Continental Aerospace Technologies GmbH
Platanenstraße 14
D - 09356 St. Egidien

Tel. +49 37204 696-0
Fax +49 37204 696-2912
www.continentaldiesel.com
support@continentaldiesel.com

Supplemental Airplane Flight Manual
or
Pilot´s Operating Handbook
and
FAA Approved Airplane Flight Manual Supplement
(as applicable)
for the
Cessna 172 R & S

equipped with
TAE 125-01 and TAE 125-02-99
Installation
Issue 3
Revision 3

MODEL No. _____

SERIAL No. _____

REGISTER No. _____

This supplement must be attached to the Pilot's Operating Handbook when the engine installation has been installed in accordance with STC SA01303WI.

This manual constitutes a FAA approved AFM Supplement or Supplemental AFM (as applicable) for US registered airplanes in accordance with FAR 21.29.

The information contained in this supplement supersedes or adds to the Pilot's Operating Handbook and FAA approved AFM (if required) only as set forth herein.

For limitations, procedures, performance and loading information not contained in this supplement, consult the basic Pilot's Operating Handbook and FAA approved AFM (as applicable).

Doc.-No.: 20-0310-22043*

*The last digit of the document number describes the issue of the manual. All manuals with a lower last digit are previous issues of this version.

APPROVAL

The technical content of this document is approved under the authority of the DOA, ref. EASA.21J.010.

LOG OF REVISIONS

Revision	Section	Description	Date	Approved
3/0	all	new Issue Change of Ownership Propeller MTV-6-A/190-69 incorporated Editorial changes	June 30, 2016	
3/1	Cover	Corrected	May 29, 2017	Revision No. 1 to AFM supplement ref. 20-0310-22043 is approved under the authority of DOA Date: May 29, 2017 Office of Airworthiness
	1	Fuels and Liquids		
	2	Fuels and Liquids Weight Limits Update		
	3	Various minor corrections		
3/2	4	Update FADEC Test above 5500ft	Jan. 22, 2018	Revision No. 2 to AFM supplement ref. 20-0310-22043 is approved under the authority of DOA Date: Jan. 22, 2018 Office of Airworthiness

Revision	Section	Description	Date	Approved
3/3	all	Change of company name	Mar. 01, 2022	Office of Airworthiness
	1	Update liquids according to OM-02-02 (Rev. 5/3)		
	2	Update liquids according to OM-02-02 (Rev. 5/3), update Placards		
	3	Description updated		
	8	Caution and Note deleted		

Remark: The parts of the text which changed are marked with a vertical line on the margin of the page.

LIST OF EFFECTIVE SECTIONS

Sections	Issue/Revision	Date
1	3/2	Mar. 01, 2022
2	3/2	Mar. 01, 2022
3	3/2	Mar. 01, 2022
4	3/1	Jan. 22, 2018
5	3/0	June 30, 2016
5a	3/0	June 30, 2016
5b	3/0	June 30, 2016
6	3/0	June 30, 2016
7	3/0	June 30, 2016
8	3/1	Mar. 01, 2022
9	3/0	June 30, 2016

GENERAL REMARK

The content of this POH supplement is developed on basis of the approved POH.

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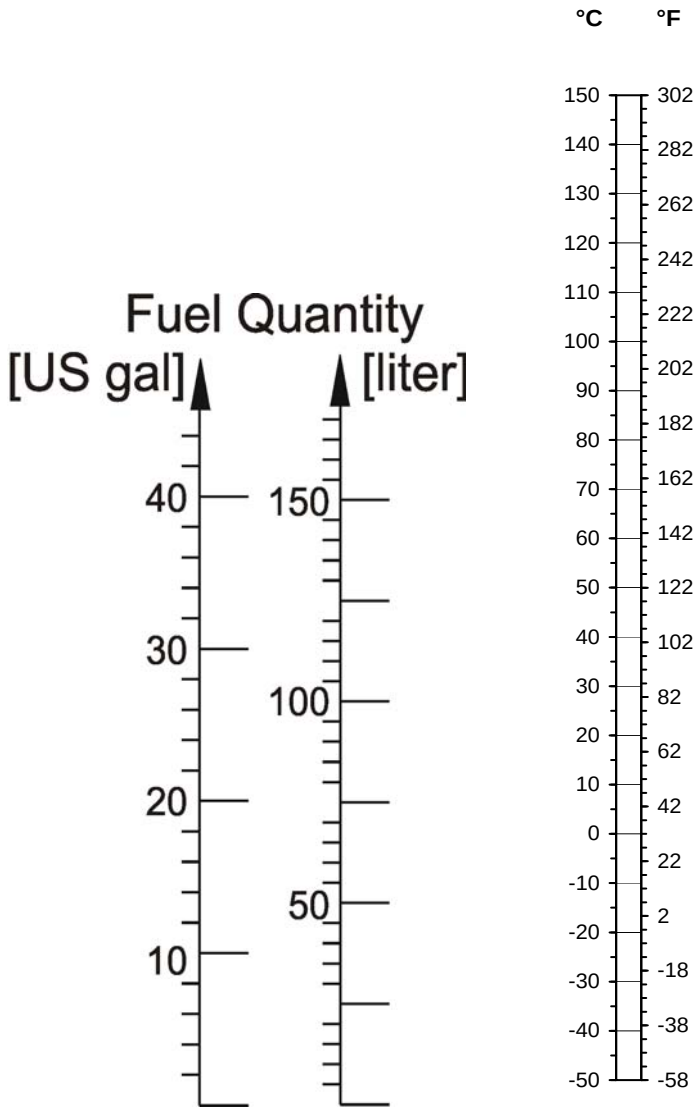
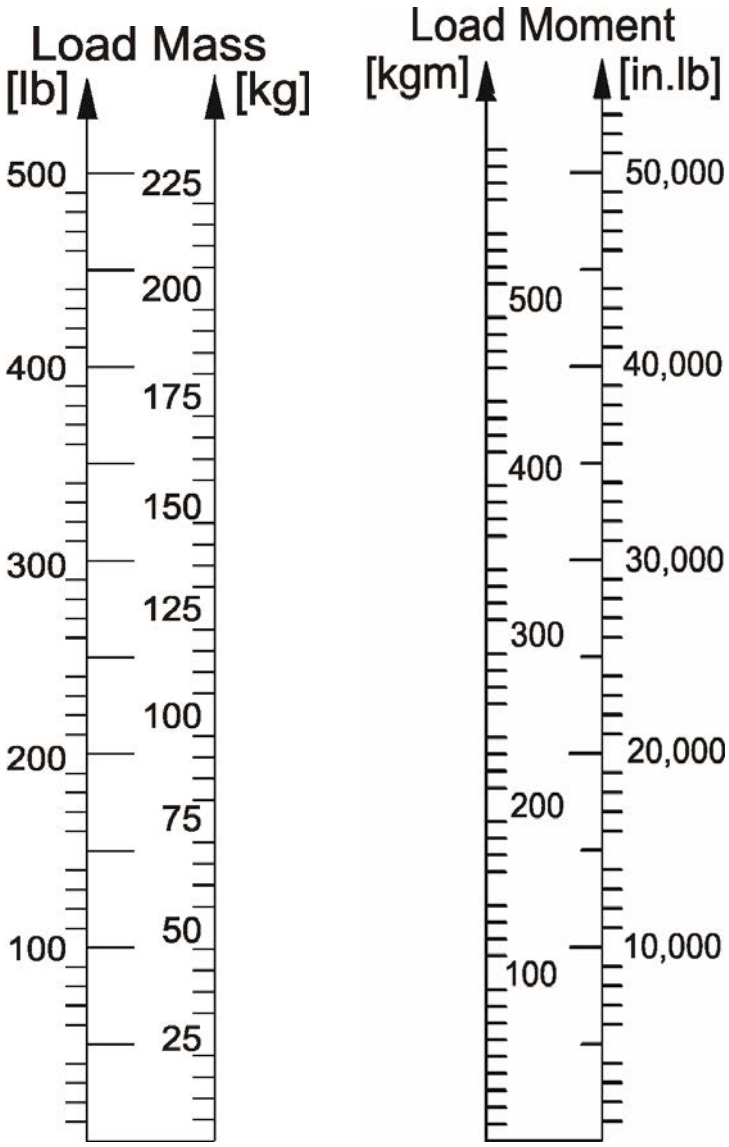
TABLE OF CONTENTS

CONVERSION TABLES

VOLUME		
Unit [Abbr.]	Conversion factor SI to US / Imperial	Conversion factor US / Imperial to Si
Liter [l] US gallon [US gal] US quart [US qt] Imperial gallon [Imp gal] Cubic inch [in³]	[l] / 3.7854 = [US gal] [l] / 0.9464 = [US qt] [l] / 4.5459 = [[Imp gal] [l] x 61.024 = [in³]	 [US gal] x 3.7854 = [l] [[US qt] x 0.9464 = [l] [[Imp gal] x 4.5459 = [l] [in³] / 61.024 = [l]
TORQUE		
Unit [Abbr.]	Conversion factor SI to US / Imperial	Conversion factor US / Imperial to Si
Kilopondmeter [kpm] Foot pound [ft.lb] Inch pound [in.lb]	[kpm] x 7.2331 = [ft.lb] [kpm] x 86.7962 = [in.lb]	 [ft.lb] / 7.2331 = [kpm] [in.lb] / 86.7962 = [kpm]
TEMPERATURE		
Unit [Abbr.]	Conversion factor SI to US / Imperial	Conversion factor US / Imperial to Si
Degree Celsius [ºC] Degree Fahrenheit [ºF]	[ºC] x 1.8 + 32 = [ºF]	 ([ºF] - 32) / 1.8 = [ºC]
SPEED		
Unit [Abbr.]	Conversion factor SI to US / Imperial	Conversion factor US / Imperial to Si
Kilometers per hour [km/h] Meters per second [m/s] Miles per hour [mph] Knots [kts] Feet per minute [fpm]	[km/h] / 1.852 = [kts] [km/h] / 1.609 = [mph] [m/s] x 196.85 = [fpm]	 [mph] x 1.609 = [km/h] [kts] x 1.852 = [km/h] [fpm] / 196.85 = [m/s]

PRESSURE		
Unit [Abbr.]	Conversion factor SI to US / Imperial	Conversion factor US / Imperial to Si
Bar [bar] Hectopascal [hpa] =Millibar [mbar] Pounds per square inch [psi] inches of mercury column [inHg]	[bar] x 14.5038 = [psi] [hpa] / 33.864= [inHg] [mbar] / 33.864 = [inHg]	 [psi] / 14.5038 = [bar] [inHg] x 33.864 = [hPa] [inHg] x 33.864 = [mbar]
MASS		
Unit [Abbr.]	Conversion factor SI to US / Imperial	Conversion factor US / Imperial to Si
Kilogramm [kg] Pound [lb]	[kg] / 0.45359 = [lb]	 [lb] x 0.45359 = [kg]
LENGTH		
Unit [Abbr.]	Conversion factor SI to US / Imperial	Conversion factor US / Imperial to Si
Meter [m] Millimeter [mm] Kilometer [km] Inch [in] Foot [ft] Nautical mile [nm] Statute mile [sm]	[m] / = 0.3048 [ft] [mm] / = 25.4 [in] [km] / = 1.852 [nm] [km] / = 1.609 [sm]	 [in] x 25.4 = [mm] [ft] x 0.3048 = [m] [nm] x 1.852 = [km] [sm] x 1.609 = [km]
FORCE		
Unit [Abbr.]	Conversion factor SI to US / Imperial	Conversion factor US / Imperial to Si
Newton [N] Decanewton [daN] Pound [lb]	[N] / 4.448 = [lb] [daN] / 0.4448 = [lb]	 [lb] x 4.448 = [N] [lb] x 0.4448 = [daN]


°C
°F
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
-10
-20
-30
-40
-50
302
282
262
242
222
202
182
162
142
122
102
82
62
42
22
2
-18
-38
-58
Fuel Quantity
[US gal]
[liter]
40
30
20
10
150
100
50


Load Mass
[lb]
[kg]
500
400
300
200
100
225
200
175
150
125
100
75
50
25
Load Moment
[kgm]
[in.lb]
500
400
300
200
100
50,000
40,000
30,000
20,000
10,000

ABBREVIATIONS

FADEC	Full Authority Digital Engine Control
CED 125	Compact Engine Display Multifunctional instrument for indication of engine data
AED 125	Auxiliary Engine Display Multifunctional instrument for indication of engine and airplane data

SECTION 1
GENERAL

Safety Recommendations

The following symbols and warnings are used in this manual. They must be heeded strictly to prevent personal injury and material damage, to avoid impairment of the operational safety of the aircraft and to rule out any damage to the aircraft as a consequence of improper handling.

▲ **WARNING:**	Non-compliance with these safety rules could lead to injury or even death.
■ CAUTION:	Non-compliance with these special notes and safety measures could cause damage to the engine or to the other components.
◆ Note:	Information added for a better understanding of an instruction.

UPDATE AND REVISION OF THE MANUAL

▲ **WARNING:**	A safe operation is only assured with an up to date POH supplement. Information about actual POH supplement issues and revisions are published in the Service Bulletin TM TAE 000-0004.
◆ Note:	The Doc.-No of this POH supplement is published on the cover sheet of this supplement.

ENGINE

▲ **WARNING:** The engine requires an electrical power source for operation. If the main battery and alternator fail, the engine will only operate for a maximum of 30 minutes on FADEC backup battery power.
Therefore, it is important to pay attention to indications of alternator failure.

Engine manufacturer: Continental Aerospace Technologies GmbH

Engine model: ..... TAE 125-01 or TAE 125-02-99

The TAE 125-02-99 is the successor of the 125-01. Both engine variants have the same power output and the same propeller speeds but different displacement. While the TAE 125-01 has 1689 ccm, the TAE 125-02-99 has 1991 ccm. Both TAE 125 engine variants are liquid cooled in-line four-stroke 4-cylinder motors with DOHC (double overhead camshaft) and are direct Diesel injection engines with common-rail technology and turbocharging. Both engine variants are controlled by a FADEC system. The propeller is driven by a built-in-gearbox (i=1.69) with mechanical vibration dampening and overload release. The engine variants have an electrical self starter and an alternator.

Due to this specific characteristic, all of the information from the flight manual recognized by EASA are no longer valid with reference to:

- carburetor and carburetor pre-heating
- ignition magnetos and spark plugs, and
- mixture control and priming system

PROPELLER

Manufacturer: ..... MT Propeller Entwicklung GmbH
Model: MTV-6-A/187-129
..... MTV-6-A/190-69 (only TAE 125-02-99)
Number of blades: 3
Diameter: ..... 1.87 m (MTV-6-A/187-129)
..... 1.90 m (MTV-6-A/190-69)
Type: ..... constant speed

FUELS and LIQUIDS

▲	**WARNING:**	The engine must not be started under any circumstances if the level is too low.
■	CAUTION:	Use of unapproved fuels may result in damage to the engine and fuel system components, resulting in possible engine failure.
■	CAUTION:	Use approved oil with exact declaration only!
■	CAUTION:	Normally it is not necessary to fill the cooling liquid or gearbox oil between maintenance intervals. If the level is too low, please notify the service department immediately.

Fuel: ..... JET A-1 (ASTM 1655)
..... JET A (ASTM 1655)
..... Jet Fuel No. 3 (GB6537-2006)
..... JP-8 (MIL-DTL-83133E)
..... JP-8+100 (MIL-DTL-83133E)
Only TAE 125-02-99:
..... TS-1 (GOST 10227-86)
..... TS-1 (GSTU 320.00149943.011-99)

◆ Note: The additive Biobor JF can be used in jet and diesel fuel systems to prevent microbial contamination and ensure fuel quality. The recommended dosage is 1 gal per 9.5 gal fuel. Drain water bottoms prior application. For further information refer to manufacturer specifications especially in the case of an already contaminated fuel system.

Engine oil: ..... AeroShell Oil Diesel Ultra
..... AeroShell Oil Diesel 10W-40
.....Shell Helix Ultra 5W-30
.....Shell Helix Ultra 5W-40

Gearbox oil: ..... Shell Spirax S6 GXME 75W-80, API GL-4
..... Shell Spirax S4 G 75W-90, API GL-4
Only TAE 125-02-99:
..... Shell Spirax S6 ATF ZM
.....Centurion Gearbox Oil N1

Coolant:.....Use of Ready Mix ratio 50:50 is recommended

◆ Note: If Ready Mix is not available please use concentrate and distilled water in a ratio of 50:50 to ensure an ice flocculation point at -38°C +/-2°C (-36,4°F +/- 3,6°F).

Radiator Protection: .....BASF Glysantin / G48
..... Valvoline/Zerex Glysantin / G48
..... BASF Glysantin Protect / G05
..... Valvoline/Zerex Glysantin / G05
Only TAE 125-02-99:
.....Mobil Antifreeze Extra / G48
..... Comma Xstream Green - Concentrate / G48

■ CAUTION: G05 and G48 must not be mixed with each other.

Coolant:..... Use of Ready Mix ratio 50:50 is recommended

◆ Note: If Ready Mix is not available please use concentrate and distilled water in a ratio of 50:50 to ensure an ice flocculation point at -38°C +/-2°C.

Radiator Protection: ..... BASF Glysantin / G48
..... Valvoline/Zerex Glysantin / G48
..... BASF Glysantin Protect / G05
..... Valvoline/Zerex Glysantin / G05
Only TAE 125-02-99:
..... Mobil Antifreeze Extra / G48
..... Comma Xstream Green - Concentrate / G48

■ CAUTION: G05 and G48 must not be mixed with each other.

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SECTION 2
LIMITATIONS

▲ **WARNING:**	It is not allowed to start up the engine using external power. If starting the engine is not possible using battery power, the condition of the battery must be verified before flight.

◆ Note:	In the absence of any other explicit statements, all of the information on RPM in this supplement to the Pilot´s Operating Handbook are propeller RPM.

◆ Note:	This change of the original aircraft is certified up to an altitude of 17,500 ft.

ENGINE OPERATING LIMITS

Engine manufacturer: Continental Aerospace Technologies GmbH
Engine model: ..... TAE 125-01 or TAE 125-02-99
Take-off and Max. continuous power: ..... 99 kW (135 HP)
Take-off and Max. continuous RPM: ..... 2300 min^{-1}

ENGINE OPERATING LIMITS FOR TAKE-OFF AND CONTINUOUS POWER

▲ **WARNING:** It is not allowed to start the engine outside of these temperature limits.

◆ Note: The operating limit temperature is a temperature limit below which the engine may be started, but not operated at the Take-off RPM. The warm-up RPM to be selected can be found in Section 4 of this supplement.

Oil temperature:

Minimum engine starting temperature: ..... -32 °C (-26°F)
Minimum operating limit temperature: .....50 °C (122°F)
Maximum operating limit temperature: .....140 °C (284°F)

Coolant temperature:

Minimum engine starting temperature: ..... -32 °C (-26°F)
Minimum operating limit temperature: .....60 °C (140°F)
Maximum operating limit temperature: .....105 °C (221°F)

Gearbox temperature:

Mininum operating limit temperature: ..... -30 °C (-26°F)
Maximum operating limit temperature: .....120 °C (248°F)

MIN. FUEL TEMPERATURE LIMITS IN THE FUEL TANK

▲ **WARNING:** The fuel temperature of the fuel tank not used should be observed if its later use is intended.

▲ **WARNING:** The following applies to Diesel and JET fuel mixtures in the tank:
As soon as the proportion of Diesel in the tank is more than 10% Diesel, the fuel temperature limits for Diesel operation must be observed. If there is uncertainty about which fuel is in the tank, the assumption should be made that it is Diesel.

