MAINTENANCE MANUAL

UL

P92 Echo Super

Manufacturer

COSTRUZIONI AERONAUTICHE TECNAM S.r.l.

Serial number: 742
Build year: 4/2003
Registration: 24-3901

The aircraft is to be operated and maintained in compliance with information and limitations contained herein.

Revision Date: 10-29-2007	
Revision Number: 3.01	

Record of Revisions

Any revisions to the present Manual, except actual weighing data, must be recorded in the following table.
New or amended text in the revised pages will be indicated by a black vertical line in the left-hand margin; Revision No. and date will be shown on the left-hand side of the amended page.

Log of Revisions

Revision No.	Date released	Chapters	Approved By
1.0	03-30-2005	All	Tecnam
2.0	12-30-2006	All	Tecnam
2.01	04-11-2007	1	Tecnam
2.02	06-13-2007	2	Tecnam
2.03	08-12-2007	3	Tecnam
3.00*	10-29-2007	All	Tecnam
3.01	02-02-2009	3	Tecnam

NOTE

* Extensive revisions to entire manual. Read entire contents.

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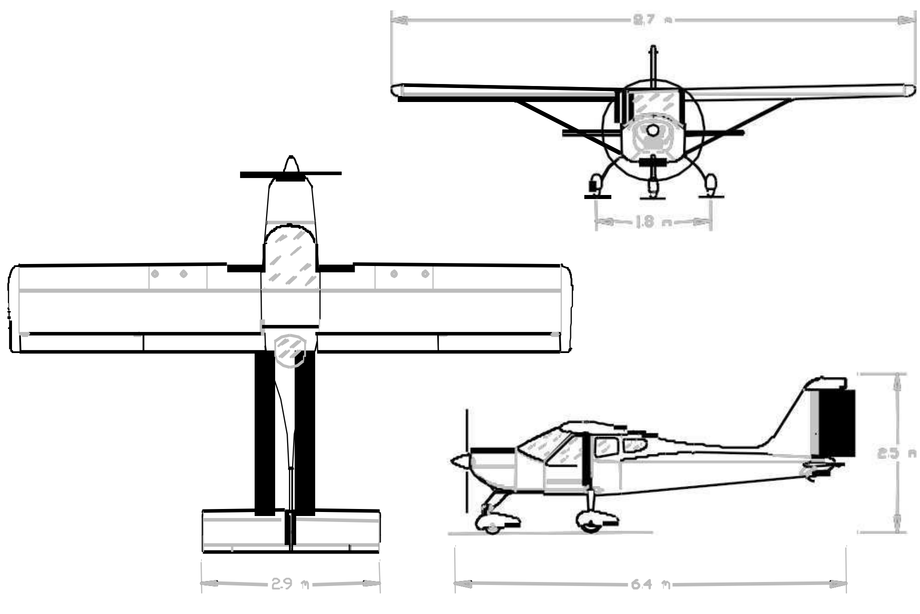
1 Introduction

Before servicing the aircraft, we recommend careful reading of this manual, the flight manual, the propeller manual, and the engine"s service manual. A thorough knowledge of the aircraft, of its qualities, and of its limitations will allow you to operate with greater safety.
The P92 Echo Super is an uncomplicated and sturdy machine 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 Super will accompany you dependably for a long time with optimal performance in absolute safety.
This manual consists of 8 sections; a table of contents in section 1 will allow you to reach any selection quickly.
Information contained herein is based on available data at time of publication; possible variations shall be presented in service directives.
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.

SECTION 2
GENERAL



2.2 Descriptive Data

2.2.1 Airframe

2.2.1.1 Wing

Wing span	8.70 m (28.54")
Wing area	12 m^2 (129 sq ft)
Aspect ratio	6.31
Taper ratio	1.0
Wing chord	1.400 m (4.6")
Flap span	1.970 m (6.463")
Flap chord	0.390 m (15.35")
Aileron span	1.505 m (4.937")
Aileron chord	0.385 m (1.263")

2.2.1.2 Fuselage

Overall length	6.4 m (21")
Overall width	1.1 m (43")
Overall height	2.5 m (8.2")

2.2.1.3 Empennage

Stabilator span	2.900 m (9.5")
Stabilator area	1.972 m^2 (21.2 ft^2)
Stabilator cord	0.680 m (26")
Vertical tail span	1.230 m (3.9")
Vertical Stabilizer area	0.720 m^2 (2.36 sq ft)
Rudder area	0.350 m^2 (1.48 sq ft)

2.2.1.4 Landing Gear

Wheel track:	1.800 m (5.9")
Wheel base:	1.600 m (5.2")
Main gear tire: Air Trac	5.00-5
Wheel brakes: Marc Ingegno	199 - 102
Nose gear tire: Sava	4.00-6

2.3 Systems

2.3.1 Engine

Manufacturer:	Bombardier-Rotax GmbH
Model	912 ULS or 912 S2 (optional)
Certification basis	ASTM F2239 or FAR 33
Austrian T.C. No.	TW 9-ACG dated 27th November 1998
Type:	4 cylinder horizontally opposed twins with overall displacement of 1352 c.c. mixed cooling, (water-cooled heads and air-cooled cylinders), twin carburetors, integrated reduction gear with torque damper.
Maximum rating:	98.6hp (73.5kW) @ 5800 rpm/min (2388 rpm/min. prop). Gear reduction ratio - 2.4286:1
Max oil consumption	Max: 0.1 liters/hour

2.3.2 Propeller

Manufacturer:	GT Tonini
Model:	GT-2/173/VRR- FW101 SRTC
Number of blades:	2
Diameter:	1730 mm (68”) (no reduction permitted)
Type:	Fixed pitch – wood / composite

2.3.3 Fuel

Fuel grade:	Min. RON 95 Auto Fuel (AKI 91 Premium USA) AVGAS 100LL
Fuel tanks:	2 integrated wing tanks
Capacity of each wing tank	35 liters (9.2 gal) (optional 45 liters) (11.9 gal)
Total capacity	70 liters (18.49 gal) (optional 90 liters) (23.8 gal)
Total usable fuel	66.8 liters. (17.64 gal) (86.8 liters) (22.93 gal)

2.3.4 Oil System

Oil system:	Forced, with external oil reservoir
Oil:	See Rotax operator˝s manual
Oil Capacity:	Max. 3.0 liters (3.2 qt) – min. 2.0 liters (2.1 qt)

2.3.5 Cooling

Cooling system:	Mixed air and liquid pressurized closed circuit system
Coolant:	See Rotax operator˝s manual

2.4 Weights

2.4.1 Maximum Weights

Maximum take-off weight:	600 kg (1320 lbs)
Maximum landing weight:	600 kg (1320 lbs)
Maximum baggage weight	20 kg (44 lbs)

2.4.2 Standard Weights

Empty weight	325 kg (716 lb)
Maximum payload weight	275 kg (604 lb)

2.4.3 Specific Loadings

Wing Loading	50 kg/m^2 (10.2 lb/ft^2)
Power Loading	6 kg/hp (13.2 lb/hp)

NOTE
Standard weights are estimates based on standard equipment.

2.5 Instructions for Reporting Possible Safety of Flight Concerns

Email to info@tecnam.co.nz the following information:

- Aircraft Make, Model, Serial Number
- Engine Make, Model, Serial Number
- Date of Inspection
- Total Time:
- Airframe
- Engine
- Description of the un-airworthy items found
- Owner of Aircraft

2.6 Source to Purchase Parts

Spare parts can be ordered from Tecnam Australasia Ltd. info@tecnam.co.nz or from your local dealer.

2.6.1 List of Disposable Replacement Parts

Air filter.......................... Rotax PN 825551
Fuel filter......................... Facet filter, Aircraft Spruce PN 479729
Oil filter.......................... Rotax PN 924420
Nose wheel tire................ Sava 4.00-6 type tire and tube or may be replaced with a similar size aircraft tire or tube
Main gear tire.................. Air Trac 5.00-5 type tire and tube or may be replaced with a similar size aircraft tire or tube
Oil.................................... See Rotax manual
Coolant............................ See Rotax manual

2.6.2 Standard Equipment

Flight Instruments
Airspeed Indicator, Altimeter, Vertical Speed Indicator, Compass
Engine instruments
Tachometer, Oil Pressure, Fuel Pressure, Oil Temperature, Cylinder Head Temperature, Hour Meter, Left and Right Fuel Quantity, Volt Meter
Warning Lights and Indicators
Trim Indicator, Flap Indicator, Generator Warning Light
Controls
Dual Stick Flight Controls, Rudder Pedals, Dual Throttles, Throttle Friction Control, Engine Choke, Electric Flaps, Hydraulic Disc Brakes with Parking Brake, Left and Right Fuel Selector Valves, Direct Nose Wheel Steering
Interior
Adjustable Pilot and Copilot Seats, Acoustic Cabin Soundproofing, Adjustable Cabin Air Ventilators, Steel Roll Cage, Cabin Heat and Windshield Defrost, 12V Power Outlet, Metal Instrument Panel
Exterior
All Aluminum structure, Landing Light, Strobe Light, Fixed Landing Gear, Nose Gear Strut Fairing, Nose and Main Wheel Fairings
Powerplant and Accessories
Rotax 912 ULS Engine (100 hp), Composite Covered Wood Propeller with Spinner, 12Volt 18 Ah Battery, internal 18 Amp AC generator, Engine Driven Fuel Pump, Electric Starter, Engine Exhaust Muffler, Gascolator with Quick Drain, Integral Wing Fuel Tanks, All Electric Circuits Fuse Protected

SECTION 3
INSPECTION & SERVICING

3 Inspection and Servicing

3.1 Ground Handling

Move the aircraft on the ground by pushing on the wing struts close to wing attachments or by pulling on the propeller blades close to hub. It is preferable to use a tow bar. A tow bar can be attached to fittings provided on nose gear fork.
Aircraft can be steered using the rudder or, for sharp turns, by lowering the tail to raise the nosewheel off the ground. In this case, owing to the favorable CG location, a gentle push on the tailcone just ahead of empennage surfaces is all that is needed. Avoid dragging nosewheel sideways and do not attempt to counter any movement of the aircraft by handling it by its wing tips.

3.2 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 damage to control surfaces.

3.3 Jacking

Given the light empty weight of the aircraft, lifting one of the main wheels can be easily accomplished even without the use of hydraulic jacks. Remove the aluminum panel located between the steel springs and, while one person lifts one half-wing by acting on the wing spar immediately before the wingtip, another person will place a suitable stand with protective cover under the steel spring attachment.
If one of the steel springs needs to be removed, the support stand must be positioned in the specific location along the landing gear support beam (do not place support against lower aluminum panel as doing so would deform and damage the panel). Prevent possible tip-over of the aircraft by placing a suitable stand to rear of aircraft.

WARNING

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

3.4 Leveling

Occasional leveling of aircraft may be necessary to insure proper wing incidence and/or dihedral or for exact CG location. The aircraft is level when the cabin floor and, in a transversal direction, the landing gear bulkhead are horizontal. Level the aircraft using a simple spirit or water level and adjust the aircraft"s tilt through shims placed under wheels or by regulating tire pressure.

3.4.1 Control surface settings

Adjustment of control surfaces must not exceed travel limits reported in table below. The 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°	◊ 1°
FLAPS (max travel)	0°	38°	◊ 1°
CONTROL CABLE TENSION (for all)	20 daN (45#)		◊ 2 daN (◊ 4#)

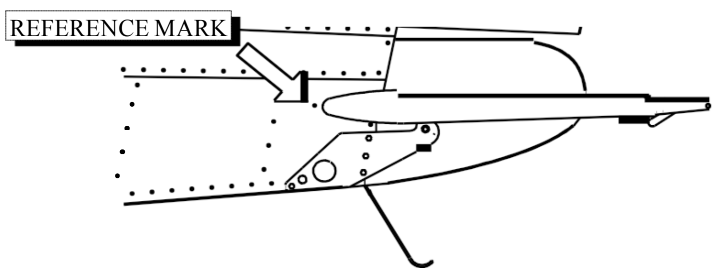
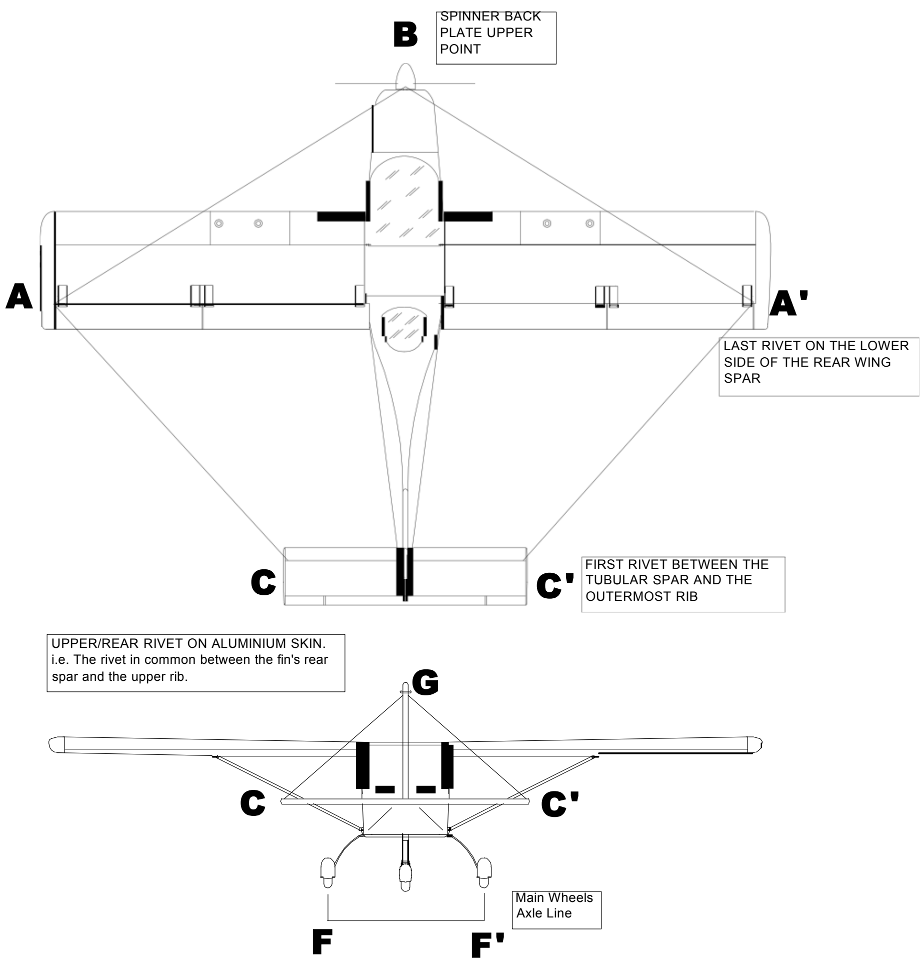


FIGURE 3-1 *STABILATOR ADJUSTMENT.*

3.4.2 Trim-tab adjustment

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

- Move stabilator to neutral (0 degrees) and lock in position; (this is accomplished by aligning the leading edge of the stabilator 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° is approximately 24mm (.945")
- Trim to maximum pitch-down
- Tighten lock-nut for adjustment thread and fasten connecting pin of control rod to trim-tab



A‟-B	4690 ◊ 20	184.6”
A-C	4140 ◊ 20	163”
A‟-C‟	4140 ◊ 20	163”
C-G	1800 ◊ 20	70.87”
C‟-G	1800 ◊ 20	70.87”
F-F‟	1880 ◊ 20	74”

3.5 Weighing

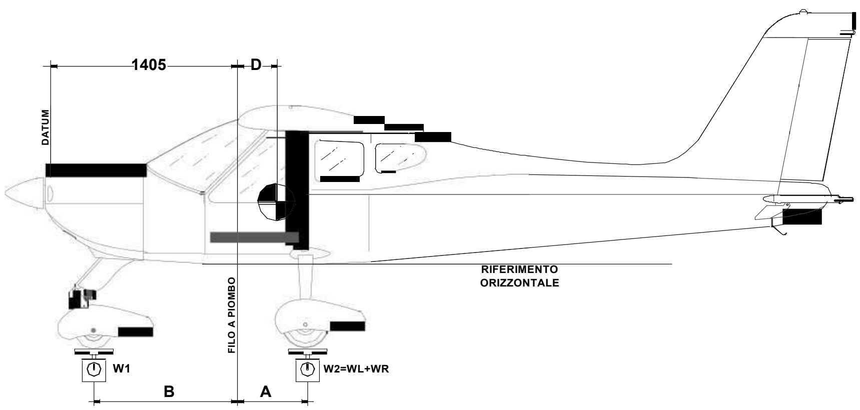
USE GUIDELINES AS FOLLOWS:

1. Carry out weighing procedure inside hangar
2. Remove any objects inadvertently left on board aircraft, excessive dirt, grease, moisture, etc.
3. Make sure that all required items of equipment that is included in the empty weight is onboard
4. Align nose wheel
5. Drain all fuel in level flight attitude
6. Oil, hydraulic fluids, and coolants are at operating levels
7. Move seats to most forward position
8. Flaps retracted (0°)
9. Control surfaces in neutral position
10. Position scales (min. capacity. 200 kg / 440 lbs) under each tire
11. Record weights of individual scales
12. Level the aircraft
13. Record weights of individual scales
14. Calculate empty weight

3.6 Determination of CG

1. Drop a plumb bob tangent to the wing‟s leading edge, (in the un-tapered section of the wing, at about one meter (~ 40") from the root) trace a reference mark on floor
2. Repeat operation on other half-wing
3. Connect the two reference marks with a taut line
4. Measure distances between reference line and landing gear wheel axles
5. Recorded data allows determination of C.G. location and aircraft‟s moment (see following table)

3.6.



