SECTION 7

DESCRIPTION OF THE AIRPLANE AND ITS SYSTEMS

TABLE OF CONTENTS

7.1 INTRODUCTION

This section describes the airframe, its equipment, controls and systems. Refer to Section 9, Supplements, for details on other supplemental equipment.

7.2 AIRFRAME

GENERAL DESCRIPTION

The airplane is of all metal, riveted, stressed skin construction with a single cantilever low wing and tricycle undercarriage.

The single engine is attached to a welded tubular steel mount. Immediately aft of the firewall is the cockpit section designed to accommodate up to two persons side-by- side with access via hinged doors on either side of the cockpit.

Aft of the cockpit the semi- monocoque construction fuselage provides a main cargo area. The fuselage structure comprises aluminium alloy frames, longerons, stringers and skin panels riveted together to form the monocoque structure.

The empennage comprises a vertical fin, rudder, manually operated rudder trim, horizontal stabilizer, elevator, electrically operated elevator trim with a manual over-ride, dorsal fin and ventral fin.

The wing comprises a centre wing with left hand and right hand outer panels. The wing is a high lift wing with a constant chord, excluding the root extension and a constant aerofoil section. The centre wing has no dihedral whilst the outer panels have a dihedral angle of 8º. An incidence angle of 2º is maintained throughout the span. The centre wing houses the four fuel system storage tanks which are integral with the structure. Mating of the centre wing to fuselage is at the one piece main beam and the split rear beam. The outer panels are attached fore and aft to the centre wing and are terminated at their extremities with fibreglass tips which contain the navigation and strobe lights.

Single slotted flaps are fitted at the trailing edge of the centre wing span. Conventional ailerons with balance tabs on both ailerons and an electrically operated trim on the left hand aileron are attached to the outer panels.

7.3 FLIGHT CONTROLS

GENERAL DESCRIPTION

Conventional manually operated flight controls comprising a rudder, elevator and ailerons are fitted to the airplane. Flight control movement is achieved through movement of a control column in either the left or right pilot position. There is a rudder/aileron interconnect comprising a spring connecting the rudder steering torque tube and control column.

AILERONS

The aileron system comprises cables, quadrants, push rods and torque tubes. Primary stops are located on the wing and secondary stops on the base of the control column. The ailerons are fitted with balance tabs.

An electrically operated trim tab is fitted to the left hand aileron and is operated by left and right movement of a switch on the control column. The trim position is indicated on an instrument in the centre of the instrument panel.

ELEVATOR

The elevator is controlled by fore and aft movement of the control column. Movement of the control column operates the elevator bellcrank by means of tensioned cables running in pulleys. Travel limits are determined by adjustable stops. The primary stops are located in the right hand side of the cockpit wall. The secondary stops are located in the tailcone.

An electric trim tab is fitted on the trailing edge of the elevator and is controlled by fore and aft movement of a switch on top of the control column. A manually operated over-ride trim is provided and is operated by a handle mounted above the pilot's seat position. The trim position is indicated on an instrument in the centre of the instrument panel.

A trim interrupt switch is located in the pedestal in the centre of the cockpit. The red coloured switch when moved forward will isolate electrical power to the elevator trim in the event of an uncommanded movement of the elevator trim. Refer to Section 3 Emergency Procedures in the event of experiencing an elevator trim runaway.

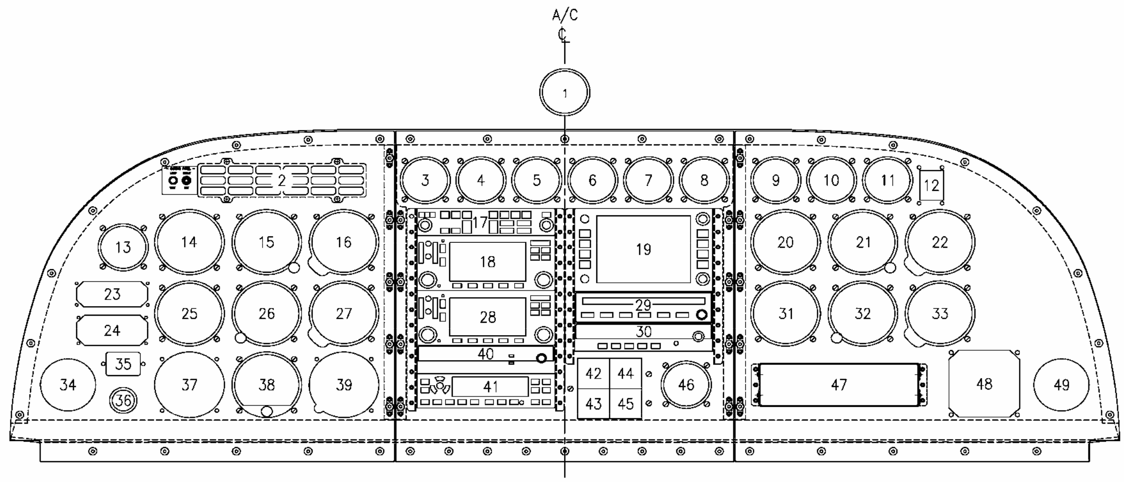
RUDDER

The rudder and nose wheel steering control are linked together at the nose wheel steering tube which is connected to the "pendulum" mounted pedals by adjustable push rods and to the rudder torque tube by tensioned cables. Travel limits are determined by adjustable stops which contact the rudder aft bellcrank and fixed stops on the rudder pedals.

The geometry of the nose wheel steering linkage ensures that the rudder and nose wheel steering are only connected when the airplane is on the ground, i.e. when the nose leg is wholly or partially compressed. As the nose leg extends the steering is progressively reduced, when full extension is reached the nose wheel locks in the centred position and the pedals control the rudder.

A manual rudder trim is fitted and is controlled by movement of a wheel located in the overhead panel above the pilot's seat position. The trim position is indicated in an instrument in the centre of the instrument panel.

7.4 INSTRUMENT PANEL



VIEW LOOKING FORWARD ON INSTRUMENT PANELS

KEY					
1	Compass	18	GPS VHF NAV/COMM	35	HSI Slaving Control
2	Annunciator Panel	19	Radar	36	Vacuum Indicator
3	Torque Indicator	20	Airspeed Indicator	37	Radio Magnetic Indicator
4	Np Indicator	21	Artificial Horizon	38	Artificial Horizon
5	ITT Indicator	22	Altimeter	39	Radar Altimeter
6	Ng Indicator	23	GPS Annunciator	40	Distance Measuring Equipment
7	Oil Temperature/Pressure Indicator	24	Auto Pilot Annunciator	41	Transponder
8	Fuel Pressure/Flow Indicator	25	Turn and Slip	42	Aileron Trim Indicator
9	Fuel Contents Indicator Front Tanks	26	Directional Gyro	43	Rudder Trim Indicator
10	Fuel Contents Indicator Rear Tanks	27	Vertical Speed Indicator	44	Elevator Trim Indicator
11	Outside Air Temperature Indicator	28	GPS VHF NAV/COMM	45	Flap Indicator
12	Emergency Locator Beacon Switch	29	Auto Pilot	46	Volt/Ammeter
13	Clock	30	Automatic Direction Finder	47	Stereo
14	Airspeed Indicator	31	Turn and Slip	48	Engine Condition Trend Monitoring
15	Artificial Horizon	32	Directional Gyro	49	Cabin Air Vent
16	Altimeter	33	Vertical Speed Indicator		
17	Audio Panel	34	Cabin Air Vent		

Figure 7-1, Instrument Panel Layout and Key

GENERAL

The instrument panel as shown in Figure 7-1 is divided into four general areas; left hand flight panel, right hand flight panel, avionics panel and engine and fuel systems instrument/annunciator panel. The instrument panel includes both standard and optional equipment.

The left hand panel contains the minimum flight instruments required for flight with space to accommodate additional optional instruments and equipment. Refer to Section 9 Supplements for information on any additional equipment fitted.

The avionics panel contains the minimum avionics equipment required for flight with space to fit additional optional equipment. Refer to Section 9 Supplements for details on fitted avionics equipment.

The right hand flight panel is available for fitment of optional flight instruments and equipment. Refer to Section 9 Supplements for details on fitted equipment. A description and the function of instruments and equipment fitted in the instrument panel is contained in the relevant part of this section of the handbook.

ANNUNICATOR PANEL

The annunciator panel is mounted in the instrument panel and provides an indication to the pilot of the status of various airplane systems. The illumination of a green light indicates a safe and normal condition. The illumination of a blue light indicates the operation of a piece of equipment not normally used for normal operations. The illumination of an amber light indicates a cautionary condition which may or may not require immediate corrective action. The illumination of a red light indicates a hazardous condition requiring immediate corrective action. Refer to Section 3 Emergency Procedures for the actions in the event of the illumination of an annunciator panel light requiring corrective action.

The annunciator panel is fitted with day/night dimming capability and a press to test facility. Selecting NIGHT will dim all lights apart from the red coloured lights.

