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Supplement Airplane Maintenance Manual

Cessna 172
TAE 125-01

Doc. No.: AMM-20-01
Version: 3/0

■ CAUTION:
This Supplement to the Airplane Maintenance Manual must be read completely before maintenance action, as it contains important safety information.

■ CAUTION:
The organizations and staff who carry out these maintenance action must be approved by the authority, with the exception of the “Pre-flight check“

◆Note:
The Supplement to the Airplane Maintenance Manual is to be included at every Cessna 172 / TAE 125-01 installation

◆ Note:
Please report any service difficulties to the Technical Support Center at Technify Motors GmbH.
See above for contact information.

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0.1 LIST OF REVISIONS

Chapter	Issue/ Revision	Date	Approved by

0.2 LIST OF APPLICABLE CHAPTERS

Chapter	Issue/Revision	Date
20-AMM-00-01	3/0	06.11.2013
20-AMM-01-01	3/0	06.11.2013
20-AMM-04-01	3/0	06.11.2013
20-AMM-05-01	3/0	06.11.2013
20-AMM-06-01	3/0	06.11.2013
20-AMM-12-01	3/0	06.11.2013
20-AMM-20-01	3/0	06.11.2013
20-AMM-21-01	3/0	06.11.2013
20-AMM-24-01	3/0	06.11.2013
20-AMM-28-01	3/0	06.11.2013
20-AMM-31-01	3/0	06.11.2013
20-AMM-37-01	3/0	06.11.2013
20-AMM-61-01	3/0	06.11.2013
20-AMM-71-01	3/0	06.11.2013
20-AMM-73-01	3/0	06.11.2013
20-AMM-74-01	3/0	06.11.2013
20-AMM-75-01	3/0	06.11.2013
20-AMM-77-01	3/0	06.11.2013
20-AMM-78-01	3/0	06.11.2013
20-AMM-79-01	3/0	06.11.2013
20-AMM-80-01	3/0	06.11.2013
20-AMM-91-01	3/0	06.11.2013

Prepared by:	Checked by	Released by:
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The technical information contained in this document has been approved under the authority of EASA design Organisation Approval no. EASA.21J.010

1 INTRODUCTION

This operating and maintenance manual contains basic information related to the proper operation of the engine in various situations and under different conditions. It also contains instructions for maintenance.
The information and descriptions of components and systems in this manual were correct at the time of publication. Any amendments released through the update information service must also be taken into account.
Please contact Technify Motors GmbH if you have any questions. We would be glad to assist you further.

1.1 ACCOMPANYING APPLICABLE DOCUMENTS

- Aircraft manufacturer's Service Manual
- Aircraft manufacturer's Airplane Maintenance Manual
- Installation Manual IM-02-01 for TAE 125-01
- Installation Manual IM-20-01 for TAE 125-01 in Cessna 172
- Repair Manual RM-02-01 for TAE 125-01
- Operation and Maintenance Manual OM-02-01 for TAE 125-01
- Operation and Installation Manual E-124 for Propeller MTV-6-A/187-129
- Installation Manual IM-TAE-CED-125 and Operation Manual OM-TAE-CED-125
- Installation Manual IM-TAE-AED-125 and Operation Manual OM-TAE-AED-125
- Constant Speed Unit Manual CSU TAE 125
- GILL Battery Service Manual
- Panasonic Valve Regulated Lead Acid batteries Technical Handbook

  http://industrial.panasonic.com/eu/index.html
- Component Repair Manual CRM-02-02

1.2 IDENTIFICATION OF PARTS OF TAE 125-01 INSTALLATION

Engine identification

The serial number of the engine is provided on the type plate on the crankcase near the starter flange.
Example:

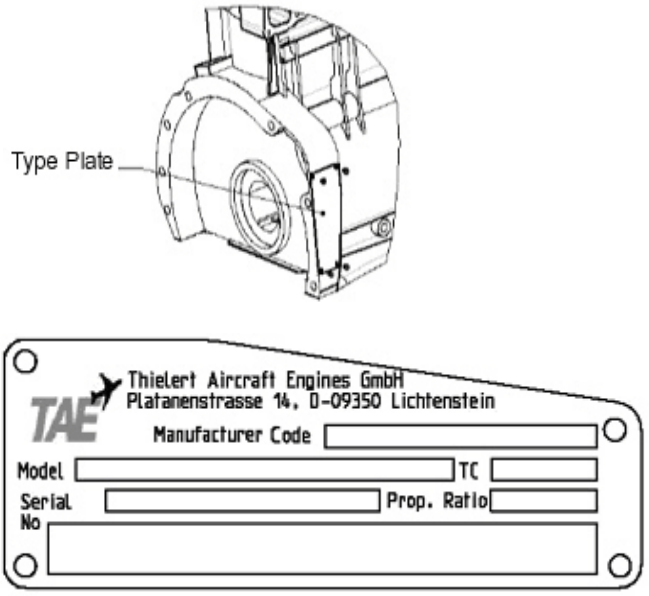

Fig. 1-1a Type Plate of TAE 125-01

◆ Note: When making inquiries, always have the serial number of the engine ready.

Engine Mount identification

The Engine Mount of the TAE 125-01 is indicated by a part number and a serial number as shown in the following picture. The first part constitutes the part number, the last four digits are the serial number.

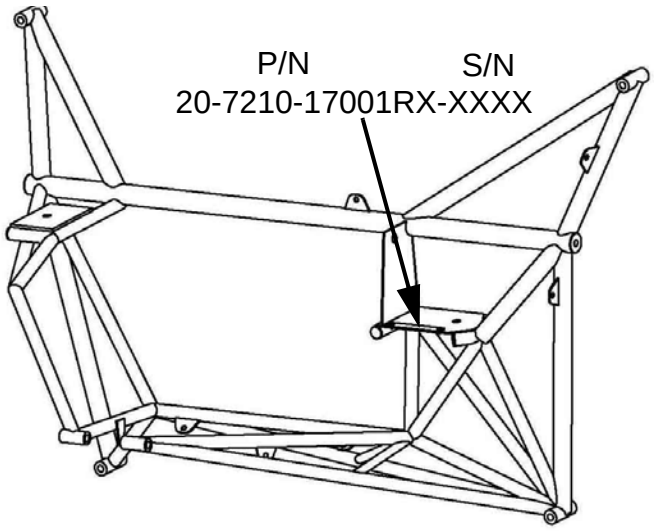

Fig. 1-2a Identification of Engine Mount

AED/CED identification

The AED and CED are indicated by a label as shown below.
As an example the identification label of an AED is shown, the layout of the CED-label is similar.

Fig. 1-3a Identification Label AED-125

Propeller identification

The serial number of the propeller MTV-6-A/187-129 consists of five digits and is provided at the back side of the propeller flange and on a label at the front side of one propeller blade.

1.3 COPYRIGHT ©

1.4 CONVENTIONS IN THIS MANUAL

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

▲ **WARNING:**	Disregarding these safety rules can lead to injury or even death.
■ CAUTION:	Disregarding these special instructions and safety measures can cause damage to the engine or to the other components.
◆ Note:	Additional note or instructions for better understanding of an instruction.

The indications "right", "left", "front" and "rear" are always relative to the flight direction. The following symbol is used:

Example of flight direction right: >

1.5 VALIDITY OF THIS MANUAL

This manual applies only to the engine having the following

serial number:_____

Installed in Cessna 172 type:___

serial number:_____

Updates and modifications must be taken into account.

1.6 ABBREVIATIONS

The following abbreviations are used in this manual:

- FADEC, Full Authority Digital Engine Control
- AED, Auxiliary Engine Display
- CED, Compact Engine Display
- CSU, Constant Speed Unit

1.7 PACKING AND TRANSPORT

According to the Operation and Maintenance Manual OM-02-01.

1.8 STORAGE

According to the Operation and Maintenance Manual OM-02-01.

1.9 QUALIFICATIONS OF THE OPERATING AND MAINTENANCE PERSONNEL

Tasks described in this manual may be performed only by trained personnel having necessary certificates and licenses.
All locally applicable national and international regulations must be observed.

1.10 UPDATE INFORMATION SERVICE

This manual is updated regularly. The engine/ aircraft operator is responsible for keeping up-to-date with all amendment bulletins issued by Technify Motors GmbH and integrating them into this manual.
Please inform Technify Motors GmbH if the owner of the engine / aircraft changes. This is the only way to ensure that information about any necessary / recommended changes to the engine / manual can be passed on. A form for this purpose is included in this manual.

1.11 SERVICE LIFE OF THE ENGINE

For Service Life of the engine refer to Chapter 4.

1.12 CONVERSION FACTORS

- CAUTION: The US units in this manual are only benchmarks ! These conversion factors shall be used in case of doubt !

LENGTH		
Unit [Abbreviation]	Conversion Factor SI to US / Imperial	Conversion Factor US / Imperial to SI
Meter [m]	[m] / 0.3048 = [ft]	
Millimeter [mm]	[mm] / 25.4 = [in]	
Kilometer [km]	[km] / 1.852 = [nm]	
	[km] / 1.609 = [sm]	
Inch [in]		[in] x 25.4 = [mm]
Foot [ft]		[ft] x 0.3048 = [m]
Nautical mile [nm]		[nm] x 1.852 = [km]
Statute mile [sm]		[sm] x 1.609 = [km]

Table 1-1a Conversion Factors - Length

SPEED		
Unit [Abbreviation]	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] x 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]

Table 1-2a Conversion Factors - Speed

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

Table 1-3a Conversion Factors - Pressure

FORCE		
Unit [Abbreviation]	Conversion Factor SI to US / Imperial	Conversion Factor US / Imperial to SI
Newton [N]	[N] / 4.448 = [lb]	
Decanewton [daN]	[daN] / 0.4448 = [lb]	
Pound [lb]		[lb] x 4.448 = [N]
		[lb] x 0.4448 = [daN]

Table 1-4a Conversion Factors - Force

MASS		
Unit [Abbreviation]	Conversion Factor SI to US / Imperial	Conversion Factor US / Imperial to SI
Kilogram [kg]	[kg] / 0.45359 = [lb]	
Pound [lb]		[lb] x 0.45359 = [kg]

Table 1-5a Conversion Factors - Mass

VOLUME		
Unit [Abbreviation]	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] / 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] x 61.024 = [l]

Table 1-6a Conversion Factors - Volume

TORQUE		
Unit [Abbreviation]	Conversion Factor SI to US / Imperial	Conversion Factor US / Imperial to SI
Newton meter [Nm]	[Nm] / 1.3558 = [ft.lb]	
	[Nm] x 8.851 = [in.lb]	
Foot pound [ft.lb]		[ft.lb] x 1.3558 = [Nm]
Inch pound [in.lb]		[in.lb] / 8.851 = [Nm]

Table 1-7a Conversion Factors - Torque

TEMPERATURE		
Unit [Abbreviation]	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]

Table 1-8a Conversion Factors - Temperature

4 AIRWORTHINESS LIMITATIONS, Issue 3

AIRWORTHINESS LIMITATIONS APPROVAL SHEET

This Airworthiness Limitations Section is EASA approved and mandatory by EASA AD 2006-0044. It specifies required maintenance unless an alternative program has been EASA approved.

4.1 ENGINE LIFE LIMIT

The entire engine TAE 125-01 as defined by the Type Design Definition ref. TDD-02-01, issue 1 or later approved revisions has a specific life limit according to service bulletin TM TAE 125-0001. This limit calls for replacement of the entire engine. No overhauls are allowed to the core engine. No repairs outside the published ICA´s allowed to the engine.

4.2 MANDATORY MAINTENANCE ACTIONS

Mandatory maintenance actions of the engine are listed in Chapter 02-OM-05-01 of the current Operation and Maintenance Manual OM-02-01.

4.3 LOG OF REVISIONS TO AIRWORTHINESS LIMITATIONS

Rev. No	Description of Revision

AIRWORTHINESS LIMITATIONS

5 TIME LIMITS / MAINTENANCE CHECKS

The maintenance work on Centurion aircraft engines must be carried out after specific time intervals or on reaching a specific operating hours interval. The Preflight check must be conducted before each start.
Parts that are not included within the scope of delivery of the engine must be maintained and checked according to the airplane manufacturer's specifications (refer to airplane manual).

▲ **WARNING:** The entire engine has a service life ("time between replacement“); refer to Chapter 4.

▲ **WARNING:** It is strongly recommended that the maintenance intervals specified by the manufacturer be adhered to. Non-compliance with the maintenance schedule can amongst other things lead to lapse of any claims to warranty.

◆ Note: For this engine, an extension program for the service life (time between replacement) is in progress. The up-to-date information is published in service bulletins.

◆ Note: Further information concerning service partners and servicing or parts to be replaced can be obtained from Technify Motors GmbH.

◆ Note: Technify Motors GmbH must be informed immediately in case of engine malfunction.

5.10 TIME LIMITS

INSPECTION REQUIREMENTS

The required periodic inspection procedures are listed in 5.20 Sheduled Maintenance.

PREFLIGHT CHECKS

Perform a thorough preflight and walk-around check in addition to inspection intervals in periodic inspections.
Pilot or mechanic must include pre-flight check as normal procedure necessary for safe aircraft operation.
Refer to TAE 125-Supplement of the Pilot´s Operating Handbook for items that must be checked.

5.20 SCHEDULED MAINTENANCE CHECKS

A. PROPELLER GROUP

Refer to Operation and Installation Manual of MT-Propeller E124 (ATA 61-01-24) for Inspections and Maintenance of the propeller MTV-6-A-/187-129.

B. ENGINE GROUP

▲ **WARNING:** Under extreme conditions such as low usage combined with operation in a salt water environment or in an environment laden with sand and dust, shorter maintenance and inspection intervals are recommended for your own safety.

◆ Note: Due to the Diesel principle of the engine TAE 125-01, all information of the Airplane Maintenance Manual relating to
- Carburetor and carburetor pre-heating
- Ignition magnetos and spark plugs and
- Mixture control and priming system

are no longer valid.

5.20.01 Checks dependent on engine operating time:

After initial 3rd - 6th operating hour

- Further maintenance action according to Operation and Maintenance Manual OM-02-01

Every 100 operating hours / Annual Inspection

- Check engine mount for signs of corrosion (refer to Chapter 71, Section 71.20, Maintenance Practices)
- Check coolant "WATER LEVEL" signal (refer to Chapter 31, Section 31.60, Maintenance Practices) and perform „coolant tank cap pressure relief test“ (refer to Chapter 75, Section , Maintenance Practices)
- Check if the turbocharger clamp can be moved easily and inspect for cracks.
- Visually inspect of the joints (e.g. hose connections)
- Replace fuel filter (refer to Chapter 28, Section 28.20, Maintenance Practices)
- Check airplane fuel pump (refer to airplane manufacturer´s specifications)
- Further maintenance action according to Operation and Maintenance Manual OM-02-01
- Inspect FADEC backup battery (refer to Chapter 24, Section 24.30, Maintenance Practices)

Every 200 operating hours

- Work as described for every 100 operating hours
- Further maintenance action according to Operation and Maintenance Manual OM-02-01

Every 300 operating hours

- Work as described for every 100 operating hours
- Further maintenance action according to Operation and Maintenance Manual OM-02-01
- Inspect turbocharger clamp (refer to Chapter 71, Section 71.60, Maintenance Practices)

Every 500 operating hours

- Work as described for every 100 operating hours
- Inspect main battery and excitation battery, servicing the batteries (refer to Chapter 24, Section 24.30, Maintenance Practices)

Every 800 operating hours

- Work as described for every 200 operating hours
- Further maintenance action according to Operation and Maintenance Manual OM-02-01

Every 1000 operating hours

- Work as described for every 200 operating hours
- Work as described for every 500 operating hours
- Replace the turbocharger clamp (refer to Chapter 71, Section 71.60, Maintenance Practices)
- Further maintenance action according to Operation and Maintenance Manual OM-02-01

Every 3000 operating hours

- Replace silicate cartridge of the expansion tank (refer to Chapter 75, Section 75.00, Maintenance Practices).
  Carry out maintenance action in reference to the 6 years limit; whichever occurs first.

5.20.02 Checks dependent on calendar time:

Every month

- Further maintenance action according to Operation and Maintenance Manual OM-02-01

Every 12 months

- Further maintenance action according to Operation and Maintenance Manual OM-02-01
- Replace FADEC Backup- Battery (refer to Chapter 24)

Every 24 months

- Visual inspection and function test of all relays (refer to Chapter 24, Section 24.50, Maintenance Practices)
- Function test of all switches and circuit breakers (refer to Chapter 24, Section 24.50, Maintenance Practices)
- Visual inspection and function test of all 14V/28V converters, if installed (refer to Chapter 24, Section 24.50, Maintenance Practices)
- Further maintenance action according to Operation and Maintenance Manual OM-02-01

Every 60 months

- Check engine mount for signs of corrosion (refer to Chapter 71, Section 71.20, Maintenance Practices)
- Inspect the radiator mounts (refer to Chapter 71, Section 71.40, Maintenance Practices)
- Further maintenance action according to Operation and Maintenance Manual OM-02-01

Every 6 years

- Replace silicate cartridge of the expansion tank (refer to Chapter 75, Section 75.00, Maintenance Practices).
  Carry out maintenance action in reference to the 3000 hours limit; whichever occurs first.

Every 10 years

- Inspect the entire engine electrical system on corrosion and abrasion. Renew all corrode and worn out components (refer to RM-02-01)

Every 25 years

- Renew following electrical components (refer to Chapter 24, Section 24.30, Maintenance Practices and airplane manufacturer´s specifications):

  - Main battery according to Gill Battery Service
  - Battery relay
  - ALT / Battery switch
  - Alternator relay
  - Battery fuse
  - Alternator fuse, if installed
  - 50A FADEC fuse
  - 100A Main Bus fuse
  - FADEC IGN switch

5.50 UNSCHEDULED MAINTENANCE

Engine Events: Overspeed, sudden stoppage, loss of oil, over temperature, lightning strike, propeller strike.

Refer to

- Operation and Maintenance Manual OM-02-01 of the TAE 125-01
- Repair Manual RM-02-01 of the TAE 125-01
- Engine Manufacturer Technify Motors GmbH

for necessary corrective actions and repair.

6 DIMENSIONS AND AREAS

6.1 MODEL

C-172 F,G,H,I,K,L,M,N,P,R,S with TAE 125-01 installation

6.2 ENGINE

■ CAUTION: Further information in the IM-02-01 must be taken into account !

Manufacturer	Technify Motors GmbH
Model	TAE 125-01
FAA Type Certificate	E00069EN
EASA Type Certificate	E.055
Takeoff power	132.8 hp / 99 kw
Rated Speed	2300 rpm
Fuels approved	JET A-1 JET A JP-8 JP-8+100 Jet Fuel No. 3 (GB 6537-2006) Diesel (DIN EN 590)
Engine Oil	AeroShell Oil Diesel Ultra AeroShell Oil Diesel 10W-40 Shell Helix Ultra 5W-30 Shell Helix Ultra 5W-40
Engine Oil Sump Capacity	4.5 to 6.0 liters (1.19 to 1.59 US gal)
Gearbox Oil	Shell Getriebeöl EP 75W-90 API GL-4 Shell Spirax EP 75W-90 Shell Spirax S4 G 75W-90 Shell Spirax GSX 75-80 GL-4 Shell Spirax S6 GXME 75W-80
Oil Capacity Gearbox	1 liter (0.26 US gal)
Coolant	Water / Radiator Protection at a ratio of 50:50
Radiator Protection	BASF Glysantin Protect Plus/G48 Mobil Antifreeze Extra/G48 ESSO Antifreeze Extra/G48 Comma Xstream Green - Concentrate/G48 Valvoline/ Zerex Glysantin G 48
Gear Reduction	1,689:1

6.3 PROPELLER

Manufacturer.....MT Propeller Entwicklung GmbH
Flugplatzstrasse 1
D-94348 Atting
Model MTV-6-A187/129
Number of blades.....3
Diameter .....1.87 m (6.14 ft)
Type .....Constant Speed

6.4 FUEL SYSTEM

◆ Note: Due to the higher specific density of Kerosene in comparison to Aviation Gasoline (AVGAS) with the TAE 125-01 installation the permissible tank capacity has been reduced.

C-172 F,G,H

2 Standard tanks:.....each 16.6 US gal (62,85 l)
total capacity:.....33.2 US gal (125,7 l)
total usable fuel:.....30.2 US gal (114,3 l)
total unusable fuel:.....3.0 US gal (11,4 l)

2 Long-range tanks:.....each 22.1 US gal (83,65 l)
total capacity:.....44.2 US gal (167,3 l)
total usable fuel:.....40.2 US gal (152,2 l)
total unusable fuel:.....4.0 US gal (15,1 l)

C-172 I,K,L,M

2 Standard tanks:.....each 17.85 US gal (68,55 l)
total capacity:.....35.7 US gal (135,1 l)
total usable fuel:.....31.7 US gal (120,0 l)
total unusable fuel:.....4.0 US gal (15,1 l)

2 Long-range tanks:.....each 22.1 US gal (83,65 l)
total capacity:.....44.2 US gal (167,3 l)
total usable fuel:.....40.2 US gal (152,2 l)
total unusable fuel:.....4.0 US gal (15,1 l)

C-172 N,P

2 Standard tanks: ..... each 18.3 US gal (69,4 l)
total capacity: ..... 36.6 US gal (138,8 l)
total usable fuel: ..... 33.6 US gal (127,4 l)
total unusable fuel: ..... 3.0 US gal (11,4 l)

2 Long-range tanks: ..... each 22.95 US gal (86,8 l)
total capacity: ..... 45.9 US gal (173,6 l)
total usable fuel: ..... 41.9 US gal (158,6 l)
total unusable fuel: ..... 4.0 US gal (15,1 l)

C-172 N,P normal category

2 Integral Tanks: ..... each 29 US gal (119.8 l)
total capacity: ..... 58 US gal (219.6 l)
total usable fuel: ..... 52 US gal (196.8 l)
total unusable fuel: ..... 6 US gal (22.8 l)

C-172 N,P utility category

2 Integral Tanks: ..... each 23.95 US gal (90.7 l)
total capacity: ..... 47.9 US gal (181.4 l)
total usable fuel: ..... 41.9 US gal (158.6 l)
total unusable fuel: ..... 6 US gal (22.8 l)

C-172 R,S normal category:

2 tanks: ..... each 23.8 US gal (90,1 l)
total capacity: ..... 47.6 US gal (180,2 l)
total usable fuel ..... 44.6 US gal (168,8 l)
total unusable fuel: ..... 3.0 US gal (11,4 l)

C-172 R,S utility category:

2 tanks: ..... each 15.5 US gal (58,7 l)
total capacity: ..... 31.0 US gal (117,4 l)
total usable fuel ..... 28.0 US gal (106,0 l)
total unusable fuel: ..... 3.0 US gal (11,4 l)

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12 SERVICING

12.00 GENERAL

The following figures show the service points of the TAE 125-01 installation.

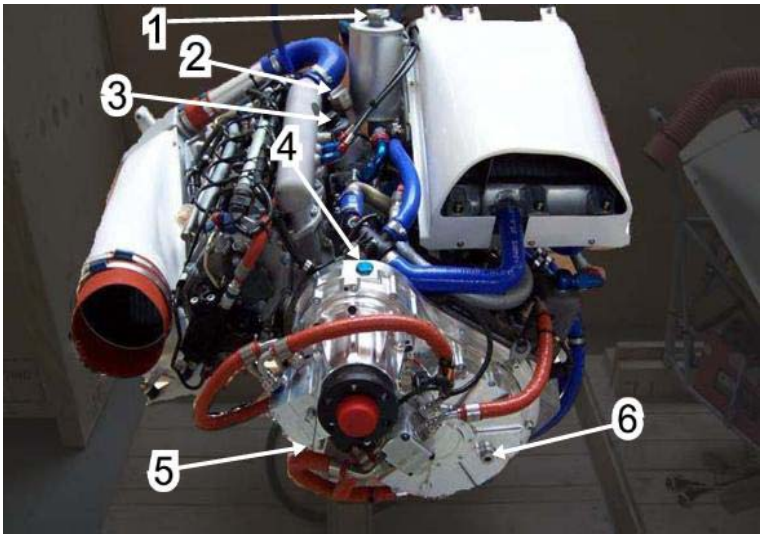

Fig. 12-1a Service Points TAE 125-01

1 Coolant Filler
2 Engine Oil Filler with Dip Stick
3 Engine Oil Filter
4 Gearbox Oil Filler
5 Gearbox Oil Micro Filter
6 Gearbox Oil Viewer

Fig. 12-2a Service Points TAE 125-01

7 Air Filter
8 Fuel Filter
9 Fuel Filter Drain

Cleaning of the engine compartment

Care must be taken when cleaning the engine compartment. If leaks are noticed, determine their location before cleaning.
The engine has to be cold before cleaning. The use of cold cleansers is recommended (for instance Berner Kaltreiniger, Art.no.: 13618.0).

■ CAUTION: The use of flammable and acidly cleansers is not allowed !

Do not clean the engine electrical system, since it could be damaged.
Do not use high pressure cleaning equipment.
Dry the engine after cleaning with pressurized air (pressure less than 8 bar).

12.10 REPLENISHING

FUEL SYSTEM

Filling Fuel Tanks

▲ **WARNING:** Observe all required safety precautions for handling kerosene.

■ CAUTION: Fill tanks with approved fuels only! For approved fuel refer to Chapter 6, Section 6.2.

For capacity of each wing tank refer to Chapter 6 of this Supplement to airplane maintenance manual.

Draining Fuel Filter Bowl

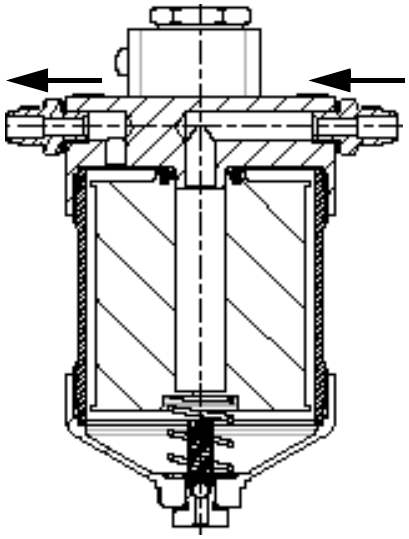

Fig. 12-3a Fuel Filter Bowl and Screen

Drain at least a cupful of fuel (using sampler cup) from valve to check for water, sediment and proper fuel grade 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 following WARNING and do not fly the airplane.

▲ **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.

Engine Oil System

Check engine oil level before each flight according to appropriate POH Supplement for TAE 125-01 installation.
Change engine oil and engine oil filter according to Operation and Maintenance Manual OM-02-01 of the TAE 125-01.

Gearbox Oil System

Check gearbox oil level before each flight according to appropriate POH Supplement for TAE 125-01 installation.
Change gearbox oil and gearbox oil filter according to Operation and Maintenance Manual OM-02-01 of the TAE 125-01.

Liquid Cooling system

1. General

▲ **WARNING:** Risk of scalding ! The cooling system may be pressurized. Carefully release the pressure before opening the drain plug.

■ CAUTION: Do not drain the coolant if its temperature is above 40°C !

2. Drain/Refill the coolant

A. Drain the coolant

(1) Open the clamp on the lower hose of the water radiator, disconnect the hose and allow the coolant to drain into a prepared collecting container.

(2) Open the clamp on the lower hose of the heat exchanger, disconnect the hose and allow the coolant to drain into a prepared collecting container.

(3) Loosen the drain plug of the engine, but do not open it yet.

(4) Attach a suitable length of hose with a diameter of 14-15 mm (0.55 in to 0.59 in) onto the collar of the plug, and insert the other end of the hose into a collecting container.

(5) Open the drain plug. The coolant can drain off through the plug.

(6) Open the cover of the coolant filler (this allows the coolant to drain faster).

(7) After draining install a new seal and tighten the drain plug Tightening torque: 10 Nm (7.4 lbf·ft)

(8) Reconnect the lower hoses of the water radiator and the heat exchanger and tighten the clamps.

B. Fill up new coolant

(1) Fill up the cooling system with coolant according to Chapter 3 of Operation and Maintenance Manual OM-02-01 by opening the coolant filler.

(2) Close the cover of the coolant filler.

(3) Perform a test run according to point 4.4.2 of Operation and Maintenance Manual OM-02-01.

(4) Check the cooling system for leaks according to Annex 3 of Operation and Maintenance Manual OM-02-01.

(5) Allow the engine to cool down.

(6) Check coolant level.

12.20 SCHEDULED SERVICING

◆ Note: See also Scheduled Maintenance Checks in Chapter 5, Section 5.20.

Electrical System

Refer to Chapter 5 of this Supplement for checks of the electrical system.

Fuel System

Refer to Chapter 5, Section 5.20 of this Supplement for checks of the fuel system.

Propeller

Refer to Operation and Installation Manual of MT-Propeller E124 (ATA 61-01-24) for Inspections and Maintenance of the propeller MTV-6-A/187-129.