Not

- A = 560 mm (22.05”)
- B = 1062 mm (41.8”)

Information Only - Adapted from AC 43.13-1B CHG 1

C.G. = D-((F * L) / W)

C.G. = Distance from datum to center of gravity of the airplane.
W = The weight of the aircraft at the time of weighing.
D = The horizontal distance measured from the datum to the main wheel weighing point.
L = The horizontal distance measured from the main wheel weighting point to the nose wheel weighing point.
F = Weight at nosewheel weighing point
D = 1965 mm
L = 1622 mm

	Kg
Fwd wheel weight	W_1 =
Main wheel left	W_L =
Main wheel right	W_R =
W2=WL+WR	

	Meters
Distance from bob to LH wheel	A_L =
Distance from bob to RH wheel	A_R =
Average distance (AL+ AR)/2	A = 560 mm
Distance from bob to nose wheel	B = 1062 mm

Empty weight → $W_{ef} = W_1 + W_2$ =	$D - \frac{W_2 \cdot A - W_1 \cdot B}{We} =$

_____Meters

	Kg	Arm (meters) D	Moment (Kg m) D · We
Net weight Wef			
Weight unusable fuel (2.6 liter 2.75 quarts)	1.9 (4.2#)	1.660 (65.35”)	3.2 (274.47 #”)
TOTAL	We =	De = Me/We =	Me =

CG position as wing chord %	De%=De/1.4 · 100=

3.7 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 **aluminum 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 an anti-corrosion finish prepared as follows:
4 liter solution containing 10% chromic acid with 20 drops of battery electrolyte. Accurate brushing with a sturdy fiber brush will rid most of the corrosion and insure that the anti-corrosion agent will penetrate completely in the cracks.
Leave the chromic acid solution on the part for at least five minutes and then remove excess with water or a damp cloth.
Apply protective finish the same day in which treatment begins.

3.8 Service Directives

No.	TITLE	TYPE

3.9 Servicing

For scheduled servicing on engine refer to manufacturer"s Operator"s manual.

3.9.1 Daily

- **Pitot and static ports** – Check for obstructions
- **Oil** – Check oil level
- **Coolant** – Check coolant level
- **Fuel strainer** – Check and drain Gascolator for water or sediment
- **Fuel tank vents** – Check vents for obstruction

3.9.2 As needed

- **Tires** – Check condition and maintain proper tire pressure

3.10 Lubrication (every 100 hours or annually)

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.
- Use grease type MIL-G-3278 or equivalent (i.e. Mobil grease 27 Synthetic aviation grease)

3.10.1 Lubrication Points

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

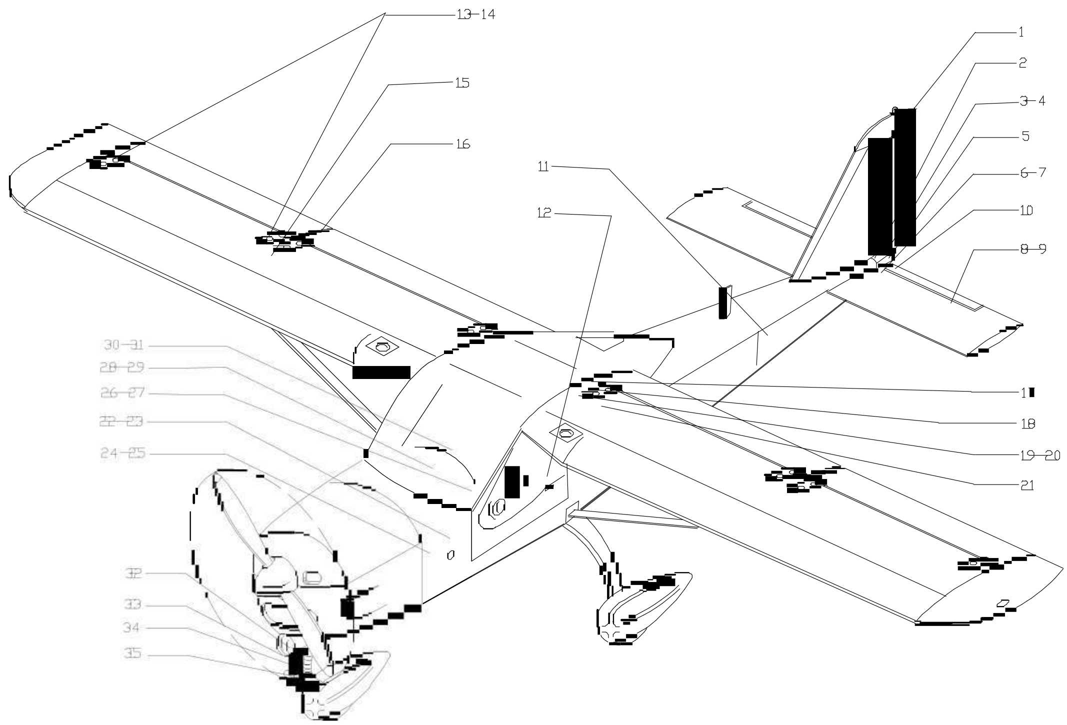


Figure 3-3 Lubrication points

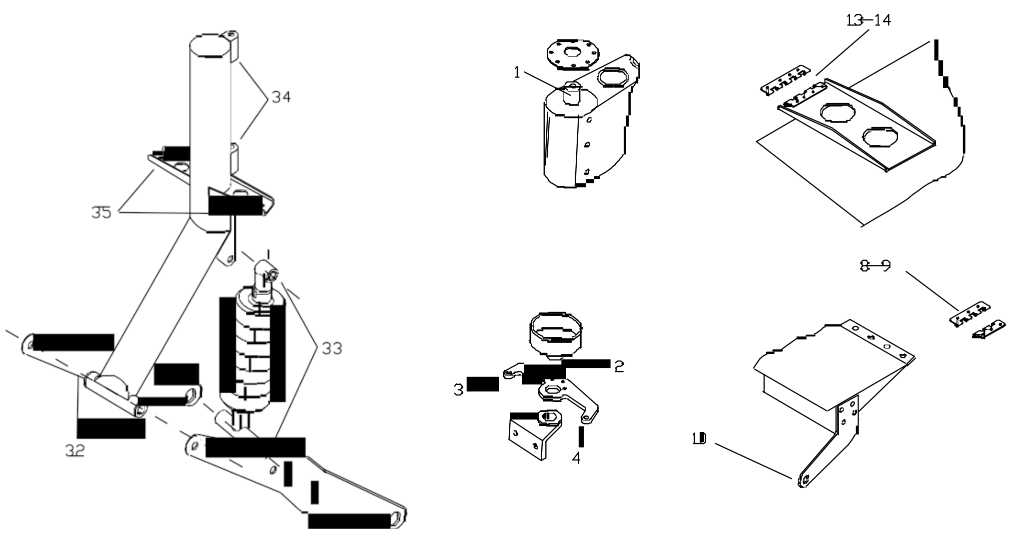


Figure 3-4
Every 50

hours

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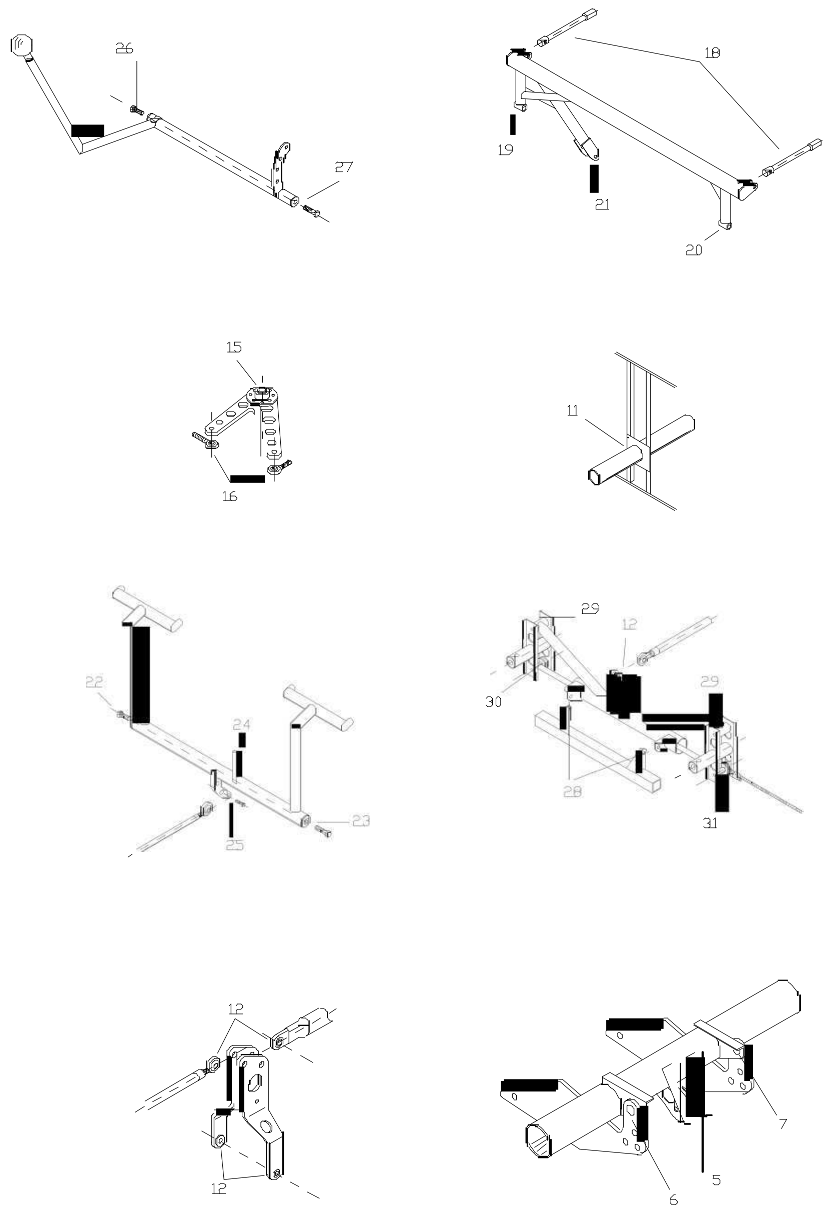

Figure 3-5 Every 100 hours

3.10.2 Inspection panels

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

1. **Inspection Ports on wing underside** - access to aileron differential bellcrank – main spar and torque box; - inspection of wing-to-strut attachment
2. **Upper strut fairing** - inspection of strut-to-wing attachment
3. **Lower strut fairing** - inspection of strut-to-fuselage attachment
4. **Tailcone underside portholes** - access to: stabilator control rod pass-through; battery relay; front attachment of vertical stabilizer; inspection of aft structure and of cables for rudder control
5. **Battery porthole** - access to battery (not normally installed)
6. **Tailcone 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 baggage 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-wing"s forward attachment; -access to fuel line tank outflow
9. **Cabin ceiling panel** - access to bellcrank joining cabin cable circuit to wing pushrods for aileron control
10. **Instrument panel cover** - access to instrumentation and radio
11. **Engine cowling** - access to engine and related systems; - access to main components of electrical system - access to nose gear strut and steering assembly mechanism
12. **Propeller spinner** - access to propeller hub

3.11 Inspection

3.11.1 INTRODUCTION

TECNAM considers the inspection schedule outlined below compulsory for the safe operation of the airframe and of the systems over an extended period of time. Described servicing requirements pertain to operation in non-extreme climatic conditions.
For the **Rotax 912 ULS / S engine**, unless otherwise stated in the present manual, it is compulsory to adhere to maintenance requirements as reported in the Engine"s Operator"s Manual (p/n 899 370).
For the **GT propeller,** refer to manufacturer"s maintenance manual

Airframe and systems inspection schedule is as follows:

- Inspections for airworthiness before first flight of day as specified in Flight Manual
- Periodic inspections at 100 hours
- Special inspections added to normal periodic inspections
- Singular inspection, when aircraft has been exposed to conditions that may have damaged one or more of its components
- If aircraft is rarely used, a "100 hour inspection" must be performed yearly
- Replacement of parts subject to usage limitations are specified in par. 3.14

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 play, 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, absence of corrosion and punctiform corrosion, damage to thread, wear and excessive play.

3.12 Condition Inspection (100 hour / annual)

3.12.1 Inspection Panels

Each person performing an annual or 100-hour inspection shall, before that inspection:

- Remove or open all necessary inspection plates, access doors, fairing, and cowling.

Clean the aircraft and aircraft engine after initial visual inspection for:

- Oil, exhaust, or other leaks

3.12.2 Fuselage group

1. Check fabric and skin-for deterioration, distortion, other evidence of failure, and defective or insecure attachment of .fittings
2. Check systems and components-for improper installation, apparent defects, and unsatisfactory operation

3.12.3 Cabin and cockpit group

1. Check for cleanliness and for loose equipment that might foul the controls
2. Check the seats and safety belts for condition and/or any defects
3. Check windows and windshields for deterioration and breakage
4. Check instruments for poor condition, mounting, marking, and (where practicable) improper operation
5. Check flight and engine controls for improper installation and improper operation
6. Check battery for improper installation and improper charge
7. Check all systems for improper installation, poor general condition, apparent and obvious defects, and insecurity of attachment

3.12.4 Engine and nacelle group

1. Check engine section for visual evidence of excessive oil, fuel, or hydraulic leaks, and sources of such leaks
2. Check studs and nuts for improper torque and obvious defects
3. Check engine compression. If there is weak cylinder compression, check for improper internal condition and improper internal tolerances
4. Check for metal particles or foreign matter on screens and sump drain plugs.
5. Check engine mount for cracks, looseness of mounting, and looseness of engine to mount
6. Check flexible vibration dampeners for poor condition and deterioration
7. Check engine controls for defects, improper travel, and improper safetying
8. Check lines, hoses, and clamps for leaks, improper condition and looseness
9. Check exhaust stacks for cracks, defects, and improper attachment
10. Check accessories for apparent defects in security of mounting
11. Check all systems for improper installation, poor general condition, defects, and insecure attachment
12. Check cowling for cracks, and defects

3.12.5 Landing gear group

1. Check all units/for poor condition and insecurity of attachment
2. Check shock absorbing devices for damage
3. Check linkages, trusses, and members for undue or excessive wear fatigue, and distortion
4. Check hydraulic lines for leakage
5. Check electrical system for change and improper operation of switches
6. Check wheels for cracks, defects, and condition of bearings
7. Check tires for wear and cuts
8. Check brakes for improper adjustment

3.12.6 Wing and center section assembly

Check for:

1. Poor general condition

2. Fabric or skin deterioration
3. Distortion
4. Evidence of failure
5. Insecurity of attachment

3.12.7 Empennage assembly

Inspect all components and systems for:

1. General condition
2. Fabric or skin deterioration
3. Distortion
4. Evidence of failure
5. Insecure attachment
6. Improper component installation
7. Improper component operation.