Fuel	Minimum fuel temperature in the fuel tank before Take-off	Minimum fuel temperature in the fuel tank during the flight
JET A-1, JET A, Fuel No.3 JP-8, JP-8+100, TS-1 (TAE 125-02-99 only)	-30°C (-22°F)	-35°C (-31°F)
Diesel Sasol GTL Diesel (TAE 125-02-99 only)	0°C (32°F)	-5°C (23°F)

Table 2-3a Minimum fuel temperature limits in the fuel tank

Oil pressure

Minimum oil pressure: ..... 1.2 bar (17.4 psi)
Minimum oil pressure (at Take-off power) ..... 2.3 bar (33.4 psi)
Minimum oil pressure (in flight) ..... 2.3 bar (33.4 psi)
Maximum oil pressure ..... 6.0 bar (87 psi)
Maximum oil pressure (cold start < 20 sec.): ..... 6.5 bar (94.3 psi)
Maximum oil consumption: ..... 0.1 l/h (0.1 quart/h)

ENGINE INSTRUMENT MARKINGS

The engine data to be monitored are integrated in the combined engine instrument CED-125.
The ranges of the individual engine monitoring parameters are shown in the following table.

◆ Note: "Load" describes the available percentage of maximum engine power.

Instrument AED/CED		Red range	Amber range	Green range	Amber range	Red range
Tachometer	[RPM]	--------	--------	0-2300	--------	> 2300
Oil pressure	[bar]	0 - 1.1	1.2 - 2.2	2.3 - 5.1	5.2 - 6.5	> 6.5
	[psi]	0 - 16	17.4 - 32	33.4 - 74	75.4 - 87.0	> 87.0
Coolant temperature	[°C]	< -32	-32...+59	60 - 100	101 - 105	> 105
Oil temperature	[°C]	< -32	-32...+49	50 - 129	130 - 140	> 140
Gearbox temperature	[°C]	--------	--------	< 115	115 - 120	> 120
Load	[%]	--------	--------	0 - 100	--------	--------
Fuel Temperature (left and right)	[°C]	< -30	-30...-1	0 - 69	70 - 75	> 75
Alternator Current	[A]	--------	--------	0 - 52.4	52.5 - 60	>60
Electrical System Voltage	[V]	0 - 21	22 - 24	25 - 29.4	29.5 - 30	>30

Table. 2-3b Markings of the engine instruments

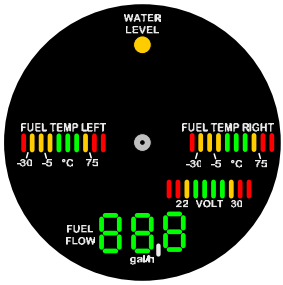

Figure 2-1a AED 125

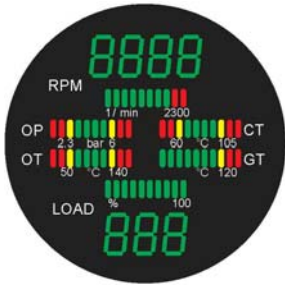

Figure 2-1b CED 125

◆ Note: The AED/CED caution lamp is switched on if an engine reading is in the amber or red range.
The AED/CED caution lamp remains on even when the parameter returns to the green/normal operating range and must be confirmed by pressing the Confirm/Test knob.
After being confirmed, the AED/CED caution lamp will switch on again whenever another parameter enters amber/red range.
Pressing the Confirm/Test knob longer than one second will initiate the power-up test sequence.

WEIGHT LIMITS

C172 R normal category:

Maximum Ramp Weight: ..... 1112 kg (2452 lbs)
Maximum Takeoff Weight: ..... 1111 kg (2450 lbs)
Maximum Landing Weight ..... 1111 kg (2450 lbs)

C172 S normal category (reduced);

C172 R with Cessna Mod. KIT MK172-72-01 or LBA-EMZ SA1358 (FAA STC SA2196CE) normal category:

◆ Note: MTOW for C172S is reduced to 1111kg if TAE 125-01 resp.TAE 125-02-99 and propeller MTV 6-A/187-129 is installed. MTOW for C172S is reduced to 1134kg if TAE 125-02-99 and propeller MTV 6-A/190-69 is installed.

Propeller MTV 6-A/187-129:
Maximum Ramp Weight: ..... 1112 kg (2452 lbs)
Maximum Takeoff Weight: ..... 1111 kg (2450 lbs)
Maximum Landing Weight ..... 1111 kg (2450 lbs)

Propeller MTV 6-A/190-69:
Maximum Ramp Weight: ..... 1135 kg (2502 lbs)
Maximum Takeoff Weight: ..... 1134 kg (2500 lbs)
Maximum Landing Weight ..... 1134 kg (2500 lbs)

C172 R utility category:

Maximum Ramp Weight: ..... 954 kg (2102 lbs)
Maximum Takeoff Weight: ..... 953 kg (2100 lbs)
Maximum Landing Weight ..... 953 kg (2100 lbs)

C172 S utility category:

Maximum Ramp Weight: ..... 1000 kg (2202 lbs)
Maximum Takeoff Weight: ..... 999 kg (2200 lbs)
Maximum Landing Weight ..... 999 kg (2200 lbs)

MANEUVER LIMITS

■ CAUTION:	Intentionally initiating negative G maneuvers is prohibited.

Normal Category: No change
Utility Category: Intentionally initiating spins is prohibited

FLIGHT LOAD FACTORS

No change

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

◆ Note:	The load factor limits for the engine must also be observed. Refer to the Operation & Maintenance Manual for the engine.

PERMISSIBLE FUEL GRADES

■ CAUTION:	Using non-approved fuels and additives can lead to dangerous engine malfunctions.

Fuel: .....JET A-1 (ASTM 1655)
.....JET A (ASTM 1655)
.....Jet Fuel No. 3 (GB6537-2006)
.....JP-8 (MIL-DTL-83133E)
.....JP-8+100 (MIL-DTL-83133E)
Only TAE 125-02-99:
..... TS-1 (GOST 10227-86)
.....TS-1 (GSTU 320.00149943.011-99)

◆ Note:	The additive Biobor JF can be used in jet and diesel fuel systems to prevent microbial contamination and ensure fuel quality. The recommended dosage is 1 gal per 9.5 gal fuel. Drain water bottoms prior application. For further information refer to manufacturer specifications especially in the case of an already contaminated fuel system.

MAXIMUM FUEL QUANTITIES

Due to the higher specific density of Kerosene and Diesel in comparison to Aviation Gasoline (AVGAS) with the TAE 125 installation the permissible tank capacity has been reduced.

■ CAUTION:	To prevent air from penetrating into the fuel system avoid running the tanks dry. As soon as the "Low Level" Warning Light illuminates, switch to a tank with sufficient fuel or land.
■ CAUTION:	With ¼ tank or less, prolonged uncoordinated flight is prohibited when operating on either left or right tank.
■ CAUTION:	In turbulent air it is strongly recommended to use the BOTH position.
◆ Note:	The tanks are equipped with a Low Fuel Warning. If the fuel level is below 19 l (5 US gal) usable fuel, the "Fuel L" or "Fuel R" Warning Light illuminates respectively.

C172 R&S normal category

Total capacity:.....180.2 litres (47.6 US gallons)
Total capacity of usable fuel: .....168.8 litres (44.6 US gallons)
Total capacity each tank: .....90.1 litres (23.8 US gallons)
Total capacity of usable fuel
each tank: .....84.4 litres (22.3 US gallons)

C172 R&S utility category

Total capacity:.....117.4 litres (31 US gallons)
Total capacity of usable fuel: .....106 litres (28 US gallons)
Total capacity each tank: .....58.7 litres (15.5 US gallons)
Total capacity of usable fuel
each tank: .....53 litres (14 US gallons)

PERMISSIBLE OIL TYPES

■ CAUTION: Use approved oil with exact designation only!

Engine oil: ..... AeroShell Oil Diesel Ultra
..... AeroShell Oil Diesel 10W-40
..... Shell Helix Ultra 5W-30
..... Shell Helix Ultra 5W-40

Gearbox oil: ..... Shell Spirax S6 GXME 75W-80, API GL-4
..... Shell Spirax S4 G 75W-90, API GL-4
Only TAE 125-02-99:
..... Shell Spirax S6 ATF ZM
.....Centurion Gearbox Oil N1

PERMISSIBLE COOLING LIQUID

Coolant:..... Use of Ready Mix ratio 50:50 is recommended

◆ Note: If Ready Mix is not available please use concentrate and distilled water in a ratio of 50:50 to ensure an ice flocculation point at -38°C +/-2°C (-36,4°F +/- 3,6°F).

Radiator Protection: .....BASF Glysantin / G48
..... Valvoline/Zerex Glysantin / G48
..... BASF Glysantin Protect / G05
..... Valvoline/Zerex Glysantin / G05
Only TAE 125-02-99:
.....Mobil Antifreeze Extra / G48
..... Comma Xstream Green - Concentrate / G48

■ CAUTION: G05 and G48 must not be mixed with each other.

PLACARDS

Near the fuel tank caps:

for normal category aircraft:
JET FUEL ONLY
JET A-1 / DIESEL
CAP. 84.4 LITERS (22.3 US GALLONS)
USABLE TO BOTTOM OF FILLER INDICATOR TAB

for utility category aircraft:
JET FUEL ONLY
JET A-1 / DIESEL
CAP. 53 LITERS (14 US GALLONS)
USABLE TO BOTTOM OF FILLER INDICATOR TAB

At the fuel selector valve:

for normal category aircraft:

Left and Right Position: 84.4 Ltr/ 22.3 gal
Both Position: 168.8 Ltr/ 44.6 gal

for utility category aircraft:

Left and Right Position: 53 Ltr/ 14 gal
Both Position: 106 Ltr/ 28 gal

On the oil funnel or at the flap of the engine cowling:

Figure 2-2

Drain Valve Fuel filter
The decal is attached to the drain valve of the fuel filter.

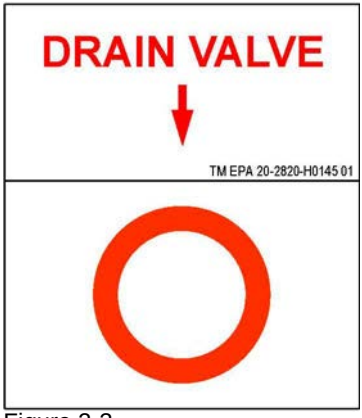

Figure 2-3

Expansion Tank Coolant: (only TAE 125-02-99)
The decal is attached to the expansion tank.

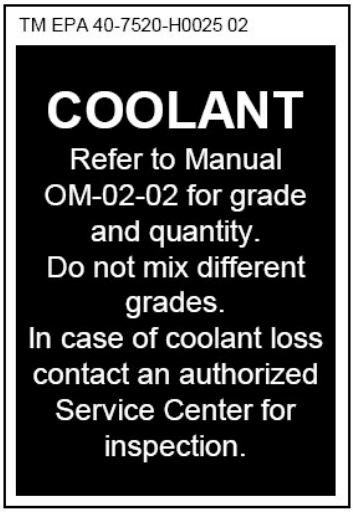

Figure 2.4

Next to the Alternator Warning Light:

"Alternator"

If installed, at the flap of the engine cowling to the External Power Receptacle**:**

„ATTENTION 24 V DC OBSERVE CORRECT POLARITY“

All further placards contained in this section of the EASA-approved POH remain valid.

SECTION 3
EMERGENCY PROCEDURES

INDEX OF CHECKLISTS

GENERAL

In addition to the original AFM/POH, the following applies:

▲ **WARNING:**	Due to an engine shut-down or failures indicated by the FADEC warning lights there might be a loss propeller valve currency which leads in a low pitch setting of the propeller. This might result in overspeed. Airspeeds below 100 KIAS are suitable to avoid overspeed in failure case. If the propeller speed control fails, climbs can be performed at 65 KIAS and a powersetting of 100%.

ENGINE MALFUNCTION

DURING TAKE-OFF (WITH SUFFICENT RUNWAY AHEAD)

(1) Thrust Lever – IDLE
(2) Brakes – APPLY
(3) Wing flaps (if extended) – RETRACT
(4) Engine Master (“IGN“ resp.) – OFF
(5) Alternator, Main Bus and Battery switch – OFF
(6) Fuel Shut-off Valve – CLOSED

IMMEDIATELY AFTER TAKE-OFF

If there is an engine malfunction after take-off, lower the nose to keep the airspeed and attain gliding attitude. In most cases, landing should be executed straight ahead with only small heading corrections to avoid obstacles.

▲ **WARNING:** Altitude and airspeed are seldom sufficient for a return to the airfield with a 180° turn while gliding.

(1) Airspeed..... 65 KIAS (wing flaps retracted)
.....60 KIAS (wing flaps extended)
(2) Fuel Shut-off Valve – CLOSED
(3) Engine Master (“IGN“ resp.) – OFF
(4) Wing flaps – as required (30° recommended)
(5) Alternator, Main Bus and Battery switch – OFF

DURING FLIGHT

◆ Note: Running a tank dry activates both FADEC warning lights flashing.

In case that one tank was flown empty, at the first signs of insufficient fuel feed proceed as follows:

(1) Fuel Shut-off Valve – OPEN (push full in)
(2) Immediately switch the Fuel Selector to BOTH position
(3) Electric Fuel Pump – ON
(4) Check the engine (engine parameters, airspeed/altitude change, whether the engine responds to changes in the Thrust Lever position).
(5) If the engine acts normal, continue the flight and land as soon as possible.

▲ **WARNING:** The high-pressure pump must be checked by an authorized service center before the next flight.

RESTART AFTER ENGINE FAILURE

Whilst gliding to a suitable landing strip, try to determine the reason for the engine malfunction. If time permits and a restart of the engine is possible, proceed as follows:

(1) Airspeed between 65 and 85 KIAS (max. 100 KIAS)
(2) Glide below 13,000 ft
(3) Fuel Shut-off Valve – OPEN (push full in)
(4) Fuel Selector switch to BOTH position
(5) Electric Fuel Pump – ON
(6) Thrust Lever – IDLE
(7) Engine Master (“IGN“ resp.) OFF and then ON
(if the propeller does not turn, then additionally Starter ON)

◆ Note: The propeller will normally continue to turn as long as the airspeed is above 65 KIAS. Should the propeller stop at an airspeed of more than 65 KIAS or more, the reason for this should be found out before attempting a restart.
If it is obvious that the engine or propeller is blocked, do not use the Starter.

◆ Note: If the Engine Master is in position OFF, the Load Display shows no value even if the propeller is turning.

(8) Check the engine power: Thrust lever 100%, engine parameters, check altitude and airspeed

FADEC MALFUNCTION IN FLIGHT

◆ Note: The FADEC consists of two components that are independent of each other: FADEC A and FADEC B. In case of malfunctions in the active FADEC, it automatically switches to the other.

a) One FADEC Light is flashing

1. Press FADEC test knob at least 2 seconds
2. FADEC light extinguished (LOW warning category):
   a) Continue normal flight,
   b) Inform service center after landing.
3. FADEC light illuminated steady (HIGH warning category)
   a) Monitor the other FADEC light.
   b) Land as soon as possible.
   c) Select an airspeed to avoid engine overspeed.
   d) Inform service center after landing.

b) Both FADEC Lights are flashing

◆ Note: CED load display should be considered unreliable with both FADEC lights illuminated. Use other indications to assess engine condition.

1. Press FADEC test knob at least 2 seconds
2. FADEC Lights extinguished (LOW warning category):
   a) Continue normal flight,
   b) Inform service center after landing.
3. FADEC Lights illuminated steady (HIGH warning category):
   a) Check the available engine power,
   b) Expect engine failure.
   c) Flight can be continued, however the pilot should
      i) Select an appropriate airspeed to avoid engine overspeed.
      ii) Land as soon as possible.
      iii) Be prepared for an emergency landing.
   d) Inform service center after landing.
4. In case a fuel tank was flown empty, proceed at the first signs of insufficient fuel feed as follows:
   a) Immediately switch the Fuel Selector to BOTH
   b) Electric Fuel Pump – ON
   c) Select an airspeed to avoid engine overspeed.
   d) Check the engine (engine parameters, airspeed/altitude change, whether the engine responds to changes in the Thrust Lever position).
   e) If the engine acts normally, continue the flight and land as soon as possible.

▲ **WARNING:** The high-pressure pump must be checked by an authorized service center before the next flight.

ABNORMAL ENGINE BEHAVIOR

If the engine acts abnormal during flight and the system does not automatically switch to the B-FADEC, it is possible switch to the B-FADEC manually.

▲ **WARNING:** It is only possible to switch from the automatic position to B-FADEC (A-FADEC is active in normal operation, B-FADEC is active in case of malfunction). This only becomes necessary when no automatic switching occurred in case of abnormal engine behavior.

(1) Select an appropriate airspeed to avoid engine overspeed.

▲ **WARNING:** When operating on FADEC backup battery only, the "Force B" switch MUST NOT BE activated. This will shut down the engine.

(2) "Force-B" switch to B-FADEC

(3) Flight may be continued, but the pilot should:

i) Select an airspeed to avoid engine overspeed

ii) Land as soon as possible

iii) Be prepared for an emergency landing

FIRES

ENGINE FIRE WHEN STARTING ENGINE ON GROUND

(1) Engine Master (“IGN“ resp.) – OFF
(2) Fuel Shut-off Valve / Fuel Selector - CLOSED
(3) Electric Fuel Pump – OFF
(4) Switch "Battery" – OFF
(5) Extinguish the flames with a fire extinguisher, wool blankets or sand.
(6) Inform service center after landing for examination of fire damages.

ENGINE FIRE DURING TAKE-OFF (ON GROUND)

(1) Engine Master – OFF
(2) Fuel Shut-off Valve / Fuel Selector - CLOSED
(3) Electric Fuel Pump – OFF
(4) Battery switch – OFF
(5) Extinguish the flames with a fire extinguisher, wool blankets or sand.
(6) Inform service center after landing for examination of fire damages.

ENGINE FIRE IN FLIGHT

(1) Engine Master – OFF
(2) Fuel Shut-off Valve / Fuel Selector - CLOSED
(3) Electric Fuel Pump – OFF
(4) Switch "Battery" – OFF
(5) Cabin heat and ventilation OFF (closed) except the fresh air nozzles on the ceiling
(6) Establish Best Glide Speed
(7) Perform emergency landing (as described in the procedure "Emergency Landing With Engine Out")

ELECTRICAL FIRE IN FLIGHT

The first sign of an electrical fire is an unmistakable sharp, acrid smell. As the fire grows, electrical load might be higher than normal or circuit breakers start to trip. In this event proceed as follows:

(1) STBY BATT Switch – OFF (G1000 Avionics)
(2) Avionics Master – OFF
(3) Fresh Air Nozzles, Cabin Heat and Ventilation – OFF (closed)
(4) Fire Extinguisher – Activate (if available)
(5) All electrical consumers – Switch OFF, leave Alternator, Battery and Engine Master ON

▲ **WARNING:** After the fire extinguisher has been used, make sure that the fire is extinguished before exterior air is used to remove smoke from the cabin.

(6) If there is evidence of continued electrical fire, consider turning off Battery and Alternator.

▲ **WARNING:** If the FADEC Backup battery is not installed this will shut down the engine and require an emergency landing (refer to “EMERGENCY LANDING WITH ENGINE OUT”). The engine has been demonstrated to continue operating for a maximum of 30 minutes when powered by the FADEC Backup battery only.

(7) Fresh Air Nozzles, Cabin Heat and Ventilation – ON (open)
(8) Check Circuit Breaker, do not reset if open

If the fire has been extinguished:

(9) STBY BATT Switch – ON (G1000 Avionics)
(10) Avionics Master – ON

▲ **WARNING:** Turn on electrical equipment required to continue flight depending on the situation and land as soon as possible. Switch circuit breakers ON one at a time, with delay after each.

