

## Aircraft Flight Manual

Doc. No. 92/298  
1<sup>st</sup> Edition – Rev. 2  
2024, June 17<sup>th</sup>



## **TECNAM P92 Echo MKII**

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

SERIAL NUMBER: .....

BUILD YEAR: .....

REGISTRATION MARKINGS: .....

*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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## **Section 0**

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## 1. RECORD OF REVISIONS

Any revision to the present Manual, except actual weighing data, is recorded: a Record of Revisions is provided at the front of this manual and the operator is advised to make sure that the record is kept up-to-date.

The Manual issue is identified by Edition and Revision codes reported on each page, lower right side.

The revision code is numerical and consists of the number “0”; subsequent revisions are identified by the change of the code from “0” to “1” for the first revision to the basic publication, “2” for the second one, etc.

Should be necessary to completely reissue a publication for contents and format changes, the Edition code will change to the next number (“2” for the second edition, “3” for the third edition etc).

Additions, deletions and revisions to existing text will be identified by a revision bar (black line) in the left-hand margin of the page, adjacent to the change.

When technical changes cause expansion or deletion of text which results in unchanged text appearing on a different page, a revision bar will be placed in the right-hand margin adjacent to the page number of all affected pages providing no other revision bar appears on the page.

These pages will be updated to the current regular revision date.

In order to be constantly updated on change on this document from TECNAM, It is the responsibility of the owner to register on TECNAM website at:

[www.tecnam.com](http://www.tecnam.com)

**NOTE:** It is the responsibility of the owner to maintain this handbook in a current status when it is being used for operational purposes.

<b>Rev</b>	<b>Revised page</b>	<b>Description of Revision</b>
0	All	First issue
1	2-10 3-5 5-6 6-11, 12, 14, 15 7-6, 10, 11 9-3	Optimization; System description optimization
2	0-1, 4, 5 1-3, 5 2-7 6-14 7-12 9-3	New propeller installation Typo correction

## 2. LIST OF EFFECTIVE PAGES

The List of Effective Pages (LOEP), applicable to manuals of every operator, lists all the basic AFM pages: each manual could contain either basic pages or one variant of these pages when the pages of some Supplements are embodied.

Pages affected by the current revision are indicated by an asterisk (\*) following the revision code.

1<sup>st</sup> Edition,

October 25<sup>th</sup> 2021

Section	Pages	Revision
<b>Section 0</b>	2 thru 3, 6 thru 8	Rev 0
	1, 4 thru 5	Rev 2
<b>Section 1</b>	1 thru 2, 4, 6 thru 14	Rev 0
	3, 5	Rev 2
<b>Section 2</b>	1 thru 6, 8 thru 9, 11 thru 14	Rev 0
	10	Rev 1
	7	Rev 2
<b>Section 3</b>	1 thru 4, 6 thru 20	Rev 0
	5	Rev 1
<b>Section 4</b>	All	Rev 0
<b>Section 5</b>	1 thru 5, 7 thru 16	Rev 0
	6	Rev 1
<b>Section 6</b>	1 thru 10, 13, 16	Rev 0
	11 thru 12, 15	Rev 1
	14	Rev 2
<b>Section 7</b>	1 thru 5, 7 thru 9, 13 thru 18	Rev 0
	6, 10 thru 11	Rev 1
	12	Rev 2
<b>Section 8</b>	All	Rev 0
<b>Section 9</b>	1 thru 2, 4	Rev 0
	3	Rev 2
Supplement LoEP: make reference to the Supplements LoEP Pages.		

### 3. FOREWORD

The P92 MKII is a twin seat, single engine light aircraft with a strut braced high wing and tricycle fixed landing gear with steerable nose wheel.

Section 1 supplies general information and it contains definitions, symbols explanations, acronyms and terminology used.

Before using the airplane, you are recommended to read carefully this manual: a deep knowledge of airplane features and limitations will allow you for operating the airplane safely.

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## **4. SECTION LISTS**

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## Section 1 - GENERAL

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## 1 INTRODUCTION

The Aircraft Flight Manual has been implemented to provide the owners with information for a safe and efficient use of the aircraft TECNAM P92 Echo MKII.

The **P92 Echo MkII** is a twin seat, single engine light aircraft with a strut braced high wing and tricycle fixed landing gear with steerable nose wheel.

This Flight Manual has been prepared to provide pilots and instructors with information for the safe and efficient operation of this aeroplane.

### 1.1 WARNING – CAUTION – NOTE

Following definitions apply to warnings, cautions and notes used in the Aircraft Flight Manual.



The non-observation of the corresponding procedure can lead, as immediate effect, to a significant reduction of the flight safety.



The non-observation of the corresponding procedure can lead to an equipment damage which leads to a reduction of the flight safety in a short or longer time interval.



Draws the attention to a procedure not directly related to safety of flight.

## 2 THREE VIEW AND DIMENSIONS

### 2.1 THREE VIEW

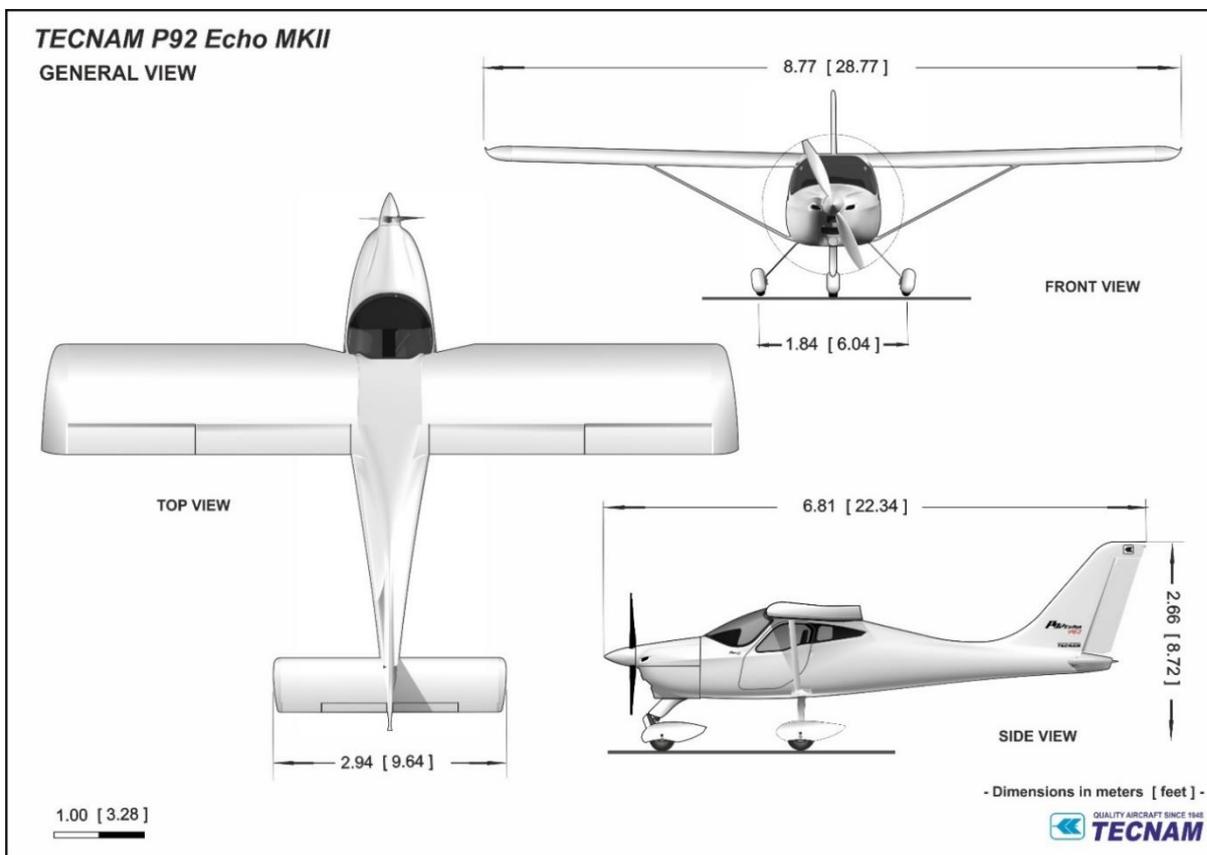


Fig. 1.1 – General views

- Dimensions shown refer to normal operating tire pressure.
- Propeller ground clearance 336 mm (Sensenich propeller) or 351 mm (E-Props propeller)
- Propeller ground clearance with deflated front tire and nose wheel shock absorber compressed 84 mm (Sensenich propeller) or 100 mm (E-Props propeller)

## 2.2 DIMENSIONS

### Overall dimensions

Wingspan	8.77 m/28.77 ft
Length	6.81 m/22.34 ft
Overall height	2.66 m/8.72 ft
Wheel Track	1.84 m/6.04 ft
Wheelbase	1.74 m

### Wing

Wing surface	12.1 m <sup>2</sup> /130.24 ft <sup>2</sup>
Mean Geometric Chord	1.40 m/4.59 ft
Dihedral	1°30'
Aspect ratio	6.35

### 3 GENERAL FEATURES

#### 3.1 CONTROL SURFACES TRAVEL LIMITS

The control surfaces travel limits are reported in the Aircraft Maintenance Manual.

#### 3.2 ENGINE

Manufacturer	Bombardier Rotax GmbH
Model	912 iS Sport
Engine type	4 cylinder horizontally-opposed twins with overall displacement of 1352 c.c., mixed cooling, (water-cooled heads and air-cooled cylinders), electronic injectors, integrated reduction gear with torque damper.
Maximum power (at declared rpm)	73.5kW (100 hp) @5800rpm (max.5') 72 kW (97 hp) @5500rpm (cont.)

#### 3.3 PROPELLER

Manufacturer	Sensenich
Model	W68T2ET-70J
Number of blades:	2
Diameter	1730 mm (no reduction allowed)
Type	Fixed pitch – wood
Manufacturer	E-Props
Model	DUR-2-170-C8-T
Number of blades:	2
Diameter	1700 mm (no reduction allowed)
Type	Fixed pitch, Ground adjustable – Carbon with titanium leading edge protection

### **3.4 FUEL**

Approved fuel:	MOGAS ASTM D4814  MOGAS EN 228 Super/Super Plus (Min RON 95) AVGAS 100LL (ASTM D910) <i>(see also Section 2)</i>
Fuel tanks	Two wing tanks integrated within the wing's leading edge. Equipped with finger strainers outlet and with drain fittings.
Capacity of each wing tank	45 litres
Tanks overall capacity	90 litres
Overall usable fuel	86 litres
Overall unusable fuel	4 litre

### **3.5 LUBRICATION**

Lubrication system	Forced type with external reservoir
Oil	Lubricant specifications and grade are detailed into the "Rotax Operators Manual" and in its related documents.
Oil capacity	Max. 3 litres – min. 2.5 litres

### **3.6 COOLING**

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

### **3.7 WEIGHTS**

See Section 2.

### **3.8 STANDARD WEIGHTS**

Empty Weight: see weighing record on Section 6.

### **3.9 SPECIFIC LOADING**

	<b>MTOW 600 kg</b>
Wing Loading	49.6 kg/m <sup>2</sup>
Power Loading	6.0 kg/hp

## 4 ACRONYMS AND TERMINOLOGY

### 4.1 GENERAL AIRSPEED TERMINOLOGY AND SYMBOLS

CAS	<u>Calibrated Airspeed</u> is the indicated airspeed, corrected taking into account the errors related to the instrument itself and its installation.
IAS	<u>Indicated Airspeed</u> is the speed shown on the airspeed indicator.
TAS	<u>True Airspeed</u> is the CAS airspeed corrected taking into account altitude and temperature.
V <sub>A</sub>	<u>Design Manoeuvring speed</u> is the speed above the which it is not allowed to make full or abrupt control movement.
V <sub>FE</sub>	<u>Maximum Flap Extended speed</u> is the highest speed permissible with flaps extended.
V <sub>NO</sub>	<u>Maximum Structural Cruising Speed</u> is the speed that should not be exceeded, except in smooth air and only with caution.
V <sub>NE</sub>	<u>Never Exceed Speed</u> is the speed limit that may not be exceeded at any time.
V <sub>S</sub>	<u>Stall Speed</u> .
V <sub>S0</sub>	<u>Stall Speed in landing configuration</u> (full flaps).
V <sub>S1</sub>	<u>Stall speed in the given flap configuration</u> .
V <sub>X</sub>	<u>Best Angle-of-Climb Speed</u> is the speed which allows best ramp climb performances.
V <sub>Y</sub>	<u>Best Rate-of-Climb Speed</u> is the speed which allows the best gain in altitude over a given time.
V <sub>R</sub>	<u>Rotation speed</u> : is the speed at which the aircraft rotates about the pitch axis during take-off

## 4.2 METEOROLOGICAL TERMINOLOGY

ISA	<u>International Standard Atmosphere</u> : is the air atmospheric standard condition at sea level, at 15°C (59°F) and at 1013.25hPa (29.92inHg).
QFE	<u>Official atmospheric pressure at airport level</u> : it indicates the aircraft absolute altitude with respect to the official airport level.
QNH	<u>Theoretical atmospheric pressure at sea level</u> : is the atmospheric pressure reported at the medium sea level, through the standard air pressure-altitude relationship, starting from the airport QFE.
OAT	<u>Outside Air Temperature</u> is the air static temperature expressed in degrees Celsius (°C).
T <sub>s</sub>	<u>Standard Temperature</u> is 15°C at sea level pressure altitude and decreased by 2°C for each 1000 ft of altitude.
H <sub>p</sub>	<u>Pressure Altitude</u> is the altitude read from an altimeter when the barometric subscale has been set to 1013 mb.

## 4.3 ENGINE POWER TERMINOLOGY

RPM	<u>Revolutions Per Minute</u> : is the number of revolutions per minute of the engine.
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#### **4.4 AIRCRAFT PERFORMANCE AND FLIGHT PLANNING TERMINOLOGY**

<i>Crosswind Velocity</i>	is the velocity of the crosswind component for which adequate control of the airplane during take-off and landing is assured.
<i>Usable fuel</i>	is the fuel available for flight planning.
<i>Unusable fuel</i>	is the quantity of fuel that cannot be safely used in flight.
<i>G</i>	is the acceleration of gravity.

## 4.5 WEIGHT AND BALANCE TERMINOLOGY

<i>Datum</i>	“Reference datum” is an imaginary vertical plane from which all horizontal distances are measured for balance purposes.
<i>Arm</i>	is the horizontal distance of an item measured from the reference datum.
<i>Moment</i>	is the product of the weight of an item multiplied by its arm.
<i>C.G.</i>	<u>Center of Gravity</u> is the point at which the airplane, or equipment, would balance if suspended. Its distance from the reference datum is found by dividing the total moment by the total weight of the aircraft.
<i>Standard Empty Weight</i>	is the weight of the aircraft with engine fluids and oil at operating levels.
<i>Basic Empty Weight</i>	is the standard empty weight to which it is added the optional equipment weight.
<i>Useful Load</i>	is the difference between maximum take-off weight and the basic empty weight.
<i>Maximum Take-off Weight</i>	is the maximum weight approved to perform the take-off.
<i>Maximum Landing Weight</i>	is the maximum weight approved for the landing touchdown (for <b>P92 Echo MKII</b> it is equivalent to the Maximum Takeoff Weight).
<i>Tare</i>	is the weight of chocks, blocks, stands, etc. used when weighing an airplane, and is included in the scale readings. Tare is deducted from the scale reading to obtain the actual (net) airplane weight.

## 5 UNIT CONVERSION CHART

<i>MULTIPLYING</i>		<i>BY</i> →	<i>YIELDS</i>	
<b>TEMPERATURE</b>				
Fahrenheit	[°F]	$\frac{5}{9} \cdot (F - 32)$	Celsius	[°C]
Celsius	[°C]	$(\frac{9}{5} \cdot C) + 32$	Fahrenheit	[°F]
<b>FORCES</b>				
Kilograms	[kg]	2.205	Pounds	[lbs]
Pounds	[lbs]	0.4536	Kilograms	[kg]
<b>SPEED</b>				
Meters per second	[m/s]	196.86	Feet per minute	[ft/min]
Feet per minute	[ft/min]	0.00508	Meters per second	[m/s]
Knots	[kts]	1.853	Kilometres / hour	[km/h]
Kilometres / hour	[km/h]	0.5396	Knots	[kts]
<b>PRESSURE</b>				
Atmosphere	[atm]	14.7	Pounds / sq. in	[psi]
Pounds / sq. in	[psi]	0.068	Atmosphere	[atm]
<b>LENGTH</b>				
Kilometres	[km]	0.5396	Nautical miles	[nm]
Nautical miles	[nm]	1.852	Kilometres	[km]
Meters	[m]	3.281	Feet	[ft]
Feet	[ft]	0.3048	Meters	[m]
Centimetres	[cm]	0.3937	Inches	[in]
Inches	[in]	2.540	Centimetres	[cm]
<b>VOLUME</b>				
Litres	[l]	0.2642	U.S. Gallons	[US Gal]
U.S. Gallons	[US Gal]	3.785	Litres	[l]
<b>AREA</b>				
Square meters	[m <sup>2</sup> ]	10.76	Square feet	[sq ft]
Square feet	[sq ft]	0.0929	Square meters	[m <sup>2</sup> ]

**6 LITRES / US GALLONS CONVERSION CHART**

Litres	US Gallons
5	1.3
10	2.6
15	4.0
20	5.3
25	6.6
30	7.9
35	9.2
40	10.6
45	11.9
50	13.2
60	15.9
70	18.5
80	21.1
90	23.8

US Gallons	Litres
1	3.8
2	7.6
3	11.4
4	15.1
6	22.7
8	30.3
10	37.9
12	45.4
14	53.0
16	60.6
18	68.1
20	75.7
22	83.3
24	90.9

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## Section 2 – LIMITATIONS

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## **1. INTRODUCTION**

Section 2 includes operating limitations and instrument markings of *P92 Echo MKII* aircraft, its engines and standard systems and equipment.

## 2. SPEED LIMITATIONS

The following table addresses the airspeed limitations and their operational significance:

SPEED		IAS [knots]	CAS [knots]	REMARKS
V <sub>NE</sub>	Never exceed speed	145	138	Do not exceed this speed in any operation.
V <sub>RA</sub>	Maximum speed for rough air	113	109	Do not exceed this speed except in smooth air, and only with caution.
V <sub>A</sub>	Design Manoeuvring speed	98	95	Do not make full or abrupt control movement above this speed, because under certain conditions the aircraft may be overstressed by full control movement.
V <sub>FE</sub>	Maximum flaps extended speed	70	70	Do not exceed this speed with flaps extended.

