Aircraft Flight Manual

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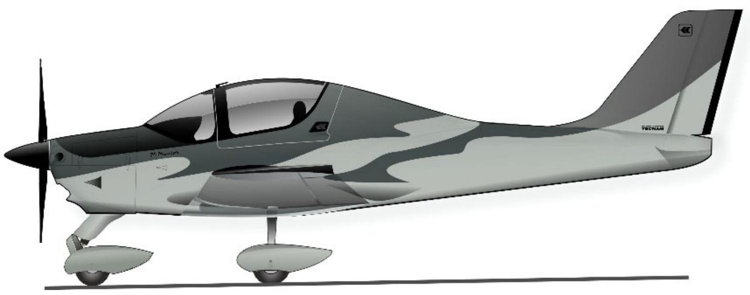

TECNAM P – MENTOR

MANUFACTURER: *COSTRUZIONI AERONAUTICHE **TECNAM** S.p.A.*
AIRCRAFT MODEL: ***P-MENTOR***

SERIAL NUMBER:……………………………….

BUILD YEAR: ………………………….................

REGISTRATION MARKINGS: ………………….…..

This manual must be carried in the airplane at all times.

The airplane has to be operated in compliance with procedures and limitations contained herein.

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1. FOREWORD

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.

For further information, please contact:

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When technical changes cause expansion or deletion of text which results in unchanged text appearing on a different page, these pages will be updated to the current regular revision date.

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

2. SECTIONS LIST

(*) approved Section.

(**) partially approved Section. Approved parts, if any, are reported in each single Supplement.

3. 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 outer 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, these pages will be updated to the current regular revision date.

For Supplements Record of Revision, make reference to the RoR Page of each Supplement

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

Ed / Rev	Revised pages	Description of Revision	Approval
Ed. 1 Rev. 0	-	First issue	
Ed. 1 Rev. 1	RoR-2 LoEP-1,2 3-5, 20, 22, 23, 28, 32, 33, 40, 41 4-14, 15, 17, 19, 20 6-13, 14 7-6, 7, 8, 13, 14, 22, 23 9-5	Updates for: - Equipment list - MOD 2002/235 - MOD 2002/236 - MOD 2002/237 - MOD 2002/238 - MOD 2002/243 - MOD 2002/245 - Typos	Approved under the authority of DOA ref. EASA.21J.335 (MOD2002/251.220606)
Ed. 1 Rev. 2	RoR-2 LoEP-1, 2, 3, 4 1-15, 16, 17, 18 6-4, 5, 14 7-7, 8, 15,29, 34, 41, 44, 45, 49, 52 9-5 Suppl.S02 refer to suppl RoR Suppl.S04: refer to suppl.RoR	Updates for: - Circuit breakers list - MOD 2002/246 - MOD 2002/255 - MOD 2002/259 - Typos Refer to RoR of Suppl.S02 Refer to RoR of Suppl.S04	Approved under the authority of DOA ref. EASA.21J.335 (MOD2002/260.220712)
Ed. 1 Rev. 3	RoR-2 LoEP-1. 2, 3 2-10	Updates for: - MOD 2002/254	EASA Approval No. 10079732

Ed / Rev	Revised pages	Description of Revision	Approval
Ed. 1 Rev. 4	RoR-3 LoEP-1, 2, 3 2-1, 2, 15 thru 26 6-13 7-27, 28, 31 9-5	Updates for: - MOD 2002/239 - MOD 2002/256 - Typos	Approved under the authority of DOA ref. EASA.21J.335 (MOD2002/266.220803)
Ed. 1 Rev. 5	RoR-3 LoEP-1, 2, 3 2-20 thru 24 6-13, 14 7-27 9-5	Updates for: - KOEL Optimization - Typos - MOD 2002/234 - MOD 2002/236 - MOD 2002/240	Approved under the authority of DOA ref. EASA.21J.335 (MOD2002/269.220928)
Ed. 1 Rev. 6	RoR-3 LoEP-1, 2, 3 6-9, 13, 14, 15 7-40 9-5 Suppl.S01: refer to suppl.RoR	Updates for: - Typos - MOD 2002/259 - MOD 2002/262 - MOD 2002/265 - MOD 2002/270 Refer to RoR of Suppl.S01	Approved under the authority of DOA ref. EASA.21J.335 (MOD2002/279.221219)
Ed. 1 Rev. 7	RoR-3 LoEP-1 thru 4 3-29, 30, 39 thru 42 4-9, 10, 14, 17 thru 19 6-13 7-13 9-5 Suppl.S01: refer to suppl.RoR	Updates for: - Typos - MOD2002/282 - MOD2002/280 Refer to RoR of Suppl.S01	Approved under the authority of DOA ref. EASA.21J.335 (MOD2002/287.230109)

Ed / Rev	Revised pages	Description of Revision	Approval
Ed. 1 Rev. 8	RoR-4 LoEP-1 thru 3 2-3, 6, 8, 11 3-35 4-3, 11, 12, 14, 15, 17, 20 5-1, 3, 12, 13 6-14, 15	Updates for: - Typos - Cruise performance optimization - MOD2002/283 - MOD2002/285 - MOD2002/295	Approved under the authority of DOA ref. EASA.21J.335 (MOD2002/288.230405)

4. 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.

Should supplements be embodied in accordance with approved instructions, make reference to the LOEP addressed on Supplements themselves.

Edition 1, Rev 0 ....18 March, 2022

Edition 1, Rev 1 ………………06 June, 2022

Edition 1, Rev 2 ………………12 July, 2022

Edition 1, Rev 3 ………………18 July 2022

Edition 1, Rev 4 ………………03 August 2022

Edition 1, Rev 5 ………………28 September 2022

Edition 1, Rev 6 ………………19 December 2022

Edition 1, Rev 7 ………………09 January 2023

Edition 1, Rev 8 ………………05 April 2023

Section	Pages	Revision
Section 0	i, ii, iii, iv, RoR-1	Rev. 0
	RoR-2	Rev.3
	RoR-3, LoEP-4	Rev.7
	RoR-4, LoEP-1 thru 3	Rev.8
Section 1	0 thru 14	Rev. 0
	15 thru 18	Rev. 2
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	3, 6, 8, 11	Rev. 8
Section 3	0 thru 4, 6 thru 19, 21, 24 thru 27, 31, 34, 36 thru 38	Rev. 0
	5, 20, 22, 23, 28, 32, 33	Rev. 1
	19	Rev. 4
	29, 30, 39 thru 42	Rev. 7
	35	Rev. 8

Section 4	0,1 ,2,4 thru 8, 13, 16, 21, 22	Rev. 0
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	3, 11, 12, 14, 15, 17, 20	Rev. 8
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	6, 14, 22, 23	Rev. 1
	7, 8, 15, 29, 34, 41, 44, 45, 49, 52	Rev. 2
	28, 31	Rev. 4
	27	Rev. 5
	40	Rev. 6
	13	Rev. 7
Section 8	All	Rev. 0

Section 9	0 thru 4, 6	Rev. 0
	5	Rev.7

SECTION 1
GENERAL

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1. Introduction

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

This manual also contains supplemental data supplied by the aeroplane manufacturer.

2. Warning – Caution – Note

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

WARNING — *Means that the non-observation of the corresponding procedure leads to an immediate or important degradation of the flight safety.*

CAUTION — *Means that the non-observation of the corresponding procedure leads to a minor or to a more or less long term degradation of the flight safety*

NOTE — *Draws the attention to any special item not directly related to safety but which is important or unusual*

3. Three view and Dimensions

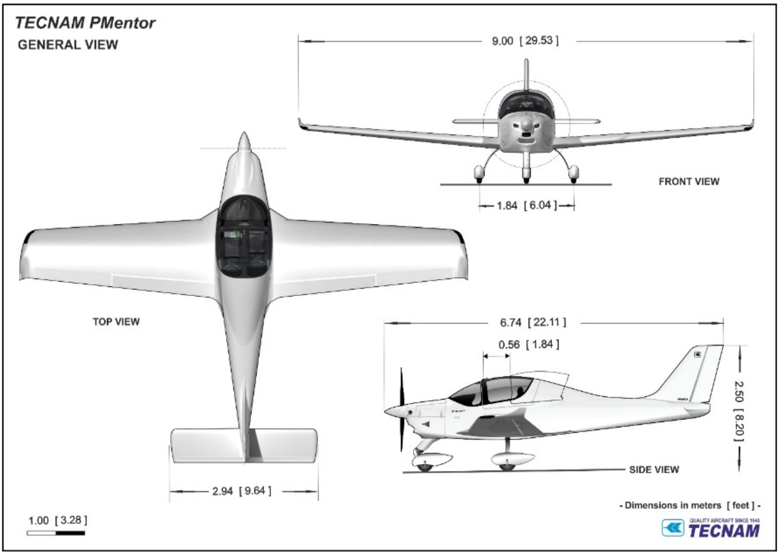

Figure 1-1 - General View

3.1. Dimensions

Overall dimensions

Wing Span……………………………………	9.00 m / 29.5 ft
Overall Length…………………………….	6.74 m / 22.1 ft
Overall Height………………………………..	2.50 m / 8.2 ft
Stabilator span………………………………	2.90m / 9.5 ft

Wing

Wing surface…………………………………	11.9 m^2 / 128.1 ft^2
Mean Geometric Chord……………………..	1.322 m / 4.337 ft
Aspect ratio…………………………………..	6.8

Landing Gear

Wheels Track………………………………....	1.84 m / 6.04 ft
Wheels base………………………………….	1.62 m / 5.31 ft
Main Gear Tire……………………………….	5.00-5
Nose Gear Tire………………………………	5.00-5

4. Engine

Manufacturer ……………………………..………....	Bombardier- Rotax GmbH
Model ……….…………………………...…….	912 iSc 3 Sport
Type Certificate ………………….....………....	EASA.E.121
Engine type …...…………….…………………	4 cylinder horizontally-opposed twins with overall displacement of 1352 c.c., mixed cooling, (water-cooled heads and air-cooled cylinders), electronic injection, integrated reduction gear with torque damper.
Max. take-off power (max. 5 min) ………..	73.5 kW / 100 hp @ 5800 rpm
Max. continuous power ……………………	72.0 kW / 98 hp @ 5500 rpm

5. Propeller

Manufacturer.………………………..…	MT Propeller
Model……….………………………..	MTV-21-A/180-51
Type Certificate.………………….....	EASA.P.101
Blades.…...…………………………..	2 laminated wood composite
Diameter.……….……………...…….	1800mm / 5 ft 10.9 in
Type……………………………...…….	Variable pitch propeller at constant speed

6. Governor

Manufacturer.………………………..…	MT Propeller
Model……….………………………..	MTV P-850-12
Type……………………………...…….	Standard hydraulic constant speed

7. Maximum Weights and Specific Loadings

7.1. Maximum Weights

Maximum Take-Off Weight…………..	720 kg (1587 lb)
Maximum Landing Weight…………..	720 kg (1587 lb)

7.2. Specific Loadings

Wing Loading…………....................	60.50 kg/m2 (12.39 lb/ft2)
Power Loading…………..................	7.20 kg/hp (15.87 lb/hp)

8. Fuel, Lubricant and Coolant

8.1. Fuel

Fuel Specification...	MOGAS (ASTM D4814) MOGAS EN 228 Super/Super Plus (min RON 95) AVGAS 100LL (ASTM D910)

8.2. Lubricant

Engine Oil Specification...................................	Use only oil with RON424 classification

8.3. Coolant

Coolant Specification.................................	Water / radiator protection in a ratio of 50:50
Radiator Protection……………………….....	BASF Glysantin Protect Plus / G48

9. Acronyms and Terminology

9.1. Velocity terminology

KCAS	Calibrated Airspeed is the indicated airspeed expressed in knots, corrected taking into account the errors related to the instrument itself and its installation.
KIAS	Indicated Airspeed is the speed shown on the airspeed indicator and it is expressed in knots.
KTAS	True Airspeed is the KCAS airspeed corrected taking into account altitude and temperature.
V_A	Design Manoeuvring speed is the speed above the which it is not allowed to make full or abrupt control movement.
V_{FE}	Maximum Flap Extended speed is the highest speed permissible with flaps extended.
V_{NO}	Maximum Structural Cruising Speed is the speed that should not be exceeded, except in smooth air and only with caution.
V_{NE}	Never Exceed Speed is the speed limit that may not be exceeded at any time.
V_O	Operating Manoeuvring speed is the speed above the which it is not allowed to make full or abrupt control movement. Operating at or below manoeuvring speed does not provide structural protection against multiple full control inputs in one axis or full control inputs in more than one axis at the same time.
V_S	Stall Speed is the minimum steady flight speed for a specific flaps configuration and power setting.
V_{S0}	Stall Speed in landing configuration (flaps fully extended).
V_X	Best Angle-of-Climb Speed is the speed which results in the greatest gain of altitude with respect to a given horizontal distance.
V_Y	Best Rate-of-Climb Speed is the speed which results in the greatest gain in altitude in a given time.
V_R	Rotation speed: is the speed at which the aircraft rotates about the pitch axis during take-off.
V_{REF}	Reference Speed is the reference speed for the approach during landing phase.
V_{50ft}	Obstacle speed (screen speed, V_{50ft}): is the speed at which the aircraft flies over a 15m (50 ft) obstacle during take-off or landing.
V_{GLIDE}	Glide speed: is the speed of maximum efficiency (to fly the longest distance per unit of altitude lost)

9.2. Meteorological terminology

ISA — International Standard Atmosphere: is the air atmospheric standard condition at sea level, at 15°C (59°F) and at 1013.25hPa (29.92 inHg).

QFE — Official atmospheric pressure at airport level: it indicates the aircraft absolute altitude with respect to the official airport level.

QNH — Theoretical atmospheric pressure at sea level: is the atmospheric pressure reported at the medium sea level, through the standard air pressure-altitude relationship, starting from the airport QFE.

OAT — Outside Air Temperature is the air static temperature expressed in degrees Celsius (°C) / Fahrenheit (°F).

T_S — Standard Temperature is 15°C (59°F) at sea level pressure altitude and decreased by about 2°C (3.5°F) for each 1000 ft of altitude.

H_P — Pressure Altitude is the altitude read from an altimeter when the barometric subscale has been set to 1013 mb (29.92 inHg).

9.3. Avionics System Acronyms

XPDR — Transponder

9.4. Engine Terminology and Acronyms

RPM — Revolutions Per Minute is the number of revolutions per minute of the propeller, multiplied by 2.4286 yields engine RPM.

EMS — Engine Management System consist of Sensors, actuators, ECU and wiring harness. The main functionality are ignition control, fuel injection control, fault detection and generator management.

ECU — Engine Control Unit is the core of the EMS which consists of two modules: Lane A & B

Lane A/B — System A/B of Engine Management System is capable of taking over control, regulation and monitoring of the engine.

9.5. Aircraft performance and flight planning terminology

Crosswind Velocity	is the velocity of the crosswind component for the which adequate control of the airplane during take-off and landing is assured.
Usable fuel	is the total fuel minus unusable fuel.
Unusable fuel	is the quantity of fuel that cannot be safely used in flight.
G	is the acceleration of gravity.
TOR *(Take-off Ground Roll)*	is the take-off distance measured from actual start to MLG (main landing gear) wheel lift-off point.
TOD *(Take-off Distance)*	is total take-off distance measured from start to 15m (50 ft) obstacle clearing.
LR	is the distance measured during landing from actual touchdown to stop point.
LD	is the distance measured during landing, from 15m (50 ft) obstacle clearing to actual stop.

9.6. Weight and balance terminology

Datum	“Reference datum” is an imaginary vertical plane from which all horizontal distances are measured for balance purposes.
Arm	is the horizontal distance of an item measured from the reference datum.
Moment	is the product of the weight of an item multiplied by its arm.
C.G.	Center of Gravity 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.
Standard Empty Weight	is the weight of the aircraft with engine fluids and oil at operating levels.
Basic Empty Weight (BEW)	is the standard empty weight to which it is added the optional equipment weight.
Useful Load	is the difference between maximum take-off weight and the basic empty weight.
Maximum Take-off Weight (MTOW)	is the maximum weight approved to perform the take-off.
Maximum Landing Weight (MLW)	is the maximum weight approved for the landing touchdown.

10. Unit Conversion Chart

Table 1-1 - Unit Conversion Chart

MOLTIPLYING		***BY →***	***YIELDS***	
TEMPERATURE				
Fahrenheit	[°F]	$\frac{5}{9}\cdot(F-32)$	Celsius	[°C]
Celsius	[°C]	$\left(\frac{9}{5}\cdot C\right)+32$	Fahrenheit	[°F]
FORCES				
Kilograms	[kg]	2.205	Pounds	[lbs]
Pounds	[lbs]	0.4536	Kilograms	[kg]
SPEED				
Meters per second	[m/s]	196.86	Feet per minute	[ft/min]
Feet per minute	[ft/min]	0.00508	Meters per	[m/s]
Knots	[kts]	1.852	Kilometers/hour	[km/h]
Kilometers/hour	[km/h]	0.5399	Knots	[kts]
PRESSURE				
Atmosphere	[atm]	14.7	Pounds / sq. in	[psi]
Pounds / sq. in	[psi]	0.068	Atmosphere	[atm]
LENGTH				
Kilometers	[km]	0.5399	Nautical miles	[nm]
Nautical miles	[nm]	1.852	Kilometers	[km]
Meters	[m]	3.281	Feet	[ft]
Feet	[ft]	0.3048	Meters	[m]
Centimeters	[cm]	0.3937	Inches	[in]
Inches	[in]	2.540	Centimeters	[cm]
VOLUME				
Litres	[l]	0.2642	U.S. Gallons	[US
U.S. Gallons	[US Gal]	3.785	Litres	[l]
AREA				
Square meters	[m^2]	10.76	Square feet	[sq ft]
Square feet	[sq ft]	0.0929	Square meters	[m^2]

11. Litres / US Gallons Conversion Chart

Table 1-2 - Litres/US Gallons Conversion Chart

Litres	US Gallons	US Gallons	Litres
5	1.3	1	3.8
10	2.6	2	7.6
15	4.0	3	11.4
20	5.3	4	15.1
25	6.6	6	22.7
30	7.9	8	30.3
35	9.2	10	37.9
40	10.6	12	45.4
45	11.9	14	53.0
50	13.2	16	60.6
60	15.9	18	68.1
70	18.5	20	75.7
80	21.1	22	83.3
90	23.8	24	90.9
100	26.4	26	98.4
110	29.1	28	106.0
120	31.7	30	113.6
130	34.3	32	121.1
140	37.7	34	128.7
150	39.6	36	136.3
160	42.3	38	143.8
170	44.9	40	151.4
180	47.6	42	159
190	50.2	45	170.3
200	52.8	47	177.9
210	55.5	50	189.3
220	58.1	55	208.2
230	60.7	60	227.1
240	63.4	63	238.4

12. DESIGNATION OF CIRCUIT BREAKERS

Table 1-3 - Main breakers

Breaker ID	Definition
START POWER	Start power
BATTERY	Main bus
ESSENTIAL BATTERY	Essential bus
BCK BATTERY	Backup battery
ALTERN	Main bus
ESSENTIAL ALTERN	Essential bus

Table 1-4 – Main bus breakers

Breaker ID	Definition
AUDIO PANEL	Audio panel
XPDR	Transponder
TAXI LIGHT	Taxi light
STDBY INSTR	Stand-by instrument
NAV LIGHT	Navigation light
CABIN HEAT	Cabin heat
INT. LIGHT	Internal light
PITCH TRIM	Pitch trim

Table 1-5 - Essential bus breakers

Breaker ID	Definition
PITOT HEAT	Pitot heat
PFD	Display unit PFD
EIS	Engine interface system
COM1	COM #1
ADAHRS	ADAHRS
NAV1/GPS	NAV #1/GPS
ANNUNC PANEL	Annunciations
LND LIGHT	Landing light
STROBE LIGHT	Strobe light
BUFF BATTERY	Buffer battery
G3X POWER2	G3X power
STALL	Stall warning system
FLAP	Flap control
GAD 29	Garmin adapter
GMU	Magnetometer

Table 1-6 – Avionic bus breakers

Breaker ID	Definition
AVIONIC BUS	Avionic bus
COM2	COM #2
A/P	Autopilot (if installed)
MFD	Display unit MFD
NAV2	NAV #2
DME	DME (if installed)
GAD 43	Garmin adapter
ADF	ADF (if installed)

SECTION 2
LIMITATIONS

INDEX

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1. Introduction

Section 2 includes operating limitations instrument markings and basic placards necessary for safe operation of P-Mentor aircraft, its engine, standard systems and equipment.

NOTE *RPM indicated inside round brackets are to be intended as Propeller RPM*

2. Speed

2.1. Speed limitations

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

Table 2-1 - Speeds Limitations

SPEED		KIAS	KCAS	REMARKS
V_{NE}	Never exceed Speed	135	136	Do not exceed this speed in any operation.
V_{NO}	Maximum Structural Cruising Speed	107	108	Do not exceed this speed except in smooth air and only with caution.
V_A	Design Manoeuvring Speed	102	103	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_O	Operating Manoeuvring Speed	102	103	
V_{FE}	Maximum Speed flap extended (flap TO)	106	105	Do not exceed this speed for indicated flaps setting.
	Maximum Speed flap extended (flap LAND)	96	95	

2.2. Airspeed Indicator Markings

Table 2-2 - Airspeed Indicator Markings

MARKING	KIAS	EXPLANATION
White arc	45 - 96	Positive Flap Operating Range (lower limit is V_{SO}, at specified maximum weight and upper limit is the maximum speed permissible with landing flaps extension).
Green arc	50 – 107	Normal Operating Range (lower limit is V_{S1} at specified maximum weight and most forward e.g. with flaps retracted and upper limit is maximum structural speed V_{NO}).
Yellow arc	107 – 135	Manoeuvres must be conducted with caution and only in smooth air.
Red line	135	Maximum speed for all operations.

3. Powerplant

3.1. Engine

Manufacturer ……………………………...	Bombardier - Rotax GmbH
Model Number ..…………………….…......	912 iSc 3 Sport

3.2. Propeller

Manufacturer ……..……………………………….	MT Propeller
Model Number …………………………………….	MTV-21-A/180-51
Number of Propeller ……………………………….	1
Number of Propeller Blades ……………………….	2
Propeller Diameter ……..………………………….	1800 mm (5 ft 10.9 in)

3.3. Powerplant Limitations

Following list reports the operating limitations for installed engines:

Power

- Max. take-off power (max. 5 min) ……….. 73.5 kW / 100 hp @ 5800 (2388) rpm
- Max. continuous power …………………… 72.0 kW / 98 hp @ 5500 (2265) rpm

Oil pressure

- Minimum below 3500 RPM ……………….. 0.8 bar / 12 psi
- Minimum above 3500 RPM ..…..………….. 2.0 bar / 29 psi
- Maximum normal ……………...………….. 5.0 bar / 73 psi
- Maximum for starting and warm-up ...…….. 7.0 bar / 102 psi

Oil temperature

- Minimum for starting ……..……………..…… -20°C (-13 °F)
- Minimum …………………..…………….…… 50°C (122°F)
- Maximum ………………...………………..…… 130°C (266°F)

Coolant temperature

- Maximum ……………...………...…………..….. 120°C (248°F)

Exhaust gas temperature

- Maximum ……………...………...…………..….. 950°C (1742°F)

Manifold Air Temperature

- Maximum in-flight …...………..………...….. 60°C (140°F)

Fuel pressure

- Minimum .... 2.8 bar / 40.6 psi
- Maximum .... 3.2 bar / 46.4 psi
- Acceptable minimum .... 2.5 bar / 36 psi *
- Acceptable maximum ……........................... 3.5 bar / 51 psi*

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

Engine operation

- Maximum Negative acceleration .... -0.5 g for max 5 seconds

4. Instrumentation Markings

Table 2-3 – Avionics System Instrument Markings

INSTRUMENT		RED ARC/BAR Minimum limit	WHITE ARC Advisory	GREEN ARC Safe operation	YELLOW ARC Caution	RED ARC/BAR Maximum limit
Engine/Prop RPM (0-6000)/(0-2470)	RPM	/	/	1400 – 5500 (580-2265)	< 1400 (<580) 5500 – 5800 (2265-2388)	> 5800 (>2388)
Fuel Flow (0.0-30.0)	LPH	/	0.0 – 30.0	/	/	/
Manifold Press. (0.0-32.0)	In.Hg	/	/	0.0 – 32.0	/	/
Manifold Temp. (0-70)	°C	/	/	0 - 60	/	> 60
Oil Press. (0.0-8.0)	bar	< 0.8	/	2.0 - 5.0	0.8 - 2.0 5.0 - 7.0	> 7.0
Oil Temp. (4-145)	°C	< 50	/	50 - 110	110 - 130	> 130
Coolant Temp. (4 - 130)	°C	/	/	4 - 120	/	> 120
Exhaust gas temp (540 - 982)	°C	/	/	≤ 950	/	> 950
Fuel Press. (2.3 – 3.7)	bar	< 2.5	/	2.8 – 3.2	2.5 – 2.8 3.2 – 3.5	> 3.5
Fuel Qty (0 – 65)	litres	0 - 1	/	15 – 65	< 15	/
	gal	0.0 – 0.3		4 - 17.2	< 4	
Alternator Amm. (0 - 30)	A	/	/	0 – 30	/	/
Battery Amm. (0 - 50)	A	/	0 – 50	/	/	/
Essential Bus Volt (10.0 – 16.0)	V	< 11.9	/	11.9 – 14.5	14.5 – 15.5	>15.5
Lane A/B Volt (8.0 – 15.5)	V	< 9	/	12.7 – 14.8	9 – 12.7	>14.8

5. Fuel

Total Fuel capacity………………………………..	140 litres (37 gallons)
Total Usable Fuel…………………………………	131.6 litres (35 gallons)
Approved Fuel Grades…………………………..	MOGAS ASTM D4814
	MOGAS EN228 Super/Super
	AVGAS 100 LL (ASTM D910)
Maximum Fuel Imbalance………………………..	30 litres

6. Oil

Maximum Oil Level (liters / USq) ………………..	3* / 3.17*
*plus the volume in the pipe	
Minimum Oil Level (liters / USq) …………………	2.5* / 2.64*
*plus the volume in the pipes	
Engine Oil Specification...................................	Use only oil with RON 424 classification

For additional info, refer to “Operator manual for Rotax Engine Type 912 i Series”.

7. Coolant

Coolant Specification......................................	Water / radiator protection in a ratio of 50:50
Radiator Protection…………………………..……	BASF Glysantin Protect Plus / G48

For additional info, refer to “Operator manual for Rotax Engine Type 912 i Series”.

8. Operative and additional limitations

8.1. Maximum Operating Altitude

Maximum operating altitude is 13000 ft (3962 m) AMSL

CAUTION

Flight crew and passengers are required to use supplemental oxygen according to applicable Air Operation Rules.

8.2. Outside Air Temperature

Minimum Temperature .... -25 °C (-13 °F)

Maximum Temperature …………………….....…… 38 °C (100 °F)

For aircraft embodying MOD2002/254:
Maximum Temperature …………………….....…… 50 °C (122 °F)

8.3. Flight Crew

The minimum crew is one pilot seated in the left hand seat.

8.4. Smoking

Smoking is not allowed.

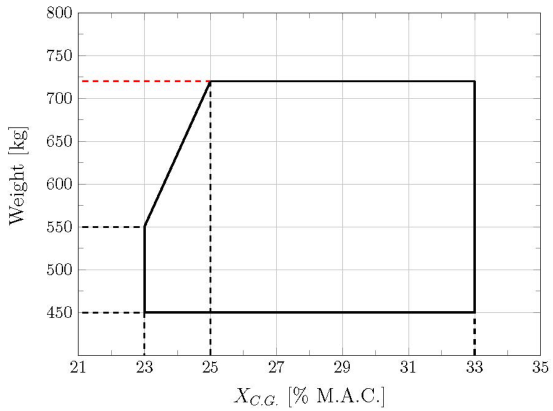
8.5. Types of surface

The take-off and landing can be conducted on hard paved or grass surfaces.

9. Weights and center of gravity limits

Table 2-4 – Weight Limits

Condition	Weight	
Maximum Take-off Weight	720 kg	1587 lb
Maximum Landing Weight	720 kg	1587 lb



Datum	Propeller support flange without spacer (the aircraft must be levelled in the longitudinal plane)
Levelling	Refer to the seat track supporting beams (see procedure in Section 6)
Forward limit	**1.753 m (5.75 ft) (23% MAC)** aft of datum for all weights up to 550 kg / 1213 lb **1.780 m (5.84 ft) (25% MAC)** aft of datum for MTOW
Aft limit	**1.889 m (6.20 ft) (33% MAC)** aft of datum for all weights

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

10. Manoeuvers and Load Factor Limits

10.1. Load Factor Limits

Maneuver load factors limits are as follows:

Positive	Negative
+ 3.8 g	-1.9 g

Maneuver load factors limits with flaps extended are as follows:

Positive	Negative
+ 1.9 g	0 g

10.2. Approved Maneuvers

This is a normal category aircraft.

No aerobatic maneuvers operations include:

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

WARNING

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

WARNING

Flight in expected and/or known icing conditions, in proximity of storms or in severe turbulence is forbidden.

11. Seats and Baggage

11.1. Maximum Passenger Seating Configuration

Maximum passenger seating configuration is one.

11.2. Baggage Loading Limit

Table 2-5 – Baggage Weight Limits

Max Loading	Max Loading Intensity
30 kg / 66 lb	1.0 kg/dm^2 20.48 lb/ft^2

12. Limitation Placards

Hereinafter limitation placards, related to the operating limitations, are placed in plain view on the pilot.

12.1. Speed limitations

On the left side instrument panel, above on the left, it is placed the following placard reporting the speed limitations:

Operating Manoeuvring Speed
V_O = 102 KIAS

12.2. Operating Limitations

On the central side of the instrument panel, the following placards are placed reminding the observance of aircraft operating limitations according to installed equipment configuration, see KOEL limitations:

This NORMAL category airplane must be operated in accordance with AFM,
in non-icing conditions and for Day/Night VFR and IFR operations
All aerobatic manoeuvres, including spins, are prohibited.
Flight in icing condition is prohibited.

12.3. No smoking placard

On the left hand side of the instrument panel the following placard is placed reminding the observance for “no smoking”:

NO SMOKING

12.4. Baggage Compartment placard

Behind the baggage compartment, the following placard is placed:

MAX BAGGAGE LOAD
30kg/66lbs
MAX. SPEC. PRESS.
1 kg/dm^2 - 20,5 lbs/sqft
FASTEN THE BAGGAGES
WITH CARGO NET BEFORE FLIGHT

13. Avionic System Limitations

13.1. General

1. The aircraft is certified for CAT I – Approaches (with a decision height not lower than 200 ft AGL (61 m)).
2. The following documents, at the latest revision, must be carried on board the airplane at all times:
   - *The "Garmin G3X Pilot's Guide" (last issue) must be carried in the aircraft and made available to the pilot at all time.*
   - *The "Garmin GI-275 Pilot's Guide" (last issue) must be carried in the aircraft and made available to the pilot at all time.*
   - *The "Garmin GTN 650 Xi Pilot's Guide" (last issue), if installed, must be carried in the aircraft and made available to the pilot at all time.*
   - *The "Garmin GNC 255A Pilot's Guide" (last issue), if installed, must be carried in the aircraft and made available to the pilot at all time.*
3. The PFD/MFD must be operational prior to engine start.
4. The Air Data Computer (ADC) must be operative for take-off.
5. The Attitude Heading Reference System (AHRS) must be operative for take-off.
6. The Stand-by Instrument must be operative for take-off.

WARNING

Sunglasses with polarized lenses or lenses that are designed to filter specific colors/frequencies of light may adversely affect a pilot's ability to see some colours shown on PFD/MFD displays. Some elements on the display can be completely invisible while wearing these types of sunglasses. Also, the colour of some elements may be changed. For example, some blue light filtering lenses can change magenta to red.

13.2. GTN650Xi GNSS (GPS/SBAS) Navigation System Limitations

The pilot must confirm at system initialization that the Navigation database is current. Navigation database is expected to be current for the duration of the flight.

If the AIRAC cycle will change during flight, the pilot must ensure the accuracy of navigation data, including suitability of navigation facilities used to define the routes and procedures for flight. If an amended chart affecting navigation data is published for the procedure, the database must not be used to conduct the procedure.

GPS/SBAS based IFR en-route and terminal navigation is prohibited unless the pilot verifies and uses a valid, compatible, and current Navigation database or verifies each waypoint for accuracy by reference to current approved data.

Discrepancies that invalidate a procedure must be reported to Garmin International. The affected procedure is prohibited from being flown using data from the Navigation database until a new Navigation database is installed in the airplane and verified that the discrepancy has been corrected.

Contact information to report Navigation database discrepancies can be found at www.Garmin.com > Support > Contact" class = "redactor-linkify-object"> www.Garmin.com > Support > Contact Garmin Support > Aviation. Pilots and operators can view navigation data base alerts at www.Garmin.com In the Air NavData Alerts.

For flight planning purposes, in areas where SBAS coverage is not available, the pilot must check RAIM availability.

Within Europe, RAIM availability can be determined using the GTN 650 WFDE Prediction program or Europe's AUGER GPS RAIM Prediction Tool at http://augur.ecacnav.com.

This requirement is not necessary if SBAS coverage is confirmed to be available along the entire route of flight.

The route planning and WFDE prediction program may be downloaded from the GARMIN GTN 650 website on the internet. For information on using the WFDE Prediction Program, refer to GARMIN WAAS FDE Prediction Program, `WFDE Prediction Program instructions'.

For flight planning purposes for operations within European B-RNAV and P-RNAV airspace, if more than one satellite is scheduled to be out of service, then the availability of GPS integrity RAIM shall be confirmed for the intended flight (route and time).

In the event of a predicted continuous loss of RAIM of more than five minutes for any part of the intended flight, the flight should be delayed, cancelled, or re- routed on a track where RAIM requirements can be met.

Whenever possible, RNP and RNAV routes including Standard Instrument Departures (SIDs) and Obstacle Departure Procedures (ODPs), Standard Terminal Arrival (STAR), and en-route RNAV “Q” and RNAV “T” routes should be loaded into the flight plan from the database in their entirety, rather than loading route waypoints from the database into the flight plan individually.