Power Plant

Regularly check the engine compartment for oil and fuel leaks, chafing of lines, loose wires and tightness of all parts. Be careful when cleaning the engine compartment. Refer to Chapter 12 of this Chapter.

Induction Air Filter

Regularly check and change the Induction Air Filter. Refer to Chapter 5.

Coolant System

Refer to Chapter 5, Section 5.20 of this Supplement for checks of the coolant system.

20 STANDARD PRACTICES - AIRFRAME

20.00 GENERAL

DESCRIPTION

This Chapter contains data about Standard and Special Torque Values as well as the approved Firewall Sealants.

20.10 Standard Torque Values

This Chapter only has data about standard threaded fasteners.
Always tighten the nut or bolt to the torque shown in the tables below. Always use the correct locking device with the nut or bolt.

■ CAUTION: Discard self-locking nuts after removal. The friction torque reduces with use.

These tables show the correct torque values for bolts and nuts to AN and DIN specifications. Use the following torque values for all bolts, nuts and screws which meet the specifications unless they are in the list of special torque values below.

Screw Size	Property Class	Nm (Loctite or similar)	Nm (dry screw joints)
M4	8.8	3.0	4.1
	10.9	4.6	6.0
M5	8.8	5.9	8.1
	10.9	8.6	11.9
M6	8.8	10.1	14.1
	10.9	14.9	20.7
M8	8.8	24.6	34.3
	10.9	36.1	50.3
M10	8.8	48	68
	10.9	71	100

Table 1: Tightening torques for set screws in accordance with VDI standard 2230

Dash Size	Material	Nm
Dash 03	Aluminium	10
	Stahl	14
Dash 04	Aluminium	15
	Stahl	20
Dash 06	Aluminium	20
	Stahl	30
Dash 08	Aluminium	35
	Stahl	55
Dash 10	Aluminium	45
	Stahl	75
Dash 12	Aluminium	55
	Stahl	105

Table 2: Tightening torques for Dash connectors

Special Torque Values

Part	Nm
Propeller to engine bolts	Refer to MT Propeller OPERATION AND INSTALLATION MANUAL, ATA 61-01-24 (E-124)
Bolts attaching the engine mount to the firewall	20

Table 3: Special torque values

20.20 Firewall Sealants

Manufacturer	Description	Address
PRC-DeSoto International / Hutchinson	PR-812	Hutchinson Le Joint Français 84-116, rue Salvador Allende B.P. 16F- 95870 Bezons, France or PRC-DeSoto International, Inc. 5454 San Fernando Road, PO Box 1800 Glendale, California 91209
PRC-DeSoto International	PS 700	PRC-DeSoto International, Inc. 5454 San Fernando Road, PO Box 1800 Glendale, California 91209
Flamemaster	CS 1900	Flamemaster Corporation Supercedes 11120 Sherman Way Sun Valley, California 91352

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21 ENVIRONMENTAL SYSTEMS

21.00 GENERAL

DESCRIPTION

The TAE 125-01 installation includes a heat exchanger, which is part of the liquid coolant system and is located at the lower front section of the engine compartment.
The heat exchanger for cabin heat is installed inline with the unregulated exit of the cooling system thermostat.
Engine coolant passes through the heater core and heats incoming air . The coolant flow through the heater core is always open. The warm air supply is regulated by the pilot over the heating valve.
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 the appropriate Pilot´s Operating Handbook), the control knob “Shut-off Cabin Heat“ has to be closed according to the appropriate procedures.

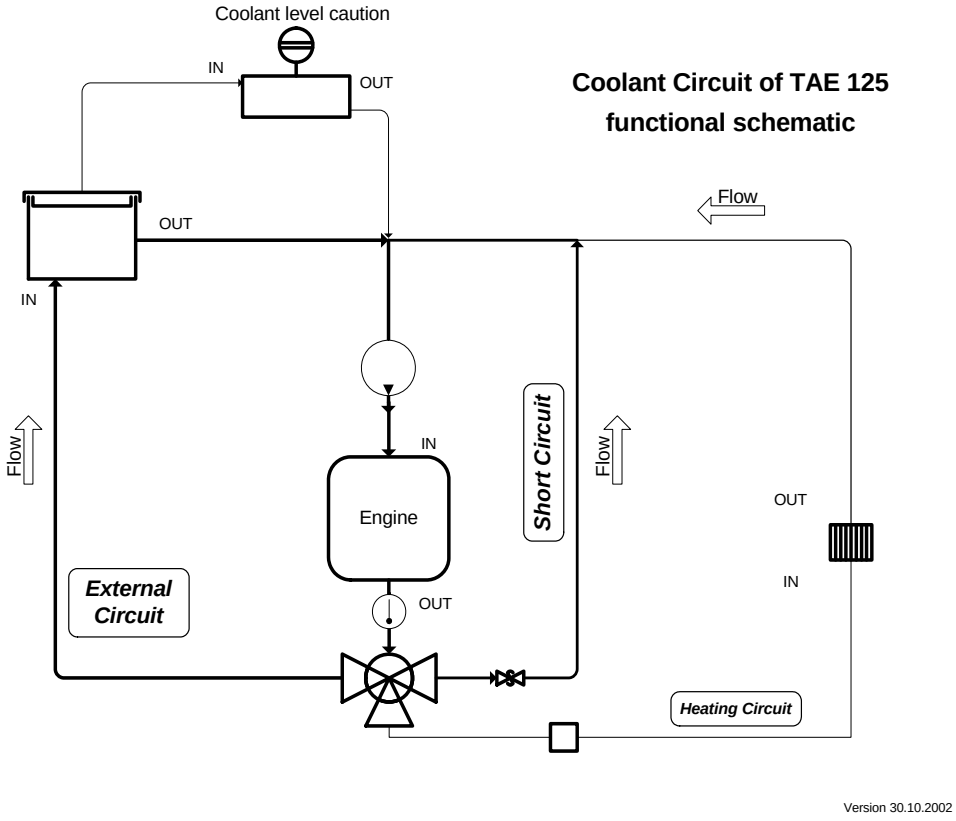

Fig. 21-1a Coolant System of TAE 125-01

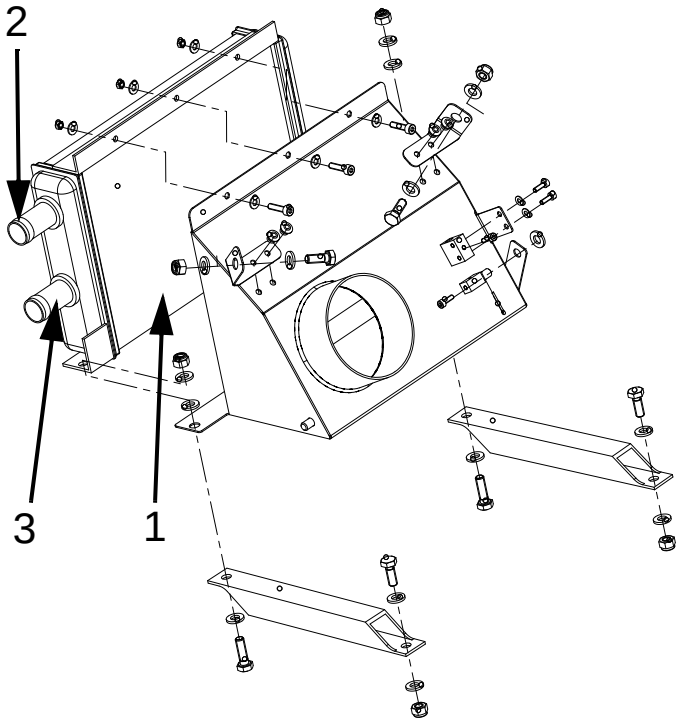

Fig. 21-2a Heat Exchanger C-172 with TAE 125-01 installation

1 Heat Exchanger
2 Coolant OUT
3 Coolant IN

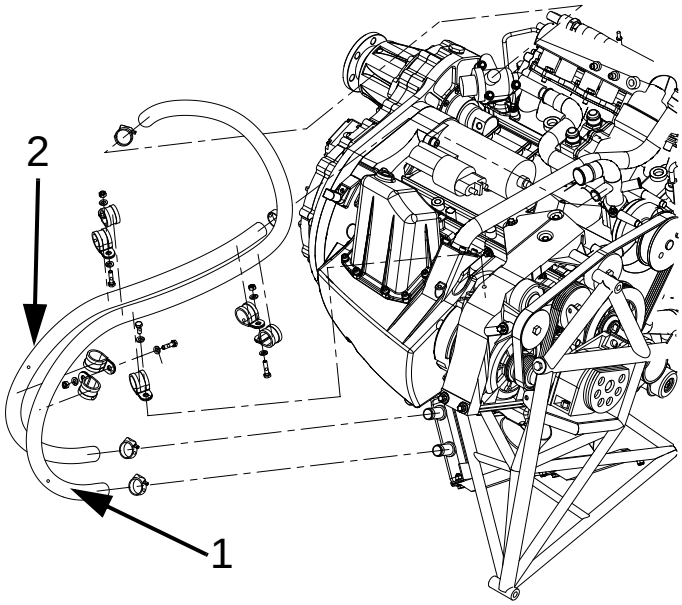

Fig. 21-3a Coolant Hose System (Heat Exchanger) C-172 with TAE 125-01 installation

1 Coolant Hose, Heat Exchanger IN
2 Coolant Hose, Heat Exchanger OUT

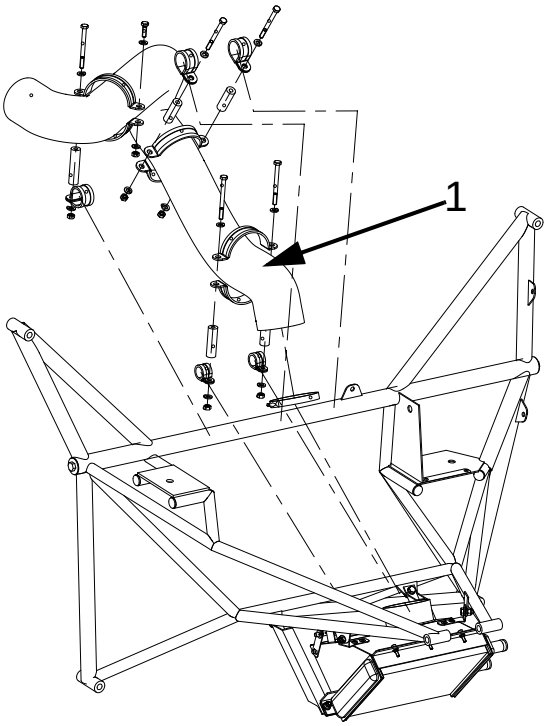

Fig. 21-4a Air Hose System C-172 F,G,H,I,K,L,M,N,P with TAE 125-01 installation

1 Air Hose, Heat Exchanger to Firewall

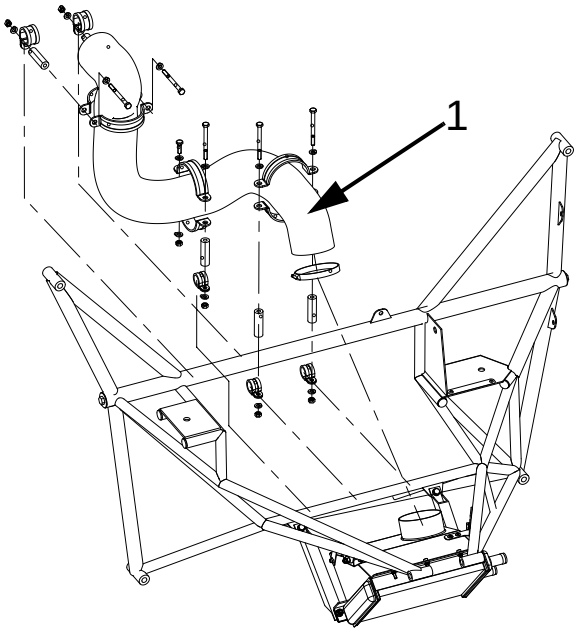

Fig. 21-5a Air Hose System C-172 R,S with TAE 125-01 installation

1 Air Hose, Heat Exchanger to Firewall

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24 ELECTRICAL POWER

24.00 GENERAL

DESCRIPTION AND OPERATION

For Cessna 172 with TAE 125-01 installation there are two electrical system variants possible:

- 14 Volt or
- 28 Volt

The 14 V system is equipped with a 90 amp alternator, a 14 V starter, a 12 V battery and an excitation battery for the alternator.
The 28 V system is equipped with a 60 amp alternator, a 28 V starter, a 24 V battery and an excitation battery for the alternator.
The alternator and the battery are operated by a separate rocker switch (BAT and ALT) located on the instrument panel.
The excitation battery of the alternator is operated with the BAT switch simultaneously.
A warning light (ALT WRNG LT) on the lightpanel will illuminate if the alternator fails to produce current, accompanied by a zero indication on the AED-125.
The battery switch (BAT) must be ON before any electrical equipment will operate.

In addition to the main battery and alternator, a backup battery which only supplies power to FADEC A is part of the electrical system when installed. The FADEC backup battery is integrated into the electrical system without manual control. The pilot can not manually switch the FADEC backup battery on or off. Under normal operating conditions when the alternator voltage is greater than the battery voltage, the alternator charges the battery.
In the event of an alternator failure and a depleted or failed main battery, the FADEC backup battery is the only power source and will automatically supply power to FADEC A. This prevents the engine from stopping in the unlikely event of interrupted power supply from both alternator and main battery.
.

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

For wiring diagrams of the electrical systems of TAE 125-01 installations refer to Chapter 91, Section 91.10 of this Supplement.

24.30 DC GENERATION

PRECAUTIONS

The following precautions must be observed when testing the electrical system.

▲ **WARNING:** Failure to observe these precautions will result in serious damage to the electrical equipment!

■ CAUTION: Refer to wiring diagram in Chapter 91, Section 91.10 when installing or testing alternator.

■ CAUTION: Disconnect battery, excitation battery and backup battery before connecting or disconnecting test instruments (except voltmeter), or before removing or replacing any unit or wiring. Accidental grounding or shorting at alternator with internal regulator (14V version only), alternator without internal regulator (28V version only), regulator (28V version only), excitation battery, ammeter or accessories, will cause severe damage to units and/or wiring.

■ CAUTION: Disconnect main battery before connecting or disconnecting the excitation or backup battery! The excitation battery wire from the alternator (14V version) or from the regulator (28V version) may carry electrical power even without connected excitation battery in case the main battery is still connected to the system.

■ CAUTION: Grounding the alternator output terminal will damage alternator and/or circuit and components!

- CAUTION: Reversed battery connections will damage rectifiers, wiring, regulator and other charging system components ! Battery polarity must be checked with a voltmeter before connecting battery. The aircraft is negative ground.

- CAUTION: If booster battery or fast charger is used, its polarity must be connected correctly to prevent damage to electrical system components!

TROUBLESHOOTING

Trouble	Check	Corrective Action
Lack of alternator current	Check alternator wiring	Replace alternator wiring
	Check alternator fuse	Replace alternator fuse
	Check alternator relay	Replace alternator relay
	Check alternator switch	Replace alternator switch
	Check alternator funcion	Replace alternator
Alternator does not work correctly without main battery connected and switched on	Check excitation battery	Replace excitation battery
	Check excitation battery wiring	Repair wiring
FADEC backup battery functioning test negative	FADEC backup battery capacity low	Replace Battery
	FADEC backup battery defect	Replace Battery
	FADEC backup battery system wiring defective	Do a test of the FADEC backup battery system wiring Refer to chapter 91 for the wiring diagrams

Table 24-1a Troubleshooting TAE 125-01 DC Generation

MAINTENANCE PRACTICES

1. General

These maintenance practices provide instructions to

- Inspecting the main battery
- Replacing the main battery
- Charging the main battery
- Replacing the excitation battery
- Functioning check of the FADEC backup battery
- Replacing the FADEC backup battery (if installed per TM TAE 601-0007)

2. Inspecting the Main Battery or FADEC backup battery

- Visually inspect the battery for signs of damage, leaks and corrosion. Refer to the battery manufacturer's specifications (refer to 01.1).
- Check for incorrect mounting.
- Check the terminal connections.

3. Disconnecting/Connecting the Main Battery for Maintenance

A. Disconnect the Main Battery for Maintenance

(1) Remove the bottom of the extended baggage area. Refer to the airplane manufactuerer´s specifications.

(2) Remove the cover from the battery box.

(3) Disconnect the negative cable from the main battery. See Fig. 24-1a.

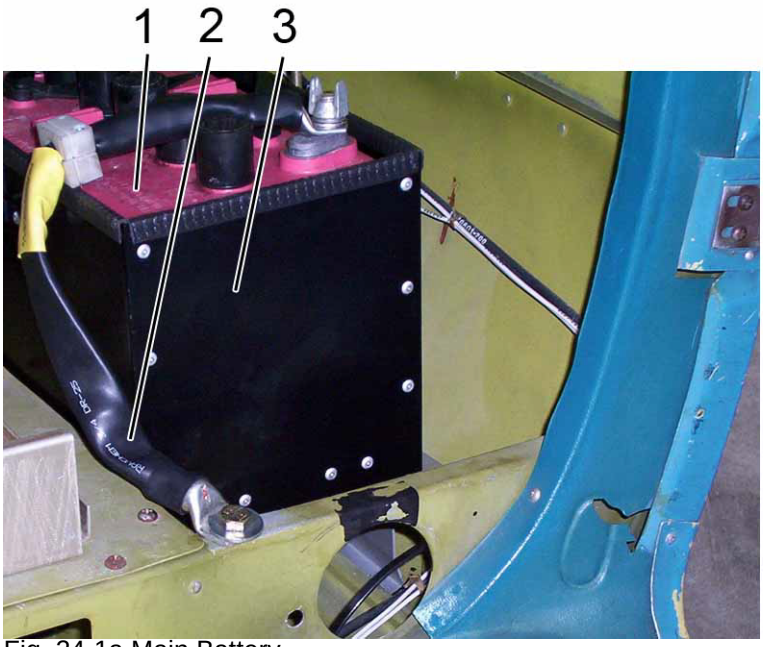

Fig. 24-1a Main Battery

1 Main battery
2 Negative cable
3 Battery box

(4) Disconnect the positive cable from the main battery.

B. Connect the Main Battery after Maintenance

(1) Connect the positive cable to the main battery

■ CAUTION: Make sure that you connect the cables to the correct terminals. Incorrect connection can damage the electrical and avionic systems.

(2) Connect the negative cable to the main battery.

(3) Install the cover to the battery box

(4) Install the bottom of the extended baggage area. Refer to the airplane manufacturer´s specifications.

4. Replacing the Main Battery

A. Remove the Main Battery

(1) Remove the bottom of the extended baggage area. Refer to the airplane manufactuerer´s specifications.

(2) Remove the cover from the battery box.

(3) Disconnect the negative cable from the main battery. See Fig. 24-1a.

(4) Disconnect the positive cable from the main battery.

(5) Remove the main battery from the airplane.

B. Install the new Main Battery in the Airplane

(1) Make sure that the main battery is dry and clean.

(2) Place the main battery into position in the battery box.

(3) Connect the positive cable to the main battery.

■ CAUTION: Make sure that you connect the cables to the correct terminals. Incorrect connection can damage the electrical and avionic systems.

(4) Connect the negative cable to the main battery.

(5) Install the cover to the battery box.

(6) Install the bottom of the extended baggage area. Refer to the airplane manufacturer´s specifications.

5. Charging the Main Battery

(1) Engine Master off

(2) Main Bus off

(3) Connect External Power to the appropriate connector.

(4) Turn the BAT Master switch on.

■ CAUTION: Do not start the engine while charging.

◆ Note: The external power connector is only to be used to charge the battery.

6. Replacing the Excitation Battery

A. Remove the Excitation Battery

(1) Disconnect the main battery. Refer to 3, Disconnect / Connect the Main Battery for Maintenance.

(2) Disconnect the negative cable from the excitation battery.

(3) Disconnect the positive cable from the excitation battery.

(4) Remove the battery carrier (top)

(5) Remove the excitation battery from the airplane.

B. Install the new Excitation Battery

(1) Place the excitation battery into position in the battery carrier (bottom).

(2) Install the battery carrier (top)

(3) Connect the positive cable to the excitation battery

(4) Connect the negative cable to the excitation battery

(5) Connect the main battery. Refer to 3, Disconnect / Connect the Main Battery for Maintenance.

(6) Do an engine ground run. Refer to OM-02-01. The Alternator Warning Lamp (AWL) must go OFF.

7. Functioning check of the FADEC backup battery

(1) Start engine in accordance with Technify Motors GmbH POH supplement

(2) Turn off all avionics

(3) FADEC Backup Battery Test

a) Alternator - OFF, engine must operate normally

b) Battery - OFF, engine must operate normally, FADEC Battery test successfull

c) Battery - ON

d) Alternator - ON

(4) Shut down engine

8. Replacing the FADEC Backup Battery

A. Remove the Backup Battery

(1) Disconnect the main battery. Refer to 3, Disconnect / Connect the Main Battery for Maintenance.

(2) Disconnect the negative cable from the backup battery.

(3) For 28V system only: disconnect the cable which interconnects the two batteries.

(4) Disconnect the positive cable from the backup battery.

(5) Remove the battery carrier (top)

(6) Remove the backup battery from the airplane.

B. Install the new Backup Battery

◆ Note: Charge the battery i.a.w. the manufacturers instruction before installation into the aircraft.

(1) Place the backup battery into position in the battery carrier (bottom).

(2) Install the battery carrier (top)

(3) Connect the positive cable to the backup battery

(4) Connect the negative cable to the backup battery

(5) For 28V system only: interconnect the two batteries

(6) Connect the main battery. Refer to 3, Disconnect / Connect the Main Battery for Maintenance.

(7) Perform functioning check of the FADEC backup battery.

24.50 ELECTRICAL LOAD DISTRIBUTION

TROUBLESHOOTING

For Troubleshooting in case of malfunction refer to Chapter 71.

MAINTENANCE PRACTICES

1. General

These maintenance practices provide instructions to inspect

- all relays
- all 14V/28V converters, if installed

They also provide instructions to accomplish a function test of the following parts:

- all relays
- all switches
- all circuit breakers
- all 14V/28V converters, if installed

2. Inspecting the relays

This is a visual inspection. Inspect whether the connections of the relays are firmly attached. In addition, the relays have to be checked for signs of corrosion.
The following relays have to be checked:

- Battery Relay (located in the Junction-Box on the firewall)
- Alternator Relay (located in the Junction-Box on the firewall)
- Glow Relay (located in the Junction-Box on the firewall)
- Main Bus Relay, only C172 K,L,M,N,P (located on the LH of the airframe, underneath the Panel LH)

3. Inspecting the 14V/28V Converters, if installed

This is ab visual inspection. Inspect whether the connections of the 14V/28V are firmly attached. In addition, the 14V/28V convertershas to be checked for signs of corrosion.

4. Accomplishing a function test of all relays

The following relays must be tested:

- Battery Relay (located in the Junction-Box on the firewall)
- Alternator Relay (located in the Junction-Box on the firewall)
- Glow Relay (located in the Junction-Box on the firewall)
- Main Bus Relay, only C172 K,L,M,N,P (located on the LH of the airframe, underneath the Panel LH)

A. Accomplish the function test of the Battery Relay

(1) Battery Switch “ON“
(2) AED, CED illuminate (without data)
(3) Fuel Pump functional (switch Fuel Pump)
(4) => Battery Relay OK
(5) Battery Switch “OFF“

B. Accomplish the function test of the Alternator Relay

(1) Battery Switch “ON“
(2) Alternator “ON“
(3) A voltmeter must indicate the same voltage at the Alternator (Terminal Wire 3) as at the battery
(4) Alternator “OFF“: No voltage at the Alternator (Terminal Wire 3)
(5) => Alternator Relay OK
(6) Battery Switch “OFF“

C. Accomplish the function test of the Glow Relay

(1) Battery Switch “ON“
(2) Engine Master “ON“
(3) Voltage at the Glow Plugs, Glow Lamp “ON“ (approx. 5sec.)
(4) => Glow Relay OK
(5) Engine Master “OFF“
(6) Battery Switch “OFF“

D. Accomplish the function test of the Main Bus Relay

(1) Battery Switch “ON“
(2) Main Bus Switch “ON“
(3) Avionics, Lights etc. functional
(4) => Main Bus Relay OK
(5) Main Bus Switch “OFF“
(6) Battery Switch “OFF“

5. Accomplishing a function test of all switches/knobs

The following switches must be tested:

- Main Bus Switch
- Engine Master Switch
- Force B Switch
- FADEC Test Knob
- AED/CED Test Knob
- Alternator Switch

▲ **WARNING:** Only run the engine on the ground with the propeller running, even for testing purposes, in a safe and clear area and ensure that prop area is clear !

A. Inspect all switches/knobs

(1) Visual inspect all switches/knobs on signs of corrosion
(2) Visual inspect whether all connections of the switches/ knobs are firmly attached

B. Accomplish the function test of the Main Bus Switch

(1) Battery Switch “ON“
(2) Main Bus Switch “ON“
(3) Main Bus Relay on, Avionics, Lights etc. functional
(4) => Main Bus Switch OK
(5) Main Bus Switch “OFF“
(6) Battery Switch “OFF“

C. Accomplish the function test of the Engine Master Switch

(1) Battery Switch “ON“
(2) Engine Master “ON“ => AED/CED indicate data
(3) Start engine

▲ **WARNING:** Only run the engine on the ground with the propeller running, even for testing purposes, in a safe and clear area and ensure that prop area is clear !

(4) Load Selector “IDLE“
(5) Accomplish FADEC Test procedure => OK
(6) Battery Switch “OFF“ => Engine must run without Battery
(7) Switch FADEC A to FADEC B using the Force B switch => Engine running OK
(8) => Engine Master Switch OK
(9) Engine Master “OFF“
(10) Battery Switch “OFF“

D. Accomplish the function test of the Force B Switch

(1) Battery Switch “ON“
(2) Engine Master “ON“
(3) Start engine

▲ **WARNING:** Only run the engine on the ground with the propeller running, even for testing purposes, in a safe and clear area and ensure that prop area is clear !

(4) Load Selector “IDLE“
(5) FADEC toggles from FADEC A to FADEC B using the Force B switch
(6) => Force B switch OK
(7) Engine Master “OFF“
(8) Battery Switch “OFF“

E. Accomplish the function test of the FADEC Test Knob

(1) Battery Switch “ON“
(2) Engine Master “ON“
(3) Start engine

▲ **WARNING:** Only run the engine on the ground with the propeller running, even for testing purposes, in a safe and clear area and ensure that prop area is clear !

(4) Load Selector “IDLE“
(5) Push FADEC test knob => Test procedure OK
(6) => FADEC Test knob OK
(7) Engine Master “OFF“
(8) Battery Switch “OFF“

F. Accomplish the function test of the AED/CED Test Knob

(1) Battery Switch “ON“
(2) Push AED/CED test knob => Selftest AED/CED OK
(3) => AED/CED Test Knob OK
(4) Battery Switch “OFF“

G. Accomplish the function test of the Alternator Switch

(1) Battery Switch “ON“
(2) Engine Master “ON“
(3) Start engine

▲ **WARNING:** Only run the engine on the ground with the propeller running, even for testing purposes, in a safe and clear area and ensure that prop area is clear !

(4) Load Selector “IDLE“
(5) Alternator on: Load current (AED), Voltage > 14V (AED), Alternator Warning Lamp (AWL) off
(6) Alternator off: No load current, voltage <14V, Alternator Warning Lamp on
(7) => Alternator OK
(8) Engine Master “OFF“
(9) Battery Switch “OFF“

6. Accomplishing a function test of all Circuit Breakers

The following circuit breakers must be tested:

- FADEC A/B
- AED/CED
- Starter

A. Accomplish the function test of the Circuit Breaker FADEC A/B

(1) Battery Switch “ON“
(2) Engine Master “ON“
(3) Establish CAN communication by connecting the computer to the airplane
(4) Switch FADEC A/B via Circuit Breaker
(5) => Circuit Breaker FADEC A/B OK
(6) Remove CAN communiction
(7) Engine Master “OFF“
(8) Battery Switch “OFF“

B. Accomplish the function test of the Circuit Breaker AED/ CED

(1) Battery Switch “ON“
(2) Engine Master “ON“
(3) Switch AED/CED via Circuit Breaker AED/CED
(4) => Circuit Beaker AED/CED OK
(5) Engine Master “OFF“
(6) Battery Switch “OFF“

C. Accomplish the function test of the Circuit Breaker Starter

(1) Battery Switch “ON“
(2) Engine Master “ON“
(3) Switch Starter via Circuit Breaker Starter
(4) => Circuit Breaker Starter OK
(5) Engine Master “OFF“
(6) Battery Switch “OFF“

7. Accomplishing a function test of all 14V/28V converters, if installed

A. Accomplish the function test of all 14V/28V converters

(1) Battery Switch “ON“
(2) Main Bus Switch “ON“

(3) Consumer of electricity “ON“ (check under Load)

(4) Check Voltage, a voltmeter must indicate the transformed voltage (refer to the 14/28V Converter manufacturer)

(5) => 14V/28V Converters OK

(6) Main Bus Switch “OFF“

(7) Battery Switch “OFF“

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28 FUEL

28.00 GENERAL

DESCRIPTION

The fuel system of the TAE 125 installation includes the original standard or long-range tanks of the Cessna 172. Additional sensors for Fuel Temperature and "Low Level" Warning (if not installed already) are installed in the fuel tanks.
The fuel flows out of the tanks to the Fuel Selector 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. A thermostat switch in the Filter Module controls the heat exchange between the fuel feed and return.

