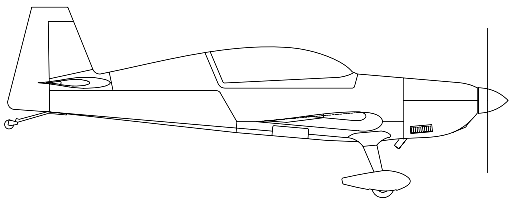
INFORMATION MANUAL

EXTRA 300L

MANUFACTURER

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



W A R N I N G

This is an Information Manual and may be used for general purposes only.

This Information Manual is not kept current.

It must not be used as a substitute for the official FAA/EASA Approved Pilot's Operating Handbook required for operation of the airplane.

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LOG OF REVISIONS

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Rev. No. 11, 2nd Ed. .... 20. January 2016	Approved under the authority of DOA N° EASA.21J.073 Date of Approval .... 11. March 2016

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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 Flugzeug-produktions- 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/techservice.php), 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.

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SECTION 1

GENERAL

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1.0 DESCRIPTION

The airframe of the EXTRA 300L is built of a tig-welded steel-tube construction. Wings, empennage and landing gear are manufactured of composite material.

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

1.1 SPECIFICATION OF CLASS

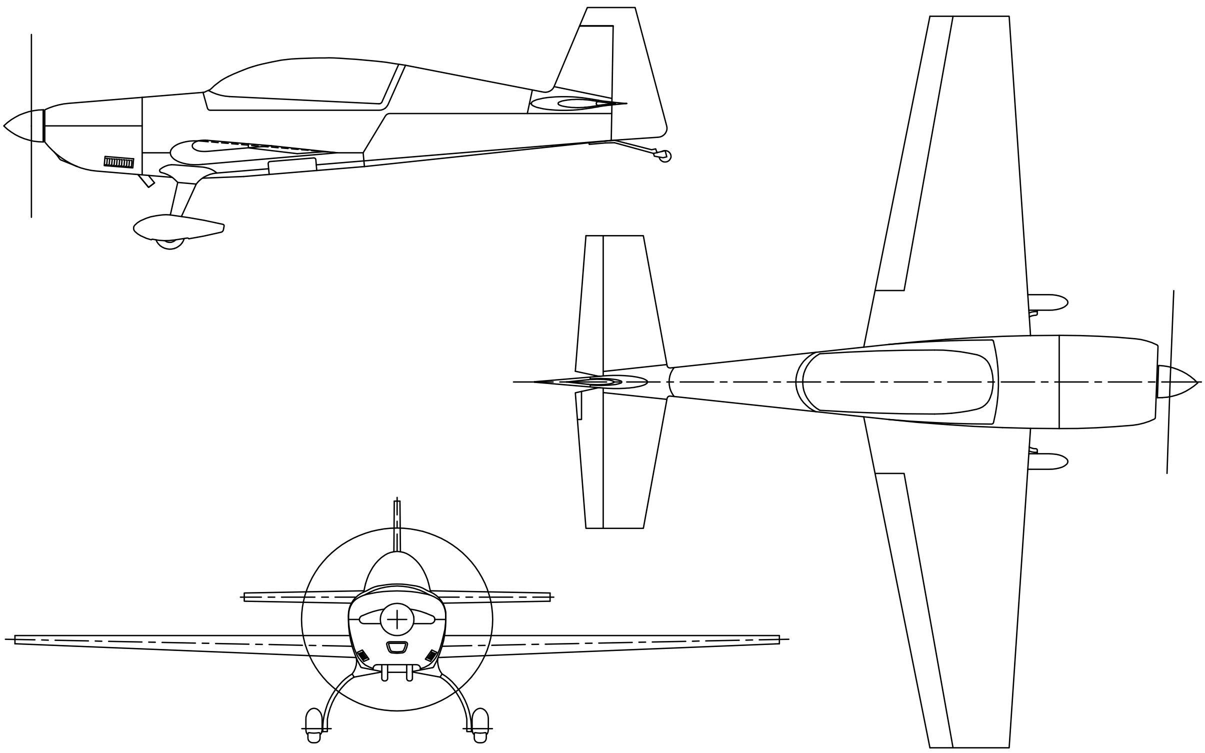
The aircraft is certified in normal and acrobatic category (T.C.D.S. EASA.A.362).

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	6,96 m (22,83 ft)
- Height	2,62 m (8,60 ft)
- Span	8,00 m (26,25 ft)
- Wheel-base	5,07 m (16,63 ft)
- Wheel-track	1,80 m (5,91 ft)

1.3.3 WING

- Wing span	8,0 m (26,25 ft)
- Wing-area	10,7 m² (115,17 ft²)
- Airfoil	Root: MA 15 S. Tip, MA 12 S
- Chord	Root: 1,85 m. Tip, 0,88 m
- MAC	1,404 m (4,61 ft)
- Aileron area	2 x 0,855 m² (2 x 9,20 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 FX 71-L-150/30

1.3.5 ELEVATOR

- Area	0,77 m² (8,29 ft²)
- Elevator-deflection	up/down 25°, tolerance ±2°
- Trim-tab-deflection	up 40°, down 50°, tolerance ±5°

1.3.6 VERTICAL TAIL

- Area	1,39 m² (14,96 ft²)
- Airfoil	Wortmann FX 71-L-150/30

1.3.7 RUDDER

- Area	0,51 m² (5,49 ft²)
- Rudder deflection	left/right 30°, tolerance ±2°

1.4 ENGINE

Manufacturer: Textron-Lycoming Williamsport Plant PA 17701 USA.
a) Type Lycoming AEIO-540-L1B5
b) Type Lycoming AEIO-540-L1B5D

Rated power: 300 HP @ 2700 RPM; 270 HP @ 2400 RPM

1.5 PROPELLER

Manufacturer: MT-Propeller Entwicklung GmbH, Federal Republic of Germany.
a) Type MTV-9-B-C/C 200-15 3-blade constant speed.
b) Type MTV-14-B-C/C 190-17 4-blade constant speed.

1.5.1 EXHAUST SYSTEMS (OPTIONAL)

Manufacturer: Gomolzig Flugzeug- und Maschinenbau GmbH, Federal Republic of Germany
Exhaust Silencer for standard system: PN: EA 300 NSD GO3-606500.
Complete 6 in 1 System with integrated Silencer: PN: EA 300-606000

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:	171 L	(45.1 US.gal)
- Wingtanks (2 x 60 L):	120 L	(31.7 US.gal)
- Acro & center tank:	51 L	(13.4 US.gal)
Usable fuel capacity in the system:	165.5 L	(43.7 US.gal)
Usable fuel capacity for acrobatic:	45.5 L	(12.0 US.gal)

1.7 OIL

Maximum sump capacity:	16 US.qt
Minimum sump capacity:	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	88,8 kg/m²	Normal
	76,6 / 81,3 kg/m²	Acrobatic (1 seat / 2 seats)
Power loading	3,17 kg/hp	Normal
	2.73 / 2.90 kg/hp	Acrobatic (1 seat / 2 seats)

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 CONVERSION TABLE

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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SECTION 2

LIMITATIONS

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.

N O T E

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 *SERVICE MANUAL EA 300/L* can be performed.

2.2 AIR SPEED (IAS)

Never Exceed Speed	V_{NE}	220 knots	(407 km/h)
Max. Structural Cruising Speed (Normal Cat.)	V_{NO}	140 knots	(259 km/h)
Max. Structural Cruising Speed (Acro I , Acro II)	V_{NO}	158 knots	(293 km/h)
Maneuver Speed (Normal Cat.)	V_A	140 knots	(259 km/h)
Maneuver Speed (Acro I , Acro II)	V_A	158 knots	(293 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-540-L1B5 / AEIO-540-L1B5D with rated maximum 300 HP @ 2700 RPM.

2.4.1 FUEL

Minimum grade aviation gasoline: 100/100LL; for alternate fuelgrades see latest revision of Lyc. S.I. No. 1070
Total fuel capacity: 171 L (45.1 US.gal).
Usable fuel capacity: 165.5 L (43.6 US.gal).
For acrobatic flight wing tanks must be empty.
Total fuel capacity for acrobatic: 51 L (13.4 US.gal) in acro & center tank.
Usable fuel capacity for acrobatic: 45.5 L (12.0 US.gal) in acro & center tank.

2.4.2 ENGINE LIMITATIONS

a) Rotational Speed

-Maximum Take-Off and Maximum Continuous	2700 rpm

b) Oil-temperature

-Max	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 Psi
-Normal	379 - 655 kPa	55 - 95 Psi
-Starting, Warm up, Taxi and Take-Off	793 kPa	115 Psi

⚠ WARNING

It is normal for the oil pressure to "flicker" from 10 to 30 psi (69 to 207 kPa) 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 psi (kPa) 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

-Max	276 kPa	40 Psi
-Min	124 kPa	18 Psi
-Min Idle	83 kPa	12 Psi

f) Cylinder head temperature

-Max	260°C	500°F

2.5 PROPELLER

MT-Propeller Entwicklung GmbH, Federal Republic of Germany

a) Type MTV-14-B-C/C190-17

-Maximum Take-Off and Maximum Continuous	2700 rpm

b) Type MTV-9-B-C/C200-15

-Maximum Take-Off (5 min)	2700 rpm
-Maximum Continuous	2400 rpm*

N O T E*

RPM limitation due to compliance with applicable noise protection requirements (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		745 kg (1643lbs)
-Acrobatic category	(1 seat)	701 kg (1546lbs)
	(2 seats)	665 kg (1466lbs)
Max allowed T/O weight:		
-Normal category		950 kg (2095 lbs)
-Acrobatic category	(1 seat)	820 kg (1808 lbs)
	(2 seats)	870 kg (1918 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 (1 SEAT)

Max T/O Weight:	forward C.G.	rear C.G.
820 kg (1808 lbs) (and below)	67.1 cm (26.4")	84.1 cm (33.1")

2.7.3 ACROBATIC FLIGHT (2 SEATS)

Max T/O Weight:	forward C.G.	rear C.G.
870 kg (1918 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. Recommended basic maneuver entry speeds are listed in the following list.

N O T E

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.

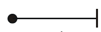
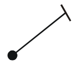
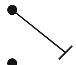
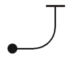
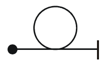
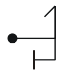
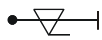
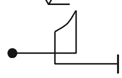
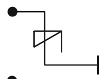
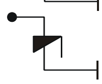
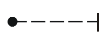
Check weight and C/G!

W A R N I N G

Particular caution must be exercised when performing maneuvers at speeds above V_A [158 KIAS (293 km/h)]. Large or abrupt control inputs above this speed may impose unacceptably high loads which exceed the structural capability of the aircraft.

N O T E

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

Maneuvers	Recommended entry speeds IAS min knots (km/h)	max knots (km/h)	Symbol	Remarks
Segment: horizontal Line	V_S	V_{NE}		
45°climbing	80 (148)	V_{NE}		
90° up	V_A	V_{NE}		
45° diving	V_S	V_{NE}		reduce throttle
90° diving	V_S	V_{NE}		reduce throttle
1/4 Loop climb.	100 (185)	190 (352)		
Looping	100 (185)	190 (352)		
Stall turn	100 (185)	190 (352)		
Aileron roll	80 (148)	V_A		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

+ 6 g
- 3 g

2.9.2 ACROBATIC FLIGHT

+ 10 g / - 10 g for 1 seat occupied (MTOW 820 kg / 1808 lbs)
+ 8 g / - 8 g for 2 seat occupied (MTOW 870 kg / 1918 lbs)

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 OPERATIONAL 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) a reversible temperature indicator (*STRUCTURAL OVERHEAT INDICATOR*) is applied on the upper side of the wing main spar in the carry-through section. After reaching the temperature limit of 72°C (161,6°F) the word "*RISK*" appears and flying is prohibited.

STRUCTURAL OVERHEAT INDICATOR
EXTRA
RISK
CAUTION:
While the word *RISK* appears, flying is prohibited !

2.12 MAXIMUM OPERATING ALTITUDE

Max. certified operating altitude is 16000 ft MSL (4877 m)

2.13 TIRE PRESSURE

The tire pressure is 3,4 Bar (49,3 PSI).

2.14 MARKINGS AND PLACARDS
2.14.1 AIRCRAFT IDENTITY PLACARDS

MANUFACTURER
EXTRA FLUGZEUGBAU GMBH
MODEL: EA 300/L
SERIAL NUMBER: _______
TC-NUMBER:

or

EXTRA
FLUGZEUGPRODUKTIONS-
UND VERTRIEBS-GMBH
MODEL: EA 300/L
SERIAL NUMBER: _______

TC-NUMBER: A67EU

2.14.2 OPERATING PLACARDS

V_A= 158 KTS (ACRO)
V_A= 140 KTS (NORMAL)

or

V_A= 293 km/h (ACRO)
V_A= 259 km/h (NORMAL)

(near 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 WHICH 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 LIMITATION MUST BE OBSERVED.

(in the rear cockpit)

THIS AIRPLANE IS CERTIFICATED FOR VFR, DAY OPERATION. OPERATION IN KNOWN ICING CONDITIONS IS PROHIBITED.

(on the rear instrument panel)

F U E L
AVGAS 100/100 LL

(near each filler cap)

OIL

(on the separate hatch / upper cowling)

FUEL SELECTOR =>

WING TANK
120 L USABLE (31,7 US GAL)

ACRO & CENTER
45.5 L USABLE (12.0 US GAL)

O F F

(in both cockpits near selector valve handle)

NOSE DOWN <= NEUTRAL=> NOSE UP
TRIM

(near the handle at the right side in the rear cockpit)

WING TANK
MUST BE EMPTY FOR ACROBATICS

(on the rear instrument panel under fuel capacity indicator)

ACRO & CENTER TANK
SHOWS *"ZERO"* IN LEVEL FLIGHT BELOW 11 L (2.9 US GAL)
UNUSABLE FUEL 5.5 L (1.5 US GAL.)

Placard	Location
THE REMAINING FUEL IN LEVEL FLIGHT CANNOT BE USED SAFELY WHEN INDICATOR READS "*ZERO*".	(on the rear instrument panel under the acro & center tank fuel capacity indicator)
ACROBATIC: ± 10 G, 1 PILOT MTOW: 820 KG (1808 LBS) ± 8 G, 2 PERSON ON BOARD MTOW: 870 KG (1918 LBS)	(in both cockpits)
NORMAL: + 6 G/ -3 G; MTOW: 950 KG (2095 LBS) ACROBATICS INCL. SPIN NOT APPROVED	(in both cockpits)
AUXILIARY FUEL PUMP ON OFF	(near pump-switch on the instrument panel in the rear cockpit)
NO SMOKING	(in both cockpits)
USE OF HEADSET IS REQUIRED USE OF PARACHUTE IS RECOMMENDED	(on the right side of both instrument panels)
NO BAGGAGE	(on Lexan® cover aft pilot's seat, if installed)
MAGNETIC DIRECTION INDICATOR CALIBRATION	(near Mag. Dir. Indicator)
LOW RPM <= PROP => HIGH RPM	(on RPM control unit in the rear cockpit)
LEAN <= MIXTURE => RICH	(on mixture control unit in the rear cockpit)
CLOSE <= THROTTLE => OPEN	(near throttle control in both cockpits)
LOCK <= CANOPY => UNLOCK	(near canopy locking handles of each cockpit)
VENT OPEN	(near the eyeball-type adjustable vents)

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	158
45°climbing	80	V_{NE}	Snap roll	80	140
90° up	158	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	Airspeeds max km/h	Maneuvers	Airspeeds min km/h	Airspeeds max km/h
Segment:					
Horizontal Line	V_S	V_{NE}	Aileron roll	148	293
45°climbing	148	V_{NE}	Snap roll	148	259
90° up	293	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			

CAUTION
Particular caution must be exercised when performing maneuvers at speeds above V_A (158 KIAS). Large or abrupt control inputs above this speed may impose unacceptably high loads which exceed the structural capability of the aircraft.

or

CAUTION
Particular caution must be exercised when performing maneuvers at speeds above V_A (293 km/h). Large or abrupt control inputs above this speed may impose unacceptably high loads which exceed the structural capability of the aircraft.

(in both cockpits)

WARNING:
SOLO FLYING FROM REAR SEAT ONLY!

(on front instrument panel)

2.14.3 INSTRUMENT MARKINGS

AIRSPEED INDICATOR

green arc	60 KIAS (111 km/h) - 158 KIAS (293 km/h)
yellow arc	158 KIAS (293 km/h) - 220 KIAS (407 km/h)
red line	220 KIAS (407 km/h)

OIL PRESSURE INDICATOR

Range markings are depending on instrument installed.

red line	25 Psi		
yellow arc	25 Psi - 55 Psi		
green arc	55 Psi - 90 Psi	or	55 Psi - 95 Psi
yellow arc	90 Psi - 100 Psi	or	95 Psi - 115 Psi
red line	100 Psi	or	115 Psi

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 - 500 °F
red line	500°F

RPM INDICATOR

green arc	700 RPM - 2400 RPM
yellow arc*	2400 RPM - 2700 RPM
red line	2700 RPM

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

*) Refer to Section 4.6 and 4.8.2

MANIFOLD PRESSURE INDICATOR

green arc	10 " Hg - 25 " Hg
yellow arc	25 " Hg - 29.5 " Hg
red radial	29.5 " Hg

2.15 KINDS OF OPERATION EQUIPMENT LIST

The aircraft may be operated in day VFR when the appropriate equipment is installed and operable. Flying under 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.

	NORMAL	ACROBATIC	
		1 seat	2 seats
COMMUNICATION			
1. Transceiver-VHF	1	1	1
ELECTRICAL POWER			
1. Battery	1	1	1
2. Alternator	1	1	1
3. Ammeter	1	1	1
FLIGHT CONTROL SYSTEM			
1. Elevator-trim control	1	1	1
2. Stall warning	1	1	1
FUEL			
1. Boost pump	1	1	1
2. Fuel quantity indicator	2	2	2
3. Manifold pressure	1	1	1
4. Fuel flow indicator	1	1	1
5. Fuel pressure	0	0	0
LIGHT			
1. Wing-tip position / strobe light	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

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

	NORMAL	ACROBATIC 1 seat	ACROBATIC 2 seats
ENGINE CONTROL			
1. RPM indicator	1	1	1
2. Exhaust gas temperature ind.	0	0	0
3. Cylinder head temperature ind.	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

N O T E

The zeros (0) used in the above 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 above may be required by the national operating regulations.

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

According FAR Part 91 „General Operating and Flight Rules" each occupant of an US registered airplane must wear an approved parachute when performing acrobatic maneuvers.

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

SECTION 3

EMERGENCY PROCEDURES

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SECTION 3

EMERGENCY PROCEDURES

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.
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 EMEREGENCY 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 <u>position, altitude, heading, speed, nature of the emergency and pilot's intentions</u> 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 <u>A</u>S <u>S</u>OON <u>A</u>S <u>P</u>OSSIBLE (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	60 KIAS (111 km/h)
Engine failure after take-off	80 KIAS (148 km/h)
Best recommended gliding speed (glide angle 1 : 6,2)	
-Normal (950 kg)	90 KIAS (167 km/h)
-Acro (820 kg)	80 KIAS (148 km/h)
Precautionary landing with engine power	80 KIAS (148 km/h)
Landing without engine power	80 KIAS (148 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. Master switch	OFF

3.2.2 ENGINE FAILURE IMMEDIATELY AFTER TAKE-OFF

Stall speed 60 KIAS (111 km/h)

1. Airspeed	80 KIAS (148 km/h)
2. Mixture	IDLE CUT OFF
3. Fuel shutoff valve	OFF (Pull & Turn)
4. Ignition switch	OFF
5. Master switch	OFF
6. Forced landing	PERFORM as practical

3.2.3 ENGINE FAILURE DURING FLIGHT (RESTART PROCESS)

1. Airspeed	80 KIAS (148 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 OIL SYSTEM MALFUNCTION

If oil pressure indicates low:	Apply positive "g"
If oil pressure is not regained then:	
1. Airspeed	80 KIAS (148 km/h)
2. Throttle	REDUCE TO IDLE
3. Engine oil temperature	OBSERVE INDICATION
4. Land	ASAP

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 ALTERNATOR FAILURE

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

1. Alternator	SWITCH OFF AND ON
2. Low voltage monitor	CHECK INDICATION
3. Red light off	CONTINUE FLIGHT

If red light illuminates again:

4. 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	80 KIAS (148 km/h)
3. Mixture	IDLE CUT OFF
4. Fuel shutoff valve	OFF (Pull & Turn)
5. Ignition switch	OFF
6. Master switch	OFF
7. Touchdown	SLIGHTLY TAIL LOW
8. Brakes	OPTIMUM BRAKING

3.3.2 PRECAUTIONARY LANDING WITH ENGINE POWER

1. Seat belts, shoulder harnesses	SECURE
2. Airspeed	80 KIAS (148 km/h)
3. Selected field	FLY OVER, noting terrain and obstructions, then reaching a safe altitude and airspeed
4. Master switch	OFF
5. Touchdown	SLIGHTLY TAIL LOW
6. Ignition switch	OFF
7. Mixture	IDLE CUT OFF
8. Fuel shutoff valve	OFF (Pull & Turn)
9. 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.
2. Fuel shutoff valve	OFF (Pull & Turn)
3. Power	1700 RPM for one minute.
4. Engine	SHUT DOWN
5. After engine stop	ABANDON aircraft and inspect for damage
6. Fire	EXTINGUISH using fire extinguisher if available

WARNING

Risk of burns due to flames shooting out.
Do not open engine compartment access doors while engine is on fire.

3.4.2 IF ENGINE FAILS TO START

1. Cranking	CONTINUE
2. Throttle	FULL OPEN
3. Mixture	IDLE CUT OFF
4. Fuel shutoff valve	OFF (Pull & Turn)

If fire is extinguished

5. Master switch	OFF
6. Ignition switch	OFF
7. Engine compartment	INSPECT

3.4.3 ENGINE FIRE IN FLIGHT

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

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

N O T E

If canopy fails to open break the canopy.

6. 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 flair the plane gently increase power to bring the nose up to landing attitude.

SECTION 4

NORMAL PROCEDURES

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SECTION 4

NORMAL PROCEDURES

4.0 GENERAL

4.0.1 AIRSPEEDS FOR NORMAL OPERATION

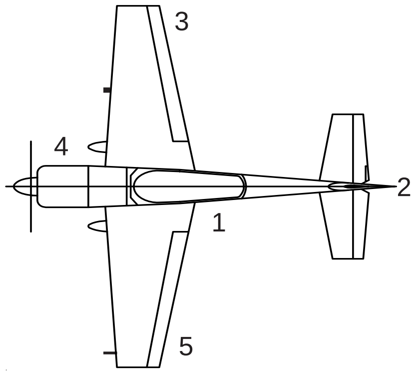
CATEGORY	ACRO 1 seat KIAS (km/h)	 2 seats KIAS (km/h)	NORMAL KIAS (km/h)
Start:			
-Rotate Speed	60 (111)	62 (115)	65 (120)
Climb:			
-Vx	87 (161)	89 (165)	93 (172)
-Vy	96 (178)	99 (183)	104 (193)
-Recommended Normal Climb Speed	100 (185)	105 (194)	110 (204)
-Max. Cruise	185 (343)	185 (343)	185 (343)
Landing:			
-Approach	80 (148)	85 (157)	90 (167)
-on Final	72 (133)	74 (137)	78 (144)
-Go-Around Speed	90 (167)	95 (176)	100 (185)
Recommended Airspeed For Flight In Rough Air (max.) (V_A)	158 (293)	158 (293)	140 (259)
Max. Demonstrated Cross Wind Component	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 the checklist for daily check and inspections (see Section 8, Handling, Servicing and Maintenance).

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. Master switch	ON
5. Fuel quantity indicators	CHECK
6. Master switch	OFF
7. Fuel selector *	ACRO & CENTER TANK

N O T E*

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!

2) Empennage

1. All round inspection, canopy, surfaces, stabilizers, elevator, trim tab, 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. Right landing gear, wheel and brake	CHECK
7. Stall warning vane	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. Wing fuel tank drain	DRAIN FOR AT LEAST 4 SECONDS TO CLEAR SUMP OF POSSIBLE WATER; CHECK CLOSED
6. Fuel filter drain	DRAIN FOR AT LEAST 4 SECONDS TO CLEAR FILTER OF POSSIBLE WATER; CHECK CLOSED
7. Exhaust silencer (if installed)	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. Pitot cover	REMOVE
5. Trailing edge	CHECK
6. 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. Master 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 bost 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 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 Scale error max. +60 ft
4. Avionic master 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:

- Check oil pressure and oil temperature.

N O T E

The RPM Gauge is electronically operated. To check the magnetos the RPM source switch must be set to the same magento as the igintion switch. Otherwise the gauge will show zero.

- Check the magnetos at 1800 RPM. Allowed drop is 175 RPM (max. difference 50 RPM).

- Check Alternator Output.

- Move also the propeller control through its complete range to check operation and return to full "HIGH RPM" position.

- Turn boost pump "ON" (check indicator movement on the fuel flow gauge).

- Check flight control free and correct

- Set trim 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 60-65 KIAS (111-120 km/h). A light pressure on the stick lifts the tail to horizontal position. Rotate the aircraft at 65 KIAS (120 km/h). On reaching climb speed of 100 KIAS (185 km/h) proceed with climb.

4.6 CLIMB

Climbs may be performed up to 2700 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"

N O T E*

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")

N O T E

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 78 KIAS (144 km/h)
3. Elevator trim	- adjust

N O T E

Stall speed will be:

MTOW = 820 kg:	55 KIAS (102 km/h)
MTOW = 870 kg:	57 KIAS (106 km/h)
MTOW = 950 kg:	60 KIAS (111 km/h)

4.8.4 NORMAL LANDING

1. Landing	- perform as practicable with respect to surface and weather condition
2. Touchdown	- 3 point landing

NOTE

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

3. Throttle	- CLOSE / IDLE
4. 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 90 KIAS (167 km/h) rotate to go-around altitude

4.10 SHUTDOWN

1. Boost pump	- "OFF"
2. Engine	- Run for 1 min. at 1000 RPM
3. Dead cut check	- Perform
4. Avionic master switch	- "OFF" (if installed)
5. Mixture	- "IDLE CUT OFF"
6. Ignition switch	- "OFF"
7. Master 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

N O T E

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.

⚠ W A R N I N G

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

⚠ W A R N I N G

Particular caution must be exercised when performing maneuvers at speeds above V_A [158 KIAS (293 km/h)]. Large or abrupt control inputs above this speed 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 lin 90° diving:
  Throttle must be reduced to idle in order to avoid exceeding V_{NE}.

Above segments may be filled up with aileron rolls on snap rolls. Watch V_A = 158 KIAS (293 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.

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.

N O T E

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.

N O T E

After six turns of spinning the altitude loss including recovery is 2000 ft.

4.13 NOISE LEVEL

The noise level with silencer Gomolzig 606000 (6 in 1) and propeller MTV-14-B-C/C190-17 has been established in accordance with ICAO Annex 16, as 77.3 dB(A)

The noise level with propeller MTV-9-B-C/C200-15 has been established in accordance with FAR 36 Appendix G, as 73.0 dB(A).

No determination has been made by the EASA for the FAA that the noise levels of this airplane are or should be acceptable or unacceptable for operation at, into, or out any airport.

SECTION 5

PERFORMANCE

Table of Contents

Paragraph *Page*

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SECTION 5

PERFORMANCE

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)

TAKE-OFF

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

-T/O Weight:	870 kg (1918 lbs)
-Ground Roll:	112 m (367 ft)
-Total Distance to clear a 50 ft obstacle:	248 m (813 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 65 % a Fuel Consumption of 52 L/H (13.7 US Gal/H) and 3,25 NM/L (12.3 NM/US Gal) can be obtained by Fig. 5.9.

RANGE AND ENDURANCE

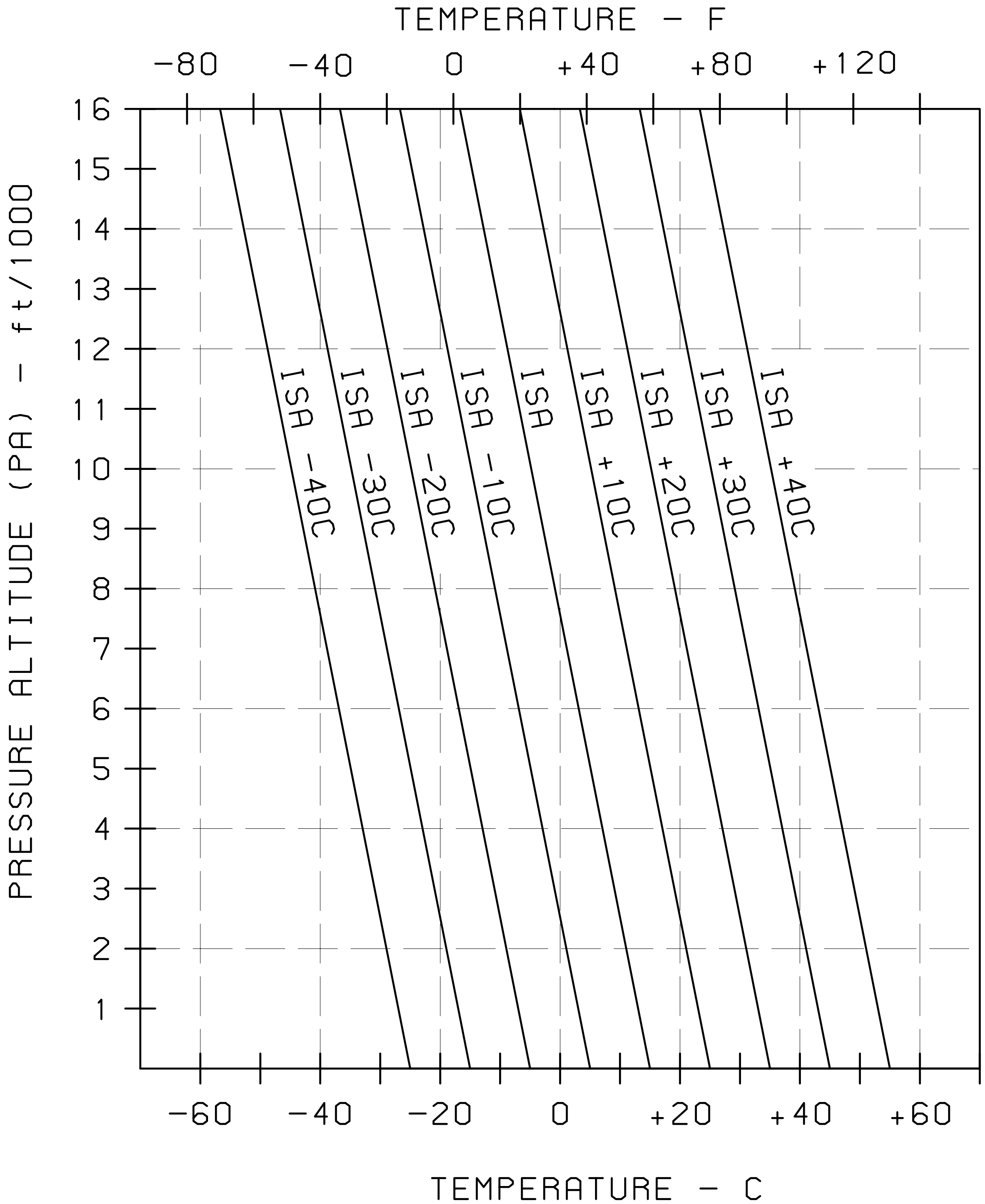
Fig. 5.8 presents Range and Endurance values for a T/O Weight of 950 kg (2095 lbs) including fuel for warm up and Take-Off from SL, max continuous Power climb to cruising altitude, and a reserve of 21 liter (5.5 US Gal.) for 45 minutes with 45% Power. 5,5 liters (1,45 US Gal.) unusable fuel is taken into account.

For the sample problem (appr.)

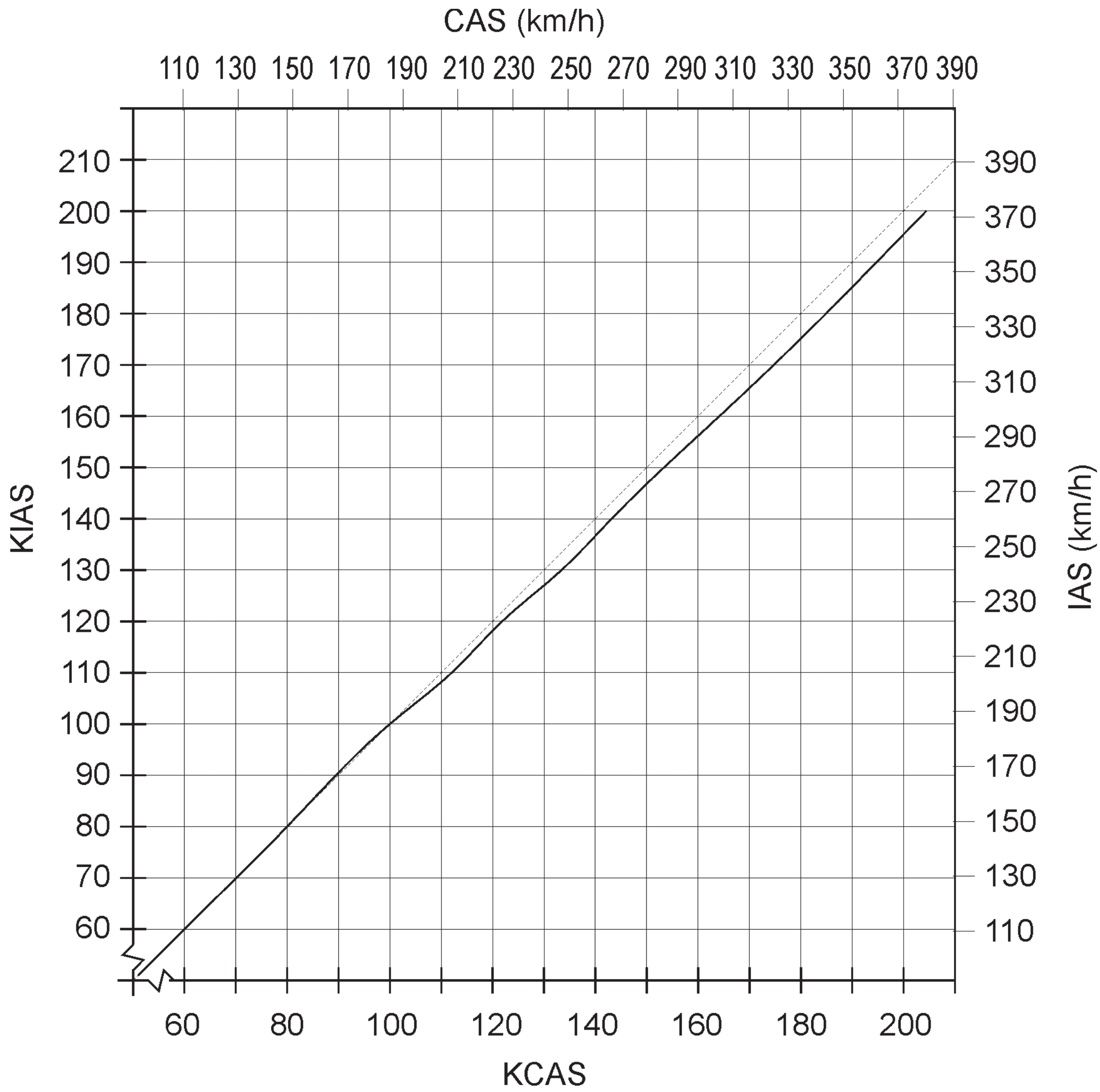
Total Fuel	171 L	(45.1 US Gal.)
Warm Up & T/O	- 5 L	(1.3 US Gal.)
Reserve	- 21 L	(5.54 US Gal.)
Unusable Fuel	- 5.5 L	(1.45 US Gal.)
	======	============
Usable Fuel	139.5 L	(36.8 US Gal.)
Range	415 NM	(768 km)
Endurance	2.49 HRS	

5.2 ISA CONVERSION

ISA Conversion of pressure altitude and outside air temperature



5.3 AIRSPEED CALIBRATION



N O T E

Indicated airspeed assumes zero instrument error

5.4 STALL SPEED

CONDITION:

POWER IDLE
FORWARD C/G

STALL SPEEDS

ANGLE OF BANK

WEIGHT	CATEGORY	0° 1g	30° 1,15 g	45° 1,41 g
kg (lbs)		KIAS (km/h)	KIAS (km/h)	KIAS (km/h)
950 (2095)	Normal	60 (111)	65 (120)	72 (133)
870 (1918)	ACRO (2 seat)	57 (106)	61 (113)	68 (126)
820 (1808)	ACRO (1 seat)	55 (102)	59 (109)	65 (120)

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

5.5 TAKE-OFF PERFORMANCE

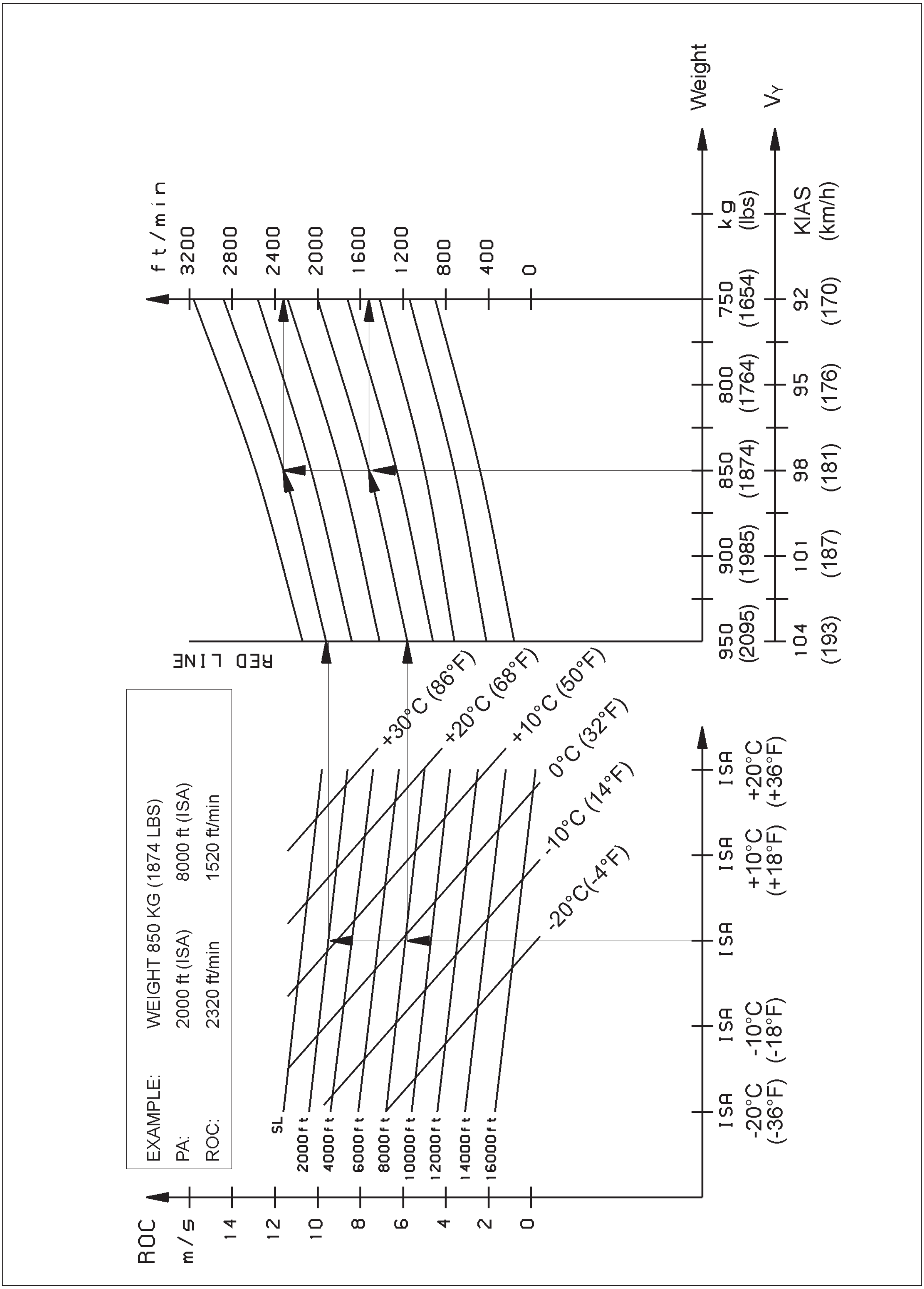
Power : T/O Power
Runway: Concrete

N O T E

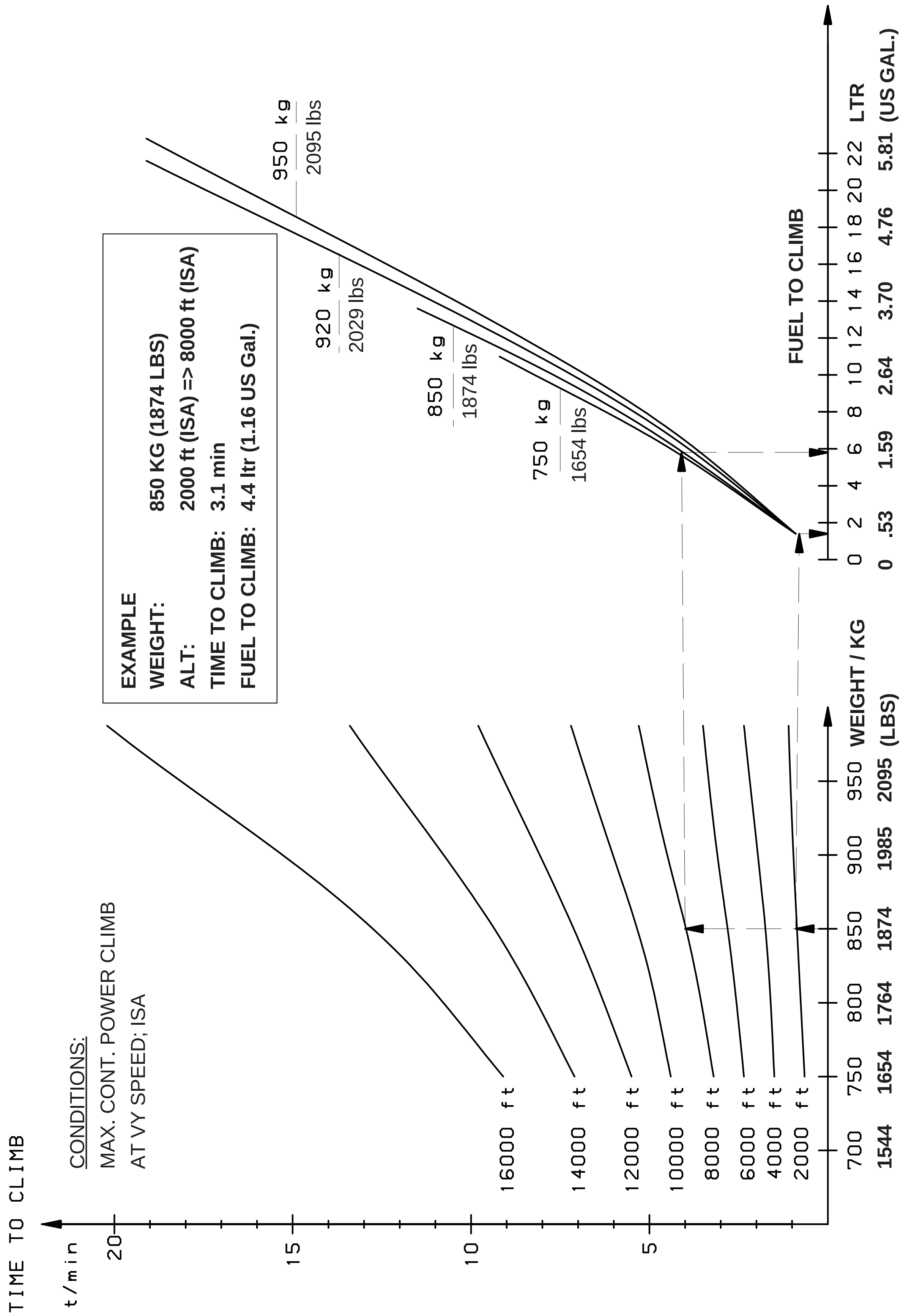
For every 5 kts (9 km/h) headwind, the T/O distance can be decreased by 4%.
For every 3 kts (6 km/h) tailwind [up to 10 kts (19 km/h)], the T/O distance is increased by 10%.
On a solid, dry and plain grass runway, the T/O is increased by 15%.

