Alternate Air

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

Placard on the lever, forward position:

ALTERNATE AIR

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

ALTERNATE AIR ON

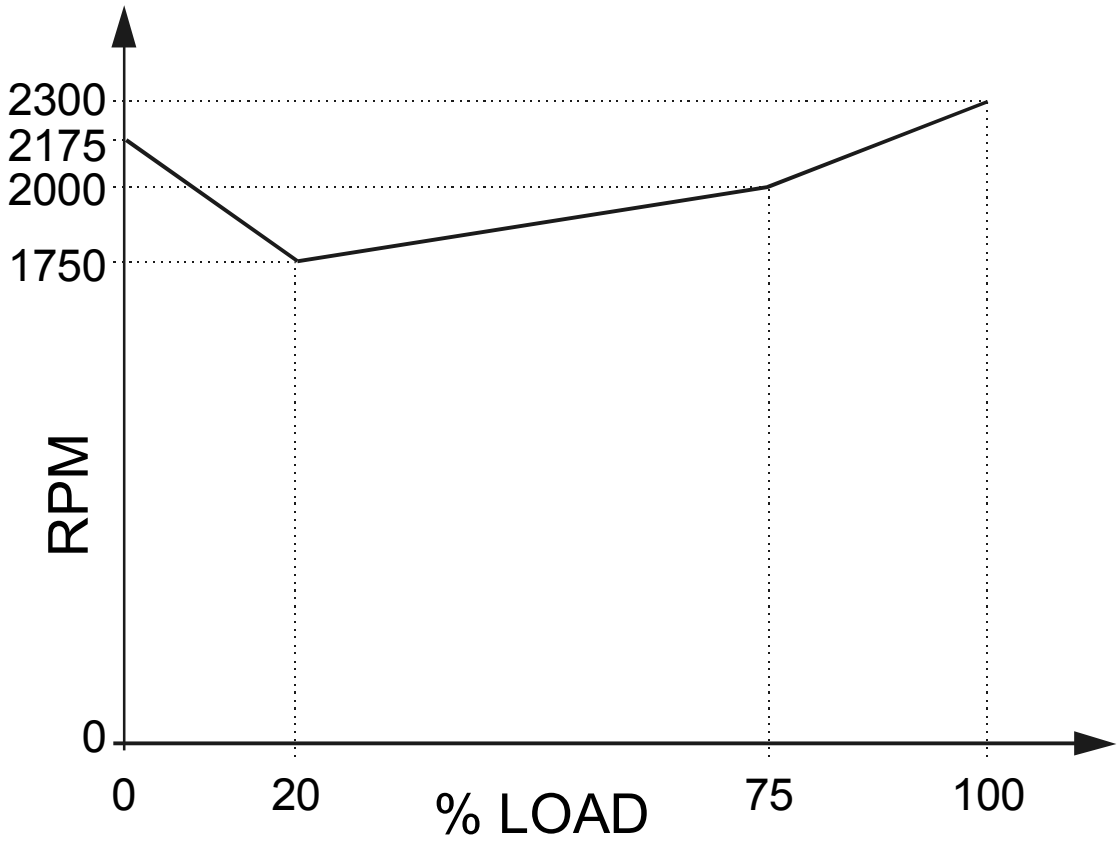
7.9.3 PROPELLER

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

Propeller control

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

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



CAUTION

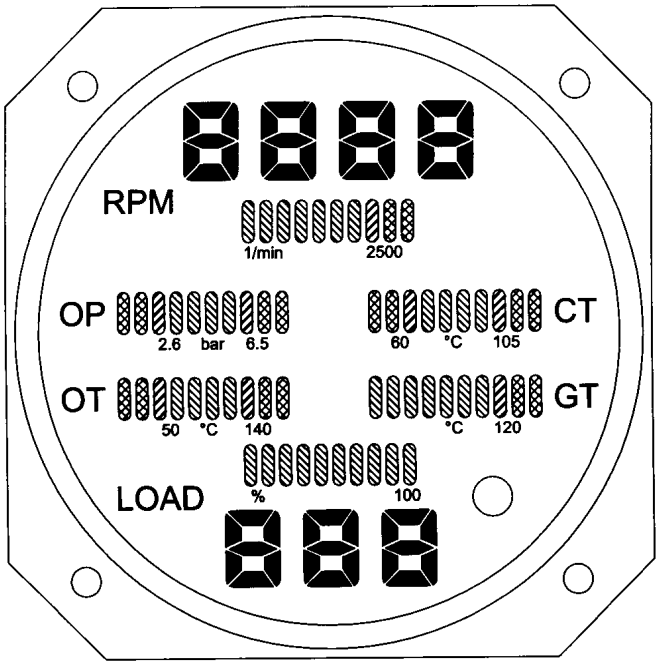
Operation on the ground at high RPM should be avoided as far as possible, as the blades could suffer stone damage. For this reason a suitable site for engine runs should be selected, where there are no loose stones or similar items.