3.12.8 Propeller group

Check propeller assembly for:

1. Cracks
2. Nicks
3. Binds
4. Bolts for improper torque and lack of safetying

3.12.9 Radio group

1. Check radio and electronic equipment for improper installation and insecure mounting
2. Check wiring and conduits for improper routing, insecure mounting, and obvious defects
3. Check bonding and shielding for improper installation and poor condition
4. Check antenna including trailing antenna for poor condition, insecure mounting, and improper operation

3.12.10 Optional equipment

Check all optional equipment for proper operation

3.12.11 ELT

Remove and inspect the installed for proper operation of the "G" switch and calendar date currency of the batteries installed in accordance with FAA Advisory Circular 91-44 current revision.

SUMMARY OF REFERENCE VALUES

Torque settings for connection bolts are a function of their thread (shank) diameter

Bolt resistance category: 8.8

+ 4	= 3.1 Nm	~ 27 In/Lb
+ 6	= 10.4 Nm	~ 92 In/Lb
+ 8	= 24.6 Nm	~ 217 In/Lb
+ 10	= 50.0 Nm	~ 442 In/Lb

Warning: propeller attachment bolts must be fastened to 18 Nm (~159 In/Lb) value even though they have an + 8 diameter.

Wing to fuselage fitting bolts

+ ½" (NAS 1308 – 28) = ~ 100 Nm (~73 Ft/Lb)

Control cable tension (for both aileron and rudder)

Value : 20 dN ◊ 2 dN (45 # ◊ 4 #)

Tire pressure: Nose 1.0 bar (15 PSI)
Main 1.6 bar (23 PSI)

3.13 Torque Conversion Table

Multiply	By	To obtain
foot-pounds	1.3558	Newton-meters
foot-pounds	0.1383	kilogram-meters
foot-pounds	12.0	inch-pounds
inch-pounds	0.0115	kilogram-meters
inch-pounds	0.1130	Newton-meters
inch-pounds	0.0833	foot-pounds
kilogram-meters	7.233	foot-pounds
kilogram-meters	86.7964	inch-pounds
kilogram-meters	9.8067	Newton-meters
Newton-meters	0.7376	foot-pounds
Newton-meters	8.8508	inch-pounds
Newton-meters	0.1020	kilogram-meter

3.14 LIMITATIONS TO AIRWORTHINESS

COMPONENTS	Type	SERVICE LIFE
Electric trim actuator	T2-10A	1000 hr or 10 yrs
Shock absorber rubber discs	92-8-200-1 (QTY 7)	1200 hr or 10 yrs
Oil system flexible hose assy	TECNAM pn"s: 21-11-910-001; 21-11-910-002; 21-11-910-003	5 yrs
Fuel system flexible hose	TECNAM pn"s: 21-11-311-1; 21-11-311-2; 21-11-340-1; 21-11-324-1; 21-11-330-	2 yrs
Liquid cooling system flexible hose	92-11-105-1; 92-11-105-2; 92-11-105-3; 92-11-105-4	2 yrs

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SECTION 4
AIRFRAME

4 Introduction

The airframe consists of the following main groups as shown in figure 4-1:

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

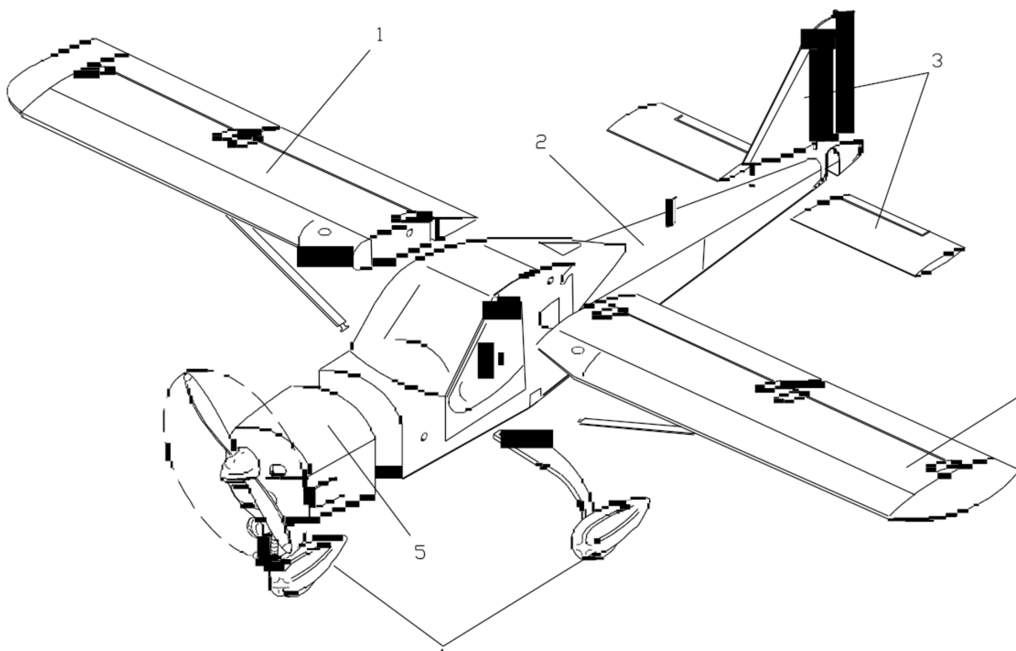

Figure 4-1 Main groups

4.1 Wing

Each wing is connected to the fuselage by means of two pin attachments and a single strut brace per side.
Wings are made up of a central light alloy torsion box; a light alloy leading edge is attached to the front spar (1) while flap (2) and aileron (3) are attached to rear fake spar through two hinges each.
The torsion box, as shown in figure 4-2 and with reference to numbers in parenthesis, consists of a main spar (4) and a fake spar (5) that makes up its front and rear vertical walls; a series of ribs (6) and wrap-around panels complete the structure.

Front and aft spars are complete with wing-to-fuselage attachment fittings (7). Wing-to-strut attachment fittings are located approximately in the middle of main spars (8). Aileron uses "piano-hinges" type MS 20001-4 for direct attachment of aileron spar to wing spar. Flap hinges are external to wing torsion box and feature SKF GE10E type ball bearings.

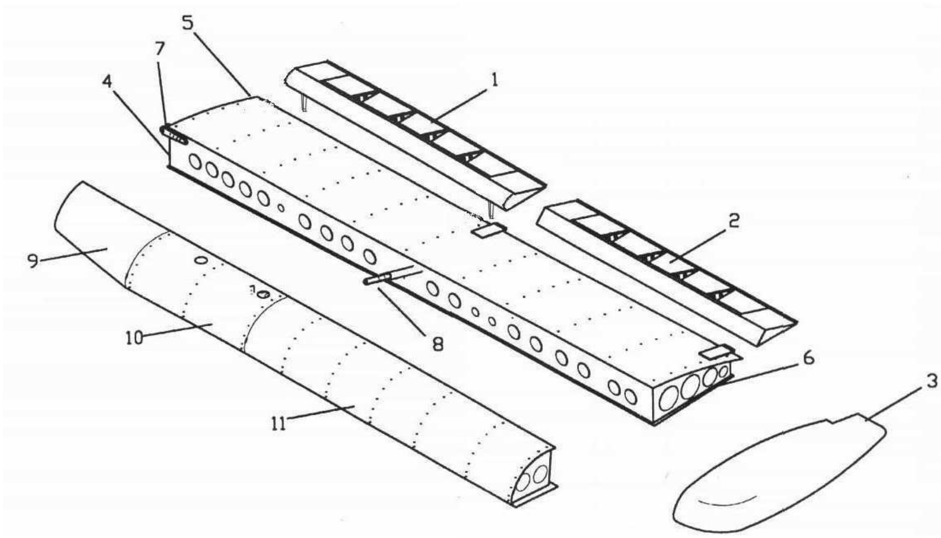

Figure 4-2 Wing structure

The aileron is constructed of an aluminum spar to which a formed sheet metal leading edge and metal ribs are attached; Dacron synthetic material wrap-around aileron structure. Flaps are constructed of a center spar to which front and rear ribs are joined; aluminum skin panels wrap-around flap structure.

Wing tips are molded epoxy resin, fiberglass reinforced. At the inboard end of half-wing's leading edge is an integrated aluminum fuel tank with individual filler cap.

Fuel tanks vent through light alloy tubes in the area immediately below the tanks.

4.1.1 Installing and reinstalling the wing

Procedure for removal of wing and strut is as follows:

- Drain fuel tank using drain tank and closing opposite side tank fuel circuit
- Remove panel inside cabin to access and disconnect fuel line
- For the right wing, disconnect stall-warning system wires
- Disconnect position lights wiring if present
- Disconnect flap control (see fig. 4-3) by removing roller bearings (7) that link push-pull rods (6) to flap control plate
- Disconnect aileron control (see fig. 4-4) by removing pins (4) that connect the small bar (3) to the pushrods (5)
- While supporting the wing"s end (not from wingtip), release strut"s upper pin, then release lower pin and remove strut
- While supporting the half-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
- Replace pins in their original location and cap fuel lines
- Reverse above procedure for reinstallation paying close attention to tighten strut"s bolts to recommended value M8 bolt torque 24.6 Nm (~ 218 inch pounds)

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4.2 Flap control

Flap control system is push-pull type. The torque tube (1), connects the two moving surfaces and hinges on two braces (2) rigidly attached to fuselage structure. Bolt, nut and cotter pin secure link. Rotation is transmitted through a push-rod (3) whose position is adjusted via an electric linear actuator (4) governed by a switch on instrument panel.
Two push-pull rods (6) are connected to the ends of the torque tube (1) and are located in the area between wing and fuselage thus facilitating inspection.
The two push-pull rods controlling flap movement feature an adjustable linkage just before the roller bearings allowing trailing edge alignment.

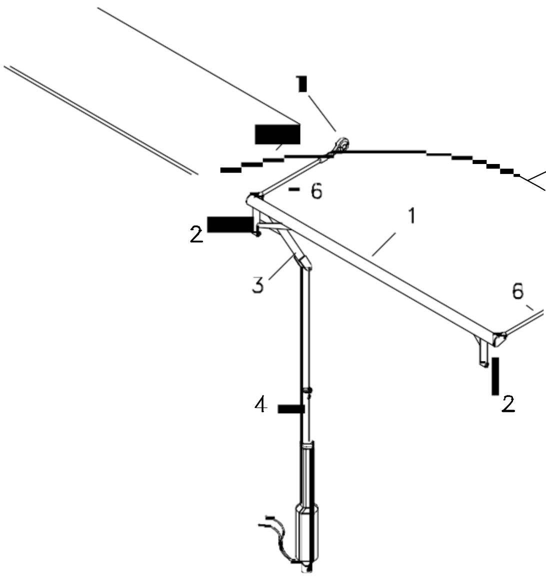

Figure 4-3 Flap control

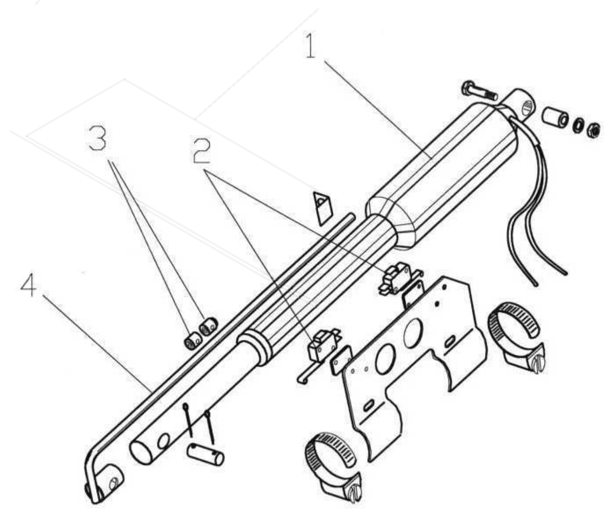

Figure 4-3a Flap Actuator

4.3 Aileron control

Aileron control system uses push-pull rods and bellcranks inside wing and steel cables and pulleys inside fuselage.
Layout of flight control system inside cabin includes three pairs of pulleys which transmit movement from the two control sticks (1), linked in parallel by a rod (2), to a small bar (3) located in cabin overhead in correspondence with main pushrods issuing from half-wings. Main rods are connected to the small bar using two pins (4). The two main rods (5), are routed through the ribs and are attached at opposite end to a bell crank (6) and a push-pull rod (7). The push-pull rod then crosses the wing‟s fake spar to transmit motion. Linkage length is adjustable.

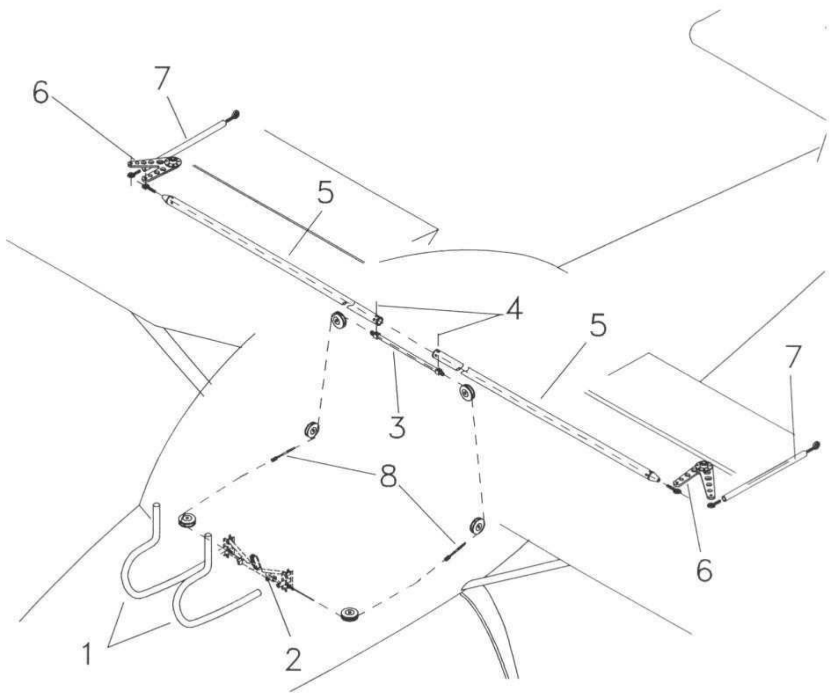

Figure 4-4 Aileron control

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 half-wings, release pins (4) that secure short bar (3) to main rods (5). The steel cable system is designed to insure proper cable tension without the need to check whenever 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 aft panel.
Also check periodically that pulleys rotate freely and tolerance for entire linkage 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; also check that pulleys and other parts of the link system positioned under seats are properly greased.
If control stiffness persists, check integrity of bellcranks and pulleys and insure that cable has not come off pulleys.
Alignment of moving surfaces with 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.