### 3. AIRSPEED INDICATOR MARKINGS

Airspeed indicator markings and their colour code are explained in the following table.

MARKING	IAS [knots]	EXPLANATION
White arc	<b>41 – 70</b>	Positive Flap Operating Range (lower limit is $1.1V_{SO}$ , at specified maximum weight and upper limit is the maximum speed permissible with landing flaps extension).
Green arc	<b>51 – 113</b>	Normal Operating Range (lower limit is $1.1V_{S1}$ at specified maximum weight and most forward c.g. with flaps retracted and upper limit is maximum speed for rough air $V_{RA}$ ).
Yellow arc	<b>113 – 145</b>	Manoeuvres must be conducted with caution and only in smooth air.
Red line	<b>145</b>	Maximum speed for all operations.
Blue Flag	<b>98</b>	Design Manoeuvring speed

## 4. POWERPLANT LIMITATIONS

Following table reports the operating limitations for aircraft engine installed:

**ENGINE MANUFACTURER:** Bombardier Rotax GmbH.

**ENGINE MODEL:** 912 iS Sport

**MAXIMUM POWER:**

	<b>Max Power kW (hp)</b>	<b>Max RPM. Prop. RPM (engine)</b>	<b>Time max. (minutes)</b>
<b>Max. T.O.</b>	73.5 (100)	2388 (5800)	5
<b>Max. Cont.</b>	72 (97)	2265 (5500)	-

### NOTE

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

### Temperatures:

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

### 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	-20° 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.*

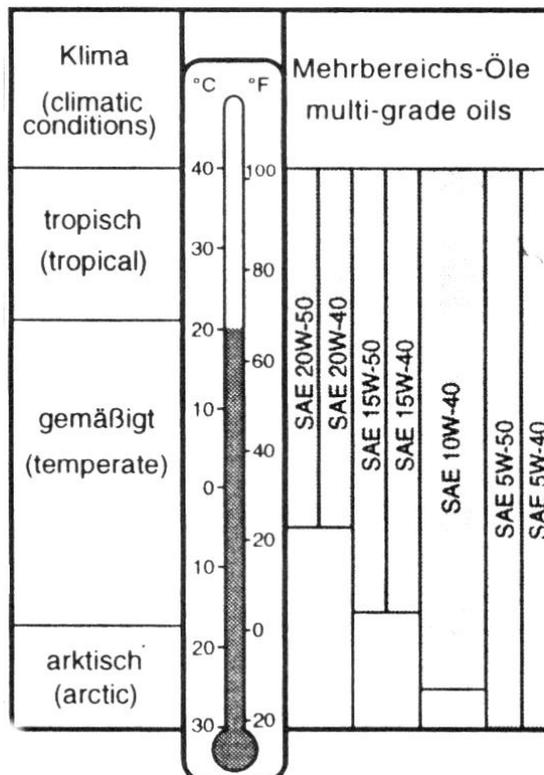
### Fuel pressure:

Minimum:	40.61 psi (2.8 Bar) or 36 psi* (2.5 bar)
Maximum:	46.41 psi (3.2 Bar) or 51 psi* (3.5 Bar)

\* Acceptable fuel pressure exceedance allowed only after power setting change for max. 3 sec.

## 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)
MANUFACTURER:	E-Props
MODEL:	DUR-2-170-C8-T
TYPE:	Carbon twin blade fixed pitch ground adjustable
DIAMETER:	1700 mm (no reduction permitted)

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## 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 -20°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
EGT	°C	---	538 - 950	---	>950
Oil temp.	°C	<50	90 - 110	50 - 90 110 - 130	>130
CT	°C	---	0 - 120	---	>120
Oil pressure	bar	<0.8	2 - 5	0.8 - 2 5 - 7	>7
Fuel press.	psi	<36	40.61 – 46.41	36 – 40.61 46.41 - 51	>51
	bar	<2.5	2.8 – 3.2	2.5 – 2.8 3.2 – 3.5	>3.5
Fuel Q.ty	litres	0 <sup>(1)</sup> - 8	15 - 45	8 - 15	----

## 11. OTHER INSTRUMENTS MARKINGS

INSTRUMENT		RED RANGE Minimum limit	GREEN RANGE Normal operating	YELLOW RANGE Caution	RED RANGE Maximum limit
Lane A	V	<11	12 – 14.5	11 – 12	>14.8
Lane B				14.5 – 14.8	
Battery	A	---	---	---	---
Alternator	A	---	---	---	---
Main	V	<11	12 – 14.5	11 – 12 14.5 – 15.5	>15.5

<sup>1</sup> - "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	1.799 m (20.0% MAC) aft of datum for all weights
Aft limit	1.939 m (30.0% 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:

<b>Positive</b>	<b>Negative</b>
<b>+ 4.0 g</b>	<b>- 2.0 g</b>

Maneuver load factors limits with flaps extended are as follows:

<b>Positive</b>	<b>Negative</b>
<b>+ 2.0 g</b>	<b>0 g</b>

## **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

<b>TWO TANKS:</b>	<i>45 liters each</i>
<b>TOTAL FUEL CAPACITY:</b>	<i>90 liters.</i>
<b>USABLE FUEL Q.TY:</b>	<i>86 liters</i>
<b>UNUSABLE FUEL Q.TY:</b>	<i>2 liters each (4 litres total)</i>

With 1/4 tank or less, prolonged uncoordinated flight is prohibited.

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)



*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:

<b><u>BEFORE ROTATION: ABORT TAKE OFF</u></b>	
1.	<b>Throttle</b> <span style="float: right;"><b><i>IDLE</i></b></span>
2.	<b>Rudder</b> <span style="float: right;"><b><i>Keep heading control</i></b></span>
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

#### Both Alternators failure:



WARNING

*Failure of both EMS supplies (Alternator A /B) result in engine stoppage.*

- |                                     |                        |
|-------------------------------------|------------------------|
| 1. Backup battery switch:           | <i>ON</i>              |
| 2. Master Key:                      | <i>ON</i>              |
| 3. Fuel pump switch:                | <i>ON</i>              |
| 4. Non-vital electric equipment:    | <i>Shed</i>            |
| 5. Starter:                         | <i>PRESS</i>           |
| 6. Throttle Lever:                  | <i>SET as required</i> |
| 7. <b>Land as soon as possible.</b> |                        |

## 2.2. ELECTRICAL FUEL PUMP FAILURE

1. Fuel pump switch: *ON*
2. Fuel pressure: *CHECK raise*

If fuel pressure doesn't build up:

3. **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:

*If TRIM CUT OUT switch is not installed:*

1. Pull TRIM Breaker as soon as possible

*If TRIM CUT OUT switch is installed:*

1. TRIM CUT OUT switch: *ON*

*After previous actions:*

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:** *LOCK*
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:

- |                            |                    |
|----------------------------|--------------------|
| <b>1. Throttle Lever</b>   | <b><i>IDLE</i></b> |
| <b>2. Lane A &amp; B</b>   | <b><i>OFF</i></b>  |
| <b>3. Fuel Selector</b>    | <b><i>OFF</i></b>  |
| <b>4. Fuel pump Switch</b> | <b><i>OFF</i></b>  |
| <b>5. Master Key</b>       | <b><i>OFF</i></b>  |

## 4. ENGINE FAILURE

### 4.1. ENGINE FAILURE DURING TAKE-OFF RUN

- |              |                             |
|--------------|-----------------------------|
| 1. Throttle: | <b>IDLE (fully out)</b>     |
| 2. Rudder    | <b>Keep heading control</b> |
| 3. Brakes:   | <b>apply as needed</b>      |

*When safely stopped:*

- |                         |            |
|-------------------------|------------|
| 4. Lane A & B:          | <b>OFF</b> |
| 5. Fuel selector valve: | <b>OFF</b> |
| 6. Fuel pump Switch     | <b>OFF</b> |
| 7. Master Key:          | <b>OFF</b> |

### 4.2. ENGINE FAILURE IMMEDIATELY AFTER TAKE-OFF

- |  |   |
|--|---|
| 1. Speed:                                | <b>keep minimum 50 kts IAS (<math>V_{50}</math> ft)</b> |
| 2. Find a suitable place to land safely. |   |



*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: | <b>as needed</b> |
|-----------|------------------|



*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:            | <b>IDLE</b> |
| 5. Lane A & B:          | <b>OFF</b>  |
| 6. Fuel selector valve: | <b>OFF</b>  |
| 7. Fuel pump Switch:    | <b>OFF</b>  |
| 8. Master Key:          | <b>OFF</b>  |



*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 **36 psi (2.5 bar)**:

1. Fuel pump switch : *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 CT is detected:

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

#### **4.3.4 CT limit exceedance**

If CT is above 120 °C:

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

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

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

#### **4.3.5 ECU FAULT**

If LANE A or LANE B is ON:

1. ECU does not function properly
2. Refer to Rotax 912iS Operator Manual for more information.

## 5. IN-FLIGHT ENGINE RESTART



**WARNING**

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

- |                            |                                     |
|----------------------------|-------------------------------------|
| 1. Backup Battery Switch   | <i>ON</i>                           |
| 2. Master Key              | <i>CHECK ON</i>                     |
| 3. Fuel pump switch        | <i>ON</i>                           |
| 4. Fuel quantity indicator | <i>CHECK</i>                        |
| 5. Fuel Selector           | <i>change the fuel feeding tank</i> |
| 6. Lane A & B              | <i>CHECK ON</i>                     |
| 7. Throttle lever          | <i>SET as required</i>              |
| 8. Starter                 | <i>PRESS</i>                        |



**CAUTION**

*After engine restart, if practical, moderate propeller RPM and throttle increase to allow OIL and 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                          | <i>SECURE (see engine securing procedure on Para. 3)</i> |
| 2. <b>Land as soon as possible</b> | <i>applying forced landing procedure (See Para. 7)</i>   |

## 6. SMOKE AND FIRE

### 6.1. ENGINE FIRE ON THE GROUND

- |                        |                              |
|------------------------|------------------------------|
| 1. Fuel Selector       | <i>OFF</i>                   |
| 2. Fuel pump switch    | <i>OFF</i>                   |
| 3. Lane A & B          | <i>OFF</i>                   |
| 4. Throttle lever      | <i>FULL FWD</i>              |
| 5. Cabin Heat          | <i>OFF</i>                   |
| 6. Master Key          | <i>OFF</i>                   |
| 7. Parking Brake       | <i>LOCK</i>                  |
| 8. Aircraft Evacuation | <i>carry out immediately</i> |

### 6.2. ENGINE FIRE DURING TAKE-OFF

#### BEFORE ROTATION: ABORT TAKE OFF

- |                   |                             |
|-------------------|-----------------------------|
| 1. Throttle Lever | <i>IDLE</i>                 |
| 2. Rudder         | <i>Keep heading control</i> |
| 3. Brakes         | <i>As required</i>          |

#### With aircraft under control

- |                         |                              |
|-------------------------|------------------------------|
| 4. Fuel Selector        | <i>OFF</i>                   |
| 5. Fuel pump switch     | <i>OFF</i>                   |
| 6. Lane A & B           | <i>OFF</i>                   |
| 7. Cabin Heat           | <i>OFF</i>                   |
| 8. Master Key           | <i>OFF</i>                   |
| 9. Parking Brake        | <i>LOCK</i>                  |
| 10. Aircraft Evacuation | <i>carry out immediately</i> |

**6.3. ENGINE FIRE IN-FLIGHT**

1. Cabin heat: *OFF*
2. Fuel selector valve: *OFF*
3. Fuel pump switch: *OFF*
4. Throttle: *FULL FORWARD until the engine stops*
5. Lane A & B: *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. Master Key: *OFF*
2. Land as soon as possible and evacuate the aircraft

**CAUTION***If the MASTER Key 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. Throttle Lever: *IDLE*
2. Lane A & B: *OFF*
3. Fuel Selector Valve: *OFF*
4. MASTER Key: *OFF*
5. 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. Fuel pump switch: OFF
6. Lane A & B: OFF
7. Safety belts: Tighten

*When certain to land*

8. Flaps: *as necessary*
9. Master Key : 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. Fuel pump switch: OFF
9. Lane A & B: OFF
10. Master Key: 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:                  | <i>APPLY until impending stall indications are eliminated</i> |
| 2. Wings level                       | <i>Obtain and Maintain</i>                                    |
| 3. Power:                            | <i>As required</i>  |
| 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-threatening 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.	<b>Airspeed</b>	<b>MINUM POSSIBLE</b> (max speed 145 kts IAS)
2.	<b>Pull activation handle firmly and to end-travel</b>	
	<i>After deployment</i>	
3.	<b>Fuel selector:</b>	<b>OFF</b>
4.	<b>Lane A &amp; B:</b>	<b>OFF</b>
5.	<b>Master Key:</b>	<b>OFF</b>
6.	<b>Seat Belts and Harnesses:</b>	<b>TIGHTEN</b>
	<i>Before impact</i>	
7.	<b>Assume emergency landing body position</b>	
	<i>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.</i>	
8.	<b>After the airplane comes to a complete stop, evacuate quickly and move upwind</b>	

## 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 :

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

### 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 Lanes: *OFF*
- D Master Key: *ON*
- E Voltmeter: check (11 – 14.5 V); Ammeter check (red).
- F Lights (if installed): *all ON, check operation*
- G Acoustic stall warning: *check operation*
- H Master Key: *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.



*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.*



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



*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.*

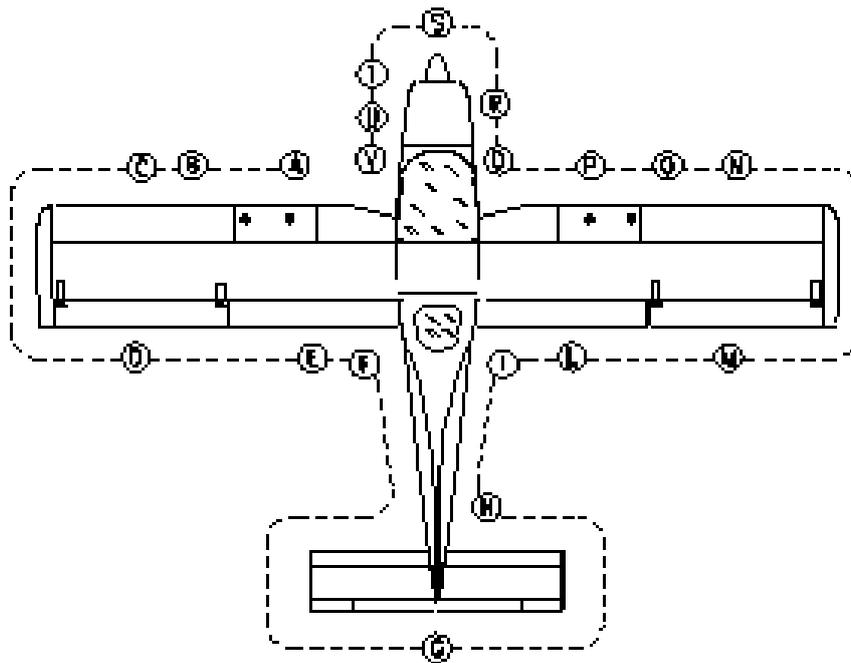


FIG. 4-1

- 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 40 psi (2.8 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 40 psi (2.8 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 Key and check cabin acoustic warning signal is operative, deactivate Master Key.
- 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 32 psi (2.2 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:
1. Check no foreign objects are present.
  2. Verify coolant level in the overflow bottle: level must be between min. and max. mark. Replenish if required.
  3. *Only before the first flight of the day:*
    - a. *Verify coolant level in the expansion tank, replenish as required up to top (level must be at least 2/3 of the expansion tank).*
    - b. *Turn the propeller by hand to and from, feeling the free rotation of 15° or 30° before the crankshaft starts to rotate. If the propeller can be turned between the dogs with practically no friction at all further investigation is necessary. Turn propeller by hand in direction of engine rotation several times and observe engine for odd noises or excessive resistance and normal compression.*
    - c. *Carburetors: check the throttle cable condition and installation.*
    - d. *Exhaust: inspect for damages, leakage and general condition*
  4. Check radiators. There should be no indication of leakage of fluid and they have to be free of obstructions.
  5. Check oil level and replenish as required. Prior to oil check, having magnetos switched off turn the propeller by hand in direction of engine rotation several times to pump oil from the engine into the oil tank, or let the engine idle for 1 minute. This process is finished when air is returning back to the oil tank and can be noticed by a murmur from the open oil tank. Prior to long flights oil should be added so that the oil level reaches the “max” mark.
  6. Inspect fuel circuit for leakages.
  7. Check integrity of silent-block suspensions.
  8. Check connection and integrity of air intake system, visually inspect that ram air intake is unobstructed.
  9. Check that all parts are secured or safetied.
- U Close engine cowling, check for proper alignment of cam-locks.
- V Visual inspection of the Landing and Strobe Light (*if installed*).
- Z Remove tow bar and chocks, stow on board pitot, static ports and stall warning protective covers.

