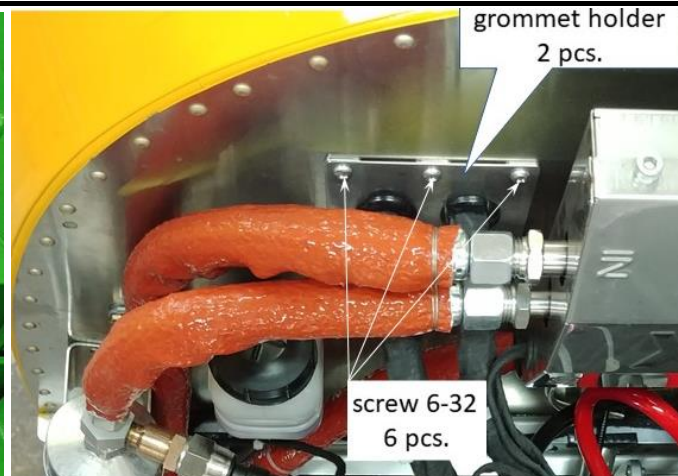


Photo 12

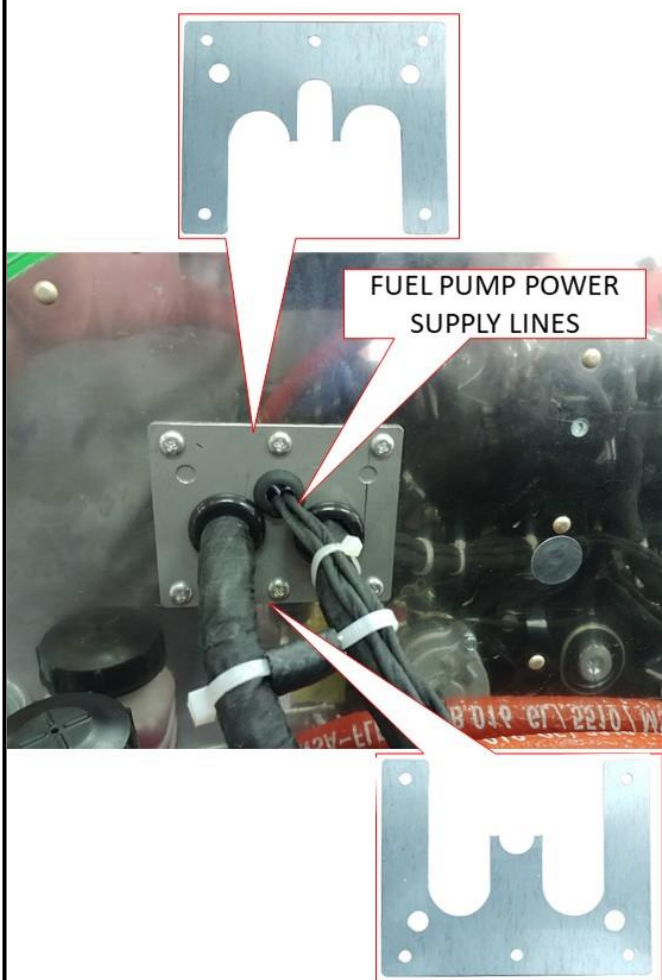


Photo 13



Photo 14

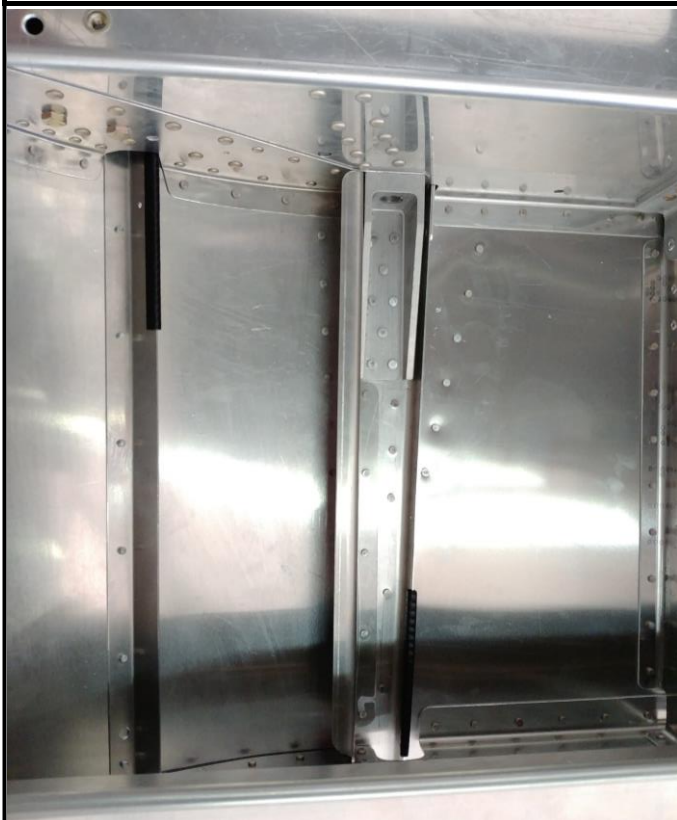


Photo 15

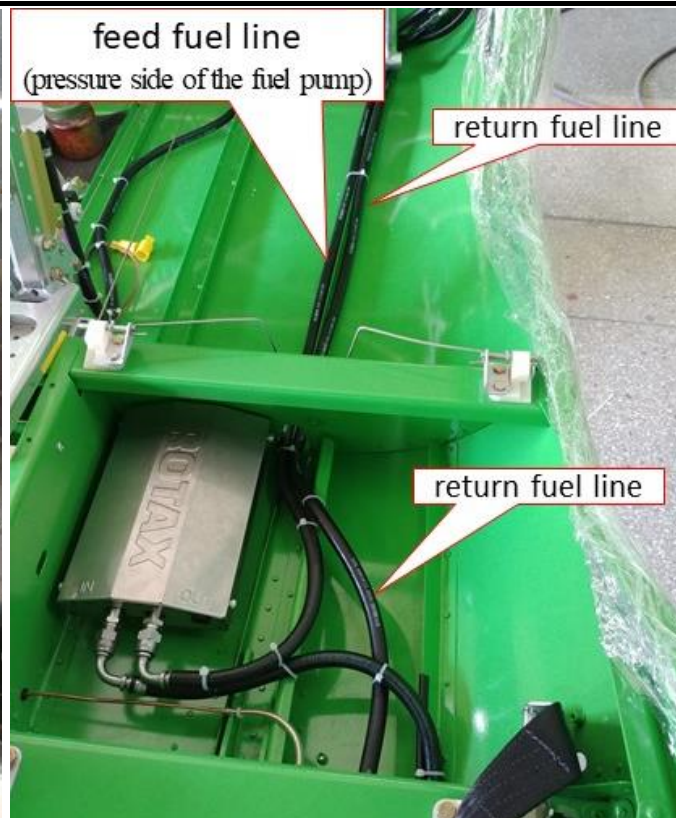


Photo 16

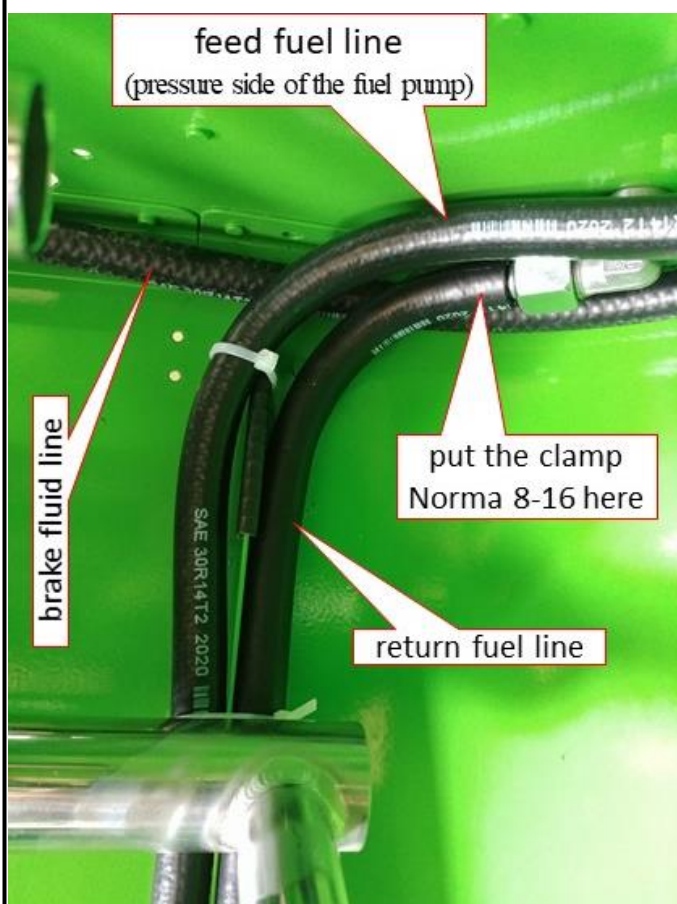


Photo 17

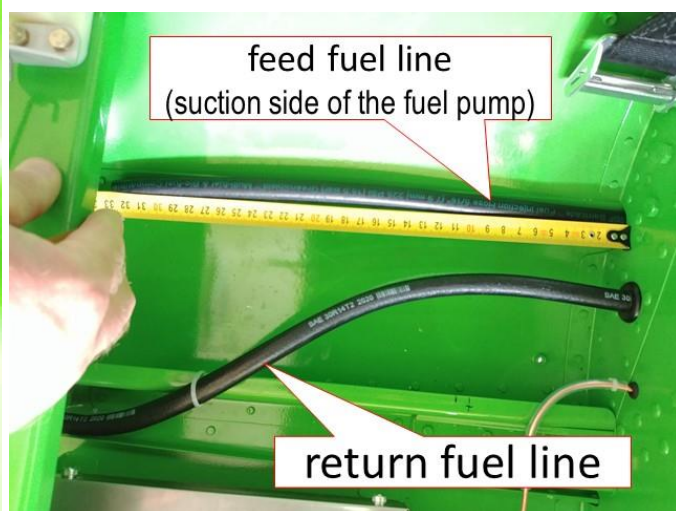


Photo 18

20. Cut the feed fuel line as shown on photo 18.

21. Connect the electric extender from the modification kit to the terminals of the fuel pump power supply lines. Put the rubber seal on the lines and insert the seal into the slot in the lower part of the pump case, put in place the case cover, tighten 4 M5 screws. Tightening torque 6 N×m. See photo 19.
22. Install the fuel pumps (with rubber shock absorbers) using 4 M6 screws (see photos 20, 21). Install the screws with Loctite 243.
23. Install the elbow hose fitting from the modification kit into the feed fuel line coming to the pump. Fix with Norma 8-16 screw clamp. The elbow fitting install on the pump intake (see photo 22).
24. Pass the high-pressure hose from the modification kit through the opening in the seat beam and lay it along the INBOARD side of the longitudinal beam flange from the pump outlet to the bulkhead fitting on the firewall. The elbow fitting connect to the pump outlet (see photos 23, 28).
25. Lay the electric extender of the fuel pump power supply lines along the return fuel line. Connect terminals of the extender to the terminals of the fuel pump power supply. Finally fix the fuel and electric lines with plastic ties to each other and to the fuselage structure (see photos 24-30).
26. Install the two high-pressure hoses in thermoresistant cover from the modification kit in the engine compartment as shown on photos 31-33. Finally tighten the two screw clamps of the fine fuel filter.
27. Make the engine ground test-run. Check for absence of fuel leakage in the fuel lines' joints.
28. Re-install the right pilot seat.