ENGINE SHUT DOWN IN FLIGHT

If it is necessary to shut down the engine in flight (for instance, abnormal engine behavior does not allow continued flight or there is a fuel leak, etc.), proceed as follows:

(1) Select an airspeed to avoid engine overspeed (best glide recommended)
(2) Engine Master (“IGN“ resp.) – OFF
(3) Fuel Shut-off Valve – CLOSED
(4) Electric Fuel Pump – OFF
(5) If the propeller also has to be stopped (for instance, due to excessive vibrations)
    i) Reduce airspeed below 55 KIAS
    ii) When the propeller is stopped, continue to glide at 65 KIAS

EMERGENCY LANDING

EMERGENCY LANDING WITH ENGINE OUT

If all attempts to restart the engine fail and an emergency landing is imminent, select suitable site and proceed as follows:

(1) Airspeed
    i) 65 KIAS (flaps retracted)
    ii) 60 KIAS (flaps extended)
(2) Fuel Shut-off Valve – CLOSED
(3) Engine Master (“IGN“ resp.) – OFF
(4) Wing Flaps – as required (Full down recommended)
(5) Alternator, Main Bus and Battery switch – OFF
(6) Cabin Doors – unlock before touch-down
(7) Touch-down – slightly nose up attitude
(8) Brake firmly

◆	Note:	Gliding Distance. Refer to "Maximum Glide" in the approved Pilot‘s Operating Handbook.

FLIGHT IN ICING CONDITIONS

▲ **WARNING:** It is prohibited to fly in known icing conditions.

In case of inadvertent icing encounter proceed as follows:

(1) Pitot Heat switch – ON (if installed)
(2) Turn back or change the altitude to obtain an outside air temperature that is less conducive to icing.
(3) Pull the cabin heat control full out and open defroster outlets to obtain maximum windshield defroster airflow. Adjust cabin air control to get maximum defroster heat and airflow.
(4) Advance the Thrust Lever to increase the propeller speed and keep ice accumulation on the propeller blades as low as possible.
(5) Watch for signs of air filter icing and pull the "Alternate Air Door" control if necessary. An unexplaned loss in engine power could be caused by ice blocking the air intake filter. Opening the "Alternate Air Door" allows preheated air from the engine compartment to be aspirated.
(6) Plan a landing at the nearest airfield. With an extremely rapid ice build up, select a suitable "off airfield" landing site.
(7) With an ice accumulation of 0.5 cm or more on the wing leading edges, a significantly higher stall speed should be expected.
(8) Leave wing flaps retracted. With a severe ice build up on the horizontal tail, the change in wing wake airflow direction caused by wing flap extension could result in a loss of elevator effectiveness.
(9) Perform a landing approach using a forward slip, if necessary, for improved visibility.
(10) Approach at 65 to 75 KIAS depending upon the amount of the accumulation.
(11) Perform a landing in level attitude.

RECOVERY FROM SPIRAL DIVE

If a spiral is encountered in the clouds, proceed as follows:

(1) Retard Thrust Lever to idle position
(2) Stop the turn by using coordinated aileron and rudder control to align the symbolic airplane in the turn coordinator with the horizontal reference line.
(3) Cautiously apply elevator back pressure to slowly reduce the airspeed to 80 KIAS.
(4) Adjust the elevator trim control to maintain an 80 KIAS glide.
(5) Keep hands off the control wheel, using rudder control to hold a straight heading.
(6) Readjust the rudder trim (if installed) to relieve the rudder of asymmetric forces.
(7) Clear the engine occasionally, but avoid using enough power to disturb the trimmed glide.
(8) Upon breaking out of clouds, resume normal cruising flight and continue the flight.

ELECTRICAL POWER SUPPLY SYSTEM MALFUNCTIONS

▲ **WARNING:**	If the power supply from both alternator and main battery is interrupted, continued engine operation is dependent on the remaining capacity of the FADEC backup battery. The engine has been demonstrated to continue operating for a maximum of 30 minutes when powered by the FADEC backup battery only. In this case, all electrical equipment will not operate: - land immidiately - do not switch the „FORCE-B“ switch, this will shut down the engine

■ CAUTION:	The engine requires an electrical power source for its operation. If the alternator fails, continued engine operation time is dependent upon the remaining capacity of the main battery, the FADEC backup battery and equipment powered. The engine has been demonstrated to continue operating for approximately 120 minutes based upon the following assumptions:

■ CAUTION:	This table only gives a reference point. The pilot should turn off all nonessential items and supply power only to equipment which is absolutely necessary for continued flight depending upon the situation. Deviating from this recommendation, the remaining engine operating time may change.

Equipment		Time switched on	
		in [min]	in [%]
NAV/COM 1 receiving	ON	120	100
NAV/COM 1 transmitting	ON	12	10
NAV/COM 2 receiving	OFF	0	0
NAV/COM 2 transmitting	OFF	0	0
Annunciator	ON	120	100
Transponder	ON	120	100
Fuel Pump	OFF	0	0
AED-125	ON	120	100
Battery	ON	120	100
CED-125	ON	120	100
Landing Light	ON	12	10
Flood Light	ON	1.2	1
Pitot Heat	ON	24	20
Wing Flaps	ON	1.2	1
Interior Lighting	OFF	0	0
Nav Lights	OFF	0	0
Beacon	OFF	0	0
Strobes	OFF	0	0
ADF	OFF	0	0
Intercom	OFF	0	0
Engine Control	ON	120	100

Table 3-1a

ALTERNATOR WARNING LIGHT ILLUMINATES DURING NORMAL ENGINE OPERATION.

(1) Ammeter – CHECK
(2) Alternator switch CHECK – ON
(3) Battery Switch CHECK – ON

■ CAUTION: If the FADEC was supplied by battery only until this point, the RPM can momentarily drop, when the alternator is switched on. In any case: leave the alternator switched ON!

(4) Electrical load – REDUCE IMMEDIATELY as follows:
    i) NAV/ COM 2 – OFF
    ii) Fuel Pump – OFF
    iii) Landing Light – OFF (use as required for landing)
    iv) Taxi Light – OFF
    v) Strobe Light – OFF
    vi) Nav Lights – OFF
    vii) Beacon – OFF
    viii) Interior Lights – OFF
    ix) Intercom – OFF
    x) Pitot Heat – OFF (use as required)
    xi) Autopilot – OFF
    xii) Non-essential equipment – OFF
(5) The pilot should:
    i) Land as soon as possible.
    ii) Be prepared for an emergency landing.
    iii) Expect an engine failure

AMMETER SHOWS BATTERY DISCHARGE DURING NORMAL ENGINE OPERATION FOR MORE THAN 5 MINUTES

◆ Note: When the AED Ammeter indication decreases to the far left and the voltage indication is decreasing simultaneously, the battery is being discharged.

(1) Alternator switch CHECK – ON
(2) Battery Switch CHECK – ON

■ CAUTION: If the FADEC was supplied by battery only until this point, the RPM can momentarily drop, when the alternator is switched on. In any case: leave the alternator switched ON!

(3) Electrical load – REDUCE IMMEDIATELY as follows:
   i) NAV/ COM 2 – OFF
   ii) Fuel Pump – OFF
   iii) Landing Light – OFF (use as required for landing)
   iv) Taxi Light – OFF
   v) Strobe Light – OFF
   vi) Nav Lights – OFF
   vii) Beacon – OFF
   viii) Interior Lights – OFF
   ix) Intercom – OFF
   x) Pitot Heat – OFF (use as required)
   xi) Autopilot – OFF
   xii) Non-essential equipment – OFF
(4) The pilot should:
   i) Land as soon as possible
   ii) Be prepared for an emergency landing
   iii) Expect an engine failure

TOTAL ELECTRICAL FAILURE
(all equipment inoperative, except engine)

▲ **WARNING:** If both alternator and main battery fail, continued engine operation is dependent on the remaining capacity of the FADEC backup battery. The engine has been demonstrated to continue operating for a maximum of 30 minutes when powered by the FADEC backup battery only. In this case, all other electrical equipment will not operate.

▲ **WARNING:** If the aircraft was operated on battery power only until this point (alternator warning light illuminated), the remaining engine operating time may be less than 30 minutes.

▲ **WARNING:** Do not activate the FORCE-B switch, this will shut down the engine.

(1) Alternator switch CHECK – ON
(2) Battery Switch CHECK – ON
(3) Land as soon as possible
    i) Be prepared for an emergency landing
    ii) Expect an engine failure

ROUGH ENGINE OPERATION OR LOSS OF POWER

DECREASE IN POWER

(1) Push Thrust Lever full forward (Take-off position)
(2) Fuel Selector to BOTH Position.
(3) Electric Fuel Pump – ON
(4) Reduce airspeed to 65-85 KIAS (best glide recommended), (max. 100 KIAS)
(5) Check engine parameters (FADEC lights, oil pressure and temperature, fuel quantity)

If normal engine power is not achieved, the pilot should:

i) Land as soon as possible
ii) Be prepared for an emergency landing
iii) Expect an engine failure

▲ **WARNING:** The high pressure pump must be checked by an authorized service center before the next flight.

OIL PRESSURE TOO LOW (< 2.3 BAR IN CRUISE (YELLOW RANGE) OR < 1.2 BAR AT IDLE (RED RANGE)):

(1) Reduce power as quickly as possible
(2) Check oil temperature: If the oil temperature is high or near operating limits,
    i) Land as soon as possible
    ii) Be prepared for an emergency landing
    iii) Expect an engine failure

◆ Note: During warm-weather operation or long climbs at low airspeed engine temperatures could rise into the yellow range and trigger the "Caution" light. This warning allows the pilot to avoid overheating of the engine as follows:

(3) Increase the climbing airspeed, reduce angle of climb
(4) Reduce power, if the engine temperatures approache the red range

OIL TEMPERATURE "OT" TOO HIGH (RED RANGE):

(1) Increase airspeed and reduce power as quickly as possible
(2) Check oil pressure: if the oil pressure is lower than normal (< 2.3 bar in cruise or < 1.2 bar at idle),
    i) Land as soon as possible
    ii) Be prepared for an emergency landing
    iii) Expect an engine failure
(3) If the oil pressure is in the normal range:
    i) Land as soon as possible

COOLANT TEMPERATURE "CT" TOO HIGH (RED RANGE):

(1) Increase airspeed and reduce power as quickly as possible
(2) Cabin Heat – COLD
(3) If coolant temperature reduces rapidly to normal range, fly normally and monitor coolant temperature. Cabin heat as required.
(4) If this does not cause the coolant temperature to drop,
    i) Land as soon as possible
    ii) Be prepared for an emergency landing
    iii) Expect an engine failure

LIGHT "WATER LEVEL" ILLUMINATES

(1) Increase airspeed and reduce power as quickly as possible
(2) Coolant temperature "CT" check and monitor
(3) Oil temperature "OT" check and monitor
(4) If coolant temperature and/or oil temperature are rising into yellow or red range,
    i) Land as soon as possible
    ii) Be prepared for an emergency landing
    iii) Expect an engine failure

GEARBOX TEMPERATURE "GT" TOO HIGH (RED RANGE):

(1) Reduce power to 55% - 75% as quickly as possible
(2) Land as soon as possible.

FUEL TEMPERATURE TOO HIGH (RED RANGE):

(1) Switch to fuel tank with lower fuel temperature, if this contains sufficient fuel
(2) Reduce engine power, if possible
(3) If fuel temperature remains in Red Range, land as soon as possible

FUEL TEMPERATURE TOO LOW (AMBER RANGE for Diesel Operation, RED RANGE for Kerosine Operation):

The fuel in the selected tank will be heated by the return flow, the temperature in the non-active tank must be monitored.

(1) Switch to fuel tank with higher fuel temperature, if this contains sufficient fuel
(2) Change to altitude with higher outside air temperature
(3) If use of the non-active tank is intended, switch fuel selector to BOTH when installed

PROPELLER RPM TOO HIGH:

Propeller RPM between 2,400 and 2,500 for more than 10 seconds or over 2,500:

(1) Reduce power
(2) Reduce airspeed below 100 KIAS or as appropriate to prevent propeller overspeed
(3) Set power as required to maintain altitude and land as soon as possible.

◆ Note:	If the propeller speed control fails, climbs can be performed at 65 KIAS and a power setting of 100%. In case of overspeed the FADEC will reduce the engine power at higher airspeeds to avoid propeller speeds above 2500 rpm.

FLUCTUATIONS IN PROPELLER RPM:

If the propeller RPM fluctuates by more than + / - 100 RPM with a constant Thrust Lever position:

(1) Change the power setting and attempt to find a power setting where the propeller RPM no longer fluctuates.
(2) If this does not work, set the maximum power at an airspeed < 100 KIAS until the propeller speed stabilizes.
(3) If the problem is resolved, continue the flight
(4) If the problem continues, select a power setting where the propeller RPM fluctuations are minimum. Fly at an airspeed below 100 KIAS and land as soon as possible.

SECTION 4
NORMAL PROCEDURES

PREFLIGHT INSPECTION

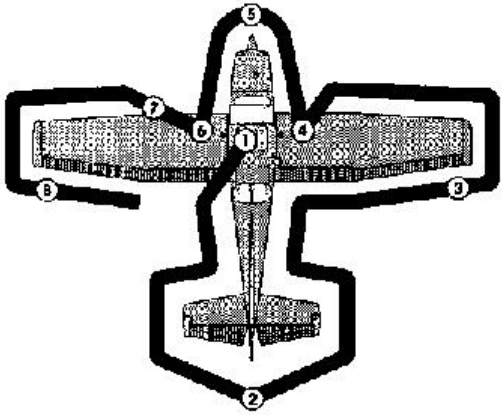

Figure 4-1a Preflight Inspection

◆ Note: Visually check airplane for general condition during walk around inspection. In cold weather, remove even small accumulations of frost, ice or snow from wing, tail and control surfaces. Also, make sure that control surfaces contain no internal accumulations of ice or debris. Prior to flight, check that pitot heater (if installed) is warm to touch within 30 seconds with battery and pitot heat switches on. If a night flight is planned, check operation of all lights, and make sure a flashlight is available.

(1) CABIN

(1) Pitot Tube Cover – REMOVE. Check for pitot blockage
(2) Pilot´s Operating Handbook – AVAILABLE IN THE AIRPLANE
(3) Airplane Weight and Balance – CHECKED
(4) Parking Brake – SET
(5) Control Wheel Lock – REMOVE
(6) "Engine Master" – OFF
(7) Avionics Master Switch – OFF.

▲ **WARNING:** When turning on the Battery switch, using an external power source, or pulling the propeller through by hand, treat the propeller as if the Engine Master (“IGN“ resp.) was on.

(8) Battery – ON
(9) Fuel Quantity Indicators and Fuel Temperature – CHECK and ENSURE LOW FUEL ANNUNCIATORS (L LOW FUEL R) ARE EXTINGUISHED
(10) Light “Water Level“ – CHECK OFF
(11) Avionics Master Switch – ON, CHECK Avionics Cooling Fan audibly for operation
(12) Avionics Master Switch – OFF
(13) Static Pressure Alternate Source Valve – OFF
(14) Annunciator Panel Test Switch – PLACE AND HOLD IN TST POSITION and ensure all annunciators illuminate
(15) Annunciator Panel Test Switch – RELEASE. Check that appropriate annunciators remain on.

◆ Note: When Battery is turned ON, some annunciators will flash for about 10 seconds before illuminating steadily. When panel TST switch is toggled up and held in position, all remaining lights will flash until the switch is released.

(16) Fuel Selector Valve – BOTH (CHECK fuel temperature)
(17) Fuel Shut-off Valve – ON (Push Full In)
(18) Shut-off Cabin Heat – OFF (Push Full Forward)
(19) Flaps – EXTEND
(20) Pilot Heat – ON (Carefully check that the pilot tube is warm to the touch within 30 seconds)
(21) Pilot Heat – OFF
(22) Battery – OFF
(23) Baggage Door – CHECK, lock with key.

(2) EMPENNAGE

(1) Rudder Gust Lock (if attached) – REMOVE
(2) Tail Tie – Down – DISCONNECT
(3) Control Surfaces – CHECK freedom of movement and security
(4) Trim Tab – CHECK security
(5) Antennas – CHECK for security of attachment and general condition

(3) RIGHT WING Trailing Edge

(1) Aileron – CHECK freedom of movement and security
(2) Flap – CHECK for security and condition

(4) RIGHT WING

(1) Wing Tie-Down – DISCONNECT

(2) Main Wheel Tire – CHECK for proper inflation and general condition (weather checks, tread depth and wear, etc.)

▲ **WARNING:** If, after repeated sampling, evidence of contamination still exists, the airplane should not be flown. Tanks should be drained and system purged by qualified maintenance personnel. All evidence of contamination must be removed before further flight.

(3) Fuel Tank Sump Quick Drain Valves (5) – DRAIN at least a cupful of fuel (using sampler cup) from each sump location to check for water, sediment and the right type of fuel (Diesel or JET-A1) before each flight and after each refueling. If water is observed, take further samples until clear and then gently rock wings and lower tail to the ground to move any additional contaminants to the sampling points. Take repeated samples from all fuel drain points until all contamination has been removed. If contaminants are still present, refer to above WARNING and do not fly airplane.

(4) Fuel Quantity – CHECK VISUALLY for desired level not above marking in fuel filler.

(5) Fuel Filler Cap – SECURE

(5) NOSE

(1) Reservoir tank Quick Drain Valve – DRAIN at least a cupful of fuel (using sampler cup) from valve to check for water, sediment and proper fuel grade (Diesel or JET-A1) before each flight and after each refueling. If water is observed, take further samples until clear and then gently rock wings and lower tail to the ground to move any additional contaminants to the sampling point. Take repeated samples until all contamination has been removed.

◆ Note: The reservoir tank drain is located in the fuselage on the co-pilot side of the aircraft.

(2) Before first flight of the day and after each refueling – DRAIN the Fuel Strainer Quick Drain Valve with the sampler cup to remove water and sediment from the screen. Ensure that the screen drain is properly closed again. If water is discovered, there might be even more water in the fuel system. Therefore, take further samples from Fuel Strainer and the Tank Sumps.

◆ Note: The fuel strainer drain is located on the lower end of the fuel strainer.

(3) Engine Oil Dipstick/Filler Cap
   a) Oil level – CHECK
   b) Dipstick/filler cap – SECURE.

   Do not operate below the minimum dipstick indication.

(4) Engine Air and Cooling Inlets – CLEAR of obstructions.

(5) Landing Light – CHECK for condition and cleanliness

(6) Propeller and Spinner – CHECK for nicks and security.

(7) Gearbox Oil Level – CHECK the oil has to cover at least half of the inspection glass

(8) Nose Wheel Strut and Tire – CHECK for proper inflation of strut and general condition (weather checks, tread depth and wear, etc.) of tire.

(9) Left Static Source Opening – CHECK for blockage

(6) LEFT WING

(1) Fuel Quantity – CHECK VISUALLY for desired level not above marking in fuel filler.

(2) Fuel Filler Cap – SECURE

(3) Fuel Tank Sump Quick Drain Valves (5) – DRAIN at least a cupful of fuel (using sampler cup) from each sump location to check for water, sediment and the right type of fuel (Diesel or JET-A1) before each flight and after each refueling. If water is observed, take further samples until clear and then gently rock wings and lower tail to the ground to move any additional contaminants to the sampling points. Take repeated samples from all fuel drain points until all contamination has been removed. If contaminants are still present, refer to previous WARNING (see right wing) and do not fly airplane.

(4) Main Wheel Tire – CHECK for proper inflation and general condition (weather checks, tread depth and wear, etc.)

(7) LEFT WING Leading Edge

(1) Fuel Tank Vent Opening – CHECK for blockage

(2) Stall Warning Opening – CHECK for blockage. To check the system, place a clean handkerchief over the vent opening and apply suction; a sound from the warning horn will confirm system operation.

(3) Wing Tie-Down – DISCONNECT

(4) Landing/Taxi Light(s) – CHECK for condition and cleanliness of cover

(8) LEFT WING Trailing Edge

(1) Aileron – CHECK freedom of movement and security.

(2) Flap – Check for security and conditions

BEFORE STARTING ENGINE

(1) Preflight Inspection – COMPLETE
(2) Passenger Briefing – COMPLETE
(3) Seats and Seat Belts – ADJUST and LOCK. Ensure inertia reel locking.
(4) Brakes – TEST
(5) Circuit Breakers – CHECK IN
(6) Electrical Equipment, Autopilot (if installed) – OFF.

■ CAUTION: The Avionics Power Switch must be off during engine start to prevent possible damage to avionics.