**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. Pre-flight inspection..... | COMPLETED  |
| 2. Seats.....                 | ADJUST   |
| 3. Seat Belts.....            | FASTENED   |
| 4. Flight controls.....       | <i>Operate full stroke checking for movement smoothness, free of play and friction</i>   |
| 5. Parking Brake.....         | LOCK   |
| 6. Throttle Friction.....     | ADJUST   |
| 7. Circuit Breaker.....       | CHECK ALL IN   |
| 8. Master Switch.....         | ON   |
| 9. Flap Control.....          | <i>Cycle fully up and down, then set to T/O</i>  |
| 10. Pitch Trim.....           | <i>Cycle fully up and down, then set to NEUTRAL</i>  |
| 11. Navigation Light.....     | ON   |
| 12. Strobe Light.....         | As Required  |
| 13. Fuel quantity.....        | <i>Compare the fuel televels read with fuel quantity visually checked into the tanks (see Pre-flight inspection – External inspection)</i> |
| 14. Door.....                 | <i>Closed and locked</i>   |

**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.*

## 4.2. ENGINE STARTING

1. Fuel Selector..... *Select the tank with less fuel*
2. Propeller Area..... *Call for CLEAR and visually Check*



**CAUTION**

*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.*

3. Lane A Switch..... ON
4. Lane B Switch..... ON
  
6. Start power Switch..... **KEEP ON**  
**(Keep ON until the check #9 is completed)**
7. Checks.....
  - Both Lane Warning Lamps illuminate and extinguish after around 3 seconds
  - Fuel Pressure has reached 3 bar (43.5 psi)
8. Throttle Lever..... 55-65% OPEN
9. Starter..... *Press and release until engine has reached 1500 RPM or more*



**CAUTION**

*If one of the Lane warning lamps start to flash, fail to illuminate, or still illuminates after a few seconds, then this indicates an anomaly operation.*



**CAUTION**

*Activate starter for a maximum of 10 seconds only (without interruption), followed by a cooling period of 2 minutes.*

- 10. Throttle Lever..... As required
- 11. Voltmeter..... CHECK more than 14V



*If LANE warning lamp flashes or lights up, perform a Lane and IGNITION check (See paragraph 4.5.). Both warning lamps must be deactivated, otherwise there is an error.*

- 12. Engine Instrument..... CHECK
- 13. Oil Pressure..... CHECK if above 3 bar (43.5 psi) before proceeding
- 14. Throttle Lever..... INCREASE Engine Speed above 2500 RPM (1030 Prop RPM) and hold for 5 seconds.
- 15. Engine instruments..... CHECK
- 16. Throttle Lever..... SET to 2000 RPM (830 Prop RPM) for 2 minutes and then continue at 2500 RPM (1030 Prop RPM) until oil temperature reaches 50°C (120°F)
- 17. Temperatures and Pressure CHECK
- 18. Throttle Lever..... *As required*

**4.3. BEFORE TAXIING**

- 1. Radio and Avionics..... ON
- 2. Strobe Light..... As Required
- 3. Altimeter..... SET
- 4. Direction indicator..... SET in accordance with the magnetic compass
- 5. Parking Brake..... FREE and taxi

#### 4.4. TAXIING

1. Brakes..... CHECK
2. Steering..... CHECK
3. Flight instruments..... CHECK *altimeter and variometer, artificial horizon alignment, gyro compass and turn & slip indicator coherent with steering direction.*

#### 4.5. PRIOR TO TAKE-OFF

1. Parking brake..... LOCK, then PRESS brake pedal
2. Strobe Light..... As Required
4. Landing Light..... ON
5. Engine Parameters..... CHECK
6. Fuel Selector..... SELECT the fullest tank
6. Fuel Pressure..... CHECK
7. Throttle Lever..... *Short FULL throttle to check MAX engine speed*



**CAUTION**

*After a full-load ground test allow a short cooling run at IDLE speed to prevent vapour formation in the cylinder head.*

8. Throttle Lever: SET to 4000 RPM (1650 RPM Prop)
9. Lane and Ignition Check:

##### LANE A:

- TURN OFF: Engine speed should not drop/increase more than 250 RPM
- TURN ON: Check engine functions properly

##### LANE B:

- TURN OFF: Engine speed should not drop/increase more than 250 RPM
- TURN ON: Check engine functions properly

*Lane A and B have different sensor inputs.*

*During Lane and ignition check, some sensor values are not displayed.*

*LANE A OFF & LANE B ON:*

- *NO Coolant Temperature*
- *NO Exhaust gas temperature from cylinder 1-4*
- *NO OAT*

**NOTE**

*LANE A ON & LANE B OFF:*

- *NO Oil Temperature*
- *NO Oil Pressure*

- |     |                                   |                                |
|-----|-----------------------------------|--------------------------------|
| 10. | Fuel Pressure.....                | CHECK                          |
| 11. | Throttle Lever.....               | SET to 2000 RPM( 825 Prop RPM) |
| 12. | Fuel Pump Switch.....             | ON                             |
| 13. | Fuel Pump check:                  |                                |
|     | - Fuel Pump Switch                | TURN OFF (for 5 seconds)       |
|     | - <i>CHECK Fuel Pressure drop</i> |                                |
|     | - Fuel Pump Switch:               | TURN ON                        |
|     | - <i>CHECK Fuel Pressure rise</i> |                                |
| 14. | Flaps.....                        | SET T/O                        |
| 15. | Flight controls.....              | CHECK free                     |
| 16. | Seat Belts.....                   | CHECK Fastened                 |
| 17. | 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. Brakes..... APPLY
2. Throttle Lever..... SET FULL and CHECK approximately 5100 engine RPM
3. Engine Instrument..... CHECK
4. Rotation Speed  $V_R$

	<b>MTOW</b> <b>600kg</b>
<b>Rotation Speed (<math>V_R</math>)</b>	<i>45 kts IAS</i>

*At safe altitude:*

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

	<b>MTOW</b> <b>600kg</b>
<b>Best of Rate Climb Speed (<math>V_Y</math>)</b>	<i>65 kts IAS</i>

1. Fuel Pump Switch..... OFF
2. Fuel Pressure..... CHECK Green Arc
3. Throttle Lever..... SET to 5500 engine RPM or below
4. Landing Light..... OFF

#### 4.7. CRUISE

1. Throttle Lever..... SET for required performance
2. Engine Instrument..... CHECK within limits

**NOTE**

*Monitor and manually compensate asymmetrical fuel consumption by switching fuel selector valve. Switch on the electric fuel pump prior to swap the fuel feeding from one tank to another.*

#### 4.8. BEFORE LANDING

1. Fuel Pump Switch..... ON
2. Fuel Selector..... SELECT the fullest tank
3. Landing Light..... ON
4. Flaps..... SET T/O

	<b>MTOW</b>
	<b>600kg</b>
<i>Approach Speed</i>	<i>54 kts IAS</i>

5. On Final leg:
  - Flaps..... SET LAND

	<b>MTOW</b>
	<b>600kg</b>
<i>Final Approach Speed</i>	<i>50 kts IAS</i>

Optimal touchdown speed: *43 KIAS*

**4.9. BALKED LANDING**

1. Throttle Lever..... FULL FWD
2. Climb Speed.....  $V_Y$  or  $V_X$  as applicable
3. Flaps..... T/O
4. Fuel Pump Switch..... CHECK ON

**4.10. AFTER LANDING**

1. Flaps..... UP
2. Fuel Pump Switch..... OFF
3. Landing Light..... OFF
4. Strobe Light..... As Required

**NOTE**

*Normally the cooling down of the engine during descending and taxiing will be sufficient to allow the engine to be shut off as soon as the aircraft is stopped. At increased operating temperatures make an engine cooling run of at least minimum 2 minutes.*

**4.11. ENGINE SHUT DOWN**

1. Parking brake..... LOCK
2. Throttle Lever..... IDLE
3. Lane A & B..... BOTH OFF
4. Strobe Light..... As Required
5. Navigation Light..... OFF
6. Radio & Avionics..... OFF
7. Master Switch..... OFF
8. Fuel Selector ..... OFF

**4.12. POSTFLIGHT CHECK**

1. Flight controls..... LOCK by mean of seat belts
2. Wheel chocks and wiring mooring lines..... SET
3. Parking Brake..... FREE
4. Doors..... CLOSE and LOCK
5. Protection Hoods..... SET over Pitot Tube, Stall Detector, static ports and doors

## **Section 5 - PERFORMANCES**

### **INDEX**

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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

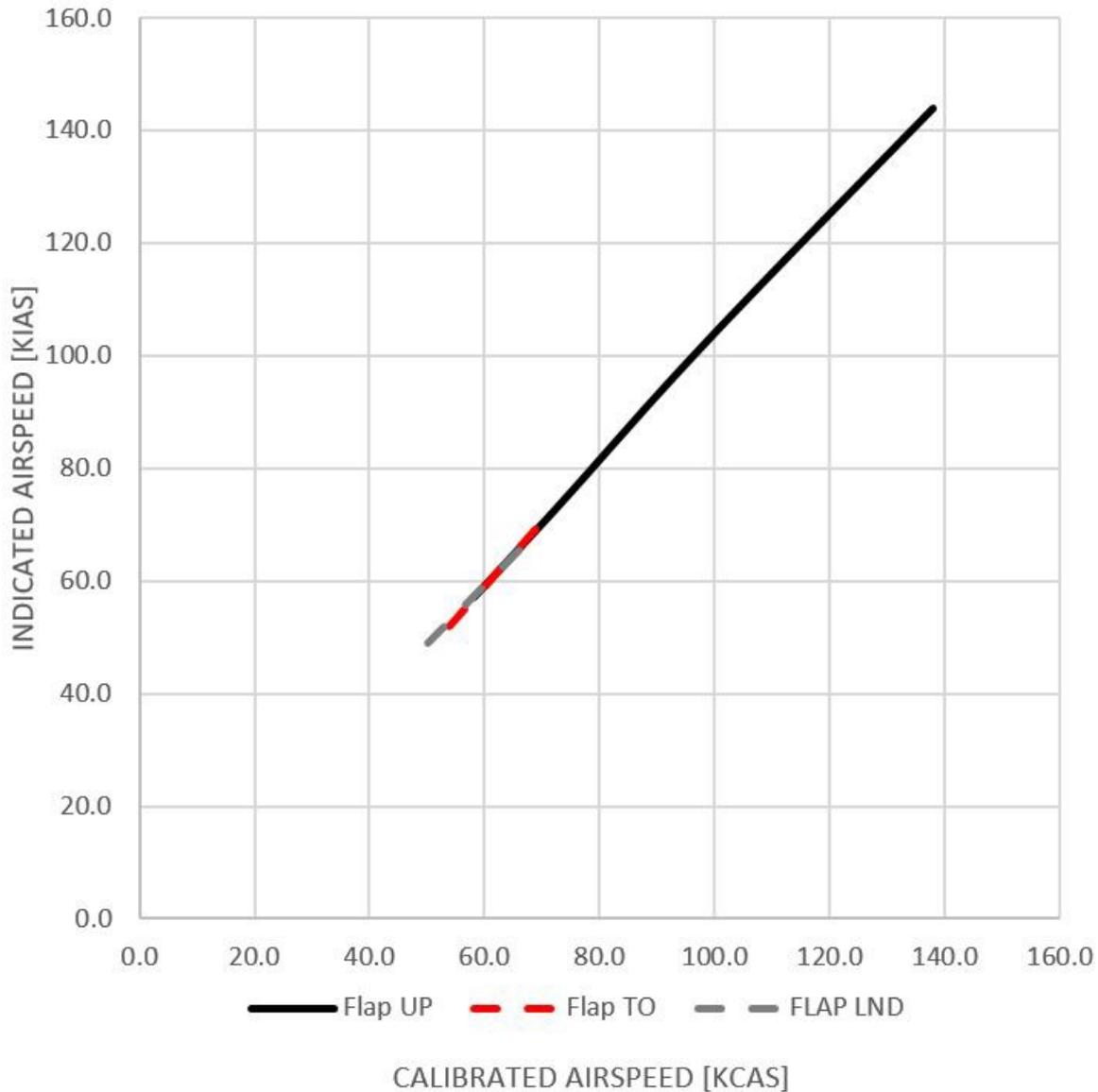
## **2. USE OF PERFORMANCES CHARTS**

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**

KCAS 75 (FLAP UP)

**Find**

KIAS 76 (FLAP UP)

**NOTE**

Indicated airspeed assumes 0 as an instrument error

### 4. ICAO STANDARD ATMOSPHERE

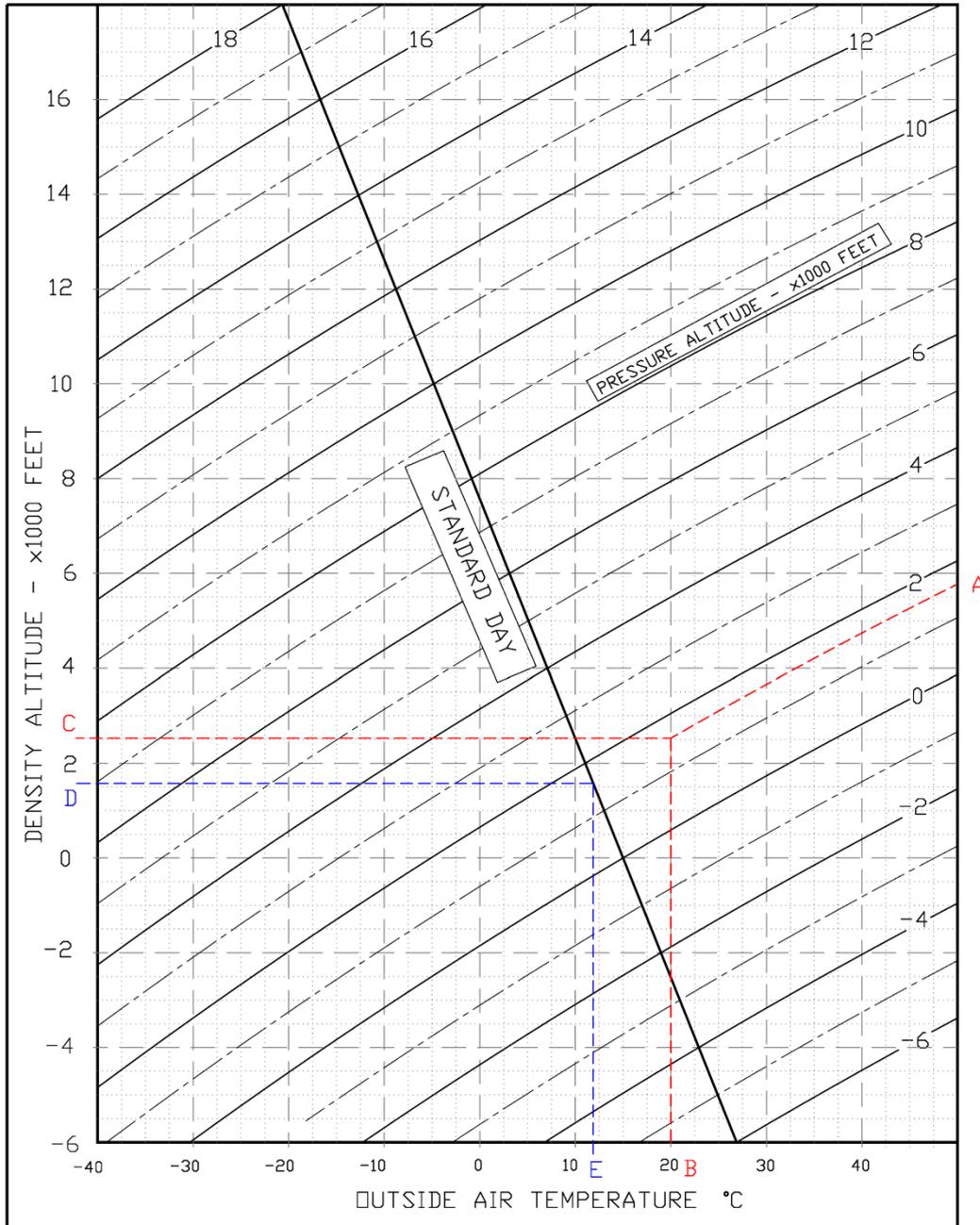


FIG. 5-2. ICAO CHART

Examples:

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

## 5. STALL SPEED

<b>Weight: 600 kg</b> <b>Throttle Levers: IDLE</b> <b>CG: Most Forward (20%)</b> <b>No ground effect</b>						
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**

Wind direction (with respect to aircraft longitudinal axis) = 30°

Wind speed = 20 Kts

**Find**

Headwind = 17.5 Kts

Crosswind = 10 Kts

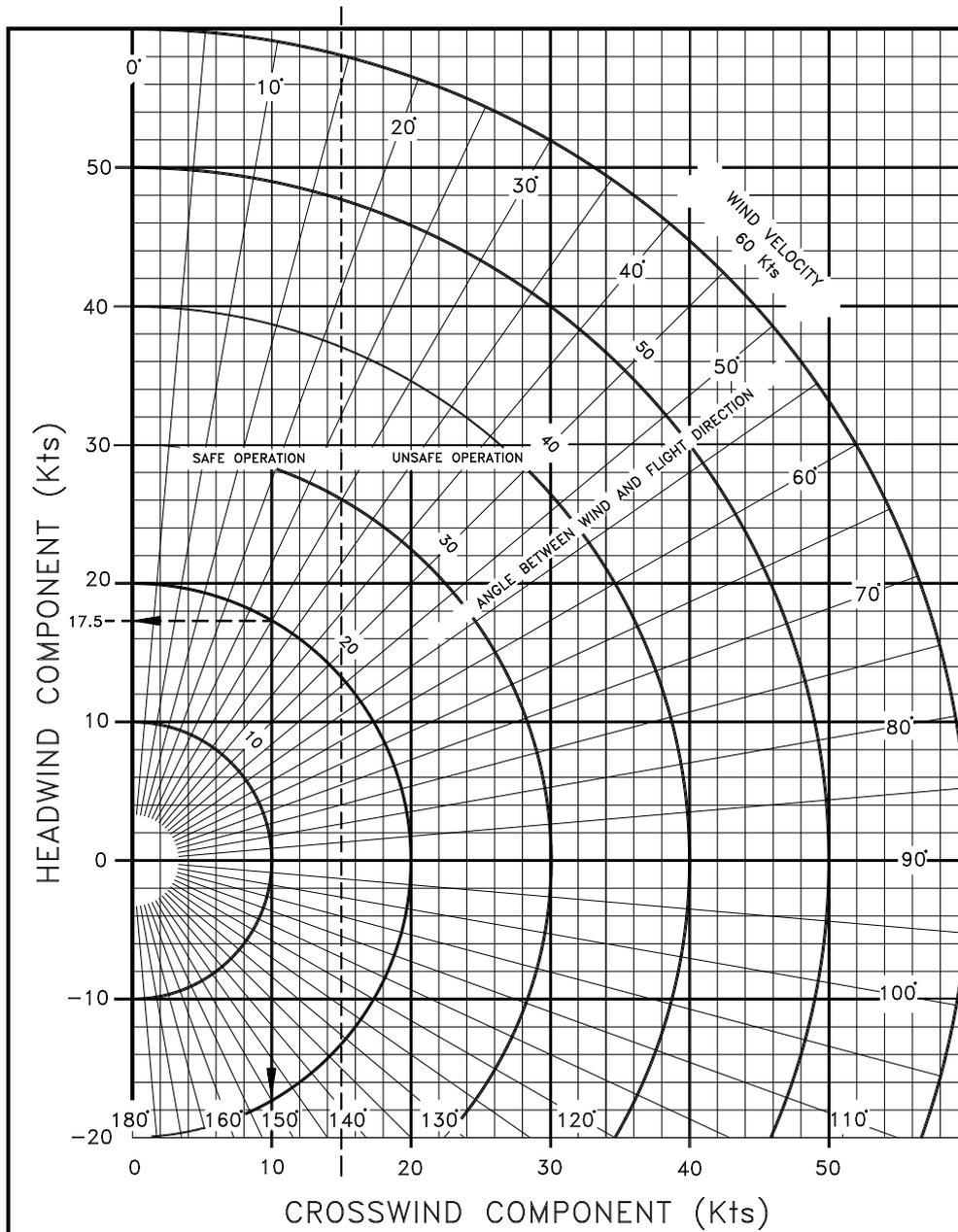


FIG. 5-3. CROSSWIND CHART

## 7. TAKE-OFF PERFORMANCE

<b>Weight = 600 kg</b>						
		<b>Corrections</b>				
<b>Flaps: T/O</b>		<b>Headwind: - 2.5m for each kt (8 ft/kt)</b>				
<b>Speed at Lift-Off = 45 KIAS</b>		<b>Tailwind: + 10m for each kt (33ft/kt)</b>				
<b>Speed Over 50ft Obstacle = 50 KIAS</b>		<b>Paved Runway: - 6% to Ground Roll</b>				
<b>Throttle Lever: Full Forward</b>		<b>Runway slope: + 5% to Ground Roll for each +1%</b>				
<b>Runway: Grass</b>						
Pressure Altitude		Distance [m]				ISA
		Temperature [°C]				
[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**
**Corrections**
**Flaps: T/O**
**Headwind: - 2.5m for each kt (8 ft/kt)**
**Speed at Lift-Off = 42 KIAS**
**Tailwind: + 10m for each kt (33ft/kt)**
**Speed Over 50ft Obstacle = 47 KIAS**
**Paved Runway: - 6% to Ground Roll**
**Throttle Lever: Full Forward**
**Runway slope: + 5% to Ground Roll for each +1%**
**Runway: Grass**