LIGHT DESCRIPTION	COLOUR	MEANING	ACTIONS
Oil Press Low	RED	Engine oil pressure below 25 psi	Refer to Low Oil Pressure emergency checklist
Generator Off	RED	Generator off line	Proceed as for Generator Failure emergency checklist
Low Fuel Level	AMBER	(1) Check fuel contents, if indicating zero fuel there is a maximum of 24 litres (6.3 U.S. gallons) of fuel remaining for flight. (2) Check fuel contents, if indicating that there is fuel in the tanks a fuel tank jet pump failure has occurred.	Refer Low Fuel Level Light Illuminates emergency checklist
Fuel Filter Bypass	AMBER	Airframe fuel filter has been bypassed	Refer to Fuel filter Bypass emergency checklist
Beta	BLUE	Propeller is set in beta range	Nil
Engine Anti-Ice	BLUE	Inertial separator door lowered	Vacate icing conditions
Door Unsafe	RED	Cargo door unlocked	Refer to Inadvertent Opening Of Airplane Doors In Flight emergency checklist
Chip Detector	AMBER	Engine reduction gearbox contamination	Refer to Engine Gear Box Contamination emergency checklist
Starter Energised	AMBER	Starter in operation	If light remains on after start and attaining 52% Ng select start interrupt.
Ignition On	BLUE	Igniters are operating	Deselect when finished using igniters
External Power	GREEN	External power connected	Ensure external power disconnected and light out prior to taxi
Pitot Heat Inoperative	AMBER	Pitot heat is either selected off, or if selected on the heating element in the pitot heat is defective.	Avoid moisture and icing conditions
Fuel Press Low	AMBER	Mechanical fuel pump pressure has decreased below 6 psi. Light will extinguish when pressure from the electric fuel pump increases system pressure to 9 psi.	Refer Engine Driven Pump Failure emergency checklist
Aux Fuel Pump On	BLUE	Electric fuel pump operating	Refer Engine Driven Pump Failure emergency checklist
Flap Fault	AMBER	The flap asymmetry switches have sensed a fault and isolated the flap motor.	No corrective action possible. Continue flight with flaps at failed position.

Figure 7-2, Annunciator Panel Lights Descriptive Details

7.5 FLIGHT INSTRUMENTS

The following flight instruments are capable of being fitted in the instrument panel as either standard or optional equipment.

Airspeed Indicator

Artificial Horizon

Altimeter

Turn and Slip Indicator

Directional Gyro

Vertical Speed Indicator

Course Direction Indicator

Clock

Outside Air Temperature Indicator

AIRSPEED INDICATOR

The airspeed indicator is calibrated in knots. The operating ranges are marked in green, white and red as detailed in Section 2 Limitations. The pitot static system provides pitot and static pressure to the airspeed indicator. The instrument is internally lit.

VERTICAL SPEED INDICATOR

The vertical speed indicator provides an indication of the rate of climb and rate of descent in feet per minute. The vertical speed indicator is supplied static pressure from the airplane pitot static system. The instrument is internally lit.

ALTIMETER

The altimeter is a barometric type altimeter. The altimeter is fitted with a knob to adjust the instrument's barometric scale to the current barometric altimeter setting. The instrument is internally lit.

ARTIFICIAL HORIZON

The electrically powered artificial horizon displays airplane flight attitude. The electrically driven rotor senses movement in the roll and pitch axis and transmits information to the "pictorial" presentation. Angle of bank index marks are positioned at 10^0, 20^0, 30^0, 45^0 and 90^0 positions either side of wings level. Pitch attitude information is divided into two sections, the upper section is blue and lower section is brown with a white horizon bar between the two. There are pitch index marks both above and below the white horizon line for pitch attitude reference. The airplane symbol is adjustable by a knob at the 6 o'clock position. A "pull to cage" knob is provided to assure immediate alignment and stability whenever power has been applied to the gyro. A power failure flag drops into view whenever the supply voltage is lost or has dropped below a level for proper operation. The instrument is internally lit.

An optional air powered artificial horizon may be fitted. The artificial horizon is controlled by an air-driven precision gyroscope to present pitch and roll information. Angle of bank index marks are positioned at 10^0, 20^0, 30^0, 45^0 and 90^0 positions either side of wings level. Pitch attitude information is divided into two sections the upper section is blue and lower section is brown with a white horizon bar between the two. There are pitch index marks both above and below the white horizon line for pitch attitude reference. The airplane symbol is adjustable by a knob at the 6 o'clock position.

DIRECTIONAL GYRO

The electrically driven directional gyro is a direct reading azimuth indicator. A heading knob is fitted at the 7 o'clock position. A power failure flag drops into view whenever the supply voltage is lost or when the voltage has dropped below a level acceptable for proper operation of the gyro. The instrument is internally lit.

COURSE DEVIATION INDICATOR

The Garmin GI-106A Course Deviation Indicator displays VOR, localiser, glideslope and GPS information. The GI-106A has a VOR/LOC/GPS needle, TO/FROM indicator, NAV warning flag, and a GS needle and flag. The GI-106A has an integral resolver for OBS feedback. The instrument is internally lit.

STANDBY COMPASS

An airpath wet compass is located on the top of the instrument panel coaming to provide magnetic heading information. The compass is internally lit.

OUTSIDE AIR TEMPERATURE INDICATOR

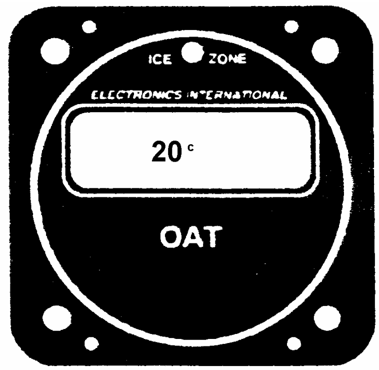


Figure 7-3, Outside Air Temperature Indicator

An Electronics International OAT indicator, as shown in Figure 7-3 is fitted. This indicator has three features that make it a valuable tool when measuring outside air temperatures. The first of these features is its accuracy and linearity. The second feature is the indicator's ability to detect small temperature changes. This provides rate and trend information at a glance. The third feature is the indicator's Ice Zone warning light. This light will come on when the OAT drops to 10°C (50°F) and stays above -10°C (14°F).

NOTE

The OAT indicator resolves outside air temperatures to 1°C (33 °F) and is very sensitive to air temperature changes. For this reason, when the OAT probe is in still air and near a heat source, such as hot asphalt or a hangar heater the unit will read the actual temperature to which the probe is subjected. When the engine starts and there is a flow over the probe, the unit will read the air temperature accurately and display changes quickly.

CLOCK

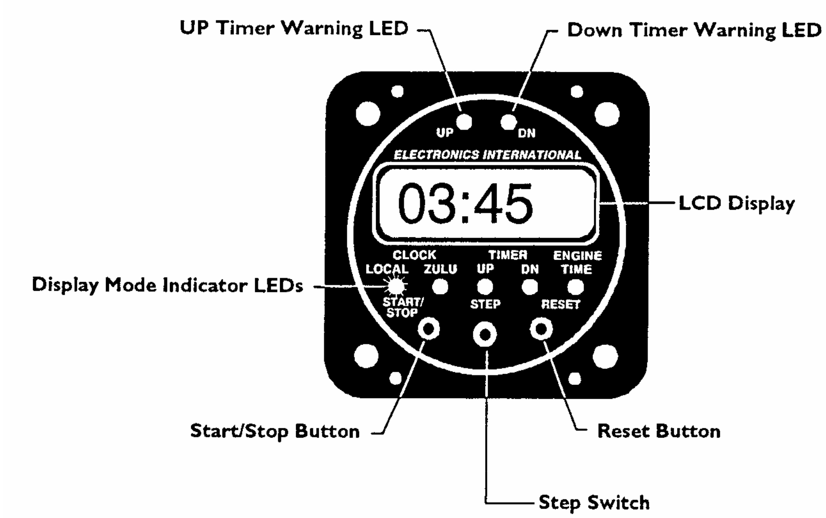


Figure 7-4, Clock

An Electronics International SC-5 clock, as shown in Figure 7-4 is fitted in the airplane. The clock uses a clock IC incorporating a 10 year lithium battery.

The clock has the following five display modes:

LOCAL Clock – In this mode the clock will display local time. The local clock may be programmed to display in a 12 or 24 hour format.

ZULU Clock – In this mode the clock will display zulu time.

UP Timer – In this mode the clock will display the UP timer. This timer counts up and starts automatically when the airplane's MASTER switch is turned on. Also a pilot programmable recurring alarm may be set to alert the pilot at appropriate time intervals. Example: If the alarm is set for 30 minutes, an alarm will activate at 30 minutes, 60 minutes, 90 minutes, etc. This alarm can be used to remind the pilot to check fuel levels, course, position or instruments at set time intervals. The yellow warning LED marked UP over the digital display will blink when the programmed time interval is reached. The START/STOP and RESET buttons control this timer.

DN Timer – In this mode the clock will display the DN timer. This timer counts down when running and the start time may be set. When the timer reaches 0:00, the yellow warning LED marked DN over the digital display will blink. The START/STOP and RESET buttons control this timer.

ENGINE TIME – In this mode the clock records the total time the generator is on line. An "/Hr" will be displayed in the upper right corner of the LCD indicating that the time is displayed in hours. The "/Hr" will blink when the clock is recording time. Push and hold the RESET button to display tenths and hundredths of an hour on the timer. This timer cannot be reset.

OPERATING FEATURES AND DISPLAY MODES

During night operation the green LED display mode indicators may be too bright. If so, use the airplane instrument light control to adjust the lighting. The two yellow warning LEDs are always will be displayed at full intensity.

UP TIMER WARNING LED

The UP timer warning LED located over the digital display blinks when the UP timer reaches the pilot programmed recurring alarm setting or a multiple of this setting. Example: If the alarm is set for 30 minutes, an alarm will activate at 30 minutes, 60 minutes, 90 minutes, etc. Push any button or switch on the clock to stop the blinking and turn off the UP timer warning LED. The UP timer display mode section explains more about the operation of this alarm.

