Aircraft Flight Manual

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TECNAM P92 Echo MKII

MANUFACTURER: *COSTRUZIONI AERONAUTICHE* ***TECNAM*** *S.p.A.*
AIRCRAFT MODEL: ***P92 Echo MKII***

SERIAL NUMBER: 1716

BUILD YEAR: 2023

REGISTRATION MARKINGS: PH-OBS

This manual contains information to be furnished to the pilot as required by LTF-UL in addition to further information supplied by the manufacturer.
This manual must always present on board the aircraft.
The aircraft is to be operated in compliance with information and limitations contained herein.

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4. POWERPLANT LIMITATIONS

Following table reports the operating limitations for aircraft engine installed:

ENGINE MANUFACTURER: Bombardier Rotax GmbH.

ENGINE MODEL: 912 ULS2

MAXIMUM POWER:

	Max Power kW *(hp)*	Max RPM. Prop. RPM *(engine)*	Time max. (minutes)
Max. T.O.	73.5 *(98.5)*	2388 *(5800)*	5
Max. Cont.	69 *(92.5)*	2265 *(5500)*	-

NOTE *With full throttle, at fixed point in no wind conditions, the maximum propeller's RPM should be 2100 ± 100.*

Temperatures:

Max CHT*	135°C
Max CT:	120°C
Min/Max Oil:	50 °C / 130 °C
Oil normal operating range (approx.):	90 °C / 110 °C

* *applicable for Engines up to serial no. 4924543(included) and repaired engine which doesn't change the cylinder head n°3 with new one (part no. 413195)*

Oil Pressure:

Minimum:	0.8 Bar / 12 psi
Normal:	2-5 Bar / 29-73 psi
Maximum:	7 Bar / 102 psi

Engine starting: allowable temperature range

OAT Min	-25° C
OAT Max	+50° C

WARNING

In event of cold starting operation, it is permitted a maximum oil pressure of 7 bar for a short period.

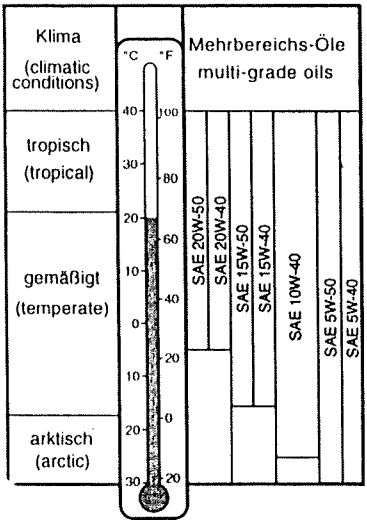
Fuel pressure:

Minimum:	2.2 psi (0.15 Bar)
Normal:	5.8 psi (0.40 Bar) or 7.26 psi* (0.5 Bar)

* only applicable for fuel pump part no. 893110, 893114 and 893115

5. LUBRICANT

Use viscosity grade oil as specified in the following table:



6. COOLANT LIQUID

Coolant type and specifications are detailed into the "Rotax Operator's Manual" and in its related documents.

7. PROPELLER

MANUFACTURER:	Sensenich Propeller
MODEL:	W68T2ET-70J
TYPE:	Wood twin blade fixed pitch
DIAMETER:	1730 mm (no reduction permitted)

8. MAXIMUM OPERATING ALTITUDE

Maximum operating altitude is 14000 ft (4260 m) MSL.

CAUTION

Flight crew is required to use supplemental oxygen according to Air Operation Rules.

9. AMBIENT TEMPERATURE

Ambient temperature: from -25°C to +50°C.

WARNING

Flight in expected and/or known icing conditions is forbidden.

10. POWERPLANT INSTRUMENTS MARKINGS

Powerplant instrument markings and their colour code significance are shown below:

INSTRUMENT		RED RANGE Minimum limit	GREEN RANGE Normal operating	YELLOW RANGE Caution	RED RANGE Maximum limit
Propeller	RPM	----	580 - 2265	2265 - 2388	>2388
Engine	RPM	----	1410- 5500	5500-5800	>5800
Oil temp.	°C	<50	90 - 110	50 - 90 110 - 130	>130
CT	°C	---	0 - 120	---	>120
CHT(1)	°C	---	0 - 135	---	>135
Oil pressure	bar	<0.8	2 - 5	0.8 - 2 5 - 7 (2)	7
Fuel press.	psi	<2.2	2.2-5.8 or 7.26(3)	----	5.8 or 7.26(3)
	bar	<0.15	0.15-0.4 or 0.5(4)	----	0.4 or 0.5(3)
Fuel Q.ty	litres	<0(5)	----	----	----

11. OTHER INSTRUMENTS MARKINGS

INSTRUMENT	RED RANGE Minimum limit	GREEN RANGE Normal operating	YELLOW RANGE Caution	RED RANGE Maximum limit
Voltmeter	<10.5 Volt	12 - 14 Volt	----	----

[1] - Applicable for Engines up to serial no. 494543 (included) and repaired engine which doesn't change the cylinder head n°3 with new one (part no. 413195)

[2] - In event of cold starting operation, it is permitted a maximum oil pressure of 7 bar for a short period.

[3] - when fuel pump part no. 893110, 893114 and 893115 is installed

[4] - when fuel pump part no. 893110, 893114 and 893115 is installed

[5] - "0" indication shows the unusable fuel quantity (1.55 litres)

12. WEIGHTS

Condition	Weight
Maximum take-off weight	*600 kg*
Maximum landing weight	*600 kg*
Maximum zero wing fuel weight	*600 kg*
Maximum baggage weight	*20 kg*

13. CENTER OF GRAVITY RANGE

Datum	Propeller support flange without spacer
Levelling	Seat track supporting trusses (ref. to sect.6 for the procedure)
Forward limit	1.841 m (23.0% MAC) aft of datum for all weights
Aft limit	1.939 m (30% MAC) aft of datum for all weights

WARNING

The pilot is responsible for ensuring that the airplane is properly loaded. Refer to Section 6 for appropriate instructions.

14. APPROVED MANEUVERS

The aircraft is intended for non-aerobatic operations only.

Non aerobatic operations include:

- Any manoeuvre pertaining to "normal" flight
- Stalls (except whip stalls)
- Lazy eights
- Chandelles
- Turns in which the angle of bank is not more than 60°

WARNING

Aerobatic manoeuvres, including spins and turns with angle of bank of more than 60°, are not approved for such a category.

WARNING

Limit load factor could be exceeded by moving abruptly flight controls at their end run at a speed above V_A.

15. MANEUVERS LOAD FACTOR LIMITS

Maneuver load factors limits are as follows:

Positive	Negative
+ 4.0 g	- 2.0 g

Maneuver load factors limits with flaps extended are as follows:

Positive	Negative
+ 2.0 g	0 g

16. FLIGHT CREW

Minimum crew for flight is one pilot seated on the left side.

17. MAXIMUM PASSENGER SEATING

With the exception of the pilot, only one passenger is allowed on board of this aircraft.

18. FUEL

TWO TANKS:	*45 liters each*
TOTAL FUEL CAPACITY:	*90 liters.*
USABLE FUEL Q.TY:	*86.9 liters*
UNUSABLE FUEL Q.TY:	*1.55 liters each (3.1 litres total)*

Compensate uneven fuel tank levels by acting on the fuel selector valve located into the cabin.

APPROVED FUEL:

- ✓ MOGAS ASTM D4814
- ✓ MOGAS EN 228 Super/Super plus (min. RON 95)
- ✓ AVGAS 100 LL (ASTM D910)

CAUTION

Prolonged use of Aviation Fuel Avgas 100LL results in greater wear of valve seats and greater combustion deposits inside cylinders due to higher lead content. Make reference to Rotax Maintenance Manual which prescribes dedicated checks due to the prolonged use of Avgas.

19. DEMONSTRATED CROSS WIND SAFE OPERATIONS

The aircraft controllability during take-offs and landings has been demonstrated with a cross wind components up to *15 kts.*

20. RESCUE SYSTEM DEPLOYMENT

Maximum airspeed for rescue system deployment is 145 KIAS

Section 3–EMERGENCY PROCEDURES

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1. INTRODUCTION

Section 3 includes checklists and detailed procedures to be used in the event of emergencies. Emergencies caused by a malfunction of the aircraft or engine are extremely rare if appropriate maintenance and pre-flight inspections are carried out.

Before operating the aircraft, the pilot should become thoroughly familiar with the present manual and, in particular, with the present section. Further, a continued and appropriate training and self-study should be done.

In case of emergency the pilot should act as follows:

1. *Keep control of the aeroplane*
2. *Analyse the situation*
3. *Apply the pertinent procedure*
4. *Inform the Air Traffic Control if time and conditions allow.*

Two types of emergency procedures are hereby given:

a. "Bold faces" which must be known by heart and executed in the correct and complete sequence, as soon as possible as the failure is detected and recognized;

   These procedures characters are boxed and highlighted, an example is shown below:

BEFORE ROTATION: ABORT TAKE OFF		
1.	**Throttle**	*IDLE*
2.	**Rudder**	***Keep heading control***
3.	- -	
4.	- -	

b. Other procedures which should be well theoretically known and mastered, but that are not time critical and can be executed entering and following step by step the AFM appropriate checklist.

NOTE

In this Chapter, following definitions apply:
***Land as soon as possible**: land without delay at the nearest suitable area at which a safe approach and landing is assured.*
***Land as soon as practical**: land at the nearest approved landing area where suitable repairs can be made.*

2. AIRPLANE ALERTS

2.1. ELECTRIC POWER SYSTEM MALFUNCTION

Generator message alert

NOTE Generator message alert *(ALT)* may appear on PFD for a faulty alternator or when voltage is above 16V, in this case the over-voltage sensor automatically shuts down the alternator

1. Generator switch: *OFF*
2. Master switch: *OFF*
3. Generator switch: *ON*
4. Master switch: *ON*

If the problem persists

5. Generator switch: *OFF*
6. Non-vital electric equipment: *Shed*

2.2. ELECTRICAL FUEL PUMP FAILURE (IF INSTALLED)

1. Electrical fuel pump switch: *OFF*
2. Electrical fuel pump switch: *ON*
3. Fuel pressure: *CHECK raise*

If fuel pressure doesn't build up:

4. **Land as soon as possible** monitoring fuel pressure.

2.3. TRIM SYSTEM FAILURE

Locked Control

Should trim control be inoperative, act as follows:

1. Breakers: *CHECK*
2. Trim switch LH/RH: *CHECK for correct position*
3. Speed: *adjust to control aircraft without excessive stick force*
4. **Land aircraft as soon as possible.**

Runaway

In event of trim runaway, act as follows:

1. Pull TRIM Breaker as soon as possible
2. Speed: *adjust to control aircraft without excessive stick force*
3. **Land aircraft as soon as possible.**

2.4. AIRPLANE EVACUATION

With the engine secured and propeller stopped (if practical):

1. **Parking brake:** *ON*
2. **Seat belts:** ***unstrap completely***
3. **Headphones:** *REMOVE*
4. **Door:** *OPEN*
5. **If door is locked or doesn't open:** ***break using the hammer (if available)***
6. ***Escape away from flames/ hot engine compartment/ spilling fuel tanks.***

3. ENGINE SECURING

Following procedure is applicable to shut-down the engine in flight:

1. Throttle Lever	*IDLE*
2. Magnetos	*OFF*
3. Fuel Selector	*OFF*
4. Electrical fuel pump (if installed)	*OFF*
5. Generator switch	*OFF*

4. ENGINE FAILURE

4.1. ENGINE FAILURE DURING TAKE-OFF RUN

1.	**Throttle:**	*IDLE (fully out)*
2.	**Rudder**	*Keep heading control*
3.	**Brakes:**	*apply as needed*

When safely stopped:

4.	Magnetos:	*OFF*
5.	Fuel selector valve:	*OFF*
6.	Electric fuel pump (if installed)	*OFF*
7.	Generator & Master switches:	*OFF*

4.2. ENGINE FAILURE IMMEDIATELY AFTER TAKE-OFF

1.	**Speed:**	***keep minimum 50 kts IAS (V_{50} ft)***
2.	**Find a suitable place to land safely.**	

WARNING

The immediate landing should be planned straight ahead with only small changes in directions not exceeding 45° to the left and 45° to the right.

3.	**Flaps:**	***as needed***

WARNING

Stall speed increases with bank angle and longitudinal load factor. Acoustic stall warning will in any case provide a correct anticipated clue of incipient stall.

At, or right before touch down

4.	**Throttle:**	***IDLE (fully out)***
5.	**Magnetos:**	***OFF***
6.	**Fuel selector valve:**	***OFF***
7.	**Electric fuel pump (if installed):**	***OFF***
8.	**Generator & Master switches:**	***OFF***

WARNING

A single engine aircraft take off should always be preceded by a thorough take off emergency pilot self-briefing. Decision to try an engine emergency restart right after take-off should be taken only if environmental situation requires it: pilot shall never ignore the priority of attentively follow an immediate emergency landing.

After possible mechanical engine seizure, fire or a major propeller damage, engine restart attempt is not recommended.

4.3. ENGINE FAILURES DURING FLIGHT

4.3.1 Low Fuel Pressure

If the fuel pressure indicator falls below the **2.2 psi** *(0.15 bar)*:

1. Electric fuel pump (if installed): *ON*
2. Fuel selector valve: *change the fuel feeding tank*
3. Check both fuel quantity indicators

If fuel pressure doesn't build up:

4. **Land as soon as possible** monitoring fuel pressure.