▲ **WARNING:** Any modification to the fuel system (e.g. installation of ferry tank installation), must be approved by Technify Motors GmbH. Any un-approved modification may lead to an unsafe situation.

28.20 DISTRIBUTION

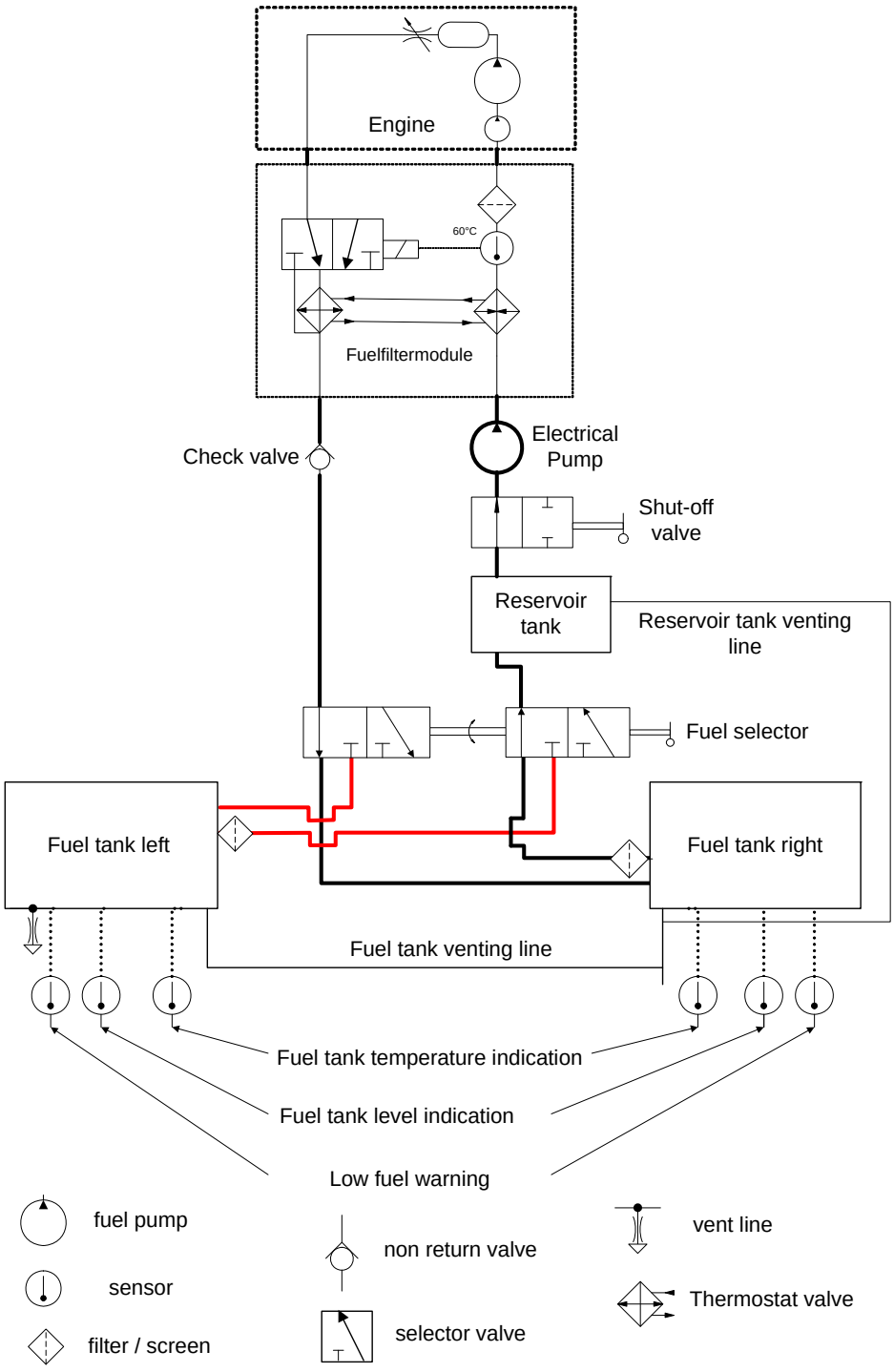

Fig. 28-1aFuel System Diagram C-172 K/L/M (left, right) with TAE 125-01 installation

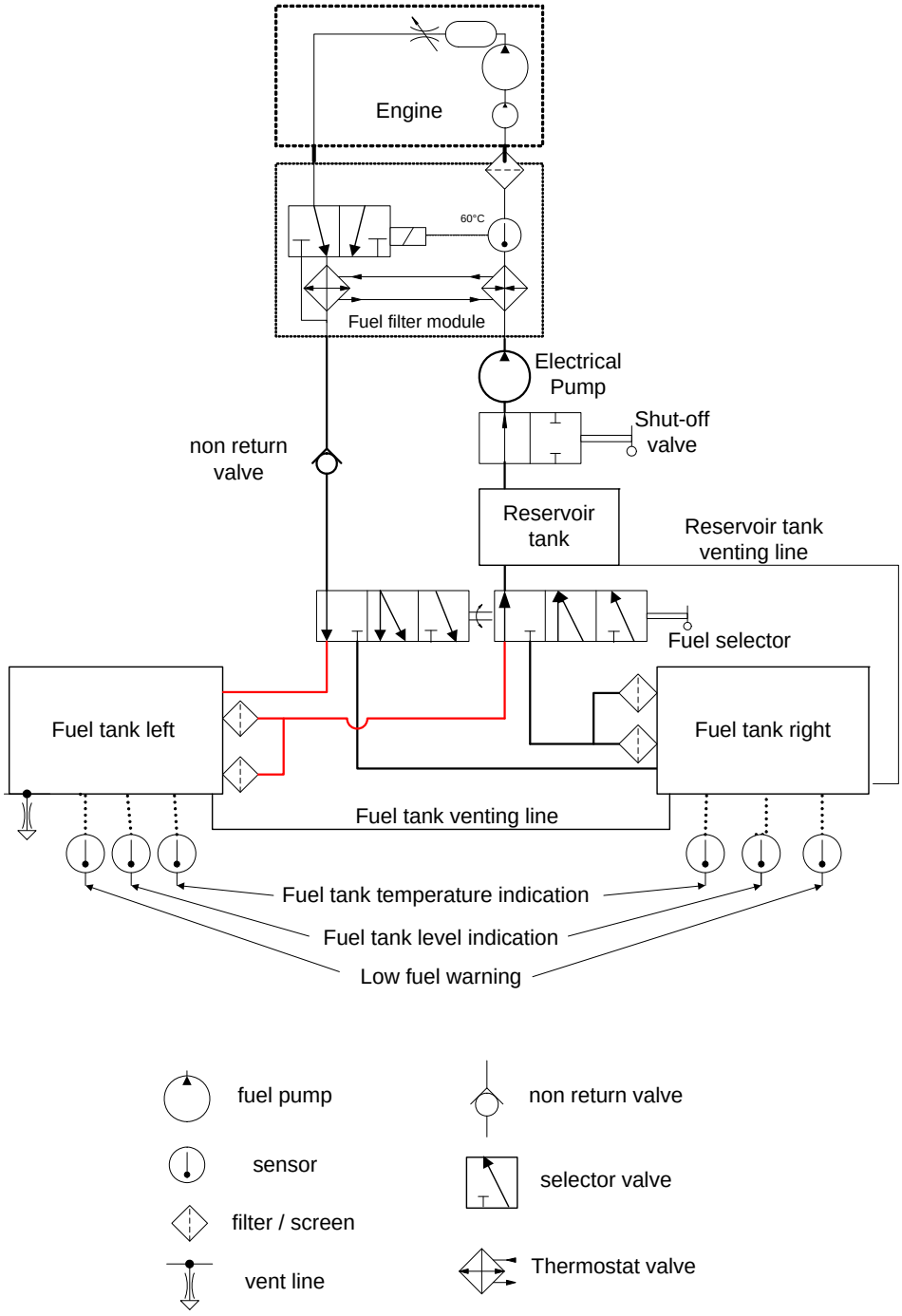

Fig. 28-2a Fuel System Diagram C-172 K/L/M (left, right, both) with TAE 125-01 installation

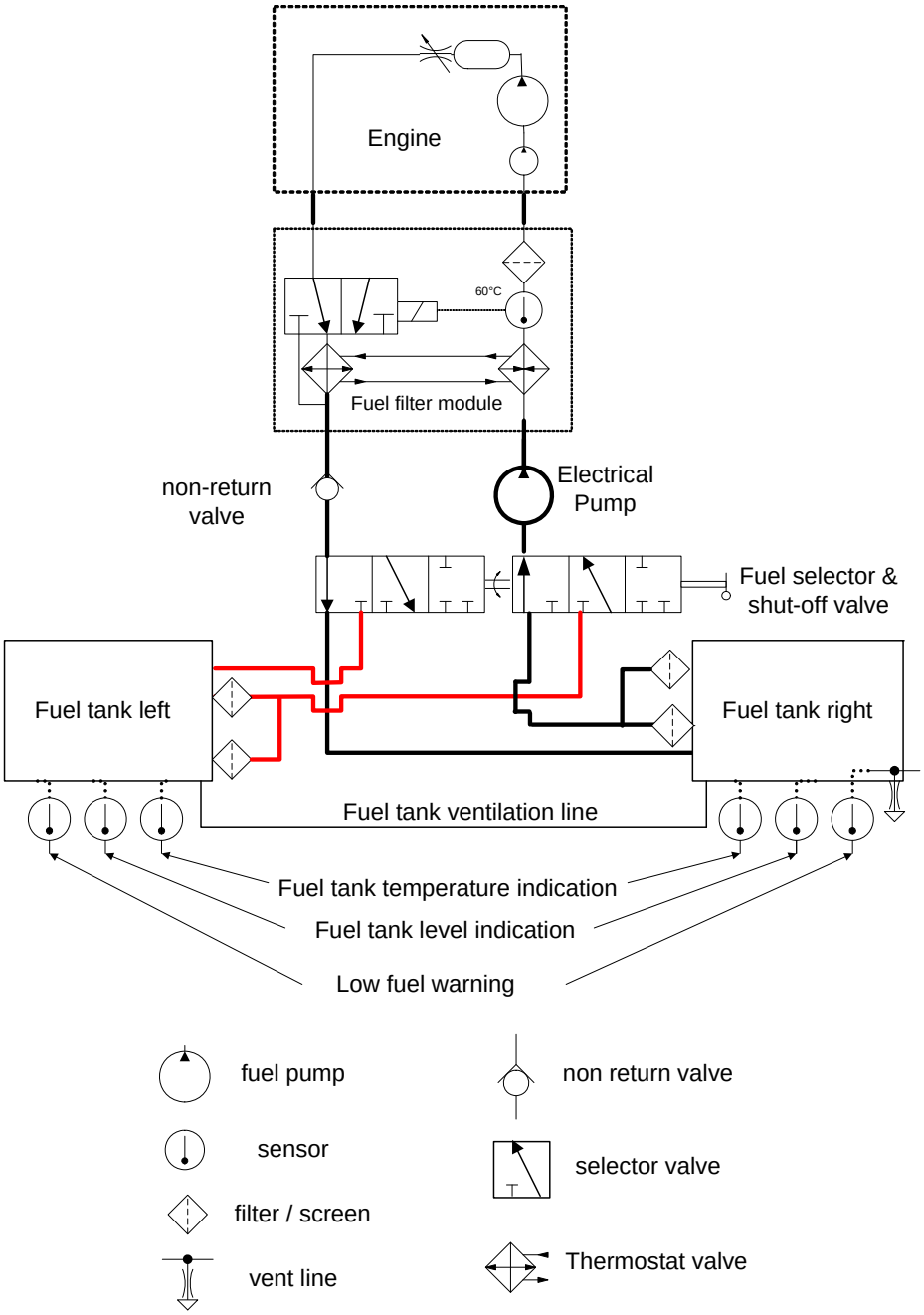

Fig. 28-3a Fuel System Diagram C-172 N/P (Left, Right) with TAE 125-01 installation

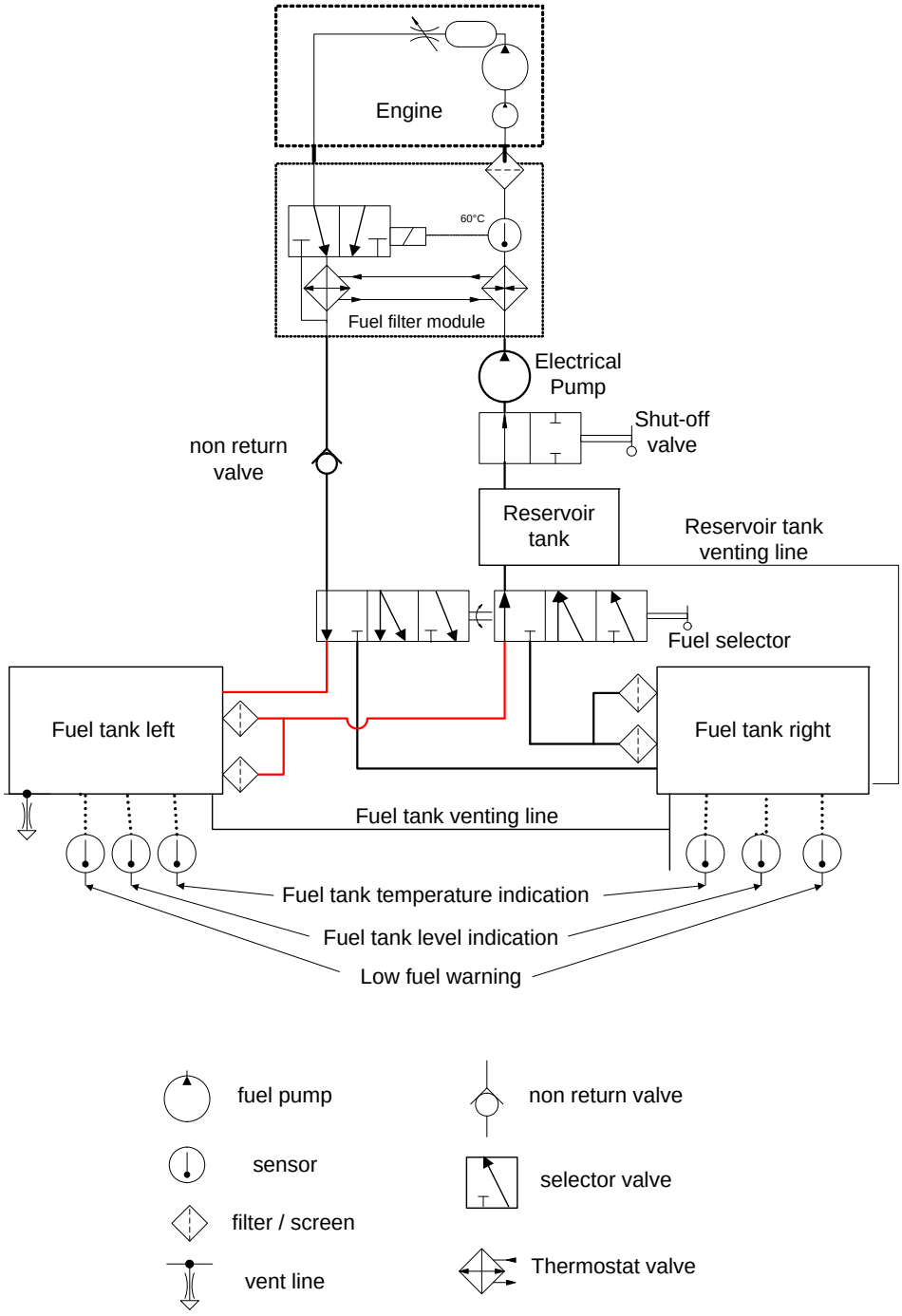

Fig. 28-4a Fuel System Diagram C-172 N/P (Left, Right, Both) with TAE 125-01 installation

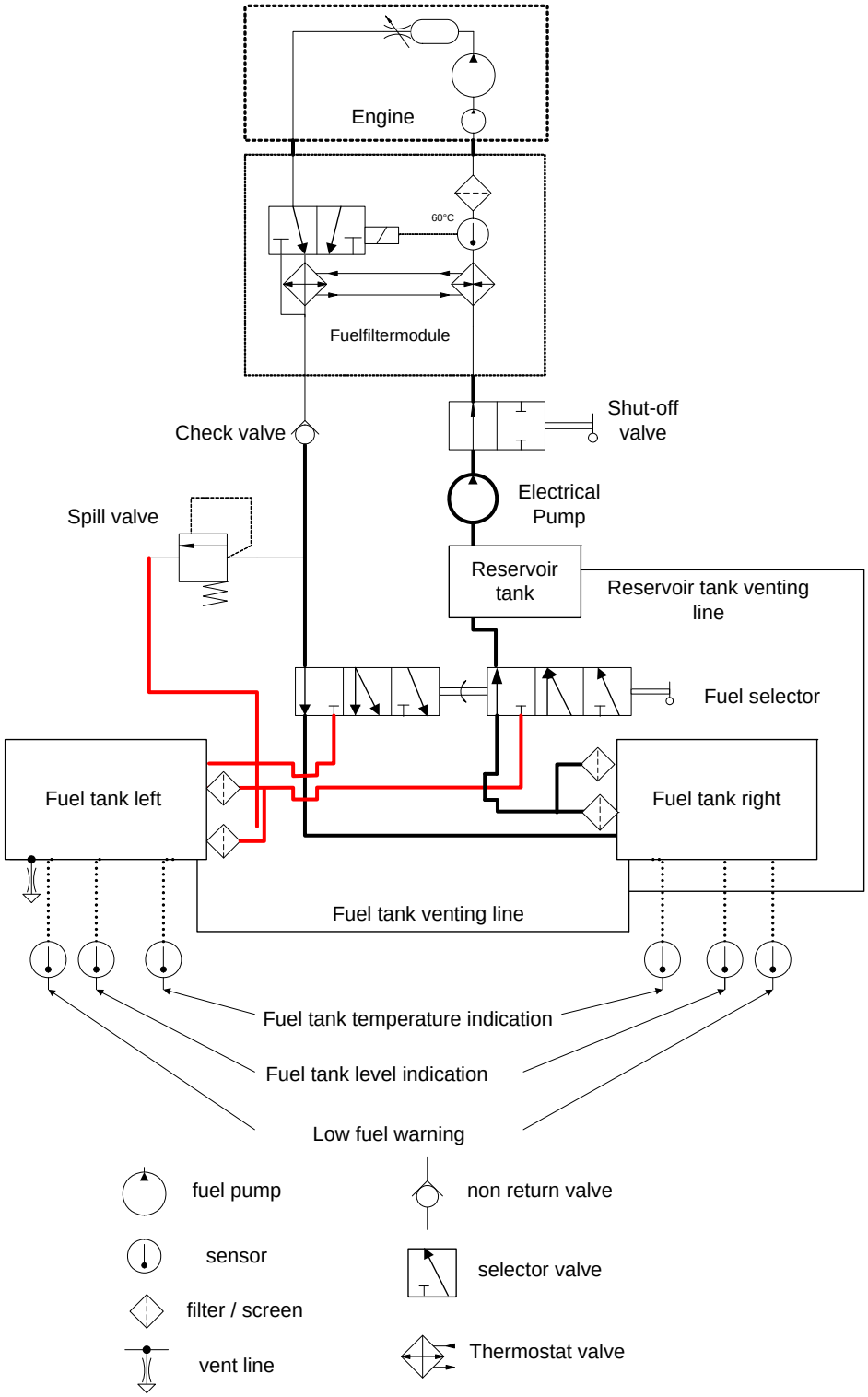

Fig. 28-5a Fuel System Diagram C-172 R/S with TAE 125-01 installation

Fuel Filter Bowl

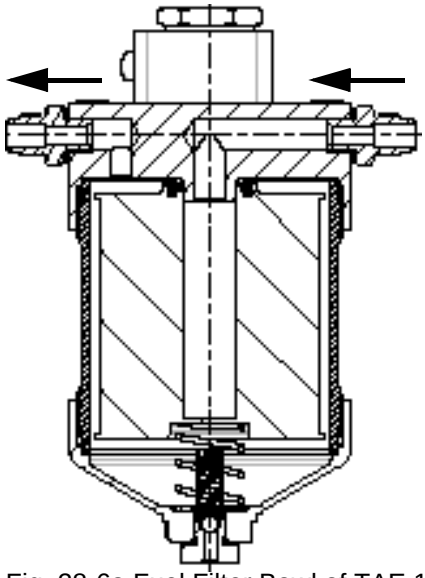

Fig. 28-6a Fuel Filter Bowl of TAE 125-01 installation

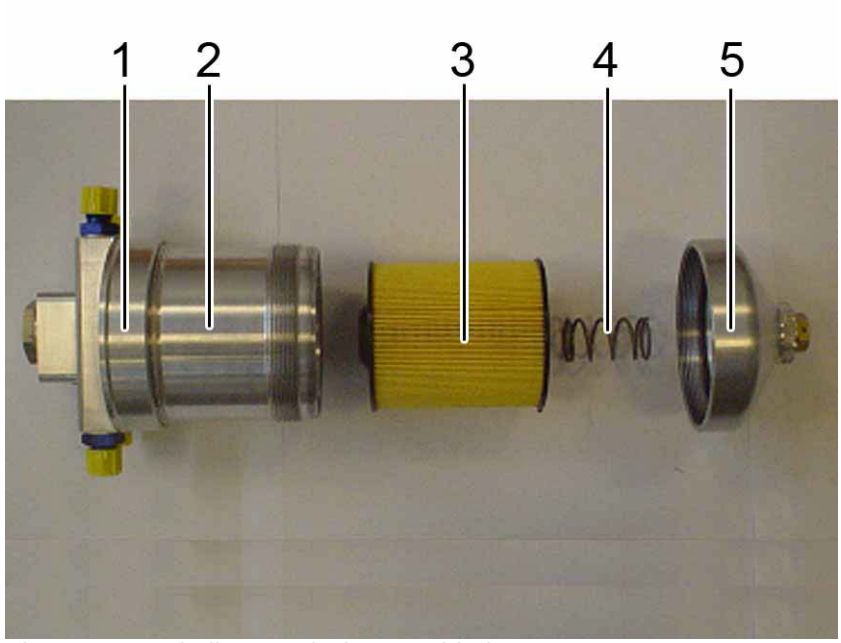

Fig. 28-7a Fuel Filter Bowl Disassembled

1 Top Lid
2 Fuel Filter Housing
3 Fuel Filter Cartridge
4 Spring
5 Bottom Lid

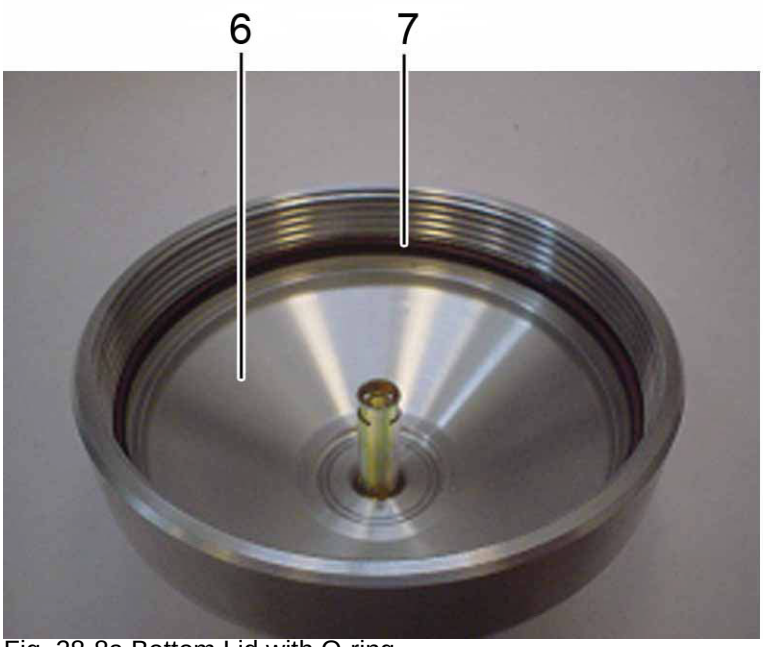

Fig. 28-8a Bottom Lid with O-ring

6 Bottom Lid
7 O-Ring

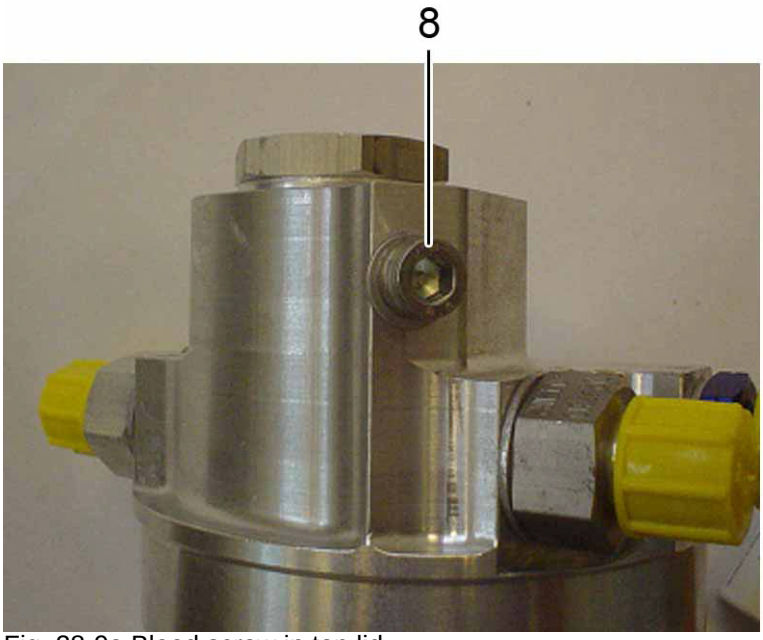

Fig. 28-9a Bleed screw in top lid

8 Bleed Screw

MAINTENANCE PRACTICES

1. General

These maintenance practices provide instructions to remove/install the Fuel Filter and replace the Fuel Filter Cartridge.

2. Removing/Installing the Fuel Filter and replace the Fuel Filter Cartridge

A. Remove the Fuel Filter

(1) Remove the Fuel Filter from the aircraft by disconnecting all fuel lines and loosening the hose clamps that hold the filter in place. Use a wrench to hold the fittings in the fuel filter bowl while loosening the fuel lines to avoid inadvertently loosening the lines. Be careful to protect all lines and openings of the housing from contamination.

B. Replace the Fuel Filter Cartridge

(1) Unscrew the bottom lid (5) of the filter using a 27mm oil filter socket wrench (short socket). Remove the fuel filter cartridge (3) from the fuel filter housing. See Fig. 28-7a.

◆ Note: If the top lid (1) of the fuel filter bowl should loosen, refit the top lid using Loctite 243.

■ CAUTION: When using Loctite 243 (blue, medium-strength), only apply a thin film to about 3 or 4 threads, depending on thread size and the threaded length. If any drops collect on the thread or if Loctite fluid escapes from the threaded connection, this is an indication that it has been used too generously and should be avoided.

(2) Replace the O-Ring (6) in the bottom lid (5), carefully seating it in the groove. Stretching the ring a little helps to retain it in the groove. See Fig. 28-8a.

(3) Insert the new fuel filter cartridge into the fuel filter. Ensure that the open end of the lid faces up into the housing.

(4) Carefully screw the bottom lid (5) onto the fuel filter housing (2), ensuring the spring seats correctly both in the lid and the fuel filter cartridge. Tighten the lid using a 27 mm oil filter socket wrench (short socket).

C. Install the Fuel Filter

(1) Install the fuel filter assembly in the aircraft. Tighten the hose clamps, and connect the fuel lines to the assembly. Ensure correct connection of the lines to the filter housing, as the fittings are the same size. All connections are clearly labelled on the top lid of the fuel filter assembly.

(2) Bleed the fuel filter bowl by opening the allen head screw, opening the fuel selector valve and activating the auxiliary fuel feed pump until fuel drains from the opening. Replace and tighten the allen head screw, ensuring the crush washer is in place. See Fig. 28-9a.

(3) Conduct a ground run after completing any other maintenance on the aircraft.

28.40 INDICATING

DESCRIPTION

Low Fuel Sensors

Electric cables connect the two low fuel sensors (each in one tank) to two low fuel warning lamps in the lightpanel. Chapter 31, Section 31.50 for more data on the lightpanel.