DN TIMER WARNING LED

The DN timer warning LED located over the digital display blinks when the DN timer reaches 0:00. Push any button or switch on the clock to stop the blinking and turn off the DN timer warning LED. The DN timer display mode section explains more about the operation of this alarm.

POWER-UP

When the airplane MASTER Switch is turned on, the clock will perform a self-diagnostics test, display "88:88" and flash the yellow warning LEDs. This allows a check of the timer warning LEDs and the LCD display for proper operation.

"LOCAL" CLOCK DISPLAY MODE

By pushing the STEP switch to the right or left, the pilot can select the various display modes. In the LOCAL clock mode, the clock will display local time. In this mode it is possible to set the LOCAL clock to display in a 12 or 24 hour format. In the LOCAL clock display mode an "/Hr" will appear in the upper right corner of the display indicating the display is shown in hours and minutes. Also an "L" will appear in the lower right of the display indicating the LOCAL clock display mode. To set the LOCAL clock see the power-up programming section. To set the format of the LOCAL clock, perform the following steps:

A. Select the LOCAL clock display mode.

B. Momentarily push both the START/STOP and RESET buttons at the same time. The display will show “12:F” or “24:F”.

C. To toggle the display between “12:F” and “24:F” push the STEP switch to left or right.

D. To exit this programming mode momentarily push both the START/STOP and RESET buttons at the same time.

ZULU CLOCK DISPLAY MODE

Pushing the STEP switch to the right or left selectsthe various display modes. In the ZULU clock mode the CLOCK will display Zulu time. In this mode “/hr” will appear in the upper right corner of the display indicating that the display is shown in hours and minutes. To set the ZULU clock see the power-up programming section.

UP TIMER DISPLAY MODE

Pushing the STEP switch to the right or left will select the various display modes. In the UP timer mode the clock displays the current time on the UP timer. Push the RESET button to stop the timer and reset the time to 0:00. Push the START/STOP button to toggle the start and stop of this timer. The UP time will start automatically when the airplane MASTER switch is turned ON. In this mode the UP time acts as an automatic timer. The UP timer has a pilot programmable recurring alarm. This alarm may be set from 0:00 to 99:59 (minutes: seconds). If the time on the UP timer reaches the recurring alarm setting the yellow UP timer warning LED will blink. Pushing any button on the clock will stop the blinking LED without starting, stopping or resetting the timer. This alarm will reoccur at multiple intervals of the recurring alarm setting. Example: For a setting of 30 minutes, an alarm will activate at 30 minutes, 60 minutes, 90 minutes, etc. This alarm can be used as a reminder to check fuel levels, flight plan, instruments, etc at regular intervals during the flight.

When the UP timer reaches 59 minutes and 59 seconds the display will switch from minutes and second to hours and minutes and an “/Hr” will appear in the upper right corner of the display. An “/Hr” in the display indicates the reading is in hours and minutes; otherwise it is in minutes and seconds.

To programme the recurring alarm perform the following steps while in the UP timer display mode:

A. Momentarily push both the START/STOP and RESET buttons at the same time. The far left digit will blink.

B Select the digit to be programmed – Only the digit that is blinking can be changed. Push the START/STOP button to blink the next digit to the left and push the RESET button to blink the next digit to the right.

C Increase or decrease a blinking digit – Move the STEP switch to the right to increase the blinking digit by one. Move the STEP switch to the left to decrease the blinking digit by one.

D To exit – To exit the UP timer programming mode momentarily push both the START/STOP and RESET buttons at the same time.

DN TIMER DISPLAY MODE

Pushing the STEP switch to the right or left will select the various display modes. In the DN timer display mode the clock displays the current time on the DN timer. Push the RESET button to stop the timer and reset the time to the programmed start time. Push the START/STOP button to toggle the start and stop of this timer.

The DN timer has a pilot programmable start time. The start time may be set from 0:00 to 99:59 (minutes: seconds). For the time set over 59 minutes and 59 seconds the down timer will display in hours and minutes and an "/Hr" will appear in the upper right corner of the display. An "/Hr" in the display indicates the reading is in hours and minutes; otherwise it is in minutes and seconds.

If the time on the DN timer reaches 0:00 the yellow DN timer warning LED will blink. Pushing any button on the clock stops the blinking LED without starting, stopping or resetting the timer.

To programme the start time perform the following steps while in the DN timer display mode:

A. Momentarily push both the START/STOP and RESET buttons at the same time. The far left digit will blink.

B Select the digit to be programmed – Only the digit that is blinking can be changed. Push the START/STOP button to blink the next digit to the left and push the RESET button to blink the next digit to the right.

C Increase or decrease a blinking digit – Move the STEP switch to the right to increase the blinking digit by one. Move the STEP switch to the left to decrease the blinking digit by one.

D To exit – To exit the DN timer programming mode momentarily push both the START/STOP and RESET buttons at the same time.

ENGINE TIME DISPLAY MODE

Pushing the STEP switch to the right or left will select the various display modes. In the ENGINE TIME display mode, the clock displays the total time the generator has been on line. Push and hold the RESET button to display the tenths and hundredths of an hour. The displayed time cannot be reset.

In the ENGINE TIME display mode an "/Hr" will appear in the upper right corner of the display indicating that the display is shown in hours. When the engine timer is running the "/Hr" in the display will blink. The timer will run when the bus voltage is above 13 V for a 12 V system or 26 V for a 24 V system.

POWER-UP PROGRAMMING

During power-up it is possible to enter the power-up programming mode. In this mode the pilot can set the Local and Zulu clock time. To enter the Power-up Programming mode perform the following steps:

A. With the airplane power OFF push and hold both the START/STOP and RESET buttons and turn the airplane power ON. The far left hour's digits will blink. An "L" appears in the lower right corner of the display indicating the Local clock. The Local and Zulu clocks are always set in a 24-hour format.

B. Select the digit to be programmed – Only the digit that is blinking can be changed. Push the START/STOP button to blink the next digit to the left and push the RESET button to blink the next digit to the right.

C. Increase or decrease a blinking digit – Move the STEP switch to the right to increase the blinking digit by one. Move the STEP switch to the left to decrease the blinking digit by one.

D. Change functions (Local to Zulu) – To display and set the Zulu time push the RESET button until the "L" in the lower right corner disappears. Use the STEP switch to increase or decrease a blinking digit. To go back to programming the Local time continue to push the START/STOP button until the "L" in the lower right corner of the display appears.

To display and set the minutes lock configuration push the RESET button until a "Loc" or "ULoc" is in the display. Use the STEP switch to toggle the display between "Loc" and "ULoc". The "Loc" indicates the Zulu and Local minutes will be locked together (i.e. the Zulu and Local minutes will always read the same. If one is changed, the other will automatically change also. If the airplane is operated only in one hour time zones, set the display to "Loc". In this configuration when the Local time is set to a standard the Zulu time minutes will automatically be set to the correct time. If the airplane is operated in half hour time zones, set the display to "ULoc". In this configuration the Local and Zulu time work independently of each other.

To go back to programming the Zulu time or Local time, continue to push the START/STOP button until the appropriate display is shown.

To exit the power-up programming mode momentarily push both the START/STOP and RESET buttons at the same time.

7.6 GROUND CONTROL

Ground control is achieved using the rudder pedals which are connected to the nose wheel. Moving the rudder pedals left and right will turn the nose wheel in the natural sense. The turn radius can be reduced with the application of toe brakes in the direction of turn with full rudder pedal applied.

CAUTION

Excessive use of the brakes will cause overheating of the brakes and wheels resulting in premature wear.

7.7 WING FLAPS

The single slotted flaps, which span the centre wing either side of the fuselage are electrically operated and driven. The flaps are extended and retracted by positioning the flap control lever located in the centre pedestal to the appropriate flap selection position. An indicator located in the centre of the instrument panel indicates the flap position. The first flap detent enables selection at $20^0 \pm 1^0$ and with the flap lever fully down 40^0 of deflection is achieved.

The flaps electrical system is protected by a circuit breaker labelled ‘FLAPS” located in the right hand circuit breaker panel.

A red warning light marked FLAP FAULT will illuminate in the annunicator panel when the electrical power supply to the flaps fails.

There is a micro switch in the flap system to detect any flap asymmetry situation. The micro switch will disconnect power from the flap system to prevent flap asymmetry in the event of a mechanical failure in the flap system.

7.8 LANDING GEAR

The fixed tricycle landing gear comprises two main assemblies attached to the centre wing and a steerable nose assembly attached to the firewall. A shimmy damper is fitted to the nose undercarriage. All units incorporate an oleo pneumatic shock strut. Brakes are fitted to the main assemblies only.

MAIN LANDING GEAR

The main landing gear comprises left and right gear assemblies employing conventional type shock struts which are attached to heavy duty castings forming part of the centre wing structure at the intermediate rib positions.

The strut charging valves pass through the upper skin panels and are accessible from the top of the wing.

Shock strut cylinders are divided into two chambers, the lower chamber in which the piston operates is separated from the upper chamber by a baffle with a metered orifice to control the fluid displaced by the piston movement thus providing the damping effect.

A detachable bearing with inner and outer 'O' ring seals and a scraper ring is located in the base of the lower chamber to act as a guide and provide external sealing for the piston. The scraper ring protects the piston seal from damage that could be caused by foreign material adhering to the exposed portion of the piston.

Steel sockets at the lower end of the pistons provide attachment for the wheel axles and brake anchor plates. The lower arms of the torque links are bolted by brackets to the sockets whilst the upper arms are attached to alloy lugs at the base of the cylinders.