Selecting and inserting individual named fixes from the database is permitted, provided all fixes along the published route to be flown are inserted. “GPS”, “or GPS” and “RNAV (GPS)” instrument approaches using the GTN 650Xi System are prohibited unless the pilot verifies and uses the current Navigation database. GPS based instrument approaches must be flown in accordance with an approved instrument approach procedure that is loaded from the Navigation database.

Not all published Instrument Approach Procedures (IAP) are in the Navigation database.

Pilots planning on flying an RNAV instrument approach must ensure that the Navigation database contains the planned RNAV Instrument Approach Procedure and that approach procedure must be loaded from the Navigation database into the FMS flight plan by its name.

The navigation equipment required to join and fly an instrument approach procedure is indicated by the title of the procedure and notes on the IAP chart.

Use of the GARMIN GTN 650Xi GPS/SBAS receivers to provide navigation guidance during the final approach segment of an ILS, LOC, LOC-BC, LDA, SDF, MLS or any other type of approach not approved for “or GPS” navigation is prohibited. When using the GTN 650Xi VOR/LOC/GS receivers to fly the final approach segment, VOR/LOC/GS navigation data must be selected and presented on the CDI.

SID/STAR

The use of SIDs and STARs stored in GPS data base is only authorized, if the pilot has checked that GPS procedure corresponds to the one given in the official documentation (coordinates of various points and paths between points).

DEAD RECKONING MODE

NOTE

Dead Reckoning Mode only functions in En-route (ENR) phase of flight. In all other phases, an invalid GPS solution produces a “NO GPS POSITION” annunciation on the map and the GTN 650 Nxi stops using GPS.

It is important to note that estimated navigation data supplied by the GTN 650Nxi in DR Mode may become increasingly unreliable and must not be used as a sole means of navigation. If while in DR Mode airspeed and/or heading data is also lost or not available, the DR function may not be capable of accurately tracking estimated position and, consequently, the system may display a path that is different than the actual movement of the aircraft. Estimated position information displayed by the GTN 650 Xi through DR while there is no heading and/or airspeed data available shall not be used for navigation.

DR Mode is inherently less accurate than the standard GPS/SBAS Mode due to the lack of satellite measurements needed to determine a position.

WARNING

Changes in wind speed and/or wind direction compound the relative inaccuracy of DR Mode. Because of this degraded accuracy, other navigation equipment must be relied upon for position awareness until GPS-derived position data is restored.

DR Mode is indicated on the GTN 650Xi by the appearance of the letters ‘DR’ superimposed in yellow over the ‘own aircraft’ symbol.

In addition, ‘DR’ is prominently displayed in yellow on the aircraft symbol. Also, the CDI deviation bar is removed from the display. Lastly, but at the same time, a ‘GPS NAV LOST’ alert message appears on the display.

Normal navigation using GPS/SBAS source data resumes automatically once a valid GPS solution is restored. As a result of operating in DR Mode, all GPS- derived data is computed based upon an estimated position and all external outputs dependent on GPS position are flagged.

While the GTN 650Xi is in DR Mode, some terrain functions are not available. Additionally, the accuracy of all nearest information (airports, airspaces, and waypoints) is questionable. Finally, airspace alerts continue to function, but with degraded accuracy.

RAIM AVAILABILITY

Because of tighter protection limit on approaches, there may be times when RAIM is not available. The GTN 650Xi automatically monitors RAIM and warns with an alert message when it is not available.

During GNSS approaches, if RAIM is not available when crossing the FAF, the missed approach procedure must be flown

14. Kinds of operation

The airplane is approved for operations under day or night VFR, day or night IFR, when the required equipment is installed and operating properly. Flights in icing conditions are prohibited.
The following list identifies the systems and equipment upon which type certification for each kind of operation was predicated. The pilot in command is responsible for determining the airworthiness of the aircraft and assuring compliance with current operating regulations for each intended flight.
The zeros (0) used in the list below mean that the system and/or equipment was not required for type certification for that kind of operation.
Deviations from this KOEL may be approved for the operation of a specific aircraft if a proper MEL (*Minimum Equipment List*) has been authorized by the appropriate regulatory agency.

NOTE

The following systems and equipment list does not include all equipment required by the National Operating Regulations. It also does not include components obviously required for the airplane to be airworthy (wing, empennages, engines, etc…).

Table 2-6 – Kinds of Operation Equipment List

Id.	System, Instrument, and/or Equipment	Number of items installed	VFR Day	VFR Night	IFR Day	IFR Night	Remarks and/or Exceptions
	Communications (ATA-23)						
1	VHF COM	1	1	1	1	1	For A/C embodying MOD2002/235 the number of items installed is equal to 2
2	Headset	2	1	1	1	1	Left hand pilot's headset must be installed and operative. In case headphones jacks are not available or operative, speakers and a handheld microphone should be available and operative.
	Electrical Power (ATA-24)						
1	Main Battery	1	1	1	1	1	Buffer Battery and Stand-by instrument battery must be operative.
2	Alternator	2	2	2	2	2	
3	AMP indicator	2	2	2	2	2	
4	Voltage indicator	3	3	3	3	3	
5	Low Volt Warning light	1	1	1	1	1	

Id.	System, Instrument, and/or Equipment	Number of items installed	VFR Day	VFR Night	IFR Day	IFR Night	Remarks and/or Exceptions
6	Backup Battery Warning light	1	1	1	1	1	
	Equipment/ Furnishings (ATA-25)						
1	Safety belt	2	One safety belt and one seat for each occupant must be operative.				
2	First aid kit	1	1	1	1	1	
3	Torch	1	0	1	0	1	
	Fire Protection System (ATA-26)						
1	Fire extinguisher	1	1	1	1	1	
	Flight Controls (ATA-27)						
1	Flap system	1	1	1	1	1	
2	Flap position indicator	1	1	1	1	1	
3	Pitch trim system	1	1	1	1	1	
4	Pitch trim position indicator	1	1	1	1	1	
5	Stall warning system	1	1	1	1	1	
	Fuel System (ATA-28)						

Id.	System, Instrument, and/or Equipment	Number of items installed	VFR Day	VFR Night	IFR Day	IFR Night	Remarks and/or Exceptions
1	Electrical fuel pumps	2	2	2	2	2	
2	Fuel quantity indicator	2	2	2	2	2	
3	Fuel Pressure Indicator	1	1	1	1	1	
4	Low Fuel Caution light	2	2	2	2	2	
	Ice And Rain Protection (ATA-30)						
1	Pitot heat system	1	0	0	1	1	
2	Pitot heater caution light	1	0	0	1	1	
3	Alternate static air source	1	0	0	1	1	
4	Alternate Air Intakes system	1	0	0	1	1	
5	Windshield Heat	1	0	0	1	1	
	Instruments (ATA-31)						
1	Clock	1	1	1	1	1	
	Lights (ATA-33)						
1	Instruments light system	1	0	1	0	1	
2	Emergency light	1	0	1	0	1	
3	Taxi light	1	0	0	0	0	

Id.	System, Instrument, and/or Equipment	Number of items installed	VFR Day	VFR Night	IFR Day	IFR Night	Remarks and/or Exceptions
4	Landing light	1	0	1	0	1	
5	Navigation light	3	0	3	0	3	
6	Strobe light	3	3	3	3	3	
7	Map light	2	0	1	0	1	
	Navigation Instruments (ATA-34)						
1	Primary flight display (PFD)	1	1	1	1	1	
2	Multifunction display (MFD)	1	1	1	1	1	
3	Air data computer (ADC)	1	1	1	1	1	
4	Attitude heading reference system (AHRS)	1	1	1	1	1	
5	Stand-by instrument	1	1	1	1	1	
6	Magnetic compass	1	1	1	1	1	
7	Transponder	1	1	1	1	1	
8	Marker beacon	1	0	0	1	1	
9	GPS / NAV Unit	1	0	0	1	1	For A/C embodying MOD2002/239 the GPS function is not applicable

Id.	System, Instrument, and/or Equipment	Number of items installed	VFR Day	VFR Night	IFR Day	IFR Night	Remarks and/or Exceptions
	Engine Indicating System (ATA-77)						
1	Engine Interface System (EIS)	1	1	1	1	1	
2	RPM indicator	1	1	1	1	1	
3	MAP indicator	1	1	1	1	1	
4	MAT indicator	1	1	1	1	1	
5	Coolant temperature indicator	1	1	1	1	1	
6	Lane A Warning Light	1	1	1	1	1	
7	Lane B Warning Light	1	1	1	1	1	
	Engine Oil (ATA-79)						
1	Oil pressure indicator	1	1	1	1	1	
2	Oil temperature indicator	1	1	1	1	1	
3	Oil quantity measuring device (dipstick)	1	1	1	1	1	

15. PBN (RNAV & RNP) Operational Capability

The Performance-Based Navigation (PBN) concept describes the standards and performance requirements for navigation equipment along an ATS route, instrument procedure, or in a defined airspace. These standards determine the basis for designing flight plan trajectories and the aircraft’s capabilities determine if it can meet the performance requirements to safely fly the operations. PBN consists of both RNAV and RNP specifications.

15.1. General GNSS Navigation Equipment Approvals

The Garmin GNSS navigation system (GTN 650 Xi), if installed on this airplane complies with the requirements of CS-ACNS.

It's approved for navigation using GPS and SBAS for IFR en-route, terminal area, precision and non-precision approach operations.

In accordance to ICAO doc 9613 (Fourth Edition - 2013), the GTN 650 Xi system has been shown to be eligible for:

- RNAV-5 (B-RNAV).
- RNAV-1 (P-RNAV) for en-route, terminal and approach navigation.
- RNP 1 for en-route, terminal and approach navigation.
- RNP APCH LNAV
- RNP APCH LNAV/VNAV. Vertical guidance is supported only via Satellite-Based Augmentation System (SBAS). This does not include APV BARO-VNAV operation which is not cleared.
- RNP APCH LPV/LP

This does not constitute an operational approval.

RNAV OPERATIONS

In general terms, RNAV equipment operates by automatically determining aircraft position from one, or a combination, of the following together with the means to establish and follow a desired path:

- GPS

Therefore, in addition to the information provided in the KOEL for "IFR Night", the airplane may enter and operate in R-NAV airspace when one of the above equipment is installed and operable.

NOTE *GNC 255A doesn't embody GPS feature therefore, if this is the only navigation system installed, RNAV operations are not allowed.*

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SECTION 3
EMERGENCY PROCEDURES

INDEX

1. Introduction

Section 3 includes checklists and detailed procedures for coping with various types of emergency conditions that could arise.

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 should be provided.

Two types of emergency procedure are hereby given:

a. "Bold faces" which must be committed to memory 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, as shown below:

BEFORE ROTATION: ABORT TAKE OFF

1.	**Thrust Lever……………………………**	**IDLE**
2.	**Rudder…………………………………..**	**Keep heading control**
3.	**- -**	
4.	**- -**	

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

In case of emergency the pilot should acts as follows:

1. Maintain aircraft control
2. Analyse the situation
3. Apply the pertinent procedure
4. Inform the Air Traffic Control if time and conditions permit

NOTE

The 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.*

1.1. Reference Airspeeds for Emergency Procedures

MTOW	720 Kg
Best glide speed (V_{GLIDE})	**70 KIAS**

1.2. Annunciator and Alerts

The following annunciations and alerting functions are displayed on the PFD.

Annunciation Window: The Annunciation Window displays abbreviated annunciation text. Text color is based on alert levels as following:

- Warning (red): requires immediate attention. Warning messages will flash until acknowledged by pressing the back or touching the on-screen message.
- Caution(yellow): requires pilot awareness and possible future corrective action.
- Advisory (white): provides general information.
- Safe (green): indicates a safe condition.

The Annunciation Window is located to the right of the Altimeter and Vertical Speed Indicator. All *P-Mentor* annunciations can be displayed simultaneously in the Annunciation Window. A white horizontal line separates annunciations that are acknowledged from annunciations that are not yet acknowledged. Higher priority annunciations are displayed toward the top of the window. Lower priority annunciations are displayed toward the bottom of the window.

1.3. Annunciator Light Summary

The following table shows a summary of all Annunciator and Warning lights, divided for System or Function.

ID#	System or Function	Annunciator Light	Alert	Conditions (to activate flag)
1	Electrical	BCK BATT.	Backup Battery	Backup Battery Switch ON
2	Electrical	LOW VOLT	Low Voltage	Essential Bus voltage < 12V
3	ECU	LANE A	Lane A (ECU)	Engine system failure/fault detected by ECU.
4	ECU	LANE B	Lane B (ECU)	Engine system failure/fault detected by ECU.
5	Fuel	LH FUEL LEVEL	Left Fuel level	Low fuel quantity detected (<20L)
6	Fuel	RH FUEL LEVEL	Right fuel level	Low fuel quantity detected (<20L)
7	Fuel	FUEL PUMP	Fuel Pump	Fuel Pump ON
8	Pitot	PITOT HEAT ON	Pitot Heat ON	Pitot Heater ON and Operative
9	Pitot	PITOT HEAT	Pitot Heat Failure	Pitot heat ON and in Failure

1.4. CAS Message Summary

The following table shows a summary of all CAS Message, included in the G3X Avionic Suite, divided for System or Function.

ID#	System or Function	Annunciator Window	Alert	Conditions (to activate flag)
1	Electrical	ESS VOLT	Essential Volt	Essential Bus Voltage < 12V
2	Electrical/Avionic	EIS FAIL	EIS Failure	No data from Engine Indicating system
3	Electrical/Avionic	AHRS FAIL	AHRS Failure	No data from Attitude and Heading reference system
4	Electrical/Avionic	ADC FAIL	ADC Failure	No data from Air Data Computer

2. ELECTRICAL SYSTEM

2.1. Low Volt

Annunciator Light	Alert
	Low Voltage

Annunciation window	Alert
ESS VOLT	Essential Voltage

1. Circuit breaker(s)………………………… *CHECK*
2. Avionic Master ……..……………………. *OFF*
3. Pitot heat switch ………………………… *OFF*
4. Load Shedding …..……………………….. *PERFORM* *(Strobe lights set OFF)*
5. **Land as soon as practical**

CAUTION

The ECU System requires an electrical power source for its operation. If one alternator fails, continued engine operation is assured by the other alternator. Therefore, the airframe loads are supplied by battery.

2.2. Generator Failure

NOTE

A generator failure can be detected by illumination of LOW VOLT warning light, ESS VOLT CAS Message and positive Battery ammeter.

In case of Generator A Failure, Lane A and Lane B Warning flashing lights indication is provided to the pilot.

1. Load Shedding ……………………………… *PERFORM*

   (Pitot Heat and Strobe lights set OFF)

2. **Land as soon as practical**

CAUTION

In case of failure of the remaining generator expect imminent engine stoppage.

NOTE

If any generator fails, the airframe electrical system is automatically cut-off from the generator. The battery is the remaining source for the airframe electrical system for a minimum of 30 minutes. Additional load shedding, according to flight conditions, could lead to extend battery capacity.

2.3. BCK Batt

Annunciator Light	Alert
	Backup Battery Switch

1. Engine Parameters .... *CHECK*
2. BCK BATT Switch .... *SET OFF IF NOT REQUIRED*

CAUTION

The BCK BATT switch is required to be set ON during in-flight engine restart and in case of both alternator failure.

NOTE

The BCK BATT light is illuminated when the SWITCH is ON. In this condition. the ECU system is powered by aircraft battery. In case of double alternators failure the BCK BATT switch must be set ON (according to in-flight engine restart).

2.4. Loss of Essential Bus

The loss/failure of essential bus will be recognize with the simultaneous loss of the following equipment:

Table 3-2 – Loss of Essential Bus

PITOT HEAT	PFD	EIS	COM 1
ADAHRS	NAV1/GPS	ANNUNC PANEL	LND LIGHT
STROBE LIGHT	BUFF BATTERY	G3X POWER 2	STALL
FLAP	GDA 29	GMU	-

NOTE

Change or maintain flight conditions according to available equipment.

CAUTION

Pilot will need to make reference to standby instrument for primary flight information and parameters.

Pilot will be able to use the audio panel via MFD.

CAUTION

Strobe and landing lights will be lost, NAV and taxi lights are still available.

1. **Land as soon as practical**

2.5. Loss of Main Bus

The loss/failure of main bus will be recognize with the simultaneous loss of the following equipment:

Table 3-3 – Loss of Main Bus

AUDIO PANEL	XPDR	NAV LIGHT	TAXI LIGHT
SOCKET 12V	STDBY INSTR	INT LIGHT	PITCH TRIM

NOTE *Fail safe operation of G3X Touch allows pilot to transmit and use COM1 using headphones only; speakers will not be available.*

NOTE *For night flights, all instruments and map lights will be lost, but emergency light will still be available.*

1. **Land as soon as practical**

2.6. Loss of Avionic Bus

The loss/failure of avionic bus will be recognize with the simultaneous loss of the following equipment:

Table 3-4 – Loss of Avionic Bus

MFD	-	-	-

1. Avionic Master switch ………………… *SET OFF*
2. Continue flight with PFD in reversionary mode

3. PITOT-STATIC SYSTEM

3.1. Pitot heating system failure

Annunciator Light	Alert
	Pitot Heat Failure

NOTE

*When the Pitot Heating system is active, the green **PITOT HEAT ON** advisory light turns on indicating that the Pitot Heating system is functioning properly.*

CAUTION

*If the amber **PITOT HEAT** caution light is **ON** when the pitot heat switch is on, then the Pitot Heating system is not functioning properly.*

In this case apply following procedure:

2. Pitot heat switch………………………… *OFF*
3. Pitot heat circuit breaker……………….. *CHECK IN*
4. Pitot heat switch………………………… *ON*
5. **PITOT HEAT** caution light…………….. *CHECK*

3.2. Static source malfunction

NOTE *The alternate source valve is located on the right side of the central pedestal.*

If static source malfunction is suspected and/or abnormal fluctuations of indicated airspeed and/or altitude are detected in relationship with yawing:

1. Alternate static port …..……………………..........................*OPEN*
2. Cabin heating ……... *OFF*

NOTE *Operation of the alternate static air requires that the cabin air system be switched off in order not to affect the air pressure measurement.*

4. AVIONIC SYSTEM

4.1. Loss of information displayed

When a LRU or a LRU function fails, a large red "X" is typically displayed on the display field associated with the failed data.

NOTE

In most of cases, the red "X" annunciation is accompanied by a message advisory alert. Softkey annunciation which, once selected, acknowledges the presence of the message advisory alert and displays the alert text message in the Alerts Window.

4.2. AHRS Failure

Annunciation window	Alert window
AHRS FAIL	AHRS Unit Failure

Display system is not receiving input from AHRS. The following information will be lost (large red X on the display field):

Attitude	Heading
	

INSTRUCTION: revert to stand-by and magnetic compass instruments

4.3. ADC Failure

Annunciation window	Alert window
ADC FAIL	ADC Unit Failure

Display system is not receiving input from Air Data Computer. The following information will be lost (large red X on the display field):

Airspeed	Altitude	Vertical Speed
		

INSTRUCTION: revert to stand-by instrument

4.4. EIS Failure

Annunciation window	Alert window
EIS FAIL	Engine Instrument System failure

Display system is not receiving input from Air Data Computer All engine information are lost and a large red X appears on the engine display fields.

INSTRUCTION: Land as soon as possible

4.5. Loss of airspeed information

	**AIRSPEED FAIL** **(red X on display field)**
	Display system is not receiving airspeed input from Air Data Computer.

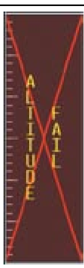
INSTRUCTION: revert to standby instrument

4.6. Loss of attitude information

	**ATTITUDE FAIL** **(red X on display field)**
	Display system is not receiving attitude information from AHRS**.**

INSTRUCTION: revert to standby instrument

4.7. Loss of altitude information

	**ALTITUDE FAIL** **(red X on display field)**
	Display system is not receiving altitude input from Air Data Computer.

INSTRUCTION: revert to standby instrument

4.8. Loss of vertical speed information

	**VERT SPEED FAIL** **(red X on display field)**
	Display system is not receiving vertical speed input from Air Data Computer.

INSTRUCTION: revert to standby instrument

4.9. Loss of heading information

	**HDG** **(red X on display field)**
	Display system is not receiving valid heading input from AHRS.

INSTRUCTION: revert to magnetic compass

4.10. Garmin GDU(s) failure

In case of <u>one</u> GDU Failure:

The G3X Touch System automatically switches to reversionary mode.

NOTE

In reversionary mode, the information is presented on the remaining display in the split-screen configuration. In reversionary mode, all important flight information is presented on the remaining display in the same format as in normal operating mode. The change to backup path is completely automated for all LRUs and no pilot action is required.

In case of <u>both</u> GDU Failure:

INSTRUCTION: revert to standby instrument.

4.11. COM failure

If Complete communication failure occurred and no other COM sources are available on board:

1. Transponder …………………………… *SQUAK 7600 CODE*
2. **Land as soon as possible**

4.12. NAV/GPS failure

In case of loss of navigation unit, try to inform ATC of emergency conditions and apply procedure 4.11 in addition to the following steps.

In case of loss of, or invalid NAV/GPS signal during en-route or terminal phase of flight:

1. Navigation Instrument …………………. *SWITCH to NAV/GPS source available*

If G3X Touch internal GPS is the only navigation source available:

2. Report to ATC and continue to flight under Visual Flight Rules.

If on an instrument approach at the time the navigation signal is lost:

1. Missed Approach …..………………….. *PERFORM*

NOTE

If the system automatically reverts to using the G3X Touch GPS navigation source due to unavailability of the GTN 650 Xi, if installed, GPS navigation data, 'REV' is display in the lower left quadrant of the HSI and VFR is displayed in the lower right quadrant on the PFD. In addition, a system status message 'Using internal GPS flight plan for navigation' is displayed.

CAUTION

The G3X Touch Internal GPS flight plan is only for VFR use.

5. Engine Securing

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

1.	Throttle Lever……………………………………..	*IDLE*
2.	Lane A & B Switches …………………………….	*OFF*
3.	Main Fuel Pump & Fuel Pump Switches ………	*OFF*
4.	Fuel Selector valve………………………………	*OFF*

6. Aircraft Evacuation

With the engine secured and propeller stopped:

1.	Parking brakes……………………….…………	*LOCK*
2.	Seat Belts…...………………………………….	*UNSTRAP*
3.	Headphones……………………………………...	*REMOVE*
4.	Canopy ....………………………………	*OPEN*
5.	Master switch…..…………………………………	*OFF*
6.	Escape away from flames/hot engine compartment/spilling fuel tanks/hot brakes	

7. POWERPLANT

7.1. Engine Failure during Take-off run

If engine fails before rotation: ABORT TAKE OFF

1. Throttle Lever ………………………….. *IDLE*
2. Brakes…………………………………… *AS REQUIRED*

With aircraft stopped

3. Lane A & B Switches ………………….. *OFF*
4. Fuel Selector valve……………………. *OFF*
5. Main Fuel Pump & Fuel Pump Switches ………………………………... *OFF*
5. Master Switch ……………..………… *OFF*
6. Parking Brake…………………………... *ENGAGED*
7. Aircraft Evacuation………..…………… *PERFORM if necessary*

7.2. Engine Failure after Take-off

<u>If engine fails immediately after becoming airborne:</u>

- ***Abort on the runway if possible.***

<u>In case low altitude precludes a runway stop and/or engine restart:</u>

1. Establish a glide attitude

- Find a suitable place on the ground to land safely

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

Any turn would reduce the glide performance.

2. Throttle Lever ……………………………...... *IDLE*
3. Brakes……………………………………… *As required*

With aircraft stopped

4. Fuel Selector valve...……………………… *OFF*
5. Main Fuel Pump & Fuel Pump Switches … *OFF*
6. Lane A & B Switches ….…….…………….. *OFF*
7. Master Switch ………………...…………… *OFF*
8. Parking Brake………………..………….. *ENGAGED*
9. Aircraft Evacuation…………….………….. *PERFORM if necessary*

7.3. Propeller Overspeed

In case of propeller overspeeding, apply following procedure:

1. Throttle Lever …..…………………………….... *REDUCE*
2. Propeller Lever ……….…………………….... *REDUCE*
3. Airspeed……………………………………….. *REDUCE to prevent propeller overspeed*
4. RPM indicator…………………………………. *CHECK*

If it is not possible to decrease propeller RPM, **land as soon as possible** applying Forced landing procedure.

CAUTION

Maximum propeller RPM exceedance may cause engine components damage.
Apply caution while accelerating with power lever close to max and monitor RPM; RPM overspeed shall be prevented by retarding thrust lever.

7.4. Coolant Temperature (CT) Limit Exceedance

7.4.1. HIGH COOLANT TEMPERATURE

If CT exceeds maximum limit:

1. Throttle lever ………………………… *REDUCE as practical*
2. Airspeed ..……………………………. *INCREASE*
3. CT……………………………………… *Verify decreasing*

If CT stabilizes in the green arc:

4. Continue flight

If CT continue to rise and engine shows roughness:

4. **Land as soon as possible a**pplying forced landing procedures (§15)
5. Expect an engine failure

7.5. Exhaust Gas Temperature (EGT) Limit Exceedance

7.5.1. HIGH EGT

1. Throttle Lever ………………………… *REDUCE as practical*
2. Airspeed ..……………………………. *INCREASE*
3. **Land as soon as practical**

7.6. Manifold Air Temperature (MAT) Limit Exceedance

7.6.1. HIGH MAT

1. Alternate Air ………………………….. *CHECK CLOSED*
2. Propeller Lever ……………………… *AS REQUIRED*
3. Throttle Lever ………………………… *FULL FWD*
4. Airspeed ..……………………………. *INCREASE*

7.7. Oil Temperature Limits Exceedance

7.7.1. HIGH OIL TEMPERATURE

NOTE *Maximum oil temperature limit exceedance can be the final effect of different causes: excessive friction between moving engine components, oil leakage from the circuit (with related pressure reduction) etc.*

1. Throttle Lever ……………………………. *REDUCE*
2. OIL TEMP…………………………………. *CHECK*

<u>If oil temperature does not decrease</u>

3. Airspeed…………………………………… *INCREASE*
4. OIL TEMP…………………………………. *CHECK*

<u>If oil temperature comes back within limits</u>

3. **Land as soon as practical**

<u>If oil temperature does not come back within limits</u>

3. **Land as soon as practical** with engine set to the minimum necessary power
4. Be prepared for an emergency landing and expected an engine failure

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

3. ENGINE……………….……….. *SECURE*
4. **Land as soon as possible** applying Forced landing procedure

7.8. Oil Pressure Limits Exceedance

7.8.1. LOW OIL PRESSURE

<u>If the oil pressure is under the lower limit</u>

1. Throttle Lever ………………… *REDUCE to minimum practical*
2. OIL TEMP……………………… *CHECK within limits*
3. OIL PRESS……………………. *CHECK*

<u>If oil pressure does not increase and temperature remains within limits</u>

4. OIL and CT………………….... *CHECK*
5. **Land as soon as practical**

<u>If oil pressure does not increase and temperature exceeds limits</u>

4. ENGINE ………………………. *SECURE*
5. **Land as soon as possible** applying Forced landing procedure

7.8.2. HIGH OIL PRESSURE

<u>If the oil pressure exceeds upper limit</u>

1. Thrust Lever…………………… *REDUCE*
2. OIL PRESS……………………. *CHECK*

<u>If oil pressure does not decrease</u>

3. ENGINE ……………………. *SECURE*
4. **Land as soon as possible** applying Forced landing procedure

8. FUEL SYSTEM

8.1. Fuel Temperature Limits Exceedance

8.1.1. LOW FUEL PRESSURE

1. Fuel Pump Switch ……… *ON*
2. Fuel Qty ……………………… *CHECK*
3. Fuel Selector …………………. *CHANGE*

<u>If fuel pressure does not increase</u>

4. Throttle Lever …………………. *REDUCE*
5. **Land as soon as possible**

<u>If engine stops:</u>

6. **Land as soon as possible** applying Forced landing procedure

8.1.2. HIGH FUEL PRESSURE

1. Fuel Pump Switch …….…. *OFF*
2. Fuel Qty ……………………… *CHECK*
3. Fuel Selector …………………. *CHANGE*

<u>If fuel pressure does not decrease</u>

4. Throttle Lever …………………. *REDUCE*
5. **Land as soon as possible**

<u>If engine stops:</u>

7. **Land as soon as possible** applying Forced landing procedure

8.2. LH / RH Fuel Level

Annunciator Light	Alert
	LH Fuel Level Low
	RH Fuel Level Low

<u>If ONE Low Fuel Level Caution Light is illuminated:</u>

1. Fuel Pump ……………………. *ON*
2. Opposite Tank Fuel Qty …….. *CHECK*
3. Fuel Selector ….………………. *CHANGE*
4. Engine parameters ……..…… *CHECK*

<u>If BOTH Low Fuel Level Caution Lights are illuminated:</u>

5. **Land as soon as possible**

NOTE

Flight plan has to be reviewed according to low fuel level in the tank. The remaining fuel in the tank equal to unusable fuel plus fuel required for 30 minutes at 75% MCP

9. In-flight Engine Restart

NOTE *Engine inflight restart could be performed in the whole aircraft envelope using the starter, even if the propeller is windmilling.*

NOTE *The propeller will normally continue to turn as long as the airspeed is above 60 KIAS. Should the propeller stop at an airspeed of 60 KCAS or more, the reason for this should be investigated before attempting a restart. <u>If the engine or propeller jamming is suspected, do not use the Starter.</u>*

1. Master switch………….…….….. *CHECK ON*
2. Propeller Lever ..……….…..... *FULL FWD*
3. Throttle Lever ..……….…....... *1-2 cm above IDLE*
4. Engine Alternate Air …..…...... *OPEN*
5. Fuel quantity indicator……..... *CHECK*
6. Fuel Selector valve..………..... *SWITCH TANK (if not empty)*
7. Fuel Pumps ……...………. *BOTH ON*
8. Lane A & B Switches ……..… *CHECK ON*

<u>If propeller is windmilling:</u>

9. Backup Battery Switches ..…. *ON*

<u>If propeller is not windmilling:</u>

10. Backup Battery Switches ..…. *ON*
11. Starter …………………….…. *PRESS THE BUTTON and RELEASE when above*

<u>In case of unsuccessful engine restart:</u>

12. Engine ……………….….… *SECURE*
13. **Land as soon as possible** applying *Forced landing procedure.(§15.1)*

<u>In case of successful engine restart:</u>

14. Throttle Lever ………….…..… *AS REQUIRED*
15. Engine Parameters …….…. *CHECK*

10. LANE A / LANE B Warning Light Illuminated or Flashing

Annunciator Light	Alert
	Lane A Fail/Fault
	Lane B Fail/Fault

1. **Land as soon as practical.**

NOTE

The Lane warning lights can flash or be permanently illuminated depending on the nature of the fault.
If a warning indicator remains on permanently, it indicates that an error with higher severity (Failure) has been detected by the internal testing procedures of the ECU. In this case, the ECU will continue to operate in an alternative control mode, which will transfer the control of ignition and injection to the error- free Lane.
Regular operation as well as alternative control modes of the ECU are able to represent the full engine power. The engine is operated in power-mode with increased fuel consumption.

NOTE

Refer to Rotax Operator and Maintenance Manuals for Maintenance troubleshooting

11. Smoke and Fire

11.1. Engine fire on the ground

1.	Main Fuel Pump & Fuel Pump Switches ………	*OFF*
2.	Lane A & B Switches …………………………….	*OFF*
3.	Cabin heat and defrost…………………………..	*OFF*
4.	Master Switch …………………...……………….	*OFF*
5.	Parking Brake …………………………………….	*LOCK*
6.	Fuel Selector valve……………………………...	*OFF*
7.	Aircraft Evacuation …………………………….	*PERFORM*

11.2. Engine fire during take-off

If engine fails before rotation: ***ABORT TAKE-OFF***

1.	Throttle Lever …………..…………………………	*OFF*
2.	Lane A & B Switches ……………………………	*OFF*
3.	Brakes……………………………………………..	*As required*
	With the aircraft under control	
4.	Fuel Selector valve…..…………………………..	*OFF*
5.	Main Fuel Pump & Fuel Pump Switches ………	*OFF*
6.	Cabin heat………………………………………...	*OFF*
7.	Master Switch …………………….………………	*OFF*
8.	Parking Brake …………………………………….	*ENGAGED*
9.	Aircraft Evacuation ..…………………………….	*PERFORM*

11.3. Engine fire in flight

1.	Fuel Selector valve....................................	*OFF*
2.	Main Fuel Pump & Fuel Pump Switches	*OFF*
3.	Lane A & B Switches	*OFF*
4.	Cabin heat and defrost................................	*OFF*
5.	Master Switch	*OFF*
6.	**Land as soon as possible** applying *Forced landing procedure*	

11.4. Electrical smoke or fire in cabin on the ground

1.	Master Switch..	*OFF*
2.	Cabin heat and defrost................................	*OFF*
3.	Cabin Ventilation	*OPEN*
4.	Throttle Lever	*IDLE*
5.	Main Fuel Pump & Fuel Pump Switches	*OFF*
6.	Lane A & B Switches	*OFF*
7.	Fuel Selector valve.....................................	*OFF*

With propeller stopped, evacuate the aircraft

11.5. Electrical smoke or fire in cabin during flight

1.	Cabin heat…………………………..	*OFF*
2.	Cabin ventilation……………………	*OPEN*
3.	In case of fire, direct the fire extinguisher toward the base of flame	

Initiate an emergency descent:

4. Flaps .... UP
5. Throttle lever .... IDLE
6. Airspeed .... *as required*

<u>If smoke persists:</u>

7. Master switch………………………. *OFF*
8. Load Shedding……………………. *PERFORM*
9. **Land as soon as possible**

*Turn on electrical equipment required to continue flight depending on the situation and **land as soon as possible**.*

12. FLIGHT CONTROLS

12.1. Electrical pitch trim control failure

Trim Runaway

In event of trim runaway:

1.	TRIM DISC switch…..………...	*ON*
2.	Airspeed …………...…………...	*ADJUST to control aircraft without excessive force*
3.	**Land aircraft as soon as practical**	

Trim Jamming

Should trim control be jammed/inoperative:

1.	Breaker………………………….	*CHECK IN*
2.	Airspeed and flaps…………...	*ADJUST to control aircraft without excessive force*
3.	**Land aircraft as soon as practical**	

12.2. Flaps control failure

1. Flaps position .... *Visually check position*
2. Airspeed ....*Maintain according to observed flap position*
3. Flaps position ....*Visually check movement while operating the flaps switch in all positions*

If flaps are stuck:

4. Consider possible degraded performance

CAUTION

If flaps are stuck at T/O or LDG consider higher aerodynamic drag, decreased specific range and 106 or 96 KIAS V_{MAX} according to actual flap setting. If exactly flaps position can be determined, observe the lower V_{FE} value.