Fuel Temperature Sensors

Electric cables connect the two fuel temperature sensors (each in one tank) to the AED, where the LH and RH fuel temperatures are indicated. Refer to Chapter 31, Section 31.60 for more data on the AED.

TROUBLESHOOTING

Trouble	Cause	Corrective Action
Fuel low level warning lamp illuminate on the lightpanel when the tank has more than 2.6 US gal (C-172 F,G,H,I,K,L,M,N,P) or 5 US gal (C-172 R,S)	Low Fuel Sensor defective	Replace Low Fuel Sensor

Table 28-1a Troubleshooting TAE 125-01 / Low Fuel Sensor

MAINTENANCE PRACTICES

1. General

These maintenance practices provide instructions to replace the low fuel sensor (C-172 F,G,H,I,K,L,M,N,P) and the fuel temperature sensor.

▲ **WARNING:** Do not get fuel on you. Fuel can cause skin desease !

▲ **WARNING:** Do not allow fire near fuel. Fuel burns and causes injury to persons and damage to equipment !

▲ **WARNING:** Do not breath fuel vapor ! Fuel vapor can make you ill !

2. Replacing the Low Fuel Sensor (C-172 F,G,H,I,K,L,M,N,P)

A. Remove the Low Fuel Sensor

(1) Remove the tank. Refer to the aircraft manufacturer´s specifications.
(2) Disconnect the electrical cables for the low fuel sensor.
(3) Remove the rivets of the fitting for the low fuel sensor.
(4) Remove the fitting of the low fuel sensor.
(5) Remove the low fuel sensor out of the fitting.
See Fig. 28-10a.

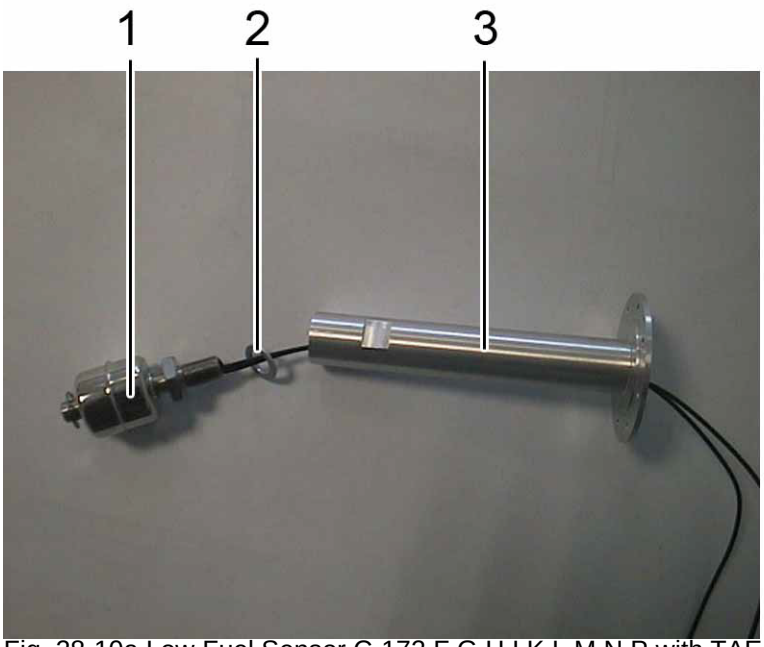

Fig. 28-10a Low Fuel Sensor C-172 F,G,H,I,K,L,M,N,P with TAE 125-01 installation

1 Low Fuel Sensor
2 Crush Washer
3 Fitting

(6) Clean the tank and the fitting.

B. Install the new Low Fuel Sensor

(1) Refer to IM-20-01.

3. Replacing the Fuel Temperature Sensor (C-172 F,G,H,I,K, L,M,N,P)

A. Remove the Fuel Temperature Sensor

(1) Remove the tank. Refer to the aircraft manufacturer´s specifications.

(2) Remove the rivets of the fitting for the fuel temperature sensor.

(3) Remove the fitting of the fuel temperature sensor.

(4) Remove the cover of the fitting.

(5) Disconnect the connector of the fuel temperature sensor.

(6) Remove the fuel temperature sensor. See Fig. 28-11a.

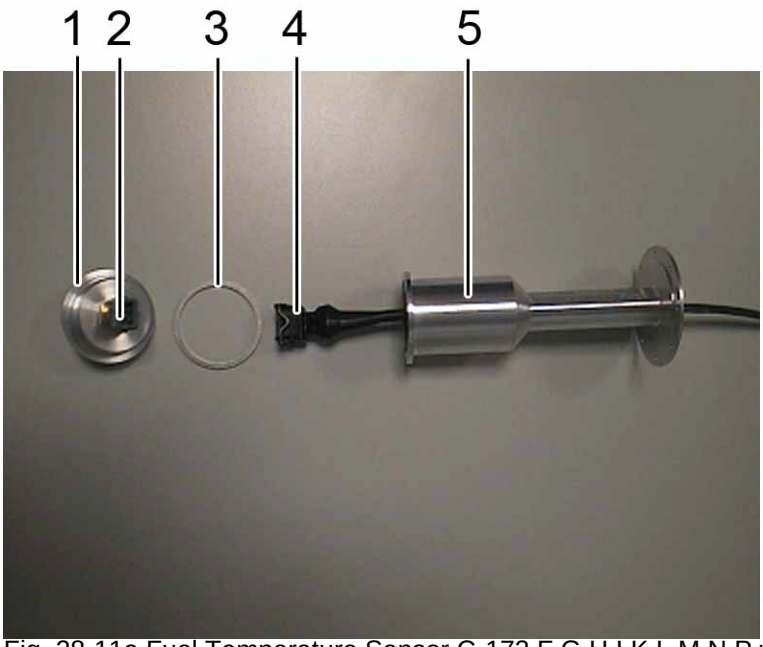

Fig. 28-11a Fuel Temperature Sensor C-172 F,G,H,I,K,L,M,N,P with TAE 125-01 installation

1 Cover
2 Fuel Temperature Sensor
3 Seal Ring
4 Connector
5 Fitting

(7) Clean the tank and the fitting.

B. Install the new Fuel Temperature Sensor

(1) Refer to IM-20-01.

4. Replacing the Fuel Temperature Sensor (C-172 R,S)

A. Remove the Fuel Temperature Sensor

(1) Remove the access panel. See Fig. 28-12a.

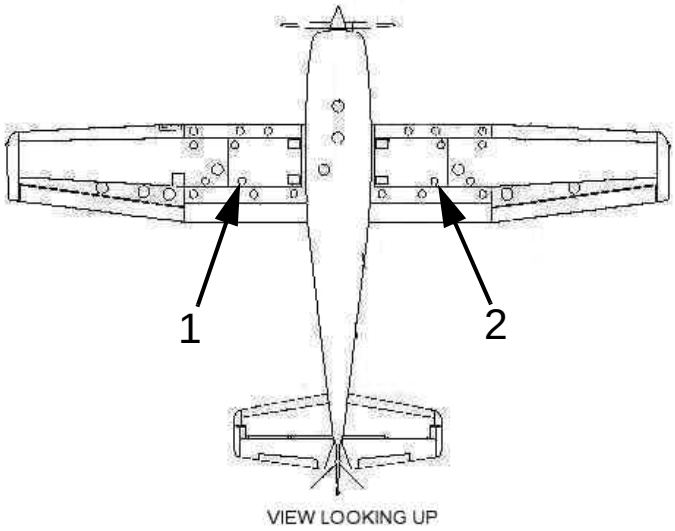

Fig. 28-12a Access Panel C-172 R,S

1 Access Panel
2 Access Panel

(2) Disconnect the connector of the fuel temperature sensor.

(3) Remove the fuel temperature sensor. See Fig. 28-13a.

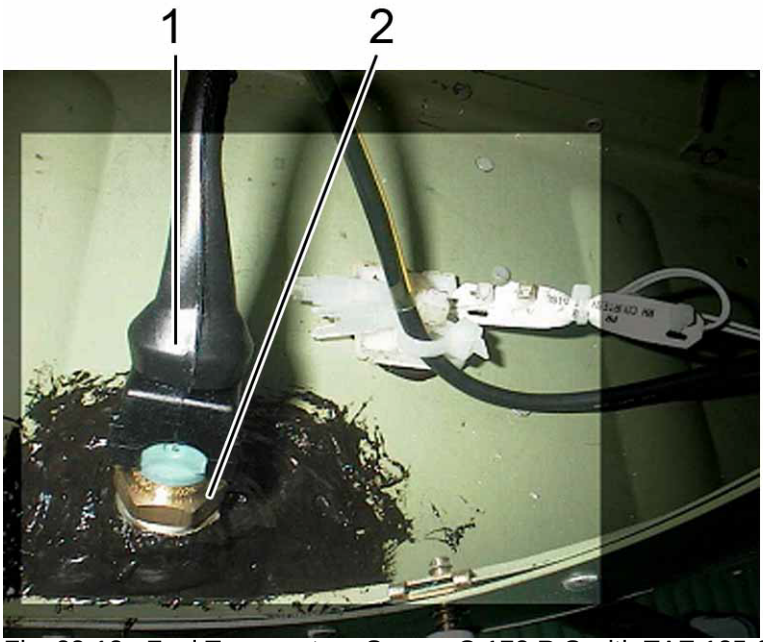

Fig. 28-13a Fuel Temperature Sensor C-172 R,S with TAE 125-01 installation

1 Connector
2 Fuel Temperature Sensor

(4) Make sure that the tank and the adaptor of the fuel temperature sensor are clean.

B. Install the new Fuel Temperature Sensor

(1) Refer to IM-20-01.

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31 INDICATING / RECORDING SYSTEMS

31.50 CENTRAL WARNING SYSTEMS

Lightpanel

The TAE 125 installation includes a lightpanel, which is installed on the instrument panel with the following functions:

C-172 F,G,H,I,K,L,M,N,P

Lightpanel	Function
FADEC	Test Knob
A $_{FADEC}$ B	Warning lamps for FADEC A and B
Alt	Alternator Warning Lamp (red)
AED	Lamp (amber) for AED 125
CED	Lamp (amber) for CED 125
CED/AED	Test/Confirm knob for CED 125, AED 125 an Caution Lamps
Fuel L; Fuel R	Lamps for Low Fuel Level (amber)
Glow	Glow Control Lamp (amber)

Table 31-1a Description of the Lightpanel C-172 F,G,H,I,K,L,M,N,P with TAE 125-01 installation

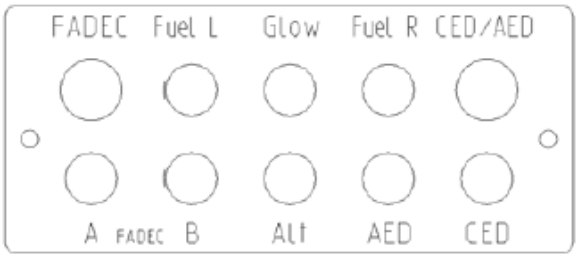

Fig. 31-1a Lightpanel C-172 F,G,H,I,K,L,M,N,P with TAE 125-01 installation

C-172 R,S

Lightpanel	Function
FADEC	Test Knob
A $_{FADEC}$ B	Warning Lamps for FADEC A and B
Force B	Switch for FADEC
Alt	Alternator Warning Lamp (red)
AED	Lamp (amber) for AED 125
CED	Lamp (amber) for CED 125
CED/AED	Test/Confirm knob for CED 125, AED 125 an Caution Lamps
Glow	Glow Control Lamp (amber)

Table 31-2a Description of the Lightpanel C-172 R,S with TAE 125-01 installation

Lightpanel Description and Function

Nomenclature	Colour	Function
FADEC	N/a	Test Knob
A FADEC B	red	Warning Lamps for FADEC A and FADEC B
Force B	N/a	Switch for manual switching to FADEC B
Alt	red	Alternator Warning Lamp
AED	amber	Caution Lamp for AED 125
CED	amber	Caution Lamp for CED 125
CED/AED	N/a	Test/Confirm Knob for CED 125, AED 125 and Caution Lamps
Fuel L; Fuel R	amber	Lamps for Low Fuel Level
Glow	amber	Glow Control Lamp

Table 31-3a Description of Lightpanel functions

31.60 INDICATING INSTRUMENTS

CED 125

Fig. 31-2a CED 125

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	Amber Range	Green Range	Amber Range	Red Range
Tachometer [rpm]	-	-	0-2300	-	> 2300
Oil Pressure [mbar]	0-1200	1200-2300	2300-5200	5200-6000	> 6000
Oil Pressure [psi]	0-17.4	17.4-33.4	33.4-75.4	75.4-87	> 87
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	-	-

Table 31-4a Markings of the CED 125

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

AED 125

Fig. 31-3a AED 125

Additional airplane data of the TAE 125-01 installation to be monitored are integrated in the auxiliary engine instrument AED-125:

- Warning Lamp "Water Level" for low level of coolant
- Indication of fuel temperature in the fuel tanks
- Voltage
- Fuelflow

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

MAINTENANCE PRACTICES

1. General

This maintenance practice provides instructions to check the "WATER LEVEL" signal.

2. Checking the "WATER LEVEL" signal

A. Drain the Coolant from the Expansion Tank

(1) Remove the cap of the expansion tank.

▲ **WARNING:** Risk of scalding ! The cooling system may be pressurized. Carefully release the pressure before opening the coolant system.

■ CAUTION: Do not drain the coolant if its temperature is above 40°C !

(2) Disconnect the coolant hose and allow the coolant to drain in a suitable container. See Fig. 31-4a.

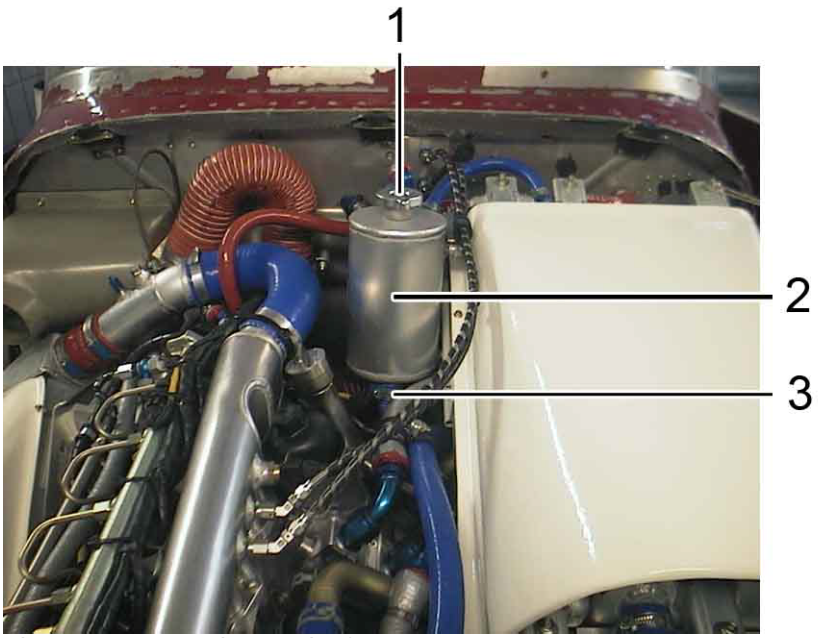

Fig. 31-4a Expansion Tank of TAE 125-01

1 Cap
2 Expansion Tank
3 Coolant Connection

(3) Seal the coolant connection of the expansion tank. See Fig. 31-4a.

B. Check the "WATER LEVEL" signal

(1) C 172 F,G,H,I,K,L,M,N,P: BATT and Main Bus Switch - "ON"

(1) C 172, R,S: BATT - "ON"

(2) The "WATER LEVEL" - Signal (AED-Instrument) must be illuminate

(3) Fill the expansion tank half with coolant

(4) The "WATER LEVEL" - Signal (AED-Instrument) must be extinguished, otherwise the "WATER LEVEL" - Sensor must be replaced

C. Replenish the Coolant

(1) Connect the coolant hose to the expansion tank. See Fig. 31-4a.

(2) Replenish the coolant (refer to Chapter 12, Liquid Cooling System)

37 VACUUM

37.00 GENERAL

DESCRIPTION

The TAE 125-01 engine includes a vacuum pump, which is supplying the following flight instruments with suction air:

- the artificial horizon
- the directional gyro and
- the turn and bank indicator.

The vacuum pump is mounted to the camshaft and works as an excenter with oildust seal. An inline spring loaded valve limits the suction pressure and the stream of the volume.
The original suction indicator of the concerned aircraft is used to indicate the suction pressure.
For adjusting the vacuum system refer to Aircraft manufacturer´s Service Manual.

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61 PROPELLER

61.10 CONSTANT SPEED PROPELLER

The TAE 125-01 installation is equipped with the propeller MTV-6-A/187-129.
For Inspections and Maintenance of the propeller refer to Operation and Installation Manual of MT-Propeller E124 (ATA 61-01-24).
The propeller control system uses gearbox oil to function. The oil pump delivers oil to the constant speed unit. Inside the constant speed unit the oil passes through a micro filter and a pressure relief valve where the pressure is reduced to a constant 20 bar (290 psi) before reaching the actual control valve. The propeller control valve regulates the oil pressure to the propeller to regulate pitch. Returned oil from the control valve is used to lubricate the gearbox. The propeller control valve is regulated by an electric signal from the FADEC while the pilot has no direct input to the propeller. The propeller itself is a conventional variable pitch propeller, pitch is increased by increasing oil pressure and is decreased by the blade pitching moment and a servo spring. The next Figure shows a schematic of the propeller control system. See Fig. 61-1a.

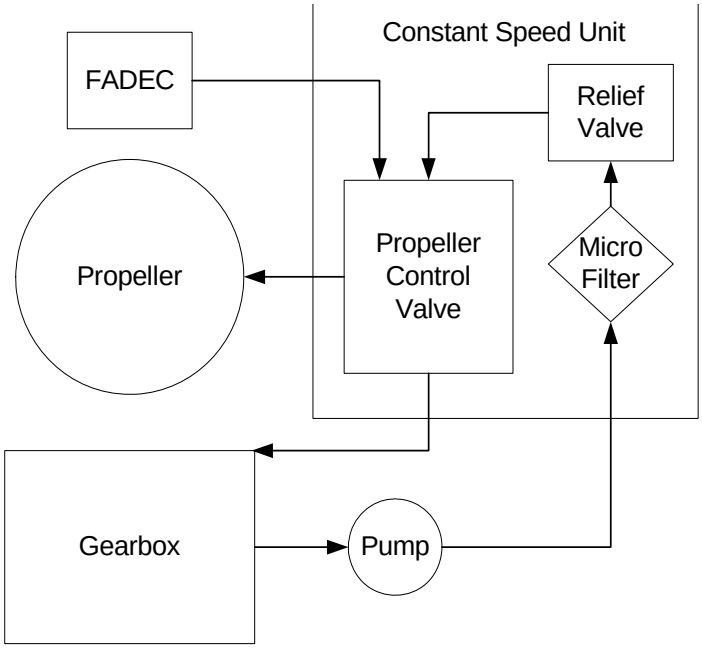

Fig. 61-1a Propeller Control System of TAE 125-01

61.20 CONSTANT SPEED UNIT

The Constant Speed Unit (CSU) of the TAE 125 installation is a FADEC-controlled single-acting propeller governor produced by Technify Motors GmbH for hydraulically variable pitch propellers with and without feathering.
The CSU TAE 125 is installed on the front side of the gearbox.
No overhaul permitted.
The micro filter have to be exchanged according to Chapter 5, Section 5.20. No cleaning allowed.
Enter each filter exchange in CSU installation record.
The governor uses gear box oil with a pressure of 20 bar (290 psi)

Limitations

Maximum acceptable operation temperature:.....+120°C

Range of altitude:.....up to 18 000ft

Dimensions of CSU TAE 125-01

(figures not to scale)

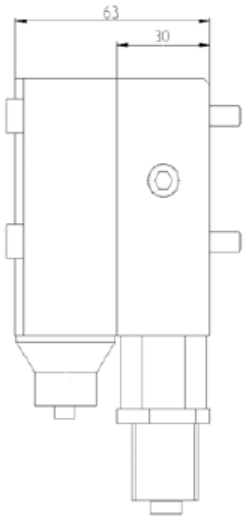

Fig. 61-2a CSU front view

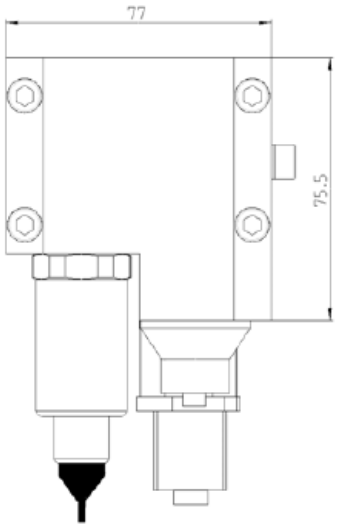

Fig. 61-3a CSU side view

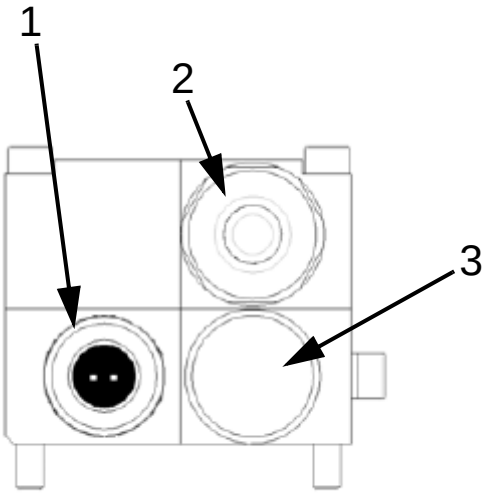

Fig. 61-4a CSU bottom view

1 Pressure Control Valve with Electrical Connection
2 Micro Filter
3 Pressure Relief Valve

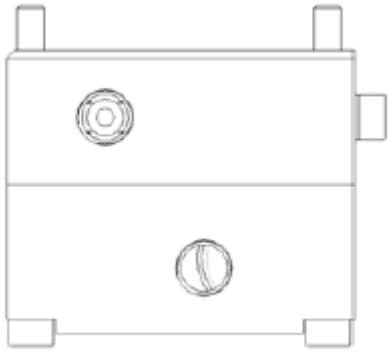

Fig. 61-5a CSU top view

TROUBLESHOOTING

Trouble	Cause	Corrective Action
Propeller surging or "wandering"	low level of gear box oil	check oil level at oil viewer glass at front side of the gear box
		fill up gear box oil (see OM-02-01)
	high contamination of micro filter	check, when micro filter has been changed last time (every 50 operating hours)
		authorised maintenance will change the microfilter
		change gear box oil
	broken connection between FADEC and pressure control valve	check electrical connection to pressure control valve
	incorrect function of the pid-regulator	contact authorised maintenance or engine manufacturer
	dirty gear box oil	Contaminants in dirty gear box oil can cause blockage of close tolerance passages in the CSU, leading to erratic operation. Timely gear box oil changes should eliminate this problem

Table 61-1a Troubleshooting TAE 125-01 / Propeller

MAINTENANCE PRACTICES

1. General

These maintenance practices provide instructions to remove/install the Micro Filter. They also provide instructions to calibrate the CSU.

2. Exchanging the Micro Filter

A. Remove the Micro Filter

(1) Open safety wire at bottom of the module block.

(2) Turn the cover of the filter with a wrench, remove the cover and the aluminum o-ring.

(3) Pull the filter downwards.

B. Install the new Micro Filter

(1) Take a new filter (P/N 02-6120-16107R1) lubricate the rubber o-ring with gear box oil.

(2) Install the new filter.

(3) Take a new aluminum gasket (P/N NM-0000-0029601) and install it with the cover.
Torque:
40 Nm (29.5 lbf·ft)

(4) Attach safety wire so that filter cover cannot move.

3. Calibrating the CSU

◆ Note: The calibration of the CSU will be done by the engine manufacturer.
If calibration is necessary by authorized maintenance, proceed at a gear box temperature of 50°C as follows:

A. Calibrate the CSU

(1) Install a manometer between gear pump and micro filter

(2) Loose the nut at pressure relief valve with a 25 mm wrench

(3) Check the pressure indicated at the manometer

(4) If pressure not 20 bar ± 2 bar (290 psi ± 29 psi), turn screw at pressure relief valve with a 10 mm wrench until this value is reached

(5) Tighten the nut with a 25 mm wrench.
Torque:
25 Nm (18.4 lbf·ft).

◆ Note: The propeller pitch limits will be set by the propeller manufacturer.

71 POWER PLANT

71.00 GENERAL

DESCRIPTION

The TAE 125-01 is a liquid-cooled in-line four-stroke 4-cylinder motor with DOHC (double overhead camshaft). The engine is a direct Diesel injection engine with common-rail technology and turbocharging. The engine is 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 has 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 the specific characteristic, all of the information from the airplane maintenance manual are no longer valid with reference to:

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

Whole Assembly

The capacity is 1689 cm^3 , each cylinder has a swept volume of 422 cm^3. The engine produces 99 kW (132.8 hp) at 2300 rpm (Propeller rotational speed) with a static compression ratio of 19:1 or 18:1 respectively.
(19:1 up to serial number -0100; 18:1 from serial number -0101 and on)

Crankcase

The aluminium crankcase is made using pressure die casting with ductile iron liners, bore is 80 mm (3.15 in). The gauge for boreholes is 90 mm (3.54 in). The crankcase is fine ribbed and the main bearing caps are cross-bolted to get maximum stiffness to weight. In normal running the cylinder pressure is always less than 155 bar (2248 psi).

Crankshaft

The stroke is 84 mm (3.31 in), main journal diameter is 55 mm (2.17 in), rod journal diameter is 46 mm (1.81 in). The original 2-mass flywheel is changed to a 1-mass type.

Connecting Rods

The connecting rods are made of forged steel each including big end bearing. The big end diameter is 50 mm (1.97 in), the bushing in the small end has a diameter of 28 mm (1.1 in). In the case of overload the rod has the tendency to become shorter, it shows no bending tendency. The rods are forged in one piece, then the big end is cracked, so that the mating surfaces are perfectly aligned at assembly. They are equipped with M7 bolts and are axially guided at the piston. The rod length is 140 mm (5.51 in).

Pistons

The original aluminum pistons have special steel inlays in the piston ring groove and are a cooling duct design. Special chrome ceramic rings guarantee good wear resistance.

Cylinder Head

The 4 valve cast aluminum cylinder head has diametrically opposed valves. There are 2 water jackets which reduce the temperatures in the critical areas around the exhaust valve seats and the injector to less than 200 °C.
The hydraulically adjusted roller lifters acting on the nimonic valves guaranty low friction values benefiting the efficiency and reliability of the engine. An original three layer steel head gasket is used.
A glow plug is installed for the reason of starting in very cold conditions.

Camshafts

The forged steel camshafts are gun drilled. A simplex timing chain is fitted. The cam profiles provide an intake valve lift of 8.5 mm (0.33 in) and an exhaust valve lift of 8 mm (0.31 in).

Valve Train

The intake valves have a shaft diameter of 6 mm (0.24 in) and a valve head diameter of 29.6 mm (1.17 in), the exhaust valves have a shaft diameter of 7 mm (0.28 in) and a valve head diameter of 24.6 mm (0.97 in). The valve springs have an inside diameter of 15.5 mm (0.61 in), an outside diameter of 21 mm (0.83 in) and 2.75 mm (0.108 in) wire diameter. The unstressed height of the spring is 45.5 mm (1.79 in), assembled height is 32.5 mm (1.28 in), it has 8 threads. The valve keys are of type MK6 to guarantee a good valve rotation.

Induction and Fuel System

A common rail system with electrically actuated injectors is used. The high-pressure fuel pump is driven by the intake cam and is a three piston radial pump. The injection pump is set to a more advanced timing for a cooler exhaust temperature, the aim is a exhaust temperature below 900°C (during maximum continuous power), the preinjection is retained. The airflow passes through the air filter, the turbo charger and then the air-to-air intercooler into the intake manifold. The improved intake manifold is short but provides an undisturbed intake spin.

Oil System

The wet oil sump system has a 1 sectioned oil pump and is driven by a gear from the crank. The oil thermostat maintains the oil temperature always to a constant level.

Cooling system

The water flow through the engine guaranties a perfect heat transfer from the hottest section in the engine to the radiator and maintains the optimum engine operating temperature. An oil thermostat maintains the oil temperature at a constant level.

Propeller Drive System

The drive for the propeller is via a gear set. The propeller shaft speed is 2300 rpm during start conditions and continues fly conditions. The gears are steel forged to reduce mass and to guaranty good reliability. The die cast housing is mounted directly to the crankcase and incorporates internal oil paths to lubricate the gears and constant speed propeller drive.

Governor System

The prop-pitch-control system is integrated in the FADEC. The gear oil is sucked off at the lower side of the gear and is brought to the pressure control and control unit with a gear pump. The system pressure regulator provides a constant system pressure of 20 bar (290 psi). The control unit controls the oil flow to the cylinder over a pulse valve, the cylinder controls the propeller pitch adjustment.