A nylon bumper pad is set into each of the upper arms to contact the pistons and limit their extension when the wheels are clear of the ground.

NOSE LANDING GEAR

The nose landing gear is located between two reinforcing angles on the forward face of the firewall. The shock strut cylinder is longer and is not interchangeable with the main gear shock strut.

The steerable nose wheel is actuated by a steering post and mechanical linkage attached to the piston.

With weight on the nose wheel the linkage assumes a geometric configuration through which direct control of the nose wheel is achieved by rotating the steering post by means of pushrods connecting to the rudder pedals. When weight is removed, as in flight, the linkage extends disengaging the steering, locking the wheel aligned fore and aft freeing the rudder pedal for control of the rudder only.

Bolted to an alloy socket at the base of the piston are the nose wheel fork and the lower portion of the steering linkage, the upper portion of the linkage connects to the steering post which in turn is supported at its lower end to the shock strut cylinder in a trunnion type bearing. The top of the steering post is located in a bearing attached to the rear face of the firewall. A nylon bumper pad is set in the lower portion of the linkage to limit the extension of the piston when the wheel is clear of the ground. In addition as a safety feature in the event of a linkage failure, two cables are connected between the cylinder and the nose wheel fork to prevent the nose wheel separating from the airplane.

WHEEL BRAKES

Brakes fitted to the main gear are hydraulically operated by applying toe pressure to the brake pedals incorporated in the top portion of the rudder pedal assembly. Rotation of either pedal actuates a master brake cylinder resulting in braking action to the disc brake unit on the corresponding wheel. Differential or simultaneous braking action can be achieved as desired.

PARKING BRAKE

A parking brake control knob is located in the pedestal in the centre of the cockpit. The parking brake is set by simultaneously depressing both brake pedals, pulling and holding out the park brake knob, then releasing the brake pedals and finally releasing the park brake knob. The parking brake is released by depressing both toe brake pedals and pushing the parking brake control knob fully in.

7.9 CARGO COMPARTMENT

The baggage/cargo compartment extends from the area immediately behind the pilot and front passenger seats to the rear bulkhead aft of the cargo door. The baggage/cargo compartment floor has provision for passenger seat pick-ups and cargo tie down points. There are three windows on each side of the baggage/cargo compartment. Access to the baggage/cargo compartment is via the entry door on the left hand side of the fuselage behind the trailing edge of the wing.

WARNING

Hazardous material is not to be carried in the airplane. Refer to the relevant regulatory authority for specific rules and regulations.

WARNING

The cargo compartment must be loaded in a manner to ensure the weight and CG limits are not exceeded. Refer to Section 2 for the weight and CG limits and Section 6 for weight and balance details.

7.10 SEATS, SEAT BELTS AND HARNESSES

PILOT AND FRONT PASSENGER SEATS

The pilot and front passenger seat may be moved fore and aft. Moving the seat fore and aft is accomplished by pulling the levers located on the left and right hand side at the rear of the seat fully up to remove the locating pins from the seat slide rail. Move the seat forward or backwards to the desired position while holding the levers fully up. When the desired position is reached release the two levers and gently slide the seat backwards or forwards to allow the locating pins to engage in the nearest hole.

WARNING

The seat is not locked in position unless the locking pin is fully engaged. This can be checked by ensuring the adjusting levers are fully depressed and that fore and aft movement of the seat is not possible.

SEAT BELTS AND HARNESSES

The pilot and front passenger seats are equipped with lap seat belts and shoulder harnesses which are mounted directly on to the seat. The shoulder harness is fitted to an inertia reel unit.

There is a quick release box located on one of the lap seat belts. The other lap seat belt and shoulder harness strap locating lugs locate into the quick release box. To release the lap seat belt and shoulder harness lugs rotate the quick release box in either direction as depicted on the quick release box.

WARNING

Serious or fatal injury could result if the seat belts and shoulder harness are not used correctly.

7.11 DOORS, WINDOWS AND EXITS

PASSENGER/CARGO DOOR

The passenger/cargo door is located on the left hand side of the fuselage behind the wing trailing edge. The door is approximately 48” x 41” and is fabricated from aluminium alloy interlocking panels. The door may be locked, unlocked, opened and closed from both inside and outside. From the outside the door is unlocked by rotating the locking handle on the fuselage adjacent to the door counter clockwise. From the inside the door is unlocked by rotating the handle clockwise. Rotating the handle removes a locating pin at the top of the door allowing the door to slide. The door opens upwards on two tracks. Latches hold the door in the closed position flush with the fuselage skin. A red warning light marked DOOR UNSAFE will illuminate on the annunciator panel when the door is unlocked. Refer to Section 3 Emergency Procedures for actions in the event of inadvertent door opening in flight. To close and lock the door from the outside slide the door closed and rotate the handle clockwise. To lock the door from the inside rotate the locking handle counter clockwise. Ensure the DOOR UNSAFE annunciator light is extinguished.

NOTE

Careful attention is required to ensure the door is closed and locked.

CREW ENTRY DOORS

The airplane is fitted with two gull wing crew entry doors adjacent to the pilot and front passenger seats. These doors are also emergency exit doors. The doors open upwards with assistance of gas filled struts. Both doors pivot on bearing blocks attached to the cockpit closure.

To doors can be opened, closed, locked and unlocked from inside and outside the airplane. To unlock the door from the outside pull and hold the knob above the handle and rotate the lever downwards. To unlock the door from inside push the knob behind the handle and rotate the handle towards the pilot's seat. To lock the door from the outside close the door and rotate the handle backwards and ensure the knob engages. To lock the door from the inside close the door and rotate the handle forwards towards the instrument panel and ensure the button engages. Refer to Section 3 Emergency Procedures for actions in the event of inadvertent door opening in flight.

CAUTION

Crew entry doors must be closed and locked for flight.

WINDSCREEN

Two blow formed acrylic windscreens are attached to the centre pillar and cockpit composite structure by adhesive and locating screws.

FUSELAGE WINDOWS

Windows are mounted in the crew entry doors and there are three windows on each side of the baggage/cargo compartment. All are made from acrylic sheet attached to the structure by adhesive and locating screws.

7.12 CONTROL LOCK

A control lock capability is provided. The control column lock fits to the left hand control column and lower switch panel and when in place it covers the airplane MASTER switch preventing airplane operation. The control lock is removed and stowed when not in use.

WARNING

Airplane operation should not be attempted with the control lock fitted to the control column.

7.13 ENGINE

GENERAL DESCRIPTION

The airplane is powered by a Pratt & Whitney Canada PT6A-34 750 shaft horsepower free turbine engine, utilizing two independent turbine sections: one driving the compressor in the gas generator section and the second driving the propeller shaft through a reduction gear-box. Refer to Figure 7-5 for engine component layout.

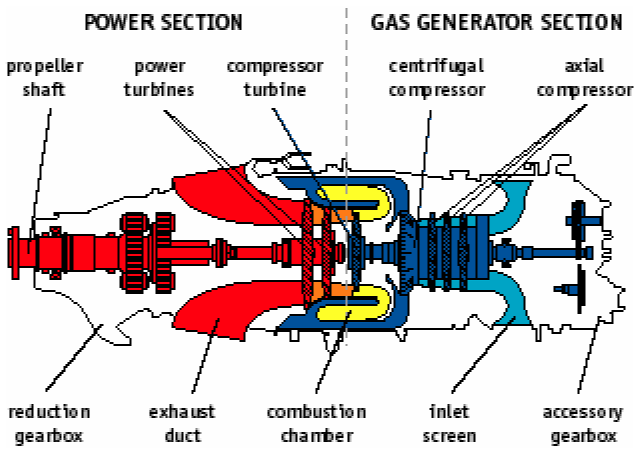


Figure 7-5, Engine Schematic

The air enters the engine through the inlet screen; it is then compressed by a multi-stage compressor and fed to the combustion chamber where it is mixed with fuel and ignited. The hot gas expands through two turbine stages; the first drives the compressor and the accessories; the second, mechanically independent from the first, drives the propeller shaft by means of a reduction gearbox. Finally, the hot gas is discharged through the exhaust ducts.

The engine is self sufficient since the gas generator driven oil system provides lubrication for all areas of the engine, pressure for the torquemeter and power for the propeller pitch control.

Three isolators or shock mounts attach the engine to a tubular steel engine mount assembly which is bolted to the firewall.

The engine is enclosed by detachable upper and lower cowls which are cut-away on the joint line (both sides) to provide clearance for the exhausts. The upper cowl has a panel which provides access to the oil dipstick and filler. The lower cowl contains an engine air intake and inertial separator at the front of the cowl and NACA ducts for the oil cooler (right hand side rear), ambient air supply to cockpit (ducts left and right forward of the exhaust pipes) and for accessories cooling (left hand side behind exhaust pipe). The cowl halves are held together by 8 lever cowl fasteners.

Vents and drains for components of the engine are provided by pipes and hoses routed overboard from the engine compartment. The 6 pipes are located on the firewall behind the nose wheel.

There are no specific break in procedures for the engine. The performance, reliability and length of life of the engine are dependent on the care and attention given to the engine during operations and maintenance. All engine limitations and operating procedures should be followed and maintenance carried out in accordance with the engine manufacturer's procedures.

ENGINE OPERATION DESCRIPTION

Inlet air enters the engine through an annular plenum chamber, formed by the compressor inlet case, where it is directed forward to the compressor. The compressor comprises three axial stages combined with a single centrifugal stage, assembled as an integral unit.