(7) Avionics Master Switch – OFF.
(8) Circuit Breakers – CHECK IN
(9) Avionics Circuit Breakers – CHECK IN.
(10) Battery, Alternator and Main Bus Switches – ON

■ CAUTION: The electronic engine control needs an electrical power source for its operation. For normal operation Battery, Alternator and Main Bus have to be switched on. Separate switching is only allowed for tests and in the event of emergencies.

(11) Fuel Quantity and Temperature – CHECK
(12) Fuel Selector Valve – SET to BOTH position.The fuel temperature limitations must be observed.
(13) Fuel Shut-off Valve – OPEN (Push Full In)
(14) Alternate Air Door – CLOSED
(15) Thrust Lever – CHECK for freedom of movement
(16) Load Display – CHECK 0% at Propeller RPM 0

PROCEDURES UP TO 5500ft AIRFIELD ELEVATION

STARTING ENGINE

▲	**WARNING:**	Do not use ground power unit for engine starts. It is not allowed to start up the engine using external power. If starting the engine is not possible using battery power, the condition of the battery must be verified before flight.

(1) Electric Fuel Pump – ON
(2) Navigation Lights and Flashing Beacon – ON (as required).
(3) Thrust Lever – IDLE
(4) Area Aircraft / Propeller – CLEAR
(5) "Engine Master" – ON, wait until the Glow Control light extinguishes
(6) Starter – ON, keep starter engaged until min. 500rpm
Release when engine starts, leave Thrust Lever in idle

■	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.

(7) Oil Pressure – CHECK

■	CAUTION:	If after 3 seconds the minimum oil pressure of 1 bar is not indicated: shut down the engine immediately!

(8) CED-Test Knob – PRESS (to delete Caution light)
(9) Ammeter – CHECK for positive charging current
(10) Voltmeter – CHECK for green range

(11) FADEC Backup Battery test
   a) Alternator – OFF, engine must operate normally
   b) Battery – OFF, for min. 10 seconds;
      engine must operate normally, the red FADEC lamps must not be illuminated
   c) Battery – ON
   d) Alternator – ON

▲ **WARNING:** It must be ensured that both battery and alternator are ON!
If the guarded alternator switch is installed, the switch guard must be closed.

(12) Avionics Power Switch – ON
(13) Radios – ON
(14) Ammeter – Check positive charge, alternator warning light must be OFF
(15) Voltmeter – Check in green range
(16) Electric Fuel Pump – OFF
(17) Flaps – RETRACT

WARM UP

(1) Let the engine warm up about 2 minutes at IDLE (890 RPM).
(2) Increase RPM to max. 1,400 RPM until Oil Temperature 50°C (122°F), Coolant Temperature 60°C (140°F).

BEFORE TAKE-OFF

(1) Parking Brake – SET
(2) Passenger Seat Backs – MOST UPRIGHT POSITION
(3) Seats and Seat Belts – CHECK SECURE
(4) Cabin Doors and Windows – CLOSED and LOCKED
(5) Flight Controls – FREE and CORRECT
(6) Flight Instruments – CHECK and SET
(7) Fuel quantity – CHECK
(8) Fuel Selector Valve – SET to BOTH position.
(9) Elevator Trim and Rudder Trim (if installed) – SET for Takeoff

(10) FADEC and propeller adjustment function check:

a) Thrust Lever – IDLE (both FADEC lights should be OFF)

b) FADEC Test Button – PRESS and HOLD button for entire test.

c) Both FADEC lights – ON, RPM increases

▲ **WARNING:** If the FADEC lights do not come on at this point, it means that the test procedure has failed and take off should not be attempted.

d) The FADEC automatically switches to B-component (only FADEC B light is ON)

e) The propeller control is excited, RPM decreases

f) The FADEC automatically switches to channel A (only FADEC A light is ON), RPM increases

g) The propeller control is excited, RPM decreases

h) FADEC A light goes OFF, idle RPM is reached, the test is completed.

i) FADEC Test Button – RELEASE

(11) Force B Switch – switch to FADEC B

(12) Engine – check running without a change

(13) Force B Switch – switch back to Automatic

▲ **WARNING:** If there are prolonged engine misfires or the engine shuts down during the test, take off may not be attempted.

▲ **WARNING:** The whole test procedure has to be performed without any failure. In case the engine shuts down or the FADEC lights are flashing, take off is prohibited. This applies even if the engine seems to run without failure after the test.

◆ Note:	If the test button is released before the self test is over, the FADEC immediately switches over to normal operation.

◆ Note:	While switching from one FADEC to another, it is normal to hear and feel a momentary surge in the engine.

(14) Thrust Lever – FULL FORWARD, load display min. 94%, RPM 2240 - 2300
(15) Thrust Lever – IDLE
(16) Engine Instruments and Ammeter – CHECK
(17) Suction gage – CHECK
(18) Annunciator Panel – Ensure no annunciators are illuminated
(19) Wing Flaps – SET for Take-off (0° or 10°).
(20) Electric Fuel Pump – ON
(21) Strobe Lights – AS DESIRED
(22) Radios and Avionics – ON and SET
(23) Autopilot (if installed) – OFF
(24) Air Conditioning (if installed) – OFF
(25) Thrust Lever Friction Control – ADJUS
(26) Brakes – RELEASE

PROCEDURES OVER 5500ft AIRFIELD ELEVATION

◆ Note: Procedures apply only to TAE 125-02-99. For TAE 125-01 refer to procedures for airfield elavations up to 5500ft.

◆ Note: Due to the increase of the idle speed with increasing pressure altitudes, the FADEC test is only possible to a limited extent from an airfield elevation of approximately 5500ft.
Over 5500ft, the FADEC test is only possible if the load selector lever remains in the idle position after engine start until the FADEC test is starting.
If the load selector lever is moved from the idle position, a FADEC test is no longer possible at pressure altitudes above 5500ft. For this purpose, the engine has to be stopped and re-started to perform the FADEC test.

STARTING ENGINE

▲ **WARNING:** Do not use ground power unit for engine starts. It is not allowed to start up the engine using external power. If starting the engine is not possible using battery power, the condition of the battery must be verified before flight.

(1) Electric Fuel Pump – ON
(2) Navigation Lights and Flashing Beacon - ON (as required)
(3) Thrust Lever – IDLE
(4) Area Aircraft / Propeller – CLEAR
(5) "Engine Master" – ON, wait until the Glow Control light extinguishes
(6) Starter – ON, keep starter engaged until min. 500rpm
Release when engine starts, leave Thrust Lever in idle

■ 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.

(7) Oil Pressure – CHECK

■ CAUTION:	If after 3 seconds the minimum oil pressure of 1 bar is not indicated: shut down the engine immediately!

(8) CED-Test Knob – PRESS (to delete Caution light)
(9) Ammeter – CHECK for positive charging current
(10) Voltmeter – CHECK for green range
(11) FADEC Backup Battery test
   a) Alternator – OFF, engine must operate normally
   b) Battery – OFF, for min. 10 seconds;
   engine must operate normally, the red FADEC lamps must not be illuminated
   c) Battery – ON
   d) Alternator – ON

▲ **WARNING:**	It must be ensured that both battery and alternator are ON! If the guarded alternator switch is installed, the switch guard must be closed.

(12) Ammeter – Check positive charge, alternator warning light must be OFF
(13) Voltmeter – Check in green range
(14) Flaps – RETRACT

WARM UP AND FADEC-TEST

(1) Let the engine warm up about 2 minutes at IDLE (890 RPM).
(2) Increase RPM to max. 1,400 RPM until Oil Temperature 50°C (122°F), Coolant Temperature 60°C (140°F).
(3) Area Aircraft / Propeller - CLEAR

(4) "Engine Master" ("IGN" resp.) - ON, wait until the Glow Control light extinguishes
(5) Starter - ON, keep starter engaged until min. 500rpm Release when engine starts, leave Thrust Lever in idle
(6) Ammeter - CHECK for positive charging current
(7) Voltmeter - CHECK for green range
(8) FADEC and propeller adjustment function check:
    a) Thrust Lever – IDLE (both FADEC lights should be OFF)
    b) FADEC Test Button – PRESS and HOLD button for entire test.
    c) Both FADEC lights – ON, RPM increases

▲ **WARNING:** If the FADEC lights do not come on at this point, it means that the test procedure has failed and take off should not be attempted.

    d) The FADEC automatically switches to B-component (only FADEC B light is ON)
    e) The propeller control is excited, RPM decreases
    f) The FADEC automatically switches to channel A (only FADEC A light is ON), RPM increases
    g) The propeller control is excited, RPM decreases
    h) FADEC A light goes OFF, idle RPM is reached, the test is completed.
    i) FADEC Test Button – RELEASE
(9) Force B Switch – switch to FADEC B
(10) Engine – check running without a change
(11) Force B Switch – switch back to Automatic

▲ **WARNING:** If there are prolonged engine misfires or the engine shuts down during the test, take off may not be attempted.

▲ **WARNING:**	The whole test procedure has to be performed without any failure. In case the engine shuts down or the FADEC lights are flashing, take off is prohibited. This applies even if the engine seems to run without failure after the test.

◆ Note:	If the test button is released before the self test is over, the FADEC immediately switches over to normal operation.

◆ Note:	While switching from one FADEC to another, it is normal to hear and feel a momentary surge in the engine.

(12) Avionic Switch – ON
(13) Radios – ON
(14) Electric Fuel Pump – OFF

BEFORE TAKE-OFF

(1) Parking Brake – SET
(2) Passenger Seat Backs – MOST UPRIGHT POSITION
(3) Seats and Seat Belts – CHECK SECURE
(4) Cabin Doors and Windows – CLOSED and LOCKED
(5) Flight Controls – FREE and CORRECT
(6) Flight Instruments – CHECK and SET
(7) Fuel quantity – CHECK
(8) Fuel Selector Valve – SET to BOTH position.
(9) Elevator Trim and Rudder Trim (if installed) – SET for Takeoff
(10) Thrust Lever – FULL FORWARD, load display min. 94%, RPM 2240 - 2300
(11) Thrust Lever – IDLE
(12) Engine Instruments and Ammeter – CHECK
(13) Suction gage – CHECK

(14) Annunciator Panel – Ensure no annunciators are illuminated
(15) Wing Flaps – SET for Take-off (0° or 10°).
(16) Electric Fuel Pump – ON
(17) Strobe Lights – AS DESIRED
(18) Radios and Avionics – ON and SET
(19) Autopilot (if installed) – OFF
(20) Air Conditioning (if installed) – OFF
(21) Thrust Lever Friction Control – ADJUS
(22) Brakes – RELEASE

TAKE-OFF

NORMAL TAKEOFF

(1) Wing Flaps – 0° or 10°
(2) Thrust Lever – FULL FORWARD
(3) Elevator Control – LIFT NOSE WHEEL at 55 KIAS.
(4) Climb Speed – 65 to 80 KIAS

SHORT FIELD TAKEOFF

(1) Wing Flaps – 10°
(2) Brakes – APPLY
(3) Thrust Lever – FULL FORWARD
(4) Brakes – RELEASE
(5) Elevator Control – SLIGHTLY TAIL LOW
(6) Elevator Control – LIFT NOSE WHEEL at 51 KIAS
(7) Climb Speed – 57 KIAS (until all obstacles are cleared)

AFTER TAKEOFF

(1) Altitude about 300 ft, Airspeed more than 65 KIAS – Wing Flaps – RETRACT
(2) Electric Fuel Pump – OFF

CLIMB

(1) Airspeed – 70 to 85 KIAS.

◆ Note:	If a maximum performance climb is necessary, use speeds shown in the "Maximum Rate Of Climb" chart in Section 5. In case that Oil Temperature and/or Coolant Temperature are approaching the upper limit, continue at a lower climb angle for better cooling if possible.

◆ Note:	It is recommended to set the fuel selector valve to the BOTH position.The fuel temperatures have to be monitored.

(2) Thrust Lever – FULL FORWARD

CRUISE

(1) Power – maximum load 100% (maximum continuous power), 75% or less is recommended.
For economic cruise set load 70% or less.

(2) Elevator trim – ADJUST

(3) Compliance with Limits for Oil Pressure, Oil Temperature, Coolant Temperature and Gearbox Temperature (CED 125 and Caution light) – MONITOR closely

(4) Fuel Quantity and Temperature (Display and LOW LEVEL warning lights) – MONITOR.
Whenever possible, the airplane should be flown with the fuel selector in the BOTH position to empty and heat both fuel tanks evenly. However, operation in the LEFT or RIGHT position may be desirable to correct a fuel quantity imbalance or during periods of intentional uncoordinated flight maneuvres. During prolonged operation with the fuel selector in either the LEFT or RIGHT position the fuel balance and temperatures should be closely monitored.

■	CAUTION:	Do not use any fuel tank below the minimum permissible fuel temperature!

■	CAUTION:	In turbulent air it is strongly recommended to use the BOTH position.

■	CAUTION:	With ¼ tank or less prolonged or uncoordinated flight is prohibited when operating on either the left or right tank.

(5) FADEC and Alternator Warning Lights – MONITOR

DESCENT

(1) Fuel Selector Valve – SELECT BOTH position
(2) Power – AS DESIRED

BEFORE LANDING

(1) Pilot and Passenger Seat Backs – MOST UPRIGHT POSITION
(2) Seats and Seat Belts – SECURED and LOCKED
(3) Fuel Selector Valve – SELECT BOTH position
(4) Electric Fuel Pump – ON
(5) Landing / Taxi Lights – ON
(6) Autopilot (if installed) – OFF
(7) Air Conditioning (if installed) – OFF

LANDING

NORMAL LANDING

(1) Airspeed – 69 to 80 KIAS (wing flaps UP)
(2) Wing Flaps – AS REQUIRED (0°-10° below 110 KIAS; 10°–Full below 85 KIAS)
(3) Airspeed – 60 to 70 KIAS (Flaps DOWN)
(4) Touchdown – MAIN WHEELS FIRST
(5) Landing Roll – LOWER NOSE WHEEL GENTLY
(6) Brakes – MINIMUM REQUIRED

SHORT FIELD LANDING

(1) Airspeed – 69 to 80 KIAS (Flaps UP)
(2) Wing Flaps – FULL DOWN
(3) Airspeed – 62 KIAS (until flare)
(4) Power – REDUCE to idle after clearing obstacles.
(5) Touchdown – MAIN WHEELS FIRST
(6) Brakes – APPLY HEAVILY
(7) Wing Flaps – RETRACT

BALKED LANDING

(1) Thrust Lever – FULL FORWARD
(2) Wing Flaps – RETRACT TO 20° (immediately after Thrust Lever FULL FORWARD)
(3) Climb Speed – 58 KIAS
(4) Wing Flaps – 10° (until all obstacles are cleared)
(5) Wing Flaps – RETRACT after reaching a safe altitude and 65 KIAS

AFTER LANDING

(1) Wing Flaps – RETRACT
(2) Electric Fuel Pump – OFF

SECURING AIRPLANE

(1) Parking Brake – SET
(2) Thrust Lever – IDLE
(3) Avionics Power Switch, Electric Equipment, Autopilot (if installed) – OFF
(4) "Engine Master" (“IGN“ resp.) – OFF
(5) Switch Battery – OFF
(6) Control Lock – INSTALL
(7) Fuel Selector Valve – LEFT or RIGHT (to prevent crossfeeding between tanks)

AMPLIFIED PROCEDURES

STARTING ENGINE

The TAE 125 is a direct Diesel injection engine with common-rail technology and a turbocharger. It is controlled automatically by the FADEC, which makes a proper performance of the FADEC test important for safe flight operation.
All information relating to the engine are compiled in the CED 125 multifunction instrument.
Potentiometers within the Thrust Lever transmit the load value selected by the pilot to the FADEC.
With the Engine Master (“IGN“ resp.) in position ON the glow relay is triggered by the FADEC and the Glow Plugs are supplied with electrical power, in position OFF the Injection Valves are not supplied by the FADEC and stay closed.
The switch "Starter" controls the Starter.

EXTERNAL POWER

External power may be used to charge the battery or for maintenance purposes. Refer to original instructions.

It is not allowed to start up the engine using external power. If starting the engine is not possible using battery power, the condition of the battery must be verified before flight.

TAXIING

When taxiing, it is important that speed and use of brakes be held to a minimum and that all controls be utilized (Refer to Figure 4-2, Taxiing Diagram) to maintain directional control and balance.
The Alternate Air Door Control should be always pushed for ground operation to ensure that no unfiltered air is sucked in.
Taxiing over loose gravel or cinders should be done at low engine speed to avoid abrasion and stone damage to the propeller tips.

BEFORE TAKE-OFF

WARM UP

To warm up the engine, operate the engine for about 2 minutes at IDLE (890 RPM).
Let the engine run at propeller RPM of max. 1,400 RPM to ensure normal operation of the TAE 125 until it reaches an Engine Oil Temperature of 50°C (122°F) (green range) and a Coolant Temperature of 60°C (140°F) (green range).

MAGNETO CHECK

N/A since this is a Diesel engine.

ALTERNATOR CHECK

Prior to flights where verification of proper alternator and alternator control unit operation is essential (such as night and instrument flights), a positive verification can be made by loading the electrical system momentarily (3 to 5 seconds) with the landing light or by operating the wing flaps during the engine runup (20% load). The ammeter will remain within a needle width of zero if the alternator and alternator control unit are operating properly.

BATTERY CHECK

If there is doubt regarding the battery conditions or functionality the battery has to be checked after warm-up as follows:

Switch-off the alternator while the engine is running (battery remains "ON").

Perform a 10 sec. engine run. The voltmeter must remain in the green range. If not, the battery has to be charged or, if necessary, exchanged.

After this test the alternator has to be switched on again.

TAKE-OFF

POWER CHECK

It is important to check full load engine operation early in the takeoff roll. Any signs of rough engine operation or sluggish engine acceleration is good cause for discontinuing the take-off. If this occurs, you are justified in making a thorough full load static runup before another take-off is attempted.
After full load is applied, adjust the Thrust Lever Friction Control to prevent the Thrust Lever from creeping back from a maximum power position. Similar friction lock adjustments should be made as required in other flight conditions to maintain a fixed Thrust Lever setting.

WING FLAP SETTINGS

Flap deflections greater than 10° are not approved for normal and short field takeoffs. Using 10° wing flaps reduces the ground roll and total distance over a 15 m obstacle by approximately 10%.

CLIMB

Normal climbs are performed with flaps up and full load and at speeds 5 to 10 knots higher than best rate-of-climb speeds for the best combination of engine cooling, climb speed and visibility. The speed for best climb is about 70 KIAS/ . If an obstruction dictates the use of a steep climb angle, climb at 62 KIAS and flaps up.

◆ Note:	Climbs at low speeds should be of short duration to improve engine cooling.

CRUISE

As guidance for calculation of the optimum altitude and power setting for a given flight use the tables in chapter 5. Observe the various rates of consumption with Diesel or Jet A-1 operation.

LANDING

BALKED LANDING

In a balked landing (go around) climb, reduce the flap setting to 20° immediately after full power is applied. If obstacles must be cleared during the go-around climb, reduce wing flap setting to 10° and maintain a safe airspeed until the obstacles are cleared. After clearing any obstacles, the flaps may be retracted as the airplane accelerates to the normal flaps up climb speed.

COLD WEATHER OPERATION

Special attention should be paid to operation of the aircraft and the fuel system in winter or before any flight at low temperatures. Correct preflight draining of the fuel system is particularly important and will prevent the accumulation of water.
The following limitations for cold weather operation are established due to temperature. “Operating limits“.
(Refer Section 2 "Limitations" also)

Fuel	Minimum fuel temperature in the fuel tank before Take-off	Minimum fuel temperature in the fuel tank during the flight
JET A-1, JET A, Fuel No.3 JP-8, JP-8+100, TS-1 (TAE 125-02-99 only)	-30°C (-22°F)	-35°C (-31°F)
Diesel Sasol GTL Diesel (TAE 125-02-99 only)	0°C (32°F)	-5°C (23°F)

Figure 4-1a Minimum fuel temperature limits in the fuel tank

▲ **WARNING:** The fuel temperature of the fuel tank not in use should be observed if it is intended for later use.