Auxiliary System

The vacuum pump is direct driven by camshaft and provides the necessary vacuum for the navigation instruments.

Electronic and Electronical System

The engine is controlled via a 32-bit Microprocessor Engine Management system (FADEC) incorporating redundancy. The FADEC consists of two complete and identical redundant halves and the most important sensors (Cam and Crank signals) are redundant as well. An intelligent control strategy manages switching between the two redundant FADEC channels in case of a failure. All sensor signals are continuously monitored, sensor failures are detected automatically and the control strategies account for sensor failures. The FADEC is equipped with two warning lights (one for each redundant half) that constitute the means to alert the crew of failures and when crew action is needed.
An event log store logging all failures and extreme sensor input values as well as an integral hours run meter ensure maximum safety against potentially damaging events.
An independent safety system monitors the stored events before every take off and independently makes a check of all functions including a switch to the other redundant half to make sure both FADEC channel are in working order.
The control system includes a data stream interface implemented as a CAN line that carries several sensor and FADEC internal values and can be used to drive an engine instrument like the CED-125.

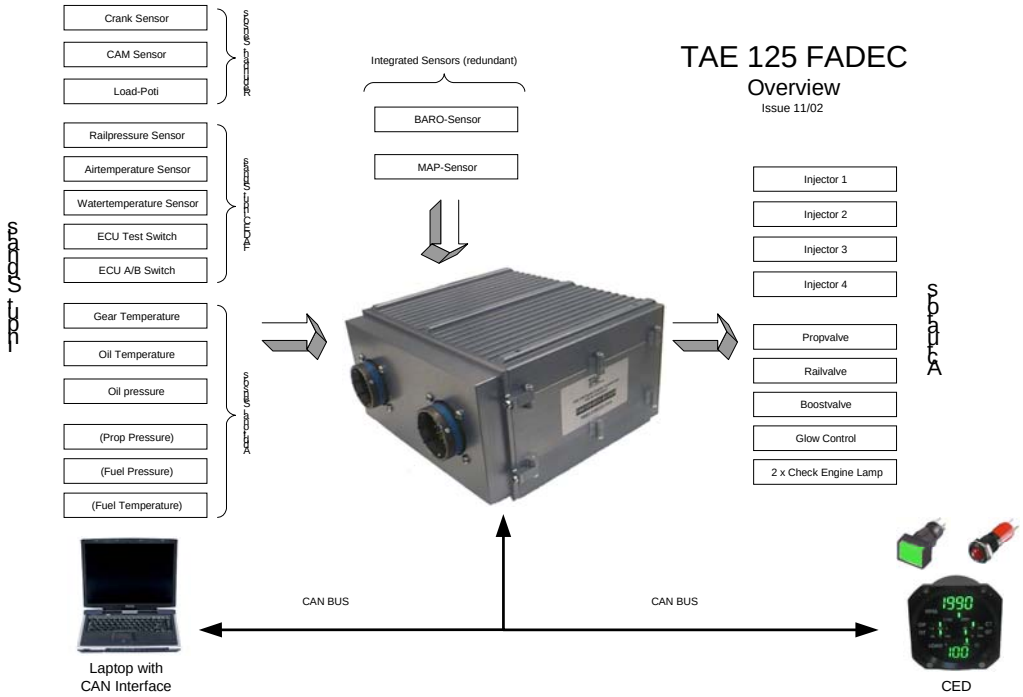

Fig. 71-1a TAE 125-01 FADEC overview

Technical Data

Type of engine:	4-cylinder inline, DOHC, 4 valves per cylinder
Engine code:	TAE 125
Displacement:	1689 cm^3
Piston-swept volume:	422 cm^3
Engine principle:	4 cycle Diesel Direct Injection with turbocharger
Power:	99 kW (132.8 hp) at 2300 rpm (Prop. rotational speed)
Torque:	410 Nm (302.4 lbf·ft) at 2300 rpm (Prop. rotational speed)
Bore:	80.0 mm (3.15 in)
Stroke:	84.0 mm (3.31 in)
Gauge of boreholes:	90.0 mm (3.54 in)
Compression ratio:	19:1 up to serial number -0100 18:1 from serial number -0101 and on
Main journal diameter:	55.0 mm (2.17 in)
Rod journal diameter:	46.0 mm (1.81 in)
Connecting rod length:	140.0 mm (5.51 in)
Rod big end diameter:	50.0 mm (1.97 in)
Rod small end diameter:	28.0 mm (1.1 in)
Wrist pin diameter:	28.0 mm (1.1 in)
Valves per cylinder:	2 intakes, 2 exhausts
Valve lift intake:	8.5 mm (0.33 in)
Valve lift exhaust:	8.0 mm (0.31 in)
Intake valve head diameter:	29.6 mm (1.17 in)
Exhaust valve head diameter:	24.6 mm (0.97 in)
Intake valve shaft diameter:	6.0 mm (0.24 in)
Exhaust valve shaft diameter:	7.0 mm (0.28 in)
Valve spring outside diameter:	21.0 mm (0.83 in)
Valve spring inside diameter:	15.5 mm (0.61 in)
Valve spring wire diameter:	2.75 mm (0.108 in)
Valve spring threads:	8
Valve spring height:	45.5 mm (1.79 in)
Valve spring installed height:	32.5 mm (1.28 in)
Max. fuel pressure:	1350 bar (19580 psi)

Oil system:

Oil pump:.....1 stage
Tappet clearance compensation:.....Hydraulic
Type of cam timing drive:.....Chain

TROUBLESHOOTING

To isolate a fault, proceed as follows:

Step	Action
1	Select the “Fault Isolation“ Tab
2	Find the heading appropriate to the fault
3	Find the symptom which best describes the abnormality
4	Follow the instruction in the verify column
5	If the Item passes the check, proceed to the next line
6	If an item fails a check, perform the appropriate corrective action

◆ Note: Always proceed from top to bottom, and perform checks and corrective actions in the specified order.

"Sensor Properties" and "Actuator Control Signal" are separately provided files. They contain information relevant to tasks in the "corrective action" column.

Code	Heading	Indication	Sub-Code	Task/Check	Corrective Action
1	Engine Fails to Start	Engine does not turn	1.1.	Check Battery Voltage	Charge Battery, Check Battery water level and acidity, Replace Battery as appropriate
			1.1.2	Check Starter Supply Voltage	Repair Starter Power Supply
			1.1.3	Check Starter Switch Operational	Replace Switch
			1.1.4	Is Starter Operational?	Replace Starter
		Engine turns but does not start	1.2.1	Check crank signal using FADEC software service tool	Check Crank Signal with Operator. Proceed to Section 10.8, "Faulty Crank /CAMSignal"
			1.2.2	Verify Fuel Pressure (P-Rail) >280 bar (4061 psi)	Proceed to Code 9 “Fuel Pressure"
			1.2.3	Check Cam Signal	Check Cam Signal with Operator. Proceed to Section 10.8, "Faulty Crank/CAM Signal"
			1.2.4	Check Glow Plug Operation	Proceed to Code 10.3
		Engine start but dies	1.3.1	Check Fuel Type	Contact TAE if inappropriate fuel type has been used
			1.3.2	Check Crank/CAM Signal	Check Crank Signal with Operator. Proceed to Section 10.8, "Faulty Crank /CAMSignal"
			1.3.3	Verify Fuel Pressure >280bar (4061 psi)	Proceed to Code 9 "Low Fuel Pressure"

Table 71-1a Troubleshooting TAE 125-01 / Engine fails to start

Code	Heading	Indication	Sub-Code	Task/Check	Corrective Action
2	Engine Runs Roughly	Engine vibrates, Runs on three Cylinders continuously	2.1.1	Check Fuel Type and Quality	Contact TAE if inappropriate fuel type has been used
			2.1.2	Check CAM Signal	Check Crank Signal with Operator. Proceed to Section 10.8, "Faulty Crank /CAMSignal"
			2.1.3	Check Injector Operation	Repair Injector Power Supply; Replace Injector
			2.1.4	Perform Leak Down Test	Contact TAE
		Engine vibrates, Runs on three Cylinders intermittently	2.2.1	Check Crank Signal	Check Crank Signal with Operator. Proceed to Section 38, "Faulty Crank Signal"
			2.2.2	Check Injector Operation	Repair Injector Power Supply
		RPM Surging	2.3.1	Check Fuel Quality/Type	Contact TAE
			2.3.2	Check Crank Signal	Check Crank Signal with Operator. Proceed to Section 10.8, "Faulty Crank/CAM Signal"
			2.3.3	Check Propeller Operation	Refer to MT Propeller Manual

Table 71-2a Troubleshooting TAE 125-01 / Engine Runs Roughly

Code	Heading	Indication	Sub-Code	Task/Check	Corrective Action
3	Power Delivery	Poor Throttle Response	3.1.1	Check Fuel Quality / Type	Contact TAE
		Gradual Power Loss	3.2.1	Verify Fuel supply/Pressure	Proceed to Code 9 "Low Fuel Pressure"
			3.2.2	Perform Leak Down Test	Contact TAE if inappropriate fuel type has been used
		Temporary Power Loss	3.3.1	Verify Steady Fuel (Rail Pressure)	Proceed to Code 9 "Low Fuel Pressure"
			3.3.2	Verify Crank Signal	Check Crank Signal with Operator. Proceed to Section 10.8, "Faulty Crank Signal"
		Sudden Power Loss	3.4.1	Verify Fuel Pressure	Ensure Steady Fuel Supply
			3.4.2	Verify Manifold Pressure	Proceed to Code 8
		Complete Power Loss (Engine has quit)	3.5.1	Verify Fuel Supply	Ensure Fuel Supply
			3.5.2	Verify Crank Signal	Check Crank Signal with Operator. Proceed to Section 10.8, "Faulty Crank/CAM Signal"
			3.5.3	Verify Power Supply to FADEC. Ensure both FADECs are powered	Repair FADEC Power Supply
		Engine does not Reach Target RPM or Load during Ground Run	3.6.1	Verify Gearbox Oil Temperature >50°C	Wait for Gearbox Oil to heat
			3.6.2	Verify Manifold Pressure	Proceed to Code 8 "Induction System"
			3.6.3	Verify Propeller in Low Pitch	Repair Prop Control/Adjust Propeller according to MT procedures

Table 71-3a Troubleshooting TAE 125-01 / Power Delivery

Code	Heading	Indication	Sub-Code	Task/Check	Corrective Action
4	Engine Speed Regulation	Overspeed	4.1.1	Check Gearbox Oil Level	Replenish Gearbox Oil/ Contact TAE if gearbox has been operated with low oil level
			4.1.2	Check Gearbox Oil Filter	Change Gearbox Oil Filter
			4.1.3	Check CSU oil supply	Prime CSU
			4.1.4	Verify CSU supply pressure = 20 bar (290 psi)	Adjust CSU oil Pressure to 20 bar (290 psi)
			4.1.5	Check Prop Control Signal	Refer to instructions to verify actuator/harness
		Poor Engine Speed Regulation	4.2.1	Check Gearbox Oil Level	Replenish Gearbox Oil/ Contact TAE if gearbox has been operated with low oil level
			4.2.2	Check Gearbox Oil Filter	Change Gearbox Oil Filter
			4.2.3	Check CSU oil supply	Prime CSU
			4.2.4	Verify CSU supply pressure = 20 bar (290 psi)	Adjust CSU oil Pressure to 20 bar (290 psi)
			4.2.5	Check Prop Control Signal	Refer to instructions to check actuator/harness
			4.2.6	Check Prop Control Valve Function	Replace Prop Control Valve
			4.2.7	Check Propeller	Refer to MT Propeller Manual

Table 71-4a Troubleshooting TAE 125-01 / Engine Speed Regulation

Code	Heading	Indication	Sub-Code	Task/Check	Corrective Action
5	Engine Smoke	White Smoke	5.1.1	Verify Exhaust Pipe is Dry/Check Coolant Level, remove glowplugs, check combustion chamber for moisture	Contact TAE if engine uses coolant or if moisture is found in combustion chamber
		Blue Smoke	5.1.2	Perform Leak Down Test	Replace Engine if blow specification
		Black Smoke	5.2.1	Check Injector Function	Replace Injektor/Injector Power supply

Table 71-5a Troubleshooting TAE 125-01 / Engine Smoke

Code	Heading	Indication	Sub-Code	Task/Check	Corrective Action
6	Cooling System	Low Coolant Level / Coolant Loss	6.1.1	Perform leak check on coolant	Repair coolant leak
			6.1.2	Verify Dry Exhaust Pipe, remove glow plugs, check combustion chamber for moisture	Contact TAE. Replace engine if cooling jacket is damaged.
		Low Coolant Temperature indication	6.2.1	Check Coolant Level	Replenish Coolant/Isolate source of Coolant loss
			6.2.2	Extreme Environmental Conditions	Compare to Normal Environmental Conditions; Warm up engine
			6.2.3	Check Coolant Temp Sensor Function	Proceed to Code 10.6 "Erroneous Indication"
		High Coolant Temperature indication	6.3.1	check Coolant Level	Replenish Coolant/Isolate source of Coolant Loss
			6.3.2	Verify Radiator/heater Core Unobstructed	Remove Obstruction/Clean Radiator and Heater Core
			6.3.3	Verify Coolant Temp Sensor Function	Proceed to Code 10.6 "Erroneous Indication"

Table 71-6a Troubleshooting TAE 125-01 / Cooling System

Code	Heading	Indication	Sub-Code	Task/Check	Corrective Action
7	Lubricating	Low oil pressure indication	7.1.1	Check Oil Level	Replenish Oil
			7.1.2	Check Oil Pressure Sensor and Connector	Proceed to Code 10.6 “Erroneous Indication”.
		High Oil pressure indication	7.2.1	Verify Oil Type	Replace Oil
			7.2.2	Check Oil Pressure Sensor	Proceed to Code 10.6 “Erroneous Indication”.
			7.2.3	Verify Correct connection of all oil lines to and from the appropriate location	Connect hoses Correctly/Investigate for secondary damage. Contact TAE
		Erratic Oil Pressure indication	7.3.1	Check Oil Pressure Sensor/ connection	Ensure SB TAE 125-0003 is completed. Check P-Oil Pressure Sensor Connector. Replace P-Oil Sensor Connector.Proceed to Code 10.6 “Erroneous Indication”.
		High Oil temperature indication	7.4.1	Check Environmental Conditions	Compare to Operation under normal Conditions
			7.4.2.	Check Oil Level	Replenish Oil/Investigate for secondary damages
			7.4.3	Check Oil Cooler for obstructions	Clean Oil Cooler/Remove Obstruction
			7.4.4	Check Oil Temperature Sensor/ connection	Proceed to Code 10.6 "Erroneous Indication"
			7.5.5	Check Oil Thermostat Operation	Replace Oil Thermostat
		Oil Leak	7.6.1	Oil leak from Wastegate control valve air filter/Oil present in induction manifold	Examine turbocharger for oil leak/Replace turbocharger
			7.6.2	Isolate Oil Leak Source	Repair Oil Leak
		Excessive Blowby	7.7.1	Perform Leak Down Test	Replace Engine

Table 71-7a Troubleshooting TAE 125-01 / Lubricating

Code	Heading	Indication	Sub-Code	Task/Check	Corrective Action
8	Induction / Exhaust System	Lack of Manifold Pressure	8.1.1	Inspect Induction System for Leaks. Inspect MP lines to FADEC, Inspect all hoses, connections.Pressurize Induction system < 1 bar (14.5 psi) if necessary.	Repair hoses, connections as necessary.
			8.1.2	Inspect Pneumatic Wastegate control Hoses.	Install correctly, repair as necessary
			8.1.3	Inspect Harness for Damage or Penetration	Replace Damaged/Penetrated Harness
			8.1.4	Measure Wastegate Control Signal	Refer to instructions for measuring actuator control signal
			8.1.5	Verify Wastegate Control Valve Function	Replace Wastegate Control Valve
		Soot build-up around Exhaust Manifold	8.2.1	Some soot build-up is normal. Check for cracked manifold. Check for distinct single cylinder combustion noise during cold engine startup	Replace exhaust manifold and gasket if necessary

Table 71-8a Troubleshooting TAE 125-01 / Induction and Exhaust System

Code	Heading	Indication	Sub-Code	Task/Check	Corrective Action
9	Lack of Fuel Pressure	Fuel Pressure <30bar (435 psi) during start-up	9.1.1	Ensure Fuel supply/return	Refuel Aircraft, Check fuel Filters, bleed system, Ensure both fuel feed and return lines are clear of obstructions
			9.1.2	Check fuel pumps. Measure fuel feed pressure between feed pump and high pressure pump. Ensure fuel delivery from high pressure pump	Replace fuel pumps as necessary
		Fuel Pressure =60bar (870 psi) during start-up	9.2.1	Check Crank Signal	Check Crank Signal with Operator. Proceed to Section 10.8, "Faulty Crank Signal"
			9.2.2	Verify Rail Control signal	Refer to instructions for checking harness/actuator control signal
		Fuel Pressure >60bar (870 psi), but <280bar (4061 psi)	9.3.1	Check Fuel Supply	Refuel Aircraft, Check fuel Filters, bleed system, Ensure both fuel feed and return lines are clear of obstructions
			9.3.2	Check fuel pumps. Measure fuel feed pressure between feed pump and high pressure pump. Ensure fuel delivery from high pressure pump	replace Fuel Pump as necessary
		Too Low Fuel Pressure in flight	9.4.1	Check fuel supply	Refuel Aircraft, Check fuel Filters, bleed system, Ensure both fuel feed and return lines are clear of obstructions
			9.4.2	Check fuel pumps. Measure fuel feed pressure between feed pump and high pressure pump. Ensure fuel delivery from high pressure pump	replace Fuel Pumps as necessary

Table 71-9a Troubleshooting TAE 125-01 / Lack of Fuel Pressure

Code	Heading	Indication	Sub-Code	Task/Check	Corrective Action
10	Electrical System / FADEC	Flashing FADEC Lights	10.1.1	Proceed according to indicated Code in Event Log	
		Lack of FADEC Power	10.2.1	Check FADEC Power Supply	Re-establish FADEC Power
			10.2.2	Check FADEC Power switch	Repair FADEC Power Switch
		Glow Plug functionality	10.3.1	Check CAN termination plug is in place	Replace CAN terminator plug
			10.3.2	Check Glow Plug Signal Output	Repair Glow Plug Signal Output
			10.3.3	Check Glow Plug Relay Function	Relace Glow Plug Relay
			10.3.4	Check Glow Plug Function Check resistance of two glow plugs in parallel by measuring resistance from connector to engine ground. Repeat for both pairs of glowplugs by checking both pins to ground. Resistance for two glow plugs in parallel should be 1 Ω. If necessary, check resistance of individual glow plug. Resistance should be 2 Ω	Replace Glow Plugs as necessary.
		Lack of Alternator Charge	10.4.1	Check Alternator Connection	Repair Alternator Connection
			10.4.2	Check Alternator Function	Replace Alternator
		Starter Malfunction	10.5.1	Check Starter Supply Voltage	Repair Starter Power Supply
			10.5.2	Verify Starter Switch Operational	Replace Switch
			10.5.3	Verify Starter Operational	Replace Starter

Code	Heading	Indication	Sub-Code	Task/Check	Corrective Action
		Erroneous Indication	10.6.1	Check Connectors and wires	Verify no loose wires/poor connection Refer to instructions for harness troubleshooting
			10.6.2	Inspect Harness for damage/ Penetration	Replace damaged/Penetrated Harness.
			10.6.3	Measure Sensor	Refer to instruction for measuring sensor operation
		Mulitiple Sensor Failure displayed by FADEC	10.7.1	Check 5 V supply of FADEC using Service software tool	If 5 V supply is less than 5V, check harness/connectors for short circuit (including unused pfuel and pgear connectors) Check supply voltage of each FADEC while each FADEC is active (use Force B). If supply voltage drops for both FADECs while active, check harness. If voltage for one FADEC is satisfactory **while it is ative, while voltage from other FADEC is not satisfactory,** replace FADEC.
		No Display on Instruments	10.8.1	Verify that CAN Termination Plug is installed	Install CAN Termination Plug
		Engine will not perform FADEC test	10.9.1	Ensure engine is operating on FADEC A	Cycle FADEC power;
					Verify Crank signal on both FADECs using TAE service software tool. Proceed to Code 10.9 “Faulty Crank Signal”
		Faulty Crank / CAM Signal	10.10.1	Check Connector	Refer to Instructions for damaged connector/harness
			10.10.2	Inspect Harness for Damage/ Penetration. Check connector	Replace Harness if Damaged Penetrated
			10.10.3	Inspect Crank/CAM Sensor.Check Sensor for Damage	Clean Sensor. Replace if Damaged
			10.10.4	Check Sensor Clearance (Crank only)	Measure Sensor Clearance, Verify within Repair manual tolerances

Table 71-10a Troubleshooting TAE 125-01 / Electrical System and FADEC

Troubleshooting the Wiring Harness

To troubleshoot the harness, unplug the connector in question, and perform the following measurements to verify functionality of the harness. If the harness fails the test, repair the connector as neccessary. **If there is any damage to the harness other than directly at the connector, it must be replaced**. Move the end of the connector while performing the measurements to show any intermittent loss of continuity.

Input	From	To	Unit	Nominal Value
Temperatures (T Gear, T Oil, T Coolant, T Air)	Connector Gnd (Pin 2)	Gnd	Resistance (Ensure FADEC power is off)	0 Ω
	Connector Signal Pin (Pin 1)	5 V Supply (Pin xx of nearest Pressure connector)	Resistance(Ensure FADEC power is off)	3 k Ω
	Connector Signal Pin (Pin 1)	Connector GND (Pin 2)	Voltage (Ensure FADEC power is on)	5 V
Pressure (P Oil); Load	Connector Gnd (Pin 1)	Gnd	Resistance (Ensure FADEC power is off)	0 Ω
	Connector Signal (Pin 3)	Connector GND (Pin 1)	Resistance (Ensure FADEC power is off)	47 k Ω
	Connector Power Supply (Pin 2)	Connector GND (Pin 1)	Voltage (Ensure FADEC power is on)	5 V
Crank Sensor	Connector GND (Pin 2)	Gnd	Resistance (Ensure FADEC power is off)	0 Ω
	Connector Signal (Pin 1)	Connector Gnd (Pin 2)	Resistance (Ensure FADEC power is off)	10 k Ω

Table 71-11a

Input	From	To	Unit	Nominal Value
CAM Sensor	Connector GND (Pin 1)	Gnd	Resistance (Ensure FADEC power is off)	0 Ω
	Connector power Supply (Pin 3)	Connector Gnd (Pin 1)	Voltage (Ensure FADEC power is on9	5 V
	Connector Signal (Pin 2)	Connector 5 V Supply (Pin 3)	Resistance (Ensure FADEC power is off)	10 k Ω
Actor Supply (Waste Gate Control Valve, Rail Control Valve Prop Control Valve)	Connector Power (Pin 2)	Engine Gnd	Voltage (Ensure FADEC power is on)	12 V
	Connector power supply (Pin 2)	Connector Signal (Pin 1)	Resistance	0 Ω Note : The two pins are connected with a diode; Resistance will be infinite if the poles are reversed

Table 71-12a Troubleshooting Wiring Harness TAE 125-01

Sensor Properties

Sensor	Loacation	Connect	Measure	**Nominal Value** at standart condtions
T-Oil	Oil Filter Housing	Pin 1	Resistance	6300 Ω at Room Temperature (Resistance decreases with increasing temperature)
P-Oil	Oil Thermostat housing	Pin 1: 5 V Pin 2: Gnd	Pin 3; Voltage	0.9 V
T-Air	Intake Manifold	n.A	Resistance across Sensor	2500 Ω at Room Temperature (Resistance decreases with increasing temperature)
T-Coolant	Coolant Thermostat Housing	n.A	Resistance across Sensor	3100 Ω at Room Temperature (Resistance decreases with increasing temperature)
T-Gear	Main Prop Bearing	n.A	Resistance across Sensor	6300 Ω at Room Temperature (Resistance decreases with increasing temperature)
MAP	Internal to FADEC	n.A	Cannot be measured	n/a
P-Baro	Internal to FADEC	n.A	Cannot be measured	n/a
P-Rail	Front end of Rail	Pin 1: Gnd Pin 3: 5 V	Pin 2; Voltage	0.5V (without pressure)
Throttle (Load Sensor)	Throttle quadrant	Pin 1: 5V Pin 2; Gnd	Pin 3; Voltage	0.6 to 4.8 V, depending on throttle position

Table 71-13a Sensor Properties TAE 125-01

Connector Pin Locations

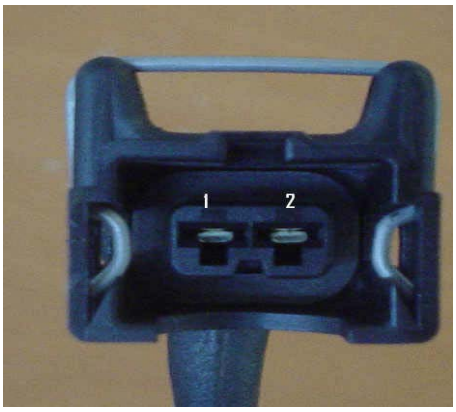

Fig. 71-2a Connector used for T-Gear, T-Oil, T-Air, Prop Control, Wastegate

Fig. 71-3a P-Oil Sensor Connector

Fig. 71-4a Can Sensor Connector

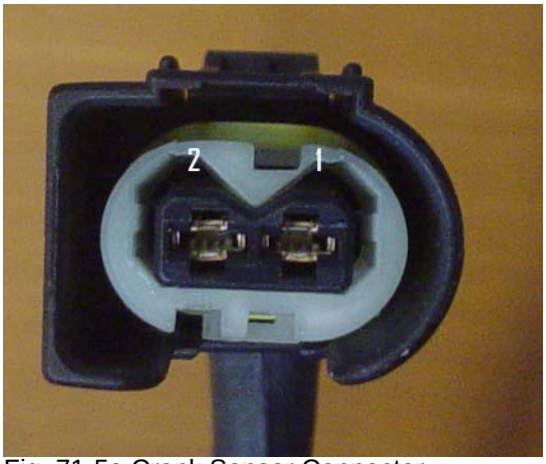

Fig. 71-5a Crank Sensor Connector

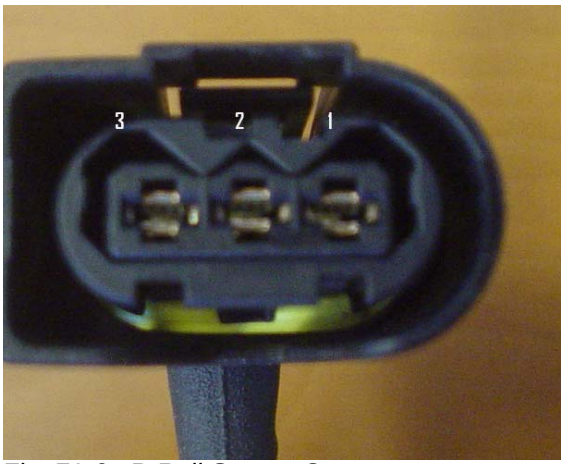

Fig. 71-6a P-Rail Sensor Connector

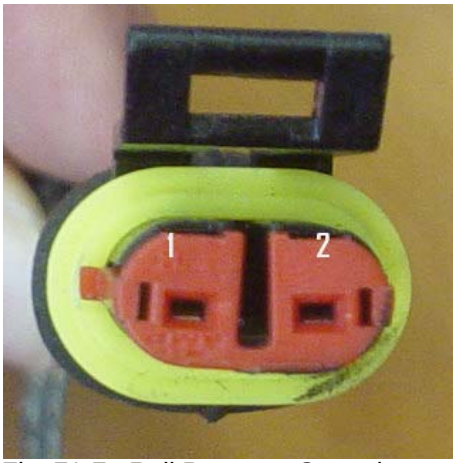

Fig. 71-7a Rail Pressure Control

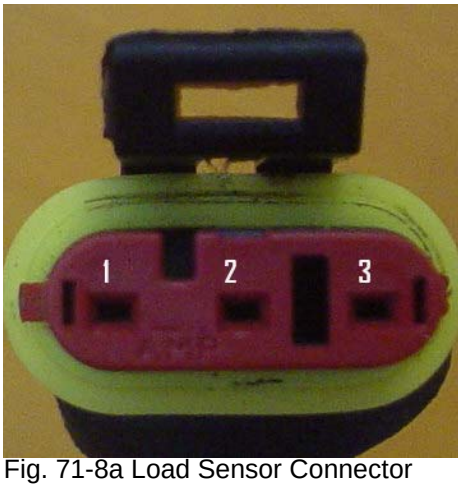

Fig. 71-8a Load Sensor Connector

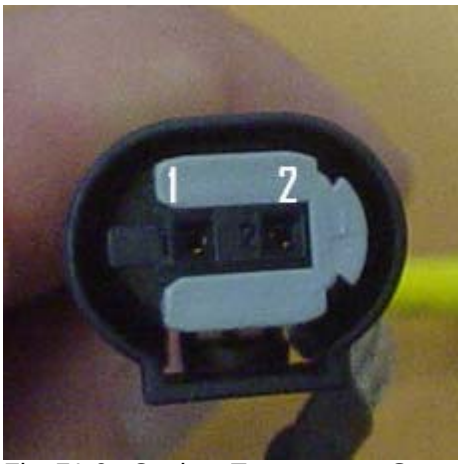

Fig. 71-9a Coolant Temperature Sensor Connector

Fig. 71-10a Injector Connector

71.20 MOUNTS

DESCRIPTION

The engine mount is made of tubular steel. The engine mount has welded joints. Paint protects the engine mount from corrosion. Welded brackets hold components such as the coolant radiator mount. Rubber lined clamps and cable ties hold electrical cables and other items of equipment to the engine mount.
The engine mount has four small mounting pads at the rear of the mount. Bolts through the pads attach the engine mount to the fuselage.
The engine is attached to the engine mount at three mounting pads. Three shock-mounts isolate the airframe from engine vibrations.
See Fig. 71-11a.

