CHAPTER 1
GENERAL

Page

1.1 INTRODUCTION

This Airplane Flight Manual has been prepared in order to provide pilots and instructors with all the information required for the safe and efficient operation of the airplane.

The Airplane Flight Manual includes all the data which must be made available to the pilot according to the JAR-23 requirement. Beyond this, it contains further data and operating instructions which, in the manufacturer's opinion, could be of value to the pilot.

This Airplane Flight Manual is valid for all serial numbers. Equipment and modification level (design details) of the airplane may vary from serial number to serial number. Therefore, some of the information contained in this manual is applicable depending on the respective equipment and modification level. The exact equipment of your serial number is recorded in the Equipment Inventory in Section 6.5. The modification level is recorded in the following table (as far as necessary for this manual).

NOTE

If the Garmin G1000 System is installed, the warning, caution and advisory alerts differ from those contained in the AFM. Refer to Supplement A32, Integrated Avionics System, G1000, Garmin, IFR-Operation (OÄM 40-193 and OÄM 40-278) or Supplement A31, Integrated Avionics System, G1000, Garmin, VFR-Operation (OÄM 40-224 and OÄM 40-268) for further information.

1.1 INTRODUCTION

Die following is added to the Modifaction List:

Modifcation	Source	Installed	
Optional Main Battery Concorde RG-35AXC	OÄM 40-384	□ yes	□ no

Modification	Source	Installed	
Increase of Fuel Temp Limit	MÄM 40-106	◻ yes	◻ no
Use of Diesel Fuel	MÄM 40-129		
Modified MLG-Strut	MÄM 40-123	◻ yes	◻ no
TAE 125 Rev. 5 Engine	MÄM 40-124	◻ yes	◻ no
Coolant G30	MÄM 40-147	◻ yes	◻ no
Alternator with External Regulator	MÄM 40-151	◻ yes	◻ no
Fuel Cooler	MÄM 40-169	◻ yes	◻ no
TAE 125-02-99 Engine	MÄM 40-256	◻ yes	◻ no
TAE 125-02-99 Dual-mass Flywheel	MÄM 40-701	◻ yes	◻ no
AED/CED in Combination with TAE 125-02-99 Engine	OÄM 40-293	◻ yes	◻ no
Muffler	OÄM 40-096	◻ yes	◻ no
Long Range Tank	OÄM 40-130	◻ yes	◻ no
Winter Baffle Fresh Air Inlet	OÄM 40-183	◻ yes	◻ no
Nose Landing Gear Tie-down	OÄM 40-200	◻ yes	◻ no
ELT Artex ME 406	OÄM 40-247	◻ yes	◻ no
Autopilot Static Source	OÄM 40-267	◻ yes	◻ no
Garmin G1000, VFR	OÄM 40-224	◻ yes	◻ no
Garmin G1000, VFR without A/P	OÄM 40-268	◻ yes	◻ no
Garmin G1000, IFR	OÄM 40-193	◻ yes	◻ no
Optional Main Battery	OÄM 40-272	◻ yes	◻ no
Garmin G1000, IFR without A/P	OÄM 40-278	◻ yes	◻ no
Emergency Axe	OÄM 40-326	◻ yes	◻ no

This Airplane Flight Manual must be kept on board the airplane at all times. Its designated place is the side bag of the forward left seat.

CAUTION

The DA 40 D is a single engine airplane. When the operating limitations and maintenance requirements are complied with, it has the high degree of reliability which is required by the certification basis. Nevertheless, an engine failure is not completely impossible. For this reason, flights during the night, on top, under instrument meteorological conditions (IMC), or above terrain which is unsuitable for a landing, constitute a risk. It is therefore highly recommended to select flight times and flight routes such that this risk is minimized.

1.2 CERTIFICATION BASIS

This airplane has been type certified in accordance with the JAA JC/VP procedure. The certification basis is JAR-23, published on 11-Mar-1994, including Amdt.1, and additional requirements as laid down in CRI A-01.

1.3 WARNINGS, CAUTIONS AND NOTES

Special statements in the Airplane Flight Manual concerning the safety or operation of the airplane are highlighted by being prefixed by one of the following terms:

WARNING

means that the non-observation of the corresponding procedure leads to an immediate or important degradation in flight safety.

CAUTION

means that the non-observation of the corresponding procedure leads to a minor or to a more or less long term degradation in flight safety.

NOTE

draws the attention to any special item not directly related to safety but which is important or unusual.

1.4 DIMENSIONS

Overall Dimensions

Span	:	appr. 11.94 m	appr. 39 ft 2 in
Length	:	appr. 8.06 m	appr. 26 ft 5 in
Height	:	appr. 1.97 m	appr. 6 ft 6 in

Wing

Airfoil	:	Wortmann FX 63-137/20 - W4	
Wing Area	:	appr. 13.54 m²	appr. 145.7 sq.ft.
Mean aerodynamic chord (MAC)	:	appr. 1.121 m	appr. 3 ft 8.1 in
Aspect ratio	:	appr. 10.53	
Dihedral	:	appr. 5°	
Leading edge sweep	:	appr. 1°	

Aileron

Area (total, left + right)	:	appr. 0.654 m²	appr. 7.0 sq.ft.

Wing Flaps

Area (total, left + right)	:	appr. 1.56 m²	appr. 16.8 sq.ft.

Horizontal Tail

Area	:	appr. 2.34 m²	appr. 25.2 sq.ft.
Elevator area	:	appr. 0.665 m²	appr. 7.2 sq.ft.
Angle of incidence	:	appr. -3.0° relative to longitudinal axis of airplane	

Vertical Tail

Area	:	appr. 1.60 m²	appr. 17.2 sq.ft.
Rudder area	:	appr. 0.47 m²	appr. 5.1 sq.ft.

Landing Gear

Track	:	appr. 2.97 m	appr. 9 ft 9 in
Wheelbase	:	appr. 1.68 m	appr. 5 ft 6 in
Nose wheel	:	5.00-5; 6 PR, 120 mph	
Main wheel	:	(a) 6.00-6; 6 PR, 120 mph	
		(b) 6.00-6; 8 PR, 120 mph	
		(c) 15x6.0-6, 6 PR, 160 mph (OÄM 40-124; approved only in combination with MÄM 40-123, main landing gear strut with 18 mm / 0.71 in thickness)	

1.5 DEFINITIONS AND ABBREVIATIONS

(a) Airspeeds

CAS: Calibrated Airspeed. Indicated airspeed, corrected for installation and instrument errors. CAS equals TAS at standard atmospheric conditions (ISA) at MSL.

KCAS: CAS in knots.

KIAS: IAS in knots.

IAS: Indicated Airspeed as shown on an airspeed indicator.

TAS: True Airspeed. The speed of the airplane relative to the air. TAS is CAS corrected for errors due to altitude and temperature.

v_A: Maneuvering Speed. Full or abrupt control surface movement is not permissible above this speed.

v_C: Design Cruising Speed. This speed may be exceeded only in smooth air, and then only with caution.

v_{FE}: Maximum Flaps Extended Speed. This speed must not be exceeded with the given flap setting.

v_{NE}: Never Exceed Speed in smooth air. This speed must not be exceeded in any operation.

v_{NO}: Maximum Structural Cruising Speed. This speed may be exceeded only in smooth air, and then only with caution.

v_S: Stalling Speed, or the minimum continuous speed at which the airplane is still controllable in the given configuration.

v_{S0}: Stalling Speed, or the minimum continuous speed at which the airplane is still controllable in the landing configuration.

v_x: Best Angle-of-Climb Speed.

v_y: Best Rate-of-Climb Speed.

(b) Meteorological Terms

ISA: International Standard Atmosphere. Conditions at which air is identified as an ideal dry gas. The temperature at mean sea level is 15 °C (59 °F), air pressure at MSL is 1,013.25 hPa (29.92 inHg); the temperature gradient up to the altitude at which the temperature reaches -56.5 °C (-69.7 °F) is -0.0065 °C/m (-0.00357 °F/ft), and above this 0 °C/m (0 °F/ft).

MSL: Mean Sea Level.

OAT: Outside Air Temperature.

QNH: Theoretical atmospheric pressure at MSL, calculated from the elevation of the measuring point above MSL and the actual atmospheric pressure at the measuring point.

Density Altitude:
Altitude in ISA conditions at which the air density is equal to the current air density.

Indicated Pressure Altitude:
Altitude reading with altimeter set to 1,013.25 hPa (29.92 inHg).

Pressure Altitude:

Altitude above MSL, indicated by a barometric altimeter which is set to 1,013.25 hPa (29.92 inHg). The Pressure Altitude is the Indicated Pressure Altitude corrected for installation and instrument errors.
In this Airplane Flight Manual altimeter instrument errors are regarded as zero.

Wind: The wind speeds which are shown as variables in the diagrams in this manual should be regarded as headwind or tailwind components of the measured wind.

(c) Flight Performance and Flight Planning

Demonstrated Crosswind Component:

The speed of the crosswind component at which adequate maneuverability for take-off and landing has been demonstrated during type certification.

MET: Weather, weather advice.

NAV: Navigation, route planning.

(d) Mass and Balance

CG: Center of Gravity, also called 'center of mass'. Imaginary point in which the airplane mass is assumed to be concentrated for mass and balance calculations. Its distance from the Datum Plane is equal to the Center of Gravity Moment Arm.

Center of Gravity Moment Arm:
The Moment Arm which is obtained if one divides the sum of the individual moments of the airplane by its total mass.

Center of Gravity Limits:
The Center of Gravity range within which the airplane, at a given mass, must be operated.

DP: Datum Plane; an imaginary vertical plane from which all horizontal distances for center of gravity calculations are measured.

Empty Mass:
The mass of the airplane including unusable fuel, all operating consumables and the maximum quantity of oil.

Maximum Take-off Mass:
The maximum permissible mass for take-off.

Maximum Landing Mass:
The highest mass for landing conditions at the maximum descent velocity. This velocity was used in the strength calculations to determine the landing gear loads during a particularly hard landing.

Moment Arm:
The horizontal distance from the Datum Plane to the Center of Gravity of a component.

Moment: The mass of a component multiplied by its moment arm.

Usable Fuel:

The quantity of fuel available for flight planning.

Unusable Fuel:

The quantity of fuel remaining in the tank which cannot be used for flight.

Useful Load:

The difference between take-off mass and empty mass.

(e) Engine

AED: Auxiliary Engine Display

CED: Compact Engine Display

CT: Coolant Temperature

ECU: Engine Control Unit

FADEC: Full Authority Digital Engine Control

GT: Gearbox Temperature

LOAD: Engine output power in percent of max. continuous power

OP: Oil Pressure (oil pressure in the lubrication system of the engine)

OT: Oil Temperature (oil temperature in the lubrication system of the engine)

RPM: Revolutions per minute (rotational speed of the propeller)

Engine Starting Fuel Temperature:

Above this fuel temperature the engine may be started.

Take-Off Fuel Temperature:

Above this fuel temperature take off power setting is permitted.

(f) Designation of the Circuit Breakers on the Instrument Panel

ESSENTIAL BUS:

ESS. AV.	Essential Avionic Bus
FLAPS	Flaps
HORIZON	Artificial Horizon (Attitude Gyro)
ANNUN	Annunciator Panel
INST.1	Engine Instrument
PITOT	Pitot Heating System
LANDING	Landing Light
FLOOD	Flood Light
ESS. TIE	Bus Interconnection
MASTER CONTROL	Master Control (Avionics Main Switch, Bus Connection, Avionics Relais)

MAIN BUS:

PWR	Power
MAIN TIE	Bus Interconnection
FAN/OAT	Fan / Outside Air Temperature
T&B	Turn And Bank Indicator
DG	Directional Gyro
INST. LT	Instrument Lights

TAXI/MAP	Taxi Lights / Map Lights
POSITION	Position Lights
STROBE	Strobe Lights (=Anti Collision Lights, ACL)
START	Starter
XFER PUMP	Fuel Transfer Pump
AV. BUS	Avionics Bus
2. HORIZON	2nd Artificial Horizon (2nd Attitude Gyro)

MAIN AV. BUS (MAIN AVIONIC BUS):

GPS/NAV2	Global Positioning System and NAV Receiver No. 2
COM2	COM Radio No. 2
AUTO PILOT	Auto Pilot System
ADF	Automatic Direction Finder
DME	Distance Measuring Equipment
Wx500	Stormscope
AUDIO	Audio Panel

ESSENTIAL AV. BUS:

COM1	COM Radio No. 1
GPS/NAV1	Global Positioning System and NAV Receiver No. 1
XPDR	Transponder

ECU BUS:

ECU ALT	ECU Alternate power relay
ECU A	ECU A
ECU B	ECU B

(g) Equipment

ELT: Emergency Locator Transmitter

(h) Design Change Advisories

MÄM: Mandatory Design Change Advisory

OÄM: Optional Design Change Advisory

(i) Miscellaneous

ACG: Austro Control GmbH (formerly BAZ, Federal Office of Civil Aviation)

ATC: Air Traffic Control

CFRP: Carbon Fiber Reinforced Plastic

GFRP: Glass Fiber Reinforced Plastic

JAR: Joint Aviation Requirements

JC/VP: Joint Certification/Validation Procedure

PCA: Primary Certification Authority

1.6 UNITS OF MEASUREMENT

1.6.1 CONVERSION FACTORS

Dimension	SI-Units	US Units	Conversion
Length	[mm] millimeters [m] meters [km] kilometers	[in] inches [ft] feet [NM] nautical miles	[mm] / 25.4 = [in] [m] / 0.3048 = [ft] [km] / 1.852 = [NM]
Volume	[l] liters	[US gal] US gallons [qts] US quarts	[l] / 3.7854 = [US gal] [l] / 0.9464 = [qts]
Speed	[km/h] kilometers per hour [m/s] meters per second	[kts] knots [mph] miles per hour [fpm] feet per minute	[km/h] / 1.852 = [kts] [km/h] / 1.609 = [mph] [m/s] x 196.85 = [fpm]
Speed of rotation	[RPM] revolutions per minute		--
Mass	[kg] kilograms	[lb] pounds	[kg] x 2.2046 = [lb]
Force, weight	[N] newtons	[lbf] pounds force	[N] x 0.2248 = [lbf]
Pressure	[hPa] hecto-pascals [mbar] millibars [bar] bars	[inHg] inches of mercury [psi] pounds per square inch	[hPa] = [mbar] [hPa] / 33.86 = [inHg] [bar] x 14.504 = [psi]
Temperature	[°C] degrees Celsius	[°F] degrees Fahrenheit	[°C]x1.8 + 32 = [°F] ([°F] - 32)/1.8 = [°C]

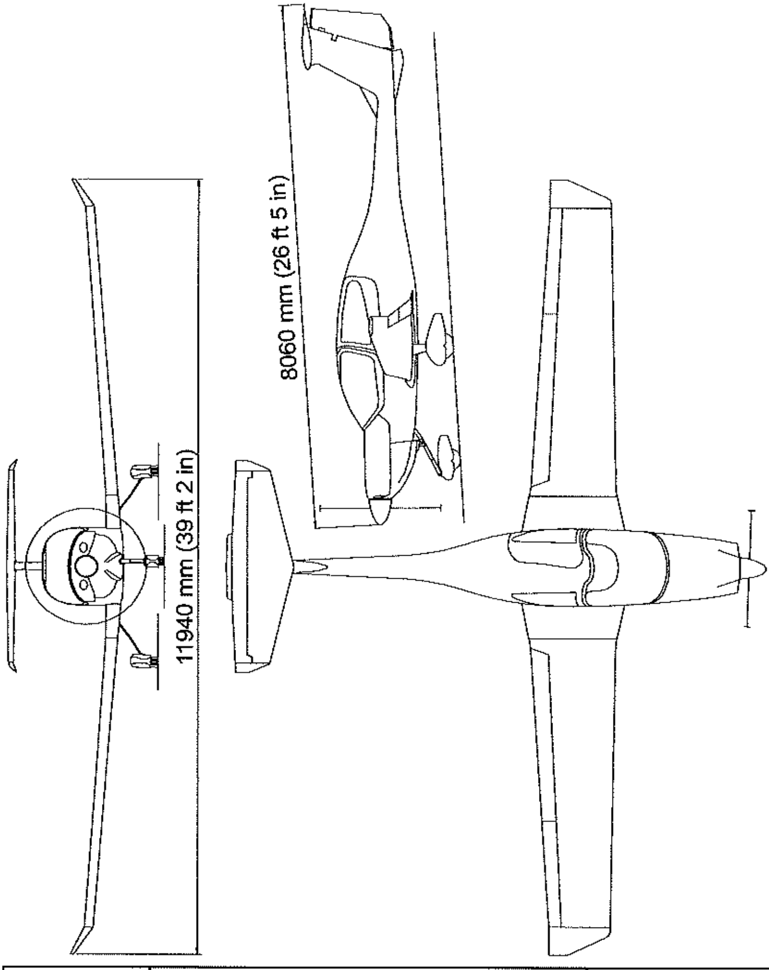
Dimension	SI-Units	US Units	Conversion
Intensity of electric current	[A] ampères		--
Electric charge (battery capacity)	[Ah] ampère-hours		--
Electric potential	[V] volts		--
Time	[sec] seconds		--

1.6.2 CONVERSION CHART LITERS / US GALLONS

Liters	US Gallons
5	1.3
10	2.6
15	4.0
20	5.3
25	6.6
30	7.9
35	9.2
40	10.6
45	11.9
50	13.2
60	15.9
70	18.5
80	21.1
90	23.8
100	26.4
110	29.1
120	31.7
130	34.3
140	37.0
150	39.6
160	42.3
170	44.9
180	47.6

US Gallons	Liters
1	3.8
2	7.6
4	15.1
6	22.7
8	30.3
10	37.9
12	45.4
14	53.0
16	60.6
18	68.1
20	75.7
22	83.3
24	90.9
26	98.4
28	106.0
30	113.6
32	121.1
34	128.7
36	136.3
38	143.8
40	151.4
45	170.3
50	189.3

1.7 THREE-VIEW DRAWING



1.8 SOURCE DOCUMENTATION

This Section lists documents, manuals and other literature that were used as sources for the Airplane Flight Manual, and indicates the respective publisher. However, only the information given in the Airplane Flight Manual is valid.

1.8.1 ENGINE AND ENGINE INSTRUMENTS

Address:	Thielert Aircraft Engines GmbH Platanenstrasse 14 D-09350 LICHTENSTEIN GERMANY
Phone:	+49-37204-696-90
Fax:	+49-37204-696-50
Internet:	www.thielert.com
Documents:	TAE 125-01 Operation and Maintenance Manual or TAE 125-02-99 Operation and Maintenance Manual (MÄM 40-256 carried out)

1.8.2 PROPELLER

Address:	mt-propeller Airport Straubing Wallmühle D-94348 ATTING GERMANY
Phone:	+49-9429-9409-0
E-mail:	sales@mt-propeller.com
Internet:	www.mt-propeller.de
Documents:	E-124, Operation and Installation Manual Hydraulically controlled variable pitch propeller MTV -5, -6, -9, -11, -12, -14, -15, -16, -21, -22, -25

CHAPTER 2
OPERATING LIMITATIONS

Page

2.1 INTRODUCTION

Chapter 2 of this Airplane Flight Manual includes operating limitations, instrument markings, and placards necessary for the safe operation of the airplane, its power-plant, standard systems and standard equipment.

The limitations included in this Chapter are approved.

WARNING

Operation of the airplane outside of the approved operating limitations is not permissible.

2.2 AIRSPEED

	Airspeed	IAS	Remarks
v_A	Maneuvering speed	108 KIAS above: 980 kg / 2161 lb up to: 1150 kg / 2535 lb 94 KIAS above: 780 kg / 1720 lb up to: 980 kg / 2161 lb	Do not make full or abrupt control surface movement above this speed.
v_{FE}	Max. flaps extended speed	LDG: 91 KIAS T/O: 108 KIAS	Do not exceed these speeds with the given flap setting.
v_{NO} = v_C	Max. structural cruising speed	129 KIAS	Do not exceed this speed except in smooth air, and then only with caution.
v_{NE}	Never exceed speed in smooth air	178 KIAS	Do not exceed this speed in any operation.

2.3 AIRSPEED INDICATOR MARKINGS

Marking	IAS	Significance
White arc	49 KIAS - 91 KIAS	Operating range with flaps fully extended
Green arc	52 KIAS - 129 KIAS	Normal operating range.
Yellow arc	129 KIAS - 178 KIAS	'Caution' range - "Only in smooth air".
Red line	178 KIAS	Maximum speed for all operations - v_{NE}.

2.4 POWER-PLANT LIMITATIONS

a) Engine manufacturer : Thielert Aircraft Engines

b) Engine designation : TAE 125-01

or

TAE 125-02-99 (if MÄM 40-256 is carried out)

c) RPM limitations (shown as propeller RPM)

	TAE 125-01	TAE 125-02-99 (MÄM 40-256 carried out)
Maximum	2500 RPM	2300 RPM
Maximum overspeed	--	2500 RPM (max. 20 sec)

d) Engine power

Max. take-off power : 99 kW (135 DIN-hp) at 2300 RPM

Max. continuous power : 99 kW (135 DIN-hp) at 2300 RPM

e) Oil pressure (indicated values are corrected for pressure altitude)

Minimum : 1.2 bar

Maximum : 6.5 bar

f) Oil quantity

Minimum : 4.5 liters (appr. 4.8 US qts)

Maximum : 6.0 liters (appr. 6.3 US qts)

Maximum oil consumption : 0.1 liters/hr (appr. 0.1 US qts/hr)

g) Oil temperature

	TAE 125-01	TAE 125-02-99 (MÄM 40-256 carried out)
Minimum	-32 °C	-32 °C
Maximum	+140 °C	+140 °C

h) Gearbox temperature

Maximum : 120 °C

i) Coolant temperature

	TAE 125-01	TAE 125-02-99 (MÄM 40-256 carried out)
Minimum	-32 °C	-32 °C
Maximum	+105 °C	+105 °C

j) Propeller manufacturer : mt-Propeller

k) Propeller designation : MTV-6-A/187-129

l) Propeller diameter : 187 cm (6 ft 2 in)

m) Propeller pitch angle (0.75 R) : 12° to 28°

n) Oil specification : SHELL HELIX ULTRA 5W-30

SHELL HELIX ULTRA 5W-40

AERO SHELL OIL Diesel 10W-40

AERO SHELL OIL DIESEL ULTRA 5W-30

o) Coolant : DAI-G30-MIX (TAE 125-01 engine) or

DAI-G48-MIX (TAE 125-02-99 engine)

Water according to TAE-125-OM-02-01 / Cooler protection (BASF Glysantin Alu Protect / G30 (TAE 125-01 engine) or G48 (TAE 125-02-99 engine)) 1/1. The freezing point of the coolant is -36 °C (-32.8 °F).

CAUTION

The use of water which does not meet the specifications according to the applicable TAE Operation Manual may cause engine damage.

CAUTION

If the coolant level is low the reason must be determined and the problem must be corrected by authorized personnel.

p) Gearbox oil (propeller gearbox) : SHELL EP 75W90 API GL-4

SHELL SPIRAX GSX 75W-80 GL-4

SHELL SPIRAX S4 G 75W-90

SHELL SPIRAX S6 GXME 75W-80

CAUTION

If the gearbox oil level is low the reason must be determined and the problem must be corrected by authorized personnel.

q) Maximum restart altitude : 6500 ft (TAE 125-01 engine)
6000 ft (TAE 125-01 R5 engine)
8000 ft (TAE 125-02-99 engine)

2. OPERATING LIMITATIONS

2.4 POWER-PLANT LIMITATIONS

The item "Gearbox oil (propeller gearbox)" is amended to read:

p) Gearbox oil (propeller gearbox) :

SHELL EP 75W90 API GL-4
SHELL SPIRAX GSX 75W-80 GL-4
SHELL SPIRAX S4 G 75W-90
SHELL SPIRAX S6 GXME 75W-80 API GL-4

Additionally, if MÄM 40-256 is incorporated:

CENTURION Gearbox Oil N1
SHELL SPIRAX S6 ATF ZM, API GL-4

CAUTION

If the gearbox oil level is low the reason must be determined and the problem must be corrected by authorized personnel.

2.5 ENGINE INSTRUMENT MARKINGS

Engine instrument markings and their color code significance are shown in the tables below:

If the TAE 125-01 engine is installed:

Indi-cation	Red arc/bar = lower prohibited range	Yellow arc/bar = caution range	Green arc/bar = normal operating range	Yellow arc/bar = caution range	Red arc/bar = upper prohibited range
RPM	--	--	up to 2400 RPM	2400 to 2500 RPM	above 2500 RPM
Oil pressure	below 1.2 bar	1.2 to 2.3 bar	2.3 to 5.2 bar	5.2 to 6.5 bar	above 6.5 bar
Oil temp.	below -32 °C	-32 to 50 °C	50 to 125 °C	125 to 140 °C	above 140 °C
Coolant temp.	below -32 °C	-32 to 60 °C	60 to 96 °C	96 to 105 °C	above 105 °C
Gearbox temp.	--	--	up to 115 °C	115 to 120 °C	above 120 °C
Load	--	--	0 - 100 %	--	--
Fuel temp.	below -30 °C	-30 to +4 °C	+5 to 69 °C	70 to 75 °C	above 75 °C
Ammeter	--	--	up to 85 A	85 to 90 A	above 90 A
Volt-meter	below 11 V	11 to 12.6 V	12.6 to 15.0 V	15.0 to 15.5 V	above 15.5 V
Fuel qty.	below 0.45 US gal	--	0.45 to 14 US gal	--	--

If the TAE 125-02-99 engine and the AED/CED Engine Instrument are installed (MÄM 40-256 & OÄM 40-293 are carried out):

Indi-cation	Red arc/bar = lower prohibited range	Yellow arc/bar = caution range	Green arc/bar = normal operating range	Yellow arc/bar = caution range	Red arc/bar = upper prohibited range
RPM	--	--	0-2300 RPM	--	above 2300 RPM
Oil pressure	below 1.2 bar	1.2 to 2.3 bar	2.3 to 5.2 bar	5.2 to 6.5 bar	above 6.5 bar
Oil temp.	below -32 °C	-32 to 50 °C	50 to 125 °C	125 to 140 °C	above 140 °C
Coolant temp.	below -32 °C	-32 to 60 °C	60 to 96 °C	96 to 105 °C	above 105 °C
Gearbox temp.	--	--	up to 115 °C	115 to 120 °C	above 120 °C
Load	--	--	0 - 100 %	--	--
Fuel temp.	below -30 °C	-30 to +4 °C	+5 to 69 °C	70 to 75 °C	above 75 °C
Ammeter	--	--	up to 85 A	85 to 90 A	above 90 A
Volt-meter	below 11 V	11 to 12.6 V	12.6 to 15.0 V	15.0 to 15.5 V	above 15.5 V
Fuel qty.	below 0.45 US gal	--	0.45 to 14 US gal	--	--

From -30 °C to -6 °C the lower yellow bar of the fuel temp bar flashes, from -5 °C to +4 °C the lower yellow bar of the fuel temp is continuously on. This applies only to conventional instrument panel versions.

2.6 WARNING, CAUTION AND STATUS LIGHTS

The following tables show the color and significance of the warning, caution and status lights on the annunciator panel.

NOTE

The ECU BACKUP UNSAFE warning light is located above the airspeed indicator on the instrument panel.

NOTE

Section 7.10 - ELECTRICAL SYSTEM includes a detailed description of the lights on the annunciator panel.

Color and Significance of the Warning Lights (Red)

Warning Light (Red)	Meaning	Cause
WARNING	Warning message	--
START	Starter	Operation of starter, or failure of the starter motor to disengage from the engine after starting
DOOR	Doors	Front canopy and/or rear door not completely closed and locked
TRIM FAIL	Trim fail / autopilot	Failure in the automatic trim system of the autopilot (if installed)
ECU BACKUP UNSAFE	ECU Backup Battery	ECU Backup Battery has less than 70% electric charge.

Color and Significance of the Caution Lights (Amber)

Caution Light (Amber)	Meaning	Cause
CAUTION	Caution message	--
LOW VOLTS	Low voltage	On-board voltage below 12.6 V (± 0.2 V)
ALTERNATOR	Generator	Generator failure
PITOT	Pitot heating	Pitot heating OFF or failure
LOW FUEL	Low fuel	MAIN tank, fuel low
ENGINE	Engine	Engine limit exceeded
ECU A	ECU A	A fault has occurred in the ECU A (one reset of minor faults is possible) or ECU A is being tested during the ECU-test procedure during the 'before take-off-check'.
ECU B	ECU B	A fault has occurred in the ECU B (one reset of minor faults is possible) or ECU B is being tested during the ECU-test procedure during the 'before take-off-check'.

Color and Significance of the Status Lights (White)

Status Light (White)	Meaning	Cause
FUEL TRANS	Transfer pump	Transfer pump active / fuel transfer from the AUX tank to the MAIN tank
GLOW	Glow plugs	Glow plugs active

2.7 MASS (WEIGHT)

Maximum take-off mass (Normal Category)	:	1150 kg	(2535 lb)
Maximum take-off mass (Utility Category)	:	980 kg	(2161 lb)
Maximum landing mass	:	1150 kg	(2535 lb) if landing gear struts with 18 mm (0.71 in) thickness are installed (if MÄM 40-123 is installed)
		1092 kg	(2407 lb) otherwise
Max. load in baggage compartment	:	30 kg	(66 lb)

WARNING

Exceeding the mass limits will lead to an overstressing of the airplane as well as to a degradation of flight characteristics and flight performance.

NOTE

The maximum landing mass is the highest mass for landing conditions at the maximum descent velocity. This velocity was used in the strength calculations to determine the landing gear loads during a particularly hard landing.

2.8 CENTER OF GRAVITY

Datum Plane

The Datum Plane (DP) is a plane which is normal to the airplane's longitudinal axis and in front of the airplane as seen from the direction of flight. The airplane's longitudinal axis is parallel with the upper surface of a 600:31 wedge which is placed on top of the rear fuselage in front of the vertical stabilizer. When the upper surface of the wedge is aligned horizontally, the Datum Plane is vertical. The Datum Plane is located 2.194 meters (86.38 in) forward of the most forward point of the root rib on the stub wing.

Center of Gravity Limitations

The center of gravity (CG position) for flight conditions must be between the following limits:

Most forward CG:

2.40 m (94.5 in) aft of DP from 780 kg to 980 kg (1720 lb to 2161 lb)
2.46 m (96.9 in) aft of DP at 1150 kg (2535 lb)
linear variation between these values

Most rearward CG:

Standard tank:	2.59 m (102.0 in) aft of DP
Long Range Tank:	2.55 m (100.4 in) aft of DP

WARNING

Exceeding the center of gravity limitations reduces the controllability and stability of the airplane.

2.9 APPROVED MANEUVERS

The airplane is certified in the Normal Category and in the Utility Category in accordance with JAR-23.

Approved Maneuvers

a) Normal Category:

1) All normal flight maneuvers;
2) Stalling (with the exception of dynamic stalling); and
3) Lazy Eights, Chandelles, as well as steep turns and similar maneuvers, in which an angle of bank of not more than 60° is attained.

CAUTION

Aerobatics, spinning, and flight maneuvers with more than 60° of bank are not permitted in the Normal Category.

b) Utility Category:

1) All normal flight maneuvers;
2) Stalling (with the exception of dynamic stalling); and
3) Lazy Eights, Chandelles, as well as steep turns and similar maneuvers, in which an angle of bank of not more than 90° is attained.

CAUTION

Aerobatics, spinning, and flight maneuvers with more than 90° of bank are not permitted in the Utility Category.

CAUTION

The accuracy of the attitude gyro (artificial horizon) and the directional gyro is affected by the maneuvers approved under item 3 if the bank angle exceeds 60°. Such maneuvers may therefore only be flown when the above mentioned instruments are not required for the present kind of operation.

2.10 MANEUVERING LOAD FACTORS

NOTE

The tables below show structural limitations. The load factor limits for the TAE 125-01 engine or TAE 125-02-99 engine (if MÄM 40-256 is carried out) must also be observed. Refer to the Operation & Maintenance Manual for the engine.

CAUTION

Avoid extended negative g-loads duration. Extended negative g-loads can cause propeller control problems and engine surging.

Table of maximum structural load factors:

Normal Category

	at v_A	at v_{NE}	with flaps in T/O or LDG position
Positive	38	38	20
Negative	-152	0	

Utility Category

	at v_A	at v_{NE}	with flaps in T/O or LDG position
Positive	44	44	20
Negative	-176	-1	

WARNING

Exceeding the maximum load factors will lead to an overstressing of the airplane.

2.11 OPERATING ALTITUDE

The maximum demonstrated operating altitude is 16400 ft (5000 m) pressure altitude.

2.12 FLIGHT CREW

Minimum crew : 1 (one person)

Maximum number of occupants

- Normal Category : 4 (four persons)
- Utility Category : 2 (two persons, both must sit in front)

2.13 KINDS OF OPERATION

Approved are :

* Flights according to Visual Flight Rules (VFR)
* Flights according to Night Visual Flight Rules (NVFR)
* Flights according to Instrument Flight Rules (IFR)

Flights into known or forecast icing conditions are prohibited.

Flights into known thunderstorms are prohibited.

Minimum Operational Equipment (Serviceable)

The following table lists the minimum serviceable equipment required by JAR-23 and operational requirements. Additional minimum equipment for the intended operation may be required by national operating rules and also depends on the route to be flown.

	For daytime VFR flights	In addition for night VFR flights	In addition for IFR flights
Flight and naviga-tion instru-ments	* Airspeed indicator * Altimeter * Magnetic compass	* Vertical speed indicator (VSI) * Attitude gyro (artificial horizon) * Turn & bank indicator * Directional gyro * OAT indicator * Chronometer with indication of hours, minutes, and seconds * VHF radio (COM) * VOR receiver * Transponder (XPDR), mode A and mode C * 1 headset (2 headsets if PM 1000 Intercom is installed)	* Second VHF radio (COM) * VOR-LOC-GS receiver * Marker beacon receiver

	For daytime VFR flights	In addition for night VFR flights	In addition for IFR flights
Engine instru-ments	* Fuel quantity * Oil pressure * Oil temperature * Coolant temperature * Gear box temperature * Load * Propeller RPM * Fuel temperature left & right tank * Engine caution light (on White Wire)	* Ammeter * Voltmeter	
Lighting		* Position lights * Strobe lights (anti collision lights) * Landing light * Instrument lighting * Flood light * Flashlight	

	For daytime VFR flights	In addition for night VFR flights	In addition for IFR flights
Other opera-tional minimum equip-ment	* Stall warning system * Fuel quantity measuring device (see 7.9 of the AFM) * Safety belts for each occupied seat * Airplane flight manual	* Pitot heating system * Alternate static valve	* Emergency battery for horizon/ flood light * ECU-backup unsafe warning light

NOTE

A list of approved equipment can be found in Chapter 6.

2.14 FUEL

Approved fuel grades:

The paragraph "JET Fuel" is amended to read:

JET Fuel:

JET A-1 (ASTM D 1655)
JET A (ASTM D 1655)
JP-8 (MIL-DTL-83133)
JET Fuel No. 3 (China, GB 6537-2006)

Additionally, if MÄM 40-256 is incorporated:

TS-1 (GOST 10227-86)

TS-1 (Ukraine GSTU 320.00149943.011-99)

and blends of the above listed Jet Fuel grades, Diesel and TS-1 Fuel.

2.14 FUEL

JET Fuel:	JET A-1 (ASTM D 1655) JET A (ASTM D 1655) JP-8 (MIL-DTL-83133) JET Fuel No. 3 (China, GB 6537-2006) TS-1 (GOST 10227-86) (only if MÄM 40-256 is incorporated) and blends of the above listed Jet Fuel grades, Diesel and TS-1 Fuel.
Diesel Fuel:	Diesel Fuel (EN590) and blends of the above listed Jet Fuel grades: see CAUTIONS below.

CAUTION

Additional temperature limitations must be observed if the airplane is operated with Diesel Fuel or blends of Diesel Fuel with JET Fuel.

CAUTION

Limitations for operation in the following countries:
Indonesia, Malaysia: Use of Diesel Fuel is NOT approved.

NOTE

Use only uncontaminated fuel from reliable sources.

Standard tank:

Total fuel quantity	:	2 x 15.0 US gal (2 x 56.8 liters)
Usable fuel	:	2 x 14.0 US gal (2 x 53.0 liters)

Long Range Tank:

Total fuel quantity	:	2 x 20.5 US gal (2 x 77.6 liters)
Usable fuel	:	2 x 19.5 US gal (2 x 73.8 liters)
Max. indicated fuel quantity	:	15 US gal (56.8 liters) per tank
Max. permissible difference between right and left tank	:	9 US gal (approx. 34 liters)

CAUTION

If an indicator shows 15 US gal, then 19.5 US gal must be assumed for the calculation of the difference between right and left tank.

2.15 LIMITATION PLACARDS

All *limitation* placards are shown below. A list of *all* placards is included in the Airplane Maintenance Manual (Doc. No. 6.02.01), Chapter 11.

On the Instrument Panel:

Maneuvering speed: v_A = 108 KIAS (above 980 up to 1150 kg / above 2161 up to 2535 lb) v_A = 94 KIAS (780 to 980 kg / 1720 to 2161 lb) This airplane may only be operated in accordance with the Airplane Flight Manual. It can be operated in the "Normal" and "Utility" categories in non-icing conditions. Provided that national operational requirements are met and the appropriate equipment is installed, this airplane is approved for the following kinds of operation: day VFR, night VFR and IFR. All aerobatic maneuvers including spinning are prohibited. For further operational limitations refer to the Airplane Flight Manual.
No smoking.

If KAP 140 Autopilot system is installed (OÄM 40-153 carried out):

Limitations for KAP 140 Autopilot System: Do not use AP if "Alternate Static" is open. Conduct AP and trim check prior to each flight (see AFM). Autopilot OFF during take-off and landing. Maximum speed for autopilot operation is 165 KIAS. Minimum speed for autopilot operation is 70 KIAS. Minimum altitude for autopilot operation: Cruise, Climb, Descent and Maneuvering: 800 feet AGL Approach: 200 feet AGL

GPS NOT APPROVED
FOR SBAS OPERATIONS

If the No. 2 Course Deviation Indicator (CDI) is installed on the co-pilot's side (OÄM 40-214 or OÄM 40-153 carried out):

NAV No. 2 not approved
for precision approaches.

On the Instrument Panel, Next to the Fuel Quantity Indication:

Long Range Tank:

max. usable fuel: 2 x 19.5 US gal

- Max. indicated fuel quantity: 2 x 15 US gal
- Refer to AFM to use entire tank capacity
- Max. difference LH/RH tank: 9 US gal

On the Conventional Instrument Panel, Next to the Fuel Temperature Indication:

Diesel Fuel or Unknown Fuel Blend:	
Yellow blinking:	No engine start permitted
Yellow steady on (LH fuel tank):	No take-off permitted

Next to Each of the Two Fuel Filler Necks:

WARNING
APPROVED FUEL:
JET A-1
or see Airplane Flight Manual

On Airplanes with early serial numbers the placard may include "Diesel EN590".

Next to the Essential Bus Switch:

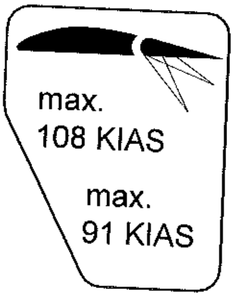
Ess. Bus NOT for normal operation. See AFM.

In the Cowling, on the Door for the Oil Filler Neck:

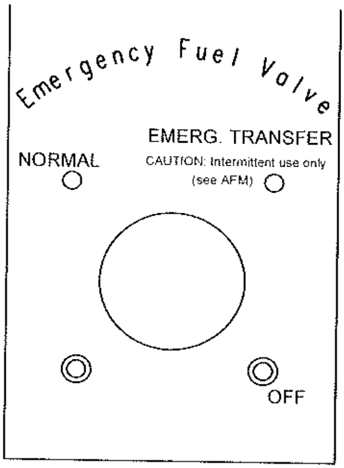
OIL
Shell Helix Ultra
5W-30

or see Airplane Flight Manual

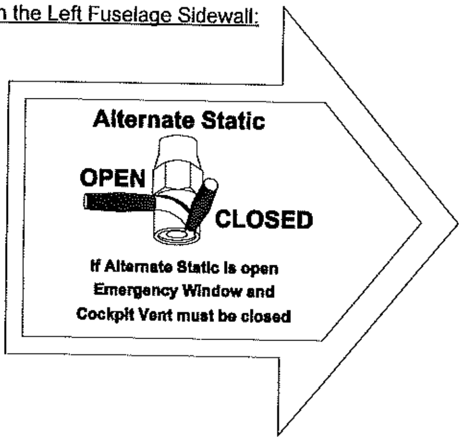
Next to the Flap Selector Switch:



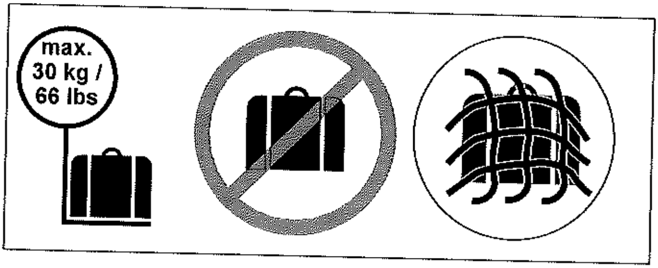
On the Emergency Fuel Valve:



In the Cockpit, on the Left Fuselage Sidewall:



Next to the Baggage Compartment:



Beside the Door Locking Device:

EMERGENCY EXIT:
The keylock must be
unlocked during flight

2.16 OTHER LIMITATIONS

2.16.1 TEMPERATURE

- The airplane may only be operated when its temperature prior to operation is not less than -20 °C (-4 °F) and not higher than 54 °C (129 °F) .
- With the airplane cold soaked and its temperature below -20 °C (-4 °F) the use of an external pre-heater for the engine and pilot compartment prior to operation is mandatory.

2.16.2 FUEL TEMPERATURE

JET Fuel grades and blends thereof:

TAE 125-01 engine:	from -30 °C to +65 °C (from -22 °F to +149 °F)
TAE 125-02-99 engine (MÄM 40-256 carried out):	from -30 °C to +75 °C (from -22 °F to +167 °F)

Diesel Fuel, blends of Jet Fuel grades with Diesel Fuel or unknown fuel blend:

Engine starting fuel temperature:	min. -5 °C (+23 °F)
Take-off fuel temperature left:	min. +5 °C (+41 °F)

Maximum fuel temperature:

TAE 125-01 engine:	+65 °C (+149 °F)
TAE 125-02-99 engine (MÄM 40-256 carried out):	+75°C (+167 °F)

2.16.3 DOOR LOCKING DEVICE

The canopy and the passenger door must not be locked during operation of the airplane.

2.16.4 ELECTRONIC EQUIPMENT

The use and switching on of electronic equipment other than that which is part of the equipment of the airplane is not permitted, as it could lead to interference with the airplane's avionics.

Examples of undesirable items of equipment are:

- Mobile telephones
- Remote radio controls
- Video screens employing CRTs
- Minidisc recorders when in the record mode

This list is not exhaustive.

The use of laptop computers, including those with CD-ROM drives, CD and minidisc players in the replay mode, cassette players and video cameras is permitted. All this equipment however should be switched off for take-off and landing.

2.16.5 SMOKING

Smoking in the airplane is not permitted.

2.16.6 EMERGENCY SWITCH

IFR flights are not permitted when the seal on the EMERGENCY switch is broken.

2.16.7 ECU BACKUP BATTERY

The ECU BACKUP UNSAFE-light (red) indicates an insufficient backup battery charge. IFR-flights are not permitted.

2.16.8 USE OF THE SUN VISORS

The sun visors (if installed, OÄM 40-327) may only be used during cruise. During all other phases of flight the sun visors must be locked in the fully upward position.

Intentionally left blank.

CHAPTER 3
EMERGENCY PROCEDURES

NOTE

Procedures for uncritical system faults are given in Chapter 4B - ABNORMAL OPERATING PROCEDURES.

3.1 INTRODUCTION

3.1.1 GENERAL

This Chapter contains checklists as well as the description of recommended procedures to be followed in the event of an emergency. Engine failure or other airplane-related emergencies are most unlikely to occur if the prescribed procedures for pre-flight checks and airplane maintenance are followed.

If, nonetheless, an emergency does arise, the guidelines given here should be followed and applied in order to clear the problem.

As it is impossible to foresee all kinds of emergencies and cover them in this Airplane Flight Manual, a thorough understanding of the airplane by the pilot is, in addition to his knowledge and experience, an essential factor in the solution of any problems which may arise.

WARNING

In each emergency, control over the flight attitude and the preparation of a possible emergency landing have priority over attempts to solve the current problem ("first fly the aircraft"). Prior to the flight the pilot must consider the suitability of the terrain for an emergency landing for each phase of the flight. For a safe flight the pilot must constantly keep a safe minimum flight altitude. Solutions for various adverse scenarios should be thought over in advance. Thus it should be guaranteed that the pilot is at no time shocked by an engine failure and that he can act calmly and with determination.

3.1.2 CERTAIN AIRSPEEDS IN EMERGENCIES

Event		850 kg 1874 lb	1000 kg 2205 lb	1150 kg 2535 lb
Engine failure after take-off (Flaps T/O)		59 KIAS	66 KIAS	72 KIAS
Airspeed for best glide angle (Flaps UP)		60 KIAS	68 KIAS	73 KIAS
Emergency landing with engine off	Flaps UP	60 KIAS	68 KIAS	73 KIAS
	Flaps T/O	59 KIAS	66 KIAS	72 KIAS
	Flaps LDG	58 KIAS	63 KIAS	71 KIAS

3.2 ENGINE PROBLEMS

3.2.1 ENGINE PROBLEMS ON GROUND

1. Power lever . . . . IDLE
2. Brakes . . . . as required

NOTE

If considered necessary, the engine must be shut down. Otherwise the cause of the problem must be established in order to re-establish engine performance.

CAUTION

If the oil pressure is in the red range, the engine must be shut down immediately.

WARNING

If the problem cannot be cleared, the airplane must not be flown.

END OF CHECKLIST

3.2.2 ENGINE PROBLEMS DURING TAKE-OFF

(a) Take-Off Can Still Be Aborted (Sufficient Runway Length Available)

Land straight ahead:

1. Power lever .... IDLE

On the ground:

2. Brakes .... as required

CAUTION

If sufficient time is remaining, the risk of fire in the event of a collision can be reduced as follows:

- Emergency fuel valve .... OFF
- ENGINE MASTER .... OFF
- ELECTRIC MASTER .... OFF

END OF CHECKLIST

(b) Take-Off Can No Longer Be Aborted

1. Airspeed . . . . 72 KIAS (1150 kg, 2535 lb)
   66 KIAS (1000 kg, 2205 lb)
   59 KIAS (850 kg, 1874 lb)

WARNING

If, in the event of an engine problem occurring during take-off, the take-off can no longer be aborted and a safe height has not been reached, then a straight-ahead emergency landing should be carried out. Do not attempt to turn back to the airfield. Turning back can be fatal.

If time allows:

2. Power lever . . . . check MAX
3. ECU SWAP . . . . ECU B

WARNING

If the problem does not clear itself immediately, and the engine is no longer producing sufficient power, then an emergency landing must be carried out in accordance with 3.5.1 - EMERGENCY LANDING WITH ENGINE OFF.

END OF CHECKLIST

3.2.3 ENGINE PROBLEMS IN FLIGHT

(a) Engine Running Roughly

1. Airspeed .... 73 KIAS (1150 kg, 2535 lb)
   68 KIAS (1000 kg, 2205 lb)
   60 KIAS (850 kg, 1874 lb)
2. Power lever .... MAX
3. Engine caution light .... check

NOTE

If the caution light is on, the engine instruments must be checked. Proceed in accordance with 4B.2 - INSTRUMENT INDICATIONS OUTSIDE OF GREEN RANGE.

4. If in icing conditions .... Alternate Air ON
5. Fuel qty. MAIN tank .... check
6. Fuel transfer pump .... ON
7. Emergency fuel valve .... check NORMAL
8. ECU SWAP .... ECU B

NOTE

If selecting ECU B does not solve the problem, switch back to AUTOMATIC.

CONTINUED

WARNING

If the problem does not clear itself immediately, and the engine is no longer producing sufficient power, perform a precautionary landing on the nearest airfield in accordance with 4B.1 - PRECAUTIONARY LANDING, but be prepared for an emergency landing in accordance with 3.5.1 - EMERGENCY LANDING WITH ENGINE OFF.

END OF CHECKLIST

(b) Loss of Power

NOTE

As long as an airspeed of at least 60 KIAS is maintained, and there is no major mechanical engine defect, the propeller will continue to windmill.

1. Airspeed .... 73 KIAS (1150 kg, 2535 lb)
   68 KIAS (1000 kg, 2205 lb)
   60 KIAS (850 kg, 1874 lb)
2. Power lever .... MAX
3. If in icing conditions .... Alternate Air ON
4. Fuel qty. MAIN tank .... check
5. Fuel transfer pump .... ON
6. Emergency fuel valve .... check NORMAL
7. ECU SWAP .... ECU B

CONTINUED

ECU reset:

8. ENGINE MASTER . . . . OFF - ON

NOTE

If selecting ECU B does not solve the problem, switch back to AUTOMATIC.

WARNING

If the problem does not clear itself immediately, prepare for an emergency landing in accordance with 3.5.1 - EMERGENCY LANDING WITH ENGINE OFF, then try to restart the engine with windmilling propeller in accordance with 3.2.4 - RESTARTING THE ENGINE WITH WINDMILLING PROPELLER.

END OF CHECKLIST

3.2.4 RESTARTING THE ENGINE WITH WINDMILLING PROPELLER

NOTE

As long as an airspeed of at least 60 KIAS is maintained, and there is no major mechanical engine defect, the propeller will continue to windmill.

CAUTION

The maximum airspeed for windmilling is 110 KIAS. Higher airspeeds may result in propeller overspeed.

NOTE

Restarting the engine with windmilling propeller is possible at airspeeds between 73 and 110 KIAS and altitudes below 6500 ft (TAE 125-01 engine) or 6000 ft (TAE 125-01 R5 engine) or 8000 ft (TAE 125-02-99 engine) pressure altitude.

1. Airspeed for best glide angle .... 73 KIAS (1150 kg, 2535 lb)
   68 KIAS (1000 kg, 2205 lb)
   60 KIAS (850 kg, 1874 lb)
2. Power lever .... IDLE
3. Emergency fuel valve .... check NORMAL
4. Alternate air .... OPEN
5. Fuel transfer pump .... ON
6. AVIONIC MASTER .... OFF

CONTINUED

7. ELECTRIC MASTER .... ON
8. Airspeed .... 73 to 110 KIAS

ECU reset:

9. ENGINE MASTER .... OFF - ON

NOTE

If it is not possible to start the engine:
- Adopt glide configuration as in 3.4 - GLIDING.
- Carry out emergency landing in accordance with 3.5.1 - EMERGENCY LANDING WITH ENGINE OFF.

CAUTION

Engine restart following an engine fire should only be attempted if it is unlikely that a safe emergency landing can be made. It must be expected that engine restart is impossible after an engine fire.

