POH EXTRA 330LX

EXTRA

PILOT'S OPERATING HANDBOOK

AND

EASA APPROVED AIRPLANE FLIGHT MANUAL

Doc-No. EA - 0E701

NATIONALITY AND REGISTRATION MARKS

HB-MGB

DESIGNATION OF AIRCRAFT

EA 300/LC (EXTRA 330LX)

SERIAL NO/YEAR OF MANUFACTURE

LC097 / 2024

MANUFACTURER

EXTRA Flugzeugproduktions- und Vertriebs- GmbH
Flugplatz Dinslaken
46569 Hünxe, Federal Republic of Germany

EXTRA QM-078 JMA 12.07.24

EASA approved in the normal and acrobatic category based on FAR-23 AMDT. 34.
This document must be carried in the airplane at all times.

THIS HANDBOOK INCLUDES THE MATERIAL REQUIRED TO BE FURNISHED TO THE PILOT BY THE EASA REGULATIONS AND ADDITIONAL INFORMATION PROVIDED BY THE MANUFACTURER AND CONSTITUTES THE EASA APPROVED AIRPLANE FLIGHT MANUAL.

This Handbook meets GAMA Specification No. 1 for Pilot's Operating Handbook.

Signed: For the EASA
Roger Hardy
Certification Manager
General Aviation

Date: 8. April 2011

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LOG OF REVISIONS

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INTRODUCTION

This handbook contains 9 sections, and includes the material required to be furnished to the pilot by FAR Part 23. It also contains supplementary data supplied by EXTRA Flugzeugproduktions- und Vertriebs- GmbH.

THIS MANUAL IS FURNISHED TO THE CIVIL AVIATION AUTHORITIES AS A PART OF THE CERTIFICATION MATERIAL FOR THIS MODEL.

NOTES

This Flight Manual applies only to the aircraft whose nationality and registration marks are noted on the title page.

This Flight Manual is only valid in connection with the latest approved revision. Refer to the EXTRA Homepage (direct link: http://www.extraaircraft.com/techserv.asp), where the POH Revision Index always shows the current revision status.

It is the responsibility of the pilot to be familiar with the contents of this Flight Manual including revisions and any relevant supplements.

Pages of this Airplane Flight Manual must not be exchanged and no alterations of or additions to the approved contents may be made without the EXTRA Flugzeugproduktions- und Vertriebs- GmbH/EASA approval.
The editor has the copyright of this Flight Manual and is responsible for edition of revisions/ amendments and supplements.

Amendments, which affect the airworthiness of the aircraft will be announced in the mandatory Service Bulletins issued by the manufacturer EXTRA Flugzeugproduktions- und Vertriebs- GmbH coming along with the "Airworthiness Directive" (AD) publication issued by the EASA. The owner is responsible for incorporating prescribed amendments and should make notes about these on the records of amendments.

Should this Flight Manual get lost, inform EXTRA Flugzeugproduktions- und Vertriebs- GmbH, Flugplatz Dinslaken 46569 Hünxe, Federal Republic of Germany.

Should this Flight Manual be found, kindly forward it to the civil board of aviation in the country the aircraft is registered.

NOTES AND SAFETY NOTES

Safety notes in this manual are marked by a boxed textmarker in the middle of the page and written in semi-bold characters. This manual distinguishes three warning levels:

⚠ DANGER

Indicates a hazardous situation which, if not avoided, will result in death or serious injury.

⚠ WARNING

Indicates a hazardous situation which, if not avoided, could result in death or serious injury.

⚠ CAUTION

Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.

Additional information given in this manual are also marked by boxed textmarkers in the middle of the page and are written in semi-bold characters:

NOTICE

is used to address practices not related to physical injury.

NOTE

Represents an useful or remarkable hint.

TERMINOLOGIE

The words "shall", "must" or "will" are used to express a mandatory requirement.

The word "should" is used to express nonmandatory provisions.

The word "may" is used to express permissible.

MAIN TABLE OF CONTENTS

SECTION 1

GENERAL

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1.0 DESCRIPTION

The fuselage of the EXTRA 330LX is built of a tig-welded steel-tube construction. Wings, empennage and landing gear are manufactured from composite material.

The aircraft is a two-seater with the rear seat instrumented for pilot in command.

1.1 SPECIFICATION OF CLASS

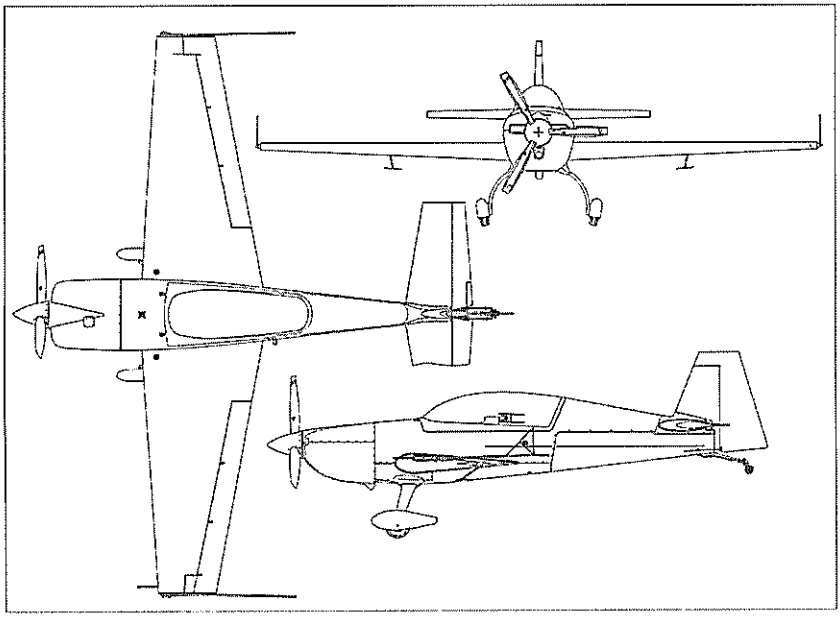
The aircraft is certified in normal and acrobatic category.

1.2 MANUFACTURER

EXTRA Flugzeugproduktions- und Vertriebs- GmbH,
Flugplatz Dinslaken
46569 Hünxe,
Federal Republic of Germany.

1.3 TECHNICAL DATA

1.3.1 3-VIEW DRAWING



1.3.2 MAIN DATA

- Length	7.20 m (23.06 ft)
- Height	2.62 m (8.60 ft)
- Span	8.00 m (26.25 ft)
- Wheel base	5.12 m (16.80 ft)
- Wheel track	1.80 m (5.91 ft)

1.3.3 WING

- Wing span	8.0 m (26.25 ft)
- Wing-area	10.72 m² (115.39 ft²)
- Airfoil Root:	MA 15 S
- Airfoil Tip:	MA 12 S
- Chord Root:	1.85 m (6.07 ft)
- Chord Tip:	0.83 m (2.72 ft)
- MAC	1.405 m (4.61 ft)
- Aileron area (without horn balance)	2 x 0.839 m² (2 x 9.03 ft²)
- Aileron area (with horn balance)	2 x 0.876 m² (2 x 9.43 ft²)
- Aileron deflection	up/down 30°, tolerance ± 2°

1.3.4 HORIZONTAL TAIL

- Span	3.20 m (10.50 ft)
- Area	2.56 m² (27.56 ft²)
- Airfoil	Wortmann FX71-L-150/30

1.3.5 ELEVATOR

- Area	0.768 m² (8.27 ft²)
- Elevator-deflection	up 25°, toler. ±2°; down 25°, toler. -2°
- Trim-tab-deflection	up 35°, down 27°, tolerance ±2°

1.3.6 VERTICAL TAIL

- Area	1.55 m² (16.68 ft²)
- Airfoil	Wortmann FX71-L-150/30

1.3.7 RUDDER

- Area (without horn balance)	0.68 m² (7.32 ft²)
- Area (with horn balance)	0.75 m² (8.07 ft²)
- Rudder deflection	left/right 30°, tolerance ±2°

1.4 ENGINE

Manufacturer: Textron-Lycoming Williamsport Plant PA 17701 USA.
Type: Lycoming AEIO-580-B1A
Rated power: 315 HP/235 kW @ 2700 RPM
303 HP/226 kW @ 2600 RPM
286 HP/213 kW @ 2400 RPM

1.5 PROPELLER

Manufacturer: MT-Propeller Entwicklung GmbH, Federal Republic of Germany.
Type: MTV-9-B-C/C 198-25 3-blade constant speed.
Type: MTV-14-B-C/C 190-130 4-blade constant speed.

1.5.1 EXHAUST SYSTEM

Manufacturer: Gomolzig Flugzeug- und Maschinenbau GmbH, Federal Republic of Germany
Complete 6 in 1 System with integrated Silencer.

1.6 FUEL

Fuel type AVGAS 100/100 LL (for alternate fuel grades see later issues of Textron Lycoming S.I. No 1070)
Minimum 100/130 octane. Maximum 115/145 octane.

Total fuel capacity:	189 L	(49.9 US.gal)
- Wingtanks (2 x 60 L):	120 L	(31.7 US.gal)
- Center tank:	60 L	(15.9 US.gal)
- Acro tank:	9 L	(2.3 US.gal)
Usable fuel capacity in the system:	187 L	(49.4 US.gal)
Usable fuel capacity for acrobatic:	67 L	(17.7 US.gal)

1.7 OIL

Maximum sump capacity: 15.13 L (16 US.qt)
Minimum sump capacity: 8.51 L (9 US.qt)

Average ambient air temperature	Mil-L6082 grades	Mil-22851 ashless dispersant grades
All temperatures	----	SAE 15W50 or 20W50
> 27°C (80°F)	SAE 60	SAE 60
> 16°C (60°F)	SAE 50	SAE 40 or 60
- 1°C til 32°C (30°F - 90°F)	SAE 40	SAE 40

1.7 OIL (Cont.)

Average ambient air temperature	Mil-L6082 grades	Mil-22851 ashless dispersant grades
- 18°C til 21°C (0°F - 70°F)	SAE 30	SAE 30,40 or 20W40
- 18°C til 32°C (0°F - 90°F)	SAE 20W50	SAE 20W50 or 15W50
<-12°C (10°F)	SAE 20	SAE 30 or 20W30

(single or multi - viscosity aviation grade oils see latest issue of Textron Lyc. S.I. No. 1014)

1.8 LOADING

Wing loading @ MTOW	Normal/Acrobatic III	88.62 kg/m²	(18.15 lbs/ft²)
	Acrobatic II	81.16 kg/m²	(16.63 lbs/ft²)
	Acrobatic I	76.49 kg/m²	(15.67 lbs/ft²)
Power loading @ MTOW	Normal/Acrobatic III	4.04 kg/kW	(6.65 lbs/hp)
	Acrobatic II	3.70 kg/kW	(6.09 lbs/hp)
	Acrobatic I	3.49 kg/kW	(5.74 lbs/hp)

1.9 TERMINOLOGY

Air Speeds

CAS	Calibrated Air Speed. CAS is the same as TAS (True Air Speed) in standard atmospheric condition at sea level
KCAS	Calibrated speed in knots
GS	Ground speed
IAS	Indicated air speed
KIAS	Indicated speed in knots
TAS	True air speed. It's the same as CAS compensated for altitude, temperature and density
V_A	Maneuvering speed
V_{NE}	Never exceed speed
V_{NO}	Maximum structural crusing speed
V_S	Stalling speed or minimum steady flight speed
V_X	Best angle-of-climb speed
V_Y	Best rate-of-climb speed

Meteorological terminology

ISA	International standard atmospheric condition
OAT	Outside air temperature

1.10 SECONDARY TERMINOLOGY

fpm	Feet/minute
ft	Feet = 0.3048 m
in	inch = 2.54 cm
m	Meter
L	Litres
US.gal	US (liquid) gallon = 3.79 litres
US.qt	US (liquid) quart = 0.946 litres
hp	Horse power (english)
h	Hour
kts	Knots (nm/h) = 1.852 kilometer per hour
km/h	Kilometer per hour
lbs	English pound = 0.4536 kg
hPa	hekto Pascal
inHg	Inches of mercury
MP	Manifold pressure
PA	Pressure altitude (ft)
nm	Nautical miles = 1.852 km
rpm	Revolutions per minute
CG	Center of gravity
Arm	Arm is the horizontal distance from reference datum
Moment	is the product of weight of an item multiplied by its arm.

1.11 CONVERSIONTABLE

knots <> km/h		km/h <> knots		ft <> m		m <> ft		NM <> km		km <> NM	
60	111	100	54	500	152	250	820	10	19	10	5
65	120	110	59	1000	305	375	1230	20	37	20	11
70	130	120	65	1500	457	500	1640	30	56	30	16
75	139	130	70	2000	610	625	2051	40	74	40	22
80	148	140	76	2500	762	750	2461	50	93	50	27
85	157	150	81	3000	914	875	2871	60	111	60	32
90	167	160	86	3500	1067	1000	3281	70	130	70	38
95	176	170	92	4000	1219	1125	3691	80	148	80	43
100	185	180	97	4500	1372	1250	4101	90	167	90	49
105	194	190	103	5000	1524	1375	4511	100	185	100	54
110	204	200	108	5500	1676	1500	4921	110	204	110	59
115	213	210	113	6000	1829	1625	5331	120	222	120	65
120	222	220	119	6500	1981	1750	5741	130	241	130	70
125	232	230	124	7000	2134	1875	6152	140	259	140	76
130	241	240	130	7500	2286	2000	6562	150	278	150	81
135	250	250	135	8000	2438	2125	6972	160	296	160	86
140	259	260	140	8500	2591	2250	7382	170	315	170	92
145	269	270	146	9000	2743	2375	7792	180	333	180	97
150	278	280	151	9500	2896	2500	8202	190	352	190	103
155	287	290	157	10000	3048	2625	8612	200	370	200	108
160	296	300	162	10500	3200	2750	9022	220	407	250	135
165	306	310	167	11000	3353	2875	9432	240	444	300	162
170	315	320	173	11500	3505	3000	9843	260	482	350	189
175	324	330	178	12000	3658	3125	10253	280	519	400	216
180	333	340	184	12500	3810	3250	10663	300	556	450	243
185	343	350	189	13000	3962	3375	11073	320	593	500	270
190	352	360	194	13500	4115	3500	11483	340	630	550	297
195	361	370	200	14000	4267	3625	11893	360	667	600	324
200	370	380	205	14500	4420	3750	12303	380	704	650	351
205	380	390	211	15000	4572	3875	12713	400	741	700	378
210	389	400	216	15500	4724	4000	13123	420	778	750	405
215	398	410	221	16000	4877	4125	13533	440	815	800	432
220	407	420	227	16500	5029	4250	13944	460	852	850	459
225	417	430	232	17000	5182	4375	14354	480	889	900	486
230	426	440	238	17500	5334	4500	14764	500	926	950	513
235	435	450	243	18000	5486	4625	15174	520	963	1000	540

SECTION 2

LIMITATIONS

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2.1 GENERAL

This section includes operating limitations, instrument markings, and basic placards necessary for the safe operation of the aircraft, its engine, standard systems, and standard equipment. The limitations included in this section have been approved by the EASA. Observance of these operating limitations is required by national aviation regulations.

NOTE

In case of an aircraft equipped with specific options additional information required for safe operation will be contained in Section 9 "Supplements".

Instrument markings and placards are provided for the acrobatic category only; for normal category refer to corresponding limitations. This aircraft is certified under Type Certification Data Sheet (T.C.D.S. EASA.A.362).

Any exceedance of given limitations has to be reported by the pilot so that necessary inspection or maintenance procedures according to the *MAINTENANCE MANUAL EXTRA 330LX* can be performed .

2.2 AIR SPEED (IAS)

Never Exceed Speed	V_{NE}	219 knots	(406 km/h)
Max. Structural Cruising Speed (Normal Cat.)	V_{NO}	138 knots	(256 km/h)
Max. Structural Cruising Speed (Acro Cat. I , II, III)	V_{NO}	154 knots	(285 km/h)
Maneuver Speed (Normal Cat.)	V_A	138 knots	(256 km/h)
Maneuver Speed (Acro Cat. I , II, III)	V_A	154 knots	(285 km/h)
Max. Aileron Control Inputs (Acro Cat. I , II, III)	up to	185 knots	(343 km/h)

2.3 CROSS-WIND COMPONENT

Max. demonstrated cross-wind component for take-off and landing is 15 knots (27 km/h).

2.4 ENGINE

Engine-type:	Textron-Lycoming AEIO-580-B1A
Rated maximum power:	235 kW (315 HP) @ 2700 rpm.

2.4.1 FUEL

Minimum grade aviation gasoline: 100/100LL; for alternate fuelgrades see latest revision of Lycoming S.I. No. 1070.

Total fuel capacity:	189 L	(49.9 US.gal)
Usable fuel capacity:	187 L	(49.4 US.gal)
Total fuel capacity for acrobatic in acro & center tank:	69 L	(18.2 US.gal)
Usable fuel capacity for acrobatic in acro & center tank:	67 L	(17.7 US.gal)

For acrobatic flight wing tanks must be empty.

2.4.2 ENGINE LIMITATIONS

a) Maximum Rotational Speed

Take-Off and Maximum Continuous:	2700 rpm*

NOTE*

Applicable RPM limitations approved for the MTV-9-B-C/C 198-25 propeller must be observed. Refer to Section 2.5.

b) Oil-temperature

- Maximum	118°C	(245°F)

c) Oil capacity

- Maximum sump capacity:	15.13 L	(16 US.qt)
- Minimum sump capacity:	8.51 L	(9 US.qt)

d) Oil pressure

- Minimum Idling	172 kPa	(25 psig)
- Normal	379 - 655 kPa	(55 - 95 psig)
- Starting, Warm up, Taxi and Take-Off	793 kPa	(115 psig)

⚠ WARNING

It is normal for the oil pressure to "flicker" from 69 to 207 kPa (10 to 30 psig) when going from upright to inverted flight. During knife edge flights and zero-g flights oil pressure may drop and the oil system may not scavenge resulting in engine failure or damage if flight is prolonged. Knife edge and zero-g flight should not exceed 10 seconds.

⚠ WARNING

If oil pressure drops to 0 kPa (psig) the propeller pitch changes automatically to coarse (high) pitch with a corresponding decrease in RPM. Apply positive g to avoid engine stoppage.

e) Fuel pressure

at fuel flow divider:		
- Maximum	97 kPa	(14 psig)

f) Cylinder head temperature

- Max	241°C	(465°F)

2.5 PROPELLER

MT-Propeller Entwicklung GmbH, Federal Republic of Germany
a) Standard: MTV-9-B-C/C198-25, 3-blade constant speed
b) Alternative: MTV-14-B-C/C190-130, 4-blade constant speed

Maximum rotational speed
- Take-Off and Maximum Continuous: 2600 rpm*

NOTE*

RPM limitation due to compliance with applicable noise protection requirements (ICAO Annex 16 and FAR 36). However for non-US registered airplanes an enhanced rotational speed limitation of 2700 RPM may be permissable when registered in the Acrobatic Category only as ICAO Annex 16 grants an exception for airplanes specially designed for acrobatic purposes.

2.6 WEIGHT LIMITS

Max allowed empty weight:	
- Normal category	738 kg (1627 lbs)
- Acrobatic category III	742 kg (1636 lbs)
- Acrobatic category II	662 kg (1460 lbs)
- Acrobatic category I	686 kg (1513 lbs)
Max allowed T/O weight:	
- Normal category & Acrobatic category III	950 kg (2095 lbs)
- Acrobatic category II	870 kg (1918 lbs)
- Acrobatic category I	820 kg (1808 lbs)
Max allowed landing weight:	950 kg (2095 lbs)

2.7 WEIGHT AND C.G. ENVELOPE

Vertical reference = fire-wall.
Horizontal reference = upper longerons in cockpit.

2.7.1 NORMAL FLIGHT

Max T/O Weight:	forward C.G.	rear C.G.
950 kg (2095 lbs) (and below)	67.1 cm (26.4")	84.1 cm (33.1")

2.7.2 ACROBATIC FLIGHT

Max T/O Weight:	forward C.G.	rear C.G.
950 kg (2095 lbs) (and below)	67.1 cm (26.4")	84.1 cm (33.1")

2.8 ACROBATIC MANEUVERS

2.8.1 NORMAL FLIGHT

All acrobatic maneuvers are prohibited except stall, chandelle, lazy eight and turns up to 60 degrees bank angle.

2.8.2 ACROBATIC FLIGHT

The plane is designed for unlimited acrobatics (wing tank must be empty). Inverted flight maneuvers are limited to max 4 minutes.

The structure is designed for full aileron control input up to 185 KIAS (343 km/h) in combination with 2/3 of the applicable max. load factor.

Recommended basic maneuver entry speeds are listed in the following list.

NOTE

This airplane is capable up to 10g maneuvers. If acrobatic maneuvers will be performed with a co-pilot or passenger, the pilot should ensure that the co-pilot/ passenger has been properly briefed on the physiological effects of high g maneuvers. This briefing should include accepted muscles straining and breathing techniques to counter the physiological effects of high g maneuvers. During the flight, the pilot should ensure the co-pilot/passenger is doing OK.

Check weight and C/G!

⚠ WARNING

Particular caution must be exercised when performing maneuvers at speeds above V_A [154 KIAS (285 km/h)]. Large or abrupt rudder and elevator control inputs above this speed as well as full aileron control inputs above 185 KIAS (343 km/h) may impose unacceptably high loads which exceed the structural capability of the aircraft.

NOTE

For acrobatic maneuvers see Section 4. All maneuvers can be performed in upright and inverted flight attitude.

Maneuvers	Recommended entry speeds IAS		Symbol	Remarks
	min knots (km/h)	max knots (km/h)		
Segment: horizontal Line	V_S	V_{NE}		
45°climbing	80 (148)	V_{NE}		
90° up	V_A	V_{NE}		
45° diving	V_S	190 (352)		reduce throttle
90° diving	V_S	190 (352)		reduce throttle
1/4 Loop climb.	100 (185)	190 (352)		
Loop	100 (185)	190 (352)		
Stall turn	100 (185)	190 (352)		
Aileron roll	80 (148)	185 (343)		full deflection
Snap roll	80 (148)	140 (259)		
"tail slide"	100 (185)	190 (352)		
Spin	V_S			
Inverted spin	V_S			
Knife edge	>150 (278)			< 10 s
Inverted Flight	$>V_S$	190 (352)		< 4 min

2.9 LOAD FACTOR

2.9.1 NORMAL FLIGHT

MTOW 950 kg (2095 lbs) + 6 g / - 3 g

2.9.2 ACROBATIC FLIGHT

Category I MTOW 820 kg (1808 lbs) + 10 g / - 10 g for 1 seat occupied
Category II MTOW 870 kg (1918 lbs) + 8 g / - 8 g for 2 seat occupied
Category III MTOW 950 kg (2095 lbs) + 6 g / - 6 g for 2 seat occupied

2.10 FLIGHT CREW LIMITS

Minimum crew is one pilot in the rear seat. Solo flying from rear seat only. Maximum 2 persons are allowed. For hearing protection noise supression (passive or active) communication headsets are required. The rear cockpit is equipped with a complete set of airplane controls and instruments.

2.11 KINDS OF OPERATION LIMITS

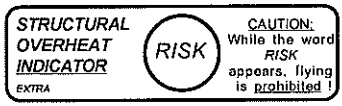
Only VFR flights at day are allowed. The A/C may be operated at OAT from -20°C (-4°F) to +44°C (+111°F). Below temperatures of -10°C (+14°F) the oil vent line must be modified by the low temperature kit (breather line). Flight in known icing-conditions is prohibited. Smoking is prohibited.

2.11.1 STRUCTURAL TEMPERATURE/COLOUR LIMITATION

Structure is qualified up to 72°C (161.6°F). Structure temperatures (composite) above 72°C (161.6°F) are not permitted. Not to exceed this temperature limit, color specification for composite structure (manufacturer document EA-03205.19) has to be complied with.

To check the temperature inside the cockpit (potential "green house" effect) one of two possible reversible temperature indicators (*STRUCTURAL OVERHEAT INDICATOR*) is applied on the left side of the wing main spar rear web in the carry-through section.

On the first one the word "RISK" appears after reaching the temperature limit and flying is prohibited:



On the second one the indication spot changes from green to amber above 50°C and from amber to red above 70°C. While indication spot is red flying is prohibited:

2.12 MAXIMUM OPERATING ALTITUDE

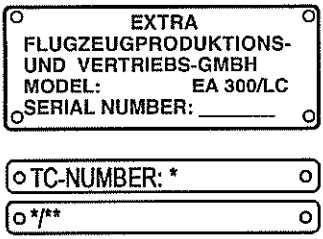
Max. certified operating altitude is 10,000 ft (3048 m) MSL

2.13 TIRE PRESSURE

The tire pressure is 3.4 bar (49 psi).

2.14 MARKINGS AND PLACARDS

2.14.1 AIRCRAFT IDENTIFICATION PLATE



*)The latest national aviation regulations must be observed in determining whether the placard is required.
**) call sign placard

2.14.2 OPERATING PLACARDS

V_A= 154 KTS (ACRO)
V_A= 139 KTS (NORMAL)

or

V_A= 285 km/h (ACRO)
V_A= 256 km/h (NORMAL)

(near the airspeed indicator)

The markings and placards installed in this airplane contain operating limitations which must be complied with when operating this airplane in the acrobatic category. Other limitations that must be complied with when operating this airplane in this category or in the normal category are contained in the airplane flight manual. Applicable RPM limitations must be observed.

(in the rear cockpit)

This airplane is certified for VFR day operation. Operation under known icing conditions prohibited.

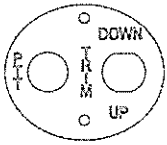
(on the rear instrument panel)

FUEL
AVGAS 100/100LL

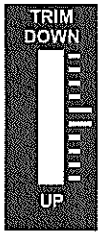
(near each filler cap)

OIL

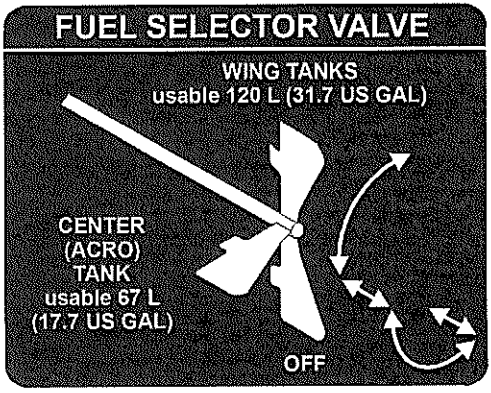
(on the seperate hatch of the upper cowling)



(On the rear control stick)



(On the rear instrument panel on the trim LED indicator)



(in both cockpits next to the fuel selector)

WING TANK
MUST BE EMPTY FOR ACROBATICS
USABLE FUEL 120L (31.7 US GAL).

(On the rear instrument panel beneath wing tank fuel capacity indicator)

CENTER TANK INDICATION
SHOWS "ZERO" IN LEVEL FLIGHT
BELOW 9 L (2.4 US GAL).
UNUSABLE FUEL 2 L (0.5 US GAL)

(On the rear instrument panel beneath center tank fuel capacity indicator)

THE REMAINING FUEL IN LEVEL
FLIGHT CANNOT BE USED SAFELY
WHEN INDICATOR READS "ZERO"!

(On the rear instrument panel beneath the acro & center tanks fuel capacity indicators)

ACROBATIC:
±10 G, 1 Pilot, MTOW: 820 kg (1808 lbs)
± 8 G, 2 Persons on board, MTOW: 870 kg (1918 lbs)
± 6 G, 2 Persons on board, MTOW: 950 kg (2095 lbs)

(In both cockpits)

NORMAL: +6G / -3G MTOW 950 KG (2095 LBS)
ACROBATICS INCL. SPIN NOT APPROVED!

(In both cockpits)

NO SMOKING

(In both cockpits)

USE OF HEADSET IS REQUIRED
USE OF PARACHUTE IS RECOMMENDED

(On the right side of both instrument panels)

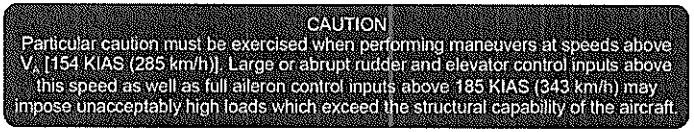
(On RPM control in the rear cockpit)

(On mixture control in the rear cockpit)

(Near throttle control in both cockpits)

(near canopy locking handles of each cockpit)

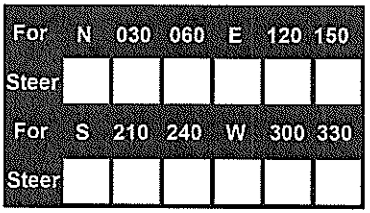
(Near the eyeball-type adjustable vents)



(In both cockpits)

(In front instrumental panel)

(In both cockpits)



(Near Mag. Dir. Indicator)

(Near the LH drain valve in the bottom fuselage cover)

(Near the RH drain valve in the bottom fuselage cover)

(Near the drain valve on the RH lower side of the firewall)

(On the inside of the separate hatch / upper cowling)

(On the outside of the wheel fairings)

(On the centreline of bottom fuselage cover)

(In rear cockpit, on the aileron control rods)

(In rear cockpit, on the LH side of the panel cover)

(On the FOD protection cover behind the pilot seat)

(In both cockpits, on the RH side)

Approved acrobatic maneuvers and recommended entry airspeeds					
Maneuvers	Airspeeds min KIAS	Airspeeds max KIAS	Maneuvers	Airspeeds min KIAS	Airspeeds max KIAS
Segment:					
Horizontal Line	V_S	V_{NE}	Aileron roll	80	185
45°climbing	80	V_{NE}	Snap roll	80	140
90° up	V_A	V_{NE}	"Tail-slide"	100	190
45° diving	V_S	190	Spin	V_S	----
90° diving	V_S	190	Inverted spin	V_S	----
1/4 Loop climb.	100	190	Inverted flight (Less than 4 min)	> V_S	190
Loop	100	190	Knife edge (Less than 10 s)	>150	----
Stall turn	100	190			

or

Approved acrobatic maneuvers and recommended entry airspeeds					
Maneuvers	Airspeeds min km/h	Airspeeds max km/h	Maneuvers	Airspeeds min km/h	Airspeeds max km/h
Segment:					
Horizontal Line	V_S	V_{NE}	Aileron roll	148	343
45°climbing	148	V_{NE}	Snap roll	148	259
90° up	V_A	V_{NE}	"Tail-slide"	185	352
45° diving	V_S	352	Spin	V_S	----
90° diving	V_S	352	Inverted spin	V_S	----
1/4 Loop climb.	185	352	Inverted flight (Less than 4 min)	> V_S	352
Loop	185	352	Knife edge (Less than 10 s)	>278	----
Stall turn	185	352			

(in both cockpits)

(Near the LH drain valve in the bottom fuselage cover)

(Near the RH drain valve in the bottom fuselage cover)

(Near the drain valve on the RH lower side of the firewall)

(On the inside of the separate hatch / upper cowling)

(On the outside of the wheel fairings)

(On the centreline of bottom fuselage cover)

(In rear cockpit, on the aileron control rods)

(In rear cockpit, on the LH side of the panel cover)

(On the FOD protection cover behind the pilot seat)

(In both cockpits, on the RH side)

Approved acrobatic maneuvers and recommended entry airspeeds					
Maneuvers	Airspeeds min KIAS	max KIAS	Maneuvers	Airspeeds min KIAS	max KIAS
Segment:					
Horizontal Line	V_S	V_{NE}	Aileron roll	80	185
45° climbing	80	V_{NE}	Snap roll	80	138
90° up	V_A	V_{NE}	"Tail-slide"	100	190
45° diving	V_S	V_{NE}	Spin	V_S	----
90° diving	V_S	V_{NE}	Inverted spin	V_S	----
1/4 Loop climb.	100	190	Inverted flight (Less than 4 min)	$>V_S$	190
Loop	100	190	Knife edge (Less than 10 s)	>150	----
Stall turn	100	190			

or

Approved acrobatic maneuvers and recommended entry airspeeds					
Maneuvers	Airspeeds min km/h	max km/h	Maneuvers	Airspeeds min km/h	max km/h
Segment:					
Horizontal Line	V_S	V_{NE}	Aileron roll	148	343
45° climbing	148	V_{NE}	Snap roll	148	256
90° up	V_A	V_{NE}	"Tail-slide"	185	352
45° diving	V_S	V_{NE}	Spin	V_S	----
90° diving	V_S	V_{NE}	Inverted spin	V_S	----
1/4 Loop climb.	185	352	Inverted flight (Less than 4 min)	$> V_S$	352
Loop	185	352	Knife edge (Less than 10 s)	>278	----
Stall turn	185	352			

(in both cockpits)

2.14.3 INSTRUMENT MARKINGS

AIRSPEED INDICATOR

green arc	64 KIAS (119 km/h) - 154 KIAS (285 km/h)
yellow arc	154 KIAS (285 km/h) - 219 KIAS (406 km/h)
red line	219 KIAS (406 km/h)

OIL PRESSURE INDICATOR

red line	25 psig
yellow arc	25 psig - 55 psig
green arc	55 psig - 95 psig
yellow arc	95 psig - 115 psig
red line	115 psig

OIL TEMPERATURE INDICATOR

yellow arc	< 140 °F
green arc	140°F - 210°F
yellow arc	210°F - 245°F
red line	245°F

CYLINDERHEAD TEMPERATURE INDICATOR

yellow arc	< 150°F
green arc	150°F - 435°F
yellow arc	435°F - 465°F
red line	465°F

RPM INDICATOR

green arc	700 rpm - 2600/2700* rpm
red line	2600/2700* rpm

*) Refer to Section 2.4.2 and 2.5.

G - METER

green arc	- 5 g - + 8 g
yellow arc	+ 8 g - + 10 g
red line	+ 10 g

FUEL FLOW INDICATOR

green arc	0 gal/h - 35 gal/h
red radial	35 gal/h

MANIFOLD PRESSURE INDICATOR

green range	10 " Hg - 30 " Hg

2.15 KINDS OF OPERATION EQUIPMENT LIST

The aircraft may be operated in day VFR when the appropriate equipment is installed and operable. No Pilot's Operating Handbook Supplement grants approval for IFR operation. Flight in icing conditions is prohibited.
The following equipment list identifies the systems and equipment upon which type certification for each kind of operation was predicated. The following systems and items of equipment must be installed and operable for the particular kind of operation indicated.

NOTE

The zeros (0) used in the below list mean that either the equipment or system, or both were not required for type certification for that kind of operation.

Either equipment or systems in addition to those listed below may be required by the national operating regulations.

The asterisks (*) used in the below list mean that latest national aviation regulations must be observed in determining whether the equipment and/or system are required.

Extra Flugzeugproduktions- und Vertriebs- GmbH considers acrobatics without wearing an approved parachute to be unsafe.

	NORMAL	ACROBATIC	
		1 seat	2 seats
COMMUNICATION			
1. Transceiver-VHF	*	*	*
ELECTRICAL POWER			
1. Battery	1	1	1
2. Alternator	1	1	1
3. Ammeter	1	1	1
4. Voltmeter	0	0	0
FLIGHT CONTROL SYSTEM			
1. Elevator-trim control (electric)	1	1	1
2. Stall warning	0	0	0
FUEL			
1. Boost pump	1	1	1
2. Fuel quantity indicator (wing tank)	1	1	1
3. Fuel quantity indicator (center tank)	1	1	1
4. Fuel flow/pressure indicator	1	1	1

	NORMAL	ACROBATIC	
		1 seat	2 seats
LIGHT			
1. Wing-tip NAV lights	0	0	0
2. Wing-tip strobe lights	1	1	1
NAVIGATION			
1. Altimeter	1	1	1
2. Airspeed indicator	1	1	1
3. Mag. direction indicator	1	1	1
4. OAT indicator	0	0	0
5. Vertical speed indicator	0	0	0
6. Turn and bank indicator	0	0	0
7. Artificial horizon	0	0	0
8. Directional gyro	0	0	0
9. Transponder[1]	1	1	1
ENGINE INDICATION			
1. RPM indicator	1	1	1
2. Manifold pressure indicator	1	1	1
3. Exhaust gas temperature indicator	0	0	0
4. Cylinder head temperature indicator	0	0	0
OIL			
1. Oil temperature indicator	1	1	1
2. Oil pressure indicator	1	1	1
FLIGHT CREW EQUIPMENT			
1. Parachute rear	0	*	*
2. Parachute front	0	0	*
3. Seat belt rear	1	1	1
4. Seat belt front	1	0	1
5. Headset rear	1	1	1
6. Headset front	1	0	1

1) In some airspaces Mode S Elementary Surveillance functionality is required

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SECTION 3

EMERGENCY PROCEDURE

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3.0 INTRODUCTION

3.0.1 GENERAL

This section contains the checklist and procedures coping with emergencies that may occur. This checklist must be followed in various emergencies to ensure maximum safety for the crew and/or aircraft. Refer to the Supplement Sections for emergency procedures associated with optional systems or equipment.

Thorough knowledge of these procedures will enable the aircrew to better cope with an emergency. The steps should be performed in the listed sequence. However the procedures do not restrict the aircrew from taking any additional action necessary to deal with the emergency.