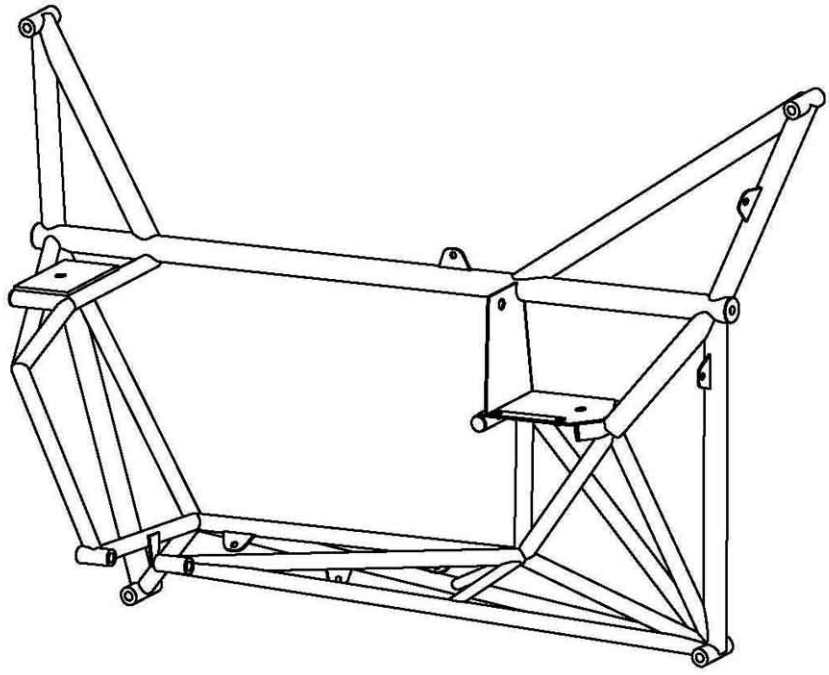

Fig. 71-11a Engine Mount of TAE 125-01

TROUBLESHOOTING

Trouble	Cause	Corrective Action
Engine vibration	Cracked engine mount	Do a test for cracked tubes. Look specially at the welded joints.
	Defective shock mounts	Refer to RM-02-01

Table 71-14a

MAINTENANCE PRACTICES

1. General

This maintenance practice provides instructions to check the engine mount.

2. Checking the engine mounts on signs of corrosion and for chafe marks

This is a visual inspection. Check the engine mount for signs of corrosion (e.g. nonexistant paint) and for chafe marks (e.g. chafing hoses) accurately.

3. Checking the bolts on the mount for paint cracks

This is a visual inspection. For mounts having bolts installed to seal the tube, check for signs of paint cracks and corrosion.
(See Fig. 71-12a)
If there are any damages, please contact Technify Motors GmbH.

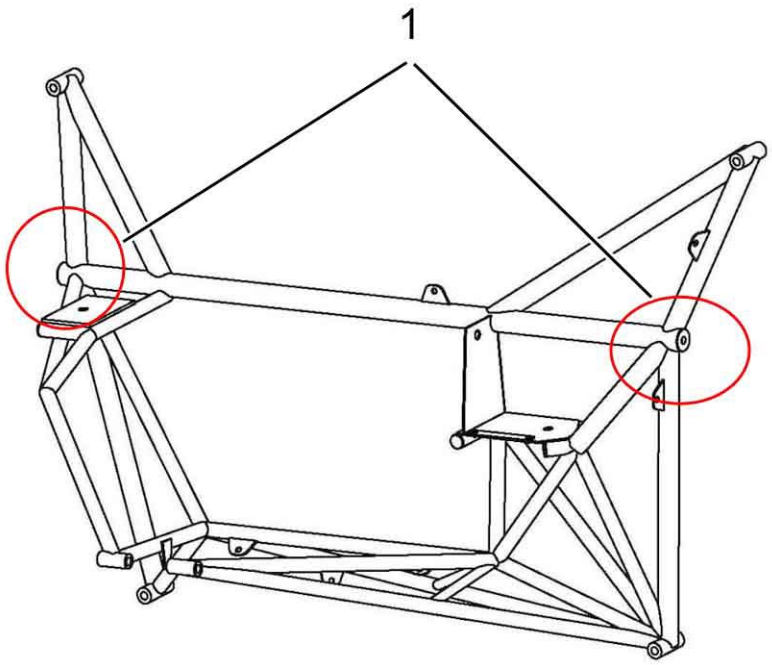

Fig. 71-12a

1 Position of Bolts (if installed)

71.40 ATTACH FITTINGS

DESCRIPTION

The radiator mounts are made of tubular steel. The radiator mounts have welded joints. Paint protects the radiator mounts from corrosion. The radiator mounts hold the coolant radiator and the oil radiator. The radiator mounts are attached to the engine mount at three positions.
See Fig. 71-13a.

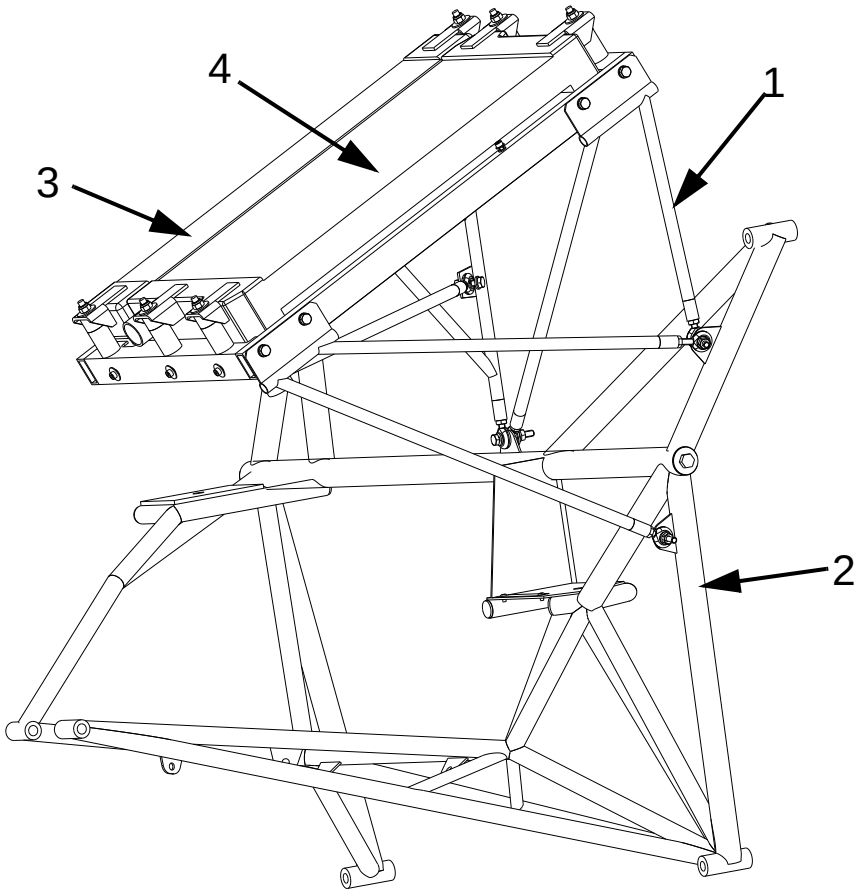

Fig. 71-13a Radiator mounts

1 Radiator Mount
2 Engine Mount
3 Oil Radiator
4 Coolant Radiator

MAINTENANCE PRACTICES

1. General

This maintenance practice provides instructions to inspect the radiator mounts.

2. Inspecting the Radiator Mounts

This is a visual inspection. Check the radiator mounts for signs of corrosion (e.g. noexistant paint) and for chafe marks (e.g. chafing hoses) accurately.

71.60 AIR INTAKES

DESCRIPTION

The engine air intake system of the airplane consists of an air filter housing, air filter and alternate air door assembly. The air intake has three main parts:

- Alternate Air Door
- Air Filter Housing
- Air Filter

Alternate Air Door

The alternate air door is attached to the left (in the direction of flight) of the air filter housing. The air filter attaches to the right (in the direction of flight) of the alternate air door. The alternate air door has an inlet direct from the engine compartment. A flap in the alternate air door can select either filtered or warm, unfiltered air. See Fig. 71-14a.

Air Filter Housing

The air filter housing is made of GRP. It has a connection between the air intake assembly and the upper cowling. Four cylindrical bolts attach the air filter housing to the firewall. See Fig. 71-14a.

Air Filter

The air filter is a K&N RU-0610 high-flow air filter. The air filter locates on the air filter housing, on the right of the firewall. It is held to the left (in the direction of flight) of the alternate air door by a clamp. See Fig. 71-14a.

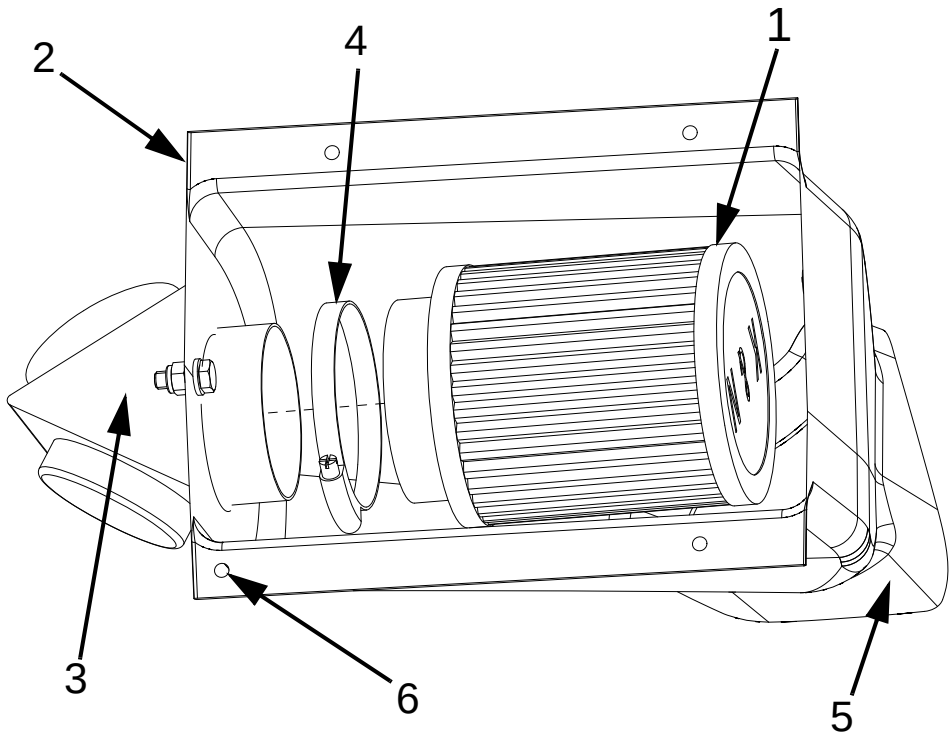

Fig. 71-14a Air Filter Housing, Air Filter and Alternate Air Door

1 Air Filter
2 Air Filter Housing
3 Alternate Air Door
4 Clamp
5 Connection to Air Duct
6 Hole for cylindrical bolt

TROUBLESHOOTING

Trouble	Cause	Corrective Action
Engine does not develop full power	Air Filter blocked/defective	Replace Air Filter

Table 71-15a Troubleshooting Air Filter TAE 125-01

MAINTENANCE PRACTICES

1. General

These maintenance practices provide instructions to inspect/ replace the air filter.

2. Inspecting the air filter

This is a visual inspection. The air filter should not be blocked or defectice. Replace as neccessary.

3. Replacing the Air Filter

◆ Note: When replacing the air filter check carefully that no loosen parts are in it.

A. Remove the Air Filter

(1) Remove the engine cowlings. Refer to the airplane manufacturer´s specifications.

(2) Disconnect the airplane main battery refer to Chapter 24, Section 24.30, Maintenance Practices.

(3) Remove the air filter housing. To do this, loosen the four cylindrical bolts. See Fig. 71-14a.

(4) Loosen the clamp. See Fig. 71-14a.

(5) Pull the air filter to the right and clear of the air filter housing.

B. Install the new air filter

(1) Make sure that the new clamp is in position on the air filter.

(2) Put the air filter in position on the air filter housing. See Fig. 71-14a.

(3) Tighten the clamp. See Fig. 71-14a.

(4) Connect the airplane main battery refer to Chapter 24, Section 24.30, Maintenance Practices.

(5) Install the engine cowlings. Refer to the airplane manufacturer´s specifications.

4. Inspect turbocharger clamp

(1) Remove the turbocharger clamp.

■ CAUTION: Damage to the turbocharger clamp (esp. O-rings), the turbocharger as well as piping may occur due to use of force tools (e.g. screwdriver). Damaged parts have to be replaced.

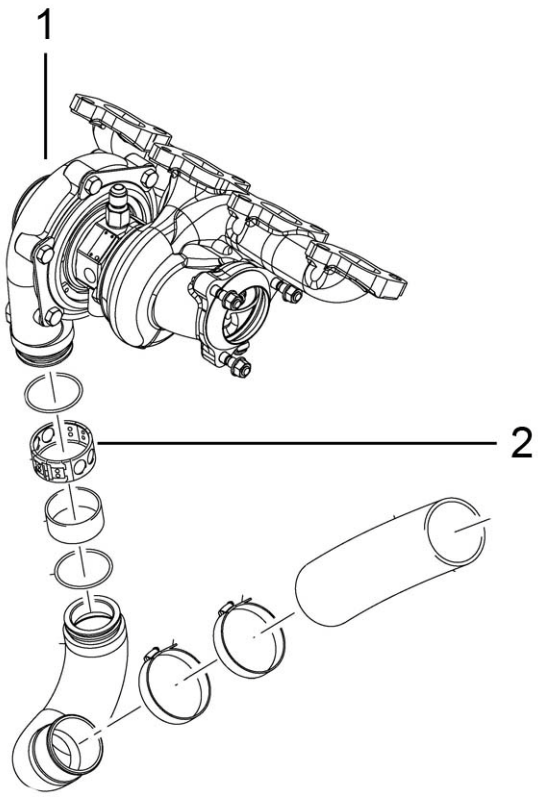

Figure 7
1 Turbocharger
2 Clamp

(2) Inspect clamp for cracks.

(3) Open the clamp completely, check hinge pins for wear and play.

(4) Inspect the clamp locking mechanism and springs for cracks and damage.

(5) Visual inspect the inner ring as well as both O-rings in installed condition.

(6) Replace clamp, inner ring or O-rings as necessary.

■ CAUTION:	If turbo charger system will opened, pay special attention to prevent contaminations.

◆ Note:	Use lubricant for installation of the O-rings and the inner ring. Check correct fitting.

(7) Install the turbo charger clamp.
(8) Close latch into locked position.
(9) Check if the clamp can be moves easily.

◆ Note:	Tension at the clamp or misalignment of piping can lead to deformation or damage.

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73 ENGINE FUEL SYSTEM

73.00 GENERAL

DESCRIPTION

The TAE 125-01 is a direct Diesel injection engine with common-rail technology.
Fuel passes the Selector, the electrical gear pump (if installed) and reaches the filter module, where the cold fuel is warmed by returning fuel (until the feeding fuel temperature of 60°C).
Thereafter it reaches the feed pump (building a pressure of 5 bar (72.5 psi)) and then the high pressure piston pump, producing a pressure up to 1500 bar (21755 psi), which is led to the rail. The pressure is measured and regulated between 500 bar (7252 psi) and 1350 bar (19580 psi) by a pulse width modulated control valve.
Since the main pump produces a high fuel flow and only a part of it is used for combustion, the rest is returned through the filter module and fuel selector to the tank in use, where it warms the remaining fuel.

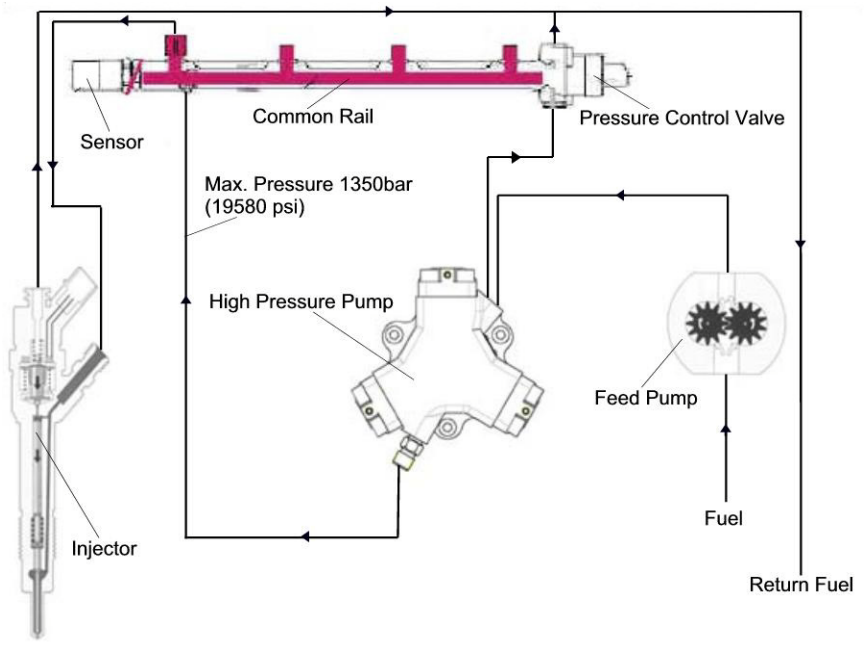

Fig. 73-1a Engine Fuel System of TAE 125-01

◆ Note: Due to Diesel injection principle there is no carburetor, primer or mixture neccessary.

Feed Pump

The feed pump is an intake-camshaft driven gearwheel pump which provides the HPP with diesel or jet-fuel with a pressure of 3-5 bar (43.5 psi to 72.5 psi).
The main components are two counter rotating gear wheels which mesh with each other when rotating, whereby fuel is trapped in the chambers formed between the gearwheels and is transported to the outlet. Due to the camshaft drive, the delivery quantity is proportional to the engine speed. See Fig. 73-2a.

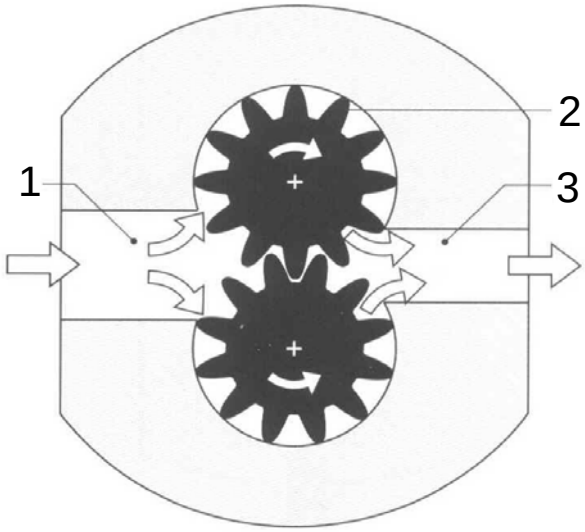

Fig. 73-2a Fuel Feed Pump of TAE 125-01

1 Suction End
2 Drive Gear
3 Pressure end

High Pressure Pump

The high pressure pump is an outlet-camshaft driven radial-piston-pump, which pressurizes the common rail with up to 1350 bar (19580 psi).
The HPP is the interface between the low pressure and the high pressure stages. In contrast to conventional systems, the HPP continually generates the rail pressure so the fuel does not have to be specially compressed for the injection process.
An eccentric drive shaft moves the 3 pistons of the pump up and down in accordance with the shape of the cam. The feed pump forces fuel through the inlet valve into the pumping element chamber and the down moving piston sucks the fuel into the cylinder. Passing the BDC the inlet valve closes and the fuel can now be compressed. As soon the pressure in the cylinder is higher than the rail pressure, the outlet valve opens and the fuel enters the high pressure circuit.
Several parts of the HPP have got a special coating to ensure the operation with diesel and jet fuel in any mix-ratio. See Fig. 73-3a.

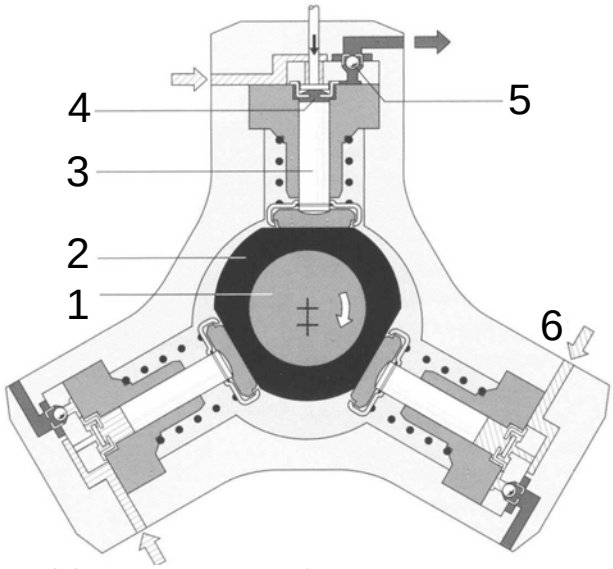

Fig. 73-3a High Pressure Pump of TAE 125-01

1 Driveshaft
2 Eccentric cam
3 Pumping element with Pump Piston
4 Inlet Valve
5 Outlet Valve
6 Inlet

Common Rail

The common rail stores the pressure of the HPP and supplies the injectors with fuel. The sensor and the pressure control valve are fit in the common rail.
The high pressure accumulator is common to all cylinders. Its available rail volume is permanently filled with pressurised fuel. The compressibility of the fuel resulting from the high pressure is utilised to achieve the accumulator effect. This causes a practically constant rail pressure even when fuel leaves the rail for injection. See Fig. 73-4a.

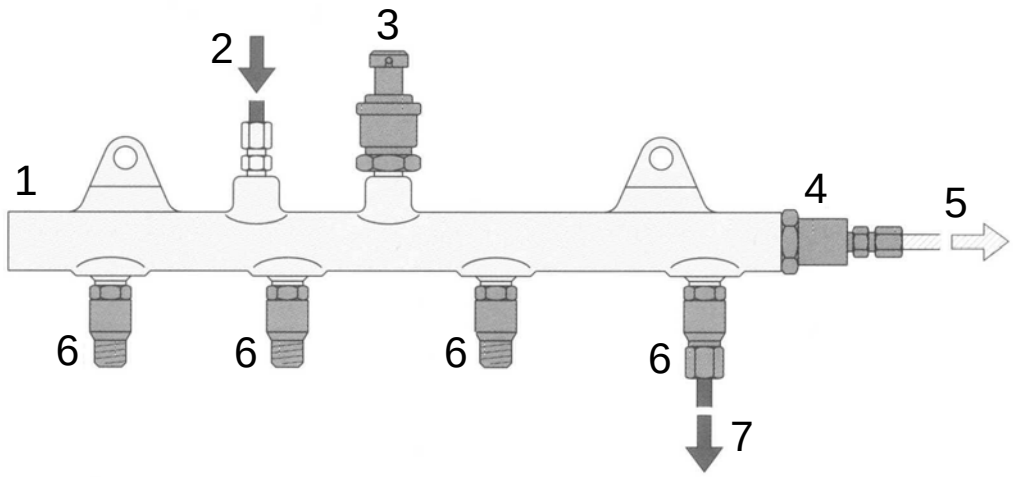

Fig. 73-4a Common Rail of TAE 125-01

1 Rail
2 Inlet High Pressure Pump
3 Rail Pressure Sensor
4 Pressure Control Valve
5 Fuel Return
6 Injector Duct Connection
7 High Pressure Supply

Pressure Control Valve

The pressure control valve sets the correct pressure in the rail. It is a solenoid operation valve actuated by FADEC.
The Pressure control valve is provided with a mounting flange for attachment to the rail and connection to the return fuel system. It incorporates two control loops:

- A fast-response mechanical control loop to compensate for the high-frequency pressure fluctuations. A spring closes the control valve up to maximum pressure of approximate 100 bar (1450 psi)
- A slow-response electrical control loop for setting a variable mean pressure in the rail. If the pressure in the high pressure circuit has to be increased, the force of the solenoid must be generated in addition to the spring force. The forces of the solenoid are proportional to its energizing current which is pulse width modulated with a frequency of 1 kHz.

See Fig. 73-5a.

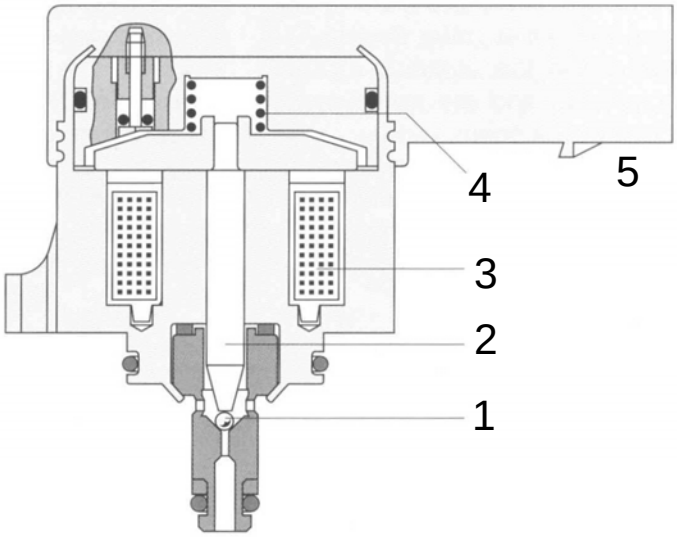

Fig. 73-5a Pressure Control Valve of TAE 125-01

1 Valve Ball
2 Armature
3 Electromagnet
4 Spring
5 Electrical Connection

Rail Pressure Sensor

The rail pressure sensor measures the instantaneous pressure in the rail and generates an output signal for the FADEC.
The fuel flows to the rail pressure sensor through in opening in the rail. Pressurized fuel reaches the sensor's diaphragm through a blind hole. The sensor element for converting the pressure to an electric signal is mounted on this diaphragm. The signal is needed as feedback signal for the FADEC to control the rail pressure. See Fig. 73-6a.

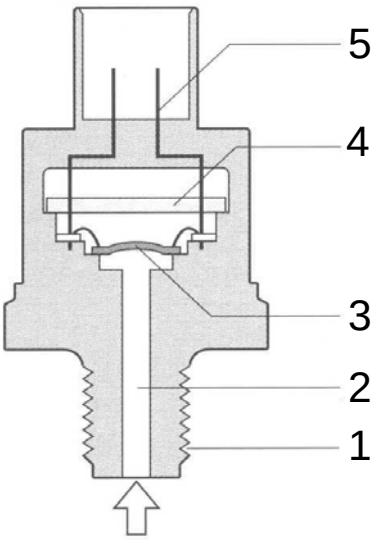

Fig. 73-6a Rail Pressure Sensor of TAE 125-01

1 Electric Connections
2 Evaluation Circuit
3 Diaphragm with Sensor Element
4 High Pressure Connection

Injectors

The Injectors are solenoid operation injectors actuated by FADEC. They inject the fuel out of the common rail into the combustion chamber of each cylinder.
Fuel is fed from the high pressure connection , to the nozzle through the passage, and to the control chamber through the feed orifice which is opened by the solenoid valve.
With the orifice closed, the hydraulic force applied to the valve control plunger exceeds that at the nozzle needle pressure shoulder. As a result, the needle is forced into its seat and seals off the high pressure passage from the combustion chamber.
When the solenoid valve is triggerd, the bleed orifice is opened. This leads to a drop in control chamber pessure and, as a result, the hydraulic pressure on the plunger drops, too. As soon as the hydraulic force drops below the force on the nozzle needle pessure shoulder, the nozzle-needle opens and fuel is injected through spray holes itnto the combustion chamber. This hydraulic force amplification is needed because the necessary forces cannot directly generated by the solenoid valve. The control and leak-off fuel is qanities are retuned to the fuel return.
See Fig. 73-7a.