If engine stops:

5. **Land as soon as possible** applying forced landing procedure (See Para. 7)

4.3.2 Oil Pressure limits exceedance

If oil pressure exceeds upper limit (7 bar):

1. Throttle Lever *REDUCE engine power as practical*
2. OIL PRESS and OIL TEMP *CHECK within limits*
3. **Land as soon as practical**

If oil pressure is under the lower limit (0.8 bar):

1. Throttle Lever *REDUCE Minimum practical*
2. **Land as soon as practical**

If oil pressure continues to decrease:

3. **Land as soon as possible** applying forced landing procedure (See Para. 7)

4.3.3 High Oil Temperature

If oil pressure is low see para. 4.3.2 Low Oil Pressure.

If oil pressure is within limits:

1. Throttle Lever — *REDUCE Minimum practical*

If oil temperature does not decrease

2. Airspeed — *INCREASE*

NOTE

If oil temperature does not come back within limits, the thermostatic valve (if embodied), regulating the oil flow to the heat exchangers, could be damaged or an oil leakage can be present in the oil supply line.

3. **Land as soon as practical**

If engine roughness, vibrations, erratic behaviour, or high CHT /CT is detected:

4. **Land as soon as possible** applying forced landing procedure (See Para. 7)

4.3.4 CHT/CT limit exceedance

If CHT is above 135°C or CT is above 120 °C:

1. Throttle Lever *REDUCE Minimum practical*
2. **Land as soon as practical**

If CHT/CT continues to rise and engine shows roughness or power loss:

3. **Land as soon as possible** applying forced landing procedure (See Para. 7)

5. IN-FLIGHT ENGINE RESTART

WARNING

After a mechanical engine seizure, fire or a major propeller damage engine restart is not recommended.

1.	Electrical fuel pump (if installed)	*ON*
2.	Fuel quantity indicator	*CHECK*
3.	Fuel Selector	*change the fuel feeding tank*
4.	Magnetos	*BOTH*
5.	Magnetos	*START*
6.	Throttle lever	*SET as required*

CAUTION

After engine restart, if practical, moderate propeller RPM and throttle increase to allow OIL and CHT/CT temperatures for stabilizing in the green arcs.

NOTE

If the fuel quantity in the tank which feeds the stopped engine is low, select the opposite side fuel tank by means of the fuel selector.

In case of unsuccessful engine restart:

1. Engine — *SECURE (see engine securing procedure on Para. 3)*
2. **Land as soon as possible** applying forced landing procedure (See Para. 7)

6. SMOKE AND FIRE

6.1. ENGINE FIRE ON THE GROUND

1.	Fuel Selector	*OFF*
2.	Electrical fuel pump (if installed)	*OFF*
3.	Magnetos	*OFF*
4.	Throttle lever	*FULL POWER*
5.	Cabin Heat	*OFF*
6.	Generator & Master Switches	*OFF*
7.	Parking Brake	*ENGAGED*
8.	Aircraft Evacuation	*carry out immediately*

6.2. ENGINE FIRE DURING TAKE-OFF

BEFORE ROTATION: ABORT TAKE OFF

1.	Throttle Lever	IDLE
2.	Rudder	*Keep heading control*
3.	Brakes	*As required*

With aircraft under control

4.	Fuel Selector	*OFF*
5.	Electrical fuel pump (if installed)	*OFF*
6.	Magnetos	*OFF*
7.	Cabin Heat	*OFF*
8.	Generator & Master Switches	*OFF*
9.	Parking Brake	*ENGAGED*
10.	Aircraft Evacuation	*carry out immediately*

6.3. ENGINE FIRE IN-FLIGHT

1.	**Cabin heating:**	*OFF*
2.	**Fuel selector valve:**	*OFF*
3.	**Electric fuel pump (if installed):**	*OFF*
4.	**Throttle:**	*FULL FORWARD until the engine stops*
5.	**Magnetos:**	*OFF*
6.	**Cabin vents:**	*OPEN*

WARNING

Do not attempt engine restart

7. **Land as soon as possible** applying forced landing procedure (See Para. 7).

6.4. CABIN FIRE / ELECTRICAL SMOKE IN CABIN DURING FLIGHT

1.	**Cabin heating:**	*OFF*
2.	**Cabin vents:**	*OPEN*
3.	**Door:**	*OPEN, if necessary*
4.	**Try to choke the fire. Direct the fire extinguisher (if on board) towards flame base**	

If smoke persists:

1. Generator & Master switches: *OFF*
2. **Land as soon as possible** and evacuate the aircraft

CAUTION

If the MASTER SWITCH is set to OFF, consider that flaps extension and pitch trim operation would be not possible.

6.5. ELECTRICAL SMOKE/FIRE IN CABIN ON THE GROUND

1.	**Generator Switch:**	*OFF*
2.	**Throttle Lever:**	*IDLE*
3.	**Magnetos:**	*OFF*
4.	**Fuel Selector Valve:**	*OFF*
5.	**MASTER SWITCH:**	*OFF*
6.	**Aircraft Evacuation**	*carry out immediately*

7. LANDING EMERGENCY

7.1. FORCED LANDING WITHOUT ENGINE POWER

1. Flap: UP
2. Airspeed (Best glide speed): *65 kts IAS*
3. Find a suitable place to land safely, plan to approach it upwind.
4. Fuel selector valve: *OFF*
5. Electric fuel pump (if installed): *OFF*
6. Magnetos: *OFF*
7. Safety belts: *Tighten*

When certain to land

8. Flaps: *as necessary*
9. Generator and Master switches: *OFF.*

NOTE *Glide ratio is about 10.2 therefore in zero wind conditions every 1000ft Above Ground Level it is possible to cover about 1.5 NM (about 3 km).*

7.2. POWER-ON FORCED LANDING

1. Airspeed (Best glide speed): *65 kts IAS*
2. Flaps: *UP*
3. Locate the most suitable terrain for emergency landing, plan to approach it upwind.
4. Safety belts: *Tighten*
5. Canopy locks: *CHECK LOCKED*

When certain to land, right before touch down

6. Flaps: *as necessary*
7. Fuel selector valve: *OFF*
8. Electric fuel pump (if installed): *OFF*
9. Magnetos: *OFF*
10. Generator and Master switches: *OFF*

7.3. LANDING WITH A FLAT NOSE TIRE

1. Pre-landing checklist: *Complete*
2. Flaps: *Land*
3. Land and maintain aircraft *NOSE HIGH* attitude as long as possible.

As aircraft stops

4. Engine securing: *Perform (see Para. 3)*
5. Airplane evacuation: *Perform (see Para. 2.4)*

7.4. LANDING WITH A FLAT MAIN TIRE

If it's suspected a main tire defect or it's reported to be defective:

1. Pre-landing checklist: *Complete*
2. Flaps: *Land*
3. Land the aeroplane on the side of runway opposite to the defective tire (if detected) to compensate the change in direction which is to be expected during final rolling
4. Touchdown with the GOOD TIRE FIRST (if detected) and hold aircraft with the flat tire off the ground as long as possible by mean of aileron and rudder control.

As aircraft stops

5. Engine securing: *Perform (see Para. 3)*
6. Airplane evacuation: *Perform (see Para. 2.4)*

8. STALL RECOVERY

At the first indication of stall, for example, uncontrolled lateral departure, pitch down, stall warning:

1. Pitch nose down: *APPLY until impending stall indications are eliminated*
2. Wings level *Obtain and Maintain*
3. Power: *As required*
4. Return to the desired flight path

CAUTION

Apply smooth and coordinated flight control movements to return the airplane to the desired flight path being careful to avoid a secondary stall.

9. RECOVERY FROM UNINTENTIONAL SPIN

If unintentional spin occurs, the following recovery procedure should be used:

1.	**Throttle:**	*IDLE*
2.	**Rudder:**	***full, in the opposite direction of the spin***
3.	**Stick:**	***forward***

As the spin stops:

4.	**Rudder:**	*SET NEUTRAL*
5.	**Aeroplane attitude:**	***smoothly recover averting speeds in excess of V_{NE} and maximum load factor (n=+4.0)***
6.	**Throttle:**	***Readjust to restore engine power.***

WARNING

Keep full rudder against rotation until spin has stopped.

10. RESCUE SYSTEM DEPLOYMENT

Rescue system should be deployed in the event of a life-threating emergency where parachute activation is determined to be safer than continued flight and landing.

CAUTION

Full deployment of parachute is achieved in about 4 seconds.

Rescue system should only be activated when any other means of handling the emergency would not protect the occupants from serious injury.

CAUTION

Successful deployment depends on aircraft attitude and air-speed: greater deployment altitude yields better chances for successful deployment

Shown below the procedure to be followed:

1.	**Airspeed**	**MINUM POSSIBLE** (max speed 145 kts IAS)
2.	**Pull activation handle firmly and to end-travel**	
	After deployment	
3.	**Fuel selector:**	**OFF**
4.	**Magnetos:**	**OFF**
5.	**Master Switch:**	**OFF**
6.	**Seat Belts and Harnesses:**	**TIGHTEN**
	Before impact	
7.	**Assume emergency landing body position**	

The emergency landing body position is assumed by placing both hands on the lap, clasping one wrist with the opposite hand, and holding the upper torso erect and against the seat backs.

8. **After the airplane comes to a complete stop, evacuate quickly and move upwind**

11. OTHER EMERGENCIES

11.1. UNINTENTIONAL FLIGHT INTO ICING CONDITIONS

WARNING

Carburettor ice is possible when flying at low engine rpm in visible moisture (outside visibility less than 5 km, vicinity of fog, mist, clouds, rain, snow or hail) and OAT less than 10°C.

1. Immediately fly away from icing conditions (changing altitude and direction of flight, out of clouds, visible moisture, precipitations)
2. Controls surfaces: *continue to move to maintain their movability*
3. Engine: *increase rpm.*

WARNING

In case of ice formation on wing leading edge, stall speed would increase.

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Section 4 – NORMAL PROCEDURES

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1. INTRODUCTION

Section 4 contains checklists and the procedures for the conduction of normal operation.

2. AIRSPEEDS FOR NORMAL OPERATIONS

Following airspeeds are significant for normal operations at MTOW (*600 kg*).

	FLAPS	IAS [kts]
Rotation Speed (in take-off, V_R)	T/O	*45*
Best Angle-of-Climb Speed (V_X)	0°	*62*
Best Rate-of-Climb speed (V_Y)	0°	*65*
Approach speed	T/O	*54*
Final Approach Speed	FULL	*50*
Manoeuvring speed (V_A)	0°	*98*
Never Exceed Speed (V_{NE})	0°	*145*
Glide Speed (V_{GLIDE})	0°	*65*

3. PRE-FLIGHT INSPECTIONS

Before each flight, it is necessary to carry out a complete aircraft check comprising an external inspection followed by a cockpit inspection as below detailed.

3.1. CABIN INSPECTION

A Weight and balance: *calculate (ref. this AFM sect. 6) check within limits*

B Safety belts: *connected to hard points, check condition*

C Magnetos: *OFF, keys extracted*

D Master switch: *ON*

E Voltmeter: check (10-12 V); Ammeter check (red).

F Lights (*if installed*): *all ON, check operation*

G Acoustic stall warning: *check operation*

H Master switch: *OFF*

I Baggage: *check ELT, luggage stowage and fastened with restraint net.*

3.2. AIRCRAFT WALK-AROUND

To perform the aircraft walk-around, carry out the checklist according to the station shown in Figure 4-1.

WARNING

Visual inspection is defined as follows: check for defects, cracks, detachments, excessive play, unsafe or improper installation as well as for general condition. For control surfaces, visual inspection also involves additional check for freedom of movement and security. Red lubber lines on bolts and nuts shall be intact.

WARNING

Fuel level indicated by the avionics system indication should be verified by visual check of actual fuel quantity embarked in the tanks.

NOTE

Fuel drainage operation must be carried out with the aircraft parked on a level surface. Set Cockpit Fuel Selector Valve to open prior to drain fuel circuit nose section valve.

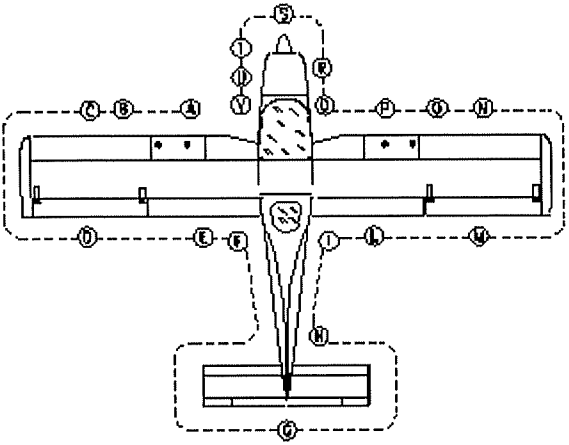

FIG. 4-1

A Left hand fuel filler cap: check visually for desired fuel level and secure. Left tank vent: check for obstructions.

B Remove protection cap and check pitot mounted on left strut is unobstructed, do not blow inside vents, place protection cap inside aircraft.

C Left side leading edge and wing skin: visual inspection

D Left aileron: visual inspection

E Left flap and hinges: visual inspection

F Left main landing gear; check inflation 14 psi (1.0 bar), tire condition, alignment, fuselage skin condition.