10. AVIONIC MASTER .... ON, if required

END OF CHECKLIST

3.2.5 RESTARTING THE ENGINE WITH STATIONARY PROPELLER

CAUTION

The propeller of a failed TAE 125-02-99 engine with dual-mass flywheel (MÄM 40-701) installed continues windmilling. A stopped propeller indicates a major mechanical engine defect. A restart with a stationary propeller shall not be considered.

NOTE

Restarting the engine with stationary propeller is possible at altitudes below 6500 ft (TAE 125-01 engine) or 6000 ft (TAE 125-01 R5 engine) or 8000 ft (TAE 125-02-99 engine, pressure altitude.

1. Airspeed for best glide angle .... 73 KIAS (1150 kg, 2535 lb)
   68 KIAS (1000 kg, 2205 lb)
   60 KIAS (850 kg, 1874 lb)
2. ENGINE MASTER .... OFF
3. Power lever .... IDLE
4. Emergency fuel valve .... check NORMAL
5. Alternate air .... OPEN
6. Fuel transfer pump .... ON
7. AVIONIC MASTER .... OFF
8. ELECTRIC MASTER .... ON
9. ENGINE MASTER .... ON

NOTE

Only if the ENGINE MASTER is switched OFF and ON again, glowing will be initiated. Glowing must be initiated shortly before the restart attempt.

CONTINUED

10. ELECTRIC MASTER .... START (release when engine is running)

NOTE

By increasing the airspeed above approximately 105 KIAS (TAE 125-01 engine) or 110 KIAS (TAE 125-02-99 engine, MÄM 40-701 NOT installed), the propeller will begin to rotate due to windmilling and the engine can thus be started. For this, the ELECTRIC MASTER should be set to ON (see 3.2.4 - RESTARTING THE ENGINE WITH WINDMILLING PROPELLER). A loss of altitude of at least 1000 ft (300 meters) must be expected.

If it is not possible to start the engine:

- Adopt glide configuration as in 3.4 - GLIDING.
- Carry out emergency landing as in 3.5.1 - EMERGENCY LANDING WITH ENGINE OFF.

CAUTION

Engine restart following an engine fire should only be attempted if it is unlikely that a safe emergency landing can be made. It must be expected that engine restart is impossible after an engine fire.

END OF CHECKLIST

3.2.6 DEFECTIVE RPM REGULATING SYSTEM

CAUTION

Following a failure of the governor the RPM should be adjusted with the power lever. Every effort should be made not to exceed 2500 RPM.

CAUTION

The power lever should be moved slowly, in order to avoid over-speeding and excessively rapid RPM changes. The light wooden propeller blades produce more rapid RPM changes than metal blades.

WARNING

It is possible that the propeller blades remain in the position of highest pitch in case of a malfunction of the engine control unit. In this case the reduced engine performance should be anticipated.

(a) Oscillating RPM

1. Power setting .... change

If the problem does not clear:

2. ECU SWAP .... ECU B

NOTE

If the problem does not clear itself, switch back to AUTOMATIC and land on the nearest airfield.

END OF CHECKLIST

(b) Propeller Overspeed

CAUTION

Climb performance will be reduced.

NOTE

Constant propeller overspeed indicates that the defective governor holds the propeller blades at the fine pitch stop.

NOTE

The propeller now works like a fixed pitch propeller. RPM is controlled by the engine power setting. Flight to the nearest airfield can be continued with a lower power setting and at a lower airspeed. Climb and go-around remain possible.

1. Power lever .... reduce to not exceed 2300 RPM
2. Flaps .... check UP
3. Airspeed .... 73 KIAS
4. Power lever .... as required, do not exceed 2300 RPM
5. ECU SWAP .... ECU B

NOTE

Keep controlling the climb/sink rate with the power lever and do not exceed 2300 RPM.

CONTINUED

If the problem does not clear:

6. ECU SWAP .... AUTOMATIC
7. Land on the next suitable airfield.

If an increased climb rate is required:

8. Flaps .... T/O position
9. Airspeed .... 66 KIAS
10. Power lever .... as required, do not exceed 2300 RPM

NOTE

If situation requires increased engine power, a maximum of 2500 RPM is permissible for a maximum of 10 minutes. Set the power lever to a maximum of 2300 RPM as soon as increased engine power is not required anymore.

Special maintenance of the engine and the propeller is required before next flight.

END OF CHECKLIST

(c) Propeller Underspeed

NOTE

The propeller speed is constantly below the speed that is correct for the given power setting. This indicates that the governor holds the propeller blades at the high pitch stop.

1. Power lever .... as required
2. ECU SWAP .... ECU B

NOTE

If selecting ECU B does not solve the problem, switch back to AUTOMATIC.

WARNING

Due to this problem the propeller RPM will drop to 1400 RPM or below. There will be no climb performance and no go-around power available. Level flight should be possible except in rough weather.

3. Land as soon as possible.

END OF CHECKLIST

3.2.7 FUEL TRANSFER PUMP FAILURE

1. Emergency fuel valve .... EMERG. TRANSFER

CAUTION

When set to EMERG. TRANSFER, the emergency fuel valve transfers fuel using the engine driven fuel pump from the auxiliary tank to the main tank at a rate of approximately 18 to 21 US gal/h (70 to 80 liters/h).

WARNING

The emergency fuel valve must be switched back to NORMAL before the auxiliary tank indication reads zero! Otherwise, the engine will stop during flight when the auxiliary tank is empty.

WARNING

When the fuel pump takes in air (e.g. when the emergency fuel valve is not switched back and the auxiliary tank is empty), an inspection of the pump is necessary prior to next flight.

2. AUX tank .... monitor quantity
3. MAIN tank .... monitor quantity

NOTE

AUX tank quantity must not be less than 1 US gal and MAIN tank quantity must not be more than 15 US gal.

4. Emergency fuel valve .... NORMAL

END OF CHECKLIST

3.3 SMOKE AND FIRE

3.3.1 SMOKE AND FIRE ON GROUND

(a) Engine Fire When Starting on the Ground

1. Emergency fuel valve .... OFF
2. Fuel transfer pump .... OFF
3. ENGINE MASTER .... OFF
4. ELECTRIC MASTER .... OFF

After standstill:

5. Canopy .... open
6. Airplane .... evacuate immediately

END OF CHECKLIST

(b) Electrical Fire with Smoke on the Ground

1. ELECTRIC MASTER .... OFF

If the engine is running:

2. Power lever .... IDLE
3. ENGINE MASTER .... OFF

When the engine has stopped:

4. Canopy .... open
5. Airplane .... evacuate immediately

END OF CHECKLIST

3.3.2 SMOKE AND FIRE DURING TAKE-OFF

(a) If Take-Off Can Still Be Aborted

1. Power lever .... IDLE
2. Cabin heat .... OFF
3. Brakes .... apply - bring the airplane to a stop
4. After stopping .... proceed as in 3.3.1 - SMOKE AND FIRE ON GROUND

END OF CHECKLIST

(b) If Take-Off Cannot Be Aborted

1. Cabin heat .... OFF
2. If possible, fly along a short-cut traffic circuit and land on the airfield.

WARNING

If, in the event of an engine problem occurring during take-off, the take-off can no longer be aborted and a safe height has not been reached, then a straight-ahead emergency landing should be carried out. Do not attempt to turn back to the airfield. Turning back can be fatal.

3. Airspeed .... 73 KIAS (1150 kg, 2535 lb)
   68 KIAS (1000 kg, 2205 lb)
   60 KIAS (850 kg, 1874 lb)

CONTINUED

After climbing to a height from which the selected landing area can be reached safely:

4. Emergency fuel valve .... OFF
5. Fuel transfer pump .... OFF
6. Cabin heat .... OFF
7. ENGINE MASTER .... OFF
8. ELECTRIC MASTER .... OFF
9. Emergency windows .... open if necessary
10. Carry out emergency landing with engine off. Allow for increased landing distance due to the flap position.

CAUTION

In case of extreme smoke development, the front canopy may be unlatched during flight. This allows it to partially open, in order to improve ventilation. The canopy will remain open in this position. Flight characteristics will not be affected significantly.

When airplane has stopped:

11. Canopy .... open
12. Airplane .... evacuate immediately

END OF CHECKLIST

3.3.3 SMOKE AND FIRE IN FLIGHT

WARNING

In the event of smoke or fire, prepare to land the airplane without delay while completing fire suppression and/or smoke evacuation procedures. If it cannot be visually verified that the fire has been completely extinguished, whether the smoke has cleared or not, land immediately.

(a) Engine Fire in Flight

1. Cabin heat .... OFF
2. Select appropriate emergency landing area.

When it seems certain that the landing area will be reached:

3. Emergency fuel valve .... OFF
4. Power lever .... MAX
5. Emergency windows .... open if required
6. Carry out emergency landing with engine off.

CAUTION

In case of extreme smoke development, the front canopy may be unlatched during flight. This allows it to partially open, in order to improve ventilation. The canopy will remain open in this position. Flight characteristics will not be affected significantly.

When airplane has stopped:

7. Canopy .... open
8. Airplane .... evacuate immediately

END OF CHECKLIST

(b) Electrical Fire with Smoke in Flight

1. EMERGENCY switch .... ON, if installed
2. AVIONIC MASTER .... OFF
3. ELECTRIC MASTER .... OFF
4. Cabin heat .... OFF
5. Emergency windows .... open if required
6. Land at an appropriate airfield immediately

WARNING

Switching OFF the ELECTRIC MASTER will lead to total failure of all electronic and electric equipment. Also affected from this are the attitude gyro (artificial horizon) and the directional gyro, if installed.

However, by switching the EMERGENCY switch ON, the emergency battery will supply power to the attitude gyro (artificial horizon) and the flood light.

In case of extreme smoke development, the front canopy may be unlatched during flight. This allows it to partially open, in order to improve ventilation. The canopy will remain open in this position. Flight characteristics will not be affected significantly.

When airplane has stopped:

7. Canopy .... open
8. Airplane .... evacuate immediately

END OF CHECKLIST

3.4 GLIDING

1. Flaps . . . . UP
2. Airspeed . . . . 73 KIAS (1150 kg, 2535 lb)
   68 KIAS (1000 kg, 2205 lb)
   60 KIAS (850 kg, 1874 lb)

NOTE

The glide ratio is 8.8; i.e., for every 1000 ft (305 meters) of altitude loss the maximum horizontal distance traveled in still air is 1.45 NM (2.68 km). During this the propeller will continue to windmill.

With a stationary propeller the glide ratio is 10.3; this corresponds to a maximum horizontal distance of 1.70 NM (3.14 km) for every 1000 ft altitude. In consideration of a safe airspeed however, this configuration may not be attainable.

END OF CHECKLIST

3.5 EMERGENCY LANDINGS

3.5.1 EMERGENCY LANDING WITH ENGINE OFF

1. Select suitable landing area. If no level landing area is available, a landing on an upward slope should be sought.
2. Consider wind.
3. Approach: If possible, fly along a short-cut rectangular circuit. On the downwind leg of the circuit the landing area should be inspected for obstacles from a suitable height. The degree of offset at each part of the circuit will allow the wind speed and direction to be assessed.
4. Airspeed . . . . 73 KIAS (1150 kg, 2535 lb)
68 KIAS (1000 kg, 2205 lb)
60 KIAS (850 kg, 1874 lb)
5. Radio . . . . advise ATC
6. Emergency fuel valve . . . . OFF
7. ENGINE MASTER . . . . check OFF

When it is certain that the landing field will be reached:

8. Flaps . . . . LDG
9. Safety harnesses . . . . tighten

CAUTION

If sufficient time is remaining, the risk of fire in the event of a collision with obstacles can be reduced as follows:

- ELECTRIC MASTER . . . . OFF

10. Touchdown . . . . with the lowest possible airspeed

END OF CHECKLIST

3.5.2 LANDING WITH A DEFECTIVE TIRE ON THE MAIN LANDING GEAR

CAUTION

A defective (e.g. burst) tire is not usually easy to detect. The damage normally occurs during take-off or landing, and is hardly noticeable during fast taxiing. It is only during the roll-out after landing or at lower taxiing speeds that a tendency to swerve occurs. Rapid and determined action is then required.

1. Advise ATC.
2. Land the airplane at the edge of the runway that is located on the side of the intact tire, so that changes in direction which must be expected during roll-out due to the braking action of the defective tire can be corrected on the runway.
3. Land with one wing low. The wing on the side of the intact tire should be held low.
4. Direction should be maintained using the rudder. This should be supported by use of the brake. It is possible that the brake must be applied strongly - if necessary to the point where the wheel locks. The wide track of the landing gear will prevent the airplane from tipping over a wide speed range. There is no pronounced tendency to tip even when skidding.

END OF CHECKLIST

3.5.3 LANDING WITH DEFECTIVE BRAKES

In general, a landing on grass is recommended in order to reduce the landing run due to the greater rolling resistance.

CAUTION

If sufficient time is remaining, the risk of fire in the event of a collision can be reduced as follows after a safe touch-down:

- Emergency fuel valve . . . . OFF
- ENGINE MASTER . . . . OFF
- ELECTRIC MASTER . . . . OFF

END OF CHECKLIST

3.6 RECOVERY FROM AN UNINTENTIONAL SPIN

CAUTION

Steps 1 to 4 must be carried out **immediately** and **simultaneously**.

1. Power lever .... IDLE
2. Rudder .... full deflection against direction of spin
3. Elevator (control stick) .... fully forward
4. Ailerons .... neutral
5. Flaps .... UP

When rotation has stopped:

6. Rudder .... neutral
7. Elevator (control stick) .... pull carefully
8. Return the airplane from a descending into a normal flight attitude. Do not exceed the 'never exceed speed' v_{NE} = 178 KIAS.

END OF CHECKLIST

3.7 OTHER EMERGENCIES

3.7.1 ICING

Unintentional Flight Into Icing Conditions

1. Leave the icing area (by changing altitude or turning back, in order to reach zones with a higher ambient temperature).
2. Pitot heating . . . . ON
3. Cabin heat . . . . ON
4. Air distributor lever . . . . DEFROST
5. Power lever . . . . increase power, in order to prevent ice build-up on the propeller blades
6. Alternate air . . . . OPEN
7. Emergency windows . . . . open if required

CAUTION

Ice build-up increases the stalling speed.

8. ATC . . . . advise if an emergency is expected

CAUTION

When the Pitot heating fails:

- Alternate static valve . . . . OPEN
- Emergency windows . . . . close

END OF CHECKLIST

3.7.2 FAILURES IN THE ELECTRICAL SYSTEM

(a) Complete Failure of the Electrical System

1. Circuit breakers .... check if all OK (pressed in)
2. ESSENTIAL BUS .... ON

If there is still no electrical power available:

3. EMERGENCY switch .... ON, if installed
4. Flood light, if necessary .... ON
5. Power .... set based on lever positions and engine noise
6. Prepare landing with flaps in the given position. Refer to 4B.6 - FAILURES IN FLAP OPERATING SYSTEM.
7. Land on the nearest appropriate airfield.

END OF CHECKLIST

(b) Starter Malfunction

If the starter does not disengage from the engine after starting (starter warning light (START) on the annunciator panel remains illuminated or blinking after the engine has started):

1. Power lever .... IDLE
2. ENGINE MASTER .... OFF
3. ELECTRIC MASTER .... OFF

Terminate flight preparation!

END OF CHECKLIST

(c) Voltage

If a voltage in the red range (above 15.5 V or below 11 V) is indicated:

1. Essential bus . . . . ON
2. Land on the nearest appropriate airfield.

END OF CHECKLIST

3.7.3 SUSPICION OF CARBON MONOXIDE CONTAMINATION IN THE CABIN

Carbon monoxide (CO) is a gas which is developed during the combustion process. It is poisonous and without smell. Since it occurs however usually together with flue gases, it can be detected. Increased concentration of carbon monoxide in closed spaces can be fatal. The occurrence of CO in the cabin is possible only due to a defect. If a smell similar to exhaust gases is noticed in the cabin, the following measures should be taken:

1. Cabin heat .... OFF
2. Ventilation .... open
3. Emergency windows .... open
4. Airspeed .... reduce below 120 KIAS
5. Forward canopy .... unlatch, push up and lock in 'Cooling Gap' position

NOTE

The maximum demonstrated airspeed for opening the front canopy in flight is 120 KIAS.

CAUTION

In case of suspicion of carbon monoxide contamination in the cabin, the front canopy may be unlatched during flight. This allows it to partially open, in order to improve ventilation. The canopy will remain open in this position. Flight characteristics will not be affected significantly.

END OF CHECKLIST

3.7.4 'DOOR'-WARNING LIGHT ON

1. Airspeed . . . . reduce immediately
2. Canopy . . . . check visually if closed
3. Rear passenger door . . . . check visually if closed

Canopy Unlocked

4. Airspeed . . . . below 140 KIAS
5. Land at the next suitable airfield.

Rear Door Unlocked

4. Airspeed . . . . below 140 KIAS
5. Land at the next suitable airfield.

WARNING

Do not try to lock the rear door in flight. The safety latch may disengage and the door opens. Usually this results in a separation of the door from the airplane.

NOTE

If the rear door has been lost the airplane can be safely flown to the next suitable airfield.

END OF CHECKLIST

CHAPTER 4A
NORMAL OPERATING PROCEDURES

Page

4A.1 INTRODUCTION

Chapter 4A contains checklists and describes procedures for the normal operation of the airplane.

4A.2 AIRSPEEDS FOR NORMAL OPERATING PROCEDURES

Flight Mass	850 kg (1874 lb)	1000 kg (2205 lb)	1150 kg (2535 lb)
Airspeed for rotation (Take-off run, v_R) (Flaps T/O)	49 KIAS	55 KIAS	59 KIAS
Airspeed for take-off climb (best rate-of-climb speed v_Y) (Flaps T/O)	54 KIAS	60 KIAS	66 KIAS
Airspeed for cruise climb (Flaps UP)	60 KIAS	68 KIAS	73 KIAS
Approach speed for normal landing (Flaps LDG)	58 KIAS	63 KIAS	71 KIAS
Minimum speed during go-around (Flaps T/O)	54 KIAS	60 KIAS	66 KIAS

4A.3 CHECKLISTS FOR NORMAL OPERATING PROCEDURES

4A.3.1 PRE-FLIGHT INSPECTION

I. Cabin Check

a) MET, NAV, Mass & CG .... flight planning completed
b) Airplane documents .... complete and up-to-date
c) ELECTRIC MASTER .... OFF, pull out key
d) ENGINE MASTER .... check OFF
e) ECU SWAP .... check AUTOMATIC
f) Emergency fuel valve .... locked, in NORMAL position
g) Front canopy & rear door .... clean, undamaged, check locking mechanism function
h) All electrical equipment .... OFF
i) Circuit breakers .... set in (if one has been pulled, check reason)
j) Power lever .... check condition, freedom of movement and full travel
k) Power lever .... IDLE
l) ELECTRIC MASTER .... ON
m) Fuel quantity .... check, use alternate mean

NOTE

If the Long Range Tank is installed and the fuel quantity indicator reads 15 US gal, the correct fuel quantity must be determined with the fuel quantity measuring device. If this measurement is not carried out, the fuel quantity available for flight planning is 15 US gal.

CONTINUED

n) Position lights, strobe lights (ACL) .... check
o) ELECTRIC MASTER .... OFF
p) Foreign objects .... check
q) Controls and trim .... free and correct
r) Baggage .... stowed and secured
s) Emergency axe (if OÄM 40-326 is installed) . stowed and secured

END OF CHECKLIST

II. Walk-Around Check, Visual Inspection

CAUTION

A visual inspection means: examination for damage, cracks, delamination, excessive play, load transmission, correct attachment and general condition. In addition control surfaces should be checked for freedom of movement.

CAUTION

In low ambient temperatures the airplane should be completely cleared of ice, snow and similar accumulations.

CAUTION

Prior to flight, remove such items as control surfaces gust lock, Pitot cover, tow bar, etc.

CONTINUED

1. Left main landing gear:

a)	Landing gear strut or fairing	visual inspection
b)	Wheel fairing	visual inspection
c)	Tire inflation pressure (2.5 bar/36 psi)	check
d)	Wear, tread depth of tire	check
e)	Tire, wheel, brake	visual inspection
f)	Brake line connection	check for leaks
g)	Slip marks	visual inspection
h)	Chocks	remove

2. Left wing:

a)	Entire wing surface	visual inspection
b)	Step	visual inspection
c)	Air intake on lower surface	visual inspection
d)	Openings on lower surface	check for foreign objects and for traces of fuel (if tank is full, fuel may spill over through the tank vent)
e)	Tank drain	drain off to check for water and sediment (drain until no water comes out)
f)	Stall warning	check (suck on opening)
g)	Tank filler	visual inspection, use alternate mean for fuel qty. check
h)	Tank air outlet in lower surface	visual inspection
i)	2 stall strips on wing	visual inspection
j)	Pitot probe	clean, orifices clear
k)	Landing/taxi light	visual inspection
l)	Wing tip	visual inspection

CONTINUED

m) Position light, strobe light (ACL) . . . . visual inspection
n) Tie-down . . . . check, clear
o) Aileron and linkage . . . . visual inspection
p) Aileron hinges and safety pin . . . . visual inspection
q) Foreign objects in aileron paddle . . . . visual inspection
r) Flap and linkage . . . . visual inspection
s) Flap hinges and safety pin . . . . visual inspection
t) Static dischargers . . . . visual inspection

3. Fuselage, left side:

a) Canopy, left side . . . . visual inspection
b) Rear cabin door & window . . . . visual inspection
c) Fuselage skin . . . . visual inspection
d) Antennas . . . . visual inspection
e) Autopilot static source (if installed) . . . . check for blockage

4. Empennage:

a) Stabilizers and control surfaces . . . . visual inspection
b) Hinges . . . . visual inspection
c) Elevator trim tab . . . . visual inspection, check safetying
d) Rudder trim tab . . . . visual inspection
e) Tie-down . . . . check, clear
f) Tail skid and lower fin . . . . visual inspection
g) Static dischargers . . . . visual inspection

CONTINUED

5. Fuselage, right side:

a)	Fuselage skin	visual inspection
b)	Rear window	visual inspection
c)	Canopy, right side	visual inspection
d)	Autopilot static source (if installed)	check for blockage

6. Right wing:

a)	Flap and linkage	visual inspection
b)	Flap hinges and safety pin	visual inspection
c)	Aileron and linkage	visual inspection
d)	Aileron hinges and safety pin	visual inspection
e)	Foreign objects in aileron paddle	visual inspection
f)	Wing tip	visual inspection
g)	Position light, strobe light (ACL)	visual inspection
h)	Tie-down	check, clear
i)	Entire wing surface	visual inspection
j)	2 stall strips on wing	visual inspection
k)	Tank air outlet in lower surface	visual inspection
l)	Tank filler	visual check, use alternate mean for fuel qty. check
m)	Openings on lower surface	check for foreign objects and for traces of fuel (if tank is full, fuel may spill over through the tank vent)
n)	Tank drain	drain off to check for water and sediment (drain until no water comes out)

CONTINUED

o) Fuel cooler baffle on stub wing .... check
removed, if OAT on ground is higher than 20 °C (68 °F)
installed, if OAT on ground is lower than 20 °C (68 °F)
p) Step .... visual inspection
q) Static dischargers .... visual inspection

7. Right main landing gear:

a) Landing gear strut or fairing .... visual inspection
b) Wheel fairing .... visual inspection
c) Tire inflation pressure (2.5 bar/36 psi) ...... check
d) Wear, tread depth of tires .... check
e) Tire, wheel, brake .... visual inspection
f) Brake line connection .... check for leaks
g) Slip marks .... visual inspection
h) Chocks .... remove

8. Front fuselage:

a) Engine oil level .... check dipstick (inspection hole in the upper cowling)

CAUTION

Do not check the engine oil level within 5 minutes after engine shut down. The engine oil returns to the oil pan slowly; after 5 minutes 80 %, after 15 minutes 90 % and after 30 minutes 100 % of the engine oil has returned to the oil pan.

Do not overfill the engine with engine oil.

CONTINUED

b) Gearbox oil level .... check visually (inspection hole in the lower cowling)
c) Cowling .... visual inspection
d) 5 air intakes .... clear
e) Propeller .... visual inspection

WARNING

Never move the propeller by hand while the ENGINE MASTER switch is ON! Also do not move the propeller by hand while the ENGINE MASTER is OFF immediately after operation (remaining pressure in the rail). Serious personal injury may result.

f) Spinner including attachment screws .... visual inspection
g) Nose landing gear strut .... visual inspection
h) Gear strut fairing (if installed) .... visual inspection
i) Winter Baffle (if installed) .... visual inspection
j) Tie-down (if installed) .... check, clear
k) Tire and wheel .... visual inspection, check slip marks
l) Wear, tread depth of tire .... check
m) Wheel fairing .... visual inspection
n) Tow bar .... removed
o) Tire inflation pressure (2.0 bar/29 psi) ...... check
p) Chocks .... remove
q) Exhaust .... visual inspection

WARNING

The exhaust can cause burns when it is hot.

CONTINUED

Underside:

r) Antennas (if fitted) .... visual inspection
s) Gascolator .... drain off to check for water and sediment (drain until no water comes out)
t) Venting pipes .... check for blockage
u) Fuselage underside .... check for excessive contamination particularly by oil, fuel, and other fluids

END OF CHECKLIST

4A.3.2 BEFORE STARTING ENGINE

1. Pre-flight inspection .... complete
2. Rudder pedals .... adjusted and locked
3. Passengers .... instructed
4. Safety harnesses .... all on and fastened
5. Rear door .... closed and locked
6. Front canopy .... Position 1 or 2 ("cooling gap")

CAUTION

When operating the canopy, pilots / operators are to ensure that there are no obstructions between the canopy and the mating frame, for example seat belts, clothing, etc. When operating the locking handle do NOT apply undue force.

NOTE

A slight downward pressure on the canopy may be required to ease the handle operation.

7. Parking brake .... set
8. Flight controls .... free movement
9. Trim wheel .... T/O
10. Power lever .... check IDLE
11. Friction device on power lever .... adjusted
12. Alternate air .... check CLOSED
13. Alternate static valve .... check CLOSED
14. AVIONIC MASTER .... check OFF
15. ELECTRIC MASTER .... ON
16. Annunciator panel / engine instruments .... check
17. Acknowledge button .... press

CONTINUED

18. WATER LEVEL caution light . . . . check OFF
19. Fuel temperature . . . . check

WARNING

Never move the propeller by hand.

WARNING

If Diesel Fuel or a blend of Diesel Fuel with JET Fuel is used, or if the fuel grade is unknown, the engine must not be started if the fuel temperature indication on the left side prior to operation is flashing (below -5 °C/ +23 °F) on a conventional instrument panel, or is below -5 °C (+23 °F) on a G1000 instrument panel.

Operation with a flashing fuel temperature indication on a conventional instrument panel (below -5 °C/ +23 °F) or below -5°C (+23 °F) on a G1000 instrument panel is not permitted, as safe operation of the engine under those conditions cannot be ensured and the engine can stop.

NOTE

Make sure which fuel grade is being used (see Section 7.9.5). If it is not possible to determine the fuel grade, the Diesel Fuel temperature limitations must be observed.

END OF CHECKLIST

Affected Chapter:

4A.3 CHECKLISTS FOR NORMAL OPERATING PROCEDURES

4A.3.3 STARTING ENGINE

The CAUTION is added:

CAUTION

Before starting the engine and until the engine is shut down, the canopy must be closed and latched in position 1 or 2 ('cooling gap') and the door must be closed and latched.

During engine operation it is prohibited to enter or exit the airplane.

4A. NORMAL OPERATING PROCEDURES

4A.3 CHECKLISTS FOR NORMAL OPERATING PROCEDURES

4A.3.3 STARTING ENGINE

Item 4 of the checklist is amended to read:

4. ELECTRIC MASTER .... START / release when propeller speed has reached 500 RPM

The CAUTION is added after the second WARNING:

CAUTION

If the TAE 125-02-99 engine with dual mass flywheel (MÄM 40-701) is installed, disengaging the starter below a propeller speed of 500 RPM might damage the gearbox.

4A.3.3 STARTING ENGINE

1. Strobe light (ACL) .... ON
2. Power lever .... check IDLE
3. ENGINE MASTER .... ON, wait until GLOW indication extinguishes

WARNING

Before starting the engine the pilot must ensure that the propeller area is free, and no persons can be endangered.

CAUTION

Do not overheat the starter motor. Do not operate the starter motor for more than 10 seconds. After operating the starter motor, let it cool off for 20 seconds. After 6 attempts to start the engine, let the starter cool off for half an hour.

4. ELECTRIC MASTER .... START
5. Oil pressure .... check

WARNING

If the oil pressure has not moved from the red range within 3 seconds after starting, set the ENGINE MASTER switch to OFF and investigate problem. When starting the cold engine, the oil pressure can be as high as 6.5 bar for a maximum of 20 seconds.

CONTINUED

6. Warm up .... IDLE for 2 minutes
7. Warm up .... 1400 RPM until oil temperature and coolant temperature are in the green range
8. Annunciator panel / engine instruments ..... check
9. Acknowledge button .... press

END OF CHECKLIST

4A.3.4 BEFORE TAXIING

1. AVIONIC MASTER . . . . ON
2. Electrical equipment . . . . ON as required
3. Flaps . . . . UP - T/O - LDG - T/O (indicator and visual check)
4. Flight instruments and avionics . . . . set, test function, as required
5. Flood light . . . . ON, test function, as required
6. Pitot heating . . . . ON, test function
7. Pitot heating . . . . OFF
8. Strobe lights (ACLs) . . . . check ON
9. Position lights, landing and taxi lights . . . . . . ON, test function, as required

CAUTION

When taxiing at close range to other aircraft, or during night flight in clouds, fog or haze, the strobe lights should be switched OFF. The position lights must always be switched ON during night flight.

10. Idle RPM . . . . check, 890 ±20 RPM

END OF CHECKLIST

4A.3.5 TAXIING

1. Parking brake . . . . release
2. Brakes . . . . test on moving off
3. Flight instrumentation and avionics (particularly directional gyro and turn and bank indicator) . . . . check for correct indications

CAUTION

When taxiing on a poor surface select the lowest possible RPM to avoid damage to the propeller from stones or similar items.

CAUTION

Avoid prolonged permanent braking while taxiing. Prolonged permanent braking while taxiing will overheat the brakes and may cause loss of brake capacity and subsequent damage to the airplane.

END OF CHECKLIST

4A.3.6 BEFORE TAKE-OFF

1. Position airplane into wind if possible.
2. Parking brake . . . . set
3. Safety harnesses . . . . on and fastened
4. Rear door . . . . check closed and locked
5. Front canopy . . . . closed and locked

CAUTION

When operating the canopy, pilots / operators are to ensure that there are no obstructions between the canopy and the mating frame, for example seat belts, clothing, etc. When operating the locking handle do NOT apply undue force.

A slight downward pressure on the canopy may be required to ease the handle operation.

6. Door warning light (DOOR) . . . . check no indication
7. Engine instruments . . . . check in green range (except oil pressure may be in yellow range with a warm engine and power lever at IDLE, and fuel temp may be in the low yellow range if the airplane is operated with JET Fuel)

CONTINUED

WARNING

If the airplane is operated with Diesel Fuel or a blend of Diesel Fuel with JET Fuel, or the fuel grade is unknown, the fuel temperature on the left side must be in the green range (minimum +5 °C / +41 °F) before take-off.

CAUTION

If the airplane is operated with Diesel Fuel or a blend of Diesel Fuel with JET Fuel, or the fuel grade is unknown, a safe fuel transfer is not ensured until the fuel temperature indication of both fuel tanks is in the green range (minimum +5 °C / +41 °F).

8. Circuit breakers .... check pressed in
9. Flaps .... check T/O
10. Trim .... check T/O
11. Flight controls .... free movement, correct sense
12. Power lever .... MAX for 10 seconds
13. Oil pressure .... check green range
14. RPM .... stabilizes at 2240 to 2300 RPM
15. LOAD indication .... stabilizes at 90 to 100 %

NOTE

Under high temperature and high altitude conditions, load indications below 90 % are possible.

CONTINUED

16. Power lever .... IDLE
17. ECU TEST .... press and hold
18. Caution lights (ECU A, ECU B, CAUTION) .. blinking
19. 'ECU BACKUP UNSAFE'-light .... blinking, if installed

WARNING

If the caution lights and the 'ECU BACKUP UNSAFE'-light do not illuminate, there is an error in the test procedure. IFR-flights are prohibited.

20. Caution lights (ECU B, CAUTION) .... blinking
21. Propeller RPM .... cycling
22. Caution lights (ECU A, CAUTION) .... blinking
23. Propeller RPM .... cycling
24. Caution lights .... extinguished
25. 'ECU BACKUP UNSAFE'-light .... extinguished

WARNING

If the 'ECU BACKUP UNSAFE'-light does not extinguish after the test, the ECU Backup Battery System does not have sufficient power to supply the engine with electrical power in case of a severe electric malfunction. IFR-flights are prohibited.

When switching from one ECU to the other a slight shake of the engine may occur. In case of longer dropouts of the engine, or if the engine stops during the test, terminate flight preparation.

CONTINUED

26. ECU TEST . . . . release

CAUTION

The whole test procedure must be passed without any error. In case of an error terminate flight preparation even when the engine seems to run smoothly after the test procedure.

27. ECU SWAP . . . . ECU B
28. Engine . . . . check running without a change
29. ECU SWAP . . . . AUTOMATIC

NOTE

When switching from one ECU to the other a slight shake of the engine may occur.

30. Pitot heating . . . . ON, if required
31. Landing light . . . . ON, if required
32. Parking brake . . . . release

END OF CHECKLIST

4A.3.7 TAKE-OFF

Normal Take-Off Procedure

1. Transponder . . . . ON/ALT
2. Power lever . . . . MAX

WARNING

The proper performance of the engine at MAX should be checked early in the take-off procedure, so that the take-off can be aborted if necessary.

3. Elevator . . . . neutral
4. Rudder . . . . maintain direction

NOTE

In strong crosswinds steering can be augmented by use of the toe brakes. It should be noted, however, that this method increases the take-off roll, and should not generally be used.

5. Nose wheel lift-off . . . . at v_R = 59 KIAS (1150 kg, 2535 lb)
   at v_R = 55 KIAS (1000 kg, 2205 lb)
   at v_R = 49 KIAS (850 kg, 1874 lb)

6. Airspeed for initial climb . . . . 66 KIAS

Above a safe height:

7. Landing light . . . . OFF

END OF CHECKLIST

4A.3.8 CLIMB

Procedure for Best Rate of Climb

1. Flaps .... T/O
2. Airspeed .... 66 KIAS (1150 kg, 2535 lb)

NOTE

With lower mass the air speeds can be reduced as given below:

1000 kg / 2205 lb .... 60 KIAS

850 kg / 1874 lb .... 54 KIAS

The engine temperatures must be observed then.

3. Power lever .... MAX
4. Engine instruments .... in green range
5. Trim .... as required

CAUTION

If the oil temperature and/or coolant temperature reaches the yellow range during climb, flight should be continued with an airspeed increased by 5 kts and power reduced by 10 % (reduced climb rate) for better engine cooling.

END OF CHECKLIST

Cruise Climb

1. Flaps . . . . UP
2. Airspeed . . . . 73 KIAS (1150 kg, 2535 lb)

NOTE

With lower mass the air speeds can be reduced as given below:
1000 kg / 2205 lb . . . . 68 KIAS
850 kg / 1874 lb . . . . 60 KIAS
The engine temperatures must be observed then.

3. Power lever . . . . MAX
4. Engine instruments . . . . in green range
5. Trim . . . . as required

END OF CHECKLIST

4A.3.9 CRUISE

1. Flaps . . . . UP
2. Power lever . . . . performance as required
3. Trim . . . . as required
4. Fuel transfer . . . . repeat as required (in accordance with 4A.3.10 - FUEL TRANSFER)

NOTE

The engine manufacturer recommends a cruise power setting of 70 %.

NOTE

Proper operation of the transfer pump must be checked by monitoring the fuel quantities (increasing in the MAIN tank, decreasing in the AUX tank).

END OF CHECKLIST

4A.3.10 FUEL TRANSFER

CAUTION

During normal operation fuel is taken from the main tank only. Therefore fuel must be transferred from the auxiliary tank to the main tank by activating the fuel transfer pump. The transfer rate is approximately 60 US gal/h (227 liters/h).

1. Fuel transfer switch .... ON

NOTE

The transfer pump turns off automatically to avoid overfilling the main tank. The switch remains in its position. If the pump is not turned off, it will continue pumping each time the fuel level in the main tank drops, but only as long as there is fuel in the auxiliary tank. The fuel transfer status light is illuminated only while the pump is running.

2. Fuel transfer switch .... OFF, if required

NOTE

If the fuel transfer status light starts to blink, the fuel transfer pump must be switched off.

END OF CHECKLIST

4A.3.11 DESCENT

1. Power lever .... as required (below 5000 ft)
   above 5000 ft not less than 30%

CAUTION

Engine combustion may stop unrecognized during descents with idle power at altitudes above 5000 ft with outside air temperatures below -10 °C.

2. Power lever .... clear engine occasionally

Restart Procedure see Chapter 3.2.3 - ENGINE PROBLEMS IN FLIGHT.

END OF CHECKLIST

4A.3.12 LANDING APPROACH

1. Safety harnesses .... check fastened & tightened
2. Airspeed .... reduce to operate flaps (108 KIAS)
3. Flaps .... T/O
4. Trim .... as required
5. Landing light .... as required

Before landing:

6. Power lever .... as required
7. Airspeed .... reduce to operate flaps (91 KIAS)
8. Flaps .... LDG
9. Approach speed .... 71 KIAS (1150 kg, 2535 lb)
   67 KIAS (1092 kg, 2407 lb)
   63 KIAS (1000 kg, 2205 lb)
   58 KIAS (850 kg, 1874 lb)

NOTE

In case of airplanes with a maximum landing mass of 1092 kg (2407 lb), a landing with a higher mass constitutes an abnormal operating procedure. Refer to Sections 2.7 and 4B.7.

NOTE

Higher approach speeds result in a significant longer landing distance during flare.

CAUTION

In conditions such as (e.g.) strong wind, danger of wind shear or turbulence a higher approach speed should be selected.

END OF CHECKLIST

4A.3.13 GO-AROUND

1. Power lever .... MAX
2. Airspeed .... 66 KIAS (1150 kg, 2535 lb)
   60 KIAS (1000 kg, 2205 lb)
   54 KIAS (850 kg, 1874 lb)
3. Flaps .... T/O

Above a safe height:

4. Airspeed .... 73 KIAS
5. Flaps .... UP

END OF CHECKLIST

4A.3.14 AFTER LANDING

1. Power lever .... IDLE
2. Brakes .... as required
3. Transponder .... OFF / STBY
4. Pitot heating .... OFF
5. Avionics .... as required
6. Lights .... as required
7. Flaps .... UP

END OF CHECKLIST

4A.3.15 ENGINE SHUT-DOWN

1. Parking brake .... set
2. Power lever .... IDLE for 2 minutes
3. Engine instruments .... check
4. AVIONIC MASTER .... OFF
5. Electrical consumers .... OFF
6. ENGINE MASTER .... OFF
7. ELECTRIC MASTER .... OFF

CAUTION

Before shut-down the engine must run for at least 2 minutes with the power lever at IDLE to avoid heat damage of the turbo charger.

END OF CHECKLIST

4A.3.16 POST-FLIGHT INSPECTION

1. ENGINE MASTER .... OFF
2. ELECTRIC MASTER .... ON
3. AVIONIC MASTER .... ON
4. ELT .... check activated: listen on 121.5 MHz
5. AVIONIC MASTER .... OFF
6. ELECTRIC MASTER .... OFF
7. Parking brake .... release, use chocks
8. Airplane .... moor, if unsupervised for extended period

END OF CHECKLIST

4A.3.17 FLIGHT IN RAIN

NOTE

Performance deteriorates in rain; this applies particularly to the take-off distance and to the maximum horizontal speed. The effect on the flight characteristics is minimal. Flight through very heavy rain should be avoided because of the associated visibility problems.

4A.3.18 REFUELING

CAUTION

Before refueling, the airplane must be connected to electrical ground. Grounding points: unpainted areas on steps, left and right.

NOTE

If the airplane is operated with Diesel Fuel, additional temperature limitations must be observed.

If JET Fuel is used make sure that no Diesel Fuel is remaining in the tanks, neither in the left nor in the right tank (see fuel grade, Section 7.9.5). Otherwise the temperature limitations for Diesel operation must be observed.

4A.3.19 FLIGHT AT HIGH ALTITUDE

At high altitudes the provision of oxygen for the occupants is necessary. Legal requirements for the provision of oxygen should be adhered to.

Also see Section 2.11 - OPERATING ALTITUDE.

CHAPTER 4B
ABNORMAL OPERATING PROCEDURES

4B.1 PRECAUTIONARY LANDING

NOTE

A landing of this type is only necessary when there is a reasonable suspicion that due to fuel shortage, weather conditions, or at nightfall the possibility of endangering the airplane and its occupants by continuing the flight cannot be excluded. The pilot is required to decide whether or not a controlled landing in a field represents a lower risk than the attempt to reach the target airfield under all circumstances.

NOTE

If no level landing area is available, a landing on an upward slope should be sought.

1. Select appropriate landing area.
2. Consider wind.
3. Approach: If possible, the landing area should be overflown at a suitable height in order to recognize obstacles. The degree of offset at each part of the circuit will allow the wind speed and direction to be assessed.
4. Airspeed . . . . 73 KIAS (1150 kg, 2535 lb)
   68 KIAS (1000 kg, 2205 lb)
   60 KIAS (850 kg, 1874 lb)
5. ATC . . . . advise

CONTINUED

On final approach:

6. Flaps . . . . LDG
7. Approach speed . . . . 67 KIAS (1092 kg, 2407 lb)
   63 KIAS (1000 kg, 2205 lb)
   58 KIAS (850 kg, 1874 lb)
8. Safety harnesses . . . . tighten
9. Touchdown . . . . with the lowest possible airspeed

CAUTION

If sufficient time is remaining, the risk of fire in the event of a collision with obstacles can be reduced as follows after a safe touch-down:

- Emergency fuel valve . . . . OFF
- ENGINE MASTER . . . . OFF
- ELECTRIC MASTER . . . . OFF

END OF CHECKLIST

4B.2 INSTRUMENT INDICATIONS OUTSIDE OF GREEN RANGE

4B.2.1 RPM

High RPM

1. Reduce power.
2. Keep RPM within the green range using the power lever.

NOTE

An RPM in the yellow range is permissible for a short time if required, e.g. for go-around.

CAUTION

If the available power is too low to continue a safe flight, perform a precautionary landing on the nearest airfield in accordance with 4B.1 - PRECAUTIONARY LANDING.

END OF CHECKLIST

4B.2.2 COOLANT TEMPERATURE CT

High Coolant Temperature

- Check coolant qty. caution light (WATER LEVEL).

If off:

During climb:

- Reduce power by 10 %.
- Increase airspeed by 10 KIAS.
- If the coolant temperature does not reach the green range within 60 seconds, reduce power as far as possible and increase airspeed.

During cruise:

- Reduce power.
- Increase airspeed.
- Check coolant temperature in green range.

CAUTION

If the coolant temperature does not return to the green range, perform a precautionary landing on the nearest airfield in accordance with 4B.1 - PRECAUTIONARY LANDING.

If on:

- Reduce power.
- Expect loss of coolant.

CONTINUED

WARNING

A further increase in coolant temperature must be expected. Prepare for an emergency landing in accordance with 3.5.1 - EMERGENCY LANDING WITH ENGINE OFF.

END OF CHECKLIST

Low Coolant Temperature

- Check coolant qty. caution light (WATER LEVEL).

NOTE

During an extended descent from high altitudes with a low power setting coolant temperature may decrease.

If on:

- Reduce power.
- Expect loss of coolant.

WARNING

A further decrease in coolant temperature must be expected. Prepare for an emergency landing in accordance with 3.5.1 - EMERGENCY LANDING WITH ENGINE OFF.

END OF CHECKLIST

4B.2.3 OIL TEMPERATURE OT

High Oil Temperature

- Check oil pressure.

If the oil pressure is low:

- Reduce power.
- Expect loss of oil with engine failure. Prepare for an emergency landing in accordance with 3.5.1 - EMERGENCY LANDING WITH ENGINE OFF.

If the oil pressure is within the green range:

- Reduce power.
- Increase airspeed.
- monitor oil temperature (OT).

END OF CHECKLIST

Low Oil Temperature

- Increase power.
- Reduce airspeed.
- monitor oil temperature (OT).

END OF CHECKLIST

4B.2.4 OIL PRESSURE OP

High Oil Pressure

- Check oil temperature.
- Check coolant temperature.

If the temperatures are within the green range:

- Expect wrong oil pressure indication. Keep monitoring temperatures.

If the temperatures are not within the green range:

- Reduce power.
- Expect engine failure. Prepare for an emergency landing in accordance with 3.5.1 - EMERGENCY LANDING WITH ENGINE OFF.

CAUTION

When starting a cold engine, the oil pressure can be as high as 6.5 bar for a maximum of 20 seconds.

END OF CHECKLIST

Low Oil Pressure

NOTE

If the RPM indication is less than 1500 RPM with the power lever at IDLE, the oil pressure must drop into the red range to cause the caution light to illuminate.

- Reduce power.
- Monitor oil temperature (OT).
- Expect loss of oil with engine failure. Prepare for an emergency landing in accordance with 3.5.1 - EMERGENCY LANDING WITH ENGINE OFF.

END OF CHECKLIST

4B.2.5 GEARBOX TEMPERATURE GT

High Gearbox Temperature

- Reduce power.
- Increase airspeed.

END OF CHECKLIST

4B.2.6 FUEL TEMPERATURE FUEL TEMP

High Fuel Temperature

- Reduce power.
- Increase airspeed.

NOTE

Increased fuel temperature can occur when the fuel quantity in the main tank is low. The fuel temperature can be decreased by transferring fuel from the auxiliary to the main tank.

END OF CHECKLIST

Low Fuel Temperature

- Increase power.
- Reduce airspeed.

If the fuel cooler is in operation (baffle removed):

- Select lower flight altitude, if possible.

END OF CHECKLIST

4B.3 FAILURES IN THE ELECTRICAL SYSTEM INDICATED ON THE ANNUNCIATOR PANEL

4B.3.1 LOW VOLTAGE CAUTION (LOW VOLTS)

This caution is indicated when the normal on-board voltage (14 V) drops below 12.6 V.

Possible reasons are:

- A fault in the power supply.
- RPM too low.

(a) 'Low Voltage' Caution on the Ground

1. Circuit breakers . . . . check
2. Power lever . . . . increase RPM
3. If the caution light does not go out . . . . terminate flight preparation

(b) 'Low Voltage' Caution During Flight

1. Circuit breakers . . . . check
2. Electrical equipment . . . . OFF if not needed
3. If the caution light does not go out . . . . Follow procedure in 4B.3.4 - ALTERNATOR FAILURE

(c) 'Low Voltage' Caution During Landing

- Follow (a) after landing.

END OF CHECKLIST

4B.3.2 ECU A FAILURE (ECU A)

(a) 'ECU A' Caution on the Ground

- Terminate flight preparation.

(b) 'ECU A' Caution During Flight

NOTE

In case of a failure in the electronic ECU (Engine Control Unit) 'A' the system automatically switches to ECU 'B'.

1. Press the ECU TEST button for more than 2 seconds to reset the caution message.

If the ECU A caution re-appears or cannot be reset:

2. Land on nearest suitable airfield.
3. The engine must be serviced after landing.

If the ECU A caution can be reset:

2. Continue flight.
3. The engine must be serviced after landing.

END OF CHECKLIST

4B.3.3 ECU B FAILURE (ECU B)

(a) 'ECU B' Caution on the Ground

- Terminate flight preparation.

(b) 'ECU B' Caution During Flight

1. Press the ECU TEST button for more than 2 seconds to reset the caution message.

If the ECU B caution re-appears, or cannot be reset:

2. Land on nearest suitable airfield.
3. The engine must be serviced after landing.

If the ECU B caution can be reset:

2. Continue flight.
3. The engine must be serviced after landing.

END OF CHECKLIST

4B.3.4 ALTERNATOR FAILURE (ALTERNATOR)

An alternator failure is indicated by an illuminated or blinking alternator caution light (ALTERNATOR) on the annunciator panel. The batteries are the last remaining source of electrical power for a minimum of 30 minutes.

1. Circuit breakers . . . . check; if all are O.K., proceed with step 2
2. ESSENTIAL BUS . . . . ON
3. Electrical equipment . . . . switch OFF all equipment which is not needed
4. Land on the nearest suitable airfield

WARNING

The ECU, which is absolutely necessary for engine operation, needs electrical power. It is recommended to switch off all electrical consumers and to land as soon as possible. Be prepared for an engine failure and an emergency landing. For a severe electrical failure a ECU-Backup-System is installed.

CAUTION

For cases, in which the battery capacity is not sufficient to reach a suitable airfield, an emergency battery is installed in the IFR model, serving as an additional back-up system for the attitude gyro (artificial horizon) and flood light. This battery is switched on with the Emergency Switch, located on the left side of the instrument panel.

END OF CHECKLIST

4B.3.5 ENGINE FAILURE (ENGINE)

1. Engine instrument CED 125 . . . . check
2. Engine instrument AED 125 . . . . check
3. Acknowledge button . . . . press

NOTE

If an indication either on the CED 125 or AED 125 is near the end of the green range, it may happen that it switches over to the yellow or red range for a short time. This will also cause the ENGINE caution light to illuminate.

NOTE

If an indication either on the CED 125 or AED 125 is outside of the green range, proceed in accordance with 4B.2 - INSTRUMENT INDICATIONS OUTSIDE OF THE GREEN RANGE.

END OF CHECKLIST

4B.3.6 PITOT HEATING FAILURE (PITOT)

1. Pitot heating . . . . check ON

NOTE

The Pitot heating caution message is displayed when the Pitot heating is switched off, or when there is a failure of the Pitot heating system. Prolonged operation of the Pitot heating on the ground can also cause the Pitot heating caution message to be displayed. In this case it indicates the activation of the thermal switch, which prevents overheating of the Pitot heating system on the ground. This is a normal function of the system. After a cooling period, the heating system will be switched on again automatically.

If in icing conditions:

2. Expect loss of static instruments.
3. Alternate Static . . . . OPEN
4. Leave icing zone.

END OF CHECKLIST

4B.3.7 LOW FUEL CAUTION (LOW FUEL)

1. Fuel transfer pump .... ON
2. Fuel quantity .... check

CAUTION

As soon as the amount of usable fuel in the main tank is less than 3 US gal (+2/-1 US gal), a caution message is displayed. The indication is calibrated for straight and level flight. The caution message may be triggered during turns which are flown with slip, or while taxiing in curves.

If the caution light does not extinguish:

- Expect loss of fuel.
- Be prepared for an emergency landing.
- Proceed in accordance with 3.5.1 - EMERGENCY LANDING WITH ENGINE OFF.

WARNING

When the fuel pump takes in air (e.g. when the emergency fuel valve is not switched back and the auxiliary tank is empty), an inspection of the pump is necessary prior to next flight.