4.4 Horizontal Tail

The horizontal tail is an all-moving type, that is, the stabilizer and elevator form a single, uniform plane called stabilator that rotates about an axis normal to fuselage at the desired pitch setting.
The stabilator structure (see fig.4-5) is made-up of an aluminum tubular spar (1) to which a series of ribs (2) and an aluminum leading edge (3) are riveted. Dacron heat-shrink wrap-around material covers structure.
A trim tab (4) provides stick force adjustment and longitudinal compensation through an electric actuator controlled by pilot. Tab is split in two parts interconnected at the support brackets (5) and attached to the stabilator through four external hinges (6) that allow for immediate inspection.

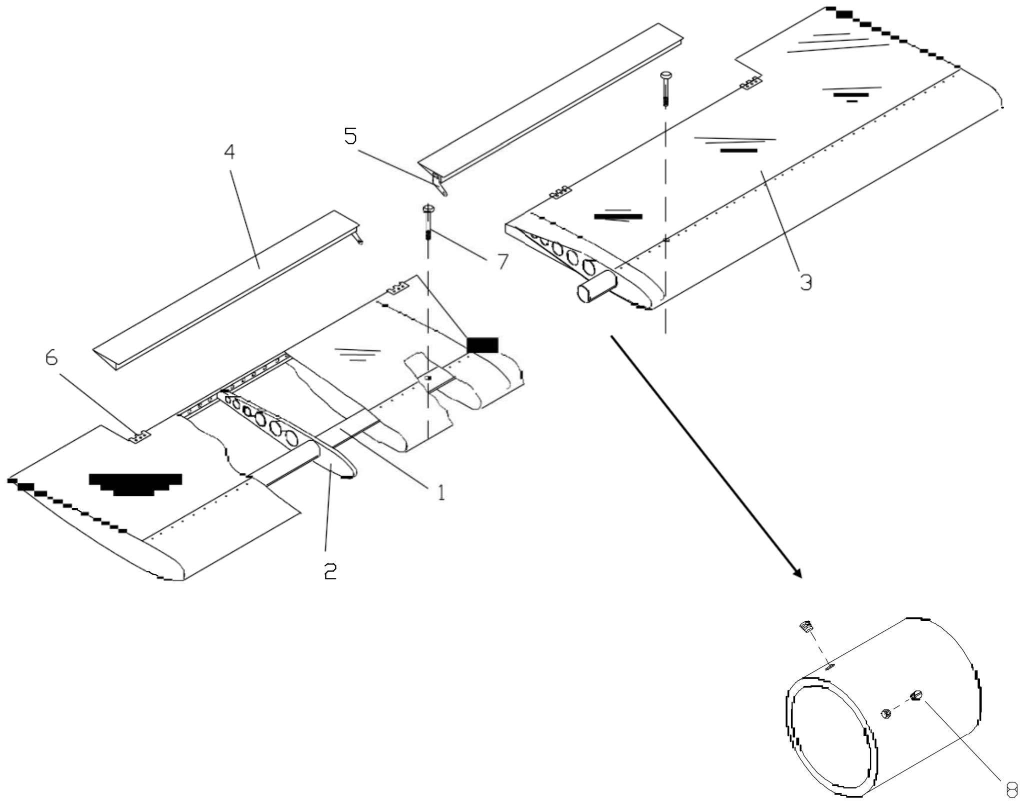

Figure 4-5 Stabilator

To remove the stabilator, disconnect the two halves of the tab from each other and from the control rod, remove pins (7), and then remove half-planes. To avoid cover damage during operation, handle parts by their rigid components.
Reverse procedure for reinstallation applying a small amount of grease to 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-pull type (see fig. 4-6) 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 the tail cone supported at midsection by a bracket (4) and connected with the stabilator torque tube through the aft bellcrank assembly (5).
All significant transmission elements such as bellcranks, pushrods, supports and hinges can be easily accessed and inspected.

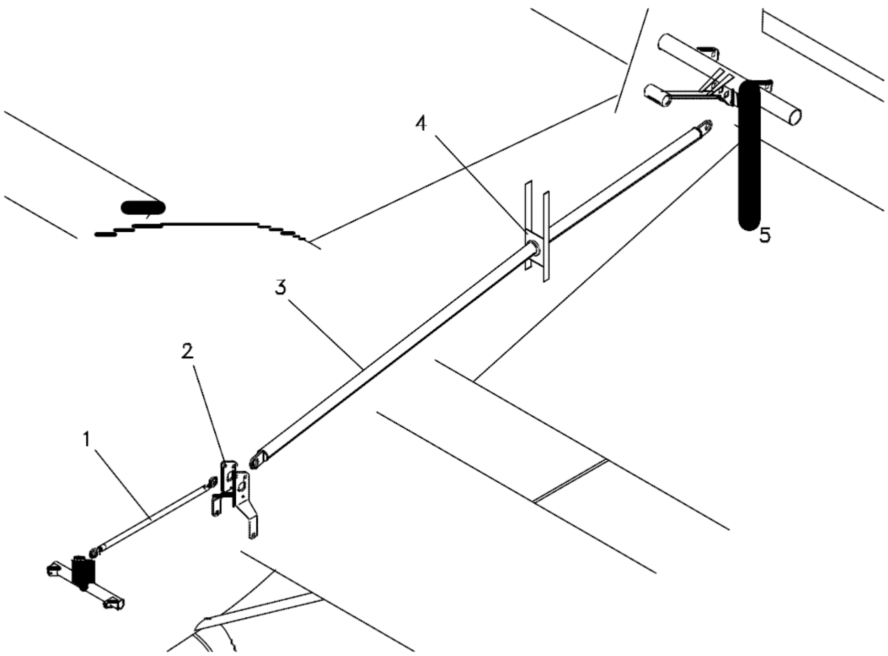

Figure 4-6 Stabilator control

If unusual tolerance is found along transmission, replace parts displaying excessive wear.
The aft bellcrank assembly (see fig. 4-7) consists of a steel tube (1) with welded horn assembly (2), attachment for stabilator control shaft (3) and balanced weight bellcrank (4). Counterweight is located at the end of a prong bolted to the torque tube and entering tail cone through the tail-frame cutout.
Longitudinal trim is controlled through two switches on the stick handle and is monitored via an indicator located on instrument panel. Control activates the linear actuator (5) connected to supports (6) and horn assembly (7). Actuator˝s motion is transmitted to an adjustable push-pull rod (8) through a bellcrank (9).
To remove the stabilator torque tube, disconnect electric actuator frame assembly (7) from support (6), release control shaft (4) from aft bellcrank assembly (3) then release horn assembly (2) from brackets (6).

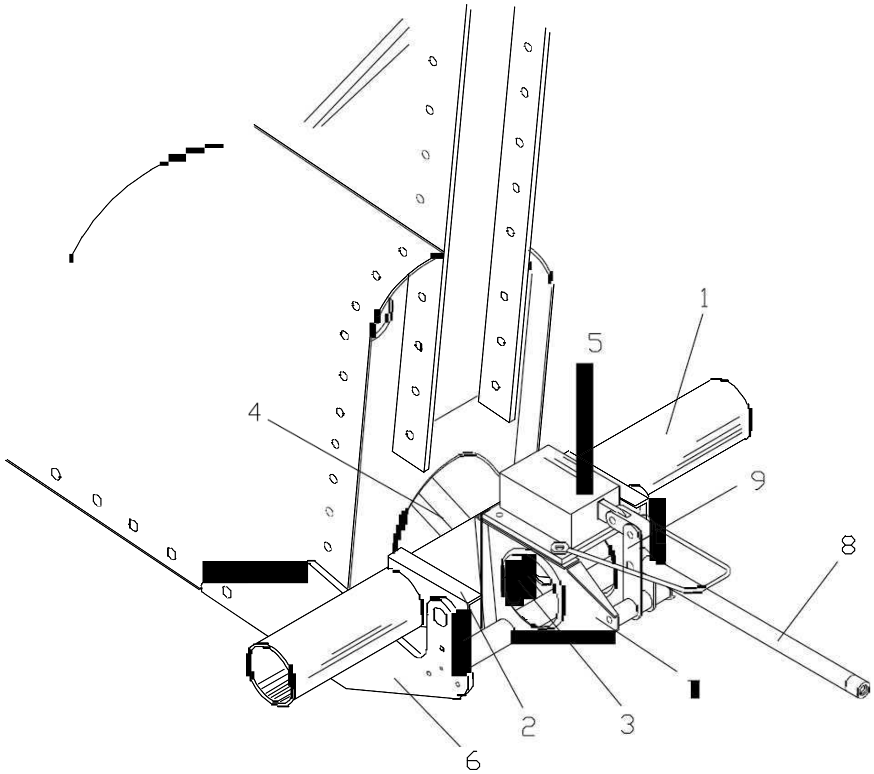

Figure 4-7 Stabilator control

4.4.1 Stabilator balance

If it becomes necessary to verify stabilator balance (repairs etc.) proceed as follows:
Remove the tail fairing and open the inspection hatch located on the bottom of the tailcone (the one closest to tail-end);
Disconnect the moving surface from its control rod. To avoid interference with the free rotation of the tailplane, temporarily secure control rod to the stabilator support assembly;
Disconnect the trim-tab control rod;
Secure trim-tab to stabilator to avoid any relative movement. Use adhesive tape to avoid any influence on balance;
Check for excessive friction or lock-ups in the moving parts;
The stabilator is balanced when the application of an 800 grams / ~ 28.21 ounces weight at point (1) in figure above brings stabilator to horizontal position.
If the stabilator should result “trailing-edge-heavy” it is necessary to add a few small weights to the leading edge near the root.
A slight imbalance towards the leading edge is acceptable as it is deemed conservative with respect to stability.

4.5 Vertical Tail

The vertical tail consists of an all-metal light alloy structure (fig. 4-8). Vertical stabilizer tip is composite with cut-outs for navigation and strobe light.
The vertical stabilizer consists of a twin spar with wrap-around stressed skin paneling. An attachment plate (1) secures the stabilizer"s front spar to the penultimate tailcone frame while the rear spar is extended to attach directly onto the last tailcone 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.
The rudder rotates about its torque tube via two, specially designed hinges (parts 6 and 7). The top hinge pin rotates about a bushing embedded in the topmost ordinate of the vertical stabilizer. The bottom hinge pin rotates about a bushing (8) embedded within a support flange attached to vertical stabilizer aft spar. A bellcrank (9) secured to the rudder's lower hinge converts the rudder pedals cable commands.

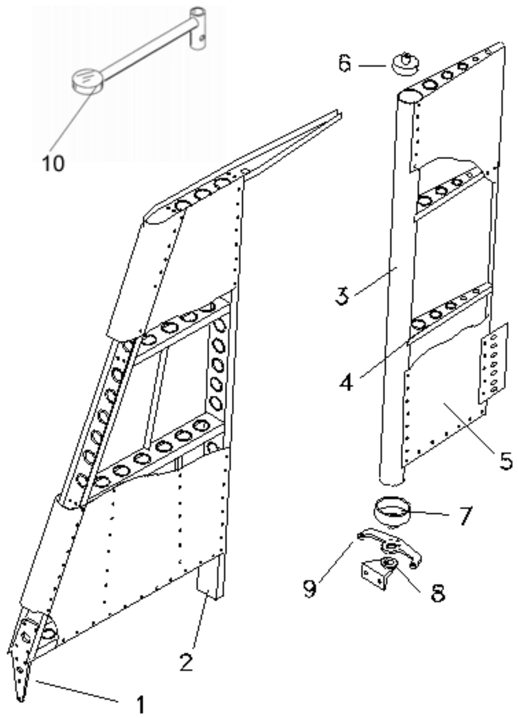

Figure 4-8 Vertical stabilizer, rudder and supports

Rudder mass balancing (10) is via a counterweight attached to a prong coupled, in turn, to the upper end of the rudder torque tube. Weight and prong move within stabilizer tip and within specially designed fairings (one is removable) for overhang.
To remove rudder, after removing tail fairing, disconnect cables from bellcrank, unfasten lower support flange from stabilizer and uncouple rudder with downward motion.
Control system layout (fig. 4-9) is steel cable driven and circuit terminates on nose wheel steering lever.
Rudder pedals (1) are attached to two pushrods (3) that terminate the control circuit (2) for the rudder and transmit steering motion to the nose gear leg through a lever. This lever hinges on the engine mount and springs connected to the steering lever via two small plates allow for a more effective realignment of the rudder. Length of pushrods can be modified via adjustable ball and socket connections.
Cable tension must be checked periodically and adjusted to proper value using the turnbuckles (4) (Tension = 20 daN ◊ 2).
Pulley condition (5) and their smooth operation must also be checked. To access levers and rudder pedals support, remove cabin"s central tunnel; for speedier operation remove seats from railings.

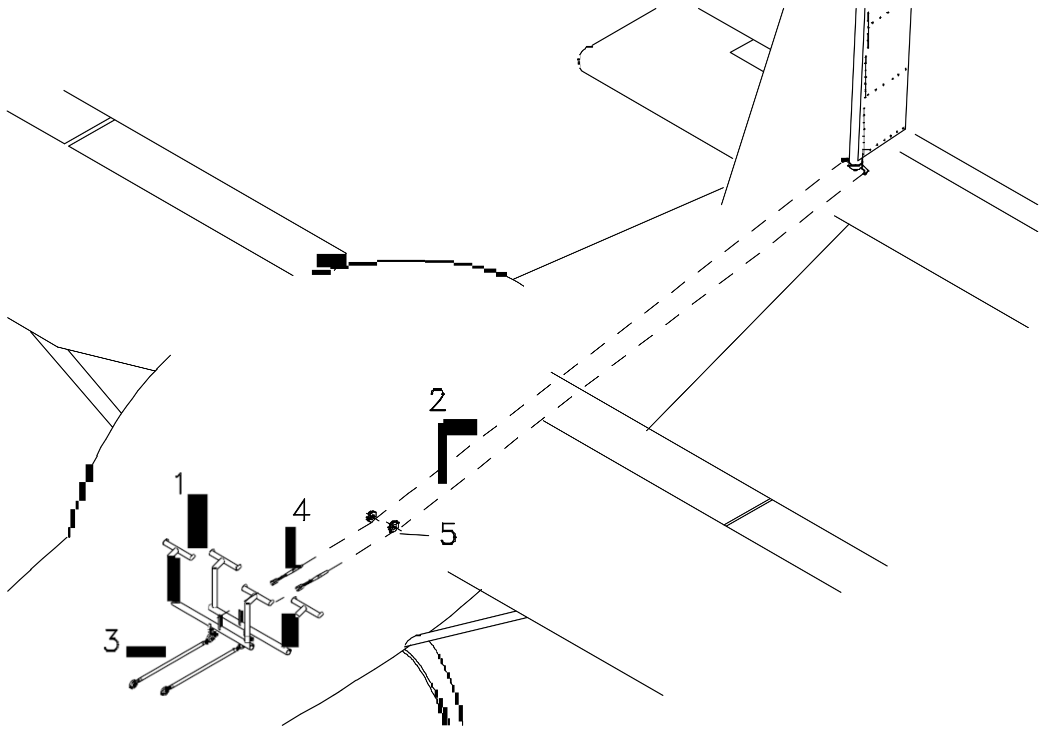

Figure 4-9 Rudder control

4.6 Fuselage

The front part of the fuselage is made up of a mixed structure: a truss structure with special steel members for cabin survival cell (fig. 4-10), and a light-alloy semi-monocoque structure for the cabin's bottom section.
The aft part of the fuselage (fig. 4-11) is constructed of an aluminum alloy semi-monocoque structure. Attachment to cabin truss is at the forward fittings of four stringers that run the aft fuselage length (1). Two flanges are located at the aft end of the tail section to support the horizontal tail assembly (2) and the vertical tail forward and aft spars.
Forward truss structure drawing (fig. 4-10) shows location of attachment points for half-wing (1), aft section (2), brace-strut (3), main landing gear (4), engine mount (5), flap torque tube (6), stabilator bellcrank (7), throttle support (8) and pulley support for cable driven aileron control (9). Seat supports and safety harness attachment points are also shown.