G Horizontal tail and tab: visual inspection.

H Vertical tail and rudder: visual inspection.

I Right side main landing gear; check inflation 14 psi (1.0 bar), tire condition, alignment, fuselage skin condition.

L Right flap and hinges: visual inspection.

M Right aileron: visual inspection.

N Right leading edge and wing skin: visual inspection.

O Check freedom of movement of stall detector micro-switch on right side leading edge, activate Master switch and check cabin acoustic warning signal is operative, deactivate Master switch.

P Right side fuel filler cap: check visually for desired fuel level and secure. Right side tank vent: check for obstructions.

Q Right side static port: check for obstructions, do not blow inside vents (read note).

R Nose wheel strut and tire: check inflation 11 psi (0.8 bar), tire condition and condition of rubber shock absorber discs.

S Propeller and spinner condition: check for nicks and security.

T Open engine cowling and perform the following checklist:

I. Check no foreign objects are present.

II. Check the cooling circuit for losses, check coolant reservoir level, insure radiator honeycomb is unobstructed.

III. Check lubrication circuit for losses, check oil reservoir level, insure radiator honeycomb is unobstructed.

IV. Open both fuel shutoff valves, inspect fuel circuit for losses, check integrity of fireproof protection braids, drain circuit using a cup to collect fuel by opening the specific drainage valve located on the firewall, close shutoff fuel valves. Check for water or other contaminants.

U Nose wheel strut and tire: check tire condition and condition of rubber shock absorber discs.

V Left side static port: check for obstructions, do not blow inside vents (read note).

NOTE *Avoid blowing inside Pitot-tube and inside airspeed indicator system's static vents as this may damage instruments.*

4. CHECKLISTS

4.1. BEFORE ENGINE STARTING (AFTER PRE-FLIGHT INSPECTION)

1. Seat position and safety belts adjustment
2. Flight controls: *operate until their stop checking for movement smoothness, free of play and friction.*
3. Parking brake: *engage and brake pedal press/brake lever pull*
4. Throttle friction: *adjust*
5. Circuit Breakers: *check all IN*
6. Master switch: *ON, Check Voltage (at least 10.5 V)*
7. Electric fuel pump: *ON, (check for audible pump noise and fuel pressure build up) (if installed)*
8. Electric fuel pump: *OFF (if installed)*
9. Avionic Master switch: *ON, instruments check, then set in OFF*
10. Flap control: *cycle fully extended and then set T/O*
11. Pitch Trim: *cycle fully up and down, from both left and right controls*
12. Pitch trim: *set neutral*

WARNING

Pitch trim other than in neutral position would affect take off performance and take off rotation execution at the correct V_R IAS.

13. Nav. light & Strobe light *(if installed)*: *ON*
14. Fuel quantity: *compare the fuel indication of avionic system with fuel quantity visually checked into the tanks (see Pre-flight inspection – External inspection)*

NOTE

In absence of RH seat occupant: fasten seat belts around the seat so as to prevent any interference with the aeroplane flight control operation and with rapid egress in an emergency.

15. Doors: *Closed and locked*

4.2. ENGINE STARTING

1. Master switch ON.
2. Engine throttle: *idle*
3. Choke: *as needed*
4. Fuel selector valve: *select the tank with less fuel*
5. Electric fuel pump: *ON (if installed)*
6. Propeller area: *call for CLEAR and visually check*

WARNING

Check to insure no person or object is present in the area close to the propeller. Forward lower sector visibility is not possible from inside the cockpit.

7. Magnetos: *BOTH*
8. Magnetos: *START*
9. Check oil pressure rise within 10 sec. (maximum cold value 7 bar)
10. Generator switch "ON"
11. Check *ALT* message disappears.
12. Voltmeter: check more than 14V
13. Engine parameters: Check
14. Choke: *OFF*
15. Throttle lever: *2430-2915 rpm*
16. Electric fuel pump: *OFF (if installed)*
17. Check fuel pressure (min 2.2 psi)

4.3. BEFORE TAXIING

1. Radio and Avionics: *ON*
2. Altimeter: *set*
3. Direction indicator: *set in accordance with the magnetic compass*
4. Parking brake: *OFF and taxi*

4.4. TAXIING

1. Brakes: *check*
2. Steering: *check*
3. Flight parameters: *check operation*

4.5. PRIOR TO TAKE-OFF

1. Parking brake: *ON, brake pedal press / brake lever pull*
2. Engine parameters: *Check within limits*
   - Oil pressure: 2-5 bar *(above 3500 rpm)*; 0.8 bar *(below 3500 rpm)*
3. Ammeter check: "green".
4. Electric Fuel pump: *ON (if installed)*
5. Fuel valve: *select the fullest tank*
6. Fuel pressure: *check*
7. Throttle lever: *advance to 4000 rpm*
   a. Ignition magnetos test: *select LEFT, check rpm drop within 315 rpm;*
   b. Select BOTH: *check engine 4000 rpm;*
   c. Select RIGHT: *check rpm drop within 315 rpm;*
   d. *Maximum difference of speed between LEFT and RIGHT 120 rpm,*
   e. Select BOTH: *check engine 4000 rpm.*
8. Flaps: *set T/O (15°)*
9. Pitch trim: *check neutral*
10. Flight controls: *check free*
11. Seat belts: *checked fastened*
12. Doors: *check closed and locked*

4.6. TAKE-OFF AND CLIMB

WARNING

On uncontrolled fields, before line up, check runway wind direction and speed and check for traffic on final

1. Parking brake: *OFF*
2. Throttle lever: *Full Forward*
3. Engine parameters: *check*
4. Rotation speed V_R:

	MTOW 600kg
Rotation Speed (V_R)	*45 kts IAS*

At safe altitude:

5. Flaps: *retract (above flap retraction speed 50 kts IAS)*

	MTOW 600kg
Best of Rate Climb Speed (V_Y)	*65 kts IAS*

6. Electric fuel pump: *OFF (if installed)*
7. Fuel pressure: *check green arc*
8. Engine speed: *reduce at or below 5500 rpm*

NOTE

Take-off into crosswind is performed with the flaps normally set at 15° (T/O).

With the ailerons deflected into the wind, accelerate the airplane to a speed slightly higher than normal while decreasing the aileron deflection as speed increases then - with authority - rotate to prevent possible settling back to the runway while drifting. When clear of the ground, make a coordinated turn into the wind to correct for drift.

4.7. CRUISE

1. Set power at or below maximum continuous: *5500 rpm*
2. Check engine parameters within limits

4.8. BEFORE LANDING

1. Electric fuel pump: *ON (if installed)*
2. Fuel valve: select the fullest tank
3. Landing Light *(if applicable)*: *ON*
4. On downwind, leg abeam touch down point:

   Flaps: set T/O

	MTOW 600kg
Approach Speed	*54 kts IAS*

5. On final leg:

   Flaps: set Land

	MTOW 600kg
Final Approach Speed	*50 kts IAS*

6. Optimal touchdown speed: *43 KIAS*

NOTE

Normal crosswind landings are made with full flaps. Avoid prolonged slips. Increase airspeed depending on wind intensity and direction as required above normal approach and landing speeds to accommodate increased stall speed when side slip is added.

After touchdown, hold a straight course with rudder and brakes as required.

The maximum allowable crosswind velocity is dependent upon pilot capability as well as aircraft limitations(refer to Sec 2).

4.9. BALKED LANDING

1. Throttle lever: Full Forward
2. Attitude: attain climb speed, climb to V_Y or V_X as applicable
3. Flaps position: retract to *TO* as practical
4. Electric fuel pump: *ON (if installed)*

4.10. AFTER LANDING

1. Flaps: *UP*
2. Electric Fuel Pump*: OFF (if installed)*
3. Landing light *(if installed)*: *OFF*

4.11. ENGINE SHUT DOWN

1. Parking brake: *engage*
2. Keep engine running at about 2900 rpm for about one minute in order to reduce latent heat.
3. Avionic equipment: *OFF*
4. Magnetos: *OFF, keys extracted*
5. Strobe light *(if installed)*: *OFF*
6. Master & Generator switches: *OFF*
7. Fuel selector valve: *OFF*

4.12. POSTFLIGHT CHECK

1. Flight controls/surfaces: *lock by means of gust lock (if available)*
2. Wheel chocks and wing mooring lines: *Set (if available)*
3. Parking brake: *release*
4. Doors: *Close and lock*
5. Protection covers: *install*

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Section 5 - PERFORMANCES

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1. INTRODUCTION

This section provides all necessary data for an accurate and comprehensive planning of flight activity from take-off to landing.

Data reported in graphs and/or in tables were determined using:

- ✓ aircraft and engine in good condition
- ✓ average piloting techniques

Each graph or table was determined according to ICAO Standard Atmosphere (ISA - s.l.); evaluations of the impact on performances were carried out by theoretical means for:

- ✓ Airspeed
- ✓ External temperature
- ✓ Altitude
- ✓ Weight
- ✓ Runway type and condition

2. USE OF PERFORMANCES CHARTS

Performances data are presented in tabular or graphical form to illustrate the effect of different variables such as altitude, temperature and weight. Given information is sufficient to plan the mission with required precision and safety.

Additional information is provided for each table or graph.

3. AIRSPEED INDICATOR SYSTEM CALIBRATION

Graph shows indicated airspeed V_{IAS} as a function of calibrated airspeed V_{CAS}.

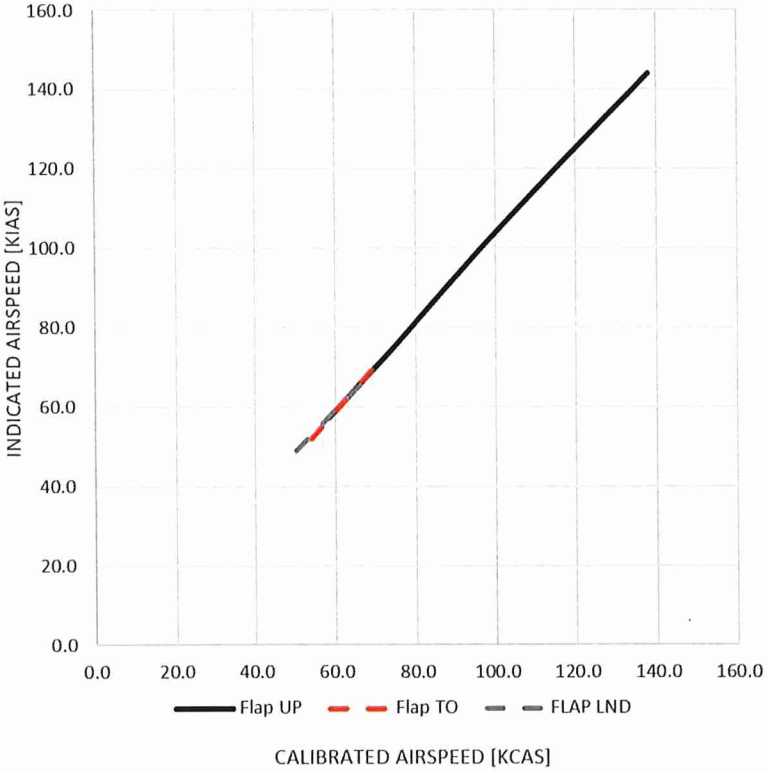

FIG. 5-1. INDICATED VS CALIBRATED AIRSPEED

Example:

Given	***Find***
KCAS *75(FLAP UP)*	KIAS *76 (FLAP UP)*

NOTE *Indicated airspeed assumes 0 as an instrument error*

4. ICAO STANDARD ATMOSPHERE

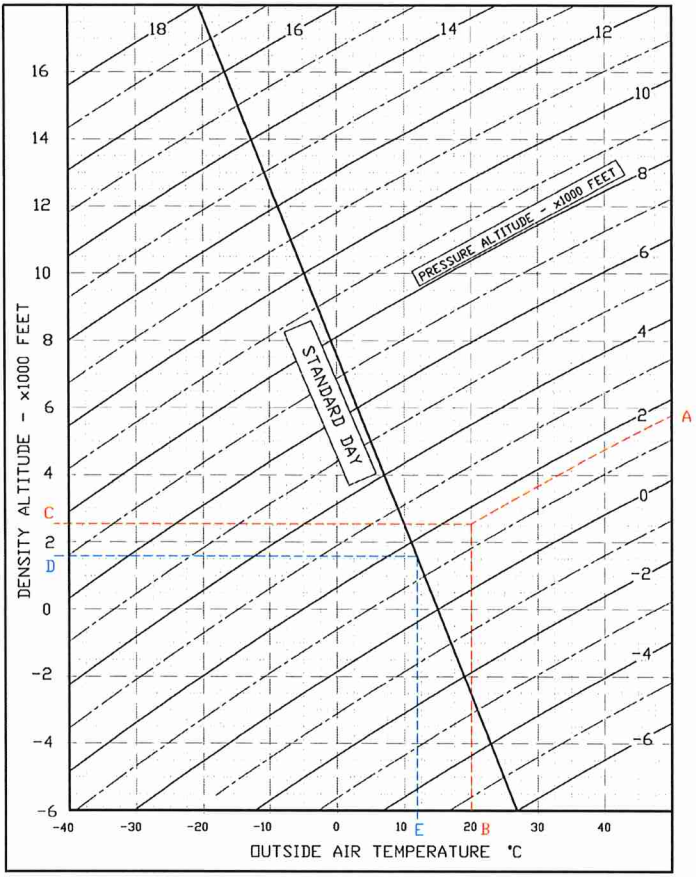

FIG. 5-2. ICAO CHART

Examples:

Scope	*Given*		*Find*
Density Altitude:	A: Pressure altitude = *1600ft* B: Temperature = *20°C*	→	C: Density Altitude = *2550ft*
ISA Temperature:	D: Pressure altitude = *1600ft*	→	E: ISA Air Temperature = *12°C*

5. STALL SPEED

Weight: *600 kg*
Throttle Levers: *IDLE*
CG: *Most Forward (23%)*
No ground effect

BANK ANGLE	STALL SPEED					
	FLAPS 0°		FLAPS T/O		FLAPS FULL	
[deg]	KIAS	KCAS	KIAS	KCAS	KIAS	KCAS
0	45	47	40	43	37	39
15	46	48	41	44	38	40
30	49	50	43	46	40	42
45	55	56	49	51	45	46
60	67	67	60	61	54	55

NOTE

Altitude loss during conventional stall recovery, as demonstrated during flight tests is approximately 200 ft with banking below 20°.