END OF CHECKLIST

4B.4 FAILURES IN THE ELECTRICAL SYSTEM INDICATED ON THE AUXILIARY ENGINE DISPLAY (AED 125)

4B.4.1 HIGH ELECTRIC LOAD CAUTION (GENERATOR)

This caution is indicated when the consumption of electrical power is too high.

Possible reasons are:

- A fault in wiring or equipment

1. Electrical equipment . . . . switch OFF as necessary and possible to reduce electric load

If the problem does not clear itself:

2. Land on the nearest suitable airfield.

END OF CHECKLIST

4B.4.2 VOLT

Low Voltage

1. Circuit breakers .... check
2. Electrical equipment .... OFF if not needed

If 'Low voltage' is still indicated on the AED 125:

3. Follow procedure in 4B.3.4 - ALTERNATOR FAILURE (ALTERNATOR)

END OF CHECKLIST

High Voltage

- Land on the nearest suitable airfield.

NOTE

The ENGINE caution light on a conventional instrument panel can illuminate during warm-up on the ground due to the increased voltage indication in case of a cold engine (see voltmeter, Section 7.10).

END OF CHECKLIST

4B.5 TAKE-OFF FROM A SHORT GRASS STRIP

1. Brakes .... apply
2. Flaps .... T/O
3. Power lever .... MAX
4. Elevator (control stick) .... fully aft
5. Brakes .... release
6. Hold direction .... using rudder

NOTE

In strong crosswinds steering can be augmented by use of the toe brakes. It should be noted, however, that this method increases the take-off roll, and should not generally be used.

7. Elevator (control stick) .... Release slowly after nose wheel has lifted.
   Allow airplane to lift off as soon as possible and increase speed at low level.
8. Airspeed .... 66 KIAS (1150 kg, 2535 lb)
   60 KIAS (1000 kg, 2205 lb)
   54 KIAS (850 kg, 1874 lb)
9. Flaps .... UP, above safe altitude
10. Airspeed .... 73 KIAS (1150 kg, 2535 lb)
   68 KIAS (1000 kg, 2205 lb)
   60 KIAS (850 kg, 1874 lb)
11. Landing light .... as required

END OF CHECKLIST

4B.6 FAILURES IN FLAP OPERATING SYSTEM

Failure in Position Indication or Function

- Check flap position visually.
- Keep airspeed in white sector.
- Re-check all positions of the flap switch.

Modified Approach Procedure Depending on the Available Flap Setting

(a) Only UP available:

Airspeed . . . . 73 KIAS (1150 kg, 2535 lb)
68 KIAS (1000 kg, 2205 lb)
60 KIAS (850 kg, 1874 lb)

Land at a flat approach angle, use power lever to control airplane speed and rate of descent.

(b) Only T/O available:

Airspeed . . . . 73 KIAS (1150 kg, 2535 lb)
68 KIAS (1000 kg, 2205 lb)
60 KIAS (850 kg, 1874 lb)

Land at a flat approach angle, use power lever to control airplane speed and rate of descent.

(c) Only LDG available:

Perform normal landing.

END OF CHECKLIST

4B.7 LANDING WITH HIGH LANDING MASS

NOTE

This Section only applies to airplanes with a maximum landing mass of 1092 kg (2407 lb). In case of airplanes with a maximum landing mass of 1150 kg (2535 lb) a landing with a mass between 1092 kg and 1150 kg (2407 and 2535 lb) constitutes a normal operating procedure. Refer to Sections 2.7 and 4A.3.12.

NOTE

The maximum landing mass given in Chapter 2 is the highest mass for landing conditions at the maximum descent velocity. This velocity was used in the strength calculations to determine the landing gear loads during a particularly hard landing.

Perform landing approach and landing according to Chapter 4A, but maintain an increased airspeed during landing approach.

Approach speed . . . . 71 KIAS (1150 kg, 2535 lb)

WARNING

Damage of the landing gear can result from a hard landing with a flight mass above the maximum landing mass.

END OF CHECKLIST

Intentionally left blank.

CHAPTER 5
PERFORMANCE

5.1 INTRODUCTION

The performance tables and diagrams on the following pages are presented so that, on the one hand, you can see what performance you can expect from your airplane, while on the other they allow comprehensive and sufficiently accurate flight planning. The values in the tables and the diagrams were obtained in the framework of the flight trials using an airplane and power-plant in good condition, and corrected to the conditions of the International Standard Atmosphere (ISA = 15 °C/59 °F and 1,013.25 hPa/29.92 inHg at sea level).

The performance diagrams do not take into account variations in pilot experience or a poorly maintained airplane. The performances given can be attained if the procedures quoted in this manual are applied, and the airplane has been well maintained.

Where appropriate, any flight performance degradation resulting from the absence of wheel fairings is given as a percentage.

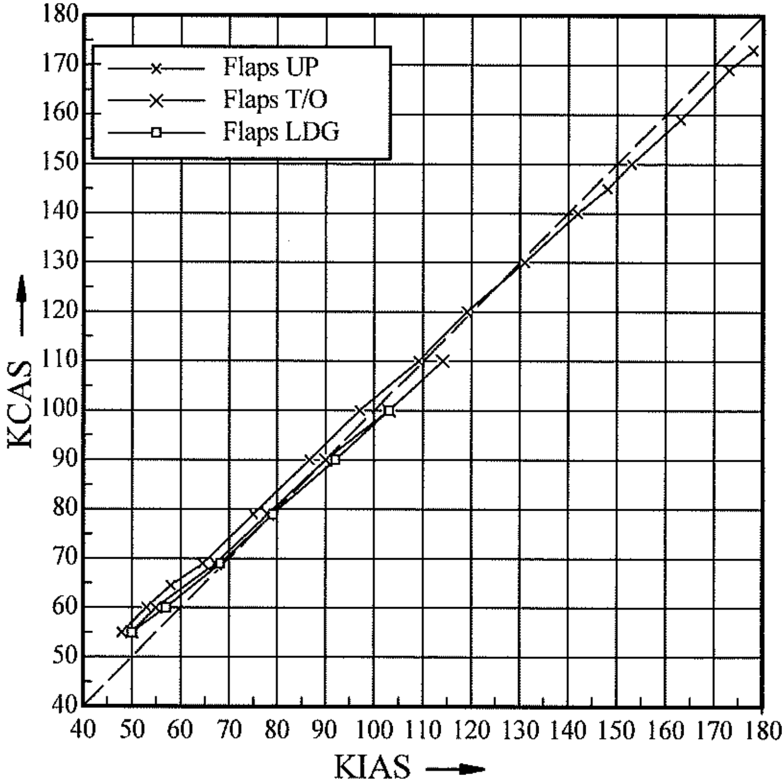
5.2 USE OF THE PERFORMANCE TABLES AND DIAGRAMS

In order to illustrate the influence of a number of different variables, the performance data is reproduced in the form of tables or diagrams. These contain sufficiently detailed information so that conservative values can be selected and used for the determination of adequate performance data for the planned flight.

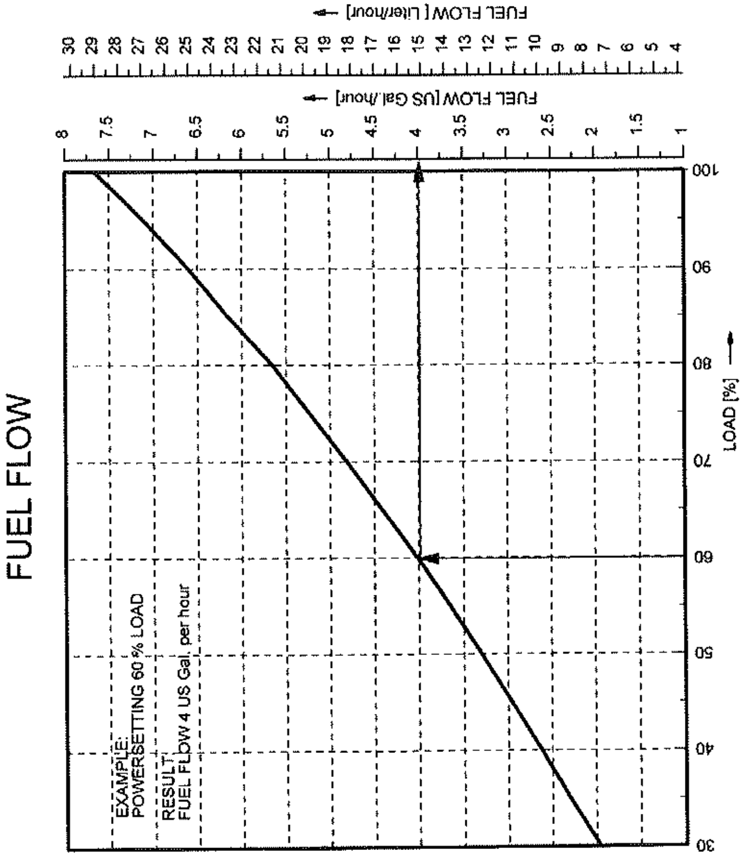
The installation of the optional fairings on the main landing gear struts and/or nose landing gear strut has only minor effects on the flight performance of the DA 40 D. Therefore, no change applies to the performance tables and diagrams.

5.3 PERFORMANCE TABLES AND DIAGRAMS

5.3.1 AIRSPEED CALIBRATION

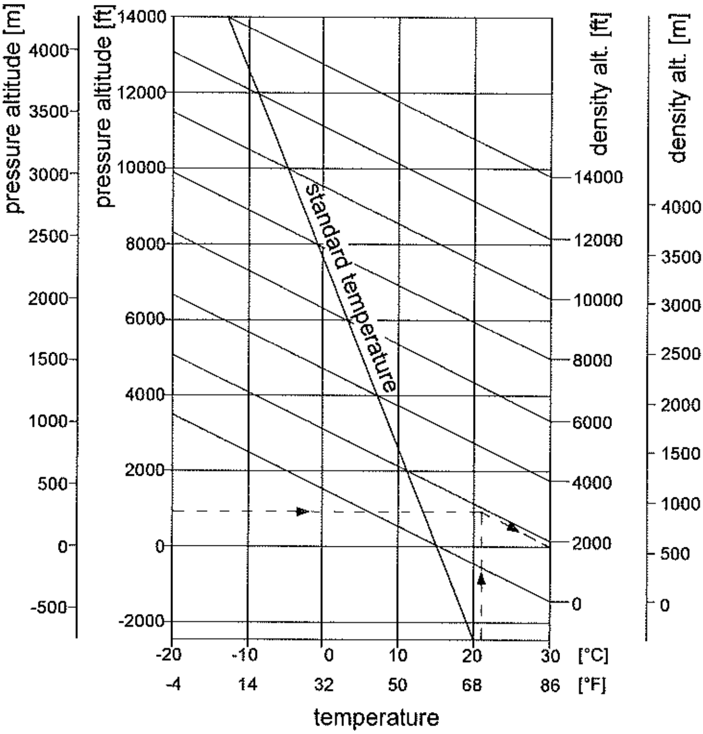


5.3.2 DIAGRAM FOR SETTING ENGINE PERFORMANCE



5.3.3 PRESSURE ALTITUDE - DENSITY ALTITUDE

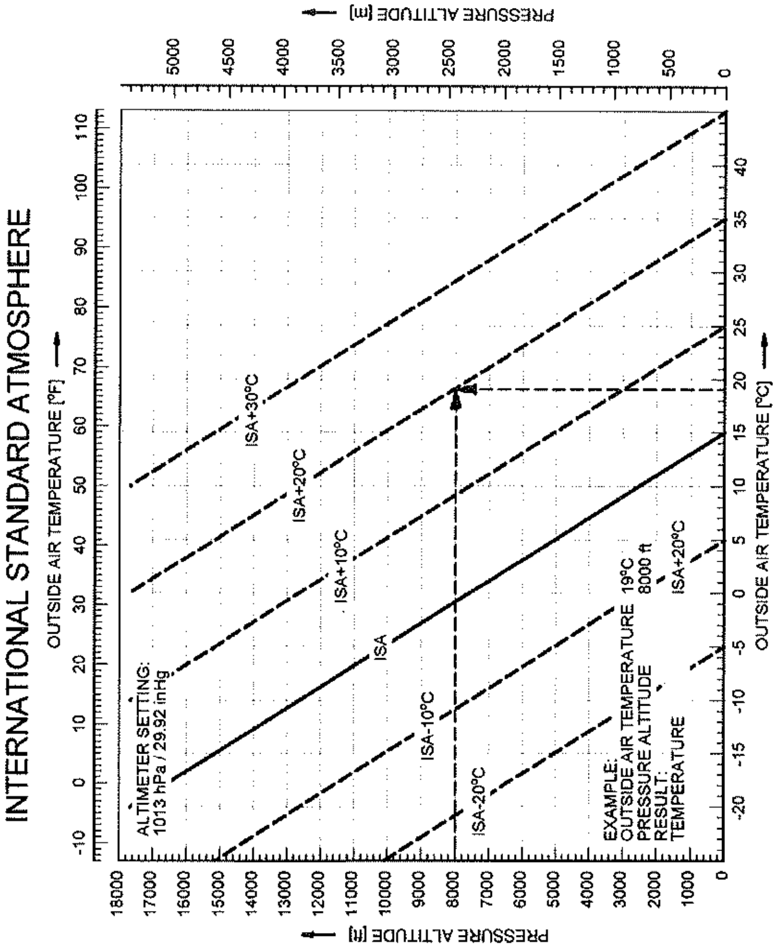
Conversion from pressure altitude to density altitude.



Example:
1. Set 1,013.25 hPa on altimeter and read pressure altitude (900 ft).
2. Establish ambient temperature (+21 °C).
3. Read off density altitude (1800 ft).

Result: From a performance calculation standpoint the airplane is at 1800 ft.

5.3.4 INTERNATIONAL STANDARD ATMOSPHERE



5.3.5 STALLING SPEEDS

Mass: 980 kg (2161 lb)

Airspeeds in KIAS

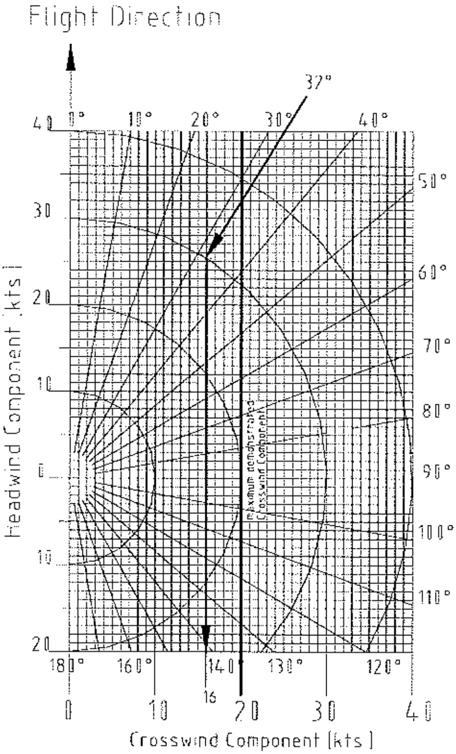
980 kg		Bank Angle			
		0°	30°	45°	60°
Flaps	UP	47	52	58	73
	T/O	44	51	58	72
	LDG	42	49	57	71

Mass: 1150 kg (2535 lb)

Airspeeds in KIAS

1150 kg		Bank Angle			
		0°	30°	45°	60°
Flaps	UP	52	57	66	79
	T/O	51	55	64	78
	LDG	49	55	62	76

5.3.6 WIND COMPONENTS



Example:	Flight direction	:	360°
	Wind	:	32°/30 kts
Result:	Crosswind component	:	16 kts

Max. demonstrated crosswind component : 20 kts

5.3.7 TAKE-OFF DISTANCE

Conditions:	- Power lever	MAX
	- Flaps	T/O
	- Nose wheel lift-off	at v_R = 59 KIAS (1150 kg, 2535 lb)
		at v_R = 55 KIAS (1000 kg, 2205 lb)
		at v_R = 49 KIAS (850 kg, 1874 lb)
	- Airspeed for initial climb	66 KIAS (1150 kg, 2535 lb)
		60 KIAS (1000 kg, 2205 lb)
		54 KIAS (850 kg, 1874 lb)
	- Runway	level, asphalt surface

WARNING

Poor maintenance condition of the airplane, deviation from the given procedures as well as unfavorable outside conditions (high temperature, rain, unfavorable wind conditions, including cross-wind) will increase the take-off distance.

CAUTION

For a safe take-off the available runway length must be at least equal to the take-off distance over a 50 ft (15 m) obstacle.

CAUTION

The figures in the following NOTE are typical values. On wet ground or wet soft grass covered runways the take-off roll may become significantly longer than stated below. In any case the pilot must allow for the condition of the runway to ensure a safe take-off.

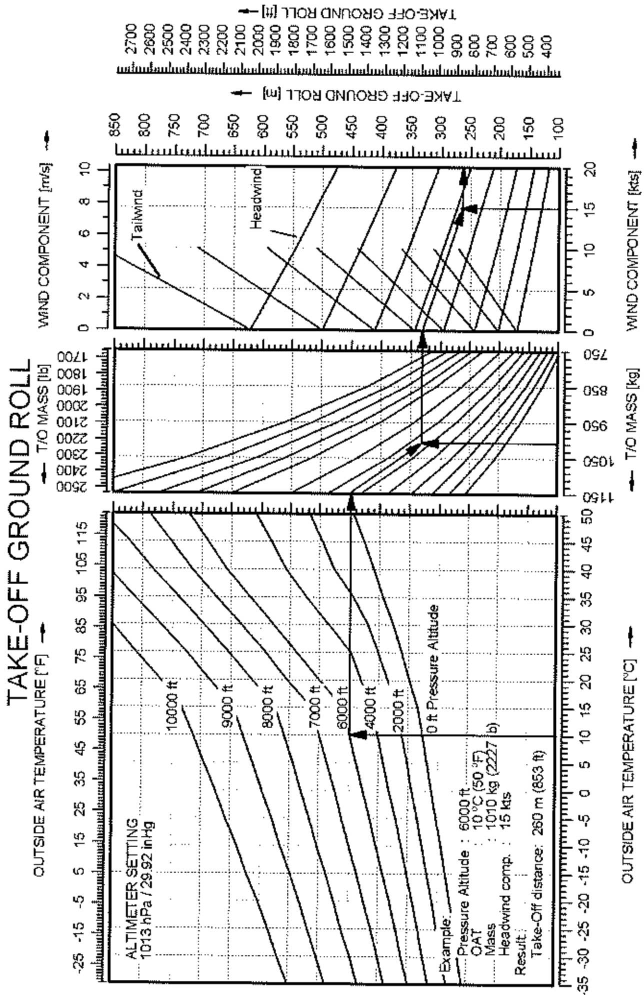
NOTE

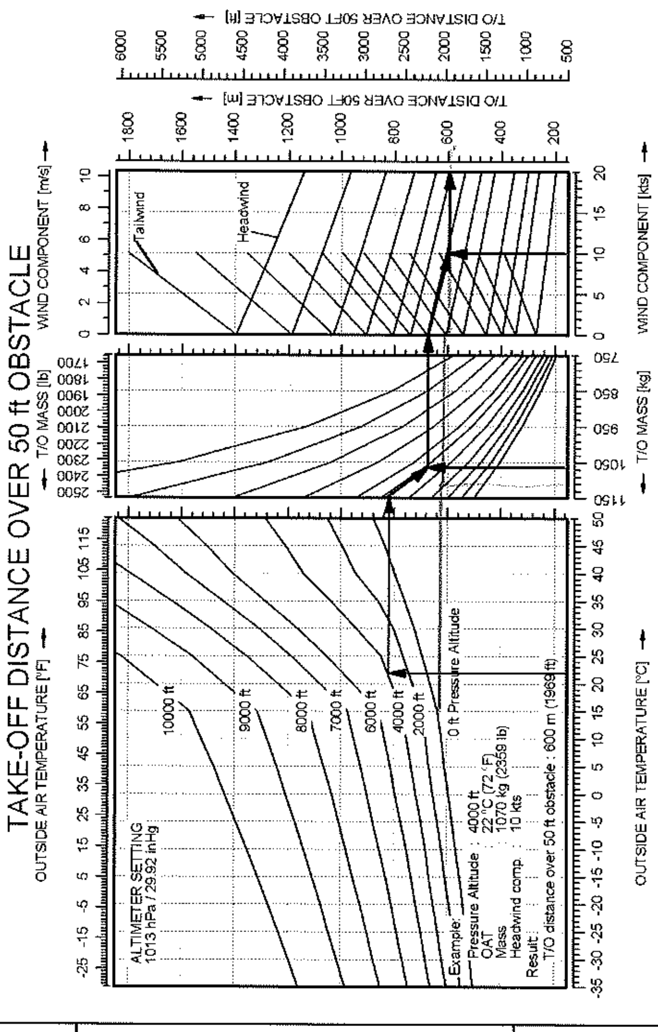
For take-off from dry, short-cut grass covered runways, the following corrections must be taken into account, compared to paved runways (typical values, see CAUTION above):

- Grass up to 5 cm (2 in) long: 10 % increase in take-off roll.
- Grass 5 to 10 cm (2 to 4 in) long: 15 % increase in take-off roll.
- Grass longer than 10 cm (4 in): at least 25 % increase in take-off roll.

NOTE

An uphill slope of 2 % (2 m per 100 m or 2 ft per 100 ft) results in an increase in the take-off distance of approximately 10 %. The effect on the take-off roll can be greater.


TAKE-OFF GROUND ROLL
OUTSIDE AIR TEMPERATURE [°F]
OUTSIDE AIR TEMPERATURE [°C]
T/O MASS [lb]
T/O MASS [kg]
WIND COMPONENT [m/s]
WIND COMPONENT [kts]
TAKE-OFF GROUND ROLL [m]
TAKE-OFF GROUND ROLL [ft]
Tailwind
Headwind
10000 ft
9000 ft
8000 ft
7000 ft
6000 ft
4000 ft
2000 ft
0 ft Pressure Altitude
ALTIMETER SETTING
1013 hPa / 29.92 inHg
Example:
Pressure Altitude : 6000 ft
OAT : 10 °C (50 °F)
Mass : 1010 kg (2227 lb)
Headwind comp. : 15 kts
Result:
Take-Off distance: 260 m (853 ft)


TAKE-OFF DISTANCE OVER 50 ft OBSTACLE
OUTSIDE AIR TEMPERATURE [°F]
OUTSIDE AIR TEMPERATURE [°C]
T/O MASS [lb]
T/O MASS [kg]
WIND COMPONENT [m/s]
WIND COMPONENT [kts]
T/O DISTANCE OVER 50FT OBSTACLE [m]
T/O DISTANCE OVER 50FT OBSTACLE [ft]
Tailwind
Headwind
ALTIMETER SETTING
1013 hPa / 29.92 inHg
10000 ft
9000 ft
8000 ft
7000 ft
6000 ft
4000 ft
2000 ft
0 ft Pressure Altitude
Example:
Pressure Altitude : 4000 ft
OAT : 22 °C (72 °F)
Mass : 1070 kg (2359 lb)
Headwind comp. : 10 kts
Result:
T/O distance over 50 ft obstacle : 600 m (1969 ft)

5.3.8 CLIMB PERFORMANCE - TAKE-OFF CLIMB

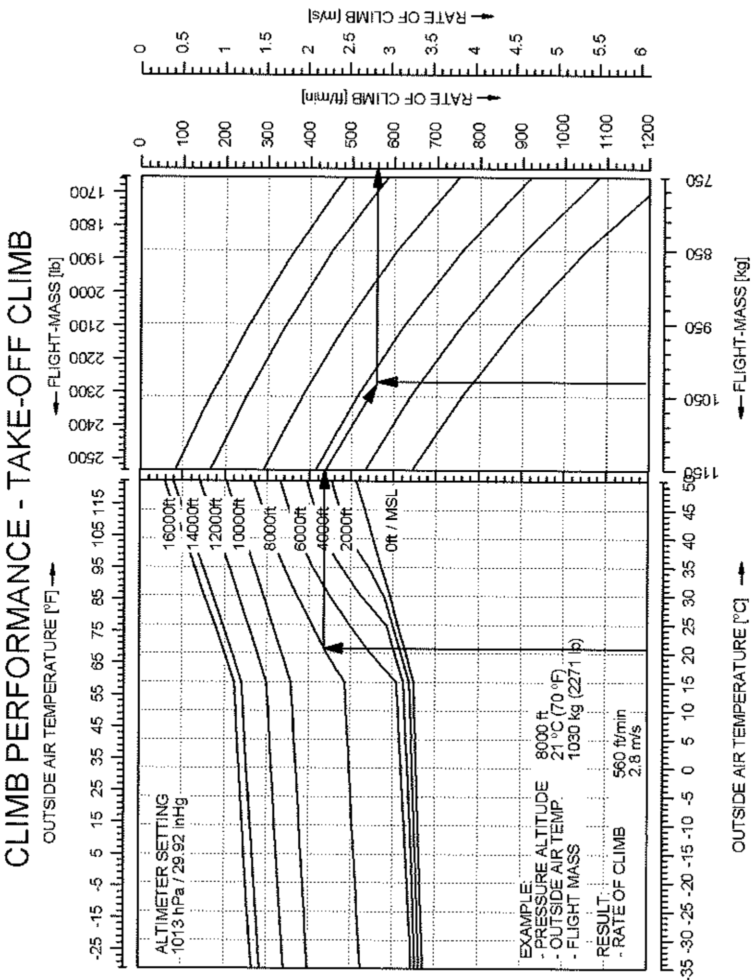
Conditions:
- Power lever .... MAX
- Flaps .... T/O
- Airspeed .... 66 KIAS (1150 kg, 2535 lb)
  60 KIAS (1000 kg, 2205 lb)
  54 KIAS (850 kg, 1874 lb)
- Altitude .... 0 up to 8500 ft pressure altitude

NOTE

The graph on the following page shows the *rate* of climb. The *gradient* of climb cannot easily be determined with a graph, but it can be calculated using the following formulae:

$$\text{Gradient [\%]} = \frac{\text{ROC [fpm]}}{\text{TAS [KTAS]}} \cdot 0.95$$

$$\text{Gradient [\%]} = \frac{\text{ROC [m/s]}}{\text{TAS [KTAS]}} \cdot 190$$


CLIMB PERFORMANCE - TAKE-OFF CLIMB
OUTSIDE AIR TEMPERATURE [°F]
FLIGHT-MASS [lb]
RATE OF CLIMB [m/s]
RATE OF CLIMB [ft/min]
FLIGHT-MASS [kg]
OUTSIDE AIR TEMPERATURE [°C]
16000ft
14000ft
12000ft
10000ft
8000ft
6000ft
4000ft
2000ft
0ft / MSL
ALTIMETER SETTING
1013 hPa / 29.92 inHg
EXAMPLE:
- PRESSURE ALTITUDE 8000 ft
- OUTSIDE AIR TEMP. 21 °C (70 °F)
- FLIGHT MASS 1030 kg (2271 lb)
RESULT:
- RATE OF CLIMB 560 ft/min
2.8 m/s

5.3.9 CLIMB PERFORMANCE - CRUISE CLIMB

Conditions:
- Power lever .... MAX
- Flaps .... UP
- Airspeed .... 73 KIAS (1150 kg, 2535 lb)
  68 KIAS (1000 kg, 2205 lb)
  60 KIAS (850 kg, 1874 lb)
- Altitude .... 0 up to 8500 ft pressure altitude

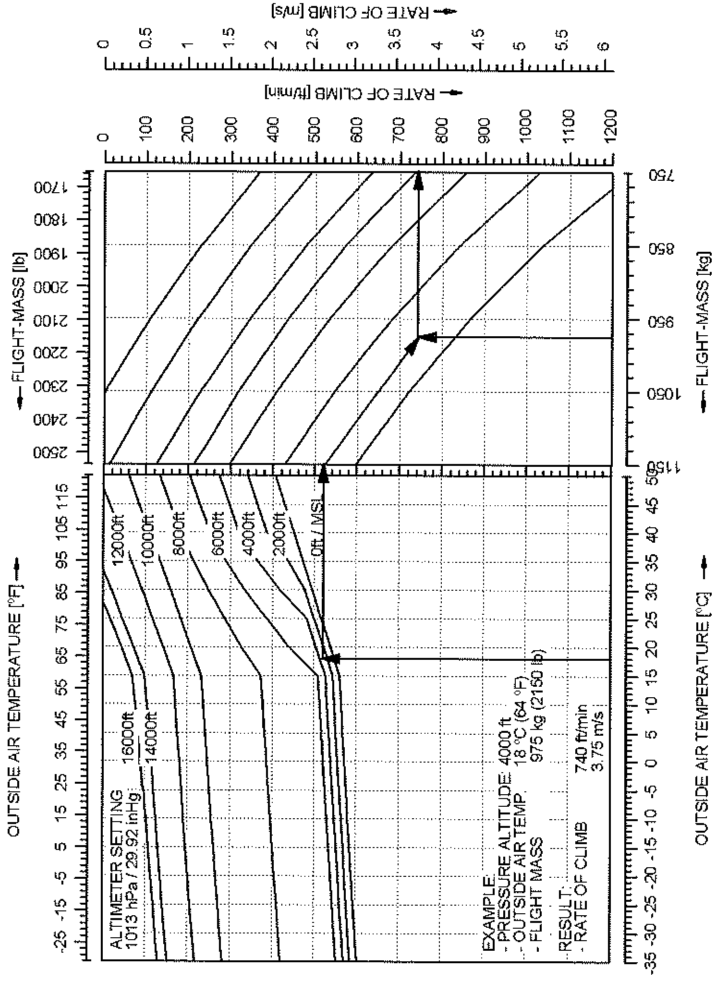
NOTE

The graph on the following page shows the *rate* of climb. The *gradient* of climb cannot easily be determined with a graph, but it can be calculated using the following formulae:

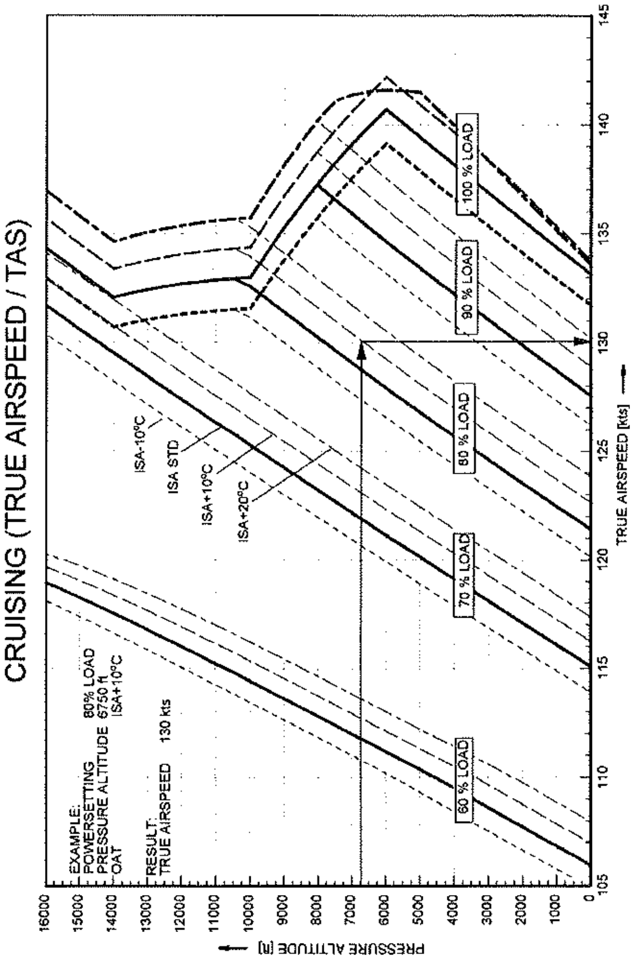
$$\text{Gradient [\%]} = \frac{\text{ROC [fpm]}}{\text{TAS [KTAS]}} \cdot 0.95$$

$$\text{Gradient [\%]} = \frac{\text{ROC [m/s]}}{\text{TAS [KTAS]}} \cdot 190$$

CLIMB PERFORMANCE - CRUISE CLIMB



5.3.10 CRUISING (TRUE AIRSPEED TAS)



5.3.11 LANDING DISTANCE - FLAPS LDG

Conditions:
- Power lever . . . . IDLE
- Flaps . . . . LDG
- Approach speed . . . . 71 KIAS (1150 kg, 2535 lb)
  63 KIAS (1000 kg, 2205 lb)
  58 KIAS (850 kg, 1874 lb)
- Runway . . . . level, asphalt surface

Values for ISA and MSL, at 1150 kg (2535 lb)	
Landing distance over a 50 ft (15 m) obstacle	744 m (2441 ft)
Ground roll	287 m (942 ft)

WARNING

Poor maintenance condition of the airplane, deviation from the given procedures as well as unfavorable outside conditions (high temperature, rain, unfavorable wind conditions, including cross-wind) will increase the landing distance.

CAUTION

For a safe landing the available runway length must be at least equal to the landing distance over a 50 ft (15 m) obstacle.

CAUTION

The figures in the following NOTE are typical values. On wet ground or wet soft grass covered runways the landing distance may become significantly longer than stated below. In any case the pilot must allow for the condition of the runway to ensure a safe landing.

NOTE

For landings on dry, short-cut grass covered runways, the following corrections must be taken into account, compared to paved runways:

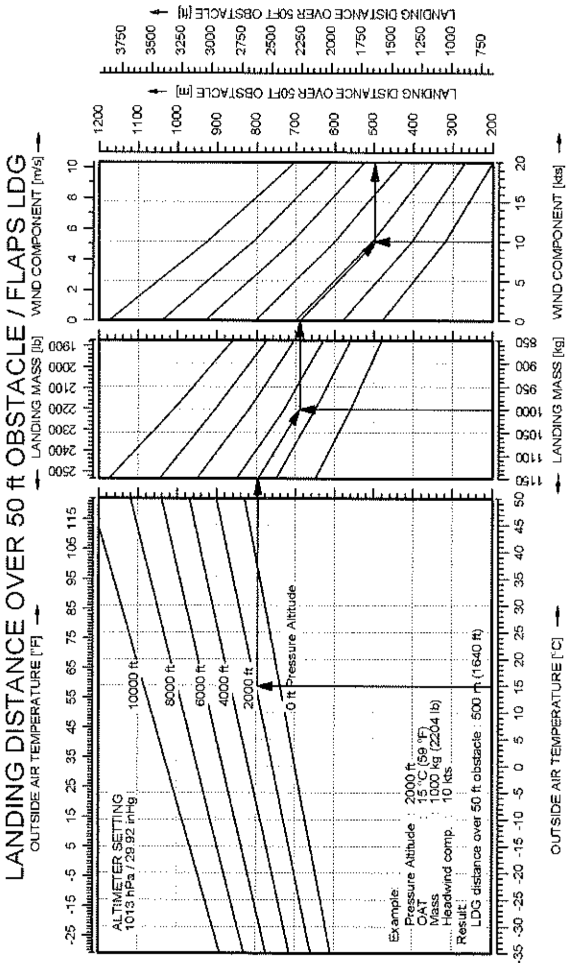
- Grass up to 5 cm (2 in) long: 5 % increase in landing roll.
- Grass 5 to 10 cm (2 to 4 in) long: 15 % increase in landing roll.
- Grass longer than 10 cm (4 in): at least 25 % increase in landing roll.

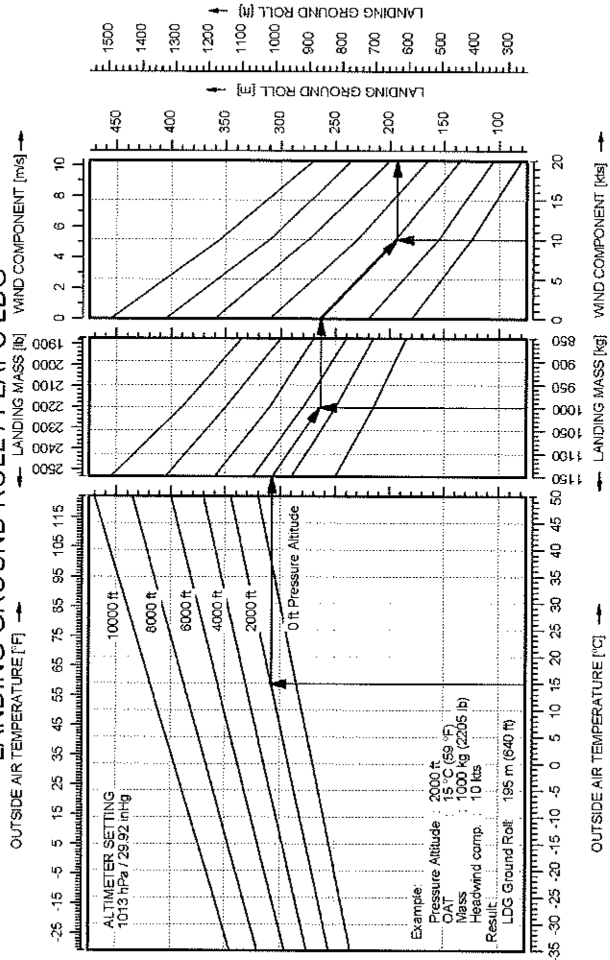
NOTE

A downhill slope of 2 % (2 m per 100 m or 2 ft per 100 ft) results in an increase in the landing distance of approximately 10 %. The effect on the landing roll can be greater.

NOTE

Higher approach speeds result in a significant longer landing distance during flare.


LANDING DISTANCE OVER 50 ft OBSTACLE / FLAPS LDG
OUTSIDE AIR TEMPERATURE [°F]
OUTSIDE AIR TEMPERATURE [°C]
LANDING MASS [lb]
LANDING MASS [kg]
WIND COMPONENT [m/s]
WIND COMPONENT [kts]
LANDING DISTANCE OVER 50FT OBSTACLE [m]
LANDING DISTANCE OVER 50FT OBSTACLE [ft]
ALTIMETER SETTING
1013 hPa / 29.92 inHg
10000 ft
8000 ft
6000 ft
4000 ft
2000 ft
0 ft Pressure Altitude
Example:
Pressure Altitude : 2000 ft
OAT : 15 °C (59 °F)
Mass : 1000 kg (2204 lb)
Headwind comp. : 10 kts
Result:
LDG distance over 50 ft obstacle : 500 m (1640 ft)


LANDING GROUND ROLL / FLAPS LDG
OUTSIDE AIR TEMPERATURE [°F]
OUTSIDE AIR TEMPERATURE [°C]
LANDING MASS [lb]
LANDING MASS [kg]
WIND COMPONENT [m/s]
WIND COMPONENT [kts]
LANDING GROUND ROLL [m]
LANDING GROUND ROLL [ft]
ALTIMETER SETTING
1013 hPa / 29.92 inHg
10000 ft
8000 ft
6000 ft
4000 ft
2000 ft
0 ft Pressure Altitude
Example:
Pressure Altitude : 2000 ft
OAT : 15 °C (59 °F)
Mass : 1000 kg (2205 lb)
Headwind comp. : 10 kts
Result:
LDG Ground Roll: 195 m (640 ft)

5.3.12 LANDING DISTANCE - FLAPS UP

Conditions:
- Power lever .... IDLE
- Flaps .... UP
- Approach speed .... 71 KIAS (1150 kg, 2535 lb)
  63 KIAS (1000 kg, 2205 lb)
  58 KIAS (850 kg, 1874 lb)
- Runway .... level, asphalt surface

Values for ISA and MSL, at 1150 kg (2535 lb)	
Landing distance over a 50 ft (15 m) obstacle	916 m (3005 ft)
Ground roll	304 m (977 ft)

WARNING

Poor maintenance condition of the airplane, deviation from the given procedures as well as unfavorable outside conditions (high temperature, rain, unfavorable wind conditions, including cross-wind) will increase the landing distance.

CAUTION

For a safe landing the available runway length must be at least equal to the landing distance over a 50 ft (15 m) obstacle.

CAUTION

The figures in the following NOTE are typical values. On wet ground or wet soft grass covered runways the landing distance may become significantly longer than stated below. In any case the pilot must allow for the condition of the runway to ensure a safe landing.

NOTE

For landings on dry, short-cut grass covered runways, the following corrections must be taken into account, compared to paved runways:

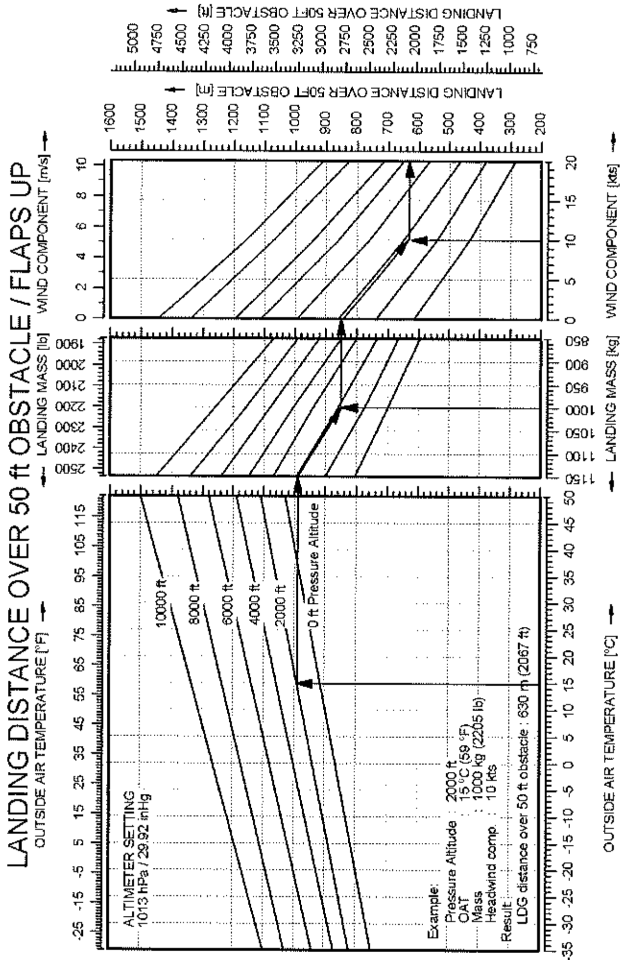
- Grass up to 5 cm (2 in) long: 5 % increase in landing roll.
- Grass 5 to 10 cm (2 to 4 in) long: 15 % increase in landing roll.
- Grass longer than 10 cm (4 in): at least 25 % increase in landing roll.

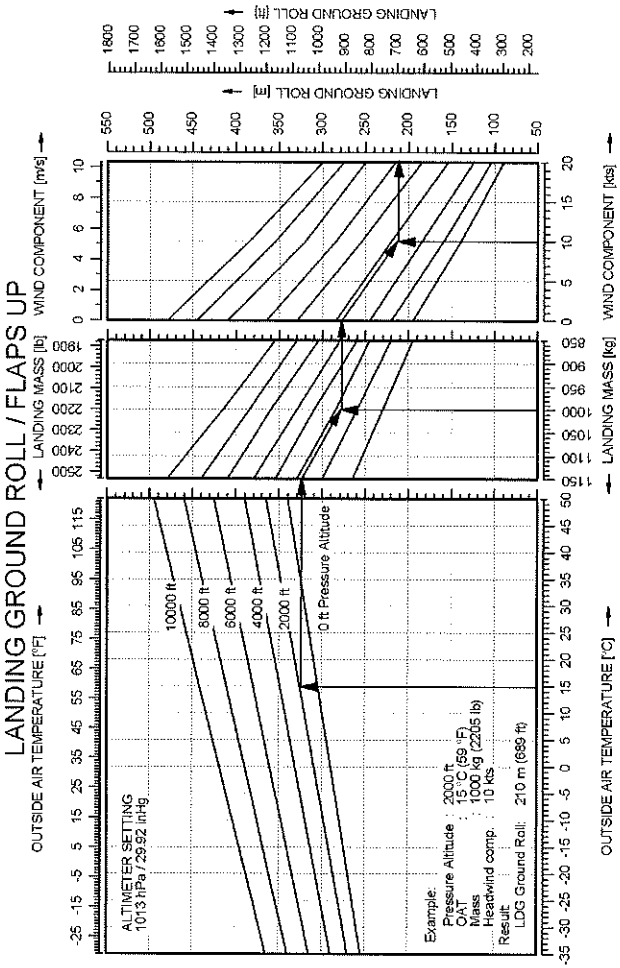
NOTE

A downhill slope of 2 % (2 m per 100 m or 2 ft per 100 ft) results in an increase in the landing distance of approximately 10 %. The effect on the landing roll can be greater.

NOTE

Higher approach speeds result in a significant longer landing distance during flare.


LANDING DISTANCE OVER 50 ft OBSTACLE / FLAPS UP
OUTSIDE AIR TEMPERATURE [°F]
LANDING MASS [lb]
WIND COMPONENT [m/s]
LANDING DISTANCE OVER 50FT OBSTACLE [m]
LANDING DISTANCE OVER 50FT OBSTACLE [ft]
OUTSIDE AIR TEMPERATURE [°C]
LANDING MASS [kg]
WIND COMPONENT [kts]
10000 ft
8000 ft
6000 ft
4000 ft
2000 ft
0 ft Pressure Altitude
ALTIMETER SETTING
1013 hPa / 29.92 inHg
Example:
Pressure Altitude : 2000 ft
OAT : 15 °C (59 °F)
Mass : 1000 kg (2205 lb)
Headwind comp. : 10 kts
Result:
LDG distance over 50 ft obstacle : 630 m (2067 ft)


LANDING GROUND ROLL / FLAPS UP
OUTSIDE AIR TEMPERATURE [°F]
OUTSIDE AIR TEMPERATURE [°C]
LANDING MASS [lb]
LANDING MASS [kg]
WIND COMPONENT [m/s]
WIND COMPONENT [kts]
LANDING GROUND ROLL [m]
LANDING GROUND ROLL [ft]
10000 ft
8000 ft
6000 ft
4000 ft
2000 ft
0 ft Pressure Altitude
ALTIMETER SETTING
1013 hPa / 29.92 inHg.
Example:
Pressure Altitude : 2000 ft
OAT : 15 °C (59 °F)
Mass : 1000 kg (2205 lb)
Headwind comp. : 10 kts
Result:
LDG Ground Roll: 210 m (689 ft)

5.3.13 GRADIENT OF CLIMB ON GO-AROUND

The DA 40 D reaches a constant gradient of climb of 4.86 % (conforming to an angle of 2.8°) in the following condition:

- Mass . . . . max. flight mass (1150 kg, 2535 lb)
- Power lever . . . . MAX
- Flaps . . . . LDG
- Airspeed . . . . 70 KIAS
- ISA, MSL

5.3.14 GLIDE PERFORMANCE

The following table shows the glide ratio and the resulting maximum horizontal distance in nautical miles per 1000 ft of altitude loss in a glide traveled in still air.

	Glide ratio	**Maximum horizontal distance per 1000 ft altitude loss**
Windmilling propeller	8.8	1.45 NM (2.68 km)
Stationary propeller	10.3	1.70 NM (3.14 km)

- Airspeed . . . . 73 KIAS (1150 kg, 2535 lb)
  68 KIAS (1000 kg, 2205 lb)
  60 KIAS (850 kg, 1874 lb)

5.3.15 APPROVED NOISE DATA

If TAE 125-01 engine is installed:

With exhaust pipe:

ICAO Annex 16 Chapter X . . . . 78.7 dB(A)
JAR-36 Subpart C . . . . 78.7 dB(A)

With muffler:

ICAO Annex 16 Chapter X . . . . 69.5 dB(A)
JAR-36 Subpart C . . . . 69.5 dB(A)

If TAE 125-02-99 engine is installed (if MÄM 40-256 carried out):

ICAO Annex 16 Chapter X . . . . 73.0 dB(A)
JAR-36 Subpart C . . . . 73.0 dB(A)

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CHAPTER 6
MASS AND BALANCE / EQUIPMENT LIST

6.1 INTRODUCTION

In order to achieve the performance and flight characteristics described in this Airplane Flight Manual and for safe flight operation, the airplane must be operated within the permissible mass and balance envelope.

The pilot is responsible for adhering to the permissible values for loading and center of gravity (CG). In this, he should note the movement of the CG due to fuel consumption. The permissible CG range during flight is given in Chapter 2.

The procedure for determining the flight mass CG position is described in this Chapter. Over and above this there is a comprehensive list of the equipment approved for this airplane (Equipment List), as also a list of that equipment installed when the airplane was weighed (Equipment Inventory).

Before the airplane is delivered the empty mass and the corresponding CG position are determined, and entered in Section 6.3 - MASS AND BALANCE REPORT.

NOTE

Following equipment changes the new empty mass and the corresponding CG position must be determined by calculation or by weighing.

Following repairs or repainting the new empty mass and the corresponding CG position must be determined by weighing.

Empty mass, empty mass CG position, and the empty mass moment must be certified in the Mass and Balance Report by an authorized person.

NOTE

Refer to Section 1.6 UNITS OF MEASUREMENT for conversion of SI units to US units and vice versa.

6.2 DATUM PLANE

The Datum Plane (DP) is a plane which is normal to the airplane's longitudinal axis and in front of the airplane as seen from the direction of flight. The airplane's longitudinal axis is parallel with the upper surface of a 600:31 wedge which is placed on top of the rear fuselage in front of the vertical stabilizer. When the upper surface of the wedge is aligned horizontally, the Datum Plane is vertical. The Datum Plane is located 2.194 meters (86.38 in) forward of the most forward point of the root rib on the stub wing.

6.3 MASS AND BALANCE REPORT

The empty mass and the corresponding CG position established before delivery are the first entries in the Mass and Balance Report. Every change in permanently installed equipment, and every repair to the airplane which affects the empty mass or the empty mass CG must be recorded in the Mass and Balance Report.

For the calculation of flight mass and corresponding CG position (or moment), the *current* empty mass and the corresponding CG position (or moment) in accordance with the Mass and Balance Report must always be used.

Condition of the airplane for establishing the empty mass:

- Equipment as per Equipment Inventory (see Section 6.5).
- Including brake fluid, lubricant (6.0 liters = 6.3 qts), coolant (6.0 liters = 6.3 qts), gearbox oil (0.9 liters = 0.95 qts), plus unusable fuel (2 US gal = approx. 7.6 liters).

MASS AND BALANCE REPORT

(Continuous report on structural or equipment changes)

DA 40 D				Serial No.:			Registration:			Page No.:		
				Changes in Mass						Current Empty Mass		
				Addition (+)			Subtraction (-)					
	Entry No.		Description of Part or Modification	Mass	Moment Arm	Moment	Mass	Moment Arm	Moment	Mass	Moment Arm	Moment
Date	IN	OUT		[kg]	[m]	[kgm]	[kg]	[m]	[kgm]	[kg]	[m]	[kgm]
			upon delivery									

6.4 FLIGHT MASS AND CENTER OF GRAVITY

The following information enables you to operate your DA 40 D within the permissible mass and balance limits. For the calculation of the flight mass and the corresponding CG position the following tables and diagrams are required:

6.4.1 - MOMENT ARMS
6.4.2 - LOADING DIAGRAM
6.4.3 - CALCULATION OF LOADING CONDITION
6.4.4 - PERMISSIBLE CENTER OF GRAVITY RANGE
6.4.5 - PERMISSIBLE MOMENT RANGE

The diagrams should be used as follows:

1. Take the empty mass and the empty mass moment of your airplane from the Mass and Balance Report, and enter the figures in the appropriate boxes under the column marked 'Your DA 40 D' in Table 6.4.3 - CALCULATION OF LOADING CONDITION.