▲ **WARNING:**	The following applies to Diesel and JET fuel mixtures in the tank: As soon as the proportion of Diesel in the tank is more than 10% Diesel, the fuel temperature limits for Diesel operation must be observed. If there is uncertainty about which fuel is in the tank, the assumption should be made that it is Diesel.

◆ Note:	It is advisable to refuel before each flight and to enter the type of fuel filled and the additives used in the log-book of the airplane.

Cold weather often causes conditions which require special care during airplane operations. Even small accumulations of frost, ice or snow must be removed, particularly from wing, tail and all control surfaces to assure satisfactory flight performance and handling. Also, control surfaces must be free of any internal accumulations of ice or snow.

If snow or slush covers the take-off surface, allowance must be made for take-off distances which will be increasingly extended as snow or slush depth increases. The depth and consistency of this cover can, in fact, prevent take-off in many instances.

Cold weather starting procedures are the same as the normal starting procedures. Use caution to prevent inadvertent forward movement of the airplane during starting when parked on snow or ice.

HOT WEATHER OPERATION

Engine temperatures may rise into the yellow range and activate the "Caution" Light when operating in hot weather or longer climbouts at low speed. This indication gives the pilot the opportunity to keep the engine from possibly overheating by doing the following:

i) decrease rate of climb

ii) increase airspeed

iii) reduce power, if the engine temperatures approach the red range.

Should the seldom case occur that the fuel temperature is rising into the yellow or red range, switch to the other tank or to the BOTH position.

SECTION 5
PERFORMANCE

SAMPLE PROBLEM

The following sample flight problem utilizes information from the various tables and diagrams of this section to determine the predicted performance data for a typical flight.
Assume the following information has already been determined:

AIRPLANE CONFIGURATION

Takeoff Weight ..... 1111 kg (2450 lb)
Usable Fuel ..... 168.8 l (44.6 US gal)

TAKEOFF CONDITIONS

Field Pressure Altitude 1500ft
Temperature ..... 28°C (ISA +16°C)Wind Component along Runway ..... 12 Knot Headwind
Field Length ..... 1070 m (3500 ft)

CRUISE CONDITIONS

Total Distance ..... 852 km (460 NM)
Pressure Altitude ..... 5500 ft
Temperature ..... 20°C (ISA + 16°C)
Expected Wind Enroute ..... 10 Knot Headwind

LANDING CONDITIONS

Field Pressure Altitude ..... 2000 ft
Temperature ..... 25°C
Field Length ..... 915 m (3000 ft)

GROUND ROLL AND TAKE-OFF

The ground roll and take-off distance chart, Figure 5-1c (Takeoff Distance), should be consulted, keeping in mind that distances shown are based on the short field technique. Conservative distances can be established by reading the chart at the next higher value of weight, temperature and altitude. For example, in this particular sample problem, the takeoff distance information presented for a weight of 1111 kg, pressure altitude of 2000 ft and a temperature of 30°C should be used and results in the following:

Ground Roll.....357 m (1171 ft)

Total Distance to clear a 15 m obstacle.....690m (2265 ft)

These distances are well within the available takeoff field length. However, a correction for the effect of wind may be made based on Note 2 of the takeoff chart. The correction for a 12 Knot Headwind is:

$$\frac{12\ \text{Kt}}{9\ \text{Kt}} \times 10\ \% = 13\ \%\ \text{(Decrease)}$$

This results in the following distances, corrected for wind:

Ground Roll, zero wind	357 m(1171 ft)
Decrease at 12 Knot Headwind (357m x 13%)=	- 46 m (152 ft)
Corrected Ground Roll	311 m (1019 ft)

Total Distance to clear a 15 m obstacle, zero wind.....	690 m (2265 ft)
Decrease at 12 Knot Headwind (690m x 13%)= .	- 90 m (294 ft)
Corrected Total Distance to clear a 15 m obstacle	600m (1971 ft)

CRUISE

The cruising altitude should be selected based on a consideration of trip length, winds aloft and the airplanes performance. A typical cruising altitude and the expected wind enroute have been given for this sample problem. However, the power setting selection for cruise must be determined based on several considerations. These include the cruise performance characteristics presented in Figures 5-4a. Considerable fuel savings and longer range result when lower power settings are used.

Figure 5-4a shows a range of 802 NM at zero wind, a power setting of 70% and altitude of 6,000 ft.

With an expected headwind of 10 Knot at 5,500 ft altitude the range has to be corrected as follows:

Range at zero wind (standard tanks) ..... 802 NM

Reduction due to Headwind..... (7.6 h x 10 Knots) = 76 NM

Corrected Range..... 726 NM

This shows that the flight can be performed at a power setting of approximately 70% with full tanks without an intermediate fuel stop.

Figure 5-4a is based on ISA conditions. For a temperature of 16°C above ISA temperature, according to Note 3, true airspeed and maximum range are increased by 1.6 %.

The following values most nearly correspond to the planned altitude and expected temperature conditions. Engine Power setting chosen is 70%.

The resultants are:

Engine Power:.....70%

True Airspeed: ..... 101 kt
Fuel Consumption in cruise: ..... 18.6 l/h (4.9 US gal/h)

FUEL REQUIRED

The total fuel requirement for the flight may be estimated using the performance information in Figures 5-2 and 5-4. For this sample problem, Figure 5-2a shows that a climb from 1000 ft to 6,000 ft requires 4.6 l (1.2 US gal) of fuel. The corresponding distance during the climb is 12.1 NM. These values are for a standard temperature and are sufficiently accurate for most flight planning purposes.
However, a further correction for the effect of temperature may be made as noted in Note 2 of the climb chart in Figure 5-2a. An effect of 10°C above the standard temperature is to increase time and distance by 10%due to the lower rate of climb.

In this case, assuming a temperature 16°C above standard, the correction would be:

$$\frac{16\ °C}{10\ °C} \times 10\ \% = \quad 16\ \%\ \text{(Increase)}$$

With this factor included, the fuel estimate would be calculated as follows:

Fuel to climb, standard temperature:
4.6 l (1.2 US gal)

Increase due to non-standard temperature:
4.6 l (1.2 US gal) x 16% = 0.7 l (0.2 US gal)

Corrected fuel to climb:
5.3 l (1.4 US gal)

Using a similar procedure for the distance to climb results in 14.0 NM.

The resultant cruise distance is:

Total Distance	460.0 NM
Climbout Distance	- 12.0 NM
Cruise Distance	448.0 NM

With an expected 10 Kt headwind, the ground speed for cruise is predicted to be:

101 Knot
- 10 Knot
91 Knot

Therefore, the time required for the cruise portion of the trip is:

$$\frac{448.0 \text{ NM}}{91 \text{ Kt}} = 4.9 \text{ hrs}$$

The fuel required for cruise is:

4.9 h x 18.6 l/h = 91.1 l (24.0 US gal)

The total estimated fuel required is as follows:

Engine Start, Taxi and Takeoff	4.0 l (1.1 US gal)
Climb	+ 5.3 l (1.4 US gal)
Cruise	+ 91.1 l (24.0 US gal)
Total fuel required	100.4 l (26.5US gal)

This gives with full tanks a reserve of:

168.8 l (44.6 US gal)
- 100.4 l (26,5 US gal)
68.4 l (18.1 US gal)

Once the flight is underway, ground speed checks will provide a more accurate basis for estimating the time enroute and the corresponding fuel required.

LANDING DISTANCE

Refer to Pilot´s Operating Handbook

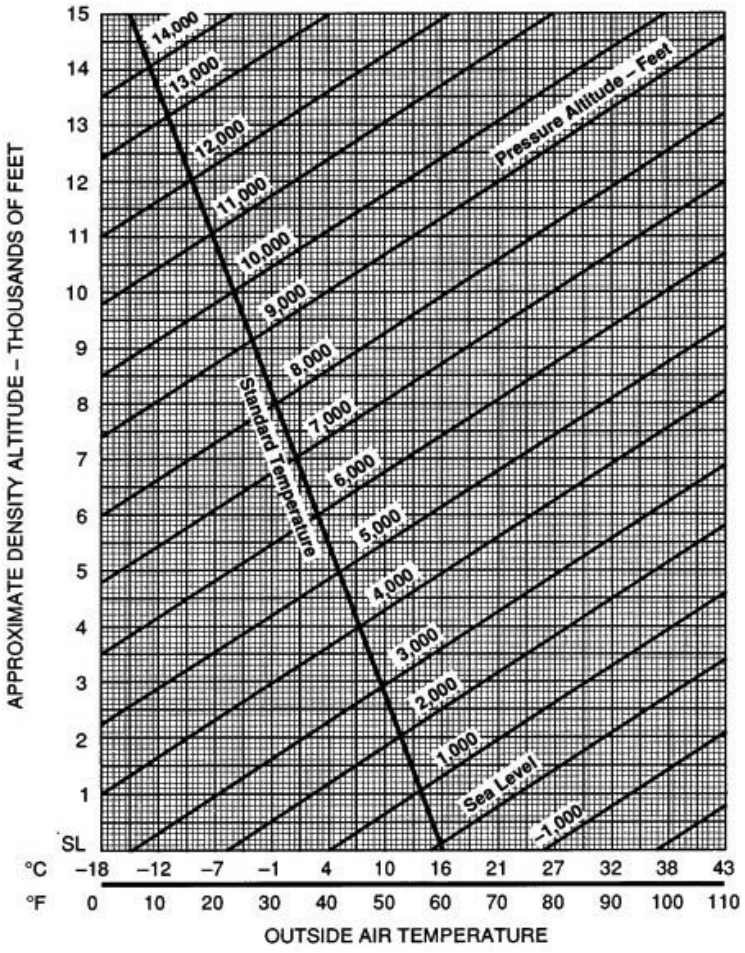

Figure 5-1 Density Altitude Chart

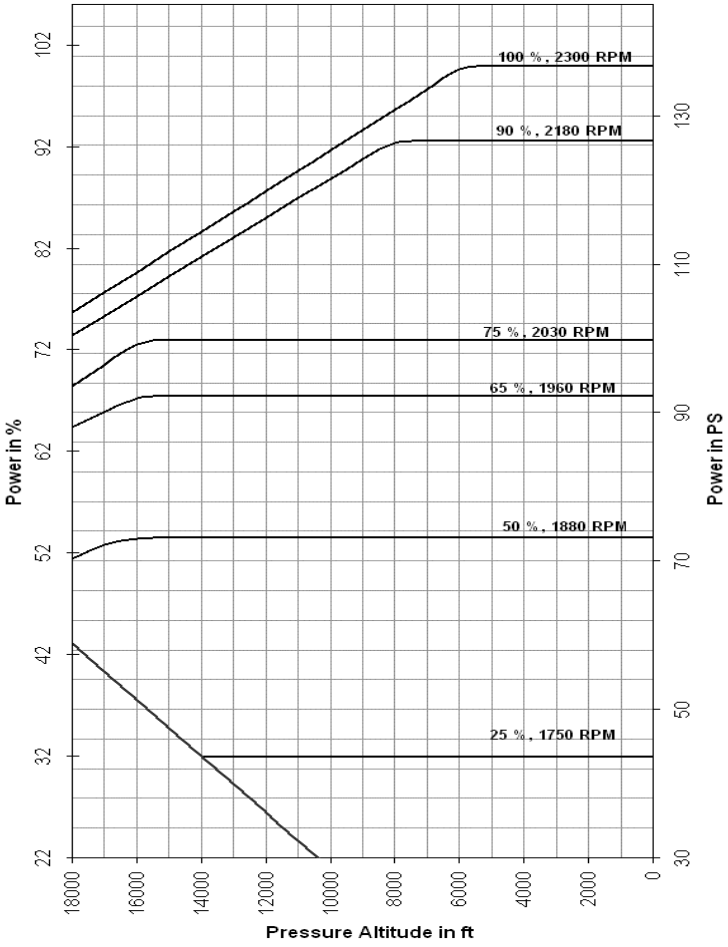

Figure 5-2 Engine Power Over Altitude

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SECTION 5a
PERFORMANCE

◆ Note:	This chapter applies to aircraft with propellers **MTV-6-A/187-129**. The correct propeller designation can be found on the blades.

◆ Note:	The chapter not relevant to the respective propeller can be omitted.

GROUND ROLL AND TAKE-OFF DISTANCE
at 953 kg (2100 lbs)

SHORT FIELD TAKEOFF

Conditions:
Take-off weight 953 kg (2100 lbs)
Flaps 10°
Full Power Prior to Brake Release
Paved, level, dry runway
Zero Wind

Lift Off: .....44 KIAS

Speed at 15 m / 50 ft: .....50 KIAS

Notes:

1. Short field technique
2. Decrease distances 10% for each 9 Knot headwind. For operation with tailwinds up to 10 Knot increase distances by 10% for each 2 Knot.
3. For operation on dry, grass runway, increase distances by 15% of the "ground roll" figure.
4. Consider additional distances (min. 20%) for wet grass runway, softened ground or snow.

PRESS ALT	Ground Roll and Take-Off Distance [m] Outside Air Temperature [°C]							
[ft]	---	-20°C	0°C	10°C	20°C	30°C	40°C	50°C
0	Gnd Roll	146	169	181	193	208	228	254
	15 m obst.	283	327	350	374	403	442	495
1000	Gnd Roll	157	181	194	207	223	244	272
	15 m obst.	303	350	375	400	431	473	530
2000	Gnd Roll	168	194	208	222	239	262	292
	15 m obst.	325	375	402	429	462	507	568
3000	Gnd Roll	180	208	223	238	256	281	313
	15 m obst.	348	403	431	460	496	544	609
4000	Gnd Roll	193	224	239	256	275	301	335
	15 m obst.	374	432	462	494	532	584	654
5000	Gnd Roll	208	240	257	274	295	323	360
	15 m obst.	401	464	496	530	571	627	702
6000	Gnd Roll	223	258	276	295	317	347	387
	15 m obst.	431	498	533	569	613	673	754
7000	Gnd Roll	247	285	305	326	351	384	428
	15 m obst.	478	552	590	631	680	746	835
8000	Gnd Roll	274	316	339	362	390	426	475
	15 m obst.	530	613	655	700	755	828	927
9000	Gnd Roll	304	351	376	402	432	473	527
	15 m obst.	589	681	728	778	839	920	1030
10000	Gnd Roll	338	391	418	446	481	526	586
	15 m obst.	656	758	810	866	933	1024	1147

Figure 5-1a Ground Roll and Take-Off Distance [m] at take-off weight 953 kg (2100 lbs)

PRESS ALT	Ground Roll and Take-Off Distance [ft] Outside Air Temperature [°C]							
[ft]	---	-20°C	0°C	10°C	20°C	30°C	40°C	50°C
0	Gnd Roll	480	555	594	635	683	748	833
	50 ft obst.	928	1072	1147	1226	1321	1450	1623
1000	Gnd Roll	515	595	636	680	732	801	892
	50 ft obst.	994	1149	1229	1313	1415	1553	1739
2000	Gnd Roll	552	637	682	729	784	858	956
	50 ft obst.	1066	1231	1317	1408	1517	1665	1863
3000	Gnd Roll	591	683	731	781	841	920	1026
	50 ft obst.	1143	1320	1412	1509	1627	1785	1998
4000	Gnd Roll	635	733	784	838	902	988	1100
	50 ft obst.	1226	1417	1515	1619	1745	1915	2144
5000	Gnd Roll	681	787	842	900	969	1060	1181
	50 ft obst.	1316	1521	1627	1738	1873	2056	2301
6000	Gnd Roll	732	845	904	966	1040	1139	1269
	50 ft obst.	1413	1633	1747	1867	2012	2208	2472
7000	Gnd Roll	810	936	1002	1070	1152	1261	1405
	50 ft obst.	1567	1811	1937	2070	2230	2448	2740
8000	Gnd Roll	898	1038	1111	1187	1278	1398	1558
	50 ft obst.	1739	2010	2150	2297	2476	2717	3041
9000	Gnd Roll	997	1152	1233	1318	1418	1552	1730
	50 ft obst.	1933	2233	2389	2553	2751	3019	3380
10000	Gnd Roll	1109	1281	1370	1465	1577	1725	1922
	50 ft obst.	2151	2485	2658	2841	3061	3359	3761

Figure 5-1b Ground Roll and Take-Off Distance [ft] at take-off weight 953 kg (2100 lbs)

GROUND ROLL AND TAKE-OFF DISTANCE
at 1111 kg (2450 lbs)

SHORT FIELD TAKEOFF

Conditions:
Take-off weight 1111 kg (2450 lbs)
Flaps 10°
Full Power Prior to Brake Release
Paved, level, dry runway
Zero Wind

Lift Off: .....51 KIAS

Speed at 15 m / 50 ft: .....57 KIAS

Notes:

1. Short field technique
2. Decrease distances 10% for each 9 Knot headwind. For operation with tailwinds up to 10 Knot increase distances by 10% for each 2 Knot.
3. For operation on dry, grass runway, increase distances by 15% of the "ground roll" figure.
4. Consider additional distances (min. 20%) for wet grass runway, softened ground or snow.

PRESS ALT	Ground Roll and Take-Off Distance [m] Outside Air Temperature [°C]							
[ft]	---	-20°C	0°C	10°C	20°C	30°C	40°C	50°C
0	Gnd Roll	219	253	270	289	311	340	379
	15 m obst.	422	488	522	558	601	660	739
1000	Gnd Roll	234	271	290	309	333	365	406
	15 m obst.	453	523	559	598	644	707	791
2000	Gnd Roll	251	290	310	332	357	391	435
	15 m obst.	485	561	600	641	690	758	848
3000	Gnd Roll	269	311	333	356	383	419	467
	15 m obst.	520	601	643	687	740	813	910
4000	Gnd Roll	289	334	357	382	411	450	501
	15 m obst.	558	645	690	737	794	872	976
5000	Gnd Roll	310	358	383	410	441	483	538
	15 m obst.	599	692	740	791	853	936	1048
6000	Gnd Roll	333	385	412	440	474	518	578
	15 m obst.	643	743	795	850	916	1005	1125
7000	Gnd Roll	369	426	456	487	525	574	640
	15 m obst.	713	824	882	942	1015	1114	1247
8000	Gnd Roll	409	473	506	540	582	637	709
	15 m obst.	792	915	979	1046	1127	1237	1385
9000	Gnd Roll	454	525	561	600	646	707	787
	15 m obst.	880	1017	1088	1162	1252	1374	1539
10000	Gnd Roll	505	583	624	667	718	785	875
	15 m obst.	979	1131	1210	1293	1394	1529	1712

Figure 5-1c Ground Roll and Take-Off Distance [m] at take-off weight 1111 kg (2450 lbs)

PRESS ALT	Ground Roll and Take-Off Distance [ft] Outside Air Temperature [°C]							
[ft]	---	-20°C	0°C	10°C	20°C	30°C	40°C	50°C
0	Gnd Roll	717	829	887	947	1020	1116	1244
	50 ft obst.	1386	1601	1713	1830	1972	2164	2423
1000	Gnd Roll	768	888	950	1015	1093	1196	1332
	50 ft obst.	1485	1715	1835	1961	2113	2319	2596
2000	Gnd Roll	824	952	1018	1088	1171	1282	1428
	50 ft obst.	1591	1838	1967	2102	2265	2485	2782
3000	Gnd Roll	883	1020	1092	1167	1256	1374	1531
	50 ft obst.	1706	1972	2109	2254	2429	2665	2984
4000	Gnd Roll	948	1095	1171	1252	1347	1475	1643
	50 ft obst.	1831	2115	2263	2418	2606	2860	3201
5000	Gnd Roll	1017	1175	1257	1344	1446	1583	1764
	50 ft obst.	1965	2271	2429	2596	2797	3070	3436
6000	Gnd Roll	1092	1262	1350	1443	1553	1700	1894
	50 ft obst.	2110	2438	2608	2788	3004	3297	3690
7000	Gnd Roll	1210	1398	1495	1598	1721	1883	2098
	50 ft obst.	2340	2703	2892	3091	3330	3655	4092
8000	Gnd Roll	1342	1550	1658	1772	1908	2088	2326
	50 ft obst.	2597	3001	3210	3430	3697	4057	4541
9000	Gnd Roll	1489	1721	1841	1967	2118	2318	2583
	50 ft obst.	2886	3335	3567	3812	4108	4508	5047
10000	Gnd Roll	1655	1913	2046	2187	2354	2576	2871
	50 ft obst.	3211	3710	3969	4242	4571	5016	5616

Figure 5-1d Ground Roll and Take-Off Distance [ft] at take-off weight 1111 kg (2450 lbs)

TIME, FUEL AND DISTANCE TO CLIMB AT 1111 kg (2450 lbs)

Conditions:

Takeoff weight 1111 kg (2450 lbs)
Climb speed v_y = 70 KIAS
Flaps Up
Full Power
Standard Temperature (ISA)

Notes:

1. Add 4 l (1.1 US gal) of fuel for engine start, taxi and takeoff allowance.
2. Increase time and distance by 10% for 10°C above standard temperature.
3. Distances shown are based on zero wind.
4. Time, distance and fuel required are only valid from the point where the airplane climbs at v_y = 70 KIAS.