3.0.2 GENERAL BEHAVIOUR IN EMERGENCY SITUATIONS

As soon as one of the crew member becomes aware that an emergency situation exists, he must immediately alert the other crew member of the situation. In any emergency situation, contact should be established with a ground station as soon as possible after completing the initial corrective action. Include **position, altitude, heading, speed, nature of the emergency and pilot's intentions** in the first transmission. There after the ground station should be kept informed of the progress of the flight and of any changes or developments in the emergency. Three basic rules apply to most emergencies and should be observed by each aircrew member:

1. Maintain aircraft control
2. Analyze the situation and take proper action
3. Land as soon as possible/as soon as practical

The meaning of "*as soon as possible*" and "*as soon as practical*" as used in this section is as follows:

Land AS SOON AS POSSIBLE (ASAP) =	Emergency conditions are urgent and require an immediate landing at the nearest suitable airfield, considering also other factors, such as weather conditions and aircraft mass.
Land AS SOON AS PRACTICAL=	Emergency conditions are less urgent and in the aircrews judgement the flight may be safely continued to an airfield where more adequate facilities are available.

⚠ WARNING

Make only one attempt to restore an automatically disconnected power source or reset or replace an automatically disconnected CPD (circuit protection device) that affects flight operations or safety. Each successive attempt to restore an automatically disconnected power source, or the resetting of an automatically disconnected CPD can result in progressively worse effects.

3.1 AIRSPEEDS FOR EMERGENCY OPERATION

Stall speed		64 KIAS (119 km/h)
Engine failure after take-off		90 KIAS (167 km/h)
Best recommended gliding speed (glide angle 1 : 6,2)		
-Normal & Acro III Category	950 kg (2095 lbs)	90 KIAS (167 km/h)
-Acro II	870 kg (1918 lbs)	87 KIAS (161 km/h)
-Acro I	820 kg (1808 lbs)	85 KIAS (157 km/h)
Precautionary landing with engine power		90 KIAS (167 km/h)
Landing without engine power		90 KIAS (167 km/h)
Maximum demonstrated cross wind component		15 Knots (27 km/h)

3.2 OPERATIONAL CHECKLIST

3.2.1 ENGINE FAILURE DURING TAKE-OFF ROLL

1. Throttle	IDLE
2. Brakes	APPLY
3. Mixture	IDLE CUT OFF
4. Ignition switch	OFF
5. Battery switch	OFF
6. Alternator switch	OFF

3.2.2 ENGINE FAILURE IMMEDIATELY AFTER TAKE-OFF

Stall speed 64 KIAS (119 km/h)

1. Airspeed	90 KIAS (167 km/h)
2. Mixture	IDLE CUT OFF
3. Fuel shutoff valve	OFF (Pull & Turn)
4. Ignition switch	OFF
5. Battery switch	OFF
6. Alternator switch	OFF
7. Forced landing	PERFORM as practical

3.2.3 ENGINE FAILURE DURING FLIGHT (RESTART PROCESS)

1. Airspeed	90 KIAS (167 km/h)
2. Fuel shutoff valve	CENTER & ACRO
3. Mixture	RICH
4. Boost pump	ON
5. Ignition switch	BOTH (or START if propeller has stopped)

3.2.4 LOSS OF OIL PRESSURE

1. Positive "g"	Apply
If oil pressure is not regained then:	
2. Airspeed	90 KIAS (167 km/h)
3. Throttle	REDUCE AS REQUIRED
4. Engine oil temperature	OBSERVE INDICATION
5. Land	ASAP BE PREPARED FOR POWER OFF LANDING

NOTE

If oil pressure drops to 0 psi (kPa) the propeller pitch changes automatically to coarse (high) pitch with a corresponding decrease in RPM.

3.2.5 HIGH OIL TEMPERATURE

1. Throttle	REDUCE
2. Mixture	ENRICH; if practical
3. Airspeed	INCREASE, if practical
4. Land	ASAP BE PREPARED FOR POWER OFF LANDING

3.2.6 ALTERNATOR FAILURE

An alternator failure is indicated by the red light of the low voltage monitor.

If red light illuminates:	
1. Digital voltage indication	CROSS CHECK
If indication is above 13 V, alternator is in function:	
2. Flight	CONTINUE
if it is not:	
3. rpm	CHECK min. 2500 rpm
4. Alternator switch	OFF AND ON
5. ALTERNATOR circuit breaker	PULL AND RESET
6. Low voltage monitor	CHECK INDICATION
If red light is off:	
7. Flight	CONTINUE
If red light illuminates again:	
8. Land	AS SOON AS PRACTICAL

3.3 FORCED LANDINGS

3.3.1 EMERGENCY LANDING WITHOUT ENGINE POWER

1. Seat belts, shoulder harnesses	SECURE
2. Airspeed	90 KIAS (167 km/h)
3. Mixture	IDLE CUT OFF
4. Fuel shutoff valve	OFF (Pull & Turn)
5. Ignition switch	OFF
6. Battery switch	OFF
7. Alternator switch	OFF
8. Touchdown	SLIGHTLY TAIL LOW
9. Brakes	OPTIMUM BRAKING

3.3.2 PRECAUTIONARY LANDING WITH ENGINE POWER

1. Seat belts, shoulder harnesses	SECURE
2. Airspeed	90 KIAS (167 km/h)
3. Selected field	FLY OVER, noting terrain and obstructions, then reaching a safe altitude and airspeed
4. Battery switch	OFF
5. Alternator switch	OFF
6. Touchdown	SLIGHTLY TAIL LOW
7. Ignition switch	OFF
8. Mixture	IDLE CUT OFF
9. Fuel shutoff valve	OFF (Pull & Turn)
10. Brakes	APPLY HEAVILY

3.4 FIRES

3.4.1 DURING START ON GROUND

1. Cranking	CONTINUE to get a start which would suck the flames and accumulated fuel through the air inlet and into the engine.
If engine starts:	
2. Fuel selector valve	OFF (Pull & Turn)
3. Power	1700 RPM for one minute.
4. Engine	SHUT DOWN
If engine fails to start:	
2. Cranking	CONTINUE, hold elevator up and apply brakes
3. Fuel selector valve	OFF (Pull & Turn)
4. Throttle	FULL OPEN
5. Mixture	IDLE CUT OFF
6. Battery switch	OFF
7. Alternator switch	OFF
8. Ignition switch	OFF

⚠ WARNING

Risk of burns due to flames shooting out.

Do not open engine compartment access doors while engine is on fire!

9.	After engine stop	ABANDON aircraft
10.	Fire	EXTINGUISH using fire extinguisher if available
11.	Aircraft	INSPECT

3.4.2 ENGINE FIRE IN FLIGHT

1.	Mixture	IDLE CUT OFF
2.	Fuel shutoff valve	OFF (Pull & Turn)
3.	Battery switch	OFF
4.	Alternator switch	OFF
5.	Airspeed	100 KIAS (185 km/h), find your airspeed/attitude which will keep the fire away from the cockpit
6.	Land	AS SOON AS POSSIBLE

3.5 ICING

3.5.1 INADVERTENT ICING ENCOUNTER

1. Turn back or change altitude to obtain an outside temperature that is less conductive to icing.
2. Plan a landing at the nearest airfield. With extremely rapid ice build-up select a suitable "off airport" landing field.

3.6 UNINTENTIONAL SPIN

Refer to section 4 (Normal Procedures) acrobatic maneuver, spin recovery.

3.7 MANUAL BAIL-OUT

When in an emergency situation that requires abandoning the aircraft and while wearing a parachute, which is at least strongly recommended for acrobatics:

1. Inform your passenger
2. Reduce speed to 100 KIAS (185 km/h) if possible
3. Pull mixture to lean
4. Open canopy (the low pressure over the canopy in normal flight will flip the canopy full open immediately)
5. Take off headset
6. Open seat belt
7. Leave airplane to the left side
8. Try to avoid wing and tail
9. Open parachute

3.8 EMERGENCY EXIT AFTER TURN OVER

1. Battery switch	OFF
2. Alternator switch	OFF
3. Fuel shutoff valve	OFF (Pull & Turn)
4. Seat belts	OPEN
5. Parachute harnesses (if wearing a parachute)	OPEN
6. Canopy handle	PULL TO OPEN

NOTE

If canopy fails to open break the canopy.

7. Aircraft	EVACUATE ASAP

3.9 ELEVATOR CONTROL FAILURE

In case of elevator control failure the aircraft can be flown with the elevator trim. In this case trim nose up to the desired speed and control horizontal flight or descend with engine power. For landing trim nose up and establish a shallow descend by adjusting throttle. To flare the plane gently increase power to bring the nose up to landing attitude.

SECTION 4

NORMAL PROCEDURES

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4.0 GENERAL

4.0.1 AIRSPEEDS FOR NORMAL OPERATION

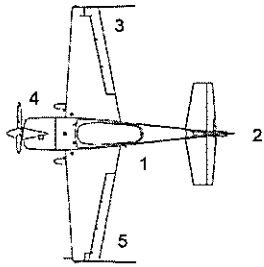
CATEGORY	ACRO I 820 kg (1808 lbs) KIAS (km/h)	ACRO II 870 kg (1918 lbs) KIAS (km/h)	ACRO III 950 kg (2095 lbs) KIAS (km/h)	NORMAL 950 kg (2095 lbs) KIAS (km/h)
Start:				
-Rotate Speed	63 (117)	65 (120)	68 (126)	68 (126)
Climb:				
-Vx	91 (169)	92 (170)	96 (178)	96 (178)
-Vy	99 (183)	101 (187)	106 (196)	106 (196)
-Recommended Normal Climb Speed	100 (185)	105 (194)	110 (204)	110 (204)
-Max. Cruise	181 (335)	181 (335)	181 (335)	181 (335)
Landing:				
-Approach	84 (156)	89 (165)	93 (172)	93 (172)
-on Final	76 (141)	78 (144)	82 (152)	82 (152)
-Go-Around Speed	93 (172)	98 (181)	102 (189)	102 (189)
Recommended Airspeed For Flight In Rough Air (max.) (V_A)	154 (285)	154 (285)	154 (285)	138 (256)
Max. Demonstrated Cross Wind Component	15 kts (27)	15 kts (27)	15 kts (27)	15 kts (27)

4.0.2 CHECKLIST AND PROCEDURES

This handbook contains the checklist and procedures to operate the aircraft in normal and acrobatic operation. The pilot should be familiar with all procedures contained in this Pilot's Operating Handbook, which must be carried on board. The pilot has to comply with Checklist for daily check and inspections (see Section 8, Handling, Servicing and Maintenance). Refer to the Supplement Sections for normal procedures associated with optional systems or equipment.

4.1 PREFLIGHT INSPECTION

4.1.1 EXTERIOR INSPECTION ILLUSTRATION



4.1.2 GENERAL

Visually check airplane for general condition during walk around inspection. Perform exterior check as outlined in the picture above in counterclockwise direction.

4.2 CHECKLIST PROCEDURES

1) Cockpit

1. Pilot's Operating Handbook	(AVAILABLE)
2. Airplane weight and balance	CHECKED
3. Ignition switch	OFF
4. Battery switch	ON
5. Fuel quantity indicators	CHECK
6. Battery switch	OFF
7. Fuel selector *	ACRO & CENTER TANK

NOTE*

Although safe operation does not require the use of the tanks in a specific sequence, it is recommended to set fuel selector to "ACRO & CENTER TANK" position!

2) Empennage

1. All round inspection, canopy, surfaces, stabilizer, elevator, trim rudder and tailwheel	CHECK
2. Horizontal stabilizer attachment bols	CHECK FOR FREEPLAY BY MOVING THE TIP OF THE HORIZ. STABILIZER UP- AND DOWNWARDS

3) Right Wing

1. Aileron, freedom of movement and security	CHECK
2. Trailing edge	CHECK
3. Fuel tank vent opening (right landing gear)	CHECK
4. Fuel quantity	CHECK
5. Fuel tank filler cap	CHECK

6. Wing fuel tank drain	DRAIN FOR AT LEAST 4 SECONDS TO CLEAR SUMP OF POSSIBLE WATER; CHECK CLOSED
7. Right landing gear, wheel	CHECK

4) Nose

1. Engine oil dipstick	CHECK
2. Propeller and spinner	CHECK
3. Air inlet	CHECK
4. Acro & center fuel tank drain	DRAIN FOR AT LEAST 4 SECONDS TO CLEAR SUMP OF POSSIBLE WATER; CHECK CLOSED
5. Fuel filter drain	DRAIN FOR AT LEAST 4 SECONDS TO CLEAR FILTER OF POSSIBLE WATER; CHECK CLOSED
6. Exhaust silencer	CHECK FOR DAMAGE AND SECURE ATTACHMENT

5) Left wing

1. Left landing gear, wheel and brakes	CHECK
2. Fuel quantity	CHECK
3. Fuel tank filler cap	CHECK
4. Wing fuel tank drain	DRAIN FOR AT LEAST 4 SECONDS TO CLEAR SUMP OF POSSIBLE WATER; CHECK CLOSED
5. Pitot cover	REMOVE
6. Trailing edge	CHECK
7. Aileron, freedom of movement and security	CHECK

6) Before starting engine

1. Preflight inspection	COMPLETE
2. Passenger briefing	COMPLETE
3. Parachute handling briefing	COMPLETE
4. Seats, seatbelts, shoulder harnesses	ADJUST AND LOCK
5. Canopy	CLOSE AND LOCK
6. Brake	CHECK
7. Battery switch	ON
8. Avionics power switch	OFF
9. Electrical equipment	OFF
10. Alternator	ON
11. Wingtip position/Strobe lights	ON

4.3 STARTING PROCEDURES

4.3.1 COLD ENGINES

The following starting procedures are recommended, however, the starting conditions may necessitate some variation from these procedures.

1. Perform pre-flight inspection.
2. Set propeller governor control to "High RPM" position.
3. Open throttle approximately 1/4 travel.
4. Turn boost pump "ON".
5. Move mixture control to "FULL RICH" until a slight but steady fuel flow is noted (approximately 3 to 5 seconds) and return mixture control to "IDLE CUT-OFF". Turn boost pump "OFF".
6. Engage starter.
7. When engine fires release the ignition switch back to "BOTH".
8. Move mixture control slowly and smoothly to "FULL RICH".
9. Check the oil pressure gauge. If minimum oil pressure is not indicated within 30 seconds, shut off the engine and determine cause of trouble.

4.3.2 HOT ENGINES

Because of the fact that the fuel percolates and the system must be cleared of vapor, it is recommended to use the same procedure as outlined for cold engine start.

4.4 TAXIING THE AIRCRAFT

1. Canopy	CLOSE AND LOCK
2. Brake	CHECK
3. Altimeter	Set on QFE or QNH
4. Avionic switch	ON
5. Electrical equipment	ON
6. Radio	Set and test
7. Mixture	Leave in "FULL RICH" position

Operate only with the propeller in minimum blade angle (High RPM).
Warm-up at approximately 1000-1200 RPM. The engine is ready for take-off when the throttle can be opened without the engine faltering.

4.5 TAKE-OFF PROCEDURE

4.5.1 BEFORE TAKE-OFF

Before you line up at the runway for take-off:

Oil pressure and oil temperature	CHECK
Magnetos	CHECK as follows:
Engine RPM:	1800 min^{-1}

Pay attention to the three small LEDs in the "Status" area on the upper left corner of the P-1000 face:

Ignition switch position:	LEFT
Status area:	Right red LED illuminates
Display:	shows RPM drop
Ignition switch position:	RIGHT
Status area:	Left red LED illuminates
Display:	shows RPM drop
Ignition switch position:	BOTH
Status area:	Right and left red LED remain off The middle LED is not allowed to alert, otherwise the difference is more than permissible.

NOTE

During the short circuit (grounding) of a single magneto, the respective red LED must illuminate. The maximal allowed RPM drop at 1800 min^{-1} is 175 min^{-1}. The maximum difference between the magnetos shall not to be more than 50 RPM (identify with the illuminated yellow LED).

Alternator output	CHECK
Propeller control	MOVE through its complete range to check operation and return to full HIGH RPM position.
Boost pump	ON (check indicator movement on the fuel flow gauge).
Flight controls	CHECK free and correct
Trim	SET to appropriate takeoff position (half way nose down)

4.5.2 TAKE-OFF

Set throttle smoothly to max and let the airspeed go up to 65-68 KIAS (120-126 km/h). A light pressure on the stick lifts the tail to horizontal position. Rotate the aircraft at 68 KIAS (126 km/h). On reaching climb speed of 110 KIAS (204 km/h) proceed with climb.

4.6 CLIMB

Climbs may be performed up to maximum continuous RPM. RPM above 2400 should, however, be used only when necessary for maximum performance in order to avoid unnecessary noise.

Turn boost pump "OFF".

4.7 CRUISE

1. Altitude	As selected
2. Throttle/RPM	ADJUST for cruising speed
3. Mixture	ADJUST for minimum fuel consumption
4. Trim	As required
5. Fuel	CHECK periodically

4.8 LANDING PROCEDURES

4.8.1 DESCENT

1. Throttle	REDUCE
2. Mixture	"FULL RICH"
3. RPM Control	SET to 2400 RPM
4. Trim	ADJUST
5. Fuel selector*	"ACRO & CENTER TANK"

NOTE*

Although safe operation does <u>not</u> require the use of the tanks in a specific sequence, it is recommended to set fuel selector to "ACRO & CENTER TANK" position!

4.8.2 APPROACH

1. Boost pump	ON
2. Mixture	SET to "RICH"
3. Airspeed	REDUCE to approach speed
4. Propeller	SET to low pitch ("HIGH RPM")

NOTE

It is recommended to set the RPM to 2400 during approach and landing in order to avoid unnecessary noise. In case of "Go Around", RPM control must be set to max. RPM before applying power.

4.8.3 BEFORE LANDING

1. Landing approach	PROCEED
2. Airspeed on final	maintain 82 KIAS (152 km/h)
3. Elevator trim	ADJUST

NOTE

Stall speed will be:

MTOW = 820 kg (1808 lbs):	**59 KIAS (109 km/h)**
MTOW = 870 kg (1918 lbs):	**61 KIAS (113 km/h)**
MTOW = 950 kg (2095 lbs):	**64 KIAS (119 km/h)**

4.8.4 NORMAL LANDING

1. Landing	PERFORM as practicable with respect to surface and weather condition
2. Landing light	As desired

NOTE

The rudder is effective down to 30 KIAS (56 km/h)

3. Touchdown	3 point landing
4. Throttle	CLOSE / IDLE
5. Braking	Minimum required

4.9 GO-AROUND

Decide early in the approach if it is necessary to go around and then start go-around before too low altitude and airspeed are reached.

Proceed as follows:

1. RPM control	HIGH RPM / Full forward
2. Throttle	OPEN / Take-off power
3. Airspeed	Minimum 102 KIAS (189 km/h) rotate to go-around altitude

4.10 SHUTDOWN

1. Boost pump	OFF
2. Landing light	OFF
3. Engine	RUN for 1 min. at 1000 RPM
4. Dead cut check	PERFORM
5. Avionic switch	OFF
6. Mixture	IDLE CUT OFF
7. Ignition switch	OFF
8. Battery switch	OFF

4.11 LEAVING THE AIRCRAFT

1. Canopy	CLOSE and LOCK
2. Aircraft	SECURE
3. Pitot cover	ATTACH
4. Log book	COMPLETE

4.12 ACROBATIC MANEUVERS

4.12.1 GENERAL

NOTE

Prior to executing these maneuvers tighten harnesses and check all loose items are stowed. Start the maneuvers at safe altitude and maximum continuous power setting if not otherwise noted.

For maneuver limits refer to Section 2 LIMITATIONS.

After termination of acrobatic maneuvers the artificial horizon (if installed) must be reset if possible.

At high negative g-loads and zero g-periods it is normal that oil pressure and RPM indication might drop down momentarily returning to normal status at positive g-loads.

⚠ WARNING

The high permissible load factors of the airplane may exceed the individual physiological limits of pilot or passenger. This fact must be considered when pulling or pushing high g's.

4.12.2 MANEUVERS

⚠ WARNING

Particular caution must be exercised when performing maneuvers at speeds above V_A [154 KIAS (285 km/h)]. Large or abrupt rudder and elevator control inputs above this speed as well as full aileron control inputs above 185 KIAS (343 km/h) may impose unacceptably high loads which exceed the structural capability of the aircraft.

Acrobatics is traditionally understood as maneuvers like loop, humpty bump, hammerhead turn, aileron roll etc..

This manual does not undertake to teach acrobatics, however, it is meant to demonstrate the plane's capabilities.

For this reason maneuvers are divided into segments. The segments are described. Limitations are pointed out.

- Segment horizontal line:
  A horizontal line may be flown with any speed between V_S and V_{NE}

- Segment line 45° climbing:
  The plane will follow the line at max. power. The speed will not decrease below 80 KIAS (148 km/h)

- Segment line 90° up:
  Any entry speed may be used. Out of a horizontal pull-up at 200 KIAS (370 km/h) the vertical penetration will be 2.500 ft. The speed will gradually decrease to 0.

NOTICE

In extremely long lines a RPM decay may occur. This is related to a loss of oil pressure. Positive g's should be pulled immediately in order to protect the engine. Oil pressure will return immediately.

- Segment line 45° diving:
  Throttle must be reduced in order to avoid exceeding V_{NE}.

- Segment line 90° diving:
  Throttle must be reduced to idle in order to avoid exceeding V_{NE}.

Above segments may be filled up with aileron rolls or snap rolls. Watch V = 185 KIAS (343 km/h) for aileron rolls with max. deflection.
Snap rolls should not be performed at speeds above 140 KIAS (259 km/h).

- Segment 1/4 loop, climbing:
  The minimum recommended speed is 100 KIAS (185 km/h). If the maneuver is to be followed by a vertical line, a higher entry speed is required depending on the expected length of the line. A complete loop can be performed at speeds above 100 KIAS (185 km/h).

NOTE

Since the maximum horizontal speed is 185 KIAS (343 km/h), higher speeds should be avoided in acrobatics since an unnecessary loss of altitude would occur.

- Torque maneuvers:
  All maneuvers with high angular velocity associated with high propeller RPM must be considered dangerous for the engine crankshaft.

Although wooden composite propeller blades are used, the gyroscopic forces at the prop flange are extremely high.

NOTE

If performing a gyroscopic maneuver such as flat spin, power on, or knife edge spin, reduce RPM to 2400 in order to minimize the gyroscopic forces.

NOTE

Fuel consumption during acrobatic maneuvers is higher than stated in Section 5.

4.12.3 SPIN

To enter a spin proceed as follows:

- Reduce speed, power idle
- When the plane stalls:
  - Kick rudder to desired spin direction
  - Hold ailerons neutral
  - Stick back (positive spinning), stick forward (negative spinning)

The plane will immediately enter a stable spin.

- Ailerons against spin direction will make the spin flatter.
- Ailerons into spin direction will lead to a spiral dive.

Above apply for positive and negative spinning.

To stop the spin:

- Apply opposite rudder
- Make sure, power idle
- Hold ailerons neutral
- Stick to neutral position

The plane will recover within 1/2 turn.
Recovery can still be improved by feeding in in-spin ailerons.

NOTE

If ever disorientation should occur during spins (normal or inverted) one method always works to stop the spin:

- Power idle
- Kick rudder to the heavier side
  (this will always be against spin direction)
- Take hands off the stick

The spin will end after 1/2 turn. The plane will be in a steep dive in a side-slip.
Recovery to normal flight can be performed easily.

NOTE

After six turns of spinning the altitude loss including recovery is 3200 ft.

4.13 NOISE CHARACTERISTICS

The noise level with silencer Gomolzig EA300-606000 (6 in 1) and propeller MTV-9-B-C/C 198-25 at 2600 RPM has been established in accordance with

- ICAO Annex 16, 4th Edition incorporating Amendment 8, Volume 1, Chapter 10 as 77.8 dB(A)

The noise level with silencer Gomolzig EA300-606000 (6 in 1) and propeller MTV-14-B-C/C 190-130 at 2600 RPM has been established in accordance with

- ICAO Annex 16, 6th Edition incorporating Amendment 10, Volume 1, Chapter 10 as 74.2 dB(A).

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SECTION 5

PERFORMANCE

Table of Contents

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5.1 GENERAL

Performance data charts on the following pages are presented to facilitate the planning of flights in detail and with reasonable accuracy under various conditions. The data in the charts have been computed from actual flight tests with the aircraft and engine in good condition and using average piloting techniques.

It should be noted that the performance information presented in the range and endurance charts allow for 45 minutes reserve fuel at specified speeds. Some indeterminate variables such as engine and propeller, air turbulence and others may account for variations as high as 10% or more in range and endurance. Therefore, it is important to utilize all available information to estimate the fuel required for the particular flight.

5.1.1 Performance Charts

Performance data are presented in tabular or graphical form to illustrate the effect of different variables. Sufficiently detailed information are provided in the tables so that conservative values can be selected and used to determine the particular performance figure with reasonable accuracy.

All speeds in this chapter are Indicated Air Speeds (IAS) except otherwise stated. The performance figures below are given under following conditions.

1. Maximum allowed weight 950 kg (2095 lbs) except otherwise stated
2. Take-off and landing on concrete surface.
3. No wind.
4. Standard atmospheric condition.

5.1.2 Definitions of Terms

For definition of terms, abbreviations and symbols refer to section 1, General.

5.1.3 Sample Problem

TAKE-OFF CONDITIONS

Field Pressure Alt	2000 ft (610 m)
Temperature	15°C (59°F)
Wind Component (Headwind)	8 KT (15 km/h)
Field Length	3000 ft (914 m)

CRUISE CONDITIONS

Total Distance	400 NM (741 km)
Pressure Altitude	8000 ft (2438 m)
Temperature (ISA)	-1°C (30°F)

LANDING CONDITIONS

Field Pressure Alt	4000 ft (1219 m)
Temperature	0°C (32°F)
Wind Component (Headwind)	5 KT (9 km/h)
Field Length	2000 ft (610 m)

TAKE-OFF

Example (Take-Off Distance is shown by Fig. 5.5):

-T/O Weight:	870 kg (1918 lbs)
-Ground Roll:	105 m (344 ft)
-Total Distance to clear a 50 ft obstacle:	225 m (738 ft)

These distances are well within the available field length incl. the 8 kts (15 km/h) headwind.

RATE OF CLIMB

Fig. 5.6 shows the Rate Of Climb using Take-off Power
The Rate of Climb at 2000 ft (610 m): 2320 ft/min (11.8 m/s)
The Time to Climb from 2000 ft (610 m) to 8000 ft (2438 m) is acc. to Fig. 5.7:
=> (4,0 - 0,9) min = 3,1 min
The Fuel to Climb from 2000 ft (610 m) to 8000 ft (2438 m) is:
=> (5,8 - 1,4) Liters = 4,4 Liters (1.2 US Gal.)

CRUISE

Cruise Altitude and Power Setting should be determined for most economical fuel consumption and several other considerations. In an altitude of 8000 ft (2438 m) and a Power Setting of 62 % a Fuel Consumption of 52 L/H (13.7 US Gal/H) and can be obtained by the Table of Paragraph 5.10.

RANGE AND ENDURANCE

Figures 5.8 and 5.9 present Range and Endurance values for a T/O Weight of 950 kg (2095 lbs) including fuel for warm up and Take-Off from SL, max continuous Power climb to cruising altitude, and a reserve of 28 liter (7.40 US Gal.) for 45 minutes with 45% Power. 5,5 liters (1,45 US Gal.) unusable fuel is taken into account.

Total fuel	189 L	(49.9 US Gal.)
- Range	485 NM	(898 km)
- Endurance	2.90 HRS	

When started with full tanks and a cruise power setting of 62 % the desired Range of 400 NM can be reached safely.

LANDING

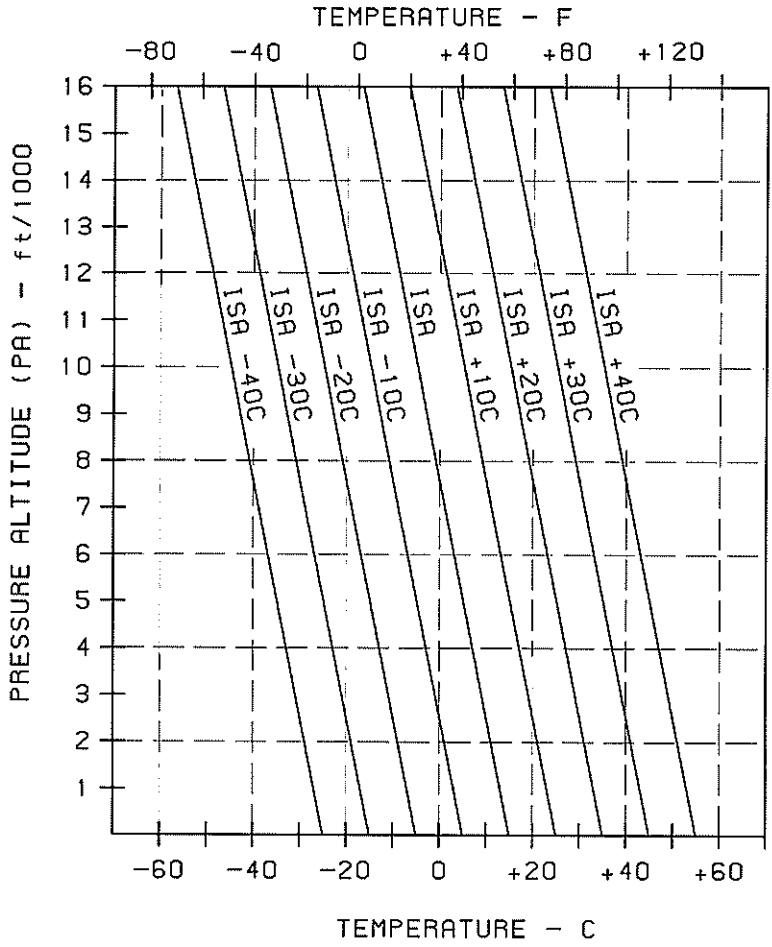
Example (§ 5.11 shows the Landing Distance):

- Landing Weight:	820 kg (1809 lbs)
- Ground Roll:	168 m (551 ft)
- (decreased by 15% due to headwind):	143 m (469 ft)
- Total Distance to clear a 50 ft obstacle:	522 m (1713 ft)
- (decreased by 15% due to headwind):	444 m (1457 ft)

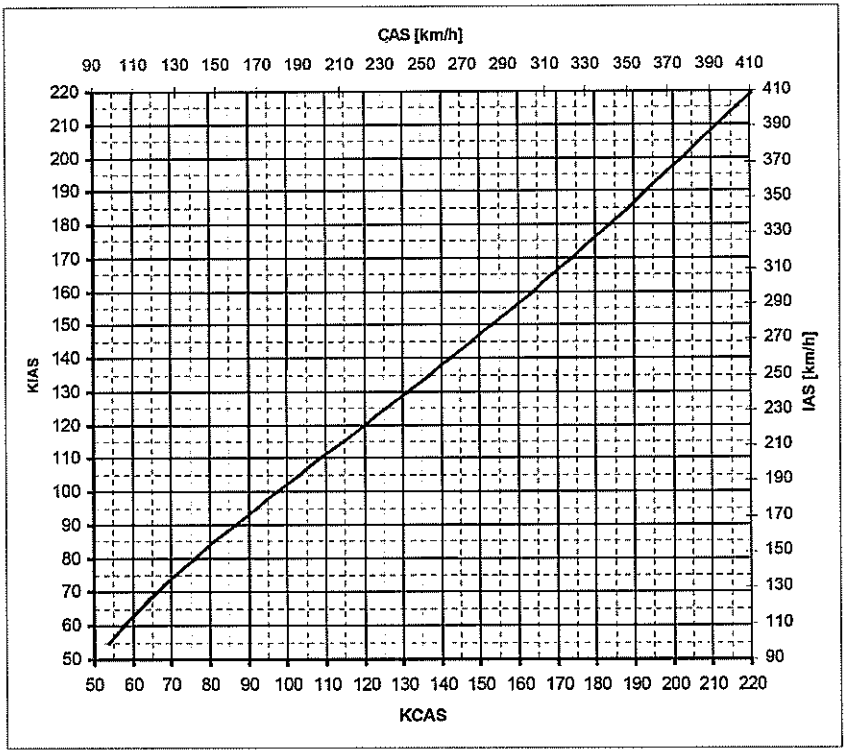
These distances are well within the available field length in this sample problem.

5.2 ISA CONVERSION

ISA Conversion of pressure altitude and outside air temperature



5.3 AIRSPEED CALIBRATION



NOTE

Indicated airspeed assumes zero instrument error

5.4 STALL SPEED

CONDITION:

POWER IDLE
FORWARD C/G

STALL SPEEDS
ANGLE OF BANK

WEIGHT	CATEGORY	0° 1 g	30° 1,15 g	45° 1,41 g	60° 2 g
kg (lbs)		KIAS (km/h)	KIAS (km/h)	KIAS (km/h)	KIAS (km/h)
950 (2095)	NORMAL/ACRO III	64 (119)	69 (128)	76 (141)	91 (169)
870 (1918)	ACRO II	61 (113)	66 (122)	73 (135)	87 (161)
820 (1808)	ACRO I	59 (109)	64 (119)	71 (131)	84 (156)

Max altitude loss during stall recovery is approximately 100 ft (30 m)

5.5 TAKE-OFF PERFORMANCE

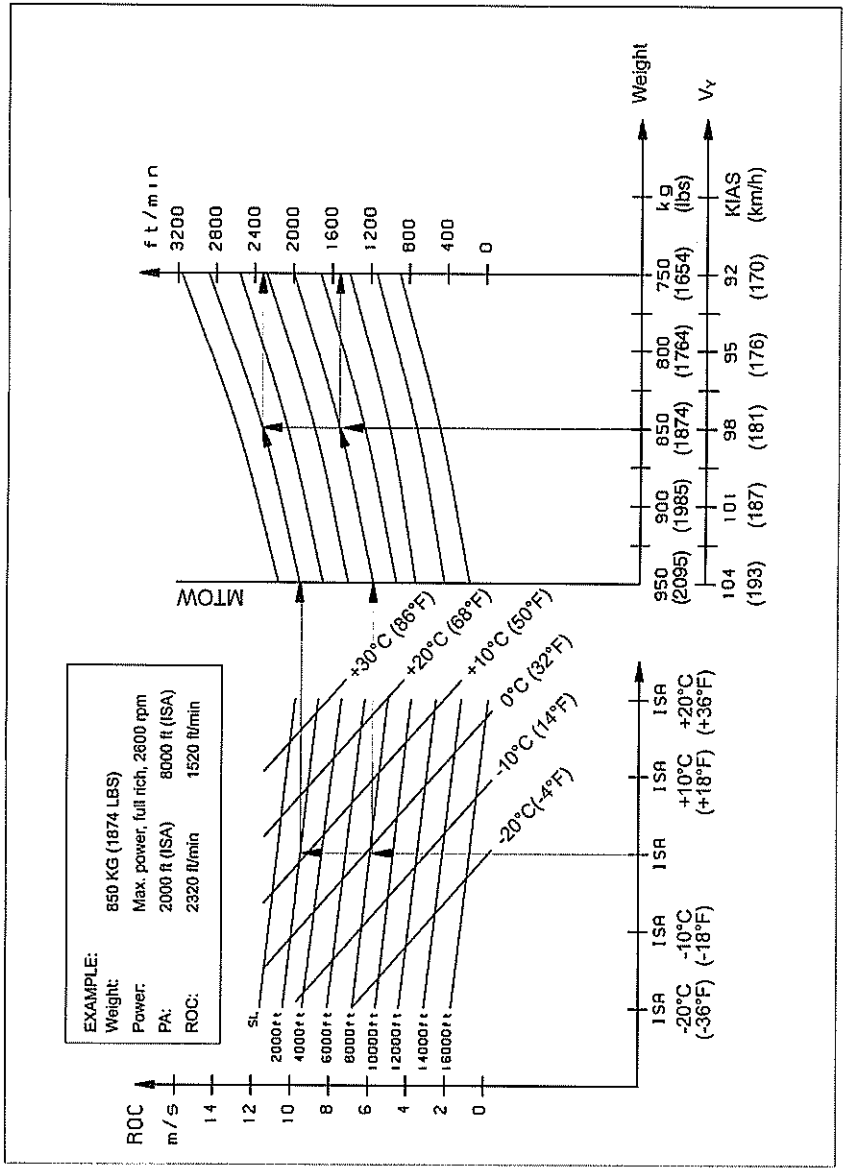
Power: T/O Power
Runway: Concrete

NOTE

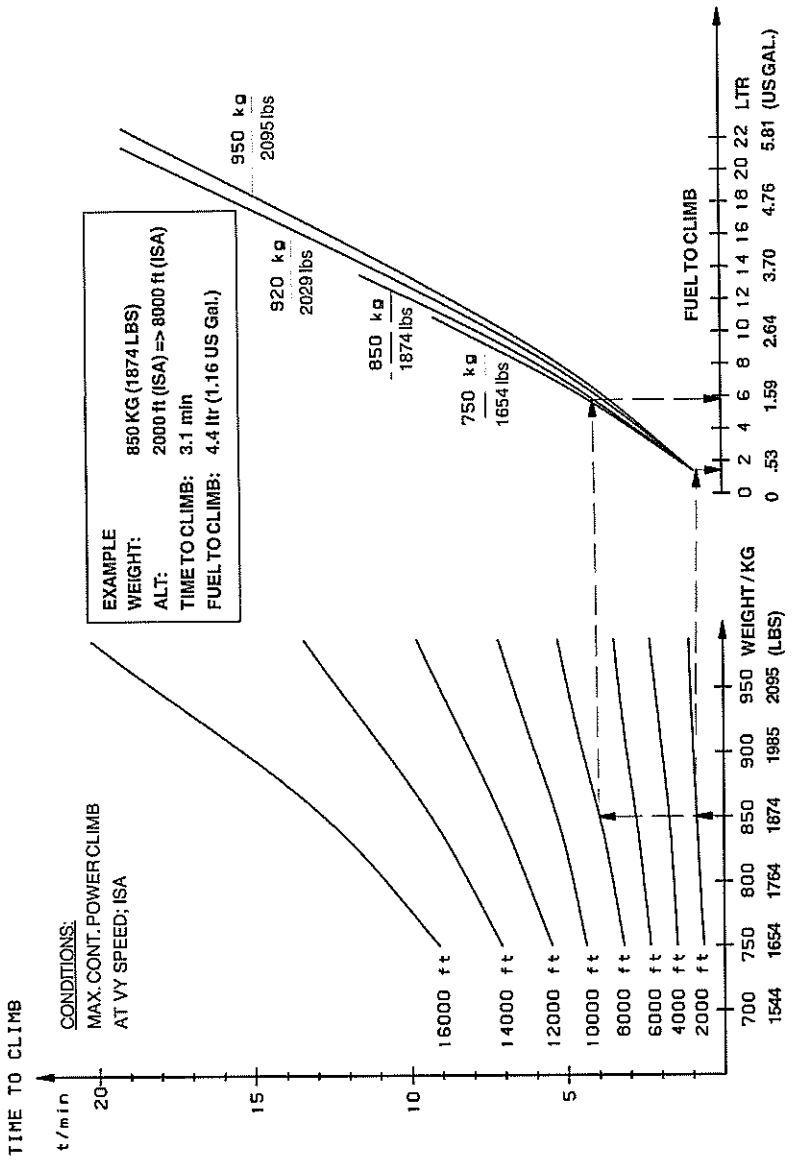
For every 5 kts (9 km/h) headwind, the T/O distance can be decreased by 4%.
For every 3 kts (6 km/h) tailwind [up to 10 kts (19 km/h)], the T/O distance is increased by 10%.
On a solid, dry and plain grass runway, the T/O is increased by 15%.