2. Read the fuel quantity indicators to determine the fuel quantity. If an indicator shows 15 US gal, up to 19.5 US gal can be in the Long Range Tank. In this case, the exact quantity must be determined with the alternate mean for fuel quantity indication.

3. Multiply the individual masses by the moment arms quoted to obtain the moment for every item of loading and enter these moments in the appropriate boxes in Table 6.4.3 - CALCULATION OF LOADING CONDITION.

4. Add up the masses and moments in the respective columns. The total moments may be rounded to whole numbers. The CG position is calculated by dividing the total moment by the total mass (using row 5 for the condition with empty fuel tanks, and row 7 for the pre take-off condition). The resulting CG position must be inside the limits.

   As an illustration the total mass and the CG position are entered on Diagram 6.4.4 - PERMISSIBLE CENTER OF GRAVITY RANGE. This checks graphically that the current configuration of the airplane is within the permissible range.

5. Graphical method:

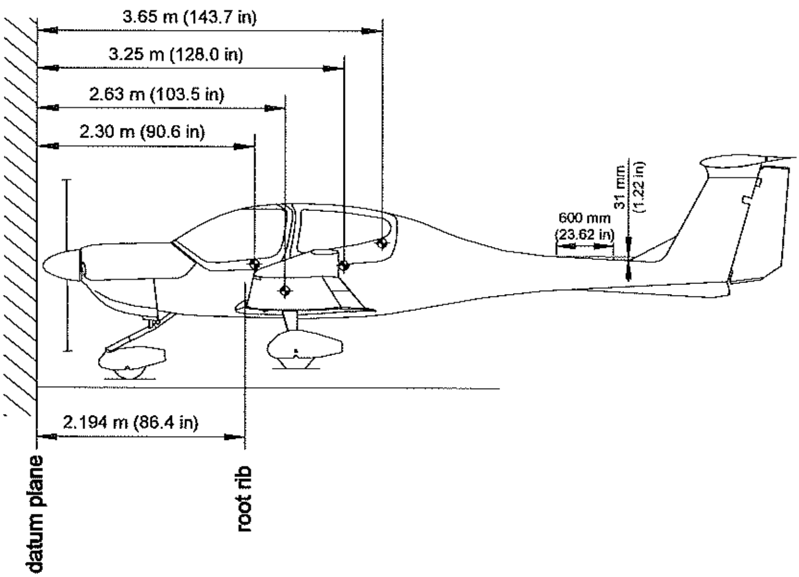
   Diagram 6.4.2 - LOADING DIAGRAM is used to determine the moments. The masses and moments for the individual items of loading are added. Then Diagram 6.4.5 - PERMISSIBLE MOMENT RANGE is used to check whether the total moment associated with the total mass is in the admissible range.

   The result found with the graphical method is however inaccurate. In doubtful cases the result must be verified using the exact method given above.

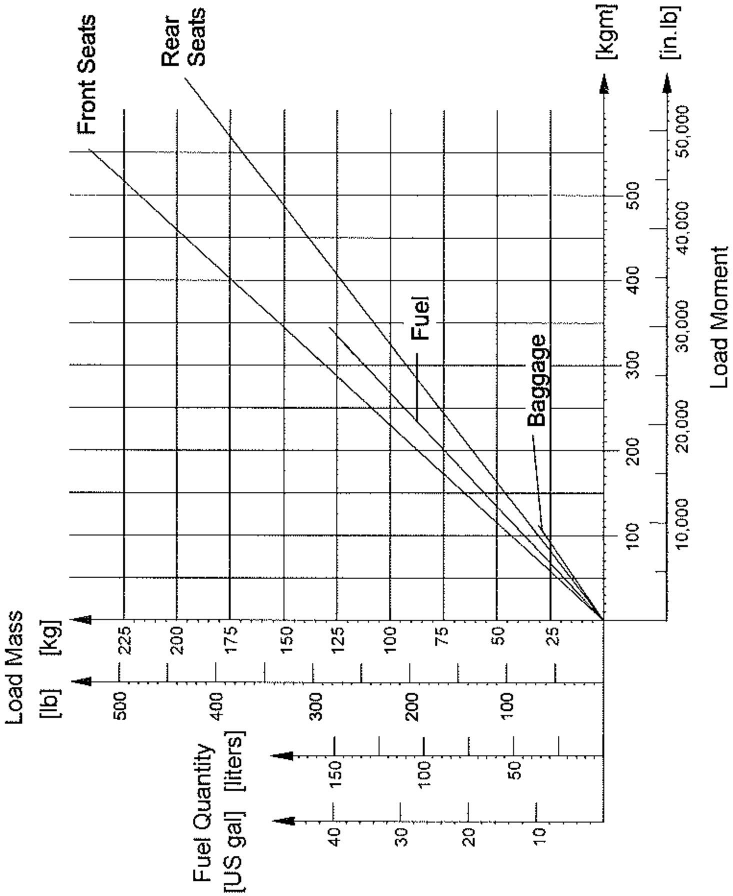
6.4.1 MOMENT ARMS

The most important lever arms aft of the Datum Plane:

- Front seats : 2.30 m 90.6 in
- Rear seats : 3.25 m 128.0 in
- Wing tank : 2.63 m 103.5 in
- Baggage : 3.65 m 143.7 in



6.4.2 LOADING DIAGRAM



6.4.3 CALCULATION OF LOADING CONDITION

a) Standard tank

CALCULATION OF LOADING CONDITION	DA 40 D (Example)		Your DA 40 D	
	Mass [kg] *[lb]*	Moment [kgm] *[in.lb]*	Mass [kg] *[lb]*	Moment [kgm] *[in.lb]*
1. Empty mass (from Mass and Balance Report)	735 *1620*	1820 *158,000*		
2. Front seats Lever arm: 2.30 m *(90.6 in)*	150 *331*	345 *29,989*		
3. Rear seats Lever arm: 3.25 m *(128.0 in)*	150 *331*	487.5 *42,368*		
4. Baggage Lever arm: 3.65 m *(143.7 in)*	0 *0*	0 *0*		
5. Total mass and total moment with empty fuel tanks (Total of 1.-4.)	1035 *2282*	2652.5 *230,357*		
6. On-board usable fuel (0.84 kg/liter) *(7.01 lb/US gal)* Lever arm: 2.63 m *(103.5 in)*	100.8 *222*	265.10 *23,001*		
7. Total mass and total moment with full fuel tanks (Total 5. plus 6.)	1135.8 *2504*	2917.60 *253,357*		
8. The total moments from rows 5 and 7 (2652.5 and 2917.6 kgm *(30,357 and 53,357 in.lb)*) must be divided by the related total mass (1035 and 1135.8 kg *(2282 and 2504 lb)* respectively) and then located in Diagram 6.4.4 - PERMISSIBLE CENTER OF GRAVITY RANGE. As in our example CG positions (2.562 m and 2.569 m *(100.95 and 101.18 in)* respectively) and masses fall into the permitted area, this loading condition is allowable.				

b) Long Range Tank

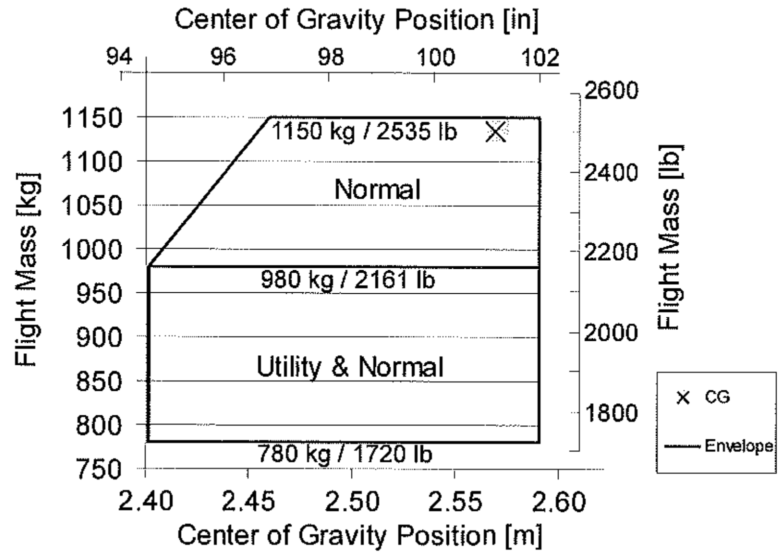
CALCULATION OF LOADING CONDITION	DA 40 D (Example)		Your DA 40 D	
	Mass [kg] *[lb]*	Moment [kgm] *[in.lb]*	Mass [kg] *[lb]*	Moment [kgm] *[in.lb]*
1. Empty mass (from Mass and Balance Report)	735 *1620*	1820 *158,000*		
2. Front seats Lever arm: 2.30 m *(90.6 in)*	150 *331*	345 *29,989*		
3. Rear seats Lever arm: 3.25 m *(128.0 in)*	80 *176*	260 *22,528*		
4. Baggage Lever arm: 3.65 m *(143.7 in)*	0 *0*	0 *0*		
5. Total mass and total moment with empty fuel tanks (Total of 1.-4.)	965 *2127*	2425 *210,517*		
6. On-board usable fuel (0.84 kg/liter) *(7.01 lb/US gal)* Lever arm: 2.63 m *(103.5 in)*	100.8 *222*	265.10 *22,977*		
7. Total mass and total moment with full fuel tanks (Total 5. plus 6.)	1065.8 *2349*	2690.10 *233,494*		

8. The total moments from rows 5 and 7 (2425 and 2690.1 kgm *(210,517 and 233,494 in.lb)*) must be divided by the related total mass (965 and 1065.8 kg *(2127 and 2349 lb)* respectively) and then located in Diagram 6.4.4 - PERMISSIBLE CENTER OF GRAVITY RANGE.

   As in our example CG positions (2.513 m and 2.524 m *(98.97 and 99.40 in)* respectively) and masses fall into the permitted area, this loading condition is allowable.

6.4.4 PERMISSIBLE CENTER OF GRAVITY RANGE

a) Standard Tank:



The CG shown in the diagram is that from the example in Table 6.4.3 (a) CALCULATION OF LOADING CONDITION, row 7 (pre take-off condition).

The flight CG position must be within the following limits:

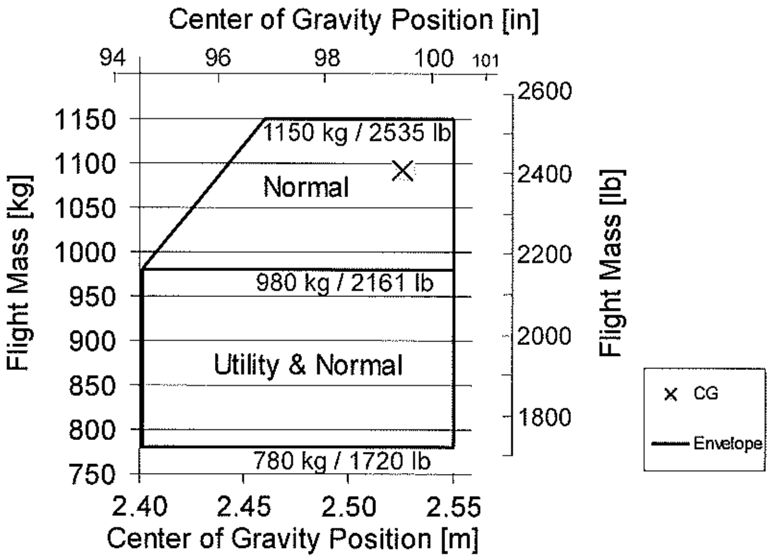
Most forward flight CG:

2.40 m (94.5 in) aft of Datum Plane at 780 to 980 kg (1720 to 2161 lb)
2.46 m (96.9 in) aft of Datum Plane at 1150 kg (2535 lb)
linear variation between these values

Most rearward flight CG:

2.59 m (102.0 in) aft of Datum Plane

b) Long Range Tank



The CG shown in the diagram is that from the example in Table 6.4.3 (b) CALCULATION OF LOADING CONDITION, row 7 (pre take-off condition).

The flight CG position must be within the following limits:

Most forward flight CG:

2.40 m (94.5 in) aft of Datum Plane at 780 to 980 kg (1720 to 2161 lb)

2.46 m (96.9 in) aft of Datum Plane at 1150 kg (2535 lb)

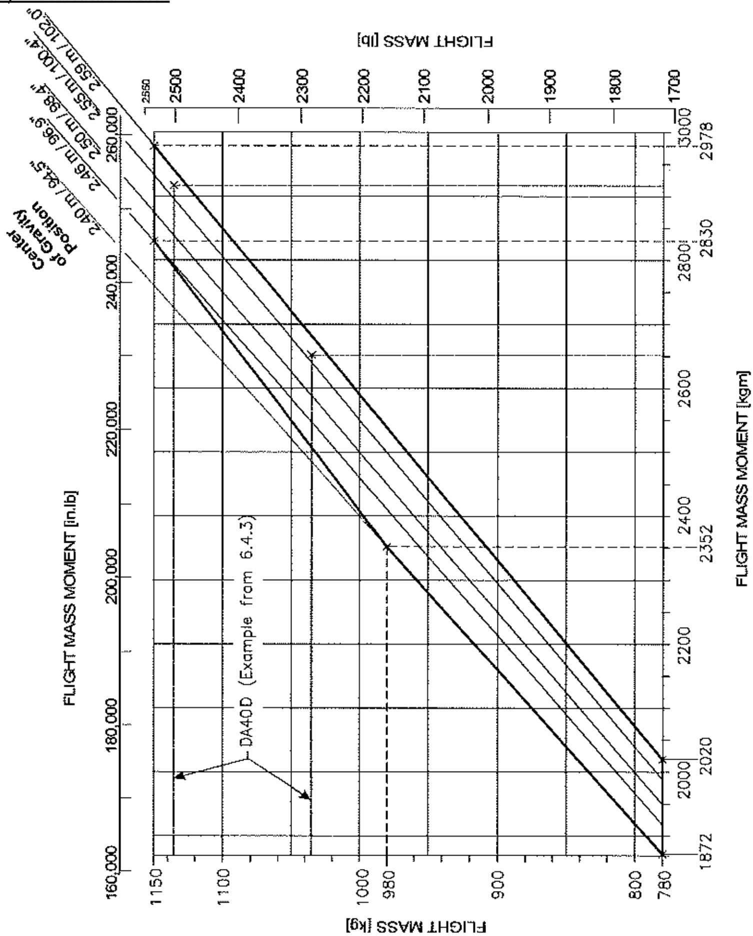
linear variation between these values

Most rearward flight CG:

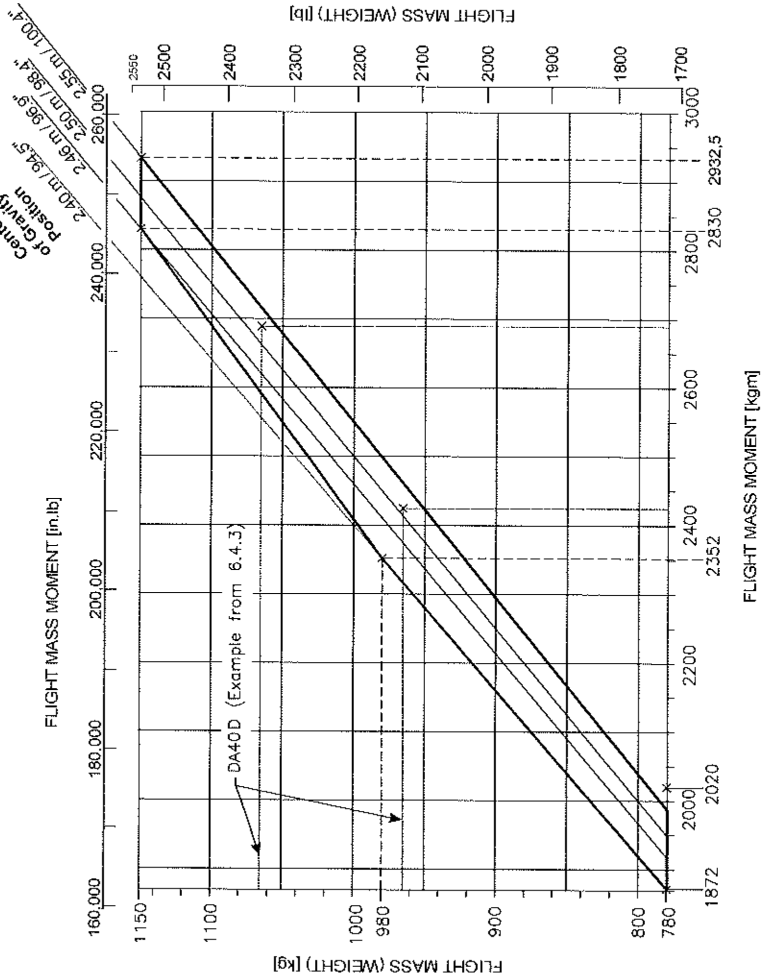
2.55 m (102.0 in) aft of Datum Plane

6.4.5 PERMISSIBLE MOMENT RANGE

a) Standard Tank



b) Long Range Tank



Affected Chapters:

6.5 EQUIPMENT LIST AND EQUIPMENT INVENTORY

The following items are added to the Equipment List:

Airplane Serial No.:		Registration:		Date:	
Description	Type	Part No.:	Manufacturer	S/N	installed
COMMUNICATION/ NAVIGATION					
COMM #1 antenna	CI 291		Comant		
COMM #2 antenna	CI 292-2		Comant		

6.5 EQUIPMENT LIST AND EQUIPMENT INVENTORY

All equipment that is approved for installation in the DA 40 D is shown in the *Equipment List* below.

The items of equipment installed in your particular airplane are indicated in the appropriate column. The set of items marked as 'installed' constitutes the *Equipment Inventory*.

NOTE

The equipment listed below cannot be installed in any arbitrary combination. The airplane manufacturer must be contacted before removing or installing equipment, with the exception of replacing a unit by an identical unit.

Airplane Serial No.:		**Registration:**		**Date:**	
Description	**Type**	**Part No.**	**Manu-facturer**	**S/N**	**in-stalled**
AVIONICS COOLING					
Avionics cooling fan	ACF314	ACF314	Sandia Aerospace		
Avionics cooling fan	SAFE 328	305-467-00	Sandia Aerospace		
PFD cooling fan	SAFE 128	305-468-00	Sandia Aerospace		
MFD cooling fan	SAFE 128	305-468-00	Sandia Aerospace		
Avionics cooling fan	Cyclon 21-3 Port	CRB6457	Lone Star Aviation		
COMMUNICATION					
COMM 1 antenna	DMC63-1/A		DM		
COMM 2 antenna	DMC63-2		DM		
COMM #1	GNS 430	011-00280-10	Garmin		
COMM #1	GNS 530	011-00550-10	Garmin		
COMM #2	GNS 430	011-00280-10	Garmin		
Audio panel / Marker / ICS	GMA 340	011-00401-10	Garmin		
ICS	PM1000 II	11922	PS Engineering		
Headset, pilot	Echelon 100		Telex		
Headset, copilot	Echelon 100		Telex		

6.5 EQUIPMENT LIST AND EQUIPMENT INVENTORY

The following items are added to the Equipment List:

Airplane Serial No.:		Registration:		Date:	
Description	**Type**	**Part No.:**	**Manufacturer**	**S/N**	**installed**
ELECTRICAL POWER					
Optional Main Battery	RG-35AXC	RG-35AXC	Concorde		

Airplane Serial No.:		Registration:		Date:	
Description	Type	Part No.	Manu-facturer	S/N	in-stalled
Headset, RH pax	Echelon 100		Telex		
Headset, LH pax	Echelon 100		Telex		
Speaker	FRS8 /4 Ohms		Visaton		
Handmic	100TRA	62800-001	Telex		
AUTOPILOT SYSTEM:	KAP 140		Bendix/King		
Flight computer	KC 140	065-00176-5402 (prior MSB40-018)	Bendix/King		
Flight computer	KC 140	065-00176-7702 (prior MSB40-018)	Bendix/King		
Flight computer	KC 140	065-00176-5403 (post MSB40-018)	Bendix/King		
Flight computer	KC 140	065-00176-7703 (post MSB40-018)	Bendix/King		
Flight computer	KC 140	065-00176-7904	Bendix/King		
Pitch servo	KS 270 C	065-00178-2500	Bendix/King		
Pitch servo mount	KM 275	065-00030-0000	Bendix/King		
Roll servo	KS 271 C	065-00179-0300	Bendix/King		
Roll servo mount	KM 275	065-00030-0000	Bendix/King		
Trim servo	KS 272 C	065-00180-3500	Bendix/King		
Trim servo mount	KM 277	065-00041-0000	Bendix/King		
Configuration module	KCM 100	071-00073-5000	Bendix/King		
Sonalert	SC	SC 628	Mallory		
Control stick		DA4-2213-12-90	Diamond		
CWS switch		031-00514-0000	Bendix/King		
AP-Disc switch		031-00428-0000	Bendix/King		
Trim switch assy		200-09187-0000	Bendix/King		
ELECTRICAL POWER					
Main battery	G-35		Gill		
Optional main battery	CB-35AXC	CB-35AXC	Concorde		
ECU backup battery	SLA Battery	LC-RA1212P()1	Panasonic		
Alternator excitation battery	SLA Battery	LC-R121R3P()	Panasonic		
External power connector			Diamond		

Airplane Serial No.:		Registration:		Date:	
Description	**Type**	**Part No.**	**Manu-facturer**	**S/N**	**in-stalled**
Voltage converter	RB-125	RB125-BP31	KGS Electronics		
Emergency battery (28 pcs.)	MN 1500 AA		Duracell		
Emergency battery		D4D-2560-93-00	Diamond		
ECU backup battery tester		DAI-9024-00-01	Diamond		
DC/AC inverter	MD 26	MD 26-14	Mid Continent		
Voltage converter	RB-125		KGS Electronics		
EQUIPMENT					
Safety belts, pilot		5-01-1C0701-LH	Schroth		
Safety belts, co-pilot		5-01-1C5701-RH	Schroth		
Safety belts, RH pax		5-01-1B0701-RH	Schroth		
Safety belts, LH pax		5-01-1B5701-LH	Schroth		
ELT unit		E-01	ACK		
ELT remote unit		E0105	ACK		
ELT antenna		E0109	ACK		
ELT unit	JE2-NG	JE2-1978-1NG	Jolliet Electronique		
ELT remote unit		JE2-1978-16	Jolliet Electronique		
ELT antenna		JE2-1978-73	Jolliet Electronique		
ELT unit	C406-1	453-5002-( )[2]	Artex		
ELT remote switch		345-6196-04	Artex		
ELT antenna		110-338	Artex		
ELT antenna		110-773	Artex		
Buzzer		130-4004	Artex		
ELT unit	ME 406	453-6603	Artex		
ELT buzzer		452-6505	Artex		
Arm rest from semi hard integral foam		DA4-5210-50-91	Diamond		
Winter baffle		DA4-2157-00-00	Diamond		
Nose gear tie-down		DA4-1001-00-00	Diamond		
FLIGHT CONTROLS					
Stall warning horn assy	"A"	DA4-2739-10-00	Diamond		
Stall warning horn assy	"B"	DA4-2739-10-00X01	Diamond		
Stall warning horn assy	"C"	DA4-2739-10-00X02	Diamond		
Stall warning horn assy	"D"	DA4-2739-10-00X03	Diamond		

Airplane Serial No.:		Registration:		Date:	
Description	**Type**	**Part No.**	**Manu-facturer**	**S/N**	**in-stalled**
Stall warning horn assy	'E'	DA4-2739-10-00X04	Diamond		
Stall warning horn assy	'F'	DA4-2739-10-00X05	Diamond		
Flaps control unit (inst. panel)		500510	Krutz		
Flaps actuator assy		500535	Krutz		
Flaps actuator		DAI-9027-50-03	Diamond		
Flap control unit (PCB)		DAI-9027-50-04	Diamond		
SAFETY EQUIPMENT					
Fire extinguisher, portable		HAL1	AIR Total		
Fire extinguisher, portable [3]		A 620 T	Amerex		
First aid kit					
Emergency axe		G45912	Fiskars		
FUEL					
Fuel transfer pump		5100-00-15	Dukes Inc.		
HYDRAULIC					
Master cylinder		10-54A	Cleveland		
Parking valve		60-5D	Cleveland		
Brake assembly		30-239B	Cleveland		
INDICATING / REC. SYSTEM					
Digital chronometer with OAT	M803		Davtron		
Flight timer		85094-12	Hobbs		
Annunciator panel		WW-IDC 002	White Wire		
Primary flight display (PFD)	GDU 1040	011-00972-02	Garmin		
Multi function display (MFD)	GDU 1040	011-00972-02	Garmin		
Primary flight display (PFD)	GDU 1040	011-00972-03	Garmin		
Multi function display (MFD)	GDU 1040	011-00972-03	Garmin		
Primary flight display (PFD)	GDU 1040	011-00972-10	Garmin		
Multi function display (MFD)	GDU 1040	011-00972-10	Garmin		

Airplane Serial No.:		Registration:		Date:	
Description	**Type**	**Part No.**	**Manu-facturer**	**S/N**	**in-stalled**
LIGHTS					
Map/Reading light assy crew		W1461.0.010	Rivoret		
Cabin light		W1461.0.010	Rivoret		
Instr./Radio lights dimmer assy		WW-LCM 001	White Wire		
Glareshield lamp assy		DA4-3311-10-01	Diamond		
Glareshield lamp assy		DA4-3311-10-02	Diamond		
Glareshield light inverter		APVL314-8-3-L-18QF	Quantaflex		
Glareshield light inverter		APVL314-8-3-L-15QF	Quantaflex		
Glareshield light inverter		APVL-314-4-1-L-5QF	Quantaflex		
Placards inverter		APVL314-8-3-L-5QF	Quantaflex		
Placard inverter		APVL-314-4-1-L-15QF	Quantaflex		
Strobe/Pos. light assy LH	A600-PRD-14	01-0790006-06	Whelen		
Strobe/Pos. light assy RH	A600-PGD-14	01-0790006-04	Whelen		
Strobe light power supply LH/RH	A490ATS-CF-14/28	01-0770062-05	Whelen		
Taxi light	70346	01-0770346-00	Whelen		
Landing light	70346	01-0770346-00	Whelen		
Electroluminescent lamp	Quantaflex 1600	D4D-1131-20-05	Quantaflex		
Electroluminescent lamp	Quantaflex 1600	D4D-1131-21-07	Quantaflex		
Electroluminescent lamp	Quantaflex 1600	D4D-1131-20-08	Quantaflex		
Electroluminescent lamp	Quantaflex 1600	D4D-1131-20-09	Quantaflex		
NAVIGATION					
Pitot/Static probe head, heated		DAI-9034-57-00	Diamond		
P/S probe HTR fail sensor		D4D-3031-01-00	Diamond		
Altimeter inHg/mbar, primary		5934PD-3	United Instr.		
Altimeter inHg/mbar, primary	LUN 1128	1128-12B8	Mikrotechna		
Altimeter inHg/mbar, secondary		5934PD-3	United Instr.		
Altimeter inHg/mbar, secondary	LUN 1128	1128-12B8	Mikrotechna		
Vertical speed indicator		7000	United Instr.		
Vertical speed indicator	LUN 1144	1144-A2B3	Mikrotechna		
Airspeed indicator		8025	United Instr.		
Airspeed indicator	LUN 1116	1116-B2B3	Mikrotechna		
Magnetic compass		C2400L4P	Airpath		
Directional gyro	4000B-31	1U262-002-42	Sigma-Tek		
Directional gyro	4000C-17	1U262-042-3	Sigma-Tek		
Attitude indicator	1100-14LK(0D)	504-0110-926	BF-Goodrich		

Airplane Serial No.:		Registration:		Date:	
Description	**Type**	**Part No.**	**Manu-facturer**	**S/N**	**in-stalled**
Attitude indicator	1100-14LK(-2D)	504-0110-927	BF-Goodrich		
Attitude indicator, secondary	1100-14LK(0D)	504-0110-926	BF-Goodrich		
Attitude indicator, secondary	1100-14LK(-2D)	504-0110-927	BF-Goodrich		
Attitude indicator	LUN 1241	1241.A4Y4W	Mikrotechna		
Attitude indicator	LUN 1241	1241.C4Y4W	Mikrotechna		
Turn coordinator w/o AP pickup	1394T100-(3Z)		Electric Gyro Corp.		
Turn coordinator	1394T100-(12RZ)		Mid Continent Instr.		
Turn coordinator [4]	1394T100-(12RA)		Mid Continent		
Turn coordinator	1394T100-(12RB)		Mid Continent		
Transponder	GTX 327	011-00490-00	Garmin		
Transponder	GTX 328	011-01684-00	Garmin		
Transponder	GTX 330	011-00455-00	Garmin		
XPDR antenna	KA60	071-01591-0001	Bendix/King		
XPDR antenna	KA 61	071-00221-0010	Bendix/King		
Altitude digitizer	SAE5-35	305154-00	Sandia Aerospace		
NAV antenna coupler	CI507		Comant		
dual NAV/dual GS antenna coupler	CI 1125		Comant		
VOR/LOC/GS antenna	CI157P		Comant		
NAV/COM/GPS #1	GNS 430	011-00280-10	Garmin		
NAV/COM/GPS #1	GNS 530	011-00550-10	Garmin		
NAV/COM/GPS #2	GNS 430	011-00280-10	Garmin		
CDI, VOR/LOC/GS	GI 106A	013-00049-01	Garmin		
CDI, VOR/LOC/GS #2	GI 106A	013-00049-01	Garmin		
GPS antenna #1	GA 56	011-00134-00	Garmin		
GPS antenna #2	GA 56	011-00134-00	Garmin		
GPS annunciation	MD41-1484		Mid Continent		
GPS antenna	GA 35	013-00235-00	Garmin		
GPS antenna	GA 35	013-00235-00	Garmin		
Compass system C/O	KCS 55A		Bendix/King		
Slave gyro	KG 102 A	060-00015-0000	Bendix/King		
HSI	KI 525A	066-03046-0007	Bendix/King		
Slaving unit	KA 51B	071-01242-0000	Bendix/King		
Flux valve	KMT 112	071-01052-0000	Bendix/King		
Marker antenna	CI102		Comant		
DME	KN 62A	066-01068-0004	Bendix/King		
DME antenna	KA60	071-01174-0000	Bendix/King		
DME antenna	KA61	071-00221-0010	Bendix/King		
ADF	KR87	066-01072-0004	Bendix/King		

Airplane Serial No.:		Registration:		Date:	
Description	**Type**	**Part No.**	**Manu-facturer**	**S/N**	**in-stalled**
ADF antenna	KA44B	071-01234-0000	Bendix/King		
ADF indicator	KI227	066-03063-0001	Bendix/King		
Stormscope	WX-500	805-11500-001	Goodrich		
Stormscope antenna	NY-163	805-10930-001	Goodrich		
Audio panel / marker / ICS	GMA 1347	011-00809-00	Garmin		
Backup altimeter	5934PD-3	5934-PD3	United Instruments		
Backup airspeed indicator	8025	8025-B.833	United Instruments		
Backup artificial horizon	4300	4300-206	Mid Continent		
Emergency compass	PG2	PG2C-12V	SIRS Navigation		
OAT probe	GTP 59	011-00978-00	Garmin		
Digital air data system	GDC 74A	011-00882-00	Garmin		
Digital air data system	GDC 74A	011-00882-10	Garmin		
Integrated avionics #1	GIA 63	011-00781-01	Garmin		
Integrated avionics #2	GIA 63	011-00781-01	Garmin		
Integrated avionics #1	GIA 63W	011-01105-20	Garmin		
Integrated avionics #2	GIA 63W	011-01105-20	Garmin		
Transponder	GTX 33	011-00779-10	Garmin		
Attitude / Heading reference system	GRS 77	011-00868-00	Garmin		
Attitude / Heading reference system	GRS 77	011-00868-10	Garmin		
Magnetometer	GMU 44	011-00870-00	Garmin		
Magnetometer	GMU 44	011-00870-10	Garmin		
ADF receiver	RA 3502-(01)	0576.786-912	Becker		
ADF/RMI converter	AC 3504-(01)	0576.808-912	Becker		
ADF antenna	AN3500	0576.816-912	Becker		
DME	KN 63	066-1070-01	Bendix/King		
VACUUM					
Vacuum regulating valve	2H3-2		Parker		
Suction gauge		5001	Varga		
Pneumatic filter	1J7-2		Parker		
ENGINE	TAE-125-01	02-7200-14001R(*)	Thielert		
ENGINE	TAE-125-01	02-7200-14005R5	Thielert		
ENGINE	TAE-125-02-99	125-02-99-(0001)-(01)	Thielert		
ENGINE CONTROL UNIT	ECU	02-7610-55001R(*)	Thielert		

Affected Chapters:

6.5 EQUIPMENT LIST AND EQUIPMENT INVENTORY

The following item is added to the Equipment List:

Airplane Serial No.:		Registration:		Date:	
Description	Type	Part No.:	Manufacturer	S/N	installed
ENGINE					
ENGINE CONTROL UNIT	ECU	05-7611-001904	Technify		

Airplane Serial No.:		Registration:		Date:	
Description	**Type**	**Part No.**	**Manu-facturer**	**S/N**	**in-stalled**
ENGINE CONTROL UNIT	ECU	02-7610-55180R(*)	Thielert		
ENGINE CONTROL UNIT	ECU	02-7610-E000101 [5]	Thielert		
	ECU	05-7610-E0001 02 [6]	Thielert		
	ECU Firmware 7		Thielert		
	ECU Mapping 7		Thielert		
ENGINE EXHAUST					
Exhaust pipe		600400	Diamond		
Muffler		D4D-7807-10-00	Diamond		
ENGINE INDICATING					
Compact engine display	CED-125	02-7730-5501-(01)-(01)	Thielert		
Compact engine display	TAE-CED-125	02-7730-5501-(06)-(02) [6]	Thielert		
Auxiliary engine display	AED-125	02-7730-5503-(01)-(01)	Thielert		
Auxiliary engine display	AED-125	02-7730-5503-(02)-(02)	Thielert		
Engine / Airframe unit	GEA 71	011-00831-00	Garmin		
PROPELLER	MTV-6-A/187-129		mt-Propeller		
LANDING GEAR					
LANDING GEAR STANDARD FAIRINGS					
MLG wheel fairing LH		D41-3213-91-00	Diamond		
MLG wheel fairing RH		D41-3213-92-00	Diamond		
NLG wheel pant shell LH		D41-3223-91-00_1	Diamond		
NLG wheel pant shell RH		D41-3223-92-00_1	Diamond		
LANDING GEAR SPEEDKIT					
MLG speed cover LH		DA4-3219-27-00_1	Diamond		
MLG speed cover RH		DA4-3219-28-00_1	Diamond		

Airplane Serial No.:		Registration:		Date:	
Description	**Type**	**Part No.**	**Manu-facturer**	**S/N**	**in-stalled**
MLG sheet cover LH		DA4-3219-25-00	Diamond		
MLG sheet cover RH		DA4-3219-26-00	Diamond		
MLG cover speed LH		DA4-3219-21-00	Diamond		
MLG cover speed RH assembly		D4D-3219-12-00	Diamond		
MLG strut cover LH		DA4-3219-23-00	Diamond		
MLG strut cover RH		DA4-3219-24-00	Diamond		
NLG wheel pant shell LH		D41-3223-91-00_1	Diamond		
NLG wheel pant shell RH		D41-3223-92-00_1	Diamond		
NLG strut cover		DA4-3229-29-00	Diamond		
LANDING GEAR SMALL TIRES AND FAIRINGS					
MLG wheel fairing assy small tire LH		DA4-3215-91-00	Diamond		
MLG wheel fairing assy small tire RH		DA4-3215-92-00	Diamond		
NLG wheel fairing shell LH		DA4-3225-91-00	Diamond		
NLG wheel fairing shell RH		DA4-3225-92-00	Diamond		
Bracket assy LH MLG wheel fairing		DA4-3215-31-00	Diamond		
Bracket assy RH MLG wheel fairing		DA4-3215-32-00	Diamond		
Brake cover MLG wheel frame LH		DA4-3215-93-00	Diamond		
Brake cover MLG wheel frame RH		DA4-3215-94-00	Diamond		
NLG strut fairing assy		DA4-3227-90-00	Diamond		
LANDING GEAR SMALL TIRES AND FAIRINGS WITH MAINTENANCE ACCESS					
MLG wheel fairing assy access door LH		DA4-3215-91-00X01	Diamond		
MLG wheel fairing assy access door RH		DA4-3215-92-00X01	Diamond		
NLG wheel fairing shell LH		DA4-3225-91-00X01	Diamond		
NLG wheel fairing shell RH		DA4-3225-92-00	Diamond		
Bracket assy LH MLG wheel fairing		DA4-3215-31-00	Diamond		
Bracket assy RH MLG wheel fairing		DA4-3215-32-00	Diamond		
Brake cover MLG wheel frame LH		DA4-3215-93-00	Diamond		
Brake cover MLG wheel frame RH		DA4-3215-94-00	Diamond		
NLG strut fairing assy		DA4-3227-90-00	Diamond		

Airplane Serial No.:		Registration:		Date:	
Description	Type	Part No.	Manu-facturer	S/N	in-stalled
TANK SYSTEM					
Standard tank chamber[1]		D4D-2817-21(22)-00	Diamond		
Long range tank chamber[1]		D4D-2807-23-00	Diamond		
AIRPLANE FLIGHT MANUAL		Doc. No 6.01.05-E	Diamond		

(*)......Mod. Status

1. One of the following tanks may be installed: Standard Tank (OÄM 40-100) or Long Range Tank (OÄM 40-130).
2. The complete Part Number of the ELT unit depends on the registration of the airplane in which the ELT is installed.
3. Amerex A620T is UL approved and can be used in airplanes registered in Canada and in the USA. For airplanes registered in other countries, contact the local airworthiness authority.
4. The turn coordinator 1394T100-(12RA) can only be installed in conjunction with the Garmin G1000 System.
5. On replacement the ECU P/N 02-7610-E000101 must be replaced by ECU P/N 02-7610-E000102.
6. For TAE 125-02-99 engine only (if MÄM 40-256 is carried out).

7. Refer to Service Bulletin MSB-D4-044, latest effective issue for approved firmware and mapping.

Place:__________ Date: __________ Signature: __________

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CHAPTER 7
DESCRIPTION OF THE AIRPLANE AND ITS SYSTEMS

7.1 INTRODUCTION

Chapter 7 contains a description of the airplane and its systems, together with operating instructions.

For details about optional equipment see Chapter 9.

7.2 AIRFRAME

Fuselage

The GFRP fuselage is of semi monocoque molded construction. The fire protection on the firewall is of a special fire-resistant matting, which is covered on the engine side by stainless steel cladding. The two main bulkheads are GFRP/CFRP items.

Wings

The wings have a front and rear spar; each wing has a top shell and a bottom shell - a 'fail-safe' concept. The wings, as well as the ailerons and flaps, are made of GFRP/CFRP, and are principally of sandwich construction. An aluminum fuel tank is installed in each of the wings.

Empennage

The airplane has a 'T' tail of GFRP semi monocoque construction. Both the stabilizers have twin spars and a skin with no sandwich. Rudder and elevator are of sandwich construction.

7.3 FLIGHT CONTROLS

The ailerons, elevator and wing flaps are operated through control rods, while the rudder is controlled by cables. The flaps are electrically operated. Elevator forces can be balanced by a trim tab on the elevator, which is operated by a Bowden cable.

Ailerons

Construction:	GFRP/CFRP composite sandwich.
Hinges:	There are 4 hinges, which are hinge pins mounted in an aluminum bracket. They are secured in position by a roll pin. The absence of this roll pin can lead to the loss of the hinge pin and a consequent loss of flight safety.
Operation:	A rod-end bearing is screwed into a steel push rod and locked by means of a jam nut which has locking varnish applied to it. Damage to this varnish can indicate a twisting and thus a change to the adjustment. The connection between the rod-end bearing and the control horn is a bolt, the nut of which is likewise sealed with locking varnish. The aluminum control horn is attached to the aileron with 3 screws.

Flaps

Construction: GFRP/CFRP composite sandwich.

Hinges: There are 6 hinges, which are hinge pins mounted in an aluminum bracket. They are secured in position by a roll pin. The absence of this roll pin can lead to the loss of the hinge pin and a consequent loss of flight safety. Another aluminum fitting is located at the fuselage and is attached to a torsion tube. The torsion tube is located in the fuselage, creating a connection between the left and right flaps.

Operation: A rod-end bearing is screwed into a steel push rod and locked by means of a jam nut which has locking varnish applied to it. Damage to this varnish can indicate a twisting and thus a change to the adjustment. The connection between the rod-end bearing and the control horn is a bolt, the nut of which is likewise sealed with locking varnish.

The flap control horn is attached to the flap with 3 screws.

The flaps are driven by an electric motor and have 3 settings:
- Cruise (UP), totally retracted
- Take-off (T/O), and
- Landing (LDG).

The flaps are operated by means of a 3-position flap selector switch on the instrument panel. The positions of the switch correspond to the positions of the flaps, the Cruise position of the switch being at the top. If the switch is moved to another position, the flaps continue to travel automatically until they have reached the position selected on the switch. The UP and LDG positions are additionally protected by a limit switch to guard against over-running the end positions.

The electrical flap drive has an automatic circuit breaker which can also be operated manually.

Flap position indicator:

The current flap position is indicated by means of three lights beside the flap selector switch.

When the upper light (green) is illuminated, the flaps are in the Cruise position (UP); when the center light (white) is illuminated, the flaps are in Take-off position (T/O); when the lower light (white) is illuminated, the flaps are in Landing position (LDG).

When two lights are illuminated simultaneously, the flaps are between the two indicated positions. This is the case only when the flaps are traveling.

Elevator

Construction: GFRP sandwich.

Hinges: 5 hinges.

Operation: Steel push-rods;

Two of the bellcrank bearings are accessible to visual inspection next to the lower hinge of the rudder. The elevator horn and its bearing, as well as the connection to the push-rod, can be visually inspected at the upper end of the rudder.

Rudder

Construction: GFRP sandwich.

Hinges: Upper hinge: One bolt.

Lower hinge: Bearing bracket including rudder stops, held by 4 screws to the rear web of the vertical stabilizer. The mating part on the rudder is a bracket which is attached to the rudder by 2 bolts. The bolts and nuts are accessible to visual inspection.

Operation: Steel cables, the eyes of which are connected to the bolts on the bracket.

Elevator Trim

The trim control is a black wheel in the center console to the rear of the power lever. To guard against over-rotating, the trim wheel incorporates a friction device. A mark on the wheel shows the take-off (T/O) position.

Turn wheel to the front = nose down
Turn wheel to the rear = nose up

Pedal Adjustment

NOTE

The pedals may only be adjusted on the ground!

The pedals are unlocked by pulling the black handle which is located behind the rear attachment.

Forward adjustment:

Whilst keeping the handle pulled, push the pedals forward with your feet. Release the handle and allow the pedals to lock into place.

Rearward adjustment:

Using the unlocking handle, pull the pedals back to the desired position. Release the handle and push the pedals forward with your feet until they lock into place.

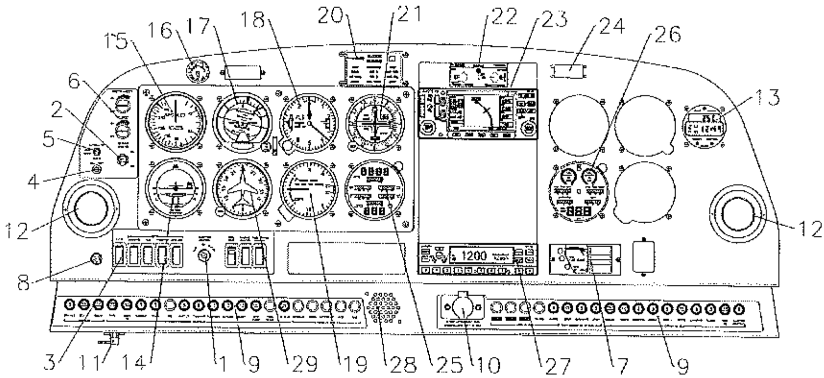
7.4 INSTRUMENT PANEL

Instrument Panel Variants

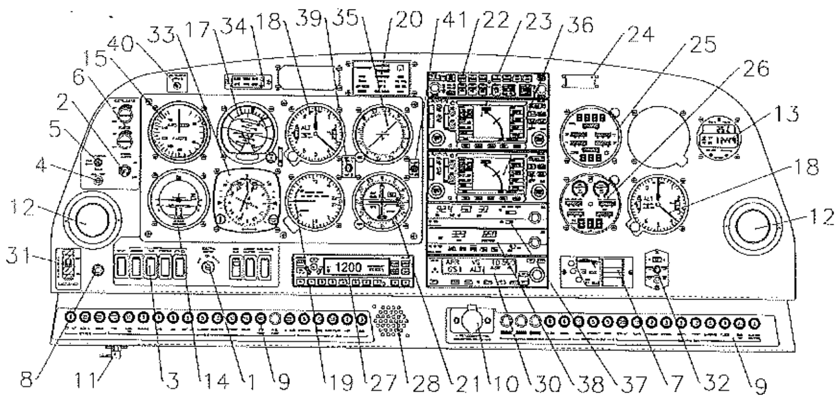
The DA 40 D can be equipped with one of numerous instrument panel variants. Therefore only two example variants (VFR, IFR) are described in this section. The equipment that is actually installed in a particular airplane is listed in the Equipment Inventory in Section 6.5. The airplane manufacturer must be contacted before removing or installing equipment, with the exception of replacing a unit by an identical unit.

Major instruments and controls			
1	Electric Master switch	22	Intercom
2	Engine Master switch	23	COM / NAV / GPS
3	Electrical switches	24	ELT control unit
4	ECU Test button	25	Compact Engine Display (CED)
5	ECU Swap switch	26	Auxiliary Engine Display (AED)
6	Rotary buttons for instrument lighting and flood light	27	Transponder
7	Flap selector switch	28	Stall warning horn
8	Microphone socket	29	Directional gyro
9	Circuit breakers*	30	Autopilot control unit
10	Accessory power socket	31	Emergency switch
11	Alternate static valve	32	Slaving meter
12	Ventilation nozzles	33	Horizontal situation indicator (HSI)
13	Chronometer with OAT indicator	34	GPS annunciation unit
14	Turn & bank indicator	35	ADF indicator
15	Airspeed indicator	36	COM / NAV / GPS No. 2
16	Suction gauge	37	DME
17	Attitude gyro (artificial horizon)	38	ADF receiver
18	Altimeter	39	Remote DME switch
19	Vertical speed indicator (VSI)	40	'ECU Backup Unsafe' light
20	Annunciator panel	41	'Clear WX 500' button
21	Course deviation indicator (CDI)		

*) Designations and abbreviations used to identify the circuit breakers are explained in Section 1.5 - DEFINITIONS AND ABBREVIATIONS of the AFM.



VFR instrument panel (example)

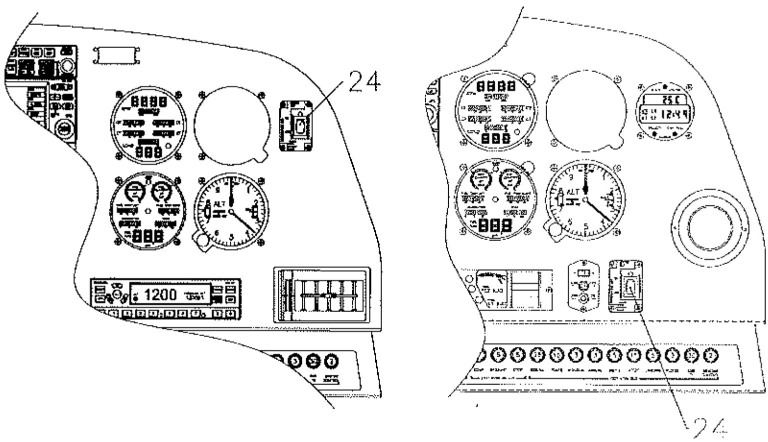


IFR instrument panel (example)

Cockpit Ventilation

Ventilation in the front is provided by the movable ventilation over nozzles (12) in the instrument panel. Furthermore there are spherical nozzles in the roll bar on the left and right side next to the front seats as well as on the central console above the passengers' heads. The spherical nozzles are opened and closed by twisting.

The figures below show the position of the panel mounted switch of the ELT, ARTEX C406-1 or ME 406, which are applicable for all instrument panel versions of the DA 40 D, except the Garmin G1000 variant.



7.5 LANDING GEAR

The landing gear consists of a main landing gear of sprung steel struts, and a free-castering nose wheel which is sprung by an elastomer package.

The wheel fairings are removable. When flying without wheel fairings, it should be noted that there is a reduction in some areas of performance (see Chapter 5).

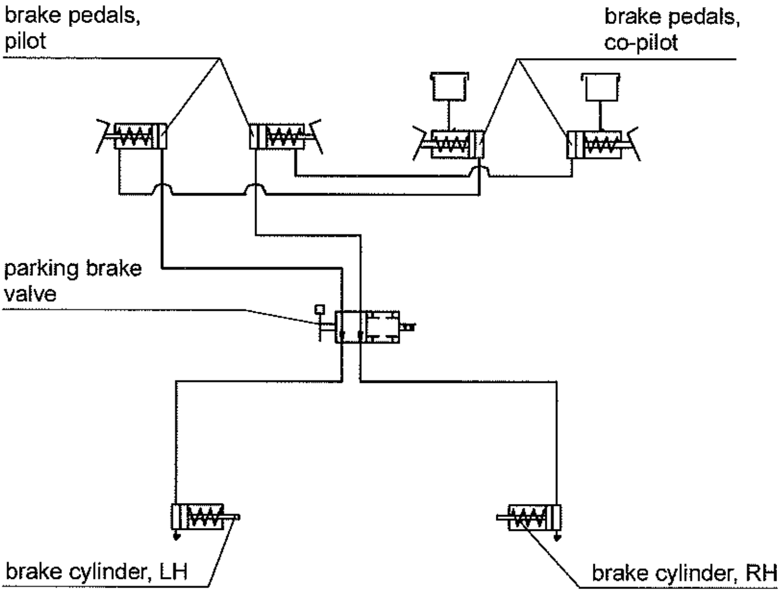
Wheel Brakes

Hydraulically operating disk brakes act on the wheels of the main landing gear. The wheel brakes are individually operated by means of toe pedals.

Parking Brake

The lever is located on the small center console under the instrument panel, and is in the upper position when the brakes are released. To operate the parking brake pull the lever downwards until it catches. Brake pressure is built up by multiple operation of the toe brake pedals, and is maintained until the parking brake is released. To release, the lever is pushed upwards.

Hydraulic System Schematic



7.6 SEATS AND SAFETY HARNESSES

To increase passive safety, the seats are constructed using a carbon fiber/Kevlar hybrid material and GFRP. The seats are removable to allow the maintenance and inspection of the underlying controls. Covers on the control sticks prevent loose objects from falling into the area of the controls.

The seats have removable furnishings and are equipped with energy-absorbing foam elements.

The seats are fitted with three-point safety harnesses. The harnesses are fastened by inserting the belt clip into the belt lock, and are opened by pressing the release button on the belt lock.