5. Plan landing considering the actual flap setting (refer to the Table below)

Table 3-5 – Reference Approach Speed

CONFIGURAT.	V_{REF} (@MLW=720 kg / 1587 lbs)
Flaps UP	65 KIAS
Flaps T/O	61 KIAS
Flaps LDG	58 KIAS

NOTE

If flaps are stuck UP, plan landing using a flat approach and use power levers to control airplane speed and rate of descent.

If flaps are NOT stuck:

NOTE

Consider flaps indicator inoperative.

4. Flaps switch ....*as required*
5. Flaps position..*CHECK visually*

13. RECOVERY FROM UNINTENTIONAL SPIN

If unintentional spin occurs:

1. Throttle Lever……………………..… *IDLE*
2. Ailerons …………………………... *Neutral*
3. Rudder …………………………….. *Fully opposite to the direction of spin*
4. Control Stick ………………………. *Forward*
5. Flap……...………………………. *UP*

<u>When rotation stops:</u>

6. Rudder …………………………….. *NEUTRAL*
7. Attitude ……………………………. *RECOVERY promptly but smoothly, averting speed close to/in excess of V_{NE}*
8. Throttle Lever………………………. *As required*

WARNING

Keep full rudder against rotation until spin has stopped.

One complete turn and recovery will take about 800 to 1000 feet altitude loss.

14. UNINTENTIONAL FLIGHT INTO ICING CONDITIONS

1. Pitot heat…………………….. *CHECK ON*
2. Engine Alternate Air ……….. *CHECK OPEN*
3. *Fly immediately away from icing conditions (changing altitude and direction of flight, out and below of clouds, visible moisture, precipitation)*
4. Control surfaces……………. *MOVE continuously to avoid locking*
5. Throttle Lever ……………… *INCREASE to prevent ice build-up on propeller blades*

WARNING

In event of ice build-up in correspondence of wing leading edges, stall speed increases and stall may become asymmetric. In case of stabilator ice accretion, it may lose its efficiency, leading to lack of aircraft pitch control and loss of control.

15. RESCUE SYSTEM DEPLOYMENT (IF INSTALLED)

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

CAUTION

Full deployment of parachute is achieved in about 4 seconds.

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

CAUTION

Successful deployment depends on aircraft attitude and airspeed: greater deployment altitude yields better chances for successful deployment

1. Airspeed …………………….. *MINIMUM POSSIBLE (MAX SPEED 135 kts)*
2. Pull activation handle firmly and to end travel.

After Deployment:

3. Lane A & B …….………….. *SET OFF*
4. Fuel Selector ……………….. *SET OFF*
5. Master ………..…………….. *SET OFF*
6. Seat belts and harness ……. *TIGHTEN*
7. Assume emergency landing body position before impact
8. Evacuation …………….…….. *PERFORM*

16. Emergency Landing

16.1. Forced Landing without Engine Power

Preparation:

1.	Flaps……………………………………….	*UP*
2.	Airspeed…………………………………...	*ESTABLISH V_{GLIDE}*

NOTE *Glide ratio is about 9.7, therefore in zero wind conditions for every 1000 ft it is possible to cover about 1.6 NM. With propeller in windmilling glide ratio is about 9.5, therefore for every 1000 ft it is possible to cover about 1.5 NM.*

3.	Radio……………………………………….	*Transmit MAYDAY giving location and intentions*
4.	Transponder……………………………….	*Set EMERGENCY CODE*
5.	If off airport, ELT………………………….	*ON*
6.	Find a suitable place to land safely	
7.	Throttle Lever …………………………….	*IDLE*
8.	Fuel Selector valve……………………….	*OFF*
9.	Lane A & B Switches …………………….	*OFF*
10.	Main Fuel Pump & Fuel Pump Switches	*OFF*
11.	Seat Belts………………………………….	*Tightly FASTENED*

When landing is assured:

12.	Flaps……………………………………….	*As required*
13.	Landing Gear control knob* …………….	*DOWN: check three green lights ON*
14.	Master switch ……………………..……….	*OFF*

NOTE *Be prepared for aircraft evacuation.*

**) applicable for aircraft embodying MOD2002/245 LG extraction simulation*

16.2. Power on forced landing

1. Flaps………………………………………….. *UP*
2. Airspeed……………………………………… *ESTABLISH V_{GLIDE}*

NOTE *Glide ratio is about 9.7, therefore in zero wind conditions for every 1000 ft it is possible to cover about 1.6 NM. With propeller in windmilling glide ratio is about 9.5, therefore for every 1000 ft it is possible to cover about 1.5 NM.*

3. Find a suitable place to land safely
4. Safety Belts………………………………….. *Tightly FASTENED*

When landing is assured:

5. Flaps………………………………………….. *As necessary*
6. Landing Gear control knob* ………………. *DOWN: check three green lights ON*
7. Fuel selector valve………………………….. *OFF*
8. Main Fuel Pump & Fuel Pump Switches…. *OFF*
9. Lane A & B Switches ……………………….. *OFF*
10. Master switch ……………………………….. *OFF*

NOTE *Be prepared for aircraft evacuation.*

**) applicable for aircraft embodying MOD2002/245 LG extraction simulation*

17. Landing Gear Failures*

17.1. Failed extension

NOTE *Landing Gear extension failure is identified by means of the green lights not illuminated.*

1. Continue Flight

17.2. Failed retraction

NOTE *Landing Gear failed retraction is identified by means of the green lights or red light illuminated.*

1. Continue Flight

17.3. Unintentional landing gear extension

NOTE *Unintentional landing gear extension is identified by means of the green lights or red light illuminated during flight.*

1. Continue Flight

**) applicable for aircraft embodying MOD2002/245 LG extraction simulation*

SECTION 4
NORMAL PROCEDURES

INDEX

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1. Introduction

Section 4 describes checklists and recommended procedures for the conduct of normal operations for *P-MENTOR* aircraft.

NOTE

RPM indicated inside round brackets are to be intended as Propeller RPM

2. Airspeeds for normal operations.

The following airspeeds are those which are significant for normal operations.

SPEEDS	FLAPS	MTOW 720 kg (1587 lb)
Rotation Speed (V_R)	T/O	53 KIAS
Best Angle-of-Climb Speed (V_X)	UP	65 KIAS
Best Rate-of-Climb Speed (V_Y)	UP	70 KIAS
Best Angle-of-Climb Speed (V_X)	TO	56 KIAS
Best Rate-of-Climb Speed (V_Y)	TO	61 KIAS
No flaps approach speed (V_{REF})	UP	65 KIAS
Approach speed (V_{REF})	T/O	61 KIAS
Final Approach Speed (V_{REF})	LN	58 KIAS
Glide Speed (V_{GLIDE})	UP	70 KIAS
Manoeuvring Speed (V_A)	UP	102 KIAS
Never Exceed Speed (V_{NE})	UP	135 KIAS

3. Pre-Flight Inspection

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

3.1. Cabin Inspection

1. Aircraft documents ……………….. *CHECK valid and on board*
2. Weight and balance ……………… *CALCULATE (ref. to Section 6) and CHECK within limits*
3. Breakers……………………………. all IN
4. Safety belts…………………………. *CONNECTED to hard points, and CHECK condition*
5. Lane A & B Switches ……………… *OFF*
6. Master switch ……………………… *ON*
7. Voltmeters …………………………. *CHECK within limits*
8. External Lights ……………………. *All ON, CHECK for operation*
9. Pitot ………………………………… *REMOVE cover*
10. Acoustic stall warning…………… *CHECK for operation*
11. Pitot heater ………………………… *CHECK WARM and SET OFF*
    CHECK Pitot Heat Light ON
12. External Lights ……………………. *SET OFF*
13. Master switch ……………………… *OFF*
14. Baggage ……………………………. *CHECK: ELT fire extinguisher, luggage secured with restraint net*

3.2. Aircraft Walk-Around

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

WARNING

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

WARNING

Fuel level indicated by the cockpit indicators should be verified by visual check of actual fuel quantity embarked in the tanks.

NOTE

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

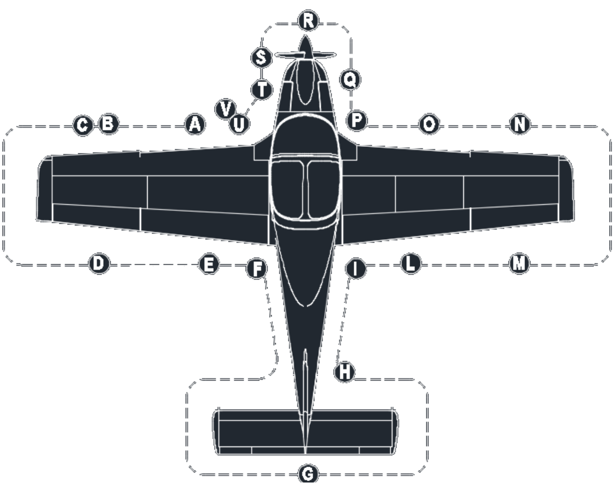

FIG. 4-1

A Left fuel filler cap: check visually for desired fuel level. Drain the left fuel tank by drainage valve using a cup to collect fuel (drainage operation must be carried out with the aircraft parked on a level surface). Check for water or other contaminants. Close filler cap.

B Remove protection plug (if provided) and check the Pitot tube and the static ports mounted on left wing are unobstructed; do not blow inside vents.

C Left side leading edge and wing skin: visual inspection. Visual inspection of the Nav/Strobe lights.

D Left aileron, trim tab and hinges: visual inspection, check free of play, friction; Left tank vent: check for obstructions.

E Left flap and hinges: visual inspection

F Left main landing gear: check inflation, tire condition, alignment, fuselage skin condition.

G Horizontal tail and tab: visual inspection, check free of play, friction.

H Vertical tail, rudder and trim tab: visual inspection, check free of play, friction. Visual inspection of the /Strobe light.

I Right main landing gear; check inflation, tire condition, alignment, fuselage skin condition.

L Right flap and hinges: visual inspection.

M Right aileron, trim tab and hinges: visual inspection, check free of play, friction; Right side tank vent: check for obstructions.

N Right leading edge and wing skin: visual inspection. Visual inspection of the Nav/Strobe lights.

O Right fuel filler cap: check visually for desired fuel level. Drain the right fuel tank by the drainage valve using a cup to collect fuel. Drainage operation must be carried out with the aircraft parked on a level surface. Check for water or other contaminants. Close filler cap.

P Set the fuel selector valve to ON. Drain circuit using a cup to collect fuel by opening the specific drainage valve (part of the gascolator). Check for water or other contaminants.

Q Nose wheel strut and tire: check inflation, tire and rubber shock absorber disc condition.

R Propeller and spinner condition: check for nicks, cracks, dents and other defects, propeller should rotate freely. Check fixing and lack of play between blades and hub. Visual inspection of Taxi/Landing light.

S Open engine cowling:

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. *<u>Only before the first flight of the day:</u>*
   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 propeller by hand in direction of engine rotation several times and observe engine for odd noises or excessive resistance and normal compression.
   c. 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 Lanes 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 safety.

T Close engine cowling, check for proper alignment of cam-locks.

U *reserved*

V Remove tow bar and chocks, stow on board pitot, static ports and stall warning protective covers.

4. Checklist

NOTE

Due to the limited dimensions of the cockpit, it might be helpful to connect the headset before sitting down. In night conditions, the operation of an handheld torch could aid to better locate the aircraft headsets plugs.

NOTE

The map lights and instrument dimming rheostats are not directly illuminated. In preparation for or during dusk and night operations, it is recommended to gradually set the desired level of brightness as the ambient lighting conditions change. In addition, maintaining the left map light at an appropriate level of brightness and orientation throughout the ground operations and flight, allows to better locate unilluminated items in the cockpit without impairing night vision. However, with very little cockpit familiarization time it becomes easy to locate the three rheostats only via tactile cues.

4.1. Before Starting Engine

1. Pre-flight inspection …………………….. *Complete*
2. Master switch ……………………………. *ON*
3. Instrument light ….………………………. *AS REQUIRED*
4. Seat position and safety belts…..……… *Adjust*

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.

5. Flight controls …………………………… *Operate full stroke checking for movement smoothness, free of play and friction*
6. Parking brake (left side central pedestal) ……………………………………….……. *CHECK LOCK*
7. Propeller Lever ………………………... *FULL FWD*

8.	Landing gear control knob* ……………..	*CHECK DOWN – three green lights ON*
9.	Throttle Lever …………………………...	*Check for freedom of movement*
10.	Throttle Lever …………………………...	*IDLE*
11.	Lane A and B Switches …………………	*BOTH OFF*
12.	Circuit Breakers ………………………….	*CHECK all IN*
13.	Avionic Master …………………………...	*ON, check instruments and check Voltage on Essential Buses.*
14.	Standby Instrument ………………………	*Check no red crosses displayed*
15.	Fuel quantity ……………………………..	*compare the fuel quantity indicators with fuel quantity visually checked into the tanks*
16.	Annunciator Panel ……………………..	*PUSH TEST BUTTON and CHECK lights*
17.	Alternate Air ……..……..……………..	*CHECK CLOSED*
18.	Flap control……………………………..	*Cycle fully extended and then set to T/O*
19.	Pitch Trim……………………………….	*Cycle fully up and down, then set to NEUTRAL*
20.	Nav & Strobe lights ..…………………….	*ON*
21.	Canopy ..………………………………….	*Closed and locked*

**) applicable for aircraft embodying MOD2002/245*

4.2. Engine Starting

1. Fuel selector valve…………………..….. *Select the tank with less fuel*
2. Propeller area…………………………. *Check that area is clear of persons / objects*

WARNING

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

CAUTION

Do not overheat the starter. Do not operate the starter for more than 10 seconds. After operating the starter, let it cool down for 2 minutes.

3. Main Fuel Pump …...…….…………….. *ON*
4. Lane A & B Switches …..…………... *ON*
5. Propeller Lever …………..……………... *FULL FWD*
6. Throttle Lever ………………………. *1-2 cm above IDLE*
7. Start power Switch ……..…………... *HOLD ON and perform points 7.1 and 7.2:*

   7.1 Check:

   - Both Lane Warning Lamps illuminate and extinguish after around 3 seconds
   - Fuel pressure stabilized in green arc

   7.2 Engine starter

   - Starter ………………………..…. *PRESS and RELEASE when >1500 (620) RRPM*
   - Start Power Switch ………. *RELEASE*

8. Throttle Lever ………………………. *AS REQUIRED*
9. Check :

- Oil Pressure rise within 10 seconds
- Lane A Warning lamp OFF
- Lane B Warning lamp OFF

CAUTION

If LANE warning lamp flashes or lights up, perform a Lane check. Both warning lamps must be deactivated, otherwise there is an error.

10.	Engine instrument ………………………	*CHECK*
11.	Throttle Lever …………………………...	*SET to 2500 (1000) RPM and hold for 5 sec.*
12.	Electrical Parameters …………………	*CHECK Essential Bus more than 14 Volt*
13.	Throttle Lever …………..…………….	*IDLE*

4.3. Warm Up

1.	Oil Pressure ………………...…………	*CHECK if above 3 bar*
2.	Throttle Lever…………………….......	SET to 2000 (820) RPM for 2 minutes
3.	Throttle Lever…………………….......	SET to 2500 (1000) RPM
4.	Oil temperature ……………………..	CHECK above 50 °C (120 °F)
5.	Throttle Lever…………………….......	IDLE
6.	Engine Parameters…………………	CHECK
7.	Temperatures and Pressure	CHECK

4.4. Before taxing

1.	Flight instruments ………………..………	*SET AS REQUIRED*
2.	Altimeters…………………………….……	*SET*

4.5. Taxiing

1.	Parking brake (left side central pedestal)...	*Release*
2.	Brakes……………………………………	*Check*
3.	Flight Instruments………………………	*Check altimeters*

4.6. Before Take-off

1. Parking brake (left side central pedestal).............. LOCK, then PRESS brake pedal
2. External Lights ……………………..……...……….. As Required
3. Engine Parameters…………………….……..…….. CHECK
4. Fuel Pump ………………………..………..……….. ON
5. Fuel Selector ..…………...……………………… SELECT the fullest tank
6. Fuel Pressure…………………………….………... CHECK
7. Propeller Lever…………………...……...……….. FULL FWD
8. Throttle Lever…………………...……...……….. *Short FULL throttle to check MAX engine speed*
9. Throttle Lever……………………..………..……….. SET to 4000 (1650) RPM
10. <u>Lane and Ignition Check :</u>

<u>LANE B CHECK:</u>

a. Lane A Switch ……………………………………… OFF

b. Check:

- Engine RPM (about 250 (100) RPM drop/increase)
- Lane A Warning Lamp ON
- Lane B Warning Lamp OFF
- NO Coolant temperature
- NO Exhaust gas temperature
- NO Oil Pressure
- NO Fuel Flow (if available)

c. Lane A Switch ……………………………………… ON

d. Lane A Warning Light……………………………… Extinguish after around 3 sec.

LANE A CHECK :

a. Lane B Switch ……………………………… OFF

b. Check:

- Engine RPM (about 250 RPM drop/increase)
- Lane A Warning Lamp OFF
- Lane B Warning Lamp ON
- NO Oil temperature
- NO Oil Pressure
- NO Fuel Flow (if available)

c. Lane B Switch ……………………………… ON

d. Lane B Warning Light ……………………… Extinguish after around 3 sec.

11. Throttle Lever ..………………..………………. SET to 2000 (820) RPM

12. Fuel Pump Check :

a. Fuel Pressure ..……………….……………… Check within green arc

b. Fuel Pump ……………….……..……………. OFF for 5 sec.

c. Fuel Pressure..……………….……………… CHECK within green arc

d. Fuel Pump..…………………..…...…………… ON

e. Main Fuel Pump …………….……………….. OFF for 5 sec.

f. Fuel Pressure..……………….……………… CHECK within green arc

g. Main Fuel Pump ……………..…………….... ON

13. Throttle Lever…...………………..…………… SET to 4300 (1770) RPM

14. Governor Check :

- Decrease speed to 3800 RPM with propeller lever
- Move Propeller Lever FULL FWD
- Cycle 3 times
- Verify that the governor closely and firmly controls the RPM

15. Alternate Air ……….…………………..………………… PULL and CHECK Manifold Temperature INCREASE then PUSH IN

16. Throttle Lever…………………….…..……………… As Required

17. Alternate Air …………………………..……………… CHECK CLOSED

18. Pitot heat …..…………………….…..……………… AS REQUIRED

    If flight into icing condition (in visible moisture below +5°C) is anticipated or encountered, ACTIVATE the pitot ice protection system.

19. Flaps ……………………………..…..……………… CHECK T/O

20. Pitch Trim …………………………...………..…… CHECK NEUTRAL

21. Flight controls ………………….....……………… CHECK Free

22. Transponder …………………...………………... CHECK

23. Fuel Pumps ..………………….....……………….. CHECK BOTH ON

24. Seat Belts……………………….....……………… CHECK Fastened

25. Canopy…………………………....……………….. CHECK closed and locked

4.7. Take-off

1. Parking brake (left side central pedestal)... *Release*
2. Brakes…………………………………. *Apply*
3. Propeller Lever ……………………... *FULL FORWARD*
4. Throttle Lever ………………………... *FULL and CHECK approximately 5700 (2350) RPM*
5. Engine parameters…………………… C*heck within the limits*
6. Brakes………...…………………….. *Release*
7. At rotation speed……………………… *Rotate*

At safe altitude

8. Flaps…………………..……………. *UP*
9. Landing gear control knob* …………. *UP: check green lights and red light turned OFF in about 10”*

NOTE *Expect to adjust pitch trim (pitch up) when retracting flaps after take-off.*

10. Attitude………………………………… *As required for en-route climb*
11. Fuel pump ………..……………..…… *OFF*
12. Landing light ……..……………..…… *OFF*

**) applicable for aircraft embodying MOD2002/245*

4.8. Climb

1. Propeller Lever …………….…………….... *As required*
2. Throttle Lever ……………………………... *As required*
3. Engine parameters………………………... *In the allowed range*

4.9. Cruise

1. Power …………………………….. *Set performance as required, refer to table in section 5 of AFM*
2. Fuel tank selector………………….. *As required to maintain symmetric balance*
3. Engine parameters………………... *Monitor*

NOTE *Switch on the electric fuel pump prior to swap the fuel feeding from one tank to another*

4.10. Descent

1. Throttle Lever ……………………..……….. *AS REQUIRED*
2. Pitot Heat …..…………………..……….. *AS REQUIRED*
3. Alternate Air ………………….……..……….. *AS REQUIRED*

4.11. Before Landing

1. Propeller Lever ....…...…………………. *FULL FORWARD*
2. Fuel pump ……...……………………. *ON*
3. Fuel selector valve…………………...…. *Select the fullest tank*
4. Landing Light…………...……………..…. *ON*

On downwind, leg abeam touch down point

5. *Landing gear control knob* …………..* *DOWN: check green lights ON*
6. Flaps……………………..……………... *Set T/O (below 106 KIAS)*

NOTE *Expect to adjust pitch trim (pitch down) when extending flaps to T/O or LAND*

7. Approach speed…………..…………… *Set*
8. Flaps…………………………………….. *LAND (below 96 KIAS)*
9. Final Approach Speed…………………. *Set*

CAUTION *In conditions such as (e.g.) strong crosswind, gust, danger of windshear or turbulence a higher approach speed shall be selected.*

4.12. Balked landing/Missed Approach/Go-Around

1. Throttle Lever ………………..…….. *FULL FORWARD*
2. Attitude………………………………. *Attain climb speed*

Above a safe altitude

3. Flaps………………………………. *UP*
4. Landing gear control knob* ………. *UP as positive climb is achieved*

**) applicable for aircraft embodying MOD2002/245*

4.13. Landing

1. Throttle Lever ………………………………….. *IDLE at touchdown*
2. Brakes……………………………………………. *Apply*
3. Flaps……………………………………………… *UP*
4. Fuel Pump ……….……………………………… *OFF*
5. Pitot Heat ………………………………………… *CHECK OFF*
6. External lights ……………………….………….. *As required*
7. Transponder …………………………………….. *As required*

4.14. Engine Shutdown

1. Parking brake (left side central pedestal)........... *Set*
2. Throttle Lever ..…………………………………… *IDLE*
3. Flaps…………………….………………………… *CHECK UP*
4. External lights…………….…………………….. *As required*
5. Alternate Air ……….………………….……….. *CHECK OFF*
6. Lane A & B switches ……………………………. *OFF*
7. Main Fuel Pump switch ……….………………… *OFF*
8. All electric/avionic/lights switches…..…………... *OFF*
9. Master Switch ..…………………..…….………… *OFF*
10. Fuel Selector ..…………………..……….……… *OFF*

WARNING

For safety, verify propeller is fully stopped before any other action.

4.15. Post-flight checks

1.	Wheel chocks ………………………………..	*Set*
2.	Parking brake (left side central pedestal) ……………….……………………………...	*Release*
3.	Canopy………………………………………….	*Close and Lock*
4.	Protection covers…………………………..	*Install*

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SECTION 5
PERFORMANCE

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.

NOTE *RPM indicated inside round brackets are to be intended as Propeller RPM*

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

- "Flight Test Data" under conditions prescribed by EASA CS-23 regulation
- 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 Performance 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. *RESERVED*

4. Gradient / Rate (ft/min) of climb / descent

GRADIENT			GROUND SPEED (kts)											
%	DEG	ft/NM	80	90	100	110	120	130	140	150	160	170	180	190
0.5	0.3	30	41	46	51	56	61	66	71	76	81	86	91	96
1.0	0.6	61	81	91	101	111	122	132	142	152	162	172	182	192
1.5	0.9	91	122	137	152	167	182	197	213	228	243	258	273	289
2.0	1.1	122	162	182	202	223	243	263	283	304	324	344	364	385
2.5	1.4	152	202	228	253	278	304	329	354	380	405	430	456	481
3.0	1.7	182	243	273	304	334	364	395	425	456	486	516	547	577
3.5	2.0	213	283	319	354	390	425	460	496	531	567	602	638	673
4.0	2.3	243	324	364	405	445	486	526	567	607	648	688	729	769
4.5	2.6	273	364	410	455	501	546	592	637	683	728	774	819	865
5.0	2.9	304	405	455	506	556	607	657	708	759	809	860	910	961
5.5	3.1	334	445	501	556	612	667	723	779	834	890	945	1001	1057
6.0	3.4	365	485	546	607	667	728	788	849	910	970	1031	1092	1152
6.5	3.7	395	525	591	657	723	788	854	920	985	1051	1117	1182	1248
7.0	4.0	425	566	636	707	778	849	919	990	1061	1131	1202	1273	1344
7.5	4.3	456	606	682	757	833	909	985	1060	1136	1212	1288	1363	1439
8.0	4.6	486	646	727	808	888	969	1050	1131	1211	1292	1373	1454	1534
8.5	4.9	516	686	772	858	943	1029	1115	1201	1287	1372	1458	1544	1630
9.0	5.1	547	726	817	908	999	1089	1180	1271	1362	1452	1543	1634	1725
9.5	5.4	577	766	862	958	1054	1149	1245	1341	1437	1532	1628	1724	1820
10.0	5.7	608	806	907	1008	1108	1209	1310	1411	1511	1612	1713	1814	1915
10.5	6.0	638	846	952	1058	1163	1269	1375	1481	1586	1692	1798	1904	2009
11.0	6.3	668	886	997	1107	1218	1329	1439	1550	1661	1772	1882	1993	2104
11.5	6.6	699	926	1041	1157	1273	1388	1504	1620	1735	1851	1967	2083	2198
12.0	6.8	729	965	1086	1207	1327	1448	1569	1689	1810	1931	2051	2172	2292
12.5	7.1	760	1005	1130	1256	1382	1507	1633	1759	1884	2010	2135	2261	2387
13.0	7.4	790	1044	1175	1306	1436	1567	1697	1828	1958	2089	2219	2350	2480
13.5	7.7	820	1084	1219	1355	1490	1626	1761	1897	2032	2168	2303	2439	2574
14.0	8.0	851	1123	1264	1404	1544	1685	1825	1966	2106	2247	2387	2527	2668
14.5	8.3	881	1163	1308	1453	1599	1744	1889	2034	2180	2325	2470	2616	2761
15.0	8.5	911	1202	1352	1502	1652	1803	1953	2103	2253	2404	2554	2704	2854
15.5	8.8	942	1241	1396	1551	1706	1861	2016	2172	2327	2482	2637	2792	2947
16.0	9.1	972	1280	1440	1600	1760	1920	2080	2240	2400	2560	2720	2880	3040
16.5	9.4	1003	1319	1484	1649	1814	1978	2143	2308	2473	2638	2803	2968	3132
17.0	9.7	1033	1358	1527	1697	1867	2037	2206	2376	2546	2716	2885	3055	3225
17.5	9.9	1063	1397	1571	1746	1920	2095	2269	2444	2619	2793	2968	3142	3317
18.0	10.2	1094	1435	1615	1794	1973	2153	2332	2512	2691	2870	3050	3229	3409
18.5	10.5	1124	1474	1658	1842	2026	2211	2395	2579	2763	2948	3132	3316	3500
19.0	10.8	1154	1512	1701	1890	2079	2268	2457	2646	2835	3024	3213	3403	3592
19.5	11.0	1185	1551	1744	1938	2132	2326	2520	2714	2907	3101	3295	3489	3683
20.0	11.3	1215	1589	1787	1986	2185	2383	2582	2780	2979	3178	3376	3575	3773
20.5	11.6	1246	1627	1830	2034	2237	2440	2644	2847	3051	3254	3457	3661	3864
21.0	11.9	1276	1665	1873	2081	2289	2497	2706	2914	3122	3330	3538	3746	3954
21.5	12.1	1306	1703	1916	2129	2341	2554	2767	2980	3193	3406	3619	3832	4044
22.0	12.4	1337	1741	1958	2176	2393	2611	2829	3046	3264	3481	3699	3917	4134

A rule of thumb to find the rate of climb/descent in (ft/min) is multiply Ground Speed (Kts) by gradient of climb/descent (in percent).

Example:

Given ***Find***

a. Ground Speed = 100 Kts →c. Corresponding Rate of Climb = 1200 ft/min

b. Gradient = 12%

5. Airspeed Indicator System Calibration

Indicated airspeeds provided in this flight manual assume zero instrument error for all flap configurations.

Normal Static Source

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

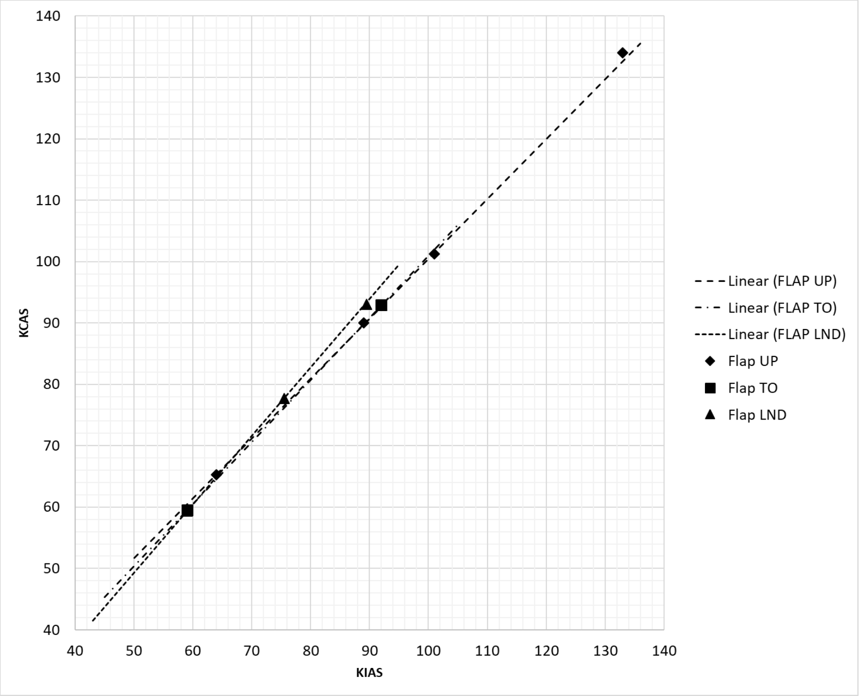

FIG. 5-1. CALIBRATED VS INDICATED AIRSPEED

Given	***Find***
KIAS *79* *Flap: UP*	KCAS *79*

6. ICAO Standard Atmosphere

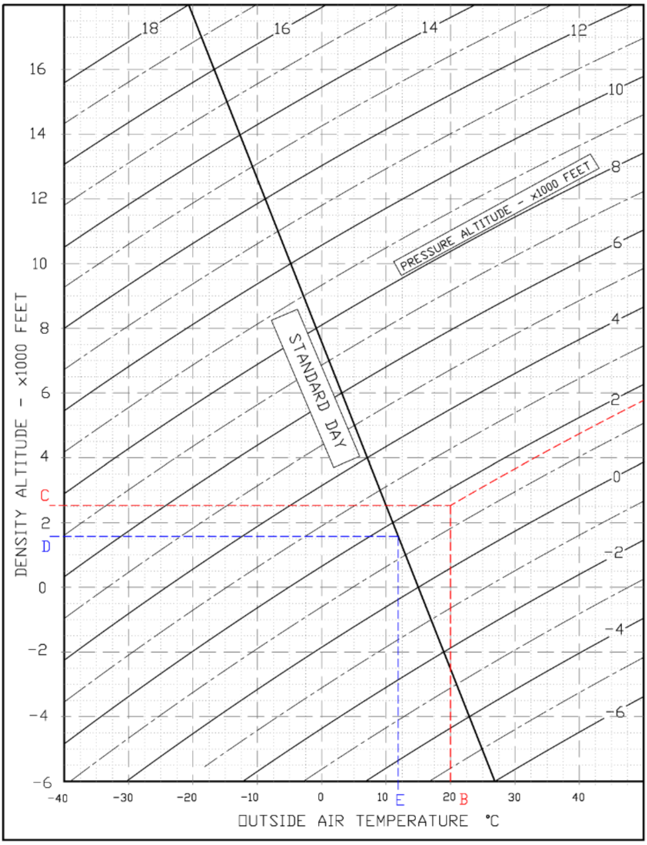

Figure 5-1 - ICAO Chart

Examples:

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

7. Stall Speed

Weight: 720 kg (1587 lb)
Thrust Lever: IDLE
CG: Most Forward (23%)

WEIGHT [kg] ([lb])	BANK ANGLE [deg]	STALL SPEED					
		FLAPS 0°		FLAPS T/O		FLAPS FULL	
		KIAS	KCAS	KIAS	KCAS	KIAS	KCAS
720 (1587) (FWD C.G.)	**0**	50	50	47	46	45	43
	15	51	51	48	47	46	44
	30	54	54	51	49	48	46
	45	60	59	56	55	53	51
	60	71	71	66	65	63	61

8. Crosswind

Maximum demonstrated crosswind is 10 kts.

⇒ *Example:*

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

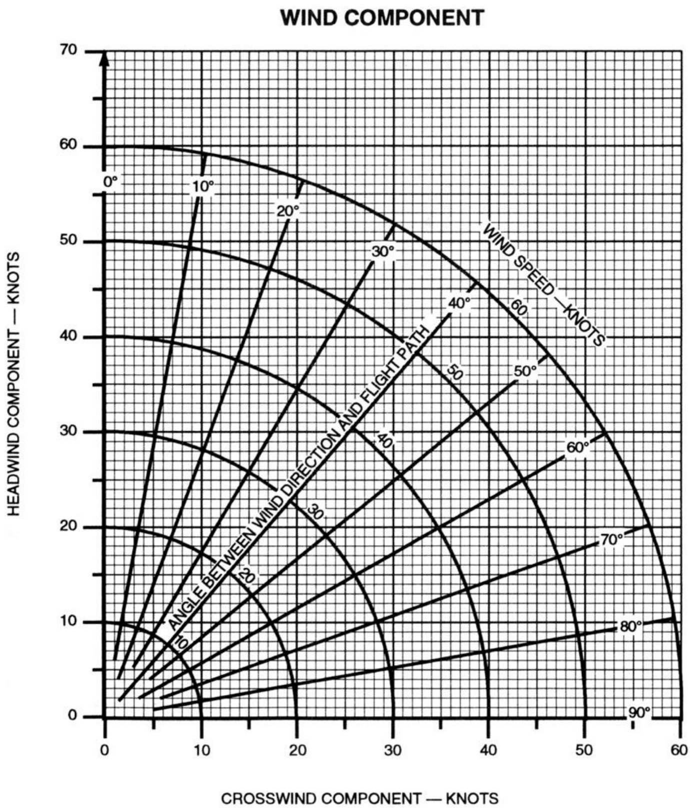

Figure 5-2 - Crosswind Chart

9. Take-Off Performance

The following factors are to be applied to the computed take-off distance for the noted condition:

Wind:

The following wind corrections are calculated considering the 50% of headwind component and 150% of tailwind component.