OAT			0°C (32°F)		15°C (59°F)		30°C (86°F)	
T/O weight	Rotating Speed	PA	T/O Roll	T/O over 15 m (50 ft)	T/O Roll	T/O over 15 m (50 ft)	T/O Roll	T/O over 15 m (50 ft)
kg (lbs)	KIAS (km/h)	ft (m)	m (ft)	m (ft)	m (ft)	m (ft)	m (ft)	m (ft)
950 (2095)	68 (126)	SL	96 (315)	207 (679)	115 (377)	248 (813)	133 (436)	285 (935)
		2000 (610)	115 (377)	248 (814)	138 (453)	298 (978)	160 (525)	342 (1122)
		4000 (1219)	138 (453)	298 (978)	166 (545)	357 (1171)	192 (630)	410 (1345)
		6000 (1829)	166 (545)	358 (1175)	199 (653)	429 (1407)	230 (755)	492 (1614)
870 (1918)	65 (120)	SL	78 (256)	167 (548)	93 (305)	200 (656)	107 (351)	230 (755)
		2000 (610)	94 (308)	200 (656)	112 (367)	240 (787)	128 (420)	276 (906)
		4000 (1219)	112 (367)	241 (791)	134 (440)	288 (945)	154 (505)	331 (1086)
		6000 (1829)	135 (443)	289 (948)	161 (528)	346 (1135)	185 (607)	397 (1302)
820 (1808)	63 (117)	SL	67 (220)	114 (374)	79 (259)	170 (558)	93 (305)	200 (656)
		2000 (610)	80 (262)	173 (568)	95 (312)	204 (669)	112 (367)	240 (787)
		4000 (1219)	97 (318)	207 (679)	114 (374)	248 (814)	134 (440)	288 (945)
		6000 (1829)	116 (381)	249 (817)	137 (449)	294 (965)	161 (528)	347 (1138)

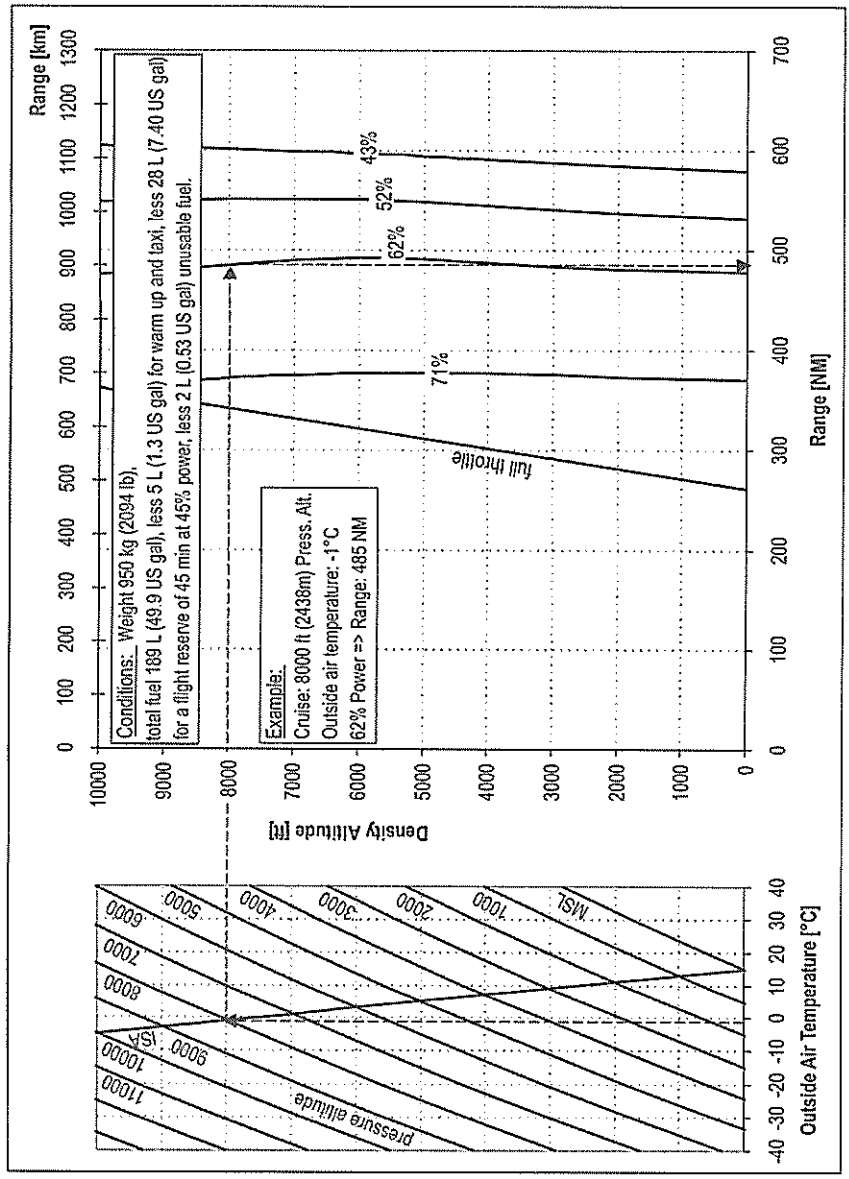
5.6 RATE OF CLIMB PERFORMANCE



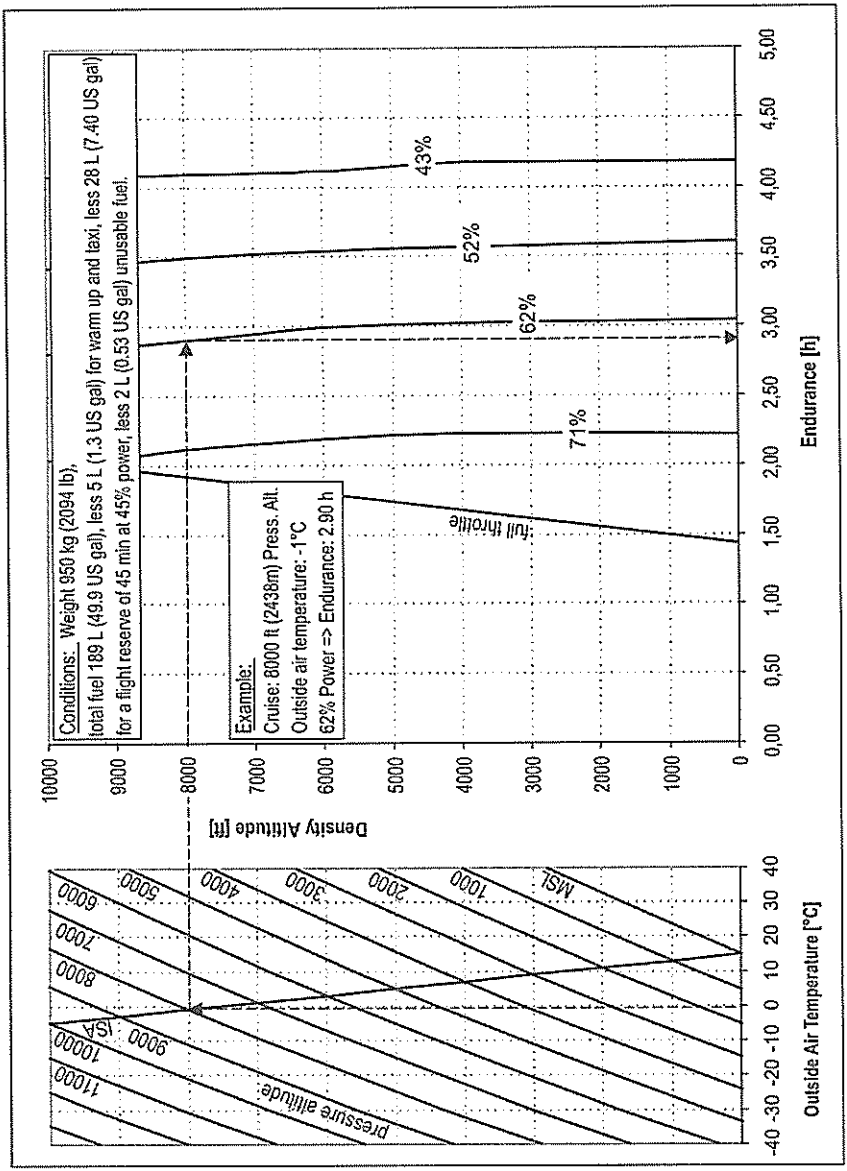
5.7 TIME TO CLIMB, FUEL TO CLIMB



5.8 RANGE


Range [km]
0 100 200 300 400 500 600 700 800 900 1000 1100 1200 1300
Conditions: Weight 950 kg (2094 lb),
total fuel 189 L (49.9 US gal), less 5 L (1.3 US gal) for warm up and taxi, less 28 L (7.40 US gal)
for a flight reserve of 45 min at 45% power, less 2 L (0.53 US gal) unusable fuel.
Example:
Cruise: 8000 ft (2438m) Press. Alt.
Outside air temperature: -1°C
62% Power => Range: 485 NM
43%
52%
62%
71%
full throttle
Density Altitude [ft]
10000 9000 8000 7000 6000 5000 4000 3000 2000 1000 0
Range [NM]
0 100 200 300 400 500 600 700
pressure altitude
MSL 1000 2000 3000 4000 5000 6000 7000 8000 9000 10000 ISA 11000
-40 -30 -20 -10 0 10 20 30 40
Outside Air Temperature [°C]

5.9 ENDURANCE



5.10 CRUISE PERFORMANCE

Configuration:

T/O Weight	950 kg (2095 lb)
Acro & Center Tank Fuel Capacity	69 L (18.2 US gal)
Total Fuel Capacity	189 L (49.9 US gal)

Range and Endurance values include fuel for warm-up and Take-Off from SL, max. cont. Power climb to cruising altitude, and a reserve of 28 L (7.40 US gal) for 45 minutes with 45% Power. 2 L (0.53 US gal) unusable fuel is taken into account. (At ISA-Conditions.)

PA	Eng.	Manif. Press.	Power Setting		Fuel Consumption		TAS		IAS		Endur. *1	Range *1		Mixture *2
[ft] (m)	[rpm]	[inHg]	[%]	[hp]	[L/h]	[gal/h]	[kts]	(km/h)	[kts]	(km/h)	[h]	[nm]	(km)	Best ...
2000	2700*3	26.5	91	286	88.2	(23.3)	182.6	(338)	169	(313)	1.73	317	(587)	Power
(610)	2400	24.0	71	225	68.7	(18.2)	167.6	(310)	156	(289)	2.22	373	(691)	Power
	2200	23.2	62	195	50.5	(13.3)	159.3	(295)	149	(276)	3.03	481	(891)	Economy
	2000	22.5	52	165	42.6	(11.3)	150.2	(278)	141	(261)	3.59	538	(996)	Economy
	2000	19.4	43	135	36.5	(9.6)	139.9	(259)	132	(244)	4.18	584	(1082)	Economy
4000	2700*3	24.5	85	267	82.7	(21.9)	181.5	(336)	164	(304)	1.85	333	(617)	Power
(1219)	2400	23.4	71	225	68.7	(18.2)	170.9	(317)	154	(285)	2.22	378	(700)	Power
	2200	22.7	62	195	50.5	(13.3)	162.4	(301)	147	(272)	3.02	487	(902)	Economy
	2000	21.8	52	165	42.6	(11.3)	153.1	(284)	140	(259)	3.57	544	(1007)	Economy
	2000	19.0	43	135	36.5	(9.6)	142.6	(264)	131	(243)	4.18	591	(1095)	Economy
6000	2700*3	22.8	79	248	77.6	(20.5)	180.5	(334)	158	(293)	1.97	351	(650)	Power
(1829)	2500	22.2	71	225	69.8	(18.4)	174.3	(323)	153	(283)	2.19	377	(698)	Power
	2200	22.2	62	195	50.5	(13.3)	165.6	(307)	146	(270)	3.00	493	(913)	Economy
	2000	21.5	52	165	42.6	(11.3)	156.1	(289)	139	(257)	3.55	551	(1020)	Economy
	2000	18.5	43	135	36.5	(9.6)	145.4	(269)	130	(241)	4.12	598	(1107)	Economy
8000	2700*3	21.0	73	231	73.4	(19.4)	179.6	(333)	162	(300)	2.08	367	(680)	Power
(2438)	2675*3	20.7	71	225	71.9	(19.0)	177.8	(329)	153	(283)	2.12	371	(687)	Power
	2350	20.6	62	195	52.0	(13.7)	169.0	(313)	144	(267)	2.90	485	(898)	Economy
	2050	20.6	52	165	43.0	(11.4)	159.3	(295)	137	(254)	3.49	552	(1022)	Economy
10000	2700*3	19.8	69	215	69.6	(18.4)	178.6	(331)	148	(274)	2.19	382	(707)	Power
(3048)	2500	19.2	62	195	53.6	(14.2)	172.4	(319)	143	(265)	2.81	476	(882)	Economy
	2150	19.3	52	165	43.7	(11.5)	162.5	(301)	136	(252)	3.42	549	(1017)	Economy

NOTE

***1 For temperatures above/below Standard (ISA), increase/decrease Range 1,7% and Endurance 1,1% for each 10°C (18°F) above/below Standard Day Temperature for particular altitude.**

***2 Leaning with exhaust gas temperature (EGT) gage. For the adjustment "Best Power", first lean the mixture to achieve the top exhaust temperature (peak EGT) and then enrich again until the exhaust temperature is 100°F lower than peak EGT.**
For the adjustment "Best Economy", simply lean the mixture to achieve the top exhaust temperature (peak EGT).

⚠ WARNING

Risk of engine overheating.
Always return the mixture to full rich before increasing power settings.

*3 This RPM setting is not allowed for airplanes registered in the normal category, in which noise protection requirements must be complied with.

5.11 LANDING PERFORMANCE

Power: Idle
Runway: Concrete
Brakes: maximum

NOTE

For every knot (1.852 km/h) headwind, the landing distance can be decreased by 3%.
On a solid, dry and plain grass runway, the landing is increased by 15%.

OAT			0°C (32°F)		15°C (59°F)		30°C (86°F)	
Landing weight kg (lbs)	Airspeed KIAS (km/h)	PA ft (m)	Land. Roll m (ft)	Land. over 15m (50 ft) m (ft)	Land. Roll m (ft)	Land. over 15m (50 ft) m (ft)	Land. Roll m (ft)	Land. over 15m (50 ft) m (ft)
950 (2095)	93 (172)	SL	171 (561)	527 (1729)	177 (581)	548 (1798)	185 (607)	586 (1923)
		2000 (610)	181 (594)	558 (1831)	188 (617)	580 (1903)	197 (646)	602 (1975)
		4000 (1219)	192 (630)	592 (1942)	199 (653)	615 (2018)	208 (682)	639 (2096)
		6000 (1829)	203 (666)	627 (2057)	211 (692)	652 (2139)	220 (722)	678 (2224)
870 (1918)	89 (165)	SL	158 (518)	488 (1601)	164 (538)	507 (1663)	171 (561)	527 (1729)
		2000 (610)	165 (541)	518 (1699)	175 (574)	537 (1762)	181 (594)	558 (1831)
		4000 (1219)	177 (581)	548 (1798)	185 (607)	570 (1870)	192 (630)	592 (1942)
		6000 (1829)	188 (617)	582 (1909)	195 (640)	605 (1985)	203 (666)	627 (2057)
820 (1809)	84 (156)	SL	150 (492)	465 (1526)	156 (512)	483 (1585)	163 (535)	502 (1647)
		2000 (610)	159 (522)	492 (1614)	166 (545)	511 (1677)	173 (568)	532 (1745)
		4000 (1219)	168 (551)	522 (1713)	176 (577)	543 (1781)	184 (604)	565 (1854)
		6000 (1829)	179 (587)	553 (1814)	186 (610)	575 (1886)	194 (636)	598 (1962)

SECTION 6

WEIGHT AND BALANCE AND EQUIPMENT LIST

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6.1 GENERAL

This section describes the procedure for establishing the basic weight and moment of the aircraft. Sample forms are provided for reference. Procedures for calculating the weight and movement for various operations are also provided. A comprehensive list of all equipment available for this aircraft is included. It is the responsibility of the pilot to ensure that the aircraft is loaded properly.

6.2 AIRCRAFT WEIGHING PROCEDURE

The aircraft weight is determined by weighing all three wheel loads simultaneously by three scales with the aircraft levelled.
(Upper fuselage reference line horizontal)

Datum line for weight arms x is the fire wall.

X1 = distance: fire wall - main wheel

X2 = distance: fire wall - tail wheel

XN = distance: fire wall - item N

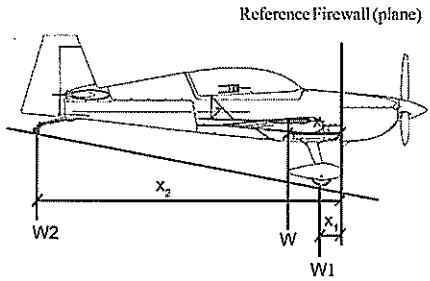
XG = distance: fire wall - Center of Gravity

W1 = Sum of weights indicated by the two scales below the main wheels

W2 = Weight indicated by the scale below the tail wheel

W = Total weight = W1 + W2

$$XG = \frac{(W1 \times X1) + (W2 \times X2)}{W} = \text{CG position}$$



W = W1 + W2 ,

$$XG = \frac{(W1 \times X1) + (W2 \times X2)}{W}$$

If a new weight is added to the known old weight and CG position the resulting new weight and CG can be obtained by a simple calculation:

Situation before adding item:

Wo, Xo = Airplane weight, CG position
Wn, Xn = Weight, distance from fire wall of item to add

New Weight of airplane and new CG:

$W = Wo + Wn$

$XG = \frac{Wo \times Xo + Wn \times Xn}{W}$ = CG position

6.2.1 Owners Weight and Balance Record

Enter below all weight change data from aircraft log book.

EXTRA330LX	SERIAL NUMBER: LC097					
Date	Description of modification	Weight change Added (+), Removed (-)			Running empty weight	
		Wt./kg [lbs]	Arm/cm [inch]	Moment/kg*cm [lbs*inch]	Wt./kg ~~[lbs]~~	Moment/kg*cm ~~[lbs*inch]~~
17.09.2024	Empty weight as delivered	—	—	———	680,4	43061,2

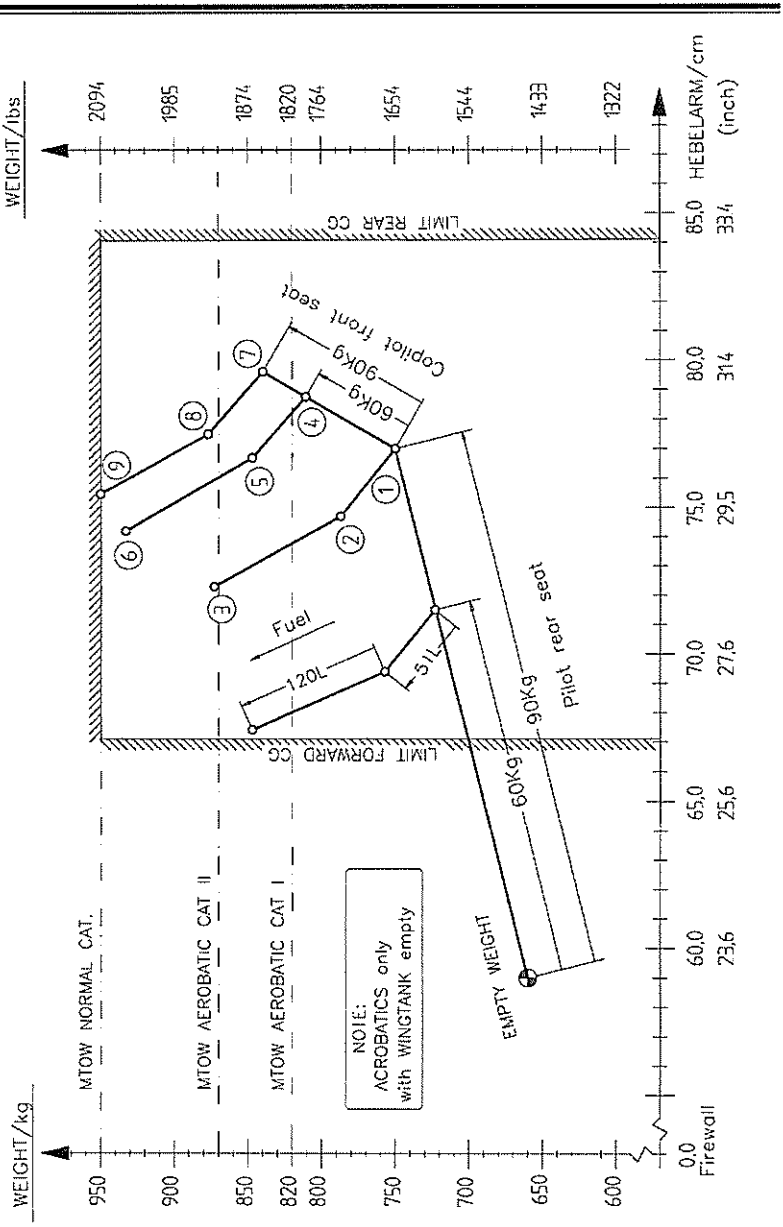
EXTRA JMA QM-078

6.3 CENTER OF GRAVITY CALCULATION (SAMPLE PROBLEM)

Position	PILOT Rear Seat		ACRO-TANK Fuel 51 LTR (13.4 US GAL)		COPILOT Front Seat		WING-TANK Fuel 120 LTR (31,7 US GAL)	
	(kg)	(lbs)	(kg)	(lbs)	(kg)	(lbs)	(kg)	(lbs)
①	90	198.5	-	-	-	-	-	-
②	90	198.5	37	81.5	-	-	-	-
③	90	198.5	37	81.5	-	-	86.4	190.5
④	90	198.5	-	-	60	132.3	-	-
⑤	90	198.5	37	81.5	60	132.3	-	-
⑥	90	198.5	37	81.5	60	132.3	86.4	190.5
⑦	90	198.5	-	-	90	198.5	-	-
⑧	90	198.5	37	81.5	90	198.5	-	-

Position	PILOT Rear Seat		ACRO-TANK Fuel 51 LTR (13.4 US GAL)		COPILOT Front Seat		WING-TANK Fuel 101 LTR (26.7 US GAL)	
	(kg)	(lbs)	(kg)	(lbs)	(kg)	(lbs)	(kg)	(lbs)
⑨	90	198.5	37	81.5	90	198.5	73	160.9

6.3 CENTER OF GRAVITY CALCULATION (SAMPLE PROBLEM)



6.3.1 Sample

Take-off Condition:		
Pilot On Rear Seat	90.0 kg	(198.5 lbs)
Copilot On Front Seat	90.0 kg	(198.5 lbs)
51 L Fuel in Acro Tanks	37.0 kg	(81.5 lbs)
101 L Fuel In Wing Tanks	73.0 kg	(160.9 lbs)
Aircraft Empty Weight	660.0 kg	(1455 lbs)
	950.0 kg	(2094.4 lbs)

To find C/G, follow line "Pilot Rear Seat" from Empty Weight to "90 kg" [198.5 lbs] (Point 1). Continue on line "Copilot Front Seat" to 90 kg (Point 7). Now follow line "Fuel" via Point 8 (51 L [13.5 US.gal] Acro Fuel) to Point 9 (101 L [26.6 US.gal] Fuel in Wing Tank).

FIND:	Weight	~ 950 kg	(2094.4 lbs)
	C/G	~ 75.4 cm	(29.6 inch)

6.3.2 Weight and Balance Record Sheet

	WEIGHT	ARM	MOMENT
EMPTY WEIGHT			
PILOT			
COPILOT			
ACRO FUEL			
WING FUEL			

$\Sigma W =$ $\Sigma (W \times X) =$

$$XG = \frac{\Sigma (W \times X)}{\Sigma W} =$$

6.4 LOADING WEIGHTS AND MOMENTS

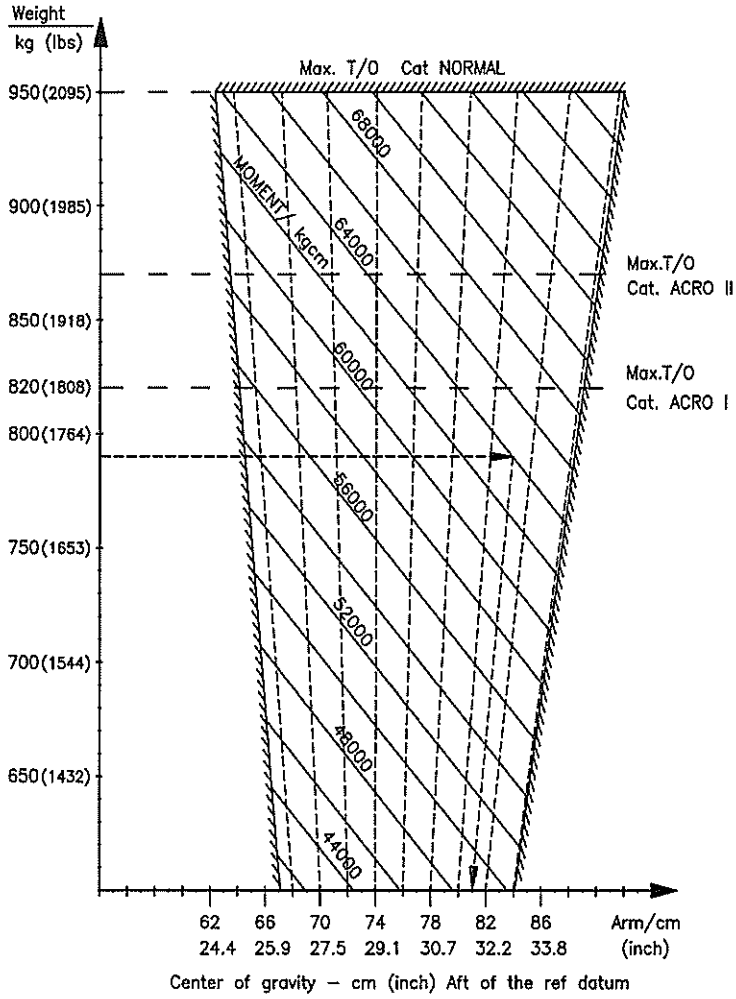
OCCUPANTS : max. 2

WEIGHT Pilot + Parachute		PILOT REAR SEAT Arm = 207cm *(81.5 inch)*		COPILOT FRONT SEAT Arm = 98 cm *(38.4 inch)*	
KG	*LBS*	KG x CM	*(IN x LBS)* MOMENT	KG x CM	*(IN x LBS)*
60	*132*	12420	*(10758)*	5880	*(5068)*
65	*143*	13455	*(11654)*	6370	*(5491)*
70	*154*	14490	*(12551)*	6860	*(5913)*
75	*165*	15525	*(13447)*	7350	*(6336)*
80	*176*	16560	*(14344)*	7840	*(6758)*
85	*187*	17595	*(15240)*	8330	*(7180)*
90	*198*	18630	*(16137)*	8820	*(7603)*

TOTAL FUEL CAPACITY: 189 L (49.9 US gal)

FUEL					
ACRO & CENTER TANK			WING TANK		
L *(US gal)*	kg *(lb)*	kg x cm *(lb x in)*	L *(US gal)*	kg *(lb)*	kg x cm *(lb x in)*
9 *(2.4)*	6.5 *(14.3)*	182 *(157)*	10 *(2.6)*	7.2 *(15.9)*	360 *(313)*
20 *(5.3)*	14.4 *(31.8)*	420 *(365)*	20 *(5.3)*	14.4 *(31.8)*	721 *(629)*
25 *(6.6)*	18.0 *(39.7)*	529 *(459)*	40 *(10.6)*	28.8 *(63.5)*	1442 *(1257)*
30 *(7.9)*	21.6 *(47.6)*	638 *(553)*	60 *(15.9)*	43.2 *(95.3)*	2164 *(1886)*
35 *(9.2)*	25.2 *(55.6)*	746 *(648)*	80 *(21.1)*	57.6 *(127.0)*	2885 *(2514)*
40 *(10.6)*	28.8 *(63.5)*	855 *(742)*	100 *(26.4)*	72.0 *(158.8)*	3607 *(3144)*
45 *(11.9)*	32.4 *(71.4)*	964 *(836)*	120 *(31.7)*	86.4 *(190.5)*	4328 *(3771)*
50 *(13.2)*	36.0 *(79.3)*	1073 *(931)*			
55 *(14.5)*	39.6 *(87.3)*	1182 *(1026)*			
60 *(15.9)*	43.2 *(95.2)*	1290 *(1120)*			
65 *(17.2)*	46.8 *(103.2)*	1399 *(1215)*			
69 *(18.2)*	49.7 *(109.6)*	1487 *(1291)*			

6.5 WEIGHTS AND MOMENTS LIMITS



EXAMPLE:

At 790 KG (1741 LBS) and 640000 kgcm the C/G location is 81.0 cm (31.9") aft of ref datum

6.6 EQUIPMENT LIST

EXTRA 330LX S/N: LC097

QTY	ITEM	MANUFACT.	MODEL NO	PART OR P/N	WEIGHT (kg)	ARM (m)	R* A O	INST
	Mooring (10)							
2	Wing Tie Down Rings	Extra		8C801.002	0.05	1.07	O	✓
1	Canopy Lock	Extra		83401.001-LK	0.25	1.90	O	✓
	Placards (11)							
1	Structural Overheat Ind.	Extra		02358	0.0	0.75	R	✓
	Venting and Heating (21)							
1	Heater	Extra	EA-8D606	Option 300/LT KBS01	3.70	0.20	O	✓
	Electrics (24)							
1	Battery	Concorde	RG-25 XC	03617	10.40	0.32	R	✓
1	Battery Lightweight	Concorde	RG-12LSA	33697	5.90	0.32	A	✓
1	Alternator 60 Amps	Plane Power	AL12-EI60/B	33552	3.00	-0.86	R	✓
1	Alternator 65 Amps	Prestolite	66021637	33558	4.00	-0.86	A	✓
1	Alternator 55 Amps	Bosch	0 120 489 917	33508	4.60	-0.86	A	✓
1	Shunt (100A. 100mV)	Electronics International	S-50	FA3008	0.09	0.25	R	✓
1	Volt/Ammeter	Electronics International	VA-1A-50	FA3007-PG	0.22	1.62	R	✓
1	External Power Socket (Piper Type)	Cole Hersee	11041-06	31731	1.46	1.07	O	✓
1	Batt. Charger Plug 12V	Extra	EA-93102.18	02636	0.02	0.17	O	✓
1	12VDC Power Outlet Socket	Sutars	1218	31494	0.03	1.62	O	✓
1	Dual USB Charging Port	Mid-Continent	TA102	34454	0.09	1.62	O	✓
	Cockpit (25)							
1	Safety Belt Assy Rear Seat (seat belts w. ratchet, shoulder harness, crotch strap)	Hooker	(1011230 [3x] & 1113012-1 [1x], 1H5630-3 [2x] 1CS924-D [1x])	FK0002 or FK0019	3.30	2.12	R	✓
1	Safety Belt Assy Front Seat (seat belts, shoulder harness, crotch strap)	Hooker	1011230 [4x] 1H3030-3 [2x] 1CS924-D [1x]		2.90	1.03	R	✓
1	Safety Belt Assy Front Seat (seat belts w. ratchet, shoulder harness, crotch strap)	Hooker	(1011230 [3x] & 1113012-1 [1x], 1H3030-3 [2x] 1CS924-D [1x])	FK0004 or FK0020	3.30	1.03	A	✓
	Emergency Equipment							
1	First Aid Pack	Hartmann	7394280	33423	0.39	2.70	R	✓

*) R = required, A = alternative, O = optional

QTY	ITEM	MANUFACT.	MODEL NO	PART OR P/N	WEIGHT (kg)	ARM (m)	R* A O	INST
	Flight Controls (27)							
1	Elevator Trim System Electric	Ray Allen	EA-4D401.0	31668	0.40	4.24	R	V
1	Mechanically Adjustable Pedal Sys.	Extra	EA-46304		4.92	1.22	R	O
1	Electrically Adjustable Pedals Sys.	Extra	EA-86612		7.28	1.10	A	V
	Fuel System (28)							
1	Elec. Fuel Pump	Weldon Tool	B8120-M		1.10	-0.04	R	V
1	Elec. Fuel Pump	Andair	PX580-TC-XT		0.47	-0.04	A	O
1	Fuel Selector	Allen	6 S 122	390144	0.19	0.73	R	V
1	Set Fuel Lines in Fuselage	Parker/Stratoflex	PTFE Type 124	33315	1.65	0.70	R	V
1/2	Fuel Cont. Probe Wing	VDO	226 801 015 001	FM4006	0.12	0.89	R	V
1	Fuel Cont. Probe Fuselage Tank	VDO	224 011 020 372	01920	0.20	0.44	R	V
	Landing gear (32)							
2	Main Wheel Tires 5.00-5 / 6PR	Goodyear	505C61-B	02323	3.90	0.33	R	V
2	Tube	Goodyear	302-013-400	FF0016			R	V
2	Main Wheel Tires 5.00-5 / 6PR	McCreary	06-08200				A	O
2	Tube	McCreary	06-08300				A	O
2	Wheel assembly	Cleveland	199-197	02497	6.40	0.33	R	V
2	Master Brake Cylinders front	Matco	MC-4E	FB0001	0.55	0.15	R	V
2	Master Brake Cylinders rear	Matco	MC-4E	FB0001	0.55	1.11	R	V
1	Tail Wheel 6" Assy (Soft)	Special Products Aviation Inc.		32477-VB	1.28	5.23	R	V
1	Tail Wheel 5" Steerable	Extra	EA-53201.7	53201.007-VB	0.90	5.23	A	O
L/R	Wheel fairing (CRP)	Extra	EA-53102.301		0.33	2.50	R	V
1	Brake Fluid Reservoir	ACS	A-315	02889	0.20	0.04	R	V
	Lights (33)							
1	Strobe / Nav Light (RH)	Whelen	01-0790340-00 (14V green)	32989	0.30	1.35	R	O
1	Strobe / Nav Light (LH)	Whelen	01-0790340-02 (14V red)	32990	0.30	1.35	R	O
2	Strobe Power Supply	Whelen	A490T	01215	0.54	1.35	R	O
1	Strobe/NAV Light (RH)	AVEO	AVE-WPSTG-54G	34334	0.083	1.35	A	V
1	Strobe/NAV Light (LH)	AVEO	AVE-WPSTR-54G	34335	0.083	1.35	A	V
1	Landing Light LED	Whelen	01-71125-12	33588	0.16	-0.57	O	V