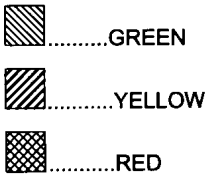
WARNING

Never move the propeller by hand.

7.9.4 ENGINE INSTRUMENTS

Compact Engine Display (CED 125)





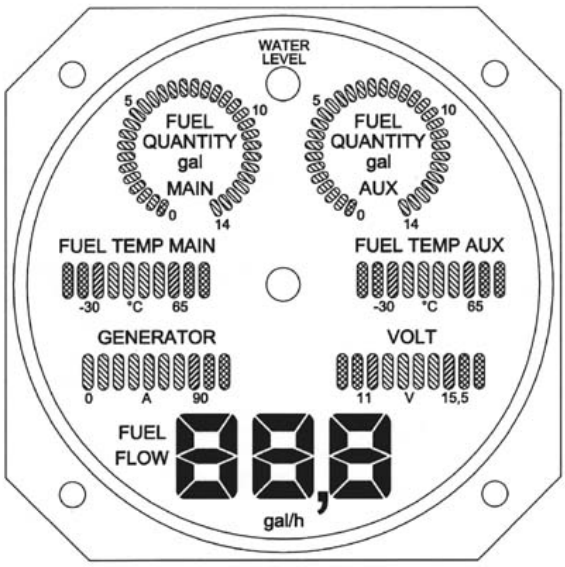
NOTE

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

Indications on the Engine Instrument CED 125

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

Auxiliary Engine Display (AED 125)