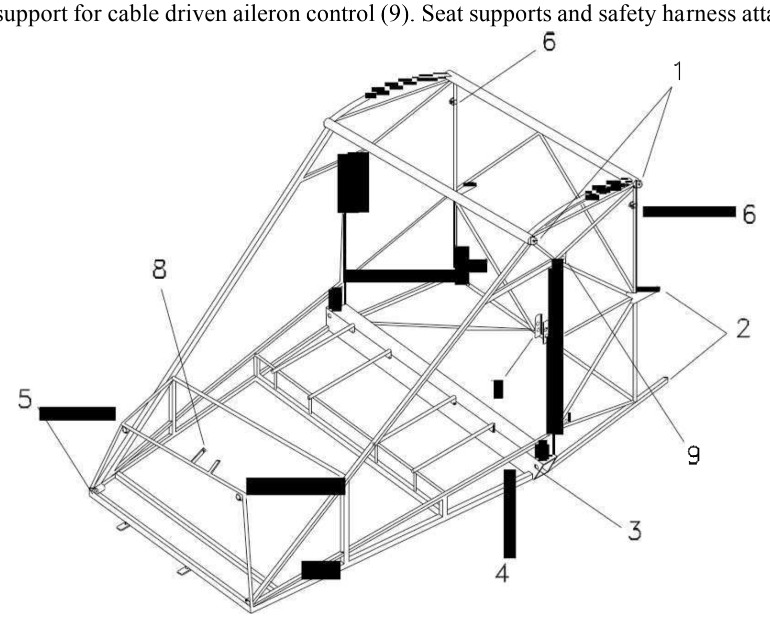

Figure 4-10 Cabin truss

Engine mount is constructed of steel tubing and is secured to cabin truss via a four-point attachment. Bolts travel through bushings welded on mount, pass through the firewall and exit through other bushings welded to cabin truss. Nose gear support assembly is attached to engine mount.

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Revision Number: 3.01

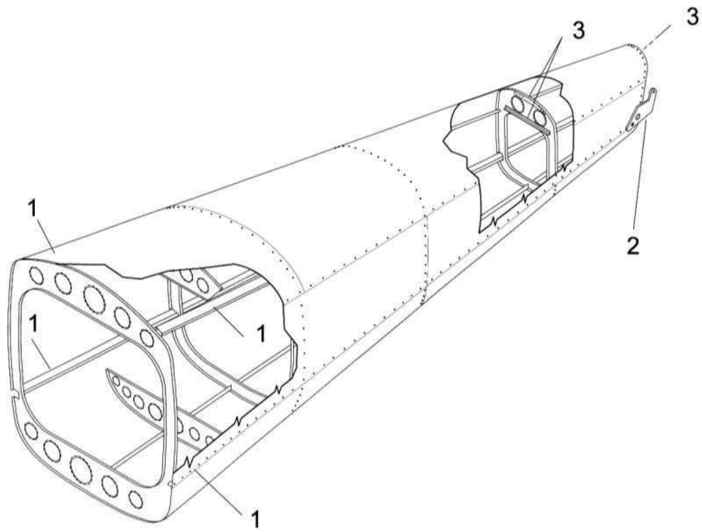


Figure 4-11 Tailcone

Cabin access is through two doors constructed of light alloy square tubing. A synthetic material door panel, shaped for better comfort, is riveted to doorframes. Both doors feature spring lock door handles with inside safety latch.
Seats are made out of metal tubing framework with fabric covered foam padding. The two seats can be independently adjusted by sliding backward and forward along rails fixed to cabin truss structure. Seat release levers are located just below seat cushions.
Cabin floor is constructed of light alloy and features matting.
Entire fuselage, wing and other exposed surfaces are finished with a highly resistant weatherproofing synthetic coating. Wash using only water, mild detergent and chamois. 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.

4.7 Landing Gear

The main landing gear (see fig. 4-12) consists of two special steel spring-leaf struts (1) positioned crossways to fuselage for elastic cushioning of landing loads.
The two steel spring-leaf struts are attached to the fuselage underside via the main girder.
Two rawhide liners (2 3) are inserted between each spring-leaf and the girder. Two bolts (5) and nuts secure the individual spring-leaf to the edge of the girder via a light alloy clamp (4) while a single bolt (6) and nut secures the inboard end of the leaf-spring to the girder.

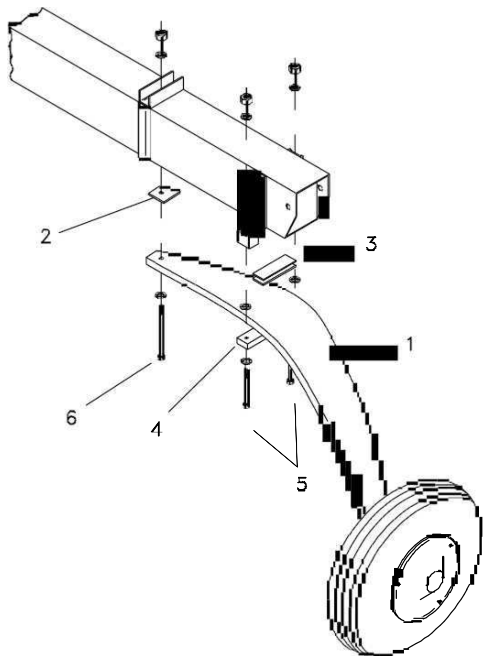


Figure 4-12 Main landing gear

Wheels are cantilevered on gear struts and feature hydraulically actuated disc brakes (see fig. 4-13) controlled by a lever (1) located on cabin tunnel between seats. Main gear wheels mount Air-Trac type 5.00-5 tires inflated at 23 psi (1.6 bar).
Hydraulic circuit shut-off valve (2) is positioned between seats. With circuit shut off, pulling emergency brake lever activates parking brake function.
Braking is simultaneous on both wheels via a “T” shaped joint (6).
Control lever (1) activates master cylinder (3) that features built-in brake-fluid reservoir (4). The brake system is equipped with a non-return valve (5), which insures that braking action is always effective even if parking brake circuit should accidentally be closed.

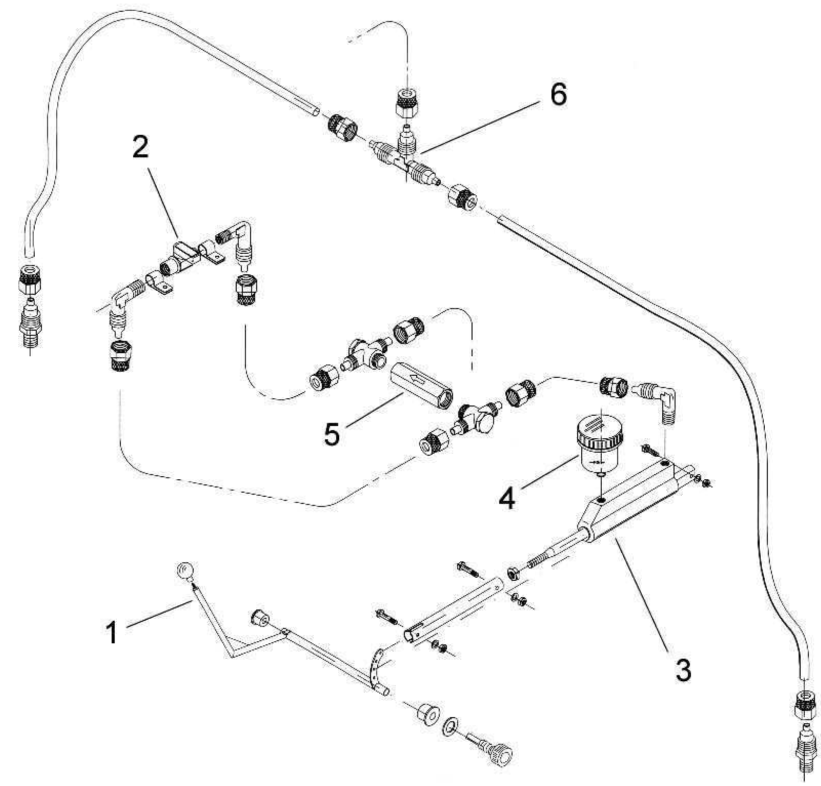


Figure 4-13 Brake circuit

To remove the leaf-spring struts proceed as follows:
Remove cabin seats by sliding them forward
Hoist aircraft onto supports
Disconnect brake fluid line unscrewing the upper link of the external line tract near fuselage bottom. Place temporary caps on lines to prevent spillage
Loosen bolts (part.5 fig. 4-12) of the aluminum clamp (part 4 fig. 4-12) that secure spring-leaf to edge of main girder
Remove bolt connection between inboard end of spring-leaf (part.6 fig. 4-12) and main girder
Remove gear strut by pulling outward from fuselage
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 dedicated valve. For best results, use external pump to push fluid through valves allowing trapped air to escape through open reservoir.
If braking action appears degraded, check and eventually replace main gear brake pads
Refer to Periodic Inspection Chart in Section B for any service operation to main gear

4.7.1 Main Gear

Removal of main gear wheel (see fig. 4-16a and 17)
Removal of a single wheel is carried out as follows:

- Hoist aircraft onto supports
- Release parking brake
- Remove fairing (1) by releasing bolt (2) and the three Phillips screws (3) that hold fairing to plate
- Remove bolt (4) and cup (5)
- Remove wheel lock nut (6)
- Unscrew 4 brake disc assembly bolts (See Figure 4-14 and Figure 4-15 (8))
- Carefully remove wheel assembly with both hands

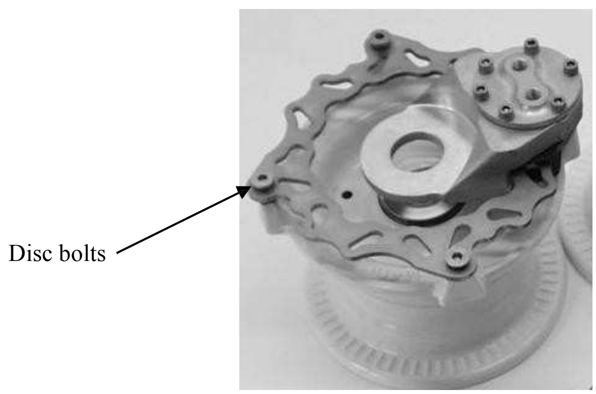


Figure 4-14

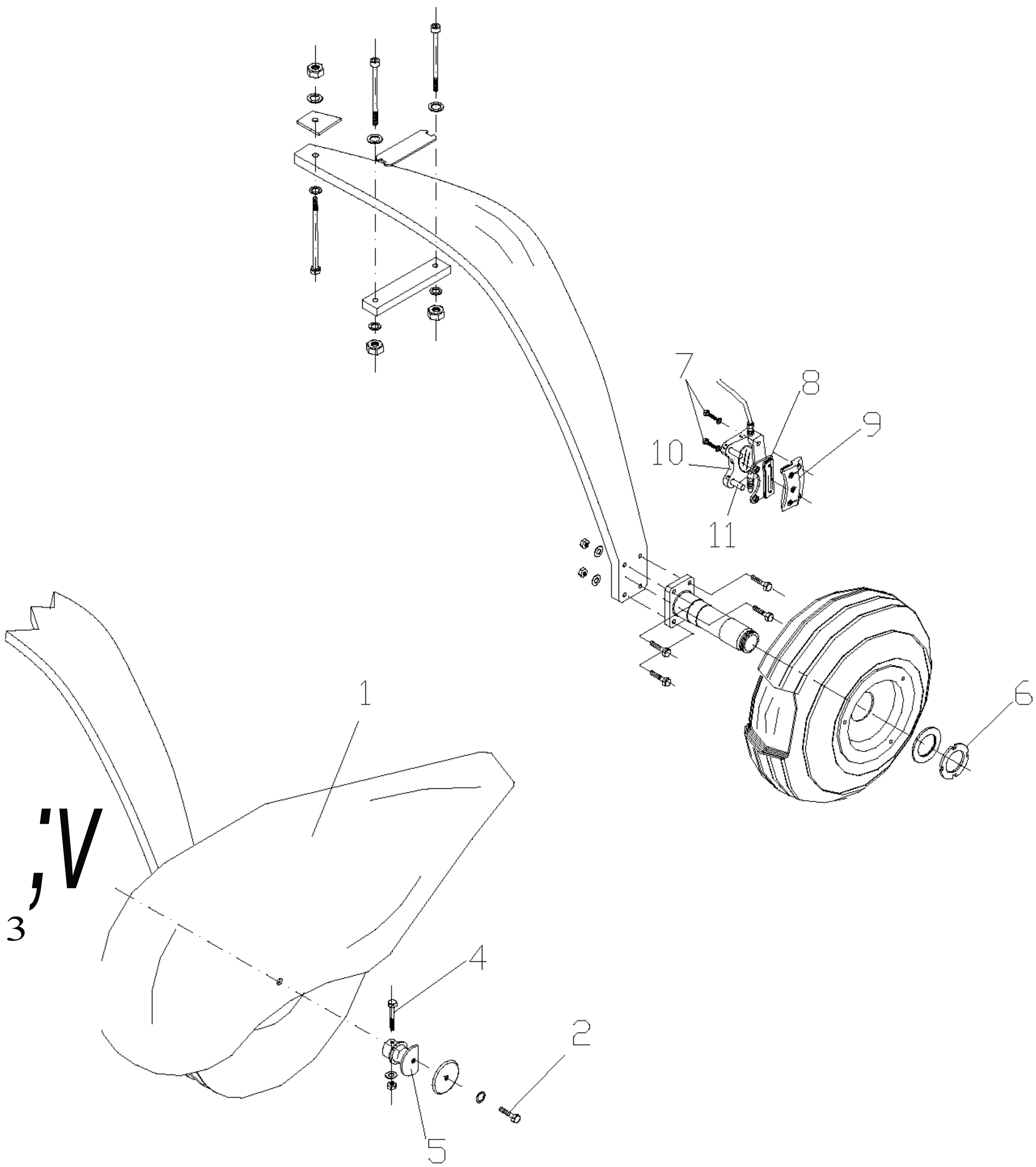


Figure 4-15 Removal of main gear wheel

Main Gear

4.7.2 Removal of cup-bearing from main gear wheel

Figure 4-16 Marc Ingegno Wheel Assembly

Removal of cup-bearing from main gear wheel (see fig.4-17)
Removal of a wheel bearing becomes necessary when excessive friction occurs during wheel motion. Procedure is as follows:

- Using an appropriate tool, remove "Seeger" type snap ring"
- Remove the two ring-grease seals and the felt-grease seal
- Remove the cup bearing
- Clean the bearings accurately using appropriate solvent and wipe wheel rim side. Grease using FIAT ZETA2. Reverse procedure to re-install. Insert ring-grease and felt-grease seals by sliding them perpendicular to hole without forcing them