OAT			0°C (32°F)		15°C (59°F)		30°C (86°F)	
T/O weight kg (lbs)	Rotating Speed KIAS (km/h)	PA ft (m)	T/O Roll m (ft)	T/O over 15 m (50 ft) m (ft)	T/O Roll m (ft)	T/O over 15 m (50 ft) m (ft)	T/O Roll m (ft)	T/O over 15 m (50 ft) m (ft)
950 (2095)	65 (120)	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)	62 (115)	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)	60 (111)	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)

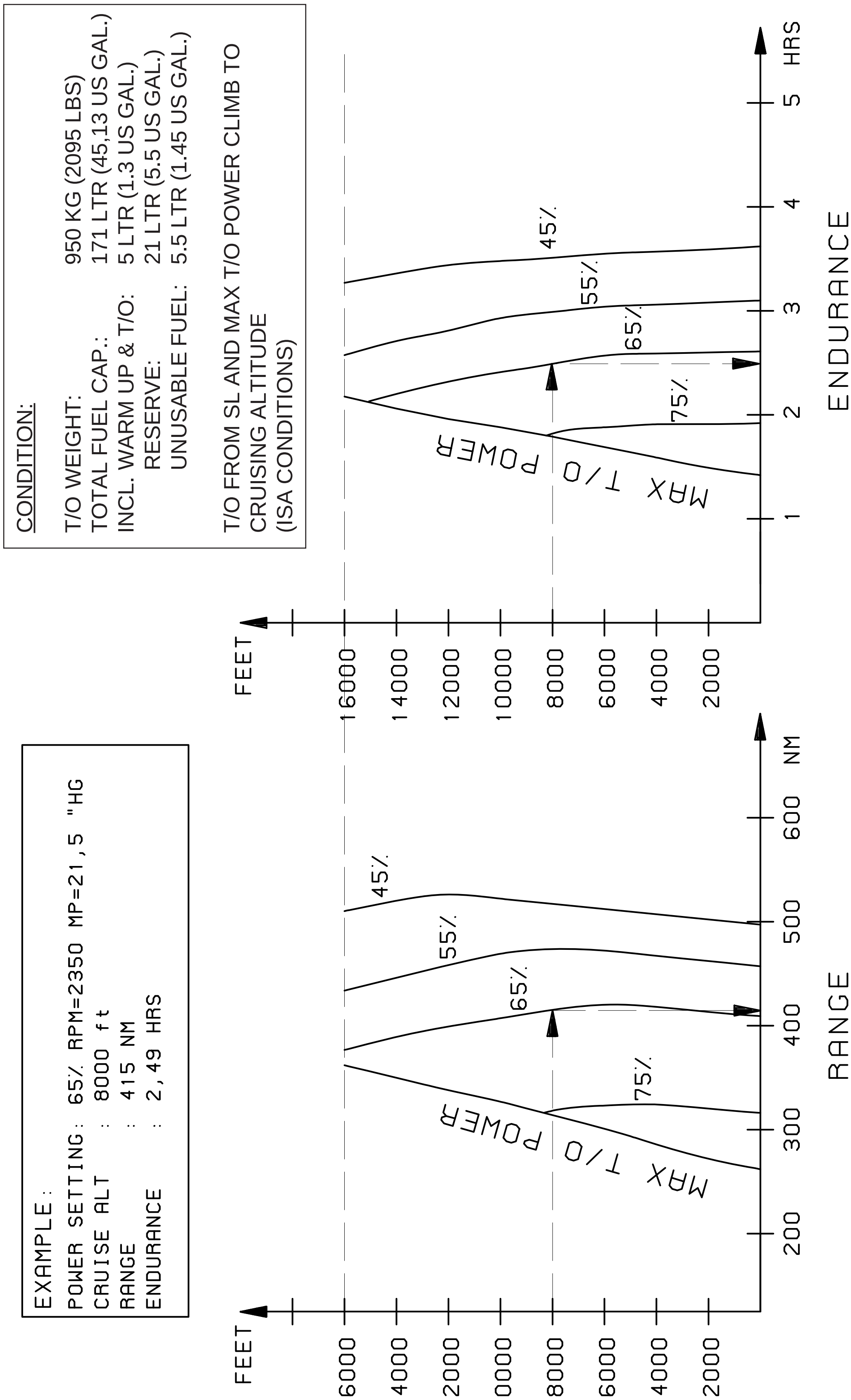
5.6 RATE OF CLIMB PERFORMANCE



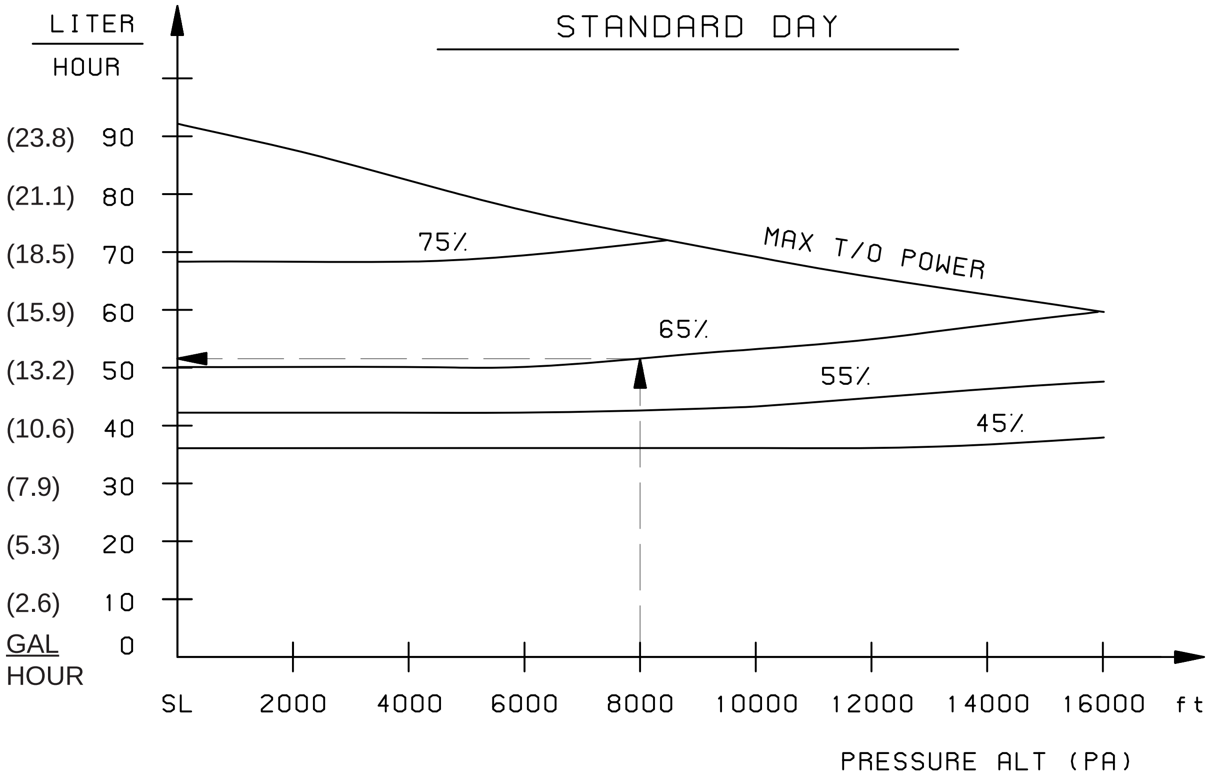
5.7 TIME TO CLIMB, FUEL TO CLIMB



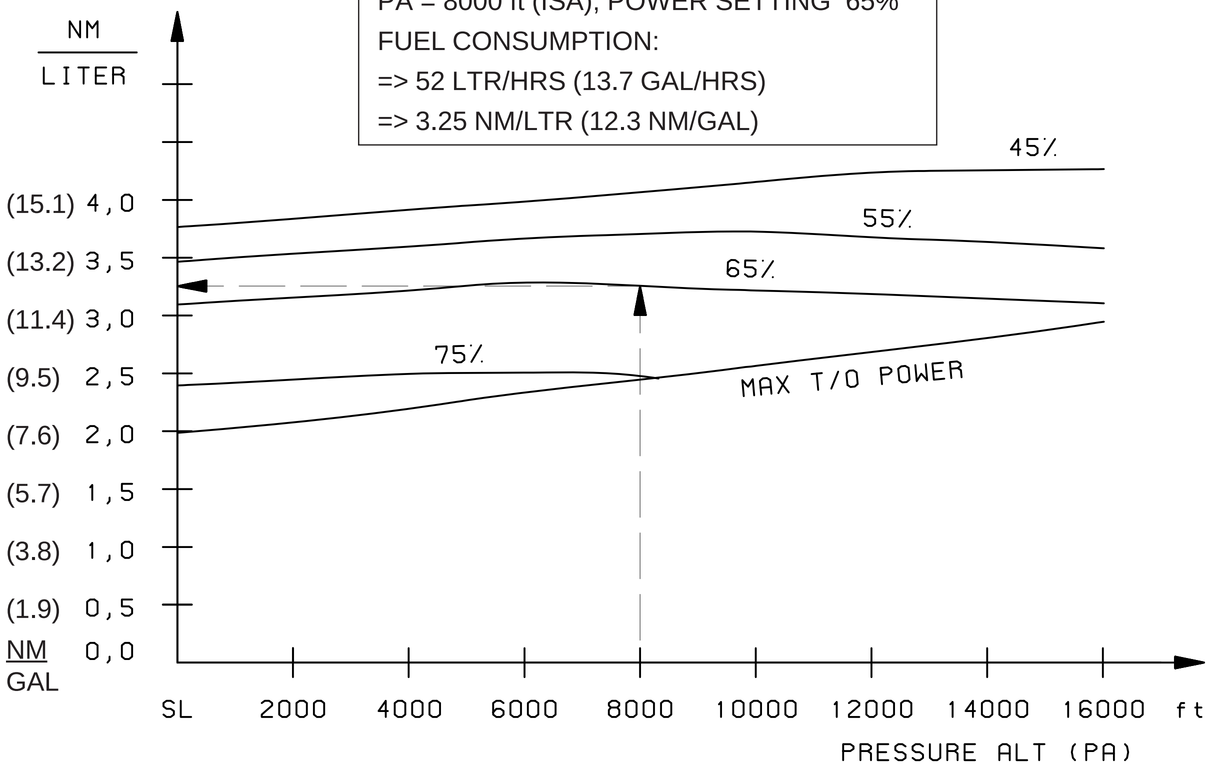
5.8 RANGE AND ENDURANCE



5.9 FUEL CONSUMPTION



EXAMPLE:
PA = 8000 ft (ISA); POWER SETTING 65%
FUEL CONSUMPTION:
=> 52 LTR/HRS (13.7 GAL/HRS)
=> 3.25 NM/LTR (12.3 NM/GAL)



5.10 CRUISE PERFORMANCE

Range and Endurance values for a T/O Weight of 950 kg (2095 lb) including fuel for warm-up and Take-Off from SL, max. cont. Power climb to cruising altitude, and a reserve of 21 L (5.55 US.gal) for 45 minutes with 45% Power. 5.5 L (1.45 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 (610)	2700	27.4	95	286	88.2	(23.3)	182.6	(338)	173	(320)	1.49	272	(504)	Power
	2400	25.1	75	225	68.7	(18.2)	167.6	(310)	160	(296)	1.91	320	(593)	Power
	2200	24.2	65	195	50.5	(13.3)	159.3	(295)	152	(282)	2.60	413	(765)	Economy
	2000	23.5	55	165	42.6	(11.3)	150.2	(278)	144	(267)	3.08	462	(856)	Economy
	2000	20.2	45	135	36.5	(9.6)	139.9	(259)	134	(248)	3.59	502	(930)	Economy
4000 (1219)	2700	25.4	89	267	82.7	(21.8)	181.5	(336)	168	(311)	1.59	286	(530)	Power
	2400	24.6	75	225	68.7	(18.2)	170.9	(317)	158	(293)	1.91	324	(600)	Power
	2200	23.7	65	195	50.5	(13.3)	162.4	(301)	150	(278)	2.59	418	(774)	Economy
	2000	23.0	55	165	42.6	(11.3)	153.1	(284)	142	(263)	3.06	467	(865)	Economy
	2000	19.7	45	135	36.5	(9.6)	142.6	(264)	133	(246)	3.59	507	(939)	Economy
6000 (1829)	2700	23.6	83	248	77.6	(20.5)	180.5	(334)	162	(300)	1.69	301	(557)	Power
	2500	23.3	75	225	69.8	(18.4)	174.3	(323)	158	(293)	1.88	323	(598)	Power
	2200	23.2	65	195	50.5	(13.3)	165.6	(307)	149	(276)	2.57	422	(782)	Economy
	2000	22.5	55	165	42.6	(11.3)	156.1	(289)	141	(261)	3.04	472	(874)	Economy
	2000	19.3	45	135	36.5	(9.6)	145.4	(269)	131	(243)	3.53	512	(948)	Economy
8000 (2438)	2700	21.8	77	231	73.4	(19.4)	179.5	(332)	156	(289)	1.79	314	(582)	Power
	2675	21.5	75	225	71.9	(19.0)	177.8	(329)	155	(287)	1.82	318	(589)	Power
	2350	21.5	65	195	52.0	(13.7)	169.0	(313)	147	(272)	2.49	415	(769)	Economy
	2050	21.4	55	165	43.0	(11.4)	159.3	(295)	139	(257)	2.99	472	(874)	Economy
	2000	18.8	45	135	36.5	(9.6)	148.4	(287)	130	(241)	3.51	517	(957)	Economy
10000 (3048)	2700	20.2	72	215	69.6	(18.4)	178.5	(331)	151	(280)	1.88	327	(606)	Power
	2500	19.9	65	195	53.6	(14.2)	172.4	(319)	148	(274)	2.41	407	(754)	Economy
	2150	19.9	55	165	43.7	(11.5)	162.5	(301)	138	(256)	2.93	469	(869)	Economy
	2000	18.4	45	135	36.5	(9.6)	151.4	(280)	129	(239)	3.48	522	(967)	Economy
12000 (3658)	2700	18.6	67	200	66.2	(17.5)	177.5	(329)	146	(270)	1.96	338	(626)	Power
	2675	18.4	65	195	55.3	(14.9)	176.0	(326)	144	(267)	2.32	399	(739)	Economy
	2300	18.3	55	165	45.2	(11.9)	165.9	(307)	136	(252)	2.81	458	(848)	Economy
	2000	17.9	45	135	36.5	(9.6)	154.5	(286)	127	(235)	3.44	526	(974)	Economy
14000 (4267)	2700	17.2	62	186	63.0	(16.6)	176.6	(327)	140	(259)	2.08	350	(648)	Power
	2450	17.0	55	165	46.7	(12.3)	169.4	(314)	135	(250)	2.71	446	(826)	Economy
	2075	17.7	45	135	37.1	(9.8)	157.8	(292)	122	(226)	3.36	520	(963)	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.

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)	90 (167)	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)	85 (157)	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)	80 (148)	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

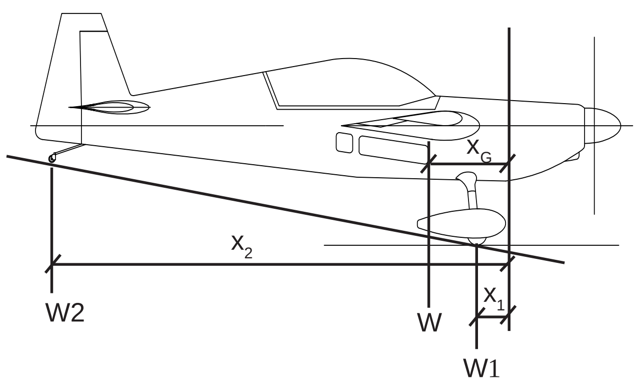
XG = distance: fire wall - Center of Gravity

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

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



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

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:

$$W = Wo + Wn$$

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

6.2.1 Owners Weight and Balance Record

Enter below all weight change data from aircraft log book.

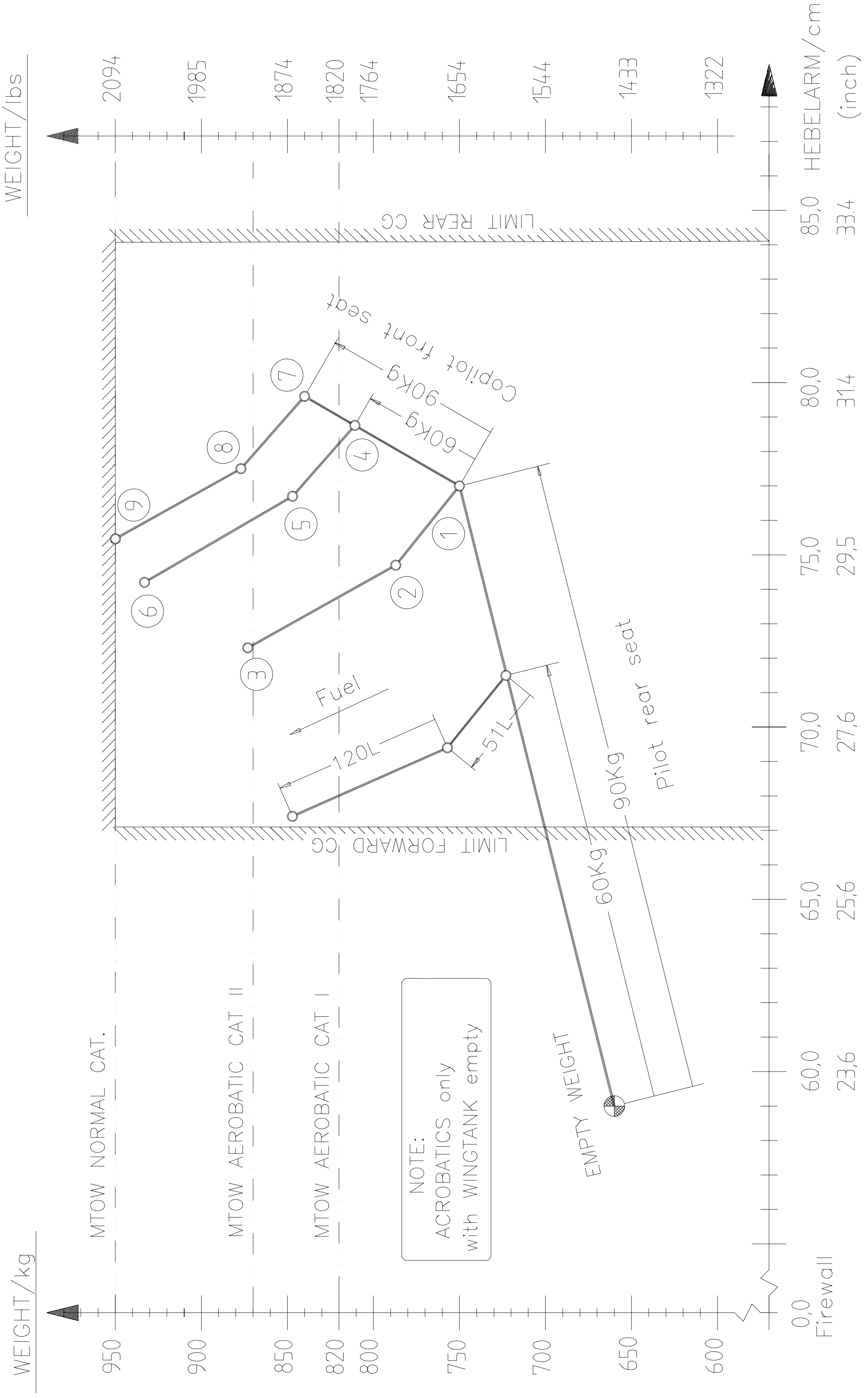
EXTRA 300L	SERIAL NUMBER:					
Date	Description of modification	Weight change Added (+), Removed (-)			Running empty weight	
		Wt./kg [lbs]	Arm/cm [inch]	Moment/kg*cm [lbs*inch]	Wt./kg [lbs]	Moment/kg*cm [lbs*inch]
	Empty weight as delivered	___	___	_______		

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)
Acro Fuel 51 L	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			

Σ W = Σ (W x X) =

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

6.4 LOADING WEIGHTS AND MOMENTS

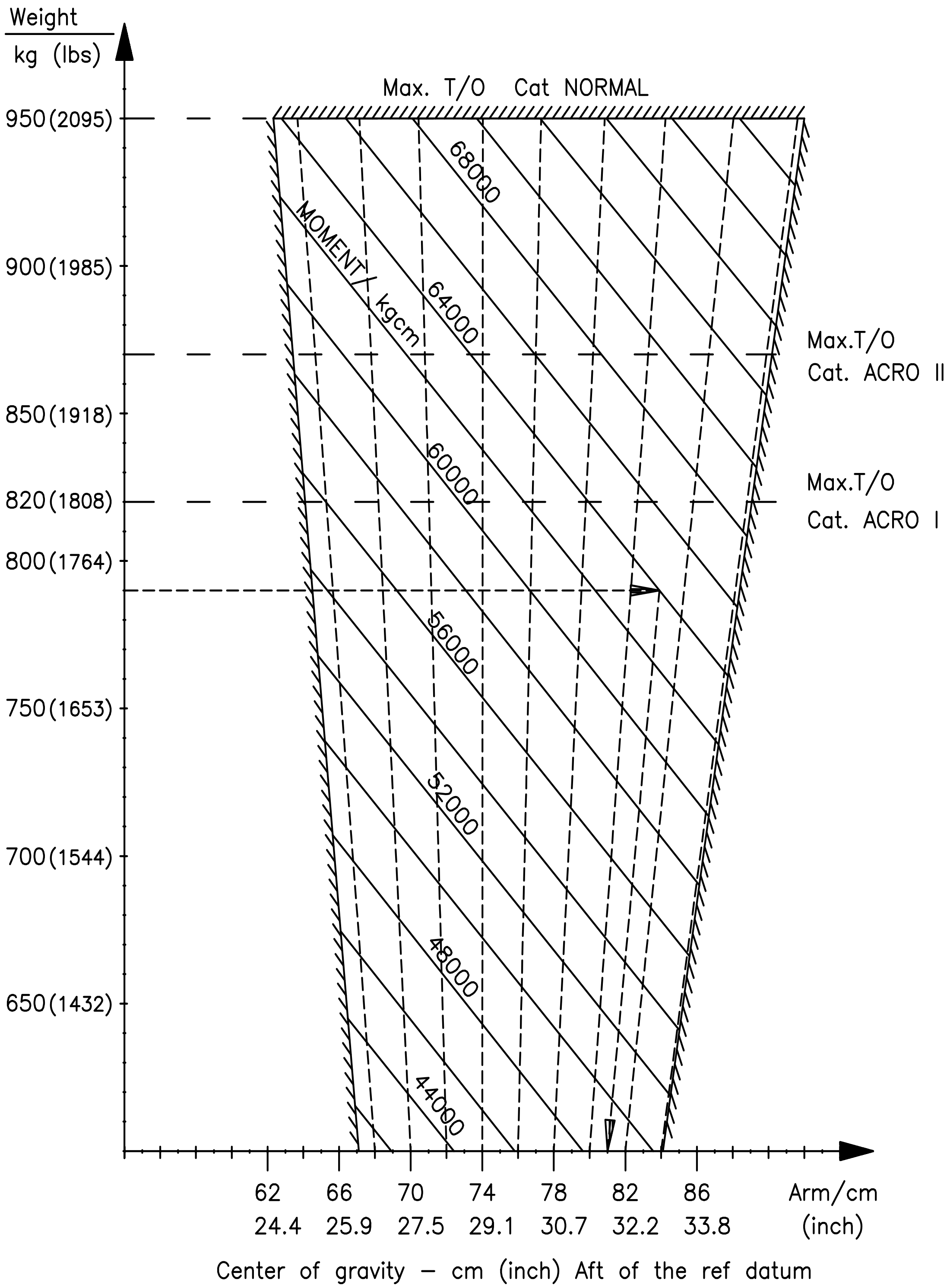
OCCUPANTS : max. 2

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)*

FUEL MAX 171 LITER (45,1 US GAL.)

FUEL					
ACRO & CENTER TANK			WING TANK		
LITER *(US GAL)*	KG *(LBS)*	KG x CM *(LBS x IN)*	LITER *(US GAL)*	KG *(LBS)*	KG x CM *(IN x LBS)*
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)
51 *(13.5)*	36.7 *(80.9)*	1094 *(949)*			

6.5 WEIGHTS AND MOMENTS LIMITS



EXAMPLE:

At 790 KG (1741 LBS) and 64000 kgcm the C/G location is 81.0 cm (31.9") aft of ref datum

6.6 EQUIPMENT LIST

EXTRA 300L S/N:

QTY	ITEM	MANUFACT.	PART OR P/N	WEIGHT (kg)	ARM (m)	MARK IF INSTALLED	REQUIRED (R) OPTIONAL (O) ALTERNAT. (A)
1	Engine	Textron Lycoming	AEIO-540-L1B5 (R/H) ENPL-RT9609	194.90	-0.72		R
1	Magneto L/H	Slick	6251 or 6351	2.30	-0.15		R
1	Magneto R/H	Slick	6250 or 6350	2.00	-0.15		R
1	Engine	Textron Lycoming	AEIO-540-L1B5D (R/H) ENPL-RT7471	194.90	-0.72		A
1	Magnetos	Bendix	D6LN-3000	5.20	-0.15		A
1	Engine	Textron Lycoming	AEIO-580-B1A (R/H) ENPL-RT10427	191.72	-0.72		A
1	Magneto L/H	Slick	6393	2.30	-0.15		A
1	Magneto R/H	Slick	6350	2.00	-0.15		A
1	Slick Start	Unison	SS1001	0.27	-0.02		A
4	Shock Mounts	Lord	J 7764-20	1.70	-0.29		R
4	Shock Mounts	Barry Controls	94016-02	1.70	-0.29		A
1	Exhaust System 6 in 2	EXTRA/ Sky Dynamics	63104A0	7.65	-0.40		R
2	Exhaust Silencer	Gomolzig	EA300 NSD GO3-606500	9.60	0.80		O
1	Exhaust System 6 in 1 with Silencer	Gomolzig	EA300-606000	8.20	-0.39		A
1	Fuel Injector	Bendix/Precision/ Avstar	RSA-10 AD 1 Lyc. PN: 61M26404	3.90	-0.68		R
1	Mech. Fuel Pump	Crane Lear Romec	RG9080-J4A Lyc. PN: 62E22581	0.86	-0.15		R
1	Mech. Fuel Pump	Hartzell Engine Tech.	200F-5002 Lyc. PN: 62E23186	0.86	-0.15		A
1	El. Fuel Pump	Weldon Tool	8120-M or B8120-M	1.10	-0.04		R
1	Oil Cooler	Stewart Warner	8406 R	1.40	-0.90		R
1	2. Oil Cooler	Stewart Warner	8406 R	1.40	-0.20		R
1	Low Temperature Breather Line Kit	Extra	83301	0.20	-0.01		A
1	Single Oilcooler, rear	Niagara NDM	20009A	1.81	-0.22		A
1	Single Oilcooler, rear	Aero Classics	8000353	1.65	-0.22		A
1	Set Fuel, Oil & Sens. Hoses in Eng. Comp.	div.	MS28741 with firesleeve	6.30	-0.21		R
1	Set Fuel, Oil & Sens. Hoses in Eng. Comp. dual Oil Cooler Sys.	Parker/Stratoflex or Aeroquip	PTFE Type 124J or AE466	4.90	-0.21		A
1	Set Fuel, Oil & Sens. Hoses in Eng. Comp. single Oil Cooler Sys.	Parker/Stratoflex or Aeroquip	PTFE Type 124J or AE466	3.70	-0.15		A
1	Set Fuel Hoses in Cabin Comp.	div.	MS28741	2.10	0.45		R
1	Set Fuel Hoses in Cabin Comp.	Parker/Stratoflex or Aeroquip	PTFE Type 124 or 666	1.40	0.45		A
1	Set Sens. Hoses (Oil, Fuel & MA Press)	Knapp/Hoerbiger	HS3MA OR H3MM	0.15	0.82		R
1	RPM Vernier Control	ACS Products Co.	A-750-30-1200	0.71	0.82		R
1	Mixture Vernier Control	ACS Products Co.	A-750-20-1080	0.65	0.94		R

QTY	ITEM	MANUFACT.	PART OR P/N	WEIGHT (kg)	ARM (m)	MARK IF INSTALLED	REQUIRED (R) OPTIONAL (O) ALTERNAT. (A)
1	Throttle Control	Teleflex	F303 03250 or CC330 10'	0.56	0.60		R
1	Throttle Control Cable	Cablecraft	580-540-501	0.63	0.60		A
1 1 1	Propeller Spinner Spinner	MT-Propeller MT-Propeller MT-Propeller	MTV-9-B-C/C200-15 P-208-B P-810-2	30.40 0.8 0.8	-1.15 -1.20 -1.20		R R A
1 1 1	Propeller Spinner Spinner	MT-Propeller MT-Propeller MT-Propeller	MTV-14-B-C/C190-17 P-238-A P-967	29.80 0.8 0.8	-1.15 -1.20 -1.20		O O A
1 1	Propeller Spinner	MT-Propeller MT-Propeller	MTV-9-B-C/C198-25 P-810-2	30.50 0.8	-1.15 -1.20		O O
1	Cowling (GRP)	EXTRA EXTRA	23205.01 & .02 83802.1	9.80	-0.52		R
1	Cowling (CRP)	EXTRA EXTRA	23205.301 & .302 83802.1	8.80	-0.52		A
1	Cowling (CRP)	EXTRA	83001.0	9.20	-0.57		A
1	Cowling (GRP)	EXTRA	83003.0	10.60	-0.57		A
1	Cowling (CRP) (incl. Landing Light provision)	EXTRA	8E001.0	9.20	-0.57		A
1	Governor	Woodward	A- 210 988	1.10	-0.91		R
1	Governor	MT-Propeller	P-880-5	1.10	-0.91		A
1	Governor	MT-Propeller	P-880-41	1.10	-0.91		A
7	Switches	Cutler Hammer	div.	0.28	1.63		R
7	Switches	Kissling	div.	0.28	1.63		A
11	Circuit Breaker	Potter&Brumfield	div.	0.50	1.60		R
11	Circuit Breaker	ETA or Klixon	div.	0.30	1.60		A
1 1	Main Bus Fuseholder Main Bus Strip Fuse (40 Amps)	MTA MTA	03.00360 02.00300	0.03	0.02		O O
1	PCB Auto Fuse	EXTRA	83290.1	0.01	0.03		O
1	Fuel Cont. Probe Wing Tank	VDO	226 801 015 001 G	0.12	0.49		R
1	Fuel Cont. Probe Center Tank 42 L	VDO	224 082 006 097 R or 224-011-010-251	0.20	0.20		R
1	Fuel Cont. Probe Center Tank 60 L	VDO	224 082 007 004 R or 224-011-020-372	0.20	0.44		A
1	Fuel Cont. Ind. Wing Tank	VDO	301 271 036 001 K or 301 030 001 G	0.08	1.62		R
1	Fuel Cont. Ind. Acro Tank	VDO	301 272 052 001 K or 301 030 002 G	0.14	1.62		R
1	Ammeter	VDO	190 004 039 002 or 190 037 002 G	0.08	1.62		R
1	Volt/Ammeter	Electronics Intern.	VA-1A	0.26	1.62		A
1 1	Shunt Volt/Ammeter	Electronics Intern. Electronics Intern.	S-50 VA-1A-50	0.09 0.22	1.50 1.62		A A
1	RPM Indicator	VDO	333 230 115 002 or 333 035 001 G	0.31	1.60		R
1	RPM Indicator digital (2700RPM)	Horizon	P100-230-643-00	0.68	1.60		A

QTY	ITEM	MANUFACT.	PART OR P/N	WEIGHT (kg)	ARM (m)	MARK IF INSTALLED	REQUIRED (R) OPTIONAL (O) ALTERNAT. (A)
1	RPM Indicator digital (2600RPM)	Horizon	P100-230-635-00	0.68	1.60		A
1	Magnetic Compass	Airpath	C 2300	0.25	1.62		R
1	Magnetic Compass	SIRS Navigation Ltd	PG2A	0.13	1.62		A
1	Oil Press./ Oil Temp. Ind.	AMITEK or Christen	61943	0.51	1.62		R
1 1 1	Oil Press./ Oil Temp. Ind. (3 1/8") Oil Temp. Sender Oil Press Sensor	Westach Westach Mediamate	3DA3-3MM or 3DA3-3KV W399-S9 387-100MM or 387-100KV	0.14 0.08 0.12	1.62 -0.11 0.04		A A A
1 1 1	Oil Press / Oil Temp Ind. (2 1/4") Oil Temp. Sender Oil Press Sensor	Westach Westach Mediamate	2DA3-3MM or 2DA3-3KV W399-S9 387-100MM or 387-100KV	0.09 0.08 0.12	1.62 -0.11 0.04		A A A
1 1 1	Oil Press/Oil Temp Ind. (2 1/4") Oil Temp. Probe Oil Press. Sender	UMA UMA UMA	D2-OP130U- OT300U-01 1B3A N1EU150G(-A) or T1EU150G(-A)	0.09 0.08 0.12	1.62 -0.11 0.04		A A A
1	Stall Sensor	EXTRA	73106.1	0.07	0.53		R
1	Stall Warning Horn	EMAG	EM-S 110P	0.13	1.60		R
1	Accelerometer	EXTRA	DSA 12	0.37	1.60		O
1	Accelerometer	Kollsman or Pioneer or Bendix or Jaeger or Century	AN5745	0.40	1.60		O
1	Accelerometer	EZE Technologies	DA-55	0.16	1.60		O
1	ELT and Antenna	Pointer	3000-10	0.90	2.60		O
1	ELT System	ARTEX	ME-406	1.42	2.60		A
1	Turn & Bank Ind.	United Instruments	9501-2 / TSO C3b	0.55	1.63		O
1	Turn & Bank Ind.	Castleberry	C101 / TSO C101T	0.55	1.63		O
1	Horizon, electric digital	RC Allen	RCA 2600-2 (0° tilt)	0.24	1.63		O
1	Horizon, electric digital	RC Allen	RCA 2600-2 (0° tilt) 102-0202-01	0.13	1.61		A
1	Horizon, electric digital	RC Allen	RCA 2600-3 (0° tilt)	0.45	1.63		O
1	Horizon, electric digital	RC Allen	RCA 2600-3 (0° tilt) 102-0203-01	0.19	1.61		A
1	Slip Indicator (on RCA 2600)	RC Allen	444-0010-01	0.03	1.63		A
1	Altimeter, front	United Instruments	UI5934PD-3 A.134	0.39	0.66		O
1	Altimeter, front metric	Winter	4110	0.33	0.66		O
1	Altimeter, front metric	United Instruments	UI5934PD-3M A.665	0.39	0.66		A
1	Altimeter front (ft)	Mikrotechna Praha	LUN 1128.10B6	0.59	0.65		A
1	Altimeter, rear	United Instruments	UI5934PD-3 A.134	0.39	1.62		R
1	Altimeter, rear metric	Winter	4110	0.33	1.62		A
1	Altimeter, rear metric	United Instruments	UI5934PD-3M A.665	0.60	1.62		A
1	Altimeter rear (ft)	Mikrotechna Praha	LUN 1128.10B6	0.59	1.61		A

QTY	ITEM	MANUFACT.	PART OR P/N	WEIGHT (kg)	ARM (m)	MARK IF INSTALLED	REQUIRED (R) OPTIONAL (O) ALTERNAT. (A)
1 1	Radar Altimeter Anten. incl. Digital Indicator	FreeFlight	TRA 3000 TRI 20	0.68 0.34	2.33 1.55		O
1	Altitude Encoder	ACK	A-30	0.15	1.50		O
1	Airspeed Ind., front	Winter	6533-321	0.21	0.65		O
1	Airsp. Ind., front metric	Winter	6531-321	0.21	0.65		O
1	Airspeed Ind., front	United Instruments	UI8030 B.835	0.32	0.65		O
1	Airspeed Ind., front (dual scale)	United Instruments	UI8030 B.898	0.32	0.65		A
1	Airspeed Ind. front (kts)	Mikrotechna Praha	LUN 1106.K2B4/SC	0.50	0.65		A
1	Airspeed Ind. front (km/h)	Mikrotechna Praha	LUN 1106.P2B4/SC	0.50	0.65		A
1	Airspeed Ind., rear	Winter	6533-321	0.21	1.61		R
1	Airsp. Ind., rear metric	Winter	6531-321	0.21	1.61		A
1	Airspeed Ind., rear	United Instruments	UI8030 B.835	0.32	1.61		A
1	Airspeed Ind., rear (dual scale)	United Instruments	UI8030 B.898	0.32	1.61		A
1	Airspeed Ind. rear (kts)	Mikrotechna Praha	LUN 1106.K2B4/SC	0.50	1.61		A
1	Airspeed Ind. rear (km/h)	Mikrotechna Praha	LUN 1106.P2B4/SC	0.50	1.61		A
1	Vertical Speed Ind. metric	Winter	5 STVM 15	0.45	1.62		A
1	Vertical Speed Ind. metric	United Instruments	UI7030 M C.194	0.35	1.62		A
1	Vertical Speed Ind.	United Instruments	UI7030 C.27	0.35	1.62		A
1	Vertical Speed Ind. (fpm)	Mikrotechna Praha	LUN 1144.B0B1	0.40	1.61		A
1	Vertical Speed Ind. (m/s)	Mikrotechna Praha	LUN 1144.F0B1	0.40	1.61		A
1 1 1	EGT/CHT EGT Probe CHT Probe	Westach Westach Westach	2 DA 1 712-2 DWK 712-7 DK	0.07 0.06 0.05	1.62 -0.37 -0.20		O O O
1 1 1	EGT/CHT EGT Probe CHT Probe	Westach Westach Westach	EF300/SC-2 DA 1 712-2 DWK 712-7 D	0.07 0.06 0.05	1.62 -0.37 -0.20		O O O
1 1 1	EGT/CHT EGT Probe CHT Probe	UMA UMA UMA	D2-ET1K7K- CT600J-01 2BU20 2B18 or 2B02	0.07 0.06 0.05	1.62 -0.37 -0.20		A A A
1 6 6 1 1 1 1 1 	EGT/CHT EGT Probe CHT Probe OAT Probe Oil Temp. Probe Manifold Press. Probe RPM Probe Fuel Flow Transducer 	JPI JPI JPI JPI JPI JPI JPI Flowscan Shadin	EGT-701 M-111 M-113 (S-Plug Gask.) 400510 400500-L 604010 420815-1 201-B or FXT-201 680501 or 680600	0.41 0.35 0.26 0.05 0.05 0.05 0.05 0.09 0.09	1.56 -0.57 -0.56 -0.22 1.55 -0.11 -0.02 -0.02		O O O O O O O O A
1 1 	Fuel Scan Fuel Flow Transducer 	JPI Flowscan Shadin	FS-450 201-B or FXT-201 680501 or 680600	0.12 0.09 0.09	1.56 -0.02 -0.02		O O A

QTY	ITEM	MANUFACT.	PART OR P/N	WEIGHT (kg)	ARM (m)	MARK IF INSTALLED	REQUIRED (R) OPTIONAL (O) ALTERNAT. (A)
1	Manifold Press. / Fuel Flow Ind.	United Instruments	UI6331-H.186	0.49	1.60		R
1	Manifold Press. / Fuel Flow Ind.	United Instruments	UI6331-H.217	0.49	1.60		A
1	VHF Radio	Becker	AR 3201	0.90	1.54		R
1	VHF Radio	Becker	AR 4201	0.67	1.54		A
1	VHF Radio (8.33kHz ch. spacing)	Becker	AR 6201	0.85	1.54		A
1	VHF Radio (8.33kHz ch. spacing)	Funkwerk	ATR 833	0.60	1.55		A
1	Audio Panel	Garmin	GMA 240	0.68	1.49		O
1	Audio Panel	Garmin	GMA 340	0.80	1.49		A
1	Remote Audio Panel	Garmin	GMA 35	1.00	1.53		O
1	GPS/NAV/COM	Garmin	GNS 430	2.95	1.49		O
1	GPS/COM	Garmin	GNC 420W	2.65	1.49		A
1	GPS/NAV/COM	Garmin	GNS 430W	2.95	1.49		A
1	GPS/NAV/COM	Garmin	GNS 530W	3.75	1.49		A
1	GPS/COM	Garmin	GTN 635	2.82	1.54		A
1	GPS/NAV/COM	Garmin	GTN 650	3.20	1.54		A
1	GPS/NAV/COM	Garmin	GTN 750	4.24	1.54		A
1	Course Deviation Ind.	Garmin/Mid Continent	GI-102A	0.64	1.54		O
1	Course Deviation Ind.	Garmin/Mid Continent	GI-106A	0.64	1.54		A
1	GPS Antenna	Garmin/AeroAntenna	GA35	0.21	3.92		O
1 1	EFIS Remote Sensor Module	Aspen Aspen	EFD1000 PFD RSM	1.31 0.09	1.60 4.00		O O
1	Transponder	Bendix/King	KT 73	1.64	1.73		O
1	Transponder	Bendix/King	KT 76A	0.89	1.75		O
1	Transponder	Filser	TRT-600 (LAST)	0.70	1.60		O
1	Transponder	Filser	TRT-800	0.70	1.60		O
1	Transponder	Garmin	GTX 327	0.95	1.75		O
1	Transponder	Garmin	GTX 328	1.50	1.73		O
1	Transponder	Garmin	GTX 330	1.50	1.73		O
1	Transponder (Mode S)	Garmin	GTX 33	2.00	3.02		O
1 1	Transponder Blind Encoder Module	Becker Becker	BXP6401-1 BE 6400-01	0.80 0.10	1.60 1.39		O A
1 1	Transponder Blind Encoder Module	Becker Becker	BXP6401-2 BE 6400-01	0.80 0.10	1.60 1.39		O A
1	Transponder	Becker	ATC-2000	1.20	1.74		O
1	Transponder	Becker	ATC-4401	0.73	1.60		O
1	Transponder Antenna	Comant Industries	CI 105	0.11	0.14		O
1	Transponder Antenna	Bendix/King	KA 60	0.11	0.14		O
1	COM Antenna	Moba	210FA	0.10	4.38		R
1	COM Antenna	Extra	83205A	0.10	4.38		A
1	COM Antenna	Pointer	P1 3001-10	0.05	4.38		A
1	NAV Antenna	Comant Industries	CI 158C	0.16	3.90		O

QTY	ITEM	MANUFACT.	PART OR P/N	WEIGHT (kg)	ARM (m)	MARK IF INSTALLED	REQUIRED (R) OPTIONAL (O) ALTERNAT. (A)
1	Starter	B&C Speciality	BC 315-100-2	4.63	-0.85		R
1	Starter	SKYTEC (Lycoming)	149-12LS (31A22 104)	3.65	-0.85		A
1 1 1	Alternator 60 Amps with bracket Voltage Regul. Low Volt. Monitor	Electrosystems Lamar Lamar	ALX 8421 LS B-00371-25 B-00378-4	5.90 0.15	-0.86 0.02		R R R
1	Alternator 65 Amps	Bosch	0 120 489 935	4.60	-0.86		A
1	Alternator 55 Amps	Bosch	0 120 489 917	4.20	-0.86		A
1	Alternator 55 Amps	Bosch	0 120 489 469	4.20	-0.86		A
1	Alternator 65 Amps	Prestolite	66021637	4.70	-0.86		A
1	Battery	Sonnenschein	Dryfit A 212/28G	10.70	0.23		R
1	Battery	Concorde	RG-25XC	10.40	0.23		A
1	Batt. Charger Plug	EXTRA	146 19 20	0.02	0.17		O
1	Ext. Power Recept.	Div.	AN2552-3A	1.46	1.07		O
1	Ext. Power Solenoid	Switches Kidde	22735	0.40	0.03		O
1	Ext. Power Solenoid (cont. operation)	White-Rodgers	70-111-225-5	0.40	0.03		O
1	Main Bus Solenoid	White-Rodgers	70-111-226-5	0.40	0.03		R
1	Starter Solenoid	Switches Kidde	22735	0.40	0.03		R
1	Low Voltage Light	OAK	MS25041-2	0.02	1.63		R
1	Starter Engaged Light	OAK	MS25041-4	0.02	1.63		O
1	Ignition Switch	TCM	10-357200-1	0.15	1.63		R
2	Wheel	Cleveland	40-151	4.00	0.33		R
2	Main Wheel Tires	Div	5.00-5 / 6PR	3.90	0.33		R
1	Tail Wheel 5"	EXTRA	steerable	5.50	5.23		R
1	Tail Wheel 6" Assy (Soft)	Special Products Aviation Inc.		5.90	5.23		A
2	Brake Assy	Cleveland	30-164	1.40	0.33		R
2	Brake Cyl., front	Cleveland	10-20 or 10-20E	0.55	0.15		R
2	Brake Cyl., front	Matco	MC-4E	0.55	0.15		A
2	Brake Cyl., rear	Cleveland	10-20 or 10-20E	0.55	1.15		R
2	Brake Cyl., rear	Matco	MC-4E	0.55	1.15		A
1	Brake Fluid Reservoir	EXTRA	53301.1	0.20	0.03		R
1	Brake Fluid Reservoir	ACS	A-315	0.20	0.04		A
1	Safety Belt Assy Rear Seat (seat belts w. ratchet, shoulder harness, crotch strap)	Hooker	FK0002 or FK0019 (1011230 [3x] & 1113012-1 [1x], 1H5630-3 [2x] 1CS924-D or -N [1x])	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 or -N [1x]	2.90	1.03		R

QTY	ITEM	MANUFACT.	PART OR P/N	WEIGHT (kg)	ARM (m)	MARK IF INSTALLED	REQUIRED (R) OPTIONAL (O) ALTERNAT. (A)
1	Safety Belt Assy Front Seat (seat belts w. ratchet, shoulder harness, crotch strap)	Hooker	FK0004 or FK0020 (1011230 [3x] & 1113012-1 [1x], 1H3030-3 [2x] 1CS924-D or -N [1x])	3.30	1.03		A
2	NAV/STROBE LTS	Whelen	A 600-PG/PR-14	0.23	0.74		R
2	Power Supply	Whelen	A490T	0.54	0.74		R
1	Landing Light LED	Whelen	01-71125-12	0.16	-0.57		O
1	Standard Canopy	EXTRA	26301.000-LV	13.50	1.69		R
1	Single Seat Canopy	EXTRA	86411.011-LV	13.20	1.69		A
2	Electric Actuator Pedal Adjust.	SKF	CARR 22x200x1/D12B	3.25	0.95		R
1	Long Range Tank	EXTRA	86901	1.80	0.55		O
1	Center Tank 42 L	EXTRA	66203.001-LK	3.30	0.30		R
1	Center Tank 60 L	EXTRA	86713.010-LK	3.90	0.30		A
1	Fuel Selector	Allen	6 S 122	0.19	0.73		R
1	Safety Cover (Polycarbonate)	EXTRA	86803.1	1.68	3.03		O
1	Dual Pump Smoke System without Pumps	EXTRA	86100	8.80	0,16		O
2	Smoke Oil Pump (Inject. and Refill)	ITT Jabsco	8860-1203	3.60	0.10		O
2	Smoke Oil Pump (Inject. and Refill)	ITT Jabsco	23620-3003	4.40	0.10		O
1	Smoke Oil Pump (Injection)	Johnson	F3B-19 (12V)	2.00	-0.05		O
1	Smoke Oil Pump (Refill)	Johnson	F2P10-19 (12V)	1.65	0.25		O
1	Single Pump Smoke System incl. Pump	EXTRA Marco	86112 UP3/OIL 12V	9.20	0.30		O
1	Airtow Hook	EXTRA/TOST	83607A0	0.50	5.42		O
1/2	Sighting Dev. LH/RH	EXTRA	83801.10	each 0.54	1.59		O
1	Aresti-Card Holder	EXTRA	Assy	0.09	1.66		O
2	Wing Tie Down Rings	EXTRA	83801.2-01	0.04	1.08		O
1	Remote Mounted Oil Filter Kit	Airwolf Filter Corp.	AFC-K007		-0.09		O

SECTION 7

DESCPRIPTION AND OPERATION OF AIRCRAFT AND SYSTEMS

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SECTION 7

DESCPRIPTION AND OPERATION OF AIRCRAFT AND SYSTEMS

7.1 THE AIRCRAFT

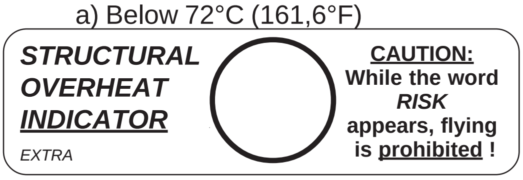
The aircraft EXTRA 300L is designed and developed by EXTRA Flugzeugproduktions- und Vertriebs- GmbH, Flugplatz Dinslaken, 46569 Hünxe, Federal Republic of Germany, in accordance with the U.S. Federal Aviation Regulations, part 23, categories normal and acrobatic to fullfill the primary flight training, normal operation rules and acrobatic training up to the unlimited acrobatic level.

EXTRA 300/L is a light weight, robust, single piston-engined, two-seat aircraft with a fuselage structure in tig-welded steel-tube construction.

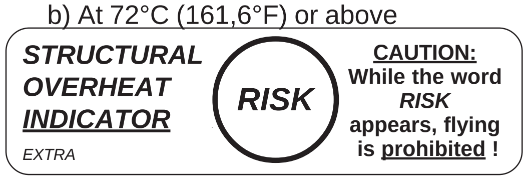
The landing gear, wing, and tail are made of epoxy, reinforced with glass- and carbonfiber. The items are qualified up to 72°C (161,6°F). Not to exceed this temperature limit an appropriate colour specification for composite structure is given by the manufacturer document EA-03205.19.

To check the temperature inside the cockpit (potential "green house" effect) a reversible temperature indicator (*STRUCTURAL OVERHEAT INDICATOR*) is applied on the upper side of the wing main spar in the carry-through section. After reaching the temperature limit of 72°C (161,6°F) the word "*RISK*" appears on the red spot of this structural overheat indicator immediately and flying is prohibited. When the structure cools down below this temperature limit the word "*RISK*" disappears and you may go on with the preflight checklist.

a) Below 72°C (161,6°F)



b) At 72°C (161,6°F) or above



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 WINGS

The wing is of CRP construction. The dual chamber main spar - fullfilling the requirement for fail safe design - consists of carbon roving caps combined with CRP webs. Core foam is a PVC foam (Divinycell HT 50). The wing shell is built by a Honeycomb sandwich with CRP Laminates. On the surface there is a protective layer of GRP. To prevent buckling of the shell plywood ribs are used. In the area of the wingtanks is a layer of CRP laminate with an incorporated aluminium thread bonded to the metal fuselage structure as means of lightning protection.
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. Integral fuel cells are provided in the leading edge of the wing extending from the root ribs to half the span of each R/L and L/H wing. The ailerons are supported at three points in spherical bearings pressed into aluminium brackets. To reduce pilot's hand forces the hinge line of the ailerons is positioned 25% of the aileron depth at the root and 21,5% at the tip. Furthermore the ailerons are equipped with "spades" to decrease pilot forces. Ailerons are controlled via the center bracket. To prevent flutter the ailerons are weight balanced in the overhanging leading edge.

7.4 EMPENNAGE

The EXTRA 300/L 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 GRP laminates. The shell is built using honeycomb sandwich with GRP 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 rudder tip while the balance weight for the elevator is mounted on the elongated center bracket of the elevator extending into the fuselage.

7.5 FLIGHT CONTROL SYSTEM

7.5.1 PRIMARY CONTROL SYSTEM

The EXTRA 300/L is standard equipped with full dual primary flight controls including conventional stick-type control columns and adjustable rudder pedals. The primary control surfaces are operated through a direct mechanical linkage.

7.5.2 LONGITUDINAL FLIGHT CONTROL SYSTEM

The two control columns are interconnected by a torque tube. The control movements are from there transferred to the elevator by a push rod.

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 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 control is located on the right side in the rear cockpit.

The canopy lock is operated from the outside by a handle on left side of the canopy by reaching into the cockpit through the window. Inside a handle is located in both cockpits, used for locking as well as for normal operation and for emergency release.

The starter/magneto switch is located on the left side of the instrument panel in front of the rear seat.

7.6 INSTRUMENTATION

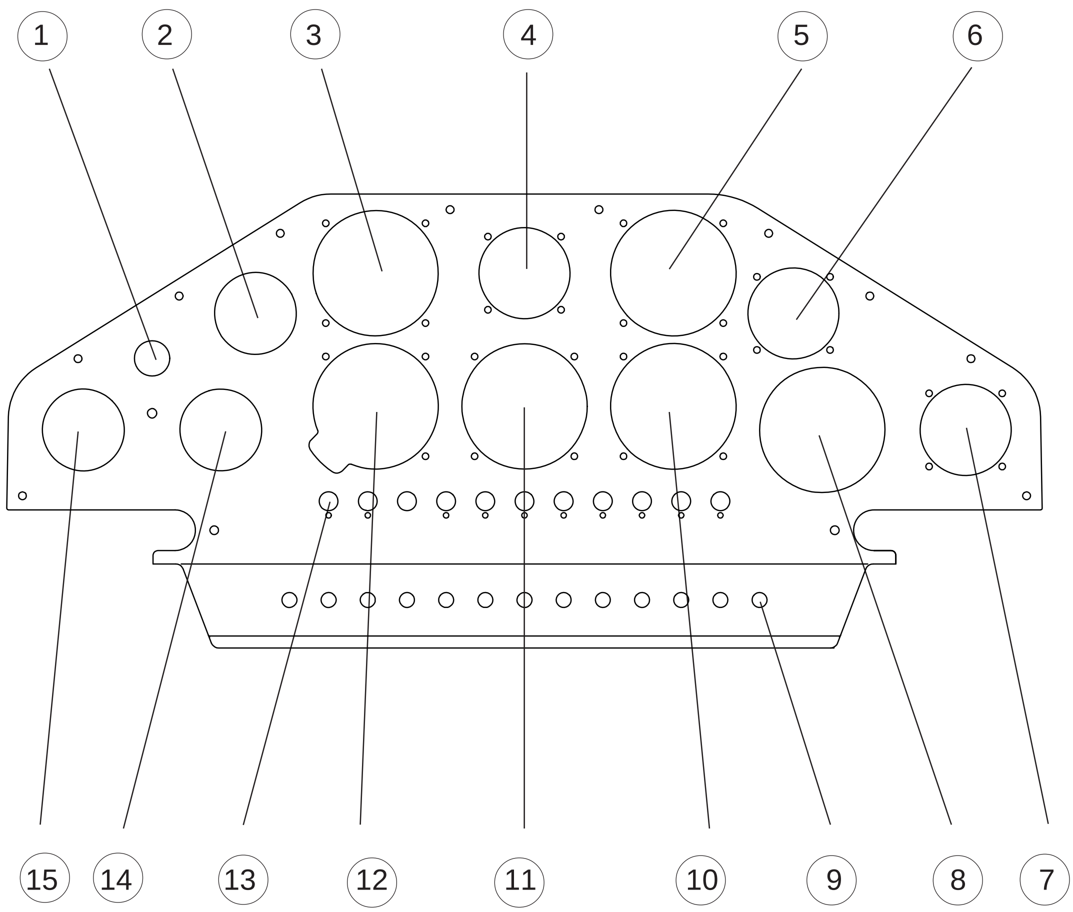
The Extra 300/L is equipped with flight instruments in both cockpits.