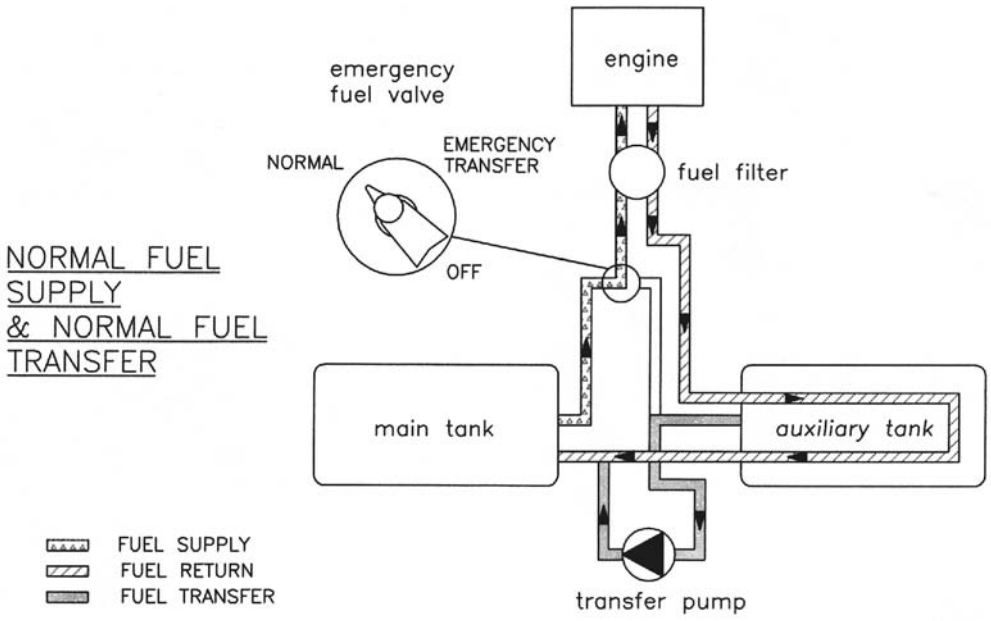


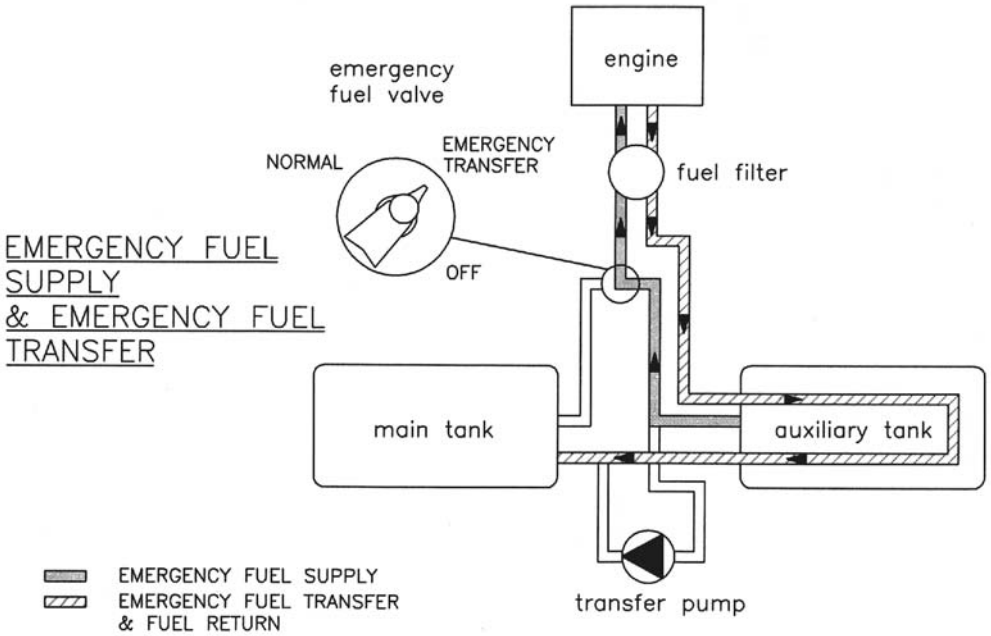
Fuel quantity:
2 digits = appr. 1 US gal

Indications on the Auxiliary Engine Instrument AED 125

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

7.9.5 FUEL SYSTEM





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

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

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

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

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

CAUTION

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

Emergency fuel valve

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

Fuel tanks

Main tank (left wing):

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

Auxiliary tank (right wing):

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

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

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

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

Long Range Tank

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

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

NOTE

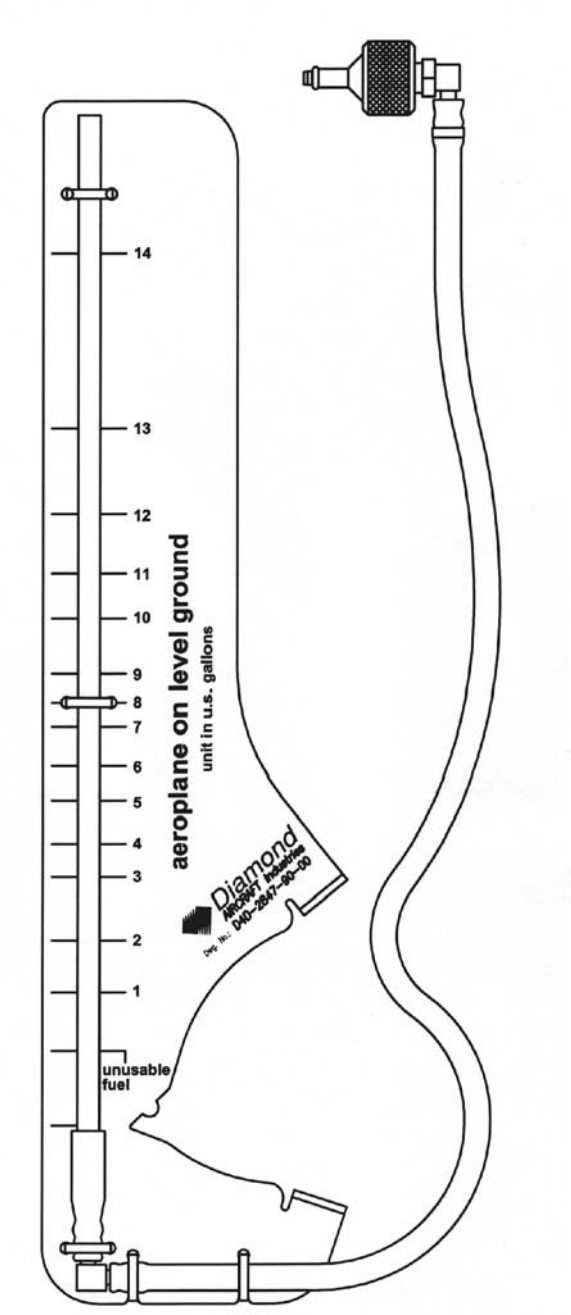
When the fuel quantity indicator reads 15 US gal, the correct fuel quantity must be determined with the alternate mean for fuel quantity indication. If this measurement is not carried out, the fuel quantity available for flight planning is 15 US gal.