A row of stator vanes, located between each stage of compression, diffuses the air, raises its static pressure and directs it to the next stage of compression. The compressed air passes through diffuser tubes which turn the air through ninety degrees in direction and convert velocity to static pressure. The diffused air then passes through straightening vanes to the annulus surrounding the combustion chamber liner.

The combustion chamber liner comprises an annular weldment having perforations of various sizes that allow entry of compressor delivery air. The flow of air changes direction through 180 degrees as it enters and mixes with fuel. The fuel / air mixture is ignited and the resultant expanding gases are directed to the turbines. The location of the liner eliminates the need for a long shaft between the compressor and the compressor turbine, thus reducing the overall length and weight of the engine.

Fuel is injected into the combustion chamber liner through fourteen simplex nozzles arranged in two sets of seven for ease of starting and supplied by a dual manifold comprising primary and secondary transfer tubes and adapters. The fuel / air mixture is ignited by two glow plugs or spark igniters which protrude into the liner. The resultant gases expand from the liner, reverse direction in the exit duct zone and pass through the compressor turbine inlet guide vanes to the compressor turbine. The guide vanes ensure that the expanding gases flow on to the turbine blades at the correct angle, with the minimum loss of energy. The still expanding gases are then directed forward to drive the power turbine.

Refer to Section 3 Emergency Procedures in the event of engine malfunctions.

ENGINE FUEL SYSTEM

DESCRIPTION

The engine fuel system comprises those components that deliver and control metered fuel to the engine combustion chamber with compensation for changes in ambient temperature, compressor discharge pressure and gas generator rpm.

The engine fuel system comprises an oil-to-fuel heater, fuel pump, fuel control unit, flow divider and dump valve, a dual fuel manifold with 14 simplex nozzles, fuel drain valves and interconnecting pneumatic sense lines.

An environmental fuel container is mounted on the firewall and collects fuel drained from the compressor and combustion sections. A valve in the bottom of the container allows the container to be emptied. If the container is not emptied an overflow pipe allows fuel to drain on to the ground.

NOTE

The environmental fuel container should be emptied on a regular basis to prevent fuel draining on to the ground.

OPERATION

In normal operation fuel from the airplane tanks is drawn to the oil-to-fuel heater by the engine driven fuel pump. Heated fuel then flows to the engine driven fuel pump. The fuel pump delivers high pressure fuel to the fuel control unit. The fuel control unit determines the correct fuel schedule for engine steady state operation and acceleration and returns the unused fuel to the pump inlet. Metered fuel exiting the fuel control unit flows to the flow divider which supplies the metered fuel to the primary and secondary manifolds as required. Fuel is then atomized by the 14 simplex nozzles.

ENGINE FUEL SYSTEM COMPONENTS

The following paragraphs describe the details of the major engine fuel system components:

OIL-TO FUEL-HEATER

The oil-to-fuel heater, mounted at the top of the accessory gearbox at the rear of the engine is a heat exchanger which utilises heat from the engine lubricating oil system to preheat the fuel in the fuel system to prevent ice crystal formation. A thermal element reacts to fuel temperature and moves a sliding valve to control the amount of oil flowing into the heat exchanger.

Cold fuel from the airplane fuel system enters the fuel heater and surrounds the thermal element. The thermostatic element contracts and allows oil to travel across the heat exchanger. Heat from the oil transfers to the fuel and fuel temperature starts to rise. At 21^0C (69.8^0F) the thermal element begins to expand and push the sliding valve out. In this position, oil progressively bypasses the fuel heater and fuel temperature begins to stabilise. A spring located at the back of the sliding valve returns it back in (heating position) when fuel temperature drops. During operation, the thermal element constantly reacts to maintain the fuel outlet temperature.

FUEL PUMP

The engine driven fuel pump is a positive displacement gear-type pump, mounted on a pad at the 2 o'clock position on the rear face of the accessory gearbox. The pump provides clean high pressure fuel to the fuel control unit.

Fuel coming from the fuel heater enters the pump housing and passes through the wire mesh screen inlet filter, then through the pump gears. Fuel is filtered a second time through a fibre type outlet filter before being delivered to the fuel control unit via an external flexible hose. The majority of the fuel delivered by the fuel pump towards the fuel control unit is returned back to the pump inlet via an internal cored bypass passage.

FUEL CONTROL UNIT

The fuel control unit determines the correct fuel schedule for engine steady state operation and acceleration and returns the unused fuel to the pump inlet.

The fuel control unit has a number of individual parts which are described in the following paragraphs and are shown on Figure 7-6.

HIGH PRESSURE RELIEF VALVE. The high pressure relief valve protects the system from over pressure by dumping excess fuel pressure to the pump inlet.

BYPASS VALVE. The bypass valve regulates the pressure differential (delta P) between pump delivery fuel (P1) and metered fuel (P2) across the ports of the metering valve by returning excess fuel (P0) back to the pump inlet. It comprises a steel plunger moving within a ported steel sleeve. Actuated and supported by means of a diaphragm and spring, it maintains a constant delta P.

METERING VALVE. The fuel flow metering valve regulates engine fuel burn over a wide range of settings. It travels between a minimum and maximum flow stop. It comprises a steel needle moving within a ported steel sleeve. The position is controlled by pneumatic bellows via a torque tube.

GOVERNOR BELLOWS. The governor bellows initiate acceleration, deceleration and controls Ng steady state. They are moved by modified P3 air pressure, called Px and Py. To increase Ng, Py is increased. To reduce Ng, Py is reduced.

ACCELERATION (EVACUATED) BELLOWS. The acceleration bellows are moved by modified P3 air pressure (Px). They are attached to the fuel control unit housing while the rest of the bellows assembly is allowed to move up and down depending on Px and Py pressure and torque tube spring loading. The acceleration bellows control acceleration and deceleration rates in response to Px air variations following changes in Ng.

GOVERNOR LEVER. The governor lever controls Py bleed off to actuate the governor bellows.

NG GOVERNOR. The Ng governor controls Ng as a function of the power lever angle. Driven by the accessory gearbox via the fuel pump, the Ng governor flyweights rotate at a speed proportional to compressor speed. The cockpit power lever is linked to the speed-scheduling cam located inside the governor section of the fuel control unit. Movement of the power lever from idle to a higher position increases the tension on the spring and closes the governor bleed to prevent Py from venting to atmosphere. The centrifugal governor flyweights apply a force in the opposite direction to reopen the Py bleed.

INTERCONNECTING COUPLING. The plastic coupling connects the fuel pump drives to the fuel control unit. It drives the Ng governor.

SPEED SCHEDULING CAM. The speed scheduling cam is connected to the power lever and it moves the cam follower lever.

CAM FOLLOWER LEVER. The cam follower lever is contacted by either the idle screw or the Ng scheduling cam, it applies a spring tension to close the governor lever Py bleed.

TORQUE TUBE. The torque tube transmits the movement of the bellows to the metering valve. The torque tube is torsion loaded towards minimum flow. The bellows are spring loaded towards maximum flow. These tensions will cancel each other; therefore, a very small change in air pressure is able to move the metering valve to the proper setting. It comprises two arms connected together by a coaxial shaft. The inner part of the shaft transmits movements from the bellows to the metering valve and outer bellow shaft exerts a torsion force.

The fuel control unit operates in the starting, acceleration, governing, deceleration and shutdown modes of operation as described in the following paragraphs.

STARTING. At start, the fuel flow is determined by the engine driven fuel pump rpm and minimum position of the metering valve. The compressor is rotated by the starter until a minimum Ng of 12% is obtained for introducing fuel. Fuel is introduced by moving the fuel condition lever to the GROUND IDLE position. As the engine accelerates towards idle, compressor delivery pressure begins to move the metering valve away from the minimum stop. As Ng approaches idle, the governor spring forces and opens the governor orifice. This creates a Py-Px differential, which causes the metering valve to move to a floating position to maintain the required Ng idle speed.

ACCELERATION. As the power lever is advanced above idle, the speed-scheduling cam is repositioned, moving the cam follower lever to increase the governor spring force. The governor spring then overcomes the flyweights and moves the levers, closing the governor valve. Py increases and causes the governor bellows to compress, moving the metering valve towards an increasing fuel flow position. As Ng increases, the acceleration bellows progressively compress and move the metering valve to a more open position. Acceleration is then a function of increasing Px (P3). It is completed when the centrifugal force of the flyweights overcomes the spring tension and opens the governor valve.