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)

For instrument panel arrangement of the rear cockpit refer to Fig. 7.6.1, which includes standard and optional equipment marked as such.

Fig. 7.6.1:



Standard	Optional	Position	Item
x		1	Magneto Selector switch & starter
x		2	Amperemeter
x		3	Airspeed indicator
x		4	Magn. Direction indicator
x		5	Oil pressure / Oil temperature
x		6	EGT / CHT
x		7	COM
x		8	RPM indicator
x		9	Circuit breaker
x		10	g-meter
x		11	Manifold pressure / Fuel Flow
x		12	Altimeter
x		13	Master switch
x		14	Fuel Quantity Acro Tank
x		15	Fuel Quantity Wing Tank
	x	16	Vertical speed indicator
	x	17	Turn and bank indicator
	x	18	Artificial horizon
	x	19	Fuel pressure
x		20	Intercom button
	x	21	Directional gyro
x		22	RPM control, Prop governor
x		23	Mixture control
x		24	Throttle lever
x		25	Stick
x		26	Radio button
x		27	Fuel shutoff valve
x		28	Trim lever and indicator
x		29	Boost pump

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 the following positions.

3	Airspeed indicator
12	Altimeter indicator
20	Intercom button
24	Throttle
25	Stick
26	Radio button
27	Fuel shutoff valve

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.

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 rated maximum T/O Power is 300 HP at 2700 RPM.

Engine specification:	a) Textron - Lycoming AEIO-540-L1B5
	b) Textron - Lycoming AEIO-540-L1B5D

For the present TBO refer to latest issue of Textron - Lycoming SERVICE LETTER No. L 201.

The AEIO-540-L1B5 (D) engine is equipped with special antivibration counterweights.

The following accessories are included in the power plant installation:

Fuel Injector:	Bendix
Magnetos:	Slick
Alternator:	Electrosystems
Starter:	B&C
Fuel pump:	Gates Lear

Shielded ignition system
Propeller governor drive
Transistor voltage regulator
Overvoltage relay

The engine is operated with the following manual controls:

Throttle control, dual
RPM control
Fuel mixture control

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-540-L1B5 (D) engine.

For continuous operation 115/145 aviation fuel is the maximum grade.

7.10.2 OIL SYSTEM

The oil is cooled by a Two Cooler System mounted on the left hand side in the engine compartment.
Alternatively a Single Cooler System is available. In this case the oil is cooled by one oil cooler 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.

Oil capacity and grades:

Max sump capacity	16 qts.
Min sump capacity	9 qts.

For temperatures and oil grades refer to Section 1.7.

7.10.3 ENGINE INSTALLATION

The engine is supported by four shock mounts (type LORD or 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 propeller type MTV-9-B-C/C200-15. The propeller has a diameter of 2,0 m (78.74 in.). A 4-blade propeller type MTV-14-B-C/C190-17 with a diameter of 1,9 m (74.8 in.) is also available as an alternative.

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 SYSTEMS (OPTIONAL)

Optionally the EA 300/L can be equipped with an additional silencer system type Gomolzig. The attachment is integrated in the fuselage structure. Thus no modifications are necessary to install the silencer system.
Alternatively a complete 6 in 1 System with integrated silencer is available.

7.11 FUEL SYSTEM

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

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 42 liters (11,1US 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 approximately 5.5 liters (1.45 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 is supplied by a 12 V alternator with rectifier, transistor voltage regulator. The alternator is mounted on and driven by the engine.

The field current is controlled by the voltage regulator to nominal 14 V under all load conditions. The masterswitch is located on the rear instrument panel.

Circuit protection against overvoltage is provided by the voltage regulator.

The maximum load taken from the alternator is 40 amp.

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.

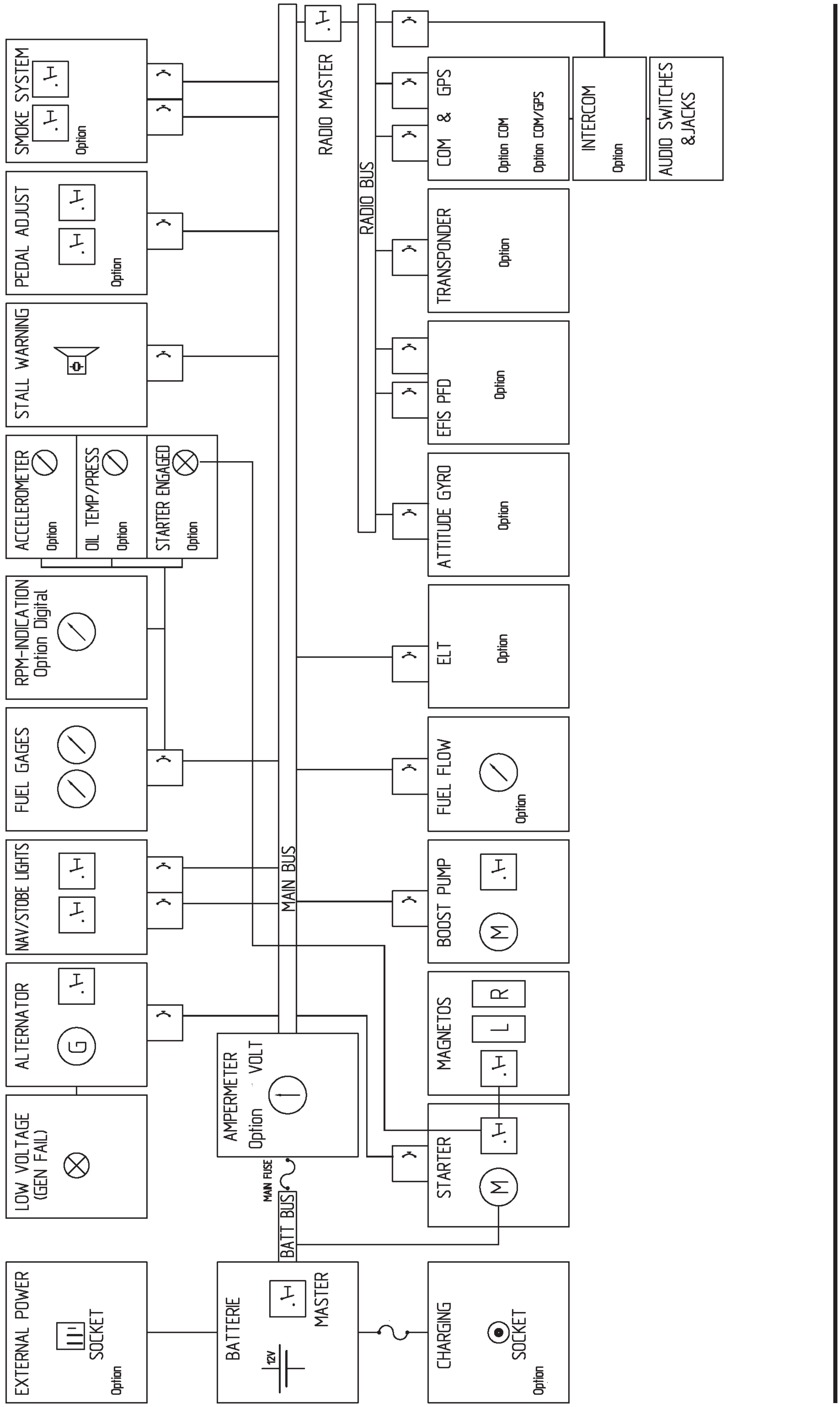
All electrical circuits are protected by circuit breakers located on the rear instrument panel and they are easily accessible to the pilot during flight.

The electrical system is adequately suppressed to ensure satisfactory operation of the radio equipment.

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

SCHEMATIC ELECTRICAL SYSTEM

Standard and Optional Equipment shown



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.

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SECTION 8

HANDLING, SERVICING AND 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 M6 nut plates are provided in the wing tips where ring bolts can be screwed in. 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 rested on a balance and jacked to 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-06701.1

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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 300/L.* 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 300/L. 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 300/L 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 steelsleeve 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 300/L can be equipped with an optional elect. 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.

902.3 EMERGENCY PROCEDURES

In case of an electric failure occurs during adjustment procedure (e.g. unintentional continued adjustment by failure of a control switch), try to move the pedals to the opposite direction immediately. If this measure is unsuccessful, the circuit breaker has to be pulled without delay. The relative low actuation velocity enables the pilot to sufficient rudder control input.

902.4 NORMAL PROCEDURES

Check rudder control system for impeccable, easy operation during preflight inspection. For that purpose the pedals have to be adjusted to a position, which allows full control inputs of rudder and aileron simultaneously as well as full rudder control input in conjunction with full applied brakes. the pedals may be stepless adjusted inflight independently by two switches located on the instrument panel. Pay attention to symmetrical adjustment of left and right pedal.

902.5 PERFORMANCE

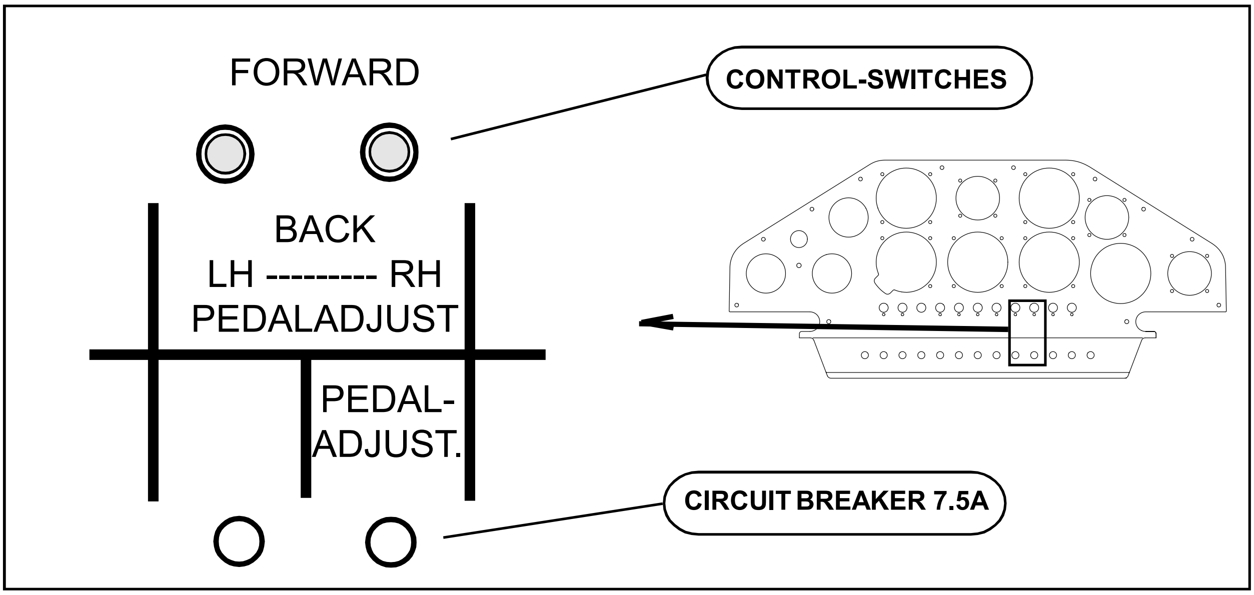
Not affected.

902.6 WEIGHT AND BALANCE

Not affected.

902.7 DESCRIPTION OF THE SYSTEM

The optional electrical pedal adjustment system which is guided on slide tubes, replaces the rear mechanical rudder pedal adjustment. Such a pedal 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 below). The total travel of the system is limited to 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 15sec.



902.8 HANDLING, SERVICING AND MAINTENANCE

Not affected.

SECTION 903

ELECTRONIC ACCELEROMETER

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903 ELECTRONIC ACCELEROMETER

903.1 GENERAL

The standard equipped accelerometer typ AN 5745 can be replaced by an optional "Digital Solid State Accelerometer DSA 12".

903.2 LIMITATIONS

The instrument markings and placards are provided for the acrobatic category (1 seat) only; for the acrobatic category (2 seat) and for the normal category refer to corresponding limitations.
Any exceedance of given limitations have to be reported by the pilot and considered by corresponding maintenance or inspection procedure according to the *SERVICE MANUAL EA 300/L*.

Instrument markings

<u>Electronic Accelerometer DSA 12</u>

red range	-12 g	-	-10 g
yellow range	> -10 g	-	-8 g
green range	> -8 g	-	< +8 g
yellow range	+ 8 g	-	< +10 g
red range	+10 g	-	+12 g

903.3 EMERGENCY PROCEDURES

Not affected.

903.4 NORMAL PROCEDURES

Not affected.

903.5 PERFORMANCE

Not affected.

903.6 WEIGHT AND BALANCE

Not affected.

903.7 DESCRIPTION AND OPERATION OF THE SYSTEM

The DSA 12 accelerometer measures acceleration in one certain direction. The measuring range is between +20g and -20g. A clock inside the instrument measures time and date. One of the output-displays is an LCD with two lines and eight positions per line. Positive values of accelerations are always shown in the upper line of the LCD, and negative values of acceleration always in the bottom line.

The other output-display are twentyfive LEDs which are arranged in a semicircle. The upper twelve LEDs show positive acceleration, the lower twelve LEDs show negative acceleration. The middle LED is on line all time long.

INSTANTANEOUS ACCELERATION

The current value of acceleration is called **Instantaneous Acceleration**. It is shown by the LED-display if the value is between +12g and -12g. If the “Instantaneous Acceleration” is zero g, only the middle LED lights up. Every single g illuminates one more LED in positive (up) or negative (down) direction. For example:
The “Instantaneous Acceleration” is +5g, the middle LED and five LEDs in positive direction are illuminated. If the “Instantaneous Acceleration” is -7g, the middle LED and seven LEDs in negative direction are illuminated. In case the absolute value of the “Instantaneous Acceleration” is greater then 12g all twelve LEDs of this range are turned on.

CURRENT EXTREME VALUES "A"

A permanent illumination of two LEDs, one for positive acceleration and another one for negative acceleration, shows the **Current Extreme Values**. They are signed by two illuminated LEDs, one in the positive and one in the negative range. These two "Current Extreme Values" are shown furthermore on the LC-Display in case of normal operation (the positive "Current Extreme Value" is shown in the upper line, and the negative “Current Extreme Value” is shown in the lower line).
They are both signed by an “**A**” as first character of every line. The "Current Extreme Values" change, if the “Instantaneous Acceleration” is greater than the last positive or lower than the last negative "Current Extreme Value” (the positive or the negative). The “Current Extreme Values” can be reset to 0g by pushing the buttons.

TOTAL EXTREME VALUE "B"

Eventhough the two “Current Extreme Values” are reset to 0g, there will remain a positive and a negative **Total Extreme Value** in the memory. As soon as a “Current Extreme Value” occurs that is greater than the positive or lower than the negative "Total Extreme Value", the corresponding “Total Extreme Value” is exchanged with the “Current Extreme Value”. This is a possibility to store the positive and the negative “Total Extreme Value” during different actions, while the “Current Extreme Values” are reseted to 0g after every single action.
The “Total Extreme Values” can be shown or reseted to 0g by pushing the buttons. They are signed with a “**B**” as the first character on every LC-Display line.
The “Total Extreme Values” only change if one of them is lower than the corresponding “Current Extreme Value” or if they are reset to 0g.

Here is an example: Since the last reset of the “Current Extreme Values” and the “Total Extreme Values” the maximum of the positive acceleration was +9g and the maximum of the negative acceleration was -5g. The “Instantaneous Acceleration” is +3g. Therefore the middle LED and the first three positive LEDs are illuminated for the “Instantaneous Acceleration”. Furthermore the ninth LED in positive direction is illuminated for the positive “Current Extreme Value”, and the fifth LED in negative direction for the negative “Current Extreme Value”.

The LC-Display shows

A + 9.0 g
A - 5.0 g

After resetting the "Current Extreme Values", the LC-Display shows

A	**+ 3.0 g**
A	**- 0.0 g**

and only the middle LED and three LEDs in the positive range of the LED-Display are shining. If the display presents the "Total Extreme Value" you will see

A	**+ 9.0 g**
A	**- 5.0 g**

on the LC-Display, because the "Total Extreme Values" has not changed.

The "Total Extreme Values" only change if one of them is lower than the corresponding "Current Extreme Value" or if they are reset to 0g.

ABSOLUTE EXTREME VALUES "C"

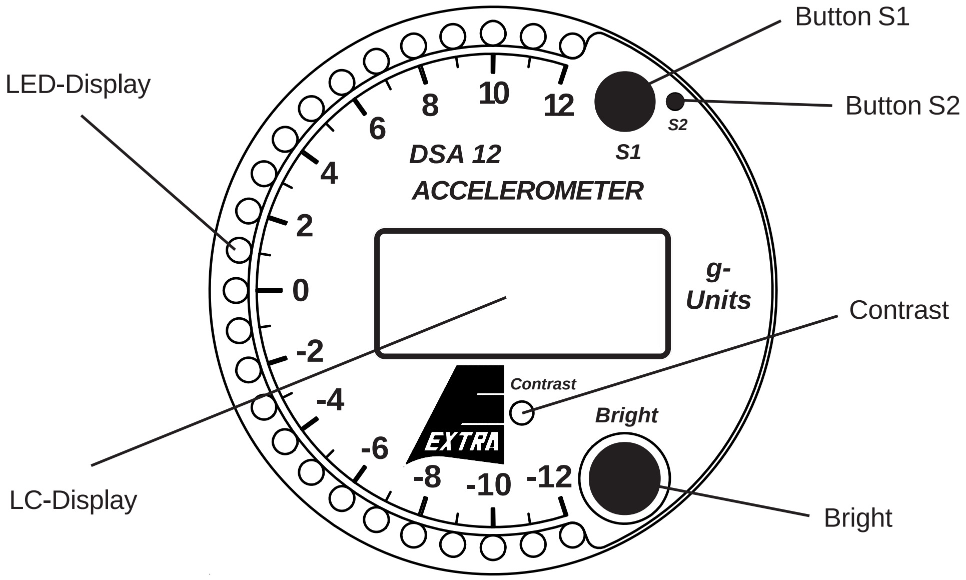
Two further extreme acceleration values are the positive and the negative **Absolute Extreme Value**. These values are the greatest acceleration values that ever occurred. They can not be reset and they are stored in the long-term memory inside the instrument. Additionally, time and date these "Absolute Extreme Values" occurred are stored. These dates can be shown by the LC-Display by pushing the buttons.
The Output of the "Absolute Extreme Values" is signed by a "**C**" as first character of the two LC-Display lines. The "Absolute Extreme Values" only change, if an "Instantaneous Value" occurs that is greater than the positive "Absolute Extreme Value" or lower than the negative "Absolute Extreme Value".

TIME AND DATE

You can recall the current **time** and **date** by pushing the buttons. If you want to change the current time and date of the clock, you have to enter the security code by the buttons. In Case the code is wrong or you wait too long, the instrument will return into the "Normal Operating Mode". The clock module has its own battery power supply backup, preventing the clock from stopping even in case of turning off the master switch or disconnecting the DSA 12 from the electrical system of the aircraft.

OPERATING INSTRUCTIONS

The left button of the instrument will be called S1 and the right button will be called S2 during the following text. If the LC-Display shows acceleration values, then the upper line exhibits the positive acceleration, and the lower line shows the negative acceleration. If the LC-Display presents time and date, you will see the time in the upper line, and in the lower line you will see the date.



1) THE FIRST SECONDS AFTER THE POWER ON

All LEDs are lighted up during the first two seconds after the power on of the instrument. Both the “Current Extreme Value” and the “Total Extreme Value” are reset to 0g.
The LCD shows:

A	+ 0.0 g
A	- 0.0 g

After two seconds the Instrument changes automatically into the “Normal Operating Mode”.

2) THE “NORMAL OPERATING MODE”

In the “Normal Operating Mode” the instrument outputs the “Instantaneous Acceleration” and the “Current Extreme Values”. The “Instantaneous Acceleration” is shown as a bar on the LED-Display. Furthermore one LED indicates the positive and another one indicates the negative “Current Extreme Value”. The “Current Extreme Values” are also shown on the LC-Display and signed with an “A”, for example:

A	+ 7.3 g
A	- 3.5 g

3) RESET OF THE “CURRENT EXTREME VALUES”

Push button: once S1

If you want to reset the “Current Extreme Value” to 0g (for example you want to measure the extreme values of the next flight figure), you have to push S1 once. In this case, all LEDs are lighting up for two seconds, the LC-Display is showing:

A	**+ 0.0 g**
A	**- 0.0 g**

and the “Current Extreme Value” is reset to 0g.
On condition you push S1 for another time during this two seconds, you get to other submenues, else the instrument returns into the “Normal Operating Mode”.
All LEDs are illuminated during the submenues.

4) DISPLAY OF THE “TOTAL EXTREME VALUES”

Push button: twice S1

Reset of the “Total Extreme Values”

Push button: twice S1 and once S2 you push S1 twice, the LC-Display shows the “Total extreme values”. These values are the maximums of positive and negative acceleration that occurred since the last reset of these values. They are signed with a “B” as first character of a line, like the following example:

B	**+ 8.4 g**
B	**- 4.2 g**

In case you want to reset these two values, you have to press S2 and the instrument sets the “Total Extreme Values” to 0g and returns into the “Normal Operating Mode”. Provided you pushed S1 instead of S2, the LC-Display will show the “Absolute Extreme Values”.
If there is no button pushed, the instrument will return into the “Normal Operating Mode”.

5) DISPLAY OF THE “ABSOLUTE EXTREME VALUES

push button: three times S1
Display of time and date of the “Absolute Extreme Values”

push button: three times S1 and once S2

After pushing S1 for three times, the LC-Display shows the greatest positive and the greatest negative acceleration the instrument ever measured. These two values are stored in the long-term memory of the instrument and signed with a “C” as first character of the LC-Display:

C	**+ 9.6 g**
C	**- 8.3 g**

Additionally the long-term memory stores the times and dates when new “Absolute Extreme Values” occur. They are shown if you push S2 next. In this case during the next twelve seconds the LC-Display shows under the title “MAX-DATE” the time and date of the positi ve “Absolute Extreme Value” and under the title “MIN-DATE” the time and date of the negative “Absolute Extreme Value”. Afterwards the instrument returns into the “Normal Operating Mode”.

If you push S1 instead of S2, the LC-Display will show the current time and date.

If there is no button pushed for about five seconds, the instrument will return into the “Normal Operating Mode.

6) OUTPUT OF TIME AND DATE

push button: four times S1

The LC-Display will exhibit time and date after you have pushed S1 for four times. For example:

02: 52 PM
12 / 09 93

is the ninth December 1993 at 2 o’clock and 52 minutes in the afternoon. If you want to set the clock, you have to push S1 for another time, otherwise the instrument returns into the “Normal Operating Mode”.

7) SETTING OF THE CLOCK

push button: five times S1

You can only set the clock, if you know the right four digit code.

If you push S1 for five times, the LC-Display shows a request to enter the code. You can change the code-digit by pushing S2. To confirm your input of a digit you have to push S1. If the entered code-digits are wrong, or you wait longer than six seconds, the instrument will return into the “Normal Operating Mode”.

CODE
0_ _ _

Provided it was the right code, the LC-Display shows the current time and date with a cursor under the first digit. By pushing S2 you can change the digit.
The change can be confirmed by pushing S1. In this case the cursor moves to the next digit. The instrument changes into the “Normal Operating Mode”, if you have stepped through all digits with the cursor, or you waited more than six seconds without pushing a button. In this case the time and date on the display are transferred into the clock. If you try to enter an impossible number (like 18 as months or 35 as days), the instrument turns back

into the “Normal Operating Mode” and the clock will be programmed with the correct changed numbers. The wrongly changed number is exchanged by its old value.

903.8 HANDLING, SERVICING AND MAINTENANCE

If the absolute extreme value "C" indicates that the operating limits have been exceeded, the manufacturer must be informed. The battery inside, which is used for the clock power supply backup, is expected to have a lifetime of 5 to 10 years. A weak battery can be exchanged by the manufacturer only.

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SECTION 904

EMERGENCY LOCATOR TRANSMITTER

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904 EMERGENCY LOCATOR TRANSMITTER

904.1 GENERAL

To improve the passive security, the EXTRA 300/L can be equipped with an optional Emergency Locator Transmitter POINTER 3000 ELT. This POINTER 3000 ELT transmit s automatically after a crash or manual activity on the emergency frequencies of 121.5 MHz (civilian) and 243.0 MHz (military).

904.2 LIMITATIONS

The operation limitations are not effected due to the installation of the POINTER 3000 ELT. For the location and operation of the transmitter the following placards have to be attached in the aircraft:

ELT located here - placard outside on the left fuselage board in high of the ELT-unit,

ELT - placard above the ELT- circuit breaker (see Fig.1) ,

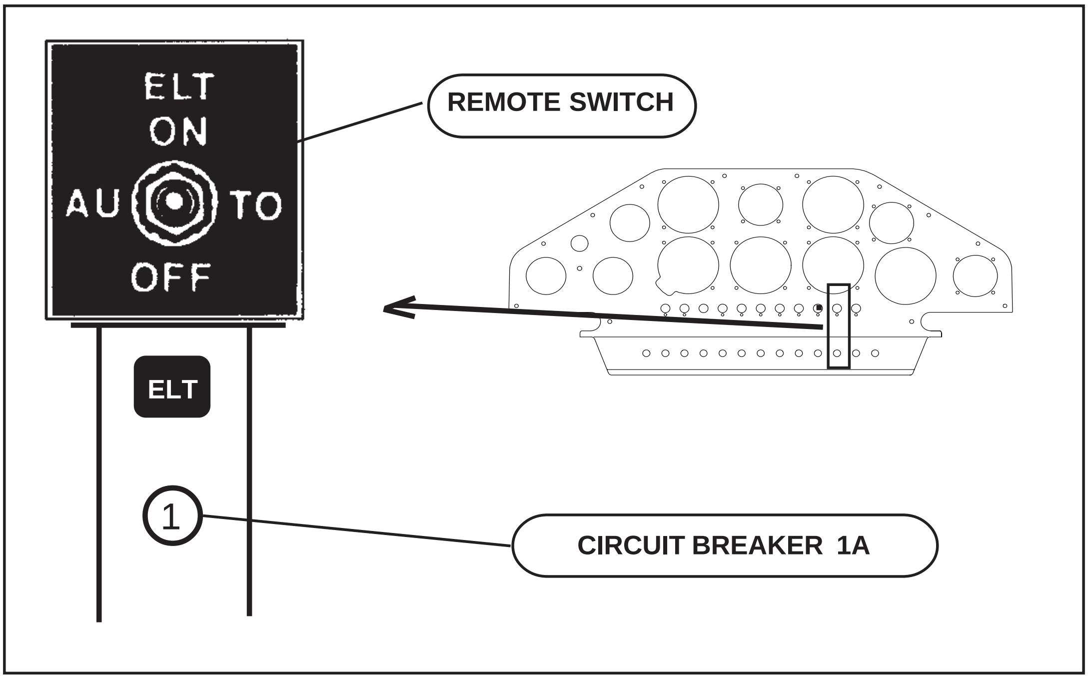
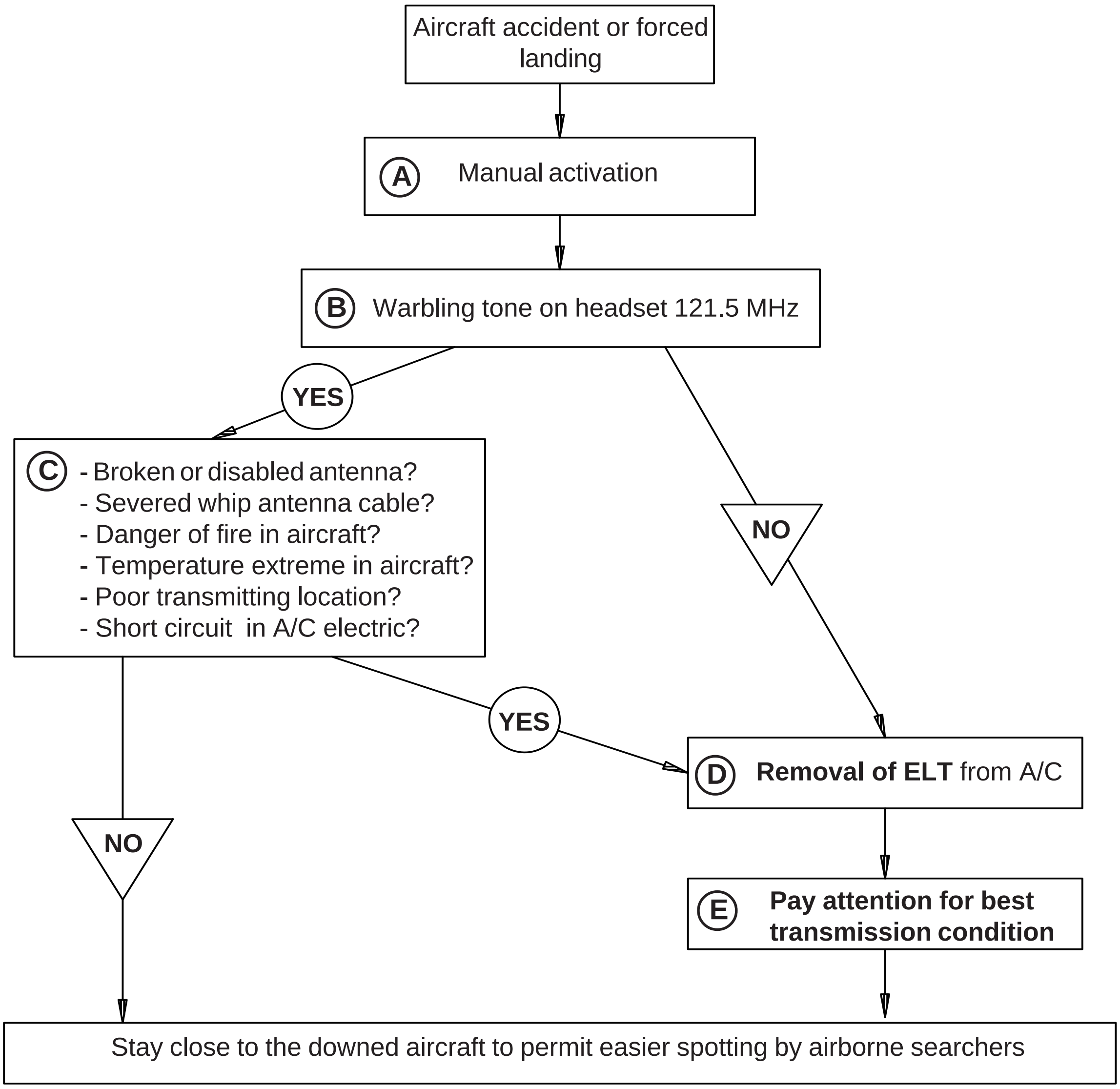


Figure 1

904.3 EMERGENCY PROCEDURES



A) Automatic and manual activation

Although the ELT will be activated automatically by a *ROLAMITE* Type INTERTIA switch after an aircraft accident or forced landing with high G-force, turn additionally the remote switch (optional) in the rear panel or the unit master switch at the ELT unit to "ON" position. The ELT will send a signal on the emergency frequencies of 121.5 MHz and 243.0 MHz.

B) Control of the ELT

If the aircraft receiver is operable listen on 121. 5 MHz for ELT transmission. Ensure that whip antenna is clear of obstruction.

C) Operating of the ELT in the portable mode

After forced landing or aircraft accident it may be desirable to use the transmitter in the portable mode. Various reasons may necessitate this, such as:

- Broken or disabled whip antenna:	⇒	D	REMOVE ELT FROM A/C
- Severed whip antenna cable:			"
- Danger of fire or explosion in aircraft:			"
- Temperature extremes in aircraft:			"
- Poor transmitting location:			"

D) Removal of ELT from aircraft:

N O T E

Accomplish as quickly as possible to resume or start emergency signal.

1. Turn the unit master switch to **"OFF"-**position.
2. Disconnect whip antenna cable and remote switch cable.
3. Turn winged nut on rear bracket clip to release transmitter (remove ELT).
4. Remove the telescope antenna from the stowage clips and insert into the ANT recepta cle. Extend antenna fully.

N O T E

Do <u>not</u> use the "AUTO" position!

5. Turn unit master switch to "**ON**" position.

E) Best transmission may be obtained by:

- Keeping antenna vertical.
- Standing transmitter upright on a metallic surface, such as an aircraft wing or stabilizer.
- If terrain prohibits good transmission (such as a deep valley or canyon) place the transmitter on the high ground or hold in hand on high place.
- Stay close to the downed aircraft.
- In freezing weather, place transmitter inside jacket or coat to keep the battery warm. Let the antenna extend outside jacket.
- Keep all moisture and ice away from the antenna connection and the remote connector pins.

N O T E

Do <u>not</u> turn pointer portable "OFF" - <u>even by night</u> as search aircraft may be enroute around the clock. Even when you have been sighted or think you have, the spotting aircraft may not be able to relay an accurate or timely "fix" on your position without a continued signal.

Only when the rescue team appears discontinue signalling by using the "OFF" position.

904.4 NORMAL PROCEDURES

There is no change of basic normal procedures with the installation of the POINTER 3000 ELT. In addition to the existing normal procedures the "**AUTO**" position of the unit master switch or the remote switch has to be checked during the preflight check.

904.5 PERFORMANCE

Not affected.

904.6 WEIGHT AND BALANCE

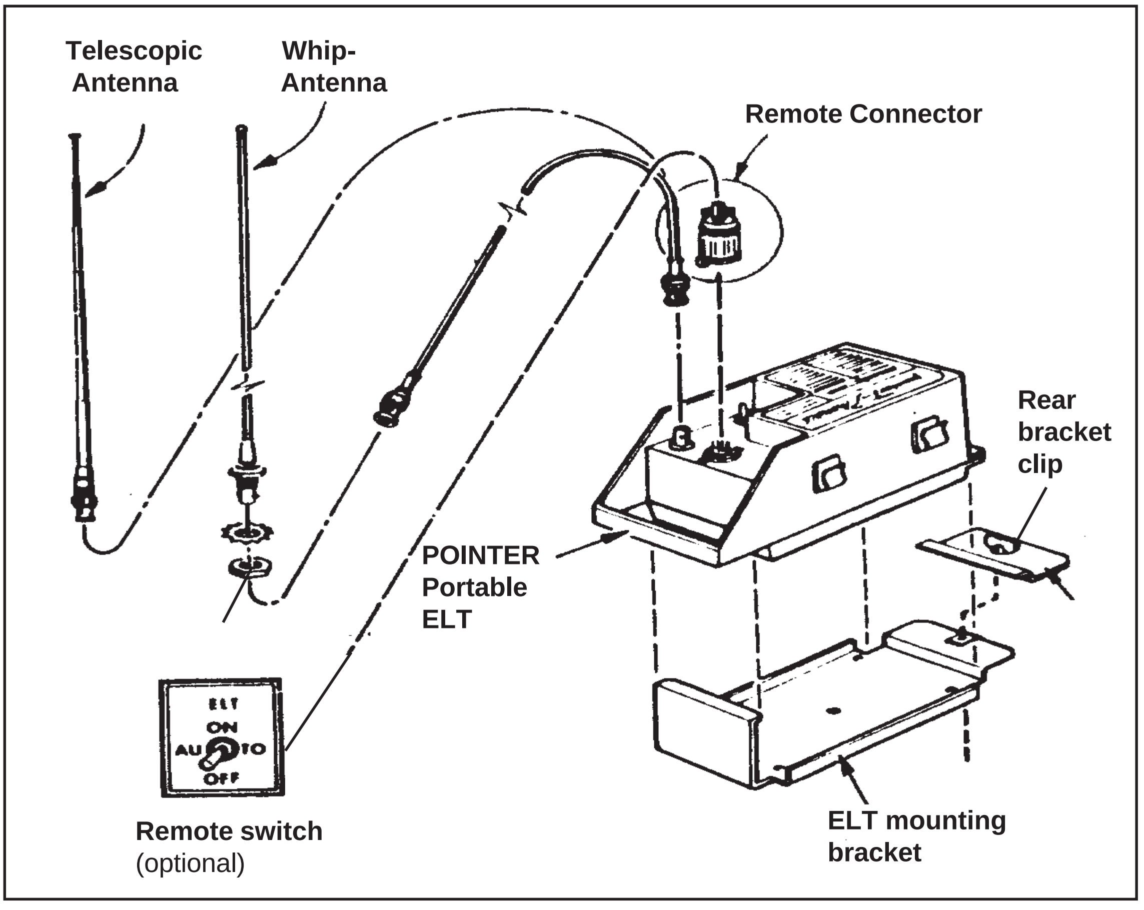
Not affected.

904.7 DESCRIPTION AND OPERATION OF THE SYSTEM

The used Emergency Locator Transmitter is a POINTER 3000 ELT from the POINTER INC.., Tempe, Arizona. After an activation the necessity signal is transmitted on the 121,5 MHz and the 243.0 MHz for a period of 48 hours at -20° respectively 2 hours at +50°.
The inertia-switch releases the necessity signal after a G-force of 5 ± 2/0 g in aircraft longitudinal axis and a duration of 11± 5/0 milliseconds.
When properly installed, parallel to the line of flight, the ELT will not activate due to turbulence, normal operation, or aerobatics.

POINTER PORTABLE ELT MAYOR SYSTEM COMPONENTS

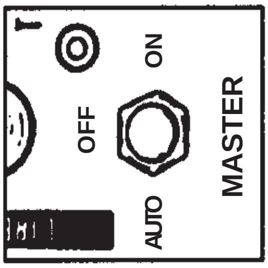
The POINTER PORTABLE ELT System consists of the following components:



OPERATING INSTRUCTION OF THE TRANSMITTER

The operation of the ELT is possible over the master unit switch or over the remote switch (optional) in the panel.

UNIT MASTER SWITCH



ON: used to activate the transmitter for test or emergency situations

OFF: used to de-activate transmitter or to insure non-activation by handling

AUTO: used to arm the Pointer Portable for automatic activation by the "G" switch only.

REMOTE SWITCH (optional)

ON: used to remotely activate the transmitter for test or emergency situation. An example of such an emergency situation would be forced landing with an impact insufficient to activate the Rolamite "G-"-switch.

AUTO: used to arm the Pointer Portable for automatic activation by the "G" switch only.

OFF: used to de-activate transmitter after automatic activation by the "G"-switch

904.8 HANDLING, SERVICING AND MAINTENANCE

Visually inspect the unit at regular intervals for cleanliness and secureness.

Check whip antenna mounting and cable connections for tightness.

In accordance with FAA regulations, batteries must be replaced after 2 years shelf or service life or for any of the following reasons:

- after the transmitter has been used in emergency situation (including any inadvertent activation of unknown duration),
- after the transmitter has been operated fore more than one cumulative hour,
- on or before battery replacement date.

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SECTION 905

EXTERNAL POWER

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905 EXTERNAL POWER

905.1 GENERAL

The EXTRA 300/L can be equipped with two versions of an optional external power receptacle system. The "normal" system (PN 93102.16-01) provides the capability to start the engine independent of the board battery and is limited to this use. The "continuous operation" system (PN 93102.16-02) further allows feeding the electrical system for longer periods.

905.2 LIMITATIONS

The operation limitations are not affected due to the installation of the external power receptacle system. For the location of the external power receptacle and protection of the electrical connection cable against overheating the following placard has to be attached on the rear instrument panel with an indicator arrow to the receptacle:

EXTERNAL POWER 12V
DO NOT CRANK FOR MORE THAN 10 SECONDS!
Allow 20 seconds to cool-down between attempts. Repeat up to 6 times.
Then let starter cool for 30 minutes.

905.3 EMERGENCY PROCEDURES

Not affected.

905.4 NORMAL PROCEDURES

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. **Master switch "OFF"**
5. Put the external power plug into the board receptacle
6. Turn boost pump "ON".
7. 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".
8. Apply the brakes.

DANGER

Propeller strike possible.
Do not allow any person to stay close to the propeller area!

NOTICE

Risk of damage due to propeller strike or air stream.
Remove any objects from the propeller operating area. Hold the canopy tight.

9. Start engine.
10. When engine fires release the ignition switch back to "BOTH".
11. Pull the external power plug from the board receptacle.
12. Move mixture control slowly and smoothly to "FULL RICH".
13. Check the oil pressure gauge. If minimum oil pressure is not indicated within 30 seconds, shut off the engine and determine trouble.
14. **Master switch "ON".**

905.5 PERFORMANCE

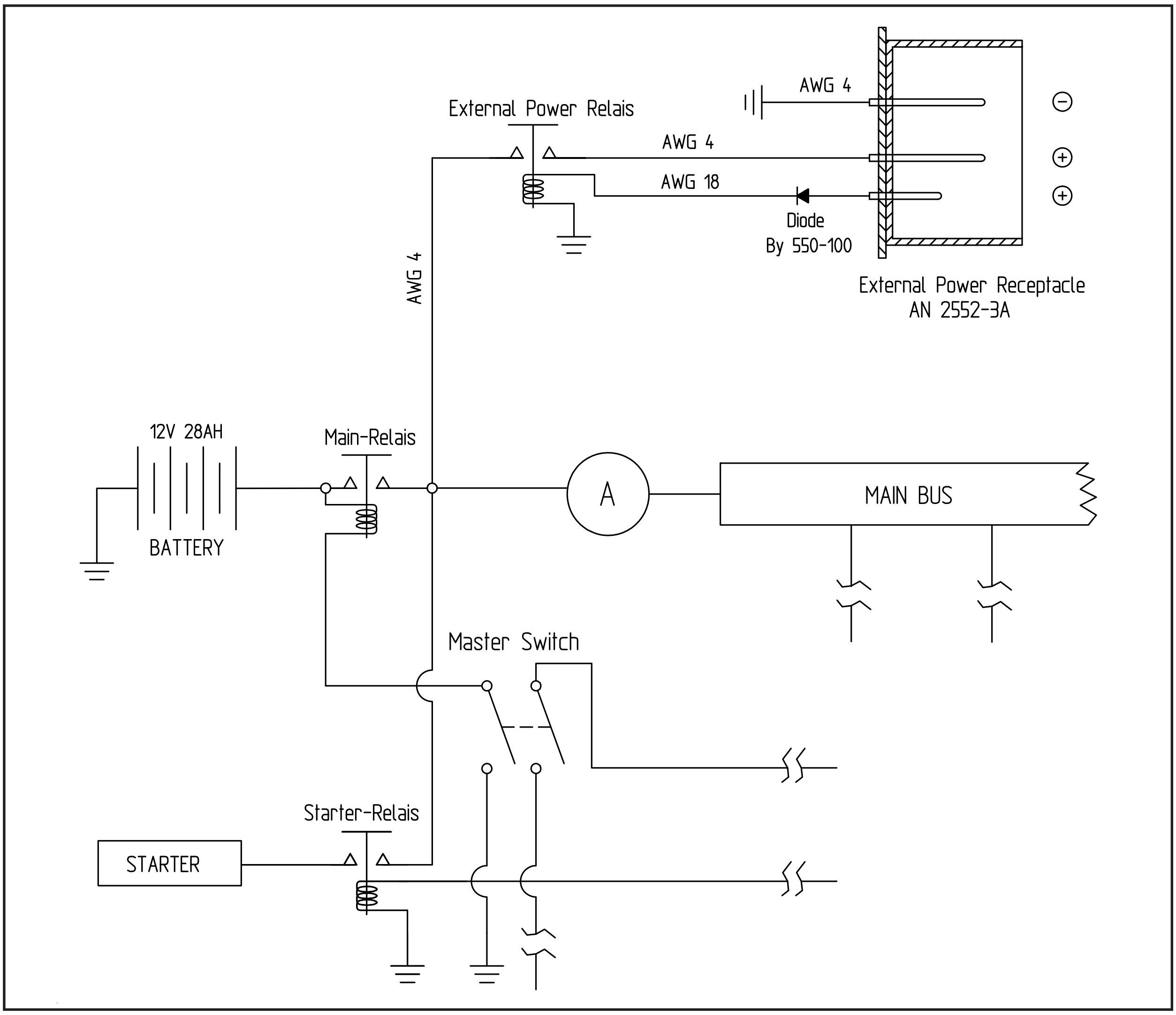
Not affected.

905.6 WEIGHT AND BALANCE

Not affected.

905.7 DESCRIPTION OF THE SYSTEM

The external power receptacle is attached left under the rear seat.
The main-relais is located at the left side of the firewall, above the starter-relais. For the avoidance of sparks, this relais does not switch before a safe contact from plug to receptacle will be ensured. During the engine start, the master switch has to be switched in **"OFF"**-position for the disconnection of the battery from the aircraft electric circuit.



905.8 HANDLING, SERVICING AND MAINTENANCE

Not affected.

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SECTION 906

DIGITAL RPM INDICATOR

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906 DIGITAL RPM INDICATOR

906.1 GENERAL

The EXTRA 300/L can be equipped with the optional "P-1000" Digital RPM indicator as an alternative to the mechanical VDO RPM indicator. One of the following models is used:
P100-230-635-00 (max. 2600RPM)
P100-230-643-00 (max. 2700RPM)

906.2 LIMITATIONS

The operation limitations are not affected by the installation of the "P-1000" Digital RPM indicator.
The model of digital RPM indicator installed must match the applicable RPM limitation approved for the propeller installed. Refer to the applicable noise level limitation included in section 2 or within any relevant supplement.
The face of the indicator is placarded with the unchanged engine RPM operating range. Additionally the operating RPM ranges are indicated on the large green, yellow, and red LEDs. These LEDs are located on the upper right corner of the indicator face.

Model P100-230-635-00 (max. 2600RPM):

$$\text{Green}\ \frac{2400}{700}\quad \text{Yellow}\ \frac{2600}{2400}\quad \text{Red}\ \frac{3500}{2600}$$

Model P100-230-643-00 (max. 2700RPM):

$$\text{Green}\ \frac{2400}{700}\quad \text{Yellow}\ \frac{2700}{2400}\quad \text{Red}\ \frac{3500}{2700}$$

906.3 EMERGENCY PROCEDURES

Not affected.

906.4 NORMAL PROCEDURES

The *Normal Procedures* have to be changed in Chapter "4.5 *Take-Off Procedure"* section "4.5.1. *Before take off"*. If the P-1000 RPM indicator is installed, the mag-drop test has to be carried out in the following manner:

<u>Magneto check</u>

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 OFF The middle LED should be OFF, otherwise the difference is more than permissible.

NOTE

During the short circuit (grounding) of a single magneto, the respective red LED has to be illuminated. The maximal allowed RPM drop at 1800 RPM is 175 min^{-1}. The maximal RPM difference between the magnetos should not exceed 50 min^{-1} (identified by the illuminated yellow LED).

906.5 PERFORMANCE

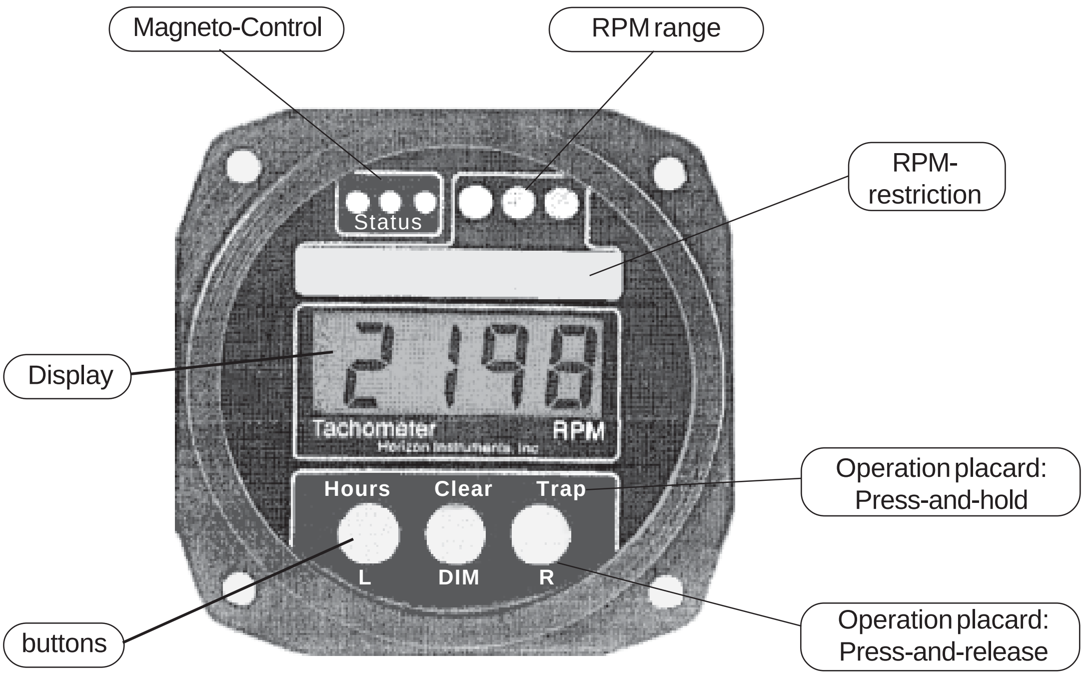
Not affected.

906.6 WEIGHT AND BALANCE

Not affected.