Photo 19



Photo 22



Photo 20



Photo 21

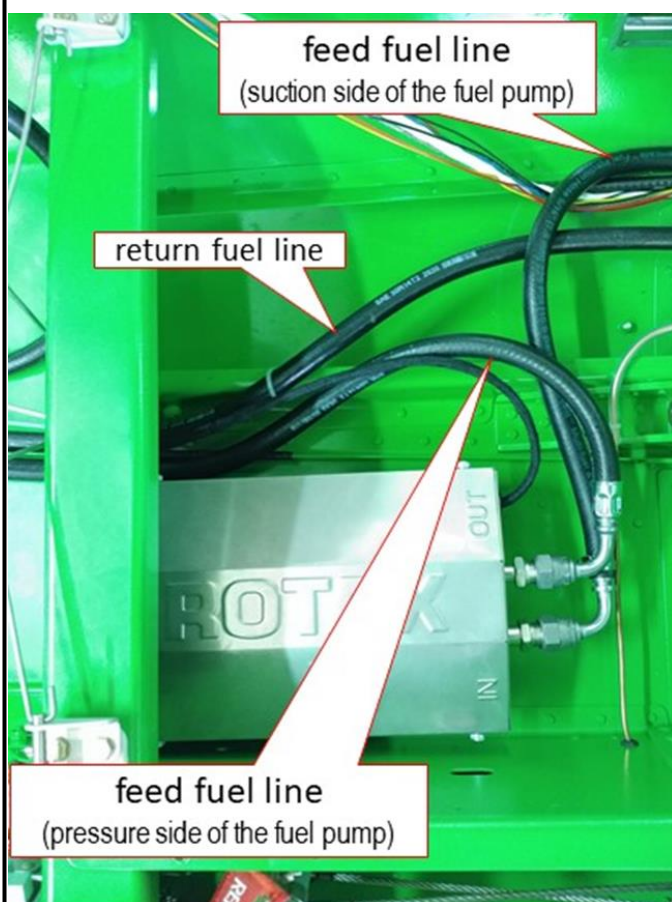


Photo 23



Photo 24



Photo 25



Photo 26

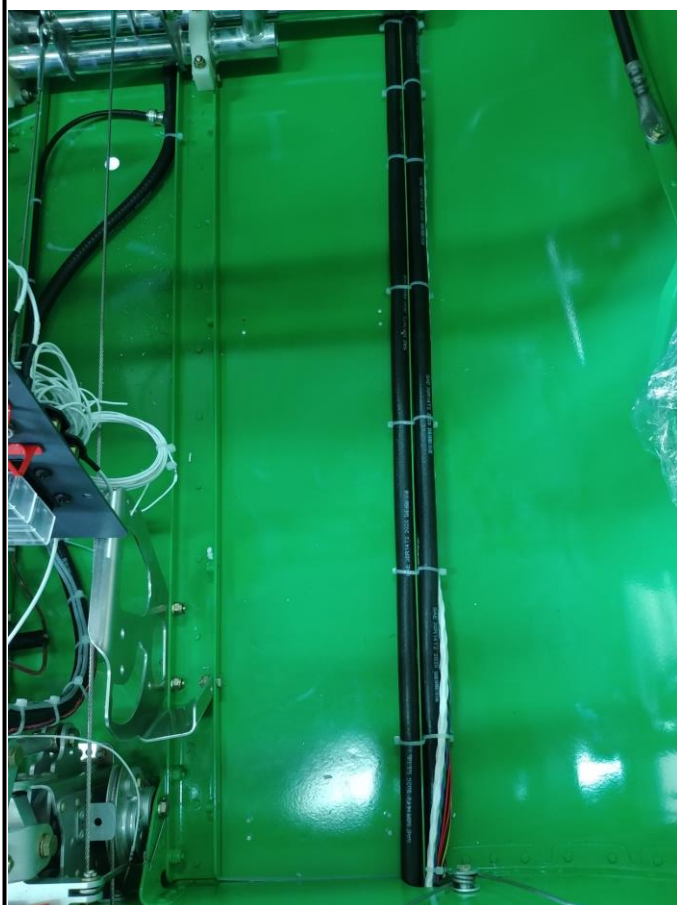


