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Supplement
Pilot´s Operating Handbook
and
FAA Approved Airplane Flight Manual
for the
Cessna 172 N & P
Reims Cessna F 172 N & P

Equipped with TAE 125 Installation
Issue 2

MODEL no. ____________________
SERIAL no. ____________________
REGISTR. no. ____________________

This supplement must be attached to the Pilot s Operating Handbook when the TAE 125 installation has been installed in accordance with STC SA01303WI.

This manual constitutes a FAA approved AFM Supplement for US registered airplanes in accordance with FAR 21.29.

The information contained in this supplement supersede or add to the Pilot's Operating Handbook and FAA approved AFM only as set forth herein.

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

The owner/operator is responsible for updating limitations, procedures, performance data, and any other material in this AFMS originating from the aircraft manufacturer Pilot Operating Handbook from applicable update information supplied by the aircraft manufacturer.

FAA APPROVED ____________________
for Margaret Kline, Manager
Wichita Aircraft Certification Office
Federal Aviation Administration
Wichita, Kansas
DATE: 3/12/07

TAE-Nr.: 20-0310-20042

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Log of Revisions

Revision	Page	Description	Approved	
			Date	Endorsed
IR	ALL	INITIAL RELEASE	3/12/07	[illegible]

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

General remark

The content of this POH supplement is developed on basis of the LBA-approved POH. The content of the LBA- approved POH is equivalent to the original, FAA-approved POH.

TABLE OF CONTENTS

CONVERSION TABLES

VOLUME		
Unit [Abbr]	Conversion factor SI to US / Imperial	Conversion factor US / Imperial to SI
Liter [l]	[l] / 3.7854 = [US gal] [l] / 0.9464 = [US qt] [l] / 4.5459 = [Imp gal] [l] x 61.024 = [in^3]	
US gallon [US gal]		[US gal] x 3.7854 = [l]
US quart [US qt]		[US qt] x 0.9464 = [l]
Imperial gallon [Imp gal]		[Imp gal] x 4.5459 = [l]
Cubic inch [in^3]		[in^3] / 61.024 = [l]

TORQUE		
Unit [Abbr]	Conversion factor SI to US / Imperial	Conversion factor US / Imperial to SI
Kilopondmeter [kpm]	[kpm] x 7.2331 = [ft.lb] [kpm] x 86.7962 = [in.lb]	
Foot pound [ft.lb]		[ft.lb] / 7.2331 = [kpm]
Inch pound [in.lb]		[in.lb] / 86.7962 = [kpm]

TEMPERATURE		
Unit [Abbr.]	Conversion factor SI to US / Imperial	Conversion factor US / Imperial to SI
Degree Celsius [°C]	[°C] x 1.8 + 32 = [°F]	
Degree Fahrenheit [°F]		([°F] - 32) / 1.8 = [°C]

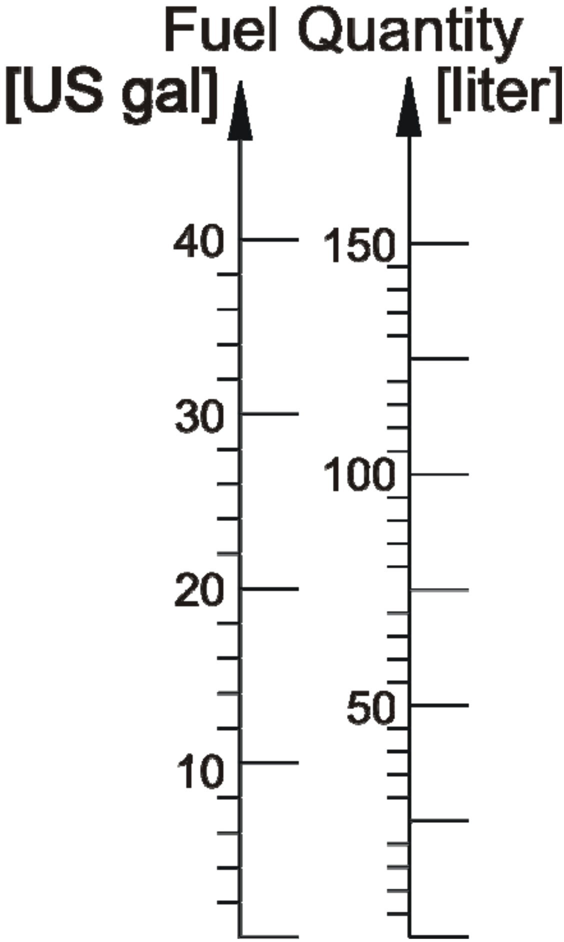
SPEED		
Unit [Abbr.]]	Conversion factor SI to US / Imperial	Conversion factor US / Imperial to SI
Kilometers per hour [km/h]	[km/h] / 1.852 = [kts] [km/h] / 1.609 = [mph]	
Meters per second [m/s]	[m/s] / 196.85 = [fpm]	
Miles per hour [mph]		[mph] x 1.609 = [km/h]
Knots [kts]		[kts] x 1.852 = [km/h]
Feet per minute [fpm]		[fpm] / 196.85 = [m/s]

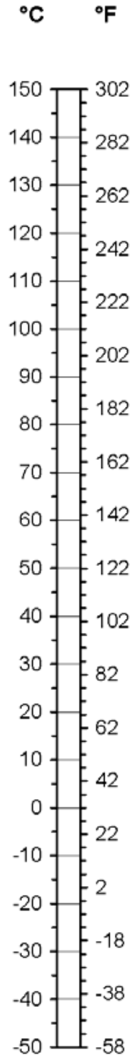
PRESSURE		
Unit [Abbr.]	Conversion factor SI to US / Imperial	Conversion factor US / Imperial to SI
Bar [bar] Hectopascal [hpa]=Millibar [mbar] Pounds per square inch [psi] Inches of mercury column [inHg]	[bar] x 14.5038 = [psi] [hpa] / 33.864 = [inhg] [mbar] / 33.864 = [inhg]	[psi] / 14.5038 = [bar] [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
Kilogram [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]


Fuel Quantity
[US gal]
[liter]
40
30
20
10
150
100
50


°C
°F
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
-10
-20
-30
-40
-50
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222
202
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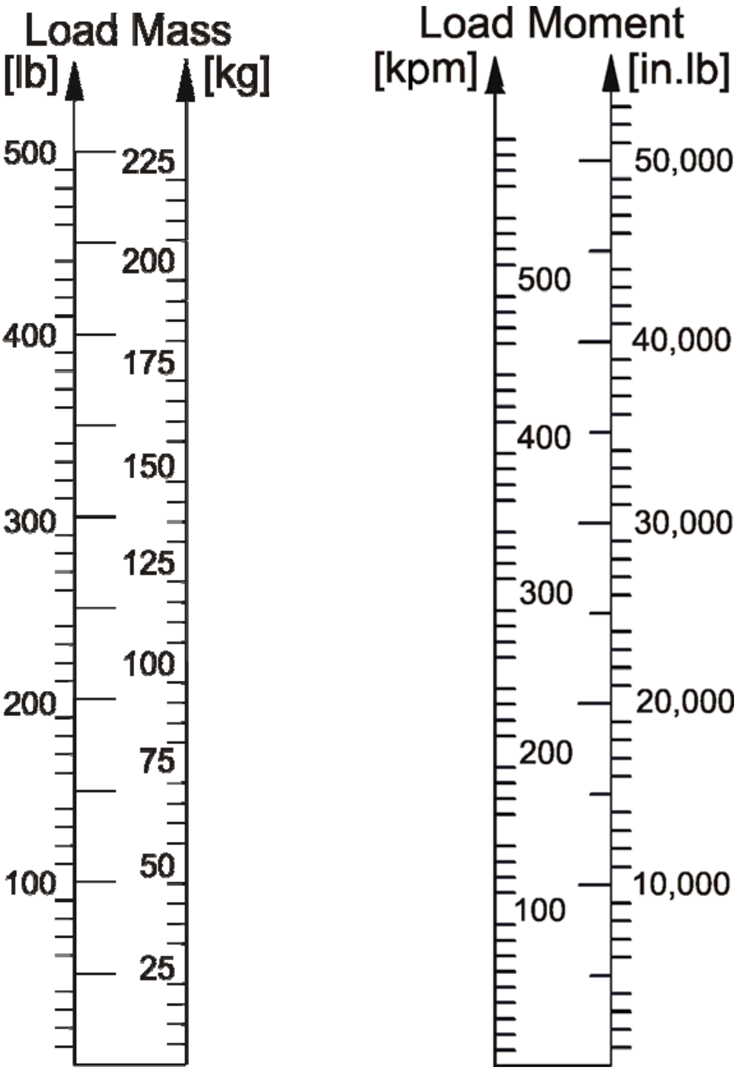
62
42
22
2
-18
-38
-58


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

Abbreviations

TAE	Thielert Aircraft Engines GmbH, developing and manufacturing company of TAE 125
FADEC	Full Authority Digital Engine Control
CED 125	Compact Engine Display of TAE 125 Multifunctional instrument for indication of engine data of TAE 125
AED 125	Auxiliary Engine Display Multifunctional instrument for indication of engine and airplane data

Section 1
GENERAL

CONVENTIONS IN THIS HANDBOOK

This manual contains following conventions and warnings. They should be strictly followed to rule out personal injury, property damage, impairment to the aircraft's operating safety or damage to it as a result of improper functioning.

▲ **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 TAE Service Bulletin TM TAE 000-0004.
◆ Note:	The TAE-No of this POH supplement is published on the cover sheet of this supplement.

ENGINE

Engine manufacturer: Thielert Aircraft Engines GmbH
Engine model: TAE 125-01 or TAE 125-02

The TAE 125-02 is the successor of the TAE 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 has 1991 ccm. Both TAE 125 engine variants are liquid-cooled in-line four-stroke 4-cylinder motor 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 damping and overload release. The engine variants have an electrical self starter and an alternator.

■ CAUTION: The engine requires an electrical power source for operation. If the battery and alternator fail simultaneously, this leads to engine stop. Therefore, it is important to pay attention to indications of alternator failure.

Due to this specific characteristic, all of the information from the Pilot's Operating Handbook and FAA approved AFM 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
Number of blades: 3
Diameter: 1.87 m
Type: Constant Speed

FUELS

■ CAUTION: If non-approved fuels are used, this may lead to dangerous engine malfunctions.

Fuel: ....Jet A and JET A-1 (ASTM 1655)

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

Gearbox oil: ....Shell EP 75W-90 API GL-4
Shell Spirax GSX 75W-80

Coolant: ....Water/Radiator Protection at a ratio of 50:50
Radiator Protection: ......BASF Glysantin Protect Plus/G48

◆ Note: The ice flocculation point of the coolant is –36°C.

■ 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.

▲ **WARNING**: The engine must not be started under any circumstances if the level is too low.

NOISE LEVEL

For the C 172 N with TAE 125-01 installation
The noise level has been established in accordance with:

a) FAR 36 Appendix G as 75.5 db(A)
b) ICAO Annex 16, Chpt. 10 as 75.5 db(A).

The noise level when the airplane is equipped with muffler option "Akrapovic D4D-7807-10-00" has been established in accordance with:

a) FAR 36 Appendix G as 70.6 db(A)
b) ICAO Annex 16, Chpt. 10 as 70.6 db(A).

For the Cessna 172 N with TAE 125-02 installation
The noise level when the airplane is equipped with muffler option "Akrapovic D4D-7807-10-00" has been established in accordance with:

a) FAR 36 Appendix G as 70.6 db(A)
b) ICAO Annex 16, Chpt. 10 as 70.6 db(A).

For the C 172 P with TAE 125-01 installation
The noise level has been established in accordance with:

a) FAR 36 Appendix G as 75.5 db(A)
b) ICAO Annex 16, Chpt. 10 as 75.5 db(A).

The noise level when the airplane is equipped with muffler option "Akrapovic D4D-7807-10-00" has been established in accordance with:

a) FAR 36 Appendix G as 70.6 db(A)
b) ICAO Annex 16, Chpt. 10 as 70.6 db(A).