906.7 DESCRIPTION AND OPERATION OF THE SYSTEM

The operation of the indicator is straight-forward. After power is supplied to the indicator, the engine is started, and the self tests are performed, the default display of the engine RPM appears on the display. The default display is insured via the use of internal timers that will restore the display to the current RPM even in the event that one of the panel buttons becomes stuck or defective.
Internally, two independent tachometers watch the pulses received from each magneto. Each tachometer is accurate to less than 1 RPM and can be individually enabled/disabled via buttons on the face of the indicator.



RPM RANGES

Engine operating ranges are indicated by the large green, yellow, and red LEDs. These LEDs are located on the upper right corner of the indicator face.

MAGNETO-CHECK

Three small LED magneto system alert indicator lights are located within the "Status" aera on the upper left corner of the indicator face.
The left and right red LED alert indicator lights, when illuminated, indicate, because of loss of ignition signal to the tachometer, a possible malfunction of the respective left or right magneto ignition system.
While performing a magneto check during engine run-up, the red alert indicator lights will illuminate, thus identifying the grounding of the respective right or left magneto systems.

Ignition Switch Position	Tachometer Magneto Alert Indicator Lights	
	LEFT Status LED	RIGHT Status LED
OFF	ON	ON
RIGHT	ON	OFF
LEFT	OFF	ON
BOTH	OFF	OFF

Between the left and right magneto ignition system alert indicators is a yellow **RPM synchronization indicator**. This small yellow indicator is illuminated when there is a difference of more than 50 RPM between the right and left tachometers.

This indicator also may flicker during extreme RPM excursions of the engine.

OPERATION BUTTONS

There are three panel buttons. Each button has two modes of operation.

PRESS-AND-HOLD operation mode

(press and hold for more than 2/3 of a second)

This operation mode is placarded above each button.*(Hours, Clear, Trap)*

Engine time *(Hours)*
The left button, upon depression, will cause the tachometer to display the non-fractional portion (0000.) of the current accumulated engine hours. When the button is released, the fractional part of the engine hours (.00) is displayed for a short period of time. The clock is started whenever the engine RPM exceeds 800 RPM and is recorded in real hours.

Clear (Clear)
The middle button clears the RPM trap. During depression of the switch, the RPM trap is zeroed. When the button is released, the trap will record the current engine RPM.

Engine RPM (Trap)
The right button will cause the tachometer to display the current contents of the RPM trap. This trap records the **highest engine RPM** achieved before the button was pressed.

PRESS-AND-RELEASE operation mode

(press and release in less than 2/3 of a second)

This operation mode is placarded below each button.*(L , DIM , R)*

Masks *(L , R)*
During normal operation, the tachometer presents the average of the left and right internal tachometers on the display. However, a mechanism **exists to mask** either tachometer from the display, leaving the remaining tachometer to determine magneto/ignition problems.

Quickly pressing and releasing the left button *(L)*, causes the tachometer to mask the left tachometer.

Quickly pressing and releasing the right button *(R)*, causes the tachometer to mask the right tachometer.

Dimmer *(DIM)*
Quickly pressing and releasing the middle button *(DIM)*, causes the tachometer to alternately dim or brighten the LED indicators (except the large red LED of the RPM Range).

906.8 HANDLING, SERVICING AND MAINTENANCE

Not affected.

SECTION 907

LONG RANGE WING TANK CAPACITY

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907 LONG RANGE WING TANK CAPACITY

907.1 GENERAL

The leading edge wing tank on the EA 300/L equipped with the long range tank capacity features two tank compartments on either wing side. The compartments are separated by a slosh rib.

907.2 LIMITATIONS

FUEL

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

Total fuel capacity:	**205 L**	(**54.1** US Gallons).
- Wingtank:	**154 L** (2 x 77 L)	(**40.7** US Gallons)
- Acro & Center Tank:	**51 L**	(**13.4** US Gallons)

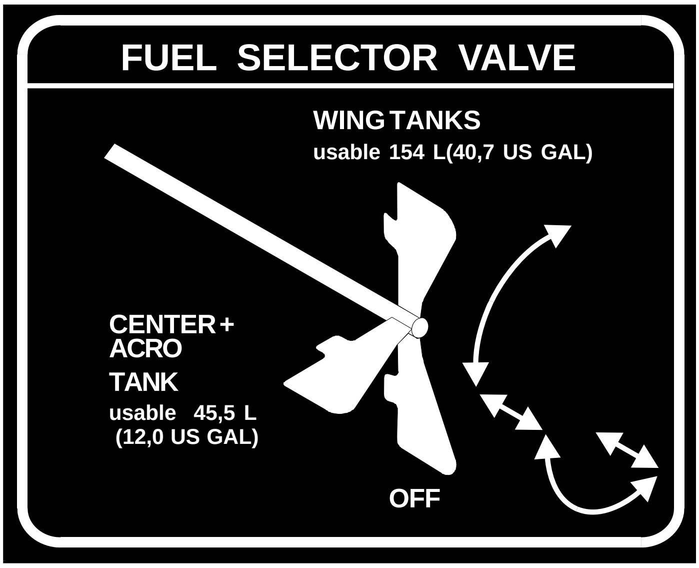
Usable fuel capacity in the system: **199.5** L (**52.7** US Gallons).
For acrobatic flight wing tanks must be empty.
Usable fuel capacity for acrobatic: **45.5 L** (**12.0** US Gallons).

WEIGHT LIMITS

Max. allowed **empty** weight - Normal category: 716 kg (1578lbs)

PLACARD

The existing FUEL SELECTOR VALVE - placard has to be replaced by the following placard:



(in both cockpits near selector valve handle)

907.3 EMERGENCY PROCEDURES

Not affected.

907.4 NORMAL PROCEDURES

Not affected

907.5 PERFORMANCE

RANGE AND ENDURACE

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 21 litre (5.5 US Gal.) for 45 minutes with 45% Power. 5.5 liters (1.45 US Gal.) unusable fuel is taken into account. (At ISA-Conditions).

PA [ft] (m)	Eng. [rpm]	Manif. Press. [inHg]	Power Setting [%]	[hp]	Fuel Consumption [L/h] [gal/h]	TAS [kts] (km/h)	IAS [kts] (km/h)	Endur. 1* [h]	Range 1* [nm] (km)	Mixture 2* Best ...
2000	2700	27.4	95	285	88.2 (23.3)	182.6 (338)	173 (320)	1.88	342 (634)	Power
(610)	2400	25.1	75	225	68.7 (18.2)	167.6 (310)	160 (296)	2.40	403 (746)	Power
	2200	24.2	65	195	50.5 (13.3)	159.3 (295)	152 (282)	3.27	520 (964)	Economy
	2000	23.5	55	165	42.6 (11.3)	150.2 (278)	144 (267)	3.88	582 (1078)	Economy
	2000	20.2	45	135	36.5 (9.6)	139.9 (259)	134 (248)	4.52	632 (1171)	Economy
4000	2700	25.4	89	267	82.7 (21.8)	181.5 (336)	168 (311)	2.00	361 (668)	Power
(1219)	2400	24.6	75	225	68.7 (18.2)	170.9 (317)	158 (293)	2.40	409 (757)	Power
	2200	23.7	65	195	50.5 (13.3)	162.4 (301)	150 (278)	3.26	527 (977)	Economy
	2000	23.0	55	165	42.6 (11.3)	153.1 (284)	142 (263)	3.86	589 (1091)	Economy
	2000	19.7	45	135	36.5 (9.6)	142.6 (264)	133 (246)	4.52	640 (1185)	Economy
6000	2700	23.6	83	249	77.6 (20.5)	180.5 (334)	162 (300)	2.13	380 (704)	Power
(1829)	2500	23.3	75	225	69.8 (18.4)	174.3 (323)	158 (293)	2.37	408 (755)	Power
	2200	23.2	65	195	50.5 (13.3)	165.6 (307)	149 (276)	3.24	533 (988)	Economy
	2000	22.5	55	165	42.6 (11.3)	156.1 (289)	141 (261)	3.84	597 (1105)	Economy
	2000	19.3	45	135	36.5 (9.6)	145.4 (269)	131 (243)	4.46	647 (1199)	Economy
8000	2700	21.8	77	231	73.4 (19.4)	179.5 (332)	156 (289)	2.25	397 (736)	Power
(2438)	2675	21.5	75	225	71.9 (19.0)	177.8 (329)	155 (287)	2.29	402 (745)	Power
	2350	21.5	65	195	52.0 (13.7)	169.0 (313)	147 (272)	3.14	526 (973)	Economy
	2050	21.4	55	165	43.0 (11.4)	159.3 (295)	139 (257)	3.78	598 (1107)	Economy
	2000	18.8	45	135	36.5 (9.6)	148.4 (287)	130 (241)	4.44	655 (1213)	Economy
10000	2700	20.2	72	216	69.6 (18.4)	178.5 (331)	151 (280)	2.37	414 (767)	Power
(3048)	2500	19.9	65	195	53.6 (14.2)	172.4 (319)	148 (274)	3.04	516 (956)	Economy
	2150	19.9	55	165	43.7 (11.5)	162.5 (301)	138 (256)	3.71	595 (1103)	Economy
	2000	18.4	45	135	36.5 (9.6)	151.4 (280)	129 (239)	4.41	663 (1228)	Economy
12000	2700	18.6	67	201	66.2 (17.5)	177.5 (329)	146 (270)	2.47	429 (795)	Power
(3658)	2675	18.4	65	195	55.3 (14.9)	176.0 (326)	144 (267)	2.93	507 (939)	Economy
	2300	18.3	55	165	45.2 (11.9)	165.9 (307)	136 (252)	3.56	583 (1079)	Economy
	2000	17.9	45	135	36.5 (9.6)	154.5 (286)	127 (235)	4.37	670 (1241)	Economy
14000	2700	17.2	62	186	63.0 (16.6)	176.6 (327)	140 (259)	2.62	445 (825)	Power
(4267)	2450	17.0	55	165	46.7 (12.3)	169.4 (314)	135 (250)	3.44	569 (1054)	Economy
	2075	17.7	45	135	37.1 (9.8)	157.8 (292)	122 (226)	4.28	665 (1231)	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.

907.6 WEIGHT AND BALANCE

LOADING WEIGHTS AND MOMENTS

TOTAL FUEL CAPACITY: 205 Litre (54.1 US GAL.)

FUEL					
ACRO & CENTER TANK			WING TANK		
Litre *(US GAL)*	KG *(LBS)*	KG x CM *(LBS x IN)*	Litre *(US GAL)*	KG *(LBS)*	KG x CM *(IN x LBS)*
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)*
51 *(13.5)*	36.7 *(80.9)*	1094 *(949)*	*140 (36.9)*	100.8 *(222.3)*	5050 *(4402)*
			154 *(40.7)*	110.9 *(244.6)*	5555 *(4842)*

907.7 DESCRIPTION OF THE SYSTEM

Wing tank:

The leading edge section of each wing in front of main spars forms an integral fuel tank providing two interconnected tanks with 154 litres (40.7 US GAL.) total capacity. Each side of the wing has a 2" diameter filler cap for gravity refuelling. The long range tank has two compartments in either wing which are separated by a slosh rib. Due to the interconnection the fuel level of the left and right integral tank will equalize during refuelling within reasonable time. For max. fuel capacity, the first-filled side has to be filled once again!
The wing tank can be completely emptied in flight.

907.8 HANDLING, SERVICING AND MAINTENANCE

Not affected.

SECTION 908

AIRTOW HOOK

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908.1 GENERAL

The EXTRA 300/L can optionally be equipped with a "TOST" glider air-tow release Typ E 85. The release mechanism is mounted at the tail spring end and actuated from the cockpit by a yellow knob.

908.2 LIMITATIONS

The following combinations are certified:

Aircraft

a) Engine: AEIO 540-L1B5 or AEIO 540-L1B5D
Propeller: MTV-14-B-C/C190-17
Exhaust system: Typ Gomolzig EA 300-606000 or standard exhaust PC-63104 with silencer: NSD GO3-606500

b) Engine: AEIO-580-B1A
Propeller: MTV-9-B-C/C 198-25 (restricted to max. 2600 RPM) or MTV-14-B-C/C190-17
Exhaust system: Typ Gomolzig EA 300-606000

Air-tow release system according to replacement instruction: UA-300-4-95
Air-tow release: "TOST, E 85"

Glider

MTOW of the glider: 765Kg (1687 lbs)

Max. air towing speed of the glider: 152 km/h or above

Air tow cable and breaking piece (weak links)

Length of the synthetic tow between 40 m (130 ft) and 60 m (195 ft)
Ultimate load of the air-tow max. 850 kp (1875 lbs)
If tows with higher ultimate load are used a breaking piece (weak links) of max. 850 kp (1875 lbs) must be interconnected.

For a safe air towing the following points must be observed:

	1-seat	2-seats *
Max. Takeoff Weight	820 kg (1813 lbs)	870 kg (1924 lbs)
Max. Empty Weight	701 kg (1546 lbs)	665 kg (1466 lbs)
Min. Air-Towing Speed	66 KIAS (122 km/h)	68 KIAS (126 km/h)
Best Air-Towing Speed	72-76 KIAS (133 - 141 km/h)	74-78 KIAS (137 - 144 km/h)

N O T E*

2-seats only in case of an instruction flight!

1.) Maximum air-towing speed = maximum permissible air-towing speed of the glider.
2.) The maximum permissible cylinder head temperature is 500°F (red line) for AEIO-540 and 465°F (red line) for AEIO-580.
3.) Interior mirror mounted.

For the location of the yellow release knob the following placard has to be attached in the near of the knob:

AIR TOW

908.3 EMERGENCY PROCEDURES

A) ABORTED TAKE OFF

1. Pilot of the glider	INFORM
2. Throttle	IDLE
3. Mixture	IDLE CUT OF
4. Brakes	APPLY AS PRACTICAL

B) ENGINE FAILURE IMMEDIATELY AFTER TAKEOFF

Stall speed: 60 KIAS (111 km/h)

1. Pilot of the glider	INFORM
2. Air tow	RELEASE
3. Airspeed	80 KIAS (148 km/h)
4. Mixture	IDLE CUT OFF
5. Fuel shutoff valve	OFF
6. Ignition switch	OFF
7. Master switch	OFF
8. Forced landing	PERFORM AS PRACTICAL

C) EXCESSIVE "CLIMB OVER" BY THE TOWING GLIDER

1. Pilot of the glider	INFORM
2. Air tow	RELEASE
3. Landing	PERFORM AS PRACTICAL

D) TOW BREAK

1. Pilot of the glider	INFORM
2. Landing	PERFORM AS PRACTICAL

908.4 NORMAL PROCEDURES

Preflight inspection, starting procedures, take-off procedure and the following climbing flight have to be carry out in accordance with Chapter 4 "Normal procedure". In addition to this procedures the following points have to be observed:

A) PRIOR TO THE TAKE OFF

A release test needs to be conducted to determine safe release operation. The test shall be made on both, aircraft and glider.

B) TAKE OFF

After air-tow hook up the tow shall be tighened gently. During the following take-off and climb the maximum air-tow speed of the glider must be observed.

C) CLIMB

While climbing the max C.H.T. must be observed. Towing light gliders, the intial climb angle may be very step. Information of the glider pilot is recomended.

D) RELEASE

After the release of the glider a gently left handed descent shall be flown to avoid collision of glider and air-tow.

E) DESCENT AND LANDING

While descending the engine temperatures shall be observed (Avoid overcooling). Final approach should account for the air-tow hanging below the aircraft flight path.

908.5 PERFORMANCE

The existing POH-Data remain valid with the exception of:

TAKE-OFF DISTANCE

Conditions:

Power: 2600 Rpm or above and full throttle, mixture rich,
short grass, dry and paved level runway, no wind,
takeoff weight of the towing aircraft: 820Kg (1808lbs)

Liftoff speed (T/O): 65 KIAS = 120 Km/h indicated
Obstacle clearance speed over 15m (50ft) : 70 KIAS = 130 Km/h indicated

For every 5 kts (9 km/h) headwind, the takeoff (T/O) distance can be decreased by 5%. For every 2 kts (4 km/h) tailwind [up to 10 kts (19 km/h)], the (T/O) distance is increased by 10%.

NOTE

All values are valid for single-pilot air-towing operation [820kg (1808 lbs) TOW]. In case of an instruction flight with copilot, the higher takeoff weight has to be considered!

NOTE

The maximum permissible air-towing speed of the glider needs to be observed!

TAKE-OFF DISTANCE

Takeoff weight glider: 350 kg (772 lbs)

PA ft (m)	OAT -10°C (14°F) T/0 roll m (ft)	-10°C 15 m (50 ft) m (ft)	0°C (32°F) T/0 roll m (ft)	0°C 15 m (50 ft) m (ft)	10°C (50°F) T/0 roll m (ft)	10°C 15 m (50 ft) m (ft)	20°C (68°F) T/0 roll m (ft)	20°C 15 m (50 ft) m (ft)	30°C (86°F) T/0 roll m (ft)	30°C 15 m (50 ft) m (ft)	40°C (104°F) T/0 roll m (ft)	40°C 15 m (50 ft) m (ft)
SL	134 (440)	219 (719)	150 (492)	244 (801)	166 (545)	271 (889)	184 (604)	300 (984)	202 (663)	331 (1086)	223 (732)	364 (1194)
2000 (610)	156 (512)	256 (840)	174 (571)	285 (935)	194 (636)	316 (1037)	214 (702)	350 (1148)	236 (774)	386 (1266)	260 (853)	424 (1391)
4000 (1219)	183 (600)	299 (981)	204 (669)	333 (1093)	226 (741)	370 (1214)	251 (823)	409 (1342)	276 (906)	451 (1480)	304 (997)	497 (1631)
6000 (1829)	214 (702)	350 (1148)	239 (784)	390 (1280)	265 (869)	434 (1424)	294 (965)	480 (1575)	324 (1063)	530 (1739)	357 (1171)	583 (1913)
8000 (2438)	252 (827)	411 (1348)	281 (922)	459 (1506)	312 (1024)	510 (1673)	346 (1135)	565 (1854)	382 (1253)	624 (2047)	421 (1381)	687 (2254)

Takeoff weight glider: 600 kg (1323 lbs)

PA ft (m)	OAT -10°C (14°F) T/0 roll m (ft)	-10°C 15 m (50 ft) m (ft)	0°C (32°F) T/0 roll m (ft)	0°C 15 m (50 ft) m (ft)	10°C (50°F) T/0 roll m (ft)	10°C 15 m (50 ft) m (ft)	20°C (68°F) T/0 roll m (ft)	20°C 15 m (50 ft) m (ft)	30°C (86°F) T/0 roll m (ft)	30°C 15 m (50 ft) m (ft)	40°C (104°F) T/0 roll m (ft)	40°C 15 m (50 ft) m (ft)
SL	176 (577)	287 (942)	196 (643)	320 (1050)	217 (712)	355 (1165)	240 (787)	393 (1289)	265 (869)	433 (1421)	291 (955)	476 (1562)
2000 (610)	205 (673)	334 (1096)	228 (748)	373 (1224)	253 (830)	414 (1358)	280 (919)	458 (1503)	309 (1014)	505 (1657)	340 (1115)	555 (1821)
4000 (1219)	239 (784)	391 (1283)	267 (876)	436 (1430)	296 (971)	484 (1588)	328 (1076)	535 (1755)	362 (1188)	591 (1939)	398 (1306)	650 (2133)
6000 (1829)	280 (919)	458 (1503)	313 (1027)	511 (1677)	347 (1138)	567 (1860)	385 (1263)	628 (2060)	425 (1394)	693 (2274)	467 (1532)	763 (2503)
8000 (2438)	329 (1079)	538 (1765)	368 (1207)	600 (1969)	409 (1342)	668 (2192)	453 (1486)	740 (2428)	500 (1640)	817 (2680)	550 (1804)	899 (2949)

Takeoff weight glider: 765 kg (1687 lbs)

PA ft (m)	OAT -10°C (14°F) T/0 roll m (ft)	-10°C 15 m (50 ft) m (ft)	0°C (32°F) T/0 roll m (ft)	0°C 15 m (50 ft) m (ft)	10°C (50°F) T/0 roll m (ft)	10°C 15 m (50 ft) m (ft)	20°C (68°F) T/0 roll m (ft)	20°C 15 m (50 ft) m (ft)	30°C (86°F) T/0 roll m (ft)	30°C 15 m (50 ft) m (ft)	40°C (104°F) T/0 roll m (ft)	40°C 15 m (50 ft) m (ft)
SL	220 (722)	360 (1181)	245 (804)	401 (1316)	272 (892)	445 (1460)	301 (988)	492 (1614)	332 (1089)	542 (1778)	365 (1198)	596 (1955)
2000 (610)	257 (843)	419 (1375)	286 (938)	467 (1532)	317 (1040)	518 (1699)	351 (1152)	574 (1883)	387 (1270)	633 (2077)	426 (1398)	696 (2283)
4000 (1219)	300 (984)	489 (1604)	334 (1096)	546 (1791)	371 (1217)	606 (1988)	411 (1348)	671 (2201)	453 (1486)	740 (2428)	499 (1637)	814 (2671)
6000 (1829)	351 (1152)	574 (1883)	392 (1286)	640 (2100)	435 (1427)	711 (2333)	482 (1581)	787 (2582)	532 (1745)	869 (2851)	585 (1919)	956 (3136)
8000 (2438)	413 (1355)	674 (2211)	461 (1512)	752 (2467)	512 (1680)	836 (2743)	567 (1860)	926 (3038)	626 (2054)	1023 (3356)	690 (2264)	1126 (3694)

CLIMBRATE

Conditions:

Power: 2500 Rpm and full throttle, mixture rich,
Speed of the aircraft tow: 76 KIAS = 140 Km/h,
Weight of the towing aircraft: m = 820 Kg (1808 lb), (1 Pilot = 86 kg, Acro & Center Tank full 38 L, Wingtank 30 L)

Tow force: glider with m = 350 kg (772 lbs)

PA	0°C (32°F) OAT		10°C (50°F)		20°C (68°F)		30°C (86°F)	
ft (m)	ft/min	m/s	ft/min	m/s	ft/min	m/s	ft/min	m/s
SL	1610	8.2	1540	7.8	1480	7.5	1410	7.2
1000 (305)	1540	7.8	1475	7.5	1410	7.2	1345	6.8
2000 (610)	1475	7.5	1400	7.1	1340	6.8	1275	6.5
3000 (914)	1400	7.1	1335	6.8	1270	6.4	1210	6.1
4000 (1219)	1330	6.8	1265	6.4	1200	6.1	1140	5.8
5000 (1524)	1260	6.4	1195	6.1	1130	5.7	1070	5.4
6000 (1829)	1190	6.0	1130	5.7	1065	5.4	1000	5.1
7000 (2134)	1120	5.7	1060	5.4	995	5.1	935	4.7
8000 (2438)	1050	5.3	990	5.0	925	4.7	865	4.4

Tow force: glider with m = 600 kg (1323 lbs)

PA	0°C (32°F) OAT		10°C (50°F)		20°C (68°F)		30°C (86°F)	
ft (m)	ft/min	m/s	ft/min	m/s	ft/min	m/s	ft/min	m/s
SL	1280	6.5	1210	6.1	1150	5.8	1080	5.5
1000 (305)	1210	6.1	1145	5.8	1080	5.5	1015	5.2
2000 (610)	1140	5.8	1080	5.5	1010	5.1	950	4.8
3000 (914)	1080	5.5	1005	5.1	940	4.8	880	4.5
4000 (1219)	1005	5.1	935	4.7	870	4.4	810	4.1
5000 (1524)	935	4.7	870	4.4	800	4.1	740	3.8
6000 (1829)	865	4.4	800	4.1	735	3.7	675	3.4
7000 (2134)	800	4.1	730	3.7	670	3.4	605	3.1
8000 (2438)	730	3.7	670	3.4	600	3.0	545	2.8

Tow force: glider with m = 765 kg (1687 lbs)

PA	0°C (32°F) OAT		10°C (50°F)		20°C (68°F)		30°C (86°F)	
ft (m)	ft/min	m/s	ft/min	m/s	ft/min	m/s	ft/min	m/s
SL	920	4.7	850	4.3	785	4.0	725	3.7
1000 (305)	850	4.3	780	4.0	720	3.7	655	3.3
2000 (610)	780	4.0	715	3.6	650	3.3	585	3.0
3000 (914)	710	3.6	645	3.3	580	2.9	515	2.6
4000 (1219)	645	3.3	575	2.9	510	2.6	450	2.3
5000 (1524)	575	2.9	505	2.6	445	2.3	380	1.9
6000 (1829)	505	2.6	440	2.2	375	1.9	310	1.6
7000 (2134)	435	2.2	370	1.9	305	1.5	240	1.2
8000 (2438)	365	1.9	300	1.5	235	1.2	180	0.9

908.6 WEIGHT AND BALANCE

Not affected.

908.7 DESCRIPTION OF THE SYSTEM

The release mechanism is a typ "E 85" of the "TOST" company, Munich. It is mounted at the tail spring rear end aft the tail wheel and activated with a yellow handle located at the rear seat cockpit via a bowden cable.

908.8 HANDLING, SERVICING AND MAINTENANCE

Service and maintenance needs to be conducted in accordance with the latest operation handbook (Typ E 85) of the manufacturer TOST GmbH, Germany. Additionally during the 100 h inspection the bowden cable and the release handle have to be checked.

SECTION 909

SMOKE SYSTEM

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909 SMOKE SYSTEM

909.1 GENERAL

For performing at airshows, the EXTRA 300L may optionally be equipped with a smoke system.

909.2 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) The operation of the smoke system is **not allowable** for the standard exhaust (6 into 2) PC-63104 **with** mounted, external silencer NSD GO3-606500
7) Wearing a parachute is strongly recommended.

Operating Markings & Placards:

Placard	Location
SMOKE-OIL (straight paraffin oil) 40cSt, 31L, 8.2 USG	External: Next to the quick connector at the fuselage bottom
ON / OFF	On switch of the throttle lever
ON ON	On instrument panel above control switch row
OFF SMOKE ARM / OFF SMOKE REFILL	On instrument panel below control switch row
SMOKE PUMPS / SMOKE CONTROL	For DUAL PUMP SYSTEM: On instrument panel above circuit breaker row.
SMOKE SYSTEM	For SINGLE PUMP SYSTEM: On instrument panel above circuit breaker row.
BREAKER	On instrument panel below circuit breaker row

909.3 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. Master 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*

909.4 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

N O T E

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.

909.5 PERFORMANCE

Not affected.

909.6 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).

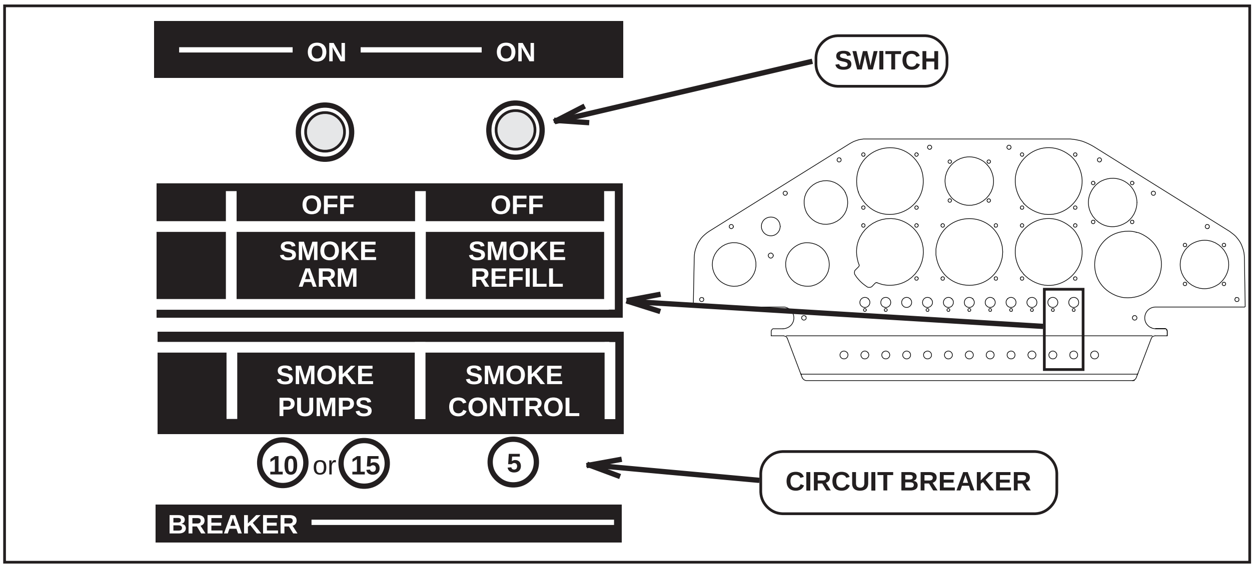
909.7 DESCRIPTION OF THE SYSTEM

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. There are two different systems approved:

A) DUAL PUMP SYSTEM

The main smoke oil tank is filled by a refill pump through a quick connector located in the aircraft belly fairing. The separate floptube smoke oil tank is interconnected to the main smoke oil tank and gravity fed. Filled tanks are detected by a float switch placed in the main smoke oil tank which shuts the refill pump off. An additional injection pump placed at the firewall within the engine compartment pumps the smoke oil from the floptube smoke oil tank through a solenoid 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 pump in the pilot compartment with quick connector in the belly fairing
- Injection pump in the engine compartment with a shut-off solenoid in the pilot compartment
- ON-OFF switch on the throttle lever
- Two relais (make contact type) for pumps and for the solenoid control
- "SMOKE ARM" switch to arm the system and "SMOKE REFILL" switch for refilling placed at the instrument-panel
- Circuit breaker for pumps and control placed at the instrument-panel

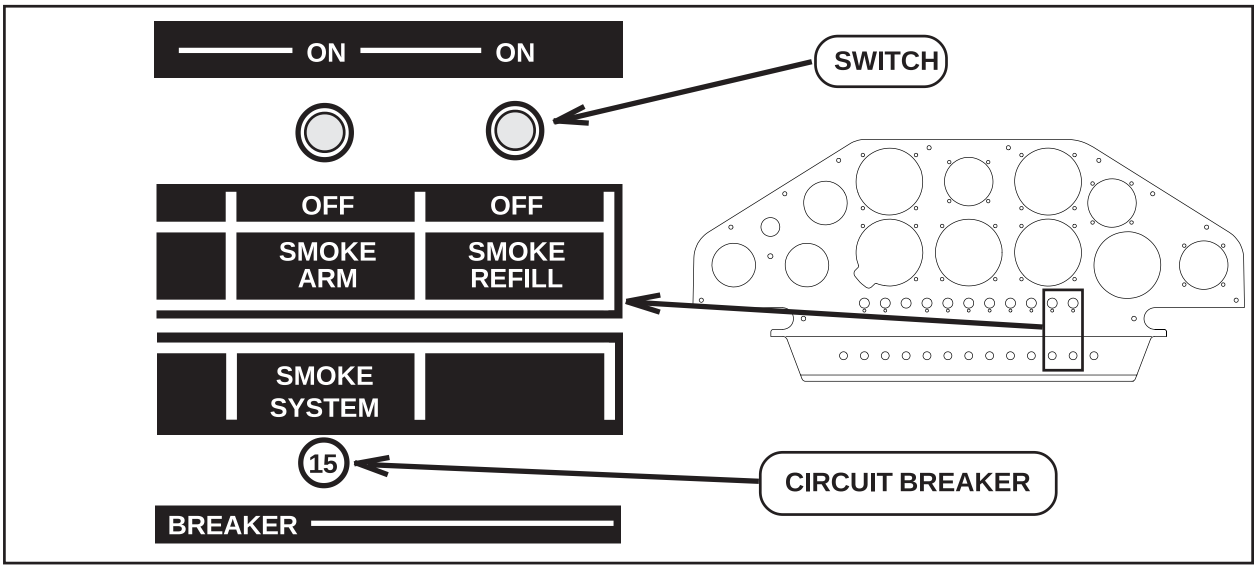


B) SINGLE PUMP SYSTEM

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



909.8 HANDLING, SERVICING AND MAINTENANCE

At every refilling:

- Check automatic shut-off

Additionally during the 100h Check for the DUAL PUMP SYSTEM

- Check the system for leakage (lines, fittings, tanks)
- Check the smoke oil tanks for proper attachment
- Check the function of the solenoid valve
- Clean the injector nozzle: if required, remove carbon debris

Additionally during the 100h Check for the SINGLE PUMP SYSTEM

- 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 cable from smoke oil contamination

N O T E

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

SECTION 910

ACRO III CATEGORY

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910 ACRO III CATEGORY

910.1 GENERAL

The EXTRA 300/L can be operated in an additional two seat Acro III category. This category is defined by a MTOW of 950 kg (2095 lbs), a max. load factor of +6g/-6g, and a V_A of 158 KIAS (293 km/h).

910.2 LIMITATIONS

AIRSPEED

Maneuver Speed (Acro III):	V_A	158 KIAS (293 km/h)

WEIGHT LIMITS

Max. allowed empty weight:	745 kg (1643 lbs)
Max. allowed T/O weight:	950 kg (2095 lbs)

WEIGHT AND C.G. ENVELOPE

Weight:	forward C.G.	rear C.G.
MTOW 950 kg (2095 lbs) and below:	67,1 cm (26.4")	84,1 cm (33.1")

LOAD FACTOR

+6g / -6g for two seat occupied (MTOW 950 kg / 2095 lbs)

OPERATING PLACARDS

VA = 158 Kts (Acro I+II+III)
VA = 140 Kts (Normal)

or

VA = 293 km/h (Acro I+II+III)
VA = 259 km/h (Normal)

(near airspeed indicator)

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)

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

(in both cockpits)

910.3 EMERGENCY PROCEDURES

Not affected

910.4 NORMAL PROCEDURES

AIRSPEEDS FOR NORMAL OPERATION

CATEGORY	ACRO I 1 seat KIAS (km/h)	ACRO II 2 seats KIAS (km/h)	ACRO III 2 seats KIAS (km/h)	NORMAL KIAS (km/h)
Start:				
-Rotating Speed	60 (111)	62 (115)	65 (120)	65 (120)
Climb:				
-Vx	87 (161)	89 (165)	93 (172)	93 (172)
-Vy	96 (178)	99 (183)	104 (193)	104 (193)
-Recommended Normal				
-Climb Speed	100 (185)	105 (194)	110 (204)	110 (204)
-Max. Cruise	185 (343)	185 (343)	185 (343)	185 (343)
Landing:				
-Approach	80 (148)	85 (157)	90 (167)	90 (167)
-on Final	72 (133)	74 (137)	78 (144)	78 (144)
-Go-Around Speed	90 (167)	95 (176)	100 (185)	100 (185)
Recommended Airspeed For Flight In Rough Air (max.) V_A	158 (293)	158 (293)	158 (293)	140 (259)
Max. Demonstrated Cross Wind Component	15 kts (27)	15 kts (27)	15 kts (27)	15 kts (27)

910.5 PERFORMANCE

STALL SPEEDS

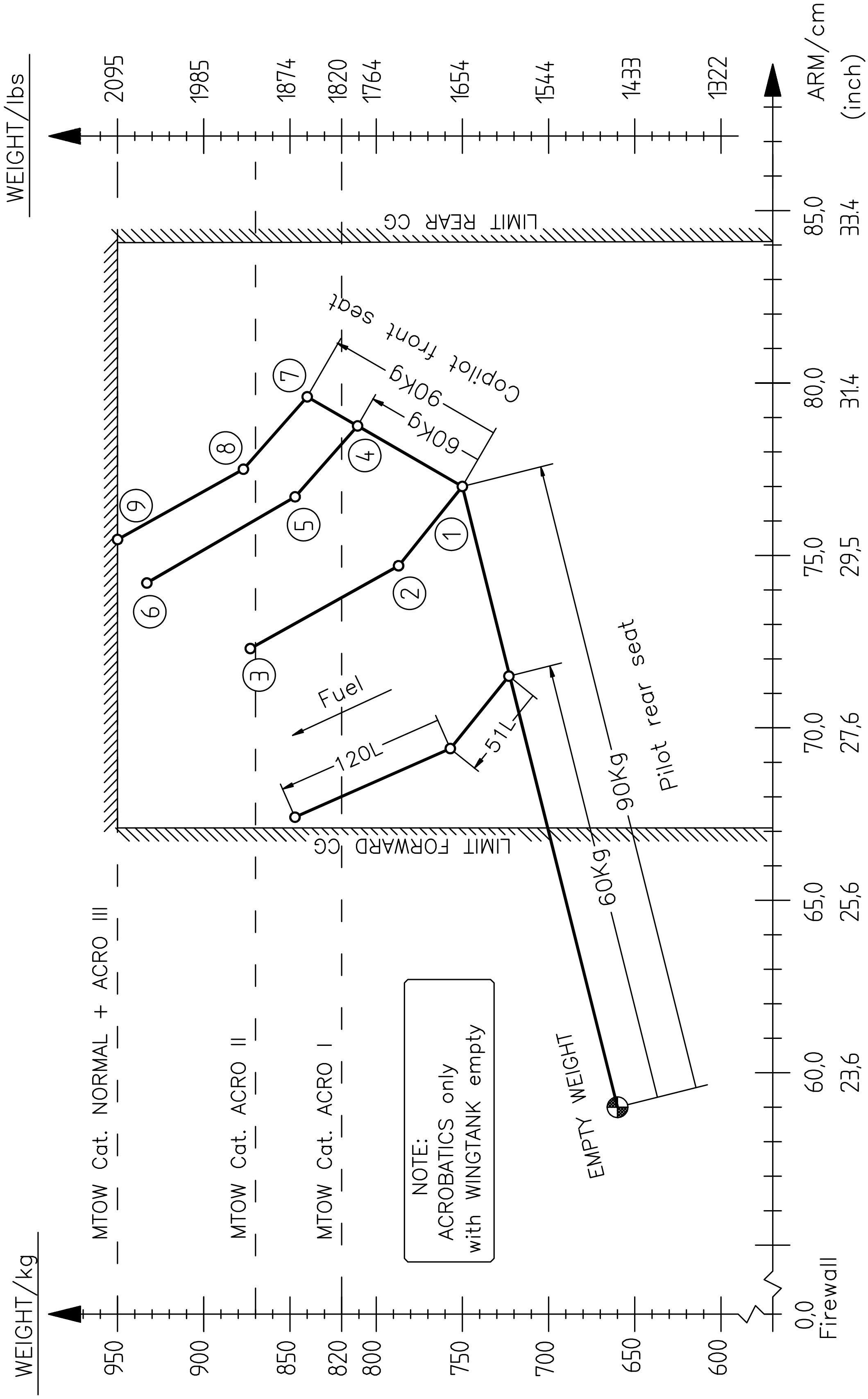
CONDITION: POWER IDLE
FORWARD C/G

WEIGHT	CATEGORY	ANGLE OF BANK / STALL SPEEDS 0° 1g KIAS (km/h)	 30° 1,15 g KIAS (km/h)	 45° 1,41 g KIAS (km/h)
950 kg (2095 lbs)	Normal + ACRO III	60 (111)	65 (120)	72 (133)
870 kg (1918 lbs)	ACRO II (2 seat)	57 (106)	61 (113)	68 (126)
820 kg (1808 lbs)	ACRO I (1 seat)	55 (102)	59 (109)	65 (120)

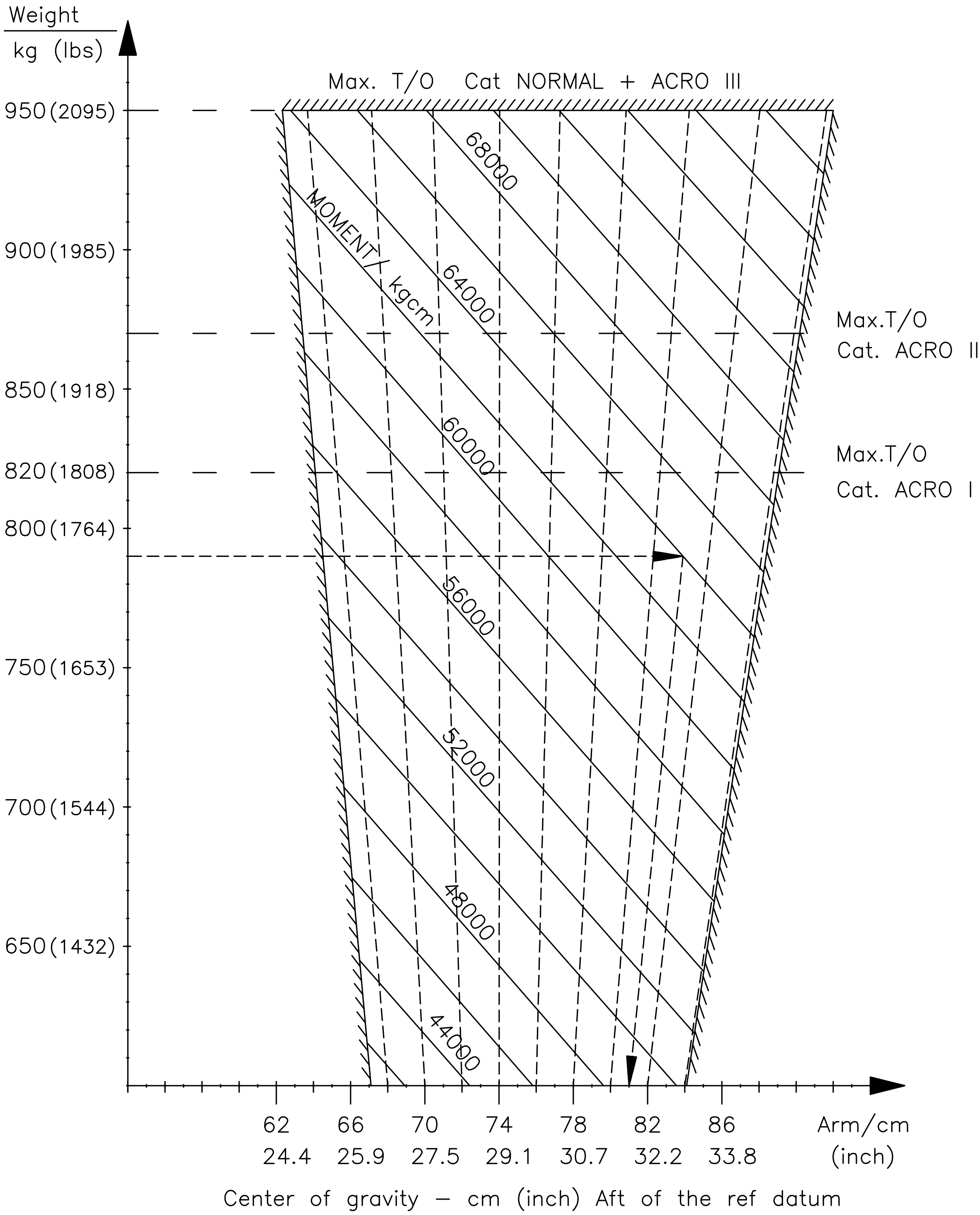
Max altitude loss during stall recovery is approximately 100 ft (30 m).

910.6 WEIGHT AND BALANCE

CENTER OF GRAVTITY CALCULATION (SAMPLE PROBLEM)



WEIGHT AND MOMENT LIMITS



EXAMPLE:
At 790 KG (1741 LBS) and 640000 kgcm the
C/G location is 80,0 cm (31,4") aft of ref datum

910.7 DESCRIPTION AND OPERATION OF AIRCRAFT AND ITS SYSTEMS

Not affected.

910.8 HANDLING, SERVICING AND MAINTENANCE

Not affected.

SECTION 911

SINGLE SEAT CANOPY

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911 SINGLE SEAT CANOPY

911.1 GENERAL

For airshow performances the standard canopy can be replaced by a single seat canopy, which gives a gorgeous appearance.

911.2 LIMITATIONS

With the single seat canopy installed the aircraft is limited to the categories

NORMAL and ACRO I.

In the NORMAL category the aircraft can be flown only with the pilot in the rear seat.

911.3 EMERGENCY PROCEDURES

Not affected.

911.4 NORMAL PROCEDURES

Befor starting engine, check front seat area and ensure seat belts and shoulder harness of front seat are completely removed or fastened and secured, so that nothing can obstruct the free movement of controls.

911.5 PERFORMANCE

Not affected.

911.6 WEIGHT AND BALANCE AND EQUIPMENT LIST

Refer to the equipment list in section 6.

911.7 DESCRIPTION OF THE SYSTEM

The single seat canopy has been designed to easily replace the standard canopy. This can be achieved by using the same canopy frame, hinges and latches included. The front seat is covered by the flat portion of the frame in front of the canopy. Operation of the locking mechanism is feasible only from the rear seat.

911.8 HANDLING, SERVICE AND MAINTENANCE

Not affected.

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SECTION 912

FILSER TRT 600 TRANSPONDER

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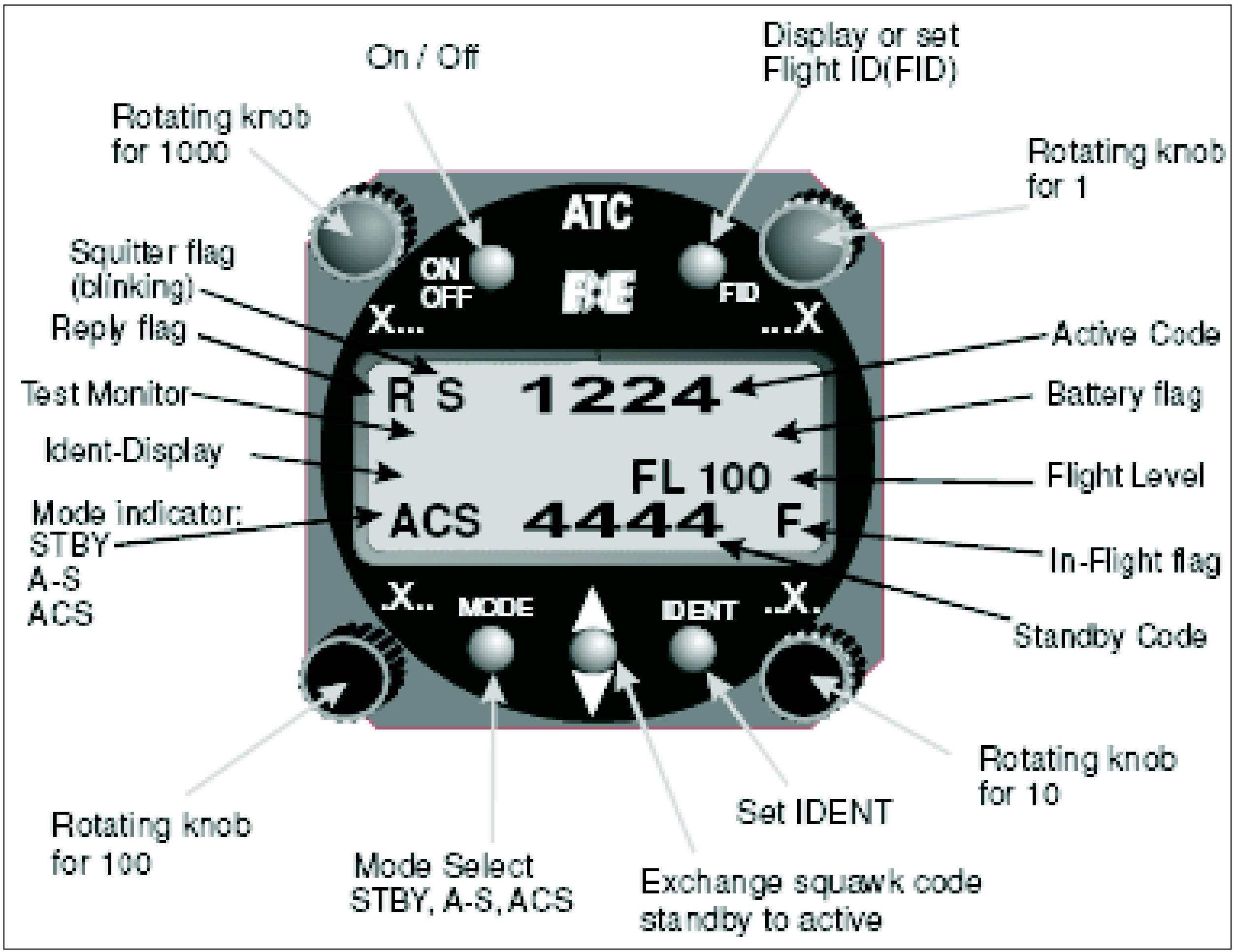
912.1 GENERAL

The TRT 600 is Level 2es Class2 (SSR Mode S Elementary Surveillance) Transponder. It has Mode A, Mode A/C and Mode S capability. In Mode S the transponder provides acquisition capability. Furthermore, the TRT 600 has a built-in barometric pressure altitude coder in 100 ft increments.

NOTE

Refer to latest edition of Filser TRT 600 Pilot's Operation Manual (Doc. No. 03.200.010.11) to get familiar with the TRT 600 Transponder.

The following illustration of the front panel of the TRT 600 will assist the operator to understand this Mode S Transponder.



912.1.1 FRONT PANEL OPERATION

The input elements consist of four rotating knobs and five push buttons.

ROTATING KNOBS

Four rotating knobs are used to select the IDENT CODE.

The assignments **X… , .X.. , ..X. , …X** indicate the position of the code number set by each knob.

PUSH BUTTONS

ON OFF
The unit can be turned on by pressing the **ON OFF** button for less then 1 second.
The unit can be turned off by pressing the **ON OFF** button for more then 2 seconds.
(also refer to the System Operation Paragraph 912.1.2).