QTY	ITEM	MANUFACT.	MODEL NO	PART OR P/N	WEIGHT (kg)	ARM (m)	R* A O	INST
	Navigation / Flight Instruments / Avionics (34)							
1	Accelerometer 3-1/8"	Kollsman/Pioneer/ Bendix/Jaeger/Century	AN 5745	FI3001	0.40	1.60	R	O
1	Accelerometer 2-1/4"	Kollsman/Pioneer/ Bendix/Jaeger/Century	AN 5745	01206	0.30	1.60	A	O
1	Magnetic Compass	SIRS Navigation Ltd	PG2A	33085	0.13	1.62	R	V
1	Magnetic Compass	Airpath	C 2300	00189	0.25	1.62	A	O
1	Airspeed Indicator front (kts)	United Instr.	UI8030 B.882	32811	0.32	0.65	O	O
1	Airspeed Indicator front (kts/km/h)	United Instr.	UI8030 B.896	33630	0.32	0.65	A	O
1	Airspeed Ind. front (kts)	Mikrotechna Praha	LUN 1106.K2B4/SC	34155	0.50	0.65	A	O
1	Airspeed Ind. front (km/h)	Mikrotechna Praha	LUN 1106.P2B4/SC	34156	0.50	0.65	A	O
1	Airspeed Indicator rear (kts)	United Instr.	UI8030 B.882	32811	0.32	1.61	R	O
1	Airspeed Indicator rear (kts/km/h)	United Instr.	UI8030 B.896	33630	0.32	1.61	A	O
1	Airspeed Ind. rear (kts)	Mikrotechna Praha	LUN 1106.K2B4/SC	34155	0.50	1.61	A	V
1	Airspeed Ind. rear (km/h)	Mikrotechna Praha	LUN 1106.P2B4/SC	34156	0.50	1.61	A	O
1	Alternate Static Valve	Extra	Assy	300/L Option StatLel	0.15	1.60	O	O
1	Altimeter front (ft)	United Instr.	UI5934PD-3 A.134	30416	0.39	0.66	O	O
1	Altimeter front (m)	United Instr.	UI5934PD-3M A.665	31393	0.39	0.66	A	O
1	Altimeter front (ft)	Mikrotechna Praha	LUN 1128.10B6	34159	0.59	0.65	A	O
1	Altimeter front (m)	Mikrotechna Praha	LUN 1124.01-8	34160	0.64	0.65	A	O
1	Altimeter rear (ft)	United Instr.	UI5934PD-3 A.134	30416	0.39	1.62	R	V
1	Altimeter rear (m)	United Instr.	UI5934PD-3M A.665	33652	0.39	1.62	A	O
1	Altimeter rear (ft)	Mikrotechna Praha	LUN 1128.10B6	34159	0.59	1.61	A	O
1	Altimeter rear (m)	Mikrotechna Praha	LUN 1124.01-8	34160	0.64	1.61	A	O
1	Vertical Speed Indicator (fpm)	United Instr.	UI7030 C.27	01485	0.54	1.62	O	O
1	Vertical Speed Indicator (m/s)	United Instr.	UI7030-M C.194	33653	0.54	1.62	O	O
1	Vertical Speed Ind. (fpm)	Mikrotechna Praha	LUN 1144.B0B1	34161	0.40	1.61	A	O
1	Vertical Speed Ind. (m/s)	Mikrotechna Praha	LUN 1144.F0B1	34162	0.40	1.61	A	O
1	Attitude Gyro (electronic. 2 1/4")	RC Allen	RCA2600-2 (0° tilt)	obsolete	0.24	1.63	O	O
1	Attitude Gyro (electronic. 2 1/4")	RC Allen	RCA2600-2 (0° tilt) 102-0202-01	obsolete	0.13	1.61	A	O
1	Attitude Gyro (electronic. 3 1/8")	RC Allen	RCA2600-3 (0° tilt)	obsolete	0.45	1.63	O	O
1	Attitude Gyro (electronic. 3 1/8")	RC Allen	RCA2600-3 (0° tilt) 102-0203-01	obsolete	0.19	1.61	A	O

QTY	ITEM	MANUFACT.	MODEL NO	PART OR P/N	WEIGHT (kg)	ARM (m)	R* A O	INST
1	Attitude Gyro (electronic, 2 1/4")	RC Allen	RCA2610-2 (0° tilt) 102-0402-01-01	34921	0.14	1.63	O	O
1	Attitude Gyro (electronic, 2 1/4")	RC Allen	RCA2610-2G (0° tilt) 102-0402-01-03	34923	0.14	1.61	A	O
1	Attitude Gyro (electronic, 3 1/8")	RC Allen	RCA2610-3 (0° tilt) 102-0403-01-01	34922	0.19	1.63	O	O
1	Attitude Gyro (electronic, 3 1/8")	RC Allen	RCA2610-3G (0° tilt) 102-0403-01-03	34924	0.19	1.61	A	O
1	Slip Indicator (on RCA 2600)	RC Allen	444-0010-01	33529	0.03	1.63	O	O
1	Stall Sensor	Extra	EA-73106.0	7D106.001-VB	0.07	0.45		O
1	Stall Warn Horn	EMAG	EM-S 110P	01600	0.13	1.60	O	O
1/1	Slip/Skid Indicator	Rieker	1040	FI0009	0.05	1.60	O	V
1	Flight Display front	Garmin	G5	34749	0.31	0.65	A	V
1	Backup Battery Pack	Garmin	G5	34751	0.14	0.64	AO	O
	Optional Primary Flight Display (ASPEN)							
1	Electr. Flight Display (EFD1000)	Aspen	910-00001-001	in 33846, 33291, 34020 & 34021	1.32	1.55	O	O
1	Configuration Module (Pilot)	Aspen	920-00004-001	in 33846 & 34020	0.04	1.50	O	O
1	Configuration Module (Pro)	Aspen	920-00004-002	in 33291 & 34021	0.04	1.50	O	O
1	Remote Sensor Module (RSM) w GPS	Aspen	910-00003-001	in 33846, 33291, 34020 & 34021	0.91	3.95	O	O
1	RSM Installation bracket	Extra	EA-86206.10		0.19	3.95	O	O
	Optional Multi-Function Display (ASPEN)							
1	Electr. Flight Display (EFD1000)	Aspen	910-00001-001	in 33292, 33293, 34024 & 34025	1.32	1.55	O	O
1	Electr. Flight Display (EFD500)	Aspen	910-00001-003	in 32956, 33639, 34022 & 34023	1.09	1.55	O	O
1	Configuration Module (EFD 1000 MFD)	Aspen	920-00004-004	in 33292, 33293, 34024 & 34025	0.04	1.50	O	O
1	Configuration Module (EFD 500 MFD)	Aspen	920-00004-005	in 32956, 33639, 34022 & 34023	0.04	1.50	O	O
1	Remote Sensor Module (RSM) w/o GPS	Aspen	910-00003-002	in 33292, 33293, 34024 & 34025	0.91	3.95	O	O
	Optional Hour Meters							
1	Flight Timer	Wintor	FSZM 1510	01605	0.15	1.55	O	O
	Optional Clock							
1	Digital Clock	Astrotech	LC-2	FI0004	0.14	1.60	O	O

QTY	ITEM	MANUFACT.	MODEL NO	PART OR P/N	WEIGHT (kg)	ARM (m)	R A O	INST
	Optional Aerobatics Equipment							
1	Aresti-Card Holder	Extra	EA-83504.4	EA-83504.004-PG	0.09	1.66	O	V
1	Aresti-Card Holder (Aspen)	Extra	EA-86504.4	EA-86504.004-PG	0.09	1.66	A	O
1/1	Sighting device (45°/90°)	Extra	EA-8E801.30	8E801.030	0.275	1.60	O	V
1/1	Sighting device (45°/90°) big	Extra	EA-8E801.50	8E801.050	0.285	1.59	O	O
1	Smoke System	Extra	86112		9.20	0.30	O	V
	Optional Electronic Accelerometer							
1	El. accelerometer with audio/visual warning	TL Electronik	TL-3424_EXT	32582	0.30	1.60	O	O
	Avionics (34 & 23)							
1	VHF-COM	Becker	AR 4201	00652-PG	0.67	1.54	R	O
1	VHF-COM (8.33kHz spacing)	Becker	AR 6201	33041	0.85	1.54	A	O
1	COM unit	TRIG Avionics	TY91	00882-00-01	0.35	1.01	A	O
1	Panel Mount Controller	TRIG Avionics	TC90	00857-00-01	0.09	1.62	A	O
1	GPS / COM	Garmin	GNC 420W	32734-PG	2.65	1.54	O	O
1	GPS / NAV / COM	Garmin	GNS 430W	32773-PG	2.95	1.54	A	O
1	GPS / NAV / COM	Garmin	GNS 530W	28219-PG	3.75	1.49	A	O
1	GPS / COM	Garmin	GTN 635(Xi)	33772[-PG]	2.82	1.54	A	V
1	GPS / NAV / COM	Garmin	GTN 650(Xi)	33773[-PG]	3.20	1.54	A	O
1	GPS / NAV / COM	Garmin	GTN 750(Xi)	33774[-PG]	4.24	1.54	A	O
	Reserved							
1	COM Antenna	Pointer	P1 3001-10	FE4254	0.05	1.60	R	V
1	GPS-Antenna	Garmin	GA 35	32620	0.21	3.90	O	V
1	NAV-Antenna	Comant Industries	CI-158C	33035	0.16	3.90	O	O
1	Diplexer	Comant Industries	CI 507	FA4057	0.09	3.90	O	O
1	Course Deviation Ind.	Garmin/Mid Continent	GI-102A	FA3010	0.64	1.54	O	O
1	Course Deviation Ind./GS	Garmin/Mid Continent	GI-106A	FA3003	0.64	1.54	O	O
1	Transponder (Mode S)	Becker	BXP6401-2-(01)	31860-PG	0.80	1.60	A	O
1	Transponder (mode A&C)	Becker	ATC-4401	31002-PG	0.73	1.60	A	O
1	Blind Encoder Module	Becker	BE-6400-01	32100	0.10	1.39	O	O
1	Transponder (Mode A&C)	Garmin	GTX 327	FA3009-PG	0.95	1.75	O	O
1	Transponder (Mode S)	Garmin	GTX 328	32839-PG	1.50	1.73	A	O
1	Transponder (Mode S)	Garmin	GTX 330	30334-PG	1.50	1.73	A	O
1	Transponder (Mode S)	Garmin	GTX 33	33775-PG	2.00	3.02	A	O
	Reserved							

QTY	ITEM	MANUFACT.	MODEL NO	PART OR P/N	WEIGHT (kg)	ARM (m)	R* A O	INST
1	Transponder (Mode S)	TRIG Avionics	TT21 (class 2)	00675-00-01	0.35	1.01	A	
1	Transponder (Mode S)	TRIG Avionics	TT22 (class 1)	00745-00-01	0.35	1.01	A	
1	Panel Mount Control	TRIG Avionics	TC20	00649-00	0.09	1.62	A	
1	Transponder	f.u.n.k.e.	TRT800H	32090	0.60	1.20	A	
1	Altitude Blind Encoder (grey code)	ACK	A-30	02239	0.20	1.50	O	
1	Altitude Blind Encoder (serial output)	ACK	A-30.8 (or higher)	32960	0.20	1.50	O	
1	Transponder Antenna	Comant Industries	CI 105	32269	0.11	0.14	O	
1	ELT ELT Antenna (for Artex)	Artex Artex	ME 406 110-773	32173-PG 33524	1.42 0.08	3.04 3.00	O O	
1	ELT	KANNAD	406 AF COMPACT	34210	1.11	2.97	A	
1	ELT	KANNAD	406 AF INTEGRA	34422	0.99	2.96	A	
1	ELT Antenna (for Artex or KANNAD)	Rami	AV-200	33965	0.08	3.00	AO	
1	Intercom	Northern Airborne	NAT AA83-001	31659-PG	0.28	1.55	O	
1	Panel Dock	AirGizmos	GPSMAP 696	33665	0.25	1.60	O	
1	Panel Dock	AirGizmos	GPSMAP 796	34175	0.27	1.60	O	
1	Panel Dock	AirGizmos	iPad Mini Panel Dock	34410	0.12	1.62	O	
1	Remote Audio Panel	Garmin	GMA 35	33902-PG	1.00	1.53	O	
	Cowling (54)							
1	Cowling (CRP)	Extra	EA-83001.0		9.20	-0.57	R	
1	Cowling (GRP)	Extra	EA-83003.0		10.60	-0.57	A	
1	Cowling (CRP, incl. Landing Light provision)	Extra	EA-8E001.0		9.20	-0.57	A	
	Canopy (56)							
1	Standard Canopy	Extra	26301.000-LV	26301.000-VF	13.50	1.69	R	
1	Single Seat Canopy	Extra	EA-86411.0	86411.001-VF	13.20	1.69	A	
	Propeller (61)							
1	3-Blade Propeller	MT-Propeller	MTV-9-B-C/ C198-25	32285	30.50	-1.15	R	
1	Spinner	MT-Propeller	P-810-2	31415	0.80	-1.20	R	
1	4-Blade Propeller	MT-Propeller	MTV-14-B-C/ C190-130	33970	30.60	-1.15	A	
1	Spinner	MT-Propeller	P-967	31560	0.80	-1.20	A	
1	Governor (max 2600 RPM)	MT-Propeller	P-880-41	32941	1.10	-0.91	R	
1	Governor (max 2700 RPM)	MT-Propeller	P-880-5	31509	1.10	-0.91	A	
1	Governor (max 2700 RPM)	Woodward	A-210988	01209	1.10	-0.91	A	

QTY	ITEM	MANUFACT.	MODEL NO	PART OR P/N	WEIGHT (kg)	ARM (m)	R* A O	INST
	Powerplant (7X)							
	Engine							
1	Engine	Lycoming	AEIO-580-B1A (R/H)ENPL-RT10427	32712	191.72	-0.72	R	V
4	Shock Mount	Barry	94016-02	01817	0.425	-0.29	R	O
4	Shock Mount	Lord	J-7764-20	31093	0.535	-0.29	A	V
1	Set Fuel, Oil, Sense Lines in Eng. Comp.	Parker/Stratoflex	PTFE Type 101	33592	3.40	-0.15	R	V
	Engine Fuel System							
1	Fuel Injector	Precision/Avstar	RSA 10 AD 1	61M26404	3.90	-0.68	R	V
1	Mech. Fuel Pump	Crane Lear Romec Hartzell Engine Tech.	RG9080-J4A PN 200F-5002	62E22581 62E23186	0.57 0.57	-0.30 -0.30	R A	V V
	Ignition							
1	Ignition Switch	TCM	10-357200-1	00185	0.15	1.63	R	O
1	Ignition Switch	ACS Products Co.	A-510-2	35595	0.15	1.63	A	V
1	Magneto, LH	Slick	6393	32860	2.30	-0.15	R	V
1	Magneto, RH	Slick	6350	02337	2.00	-0.15	R	V
1	Slick Start; Magneto Start Booster	Unison	SS1001	32598	0.27	-0.02	R	V
	Engine Controls							
1	RPM Vernier Control	ACS Products Co.	A-750-30-1200	00113	0.71	0.82	R	V
1	Mixture Vernier Control	ACS Products Co.	A-750-20-1080	00112	0.65	0.94	R	V
1	Throttle Control	Teleflex	CC330 10	33052	0.56	0.60	R	V
1	Throttle Control (10 ft)	Teleflex Marine	CCX633	34985	0.50	0.50	A	O
1	Throttle Control Cable	Cablecraft	580-540-501	obsolete	0.63	0.60	A	O
	Engine Indicating (77)							
	Conventional engine gauges							
1	RPM Indicator digital (max 2600 RPM)	Horizon	P100-230-635-00	33624	0.68	1.60	R	O
1	RPM Indicator digital (max 2700 RPM)	Horizon	P100-230-643-00	02489	0.68	1.60	A	O
1 1	RPM Indicator digital (max 2600 RPM) Magn. Pickup Tach Sender	UMA UMA	T19-801-1XX FAA TSO-C49b T1A9-1	35800	0.68 0.03	1.60 -0.15	A A	O
1	RPM Indicator		FAA TSO-C49b			1.60	A	O
1 1 1	Oil Press / Oil Temp Ind. (2 1/4") Oil Temp. Sender Oil Press Sensor	UMA UMA UMA	D2-OP130U-OT300U-01 1B3A N1EU150G(-A) or T1EU150G(-A)	33428	0.09 0.08 0.12	1.62 -0.11 0.04	R R R	O
1	Manifold Pressure / Fuel Flow Ind.	United Instr.	UI6331-H.217	33448	0.49	1.60	R	O

QTY	ITEM	MANUFACT.	MODEL NO	PART OR P/N	WEIGHT (kg)	ARM (m)	R* A O	INST
1	Fuel Qty. Ind. Wing	VDO	301 030 001 G	200171	0.14	1.62	R	O
1	Fuel Qty. Ind. Fuselage Tank	VDO	301 030 002 G	00390	0.14	1.62	R	O
1	EGT/CHT Indicator	UMA	D2-ET1K7K-CT600J-01	33438	0.07	1.62	R	O
1	EGT Probe	UMA	2BU20		0.06	-0.37	R	
1	CHT Probe	UMA	2B18 or 2B02		0.05	-0.20	R	
	Optional add on to convent eng. Gauges							
1	Fuel Scan Sys.	JPI	FS-450	30611-PG	0.18	0.98	O	O
1	Fuel Flow Transducer	Flowscan	201-B or FXT-201		0.09	-0.02	O	
		Shadin	680501 or 680600	FI4015	0.09	-0.02	A	
1	Engine Monitor Sys.	JPI	EDM700/800	31530-PG	1.39	0.50	O	O
6	EGT Probe	JPI	M-111		0.35	-0.57	O	
6	CHT Probe	JPI	M-113 (S-Plug Gask.)		0.26	-0.56	O	
1	OAT Probe	JPI	400510		0.05		O	
1	Oil Temp Probe	JPI	400500-L		0.05	-0.22	O	
1	Manifold Press. Probe	JPI	604010		0.05	1.55	O	
1	RPM Probe	JPI	420809		0.05	-0.11	O	
1	Fuel Flow Transducer	Flowscan	201-B or FXT-201		0.09	-0.02	O	
		Shadin	680501 or 680600	FI4015	0.09	-0.02	A	
	Option Integrated Engine Instrument System							
1	Engine Instr. Display	Electronics Intern.	MVP-50P-EX-03	34393	0.91	1.55	O	O
1	Engine Instr. Display	Electronics Intern.	MVP-50P-EX-04	34394	0.91	1.55	A	O
1	Engine Data Converter	Electronics Intern.	EDC-33P	33283	0.45	0.42	O	O
1	Fuel Flow Transducer	Electronics Intern.	FT-60	33288	0.15	-0.57	O	O
6	EGT Probes	Electronics Intern.	P-110	33569	0.26	-0.72	O	O
6	CHT Probes	Electronics Intern.	P-100	33568	0.16	-0.72	O	O
1	Oil Temp Probe	Electronics Intern.	P-120	33289	0.07	-0.09	O	O
1	OAT Probe	Electronics Intern.	P-128	33290	0.02	0.77	O	O
1	Man. Press. Transducer	Electronics Intern.	PT-30ABS	33284	0.11	0.25	O	O
1	Oil Pressure Transducer	Electronics Intern.	PT-100GA	33286	0.05	0.05	O	O
1	Fuel Press. Transducer	Electronics Intern.	PT-30GA	33285	0.05	0.05	O	O
1	Resistive Fuel Level Mod.	Electronics Intern.	RFLM-4-12V	33109	0.20	0.31	O	O
	Exhaust (78)							
1	Exhaust System "6 in 1" (incl. silencer) with	Gomolzig	EA300-606000	33891	8.48	-0.39	R	O
1	2" inlet/outlet cooling shroud	Gomolzig	EA300-606009	32153				
1	Exhaust System "6 in 1" (incl. silencer) with	Gomolzig	EA300-606000	33891	8.48	-0.39	A	✓
1	3" inlet/outlet cooling shroud for heating system	Gomolzig	EA300-606024	03248				
	Oil System (79)							
1	Single Oil cooler rear	Aero Classics	6000353	31417	1.65	-0.22	R	✓
1	Single Oil cooler rear	Niagara Thermal Prod.	20009A	34674	1.65	-0.22	A	O
1	Additional Oil Cooler Sys.	Meggitt/Stewart Warner	8406R	00107	2.00	-0.80	O	O

QTY	ITEM	MANUFACT.	MODEL NO	PART OR P/N	WEIGHT (kg)	ARM (m)	R* A O	INST
1	Additional Oil Cooler Sys.	Niagara Thermal Prod.	20002A	34675	2.00	-0.80	A	O
1	Additional Oil Cooler Sys.	Aero Classics	8001602	34676	2.00	-0.80	A	O
1	Low Temperature Breather Line Kit	Extra	EA-83301	300 Option cold weather kit	0.20	-0.01	A	V
	Starting (80)							
1	Starter Flyweight	Sky-Tec	149-12LS	32865	3.74	-0.85	R	O
1	Starter High-Torque inline	Sky-Tec	149-12NL	30552	4.26	-0.85	A	V
1	Starter Engaged Light	OAK	MS25041-4	31732	0.02	1.63	O	O
	Ground Equipment							
1	Batt. Charger Cable	Extra	Assy	03543			O	V
1	External Power Cable	Extra	Assy	31730			O	O
1	Smoke Filling Hose	Extra	Assy	86100.000-24			O	V

SECTION 7

DESCPRIPTION & OPERATION OF AIRCRAFT AND SYSTEMS

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SECTION 7

DESCPRIPTION AND OPERATION OF AIRCRAFT AND SYSTEMS

7.1 THE AIRCRAFT

The aircraft EXTRA 330LX is designed and developed by EXTRA Flugzeugproduktions- und Vertriebs- GmbH, Flugplatz Dinslaken, 46569 Hünxe, Federal Republic of Germany, in accordance with the U.S. Federal Aviation Regulations, part 23, categories normal and acrobatic to fullfill the primary flight training, normal operation rules and acrobatic training up to the unlimited acrobatic level.

EXTRA 330LX is a light weight, robust, single piston-engined, two-seat aircraft with a fuselage structure in tig-welded steel-tube construction.

The landing gear, wing, and tail are made of epoxy, reinforced with glass- and carbonfiber. The items are qualified up to 72°C (161,6°F). Not to exceed this temperature limit an appropriate colour specification for composite structure is given by the manufacturer document EA-03205.19.

To check the temperature inside the cockpit (potential "green house" effect) one of two possible reversible temperature indicators (STRUCTURAL OVERHEAT INDICATOR, refer to Section 2.11.1) is applied on the left side of the wing main spar rear web in the carry-through section.
On the first one the word "RISK" appears after reaching the temperature limit and flying is prohibited.
On the second one the indication spot changes from green to amber above 50°C and from amber to red above 70°C. While indication spot is red flying is prohibited.
When the structure cools down below the temperature limit the word "RISK" disappears or the indication spot turns to amber or green respectively and you may go on with the preflight checklist.

The standard aircraft is designed to operate within a range of ambient air temperature from -20°C to +44°C (-4°F to 111°F) at sea level. It is possible to start the engine using the aircraft battery at -20°C (-4°F) without preheating. Below -10°C (+14°F) OAT a special oil breather line must be adapted (available as kit).

7.2 FUSELAGE

The fuselage structure consists of a steel tube construction integrating the wing and empennage connections as well as the seats. The fuselage except the rear lower part, is faired with an aramid/carbon laminate shell. Within the exhaust area stainless steel sheet metal is used. The upper fuselage body surface is one part from firewall to vertical stabilizer including the correlated canopy frame. Only the lower rear part of the fuselage is covered with Ceconite® 102.
The canopy frame itself is constructed by carbon laminate. The canopy is one part, opens to the right and is held in the open position by a belt. Emergency jettisonning is achieved by simply unlatching the canopy. For additional pilot protection a roll bar is installed behind the rear pilots seat.

7.3 WING

The wing is a CRP construction. The dual chamber main spar - being a fail safe design - consists of carbon roving caps combined with CRP webs. Core foam is a PVC foam. The wing shell is built by a Honeycomb sandwich with CRP laminates. Wing box ribs are made of carbon fiber composite with honeycomb core. The ribs in the nose section are made of wood. The connection to the fuselage is arranged by two bolts piercing through the spar parallel to the centerline of the fuselage and two brackets at the rear spars.
The ailerons are supported at four points in spherical bearings. In addition the aileron tip has a shielded horn balance.
The hinge line of the ailerons is positioned 25% of the aileron chord. Furthermore the ailerons are equipped with "spades" to decrease pilot's forces. The aileron control push-pull rods are connected to the aileron at the second bearing point (in span-wise direction). To prevent flutter the ailerons are mass balanced at the leading edge of the shielded horn.

7.4 EMPENNAGE

The EXTRA 330LX possesses a cruziform empennage with stabilizers and moveable control surfaces. The rudder is balanced aerodynamically at the tip. Spars consist of PVC foam cores, CRP caps and CRP laminates. The shell is built using honeycomb sandwich with CRP laminates.
Deviating from the other control surfaces the spar webs of the surfaces of the elevator is built by CRP. On the R/H elevator half a trim tab is fitted with two hinges. The control surfaces are mounted in spherical bearings (exception: trim tab). To prevent flutter rudder and elevator are mass balanced. The balance weight for the rudder is installed in the nose of the rudder horn while the balance weights for the elevator are mounted near the outside elevator tips and in the center position.

7.5 FLIGHT CONTROL SYSTEM

7.5.1 PRIMARY CONTROL SYSTEM

The EXTRA 330LX is standard equipped with full dual primary flight controls including front and rear sticks and adjustable rudder pedals. The primary control surfaces are operated through a direct mechanical linkage.

7.5.2 LONGITUDINAL FLIGHT CONTROL SYSTEM

Front and rear sticks are interconnected by a push rod inside the torque tube. From there the control movements are transferred to the elevator by two additional push rods.

7.5.3 LATERAL FLIGHT CONTROL SYSTEM

Push and pull rods are connected by sealed ball bearings from the torque tube to the ailerons.

The ailerons are statically as well as dynamically balanced (dynamically with spades).

The ailerons are supported by lubricated, sealed bearings.

7.5.4 DIRECTIONAL FLIGHT CONTROL SYSTEM

The dual rudder pedals with brake pedals are electric adjustable and operate the rudder through a cable system. Springs keep the cables under tension when they are not operated.

7.5.5 SECONDARY CONTROL

The elevator trim tab is actuated by an electric trim servo located in the right rear fuselage. It is controlled by a trim switch integrated in the control stick handle or in the instrument panel. Trim position is indicated by a LED indicator on the instrument panel.

7.6 INSTRUMENTATION

The Extra 330LX is equipped with flight instruments in both cockpits.

Instruments and placards can be provided with markings in either metric or English units. The colour markings in instruments follow US-FAR, part 23 recommendation (see section 2).

7.6.1 INSTRUMENT PANEL (REAR COCKPIT)

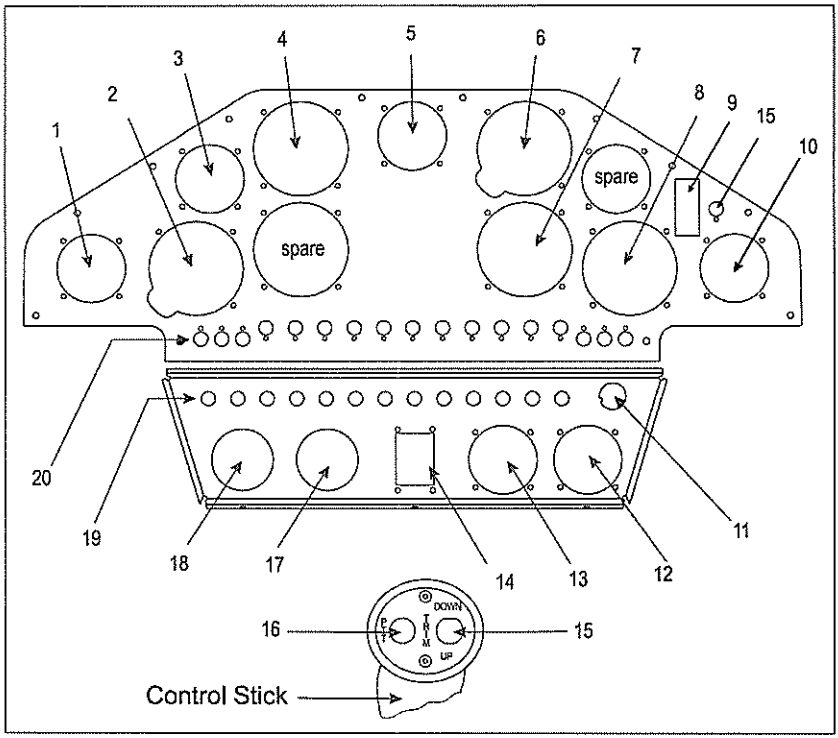

Figure 1, Instrument Panel

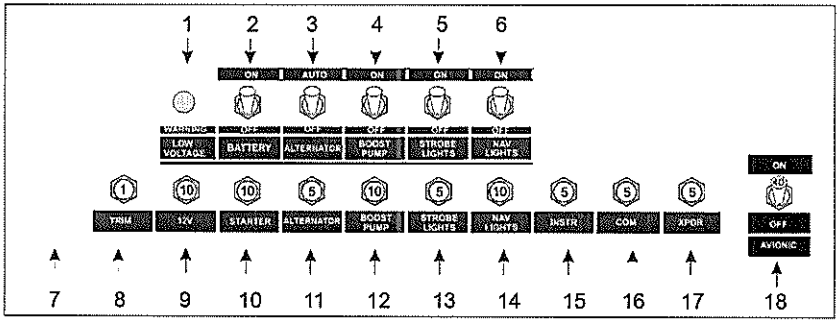

Figure 2, Switches, Circuit Breaker

Position Fig. 1	Item
1	COM
2	G-meter
3	Volt/Amperemeter
4	Airspeed indicator
5	Magn. direction indicator
6	Altimeter
7	Manifold pressure / fuel flow
8	RPM Indicator
9	Trim position indicator
10	Transponder
11	Magneto selector switch and starter
12	Oil pressure / oil temperature
13	EGT / CHT
14	Fuel quantity center tank
15	Trim switch (different positions possible)
16	PTT switch
17	Fuel quantity center tank
18	Fuel quantity wing tank
19	Circuit breaker
20	Switches

Position Fig. 2	Item
1	Alternator warning light incl. press-to-test feature
2	Battery switch (red cap)
3	Alternator switch (red cap)
4	Boost pump switch
5	Strobe lights switch
6	NAV lights switch
7	Reserved
8	Trim circuit breaker
9	12 V circuit breaker
10	Starter circuit breaker
11	Alternator circuit breaker
12	Boost pump circuit breaker
13	Strobe lights circuit breaker
14	NAV lights circuit breaker
15	Instruments circuit breaker
16	COM circuit breaker
17	Transponder circuit breaker
18	Avionic switch/circuitbreaker

NOTE

This list may be modified by the minimum equipment requirements of individual certifying authorities!

7.6.2 INSTRUMENT PANEL (FRONT COCKPIT)

Normally the instument panel in the front cockpit is only equipped with:
- Airspeed indicator
- Altimeter indicator.

7.7 LANDING GEAR

The landing gear is a composite construction with a multichamber fiberglass spring in a tail-wheel design.
The main wheels have a size of 5-5.50 and they are equipped with hydraulic disc brakes.
To reduce aerodynamic drag carbonfiber wheel fairings are installed. They feature a submerged air intake for brake disc cooling and a small hatch to reach the valve of the wheel tube for inflation.

The tail wheel has a solid rubber tire with full-swivel capability.

7.8 SEATS, SEAT BELTS

The seats are ergonomically shaped composite designs. The rear seat angle can be adjusted on the ground with 2 quickpins, there are different seat angle possibilities. The back rest is also adjustable on the ground in different positions and angle. The rear pedal-to-seat distance can be varied in different positions. In the front cockpit there is no possibility to adjust either the pedals nor the seat. The seat belt assembly consists of a left and a right shoulder strap, two left and two right lap belts and a negative-g-strap. All belts are adjustable. As each lap belt features a single point release, they are redundant for safety during aerobatic maneuvers. If one release is opened unintentionally, the second one guarantees full safety. For safe operation the releases are arranged in a way that one has to be closed to the right side, the other one to the left. During acrobatic maneuvers the seat belt system should be tightened firmly.

7.9 CANOPY

The canopy is manufactured in one section and can be manually operated by interior locking handles located on the left side on the canopy.
To open the canopy from inside proceed as follows:
Pull together the interior locking handles of the front or rear seat and lift canopy to the right. The canopy strap will limit the opening angle.
To lock the canopy pull together the interior locking handles and then release.
To open the canopy from the outside use the aft interior handles by reaching through the small window (bad weather window) and proceed as mentioned above.
Generally the emergency operation is equal to the normal procedure. When opening the canopy in normal flight the low pressure over the canopy will flip the canopy fully open immediately. However complete jettison of the canopy is possible. In this case the canopy can be finally unlatched at its RH hinge line by the following action:
push canopy slightly forward while opening.

7.10 POWER PLANT

7.10.1 ENGINE

The power plant consists of one Textron-Lycoming six-cylinder, horizontally opposed, aircooled, direct drive, fuel injection engine type with inverted oil system.

The AEIO-580-B1A engine is characterized by the following performance data:
- Rated power at 2700 RPM: 315 HP (234.9 kW).
- Rated power at 2600 RPM: 303 HP (225.9 kW).
- Rated power at 2400 RPM: 286 HP (213.3 kW).

The engine is equipped on the left side with a retard type magneto. This magneto has a retard breaker providing a fixed retard and long duration boosted spark for starting. A Slick Start System completes the installation.
For the present TBO refer to latest issue of Textron - Lycoming SERVICE LETTER No. L 201.

The AEIO-580-B1A engine is equipped with special antivibration counterweights.

The following accessories are included in the power plant installation:
- Fuel Injector:
- Magnetos/Start System:
- Alternator:
- Starter:
- Fuel pump:
- Shielded ignition system
- Propeller governor drive

The engine is operated with the following manual controls:
- Throttle control, dual
- RPM control
- Fuel mixture control

The starter/magneto switch is located on the right side of the instrument panel in front of the rear seat.
The propeller governor monitors the RPM automatically and prevents overspeeding. In the event that oil pressure is lost the propeller is automatically adjusted to coarse pitch in order to avoid overspeeding.
The use of 100/130 aviation grade fuel (AVGAS 100) is the minimum grade recommended by the manufacturer of the AEIO-580-B1A engine.
For continuous operation 115/145 aviation fuel is the maximum grade.

7.10.2 OIL SYSTEM

The oil is cooled by a Single Cooler System. The oil cooler is mounted on the aft, right hand side of the engine. The oil level is determined by a dip-stick.

A thermostatic valve is fitted upstream of the oil cooler. This valve ensures a quick warm-up of the oil after engine start.

For oil capacities, temperatures and grades refer to Section 1.7.

7.10.3 ENGINE INSTALLATION

The engine is supported by four shock mounts (type BARRY CONTROLS), to the tig-welded steel tube engine mount which is attached to the fuselage with four bolts on the firewall axis. The engine cowling is divided into two parts, a lower and an upper part both made of glass-fibre/carbonfibre reinforced epoxy. The parts are fixed by a number of screws and the upper cowling has a separate hatch for easy access to the oil dip-stick.

7.10.4 PROPELLER

The standard propeller is a 3-blade wood composite, constant speed MTV-9-B-C/C 198-25 type propeller having a diameter of 1.98 m (77.95 in).
Alternatively a 4-blade constant speed MTV-14-B-C/C190-130 propeller can be installed. This propeller has a diameter of 1.90 m (74.8 in).

7.10.5 THROTTLE

Dual control mounted on the left side of the cockpit.

7.10.6 MIXTURE

Vernier-control located at the left side of the rear cockpit (red knob).

7.10.7 RPM-CONTROL

Vernier-control on the left side of the rear cockpit.
Preselection of RPM possible due to constant speed governor (blue knob).

7.10.8 FUEL SELECTOR VALVE

Dual control. A rotary fuel selector valve is mounted behind the firewall on the right side of the fuselage. A torque tube connects the valve to both cockpit handles. Pull and turn the handle 90° to open the valve to the Acro & Center Tank. A further 90° turn switches to the Wing Tank fuel supply.

Position down = CLOSED
Position left = ACRO & CENTER TANK
Position up = WING TANK

7.10.9 EXHAUST SYSTEM

A complete Gomolzig 6 in 1 System with integrated silencer is installed on the 330LX.

7.11 FUEL SYSTEM

The fuel system (refer to Figure 3) consists of two separate, independent tanks:
- Acro & center tank in the fuselage
- Wing tank (LH and RH)

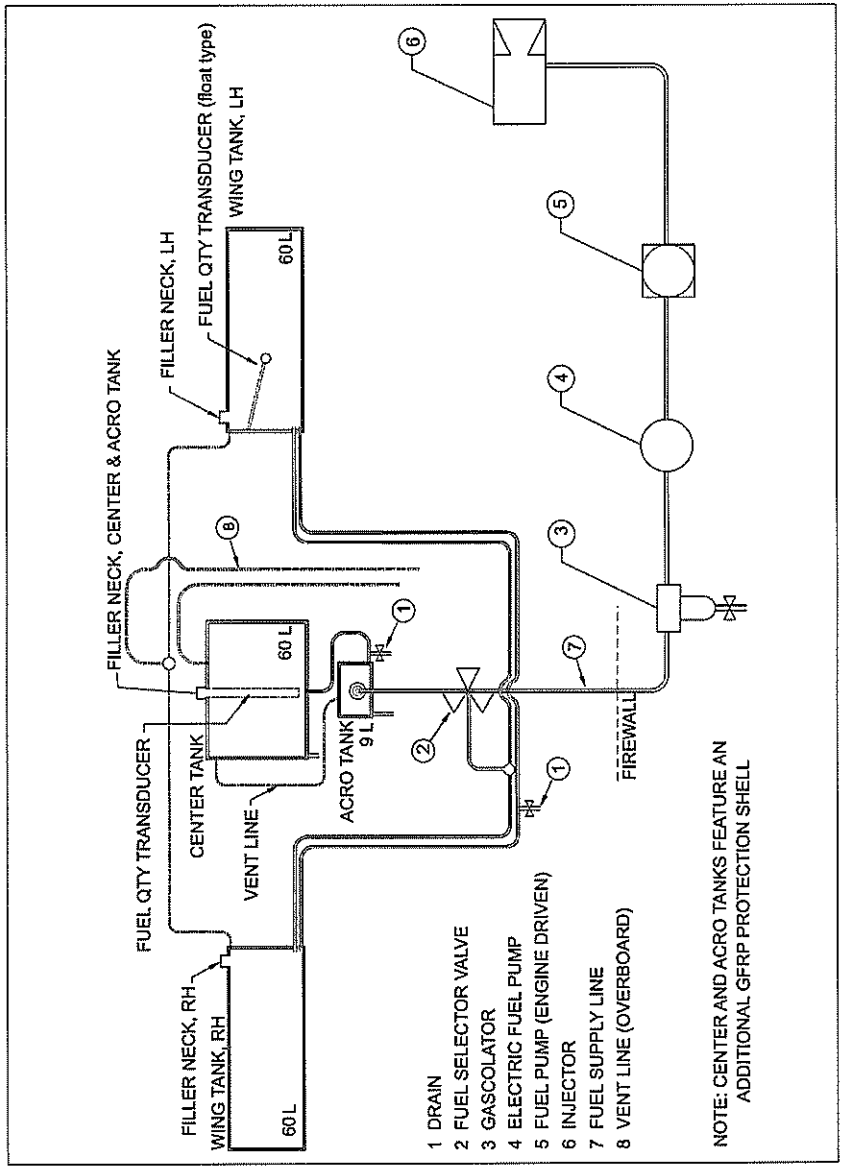

Figure 3, Fuel System

Wing Tank:
The root section of each wing - in front of main spars forms an integral fuel tank providing two interconnected tanks with 120 liters (31,7 US GAL.) total capacity. Each side of the wing has a 2" diameter filler cap for gravity refueling. The wing tank can be completely emptied in flight.