For the Cessna 172 P with TAE 125-02 installation
The noise level when the airplane is equipped with muffler option "Akrapovic D4D-7807-10-00" has been established in accordance with:

a) FAR 36 Appendix G as 71.0 db(A)
b) ICAO Annex 16, Chpt. 10 as 71.0 db(A).

No determination has been made by the Federal Aviation Administration that the noise levels of this aircraft are or should be acceptable or unacceptable for operation at, into, or out of, any airport.

INSTRUMENT PANEL

The following information relate to Figure 1-2 „The instrument panel“ of the Pilot´s Operating Handbook and FAA approved AFM. Components of the new installation can be seen as example in the following Figure 1-2a.

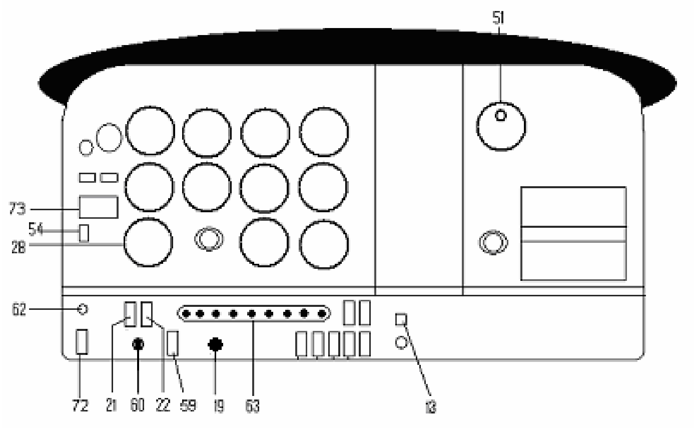


Figure1-2a Example of Instrument panel with TAE 125 installation

13. “Alt. Air Door” Alternate Air Door (Carburetor Heat Button **N/A**)
19. “Starter”-Push Button for Starter
21. “BAT”-Switch for Battery
22. “MAIN”-Switch for Main Bus
23. Primer **N/A**
26. Fuel Quantity Gauges
    (Oil Temperature and Oil Pressure Gauge **N/A**)
28. 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.
51. AED 125 SR with indication of Fuel Temperature, Voltage and a warning lamp “Water Level” (yellow) for low coolant level
54. “Force B”-Switch for manually switching the FADEC
59. “Fuel Pump”-Switch for the Electrical Fuel Pump
60. “ALT”-Circuit Breaker for Alternator
62. Fuse Electrical Fuel Pump

63. Fuses, among other for Alternator Warning Lamp, Starter, FADEC and Main Bus
72. “Engine Master”(“IGN” resp.)-Switch electrical supply FADEC

73. Lightpanel with:
    “FADEC” Test Knob
    “A FADEC B” Warning Lamps for FADEC A and B
    “Alt” Alternator Warning Lamp (red)
    “AED” Lamp (Yellow) for AED 125
    “CED” Lamp (yellow) for CED 125
    “CED/AED” – Test/Confirm Knob for CED 125, AED 125 and Caution Lamps
    “Fuel L”;”Fuel R” Lamps for low fuel level (yellow)
    “Glow” Glow Control Lamp (yellow)

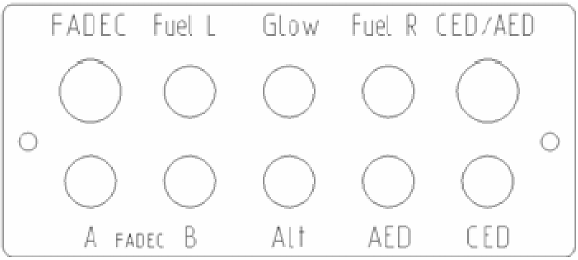


Figure 1-2c Lightpanel

FUEL SYSTEM (Left, Right)

The fuel system of both TAE 125 installations includes the original standard or long-range tanks of the Cessna 172. Additional sensors for Fuel Temperature and “Low Level” Warning are installed.
The fuel flows out of the tanks to the Fuel Selector Valve with the positions LEFT, RIGHT and OFF, through a reservoir tank to the fuel shut-off valve and then via the electrically driven Fuel Pump to the fuel filter. There is no BOTH position.
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 the density of jetfuel (0.80kg/l) is higher than of AVGAS (0.715kg/l), the usable fuel capacity was reduced by this factor through the fuel filler neck, to stay within the approved wing load.

Fuel Capacity				
Tanks		Total Usable Fuel	Total Unusable Fuel	Total Capacity
N & P	2 Standard-Tanks: each 72.85 l (19.25 US gal)	134.3 l (35.5 US gal)	11.4 l (3 US gal)	145.7 l (38.5 US gal)
N & P	2 Long-Range-Tanks: each 91.2 l (24.1 US gal)	167.3 l (44.2 US gal)	15.1 l (4 US gal)	182.4 l (48.2 US gal)

FUEL SYSTEM (Left, Right)

■ CAUTION: In flight conditions with downward pointing wing, switch the fuel selector to the upper fuel tank.

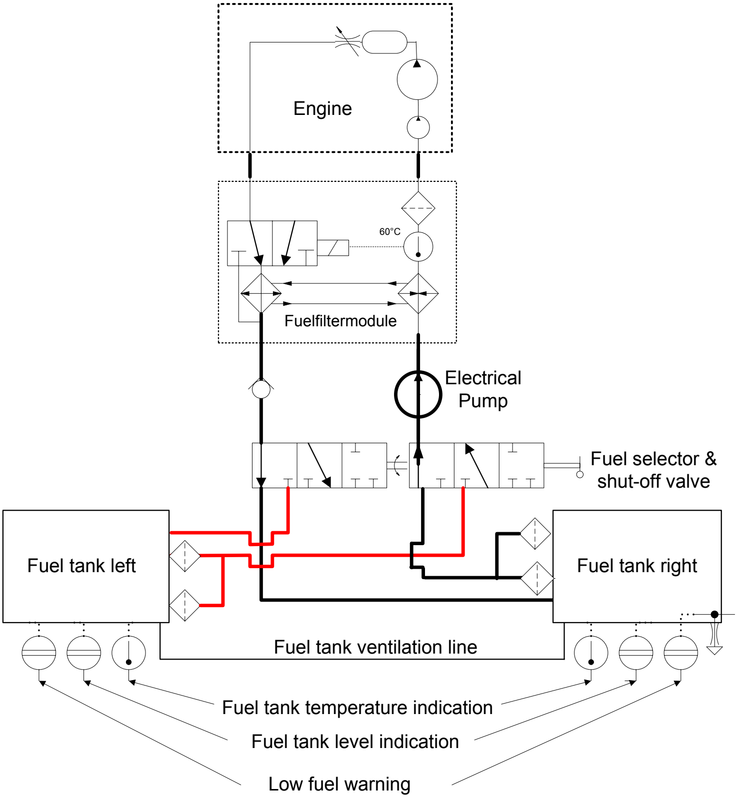


Figure1-3a Scheme of the Fuel System (Left, Right)

FUEL SYSTEM (Left, Right, Both)

The fuel system of both TAE 125 installations includes the original standard or long-range tanks of the Cessna 172. Additional sensors for Fuel Temperature and “Low Level” Warning are installed.
The fuel flows out of the tanks to the Fuel Selector Valve with the positions LEFT, RIGHT or BOTH, through a reservoir tank to the fuel shut-off valve and then via the electrically driven Fuel Pump to the fuel filter. Fuel can be shut off by the separate shutoff valve.
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, if BOTH is selected the fuel return to both tanks. A temperature sensor in the Filter Module controls the heat exchange between the fuel feed and return.
Since the density of diesel and jet fuel (0.8 kg/l) is higher than of AVGAS (0.715kg/l), the usable fuel capacity was reduced by this factor through the fuel filler neck, to stay within the approved wing load.

Fuel Capacity				
Tanks		Total Usable Fuel	Total Unusable Fuel	Total Capacity
N & P	2 Standard-Tanks: each 72.85 l (19.25 US gal)	134.3 l (35.5 US gal)	11.4 l (3 US gal)	145.7 l (38.5 US gal)
N & P	2 Long-Range-Tanks: each 91.2 l (24.1 US gal)	167.3 l (44.2 US gal)	15.1 l (4 US gal)	182.4 l (48.2 US gal)

FUEL SYSTEM (Left, Right, Both)

■ CAUTION: In flight conditions with downward pointing wing, switch the fuel selector to the upper fuel tank or to the position BOTH.

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

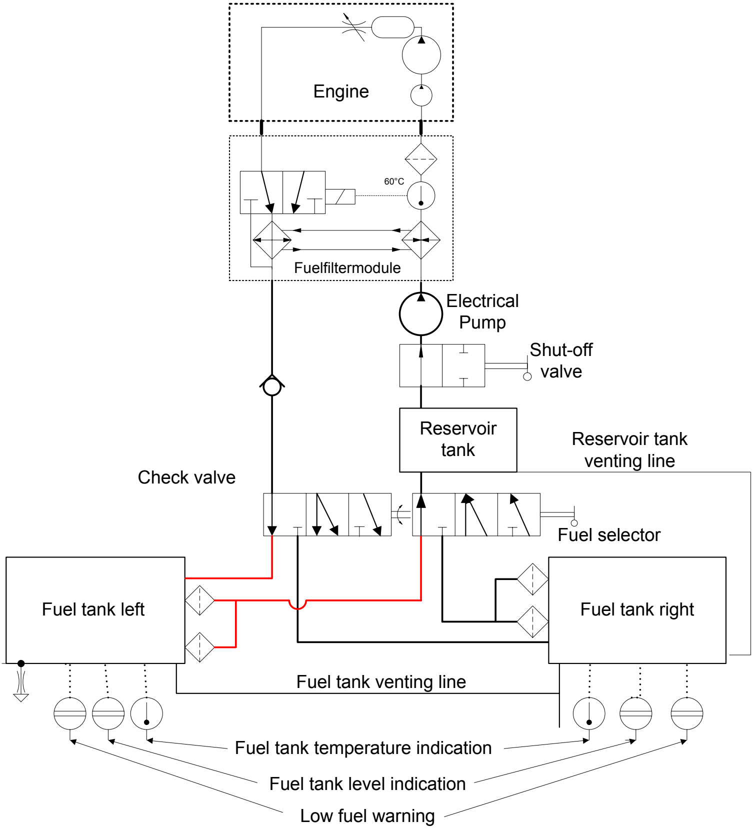


Figure1-3b Scheme of the Fuel System (Left, Right, Both)

◆ Note: The handling of the fuel selector positions left, right and both are described in the original POH.

ELECTRICAL SYSTEM

The electrical system of both TAE125 installations differs from the previous original installation and is equipped with the following operating and display elements:

1. Switch “Main Bus”
   The switch controls the Main Bus. The Main Bus is necessary to be able to run FADEC and engine with Battery/Alternator without disturbance in the event of onboard electrical system malfunctions. Normally, Alternator, Main Bus and Battery have to be switched on simultaneously.

2. Circuit Breaker “Alternator”
   Controls the alternator.

3. Switch “Battery”
   Controls the Battery.

4. Push Button “Starter”
   Controls the magneto switch of the starter.

5. Ammeter
   The Ammeter shows the charging or discharging current to/from the battery.

6. Warning Lamp “Alternator”
   Illuminates when the power output of the alternator is too low or the Circuit Breaker “Alternator” is switched off. Normally, this warning lamp always illuminates when the “Engine Master is switched on without revolution and extinguishes immediately after starting the engine.

7. Switch “Fuel Pump”
   This switch controls the electrical fuel pump.

8. Switch “Engine Master“
   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.

9. Switch “Force B”

10. 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.

The basic wiring of the TAE 125 installation is available in 14V as well as 28V versions.