Maximum pitch under the horizon during recovery experienced during flight testing is about 20°.

For Stall Recovery procedure, see Section 3.

6. CROSSWIND

Maximum demonstrated crosswind is 15 Kts

⇒ *Example:*

Given	*Find*
Wind direction (*with respect to aircraft longitudinal axis*) = 30°	Headwind = 17.5 Kts
Wind speed = 20 Kts	Crosswind = 10 Kts

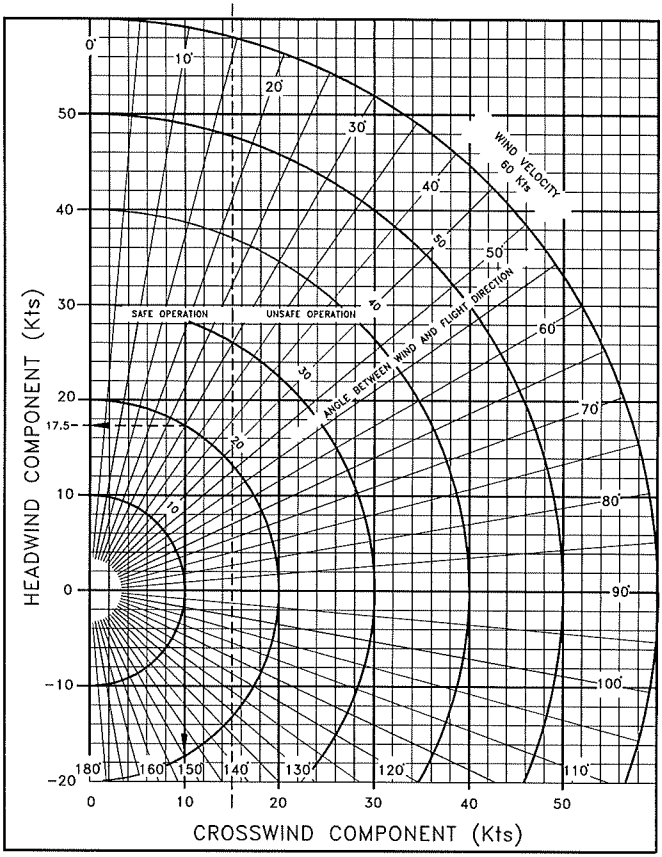

FIG. 5-3. CROSSWIND CHART

7. TAKE-OFF PERFORMANCE

Weight = *600 kg*

Flaps: *T/O*
Speed at Lift-Off = *45 KIAS*
Speed Over *50ft* **Obstacle** = *50 KIAS*
Throttle Lever: *Full Forward*
Runway: *Grass*

Corrections

Headwind: - 2.5m for each kt (*8 ft/kt*)
Tailwind: + 10m for each kt (*33ft/kt*)
Paved Runway: - *6%* to Ground Roll
Runway slope: + 5% to Ground Roll for each +1%

Pressure Altitude		Distance [m] Temperature [°C]				ISA
[ft]		-25	0	25	50	
S.L.	Ground Roll	150	188	232	282	214
	At 50 ft AGL	261	326	399	481	369
1000	Ground Roll	163	205	253	307	230
	At 50 ft AGL	284	355	434	523	395
2000	Ground Roll	178	224	277	337	247
	At 50 ft AGL	309	386	473	573	423
3000	Ground Roll	194	245	302	377	265
	At 50 ft AGL	336	420	515	639	453
4000	Ground Roll	213	268	331	422	285
	At 50 ft AGL	367	458	561	712	486
5000	Ground Roll	232	293	370	472	306
	At 50 ft AGL	400	499	627	794	521
6000	Ground Roll	254	320	415	528	329
	At 50 ft AGL	436	545	700	885	559
7000	Ground Roll	279	357	465	590	361
	At 50 ft AGL	476	605	782	987	612
8000	Ground Roll	305	400	521	661	397
	At 50 ft AGL	520	677	874	1101	671
9000	Ground Roll	336	449	583	739	436
	At 50 ft AGL	571	757	976	1229	735
10000	Ground Roll	378	505	654	828	478
	At 50 ft AGL	640	847	1090	1371	805

Weight = *550 kg*

Flaps: *T/O*
Speed at Lift-Off = *42 KIAS*
Speed Over *50ft* **Obstacle** = *47 KIAS*
Throttle Lever: *Full Forward*
Runway: *Grass*

Corrections

Headwind: - 2.5m for each kt (*8 ft/kt*)
Tailwind: + 10m for each kt (*33ft/kt*)
Paved Runway: - *6%* to Ground Roll
Runway slope: + 5% to Ground Roll for each +1%

Pressure Altitude		Distance [m] Temperature [°C]				ISA
[ft]		-25	0	25	50	
S.L.	Ground Roll	121	153	188	229	174
	At 50 ft AGL	213	267	326	393	302
1000	Ground Roll	132	167	206	249	186
	At 50 ft AGL	232	290	355	428	323
2000	Ground Roll	144	182	224	274	200
	At 50 ft AGL	253	315	386	468	346
3000	Ground Roll	158	199	245	306	215
	At 50 ft AGL	275	344	421	522	370
4000	Ground Roll	172	217	268	342	231
	At 50 ft AGL	300	374	459	582	397
5000	Ground Roll	189	237	300	383	248
	At 50 ft AGL	327	408	512	649	426
6000	Ground Roll	206	260	337	428	267
	At 50 ft AGL	356	445	572	724	457
7000	Ground Roll	226	290	377	479	293
	At 50 ft AGL	389	494	639	807	500
8000	Ground Roll	248	325	423	536	322
	At 50 ft AGL	425	553	714	900	548
9000	Ground Roll	273	365	473	600	354
	At 50 ft AGL	467	619	798	1004	600
10000	Ground Roll	307	409	531	672	388
	At 50 ft AGL	523	693	891	1121	658

Weight = *500 kg*

Flaps: *T/O*
Speed at Lift-Off = *40 KIAS*
Speed Over *50ft* **Obstacle** = *44 KIAS*
Throttle Lever: *Full Forward*
Runway: *Grass*

Corrections

Headwind: - 2.5m for each kt (*8 ft/kt*)
Tailwind: + 10m for each kt (*33ft/kt*)
Paved Runway: - *6%* to Ground Roll
Runway slope: + 5% to Ground Roll for each +1%

Pressure Altitude		Distance [m] Temperature [°C]				ISA
[ft]		-25	0	25	50	
S.L.	Ground Roll	97	122	150	182	138
	At 50 ft AGL	171	214	262	315	242
1000	Ground Roll	105	133	164	198	148
	At 50 ft AGL	186	233	285	343	259
2000	Ground Roll	115	145	179	218	159
	At 50 ft AGL	203	253	310	375	277
3000	Ground Roll	126	158	195	244	171
	At 50 ft AGL	221	276	337	419	297
4000	Ground Roll	137	173	213	272	184
	At 50 ft AGL	240	300	368	467	318
5000	Ground Roll	150	189	239	305	198
	At 50 ft AGL	262	327	411	520	342
6000	Ground Roll	164	207	268	341	212
	At 50 ft AGL	286	357	459	580	366
7000	Ground Roll	180	230	300	381	233
	At 50 ft AGL	312	396	513	647	401
8000	Ground Roll	197	259	336	427	256
	At 50 ft AGL	341	444	572	722	439
9000	Ground Roll	217	290	377	477	281
	At 50 ft AGL	374	496	639	805	481
10000	Ground Roll	244	326	422	534	309
	At 50 ft AGL	419	555	714	898	527

8. RATE OF CLIMB

Throttle lever: Full forward
Flaps: Up
V_Y = 65 KIAS
V_X = 62 KIAS

Weight	Pressure Altitude	Rate of Climb [ft/min] at Vy				
		Temperature [°C]				ISA
[kg]	[ft]	-25	0	25	50	
600	S.L.	1318	1085	876	689	957
	2000	1140	911	706	522	818
	4000	964	738	537	355	679
	6000	788	566	368	190	540
	8000	612	394	200	25	401
	10000	437	223	32	-141	261
550	S.L.	1482	1230	1006	803	1092
	2000	1290	1043	822	623	942
	4000	1100	857	640	444	793
	6000	910	671	458	265	643
	8000	720	486	276	87	493
	10000	532	301	95	-91	343
500	S.L.	1677	1402	1156	935	1251
	2000	1468	1198	957	740	1088
	4000	1260	994	757	544	925
	6000	1052	791	558	349	761
	8000	845	589	360	154	598
	10000	639	388	163	-39.6	434

9. CRUISE PERFORMANCE

Maximum takeoff weight = 600 kg (1320 lbs)

(2) Fuel tanks 2x45 liters (11.9 gal) (less the unusable fuel)

Pressure altitude Hp: **0** *ft OAT: +15°C*

Engine RPM	Speed KTAS	Consumption (lt/h)
4300	102	14
4800	107	18
5200	110	21

Pressure altitude Hp: **3000** *ft OAT: +9°C*

Engine RPM	Speed KTAS	Consumption (lt/h)
4300	100	14
4800	107	18
5200	109	21

Pressure altitude Hp: **6000** *ft OAT: +3°C*

Engine RPM	Speed KTAS	Consumption (lt/h)
4300	97	14
4800	105	18
5200	108	21

10. LANDING PERFORMANCE

Weight = *600 kg*

Flaps: *LAND*
Final Approach Speed = *50 KIAS*
Throttle Levers: *Idle*
Runway: *Grass*

Corrections

Headwind: - 5m for each kt (*16 ft/kt*)
Tailwind: + 11m for each kt (*36ft/kt*)
Paved Runway: - *2%* to Ground Roll
Runway slope: - 2.5% to Ground Roll for each +1%

Pressure Altitude [ft]		Distance [m]				
		Temperature [°C]				ISA
		-25	0	25	50	
S.L.	Ground Roll	132	146	159	172	**154**
	At 50 ft AGL	260	286	312	338	**302**
1000	Ground Roll	137	151	165	179	**158**
	At 50 ft AGL	269	296	324	351	**311**
2000	Ground Roll	142	157	171	185	**163**
	At 50 ft AGL	279	307	336	364	**320**
3000	Ground Roll	148	162	177	192	**168**
	At 50 ft AGL	290	319	348	377	**330**
4000	Ground Roll	153	169	184	199	**173**
	At 50 ft AGL	301	331	361	392	**340**
5000	Ground Roll	159	175	191	207	**178**
	At 50 ft AGL	312	344	375	406	**350**
6000	Ground Roll	165	182	198	215	**184**
	At 50 ft AGL	324	357	389	422	**361**
7000	Ground Roll	171	189	206	223	**189**
	At 50 ft AGL	337	370	404	438	**372**
8000	Ground Roll	178	196	214	232	**195**
	At 50 ft AGL	350	385	420	455	**384**
9000	Ground Roll	185	204	222	241	**202**
	At 50 ft AGL	363	400	437	473	**396**
10000	Ground Roll	192	212	231	250	**208**
	At 50 ft AGL	378	416	454	492	**408**

Weight = *550 kg*

Flaps: *LAND*
Short Final Approach Speed = *47 KIAS*
Throttle Levers: *Idle*
Runway: *Grass*

Corrections

Headwind: - 5m for each kt (*16 ft/kt*)
Tailwind: + 11m for each kt (*36ft/kt*)
Paved Runway: - *2%* to Ground Roll
Runway slope: - 2.5% to Ground Roll for each +1%

Pressure Altitude [ft]		Distance [m]				
		Temperature [°C]				ISA
		-25	0	25	50	
S.L.	Ground Roll	111	122	134	145	129
	At 50 ft AGL	218	240	262	284	253
1000	Ground Roll	115	127	138	150	133
	At 50 ft AGL	226	249	272	295	261
2000	Ground Roll	120	132	144	156	137
	At 50 ft AGL	235	258	282	306	269
3000	Ground Roll	124	137	149	161	141
	At 50 ft AGL	243	268	293	317	277
4000	Ground Roll	129	142	155	168	145
	At 50 ft AGL	253	278	304	329	285
5000	Ground Roll	134	147	160	174	150
	At 50 ft AGL	262	289	315	342	294
6000	Ground Roll	139	153	167	181	154
	At 50 ft AGL	272	300	327	355	303
7000	Ground Roll	144	159	173	188	159
	At 50 ft AGL	283	311	340	368	313
8000	Ground Roll	150	165	180	195	164
	At 50 ft AGL	294	323	353	383	322
9000	Ground Roll	155	171	187	202	169
	At 50 ft AGL	305	336	367	398	333
10000	Ground Roll	162	178	194	210	175
	At 50 ft AGL	317	349	381	413	343