- ***Headwind**: subtract 5% and 4% respectively from the ground and total distances for each 3 knots headwind.*
- ***Tailwind**: add 19% and 15% respectively to the ground and total distances for each 3 knots tailwind.*

Grass runways:

Add 20% to the ground roll distance.

Runway slope:

Increase ground roll distance for each 1% upslope, applying the following factors:

- 11% at Sea level
- 14% at 5000 ft
- 20% at 10000 ft

Decrease ground roll distance for each 1% downslope, applying the following factors:

- 9% at Sea level
- 11% at 5000 ft
- 15% at 10000 ft

Weight Correction:

Consider about 17% of take-off distance reduction for each 50 kg (100 lb) of weight reduction.

Weight: 720 kg (1587 lbs) V_R : 53 KIAS V_{50ft} : 61 KIAS		Flaps: T/O Propeller Lever: FULL FWD Throttle Lever: FULL FWD Runway: dry, paved and level													
Press Alt [ft]		Distance [m / ft]													
		Temperature [°C / °F]													
		-25/-13		-15/5		0/32		15/59		30/86		50/122		ISA	
		[m]	[ft]	[m]	[ft]	[m]	[ft]	[m]	[ft]	[m]	[ft]	[m]	[ft]	[m]	[ft]
0	GR	240	787	259	850	288	945	319	1046	351	1151	397	1302	**319**	**1046**
	50ft	366	1200	394	1292	439	1440	486	1594	535	1755	604	1981	**486**	**1594**
1000	GR	257	843	277	909	309	1014	342	1122	376	1233	425	1394	**337**	**1105**
	50ft	392	1286	422	1384	470	1542	521	1709	573	1879	647	2122	**514**	**1686**
2000	GR	276	905	297	974	331	1086	366	1200	403	1322	458	1502	**357**	**1171**
	50ft	420	1378	453	1486	504	1653	558	1830	615	2017	698	2289	**544**	**1784**
3000	GR	296	971	319	1046	355	1164	393	1289	433	1420	503	1650	**378**	**1240**
	50ft	450	1476	486	1594	541	1774	599	1965	659	2162	766	2512	**575**	**1886**
4000	GR	317	1040	342	1122	381	1250	422	1384	470	1542	552	1811	**400**	**1312**
	50ft	483	1584	521	1709	580	1902	642	2106	716	2348	841	2758	**609**	**1998**
5000	GR	341	1118	367	1204	409	1342	454	1489	516	1692	606	1988	**423**	**1387**
	50ft	519	1702	559	1834	623	2043	691	2266	787	2581	923	3027	**645**	**2116**
6000	GR	366	1200	394	1292	439	1440	499	1637	567	1860	665	2181	**448**	**1469**
	50ft	557	1827	601	1971	669	2194	761	2496	865	2837	1014	3326	**683**	**2240**
7000	GR	393	1289	424	1391	480	1574	549	1801	624	2047	730	2394	**485**	**1591**
	50ft	599	1965	646	2119	731	2398	837	2745	950	3116	1113	3651	**739**	**2424**
8000	GR	423	1387	458	1502	529	1735	604	1981	685	2247	802	2631	**524**	**1719**
	50ft	644	2112	698	2289	805	2640	921	3021	1044	3424	1222	4008	**799**	**2621**
9000	GR	457	1499	505	1656	582	1909	665	2181	753	2470	880	2886	**567**	**1860**
	50ft	696	2283	769	2522	887	2909	1013	3323	1148	3765	1341	4398	**864**	**2834**
10000	GR	504	1653	557	1827	641	2102	731	2398	828	2716	967	3172	**613**	**2011**
	50ft	768	2519	848	2781	976	3201	1114	3654	1262	4139	1473	4831	**934**	**3064**

10. Take-Off Rate of Climb

Throttle Lever: Full FWD, Propeller Lever: Full Forward Flaps Take-off Vy=61 kts (IAS)								
Weight [kg/lbs]	Pressure Altitude [ft]	Rate of Climb [ft/min]						
		Temperature [°C/°F]						
		-25/-13	-15/5	0/32	15/59	30/86	50/122	ISA
720 / 1587	0	822	762	678	599	525	433	**599**
	2000	712	654	571	493	421	331	**513**
	4000	603	546	464	388	317	228	**428**
	6000	495	438	358	283	213	126	**342**
	8000	386	331	252	178	110	24	**256**
	10000	278	224	146	74	6	-78	**171**
	12000	171	117	41	-30	-96	-179	**85**
	13000	117	64	-11	-82	-147	-229	**42**
670 / 1477	0	928	865	776	693	615	518	**693**
	2000	812	750	663	581	504	409	**602**
	4000	697	636	550	470	394	301	**512**
	6000	582	522	438	359	285	193	**421**
	8000	468	409	326	248	175	85	**331**
	10000	354	296	214	138	67	-22	**240**
	12000	240	183	103	28	-42	-129	**150**
	13000	183	127	48	-27	-96	-182	**104**
620 / 1367	0	1048	981	886	798	715	611	**798**
	2000	925	859	766	679	597	496	**701**
	4000	802	738	646	560	480	381	**605**
	6000	680	616	526	442	364	266	**509**
	8000	558	496	407	325	247	151	**412**
	10000	437	376	289	208	132	37	**316**
	12000	316	256	171	91	16	-76	**220**
	13000	256	196	112	33	-41	-133	**172**

11. En-Route Rate of Climb

Throttle Lever: Full FWD, Propeller Lever: 5500 (2265) RPM Flaps UP Vy=70 kts (IAS)								
Weight [kg/lbs]	Pressure Altitude [ft]	Rate of Climb [ft/min]						
		Temperature [°C/°F]						
		-25/-13	-15/5	0/32	15/59	30/86	50/122	ISA
720 / 1587	0	855	797	714	638	566	477	**638**
	2000	748	691	610	535	464	377	**554**
	4000	642	586	507	433	363	277	**471**
	6000	536	481	403	330	262	177	**388**
	8000	431	377	300	229	162	78	**304**
	10000	326	272	197	127	61	-21	**221**
	12000	221	169	95	26	-39	-119	**138**
	13000	169	117	44	-24	-88	-168	**96**
670 / 1477	0	957	895	808	727	651	557	**727**
	2000	844	784	698	618	544	451	**639**
	4000	732	672	588	510	436	345	**551**
	6000	620	561	479	402	330	240	**463**
	8000	508	451	370	294	223	135	**374**
	10000	397	340	261	187	117	30	**286**
	12000	286	231	153	80	11	-74	**198**
	13000	231	176	98	26	-42	-126	**154**
620 / 1367	0	1072	1007	914	828	747	646	**828**
	2000	952	888	797	712	632	533	**734**
	4000	833	769	680	596	518	421	**640**
	6000	713	651	563	481	404	309	**546**
	8000	594	533	447	366	291	197	**452**
	10000	476	416	331	252	178	85	**358**
	12000	358	299	216	138	65	-26	**264**
	13000	299	240	158	81	9	-81	**217**

12. Cruise Performance

Pressure Altitude: ***Sea level***

	ISA-10°C			ISA			ISA+30°C		
RPM	MAP	Fuel/Flow	TAS	MAP	Fuel/Flow	TAS	MAP	Fuel/Flow	TAS
[-]	[inHg]	[l/hr]/[USg/hr]	[kts]	[inHg]	[l/hr]/[USg/hr]	[kts]	[inHg]	[l/hr]/[USg/hr]	[kts]
5000 (2060)	23.9	16.5 / 4.4	100	24.7	16.3 / 4.3	101	26.9	16.5 / 4.4	104
4800 (1975)	21.4	14 / 3.7	93	22.2	14 / 3.7	93	24.3	14 / 3.7	96
4300 (1770)	20.6	11 / 2.9	83	21.4	11 / 2.9	83	23.5	11 / 2.9	86

Pressure Altitude: ***5000 ft***

	ISA-10°C			ISA			ISA+30°C		
RPM	MAP	Fuel/Flow	TAS	MAP	Fuel/Flow	TAS	MAP	Fuel/Flow	TAS
[-]	[inHg]	[l/hr]/[USg/hr]	[kts]	[inHg]	[l/hr]/[USg/hr]	[kts]	[inHg]	[l/hr]/[USg/hr]	[kts]
5000 (2060)	23.3	16.5 / 4.4	106	24.1	16.5 / 4.4	107	26.4	16.5 / 4.4	110
4800 (1975)	21.1	14 / 3.7	98	21.8	14 / 3.7	99	24.1	14 / 3.7	102
4300 (1770)	20.4	11 / 2.9	85	21.1	11 / 2.9	86	23.3	11 / 2.9	88

Pressure Altitude: ***10000 ft***

	ISA-10°C			ISA			ISA+30°C		
RPM	MAP	Fuel/Flow	TAS	MAP	Fuel/Flow	TAS	MAP	Fuel/Flow	TAS
[-]	[inHg]	[l/hr]/[USg/hr]	[kts]	[inHg]	[l/hr]/[USg/hr]	[kts]	[inHg]	[l/hr]/[USg/hr]	[kts]
4800 (1975)	19.2	14 / 3.7	99	19.9	13 / 3.4	100			
4300 (1770)	18.8	11 / 2.9	86	19.5	11 / 2.9	87	21.6	11 / 2.9	90

13. Landing Performance

The following factors are to be applied to the computed landing distance for the noted condition:

Wind:

The following wind correction are calculated considering the 50% of headwind component and 150% of tailwind component.

- ***Headwind****: subtract 5% and 3% respectively from the ground and total distances for each 3 knots headwind.*
- ***Tailwind****: add 20% and 13% respectively to the ground and total distances for each 3 knots tailwind.*

Grass runways:

Add 20% to the ground roll distance.

Runway slope:

Decrease ground roll distance for each 1% upslope, applying the following factors:

- 5% at Sea level
- 6% at 5000 ft
- 7% at 10000 ft

Increase ground roll distance for each 1% downslope, applying the following factors:

- 6% at Sea level
- 7% at 5000 ft
- 8% at 10000 ft

Weight Correction:

Consider about 3% of landing distance reduction for each 50 kg (100 lb) of weight reduction.

Weight: 720 kg (1587 lbs) **V_{REF} = 58 KIAS** **V_{TD} = 52 KIAS**	**Flaps: LND** **Propeller Lever: FULL FWD** **Throttle Lever: IDLE** **Runway: dry, paved and level**

Press Alt [ft]		**Distance [m / ft]**													
		Temperature [°C / °F]													
		-25/-13		**-15/5**		**0/32**		**15/59**		**30/86**		**50/122**		**ISA**	
		[m]	**[ft]**	**[m]**	**[ft]**	**[m]**	**[ft]**	**[m]**	**[ft]**	**[m]**	**[ft]**	**[m]**	**[ft]**	**[m]**	**[ft]**
0	GR	153	502	159	522	169	554	178	584	187	613	200	656	**178**	**584**
	50ft	415	1361	421	1381	431	1414	440	1443	449	1473	462	1515	**440**	**1443**
1000	GR	159	522	165	541	175	574	185	607	194	636	207	679	**183**	**600**
	50ft	421	1381	427	1401	437	1433	447	1466	456	1496	469	1538	**445**	**1460**
2000	GR	165	541	172	564	181	594	191	626	201	659	216	708	**189**	**620**
	50ft	427	1401	434	1424	443	1453	453	1486	463	1519	479	1571	**451**	**1479**
3000	GR	171	561	178	584	188	617	199	653	209	686	229	751	**195**	**640**
	50ft	433	1420	440	1443	450	1476	461	1512	471	1545	499	1637	**457**	**1499**
4000	GR	177	581	185	607	195	640	206	676	219	718	243	797	**200**	**656**
	50ft	439	1440	447	1466	457	1499	468	1535	485	1591	519	1702	**462**	**1515**
5000	GR	184	604	192	630	203	666	215	705	233	764	258	846	**207**	**679**
	50ft	446	1463	454	1489	465	1525	477	1565	505	1656	541	1774	**469**	**1538**
6000	GR	191	626	199	653	211	692	228	748	248	813	274	899	**213**	**699**
	50ft	453	1486	461	1512	473	1551	497	1630	526	1725	563	1847	**475**	**1558**
7000	GR	199	653	207	679	223	731	243	797	263	863	291	954	**224**	**735**
	50ft	461	1512	469	1538	489	1604	518	1699	547	1794	586	1922	**491**	**1610**
8000	GR	206	676	216	708	237	777	258	846	280	918	309	1014	**236**	**774**
	50ft	468	1535	479	1571	510	1673	540	1771	570	1870	610	2001	**508**	**1666**
9000	GR	215	705	230	754	252	827	274	899	297	974	327	1073	**248**	**813**
	50ft	479	1571	500	1640	531	1742	563	1847	594	1948	635	2083	**525**	**1722**
10000	GR	230	754	245	804	268	879	291	954	315	1033	347	1138	**260**	**853**
	50ft	499	1637	521	1709	554	1817	586	1922	618	2027	661	2168	**543**	**1781**

14. Balked Landing Performance

Throttle Lever: Full Forward ; Propeller Lever: Full Forward Flaps LAND V_{REF}=58 kts (IAS)								
Weight [kg/lbs]	Pressure Altitude [ft]	Steady Gradient of Climb [%]						
		Temperature [°C/°F]						
		-25/-13	-15/5	0/32	15/59	30/86	50/122	ISA
720 / 1587	0	11.8	10.9	9.7	8.5	7.4	6.1	**8.5**
	2000	10.2	9.3	8.1	6.9	5.9	4.5	**7.2**
	4000	8.6	7.7	6.5	5.4	4.3	3.0	**6.0**
	6000	7.0	6.1	4.9	3.8	2.8	1.5	**4.7**
	8000	5.4	4.5	3.4	2.3	1.3	0.0	**3.4**
	10000	3.8	3.0	1.8	0.8	-0.2	-1.5	**2.2**
670 / 1477	0	13.7	12.7	11.4	10.1	8.9	7.4	**10.1**
	2000	11.9	11.0	9.6	8.4	7.2	5.7	**8.7**
	4000	10.2	9.2	7.9	6.7	5.5	4.1	**7.3**
	6000	8.4	7.5	6.2	5.0	3.8	2.4	**5.9**
	8000	6.6	5.7	4.5	3.3	2.2	0.8	**4.5**
	10000	4.9	4.0	2.8	1.6	0.5	-0.9	**3.2**
620 / 1367	0	15.7	14.7	13.2	11.8	10.5	8.9	**11.8**
	2000	13.8	12.8	11.3	10.0	8.7	7.1	**10.3**
	4000	11.9	10.9	9.5	8.1	6.9	5.4	**8.8**
	6000	10.0	9.0	7.6	6.3	5.1	3.6	**7.3**
	8000	8.1	7.1	5.8	4.5	3.3	1.8	**5.9**
	10000	6.2	5.3	3.9	2.7	1.5	0.0	**4.4**

15. Noise Data

Noise level, determined in accordance with ICAO/Annex 16 6th Ed., July 2011, Vol. I°, Chapter 10 and 14 CFR Part 36, is **64.51** dB(A).

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SECTION 6
WEIGHT AND BALANCE

INDEX

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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 re- ported in Flight Manual Section 2.

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

2. Weighing Procedures

2.1. PREPARATION

- Carry out weighing procedure inside closed hangar
- Remove from cabin any object unintentionally left
- Make sure Flight Manual and mandatory documents are on board
- Align nose wheel
- Drain fuel via the specific drain valve
- Oil and hydraulic fluid at the operating levels
- Move sliding seats in middle position
- Refuel/Defuel the aircraft tanks remaining the unusable fuel
- Raise flaps to fully retracted position
- Place control surfaces in neutral position
- Place scales under each wheel

2.2. LEVELLING

- Level the aircraft (the reference for longitudinal levelling is made putting a spirit-level on the seat track as shown in the Aircraft Maintenance Manual).
- Adjust longitudinal attitude deflating nose tire

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 wing leading edge in correspondence of the plumb line placard (see Figure 6 - 1) and trace a reference mark on the floor
- Repeat the operation for other wing
- Stretch a taught line between the two marks
- Measure the distance between the reference line and both main and nose wheel axis (A and B distances respectively)
- Using recorded data it is possible to determine the aircraft C.G. location and the aircraft moment (see following table)

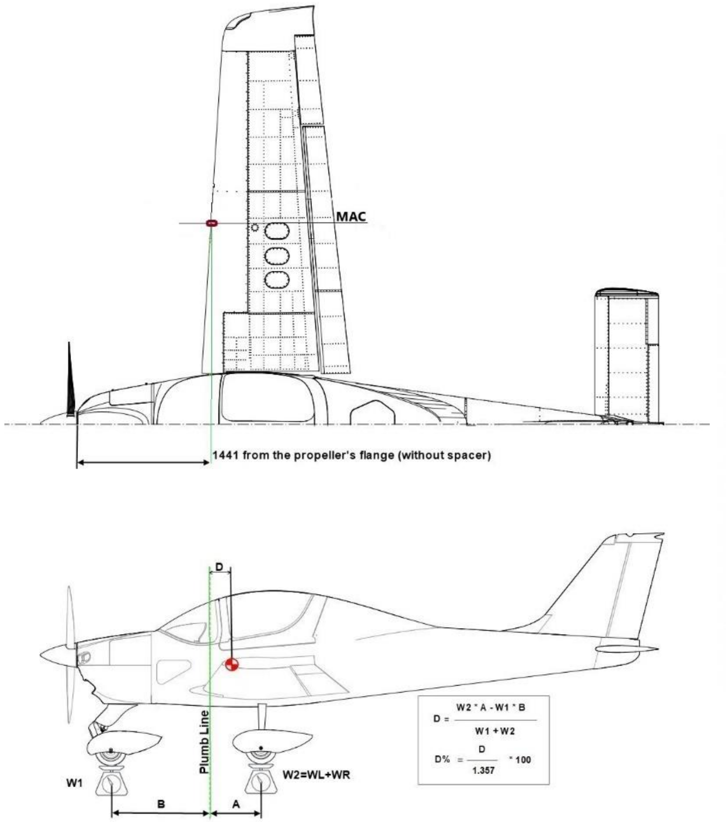
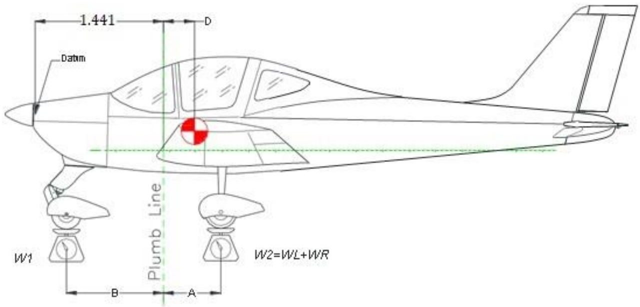


Figure 6 - 1 – Aircraft plumb line position

2.5. Weighing Record

Model **P-MENTOR** S/N:________________ Weighing no.____________ Date:______________

Datum: **Propeller support flange without spacer**



		kg or lbs
Nose wheel weight	W_1=	
LH wheel weight	W_L=	
RH wheel weight	W_R=	
$W_2 = W_L + W_R$ =		

	meters or feet
Plumb bob distance LH wheel	A_L =
Plumb bob distance RH wheel	A_R =
Average distance $\frac{(A_L + A_R)}{2}$	A =
Plumb bob distance from nose wheel	B =

Empty weight $W_e = W_1 + W_2$ =	[kg] or [lbs]

$$D = \frac{W_2 \cdot A - W_1 \cdot B}{We} = \_\_\_\_ \quad [m] \longrightarrow D(\%MAC) = \frac{D}{1.357} \cdot 100 = \_\_\_\_\_$$

$$D = \frac{W_2 \cdot A - W_1 \cdot B}{We} = \_\_\_\_ \quad [ft] \longrightarrow D(\%MAC) = \frac{D}{4.452} \cdot 100 = \_\_\_\_\_$$

Empty weight moment $M = (D+1.441) \cdot W_e$ =	[m · kg]
Empty weight moment $M = (D+4.728) \cdot W_e$ =	[ft · lbs]

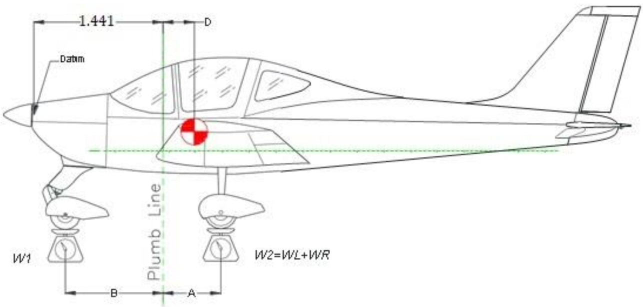
Maximum take-off weight	W_T =	[kg] or [lbs]	Signature
Empty weight	W_e =	[kg] or [lbs]	
Max. useful load W_T - W_e	W_u =	[kg] or [lbs]	________________

Figure 6 - 2 – Aircraft weighing record

2.6. Weighing Record (II)

Model **P-MENTOR** S/N:________________ Weighing no.___________ Date:______________

Datum: **Propeller support flange without spacer**



		kg or lbs
Nose wheel weight	W_1=	
LH wheel weight	W_L=	
RH wheel weight	W_R=	
$W_2 = W_L + W_R$ =		

	meters or feet
Plumb bob distance LH wheel	A_L =
Plumb bob distance RH wheel	A_R =
Average distance $\frac{(A_L + A_R)}{2}$	A =
Plumb bob distance from nose wheel	B =

Empty weight $W_e = W_1 + W_2$ =	[kg] or [lbs]

$$D = \frac{W_2 \cdot A - W_1 \cdot B}{We} = \_\_\_\_ \quad [\mathrm{m}] \longrightarrow D(\%MAC) = \frac{D}{1.357} \cdot 100 = \_\_\_\_$$

$$D = \frac{W_2 \cdot A - W_1 \cdot B}{We} = \_\_\_\_ \quad [\mathrm{ft}] \longrightarrow D(\%MAC) = \frac{D}{4.452} \cdot 100 = \_\_\_\_$$

Empty weight moment $M = (D+1.441) \cdot W_e$ =	[m · kg]
Empty weight moment $M = (D+4.728) \cdot W_e$ =	[ft · lbs]

Maximum take-off weight	W_T =	[kg] or [lbs]	Signature
Empty weight	W_e =	[kg] or [lbs]	
Max. useful load $W_T - W_e$	W_u =	[kg] or [lbs]	____________________

Figure 6 - 3 – Aircraft weighing record

3. Weight and Balance determination for flight

The pilot is responsible for ensuring the correct useful load loading.

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 Record (Figure 6-1/2)
- Weight and C.G. – Form (Table 6-1)
- Weight-Moment Envelope (Figure 6-3)

An example calculation is provided to help understand the method.

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 Record (Figure 6-1/2) and write them in the Weight and C.G. – Form (Table 6-1)
2. Write the weight and moment of the pilot/co-pilot and occupant(s) 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
3. Sum the weights to obtain the zero fuel weight condition and write it in the Weight and C.G. – Form (Table 6-1). The zero fuel weight must not exceed its limit value provided in Section 2 and reported in Table 6-1.
4. Write weight and moment of the usable fuel in the Weight and C.G. – Form (Table 6-1). Determine the fuel moment using the procedure of step 2.
5. The total weight can be obtained summing zero fuel condition and usable fuel weights; the resulting moment is, instead, obtained summing all moments; report take-off condition (weight and moment) in the Weight and Balance C.G. – Form (Table 6-1)
6. To obtain the landing weight and moment, subtract from 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).
7. Locate on Weight-Moment Envelope (Figure 6-3) 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] or (lb)	**Arm [m] or (ft)**	**Moment (M) = W * Arm [kg*m] or (lb*ft)**
Empty weight			
USEFUL LOAD			
Pilot		1.804 (5,92 ft)	
Co-Pilot		1.804 (5,92 ft)	
Baggage		2.26 (7,41 ft)	
Usable fuel Fuel (liters) *ρ_{fuel} (0.8) [kg] Fuel (USg) *ρ_{fuel} (6.7) [lb]		2.139 (7,02 ft)	
Take-off condition $W_{TO} = \sum W$		$M_{TO} = \sum M$	
Fuel required Fuel (liters) *ρ_{fuel} (0.72) [kg] Fuel (USg) *ρ_{fuel} (6.0) [lb]		2.139 (7,02 ft)	
Landing condition $W_L = W_{TO} - W_{fuel\_req}$		$M_L =$ $M_{TO} - M_{fuel\_req}$	

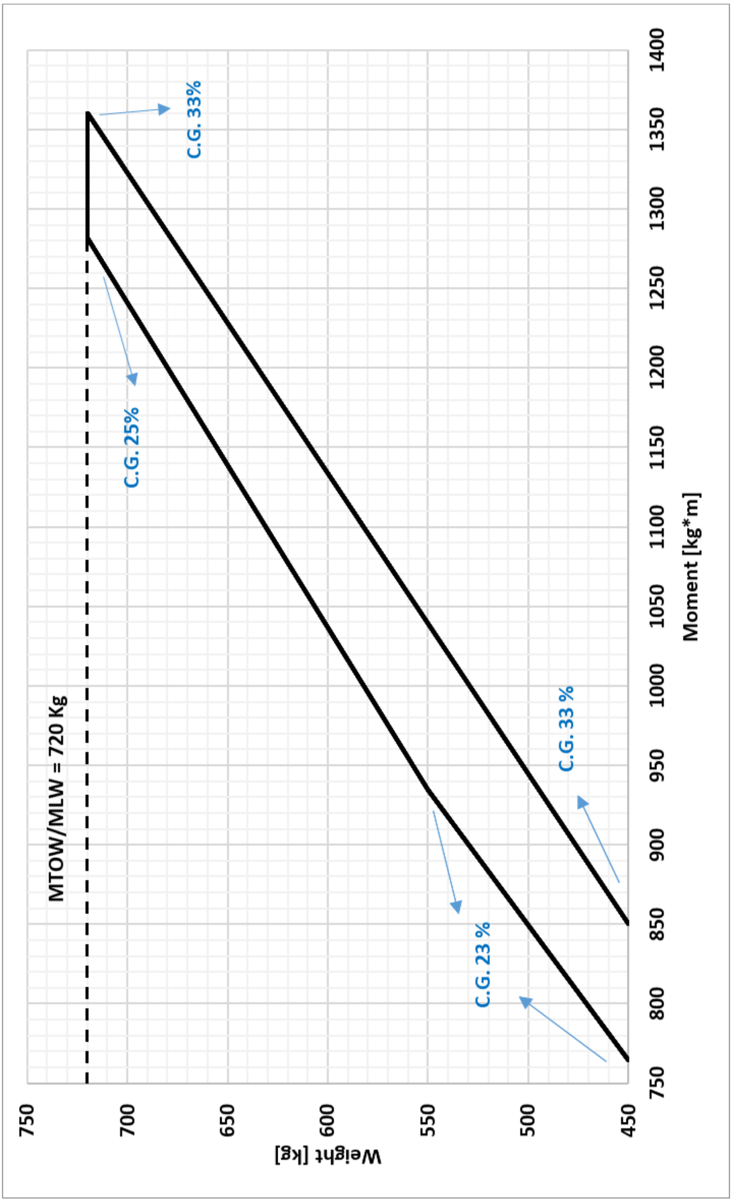


Figure 6 - 4 – Weight moment envelope

4. Baggage Loading

The baggage loading in the dedicated compartments must be carried out in accordance with diagram addressed and with C.G. excursion and weight limitations reported in Section 2.

Pilot is provided with tie-down nets and snap fasteners allowing for securing the loads.

CAUTION

Loading the baggage, make sure that you correctly stretched the net which must be secured to the hooking points.

5. Equipment List

This paragraph contains a list of equipment which may be installed on TECNAM P-MENTOR. The items that have been installed on the aircraft at the time of its registration are marked with an “X” in the column “As deliv.”. It is an operator’s responsibility made on the airplane. New installations shall be marked in the column “Inst./Rem.” With a “I” before the date, while removals shall be marked with a

Id	Description	Model/PN	Weight (each) [kg]	Weight (each) [lbs]	Arm [m]	Arm [ft]	As deliv.	Inst. / Rem. (I/R) & Date
ATA 22 – Auto flight								
22-10-1	Ailerons servo actuator	Garmin GSA 28	0.635	1.4	2.36	7.742		
22-10-2	Elevator servo actuator	Garmin GSA 28	0.635	1.4	2.78	9.12		
22-10-3	Rudder servo actuator	Garmin GSA 28	0.635	1.4	1.75	5.84		
22-10-4	Mode Controller	Garmin GMC 507	0.308	0.68	1.338	4.389		
ATA 23 – Communications								
23-10-1	COM #1 Antenna	Comant CI-121	0.23	0.5	4.276	14		
23-20-1	Antenna Marker Beacon	Comant CI-102	0.27	0.6	3.131	10.27		
23-00-4	Audio panel	Garmin GMA 245R MKR	0.64	1.42	1.241	4.07		
23-80-1	COM/NAV Panel	Garmin GNC 255A	1.8	3.96	1.338	4.389		
23-10-2	COM/NAV Antenna	Comant CI-292-2	0.27	0.6	3.87	12.69		
23-10-3	COM radio	Garmin GTR 225*	1.8	3.96	1.338	4.389		
ATA 24 – Electrical Power								
24-30-1	Main Battery	Gill-Teledyne G-25 @12V 18Ah	9.5	21	2.26	7.41		
					0.76*	2.49		
24-30-2	Buffer Battery	Sonnenschein 512/2 @12V 1.5Ah	1	2.2	1.112	3.65		
24-40-1	External power socket	MS3506-1	0.907	2	0.324	1.06		
ATA 25 - Equipment / Furnishing								
25-10-1	Pilot seat LH	22-12-3400-001-A00-01	10	22	2.028	6.65		
25-10-2	Pilot seat RH	22-12-3400-002-A00-01	10	22	2.028	6.65		
25-60-1	ELT (Unit)	Kannad 406 Integra	0.85	1.873	2.26	7.41		
25-60-2	ELT (Antenna)	AV200	0.086	0.19	2.56	8.40		
25-60-3	ELT Remote Switch	RC200	0.04	0.088	1.338	4.55		
25-60-4	First aid kit	FIA270160	0.2	0.44	2.26	7.41		
25-60-5	Parachute system	TC2002-05	25	55	3.53	11.6		
ATA 26 – Fire protection								
26-20-1	Fire extinguisher	Amerex A620T	1.6	3.5	2.26	7.41		
		Amerex A376T**	1.6	3.5	2.26	7.41		
ATA 27 – Flight Controls								
27-00-1	Stall Warning	21-9-420-000	0.23	0.5	1.464	4.8		
27-30-1	Servo pitch trim	T2-10A	0.113	0.25	5.79	19		
		B6-11T***	0.147	0.32	5.79	19		
27-50-1	Flaps actuator	Sir AO-01/M	0.84	1.85	2.411	7.9		
ATA 28 – Fuel system								
28-40-1	Fuel q.ty sender – CIES CC-Series – LH	CIES CC284022 - (1302) - (101)	0.29	0.64	1.982	6.5		
28-40-2	Fuel q.ty sender – CIES CC-Series - RH	CIES CC284022 - (1302) - (101)	0.29	0.64	1.982	6.5		
ATA 31 – Indicating / Reporting Systems								
31-20-1	Magnetic Compass	Airpath C2400L4P	0.91	2	1.338	4.55		
31-20-2	Stand by instrument	Garmin GI 275	1.1	2.4	1.338	4.55		
34-10-1	PFD Display	Garmin GDU 460	2.95	6.5	1.338	4.55		
34-10-1	MFD Display	Garmin GDU 460	2.95	6.5	1.338	4.55		

**) for aircraft embodying MOD 2002/237*
***) for aircraft embodying MOD 2002/262*
****) for aircraft embodying MOD 2002/280*

Id	Description	Model/PN	Weight (each)		Arm		As deliv.	Inst. / Rem. (I/R) & Date
			[kg]	[lbs]	[m]	[ft]		
ATA 32 – Landing gear								
32-10-1	MLG wheel LH	Cleveland 40-78B	4	9	1.992	6.54		
		Beringer RF-018(c)*	1.58	3.47				
32-10-2	MLG wheel RH	Cleveland 40-78B	4	9	1.992	6.54		
		Beringer RF-018(c)*	1.58	3.47				
32-10-3	MLG tyre LH	Airtrac AA1D4	2.045	4.4	1.992	6.54		
		Michelin 070-310-0*	2.63	5.8				
32-10-4	MLG tyre RH	Airtrac AA1D4	2.045	4.4	1.992	6.54		
		Michelin 070-310-0*	2.63	5.8				
32-20-1	MLG Fairing LH	27-8-410-1	1.5	3.3	1.992	6.54		
32-20-2	MLG Fairing RH	27-8-410-2	1.5	3.3	1.992	6.54		
32-20-3	NLG Fairing front part	92-80-420-4	0.5	1.1	0.324	1.06		
32-20-4	NLG Fairing rear part	92-8-420-3	0.5	1.1	0.324	1.06		
32-20-5	NLG single wheel fairing	27-8-240-1	1.5	3.3	0.324	1.06		
32-20-6	NLG shock absorber	92-8-200-000	0.5	1.1	0.324	1.06		
32-20-7	NLG wheel	Cleveland 40-77C	4	9	0.324	1.06		
		Beringer RA-014B*	1.489	3.28				
32-20-8	NLG tyre	Airtrac AA1D4	2.045	4.4	0.324	1.06		
		Michelin 025-309-0*	2.99	6.6				
ATA 33 – Lights								
33-40-1	Nav/Strobe lights Wing	Orion 6501 (R) E – Left wing (red) Orion 6501 (G) E – Right wing (green)	0.118	0.26	1.747	5.73		
33-40-2	Landing/taxi light	AVE-H16MWSSNH-00A Aveo	0.490	1.08	0.213	0.7		
		WAT PAR36 P/N 01-0772131-00	0.410	0.90	0.213	0.7		
33-40-3	Nav/Strobe light Vertical tail	OR550 (White)	0.127	0.28	6.344	20.8		
ATA 34 – Navigation Instruments								
34-00-1	Garmin Adapter	GAD29B	0.18	0.4	1.051	3.45		
		GAD29D						
34-00-3	Transponder	Garmin GTX 345 R	1.5	3.3	1.051	3.45		
23-20-2	Transponder Antenna	Comant CI-105	0.109	0.24	2.523	8.28		
23-20-3	VOR/LOC/GS Antenna	Comant CI-158C	0.16	0.35	5.766	18.9		
34-10-2	OAT Probe	Garmin GTP 59	0.6	0.8	2.012	6.6		
34-10-2	Pitot Probe	28-9-2050-000	0.35	0.77	2.012	6.6		
34-10-3	Alternate Static port	Camozzi 338-910	0.09	0.2	1.338	4.55		
34-20-1	Radio COM/NAV/GPS	GTN 650 Xi	5.76	12.7	1.338	4.55		
34-20-2	ADAHRS	Garmin GSU 25D	1.13	2.5	1.98	6.5		
34-20-3	Magnetometer Unit	Garmin GMU 11	0.113	0.25	2.26	7.41		
34-20-4	GPS #1 Antenna	Garmin GA-35	0.29	0.64	4.016	13.17		

**) for aircraft embodying MOD2002/270*

Id	Description	Model/PN	Weight (each)		Arm		As deliv.	Inst. / Rem. (I/R) & Date
			[kg]	[lbs]	[m]	[ft]		
34-20-5	GPS #2 Antenna	Garmin GA-56	2	4.4	1.026	3.37		
		Garrecht Avionik B575**						
		JC ANTENNA JCA001***						
34-50-1	ADF Indicator	Bendix/King KI227 066-03063-0000	0.32	0.7	1.338	4.389		
34-50-2	ADF Receiver	Bendix/King KR87 066-01072-0004	1.47	3.24	1.338	4.389		
34-50-3	ADF Antenna	Bendix/King KA44B 071-01234-0000	1.89	4.16	4.3	14.10		
34-50-4	DME Receiver	Bendix/King KN63 066-1070-01	1.27	2.79	2.9	9.51		
34-50-5	DME Antenna	Comant CI-105-16	0.9	1.98	2.62	8.59		
34-50-6	DME Adapter	Garmin GAD43e	0.86	1.89	2.9	9.51		
34-50-7	Radio XPDR/GPS	Garmin GNX 375	2	4.41	1.338	4.389		
ATA 77 – Engine indicating								
77-00-01	EIS unit	Garmin GEA 24	0.322	0.71	1.051	3.45		

***) for aircraft embodying MOD2002/259*
****) for aircraft embodying MOD2002/265*

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SECTION 7
AIRFRAME AND SYSTEM DESCRIPTION

INDEX

1. INTRODUCTION

This section provides description and operation of the its system

2. AIRFRAME

P-Mentor's airframe can be divided in the following main groups:

1. Wing
2. Fuselage
3. Empennage
4. Landing gear

2.1. WING

Each wing is connected to the fuselage by means of two bolt attachments and a single strut brace per side. The wings are made up of a central light alloy torsion box; a light alloy leading edge is attached to the front spar whereas the flap ("slotted") and the aileron are attached to a rear spar through two hinges each.