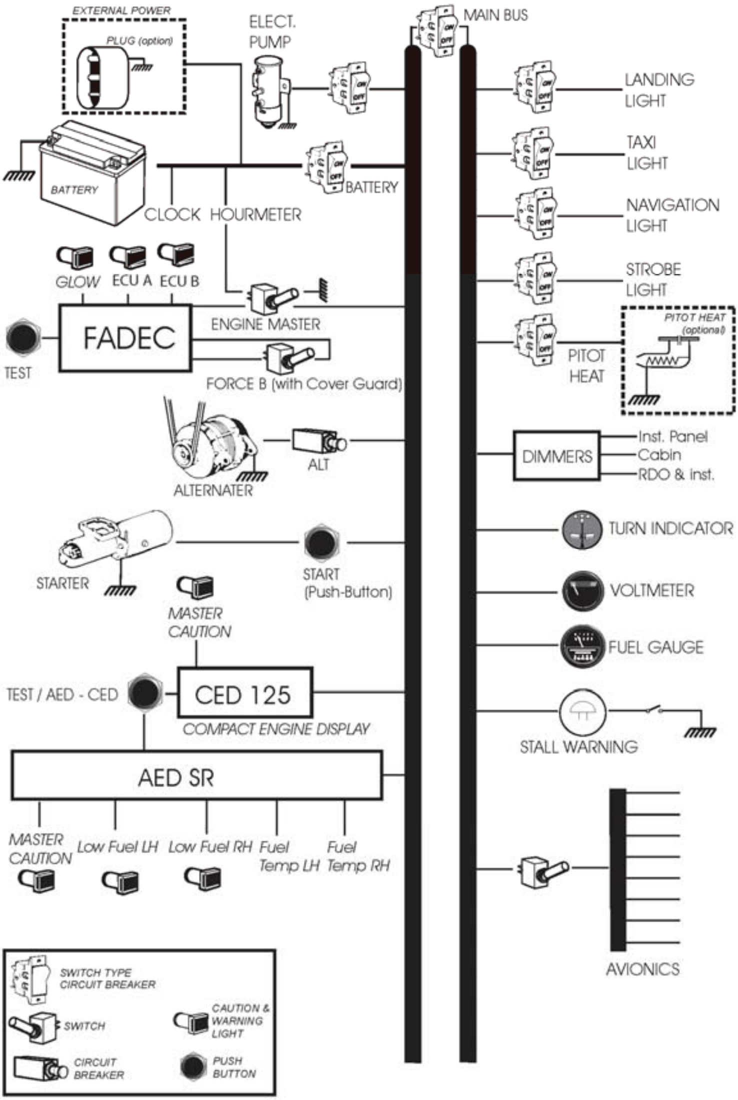


Figure1-4a Basic Wiring of the Electrical System with Circuit Breaker Alternator

FADEC-RESET (from Software 2.7 on and following)

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

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

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

COOLING

The TAE 125 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 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 lamp "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 1-5a.
In normal operation the control knob “Shut-off Cabin Heat” must be OPEN, with the control knob “Cabin Heat” the supply of warm air into the cabin can be controlled.
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.

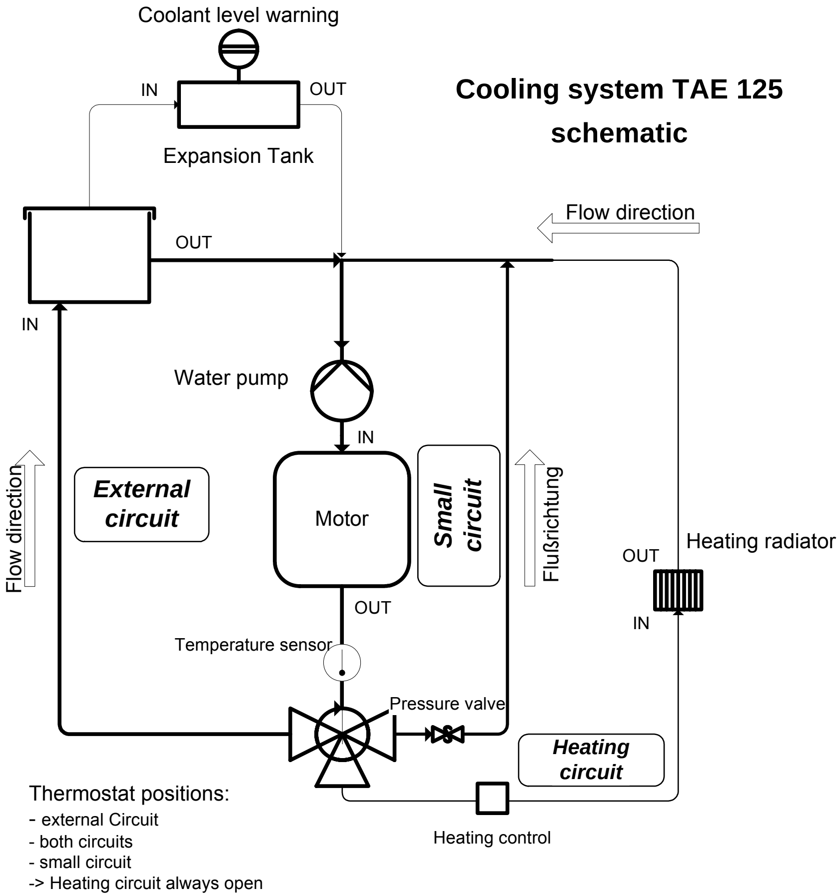


Figure1-5a Cooling system TAE 125

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Section 2
LIMITATIONS

WEIGHT LIMITS

Normal Category Cessna 172 N:

Maximum Ramp Weight: .... 2302 lbs (1044 kg)
Maximum Takeoff Weight: .... 2300 lbs (1043 kg)
Maximum Landing Weight......................... 2300 lbs (1043 kg)

Utility Category Cessna 172 N:

Maximum Ramp Weight: .... 2002 lbs (908 kg)
Maximum Takeoff Weight: .... 2000 lbs (907 kg)
Maximum Landing Weight........................... 2000 lbs (907 kg)

Normal Category Cessna 172 P:

Maximum Ramp Weight: .... 2402 lbs (1090 kg)
Maximum Takeoff Weight: .... 2400 lbs (1089 kg)
Maximum Landing Weight......................... 2400 lbs (1089 kg)

Utility Category Cessna 172 P:

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

MANEUVER LIMITS

Normal Category: No change

Utility Category: The following maneuvers are prohibited:

- intentionally initiating spins
- intentionally initiating negative-G flights

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

ENGINE OPERATING LIMITS

Engine manufacturer:	Thielert Aircraft Engines GmbH
Engine model:	TAE 125-01 or TAE 125-02
Take-off and Max. continuous power:	99 kW (135 HP)
Take-off and Max. continuous RPM:	2300

◆ Note: All revolution data of this POH supplement are related to the propeller speed, unless otherwise stated.

Engine operating limits for takeoff and continuous operation:

◆ 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.

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

Min. oil temperature (engine starting temperature):	- 30 °C
Min. oil temperature (minimum operating limit temperature):	50 °C
Maximum oil temperature:	140 °C
Min. cooling water temp. (engine starting temperature):	- 30 °C
Min. cooling water temp. (min. operating limit temperature):	60 °C
Max. cooling water temperature:	105 °C
Min. gearbox temperature	-30 °C
Max. gearbox temperature:	120 °C

Min. fuel temperature limits in the fuel tank:

Fuel	Minimum permissible fuel temperature in the fuel tank before Take-off	Minimum permissible fuel temperature in the fuel tank during the flight
Jet A-1, JET-A	-30°C	-35°C

Tab. 2-3a Minimum fuel temperature limits in the fuel tank

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

Minimum oil pressure:	1.0 bar
Minimum oil pressure (at Take-off power)	2.3 bar
Minimum oil pressure (in flight)	2.3 bar
Maximum oil pressure	6.0 bar
Maximum oil pressure (cold start < 20 sec.):	6.5 bar
Maximum oil consumption:	0.1 quart/h (0.1 l/h)

ENGINE INSTRUMENT MARKINGS

The engine data of the TAE 125 installation 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.

Instrument		Red range	Yellow range	Green range	Yellow range	Red range
Tachometer	[RPM]	-------	-------------	0-2300	------------	> 2300
Oil pressure	[mbar]	0-1200	1200-2300	2300-5200	5200-6000	> 6000
Coolant temperature	[°C]	< -32	-32 ..+ 60	60-101	101-105	> 105
Oil temperature	[°C]	< -32	-32 ..+ 50	50-125	125-140	> 140
Gearbox temperature	[°C]	-------	-------------	< 115	115-120	> 120
Load	[%]	-------	-------------	0-100	------------	---------

Tab. 2-3b Markings of the engine instruments

◆ Note: If an engine reading is in the yellow or red range, the “Caution” lamp. is activated.
It only extinguishes when the “CED-Test/Confirm” button is pressed. If this button is pressed longer than a second, a selftest of the instrument is initiated.

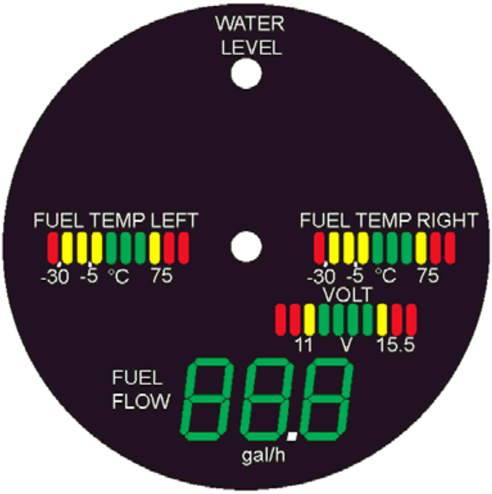

Figure 2-1a AED 125 SR

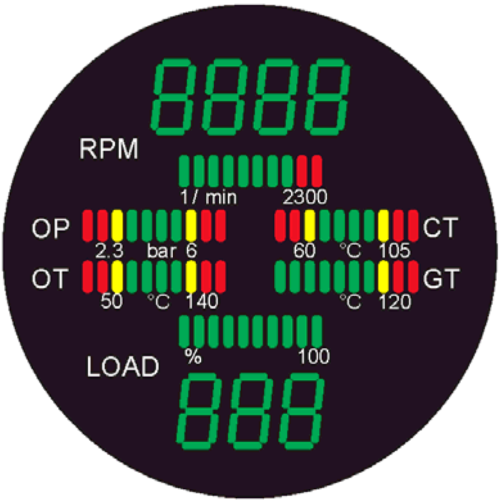

Figure 2-1b CED 125

PERMISSIBLE FUEL GRADES

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

Fuel:.................................... Jet A and JET A-1 (ASTM 1655)

MAXIMUM FUEL QUANTITIES

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

Fuel Capacity				
Tanks		Total Usable Fuel	Total Unusable Fuel	Total Capacity
N & P	2 Standard-Tanks: each 72.85 l (19.25 US gal)	134.3 l (35.5 US gal)	11.4 l (3 US gal)	145.7 l (38.5 US gal)
N & P	2 Long-Range-Tanks: each 91.2 l (24.1 US gal)	167.3 l (44.2 US gal)	15.1 l (4 US gal)	182.4 l (48.2 US gal)

■ CAUTION: To prevent air from penetrating into the fuel system avoid flying the tanks dry. As soon as the “Low Level” Warning Lamp 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 2.6 US gal (10 l) usable fuel, the “Fuel L” or “Fuel R” Warning Lamp illuminates respectively.

PLACARDS

Near the fuel tank caps:

With standard tanks:

"JET A/ JET A-1"
"CAP. 67.15 LITER (17.75 U.S. GAL.) USABLE TO BOTTOM OF FILLER INDICATOR TAB"

With long-range tanks:

"JET A/ JET A-1"
"CAP. 83.65 LITER (22.1 U.S. GAL.) USABLE TO BOTTOM OF FILLER INDICATOR TAB"

At the fuel sector valve:

With standard tanks:

Left and Right position: 67.15 Ltr / 17.75 gal
Both position: 134.3 Ltr/ 35.5 gal

With standard tanks:

Left and Right position: 67.15 Ltr / 22.1 gal
Both position: 167.3 Ltr/ 44.2 gal

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

„Oil, see POH supplement"

Next to the Alternator Warning Lamp:

„Alternator"

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

„ATTENTION 12 V DC OBSERVE CORRECT POLARITY"

OR

„ATTENTION 24 V DC OBSERVE CORRECT POLARITY"

Section 3
EMERGENCY PROCEDURES
INDEX OF CHECKLISTS

GENERAL

▲ WARNING: Due to an engine shut-off or a FADEC diagnosed failure 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, climb flights can be performed at 65KIAS / 75 mph and a power setting of 100%.