MODE
The following modes can be selected in sequence by pressing the **MODE** button:

STBY Standby Mode used for aircraft on ground with reduced squitter rate, only Mode S with altitude reporting all ZERO only

A-S Mode A active with Mode C frames only and Mode S with altitude reporting all ZERO only

ACS Mode A ,C and S full active

ARROWS UP AND DOWN
To activate the inserted SQUAWK CODE from the lower standby line to the upper active position the button with the **UP AND DOWN ARROWS** shall be pressed.

IDENT
The **IDENT** push button causes the special position identification pulse (SPI) to be transmitted for a period of 18 seconds.

FID
In the Standby Mode, the Aircraft Identification (Flight Identification) and Aircraft Address can be checked by pressing the push button **FID**. The Flight Identification is displayed on the right side of the lower line. By pressing the button **FID** for more than 3 seconds the input mode can be set or the Flight Identification can be changed.

FLAGS

Squitter Flag
When the extended squitter is active the letter **'S'** is displayed on the left top side of the display. As the squitter is a periodic signal, the displayed **'S'** is blinking.

Reply Flag
In case of the transponder replying to interrogations the letter **'R'** is displayed on the left top side of the display.

In-Flight Flag
When there is an undercarriage switch installed, the display can toggle between the letters **'F'** whether the aircraft is in flight condition or the letter **'G'** whether the aircraft is in „on-ground“ condition. The flag is displayed on the right bottom side of the display.

Battery Flag
If the power supply to the transponder drops below 10 Volts, the flag **'BAT'** appears and starts flashing.

912.1.2 SYSTEM OPERATION

The transponder should be turned off before starting and shutting down aircraft engines.

ON /OFF
After having switched on the **AVIONIC MASTER** switch the TRT 600 has to be turned on by hand by pressing the **ON OFF** button for less then 1 second. The display will first show the transponder type and the software and firmware version. To turn off the unit the button **ON/OFF** must be pressed for more then two seconds or the **AVIONIC MASTER** switch must be placed to the **OFF**-position. ACS is the default operation mode and the transponder replies to Mode A,C and S interrogations. The pressure altitude will be displayed as Flight Level.

SQUAWK SELECTION

Squawk selection is done with the four rotating knobs to provide 4096 identification codes. The assignments of the knobs, starting at top left, are:

X… selection of thousands (0-7)
.X... selection of hundreds (0-7)
..X. selection of ten (0-7)
…X selection of one (0-7)

The code is entered in the lower line and remains inactive. By pushing the **UP AND DOWN ARROWS** button the squawk code is transferred to the upper line and becomes active. The code in the upper line is always the active one.

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)

0021 The VFR code commonly used in Germany (default is set to 0021 at time of installation)

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)

Care should be taken not to select the code 7500 and all codes in the 7600-7777 range, which 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.

STANDBY MODE

The standby mode is activated by pressing the **MODE** button once. This sets **'STBY'** in the mode indicator field. The transponder will now only reply to direct addressed Mode S interogations. The squitter stays active at a lower rate.

ALTITUDE OFF

Switching off altitude reporting will be necessary if the ATC controller requests it. For switching off altitude reporting the **MODE** button has to be pressed until **'A-S'** is displayed. The altitude display shows **'FL ——'** to indicate that the altitude reporting is not active. Now the transponder will reply on Mode C interrogations with Mode C frames only and Mode S interrogations with FL000 (= 0000ft) instead of the actual altitude.

IDENT

Pressing the **IDT** push button causes the special position identification pulse (SPI) to be appended to the Mode A replies for a period of 18 seconds and sets **'IDT'** in the display.

LOW POWER SUPPLY

If the power supply to the transponder drops below 10 Volts, the flag '**BAT**' appears and starts flashing.

DISPLAYING AIRCRAFT ADDRESS AND FLIGHT IDENTIFICATION

By pressing, the **FID** button for less than 3 seconds, while the unit is in Stanby-mode, the left side of the bottom line will show the aircraft address.

NOTE

Only an authorized service station is allowed to enter or change the ICAO aircraft address. If you do not have the ICAO aircraft address. Please refer to your national aviation authority to apply for your aircraft address.

The Aircraft Identification (FID) code is displayed on the right bottom line and consists of seven alphanumerical characters.

NOTE

The ICAO Flight Plan specifies only 7 characters as Flight Identification. Filser reserves 8 characters as stated in ED- 73B for further expansion of the flight plan. The user shall only program 7 characters for FID.

SELECTING FLIGHT IDENTIFICATION

By pressing the button **FID** for more than 3 seconds, the unit will change into the Flight Identification input menu. This FID code is a changeable alphanumerical flight number. The right lower knob is used to set the cursor position (flashing ^) and with the left lower knob the figures A..Z, blank, and 0..9 can be selected. To enter the code, press the **MODE** button or the **FID** button again. The FID code is stored in the external aircraft connector.

a. Factory setting for the FID is **'ZZZZZZZ'**

b. The authorized service station should program a default FID that can be the tail-number of the aircraft.

c. The pilot has to change the FID manually if necessary.

912.1.3 ERROR REPORTING / FAULT CODES

The transponder’s reception, transmission, altitude and power supply are monitored periodically. This self-testing routine is permanently active in the background. If any error occurs due to an internal malfunction or from an external disturbance at the antenna, the transponder changes to the Stanby mode and '**Error**' is displayed on the lowest line. Additionally the result of the internal analysis are displayed in the second line.

LIST OF POSSIBLE ERRORS

1. '**ANT**' will appear if the antenna is defective (e.g. broken cable).

2. '**FLerr**' instead of the altitude appears on the display, if there is an error with the altimeter or if the aircraft is outside the altitude range(FL-010 to FL350). If the mode ACS was active before, it will change to mode A-S automatically.

3. '**DC**' for a faulty transmitter power supply

4. '**FPG**' for internal communication errors,

5. '**TRX**' will appear for transmitter error. In this case, the unit will change to '**STBY**' and will stop all transmission.

To meet ICAO specifications the TRT 600 uses an external memory inside the aircraft connector housing of the cable set, which is a part of the aircraft. Because this cable is installed permanent into the aircraft, a change of the transponder will not affect the aircraft address and the Flight ID. In the event there is a Cradle error, (empty memory or data error) '**OUT OF ORDER**' will be displayed .The first line shows which kind of error is present:

'Cradle OFF' displayed means no or defective data.
'Cradle Data' displayed means digital checksum error.

After a few seconds the display shows normal operating condition but with inhibited Mode S. The transponder will work with Mode A/C only. You will need to consult an authorized service station to enter the ICAO aircraft address (see TRT 600 Installation Manual). Please consult your airworthiness authority for national procedures.

N O T E

If no valid ICAO 24 bit aircraft address is programmed to the unit or if the memory is inoperative the transponder will inhibit the Mode S functions. In this case only Mode A/C function will be available.

912.2 LIMITATIONS

Not applicable

912.3 EMERGENCY PROCEDURES

The following emergency codes should be noted:

7500 Hijacking

7600 Loss of communication

7700 Emergency

912.4 NORMAL PROCEDURES

Not applicable

912.5 PERFORMANCE

Not applicable

SECTION 913

FILSER TRT 800 TRANSPONDER

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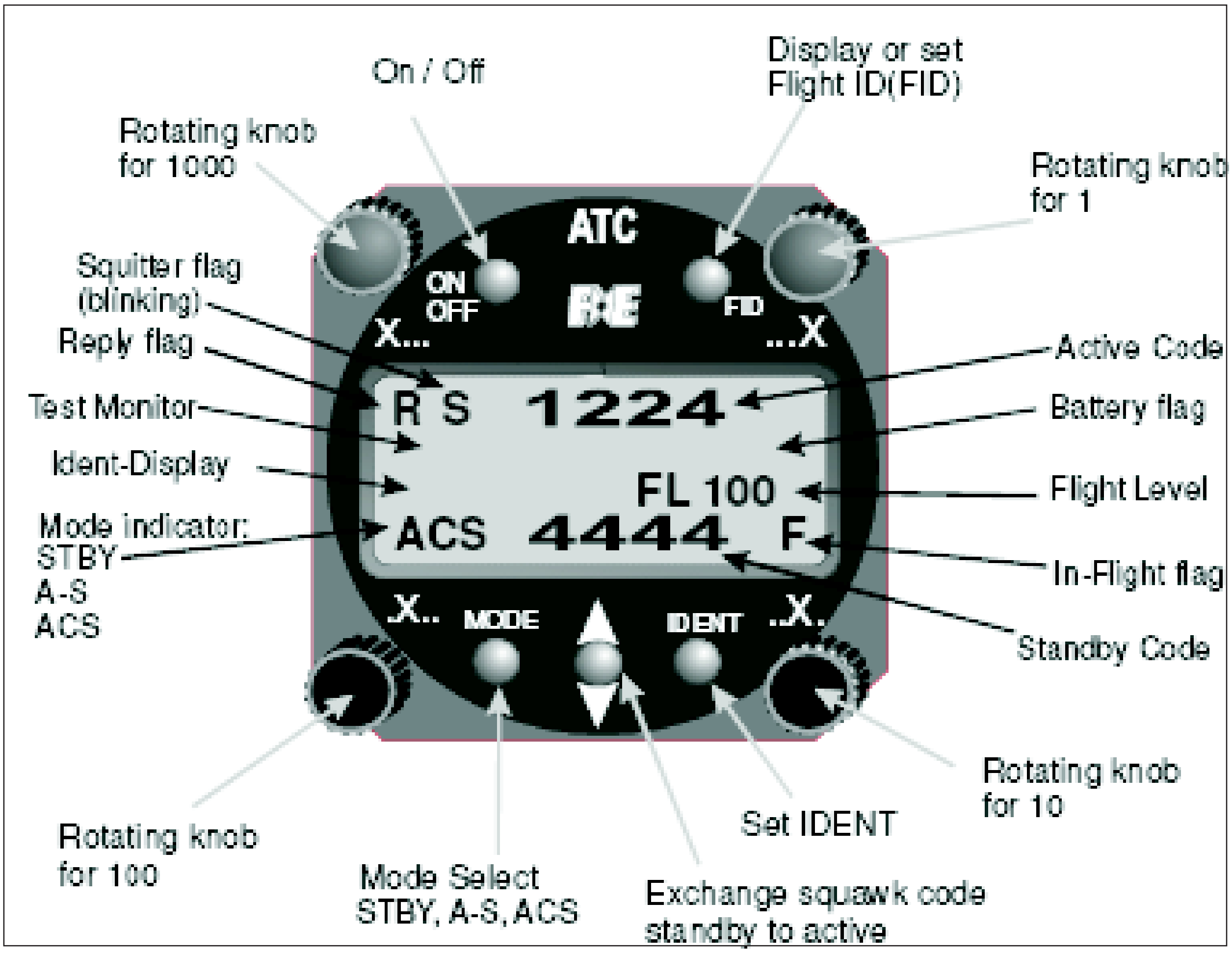
913.1 GENERAL

The TRT 800 is Level 2es Class2 (SSR Mode S Elementary and Enhanced Surveillance) Transponder. It has Mode A, Mode A/C and Mode S capability. In Mode S the transponder provides acquisition and extended squitter capability. Furthermore, the TRT 800 has a built-in barometric pressure altitude coder in 100 ft increments.

NOTE

Refer to latest edition of Filser TRT 800 Pilot's Operation Manual (Doc. No. 03.210.010.11) to get familiar with the TRT 800 Transponder.

The following illustration of the front panel of the TRT 800 will assist the operator to understand this Mode S Transponder.



913.1.1 FRONT PANEL OPERATION

The input elements consist of four rotating knobs and five push buttons.

ROTATING KNOBS

Four rotating knobs are used to select the IDENT CODE.

The assignments **X… , .X.. , ..X. , …X** indicate the position of the code number set by each knob.

PUSH BUTTONS

ON OFF
The unit can be turned on by pressing the **ON OFF** button for less then 1 second. The unit can be turned off by pressing the **ON OFF** button for more then 2 seconds. (also refer to the System Operation Paragraph 913.1.2)

MODE
The following modes can be selected in sequence by pressing the **MODE** button:

STBY Standby Mode used for aircraft on ground with reduced squitter rate, only Mode S with altitude reporting all ZERO only

A-S Mode A active with Mode C frames only and Mode S with altitude reporting all ZERO only

ACS Mode A ,C and S full active

ARROWS UP AND DOWN
To activate the inserted SQUAWK CODE from the lower standby line to the upper active position the button with the **UP AND DOWN ARROWS** shall be pressed.

IDENT
The **IDENT** push button causes the special position identification pulse (SPI) to be transmitted for a period of 18 seconds.

FID
In the Standby Mode, the Aircraft Identification (Flight Identification) and Aircraft Address can be checked by pressing the push button **FID**. The Flight Identification is displayed on the right side of the lower line. By pressing the button **FID** for more than 3 seconds the input mode can be set or the Flight Identification can be changed.

FLAGS

SQUITTER FLAG
When the extended squitter is active the letter **'S'** is displayed on the left top side of the display. As the squitter is a periodic signal, the displayed **'S'** is blinking.

REPLY FLAG
In case of the transponder replying to interrogations the letter **'R'** is displayed on the left top side of the display.

IN-FLIGHT FLAG
When there is an undercarriage switch installed, the display can toggle between the letters **'F'** whether the aircraft is in flight condition or the letter **'G'** whether the aircraft is in „on-ground“ condition. The flag is displayed on the right bottom side of the display.

BATTERY FLAG
If the power supply to the transponder drops below 10 Volts, the flag **'BAT'** appears and starts flashing.

913.1.2 SYSTEM OPERATION

The transponder should be turned off before starting and shutting down aircraft engines.

ON /OFF
After having switched on the **AVIONIC MASTER** switch the TRT 800 has to be turned on by hand by pressing the **ON OFF** button for less then 1 second. The display will first show the transponder type and the software and firmware version. To turn off the unit the button **ON/OFF** must be pressed for more then two seconds or the **AVIONIC MASTER** switch must be placed to the **OFF** position. ACS is the default operation mode and the transponder replies to Mode A,C and S interrogations. The pressure altitude will be displayed as Flight Level.

SQUAWK SELECTION

Squawk selection is done with the four rotating knobs to provide 4096 identification codes. The assignments of the knobs, starting at top left, are:

X… selection of thousands (0-7)
.X... selection of hundreds (0-7)
..X. selection of ten (0-7)
…X selection of one (0-7)

The code is entered in the lower line and remains inactive. By pushing the **UP AND DOWN ARROWS** button the squawk code is transferred to the upper line and becomes active. The code in the upper line is always the active one.

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)

0021 The VFR code commonly used in Germany (default is set to 0021 at time of installation)

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)

Care should be taken not to select the code 7500 and all codes in the 7600-7777 range, which 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.

STANDBY MODE

The standby mode is activated by pressing the MODE button once. This sets '**STBY**' in the mode indicator field. The transponder will now only reply to direct addressed Mode S interogations. The squitter stays active at a lower rate.

ALTITUDE OFF

Switching off altitude reporting will be necessary if the ATC controller requests it. For switching off altitude reporting the **MODE** button has to be pressed until **'A-S'** is displayed. The altitude display shows **'FL ——'** to indicate that the altitude reporting is not active. Now the transponder will reply on Mode C interrogations with Mode C frames only and Mode S interrogations with FL000 (= 0000ft) instead of the actual altitude.

IDENT

Pressing the **IDT** push button causes the special position identification pulse (SPI) to be appended to the Mode A replies for a period of 18 seconds and sets '**IDT**' in the display.

LOW POWER SUPPLY

If the power supply to the transponder drops below 10 Volts, the flag '**BAT**' appears and starts flashing.

DISPLAYING AIRCRAFT ADDRESS AND FLIGHT IDENTIFICATION

By pressing, the **FID** button for less than 3 seconds, while the unit is in Stanby-Mode, the left side of the bottom line will show the aircrafgt address.

N O T E

Only an authorized service station is allowed to enter or change the ICAO aircraft address. If you do not have the ICAO aircraft address. Please refer to your national aviation authority to apply for your aircraft address.

The Aircraft Identification (FID) code is displayed on the right bottom line and consists of seven alphanumerical characters.

NOTE

The ICAO Flight Plan specifies only 7 characters as Flight Identification. Filser reserves 8 characters as stated in ED- 73B for further expansion of the flight plan. The user shall only program 7 characters for FID.

SELECTING FLIGHT IDENTIFICATION

By pressing the button **FID** for more than 3 seconds, the unit will change into the Flight Identification input menu. This FID code is a changeable alphanumerical flight number. The right lower knob is used to set the cursor position (flashing **^**) and with the left lower knob the figures A..Z, blank, and 0..9 can be selected. To enter the code, press the **MODE** button or the **FID** button again. The FID code is stored in the external aircraft connector.

a. Factory setting for the FID is **'ZZZZZZZ'**

b. The authorized service station should program a default FID that can be the tail-number of the aircraft.

c. The pilot has to change the FID manually if necessary.

913.1.3 ERROR REPORTING / FAULT CODES

The transponder's reception, transmission, altitude and power supply are monitored periodically. This self-testing routine is permanently active in the background. If any error occurs due to an internal malfunction or from an external disturbance at the antenna, the transponder changes to the Standby Mode and „**Error**“ is displayed on the lowest line. Additionally the result of the internal analysis are displayed in the second line.

LIST OF POSSIBLE ERRORS:

1. '**ANT**' will appear if the antenna is defective (e.g. broken cable).

2. '**FLerr**' instead of the altitude appears on the display, if there is an error with the altimeter or if the aircraft is outside the altitude range(FL-010 to FL350). If the mode ACS was active before, it will change to mode A-S automatically.

3. '**DC**' for a faulty transmitter power supply

4. '**FPG**' for internal communication errors,

5. '**TRX**' will appear for transmitter error. In this case, the unit will change to '**STBY**' and will stop all transmission.

To meet ICAO specifications the TRT 800 uses an external memory inside the aircraft connector housing of the cable set, which is a part of the aircraft. Because this cable is installed permanent into the aircraft, a change of the transponder will not affect the aircraft address and the Flight ID. In the event there is a Cradle error, (empty memory or data error) „OUT OF ORDER“ will be displayed .The first line shows which kind of error is present:

'Cradle OFF' displayed means no or defective data.
'Cradle Data' displayed means digital checksum error.

After a few seconds the display shows normal operating condition but with inhibited Mode S. The transponder will work with Mode A/C only. You will need to consult an authorized service station to enter the ICAO aircraft address (see TRT800 Installation Manual). Please consult your airworthiness authority for national procedures.

N O T E

If no valid ICAO 24 bit aircraft address is programmed to the unit or if the memory is inoperative the transponder will inhibit the Mode S functions. In this case only Mode A/C function will be available.

913.2 LIMITATIONS

Not applicable.

913.3 EMERGENCY PROCEDURES

The following emergency codes should be noted:

7500 Hijacking

7600 Loss of communication

7700 Emergency

913.4 NORMAL PROCEDURES

Not applicable.

913.5 PERFORMANCE

Not applicable.

SECTION 914

GARMIN GTX 327 TRANSPONDER

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914.1 GENERAL

The GARMIN GTX 327 is a panel-mounted TSO.d transponder with the addition of timing functions. The transponder is a radio transmitter and receiver that operates on radar frequencies, receiving ground radar interrogations at 1030 MHz and transmitting a coded response of pulses to ground-based radar on a frequency of 1090 MHz.

NOTE

The GTX 327 owner accepts all responsibility for obtaining the proper license before using the transponder.

The coverage you can expect from the GTX 327 is limited to „line of sight“. Low altitude or aircraft antenna shielding by the aircraft itself may result in reduced range. Range can be improved by climbing to a higher altitude. It may be possible to minimize antenna shielding by locating the antenna where dead spots are only noticed during abnormal flight attitudes.

NOTICE

Damage possible due to current peaks.
The GTX 327 should be turned off before starting or shutting down aircraft engine.

The GTX 327 Transponder is powered on by pressing the **STBY**, **ALT** or **ON** keys, or by the **AVIONIC MASTER** switch. After power on a start-up page will be displayed while the unit performs a self test.

914.1.1 MODE SELECTION KEYS

OFF
Powers off the GTX 327.

STBY
Powers on the transponder in standby mode. At power on the last active identification code will be selected. When in standby mode, the transponder will not reply to any interrogations.

ON
Powers on the transponder in Mode A. At power on the last active identification code will be selected. In this mode the transponder replies to interrogations, as indicated by the Reply Symbol. Replies do not include altitude information.

ALT
Powers on the transponder in Mode A and Mode C. At power on the last active identification code will be selected. In ALT mode, the transponder replies to identification and altitude interrogations, as indicated by the Reply Symbol. Replies to altitude interrogations include standard pressure altitude received from a separate encoder.

914.1.2 CODE SELECTION

Code selection is done with eight keys (**0 - 7**) that provide 4,096 active identification codes. Pushing one of these keys begins the code selection sequence. The new code will not be activated until the fourth digit is entered. Pressing the **CLR** key will move the cursor back to the previous digit. Pressing the **CLR** key when the cursor is on the first key of the code, or pressing the **CRSR** key during code entry, will remove the cursor and cancel data entry, restoring the previous code. The numbers **8** and **9** are not used for code entry, only for entering a Count Down time, and in Configuration Mode.

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)

0021 The VFR code commonly used in Germany (default is set to 0021 at time of installation)

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)

Care should be taken not to select the code 7500 and all codes in the 7600-7777 range, which 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.

914.1.3 KEYS FOR OTHER GTX 327 FUNCTIONS

IDENT
Pressing the **IDENT** key activates the Special Position Identification (SPI) Pulse for 18 seconds, identifying your transponder return from others on the air traffic controller's screen. The word '**IDENT**' will appear in the upper left corner of the display while the IDENT mode is active.

VFR
Sets the transponder code to the pre-programmed VFR code selected in the Configuration Mode. Pressing the **VFR** key again will restore the previous identification code.

START/STOP
Starts and stops the Count Up and Count Down timers.

CRSR
Initiates entry of starting time for the Count Down timer and cancels transponder code entry.

CLR
Resets the Count Up and Count Down timers and cancels the previous keypress during code selection.

8
Reduces Contrast and Display Brightness when the respective pages are displayed. Also enters the number eight into the Count Down timer.

9
Increases Contrast and Display Brightness when the respective pages are displayed. Also enters the number nine into the Count Down timer.

FUNC
Changes the page shown on the right side of the display. Displayed data includes Pressure Altitude, Flight Time, Count Up timer, Count Down timer, and may include Contrast and Display Brightness, depending on configuration (refer to the screen description below):

SCREEN DESCRIPTION:

'PRESSURE ALT'
Displays the altitude data supplied to GTX 327 in feet, hundreds of feets (i.e., flight level), or meters, depending on configuration.

'FLIGHT TIME'
Displays the Flight Time, which is controlled by the **START/STOP** key.

'COUNT UP TIMER'
Controlled by the **START/STOP** and **CLR** keys.

'COUNT DOWN TIMER'
Controlled by **START/STOP**, **CLR**, and **CRSR** keys. The initial Count Down time is entered with the **0 - 9** keys.

'CONTRAST'
This page is only displayed if manual contrast mode is selected in Configuration Mode. Contrast is controlled by the **8** and **9** keys.

'DISPLAY'
This page is only displayed if manual backlighting mode is selected on Configuration Mode. Backlighting is controlled by the **8** and **9** keys.

914.2 LIMITATIONS

Not applicable.

914.3 EMERGENCY PROCEDURES

914.3.1 IMPORTANT CODES

7600 Loss of communications.

7500 Hijacking.

7700 Emergency (All secondary surveillance radar sites are ready to receive this code at all times).

See the Airman’s Information Manual (AIM) for a detailed explanation of identification codes.

914.4 NORMAL PROCEDURES

Not applicable.

914.5 PERFORMANCE

Not applicable.

SECTION 915

GARMIN GTX 330 TRANSPONDER

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915.1 GENERAL

The Garmin GTX 330 panel mounted Mode S Transponder is a radio transmitter and receiver that fulfills the role of the airborne beacon equipment according to the requirements of the Air Traffic Radar Beacon System (ATCRBS). Its functionality includes replying to ATCRBS Mode A and C and Mode S interrogations. The Mode S function will allow the ground station to individually select the aircraft by its Aircraft Address assigned to the aircraft by the aviation agency.

It operates on radar frequencies, receiving ground radar interrogations at 1030 MHz and transmitting a coded response of pulses to ground-based radar on a frequency of 1090 MHz. The GTX 330 is equipped with IDENT capability that activates the Special Position Identification (SPI) pulse for 18 seconds. Mode S transmit/receive capability also requires 1090 MHz transmitting and1030 MHz receiving for Mode S functions.

In addition to displaying the code, reply symbol and mode of operation, the GTX 330 screen will display pressure altitude and timer functions. The displayed pressure altitude may not agree with the aircraft’s baro-corrected altitude under non standard conditions. The unit also features flight timers.

The Traffic Information Service (TIS) is not available in this installation.

NOTE

The GTX 330 owner accepts all responsibility for obtaining the proper license before using the transponder.

The coverage you can expect from the GTX 330 is limited to „line of sight“. Low altitude or aircraft antenna shielding by the aircraft itself may result in reduced range. Range can be improved by climbing to a higher altitude. It may be possible to minimize antenna shielding by locating the antenna where dead spots are only noticed during abnormal flight attitudes.

NOTICE

Damage possible due to current peaks.
The GTX 330 should be turned off before starting or shutting down aircraft engine.

The GTX 330 Transponder is automatically powered on by the respective **AVIONIC MASTER** switch or when previously manually powered off while **AVIONIC MASTER** switch is on by pressing the **STBY**, **ALT** or **ON** keys. After power on, a start-up page will be displayed while the unit performs a self test.

This supplement is written for software version 3.00 or later, 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 GTX 330 pilot's guide (PN 190-00207-00 applicable revision) you received with your transponder.

915.1.1 MODE SELECTION KEYS

OFF
Powers off the GTX 330.

STBY
Selects the standby mode displaying the last active identification code. When in standby mode, the transponder will not reply to any interrogations.

ON
Selects Mode A. At power on the last active identification code will be selected. In this mode the transponder replies to interrogations, as indicated by the Reply Symbol. Replies do not include altitude information.

ALT
Powers on the transponder in Mode A and Mode C. At power on the last active identification code will be selected. In ALT mode, the transponder replies to identification and altitude interrogations, as indicated by the Reply Symbol. Replies to altitude interrogations include standard pressure altitude received from a separate encoder.

915.1.2 CODE SELECTION

Code selection is done with eight keys (**0 - 7**) that provide 4,096 active identification codes. Pushing one of these keys begins the code selection sequence. The new code will not be activated until the fourth digit is entered. Pressing the **CLR** key will move the cursor back to the previous digit. Pressing the **CLR** key when the cursor is on the first key of the code, or pressing the **CRSR** key during code entry, will remove the cursor and cancel data entry, restoring the previous code. You may press the **CLR** key up to five seconds after code entry is complete to return the cursor to the fourth digit. The numbers **8** and **9** are not used for code entry, only for entering a Count Down time, contrast and display brightness, and in the Configuration Mode.

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.

915.1.3 KEYS FOR OTHER GTX 330 FUNCTIONS

IDENT
Pressing the IDENT key activates the Special Position Identification (SPI) Pulse for 18 seconds, identifying your transponder return from others on the air traffic controller's screen. The word 'IDENT' will appear in the upper left corner of the display while the IDENT mode is active.

VFR
Pressing the VFR key sets the transponder code to the pre-programmed VFR code selected in the Configuration Mode. Pressing the VFR key again will restore the previous identification code.

FUNC
Pressing the FUNC key changes the page shown on the right side of the display. Displayed data includes Pressure Altitude, Flight Time, Count Up timer, Count Down timers. In the Configuration Mode, steps through function pages.

START/STOP
Starts and stops the Count Up, Count Down and flight timers. In the Configuration Mode, steps through functions in reverse.

CRSR
Initiates starting time entry for the Count Down timer and cancels transponder code entry. Returns cursor to last code digit within five seconds after entry. Selects changeable fields in Configuration Mode.

CLR
Resets the Count Up and Count Down timers. Cancels the previous keypress during code selection and Count Down entry. Returns cursor to last code digit within five seconds after entry. Used in Configuration Mode.

8
Reduces Contrast and Display Brightness when the respective pages are displayed and enters the number eight into the Count Down timer. Used in Configuration Mode.

9
Increases Contrast and Display Brightness when the respective pages are displayed. Also enters the number nine into the Count Down timer. Used in Configuration Mode.

915.1.4 FUNCTION DISPLAY

'PRESSURE ALT'
Displays the altitude data supplied to GTX 330 in feet, hundreds of feet (i.e., flight level), or meters, depending on configuration. An arrow to the right of the altitude indicates that the airplane is climbing or descending.

'FLIGHT TIME'
Displays the Flight Time controlled by the **START/STOP** and **CLR** keys when Automated Airborne Determination is configured as normal.

'ALTITUDE MONITOR'
The ALTITUDE MONITOR function is not available in this installation.

'OAT/DALT'
The OAT/DALT function is not available in this installation (no temperature input).

'COUNT UP TIMER'
The count up timer is controlled by the **START/STOP** and **CLR** keys. Pressing the **CLR** key zeros the display.

'COUNT DOWN TIMER'
The count down timer is controlled by **START/STOP**, **CLR**, and **CRSR** keys. The initial Count Down time is entered with the **0 - 9** keys. Pressing the **CLR** key resets the timer to the initial value.

'STBY'
The transponder will not reply to any interrogations.

'GND'
This page is not active.

'CONTRAST'
This page is only displayed if manual contrast mode is selected in Configuration Mode. Contrast is controlled by the **8** and **9** keys.

'DISPLAY'
This page is only displayed if manual backlighting mode is selected on Configuration Mode. Backlighting is controlled by the **8** and **9** keys.

915.1.5 CONFIGURATION MODE

The configuration is normally set at time of installation, including the unique Mode S aircraft address. The configuration Mode should not be used during flight. Refer to the GTX 330 pilot's guide (PN 190-00207-00 applicable revision) you received with your transponder.

915.1.6 ALTITUDE TREND INDICATOR

When the '**PRESSURE ALT**' page is displayed, an arrow is displayed to the right of the altitude, indicating that the altitude is increasing or decreasing. One of two sizes of arrows is displayed depending on the rate of climb/&descent. The sensitivity of these arrows is set using the Configuration Mode vertical speed rate.

915.1.7 FAILURE ANNUNCIATION

If the unit detects an internal failure, the screen displays **'FAIL'**.

915.2 LIMITATIONS

Not applicable.

915.3 EMERGENCY PROCEDURES

915.3.1 IMPORTANT CODES

7600 Loss of communications.

7500 Hijacking.

7700 Emergency (All secondary surveillance radar sites are ready to receive this code at all times).

See the Airman's Information Manual (AIM) for a detailed explanation of identification codes.

915.4 NORMAL PROCEDURES

Not applicable.

915.5 PERFORMANCE

Not applicable.

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SECTION 916

BENDIX/KING KT 76A TRANSPONDER

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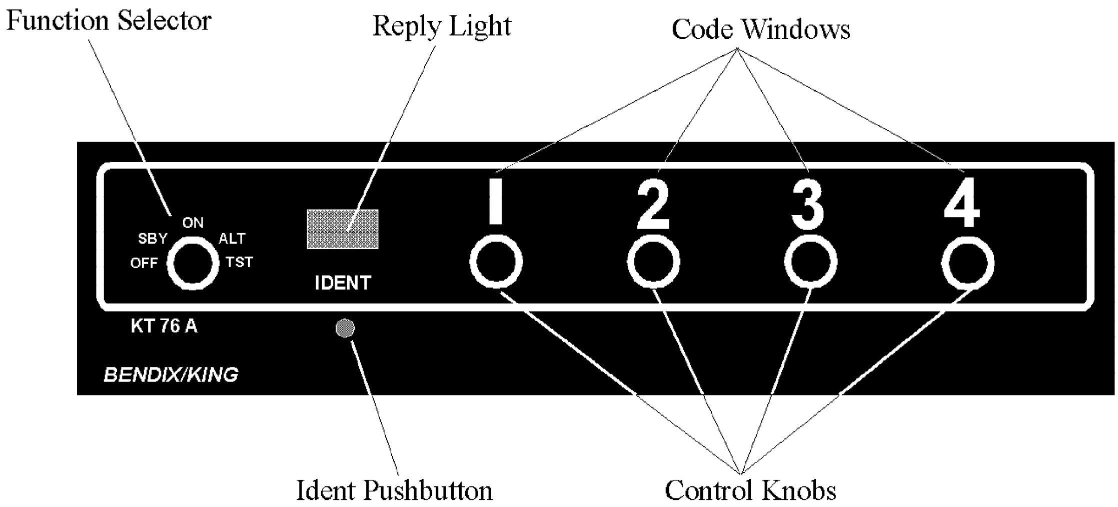
916.1 GENERAL

The BENDIX/KING KT 76A panel mounted transponder receives interrogations at 1030 MHz, and these trigger a coded response of radar pulses, which are transmitted back to ATC at 1090 MHz. The return reinforces your aircraft's image or „blip“ on the controller's radar screen.

The KT 76A can reply to radar in any of 4096 preselected codes. Each code is identified by a unique group of pulses. With either an separate encoder, the KT 76A also provides ground radar with a continuos report of your altitude, which are automatically updated in 100-foot increments.

N O T E

The KT 76A owner accepts all responsibility for obtaining the proper license before using the transponder.



916.1.1 CODE SELECTION

The Identification Code selection is done with 4 ATCRBS Code Selector Knobs that provide 4,096 active identification codes. Each of the 4 Code Selector Knobs selects a separate digit of the identification code.

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)

0021 The VFR code commonly used in Germany (default is set to 0021 at time of installation)

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.

916.1.2 REPLY LIGHT

During normal operation, the flashing Reply Light indicates that the KT 76A is functioning properly and replying to interrogations from ground radar. Interrogations occur at 10-15 second intervals, corresponding to each radar sweep. Frequently, the reply light will blink almost continuously, meaning that the transponder is responding to interrogations from several radar stations.

916.1.3 TESTING THE KT 76A

Allow a warm-up time of about 25 sec. before testing the KT 76A. Switching the function selector to the **TST** position a series of internal tests is performed to check the KT 76A. If no faults are detected the reply-light illuminates.

916.2 LIMITATIONS

Not Applicable.

916.3 EMERGENCY PROCEDURE

IMPORTANT CODES

7500 Use to report a hijacking.

7600 Signifies communication failure.

7700 Reserved for emergencies.

916.4 NORMAL PROCEDURE

After engine start-up, turn the function selector to the Standby (**SBY**) position. Then select the proper reply code by rotating the code select knobs.

As soon as aircraft is airborne, switch the function selector to **ON**. Your KT 76A is now operating in „Mode A“, or normal mode. To operate in „Mode C“, or altitude reporting mode, turn the function selector to **ALT** (if aircraft is equipped with altitude encoding equipment).

916.4.1 SQUAWK IDENT

When you are asked to „ident“ by ATC, briefly press the **IDENT** push-button. Your aircraft will be positively identified to the Air Traffic Controller.

916.5 PERFORMANCE

Not Applicable

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SECTION 917

BENDIX/KING KT 73 TRANSPONDER

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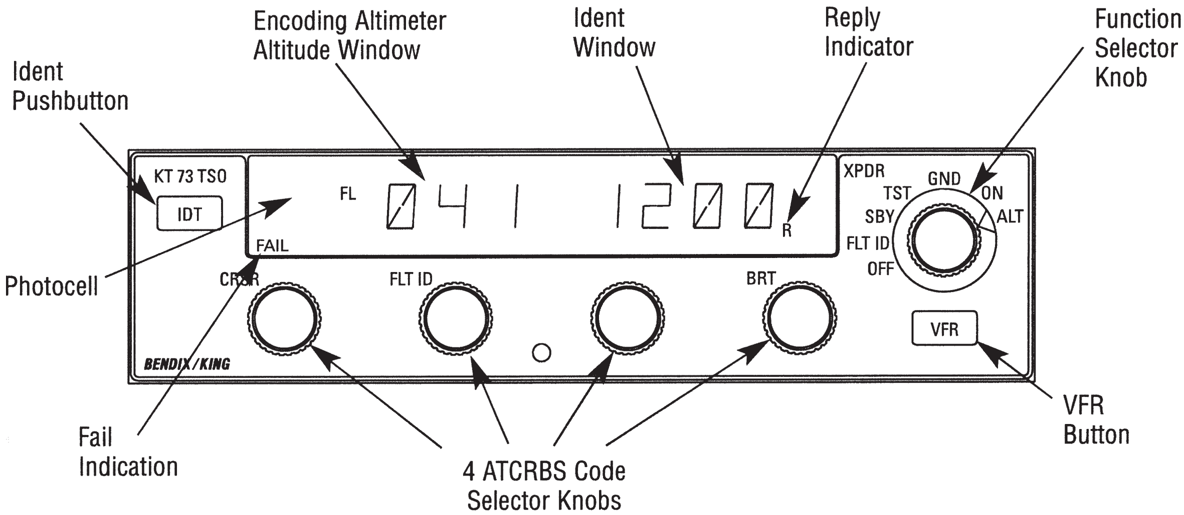
917.1 GENERAL

The BENDIX/KING KT 73 panel mounted Mode S Transponder is a radio transmitter and receiver that fulfills the role of the airborne beacon equipment according to the requirements of the Air Traffic Radar Beacon System (ATCRBS). Its functionality includes replying to ATCRBS Mode A and C and Mode S interrogations. The Mode S function will allow the ground station to individually select the aircraft by its Aircraft Address assigned to the aircraft by the aviation agency.



It operates on radar frequencies, receiving ground radar interrogations at 1030 MHz and transmitting a coded response of pulses to ground-based radar on a frequency of 1090 MHz.

The KT 73 is equipped with IDT (ident) capability that activates the Special Position Identification (SPI) pulse for 18 seconds.

In addition to displaying the code, reply symbol and mode of operation, the KT 73 screen will display pressure altitude. The displayed pressure altitude may not agree with the aircraft's baro-corrected altitude under non standard conditions.

The Traffic Information Service (TIS) and Automatic Dependent Surveillance-Broadcast (ADS-B) is not available in this installation.

NOTE

The KT 73 owner accepts all responsibility for obtaining the proper license before using the transponder.

The coverage you can expect from the KT 73 is limited to „line of sight“. Low altitude or aircraft antenna shielding by the aircraft itself may result in reduced range. Range can be improved by climbing to a higher altitude. It may be possible to minimize antenna shielding by locating the antenna where dead spots are only noticed during abnormal flight attitudes.

NOTICE

Damage possible due to current peaks.
The KT 73 should be turned off before starting or shutting down aircraft engine.

The KT 73 Transponder is powered on by rotating the Function Selector Knob from the **OFF** position to any functional mode position.

917.1.1 FUNCTION SELECTOR KNOB

The following operating modes can be chosen by the Function Selector Knob:

OFF
Powers off the KT 73. When the unit is turned to another mode, it will reply or squitter within two seconds, according to the selected mode.

FLT ID
Selects the Flight ID mode displaying the 8 character Flight ID or registration marking of the airplane. When in Flight ID mode, the transponder will not reply to any interrogations.

SBY
Selects the Standby mode displaying the last active identification code. When in Standby mode, the transponder is energized but will not reply to any interrogations.

TST
Selects the Test mode displaying all display segments for a minimum of 4 seconds. A series of internal tests is performed to check its integrity, verify all aircraft specific configuration data and make hardware and squitter checks. When in Flight TST mode, the transponder will not reply to any interrogations. In addition the display brightness can be manually adjusted by rotating the **BRT** knob.

GND
Selects the Ground mode displaying '**GND**' in the altitude window. When in Ground mode, the transponder will not reply to ATCRBS, ATCRBS/Modes S All-Call and Mode S-only All-Call interrogations. It will continue to generate Mode S squitter transmissions and reply to discretely addressed Mode S interrogations.

ON
Powers on the transponder in Mode A, C and S. In this mode the transponder replies to interrogations, as indicated by the Reply Symbol. Replies do not include altitude information.

ALT
Powers on the transponder in Mode A, C and Mode S. In ALT mode, the transponder replies to identification and altitude interrogations, as indicated by the Reply Symbol. Replies to altitude interrogations include standard pressure altitude received from a separate encoder.

917.1.2 CODE SELECTION

The Identification Code selection is done with 4 ATCRBS Code Selector Knobs that provide 4,096 active identification codes. Each of the 4 Code Selector Knobs selects a separate digit of the identification code.

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)

0021 The VFR code commonly used in Germany (default is set to 0021 at time of installation)

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)

Changing the preset VFR code is done as follows:
Place the unit in SBY
Select the desired VFR code
While holding the **IDT** button in, momentarily press the **VFR** button.

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.

917.1.3 BUTTONS/SELECTORS FOR OTHER KT 73 FUNCTIONS

IDT
Pressing the **IDT** (Ident) button while in the GND, ON or ALT mode activates the Special Position Identification (SPI) Pulse for 18 seconds, identifying your transponder return from others on the air traffic controller's screen . The word '**IDT**' will appear in the left lower corner of the altitude window while the IDT mode is active. When the Function Selector Knob in test mode (**TST**), pressing the **IDT** button will return the brightness to the default factory value.

VFR
Momentarily pressing the **VFR** Pushbutton sets the transponder code to the pre-programmed VFR code, superseding whatever code was previously entered. Pressing the **VFR** key again and holding it for two seconds will restore the previous identification code. When in TST mode pushing the **VFR** button will display the software revisions on the Altitude window and Ident window for a minimum of 4 seconds.

FLT ID
When in FLT ID mode, the flight ID can be entered or modified by rotating the **FLT ID** knob (= 2nd ATCRBS Code Selector Knob) to select desired character for each digit selected by the **CRSR** knob. Once the **CRSR** and **FLT ID** knobs have been idle for 5 seconds or the Function Selector Knob has been turned to the **SBY** position the flight ID will be saved.

CRSR
When in FLT ID mode, rotating the **CRSR** knob (= 1st ATCRBS Code Selector Knob) will position the cursor under the character of the flight ID to be changed.

BRT
When in TST mode, rotating the **BRT** knob (= 4th ATCRBS Code Selector Knob) will manually adjust the display brightness. Clockwise rotating will increase display brightness and counterclockwise will decrease display brightness. The brightness of the display is determined by a photocell relative to the programmed or manual adjusted brightness level.

917.1.4 FUNCTION DISPLAY

'FL'
When the ALT mode is selected, the letters '**FL**' will be illuminated. The pressure altitude data supplied to the KT 73 is displayed in hundreds of feet (i.e., Flight Level) on the left side of the display, the altitude window. In addition the ID code is displayed in the right window, the ident window. A fault in the altitude interface or an invalid altitude input to the KT 73 will cause the display to show a series of dashes when the ALT mode is selected.

'SBY'
'**SBY**' is displayed in the altitude window when SBY mode is selected by the Function Selector Knob. In addition the ID code is displayed in the right window, the ident window.

'GND'
'**GND**' is only displayed on the left side (altitude window) when the aircraft is on ground. The ID code is shown on the right side, the ident window.

'FLT IDT'
The '**FLT IDT**' is annunciated and the flight ID is illuminated in the display area when the FLT ID mode is selected by the Function Selector Knob.

'TEST OK'
'**TEST OK**' is displayed in the Test mode if no faults are detected.

'SBY FXYZ'
If one or more fault is detected in the Test mode, '**SBY**' is displayed in the altitude window and the ident window will cycle through all detected faults indicated by '**FXYZ**'. The '**XYZ**' denotes the specific fault.

917.1.5 PROGRAMMING MODE

The programming mode is normally set at time of installation, including the unique Mode S aircraft address. The programming mode should not be used during flight. Refer to the KT 73 Installation Manual 006-10563-0004 latest revision.

917.1.6 AIR/GROUND SWITCHING

The AUTO GND (Automatic Ground Programming) function is not available.

917.1.7 FAILURE ANNUNCIATION

If the unit detects an internal failure, FAIL annunciation light on the left side of the displays will illuminate.

917.2 LIMITATIONS

Not applicable.

917.3 EMERGENCY PROCEDURES

IMPORTANT CODES

7600 Loss of communications.

7500 Hijacking.

7700 Emergency (All secondary surveillance radar sites are ready to receive this code at all times).

See the Airman's Information Manual (AIM) for a detailed explanation of identification codes.

917.4 NORMAL PROCEDURES

Not applicable.

917.5 PERFORMANCE

Not applicable.

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SECTION 918

BECKER ATC 2000 TRANSPONDER

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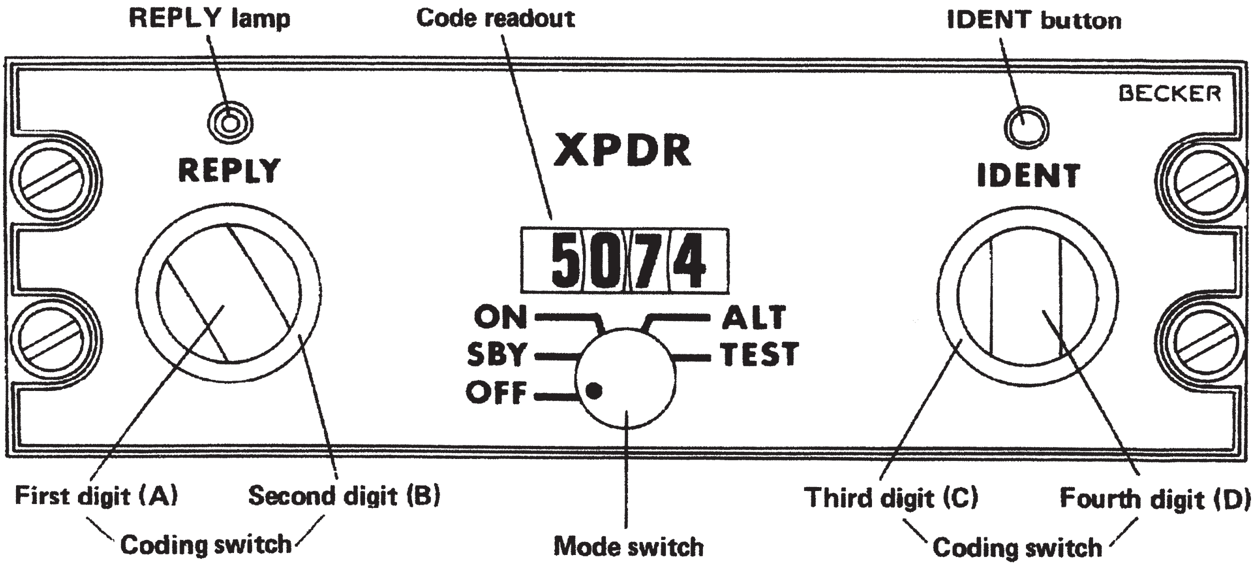
918.1 GENERAL

The Becker panel mounted ATC 2000 Transponder is a radio transmitter and receiver that fulfills the role of the airborne beacon equipment according to the requirements of the Air Traffic Radar Beacon System (ATCRBS). Its functionality includes replying to ATCRBS Mode A and Mode C interrogations.

It operates on radar frequencies, receiving ground radar interrogations at 1030 MHz and transmitting a coded response of pulses to ground-based radar on a frequency of 1090 MHz. The ATC 2000 is equipped with IDENT capability that activates the Special Position Identification (SPI) pulse.



Controls	Description	Function	
OFF/SBY/ON/ALT/TEST mode switch	Four-Position rotary switch and one key position	OFF	Transponder is switched off (with exception of panel lighting)
		SBY	Transmitter tube warm-up
		ON	Transponder responds to mode A interrogation with the set code
		ALT	Transponder responds to mode A and mode C interrogation
		TEST	Built-in test by interrogation simulation, REPLY lamp must light up
IDENT button	Pushbutton	Pressing the IDENT button the transponder transmits an SPI pulse	
REPLY lamp	Lamp, orange, with dimmer	Lights up if transponder responds; intensity set by means of a mechanical dimmer	
4 coding switches	Rotary switches with eight positions	Setting the code from 0000 to 7777 permitting 4096 different digit combinations	
Code readout	Digital readout, each digit from 0 to 7	Indication of coding from 0000 to 7777	

NOTE

The ATC 2000 owner accepts all responsibility for obtaining the proper license before using the transponder.

NOTICE

Damage possible due to current peaks.
Do not switch on or off the transponder until the engine has been startet or stopped respectively.

918.1.1 BUILT-IN TEST

1. Position mode switch from **OFF** to **SBY**. Operate the transponder approx. 60s in the SBY position since transmitting tube must warm up and stabilize prior to operation. It is, however, possible to skip the **SBY** position without danger for the transmitter tube, since the latter is safeguarded by cavity protection circuit which also requires approx. 60s to warm up.

2. Turn mode switch as far as it will go to **TEST** (key position) in which the transponder simulates interrogation, prompting a reply. The reply indication is given by the reply lamp illuminating.

918.1.2 SQUAWK SELECTION

Squawk selection is done with the four rotating knobs to provide 4096 identification codes. 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)

0021 The VFR code commonly used in Germany (default is set to 0021 at time of installation)

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.

918.1.3 MODE A OPERATION

1 Activate the transponder on ATC request only. To enshure instant readiness, position the mode switch to **SBY** (standby) during the flight.

2 Set the code requested by ATC using the four coding switches. Set two-digit code numbers in the first two windows of the readout.

NOTE

Only operate the coding switches in the SBY (standby) mode.

3 Switch the mode switch **ON** on ATC request, the transponder then responding to mode A interrogation with dialed code, as indicated by the REPLY lamp coming on.

4 Only press the **IDENT** button briefly when requested by ATC, causing a special identification pulse (SPI pulse) being transmitted, permitting instant identification of the aircraft on the ATC radar system.

918.1.4 MODE A AND C OPERATION

1 Postion mode switch to **ALT** on ATC request only. The transponder then responds with dialed code, causing REPLY lamp to light up and additionally transmits the height of the aircraft to ATC.