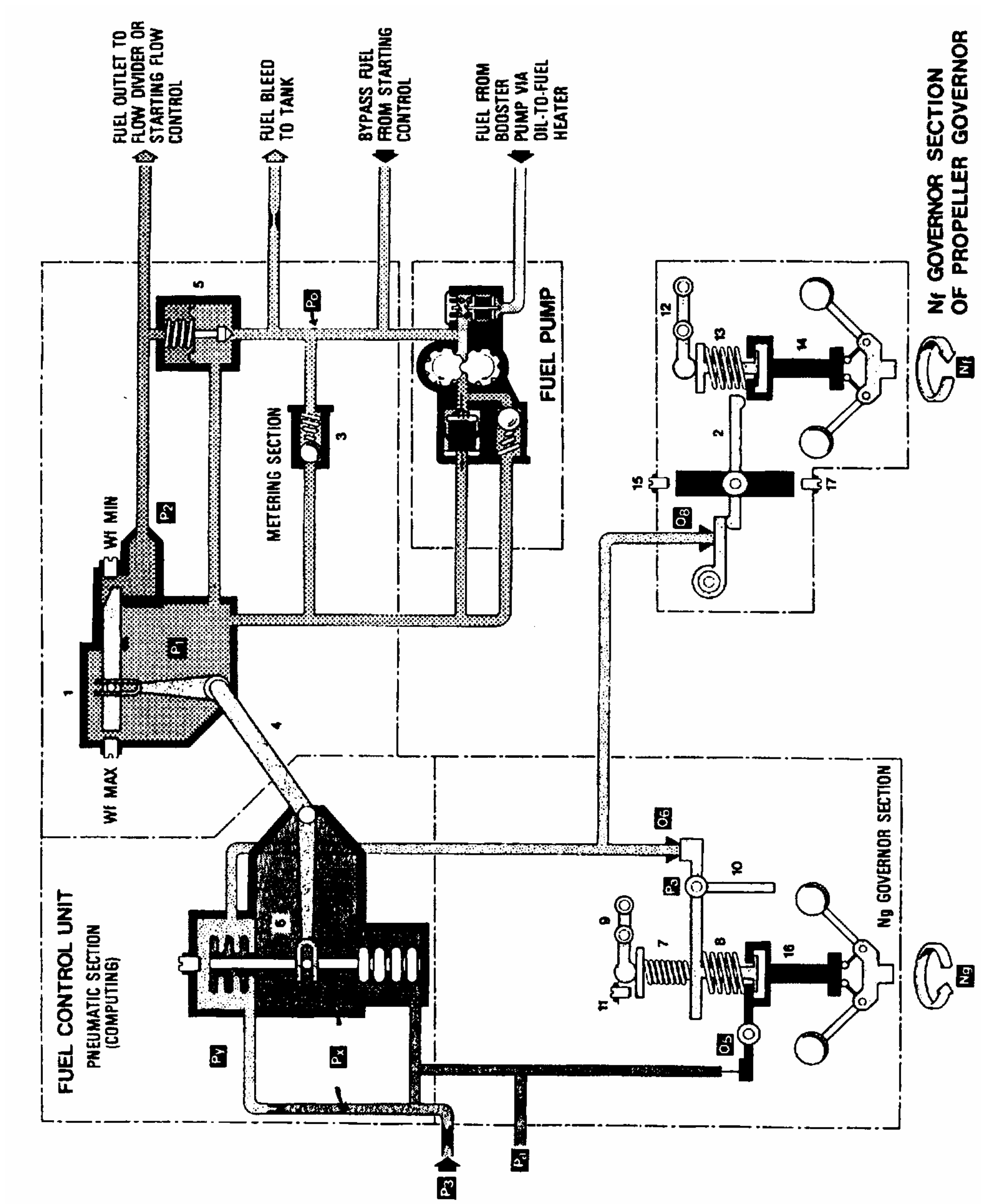
GOVERNING. Once the acceleration cycle has been completed, any variation in engine speed from the selected speed will be sensed by the governor flyweights and will result in increased or decreased centrifugal force. This change in force will cause the governor valve to either open or close, which will then be reflected by the change in fuel flow necessary to re-establish the proper speed. When the fuel control unit is governing, the valve will be maintained in regulating or floating position.

DECELERATION. When the power lever is pulled back, the speed scheduling lever is rotated to a lower point on the cam. This reduces the governor spring force and causes the governor valve to open. The resulting drop in Py moves the metering valve in the closing direction. As Ng and P3 decrease, the acceleration bellows now expand and progressively move the metering valve to a more closed position until it contacts the minimum flow stop. The engine will continue to decelerate until the governor weight force decreases to balance at the new governing position.

ENGINE SHUTDOWN. The engine is stopped by moving the fuel condition lever from the GROUND IDLE position to the CUT OFF position. This equalises pressure on both sides of the minimum pressuring valve and its spring causes it to close, cutting flow to the flow divider.

ALTITUDE COMPENSATION. The compressor surge (stall) margin reduces as altitude increases. Therefore, the acceleration fuel flow must be reduced at altitude to prevent surging. This is achieved by the acceleration bellows. As Px (P3) is a function of engine speed and air density, the pressure will then react by expanding more, reducing fuel flow during acceleration.

Figure 7-6, Fuel Control Unit



LEGEND

1.	Fuel Metering Valve	12.	Speed Set Lever	P_o	Bypass Fuel
2.	Yoked Bellcrank	13.	Speeder Spring	P_x	Enrichment Fuel
3.	High Pressure Relief Valve	14.	Platform	P_y	Governing Pressure
4.	Torque Tube Assembly	15.	Overspeed Adjust	O_5	Enrichment Orifice
5.	Bypass Valve	16.	Compressor Turbine Governing Platform	O_6	Governing Orifice
6.	Rod			O_8	Propeller Governor Nf Section Orifice
7.	Governing Spring	17.	Underspeed Spring		
8.	Enrichment Spring	P_a	Ambient Air		
9.	Speed Set Lever	P_1	Unmetered Fuel		
10.	Link	P_2	Metered Fuel		
11.	Idle Speed Adjust	P_3	Compressor Discharge Air		

FLOW DIVIDER AND DUMP VALVE

The flow divider and dump valve assembly is mounted on the fuel inlet manifold adaptor located at the six o'clock position on the gas generator case.

The flow divider and dump valve divides the fuel flow from the fuel control unit between the primary and secondary fuel manifolds during engine start and operation, and dumps residual fuel from the manifolds at engine shutdown.

During engine start, when the fuel condition lever is moved to GROUND IDLE metered fuel enters the flow divider and pushes against the spring loaded primary valve piston and allows fuel to flow in the primary manifold only, to provide optimum fuel atomisation and lightup characteristics. As Ng speed approaches 35%, fuel pressure increases and the secondary valve also moves against the stop, fuel will then flow to all 14 nozzles. All nozzles are operative at idle and above.

When the fuel condition lever is moved to the CUT OFF position, fuel pressure ends and the two springs push the primary and secondary valves towards the closed position, allowing fuel to drain by gravity into the environmental collector tank mounted on the firewall in the seven o'clock position. This prevents deposit formation in the manifolds and fuel nozzles.

FUEL MANIFOLD AND NOZZLES

The dual fuel manifold delivers metered fuel from the flow divider to the primary and secondary fuel nozzles. The manifold comprises 14 adaptor assemblies (10 primary and 4 secondary). The adaptors are interconnected by pairs of fuel transfer tubes and are each secured to their respective bosses on the gas generator.

Each fuel manifold adaptor incorporates a simplex, single orifice fuel nozzle, with swirl-type tip and sheath. The swirl-type tips provide a fine atomised fuel spray in the annual combustion chamber liner. They are positioned so that they produce a tangential spray from one nozzle to the next in the liner. Holes in the sheath allow cooling air, from the space between the gas generator case and liner, to pass within the sheath and out through the nozzle aperture; this air, in addition to cooling the tip of the nozzle, also assists in fuel atomisation.

ENGINE LUBRICATION SYSTEM

GENERAL DESCRIPTION

The engine lubrication system comprises an oil pump, integrally formed oil tank with the filler cap incorporating a dipstick, ports for the temperature and pressure sensing probes, an oil filter, chip detector and warning system, together with an airframe mounted oil cooler. Refer to Figure 7-7 for engine lubrication system schematic.

The lubrication system provides a constant supply of clean oil to the engine bearings, reduction gears, accessory drives, torquemeter and propeller governor. The oil tank is integrated in the engine air inlet casing. The oil lubricates and cools the bearings and carries extraneous matter to the oil filter where it is precluded from further circulation. The oil is also an anti corrosion agent for the steel bearings and gears. A chip detector is located in the reduction gearbox to detect metal particles and warn of metal contamination.

To avoid overfilling of oil tank, and high oil consumption, an oil level check is recommended within 10 to 20 minutes of engine shutdown. Graduations on the dipstick indicate the oil level in U.S. quarts below maximum capacity of the oil tank.

The system comprises a pressure system, scavenge system, and a breather system.

PRESSURE OIL SYSTEM

Oil is drawn from the oil tank and pumped through a gear type pump and is then delivered to the oil filter. At the filter outlet oil separates into several paths.

The Number 1 bearing and accessory input drives are lubricated with pressure oil directed through cored passages and transfer tubes.

A single tube located at the bottom right hand side of the engine delivers oil to lubricate the Number 2,3 and 4 bearings, the reduction gearbox, front accessories and supply the propeller system.

SCAVENGE OIL SYSTEM

The scavenge oil system returns used oil back to the tank. It comprises two oil sumps, one in the accessory gearbox, and one in the reduction gearbox. The sumps allow the oil to be collected and de-aerated before it returns to the tank.

Four gear type pumps assembled in two double elements form the scavenge system. Two pumps are located inside the accessory gearbox, the other two are mounted externally at the left rear side of the accessory gearbox.

Number 1 bearing scavenges into the secondary gearbox by gravity. Number 2 bearing scavenges through an external tube mounted underneath the engine. At high power a relief valve mounted at the Number 2 bearing scavenge pump inlet allows air/oil from the bearing cavity to bleed into the accessory gearbox, preventing flooding of the Number 2 bearing cavity.

Number 3 and 4 bearing area scavenges into the accessory gearbox via a scavenge tube mounted on the left hand side of the engine. Oil is scavenged by one of the pumps located at the rear of the accessory gearbox.

The reduction gearbox and the propeller system oil scavenge through an external tube located along the Number 3 and 4 bearing scavenge tube. The oil is pumped by the externally mounted scavenge pump and goes directly to the airframe oil cooler.

Oil from the accessory gearbox sump (from Numbers,1,2,3 and 4 bearings) is returned to the oil cooler by a scavenge pump located at the bottom of the accessory gearbox.