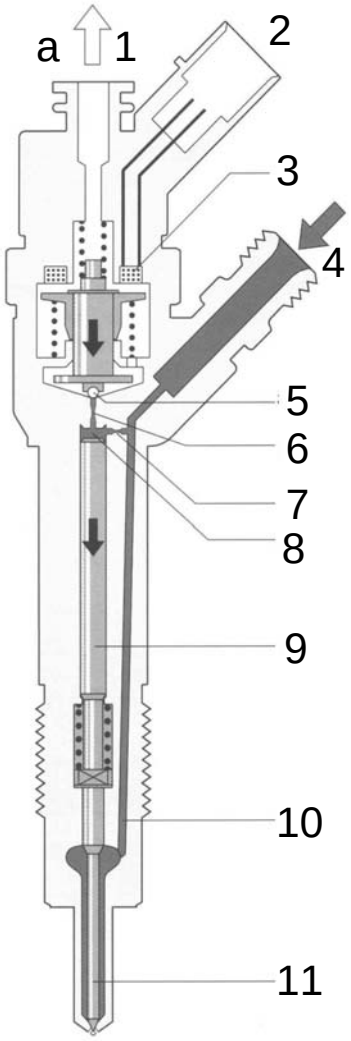

Fig. 73-7a Injectors of TAE 125-01

1	Fuel Return
2	Electrical Connection
3	Triggering Element
4	High Pressure Fuel Inlet
5	Valve Ball
6	Bleed Orifice
7	Feed Orifice
8	Valve Control Chamber
9	Valve Control Plunger
10	Feed Passage to the Nozzle
11	Nozzle Needle

Controlling

With TAE 125-01 installations, the pilot selects the desired load with the single load lever which is connected to two redundant Load Potentiometers.
The FADEC regulates all engine parameters to achieve the desired condition. It consists of two redundant units which steer 5 main control loops through the use of 16 sensors and 9 actuators.
For more information refer to Chapter 71 of this Supplement.

Indicating

Since all engine power parameters are controlled automatically by the FADEC, no indication of manifold air pressure, fuel pressure or exhaust gas temperature to the pilot is necessary.
The fuel flow, which is calculated by the FADEC, is indicated at the AED 125. Refer to Chapter 31 of this Supplement.

MAINTENANCE PRACTICES

1. General

This maintenance practice provides instructions to inspect the fuel system.

2. Inspecting the fuel system

This is a visual inspection. Check all pipes, pipe joints, supply connections and engine housing separation points for leakage, seepage points and correct routing. Visually inspect fuel for water contamination.

▲ **WARNING:** No leakage or seepage points are permitted !

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74 IGNITION

74.00 GENERAL

DESCRIPTION

Due to the Diesel principle of the TAE 125-01 engine, no ignition system is necessary.
The TAE 125-01 is equipped with 4 glow plugs - one for each cylinder for better starting behaviour under cold weather conditions. The glow plugs are controlled by the FADEC.

TROUBLESHOOTING

For Troubleshooting in case of glow plug malfunction refer to Chapter 71 of this Supplement.

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75 LIQUID COOLING

75.00 GENERAL

DESCRIPTION

The TAE 125 is 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.

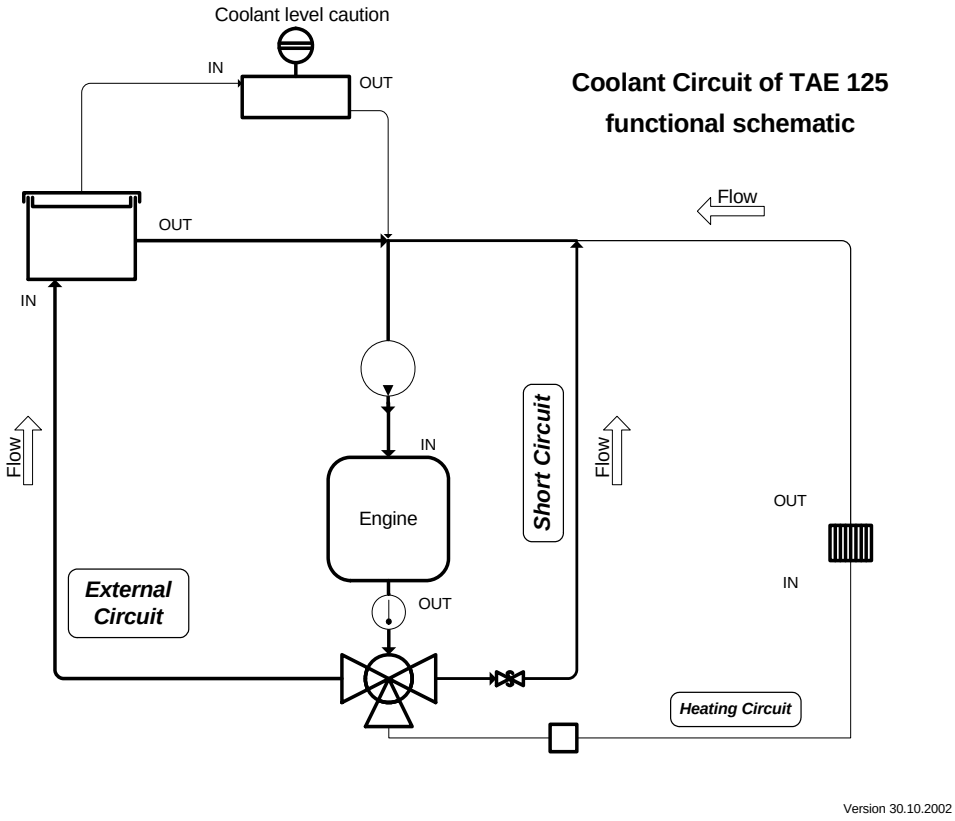

Fig.: 75.1 Coolant System of TAE 125-01

TROUBLESHOOTING

For Troubleshooting in case of malfunction refer to Chapter 20-AMM-71-01.

MAINTENANCE PRACTICES

1. Inspecting the liquid cooling system

Do a visual check of all coolant lines and connections. No leaks or chafe marks are permitted.

2. Coolant tank cap pressure relief test

◆ Note: Perform coolant tank cap pressure relief test before the coolant system pressure test (see OM-20-01).

◆ Note: Use suitable manual pump with manometer or pressurized-air hose with suitable pressure reduction valve for testing.

(1) Disconnect the hose from coolant radiator to expansion tank on tank side (expansion tank „IN“)

(2) Plug the hose. Plug has to withstand a pressure of 2.3 bar (33.3 psi).

(3) Connect pump to expansion tank port

(4) Disconnect the breather line and install a clear hose. Fill clear hose partly with coolant liquid or water.

■ CAUTION: Check proper fit of the coolant tank cap.

■ CAUTION: The pressure must not exceed 2.7 bar (39.1 psi) during testing.

(5) Pressurize the tank up to relief pressure of the cap, indicated by rising bubbles in the clear hose.

■ CAUTION: Do not relieve pressure via opening the tank cap. Use pressure relief unit on pump.

(6) Check if the relief pressure lies within following limits for both cap orientations.

- Min. relief pressure: 1.8 bar (26.1 psi)
- Max. relief pressure: 2.3 bar (33.3 psi)

(7) If relief pressure is out of limits the cap has to be modified as follows (premature opening) resp. replaced.
See Fig.: 75.2.

- Bend up one of the 3 latches
- Remove the low portion of the cap
- Manufacture a shim washer made of brass sheet.
  (OD = 24mm, ID = 13mm, t = 0.3 - 0.5mm)
- Add shim washer and reassemble the cap
- Bend latches back
- Check relief pressure according to step 6
- If necessary add further shim washer until relief pressure is correct adjusted

◆ Note: The bent latches must be inspected for cracks as well as proper fit before installation of cap. Experience shows, that each latch can be bended (up and back again) 3 to 4 times, alter latches during adjustment.

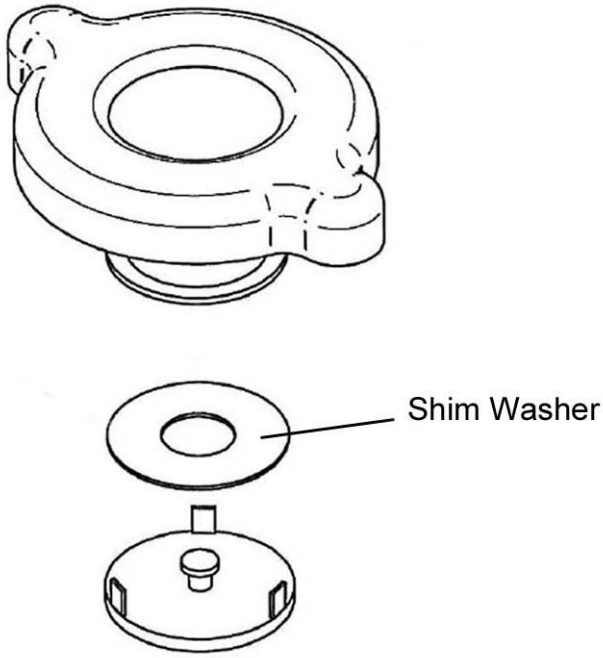

Fig.: 75.2

(8) Disconnect test equipment and reassemble coolant system hoses.

(9) Perform coolant system pressure test according to OM-20-01.

3. Replacing the silicate cartridge of expansion tank

◆ Note: Expansion tanks with integrated silicate cartridge:
- P/N 20-7520-H0037 - P/N 30-7520-08002
- P/N 50-7520-H0016
Please contact Technify Motors GmbH if installed expansion tank is not listed.

(1) Drain the expansion tank.
(refer to Chapter 12, Section 12.10, Drain the coolant)

(2) Remove wiring as well as hoses from the expansion tank. Plug the hoses.

(3) Remove the expansion tank.

(4) Open the bottom cover of expansion tank and remove the silicate cartridge. See Fig.: 75.3.

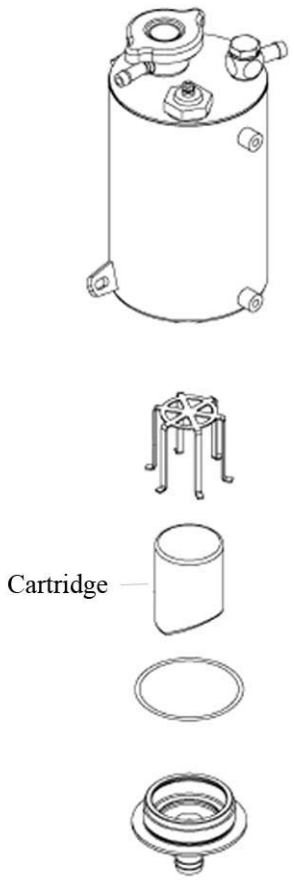

Fig.: 75.3

(5) Inspect cartridge for damages. If silicate cartridge is damaged please contact the technical service at Technify Motors GmbH.

(6) Replace cartridge as well as o-ring.

(7) Install bottom cover.

◆ Note: Use Loctite 243 for installation. Tightening torque: 50 Nm

(8) Carry out an expansion tank pressure test. Expansion tank has to withstand a pressure of 3 bar (43.5 psi) without leakage. Plug all openings. If necessary put tank into water to check for leaks.

◆ Note: Use suitable manual pump with manometer or pressurized-air hose with suitable pressure reduction valve for testing.

(9) Attach expansion tank to aircraft and install wiring as well as hoses.

(10) Replenish the cooling system as well as checking the „water level“ signal simultaneously. See Chapter 31, Section 31.60.

(11) Close cap of coolant filler and perform a coolant cap pressure relief test. See point 2 of this chapter.

■ CAUTION: The pressure must not exceed 2.7 bar (39.1 psi) during testing.

■ CAUTION: Do not relieve pressure via opening the tank cap. Use pressure relief unit on pump.

(12) Perform coolant system pressure test according to OM-02-01 (2.7 bar; 2 min.)

(13) Check system for leakage

(14) Fill up cooling system and perform test run. Refer to chapter 12.10.

(15) Check coolant level.

77 ENGINE INDICATION

77.00 GENERAL

DESCRIPTION

For indication instruments of the TAE 125-01 installation refer to Chapter 31 of this Supplement.

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78 EXHAUST

78.00 GENERAL

DESCRIPTION

The exhaust system of the TAE 125-01 installation includes a muffler. The turbocharger is driven by exhaust gases.
For inspection intervals of the exhaust system refer to Chapter 5 of this Supplement.

TROUBLESHOOTING

For Troubleshooting in case of exhaust malfunction refer to Chapter 71 of this Supplement.

MAINTENANCE PRACTICES

1. General

This maintenance practice provides instructions to inspect the exhaust system.

2. Inspecting the exhaust system

This is a visual inspection. Check the exhaust manifold and the exhaust muffler for cracks and leakage (e.g. exhaust manifold to the cylinder head). Check rubber mountings for damage, replace as neccessary.

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79 OIL

79.00 GENERAL

ENGINE OIL SYSTEM

The engine oil system of the TAE 125-01 is a wet oil sump system. The oil system is used for lubrication, cooling and the micro sealing of the engine in the area of the piston and cylinder. The pressure cycle lubricates all heavily used bearings of the engine and supplies the turbocharger with oil. Cams, chain drive and valve guides are lubricated with pressure less leak oil.
The oil is sucked by the chain driven pump from the sump and led to the filter, thereafter to the thermostat. At oil temperatures lower than 78°C oil is streaming directly to the main path through the short cycle. When the oil temperature rises above 78°C, the thermostat opens the path to the oil cooler. At temperatures above 94°C the oil is taking the path through the oil cooler exclusively, which ensures a maximum oil temperature of 140°C under all operating conditions.
Then the engine parts are lubricated and cooled by the oil, the turbocharger is supplied by an extra hose.
The oil within the engine is passing the bearings and then drops back into the sump. The turbocharger oil is draining into the catch tank as well as the oil from the blow by system.
This oil is supplied by the gear driven pump back to the sump.
The measured values of oil temperature and pressure are displayed at the CED 125 and led to the FADEC.
The system contains 4.5 to 6 liters (1.19 to 1.59 US gal) oil, the level can be checked with a dip stick.
For type of engine oil refer to Chapter 6 of this Supplement.

Following limitations are established for the oil system of the TAE 125-01:

min. oil temperature for engine start: .....-32°C
min. oil temperature for operation: .....50°C
max. oil temperature: .....140°C
min. oil pressure:.....1.2 bar (17.4 psi)
min. oil pressure for take off power:.....2.3 bar (33.4 psi)
min. oil pressure for cruise power:.....2.3 bar (33.4 psi)
max. oil pressure:.....6.0 bar (87 psi)
max. oil pressure cold start < 20 sec: .....6.5 bar (94.2 psi)
max. oil consumption: .....0.1 l/h
(0.026 US gal/hour)

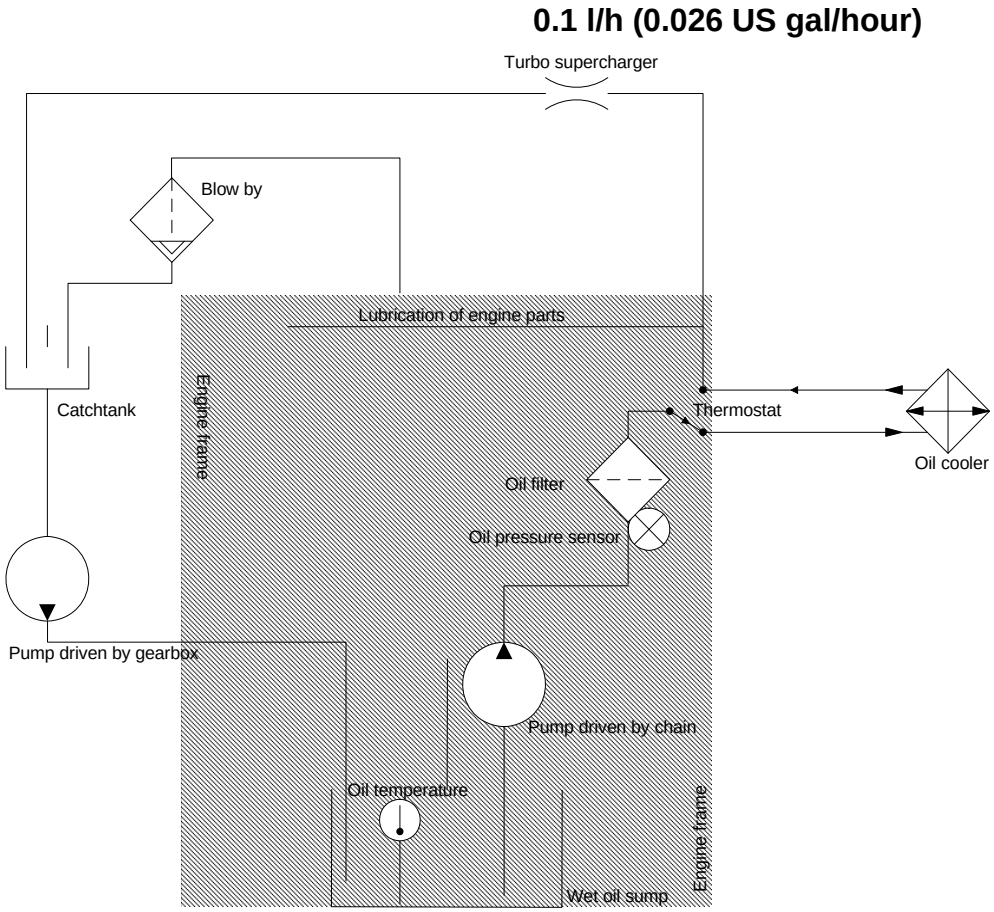

Fig. 79-1a Engine Oil System of TAE 125-01

GEARBOX OIL SYSTEM

The gearbox oil system of the TAE 125-01 is a wet oil sump system. Gearbox oil is used for lubrication and cooling of the gearbox and for operation of the propeller regulation by the Constant Speed Unit. The bearings of the gearbox are lubricated without pressure, the gear wheels convey the oil and leak oil from the propeller regulation is used.
The oil pump sucks oil from the sump and leads it to the micro filter within the Constant Speed Unit, then to the pressure relief valve (mechanically adjusted to 20 +/- 2 bar (290 psi +/- 29 psi)) and thereafter to the regulation valve (electronically controlled by the FADEC with Pulse-Width-Modulation). The oil is then reaching the piston of the propeller which is changing the blade pitch according to the value given by the FADEC. The oil temperature is measured at the propeller-shaft, leak oil of the propeller-regulation lubricates the bearings and returns to the sump.
The system contains 1 liter gearbox oil, the level can be checked at a viewer at the left lower front side of the gear accessible through a flap at the front side of the cowling.
A filler screw is installed on top, a screw for draining at the bottom of the gearbox housing.
For type of gearbox oil refer to Chapter 6 of this Supplement.

Following limitations are established for the gearbox oil system:

min. oil temperature: .....-32°C

max. oil temperature: .....120°C

MAINTENANCE PRACTICES

1. General

This maintenance practice provides instructions to inspect the oil system.

2. Inspecting the oil system

▲ **WARNING:** Avoid skin contact with the oil as it may result in skin irritation.

This is a visual inspection. Check all pipes, pipe joints, supply connections and engine housing separation points (e.g. cylinder head gasket, cylinder head cover gasket for leakage, seepage points and correct routing. Visually inspect oil for water contamination.

▲ **WARNING:** No leaks or seepage points are permitted !

79.30 INDICATING

Relating to oil the Compact Engine Display CED 125 is indicating the following parameters:

- engine oil pressure "OP"
- engine oil temperature "OT" and
- gearbox temperature "GT".

For further information refer to Chapter 31 of this Supplement.

80 STARTING

80.00 GENERAL

DESCRIPTION

Depending on the electrical system variant of the installed TAE 125-01 engine it is equipped with a 14 V or a 28 V engine starter respectively. The starter is free of maintenance, no overhaul permitted.
For troubleshooting refer to Chapter 71 of this Supplement.

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91 CHARTS AND WIRING DIAGRAMS

91.10 WIRING DIAGRAMS

Depending on the electrical system variant of the installed TAE 125-01 engine, the wiring diagram for a 14V or 28V system is applicable.

91.10.01 Wiring diagrams for Centurion 1.7 installation:

Figure 1: Wiring of the 14V Electrical System (C172 F,G,H,I,K,L,M,N)

Figure 2 Wiring of the 14V Electrical System (C172 F,G,H,I,K,L,M,N) with "FADEC backup battery" and with Alternator switch

Figure 3: Wiring of the 28V Electrical System (C172 N,P)

Figure 4 Wiring of the 28V Electrical System (C172 N,P) with "FADEC backup battery" and with Alternator switch

Figure 5: Wiring of the Electrical System (C172 R)

Figure 6: Wiring of the Electrical System (C172 S)

Figure 7 Wiring of the Electrical System (C172 R,S) with "FADEC backup battery" and with Alternator switch

Figure 7 Wiring of the Electrical System (C172 R,S) with "FADEC backup battery", with Alternator switch and service bulletin TM TAE 601-0011 incorporated

Figure 8 Wiring of the Electrical System (C172 R,S) with "Change of the electrical circuit breaker connection" according to service bulletin TM TAE 601-0008 Rev. 0

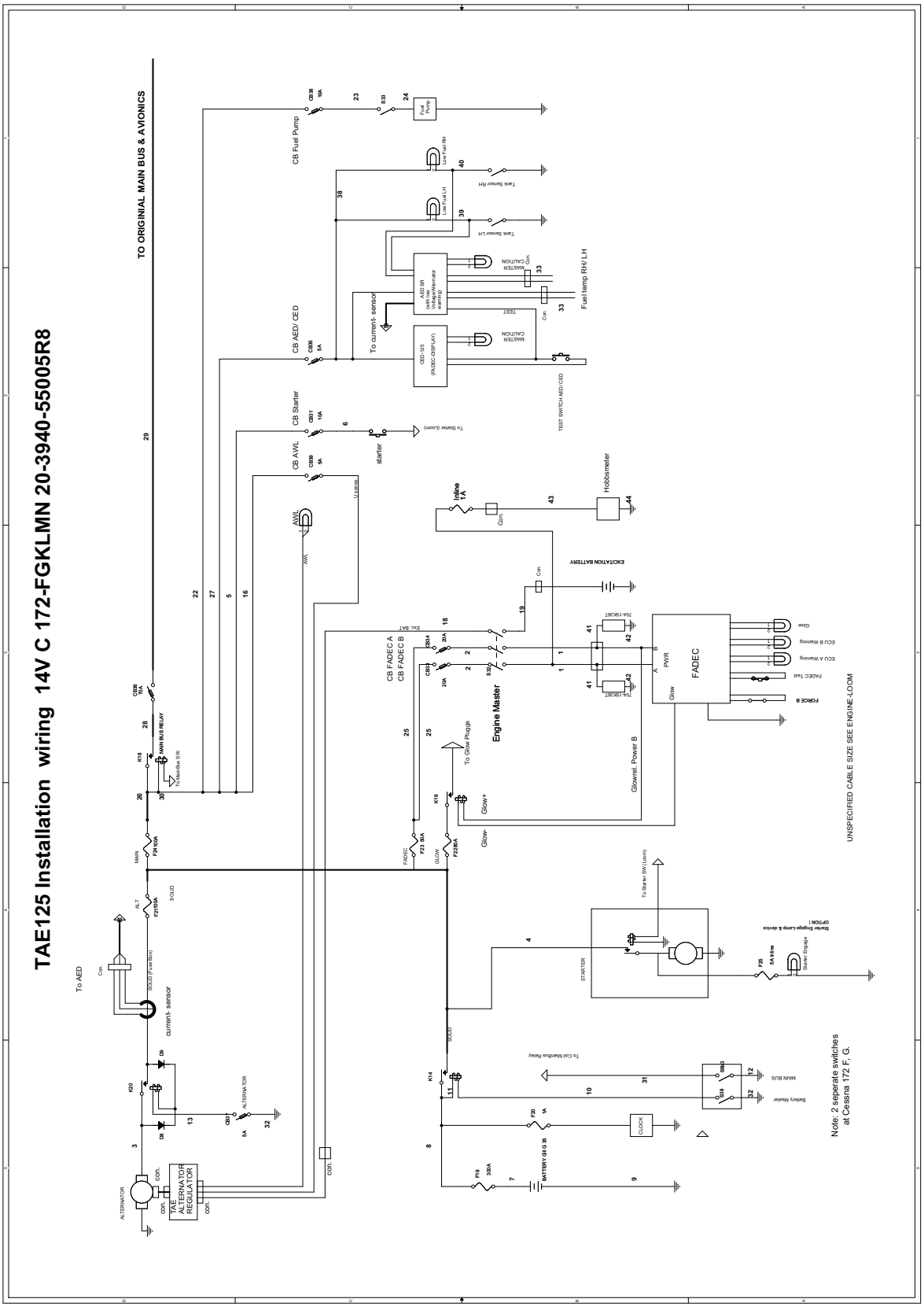

Figure 1 Wiring of the 14V Electrical System (C-172 F/G/H/I//K/L/M/N)

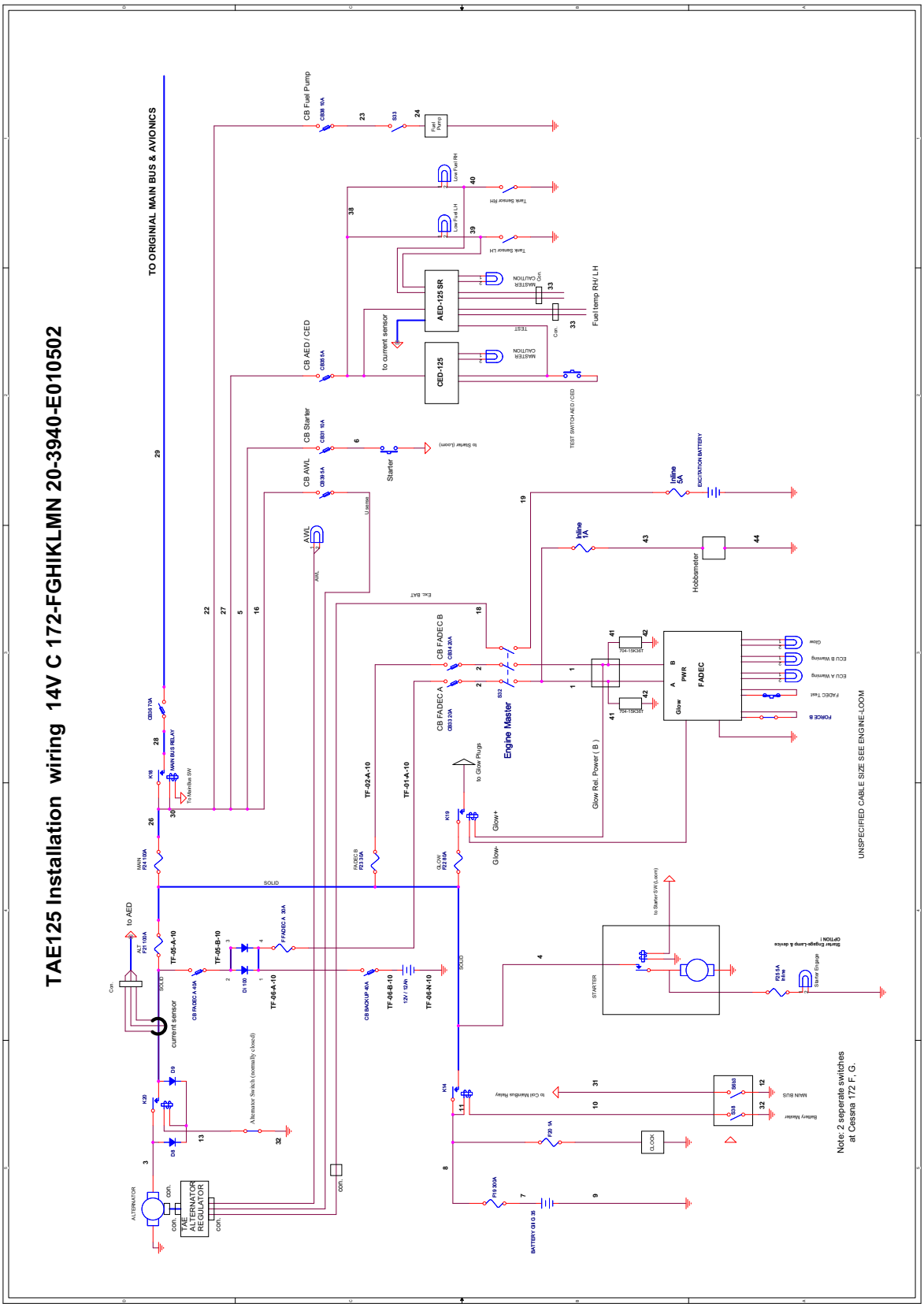

Figure 2 Wiring of the 14V Electrical System (C172 F,G,H,I,K,L,M,N) with "FADEC backup battery" and with Alternator switch