ENGINE MALFUNCTION

DURING TAKE-OFF (WITH SUFFICIENT RUNWAY AHEAD)

- Take-off abort -

(1) Thrust Lever – IDLE
(2) Brakes – APPLY
(3) Wing flaps (if extended) – RETRACT to increase the braking effect on the runway
(4) Engine Master – OFF
(5) Alternator Circuit Breaker , Switches “Main Bus” and “Battery” – OFF

IMMEDIATELY AFTER TAKE-OFF

- Take-off abort -

If there is an engine malfunction after take-off, at first lower the nose to keep the airspeed and attain gliding attitude. In most cases, landing should be executed straight ahead with only small corrections in direction 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 – OFF
(4) Wing flaps – as required (40° recommended)
(5) Alternator Circuit Breaker , Switches “Main Bus” and “Battery” – OFF

DURING FLIGHT

◆ Note: Flying a tank dry activates both FADEC lamps flashing.

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

(1) Immediately switch the Fuel Selector to tank with sufficient fuel quantity, if optional BOTH selector is installed, switch to the position BOTH

(2) Electrical Fuel Pump – ON

(3) Check the engine (engine parameters, airspeed/altitude change, whether the engine responds to changes in the Thrust Lever position).

(4) If the engine acts normally, continue the flight to the next airfield or landing strip.

▲ **WARNING**: The high-pressure pump must be checked 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) If possible, airspeed between 65 and 85 KIAS

(2) If possible, glide below 13000 ft

(3) Fuel Selector to tank with sufficient fuel quantity (LEFT or RIGHT) , if optional BOTH selector is installed, switch to the position BOTH

(4) Electrical Fuel Pump – ON

(5) Thrust Lever – IDLE

(6) Engine Master OFF, then ON (if the propeller does not turn, then additionally Starter ON

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

◆ 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 0% even if the propeller is turning.

FADEC MALFUNCTION IN FLIGHT

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

a) One FADEC Lamp is flashing

(1) Press FADEC-Testknob at least 2 seconds (refer to Section 1 “FADEC-Reset”)

(2) FADEC Lamp extinguished (LOW warning category):
   a) Continue flight normally,
   b) Inform service center after landing.

(3) FADEC Lamp steady illuminated (HIGH warning category):
   a) Observe the other FADEC lamp,
   b) Fly to the next airfield or landing strip,
   c) Select airspeed to avoid overspeed
   d) Inform service center after landing.

b) Both FADEC Lamps are flashing

◆ Note: The Load Display may not correspond to the current value.

(1) Press FADEC-Testknob at least 2 seconds (refer to Section 1 “FADEC-Reset”)

(2) FADEC Lamps extinguished (LOW warning category):
  a) Continue flight normally,
  b) Inform service center after landing.

(3) FADEC Lamps steady illuminated (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 overspeed.
    ii. Fly to the next airfield or landing strip.
    iii. Be prepared for an emergency landing.
  d) Inform service center after landing.

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

(1) Immediately switch the Fuel Selector to tank with sufficient fuel quantity, if the BOTH option is installed, select the fuel selector position BOTH.

(2) Electrical Fuel Pump – ON

(3) Select an airspeed to avoid overspeed.

(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 normally, continue the flight to the next airfield or landing strip.

c) Abnormal Engine Behavior

If the engine acts abnormally 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 overspeed.

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

(3) Flight may be continued, but the pilot should
  i. Select an appropriate airspeed to avoid overspeed.
  ii. Fly to the next airfield or landing strip
  iii. Be prepared for an emergency landing

FIRES

ENGINE FIRE WHEN STARTING ENGINE ON GROUND

(1) Engine Master – OFF

(2) Fuel Selector – OFF

(3) Electrical Fuel Pump – OFF

(4) Switch "Battery" – OFF

(5) Extinguish the flames with a fire extinguisher, wool blankets or sand

(6) Examine the fire damages thoroughly and repair or replace the damaged parts before the next flight

ENGINE FIRE IN FLIGHT

(1) Engine Master – OFF

(2) Fuel Selector – OFF

(3) Select an appropriate airspeed to avoid overspeed

(4) Electrical Fuel Pump – OFF (if in use)

(5) Switch "Main Bus" – OFF

(6) Shut-off Cabin Heat – CLOSE

(7) Perform emergency landing (as described in the procedure „Emergency Landing With Engine Out")

ELECTRICAL FIRE IN FLIGHT

The first signs of an electrical fire is usually the odour of burning or smouldering insulation. Proceed as follows:

(1) Switch Main Bus – OFF

(2) Avionics Power Switch – OFF

(3) Fresh air jets – open

(4) Shut-off Cabin Heat – OFF (push for OFF)

(5) Land as quickly as possible.

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 appropriate airspeed to avoid overspeed

(2) Engine Master – OFF

(3) Fuel Selector – OFF

(4) Electrical Fuel Pump – OFF (if in use)

(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

<u>EMERGENCY LANDING WITH ENGINE OUT</u>

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

(1) Airspeed

    i. 65 KIAS (flaps retracted)

    ii. 60 KIAS (flaps extended)

(2) Fuel Selector – OFF

(3) Engine Master – OFF

(4) Wing Flaps – as required (40° is recommended)

(5) Circuit Breaker "Alternator", Switches "Main Bus" and "Battery" – OFF

(6) Cabin Doors – unlock before touch-down

(7) Touch-down – slightly nose up attitude

(8) Brake firmly

◆ Note: Gliding Distance. Refer to Figure 3-1 „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 unexplained 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 side.

(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) Open left window, if practical, scrape ice from a portion of the windshield for visibility in the landing approach.

(10) Perform a landing approach using a forward slip, if necessary, for improved visibility.

(11) Approach at 65 to 75 KIAS depending upon the amount of the accumulation.

(12) 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 e 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

◆ Note: The TAE125 requires a voltage source for its operation. If the alternator fails, the engine's further running time is dependant upon the battery and switched-on equipment. A remaining engine operating time of about 120 minutes has been shown for an old battery based upon the following assumptions:

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
GPS	ON	60	50
Transponder	ON	120	100
Fuel Pump	OFF	0	0
AED-125	ON	120	100
Battery Ignition Relay	ON	120	100
CED-125	ON	120	100
Landing Light	ON	12	10
Flood Light	ON	1,2	1,0
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
Turn Coordinator	OFF	0	0
Engine Control	ON	120	100

◆ Note: This table only gives a reference point. The pilot should select equipment, which is not absolutely necessary, depending upon the situation. If deviated from this recommendation, the remaining engine operating time may change.

ALTERNATOR WARNING LAMP ILLUMINATES DURING NORMAL

ENGINE OPERATION

(1) Ammeter – CHECK

(2) Circuit Breaker "Alternator" CHECK – ON

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

(3) Nonessential Electrical Equipment (eg. Blower, Lights, Heater, Autopilot) – OFF

(4) Flight may be continued, but the pilot should

i. Fly to the next airfield or landing strip

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

(1) Circuit Breaker "Alternator" CHECK – ON

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

(2) Nonessential Electrical Equipment – OFF

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

i. Fly to the next airfield or landing strip

ii. Be prepared for an emergency landing

iii. 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 tank with sufficient fuel quantity and temperature

(3) Electrical Fuel Pump – ON

(4) Reduce airspeed to 65-85 KIAS (max. 100 KIAS)

(5) Check engine parameters (FADEC lamps, oil pressure and temperature, fuel quantity)

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

i. Fly to the next airfield or landing strip

ii. Be prepared for an emergency landing

iii. Expect an engine failure

ICE FORMATION IN THE CARBURETOR

- N/A, since this is a Diesel engine -

SOILED SPARK PLUGS

- N/A, since this is a Diesel engine -

IGNITION MAGNET MALFUNCTIONS

- N/A, since this is a Diesel engine -

OIL PRESSURE TOO LOW
(< 2.3 bar IN CRUISE OR < 1.2 bar AT IDLE):

(1) Reduce power as quickly as possible

(2) Check oil temperature: If the oil temperature is high or near operating limits,

   i. Fly to the next airfield or landing strip

   ii. Be prepared for an emergency landing

   iii. Expect an engine failure

◆ Note: During warm-weather operation or longer climbouts at low airspeed engine temperatures could rise into the yellow range and trigger the “Caution” lamp. This warning allows the pilot to avoid overheating of the engine as follows:

(1) Increase the climbing airspeed

(2) Reduce power, if the engine temperatures approache the red area.

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 < 1.0 bar at idle),

   i. Fly to the next airfield or landing strip

   ii. Be prepared for an emergency landing

   iii. Expect an engine failure

(3) If the oil pressure is in the normal range

   i. Fly to the next airfield or landing strip

COOLANT TEMPERATURE "CT" TOO HIGH (red range):

(1) Increase airspeed and reduce the power as quickly as possible

(2) Cabin Heat – COLD

(3) If this reduces the coolant temperature to within the normal operating range quickly, continue to fly normally and observe coolant temperature. Cabin heat as required.

(4) As far as this does not cause the coolant temperature to drop,

   i. Fly to the next airfield or landing strip
   ii. Be prepared for an emergency landing
   iii. Expect an engine failure

LAMP "Water Level" ILLUMINATES

(1) Increase airspeed and reduce the power as quickly as possible

(2) Coolant temperature "CT" check and observe

(3) Oil temperature "OT" check and observe

(4) As far as coolant temperature and/or oil temperature are rising into yellow or red range,

   i. Fly to the next airfield or landing strip
   ii. Be prepared for an emergency landing
   iii. Expect an engine failure

GEARBOX TEMPERATURE "GT" TOO HIGH (red range):
(antifriction bearing temperature of the propeller shaft is too high)

(1) Reduce power to 55% – 75% as quickly as possible

(2) Fly to the next airfield or landing strip

PROPELLER RPM TOO HIGH:

with 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

(3) At reduced propeller RPM and engine power fly to the next airfield or landing strip

◆ Note: If the propeller speed control fails, climb flights can be performed at 65KIAS / 75 mph 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 2500rpm.

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, reduce power to 55% – 75% or select a power level where the propeller RPM fluctuations are minimum and fly to the next airfield or landing strip at an airspeed below 110 KIAS.

Section 4
Normal Procedures

PREFLIGHT INSPECTION

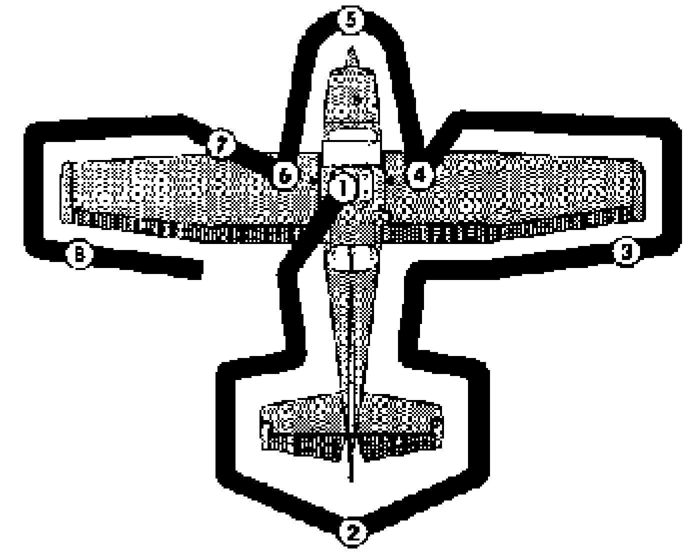

Figure 4-1a Preflight Inspection

◆ 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)

b) Pilot´s Operating Handbook – AVAILABLE IN THE AIRPLANE.
c) Control Wheel Lock - REMOVE.
d) “Engine Master” – OFF.
e) Avionics Power Switch – OFF.
f) „Shut-off Cabin Heat“ - OPEN

▲ **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” was on.

g) Battery and Main Bus switches – ON ,
Fuel Quantity Indicators and Fuel Temperature CHECK ,
Lamp “Water Level” – CHECK OFF
Battery and Main Bus switches - OFF
h) Entry in log-book concerning type of fuel filled - CHECK
i) Static Pressure Alternate Source Valve - CHECK
j) Fuel Selector Valve - tank with sufficient fuel quantity
k) Fuel Shut-off Valve – ON (Push Full In)
l) Baggage Door – CHECK, lock with key if the child's seat is supposed to be occupied.

