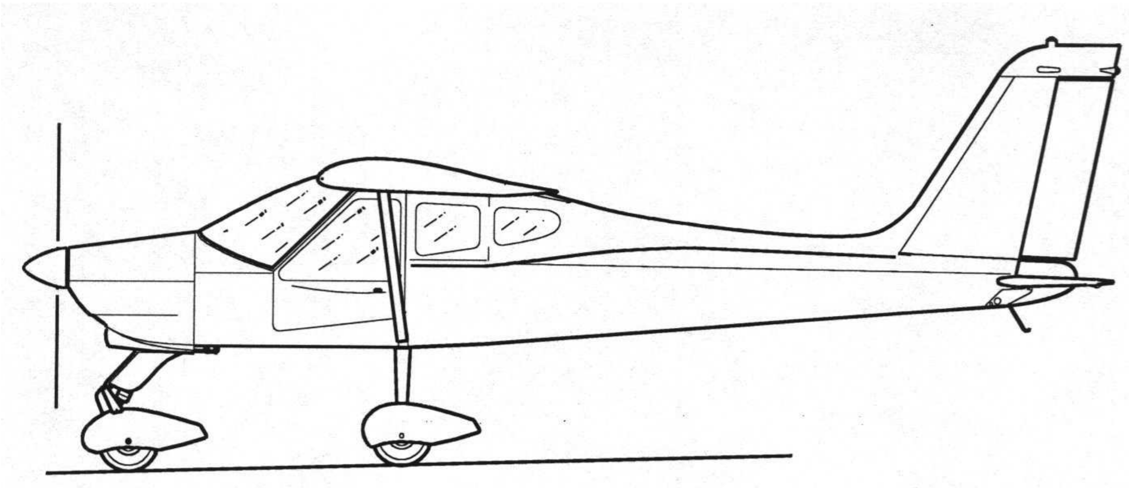
Maintenance Manual



P92 Echo
P92-S Echo

Doc. n° 92/115
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Before flying the aircraft we recommend reading carefully this manual, the flight manual and the engine's manuals. A thorough knowledge of the aircraft, of its qualities and of its limitations will allow you to operate with greater safety.

The ***P92 Echo*** and ***P92-S Echo*** are uncomplicated and sturdy machines whose features include simple servicing and superior flying qualities. This manual describes time and modes for correct servicing procedures. Scrupulously following instructions will insure that your ***P92 Echo*** or ***P92-S Echo*** will accompany you dependably for a long time with optimal performance in absolute safety.

This manual consists of 5 sections; a table of contents at the beginning of each section will allow you to reach quickly any selection.

Information contained in this manual is based on available data at publication time, possible variations shall be presented with servicing bulletins.

This manual describes correct servicing of parts manufactured by ***TECNAM*** and, in subordinate measure, of the list of components purchased from external suppliers; for more complete information on individual components it is necessary to refer to the component's manufacturer's manual.

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SECTIONS

SECTION A

GENERAL

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TABLE I

WING		
	Wing Span	9.3 m
	Wing Area	13 m^2
	Aspect Ratio	6.6
	Taper ratio	1.0
	Chord	1.4 m
	Flap span	1.97 m
	Flap chord	0.385 m
	Aileron span	1.97 m
	Aileron chord	0.385 m
FUSELAGE		
	Length (overall)	6.4 m
	Width max.	1.06 m
	Height max. (vertical tail end)	2.5 m
EMPENNAGES		
	Stabilator Span	2.90 m
	Stabilator Area	1.972 m^2
	Stabilator chord	0.680 m
	Vertical Tail Span	1.230 m
	Vertical Stabilizer Area	0.720 m^2
	Rudder Area	0.350 m^2
LANDING GEAR		
	Wheel Track	1.8 m
	Wheel Base	1.6 m
	Nose Wheel Tire *Sava*	4.00-6
	Main Wheel Tires *AirTrac A-A1D4*	5.00-5
WEIGHTS		
	Maximum Take Off Weight	450 kg
	Empty Weight	281 kg
	Payload	169 kg
	Wing Loading	34.1 kg/m^2
	Power Loading (Rotax 912 UL)	5.6 kg/hp
	Power Loading (Rotax 912 ULS)	4.6 kg/hp

POWERPLANT:

ROTAX 912 UL

Four stroke, four cylinder
Maximum Power 59.6 kW @ 5800 rpm (max. 5 minutes)
Maximum Continuous Power 58 kW @ 5500 rpm
Reduction Gear 1 : 2.27

ROTAX 912 ULS

Four stroke, four cylinder
Maximum Power 73.5 kW @ 5800 rpm (max. 5 minutes)
Maximum Continuous Power 69 kW @ 5500 rpm
Reduction Gear 1 : 2,43

PROPELLER:

For 912UL: TONINI GT ECHO 92/166/145

Twin blade all-wood ∅ 166 cm, fixed pitch.

For 912ULS: TONINI GT ECHO 92/172/164

Twin blade all-wood ∅ 172 cm, fixed pitch.

FUEL

Fuel grade	**Rotax 912 UL**	**Rotax 912 UL**
	• Min RON 90 • EN 228 Regular • EN 228 Premium • EN 228 Premium plus • AVGAS 100 LL (*)	• Min RON 90 • EN 228 Premium • EN 228 Premium plus • AVGAS 100 LL (*)
Fuel tanks	2 wing tanks integrated within the wing's leading edge with fuel strainer located in engine cowling	
Capacity of each wing tank	35 litres (45 litres – Optional)	
Total capacity	70 litres (90 litres – Optional)	

(*) Please refer to "Rotax Operator's Manual"

Oil System

Oil system type	Forced, with external oil reservoir
Oil	Lubricant specifications and grade are detailed into the "Rotax Operator's Manual" and in its related documents
Oil Capacity:	max. 3.0 litres – min 2.0 litres

COOLING

Cooling system:	Mixed air and liquid pressurized closed circuit system
Coolant:	Coolant type and specifications are detailed into the "Rotax Operator's Manual" and in its related documents.

1 - DESCRIPTION AND GENERAL CHARACTERISTICS

The ***P92 Echo*** *and* ***P92-S Echo*** *are a twin seat, single engine, strutted high wing, metal structure monoplane with tricycle landing gear and steerable nose gear.*

Figure A-1 below shows a Three View drawing of the aircraft (P92-S Echo) while table I reports main technical characteristics and dimensions; figure A-2 shows a longitudinal section of the aircraft and figure A-3 shows the wing's planform view.

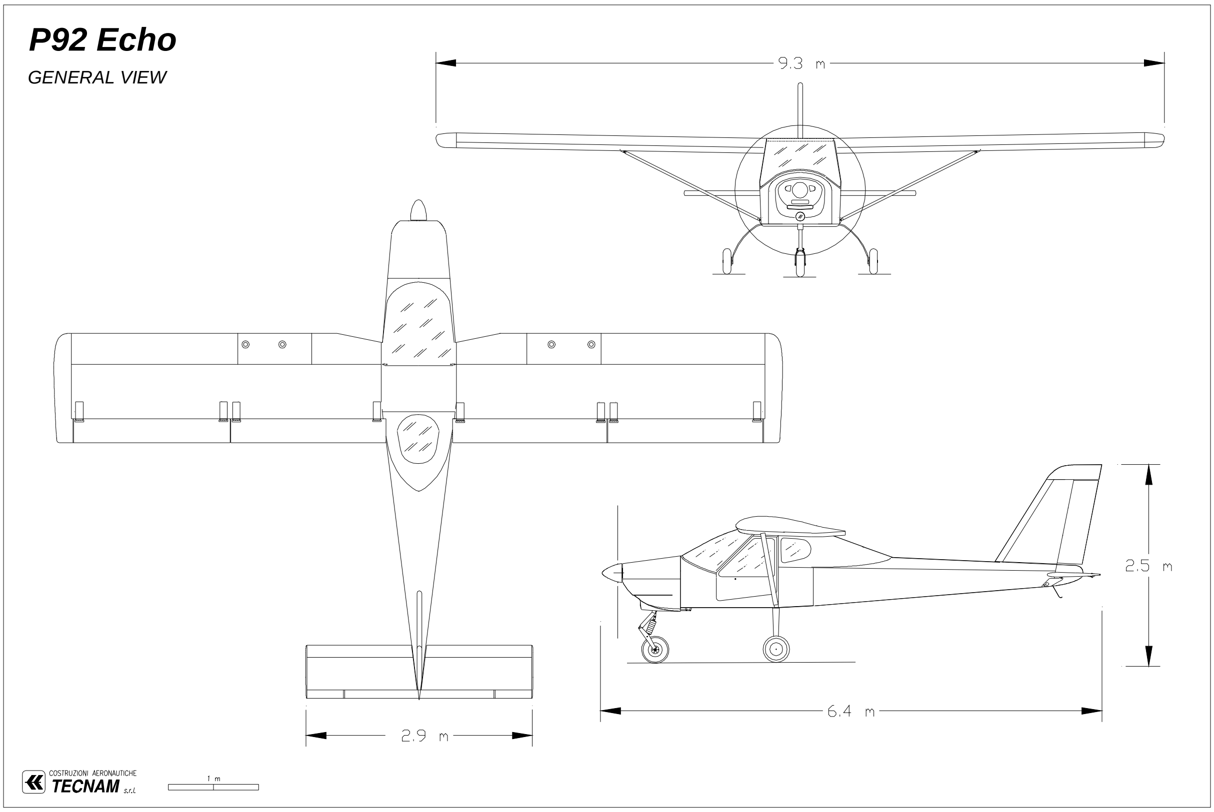

FIGURE A-1 *P92 ECHO - THREE VIEWS*

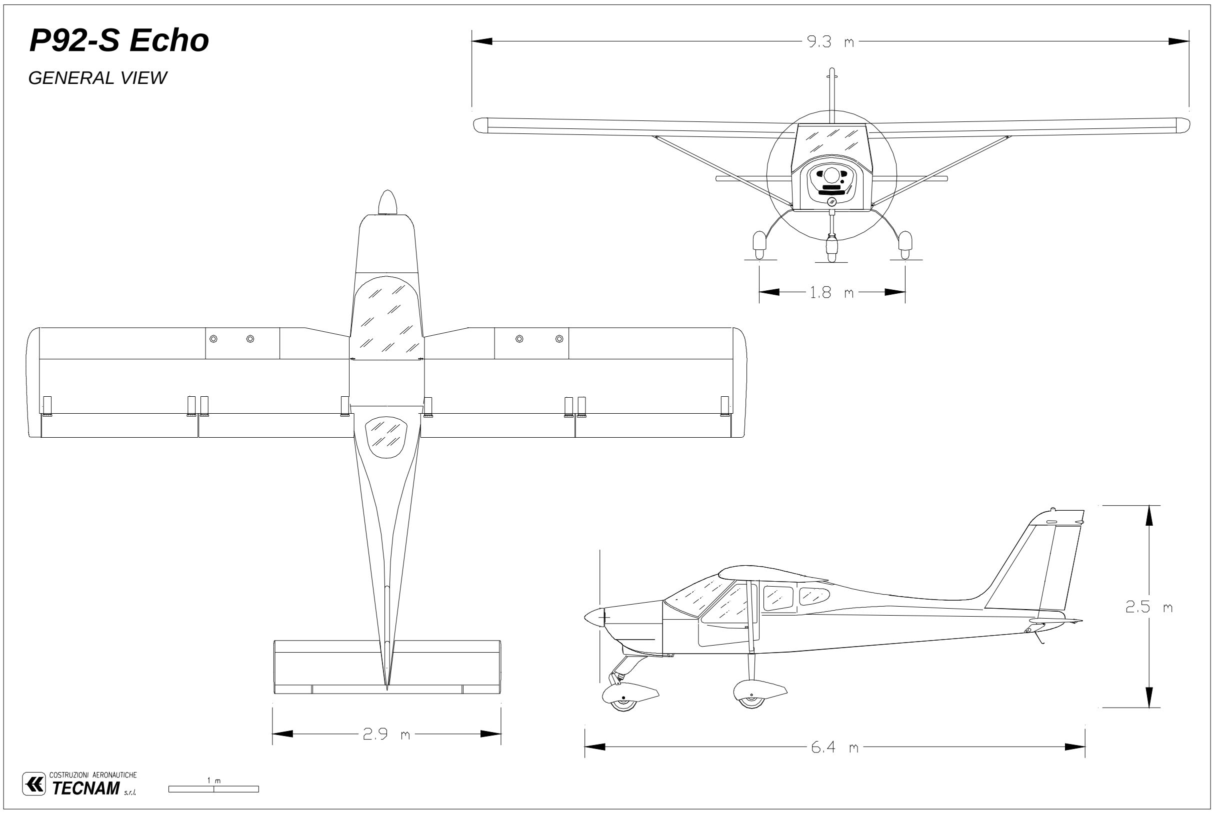

FIGURE A-1BIS *P92-S ECHO - THREE VIEWS*

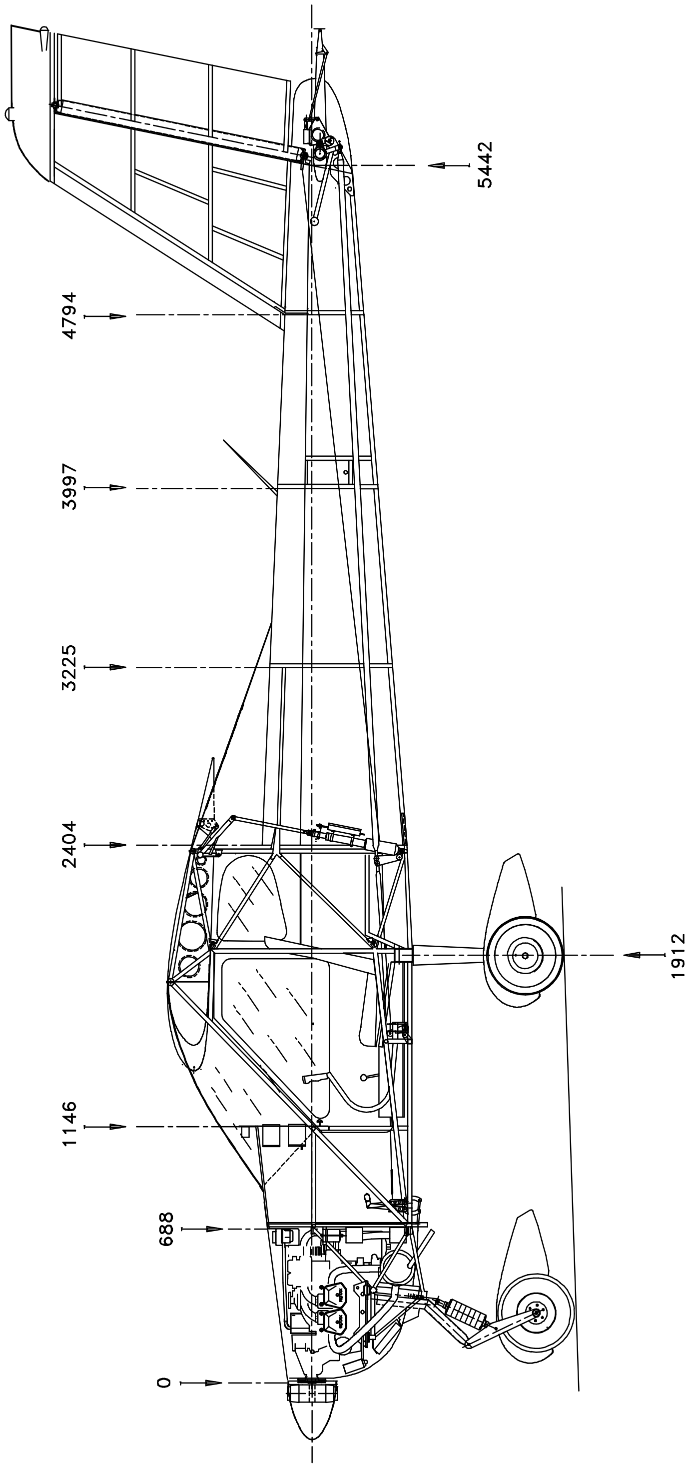

FIGURE A-2 *LONGITUDINAL SECTION*

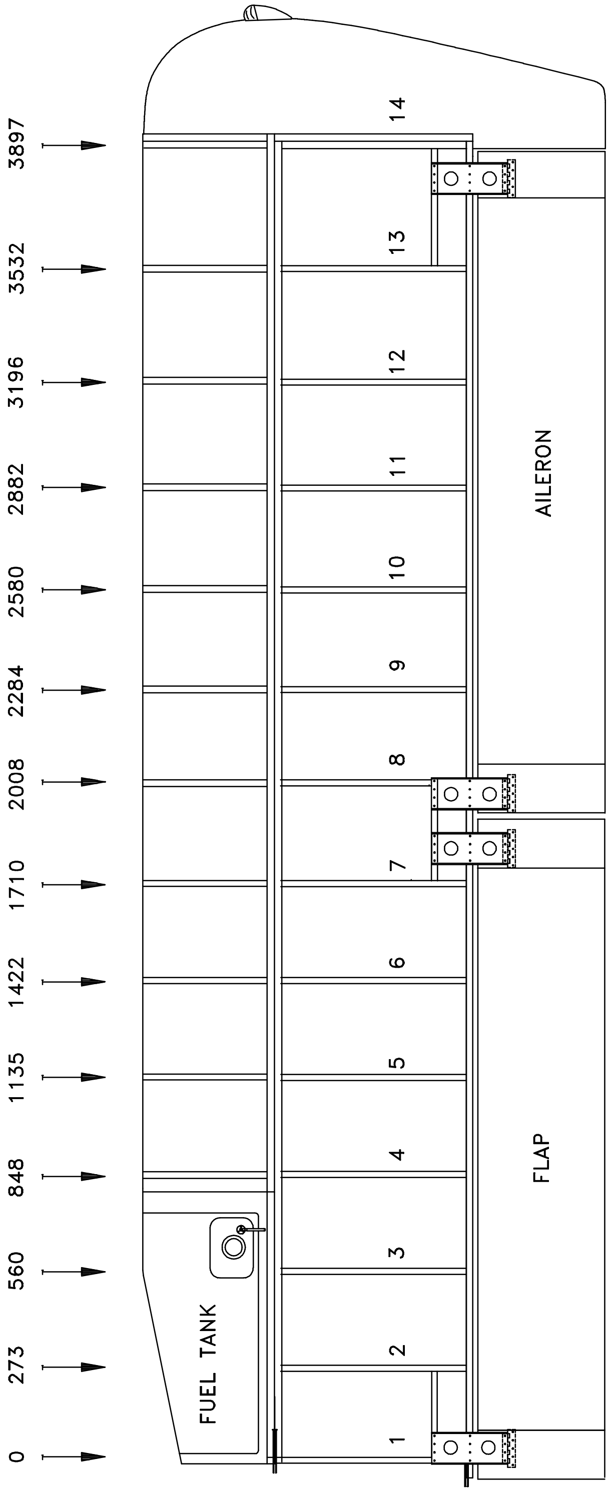

FIGURE A-3 *WING'S PLANFORM VIEW*

SECTION B

INSPECTIONS AND SERVICING

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1. GROUND HANDLING

Moving the aircraft on ground is accomplished by pushing on the wing struts close to wing attachments or by pulling on the propeller blades close to hub. Aircraft can be steered using the rudder or, for sharp turns, by lowering the tail to raise nose wheel off the ground. In this case, owing to the favourable CG location, a gentle push on the tail cone just ahead of empennage surfaces is all that's needed. Avoid dragging nose wheel sideways and do not attempt to counter any movement of the aircraft by handling it by its wing tips.