Weight = *500 kg*

Corrections

Flaps: *LAND*
Short Final Approach Speed = *45 KIAS*
Throttle Levers: *Idle*
Runway: *Grass*

Headwind: - 5m for each kt (*16 ft/kt*)
Tailwind: + 11m for each kt (*36ft/kt*)
Paved Runway: - *2%* to Ground Roll
Runway slope: - 2.5% to Ground Roll for each +1%

Pressure Altitude [ft]		Distance [m]				
		Temperature [°C]				ISA
		-25	0	25	50	
S.L.	Ground Roll	92	101	110	120	107
	At 50 ft AGL	180	199	217	235	209
1000	Ground Roll	95	105	114	124	110
	At 50 ft AGL	187	206	225	244	216
2000	Ground Roll	99	109	119	129	113
	At 50 ft AGL	194	214	233	253	222
3000	Ground Roll	102	113	123	133	117
	At 50 ft AGL	201	221	242	262	229
4000	Ground Roll	106	117	128	138	120
	At 50 ft AGL	209	230	251	272	236
5000	Ground Roll	110	122	133	144	124
	At 50 ft AGL	217	239	260	282	243
6000	Ground Roll	115	126	138	149	128
	At 50 ft AGL	225	248	270	293	251
7000	Ground Roll	119	131	143	155	132
	At 50 ft AGL	234	257	281	304	258
8000	Ground Roll	124	136	149	161	136
	At 50 ft AGL	243	267	292	316	266
9000	Ground Roll	128	141	154	167	140
	At 50 ft AGL	252	278	303	329	275
10000	Ground Roll	134	147	160	174	144
	At 50 ft AGL	262	289	315	341	284

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SECTION 6 – WEIGHT and BALANCE

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1 INTRODUCTION

This section describes the procedure for establishing the basic empty weight and the moment of the aircraft. Loading procedure information is also provided.

NOTE *Aircraft must be operated in accordance with the limits concerning the maximum take-off weight and CG excursion as reported in Flight Manual Section 2.*

Pilot is responsible for checking the weight and CG excursion are compliant with the related limits. CG excursion and weight limits are reported in Section 2 – Limitations.

2 WEIGHING PROCEDURE

2.1 PREPARATION

- Carry out weighing procedure inside closed hangar
- Remove from cabin any objects left unintentionally
- Insure on board presence of the Flight Manual
- Align nose wheel
- Drain fuel via the specific drain valve.
- The unusable fuel for each tank must be considered (1.55 liter)
- Oil, hydraulic fluid and coolant to operating levels
- Move sliding seats to middle position
- Raise flaps to fully retracted position (0°)
- Place control surfaces in neutral position
- Place scales (min. capacity 200 kg) under each wheel

2.2 LEVELLING

- Level the aircraft.

  Reference for levelling: baggage area.
- Center bubble on level by deflating tires

2.3 WEIGHING

- Record weight shown on each scale
- Repeat weighing procedure three times
- Calculate empty weight

2.4 DETERMINATION OF C.G. LOCATION

- Drop a plumb bob tangent to the leading edge (at 15mm inboard respect the rib#7 riveting line) and trace reference mark on the floor.
- Repeat operation for other wing.
- Stretch a taught line between the two marks
- Measure the distance between the reference line and main wheel axis
- Using recorded data it is possible to determine the aircraft's C.G. location and moment (see following table)

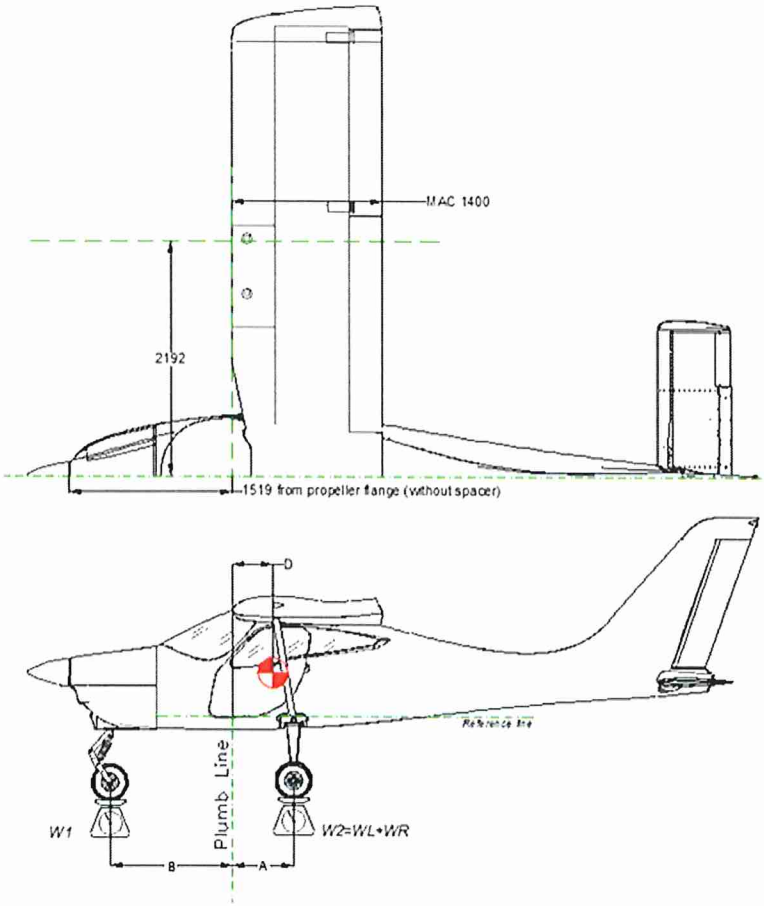
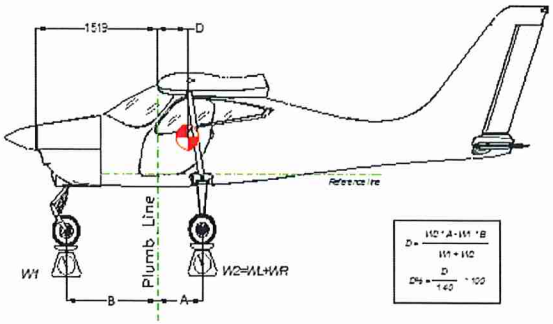


Fig.6-1-P92 Echo MkII

3 WEIGHING REPORT (I)

Model **P92Echo MKII** *S/N:* 1716 *Weighing no.* I *Date:* 30/01/2023

Datum: Propeller support flange without spacer.



	Kg
Nose wheel weight	W_1 = 51
LH wheel weight	W_L = 169
RH wheel weight	W_R = 169
$W_2 = W_L + W_R$ =	338

	meters
Plumb bob distance(1) LH wheel	A_L = 0,564
Plumb bob distance(1) RH wheel	A_R = 0,564
Average distance $(A_L + A_R)/2$	A = 0,564
Bob distance from nose wheel(1)	B = 1,141

Empty weight We = $W_1 + W_2$ = 389

$$D = \frac{W_2 \cdot A - W_1 \cdot B}{We} = 0,3405\ m \qquad D\% = \frac{D}{1.400} \cdot 100 = 24,3\%$$

Empty weight moment: M = [(D+1.519) ·We] = *Kg · m* 723

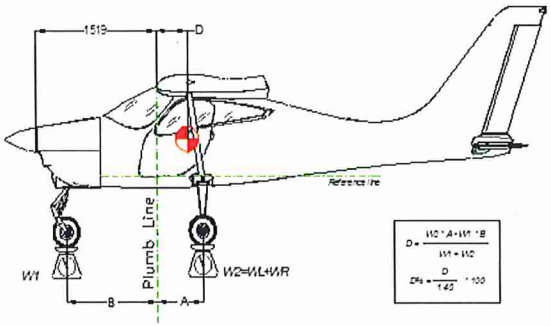
Maximum takeoff weight	W_T = 600	Kg
Empty weight	We = 389	Kg
Maximum payload W_T - We	Wu = 211	Kg

(1) To determine the Mean Aerodynamic Chord (MAC) and the plumb line see FIG.6-1.

4 WEIGHING REPORT (II)

Model **P92Echo MKII** *S/N*:____*Weighing no.*_____*Date*:_____

Datum: Propeller support flange without spacer.



	Kg
Nose wheel weight	W_1 =
LH wheel weight	W_L =
RH wheel weight	W_R =
$W_2 = W_L + W_R$ =	

	meters
Plumb bob distance(1) LH wheel	A_L =
Plumb bob distance(1) RH wheel	A_R =
Average distance $(A_L + A_R)/2$	A =
Bob distance from nose wheel(1)	B =

Empty weight $We = W_1 + W_2$ =

$D = \frac{\overline{W_2 \cdot A - W_1 \cdot B}}{We} = m$	$D\% = \frac{D}{1.400} \cdot 100 =$

Empty weight moment: $M = [(D+1.519) \cdot We] = Kg \cdot m$

Maximum takeoff weight	W_T =	Kg
Empty weight	We =	Kg
Maximum payload W_T - We	Wu =	Kg

(1) To determine the Mean Aerodynamic Chord (MAC) and the plumb line see FIG.6-1.

5 WEIGHT AND BALANCE DETERMINATION FOR FLIGHT

In this subsection, the procedure to be used for the determination of aircraft weight and balance in flight is described. The weight and moment obtained must fall within the approved Weight-Moment Envelope (Figure 6-3). The procedure explained requires the use of:

- Aircraft Weighing Report (I/II)
- Weight and C.G. - Form (Table 6-1)
- Loading Diagram (Figure 6-2)
- Weight-Moment Envelope (Figure 6-3)

An example calculation is provided to help understand the method.

5.1 USE OF "WEIGHT & BALANCE" CHART

To determine weight and balance for flight, proceed as follows:

1. Read the most recent values of the Empty A/C weight and corresponding moment from the Aircraft Weighing Report and write them in the Weight and C.G.- Form (Table 6-1).
2. Write the weight and moment of the pilot/co-pilot in the Weight and C.G. - Form (Table 6-1). Calculate the moment as:

   Moment = weight X arm where the arm is read in Table 6-1.

   Alternatively, the moment can be read from the Loading Diagram (Figure 6-3).

NOTE *It is strongly recommended to perform a cross-check with Loading Tables (Table 6-3) to assure an accurate loading value.*

3. Repeat the procedure described in 2 for the fuel and baggage loads.
4. The total weight/moment is obtained summing all weights/moments; report take-off condition (weight and moment) in the Weight and Balance C.G. - Form (Table 6-1).
5. To obtain the landing weight and moment, subtract from the take-off condition values the weight and moment of the total fuel required. These values are reported in the Weight and Balance C.G. - Form (Table 6-1). Write the landing values Weight and Balance C.G. - Form (Table 6-1).

Locate on the Weight-Moment Envelope (Figure 6-4) the points (weights and moment) corresponding to the take-off and landing conditions. If the points fall within the envelope, the loading condition meets the weight and balance requirements

Table 6-1 -Weight and C.G.- Form

	W [kg]	Arm [m]	Moment (M) = W * Arm [kg*m]
Empty weight			
LOADING			
Pilot		1.948	
Co-pilot		1.948	
Baggage		2.320	
Usable fuel Fuel (liters)*ρ_{fuel}(0.72) [kg]		1.774	
TAKE-OFF CONDITION			
Take-off condition $W_{TO} = \sum W$		$M_{TO} = \sum M$	
LANDING CONDITION			
Fuel required Fuel (liters)*ρ_{fuel}(0.72) [kg]		1.774	
Landing condition $W_L = W_{TO} - W_{fuel\_req}$		$M_L = M_{TO} - M_{fuel\_req}$	

Table 6-2 -Weight and C.G.- Example

	W [kg]	Arm [m]	Moment (M) = W * Arm [kg*m]
Empty weight	380	1.898	721.24
LOADING			
Pilot	80	1.948	155.84
Co-pilot		1.948	
Baggage	5	2.320	11.6
Usable fuel Fuel (liters)*ρ_{fuel}(0.72) [kg]	(80 litres) 57.6	1.774	102.18
TAKE-OFF CONDITION			
Take-off condition $W_{TO} = \sum W$	523	$M_{TO} = \sum M$	990.86
LANDING CONDITION			
Fuel required Fuel (liters)*ρ_{fuel}(0.72) [kg]	(40 litres) 28.8	1.774	51.09
Landing condition $W_L = W_{TO} - W_{fuel\_req}$	494	$M_L = M_{TO} - M_{fuel\_req}$	939.77