Alternate mean for fuel quantity indication for the Standard Tank

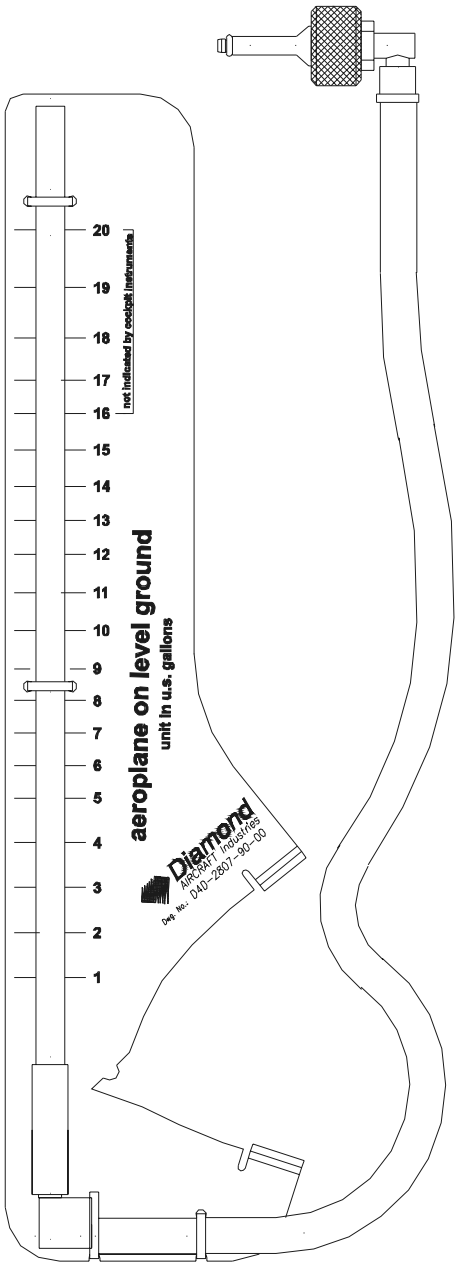
The alternate mean for fuel quantity indication allows the fuel quantity in the tank to be determined during the pre-flight inspection. It functions according to the principle of communicating containers. The fuel quantity measuring device has a recess which fits the airfoil of the wing. With this recess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