Pressure Altitude		Distance [m]				ISA
		Temperature [°C]				
[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**
**Corrections**

 Flaps: *T/O*

 Speed at Lift-Off = *40 KIAS*

 Speed Over *50ft Obstacle* = *44 KIAS*

 Throttle Lever: *Full Forward*

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

## 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 $V_Y$				
		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	-40	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 H<sub>P</sub>:* **0 ft** *OAT:* **+15°C**

Engine RPM	Speed KTAS	Consumption (lt/h)
4300	90	12
4800	98	15
5200	104	17

*Pressure altitude H<sub>P</sub>:* **3000 ft** *OAT:* **+9°C**

Engine RPM	Speed KTAS	Consumption (lt/h)
4300	83	12
4800	97	15
5200	107	17

*Pressure altitude H<sub>P</sub>:* **6000 ft** *OAT:* **+3°C**

Engine RPM	Speed KTAS	Consumption (lt/h)
4300	75	12
4800	95	15
5200	110	17

## 10. LANDING PERFORMANCE

<b>Weight = 600 kg</b>		<b>Corrections</b>				
<b>Flaps: LAND</b>		<b>Headwind: - 5m for each kt (16 ft/kt)</b>				
<b>Final Approach Speed = 50 KIAS</b>		<b>Tailwind: + 11m for each kt (36ft/kt)</b>				
<b>Throttle Levers: Idle</b>		<b>Paved Runway: - 2% to Ground Roll</b>				
<b>Runway: Grass</b>		<b>Runway slope: - 2.5% to Ground Roll for each +1%</b>				
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

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 = 550 kg**
**Corrections**
**Flaps: LAND**
**Short Final Approach Speed = 47 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	<b>107</b>
	At 50 ft AGL	180	199	217	235	<b>209</b>
1000	Ground Roll	95	105	114	124	<b>110</b>
	At 50 ft AGL	187	206	225	244	<b>216</b>
2000	Ground Roll	99	109	119	129	<b>113</b>
	At 50 ft AGL	194	214	233	253	<b>222</b>
3000	Ground Roll	102	113	123	133	<b>117</b>
	At 50 ft AGL	201	221	242	262	<b>229</b>
4000	Ground Roll	106	117	128	138	<b>120</b>
	At 50 ft AGL	209	230	251	272	<b>236</b>
5000	Ground Roll	110	122	133	144	<b>124</b>
	At 50 ft AGL	217	239	260	282	<b>243</b>
6000	Ground Roll	115	126	138	149	<b>128</b>
	At 50 ft AGL	225	248	270	293	<b>251</b>
7000	Ground Roll	119	131	143	155	<b>132</b>
	At 50 ft AGL	234	257	281	304	<b>258</b>
8000	Ground Roll	124	136	149	161	<b>136</b>
	At 50 ft AGL	243	267	292	316	<b>266</b>
9000	Ground Roll	128	141	154	167	<b>140</b>
	At 50 ft AGL	252	278	303	329	<b>275</b>
10000	Ground Roll	134	147	160	174	<b>144</b>
	At 50 ft AGL	262	289	315	341	<b>284</b>

**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%**

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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)

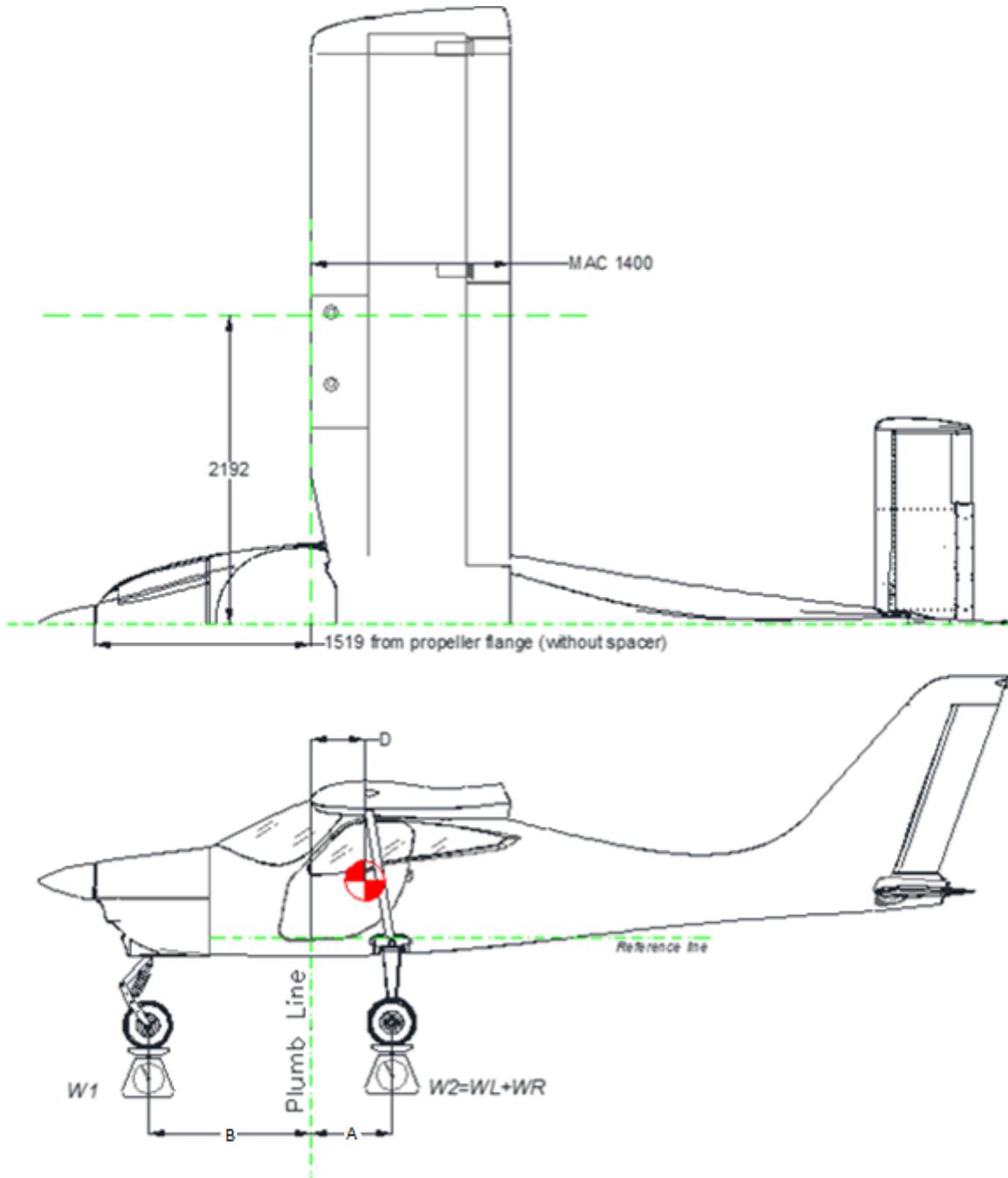
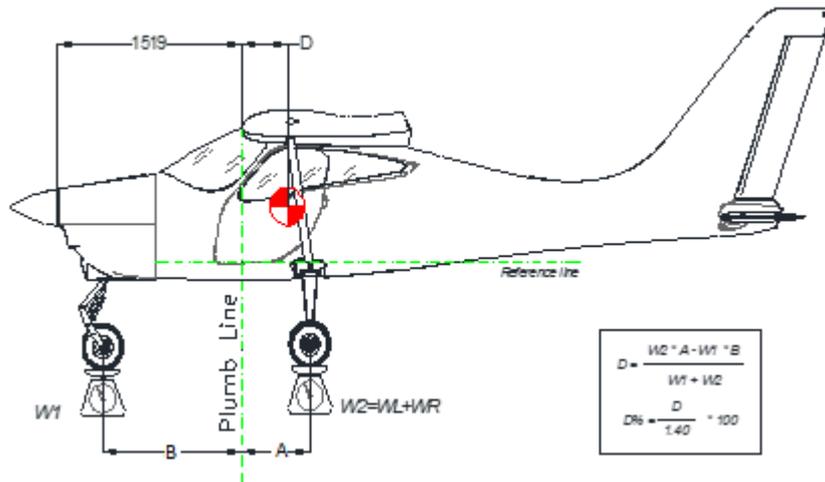


Fig.6-1-P92 Echo MkII

### 3 WEIGHING REPORT (I)

Model **P92Echo MKII**/N: \_\_\_\_\_ Weighing no. \_\_\_\_\_ Date: \_\_\_\_\_

Datum: Propeller support flange without spacer.



	<i>Kg</i>		<i>meters</i>
Nose wheel weight	$W_1 =$	Plumb bob distance <sup>(1)</sup> LH wheel	$A_L =$
LH wheel weight	$W_L =$	Plumb bob distance <sup>(1)</sup> RH wheel	$A_R =$
RH wheel weight	$W_R =$	Average distance $(A_L + A_R)/2$	$A =$
$W_2 = W_L + W_R =$		Bob distance from nose wheel <sup>(1)</sup>	$B =$

Empty weight  $W_e = W_1 + W_2 =$

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

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

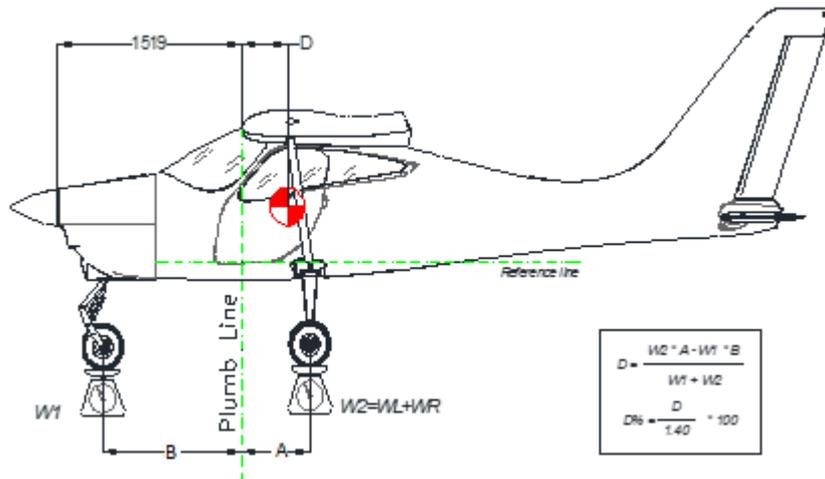
Maximum takeoff weight	$W_T =$	Kg
Empty weight	$W_e =$	Kg
Maximum payload $W_T - W_e$	$W_u =$	Kg

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

### 4 WEIGHING REPORT (II)

Model **P92Echo MKII**/N: \_\_\_\_\_ Weighing no. \_\_\_\_\_ Date: \_\_\_\_\_

Datum: Propeller support flange without spacer.



	Kg		meters
Nose wheel weight	$W_1 =$	Plumb bob distance <sup>(1)</sup> LH wheel	$A_L =$
LH wheel weight	$W_L =$	Plumb bob distance <sup>(1)</sup> RH wheel	$A_R =$
RH wheel weight	$W_R =$	Average distance $(A_L + A_R)/2$	$A =$
$W_2 = W_L + W_R =$		Bob distance from nose wheel <sup>(1)</sup>	$B =$

Empty weight  $W_e = W_1 + W_2 =$

$D = \frac{W_2 \cdot A - W_1 \cdot B}{W_e} = m$	$D\% = \frac{D}{1.40} \cdot 100 =$
---	------------------------------------

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

Maximum takeoff weight	$W_T =$	Kg
Empty weight	$W_e =$	Kg
Maximum payload $W_T - W_e$	$W_u =$	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]
<b>Empty weight</b>			
<b>LOADING</b>			
Pilot		1.948	
Co-pilot		1.948	
Baggage		2.320	
<i>Usable fuel</i> Fuel (liters)* $\rho_{fuel}$ (0.72) [kg]		1.774	
<b>TAKE-OFF CONDITION</b>			
<i>Take-off condition</i> $W_{TO} = \sum W$		$M_{TO} = \sum M$	
<b>LANDING CONDITION</b>			
<i>Fuel required</i> Fuel (liters)* $\rho_{fuel}$ (0.72) [kg]		1.774	
<i>Landing condition</i> $W_L = W_{TO} - W_{fuel\_req}$		$M_L = M_{TO} - M_{fuel\_req}$	