Press. Alt. [ft]	OAT [°C]	Vy [KIAS]	ROC [FPM]	Time [MIN]	Distance [NM]	Fuel used [l]	Fuel used [US Gal]
0	15	70	564	0.0	0.0	0.0	0.0
1000	13	70	556	1.8	2.1	0.9	0.2
2000	11	70	547	3.6	4.3	1.8	0.5
3000	9	70	539	5.4	6.6	2.7	0.7
4000	7	70	530	7.3	9.0	3.6	0.9
5000	5	70	522	9.2	11.5	4.5	1.2
6000	3	70	513	11.1	14.2	5.5	1.4
7000	1	70	481	13.2	17.0	6.3	1.7
8000	-1	70	450	15.3	20.1	7.1	1.9
9000	-3	70	418	17.6	23.5	8.0	2.1
10000	-5	70	386	20.1	27.2	8.8	2.3
11000	-7	70	354	22.8	31.4	9.7	2.6
12000	-9	70	321	25.8	36.1	10.6	2.8
13000	-11	70	288	29.0	41.3	11.6	3.1
14000	-13	70	255	32.7	47.3	12.6	3.3
15000	-15	70	222	36.9	54.2	13.7	3.6
16000	-17	70	189	41.8	62.4	15.0	4.0
17000	-19	70	155	47.6	72.3	16.4	4.3
18000	-21	70	121	54.9	84.8	18.2	4.8

Figure 5-2a Time, Fuel and Distance to Climb at 1111 kg (2450 lbs)

MAXIMUM RATE-OF-CLIMB at 1111 kg (2450 lbs)

Conditions:
Take-off weight 1111 kg (2450 lbs)
Climb speed v_y = 70 KIAS
Flaps Up
Full Power

Notes:

1. For operation in air colder than this table provides, use coldest data shown.
2. For operation in air warmer than this table provides, use extreme caution.

PRESS ALT [FT]	Climb speed [KIAS]	Rate of Climb [ft/min] Outside Air Temperature [°C]				
		-20°C	0°C	+20°C	+40°C	+50°C
0	70	596	576	558	458	354
1000	70	587	567	548	447	343
2000	70	577	557	538	437	333
3000	70	567	547	527	426	321
4000	70	557	536	516	414	310
5000	70	547	525	505	403	298
6000	70	536	514	494	391	286
7000	70	503	481	460	358	255
8000	70	470	447	426	326	224
9000	70	436	413	391	292	193
10000	70	403	379	356	259	161
11000	70	368	344	321	225	128
12000	70	334	309	286	190	96
13000	70	299	273	250	156	63
14000	70	263	238	213	120	29
15000	70	228	201	177	85	-5
16000	70	192	165	140	49	-39
17000	70	155	128	102	12	-74
18000	70	118	90	64	-24	-109

Figure 5-3a Maximum Rate of Climb at take-off weight 1111 kg (2450 lbs)

CRUISE PERFORMANCE, RANGE AND ENDURANCE at 1111 kg (2450 lbs)

Conditions:

Take-off weight 1111kg (2450 lbs)
Flaps Up
Zero wind

Notes:

1. Endurance information are based on 168.8 l (44.6 US gal) usable fuel.
2. The table assumes 4 l (1.1 US gal) for startup and taxi; time, fuel and distance to climb and 45 min. reserve.
3. Increase true airspeed (KTAS) and maximum range (NM) by 1% per 10°C above ISA temperature.
4. Cruise Power above 75% not recommended. For economic cruise set load 70% or less.

Press. Alt.	Load	Speed		Fuel Flow		Distance	Endu-rance Time
[ft]	[%]	[KTAS]	[mph]	[l/h]	[US Gal/h]	[NM]	[Hrs]
0	100	114	131	29.5	7.8	550	4.8
0	90	109	125	25.3	6.7	625	5.8
0	80	103	118	21.7	5.7	704	6.8
0	70	96	111	18.6	4.9	782	8.1
0	60	89	103	15.8	4.2	863	9.7
0	50	80	92	13.0	3.4	958	11.9
2000	100	116	133	29.5	7.8	556	4.7
2000	90	110	127	25.3	6.7	632	5.6
2000	80	104	120	21.7	5.7	710	6.7
2000	70	98	113	18.6	4.9	789	8.0
2000	60	90	104	15.8	4.2	869	9.5
2000	50	81	93	13.0	3.4	962	11.7
4000	100	118	135	29.5	7.8	563	4.6
4000	90	112	129	25.3	6.7	639	5.5
4000	80	106	122	21.7	5.7	717	6.6
4000	70	99	114	18.6	4.9	796	7.8
4000	60	92	105	15.8	4.2	875	9.3
4000	50	82	94	13.0	3.4	965	11.5
6000	100	120	138	29.5	7.8	569	4.5
6000	90	114	131	25.3	6.7	646	5.4
6000	80	108	124	21.7	5.7	724	6.4
6000	70	101	116	18.6	4.9	802	7.6
6000	60	93	107	15.8	4.2	880	9.1
6000	50	83	95	13.0	3.4	967	11.3
8000	90	116	133	25.3	6.7	652	5.2
8000	80	109	126	21.7	5.7	731	6.2
8000	70	102	118	18.6	4.9	808	7.5
8000	60	94	108	15.8	4.2	885	9.0
8000	50	84	96	13.0	3.4	968	11.1

Press. Alt.	Load	Speed		Fuel Flow		Distance	Endu-rance Time
[ft]	[%]	[KTAS]	[mph]	[l/h]	[US Gal/h]	[NM]	[Hrs]
10000	90	118	136	25.3	6.7	659	5.0
10000	80	111	128	21.7	5.7	738	6.1
10000	70	104	120	18.6	4.9	814	7.3
10000	60	95	110	15.8	4.2	890	8.7
10000	50	84	97	13.0	3.4	968	10.9
12000	80	113	130	21.7	5.7	744	5.9
12000	70	105	121	18.6	4.9	820	7.0
12000	60	96	111	15.8	4.2	894	8.5
12000	50	85	98	13.0	3.4	966	10.6
14000	80	115	132	21.7	5.7	751	5.7
14000	70	107	123	18.6	4.9	826	6.8
14000	60	98	112	15.8	4.2	897	8.2
14000	50	85	98	13.0	3.4	962	10.3

Figure 5-4a Cruise Performance, Range and Endurance at 1111 kg (2450 lbs)

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SECTION 5b
PERFORMANCE

◆ Note:	This chapter applies to aircraft with propellers **MTV-6-A/190-69** and TAE 125-02-99 installation. The correct propeller designation can be found on the blades.

◆ Note:	The chapter not relevant to the respective propeller can be omitted.

GROUND ROLL AND TAKE-OFF DISTANCE
at 953 kg (2100 lbs)

SHORT FIELD TAKEOFF

Conditions:
Take-off weight 953 kg (2100 lbs)
Flaps 10°
Full Power Prior to Brake Release
Paved, level, dry runway
Zero Wind

Lift Off: .....44 KIAS

Speed at 15 m / 50 ft: .....50 KIAS

Notes:

1. Short field technique
2. Decrease distances 10% for each 9 Knot headwind. For operation with tailwinds up to 10 Knot increase distances by 10% for each 2 Knot.
3. For operation on dry, grass runway, increase distances by 15% of the "ground roll" figure.
4. Consider additional distances (min. 20%) for wet grass runway, softened ground or snow.

PRESS ALT	Ground Roll and Take-Off Distance [m] Outside Air Temperature [°C]							
[ft]	---	-20°C	0°C	10°C	20°C	30°C	40°C	50°C
0	Gnd Roll	139	161	172	185	197	217	244
	15 m obst.	258	298	319	343	366	404	457
1000	Gnd Roll	149	172	184	198	211	232	261
	15 m obst.	276	319	342	367	392	433	490
2000	Gnd Roll	160	184	197	212	226	249	280
	15 m obst.	296	342	367	394	420	464	525
3000	Gnd Roll	171	198	212	227	243	267	300
	15 m obst.	318	367	393	422	451	498	563
4000	Gnd Roll	184	212	227	244	260	286	322
	15 m obst.	341	394	422	453	484	534	604
5000	Gnd Roll	197	228	244	262	279	307	346
	15 m obst.	366	423	453	486	519	573	648
6000	Gnd Roll	212	245	262	281	300	330	372
	15 m obst.	393	454	486	522	557	615	696
7000	Gnd Roll	234	271	290	311	332	366	411
	15 m obst.	435	503	539	579	618	682	772
8000	Gnd Roll	259	300	321	345	368	405	456
	15 m obst.	483	558	597	641	685	756	855
9000	Gnd Roll	288	332	356	382	408	449	505
	15 m obst.	535	619	662	711	759	839	949
10000	Gnd Roll	319	368	394	423	452	497	559
	15 m obst.	594	686	735	789	843	930	1053

Figure 5-1a Ground Roll and Take-Off Distance [m] at take-off weight 953 kg (2100 lbs)

PRESS ALT	Ground Roll and Take-Off Distance [ft] Outside Air Temperature [°C]							
[ft]	---	-20°C	0°C	10°C	20°C	30°C	40°C	50°C
0	Gnd Roll	456	527	564	605	646	711	800
	50 ft obst.	846	978	1047	1125	1200	1325	1499
1000	Gnd Roll	488	564	604	648	698	762	857
	50 ft obst.	907	1048	1122	1205	1286	1420	1606
2000	Gnd Roll	523	605	647	695	742	817	919
	50 ft obst.	972	1123	1202	1291	1378	1522	1722
3000	Gnd Roll	561	648	694	745	796	876	985
	50 ft obst.	1042	1204	1289	1385	1478	1632	1846
4000	Gnd Roll	602	696	745	800	854	940	1057
	50 ft obst.	1118	1292	1383	1486	1586	1751	1981
5000	Gnd Roll	646	747	800	858	916	1008	1135
	50 ft obst.	1200	1387	1458	1595	1702	1880	2127
6000	Gnd Roll	694	802	859	922	984	1083	1219
	50 ft obst.	1289	1489	1595	1713	1828	2019	2284
7000	Gnd Roll	769	888	951	1021	1089	1199	1349
	50 ft obst.	1428	1650	1767	1898	2026	2237	2531
8000	Gnd Roll	851	983	1053	1130	1207	1328	1494
	50 ft obst.	1584	1830	1959	2104	2246	2480	2806
9000	Gnd Roll	943	1090	1167	1252	1337	1471	1656
	50 ft obst.	1756	2029	2173	2333	2491	2750	3112
10000	Gnd Roll	1045	1208	1293	1388	1482	1631	1835
	50 ft obst.	1948	2251	2410	2589	2764	3052	3452

Figure 5-1b Ground Roll and Take-Off Distance [ft] at take-off weight 953 kg (2100 lbs)

GROUND ROLL AND TAKE-OFF DISTANCE
at 1111 kg (2450 lbs)

SHORT FIELD TAKEOFF

Conditions:
Take-off weight 1111 kg (2450 lbs)
Flaps 10°
Full Power Prior to Brake Release
Paved, level, dry runway
Zero Wind

Lift Off: .....51 KIAS

Speed at 15 m / 50 ft: .....57 KIAS

Notes:

1. Short field technique
2. Decrease distances 10% for each 9 Knot headwind. For operation with tailwinds up to 10 Knot increase distances by 10% for each 2 Knot.
3. For operation on dry, grass runway, increase distances by 15% of the "ground roll" figure.
4. Consider additional distances (min. 20%) for wet grass runway, softened ground or snow.

PRESS ALT	Ground Roll and Take-Off Distance [m] Outside Air Temperature [°C]							
[ft]	---	-20°C	0°C	10°C	20°C	30°C	40°C	50°C
0	Gnd Roll	207	240	257	275	294	324	364
	15 m obst.	385	445	477	512	546	603	682
1000	Gnd Roll	222	257	275	295	315	347	390
	15 m obst.	413	477	510	548	585	646	731
2000	Gnd Roll	238	275	295	316	338	372	418
	15 m obst.	442	511	547	588	627	693	784
3000	Gnd Roll	255	295	316	339	362	399	448
	15 m obst.	474	548	587	630	673	743	840
4000	Gnd Roll	274	317	339	364	388	428	481
	15 m obst.	509	588	630	676	722	797	902
5000	Gnd Roll	294	340	364	391	417	459	516
	15 m obst.	546	631	676	726	775	855	968
6000	Gnd Roll	316	365	391	420	448	493	555
	15 m obst.	587	678	726	779	832	919	1039
7000	Gnd Roll	350	404	433	465	496	546	614
	15 m obst.	650	751	804	864	922	1018	1152
8000	Gnd Roll	387	448	479	514	549	604	680
	15 m obst.	721	833	892	958	1022	1129	1277
9000	Gnd Roll	429	496	531	570	608	670	753
	15 m obst.	799	923	989	1062	1134	1252	1416
10000	Gnd Roll	476	550	589	632	674	742	835
	15 m obst.	887	1025	1097	1178	1258	1389	1571

Figure 5-1c Ground Roll and Take-Off Distance [m] at take-off weight 1111 kg (2450 lbs)

PRESS ALT	Ground Roll and Take-Off Distance [ft] Outside Air Temperature [°C]							
[ft]	---	-20°C	0°C	10°C	20°C	30°C	40°C	50°C
0	Gnd Roll	680	786	842	904	964	1062	1194
	50 ft obst.	1263	1460	1563	1679	1792	1979	2238
1000	Gnd Roll	729	842	902	968	1033	1137	1280
	50 ft obst.	1353	1564	1674	1798	1920	2120	2398
2000	Gnd Roll	781	903	967	1038	1108	1219	1372
	50 ft obst.	1451	1676	1795	1928	2058	2272	2570
3000	Gnd Roll	838	968	1036	1113	1188	1307	1471
	50 ft obst.	1556	1797	1925	2067	2207	2436	2756
4000	Gnd Roll	899	1039	1112	1194	1274	1402	1578
	50 ft obst.	1669	1929	2065	2218	2368	2614	2957
5000	Gnd Roll	965	1115	1194	1281	1368	1505	1694
	50 ft obst.	1792	2070	2216	2381	2541	2806	3174
6000	Gnd Roll	1036	1197	1282	1376	1469	1617	1819
	50 ft obst.	1924	2223	2380	2557	2729	3014	3409
7000	Gnd Roll	1147	1326	1419	1524	1626	1790	2014
	50 ft obst.	2132	2464	2638	2833	3025	3340	3778
8000	Gnd Roll	1271	1468	1572	1687	1801	1982	2231
	50 ft obst.	2364	2731	2924	3141	3353	3702	4188
9000	Gnd Roll	1408	1627	1742	1870	1996	2196	2471
	50 ft obst.	2622	3029	3243	3483	3719	4106	4645
10000	Gnd Roll	1560	1803	1930	2072	2212	2435	2739
	50 ft obst.	2909	3361	3598	3865	4126	4555	5153

Figure 5-1d Ground Roll and Take-Off Distance [ft] at take-off weight 1111 kg (2450 lbs)

GROUND ROLL AND TAKE-OFF DISTANCE
at 1134 kg (2500 lbs)

SHORT FIELD TAKEOFF

Conditions:
Take-off weight 1134 kg (2500 lbs)
Flaps 10°
Full Power Prior to Brake Release
Paved, level, dry runway
Zero Wind

Lift Off: .....51 KIAS

Speed at 15 m / 50 ft: .....56 KIAS

Notes:

1. Short field technique
2. Decrease distances 10% for each 9 Knot headwind. For operation with tailwinds up to 10 Knot increase distances by 10% for each 2 Knot.
3. For operation on dry, grass runway, increase distances by 15% of the "ground roll" figure.
4. Consider additional distances (min. 20%) for wet grass runway, softened ground or snow.

PRESS ALT	Ground Roll and Take-Off Distance [m] Outside Air Temperature [°C]							
[ft]	---	-20°C	0°C	10°C	20°C	30°C	40°C	50°C
0	Gnd Roll	219	253	270	290	310	341	384
	15 m obst.	406	469	502	539	576	636	719
1000	Gnd Roll	234	271	290	311	332	365	411
	15 m obst.	435	503	538	578	617	681	771
2000	Gnd Roll	251	290	311	333	356	392	441
	15 m obst.	466	539	577	619	661	730	826
3000	Gnd Roll	269	311	333	358	382	420	473
	15 m obst.	500	578	618	664	709	783	886
4000	Gnd Roll	289	334	357	384	409	451	507
	15 m obst.	536	620	664	713	761	840	950
5000	Gnd Roll	310	358	384	412	440	484	544
	15 m obst.	576	665	712	765	817	902	1020
6000	Gnd Roll	333	385	412	442	472	520	585
	15 m obst.	618	714	765	822	877	968	1095
7000	Gnd Roll	369	426	456	490	523	575	647
	15 m obst.	685	792	848	911	972	1073	1214
8000	Gnd Roll	408	472	505	543	579	637	717
	15 m obst.	760	878	940	1011	1077	1190	1346
9000	Gnd Roll	452	523	560	603	641	706	794
	15 m obst.	842	973	1042	1123	1195	1319	1493
10000	Gnd Roll	501	579	620	670	711	782	880
	15 m obst.	935	1080	1156	1250	1326	1464	1656

Figure 5-1e Ground Roll and Take-Off Distance [m] at take-off weight 1134 kg (2500 lbs)

PRESS ALT	Ground Roll and Take-Off Distance [ft] Outside Air Temperature [°C]							
[ft]	---	-20°C	0°C	10°C	20°C	30°C	40°C	50°C
0	Gnd Roll	717	829	887	952	1017	1119	1259
	50 ft obst.	1332	1539	1647	1769	1889	2085	2359
1000	Gnd Roll	768	888	950	1020	1089	1199	1349
	50 ft obst.	1427	1648	1765	1895	2023	2234	2528
2000	Gnd Roll	823	951	1019	1094	1167	1285	1446
	50 ft obst.	1529	1767	1892	2032	2169	2395	2709
3000	Gnd Roll	883	1020	1092	1173	1252	1378	1550
	50 ft obst.	1640	1895	2028	2179	2326	2568	2905
4000	Gnd Roll	947	1095	1172	1258	1343	1478	1663
	50 ft obst.	1759	2033	2176	2337	2495	2755	3117
5000	Gnd Roll	1017	1175	1258	1351	1442	1587	1785
	50 ft obst.	1888	2182	2336	2509	2679	2957	3346
6000	Gnd Roll	1092	1262	1351	1451	1548	1704	1917
	50 ft obst.	2028	2343	2509	2695	2877	3176	3593
7000	Gnd Roll	1209	1397	1496	1607	1714	1887	2123
	50 ft obst.	2247	2597	2780	2987	3188	3520	3982
8000	Gnd Roll	1339	1547	1657	1781	1898	2089	2351
	50 ft obst.	2491	2879	3082	3316	3534	3902	4414
9000	Gnd Roll	1484	1714	1836	1978	2103	2315	2605
	50 ft obst.	2763	3192	3418	3685	3919	4327	4896
10000	Gnd Roll	1645	1900	2034	2198	2331	2566	2887
	50 ft obst.	3066	3542	3792	4100	4348	4801	5432

Figure 5-1f Ground Roll and Take-Off Distance [ft] at take-off weight 1134 kg (2500 lbs)

TIME, FUEL AND DISTANCE TO CLIMB AT 1111 kg (2450 lbs)

Conditions:

Takeoff weight 1111 kg (2450 lbs)
Climb speed v_y = 70 KIAS
Flaps Up
Full Power
Standard Temperature (ISA)

Notes:

1. Add 4 l (1.1 US gal) of fuel for engine start, taxi and takeoff allowance.
2. Increase time and distance by 10% for 10°C above standard temperature.
3. Distances shown are based on zero wind.
4. Time, distance and fuel required are only valid from the point where the airplane climbs at v_y = 70 KIAS.