2 Press the **IDENT** button briefly when requested by ATC, causing a special identification pulse (SPI pulse) being transmitted, permitting instant identification of the aircraft on the ATC radar system.

918.2 LIMITATIONS

Not applicable.

918.3 EMERGENCY PROCEDURES

918.3.1 IMPORTANT CODES

7600 Loss of communications.

7500 Hijacking.

7700 Emergency (All secondary surveillance radar sites are ready to receive this code at all times).

See the Airman’s Information Manual (AIM) for a detailed explanation of identification codes.

918.4 NORMAL PROCEDURES

Not applicable

918.5 PERFORMANCE

Not applicable

SECTION 919

BECKER ATC 4401 TRANSPONDER

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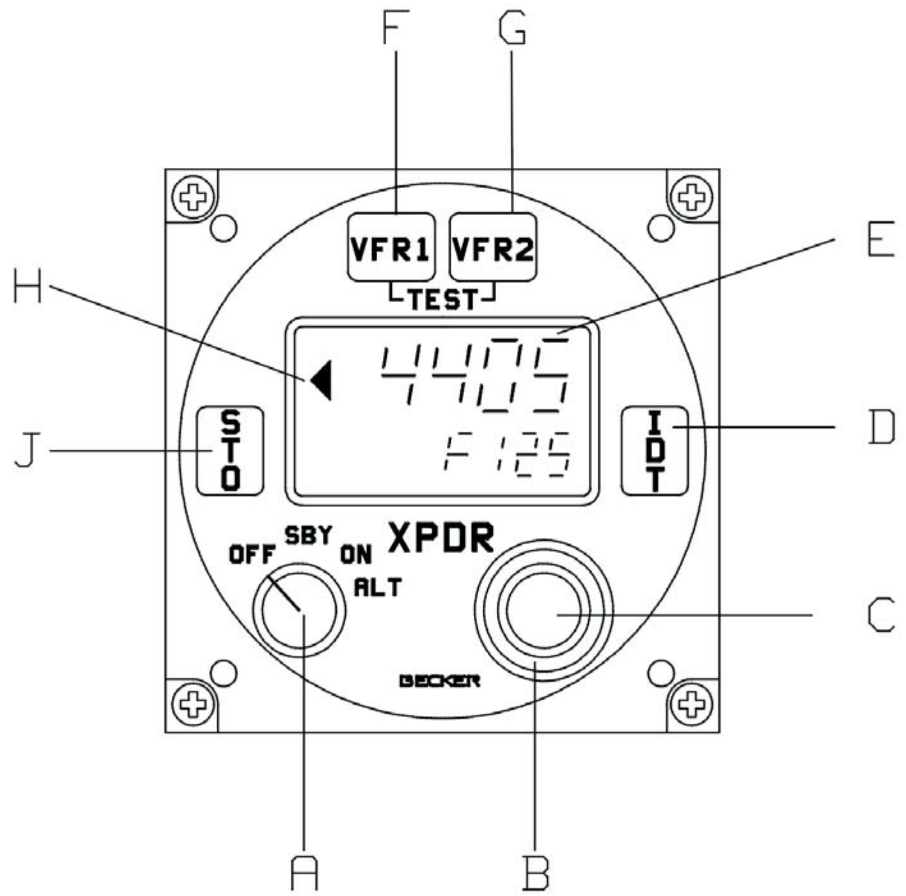
919.1 GENERAL

The Becker panel mounted ATC 4401 Transponder is a radio transmitter and receiver that fulfills the role of the airborne beacon equipment according to the requirements of the Air Traffic Radar Beacon System (ATCRBS). Its functionality includes replying to ATCRBS Mode A and Mode C interrogations.

It operates on radar frequencies, receiving ground radar interrogations at 1030 MHz and transmitting a coded response of pulses to ground-based radar on a frequency of 1090 MHz. The ATC 4401 is equipped with IDENT capability that activates the Special Position Identification (SPI) pulse.

NOTE

The ATC 4401 owner accepts all responsibility for obtaining the proper license before using the transponder. Refer to Becker Pilot's Guide.



919.1.1 CONTROLS AND INDICATORS

A	OFF/SBY/ON/ALT rotary mode switch with 4 detent positions	OFF position : Transponder is switched off (expect panel lighting). SBY position : Standby mode is switched on. ON position : Mode A is switched on. ALT position : Mode A+C is switched on.
B	Rotary coding switch with 8 detents positions, continuously rotable	Control of the cursor in one of the 4 code digits or from the display field
C	Rotary coding switch with 8 detents positions continuously rotable	Setting the code digits from 0 to 7.
D	Ident push-button IDT	In Mode A and Mode A+C this triggers the transmission of an identification impulse additional to the Mode A reply code for approx. 18 seconds. During this time "Idt" appears in the bottom line of the LC display.
E	2-line LC display	Code indication (top line): Codes from 0000 to 7777 are possible.
		"Mode indication (bottom line) : SBY mode: ""SbY"" is displayed."
		"Mode A (ON): ""On"" appears in the display ""IDT"" is displayed the duration of the identification function."
		"Mode A+C (ALT):If a valid altitude is present, the flight level (height in steps of 100 ft) preceded by F (e.g.""F241""= 24100 ft) appears. If no valid altitude code is present, ""FÑ-"" is diplayed. The flight level display can be switched off in the configuration mode. ""Idt"" is displayed for the duration of the identification function."
F	Code push-button VFR1	Activates a first user-specific VFR code
G	Code push-button VFR2	Activates a second user-specific VFR code.
H	Reply indication REPLY	The triangle signals a Transponder reply.
J	Store push-button STO	Stores user-specific VFR codes or changes in the configuration mode

919.1.2 SWITCHING ON THE UNIT (PRE-FLIGHT CHECK)

1 Check that the circuit breaker is set and switch on the aircraft power supply .

NOTICE

Damage due to current peaks.
Do not switch on the transponder if the engine isbeing started or shut down.

2 Using mode switch (A), switch the transponder from **OFF** to **SBY**. A test then follows automatically for 3 seconds. The display is flashing with all digits and the unit is subject to a self-test simultaneously.

3 After the switch-on test has elapsed and no error-message is written in the display, the transponder switches to the mode set on the mode switch (A).

NOTE

The blind encoder is only powered if the transponder is not switched OFF (at least SBY). A blind encoder needs a warm-up time (sometimes a several minutes). Therefore although the solid state transponder needs no warm-up time, turn the transponder to SBY immediately after starting the engine.

919.1.3 SQUAWK SELECTION

1 The transponder remains switched in the standby mode until requested by the ground station (ATC) to transmit a code, e.g. „squawk alpha 6426“.

2 Using the double rotary switch (B,C) set the 4-digit code requested by ATC as follows :

a Using switch (B) move the cursor to the particular digit. Digits 0 to 7 can then be set using switch (C).

NOTES

If switch (B) is turned clockwise or counter-clockwise, the cursor is moved one position to the right or the left. The cursor appears only in the code display and is indicated by the flashing digit. If no cursor is visible, the first digit flashes after a clockwise rotation and the last digit after a counter-clockwise rotation. When the code is being changed in the ON or ALT position, the transponder temporarily switches to the standby mode.

The active time of the cursor and the rate of flashing can be changed in the configuration mode.

b If the cursor is not moved again within of 3 seconds (can be changed in configuration mode) or if the cursor is moved so far that it can no longer be seen in the display field or the identification switch is pressed (in the ON or ALT mode), the code currently set is switched active.

NOTES

Whilst settings are taking place, the transmission branch of the transponder is inhibited to prevent unintentional transmission.

If only two digits were named by ATC, e.g. „Squawk alpha 64“, then a zero is to be used for positions three and four, i.e. „6400“.

c The last used code is stored in each case and is also activated when the transponder is switched on.

SPECIAL VFR CODINGS

Two user-specific VFR codes can be stored and activated on the transponder.

1 Storing a new VFR code:

a Set the code to be stored in accordance with section B.

b Press store push-button **STO** (J), the set code then flashes.

c Press the **VFR1** push-button (F) or the **VFR2** push-button (G) wit-hin 3 seconds to store the code under the corresponding button.

d If neither button (F) or (G) is pressed within 3 seconds, the flashing stops and the storage operation is aborted.

N O T E

If one of the two buttons (F) or (G) is pressed without the STO button having been pressed beforehand, then the stored code allocated this button appears in the code display and is switched to active after 3 seconds (can be changed in the configuration mode). If the same button is again pressed within 3 seconds, the previous code appears.

2 Activation of the VFR codes:

a Press the **VFR** push-button **1** or **2** (F, G). The selected code is then displayed. After 3 seconds, the displayed code becomes activate and overwrites the previously-set reply code.

b Pressing button (F) or (G) again within 3 seconds reactivates the previously-set reply code.

N O T E

When the unit is delivered, the store buttons are not assigned a code. This means that if these buttons are pressed for 0.5 seconds, „——“ is shown in the code display and the transponder then switches back to the previously-active code.

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)

0021 The VFR code commonly used in Germany (default is set to 0021 at time of installation)

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

Unintentional transmission of an emergency code is prevented in that the transponder replies are inhibited whilst the code is being set. This applies particularly where the new code is being set in the ON or ALT modes. Also if a special code is called up, no transponder reply takes place during the period in which the previous code can be reactivated (approximately 3 seconds).

919.1.4 FLIGHT OPERATION IN MODE A (TRANSPONDER REPLY CODE ONLY)

1 Select squawk as described above.

2 Set mode switch (A) from **SBY** to **ON**. The transponder immediality replies with the set code. A triangle on the left next to the code signals the tranponder replies.

919.1.5 FLIGHT OPERATION IN MODE A+C (REPLY CODE AND ALTITUDE CODE)

1 Select squawk as described above.

2 ATC requests the transmission „alpha/charlie“ or „charlie“, switch the transponder to **ALT** using mode switch (A).

3 The transponder replies using the code set and in response to mode C requests it tansmits the flight level of the aircraft to ATC. A triangle on the left next to the code signals the transponder replies.

919.1.6 SQUAWK IDENT

After a „squawk ident“ request from ATC, press Ident button **IDT** (D) briefly. This transmits an additional special pulse (SPI) for approx. 18 seconds, which enables the aircraft to be clearly identified on the radar screen of the controller. **'Idt'** appears in the bottom line of the LC display during this time.

919.1.7 TEST

The following different tests are integrated in the transponder or can be triggered at the transponder :

1 Automatic switching-on test, in which the display (E) is flashing with all digits for 3 seconds. The unit is subject to a self-test in this time.

2 A permanent test runs in the background of the transponder operation. The built-in FPGA organizes the required resources for this. The transmitter recognizes a missmatching or own abnormal behavior and delivers an alarm signal to the FPGA.

3 A further test of the unit is triggered, if the **VFR1** button (F) and **VFR2** button (G) are pressed simultaneously. At this test all segments must flash into display (E) as long as the buttons are pushed. Additional the transmitter and evaluation are tested on correct function in the SBY, ON and ALT modes.

4 In case of a failure appears the report e.g. '**E10**' in the top line of the display. Switch OFF the transponder at such '**E**' fault indications.

919.1.8 CONFIGURATION MODE

The configuration Mode is used to set the unit on the ground and must not be called up in flight. Refer to BECKER's Pilot's Guide for further information.

919.2 LIMITATIONS

Not applicable.

919.3 EMERGENCY PROCEDURES

919.3.1 IMPORTANT CODES

7600 Loss of communications.

7500 Hijacking.

7700 Emergency (All secondary surveillance radar sites are ready to receive this code at all times).

See the Airman's Information Manual (AIM) for a detailed explanation of identification codes.

919.4 NORMAL PROCEDURES

Not applicable

919.5 PERFORMANCE

Not applicable

SECTION 920

BECKER BXP 6401 TRANSPONDER

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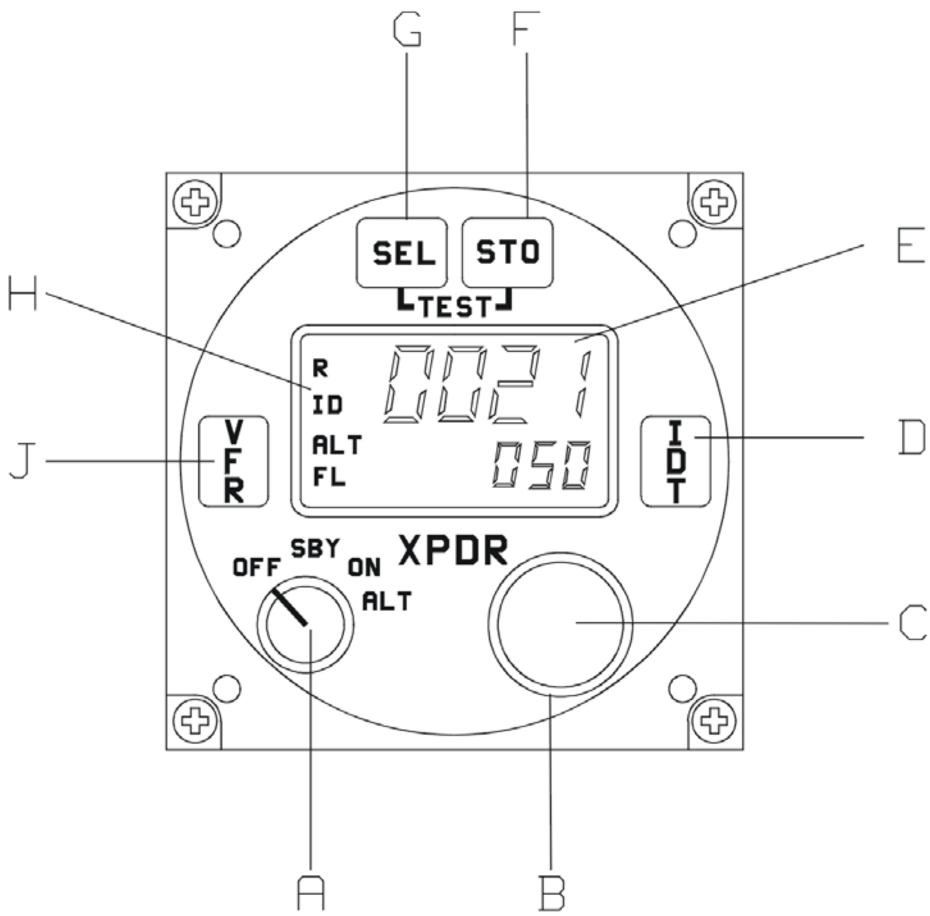
920.1 GENERAL

The Becker panel mounted BXP 6401 Transponder is a radio transmitter and receiver that fulfills the role of the airborne beacon equipment according to the requirements of the Air Traffic Radar Beacon System (ATCRBS). Its functionality includes replying to ATCRBS Mode A, C and Mode S interrogations.

It operates on radar frequencies, receiving ground radar interrogations at 1030 MHz and transmitting a coded response of pulses to ground-based radar on a frequency of 1090 MHz. The BXP 6401 is equipped with IDENT capability that activates the Special Position Identification (SPI) pulse.

NOTE

The BXP 6401 owner accepts all responsibility for obtaining the proper license before using the transponder. Refer to Becker Pilot's Guide.



920.1.1 CONTROLS AND INDICATORS

A	Mode Selector	Rotary switch with 4 positions	OFF position : Transponder is switched off SBY position : Standby mode is switched on ON position: Mode A/S is switched on. Transmission of altitude information is suppressed ALT position: Mode A/C/S is switched on and the altitude information is transmitted.
B	Rotary switch	Rotary optical encoder (rotary mode of C)	Rotary switch to change settings (16 steps per turn)
C	Button	Push-button (mode of B)	Push to jump from digit to digit for settings or from one menu to the next; generally used as an enter key
D	IDT	Push-button	Activates the Special Identifier (SPI) in ad- dition to the reply code for approx. 18 seconds; during this time "ID" appears in the LC display
E	Display, part 1	2-line LCD display	Displays the following informations: - code indication in the top row - flight level in the bottom row - various informations in the bottom row - additional indicators on the left side (see Ref. H)
F	STO	Push-button	Stores the selected values to the settings
G	SEL	Push-button	Opens and selects the menu
H	Display, part 2	LCD indicators	Displays additional indicators, (R for reply, ID for Ident, ALT for XPDR ALT mode or ON for XPDR ON mode, FL for flight level)
J	VFR	Push-button	Activates VFR code in the upper row of the display

920.1.2 SWITCHING ON THE UNIT (PRE-FLIGHT CHECK)

1 Check that the circuit breaker is set and switch on the aircraft power supply .

N O T I C E

Damage possible due to current peaks.
Do not switch on the transponder if the engine is being started or shut down.

2 Using mode selector (A), switch the transponder from **OFF** to **SBY**. A test then follows automatically for 1 seconds. The display shows '**WAIT**' and the unit is subject to a self-test simultaneously.

3 After the switch-on test has elapsed and no error-message is written in the display, the transponder switches to the mode set on the mode selector (A).

NOTE

The blind encoder is only powered if the transponder is not switched OFF (at least SBY). A blind encoder needs a warm-up time (sometimes a several minutes). Therefore although the solid state transponder needs no warm-up time, turn the transponder to SBY immediately after starting the engine.

920.1.3 DISPLAY

Transponder’s code is displayed in the top line using high readability font, at all times in modes SBY, ON, ALT. Depending on the configuration settings, the Aircraft Identification (AI) or Flight Number (FN) is displayed in the bottom line. Flight level is displayed in ALT mode in the bottom line of the display (altitude= FL x 100 in ft).

920.1.4 SQUAWK SELECTION

1 The transponder remains switched in the standby mode until requested by the ground station (ATC) to transmit a code, e.g. „squawk alpha 6426“.

2 Using the rotary switch (B) and the button (C) set the 4-digit code requested by ATC as follows:

a Using switch (C) move the cursor to the particular digit. Digits 0 to 7 can then be set using the rotary switch (B).

NOTES

Whilst settings are taking place, the transmission branch of the transponder is inhibited to prevent unintentional transmission.

If only two digits were named by ATC, e.g. „Squawk alpha 64“, then a zero is to be used for positions three and four, i.e. „6400“.

b The last used code is stored in each case and is also activated when the transponder is switched on.

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)

0021 The VFR code commonly used in Germany (default is set to 0021 at time of installation)

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

Unintentional transmission of an emergency code is prevented in that the transponder replies are inhibited whilst the code is being set. This applies particularly where the new code is being set in the ON or ALT modes. Also if a special code is called up, no transponder reply takes place during the period in which the previous code can be reactivated (approximately 3 seconds).

920.1.5 SQUAWK IDENT

After a „squawk ident" request from ATC, press Ident button **IDT** (D) briefly. This transmits an additional special pulse (SPI) for approx. 18 seconds, which enables the aircraft to be clearly identified on the radar screen of the controller. **'Idt'** appears in the bottom line of the LC display during this time.

920.1.6 SELFTESTS OF THE UNIT (BITS)

The following different tests are integrated in the transponder or can be triggered at the transponder:

1 The IBIT (Initiated Built-in Test) can be activated in any mode (excluding the configuration mode) with the push of (F) and (G) at the same time. The action starts with the leading edge of the second pushed button. The IBIT works as follows in all modes:

The test starts with all available test routines including the transmitter test routine. During the test, '**IBIT**' is indicated on the display.The test takes not longer than 1 second. If the IBIT was successful, the XPDR switches immediately into the normal operating mode. During the IBIT any action from other switches is not recognized.

Negative results of the IBIT are indicated on the display with '**FAILURE**'. The transponder may be not switched into ON or ALT mode if any failure was found.

2 The CBIT (Continuous Built-in Test) works as follows:

The continuous BIT acts as a kind of watchdog during operation. Negative results of the CBIT are indicated on the display with '**FAILURE**'. In this case the transponder may be not switched into ON or ALT mode (display indication of operating mode set to **'SBY'**) if any failure was found.

3 The PBIT (Power-on Built-in Test) works as follows:

The XPDR has a power-on BIT after switching on. During the PBIT any action from other switches are not accepted.

During the PBIT the XPDR is in the SBY mode but this is not indicated on the display. The operating mode indication on the display starts immediately after finalisation of the PBIT.

Negative results are indicated on the display with '**FAILURE**'. The transpondermay be not switched into ON or ALT mode if any failure was found.

The PBIT takes not longer than 1 second. If the test was successful, the XPDR switches immediately into the normal operating mode.

920.1.7 SELECTION MODE

Press **SEL** button (G) and rotate encoder (B) for selection. In selection mode additional information is displayed in the bottom line of the display. Some of the data are editable, some are read only:

VFR	4096 code presetting	editable
AI	Aircraft Identifier (Tail Number)	fixed; read only from address module (an be replaced by FN). If no valid AI is stored, "---------" is displayed.
FN	Flight Number or Company Call Sign	editable; can be replaced by AI (fixed) byselecting "AI DEF"
AA	Aircraft Address (24-bit ICAO)	fixed; read only from addressmodule (unique number for each aircraft)
MA	Maximum Airspeed	fixed; read only from address module
AT	Aircraft Type	fixed; read only from address module
CFG	Configuration	available in SBY mode only
INS	Installation setup	available in SBY mode only; protected by password

AIRCRAFT IDENTIFICATION (AI OR FN)

With flight plan:
The definition out of the flight plan: e.g. Flight Number or Company Call Sign

Without flight plan (VFR):
Tail Number (Call Sign)

The indication of **'AI'** in the bottom line of the display is in mode SBY and ON only if selected in configuration menu. The Aircraft Identifier (fixed) is available in any mode after pressing **SEL** button (G) and turning the rotary encoder (B). The default value for AI is the Tail Number of the aircraft and is stored in the Address Module.

If a flight plan exists, it has to be checked, which AI has to be used. If a Flight Number is assigned it has to be entered. If a Company Call Sign is mentioned, this has to be entered. To enter it see below. It will be stored in the EEPROM of the control head. In this case the indication on the display changes to **'FN'** (Flight Number). If the Call Sign (Tail Number) is mentioned, no change, as it is the default setting from the Address Module.

SETTING THE FLIGHT NUMBER:

1 Press **SEL** button (G) to enter the select mode.

2 Rotate (B) until '**AI**' is displayed.

3 Push (C) to switch to '**FN**'. The cursor is set on the first character.

4 Rotate (B) to change this character.

5 Push (C) to set the cursor to the next character.

6 Repeat steps 4 and 5 until the flight number is entered.

7 If the flight number consists of less than 7 characters, put a space at the end to fill the remaining characters with spaces.

8 Store the changes with **STO** button (F). For leaving the setting procedure without storing, push the **SEL** button (G).

N O T E

Aircraft Identifier / Flight Number consists of max. 7 characters (on the left- hand side oriented). No dashes or spaces shall be included. If the FN con- sists of less than 7 characters, the remaining characters on the right side shall be filled with spaces.

SWITCHING BACK TO DEFAULT AI:

1 Press **SEL** button (G) to enter the select mode.

2 Rotate (B) to the indication '**FN=XXXXXXXX**'.

3 First push on (C) indicates'**FN=AI DEF**' (inverted).

4 Can be set to '**AI=DEF**' with **STO** button (F).

CHANGING THE FLIGHT NUMBER:

1 Press **SEL** button (G).

2 Rotate (B) until '**FN**' is displayed.

3 Push (C) twice to enter the FN editing mode.

4 Change the FN as described above.

VFR CODE PRESETTING

Press the **SEL** button (G) to get into configuration mode (selection is indicated in the left bottom corner of the display under the operating mode indication).

1 Rotate (B) to the indication '**VFR=XXXX**'.

2 First push to button (C) now left digit of the code is inverted.

3 Now the digit can be changed with (B).

4 Second push to button (C) now next left digit of the code is inverted.

5 The next digit can be changed with (B)

6 and the same for next digits.

7 Fifth push to button (C) now again first digit is inverted.

8 Changes can be stored with **STO** button (F) at any time, inversion stops in this case.

9 A VFR code that was preset in this way can be activated as described in chapter *VFR Code Activation*.

10 A timeout for inversion (10 sec) is introduced if no action happens. Nothing stored, as long as (F) is not pressed.

N O T E

It is possible to leave the setting procedure with SEL button (G) at any time and normal mode is available then. Indication SEL on the display changes back to mode indication. If STO button (F) was not used, no change has been stored.

920.1.8 FLIGHT OPERATION IN MODE A/C/S (REPLY CODE AND ALTITUDE CODE)

1 When ATC requests the transmission „squawk“, switch the transponder to **ALT** using mode switch (A).

N O T E

In exceptions the altitude has to be turned off, i.e. switch the transponder to ON using mode switch (A).

2 The transponder replies using the selected Code and in response to mode C interrogation it transmits the altitude of the aircraft to ATC. A '**R**' on the left next to the Code on the display signals the transponder replies.

N O T E

Switch the transponder to Stand-by (SBY), if the Code has to be changed. Otherwise if could happen that a Code with a special meaning (see chapter K, e.g. highjack) will be transmitted and unwanted actions could take place.

920.1.9 VFR CODE ACTIVATION

1 Press the **VFR** push-button (J). The preselected code is then displayed. After 3 seconds, the displayed code gets active and overwrites the previously-set reply code.

2 Pressing push-button (J) again within 3 seconds reactivates the previously-set reply code.

NOTE

When the unit is delivered, the VFR button is not assigned a code. This means that if this button is pressed for 0.5 seconds, „——“ is shown in the code display and the transponder then switches back to the previously-active code.

920.1.10 CONFIGURATION MODE

The configuration mode is available from SBY mode only. To get into configuration mode press button **SEL** (G), turn rotary encoder (B) until '**CFG**' appears in the bottom row of the display. Refer to BECKER's Pilot's Guide for available options.

920.2 LIMITATIONS

Not applicable.

920.3 EMERGENCY PROCEDURES

920.3.1 IMPORTANT CODES

7600 Loss of communications.

7500 Hijacking.

7700 Emergency (All secondary surveillance radar sites are ready to receive this code at all times).

See the Airman's Information Manual (AIM) for a detailed explanation of identification codes.

920.4 NORMAL PROCEDURES

Not applicable

920.5 PERFORMANCE

Not applicable

SECTION 921

LYCOMING AEIO-580-B1A ENGINE

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921.1 GENERAL

As an alternative to the Lycoming AEIO-540-L1B5 engine the EXTRA 300L can be equipped with an AEIO-580-B1A engine. It is a six-cylinder, horizontally opposed, aircooled, direct drive, fuel injection engine with inverted oil system.

The EXTRA 300L with AEIO-580-B1A engine is available in one of the following fuel tank configurations ex factory, both combined with a wing tank of 120 L (31.7 US gal) capacity:

Configuration 1:	Acro and center tank with 51 L (13.4 US gal) total fuel capacity (refer to section 1 thru 7 of this handbook)
Configuration 2:	Acro and center tank with 69 L (18.2 US gal) total fuel capacity

The AEIO-580-B1A engine can be operated with the following propellers:

1) Type MTV-9-B-C/C 200-15	3-blade constant speed
2) Type MTV-14-B-C/C 190-17	4 blade constant speed
3) Type MTV-9-B-C/C 198-25	3-blade constant speed

921.2 LIMITATIONS

The following data deviate from the values given in Section 2 of this handbook:

921.2.1 Engine Limitations

a) Rotational Speed:

Maximum Take-Off and Maximum Continuous: 2700 RPM*

N O T E *

Applicable RPM limitations approved for individual propeller types must be observed. Refer to Section 2.5 eligible for the MTV-9-B-C/C 200-15 & MTV-14-B-C/C 190-17 as well as Section 921.2.3 eligible for the MTV-9-B-C/C 198-25 propeller.

b) Fuel (configuration 2)

Total fuel capacity:	189 L	(49.9 US gal)
Usable fuel capacity in the system:	187 L	(49.4 US gal).
Acro & Center Tank capacity:	69 L	(18.2 US gal)
Usable fuel capacity for acrobatic:	67 L	(17.7 US gal)

c) Fuel pressure (at inlet to fuel injector):

Max:	448.2 kPa	(65 psig)
Min:	200.0 kPa	(29 psig)
Min Idle:	82.7 kPa	(12 psig)

d) Cylinder head temperature:

Max:	241 °C	(465°F)

921.2.2 Weight Limits

Max allowed empty weight:	
-Normal category	
configuration 1	742 kg (1636 lb)
configuration 2	729 kg (1607 lb)
-Acrobatic category	
single seat operation / ACRO I	
configuration 1	698 kg (1540 lb)
configuration 2	686 kg (1512 lb)
double seat operation / ACRO II	662 kg (1460 lb)
double seat operation / ACRO III	742 kg (1636 lb)

921.2.3 Propeller Limitations

The MTV-9-B-C/C 198-25 propeller may be operated only with the AEIO-580-B1A engine.

With respect to the noise level (refer to paragraph 921.2.5) following rotational speed limitations apply for the MTV-9-B-C/C 198-25 propeller:

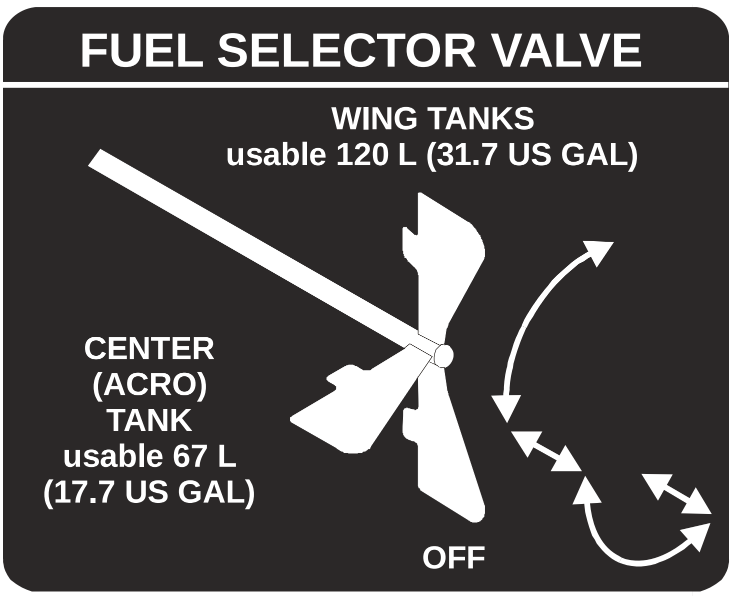
Maximum Take-Off and Maximum Continuous: 2600 RPM*

N O T E *

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.

921.2.4 Operating Placards

The following placards replace the existing placards when the aircraft is delivered in configuration 2:



(in both cockpits near selector valve handle)

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 next to the fuel quantity indicator)

921.2.5 Instrument Markings

<u>CYLINDERHEAD TEMPERATURE INDICATOR</u>

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

<u>MANIFOLD PRESSURE INDICATOR</u>

green arc	10 " Hg - 30 " Hg

921.2.6 Maximum Operating Altitude

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

921.3 EMERGENCY PROCEDURES

Not applicable

921.4 NORMAL PROCEDURES

921.4.1 Noise Level

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 as 77.8 dB(A).

In addition: 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 FAR 36 Appendix G (incl. Amdt. 36-28) as 77.5 dB(A).
No determination has been made by the Federal Aviation Administration that the noise level of this aircraft is or should be acceptable or unacceptable for operation at, into, or out of, any airport.

921.5 PERFORMANCE

Due to the slightly increased power as well as the similar brake specific fuel consumption of the AEIO-580-B1A engine compared to the AEIO-540-L1B5 engine, the performance data given in Section 5 of this handbook are considered to be conservative thus can be applied in general.

Even at 2600RPM the climb performance is slightly better than that of the aircraft equipped with the AEIO-540-L1B5 engine. The actual value of the climb rate at MTOW 950kg (2095lbs), SL, ISA and T/O power with 2600RPM is established as 2163ft/min.

However, the Cruise Performance Charts and related Drawings have been adapted with regard to the power settings. The power settings are adjusted to match the absolute power values in the HP column of the Cruise Performance Chart presented in Section 5 of this handbook. For this reason the %-values of the power setting column deviate from the common values (75%, 65% etc.).

In the Cruise Performance Chart for configuration 2 the increased fuel capacity of the center tank has been considered.

921.5.1 Cruise Performance Chart Configuration 1

Configuration:

T/O Weight	950 kg (2095 lb)
Center Tank Fuel Capacity	51 L (13.4 US gal)
Total Fuel Capacity	171 L (45.2 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 21 L (5.55 US gal) for 45 minutes with 45% Power. 5.5 L (1.45 US gal) unusable fuel is taken into account. (At ISA-Conditions.)

PA [ft] (m)	Eng. [rpm]	Manif. Press. [inHg]	Power Setting [%]	[hp]	Fuel Consumption [L/h]	(gal/h)	TAS [kts]	(km/h)	IAS [kts]	(km/h)	Endur. 1* [h]	Range 1* [nm]	(km)	Mixture 2* Best ...
2000 (610)	2700*	26.5	91	286	88.2	(23.3)	182.6	(338)	173	(320)	1.49	272	(504)	Power
	2400	24.0	71	225	68.7	(18.2)	167.6	(310)	160	(296)	1.91	320	(593)	Power
	2200	23.2	62	195	50.5	(13.3)	159.3	(295)	152	(282)	2.60	413	(765)	Economy
	2000	22.5	52	165	42.6	(11.3)	150.2	(278)	144	(267)	3.08	462	(856)	Economy
	2000	19.4	43	135	36.5	(9.6)	139.9	(259)	134	(248)	3.59	502	(930)	Economy
4000 (1219)	2700*	24.5	85	267	82.7	(21.9)	181.5	(336)	168	(311)	1.59	286	(530)	Power
	2400	23.4	71	225	68.7	(18.2)	170.9	(317)	158	(293)	1.91	324	(600)	Power
	2200	22.7	62	195	50.5	(13.3)	162.4	(301)	150	(278)	2.59	418	(774)	Economy
	2000	21.8	52	165	42.6	(11.3)	153.1	(284)	142	(263)	3.06	467	(865)	Economy
	2000	19.0	43	135	36.5	(9.6)	142.6	(264)	133	(246)	3.59	507	(939)	Economy
6000 (1829)	2700*	22.8	79	248	77.6	(20.5)	180.5	(334)	162	(300)	1.69	301	(557)	Power
	2500	22.2	71	225	69.8	(18.4)	174.3	(323)	156	(289)	1.88	323	(598)	Power
	2200	22.2	62	195	50.5	(13.3)	165.6	(307)	149	(276)	2.57	422	(782)	Economy
	2000	21.5	52	165	42.6	(11.3)	156.1	(289)	141	(261)	3.04	472	(874)	Economy
	2000	18.5	43	135	36.5	(9.6)	145.4	(269)	131	(243)	3.53	512	(948)	Economy
8000 (2438)	2700*	21.0	73	231	73.4	(19.4)	179.6	(333)	166	(307)	1.79	314	(582)	Power
	2675*	20.7	71	225	71.9	(19.0)	177.8	(329)	156	(289)	1.82	318	(589)	Power
	2350	20.6	62	195	52.0	(13.7)	169.0	(313)	147	(272)	2.49	415	(769)	Economy
	2050	20.6	52	165	43.0	(11.4)	159.3	(295)	139	(257)	2.99	472	(874)	Economy
10000 (3048)	2700*	19.8	69	215	69.6	(18.4)	178.6	(331)	151	(280)	1.88	327	(606)	Power
	2500	19.2	62	195	53.6	(14.2)	172.4	(319)	146	(270)	2.41	407	(754)	Economy
	2150	19.3	52	165	43.7	(11.5)	162.5	(301)	138	(256)	2.93	469	(869)	Economy

*) This RPM setting is not allowed for airplanes equipped with a 3-blade propeller Type MTV-9-B-C/C 198-25 operated in the normal category, in which noise protection requirements must be complied with.

NOTE

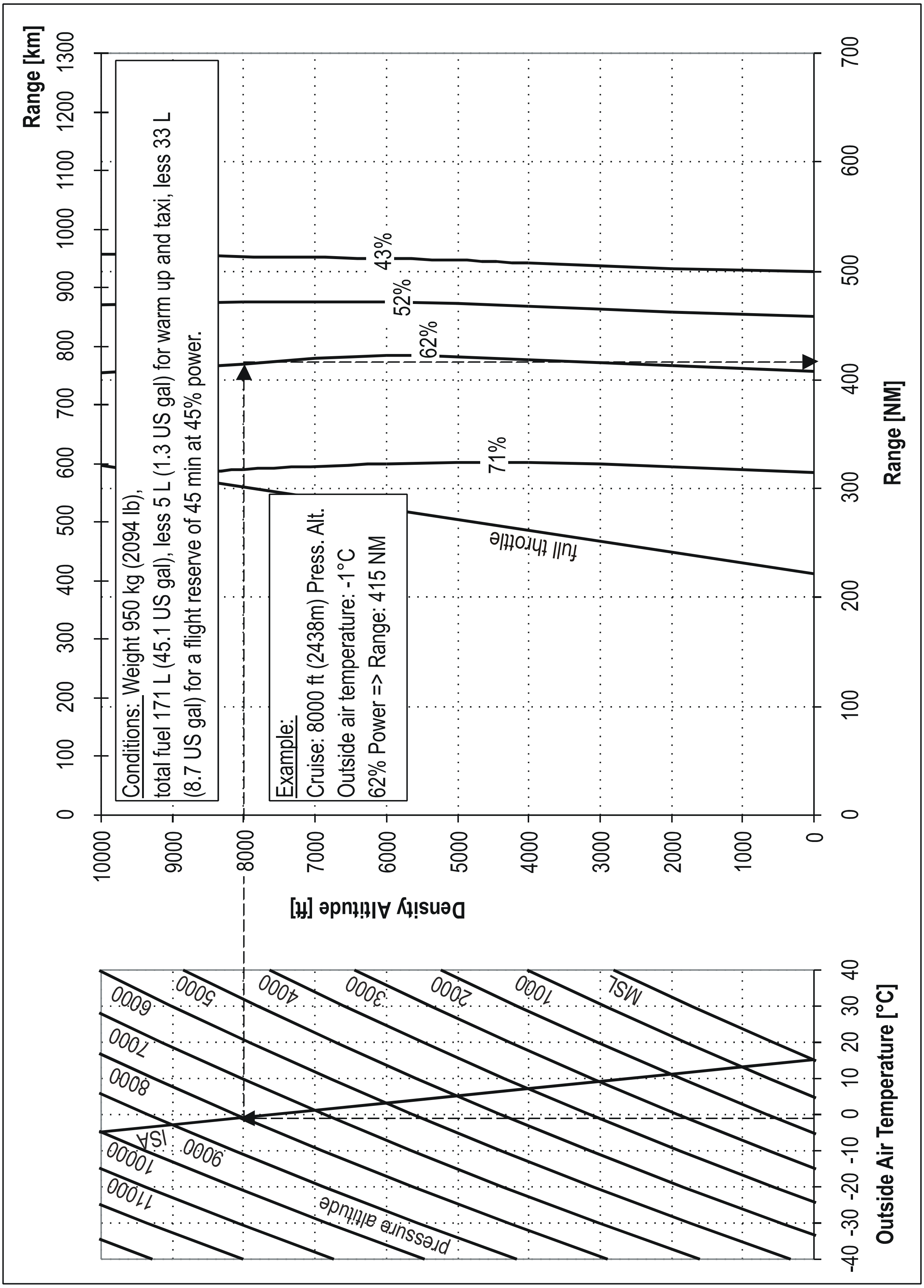
1* For temperatures above/ below Standard (ISA), increase/decrease Range 1,7% and Endurance 1,1% for each 10°C (18°F) above/below Standard Day Temperature for particular altitude.

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).

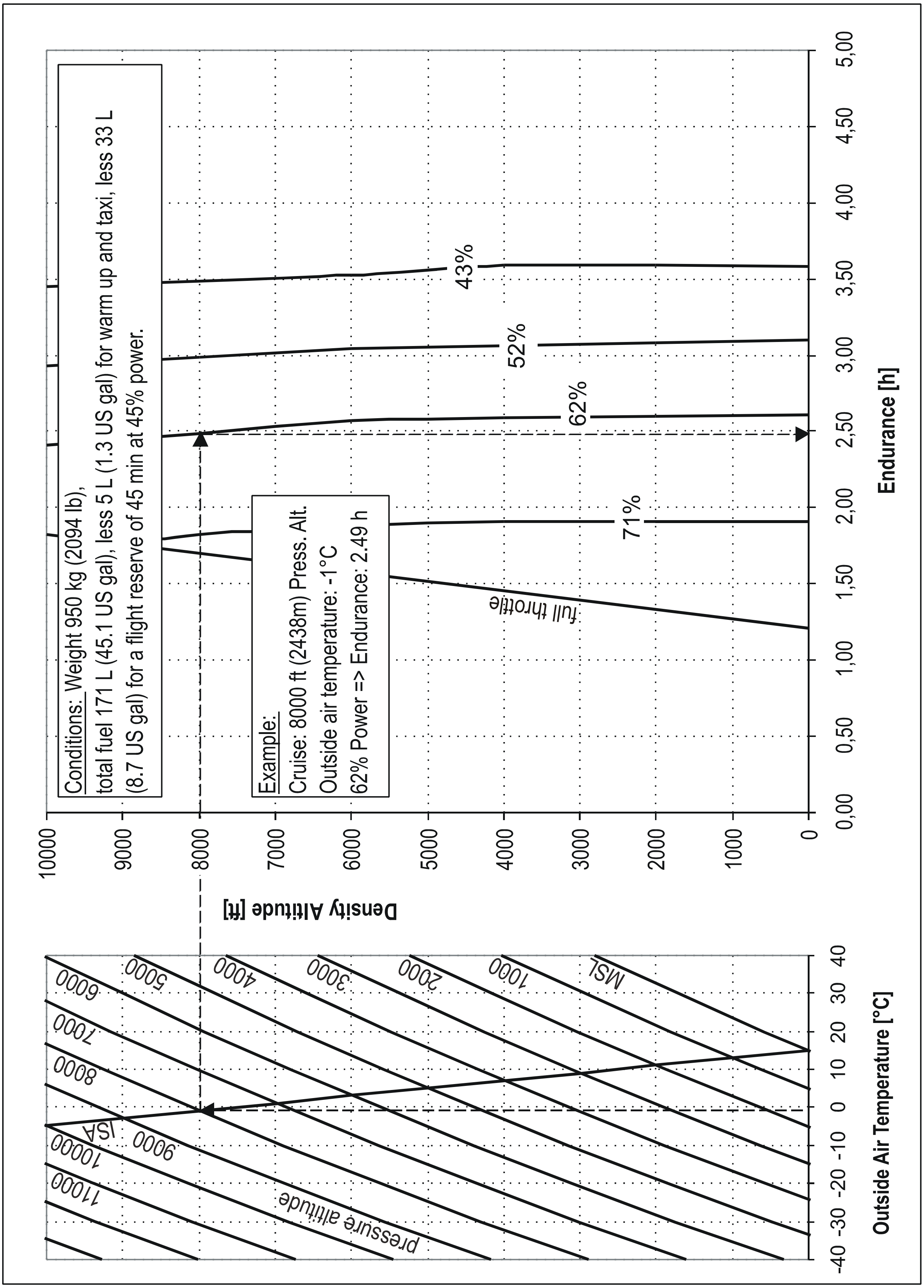
⚠ WARNING

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

921.5.2 Range Configuration 1



921.5.3 Endurance Configuration 1



921.5.4 Cruise Performance Chart Configuration 2

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 21 L (5.55 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	(610)	2700*	26.5	91	286	88.2	(23.3)	182.6	(338)	173	(320)	1.73	317	(587)	Power
		2400	24.0	71	225	68.7	(18.2)	167.6	(310)	160	(296)	2.22	373	(691)	Power
		2200	23.2	62	195	50.5	(13.3)	159.3	(295)	152	(282)	3.03	481	(891)	Economy
		2000	22.5	52	165	42.6	(11.3)	150.2	(278)	144	(267)	3.59	538	(996)	Economy
		2000	19.4	43	135	36.5	(9.6)	139.9	(259)	134	(248)	4.18	584	(1082)	Economy
4000	(1219)	2700*	24.5	85	267	82.7	(21.9)	181.5	(336)	168	(311)	1.85	333	(617)	Power
		2400	23.4	71	225	68.7	(18.2)	170.9	(317)	158	(293)	2.22	378	(700)	Power
		2200	22.7	62	195	50.5	(13.3)	162.4	(301)	150	(278)	3.02	487	(902)	Economy
		2000	21.8	52	165	42.6	(11.3)	153.1	(284)	142	(263)	3.57	544	(1007)	Economy
		2000	19.0	43	135	36.5	(9.6)	142.6	(264)	133	(246)	4.18	591	(1095)	Economy
6000	(1829)	2700*	22.8	79	248	77.6	(20.5)	180.5	(334)	162	(300)	1.97	351	(650)	Power
		2500	22.2	71	225	69.8	(18.4)	174.3	(323)	156	(289)	2.19	377	(698)	Power
		2200	22.2	62	195	50.5	(13.3)	165.6	(307)	149	(276)	3.00	493	(913)	Economy
		2000	21.5	52	165	42.6	(11.3)	156.1	(289)	141	(261)	3.55	551	(1020)	Economy
		2000	18.5	43	135	36.5	(9.6)	145.4	(269)	131	(243)	4.12	598	(1107)	Economy
8000	(2438)	2700*	21.0	73	231	73.4	(19.4)	179.6	(333)	166	(307)	2.08	367	(680)	Power
		2675*	20.7	71	225	71.9	(19.0)	177.8	(329)	156	(289)	2.12	371	(687)	Power
		2350	20.6	62	195	52.0	(13.7)	169.0	(313)	147	(272)	2.90	485	(898)	Economy
		2050	20.6	52	165	43.0	(11.4)	159.3	(295)	139	(257)	3.49	552	(1022)	Economy
10000	(3048)	2700*	19.8	69	215	69.6	(18.4)	178.6	(331)	151	(280)	2.19	382	(707)	Power
		2500	19.2	62	195	53.6	(14.2)	172.4	(319)	146	(270)	2.81	476	(882)	Economy
		2150	19.3	52	165	43.7	(11.5)	162.5	(301)	138	(256)	3.42	549	(1017)	Economy

* This RPM setting is not allowed for airplanes equipped with a 3-blade propeller MTV-9-B-C/C 198-25 operated in the normal category, in which noise protection requirements must be complied with.

NOTE

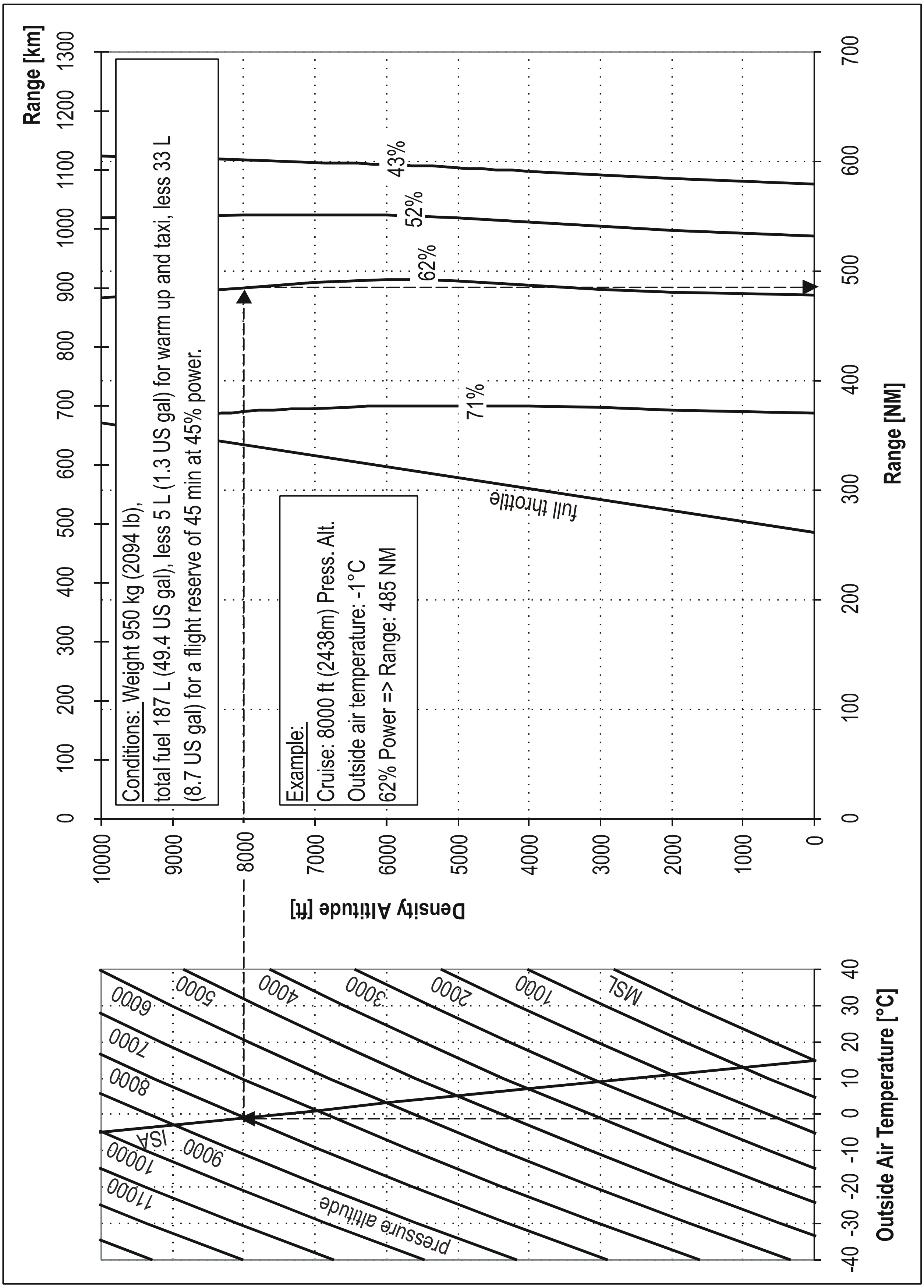
1* For temperatures above/ below Standard (ISA), increase/decrease Range 1,7% and Endurance 1,1% for each 10°C (18°F) above/below Standard Day Temperature for particular altitude.