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

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

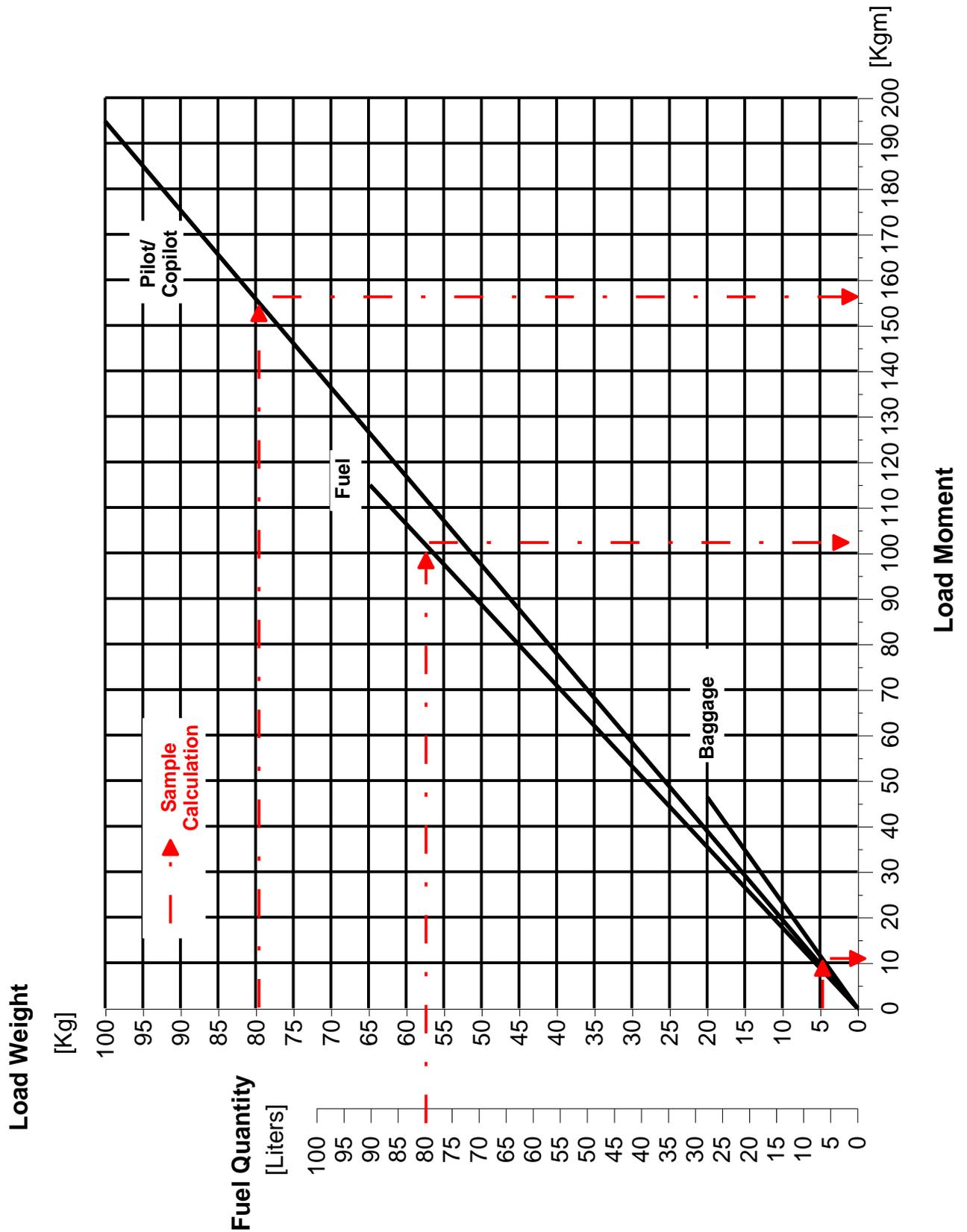


Fig.6.2 LOADING DIAGRAM



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

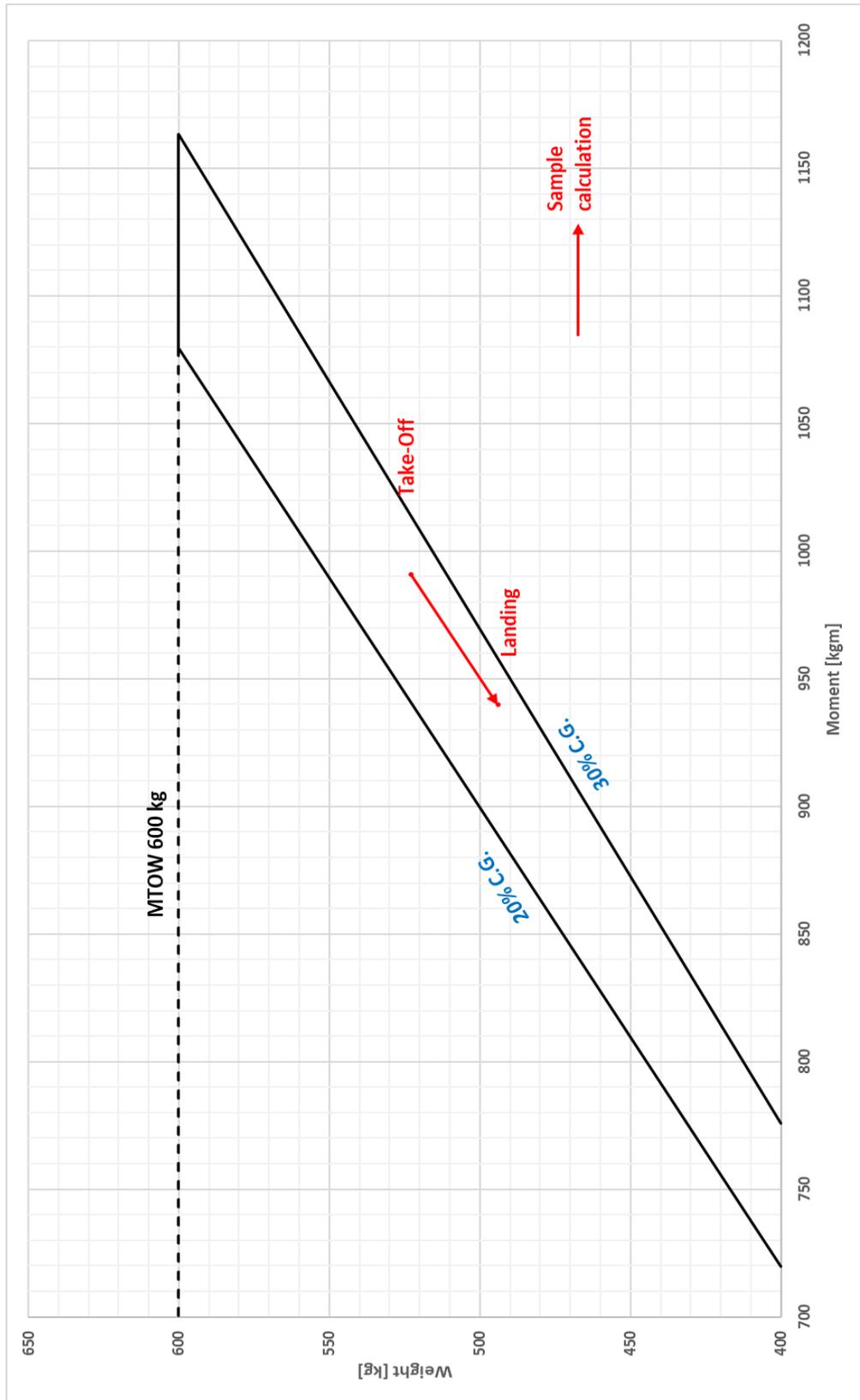


Fig.6.3 WEIGHT-MOMENT ENVELOP

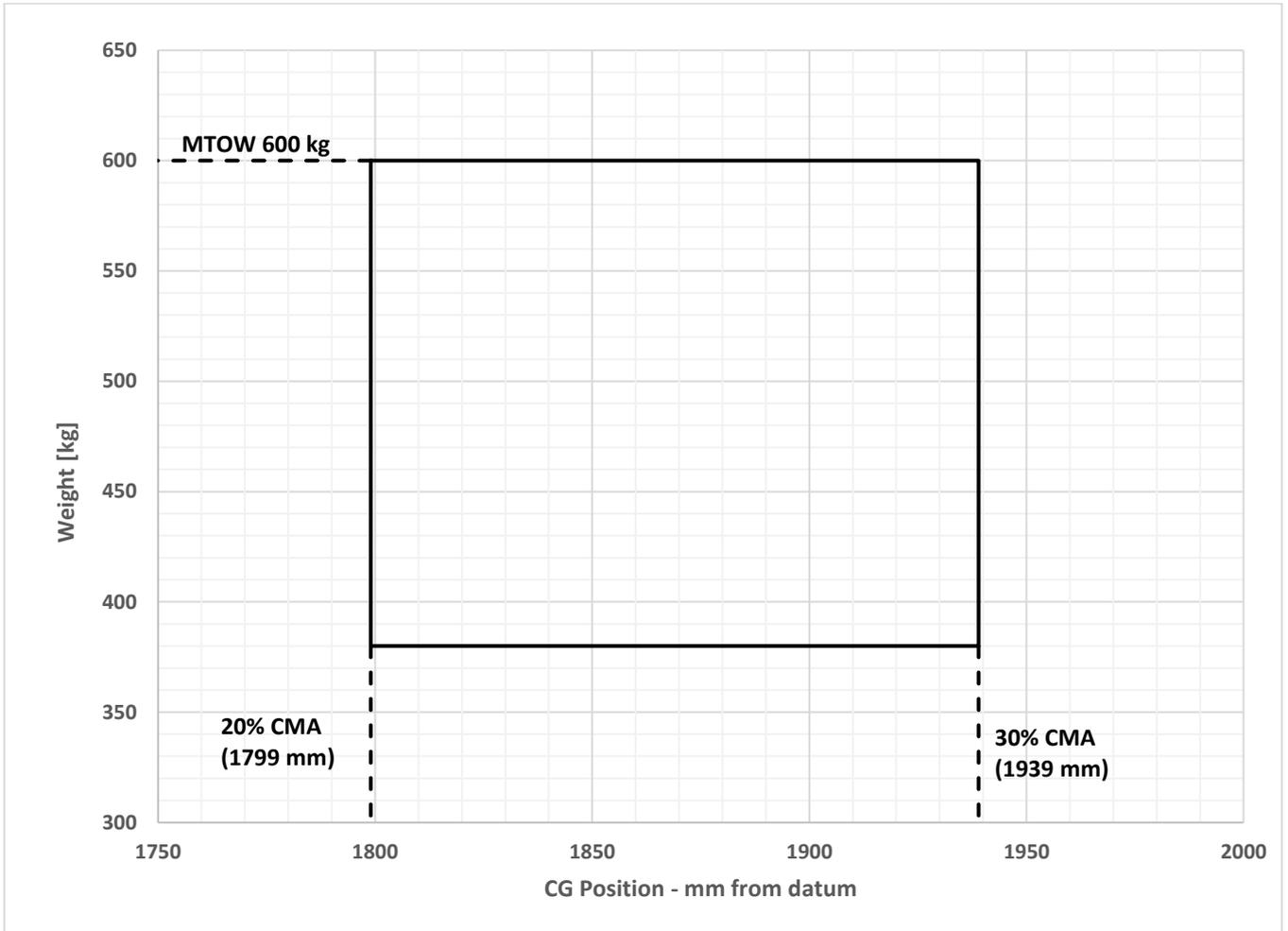


Fig 6.4 C.G. RANGE CHART



## 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:	DATE:		
RIF.	DESCRIPTION & P/N	INST	WEIGHT [kg]	ARM [m]	
<b>ENGINE &amp; ACCESSORIES</b>					
A1	Engine Rotax 912 iS	*	66.0	0.499	
A2	Prop. Sensenich Wood – p/n W68T2ET-70J	*	6.0	-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		0.10	0.889	
A10	Thermostatic water valve p/n 26-9-9100-000		0.35	0.329	
A11	Thermostatic oil valve p/n 26-9-9000-000		0.20	0.379	
A12	Prop. E-Props Carbon – p/n DUR-2-170-C8-T	*	2.1	-0.051	
<b>LANDING GEAR AND ACCESSORIES</b>					
B1	Main gear spring-leafs - p/n 28-8-710-1	*	5.700	2.119	
B2	Main gear wheel rims. - Matco P/N WHLW151L30MM 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	
<b>ELECTRICAL SYSTEM</b>					
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		0.15	6.069	
C7	Navigation lights - DAYLIFE A06-2001-01326		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		0.50	1.559	
	Landing light – FLYWAT P36G3L p/n 01-0772102-10		0.50	1.559	
C10	Aveo NAV/POS/Strobe AVE-WPST G/R-20D		0.20	1.579	



EQUIPMENT LIST		S/N:	DATE:		
RIF.	DESCRIPTION & P/N	INST	WEIGHT [kg]	ARM [m]	
<i>AVIONICS AND OTHER</i>					
E1	VHF COMM GTR 225A		0.870	1.532	
E2	ELT Kannad 406 AF		1.180	2.922	
E3	Audio Panel GMA 245		0.440	1.532	
E4	LH Display Garmin GDU 460		2.150	1.532	
E5	RH Display Garmin GDU 460		2.150	1.532	
E6	ADAHRS Garmin GSU 25C		0.217	1.532	
E7	Engine Interface Garmin GEA 24		0.322	1.532	
E8	Magnetometer Garmin GMU 22		0.158	1.532	
E9	Transponder GTX 35R		0.900	1.532	
E10	Temperature Probe GTP 59		0.363	1.829	
E11	Emergency Hammer – Cora 000120628		0.350	2.922	
E12	Magnetic compass – Falcon MCDN-2L		0.276	1.532	
E13	RPM Indicator - I.C.P. VDO PN 031449		0.350	1.532	
E14	Audio Panel – Flight Com 403MC		1.200	1.532	
E15	CT Indicator – Sorlini SOR59		0.300	1.532	
E16	Voltmeter Indicator – Sorlini SOR 51		0.300	1.532	
E17	Oil Temp Indicator – Sorlini SOR 54		0.300	1.532	
E18	Vertical Speed Indicator – Mikrotechna UL30-42.2		1.00	1.532	
E19	Fuel Pressure Indicator – Sorlini SOR50/v		0.100	1.532	
	Fuel Pressure Indicator – SKYDRIVE P/N FP-912/12		0.100	1.532	
E20	COMM – ICOM IC-A220		1.00	1.532	
E21	COMM Antenna – Commant Industries CI292-2		0.200	1.532	
E22	Parachute – BRS-6 1050	*	13.00	3.019	
E23	Speed Com Amperometer – P/N 00203		0.150	1.532	
E24	Trasponder GTX 335		1.27	1.532	
E25	Trasponder GTX 45R or 35R		1.27	1.532	
E26	Trasponder TRIG TT21		0.50	1.532	
E27	COMM TRIG TY91		1.57	1.532	
E28	COMM GNC 255A		0.50	1.532	
E29	Altitude encoder ACK Technologies A30		0.144	1.532	
E30	Magnetometer Garmin GMU 11		0.100	1.532	
E31	NAV – Garmin AERA660		0.245	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.