The backs of the rear seats can be laid forward after pulling upwards on the knob of the locking bolt.

7.7 BAGGAGE COMPARTMENT

The baggage compartment is behind the seat backs of the rear seats. Without a baggage net, no baggage may be loaded.

7.8 CANOPY, REAR DOOR, AND CABIN INTERIOR

Front Canopy

The front canopy is closed by pulling down on the canopy frame, following which it is locked by means of a handle on the left hand side of the frame. On locking, steel bolts lock into mating holes in polyethylene blocks.

"Cooling Gap" position: A second setting allows the bolts to lock in, leaving a gap under the forward canopy.

The canopy can be blocked by a locking device on the left side near the canopy opening lever by turning the key clockwise. The closed and blocked canopy can be opened from inside by pulling the lever inside the opening handle.

WARNING

The airplane may be operated with the front canopy in the "cooling gap" position on the ground only. Before take-off the front canopy must be completely closed and locked.

Do not block the front canopy with the locking key before flight in order to assure emergency evacuation from outside.

A window on the left and right hand side of the canopy can be opened for additional ventilation or as an emergency window.

Rear Door

The rear door is closed in the same way, by pulling down on the frame and locking it with the handle. A gas pressure damper prevents the door from dropping; in strong winds the assembly must be held. The rear door is protected against unintentional opening by an additional lever.

The door can be blocked by a locking device on the left side near the door opening lever by turning the key clockwise. The closed and blocked door can be opened from inside by pulling the lever inside the opening handle. For a better handling an additional handle is mounted.

WARNING

Do not block the door with the locking key before flight in order to assure emergency evacuation from outside.

Heating and Ventilation

Heating and ventilation are operated using two levers located on the small center console under the instrument panel.

Left lever:	up	=	heating ON
	down	=	heating OFF
Central lever:	up	=	airflow to canopy (DEFROST)
(air distribution lever)	down	=	airflow to floor (FLOOR)

Emergency Axe

If OÄM 40-326 is incorporated an emergency axe is installed on the floor panel under the co-pilot's seat (see Figure below).

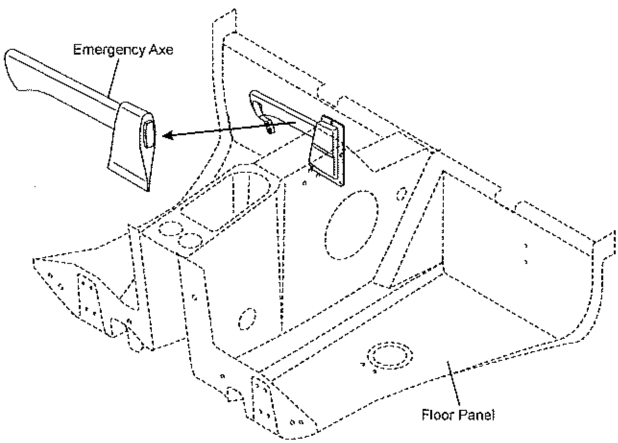
If the canopy can not be opened in case of an emergency use the emergency axe to break through the canopy.

WARNING

Make sure not to harm other persons by using the emergency axe.

WARNING

Beware of sharp edges and fragments of the broken canopy.



7.9 POWER PLANT

7.9.1 ENGINE, GENERAL

Thielert Aircraft Engines TAE125:

- Liquid-cooled four-stroke Diesel-cycle engine with wet sump lubrication
- In-line construction
- Common-rail direct injection
- Propeller speed-reducing gear 1:1.69
- Digital Engine Control with Integrated Propeller Governor (separate oil system)
- Turbo charger with Intercooler

Displacement:

TAE 125-01:	1689 cm^3 (103 in^3)
TAE 125-02-99:	1991 cm^3 (121.5 in^3)

Max. power:	99 kW (135 DIN-HP) at 2300 RPM at sea level and ISA
Max. continuous power:	99 kW (135 DIN-HP) at 2300 RPM at sea level and ISA

The indications for monitoring important engine-parameters during operation are integrated within two instruments (CED 125; AED 125) in the right half of the instrument panel. The engine can only be operated with the ENGINE MASTER switch ON. The ECU receives its electrical power from the battery even if the battery is disconnected from the electric power distribution system by the ELECTRIC MASTER switch.

7.9.2 OPERATING CONTROLS

Power Lever

The engine performance is controlled by the power lever, situated on the large center console. 'Front' and 'rear' are defined in relation to the direction of flight. Friction can be adjusted by pulling up the friction handle (high friction) or pressing the button (low friction) on top of the lever.

This lever is used to set the desired engine power LOAD (%)

Lever forward (MAX)	=	Full power
Lever to rear (IDLE)	=	Idle

The ECU controls manifold pressure, injected fuel quantity and propeller speed according to the desired engine power preselected with the power lever.

The propeller governor is flanged onto the front of the engine. The propeller governor oil circulation is a separate oil circulation system. Following a loss of oil pressure the blades go to the finest possible pitch (maximum RPM), thus allowing continuation of the flight according to 3.2.6 - DEFECTIVE RPM REGULATING SYSTEM.

CAUTION

Following governor failure the RPM should be adjusted using the power lever. Every effort should be made not to exceed 2500 RPM.

CAUTION

The power lever should be moved slowly, in order to avoid over-speeding and excessively rapid RPM changes. The light wooden propeller blades produce more rapid RPM changes than metal blades.

WARNING

It is possible that the propeller blades remain in the position of highest pitch in case of a malfunction of the engine control unit. In this case the reduced engine performance should be taken into consideration.

ELECTRIC MASTER

The key can be switched into three positions:

OFF	disconnecting battery power
ON	connecting battery power to the power distribution system
START	starting the engine

ENGINE MASTER

The engine can only be cranked with the ENGINE MASTER switched to ON. To shut down the engine the ENGINE MASTER is switched to OFF.

ECU SWAP

For normal operation this switch is set to AUTOMATIC. The engine is controlled by ECU A. In case of a failure of the active engine control unit (ECU) there should be an automatic switch-over to the ECU B. If the automatic switch-over fails, switch-over can be done manually by switching to ECU B. This procedure should only be applied in an emergency.

ECU TEST

Depending on the position of the power lever and the engine speed, the ECU TEST button has two different functions.

Power lever at IDLE and RPM below approximately 900:

By pushing and holding the button until the end of the procedure, the self-test of the engine control unit is started. The procedure is possible on the ground as well as during flight, but only if the power lever is in the IDLE position. Otherwise the test will not start. During the procedure the ECU performs a switch from ECU A to ECU B with the propeller cycling. The propeller RPM is monitored automatically by the ECU. When switching from one ECU to the other, a slight shake of the engine may occur. Finally the ECU switches back from ECU B to ECU A. After that both caution lights must extinguish and the engine must run without a change.

Power lever above IDLE, or RPM above approximately 900:

If an ECU A or ECU B caution message is displayed, the ECU TEST button can be pressed for more than 2 seconds to reset the message. The reset is possible only once, and only in case of system faults of minor criticality.

In addition, the 'ECU Test'-button is used in IFR equipped airplanes to test the ECU Backup Battery for proper charge. This test must be passed prior to each flight. The test is possible on ground as well as during flight, but only if the ECU Backup Battery is not in use. Otherwise the test will not start. During the test, a battery tester, installed in the instrument panel, measures several parameters of the ECU Backup Battery. This will be indicated with a red LED flashing, installed on the left hand side of the instrument panel. If the capacity of the ECU Backup Battery has been found to be less than 70% of its rated capacity the 'ECU BACKUP UNSAFE'- light is on continuously.

Alternate Air

In the event of power loss because of icing or blocking of the air filter, there is the possibility of drawing air from the engine compartment. The ALTERNATE AIR operating lever is located under the instrument panel to the left of the center console. To open the alternate air source the lever is pulled to the rear. Normally, the alternate air source is closed, with the lever in the forward position.

Placard on the lever, forward position:

ALTERNATE AIR

Placard on the lever, visible when lever is in the rearward position:

ALTERNATE AIR
ON

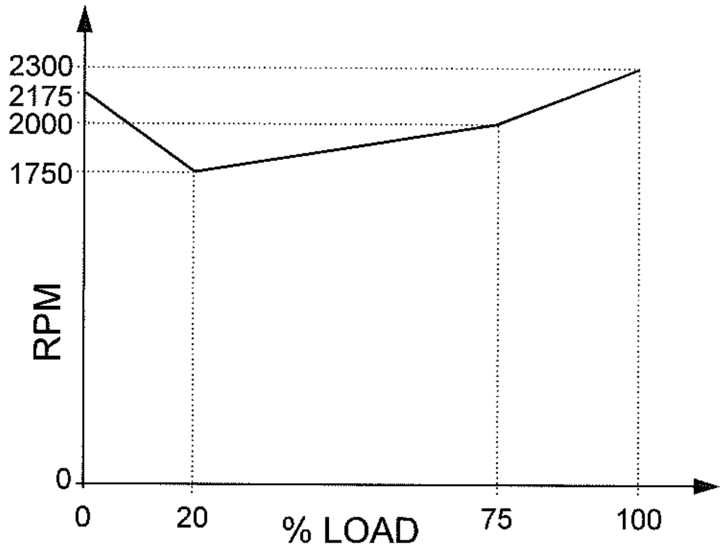
7.9.3 PROPELLER

An mt-Propeller MTV-6-A/187-129 hydraulically regulated 3-bladed constant speed propeller is installed. It has wood-composite blades with fiber-reinforced plastic coating and stainless steel edge cladding; in the region of the propeller hub the leading edge is coated with adhesive PU foil. These blades combine the lowest weight whilst minimizing vibration.

Propeller Control

The propeller pitch control system is integrated into the engine. The pitch is controlled automatically by the ECU.

Depending on the power setting the propeller pitch is adjusted so that the required RPM will be obtained as shown in the following diagram.



CAUTION

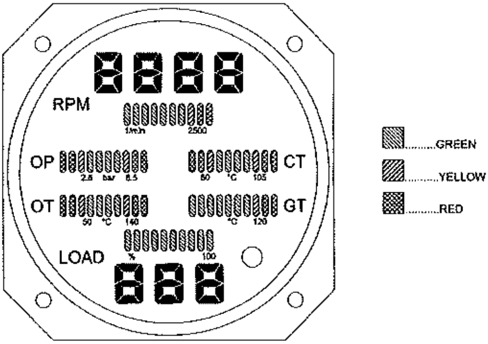
Operation on the ground at high RPM should be avoided as far as possible, as the blades could suffer stone damage. For this reason a suitable site for engine runs should be selected, where there are no loose stones or similar items.

WARNING

Never move the propeller by hand.

7.9.4 ENGINE INSTRUMENTS

Compact Engine Display (CED 125)



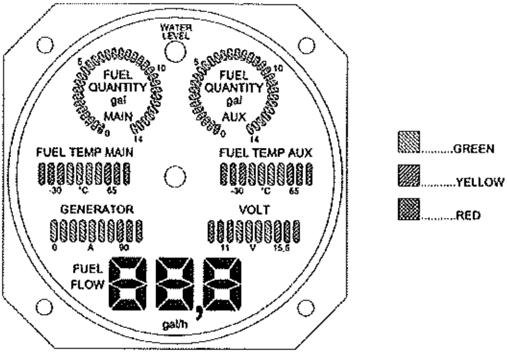
NOTE

Indicated values are only for general information. Exact values cannot be indicated on the CED 125.

Indications on the Engine Instrument CED 125

Designation	Indication	Unit
RPM	Propeller RPM	1/min
OP	Oil pressure	bar
OT	Engine oil temperature	°C
CT	Coolant temperature	°C
GT	Gearbox temperature	°C
LOAD	Available power	%

Auxiliary Engine Display (AED 125)

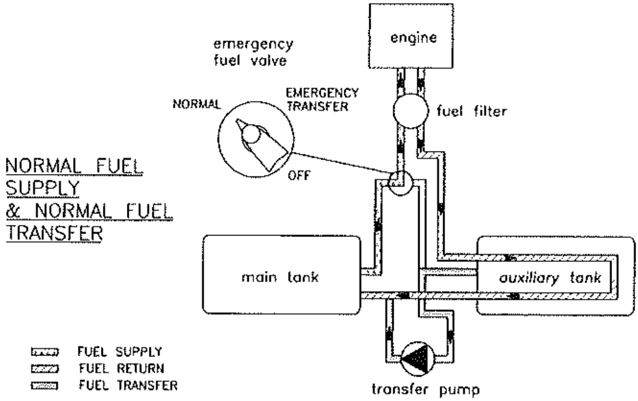


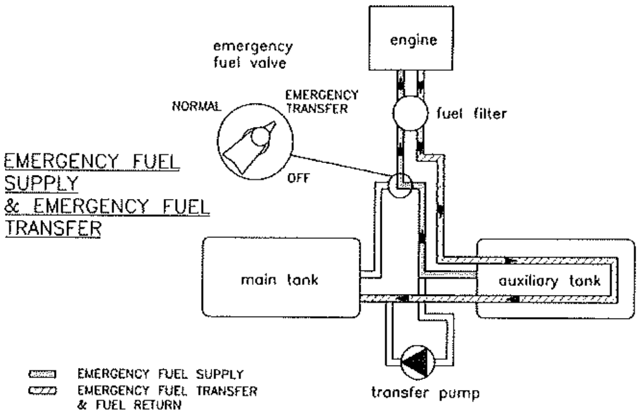
Fuel quantity:
digits = appr. 1 US gal

Indications on the Auxiliary Engine Instrument AED 125

Designation	Indication	Unit
FUEL QUANTITY MAIN	Fuel quantity MAIN tank	gal
FUEL QUANTITY AUX	Fuel quantity AUX tank	gal
WATER LEVEL	Coolant level	--
FUEL TEMP. LEFT	Fuel temperature left tank	°C
FUEL TEMP. RIGHT	Fuel temperature right tank	°C
GENERATOR	Ampères	A
VOLT	Volts	V
FUEL FLOW	Fuel flow	US gal/h

7.9.5 FUEL SYSTEM





Fuel is injected with high pressure directly into the cylinders. The injection nozzles (one per cylinder) are supplied with fuel by the common rail. Pressure inside the rail is generated by a high pressure pump which receives fuel from a low pressure pump. Both pumps are powered mechanically by the engine.

Normally fuel is taken only from the MAIN tank (left wing). Fuel that is not injected is lead through the AUX tank (right wing) back into the MAIN tank (left wing). This way hot fuel from the rail is cooled and cold fuel in both tanks is heated. With the help of an electrical transfer pump fuel can be transferred from the AUX tank (right wing) to the MAIN tank (left wing) manually.

The transfer pump is switched off automatically when the auxiliary tank is empty or the main tank is full.

If fuel transfer with the transfer pump becomes impossible for any reason, fuel can also be taken directly from the AUX tank (right wing). As the return line goes back into the MAIN tank (left wing), fuel will be transferred from right to left.

The rail pressure is controlled by an electrical valve using the return flow as parameter.

CAUTION

Switching the emergency fuel valve to the EMERG. TRANSFER position will start the transfer of fuel with the help of the engine driven fuel pump from the auxiliary tank through the fuel return line to the main tank at a rate of approximately 18 to 21 US gal/h (70 to 80 liters/h). The emergency fuel valve must be switched back to the NORMAL position before the auxiliary tank indication reads zero. If the emergency fuel valve is not switched back to the NORMAL position, the engine will stop during flight when the auxiliary tank is empty.

Emergency Fuel Valve

The emergency fuel valve is situated on the center console. Its positions are NORMAL, EMERG. TRANSFER and OFF. The desired position is reached by turning the valve handle while pulling up the safety catch on the valve handle. This is to ensure that a selection is not made unintentionally.

Fuel Tanks

Main tank (left wing):

The main tank consists of an aluminum chamber and a filler tube which are connected by a flexible hose. There are two tank vents. One includes a check valve with a capillary and one includes a relief pressure valve, which operates at 150 mbar (2 psi) and allows fuel and air to flow to the outside with higher internal pressure. The relief pressure valve protects the tank against high pressure, if the tank will be overfilled in case of a fuel transfer failure. The check valve with capillary allows air to enter the tank but prevents flow of fuel to the outside. The capillary equalizes the air pressure during climb. The hose terminations are situated on the underside of the wing, approximately 2 meters (7 ft) from the wing tip.

Auxiliary tank (right wing):

The auxiliary tank consists of an aluminum chamber and a filler tube which are connected by a flexible hose. There are two tank vents. One includes a check valve with a capillary and one includes a capillary. The check valve with capillary allows air to enter the tank during descent but prevents flow of fuel to the outside. The capillary equalizes the air pressure during climb. The second capillary is installed for additional safety. The hose terminations are situated on the underside of the wing, approximately 2 meters (7 ft) from the wing tip.

In each tank a coarse filter (finger filter) is fitted before the outlet. To allow draining of the tank, there is an outlet valve at its lowest point.

A gascolator sits at the lowest point in the fuel system. A drain valve is fitted to the gascolator, which can be used to remove water and sediment which has collected in the fuel system. This valve is fitted centrally on the underside of the fuselage, approximately 30 cm (1 ft) forward of the wing leading edge.

A capacity probe measures the fuel quantity in each tank. The AED shows only counts. The indication is non-linear, therefore proportional calculations to determine the remaining fuel quantity or direct calculations of fuel consumption are not possible. Information about the fuel consumption can be found in Chapter 5 - PERFORMANCE.

Long Range Tank

If the Long Range Tank is installed, the filler tube of the main and the auxiliary tank is replaced by another tank chamber. This tank chamber has a capacity of approx. 5 US gal (19 liters). The ventilation system of the main and the auxiliary tank remains unchanged.

When the fuel quantity indicator reads zero, only the unusable fuel remains in the tank. The useable capacity of each tank is 19.5 US gal, the maximum quantity that can be indicated is 15 US gal. Up to an actual quantity of 15 US gal the indication is correct. At an actual quantity above 15 US gal the indication remains at 15 US gal.

NOTE

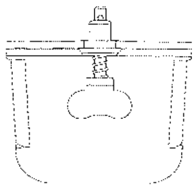
When the fuel quantity indicator reads 15 US gal, the correct fuel quantity must be determined with the alternate mean for fuel quantity indication. If this measurement is not carried out, the fuel quantity available for flight planning is 15 US gal.

Fuel Cooler

The fuel cooler reduces the fuel temperature in the return line between the AUX tank (right wing) and the MAIN tank (left wing).

The fuel cooler is installed in the right hand stub wing between the main spars. It receives its cooling air through an air scoop on the lower surface of the stub wing. This inlet is closed with a baffle which must be removed at high outside air temperatures (OAT higher than 20 °C (68 °F), see also Sections 4A.3.1 and 4B.2.6).

Fuel Cooler Baffle:

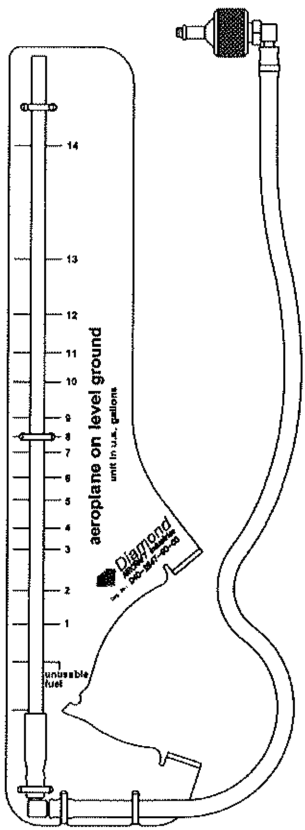


Alternate Mean for Fuel Quantity Indication for the Standard Tank

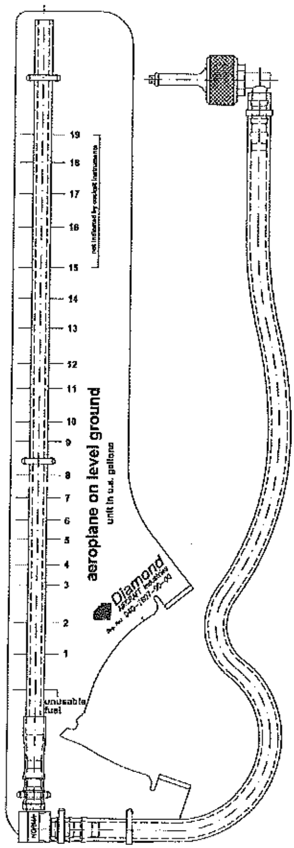
The alternate mean for fuel quantity indication allows the fuel quantity in the tank to be determined during the pre-flight inspection. It functions according to the principle of communicating containers. The fuel quantity measuring device has a recess which fits the airfoil of the wing. With this recess the device is held against the stall strip at the leading edge of the wing. The exact position is marked by a bore in the stall strip. Then the metal connector is pressed against the drain of the tank. The amount of fuel in the tank can now be read off from the vertical ascending pipe.

For an exact indication the airplane must stand on a horizontal ground.

The designated place for the fuel quantity measuring device is the bag on the rear side of the pilot seat.



Alternate Mean for Fuel Quantity Indication for Long Range Tank



Fuel Temperature

The fuel temperature is indicated by the AED. The temperature indication range goes from -30 °C up to +75 °C (-22 °F to +167 °F) . The lower yellow bar indicates temperatures from -30 °C to +4 °C (-22 °F to +39 °F).

The lower yellow bar of the fuel temp flashes from -30 °C to -6 °C (-22 °F to +21 °F). The flashing bar indicates the temperature range in which the engine must not be started if Diesel Fuel or a blend of Diesel Fuel with JET Fuel is used. If the fuel blend is uncertain, the engine must not be started in this temperature range either.

Between -5 °C and +4 °C (+23 °F to +39 °F) the lower yellow bar of the fuel temp is continuously on. This indicates that the airplane is not ready for take-off if Diesel Fuel or a blend of Diesel Fuel with JET Fuel is used. If the fuel grade is uncertain, take-off is not allowed in this temperature range either.

If the airplane is being operated with JET Fuel, operation in the yellow temperature range (conventional instrument: flashing or steady on) is permissible.

Fuel Grades:

The airplane may be operated with JET Fuel and Diesel Fuel according to Section 2.14, and with blends of these fuel grades. As the fuel grade is important concerning operating temperature limitations, the pilot must be sure about the fuel grade. Solid particles can form in cold Diesel Fuel which can lead to blocking of the gascolator filter. The gascolator filter is not heated.

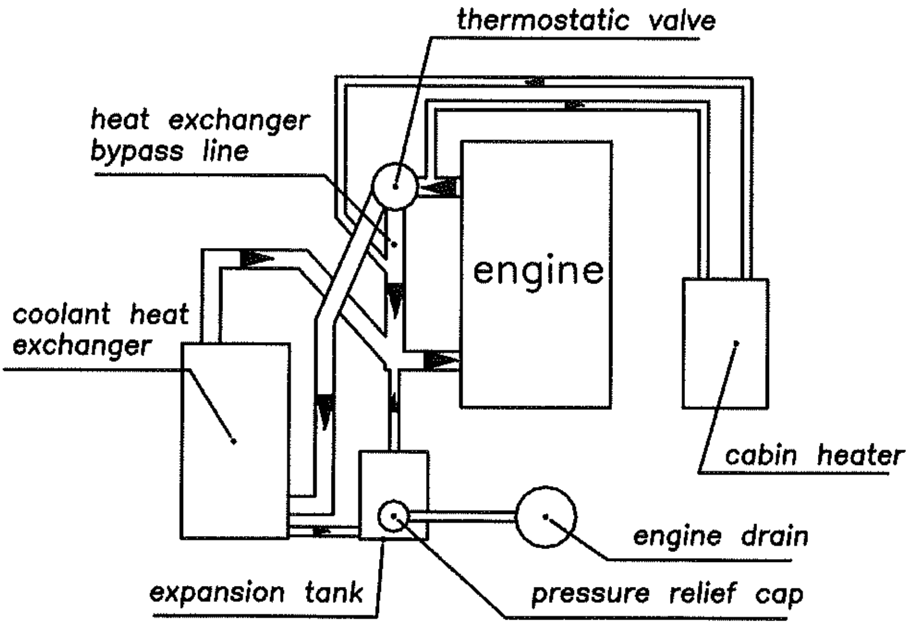
If the airplane is operated in a cold environment, it must be changed from Diesel Fuel operation to JET Fuel operation. To ensure that no blend of JET Fuel with Diesel Fuel is in one of the tanks, each tank must be refilled at least twice with more than 10.6 US gal (40 liters) of JET Fuel or 17.2 US gal (65 liters) when the long range tank is installed (OÄM 40-130). Otherwise both tanks must be drained before refueling with JET Fuel.

NOTE

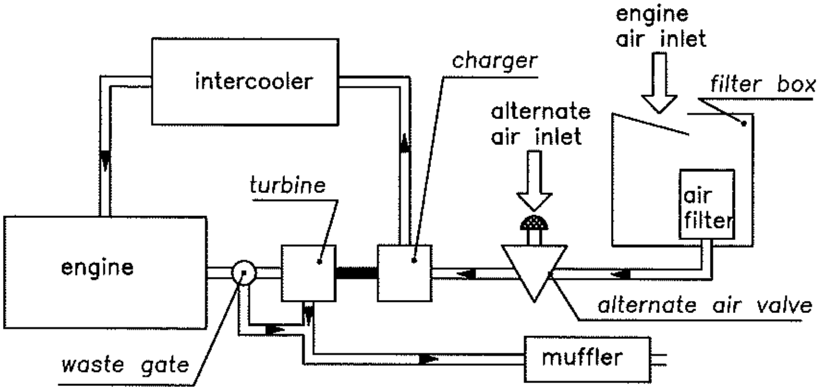
In order to provide information about the fuel grade it is recommended to enter the fuel grade in the airplane log each time fuel is refilled.

7.9.6 COOLING SYSTEM

The water cooling system consists of a radiator and a bypass to this radiator. The bypass cooler is in operation when coolant temperatures are low. It therefore allows a warm-up of the engine. Upon reaching a certain temperature (approximately 80 °C) the radiator is activated by a thermostat valve. Additionally a coolant to air heat exchanger is provided for the cabin heat system. The flow through the heat exchanger is independent of the coolant temperature. An expansion tank helps to adjust the pressure in the system. The system is protected against overpressure by means of a pressure relief valve.



7.9.7 TURBO CHARGER SYSTEM



The exhaust system contains a collecting line which collects exhaust gases from the outlets of the cylinders and leads them to the turbine of the turbo charger. Behind the turbine the exhaust gases are guided through the lower cowling to the exterior of the airplane. Excess exhaust gases bypass the turbine. The bypass is controlled by the ECU through the waste gate valve. A manifold pressure sensor behind the compressor allows the ECU to calculate the correct position of the waste gate valve. This prevents too high manifold pressures at low density altitudes. The intake air is compressed in the compressor which is driven by the turbine, and afterwards cooled down in the intercooler to increase power. Cooling the air increases efficiency through the higher density of the cooler air.

7.9.8 OIL SYSTEMS

The engine has two separate oil systems.

Lubrication System (Engine and Turbo Charger)

The engine lubrication is a wet sump lubrication system. Oil is cooled by a separate cooler on the underside of the engine.

A dip-stick is provided to check the oil quantity through an inspection hole in the upper cowling. If required, oil can also be filled in there (for specified oil types refer to 2.4 - POWER-PLANT LIMITATIONS).

Gearbox and Propeller Governor System

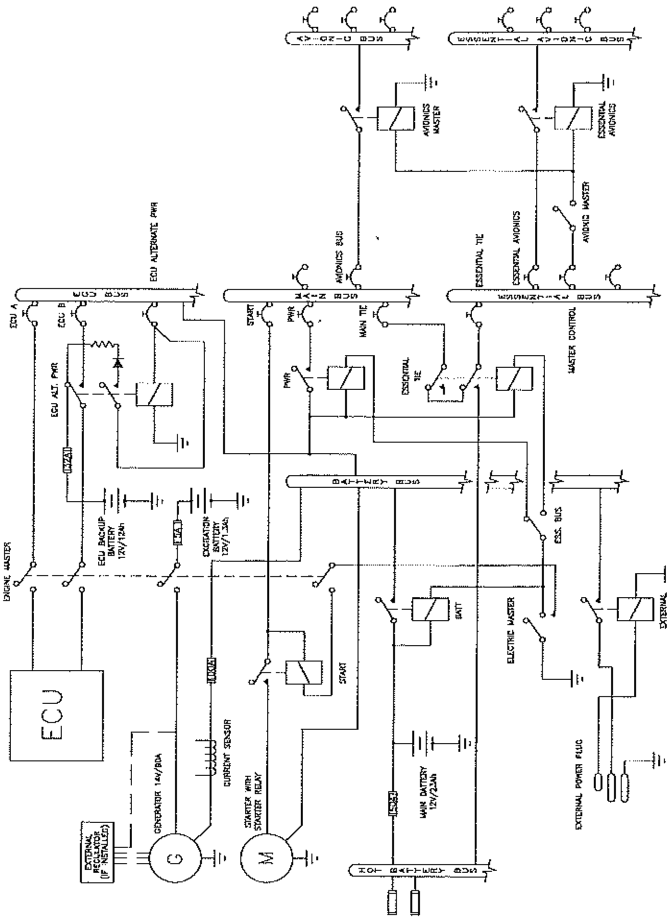
The second oil circuit lubricates the gear and serves the governor system and the regulation of the propeller.

Gear oil quantity can be checked with the help of an inspection glass which can be reached through an inspection hole on the front side of the lower cowling.

CAUTION

If the gear oil quantity is too low, an unscheduled maintenance is necessary (for specified oil types refer to 2.4 - POWER-PLANT LIMITATIONS).

7.10 ELECTRICAL SYSTEM



7.10.1 GENERAL

The DA 40 D has 12 Volt DC system, which can be sub-divided into:

- Power generation
- Storage
- Distribution
- Consumers

Power Generation

Power generation is provided by a 90 ampère alternator (generator) which is mounted on the bottom left side of the engine. The alternator is driven by a flat-belt.

The power output line of the alternator is connected to the 'battery bus' via a 100 A fuse, which is installed in the relay junction box mounted on the left-hand side of the firewall. The power output line also runs through the current sensor, which provides an indication of the power being supplied to the electrical system by the alternator including the current for battery charging.

In the event of a main battery failure the field of the alternator is energized by a 12 V, 1.3 Ah sealed-lead-acid battery ('excitation'-battery) which is installed behind the instrument panel. The 'ENGINE MASTER'-switch connects the 'excitation'-battery to the alternator field or the external voltage regulator via a 5 A fuse.

The alternator (P/N: 02-7150-55 002R2) has an internal voltage regulator and the alternator (P/N: 02-7150-55850R1) has an external voltage regulator which regulates the output voltage between 12 and 14 V.

Alternator Control:

The alternator (P/N: 02-7150-55850R1) has an external alternator control unit. It measures the alternator output voltage and controls the current through the alternator field coils via a pulse-width modulated signal. To keep the output voltage stable in all load and speed situations, the alternator field signal is modulated accordingly.

The alternator control unit includes a comprehensive set of diagnostic functions that will warn the operator using a caution message (ALTERNATOR) on the Annunciator Panel in case of over- or undervoltage as well as a couple of other internal warning levels.

Storage

'Main'-battery power is stored in a 12 V, 23 Ah lead-acid battery mounted on the right-hand side of the firewall. The 'main' battery is connected to the 'hot battery bus' via a 50 A fuse and to the 'battery bus' via the 'battery'-relay which is installed in the relay junction box on the left-hand side of the firewall.

The 'battery'-relay is controlled with the 'ELECTRIC MASTER'-key switch which is located on the left-hand side of the instrument panel.

In addition, a 12 V, 12 Ah sealed-lead-acid battery ('ECU backup'-battery) is installed under the rear right seat as a further source of power for the 'Engine Control Unit' (ECU B only).

Under normal operating conditions the 'ECU backup'-battery is charged by the 'ECU bus'. In the event of an alternator failure and a depleted 'main'-battery the 'ECU alternate power'-relay connects the 'ECU backup'-battery automatically to ECU B via a 30 A fuse. This prevents the engine from stopping in the unlikely event of an alternator failure and a totally discharged 'main'-battery.

In addition, a non-rechargeable dry battery is installed in the IFR model as a further source of power for the attitude gyro (artificial horizon) and the flood light. When the EMERGENCY switch is set to ON, these two systems are supplied with power for 1 hour, independent of all other electrical consumers. During each 100 hour inspection, this battery is checked for proper functioning. Every 2 years or after use (broken seal on the switch) the battery cells must be replaced.

Distribution

Electrical power is distributed via the 'hot battery bus', the 'battery bus', the 'ECU-bus', the 'main bus', the 'essential bus', the 'avionic bus', and the 'essential avionic bus'.

Hot battery bus:

The 'hot battery bus' is directly connected to the 'main'-battery via a 50 A fuse installed in the relay junction box and cannot be disconnected from the 'main'-battery. The 'hot battery bus' provides power to the pilot map/reading light and the accessory power plug which are protected by their own fuses.

Battery bus:

The 'battery bus' is connected to the 'main'-battery via the 'battery'-relay which can be controlled by the 'ELECTRIC MASTER'-key switch. The 'battery bus' provides power to the 'ECU bus' and heavy duty power to the starter. It also provides power to the 'main bus' via the 'power'-relay which can be controlled by the 'ELECTRIC MASTER'-key switch and the 'ESSENTIAL BUS'-switch. The 'ELECTRIC MASTER'-key switch must be set to 'ON' and the 'ESSENTIAL BUS'-switch must be set to OFF to connect the 'battery bus' to the 'main bus'.

The 'battery bus' is also connected to the power output line of the alternator and the power input line of the external power plug.

ECU bus:

The 'ECU bus' is directly connected to the 'battery bus' and provides power for the ECU A and ECU B via the 'ENGINE MASTER'-switch. It also provides power for charging the 'ECU backup'-battery via the 'ECU alternate power'-relay. The 'ENGINE MASTER'-switch must be set to 'ON' to connect the ECU A and ECU B to the 'ECU bus'.

Main bus:

The 'main bus' is connected to the 'battery bus' via the 'power'-relay. It provides power to the consumers directly connected to the 'main bus' and the 'avionic bus' via the 'avionic master'-relay. The 'AVIONIC MASTER'-switch must be set to 'ON' to connect the 'main bus' to the 'avionic bus'. Under normal operating conditions the 'main bus' is also connected to the 'essential bus' via the 'essential tie'-relay. In the event of an alternator failure the pilot must switch ON the 'ESSENTIAL BUS'-switch (refer to Section 3.7.2 - FAILURES IN THE ELECTRICAL SYSTEM). This separates the 'main bus' from the 'battery bus' and the 'essential bus' and the equipment connected to the 'main bus' no longer has power.

Essential bus:

Under normal operating conditions the 'essential bus' is connected to the 'main bus' via the 'essential tie'-relay. The 'essential bus' provides power to the consumers connected to the 'essential bus' and the 'essential avionic bus' via the 'essential avionic'-relay. The 'AVIONIC MASTER'-switch must be set to 'ON' to connect the 'essential bus' to the 'essential avionic bus'. In the event of an alternator failure the pilot must switch ON the 'ESSENTIAL BUS'-switch (refer to Section 3.7.2 - FAILURES OF THE ELECTRICAL SYSTEM). This separates the 'essential bus' from the 'main bus'. The 'essential bus' is then connected to the 'hot battery bus' which provides battery power for a limited time to the equipment essential for safe flight and landing.

<u>Consumers</u>

The individual consumers (e.g. radio, electrical fuel transfer pump, position lights, etc.) are connected to the appropriate bus via automatic circuit breakers.

Designations and abbreviations used to identify the circuit breakers are explained in Section 1.5 - DEFINITIONS AND ABBREVIATIONS.

Voltmeter

The voltmeter shows the voltage of the ECU bus. Under normal operating conditions the alternator voltage is shown, otherwise it is the voltage of the 'main'- or 'ECU backup'-battery, depending on which battery is currently connected to the 'ECU bus'.

As long as the operating temperature of the alternator is not reached, it is possible that the voltage indication is in the upper yellow range. After 10 minutes of engine operation the indication should be in the green range.

On a conventional instrument panel the ENGINE caution light illuminates, if the voltage stays in the yellow range for longer than 1 minute.

Ammeter

The ammeter displays the intensity of current which is supplied to the electrical system by the alternator.

Landing and Taxi Lights

Landing and taxi lights are built into the left wing, and are each operated by means of a switch (LANDING, TAXI) on the row of switches on the instrument panel.

Position and Strobe Lights

Combined position and strobe lights (anti collision lights) are installed on both wing tips. Each system is operated by a switch (POSITION, STROBE) on the row of switches on the instrument panel.

Flood Light

A two-dimensional light emitter is mounted above the instrument panel. It illuminates the instrument panel as well as all levers, switches, etc. With a rotary button (FLOOD) in the left-hand section of the instrument panel the flood light is switched on and its brightness is adjusted.

Instrument Lighting

With a rotary button (INSTRUMENT) in the left-hand section of the instrument panel the internal lighting of the instruments is switched on and its brightness is adjusted.

Pitot Heating

The Pitot probe, which provides measurement for the Pitot-static system, is electrically heated. The heating is activated with a switch (PITOT) on the row of switches on the instrument panel. The temperature is automatically kept constant by means of a thermal switch on the Pitot probe, and as an additional safety measure a thermal fuse is built in. If this thermal fuse is activated, the Pitot heating can no longer be switched on, and the Pitot heating caution will be displayed. In this case the system should be serviced. The Pitot heat caution light is also on if the Pitot heating is switched off.

7.10.2 ENGINE CONTROL UNIT / ECU

Engine Control and Regulation

The ECU monitors, controls and regulates all important parameters for engine operation.

Sensors installed are:

- Oil temperature (lubrication system engine) / OT
- Oil pressure (lubrication system engine) / OP
- Coolant temperature / CT
- Gearbox temperature / GT
- Camshaft RPM (twice)
- Crankshaft RPM (twice)
- Fuel pressure in the common rail
- Manifold pressure
- Manifold air temperature
- Ambient air pressure
- Propeller governor / oil pressure
- Power lever position (twice)
- Voltage
- ELECTRIC MASTER signal (starter)
- Fuel pressure
- 'ECU Swap'-switch signal
- 'ECU Test'-switch signal

In accordance with the received signals and a comparison with the programmed characteristic diagrams the necessary inputs are calculated and transmitted by the following signal lines to the engine:

- Activation of starter (relay)
- Signal for propeller governor pressure valve
- Signal for the rail-pressure regulation valve
- Signal for each of the 4 injection nozzles
- Activation of the glow plugs
- Signal for the waste gate valve

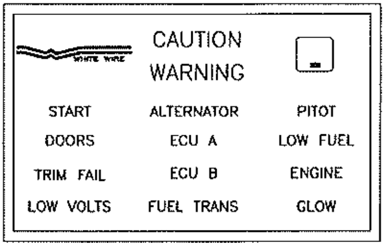
The following signals are transmitted to the annunciator panel installed in the instrument panel:

- Glow sparks active
- Status ECU A
- Status ECU B

Normally the engine is controlled and regulated by the ECU A. The ECU B is a backup system to ensure redundancy. In case of an internal error during operation or the loss of a sensor signal the system automatically switches to the ECU B. If the loss of the sensor signal was the cause for the error, the system automatically switches back to ECU A.

A fault in one of the ECU's is indicated by a caution message on the annunciator panel (ECU A / ECU B). In case of minor faults, the annunciation can be reset once by pressing the ECU TEST button for more than 2 seconds. However, the annunciation will re-appear upon the next attempt to start the engine. After the indication of the ECU A/B FAIL caution message, the engine must be serviced, even if the caution message could be reset.

7.10.3 ANNUNCIATOR PANEL (WARNING, CAUTION AND STATUS LIGHTS)



Testing the Annunciator Panel

In the process of the pre-flight check, proper functioning of the annunciator panel must be verified. This functional check is automatically started after switching the ELECTRIC MASTER to ON. All lights are flashed, and the aural alert is muted. By pressing the 'acknowledge' button, the lights are extinguished, and a momentary aural alert is sounded. This test verifies functionality of the microprocessor, the lights, and the aural signal.

The pilot may initiate additional system tests by holding the 'acknowledge' button for 2 seconds. All lights will begin to blink, and the aural alert will sound continuously.

Warning Messages

A warning is indicated by a continuous aural alert (sounded in the airplane's intercom system), blinking of the red WARNING light, and blinking of the red warning light associated with the affected system.

By pressing the 'acknowledge' button, which is now illuminated green, the aural alert will be terminated, and the WARNING light will be extinguished. The warning light associated with the affected system will change from blinking to solid illumination.

Door warning (DOORS)

The door warning is indicated when one of the two cabin doors is not closed or latched.

Starter warning message (START)

The starter warning message is displayed when the connection between the starter motor and the engine has not been broken. This occurs when the pinion of the starter motor remains engaged.

Furthermore, the START warning light is illuminated continuously as long as the starter is being operated. In this case the WARNING light and the aural alert will not be activated.

The procedure to be followed upon starter warning is given in 3.7.2 - FAILURES IN THE ELECTRICAL SYSTEM.

Trim failure warning message (TRIM FAIL)

The White Wire annunciator panel is prepared for the installation of an autopilot in the DA 40 D. When the autopilot is installed and ready for operation, this warning message indicates a failure of the automatic trim system of the autopilot. For further details, refer to the Supplement to the AFM for the autopilot (if installed).

Caution Messages

A caution is indicated by a momentary aural alert (sounded in the airplane's intercom system), blinking of the amber CAUTION light, and blinking of the amber caution light associated with the affected system.

By pressing the 'acknowledge' button, which is now illuminated green, the CAUTION light will be extinguished. The caution light associated with the affected system will change from blinking to solid illumination.

Alternator caution message (ALTERNATOR)

The alternator caution message is displayed on alternator failure. The only remaining source of electrical power is the battery.

The procedure to be followed upon alternator caution is given in 4B.3.4 - ALTERNATOR FAILURE (ALTERNATOR).

Low voltage caution message (LOW VOLTS)

The low voltage caution message is displayed when the on-board voltage drops below 12.6 volts. It is terminated when the voltage exceeds 12.9 volts again.

The procedure to be followed upon low voltage caution is given in 4B.3.1 - LOW VOLTAGE CAUTION (LOW VOLTS).

Engine control unit caution message (ECU A or ECU B)

This caution message is displayed in case of a malfunction of the related engine control unit (ECU A or ECU B).

In case of minor faults, the annunciation can be reset once by pressing the ECU TEST button for more than 2 seconds. However, the annunciation will re-appear upon the next attempt to start the engine.

Low fuel caution message (LOW FUEL)

As soon as the amount of usable fuel in the main tank is less than 3 US gal (+2/-1 US gal), this caution message is displayed.

The indication is calibrated for straight and level flight. The caution message may be triggered during turns which are flown with slip, or while taxiing in curves.

Pitot heating caution message (PITOT)

The Pitot heating caution message is displayed when the Pitot heating is switched off, or when there is a failure of the Pitot heating system.

Prolonged operation of the Pitot heating on the ground can also cause the Pitot heating caution message to be displayed. In this case it indicates the activation of the thermal switch, which prevents overheating of the Pitot heating system on the ground. This is a normal function of the system. After a cooling period, the heating system will be switched on again automatically.

Engine parameter caution message (ENGINE)

This caution message is displayed if a parameter shown on the engine instruments (AED 125 or CED 125) is outside of the green range.

The procedure to be followed is given in 4B.2 - INSTRUMENT INDICATIONS OUTSIDE OF GREEN RANGE.

<u>Status Lights</u>

Fuel transfer pump status light (FUEL TRANS)

This light will be illuminated as long as the electric fuel transfer pump is active.

Glow plugs status light (GLOW)

This status light will be illuminated as long as the glow plugs are active.

7.11 PITOT-STATIC SYSTEM

Total pressure is measured at the leading edge of a Pitot probe under the left wing. Static pressure is measured at two orifices at the lower and rear edges of the same probe. To protect against dirt and condensation there are filters in the system, which are accessible from the wing root. The Pitot probe is electrically heated.

With the alternate static valve, the static pressure in the cabin can be used as static pressure source in the event of a failure of the Pitot-static system.

If an Autopilot System is installed, additional static sources may be installed.

7.12 STALL WARNING SYSTEM

If airspeed drops below approximately 10 to min. 5 knots above the stalling speed, the stall warning horn, located in the instrument panel, will sound. The horn becomes progressively louder the closer one gets to stalling speed. Suction at an orifice on the left wing leading edge activates the horn via a hose. The orifice for the stall warning in the left wing is marked by a red ring.

7.13 AVIONICS

The radio and navigation equipment is located in the central part of the instrument panel. A push-to-talk (PTT) button for the radio is mounted on the end of each control stick. There are connection facilities for up to 4 headsets between the front seats.

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CHAPTER 8
AIRPLANE HANDLING, CARE AND MAINTENANCE

Page

8.1 INTRODUCTION

Chapter 8 contains the manufacturer's recommended procedures for proper ground handling and servicing of the airplane. The Airplane Maintenance Manual (Doc. No. 6.02.01) lists certain inspection and maintenance requirements which must be followed if the airplane is to retain a new plane performance and reliability.

8.2 AIRPLANE INSPECTION INTERVALS

Inspections are scheduled every 100, 200 and 1000 hours. Independent of the flight hours an annual inspection must be performed every year. The respective inspection checklists are prescribed in the Airplane Maintenance Manual, Chapter 05.

For maintenance work on engine and propeller, the currently effective Operator's Manuals, Service Instructions, Service Letters and Service Bulletins of TAE and mt-Propeller must be followed. For airframe inspections, the currently effective checklists/manuals, Service Bulletins and Service Instructions of the manufacturer must be followed.

CAUTION

Unscheduled maintenance checks are required after:

- hard landings
- propeller strike
- engine fire
- lighting strike
- occurrence of other malfunctions and damage

Unscheduled maintenance checks are described in the Airplane Maintenance Manual (Doc. No. 6.02.01; Section 05-50).

8.3 AIRPLANE ALTERATIONS OR REPAIRS

Alterations or repairs of the airplane may be carried out only according to the Airplane Maintenance Manual, Doc. No. 6.02.01, and only by authorized personnel.

8.4 GROUND HANDLING / ROAD TRANSPORT

8.4.1 GROUND HANDLING WITHOUT TOW BAR

During forward traversing the nose wheel will follow the movement of the airplane. Change in direction is achieved by pulling on the propeller near the spinner. To traverse in the rear direction, the tail section of the airplane should be pushed down until the nose wheel is clear of the ground. This method can also be used to turn the airplane around its main landing gear.

8.4.2 GROUND HANDLING WITH TOW BAR

For pushing or pulling the airplane on the ground, it is recommended to use the tow bar which is available from the manufacturer. The tow bar is bent apart and engaged in the appropriate holes in the nose wheel fairing as shown on the picture below. The arresting knob must be fully engaged.

WARNING

The tow bar must be removed before starting the engine.

CAUTION

The tow bar may only be used for moving the airplane on the ground by hand. After moving the airplane, the tow bar must be removed.

NOTE

When moving the airplane rearward, the tow bar must be held firmly to prevent abrupt sideward deflection of the nose wheel.

8.4.3 PARKING

For short term parking, the airplane must be positioned into the wind, the parking brake must be engaged and the wing flaps must be in the retracted position. For extended and unattended parking, as well as in unpredictable wind conditions, the airplane must be anchored to the ground or placed in a hangar. Parking in a hangar is recommended.

Control Surfaces Gust Lock

The manufacturer offers a control surfaces gust lock which can be used to block the primary controls. It is recommended that the control surfaces gust lock be used when parking outdoors, because otherwise the control surfaces can hit the stops in strong tail wind. This can lead to excessive wear or damage.

WARNING

The control surfaces gust lock must be removed before flight.

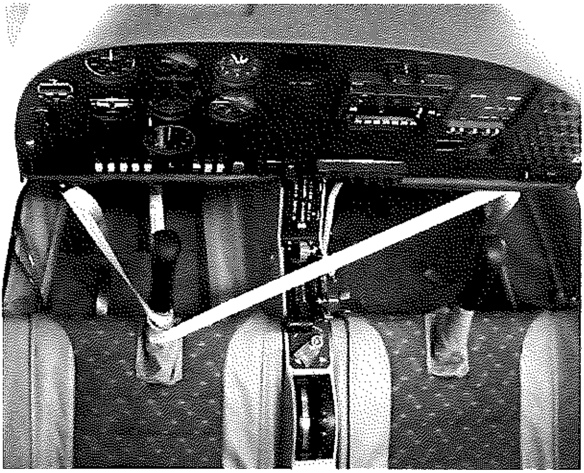
The control surfaces gust lock is installed as follows:

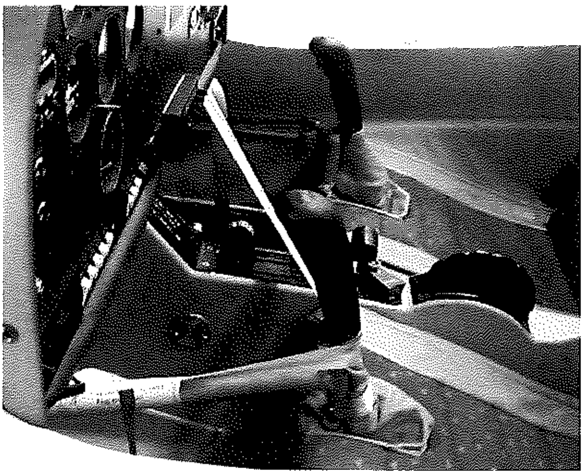
1. Move the rudder pedals fully rearward.
2. Engage the control surfaces gust lock with the pedals.
3. Engage the stick, wrap straps around stick once.
4. Attach the locks and tighten the straps.

For removal, reverse the sequence.

NOTE

It is recommended to cover the canopy when the airplane is parked outdoors, in direct sunlight, at outside air temperatures above +25 °C (77 °F), in order to prevent excessive heat generation within the instrument panel which can cause damage to the equipment. Such a canopy cover is available from Diamond Aircraft Industries, P/N: S_30172.





8.4.4 MOORING

The tail fin of the airplane has a hole which can be used to tie-down the airplane to the ground. Also on each wing near the wing tip, an eyelet with a metric M8 thread can be installed and used as tie-down points.

8.4.5 JACKING

The airplane can be jacked at the two jackpoints located on the lower side of the fuselage's LH and RH root ribs as well as at the tail fin.

8.4.6 ALIGNMENT

For alignment push down on the tail section at the fuselage/vertical tail junction until the nose wheel is clear of the ground. With the nose wheel free, the airplane can be turned around the main landing gear. After turning the airplane into the correct position, release the tail section slowly until the nose wheel is back on the ground.

8.4.7 ROAD TRANSPORT

For transporting the airplane on the road it is recommended that an open trailer be used. All airplane components must be stored on a cushioned surface and secured to avoid any movement during transportation.

1. *Fuselage:*

The fuselage should stand on the main and nose landing gear. It must be ensured that the fuselage will not move in any direction. Furthermore, it must be ensured that the propeller has sufficient clearance so that it cannot be damaged due to fuselage movement during transportation.

2. *Wings:*

For transportation, both wings must be removed from the fuselage. To avoid any damage, the wings must be stored in an upright position on the leading edge with the root rib area positioned on an upholstered profiled surface with a width of at least 400 mm (1.3 ft). The outside wing area (approximately 3 m (10 ft) from the root rib area) must be placed on an upholstered profiled surface with a minimum width of 300 mm (1 ft).