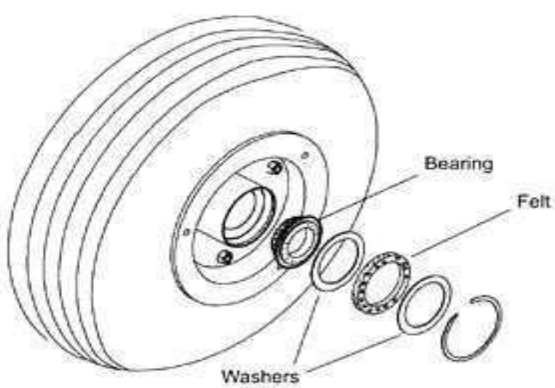
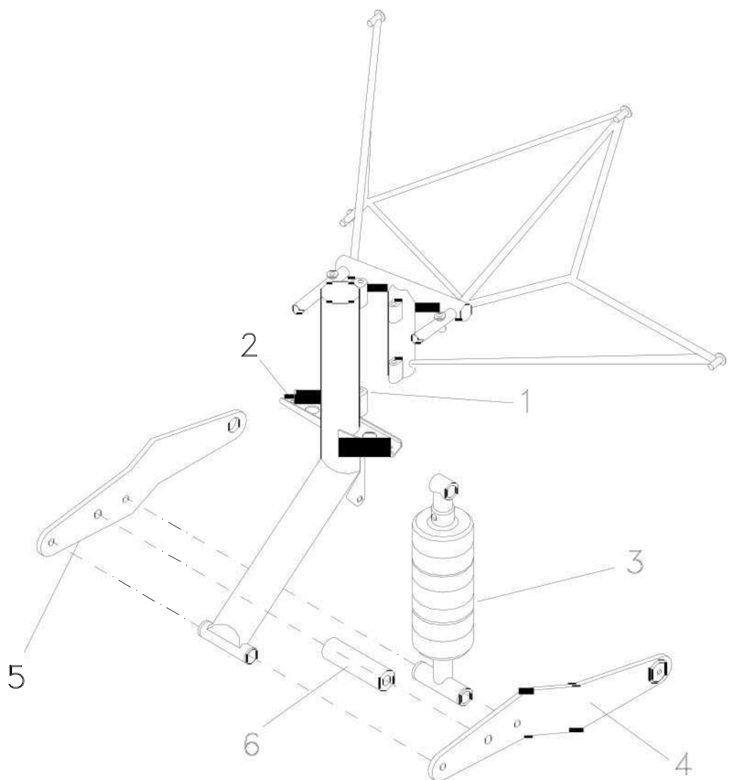


Figure 4-17 Removal of cup-bearing

4.8 Nosegear

The nose gear (fig. 4-18) 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



4.9 Removal of nosegear fairing and wheel

To remove the nose gear fairings proceed as follows:

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

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

4.10 To remove nose wheel proceed as follows:

Remove the fairings (5) (6) and (9)
Loosen bolts (10), (11) and (13)

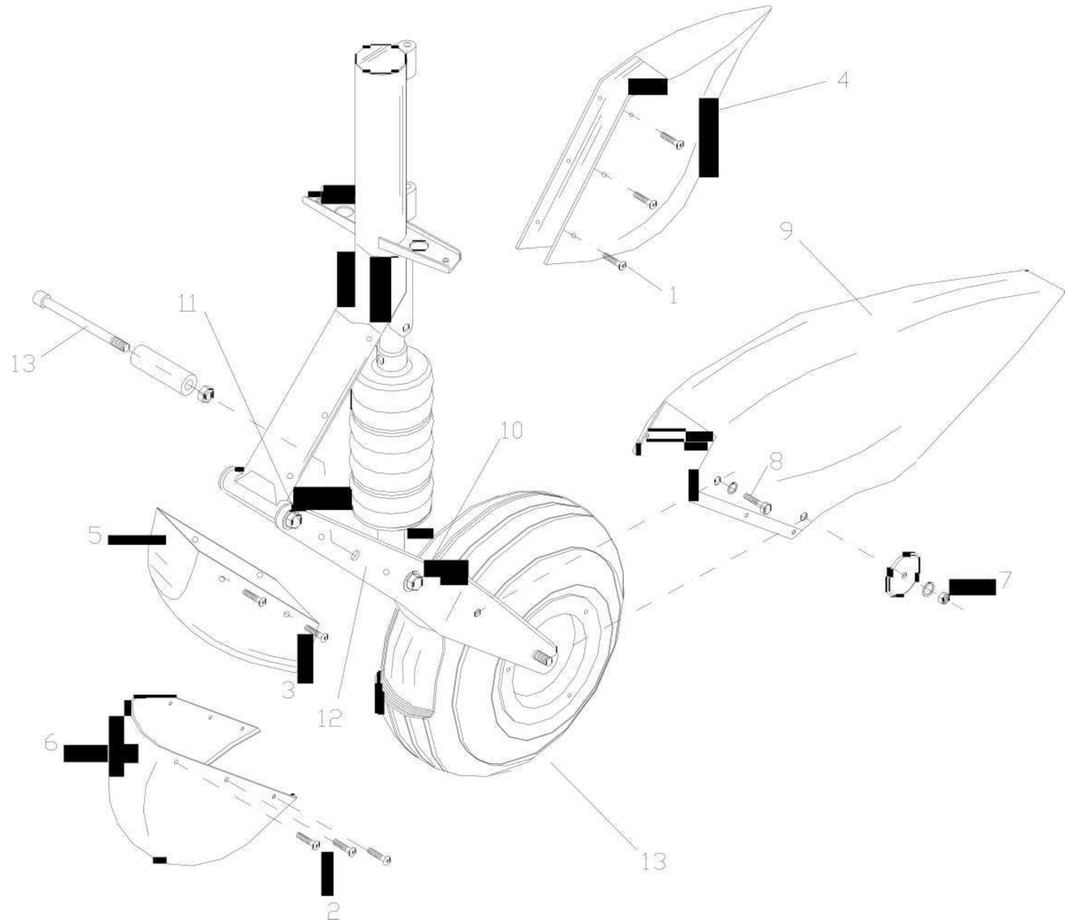


Figure 4-19 Removal of nosegear fairing

4.11 Tire inflation pressure

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

CHECKLIST TO CARRY OUT AFTER INSTALLATION		
N°	*ITEM*	*CHECK*
1	Pitot tube attachment	❑
2	Lower bolt right side strut (24.6 Nm)	❑
3	Right side half-wing mounting	❑
4	Front right side wing attachment bolt (24.6 Nm)	❑
5	Rear right side wing attachment bolt (24.6 Nm)	❑
6	Upper bolt right side strut (24.6 Nm)	❑
7	Lower bolt left side strut (24.6 Nm)	❑
8	Left side half-wing mounting	❑
9	Front left side wing attachment bolt (24.6 Nm)	❑
10	Rear left side wing attachment bolt (24.6 Nm)	❑
11	Upper bolt left side strut (24.6 Nm)	❑
12	Right side flap attachment bolt (10.4 Nm)	❑ ❑
13	Left side flap attachment bolt (10.4 Nm)	❑ ❑
14	Right side aileron control attachment bolt (6 Nm)	❑ ❑
15	Left side aileron control attachment bolt (6 Nm)	❑ ❑
16	Right side stabilator insertion bushing	❑
17	Right side hemi-stabilator attachment bolt (10.4 Nm)	❑ ❑
18	Left side stabilator insertion bushing	❑
19	Left side hemi-stabilator attachment bolt (10.4 Nm)	❑ ❑
20	Stabilator fake spar attachment screws	❑
21	Tab connection bushing	❑ ❑
22	Trim control rod attachment bolt	❑ ❑
23	Right aileron control bar grease	❑
24	Left aileron control bar grease	❑
25	Right wing fuel line attachment	❑
26	Left wing fuel line attachment	❑
27	Return thin fuel line attachment (only right wing)	❑
28	Right wing navigation light wiring connection (*optional*)	❑
29	Left wing navigation light wiring connection (*optional*)	❑

SECTION 5
POWERPLANT

5 Powerplant

5.1.1 Cowling

The engine cowling is available in two versions either classic or gull wing type. The cowling is made up of two parts: the upper part consists of a fiberglass nose and light alloy panels while the bottom part is partially made of fiberglass and aluminum.
Cowling top 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 (See fig. 5-1)

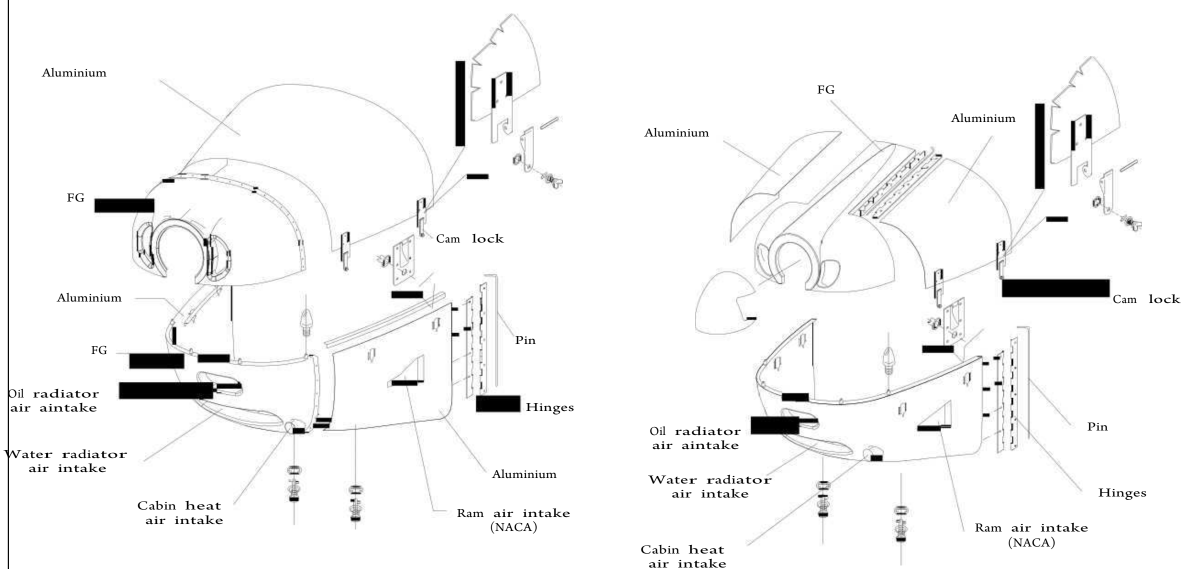


Figure 5-1 Engine cowling

5.1.2 Engine Main Features

The installed engine is a BOMBARDIER-ROTAX type 912 S2 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 with integrated shock absorber and overload protection.
Electric starter, integrated AC generator and mechanical fuel pump are standard.
Technical data:

Maximum power rating	73.5 kW
RPM @ max power	5800 rpm
Cruise power rating	69.0 kW @ 5500 rpm
Bore	84 mm
Stroke	61 mm
Displacement	1352 cm3
Compression ratio	10.5: 1
Firing order	1-4-2-3
Direction of rotation of prop shaft	clockwise (pilot"s view)
Max temp. Cylinder heads	135° C
Fuel	See Flight Manual Sect. 2 Limitations
Reduction ratio	1: 2.4286

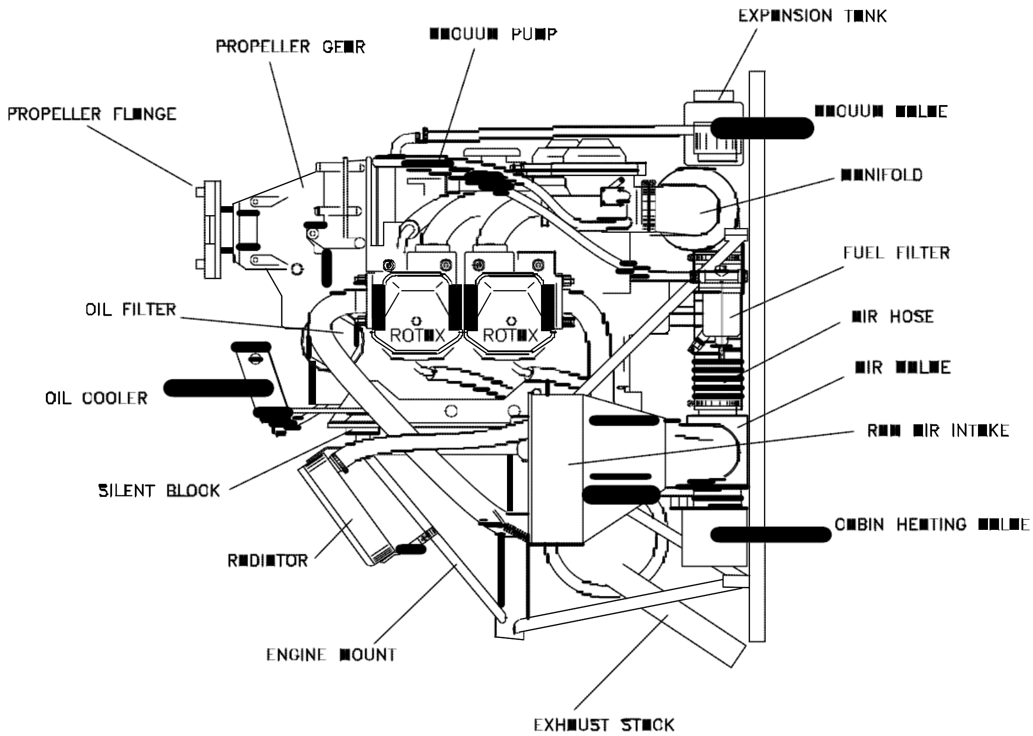


Figure 5-2 Engine installation

5.2 General Servicing Procedures

5.2.1 Idle speed synchronization

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

5.2.2 Ordinary servicing

Refer to the Engine Operator"s Manual furnished by the engine"s manufacturer (p/n 899370 Issue 0 of 1/7/1998 and later versions) for all servicing operations furnished along with the present manual.

5.2.3 Propeller

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

5.2.4 Propeller removal

To remove propeller use the following procedure

1. Remove screws holding spinner dome to spinner bulkhead
2. Remove safetying
3. Remove bolts that secure prop to hub

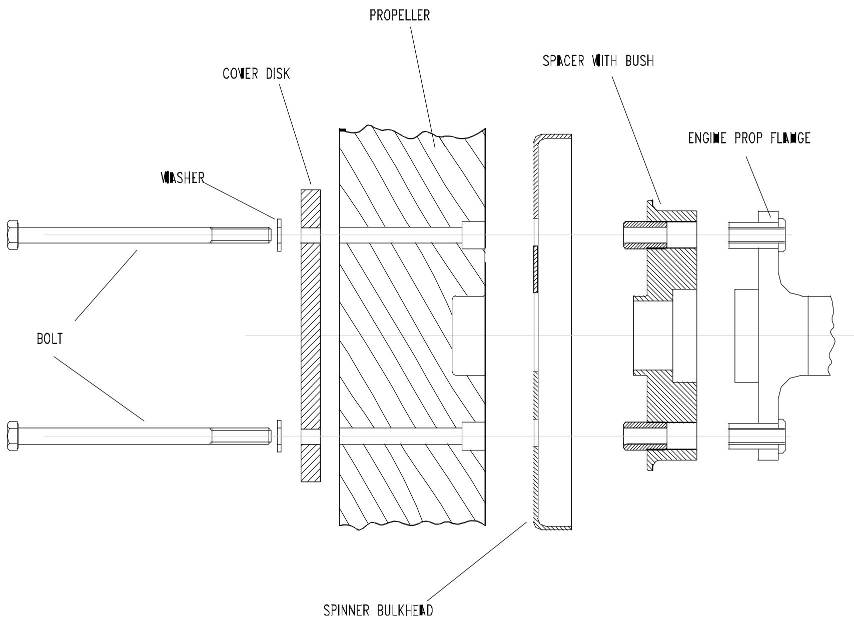
After removal, do not lay propeller down on its tip but always lay flat and away from sources of humidity, heat or, in any case, away from areas subject to excessive temperature change.

5.2.5 Propeller installation

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

1. Carefully clean hub area insuring no oil traces are present
2. Check bolts for cracks, rust, proper thread and cleanliness
3. Check spinner bulkhead for cracks or deformations
4. Check spinner for cracks and deformations
5. Install spinner spacer and prop
6. Insert washers and fasten locknuts (bolt torque = 17 Nm)
7. Safety all bolts
8. Install spinner

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



5.2.6 Periodic inspection

Refer to specific subsection in Periodic Inspection Schedule of Section 3

For further information refer to the "Owner"s Manual" and to all the pertinent documents issued by GT.