The torsion box consists of a front and rear spar that represent its front and rear vertical walls; a series of ribs and wrap-around panels complete the structure. Front and rear spars are integrated with wing-fuselage attachment fittings.

Integral fuel tanks are located in the wing box, behind the main spar, with a capacity of 70 litres each (18.5 gallons).

The ailerons and flaps are made by an aluminium spar attached to a formed sheet composite material leading edge and metal ribs; an aluminium skin surrounds the aileron structure

2.2. FUSELAGE

The P-Mentor fuselage is made by composite and aluminium materials.

The fuselage is made by two main shells that are later assembled bonding the two main bodies and the floor (composite) and adding aluminium parts that allow the connection of the main landing gear, seats, wing and instrument panel. Fuselage and vertical fin are thus a unique body.

2.3. EMPENNAGES

2.3.1. HORIZONTAL TAIL

The horizontal tail is an all-moving type; the stabilizer and elevator form a single uniform plane called stabilator that rotates to the desired pitch setting.

The stabilator structure (see Figure 7-1) is made-up by two aluminium spar and ribs.

Aluminium skin panels are riveted to the above elements.

A trim tab provides stick force adjustment and longitudinal compensation through a control located on both pilot and co-pilot stick.

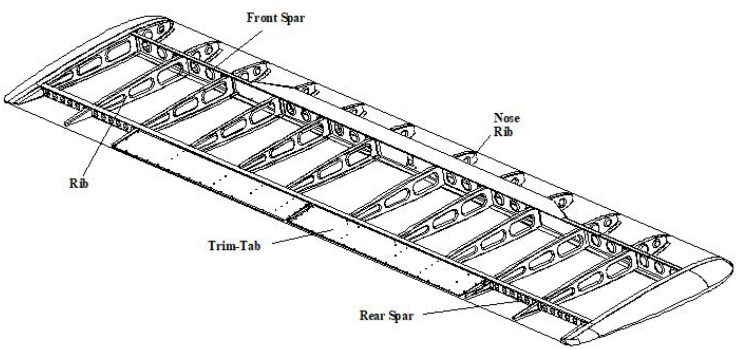


Figure 7-1 - Stabilator Structure

2.3.2. VERTICAL TAIL

The vertical tail is entirely metale made: the the vertical fin is made up of a twin spar with stressed skin while the rudder consists of an aluminium torque box made of light alloy ribs and skin.

2.4. LANDING GEAR

The landing gear consists of the main landing gear composed by two main steel leaf-springs positioned crossways to the fuselage and the nose landing gear composed by hydraulic shock absorber connected directly to the main structure. The steel leaf-springs (main landing gear) are attached to the fuselage structure on composite beams. Wheels are cantilevered on gear struts and feature hydraulically actuated disc brakes controlled by toe.

P-Mentor is provided with an independent hydraulically actuated brake system for each main wheel. A master cylinder is attached to each pilot's rudder pedal. Hydraulic pressure, applied via the master cylinders, enters the brake via lines connected to an inlet fitting on the caliper.

A parking brake valve, mounted in correspondence of the cabin floor and operated by a knob on the cockpit central pedestal (pilot side), intercepts the hydraulic lines, once pressurized by toe brakes, to hold the brake assemblies linings tightened round the main wheels brake discs. Brakes can be operated from either pilot's and co-pilot's pedals: a single vented oil reservoir feeds the pilot side master cylinders which are connected, via hoses, with the co-pilot's side ones.

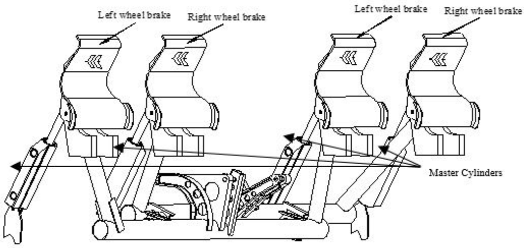


Figure 7-2 - Rudder Pedals and Brake Master Cylinders (Pilot and Co-pilot Side)

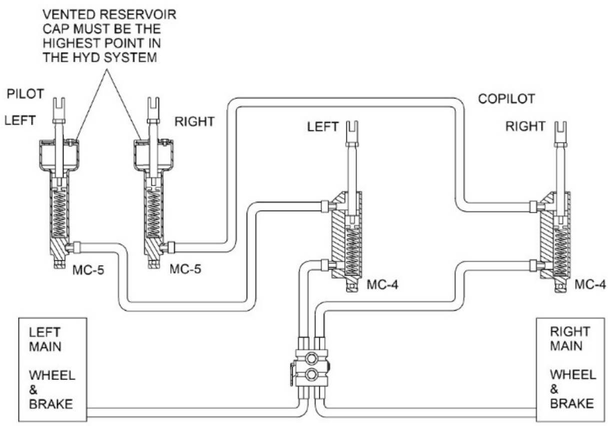


Figure 7-3 - Brake System Schemati

3. FLIGHT CONTROLS

The ailerons, elevator and wing flaps are operated through control rods, while the rudder is controlled by cable. Aircraft flight controls are operated through control stick and rudder pedals.

Stabilator

Longitudinal control acts through a system of push-rods and is equipped with a trim tab. The control and the movement of the stabilator is transmitted through the connecting rod to the transmission lever and from this to the rod that, passing through the tail section, transmits the motion to the stabilizer torque tube lever.

Aileron

The transmission of the aileron control is of the rigid rod type for the part of the circuit inside the half wing, while of a steel cable for the fuselage part. A cable control circuit is confined within the cabin and it is connected to a pair of push-pull rod systems positioned in each main wing which control ailerons differentially.

Rudder

Directional control acts through a system characterized by a steel cable that connects the pedal system to the vertical tail lever control. From the pedal system two rods connect also the nose landing gear and guarantee the ground maneuvers.

Flap

The Flap command is of the rigid rod type. The torsion tube connecting element of the two surfaces, is hinged of supports integral with the fuselage structure. The rotation movement is transmitted by means of the lever whose positions are regulated by the electric linear actuator controlled by a lever switch placed on the instrument panel. Flaps act in discret mode; the indicator lights show three markings related to clean (UP), takeoff (T/O) and landing (LND) positions*. A breaker positioned on the right side of the instrument panel protects the electric circuit.

**) for aircraft embodying MOD 2002/243 flap position is displayed on a dedicated indicator included in the Garmin G3X Touch near the trim indicator.*

Trim

Stabilator trim control is operated by means of integrated button on both pilot and copilot sticks. The buttons activate the linear actuator connected to the shelves by means of a plate. The electric trim system is activated/disconnected by means of a dedicated switch on the upper side of instrument panel. Trim position is displayed on a dedicated indicator included in the Garmin G3X Touch.

4. INSTRUMENT PANEL

The instrument panel, for basic configuration, is divided in three areas:

- The left area holds Garmin G3X Touch PFD, Warning Panel, Alternate Air , Master Switch and Engine Starter Panel;
- The Central area holds the standby unit GI 275, GTN 650Xi or different equipment installed;
- The right area holds Garmin G3X Touch MFD, Internal Lightning Panel and breaker panel;
- The lower-LH portion of the instrument panel holds:
  - Back Battery Switch;
  - Fuel Pump;
  - AP Master (if installed);
  - Avionic Master switch;
  - Parachute handle (if installed);
- The lower-central portion of the instrument panel holds:
  - Flap Control *(for aircraft NOT embodying MOD 2002/243)*;
  - Fuel selector valve;
  - Propeller Lever;
  - Throttle Lever;
- The lower-RH portion of the instrument panel holds:
  - Alternate Static Port knob;
  - Flap Control *(for aircraft embodying MOD 2002/243)*;
  - External Lights;
  - Cabin Heating control;
  - ELT switch;
- The higher-central portion of the instrument panel holds:
  - Annunciator Panel Lights;
  - Night/Day Switch;
  - Pitch trim Disc;
  - Pith Trim Selector (LH/RH);
  - Magnetic compass

In the following figure is represented a typical layout for P-Mentor aircraft, alternative layouts are possible.

Figure 7-4 – Instrument Panel

4.1. CABIN HEAT

Aircraft NOT embodying MOD2002/246:

One control knob, located on the lower side of the right side of cockpit, allow defrost and cabin heat functions. The cabin heat allows hot air to perform windshield defrost and cabin heat. Starting from this condition, if the cabin heat control knob is fully outward, it allows cabin/windshield to receive maximum hot air.

Aircraft embodying MOD2002/246:

Cabin heat is based on engine coolant system since hot coolant is used to heat fresh air from outside with an additional radiator installed behind the firewall.

One control switch, located on the instrument panel of cockpit, allows defrost and cabin heat functions. The panel switch has three positions:

- **CABIN** position: hot air is delivered to cabin;
- **CABIN AND DEFROST** position: hot air is delivered both to cabin and to defrost diffusers;
- **OFF** position: hot air is not delivered at all.

5. SEATS AND SAFETY HARNESS

Seats are made of composite material (carbon fiber) kept together by means of aluminium alloy hinges. The seats are removable to allow maintenance and inspection of the underlying controls.

In correspondence of the seats, three fitting points safety belts are provided; two on cabin floor on both side of the seat and one on the structure behind the seat.

It is possible to perform the following seat adjustments to ensure comfort to the crew and passengers:

Horizontal – pulling the lateral lever and sliding the seat

Seat back inclination – unlocking it via the lateral knob

6. CANOPY

The P-Mentor can accommodate 2 persons, in fact it presents two seats positioned side by side. The canopy allows and guarantees the external visibility, giving the pilot and the passenger a complete view in any flight operation. The windshield is made of plastic material Plexiglas GS233 designed so that the pilot is protected from the elements that moderate rain conditions do not unduly impair his view of the flight path in normal flight and while loading. The opening system is simple and easy, it can be operated by each occupant. Baggage compartment is located in the rear area, accessible from behind the seats.

Figure 7-5 – Canopy Door Opening

NOTE The internal handle can be locked, to avoid any chance of inadvertent opening, by means of a protective mechanism.

7. POWERPLANT

7.1. ENGINE GENERAL SPECIFICATION

The Rotax 912 iS is a 4-stroke, mixed cooling (water-cooled heads and air-cooled cylinders), 4-cylinder horizontally opposed engine with single central camshaft push rods.

The engine is equipped with an electronic fuel injection system. This system is controlled by the ECU and enables highly accurate metering of the fuel according to operating and load conditions, whilst at the same time also taking ambient conditions into account. The key input variables are throttle valve position, engine speed signal, intake air temperature, ambient pressure, manifold pressure and exhaust temperature. Ultimately, the required fuel quantity or injection period is determined on the basis of the calculated air density in the airbox.

The propeller is driven via a hydraulic governor integrated gearbox with a clutch/dual mass flywheel.

The engine is capable to operating with both AVGAS (ASTM D910) or MOGAS (ASTM D4814 or EN228).

Table 1 – Rotax 912 Specification

Description	912 i Series
Bore	84 mm (3.31 in)
Stroke	61 mm (2.40 in)
Displacement	1352 cm3 (82.5 in3)
Gear ratio (crankshaft: propeller shaft)	2.43:1
Compression ratio	10.8:1

7.2. PROPELLER

The engine is equipped with a MT propeller MTV-21-A/180-51 manufactured. It is a two blade constant speed variable pitch propeller. Blades are made of laminated wood composite structure. Epoxy fiberglass covers the entire blade surface and it is painted with acryl lacquer. The outer portion is protected against erosion by a bounded on stainless steel erosion sheath.

The inner portion of the blade is protected by a self-adhesive PU strip. Propeller hub is made in aluminium alloy. The propeller spinner installed is build and furnished by MT-Propeller. The spinner dome is a one-piece part made from fibre reinforced composite or spin-formed aluminium alloy. The bulkhead is spin-formed or truncated aluminium alloy.

The front support is part of the hub. Filler plates increase the stiffness of the dome on the cut-outs for the blades. The dome is mounted on the supports by means of screws.

Once an engine rotational speed is selected it will be held constant at variations of airspeed and power. Mechanical stops for low pitch and high pitch limit the pitch change travel.

7.3. AIR INTAKE SYSTEM

The engine air intake system consists of an air filter housing, air filter and alternate valve body. In normal operation the RAM air can enter from the NACA inlet directly to the engine passing through the alternate air valve body.

In the event of power loss due to icing or blocking of the air filter, there is the possibility of drawing air from the engine compartment. The ALTERNATE AIR holes is manually opened through a control knob located in the cockpit, which allows the warm air around the engine collector (exhaust pipe #3) to flow into the airbox when the lever is pulled.

7.4. ENGINE CONTROL LEVERS

Engine handling is via two lever: Throttle and Propeller Lever.

Control levers are situated on the centre pedestal and it is used to control the throttle body valve (manifold pressure) and governor (RPM). On the throttle body is connected a throttle position sensor which record and show throttle position on the Engine Instrument Strip before starting the engine, with both Lanes activated (see Figure 7-6, Left).

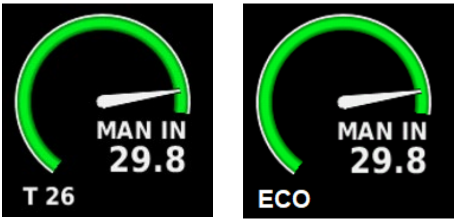


Figure 7-6 – Throttle position indicator and engine operating mode

The Rotax engine has two different operating modes, POWER and ECO, which differs significantly in mixture ratio. The switchover between POWER and ECO mode is about 97% of throttle position. The POWER-mode is always active in Single-Lane operation. Appropriate display instrument indicate this threshold, showing ECO under MAP display indicator (see Figure 7-6, Right).

7.5. FUEL SYSTEM

The P-Mentor fuel system provides to the following function: fuel storage, fuel distribution and fuel indicating, Figure 7-7. Fuel system and relative components are designed in accordance to Rotax motors specification and requirements. It is designed to ensure a fuel flow at a rate and pressure established for proper engine functioning under any normal operating condition required by Rotax Operation and Installation Manual.

The fuel system consists of two fuel tanks integrated in the wing box and having a capacity of 70 lt (18.5 USG) for a total capacity of 140 lt (37 USG). Internal side of fuel tank is accessible for inspection through dedicated fuel tank inspection doors.

The mainly component of the fuel system are:

- Suction pipe: it is the first fuel filter (in the fuel tank sump);
- Gascolator filter: it is installed between the fuel tank outlet and the main electric fuel pump. It is positioned in the lowest point of the engine and the fuel system, this allows to obtain a complete drainage of any water debris and of the fuel, if needed;
- Fuel pumps: Main fuel pump and fuel pump feed the engine and are designed to ensure a flow of fuel at a rate and pressure established for proper engine functioning under any normal operating condition

Fuel pumps are managed through switching system which is required to allow a real check of the functional performance of each pump. The ECU does not control and monitor the fuel pumps. The EMS provides the possibility to supply and control the fuel pumps. The fuel pump is directly driven in an electrical manner, as it is supplied by a power supply system which is directly driven from the crankshaft, self-supplying the system as long as the engine is rotating (as it would be the case on a typical mechanical system).

In case of failure of main pump, the check valve allows fuel passage into fuel pump for continue safely grounding and flight operation.

So starting from the tank the fuel passes first through the suction pipe, gascolator, electric pumps and fuel filtering system before to enter in the engine.

A multi position fuel selector is located on the top side of the central console, just below the instrument panel and it is easily accessible from pilot and co-pilot. Two capacitive type fuel quantity senders are installed in each tank and provide the fuel indication on the A/C cockpit.

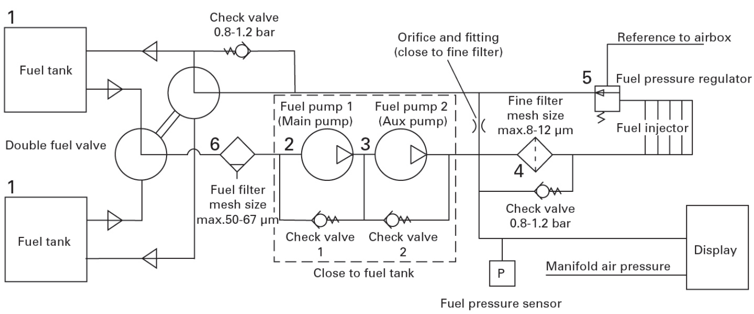


Figure 7-7 - Fuel System

In the Rotax engine, the fuel surplus flows in the return line. Starting from engine regulator, the fuel flows through the line connected with a T fitting with internal restriction that is used to eliminate eventually presence of air into the system. Finally, a check valve connects the return line from engine to return line of the selected tank through the selector valve. In case of activation of the fuel pump with fuel selector in OFF position a dedicated connection permits fuel bypassing the selector and discharging fuel pressure in the LH tank.

7.6. COOLING SYSTEM

The cooling system is designed for liquid cooling of the cylinder heads and ram air cooling of the cylinders. The cooling system for cylinder heads is a closed circuit with an expansion tank. The coolant flow is forced by a water pump, driven from the camshaft, from the radiator to the cylinder heads. From the top of the cylinder heads the coolant passes on to the expansion tank (1). The expansion cap is closed by a pressure cap (3). From the expansion tank the coolant is sucked back to the water pump passing through a radiator (2). At temperature rise of the coolant the excess pressure valve open and the coolant will escape via hose connected to an overflow bottle (4).

In addition, for aircraft embodying MOD2002/246, the coolant system presents two additional hoses with metallic joints connected to water pump and outlet of thermostatic valve, that allows the coolant to flow through an additional cooler installed behind the firewall used for heating.

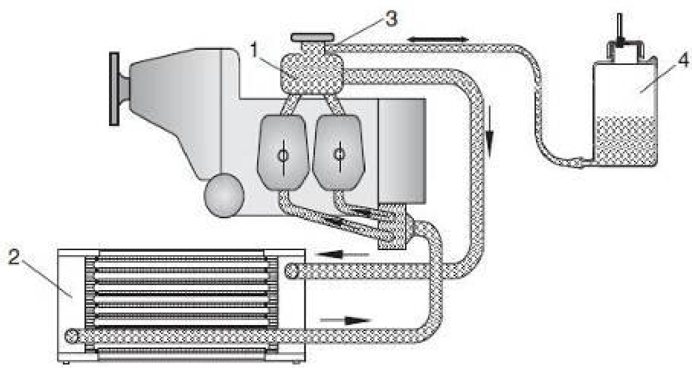


Figure 7-8 – Cooling system scheme

7.7. LUBRICATION SYSTEM

The engine Is equipped by a dry sump forced lubrication system with an oil pump and integrated pressure regulator. The oil pump, driven by the camshaft, sucks the motor oil from the oil tank through the thermostatic valve and oil cooler and forces it through the oil filter to the points of lubrication in the engine. The thermostatic valve is fitted with two thermal sensors (set to 90 °C and 100 °C) allowing for a partial radiator passage occlusion. The surplus oil emerging from the points of lubrication accumulates on the bottom of crankcase and is forced back to the oil tank by the piston blow-by gases.

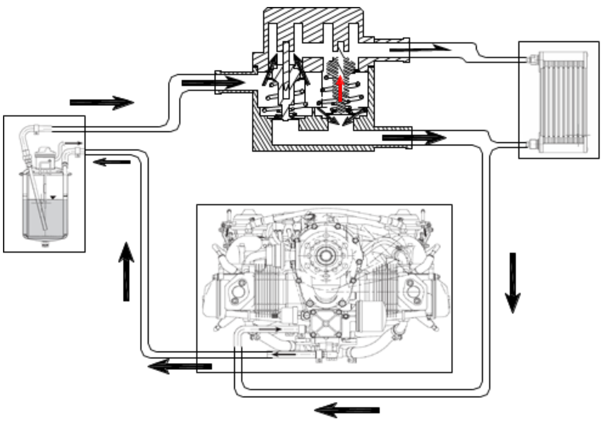


Figure 7-9 – Lubrication system scheme

8. ELECTRICAL SYSTEM

The electric system installed on P-Mentor A/C is based on 14VDC voltage.
The electrical power source is provided by two internal engine driven alternator and a main battery, as shown in Figure 7-10. The two generators (Generator A and B) are electrically isolated and mounted on one stator. Each generator is connected with a regulator mounted on the Fusebox. The Fusebox takes care of the energy management and allows selecting whether the EMS is supplied by the battery or one of the generators. The selection which of the generators is powering the EMS depends on the engine status and can only be done by the Engine Control Unit (ECU). During the engine start the battery is needed to power the EMS. After the engine speed is high enough to power the EMS with the Generator B, for running the engine the external power source is only required in emergency situations. If a defined engine speed threshold has been reached for a certain time Generator A takes over to supply the EMS. After this, Generator B can be used to supply the Airframe.

In the Table 7-2 is shown the energy sources specification.

Table 7-2 – Energy sources specification

Item	Description	Output Voltage	Output Current	Q.ty
Main Battery	Gil Teledyne (G25)	12V	18Ah	1
Buffer Battery	Sonnenschein (A512/2 S)	12V	1.5Ah	1
Alternator A (Internal)	Rotax	14V	16A	1
Alternator B (Internal)	Rotax	14V	30A	1

The MAIN battery is used to start the engine and to power the airframe units in case of one alternator failure.

The Dual Alternator configuration allows to prevent engine shut down in case of one alternator failure, so the EMS power supply is still provided by the remaining alternator. In this case the airframe power supply is related to the Main battery. In normal condition, the Main battery is recharged by the Alternator. In case of failure of Main battery, the pilot is able to continue to fly safely, switching off the “MASTER” switch, Figure 7-13.

The main battery supply power to the aircraft for at least 30 minutes in case of one alternator failure.

The electric system is composed of three distribution busses:

- Essential bus;
- Main bus;
- Avionic bus (activated/deactivated by Avionic Master Switch).

The electrical system page, showed in the MFD or in PFD in reversionary mode, includes the following information:

- Lane A/B Voltage
- Alternator Ammeter
- Battery Ammeter
- Essential Bus voltage

The electrical loads are connected to the buses through dedicated circuit breakers. Switches are installed in order to allow the pilot the control of loads, where required. Essential bus is fed from 2 points protected by means of two different breakers (ESS ALT and ESS BATT) and includes electrical loads required for continued safe flight and landing.

The power sources are able to run independently or together without any pilot action required.

The switch to enable and disable Main battery is in the master switches group and are located lower in the left side of cockpit, Figure 7-13.

The failure of one of the energy sources will not affect alternate energy sources operation. The switch between the energy sources is automatic and no action is required in order to activate the alternate energy source.

Since each instrument using a power source is connected to a dedicated circuit breaker, the failure of an instrument will not interfere with the proper supply of energy to the other instruments.

The following circuit breakers are installed to secure and protect the ECU and Electrical busses:

- Two 30 Amps breakers for the Main and Essential Bus when powered by battery (BATT and ESS BATT);
- Two 30 Amps breakers for the Main and Essential Bus when powered by alternators (ALTERN and ESS ALT);
- One 30 Amps breaker for both Main and Essential Bus when powered by alternator and/or for ECU at the engine starting phase (START POWER).
- One 30 Amps breaker for ECU when powered from battery through the “BCK BATT” switch (BCK BATT).

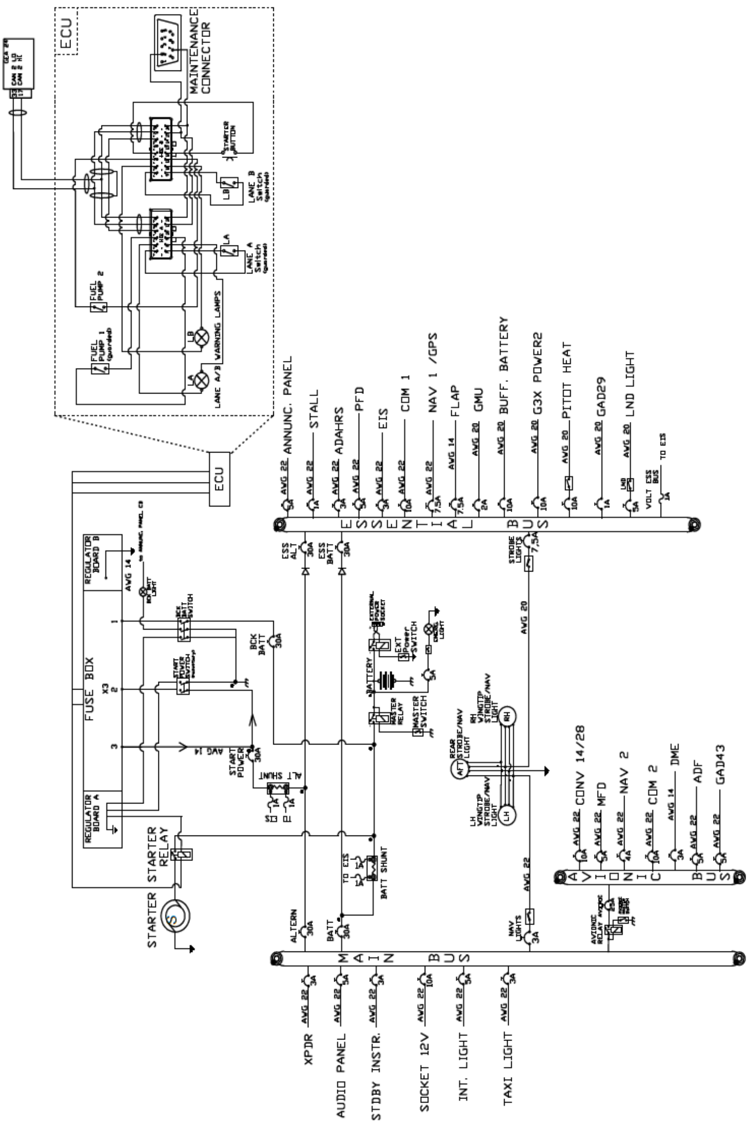


Figure 7-10 - Electric System

8.1. EMS

The Engine Management System has following main functionality

- Ignition control
- Fuel injection control
- Fault detection
- (Internal-) Generator management

Parts of the Engine Management System are Sensors, Actuators, the ECU and the wiring harness.

The core of the EMS is the engine control unit (ECU), which consists of two modules. These modules will be denoted by Lane A and Lane B, each one capable of taking over control, regulation and monitoring of the engine. In error-free engine operation, both Lanes are turned ON. During engine control by Lane A, Lane B ensures that the engine operation can be maintained even after a failure or reduced functionality of Lane A. Depending on the activity and the failure status of the two Lanes, the ECU automatically selects a Lane to take over control of the engine.

A huge quantity of sensors (e. g. sensors for measuring the pressure and temperature in the airbox) and actuators (e. g. ignition coils) of the engine are designed with redundancy. In this case, each of the sensors or actuators is connected to a Lane, so that the two Lanes have the same measurement values and send the same output signals. Non redundant sensors (e. g. oil pressure sensors) are connected to one Lane only and serve for the expanded monitoring of the engine functionality. Due to an ECU internal communication, these sensor values will be exchanged between the two Lanes (assuming that both Lanes are active and free of errors).

In addition to the ECU, the Fuse box is another major component of the EMS. The Fuse box with its two rectifier regulators (from generator A and generator B) is responsible for a constant power supply to all EMS components including fuel pump module and the aircraft.

8.2. WARNING PANEL

The warning panel on the left side of cockpit gives an immediate state of warning of the system to the pilot.

The BCK BATT lights on to alert the pilot that the EMS is powered by aircraft main battery, when the Backup battery switch is turned ON.

The LOW VOLT message lights on when the Essential bus voltage is less than 12 V. This threshold is representative of initial battery discharge. It is clear that the light indicates that the airframe loads are powered by main battery and not by alternator. In case of failure of any generator, the engine provides no more electric power to the airframe. Failure of the generator is indicated by the low voltage light.

The EMS provides an automatic reaction in the case of faults/failures, still producing sufficient power/thrust in a relevant critical flight phase. Lane A and Lane B warning lights indicates the state of an individual Lane. The system modes are Automatic, when both Lanes are operating, Lane A only and Lane B only. The alternate system modes (Lane A or Lane B only) are engaged either during pre-flight checks or during presence of faults/failures. The ECU distinguishes between fault and failures. The presence of a failure is indicated by warning lamp which is permanent on. In this case, the ECU will continue to operate in an alternative control mode, which will transfer the control of ignition and injection to the error- free Lane. Instead, the warning lamps that is “just flashing “ does not lead to a system mode change, therefore is a fault indication.

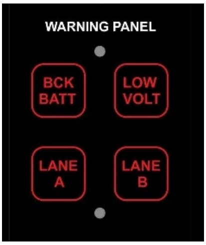


Figure 7-11 – Warning Panel

8.3. ANNUNCIATOR PANEL

The annunciator panel on the upper side of cockpit indicate the status of aircraft subsystems. The annunciator panel have a test switch, which when pressed illuminates all the lights to confirm they are working order.

The LH FUEL LEVEL and RH FUEL LEVEL lights on to alert the pilot that the fuel quantity in the respective tank is less than 20 litres.

The FUEL PUMP indicates that the Fuel Pump Switch is ON and the fuel pump is operating.

The PITOT HEAT comes ON when the switch is ON and the pitot heating system is functioning properly. In case of failure, turning on the switch, the amber PITOT HEAT light turns on.

The STALL WARNING comes on, together with synthetic voice activation, when activated by the stall detector to advise the pilot of an imminent stall.

Figure 7-12 – Annunciator Panel

8.4. STALL WARNING SYSTEM

The aircraft is equipped with a stall warning system consisting of a sensor located on the right wing leading edge connected to a warning horn located near the instrument panel.

8.5. MASTER SWITCH ARRANGEMENT

The “Master” switch is put in the ON position it enables the master relay and connects the battery to the bus Bar and it is located on the Engine Starter panel.

The “Fuel Pump” switch when set ON, enables fuel pump to feed the engine.

The “Pitot Heat” switch when set ON, enables to heat by means of an electric circuit the Pitot probe.

The “Avionic Master” switch when set ON, enables the avionic bar to be powered by Main bus power source.

The switches named “BCK BATTERY”, located near “Fuel Pump” switch, Figure 7-13, allows to power the ECU directly with the Main battery. When activated, the BCK BATT red warning light turn on, to indicate to pilot that the ECU is fed by battery and not alternator. The Backup battery switch must be set on in case of both alternator failure.

Figure 7-13 - Electrical Main Switches

8.6. External Power Supply

An external power socket provided by Adams Aviation, is installed in order to allow engine starting and the possibility of feeding electric system during ground operations without depleting the batteries. The external power plug is made in such a way that the polarity cannot be inadvertently reversed and is located near Main Battery. The External socket is connected to Electrical system by mean a dedicated relay controlled by External Voltage

Figure 7-14 - External power Receptacle

Exercise caution while applying external power.
Exercise extreme caution while disconnecting external power with engine running due to airflow coming from the propeller.
Approach the power supply receptacle from rear of the wing.
Make a positive check, upon disconnection, that:
- *the power chord is free from any aircraft structure*
- *the receptacle is firmly closed.*

Follow this procedure to start the engine using the external power source.