The wings must be secured to avoid any sliding movement to the rear.

3. *Horizontal stabilizer:*

The horizontal stabilizer must be stored flat on the trailer and secured with straps, or in an upright position sitting on the leading edge on a profiled surface. All storing surfaces must be upholstered with felt or cellular rubber.

8.5 CLEANING AND CARE

CAUTION

The airplane must be kept clean. The bright surface prevents the structure from overheating.

CAUTION

Excessive dirt deteriorates the flight performance.

8.5.1 PAINTED SURFACES

The entire surface of the airplane is painted with a white weatherproof two component paint. Nevertheless, it is recommended to protect the airplane against moisture and dampness. It is also recommended not to store the airplane outside for long periods of time.

Dirt, insects, etc. can be removed with water alone and if necessary with a mild detergent. An automotive paint cleaner can be used for stubborn spots. For best results, clean the airplane after the day's flying is ended, so that the dirt will not become ingrained.

Oil stains, exhaust stains, etc. on the lower fuselage skin can be removed with a cold detergent. Before starting, ensure that the detergent does not affect the surface finish. Use commercial automotive preservatives without silicone additives to conserve the paint finish.

8.5.2 CANOPY AND REAR DOOR

The canopy and rear door should be cleaned with 'Plexiklar' or any other acrylic glass detergent if available; otherwise use lukewarm water. Final cleaning should be done with a clean piece of chamois-leather or soft cloth. Never rub or polish dry acrylic glass.

8.5.3 PROPELLER

Damage and malfunctions during operation must be inspected by authorized personnel.

Surface

The manufacturer uses PU paint or acrylic paint which is resistant to almost any solvent. The blades may be treated with commercial automotive cleaning agents or preservatives. The penetration of moisture into the wooden core must be avoided by all means. Should doubts arise, an appropriately rated inspector must be consulted.

8.5.4 ENGINE

Engine cleaning is part of the scheduled inspections.

8.5.5 INTERIOR SURFACES

The interior should be cleaned using a vacuum cleaner. All loose items (pens, bags etc.) should be removed or properly stored and secured.

All instruments can be cleaned using a soft dry cloth, plastic surfaces should be wiped clean using a damp cloth without any cleaning agents.

8.6 GROUND DE-ICING

Approved de-icing fluids are:

Manufacturer	Name
"Kilfrost"	TKS 80
"Aeroshell"	Compound 07
Any source	AL-5 (DTD 406B)

1. Remove any snow from the airplane using a soft brush.
2. Spray de-icing fluid onto ice-covered surfaces using a suitable spray bottle.
3. Use a soft piece of cloth to wipe the airplane dry.

CHAPTER 9
SUPPLEMENTS

Page

9.1 INTRODUCTION

Chapter 9 contains information concerning additional (optional) equipment of the DA 40 D.

Unless otherwise stated, the procedures given in the Supplements must be applied in addition to the procedures given in the main part of the Airplane Flight Manual.

All approved supplements are listed in the List of Supplements in this Chapter.

The Airplane Flight Manual contains exactly those Supplements which correspond to the installed equipment according to the Equipment Inventory of Section 6.5.

9.2 LIST OF SUPPLEMENTS

Airplane S/N: D4.264 Registration: F-HJAF Date: 01/10/2015

Sup. No.	Title	Rev. No.	Date	applicable	
				YES	NO
A2	Intercomm System, Model PM 1000 II PS Engineering, Inc.	0	11-Nov-2002	☐	☒
A9	ADF, KR 87 Bendix/King	2	17-Feb-2003	☐	☒
A10	DME, KN 62 A Bendix/King	2	17-Feb-2003	☐	☒
A11	Compass System, KCS 55 A Bendix King	4	15-Mar-2005	☐	☒
A13	Autopilot, KAP 140 Bendix/King	1	26-May-2003	☒	☐
A17	COM / NAV / GPS GNS 430 Garmin	3	22-Jun-2005	☒	☐
A18	Audio Panel, GMA 340 Garmin	2	22-Jun-2005	☒	☐
A19	Transponder, GTX 327 Garmin	0	11-Nov-2002	☐	☒
A20	CDI, GI 106A GARMIN	0	11-Nov-2002	☒	☐

Airplane S/N:	Registration:		Date:		
Sup. No.	**Title**	**Rev. No.**	**Date**	**applicable**	
				YES	**NO**
A23	GPS Annunciation Unit MD41-1488/1484 MID CONTINENT	1	20-Dec-2002	☐	☒
A24	Stormscope WX 500	2	28-Feb-2003	☐	☒
A25	Audio Panel GMA 340, VFR	2	15-Mar-2005	☒	☐
A26	COM / NAV / GPS GNS 430, VFR GARMIN	1	15-Mar-2005	☒	☐
A28	COM / NAV / GPS GNS 530 (VFR Operation) Garmin	0	20-Mar-2003	☐	☒
A29	Transponder, GTX 330 / GTX 328 Garmin	1	11-Oct-2007	☒	☐
A31	Integrated Avionics System G1000, VFR Operation Garmin	3	01-Jun-2008	☐	☒
A32	Integrated Avionics System G1000, IFR Operation Garmin	4	12-Mar-2012	☐	☒

Airplane S/N: Registration: Date:

Sup. No.	Title	Rev. No.	Date	applicable YES	applicable NO
E3	Attitude Indicator, AIM 1100-14LK(0D) BF Goodrich	1	14-Mar-2003	☒	☐
E4	DIGITAL CHRONOMETER MODEL 803 DAVTRON	0	11-Nov-2002	☒	☐
E5	Attitude Indicator, LUN 1241 MIKROTECHNA	0	11-Nov-2002	☐	☒
E6	Operation with Baggage Extension and Baggage Tray	0	09-Jan-2004	☐	☒
E7	Winter Baffle Fresh Air Inlet	1	27-Apr-2005	☒	☐
S1	Emergency Locator Transmitter, Model E-01 ACK	0	11-Nov-2002	☐	☒
S2	Emergency Locator Transmitter, JE2-NG JOLLIET ELECTRONIQUE	0	11-Nov-2002	☐	☒
S3	Emergency Locator Transmitter ELT, ARTEX C406-1	0	12-May-2003	☐	☒

Airplane S/N: Registration: Date:

Sup. No.	Title	Rev. No.	Date	applicable	
				YES	NO
S4	ELT Artex ME 406	1	10-Apr-2007	☒	☐

SUPPLEMENT A13
TO THE AIRPLANE FLIGHT MANUAL DA 40 D

AUTOPILOT SYSTEM
KAP 140
BENDIX/KING

Doc. No.	**: 6.01.05-E**
Date of Issue	**: 11 November 2002**

Signature	:	
Authority	:	AUSTRO CONTROL GmbH Abteilung Flugtechnik Zentrale
Stamp	:	A-1030 Wien, Schnirchgasse 11
Date of approval	:	1 3 DEZ. 2002

This Supplement has been approved for the Joint Aviation Authorities (JAA) by the Austrian Civil Aviation Authority Austro Control (ACG) as Primary Certification Authority (PCA) in accordance with the JAA Certification Procedures of the Joint Aviation Authorities (JAA JC/VP).

DIAMOND AIRCRAFT INDUSTRIES GMBH
N.A. OTTO-STR. 5
A-2700 WIENER NEUSTADT
AUSTRIA

0.1 RECORD OF REVISIONS

Rev. No.	Reason	Chap-ter	Page(s)	Date of Revision	Approval	Date of Approval	Date Inserted	Signature
1	MÄM 40-099 P/N Change Autopilot Computer	all	all except 9-A13-0	26-May-2003		06 JUN 2003		

0.2 LIST OF EFFECTIVE PAGES

Chapter	Page	Date
0	9-A13-0	11 Nov 2002
	9-A13-1	26 May 2003
	9-A13-2	26 May 2003
	9-A13-3	26 May 2003
	9-A13-4	26 May 2003
	9-A13-5	26 May 2003
1	9-A13-6	26 May 2003
2	appr. 9-A13-7	26 May 2003
	appr. 9-A13-8	26 May 2003
3	9-A13-9	26 May 2003
	9-A13-10	26 May 2003
	9-A13-11	26 May 2003
	9-A13-12	26 May 2003

4A		9-A13-12	26 May 2003
		9-A13-13	26 May 2003
		9-A13-14	26 May 2003
		9-A13-15	26 May 2003
		9-A13-16	26 May 2003
		9-A13-17	26 May 2003
		9-A13-18	26 May 2003
		9-A13-19	26 May 2003
		9-A13-20	26 May 2003
		9-A13-21	26 May 2003
		9-A13-22	26 May 2003
		9-A13-23	26 May 2003
		9-A13-24	26 May 2003
		9-A13-25	26 May 2003
		9-A13-26	26 May 2003
		9-A13-27	26 May 2003
		9-A13-28	26 May 2003
		9-A13-29	26 May 2003
4B		9-A13-29	26 May 2003
		9-A13-30	26 May 2003
		9-A13-31	26 May 2003
		9-A13-32	26 May 2003
5, 6		9-A13-33	26 May 2003

7		9-A13-33	26 May 2003
		9-A13-34	26 May 2003
		9-A13-35	26 May 2003
		9-A13-36	26 May 2003
		9-A13-37	26 May 2003
		9-A13-38	26 May 2003
		9-A13-39	26 May 2003
		9-A13-40	26 May 2003
		9-A13-41	26 May 2003
8		9-A13-42	26 May 2003

0.3 TABLE OF CONTENTS

1. GENERAL

This Supplement supplies the information necessary for the efficient operation of the airplane when the Autopilot System KAP 140 is installed. The information contained within this Supplement is to be used in conjunction with the complete AFM.

This Supplement is a permanent part of this AFM and must remain in this AFM at all times when the Autopilot System KAP 140 is installed.

2. LIMITATIONS

A. The entire preflight test procedure outlined under Section 4 of this Supplement, must be successfully completed prior to each flight. Use of the autopilot or manual electrical trim system is prohibited prior to completion of these tests.

B. During autopilot operation, a pilot with the seat belt fastened must be seated at the left pilot position.

C. The autopilot must be DISENGAGED during take-off and landing.

D. The system is approved for Category I operation only (Approach mode selected).

E. Maximum flap extension during approach operation: T/O position

F. Autopilot maximum airspeed limitation: 165 KIAS

Autopilot minimum airspeed limitation: 70 KIAS

G. Altitude Select captures below 800 feet AGL are prohibited (if altitude preselect option installed).

H. The autopilot must be disengaged below 200 feet AGL during approach operations and below 800 feet AGL for all other phases of flight.

I. Overriding the autopilot to change pitch or roll attitude is prohibited. (Disengage or press CWS while maneuvering.)

J. The AUTOPILOT circuit breaker must be pulled following any inflight illumination of the red TRIM FAIL warning light, but only after first completing the Emergency Procedures (Section 3). The manual electric trim and autopilot autotrim systems will be disabled with the AUTOPILOT circuit breaker pulled.

NOTE

The red TRIM FAIL warning will illuminate normally during the preflight self test. If the TRIM FAIL light remains illuminated after the preflight self test, the AUTOPILOT circuit breaker must be pulled. The TRIM FAIL light will extinguish when the circuit breaker is pulled.

K. The autopilot must be disengaged if the Alternate Static Valve is open.

L. The following limitation placard is in the forward view of the pilot:

Limitations for KAP 140 Autopilot System:

Do not use AP if "Alternate Static" is open.
Conduct AP and trim check prior to each flight (see AFM).
Autopilot OFF during take-off and landing.
Maximum speed for autopilot operation is 165 KIAS.
Minimum speed for autopilot operation is 70 KIAS.
Minimum altitude for autopilot operation:
Cruise, Climb, Descent and Maneuvering: 800 feet AGL
Approach: 200 feet AGL

041-131-22-35

3. EMERGENCY PROCEDURES

The four step procedure listed below should be among the basic airplane emergency procedures that are committed to memory. It is important that the pilot be proficient in accomplishing all four steps without reference to this manual.

In case of Autopilot, Autopilot Trim, or Manual Electric Trim malfunction (accomplish Items A and B simultaneously):

A. Airplane Control Stick - GRASP FIRMLY and regain airplane control.

B. AP DISC Switch - PRESS and HOLD throughout recovery.

C. AIRPLANE - RETRIM manually as needed.

D. AUTOPILOT Circuit Breaker - PULL.

NOTE

The AVIONIC MASTER switch may be used as an alternate means of removing all power from the autopilot and electric trim system. If necessary perform steps A through C above, then turn the AVIONIC MASTER switch off before locating and pulling the AUTOPILOT circuit breaker. Turn the AVIONIC MASTER switch ON as soon as possible to restore power to all other avionics equipment. Primary attitude, airspeed and altitude instruments will remain operational at all times.

WARNING

Do not attempt to re-engage the autopilot following an autopilot, autotrim, or manual electric trim malfunction until the cause for the malfunction has been corrected.

Maximum Altitude losses and maximum absolute Attitude changes due to an autopilot malfunction:

Configuration	Alt Loss	Pitch	Roll
Cruise, Climb, Descent	400 ft	25°	50°
Maneuvering	400 ft	25°	35°
Approach	100 ft	15°	20°

NOTES

The following paragraphs are presented to supply additional information for the purpose of providing the pilot with a more complete understanding of the recommended course of action for an emergency situation.

1. An autopilot trim malfunction may be recognized as an uncommanded deviation in the airplane flight path or when there is abnormal control stick or trim wheel motion. In some cases, especially for autopilot trim, there may be little or no airplane motion, yet the red TRIM FAIL annunciator may illuminate and an alert tone will sound. The primary concern in reacting to an autopilot or autopilot trim malfunction, or to an automatic disconnect of the autopilot, is in maintaining control of the airplane. Immediately grasp the control stick and press and hold down the AP DISC switch throughout the recovery. Manipulate the controls as required to safely maintain operation of the airplane within all of its operating limitations.

Elevator trim should be used manually as needed to relieve control forces. Finally, locate and pull the AUTOPILOT circuit breaker, to completely disable these systems.

2. A manual electric trim malfunction may be recognized by the illumination of the red TRIM FAIL warning light accompanied by an alert tone, or by unusual trim wheel motions with the autopilot mode DISENGAGED without pilot actuation of the manual electric trim switch. As with an autopilot malfunction, the first concern following a manual electric trim malfunction is regaining control of the airplane. Grasp the control stick firmly and press and hold down the AP DISC switch. Locate and pull the AUTOPILOT circuit breaker.

3. Note that the emergency procedure for any malfunction is essentially the same: immediately grasp the control stick and regain airplane control while pressing and holding the AP DISC switch down, and manually retrim the airplane as needed. After these steps have been accomplished secure the autopilot or electric trim system using the proper circuit breaker. As with any other airplane emergency procedure, it is important that the 4 steps of the Autopilot/Electric Trim Emergency Procedures located on page 9 of this Supplement are committed to memory.

4. The AVIONICS MASTER switch may be used as required to remove all power from the Autopilot and Electric Trim systems while the circuit breaker is located and pulled. Return the AVIONICS MASTER switch to the ON position as soon as possible. With the AVIONICS MASTER switch off, all flight instruments will remain operational; however, communications, navigation, and identification equipment will be inoperable.

5. The KAP 140 autopilot incorporates a pitch monitor that detects abnormal airplane acceleration in the vertical axis; therefore, if the airplane, for any reason, is moved rapidly in pitch, the autopilot may disconnect automatically.

6. It is important that all portions of the autopilot and electric trim system are preflight tested prior to each flight in accordance with the procedures published herein in order to assure their integrity and continued safe operation during flight.

WARNING

Do not attempt to re-engage the autopilot or to use the manual electric trim system following an autopilot, autotrim or manual electric trim malfunction until the cause for the malfunction has been corrected.

4A. NORMAL OPERATING PROCEDURES

4A.3.4.A BEFORE TAXIING

1. POWER APPLICATION AND SELF TEST - A self test is performed upon power application to the computer. This test is a sequence of internal checks that validate proper system operation prior to allowing normal operation. The sequence is indicated by „PFT" with an increasing number for the sequence steps. Successful completion of self test is identified by all display segments being illuminated (Display Test) and the disconnect tone sounding.

NOTE

Following the preflight self test, the red P warning on the face of the autopilot may illuminate indicating that the pitch axis cannot be engaged. This condition should be temporary, lasting approximately 30 seconds. The P will extinguish and normal operation will be available.

If power to the autopilot is cycled in flight (i.e., through the autopilot circuit breaker for instance) it is possible that a 5 minute delay may be necessary prior to autopilot engagement to allow the pitch axis accelerometer circuit to stabilize. Engagement prior to stabilization may result in mildly erratic pitch axis behavior.

WARNING

If the TRIM FAIL warning light stays on, the autotrim did not pass the preflight test. The autopilot circuit breaker must be pulled. Manual electric trim cannot be used.

2. MANUAL ELECTRIC TRIM - TEST as follows:

   Press the AP DISC switch down and hold while commanding trim. Manual Electric Trim should not operate either nose up or nose down.

3. AUTOPILOT - ENGAGE by pressing AP button.

4. FLIGHT CONTROLS - MOVE fore, aft, left and right to verify that the autopilot clutches can be overpowered.

5. AP DISC Switch - PRESS. Verify that the autopilot disconnects.

6. TRIM - SET to take-off position manually.

7. AP DISC Switch - PRESS.

8. Autopilot Altitude Alert/Preselector Operation (if Altitude Preselect Option is installed).

   a. BARO setting - CHECK.

CAUTION

If the installation does not incorporate automatic baro setting, the baro display will flash until set manually by the pilot. Continue to set manually throughout the flight. Each time the altimeter baro setting requires adjustment. No further reminders (flashing) will be given.

   b. ALTITUDE SELECT knob (if Altitude Preselect Option is installed) - ROTATE until the desired altitude is displayed.

NOTE

An altitude alert is annuciated 1000 ft prior to arrival at the selected altitude. After arriving at the selected altitude, a further alert is annunciated if the airplane deviates from the selected altitude by ± 200 ft. The alert is a series of 5 short tones.

4A.3.8 CLIMB / 4A.3.11 DESCENT

1. Elevator Trim - VERIFY or SET to place the airplane in a trimmed condition prior to Autopilot engagement.

NOTE

Engaging the autopilot into a mistrim condition may cause unwanted attitude changes and a TRIM FAIL annunication.

2. AP Button - PRESS. Note ROL and VS annunciators on. If no other modes are selected, the autopilot will operate in the ROL and vertical speed hold modes.

WARNING

The pilot in command must continuously monitor the autopilot when it is engaged, and be prepared to disconnect the autopilot and take immediate corrective action - including manual control of the airplane and/or performance of emergency procedures - if autopilot operation is not as expected or if airplane control is not maintained.

During all autopilot coupled operations the pilot in command must use proper autopilot commands and use the appropriate combination of engine power and wing flaps to ensure that the airspeed is maintained between 70 and 165 KIAS, and the airplane does not exceed other basic airplane operating limitations.

WARNING

When operating at or near the best rate of climb airspeed and using vertical speed hold, it is easy to decelerate to an airspeed on the back side of the power curve where a decrease in airspeed results in a reduced rate of climb. Continued operation on the back side of the power curve in vertical speed hold mode will result in a stall.

When operating at or near the maximum autopilot speed, it may be necessary to reduce power in order to maintain the desired rate of descent and not exceed the maximum autopilot speed.

CAUTION

Avoid abrupt power changes at low indicated airspeeds with the autopilot engaged.

WARNING

Do not help the autopilot or hand-fly the airplane with the autopilot engaged as the autopilot will run the pitch trim to oppose control wheel movement. A mistrim of the airplane, with accompanying large elevator control forces, may result if the pilot manipulates the control wheel manually while the autopilot is engaged.

3. BARO setting - CHECK if not automatic.

4. Using CWS

   a. CWS Button - PRESS and MOVE airplane nose to the desired vertical speed.

   b. CWS Button - RELEASE. Autopilot will command airplane vertical speed up to the limits of ± 2000 ft/min.

5. Using Vertical Trim

   a. VERTICAL TRIM Control - PRESS either the UP or DN button to modify airplane vertical speed within the limits of ± 2000 ft/min.

   b. VERTICAL TRIM Control - RELEASE when desired vertical speed is displayed. The autopilot will command the desired vertical speed.

4A.3.9. CRUISE

NOTE

The airplane´s altitude may vary by as much as 120 feet with an airspeed change from 70 KIAS to 140 KIAS in altitude hold in heavy turbulence.

1. ALT Mode Selector Button - PRESS. Note ALT mode annunciator ON. The autopilot will maintain the selected baro corrected altitude.

2. Capture preselected altitudes (if Altitude Preselect Option is installed)

   a. ALTITUDE SELECT knob - ROTATE until the desired altitude is displayed. Note ARM annunciation occurs automatically upon altitude selection when the autopilot is engaged.

b. ALTITUDE SELECT MODE (ARM) button - PUSH to alternately disarm or arm altitude capture.

c. Airplane - ESTABLISH vertical speed necessary to intercept the selected altitude.

NOTE

Autopilot tracking performance will be degraded in turbulence. Use of basic 'ROL' mode is recommended during operation in heavy turbulence. It is recommended that the autopilot be disconnected and that the airplane be flown by hand in severe turbulence.

3. Change altitudes

   a. Using CWS (recommended for altitude changes greater than 100 ft.)

      1) CWS Button - PRESS and fly airplane to desired altitude.

      2) CWS Button - RELEASE when desired altitude is reached. The autopilot will maintain the desired altitude.

   b. Using Vertical Trim (recommended for altitude changes less than 100 ft.)

      1) VERTICAL TRIM Control - PRESS and HOLD either the UP or DN button. Vertical Trim will seek an altitude rate of change of about 500 fpm.

      2) VERTICAL TRIM Control - Release when the desired altitude is reached. The autopilot will maintain the desired altitude.

NOTE

As an alternative, press either the UP or DN button with a succession of quick momentary presses programming either an increase or decrease in the altitude reference at the rate of 20 feet per button press.

4. Heading Changes

a. Manual Heading Changes in ROL mode.

1) CWS Button - PRESS and MANEUVER airplane to the desired heading.

2) CWS Button - RELEASE. Autopilot will attempt to maintain the airplane at a zero turn rate in the ROL mode.

NOTE

Airplane heading may change in ROL mode due to turbulence.

b. Heading Hold

1) Heading Selector Knob - SET BUG to desired heading.

2) HDG Mode Selector Button - PRESS. Note HDG mode annunciator ON. Autopilot will automatically turn the airplane to the selected heading.

c. Command Turns (Heading Hold mode ON)

1) Heading Selector Knob - MOVE BUG to the desired heading. Autopilot will automatically turn the airplane to the new selected heading.

if Compass System KCS 55A is installed:

5. NAV Coupling

   a. Course Bearing Pointer - SET to desired course.

   b. Heading Selector Knob - SET BUG to provide desired intercept angle and engage HDG mode.

   c. NAV Mode Selector Button - PRESS.

      1) If the Course Deviation Bar is greater than 2 to 3 dots: the airplane will continue in HDG mode (or ROL if HDG not selected) with NAV ARM annunciated; when the computed capture point is reached HDG will disengage, the ARM annunciator will go out and the selected course will be automatically captured and tracked.

      2) If the D-Bar is less than 2 to 3 dots: the HDG mode will disengage upon selecting NAV mode; the NAV annunciator will illuminate and the capture/track sequence will automatically begin.

if vacuum driven DG Sigma-Tek 4000C-17 is installed:

5. NAV Coupling

   a. No. 1 OBS Knob - SET to desired course.

   b. NAV Mode Selector Button - PRESS. Note NAVARM annunciated.

   c. Heading Selector Knob - ROTATE bug to agree with OBS course.

NOTE

When NAV is selected, the autopilot will flash HDG for 5 seconds to remind the pilot to reset the HDG bug to the OBS course. A 45° intercept angle will then be automatically established based on the position of the bug.

NOTE

An all-angle intercept after receiving radar vectors may be accomplished by deactivating HDG mode (defaulting to ROL) just prior to pressing the NAV button. The heading bug must still be positioned to agree with the OBS course to provide course datum to the autopilot but the airplane will track approximately the last heading until intercept.

d. If the Course Deviation Indicator (CDI) needle is greater than 2 to 3 dots from the center: the autopilot will annunciate NAVARM; when the computed capture point is reached the ARM annunciator will go out and the selected course will be automatically captured and tracked.

e. If the Course Deviation Indicator (CDI) needle is less than 2 to 3 dots from the center: the HDG mode will disengage upon selecting NAV mode; the NAV annunciator will illuminate and the capture/track sequence will automatically begin (after 5 seconds allotted to position the heading bug to agree with the desired course).

4A.3.12 LANDING APPROACH

if Compass System KCS 55A is installed:

1. Approach (APR) Coupling (to enable glideslope coupling on an ILS, and more precise course tracking on instrument approaches).

   a. BARO setting - CHECK if not automatic.

      1) Course Bearing Pointer - SET to desired course.

      2) Heading Selector Knob - SET BUG to provide desired intercept angle.

      3) APR Mode Selector Button - PRESS.

         a) If the Course Deviation Bar is greater than 2 to 3 dots: the airplane will continue in HDG mode (or ROL if HDG not selected) with the APR ARM annunciated; when the computed capture point is reached HDG mode will disengage, the ARM annunciator will go out and the selected course will be automatically captured and tracked.

         b) If the D-Bar is less than 2 to 3 dots: the HDG mode will disengage upon selecting APR mode; the APR annunciator will illuminate and the capture/track sequence will automatically begin.

      4) Airspeed - Maintain 90 to 100 KIAS minimum during coupled autopilot approaches (recommended).

if vacuum driven DG Sigma-Tek 4000C-17 is installed:

1. Approach (APR) Coupling (to enable glideslope coupling on an ILS, and more precise course tracking on instrument approaches).

   a. No. 1 OBS Knob - SET to desired course (for localizer, set it to serve as a memory aid).

   b. APR Mode Selector Button - PRESS. Note APRARM annunciated.

   c. HDG Selector Knob - ROTATE bug to agree with desired approach course within 5 seconds.

NOTE

When APR is selected, the autopilot will flash HDG for 5 seconds to remind the pilot to reset the HDG bug to the desired approach course. A 45° intercept angle will then be automatically established based on the position of the bug.

NOTE

An all-angle intercept after receiving radar vectors may be accomplished by deactivating HDG mode (defaulting to ROL) just prior to pressing the APR button. The HDG bug must still be positioned to agree with the OBS course to provide course datum to the autopilot, but the airplane will continue to track approximately the last heading until intercept.

d. If the Course Deviation Indicator (CDI) needle is greater than 2 to 3 dots from the center: the autopilot will annunciate APRARM; when the computed capture point is reached the ARM annunciator will go out and the selected course will be automatically captured and tracked.

e. If the Course Deviation Indicator (CDI) needle is less than 2 to 3 dots from the center: the HDG mode will disengage upon selecting APR mode; the APR annunciator will illuminate and the capture/track sequence will automatically begin (after 5 seconds allotted to position the heading bug to agree with the desired course).

if Compass System KCS 55A is installed:

2. BC Approach Coupling (i.e., reverse localizer) (REV)

   a. BARO setting - CHECK if not automatic.

      1) Course Bearing Pointer - SET to the ILS front course inbound heading.

      2) Heading Selector Knob - SET BUG to provide desired intercept angle and engage HDG mode.

      3) REV Mode Selector Button - PRESS.

         a) If the Course Deviation Bar is greater than 2 to 3 dots: the airplane will continue in HDG mode (or ROL if HDG not selected) with REV ARM annunciated; when the computed capture point is reached HDG mode will disengage, the ARM annunciator will go out and the selected course will be automatically captured and tracked.

b) If the D-Bar is less than 2 to 3 dots: the HDG mode will disengage upon selecting REV mode; the REV annunciator will illuminate and the capture/track sequence will automatically begin.

if vacuum driven DG Sigma-Tek 4000C-17 is installed:

2. BC Approach Coupling (i.e., reverse localizer) (REV).

   a. No. 1 OBS Knob - SET the localizer <u>front course inbound</u> heading (as a memory aid).

   b. REV Mode Selector Button - PRESS.

   c. HDG Selector Knob - ROTATE bug to the localizer <u>front course inbound</u> heading.

NOTE

When REV is selected, the autopilot will flash HDG for 5 seconds to remind the pilot to reset the HDG bug to the localizer <u>front course inbound</u> heading. A 45° intercept angle will then be automatically established based on the position of the bug.

NOTE

An all-angle intercept after receiving radar vectors may be accomplished by deactivating HDG mode (defaulting to ROL) just prior to pressing the REV button.

The HDG bug must still be positioned to the localizer front course inbound heading to provide course datum to the autopilot, but the airplane will continue to track approximately the last heading until intercept.

d. If the Course Deviation Indicator (CDI) needle is greater than 2 to 3 dots from the center: the autopilot will annunciate REVARM; when the computed capture point is reached the ARM annunciator will go out and the selected course will be automatically captured and tracked.

e. If the Course Deviation Indicator (CDI) needle is less than 2 to 3 dots from the center: the HDG mode will disengage upon selecting REV mode; the REV annunciator will illuminate and the capture/track sequence will automatically begin (after 5 seconds allotted to position the heading bug to agree with the desired course).

3. Glideslope Coupling

NOTE

Glideslope coupling is inhibited when operating in NAV or REV modes. Glideslope arm and coupling occurs automatically in the APR mode when tracking a localizer.

a. APR Mode - ENGAGED. Note GS ARM annunciated.

b. At Glideslope centering - note ARM annunciator goes out.

NOTE

Autopilot can capture glideslope from above or below the beam.

NOTE

Altitude preselect captures are not recommended on non precision approaches to capture the MDA. Glideslope coupling will preclude a preselect altitude capture on an ILS.

4. Missed Approach

   a. AP DISC Switch - PRESS to disengage AP.

   b. MISSED APPROACH - EXECUTE.

   c. AP Button - After airplane is in trim, PRESS for autopilot operation if desired.

NOTE

If tracking the ILS course outbound as part of the missed approach procedure is desired, use the NAV mode to prevent inadvertent GS coupling.

5. Before Landing

   a. AP DISC Switch - PRESS to disengage AP.

4B. ABNORMAL OPERATING PROCEDURES

4B.7 FAILURE IN THE AUTOPILOT SYSTEM

A. A flashing PT annunciator with an up or down arrow head in the display of the autopilot computer.

A flashing PT auto trim annunciation on the face of the autopilot suggests a failure of the auto trim function to relieve pitch servo loading in a timely manner. This condition should be temporary.

1. FLASHING PT ANNUNCIATION - OBSERVE airplane pitch behavior. If pitch behavior is satisfactory, wait 5-10 seconds for the annunciation to stop.

2. If annunciation continues, Airplane Control Sticks - GRASP FIRMLY, press CWS and check for an out of pitch trim condition. Manually retrim as required.

3. CWS Button - Release.

4. AUTOPILOT OPERATION - CONTINUE if satisfied that the out of trim indication was temporary. DISCONTINUE if evidence indicates a failure of the auto trim function.

B. A red P or R on the face of the autopilot computer.

1. A red P is an indication that the pitch axis of the autopilot has been disabled and cannot be engaged. DO NOT ENGAGE INTO A ROLL AXIS ONLY SYSTEM.

NOTE

If the red P lamp was the result of some abnormal accelerations on the airplane, the annunciation should extinguish within approximately one minute and normal use of the autopilot will be re-established.

2. A red R is an indication that the roll axis of the autopilot has been disabled. The autopilot cannot be engaged.

C. Flashing Baro Setting in the display of the autopilot computer. (If Systems with automatic baro setting installed.)

A flashing baro setting annunciation on the face of the autopilot computer, in an installation when the baro setting is automatically updated with each change to the KEA 130 altimeter baro setting, indicates a failure of the communication link between the altimeter and the autopilot. The flashing will be initiated at the time the communication link failure is detected, and each time thereafter that a change to the preselected altitude is made.

1. Flashing Baro Setting - SET proper baro setting manually (or press BARO to accept the present value).
2. Altitude Alert/Preselector Setting - SET as desired.

D. Flashing Mode Annunciation in the display of the Autopilot computer.

A flashing mode annunciation on the face of the autopilot is normally an indication of mode loss.

1. Flashing HDG - Indication of a failed heading valid input. PRESS HDG button to terminate flashing. ROL will be displayed.
2. Flashing NAV, APR, or REV - Usually an indication of a flagged navigation source. PRESS the NAV, APR or REV button to terminate flashing. ROL will be displayed. (Select a valid navigation source.)

NOTE

A flashing NAV, APR or REV annunciation can also be caused by a failed heading valid input.

3. Flashing GS - Indication of a flagged glideslope. (GS will rearm automatically if a valid GS signal is received.)

NOTE

To continue tracking the localizer, observe the appropriate minimums for a non precision approach. (Press ALT twice in rapid succession to terminate the flashing. Control the pitch axis in the default VS mode.)

NOTE

At the onset of mode annunciator flashing, the autopilot has already reverted to a default mode of operation, i.e., ROL and or VS mode. An immediate attempt to re-engage the lost mode may be made if the offending navigation, glideslope or compass flag has cleared.

E. Effects of instrument losses upon autopilot operation:

1. Loss of the attitude gyro - no effect on the autopilot.
2. Loss of the turn coordinator - autopilot inoperative.
3. Loss of the HSI - HDG, NAV and approach modes inoperative.
4. Loss of altitude encoding - automatic baro set operation, preselect altitude captures and altitude alerting inoperative.

5. PERFORMANCE

No change.

6. MASS AND BALANCE

Upon removal or installation of the KAP 140 Autopilot system the change of empty mass and corresponding center of gravity of the airplane must be recorded according to Chapter 6 of the Airplane Flight Manual.

7. SYSTEM DESCRIPTION

7.14 AVIONICS

This Supplement to the AFM is provided to acquaint the pilot with the limitations as well as normal and emergency operating procedures of the Bendix/King KAP 140 Autopilot. The limitations presented are pertinent to the operation of the KAP 140 System as installed in the DA 40 airplane; the Autopilot must be operated within the limitations specified herein.

The KAP 140 Autopilot has an electric pitch trim system which provides autotrim during autopilot operation and manual electric trim for the pilot when the autopilot is not engaged. The trim system is designed to be fail safe for any single inflight trim malfunction. Trim faults are monitored and annunciated both visually and aurally.

A lockout device prevents autopilot engagement until the system has successfully passed preflight self test. Automatic preflight self test begins with initial power application to the autopilot.

The following conditions will cause the Autopilot to automatically disengage:

A. Power failure.

B. Internal Flight Control System failure.

C. Pitch accelerations in excess of +1.4 g or less than 0.6 g will cause the autopilot clutches to disengage.

D. Turn Coordinator failure.

E. Autopilot computer monitor that detects either the R (Roll) or P (Pitch) axis annunciator.

The AVIONIC MASTER switch supplies power to the avionics bus bar of the radio circuit breakers and the autopilot circuit breaker.

The airplane 'Electric Master'-key switch function is unchanged and can be used in an emergency to shut off electrical power to all flight control systems while the problem is being isolated.

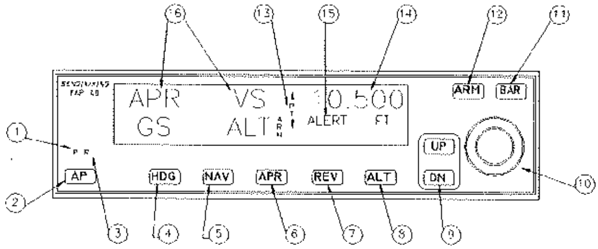
Activation of AP DISC stick switch will also disconnect the autopilot.

The following circuit breakers are used to protect the following elements of the KAP 140 Autopilot:

LABEL	FUNCTION
AUTOPILOT	Supplies power to the KC 140 Computer, and the autopilot pitch, roll and pitch trim servos.
ANNUN	Supplies separate power for autopilot alerting.

LABEL	FUNCTION
DG	Supplies power to the KCS 55A Compass System.
T&B	Supplies power to the panel mounted turn and bank indicator/gyro.
XPDR	Supplies power to the King KEA 130A Altimeter, when installed.
XPDR	Supplies power to the blind altitude encoder, when installed.

SYSTEM CONTROLS AND DISPLAYS



– PITCH AXIS, (P) ANNUNCIATOR - When illuminated, it indicates failure of the pitch axis and will either disengage the autopilot or does not allow engagement of the pitch axis. The P light may illuminate with the autopilot disengaged. This condition can occur during maneuvering flight when g thresholds are exceeded. The autopilot monitor will not allow engagement during illumination.

2. AUTOPILOT ENGAGE/DISENGAGE (AP) BUTTON - When pushed, it engages the autopilot if all logic conditions are met. The autopilot will engage in the basic roll (ROL) mode which functions as a wing leveler and in the vertical speed (VS) hold mode. The commanded vertical speed may be displayed manually in the upper right corner of autopilot display area if either UP or DN button is pressed. The captured VS will be the vertical speed present at the moment of AP button press. When pressed again, it will disengage the autopilot. If MÄM 40-099 or MSB 40-018 has been implemented, this button is the only button to engage the autopilot.

3. ROLL AXIS (R) ANNUNCIATOR - When illuminated, it indicates failure of the roll axis and will disengage the autopilot or does not allow engagement.

4. HEADING (HDG) MODE SELECTOR BUTTON - When pushed, it will select the Heading mode, which commands the airplane to turn to and maintain the heading selected by the heading bug on the HSI. A new heading may be selected at any time and will result in the airplane turning to the new heading. The button can also be used to toggle between HDG and ROL modes. If MÄM 40-099 or MSB 40-018 has not yet implemented, this button may also be used to engage the autopilot.

5. NAVIGATION (NAV) MODE SELECTOR BUTTON - When pushed, will select the navigation mode. The mode provides automatic beam capture and tracking of VOR, LOC or GPS as selected for presentation on the HSI or CDI. NAV mode is recommended for enroute navigation tracking.

6. APPROACH (APR) MODE SELECTOR BUTTON - When pushed, it will select the navigation mode. The mode provides automatic beam capture and tracking of VOR, GPS, LOC, and Glideslope (GS) on an ILS, as selected for presentation on the HSI or CDI. APR mode tracking sensitivity is recommended for instrument approaches.

7. BACK COURSE APPROACH (REV) MODE SELECTOR BUTTON - When pushed, it will select the Back Course approach mode. This mode functions identically to the approach mode except that the autopilot response to LOC signals is reversed.

8. ALTITUDE HOLD (ALT) MODE SELECT BUTTON - When pushed, it will select the Altitude Hold mode. This mode provides capture and tracking of the selected altitude. The selected altitude is the altitude at the moment the ALT button is pressed. If the ALT button is pressed with an established VS rate present, there will be approximately a 10 % (of VS rate) overshoot, with the airplane returned positively to the selected altitude. If MÄM 40-099 or MSB 40-018 has not yet implemented, this button may also be used to engage the autopilot.

9. VERTICAL TRIM (UP/DN) BUTTONS - The action of these buttons is dependent upon the vertical mode present when pressed. If VS mode is active, the initial button stroke will bring up the commanded vertical speed in the display. Subsequent immediate button strokes will increment the vertical commanded either up or down at the rate of 100 ft/min per button press, or at the rate of approximately 300 ft/min per second if continuously. If ALT mode is active, incremental button strokes will move the altitude hold reference altitude either up or down by 20 feet per press, or if held continuously will command the airplane up or down at the rate of 500 ft/min, synchronizing the altitude hold reference to the actual airplane altitude upon button release. (Note that the altitude hold reference is not displayed. The display will continue to show the altitude alerter reference.)

10. ROTARY KNOBS (only if Altitude Preselect Option is installed) - Used to set the altitude alerter reference altitude; or may be used immediately after pressing the BARO button, to adjust the autopilot baro setting to match that of the airplane´s altimeter when manual adjustment is required.

11. BARO SET (BARO) BUTTON (only if Altitude Preselect Option is installed) - When pushed and released, it will change the display from the altitude alerter selected altitude to the baro setting display (either IN HG or HPA) for 3 seconds. If pushed and held for 2 seconds, it will change the baro setting display from IN HG to HPA or vice versa. Once the baro setting display is visible, the rotary knobs may be used to manually adjust the baro setting if the system configuration does not employ automatic correction.

12. ALTITUDE ARM (ARM) BUTTON (only if Altitude Preselect Option is installed) - When pushed it will toggle altitude arming on or off. When ALT ARM is annunciated, the autopilot will capture the altitude alerter displayed altitude (provided the airplane is climbing or descending in VS to the displayed altitude). ALT hold arming when the autopilot is engaged is automatic upon altitude alerter altitude selection via the rotary knobs. Note that the alerter functions are independent of the arming process, thus providing full time alerting, even when the autopilot is disengaged.

13. PITCH TRIM (PT) ANNUNCIATION - Indicates the direction of required pitch trim. With electric trim installed, the annunciation simply provides status to the autopilot request for auto trim. A solid indication represents the lowest demand level for trim, whereas a flashing annunciation implies a greater demand. A solid PT without an arrow head is an indication of a pitch trim fault. Refer to the EMERGENCY PROCEDURES for proper response to a pitch trim fault. During MET operation, this annunciation can be caused by a stuck MET switch. If the stuck switch fault clears, trim operation will resume.

14. ALTITUDE ALERTER/VERTICAL SPEED/BARO SETTING DISPLAY (only if Altitude Preselect Option is installed) - Normally displays the altitude alerter selected altitude.

If the UP or DN button is pushed while in VS hold, the display changes to the command reference for the VS mode in FPM for 3 seconds.If the BARO button is pushed, the display changes to the autopilot baro setting in either IN HG or HPA for 3 seconds.

NOTE

This display may be dashed for up to 3 minutes on start up if a blind encoder is installed which requires a warm up period.

15. ALTITUDE ALERT (ALERT) ANNUNCIATION (only if Altitude Preselect Option is installed) - Illuminates continuously in the region of from 200 to 1000 feet from the selected altitude if the airplane was previously outside of this region.

    Flashes

    (1) for two seconds the first time the airplane crossed the selected altitude, and

    (2) continuously in the 200 to 1000 feet region if the airplane was previously inside of this region (i.e., at the selected altitude). Associated with the visual alerting is an aural alert (5 short tones) which occurs 1000 feet from the selected altitude upon approaching the altitude and 200 feet from the selected altitude on leaving the altitude.

16. PITCH AND ROLL MODE DISPLAYS - Displays the active pitch modes (VS, ALT, ARM, ALT, GS ARM, GS) and roll modes (ROL, HDG, NAV ARM, NAV, APR ARM, APR, REV ARM, REV). Also displayed will be flashing AP annunication (5 seconds) at each autopilot disconnect accompanied by an aural tone (for 2 seconds).

17. AUTOPILOT DISCONNECT (AP DISC) SWITCH (not shown) - When pressed, it will disengage the autopilot, and interrupt electric trim power. (Located on pilot's and copilot's stick.)

18. MANUAL ELECTRIC TRIM SWITCHES (not shown) - When both switches are pressed in the same direction, they will activate pitch trim in the selected direction. If only one switch is moved, the trim system will not operate. If one switch fail or is moved and held for 3 seconds, the trim monitoring system will detect a switch failure resulting in a PT annunciation on the autopilot display and the disabling of the electric trim system. Autopilot power will have to be cycled to clear the fault. Use of manual electric trim during autopilot operation will disengage the autopilot. (Located on the pilot's stick.)

19. CONTROL WHEEL STEERING (CWS) MODE BUTTON (not shown) - When pressed and held, it disengages the pitch, roll, and pitch trim clutches allowing the pilot to maneuver the airplane by hand. Pressing the CWS button will also sync the autopilot ALT or VS commands to the actual altitude or vertical speed present at the time the button is released. (Located at the pilot's stick.)

20. OMNI BEARING SELECT KNOB - Selects the desired course to be tracked by the autopilot (Located on the HSI.)

21. HEADING SELECT KNOB - Positions the heading bug on the compass card (located on the HSI.)

22. TRIM FAIL ANNUNCIATOR - Illuminates whenever the automated preflight self test detects a pitch trim fault or a continuous monitoring system detects a pitch trim fault in flight. (Located on the White Wire annunciator panel.) Refer to the EMERGENCY PROCEDURES for proper response to a pitch trim fault.

8. AIRPLANE HANDLING, CARE AND MAINTENANCE

No change in Chapter 8.

VOICE MESSAGING

The voice messaging feature provides the pilot with an additional annunciation of normal and abnormal operation of the autopilot system. The voice messages can be heard by the pilot, the copilot and the two passengers over the headsets and also over the cabin speaker. The following voice messages may be heard during operation of the autopilot system, where some messages are only available for the altitude preselect flight computers:

- The message 'ALTITUDE' occurs 1000 ft before approaching the selected altitude.
- The message 'LEAVING ALTITUDE' occurs upon a deviation of 200 ft from the selected altitude.
- The message 'AUTOPILOT' occurs when the autopilot has disengaged, either through the pilot, or automatically.
- The message 'CHECK PITCH TRIM' occurs 10 seconds after a continuous flashing of a nose up or nose down trim arrow on the autopilot display panel.
- The message 'AUTOPILOT BARO SET FAIL - SET MANUALLY' is a one time message delivered upon detection of an automatic baro set failure.
- The message 'TRIM IN MOTION, TRIM IN MOTION' occurs when the autotrim has been running for more than 5 seconds, and it repeats until the autotrim stops running.
- The message 'CHECK PITCH TRIM' occurs when the KAP 140 System has detected an out-of-trim condition for more than 15 seconds.

SUPPLEMENT A17
TO THE AIRPLANE FLIGHT MANUAL
DA 40, DA 40 D, DA 40 F

COM / NAV / GPS
GNS 430
GARMIN

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0.1 RECORD OF REVISIONS

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		7	9-A17-31, 9-A17-32					
2	OÄM 40-136	all	all	17-Feb-2003				
3	OÄM 40-221 EASA Statement	all	all	22-Jun-2005				

0.2 LIST OF EFFECTIVE PAGES

Chapter	Page	Date
0	9-A17-0	22 Jun 2005
	9-A17-1	22 Jun 2005
	9-A17-2	22 Jun 2005
	9-A17-3	22 Jun 2005
	9-A17-4	22 Jun 2005
1	9-A17-5	22 Jun 2005
2	9-A17-5	22 Jun 2005
	9-A17-6	22 Jun 2005
	9-A17-7	22 Jun 2005
3	9-A17-8	22 Jun 2005
4A	9-A17-9	22 Jun 2005
	9-A17-10	22 Jun 2005
4B	9-A17-10	22 Jun 2005
5, 6	9-A17-10	22 Jun 2005

7		9-A17-11	22 Jun 2005
		9-A17-12	22 Jun 2005
		9-A17-13	22 Jun 2005
		9-A17-14	22 Jun 2005
		9-A17-15	22 Jun 2005
		9-A17-16	22 Jun 2005
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0.3 TABLE OF CONTENTS

Page

1. GENERAL

This Supplement supplies the information necessary for the efficient operation of the airplane when the COM/NAV/GPS GNS 430 is installed. The information contained within this Supplement is to be used in conjunction with the complete AFM.

This Supplement is a permanent part of this AFM and must remain in this AFM at all times when the GNS 430 is installed.

Refer to Section 7.14 for approved modes of operation (i.e. BRNAV, MNPS) of the GNS 430's GPS receiver.

2. LIMITATIONS

A. The GNS 430 Pilot's Guide, dated October, 1998, or later appropriate revision, must be immediately available to the flight crew whenever navigation is predicated on the use of the system.

B. The GNS 430 must utilize the following or later approved software versions:

Sub-System	Software Version
Main	200
GPS	200
COMM	122
VOR/LOC	125
G/S	200

The Main software version is displayed on the GNS 430 self test page immediately after turn-on for 5 seconds. The remaining system software versions can be verified on the AUX group sub-page 2, 'SOFTWARE/DATABASE VER'.

C. IFR en route and terminal navigation predicated upon the GNS 430's GPS Receiver is prohibited unless the pilot verifies the currency of the data base or verifies each selected waypoint for accuracy by reference to current approved data.

D. Instrument approach navigation predicated upon the GNS 430's GPS Receiver must be accomplished in accordance with approved instrument approach procedures that are retrieved from the GPS equipment data base. The GPS equipment database must incorporate the current update cycle.

(1) Instrument approaches utilizing the GPS receiver must be conducted in the approach mode and Receiver Autonomous Integrity Monitoring (RAIM) must be available at the Final Approach Fix.

(2) Accomplishment of ILS, LOC, LOC-BC, LDA, SDF, MLS or any other type of approach not approved for GPS overlay with the GNS 430's GPS receiver is not authorized.

(3) Use of the GNS 430 VOR/ILS receiver to fly approaches not approved for GPS require VOR/ILS navigation data to be present on the external indicator.

(4) When an alternate airport is required by the applicable operating rules, it must be served by an approach based on other than GPS or Loran-C navigation, the airplane must have the operational equipment capable of using that navigation aid, and the required navigation aid must be operational.

(5) VNAV information may be utilized for advisory information only. Use of VNAV information for Instrument Approach Procedures does not guarantee Step-Down Fix altitude protection, or arrival at approach minimums in normal position to land.

E. If not previously defined, the following default settings must be made in the 'SETUP 1' menu of the GNS 430 prior to operation (refer to Pilot's Guide for procedure if necessary):

(1) **dis, spd:** nm, kt (sets navigation units to 'nautical miles' and 'knots')

(2) **alt, vs:** ft, fpm (sets altitude units to 'feet' and 'feet per minute')

(3) **map datum:** WGS 84 (sets map datum to WGS-84, see note below)

(4) **posn:** hddd°mm.mmm' (sets navigation grid units to decimal minutes)

(5) **fuel:** gl (sets fuel units to gallons)

NOTE

In some areas datums other than WGS-84 may be used. If the GNS 430 is authorized for use by the appropriate Airworthiness authority, the required geodetic datum must be set in the GNS 430 prior to its use for navigation.

F. The accuracy of the data base information is only assured if it is used before the end of the effectivity period. Use of out of date data base information is done entirely at the user's own risk.

3. EMERGENCY PROCEDURES

A. If GNS 430 navigation information is not available or invalid, utilize remaining operational navigation equipment as required.

B. If 'RAIM POSITION WARNING' message is displayed the system will flag and no longer provide GPS based navigational guidance. The crew should revert to the GNS 430 VOR/ILS receiver or an alternate means of navigation other than the GNS 430's GPS Receiver.

C. If 'RAIM IS NOT AVAILABLE' message is displayed in the en route, terminal, or initial approach phase of flight, continue to navigate using the GPS equipment or revert to an alternate means of navigation other than the GNS 430's GPS receiver appropriate to the route and phase of flight. When continuing to use GPS navigation, position must be verified every 15 minutes using the GNS 430's VOR/ILS receiver or another IFR-approved navigation system.

D. If 'RAIM IS NOT AVAILABLE' message is displayed while on the final approach segment, GPS based navigation will continue for up to 5 minutes with approach CDI sensitivity (0.3 nautical miles). After 5 minutes the system will flag and no longer provide course guidance with approach sensitivity. Missed approach course guidance may still be available with 1 nautical mile CDI sensitivity by executing the missed approach.

E. In an in-flight emergency, depressing and holding the Comm transfer button for 2 seconds will select the emergency frequency of 121.500 MHz into the 'Active' frequency window.