(2)

a) Rudder Gust Lock (if attached) - REMOVE
b) Tail Tie-Down - DISCONNECT
c) Control Surfaces - CHECK freedom of movement and security

(3)

a) Aileron - CHECK freedom of movement and security

(4)

a) Wing Tie-Down - DISCONNECT
b) Main Wheel Tire - CHECK for proper inflation
c) Before first flight of the day and after each refueling – DRAIN the Fuel Tank Sump Quick Drain Valve with the sampler cup

and CHECK for water, sediment and the right type of fuel (Jet A or JET A-1) based on the fuel colour.

d) Fuel Quantity – CHECK VISUALLY for desired level not above marking in fuel filler

e) Fuel Filler Cap – SECURE

(5)

a) 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 (Jet A or JET A-1) 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.

b) 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 .

c) Oil Level - CHECK, do not take off with less than 4.5 l.

d) Propeller and Spinner – CHECK for nicks and security

e) Landing Light - CHECK for condition and cleanliness

f) Gearbox Oil Level - CHECK the oil has to cover at least half of the inspection glass

g) Nose Wheel Strut and Tire CHECK for proper inflation

h) Nose Wheel Tie-Down – DISCONNECT

i) Left Static Source Opening - CHECK for stoppage

(6)

a) Main Wheel Tire - CHECK for proper inflation

b) Before first flight of the day and after each refueling – DRAIN the Fuel Tank Sump Quick Drain Valve with the sampler cup and CHECK for water, sediment and the right type of fuel (Jet A or JET A-1).

c) Fuel Quantity – CHECK VISUALLY for desired level not above marking in fuel filler

d) Fuel Filler Cap – SECURE

(7)

a) Pitot Tube Cover (if mounted) – REMOVE and CHECK for pitot stoppage
b) Fuel Tank Vent Opening - CHECK for stoppage.
c) Stall Warning Opening - CHECK for stoppage.
d) Wing Tie-Down - DISCONNECT

(8)

a) Aileron - CHECK freedom of movement and security

BEFORE STARTING ENGINE

(1) Preflight Inspection - COMPLETE (Figure 4-1a)

(2) Seats, Seat and Shoulder Belts - ADJUST and LOCK

(3) Fuel Selector Valve - SET to tank with sufficient fuel quantity or to the BOTH position if this option is installed

(4) Fuel Shut-off Valve – ON (Push Full In)

(5) Avionics Power Switch, Autopilot (if installed) and Electrical Equipment - OFF

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

(6) Brakes - CHECK , Parking Brake - SET.

(7) Circuit Breakers (including CB Alternator)- CHECK IN

(8) Alternate Air Door – CLOSED

(9) Battery and Main Bus Switches - ON, Fuel Quantity and Temperature – CHECK

■ 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.

(10) Thrust Lever - CHECK for freedom of movement

(11) Load Display - CHECK 0% at Propeller RPM 0

STARTING ENGINE

▲ **WARNING**: It is not allowed to start up the engine using external power.

(1) Electrical Fuel Pump - ON

(2) Thrust Lever – IDLE

(3) Area Aircraft / Propeller – CLEAR

(4) “Engine Master” - ON , wait until the Glow Control Lamp extinguishes

(5) Starter – ON
Release when engine starts, leave Thrust Lever in idle

(6) CED-Test Knob – PRESS (to delete Caution Lamp)

(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) Ammeter – CHECK for positive charging current

(9) Voltmeter – CHECK for green range

(10) Avionics Power Switch - ON

(11) Radios - ON

(12) Electrical Fuel Pump - OFF

WARM UP

(1) Let the engine warm up about 2 minutes at 890 RPM.

(2) Increase RPM to 1,400 until Oil Temperature 50°C, Coolant Temperature 60°C.

BEFORE TAKE-OFF

(1) Parking Brake - SET

(2) Cabin Doors and Windows - CLOSED and LOCKED

(3) Flight Controls – FREE and CORRECT

(4) Flight Instruments - CHECK and SET

(5) Fuel Selector Valve - SET to tank with sufficient fuel quantity or to the BOTH position if this option is installed. The fuel temperature

◆ Note: If the optional LEFT,RIGHT, BOTH fuel selector is installed it is recommenced to select the BOTH position

(6) Elevator Trim and Rudder Trim (if installed) – SET for Take-off

(7) FADEC and propeller adjustment function check:

a) Thrust Lever - IDLE (both FADEC lamps should be OFF)

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

c) Both FADEC Lamps – ON, RPM increases

▲ **WARNING**: If the FADEC lamps 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 lamp is ON).

e) The propeller control is excited, RPM decreases

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

g) The propeller control is excited, RPM decreases

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

i) FADEC Test Button - RELEASE.

◆ 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.

▲ **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 lamps are flashing, take off is prohibited. This applies even if the engine seems to run without failure after the test.

(8) Thrust Lever – FULL FORWARD, load display min. 94%, RPM 2240 - 2300

(9) Thrust Lever - IDLE

(10) Engine Instruments and Ammeter - CHECK

(11) Suction gage - CHECK

(12) Wing Flaps – SET 0° or 10°

(13) Electrical Fuel Pump - ON

(14) Radios and Avionics - ON

(15) Autopilot (if installed) – OFF

(16) Air Conditioning (if installed) – OFF

(17) Thrust Lever Friction Control - SET

(18) Brakes - RELEASE

TAKEOFF

NORMAL TAKEOFF

(1) Wing Flaps – 0° or 10° (refer to page 4-14, "Wing Flap Positions")

(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° (refer to page 4-10, "Wing Flap Positions")

(2) Brakes - APPLY

(3) Thrust Lever – FULL FORWARD

(4) Brakes - RELEASE

(5) Airplane Attitude – SLIGHTLY TAIL LOW

(6) Elevator Control – LIFT NOSE WHEEL at 44 KIAS

(7) Climb Speed – 59 KIAS (until all obstacles are cleared).

AFTER TAKEOFF

(1) Altitude about 300 ft, Airspeed more than 65 KIAS: Wing Flaps - RETRACT

(2) Electrical 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: If the optional LEFT,RIGHT, BOTH fuel selector is installed it is recommenced to select 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

(2) Elevator trim and Rudder trim (if installed) – ADJUST

(3) Compliance with Limits for Oil Pressure, Oil Temperature, Coolant Temperature and Gearbox Temperature (CED 125 and Caution Lamp) - MONITOR constantly

(4) Fuel Quantity and Temperature (Display and LOW LEVEL warning lamps) - MONITOR . Select the other fuel tank approximately every 30 minutes to empty and heat both tanks equally. (observe Section 2 „Operating Limits“ Chapter „Engine Operating Limits“). The described LEFT, RIGHT alternating operation can also have benefits, even if the optional BOTH position is installed, in slip or skids flight conditions to ensure a balanced emptying of the fuel tanks and a balanced fuel warming.

■ 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 Warning Lamps MONITOR

DESCENT

(1) Fuel Selector Valve – SET to tank with sufficient fuel quantity (LEFT or RIGHT)

◆ Note: If the optional LEFT,RIGHT, BOTH fuel selector is installed it is recommenced to select the BOTH position. The fuel temperatures have to be monitored.

(2) Power - AS DESIRED

BEFORE LANDING

(1) Seats, Seat and Shoulder Belts - ADJUST and SECURE or LOCK

(2) Fuel Selector Valve – SET to tank with sufficient fuel quantity

◆ Note: If the optional LEFT,RIGHT, BOTH fuel selector is installed it is recommenced to select the BOTH position. The fuel temperatures have to be monitored.

(3) Electrical Fuel Pump - ON

(4) Autopilot (if installed) –OFF

(5) 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°-30° below 85 KIAS)

(3) Airspeed in Final Approach:
- wing flaps 20°: 63 KIAS
- wing flaps 30°: 60 KIAS

(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 (wing flaps UP)

(2) Wing Flaps - 30°

(3) Airspeed in the Final Approach - 60 KIAS (until flare)

(4) Power - IDLE after clearing all obstacles

(5) Touchdown – MAIN WHEELS FIRST

(6) Brakes – APPLY HEAVILY

(7) Wing Flaps - RETRACT

BALKED LANDING

(1) Thrust Lever – FULL FORWARD

(2) Wing Flaps 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) Electrical Fuel Pump - OFF

SECURING AIRPLANE

(1) Parking Brake - SET

(2) Thrust Lever - IDLE

(3) Avionics Power Switch, Electrical Equipment, Autopilot (if installed) – OFF

(4) Main Bus switch – OFF

(5) “Engine Master” – OFF

(6) Battery Switch –OFF

(7) Control Lock – INSTALL

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” 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/push button “Starter” controls the Starter.

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 TAKEOFF

WARM UP

Let the engine run at propeller RPM of 1,400 to ensure normal operation of the TAE 125 until it reaches an Engine Oil Temperature of 50°C (green area) and a Coolant Temperature of 60°C (green area).

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:

Pull the alternator Circuit breaker 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 the alternator circuit breaker has to be pushed in again.

TAKEOFF

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 takeoff. If this occurs, you are justified in making a thorough full load static runup before another takeoff 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 69 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 Figure 5-7a or 5-7b.

LANDING

NORMAL LANDING

Remarks in Pilot´s Operating Handbook concerning carburetor pre-heating are **N/A**

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.

CARBURETOR ICING

N/A since this is a Diesel engine

FLIGHT IN HEAVY RAIN

N/A since no special procedures are necessary for heavy rain.

COLD WEATHER OPERATION

The following limitations for cold weather operation are established due to temperature
(Refer Section 2 „Limitations“ also)

Fuel	Minimum permissible fuel temperature in the fuel tank before Take-off	Minimum permissible fuel temperature in the fuel tank during the flight
Jet A-1, JET-A	-30°C	-35°C

Tab. 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.

◆ 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.

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

HOT WEATHER OPERATION

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

i. increase climbing speed

ii. 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, if installed.

Section 5
PERFORMANCE

MAXIMUM TAKE-OFF WEIGHTS

▲ **WARNING**: The Maximum Take-Off Weights have to be regarded.