BREATHER SYSTEM

Breather air from the engine bearing compartments and from the accessory and reduction gearboxes is vented overboard via the centrifugal breather installed in the accessory gearbox and the drain pipe adjacent to the nose wheel.

The Number 1 bearing compartment vents rearward into the accessory gearbox and the Number 2 bearing compartment is vented via the scavenge oil transfer tube. A by-pass valve, immediately upstream of the front element of the internal scavenge pump, allows oil and air to be vented into the accessory gearbox under certain transient operating conditions to prevent over pressurising the Number 2 bearing area. Under normal operating conditions, the valve is closed to prevent oil flooding back into the tube assembly. The Number 3 and 4 bearing compartments and the reduction gearbox areas are vented to the accessory gearbox and oil tank respectively through their scavenge oil lines. The oil tank is vented to the accessory gearbox through the anti-flooding arrangement installed in the oil tank.

OIL PUMP

Pressure oil is circulated from the engine's integral oil tank through the engine lubricating system by a self contained gear type pump mounted at the bottom of the oil tank. The oil pump comprises two gears contained in a cast housing bolted to the front of the accessory gearbox diaphragm. The pump gears are driven by an accessory gear-shaft which also drives the internal scavenge pump. A removable inlet screen is fitted at the oil pump. The pump housing incorporates a support boss at the pump for the oil filter housing, and is counterbored to accommodate the check valve which is mounted at the inner end of the filter housing. The lubrication system pressure relief valve is installed on a pad located at the upper end of the housing. An internal cored passage connects the relief valve to pump outlet.

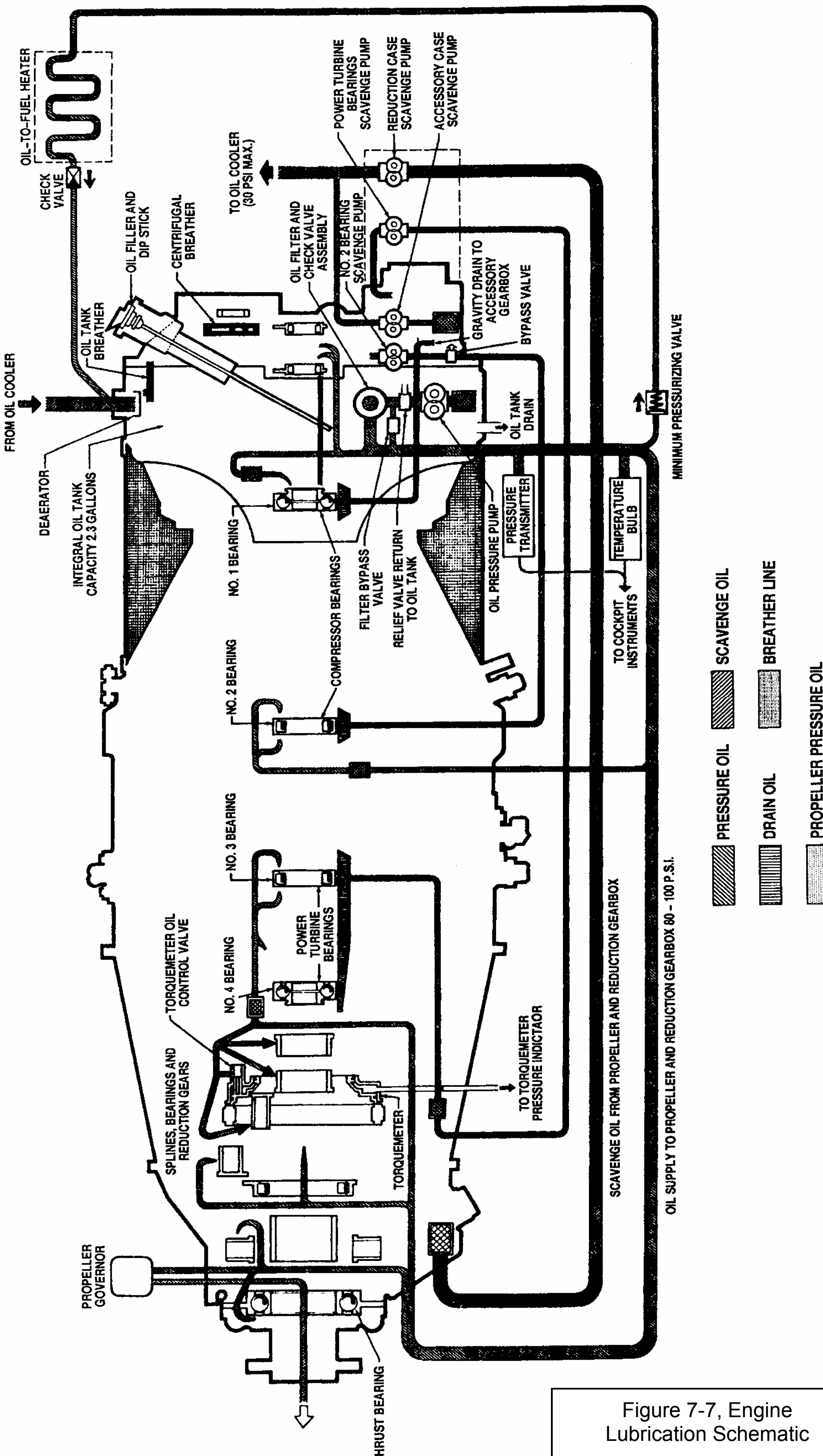


Figure 7-7, Engine Lubrication Schematic

AIR INDUCTION SYSTEM

Air is supplied to the engine compressor through the air intake in the front of the lower cowl.

The air induction system comprises an air intake and an inertial separator.

AIR INTAKE

The engine air inlet is located at the front of the engine nacelle below the propeller spinner. Ram air entering the inlet flows through ducting and an inertial particle separator system and then enters the engine through a circular plenum chamber where it is directed to the compressor by guide vanes. The compressor air inlet incorporates a screen which will prevent entry of large articles, but does not filter the inlet air.

INERTIAL SEPARATOR

An inertial separator system in the engine air inlet duct prevents moisture particles from entering the compressor air inlet plenum when in the bypass mode. The inertial separator comprises two movable vanes and a fixed airfoil which, during normal operation, route the inlet air through a gentle turn into the compressor air inlet plenum. When separation of moisture particles is desired, the vanes are positioned so that the inlet air is forced to execute a sharp turn in order to enter the inlet plenum. This sharp turn causes any moisture particles to separate from the inlet air and discharge overboard through the inertial separator outlet in the lower cowling.

Inertial separator operation is controlled by a switch located on the switch panel marked INERTIAL SEPARATOR. The switch has two positions, NORMAL and BYPASS In the NORMAL position the door remains retracted. Actuation is by an electric actuator mounted in the lower engine cowling. When the inertial separator door is lowered (BYPASS position) a blue annunciator panel light marked ENGINE ANTI ICE will illuminate.

INLET AIRFLOW MODULATION

The compressor bleed valve, located on the gas generator case, automatically opens a port in the gas generator case to spill inter-stage compressor air (P2.5) and provide anti-stall characteristics for the compressor. The bleed valve remains closed at higher gas generator speeds.

ENGINE CONTROLS

DESCRIPTION

The single quadrant housing the engine controls is located in the centre of the airplane cockpit under the instrument panel and is accessible from the left and right seats. The power lever and fuel condition lever control the engine and the propeller lever controls propeller speed and feathering. The levers are provided with an adjustable friction damper and are connected by push-pull cables to their respective engine components.

POWER LEVER

The power lever is used to control the compressor speed and to control the propeller pitch in reverse. The power lever is connected to a cam-cluster located on the accessory gearbox via push/pull cables. The cam transmits power lever movement to the fuel control unit which modifies the fuel flow to the engine and Ng speed. In the forward operation mode, the power lever controls Ng speed only and has no effect on the beta valve. From idle, minimum power position, to the full reverse position, the power lever increases Ng and moves the beta valve to change the propeller blade angle towards the reverse position.

CAUTION

To avoid mechanical damage to the propeller linkage the power lever must not be moved into the reverse position when the engine is not operating.

PROPELLER LEVER

The propeller lever is connected to the speed lever on the top of the constant speed unit. The propeller lever controls the propeller speed in the governing mode and allows the pilot to feather the propeller on the ground prior to engine shutdown of the engine or during flight, in the event of an engine malfunction.

FUEL CONDITION LEVER

The fuel condition lever is connected to the start flow control unit. The fuel condition lever has three positions, CUT OFF, GROUND IDLE and FLIGHT IDLE. In the CUT OFF position fuel flow to the engine is cut off. When in the GROUND IDLE position a modulated fuel flow is provided for engine starting.

In the GROUND IDLE position the fuel supplied to the engine is sufficient for normal flight. Selection of the FLIGHT IDLE position will provide greater fuel input and result in improved engine acceleration. FLIGHT IDLE is recommended for normal operations.

QUADRANT FRICTION

A friction control is provided on the side of the power quadrant to allow the pilot to alter the resistance on the power lever, propeller lever and fuel condition lever.

ENGINE INDICATING SYSTEMS AND INSTRUMENTS

TORQUE INDICATING SYSTEM

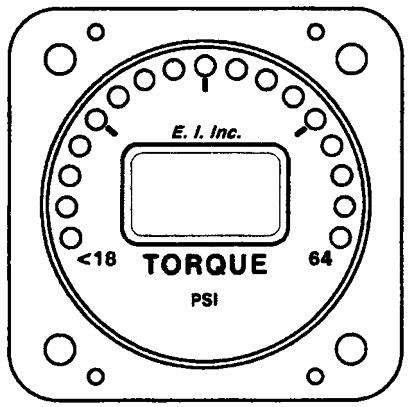


Figure 7-8, Torque Indicator

The engine torquemeter system comprises an indicator, a transmitter, torquemeter (engine), rigid pipes, flex hoses and a restrictor union.