4A. NORMAL PROCEDURES

DETAILED OPERATING PROCEDURES

Detailed operating procedures are described in the GARMIN GNS 430 Pilot's Guide, dated October 1998, or later appropriate revision.

PILOT'S DISPLAY

The GNS 430 System data will appear on the Pilot's HSI or CDI. The source of data is either GPS or VLOC as annunciated on the display above the CDI key.

AUTOPILOT COUPLED OPERATION

Coupling of the GNS 430 System steering information to the autopilot can be accomplished by engaging the autopilot in the NAV or APR mode. When the autopilot system is using course information supplied by the GNS 430 System, the course pointer on the HSI must be manually set to the desired track (DTK) indicated by the GNS 430. For detailed autopilot operational instructions, refer to the JAA Approved Flight Manual Supplement for the autopilot.

CROSSFILL OPERATIONS

For dual GNC 400 Product Series installations, crossfill capabilities exist between the number one and number two GNC 400 Systems. Refer to the GNS 430 Pilot's Guide for detailed crossfill operating instructions.

AUTOMATIC LOCALIZER COURSE CAPTURE

By default, the GNS 430 automatic localizer course capture feature is enabled. This feature provides a method for system navigation data present on the external indicators to be switched automatically from GPS guidance to localizer / glide slope guidance as the airplane approaches the localizer course inbound to the final approach fix. If an offset from the final approach course is being flown, it is possible that the automatic switch from GPS course guidance to localizer / glide slope course guidance will not occur. It is the pilot's responsibility to ensure correct system navigation data is present on the external indicator before continuing a localizer based approach beyond the final approach fix. Refer to the GNS 430 Pilot's Guide for detailed operating instructions.

4B. ABNORMAL PROCEDURES

No change.

5. PERFORMANCE

No change.

6. MASS AND BALANCE

Upon removal or installation of the GNS 430 the change of empty mass and corresponding center of gravity of the airplane must be recorded according to Chapter 6 of the Airplane Flight Manual.

7. DESCRIPTION OF THE AIRPLANE AND ITS SYSTEMS

7.14 AVIONICS

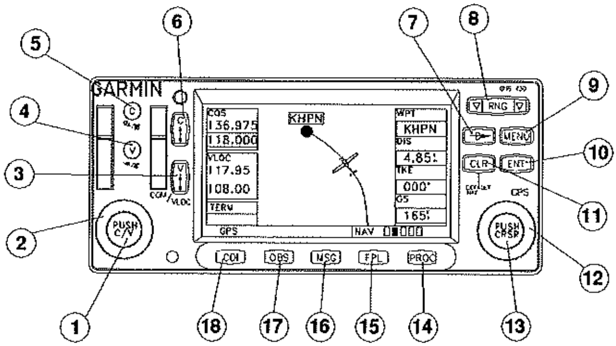
GENERAL

The GNS 430 System is a fully integrated, panel mounted instrument, which contains a VHF Communications Transceiver, a VOR/ILS receiver, and a Global Positioning System (GPS) Navigation computer. The system consists of a GPS antenna, GPS Receiver, VHF VOR/LOC/GS antenna, VOR/ILS receiver, VHF COMM antenna and a VHF Communications Transceiver. The primary function of the VHF Communication portion of the equipment is to facilitate communication with Air Traffic Control. The primary function of the VOR/ILS Receiver portion of the equipment is to receive and demodulate VOR, Localizer, and Glide Slope signals. The primary function of the GPS portion of the system is to acquire signals from the GPS system satellites, recover orbital data, make range and Doppler measurements, and process this information in real-time to obtain the user's position, velocity, and time.

Provided the GNS 430's GPS receiver is receiving adequate usable signals, it has been demonstrated capable of and has been shown to meet the accuracy specifications for:

- VFR/IFR enroute, terminal, and non-precision instrument approach (GPS, Loran-C, VOR, VOR-DME, TACAN, NDB, NDB-DME, RNAV) operation in accordance with AC 20-138.
- One of the approved sensors, for a single or dual GNS 430 installation, for North Atlantic Minimum Navigation Performance Specification (MNPS) Airspace in accordance with AC 91-49 and AC 120-33.
- The systems meets RNP5 airspace (BRNAV) requirements of AC 90-96 and in accordance with AC 20-138, and JAA AMJ 20X2 Leaflet 2 Revision 1, provided it is receiving usable navigation information from the GPS receiver.

Navigation is accomplished using the WGS-84 (NAD-83) coordinate reference datum. Navigation data is based upon use of only the Global Positioning System (GPS) operated by the United States of America.



KEY AND KNOB FUNCTIONS

The key and knob descriptions on the next pages provide a general overview of the primary function(s) for each knob.

LEFT-HAND KEYS AND KNOBS

1. The small left knob (COM/VLOC) is used to tune the kilohertz (kHz) value 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.

2. The large left knob (COM/VLOC) is used to tune the megahertz (MHz) value of the standby frequency for the communications transceiver (COM) or the VLOC receiver, whichever is currently selected by the tuning cursor.
3. The VLOC flip-flop key is used to swap the active and standby VLOC frequencies (i.e., make the selected standby frequency active).
4. The VLOC volume knob controls audio volume for the selected VOR/Localizer frequency. Press momentarily to enable/disable the ident tone.
5. The COM power/volume knob controls unit power and communications radio volume. Press momentarily to disable automatic squelch control.
6. 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

7. 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.
8. The range key 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.
9. The menu key displays a context-sensitivity list of options. This options list allows you to access additional features or make settings changes which relate to the currently displayed page.
10. The enter key is used to approve an operation or complete data entry. It is also used to confirm information, such as the Database Page during power on.
11. The clear key 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 being displayed.
12. The large right knob (CRSR) 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.
13. 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

14. The procedures key 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.
15. The flight plan key 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.
16. The message key is used to view system messages and to alert you to important warnings and requirements.
17. 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.
18. The CDI key is used to toggle which navigation source (GPS or VLOC) provides output to the HSI or CDI.

OPERATION

POWERING UP THE GNS 430

The GNS 430's power and COM volume are controlled using the COM power/volume knob (5) at the top left corner of the unit. Rotating 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.

During the self-test, check for the following indications on other instruments:

- Course deviation - half left / no flag
- TO/FROM flag - TO
- All external annunciators - on
- Glideslope - half up / no flag

The land data page will appear next, followed by the database confirmation page, which 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 for approved instrument approach operations. Information on database subscriptions is available inside your GNS 430 package.

To acknowledge the database information, press the ENT-key.

ACQUIRING SATELLITES & VIEWING MESSAGES

Once the database has been acknowledged, the satellite status page will appear, and the GNS 430 will begin to collect satellite information. An 'Acquiring' status will be displayed on the satellite status page, and the signal strength of any satellites received will appear as 'bar graph' readings. This is a good indication that you are receiving signals and a position fix will be determined. Following the first-time use of your GNS 430, the time required for a position fix will vary - usually from one to two minutes.

If the unit can only obtain enough satellites for 2D navigation (no altitude), the unit will use the altitude provided by the altitude encoder.

If the GNS 430 has not been operated for a period of six months or more, it may have to 'Search the Sky' to collect new data. This means the unit is acquiring satellite data to establish almanac and satellite orbit information, which can take 5 to 10 minutes. The satellite status page will display a 'Searching Sky' status, and the message annunciator (MSG), above the MSG key, will also flash to alert you of a system message, 'Searching the Sky'.

To view a system message, press MSG.

The message page will appear and display the status or warning information applicable to the receiver´s current operating condition.

To return to the previous page after viewing a message, press MSG again.

SELECTING COM AND VLOC FREQUENCIES

The GNS 430's display is divided into separate 'windows' (or screen areas), including a COM window, VLOC window and the GPS window (the right 3/4 of the display).
Pushing the small left knob (1) activates the tuning cursor in the desired frequency window. To select the active frequency, you must first enter the frequency in the standby field, and use the COM flip-flop (6) (or the VLOC flip-flop (3)) key to move it to the active field.

To change the standby communication frequency:

1. Press the small left knob (1) if needed, to move the tuning cursor to the COM window
2. Rotate the large left knob (2) to select the MHz, and the small left knob (1) to select the kHz of the desired frequency

To place the standby communication frequency in the active field, press the COM flip-flop key (6).

Once you've entered the active frequency, simply repeat steps 1 and 2, above, to enter the standby frequency. After both communication frequencies have been entered, you may select to keep the COM window 'hot' by leaving the cursor on the standby frequency, or move the cursor to the VLOC window by pressing the small left knob (1).

NOTE

When selecting VLOC frequencies, the tuning cursor will automatically return to the COM window after 30 seconds of inactivity.

To change the standby VLOC frequency:

1. Press the small left knob (1), if needed, to activate the tuning cursor in the VLOC window.
2. Rotate the large left knob (2) to select the MHz, and the small left knob (1) to select the kHz of the desired frequency.

To place the standby frequency in the active field, press the VLOC flip-flop key (3).

MAP PAGE

After the GNS 430 acquires satellites and computes a position, the map page will appear automatically.
The map page displays your present position (using an airplane symbol) relative to nearby airports, VORs, NDBs, intersections, user waypoints and airspace boundaries - and your route displayed as a solid line.
Data fields for destination waypoint (WPT), distance to waypoint (DIS), desired track (DTK) and ground speed (GS) appear on the right hand side of the display. These fields are user selectable to allow you to configure the unit to your own preferences. Available settings include: altitude, bearing, enroute, safe altitude, estimated time of arrival, minimum safe altitude, and ground track.

NAV PAGES & PAGE GROUPS

The map page is one of six pages available under the NAV group:

- Default NAV page
- NAVCOM page
- Satellite status page
- Vertical navigation page
- Position page
- Map page

To select the desired NAV page, rotate the small right knob (13) until the desired page is displayed.
If you are currently viewing a page which is not part of the NAV group, you can quickly return to the NAV group using the CLR-key.
To select the NAV group and display the default NAV page, press and hold the

CLR-key (11).

In addition to the NAV group of pages, additional groups of pages are available for waypoint information (WPT), auxiliary (AUX) functions such as flight planning or unit settings, and listings for nearest (NRST) airports or other facilities.

To select the desired page group, rotate the large right knob (12) until a page from the desired group is displayed

To select the desired page within the group, rotate the small right knob (13) until the desired page is displayed.

DIRECT-TO NAVIGATION

The GNS 430 can use direct point-to-point navigation to guide you from takeoff to touchdown, even in the IFR environment. Once a destination is selected, the unit will provide speed, course and distance data based upon a direct course from your present position to your destination. A destination can be selected from any page with the direct-to-key (7).

To select a direct-to destination:

1. Press the direct-to-key. The select direct-to waypoint page will appear with the destination field highlighted.
2. Rotate the small right knob (13) to enter the first letter of the destination waypoint identifier. The destination waypoint may be an airport, VOR, NDB, intersection or user waypoint, as long as it is in the database or stored in memory as a user waypoint.
3. Rotate the large right knob (12) to the right to move the cursor to the next character position.
4. Repeat steps 2 and 3 to spell out the rest of the waypoint identifier.
5. Press ENT to confirm the identifier. The 'Activate?' function field will be highlighted.
6. Press ENT to activate a direct-to course to the selected destination.

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).
From the default NAV page, simply rotate the small right knob (13) to display the map page and again to display the NAVCOM page. The NAVCOM page displays the available frequencies (communications and navigation) for the departure airport, any en route airports which are included in your flight plan, and the final destination airport. When using the direct-to function, frequencies will be listed for the airport nearest to your starting position and the destination airport.

To display the frequency list for the desired flight plan or direct-to airport:

1. Push the small right knob (13) to activate the cursor on the airport identifier field (in the GPS window).
2. Rotate the small right knob (13) to display the list of airports (departure, arrival and en route) for your flight plan or direct-to. Continue to rotate the small right knob (13) until the desired airport is selected.
3. Press ENT to display the frequency list for the selected airport.

NAVCOM PAGE

A frequency listed on the NAVCOM page can be quickly transferred to the standby field of the COM or VLOC windows. This time saving process prevents having to 're-key' a frequency already displayed elsewhere on the screen.

To select a communication or navigation frequency:

1. Push the small right knob (13) to activate the cursor in the GPS window.
2. Rotate the large right knob (12) to select the desired frequency from the list.
3. Press ENT to transfer the selected frequency to the standby field in the COM or VLOC window. COM frequencies will automatically go to the standby field of the COM window and navigation frequencies will automatically go to the standby field of the VLOC window, regardless of which window is currently being highlighted by the cursor.
4. To activate the selected frequency, press the COM flip-flop-key (6) or the VLOC flip-flop-key (3).

IFR PROCEDURES

Once the direct-to or flight plan is confirmed, the whole range of instrument procedures is available to you. Departures (SIDs), arrivals (STARs), non-precision and precision approaches are stored within the NavData card and available using the PROC (procedures) key.

To display the procedures page, press PROC.

The steps required to select and activate an approach, departure or arrival are identical. In this Supplement, examples of the steps required to select an approach are shown, but keep in mind the same process also applies to departures and arrivals.

To select an approach, departure or arrival:

1. Rotate the small right knob (13) to select the desired option ('Select Approach?', 'Select Arrival?', or 'Select Departure?') from the procedures page.
2. Press ENT to display a list of available procedures for the arrival (when using approach or STARs) or departure (when using SIDs) airport.
3. Rotate the small right knob (13) to select the desired procedure and press ENT.
4. For approaches, a window appears to select the desired initial approach fix (IAF) or provide a 'vectors' option to select just the final course segment of the approach. Rotate the small right knob (13) to select the desired option and press ENT. (The 'vectors' option extends the final outbound course beyond the final approach fix, allowing you to intercept the final course segment beyond its normal limits.)

5. For departures and arrivals, a window appears to select the desired transition. Rotate the small right knob (13) to select the desired option and press ENT.

In your flight plan or direct-to, the departure or arrival airport is replaced with the sequence of waypoints contained within the selected procedure.

NEAREST AIRPORT EMERGENCY SEARCH

The NRST group provides detailed information on the nine nearest airports, VORs, NDBs, intersections and user-created waypoints within 200 nautical miles of your current position. In addition, pages are also provided to display the five nearest center (ARTCC/FIR) and Flight Service Station (FSS) points of communication, plus alert you to any special-use or controlled airspace you may be in or near.

To display the NRST pages:

1. If necessary, press the small right knob (13) to remove the cursor from the page.
2. Rotate the large right knob (12) to select the NRST page group, as indicated by 'NRST' appearing in the lower right corner of the screen.
3. Rotate the small right knob (13) to select the desired NRST page.

The nearest airport page is one of eight pages available under the NRST group:

- Nearest airport page
- Nearest intersection page
- Nearest NDB page
- Nearest VOR page
- Nearest user waypoints page
- Nearest ARTCC page
- Nearest FSS page
- Nearest airspace page

You may examine both the communication frequencies and runway information directly from the nearest airport page. As discussed earlier for the NAVCOM page, you may also place any displayed frequency into the standby COM or VLOC field by highlighting the frequency with the cursor and pressing ENT.

NEAREST AIRPORTS: ADDITIONAL INFORMATION AND DIRECT-TO

To view additional information for a nearby airport:

1. Press the small right knob (13) to activate the cursor.
2. Rotate the large right knob (12) to select the desired airport from the list.
3. Press ENT to display waypoint (WPT) information pages for the selected airport.
4. To display runway and frequency information, press the small right knob (13) to remove the cursor and rotate the small right knob (13) to display the desired information page.

The nearest airport page may be used in conjunction with the direct-to (7) key to quickly set a course to a nearby facility in an in-flight emergency. Selecting a nearby airport as a direct-to destination will override your flight plan or cancel a previously selected direct-to destination. (You'll still have the option of returning to your flight plan by canceling the direct-to.)

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

From the nearest airport page:

1. Press the small right knob (13) to activate the cursor.
2. Rotate the large right knob (12) to select the desired airport from the list.
3. Press direct-to (7), ENT and ENT (again) to navigate to the nearby airport.

From an airport information page:

1. Press direct-to (7), ENT and ENT (again) to navigate to the nearby airport.

SPECIAL USE AND CONTROLLED AIRSPACE

The last page in the NRST group, the nearest airspace page, provides information for up to nine controlled or special-use airspaces near or in your flight path. Airspace information appears on this page based upon the same criteria used for airspace alert messages.

Nearby airspace information and airspace alert messages are provided according to the following conditions:

- If your projected course will take you inside an airspace within the next ten minutes, the message 'Airspace ahead - - less than 10 minutes' will appear.
- If you are within two nautical miles of an airspace and your current course will take you inside, the message 'Airspace near and ahead' will appear.
- If you are within two nautical miles of an airspace and your current course will not take you inside, the message 'Near airspace less than 2 nm' will appear.
- If you have entered an airspace, the message 'Inside Airspace' will appear.

By default, airspace alert messages are turned off. When turned on, the message (MSG) annunciator located directly above the MSG-key will flash to alert you to the airspace message.

To view an airspace alert message:

1. Press the MSG-key. The message page appears with the alert message.
2. Press MSG again to return to the previous display.

Note that airspace alerts are based upon three-dimensional data (latitude, longitude and altitude) to avoid nuisance alerts. The alert boundaries for controlled airspace are also sectorized to provide complete information on any nearby airspace. Additional information about a nearby airspace - such as controlling agency, frequency and floor/ceiling limits - is available from the nearest airspace page.

FLIGHT PLANS

The GNS 430 lets you create up to 20 flight plans, with up to thirty-one waypoints in each flight plan. Flight plans are created, edited and activated using the FPL-key. The FPL page group includes two pages: the active flight plan page and the flight plan catalog. The active flight plan provides information and editing features for the flight plan currently in use (referred to as 'flight plan 00'). The flight plan catalog serves as the main page for creating new flight plans, as well as editing or activating previously created flight plans.

Since using flight plans is arguably one of the more complex features of the GNS 430, we'll only discuss it briefly here - focusing on creating a new flight plan and activating it to use for navigation. After reading through this brief introduction, answers to additional questions you may have about flight plans can be found in the Pilot's Guide.

To create a new flight plan:

1. Press the FPL-key and rotate the small right knob (13) to select the flight plan catalog.
2. Press the MENU-key to display the flight plan catalog options.
3. Rotate the large right knob (12) to select 'Create New Flight Plan?' and press ENT.
4. The cursor will appear on the first waypoint identifier field (located directly below 'WAYPOINT'). Use the large (12) and small (13) right knobs to enter the identifier of the first waypoint in the flight plan. (The small knob is used to select the desired letter or number and the large knob is used to move to the next character space.)
5. Press ENT once the identifier has been selected. The cursor will move to the next blank waypoint identifier field.
6. Repeat steps 4 and 5, above, until all waypoints for the flight plan have been entered.

Once the flight plan is created, it may be activated from an options window. Activating the flight plan will place it into 'flight plan 00' (a copy of it will still reside in the original catalog location) and replaces any flight plan which currently exists in 'flight plan 00'.

To activate the new flight plan:

1. Press the MENU-key to display the flight plan catalog options.
2. Rotate the small right knob (13) to select 'Activate Flight Plan?' and press ENT.

STORMSCOPE INTERFACE

The GNS 430 provides the display interface for the Goodrich Stormscope WX-500 Weather Mapping Sensor. The interface capability allows weather data to be shown on the color display which gives you the ability to look at your display and quickly identify weather hazards relative to your airplane.

NOTE

Refer to the WX-500 Supplement A24 to the AFM and to the WX-500 Pilot´s Guide for a detailed description of the WX-500 Stormscope.

NOTE

Refer to the Pilot´s Guide Addendum of the GNS 430 for detailed operating procedures of the GNS 430 when the WX-500 Stormscope is installed.

8. AIRPLANE HANDLING, CARE AND MAINTENANCE

No change.

SUPPLEMENT A18
TO THE AIRPLANE FLIGHT MANUAL
DA 40, DA 40 D, DA 40 F

AUDIO PANEL
GMA 340
GARMIN

Doc. No.	: 6.01.01-E (DA 40) 6.01.05-E (DA 40 D) 6.01.02-E (DA 40 F)
Date of Issue of the Supplement	: 01 Oct 2001
Design Change Advisory	: OÄM 40-097 (DA 40) OÄM 40-136 (DA 40 D) OÄM 40-221 (DA 40 F)

Signature :

Authority :

AUSTRO C... ...ROL GmbH
Abt... ...echnik

Stamp : A-1030 Wien, Schnirchgasse 11

Date of approval : 20. ... 2005

This Supplement has been verified for EASA by the Austrian Civil Aviation Authority Austro Control (ACG) as Primary Certification Authority (PCA) in accordance with the valid Certification Procedures and approved by EASA with approval no.: 2005 - 3345

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0.1 RECORD OF REVISIONS

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1	OÄM 40-136	all	all	17-Feb-2003				
2	OÄM 40-221 EASA Statement	all	all	22-Jun-2005				

0.2 LIST OF EFFECTIVE PAGES

Chapter	Page	Date
0	9-A18-0	22 Jun 2005
	9-A18-1	22 Jun 2005
	9-A18-2	22 Jun 2005
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5, 6	9-A18-5	22 Jun 2005
7	9-A18-5	22 Jun 2005
	9-A18-6	22 Jun 2005
	9-A18-7	22 Jun 2005
	9-A18-8	22 Jun 2005
	9-A18-9	22 Jun 2005
	9-A18-10	22 Jun 2005
	9-A18-11	22 Jun 2005
	9-A18-12	22 Jun 2005
	9-A18-13	22 Jun 2005
8	9-A18-13	22 Jun 2005

0.3 TABLE OF CONTENTS

1. GENERAL

This Supplement supplies the information necessary for the efficient operation of the airplane when the Audio Panel GMA 340 is installed. The information contained within this Supplement is to be used in conjunction with the complete AFM.

This Supplement is a permanent part of this AFM and must remain in this AFM at all times when the GMA 340 is installed.

2. LIMITATIONS

No change.

3. EMERGENCY PROCEDURES

A failsafe circuit connects the pilot's headset and microphone directly to COM 1 in case the power is interrupted or the unit is turned off.

4A. NORMAL PROCEDURES

No change.

4B. ABNORMAL PROCEDURES

No change.

5. PERFORMANCE

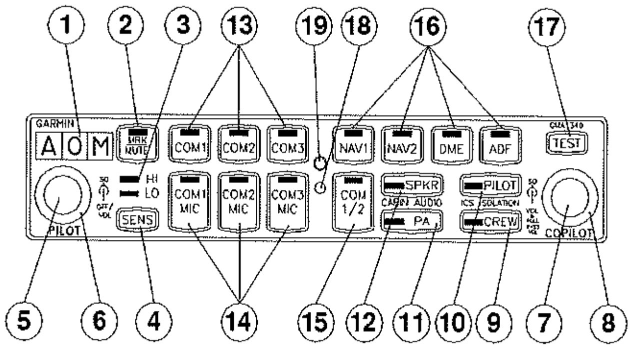
No change.

6. MASS AND BALANCE

Upon removal or installation of the GMA 340 the change of empty mass and corresponding center of gravity of the airplane must be recorded according to Chapter 6 of the Airplane Flight Manual.

7. DESCRIPTION OF THE AIRPLANE AND ITS SYSTEMS

7.14 AVIONICS



OPERATION

FRONT PANEL CONTROLS

1. Marker Beacon Lamps
2. Marker Beacon Receiver Audio Select/Mute Button
3. Marker Beacon Receiver Sensitivity Indicator LED's
4. Marker Beacon Receiver Sensitivity Selection Button
5. Unit On/Off, Pilot Intercom System (ICS) Volume
6. Pilot ICS Voice Activated (VOX) Intercom Squelch Level
7. Copilot and Passenger ICS Volume Control (Pull out for Passenger Volume)
8. Copilot and Passenger VOX Intercom Squelch Level
9. Crew Isolation Intercom Mode Button
10. Pilot Isolation Intercom Mode Button
11. Passenger Address (PA) Function Button
12. Speaker Function Button
13. Transceiver Audio Selector Buttons (COM 1, COM 2, COM 3)
14. Transmitter (Audio/Mic) Selection Buttons
15. Split COM Button
16. Airplane Radio Audio Selection Buttons (NAV 1, NAV 2, DME, ADF)
17. Annunciator Test Button
18. Locking Screw Access
19. Photocell - Automatic Annunciator Dimming

ON, OFF, AND FAILSAFE OPERATION

The GMA 340 is powered off when the left small knob (item 5) is rotated fully counter-clockwise into the detent. To turn the unit on rotate the knob clockwise past the click. The knob then functions as the pilot´s ICS volume control. A failsafe circuit connects the pilot´s headset and microphone directly to COM 1 in case the power is interrupted or the unit is turned off.

LIGHTING

The intensity of the LED button annunciator and marker beacon lamps are controlled automatically by a built-in photocell (19) on the front panel. Nomenclature backlighting is controlled by the airplane instrument light dimmer.

TRANSCEIVERS

NOTE

Audio level is controlled by the selected COM radio volume control.

NOTE

COM 3 is not used in the DA 40 installation.

Selection of either COM 1 or COM 2 (13) for both MIC and audio source is accomplished by pressing either COM 1 MIC or COM 2 MIC (14). The active com audio is always heard on the headphones.

Each audio source can be selected independently by pressing COM 1 or COM 2 (13). When selected in this way, they remain active as audio sources independently of which transceiver has been selected as the active microphone source.

When a microphone is keyed, the active transceiver's MIC button LED blinks approximately once per second to indicate the transmitter is active.

When no airplane radio activity is detected by the GMA 340, the amount of ambient background noise from the radios is further reduced by the ***MASQ™*** circuit. This processing is also applied to the Nav radios.

SPLIT COM

Pressing the COM 1/2 button (15) activates the split com function. While this mode is active, COM 2 is dedicated solely to the copilot as a MIC/audio source while COM 1 is dedicated to the pilot as a MIC/audio source. The pilot can still listen to NAV 1, NAV 2, DME, ADF, and MKR. The pilot and copilot can simultaneously transmit in this mode, the pilot transmitting over COM 1 and the copilot transmitting over COM 2. The SPLIT COM mode is canceled by pressing the COM 1/2 button a second time.

AIRPLANE RADIOS & NAVIGATION

NOTE

Audio level is controlled by the selected nav radio volume control.

Pressing NAV 1, NAV 2, DME, ADF (16), or MKR (2) (see MARKER BEACON RECEIVER) selects that audio source. A second button press deselects the audio source.

SPEAKER OUTPUT

Pressing the SPKR button (12) selects the airplane radios over the cabin speaker. The speaker output is muted when a COM microphone is keyed.

INTERCOM SYSTEM (ICS)

Intercom volume and squelch (VOX) are adjusted using the following front panel knobs:

- **LEFT SMALL KNOB** - Unit on/off power control and Pilot ICS volume (5). Full counter-clockwise DETENT position OFF.
- **LEFT LARGE KNOB** - Pilot squelch level (6). Clockwise rotation increases the amount of mic audio required to break squelch. Full counter-clockwise is the 'hot mic' position.
- **RIGHT SMALL KNOB** - IN position: Copilot ICS volume. OUT position: Passenger ICS volume (7).
- **RIGHT LARGE KNOB** - Copilot and passenger squelch level (8): clockwise rotation increases the amount of mic audio required to break squelch. Fully counter-clockwise is the 'hot mic' position.

Each microphone input has dedicated VOX circuit to ensure that only the active microphone(s) is/are heard when squelch is broken. This represents a vast improvement over single gate systems and reduces the amount of background noise in the headphones during cockpit communications. After the operator has stopped talking, the intercom channel remains momentarily open to avoid closure between words or during normal pauses.

The GMA 340 provides three intercom modes: PILOT, CREW and ALL. The mode selection is accomplished using the PILOT (10) and CREW (9) buttons.

Pressing a button activates the corresponding ICS mode. Pressing again deactivates the mode. The operator can switch directly from PILOT to CREW or from CREW to PILOT by pressing the other mode button. ALL mode is active when neither PILOT or CREW mode is selected.

These modes allow different degrees of interaction between the crew and passengers:

- PILOT mode isolates the pilot from everyone else and dedicates the airplane radios to the pilot exclusively. The copilot and passengers share communication between themselves but cannot communicate with the pilot or hear the airplane radios.
- CREW mode places the pilot and copilot on a common ICS communication channel. The passengers are on their own intercom channel and can communicate with each other, but cannot communicate with the crew or hear the airplane radios.
- ALL mode allows full intercom communication between everyone plugged into the GMA 340. Airplane radios are heard by all.

The following table summarizes the different modes supported by the GMA 340.

MODE	PILOT HEARS	COPILOT HEARS	PASSENGERS HEAR
PILOT (LED LIT)	Selected Radios. Pilot.	Copilot. Passengers.	Passengers. Copilot.
CREW (LED LIT)	Selected Radios. Pilot. Copilot.	Selected Radios. Copilot. Pilot.	Passengers.
ALL (LED´s OFF)	Selected Radios. Pilot. Copilot. Passengers.	Selected Radios. Pilot. Copilot. Passengers.	Selected Radios. Pilot. Copilot. Passengers.

MONO/STEREO HEADSETS

If monaural headsets are plugged into stereo jacks that do not have a switch installed, the unit will not be damaged.

One of the headset channel outputs will be shorted to ground under these conditions. The person plugging in the mono headset will hear only one channel from the GMA 340, but in both ears. However, anyone else plugging in a stereo headset at a different passenger position will have audio in one ear only unless his or her headset has a stereo/mono switch. Note that a stereo/mono switch on the headset does not prevent the mono headset from shorting one of the channels to ground. That headset only routes its tip audio to both ears.

MARKER BEACON RECEIVER

The marker beacon is used as part of an ILS approach, and in certain instances, to identify an airway. In addition to the normal marker beacon functions, the GMA 340 provides an audio muting function. The lamps illuminate, and an associated keyed-tone is heard (when MKR audio is selected), when the airplane passes over a 75 MHz marker beacon transmitter.

The lamp and audio keying for ILS approach operation are summarized below.

Audio Frequency	Audio Keying	Lamp Actuated
400 Hz	• •• •• •• •• •• •	Blue (Outer)
1300 Hz	● • •● • •● • •	Amber (Middle)
3000 Hz	● ● ● ● ● ●	White (Airway/Inner)

The GMA 340's marker beacon receiver controls are located on the left side of the front panel [(1) through (4)]. The SENS button (4) selects either high or low sensitivity as indicated by the HI or LO LED being lit. Low sensitivity is used on ILS approaches while high sensitivity allows operation over airway markers or to get an earlier indication of nearing the outer marker during an approach.

The marker audio is selected initially by pressing the MKR/MUTE button (2). If no marker beacon signal is being received, then pressing again will deselect the marker audio. This operation is similar to selecting any other source on the GMA 340. However, if the second button press occurs while a marker beacon signal is being received, then the marker audio is muted but not deselected.

The button´s LED will remain lit to indicate that the source is still selected.

The GMA 340´s ***SmartMute***™ function then monitors the marker signal and automatically unmutes the audio when the current marker signal is no longer being received.

In all cases, the marker beacon lamps operate independently of any audio selection and cannot be turned off.

8. AIRPLANE HANDLING, CARE AND MAINTENANCE

No change.

SUPPLEMENT A20
TO THE AIRPLANE FLIGHT MANUAL DA 40 D

COURSE DEVIATION INDICATOR
GI 106A
GARMIN

Doc. No. : **6.01.05-E**
Date of Issue of the Supplement : **11 November 2002**

Signature	:	
Authority	:	AUSTRO CONTROL
Stamp	:	AUSTRO CONTROL GmbH
Date of approval	:	22. NOV. 2002

This Supplement has been approved for the Joint Aviation Authorities (JAA) by the Austrian Civil Aviation Authority Austro Control (ACG) as Primary Certification Authority (PCA) in accordance with the JAA Certification Procedures of the Joint Aviation Authorities (JAA JC/VP).

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0.1 RECORD OF REVISIONS

Rev. No.	Reason	Chap-ter	Page(s)	Date of Revision	Approval	Date of Approval	Date Inserted	Signature

0.2 LIST OF EFFECTIVE PAGES

Chapter	Page	Date
0	9-A20-0	11 Nov 2002
	9-A20-1	11 Nov 2002
	9-A20-2	11 Nov 2002
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6	9-A20-5	11 Nov 2002
7	9-A20-5	11 Nov 2002
	9-A20-6	11 Nov 2002
	9-A20-7	11 Nov 2002
	9-A20-8	11 Nov 2002
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0.3 TABLE OF CONTENTS

1. GENERAL

This Supplement supplies the information necessary for the efficient operation of the airplane when the CDI GI 106A is installed. The information contained within this Supplement is to be used in conjunction with the complete Manual.

This Supplement is a permanent part of this Manual and must remain in this Manual as long as the CDI GI 106A is installed.

2. OPERATING LIMITATIONS

No change.

3. EMERGENCY PROCEDURES

No change.

4A. NORMAL OPERATING PROCEDURES

No change.

4B. ABNORMAL OPERATING PROCEDURES

No change.

5. PERFORMANCE

No change.

6. MASS AND BALANCE

Upon removal or installation of the CDI the change of empty mass and corresponding center of gravity of the airplane must be recorded according to Chapter 6 of the Airplane Flight Manual.

7. DESCRIPTION OF THE AIRPLANE AND ITS SYSTEMS

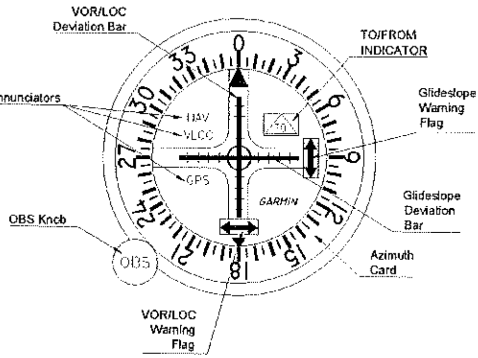
7.14 AVIONICS

GENERAL

The GI 106A Course Deviation Indicator is designed to operate with VHF and GPS navigational equipment to provide VOR, Localizer (LOC), GPS and Glideslope (GS) information.

The GI 106A is designed to accept signals from a remote mounted VOR converter or GPS receiver. Additionally it will accept signals from a glideslope receiver which will drive the Glideslope Deviation Bar along with an Glideslope warning flag. The unit incorporates NAV, GPS and VLOC (VOR/LOC as displayed on the Garmin GNS 430) annunciation with photocell dimming.

When GPS is selected for display, the GI 106A receives inputs from the GPS receiver to provide a visual presentation to the pilot. All information presented on the navigation indicator is generated from this external receiver.



VOR OPERATION

Channel the VOR/ILS receiver to the desired VOR frequency and positively identify the station by listening to received audio. Determine the left/right (VOR/LOC) warning flag is out of view.

Flying inbound to a VOR station is accomplished by first rotating the OBS knob to center the deviation indicator, and determining the TO/FROM indicator is in the TO condition. Read the 'To' bearing under the top indicator index and maneuver the airplane to approximately fly the magnetic course 'To' the station. When the airplane is on course, the vertical pointer will be centered. If the airplane moves off the course, the deviation bar will move away from the center position and flying in the direction of pointer deflection (left or right) is required to re-intercept the course.

The procedure for flying outbound from a VOR station is the same as flying inbound, except the OBS knob is first rotated to cause a 'FROM' indication to appear with the pointer centered.

To intercept a selected VOR radial (from the station) and fly outbound, turn the OBS knob to set the desired radial under the top indicator index. Maneuver the airplane to fly the selected radial magnetic heading plus or minus 45° which will provide a sufficient intercept angle. The intercept angle should be reduced as the deviation needle approaches an on course condition (center) to prevent excessive course bracketing.

LOCALIZER OPERATION

Select the desired localizer frequency and observe that the localizer flag is concealed. The TO/FROM indicator is not functional for localizer operation. When flying on the front course or outbound on the back course make corrections toward the localizer (vertical) needle deflection. The localizer path narrows as the approach end of the runway becomes closer. When flying inbound on the back course or outbound on the front course, the corrections are made away from the direction of needle deflection.

A helpful hint when flying the localizer is to set the localizer heading on the OBS dial under the lubber line for quick reference.

GLIDESLOPE OPERATION

The glideslope (horizontal) deviation bar provides the pilot with vertical steering information during ILS approaches. The glideslope circuitry is energized when the associated localizer frequency is selected on the navigation receiver. Observe that the glideslope warning flag is concealed. The glideslope deviation bar deflects towards the direction the pilot must fly to remain on the glide path.

If the glideslope deviation bar deflects upward, the airplane is below the glide path and the pilot must climb to again intercept the glide path and center the deviation bar. If the deviation bar deflects downward, the airplane is above the glide path and the pilot must descend to again intercept the glide path and center the deviation bar. When the deviation bar is centered the airplane is on the glide path.

8. AIRPLANE HANDLING, CARE AND MAINTENANCE

No change.

ADDITIF A20
AU MANUEL DE VOL DA 40 D

INDICATEUR VOR(CDI)
GI 106A
GARMIN

Date de l'édition originale : 11 novembre 2002

Le supplément initial a été approuvé le 22/11/2002 pour les JAA par les autorités de navigabilité Autrichiennes (ACG), autorités de cértification primaire, conformément aux procédures de certification JAA des autorités d'aviation communes, (JAA JC/VP)
Cet additif est la traduction en français de l'additif original en anglais approuvé par l'autorité de l'aviation civile autrichienne Austro Control (ACG).

Visa DGAC :

0 4 OCT. 2004

DIRECTION GÉNÉRALE DE L'AVIATION CIVILE

SERVAIN Sébastien
Ingénieur de Marque de Navigabilité

0.1 LISTE DES REVISIONS

Rev N°.	Section	Page	Date de révision	Date d'Insertion	Signature
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0.2 LISTE DES PAGES EN VIGUEUR

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8	9-A20-8	11 Nov 2002

3.3 TABLE DES MATIERES

1. GENERALITES

Ce supplément inclut les informations nécessaires à l'utilisation de l'avion, lorsqu'il est équipé de l'indicateur VOR CDI GI 106A.

Ce supplément doit être utilisé en même temps que le manuel de vol de l'avion et doit être intégré à ce manuel de vol dés que le CDI GI 106A est installé.

2. LIMITATIONS

Il n'y a pas de changement à la section 2 du manuel de vol.

3. PROCEDURES D' URGENCE

Il n'y a pas de changement à la section 3 du manuel de vol.

4A. PROCEDURES NORMALES

Il n'y a pas de changement à la section 4A du manuel de vol

4B. PROCEDURE ANORMALES

Il n'y a pas de changement à la section 4B du manuel de vol.

5. PERFORMANCES

Il n'y a pas de changement à la section 5 du manuel de vol.

6. MASSE ET CENTRAGE

En cas de dépose ou d'installation du CDI GI 106A, le changement de masse à vide et de centrage doit être enregistré en accord avec la section 6 du manuel de vol du DA 40.

7. DESCRIPTION DE L'AERONEF ET DE SES SYSTEMES

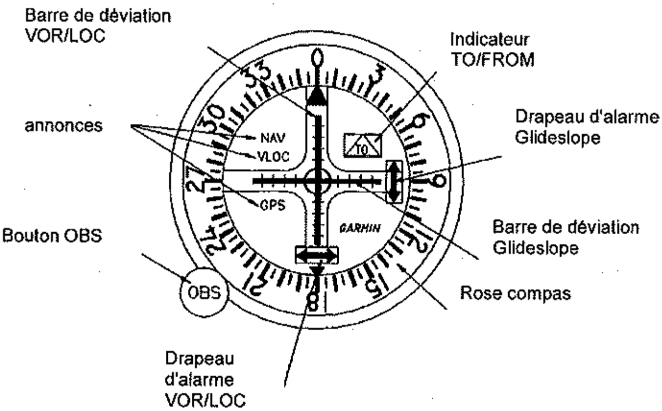
7.14 AVIONIQUE

GENERALITES

L'indicateur VOR CDI GI 106A est prévu pour être utilisé avec des moyens de navigation VHF et GPS pour fournir des informations VOR, Localizer (LOC), GPS et Glideslope (GS).

Le GI 106A accepte les signaux fournis par d'autres récepteurs VOR ou GPS. De plus il accepte les signaux d'un récepteur Glideslope pour contrôler la barre de déviation Gildeslope et le drapeau d'alarme Glideslope. Le GI 106A incorpore les indications NAV, GPS et VLOC (VOR/LOC sont affiché sur le Garmin GNS 430) et une mise en veille automatique.

Quand le GPS est choisi pour l'affichage, le GI 106A reçoit des informations provenant du récepteur GPS pour fournir une présentation visuelle au pilote. Toutes les informations indiquées sont générées depuis ce récepteur externe.



UTILISATION DU VOR

Régler le récepteur VOR/ILS sur la fréquence VOR désirée et identifier cette station en écoutant sont signal audio. Regarder si le drapeau d'alarme (VOR/LOC) gauche droite n'est plus affiché.

Voler vers une station VOR s'effectue d'abord en tournant le bouton OBS jusqu'à centrer l'indication de déviation et déterminer si l'indicateur TO/FROM est en condition TO. Lire 'TO' sous l'index d'indication du en haut et manœuvrer l'avion approximativement sur la route magnétique en direction de la station. Lorsque l'avion est sur cette route, le pointeur vertical doit être centré. Si l'avion se déplace hors de cette route, la barre de déviation bougera de la position centrale, il faudra voler en direction du pointeur de déflection (droite ou gauche) pour intercepter à nouveau la route.

La procédure pour voler en s'éloignant d'une station VOR est la même que pour s'en rapprocher, excepté la rotation du bouton OBS qui doit afficher une indication 'FROM' lorsque le pointeur est centré.

Pour intercepter un radial VOR, sélectionner (depuis la station) et voler vers celle-ci, tourner le bouton OBS sur le radial choisi sous l'index du haut. Manœuvrer l'avion sur un radial magnétique avec plus ou moins 45° ce qui fournit un angle d'interception convenable. L'angle d'interception doit être réduit au fur et à mesure que l'aiguille de déviation se rapproche du milieu afin d'éviter un dépassement de la route.

UTILISATION DU LOCALIZER

Sélectionner la fréquence localizer désirée et observer que le drapeau d'alarme localizer a disparu. L'indicateur TO/FROM ne fonctionne pas en utilisation localizer. Manœuvrer l'appareil de façon à ce que l'aiguille de l'indicateur soit centrée. Si l'on va vers la station, corriger dans le sens qu'indique l'aiguille et si on s'éloigne faire les corrections en sens inverse (à l'inverse des indications de l'aiguille).Le faisceau du localizer devient très étroit en finale à l'approche de la piste et s'éteint même au bout de piste.

Un moyen rapide pour se souvenir du radial LOCALIZER est d'afficher le radial sur le cadran omnidirectionnel.

UTILISATION DU GLIDESLOPE

La barre de déviation horizontale du glideslope fournit au pilote une information de position verticale lors d'une approche ILS. Le circuit glideslope se met en marche quand il est associé à une fréquence localizer sélectionnée sur le récepteur de navigation. Remarquer que le drapeau d'alarme glideslope a disparu. Les déflections de la barre de déviation du glideslope indiquant la direction que doit prendre le pilote pour rattraper le faisceau du glide.
Si la barre de déviation va vers le haut, c'est que l'avion est sous le glide et le pilote doit remonter pour intercepter le glide et centrer la barre. Si la barre est vers le bas c'est que l'avion est au-dessus du glide et que le pilote doit descendre pour intercepter le glide et centrer la barre. Quand la barre est centrée l'avion est sur le glide.

8 MANUTENTION MAINTENANCE ET ENTRETIEN

Il n'y a pas de changement à la section 8 du manuel de vol du DA 40 D.

SUPPLEMENT A25
TO THE AIRPLANE FLIGHT MANUAL
DA 40, DA 40 D, DA 40 F

AUDIO PANEL GMA 340
GARMIN
VFR OPERATION

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This Supplement has been verified for EASA by the Austrian Civil Aviation Authority Austro Control (ACG) as Primary Certification Authority (PCA) in accordance with the valid Certification Procedures and approved by EASA with approval no.: 2005-3345

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0.1 RECORD OF REVISIONS

Rev. No.	Reason	Chapter	Page(s)	Date of Revision	Approval Note	Approval Date	Date Inserted	Signature
1	O M 40-142	all	all	20 Feb 2003	n.a.	20 Feb 2003		
2	DA 40 F AFM Rev. 0 EASA Statement	all	all	15 Mar 2005	EASA 2005-3345	18. APR. 2005		

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1. GENERAL

This Supplement supplies the information necessary for the efficient operation of the airplane when the Audio Panel GMA 340 is installed. The information contained within this Supplement is to be used in conjunction with the complete AFM.

This Supplement is a permanent part of this AFM and must remain in this AFM at all times when the GMA 340 is installed.

2. LIMITATIONS

The marker receiver is inoperative in this installation.

3. EMERGENCY PROCEDURES

A failsafe circuit connects the pilot's headset and microphone directly to COM 1 in case the power is interrupted or the unit is turned off.

4A. NORMAL PROCEDURES

No change.

4B. ABNORMAL PROCEDURES

No change.

5. PERFORMANCE

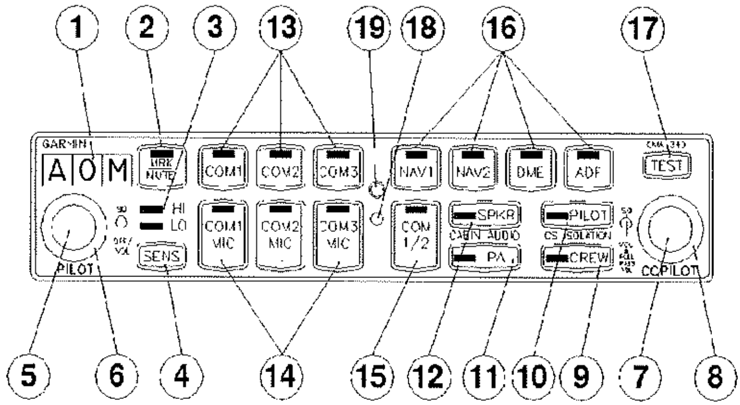
No change.

6. MASS AND BALANCE

Upon removal or installation of the GMA 340 the change of empty mass and corresponding center of gravity of the airplane must be recorded according to Chapter 6 of the Airplane Flight Manual.

7. DESCRIPTION OF THE AIRPLANE AND ITS SYSTEMS

7.14 AVIONICS



OPERATION

FRONT PANEL CONTROLS

1. Marker Beacon Lamps
2. Marker Beacon Receiver Audio Select/Mute Button
3. Marker Beacon Receiver Sensitivity Indicator LED´s
4. Marker Beacon Receiver Sensitivity Selection Button
5. Unit On/Off, Pilot Intercom System (ICS) Volume
6. Pilot ICS Voice Activated (VOX) Intercom Squelch Level
7. Copilot and Passenger ICS Volume Control (Pull out for Passenger Volume)
8. Copilot and Passenger VOX Intercom Squelch Level
9. Crew Isolation Intercom Mode Button
10. Pilot Isolation Intercom Mode Button
11. Passenger Address (PA) Function Button
12. Speaker Function Button
13. Transceiver Audio Selector Buttons (COM 1, COM 2, COM 3)
14. Transmitter (Audio/Mic) Selection Buttons
15. Split COM Button
16. Airplane Radio Audio Selection Buttons (NAV 1, NAV 2, DME, ADF)
17. Annunciator Test Button

18. Locking Screw Access

19. Photocell - Automatic Annunciator Dimming

ON, OFF, AND FAILSAFE OPERATION

The GMA 340 is powered off when the left small knob (item 5) is rotated fully counter-clockwise into the detent. To turn the unit on rotate the knob clockwise past the click. The knob then functions as the pilot's ICS volume control. A failsafe circuit connects the pilot's headset and microphone directly to COM 1 in case the power is interrupted or the unit is turned off.

LIGHTING

The intensity of the LED button annunciator and marker beacon lamps are controlled automatically by a built-in photocell (19) on the front panel. Nomenclature backlighting is controlled by the airplane instrument light dimmer.

TRANSCEIVERS

NOTE

Audio level is controlled by the selected COM radio volume control.

NOTE

COM 2 and COM 3 are not used in this DA 40 (D) installation.

Selection of either COM 1 (13) for both MIC and audio source is accomplished by pressing COM 1 MIC (14). The active com audio is always heard on the headphones.

When a microphone is keyed, the active transceiver's MIC button LED blinks approximately once per second to indicate the transmitter is active.

When no airplane radio activity is detected by the GMA 340, the amount of ambient background noise from the radios is further reduced by the ***MASQ™*** circuit. This processing is also applied to the Nav radios.

AIRPLANE RADIOS & NAVIGATION

NOTE

Audio level is controlled by the selected nav radio volume control.

Pressing NAV 1 selects the NAV 1 audio source. A second button press deselects the audio source.

SPEAKER OUTPUT

Pressing the SPKR button (12) selects the airplane radios over the cabin speaker. The speaker output is muted when a COM microphone is keyed.

INTERCOM SYSTEM (ICS)

Intercom volume and squelch (VOX) are adjusted using the following front panel knobs:

LEFT SMALL KNOB -	Unit on/off power control and Pilot ICS volume (5). Full counter-clockwise DETENT position OFF.
LEFT LARGE KNOB -	Pilot squelch level (6). Clockwise rotation increases the amount of mic audio required to break squelch. Full counter-clockwise is the 'hot mic' position.
RIGHT SMALL KNOB -	IN position: Copilot ICS volume. OUT position: Passenger ICS volume (7).
RIGHT LARGE KNOB -	Copilot and passenger squelch level (8): clockwise rotation increases the amount of mic audio required to break squelch. Fully counter-clockwise is the 'hot mic' position.

Each microphone input has dedicated VOX circuit to ensure that only the active microphone(s) is/are heard when squelch is broken. This represents a vast improvement over single gate systems and reduces the amount of background noise in the headphones during cockpit communications. After the operator has stopped talking, the intercom channel remains momentarily open to avoid closure between words or during normal pauses.

The GMA 340 provides three intercom modes: PILOT, CREW and ALL. The mode selection is accomplished using the PILOT (10) and CREW (9) buttons.

Pressing a button activates the corresponding ICS mode. Pressing again deactivates the mode. The operator can switch directly from PILOT to CREW or from CREW to PILOT by pressing the other mode button. ALL mode is active when neither PILOT or CREW mode is selected.

These modes allow different degrees of interaction between the crew and passengers:

PILOT mode isolates the pilot from everyone else and dedicates the airplane radios to the pilot exclusively. The copilot and passengers share communication between themselves but cannot communicate with the pilot or hear the airplane radios.

CREW mode places the pilot and copilot on a common ICS communication channel. The passengers are on their own intercom channel and can communicate with each other, but cannot communicate with the crew or hear the airplane radios.

ALL mode allows full intercom communication between everyone plugged into the GMA 340. Airplane radios are heard by all.

The following table summarizes the different modes supported by the GMA 340.

MODE	PILOT HEARS	COPILOT HEARS	PASSENGERS HEAR
PILOT (LED LIT)	Selected Radios. Pilot.	Copilot. Passengers.	Passengers. Copilot.
CREW (LED LIT)	Selected Radios. Pilot. Copilot.	Selected Radios. Copilot. Pilot.	Passengers.
ALL (LED´s OFF)	Selected Radios. Pilot. Copilot. Passengers.	Selected Radios. Pilot. Copilot. Passengers.	Selected Radios. Pilot. Copilot. Passengers.