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

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

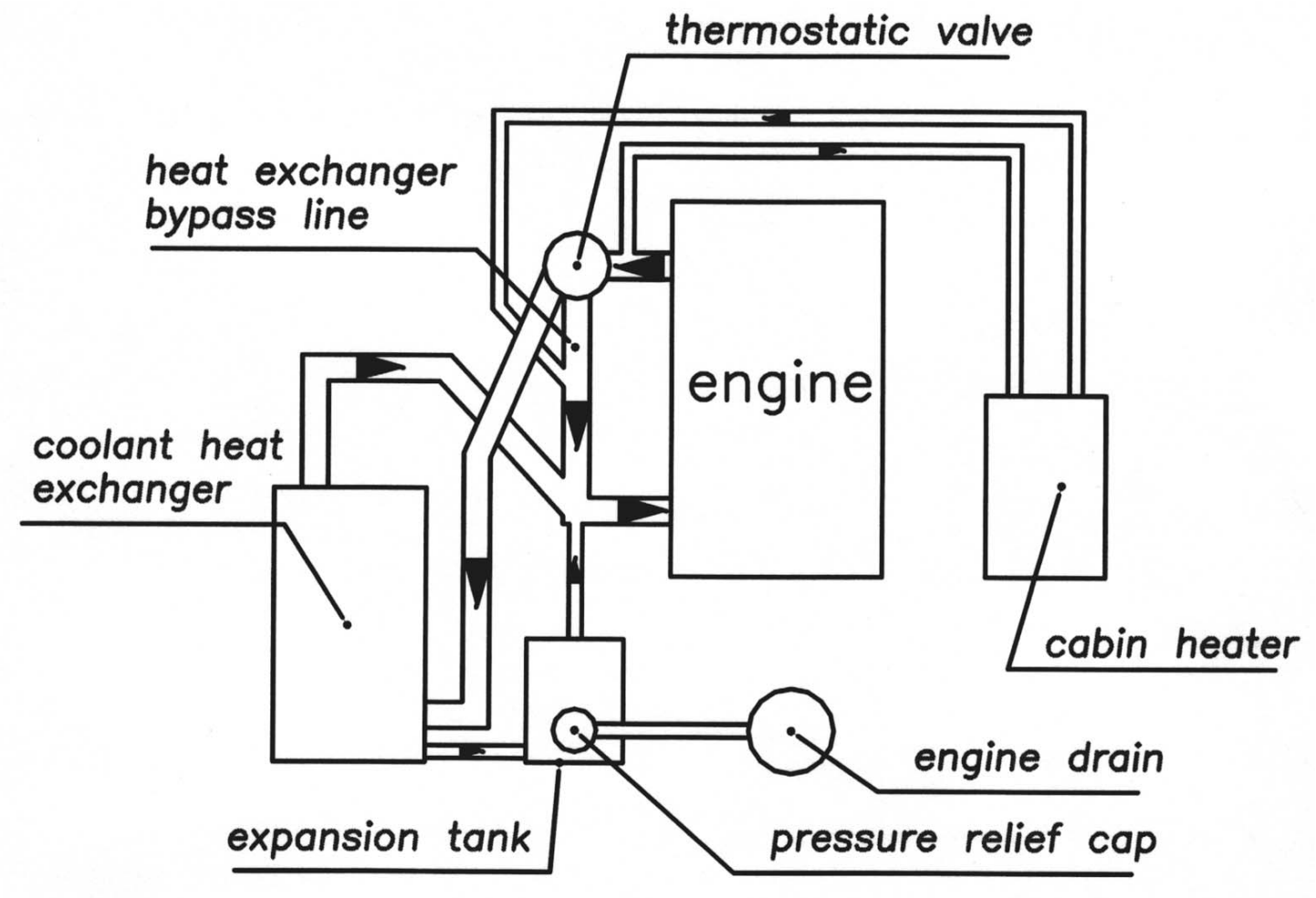


Alternate Mean for fuel quantity indication for Long Range Tank

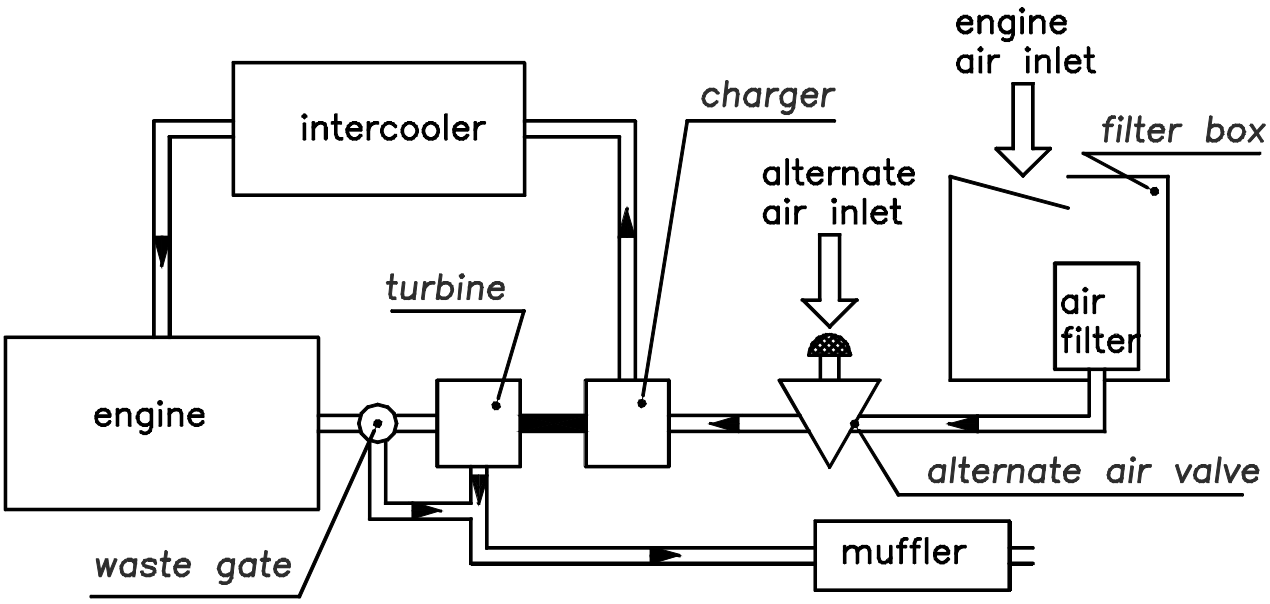


7.9.6 COOLING SYSTEM

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



7.9.7 TURBOCHARGER SYSTEM



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

7.9.8 OIL SYSTEMS

The engine has two separate oil systems.