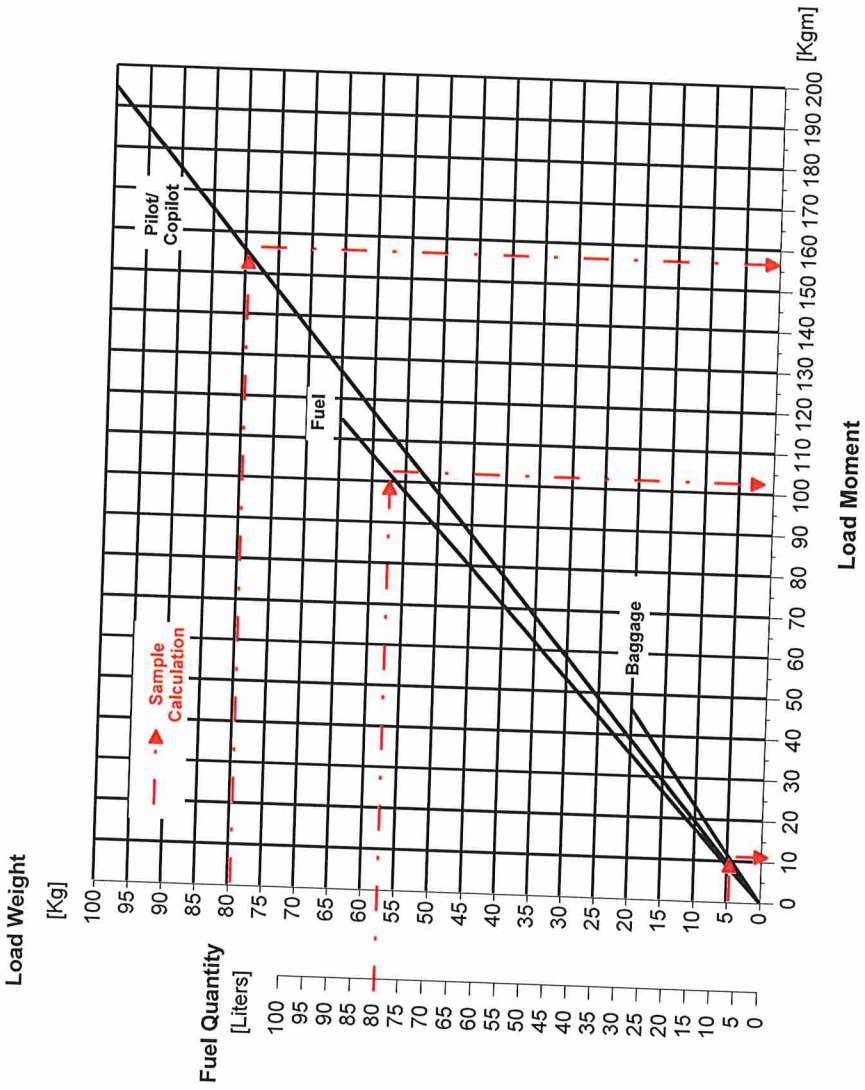


Fig.6.2 LOADING DIAGRAM

Table 6-3 –Loading tables

Pilot/Co-pilot loading	
W [kg]	M [kg*m]
5	9.7
10	19.5
15	29.2
20	39.0
30	58.4
40	77.9
50	97.4
60	116.9
65	126.6
70	136.4
75	146.1
80	155.8
85	165.6
90	175.3
95	185.1
100	194.8

Baggage loading	
W [kg]	M [kg*m]
2	4.6
4	9.3
6	13.9
8	18.6
10	23.2
12	27.8
14	32.5
16	37.1
18	41.8
20	46.4

Fuel loading		
W [litres]	W [kg]	M [kg*m]
10	7.2	12.8
20	14.4	25.5
30	21.6	38.3
40	28.8	51.1
50	36.0	63.9
60	43.2	76.6
65	46.8	83.0
70	50.4	89.4
75	54.0	95.8
80	57.6	102.2
85	61.2	108.6
90	64.8	115.0
95	68.4	12.8
100	72.0	25.5

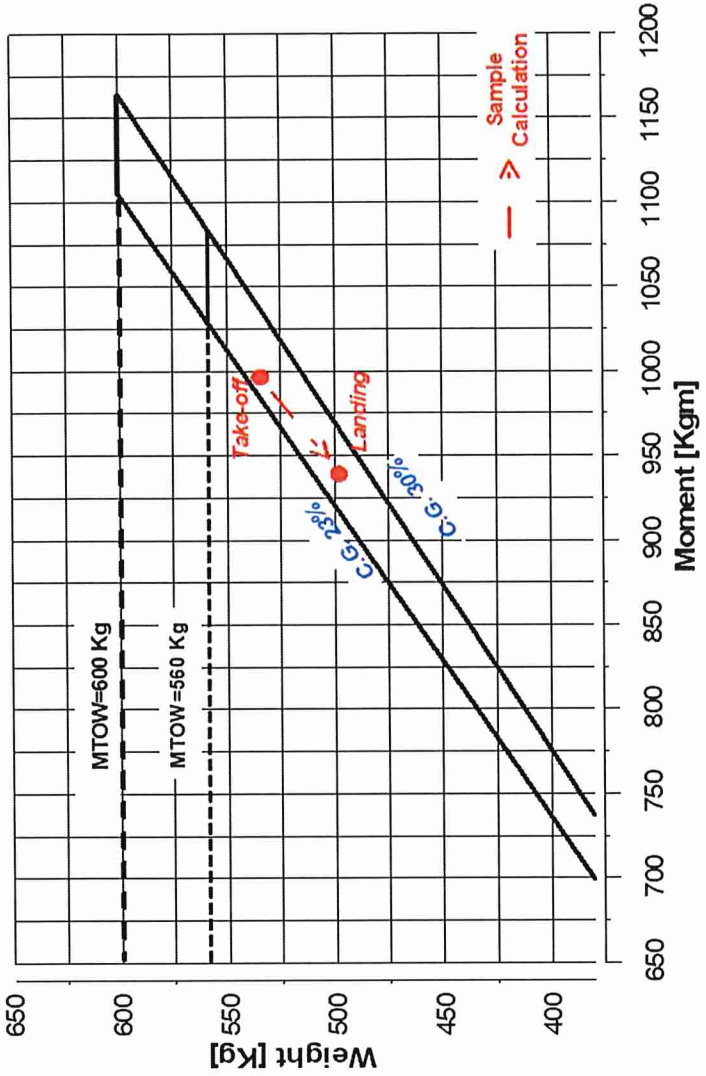


Fig.6.3 WEIGHT-MOMENT ENVELOP

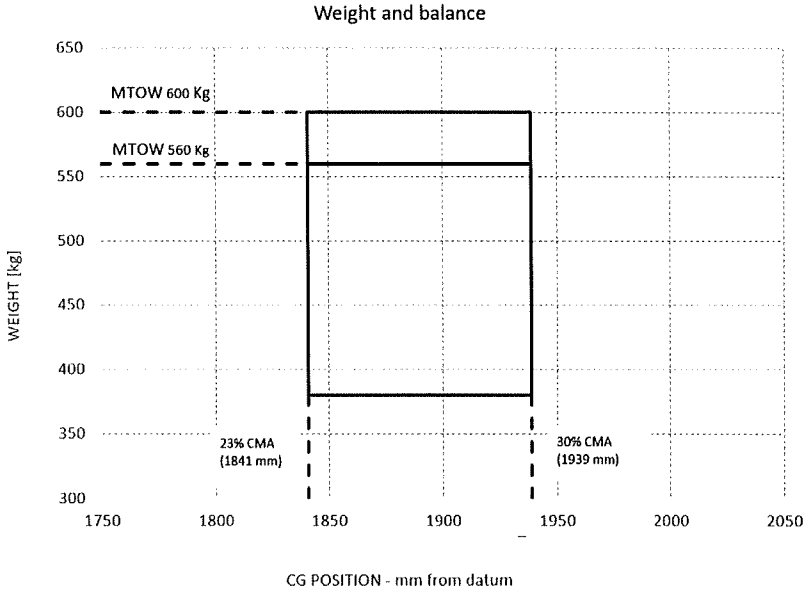


Fig 6.4 C.G. RANGE CHART

6 EQUIPMENT LIST

The following is a comprehensive list of all TECNAM supplied equipment for the P92 Echo MKII. The list consists of the following groups:

A Engine and accessories

B Landing gear

C Electrical system

D Instruments

E Avionics

the following information describes each listing:

- Part-number to uniquely identify the item type.
- Item description
- Serial number
- Weight in kilograms
- Distance in meters from datum

NOTE *Items marked with an asterisk (*) are part of basic installation. Equipment marked with X in the* Inst. *column are those actually installed on board relative to aircraft S/N.*

EQUIPMENT LIST	S/N: 1716	DATE: 30/01/2023

RIF.	DESCRIPTION &P/N	INST	WEIGHT [kg]	ARM [m]
	ENGINE & ACCESSORIES			
A1	*Engine Rotax 912 ULS2*	*	*61.0*	*0.499*
A2	*Prop. Sensenich Wood – p/n W68T2ET-70J*	X	*6.0*	*-0.051*
	Prop. E-Props Carbon – p/n DUR-2-170-C8-T	N	*1.53*	*-0.051*
A3	*Exhaust and manifolds –p/n 22-11-450-002*	*	*4.50*	*0.729*
A4	*Heat exchanger - p/n 218-10-1050-000*	*	*2.00*	*0.729*
A5	*Oil Reservoir (full) - p/n 956.137*	*	*4.00*	*0.819*
A6	*Oil radiator - p/n 886033*	*	*0.40*	*0.249*
A7	*Liquid coolant radiator - p/n 997083*	*	*0.90*	*0.509*
A8	*Air filter K&N- p/n 33-2544*	*	*0.40*	*0.779*
A9	*Fuel pump FACET GOLD-FLO 478360*	X	*0.10*	*0.889*
A10	*Thermostatic water valve p/n 26-9-9100-000*	X	*0.35*	*0.329*
A11	*Thermostatic oil valve p/n 26-9-9000-000*	X	*0.20*	*0.379*
	LANDING GEAR AND ACCESSORIES			*1.519*
B1	*Main gear spring-leafs - p/n 28-8-710-1*	*	*5.700*	*2.119*
B2	*Main gear wheel rims. - Matco P/N WHLWI51L30MM or Beringer RF-019A*	*	*2.500*	*2.119*
B3	*Main gear tires.-Air Trac 5.00-5 P/n AA1D4 or Mitas 4.00-6 P/N 040106007*	*	*2.580*	*2.119*
B4	*Disk brakes – Matco WHLD5LSA*	*	*0.800*	*2.119*
B5	*Nose gear wheel rim – Matco P/N WHLTW5120MM or Beringer RA-014A*	*	*1.500*	*0.489*
B6	*Nose gear tire - Air Trac 5.00-5 P/n AA1D4 or Mitas 4.00-6 P/N 040106007*	*	*2.580*	*0.639*
B7	*Nose gear shock p/n 92-8-200-000*	*	*1.450*	*0.649*
	ELECTRICAL SYSTEM			*1.519*
C1	*Battery POWER SAFE SB8*	*	*6.00*	*2.769*
C2	*Regulator, rectifier - p/n 362001 DUCATI*	*	*0.20*	*0.999*
C3	*Battery relay – White Rodgers 70 111 226-5*	*	*0.30*	*2.769*
C4	*Flap actuator* – SIR-6814242	*	*2.20*	*2.479*
C5	*Trim actuator control* Ray Allen Company B6 11T	*	*0.40*	*5.909*
C6	*Strobe light – DAYLIFE A06-2001-01326*	N	*0.15*	*6.069*
C7	*Navigation lights - DAYLIFE A06-2001-01326*	N	*0.15*	*1.929*
C8	*Stall detector – p/n 21-9-420-2 Rev 600*	*	*0.10*	*1.539*
C9	*Landing light – FLYWAT P36P1L p/n 01-0771833-10*	X	*0.50*	*1.559*
C10	*Aveo NAV/POS/Strobe* AVE-WPST G/R-20D	X	*0.20*	*1.579*

EQUIPMENT LIST	S/N: 1716	DATE: 30/01/2023

RIF.	DESCRIPTION &P/N	INST	WEIGHT [kg]	ARM [m]
	AVIONICS AND OTHER			
E1	*VHF COMM GTR 225A*	X	*0.870*	*1.532*
E2	*ELT Kannad 406 AF*	X	*1.180*	*2.922*
E3	*Audio Panel GMA 245*	X	*0.440*	*1.532*
E4	*LH Display Garmin GDU 460*	X	*2.150*	*1.532*
E5	*RH Display Garmin GDU 460*	X	*2.150*	*1.532*
E6	*ADAHRS Garmin GSU 25C*	X	*0.217*	*1.532*
E7	*Engine Interface Garmin GEA 24*	X	*0.322*	*1.532*
E8	*Magnetometer Garmin GMU 22*	X	*0.158*	*1.532*
E9	*Transponder GTX 35R*	X	*0.900*	*1.532*
E10	*Temperature Probe GTP 59*	X	*0.363*	*1.829*
E11	*Emergency Hammer – Cora 000120628*	N	*0.350*	*2.922*
E12	*Magnetic compass – Falcon MCDN-2L*	X	*0.276*	*1.532*
E13	*RPM Indicator - I.C.P. VDO PN 031449*	N	*0.350*	*1.532*
E14	*Audio Panel – Flight Com 403MC*	N	*1.200*	*1.532*
E15	*CT Indicator – Sorlini SOR59*	N	*0.300*	*1.532*
E16	*Voltmeter Indicator – Sorlini SOR 51*	N	*0.300*	*1.532*
E17	*Oil Temp Indicator – Sorlini SOR 54*	N	*0.300*	*1.532*
E18	*Vertical Speed Indicator – Mikrotechna UL30-42.2*	N	*1.00*	*1.532*
E19	*Anemometer – Falcon Gauge ASI 300K-3*	N	*0.290*	*1.532*
E30	*Altimeter – I FD-NET*	N	*0.350*	*1.532*
E31	*Fuel Pressure Indicator – Sorlini SOR50/v*	N	*0.100*	*1.532*
E32	*COMM – ICOM IC-A220*	N	*1.00*	*1.532*
E33	*COMM Antenna – Commant Industries CI292-2*	X	*0.200*	*1.532*
E34	*Parachute – BRS-6 1050*	X	*13.00*	*3.019*
E35	*Speed Com Amperometer – P/N 00203*	N	*0.150*	*1.532*
E36	*Trasponder GTX 335*	N	*1.27*	*1.532*
E37	*Trasponder GTX 45R*	N	*1.27*	*1.532*
E38	*Trasponder TRIG TT21*	N	*0.50*	*1.532*
E39	*COMM TRIG TY91*	N	*1.57*	*1.532*
E40	*COMM GNC 255A*	N	*0.50*	*1.532*
E41	*Altitude encoder ACK Technologies A30*	N	*0.144*	*1.532*
E42	*Magnetometer Garmin GMU 11*	N	*0.100*	*1.532*
E43	*NAV – Garmin AERA660*	N	*0.245*	*1.532*
E44	*EMS – Dynon D10*	N	*0.567*	*1.532*

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SEZIONE 7 – AIRFRAME AND SYSTEMS DESCRIPTION

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1. Introduction

This section provides description and operation of the aircraft and its systems.