1. Master, Lane A & B and Fuel Pumps switch: OFF
2. Open the receptacle door and insert the external power source’s plug into the socket
3. Engine start-up procedure (see Sect. 4 in this manual)
4. Disconnect the external power source’s plug and close firmly the receptacle door.

8.7. ENGINE STARTER PANEL

In the P-Mentor A/C there is an ECU Unit located in the engine compartment; this ECU unit is enabled by means of "Start Power" switch located on the lower-left side of the cockpit panel when the engine is not running. The "Start Power" switch connects momentarily the ECU to the General Electric System of A/C during starting phase.
The core of the EMS is the engine control unit (ECU), composed of two modules. These modules are named LANE A and LANE B, each one capable of taking over control, regulation and monitoring of the engine, controlled by appropriate switches labelled as the same name. In error-free engine operation, both LANES are turned ON. During engine control by LANE A, LANE B ensures that the engine operation can be maintained even after a failure or reduced functionality of LANE A. Depending on the activity and the failure status of the two LANES, the ECU automatically selects a LANE to take over control of the engine. When Lane A and B are switched ON, these allow the EMS for engine control (ignition automatically ECU controlled). Particularly these two switches are guarded when the ignition is enabled (engine running) and are unguarded in OFF position when the engine is stopped. In addition, the ECU has only one connector located on copilot side under the cockpit, to perform various diagnostic and maintenance activities.

The lower and upper left side of the cockpit panel, see Figure 18, the following switches are installed:

1. "MAIN FUEL PUMP" Switch,
2. "LANE A" switch,
3. "LANE B" switch,
4. "STARTER" push-button,
5. "START POWER" Switch

As shown in the below image the "Main Fuel Pump" and "Lane A & B" switches are guarded ones and are located in such a way that they cannot be inadvertently operated by the pilot. Particularly the switches are unguarded when the Main Fuel Pump and Both Lanes are disabled (engine stopped) and are guarded when engine is running.

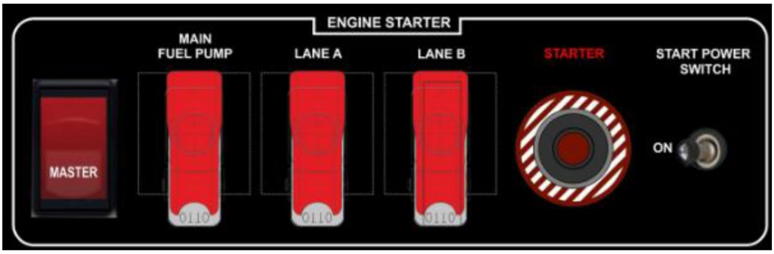


Figure 7- 15 - Engine start and Fadec Control Switches

9. AVIONIC SYSTEM

P-Mentor avionic suite is based on G3X Touch. Garmin G3X Nxi suite is an integrated flight deck whose modular layout allows to extend it in order to add new features. It provides the pilot with primary flight information, presenting navigation moving map and engine parameters.

A block diagram of the suite is given in Figure 7-16, this diagram provides a description of the system architecture and information about the data-buses used.

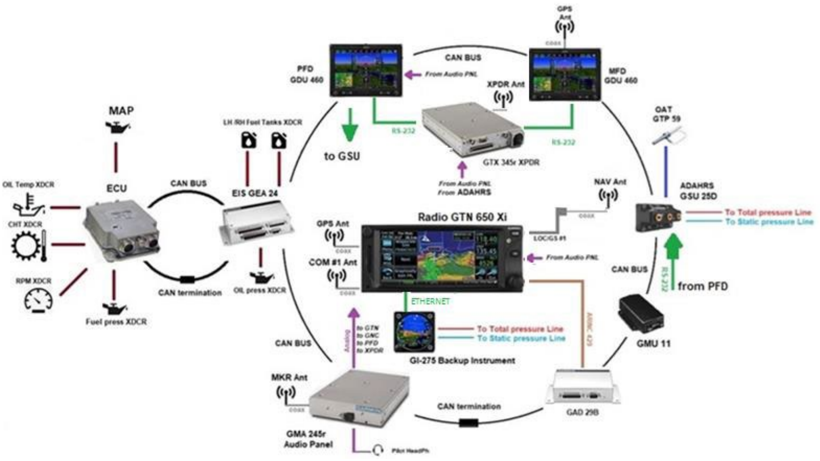


Figure 7-16 – P-Mentor, Avionic Block diagram

The installed configuration is based on a two-screens layout.

Primary flight information are displayed on the LH screen, namely PFD (Primary Flight Display).

Primary Engine and moving map information are displayed on the RH display, namely MFD (Multi-Function Display).

In the event of a PFD or MFD failure the “reversionary mode” is automatically enabled.

When reversionary mode is activated primary flight and engine information are presented together on the remaining display.

In order to provide the pilot with main flight information in the event of a dual display failure of both PFD and MFD, or in the event of an AHRS and ADC units combined failure, an integrated digital stand-by instrument, GI 275, featuring airspeed, altitude, attitude , slip and navigation information is installed.

The avionic system installed is based on the following configuration:

Table 7-3 – Garmin LRUs

LRU Model	Description	Type	Qty.
GDU 460	Display unit (PFD)	Panel Mount	1
GDU 460	Display unit (MFD)	Panel Mount	1
GI-275	Stand-by Instrument	Panel Mount	1
GTN 650 Xi	Radio COM/NAV/GPS	Panel Mount	1*
GNC 255A	Radio COM/NAV	Panel Mount	1*
GSU 25D	ADAHRS	Remote	1
GAD 26B/D[1]	Adapter	Remote	1
GEA 24	EIS unit	Remote	1
GMU 11	Magnetometer	Remote	1
GMA 245R	Audio Panel with marker beacon	Remote	1
GTP 59	OAT Probe	Remote	1
GTX 345R	MODE-S/ADSB-OUT/ADSB-IN-FIS-B XPDR	Remote	1

Table 7-4 – Other LRUs

LRU Model	Description	Type	Qty.
Airpath	Lighted Compass	Panel Mount	1
ELT	Emergency Locator transmitter	Remote	1

**) if installed*

1) for aircraft embodying MOD2002/240

Typical cockpit layout is shown in Figure 7-17. Alternative layouts are possible. Garmin LRUs other than the screens and audio panel are housed in dedicated racks, provided by the avionics manufacturer and installed behind the PFD and MFD screens or in the fuselage cone.

Figure 7-17 – Cockpit layout

9.1. GARMIN AVIONICS SUITE

Below in this paragraph, all of the Garmin avionics equipment installed on the *P-Mentor* will be individually described.

9.1.1. GDU 460 (PFD/MFD)

The Garmin Display Unit (GDU) 460 is a 10.6-inch landscape-oriented, panel mounted control and display unit with a GPS receiver. The unit displays flight and engine parameters and moving map information and act as the user interface for P-Mentor avionics suite. The GPS signal (GA56 Antenna or GA26C Antenna*) is used for backup GPS Navigation and information. The GDU features a high-resolution infrared touchscreen user interface augmented by two dual-concentric knobs and dedicated buttons for commonly used functions. The GDU 460 is mounted flush to the aircraft instrument panel on the left side within the pilot's primary field of view. Below is a list of some of the functions provided by the GDU 460.

GDU 460 units placed on instrument panel LH side are identified as Primary Flight Display (PFD), while GDU 460 placed on instrument panel RH side are identified as Multifunction Display (MFD).

Figure 7-18 – GDU 460 (PFD/MFD)

) Applicable for aircraft embodying MOD2002/259

This feature provides the pilot with an automatic dimming of both display and keys in accordance with the lighting conditions sensed by the two external light sensors positioned in the upper right and lower left corners of each display. Furthermore, the pilot can easily access a manual dimming mode for both displays and keys.

In the event of a single display failure, the system will automatically switch the critical information including flight and engine parameters on the remaining display presenting them in a compact view.

GDU 460 provides the interface for NAV and COM information, displaying the functions listed further:

1. **Flight instruments functions**
   (a) Display of attitude (pitch and roll) rate of turn, slip/skid, directional, airspeed, altitude and vertical speed (PFD function); display of Outside Air Temperature, navigation functions transponder management;
   (b) Display of engine and airframe instrumentation (MFD or PFD in reversionary modes only).

2. **Navigation instruments functions**
   (a) Display of position and ground speed;
   (b) HSI, source selected on External Navigator;
   (c) Selected Heading and Selected Course;
   (d) Area Navigation functions;
   (e) Baro-altitude Vertical Navigation;
   (f) Display of the navigation from external GPS, VOR/ILS NAV radio or internal GPS.
   (g) Creation/selection/loading/editing and display of flight plan information.

3. **Interface functions**
   (a) CAN and RS-232 interfaces to communicate with Garmin LRUs and other devices;
   (b) BNC connector for antenna (GA56 antenna behing the MFD)
   (c) Control and display of transponder and COM radios;

9.1.2. GTN 650Xi (COM/NAV/GPS) (IF INSTALLED)

The GTN 650Xi unit is panel-mounted navigator, linked to G3X Touch Avionic Suite and GI275, which use a color display and touchscreen to provide an intuitive user interface and includes an airborne VHF communications transceiver and airborne VOR/localizer (LOC) and glideslope (G/S) receivers. The GTN 650 Xi is equipped with a dual-core processor that boost the GTN Xi series graphical display capabilities with faster zooming, panning and map rendering on the display.

The GTN is interfaced with the following antennas:

- GPS #1 antenna;
- COM antenna;
- NAV (VOR/ILS) antenna.

The GTN 650Xi provides navigation information to both G3X Touch avionic suite and GI275.

Figure 7 - 19 – GTN 650Xi

9.1.3. GNC 255A (COM/NAV) (IF INSTALLED)

The GNC 255A provides a full-functioned navigation and communications instrument combining a powerful VHF communications transceiver with 200 channel VOR, Localizer and Glideslope receivers.

The GNC 255A controls are comprised of dual concentric knobs for frequency tuning, COM volume/squelch knob, NAV volume/ID knob and bezel keys.

The GNC 255A is connected to the aircraft electrical system by means of two circuit breakers labelled “COM1” and “NAV1”, linked to the avionic bus.

9.1.4. GMA 245R (AUDIO PANEL)

The GMA 245r unit is high-fidelity digital audio panels that collect, process, and distribute audio signals to crew and passengers. The GMA 245r digital signal processing (DSP) core filters the audio signals and provides digital audio routing to minimize noise. The GMA 245r includes a Bluetooth® transceiver for listening to music. A fail-safe circuit connects the pilot's headset and microphone directly to COM 1 and a failsafe warning audio input in the event that power is interrupted or the unit is turned off.

9.1.5. GTP 59 (TEMPERATURE PROBE)

The Garmin GTP 59 is an outside mounted temperature probe that provides raw air temperature data.

One GTP are installed, interfaced with the GSU 25, and provide them with temperature data in order to allow the evaluation of temperature influenced air data parameters.

9.1.6. GSU25 (ADAHRS)

GSU25D ADAHRS (Air Data Computer plus Attitude and Heading Reference System) unit is remote device that provide the aircraft with AIR DATA, attitude and heading reference system.

The GSU25D is the LRU responsible for sensing and converting in a suitable format air data, attitude, and heading information and is connected to Engine/Airframe sensors in order to receive their information. The GSU 25D interfaces also to a remote mounted GMU magnetometer responsible of sensing of heading information and furthermore computes OAT and TAS exploiting data provided by the GTP 59 outside temperature probe. It is divided into two modules (AHRS and ADC).

GSU 25D provides the following information:

- Aircraft Altitude and Airspeed
- Aircraft Vertical Speed, Mach, and Air Temperature
- Density Altitude
- Pressure Altitude
- Indicated Airspeed
- True Airspeed
- Aircraft heading, pitch and roll
- Aircraft yaw, pitch and roll rates
- Aircraft body-axis accelerations
- Rates of change of heading, pitch and roll
- Aircraft accelerations expressed in a local level frame of reference

The air data computer static port is connected to the primary static ports. The GSU 25 also provides the operating current to the GTP 59 OAT Probe.

9.1.1. GMU 11 (MAGNETOMETER)

GMU 11 unit is a microprocessor based magnetometer. It is used to sense Earth magnetic field alignment and provide this data to compatible ADAHRS processors for use in Referencing aircraft magnetic heading.

GMU 11 provides magnetic information to support GSU25D functions. The following list shows the GSU 25D Interfaces used to connect the GMU 11:

- Magnetic field strength and direction

9.1.2. GTX 345R (TRANSPONDER)

GTX 345R is rack mounted MODE C and S transponder that operates on radar frequencies receiving ground radar or TCAS interrogations at 1030 MHz and transmitting a coded response of pulses to ground–based radar on a frequency of 1090 MHz.

The GTX 345R replies to Mode A, Mode C and Mode S interrogation. Mode A replies consist of framing pulses and any one of 4096 codes, which differ in the position and number of pulses transmitted. Mode C replies include framing pulses and encoded altitude.

GTX 345R is equipped with IDENT capability.

GTX 345R includes the ADS-B IN/OUT enhanced capabilities.

For aircraft embodying MOD2002/255, an USB port is installed in the baggage compartment for maintenance purposes.

9.1.3. GEA 24 (ENGINE/AIRFRAME INTERFACE)

The GEA 24 is a microprocessor based input/output Line Replaceable Unit (LRU) used to monitor sensor inputs and drive annunciator outputs for aircraft engine systems via CAN bus. It interfaces with all engine sensors on the aircraft and communicates engine information with the GDU Primary Flight Display (PFD) and Multi-Function Display (MFD).

Engine instrumentation is also displayed on the PFD and/or MFD while the system is in reversionary mode.

9.1.4. GI-275 STAND-BY INSTRUMENT

GI-275 is a Stand–by Attitude Module installed in order to provide the pilot with flight information in case of failure of the PFD and MFD or in the event of an ADAHRS unit failure. It is a digital instrument featuring airspeed, altitude, attitude, slip and navigation information.

The display has automatic and manual dimming adjustment in order to have proper visibility in all operative conditions.

Figure 7-20 – GI-275 (Stand-by Instrument)

10. PITOT-STATIC PRESSURE SYSTEMS

The P-Mentor airspeed/altitude indicating systems are connected with a Pitot-Static system based on a total pressure/Pitot probe (simple Pitot tube, heated for icing protection) mounted on left wing strut and two static pressure ports connected in parallel and located on left and right side of fuselage. Flexible hoses connect total pressure and static ports to primary analogue instruments, anemometer and altimeter. Garmin G3Xs Touch and standby GI-275 unit are connected to both static and total pressure lines providing both airspeed and altitude information.

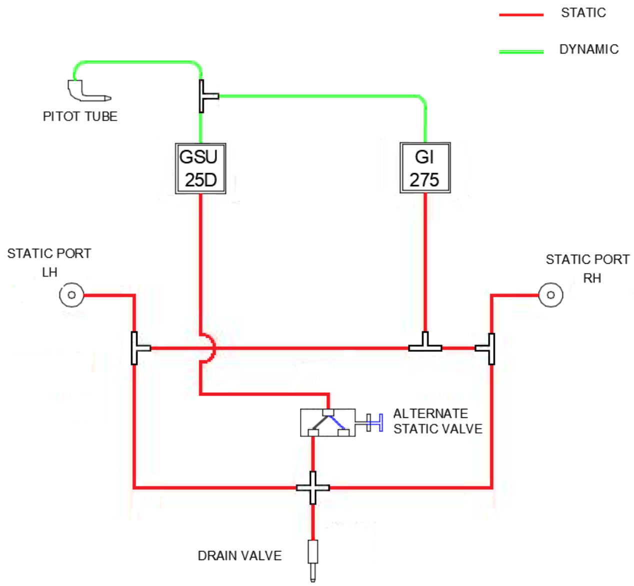


Figure 7-21 – Pitot-Static Pressure System

11. LIGHTS

11.1. EXTERNAL LIGHTS

P-Mentor is equipped with the following external lights:

- 2 combined LED NAV/STROBE integrated lights located on RH and LH wing;
- 1 NAV/STROBE combined light located on the rear (fixed on the rudder);
- 1 combined LED landing and taxi light located on the lower engine cowling.

On the right lower side cockpit panel are located the dedicated switches.

Figure 7-22 – External light switches

11.2. INTERNAL LIGHTS

The instrument panel can be illuminated by three light strips and two spotlights. The map lights and instrument dimming rheostats are not directly illuminated.

On the “Internal lighting” instrument panel you can turn ON and regulate the following elements:

- “LH MAP LIGHT” rheostat turn on and regulates the left directional cockpit spotlight.
- “RH MAP LIGHT” rheostat turn on and regulates the right directional cockpit spotlight.
- “INSTRUMENTS” rheostat turn on and regulates the upper left and right led strip lights. Indirectly, if the displays are set on PHOTOCELL mode and regulated correctly, the input light level inside the cockpit modify the display brightness too.
- “EMERG LIGHT” switch turn on the upper central led light.

Figure 7-23 – Cockpit internal lights

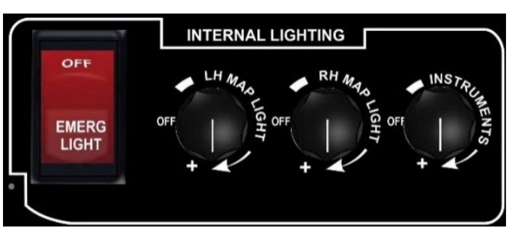


Figure 7-24 –Internal Lighting panel

12. PARACHUTE SYSTEM (IF INSTALLED)

The recovery system is mechanically activated by one of the aircraft occupants when such an occurrence is detected by means of an activation handle located on the lower left side of cockpit panel. The system is composed by the following main elements:

- Parachute: A non-steerable round parachute is used for aircraft recovering slowing the speed down. The system provides the deployment of the parachute, in particular its opening is handled through two different phases: reef and dis-reef. Dividing the parachute opening into two subsequent phases arises from the need to reduce the high inflation pressure that would occur in case of single phase, not controlled, opening. This is possible through a key element added to this system: the slider. It controls the opening rate and gives control over the maximum loads reached during the opening process.

- Activation System: A mechanical cockpit activation system used to activate the recovery system. This system consists of a cockpit handle, an enclosed activation Bowden cable that connects cockpit handle to the igniter of the rocket.

- Rocket: A solid fuel rocket is used for the extraction and ejection of the parachute from the aircraft parachute bay.

- Igniter: The element that receives the input signal from any of the occupants and initiates the combustion in the rocket.
- Frame: A mechanical support device or compartment that is used to store the system inside the aircraft.
- Egress panel: A prepared surface that will allow the rocket and parachute to emerge from the aircraft.
- Harness: A harness assembly made of woven Kevlar® strands. The harness is attached to the aircraft with two front attachment points and two rear attachment points.
- Attachment Points (AP): Attachment Points provide the connection between the parachute and the aircraft. The AP point are four, two on the forward lower side of cabin and the other two on the upper aft side of cabin.

13. PLACARDS

Here in the overview of the placard installed on the aircraft in addition to the limitation placards reported in Section 2.

NOTE

Additionally, nearby the placards listed below (English language), directly translated placards in the language of the country in which the airplane is registered can be installed, when required by the specific NAA.

13.1. EXTERNAL PLACARDS

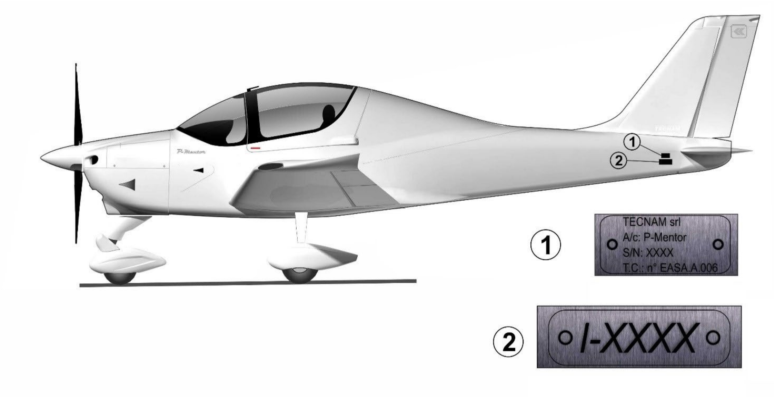


Figure 7-25 – Aircraft registration

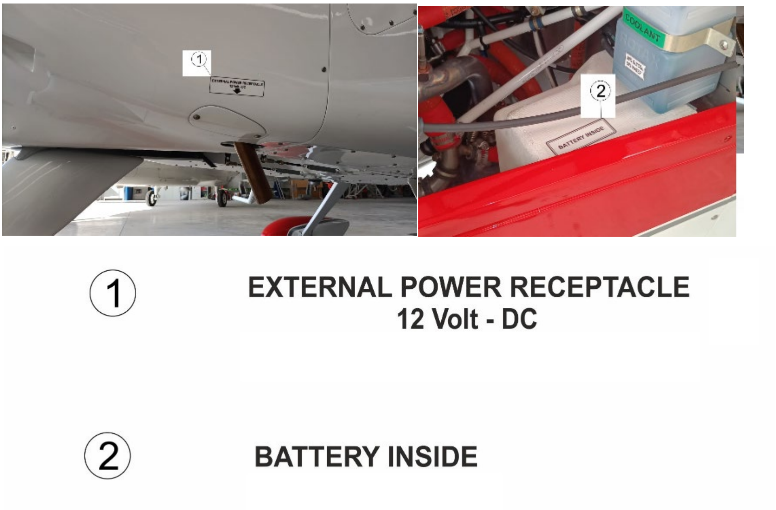


Figure 7-26 – External and Internal Power Source

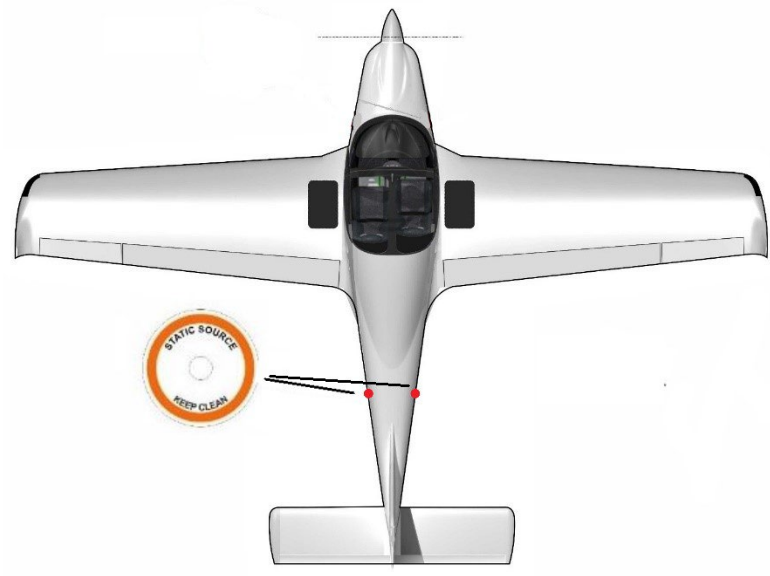


Figure 7-27 – Static Ports

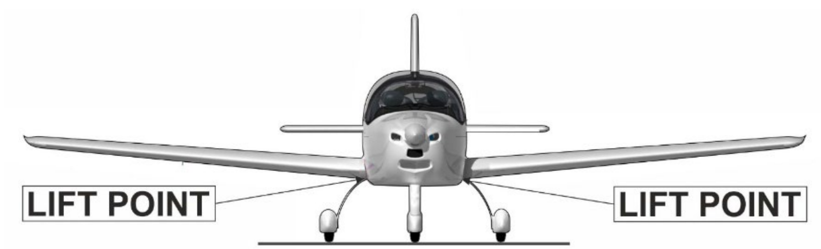


Figure 7-28 – Lift points

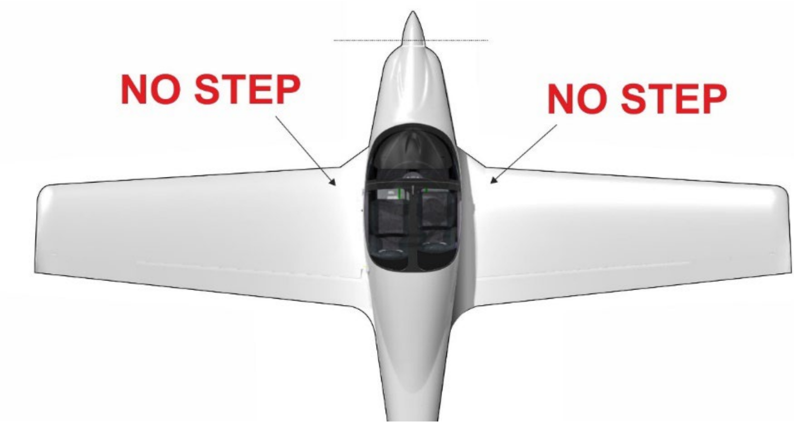


Figure 7-29 – NO STEP placards

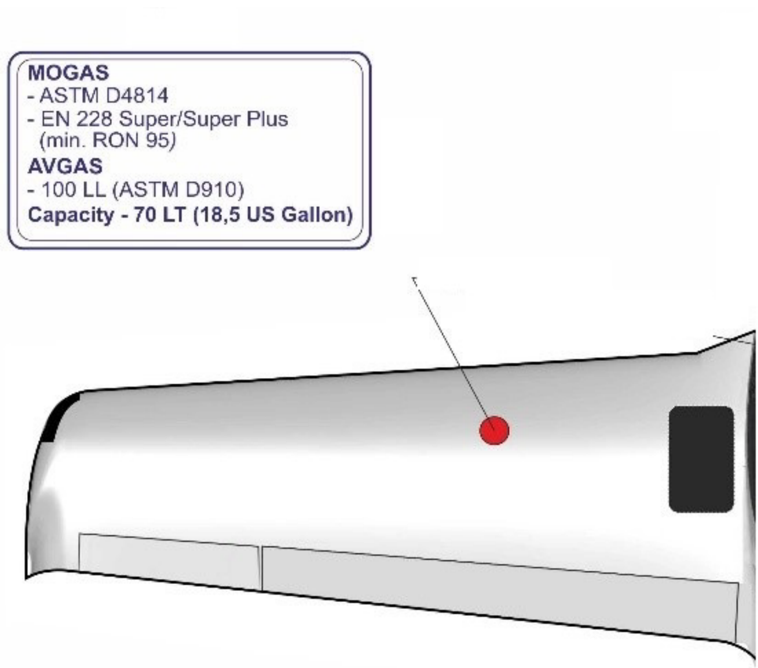


Figure 7-30 – Usable fuel placard

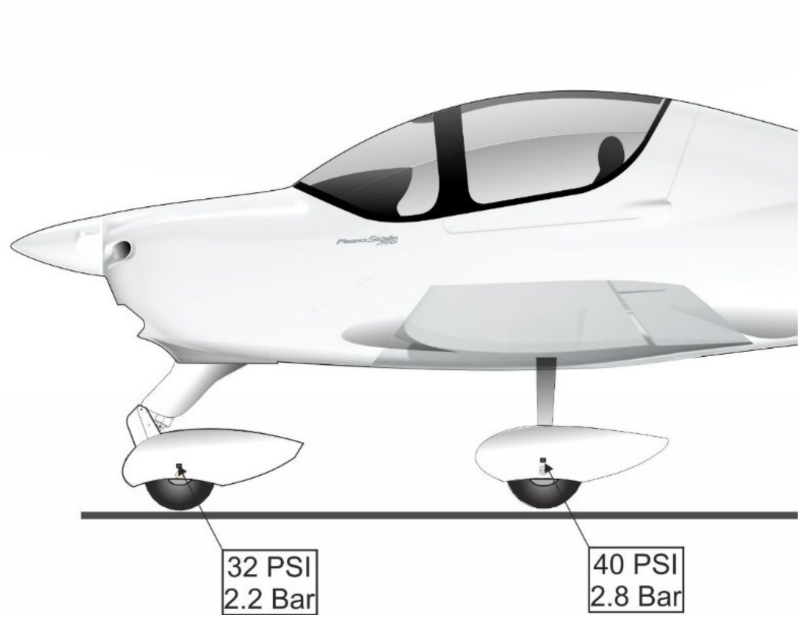


Figure 7-31 – Tire pressure placards

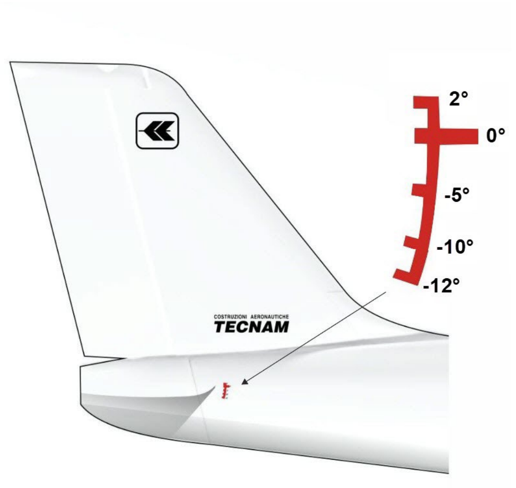


Figure 7-32 – Stabilator degree placard

13.2. INTERNAL PLACARD

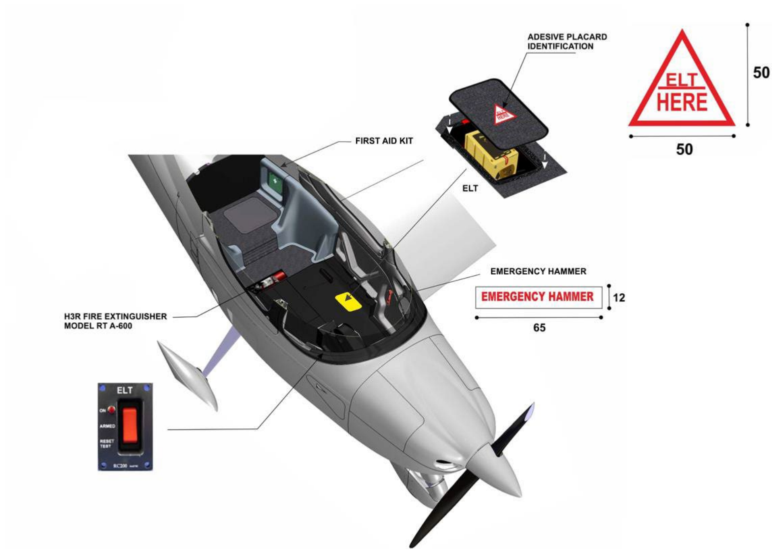


Figure 7-33 – Safety equipment placard

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

DATE RADIO ON AIRPATH

Figure 7-34 – Magnetic compass placard

Figure 7-35 – Reserved

Figure 7-36 – Engine Oil Tank placard

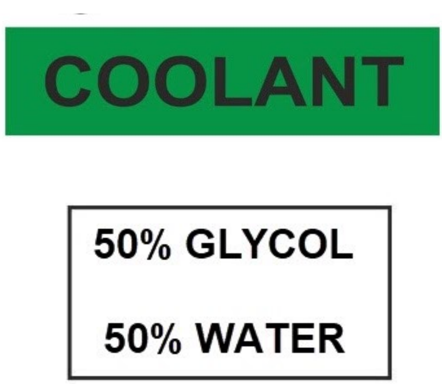
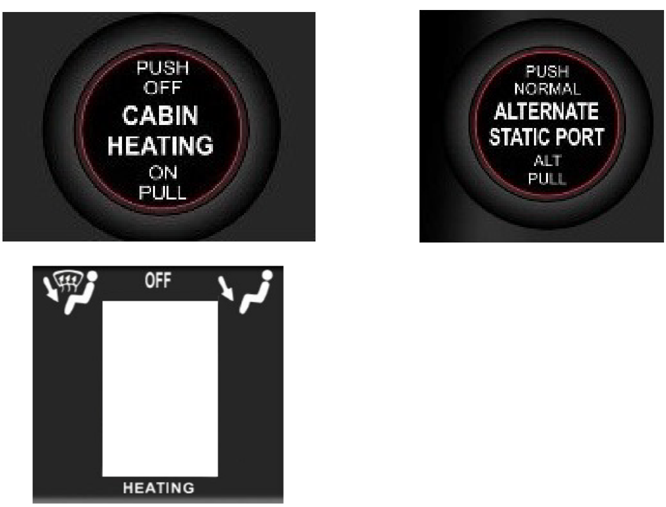


Figure 7-37 – Coolant Tank Placards

Figure 7-38 – Emergency Exit Placard

Figure 7-39 – Pedestal Placard

Figure 7-40 – Fuel Selector Placard



Applicable for MOD2002/246

Figure 7-41 – Cabin Heating and Alternate Static Port Placards

Figure 7-42 – Alternate Air Placard

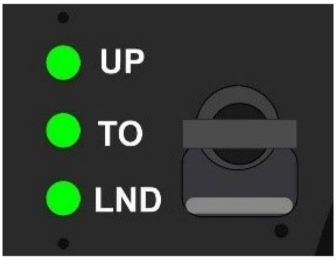


Figure 7-43 – Flap Selector

13.3. PARACHUTE PLACARDS (IF INSTALLED)

Figure 7-44 – Parachute Handle placard

Figure 7-45 – Parachute Handle placard

Figure 7-46 – Parachute Exit surface placard

Figure 7-47 – Parachute Entry areas warning placard

13.4. XPDR PLACARD (FOR AIRCRAFT EMBODYING MOD2002/255)

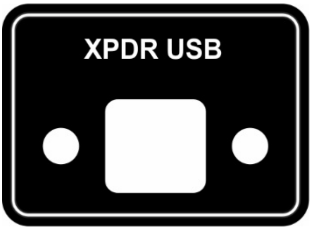


Figure 7-48 – XPDR USB placard

SECTION 8
AIRCRAFT CARE AND MAINTENANCE

INDEX

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1. Introduction

This section deals with main care and maintenance operations for P-mentor.

Refer to Aircraft Maintenance Manual to establish the control / inspections / maintenance tasks (scheduled and unscheduled) to be performed.

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2. Inspection Intervals

Scheduled inspections must be performed in accordance with the instructions addressed on the Aircraft Maintenance Manual. Independently from the aircraft flight hours, an annual inspection has to be performed.

All required inspections are reported in the Aircraft Maintenance Manual.

As far as the scheduled/unscheduled engine maintenance is concerned, refer to the engine manufacturer Maintenance Manual.