Cessna 172 N:

Maximum Take-Off Weight Normal category ... 2300 lbs (1043 kg)
Maximum Take-Off Weight Utility category .... 2000 lbs (907 kg)

Cessna 172 P:

Maximum Take-Off Weight Normal category ... 2400 lbs (1089 kg)
Maximum Take-Off Weight Utility category .... 2100 lbs (953 kg)

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 – Cessna 172 N

Takeoff Weight	2300 lbs (1043 kg)
Usable Fuel	134.3 l (35.5 US gal)
Type of Fuel Selected	Jet A-1

TAKEOFF CONDITIONS

Field Pressure Altitude	1,000 ft
Temperature	28°C (15°C above ISA)
Wind Component along Runway	12 Knot Headwind
Field Length	1,067 m (3500 ft)

CRUISE CONDITIONS

Total Distance	852 km (460 NM)
Pressure Altitude	6,000 ft
Temperature	23 °C (20 °C above ISA)
Expected Wind Enroute	10 Knot Headwind

LANDING CONDITIONS

Field Pressure Altitude	2000 ft

Temperature	25 °C
Field Length	914 m (3000 ft)
Total Calculated Fuel Required:	
- Engine Start, Taxi and Takeoff	1 l (0.3 US gal)

TAKEOFF

The takeoff distance chart, Figure 5-4a (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 1,043 kg (2300 lbs), pressure altitude of 1000 ft and a temperature of ISA+20°C should be used and results in the following:

Ground Roll	300 m (984 ft)
Total Distance to clear a 15 m obstacle	616 m (2021 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:

$$\frac{12KN}{9KN} \times 10\% = 13\% \text{ Decrease}$$

This results in the following distances, corrected for wind:

Ground Roll, zero wind	300 m (984 ft)
Decrease at 12 Knot Headwind (300 m x 13%) =	-39 m (128 ft)
Corrected Ground Roll	261 m (856 ft)
Total Distance to clear a 15 m obstacle, zero wind	616 m (2021 ft)
Decrease at 12 Knot Headwind (616 m x 13%) =	-80 m (-262 ft)
Corrected Total Distance to clear a 15 m obstacle	536 m (1759 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 5-7a to 5-7d. Considerable fuel savings and longer range result when lower power settings are used.
Figure 5-7a shows a range of 751 NM at zero wind, a power setting of 70% and altitude of 6,000 ft.
With an expected headwind of 10 Knot at 6,000 ft altitude the range has to be corrected as follows:

Range at zero wind (standard tanks)	751 NM
Reduction due to Headwind	(7.2 h x 10 Knot)= 72NM
Corrected Range	679 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 5-7a is based upon a pressure altitude of 6,000 ft and a temperature of 20°C above ISA temperature, according to Note 2 true airspeed and maximum range are increased by 2 %.
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:	106 kt
Fuel Consumption in cruise:	18.6l/h (4.9 US gal/h)

FUEL REQUIRED

The total fuel requirement for the flight may be estimated using the performance information in Figures 5-6 and 5-7. For this sample problem, Figure 5 6a shows that a climb from 1,000 ft to 6,000 ft requires 4.4 l (1.14 US gal) of fuel. The corresponding distance during the climb is 10,7 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 5-6a/5-6b. An effect of 10°C above the standard temperature is to increase time and distance by 10% and the time and above 10,000ft by 5% due to the lower rate of climb.
In this case, assuming a temperature 20°C above standard, the correction would be:

$$\frac{20°C}{10°C} \times 10\% = 20{,}0\% \quad \text{Increase}$$

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

Fuel to climb, standard temperature	4.4 l (1.14 US gal)
Increase due to non-standard temperature 4.4 l (1.14 US gal) x 20,0% =	0.9 l (0.2 US gal)
Corrected fuel to climb	5.3 l (1.34 US gal)

Using a similar procedure for the distance to climb results in 11,3 NM.

The resultant cruise distance is:

Total Distance	460.0 NM
Climbout Distance	-11.3 NM
Cruise Distance	448.7 NM

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

106	Knot
-10	Knot
96	Knot

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

$$\frac{448{,}7NM}{96KN} = 4{,}7h$$

The fuel required for cruise is:

4.7 h x 18.6 l/h = 87.4 l (23.1 US gal)

The total estimated fuel required is as follows:

Engine Start, Taxi and Takeoff	1.00 l (0.30 US gal)
Climb	+ 5.30 l (1.34 US gal)
Cruise	+87.40 l (23.10 US gal)
Total fuel required	93.70 l (24,74 US gal)

This gives with full tanks a reserve of:

134.30 l (35.50 US gal)
-93.70 l (24,74 US gal)
40.60 l (10.76 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.

TAKEOFF DISTANCE

SHORT FIELD TAKEOFFS

Conditions:
Flaps 10°
Full Power Prior to Brake Release
Paved, level, dry runway
Zero Wind
Lift Off: 44 KIAS
Speed at 15 m: 58 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 additionals for wet grass runway, softened ground or snow

Takeoff Distance at 1043 kg

Pressure Altitude	ISA		ISA +10°C		ISA +20°C		ISA +30°C	
	Ground Roll	Total Distance to clear a 15m obstacle	Ground Roll	Total Distance to clear a 15m obstacle	Ground Roll	Total Distance to clear a 15m obstacle	Ground Roll	Total Distance to clear a 15m obstacle
(ft)	(m)	(m)	(m)	(m)	(m)	(m)	(m)	(m)
NN	252	520	267	551	288	593	311	643
1000	265	547	281	578	300	616	325	670
2000	279	573	295	606	313	641	339	697
3000	293	601	310	634	327	669	353	725
4000	308	630	325	665	343	700	367	754
5000	323	660	341	696	359	733	382	784
6000	338	691	357	729	375	767	397	814
7000	373	774	393	815	412	856	432	901
8000	395	823	415	867	435	910	454	953

Figure 5-4a Takeoff Distance at take-off weight 1,043 kg

Takeoff Distance at 940 kg

Pressure Altitude	ISA		ISA +10°C		ISA +20°C		ISA +30°C	
	Ground Roll	Total Distance to clear a 15m obstacle	Ground Roll	Total Distance to clear a 15m obstacle	Ground Roll	Total Distance to clear a 15m obstacle	Ground Roll	Total Distance to clear a 15m obstacle
(ft)	(m)	(m)	(m)	(m)	(m)	(m)	(m)	(m)
NN	195	406	207	429	224	461	242	500
1000	205	426	219	450	234	480	254	521
2000	217	447	230	472	245	500	266	543
3000	229	468	243	495	257	522	278	566
4000	241	491	256	519	270	548	291	590
5000	253	515	269	545	284	574	304	614
6000	267	540	283	571	298	602	317	640
7000	295	603	312	637	328	671	346	707
8000	313	642	331	678	348	713	365	749

Figure 5-4b Takeoff Distance at take-off weight 940 kg

Takeoff Distance at 1089 kg (Cessna 172P only)

Pressure Altitude	ISA		ISA +10°C		ISA +20°C		ISA +30°C	
	Ground Roll	Total Distance to clear a 15m obstacle	Ground Roll	Total Distance to clear a 15m obstacle	Ground Roll	Total Distance to clear a 15m obstacle	Ground Roll	Total Distance to clear a 15m obstacle
(ft)	(m)	(m)	(m)	(m)	(m)	(m)	(m)	(m)
NN	271	535	287	566	304	599	321	633
1000	285	562	302	596	319	630	337	665
2000	300	591	317	627	336	663	354	700
3000	315	622	334	659	354	698	373	736
4000	332	655	352	694	373	736	392	775
5000	349	689	370	731	393	775	413	815
6000	368	726	390	770	414	817	435	859
7000	388	766	411	811	436	861	458	905
8000	421	808	434	854	459	907	482	952

Figure 5-4c Takeoff Distance at take-off weight 1,043 kg

Takeoff Distance at 970 kg

Pressure Altitude	ISA		ISA +10°C		ISA +20°C		ISA +30°C	
	Ground Roll	Total Distance to clear a 15m obstacle	Ground Roll	Total Distance to clear a 15m obstacle	Ground Roll	Total Distance to clear a 15m obstacle	Ground Roll	Total Distance to clear a 15m obstacle
(ft)	(m)	(m)	(m)	(m)	(m)	(m)	(m)	(m)
NN	205	405	217	429	230	454	243	480
1000	216	426	229	451	242	477	255	504
2000	227	448	240	475	255	503	269	530
3000	239	471	253	499	268	529	282	558
4000	251	496	266	526	282	557	297	587
5000	264	522	280	554	297	587	313	618
6000	278	550	295	583	313	619	329	650
7000	292	579	310	614	329	653	345	684
8000	307	610	326	646	346	688	362	720

Figure 5-4d Takeoff Distance at take-off weight 940 kg

MAXIMUM RATE-OF-CLIMB

Conditions:

Takeoff weight 1,043 kg
Climb speed v_y = 69 KIAS
Flaps Up
Full Power

Pressure altitude (ft)	Rate of climb (ft/min)			
	ISA	ISA +10°C	ISA +20°C	ISA +30°C
NN	625	622	613	600
1000	622	614	601	583
2000	616	603	585	563
3000	605	587	565	538
4000	590	568	542	510
5000	570	544	515	473
6000	547	517	485	445
7000	521	487	452	409
8000	491	454	417	371
9000	458	419	379	331
10000	452	382	341	291
11000	385	343	301	250
12000	346	303	261	210
13000	306	263	222	171
14000	265	223	183	134
15000	225	184	146	101
16000	186	146	111	70
17000	148	111	79	44

Figure 5-5a Maximum Rate of Climb

MAXIMUM RATE-OF-CLIMB Cessna 172P

Conditions:

Takeoff weight 1,089 kg
Climb speed v_y = 69 KIAS
Flaps Up
Full Power

Pressure altitude (ft)	Rate of climb (ft/min)			
	ISA	ISA +10°C	ISA +20°C	ISA +30°C
NN	602	600	582	559
1000	595	584	561	535
2000	582	564	538	509
3000	565	541	512	481
4000	545	515	485	451
5000	522	487	456	420
6000	496	458	425	389
7000	468	428	395	357
8000	438	397	363	325
9000	407	366	332	293
10000	374	334	301	262
11000	341	302	270	231
12000	307	271	239	201
13000	274	240	210	173
14000	240	211	181	146
15000	207	182	154	121
16000	176	154	128	97
17000	146	129	104	75

Figure 5-5b Maximum Rate of Climb C172P

TIME, FUEL AND DISTANCE TO CLIMB AT 1,043KG

Conditions:

Takeoff weight 1,043 kg; Climb speed v_y = 69 KIAS
Flaps Up; Full Power; Standard Temperature

Notes :

(1) Add 1 l (0.3 US gal) of fuel for engine start, taxi and takeoff allowance.
(2) Increase time and distance by 10% for 10°C above standard temperature. Above 10,000 ft. increase time by 5%.
(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 = 69 KIAS.

Press. Alt.	Temp.	Rate of Climb	From Sea Level		
			Time	Dist.	JET-A1
(ft)	(°C)	(ft/min)	(min)	(NM)	(l)
SL	15	625	0,0	0,0	0,0
1000	13	622	1,6	1,9	0,8
2000	11	616	3,2	3,8	1,6
3000	9	605	4,9	5,8	2,4
4000	7	590	6,5	8,0	3,3
5000	5	570	8,3	10,2	4,2
6000	3	547	10,0	12,6	5,2
7000	1	521	11,9	15,2	6,3
8000	-1	491	13,9	18,0	7,4
9000	-3	458	16,0	21,1	8,5
10000	-5	452	18,3	24,5	9,8
11000	-7	385	20,8	28,2	11,1
12000	-9	346	23,5	32,5	12,4
13000	-11	306	26,6	37,3	13,9
14000	-13	265	30,1	42,9	15,5
15000	-15	225	34,1	49,5	17,3
16000	-17	186	39,0	57,5	19,2
17000	-19	148	45,0	67,4	21,5

Figure 5-6a Time, Fuel and Distance to Climb at 1,043 kg

TIME, FUEL AND DISTANCE TO CLIMB AT 940KG

Conditions:

Takeoff weight 940kg; Climb speed v_y = 69 KIAS
Flaps Up; Full Power; Standard Temperature

Notes :

(1) Add 1 l (0.3 US gal) of fuel for engine start, taxi and takeoff allowance.
(2) Increase time and distance by 10% for 10°C above standard temperature. Above 10,000 ft. increase time by 5%.
(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 = 69 KIAS.