Press. Alt. [ft]	OAT [°C]	Vy [KIAS]	ROC [FPM]	Time [MIN]	Distance [NM]	Fuel used [l]	Fuel used [US Gal]
0	15	70	665	0.0	0.0	0.0	0.0
1000	13	70	660	1.5	1.8	0.7	0.2
2000	11	70	654	3.0	3.6	1.5	0.4
3000	9	70	648	4.6	5.6	2.2	0.6
4000	7	70	641	6.1	7.5	3.0	0.8
5000	5	70	635	7.7	9.6	3.8	1.0
6000	3	70	628	9.3	11.8	4.6	1.2
7000	1	70	600	10.9	14.1	5.2	1.4
8000	-1	70	572	12.6	16.5	5.9	1.5
9000	-3	70	544	14.4	19.2	6.5	1.7
10000	-5	70	516	16.3	22.0	7.1	1.9
11000	-7	70	487	18.3	25.1	7.8	2.1
12000	-9	70	459	20.4	28.5	8.4	2.2
13000	-11	70	430	22.6	32.2	9.0	2.4
14000	-13	70	401	25.0	36.2	9.6	2.5
15000	-15	70	372	27.6	40.6	10.3	2.7
16000	-17	70	342	30.4	45.4	10.9	2.9
17000	-19	70	313	33.5	50.8	11.6	3.1
18000	-21	70	283	36.9	56.9	12.2	3.2

Figure 5-2a Time, Fuel and Distance to Climb at 1111 kg (2450 lbs)

TIME, FUEL AND DISTANCE TO CLIMB AT 1134 kg (2500 lbs)

Conditions:

Takeoff weight 1134 kg (2500 lbs)
Climb speed v_y = 70 KIAS
Flaps Up
Full Power
Standard Temperature (ISA)

Notes:

1. Add 4 l (1.1 US gal) of fuel for engine start, taxi and takeoff allowance.
2. Increase time and distance by 10% for 10°C above standard temperature.
3. Distances shown are based on zero wind.
4. Time, distance and fuel required are only valid from the point where the airplane climbs at v_y = 70 KIAS.

Press. Alt. [ft]	OAT [°C]	Vy [KIAS]	ROC [FPM]	Time [MIN]	Distance [NM]	Fuel used [l]	[US Gal]
0	15	70	640	0.0	0.0	0.0	0.0
1000	13	70	634	1.6	1.9	0.8	0.2
2000	11	70	628	3.2	3.8	1.6	0.4
3000	9	70	622	4.8	5.8	2.3	0.6
4000	7	70	616	6.4	7.9	3.1	0.8
5000	5	70	609	8.0	10.0	3.9	1.0
6000	3	70	603	9.7	12.3	4.7	1.3
7000	1	70	575	11.3	14.7	5.4	1.4
8000	-1	70	548	13.1	17.2	6.1	1.6
9000	-3	70	520	15.0	20.0	6.8	1.8
10000	-5	70	492	17.0	23.0	7.4	2.0
11000	-7	70	464	19.	26.2	8.1	2.1
12000	-9	70	435	21.3	29.8	8.8	2.3
13000	-11	70	407	23.7	33.6	9.4	2.5
14000	-13	70	378	26.2	37.9	10.1	2.7
15000	-15	70	349	29.0	42.5	10.8	2.8
16000	-17	70	320	32.0	47.7	11.5	3.0
17000	-19	70	291	35.2	53.5	12.2	3.2
18000	-21	70	261	38.9	60.0	12.9	3.4

Figure 5-2b Time, Fuel and Distance to Climb at 1134 kg (2500 lbs)

MAXIMUM RATE-OF-CLIMB at 1111 kg (2450 lbs)

Conditions:
Take-off weight 1111 kg (2450 lbs)
Climb speed v_y = 70 KIAS
Flaps Up
Full Power

Notes:

1. For operation in air colder than this table provides, use coldest data shown.
2. For operation in air warmer than this table provides, use extreme caution.

PRESS ALT [FT]	Climb speed [KIAS]	Rate of Climb [ft/min] Outside Air Temperature [°C]				
		-20°C	0°C	+20°C	+40°C	+50°C
0	70	690	676	655	566	452
1000	70	683	669	647	558	444
2000	70	676	662	640	550	436
3000	70	669	654	632	543	428
4000	70	662	647	624	534	428
5000	70	655	639	616	526	411
6000	70	647	631	608	517	403
7000	70	618	601	578	489	376
8000	70	588	572	549	461	350
9000	70	559	542	519	432	323
10000	70	529	512	488	403	296
11000	70	499	482	458	373	269
12000	70	469	451	427	344	241
13000	70	438	420	396	314	213
14000	70	408	389	365	284	185
15000	70	377	358	333	253	157
16000	70	345	326	301	223	128
17000	70	314	294	269	192	99
18000	70	282	262	236	160	69

Figure 5-3a Maximum Rate of Climb at take-off weight 1111 kg (2450 lbs)

MAXIMUM RATE-OF-CLIMB at 1134 kg (2500 lbs)

Conditions:
Take-off weight 1134 kg (2500 lbs)
Climb speed v_y = 70 KIAS
Flaps Up
Full Power

Notes:

1. For operation in air colder than this table provides, use coldest data shown.
2. For operation in air warmer than this table provides, use extreme caution.

PRESS ALT [FT]	Climb speed [KIAS]	Rate of Climb [ft/min] Outside Air Temperature [°C]				
		-20°C	0°C	+20°C	+40°C	+50°C
0	70	665	651	629	542	430
1000	70	658	644	622	534	422
2000	70	651	636	615	527	414
3000	70	644	629	607	519	406
4000	70	637	621	599	510	398
5000	70	629	613	591	502	389
6000	70	621	605	582	493	381
7000	70	593	576	553	465	355
8000	70	564	547	524	437	328
9000	70	534	517	494	408	302
10000	70	505	488	464	380	275
11000	70	475	458	434	351	248
12000	70	446	427	403	321	220
13000	70	415	397	373	292	193
14000	70	385	366	342	262	165
15000	70	354	335	310	232	137
16000	70	323	304	279	201	108
17000	70	292	272	247	171	79
18000	70	261	240	215	139	50

Figure 5-3b Maximum Rate of Climb at take-off weight 1134 kg (2500 lbs)

CRUISE PERFORMANCE, RANGE AND ENDURANCE at 1111 kg (2450 lbs)

Conditions:

Take-off weight 1111kg (2450 lbs)
Flaps Up
Zero wind

Notes:

1. Endurance information are based on 168.8 l (44.6 US gal) usable fuel.
2. The table assumes 4 l (1.1 US gal) for startup and taxi; time, fuel and distance to climb and 45 min. reserve.
3. Increase true airspeed (KTAS) and maximum range (NM) by 1% per 10°C above ISA temperature.
4. Cruise Power above 75% not recommended. For economic cruise set load 70% or less.

Press. Alt.	Load	Speed		Fuel Flow		Distance	Endu-rance Time
[ft]	[%]	[KTAS]	[mph]	[l/h]	[US Gal/h]	[NM]	[Hrs]
0	100	117	135	29.5	7.8	566	4.8
0	90	112	129	25.3	6.7	648	5.8
0	80	107	123	21.7	5.7	734	6.8
0	70	101	117	18.6	4.9	823	8.1
0	60	94	109	15.8	4.2	913	9.7
0	50	84	97	13.0	3.4	1006	11.9
2000	100	119	137	29.5	7.8	574	4.7
2000	90	114	132	25.3	6.7	657	5.7
2000	80	109	126	21.7	5.7	743	6.7
2000	70	103	119	18.6	4.9	832	8.0
2000	60	96	110	15.8	4.2	920	9.5
2000	50	85	98	13.0	3.4	1006	11.8
4000	100	121	140	29.5	7.8	582	4.6
4000	90	117	134	25.3	6.7	665	5.5
4000	80	111	128	21.7	5.7	752	6.6
4000	70	105	121	18.6	4.9	840	7.8
4000	60	97	112	15.8	4.2	927	9.4
4000	50	85	98	13.0	3.4	1001	11.6
6000	100	124	142	29.5	7.8	590	4.5
6000	90	119	137	25.3	6.7	674	5.4
6000	80	113	130	21.7	5.7	761	6.5
6000	70	107	123	18.6	4.9	849	7.7
6000	60	98	113	15.8	4.2	933	9.2
6000	50	85	97	13.0	3.4	990	11.4
8000	90	121	139	25.3	6.7	683	5.3
8000	80	115	132	21.7	5.7	771	6.3
8000	70	108	125	18.6	4.9	857	7.6
8000	60	99	114	15.8	4.2	939	9.1
8000	50	83	95	13.0	3.4	964	11.2

Press. Alt.	Load	Speed		Fuel Flow		Distance	Endu-rance Time
[ft]	[%]	[KTAS]	[mph]	[l/h]	[US Gal/h]	[NM]	[Hrs]
10000	90	123	142	25.3	6.7	692	5.2
10000	80	117	135	21.7	5.7	780	6.2
10000	70	110	126	18.6	4.9	865	7.4
10000	60	100	116	15.8	4.2	943	8.9
12000	90	125	144	25.3	6.7	702	5.0
12000	80	119	137	21.7	5.7	789	6.1
12000	70	112	128	18.6	4.9	873	7.3
12000	60	101	117	15.8	4.2	945	8.7
14000	90	128	147	25.3	6.7	711	4.9
14000	80	121	140	21.7	5.7	798	5.9
14000	70	113	130	18.6	4.9	881	7.1
14000	60	102	117	15.8	4.2	945	8.6

Figure 5-4a Cruise Performance, Range and Endurance
at 1111 kg (2450 lbs)

CRUISE PERFORMANCE, RANGE AND ENDURANCE at 1134 kg (2500 lbs)

Conditions:

Take-off weight 1134kg (2500 lbs)
Flaps Up
Zero wind

Notes:

1. Endurance information are based on 168.8 l (44.6 US gal) usable fuel.
2. The table assumes 4 l (1.1 US gal) for startup and taxi; time, fuel and distance to climb and 45 min. reserve.
3. Increase true airspeed (KTAS) and maximum range (NM) by 1% per 10°C above ISA temperature.
4. Cruise Power above 75% not recommended. For economic cruise set load 70% or less.

Press. Alt.	Load	Speed		Fuel Flow		Distance	Endu-rance Time
[ft]	[%]	[KTAS]	[mph]	[l/h]	[US Gal/h]	[NM]	[Hrs]
0	100	117	135	29.5	7.8	566	4.8
0	90	112	129	25.3	6.7	648	5.8
0	80	107	123	21.7	5.7	734	6.8
0	70	101	117	18.6	4.9	823	8.1
0	60	94	109	15.8	4.2	913	9.7
0	50	84	97	13.0	3.4	1006	11.9
2000	100	119	137	29.5	7.8	574	4.7
2000	90	114	132	25.3	6.7	657	5.7
2000	80	109	126	21.7	5.7	743	6.7
2000	70	103	119	18.6	4.9	832	8.0
2000	60	96	110	15.8	4.2	920	9.5
2000	50	85	98	13.0	3.4	1006	11.8
4000	100	121	140	29.5	7.8	582	4.6
4000	90	117	134	25.3	6.7	665	5.5
4000	80	111	128	21.7	5.7	752	6.6
4000	70	105	121	18.6	4.9	840	7.8
4000	60	97	112	15.8	4.2	927	9.4
4000	50	85	98	13.0	3.4	1001	11.6
6000	100	124	142	29.5	7.8	590	4.5
6000	90	119	137	25.3	6.7	674	5.4
6000	80	113	130	21.7	5.7	761	6.5
6000	70	107	123	18.6	4.9	849	7.7
6000	60	98	113	15.8	4.2	933	9.2
6000	50	85	97	13.0	3.4	990	11.4
8000	90	121	139	25.3	6.7	683	5.3
8000	80	115	132	21.7	5.7	771	6.3
8000	70	108	125	18.6	4.9	857	7.6

Press. Alt.	Load	Speed		Fuel Flow		Distance	Endu-rance Time
[ft]	[%]	[KTAS]	[mph]	[l/h]	[US Gal/h]	[NM]	[Hrs]
8000	60	99	114	15.8	4.2	939	9.1
8000	50	83	95	13.0	3.4	964	11.2
10000	90	123	142	25.3	6.7	692	5.2
10000	80	117	135	21.7	5.7	780	6.2
10000	70	110	126	18.6	4.9	865	7.4
10000	60	100	116	15.8	4.2	943	8.9
12000	90	125	144	25.3	6.7	702	5.0
12000	80	119	137	21.7	5.7	789	6.1
12000	70	112	128	18.6	4.9	873	7.3
12000	60	101	117	15.8	4.2	945	8.7
14000	90	128	147	25.3	6.7	711	4.9
14000	80	121	140	21.7	5.7	798	5.9
14000	70	113	130	18.6	4.9	881	7.1
14000	60	102	117	15.8	4.2	945	8.6

Figure 5-4a Cruise Performance, Range and Endurance at 1134 kg (2500 lbs)

SECTION 6
WEIGHT & BALANCE

Item	Weight x Arm = Moment		
	(kg)	(m)	(mkp)
Empty Weight			
plus Engine Oil (6 l to 0.9 kg/l)		-0.31	
plus Gearbox Oil (1 l to 0.9 kg/l)		-0.69	
plus unusable fuel (11.4 l to 0.84 kg/l)		1.17	
plus Coolant (6 l to 1.0 kg/l)		-0.26	
Changes in Equipment			
Basic Empty Weight			

Figure 6-1 Calculating the Basic Empty Weight

		Your aircraft	
		Mass kg	Moment mkp
Calculation of the loaded condition	**1. Basic Empty Weight:** Use the values for your airplane with the present equipment. Unusable fuel, engine oil, gearbox oil and coolant are included.		
	2. Usable Fuel (at 0.84 kg/l), max. 168.8l		
	3. Pilot and Front Passenger (Station 0.86 to 1.17 m)		
	4. Rear Passenger		
	5. *Baggage Area 1 or Passenger on the children's seat (Station 2.08 to 2.74; max.54kg)		
	6. *Baggage Area 2 (Station 2.74 to 3.61; max.23kg)		
	7. Ramp Weight and Moment		
	8. Fuel allowance for engine start, taxi and runup		
	9. Take-off Weight and Moment max. 1111 kg. (Subtract Step 8 from Step 7)		
	10.Locate this point in the weight and balance envelope in the original POH. Check if its within the envelope. *Maximum allowable combined weight capacity for Baggage Areas 1 and 2 is 54 kg		

Figure 6-2 Calculating Weight and Moment

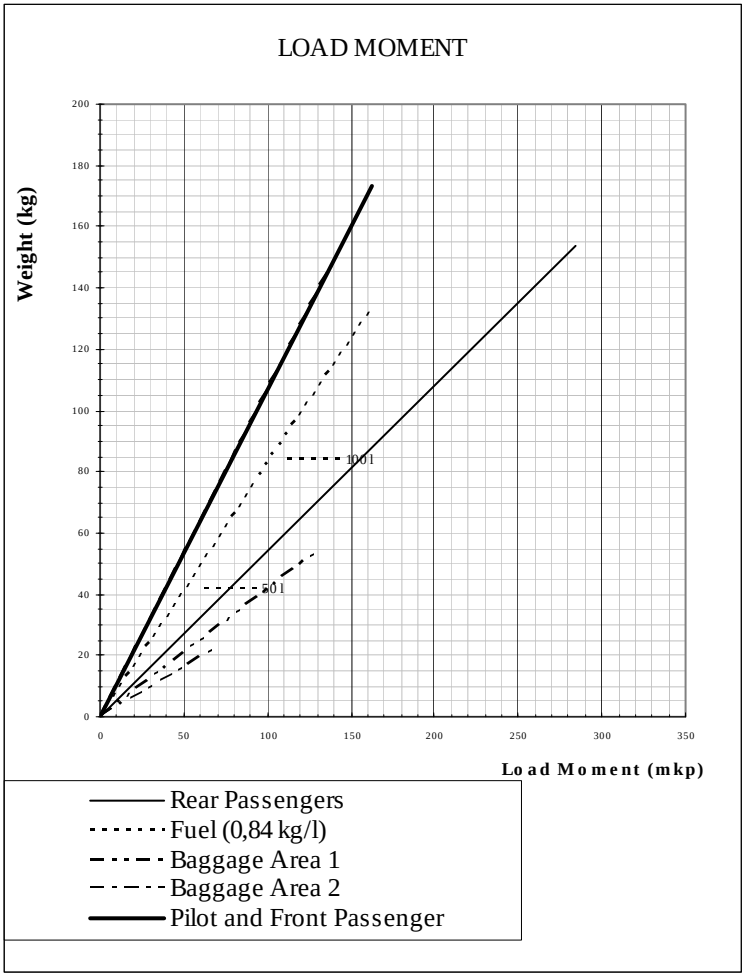

Figure 6-3 Load Moment

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SECTION 7
AIRPLANE AND SYSTEMS DESCRIPTION

INSTRUMENT PANEL

Components of the new installation can be seen as example in the following figure.
Some installations are equipped with a key switch for the starter instead of the push button and the switch "Engine Master" is designated "IGN". For these installations, the appropriate note in brackets, ("IGN" resp.) is added subsequently throughout the entire supplement for the Pilot´s Operating Handbook.