SECTION 6
SYSTEMS

6 Systems

6.1 Fuel System

The system is equipped with two aluminum fuel tanks (1) integrated within the wing leading edge and accessible for inspection through dedicated covers (6). Capacity of individual tank is 35 liters (9.24 gal) (45 liters (11.8 gal) optional) and total usable fuel is 66.8 liters (17.64 gal) (86.8 liters (22.9 gal) total). On the upper external are fuel caps (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.

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). Mechanical pump feeds the fuel manifold (14); its left branch feeds the left carburetor and, in derivation by a tee with restrictor, the fuel pressure gauge (14). The rear branch of the "X" manifold (14) is connected to the fuel return line (17).

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 half-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.

Drain gascolator daily (see Fig. 6-2) using the spring tap (2). Unscrew ring nut (1) for disconnect bowl and accede at wire mesh filter (4), use particular care not to damage seal (3) and spring (1)

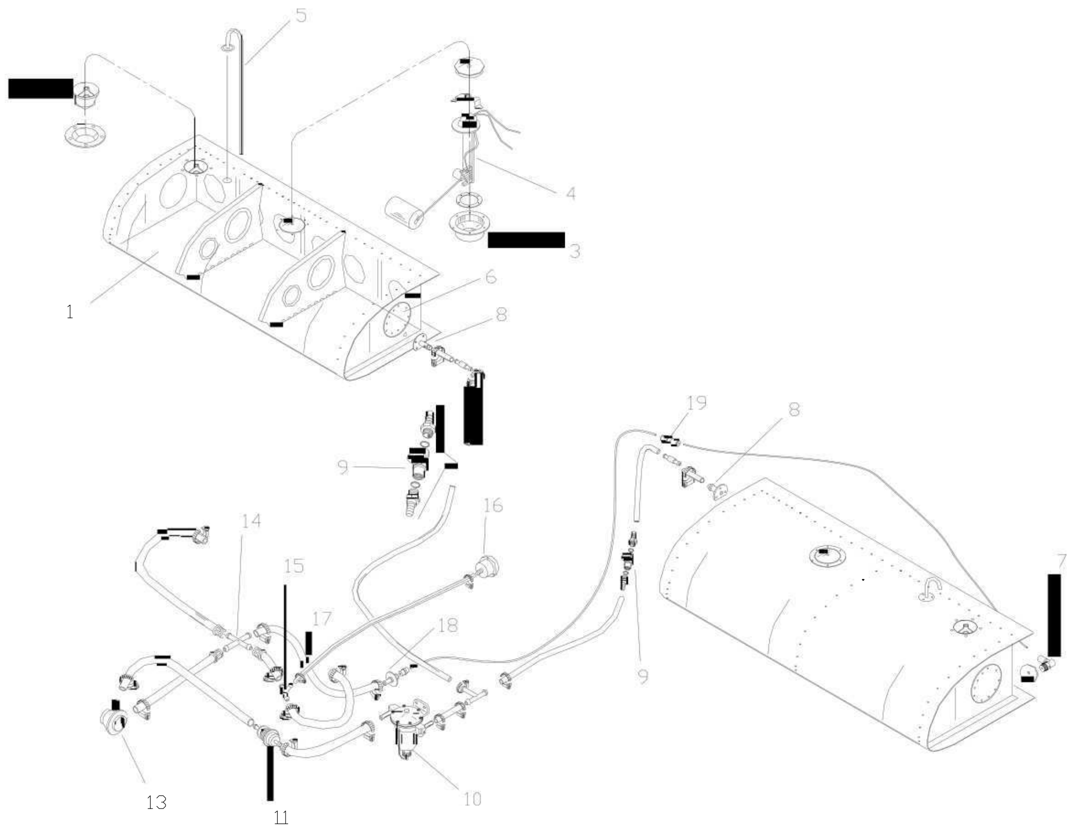


Figure 6-1 Fuel System

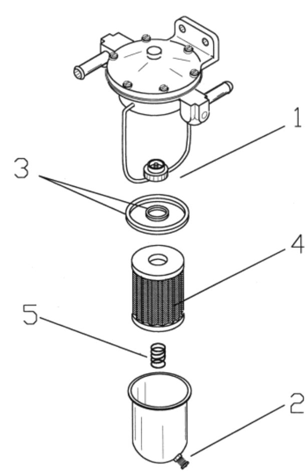


Figure 6-2 Gascolator

6.2 Instrumentation

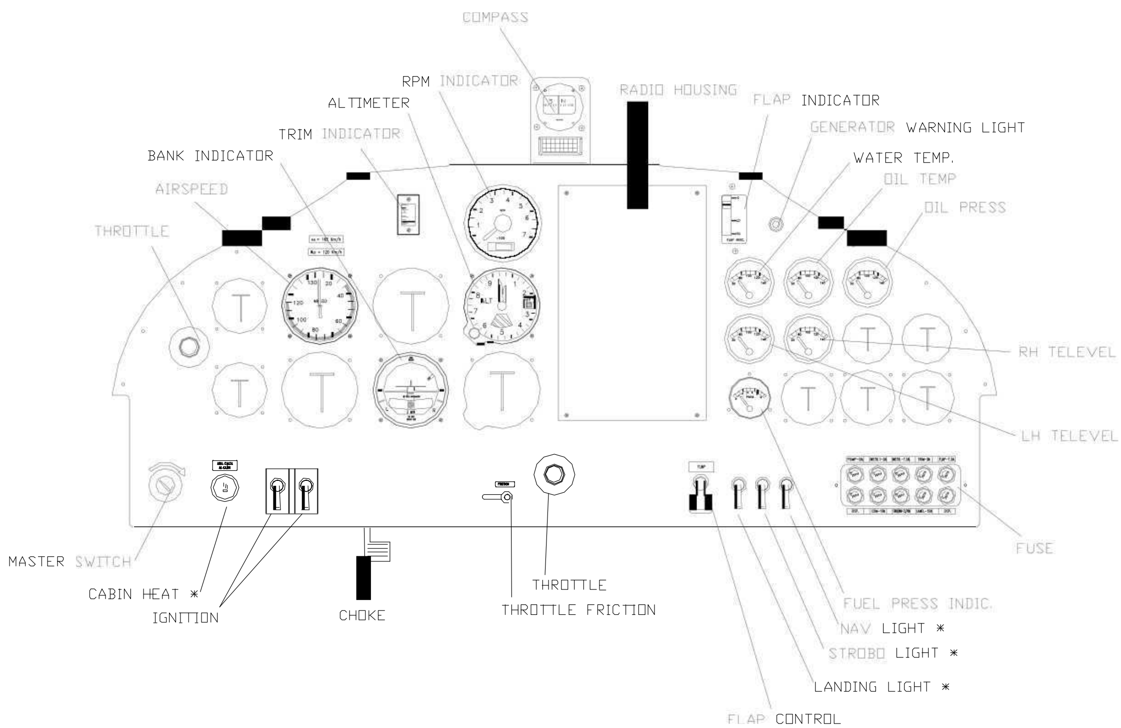


Figure 6-5 Instrument panel (typical)

The aluminum instrument panel (see Fig. 6-5) is sub-divided in three distinct areas:
The left area holds flight instruments
The right area holds engine gauges
The central area can hold Nav/Com instruments (if installed)
The lower portion of the instrument panel holds:

- Master switch
- Landing and Strobe light
- Flap switch
- Circuit protection fuses
- Throttle
- Cabin heat
- Carburetor heat knobs (if installed)

Individual instruments may be accessed for removal by releasing a screw located next to magnetic compass and sliding instrument panel protective cover along railings. Before removing individual instruments, use particular care in disconnecting wires, hoses or other links as the case applies.
When installing instruments, follow recommendations below:

- Do not over-tighten bolts as plastic instrument casing may break
- Insure hoses are free of any foreign matter and that no tight radius turns are present as this may choke hose or cause malfunction
- Insure proper grounding and tightening of all electrical instruments

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

6.2.1 Engine instrumentation

- Electric tachometer
- Hour meter
- Electric oil temperature indicator

The sensor is located on the oil pump tube and is marked with "TO" on the pump flange.

- Oil pressure gauge
  Sensor is located on oil tube
- Oil temperature gauge
- Coolant / Cylinder temperature gauge
- Cylinder head temperature sensors are located on cylinders 2 or 3
- Fuel Pressure Gauge

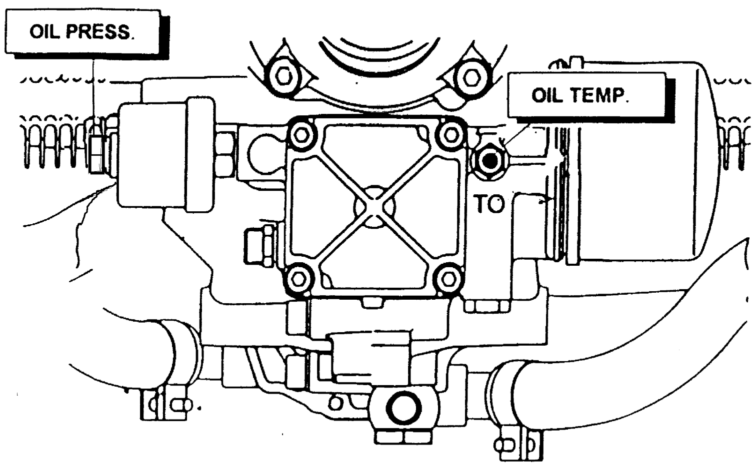


Figure 6-6 Pressure and oil temperature sensors

6.3 Pitot and Static System

Referring to figure 6-6, 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 plumbing connects pitot and static ports to pressure instruments.

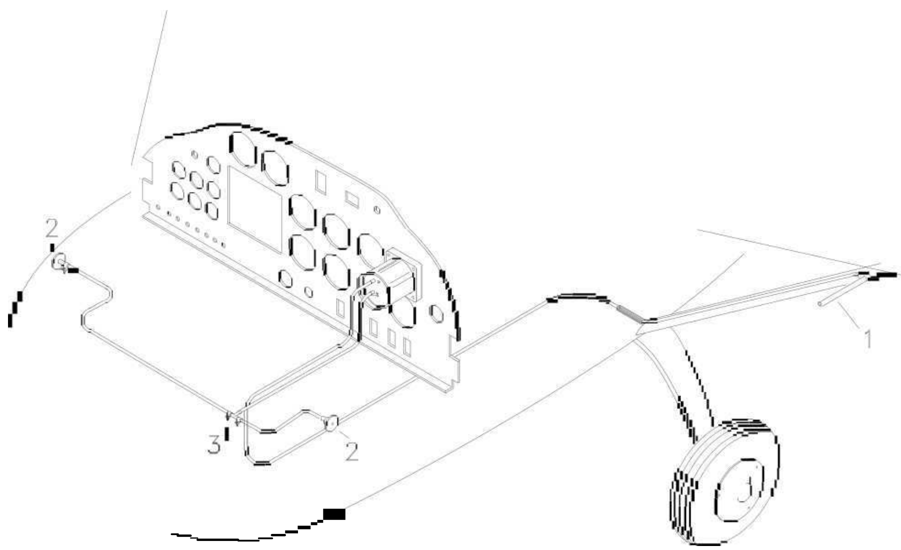


Figure 6-7 PITOT AND STATIC SYSTEM

Servicing the system is easy and is carried out in accordance with schedule listed in the Periodic Inspection Table found in the Inspection section of this manual.
Simply remove tubes from instruments and blow air in tube in port direction and never vice versa, 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.
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.

WARNING

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

6.4 Exhaust Manifolds

With reference to figure 6-8, exhaust manifolds (1) are flanged to the engine and join the muffler separately (2). The muffler also works as a heat exchanger (3) for carburetor and cabin heat.
The exhaust system must always be checked for possible cracks (ref. Periodic Inspection Table Section B). 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 carburetor and cabin air heat.

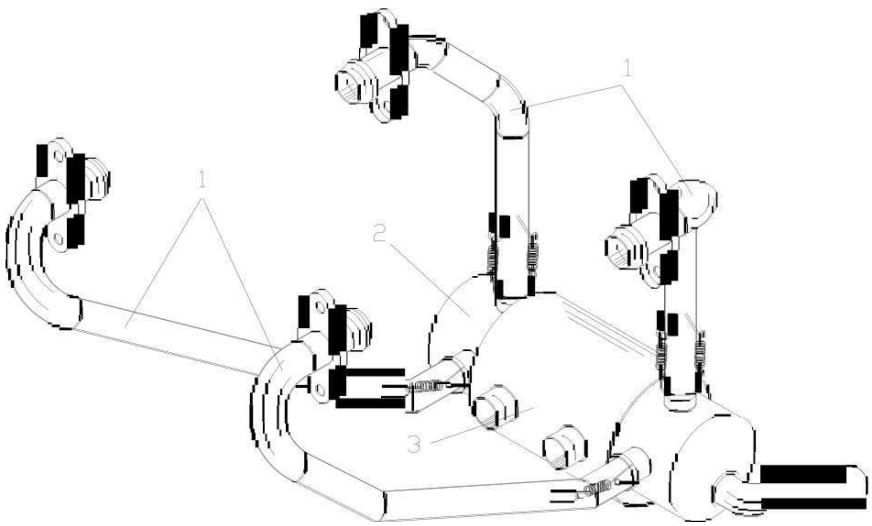


Figure 6-8 Exhaust manifold

6.4.1 Cabin heat

Cabin heat system consists of the following (see Fig. 6-9):

- Hot air vent near rudder pedal bar (1)
- De-frost vents near windshield (2)
- Heat exchanger (3)

A round knob located on lower left side of instrument panel controls cabin heat via the intercept valve located on lower part of firewall, external to cabin.

6.4.2 Carburetor heat (if installed)

The system is also designed to direct carburetor air intake from scoop (5) and manifold (6) located on top portion of firewall. Using the center valve (7), hot air from heat exchanger may be deviated towards carburetors.
A round knob located to center-left of instrument panel controls this valve.
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.

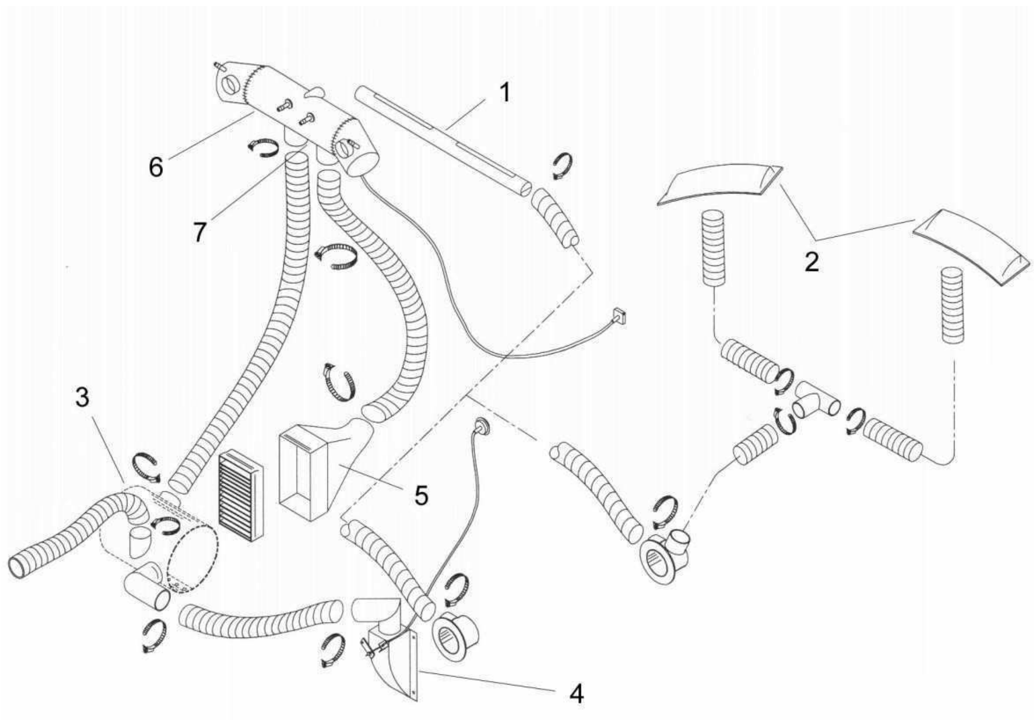


Figure 6-9 Carburetor heat and cabin heat systems

Revision Date: 10-29-2007	
Revision Number: 3.01	

6.5 Brake System

The brake system consists of a brake fluid reservoir (4), a master cylinder: (3) two disc brakes assemblies; and an intercept valve activates parking brake (3). 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. A check-valve is installed (5) that provides braking action even if the parking brake valve (2) is shut.