Lubrication system (engine and turbocharger)

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

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

Gearbox and propeller governor system

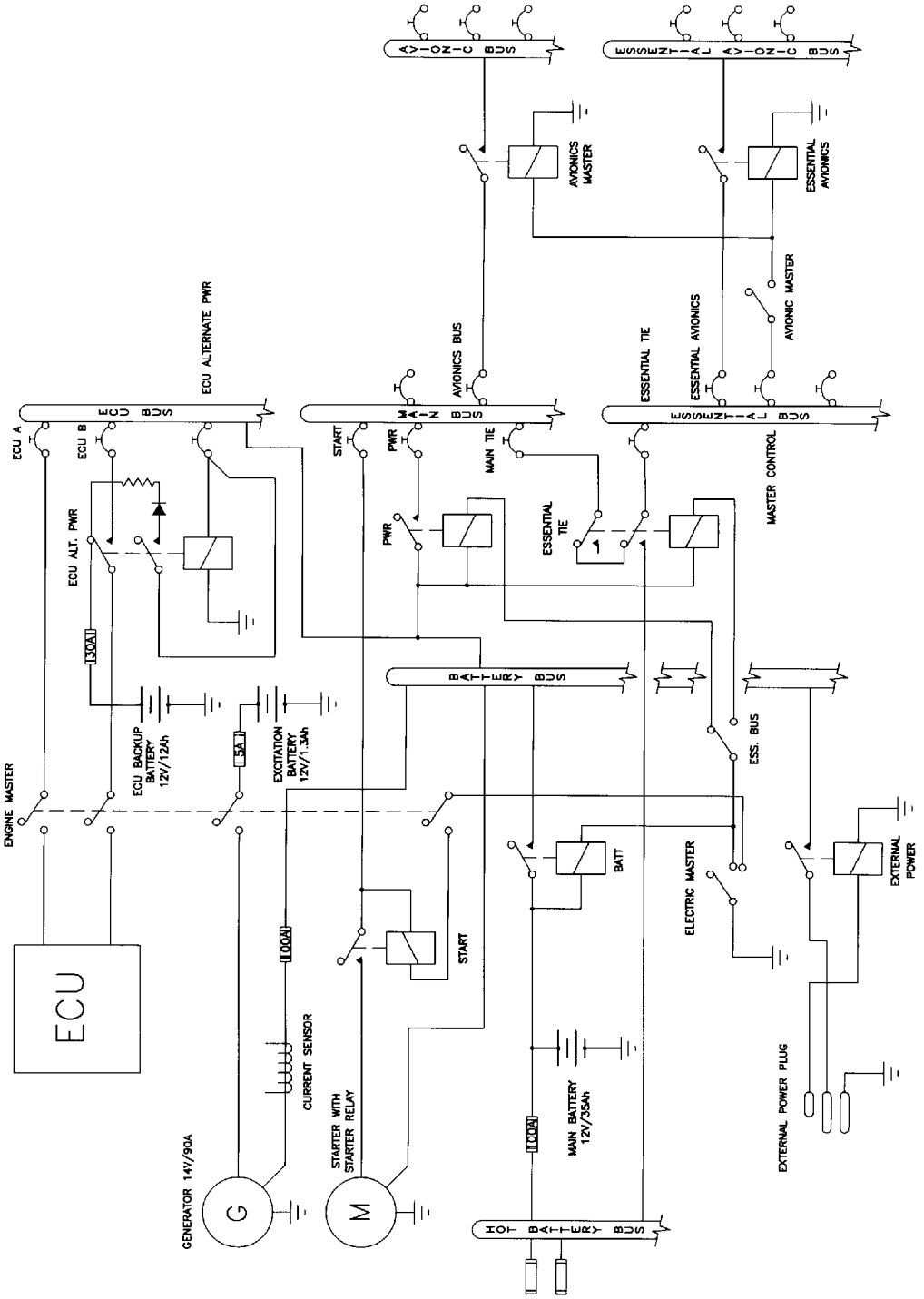
The second oil circuit lubricates the gear and serves the governor system and the regulation of the propeller.