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).

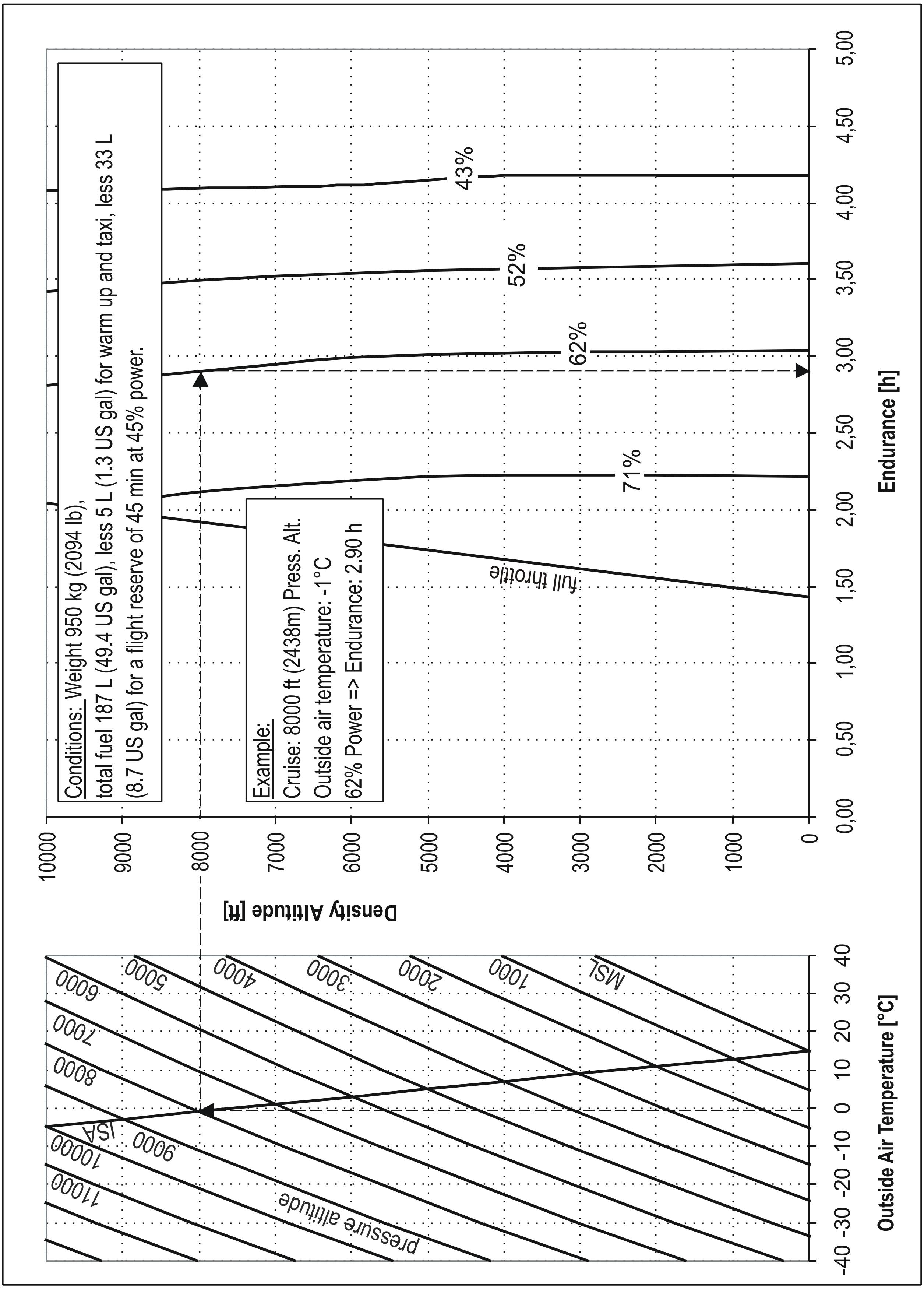
⚠ WARNING

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

921.5.5 Range Configuration 2



921.5.6 Endurance Configuration 2



921.6 WEIGHT AND BALANCE

LOADING WEIGHTS AND MOMENTS

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)*			

Also refer to the Equipment List in Section 6 which has been revised.

921.7 DESCRIPTION

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).

Apart from the improved performance 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.

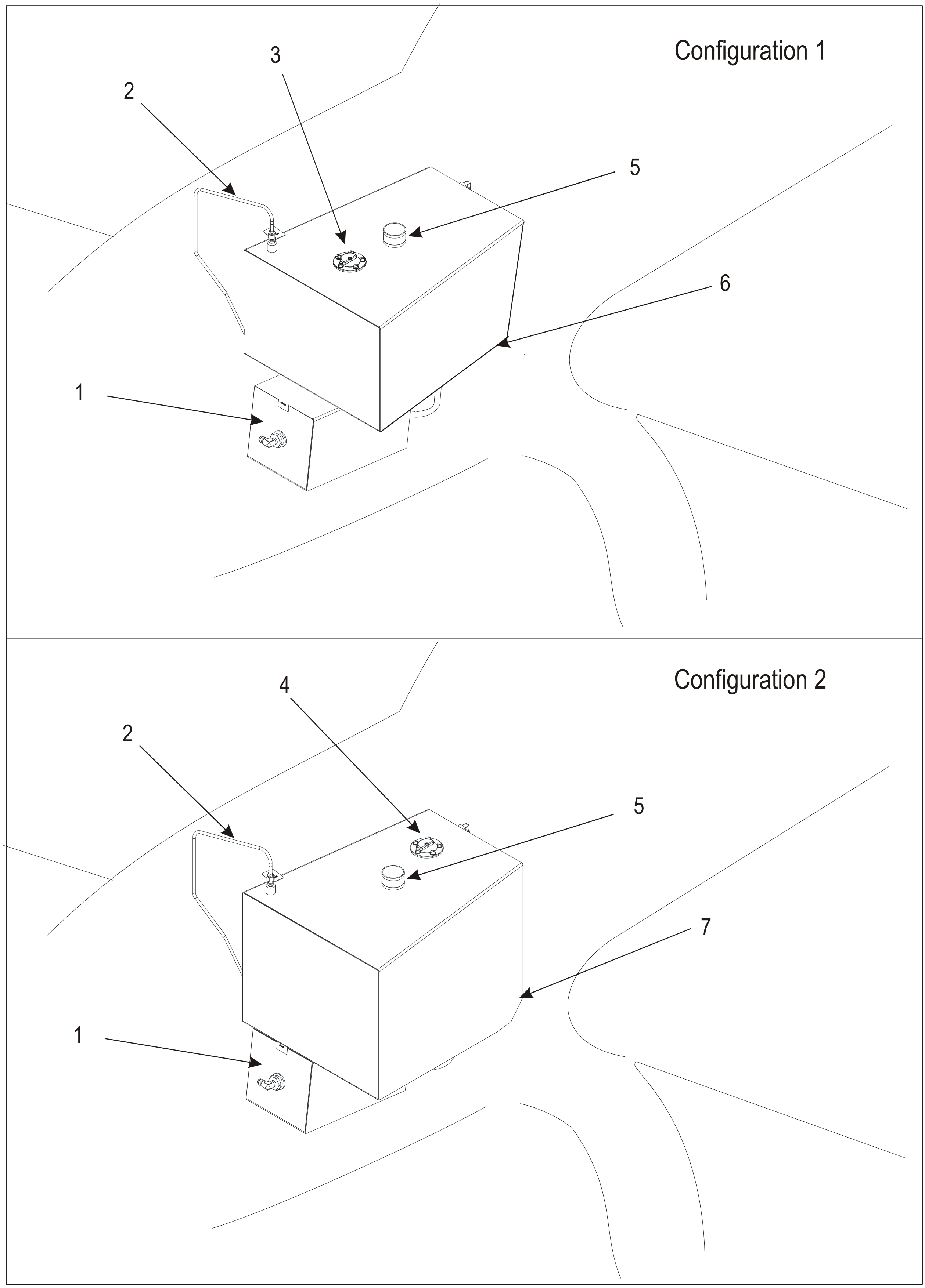


Figure 921-1, Center Tank Versions

Figure 921-1 shows both fuselage fuel tank configurations which are available for the EXTRA 300L ex factory. Item 6 shows the contour of the center tank with 42 L (11.1 US gal) capacity (configuration 1). Item 7 shows the contour of the center tank with 60 L (15.9 US gal) capacity (configuration 2). In each configuration the center tanks are located above the acro tank (1) having 9 L (2.4 US gal) fuel quantity. They are installed in the same place and in the same manner. This includes the vent line (2) and the fuel filler (5) location. However the steel tubes of the fuselage carrying the 60 L tank and its mounting have been reinforced. The configuration 1 fuel quantity probe (3) is located in front of the fuel filler (5), the configuration 2 probe (4) is located behind. The fuel quantity indicators are identical in both configurations.

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EXTRA

SECTION 922

CENTER TANK INCREASED CAPACITY

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922.1 GENERAL

The center fuel tank with an increased fuel capacity from 42 to 60 L is available ex factory for the fuelage fuel tank system of the EXTRA 300L.

922.2 LIMITATIONS

The following data deviate from the data given in Section 2 of this Handbook:

922.2.1 Fuel

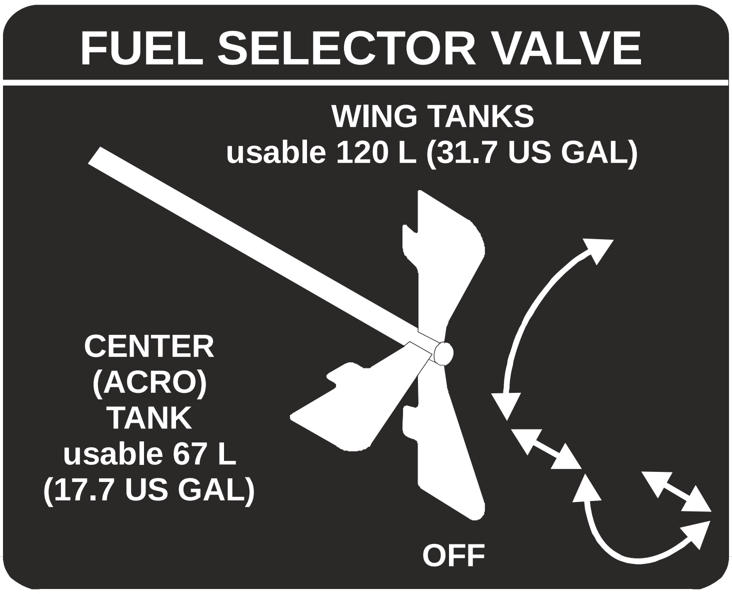
Total fuel capacity:	189 L	(49.9 US gal)
Usable fuel capacity in the system:	187 L	(49.4 US gal)
Acro & center tank capacity:	69 L	(18.2 US gal)
Usable fuel capacity for acrobatic:	67 L	(17.7 US gal)

922.2.2 Weight Limits

Max. allowed empty weight	Normal category:	729 kg (1607 lb)
	Acrobatic category I:	686 kg (1512 lb)

922.2.3 Placards

The following placards replace the existing placards:



(in both cockpits
near selector valve handle)

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
next to the fuel quantity indicator)

922.3 EMERGENCY PROCEDURES

Not affected.

922.4 NORMAL PROCEDURES

Not affected

922.5 PERFORMANCE

922.5.1 Cruise Performance

Range and Endurance values for a T/O Weight of 950 kg (2095 lb) including fuel for warm-up and Take-Off from SL, max. cont. Power climb to cruising altitude, and a reserve of 21 L (5.55 gal) for 45 minutes with 45% Power. 2 L (0.53 gal) unusable fuel is taken into account. (At ISA - Conditions.)

PA [ft] (m)	Eng. [rpm]	Manif. Press. [inHg]	Power Setting [%]	Power Setting [hp]	Fuel Consumption [L/h]	Fuel Consumption [gal/h]	TAS [kts]	TAS (km/h)	IAS [kts]	IAS (km/h)	Endur. 1* [h]	Range 1* [nm]	Range 1* (km)	Mixture 2* Best ...
2000 (610)	2700	27.4	95	286	88.2	(23.3)	182.6	(338)	173	(320)	1.73	317	(587)	Power
	2400	25.1	75	225	68.7	(18.2)	167.6	(310)	160	(296)	2.22	372	(689)	Power
	2200	24.2	65	195	50.5	(13.3)	159.3	(295)	152	(282)	3.03	481	(891)	Economy
	2000	23.5	55	165	42.6	(11.3)	150.2	(278)	144	(267)	3.58	538	(996)	Economy
	2000	20.2	45	135	36.5	(9.6)	139.9	(259)	134	(248)	4.18	584	(1082)	Economy
4000 (1219)	2700	25.4	89	267	82.7	(21.8)	181.5	(336)	168	(311)	1.85	333	(617)	Power
	2400	24.6	75	225	68.7	(18.2)	170.9	(317)	158	(293)	2.22	377	(698)	Power
	2200	23.7	65	195	50.5	(13.3)	162.4	(301)	150	(278)	3.02	487	(902)	Economy
	2000	23.0	55	165	42.6	(11.3)	153.1	(284)	142	(263)	3.56	544	(1007)	Economy
	2000	19.7	45	135	36.5	(9.6)	142.6	(264)	133	(246)	4.18	591	(1095)	Economy
6000 (1829)	2700	23.6	83	248	77.6	(20.5)	180.5	(334)	162	(300)	1.97	351	(650)	Power
	2500	23.3	75	225	69.8	(18.4)	174.3	(323)	158	(293)	2.19	377	(698)	Power
	2200	23.2	65	195	50.5	(13.3)	165.6	(307)	149	(276)	3.00	493	(913)	Economy
	2000	22.5	55	165	42.6	(11.3)	156.1	(289)	141	(261)	3.54	531	(983)	Economy
	2000	19.3	45	135	36.5	(9.6)	145.4	(269)	131	(243)	4.12	598	(1107)	Economy
8000 (2438)	2700	21.8	77	231	73.4	(19.4)	179.5	(332)	156	(289)	2.08	367	(680)	Power
	2675	21.5	75	225	71.9	(19.0)	177.8	(329)	155	(287)	2.12	371	(687)	Power
	2350	21.5	65	195	52.0	(13.7)	169.0	(313)	147	(272)	2.90	485	(898)	Economy
	2050	21.4	55	165	43.0	(11.4)	159.3	(295)	139	(257)	3.49	552	(1022)	Economy
	2000	18.8	45	135	36.5	(9.6)	148.4	(275)	130	(241)	4.10	604	(1119)	Economy
10000 (3048)	2700	20.2	72	215	69.6	(18.4)	178.5	(331)	151	(280)	2.19	382	(707)	Power
	2500	19.9	65	195	53.6	(14.2)	172.4	(319)	148	(274)	2.81	476	(882)	Economy
	2150	19.9	55	165	43.7	(11.5)	162.5	(301)	138	(256)	3.42	549	(1017)	Economy
	2000	18.4	45	135	36.5	(9.6)	151.4	(280)	129	(239)	4.07	611	(1132)	Economy
12000 (3658)	2700	18.6	67	200	66.2	(17.5)	177.5	(329)	146	(270)	2.28	396	(733)	Power
	2675	18.4	65	195	55.3	(14.9)	176.0	(326)	144	(267)	2.71	467	(865)	Economy
	2300	18.3	55	165	45.2	(11.9)	165.9	(307)	136	(252)	3.29	537	(995)	Economy
	2000	17.9	45	135	36.5	(9.6)	154.5	(286)	127	(235)	4.03	617	(1143)	Economy
14000 (4267)	2700	17.2	62	186	63.0	(16.6)	176.6	(327)	140	(259)	2.42	410	(759)	Power
	2450	17.0	55	165	46.7	(12.3)	169.4	(314)	135	(250)	3.17	524	(970)	Economy
	2075	17.7	45	135	37.1	(9.8)	157.8	(292)	122	(226)	3.94	611	(1132)	Economy

N O T E

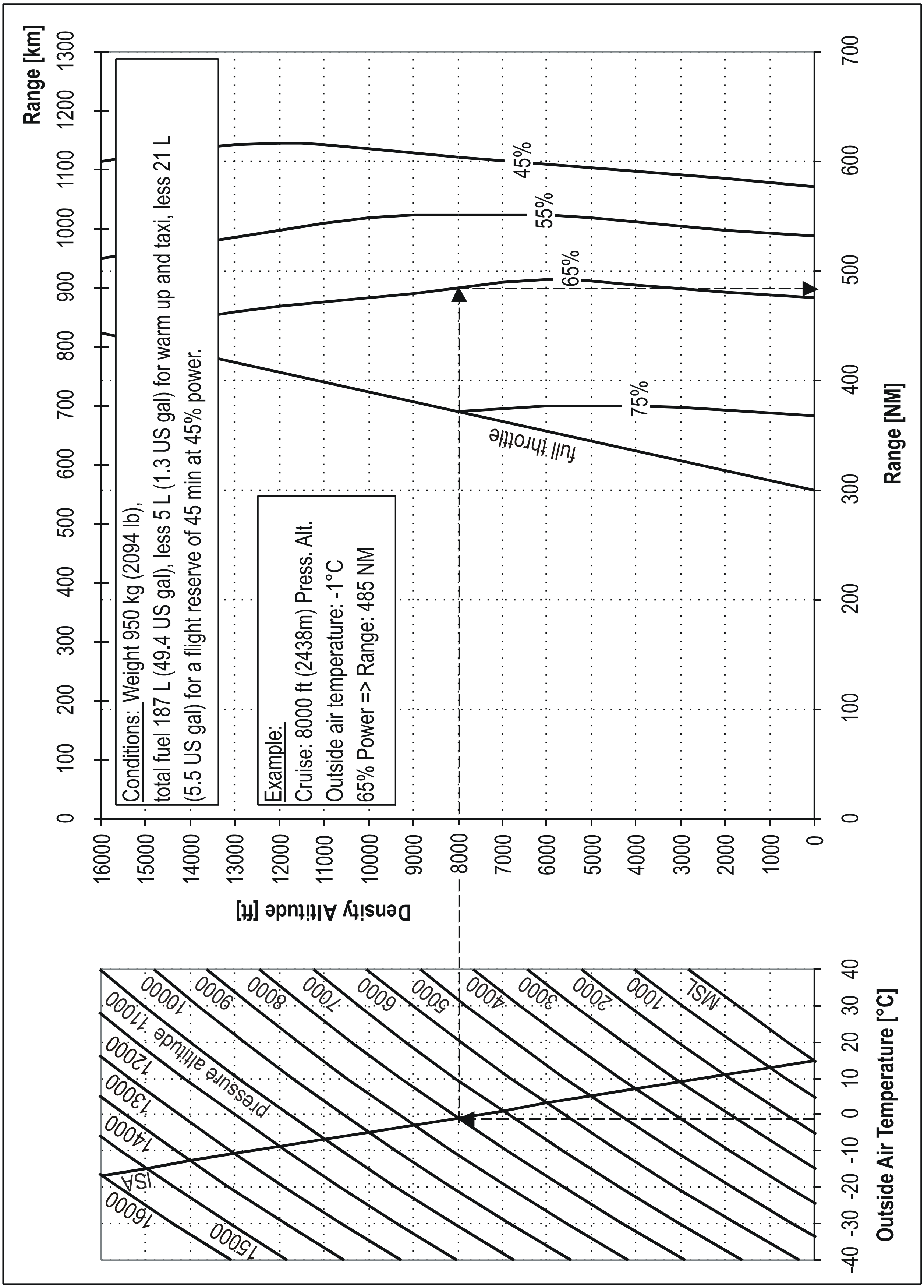
1* For temperatures above/ below Standard (ISA), increase/decrease Range 1,7% and Endurance 1,1% for each 10°C (18°F) above/below Standard Day Temperature for particular altitude.

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).

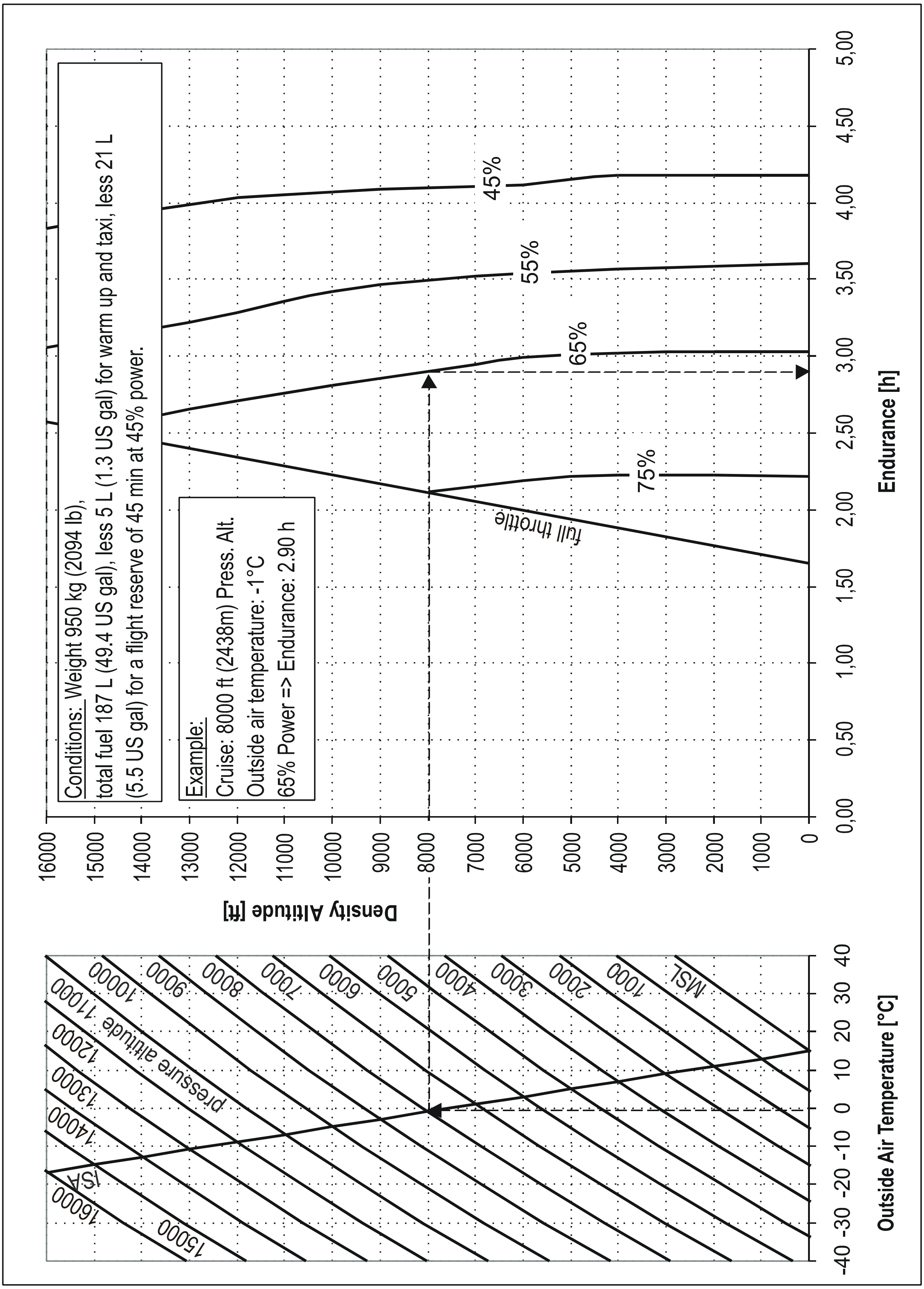
W A R N I N G

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

922.5.2 Range


Conditions: Weight 950 kg (2094 lb),
total fuel 187 L (49.4 US gal), less 5 L (1.3 US gal) for warm up and taxi, less 21 L
(5.5 US gal) for a flight reserve of 45 min at 45% power.
Example:
Cruise: 8000 ft (2438m) Press. Alt.
Outside air temperature: -1°C
65% Power => Range: 485 NM
Range [km]
0
100
200
300
400
500
600
700
800
900
1000
1100
1200
1300
Range [NM]
0
100
200
300
400
500
600
700
45%
55%
65%
75%
full throttle
Density Altitude [ft]
16000
15000
14000
13000
12000
11000
10000
9000
8000
7000
6000
5000
4000
3000
2000
1000
0
Outside Air Temperature [°C]
-40
-30
-20
-10
0
10
20
30
40
pressure altitude
MSL
1000
2000
3000
4000
5000
6000
7000
8000
9000
10000
11000
12000
13000
14000
15000
16000
ISA

922.5.3 Endurance



922.6 WEIGHT AND BALANCE

LOADING WEIGHTS AND MOMENTS

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)*			

922.7 DESCRIPTION OF THE SYSTEM

(Refer to Figure 922-1) The center fuel tank (5) with increased fuel capacity is installed in the same place and in the same manner as the standard fuel center tank. This includes the vent line (2) and the fuel filler (3) location. However the tank is increased in down- and rearward direction. The steel tubes of the fuselage carrying the tank and the tank mounting are reinforced. The fuel contents probe (4) has been changed while the indicator is still the same. The total fuel capacity of the center tank is 60 L (15.9 US gal). The total fuel capacity of the acro tank (1) is 9 L (2.4 US gal). The usable fuel quantity of both center and acro tank is 67 L (17.7 US gal).

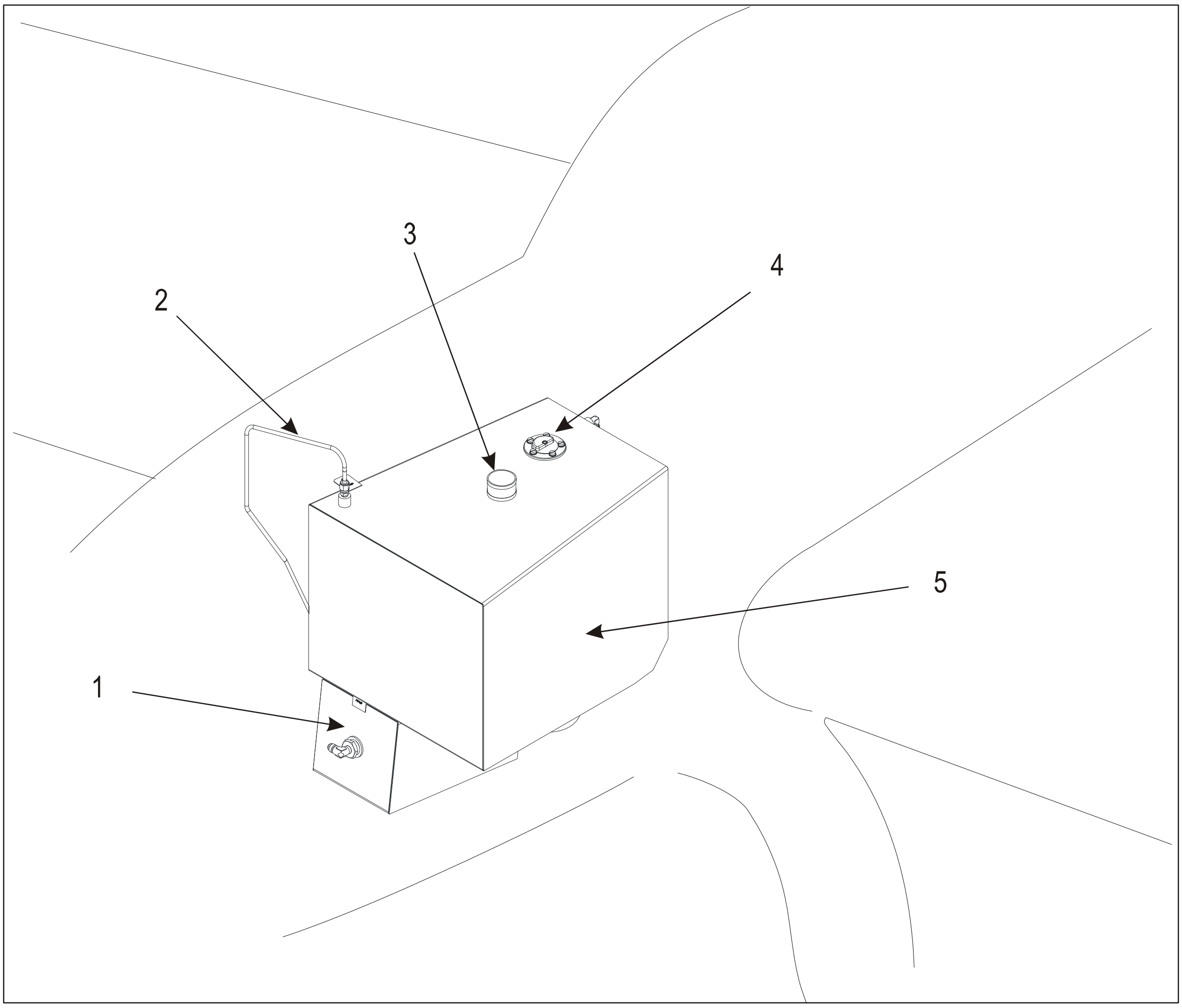


Figure 922-1, Center Tank and Environment

922.8 HANDLING, SERVICING AND MAINTENANCE

Not affected.

SECTION 923

GARMIN GTX 328 TRANSPONDER

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923.1 GENERAL

The Garmin GTX 328 panel mounted Mode S VFR Transponder is a radio transmitter and receiver that fulfills the role of the airborne beacon equipment according to the requirements of the Air Traffic Radar Beacon System (ATCRBS). Its functionality includes replying to ATCRBS Mode A and C and Mode S interrogations. The Mode S function will allow the ground station to individually select the aircraft by its Aircraft Address assigned to the aircraft by the aviation agency.

It operates on radar frequencies, receiving ground radar interrogations at 1030 MHz and transmitting a coded response of pulses to ground-based radar on a frequency of 1090 MHz. The GTX 328 is equipped with IDENT capability that activates the Special Position Identification (SPI) pulse for 18 seconds. Mode S transmit/receive capability also requires 1090 MHz transmitting and1030 MHz receiving for Mode S functions.

In addition to displaying the code, reply symbol and mode of operation, the GTX 328 screen will display pressure altitude and timer functions. The displayed pressure altitude may not agree with the aircraft's baro-corrected altitude under non standard conditions. The unit also features flight timers.

The Traffic Information Service (TIS) is not available in this installation.

N O T E

The GTX 328 owner accepts all responsibility for obtaining the proper license before using the transponder.

The coverage you can expect from the GTX 328 is limited to „line of sight“. Low altitude or aircraft antenna shielding by the aircraft itself may result in reduced range. Range can be improved by climbing to a higher altitude. It may be possible to minimize antenna shielding by locating the antenna where dead spots are only noticed during abnormal flight attitudes.

N O T I C E

Damage possible due to current peaks.
The GTX 328 should be turned off before starting or shutting down aircraft engine.

The GTX 328 Transponder is automatically powered on by the respective **AVIONIC MASTER** switch or when previously manually powered off while **AVIONIC MASTER** switch is on by pressing the **STBY**, **ALT** or **ON** keys. After power on, a start-up page will be displayed while the unit performs a self test.

This supplement is written for software version 5.00 or later, 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 GTX 328 pilot's guide (PN 190-00420-03 applicable revision) you received with your transponder. There you find also further information.

923.1.1 MODE SELECTION KEYS

OFF
Powers off the GTX 328. Pressing STBY, ON or ALT Key powers on the transponder displaying the last active identification code.

STBY
Selects the standby mode. When in standby mode, the transponder will not reply to any interrogations.

ON
Selects Mode A. In this mode the transponder replies to interrogations, as indicated by the Reply Symbol. Replies do not include altitude information.

ALT
Selects Mode A and Mode C. In ALT mode, the transponder replies to identification and altitude interrogations as indicated by the Reply Symbol. Replies to altitude interrogations include the standard pressure altitude received from an external altitude source, which is not adjusted for barometric pressure. Any time the function ON or ALT is selected the transponder becomes an active part of the Air Traffic Control Radar Beacon System (ATCRBS). The transponder also responds to interrogations from TCAS equipped aircraft.

923.1.2 CODE SELECTION

Code selection is done with eight keys (**0 – 7**) providing 4,096 active identification codes. Pushing one of these keys begins the code selection sequence. Digits that are not yet entered appear as dashes. The new code is activated when the fourth digit is entered. Pressing the **CLR** Key moves the cursor back to the previous digit. Pressing the **CLR** Key when the cursor is on the first digit of the code, or pressing the **CRSR** Key during code entry, removes the cursor and cancels data entry, restoring the previous code. Press the **CLR** Key up to five seconds after code entry is complete to return the cursor to the fourth digit. The numbers **8** and **9** are not used for code entry, only for entering a Count Down time, and contrast and display brightness.

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 codes 0000, 7500, and all codes in the 7600-7777 range. These codes trigger special indicators in automated facilities. An aircraft's transponder code is used for ATC tracking purposes, therefore exercise care when making routine code changes!

923.1.3 KEYS FOR OTHER GTX 328 FUNCTIONS

IDENT
Pressing the **IDENT** Key activates the Special Position Identification (SPI) Pulse for 18 seconds, identifying your transponder return from others on the air traffic controller's screen. The word 'IDENT' will appear in the upper left corner of the display while the IDENT mode is active.

VFR
Sets the transponder code to the pre-programmed VFR code selected in Configuration Mode (this is set to 7000 at the factory). Pressing the **VFR** Key again restores the previous identification code.

FUNC
Changes the page shown on the right side of the display. Display data includes Pressure Altitude, Flight Time, Count Up and Count Down timers. Also displays Contrast and Display (if manual control and backlighting is selected in the installation configuration).

START/STOP
Starts and stops the Count Up, Count Down and Flight timers.

CRSR
Initiates starting time entry for the Count Down timer and cancels transponder code entry.

CLR
Resets the Count Up, Count Down and Flight timers. Cancels the previous keypress during code selection and Count Down entry. Returns cursor to the fourth code digit within five seconds after entry.

8
Reduces Contrast and Display Brightness when the respective fields are displayed (if manual control is selected in the installation configuration) and enters the number eight into the Count Down timer.

9
Increases Contrast and Display Brightness when the respective fields are displayed (if manual control is selected in the installation configuration) and enters the number nine into the Count Down timer.

923.1.4 FUNCTION DISPLAY

'PRESSURE ALT'
Displays the altitude data supplied to the GTX 328 in feet, hundreds of feet (i.e., flight level), or meters, (dependent upon installation configuration).

'FLIGHT TIME'
Timer start is configured as either Manual or Automatic. When Manual, displays the Flight Time, controlled by the **START/STOP** and **CLR** keys. When Automatic, the timer begins when take off is sensed.

'ALTITUDE MONITOR'
The ALTITUDE MONITOR function is not available in this installation.

'OAT/DALT'
The OAT/DALT function is not available in this installation (no temperature input).

'COUNT UP TIMER'
Controlled by the **START/STOP** and **CLR** keys. Pressing the **CLR** key zeros the display.

'COUNT DOWN TIMER'
Controlled by **START/STOP**, **CLR**, and **CRSR** keys. The initial Count Down time is entered with the **0 - 9** keys. Pressing the **CLR** key resets the timer to the initial value.

'STBY'
The transponder will not reply to any interrogations.

'GND'
This page is not active.

'CONTRAST'
This page is only displayed if manual contrast mode is selected during installation configuration. Contrast is controlled by the **8** and **9** keys.

'DISPLAY'
This page is only displayed if manual backlighting mode is selected during installation configuration. Backlighting is controlled by the **8** and **9** keys.

923.1.5 CONFIGURATION MODE

The configurartion mode is not active.

The GTX 328's options are normally set at time of installation. To request any changes of the GTX 328 parameters, contact an authorized Garmin Aviation Service Center.

923.1.6 ALTITUDE TREND INDICATOR

When the '**PRESSURE ALT**' page is displayed, an arrow may be displayed to the right of the altitude, indicating that the altitude is increasing or decreasing. One of two sizes of arrows may be displayed depending on the vertical speed rate. The sensitivity of these arrows is set by an authorized Garmin Aviation Service Center.

923.1.7 FAILURE ANNUNCIATION

If the unit detects an internal failure, the screen displays **'FAIL'**. When **'FAIL'** is annunciated no transponder data is transmitted.

923.2 LIMITATIONS

Not applicable.

923.3 EMERGENCY PROCEDURES

923.3.1 IMPORTANT CODES

7600 Loss of communications.

7500 Hijacking.

7700 Emergency (All secondary surveillance radar sites are ready to receive this code at all times).

See the Airman's Information Manual (AIM) for a detailed explanation of identification codes.

923.4 NORMAL PROCEDURES

Not applicable.

923.5 PERFORMANCE

Not applicable.

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EXTRA

SECTION 924

ASPEN EFD1000 PILOT PFD

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924.1 GENERAL

The Aspen Avionics' EFD1000 PILOT PFD is a panel-mounted Electronic Flight Instrument System (EFIS) that presents the pilot with displays of attitude, altitude, indicated airspeed, heading, rate of turn, and slip/skid information. The system also displays supplemental flight data such as winds, TAS, OAT, etc. (see Item 36 - 39 of Figure 1), pilot-selectable indices („bugs"), and various annunciations that increase situational awareness and enhance flight safety. Moving maps are also displayed when an external GPS is installed and connected to the EFD1000 PILOT PFD. In the EXTRA 300L the EFD1000 PILOT PFD is used as a secondary (back-up) instrument system.

N O T E

Due to the capabilities of the aircraft - especially the extreme agility with high angular rates - the EFD1000 PILOT PFD cannot be operated reliably in acrobatics. Observe flags and reset EFD1000 PILOT PFD if required.

The EFD1000 PILOT PFD system components include the EFD1000 display head, a Remote Sensor Module (RSM), and a Configuration Module (CM). The RSM is installed in the aircraft tail under the main fuselage cover.

N O T E

Due to the location of the RSM the outside air temperature data is available time-delayed.

The EFD1000 PILOT PFD model does not support display of navigation data from panel-mounted GPS navigators, VOR/Localizer radios, etc. See Section 924.7 of this Aircraft Flight Manual Supplement for a description of the operation of the EFD1000 PILOT PFD System.

The EFD1000 PILOT PFD System must utilize the software version described below or later approved versions. The system software version for the Main Application Processor (MAP) and for the Input-Output Processor (IOP), both of which are contained within the EFD display head, is displayed via the Main Menu SYSTEM STATUS page.

This supplement is written for IOP SOFTWARE RELEASE 1.1, and is not suitable for earlier software versions. This software version corresponds to the ASPEN Airplane Flight Manual Supplement (Doc. A-01-179-00 Revision C). Some differences in operation may be observed when comparing the information in this supplement to later software versions. Verify the information herein with the EFD1000 PILOT PFD Pilot's Guide (Doc. A-01-184-00 applicable Revision) you received with your unit. There you find also further information.

924.2 LIMITATIONS

The functionality of the EFD1000 PILOT PFD may be used for VFR navigation purposes only when a reversion to traditional navigation (map, magnetic compass) is possible at any time.

924.2.1 PLACARDS AND DECALS

PFD (Next to the EFD1000 PILOT PFD circuit breaker)

For situational awareness only (above the EFD display head)

The following electronic placard is provided on the EFD1000 PILOT PFD display whenever the RSM GPS is providing position data for the basemap display:

„RSM GPS REVERSION EMER USE ONLY“

924.3 EMERGENCY PROCEDURES

Not affected due to the use as a secondary instrument.

924.4 NORMAL PROCEDURES

Not affected due to the use as a secondary instrument.

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

924.7.1 GENERAL

The EFD1000 PILOT PFD system is a flat-panel LCD flight instrument that presents the pilot with displays of attitude, airspeed, altitude, vertical speed, slaved compass, slip/skid, and rate of turn information. The display head incorporates a solid-state Air Data and Attitude Heading Reference System (ADAHRS) to provide data for the flight instruments. The ADAHRS system uses data from its internal solid state rate gyros and accelerometers, pitot and static sensors, solid state magnetometer, and solid state temperature probes, all contained within the display head and RSM, to derive the aircraft attitude and air data solutions.

N O T E

Although intuitive, a reasonable degree of familiarity is required to use the EFD1000 PILOT PFD.

924.7.2 PILOT CONTROLS OVERVIEW

Pilot interaction with the EFD1000 PILOT PFD is accomplished through two knobs with push/rotate function and 11 buttons located on the display bezel. Refer to Figure 2. Two control knobs are used to control pilot settable bugs and references. Three lower push buttons, located between the control knobs, are not used in the EFD1000 PILOT PFD model. Three dedicated buttons on the upper side of the right bezel control map range, display reversion, and provide access to the main menu. Up to five soft keys on the lower half of the right bezel control frequently used commands. These five keys are also used when navigating the main menu.

924.7.3 POWER CONTROL

To enhance safety, the EFD1000 PILOT PFD includes an internal battery that allows the system to continue to operate in the event of a failure of the aircraft electrical system. This ensures that the EFD1000 PILOT PFD flight instrument continues to remain available for a period of time following the loss of all external supply power. This internal battery is not required by regulation; however, it is good practice to verify the status of the battery prior to takeoff. The EFD1000 PILOT PFD receives aircraft power from the battery bus via the PFD circuit breaker. Whenever indicated airspeed is invalid or below 30 KIAS the EFD1000 PILOT PFD will power up and power down with the application or removal of external power. To turn on the system, turn on the AVIONIC switch (when Battery Master is ON). Turning off the system is vice versa. A message is presented during the normal power down sequence to enable the pilot to abort the shutdown and switch to internal battery.

The AHRS will perform an internal test during EFD1000 PILOT PFD power up. The aircraft should remain stationary during the AHRS power up and alignment sequence. If the aircraft is moved during AHRS alignment it will take longer for accurate attitude and heading information to be presented to the pilot. Attitude and heading information is presented once the AHRS completes the alignment process.

When IAS is greater than 30 KIAS and the input voltage is below 12.5 ± 0.3 V the EFD will automatically switch to its internal battery (e.g. aircraft charging system failure). The EFD1000 PILOT PFD internal battery will provide at least 30 minutes of power when it is fully charged. The battery provides power to the display head and the RSM with the emergency GPS. Reducing the backlight intensity will extend the battery operating time.

Battery charge status may be viewed from the „Power Settings“ page of the Main Menu (See Section 924.7.13 for more information).

N O T E S:

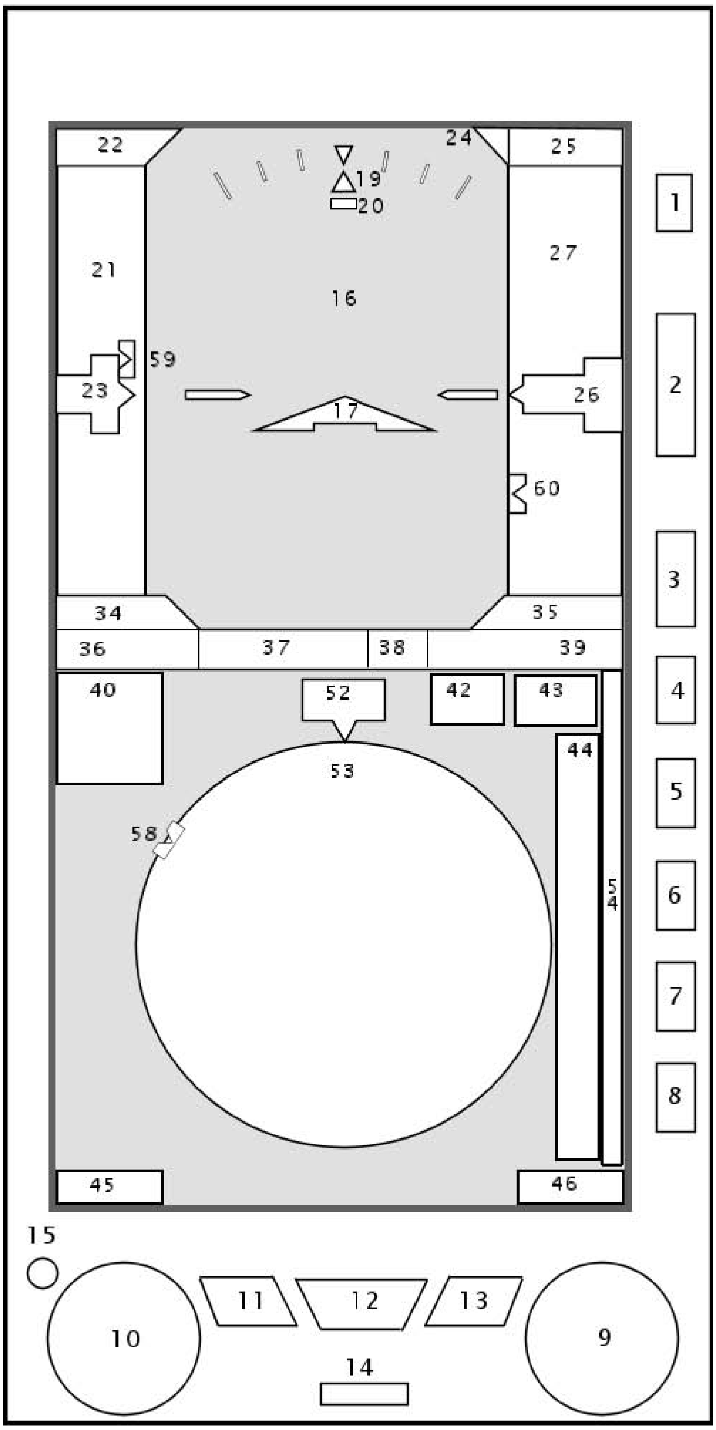
As a protection mechanism, the EFD1000 PILOT PFD internal battery may not charge when the battery temperature is at extreme high or low temperatures. This situation may occur when the battery was being used and system power is subsequently restored, or it may occur under high or low ambient temperatures.

If operation from the internal battery occurs during night and/or IFR operations, one should land as soon as possible, even if external power is restored, as the battery will not recharge following restoration of external power until the battery temperature has returned to normal.

A unit operating from battery may be powered off using the „Shut Down“ command available in the Power Settings Menu.

In the unlikely event that the normal power control is not working, the EFD1000 PILOT PFD may be forced to shut down by first pulling the PFD circuit breaker and then pressing and holding the REV button for at least 5 seconds.

924.7.4 DISPLAY SCREEN AND CONTROL LAYOUT



1) Reversion Control
2) Range Control
3) Menu Control
4) „TPS“ Tapes ON/OFF Control
5) "Minimum" indication ON/OFF Control
6) „360/ARC“ HSI View Control
7) „MAP“ ON/OFF logic Control
8) Not Used
9) Right Control Knob
10) Left Control Knob
11) Not Used
12) Not Used
13) Not Used
14) Micro SD Card slot
15) Automatic Dimming Photocell
16) Attitude Indicator
17) Aircraft Symbol
19) Roll Pointer
20) Slip / Skid Indicator
21) Airspeed Indicator Tape
22) Selected Airspeed Field
23) Airspeed Drum/Pointer
24) Altitude Alert
25) Selected Altitude Field
26) Altitude Drum/Pointer
27) Altitude Tape
34) True Airspeed
35) Barometric Pressure Setting Field
36) Ground Speed
37) OAT
38) Wind Direction Arrow
39) Wind Direction and Speed
36 - 39) Data Bar
40) Selected Source Information Field
42) Selected Heading Field
43) Vertical Speed Digital Value
44) Vertical Speed Tape
45) Left Control Knob state
46) Right Control Knob state
52) Magnetic Heading
53) Compass Scale
54) Hot Key legend
58) Heading Bug
59) Airspeed Bug
60) Altitude Bug

Figure 1 - PFD Display Features

924.7.5 CONTROL KNOBS

General
Two control knobs on the EFD bezel are used to adjust pilot editable data fields. The left knob adjusts data fields on the left side of the display, and the right knob adjusts data fields on the right side of the display.

The knob logic includes active and inactive states to prevent inadvertent adjustment of editable fields. After 10 seconds of inactivity, the knob returns to an inactive state and also returns to the „home“ state defined for that knob. A single push activates an inactive knob. Pushing the knob again will advance the knob to the next editable field (if applicable) in a round-robin sequence.

When inactive, the knob legend is rendered in cyan. Once activated, the knob legend and associated data field and bug (where appropriate) are rendered in magenta.

Left control knob
The left control knob adjusts the Indicated Airspeed Bug „IAS“ editable fields and the Course "CRS" (refer to Aspen Pilot's Guide for more information).

The home state for the left knob is „CRS“.

Right control knob
The right control knob controls Heading Bug „HDG“, Altitude Bug „ALT“, and Barometric Pressure Setting „BARO“ editable fields in that order.

The home state for the right knob is „HDG.“

924.7.6 SETTING FLIGHT INSTRUMENTS

The following procedures are used to adjust pilot-editable data on the EFD1000 PILOT PFD:

Heading Bug Set
To set the heading bug, repeatedly PUSH the right control knob until the HDG field is enabled for editing. ROTATE the knob to the desired setting.

Altitude Bug Set
To set the altitude bug, repeatedly PUSH the right control knob until the ALT field is enabled for editing. ROTATE the knob to the desired setting

Barometric Pressure Set
To set the barometric pressure, repeatedly PUSH the right control knob until the BARO field is enabled for editing. ROTATE the knob to the desired setting.

N O T E

Cross check the barometric pressure setting against the primary altimeter whenever the value is adjusted on the EFD1000 PILOT PFD.

Course Set
To set the course, repeatedly PUSH the left control knob until the CRS field is enabled for editing. ROTATE the knob to the desired setting.

Indicated Airspeed Bug Set
To set the indicated airspeed bug, repeatedly PUSH the left control knob until the IAS field is enabled for editing. ROTATE the knob to the desired setting.