2. PARKING AND TIE DOWN

As a general precaution for outdoor parking, it is wise to position aircraft into the wind and to set the parking brakes or chock the wheels if chocks are available.

In severe weather and high wind conditions, aircraft tie-down is recommended. Tie ropes should be secured to the wing tie-down fittings located at the upper end of each wing strut. Secure opposite end of ropes to ground anchors. Nose gear fork may be used as fixing for forward tie-down.

Aircraft control stick should be locked using safety belts to prevent possible wind action from causing control surfaces to hit end travel.

3. JACKING

Given the low empty weight, jacking one of the main gear wheels can be accomplished even without hydraulic jack. In fact, it is sufficient that one person lifts the wing tip in proximity of the spar area before the tip, while another person positions a suitably high support, like a wooden stand or block, under the leaf spring attachment. To avoid scratching the paint, cover the stand or block with rubber or other suitable material.

In the event the leaf spring must be removed, the stand should be positioned under the cabin, just ahead of the leaf spring as shown in figure B-1.

CAUTION

As general rule, apply force to aircraft structure only on main structural elements such as frames, ribs or spars.

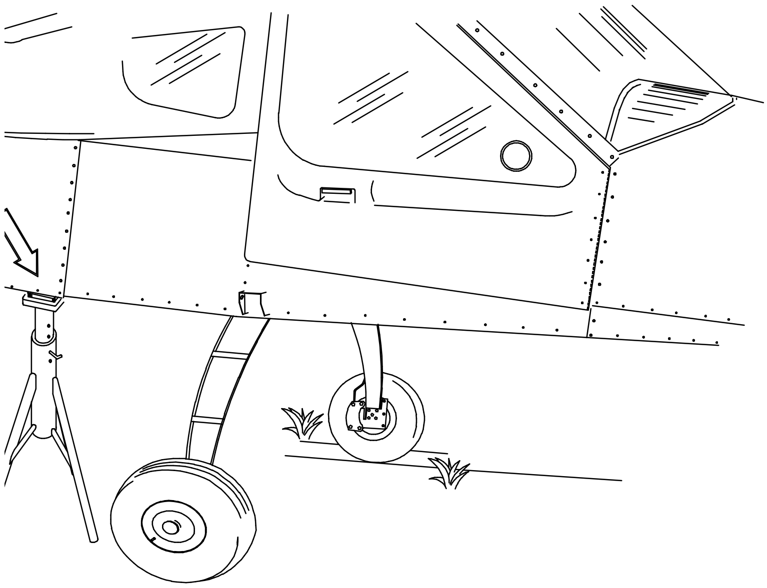


FIGURE B-1 JACKING

4. LEVELING

Occasional levelling of aircraft may be necessary to insure proper wing incidence and/or dihedral or for exact CG location.

The aircraft is levelled when the lower cabin door sill is horizontal (see fig. B-2) and the main gear support girder is horizontal in a transversal direction. Level the aircraft using a simple level and adjust the aircraft's tilt through shims placed under wheels or by regulating tire pressure.

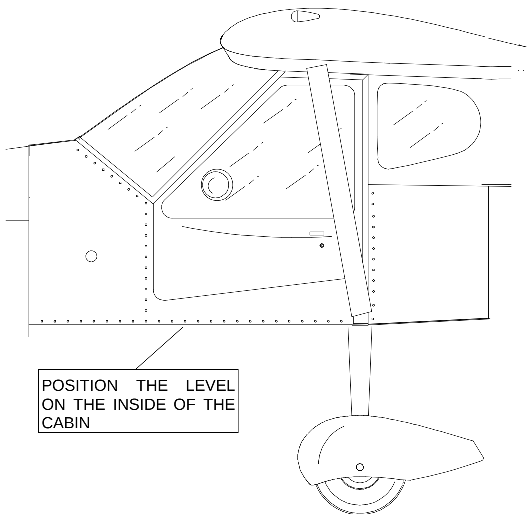


FIGURE B-2 *LEVELLING*

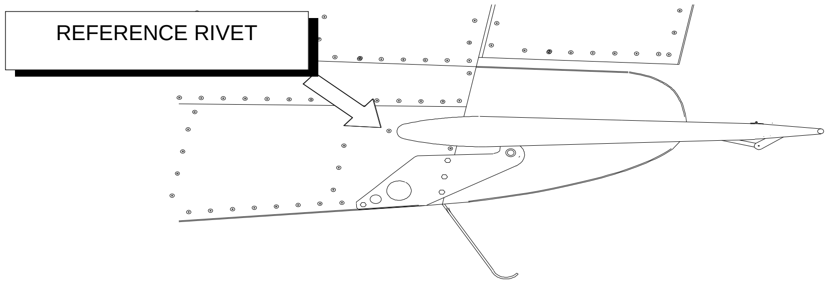
5. CONTROL SETTINGS

Adjustment of control surfaces must not exceed travel limits reported in table below. Zero reference mark for stabilator is on left side of aircraft (see figure below).

AILERONS *(starting from tip line-up)*	Up 20°	Down 15°	± 2°
STABILATOR	Up 16°	Down 3°	± 1°
TRIM *(Stab. at 0°, see fig. below)*	2°	12°	± 1°
RUDDER	RH 25°	LH 25°	± 2°
FLAPS *(maximum travel)*	0°	35°	± 2°

Cable tension should be as follows:

CONTROL CABLE TENSION: 20 daN ± 2 for all



6. TRIM-TAB ADJUSTMENT

Travel adjustment of trim tab on tail plane should be carried out as follows:

- Move stabilator to neutral (0 degrees) and lock in position; (this is accomplished by aligning the stabilator’s leading edge with the reference rivet located on the left side of tail cone);
- Turn Master-Switch ON;
- Trim to maximum pitch-up;
- Adjust thread of hinged control rod until tab is deflected downwards 12° (use a protractor or measure downward displacement of trailing edge - *12° relates to roughly 24mm* -);
- Tighten adjustment thread lock-nut and fasten connecting pin of control rod to trim-tab.

7. AIRCRAFT ALIGNMENT

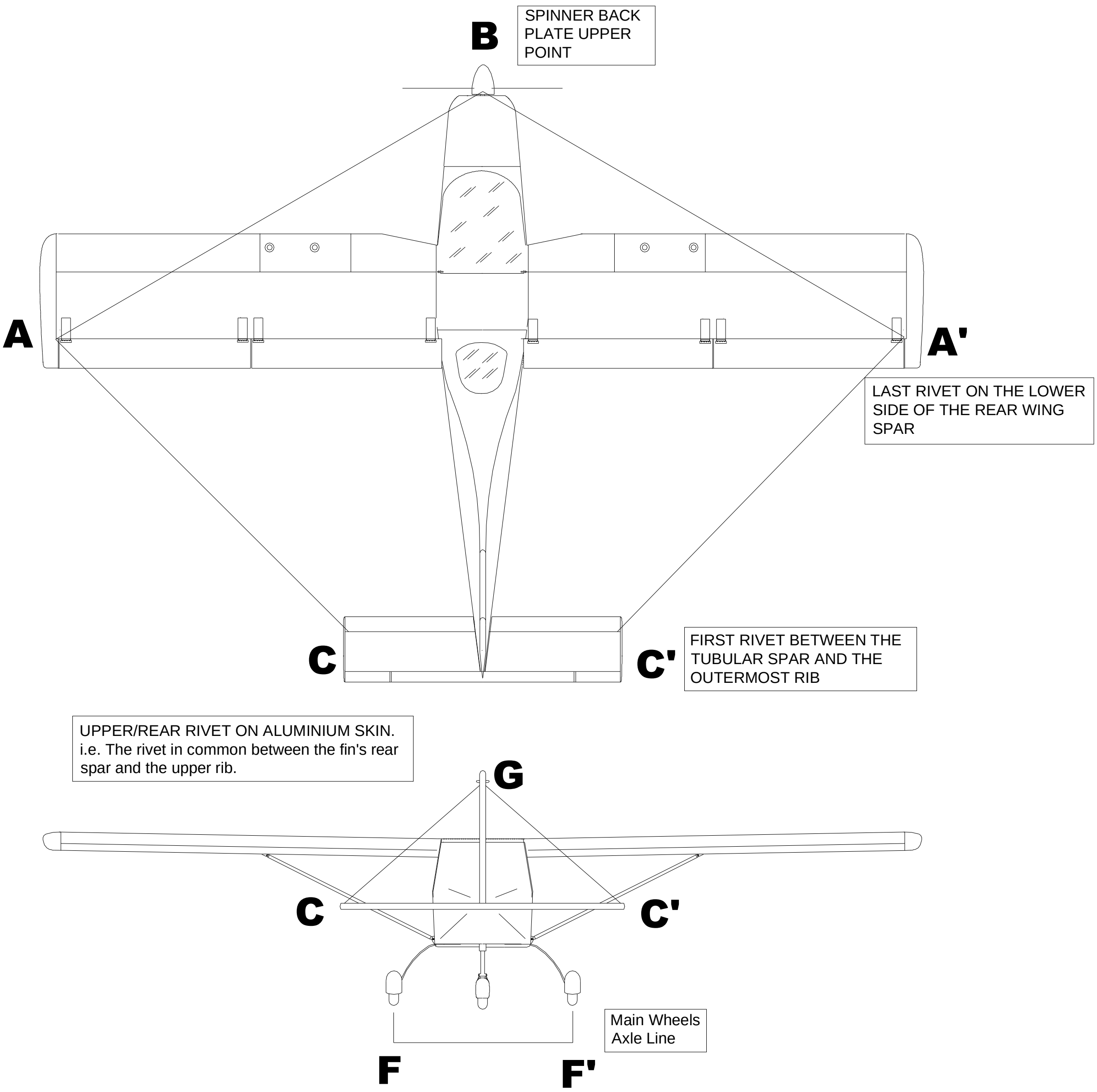


FIGURE B-4 REFERENCES FOR ALIGNMENTS

Datum	length in *mm*
A -B	5030 ± 25
A'-B	5030 ± 25
A -C	4365 ± 25
A'-C'	4365 ± 25
C -G	1860 ± 20
C'-G	1860 ± 20
F -F'	1880 ± 20

8. WEIGHING AND DETERMINATION OF THE C.G. VERTICAL

USE FOLLOWING GUIDELINES:

a. Carry out weighing procedure inside hangar
b. Remove any objects inadvertently left on board aircraft
c. Align nose wheel
d. Drain fuel
e. Oil, hydraulic fluids and coolants at operating levels
f. Move seats to most forward position
g. Flaps retracted (0°)
h. Control surfaces in neutral position
i. Position scales (min. capacity. 200 kg) under each tire

LEVELLING

a. Level the aircraft (see paragraph 4)

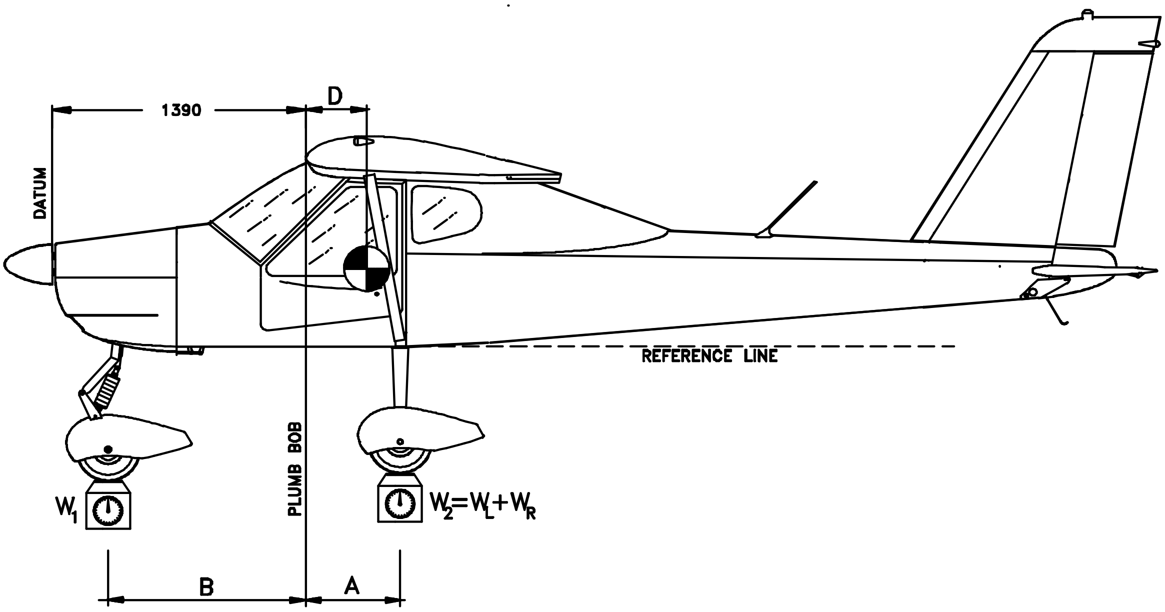
WEIGHING

a. Record weights of individual scales
b. Calculate empty weight

DETERMINATION OF C.G.

a. Dropping a plumb bob tangent to the wing's leading edge, (in the un-tapered section of the wing, at about one meter from the root), trace a reference mark on floor.
b. Repeat operation on other wing.
c. Connect the two reference marks with a taut line
d. Measure distances between reference line and landing gear axes
e. Recorded data allows determination of C.G. location and aircraft's moment (see following table)

TABLE OF WEIGHTS AND DETERMINATION OF C.G.



	Kg
Wheel weight front	**W_1** =
" " LH	**W_L** =
" " RH	**W_R** =
$W_2=W_L+W_R$=	

	meters
Distance from bob to LH wheel	**A_L** =
" " RH "	**A_R** =
Distance average $(A_L+A_R)/2$	**A** =
Distance from bob to nose wheel.	**B** =

Empty weight ➔ $W_e = W_1 + W_2$ =	$D = \dfrac{W_2 \cdot A - W_1 \cdot B}{We}$ = ___________ *meters*

CG position as wing chord %	$D_e\% = D_e / 1.4 \cdot 100$ =

9. CORROSION PREVENTION

It is important to keep the aircraft clean and to remove any collection of corrosive agents such as oil, grease, dregs and other foreign matter. To avoid damage to finish do not use polishing detergents.

Original or equivalent corrosion prevention must be re-applied after any alteration or repair.

If any trace of corrosion is detected it should be removed as soon as possible and part should be immediately treated to prevent further corrosion.

(a) For steel parts, with the exception of highly stressed components or stainless steel, it is possible to use abrasives, power brushes, steel brushes if operated manually and steel wool.

Removing corrosion byproducts from highly stressed steel components (main gear steel spring) requires particular care.

(b) For aluminium parts, treatment consists in mechanically removing as much as possible corrosion byproducts, applying corrosion inhibitor and replacing original finish.

Steel wool, emery or steel brushes (unless stainless steel) along with other highly abrasive material should not be used since steel or emery particles become embedded in the softer material causing corrosion.

After cleaning surface corrosion, parts must be treated with anti-corrosion finish.

10. SERVICE BULLETINS

The following table must report all servicing bulletins pertaining to the aircraft's operating life.

NR.	TITLE	TYPE

11. SERVICING

For scheduled servicing on engine *Rotax 912*, please refer to the Rotax documentations. The list below includes only primary engine maintenance operations.

<u>DAILY</u>

1. ***Pitot and static ports*** - Check for obstructions (see section E);
2. ***Oil*** - Check oil level in reservoir located on firewall.
3. ***Coolant*** - Check coolant level in overflow reservoir located on firewall;
4. ***Fuel strainer*** - Drain off any water and sediment by opening tap and collecting an amount of fuel at least equal to cup's capacity.
5. ***Fuel tank vents*** - Check for obstructions.(see section E)

<u>EVERY 100 HOURS</u>

6. ***Flange carburettor*** - Visually inspect rubber flange connecting carbs to engine.
7. ***Battery*** - Check level of electrolyte.
8. ***Engine oil*** - Change engine oil and replace filter element (refer to *Operator's Manual* of ROTAX 912); initially after first 25 hours.
9. ***Brake fluid*** - Check level of brake fluid in the master cylinder located below the left seat. Add fluid as needed using MIL H5606 standard type UNIVIS J43.
10. ***Fuel filter*** – Check and eventually clean the fuel filter of the electric pump (if installed).
11. ***Fuel line and carburettor air filter*** - Visually inspect fuel lines. Remove filter and clean accurately. Repeat operation more often in dusty conditions. If aircraft is equipped with carb heat system, scoop filter shall in any case be replaced (automotive type air filter: *Autobianchi Y10*).
12. ***Propeller*** - Check attachment bolts for integrity, tightening torque (18 Nm) and safetying, initially after the first 25 hours.

13.*Gyro instrumentation* (if installed)- In case of incorrect readings of vacuum system, clean or replace central filter and, if needed, adjust vacuum valve.

14.*Flap and stabilator* - Check visually for condition and for absence of crack, wear etc. of Dacron covers.

AS NEEDED

14.*Tires* - Check condition and maintain proper tire pressure.

12. LUBRICATION

INTRODUCTION

Periodic lubrication of moving parts insures proper operation and extends parts' life considerably.

Lubrication type, points and intervals are indicated below.

Avoid excessive lubrication as this may cause external surfaces of hinges and bearing to collect dirt and dust.

If part is not lubricated using a grease gun, grease part by hand removing excess.

To grease main gear wheel bearings, first remove thrust bearings from wheel hubs, then clean surface using solvent, apply grease and re-assemble.

NOTE - *Use grease type MIL-G-3278 or equivalent (e.g. ESSO BEACON 325).*

LUBRICATION POINTS (SEE fig. B-5)

1-2	Rudder hinges
3-4	Rudder control cable terminals
5	Stabilator control rod terminals
6-7	Stabilator support bearings
8-9	Trim-tab hinges
10	Tab control push-rod terminals
11	Stabilator pass-through rod
12	Stabilator control rod (inside cabin)
13-14	Aileron hinges
15	Differential ailerons hinges
16	Aileron control pushrods
17	Aileron control rods pass-trough
18	Flaps control pushrods
19-20	Flaps torque-tube support
21	Flap actuator terminals
22-23	Rudder pedals support
24-25	Rudder pushrods and cable terminals
26-27	Brake lever support
28-29	Control stick lever and support
30-31	Aileron control pulleys
32	Nose gear fork attachment hinge
33	Shock absorber attachment hinge
34	Nose gear strut attachment hinge
35	Steering pushrod terminals

Grease door hinges and adjustable seat rails when necessary.