CAUTION

Unscheduled inspection/maintenance tasks are necessary when one or more of following condition occur:

1. *Emergency landing*
2. *Hard landing*
3. *Breaking/damage of propeller (or in case of simple impact)*
4. *Engine fire*
5. *Lighting damage*
6. *Any type of damage or failure*

3. Aircraft changes or repairs

Aircraft changes or repairs must be performed in accordance with Aircraft Maintenance Manual and Job cards provided by TECNAM (and only by TECNAM authorized personnel)

4. Maintenance

4.1. Refuelling

WARNING

- *Do not perform aircraft refuelling near flames, sparks or similar.*
- *Avoid fuel contact with the skin: a skin corrosion could occur.*
- *Make sure that a fire extinguisher is available nearby during refuelling operations.*
- *Make sure that overall aircraft instrumentation is turned OFF before performing the refuelling.*
- *Do not operate switches and/or pushbuttons inside the aircraft during refuelling operation; make sure that crew left the aircraft be- fore performing refuelling.*
- *Make sure that the aircraft is electrically connected to the ground.*

4.2. Landing gear tires pressure control

For each wheel proceed as follows:

1. *Remove wheel fairing*
2. *Unscrew the tire cap*
3. *Connect a gauge*
4. *Read the pressure value*
5. *If required, rectify the pressure*
6. *Fit the tire cap*
7. *Install wheel fairing*

5. Cleaning and Care

CAUTION

Aircraft surface must be kept clean to ensure expected flight performance. Excessively dirty surfaces can affect normal flight conditions

5.1. Windows

For windows cleaning, it is allowed the use of acrylic products employed for glass and Pexiglas surfaces cleaning.

5.2. External surfaces

Aircraft surface is cleaned with soapy water; they are not allowed solvents or alcohol based products. Died insects must be removed using hot water.

It is advisable to avoid outside aircraft parking for long periods; it is always convenient to keep the aircraft in the hangar.

5.3. Propeller

To preserve its functionality avoiding wear and corrosion, the propeller manufacturer uses, for external surface painting, an acrylic paint which is resistant to all solvents. In any case it is advisable to clean the propeller using exclusively soapy water.

5.4. Engine

Engine cleaning is part of the scheduled maintenance. Refer to the engine manufacturer Maintenance Manual for operating and for planning its cleaning.

5.5. Internal surfaces

Interiors must be cleaned with a rate of 3 to 6 months. Any object present in the cabin (like pens, lost property, maps, etc.) must be removed.

The instrumentation as a whole must be cleaned with a humid cloth; plastic surfaces can be cleaned with suitable products.

For parts not easily accessible, perform cleaning with a small brush; seats must be cleaned with a humid cloth.

6. Ice Removal

Anti-icing products are not allowed. To remove ice, tow the aircraft in the hangar and operate with a soft brush or a humid cloth.

SECTION 9
SUPPLEMENTS

INDEX

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1. Introduction

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

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2. Supplement List

Aircraft S/N	Registration marks	Date

Sup. N	Title	Rev. N	Date	APPLICABLE	
				YES	NO
S01	*Autopilot installation*	2	20/12/2022	☐	☐
S02	*Garmin GNC 255A*	2	03/08/2022	☐	☐
S03	*KR87 ADF SYSTEM*	0	03/08/2022	☐	☐
S04	*KN63 DME System*	1	12/07/2022	☐	☐
S05	*Landing Gear Extraction Simulation*	0	06/06/2022	☐	☐
S06	*Reserved*	/	/	☐	☐
S07	*Garmin GTR 225A*	0	05/07/2022	☐	☐
S08	*AFMS for Argentine aircraft*	0	09/01/2023	☐	☐

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S01

AUTOPILOT GARMIN GFC500

1. RECORD OF REVISION

Ed / Rev	Revised pages	Description of Revision	Approval
Ed. 1 Rev. 0	-	First issue	EASA approval No. 10079933
Ed. 1 Rev. 1	Page i, iii S01-13, 25 thru 31	Typo errors System description optimization	Approved under the authority of DOA ref. EASA.21J.335 (MOD2002/279.221219)
Ed. 1 Rev. 2	Page i, iii S01-20	MOD2022/280	Approved under the authority of DOA ref. EASA.21J.335 (MOD2002/280.22.12.20)

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2. LIST OF EFFECTIVE PAGES

Edition 1, Rev 0 .... August 29, 2022
Edition 1, Rev 1 .... December 19, 2022
Edition 1, Rev 2 .... December 20, 2022

Section	Pages	Edition / Revision
Section 0	ii, iv	1st Edition – Rev. 0
	i, iii	1st Edition – Rev. 2
Section 1	All	1st Edition – Rev. 0
Section 2	All	1st Edition – Rev. 0
Section 3	All	1st Edition – Rev. 0
Section 4	10 thru 12, 14 thru 17	1st Edition – Rev. 0
	13	1st Edition – Rev. 1
Section 5	All	1st Edition – Rev. 0
Section 6	All	1st Edition – Rev. 0
Section 7	21 thru 24	1st Edition – Rev. 0
	25 thru 31	1st Edition – Rev. 1
	20	1st Edition – Rev. 2
Section 8	All	1st Edition - Rev. 0

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INDEX

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1. GENERAL

1.1. INTRODUCTION

This section contains supplemental information to operate, in a safe and efficient manner, the aircraft when equipped with Garmin GFC 500 autopilot device (MOD 2002/234) interfacing Garmin G3X Touch.

This supplement must be attached to the Airplane Flight Manual; the information contained herein supplements the basic Airplane Flight Manual. For limitations, procedures and performance information not contained in this supplement consult the basic approved Airplane Flight Manual.

The information contained in this Supplement must be considered to override the EASA approved Aircraft Flight Manual where there is any conflict between the supplement and the manual.

2. LIMITATIONS

Refer to the basic AFM, Section 2 – Limitations.

In addition, consider the following limitations:

2.1. AUTOPILOT LIMITATIONS

NOTE

The "Garmin G3X Touch Pilot's Guide for the Tecnam P2002" (Part No. 190-02472-00 Revision D or a more updated version) must be carried in the aircraft and made available to the pilot at all time.

Following operating limitations shall apply when the aircraft is equipped with Garmin GFC500 Autopilot :

- During Autopilot operation, a pilot with seat belt fastened must be seated at the left pilot position;
- The autopilot (AP) and yaw damper (YD) must be OFF during take-off and landing;
- the entire preflight test must be completed successfully prior to use of the autopilot or flight director.
- The autopilot must be disengaged below 200 ft AGL during approach operations.
- The autopilot must be disengaged below 500 ft AGL for all operations other than approach operations.
- The Autopilot is certified for CAT I Precision and Non Precision Approaches with a decision height not lower than 200 ft (61 m) AGL.
- Minimum Approach speed is 70 KIAS.

Autopilot Engagement Speed	
Minimum	59 KIAS
Maximum	125 KIAS

3. EMERGENCY PROCEDURES

NOTE *In the event of autopilot malfunction, or when the system is not performing as expected or commanded, take immediately the aircraft control disconnecting the autopilot which must be set inoperative until the failure has been identified and corrected.*

3.1. AUTOPILOT MALFUNCTION

If the airplane deviates unexpectedly from the planned flight path:

1. Control Stick …………..……………….. *GRIPD FIRMLY and OVERPOWER if necessary*
2. AP DISC button …….…………………. *PRESS*
3. AP Master Switch …………………….. *SET OFF*
4. Aircraft Attitude ……………………….. *MAINTAIN / REGAIN AIRCRAFT CONTROL*
5. Pitch Trim control ....………………….. *TRIM if necessary*

WARNING *Following an A/P system malfunction, do not engage the autopilot until the cause of the malfunction has been corrected.*

3.2. AUTOPILOT FAILURE/ABNORMAL DISCONNECT

(RED AP in autopilot status box on display, continuos aural disconnect tone.)

1. AP DISC button …….…………………. *PRESS (to cancel disconnect tone)*
2. Aircraft Attitude ……………………….. *MAINTAIN / REGAIN AIRCRAFT CONTROL*

NOTE

The autopilot disconnect may be accompanied by a red AFCS in the autopilot status box, indicating the Automatic Flight Control System has failed. The flight director will not be available and the autopilot cannot be re-engaged with this annunciation present.

If the disconnect is accompanied by an amber AP with a red X, the autopilot will not be available. However, the flight director will still be functional.

In the event of a GMC failure, pressing the G5 knob, GI 275 knob or autopilot status button, or G3X Autopilot status bar will acknowledge the disconnect tone.

3.3. PITCH AUTO-TRIM FAILURE

1. Control Stick …………………………….. *GRIP FIRMLY*
2. AP DISC Button ..……………………….. *PRESS and RELEASE*
3. Pitch Trim DISC Switch………………… *ON*

3.4. ESP ACTIVATION

1. Throttle Lever ….………….…………….. *AS REQUIRED*
2. Attitude ……….....………………………. *MAINTAIN/REGAIN aircraft control*

NOTE

If ESP is active for approximately 10 seconds, the autopilot will automatically engage in LVL mode, and the autopilot will roll the wings level and fly at zero vertical speed. Refer to Section 7, System Description for further information.

ESP will be disabled by pressing and holding the AP DISC button. Releasing the button will allow ESP to function. ESP can be enabled/disabled also using G3X Touch Autopilot Interface.

Enabling/disabling ESP using the G3X Touch Autopilot Interface:

1. From the PFD, touch the Autopilot Status Box. The Automatic Flight Control System page is displayed.

   Or:

   From the Main Menu, touch Flight Controls.
2. Touch the ESP button on the Automatic Flight Control System page to enable/disable ESP.

3.5. OVERSPEED PROTECTION

1. Throttle Lever ……………….………….. *REDUCE*
2. Attitude and Altitude ...….…………….. *MONITOR*

NOTE

Overspeed protection mode provides a pitch up command to decelerate the airplane to or below the maximum autopilot engagement speed.

3.6. YAW AXIS FAILURE/ YAW DAMPER DISCONNECT

(RED YD in autopilot status box on display)

1. AP DISC button ………………………….. *PRESS*
2. Aircraft Attitude ……………………….. *MAINTAIN / REGAIN AIRCRAFT CONTROL*

NOTE *The yaw damper disconnect may be accompanied by an amber YD with a red X in the autopilot status box. The YD is inoperative and will not be available. The autopilot may be re-engaged and disengaged normally, but the yaw damper will remain inoperative.*

3.7. AUTOPILOT PRE-FLIGHT TEST FAIL

(Amber AP with red X in autopilot status box)

1. Autopilot and yaw damper inoperative.

3.8. LOSS OF NAV INFORMATION

1. NAV source ……………………………… *SELECT a valid NAV source*
2. NAV Key Button ………………………… *PRESS*

NOTE *If a navigation signal is lost while the autopilot is tracking it, the autopilot will roll the aircraft wings level and default to roll mode (ROL).*

3.9. LOSS OF AIRSPEED DATA

1. AP DISC Button ………………………… *PRESS AND RELEASE*
2. Attitude ……….……………………… *Maintain/Regain aircraft control*

NOTE *The autopilot cannot be re-engaged. The flight director will be available. Loss of airspeed will be accompanied by a red PTRIM indication.*

3.10.LOSS OF ALTITUDE DATA

1. Vertical Mode .... *CHANGE*

NOTE *If altitude data is lost while the autopilot is tracking altitude, the autopilot will default to pitch mode (PIT).*

3.11.LOSS OF GPS INFORMATION

1. Autopilot .... *SELECT different lateral and vertical mode*

If on an instrument approach:

2. AP DISC .... *PRESS and Approach manually*

Or

2. Missed Approach .... *PERFORM*

NOTE *If GPS position data is lost while the autopilot is tracking a GPS, VOR or LOC, the autopilot will default to roll mode (ROL). The autopilot will default to pitch mode (PIT) if GPS information is lost while tracking an ILS. The autopilot uses GPS aiding in VOR and LOC modes.*

3.12. ELEVATOR MISTRIM

This annunciation indicates a mistrim of the elevator while the autopilot is engaged. The autopilot will normally trim the airplane as required. However, during rapid acceleration, deceleration, configuration changes, or near either end of the elevator trim limits, momentary illumination of this message may occur. If the autopilot is disconnected while this message is displayed, high elevator control forces are possible.

WARNING

Do not attempt to overpower the autopilot in the event of a pitch mistrim. The autopilot servo will oppose pilot input and will cause pitch trim to run opposite the direction of pilot input. This will lead to a significant out-of-trim condition, resulting in large control wheel force when disengaging the autopilot.

WARNING

Be prepared for significant sustained control forces in the direction of the mistrim annunciation.

1. Control Stick ……………………………… *GRIP firmly*
2. AP DISC ………………………………… *PRESS and RELEASE*
3. Elevator Trim …………………………… *RE-TRIM as required*

NOTE

Momentary display of the TRIM UP or TRIM DOWN message during configuration changes or large airspeed changes is normal.

4. NORMAL PROCEDURES

Refer to the basic AFM, Section 4 – Normal Procedures checklist. In addition consider the following procedures:

4.1. PRE-FLIGHT CHECKS

During the preflight test the G3X Touch will display PFT in the autopilot status box. When the GFC 500 passes the test, PFT will be removed from the autopilot status box.

1.	Master Switch …..…...………………..	*SET ON*
2.	AP Master Switch ………………….…..	*SET ON*
3.	Autopilot pre-flight test ..……………….	*COMPLETE*

WARNING

If the red AFCS stays ON, the A/P has failed the preflight test. Put the A/P MASTER switch OFF to make sure that the A/P will not operate.

4.2. BEFORE TAKE-OFF CHECKLIST

1.	AP Button ………………..………………..	*PRESS to ENGAGE*
2.	Flight controls …..………..……….……..	*CHECK (autopilot can be overpowered in both pitch and roll)*
3.	AP DISC Button ……...……..………….	*PRESS to DISENGAGE*
4.	Flight controls …….……....………….	*CHECK FREE*

4.3. AUTOPILOT MODES

4.3.1. VERTICAL MODES

VERTICAL SPEED (VS) MODE

1.	Altitude Preselect ……..…………………..	*SET to desired Altitude*
2.	VS Key button ……..………………………	*PRESS, current aircraft vertical speed becomes vertical speed reference*
3.	Vertical Speed Reference ..……………..	*ADJUST using UP/DN Wheel*
4.	Green ALT ..………………....................	*CHECK upon altitude capture*

INDICATED AIRSPEED (IAS) MODE

1.	Altitude Preselect ……..…………………..	*SET to desired Altitude on G3X or GMC*
2.	IAS Key button …………………………	*PRESS, current aircraft KIAS becomes speed reference*
3.	Airspeed Reference ……..……………..	*ADJUST using UP/DN Wheel*
4.	Throttle Lever ……………..…………....	*SET as required*
5.	Green ALT ..………………....................	*CHECK upon altitude capture*

ALTITUDE HOLD (ALT) MODE , MANUAL CAPTURE

At the desired altitude:

1.	ALT Key ……..……..…………………..	*PRESS*
2.	Altitude Reference ……………………..	*ADJUST using UP/DN Wheel*

NOTE

If climbing or descending at a high rate when the ALT key is pressed, the airplane will overshoot the reference altitude and then return to it. The amount of overshoot will depend on the vertical speed when the ALT key is pressed.

VERTICAL NAVIGATION (VNAV)

1.	CDI Navigation Source ……….………	*SELECT external GPS on G3X*
2.	Vertical Navigation Profile ….….…….	*LOAD into the GPS's flight plan*
3.	Altitude Preselect ……………………..	*SET to the vertical clearance limit (if ATC clearance received)*
4.	VNAV Key Button ……………………..	*PRESS*

NOTE

Vertical navigation will not function for the following conditions:

- *Selected navigation source is not GPS navigation. VNAV will not function if the navigation source is VOR or Localizer.*
- *VNAV is not enabled on the GPS Navigator*
- *If the altitude preselect is not set below the current aircraft altitude.*
- *No waypoints with altitude constraints in the flight plan • Glideslope or Glidepath is the active flight director pitch mode.*
- *OBS mode is active*
- *Dead Reckoning mode is active*
- *Parallel track is active*
- *Aircraft is on the ground*

GO AROUND

1.	GO AROUND Button ……..……………	*PRESS – Verify GA*
2.	Throttle Lever ………….……..………	*FULL FWD*
	If Autopilot is engaged:	
3.	Attitude ……………..……….….………	*VERIFY airplane pitches up following FD*
4.	NAV or HDG Key Button ……..…….	*PRESS as required*
5.	Altitude Preselect ……………………..	*VERIFY and SET appropriate*

NOTE

The pilot is responsible for initial missed approach guidance in accordance with published procedure. When the GA button is pressed the Flight Director command bars will command go-around pitch attitude and wings level. The pilot must set Go Around power, then select the CDI to the appropriate navigation source and select the desired lateral and vertical flight director modes.

4.3.2. LATERAL MODES

HEADING MODE (HDG) / TRACK MODE (TRK)

1.	HDG/TRK Knob	*SELECT desired heading/track*
2.	HDG/TRK Key	*PRESS*

NAVIGATION (VOR)

This mode will only be available if the VHF navigator is operative.

1.	NAV Source	*Tune and activate the desired VOR frequency*
2.	HSI Source	*ENSURE that VHF NAV is the selected navigation source selecting CDI to VHF NAV*
3.	Course pointer	*SET CDI to the Desired Course*
4.	Intercept Heading	*ESTABLISH in HDG,TRK or ROL mode*
5.	NAV Key	*PRESS*

NOTE

If the Course Deviation Indicator (CDI) is greater than one dot from center, the autopilot will arm the VOR mode when the NAV key is pressed. The pilot must ensure that the current heading will result in a capture of the selected course. If the CDI is one dot or less from center, the autopilot will enter the capture mode when the NAV key is pressed.

NAVIGATION (GPS)

This mode will be available if the GPS navigator is available.

1.	NAV Source	*VERIFY that GTN NAV Source is GPS.* *SELECT CDI to external GPS*
2.	Waypoint	*SELECT on Navigation source*
3.	Course pointer	*SET CDI to the Desired Course*
4.	Intercept Heading	*ESTABLISH in HDG or ROL modes*
5.	NAV Key	*PRESS*

NOTE

If the Course Deviation Indicator (CDI) is greater than one dot from center, the autopilot will arm the GPS mode. The pilot must ensure that the current heading will result in a capture of the selected course. If the CDI is one dot or less from center, the autopilot will enter the capture mode when the NAV key is pressed.

4.3.3. APPROACHES

ILS APPROACH

This mode will only be available if the VHF and GPS navigators are available.

1.	NAV Source ……..………..……………	*Tune and activate the desired ILS frequency*
2.	HSI Source ..……..………..……………	*ENSURE that VHF NAV is the selected navigation source selecting CDI to VHF NAV*
3.	Course pointer …....……..……………….	*SET CDI to front LOC course*
4.	APR Key …………………………………..	*PRESS*
5.	LOC and GS mode ...…………………..	*VERIFY ARMED, CAPTURED AND TRACKING*
6.	Altitude preselect ..………..…………..	*SET Missed Approach Altitude*

At decision Altitude (DA)

7.	AP DISC button …...……..……………	*PRESS, continue visually for normal landing*

OR

7.	Missed Approach …...……..…………..	*PERFORM*

NOTE

Pressing the GA button will not disconnect the autopilot. Select NAV or HDG mode to fly the missed approach procedure.

If the Course Deviation Indicator (CDI) is greater than half scale deflection, the autopilot will arm the LOC mode. The pilot must ensure that the current heading will result in a capture of the selected course. If the CDI is within half scale deflection, the autopilot will enter the capture mode when the APR key is pressed.

When the selected navigation source is an ILS, glideslope coupling is automatically armed when the APR key is pressed. The glideslope cannot be captured until the localizer is captured. The autopilot can capture the glideslope from above or below the glideslope.

LOC/VOR APPROACH

This mode will only be available if the VHF and GPS navigators are available.

1.	NAV Source ……...……...……………	*Tune and activate the desired VHF frequency*
2.	HSI Source ..…....…….....…………..	*ENSURE that VHF NAV is the selected navigation source selecting CDI to VHF NAV*
3.	Course pointer …....……....…………..	*SET CDI to front LOC course or desired VOR course*
4.	NAV Key ………..……………………..	*PRESS*
5.	LOC/ VOR mode ...……………….….	*VERIFY armed, capturing and tracking the course*
6.	Altitude preselect ...……...…………...	*SET to next required step down altitude*
7.	Missed approach altitude ..……...….…	*SET when in ALT mode at the MDA*

At Missed Approach Point:

8.	AP DISC button ……....…….....………	*PRESS, continue visually for normal landing*

OR

8.	Missed Approach ..…....……...………..	*PERFORM*

NOTE

Pressing the GA button will not disconnect the autopilot. Select NAV or HDG mode to fly the missed approach procedure.

If the Course Deviation Indicator (CDI) is greater than half scale deflection, the autopilot will arm the LOC/VOR mode. The pilot must ensure that the current heading will result in a capture of the selected course. If the CDI is within half scale deflection, the autopilot will enter the capture mode when the NAV key is pressed.

GPS APPROACH (LPV, LNAV/VNAV, LP+V or LNAV+V)

This procedure applies only if the GPS navigator is available:

1.	Navigation Source	*SELECT CDI to GPS*
2.	Course pointer	*Verify CDI set to the desired course*
3.	APR Key	*PRESS*
4.	GPS and GP mode	*VERIFY armed and verify airplane captures and tracks course*
5.	Altitude preselect	*SET Missed approach altitude after GP capture*
6.	ALT Key	*PRESS to level off at the MDA*

At DA (LPV or LNAV/VNAV) or MDA and Missed approach point (LP+V or LNAV+V):

7.	AP DISC button	*PRESS, continue visually for normal landing*

OR

7.	Missed Approach	*PERFORM*

NOTE

Pressing the GA button will not disconnect the autopilot. Select NAV or HDG mode to fly the missed approach procedure.

If the Course Deviation Indicator (CDI) is greater than half scale deflection, the autopilot will arm the GPS and GP modes. The pilot must ensure that the current heading will result in a capture of the selected course. If the CDI is within half scale deflection, the autopilot will enter the capture mode when the APR key is pressed.

GPS APPROACH (LP or LNAV)

This procedure applies only if the GPS navigator is available:

1.	Navigation Source ………………………	*SELECT CDI to GPS*
2.	Course pointer …………………………….	*Verify CDI set to the desired course*
3.	NAV Key ……………………………………..	*PRESS*
4.	GPS mode ………………………………….	*VERIFY armed and verify airplane captures and tracks course*
5.	Altitude preselect ………………………..	*SET to next required step down altitude*
6.	Missed approach altitude ………………	*SET when in ALT mode at the MDA*

At Missed approach point:

7.	AP DISC button …………………………	*PRESS, continue visually for normal landing*

OR

7.	Missed Approach ………………………..	*PERFORM*

NOTE

Pressing the GA button will not disconnect the autopilot. Select NAV or HDG mode to fly the missed approach procedure.

If the Course Deviation Indicator (CDI) is greater than half scale deflection, the autopilot will arm the GPS mode. The pilot must ensure that the current heading will result in a capture of the selected course. If the CDI is within half scale deflection, the autopilot will enter the capture mode when the NAV key is pressed.

5. PERFORMANCE

Refer to the basic AFM, Section 5 – Performance.

6. WEIGHT AND BALANCE

Refer to the basic AFM, Section 6 – Weight and Balance.

7. AIRFRAME AND SYSTEMS DESCRIPTION

7.1. AUTOPILOT SYSTEM

The P Mentor aircraft series with Garmin G3x touch is equipped with an integrated three axis autopilot and three servos suite manufactured by Garmin and identified as GFC 500. The autopilot is controlled via dedicated A/P control panel located lower on central area of cockpit. The autopilot suite installed on P-Mentor is based on the following configuration:

- 1 Pitch Servo
- 1 Roll Servo
- 1 Yaw Servo (if installed)
- 1 Pitch Trim Servo

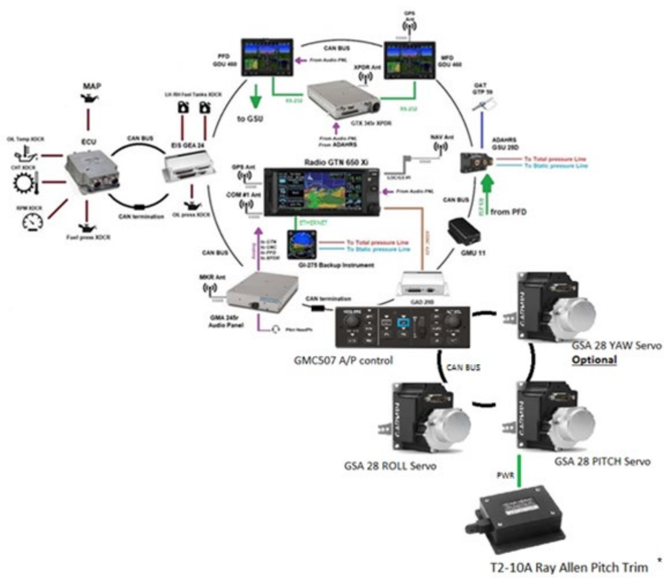
The autopilot is connected to the electric system through a circuit breaker, connected to the AVIONIC BUS properly identified and easily accessible to pilot labelled as "**A/P**", while the Pitch Trim actuator is protected by a different CB labelled as "**Pitch trim**".

The Pitch and Roll servos installed are without Capstan and are composed of three main components:

- A servo motor
- Crank Arm
- A servo Connector kit

Differently, in addition at previous parts, the optional Yaw servo is with Capstan kit and without crank arm

The following block diagrams describes the Autopilot and avionic system installed on P Mentor and its interconnections



*) B6-11T for aircraft embodying MOD2002/280

Figure S01-1 – P Mentor, Avionic System Diagram Block

In addition to the core autopilot function, the GFC 500 incorporates an independent “Aircraft Health” monitor that uses independent inertial sensors to determine what is happening to the aircraft. By monitoring aircraft attitude, attitude rates and accelerations using these independent sensors, the “Aircraft Health” monitor can disengage the autopilot if it determines the aircraft has exceeded predetermined “healthy” limits.

As previously explained, the GMC 507 provides the pilot the button for autopilot control. In the following Figure is shown the P Mentor Cockpit Layout with their controls and switches.

Figure S01-3 – GFC 500 Autopilot and P Mentor Cockpit Layout

7.2. AUTOPILOT CONTROLLER

7.2.1. GMC 507 (Autopilot Mode Controller)

Flight Director mode selection is input by the pilot using the Garmin GMC 507 Mode Controller, in addition the GMC 507 has some system monitoring of aircraft status. The GMC 507 is located on instrument panel and easily accessible to pilot.

The GMC 507 has several buttons dedicated to the control of Autopilot system. In particular:

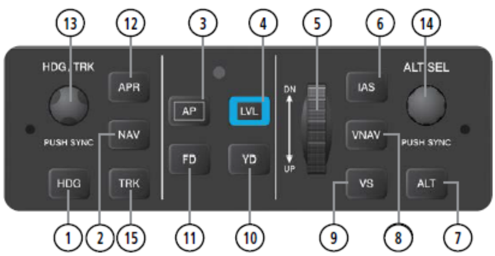


Figure S01-4 – GMC 507 A/P control 1/2

1	**HDG Key**	Selects/deselects Heading Select Mode
2	**NAV Key**	Selects/deselects Navigation Mode. Cancels GS Mode if LOC Mode is either active or armed. Cancels GP Mode if GPS Mode is either active or armed. Cancels LOC Mode if GPS Mode is active and LOC Mode is armed.
3	**AP Key**	Engages/disengages the autopilot
4	**LVL Key**	Engages the autopilot (if the autopilot is disengaged) in level vertical and lateral modes
5	**NOSE UP/DN Wheel**	Adjusts the vertical mode reference in Pitch Hold, Vertical Speed, Indicated Airspeed, and Altitude Hold modes
6	**IAS Key**	Selects/deselects Indicated Airspeed Mode
7	**ALT Key**	Selects/deselects Altitude Hold Mode
8	**VNV Key**	Selects/deselects Vertical Path Tracking Mode for Vertical Navigation flight control
9	**VS Key**	Selects/deselects Vertical Speed Mode
10	**YD Key** (if installed)	Engages/disengages the yaw damper
11	**FD Key**	Activates/deactivates the flight director only Pressing once turns on the director in the default vertical and lateral modes. Pressing again deactivates the flight director and removes the Command Bars. If the autopilot is engaged, the key is disabled.
12	**APR Key**	Selects/deselects Approach Mode
13	**HDG/TRK Knob**	Selects the desired Heading/Track
14	**ALT SEL Knob**	Selects the desired Altitude setting
15	**TRK Key**	Selects/deselects Track (TRK) Mode

Figure S01-5 – GMC 507 A/P control 2/2

7.2.2. PILOT CONTROL STICK AND THROTTLE BUTTONS/SWITCHES

The Autopilot Controls and Switches used, are:

- **Take Off/Go Around Switch** (TO/GA) is located on the throttle left handle (left side). Go Around and Take-off modes are coupled pitch and roll modes and are annunciated as both the vertical and lateral modes when active. In these modes, the flight director commands a constant set pitch attitude and keeps the wings level. The TO/G.A. Button is used to select both modes. The mode entered by the flight director depends on whether the aircraft is on the ground.
- **Autopilot Disconnect Switch** (A/P Disc) installed on pilot control stick, allows the pilot to disengage definitively the Autopilot modes active, when pushed.
- **Master Autopilot Switch**, installed on instrument panel, allows the pilot to power the Autopilot Servos and to A/P control.
- **Pitch trim Switch** (one for each Control stick) installed on control stick, allows the pilot to disengage the Autopilot modes active, when used. When the A/P is disengaged, the pitch trim switches are used in order to regulate the pitch trim surface manually operating simultaneously both sides of the switch.

Figure S01-6 – Autopilot Disc on Pilot’s Control stick

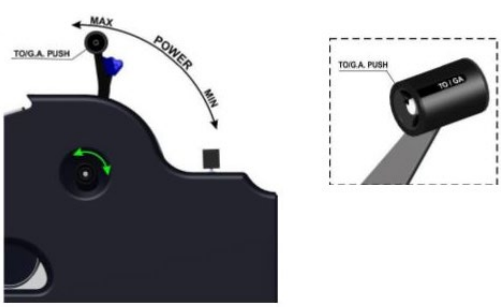


Figure S01-7 – TO/GA switch on lever throttle

7.3. AUTOPILOT FUNCTIONS

GFC 500 autopilot suite is deeply integrated with Garmin G3x avionics suite which integrates both the a/p controls and the sensors providing the required data to servos.

The GFC 500 AFCS is equipped with the following main operating functions:

- **Flight Director (FD)** – Flight director operation takes place within the primary IAU and its commands are displayed on both PFDs. The flight director provides:
  - Command Bars showing pitch/roll guidance
  - Vertical/lateral mode selection and processing
  - Autopilot communication
- **Autopilot (AP)** – Autopilot operation occurs within the pitch, roll and pitch trim servo and provides servo monitoring and automatic flight control in response to flight director steering commands, AHRS attitude and rate information, and airspeed
- **Yaw Damper (YD)** – The yaw servo is self monitoring and provides Dutch roll damping and turn coordination in response to yaw rate, roll angle, lateral acceleration and airspeed
- **Manual Electric Trim (MET)** – The pitch trim servo provides manual electric trim capability when the autopilot is not engaged
- **Electronic Stability & Protection (ESP)** – keeps the aircraft within well-defined operational limits thus preventing the pilot to operate the aircraft outside a specific envelope when it is being hand flown. This feature only operates when autopilot is not engaged and its operation is mutually exclusive with autopilot operation
- **Underspeed Protection (USP)** – When the “minimum airspeed’ value is reached, a visual MINSPD message will appear on the PFD/MFD and the autopilot/flight director will lower the nose to avoid dropping below the “minimum airspeed”.
- **Overspeed Protection (OSP)** – When overspeed protection is active a visual MAXSP message will appear on the PFD/MFD and OSP will raise the nose of the aircraft to avoid exceeding the maximum configured airspeed.

7.3.1. ESP

The GFC 500 will provide Electronic Stability and Protection when the autopilot is not engaged. Electronic Stability and Protection uses the autopilot servos to assist the pilot in maintaining the airplane in a safe flight condition within the airplane's normal pitch, roll and airspeed envelopes. ESP provides an opposing force to the pilot command on the stick. This feature automatically arms when the aircraft is above 500 feet AGL and the autopilot is not engaged, and disarm when below 200 feet AGL. Electronic Stability and Protection is invoked when the pilot allows the airplane to exceed one or more conditions beyond normal flight defined below:

- Pitch attitude beyond normal flight
- Roll attitude beyond normal flight
- Low airspeed beyond normal flight
- High airspeed beyond normal flight

The conditions that are required for ESP to be available are:

- Pitch and Roll servos available
- Autopilot not engaged
- The GPS altitude above ground is more than 200 feet (for low airspeed protection)

When ESP has been engaged for more than ten seconds (cumulative; not necessarily consecutive seconds) of a 20-second interval, the autopilot is configured to engage with the flight director in Level Mode, bringing the aircraft into level flight. An aural "Engaging Autopilot" alert is played and the flight director mode annunciation will indicate 'LVL' for vertical and lateral modes. Level mode as activated by ESP is limited by altitude. ESP will not be able to activate Level mode until the aircraft climbs above 2000 feet AGL.

The pilot can interrupt ESP by pressing and holding the Autopilot Disconnect (AP DISC) button on the stick. Upon releasing the AP DISC, ESP force will again be applied. ESP can also be overridden by overpowering the servo's torque limit. ESP is enabled or disabled from the Automatic Flight Control System (AFCS) page.

NOTE *If AGL height data is unavailable (i.e., GPS altitude or terrain data is unavailable), automatic engagement of Level mode is not supported.*

7.3.1.1. PITCH MODE

Pitch attitude boundaries set are based on P-Mentor aircraft performances.

When pitch attitude exceeds the pitch limits, the ESP engages the pitch servo applying an opposing force to encourage control movement in the direction of normal pitch attitude range for the aircraft.

The ESP pitch engagement values are the following:

Nose above the horizon:

Engagement threshold: + 24°
Disengagement low threshold: + 19°
Maximum ESP Torque: + 29°

Nose below the horizon:

Engagement threshold: - 15°
Disengagement low threshold: - 10°
Maximum ESP Torque: - 20°

Once ESP pitch mode is engaged, the torque applied by ESP increase linearly up to its maximum value when pitch is 5º more than the configured nose-up and nose-down pitch limits, and tapers to the minimum applied torque when pitch is 5º less than the configured nose-up and nose-down pitch limits. When beyond 5º of the configured pitch limit, the maximum torque is held until the aircraft returns inside the protected envelope.