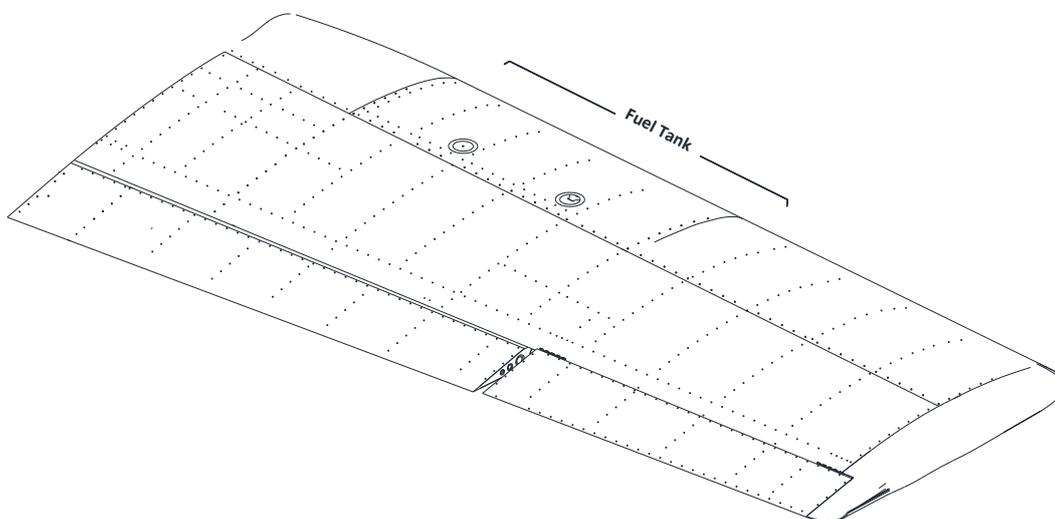


Fig. 7-1. RIGHT WING EXPLODED VIEW

### 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.

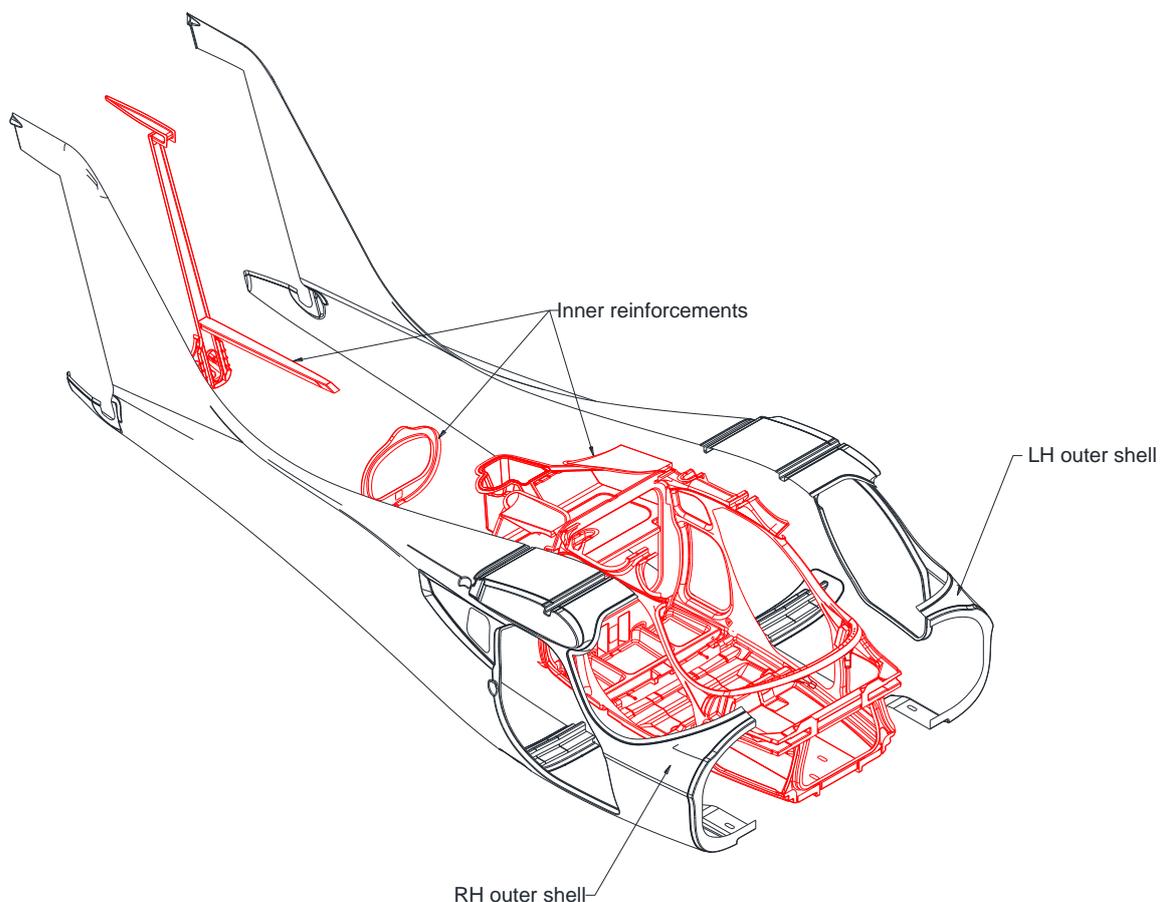


Fig. 7-2.P92 Echo MkII fuselage

### 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.

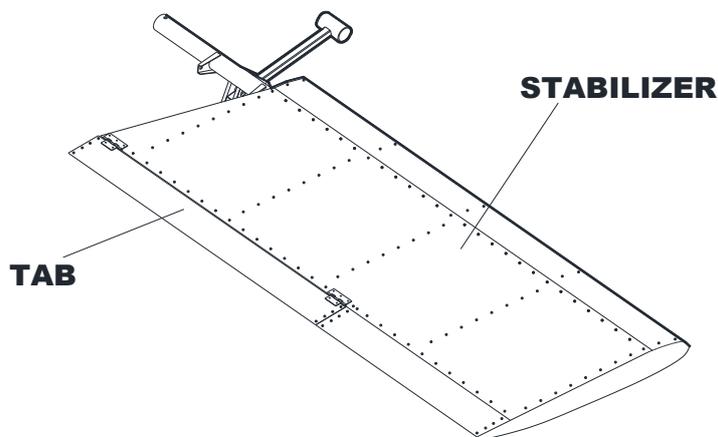


Fig. 7-3. P92 Echo MkII stabilator and tab

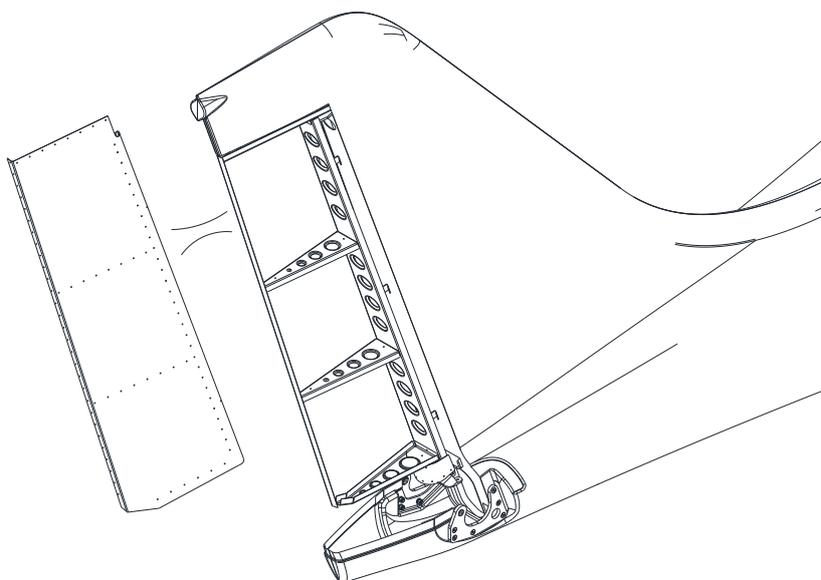


Fig. 7-4. P92 Echo MkII vertical tail and fin

### 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.

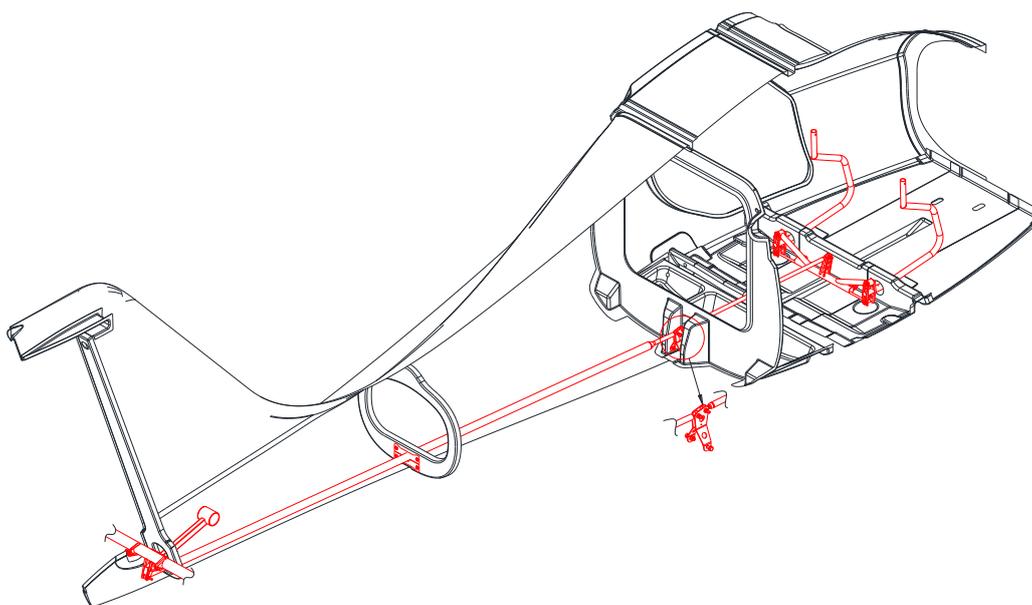


Fig. 7-4. P92 Echo MkII stabilator control line system

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

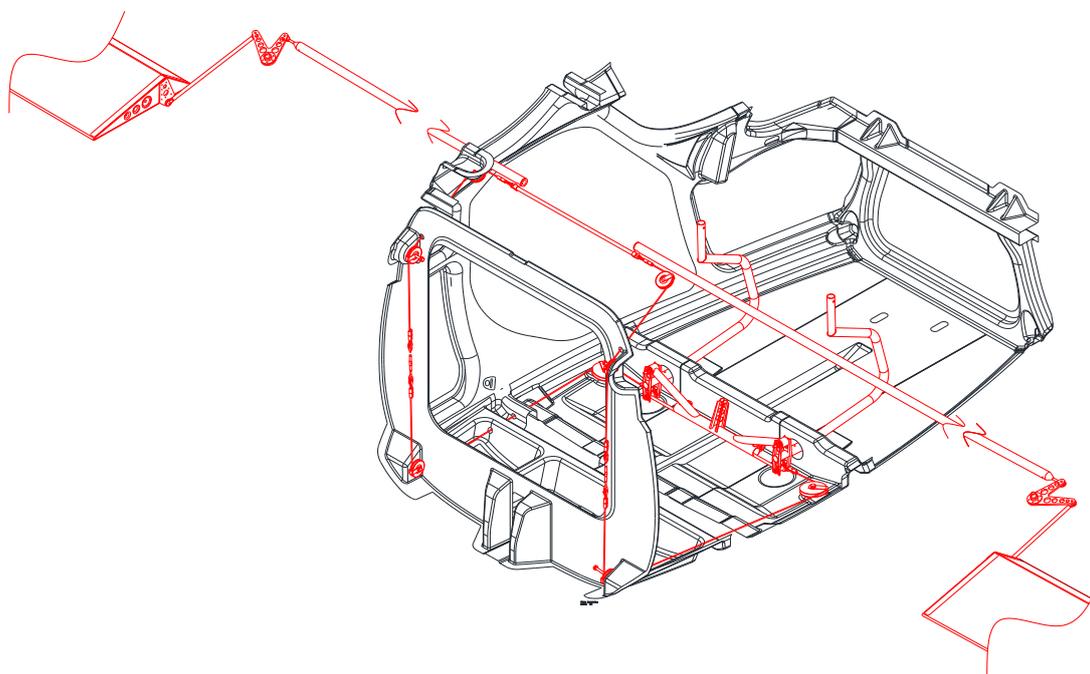


Fig. 7-5. P92 Echo MkII aileron control line

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

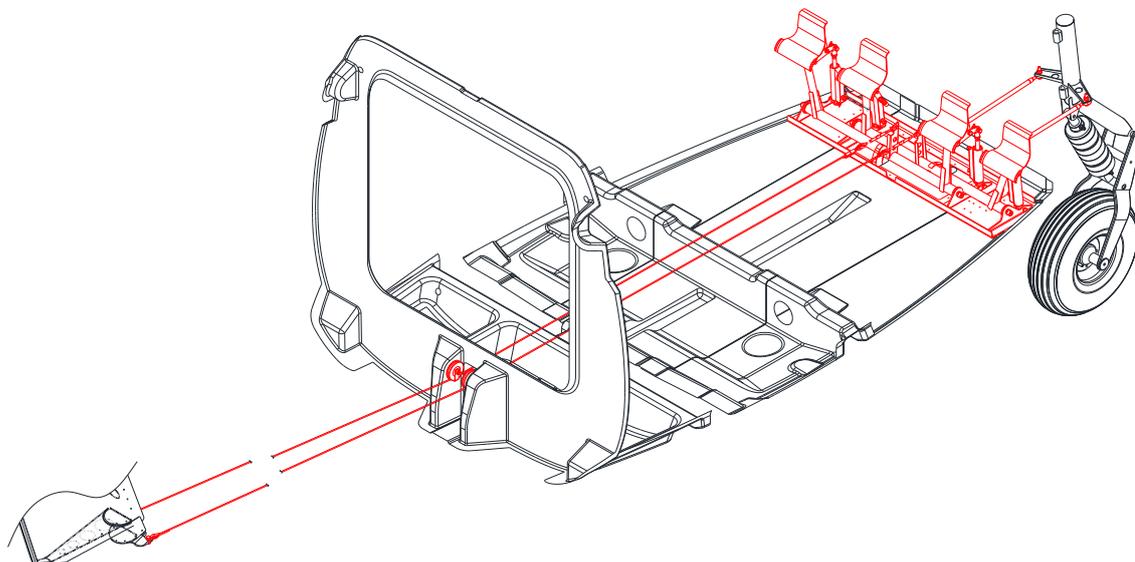


Fig. 7-6. P92 Echo MkII rudder control line

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. The electric trim system is activated/disconnected by means of a dedicated switch (if installed) on the upper side of instrument panel. In the following figure, the pitch trim tab actuation is shown.

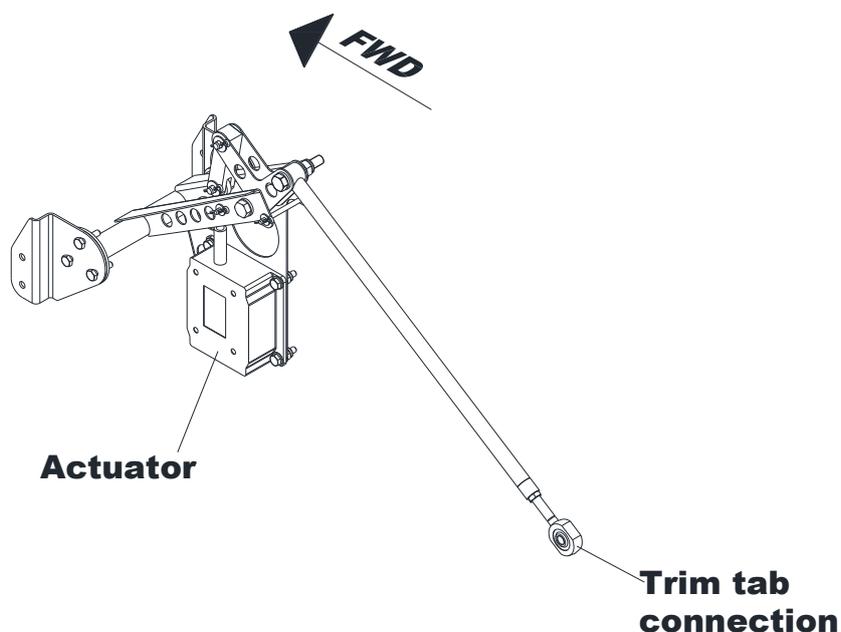


Fig. 7-7. P92 Echo MkII trim tab control line

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.

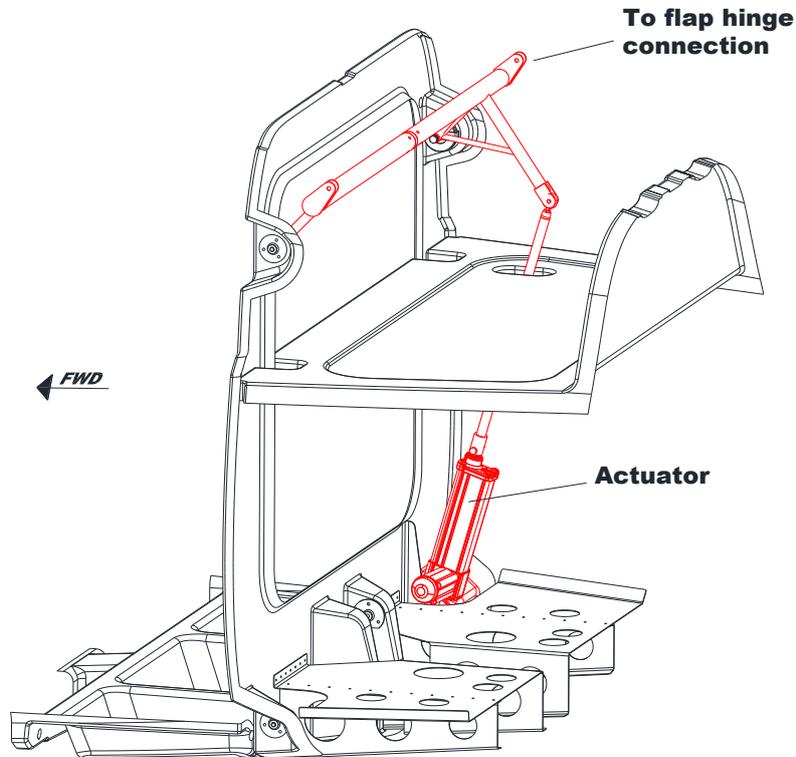


Fig. 7-8. P92 Echo MkII flap control system

## 4. LANDING GEAR

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

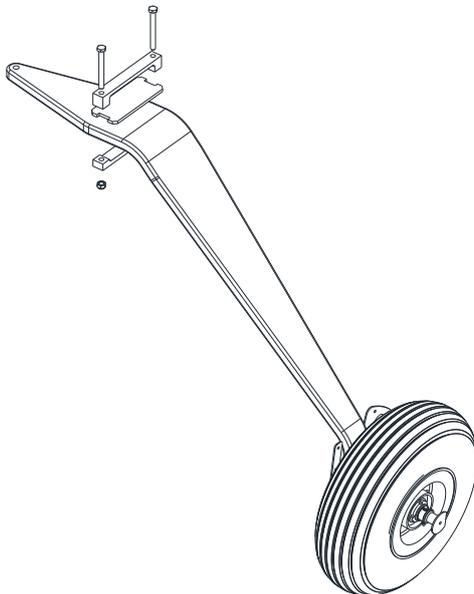


Fig. 7-9. P92 Echo MkII Main Landing Gear

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

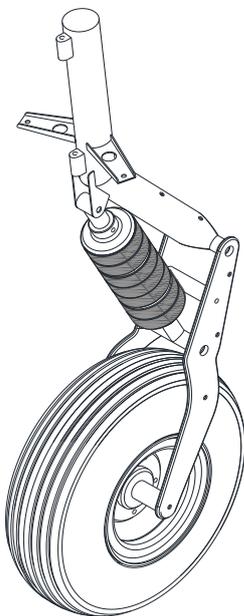


Fig. 7-10. P92 Echo MkII Nose Landing Gear

## 5. WHEEL AND BRAKES

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.

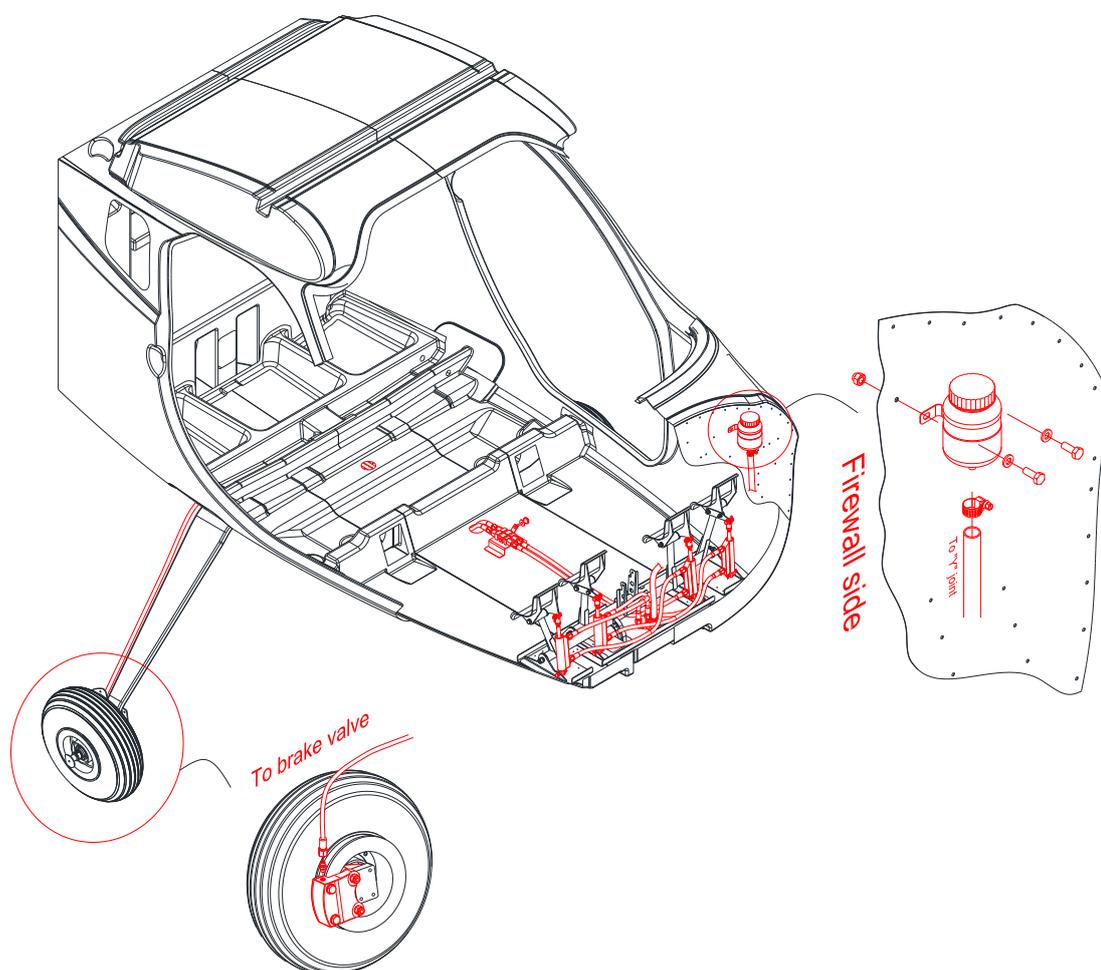


Fig. 7-11. P92 Echo MkII Brake System

**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.

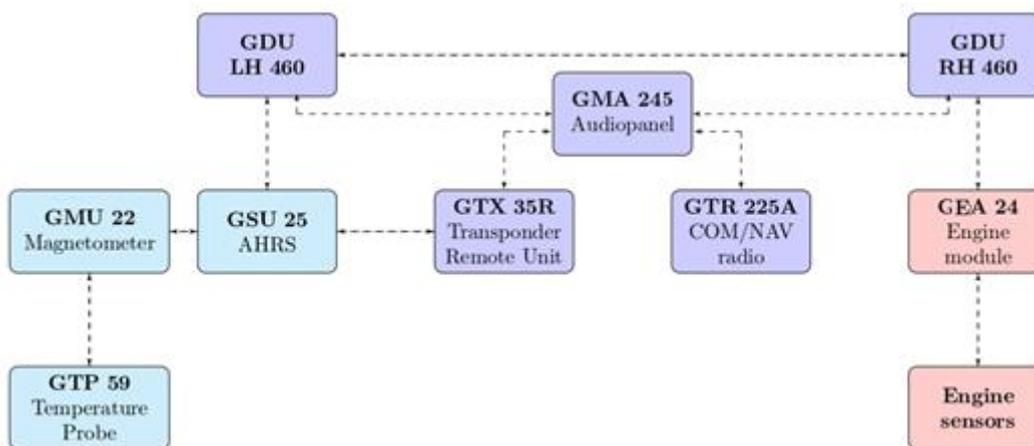


Fig. 7-12. Avionic Scheme

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, alternative layout are possible:



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

## 7. POWERPLANT

### 7.1. ENGINE

P92 Echo MkII is equipped with a Rotax 912 iS Sport 100 horse powered engine.



Fig. 7-14. Rotax 912 iS Sport 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;
- Fully redundant electronic engine management system (EMS) for controlling fuel injection, ignition.
- Electrical fuel pumps;
- Electric starter 12 V 0.8 kW;
- 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.

In alternative, P92 Echo MkII could be equipped with an E-Props Carbon propeller with Titanium leading edge. The model is DUR-2-170-C8-T and is made of two blades, with fixed pitch ground adjustable. The diameter is 1700mm.