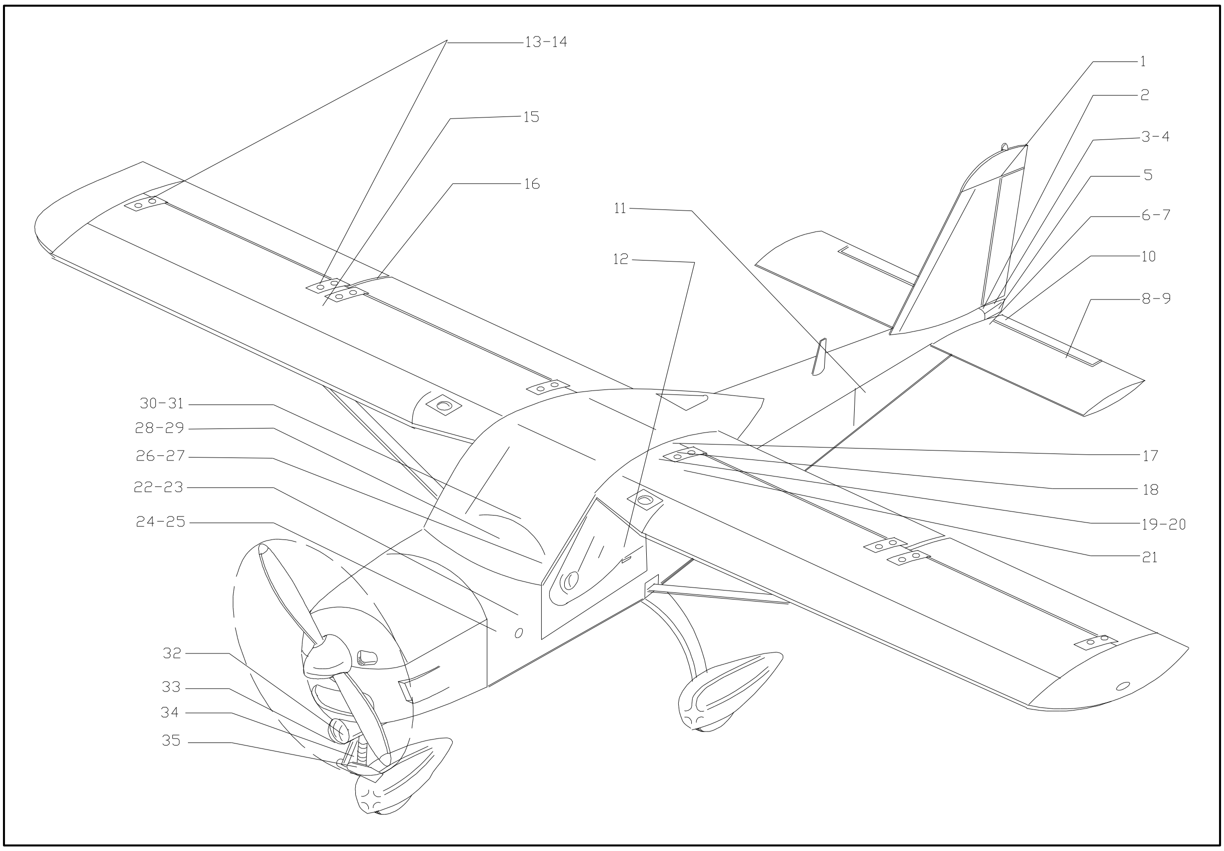


FIGURE B-5 *LUBRICATION POINTS*

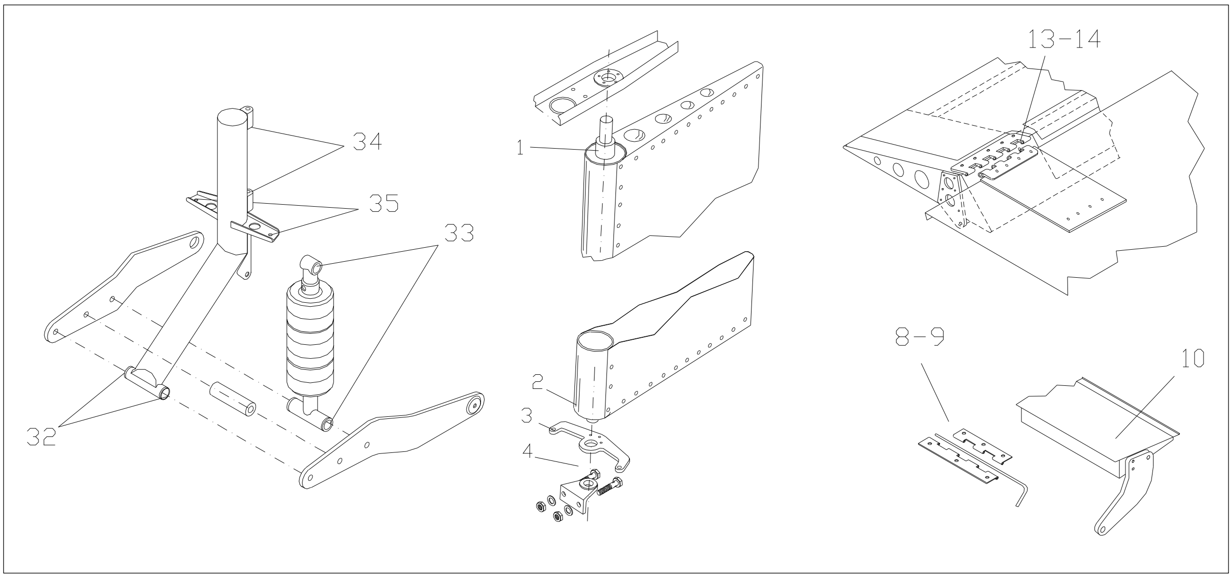


FIGURE B-6 *EVERY 100 HOURS*

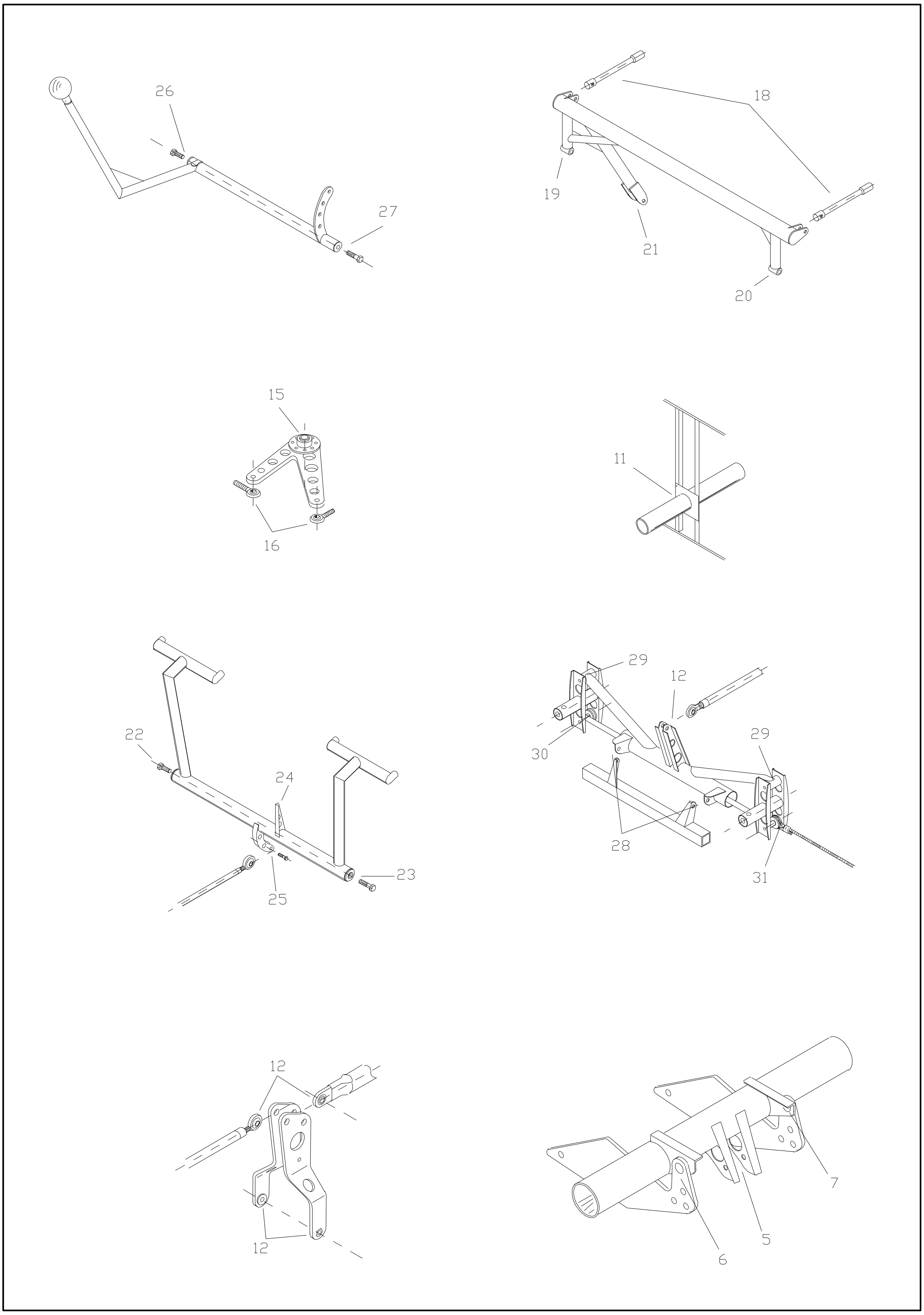


FIGURE B-7 *EVERY 100 HOURS*

13. INSPECTION'S POINT

Inspection points that are not in plain view may be accessed through specific portholes and/or removal of panels or fairings as detailed below:

1. **Portholes on wing underside** - access to aileron differential bellcrank.
2. **Upper strut-wing fairing** *(if present)* - inspection of strut attachment.
3. **Lower strut-wing fairing** *(if present)* - inspection of strut attachment.
4. **Tail cone underside portholes** - access to stabilator control; - vertical stabilizer forward attachment; -inspection of structure and rudder control cables.
5. **Battery porthole** - access to battery compartment.
6. **Tail cone end fairing** - access to stabilator torque tube and attachments to control lever; attachment of vertical stabilizer aft spar; rudder bellcrank; trim actuator and pushrods.
7. **Aft cabin bulkhead and luggage compartment floor** - inspection of aft fuselage section and attachments; inspection of stabilator control system and of cable pulleys for rudder control; access to flap actuator; access to aileron control cable turnbuckles.
8. **Forward cabin side panels** - access to half-wings' forward attachment; access to fuel line tank outflow.
9. **Cabin overhead panel** *(if present)* - access to connection between cabin's cable circuit and wing's pushrod system for aileron control;
10. **Dashboard panel** *(if present)* - access to instrumentation.
11. **Engine cowling** - access to engine and related systems; access to main components of electrical; access to nose gear strut and steering assembly.
12. **Propeller spinner** - access to propeller hub.

14. INSPECTIONS

FOREWORD

TECNAM deems inspection schedule outlined below compulsory for the aircraft's operational safety over an extended period of time. Described servicing requirements pertain to operation in non-extreme climatic conditions.

For the Rotax 912 engine, it is compulsory to adhere to maintenance requirements as reported in the engine's Operator's Manual.

Inspections are to be carried out as follows:

A. Inspections for airworthiness before first flight of day as specified in Flight Manual.
B. Periodic Inspection 100 hours as specified in the previous sections.
C. Special inspections, added to normal periodic.
D. Singular inspection, when aircraft has been exposed to fortuitous events that may have damaged one or more of its components.

If aircraft is rarely used, inspection at 100 hours must be performed yearly.

Inspections and checks, unless specifically indicated, apply to the following

STRUCTURES IN GENERAL - Condition of panel covers, ribs, frames, stringers etc., absence of cracks, deformation, rivet slackening, corrosion and any other apparent sign of damage.

MOVING PARTS - Lubrication, security of attachment, safetying of bolts, absence of EXCESSIVE tolerance, proper adjustment, proper travel, condition of attachments and hinges, absence of corrosion, deformation, rivet slackening, cleanliness.

FLUID LINES AND HOSES - Absence of leaks, cracks, dents, chafing, proper radius, deterioration.

BOLTS AND ATTACHMENTS - Proper tightening and safetying, absence of cracks or nicks, damage to thread, wear and excessive tolerance.

PERIODIC INSPECTIONS

Every porthole, fairing, panel etc. shall be removed to allow for inspection.

Procedures listed in SERVICING are included in the inspections.

Instructions for actions following inspection are detailed in specific sections pertaining to the aircraft group or system.

	NATURE OF INSPECTION	*INSPECTION INTERVALS (HRS)*	
		100	Special
	ENGINE COMPARTMENT		
1	Remove cowling and check for fuel, oil and coolant leaks; clean engine compartment	●	
2	Check density of battery electrolyte	●	(a)
3	Visually inspect electric pump connections	●	
4	Visually inspect engine mount and silent-blocks attachments	●	
5	Visually inspect exhaust manifold, muffler and heat exchanger	●	
6	Visually inspect air intake and carburetor feed circuit	●	
7	Visually inspect coolant reservoir, radiator and circuit line	●	
8	Visually inspect oil reservoir, radiator and circuit line	●	
9	Check wires and electrical connections (low and high tension)	●	
10	Check carburetor control and throttle movement	●	
11	Check idle and carburetor sync.		600
12	Clean electric fuel pump filter	●	

(a) Every 100h or more frequently in warm climate.

	NATURE OF INSPECTIONS	INSPECTION INTERVALS (HRS)	
		100	Special
	FUEL SYSTEM		
1	Check rigid circuit lines for integrity and wetness	●	
2	Check shutoff valves	●	
3	Rinse tanks and clean exit filters		1200
4	Check vent floats		600
5	Check electric fuel pump	●	
	FLIGHT CONTROLS		
1	Check cables, terminals, pulleys and turnbuckles for integrity and proper condition of aileron and rudder control	●	
2	Check pushrod terminals, lever hinge bushings, stabilator control pass-through	●	
3	Check pushrod terminals and aileron control pass-through	●	
4	Check flaps pushrod terminals	●	
5	Check flaps actuator for integrity and play, attachment of terminals and electrical connections		600
6	Check torque tube, levers and attachments for flaps control	●	
7	Check resin control lever for trim actuator		600
8	Check trim control levers and pushrods for integrity and play	●	
9	Check rudder pedals for integrity and play	●	
10	Check control stick group for integrity and play	●	
11	General check for proper tension level for control cables		600

	NATURE OF INSPECTIONS	ISPEZIONE INTERVALS (HR)	
		100	Special
	MOVING SURFACES		
1	Visually inspect integrity of dacron wrap-around for ailerons and stabilator; watch for cracks, chinks, etc.	●	
2	Visually inspect and check integrity of wrap-around paneling for rudder and flaps.	●	
3	Check integrity and play of flaps and aileron hinges	●	
4	Check integrity and play of stabilator attachments	●	
5	Check integrity and play of trim-tab hinges	●	
6	Check play and proper fastening of stabilator tubular spar	●	
7	Check integrity of balance weight support	●	
8	Check integrity and play of rudder lever and hinges	●	
	WING		
1	Visually check general condition of wrap-around skin and rivets	●	
2	Disconnect wings from fuselage and check condition of attachments and for possible play		1200
3	Check condition of spar and wing structure through dedicated openings		600

NATURE OF INSPECTIONS		ISPEZIONE INTERVALS (HR)	
		100	Special
	FUSELAGE and EMPENNAGE		
1	Visually check general condition of wrap-around skin and rivets	●	
2	Inspect cabin truss for deformations and corrosion		600
3	Check seat rails and stops and safety belt attachments	●	
4	Check internal condition of tailcone structure		600
5	Check attachment between vertical stabilizer and tail beam		600
6	Check integrity and fastening of stabilizer support assy		600
7	Check integrity and general condition of transparent surfaces and doors	●	
8	Check electric circuit wiring and antennae attachments from inside of tailcone		600
	MAIN LANDING GEAR		
1	Check brake system (reservoir, master cylinder, lines and calipers)	●	
2	Replace brake pads		600(a)
3	Visually check steel spring struts, connection clamp and fastening of bolts	●	
4	Remove legs and check for proper curvature and integrity		1200
5	Inspect main wheels for condition and fastening	●	
6	Remove wheels, clean and grease wheel bearings		600(b)
7	Check fairing integrity and attachments	●	

(a) when brake pad thickness is below 2.4 mm
(b) initially at 100 hours

	Nature of inspections	*Inspection intervals (HR)*	
		100	Special
I	**NOSE GEAR**		
1	Inspect support truss for gear strut and attachment hinges	●	
2	Check proper movement of steering levers and pushrods	●	
3	Check integrity and play of strut-to-fork hinge attachment		600
4	Check shock hinge attachments		600
5	Check shock for general condition and state of rubber disks	●	
6	Inspect wheel for condition and fastening	●	
7	Remove wheel, clean and grease wheel bearings		600(c)
8	Remove nose gear assy for general safety check and inspection		1200
9	Check integrity of fairing and fairing attachments	●	
L	**INSTRUMENT PANEL**		
1	General inspection of operation of flight and engine instruments	●	
2	Check generator charge	●	
3	Check compass alignment		48 months
4	Check calibration of airspeed indicator and altimeter		1200
5	Check operation of avionic instrumentation (if installed)	●	
6	Check operation of switches and breakers	●	

(c) initially at 100 hours.

SUMMARY OF REFERENCE VALUES
TORQUE SETTINGS FOR CONNECTION BOLTS AS A FUNCTION OF THEIR LEG DIAMETER Bolts resistance category 8.8 ∅ 4 = 3.1 Nm ∅ 6 = 10.4 Nm ∅ 8 = 24.6 Nm *Warning: propeller attachment bolts must be fastened to 18 Nm value even though they have a ∅8 diameter.*
CONTROL CABLE TENSION (FOR BOTH AILERON AND RUDDER) VALUE : 20 dN ± 2 dN
TIRE PRESSURE: NOSE 15 PSI (1.0 BAR) MAIN 23 PSI (1.6 BAR)
CONTROL SURFACES TRAVEL RANGE Ailerons: Up 20° down 15° ±2° Stabilator: Up 18° down 3° ±1° Trim: 2°, 12° ±1° Rudder: RH 25° LH 25° ±2° Flaps: 0° -35° ±2°

SECTION C

AIRFRAME

TABLE OF CONTENTS

1 - INTRODUCTION

The airframe consists of the following main components as shown in figure C-1:

1) Wings
2) Fuselage
3) Empennage
4) Landing gear
5) Powerplant

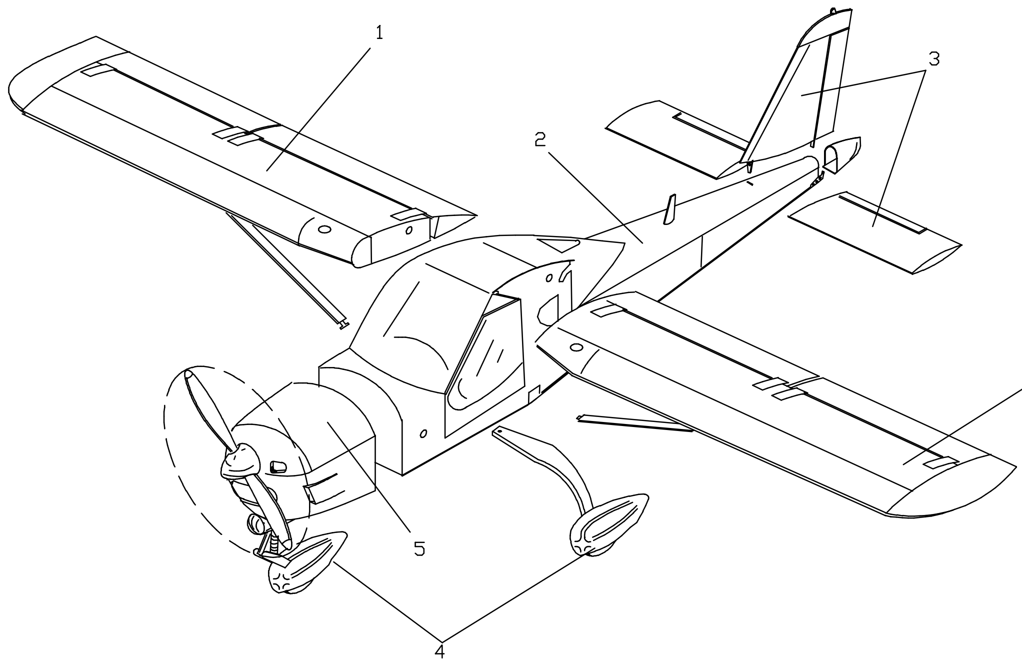


FIGURE C-1 MAIN AIRFRAME COMPONENTS

In case it becomes necessary to disassemble the aircraft for transport or other reason, it is necessary to read section C carefully.