Acro & Center Tank:
An Acro tank 9 liters (2,3 US Gal.) is mounted in the fuselage just behind the firewall and the Center tank 60 liters (15.9 US Gal.) in front of the main spar of the wing. The Acro tank is connected with the center tank in a gravity feed system. The center tank has a 2" diameter filler cap for gravity refueling. Unusable fuel is 2 liters (0.5 US Gal.).

Adequate venting is provided in each tank to a main ventilation-tube, ending outside the fuselage at the right side.
In addition to the engine driven fuelpump an electrically driven auxiliary fuel pump (boost pump) with by-pass and having sufficient capacity to feed the engine at take-off power is fitted as a safety device against failure of the engine-driven pump. The boost pump switch is located on the instrument panel.
A fuel filter with drain is installed between the fuel selector valve and the boost pump.
Separate drains are located at the lowest point of each tank system.
Normal float type transducers and electrically operated fuel indicators are used.

7.12 ELECTRICAL SYSTEM

The electrical system (refer to Figure 4) is supplied by a 12 V alternator with integrated rectifier, transistor voltage regulator. The alternator is mounted on and belt-driven by the engine.

The field current is controlled by the voltage regulator to nominal 14.5 V under all load conditions. The ALTERNATOR switch is located on the rear instrument panel.

Circuit protection against overvoltage is provided by the voltage regulator.

Depending on the alternator installed the maximum alternator output varies from 55 to 65 A. Refer to the Equipment List in Section 6 for identification of alternator installed.

A 12 V leak proof battery is connected across the alternator output to stabilize the supply and to maintain all essential services in the event of an alternator failure and when the engine is not operating. The battery is mounted behind the firewall. The BATTERY switch is located on the rear instrument panel.

All electrical circuits are protected by circuit breakers located on the rear instrument panel and they are easily accessible to the pilot during flight.

The electrical system features adequate noise suppression to ensure satisfactory operation of the radio equipment.

All wires, switches, circuit breakers etc. are manufactured to related aeronautical specifications.

7.13 CABIN ENVIRONMENT CONTROL

A ventilation system in the canopy on the left side is provided for the supply of fresh air to the cabin. Left and right at the rear seat are eyeball-type adjustable vents.

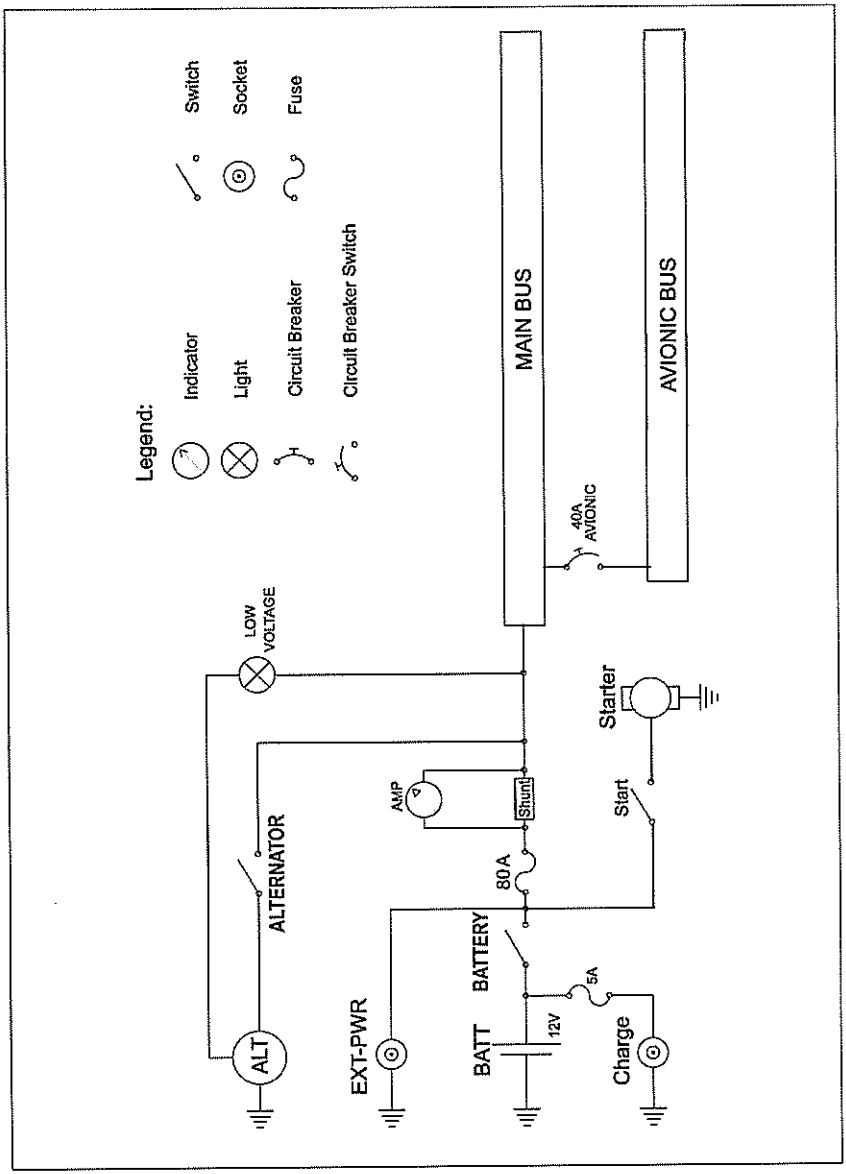

Figure 4, Electrical System

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SECTION 8

HANDLING, SERVICING & MAINTENANCE

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SECTION 8

HANDLING, SERVICING AND MAINTENANCE

8.1 INTRODUCTION

a) The airplane owner should establish contact with the dealer or certified service station for service and information.

b) All correspondence regarding the airplane must include its serial number which is stamped on a plate on the L/H rear part of the fuselage.

c) A service manual with revision service may be procured from the manufacturer.

8.2 AIRPLANE INSPECTION PERIODS

As required by national operating rules all airplanes must pass a complete annual inspection every twelve calendar months. In addition to the annual inspection airplanes must pass a complete inspection after every 100 flights hours with a minor check after 50 hours.

The Airworthiness Authority may require other inspections by the issuance of airworthiness directives applicable to the aircraft, engine, propeller and components. The owner is responsible for compliance with all applicable airworthiness directives and periodical inspections.

8.3 PILOT CONDUCTED PREVENTIVE MAINTENANCE

Pilots operating the airplane should refer to the regulations of the country of certification for information of preventive maintenance that may be performed by pilots. All other maintenance required on the airplane is to be accomplished by appropriately licensed personnel. Airplane dealer should be contacted for further information

Preventive maintenance should be accomplished with the appropriate service manual.

8.4 ALTERATIONS OR REPAIR

Alterations or repairs of the airplane must be accomplished by licensed personel.

8.5 SERVICING

In addition to the airplane inspection periods (8.2) information for servicing the aircraft with proper oil and fuel is covered in Section 2 (Limitations) and Section 7 (Description and Operation).

8.6 GROUND HANDLING

a) Due to its low weight and the free swiveling tail wheel two persons can easily move the airplane by hand.

b) To tie down the airplane ring plates are provided at the wing tips. The tail wheel leg can be used as third point to tie down the airplane.
If the aircraft is parked in the open, it must be protected against the effects of weather, the degree of protection depending on severity of the weather conditions and the expected duration of the parking period. When the airplane is parked in good weather conditions for less than a half day park the aircraft headed into the wind and place wheel chocks at the main wheels.

c) To level the aircraft, the tail wheel is placed on a balance and jacked to such a position that the fuselage reference line (upper fuselage stringer tube) is horizontal. There are two engine hoists provided on the top of the engine which can be used to lift the airplane with a crane. (Tail wheel resting on ground)

SECTION 9

SUPPLEMENTS
Doc-No. EA-0E701.1

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923	☐	f.u.n.k.e. TRT800H Transponder	10 p.
924	☒	KANNAD 406 AF COMPACT/INTEGRA ELT	8 p.
925	☒	GARMIN G5	6 p.
926	☐	reserved	
927	☐	reserved	
928	☐	TRIG TY91 VHF Radio	8 p.
929	☐	TRIG TT21/22 Transponder	6 p.

x FAA APPROVED G3X

x EASA APPROVED G3X

EXTRA QM-078 JMA
17.07.24

9 SUPPLEMENTS

9.1 Introduction

Section 9 "Supplements" of the Pilot's Operating Handbook contains all information, necessary for a safe and efficient operation of the airplane when equipped with one or more of the various optional systems and equipment not provided with the standard airplane.

9.2 Notes

The described systems and equipment are certified by the EASA for the EXTRA 330LX. Pages and contents of this section must not be exchanged and alterations of or additions to the approved contents must not be made without the EXTRA Flugzeugproduktions- und Vertriebs-GmbH/EASA approval. The editor has the copyright of these Supplements and is responsible for edition of revisions. The log of effective pages is found on the preceding pages of this Pilot's Operating Handbook.

Each Supplement section (e.g. steerable tailwheel) covers only a single system, device, or piece of equipment and is a self-contained, miniature Pilot's Operating Handbook. The owner is responsible for incorporating prescribed amendments and should make notes about these on the records of amendments. It is responsibility of the pilot to be familiar with the contents of relevant supplements.

POH Supplements must be in the airplane for flight operations when the subject equipment is installed or special operations are to be performed.

The Table of Contents shows all EXTRA Supplements available for the EXTRA 330LX. A check mark in the *Section* column indicates that the corresponding supplement must be included in this POH.

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SECTION 901

STEERABLE TAIL WHEEL

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901 STEERABLE TAIL WHEEL

901.1 GENERAL

To improve taxi and handling quality, the EXTRA 330LX can be equipped with an optional steerable tailwheel. The deflection angle of this tailwheel is arranged by the rudder control up to plus/minus 30°. Exceeding this deflection the tailwheel has a full-swivel capability by a release mechanism.

901.2 LIMITATION

The operation limitations are not effected due to the use of the steerable tailwheel.

901.3 EMERGENCY PROCEDURES

There is no change of basic emergency procedures with the installation of the steerable tailwheel.

901.4 NORMAL PROCEDURES

There are no changes for the described normal procedures after installation of the steerable tailwheel. In addition to the existing normal procedures the light precompression of connector springs and movement of the rudder have to be checked during the preflight check.

901.5 PERFORMANCE

Changes in flight performance due to installation of the steerable tailwheel are not noticeable. The given basic performance data under section 5 are still valid.

901.6 WEIGHT AND BALANCE

A change of the running empty weight and resulting C/G position after installation of the steerable tailwheel is neglectable, because of minor differences in weight and C/G between standard and optional steerable tailwheel.

901.7 DESCRIPTION OF THE SYSTEM

The 5 inch tailwheel has a solid rubber tire and is rotatable by means of a wheelfork, which is connected to a bearing steelsleeve. This steelsleeve itself contains also the release mechanic, which gives the wheelfork a full-swivel capability exceeding plus/minus 30° deflection. The steelsleeve is glued into the glasfiberspring, which is bolted to the tail hardpoint of the aircraft. The steering of the tailwheel is accomplished by a direct mechanic link (rudder control cable) from the rudder pedals. The steering deflection of the tailwheel is controlled by the rudder movement and dampened by anti shimmy connector springs.

901.8 HANDLING, SERVICING AND MAINTENANCE

During 50 hour inspection, the bearing steel sleeve has to be lubricated on the point of lubricating. Additionally all parts of the tailwheel have to be inspected visually for deformations, cracks and corrosion.

SECTION 902

ELECTRIC PEDAL ADJUSTMENT

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902 ELECTRIC PEDAL ADJUSTMENT

902.1 GENERAL

To improve seat and control convenience, the EXTRA 330LX is equipped with an electric pedal adjustment system. The pedal adjustment system provides an in-flight capability to adjust the pedals according the pilots size and operation. For example a more relaxed, stretched seating position for long cross-country flights is possible.

902.2 LIMITATIONS

An adjustment of the pedal position during takeoff and landing is not allowed. It is recommended not to adjust the pedals when radio transmissions are made or when the magnetic direction indicator is used.

902.3 EMERGENCY PROCEDURES

Pedal Run-away

Pedal switch	USE in reverse direction of run-away
if no effect: PEDALS Circuit Breaker	PULL

902.4 NORMAL PROCEDURES

On ground:

Rudder pedals	ADJUST position using the pedal switches CHECK full control inputs rudder and aileron CHECK full rudder deflection while braking

In flight:

Rudder pedals	ADJUST position using the pedal switches CHECK heels reach the pedal swivel axes and aileron control rods are free

902.5 PERFORMANCE

Not affected.

902.6 WEIGHT AND BALANCE

Not affected.

902.7 DESCRIPTION OF THE SYSTEM

The electrical pedal adjustment system consists of a foot rest and the rudder pedal itself, including brake pedal and brake cylinder. An S-shaped cable leader is attached to the rudder pedal, through which the control cable runs from the rudder actuator arm to the front cable attachment at the steel frame. The connection to the front seat pedals is realized by a further cable, which is fixed to the control cable by two Nicopress oval sleeves. The stepless pedal adjustment is realized by electromechanical actuators which are controlled separately by switches on the rear instrument panel (refer to Figure 1 below). The total travel of the system is limited to 160 mm (6.3") by a front and a rear stop switch at the slide tube attachment. A full travel from the most rearward to the most forward position takes approximately 10 sec.

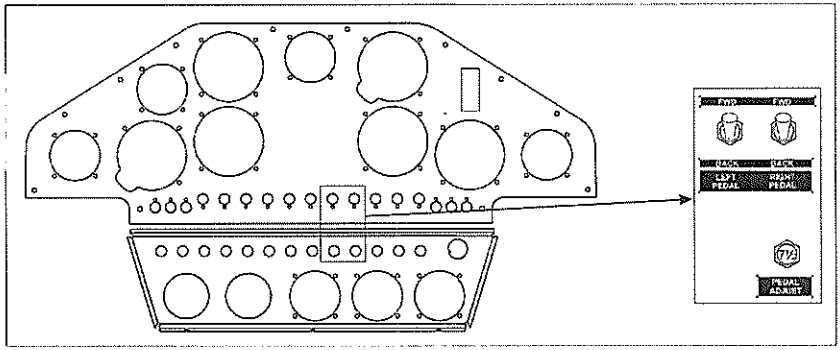

Figure 1, Switch/Circuit Breaker Location

902.8 HANDLING, SERVICING AND MAINTENANCE

Not affected.

SECTION 903

CABIN HEATING SYSTEM

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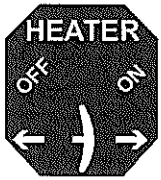
903.1 GENERAL

The 330LX can be equipped with a cabin heating system, which allows feeding the front and rear cockpit independently with warm air. The system uses fresh outside air, which is heated up by the engine exhaust muffler. The system is controlled by two handles in the rear cockpit.

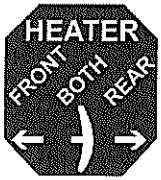
903.2 LIMITATIONS

The operation limitations are not affected due to the installation of the cabin heat system.

The following operation placards have to be attached to the aircraft:



(next to the main handle)



(next to the distribution handle)

903.3 EMERGENCY PROCEDURES

Engine fire:

Heater OFF

903.4 NORMAL PROCEDURES

Not affected.

903.5 PERFORMANCE

Not affected.

903.6 WEIGHT & CENTER OF GRAVITY

Refer to the equipment list in Section 6 of this Handbook.

903.7 SYSTEM DESCRIPTION

On the left front engine baffle a 3" air intake (1, figure 1) with screen is positioned. From there fresh air is routed through a 3" ducting (2) to the exhaust muffler heat shroud (3), where it is heated up. A selector box (4) is placed on the engine side of the firewall. Using the main handle (9) the warm air can there be guided into the cockpit or dumped overboard. A further selector box (5) is located on the aft side of the firewall. Using the distribution handle (8) the ratio of warm air supply between front and rear can be controlled there. The rear selector box incorporates the warm air dispensers for the front occupant as well as the flange for the 2" ducting (6) to the air outlets (7) at the pilot's feet.

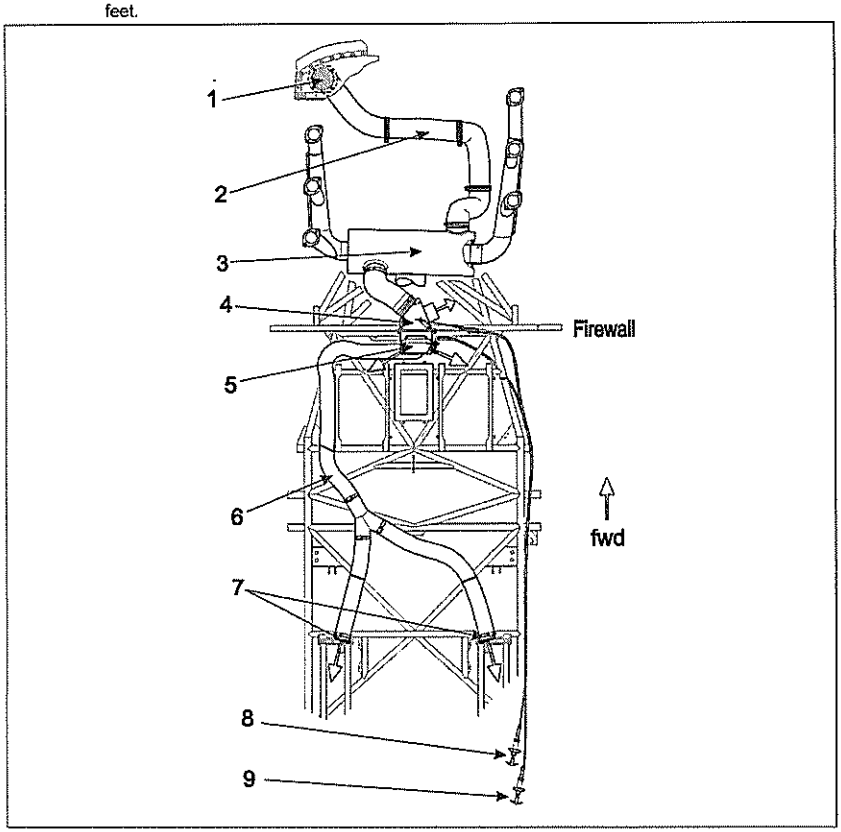


Figure 1

903.8 HANDLING, SERVICING AND MAINTENANCE

Not affected.

SECTION 907

SMOKE SYSTEM

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907 SMOKE SYSTEM

907.1 GENERAL

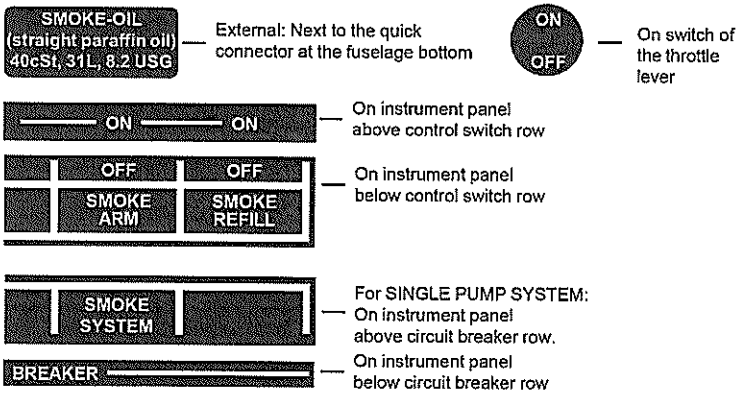
For performing at airshows, the EXTRA 330LX may optionally be equipped with a smoke system.

907.2 LIMITATIONS

For safe operation of the smoke system the following limitations have to be considered:

1) The **load factor** and **"MTOW"** are limited to:
   +8g/-8g at 870kg (ACRO II, limited to single seat operation), and
   +6g/-6g at 950kg (ACRO III)
2) **Specification** of the smoke oil: straight paraffin oil, viscosity 30-50 cSt at 20°C (68°F), initial boiling point >330°C (626°F)
   For example: *Fauth FC05, Texaco Canopus 13* or equivalent
3) Local **airfield** and **weather conditions** have to be considered:
   For the prevention of a fire alarm, inform the flight control before you activate the smoke system
4) Recommended **Manifold pressure**: min. 20" Hg
5) The activation of the smoke system **on ground is only allowable for a brief system test.**
6) Wearing a parachute is strongly recommended.

Operating Markings & Placards:



907.3 EMERGENCY PROCEDURES

FAILURE OF THE SMOKE-SYSTEM

1. Switch "SMOKE ARM" and "SMOKE REFILL": OFF
2. Circuit breaker PULL

FIRE IN FLIGHT

1. Switch "SMOKE ARM"	OFF

If the fire (after the smoke system is shut off) will not extinguish proceed as follows:

2. Mixture	IDLE CUT OFF
3. Fuel selector valve	OFF (Pull & Turn)
4. Battery switch	OFF
5. Airspeed	100 KIAS (185 km/h) find your airspeed/attitude that will keep the fire away from the cockpit
6. Land	*AS SOON AS POSSIBLE*
7. If fire persists or aircraft is uncontrollable and wearing a parachute	BAIL OUT

SMOKE IN THE COCKPIT

1. Switch "SMOKE ARM"	OFF
2. Bad weather window	OPEN
3. Ventilation	OPEN
4. If smoke persists in the cockpit, land	*AS SOON AS PRACTICAL*

907.4 NORMAL PROCEDURES

The smoke system includes features for refilling the smoke tanks and smoke generation:

A) REFILL

A separate refill hose is delivered with the smoke system which has to be used for filling the smoke oil tanks from the paraffin oil supply cansister or barrel.

1. Refill hose	CONNECT hose nipple to quick connector at the fuselage bottom; IMMERSE the other end into the paraffin oil in the canister/barrel
2. Switch "SMOKE REFILL"	ON

NOTE

The refilling should start within max. 30 sec. If this is not the case, the refill lines, fittings and filter (if installed) have to be checked for soiling or leaks. Refilling procedure can be supported by reducing the suction height e.g. lifting the canister. The fully filled status is sensed by the floating device which automatically switches the refilling off.

After automatic refill shut-off :

3. Switch "SMOKE REFILL"	OFF
4. Refill hose	DISCONNECT

NOTE

A shut-off failure of the refill process can be recognized by smoke oil spilling out of the vent line. In this case, turn off refill switch. The floating device switch in the main smoke oil tank has to be checked accordingly.

B) SMOKE GENERATION

1. Bad weather window and ventilation	CLOSE
2. "SMOKE ARM" Switch	ON
3. Manifold Pressure	minimum 20" Hg
4. Switch in the throttle lever for smoke generation	ON - OFF

⚠ CAUTION

Smoke might enter the cockpit via the air vents during reverse maneuvers (for example tail slide).
It is recommended to operate the smoke system only in forward flight.

907.5 PERFORMANCE

Not affected.

907.6 WEIGHT AND BALANCE

Capacity		Mass		Moment	
Litre	US gal	Kg	lbs	Kgcm	in-lbs
5	1.3	4.3	9.4	119	103
10	2.7	8.5	18.7	214	186
15	4	12.8	28.1	367	319
20	5.3	17	37.5	495	430
25	6.6	21.3	46.9	622	541
31	8.2	26.4	58.2	775	674

Specific Weight of the paraffin oil = 0.85 kg/Litre

NOTE

The smoke system does not feature a capacity dipstick. In the case of unknown filling, the smoke oil tanks should be drained and refilled with a known quantity. If this is not possible, the most adverse case has to be taken for CG calculation. (This may be either completely full or completely empty tanks).

907.7 DESCRIPTION OF THE SYSTEM

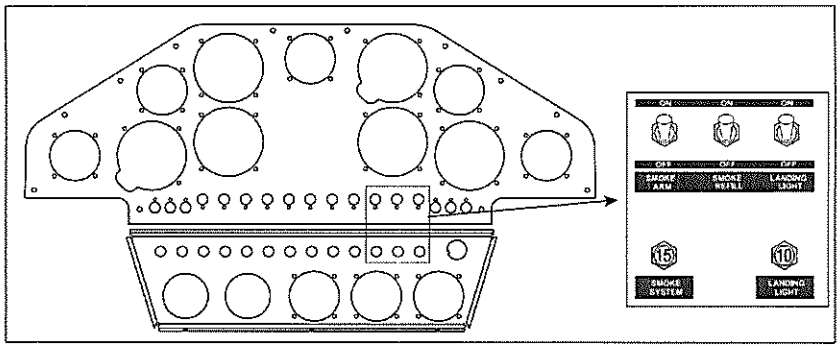
On pilot's demand the smoke system produces a trail of smoke by injection of smoke oil (straight paraffin oil) into the engine exhaust. The smoke oil is vaporised by the exhaust gas heat and is visible as dense smoke after leaving the exhaust.
For smoke system activation the "SMOKE ARM" switch located on the pilot instrument panel needs to be switched ON first. The smoke „ON-OFF" toggle switch is located on top of the

throttle lever. For filling the smoke oil tanks the "SMOKE REFILL" switch needs to be ON. After the refill process is completed the "SMOKE REFILL" has to switched OFF. When both switches ("SMOKE ARM" and "SMOKE REFILL") are in the ON position, the smoke system is not energized and will not run.

A pump (reversed polarity) fills the floptube smoke oil tank through a quick connector located in the aircraft belly fairing. This line includes a filter to prevent dirt to enter the smoke system. The separate main smoke oil tank is finally filled through the interconnected floptube smoke oil tank. Filled tanks are detected by a float switch placed in the main smoke oil tank which shuts the pump off. The same pump (normal polarity) injects the smoke oil from the floptube smoke oil tank through an overpressure/check valve and the injector nozzle into the hot exhaust gas to generate smoke.

The system consists of:

- Main smoke oil tank with float switch
- Floptube smoke oil tank
- Refill/Injection pump in the pilot compartment with quick connector in the belly fairing
- Overpressure/check valve in the smoke oil supply line to the nozzle
- Filter element in the refill line
- ON-OFF switch on the throttle lever
- Two relais (changeover contact type) for pump control
- "SMOKE ARM" switch to arm the system and "SMOKE REFILL" switch for refilling placed at the instrument-panel
- Only 1 circuit breaker for pump and control placed at the instrument-panel



907.6 HANDLING, SERVICING AND MAINTENANCE

At every refilling:

- Check automatic shut-off

Additionally during the 100h Check

- Check the system for leakage (lines, fittings, tanks)
- Check the smoke oil tanks for proper attachment
- Clean the overpressure/check valve: if required, remove oil residue
- Clean the injector nozzle: if required, remove carbon debris
- Clean the filter element

After each flight with activated Smoke System

- Clean the aircraft belly fairing and the rudder cables from smoke oil contamination

NOTE

The rudder cables might suffer from increased wear, when they are covered with smoke oil and dust.

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SECTION 919

LANDING LIGHT

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919 LANDING LIGHT

919.1 GENERAL

To improve the visibility of the aircraft during landing approach a landing light can be integrated in the RH lower cowling.

919.2 LIMITATION

No change.

919.3 EMERGENCY PROCEDURES

No change.

919.4 NORMAL PROCEDURES

No change.

919.5 PERFORMANCE

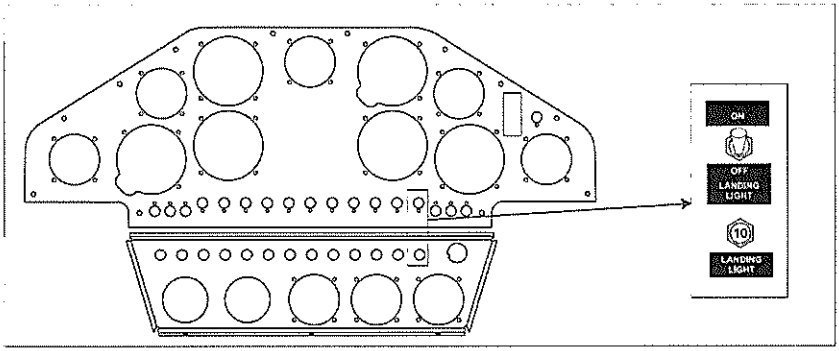
No change.

919.6 WEIGHT AND BALANCE

Refer to the Equipment List in section 6 of this Handbook.

919.7 DESCRIPTION OF THE SYSTEM

The landing light is controlled by the LANDING LIGHT switch on the right instrument panel. The system is protected by the LANDING LIGHT circuit breaker.



919.8 HANDLING, SERVICING AND MAINTENANCE

No change.

SECTION 922

GARMIN GTN 635(Xi)/650(Xi)/750(Xi)

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NOTE

This POH Supplement is written for older GTN software versions.

The GTN Xi application software version 20.00 was based on GTN software version 6.70.

The current GTN Xi application software version is 20.20.

Some differences in operation may be observed when comparing the information in the existing POH Supplement to later software versions. For the GTN Xi units, please refer to the following manual that was supplied with your unit:

Pilot's Guide GTN Xi Series – v20.20, P/N 190-02327-03, Rev. D, 01 July 2021

922.1 GENERAL

This Airplane Flight Manual Supplement (AFMS) is written for the Garmin GTN 635/650/750 units. The Garmin GTN 635 is a GPS (WAAS/SBAS capable) panel-mounted unit that includes an airborne VHF communications transceiver. The GTN 650 & 750 units include all of the features of the GTN 635 in addition to airborn VOR/localizer (LOC) and glideslope (G/S) receivers. The GTN 750 features a larger display.

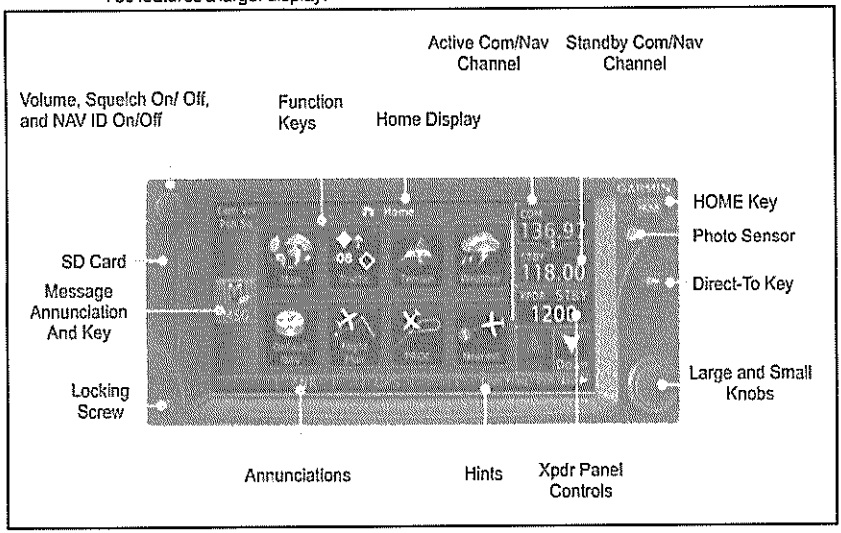

Figure 1, GTN 6xx Display Layout

All GTN units can be used to control the remote transponder GTX 33. The GTN 650 & 750 also feature NAV functionality. Additionally, the GTN 750 can be used to display Charts and to control the optional GMA 35 remote audio panel.

This supplement is written for main software version 2.00, GPS software version 4.0, COM software version 2.01 and NAV software version 6.01 and is not suitable for earlier software versions. Some differences in operation may be observed when comparing the information in this supplement to later software versions. Verify the information herein with the GTN Series Pilot's Guide & Cockpit Reference Guide (GTN 6xx P/N 190-01004-03 Issue B & P/N 190-01004-04 Issue C, GTN 750 P/N 190-01007-03 Issue B & P/N 190-01007-04 Issue B) you received with your unit. There you will also find further information.

922.2 LIMITATIONS

This supplement does not grant approval for IFR operations.

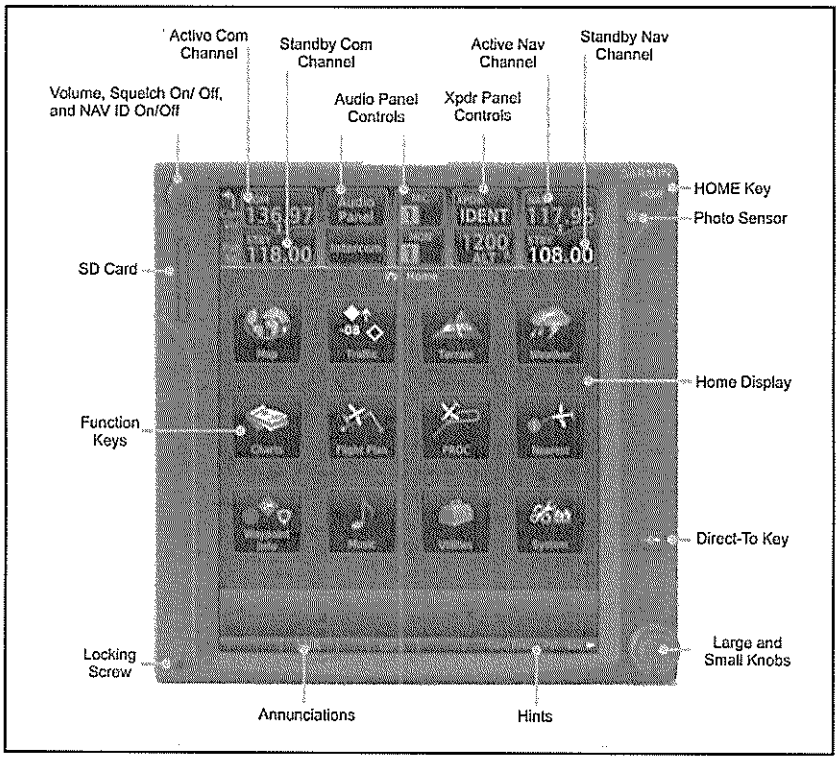

Figure 2, GTN 750 Display Layout

The system must utilize main software version 2.00, GPS software version 4.0, COM software version 2.01 and NAV software version 6.01 or later EASA/FAA approved versions. Valid and compatible databases must be installed and contain current data.

The navigation data incl. for final approach segments provided by the GTN series (e.g. moving map & CDI depiction) is for situational awareness only and should not be relied upon for navigation.

Do not use SafeTaxi or ChartView functions as the basis for ground maneuvering. SafeTaxi and ChartView are to be used for the pilot to orient himself on the airport surface to improve situational awareness during ground operation.

922.2.1 PLACARDS

(In close proximity to the GTN unit in clear view of the pilot)

(Next to the GTN unit GPS circuit breaker)

(Next to the GMA 35 Remote Audio Panel circuit breaker, if installed)

922.2.2 SD CARD

Proper function of any of the units is predicated on the SD card being present.

922.2.3 TERRAIN

Terrain proximity and obstacle information appears on the map and terrain display pages as red and yellow tiles or towers, and is depicted for advisory use only. Aircraft maneuvers and navigation must not be predicated upon the use of the terrain display. Terrain proximity and obstacle information is advisory only.

The terrain display is intended to serve as a situational awareness tool only. By itself, it may not provide either the accuracy or the fidelity on which to base decisions and plan maneuvers to avoid terrain or obstacles.

922.2.4 TRAFFIC (TIS ONLY)

Traffic may be displayed on the GTN when connected to an approved optional TIS traffic device. This system is capable of providing traffic monitoring and alerting to the pilot. Traffic shown on the display may or may not have traffic alerting available. The display of traffic is an aid to visual acquisition and may not be utilized solely for aircraft maneuvering.

922.2.5 FLIGHT PLANNING/CALCULATION FUNCTIONS

When using the calculator/planner pages data must be entered into all data fields and verified by the pilot prior to use of the data. The pilot must verify the desired altitude and appropriate barometric pressure setting to ensure valid calculations. Aircraft performance or fuel loading must not be predicated upon the use of data derived from these functions.

922.2.6 GLOVE USE

No device may be used to cover fingers used to operate the GTN unless the Glove Qualification Procedure located in the Pilot's Guide has been successfully completed. The Glove Qualification Procedure is specific to a pilot/glove/GTN unit combination.

922.2.7 DEMO MODE

Demo mode may not be used in flight under any circumstances.

922.3 EMERGENCY/ABNORMAL PROCEDURES

922.3.1 EMERGENCY PROCEDURES

LOSS OF REMOTE AUDIO PANEL FUNCTIONS (IF INSTALLED WITH GTN 750)

Pull INTERCOM circuit breaker

NOTE

This procedure will restore COM operation on the GTN 750. The intercom functions will not be available.