Press. Alt.	Temp.	Rate of Climb	From Sea Level		
			Time	Dist.	JET-A1
(ft)	(°C)	(ft/min)	(min)	(NM)	(l)
NN	15	755	0,0	0,0	0,0
1000	13	753	1,3	1,5	0,6
2000	11	746	2,7	3,2	1,3
3000	9	735	4,0	4,8	2,0
4000	7	719	5,4	6,6	2,8
5000	5	699	6,8	8,4	3,6
6000	3	674	8,3	10,4	4,4
7000	1	646	9,8	12,5	5,3
8000	-1	615	11,4	14,7	6,2
9000	-3	580	13,0	17,2	7,2
10000	-5	542	14,8	19,8	8,2
11000	-7	502	16,7	22,7	9,3
12000	-9	459	18,8	26,0	10,4
13000	-11	415	21,1	29,6	11,6
14000	-13	370	23,6	33,7	12,9
15000	-15	325	26,5	38,4	14,3
16000	-17	280	29,8	43,9	15,8
17000	-19	235	33,7	50,5	17,4

Figure 5-6b Time, Fuel and Distance to Climb at 940 kg

TIME, FUEL AND DISTANCE TO CLIMB AT 1089KG Cessna 172P

Conditions:

Takeoff weight 1089kg; Climb speed v_y = 69 KIAS
Flaps Up; Full Power; Standard Temperature

Notes :

(1) Add 1 l (0.3 US gal) of fuel for engine start, taxi and takeoff allowance.
(2) Increase time and distance by 10% for 10°C above standard temperature. Above 10,000 ft. increase time by 5%.
(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 = 69 KIAS.

Press. Alt.	Temp.	Rate of Climb	From Sea Level		
			Time	Dist.	JET-A1
(ft)	(°C)	(ft/min)	(min)	(NM)	(l)
NN	15	602	0,0	0	0,0
1000	13	595	1,7	2,0	0,8
2000	11	582	3,4	4,0	1,6
3000	9	565	5,1	6,1	2,5
4000	7	545	6,9	8,4	3,5
5000	5	522	8,8	10,9	4,5
6000	3	496	10,8	13,5	5,6
7000	1	468	12,8	16,4	6,7
8000	-1	438	15,0	19,5	7,9
9000	-3	407	17,4	22,9	9,2
10000	-5	374	20,0	26,7	10,5
11000	-7	341	22,8	30,9	11,9
12000	-9	307	25,8	35,7	13,4
13000	-11	274	29,3	41,1	15,0
14000	-13	240	33,2	47,3	16,8
15000	-15	207	37,6	54,5	18,6
16000	-17	176	42,9	63,1	20,7
17000	-19	146	49,1	73,5	23,0

Figure 5-6c Time, Fuel and Distance to Climb at 1089 kg

TIME, FUEL AND DISTANCE TO CLIMB AT 970KG

Conditions:

Takeoff weight 970kg; Climb speed v_y = 69 KIAS
Flaps Up; Full Power; Standard Temperature

Notes :

(1) Add 1 l (0.3 US gal) of fuel for engine start, taxi and takeoff allowance.
(2) Increase time and distance by 10% for 10°C above standard temperature. Above 10,000 ft. increase time by 5%.
(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 = 69 KIAS.

Press. Alt.	Temp.	Rate of Climb	From Sea Level		
			Time	Dist.	JET-A1
(ft)	(°C)	(ft/min)	(min)	(NM)	(l)
NN	15	715	0,0	0,0	0,0
1000	13	713	1,4	1,6	0,7
2000	11	706	2,8	3,3	1,4
3000	9	695	4,2	5,1	2,1
4000	7	679	5,7	6,9	2,9
5000	5	660	7,2	8,9	3,7
6000	3	636	8,7	11,0	4,6
7000	1	608	10,3	13,2	5,6
8000	-1	577	12,0	15,6	6,5
9000	-3	543	13,8	18,2	7,6
10000	-5	506	15,7	21,0	8,6
11000	-7	467	17,8	24,2	9,8
12000	-9	425	20,0	27,6	10,9
13000	-11	383	22,5	31,6	12,2
14000	-13	339	25,3	36,0	13,6
15000	-15	295	28,4	41,2	15,0
16000	-17	252	32,1	47,2	16,6
17000	-19	209	36,4	54,5	18,4

Figure 5-6d Time, Fuel and Distance to Climb at 970 kg

CRUISE PERFORMANCE, RANGE AND ENDURANCE with standard tanks (Cessna 172N)

Conditions:

Takeoff weight 1043 kg
Flaps Up
Zero wind

Notes:

1. Endurance information are based on standard tanks with 134.3 (35.5 US gal) usable fuel
2. Increase true airspeed (KTAS) and maximum range (NM) by 1% per 10°C above ISA temperature.

Press.Alt. [ft]	Load [%]	KTAS	FF[l/h] Jet-A1	NM	Hours
2000	60	82	15,8	697	8,5
2000	70	88	18,6	635	7,2
2000	80	94	21,7	582	6,2
2000	90	99	25,3	526	5,3
4000	60	93	15,8	791	8,5
4000	70	99	18,6	715	7,2
4000	80	104	21,7	644	6,2
4000	90	110	25,3	584	5,3
6000	60	98	15,8	833	8,5
6000	70	104	18,6	751	7,2
6000	80	109	21,7	675	6,2
6000	90	115	25,3	610	5,3
8000	60	101	15,8	859	8,5
8000	70	106	18,6	765	7,2
8000	80	112	21,7	693	6,2
8000	90	117	25,3	621	5,3

Press.Alt. [ft]	Load [%]	KTAS	FF[l/h] Jet-A1	NM	Hours
10000	60	102	15,8	867	8,5
10000	70	108	18,6	780	7,2
10000	80	113	21,7	699	6,2
10000	90	119	25,3	632	5,3
12000	60	103	15,8	876	8,5
12000	70	109	18,6	787	7,2
12000	80	114	21,7	706	6,2
12000	88	119	24,5	652	5,5

Figure 5-7a Cruise Performance, Range and Endurance with standard tanks, Cessna 172N

CRUISE PERFORMANCE, RANGE AND ENDURANCE with long-range tanks (Cessna 172N)

Conditions:

Takeoff weight 1043 kg
Flaps Up
Zero wind

Notes:

1. Endurance information are based on standard tanks with 167.3 l (44.2 US gal) usable fuel
2. Increase true airspeed (KTAS) and maximum range (NM) by 1% per 10°C above ISA temperature.

Press.Alt. [ft]	Load [%]	KTAS	FF[l/h] Jet-A1	NM	Hours
2000	60	82	15,8	868	10,6
2000	70	88	18,6	792	9,0
2000	80	94	21,7	725	7,7
2000	90	99	25,3	655	6,6
4000	60	93	15,8	985	10,6
4000	70	99	18,6	890	9,0
4000	80	104	21,7	802	7,7
4000	90	110	25,3	727	6,6
6000	60	98	15,8	1038	10,6
6000	70	104	18,6	935	9,0
6000	80	109	21,7	840	7,7
6000	90	115	25,3	760	6,6
8000	60	101	15,8	1069	10,6
8000	70	106	18,6	953	9,0
8000	80	112	21,7	863	7,7
8000	90	117	25,3	774	6,6

Press.Alt. [ft]	Load [%]	KTAS	FF[l/h] Jet-A1	NM	Hours
10000	60	102	15,8	1080	10,6
10000	70	108	18,6	971	9,0
10000	80	113	21,7	871	7,7
10000	90	119	25,3	787	6,6
12000	60	103	15,8	1091	10,6
12000	70	109	18,6	980	9,0
12000	80	114	21,7	879	7,7
12000	88	119	24,5	813	6,8

Figure 5-7b Cruise Performance, Range and Endurance with long-range tanks, Cessna 172N

CRUISE PERFORMANCE, RANGE AND ENDURANCE with standard tanks (Cessna 172P)

Conditions:

Takeoff weight 1089 kg
Flaps Up
Zero wind

Notes:

(1) Endurance information are based on standard tanks with 134.3 (35.5 US gal) usable fuel
(2) Increase true airspeed (KTAS) and maximum range (NM) by 1% per 10°C above ISA temperature.

Press.Alt. [ft]	Load [%]	KTAS	FF[l/h] Jet-A1	NM	Hours
2000	60	81	15,8	689	8,5
2000	70	87	18,6	628	7,2
2000	80	93	21,7	576	6,2
2000	90	98	25,3	520	5,3
4000	60	92	15,8	782	8,5
4000	70	98	18,6	708	7,2
4000	80	103	21,7	637	6,2
4000	90	109	25,3	579	5,3
6000	60	97	15,8	825	8,5
6000	70	103	18,6	744	7,2
6000	80	108	21,7	668	6,2
6000	90	114	25,3	605	5,3
8000	60	100	15,8	850	8,5
8000	70	105	18,6	758	7,2
8000	80	111	21,7	687	6,2
8000	90	116	25,3	616	5,3

Press.Alt. [ft]	Load [%]	KTAS	FF[l/h] Jet-A1	NM	Hours
10000	60	101	15,8	859	8,5
10000	70	107	18,6	773	7,2
10000	80	112	21,7	693	6,2
10000	90	118	25,3	626	5,3
12000	60	102	15,8	867	8,5
12000	70	108	18,6	780	7,2
12000	80	113	21,7	699	6,2
12000	88	118	24,5	647	5,5

Figure 5-7c Cruise Performance, Range and Endurance with standard tanks, Cessna 172P

CRUISE PERFORMANCE, RANGE AND ENDURANCE with long-range tanks (Cessna 172P)

Conditions:

Takeoff weight 1089 kg
Flaps Up
Zero wind

Notes:

(1) Endurance information are based on standard tanks with 167.3 l (44.2 US gal) usable fuel

(2) Increase true airspeed (KTAS) and maximum range (NM) by 1% per 10°C above ISA temperature.

Press.Alt. [ft]	Load [%]	KTAS	FF[l/h] Jet-A1	NM	Hours
2000	60	81	15,8	858	10,6
2000	70	87	18,6	783	9,0
2000	80	93	21,7	717	7,7
2000	90	98	25,3	648	6,6
4000	60	92	15,8	974	10,6
4000	70	98	18,6	881	9,0
4000	80	103	21,7	794	7,7
4000	90	109	25,3	721	6,6
6000	60	97	15,8	1027	10,6
6000	70	103	18,6	926	9,0
6000	80	108	21,7	833	7,7
6000	90	114	25,3	754	6,6
8000	60	100	15,8	1059	10,6
8000	70	105	18,6	944	9,0
8000	80	111	21,7	856	7,7
8000	90	116	25,3	767	6,6

Press.Alt. [ft]	Load [%]	KTAS	FF[l/h] Jet-A1	NM	Hours
10000	60	101	15,8	1069	10,6
10000	70	107	18,6	962	9,0
10000	80	112	21,7	863	7,7
10000	90	118	25,3	780	6,6
12000	60	102	15,8	1080	10,6
12000	70	108	18,6	971	9,0
12000	80	113	21,7	871	7,7
12000	88	118	24,5	806	6,8

Figure 5-7d Cruise Performance, Range and Endurance with long-range tanks, Cessna172N