2 - WING

Each wing is connected to the fuselage by means of two pin attachments and a single strut brace per side.

Wings are constructed of a central light alloy torsion box; leading edge is attached to front spar where metal fuel tank (10) and wing-fuselage plastic union (9) find collocation. Flap (1) and aileron (2) are attached by two hinges each to rear spar.

The torsion box, as shown in figure C-2 and with reference to numbers in parenthesis, consists of a main spar (4) and a secondary spar (5) that make up its front and rear walls respectively and of a series of ribs (6); metal panels cover the entire structure. Front and aft spars are equipped with wing-to-fuselage attach fittings (7). Wing-to-strut attach fitting is located approximately at the middle of main spar (8). Both aileron and flap hinges are made of “piano-hinges" type MS 20001-4 for direct attachment to spar of moving surfaces.

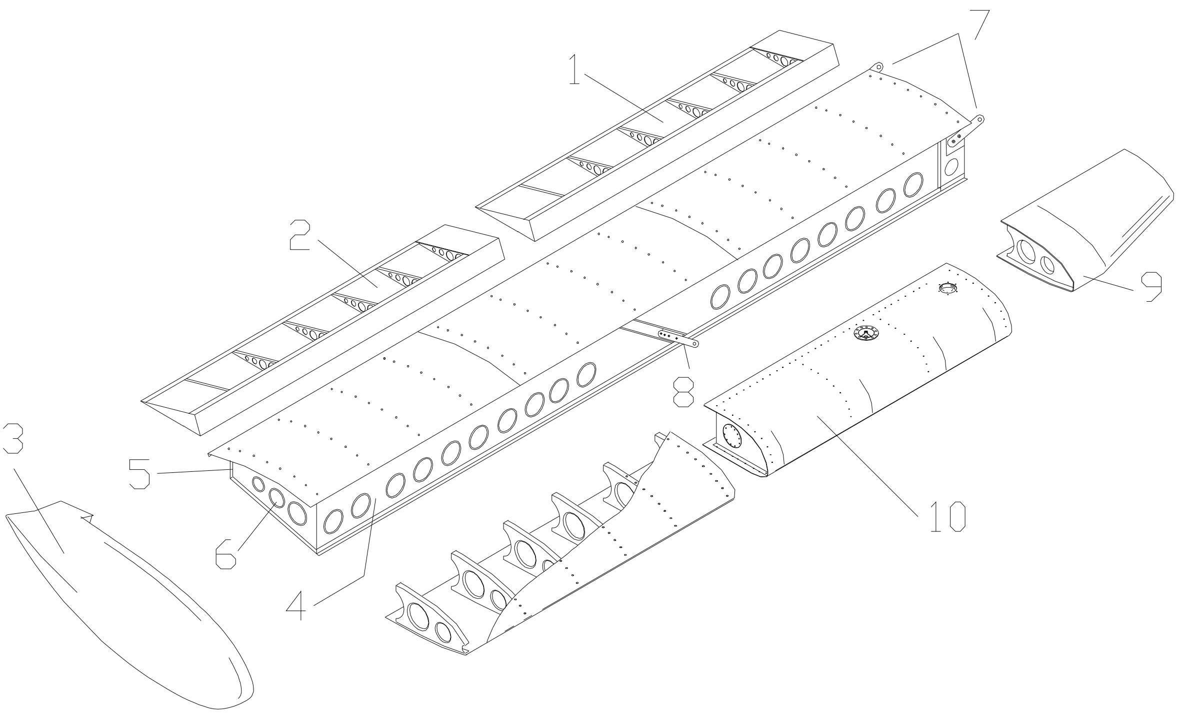


FIGURE C-2 WING STRUCTURE

Aileron is constructed of a single light alloy spar to which are joined box type leading edge and ribs; entire structure is covered with “Dacron” synthetic cloth. Flap has the same aileron structure and is covered aluminum panels.

Wing tips (3) are molded epoxy resin, fiberglass reinforced.

3 - REMOVAL AND RE-INSTALLATION OF A WINGS

Procedure for removal of a wing and strut is as follows.

A. Drain fuel tank using drain tank and closing opposite side tank fuel circuit;

B. Remove access panel located under the wing allowing access to fuel line and disconnect, plug pipe ends on both wings;

C. Disconnect transparent scavenge small pipe only LH wing;

D. Disconnect wires for navigation lights (if present);

E. Disconnect flap control (see fig. C-3) by removing roller bearings (7) linking push-pull rods (6) with flap control plate;

F. Remove aileron control (see fig. C-4) by disconnecting pins (4) linking small bar (3) with rods (5).

G. While supporting the wing’s end, release strut’s upper pin, then release lower pin and remove strut.

H. While supporting the wing from below the root area, release the two wing-to-fuselage attachment pins. To expedite release of aft pin, keep flap lifted, then remove wing.

I. Replace pins.

Reverse above procedure for reinstallation paying close attention to tighten strut’s bolts to recommended value (M8 bolt torque 24.6 Nm).

2.1 - Flap control (see fig. C-3)

Flap control system is push-rod type. The torque tube (1), connects the two moving surfaces and hinges to supports (2) rigidly attached to fuselage structure. Rotation is transmitted through a push-rod (3) whose position is controlled by an electric linear actuator (4) governed by a switch on dashboard. Jack stops are adjusted by moving the switches locate inside the flap actuator body (4).

Two push-pull rods (6) are connected to the ends of the torque tube (see fig. C-3) (1) allowing quick inspection owing to favorable location between wing and fuselage.

The two push-pull rods controlling flap movement feature an extendible linkage just before the roller bearings allowing trailing edge line-up.

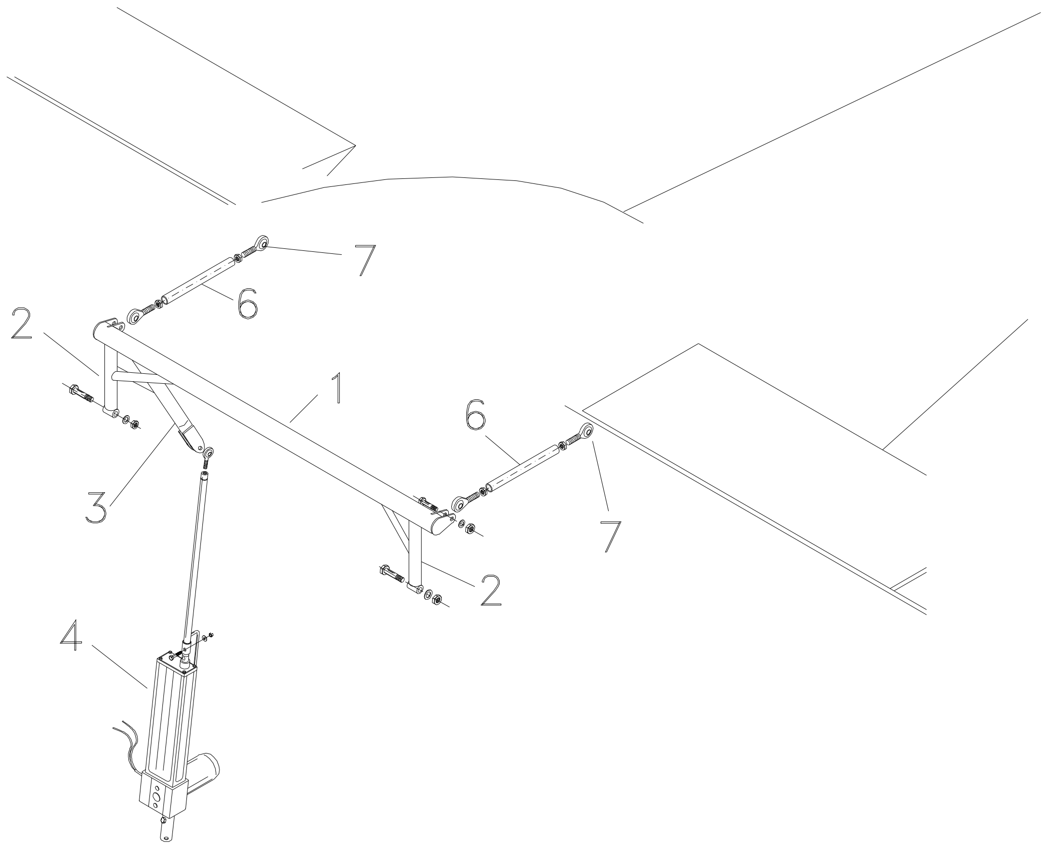


FIGURE C-3 FLAP CONTROL

2.2 - Aileron control *(see fig. C-4)*

Aileron control system uses rigid rods inside wing and steel cables inside cabin.

Flight control system inside cabin includes three pairs of pulleys which transmit movement from the two control sticks (1) linked by a rod (2), to a small bar (3) located cabin overhead in correspondence to the main rods from the wings. The main rods ends are joined using two pins (4) to the small bar ends. The two main rods (5), are routed through the ribs and are attached at bellcrank lever system (6) push-pull rod (7). The push-pull rod crosses the wing's secondary spar and features roller bearings and extendible linkage to regulate length.

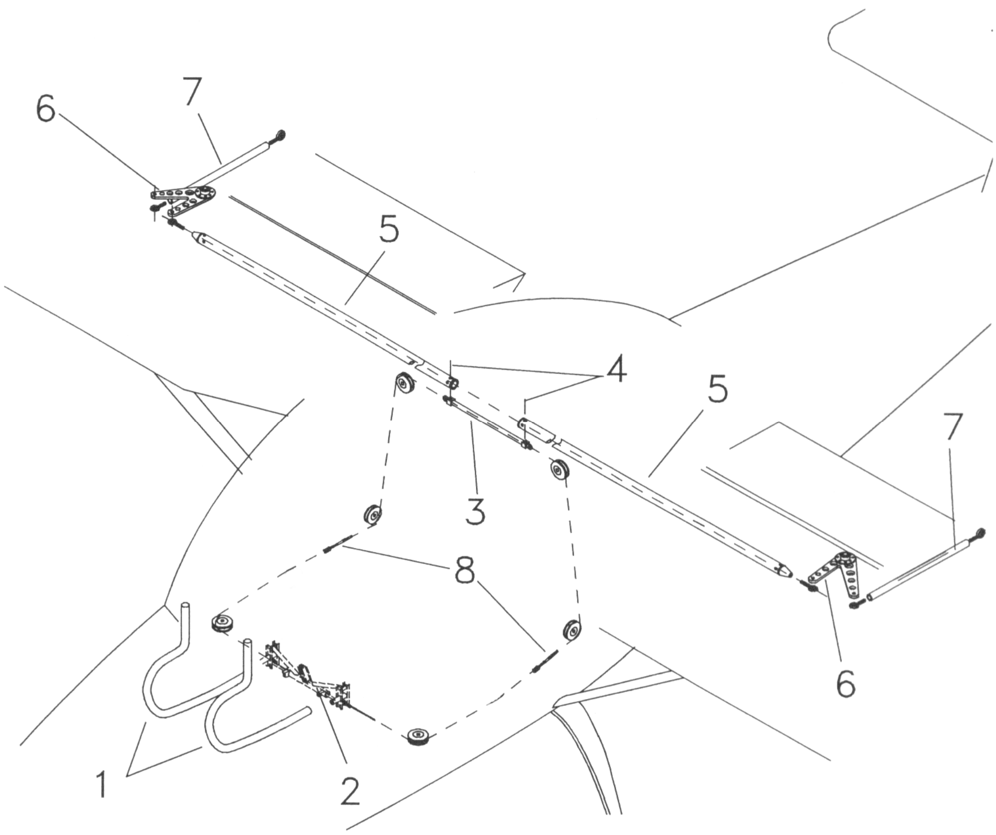


FIGURE C-4 AILERON CONTROL

To remove aileron, disconnect one end of push-pull rod and remove pins from hinges.

Reverse above procedure to reinstall aileron insuring that, with stick vertical, the aileron's trailing edge is aligned with wing's trailing edge.

Through access panels located on wing's bottom, check that the bellcrank lever is in neutral position, i.e. the inside arm at right angle with spar axis. To remove wings, disconnected release short bar (3) that close steel cable system, to main rods (5) by pins (4). The steel cable system is designed to insure proper cable tension without the need to check each time the half-wings are removed. It is however recommended that periodic checks be carried out and proper tension applied by acting on the two turnbuckles (8) located behind the cabin's rear panel.

Also check periodically that pulleys rotate freely and pins tolerance for entire transmission is within standards (ref. Section B).

If control stick should feel unusually hard, reduce cable tension as this may be the primary cause for malfunction (ref. Section B); also check that parts of the link system positioned under seats are properly greased.

If control stiffness persists, check integrity of bellcranks or pulleys and insure that cable has not come off pulleys.

Alignment of moving surfaces with half-wing must be done using outboard trailing edge as reference. Further lateral corrections (aircraft leans to one side) may be carried out adjusting trim tab located on left aileron trailing edge.

4 - HORIZONTAL TAIL

Horizontal tail is an all moving type, that is, the stabilizer and elevator form a single, uniform plane called stabilator which rotates about an axis normal to fuselage centre line at the desired pitch setting.

The stabilator structure (see fig. C-5) is constructed of a light alloy tubular spar (1) to which a series of ribs (2) and an light alloy leading edge (3) are riveted. Entire structure is Dacron covered.

A trim tab (4) provides stick force adjustment and longitudinal compensation through an electric actuator controlled by pilot. Tab is split in two halves interconnected at the support brackets (5) and attached to the stabilator through four external hinges (6) that allow immediate inspection.

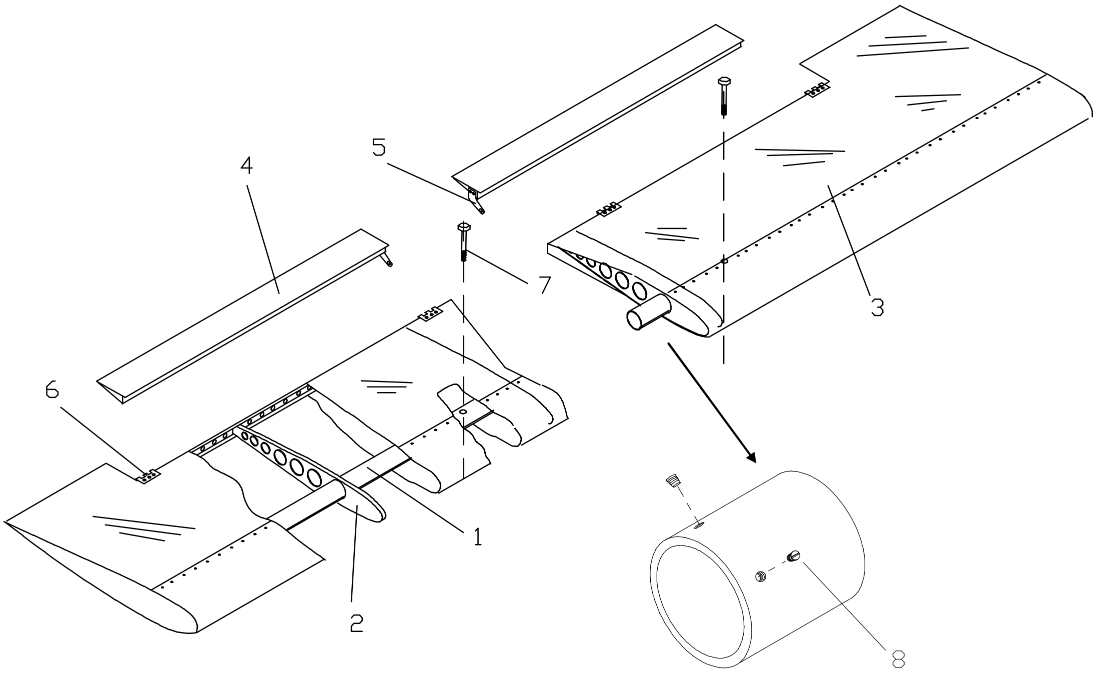


Figure C-5 STABILATOR

Each half plane engage on steel tubular hub that escape to fuselage, locked in place by means of pins (7). Taking up possible tolerance make by means of two riveted grains (8).

To remove each stabilator, disconnect the two halves of the tab from each other and from the control rod, remove pins (7), then remove half-planes. To avoid cover damage during operation, handle parts by their rigid components.

Reverse operation for reinstallation slightly greasing the inside of the torque tube (1) to facilitate insertion and gently tapping parts into position being careful not to deform outward ribs.

The stabilator control system is push-rod type (see fig. C-6) and is controlled from the cabin via the control sticks. Control is transmitted through a push-pull rod (1) linked to a bellcrank (2) and a shaft (3) that runs through (4) the tail cone, transmit movement to stabilator's hub lever (5).

All significant transmission element such as bellcranks, pushrods, supports and hinges can be easily accessed and inspected.

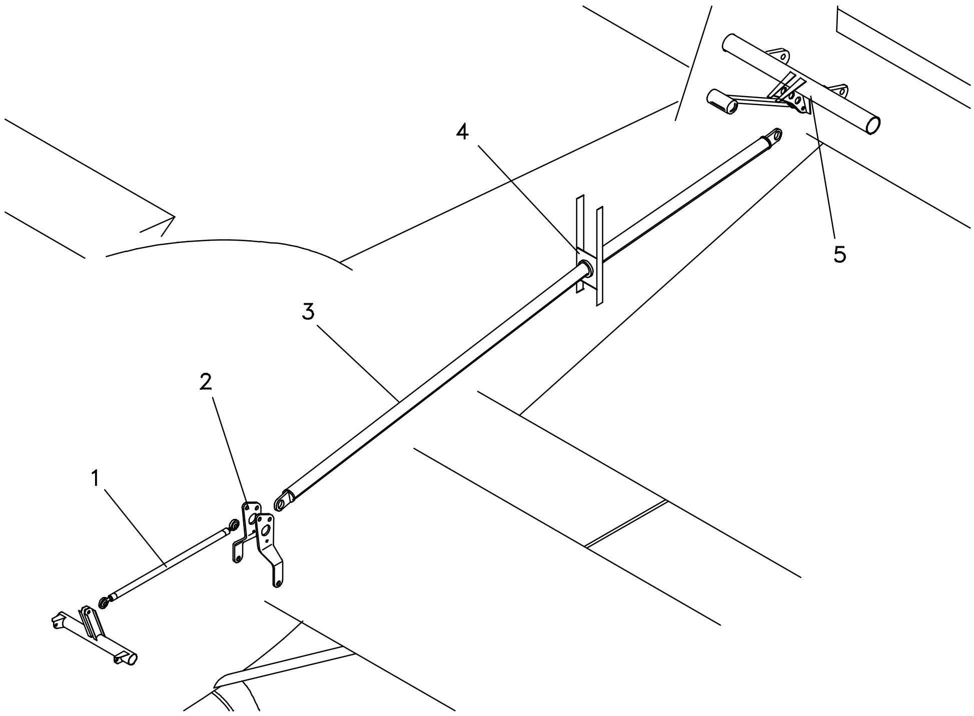


FIGURE C-6 STABILATOR CONTROL

If unusual tolerance is found along transmission, replace parts presenting excessive wear.