922.3.2 ABNORMAL PROCEDURES

GPS NAVIGATION INFORMATION NOT AVAILABLE OR INVALID

If GTN 635/650/750 GPS navigation information is not available or invalid the GTN will enter one of two modes: Loss of Integrity (LOI) mode or Dead Reckoning (DR) mode. Utilize remaining operational navigation equipment as appropriate.

A) LOSS OF INTEGRITY MODE

If the amber Loss of Integrity (LOI) Mode message is displayed, revert to an alternate means of navigation appropriate to the route and phase of flight or periodically cross-check the GPS guidance to other, approved means of navigation.

B) DEAD RECKONING MODE

If the amber Dead Reckoning (DR) Mode message is displayed, the course guidance will be removed from the CDI. The airplane position will be based on the last valid GPS position, then estimated by Dead Reckoning methods. All information normally derived from GPS will become less accurate over time.

SEARCHING A NEARBY AIRPORT

To select a nearby airport as a direct-to waypoint:

1. Press the **Direct-To** key on the right side of the unit.
2. Touch the **NRST APT** tab in the Direct-To window. The nearest 25 airports within 200NM will be listed. The airport at the top of the list is the nearest airport. To review the other nearest airports, touch the **Up** and **Down** keys to scroll through the list.
3. Touch the desired airport to select it. The selected airport will be displayed in the Waypoint page.
4. Touch the Activate key or press the **small right** knob to activate the selection.
5. The Map page will now be displayed with the new **Direct-To** course.

922.4 NORMAL PROCEDURES

TO ACTIVATE AN EXISTING FLIGHT PLAN:

1. Press the **Direct-To** key on the right side of the unit.
2. Touch the **FPL** tab in the **Direct-To** window.
3. Touch the flight plan waypoint you want to navigate directly to. The Direct-To Waypoint page will display information about the selected flight plan waypoint.
4. Touch the **Activate** key or press the **small right** knob to activate the selection.
5. The Map page will now be displayed with the new Direct-To course.

922.5 PERFORMANCE

Not affected.

922.6 WEIGHT & CENTER OF GRAVITY

Refer to the equipment list in Section 6 of this Handbook.

922.7 SYSTEM DESCRIPTION

922.7.1 TOUCHSCREEN, KEY AND KNOB FUNCTIONS

Controls are a combination of a dual concentric rotary knob and push-keys on the bezel with the color display providing information as well as active touch areas on the display.

TOUCHSCREEN

The GTN 635/650/750 units feature a touch panel that provides a visual display of both controls and functions. The required controls are displayed for the selected function. Keys on the display allow you to access and control their functions by touching the interactive display. A list of menu items may be scrolled by touching the screen and retaining pressure while sliding your finger up or down. Map displays may be panned by touching the screen and retaining pressure while sliding your finger in the desired direction.

Touchscreen keys are placed at the lower portion of the display. The keys vary depending on the page selected. Touch the key to perform the function or access the described information.

You can return to the previous page or exit the current function by touching the **Back** key.

KEYS

Quickly return to the Home page by pressing the **HOME** key. Press and hold the **HOME** key to reach the Map page.

The **Direct_To** key provides access to the direct-to function, which allows you to enter a waypoint and establishes a direct course to the selected destination.

KNOBS

The **Volume** knob controls audio volume for the selected COM radio or NAV receiver (if installed) and any external audio input devices (if installed). When the COM radio is active, press the **Volume** knob momentarily to disable automatic squelch control for the COM radio. When the NAV radio is active, press the **Volume** knob momentarily to enable/disable the ident tone for the NAV radio.

The **large right** and **small right** knobs are used for data entry and to set the frequencies for the communications transceiver or the VOR/Localizer receiver (if installed).

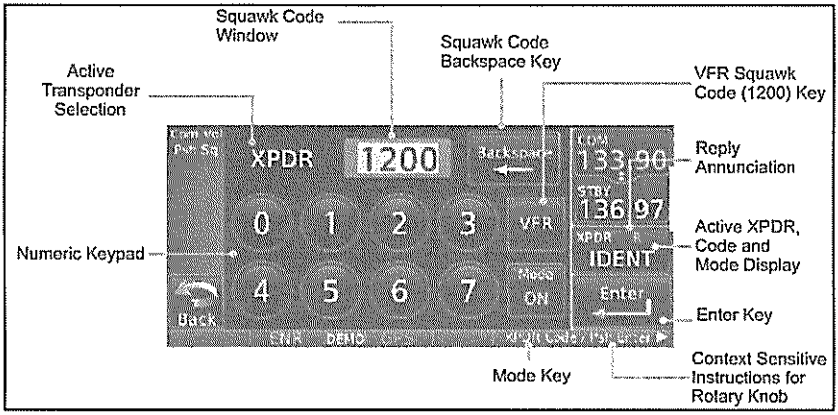

Figure 3, GTN 6xx XPDR Operation

922.7.2 SECURE DIGITAL CARD

A Secure Digital (SD) card is used to load and store various types of data and for various database updates. Ensure the GTN unit is powered off before inserting or removing an SD card.

922.7.3 SELECTING COM/NAV FREQUENCIES

Tuning control normally remains in the COM window and will return after 30 seconds of inactivity.

USING KNOBS

Press the **small right** knob momentarily to make the NAV window active for editing. The standby frequency in blue is active for editing. Turn the **large right** knob to select the desired megahertz (MHz) value. Turn the **small right** knob to select the desired kilohertz (kHz) value. Press the **small right** knob to transfer the standby frequency to the active window.

USING TOUCHSCREEN

Touch the Standby window. A pull down keypad will appear with the current Standby frequency highlighted. Touch the numeric keys to add the desired values and touch **Enter** to accept the displayed value and place it into the Standby window. Touching the **XFER** key will place the selected frequency directly in the Active window. Touch the Active (top) frequency window to flip/flop the Active and Standby frequencies.

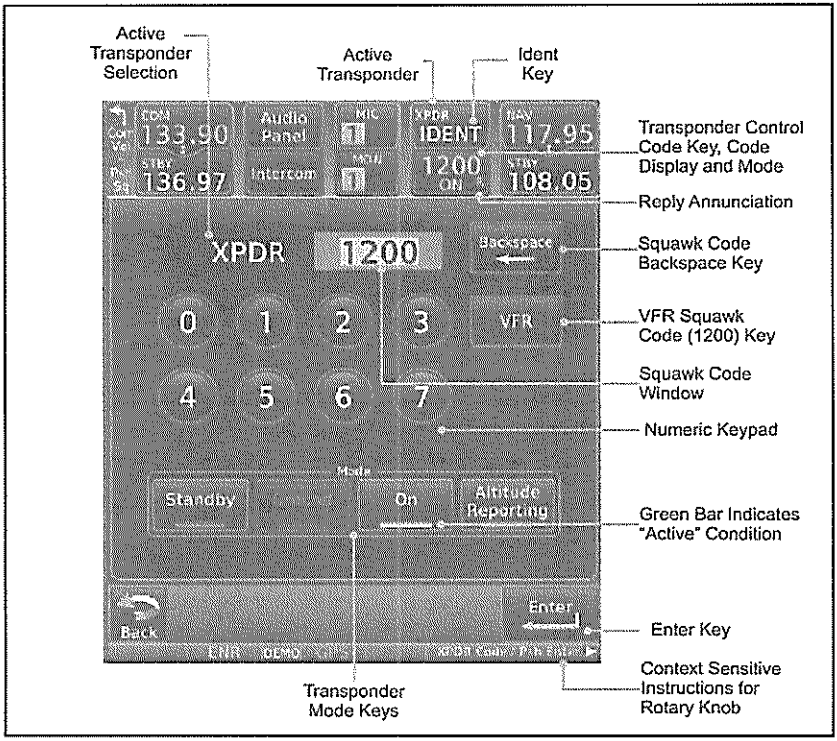

Figure 4, GTN 750 XPDR Operation

922.7.4 REMOTE TRANSPONDER OPERATION

Optionally, a remote transponder (GTX 33) can be controlled via the GTN 635/650/750 unit. Touch the transponder window to enter the transponder operation page. See figures 3 and 4 for the GTN 6xx and the GTN 750 respectively.

IDENT

1. Touch the **IDENT** key once to reply with an identifying squawk code.
2. The **IDENT** key text will change to green to indicate active Ident.

STANDBY

1. Touch the **Mode** key to show a list of available modes (directly accessible from the transponder operation page on the GTN 750). Touch the **Standby** key to place the transponder into Standby mode. The transponder will still be powered, but will not transmit information. The active transponder indication and Ident annunciation will be grayed to show they are disabled.

GROUND

1. Touch the **Ground** key to place the transponder into Ground mode. Mode S replies will be allowed in Ground mode.

ON

1. Touch the **On** key for Mode A operation. The transponder is "On" and will transmit its squawk code when interrogated.

ALTITUDE REPORTING

1. Touch the **Altitude Reporting** key for Mode C operation.
2. The transponder will be "On" and will transmit its squawk code and altitude when interrogated. An "ALT" annunciation will appear when the squawk code is transmitted.

VFR

1. Touch the **VFR** key to set the VFR squawk code (1200 or 7000 depending on location, see below).

SELECTING A SQUAWK CODE

The selected squawk code will always be in use. As you change the squawk code, the original code will be used untill you are finished selecting the new code.

1. Touch the transponder squawk code window at the top of the display.
2. The XPDR page will be displayed. The Squawk Code value will be active for selection for use by the active transponder.
3. Touch the numeric keypad, or use the rotary knobs, to select the desired Squawk Code.
4. Then, touch **Enter** or press the **small right** knob.
5. The selected Squawk Code will be shown in the XPDR window at the top of the display.

IMPORTANT CODES:

1200 The VFR code for any altitude in the US (Refer to ICAO standards elsewhere)

7000 The VFR code commonly used in Europe (Refer to ICAO standards)

7500 Hijack code (Aircraft is subject to unlawful interference)

7600 Loss of communications

7700 Emergency

7777 Military interceptor operations (Never squawk this code)

0000 Military use (Not enterable)

Avoid selecting code 7500 and all codes in the 7600-7777 range. These trigger special indicators in automated facilities. Only the code 7500 will be decoded as the hijack code. An aircraft's transponder code (if available) is utilized to enhance the tracking capabilities of the ATC facility, therefore care should be taken when making routine code changes.

NOTE

When an Aspen EFD1000 PFD is installed, it is used as the encoded altitude source. Do not power down the Aspen PFD while using the Garmin GTN 635/650/750 unit or the Garmin GTX 33 remote transponder.

922.7.5 REMOTE AUDIO PANEL OPERATION (GTN 750 ONLY)

The remote audio panel (GMA 35) can be operated from the GTN 750 only. It incorporates an intercom functionality. The Passenger Address, Cabin Speaker, Marker Beacon and Telephone functionalities are not used. See Figure 5 for the GTN750 audio panel operation page.

MIC WINDOW MIC SELECTION

1. Touch the **Mic** window to toggle between Mic 1 and Mic 2.
2. Note that the selected Mic is automatically monitored.

AUDIO PANEL PAGE MIC SELECTION

1. Touch the **Audio Panel** key at the top of the display.
2. Touch the desired Mic from the MIC Selection list on the right side of the display.
3. The selected Mic will be shown in the MIC window.

MONITOR

1. Monitor is automatically selected for the associated Com Mic Radio.
2. Touch the **Mon** key to toggle between the automatically selected monitored channel (selected Mic) and the other available channels.

AUDIO SPLIT MODE

1. While the Audio Control page is displayed, touch the **Split Mode** key to display Crew Intercom selections.
2. Touch the **Split Mode** key again to toggle the Crew Intercom selection off.
3. Touch the **Crew Intercom** key to toggle activation of the Crew Intercom allowing the Pilot and Co-Pilot to talk to each other.
4. Touch the desired Pilot and Co-Pilot Radio selections.

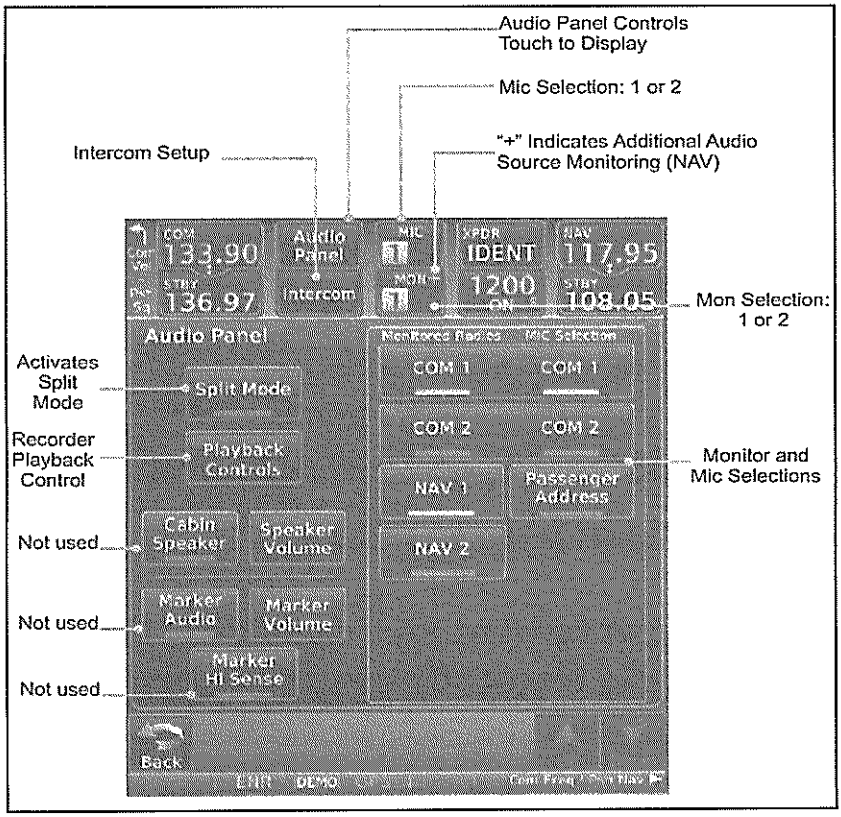

Figure 5, GTN 750 Audio Panel Operation

PLAYBACK CONTROLS

1. While the Audio Control page is displayed, touch the **Playback Controls** key to display the Playback Controls selections.
2. Touch the **Playback Volume** arrows to set volume.
3. Touch the **Backward**, **Play** or **Forward** keys to control the playback of the currently selected recording.
4. Touch the **Previous** or **Next** keys to select a recording.

INTERCOM SETUP

1. Touch the **Intercom** window at the top of the display to display the Intercom Setup page.
2. Touch the arrow between the Pilot and CO-Pilot to activate communication between those recipients. The arrow will be green when communication is active. Touch the arrow again to deactivate communication.
3. Touch the **Pilot** or **Co-Pilot** keys to set the Volume and Squelch for the selected item.
4. Touch the **Volume** arrows to set the desired Volume level.
5. Touch the **Auto Squelch** key to allow the unit to set the Squelch level automatically. When enabled, the **Auto Squelch** key will display a green bar.
6. Touch the **Squelch** arrows to set the desired Squelch level.
7. Touch the **Back** key to return to the Intercom Setup page.
8. Touch the **Music 1** or **Music 2** keys to set their configuration.
9. Select the recipients for Music Distribution by touching any combination of the **Pilot** and **Co-Pilot** keys.
10. Touch the **Radio** and/or **Intercom keys** to select the function that when active Music will be muted.
11. Touch the **Volume** arrows to set the desired Volume level.

922.7.6 POWERING UP THE GTN 635/650/750

The GTN 635/650/750 power and COM volume are controlled using the power/volume knob at the top left corner of the unit. Turning it clockwise will turn unit power on and increase the COM radio volume. After turning the unit on, several system startup pages will be displayed: A copyright page, a software & database versions and dates page and a self-test page. The database confirmation page shows the current database information on the NavData card (with the valid operating dates, cycle number and database type indicated). The database is updated every 28 days, and must be current. Information on database subscriptions is available inside your GTN 635/650/750 package.

To acknowledge or advance to the next page, touch **Continue**.

922.7.7 MAP PAGE

During most flights, the *Map page* will be used for situational awareness. The *Map page* displays Airports, NAVAIDs, airspace, airways, land data (highways, cities, lakes, rivers, borders, etc.) with names, wind direction and speed, icons for enabled map features, aircraft icon (with the nose representing present position), nav range ring, flight plan legs, a graphic course deviation indicator (CDI) with From - To - Next waypoints, topography scale, terrain overlay.

The *Map page* is reached by touching the MAP key on the Home page or by pressing and holding the Home key.

922.7.8 GROUND OPERATION

NOTE

Do not use SafeTaxi or Chartview functions as the basis for ground maneuvering. SafeTaxi and Chartview functions are not qualified to be used as an airport moving map display (AMMD).

SafeTaxi and Chartview are to be used by the flight crew to orient themselves on the airport surface to improve pilot situational awarness during ground operations.

922.7.9 TRAFFIC DISPLAY (OPTIONAL)

Traffic may be displayed on the GTN when connected to an approved TIS traffic device (e.g. GTX 330 or GTX 33). The TIS information is only available in the US. The Garmin GTN 6xx or 7xx Cockpit Reference Guide or Pilot's Guide provides additional information regarding the functionality of the traffic device.

The display of traffic is an aid to visual acquisition and may not be utilized solely for aircraft maneuvering.

922.8 SCREEN CLEANING

The Clean Screen mode makes the touchscreen inactive so the display can be manually cleaned. The front bezel, keypad, and display can be cleaned with a microfiber cloth or with a soft cotton cloth dampened with clean water. DO NOT use any chemical cleaning agents. Care should be taken to avoid scratching the surface of the display.

While viewing the Utilities page group, touch the **Clean Screen** key to start the Screen Cleaning Mode. Touch the **HOME** key to exit Screen Cleaning Mode.

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SECTION 924

KANNAD 406 AF COMPACT/INTEGRA ELT

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924.1 GENERAL

To improve the passive security, the EXTRA 330LX can be equipped with an optional Emergency Locator Transmitter KANNAD AF 406 COMPACT or INTEGRA ELT.

In the event of a crash, the AF 406 activates automatically (automatic fixed „AF" configuration), and transmits the standard swept tone on 121.5 MHz lasting until the battery is depleted. This 121.5 MHz signal is mainly used to pinpoint the beacon during search and rescue operations. In addition, for the first 24 hours of operation, a 406 MHz signal is transmitted at 50-second intervals. This transmission lasts 440 ms and contains identification data programmed into the beacon and is received by Cospas-Sarsat satellites. The transmitted data is referenced in a database (maintained by the national authority responsible for ELT registration) and used to identify the beacon and owner.

When the ELT is activated, the panel LED pulses periodically. The time between pulses lengthens after a predetermined transmitter 'on' time.

NOTE

In October 2000 the International Cospas-Sarsat Program, announced at its 25th Council Session held in London, UK that it plans to terminate satellite processing of distress signals from 121.5 and 243 MHz emergency beacons on February 1, 2009.

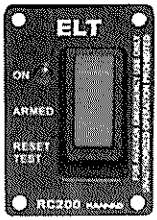
ACCURACY

Doppler positioning is employed using both 121.5 MHz and 406 MHz signals. Position accuracy of the 121.5 MHz signal is within an area of approximately 15-20 km radius about the transmitter. Due to the better integrity of the 406 MHz signal, its location accuracy is within about a 3 km radius.

924.2 LIMITATIONS

The operation limitations are not affected by the installation of the KANNAD AF 406 COMPACT or INTEGRA ELT.

For the operation of the transmitter the following placard is on the front face of the remote switch:



(on the ELT remote switch)

924.3 EMERGENCY PROCEDURES

- In case of a forced landing switch the remote switch in the rear instrument panel to the "ON" position prior to touch down.

Although the ELT will be activated automatically after an aircraft accident or forced landing with high G-force,

- switch additionally the remote switch in the rear panel to the "ON" position.

After sighting rescue aircraft:

- Switch the remote switch to the "ARM" position to prevent radio interference.
- Attempt contact with rescue aircraft with the radio transceiver set to a frequency of 121.5 MHz. If no contact is established, switch the remote switch to the "ON" position immediately.

If the function of the remote switch is in doubt proceed as follows:

- Remove quick pins from the backrest adjustment and swivel the backrest forward to get access to the ELT unit.
- Use the master switch at the ELT unit analogously.

FUNCTION CHECK OF THE ELT

- If the aircraft receiver is operable, check ELT function by listening on 121.5 MHz for ELT transmission. Ensure that the ELT antenna is clear of any obstructions.

924.4 NORMAL PROCEDURES

It is recommended by the manufacturer to test the ELT to detect any possible failure.

An operational check must be performed regularly by a pilot or maintenance personnel from the cockpit (Remote Control Panel). It is recommended to perform a self-test once a month but it **should not be done more than once a week.**

Each self-test consumes energy from the battery. Should self-tests be carried out more often than the maximum allowed, the battery life-time might be shorter than specified.

SELF-TEST PROCEDURE

- Check that the antenna is correctly connected

Do not perform self-test without antenna connected.

- Tune aircraft radio to 121.5 MHz and adjust volume to ensure you can hear it.

- Switch from position „OFF" to position „ARM" or press RESET & TEST on the Remote Control Panel (ensure that the ELT switch is in position „ARM").

Close to the end of the self-test a short (3-4 sweeps) 121.5 transmission is made.

- confirm this on the aircraft radio.
- After a few seconds, the test result is displayed with the red visual indicator:
- One long flash indicates that the system is operational and that no error conditions were found.
- A series of short flashes indicates the test has failed.

Remark: The number of flashes gives an indication of the faulty parameter detected during the self-test.

Flashes	Meaning
3 + 1	Low Battery Voltage
3 + 2	Low RF Power
3 + 3	Faulty VCO Locking (Faulty Frequency)
3 + 4	No Identification Programmed

If self-test fails, contact the distributor as soon as possible. Unless a waiver is granted, flight should be cancelled.

924.5 PERFORMANCE

Not affected.

924.6 WEIGHT & CENTER OF GRAVITY

Refer to the equipment list in Section 6 of this Handbook.

924.7 SYSTEM DESCRIPTION

The ELT installation consists of the ELT unit fastened to the fuselage structure aft of the back seat, an antenna located on the main fuselage cover behind the cockpit, and a remote switch with a red visual indicator (LED) located on the instrument panel. The remote switch has the positions 'ON', 'ARMED' and 'RESET/TEST'. The switch on the ELT unit has the positions 'ARM', 'OFF' and 'ON'.

924.7.1 SWITCH OPERATION

In a crash, an acceleration activated crash sensor (G-switch) turns the ELT 'on' automatically. Activation is also accomplished by switching the cockpit mounted remote switch or the switch on the ELT to the 'ON' position. To deactivate the ELT switch the switch on the ELT unit to the 'OFF' position.

NOTE

With remote switch disconnected or during transport the ELT can still be manually activated using the local switch on the front of the ELT. Care should be taken when transporting or shipping the ELT not to move the switch or allow packing material to become lodged such as to toggle the switch.

It is possible to stop the ELT in case of unintentional activation:

- Switch to 'OFF'.

Regulations state that no transmission must be interrupted unless all means are used to contact and inform the Air Traffic Controller of this action.

NOTE

As 406 MHz transmission is effective 50 seconds after the ELT activation, if it is switched off within this delay, no further radio contact will be necessary.

924.8 HANDLING, SERVICING AND MAINTENANCE

Refer to the following applicable manufacturer instructions for further detailed information or when working on the Kannad 406 AF ELT:

- Installation and Operation Manual 406 AF-COMPACT ELT (P/N: DOC08038E Rev. 04)
- Initial Installation Manual 406 AF-INTEGRA ELT (P/N: DOC09081C Rev. 02)
- Operation Manual 406 AF-INTEGRA ELT (P/N: DOC09078C Rev. 02)

Manufacturer:

Kannad Aviation (McMurdo Group)
Orolia SAS
Z.I. des 5 Chemins BP 23
56520 Guidel (F)

924.8.1 PERIODIC INSPECTION

Depending if the ELT is opened or not, PART 145 or FAR 145 (or equivalent) may be required. Refer to local regulations.

924.8.2 BATTERY REPLACEMENT

Carried out by an accredited PART 145 or FAR 145 (or equivalent) maintenance station.

BATTERY REPLACEMENT REQUIREMENTS

Battery replacement is mandatory:

- after more than 1 hour of real transmission (cumulated duration);
- before or on the battery expiration date;
- after use in an emergency;
- after an inadvertant activation of unknown duration.

Only an original and approved battery pack included in battery KIT BAT200 (P/N S1840510-01) supplied by KANNAD must be installed. [SAFT-FRIWO , Lithium Manganese Dioxide, 2 x M20 (D-type) cells]

KANNAD refuses all responsibility and invalidates all warranty should other packs be installed.

Battery packs or KITs are available from any KANNAD distributor or dealer.

A list of distributors is available on http://www.kannad.com

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SECTION 925

GARMIN G5

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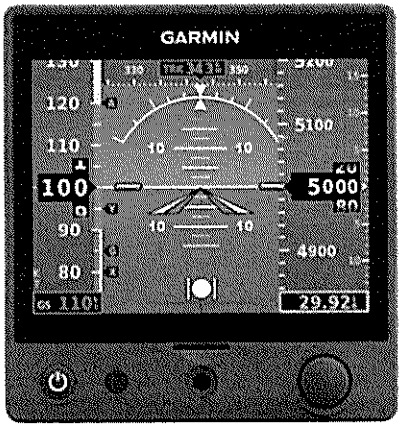
925.1 GENERAL

The G5 Electronic Flight Instrument installed in the front instrument panel is an electronic instrument which displays attitude, slip and turn rate information to the pilot. It also contains indications of airspeed and altimeter. Additionally ground track and ground speed are indicated when the G5 is connected to a GPS source. An optional backup battery sustains the G5 attitude for up to four hours, in case of a loss of aircraft electrical power.



925.2 LIMITATIONS

925.2.1 SYSTEM SOFTWARE REQUIREMENTS

The G5 must utilize the following or later FAA approved software versions for this AFMS revision to be applicable:

Component	Software Version
G5 Electronic Flight Instrument	2.60

925.2.2 USE OF INSTRUMENTS

The original type design approved instruments for airspeed, altitude and optional vertical speed installed in the rear instrument panel remain the primary indications for these parameters.

The attitude and navigation data (except airspeed and altitude) provided by the GARMIN G5 is for situational awareness only and shall not be relied upon for navigation.

925.2.3 KINDS OF OPERATIONS

No change.

925.2.4 PLACARDS

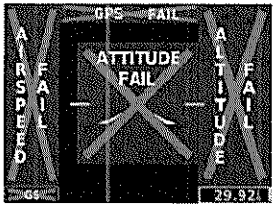
For situational awareness only (Next to the GARMIN G5)

G5 (Below the GARMIN G5 circuit breaker on the rear instrument panel)

925.3 EMERGENCY PROCEDURES

925.3.1 G5 FAILURE INDICATIONS

When a G5 function fails, a large red 'X' is typically displayed over the instrument(s) or data experiencing the failure. Upon G5 power-up, certain instruments remain invalid as equipment begins to initialize. All instruments should be operational within one minute of power-up. If any instrument remains flagged and it is not likely an installation related problem, the G5 should be serviced by a Garmin-authorized repair facility.



Attitude Failure

Attitude failure is indicated by removal of the sky/ground presentation, a red X, and a yellow "ATTITUDE FAIL" on the display.

Rate-of-turn and slip information will not be available.

925.3.2 ATTITUDE ALIGNING

During system initialization, the G5 displays the message 'ALIGNING' over the attitude indicator. The G5 should display valid attitude typically within the first minute of power-up. The G5 can align itself both while taxiing and during level flight.

Even if the attitude "ALIGNING" indication occurs during flight and attitude remains displayed, the attitude display can be used for situational awareness. The message will clear when the attitude solution is within the systems internal accuracy tolerances.

It is recommended to keep wings level to reduce the time for the message to clear.

925.3.3 ATTITUDE ALIGNING / KEEP WINGS LEVEL

If the "ALIGNING KEEP WINGS LEVEL" indication occurs during flight, the G5 has detected an invalid attitude solution and will not display any attitude information.

It is recommended to keep wings level to reduce the time for system recovery.

The system will display attitude when internal accuracy tolerances have been met again.

925.3.4 LOSS OF ELECTRICAL POWER

In the event of a loss of aircraft electrical power to the G5, the indicator will continue to function on its internal battery, when the following action is performed within 45 seconds:

▶ "External Power Lost" indication PRESS ANY KEY to continue on battery power

Internal battery endurance is then indicated on the G5 display in hours and minutes, the charging symbol will be removed and the internal battery will not be charged.

925.3.5 SYSTEM MESSAGES

The G5 has the capability to display system messages to the crew along the bottom of the display. The following table shows the meaning of each message. System messages are displayed in white text.

Message	Meaning
External Power Lost	Aircraft power has been removed from the G5
Critical battery fault! Powering off ...	Battery has critical fault condition and the unit is about to power off to avoid damage to the battery.
Battery fault	Battery has a fault condition - contact Garmin if it persists.
Battery charger fault	Battery charger has a fault condition - contact Garmin if it persists.
Low battery	Battery charge level is low
Hardware fault	Unit has a hardware fault - contact Garmin for service
Power supply fault	Unit power supply fault detected - contact Garmin for service if it persists
Unit temperature limit exceeded	Unit is too hot or too cold
Network address conflict	Another G5 with the same address is detected on the network (most commonly a wiring error on one of the units)
Communication error	General communication error (most commonly appears in conjunction with Network Address Conflict message)
Factory calibration data invalid	Unit calibration data not valid - return to Garmin
Magnetic field model database out of date	Internal magnetic field database is out of date - software update required
Using external GPS data	GPS data from another network LRU is being used. The unit's internal GPS receiver is enabled, but unable to establish a GPS fix

No specific pilot action is required for any of the displayed system messages. As long as attitude is displayed, the system is adequate for situational awareness.

These messages remain while the condition persists, or until cleared by pressing the knob.

925.4 NORMAL PROCEDURES

925.4.1 G5 POWER BUTTON AND KNOB

The G5 display will power on with the application of aircraft power.

- Use the G5 power button to turn the display on and off.
- Press and hold the power button to turn the display off.
- Use the knob to adjust the baro setting on the secondary display of altitude.
- Press the knob to get access to a menu, allowing the entry of altitude preselect or desired track information.
- Press the knob subsequently to remove the menu.

925.4.2 BACKLIGHT INTENSITY ADJUSTMENT

The power up state of the G5 backlight is in Auto adjustment mode.

To adjust the backlighting:

if unit is in Auto mode and manual adjustment is desired:

- While the unit is turned on, press the Power button.
- Turn the knob to manually adjust the backlight intensity.
- Press the knob to close the backlight page.

if unit has been manually adjusted and Auto mode is desired:

- While the unit is turned on, press the Power button.
- Press the Power button again to select Auto.
- Press the knob to close the backlight page.

925.5 PERFORMANCE

No change.

925.6 WEIGHT AND BALANCE

See current weight and balance data.

925.7 SYSTEM DESCRIPTIONS

Refer to Garmin G5 Pilot's Guide P/N 190-01112-12 for a description of the G5 electronic flight instrument. This reference material is not required to be on board the aircraft but does contain a more in depth description of all the functions and capabilities of the G5.

The G5 circuit breaker located on the rear instrument panel supplies power to the G5 instrument for normal power operation and to charge the internal battery.

GARMIN Ltd. or its subsidiaries
c/o GARMIN International, Inc.
1200 E. 151st Street
Olathe, Kansas 66062 U.S.A.

FAA Approved
AIRPLANE FLIGHT MANUAL SUPPLEMENT
or
SUPPLEMENTAL AIRPLANE FLIGHT MANUAL
for the
GARMIN G3X TOUCH ELECTRONIC FLIGHT INSTRUMENT SYSTEM
as installed in

EXTRA EA300/LC

Make and Model Airplane

Registration Number: HB-MGB Serial Number: LC097

This document serves as an Airplane Flight Manual Supplement or as a Supplemental Airplane Flight Manual when the aircraft is equipped in accordance with Supplemental Type Certificate SA01899WI for the installation and operation of the Garmin G3X Touch Electronic Flight Instrument. This document must be carried in the airplane at all times.

The information contained herein supplements or supersedes the information made available to the operator by the aircraft manufacturer in the form of clearly stated placards or markings, or in the form of an FAA approved Airplane Flight Manual, only in those areas listed herein. For limitations, procedures and performance information not contained in this document, consult the basic placards or markings, or the basic FAA approved Airplane Flight Manual.

FAA approved sections of this supplement are labeled as "FAA Approved". Sections not labeled "FAA Approved" are provided for guidance information only.

FAA APPROVED BY: Paul Mast

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ODA-240087-CE

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Garmin International, Inc

Log of Revisions

FAA Approved

AIRPLANE FLIGHT MANUAL SUPPLEMENT

or

SUPPLEMENTAL AIRPLANE FLIGHT MANUAL

for the

GARMIN G3X TOUCH ELECTRONIC FLIGHT INSTRUMENT SYSTEM

REV NO.	PAGE NO(S)	DESCRIPTION	DATE OF APPROVAL	FAA APPROVED
1	ALL	Original Issue	03/15/19	Robert Murray ODA STC Unit Administrator
2	2-2, 2-5	Added limitation for installations with an autopilot other than GFC500.	04/05/19	Paul Mast ODA STC Unit Administrator
3	1-5, 2-1	Added GPS 175 / GNX 375 as approved IFR navigators.	5/30/19	Paul Mast ODA STC Unit Administrator
4	ALL	Incorporate system software v8.60 and associated hardware changes.	12/20/19	Robert Murray ODA STC Unit Administrator
5	ALL	Formatting changes throughout document. Clarified requirements for IFR vs. VFR navigation, updated emergency procedures, annunciations, and autopilot configuration applicability. Added graphics for deviation indicators. Revised transponder mode description. Addition of Smart Glide.	12/29/21	Robert Murray ODA STC Unit Administrator
6	ALL	Added GI 275 integration, traffic aural alert limitation information, minor clerical and formatting corrections throughout document.	SEE COVER	SEE COVER

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Table of Contents

1 GENERAL

The information in this supplement is FAA-approved and must be attached to the Pilot's Operating Handbook and FAA Approved Airplane Flight Manual (POH/AFM) when the airplane has been modified by the installation of the Garmin G3X Touch Electronic Flight Instrument System in accordance with STC SA01899WI.

The information in this supplement supersedes or adds to the basic POH/AFM only as set forth below.

Users of the manual are advised to always refer to the supplement for possibly superseding information and placarding applicable to operation of the airplane.

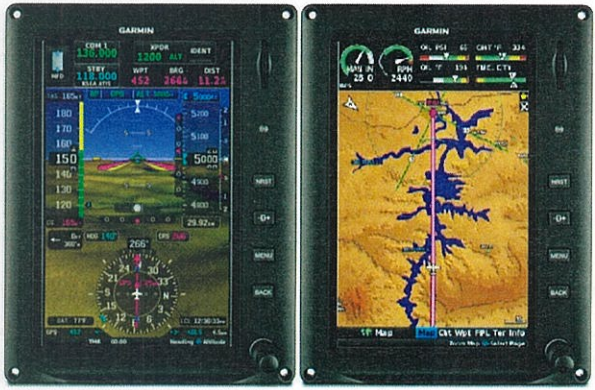
The G3X Touch provides one or more of the following functions:

- Primary Flight Display (PFD) – Provides attitude, air data, heading, and navigation information to the pilot.
- Multi-Function Display (MFD) – Provides pilot awareness of factors that may affect the overall conduct of the flight such as advanced moving map including terrain, obstacle and traffic alerts, georeferenced FliteCharts® or Jeppesen® ChartView™ charts and SafeTaxi® airport diagrams.
- Engine Indication System (EIS) – Provides engine and airframe operating parameters to the pilot.

The G3X Touch is scalable with a variety of configurations made up of the 7" portrait GDU 470 and the 10" landscape GDU 460. Installations may consist of one or both display types in any combination from one to three displays (or up to four displays total in tandem cockpit aircraft). A minimum installation with a single display may be a standalone MFD or a PFD which can be split screened to provide both PFD and MFD functions. EIS can optionally be displayed on any GDU except a 7" portrait PFD. Only one display per cockpit can be installed as a PFD (any second or third display is an MFD).

Single 7" Portrait GDU (PFD with MFD in split mode, No EIS)

Single 10" GDU (PFD & MFD, EIS Optional)



Dual 7" Portrait GDUs (PFD & MFD, EIS Optional)

One 10" + One 7" Portrait GDU (PFD & MFD, EIS Optional)

The PFD has an internal WAAS GPS receiver for VFR operations and a touchscreen interface. The G3X Touch system also can interface with an external, IFR approved navigator for IFR operations. Aircraft without an external, IFR approved navigator are approved for VFR operations only. Refer to equipment requirements for IFR operations in Limitations Section 2.3, *Navigation Systems for IFR Operations*, and the table in Section 2.24, *Kinds of Operations*.

PFD installations require the installation of a GSU 25 ADAHRS, GMU 11 magnetometer, and GTP 59 temperature probe. A GAD 27 voltage stabilizer or TCW IBBS back-up battery is required for 14V airframes with EIS. For all PFD installations in aircraft approved for IFR operations, standby instruments and an IFR approved navigation system are required.

If the installation includes a separate PFD and MFD, reversionary backup is available should a failure of either display occur. In reversionary mode, the remaining G3X Touch display combines critical flight instrumentation with engine readouts (if installed) and navigation information in a single-screen consolidated presentation.

If EIS functions are installed, they require the installation of a remote mounted GEA 24 Engine Airframe unit and associated engine sensors.

MFD functions are supported by an internal GPS receiver or connection to an external, IFR approved GPS navigator. G3X Touch flight displays can be integrated with a variety of systems including VHF radios, transponders, audio panels, ADS-B, SiriusXM® data links, mobile devices via Garmin Connext® and autopilot systems.