Photo 27

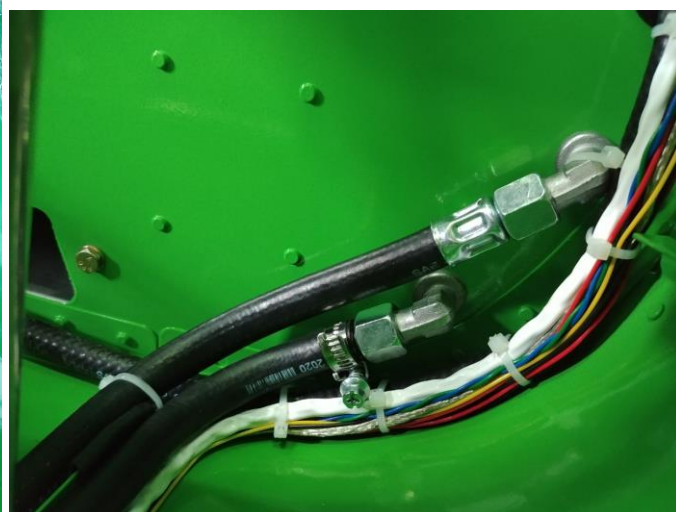


Photo 28



Photo 29



Photo 30



Photo 31

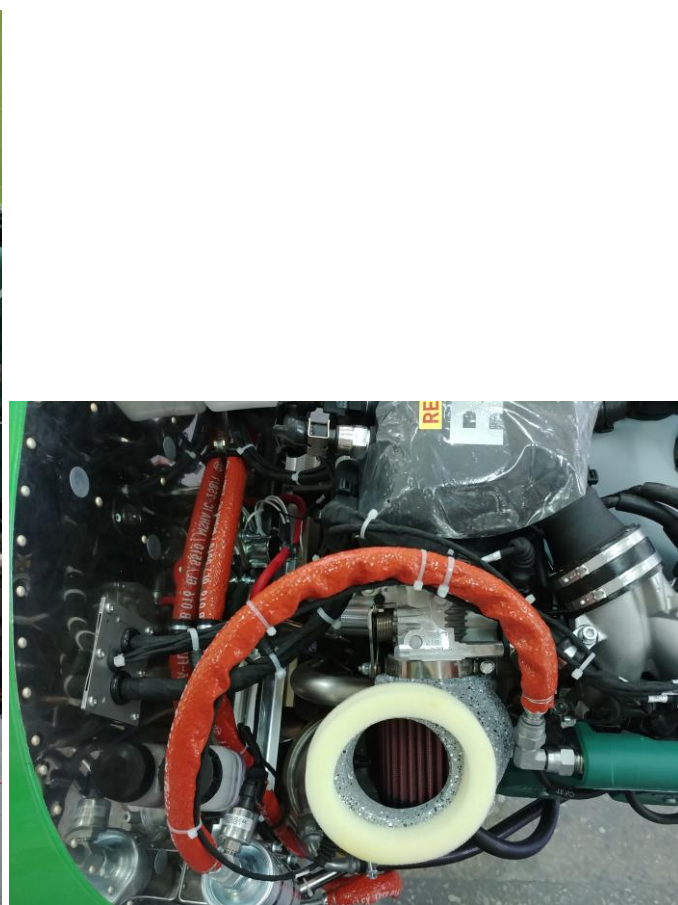


Photo 32



Photo 33