The stabilator hub (see fig. C-7) consists of, a steel tube (1) with welded horn assembly (2) and attachment for stabilator control shaft (3). Counterweight (4) is at the end of an arm joined control lever by means of two bolts. Arm entering tail stock through lightening hole of the last tail cone ordinate.

Longitudinal trim is controlled by a switch located on cabin tunnel or (*optional*) by two push-buttons mounted on the stick handle; position is, in any case, monitored via an indicator located on dashboard. Control activates the linear actuator (5) connected to supports

(6) and plates (7). Actuator's motion is transmitted to an adjustable push-pull rod (8) through a bellcrank (9).

To remove stabilator's hub disconnect electric actuator frame assembly (7), from support (6), release aft bellcrank assembly (3) then release plates (2) from brackets(6).

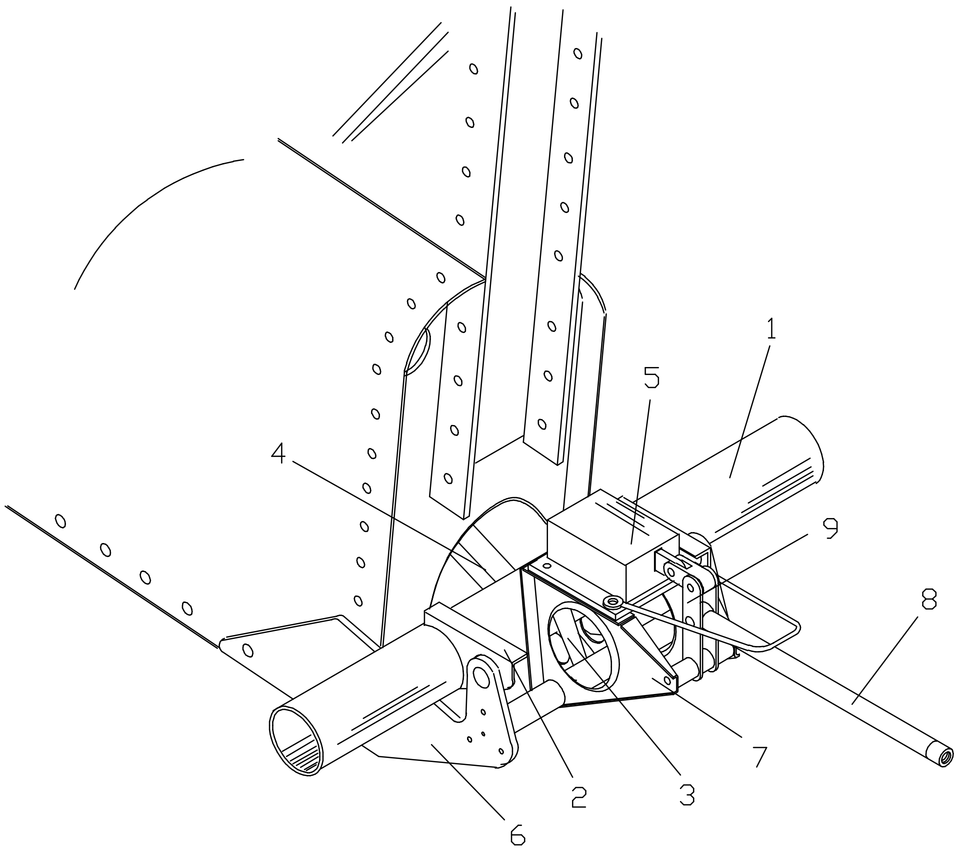


FIGURE C-7 HORIZONTAL TAIL CONTROL SYSTEM

5 - VERTICAL TAIL

The vertical tail is an all-metal light alloy structure (fig. C-8). Rudder tip is fiberglass with cut-outs for navigation and strobe light.

The vertical stabilizer consists of a twin spar with wrap-around load bearing skin paneling. An attachment plate to the fuselage tail cone (1) secures the stabilizer's front spar to the lower tip while the rear spar is extended to attach directly onto the last tail cone ordinate (2).

The rudder consists of an aluminum alloy torque tube (3), formed sheet metal ribs (4) and sheet metal panel cover (5) held in place by rivets.

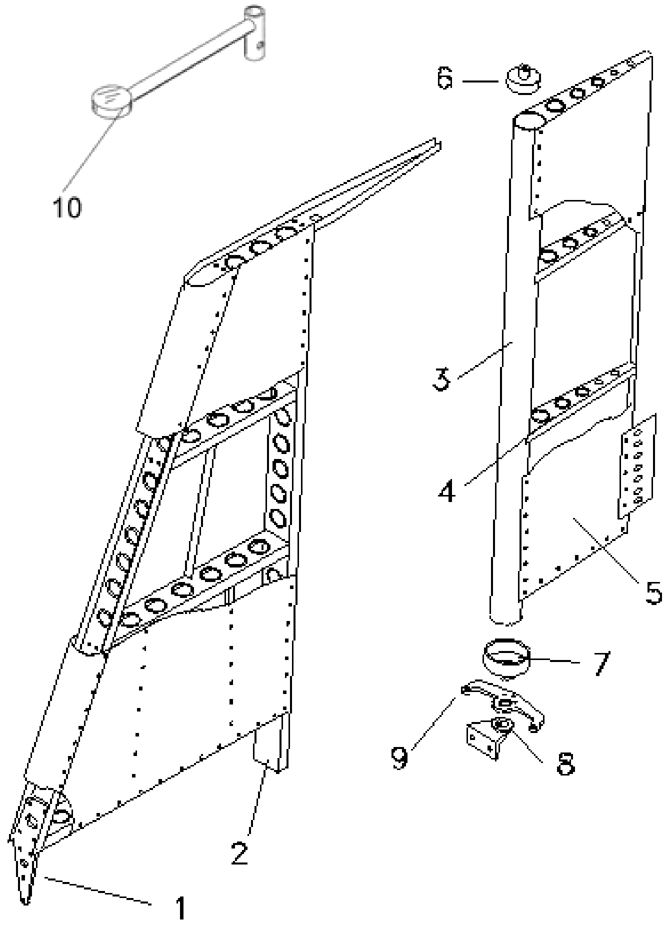


FIGURE C-8 VERTICAL STABILIZER, RUDDER AND SUPPORTS

The hubs (6) and (7) are to the ends of rudder provide by means of bushings (8) hinged rudder with vertical stabilizer. The lower hinge assembly is attached to a bellcrank controlled by cables from rudder pedals.

To the upper ends rudder torque tube is joined steel arm with, to the end, counterweight and rotate freely onto vertical stabilizer tip. In case tip isn't profile two plastic fairing (one of this removable) counterweight fitting in slot.

To remove rudder, after disconnected little stern and flying tail (see § 4), disconnect cables from bellcrank, remove lower bearing and release rudder with downward motion.

Control system layout (fig. C-9) is steel cable join rudder control lever with rudder pedals lever.

Rudder pedals (1) direct two transmission connection rod (3) close circuit rudder control and pass on the movement to the nose wheel leg via two threaded stem ball and socket joint adjustable push rods connections.

Cable tension must be checked periodically and adjusted to proper value (Tension = 20 daN ± 2) using the turnbuckles (4); condition and smooth operation of pulleys (5) must also be checked. To access levers and rudder pedals support, remove cabin's central tunnel; for speedier operation remove seats from railings.

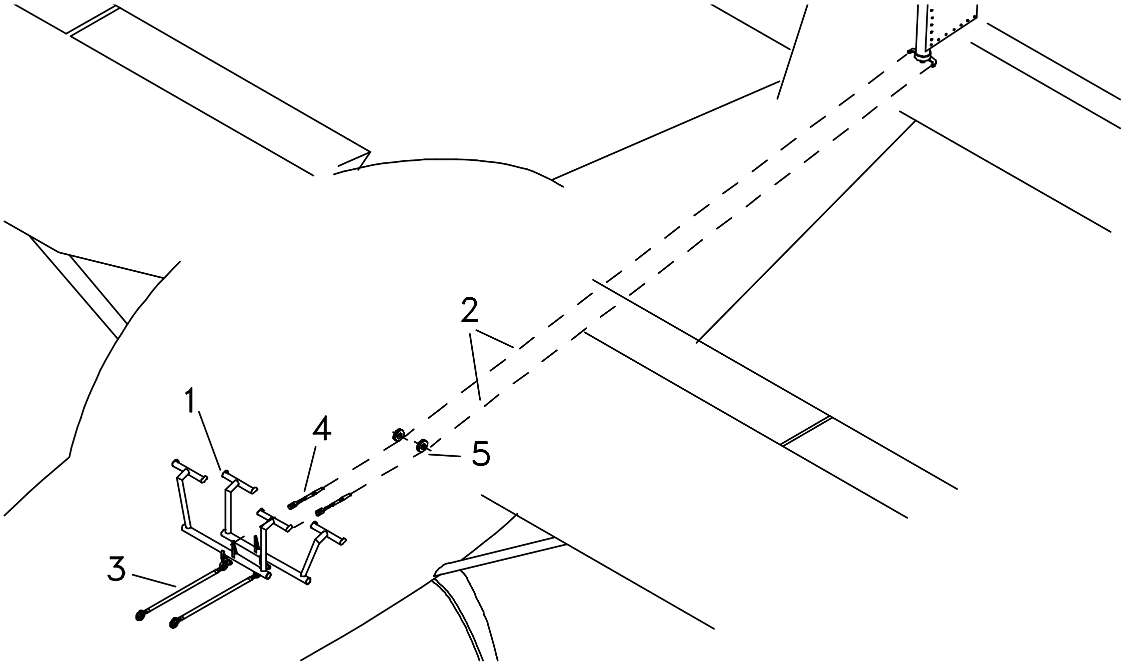


FIGURE C-9 RUDDER CONTROL

6 - FUSELAGE

The forward fuselage consist of a steel truss survival cell (fig. C-10) and of a light alloy semi-monocoque structure attached to the cabin's aft section.

Rear (fig. C-11) consist in a light alloy semi-monocoque structure. Four longitudinal structural elements trestlework connection allow. Tail beam rear end are two strut brackets of tail horizontal plane (2) and attachments vertical plane longeron on ordinate.

Framework shown in figure C-10 below, details location of attachment points for half-wing (1), aft structure (2), brace-strut (3), main gear (4), engine mount (5), flap torque tube (6), stabilator bellcrank (7), throttle (8) and pulleys for cable driven aileron control (9). Seat supports and safety harness attachment points are also shown.

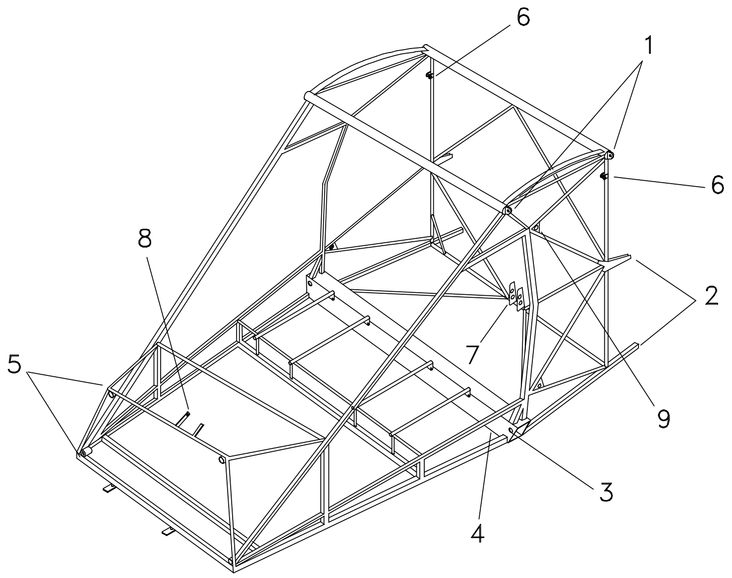


FIGURE C-10 CABIN FRAMEWORK

Engine mount is constructed of steel tubing and secured to fuselage with four-point attachment. Bolts travel through bushings welded on mount, cross firewall and exit through other bushings welded to fuselage framework. Nose wheel truss is integral part of engine mount.

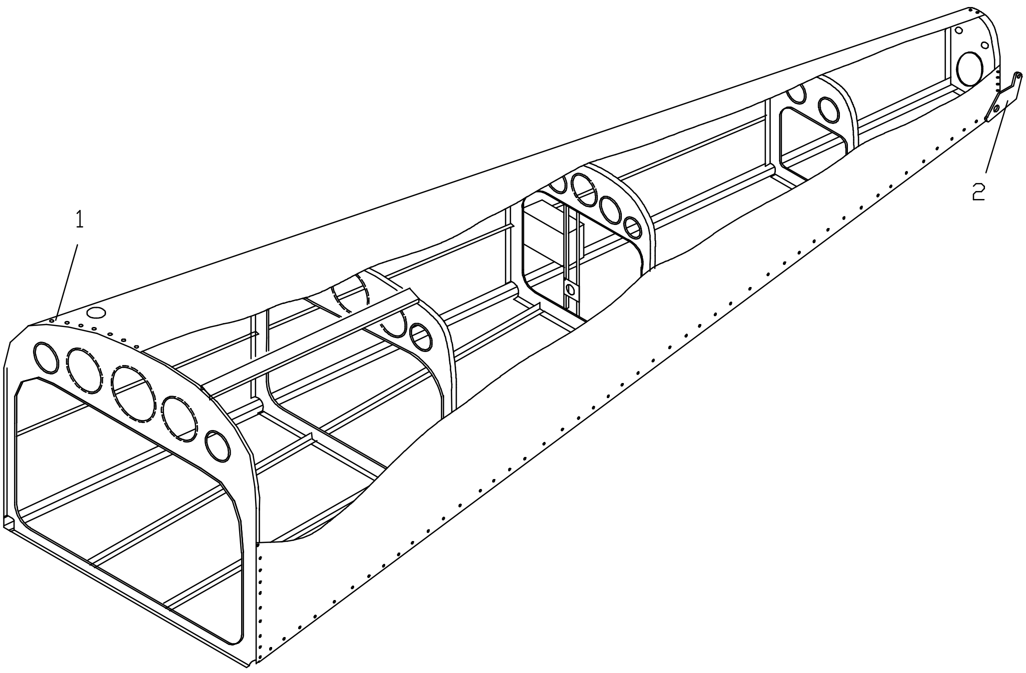


Figure C-11 Fuselage aft section

Cabin access is through two doors constructed of light alloy square tubing. A fiberglass structure, external, shaped for better comfort is riveted. Both doors feature spring lock door handles with inside safety latch.

Seats are make up in metal tubing framework with fabric covered padding. Seats can be adjusted along railings attached to fuselage using release lever positioned just below seat.

Floor matting is light alloy covered by a thin layer of carpeting.

Entire fuselage, wing and other exposed surfaces are finished with a highly resistant weatherproofing synthetic coating.

Wash using only soapy water and chamois.

NOTE

ALL PARTS IN PERSPEX MATERIAL MUST NEVER BE DUSTED DRY, BUT WASHED WITH LUKEWARM SOAPY WATER. IN ANY CASE, NEVER USE, ON THIS KIND OF SURFACE, PRODUCTS SUCH AS GASOLINE, ALCOHOL OR ANY KIND OF SOLVENT.

7 - LANDING GEAR

The main landing gear (see fig. C-12) consists of two special steel leaf-spring struts (1) for elastic cushioning of landing loads.

Gear struts are attached to fuselage underside at main framework girder.

Two shims (2,3) are positioned between gear struts and fuselage; struts are held in place by light alloy tie brackets (4) by means of bolts (5) and bolt (6) to the end.

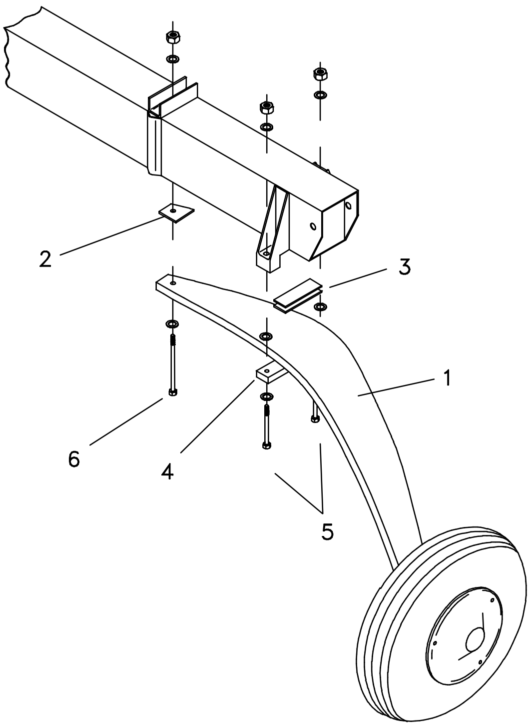


FIGURE C-12 MAIN GEAR

Wheels are cantilevered on gear struts and feature hydraulically actuated disk brakes (see fig. C-13) controlled by a lever (1) located on cabin tunnel between seats. Main gear wheels adopt **Air Trac A-A1D4**, **5.00-5** tires inflated at 23 psi (1.6 bar). Hydraulic circuit shut-off valve (2) is positioned between seats and, when off, activates parking brake function obtained pulling lever.

Braking is simultaneous on both wheels. Control lever (1) activates pump (3) that features built-in brake fluid reservoir (4); check valve (5) secure brake function when activated, unintentionally, parking brake.

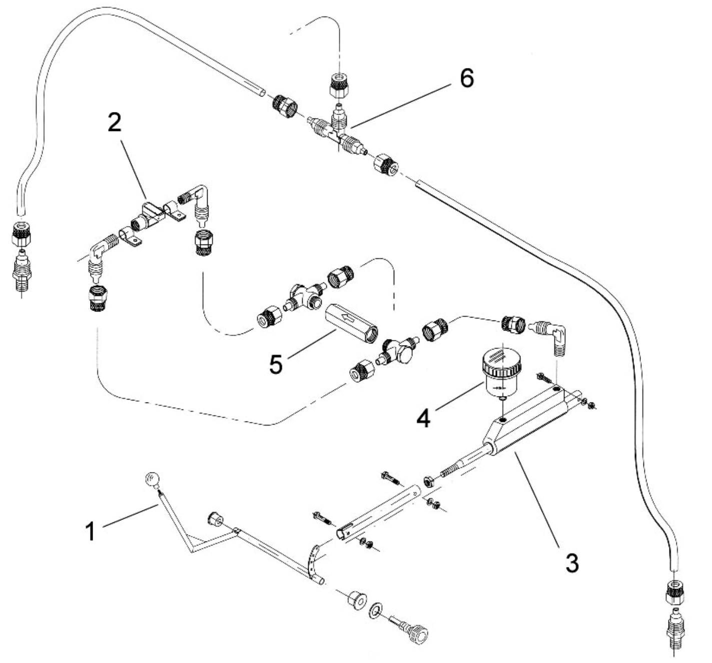


FIGURE C-13 HYDRAULIC BRAKE CIRCUIT

Removal of single gear strut is as follows:

A. Remove cabin seats by pushing them forward and off the railings;

B. Raise aircraft onto supports;

C. Close the shut-off valve (ref.2 in fig. C-13) without pull the brake lever (1); Do not activate brake lever (1) during the operation

D. Disconnect hydraulic brake circuit by unscrewing upper latch of external line on fuselage underside. Cap lines temporarily to prevent fluid spill;

E. Loosen bolts (part 5 fig. C-12) holding aluminum bracket (part 4 fig. C-12) at leaf springs lateral attachment;

F. Release inboard leaf-spring pin (part 6 fig. C-12) by unscrewing locknut on cabin girder;

G. Remove spring-steel strut pulling horizontally.

Reinstall using reverse procedure. It is however necessary to eliminate any trapped air: once the circuit is closed and fluid in reservoir is at normal level, bleed air through small valve provided. For best results pump hydraulic fluid through small valve allowing trapped air to escape through open reservoir.