POWER DIAGRAM

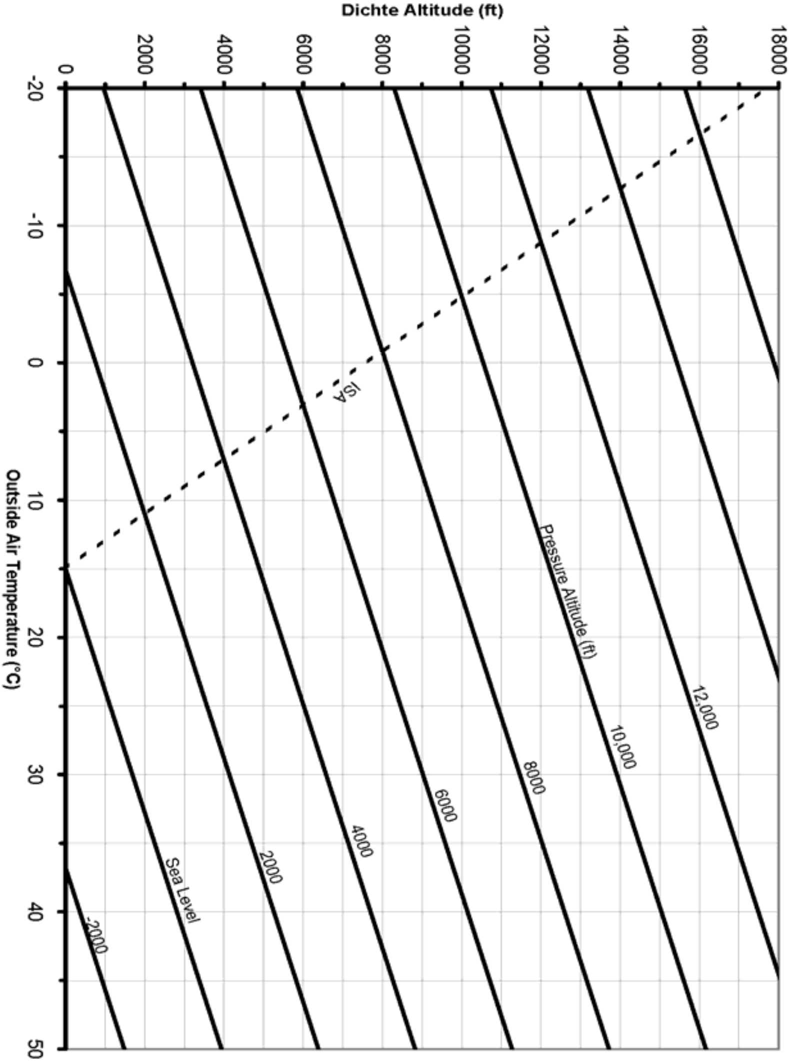

Figure 5-8 Adjustable Engine Power

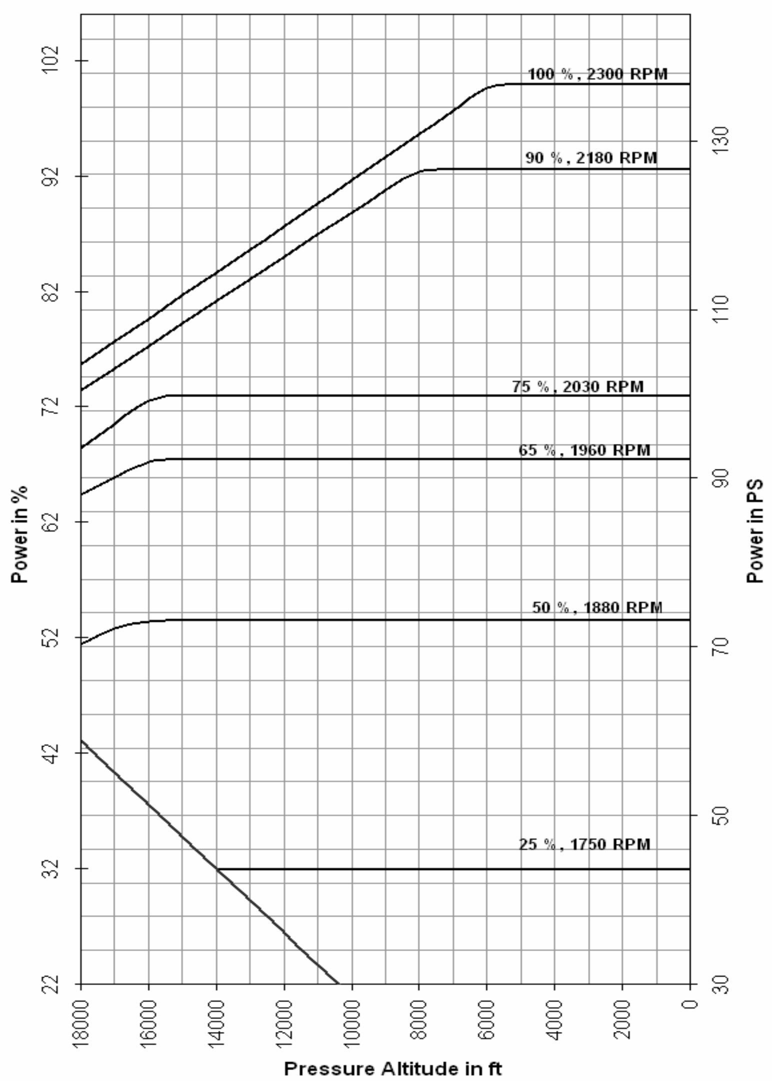

Figure 5-9 Engine Power Over Altitude

Section 6
HANDLING ON GROUND
&
MAINTENANCE

■ 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.

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

ENGINE OIL

Both TAE 125 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 engine Operation and Maintenance Manual. See OM-02-01 for the TAE 125-01 engine or OM-02-02 for the TAE 125-02 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 the TAE 125-02 engine.

GEARBOX OIL

To ensure the necessary propeller speed, both TAE 125 engine variants are equipped with a reduction gearbox filled with 1,0 l 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 engine Operation and Maintenance Manual. See OM-02-01 01 for the TAE 125-01 engine or OM-02-02 for the TAE 125-02 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 the TAE 125-02 engine.

FUEL

Both TAE 125 engine variants can be operated with kerosene fuel.
Due to the higher specific density of turbine engine fuel 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/BASF Glysantin Protect Plus/G48 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 engine Operation and Maintenance Manual. See OM-02-01 for the TAE 125-01 engine or OM-02-02 for the TAE 125-02 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 the TAE 125-02 engine.

◆ Note: The ice flocculation point of the coolant is –36°C.

■ CAUTION: The water has to satisfy the following requirements:

1. visual appearance: colorless, clear and no deposits allowed
2. pH-value: 6.5 to 8.5
3. maximum water hardness: 2.7 mmol/l
4. maximum hydrogen carbonate concentration: 100 mg/l
5. maximum chloride concentration: 100 mg/l
6. maximum sulfate concentration: 100 mg/l

◆ Note: The waterworks also provide information. In general, tap water may be diluted with distilled water. Pure distilled water may not be used to mix with BASF Glysantin Protect Plus/G48.

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

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

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Section 7
WEIGHT & BALANCE

Item	Weight (kg) x	Arm (m) =	Moment (mkp)
Empty Weight			
plus Engine Oil (6 l at 0.9 kg/l)		-0.31	
plus Gearbox Oil (1 l at 0.9 kg/l)		-0.69	
plus unusable fuel standard tanks (11.4 l at 0.80 kg/l)		1.17	
long-range tanks (15.1 l at 0.80 kg/l)		1.17	
plus Coolant (4 l at 1.0 kg/l)		-0.26	
Changes in Equipment			
Basic Empty Weight			

Figure 7-2a Calculating the Basic Empty Weight

Item	Weight (lbs) x	Arm (in) =	Moment (lbs-in)
Empty Weight			
plus Engine Oil (1.6 US gal at 7.5 lbs/US gal)		-12	
plus Gearbox Oil (0.26 US gal at 7.5 lbs/US gal)		-27	
plus unusable fuel standard tanks (3 US gal at 6.7 lb/US Gal)		46	
long-range tanks (4 US gal at 6.7 lb/US Gal)		46	
plus Coolant (1 US gal at 8.3 lbs/US gal)		-10	
Changes in Equipment			
Basic Empty Weight			

Figure 7-2b Calculating the Basic Empty Weight

Calculating Weight and Moment	Sample Airplane		Your Airplane	
	Weight kg	Moment mkp	Weight kg	Moment mkp
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 0.80 kg/l) Standardtanks 134.3 l max.) Langstreckentanks (167.3 l max.)				
3. Pilot and Front Passenger (Station 0.86 to 1.17 m)				
4. Rear Passengers				
5.*Baggage Area 1 or Passenger on the children's seat (Station 2.08 to 2.74; max.54 kg)				
6.*Baggage Area 2 (Station 2.74 to 3.61; max 23 kg)				
7. Ramp Weight and Moment				
8. Fuel allowance for engine start, taxi and runup				
9. Takeoff Weight and Moment (Subtract Step 8 from Step 7)				
10. Locate this point in Figure 7-8 for the **Load Moment** in mkp Check if its within the envelope.				
* Maximum allowable combined weight capacity for Baggage Areas 1 and 2 is 54 kg..				

Figure 7-3a Calculating Weight and Moment

Calculating Weight and Moment	Sample Airplane		Your Airplane	
	Weight lbs	Moment lbs-in /1000	Weight lbs	Moment lbs-in /1000
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 6.7 lb/ US gal) Standardtanks F,G,H (35.5 US gal max.) Long Range tanks (44.2 US gal max.)				
3. Pilot and Front Passenger (Station 0.34 to 46 in)				
4. Rear Passengers				
5.*Baggage Area 1 or Passenger on the children's seat (Station 82 to108 in; max. 120 lbs)				
6.*Baggage Area 2 (Station 108 to 142; max. 50 lbs)				
7. Ramp Weight and Moment				
8. Fuel allowance for engine start, taxi and runup				
9. Takeoff Weight and Moment (Subtract Step 8 from Step 7)				
10. Locate this point in Figure 7-8 for the **Load Moment** in lbs-in/1000 Check if its within the envelope.				
* Maximum allowable combined weight capacity for Baggage Areas 1 and 2 is 120 lbs.				

Figure 7-3b Calculating Weight and Moment

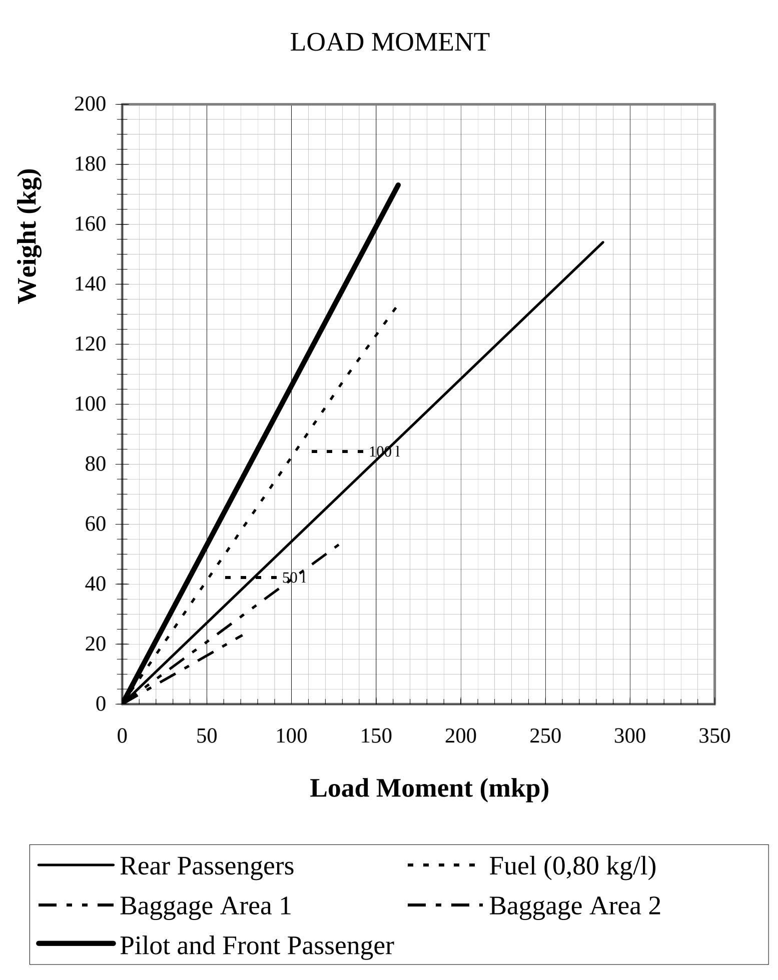

Figure 7-4 Load Moment

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Section 8
SPECIAL EQUIPMENT
EQUIPMENT LIST

EXTERNAL POWER RECEPTACLE

(1) LIMITATIONS

◆ Note: It is not allowed to start up the engine using external power.

For 12Volt system only:
Following instructions are to be attached as a placard inside of the access flap for the External Power Receptacle:

CAUTION 12 V DC
OBSERVE CORRECT POLARITY
Minus to Ground
Reversed Polarity May Damage The Electrical Equipment

For 24Volt system only:
Following instructions are to be attached as a placard inside of the access flap for the External Power Receptacle:

CAUTION 24 V DC
OBSERVE CORRECT POLARITY
Minus to Ground
Reversed Polarity May Damage The Electrical Equipment

CARBURETOR AIR TEMPERATURE GAGE

N/A

QUICK OIL DRAIN VALVE

N/A

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