924.7.7 KNOB SYNC FUNCTION

Editable fields may be synchronized as a function of data type as described in Table 1 below. Whenever a control knob is held for approximately one second the active data type will be „sync'd" as follows:

Left Knob Data Type	SYNC Behavior	Right Knob Data Type	SYNC Behavior
IAS	The airspeed bug is set to the current IAS.	HDG	The heading bug is set to the current heading.
		ALT	The altimeter bug is set to the current altitude.
		BARO	The barometric pressure is set to standard pressure of 29.92 in Hg or 1013 mB.

Table 1 - Knob „Sync" Operation

924.7.8 HOT KEY OPERATION

During normal operations, the five line select soft-keys on the lower right side of the display bezel are referred to as „Hot Keys." Hot Keys provide single-action access to frequently used functions. An electronic legend adjacent to each Hot Key indicates its hot key function. When the legend is green, the function is active. When it is gray, the function is inactive. The legend always annunciates the current state.

TAPES

Hot Key 1 enables/disables the display of the airspeed and altitude tapes.

MINIMUMS

Hot Key 2 enables/disables the display of the Minimums.

COMPASS PRESENTATION FORMAT

Hot Key 3 toggles the compass between a 360 rose display and a 100 deg ARC display.

BASEMAP AND DECLUTTER LEVEL

Hot Key 4 is used to enable the basemap and control the amount of basemap symbology that is presented to the pilot. Each successive push of the MAP hot key will change the basemap declutter level in a round-robin sequence. Available selections are FP ONLY, and OFF.

The FP ONLY selection displays just the flight plan legs and waypoints associated with the GPS flight plan, and no other basemap features.

OFF removes all basemap and flight plan symbology.

GPS STEERING

Hot Key 5 enables/disables the GPS Steering.

924.7.9 BACK LIGHT CONTROL

The EFD1000 PILOT PFD includes an adjustable LCD backlight that provides both automatic and manual brightness adjustments over a wide dimmable range. A single bezel-mounted photocell measures the ambient light, allowing an automatic dimming mode to be selected by the pilot.

Manual dimming control is enabled by the pilot to override the photocell input and adjust the display to any desired intensity level (except off).

In either mode, the bezel-key backlighting is maintained at a fixed brightness level.

To adjust backlight intensity, press the MENU button and then press the left control knob to toggle between auto (BRT AUTO) and manual brightness (BRT ADJUST) control.

To manually adjust the brightness, with BRT ADJUST displayed above the left knob rotate the knob until the desired brightness level is set. Valid brightness settings are 1 to 100.

On power up, the display defaults to AUTO brightness control.

When operating on the internal battery, backlight intensity setting is capped at a value of 70 for both manual and automatic operation.

Under extreme temperature conditions, such as may be encountered during ground operations on extremely hot days, the system backlight will automatically dim to an intensity of 30 whenever internal sensors determine that the system operating temperature has exceeded 70ºC. Should this occur the pilot should take steps to reduce the cockpit ambient temperature.

924.7.10 MAP RANGE CONTROL

The EFD1000 PILOT PFD basemap range may be set to ranges of 2.5, 5, 10, 15, 20, 30, 40, 60, 80, 100, and 200 nautical miles. Map range is measured from the own ship position to the outside of the compass arc.

To increase the range push the '+' side of the range key located on the upper right side of the bezel. To decrease the range push the '–' side of the key. The currently selected map range is displayed in the lower left corner of the display.

924.7.11 DISPLAY REVERSION CONTROL AND ABNORMAL SHUTDOWN

Single PFD installations do not have a display reversion capability that can be activated by the REV button. As such, the reversion function is inoperative in single display installations.

In addition to display reversion control, the REV button may be used to force the unit to power off should, for example, the display stop responding to pilot inputs. When external power has been removed by pulling the PFD circuit breaker, pressing and holding the REV button for 5 Seconds will produce in an immediate system shut down. When external power is available (PFD circuit breaker reset), pressing and holding the REV button for 5 seconds will result in a system restart.

924.7.12 WARNING, CAUTION, AND ADVISORY SUMMARY

WARNINGS

ON BAT
53% REM
Red annunciation presented below the aircraft symbol whenever the EFD1000 PILOT PFD is operating on the internal battery. Will be accompanied by an indication of the estimated battery charge remaining.

Function FAIL („X“)
Red annunciation presented whenever the EFD1000 PILOT PFD has determined that the associated function is invalid or failed and should not be used. The data is removed from the display and replaced by a red „X“ over the affected display feature.

CAUTIONS

CROSS CHECK
ATTITUDE
Amber annunciation presented centered in the lower half of the attitude indicator whenever the EFD1000 AHRS internal integrity monitor determines that attitude is potentially degraded. If a CROSS CHECK ATTITUDE annunciation is provided the pilot should cross check attitude, airspeed and altitude indications against the real-life horizon and the primary instruments.

GPS1 and/or

RSM GPS
Amber annunciation presented on the left edge of the display to indicate when a configured GPS flight plan and mapping data is invalid or not available.

RSM GPS REVERSION
EMER USE ONLY
Amber annunciation presented on the bottom of the display whenever the EFD1000 PILOT PFD reverts to RSM GPS data and indicates that the RSM GPS is the current GPS source. RSM GPS usage is limited to „EMER(GENCY) USE ONLY“

ADVISORY

Altitude alerter
Amber flag presented on the upper right corner of the display to indicate the aircraft is reaching (steady) or deviating (flashing) from the preselected altitude.

924.7.13 MAIN MENU OPERATION

MENU CONTROLS

The EFD1000 PILOT PFD Main menu is used to adjust various system configuration settings and preferences. To select the Main Menu, press the MENU button on the right side of the display bezel. To leave the menu, press the MENU button again. Menu items are shown exclusively in the lower half of the EFD1000 PILOT PFD display in the region below the data bar.

MAIN MENU NAVIGATION

Once the Main menu is activated, rotating the lower right control knob selects between the various menu pages. The current menu page is indicated by the page name and legend „page # of #“, and by the location of the green segment within the segmented menu navigation bar displayed at the bottom of the display

CONFIGURING MENU ITEMS

Each menu page shows a series of menu selections adjacent to the right bezel line select keys. Editable menu selections are indicated by white text, while status only or non-editable items are shown in green. Items that have been inhibited from editing are shown in gray.

Pressing a line select key adjacent to an editable field enables the item for editing, indicated by showing the editable value in magenta. Rotating the lower right control knob adjusts the editable value. Changes are effective immediately.

To exit the edit mode press the adjacent line select key, press the right control knob, or leave the menu by pressing the MENU button.

MENU OPTIONS

General Settings Page
From the GENERAL SETTINGS page the pilot may:

· Configure the barometric altimeter setting units to inches or millibars (in/mB)

· ENABLE or DISABLE the display of V-Speeds

· Perform an AHRS RESET.

V-Speed Setting Pages
This page is configured by EXTRA according to the speed values given in Section 4.0.1 of this Handbook. Values can be changed by the pilot.

Power Settings Page
The POWER SETTINGS page is used to monitor and control the source of power to the EFD1000 PILOT PFD, including overriding automatic power states. From the POWER SETTINGS Page the pilot may:

· Switch to Battery Power from External Power

· Switch to External Power from Battery Power

· Shut down or Re-Start the unit

· View the External Power Source Voltage

· View the Internal Battery Status

924.8 HANDLING, SERVICING AND MAINTENANCE

If the temperature sensor of the RSM is suspected to fail, it is advisable to initiate a check of the RSM vent hole. Consider that it is necessary to remove the aircraft tail fairing for that purpose.

Replace the internal battery every 3 years or 2200 hours.

Check unit and wiring each 100 hours or during annual inspection.

Refer to Aspen Document #A-01-126-00 latest revision for Instructions for Continued Airworthiness.

SECTION 925

GARMIN GNC 420W

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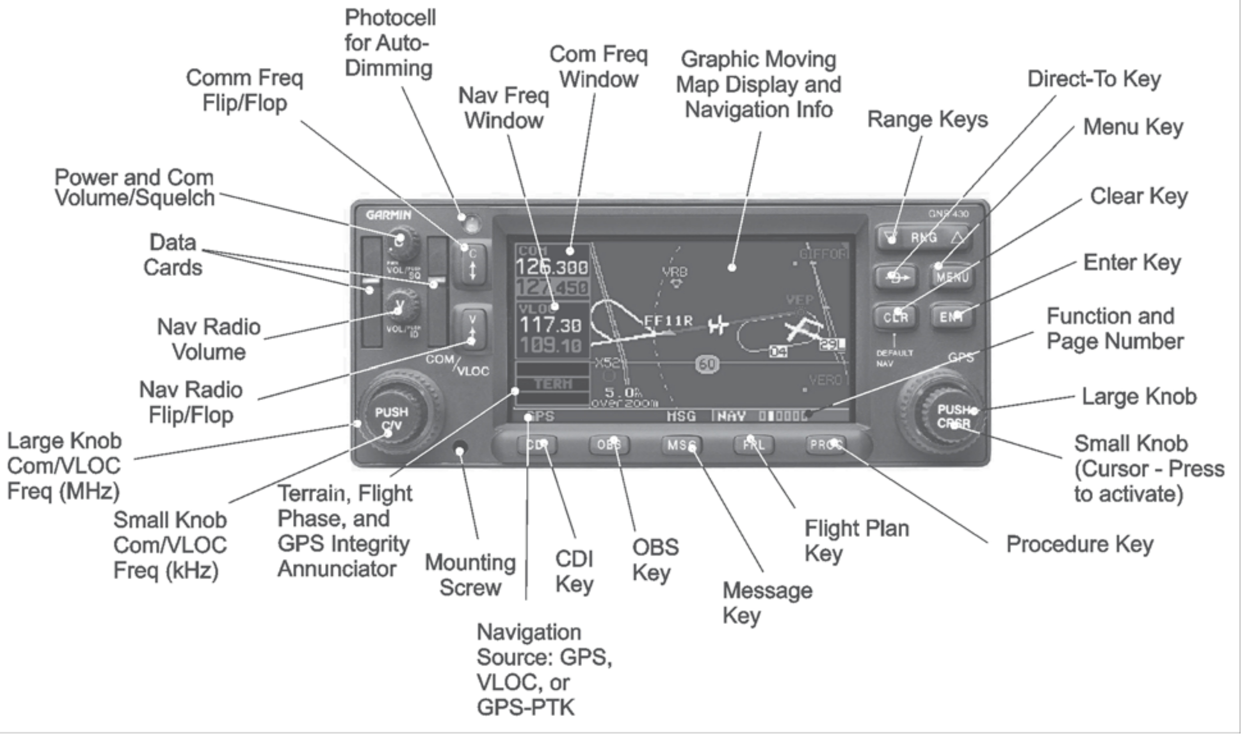
925.1 GENERAL

The Garmin GNC 420W GPS Navigator is a panel-mounted unit that contains a GPS receiver for GPS navigation plus VHF Com radio in an integrated unit with a moving map and color display. The GNC 420W features a graphical display which may also be used to depict terrain data.

This supplement is written for main software version 3.00 and GPS software version 3.0 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 400W Series Pilot's Guide & Reference (P/N 190-00356-00 applicable Revision) you received with your unit. There you will also find further information.



925.1.1 GPS/WAAS TSO-C146A CLASS 3 OPERATION:

The Garmin GNC 420W uses GPS and WAAS (within the coverage of a Space-Based Augmentation System complying with ICAO Annex 10) for enroute, terminal area, non-precision approach operations (including „GPS", „or GPS", and „RNAV" approaches), and approach procedures with vertical guidance (including „LNAV/VNAV" and „LPV").

Navigation is accomplished using the WGS-84 (NAD-83) coordinate reference datum. GPS navigation data is based upon use of only the Global Positioning System (GPS) operated by the United States of America.

925.1.2 CLASS II OCEANIC, REMOTE, AND OTHER OPERATIONS:

The Garmin GNC 420W, as installed, has been found to comply with the requirements for GPS primary means of Class II navigation in oceanic and remote airspace, when used in conjunction with WAAS Garmin Prediction Program part number 006-A0154-03. Oceanic operations are supported when the GNC 420W annunciates OCN. This provides an alarm limit of four NMI and a mask angle of five degrees. The GNC 420W also has the ability to predict RAIM availability at any waypoint in the database if WAAS corrections are expected to be absent or disabled. This AFMS does not constitute an operational approval for Oceanic or Remote area operations. Additional equipment installations or operational approvals may be required.

a) Oceanic navigation requires an additional approved long range oceanic and/or remote area navigation system with independent display, sensors, antenna, and power source.

b) Operations approval *may* be granted for the use of the GNC 420W RAIM prediction function in lieu of the Prediction Program for operators requiring this capability. Refer to your appropriate civil aviation authorities for these authorizations.

925.2 LIMITATIONS

The system must utilize main software version 3.00 and GPS software version 3.0 or later FAA approved versions. A valid and compatible database must be installed and contain current data.

The functionality of the GNC 420W may be used for VFR navigation purposes only when a reversion to traditional navigation (map, magnetic compass) is possible at any time.

925.2.1 PLACARDS

GARMIN GNC420W GPS
limited to VFR use only

(In the clear view of the pilot)

GPS (Next to the GNC 420W circuit breaker)

925.3 EMERGENCY/ABNORMAL PROCEDURES

925.3.1 EMERGENCY PROCEDURES

Not affected.

925.3.2 ABNORMAL PROCEDURES

GPS NAVIGATION INFORMATION NOT AVAILABLE OR INVALID

If GNC 420W GPS navigation information is not available or invalid, utilize remaining operational navigation equipment as appropriate.

LOSS OF INTEGRITY MONITORING

If Loss of Integrity Monitoring 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.

SEARCHING A NEARBY AIRPORT

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

1. Press the **direct-to** key. The select direct-to waypoint page will appear, with the waypoint identifier field highlighted.
2. Turn the large right knob to highlight the nearest airport (NRST) field.
3. Turn the **small right** knob to display a window showing up to nine nearby airports.
4. Continue turning the small right knob to scroll through the list and highlight the desired airport.
5. Press ENT to confirm the selected airport, and ENT to activate the direct-to function.

925.4 NORMAL PROCEDURES

TO ACTIVATE AN EXISTING FLIGHT PLAN:

1. Press FPL and turn the small right knob to display the flight plan catalog.
2. Press the small right knob to activate the cursor.
3. Turn the large right knob to highlight the desired flight plan and press MENU to display the flight plan catalog options.
4. Turn the large right knob to highlight „Activate Flight Plan?“ and press ENT.
5. Press and hold the CLR key to open the default NAV page.

925.5 PERFORMANCE

Not affected.

925.6 WEIGHT & CENTER OF GRAVITY

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

925.7 SYSTEM DESCRIPTION

925.7.1 KEY AND KNOB FUNCTIONS

LEFT-HAND KEYS AND KNOBS

The COM power/volume knob controls unit power and communications radio volume. Press momentarily to disable automatic squelch control. In the GPS 420W, this control is used only for power.

The large left knob (COM/VLOC) is used to tune the megahertz (MHz) value (to the left of the decimal point) of the standby frequency for the communications transceiver (COM) or the VLOC receiver, whichever is currently selected by the tuning cursor.

The small left knob (COM/VLOC) is used to tune the kilohertz (kHz) value (to the right of the decimal point) of the standby frequency for the communications transceiver (COM) or the VLOC receiver, whichever is currently selected by the tuning cursor. Press this knob momentarily to toggle the tuning cursor between the COM and VLOC frequency fields.

The COM flip-flop key is used to swap the active and standby COM frequencies. Press and hold to select emergency channel (121.500 MHz).

RIGHT-HAND KEYS AND KNOBS

The range key (RNG) allows you to select the desired map scale. Use the up arrow side of the key to zoom out to a larger area, or the down arrow side to zoom in to a smaller area.

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

The MENU key displays a context-sensitive list of options. This options list allows you to access additional features or make settings changes which relate to the currently displayed page.

The clear key (CLR) is used to erase information or cancel an entry. Press and hold this key to immediately display the Default Navigation Page, regardless of which page is currently displayed.

The enter key (ENT) is used to approve an operation or complete data entry. It is also used to confirm information, such as during power on.

The large right knob is used to select between the various page groups: NAV, WPT, AUX or NRST. With the on-screen cursor enabled, the large right knob allows you to move the cursor about the page.

The small right knob (CRSR) is used to select between the various pages within one of the groups listed above. Press this knob momentarily to display the on-screen cursor. The cursor allows you to enter data and/or make a selection from a list of options.

BOTTOM ROW KEYS

The nearest (NRST) key displays the nearest airports page. Then, turning the small right knob steps through the NRST pages.

The OBS key is used to select manual or automatic sequencing of waypoints. Pressing the OBS key selects OBS mode, which will retain the current „active to“ waypoint as your navigation reference even after passing the waypoint (i.e., prevents sequencing to the next waypoint). Pressing the OBS key again will return to normal operation, with automatic sequencing of waypoints.

Whenever OBS mode is selected, you may set the desired course to/from a waypoint using the OBS Page, or an external OBS selector on your HSI or CDI.

The message key (MSG) is used to view system messages and important warnings and requirements.

The flight plan key (FPL) allows you to create, edit, activate and invert flight plans, as well as access approaches, departures and arrivals. A closest point to flight plan feature is also available from the flight plan key.

N O T E

Whenever the GNC 420W is displaying a list of information that is too long for the display screen, a scroll bar will appear along the right-hand side of the display. The scroll bar graphically indicates the number of additional items available within the selected category. Simply press the small right knob to activate the cursor and turn the large right knob to scroll through the list.

The procedures key (PROC) allows you to select and remove approaches, departures and arrivals from your flight plan. When using a flight plan, available procedures for your departure and/or arrival airport are offered automatically. Otherwise, you may select the desired airport, then the desired procedure.

POWERING UP THE GNC 420W

The GNC 420W 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, a *welcome page* will be displayed while the unit performs a self test, followed by the database confirmation pages which show 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 for instrument approach operations. Information on database subscriptions is available inside your GNC 420W package.

To acknowledge the database information, press ENT.

925.7.2 DEFAULT NAV PAGE

During most flights, the *default NAV*, *map* and *NAVCOM pages* will be the primary pages used for navigation. The *default NAV page* displays a graphic course deviation indicator (CDI), the active leg of your flight plan (as defined by the current „from“ and „to“ waypoints), and six user-selectable data fields. The default settings for these fields are distance to waypoint (DIS), desired track (DTK), bearing to waypoint (BRG), ground speed (GS), ground track (TRK) and estimated time en route (ETE). The *default NAV page* is selected by pressing and holding the CLR key or turning the small right knob.

SECTION 926

ARTEX ME-406 ELT

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926.1 GENERAL

To improve the passive security, the EXTRA 300/L can be equipped with an optional Emergency Locator Transmitter ARTEX ME-406.

In the event of a crash, the ME-406 activates automatically (automatic fixed „AF“ configuration), and transmits the standard swept tone on 121.5 MHz lasting until battery power is gone. 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 buzzer ‘beeps’ and the panel LED pulses periodically. The time between pulses lengthen after a predetermined transmitter ‘on’ time.

N O T E

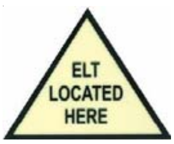
In October 2000 the International Cospas-Sarsat Program, announced at its 25th Council Session held in London, UK that it plans to terminate satellite processing of distress signals from 121.5 and 243 MHz emergency beacons on February 1, 2009.

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 signal integrity of the 406 MHz, its location accuracy is within about a 3 km radius.

926.2 LIMITATIONS

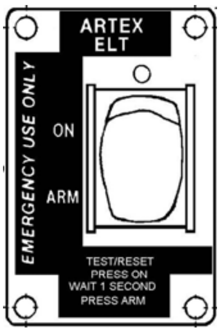
The operation limitations are not effected due to the installation of the ARTEX ME-406 ELT.

For the location and operation of the transmitter the following placards have to be attached to the aircraft:



(outside on the left fuselage in the vicinity of the ELT unit)

ELT (above the ELT circuit breaker; circuit breaker and placard installed up tp SN 1320 only)



(next to the ELT remote switch)

FOR AVIATION EMERGENCY USE ONLY
UNAUTHORIZED OPERATION PROHIBITED (as close to the ELT remote switch as practical)

926.3 EMERGENCY PROCEDURES

- In case of a forced landing turn the remote switch in the rear 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,

- turn 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 unit master switch at the ELT unit analogously.

FUNCTION CHECK OF THE ELT

If the aircraft receiver is operable listen on 121.5 MHz for ELT transmission. Ensure that the antenna is clear of obstruction.

926.4 NORMAL PROCEDURES

Not affected.

926.5 PERFORMANCE

Not affected.

926.6 WEIGHT & CENTER OF GRAVITY

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

926.7 SYSTEM DESCRIPTION

The ELT installation consists of the ELT unit and a buzzer, both fastened to the fuselage structure aft of the back seat, an antenna located on the main fuselage cover behínd the cockpit, and a remote switch with LED indication located on the instrument panel. The switch has the positions ARM and ON.

926.7.1 SWITCH OPERATION

In a crash, an acceleration activated crash sensor (G-switch) turns the ELT 'on' automatically when the ELT experiences a change in velocity (or deceleration) of 4.5 fps ±0.5 fps. Activation is also accomplished by means of the cockpit mounted remote switch or the switch on the ELT. To deactivate the ELT set either switch to the 'ON' position, then back to 'ARM'.

The ELT does not have an 'OFF' position. Instead, a jumper between two pins on the front D-sub connector must be in place for the G-switch to activate the unit. The jumper is installed on the mating half of the connector so that when the connector is installed, the beacon is armed. This allows the beacon to be handled or shipped without 'nuisance' activation (front connector removed).

N O T E

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.

926.7.2 SELF TEST MODE

Upon turn-off (from „ON“ back to „ARM“ state), the ELT automatically enters a self-test mode that transmits a 406 MHz test coded transmission that monitors certain system functions before returning to the 'ARM' mode. The transmission is ignored by any satellite that receives this signal, but the ELT requires it to check output power and correct frequency. If the ELT is left activated for approximately 50 seconds or more, a distress signal is generated that is accepted by the satellites.

In addition to 121.5 and 406 MHz signal integrity, other operating parameters are checked during the self-test. Error codes are then generated if other problems are found. The error codes are displayed by a series of „blinks“ of the ELT LED, remote LED and audio indicator. See „Installed Transmitter Test“ section for more details and a description of the error codes.

N O T E

Any time the ELT is activated, it is transmitting a 121.5 MHz distress signal. Therefore, all activations of the ELT should be kept to a minimum. Local or national regulations may limit testing of the ELT or impose special requirements or conditions to perform testing. For the „self test“, Artex recommends that the ELT be „ON“ for no more than 5 seconds. Testing should occur during the first 5 minutes after the hour.

926.8 HANDLING, SERVICING AND MAINTENANCE

926.8.1 TRANSMITTER TEST

ARTEX recommends that the ELT be tested every 1-2 months. Follow the steps outlined in the 926.8.2 SELF TEST paragraph.

NOTE

The self-test time is accumulated in a register on the battery pack. The register records activation time in 30 second increments so all activations will count as at least 30 seconds, even if the actual time is much less. Total allowable time is 60 minutes as determined by FAR 91.207 and RTCA DO-204. After this time has been accumulated a 7-flash error will be presented after the self-test. The battery must be replaced at this point for the ELT to remain in compliance. Always follow ELT testing requirements per local or national authorities.

Always perform the tests within the first 5 minutes of the hour. Notify any nearby control tower of your intentions, in accordance with AC 43.13. If outside of the US, always follow all local or national regulations for testing of ELT's.

NOTE

Do not allow test duration to exceed 5 seconds. A false alarm may be generated.

Any time the ELT is activated, it is transmitting a 121.5 MHz distress signal. After approximately 50 seconds, a „live“ 406 MHz distress signal is transmitted and is considered valid by the satellite system.

Whenever the ELT is switched from „ON“ to „ARM“ a 406 MHz signal is transmitted, however, it is specially coded as a „self test“ signal that is ignored by the COSPAS-SARSAT satellites.

926.8.2 SELF TEST

• Tune a receiver (usually the aircraft radio) to 121.5 MHz. Turn the ELT aircraft panel switch „ON“ for about 1 second, then back to the „ARM“ position. The receiver should voice about 3 audio sweeps.

• At turn-off (back to 'ARM' state) the panel LED should present 1 pulse (buzzer will not sound for 1 pulse). If more are displayed, determine the problem from the list below.

1 Flash Indicates that the system is operational and that no error conditions were found.

3 Flashes Bad load detected. Detects open or short condition on the antenna output or cable. These problems can probably be fixed by the installer.

• Check that the RF cable is connected and in good condition. Perform continuity check of center conductor and shield. Check for a shorted cable.

• Check for intermittent connection in the RF cable.

• If this error code persists there may be a problem with the antenna installation. This can be checked with a VSWR meter. Check the antenna for opens, shorts, resistive ground plane connection.

4 Flashes Low power detected. Occurs if output power is below about 33 dBm (2 watts) for the 406 signal or 17 dBm (50 mW) for the 121.5 MHz output. Also may indicate that 406 signal is off frequency. For this error code the ELT must be sent back for repair or replacement.

5 Flashes Indicates that ELT has not been programmed, or is incorrectly programmed. Does not indicate erroneous or corrupted programmed data.

6 Flashes Indicates that the G-switch loop between pins 5 and 12 at the D-sub connector is not installed. ELT will not activate during a crash.

• Check that the harness D-sub jumper is installed by verifying less than 1 ohm of resistance between pins 5 and 12.

7 Flashes Indicates that the ELT battery has too much accumulated operation time (> 1hr, see below). Battery may still power ELT; however, it must be replaced to meet FAA specifications. May also indicate damage to the battery circuit.

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SECTION 927

AIRPLANES REGISTERED IN BRAZIL AND OPERATING UNDER THE AGÊNCIA NACIONAL DE AVIAÇÃO CIVIL REQUIREMENTS

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EASA Approved
On Behalf of
ANAC of Brazil

Date: 14. NOV. 2013

(Maximilian Maas)
European Aviation Safety Agency

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927.1 GENERAL

This supplement is approved by the EASA on behalf of the „Agência Nacional de Aviação Civil“ – ANAC for Brazilian registered aircraft, in accordance with the „Regulamento Brasileiro da Aviação Civil“ – RBAC 21, Section 21.29.

The information contained within this supplement is to be used in conjunction with the basic AFM/ POH and supplements. The information contained herein supplements or supersedes that in the basic manual and approved supplements only in those areas indicated.

The following POH/AFM supplements are ANAC approved:

Section	Title
901	Steerable Tail Wheel
902	Electric Pedal Adjustment
903	Electronic Accelerometer
904	Emergency Locator Transmitter
905	External Power
906	Digital RPM Indicator
907	Long Range Wing Tank Capacity
908	Airtow Hook
909	Smoke System
910	ACRO III Category
911	Single Seat Canopy
912	FILSER TRT 600 Transponder
913	FILSER TRT 800 Transponder
914	GARMIN GTX 327 Transponder
915	GARMIN GTX 330 Transponder
916	BENDIX/KING KT 76A Transponder
917	BENDIX/KING KT 73 Transponder
918	BECKER ATC 2000 Transponder
919	BECKER ATC 4401 Transponder
920	BECKER BXP 6401 Transponder
921	Lycoming AEIO-580-B1A Engine
922	Center Tank Increased Capacity
923	GARMIN GTX 328 Transponder
924	ASPEN EFD1000 PILOT PFD
925	GARMIN GNC 420W
926	ARTEX ME-406 ELT
928	Landing Light

Compliance with the limitations contained in the basic manual and approved supplements is mandatory.

Foreign operating rules and any references to such rules in the basic manual and approved supplements are not applicable in Brazil. The aircraft must be equipped and operated in accordance with Brazilian operating requirements.

N O T E

A Kinds of Operation Equipment List may not necessarily apply in Brazil.

927.2 LIMITATIONS

927.2.1 ENGINE

The following Textron-Lycoming engines are certified:

1) Engine-type AEIO-540-L1B5 with rated maximum 300HP@2700RPM
2) Engine-type AEIO-580-B1A with rated maximum 315HP@2700RPM

927.2.2 KINDS OF OPERATIONAL LIMITS

Operation is limited to VFR-day. Use of GPS is prohibited as primary means for navigation. Optional GPS is approved as supplemental means for navigation only.

Wide Area Augmentation System (WAAS) functionality:

Since the WAAS is not available in Brazil, any kind of Global Navigation Satellite System (GNSS) approaches is prohibited even though optional GPS System installed (e.g. *GARMIN GNC420W*) may be capable of receiving WAAS.

927.2.3 OPERATING PLACARDS

The following placard has to be attached to the aircraft replacing the related placard in English language:

COMBUSTÍVEL
AVGAS 100/100LL

(adjacent to both wing fuel tank filler caps and fuselage center fuel tank filler cap)

927.3 EMERGENCY PROCEDURES

Not affected.

927.4 NORMAL PROCEDURES

Not affected.

927.5 PERFORMANCE

Not affected.

927.6 WEIGHT & CENTER OF GRAVITY

Not affected.

927.7 SYSTEM DESCRIPTION

Not affected.

927.8 HANDLING, SERVICING AND MAINTENANCE

Not affected.

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SECTION 928

LANDING LIGHT

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928 LANDING LIGHT

928.1 GENERAL

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

928.2 LIMITATION

No change.

928.3 EMERGENCY PROCEDURES

No change.

928.4 NORMAL PROCEDURES

No change.

928.5 PERFORMANCE

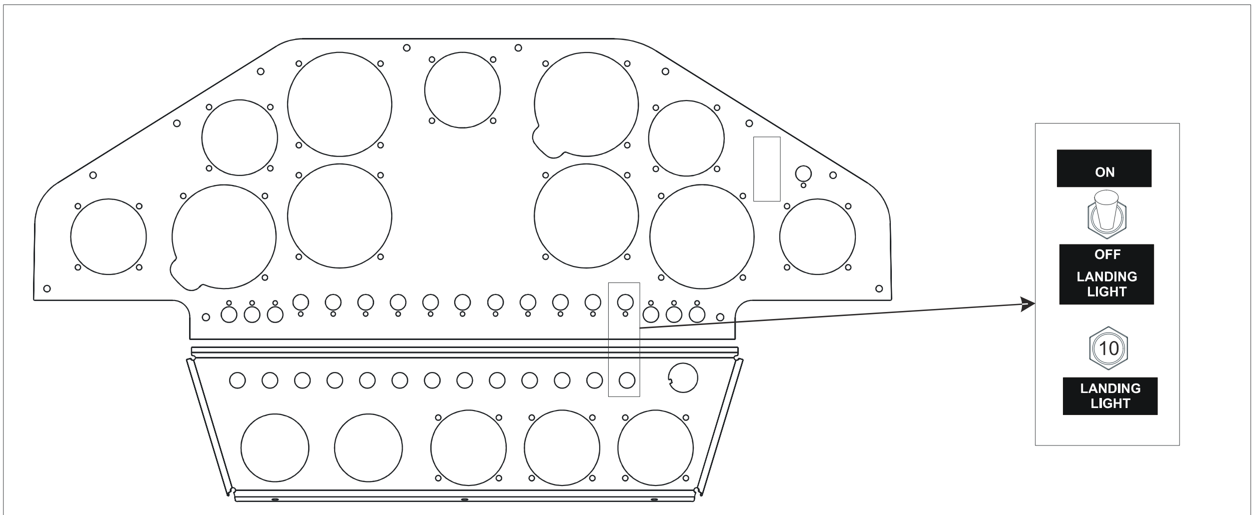
No change.

928.6 WEIGHT AND BALANCE

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

928.7 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.



928.8 HANDLING, SERVICING AND MAINTENANCE

No change.

EXTRA

SECTION 929

GARMIN GTN 635/650/750

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929.1 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.

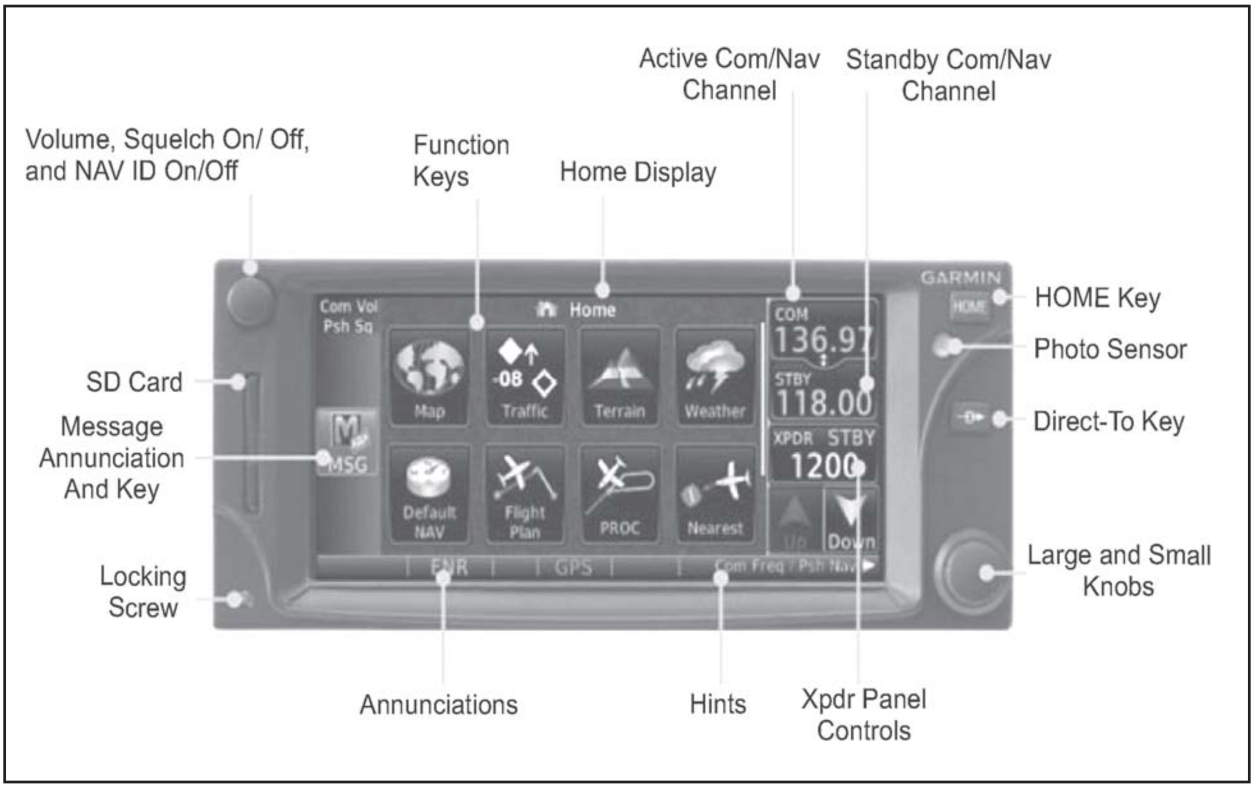

Figure 1, GTN 6xx Display Layout

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.

929.2 LIMITATIONS

This supplement does not grant approval for IFR operations.

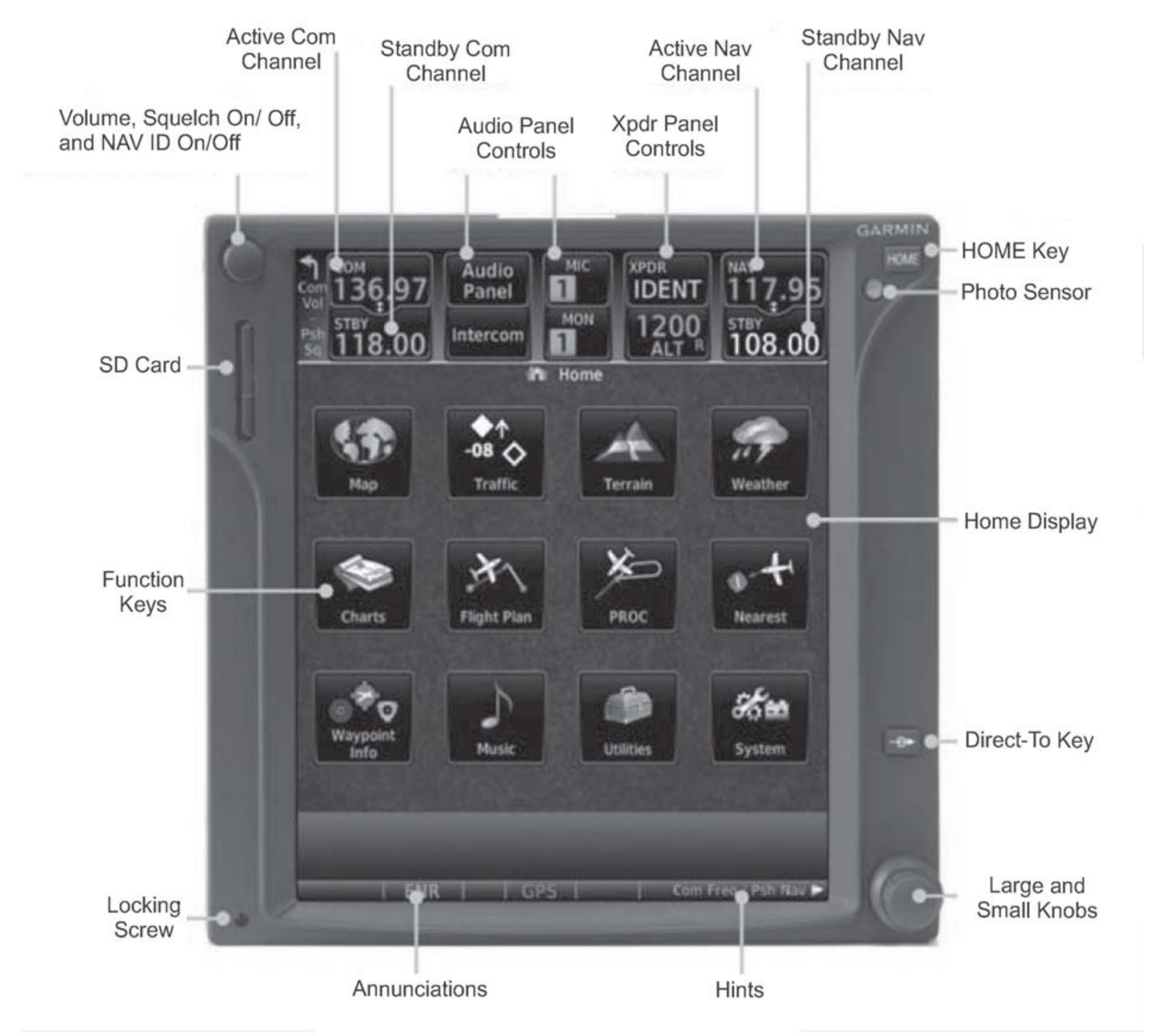

Figure 2, GTN 750 Display Layout

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.

929.2.1 PLACARDS

GARMIN GPS
limited to VFR use only

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

GPS (Next to the GTN unit GPS circuit breaker)

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

929.2.2 SD CARD

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

929.2.3 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.

929.2.4 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.

929.2.5 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.

929.2.6 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.

929.2.7 DEMO MODE

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

929.3 EMERGENCY/ABNORMAL PROCEDURES

929.3.1 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.

929.3.2 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.

929.4 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.

929.5 PERFORMANCE

Not affected.

929.6 WEIGHT & CENTER OF GRAVITY

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

929.7 SYSTEM DESCRIPTION

929.7.1 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).

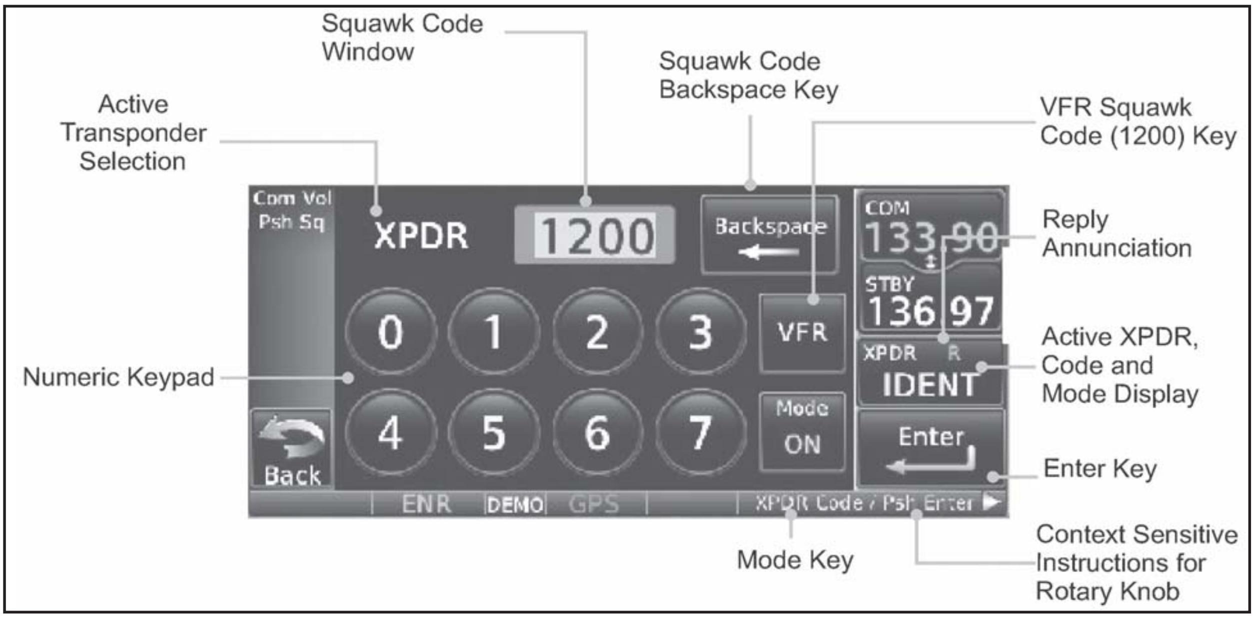

Figure 3, GTN 6xx XPDR Operation

929.7.2 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.

929.7.3 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.

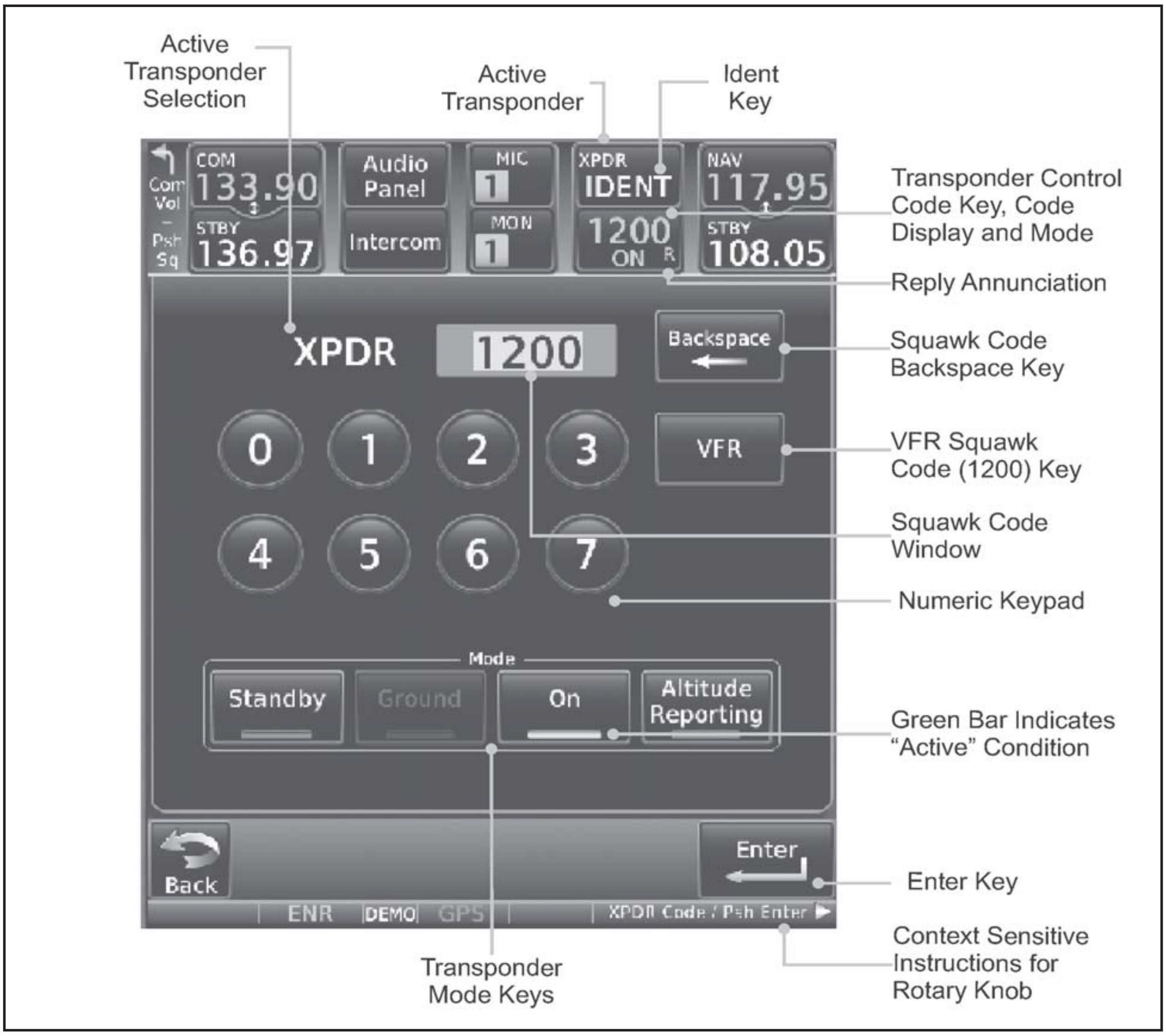

Figure 4, GTN 750 XPDR Operation

929.7.4 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.

929.7.5 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.

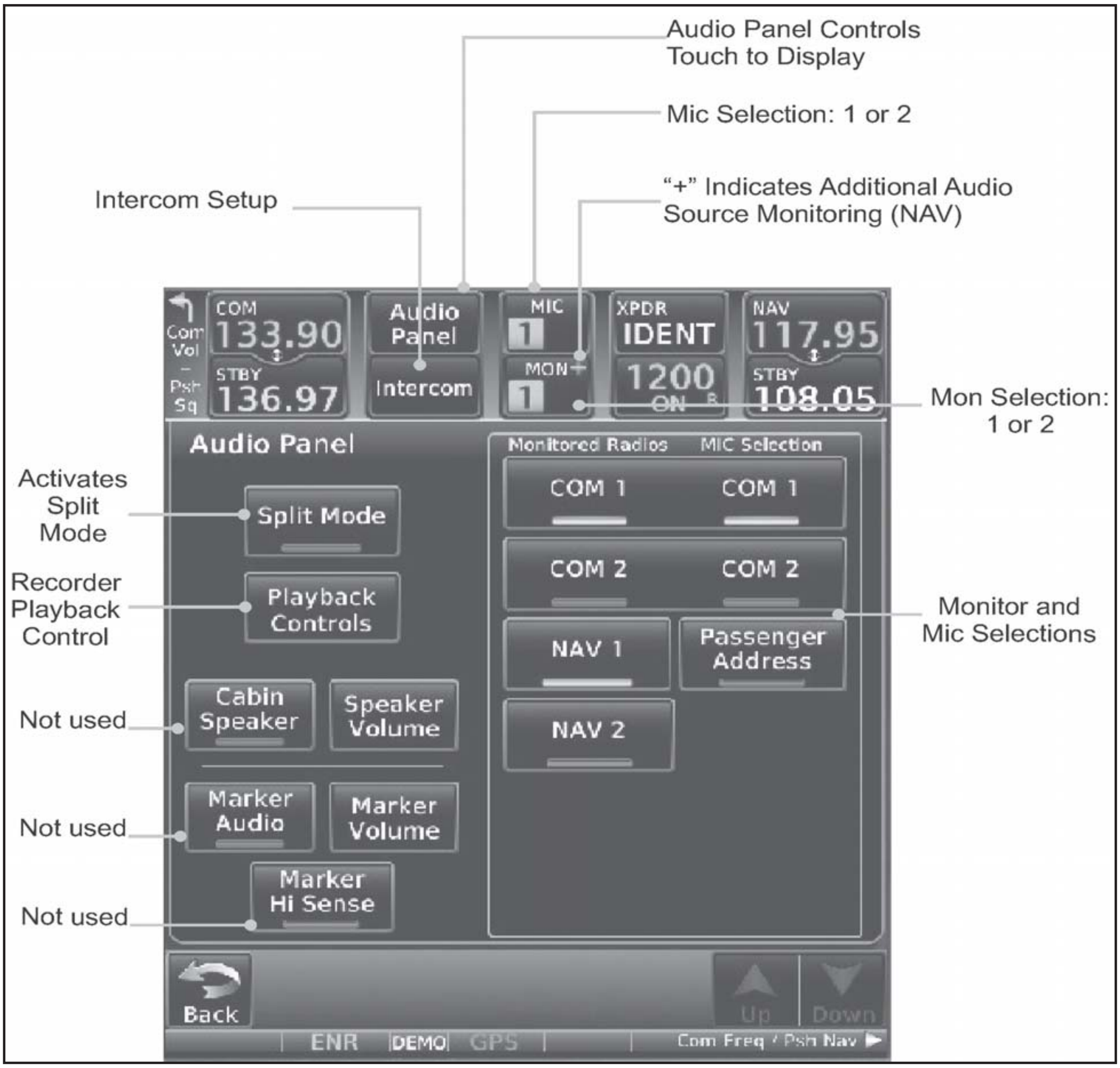

Figure 5, GTN 750 Audio Panel Operation

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.

929.7.6 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**.

929.7.7 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.

929.7.8 GROUND OPERATION

N O T E

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.

929.7.9 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.

929.8 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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