Carefully review the contents of this Airplane Flight Manual Supplement before operating the airplane. Also review Pilot's Guide 190-02472-00 Rev A, or later version applicable to the approved software version of the G3X Touch system installed on the aircraft. The Pilot's Guide provides details on the features of the G3X Touch system.

USE OF THE AFMS

The following definitions apply to WARNINGS, CAUTIONS and NOTES found throughout the AFMS:

WARNING

Operating procedures, techniques, etc., which could result in personal injury or loss of life if not carefully followed.

CAUTION

Operating procedures, techniques, etc., which could result in damage to equipment if not carefully followed.

NOTE

Operating procedures, techniques, etc., which are considered essential to emphasize.

1.1 G3X Touch GNSS (GPS/SBAS) Navigation Equipment Approvals

G3X Touch is capable of IFR operations when an external, IFR approved navigation system is installed and connected to the system and when the pilot selects the **FPL Source** to **External**. Refer to equipment requirements for IFR operations in Limitations Section 2.3, *Navigation Systems for IFR Operations*, and the table in Section 2.24, *Kinds of Operations*.

When no external, IFR approved navigator is connected, or when the pilot selects **FPL Source** to **Internal**, G3X Touch provides VFR flight planning capabilities and guidance on the HSI.

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1.2 Abbreviations and Terminology

The following glossary is applicable within the airplane flight manual supplement

AC	Advisory Circular
ADAHRS	Air Data Attitude Heading Reference System
ADC	Air Data Computer
ADS-B	Automatic Dependent Surveillance-Broadcast
AFCS	Automatic Flight Control System
AFM	Airplane Flight Manual
AFMS	Airplane Flight Manual Supplement
AHRS	Attitude Heading Reference System
ALT	Altitude
AML	Approved Model List
AMMD	Airport Moving Map Display
AOA	Angle of Attack
AP	Autopilot
APV	Approach with Vertical Guidance
ATC	Air Traffic Control
ATT	Attitude
Baro	Barometric
BC	Back Course
CAN	Controller Area Network
CB	Circuit Breaker
CDI	Course Deviation Indicator
CFR	Code of Federal Regulations
COM	Communication
DA	Decision Altitude
DG	Directional Gyro
ECS	Electrical Control System
EIS	Engine Indication System
ESP	Electronic Stability and Protection
GA	Go Around
GP	Glide Path
GPSS	GPS Steering
FAA	Federal Aviation Administration
FAF	Final Approach Fix
FD	Flight Director

FIS-B	Flight Information Service – Broadcast
FPL	Flight Plan
FPM	Feet Per Minute
GAD	Garmin Adaptor Device
GDU	Garmin Display Unit
GEA	Garmin Engine and Airframe
GFC	Garmin Flight Control
GMU	Garmin Magnetometer Unit
GNC 255	Garmin Navigation and Communication Transceiver
GNS	Garmin Navigation System
GNSS	Global Navigation Satellite System
GNX	Garmin Navigator Transponder
GP	Glide Path
GPS	Global Positioning System
GS	Glide Slope or Ground Speed
GSU	Garmin Sensor Unit (ADAHRS)
GTN	Garmin Touch Navigation
GTP	Garmin Temperature Probe
HDG	Heading
HSI	Horizontal Situation Indicator
IAF	Initial Approach Fix
IAS	Indicated Airspeed
IDENT	Identification button on Transponder
IFR	Instrument Flight Rules
ILS	Instrument Landing System
INT	Internal
K factor	Fuel flow transducer calibration factor
LNAV	Lateral Navigation
LNAV+V	Lateral Navigation with Vertical Guidance
LP	Localizer Precision
LP+V	Localizer Precision with Advisory Vertical Guidance
LPV	Localizer Precision with Vertical Guidance
LOC	Localizer
LOI	Loss of Integrity
MAX	Maximum
MDA	Minimum Descent Altitude

MFD	Multi-Function Display
MIN	Minimum
MSG	Message
N/A	Not Available
NAV	Navigation
NOTAM	Notice to Airmen
NRST	Nearest
PFD	Primary Flight Display
POH	Pilot's Operating Handbook
PTRIM	Pitch Trim
OAT	Outside Air Temperature
OBS	Omni Bearing Selector
ODA	Organizational Designation Authorization
REV	Revision or Reversion
RNAV	Area Navigation
RPM	Revolutions per Minute
SBAS	Satellite Based Augmentation System
SD Card	Secure Digital Card
SFD	Standby Flight Display
SL30	Garmin nav/com transceiver
STBY	Standby
STC	Supplemental Type Certificate
SYNC	Synchronize
TAS	True Airspeed
TAWS	Terrain Alert and Warning System
VDI	Vertical Deviation Indicator
TFR	Temporary Flight Restriction
VFR	Visual Flight Rules
VHF	Very High Frequency
VMC	Visual Meteorological Conditions
VNAV	Vertical Navigation
VOR	VHF Omni-directional Range
VSI	Vertical Speed Indicator
WAAS	Wide Area Augmentation System
XTK	Cross Track Error
YD	Yaw Damper

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2 LIMITATIONS

2.1 System Software Requirements

The G3X Touch must use the following or later FAA approved software versions for this AFMS revision to be applicable:

Component	Software Version
G3X Touch System Software	9.15

NOTE

This section is not intended to be a comprehensive list of approved software. It is intended to provide a means to determine if this AFMS revision is applicable to the software that is installed in the aircraft. Do not use this AFMS revision if the installation has a software version less than that shown in the table above.

2.2 Standby Flight Instruments

Standby Instruments are required for aircraft approved for IFR operations. Refer to the table in Section 2.24, *Kinds of Operations.*

2.3 Navigation Systems for IFR Operations

Aircraft approved for IFR operations must use one of the following navigation systems connected to the G3X Touch system, and **FPL Source** on the PFD must be selected to **External**.

- Garmin GNC 300XL / GPS 155XL
- Garmin GPS, GNC, or GNS 4XX(W) / 5XX(W)
- Garmin GNS 480
- Garmin GTN 6XX / 7XX
- Garmin GPS 175 / GNX 375
- Garmin SL30
- Garmin GNC 255
- Garmin GNC 355/355A

OR

- A separate, non-Garmin, IFR approved GPS and/or VHF navigation system along with a dedicated Course Deviation Indicator (CDI) separate from G3X Touch.

Refer to the table in Section 2.24, *Kinds of Operations.*

NOTE

Refer to the approved Airplane Flight Manual Supplement for the non-Garmin navigation system (if installed) for information on IFR operations.

IFR operations are prohibited using G3X Touch while **FPL Source** is selected to **Internal** GPS navigation as the navigation source on G3X Touch. When the internal navigation source is selected, a cyan **INT** and magenta **VFR** annunciation is displayed on the HSI. When **INT** and **VFR** are annunciated, IFR operations are prohibited based solely on guidance provided by G3X Touch.

IFR operations are prohibited using G3X Touch for navigation when the G3X system is not connected to an external, IFR approved navigator. Installations without an external, IFR approved navigator are limited to VFR operations only and have a placard located near the pilot PFD. Refer to Section 2.25, *Placards*.

2.4 Databases

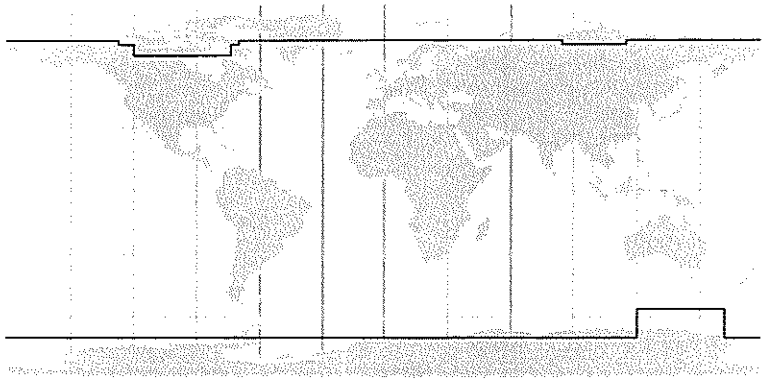
Database updates via SD card must be done while the aircraft is on the ground and stationary. Database transfers or updates are prohibited in flight.

2.5 AHRS Operational Area

IFR operations are prohibited in the following regions:

1) North of 72° North latitude, at all longitudes
2) South of 70° South latitude, at all longitudes
3) North of 65° North latitude between longitude 75° W and 120° W (Northern Canada)
4) North of 70° North latitude between longitude 70° W and 128° W (Northern Canada)
5) North of 70° North latitude between longitude 85° E and 114° E (Northern Russia)
6) South of 55° South latitude between longitude 120° E and 165° E (A region south of Australia and New Zealand)

Loss of heading may occur when operating in these regions.



2.6 Magnetic Variation Operational Area

IFR operations are prohibited in areas where the magnetic variation is greater than 99.9 degrees East or West.

2.7 Navigation Angle

The Magnetic/True Navigation Angle (as selected on the System Units page) must match the navigation angle selected on all interfaced GPS/SBAS navigators.

2.8 ADAHRS Systems Status

Valid air data, attitude, and heading must be displayed on the G3X Touch PFD and Standby Instruments for IFR operations. Refer to Section 2.24, *Kinds of Operations*, for specific equipment requirements for VFR and IFR. IFR operations are prohibited if any of the following System Status Messages are displayed:

AHRS not receiving GPS data

AHRS not receiving air data

AHRS not receiving magnetometer data

AHRS REVERT

ADC REVERT

AHRS FAIL

ADC FAIL

2.9 Aerobatic Maneuvers

Do not conduct aerobatic maneuvers if uninterrupted attitude information is required on the PFD. Refer to Section 3.2, *Attitude Failure (GSU 25)*, if the amber **AHRS ALIGN** caution is displayed on the PFD.

2.10 Other Autopilots

On aircraft with an autopilot other than a GFC 500, the pilot must select **FPL Source** to **External** on the PFD when using the autopilot in navigation (NAV or APR) modes. For those aircraft, it is prohibited to use the autopilot in navigation modes when **FPL Source** is selected to **Internal** on the PFD.

NOTE

Refer to the approved Airplane Flight Manual Supplement for the non-Garmin autopilot system (if installed) for information on modes of operation.

2.11 Synthetic Vision

The synthetic vision presentation must not be used as the sole reference for aircraft control (without reference to the primary flight instruments).

The synthetic vision presentation must not be used as the sole reference for navigation or obstacle/terrain/traffic avoidance.

2.12 Moving Maps

Moving map displays (ownship position relative to map features) must not be used as the primary or sole means of navigation or course guidance.

2.13 Terrain Display

Maneuvers and navigation must not be based solely on the display of terrain or obstacles on the moving map terrain displays.

2.14 Terrain Alerts

Terrain alerts must be inhibited when landing at an airport that is not in the airport database.

2.15 Traffic Display and Alerts

The display of traffic and aural traffic alerts are intended as an aid to visual acquisition and must not be used as the sole basis for aircraft maneuvering.

2.16 Surface Operations

SafeTaxi or Chartview functions shall not be used as the sole basis for ground maneuvering. SafeTaxi and Chartview functions do not comply with the requirements of AC 20-159 and are not qualified to be used as an airport moving map display (AMMD). SafeTaxi and Chartview use is limited to airport surface orientation to improve flight crew situational awareness during ground operations.

2.17 Glide Range Ring

In the event of engine failure or engine malfunction, the Glide Range Ring must not be used to determine gliding distance. Refer to the airplanes' Pilot's Operating Manual / Airplane Flight Manual for engine failure emergency procedures and glide distance data.

2.18 Powerplant Gauge Markings

Aircraft that were previously equipped with a fuel flow gauge which measured metered fuel pressure may have this gauge replaced by a gauge which measures fuel flow directly. When these gauges are replaced in accordance with this STC, the fuel pressure and fuel flow markings on such gauges are replaced by equivalent fuel flow markings.

Fuel flow values may be in error by as much as 15% if the K factor calibration is improperly set. Do not depend solely on the fuel flow indication or the fuel totalizer to determine fuel used, fuel remaining, or fuel reserves.

The fuel computer functions must not be used as the primary means of determining the quantity of fuel in the tanks.

The Manifold Pressure gauge and the Propeller RPM gauge are the primary means for setting engine power. The Engine Power display is for information purposes only.

2.19 Weight and Balance

Weight and balance data provided by the G3X Touch is for flight planning purposes only. Consult the aircraft's Pilot's Operating Handbook for the official weight and balance data.

2.20 Data link Products (SiriusXM, FIS-B, and Connext)

Do not use data link weather information for maneuvering in, near, or around areas of hazardous weather. Information provided by data link weather products may not accurately depict current weather conditions.

Do not use the indicated data link weather product age to determine the age of the weather information shown by the data link weather product. Due to time delays inherent in gathering and processing weather data for data link transmission, the weather information shown by the data link weather product may be significantly older than the indicated weather product age.

Do not rely solely upon data link services to provide Temporary Flight Restriction (TFR) or Notice to Airmen (NOTAM) information. Not all TFRs and NOTAMS may be depicted.

2.21 Glove Usage

No device or apparel may cover the pilot's fingertips used to operate the G3X Touch display.

2.22 Service Required

It is prohibited to initiate flight when a "Service Required" advisory is present on the PFD, MFD, or EIS display.

2.23 Portable Electronic Devices

This STC does not relieve the operator from complying with applicable requirements regarding the operation of portable electronic devices.

Data provided to a portable electronic device from the G3X Touch Bluetooth interface is not approved to replace any aircraft display equipment, including navigation or traffic/weather display equipment.

2.24 Kinds of Operations

G3X Touch is approved for Day and Night, VFR and IFR operations when the system is appropriately inspected and maintained in accordance with applicable requirements. Aircraft with a placard that reads **AIRCRAFT LIMITED TO VFR** are limited to VFR operations. Refer to Section 2.25, *Placards*.

The tables below list the minimum fully functional equipment required for flight.

This table applicable to aircraft with a G3X PFD Installed			
Equipment	**Number Installed**	**Number Required**	
		VFR	**IFR**
Primary Flight Display	1	1	1
Approved Garmin Navigator (interfaced to a PFD) **OR** Non-Garmin IFR approved navigator with standalone dedicated CDI	1	-	1
Air data and Attitude / Heading Unit (ADAHRS)	1	1a*	1
Magnetometer (GMU)	1	-	1
Standby Attitude Indicator	1	-	1
Standby Airspeed Indicator	1	1b*	1
Standby Altimeter	1	1b*	1
Non-stabilized Magnetic Compass	1	1	1

The following notes apply where indicated:

* FAA approved aircraft operating under 14 CFR Part 91 must have at least one source of altitude and airspeed information functioning for VFR operations. The altitude and airspeed information may be displayed on the PFD or on the standby instruments. The aircraft must have all "1a" items or all "1b" items from the tables above.

NOTE

Operators of aircraft approved by an airworthiness authority other than the FAA are responsible to verify equipment requirements for VFR operations and equip the aircraft accordingly.

Engine Indicating System (EIS):

The table below lists the minimum, fully functional equipment if previously installed engine instruments are replaced by G3X Touch. Refer to Section 7.6, *Engine Indication System.*

Equipment	Number Installed	Number Required
EIS Display	1	1
Engine Adaptor Unit (GEA 24)	1	1

The following engine indications must be functional on the EIS display (if these gauges are present on the EIS display as installed): Tachometer, Manifold Pressure, Oil Pressure, Oil Temperature, Fuel Quantity, and any additional engine instruments required by the aircraft Kinds Of Equipment list as listed in the Aircraft Flight Manual.

2.25 Placards

Installations Limited to VFR

☐ This installation is not limited to VFR.

☐ This installation is limited to VFR and the following placard is required near the PFD:

AIRCRAFT LIMITED TO VFR

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3 EMERGENCY PROCEDURES

3.1 ADC Failure (GSU 25)

ADC FAIL

ADC failure is indicated by:

- Red X over the airspeed and altitude tapes.
- Red X over the vertical speed tape.
- Red X over the TAS and OAT fields.

1. Use Standby Airspeed Indicator and Altimeter.

NOTE

If a Garmin G5 or GI 275 Electronic Flight Instrument is installed as the Standby Flight Instrument and the primary ADC fails, the G3X Touch will automatically revert and use air data from the G5 or GI 275. An amber **ADC REVERT** annunciation will automatically be displayed on the PFD and air data from the G5 or GI 275 will be displayed on the G3X Touch.

For G5 installations: If installed, the GFC 500 autopilot will function normally.

For GI 275 installations: If installed, the GFC 500 autopilot will be unavailable.

3.2 Attitude Failure (GSU 25)

AHRS FAIL

Attitude failure is indicated by:

- removal of the sky/ground presentation.
- Red X and **ATTITUDE FAIL** over the sky/ground presentation.

1. Use Standby Flight Instruments.

NOTE

If a Garmin G5 or GI 275 Electronic Flight Instrument is installed as the Standby Flight Instrument and the primary AHRS fails, the G3X Touch automatically reverts and uses attitude information from the G5 or GI 275. An amber **AHRS REVERT** annunciation will be displayed on the PFD and attitude information from the G5 or GI 275 will automatically be displayed on the G3X Touch.

For G5 installations: If installed, the GFC 500 autopilot will function normally.

For GI 275 installations: If installed, the GFC 500 autopilot will be unavailable.

3.3 Attitude Aligning / Keep Wings Level

If the **ALIGNING KEEP WINGS LEVEL** indication occurs during flight, the G3X Touch has detected an invalid attitude solution and will not display any attitude information.

1. Use standby instruments to maintain 1° nose up pitch and wings level flight. The system will display attitude when internal accuracy tolerances have been met.
2. Limit aircraft attitude to ±10° bank, ±5° pitch, 200 KTAS or less.
3. If attitude does not return, continue to use the standby flight instruments for aircraft attitude control.

3.4 AHRS ALIGN

The **AHRS ALIGN** annunciation indicates that the AHRS attitude information is still usable, but the internal sensors are trying to realign themselves. The attitude presentation behind the annunciation is still valid but should be crosschecked using the standby instruments.

1. Crosscheck aircraft attitude with standby attitude display.

3.5 Autopilot Abnormal Disconnect (GFC 500)

Red **AP** or **AFCS** flashing on PFD, Continuous high-low aural tone

1. Aircraft Attitude ..... MAINTAIN/REGAIN AIRCRAFT CONTROL
2. AFCS Status Box on PFD ..... PRESS
   (to cancel disconnect tone and extinguish annunciator)

3.6 Incorrect Barometric Synchronization (Standby to G3X Sync)

If the system is incorrectly changing the G5/GI 275 or G3X altimeter setting without the pilot manually changing either setting, disable **SFD Baro Sync** on the G3X Touch PFD using the following procedure:

1. Press MENU twice
2. Scroll down to SETUP and Select.
3. Scroll down to PFD and Select.
4. Scroll down to SFD BARO SYNC and Select.
5. Change the selection from ENABLED to DISABLED.
6. Press and hold the BACK button to return to a normal PFD display.
7. Readjust the Altimeter Barometric Settings on the G5/GI 275 and G3X Touch PFD to the desired setting.
8. If Altimeter Barometric Setting does not remain on the desired value for either the G5/GI 275 or G3X PFD, disregard the affected altimeter and use the other altimeter.

3.7 EIS Failure

EIS failure is indicated by the loss of displayed information on the EIS, including a blank, frozen, red 'X' over the display, or unresponsive display of EIS parameters.

1. Position engine controls to ensure operation within engine limitations.

3.8 Erroneous Air Data or Attitude Information on the G3X PFD

(On installations with a G5 or GI 275 Standby Flight Instrument)

1. PULL the ADAHRS Circuit Breaker
2. PULL the GAD 27 Circuit Breaker

G5 or GI 275 air data and AHRS data will automatically revert to be displayed on the PFD on G3X Touch. **ADC FAIL**, **AHRS FAIL**, **ADC REVERT**, **AHRS REVERT**, and **ECS FAIL** * messages will be displayed. This procedure will restore availability of the GFC 500 autopilot and flight director if G5 Standby Flight Instrument is installed.

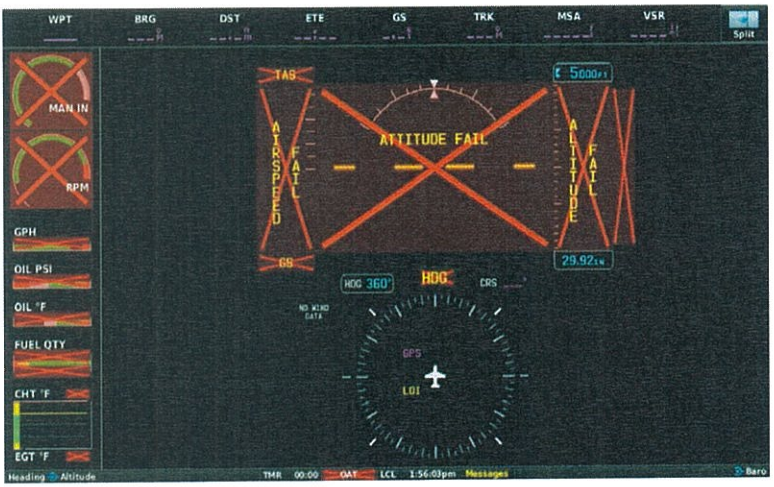
* The ECS FAIL will display when the GAD 27 circuit breaker is pulled out or the GAD 27 fails. This message is applicable only to aircraft with a 14 VDC electrical system or those with flashing (wig-wag) landing and taxi lights.

NOTE

When ECS FAIL is displayed, Landing and Taxi Lights may be inoperative if the aircraft is equipped with flashing (wig-wag) landing and taxi lights.

3.9 G3X Touch Failure Annunciations

If a G3X Touch function fails, a large red 'X' is typically displayed over the instrument(s) or data experiencing the failure. Upon G3X Touch power-up, certain instruments remain invalid as equipment begins to initialize. All instruments should be operational within one minute of power-up. If any instrument remains flagged the G3X Touch should be serviced by a Garmin-authorized repair facility.



G3X Failure Annunciations

3.10 Heading Failure, Loss of Magnetometer Data, or Magnetic Field Error

A heading failure, loss of magnetometer data, or magnetic field error is indicated by removal of the digital heading readout, a red X, and an amber "HDG" on the display.

1. Use standby magnetic compass.

NOTE

If the G3X Touch DG/HSI has a valid GPS signal the G3X Touch DG/HSI instrument will display the GPS track information in magenta.

3.11 PFD Failure

PFD failure is indicated by the loss of displayed information on the PFD, including a blank, frozen, or unresponsive display.

1. If IFR, use standby flight instruments for attitude, airspeed, altitude, and heading reference and land as soon as practical.
2. If VFR, use visual references and standby flight instruments (if installed) for attitude, airspeed, altitude, and heading reference and land as soon as practical.
3. Refer directly to the navigation source for navigation information (such as GPS).
4. If the autopilot is engaged, verify autopilot mode and cross check against visual references and standby flight instruments (if installed) and navigation data.

3.12 Navigation Data Failure (GPS/VOR/LOC/GS)

Navigation data failure may be indicated by any or all of the following:

- Loss of course deviation information on PFD
- Loss of glideslope/glidepath information on PFD
- Loss of bearing pointer on HSI

1. Select an alternate navigation source on the external navigator's CDI Key.

Or

2. Use the internal GPS navigator in G3X by changing **FPL Source** from **External** to **Internal** on the PFD. When the external GPS navigation source has failed, an amber **REV** and amber **VFR** annunciation are displayed on the HSI. When **REV** and **VFR** are annunciated, IFR operations are prohibited based solely on guidance provided by G3X Touch. Refer to Limitations, Section 2.3, *Navigation Systems for IFR Operations* for VFR operations using the G3X Touch internal navigator.

If No Alternate Navigation Sources Are Available and 'REV' is Displayed on HSI:

1. Use the CDI for course information.
2. Fly toward known visual conditions.

NOTE

In the event that all configured external GPS navigators fail, the G3X Touch reverts to its internal VFR GPS for navigation and flight plan modifications.

3.13 TERRAIN ALERTS

Aural Alert	Visual Alert	Action
"Terrain Ahead! Pull Up!" "Terrain, Terrain Pull up! Pull Up!" "Obstacle Ahead! Pull Up!" "Obstacle, Obstacle Pull Up! Pull Up!" "Sink Rate, Pull Up!" "Pull Up!"	 -OR-  -OR-  NOTE: The arrow indicates the terrain is outside the Synthetic Vision field of view.	Disconnect autopilot and initiate maximum performance climb (maximum takeoff power and best angle of climb airspeed) NOTE: Only the climb maneuver is recommended, unless operating in VMC or it is determined, based on all available information, that turning in addition climbing is the safest course of action.
"CAUTION, Terrain" "Caution, Terrain Ahead" "CAUTION, Obstacle" "CAUTION, Obstacle Ahead" "CAUTION, Sink Rate"	 -OR-  -OR-  NOTE: The arrow indicates the obstacle is outside the Synthetic Vision field of view.	Take corrective action until the alert ceases. Using all available information to determine the appropriate action, alter the flight path away from the threat by stopping descent, climbing, and/or turning.

3.14 WARNINGS, CAUTIONS, and ADVISORIES

The following tables show the color and significance of the warning, caution, and advisory messages which may appear on the G3X Touch display.

WARNING Annunciations – Red		
Annunciation	*Pilot Action*	*Cause*
Red X	Reference the data source or alternate equipment.	A red X through any display field indicates that display field is not receiving data or is corrupted.
Red Engine Parameter on EIS (if EIS is installed)	Take appropriate action to correct condition causing engine parameter exceedance.	The engine parameter has exceeded the warning threshold.
AP	Manually fly the airplane. Silence the autopilot disconnect tone and extinguish the annunciation by pressing the AP annunciation in the AFCS Status Box.	GFC 500 Autopilot has failed or is inoperative.
AFCS	Manually fly the airplane.	GFC 500 Flight Director and Autopilot have failed
	Manually fly the airplane.	GFC 500 Autopilot Failure
PTRIM	Manually trim the airplane using the pitch trim wheel.	Electric pitch trim is inoperative. (if installed and interfaced with the GFC 500 autopilot)
	Select full screen mode on display to view WARNING annunciations.	Display is in split screen mode and WARNING annunciations are not displayed.

CAUTION Annunciations – Amber		
Annunciation	*Pilot Action*	*Cause*
AP	Manually fly the airplane	Pilot has disconnected the GFC 500 autopilot
YD	NONE	GFC 500 Yaw Damper has disconnected
↑ TRIM UP ↑	Move the elevator trim in the nose up direction until the annunciation extinguishes.	The GFC 500 autopilot is holding excessive force due to the aircraft being out of trim due to changes in airspeed or power.
↓TRIM DOWN↓	Move the elevator trim in the nose down direction until the annunciation extinguishes.	The GFC 500 autopilot is holding excessive force due to the aircraft being out of trim due to changes in airspeed or power.
MIN SPEED	Add maximum available power. Autopilot will lower aircraft nose to increase airspeed.	Airspeed is too slow, approaching stall speed (GFC 500 autopilot).
MAX SPEED	Reduce power. Autopilot will raise aircraft nose to reduce airspeed.	Airspeed is approaching maximum airspeed limit (GFC 500 autopilot).
HDG (amber background)	Use standby compass	Displayed heading is outside of the internal accuracy limits.
	Select full screen mode on display to view CAUTION annunciations.	Display is in split screen mode and CAUTION annunciations are not displayed.
AHRS ALIGN – Keep Wings Level	Fly aircraft manually and crosscheck attitude indication with standby attitude indicator and other sources of attitude information. Limit aircraft attitude to ±10° bank and ±5° pitch as AHRS Aligns - OK to taxi.	Attitude and Heading Reference System is aligning. AHRS may not align with excessive pitch/bank angles.
AHRS ALIGN	Fly aircraft manually and crosscheck attitude indication with standby attitude indicator and other sources of attitude information (airspeed, heading, altitude, etc.)	The AHRS monitors have detected a possible AHRS malfunction or an error with the attitude presentation. The AHRS is attempting to realign itself. The GFC 500 autopilot may automatically disconnect.
ATT MISCOMP HDG MISCOMP	Cross-check the flagged information against other sources to identify erroneous information.	Difference detected between the G3X Touch attitude or heading display and the G5 attitude or heading display. NOTE G3X will not display miscompare annunciations for GI 275 miscompares. Only the GI 275 will display miscompare annunciations for attitude.

CAUTION Annunciations – Amber		
Annunciation	*Pilot Action*	*Cause*
AHRS FAIL ATTITUDE FAIL	Use standby attitude source, or, if AHRS REVERT message is also displayed, continue to use the G3X Touch. Attitude will be from the Standby Indicator.	The GSU 25 AHRS has failed.
AHRS REVERT	Continue to use the G3X Touch.	The GSU 25 AHRS has failed and attitude from the Standby Indicator is being displayed on the G3X Touch.
ALT MISCOMP IAS MISCOMP	Cross-check the flagged information against other sources to identify erroneous information.	Difference detected between the G3X Touch airspeed or altitude and the G5 airspeed or altitude. NOTE G3X will not display miscompare annunciations for GI 275 miscompares. Only the GI 275 will display the miscompare annunciations.
ADC FAIL	Use standby airspeed and altimeter indicator, or, if ADC REVERT message is also displayed, continue to use the G3X Touch.	The GSU 25 air data computer has failed.
ADC REVERT	Continue to use the G3X Touch.	The GSU 25 air data computer has failed and air data from the Standby Indicator is being displayed on the G3X Touch.
(Flashing) MESSAGE	Press the flashing message annunciation to view a new system message.	A new system message has annunciated.
Amber engine Parameter on EIS (if EIS is installed)	Take appropriate action to correct condition causing engine parameter exceedance.	The engine parameter has exceeded the caution threshold.
GPSS	De-select GPSS on the G3X Touch and select desired alternate autopilot lateral mode.	The GPS Steering command to the autopilot has been lost.
TRAFFIC	Visually acquire the traffic to see and avoid.	The interfaced traffic system has determined that nearby traffic may be a threat to the aircraft.
TAWS N/A, TAWS FAIL	Use vigilance, terrain depiction and TAWS alerting is no longer provided.	Database errors or lack of required GPS position.
ECS FAIL	Landing and Taxi lights may be inoperative if the aircraft is equipped with flashing (wig-wag) landing and taxi lights. At night, consider a well-lighted runway.	The GAD 27 has lost power or has failed.

CAUTION Annunciations – Amber		
Annunciation	*Pilot Action*	*Cause*
GLIDE	Smart Glide is active	Follow the Smart Glide procedures in the GTN Xi AFMS.

ADVISORY Annunciations – White		
Annunciation	*Pilot Action*	*Cause*
NO COMP	Cross check information between the G5 and the PFD to determine which unit is in error.	The unit will not be able to perform the miscompare monitor function. NOTE G3X will not display miscompare or NO COMP annunciations with GI 275 installed as standby indicator. Only the GI 275 will display the miscompare or no compare annunciations.

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4 NORMAL PROCEDURES

4.1 Before Starting Engine

1. Database Acknowledgement.....(PFD) Press "CONTINUE' button

NOTE

The data link weather advisory and current database information are displayed during power-up including valid operating dates, cycle number, and database type. When this information has been reviewed for currency (to ensure that no databases have expired), the pilot is prompted to continue.

4.2 After Starting Engine

1. Avionics Master Switch.....ON
2. Database Acknowledgment (All other displays and NAV units) ..... Press "CONTINUE" button
3. Flight Plan Source (FPL).....Select EXTERNAL or INTERNAL navigation source
4. G3X Touch CDI source .....Touch the HSI display on the PFD. PFD Options window opens.
5. In the CDI Source window.....Select GPS 1 or GPS 2 (if installed) for IFR or VFR flight, or, Select Internal GPS for VFR flight
6. Touch the HSI display on the PFD to return to normal PFD display
7. Enter a Flight Plan..... For IFR or VFR Flight, into the External GPS Navigator, or, For VFR flight only, into the PFD Internal Flight Plan

WARNING

Do not use the approach information provided by the VFR navigation database residing within the G3X Touch as a means of navigating any instrument approach. The G3X Touch VFR navigation database is limited to present only the waypoints for the final approach leg of a published procedure. These waypoints and associated course line are made available for monitoring purposes only.

8. Altimeters.....Set (PFD and Standby Altimeter)
   - Touch the Barometric Pressure Display on the PFD.
   - Enter the desired pressure using the keypad and touch ENTER.
   - Verify Barometric setting on the Standby Altimeter matches the G3X Touch.

4.3 COM Radio Tuning (Optional)

The COM Frequency Box is composed of two fields; one active frequency is on the left side and the standby frequency is on the right.

To tune the COM radio:

1. Touch STBY COM display window
2. Enter the frequency using the keypad or dual concentric knob
3. Touch ENTER to enter the frequency in the STBY window, or,
4. Touch ⇔ to transfer the entered frequency directly into the COM window.

To transfer STBY frequency to Active frequency:

1. Touch the Active COM frequency field

4.4 Lateral Navigation

Procedures below involve the Garmin GFC 500 autopilot. Information regarding a non-Garmin autopilot are provided in the G3X Touch Pilot's Guide and Airplane Flight Manual Supplement for the non-Garmin autopilot.

Changing the Navigation Source

When an external navigator that supports both GPS and VOR/ILS capabilities (i.e., GTN or GNS Series) is selected, the external navigator's **CDI** Key is used to switch the G3X Touch HSI between GPS and VOR/ILS navigation.

VOR

1. Tune a VOR station in the external navigator.
2. Navigation Source ..... Select VOR on the external navigator
3. G3X Touch CDI source ..... Touch the HSI display on the PFD. PFD Options window opens.
4. Select the external navigator from the CDI Source window (VOR 1 or 2).
5. Press and Hold **BACK** Button to return to normal PFD display.
6. Set the CDI to the desired course ..... Touch the Selected Course window on the PFD
7. Enter the desired VOR course, press ENTER
8. Establish Intercept Heading
9. Select GFC 500 autopilot modes for intercepting or tracking the selected course ..... VOR will be displayed on the AFCS Status Box.

NOTE

VOR will be annunciated in WHITE if the mode is armed or in GREEN if VOR is the active lateral mode.

GPS DIRECT TO

1. Navigation Source ..... Select GPS on the external navigator
2. Select waypoint and execute the Direct-TO on the external navigator
3. G3X Touch CDI source ..... Touch the HSI display on the PFD. PFD Options window opens.
4. Select the external navigator from the CDI Source window (GPS).
5. Press and Hold **BACK** Button to return to normal PFD display.

GPS OBS

1. Navigation Source ..... Select GPS on the external navigator
2. Select waypoint and make it the active waypoint.
3. Set external navigator to OBS mode
4. G3X Touch CDI source ..... Touch the HSI display on the PFD. PFD Options window opens.
5. Select the external navigator from the CDI Source window (GPS 1 or 2).
6. Press and Hold **BACK** Button to return to normal PFD display.
7. Set the CDI to the desired course ..... Touch the Selected Course (OBS) window on the PFD.
8. Enter the desired GPS course, press ENTER
9. Establish Intercept Heading
10. Select GFC 500 autopilot modes for intercepting or tracking the selected course ..... GPS will be displayed on the FD mode bar.

4.5 Approaches

ILS

1. Load the approach into the External navigator ..... Verify external navigator tunes the proper frequency. Select it as the active frequency.
2. Navigation Source ..... Select LOC on the external navigator
3. Approach Minimums ..... Set the barometric minimums alert bug
   - On the PFD, Touch the **HSI.**
   - Touch the Highlight Minimums window.
   - Enter Barometric Altitude Minimums and touch ENTER
4. G3X Touch CDI source ..... Touch the HSI display on the PFD. PFD Options window opens.
5. Select the external navigator from the CDI Source window (LOC 1 or 2).
6. Press and Hold BACK Button to return to normal PFD display.

If Flying Vectors-To-Final:

7. Activate Vectors-to-Final on the external navigator, verify CDI changes to LOC and slews to the inbound course,

   OR

   - If using a VHF navigation receiver, set the CDI to the desired course ..... Touch the Selected Course window on the PFD.
   - Enter the desired LOC course, press ENTER.

8. Establish Intercept Heading.
9. Verify ACTIVE and ARMED modes on the AFCS Status Box on the PFD, if using the GFC 500 autopilot/FD.
10. Upon reaching the LOC course, turn inbound and follow the ILS course and vertical guidance.
11. Set Missed Approach Altitude ..... Touch the Reference Altitude display. Enter the missed approach altitude.
12. At Decision Altitude (DA), continue visually for a normal landing,

    OR

    Press GO AROUND button and fly the missed approach procedure.

If Flying Full Approach Including Transition:

ACTIVATE THE APPROACH on the External navigator

OR

ACTIVATE a DIRECT TO the IAF on the External navigator.

7. Navigation Source ..... Select GPS on the external navigator
8. Select IAF waypoint and execute the Direct-TO on the external navigator
9. G3X Touch CDI source ..... Touch the HSI display on the PFD.
   PFD Options window opens.
10. Select the external navigator from the CDI Source window (GPS 1 or 2).
11. Press and Hold BACK Button to return to normal PFD display.
12. Verify ACTIVE and ARMED modes on the AFCS Status Box on the PFD, if using the GFC 500 autopilot/FD.

NOTE

The airplane will navigate in GPS mode throughout the intermediate portion of the approach procedure. When the airplane is inbound towards the final approach course, the CDI will automatically switch from GPS navigation to LOC navigation.

13. Verify ..... Course pointer slews to the front course.
14. Upon reaching the LOC course ..... Turn inbound and follow the ILS course and vertical guidance.
15. Set Missed Approach Altitude ..... Touch the Reference Altitude display. Enter the missed approach altitude.
16. At Decision Altitude (DA), Continue visually for a normal landing,

    OR

    Press GO AROUND button and fly the missed approach procedure.