If verify brake function decrease, provide check and substitution, eventually, main gear pads.

For this procedure refer to *Periodic Inspection Table* in Section B pertaining to main landing gear.

7.1 Main gear wheel removal (see fig. C14)

Removal of a single wheel is carried out as follows:

- *Landing gear*

  A. Lift aircraft (see sect. B).

  B. Disengage parking brake.

  C. Remove fairing (1, if installed) by loosening three rear screws (2) and the frontal screw (3).

  D. Remove the small screw (4) located on the aluminum support

  E. Remove hub ring nut (5)

  F. Grab tire with both hands and pull.

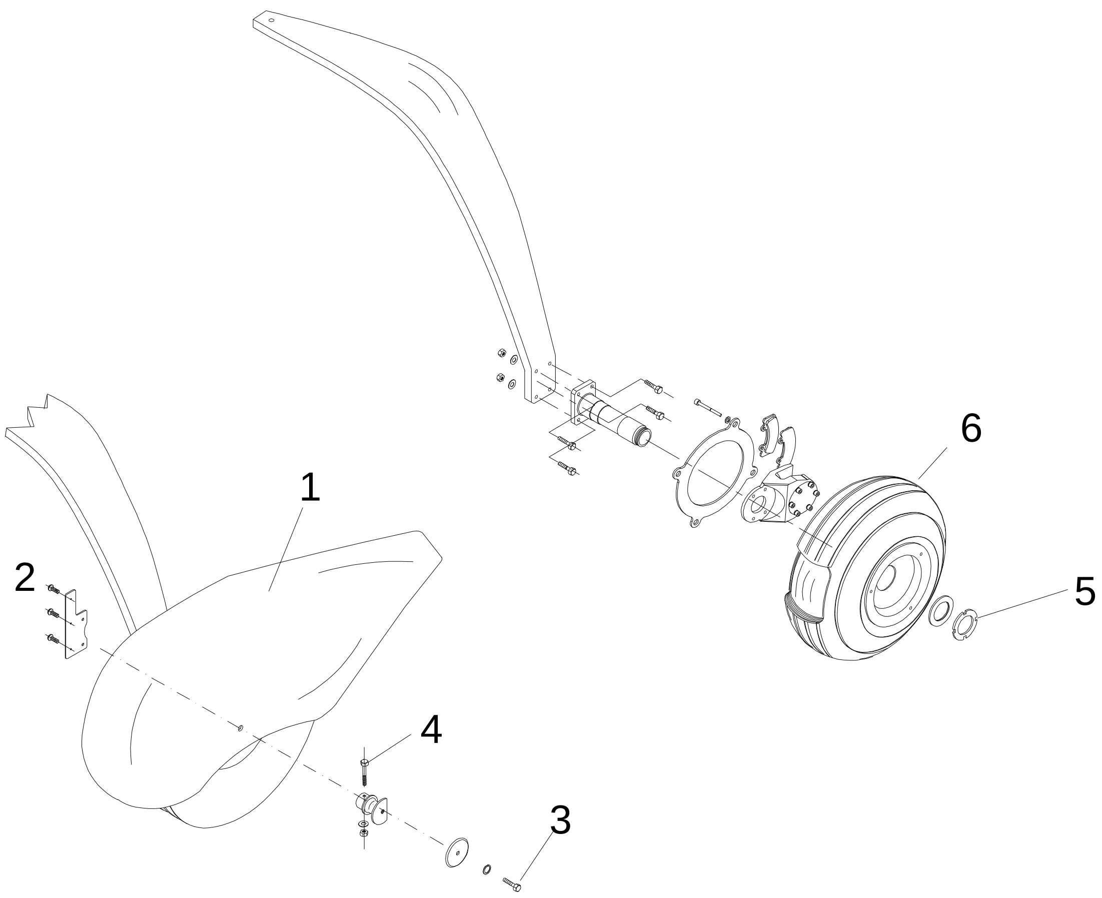


FIGURE C-14 REMOVAL OF MAIN GEAR WHEEL

7.2 Removal of main gear wheel bearing (see fig.C15)

Removal of a wheel bearing (taper roller bearing) becomes necessary when eccessive resistance occurs during wheel motion. Procedure is as follows:

- **A.** Remove the fairing (1)
- **B.** Unscrewing (4), remove the aluminum support use to fix the fairing.
- **C.** Unscrew the hub ring nut (5).
- **D.** By the use of a screwdriver, remove the hub washer and the dust-shield ring.
- **E.** Grab tire (6) with both hands and pull.
- **F.** Extracting the wheel the taper-roller bearing will be also removed.

Clean bearing accurately using an appropriate solution and wipe wheel rim side. Grease using FIAT ZETA2. Reverse procedure for mounting. Insert washers and felt by sliding them perpendicular to hole.

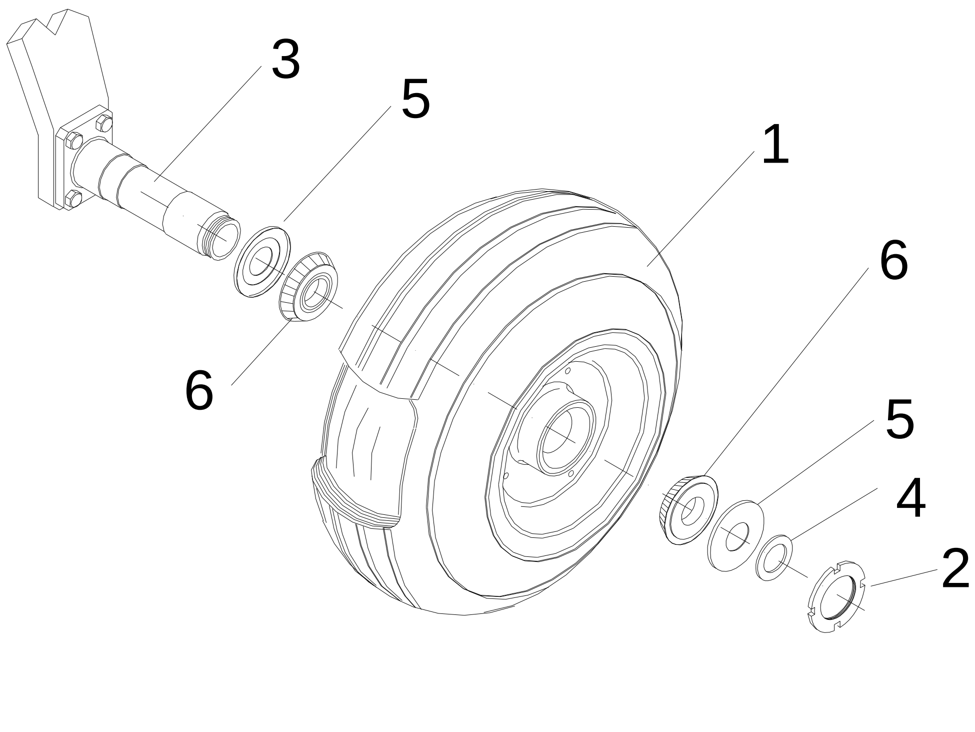


FIGURE C-15 REMOVAL OF MAIN WHEEL BEARING

7.3 Nose gear

The nose gear (fig. C-16) is attached to the engine mount with two hinges (1) and is equipped with a Sava 4.00-6 type tire.

Steering motion is transmitted from the pedals through two steering tubes that are attached to the nose gear strut by means of two brackets (2) welded to the strut.

Gear fork is made up of light alloy plates (4) & (5) and a spacer (6); it hinges on the strut leg and is braced by a rubber-disc shock absorber (3).

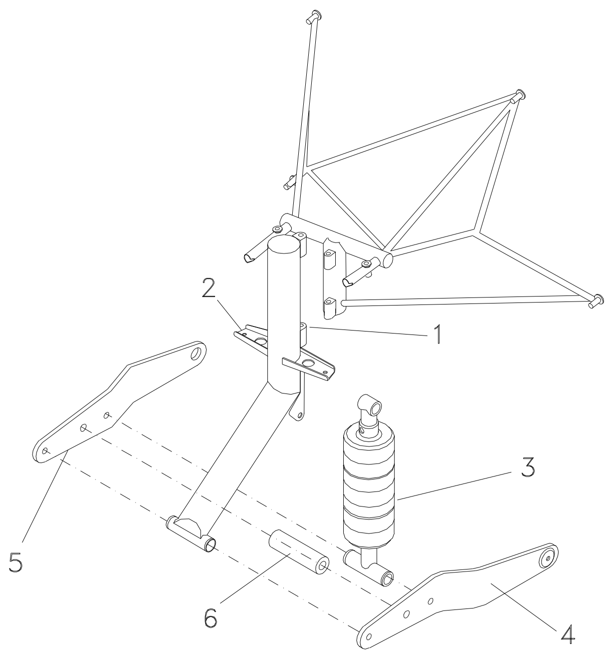


FIGURE C-16 NOSE GEAR ASSY

7.4 Removal of the nose gear fairing (if installed) and wheel (see fig.C-17)

To remove the nose gear fairings (if installed) proceed as follows:

- **A.** To remove front portions of fairing (5 & 6) loosen the screws (2) and (3)
- **B.** Remove the two fairings (6) and (5).
- **C.** To remove the rear upper fairing (4) loosen the screws (1)
- **D.** Unscrew nuts (7) and remove washer from wheel axle
- **E.** Unscrew bolt (8) in gear lever housing.
- **F.** Remove the rear fairing (9)

Reverse procedure to reinstall. Avoid damage to fiberglass fairing by not tightening screws excessively.

To remove nose wheel proceed as follows:

A. Remove the fairings (5) (6) and (9)
B. Loosen bolts (10), (11) and (13)
C. Detach the two wheel forks (12) from each other.
D. Remove wheel axle
E. Remove the wheel (13)

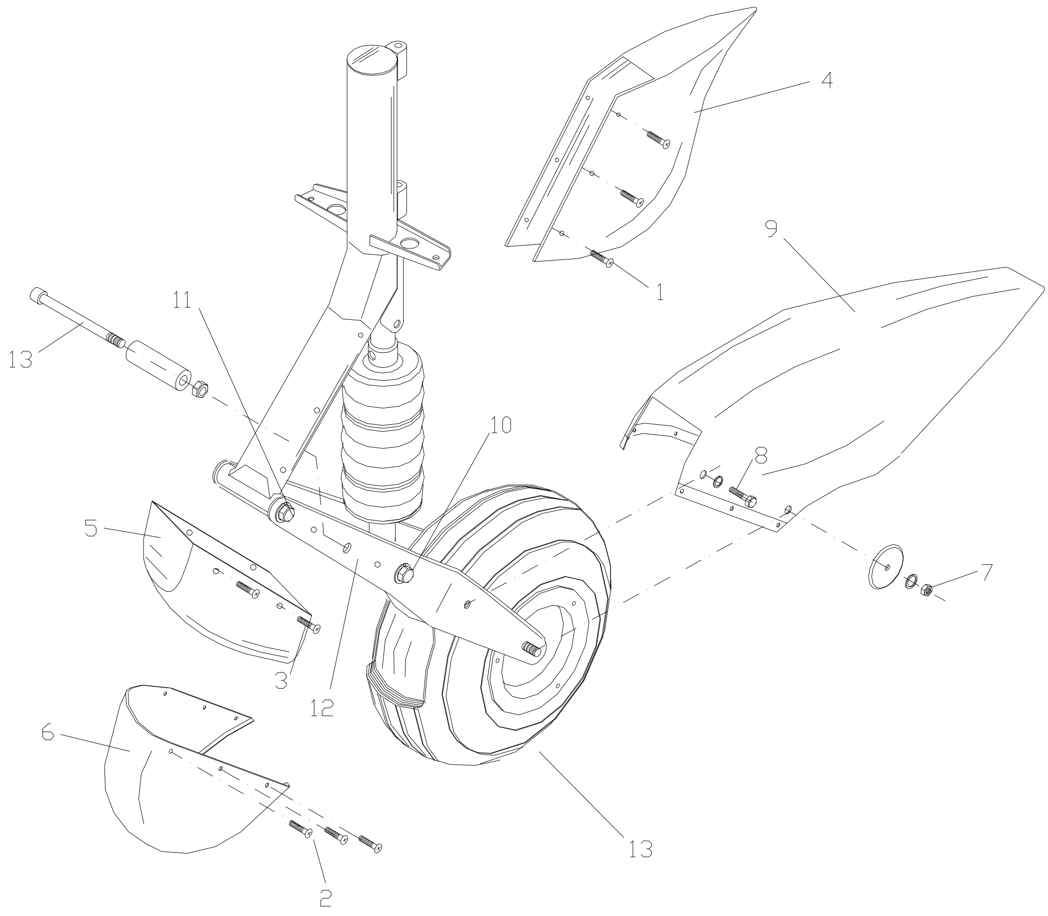


FIGURE C - 17 REMOVAL OF NOSEGEAR FAIRING

SUMMARY OF TIRE INFLATION PRESSURE

Nose tire	**15 psi**	**1.0 bar**
Main tire	**23 psi**	**1.6 bar**

SECTION D

POWERPLANT and PROPELLER

TABLE OF CONTENTS

1 - POWERPLANT

1.1 Cowling

Powerplant cowling consists of two parts: fiberglass nose section and light alloy panel on top and all fiberglass bottom.

Top cowling is easily removed by releasing four latches, two on each side.

Removal of lower portion is just as easy by quick release of two side pins and two latches located on bottom. Figure D-1 below shows cowling version featuring ram intake and landing light.

Before removing cowling, disconnect landing light wiring and ram intake air hose from heat exchanger (optional).

If any cracks are detected, immediately drill stop holes at crack ends. Air circulation is provided by front openings in nose section and by an outflow area on the underside by the firewall.

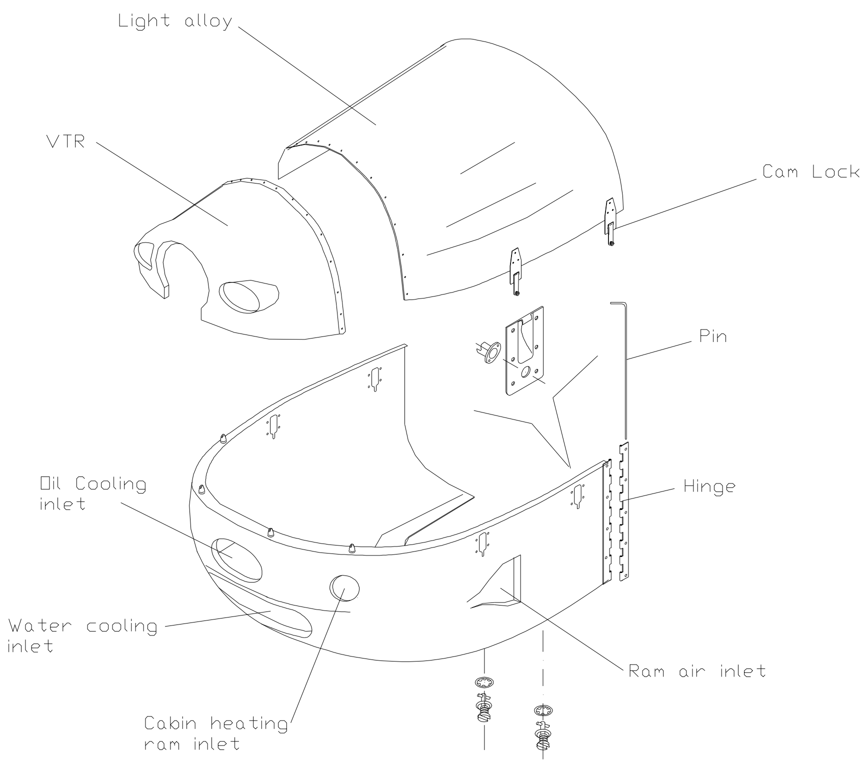


FIGURE D-1 ENGINE COWLING

1.2 Powerplant main features

The installed powerplant is a Bombardier-Rotax type 912 horizontally-opposed four-cylinder, one central camshaft with pushrods and OHV. Other features include liquid cooled cylinder heads and ram air-cooled cylinders. Prop drive is via reduction gear.

Electric starter, integrated AC generator and mechanical fuel pump are standard.

Technical data:

	912UL	**912ULS**
- Maximum power	81 hp (59.6 kW)	98.6 hp (73.5 kW)
- rpm @ maximum power	5800 rpm	5800 rpm
- Bore	79.5 mm	84 mm
- Stroke	61 mm	61 mm
- Displacement	1211 cm^3	1352 cm^3
- Compression ratio	9.0 : 1	10.5 : 1
- Firing order	1-4-2-3	1-4-2-3
- Direction of rotation of propeller's shaft	cw from pilot's perspective	cw from pilot's perspective
- Fuel	Please refer to: Rotax Operator's Manual	Please refer to: Rotax Operator's Manual
- Reduction ratio	1 : 2.273	1 : 2.4286

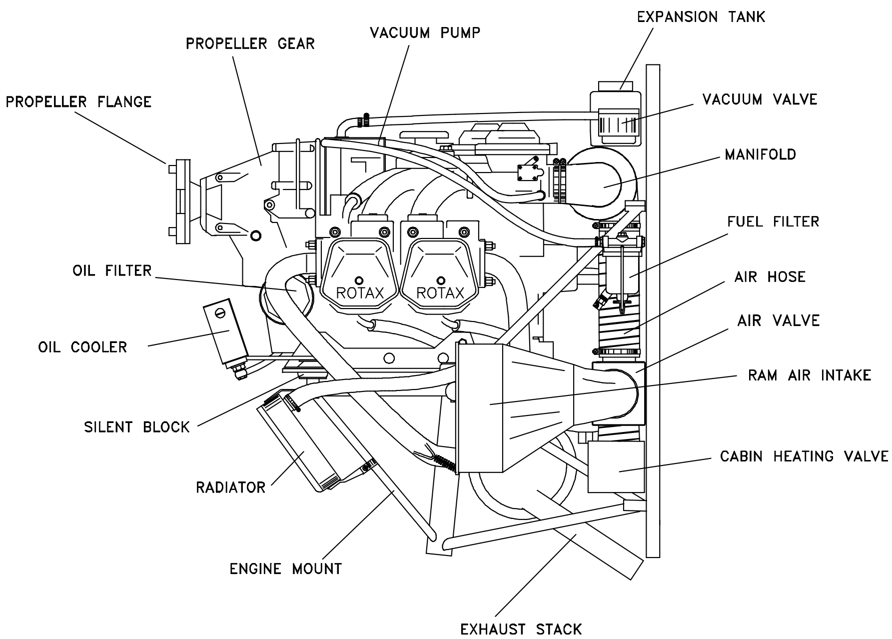


FIGURE D-2 *INSTALLED ENGINE WITH CARB HEAT SYSTEM*

2 - GENERAL SERVICING PROCEDURES

2.1 Idle speed synchronization

With the exception of idle speed synchronization, no other carburetor regulations are required. Fuel mixture is controlled and set by manufacturer and requires no further adjustment.