### 7.3 FUEL SYSTEM

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 fuel flows from the tanks via a water separator/coarse filter to the electric fuel pumps (1) (connected in series) from where it is pumped thru the fine filter to the fuel rails (2, 4), the fuel injectors (3) and to the fuel pressure regulator (5). The Main fuel pump is activated through the Master Key, the AUX is activated directly through the switch OFF/ON. During take off and landing both pumps (main and aux. ) must be ON. A fuel pressure regulator ensures that the pressure differential between the fuel injectors and the intake manifold remains constant. This enables the fuel injection system to inject the same quantity of fuel at any point given the same injection period.

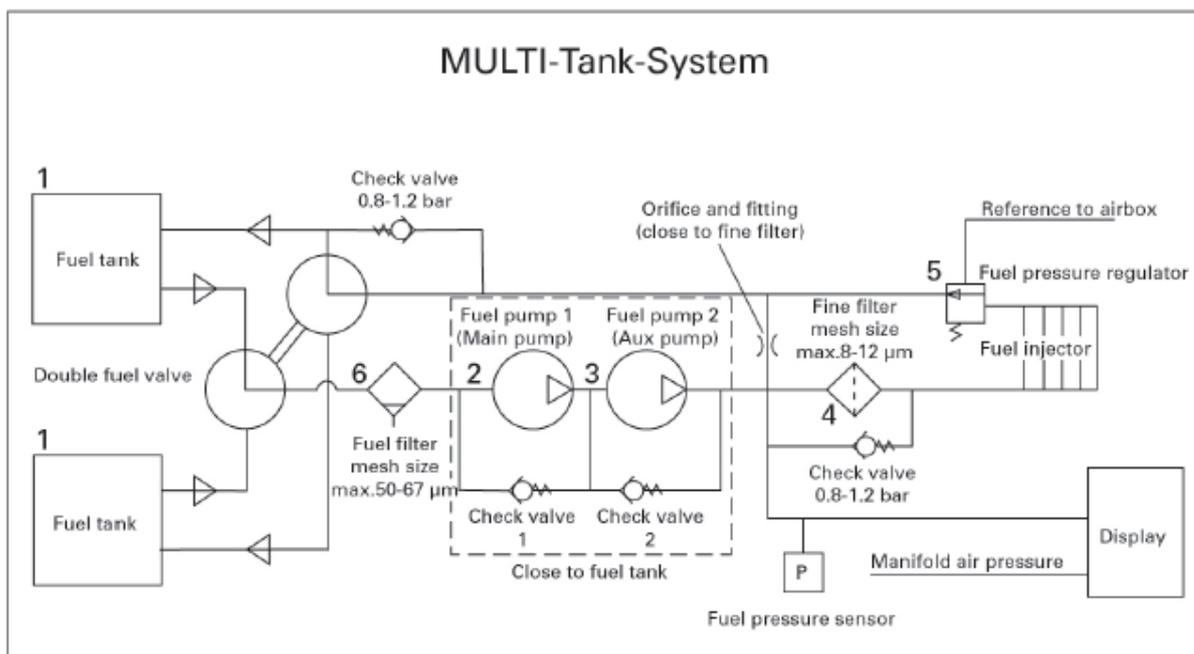


Fig. 7-15. Fuel System

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.



*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.

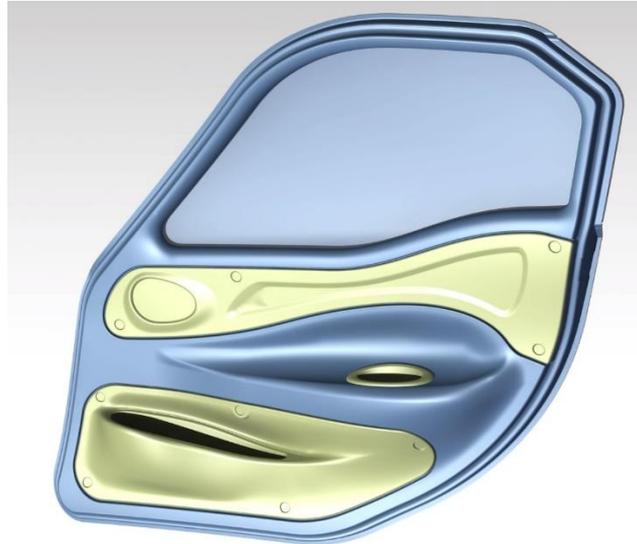


Fig. 7-16. P92 Echo MkII Door

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.

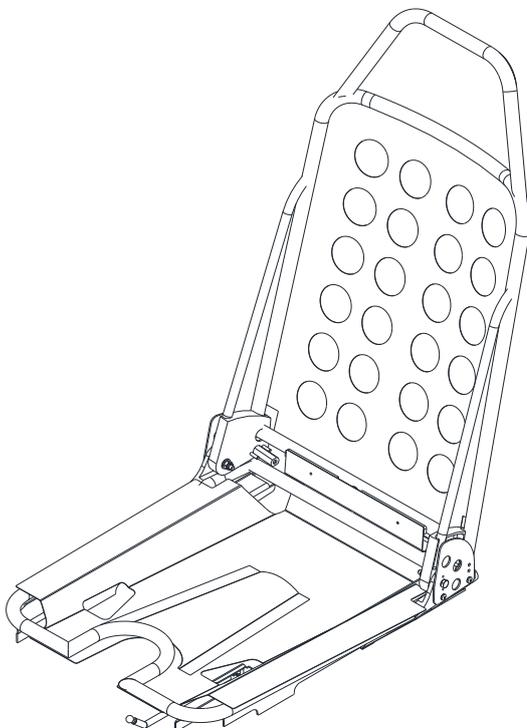


Fig. 7-17. P92 Echo MkII Seat Structure

## 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.

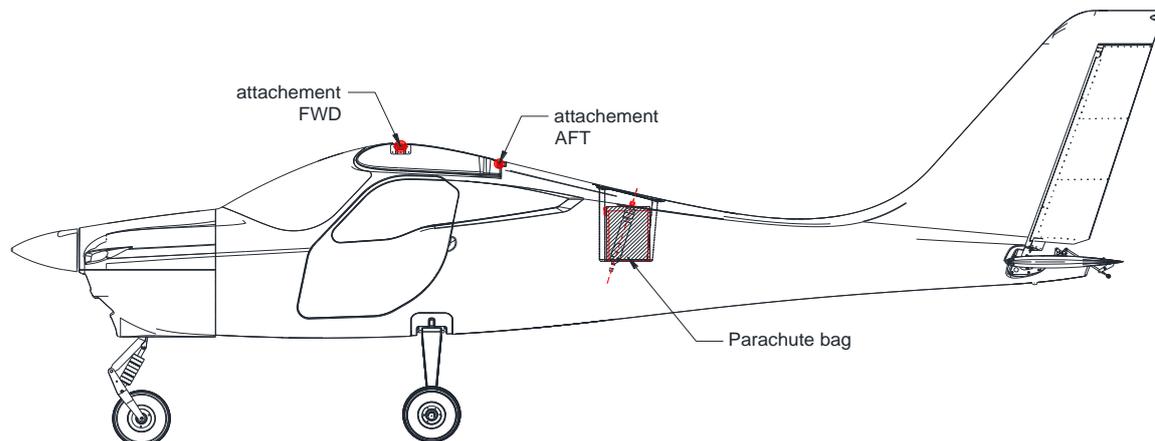


Fig. 7-16. P92 Echo MkII Rescue system

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## **SEZIONE 8 – AIRCRAFT CARE AND MAINTENANCE**

### **INDEX**

<b>1. Introduction .....</b>	<b>2</b>
<b>2. Aircraft Inspection Intervals.....</b>	<b>3</b>
<b>3. Aircraft Changes or Repairs.....</b>	<b>4</b>
<b>4. Ground Handling .....</b>	<b>5</b>
<b>4.1. Towing .....</b>	<b>5</b>
<b>4.2. Parking and Tie-Down .....</b>	<b>5</b>
<b>4.3. Jacking .....</b>	<b>5</b>
<b>4.4. Leveling .....</b>	<b>5</b>
<b>4.5. Road Transport.....</b>	<b>5</b>
<b>5. Cleaning And Care .....</b>	<b>6</b>

## **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**

### **INDEX**

<b>1. Introduction .....</b>	<b>2</b>
<b>2. Supplements List.....</b>	<b>3</b>

## **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	
Sup. N	Title	Rev. N	Date	APPLICABLE	
				YES	NO
S01	Alternative Units for Speed	1	15/04/24	<input type="checkbox"/>	<input type="checkbox"/>



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**SUPPLEMENT N° S01****AFMS FOR  
Alternative Units for Speed****RECORD OF REVISIONS**

Rev	Revised page	Description of Revision
0	All	First issue
1	1-1; 5-6	Optimization

**LIST OF EFFECTIVE PAGES**

Section	Pages	Revision
<b>Cover Pages</b>	All	Rev 1
<b>Section S1</b>	All	Rev 0
<b>Section S2</b>	All	Rev 0
<b>Section S3</b>	All	Rev 0
<b>Section S4</b>	All	Rev 0
<b>Section S5</b>	1 thru 5, 7 thru 16	Rev 0
	6	Rev. 1
<b>Section S6</b>	All	Rev 0
<b>Section S7</b>	All	Rev 0
<b>Section S8</b>	All	Rev 0

## **INTRODUCTION**

The information contained herein supplements or supersedes the basic Aircraft Flight Manual: detailed instructions are provided to allow the owner for replacing the AFM pages containing information amended per considering speeds in km/h.

**IT IS THE OWNER'S RESPONSIBILITY TO REPLACE THE MENTIONED PAGES IN ACCORDANCE WITH THE INSTRUCTIONS HEREIN ADDRESSED SECTION BY SECTION.**

**Supplement S01: pages replacement instructions**

## **SECTION 1 – GENERAL**

Refer to the basic AFM, Section 1 – General

**Supplement S01: pages replacement instructions**

**SECTION 2 – LIMITATIONS**

**Make sure you first applied instructions reported on the basic  
AFM, Section 2 Limitations**

According A/C configuration apply following pages replacement:

<b>Supplement S01 LIMITATIONS Page</b>		<b>AFM Section 2 Page</b>
S2-3	<b>REPLACES</b>	2-3
S2-4	<b>REPLACES</b>	2-4
S2-14	<b>REPLACES</b>	2-14

## 2. SPEED LIMITATIONS

The following table addresses the airspeed limitations and their operational significance:

SPEED		IAS [km/h]	CAS [km/h]	REMARKS
V <sub>NE</sub>	Never exceed speed	268	255	Do not exceed this speed in any operation.
V <sub>RA</sub>	Maximum speed for rough air	209	202	Do not exceed this speed except in smooth air, and only with caution.
V <sub>A</sub>	Design Manoeuvring speed	181	176	Do not make full or abrupt control movement above this speed, because under certain conditions the aircraft may be overstressed by full control movement.
V <sub>FE</sub>	Maximum flaps extended speed	130	130	Do not exceed this speed with flaps extended.

### 3. AIRSPEED INDICATOR MARKINGS

Airspeed indicator markings and their colour code are explained in the following table :

MARKING	IAS [km/h]	EXPLANATION
White arc	76 – 130	Positive Flap Operating Range (lower limit is $1.1V_{SO}$ , at specified maximum weight and upper limit is the maximum speed permissible with landing flaps extension).
Green arc	94 – 209	Normal Operating Range (lower limit is $1.1V_{S1}$ at specified maximum weight and most forward c.g. with flaps retracted and upper limit is maximum speed for rough air $V_{RA}$ ).
Yellow arc	209 – 268	Manoeuvres must be conducted with caution and only in smooth air.
Red line	268	Maximum speed for all operations.
Blue Flag	181	Design Manoeuvring speed

## **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 (28 km/h)*.

## **20. RESCUE SYSTEM DEPLOYMENT**

Maximum airspeed for rescue system deployment is 268 km/h IAS.

**Supplement S01: pages replacement instructions**

**SECTION 3 – EMERGENCY PROCEDURES**

**Make sure you first applied instructions reported on the basic AFM, Section 3 Emergency Procedures**

According A/C configuration apply following pages replacement:

<b>Supplement S01 EMERGENCY PROCEDURES Page</b>		<b>AFM Section 3 page</b>
S3-7	<b>REPLACES</b>	3-7
S3-14	<b>REPLACES</b>	3-14
S3-18	<b>REPLACES</b>	3-18

## 4. ENGINE FAILURE

### 4.1. ENGINE FAILURE DURING TAKE-OFF RUN

- |              |                             |
|--------------|-----------------------------|
| 1. Throttle: | <b>IDLE</b>                 |
| 2. Rudder    | <b>Keep heading control</b> |
| 3. Brakes:   | <b>apply as needed</b>      |

*When safely stopped:*

- |                         |            |
|-------------------------|------------|
| 4. Lane A & B:          | <b>OFF</b> |
| 5. Fuel selector valve: | <b>OFF</b> |
| 6. Fuel pump switch:    | <b>OFF</b> |
| 7. Master Key:          | <b>OFF</b> |

### 4.2. ENGINE FAILURE IMMEDIATELY AFTER TAKE-OFF

- |  |                                 |
|--|---------------------------------|
| 1. Speed:                                | <b>keep minimum 93 km/h IAS</b> |
| 2. Find a suitable place to land safely. |                                 |



*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: | <b>as needed</b> |
|-----------|------------------|



*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:            | <b>IDLE</b> |
| 5. Lane A & B:          | <b>OFF</b>  |
| 6. Fuel selector valve: | <b>OFF</b>  |
| 7. Fuel pump switch:    | <b>OFF</b>  |
| 8. Master Key:          | <b>OFF</b>  |



*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.*

## 7. LANDING EMERGENCY

### 7.1 FORCED LANDING WITHOUT ENGINE POWER

1. Flap: UP
2. Airspeed: 120 km/h IAS
3. Find a suitable place to land safely, plan to approach it upwind.
4. Fuel selector valve: OFF
5. Fuel pump switch : OFF
6. Lane A & B: OFF
7. Safety belts: Tighten

*When certain to land*

8. Flaps: *as necessary*
9. Master Key: OFF

#### NOTE

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

### 7.2 POWER-ON FORCED LANDING

1. Airspeed: 120 km/h IAS
2. Flaps: UP
3. Locate the most suitable terrain for emergency landing, plan to approach it upwind.
4. Safety belts: Tighten
5. Door locks: CHECK LOCKED

*When certain to land, right before touch down*

6. Flaps: *as necessary*
7. Fuel selector valve: OFF
8. Fuel pump switch: OFF
9. Lane A & B: OFF
10. Master Key: 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)

## 10. RESCUE SYSTEM DEPLOYMENT

Rescue system should be deployed in the event of a life-threatening 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. <b>Airspeed</b> | <b>MINUM POSSIBLE</b><br>(max speed 268 km/h IAS) |
|--------------------|---|

- |   |  |
|---|--|
| 2. <b>Pull activation handle firmly and to end-travel</b> |  |
|---|--|

*After deployment*

- |                                     |                |
|-------------------------------------|----------------|
| 3. <b>Fuel selector:</b>            | <b>OFF</b>     |
| 4. <b>Lane A &amp; B:</b>           | <b>OFF</b>     |
| 5. <b>Master Key:</b>               | <b>OFF</b>     |
| 6. <b>Seat Belts and Harnesses:</b> | <b>TIGHTEN</b> |

*Before impact*

- |  |  |
|--|--|
| 7. <b>Assume emergency landing body position</b> |  |
|--|--|

*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. <b>After the airplane comes to a complete stop, evacuate quickly and move upwind</b> |  |
|---|--|

**Supplement S01: pages replacement instructions**

**SECTION 4 – NORMAL PROCEDURES**

**Make sure you first applied instructions reported on the basic AFM, Section 4 Normal Procedures**

According A/C configuration apply following pages replacement:

<b>Supplement S01 NORMAL PROCEDURES Page</b>		<b>AFM Section 3 page</b>
S4-2	<b>REPLACES</b>	Page 4-2
S4-9	<b>REPLACES</b>	Page 4-9
S4-10	<b>REPLACES</b>	Page 4-10

## 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.

	MTOW	
	FLAPS	IAS [km/h]
Rotation Speed (in take-off, $V_R$ )	T/O	83
Best Angle-of-Climb Speed ( $V_X$ )	0°	115
Best Rate-of-Climb speed ( $V_Y$ )	0°	120
Approach speed	T/O	100
Final Approach Speed	FULL	93
Manoeuvring speed ( $V_A$ )	0°	181
Never Exceed Speed ( $V_{NE}$ )	0°	268
Glide Speed ( $V_{GLIDE}$ )	0°	120

**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. Brakes ..... APPLY
2. Throttle Lever ..... SET FULL and CHECK appr. 5100 RPM
3. Engine parameters..... CHECK
4. Rotation speed  $V_R$ :

	<b>MTOW</b> <b>600kg</b>
<i>Rotation Speed (<math>V_R</math>)</i>	<i>83 km/h IAS</i>

*At safe altitude:*

5. Flaps: retract (above flap retraction speed 93 km/h IAS)

	<b>MTOW</b> <b>600kg</b>
<i>Best of Rate Climb Speed (<math>V_Y</math>)</i>	<i>120 km/h IAS</i>

6. Auxiliary fuel pump..... OFF
7. Fuel pressure.....CHECK green arc
8. Throttle Lever.....SET to 5500 RPM or below
9. Landing light .....OFF

*Takeoffs into crosswinds are 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.*

**NOTE**

**4.7. CRUISE**

1. Throttle Lever.....SET to 5500 RPM or below
2. Engine Instrument.....CHECK within limits

*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.*

**NOTE**

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

**4.8. BEFORE LANDING**

1. Fuel pump Switch..... ON
2. Fuel selector ..... SELECT the fullest tank
3. Landing Light (if applicable): ....ON
4. On downwind, leg abeam touch down point:  
*Flaps.....set T/O*