ILS GLIDE SLOPE INOPERATIVE

1. Load the approach into the External navigator ..... Verify external navigator tunes the proper frequency. Select it as the active frequency.
2. Navigation Source ..... Select LOC on the external navigator
3. Approach Minimums ..... Set the barometric minimums alert bug:
   - On the PFD, Touch the HSI.
   - Touch the Highlight Minimums window.
   - Enter Barometric Altitude Minimums and touch ENTER
4. G3X Touch CDI source ..... Touch the HSI display on the PFD.
   PFD Options window opens.
5. Select the external navigator from the CDI Source window (LOC 1 or 2).
6. Press and Hold BACK Button to return to normal PFD display.

If Flying Vectors-To-Final:

7. Activate Vectors-to-Final on the external navigator, Verify CDI changes to LOC and slews to the inbound course,

   OR

   - If using a VHF navigation receiver, set the CDI to the desired course .....Touch the Selected Course window on the PFD.
   - Enter the desired LOC course, press ENTER.

8. Establish Intercept Heading.
9. Verify ACTIVE and ARMED modes on the AFCS Status Box on the PFD, if using the GFC 500 autopilot/FD.
10. Upon reaching the LOC course, turn inbound and follow the LOC course.
11. Set Minimum Descent Altitude (MDA)..... Touch the Reference Altitude display. Enter the Minimum Descent Altitude.
12. At the Final Approach Fix (FAF), begin descent to an intermediate altitude or the Minimum Descent Altitude.
13. At the Minimum Descent Altitude, Set Missed Approach Altitude .....Touch the Reference Altitude display. Enter the Missed Approach Altitude.
14. At Missed Approach Point, Continue visually for a normal landing,

    OR

    Press GO AROUND button and fly the missed approach procedure.

If Flying Full Approach Including Transition:

ACTIVATE THE APPROACH on the External navigator,

OR

ACTIVATE a DIRECT TO the IAF on the External navigator.

7. Navigation Source ..... Select GPS on the external navigator
8. Select IAF waypoint and execute the Direct-TO on the external navigator
9. G3X Touch CDI source .....Touch the HSI display on the PFD. PFD Options window opens.
10. Select the external navigator from the CDI Source window (GPS 1 or 2).
11. Press and Hold BACK Button to return to normal PFD display.
12. Verify ACTIVE and ARMED modes on the AFCS Status Box on the PFD, if using the GFC 500 autopilot/FD.

NOTE

The airplane will navigate in GPS mode throughout the intermediate portion of the approach procedure. When the airplane is inbound towards the final approach course, the CDI will automatically switch from GPS navigation to LOC navigation.

13. Verify.....Course pointer slews to the front course.
14. Upon reaching the LOC course, turn inbound and follow the LOC course.
15. Set Minimum Descent Altitude (MDA)..... Touch the Reference Altitude display. Enter the Minimum Descent Altitude.
16. At the Final Approach Fix (FAF), begin descent to an intermediate altitude or the Minimum Descent Altitude.
17. At the Minimum Descent Altitude, Set Missed Approach Altitude ..... Touch the Reference Altitude display. Enter the Missed Approach Altitude.
18. At Missed Approach Point, Continue visually for a normal landing,

    OR

    Press GO AROUND button and fly the missed approach procedure.

RNAV (GPS) OR RNAV (GNSS) – (LPV, LP+V, LNAV/VNAV, or LNAV+V)

NOTE

Some RNAV (GPS) or (GNSS) approaches provide a vertical descent angle as an aid in flying a stabilized approach. These approaches are NOT considered Approaches with Vertical Guidance (APV). Approaches that are annunciated on the HSI as LP+V, LNAV, or LNAV+V are considered Non-precision Approaches (NPA) and are flown to an MDA even though vertical glidepath (GP) information may be provided. LP approaches may not be available outside of the United States.

1. Load the approach into the External navigator.
2. Navigation Source ..... Select GPS on the external navigator
3. Approach Minimums..... Set the barometric minimums alert bug:
   - On the PFD, Touch the HSI.
   - Touch the Highlight Minimums window.
   - Enter Barometric Altitude Minimums and touch ENTER
4. G3X Touch CDI source .....Touch the HSI display on the PFD. PFD Options window opens.
5. Select the external navigator from the CDI Source window (GPS 1 or 2).
6. Press and Hold BACK Button to return to normal PFD display.

If Flying Vectors-To-Final:

7. Activate Vectors-to-Final on the external navigator.... Verify CDI slews to the inbound course.

8. Establish Intercept Heading.
9. Verify ACTIVE and ARMED modes on the AFCS Status Box on the PFD, if using the GFC 500 autopilot/FD.
10. Upon reaching the GPS course, turn inbound and follow the GPS course and GP vertical guidance.
11. Verify on the HSI the Navigation mode indicates the approach being flown, (LPV, LP+V, LNAV/VNAV, or LNAV+V)
12. Set Missed Approach Altitude ..... Touch the Reference Altitude display. Enter the missed approach altitude.
13. At Decision Altitude (DA or MDA for an LNAV+V), Continue visually for a normal landing,

OR

Press GO AROUND button and fly the missed approach procedure.

If Flying Full Approach Including Transition:

ACTIVATE THE APPROACH on the External navigator,

OR

ACTIVATE a DIRECT TO the IAF on the External navigator.

7. Navigation Source ..... Select GPS on the external navigator
8. Select IAF waypoint and execute the Direct-TO on the external navigator
9. G3X Touch CDI source ..... Touch the HSI display on the PFD. PFD Options window opens.
10. Select the external navigator from the CDI Source window (GPS 1 or 2).
11. Press and Hold BACK Button to return to normal PFD display.
12. Verify ACTIVE and ARMED modes on the AFCS Status Box on the PFD, if using the GFC 500 autopilot/FD.

NOTE

The airplane will navigate in GPS mode throughout the intermediate portion of the approach procedure. When the airplane is inbound towards the final approach course, the CDI will automatically slew to the inbound course.

13. Verify ..... Course pointer slews to the front course
14. Upon reaching the GPS course, turn inbound and follow the GPS course and GP vertical guidance.
15. Verify on the HSI the Navigation mode indicates the approach being flown, (LPV, LP+V, LNAV/VNAV, or LNAV+V)
16. Set Missed Approach Altitude ..... Touch the Reference Altitude display. Enter the missed approach altitude.

17. At Decision Altitude (DA or MDA for a LPV+V or LNAV+V), continue visually for a normal landing,

    OR

    Press GO AROUND button and fly the missed approach procedure.

RNAV (GPS) OR RNAV (GNSS) – (LNAV, LP)

NOTE

Some RNAV (GPS) or (GNSS) approaches provide a vertical descent angle as an aid in flying a stabilized approach. These approaches are NOT considered Approaches with Vertical Guidance (APV). Approaches that are annunciated on the HSI as LP+V, LNAV, or LNAV+V are considered Non-precision Approaches (NPA) and are flown to an MDA even though vertical glidepath (GP) information may be provided. Approaches that are annunciated on the HSI as LP will not have vertical glidepath (GP) information provided. LP approaches may not be available outside of the United States.

1. Load the approach into the External navigator.
2. Navigation Source ..... Select GPS on the external navigator
3. Approach Minimums..... Set the barometric minimums alert bug:
   - On the PFD, Touch the HSI.
   - Touch the Highlight Minimums window.
   - Enter Barometric Altitude Minimums and touch ENTER
4. G3X Touch CDI source .....Touch the HSI display on the PFD.
   PFD Options window opens.
5. Select the external navigator from the CDI Source window (GPS 1 or 2).
6. Press and Hold BACK Button to return to normal PFD display.

If Flying Vectors-To-Final:

7. Activate Vectors-to-Final on the external navigator .... Verify CDI slews to the inbound course.
8. Establish Intercept Heading.
9. Verify ACTIVE and ARMED modes on the AFCS Status Box on the PFD, if using the GFC 500 autopilot/FD.
10. Upon reaching the GPS course, turn inbound and follow the GPS course.
11. Verify on the HSI the Navigation mode indicates the approach being flown, (LNAV or LP)
12. Set Minimum Descent Altitude (MDA)..... Touch the Reference Altitude display.
    Enter the Minimum Descent Altitude.
13. At the Final Approach Fix (FAF), begin descent to an intermediate altitude or the Minimum Descent Altitude.
14. At the Minimum Descent Altitude, Set Missed Approach Altitude ..... Touch the Reference Altitude display.
    Enter the Missed Approach Altitude.
15. At Missed Approach Point, Continue visually for a normal landing,

OR

Press GO AROUND button and fly the missed approach procedure.

If Flying Full Approach Including Transition:

ACTIVATE THE APPROACH on the External navigator,

OR

ACTIVATE a DIRECT TO the IAF on the External navigator.

7. Navigation Source ..... Select GPS on the external navigator
8. Select IAF waypoint and execute the Direct-TO on the external navigator
9. G3X Touch CDI source ..... Touch the HSI display on the PFD. PFD Options window opens.
10. Select the external navigator from the CDI Source window (GPS 1 or 2).
11. Press and Hold BACK Button to return to normal PFD display.
12. Verify ACTIVE and ARMED modes on the AFCS Status Box on the PFD, if using the GFC 500 autopilot/FD.

NOTE

The airplane will navigate in GPS mode throughout the intermediate portion of the approach procedure. When the airplane is inbound towards the final approach course, the CDI will automatically slew to the inbound course.

13. Verify..... Course pointer slews to the front course
14. Upon reaching the GPS course, turn inbound and follow the GPS course.
15. Verify on the HSI the Navigation mode indicates the approach being flown, (LNAV or LP)
16. Set Minimum Descent Altitude (MDA)..... Touch the Reference Altitude display. Enter the Minimum Descent Altitude.
17. At the Final Approach Fix (FAF), begin descent to an intermediate altitude or the Minimum Descent Altitude.
18. At the Minimum Descent Altitude, Set Missed Approach Altitude ..... Touch the Reference Altitude display. Enter the Missed Approach Altitude.
19. At Missed Approach Point, Continue visually for a normal landing,

OR

Press GO AROUND button and fly the missed approach procedure.

VOR APPROACH

1. Load the approach into the External navigator ..... Verify external navigator tunes the proper frequency. Select it as the active frequency.
2. Navigation Source ..... Select GPS on the external navigator
3. Approach Minimums ..... Set the barometric minimums alert bug:
   - On the PFD, Touch the HSI.
   - Touch the Highlight Minimums window.
   - Enter Barometric Altitude Minimums and touch ENTER
4. G3X Touch CDI source ..... Touch the HSI display on the PFD. PFD Options window opens.
5. Select the external navigator from the CDI Source window (GPS 1 or 2).
6. Press and Hold BACK Button to return to normal PFD display.

If Flying Vectors-To-Final:

7. Activate Vectors-to-Final on the external navigator, Verify CDI slews to the appropriate course.
8. Navigation Source ..... Select VOR on the external navigator.
9. G3X Touch CDI source ..... Touch the HSI display on the PFD. PFD Options window opens.
10. Select the external navigator from the CDI Source window (VOR 1 or 2).
11. Verify the selected course ..... Touch the Selected Course window to adjust if needed.
12. Establish Intercept Heading.
13. Verify ACTIVE and ARMED modes on the AFCS Status Box on the PFD, if using the GFC 500 autopilot/FD.
14. Upon reaching the VOR course, turn inbound and follow the VOR course.
15. Set Minimum Descent Altitude (MDA) ..... Touch the Reference Altitude display. Enter the Minimum Descent Altitude.
16. At the Final Approach Fix (FAF), begin descent to an intermediate altitude or the Minimum Descent Altitude.
17. At the Minimum Descent Altitude, Set Missed Approach Altitude ..... Touch the Reference Altitude display. Enter the Missed Approach Altitude.
18. At Missed Approach Point, Continue visually for a normal landing,

    OR

    Press GO AROUND button and fly the missed approach procedure.

If Flying Full Approach Including Transition:

ACTIVATE THE APPROACH on the External navigator,

OR

ACTIVATE a DIRECT TO the IAF on the External navigator.

7. Navigation Source ..... Select GPS on the external navigator
8. Select IAF waypoint and execute the Direct-TO on the external navigator
9. G3X Touch CDI source ..... Touch the HSI display on the PFD. PFD Options window opens.
10. Select the external navigator from the CDI Source window (GPS 1 or 2).
11. Press and Hold BACK Button to return to normal PFD display.
12. Verify ACTIVE and ARMED modes on the AFCS Status Box on the PFD, if using the GFC 500 autopilot/FD.

NOTE

The airplane will navigate in GPS mode throughout the intermediate portion of the approach procedure.

13. When established inbound to the FAF ..... Navigation Source, Select VOR on the external navigator.
14. Verify ..... VOR is annunciated in the HSI.
15. Verify ..... Course pointer is on the FAF inbound course.
16. Set Minimum Descent Altitude (MDA) ..... Touch the Reference Altitude display. Enter the Minimum Descent Altitude.
17. At the Final Approach Fix (FAF), begin descent to an intermediate altitude or the Minimum Descent Altitude.
18. Adjust VOR course if needed inside the FAF.
19. At the Minimum Descent Altitude, Set Missed Approach Altitude ..... Touch the Reference Altitude display. Enter the Missed Approach Altitude.
20. At Missed Approach Point, Continue visually for a normal landing,

    OR

    Press GO AROUND button and fly the missed approach procedure.

BACK COURSE (BC)

1. Load the approach into the External navigator ..... Verify external navigator tunes the proper frequency. Select it as the active frequency.
2. Navigation Source ..... Select GPS on the external navigator
3. Approach Minimums ..... Set the barometric minimums alert bug:

- On the PFD, Touch the HSI.
- Touch the Highlight Minimums window.
- Enter Barometric Altitude Minimums and touch ENTER

4. G3X Touch CDI source ..... Touch the HSI display on the PFD. PFD Options window opens.
5. Select the external navigator from the CDI Source window (GPS 1 or 2).
6. Press and Hold BACK Button to return to normal PFD display.

If Flying Vectors-To-Final:

7. Activate Vectors-to-Final on the external navigator, Verify CDI changes slews to the localizer front course.
8. Navigation Source ..... Select LOC on the external navigator.
9. G3X Touch CDI source ..... Touch the HSI display on the PFD. PFD Options window opens.
10. Select the external navigator from the CDI Source window (LOC 1 or 2).
11. Verify the selected front course..... Touch the Selected Course window to adjust if needed.
12. Establish Intercept Heading.
13. Verify ACTIVE and ARMED modes on the AFCS Status Box on the PFD, if using the GFC 500 autopilot/FD.
14. Upon reaching the BC course, turn inbound and follow the BC course guidance.
15. Set Minimum Descent Altitude (MDA)..... Touch the Reference Altitude display. Enter the Minimum Descent Altitude.
16. At the Final Approach Fix (FAF), begin descent to an intermediate altitude or the Minimum Descent Altitude.
17. At the Minimum Descent Altitude, Set Missed Approach Altitude ..... Touch the Reference Altitude display. Enter the Missed Approach Altitude.
18. At Missed Approach Point, Continue visually for a normal landing,

    OR

    Press GO AROUND button and fly the missed approach procedure.

If Flying Full Approach Including Transition:

ACTIVATE THE APPROACH on the External navigator,

OR

ACTIVATE a DIRECT TO the IAF on the External navigator.

7. Navigation Source ..... Select GPS on the external navigator
8. Select IAF waypoint and execute the Direct-TO on the external navigator

9. G3X Touch CDI source ..... Touch the HSI display on the PFD. PFD Options window opens.
10. Select the external navigator from the CDI Source window (GPS 1 or 2).
11. Press and Hold BACK Button to return to normal PFD display.
12. Verify ACTIVE and ARMED modes on the AFCS Status Box on the PFD, if using the GFC 500 autopilot/FD.

NOTE

The airplane will navigate in GPS mode throughout the intermediate portion of the approach procedure.

13. When established inbound to the FAF ..... Navigation Source, Select LOC on the external navigator.
14. Verify ..... BC is annunciated in the HSI.
15. Verify ..... Course pointer is on the front course.
16. Set Minimum Descent Altitude (MDA) ..... Touch the Reference Altitude display. Enter the Minimum Descent Altitude.
17. At the Final Approach Fix (FAF), begin descent to an intermediate altitude or the Minimum Descent Altitude.
18. At the Minimum Descent Altitude, Set Missed Approach Altitude ..... Touch the Reference Altitude display. Enter the Missed Approach Altitude.
19. At Missed Approach Point, Continue visually for a normal landing,

    OR

    Press GO AROUND button and fly the missed approach procedure.

GO AROUND (GA)

1. Control Wheel ..... GRASP FIRMLY
2. GO AROUND button ..... PUSH
3. Rotate to Go Around attitude
4. Go Around ..... EXECUTE

NOTE

If using a Garmin external navigator and an instrument approach is loaded, the HSI will automatically change to GPS course guidance, and the flight plan will automatically sequence onto the missed approach portion of the flight plan.

5. Verify the HSI changes to the GPS navigation.
6. Verify that leg sequencing has unsuspended. If not, unsuspend leg sequencing.
7. Fly Published Missed Approach Procedure,

OR

Fly ATC Assigned Missed Approach Heading

NOTE

The pilot is responsible for initial missed approach guidance in accordance with published procedure. The G3X Touch may not provide correct guidance until the airplane is established on a defined leg of the procedure.

8. Set Missed Approach Altitude ..... Touch the Reference Altitude display. Enter the Missed Approach Altitude.

4.6 Barometric Minimums Alert

A barometric minimums alert is provided in the G3X Touch to enhance the pilot's awareness of approaching altitude minimums while flying an instrument approach procedure.

Setting the barometric minimums alert bug:

1. On the PFD, Touch the HSI.
2. Touch the Highlight Minimums window.
3. Enter Barometric Altitude Minimums and touch ENTER

CAUTION

If a new approach is loaded into an external IFR capable navigator, the pilot will need to update the Barometric Minimums Alert in the G3X Touch with the new approach's altitude minimums.

4.7 Transponder Operation (Optional)

Entering Transponder Code

1. Touch the transponder data box.
2. Use the keypad to enter a code and touch ENTER.

IDENT

1. Touch IDENT, the green bar illuminates momentarily.

4.8 Disable Electronic Stability Protection (ESP)

(If Installed, GFC 500 Autopilot)

To disable ESP for flight training purposes or aerobatic maneuvers:

On ground or in flight:

1. Touch the AFCS Status Box at the top of the PFD. Automatic Flight Control System window opens.
2. Highlight and Select ESP. The green ESP status bar extinguishes. ESP is disabled.

3. Press and Hold the BACK button to close the Automatic Flight Control System window and return to PFD display.

In flight only:

1. Press and hold the AP DISC switch for 5 seconds.

To reenable ESP:

1. Touch the AFCS Status Box at the top of the PFD. Automatic Flight Control System window opens.
2. Highlight and Select ESP. The green ESP status bar illuminates. ESP is enabled.
3. Press and Hold the BACK button to close the Automatic Flight Control System window and return to PFD display.

5 PERFORMANCE

No change.

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7 SYSTEM DESCRIPTION

The G3X Touch EFIS is scalable with a variety of configurations supported. The functions described in this section may not be available in all aircraft depending on installed equipment and interfaces. A minimum installation with a single display may be a standalone MFD or a PFD which can be split screened to provide both PFD and MFD functions. Optional functions include EIS, datalink traffic and weather, AOA, autopilot interface, remote audio panel, GPS/NAV/COM interface, transponder interface, and others.

7.1 Primary Flight Instruments

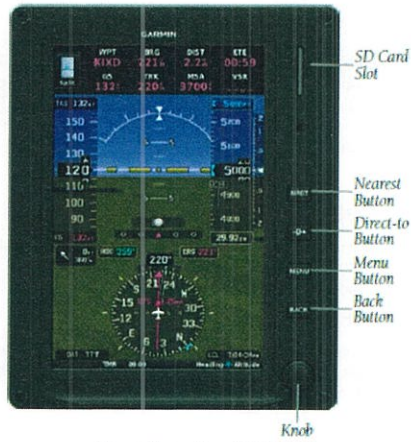
When a PFD is installed, attitude information is displayed over a virtual blue sky and synthetic ground with a white horizon line. The Attitude Indicator displays the pitch (indicated by the Amber symbolic aircraft on the pitch scale), roll, and slip/skid information.

The horizon line is part of the pitch scale. Pitch markings occur at 2.5° intervals through all pitch ranges.

The inverted white triangle indicates zero on the roll scale. Major tick marks at 30° and 60° and minor tick marks at 10°, 20°, and 45° are shown to the left and right of the zero. Angle of bank is indicated by the position of the pointer on the roll scale.

Slip/skid is indicated by the location of the ball.

Bezel Overview (GDU 460)



Bezel Overview (GDU 470)

NRST Key	Press to display the Nearest Page for viewing the nearest airports, intersections, NDBs, VORs, waypoints, frequencies, and airspaces
Direct-To Key	Press to activate the Direct-To function, enter a destination waypoint establish a direct-to course to the selected destination
MENU Key	Press once to view the Page Menu Press twice to view the Main Menu Press a third time to clear the Main Menu enabled.
BACK Key	Press to return to the previous screen Press and hold to return to the default MFD Page

The Standard Rate Turn Bank Angle Pointers are green pointers displayed on the roll scale that show the bank angle corresponding to a standard rate turn.

Standard Rate Turn Bank Angle Pointers

The Turn Rate Indicator is located at the top of the HSI. Tick marks to the left and right of the displayed heading denote standard turn rates (3 deg/sec). A magenta Turn Rate Trend Vector shows the current turn rate. The end of the trend vector gives the heading predicted in 6 seconds, based on the present

turn rate. A standard-rate turn is shown on the indicator by the trend vector stopping at the standard turn rate tick mark, corresponding to a predicted heading of 18° from the current heading. At rates greater than 4 deg/sec, an arrowhead appears at the end of the magenta trend vector and the prediction is no longer valid.

The Airspeed Indicator may be displayed as a vertical tape or a round dial. When the Airspeed Indicator is displayed as a tape, it displays a range of 70 knots on a rolling number gauge using a vertical tape. Numeric labels and major tick marks are shown at intervals of 10 knots. Minor tick marks are at intervals of 5 knots. The current airspeed is displayed in the black pointer. The True Airspeed (TAS) is displayed above the scale in white digits and the Ground Speed (GS) is displayed below the scale in magenta digits.

The Altimeter may be displayed as a vertical tape or a round dial. When the Altimeter is displayed as a tape, it displays 400 feet of barometric altitude values at a time on a rolling number gauge using a moving tape. Numeric labels and major tick marks are shown at intervals of 100 feet. Minor tick marks are at intervals of 20 feet. The current altitude is displayed in the black pointer. The barometric pressure setting is displayed below the Altimeter in inches of mercury (in Hg) or hectopascals (hPa) when metric units are selected.

The Selected Altitude is displayed above the Altimeter in the box indicated by a selection bug symbol. A bug corresponding to this altitude is shown on the altimeter; if the Selected Altitude exceeds the range shown on the tape, the bug appears at the corresponding edge of the tape.

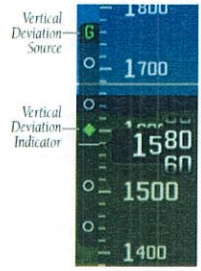
The Altitude Alerting function provides the pilot with visual and aural alerts when approaching the Selected Altitude. Whenever the Selected Altitude is changed, the Altitude Alerter is reset. The following will occur when approaching the Selected Altitude:

- Passing within 1000 feet of the Selected Altitude, the Selected Altitude (shown above the Altimeter) flashes for 5 seconds and an aural tone is generated.
- When the aircraft passes within 200 feet of the Selected Altitude, the Selected Altitude flashes for 5 seconds and an aural tone is generated to indicate that the aircraft is approaching the selected altitude.
- After reaching the Selected Altitude, if the pilot flies outside the deviation band (±200 feet of the Selected Altitude), the Selected Altitude changes to Amber text on a black background, flashes for 5 seconds, and an aural tone is generated.

The Vertical Speed Indicator (VSI) may be displayed as a tape or an arc segment. The VSI displays the aircraft vertical speed using a non-moving tape labeled at 500, 1000 and every 1000 fpm up to the maximum with minor tick marks every 100 feet up to 1000 fpm. The current vertical speed is displayed using a white arrow along the scale.

7.2 Vertical Deviation Indicators

The Vertical Deviation (Glideslope) Indicator (VDI) appears to the left of the altimeter whenever an ILS frequency is tuned in the active NAV field of an external navigator. A green diamond acts as the VDI Indicator. The green 'G' indicates an external glideslope source. If a localizer frequency is tuned and there is no glideslope signal, "NO GS" is annunciated.

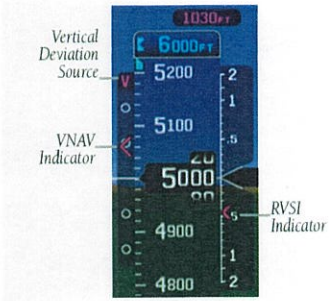


Vertical Deviation Indicator (Glideslope – ILS Source)

The Vertical Deviation (Glidepath) Indicator (VDI) also appears to the left of the altimeter during a GPS approach. The glidepath is analogous to the glideslope for GPS approaches supporting WAAS vertical guidance (LNAV+V, L/VNAV, LPV). The Glidepath Indicator appears on the G3X Touch as a magenta diamond. The magenta 'G' indicates a GPS source. If the approach type downgrades past the final approach fix (FAF), "NO GP" is annunciated.

Vertical Deviation Indicator (Glidepath – GPS Source)

An external navigation source is not required to receive VNAV indications. A magenta chevron (VNAV Indicator) to the left of the altimeter on the Vertical Deviation Scale shows the VNAV profile, and a magenta chevron (Required Vertical Speed Indicator (RVSI)) on the Vertical Speed Indicator indicates the required vertical speed to reach the target altitude. The magenta 'V' indicates a VNAV profile is active.



VNAV Indicator

7.3 HSI Annunciations

Some or all HSI annunciations may appear in the four quadrants of the G3X Touch HSI depending on the external navigator(s) configured.

Amber **LOI** – Loss of GPS integrity

Amber or Magenta **VFR** – An external GPS source is configured but there is not enough guidance data for IFR use.

Amber **REV** – External navigation source failed. Reverted to internal VFR GPS for navigation.

Amber **MSG** – External navigation source has a pending message

Cyan **INT** – The pilot has elected to use the internal GPS navigation source instead of the external GPS navigation source.

7.4 Course Deviation Indicator (CDI)

The HSI contains a Course Deviation Indicator (CDI), with a Course Pointer, To/From Indicator, and a sliding deviation bar and scale. The course pointer is a single line arrow (GPS1, VOR1, and LOC1) or a double line arrow (GPS2, VOR2, and LOC2) which points in the direction of the set course. The To/From arrow rotates with the course pointer and is displayed when the active NAVAID is received.

The Course Deviation Indicator (CDI) moves left or right from the course pointer along a lateral deviation scale to display aircraft position relative to the course. If the course deviation data is not valid, the CDI is not displayed.

Another Lateral Deviation Scale and combination Course Deviation and To/From Indicator is located below the slip/skid indicator.

CDI and Lateral Deviation Indication

The CDI can display two sources of navigation: GPS or NAV (VOR, localizer) depending on the external navigator(s) configured. Color indicates the current navigation source: magenta (for GPS) or green (for VOR and LOC). The full-scale limits for the CDI are defined by a GPS-derived distance when coupled to GPS. When coupled to a VOR or localizer (LOC), the CDI has the same angular limits as a mechanical CDI. If the CDI exceeds the maximum deviation on the scale (two dots) while coupled to GPS, the crosstrack error (XTK) is displayed below the white aircraft symbol.

In addition to the flight instruments, the PFD also displays supplemental information, including the Outside Air Temperature (OAT), wind data, User Timer, and G-Meter.

7.5 Display of PFD information on MFD

MFDs installed as part of the G3X touch system can display PFD information if manually selected by the pilot, or will automatically do so if the installed PFD display fails. The display of PFD information on an MFD is a duplication of the original PFD information and is not an independent compilation of data from other sources.

To manually display backup PFD information on an MFD:

1. On the MFD, press the MENU button twice.
2. Select Setup.
3. Select Display.
4. On a 7" GDU 470, set Full MFD/PFD Toggle to Enabled. On a 10" GDU 460, set MFD Split Screen Page to PFD.
5. Press and hold the BACK button to close the Display Setup window and return to MFD display.
6. On a 7" MFD, touch the PFD button in the upper corner to select the backup PFD display. On a 10" MFD, touch the Split button in the upper corner to select the backup PFD display.

7.6 Engine Indication System

The G3X Touch EIS (if installed) displays engine, electrical, and other system parameters. Gauges required to be displayed full time are located on the Main Engine Display which is always in view. Additional EIS information can be viewed on the Eng Page which can be selected by touching the Main Engine Display or by turning the 'Select Page' knob to the right on an MFD window.

Green bands on the instruments indicate normal ranges of operation; amber and red bands indicate caution and warning, respectively. When unsafe operating conditions occur, the corresponding caution readout will display solid amber and the warning readout will flash red. Most EIS caution and warning conditions also generate an alert message on the PFD, including gauges that may appear only on the Eng Page. An aural alert is also issued with a flashing red warning. If sensor data for an instrument becomes invalid or unavailable, a red "X" is displayed across the instrument.

7.7 Communication / Navigation / Surveillance System

The Communication/Navigation/Surveillance (CNS) system includes the audio interface, communication radios, navigation radios, and Mode S transponder. These functions can be accessed from the boxes that make up the CNS Data Bar located at the top of the PFD and/or MFD.

CNS Data Bar

7.8 Remote Transponder Interface

The G3X Touch is capable of interfacing with several remote transponders providing Mode S interrogation and reply capabilities. Transponder tuning for panel mount transponders is also supported.

Ground and Altitude Modes

Most Garmin transponders automatically transition between on-ground and in-air and operate in the appropriate mode at all times. No pilot action is required to manage modes unless there is a need to manually select STBY or ON modes.

G3X displays a green GND indication and transponder code in the Transponder Data Box while on-ground, and a green ALT indication when in-air, when not set to STBY or ON.

NOTE

Some panel mount transponders may indicate ALT on their dedicated display at all times, even while on-ground. As a result, in some installations, the transponder display and G3X display will indicate different modes while on the ground, although they are functionally equivalent.

Standby Mode (Manual)

When Standby mode is selected, the transponder does not reply to interrogations, but new codes can be entered. A white STBY indication and transponder code appear in the Transponder Data Box. The transponder will not automatically transition from STBY to ALT mode when the aircraft transitions from on-ground to in-air.

On Mode (Manual)

ON Mode can be selected at any time. ON Mode generates Mode A and Mode S replies, but Mode C altitude reporting is inhibited. In ON Mode, a green ON indication and transponder code appear in the Transponder Data Box.

Reply Status

When the transponder sends replies to interrogations, a green R indication appears momentarily in the Transponder Data Box.

IDENT Function

Touching IDENT sends a distinct identity indication to Air Traffic Control (ATC). The indication distinguishes the identing transponder from all the others on the air traffic controller's screen. After touching IDENT the bar on the button turns green momentarily.

7.9 Minimum Altitude Display and Alerting

When enabled by the pilot, an altitude minimums bug will be displayed in cyan on the barometric altitude tape.

Altitude minimums are accessed under the PFD Options Menu → Minimums sub menu and can be set by touchscreen keypad or dual-concentric knob.

Both visual and aural altitude minimums alerts are provided. During a descent to minimums, the minimums bug will change from cyan to white when the aircraft descends to within 100 ft of minimums. An aural "Minimums, Minimums" alert will be triggered when the aircraft's altitude descends through minimums and the minimums bug will change to Amber. As the aircraft altitude climbs back above minimums, the minimums bug will change to white 50 ft above minimums and cyan 150 ft above minimums. Alerting is rearmed once the aircraft is 150 ft or more above the minimum's altitude.

If a new approach is loaded into the external navigator, the Minimums Altitude display is not automatically updated with the new approach minimums. The pilot must update the Minimums Altitude Display with the MDA/DH for the approach loaded into the navigator.

7.10 AOA Probe

The G3X Touch PFD will display angle of attack from the GAP 26 AOA probe if installed. The GSU 25 uses the pressure from the GAP 26 probe and the pitot/static pressures it already receives from the existing aircraft pitot/static system to determine the aircraft's angle of attack (AOA).

The AOA indications and warnings presented on the G3X system are for reference only and are not intended as replacements for the aircraft's original stall warning system. The AOA stall warning margin and indications may not be the same at different flap settings and are only supported for positive G flight.

7.11 GAD 27 Wig Wag

The GAD 27 module (if installed) provides a feature that provides the ability to flash the Landing and Taxi lights of the airplane in an alternating fashion, otherwise known as "Wig Wag". Two 3-position switches control this feature, one for the landing lights and one for the taxi lights:

- ON – Respective light is on
- FLASH – Respective light will flash
- OFF – Respective light is off

When both switches are in the FLASH position, the landing and taxi lights alternate off and on with each other to produce the 'Wig-Wag' effect.

Before landing, switch to ON for steady landing lights.

7.12 EIS Caution / Warning Lights

If the G3X EIS display is outside the pilot's primary field of view and a PFD is not installed to provide EIS annunciations, discreet Caution/Warning lights are installed. The lights are installed in the primary field of view and are labeled ENGINE. Only a G3X EIS exceedance from a gauge on the Main EIS Display triggers the EIS Caution/Warning lights. EIS gauges that are not on the Main EIS Display do not alert.

7.13 Smart Glide

When installed with a Garmin GTN Xi with Smart Glide enabled, the G3X Touch will provide Smart Glide map indications, annunciation of GLIDE, and Emergency Page data for the Smart Glide feature. For more details on the Smart Glide function, refer to the GTN Xi Pilot's Guide (190-02327-03, revision D or later) and GTN Xi AFMS (P/N 190-01007-C2 or 190-01007-C3, revision 4 or later).

7.14 SFD Baro Sync

Cyan background coloring of the altimeter barometric window on either the G5/GI 275 or G3X PFD altimeters indicates that the altimeter setting is automatically changing to synchronize with the other unit. This feature is called **SFD Baro Sync**.

SFD Baro Sync can be **Enabled** or **Disabled** in the G3X Touch PFD Menu. It defaults to Enabled when the system is powered on. When **SFD Baro Sync** is enabled, and the pilot changes the altimeter setting on one altimeter, the other altimeter setting changes automatically and indicates in inverse video (cyan background with black numbers).

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Olathe, Kansas 66062 U.S.A.

EASA Approved AIRPLANE FLIGHT MANUAL SUPPLEMENT

G3X Touch Electronic Flight Instrument System

Dwg. Number: 190-01754-02 Rev. 1

This Supplement is Applicable to the Following Manuals:

190-01754-01

This Supplement must be attached to the FAA Approved STC Airplane Flight Manual Supplement when the GARMIN G3X Touch Electronic Flight Instrument System is installed in accordance with STC SA01899WI. The information contained herein supplements the information of the STC Airplane Flight Manual Supplement. For Limitations, Procedures, and Performance information not contained in this Supplement consult the basic Pilot's Operating Handbook, FAA Approved Airplane Flight Manual and the FAA Approved STC Airplane Flight Manual Supplement.

Airplane Serial Number: LC097

Airplane Registration Number: HB-MGB

Signed By:

Robert G. Murray
ODA STC Unit Administrator
Garmin International Inc.
ODA-240087-CE

Date: JULY 16, 2020

EASA Approval No. 10073816
Revised: --

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Log of Revisions

EASA Approved AIRPLANE FLIGHT MANUAL SUPPLEMENT

GARMIN G3X Touch Electronic Flight Instrument System
AML STC

REV NO.	PAGE NO(S)	DESCRIPTION	DATE OF APPROVAL	EASA APPROVED
1	ALL	Original Issue	See Cover	See Cover

Table of Contents

Section 1 - General

The information in this supplement is EASA-approved material and must be attached to the FAA Approved STC Airplane Flight Manual Supplement, p/n 190-01754-01 when the airplane has been modified by installation of the Garmin G3X Touch Electronic Flight System in accordance with STC SA01899WI.

This EASA approved Airplane Flight Manual Supplement is required in addition to the FAA approved Airplane Flight Manual Supplement, p/n 190-01754-01.

Section 2 – Limitations

No change except as shown below.

2.23 Portable Electronic Devices
Data Received by Personal Electronic Devices (PED)

The PED is not approved as the sole source of information to base tactical or strategic decision making and is not approved to replace the information provided by the Garmin G3X EFIS. The G3X's Bluetooth interface and data provided to a portable electronic device is not approved to replace any required or installed aircraft display equipment, including navigation or traffic/weather display equipment. The data presented on the PED may not have the required integrity to be used as the sole source of information to base tactical or strategic decision making.

2.24 Kinds of Operations
FAA operational requirements (14 Code of Federal Regulations Part 91, Part 121, and Part 135) do not apply to aircraft operated under European Operational requirements.

Flight Plan Transfer
Use of the G3X's Bluetooth connectivity for flight plan importing during critical phases of flight by the pilot flying is prohibited.

Electronic Flight Bag (EFB)
Use of the G3X's Bluetooth interface and data for the purpose of Electronic Flight Bag (EFB) applications is not approved as part of this STC. Use of any device as an EFB may require separate approvals.

Section 3 – Emergency Procedures

No Change except as shown below

3.7 EIS Failure

2. Land as soon as practical

Section 4 – Normal Procedures

References to "LP" approaches should be disregarded for aircraft operating within European airspace.

Section 5 - Performance

No Change

Section 6 – Weight and Balance

No Change

Section 7 – Systems Description

No Change