2. Airframe

2.1. WING

The wing is of a rectangular planform, with a small tapering of the leading edge near the cabin, allowing an improved visibility, also in steep turn. Its structure consists of a single spar metal torsion box. The aircraft is equipped with half-span slot flaps, with the flap hinge positioned on the lower part of the wing. All structural parts are made of aluminum light alloy (2024-T3 and 6061-T6), except for tips and fairings which are in fiberglass.

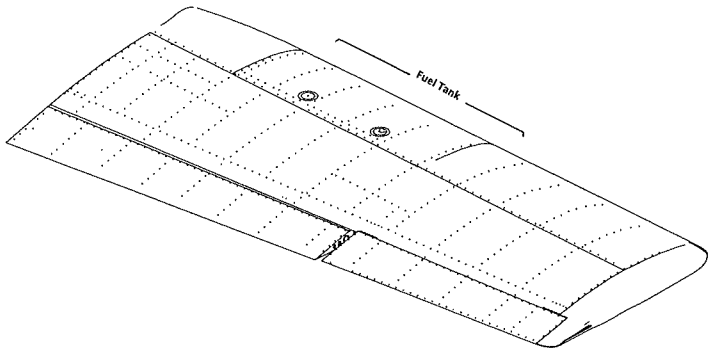

Fig. 7-1. RIGHT WING EXPLODED VIEW

2.2. FUSELAGE

The P92 Echo MkII fuselage is mainly made by carbon fibers composite materials. The fuselage is made by two main shells that are later assembled bonding the two main bodies and the floor (in composite material too) and adding aluminum stiffeners that allow the connection of the main landing gear, seats, wing and instrument panel. In this context the fuselage and vertical fin are a unique body. The following picture shows the main components of the fuselage section.

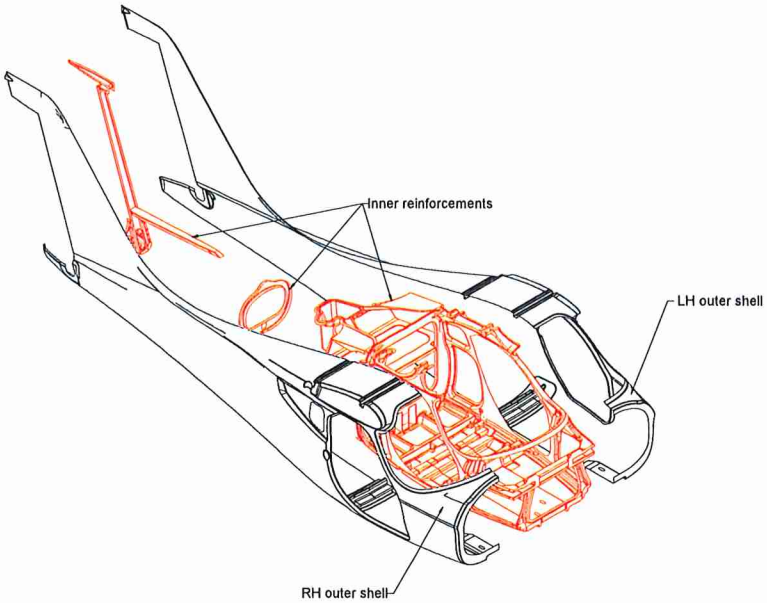

Fig. 7-2.P92 Echo MkII fuselage

2.3. EMPENNAGES

The horizontal trimmable tail plane is all-moving type, which allows a high control authority and a better stick free stability. The vertical tail is conventional fin and rudder type. Both horizontal and rudder structures are aluminum light alloy (2024-T3 and 6061-T6), except fin, which is a carbon fiber unique body with the fuselage, and tips, which are in fiberglass.

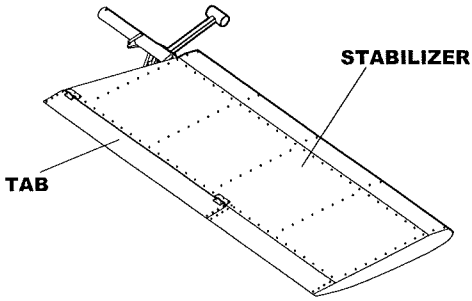

Fig. 7-3. P92 Echo MkII stabilator and tab

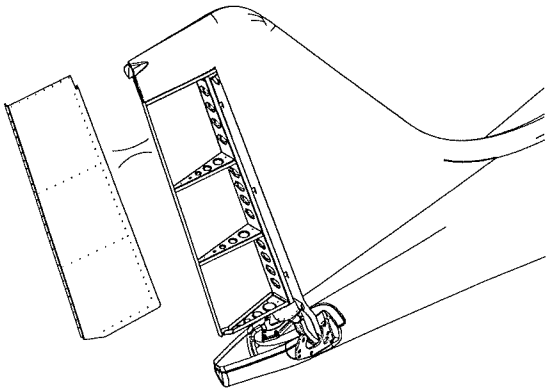

Fig. 7-4. P92 Echo MkII vertical tail and fin

3. FLIGHT CONTROLS

The primary flight controls are of conventional type, operated by control stick and rudder pedals. Stabilator, as per Figure 7-4, is actuated by push-pull rods and cables.

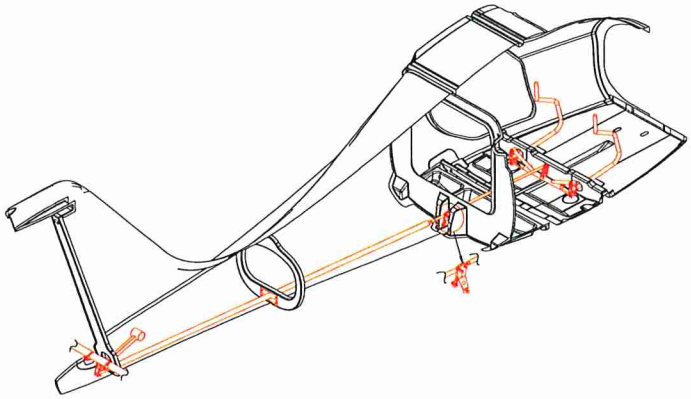

Fig. 7-4. P92 Echo MkII stabilator control line system

Ailerons, as per Figure 7-5, are actuated by push-pull rods on wing and cable in fuselage.

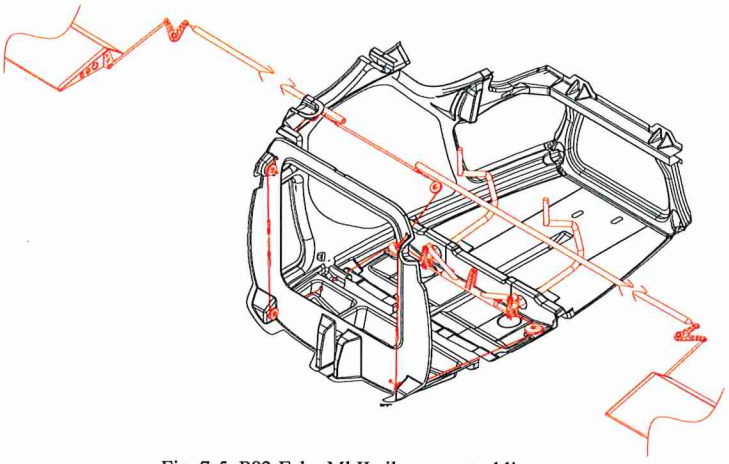

Fig. 7-5. P92 Echo MkII aileron control line

In accordance with Figure 7-6, the rudder is operated by a cable line.

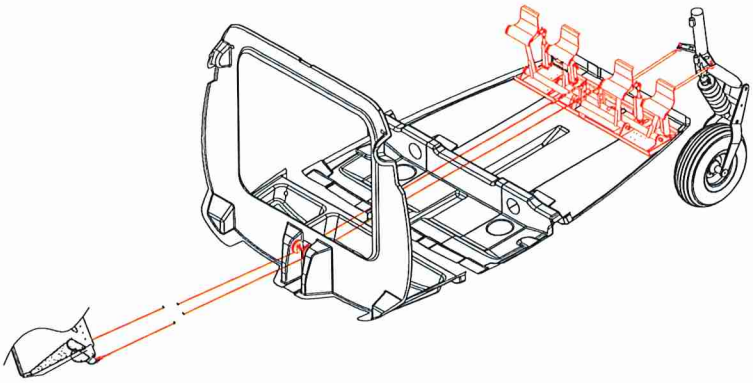

Fig. 7-6. P92 Echo MkII rudder control line

Trimming device for longitudinal is provided by push/pull rod-type system controlled by an electrical actuator. Trim position indicator is installed on A/C cockpit. In the following figure, the pitch trim tab actuation is shown.

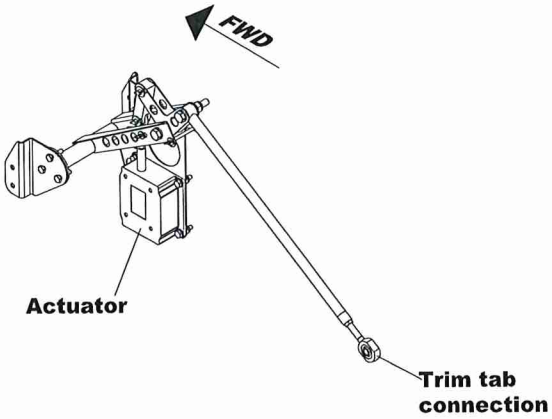

Fig. 7-7. P92 Echo MkII trim tab control line

The flap control system is reported in Figure 7-8. The system is actuated by means of a linear electrical actuator connected to rods transmitting the movement to the flap surfaces.

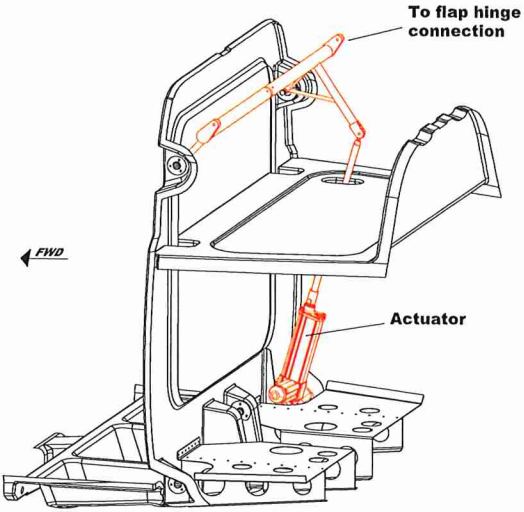

Fig. 7-8. P92 Echo MkII flap control system

4. LANDING GEAR

The main landing gear is realized with simple steel spring-leaves, wheel and tires, disc brakes, renowed for their operational record of effectiveness and safety.

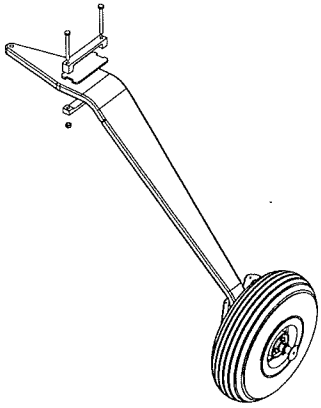

Fig. 7-9. P92 Echo MkII Main Landing Gear

The nose gear features a steerable wheel with a rubber doughnut shock absorber.

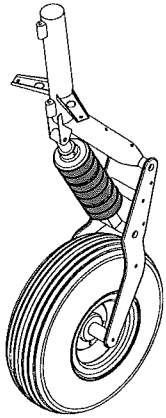

Fig. 7-10. P92 Echo MkII Nose Landing Gear

5. WHEEL AND BREAKES

The brake system installed on P92 Echo MkII consists of an independent hydraulically actuated brake system, one for each main wheel, and is composed of the following items:

- 2 brake calipers, located on the inner sides of the main wheels;
- 4 master cylinders (P/N MC-4), located on the back side of co-pilot pedals;
- 1 parking brake valve (P/N PVPVD), located downstream the master cylinders, used to trap a column of fluid between the valve itself and the brake calipers to firmly stop the wheels.
- 1 oil reservoir with P/N 03-3508-0264-3.