2.2 Ordinary servicing

For all servicing operations refer to the *Engine Operator's Manual* furnished by the engine's manufacturer and furnished along with the present manual.

3 - PROPELLER

The GT propeller is manufactured by "Fratelli Tonini" and is all-wood, with composite reinforced leading edge and blade protective finished with special lacquer coating.

3.1 Propeller removal

To remove propeller use the following procedure:

A. Remove screws holding spinner dome to spinner bulkhead.
B. Remove safetying.
C. Remove bolts that secure prop to hub.

After removal, do not lay propeller down on its tip but always lay flat and away from sources of humidity, heat or, in any case, away from areas subject to excessive temperature change.

3.2 Propeller installation

To install propeller, follow procedure below insuring propeller is correctly aligned with hub before tightening bolts:

A. Carefully clean hub area insuring no oil traces are present;
B. Check bolts for cracks, rust, proper thread and cleanliness;
C. Check spinner bulkhead for cracks or deformations;
D. Check spinner for cracks and deformations;
E. Install spinner bulkhead and prop;
F. Insert washers and fasten locknuts (bolt torque = **18 Nm**);
G. Safety all bolts;
H. Install spinner.

After correct installation of propeller, let the engine run for a few minutes and, after turning it off, carry out a further inspection (tightness, overall state, etc.).

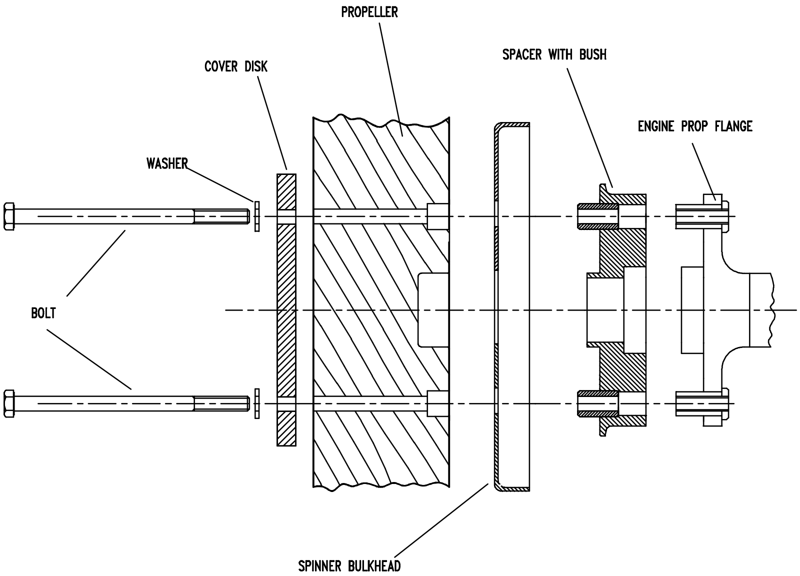


FIGURE D-3 *PROPELLER INSTALLATION*

3.3 Periodic inspection

Refer to specific subsection in the *Periodic Inspection Schedule* of Section B.

For further information refer to the *"Operator's and Servicing Manual for GT Propellers"* furnished by the propeller's manufacturer.

SECTION E

SYSTEMS

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1 - FUEL SYSTEM

The fuel system (see Fig. E-1) consists of two metallic fuel tanks (1) located in the wing's leading edge after wing-fuselage union. Each fuel tank has 35 liters capacity (optional 45 liters). On the upper external is refueling's cap (2), bay (3) for float (4) chamber and fuel tank bleed (5). Metal cover plate (6) may be removed for inspection of tank interior that assembly riveted and puttied with dope gasoline resistant. Return line discharged flange (7) of fuel system on the left fuel tank rear wall placed. At each fuel tank outlets are present (and serviceable by specific port holes) fuel mesh filters (8).

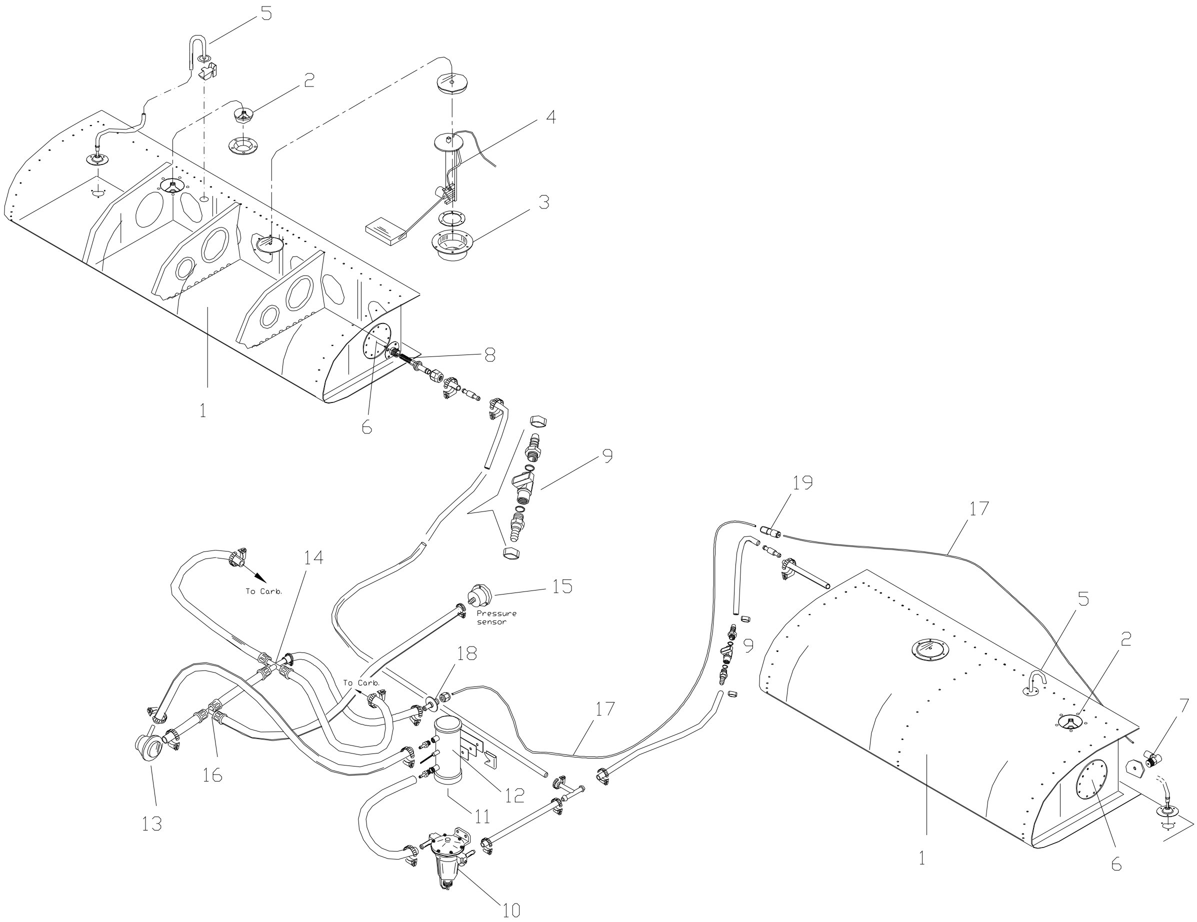
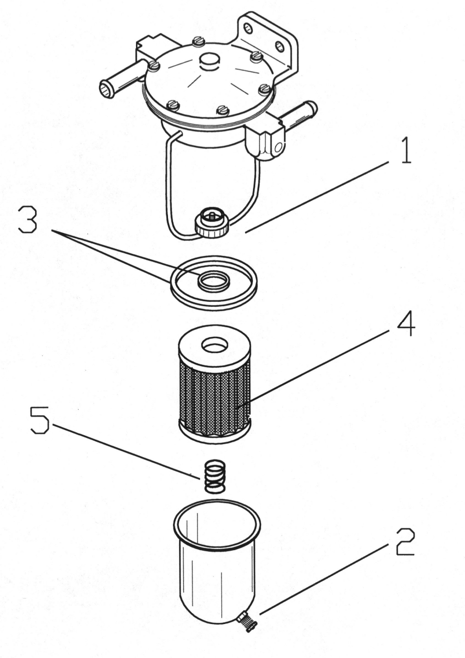


FIGURE E-1 FUEL SYSTEM

Diaphragm mechanical pump (13), engine connected, stoking provide by means flexible pipelines come to the fuel tank and across cabin vertical rods, easily accessible, after disassembled plastic structural. On the same cabin vertical rods are circuit on-off valve (9), one for each fuel tank, easily accessible to the pilot. Circuit link with union tee in correspondence of the firewall, and then to drainage bowl (10), located left upper side in the engine bay, visible through an upper cowling port.

Downstream respect to the gascolator is located a fuel filter (11) built in an electric fuel pump (12) and then the mechanical (13). Mechanical pump feeds the fuel manifold (14); its left branch feeds the left carburetor. In derivation a tee connector (16) with restrictor feed the fuel pressure gauge (15). The rear branch of the ”X” manifold (14) is connected to the fuel return line (17). In case of mechanical pump failure, electrical pump feed is available.



Return tube (17) engage in pipe fitting (18) located on the fire-wall and then by means a thin transparent tube return at the LH fuel tank.

Disassembled wing is necessary disconnect return tube by means pipe fitting (19). For release of pipe fitting’s little tube push in direction to the base knurled flange. For coupling to the tube insert in your seat.

Periodically check the fuel tank vent (5) to ensure that their openings are unobstructed; repeat inspection more frequently if operating in dusty conditions. It is recommended, for inspection purposes, to use a small rubber tube to blow through the vent clearing possible obstructions.

FIGURE E-2 GASCOLATOR

Drain gascolator daily (see Fig. E-2) using the spring tap (2). Unscrew ring nut (1) for disconnect bowl and accede at wire mesh filter (4), use particular care at don’t damage seal (3) and spring (1).

2 - INSTRUMENTATION

The instrument panel, realized in light alloy (see Fig. E-3), is imaginatively divided in three sections. The left section holds flight control instruments, the right section holds engine controls and the central section holds eventual communication and navigation instruments.

On lower part of instrument panel are the following:

- Magneto switches and switches for navigation lights, landing light and strobe light if installed;

- flap switch and circuit protection breakers;
- throttle knobs.

Individual instruments may be removed using particular care in disconnecting wiring, tubing or other linkage as the case applies.

When installing instruments, follow recommendations below:

A. Do not over-tighten bolts as plastic instrument casing may break.

B. Insure hoses are free of any foreign matter and that no tight radius turns are present as this may choke hose or cause malfunction.

C. Insure proper grounding and tightening of all electrical instruments.

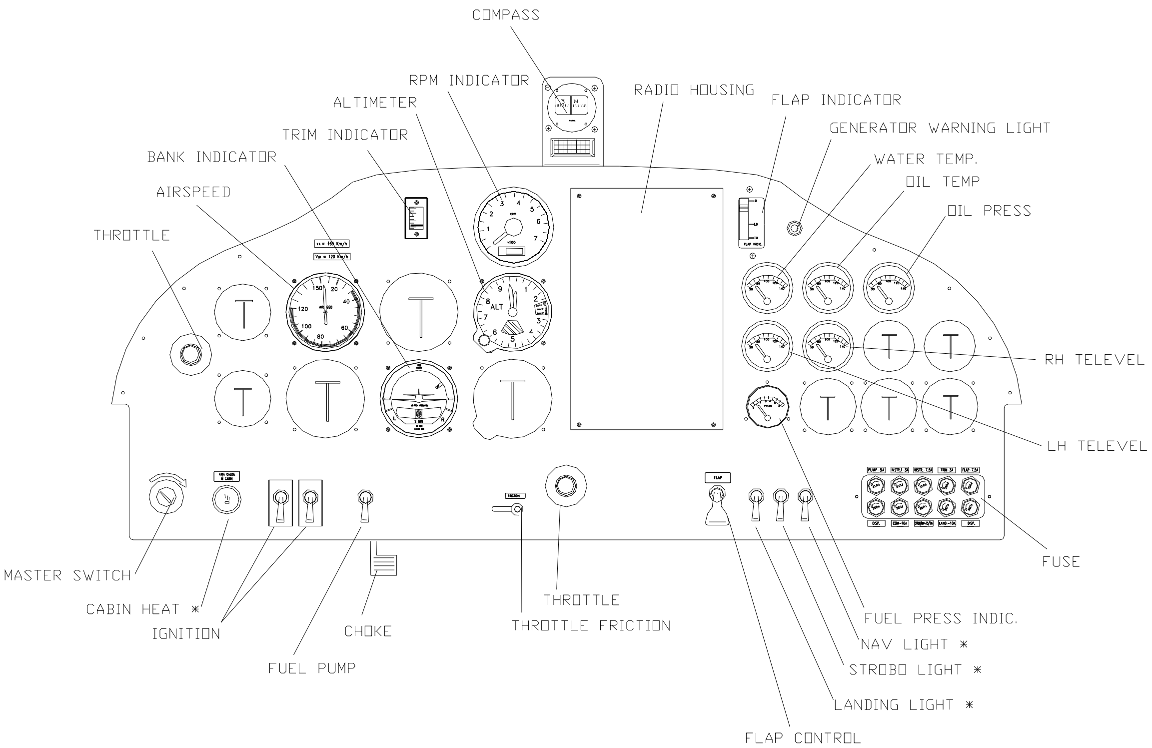


FIGURE E-3 INSTRUMENT PANEL

Repair, calibration or overhaul of instruments must be carried out only by <u>specialized</u> stations.

2.1 - Engine instrumentation

- An electric tachometer is installed;

- An electric oil temperature indicator is installed. The sensor is located on the oil pump tube and is marked with "TO" on the pump flange.

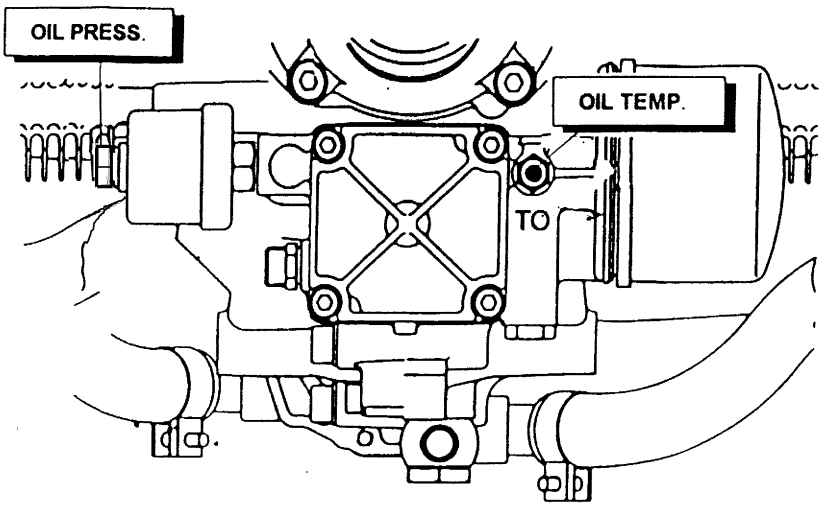


FIGURE E-4 SENSORS FOR PRESSURE AND OIL TEMPERATURE

- An oil pressure instrument is installed. See fig. E-4 for sensor location.

- Cylinder head temperature sensors are located on cylinders 2 or 3 and are linked with relative instrumentation.

- LH and RH fuel level sensors.

3 - PITOT AND STATIC SYSTEM

Referring to figure E-5, system consists of a pitot tube (1) mounted on left wing strut and two static ports (2) connected in parallel (3) and located on left and right side of fuselage just ahead of door frames. Flexible plastic tubing connect pitot and static ports to pressure instruments.

Servicing the system is easy and is carried out in accordance with Section B; simply remove tubes from instruments and blow air in tube in port direction and never viceversa, clearing possible obstructions and checking line condition.

Check visually and more frequently pitot tube on left strut (1) and static ports (2) clearing possible obstructions.

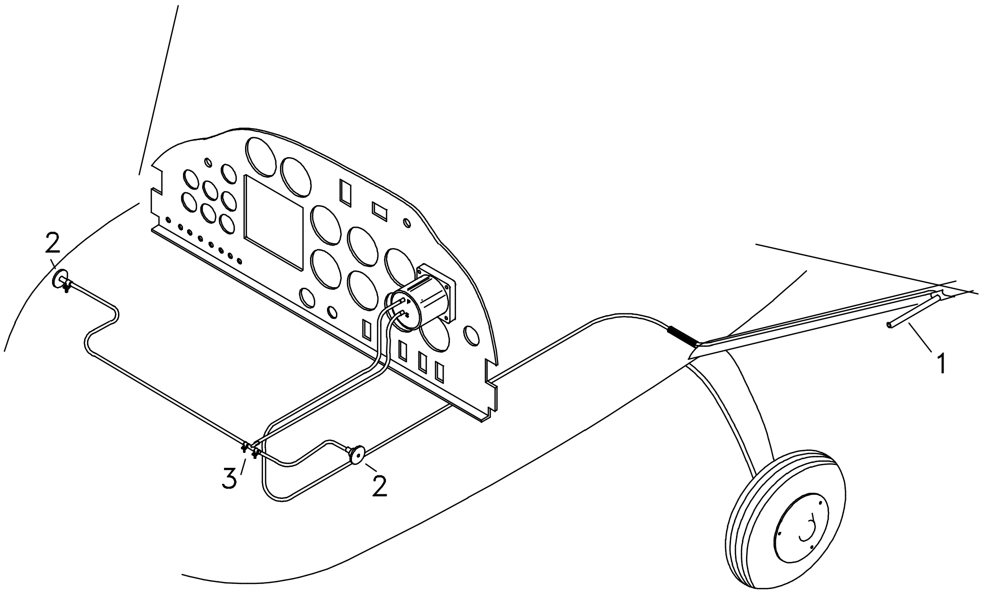


FIGURE E-5 PITOT AND STATIC SYSTEM

For safety reasons and to ensure correct airspeed readings, it is important to check the pitot system for leaks adopting the following procedure:

Fasten a piece of rubber hose approximately 30 centimeters long to the pitot tube, close off the opposite end of the hose and slowly roll it up until the airspeed indicator shows cruise speed. Constant reading is an indication of no leak in system.

CAUTION

Avoid blowing air through pitot or static ports, as this causes immediate damage to the airspeed indicator.

4 - EXHAUST MANIFOLDS

With reference to figure E-6, exhaust manifolds (1) are flanged to the engine and join the muffler (2) separately. The muffler also works as a heat exchanger (3) for carb and cabin heat (optional).

The exhaust system must always be checked for possible cracks. Close attention must be given to the heat exchanger system which should be totally disassembled for inspection as cracks would allow noxious fumes to be mixed with cabin air.