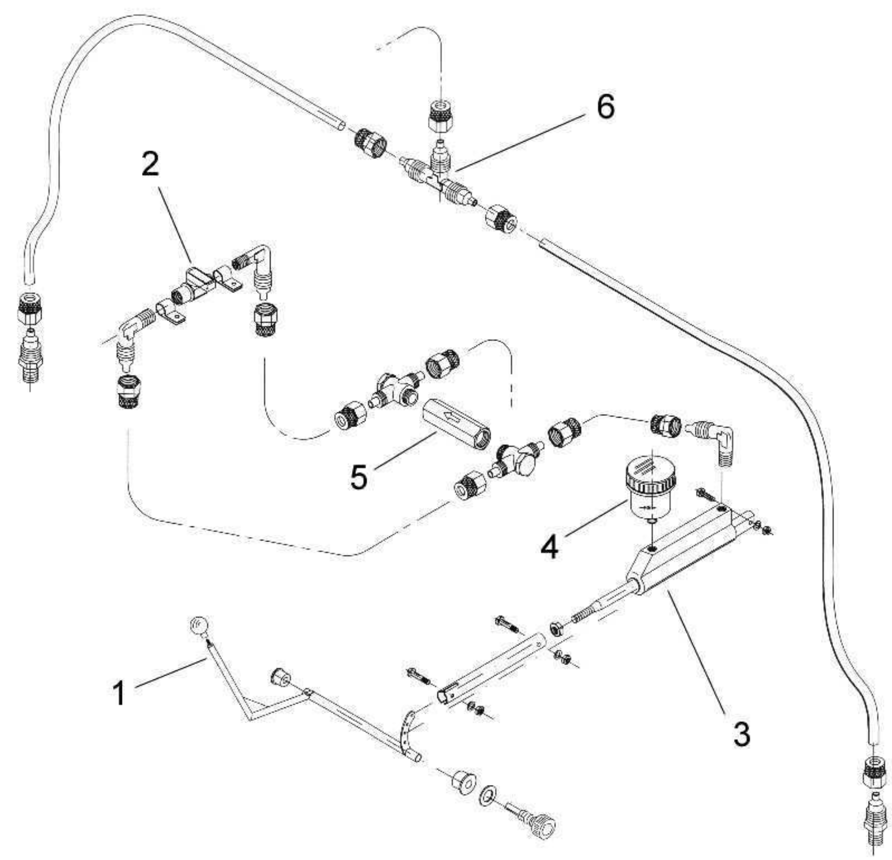


Figure 6-10 Brake System

6.5.1 Draining and replacing brake fluid

To replace the brake fluid:
Service one side first, then other

A. Remove reservoir cap
B. Unscrew line nipple (6) from disk caliper
C. Using a manually operated pump, add brake fluid MIL 5606 until level reaches bottom of reservoir, reattach line to caliper avoiding fluid spill

Repeat operations A, B, C for other side

Top fluid level to 3/4 and close cap

To drain the brake system:

D. Pull brake lever (5) to pressurize circuit
E. Loosen small escape valve (7) allowing fluid spurt
F. Close small valve and release brake lever

Repeat operations D, E and F until fluid comes out clean and no longer in spurts proving absence of air bubbles.

- Top-off reservoir with needed amount of brake fluid
- 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 reliable.

6.5.2 Replacing brake pads

When thickness of lining is less than 2.4 mm, brake pads should be replaced using the following procedure and the fig. 6-11:

- Make sure parking brake is released
- Remove fairings to expedite operation
- Loosen bolts (2) from the caliper (1)
- Remove brake pads (3)
- Replace brake pads
- Reassemble

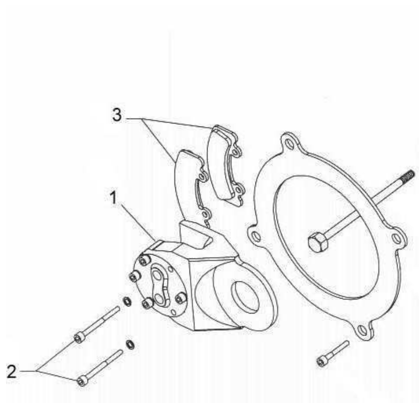
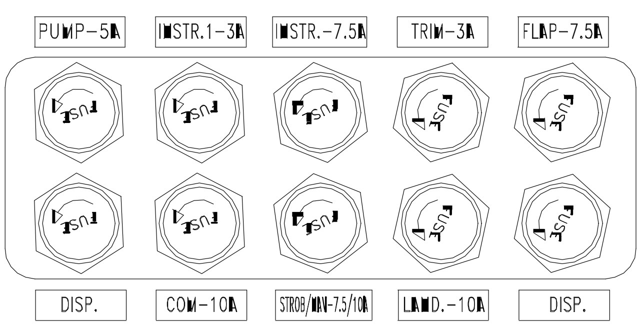


Figure 6-11 Brake Assemblies

SECTION 7
ELECTRICAL SYSTEM

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 s
Circuit prot sition
and capacit



In case of f
Proceed as follows:

- Exclude all loads relative to burnt fuse
- Close circuit by substituting the burnt fuse
- Restore one by one all loads relative to the burnt fuse until circuit protection shuts down again

NOTE
This new interruption will indicate faulty utility

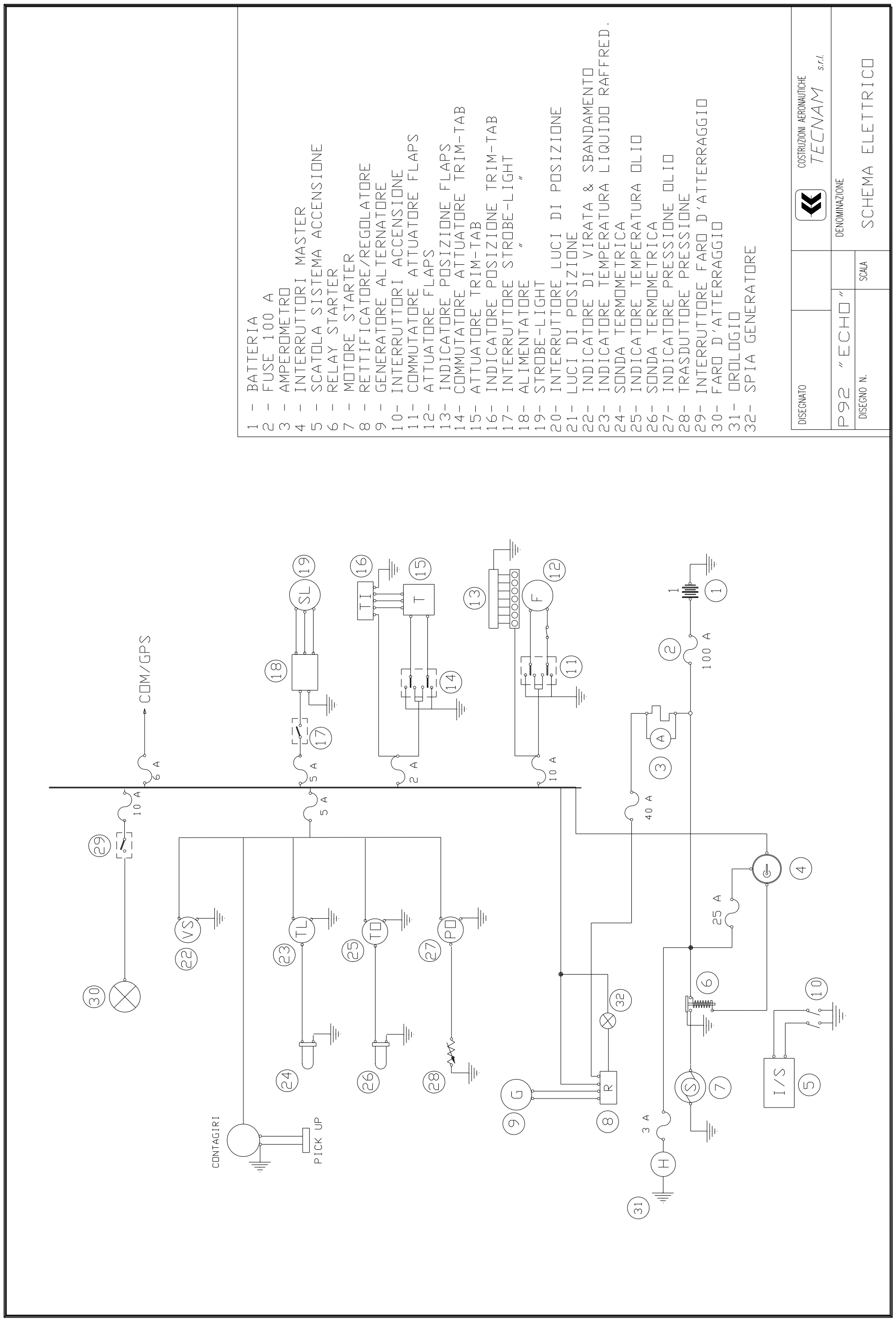


Figure 7-1 WIRING *DIAGRAM (TYPICAL)*

SECTION 8
MARKING & PLACARDS

8 Markings and Placards

8.1.1 Magnetic compass compensation table

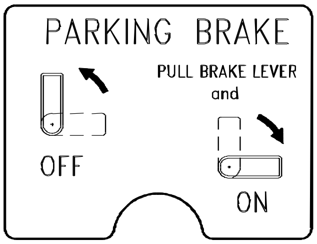
To compensate the deviation errors of the magnetic compass, the following correction table is located just below the compass:

For	N	30	60	E	120	150
Steer						
For	S	210	240	W	300	330
Steer						

DATE RADIO ON AIRPATH

8.1.2 Parking brake valve

The following placard (55x42mm) is located on the central tunnel behind the two seats next to the parking brake shutoff valve.



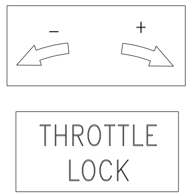
8.1.3 Engine throttle

Two throttle control knobs are located on the instrument panel. One positioned centrally while the other is on the upper left-hand side. The following placard (7x20mm) is located near each one of them.

THROTTLE

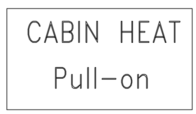
8.1.4 Engine throttle friction

A throttle friction lock is located on the instrument panel to keep the desired throttle setting.
The following placard (23x11 upper; 21x11 lower) is positioned near the friction lock knob.



8.1.5 Cabin heat

The cabin heat control knob is located on the instrument panel central area just below the left throttle control. The cabin's heat control is marked with this placard (20x11mm).

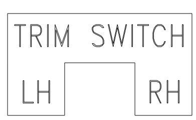


8.1.6 Carburetor heat

The carburetors heat control knob is located on the instrument panel central area near the central engine's throttle. In correspondence of it is located the following placard (20x11mm).

8.1.7 Trim switch

The trim shunt control is located on the upper central area of the instrument panel alternatively allocating trim control to either Rh or Lh control stick. The following placard (25x14mm) is positioned just above of it.



8.1.8 Fuses

Fuses are located on the lower/right side of the instrument panel and each fuse is individually marked as follows (from left to right):

BATT 25A	STALL 1A	OT/HT 3A	FuelQ./OP 3A	INSTR 7.5A	TRIM 3A	FLAP 7.5A	STROBE 5A	Land.L. 10A	Fuel PUMP 7.5A
	COM 1 10A	GPS 5A	Transp. 3A	ENC. 2A	AUDIO 5A	NAV L. 7.5A	AVAILABLE	AVAILABLE	AVAILABLE

Depending on the specific equipment installed on the a/c the type and position of the fuses could vary from the above shown.

8.1.9 Flaps

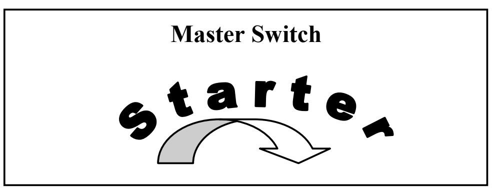
The flap control switch is located on the lower portion of the instrument panel. The following placards (15x10mm the upper, 6x15mm the lower) are just next to it.

FLAP
UP

DOWN

8.1.10 Generator, Master, Starter

On the lower part of the instrument panel are located, in order:
The starter, marked with a placard (19x11mm):



8.1.11 Choke

Located above the choke lever:

CHOKE
Push

8.1.12 Generator light

A generator warning light is located on the upper/right side of the instrument panel and it is marked with the following label (19x6mm).

GENERATOR

8.1.13 Usable fuel

Located next to the two fuel level gauges are the two placards indicating the usable fuel for each tank (18x13mm):

Left Tank Usable Fuel 11.5 gallons	Right Tank Usable Fuel 11.5 gallons

Note
For extended tanks the usable fuel per side is 45 liters or 11.9 gallons

8.1.14 Baggage compartment

A placard (30x50mm) indicating the maximum weight and to fasten the baggage's retain harnesses, is present visible into the baggage compartment.

TIE-DOWN HARNESS

MAX WEIGHT 20kg [44 lbs]

MAX SPEC. PRESS:
12.5 kg/dm^2
[256 lbs/sq ft]

8.1.15 Fuel tanks

Next to the fuel tank filler caps is located a placard (57x120mm) indicating the type of fuel and the total tank's capacity.

AUTOMOTIVE FUEL, ROZ MIN. 95 OCT. LEADED OR UNLEADED AVGAS 100LL CAPACITY 35 LT (9.2 US gal.)	AUTOMOTIVE FUEL, ROZ MIN. 95 OCT. LEADED OR UNLEADED AVGAS 100LL CAPACITY 45 LT (11.9 US gal.)

Note
For extended fuel tanks the capacity is 45 liters or 11.9 gallons

8.1.16 Oil tank reservoir

On the oil tank reservoir are present two placards (30x12mm) indicating the type and quantity of engine's oil stored into the reservoir.

AUTOMOTIVE OIL API "SF" OR "SG"	AUTOMOTIVE OIL CAPACITY 3.5 LT

8.1.17 Cooling system overflow tank

Located on the overflow tank cap is the placard indicating the solution proportion between the antifreeze additive and the water

80% antifreeze 20% distilled water

8.1.18 Brake oil reservoir

On the cap of the brake's oil tank, is a placard indicating the type of oil that must be used.

SPECIFY HYDRAULIC OIL MIL H5606

8.1.19 Tire pressures

On each steel spring leaf is a placard indicating the main tires inflating pressure (18x6mm):

23 psi

On the nose gear is located the following placard indicating the nose tire inflating pressure (18x6mm):

15 psi

8.1.20 Identification plate

The following placard is located on the pilot side of the empennage forward of the stabilator and made of stainless steel.

Builder: Costruzioni Aeronautiche Tecnam Model: P92 Echo Super Serial number: 123

8.1.22 Limitations plackards

On the pilot's panel a placard will state the following (27x7mm):

NO SMOKING

Next to the airspeed indicator is the following placard (6x52mm).

Maneuvering speed V_A = 84 KIAS

On the pilot's panel a placard will state the following:

NO INTENTIONAL SPINS