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

CAUTION

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

7.10 ELECTRICAL SYSTEM



7.10.1 GENERAL

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

- Power generation
- Storage
- Distribution
- Consumers

Power generation

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

The power output line of the alternator is connected to the 'battery bus' via a 100 A fuse, which is installed in the relay junction box mounted on the left-hand side of the firewall. The power output line also runs through the current sensor, which provides an indication of the power being supplied to the electrical system by the alternator including the current for battery charging. The alternator has an internal voltage regulator which regulates the output voltage between 12 and 14 V. In the event of a main battery failure the field of the alternator is energized by a 12 V, 1.3 Ah sealed-lead-acid battery ('excitation'-battery) which is installed behind the instrument panel. The 'ENGINE MASTER'-switch connects the 'excitation'-battery to the alternator field via a 5 A fuse.

Storage

'Main'-battery power is stored in a 12 V, 35 Ah lead-acid battery mounted on the right-hand side of the firewall. The 'main' battery is connected to the 'hot battery bus' via a 100 A fuse and to the 'battery bus' via the 'battery'-relay which is installed in the relay junction box on the left-hand side of the firewall.

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

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

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

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

Distribution

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

Hot battery bus:

The 'hot battery bus' is directly connected to the 'main'-battery via a 100 A fuse installed in the relay junction box and cannot be disconnected from the 'main'-battery. The 'hot battery bus' provides power to the pilot map/reading light and the accessory power plug which are protected by their own fuses.

Battery bus:

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

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

ECU bus:

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

Main bus:

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

Essential bus:

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

Consumers

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

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

Voltmeter

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

Ammeter

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

Landing and taxi lights

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

Position and strobe lights

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

Flood light

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

Instrument lighting

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

Pitot heating

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

7.10.2 ENGINE CONTROL UNIT / ECU

Engine control and regulation

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

Sensors installed are:

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

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

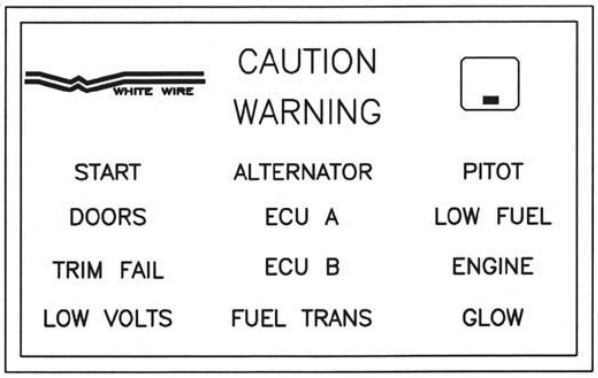
- Activation of starter (relay)
- Signal for propeller governor pressure valve
- Signal for the rail-pressure regulation valve
- Signal for each of the 4 injection nozzles
- Activation of the glow plugs
- Signal for the waste gate valve

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

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

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

7.10.3 ANNUNCIATOR PANEL (WARNING, CAUTION AND STATUS LIGHTS)



Testing the annunciator panel

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

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

Warning messages

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

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

Door warning (DOORS)

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

Starter warning message (START)

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

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

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

Trim failure warning message (TRIM FAIL)

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

Caution messages

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

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

Alternator caution message (ALTERNATOR)

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

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

Low voltage caution message (LOW VOLTS)

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

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

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

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

Low fuel caution message (LOW FUEL)

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

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

Pitot heating caution message (PITOT)

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

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

Engine parameter caution message (ENGINE)

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

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

Status lights

Fuel transfer pump status light (FUEL TRANS)

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

Glow plugs status light (GLOW)

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

7.11 PITOT-STATIC SYSTEM

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

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

7.12 STALL WARNING SYSTEM

If airspeed drops below approximately 1.1 times the stalling speed, the stall warning horn, located in the instrument panel, will sound. The horn becomes progressively louder the closer one gets to stalling speed. Suction at an orifice on the left wing leading edge activates the horn via a hose. The orifice for the stall warning in the left wing is marked by a red ring.

7.13 AVIONICS

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

CHAPTER 8
AIRPLANE HANDLING, CARE AND MAINTENANCE

Page

8.1 INTRODUCTION

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

8.2 AIRPLANE INSPECTION INTERVALS

Inspections of the Airframe are scheduled every 50, 100, 200 and 1000 hours, inspections of the power plant every 50, 200, 500 and 1000 hours. Independent of the flight hours an annual inspection must be performed every year. The respective inspection checklists are prescribed in the Airplane Maintenance Manual, Chapter 05.