	<b>MTOW</b> <b>600kg</b>
<i>Approach Speed</i>	<i>100 km/h IAS</i>

5. On final leg:  
*Flaps.....set Land*

	<b>MTOW</b> <b>600kg</b>
<i>Final Approach Speed</i>	<i>93 km/h IAS</i>

6. Optimal touchdown speed: *80 km/h IAS*



**Supplement S01: pages replacement instructions**

**SECTION 5 – PERFORMANCES**

**Supplement S01 – Performances pages replace basic AFM Section 5 as whole**

## **Section 5 - PERFORMANCES**

### **INDEX**

<b>1. Introduction .....</b>	<b>2</b>
<b>2. Use of performances charts .....</b>	<b>3</b>
<b>3. Airspeed indicator system calibration .....</b>	<b>4</b>
<b>4. ICAO Standard Atmosphere .....</b>	<b>5</b>
<b>5. Stall speed .....</b>	<b>6</b>
<b>6. Crosswind .....</b>	<b>7</b>
<b>7. Take-off performance .....</b>	<b>8</b>
<b>8. Rate of Climb .....</b>	<b>11</b>
<b>9. Cruise performance .....</b>	<b>12</b>
<b>10. Landing performance .....</b>	<b>13</b>

## 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

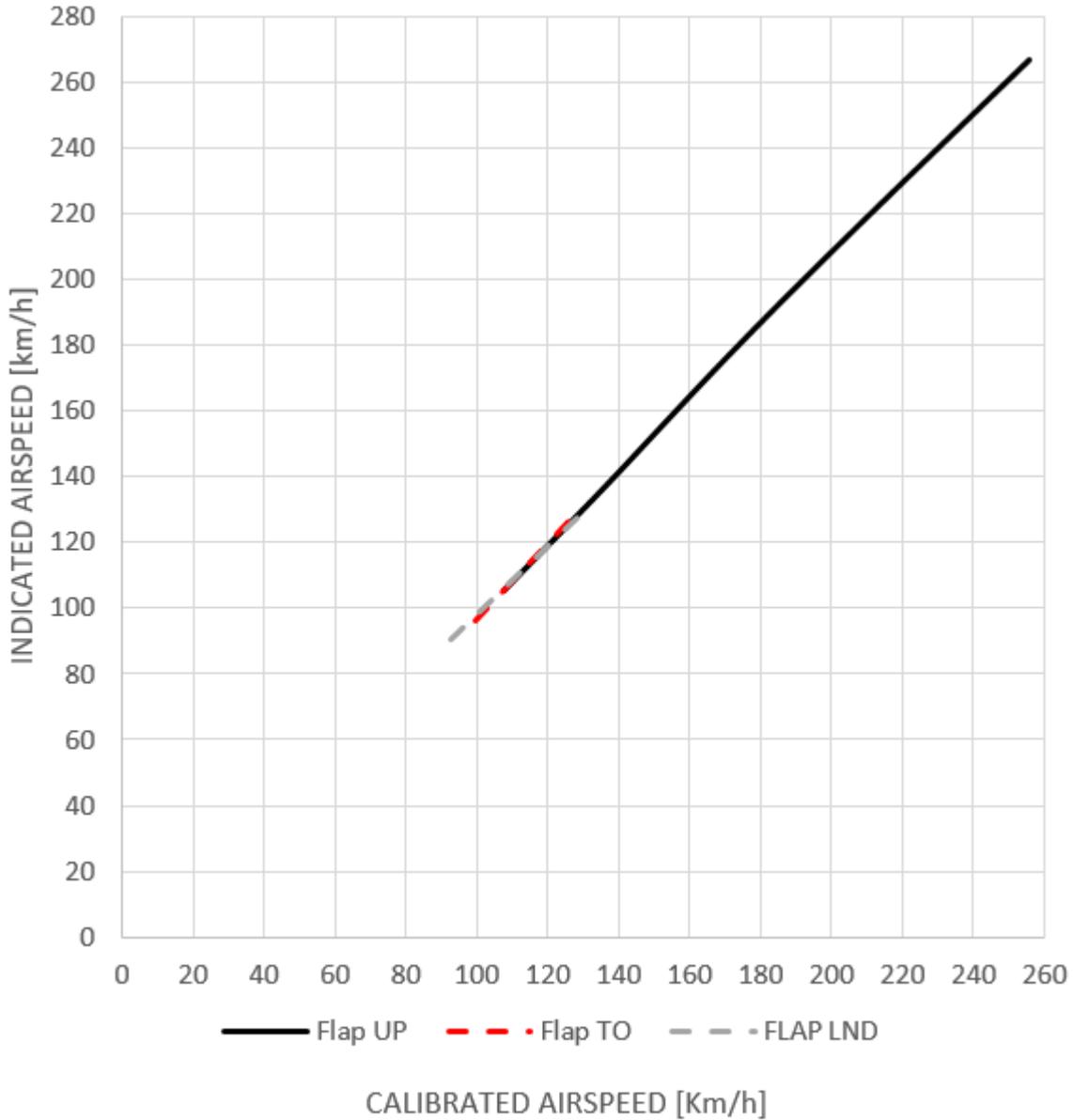
## **2. USE OF PERFORMANCES CHARTS**

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

CAS 139 km/h

IAS 141 km/h

**NOTE**

Indicated airspeed assumes 0 as an instrument error

### 4. ICAO STANDARD ATMOSPHERE

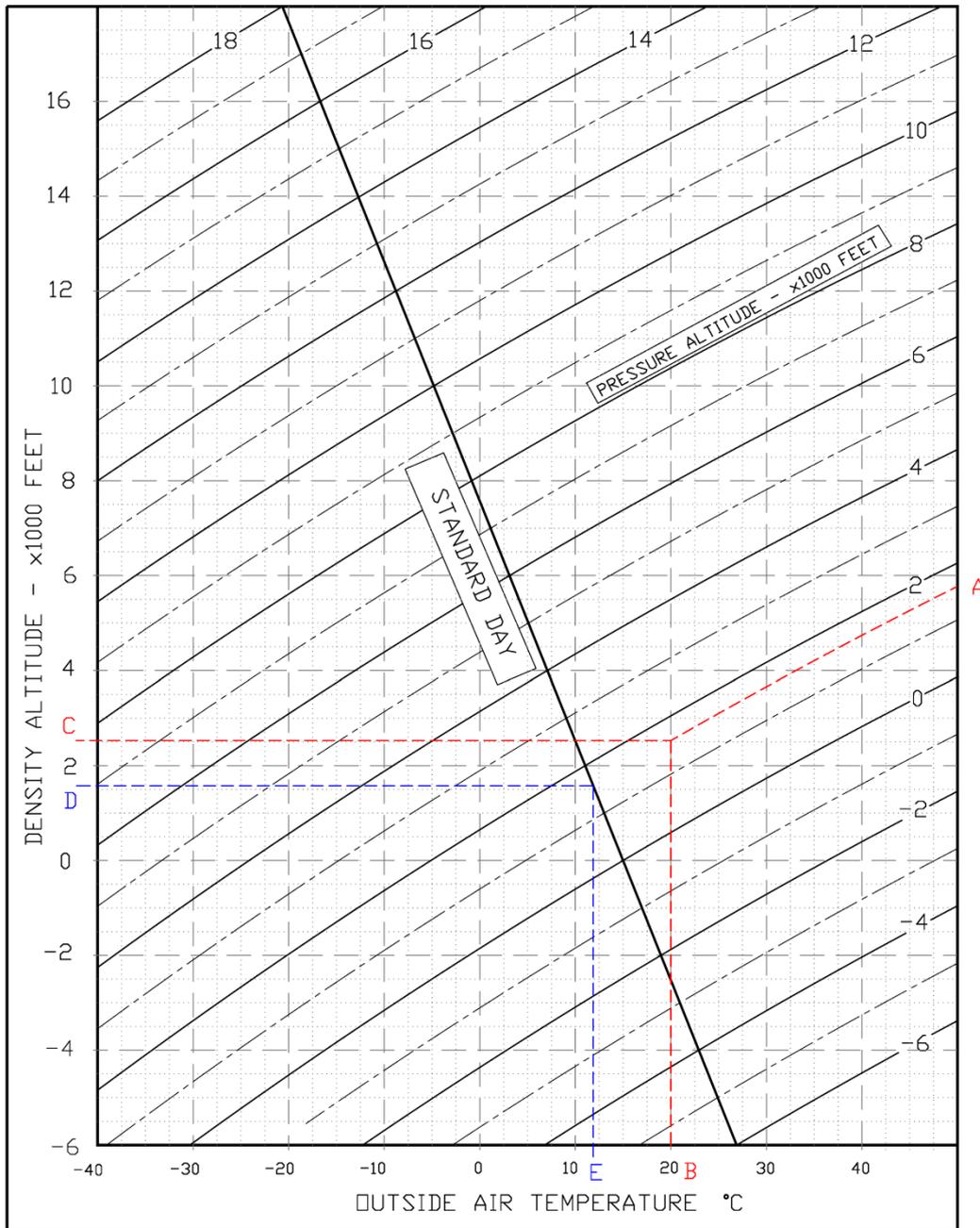


FIG. 5-2. ICAO CHART

Examples:

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

## 5. STALL SPEED

Weight: 600 kg		CG: Most Forward (20%)				
Throttle Levers: IDLE		No ground effect				
BANK ANGLE	STALL SPEED [km/h]					
	FLAPS 0°		FLAPS T/O		FLAPS FULL	
[deg]	IAS	CAS	IAS	CAS	IAS	CAS
0	83	87	74	80	68	72
15	85	89	76	81	70	74
30	91	93	80	85	74	78
45	102	104	91	94	83	85
60	124	124	111	113	100	102

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

**NOTE**

*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 (28 km/h)

⇒ Example:

**Given**

Wind direction (with respect to aircraft longitudinal axis) = 30°

Wind speed = 20 Kts

**Find**

Headwind = 17.5 Kts

Crosswind = 10 Kts

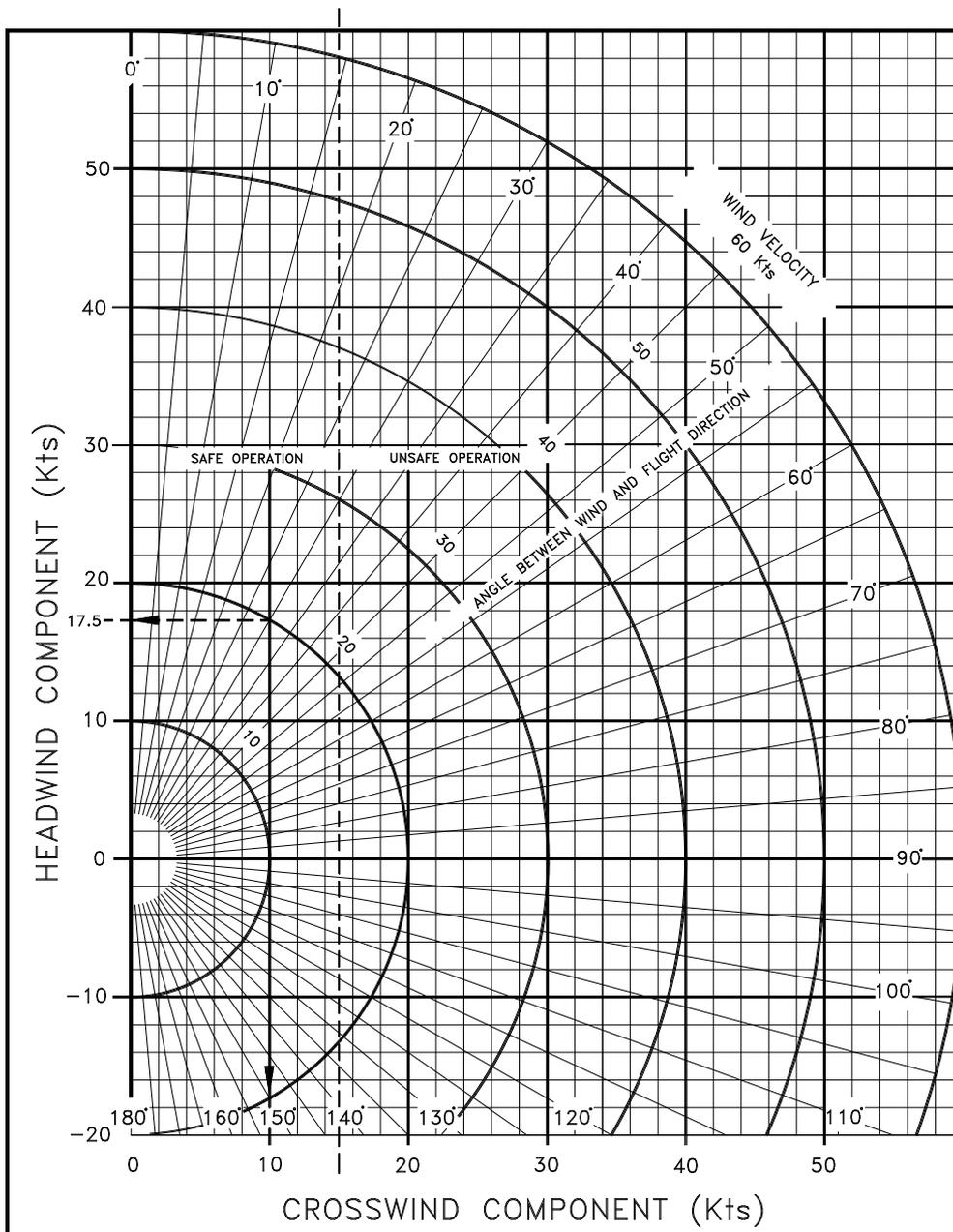


FIG. 5-3. CROSSWIND CHART

## 7. TAKE-OFF PERFORMANCE

Pressure Altitude		Distance [m]					ISA
[ft]		Temperature [°C]					
		-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 = 600 kg**

### Corrections

Flaps: T/O

Headwind: - 1.3m for each km/h (4 ft/(km/h))

Speed at Lift-Off = 83 km/h IAS

Tailwind: + 5.4m for each km/h (18 ft/(km/h))

Speed Over 50ft Obstacle = 93 km/h IAS

Paved Runway: - 6% to Ground Roll

Throttle Levers: Full Forward

Runway slope: + 5% to Ground Roll for each +1%

Runway: Grass

<b>Weight = 550 kg</b>		<b>Corrections</b>				
<b>Flaps: T/O</b>		<b>Headwind: - 1.3m for each km/h (4 ft/(km/h))</b>				
<b>Speed at Lift-Off = 78 km/h IAS</b>		<b>Tailwind: + 5.4m for each km/h (18 ft/(km/h))</b>				
<b>Speed Over 50ft Obstacle = 87 km/h IAS</b>		<b>Paved Runway: - 6% to Ground Roll</b>				
<b>Throttle Levers: Full Forward</b>		<b>Runway slope: + 5% to Ground Roll for each +1%</b>				
<b>Runway: Grass</b>						
Pressure Altitude		Distance [m]				ISA
		Temperature [°C]				
[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

<b>Weight = 500 kg</b>		<b>Corrections</b>				
<b>Flaps: T/O</b>		<b>Headwind: - 1.3m for each km/h (4 ft/(km/h))</b>				
<b>Speed at Lift-Off = 74 km/h IAS</b>		<b>Tailwind: + 5.4m for each km/h (18 ft/(km/h))</b>				
<b>Speed Over 50ft Obstacle = 81 km/h IAS</b>		<b>Paved Runway: - 6% to Ground Roll</b>				
<b>Throttle Levers: Full Forward</b>		<b>Runway slope: + 5% to Ground Roll for each +1%</b>				
<b>Runway: Grass</b>						
Pressure Altitude		Distance [m]				ISA
		Temperature [°C]				
[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 $V_Y = 120$ Km/h IAS $V_X = 115$ Km/h IAS						
Weight [kg]	Pressure Altitude [ft]	Rate of Climb [ft/min] at $V_Y$				
		Temperature [°C]				ISA
		-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	-40	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 H<sub>P</sub>:* **0 ft** OAT: +15°C

Engine RPM	Speed KTAS	Consumption (lt/h)
4300	166	12
4800	181	15
5200	193	17

*Pressure altitude H<sub>P</sub>:* **3000 ft** OAT: +9°C

Engine RPM	Speed KTAS	Consumption (lt/h)
4300	153	12
4800	179	15
5200	198	17

*Pressure altitude H<sub>P</sub>:* **6000 ft** OAT: +3°C

Engine RPM	Speed KTAS	Consumption (lt/h)
4300	138	12
4800	176	15
5200	204	17

## 10. LANDING PERFORMANCE

Pressure Altitude [ft]		Distance [m]				
		Temperature [°C]				ISA
		-25	0	25	50	
<b>Weight = 600 kg</b>						
<b>Corrections</b>						
<b>Flaps: LAND</b>		<b>Headwind: - 2.7 m for each km/h (8.6 ft/(km/h))</b>				
<b>Short Final Approach Speed = 93 km/h IAS</b>		<b>Tailwind: + 6 m for each km/h (19.5 ft/(km/h))</b>				
<b>Throttle Levers: Idle</b>		<b>Paved Runway: - 2% to Ground Roll</b>				
<b>Runway: Grass</b>		<b>Runway slope: - 2.5% to Ground Roll for each +1%</b>				
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

<b>Weight = 550 kg</b>		<b>Corrections</b>				
<b>Flaps: LAND</b>		<b>Headwind: - 2.7 m for each km/h (8.6 ft/(km/h))</b>				
<b>Short Final Approach Speed = 87 km/h IAS</b>		<b>Tailwind: + 6 m for each km/h (19.5 ft/(km/h))</b>				
<b>Throttle Levers: Idle</b>		<b>Paved Runway: - 2% to Ground Roll</b>				
<b>Runway: Grass</b>		<b>Runway slope: - 2.5% to Ground Roll for each +1%</b>				
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

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

**Weight = 500 kg**

**Corrections**

Flaps: *LAND*

Headwind: - 2.7 m for each km/h (8.6 ft/(km/h))

Short Final Approach Speed = 83 km/h IAS

Tailwind: + 6 m for each km/h (19.5 ft/(km/h))

Throttle Levers: *Idle*

Paved Runway: - 2% to Ground Roll

Runway: *Grass*

Runway slope: - 2.5% to Ground Roll for each +1%

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**Supplement S01: pages replacement instructions**

## **SECTION 6 – WEIGHT and BALANCE**

Refer to the basic AFM, Section 6 – WEIGHT and BALANCE



**Supplement S01: pages replacement instructions**

## **SECTION 7 – AIRFRAME AND SYSTEMS DESCRIPTION**

Refer to the basic AFM, Section 7 – AIRFRAME AND SYSTEMS DESCRIPTION



**Supplement S01: pages replacement instructions**

## **SECTION 8 – GROUND HANDLING & SERVICE**

Refer to the basic AFM, Section 8 – GROUND HANDLING & SERVICE