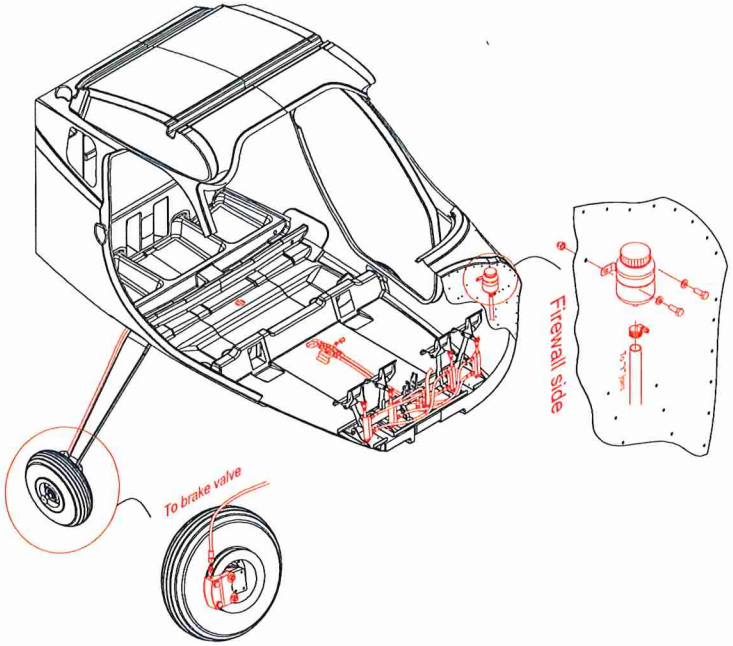

Fig. 7-11. P92 Echo MkII Brake System

NOTE *Flight without wheel fairings can be conducted without significantly affect aircraft performance and handling qualities.*

6. AVIONIC SYSTEM

The electric system installed on P92 Echo MkII is characterized by a rated voltage of 13.5 V DC furnished by a generator of 250 W DC. A 12-volts battery with a capacity of 18 Amph furnishes the power needed for aircraft start up and a reserve energy in case of anomalies to the generator. The generator connected to a regulator/rectifier supplies DC power to the bus bars and to recharge the battery. A red warning light on the instrument panel will turn on indicating to the pilot that the generator is not operating. Circuit protection is through breaker located on right side of instrument panel.

The avionic system installed on P92 Echo MkII is based on Garmin G3X touch integrated avionic suite in a dual screen configuration (GDU 460). It provides flight information (through GSU 25 that records air, attitude and heading data, GMU 22 magnetometer and GTP 59 temperature probe) and primary engine information (through the engine module GSA 24).

Stand-alone external COM/NAV sources (Garmin GTR 225A) is installed. The GTX 35R remote transponder unit is installed. In figure below, the avionic schemes are presented.

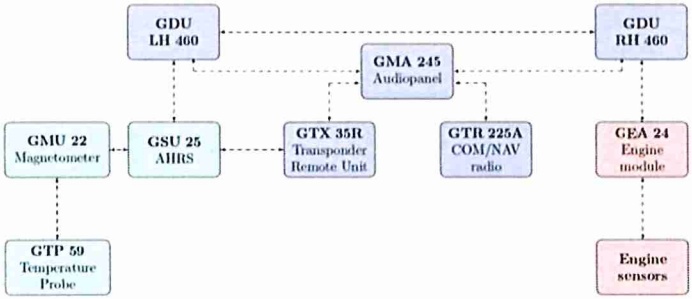

Fig. 7-12. Avionic Scheme

The generator provides DC power also to the following electrical utilities:

1) Fuel pump system
2) Flap actuator
3) Trim tab actuator

In the following figure a scheme of the cockpit configuration is shown.

Fig. 7-13. P92 Echo MkII instrument panel (typical layout)

7. POWERPLANT

7.1. ENGINE

P92 Echo MkII is equipped with a Rotax 912 ULS 2 100 horse powered engine.

Fig. 7-14. Rotax 912 ULS 2 engine

The main engine characteristics are:

- 4 stroke, 4 cylinders. horizontally opposed, spark ignition engine, single central camshaft hydraulic tappets - push rods – OHV;
- Liquid cooled cylinder heads;
- Ram air cooled cylinders;
- Dry sump forced lubrication;
- Dual ignition of breakerless, capacitor discharge design;
- 2 constant depression carburettors;
- Mechanical fuel pumps;
- Electric starter 12 V 0.9 kW;
- Integrated AC generator with external rectifier regulator;
- Propeller drive via integrated gearbox with mechanical shock absorber and overload clutch.

7.2 PROPELLER

P92 Echo MkII is equipped with a Sensenich Wood propeller. The model is W68T2ET-70J and is made by two wooden blades, with fixed pitch. The diameter is 1730mm.

7.3 FUEL SYSTEM

A sketch of the fuel system is given in Figure 7-15. It consists of two fuel tanks integrated in the wing leading edge and having a 45t (11.8 US gal) capacity (total capacity is 90lt (23.7 US gal)). The engine is fed by means of an engine-driven mechanical pump and, as backup, by an electric pump. The fuel system has a sediment bowl or chamber that is accessible for drainage.

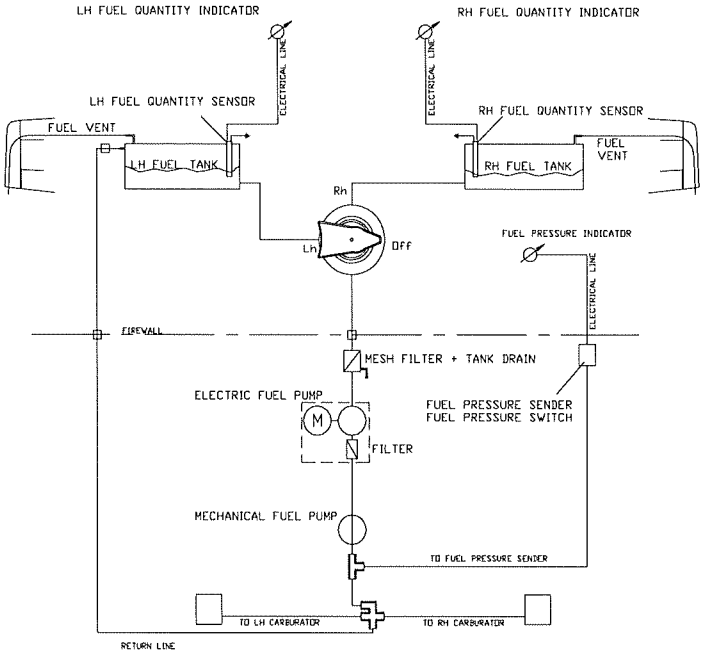

Fig. 7-15. Fuel System

A fuel selector is located in cabin. Two resistive type fuel quantity senders are installed in each tank and provide the fuel indication on the A/C cockpit.

8 LUGGAGE COMPARTMENT

The Luggage compartment is located behind the pilots' seats. Luggage shall be uniformly distributed on utility shelf and its weight shall not exceed 20kg.

WARNING

Before loading luggage, check aircraft's weight and CG location (see Sect. 6)

9 DOORS

Two doors are provided for P92 Echo MkII, on pilot and co-pilot side. Given that the propeller is located on the nose of the aircraft, there are no chances to endanger person using those exits.

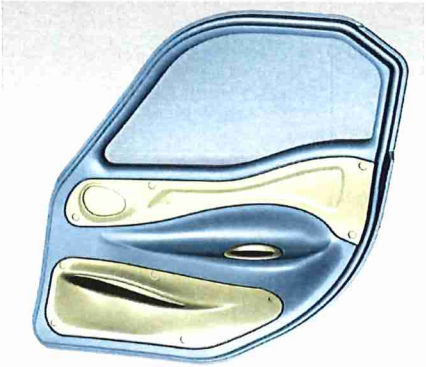

Fig. 7-16. P92 Echo MkII Door

Doors are also considered as emergency exits.

10 SEATS

Pilot and co-pilot seats are characterized by aluminium structure (Al 6061) manufactured by Tecnam. It is covered by a cushion and connected to the fuselage structure.

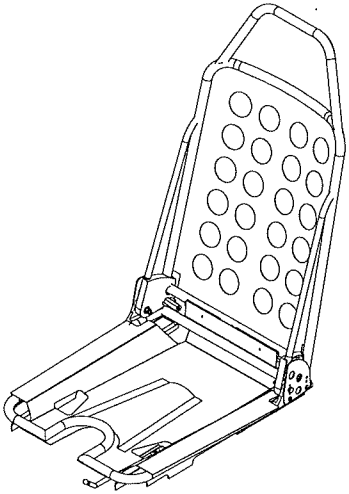

Fig. 7-17. P92 Echo MkII Seat Structure

11 RESCUE SYSTEM

The P92 Echo MkII high wing aeroplanes hang under the parachute by means of four bridles. The front fitting points are dedicated fixations points near the front attachments of the wing. The rear two fitting points are located by the connection between fuselage and the rear wing attachments. The parachute is a BRS-6-1050 model, manufactured by BRS aerospace.

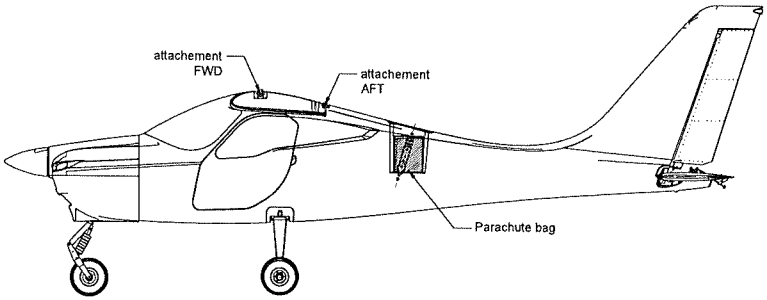

Fig. 7-16. P92 Echo MkII Rescue system

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SEZIONE 8 – AIRCRAFT CARE AND MAINTENANCE

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   4.2. Parking and Tie-Down 5
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   4.4. Leveling 5
   4.5. Road Transport 5
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1. Introduction

This section contains factory-recommended procedures for proper ground handling and routine care and servicing. It also identifies certain inspection and maintenance requirements, which must be followed if the aircraft is to retain its new-plane performance and dependability. It is recommended to follow a planned schedule of lubrication and preventive maintenance based on climatic and flying conditions encountered locally.

2. Aircraft Inspection Intervals

Correct maintenance procedures are described in the aircraft's Maintenance Manual or in the engine's Maintenance Manual.

3. Aircraft Changes or Repairs

Aircraft changes or repairs must be performed in accordance with Aircraft Maintenance Manual and only by TECNAM authorized personnel.

4. Ground Handling

4.1. TOWING

The aircraft is most easily and safely maneuvered by pulling it by its propeller near the axle. Aircraft may be steered by turning rudder or, for steep turns, by pushing lightly on tailcone to lift nose wheel.

4.2. PARKING AND TIE-DOWN

When parking airplane outdoors, head it into the wind and set the parking brake. If chocks or wedges are available it is preferable to use the latter. In severe weather and high wind conditions it is wise to tie the airplane down. Tie-down ropes shall be fastened to the lug present on the wing's lower surface. Nose gear fork can be used for front tie-down location. Flight controls shall be secured to avoid possible weather vaning damage to moving surfaces.

4.3. JACKING

Given the light empty weight of the aircraft, lifting one of the main wheels can easily be accomplished even without the use of hydraulic jacks. For an acceptable procedure please refer to the Maintenance Manual.

4.4. LEVELING

Aircraft levelling may become necessary to check wing incidence, dihedral or the exact location of CG. Longitudinal levelling verification is obtained placing a level between the front and aft seat's supporting trusses (slide off the seats to get the access to the two trusses).

4.5. ROAD TRANSPORT

It is recommended to secure tightly all aircraft components onto the cart to avoid damage during transport. It is suggested to place wings under the aircraft's bottom, secured by specific clamps. Secondary components like the stabilator shall be protected from accidental hits using plastic or other material. For correct rigging and de-rigging procedure, refer to the Maintenance Manual.

5. Cleaning And Care

To clean painted surfaces, use a mild detergent such as shampoo normally used for car finish; use a soft cloth for drying. The plastic windshield and windows should never be dusted when dry; use lukewarm soapy water and dry using chamois only. It is possible to use special glass detergents but, in any case, never use products such as gasoline, alcohol, acetone or other solvents. To clean cabin interior, seats, upholstery and carpet, it is generally recommended to use foam-type detergents.

SECTION 9 – AFM SUPPLEMENTS

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1. INTRODUCTION

This section concerns the supplemental manuals of additional (or optional) instrumentation equipping the P92 Echo MKII and/or information and limitations related to installed equipment configuration or needed to fit local national rules.

2. SUPPLEMENTS LIST

Aircraft S/N	Registration marks	Date
1716	PH-0B3	30/01/2023

Sup. N	Title	Rev. N	Date	APPLICABLE	
				YES	NO
S01	Alternative Units for Speed	1	25/05/21	☐	☒
S02	Analogic version	0	16/10/20	☐	☒
S03	Light Version (MTOW 560 Kg)	0	25/05/21	☐	☒