MONO/STEREO HEADSETS

If monaural headsets are plugged into stereo jacks that do not have a switch installed, the unit will not be damaged.

One of the headset channel outputs will be shorted to ground under these conditions. The person plugging in the mono headset will hear only one channel from the GMA 340, but in both ears. However, anyone else plugging in a stereo headset at a different passenger position will have audio in one ear only unless his or her headset has a stereo/mono switch. Note that a stereo/mono switch on the headset does not prevent the mono headset from shorting one of the channels to ground. That headset only routes its tip audio to both ears.

8. AIRPLANE HANDLING, CARE AND MAINTENANCE

No change.

SUPPLEMENT A26
TO THE AIRPLANE FLIGHT MANUAL
DA 40 D, DA 40 F

COM / NAV / GPS
GNS 430 GARMIN
VFR OPERATION

Doc. No. : **6.01.05-E, 6.01.02-E**

Date of Issue of the Supplement : **11 November 2002**

Signature	:
Authority	: AUSTRO CONTROL GmbH
Stamp	: Abteilung Flugtechnik Zentrale A-1030 Wien, Schnirchgasse 11
Date of approval	: 18. APR. 2005

This Supplement has been verified for EASA by the Austrian Civil Aviation Authority Austro Control (ACG) as Primary Certification Authority (PCA) in accordance with the valid Certification Procedures and approved by EASA with approval no.: 2005 - 3345

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Page

1. GENERAL

This Supplement supplies the information necessary for the efficient operation of the airplane when the COM/NAV/GPS GNS 430 is installed. The information contained within this Supplement is to be used in conjunction with the complete AFM.

This Supplement is a permanent part of this AFM and must remain in this AFM at all times when the GNS 430 is installed.

2. LIMITATIONS

A. The GPS of the is limited to use under visual flight rules (VFR) only.

Following placard is in the pilot's view:

GPS limited to VFR use only

B. If not previously defined, the following default settings must be made in the 'SETUP 1' menu of the GNS 430 prior to operation (refer to Pilot's Guide for procedure if necessary):

(1) **dis, spd:** nm, kt (sets navigation units to 'nautical miles' and 'knots')

(2) **alt, vs:** ft, fpm (sets altitude units to 'feet' and 'feet per minute')

(3) **map datum:** WGS 84 (sets map datum to WGS-84, see note below)

(4) **posn:** hddd°mm.mmm' (sets navigation grid units to decimal minutes)

(5) **fuel:** gl (sets fuel units to gallons)

NOTE

In some areas datums other than WGS-84 may be used. If the GNS 430 is authorized for use by the appropriate Airworthiness authority, the required geodetic datum must be set in the GNS 430 prior to its use for navigation.

C. The accuracy of the data base information is only assured if it is used before the end of the effectivity period. Use of out of date data base information is done entirely at the user's own risk.

3. EMERGENCY PROCEDURES

In an in-flight emergency, depressing and holding the Comm transfer button for 2 seconds will select the emergency frequency of 121.500 MHz into the 'Active' frequency window.

4A. NORMAL PROCEDURES

DETAILED OPERATING PROCEDURES

Detailed operating procedures are described in the GARMIN GNS 430 Pilot's Guide, dated October 1998, or later appropriate revision.

4B. ABNORMAL PROCEDURES

No change.

5. PERFORMANCE

No change.

6. MASS AND BALANCE

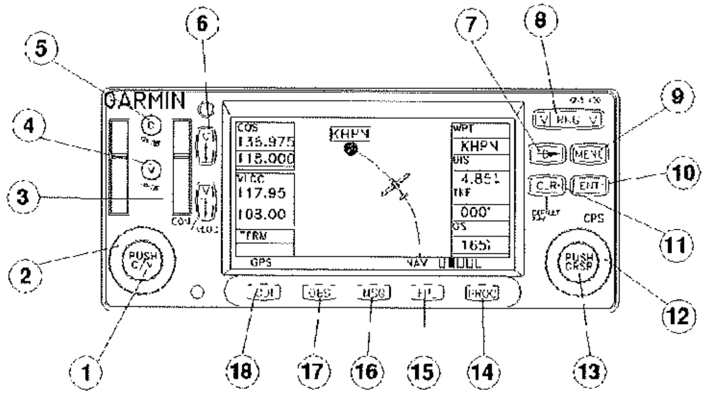
Upon removal or installation of the GNS 430 the change of empty mass and corresponding center of gravity of the airplane must be recorded according to Chapter 6 of the Airplane Flight Manual.

7. DESCRIPTION OF THE AIRPLANE AND ITS SYSTEMS

7.14 AVIONICS

GENERAL

The GNS 430 System is a fully integrated, panel mounted instrument, which contains a VHF Communications Transceiver, a VOR/ILS receiver, and a Global Positioning System (GPS) Navigation computer. The system consists of a GPS antenna, GPS Receiver, VHF VOR/LOC/GS antenna, VOR/ILS receiver, VHF COMM antenna and a VHF Communications Transceiver. The primary function of the VHF Communication portion of the equipment is to facilitate communication with Air Traffic Control. The primary function of the VOR/ILS Receiver portion of the equipment is to receive and demodulate VOR, Localizer, and Glide Slope signals. The primary function of the GPS portion of the system is to acquire signals from the GPS system satellites, recover orbital data, make range and Doppler measurements, and process this information in real-time to obtain the user's position, velocity, and time.



KEY AND KNOB FUNCTIONS

The key and knob descriptions on the next pages provide a general overview of the primary function(s) for each knob.

LEFT-HAND KEYS AND KNOBS

1. The small left knob (COM/VLOC) is used to tune the kilohertz (kHz) value 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.
2. The large left knob (COM/VLOC) is used to tune the megahertz (MHz) value of the standby frequency for the communications transceiver (COM) or the VLOC receiver, whichever is currently selected by the tuning cursor.
3. The VLOC flip-flop key is used to swap the active and standby VLOC frequencies (i.e., make the selected standby frequency active).
4. The VLOC volume knob controls audio volume for the selected VOR/Localizer frequency. Press momentarily to enable/disable the ident tone.
5. The COM power/volume knob controls unit power and communications radio volume. Press momentarily to disable automatic squelch control.
6. 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

7. 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.

8. The range key 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.

9. The menu key displays a context-sensitivity list of options. This options list allows you to access additional features or make settings changes which relate to the currently displayed page.

10. The enter key is used to approve an operation or complete data entry. It is also used to confirm information, such as the Database Page during power on.

11. The clear key 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 being displayed.

12. The large right knob (CRSR) 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.

13. 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

14. The procedures key 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.

15. The flight plan key 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.

16. The message key is used to view system messages and to alert you to important warnings and requirements.

17. 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.

18. The CDI key is used to toggle which navigation source (GPS or VLOC) provides output to the HSI or CDI.

OPERATION

POWERING UP THE GNS 430

The GNS 430´s power and COM volume are controlled using the COM power/volume knob (5) at the top left corner of the unit. Rotating 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.

During the self-test, check for the following indications on other instruments:

- Course deviation - half left / no flag
- TO/FROM flag - TO
- All external annunciators - on
- Glideslope - half up / no flag

The land data page will appear next, followed by the database confirmation page, which 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 for approved instrument approach operations. Information on database subscriptions is available inside your GNS 430 package.

To acknowledge the database information, press the ENT-key.

ACQUIRING SATELLITES & VIEWING MESSAGES

Once the database has been acknowledged, the satellite status page will appear, and the GNS 430 will begin to collect satellite information. An 'Acquiring' status will be displayed on the satellite status page, and the signal strength of any satellites received will appear as 'bar graph' readings. This is a good indication that you are receiving signals and a position fix will be determined. Following the first-time use of your GNS 430, the time required for a position fix will vary - usually from one to two minutes.

If the unit can only obtain enough satellites for 2D navigation (no altitude), the unit will use the altitude provided by the altitude encoder.

If the GNS 430 has not been operated for a period of six months or more, it may have to 'Search the Sky' to collect new data. This means the unit is acquiring satellite data to establish almanac and satellite orbit information, which can take 5 to 10 minutes. The satellite status page will display a 'Searching Sky' status, and the message annunciator (MSG), above the MSG key, will also flash to alert you of a system message, 'Searching the Sky'.

To view a system message, press MSG.

The message page will appear and display the status or warning information applicable to the receiver's current operating condition.

To return to the previous page after viewing a message, press MSG again.

SELECTING COM AND VLOC FREQUENCIES

The GNS 430´s display is divided into separate 'windows' (or screen areas), including a COM window, VLOC window and the GPS window (the right 3/4 of the display).

Pushing the small left knob (1) activates the tuning cursor in the desired frequency window. To select the active frequency, you must first enter the frequency in the standby field, and use the COM flip-flop (6) (or the VLOC flip-flop (3)) key to move it to the active field.

To change the standby communication frequency:

1. Press the small left knob (1) if needed, to move the tuning cursor to the COM window
2. Rotate the large left knob (2) to select the MHz, and the small left knob (1) to select the kHz of the desired frequency

To place the standby communication frequency in the active field, press the COM flip-flop key (6).

Once you´ve entered the active frequency, simply repeat steps 1 and 2, above, to enter the standby frequency. After both communication frequencies have been entered, you may select to keep the COM window 'hot' by leaving the cursor on the standby frequency, or move the cursor to the VLOC window by pressing the small left knob (1).

NOTE

When selecting VLOC frequencies, the tuning cursor will automatically return to the COM window after 30 seconds of inactivity.

To change the standby VLOC frequency:

1. Press the small left knob (1), if needed, to activate the tuning cursor in the VLOC window.
2. Rotate the large left knob (2) to select the MHz, and the small left knob (1) to select the kHz of the desired frequency.

To place the standby frequency in the active field, press the VLOC flip-flop key (3).

DIRECT-TO NAVIGATION

The GNS 430 can use direct point-to-point navigation to guide you from takeoff to touchdown, even in the IFR environment. Once a destination is selected, the unit will provide speed, course and distance data based upon a direct course from your present position to your destination. A destination can be selected from any page with the direct-to-key (7).

To select a direct-to destination:

1. Press the direct-to-key. The select direct-to waypoint page will appear with the destination field highlighted.
2. Rotate the small right knob (13) to enter the first letter of the destination waypoint identifier. The destination waypoint may be an airport, VOR, NDB, intersection or user waypoint, as long as it is in the database or stored in memory as a user waypoint.
3. Rotate the large right knob (12) to the right to move the cursor to the next character position.

4. Repeat steps 2 and 3 to spell out the rest of the waypoint identifier.

5. Press ENT to confirm the identifier. The 'Activate?' function field will be highlighted.

6. Press ENT to activate a direct-to course to the selected destination.

NAVCOM PAGE

A frequency listed on the NAVCOM page can be quickly transferred to the standby field of the COM or VLOC windows. This time saving process prevents having to 're-key' a frequency already displayed elsewhere on the screen.

To select a communication or navigation frequency:

1. Push the small right knob (13) to activate the cursor in the GPS window.

2. Rotate the large right knob (12) to select the desired frequency from the list.

3. Press ENT to transfer the selected frequency to the standby field in the COM or VLOC window. COM frequencies will automatically go to the standby field of the COM window and navigation frequencies will automatically go to the standby field of the VLOC window, regardless of which window is currently being highlighted by the cursor.

4. To activate the selected frequency, press the COM flip-flop-key (6) or the VLOC flip-flop-key (3).

NEAREST AIRPORT EMERGENCY SEARCH

The NRST group provides detailed information on the nine nearest airports, VORs, NDBs, intersections and user-created waypoints within 200 nautical miles of your current position. In addition, pages are also provided to display the five nearest center (ARTCC/FIR) and Flight Service Station (FSS) points of communication, plus alert you to any special-use or controlled airspace you may be in or near.

To display the NRST pages:

1. If necessary, press the small right knob (13) to remove the cursor from the page.
2. Rotate the large right knob (12) to select the NRST page group, as indicated by 'NRST' appearing in the lower right corner of the screen.
3. Rotate the small right knob (13) to select the desired NRST page.

The nearest airport page is one of eight pages available under the NRST group:

- Nearest airport page
- Nearest intersection page
- Nearest NDB page
- Nearest VOR page
- Nearest user waypoints page
- Nearest ARTCC page
- Nearest FSS page
- Nearest airspace page

You may examine both the communication frequencies and runway information directly from the nearest airport page.

SELECTING COM AND VLOC FREQUENCIES

The GNS 430´s display is divided into separate 'windows' (or screen areas), including a COM window, VLOC window and the GPS window (the right 3/4 of the display).

Pushing the small left knob (1) activates the tuning cursor in the desired frequency window. To select the active frequency, you must first enter the frequency in the standby field, and use the COM flip-flop (6) (or the VLOC flip-flop (3)) key to move it to the active field.

To change the standby communication frequency:

1. Press the small left knob (1) if needed, to move the tuning cursor to the COM window
2. Rotate the large left knob (2) to select the MHz, and the small left knob (1) to select the kHz of the desired frequency

To place the standby communication frequency in the active field, press the COM flip-flop key (6).

Once you´ve entered the active frequency, simply repeat steps 1 and 2, above, to enter the standby frequency. After both communication frequencies have been entered, you may select to keep the COM window 'hot' by leaving the cursor on the standby frequency, or move the cursor to the VLOC window by pressing the small left knob (1).

NOTE

When selecting VLOC frequencies, the tuning cursor will automatically return to the COM window after 30 seconds of inactivity.

To change the standby VLOC frequency:

1. Press the small left knob (1), if needed, to activate the tuning cursor in the VLOC window.

2. Rotate the large left knob (2) to select the MHz, and the small left knob (1) to select the kHz of the desired frequency.

To place the standby frequency in the active field, press the VLOC flip-flop key (3).

DIRECT-TO NAVIGATION

The GNS 430 can use direct point-to-point navigation to guide you from takeoff to touchdown, even in the IFR environment. Once a destination is selected, the unit will provide speed, course and distance data based upon a direct course from your present position to your destination. A destination can be selected from any page with the direct-to-key (7).

To select a direct-to destination:

1. Press the direct-to-key. The select direct-to waypoint page will appear with the destination field highlighted.

2. Rotate the small right knob (13) to enter the first letter of the destination waypoint identifier. The destination waypoint may be an airport, VOR, NDB, intersection or user waypoint, as long as it is in the database or stored in memory as a user waypoint.

3. Rotate the large right knob (12) to the right to move the cursor to the next character position.

4. Repeat steps 2 and 3 to spell out the rest of the waypoint identifier.
5. Press ENT to confirm the identifier. The 'Activate?' function field will be highlighted.
6. Press ENT to activate a direct-to course to the selected destination.

NAVCOM PAGE

A frequency listed on the NAVCOM page can be quickly transferred to the standby field of the COM or VLOC windows. This time saving process prevents having to 're-key' a frequency already displayed elsewhere on the screen.

To select a communication or navigation frequency:

1. Push the small right knob (13) to activate the cursor in the GPS window.
2. Rotate the large right knob (12) to select the desired frequency from the list.
3. Press ENT to transfer the selected frequency to the standby field in the COM or VLOC window. COM frequencies will automatically go to the standby field of the COM window and navigation frequencies will automatically go to the standby field of the VLOC window, regardless of which window is currently being highlighted by the cursor.
4. To activate the selected frequency, press the COM flip-flop-key (6) or the VLOC flip-flop-key (3).

NEAREST AIRPORT EMERGENCY SEARCH

The NRST group provides detailed information on the nine nearest airports, VORs, NDBs, intersections and user-created waypoints within 200 nautical miles of your current position. In addition, pages are also provided to display the five nearest center (ARTCC/FIR) and Flight Service Station (FSS) points of communication, plus alert you to any special-use or controlled airspace you may be in or near.

To display the NRST pages:

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- Nearest user waypoints page
- Nearest ARTCC page
- Nearest FSS page
- Nearest airspace page

You may examine both the communication frequencies and runway information directly from the nearest airport page.

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

From the nearest airport page:

1. Press the small right knob (13) to activate the cursor.
2. Rotate the large right knob (12) to select the desired airport from the list.
3. Press direct-to (7), ENT and ENT (again) to navigate to the nearby airport.

From an airport information page:

1. Press direct-to (7), ENT and ENT (again) to navigate to the nearby airport.

8. AIRPLANE HANDLING, CARE AND MAINTENANCE

No change.

SUPPLEMENT A29
TO THE AIRPLANE FLIGHT MANUAL DA 40 D

TRANSPONDER
GTX 330 / GTX 328
GARMIN

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Date of Issue Supplement	**: 20 May 2003**
Design Change Advisory	**: OÄM 40-151**
	OÄM 40-294

Signature	:	
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The technical information contained in this document has been approved under the authority of DOA No. EASA.21J.052.

DIAMOND AIRCRAFT INDUSTRIES GMBH
N.A. OTTO-STR. 5
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0.1 RECORD OF REVISIONS

Rev. No.	Reason	Chapter	Page(s)	Date of Revision	Approval	Date of Approval	Date Inserted	Signature
1	OÄM 40-294 GTX 328	all	all	11-Oct-2007			28. JAN. 2008	

0.2 LIST OF EFFECTIVE PAGES

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0.3 TABLE OF CONTENTS

1. GENERAL

This Supplement supplies the information necessary for the efficient operation of the airplane when the Transponder GTX 330 / GTX 328 is installed. The information contained within this Supplement is to be used in conjunction with the complete AFM.

This Supplement is a permanent part of this AFM and must remain in this AFM at all times when the Transponder GTX 330 / GTX 328 is installed.

2. LIMITATIONS

No change.

3. EMERGENCY PROCEDURES

To transmit an emergency signal:

–	ALT Key:	PRESS.
–	Numeric Keys 0-7:	Select 7700 operating code.

To transmit a signal representing loss of all communication (when in a controlled airspace):

–	ALT Key:	PRESS.
–	Numeric Keys 0-7:	Select 7600 operating code.

4A. NORMAL OPERATING PROCEDURES

No change.

4B. ABNORMAL OPERATING PROCEDURES

No change.

5. PERFORMANCE

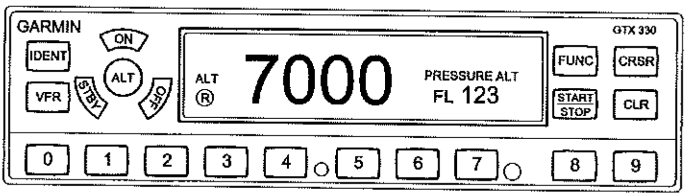
No change.

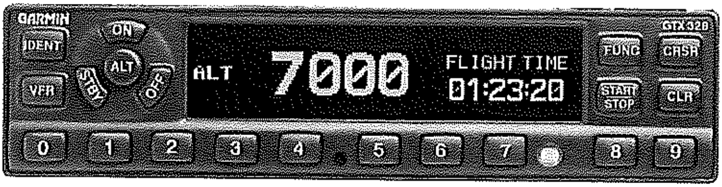
6. MASS AND BALANCE

Upon removal or installation of the Transponder GTX 330 / GTX 328 the change of empty mass and corresponding center of gravity of the airplane must be recorded according to Chapter 6 of the Airplane Flight Manual.

7. DESCRIPTION OF THE AIRPLANE AND ITS SYSTEMS

7.14 AVIONICS





GENERAL

The Garmin GTX 330 / GTX 328 panel mounted Mode S Transponder is a radio transmitter and receiver that operates on radar frequencies, receiving ground radar or TCAS interrogations at 1030 MHz and transmitting a coded response of pulses to ground-based radar on a frequency of 1090 MHz. The GTX 330 / 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 and 1030 MHz receiving for Mode S functions.

In addition to displaying the code, reply symbol and mode of operation, the GTX 330 / GTX 328 screen will display pressure altitude, and timer functions. The unit also features an altitude monitor, and flight timers. A voice or tone audio output announces altitude deviation, and count down timer expiration.

The GTX 330 / GTX 328 transponder is powered 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.

MODE SELECTION KEYS

OFF - Powers off the GTX 330 / 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 STBY 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 airplanes.

CODE SELECTION

Code selection is done with eight keys (0 - 7) that provide 4096 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 digit 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 data selection in the Configuration Mode.

KEYS FOR OTHER GTX 330 / 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. Pressing the VFR button again will restore the previous identification code.

FUNC - Changes the page shown on the right side of the display. Displayed data includes Pressure Altitude, Flight Time, Count up timer and Count down timer. In the Configuration Mode steps through the function pages.

START/STOP - Starts and stops the Altitude Monitor, Count Up, Count Down and Flight timers. In 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, 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. Used in Configuration Mode.

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

FUNCTION DISPLAY

Pressure ALT: Displays the altitude data supplied to the GTX 330 / GTX 328 in feet, hundreds of feet (i.e., flight level), or meters, depending on configuration.

Flight Time: Displays the flight time, which is controlled by the START/STOP and CLR keys.

Altitude Monitor: Controlled by the START/STOP key. Activates a voice alarm when altitude limit is exceeded.

Count Up Timer: Controlled by 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 Brightness: This page is only displayed if manual backlighting mode is selected in Configuration Mode. Backlighting is controlled by the 8 and 9 keys.

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. Two sizes of arrows may be displayed depending on the rate of climb/descent. The sensitivity of these arrows is set using the GTX 330 / GTX 328 Configuration Mode.

TIMER OPERATION

TO OPERATE THE FLIGHT TIMER:

1. Press the FUNC key until 'FLIGHT TIME' is displayed.
2. If desired, you may press START/STOP to pause or restart the timer.
3. Press CLR to reset the timer to zero.

TO OPERATE THE COUNT UP TIMER:

1. Press the FUNC key until 'COUNT UP' is displayed.
2. If necessary, press CLR to reset the Count Up timer to zero.
3. Press START/STOP to count up.
4. Press START/STOP again to pause the timer.
5. Press CLR to reset the timer to zero.

TO OPERATE THE COUNT DOWN TIMER:

1. Press the FUNC key until 'COUNT DOWN' is displayed.
2. Press CRSR and use the 0 - 9 keys to set the initial time. All digits must be entered (use the 0 key to enter leading zeros).
3. Press START/STOP to count down.
4. Press START/STOP again to pause the timer.
5. When the Count Down timer expires, the words 'COUNT DOWN' are replaced with a flashing 'EXPIRED', and the time begins counting up.
6. Press CLR to reset the timer to the initial time value.

AUTOMATIC ALT/GND MODE SWITCHING

If the GTX 330 / GTX 328 is configured with Automated Airborne Determination, normal operation begins when liftoff is sensed. When the airplane is on the ground the screen automatically displays GND. The transponder does not respond to ATCRBS interrogations when GND is annunciated. When a delay time is set in the Configuration Mode, the GTX 330 / GTX 328 waits a specified length of time after landing before changing to GND mode.

FAILURE ANNUNCIATION

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

GTX 330 / GTX 328 MODE S TRANSPONDER FEATURES

Mode S Data transmission

In addition to 4096 codes and pressure altitude, the GTX 330 / GTX 328 is capable of transmitting airplane registration number or flight ID, transponder capability and maximum speed range.

Audio Alerts

(Configuration options: male/female voice or tone, and volume level.)

- 'Leaving Altitude' Altitude deviation exceeded.
- 'Timer Expired' for countdown time.

8. HANDLING, SERVICING AND MAINTENANCE

No change.

ADDITIF E3
AU MANUEL DE VOL DA 40 D

HORIZON ARTIFICIEL
AIM 1100 – 14 LK (0D)
BF GOODRICH

Date de l'édition originale : 11 Novembre 2002

Le supplément initial a été approuvé le 03/07/2003 pour les JAA par les autorités de navigabilité Autrichiennes (ACG), autorités de certification primaire, conformément aux procédures de certification JAA des autorités d'aviation communes, (JAA JC/VP)
Cet additif est la traduction en français de l'additif original en anglais approuvé par l'autorité de l'aviation civile autrichienne Austro Control (ACG).

Visa DGAC :

0 4 OCT. 2004

SERVAIN Sébastien
Ingénieur de Marque de Navigabilité

0.1 LISTE DES REVISIONS

Rev N°.	Raison	Chapitres	Page	Date de révision	Date d'Insertion	Signature
1		Tous	Toutes	14 Mar 2003		

0.2 LISTE DES PAGES EN VIGUEUR

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	9-E3-7	14 Mar 2003
	9-E3-8	14 Mar 2003
8	9-E3-9	14 Mar 2003

TABLE DES MATIERES

1. GENERALITES

Cet additif inclut les informations nécessaires à une utilisation efficace de l'avion, lorsqu'il est équipé de l'horizon artificiel AIM 1100-14LK(0D).

L'information contenue dans cet additif doit être utilisée en conjonction avec le manuel de vol complet

Cet additif fait partie intégrante du manuel de vol et doit rester dans celui-ci à tout moment lorsque l'horizon artificiel AIM 1100-14LK(0D) est installé.

2. LIMITATIONS

Le fait de cager l'horizon artificiel ne doit être effectué que lorsque l'avion est à plat, avec une attitude de croisière normale, comme indiqué par les autres instruments ou l'horizon naturel.

3. PROCEDURES D'URGENCE

Si vous voyez le drapeau d'alerte de l'horizon artificiel AIM 1100-14LK(0D), servez vous des instruments restants pour contrôler l'attitude de l'avion.

4A. PROCEDURES NORMALES

Pas de changement à la section 4A du manuel de vol

4B. PROCEDURES ANORMALES

Pas de changement à la section 4B du manuel de vol.

5. PERFORMANCES

Pas de changement à la section 5 du manuel de vol.

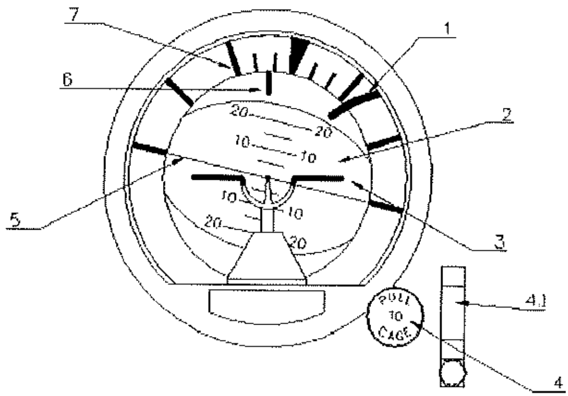
6. MASSE ET CENTRAGE

En cas de dépose ou d'installation de l'horizon artificiel AIM 1100-14LK(0D), le changement de masse à vide et de centrage doit être spécifié conformément à la section 6 du manuel de vol.

7. DESCRIPTION DE L'AERONEF ET DE SES SYSTEMES

7.14 AVIONIQUE

COMMANDES ET AFFICHAGE



1. **Drapeau d'alerte** - lorsqu'il est visible, le drapeau indique que le courant de l'horizon artificiel est coupé. Une fois rétracté, le drapeau indique que le courant passe.

2. **Affichage** – Directement lié à un gyroscope vertical. Il fournit des informations de tangage par incrément de 5°. La partie basse de l'affichage, un fois référencé à l'avion miniature indique que le nez de l'avion est sous l'horizon. La partie haute de l'affichage indique que le nez de l'avion est au-dessus de l'horizon.

3. **L'avion miniature** – Il représente le nez et les ailes de l'avion. Il indique le roulis et le tangage relatifs à l'horizon. L'avion miniature peut être réglé en tangage en utilisant le bouton d'ajustement.

4. **Bouton de cageage** – Tirer pour cager l'indicateur. Quand il est tiré, tourné et relâché en position de détente, il verrouille les cadrans de tangage et de roulis en position cagée.

4.1 **Protection du bouton de cageage** (ne fait pas partie de l'horizon artificiel) – La protection est installée pour prévenir un cageage non intentionnel de l'horizon artificiel.

5 **Ligne d'horizon** – Indique la ligne d'horizon relative à l'attitude de tangage de l'avion.

6 **Index fixe de roulis** - Disposée sur la structure du gyro. Indique le taux de roulis de l'avion par rapport à une échelle de roulis rotative disposée sur le cadran de roulis du gyro.

7 **Echelle de roulis rotative** – Disposée sur le cadran de roulis du gyro pour indiquer le taux de roulis par rapport à un index fixe disposé sur la structure du gyro.

PROCEDURES DE MISE EN ŒUVRE

Les procédures suivantes sont recommandées lorsque vous préparez l'indicateur pour son utilisation :

ATTENTION

L'indicateur peut être endommagé si le bouton « PULL TO CAGE » est relâché d'un coup sec. Relâcher le bouton « PULL TO CAGE » en évitant de le faire d'un coup sec.

NOTE

L'indicateur peut être momentanément cagé en tirant à fond le bouton « PULL TO CAGE », en le maintenant jusqu'à ce que l'affichage se stabilise et en laissant le bouton se remettre rapidement dans sa position normale. Une augmentation du bruit audible lorsque l'indicateur est utilisé dans sa position cagée peut se manifester mais n'est pas anormale.

- Mettre l'indicateur sous tension. Notez que le drapeau passe hors de vue. Attendre 2 minutes pour une stabilisation de la représentation.

- Si un cageage est nécessaire, il ne doit s'accomplir que lorsque l'avion a les ailes à plat avec une attitude de croisière normale, comme indiqué par les autres instruments ou par l'horizon. Si le gyro est cagé alors que l'avion n'est pas dans cette position, la représentation d'attitude résultante immédiatement après le cageage sera éronné d'une valeur égale à la différence entre la verticale vraie et l'attitude actuelle de l'avion. Les erreurs de moins de 7.0° se régleront automatiquement au taux nominal de 2.5° par minute.

PROCEDURES EN VOL

En cas d'erreurs de plus de 8.0°, causées par un virage excessif ou par des variations d'accélération, l'indicateur doit être cagé, une fois l'avion de retour en vol à plat.

ERREURS DYNAMIQUES

- Erreurs induite en virage

  Les erreurs de d'indication de tangage résultant d'un virage au taux standard coordonné (180° en 1 minute avec une vitesse vraie de 156 kt) n'excèdent pas 3°. Les erreurs dynamiques résultant de conditions non standard peuvent être plus importantes. Les erreurs se développant se corrigeront automatiquement par le système interne d'érection ou manuellement par une activation du système de cageage.

- Erreurs d'accélération et de décélération

  Des erreurs d'indication de tangage peuvent apparaître suite aux accélérations subies pendant le décollage, la montée, la descente ou l'atterrissage. Les erreurs se développant se corrigeront automatiquement par le système interne d'érection ou manuellement par une activation du système de cageage.

- Erreurs au roulage

  Une erreur de l'indicateur de roulis et de tangage d'approximativement 1° apparaîtra lors d'un virage à 90° soudain au roulage. Une erreur de l'indicateur de tangage d'approximativement 2° apparaîtra lors d'un virage soudain à 180° au roulage. Les erreurs se développant se corrigeront automatiquement par le système interne d'érection ou manuellement par une activation du système de cageage.

- Fluctuation de l'indication de tangage (Bar Jitter)

  La fluctuation verticale de l'affichage de l'indicateur de tangage ne doit pas excéder 0,3 mm au total lorsque l'indication est comprise entre 0° et ± 20°. Lorsque l'indication est au-delà de ± 20° la fluctuation totale ne doit pas excéder 2 mm.

8. MANUTENTION MAINTENANCE ET ENTRETIEN

Pas de changement à la section 8 du manuel de vol.

ADDITIF E4
AU MANUEL DE VOL DA 40 D
CHRONOMETRE DIGITAL
modèle 803
DAVTRON

Date de l'édition originale : 11 Novembre 2002

Le supplément initial a été approuvé le 22/11/2002 pour les JAA par les autorités de navigabilité Autrichiennes (ACG), autorités de certification primaire, conformément aux procédures de certification JAA des autorités d'aviation communes, (JAA JC/VP) Cet additif est la traduction en français de l'additif original en anglais approuvé par l'autorité de l'aviation civile autrichienne Austro Control (ACG).

Visa DGAC :

0 4 OCT. 2004

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Ingénieur de Marque de Navigabilité

0.1 LISTE DES REVISIONS

Rev N°.	Section	Page	Date de révision	Date d'Insertion	Signature
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0.2 LISTE DES PAGES EN VIGUEUR

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8	9-E4-7	11 Nov 2002

0.3 TABLE DES MATIERES

1. GENERALITES

Ce supplément inclue les informations nécessaires à l'utilisation de l'avion, lorsqu'il est équipé du chronomètre digital DAVTRON modèle 803.

Ce supplément doit être utilisé en même temps que le manuel de vol de l'avion et doit être intégré à ce manuel de vol tant que le Chronomètre DAVTRON 803 est installé.

2. LIMITATIONS

Il n'y a pas de changement à la section 2 du manuel de vol.

3. PROCEDURES D' URGENCE

Il n'y a pas de changement à la section 3 du manuel de vol.

4A. PROCEDURES NORMALES

Il n'y a pas de changement à la section 4A du manuel de vol

4B. PROCEDURE ANORMALES

Il n'y a pas de changement à la section 4B du manuel de vol.

5. PERFORMANCES

Il n'y a pas de changement à la section 5 du manuel de vol.

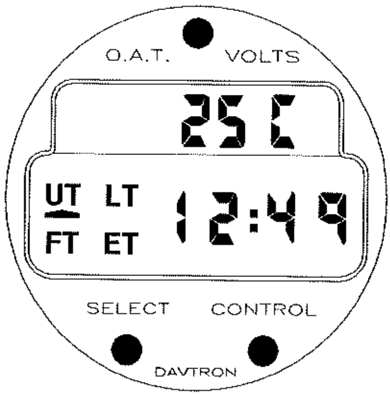
6. MASSE ET CENTRAGE

En cas de dépose ou d'installation du chronomètre digital DAVTRON 803, le changement de masse à vide et de centrage doit être enregistré en accord avec la section 6 du manuel de vol du DA 40 D.

7. DESCRIPTION DE L'AERONEF ET DE SES SYSTEMES

GENERALITE

La face avant du chronomètre comporte 3 boutons et un écran LCD de quatre chiffres. Chaque bouton porte la marque de sa fonction. Le chronomètre est éclairé.



Utilisation du chronomètre :

Opération normale :

Le bouton Select (SEL) permet d'afficher les différents paramètres et le bouton Control (CTL) permet de contrôler ces paramètres. En pressant sur le bouton SEL on affiche successivement : le temps universel (UT : Universal Time), l'heure locale (LT : Local Time), Temps de vol (FT : Flight Time), Temps écoulé (ET : Elapsed Time), et retour au temps universel. En appuyant plus de trois secondes en continu, le bouton de contrôle CTL permet de remettre à zéro le temps de vol. Des impulsions sur le bouton Contrôle CTL démarre et initialise le temps écoulé. En condition d'utilisations normales, il est impossible d'initialiser le temps accidentellement.

Réglage du temps universel :

A l'aide du bouton SEL, afficher le mode TU. Presser simultanément les boutons SEL et CTL pour entrer dans le mode réglage. Les dizaines d'heures clignotent. A chaque pression sur le bouton CTL, les heures sont incrémentés d'un digit. Après réglage des dizaines d'heures, presser le bouton SET pour passer au réglage suivant. Près avoir réglé le dernier digit, presser une dernière fois le bouton SEL pour sortir du mode réglage. L'afficheur clignotera de nouveau de façon normal, ce qui indique que l'horloge fonctionne de façon normale.

Réglage de l'heure locale :

A l'aide du bouton SEL, afficher le mode LT. Presser simultanément les boutons SEL et CTL pour entrer dans le mode réglage. Les dizaines d'heures clignotent. La procédure de réglage est la même que pour le temps universel, à l'exception près que les minutes sont synchronisées avec l'heure universelle, et ne peuvent donc être réglées séparément.

Non-fonctionnement des modes SEL et CTL:

Lorsqu'il n'y a pas d'énergie électrique fournie au chronomètre, les boutons CTL et SEL sont désactivés.

Sélection d'un temps de vol d'alarme :

Si dans le mode temps de vol (FT : Flight Time), on se trouve en mode SET (en appuyant à la fois sur CTL et SEL), on a ainsi la possibilité de programmer une heure de temps de vol d'alarme de façon identique au réglage de l'heure universelle. Lorsque l'heure d'alarme est la même que le temps de vol, l'afficheur clignote et le signal de sortie d'alarme est actif. Le chronomètre passe automatiquement à l'affichage du temps de vol (FT : Flight Time). En pressant simultanément SEL et CTL, on coupe l'alarme et on initialise à zéro le temps de vol d'alarme. Le temps de vol est inchangé et continu à s'incrémenter.

Remise à Zéro du temps de vol :

Il faut afficher le temps de vol pour pouvoir le mettre à zéro. Presser CTL pendant 3 secondes, ou jusqu'à ce que 99 :59 apparaissent à l'écran. Dès que l'on a relâché le bouton CTL, le temps de vol s'affiche à zéro.

Réglage du temps croissant en mode ET (Elapsed Time) :

Afficher le mode ET à l'écran. Presser le bouton CTL pour démarrer le comptage. Le compteur démarre à 59 minutes et 59 secondes, et passe ensuite au heures et aux minutes. Il peut être programmé jusqu'à 99 heures et 50 minutes. Presser le bouton CTL pour initialiser à zéro le mode.

Temps écoulé décroissant :

Afficher le mode ET à l'écran, et entrer dans le mode de réglage en pressant simultanément les deux boutons SEL et CTL. Un compteur décroissant peut être programmé de n'importe quel seuil jusqu'à concurrence de 59 minutes et 59 secondes. Le temps est programmé de la même façon que pour l'heure universelle. Lorsque l'on a fini de programmer le dernier digit, presser le bouton SEL pour sortir du mode réglage, et le chronomètre est prêt à démarrer le compte à rebours. Presser le bouton CTL pour démarrer le compte à rebours. L'alarme se déclenche à zéro, l'écran clignote et déclenche l'alarme extérieure. Presser au choix le bouton SEL ou CTL pour stopper l'alarme. A près avoir atteint zéro, le compteur poursuit son comptage de façon positive.

Mode TEST :

Presser pendant trois secondes le bouton SEL et l'écran affiche 88:88 et affiche les 4 modes simultanément.

Utilisation en Voltmètre et en thermomètre extérieur :

En appuyant sur le bouton rouge supérieur, on affiche les modes E, F et C. A la mise sous tension, l'afficheur donne la tension, une pression sur le bouton donne l'OAT en degrés Fahrenheit, une pression supplémentaire donne une OAT en degrés Centigrade.

8 MANUTENTION MAINTENANCE ET ENTRETIEN

Il n'y a pas de changement à la section 8 du manuel de vol du DA 40 D.

SUPPLEMENT E7
TO THE AIRPLANE FLIGHT MANUAL
DA 40 & DA 40D

OPERATION WITH
VENTILATION INLET BAFFLE

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Date of Issue of the Supplement	:	
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ACG Project Manager	:	AUSTRO C... GmbH Abt...
Stamp	:	A-1030 Wien, ...
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This Supplement has been verified for EASA by the Austrian Civil Aviation Authority Austro Control (ACG) as Primary Certification Authority (PCA) in accordance with the valid Certification Procedures and approved by EASA with approval no. 2005-760.

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0.1 RECORD OF REVISIONS

Rev. No.	Reason	Chapter	Page(s)	Date of Revision	Approval Note	Approval Date	Date Inserted	Signature
1	OÄM 40-183/a	0 0 2	9 - E7 - 1 9 - E7 - 2 9 - E7 - 5	27-Apr-2005	Diamond Aircraft	M. Reichel 20. MAI 2005		

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	9-E7-3	04-Nov-2004
1	9-E7-4	04-Nov-2004
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Page

1. GENERAL

This Supplement supplies the information necessary for the efficient operation of the airplane when the Ventilation Inlet Baffle is installed in the wing. The Ventilation Inlet Baffle reduces the amount of cooling air entering the cabin. It is recommended for use when operating at low outside air temperatures. The information contained within this Supplement is to be used in conjunction with the complete AFM.

This Supplement to the "Airplane Flight Manual DA 40 & DA 40D" is a permanent part of the AFM and must remain in the AFM at all times when the Winter Baffle is installed.

The implementation of the design change advisory OÄM 40-183 is prerequisite for the use of the DA 40 or DA 40 D with the Ventilation Inlet Baffle.

2. OPERATING LIMITATIONS

2.15 LIMITATION PLACARDS

On ventilation inlet baffle:

Remove at Outside Temperatures above 15 °C / 59 °F

2.16 OTHER LIMITATIONS

2.16.1 TEMPERATURE

The airplane may only be operated with the ventilation inlet baffle installed when the outside air temperature at take-off is does not exceed 15 • C (59 • F).

3. EMERGENCY PROCEDURES

No change.

4A. NORMAL OPERATING PROCEDURES

4A.3 CHECKLISTS FOR NORMAL OPERATING PROCEDURES

4A.3.1 PRE-FLIGHT INSPECTION

Walk-around visual inspection

Left Wing:

- Verify that the outside air temperature permits the use of the ventilation inlet baffle.
- Check ventilation inlet baffle for improper mounting or obvious damage.

4B. ABNORMAL OPERATING PROCEDURES

No change.

5. PERFORMANCE

No change.

6. MASS AND BALANCE

The mass of the ventilation inlet baffle is negligible. The mass and balance data of the airplane therefore remain unchanged.

7. DESCRIPTION OF THE AIRPLANE AND ITS SYSTEMS

7.4 INSTRUMENT PANEL

Cockpit Ventilation

Unconditioned ambient air is supplied to the interior through an inlet on the bottom surface of the left wing. To increase cabin temperatures when operating at low outside air temperatures, a ventilation inlet baffle may be installed at the inlet. With the baffle installed, the rear cabin ventilation nozzles on the left and right hand side and in the central console above the passengers' heads will be inoperative.

The ventilation inlet baffle consists of a metal plate with rubber edging and is attached to the bottom LH wing by a camloc.

8. AIRPLANE HANDLING; CARE AND MAINTENANCE

No change.

SUPPLEMENT S4
TO THE AIRPLANE FLIGHT MANUAL DA 40, DA 40 D and DA 40 F
406 MHz EMERGENCY LOCATOR TRANSMITTER
ARTEX ME 406 and ME 406 'ACE'

Doc. No.	: 6.01.01-E, 6.01.02-E, 6.01.05-E
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Signature	:	i.V. T. Krassnitzer
DAI DO Representative	:	T. Krassnitzer
Stamp	:	Diamond Aircraft Office of Airworthiness EASA.21J.052 DoA-02
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The technical information contained in this document has been approved under the authority of DOA No. EASA.21J.052.

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0.1 RECORD OF REVISION

Rev. No.	Reason	Cha p-ter	Page(s)	Date of Revision	Approval	Date of Approval	Date Inserted	Signature
1	DA 40 and DA 40 F airplanes implemented	all	all	10 Apr 2007	Diamond Aircraft Office of Airworthiness EASA 21J.052 DOA-02 i.V. T. Krassnitzer	25 MAY 2007		

0.2 LIST OF EFFECTIVE PAGES

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0	9-S4-0	10 Apr 2007
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	9-S4-5	10 Apr 2007
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4A, 4B, 5, 6	9-S4-6	10 Apr 2007
7	9-S4-7	10 Apr 2007
	9-S4-8	10 Apr 2007
	9-S4-9	10 Apr 2007
	9-S4-10	10 Apr 2007
	9-S4-11	10 Apr 2007
8	9-S4-11	10 Apr 2007

0.3 TABLE OF CONTENTS

1. GENERAL

This Supplement supplies the information necessary for the efficient operation of the airplane when the ELT (Emergency Locator Transmitter) ARTEX ME 406 is installed. The information contained within this Supplement is to be used in conjunction with the complete AFM.

This Supplement is a permanent part of this AFM and must remain in this AFM at all times when the ELT ARTEX ME 406 is installed.

2. LIMITATIONS

No change.

3. EMERGENCY PROCEDURES

Before performing a forced landing, especially in remote and mountainous areas, the ELT transmitter should be activated manually by switching the panel mounted switch to the 'ON'-position. The red LED on the panel mounted switch should flash.

Immediately after a forced landing where emergency assistance is required, the ELT should be utilized as follows:

CAUTION

The panel mounted switch could be inoperative if damaged during a forced landing. In this case the ELT can be switched ON or OFF with the main switch which is located on the ELT unit. The following points must then be executed directly on the ELT-unit.

1. ENSURE ELT ACTIVATION:

 - Switch the panel mounted switch to the 'ON'-position, even if the LED flashes.

   If the airplane's radio is operable and can be safely used (no threat of fire or explosion), turn ON and select 121.5 MHz. If the ELT can be heard transmitting, it is working properly.

2. PRIOR TO SIGHTING RESCUE AIRCRAFT:

 - Conserve airplane battery. Do not activate radio transceiver.

3. AFTER SIGHTING RESCUE AIRCRAFT:

 - Switch the panel mounted 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 panel mounted switch to the 'ON'-position immediately.

4. FOLLOWING RESCUE

- Switch the panel mounted switch to the 'ARM'-position, terminating emergency transmissions.

The ELT may be activated by hard landings or in heavy turbulence. The ELT should then be reset by toggling the panel mounted switch from the 'ARM'-position to the 'ON'-position and then back to the 'ARM'-position, or if the panel mounted switch is already in the 'ON'-position, it must be placed into the 'ARM'-position. Ensure that the ELT does not transmit.

4A. NORMAL OPERATING PROCEDURES

No change.

4B. ABNORMAL OPERATING PROCEDURES

No change.

5. PERFORMANCE

No change.

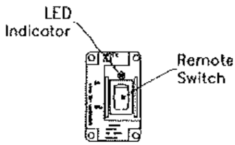
6. MASS AND BALANCE

Upon removal or installation of the ELT the change of empty mass and corresponding center of gravity of the airplane must be recorded according to Chapter 6 of the Airplane Flight Manual.

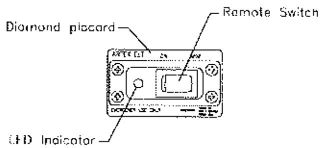
7. DESCRIPTION OF THE AIRPLANE AND ITS SYSTEMS

GENERAL

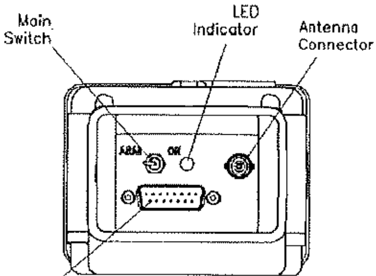
The ARTEX ME 406 ELT is an automatically activated Emergency Locator Transmitter. It may also be manually activated via the 'Main'-switch on the unit, or via the panel mounted switch, which is installed on the right side of the instrument panel of the DA 40, DA 40 D or DA 40 F.



PANEL MOUNTED SWITCH



ELT "ACE" Option



ELT UNIT (FRONT VIEW)

When the ELT is switched on, the ELT broadcasts a standard swept tone on the international distress frequency 121.5 MHz. Additionally, the 406.025 MHz transmitter turns on every 50 seconds for 520 milliseconds. During that time an encoded digital message is sent to a satellite. The information contained in that message is:

- Serial number of the transmitter or Airplane I.D.
- Country Code
- I.D. Code

One advantage of the 406.025 MHz transmitter is that it will produce a much more accurate position, typically 1 to 2 kilometers as compared to 15 to 20 kilometers for 121.5 MHz transmitter. The ELT also transmits a digital message which allows the search and rescue authorities to contact the owner/operator of the airplane through a database. The information contained in the database, that may be useful in the event of a crash, is:

- Type of Airplane
- Address of Owner
- Telephone Number of Owner
- Airplane Registration Number
- Alternate Emergency Contact

Once the ELT is activated and the 406.025 MHz signal is detected from the satellite and a position is calculated, the 121.5 MHz transmission is used to home in on the crash site. Because airplane communication radios are not capable of receiving 406.025 MHz transmissions, the only method of monitoring the ELT is the flashing cockpit light or the flashing light on the ELT unit, the buzzer or the 121.5 MHz transmission which may be monitored on the airplane`s communication transceivers.

DESCRIPTION

The system consists of a panel mounted switch, installed on the instrument panel, the Emergency Locator Transmitter-Unit (ELT-Unit), installed behind the baggage compartment frame, a buzzer, installed next to the ELT unit and an antenna which is installed behind the ring frame.

An acceleration indicator ('g'-switch) activates the ELT upon sensing a sudden change of velocity, along the airplane's longitudinal axis. As long as the ELT is locked into its mounting tray, it will activate in a crash. Neither the cockpit switch nor the ELT unit switch can be positioned to prevent automatic activation once the unit is mounted correctly.

When the ELT is activated, the presence of the emergency swept tone and a flashing front panel light indicate a normal function of the unit. The front panel light must immediately begin to continuously flash upon ELT activation.

The ELT can also be manually activated, for example for testing or after an emergency landing. It can be activated either by positioning the panel mounted switch to the 'ON'-position or by positioning the main switch of the ELT unit to the 'ON'-position.

FLIGHT OPERATION

The main switch of the ELT unit must be in the 'ARM'-position and the panel mounted switch must be in the 'ARM'-position during flight. The ELT is in standby-mode, that means, the ELT can now be activated by the 'g'-Switch. The function test (only during the first five minutes of each hour) gives the pilot the possibility to verify that the ELT is in the 'ARMED'-mode.

The ELT may be activated by hard landings or in heavy turbulence. The ELT should then be reset by toggling the panel mounted switch from the 'ARM'-position to the 'ON'-position and then back to the 'ARM'-position, or if the panel mounted switch is already in the 'ON'-position, it must be placed into the 'ARM'-position. Ensure that the ELT does not transmit. It should be remembered that the ELT cannot be reset if either the panel mounted switch or the unit switch is in the 'ON'-position.

FUNCTION TEST

The following function test is recommended to be performed once a month to verify that the ELT is operating properly. Regulations require that transmitter tests only be done during the first 5 minutes of each hour and must not last for more than 3 audio sweeps (approx. 1 second).

Note that the batteries must be replaced when the transmitter has been in use for more than 1 cumulative hour (including tests).

Performing the Test:

- Monitor 121.50 MHz using the airplane´s COM receiver. Turn the squelch off.
- Switch the panel mounted switch to 'ON', wait for 3 sweeps on the COM receiver, which takes about 1 second. Verify that the LED flashes. Then turn the switch back to the 'ARM'-position. If the LED doesn´t stop flashing or the audio sweep tone can still be heard, the main switch on the ELT unit should be set to the 'ON' position and back to the 'ARM'-position. Verify that the LED does not flash and the audio sweep tone is off.

8. AIRPLANE HANDLING, CARE AND MAINTENANCE

No change.

As discussed earlier for the NAVCOM page, you may also place any displayed frequency into the standby COM or VLOC field by highlighting the frequency with the cursor and pressing ENT.

NEAREST AIRPORTS: ADDITIONAL INFORMATION AND DIRECT-TO

To view additional information for a nearby airport:

1. Press the small right knob (13) to activate the cursor.
2. Rotate the large right knob (12) to select the desired airport from the list.
3. Press ENT to display waypoint (WPT) information pages for the selected airport.
4. To display runway and frequency information, press the small right knob (13) to remove the cursor and rotate the small right knob (13) to display the desired information page.

The nearest airport page may be used in conjunction with the direct-to (7) key to quickly set a course to a nearby facility in an in-flight emergency. Selecting a nearby airport as a direct-to destination will override your flight plan or cancel a previously selected direct-to destination. (You'll still have the option of returning to your flight plan by canceling the direct-to.)