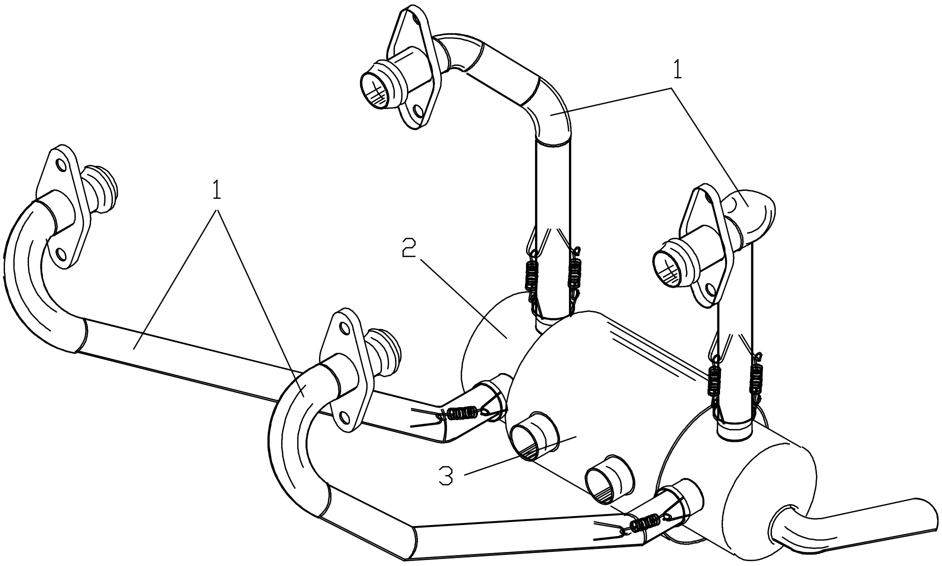


FIGURE E-6 EXHAUST MANIFOLDS

5 - CARBURETOR HEAT AND CABIN HEAT *(optional)*

Two different systems are available:

- CABIN HEAT ONLY

  This heat system (see Fig. E-7) consists of the above mentioned heat exchanger (3), of an intercept valve (4) and of an outflow hatch (1) located in rudder bar proximity, and *(optional)* two defogging otuflow openings (2).

  The intercept valve, located externally on lower part of firewall is controlled by a round knob located on lower left side of dashboard.

- CARBURETOR HEAT AND CABIN HEAT

  Carburetor heat is controlled by a valve located in the airbox that switch This system is designed to direct carb air intake from scoop and manifold located on top portion of firewall. Using a central valve (*air valve* in fig. E-7) hot air from heat exchanger may be deviated towards carburetors.

The valve, is controlled by a round knob located centrally on dashboard.

The heating system does not require particular servicing except for periodic check of heat exchanger and of intercept valve whose faulty closure may cause unwanted heat to enter cabin.

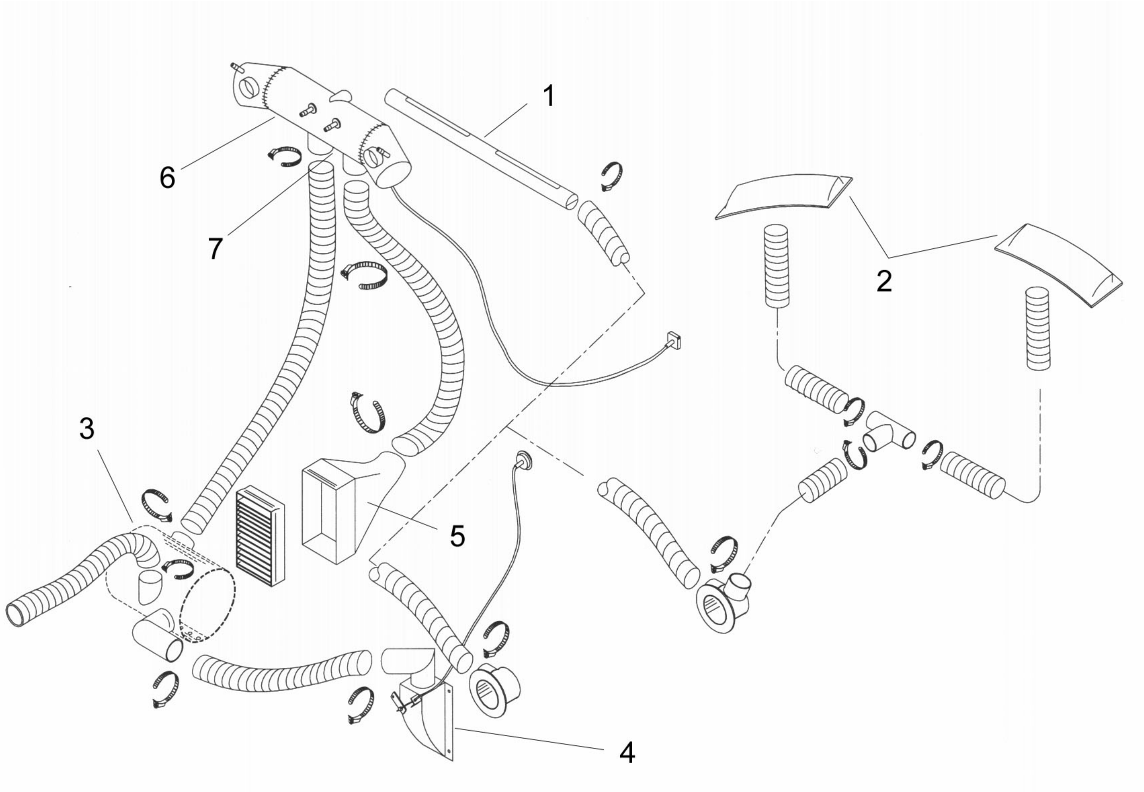


Figure E-7 CARBURETOR HEAT AND CABIN HEAT SYSTEMS

6 - BRAKE SYSTEM

The brake system (see fig. E-8) consists of a brake fluid reservoir (4), a master cylinder (3) and two disc brakes; an intercept valve activates parking brake (2).

Braking action is through a lever (1) located on cabin tunnel between seats. Hydraulic circuit intercept valve is also located between seats and, when closed with lever pulled, keeps circuit under pressure and aircraft's parking brake on. It is also installed a check-valve (5) that provides braking action even if the parking brake valve (2) is shut.

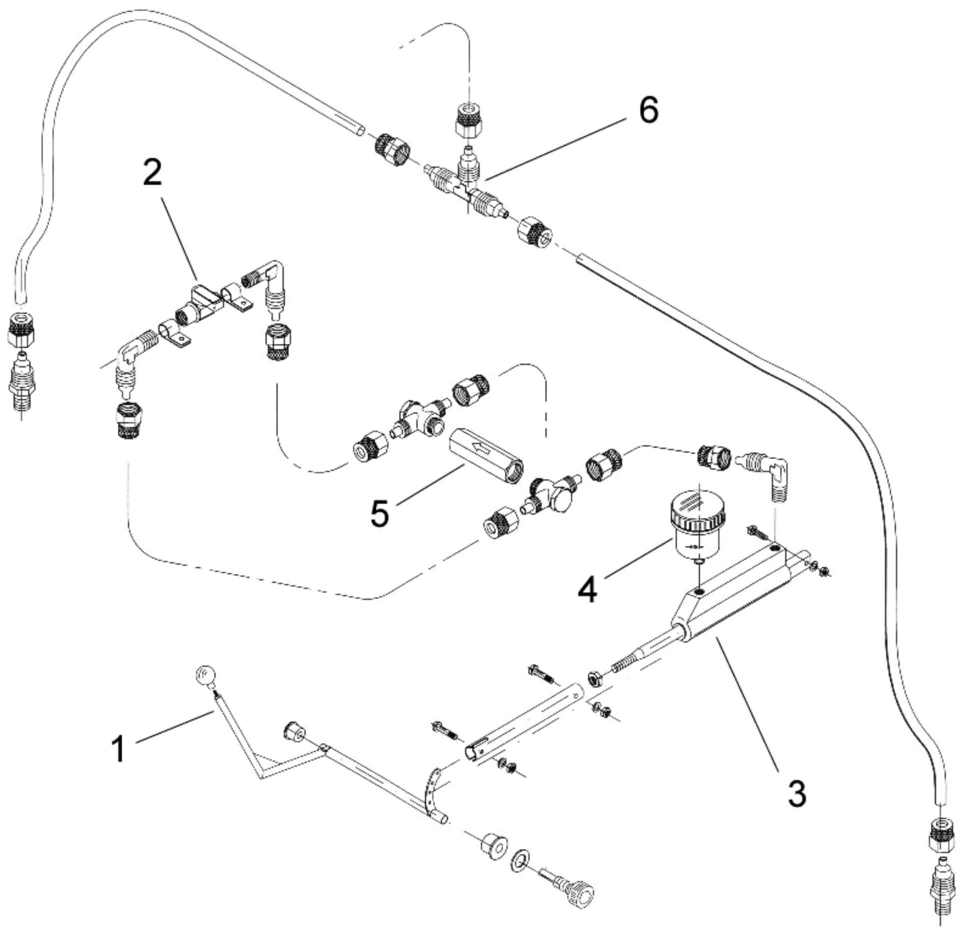


Figure E-8 BRAKE SYSTEM

6.1 - Draining and replacing brake fluid

Service one side first, then other;

A. Remove reservoir cap;

B. Unscrew line nipple from disk caliper;

C. Using a manually operated pump, add brake fluid **UNIVIS J43** until level reaches bottom of reservoir, reattach line to caliper avoiding fluid spill.

D. Repeat operations A, B, C on opposite side of aircraft.

E. Add fluid to reservoir up to 3/4 level and close cap.

To drain system proceed as follows:

F. Pull brake lever (1) to pressurize circuit;

G. Loosen small escape valve and release oil spurt;

H. Close small valve and release brake lever.

I. Repeat operations F, G and H until oil comes out clean and no longer in spurts proving absence of air bubbles.

J. Add oil used for drainage to reservoir;

K. Close reservoir and repeat operation for other brake.

Hydraulic fluid may also be replaced using gravity after disconnecting the circuit. *This method is however more laborious and less safe.*

6.2 - Replacing brake pads

When thickness of lining is less than 2.4 mm, brake pads should be replaced using the following procedure:

A. Release parking brake;

B. Remove (optional) fairings to expedite operation

C. Loosen bolts (2) from caliper (1);

D. Remove brake pads (3);

E. Replace brake pads.

F. Reassemble.

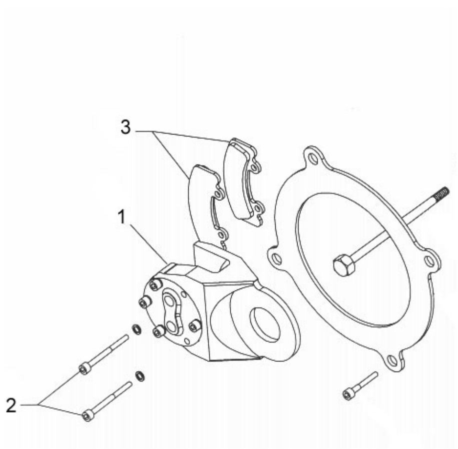


FIGURE E-9 BRAKE CALIPER

7 - ELECTRICAL SYSTEM

Electrical energy is supplied by a 12-volt direct-current system. Energy is supplied by an engine-driven generator and by a buffer battery.

The 18 Ah capacity battery, is located in a distinct compartment on the right side of the tail cone. The compartment is suitably drained and vented, and access is through a small hatch secured by a screw.

Every 50 hours, or more often during summer, add distilled water to keep electrolyte at correct level. Battery elements must be completely submerged.

Before installing battery, accurately clean support removing any trace of electrolyte and insure that drain tube is free from obstructions. Use sodium bicarbonate solution for cleaning purposes.

Make sure battery terminals are in proper condition and apply Vaseline. Insure Master switch is OFF before connecting cables. Also insure that no sulfuric acid comes into contact with the aircraft's structure. In case this should occur, rinse accurately using soap and water.

Generator is permanent magnet type. DC conversion is via an electronic regulator with integrated rectifier. Generator servicing and repair must be carried out by specialized personnel.

Circuit protection is through fuses located on right lower side of dashboard. The drawing below shows position and capacity of fuses used.

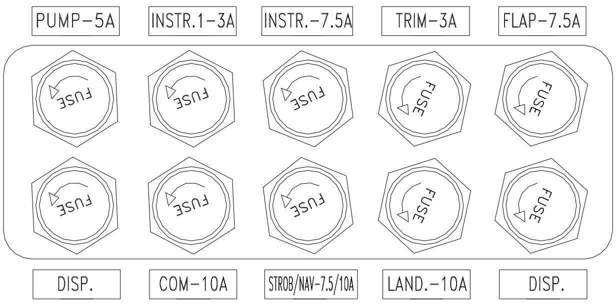


Figure E-10 *Fuses*

In case of failure of one or more utility, load is automatically interrupted by circuit protection: proceed as follows:

A. Exclude all loads relative to burnt fuse.

B. Close circuit by substituting the burnt fuse.

C. Restore one by one all loads relative to the burnt fuse until circuit protection shuts down again.

This new interruption will indicate faulty utility

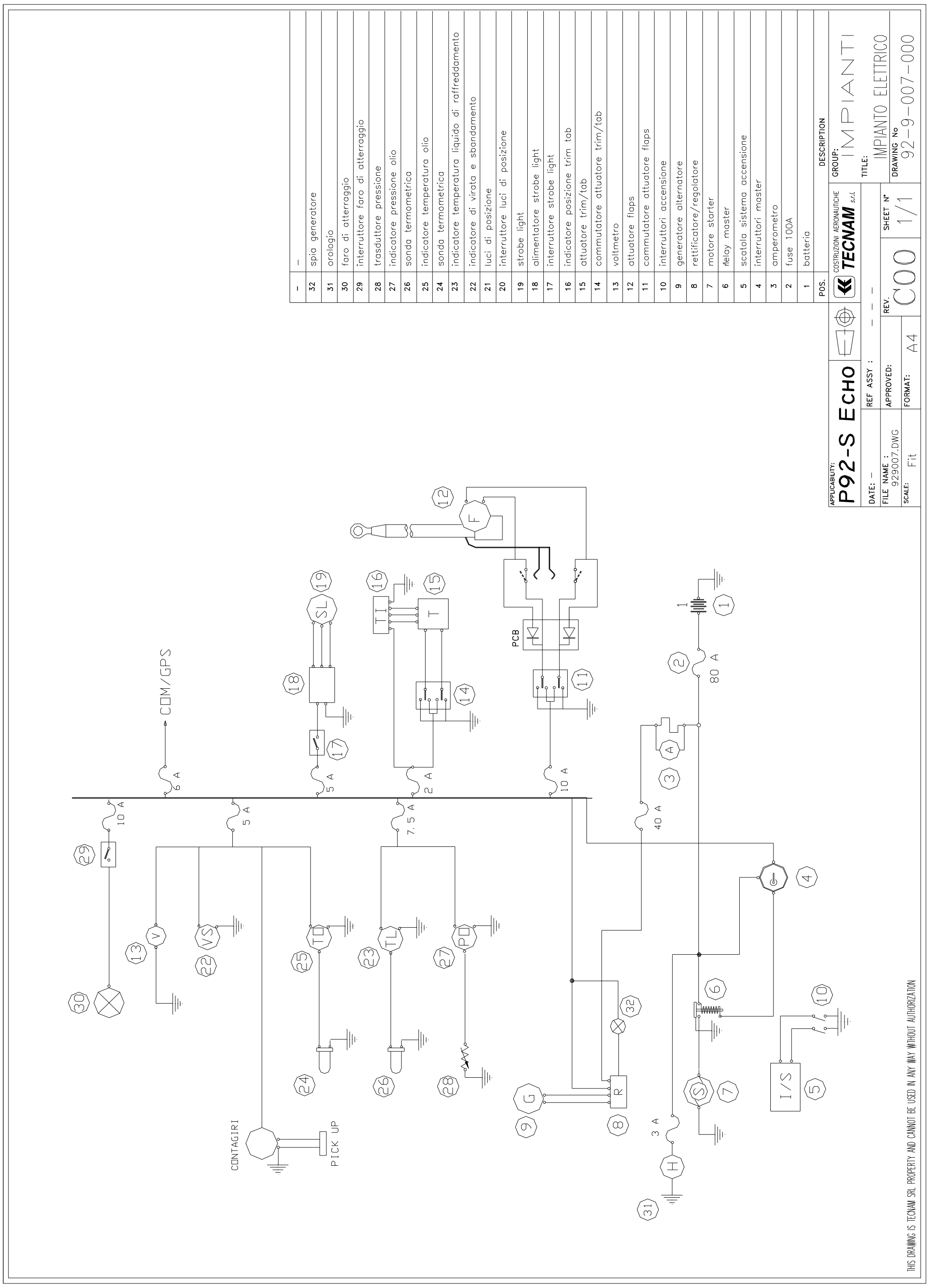


FIGURE E-11 ELECTRIC CIRCUIT LAYOUT

8 - EMERGENCY PARACHUTE SYSTEM *(optional)*

The system's main components (shown in figure E-12 below) include a capsule located inside the launch tube and set-off by pyrotechnic charges and a nylon container that houses the parachute rigged, in turn, to a cable attached to the cabin's metal framework. A flexible command cable is attached to bottom of launch tube, crosses the aft cabin bulkhead, passes below floor matting and reappears on dashboard connected to trigger control.

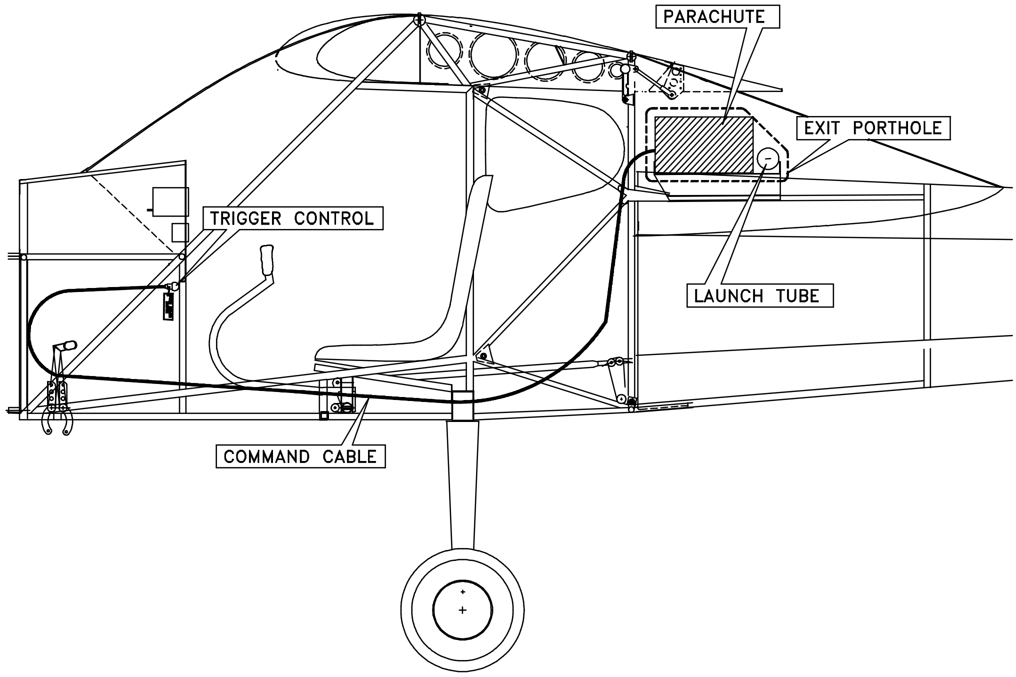


FIGURE E-12 PARACHUTE INSTALLATION

Remove safety pins from trigger control before each flight and reposition immediately after landing. Check flexible command cable periodically insuring cable is not bent excessively along route. With reference to parachute Operator's Manual (furnished to client), check periodically proper condition of pyrotechnic charges, integrity of main support cable and proper attachment to cabin framework. Check periodically parachute exit hatch and, if found unglued (because of accidental hits or other) reattach using two-face adhesive tape as that used for upholstery; do not use silicone or other strong adhesive.