When pitch attitude decreases below 5° lower than the pitch limit, the ESP disengage.

7.3.1.2. ROLL MODE

Roll mode is similar to pitch mode. The engagement and disengagement attitude limits are displayed with double hash marks on roll indicator when ESP is available and/or active.

Values for the symmetric roll limits are as follows:

Engagement threshold: ± 45°
Disengagement low threshold: ± 30°
Maximum ESP Torque: ± 60°

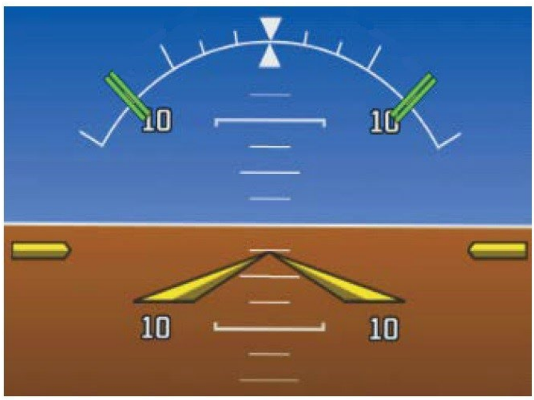


Figure S01-8 – ESP Roll angle limits

When roll attitude exceeds the bank limits, the ESP engages the roll servo, applying an opposing force, the roll limit indicators move to 15° less than the configured ESP bank limit. Once engaged, the torque applied by ESP is at its maximum when bank angle is 15º more than the configured bank limit, and tapers to the minimum applied torque when the bank angle is 15º less than the configured bank limit. The force increases as roll attitude increases and decreases as roll attitude decreases. The applied force is intended to encourage pilot input to return the airplane to a more normal roll attitude. When beyond 15º of the configured bank limit, the maximum torque is held until the aircraft returns inside the protected envelope

7.3.1.3. HIGH AIRSPEED PROTECTION

High Airspeed Protection is activated when airspeed is above the maximum airspeed limit (V_{NE} + 1 KIAS). Once activated, the ESP engages the pitch servo applying an opposing force to raise the nose of the aircraft. The torque applied by ESP is at its maximum when airspeed is 5 knots more than the configured airspeed limit, and tapers to the minimum applied torque when the airspeed is 5 knots less than the configured airspeed limit.

7.3.1.4 LOW AIRSPEED PROTECTION

Low Airspeed Protection is activated when airspeed is below the minimum airspeed limit (V_{S1} + 5 KIAS). Once activated, the ESP engages the pitch servo applying an opposing force to lower the nose of the aircraft. The torque applied by ESP is at its maximum when airspeed is 5 knots less than the configured airspeed limit, and tapers to the minimum applied torque when the airspeed is 5 knots more than the configured airspeed limit.

NOTE *If AGL height data is unavailable (i.e., GPS altitude or terrain data is unavailable), low-airspeed protection is not supported.*

7.3.2 UNDERSPEED PROTECTION - USP

Underspeed protection is an autopilot function that reacts to underspeed conditions, designed to discourage aircraft operation below minimum established airspeeds.

WARNING

USP has to be intended as a feature that will work to recover the minimum established airspeed but it does not authorize the use of autopilot below the minimum speed authorized for autopilot operation.

Pilot will be warned of impending low speed conditions, and if no action will be taken FD will directly react in a way that allows the A/P to remain engaged but prevents the airplane from stalling.

WARNING

USP function has been developed in order to warn pilot of impending low speed conditions, and if no action will be taken FD will directly react in a way that allows the Autopilot to remain engaged but prevents the airplane from stalling.
Pilot action is still expected at first warning of low airspeed conditions in order to prevent a low speed conditions, so to maintain normal flight.

NOTE

If USP engages and power is abruptly set to full throttle, pilot must be aware to expect pitch attitude changes that could not be quickly counteracted by autopilot. Avoid wide power changes that could result in hazardous attitudes and that could work against the recovery of airspeed.

CAUTION

USP engagement is a consequence of autopilot failing to properly monitoring A/P and aircraft behavior. This is mainly caused by a pilot request that cannot be fulfilled due to lack of power coupled with unattainable pitch input.
Pilot need to continuously monitor autopilot performance, while checking that mode selections are compatible with aircraft performance.

When the airspeed reaches the autopilot minimum airspeed value (59 KIAS) and a series of internal condition are triggered, a visual MINSPD message appears on the G3X and the autopilot/flight director will lower the nose to avoid dropping below the "minimum airspeed". An aural "AIRSPEED, AIRSPEED" voice alert will also be provided.

When airspeed increases (as a result of adding power/thrust), USP will then disengage and the autopilot will command the aircraft to pitch up until recapturing the vertical reference.

7.3.3 OVERSPEED PROTECTION – OSP

When the airspeed reaches the autopilot maximum airspeed value (125 KIAS) and a series of internal condition are triggered, a visual MAXSPD message appears on the G3X and the autopilot/flight director will raise the nose to avoid dropping above the "maximum airspeed". An aural "AIRSPEED, AIRSPEED" voice alert will also be provided.

7.4 DISCONNECT METHOD

The following conditions will cause the autopilot to automatically disconnect:

- Electrical power failure, including pulling the autopilot circuit breaker;
- Internal autopilot system failure (including internal AHRS failure);
- Pitch and Roll Rate above specific limits
- Excessive pitch and roll attitude
- Normal acceleration above 1.5 G or below 0.5 G

The following pilot actions will cause the autopilot to disconnect:

- Pressing the red **AP DISC** button on the pilot's control stick.
- Actuating the manual electric trim switch.
- Pushing the **AP** Key on the GMC 507 mode controller when the autopilot is engaged or by touching the "AP" annunciation in the autopilot status box.
- Pulling the autopilot circuit breaker.

7.5 AFCS ALERTS

If the commanded operation cannot be achieved due to the limitations configured, the following messages can be displayed over the pitch scale. The annunciation is removed once the condition is resolved.

AFCS	Autopilot has failed. Autopilot is inoperative and flight director is not available.
AP	Autopilot normal disconnect.
AP	Autopilot abnormal disconnect.
~~AP~~	Autopilot has failed. The autopilot is inoperative. FD modes may still be available.
MAXSPD	Autopilot Overspeed Protection mode is active. Autopilot will raise the nose to limit the aircraft's speed.
MINSPD	Autopilot Underspeed Protection mode is active. Autopilot will lower the nose to prevent the aircraft's speed from decreasing
PFT	Autopilot preflight test is in progress.
TRIM DOWN	Elevator Trim Down – Autopilot is holding elevator nose down force. The pitch trim needs to be adjusted nose down.
TRIM UP	Elevator Trim Up – Autopilot is holding elevator nose up force. The pitch trim needs to be adjusted nose up.
YD	Yaw Damper normal disconnect.
YD	Yaw Damper abnormal disconnect.
~~YD~~	Yaw Damper has failed. The Yaw Damper is inoperative.

8 AIRCRAFT CARE AND MAINTENANCE

Refer to the basic AFM, Section 8 – Aircraft Care and Maintenance.

S02

GNC 255A UNIT

1. RECORD OF REVISION

Ed / Rev	Revised pages	Description of Revision	Approval
Ed. 1 Rev. 0	-	First issue	Approved under the authority of DOA ref. EASA.21J.335 (MOD2002/235.220606)
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Ed. 1 Rev. 2	i, iii, 3	Updates for: Typos	Approved under the authority of DOA ref. EASA.21J.335 (MOD2002/266.220712)

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Edition 1, Rev 0 .... June 6, 2022
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Edition 1, Rev 2 ……………… August 03, 2022

Section	Pages	Edition / Revision
Section 0	ii, iv, 1, 2	1st Edition - Rev. 1
	i, iii	1st Edition - Rev. 2
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Section 8	All	1st Edition - Rev. 1

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1. GENERAL

1.1. INTRODUCTION

This section contains supplemental information to operate, in a safe and efficient manner, the aircraft when equipped with GNC 255A Unit (MOD2002/235 and/or MOD2002/239).

Figure S02-1 - GNC 255A Unit

NOTE *Refer to 190-01182-01 Pilot's Guide, last issue, for additional information about this equipment.*

This supplement must be attached to the Airplane Flight Manual; the information contained herein supplements the basic Airplane Flight Manual. For limitations, procedures and performance information not contained in this supplement consult the basic approved Airplane Flight Manual.

The COM/NAV radio GNC 255A is installed on the cockpit panel.

When installed as primary COM, the GNC 255A is connected to the aircraft electrical system by means of two circuit breakers labelled "**COM1**" and "**NAV1**", linked to the avionic bus.
When installed as secondary COM, the GNC 255A is connected to the aircraft electrical system by means of two circuit breakers labelled "**COM2**" and "**NAV2**", linked to the avionic bus.

To power ON the GNC 255A, turn the **Power/COM Volume/Squelch** knob clockwise past detent.

2. LIMITATIONS

Refer to the basic AFM, Section 2 – Limitations.

3. EMERGENCY PROCEDURES

Refer to the basic AFM, Section 3 – Emergency Procedures.

4. NORMAL PROCEDURES

Normal operating procedures are described on GARMIN GNC255A Pilot's guide.

NOTE

GARMIN GNC255A Pilot's guide must be carried on board the airplane at all times.

5. PERFORMANCE

Refer to the basic AFM, Section 5 – Performance.

6. WEIGHT AND BALANCE

Refer to the basic AFM, Section 6 – Weight and Balance.

7. AIRFRAME AND SYSTEMS DESCRIPTION

7.1. GNC 255A UNIT

The GNC 255A provides a full-functioned navigation and communications instrument combining a powerful VHF communications transceiver with 200 channel VOR, Localizer and Glideslope receivers.

The GNC 255A controls are comprised of dual concentric knobs for frequency tuning, COM volume/squelch knob, NAV volume/ID knob and bezel keys.

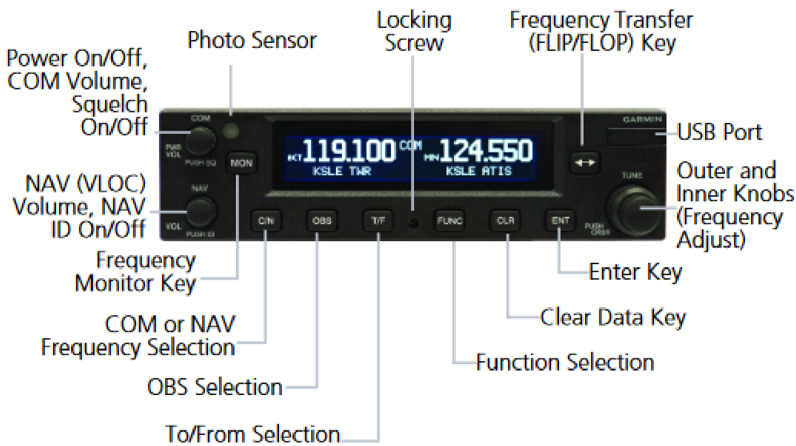

Figure S02-2 – GNC 255A Front Panel Description

7.2. SELECTING A COM FREQUENCY

New frequencies are first selected as a standby frequency and then toggled to the active side with the FLIP/FLOP key. While viewing the standby frequency display, use the outer and inner knobs on the right side of the GNC 255A to select the desired frequency.

COM Frequency Selection

1. Press **C/N** to reach the COM radio function. The COM annunciator on the top line of the display will show
2. Turn the outer knob to change the values in one MHz increments.
3. Turn the inner knob to change the values in 25 kHz or 8.33 kHz increments.
4. Turn the outer and inner knobs clockwise to increase and counterclockwise to decrease the frequency values. Standby frequency selection is not inhibited during transmit.
5. When connected to a position source, the nearest station identifier will be shown for the selected frequency.
6. Press and release the **FLIP/FLOP** key to toggle the standby frequency to the active frequency.

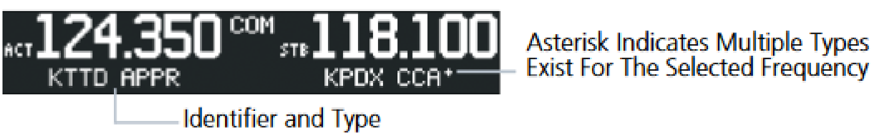

Figure S02-3 – COM Frequency Selection

7.3. SELECTING A NAV FREQUENCY

The selection of NAV frequencies is the same as for the COM frequencies

1. Press the **C/N** key to reach the NAV radio function: The NAV annunciator on the top line of the display will show.
2. Turn the outer knob to change the MHz values. The MHz selection range is between 118 and 136 in one MHz steps
3. Turn the inner knob to change the kHz values.

Figure S02-4 – NAV Frequency Selection

7.4. DISPLAY BRIGHTNESS

From the factory, the GNC 255A automatically adjusts its display brightness for the current lighting conditions. A small sensor on the display is used for this function. A manual adjustment is available for controlling the brightness level of the display as an offset from the normal or zero position.

The GNC 255A will either control dimming based on the photocell or the lighting bus. This is set in configuration mode during installation and is not selectable by the pilot.

1. Press **FUNC**
2. Turn the outer knob to SYS CONFIGURATION
3. Turn the inner knob to DSPL BRT
4. Press **ENT**
5. Turn the inner knob to set the value
6. Press **ENT** to save selected value
7. Press **CLR** to cancel change

Figure S02-5 – Display Brightness Page

7.5. DISPLAY CONTRAST

The display contrast has a range from -50 (low) and 50 (high) with 0 as the default. The range can be adjusted using the inner knob.

1. Press **FUNC**
2. Turn the outer knob to SYS CONFIGURATION
3. Turn the inner knob to DSPL CONTRAST
4. Press **ENT**
5. Turn the inner knob to set the offset value
6. Press **ENT** to save selected value
7. Press **CLR** to cancel the change

Figure S02-6 – Display Contrast Page

7.6. ANTENNA INSTALLATION

The Comant CI 292-2 antenna is placed on the fuselage lower skin in correspondence of the longitudinal plane of A/C.

Figure S02-7 – Comant CI 292-2 antenna

8. AIRCRAFT CARE AND MAINTENANCE

Refer to the basic AFM, Section 8 – Aircraft Care and Maintenance.

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S03

KR87 ADF SYSTEM

1. RECORD OF REVISION

Ed / Rev	Revised pages	Description of Revision	Approval
Ed. 1 Rev. 0	-	First issue	Approved under the authority of DOA ref. EASA.21J.335 (MOD2002/236.220803)

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2. LIST OF EFFECTIVE PAGES

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Section	Pages	Edition / Revision
Section 0	All	1st Edition - Rev. 0
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1. GENERAL

1.1. INTRODUCTION

This section contains supplemental information to operate, in a safe and efficient manner, the aircraft when equipped with GNC 255 Unit.

This supplement must be attached to the Airplane Flight Manual; the information contained herein supplements the basic Airplane Flight Manual.

For limitations, procedures and performance information not contained in this supplement consult the basic approved Airplane Flight Manual.

Regarding the electrical connection of the ADF System, it is protected with a breaker labeled" **ADF**" linked to avionic bus and the unit is turned on by rotating the volume control clockwise past the detent.

NOTE *For detailed operational instructions related to this equipment, see last issues of the manufacturer's publications..*

2. LIMITATIONS

Refer to the basic AFM, Section 2 – Limitations.

3. EMERGENCY PROCEDURES

Refer to the basic AFM, Section 3 – Emergency Procedures.

4. NORMAL PROCEDURES

Refer to the basic AFM, Section 4 – Normal Procedures.

5. PERFORMANCE

Refer to the basic AFM, Section 5 – Performance.

6. WEIGHT AND BALANCE

Refer to the basic AFM, Section 6 – Weight and Balance.

7. AIRFRAME AND SYSTEMS DESCRIPTION

7.1. INSTRUMENT PANEL

The ADF Receiver is installed in the instrument panel. In addition, in order to provide audio signal to pilot, the KR87 receiver is linked to Garmin GMA245R Audio Panel. The KI 227 (Fig.S03-2) is a single needle ADF Indicator and is the basic indicator used with the KR 87 (Fig. S03-1), it is installed between the PFD and MFD interfaces.

NOTE *It is recommended that the KR 87 unit be turned off when the aircraft engine is started in order to prevent possible voltage transient damage to the radio*

The KR 87 Automatic Direction Finder is a digitally tuned solid state receiver which provides bearing information to stations in the 200 KHz to 1799 KHz frequency band and which also provides audio reception to enable the pilot to identify stations. The unit displays the active ADF frequency in the left window.

The ADF station can be tuned by a dedicated potentiometer installed on the right side of the unit. The right window will display either the standby frequency or a flight timer or programmable elapsed timer (Timers Mode). An automatic dimming circuit adjusts the brightness of the display to compensate for changes in ambient light level.

Figure S03-1 – KR87 ADF Receiver Panel

Figure S03-2 – KI 227 Indicator Panel

Pressing the **ET/FLT** button will active Timers Mode, while pressing the **FRQ** button will display the stand-by frequency.

It is possible to change the active frequency when either timer mode is being displayed in the right hand window rotating the knob. In addition. If on the right side is displayed the stand-by frequency, rotating the knob will change it and pressing the **FRQ** button the active frequency and stand-by frequency will be exchanged.

7.2. ANTENNA INSTALLATION

The ADF antenna is located under the fuselage on the right side between Com#2 Antenna and MKR beacon antenna.

Figure S03-3 – ADF Antenna

8. AIRCRAFT CARE AND MAINTENANCE

Refer to the basic AFM, Section 8 – Aircraft Care and Maintenance.

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S04

KN63 DME SYSTEM

1. RECORD OF REVISION

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1. GENERAL

1.1. INTRODUCTION

This section contains supplemental information to operate, in a safe and efficient manner, the aircraft when equipped with DME KN 63 device.

This supplement must be attached to the Airplane Flight Manual; the information contained herein supplements the basic Airplane Flight Manual. For limitations, procedures and performance information not contained in this supplement consult the basic approved Airplane Flight Manual.

This system is composed by the KN63 (DME Receiver) and CI105-16 (DME Antenna).

The KN63 is designed to operate with the box present on PFD/MFD of G3x Touch avionic suite (see Fig.S04-1) where range, speed, and time-to-station were indicated.

In order to provide Info from the DME to G3xt, the KN63 is connected to adapt GAD43e.

In order to have the audio link, the KN63 is connected to Garmin remote Audio panel GMA 245R.

The DME KN63 is connected to the Main battery by the Avionic Switch.

The DME KN63 System is protected by means of one circuit breaker, located on the breakers panel, labeled “**DME**”, linked to avionic bus.

Also the GAD43e is protected by a dedicated circuit breaker labelled “**GAD 43**” linked to avionic bus.

Figure S04-1 – DME Box on G3xt

2. LIMITATIONS

Refer to the basic AFM, Section 2 – Limitations.

3. EMERGENCY PROCEDURES

Refer to the basic AFM, Section 3 – Emergency Procedures.

4. NORMAL PROCEDURES

Refer to the basic AFM, Section 4 – Normal Procedures.

5. PERFORMANCE

Refer to the basic AFM, Section 5 – Performance.

6. WEIGHT AND BALANCE

Refer to the basic AFM, Section 6 – Weight and Balance.

7. AIRFRAME AND SYSTEMS DESCRIPTION

7.1. KN63 UNIT

The KN 63 is a remote mounted, 200 channel TSO'd DME employing the latest state of the art solid-state transmitter and large scale integrated circuit (LSI) technology.

Touching the DME box on G3xt is possible to select the NAV frequency to be followed.

The effective range of the KN 63 DME depends on many factors; most important being the altitude of the aircraft. When the aircraft is on the ground, the KN 63 usually will not receive DME stations due to line-of-sight signal limitations. Other contributing factors to the DME's effective range are the location and altitude of the ground transmitter, transmitter power output, and the degree of maintenance of the ground facility.

The distance measured by the KN 63 is slant-range distance (measured on a slant from aircraft to ground station) and should not be confused with actual ground distance.
The difference between ground distance and slant-range distance is smallest at low altitude and long range. These differences may differ considerably when in close proximity to a VOR/DME facility.
However, if the range is three times the altitude or greater, this error is negligible.

In order to obtain accurate ground distance and time-to-station, the aircraft must be tracking directly to or from the station.

7.2. ANTENNA INSTALLATION

The DME receiver (KN63) and GAD43e are installed under baggage compartment in the tail cone. The DME antenna is Comant CI 105-16 and it is installed under the fuselage, in the middle of it on the right side.

Figure S04-2 – CI-105-16 DME Antenna

8. AIRCRAFT CARE AND MAINTENANCE

Refer to the basic AFM, Section 8 – Aircraft Care and Maintenance.

S05

LANDING GEAR EXTRACTION SIMULATION

1. RECORD OF REVISION

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Section 7	All	1st Edition - Rev. 0
Section 8	All	1st Edition - Rev. 0

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1. GENERAL

1.1. INTRODUCTION

This section contains supplemental information to operate, in a safe and efficient manner, the aircraft when equipped with Landing Gear Extraction Simulator (MOD 2002/245).

This supplement must be attached to the Airplane Flight Manual; the information contained herein supplements the basic AFM. For limitations, procedures and performance information not contained in this supplement consult the basic approved Airplane Flight Manual.

The information contained in this supplement must be considered to override the EASA approved Aircraft Flight Manual where there is any conflict between the supplement and the manual.

2. LIMITATIONS

Refer to the basic AFM, Section 2 – Limitations.

3. EMERGENCY PROCEDURES

Refer to the basic AFM, Section 3 – Emergency Procedures.

4. NORMAL PROCEDURES

Refer to the basic AFM, Section 4 – Normal Procedures.

5. PERFORMANCE

Refer to the basic AFM, Section 5 – Performance.

6. WEIGHT AND BALANCE

Refer to the basic AFM, Section 6 – Weight and Balance.

7. AIRFRAME AND SYSTEMS DESCRIPTION

7.1. LANDING GEAR SIMULATOR SYSTEM

The landing gear extraction simulator is controlled by the LG control knob located on the instrument panel.

The Landing Gear indication system is electrical and it is composed by the following main components:

a. 3 Leg position lights (green light);
b. 1 Transition light (red light)

The three green lights, to simulate the real behavior of a landing gear system, illuminate only when the respective gear is “down-locked” while the red light indicates the gear is in transit “up” or “down”.

To simulate a real landing gear, the landing gear simulator system is equipped with a timer which controls the sequence of lights. There are basically two different situations:

- In flight condition, with landing gear Up all the lights are OFF. Pushing the control knob DOWN is possible to simulate the landing gear extension and the red light will illuminate. After 10 seconds the three green lights will illuminate and at the same time the red light will extinguish;
- On ground, with the landing gear DOWN the red light is OFF while the three green lights are ON. After take-off, pushing the control knob UP is possible to simulate the landing gear retraction. The red light will illuminate and after 10 seconds all the lights will extinguish.

A warning horn alerts the pilot when the Landing Gear control knob is in UP position and the throttle lever and/or flaps are respectively set to IDLE and to LAND position.

8. AIRCRAFT CARE AND MAINTENANCE

Refer to the basic AFM, Section 8 – Aircraft Care and Maintenance.

S07

GTR 225A UNIT

1. RECORD OF REVISION

Ed / Rev	Revised pages	Description of Revision	Approval
Ed. 1 Rev. 0	-	First issue	Approved under the authority of DOA ref. EASA.21J.335 (MOD2002/256.220705)

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2. LIST OF EFFECTIVE PAGES

Edition 1, Rev 0 .... July 5, 2022

Section	Pages	Edition / Revision
Section 0	All	1st Edition - Rev. 0
Section 1	All	1st Edition - Rev. 0
Section 2	All	1st Edition - Rev. 0
Section 3	All	1st Edition - Rev. 0
Section 4	All	1st Edition - Rev. 0
Section 5	All	1st Edition - Rev. 0
Section 6	All	1st Edition - Rev. 0
Section 7	All	1st Edition - Rev. 0
Section 8	All	1st Edition - Rev. 0

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1. GENERAL

1.1. INTRODUCTION

This section contains supplemental information to operate, in a safe and efficient manner, the aircraft when equipped with GTR 225A Unit (MOD2002/256).

Figure S07-1 - GTR 225A Unit

NOTE *Refer to 190-01182-00 Pilot's Guide, last issue, for additional information about this equipment.*

This supplement must be attached to the Airplane Flight Manual; the information contained herein supplements the basic Airplane Flight Manual. For limitations, procedures and performance information not contained in this supplement consult the basic approved Airplane Flight Manual.

The COM radio GTR 225A is installed on the cockpit instrument panel.

The GTR 225A is connected to the aircraft electrical system by means of one circuit breaker labelled "**COM2**" linked to the avionic bus.

To power ON the GTR 225A, turn the **Power/COM Volume/Squelch** knob clockwise past detent.
To power OFF the unit turn the same knob in the counter-clockwise direction.

2. LIMITATIONS

Refer to the basic AFM, Section 2 – Limitations.

3. EMERGENCY PROCEDURES

3.1 ELECTRICAL SYSTEM

3.1.1 Loss of Avionic Bus

The loss/failure of avionic bus will be recognized with the simultaneous loss of the following equipment:

Table 3-1 – Loss of Avionic Bus

MFD	COM 2	-	-

1. Avionic Master switch ……………………..………. *SET OFF*

2. Continue flight with PFD in reversionary mode

Refer to the basic AFM, Section 3 – Emergency Procedures.

4. NORMAL PROCEDURES

Normal operating procedures are described on GARMIN GTR225A Pilot's guide.

NOTE

GARMIN GTR225A Pilot's guide must be carried on board the airplane at all times.

5. PERFORMANCE

Refer to the basic AFM, Section 5 – Performance.

6. WEIGHT AND BALANCE

Refer to the basic AFM, Section 6 – Weight and Balance.

7. AIRFRAME AND SYSTEMS DESCRIPTION

7.1. GTR 225A UNIT

The GTR 225A provides a powerful VHF communications transceiver in a small footprint.

The GTR 225A controls are comprised of dual concentric knobs for frequency tuning, COM volume/ knob and bezel keys.

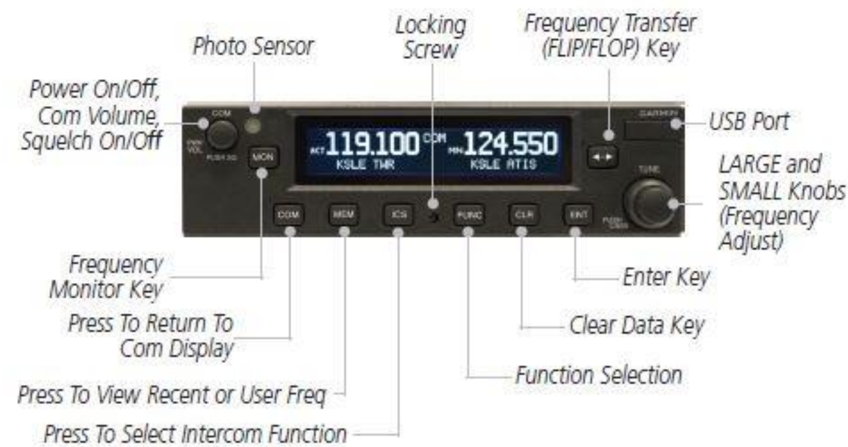

Figure S07-2 – GTR 225A Front Panel Description

The main features of the device are listed below:

- Power ON/OFF/Volume COM Knob
- Photocell
- Switch Active/Stand By frequency
- Double Knobs frequency selector
- Enter softkey
- Clear softkey
- Fixing screw
- COM softkey

7.2. SELECTING A COM FREQUENCY

New frequencies are first selected as a standby frequency and then toggled to them active side with the **FLIP/FLOP** key. While viewing the standby frequency display, use the **LARGE** and **SMALL** knobs on the right side of the GTR 225A to select the desired frequency.

COM Frequency Selection

1. Press **C/N** to reach the COM radio function. The COM annunciator on the top line of the display will show
2. Turn the **LARGE** knob to change the values in one MHz increments.
3. Turn the **SMALL** knob to change the values in 25 kHz or 8.33 kHz increments.
4. Turn the **LARGE** and **SMALL** knobs clockwise to increase and counterclockwise to decrease the frequency values. Standby frequency selection is not inhibited during transmit.
5. When connected to a position source, the nearest station identifier will be shown for the selected frequency.
6. Press and release the **FLIP/FLOP** key to toggle the standby frequency to the active frequency.

Figure S07-3 – COM Frequency Selection

7.3. DISPLAY BRIGHTNESS

From the factory, the GTR 225A automatically adjusts its display brightness for the current lighting conditions. A small sensor on the display is used for this function. A manual adjustment is available for controlling the brightness level of the display as an offset from the normal or zero position.

The GTR 225A will either control dimming based on the photocell or the lighting bus. This is set in configuration mode during installation and is not selectable by the pilot.

1. Press **FUNC**
2. Turn the **LARGE** knob to SYS FUNCTION
3. Turn the **SMALL** knob to view the Display Brightness function.
4. Press **ENT**
5. Turn the **SMALL** knob to set the value
6. Press **ENT** to save selected value

Figure S07-5 – Display Brightness Page

7.4. DISPLAY CONTRAST

The display contrast has a range from -50 (low) and 50 (high) with 0 as the default. The range can be adjusted using the **SMALL** knob.

1. Press **FUNC**
2. Turn the **LARGE** knob to SYS FUNCTION
3. Turn the **SMALL** knob to view the display
4. Press **ENT**
5. Turn the **SMALL** knob to set the value
6. Press **ENT** to save selected value

Figure S07-6 – Display Contrast Page

7.5. ANTENNA INSTALLATION

The Comant CI 292-2 antenna is placed on the fuselage lower skin in correspondence of the longitudinal plane of A/C.

Figure S07-7 – Comant CI 292-2 antenna

8. AIRCRAFT CARE AND MAINTENANCE

Refer to the basic AFM, Section 8 – Aircraft Care and Maintenance.

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S08

AFMS FOR ARGENTINE AIRCRAFT

1. RECORD OF REVISION

Ed / Rev	Revised pages	Description of Revision	Approval
Ed. 1 Rev. 0	-	First issue	Approved under the authority of DOA ref. EASA.21J.335 (MOD2002/282.230109)

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2. LIST OF EFFECTIVE PAGES

Edition 1, Rev 0 .... January 09, 2023

Section	Pages	Edition / Revision
Section 0	All	1st Edition - Rev. 0
Section 1	All	1st Edition - Rev. 0
Section 2	All	1st Edition - Rev. 0
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INDEX

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1. GENERAL

1.1. INTRODUCTION

This section contains supplemental information to operate, in a safe and efficient manner, the aircrafts delivered in Argentina in accordance with Argentina Local Authority requirements (MOD2002/282).

This supplement must be attached to the Airplane Flight Manual; the information contained herein supplements the basic Airplane Flight Manual. For limitations, procedures and performance information not contained in this supplement consult the basic approved Airplane Flight Manual.

The information contained in this Supplement must be considered to override the EASA approved Aircraft Flight Manual where there is any conflict between the supplement and the manual.

1.2. FUEL, LUBRICANT AND COOLANT

1.2.1. Fuel

Fuel Specification …………………………….	MOGAS (ASTM D4814) MOGAS EN228 (min RON 95) AVGAS 100LL (ASTM D910)

2. LIMITATIONS

Refer to basic AFM, Section 2 – Limitations.

In addition, consider the following limitations:

2.1. Fuel

Approved Fuel Grades ………………………	MOGAS (ASTM D4814) MOGAS EN228 (min RON 95) AVGAS 100LL (ASTM D910)

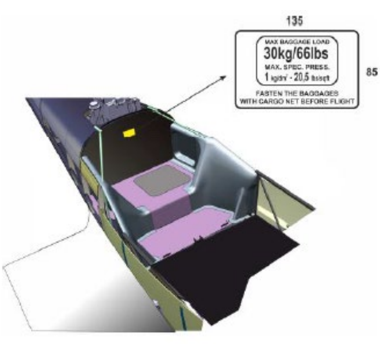
2.2. Limitation placards

2.2.1. No smoking placard

On the left hand side of the instrument panel the following placard is placed reminding the observance for “no smoking”:

2.2.2. Baggage compartment placard

Behind the baggage compartment door, the following placard is placed:



2.3. Kinds of Operations

For each kind of operation in Argentina, airplane must have installed and operative the equipment required by applicable RAAC.

3. EMERGENCY PROCEDURES

Refer to basic AFM, Section 3 – Emergency Procedures.

4. NORMAL PROCEDURES

Refer to basic AFM, Section 4 – Normal Procedures.

5. PERFORMANCE

Refer to the basic AFM, Section 5 – Performance.

6. WEIGHT AND BALANCE

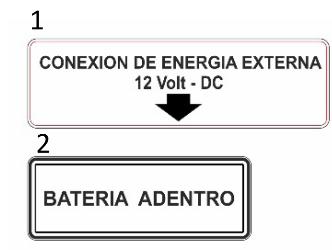
Refer to the basic AFM, Section 6 – Weight and Balance.

7. AIRFRAME AND SYSTEMS DESCRIPTION

Refer to the basic AFM, Section 7 – Airframe and Systems Description except for the following placards.

7.1 EXTERNAL PLACARDS

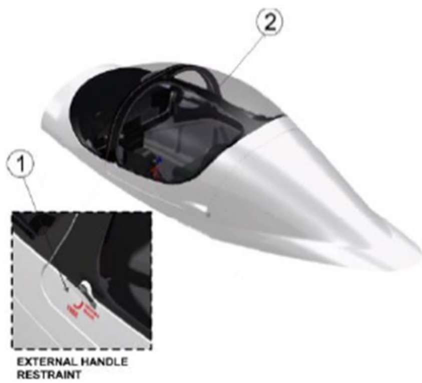
External Power Receptacle



No Step Placard

Fuel Placards

Canopy External Placard



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7.2 INTERNAL PLACARDS

ELT Placard

ELT
DETRÁS
ESTE PANEL

Hammer Placard

MARTILLO DE EMERGENCIA

Canopy Internal Placards

Safety Equip. Location Placard

Oil dipstick level Placard

7.3 OPTIONAL EQUIPMENT PLACARDS

Parachute system Placards (if installed)

8. AIRCRAFT CARE AND MAINTENANCE

Refer to the basic AFM, Section 8 – Aircraft Care and Maintenance.

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