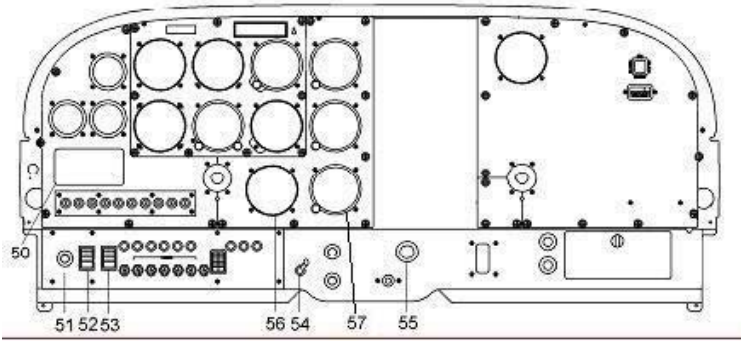

Figure 7-1 Example of Instrument panel

50. Lightpanel with:
"Force B" switch for manually switching the FADEC
"FADEC" test knob
"A FADEC B" Warning light for FADEC A and B
"AED" Caution light (amber) for AED 125
"CED" Caution light (amber) for CED 125
"CED/AED" Test/Confirm Knob for CED 125, AED 125 and Caution lights (amber)
"Glow" Glow Control light (amber)

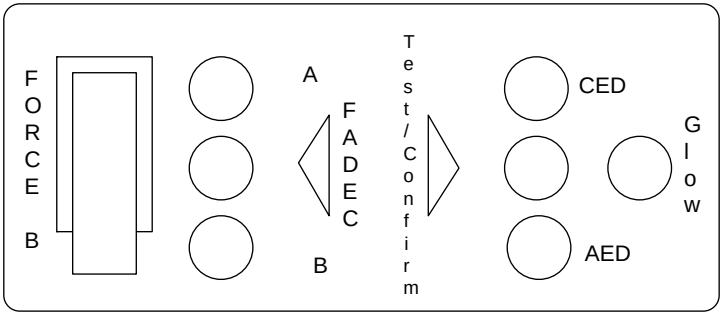

Figure 7-2 Example of Instrument panel

51. "Starter" - Push Button (Switch resp.) for Starter
52. "ALT" - Switch for Alternator
53. "BAT"- Switch for Battery
54. "Engine Master" ("IGN" resp.) - Switch electrical supply FADEC
55. "Alt. Air Door" Alternate Air Door
56. CED 125 (Tachometer -N/A-)
    The Compact Engine Display contains indication of Propeller Rotary Speed, Oil Pressure, Oil Temperature, Coolant Temperature, Gearbox Temperature and Load.
57. AED 125 SR with indication of Fuel Flow, Fuel Temperature, Voltage and a warning light "Water Level" (yellow) for low coolant level for Figure 7-2b only:
58. "ALT" light - Alternator warning light (red)

FUEL SYSTEM

The fuel system of both TAE 125 installations includes the original tanks of the Cessna 172. Additional sensors for fuel temperature are installed.
The fuel flows out of the tanks to the Fuel Selector Valve with the positions LEFT, RIGHT and BOTH, through a reservoir tank to the fuel shut-off valve and then via the electrically driven Fuel Pump to the fuel filter.
The electrically driven fuel pump supports the fuel flow to the filter module if required. Upstream to the fuel filter module a thermostat-controlled Fuel Pre-heater is installed. Then, the engine-driven feed pump and the high-pressure pump supply the rail, from where the fuel is injected into the cylinders depending upon the position of the thrust lever and regulation by the FADEC.
Surplus fuel flows to the Filter Module and then through the Fuel Selector Valve back into the pre-selected tank. A temperature sensor in the Filter Module controls the heat exchange between the fuel feed and return. Since Diesel fuel tends to form paraffin at low temperatures, the information in Section 2 "Operating Limits" pertaining to fuel temperature have to be observed. The fuel return ensures a quicker warm up of the fuel in the tank in use.
If Diesel fuel is used, it shall meet DIN EN 590.

◆ Note: Approved fuels for use appear in Section 2.

Total capacity:.....180.2 litres (47.6 US gallons)
Total capacity of usable fuel: .....168.8 litres (44.6 US gallons)
Total capacity each tank: .....90.1 litres (23.8 US gallons)
Total capacity of usable fuel
each tank: .....84.4 litres (22.3 US gallons)

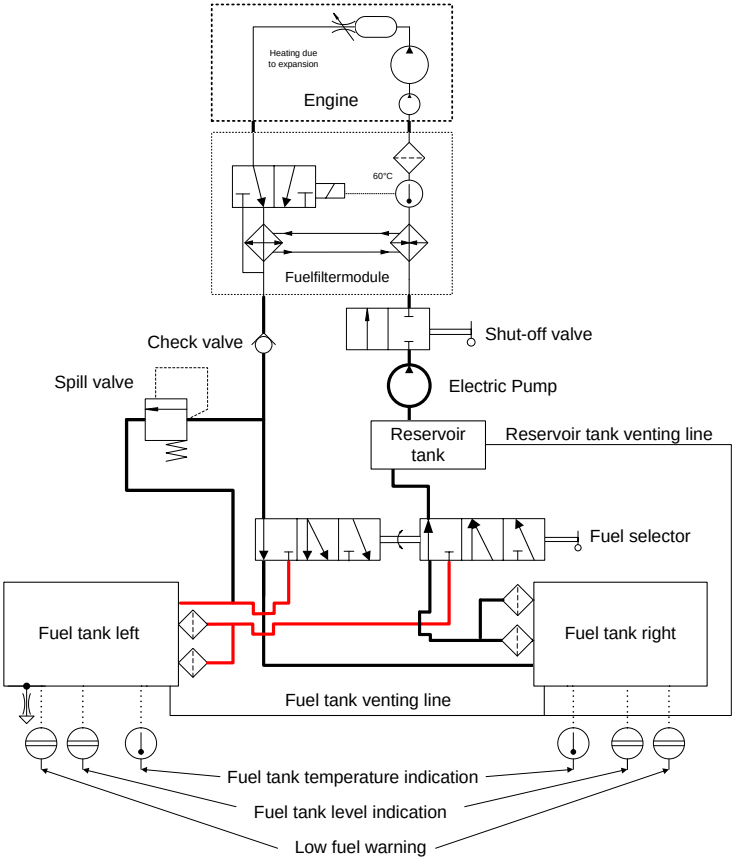

Figure 7-3 Scheme of the Fuel System

ELECTRICAL SYSTEM

The electrical system of both engine installations differs from the previous installation and is equipped with the following operating and display elements:

1. Switch "Alternator"
   Controls the alternator. Must be ON in normal operation.
2. Switch "Battery"
   Controls the Battery.
3. Push Button (Switch resp.) "Starter"
   Controls the magneto switch of the starter.
4. Ammeter
   The Ammeter shows the charging or discharging current to/ from the battery.
5. Warning light "Alternator"
   Illuminates when the power output of the alternator is too low or the Alternator Switch is switched off. Normally, this warning light always illuminates when the "Engine Master" ("IGN" resp.) is switched on without revolution and extinguishes immediately after starting the engine.
6. Switch "Fuel Pump" (if installed)
   This switch controls the electric fuel pump.
7. Switch "Engine Master" ("IGN" resp.)
   Controls the two redundant FADEC components and the Alternator Excitation Battery with two independent contacts. The Alternator Excitation Battery is used to ensure that the Alternator continues to function properly even if the main battery fails.

▲ **WARNING:** If the "Engine Master" is switched off, the power supply to the FADEC is interrupted and the engine will shut down.

8. Switch "Force B"
   If the FADEC does not automatically switch from A-FADEC to the B-FADEC in case of an emergency despite of obvious necessity, this switch allows to switch manually to the B-FADEC.

▲ **WARNING:** When operating on FADEC backup battery only, the "Force B" switch must not be activated. This will shut down the engine.

FADEC Backup Battery

The electrical system includes a FADEC backup battery to ensure power supply to A-FADEC in case that supply from both battery and alternator is interrupted. The engine can be operated for a maximum of 30 minutes when powered by the FADEC backup battery only. Only A-FADEC is connected to the backup battery.

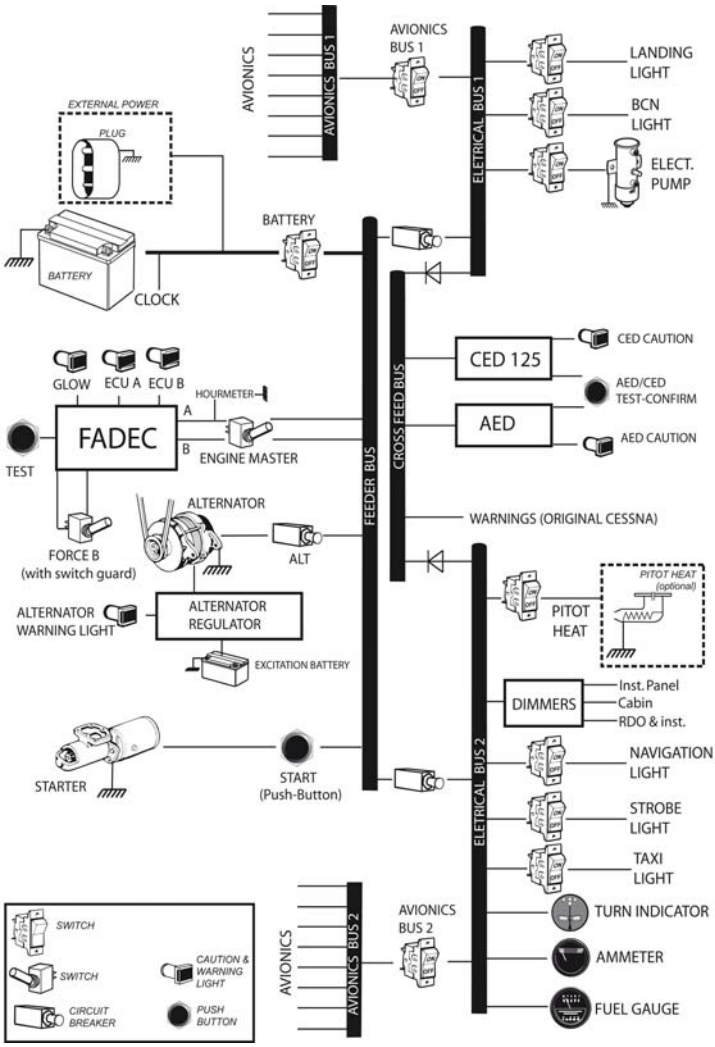

Figure 7-4a Basic wiring of the electrical system with alternator circuit breaker and without FADEC backup battery

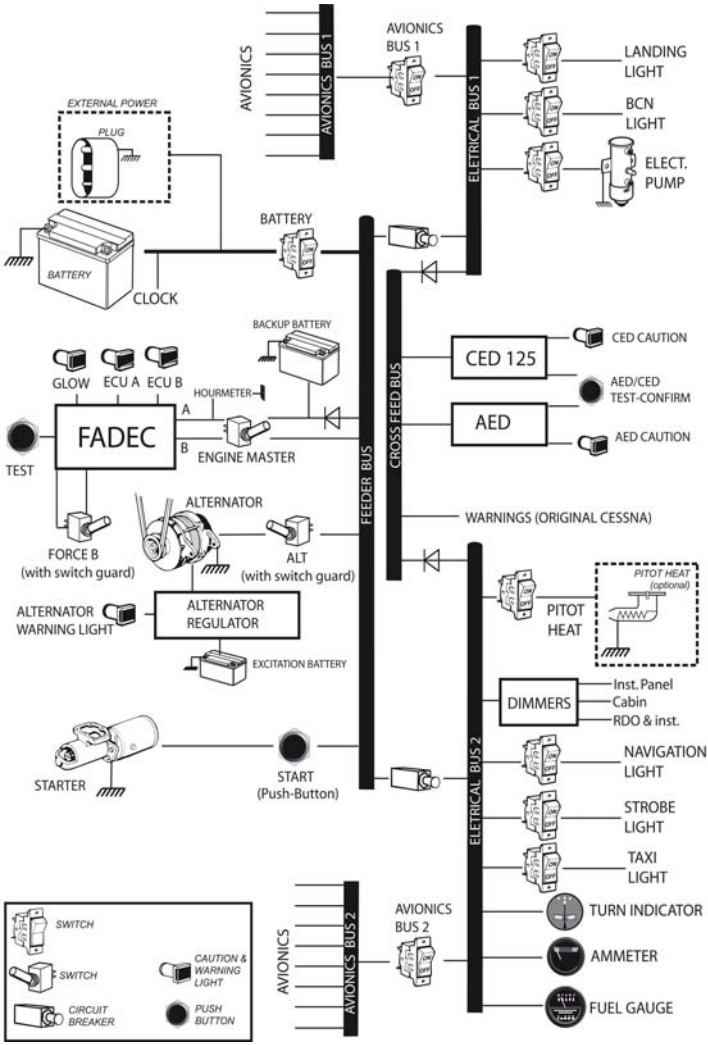

Figure 7-4b Basic wiring of the electrical system with alternator switch and FADEC backup battery

FADEC-RESET

In case of a FADEC-warning, one or both FADEC warning lights are flashing. If then the "FADEC" Test Knob is pressed for at least 2 seconds,

a) the active warning lights will extinguish if it was a LOW category warning.

b) the active warning lights will be illuminated steady if it was a HIGH category warning.

■ CAUTION: If a FADEC-warning accurred, contact your service center.

When a high category warning occurs the pilot should land as soon as possible, since the affected FADEC ECU has diagnosed a severe fault. A low category fault has no significant impact on engine operation.
Refer also to the engine OM-02-01 or OM-02-02 for additional information.

COOLING

The engine variants are fitted with a fluid-cooling system whose three-way thermostat regulates the flow of coolant between the large and small cooling circuit.
The coolant exclusively flows through the small circuit up to a cooling water temperature of 84°C and then between 84°C and 94°C both through the small and the large circuit.
If the cooling water temperature rises above 94°C, the complete volume of coolant flows through the large circuit and therefore through the radiator. This allows a maximum cooling water temperature of 105°C.
There is a sensor in the expansion reservoir which sends a signal to the warning light "Water level" on the instrument panel if the coolant level is low.
The cooling water temperature is measured in the housing of the thermostat and passed on to the FADEC and CED 125.
The connection to the heat exchanger for cabin heating is always open; the warm air supply is regulated by the pilot over the heating valve. See Figure 7-5a.

The supply of warm air into the cabin is controlled through the cabin heat control knob. In normal operation the cabin heat control knob must be in OPEN position.
In case of certain emergencies (refer to section 3), the control knob "Shut-off Cabin Heat" has to be closed according to the appropriate procedures.
Aircraft having a TAE 125-02-99 engine installation, can be equipped with a gearbox oil cooler that is connected to the coolant circuit.

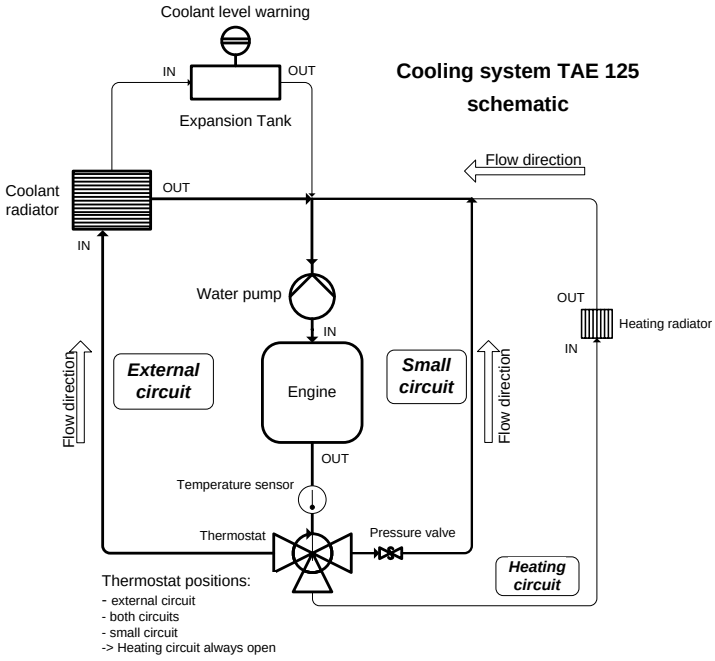

Figure 7-5a Cooling System

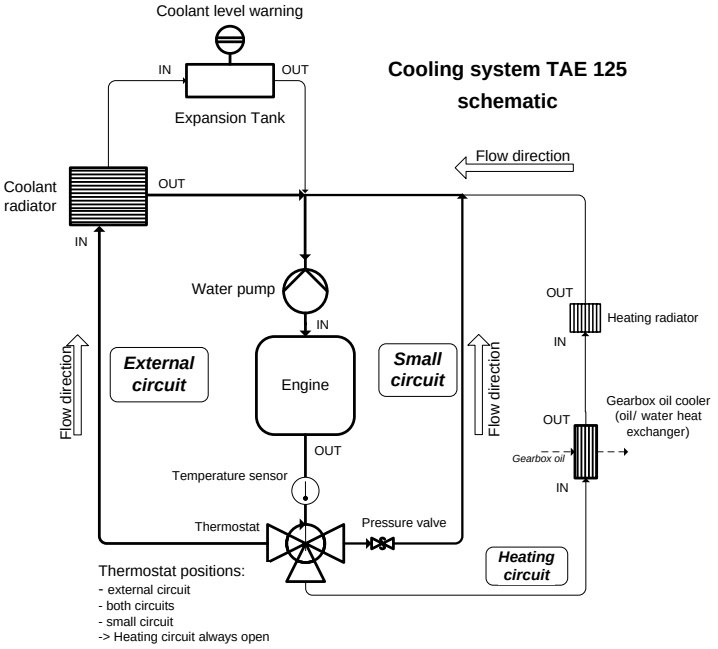

Figure 7-5b Cooling System with Gearbox Oil Cooler

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SECTION 8
AIRPLANE HANDLING, SERVICE AND MAINTENANCE

▲	**WARNING:**	Do not start the engine in any case when filling levels are below the corresponding minimum marking.

■	CAUTION:	Normally, a refill of coolant or gearbox oil between service intervals is not necessary. In case of low coolant or gearbox oil levels, inform the maintenance company immediately.

ENGINE OIL

Both engine variants are filled with 4.5 - 6 l engine oil (refer to section 1 of this supplement for specification).
A dip stick is used to check the oil level. It is accessible by a flap on the upper right-hand side of the engine cowling.
Notice that on warm engines 5 minutes after engine shut-off there are 80% of the entire engine oil in the oil pan and therefore visible on the oil dipstick. On warm engines oil should be added if the oil dip stick shows oil levels below 50%. After 30 minutes the real oil level is visible on the dip stick.
The drain screw is located on the lower left-hand outside of the oil pan, the oil filter is on the upper left-hand side of the housing.
The oil system has to be checked for sealing after the first 5 operating hours (visual inspection).
Checks and changes of oil and oil filter have to be performed regularly according to the Operation and Maintenance ManualSee OM-02-01 for the TAE 125-01 engine or OM-02-02 for the TAE 125-02-99 engine.
The Supplement of the Aircraft Maintenance Manual has to be considered as well.
See AMM-20-01 for the TAE 125-01 engine or OM-20-02 for the TAE 125-02-99 engine.

GEARBOX OIL

To ensure the necessary propeller speed, both engine variants are equipped with a reduction gearbox filled with gearbox oil. (refer to section 1 of this supplement for specification)
The level can be checked through a viewing glass on the lower leading edge of the gearbox. To do so, open the flap on the left front side of the engine cowling.
The drain screw is located at the lowest point of the gearbox. A filter is installed upstream of the pump, as well as microfilter in the Constant Speed Unit. Check the gearbox for sealing after the first 5 hours of operation (visual inspection). Regular checks as well as oil and filter changes have to be performed in accordance with the Operation and Maintenance Manual.
See OM-02-01 for the TAE 125-01 engine or OM-02-02 for the TAE 125-02-99 engine.
The Supplement of the Aircraft Maintenance Manual has to be considered as well. See AMM-20-01 for the TAE 125-01 engine or AMM-20-02 for theTAE 125-02-99 engine.

▲	**WARNING:**	It is not allowed to start the engine with low gearbox oil level.

■	CAUTION:	Between scheduled maintenance topping-up gearbox oil should not be necessary. If low gearbox oil level is detected, inform your service centre immediately.

FUEL

Both engine variants can be operated with kerosene (JET A-1, Jet A, Fuel No.3, TS-1 [TAE 125-02-99 only]) or Diesel fuel. Due to the higher specific density of turbine engine fuel or Diesel in comparison to aviation gasoline (AVGAS) the permissible capacity for standard tanks was reduced as mentioned in Section 1.
Appropriate placards are attached near the fuel filler connections. For temperature limitations refer to Section 2 "Limitations" and Section 4 "Normal Operation".

It is recommended to refuel before each flight and to enter the type of fuel into the log-book.

COOLANT

To cool the engine a liquid cooling system was installed with a water/approved radiator protection mixture at a ratio of 1:1.
A heat exchanger for cabin heating is part of the cooling system.
Check the cooling system for sealing after the first 5 hours of operation (visual inspection).
The coolant has to be changed in accordance with the Operations and Maintenance Manual. See OM-02-01 for the TAE 125-01 engine or OM-02-02 for the TAE 125-02-99 engine.
The Supplement of the Aircraft Maintenance Manual has to be considered as well. See AMM-20-01 for the TAE 125-01 engine or AMM-20-02 for theTAE 125-02-99 engine.

▲	**WARNING:**	It is not allowed to start the engine with low coolant level.
■	CAUTION:	Between scheduled maintenance topping-up coolant should not be necessary. If low coolant level is detected, inform your service centre immediately.
◆	Note:	The freezing point of the coolant is -36°C (-32.8°F)

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SECTION 9
SUPPLEMENTS

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