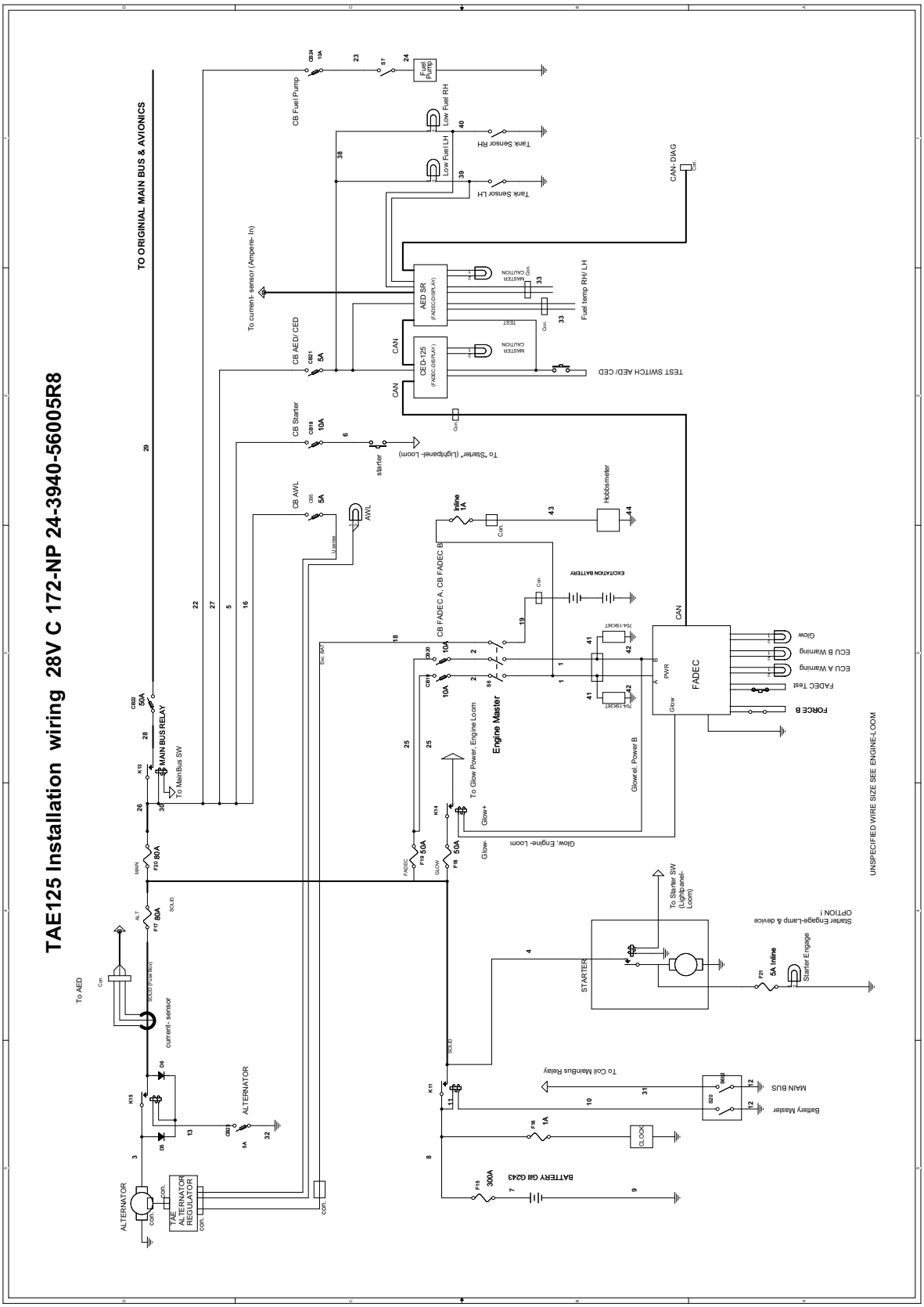

Figure 3 Wiring of the 28V Electrical System (C-172 N/P)

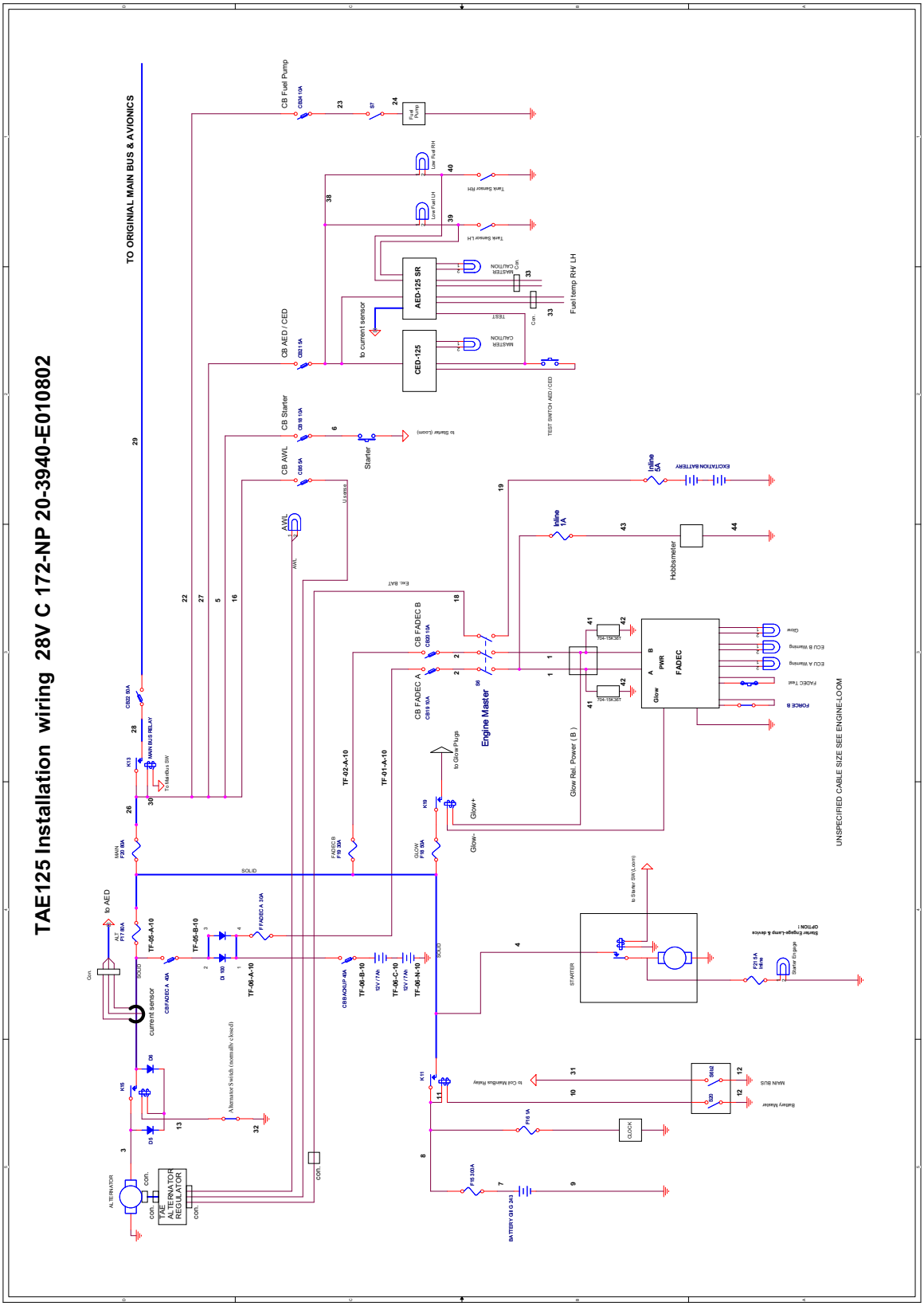

Figure 4 Wiring of the 28V Electrical System (C172 N,P) with "FADEC backup battery" and with Alternator switch

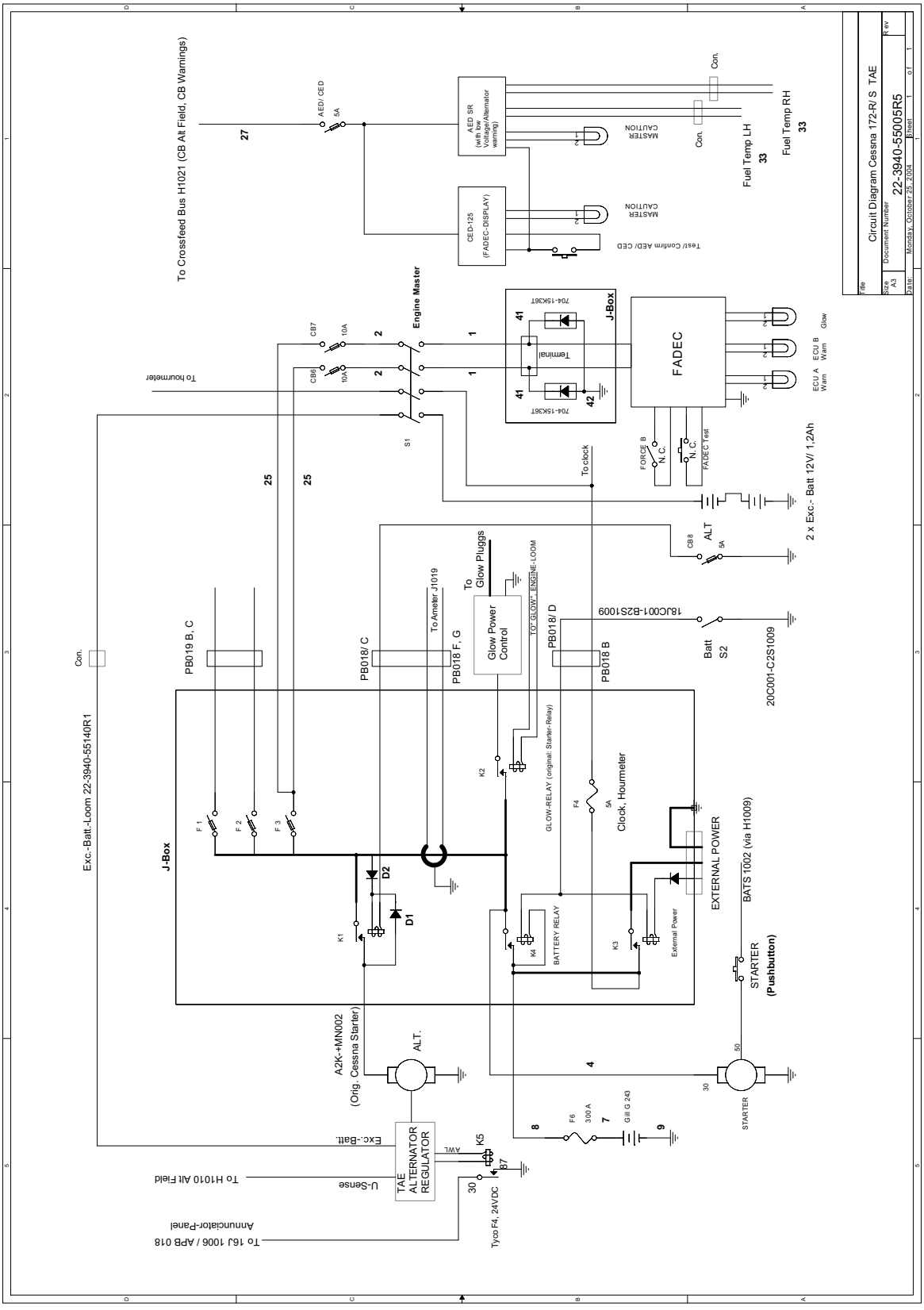

Figure 5 Wiring of the 28V Electrical System (C-172 R)

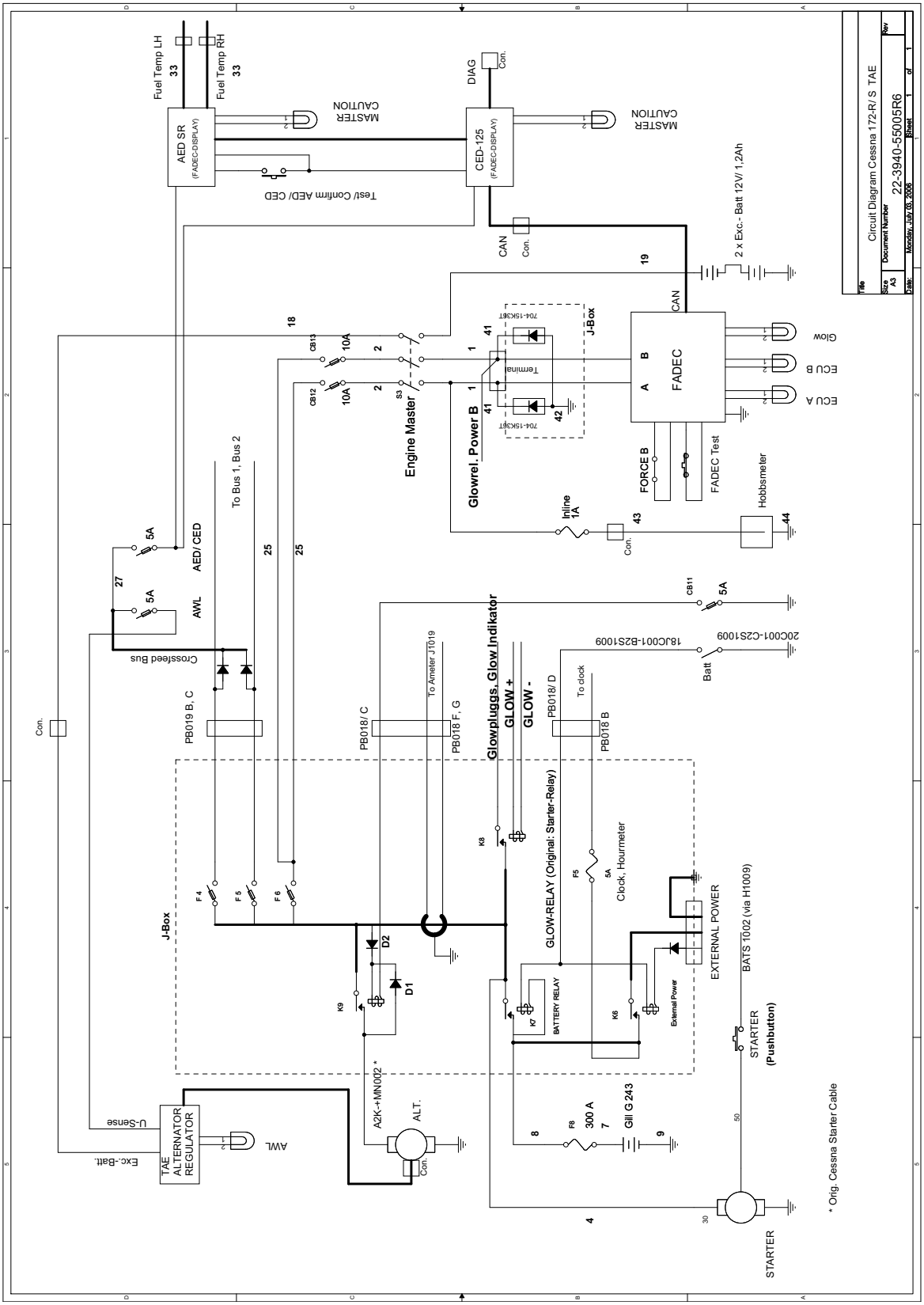

Figure 6 Wiring of the 28V Electrical System (C-172 S)

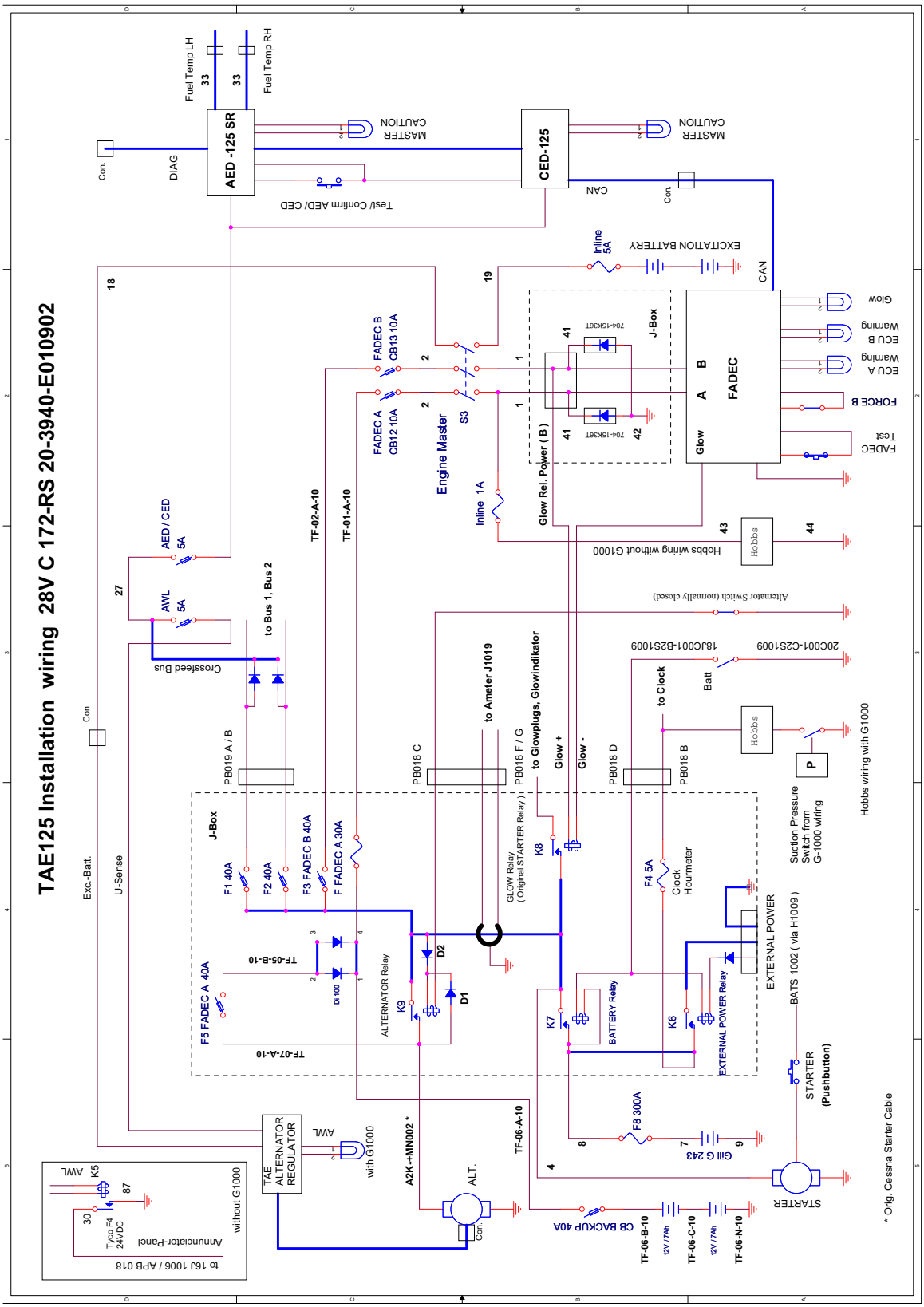

Figure 7 Wiring of the 28V Electrical System (C172 R,S) with "FADEC backup battery" and with Alternator switch

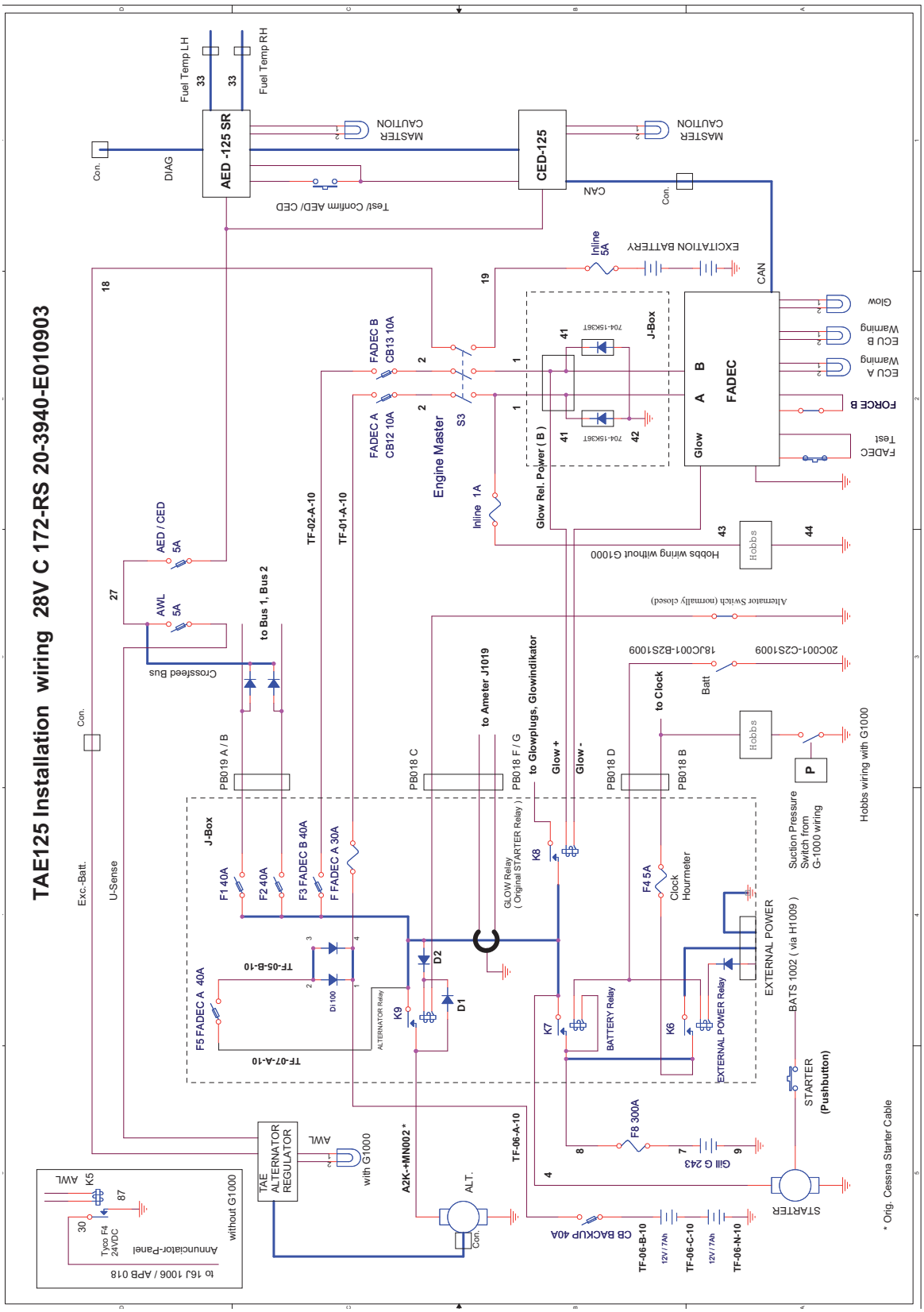

Figure 8 Wiring of the 28V Electrical System (C172 R,S) with "FADEC backup battery", with Alternator switch and service bulletin TM TAE 601-0011 incorporated

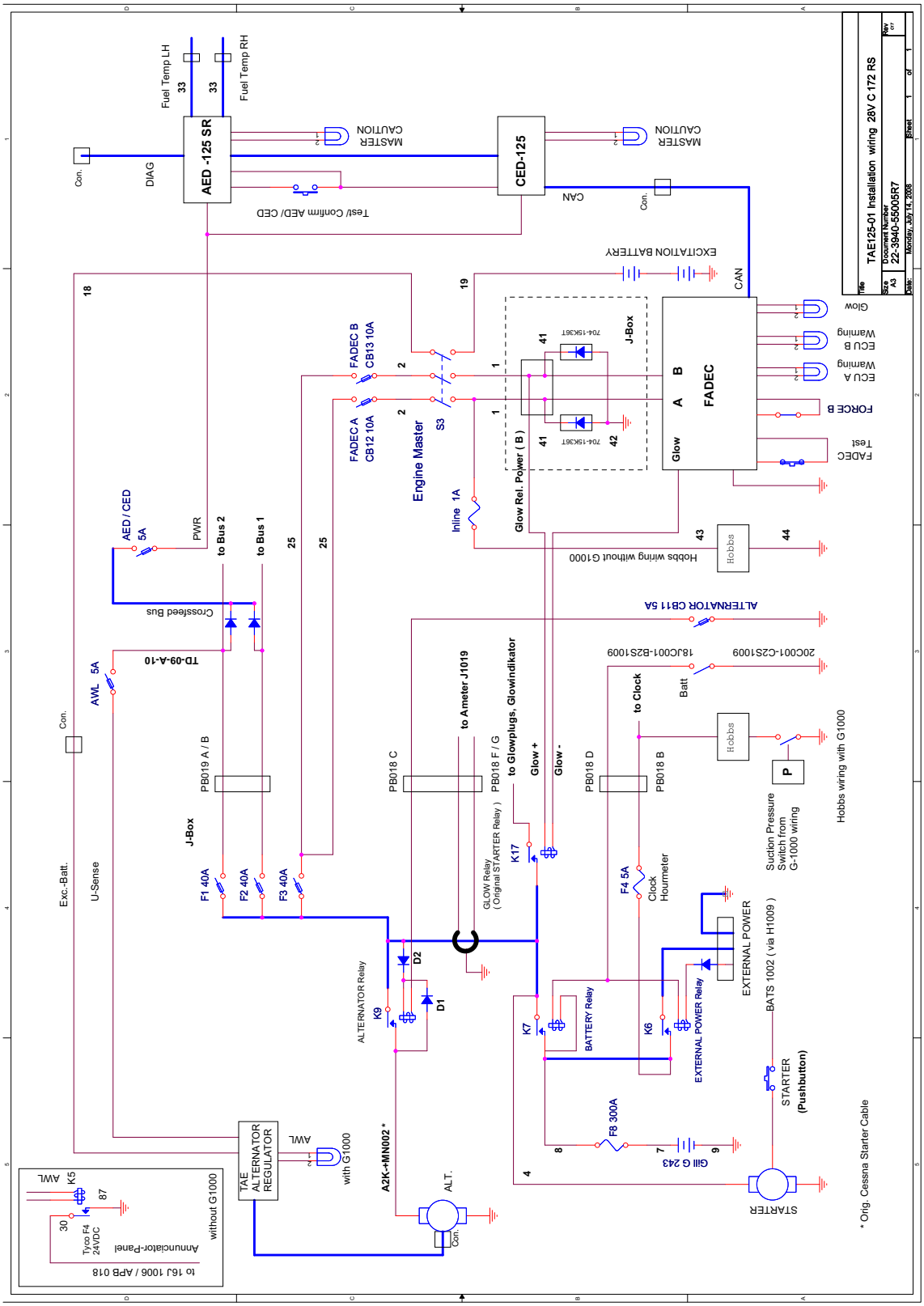

Figure 9 Wiring of the Electrical System (C172 R,S) with "Change of the electrical circuit breaker connection" according to service bulletin TM TAE 601-0008 Rev. 0

91.20 SPECIAL TOOLS

To perform maintenance actions on TAE125 engines the performing maintenance station must be trained and also be equipped with the specific tooling approved by Technify Motors GmbH.
Below this specific tooling is listed.

Basic Tool Set TAE 125-01 (P/N: ATA 00-0001-1000)

Section	Action	Qty.	Tool description
Gearbox Installation	gearbox inst./rem.	2x1	Screwdriver Bit 5+6mm allen key
Glow Plugs	contacts inst./rem.	1	Flexible 6 Point Wrench 8 mm
	glowplug inst./rem.	1	Swivel Deep Socket 10 mm with Extension
Engine Oil exchange and Fuel Filter repl.		1	Oil Filter Wrench 27 mm (Short Socket)
Standard Tools		1 1	Flexible 6 Point Shaft Wrench6/7 mm 6/7 mm
		1	12 Point Combination Wrench 6-24 mm /17 Tools
		1	Wrench 17/19mm
		1	6 Point Ratchet Set 3/8“ 6-22mm
		1	12 Point Deep Socket 17 mm
		1	Ratchet 3/8“

Table 91-1a Basic Tool Set TAE 125-01

Special Tool Set TAE 125-01 (P/N: ATA 00-0002-1000)

Section	Action	Qty.	Tool description
General		3x1	Torx Sockets E8/10/12
Clutch	ring gear locating	1	Special Tool
	clutch shaft pull extraction	1	Slide Hammer Puller 10mm thread
	bearing extraction	1 1	Internal Extractor Counter Stay
Cooling System	leak test	1	Pressure Tester incl. Adaptors
Coolant Fluid	check and replacement	1	Anti-Freeze Tester
Hose Clamps	removal/ installation	1	Hose Clamp Pliers
Gearbox	gear box removal	1	Ratchets 3/8“ 0° follow-up
Prop Governor	pressure check	1	Pressure Gauge incl. Connector
	governor valve repl.	1	Special Socket 27 mm

Table 91-2a Special Tool Set TAE 125-01