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

CAUTION

Unscheduled maintenance checks are required after:

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

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

8.3 AIRPLANE ALTERATIONS OR REPAIRS

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

8.4 GROUND HANDLING / ROAD TRANSPORT

8.4.1 GROUND HANDLING WITHOUT TOW BAR

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

8.4.2 GROUND HANDLING WITH TOW BAR

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

WARNING

The tow bar must be removed before starting the engine.

CAUTION

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

NOTE

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

8.4.3 PARKING

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

Control surfaces gust lock

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

WARNING

The control surfaces gust lock must be removed before flight.

The control surfaces gust lock is installed as follows:

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

For removal, reverse the sequence.

8.4.4 MOORING

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

8.4.5 JACKING

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

8.4.6 ALIGNMENT

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

8.4.7 ROAD TRANSPORT

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

1. Fuselage:

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

2. Wings:

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

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

3. Horizontal stabilizer:

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

8.5 CLEANING AND CARE

CAUTION

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

CAUTION

Excessive dirt deteriorates the flight performance.

8.5.1 PAINTED SURFACES

The entire surface of the airplane is painted with a white weatherproof two component paint. Nevertheless, the airplane should be protected against moisture and dampness. The airplane should not be stored outdoors for long periods of time. Moisture that has penetrated must be removed by storing the affected parts in a dry place and turning them over several times.

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

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

8.5.2 CANOPY AND REAR DOOR

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

8.5.3 PROPELLER

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

Surface

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

8.5.4 ENGINE

Engine cleaning is part of the scheduled inspections.

8.5.5 INTERIOR SURFACES

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

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

CHAPTER 9
SUPPLEMENTS

Page

9.1 INTRODUCTION

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

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

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

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

9.2 LIST OF SUPPLEMENTS

Airplane S/N:	Registration:	Date:			
Sup. No.	**Title**	**Rev. No.**	**Date**	**applicable**	
				YES	**NO**
A2	Intercomm System, Model PM 1000 II PS Engineering, Inc.	0	11-Nov-2002	**9**	**9**
A9	ADF, KR 87 Bendix/King	2	17-Feb-2003	**9**	**9**
A10	DME, KN 62 A Bendix/King	2	17-Feb-2003	**9**	**9**
A11	Compass System, KCS 55 A Bendix King	3	17-Feb-2003	**9**	**9**
A13	Autopilot, KAP 140 Bendix/King	0	11-Nov-2002	**9**	**9**
A17	COM / NAV / GPS GNS 430 Garmin	2	17-Feb-2003	**9**	**9**
A18	Audio Panel, GMA 340 Garmin	1	17-Feb-2003	**9**	**9**
A19	Transponder, GTX 327 Garmin	0	11-Nov-2002	**9**	**9**
A20	CDI, GI 106A GARMIN	0	11-Nov-2002	**9**	**9**

Airplane S/N: Registration: Date:

Sup. No.	Title	Rev. No.	Date	applicable	
				YES	NO
% A23 %	GPS Annunciation Unit MD41-1488/1484 MID CONTINENT	1	20-Dec-2002	**9**	**9**
% A24 %	Stormscope WX 500	2	28-Feb-2003	**9**	**9**
% A25 %	Audio Panel GMA 340, VFR	1	20-Feb-2003	**9**	**9**
A26	COM / NAV / GPS GNS 430 (VFR Operation) GARMIN	0	11-Nov-2002	**9**	**9**
% A28 %	COM / NAV / GPS GNS 530 (VFR Operation) Garmin	0	20-Mar-2003	**9**	**9**
% E3	Attitude Indicator, AIM 1100-14LK(0D) BF Goodrich	1	14-Mar-2003	**9**	**9**
E4	DIGITAL CHRONOMETER MODEL 803 DAVTRON	0	11-Nov-2002	**9**	**9**
E5	Attitude Indicator, LUN 1241 MIKROTECHNA	0	11-Nov-2002	**9**	**9**

Airplane S/N:	Registration:	Date:			
Sup. No.	**Title**	**Rev. No.**	**Date**	**applicable**	
				YES	**NO**
S1	Emergency Locator Transmitter, Model E-01 ACK	0	11-Nov-2002	**9**	**9**
S2	Emergency Locator Transmitter, JE2-NG JOLLIET ELECTRONIQUE	0	11-Nov-2002	**9**	**9**
S3	Emergency Locator Transmitter ARTEX C406-1	0	12-May-2003	**9**	**9**

9.3 AMENDMENTS

There are no Amendments at this time.