Rigid pipes (routed along the engine) and flex hoses connect the transmitter to a restrictor union in the outlet port of the torquemeter which is located in the forward upper right hand face of the gearbox housing and a balance gearbox case fitting in the forward upper left face of the gearbox housing.

Torque reaction between gears in the power transmission train is applied to the torque meter, which transmits the force as pressure oil to the transmitter which sends an electrical signal to the indicator

The Electronics International electronic pressure indicator as shown in Figure 7-8 is mounted in the instrument panel. The dial of the indicator is graduated in pounds per square inch. The torque indicator comprises a digital and an analogue display. The analogue display comprises green lights signifying the normal operating range, yellow lights signifying that the torque is above the maximum continuous limit and a red light indicating that the torque has exceeded the maximum limit. The display may be dimmed using the airplane lighting controls; however, the red light will always be displayed at full intensity.

The analogue display lights provide a visual indication of the current operating torque and where this is in respect to the various ranges. The digital display provides torque indications in 1 psi increments.

CAUTION

The digital display should be used for precise torque indications.

INTER TURBINE TEMPERATURE (ITT) SYSTEM AND INDICATOR

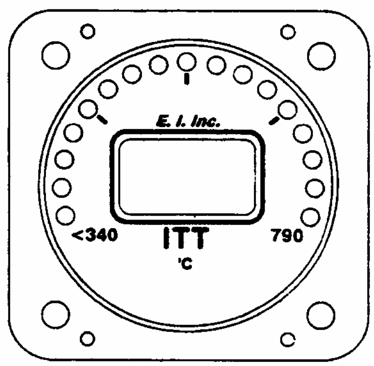


Figure 7-9 ITT Indicator

The Inter Turbine Temperature (ITT) indicating system provides an indication of the engine operating temperature occurring in the zone between the compressor turbine and the power turbine stator.

The ITT system comprises an indicator, a harness (includes a thermocouple and alumel and chromel wires) and resistor block

The indicator as shown in Figure 7-9, is a millivoltmeter and is mounted in the instrument panel. The dial of the indicator is graduated in degrees centigrade. Alumel and chromel wires (harness) connect the indicator via a resistor block mounted on the firewall.

The harness generates a milli-voltage in proportion to the temperature and passes this signal to the resistor block which measures the difference in resistance and then sends the resultant signal to the indicator.

The green analogue lights signify the ITT is in the normal operating range and the red light indicates that 790°C has been exceeded. The digital display provides ITT indications in 1°C increments.

CAUTION

The digital display should be used for precise ITT indication.

GAS GENERATOR RPM INDICATOR

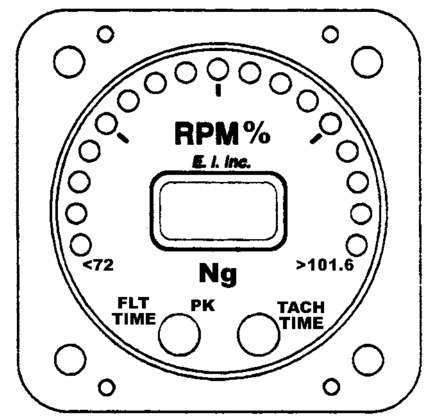


Figure 7-10, Gas Generator RPM Indicator

The gas generator indicating systems comprises an indicator, a circuit breaker, a tachometer generator (engine component) and associated wiring.

The Ng tachometer generator produces an electric current which is used in conjunction with the gas generator indicator to indicate gas generator speed as a percentage. The Ng tachometer generator drive and mount are located on the accessory gearbox.

The Electronics International R-1 indicator, as shown in Figure 7-10 is graduated as a percentage of the rotational speed of the gas generator turbine and is located in the centre of the instrument panel. The Ng indicator incorporates a 210^0 analogue display and a digital display. There are no moving parts (needles, bearings and springs etc) in the indicator. The internal microprocessor provides accuracy and repeatability.

ANALOGUE DISPLAY

The 210^0 analogue display provides a quick reference of the Ng with respect to the operating range. The red (maximum limit) and green (normal operating range) analogue lights provide a visual indication of the current operating range. The red light will blink 20 times at full intensity when the maximum limit is exceeded. After 20 blinks the red light will stop blinking and display a continuous red light. The digital display will continue to provide readings beyond the red light limit. The analogue lights may be dimmed using the airplane lighting controls; however, the red light will always be displayed at full intensity.

DIGITAL DISPLAY

The digital display provides Ng information as a percentage in tens, units and to one decimal place.

CAUTION

The digital display should be used for precise Ng indication.

TACH TIMER

The tach timer keeps a running total of time the engine is above 45%. The time is stored in the indicator's memory for life. To display the time on the tach timer in thousands of hours, press the right push button marked TACH TIME and hold the button in. The digital display will show two digits which represent thousands of hours on the tach timer. To display the hundreds, tens, units and 1/10 hours on the tach timer release the TACH TIME button for no more than two seconds and press it again and hold it in. The display will show four digits with a decimal. The digits represent hundreds, tens, units and 1/10 hours on the tach timer. Each time the TACH TIME button is pushed and held in the display will toggle between the two displays. If the TACH TIME button is released for more than three seconds the display will revert back to Ng.

FLIGHT TIMER AND PEAK RPM

The indicator includes an automatic timer. When Ng reaches or exceeds 65% for 10 seconds, the flight timer will reset to "00.00" and start timing in one minute increments. The peak Ng register will also reset to "0000". The flight timer will continue to count until the Ng drops below 65% for 10 seconds. At this point the flight time and peak Ng will be stored in the memory. There are no internal batteries in the indicator and bus power is not required to keep the memory alive. The last flight time and peak Ng will always be available even if the power is turned off.

As the flight timer is counting, the maximum Ng is also being recorded. For a Ng to be recorded as peak it must exceed the last recorded Ng for three seconds or longer.

To display flight time press the button marked FLT TIME and hold it in. The digital display will display the flight time in hours and minutes.

To display the highest Ng reached during the flight release the FLT TIME button for no more than two seconds and press it again and hold it in. The digital display will show the peak Ng reached during the flight. Each time the FLT TIME button is pushed the display will toggle between flight time and peak Ng. If the FLT TIME button is released for more than three seconds the display will revert back to Ng.

FUEL SYSTEM INDICATOR

DESCRIPTION

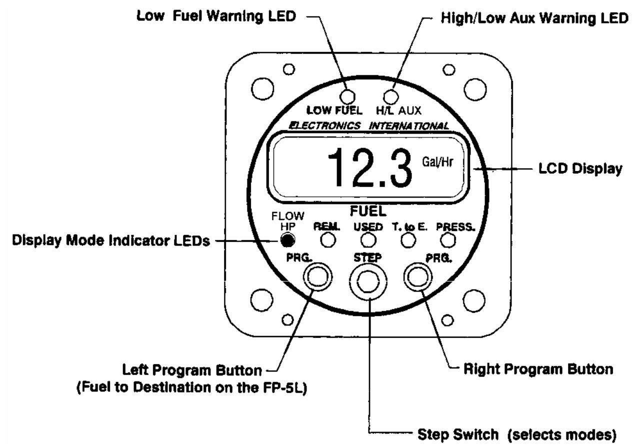


Figure 7-11, Fuel system indicator

Engine fuel pressure and flow are displayed on an Electronics International FP-5 digital indicator, as shown in Figure 7-11 mounted in the centre instrument panel. Pressure is sensed by a transducer mounted on the firewall which transmits an electrical signal to the indicator. Flow is sensed by a transducer mounted on the firewall in the engine entry line.

The fuel system indicator has the following main display modes; fuel flow (FLOW), fuel remaining (REM), fuel used (USED), time to empty (T to E) and an auxiliary channel (AUX) which displays fuel pressure.

In addition to the display modes detailed above the following pilot programmable settings (used to set up the display and alarms) are available; display in U.S. gallons, Imperial gallons, pounds or litres, fuel remaining, two low fuel alarms, time to empty alarm, re-occurring fuel used alarm, high and low aux alarm. There are also power-up programmable settings that are used to configure the instrument for personal preferences, airplane and engine.

WARNING

The fuel remaining displayed by the fuel system indicator is not a measurement of the fuel in the tanks. It is an amount calculated from the starting fuel level manually programmed into the fuel system indicator by the pilot minus the fuel used. When properly calibrated, the fuel system indicator can accurately measure the fuel used. It is imperative the pilot verify the calibration of the fuel system indicator over many tanks of fuel before using the REM and/or USED modes as an indication of the fuel in the tanks or fuel used. Even after verifying the calibration of the fuel system indicator it should never be used as the primary indicator of fuel quantity in the tanks. It is important the pilot visually check/measure the

fuel quantity for each tank before takeoff and cross check these readings against the fuel quantity indicators and the fuel system indicator.

CAUTION

The accuracy of the displayed fuel flow is affected by the value of the K Factor. The K Factor sets the calibration of the instrument to match the flow transducer and the variations in the installation. The differences between the flow transducers, elbows, fittings, pipe sizes, hoses and routing methods used during installation for any fuel flow instrument can cause the flow transducer to output different electrical pulses per unit measurement, called K Factor than when it was tested at the factory. The accuracy of the fuel flow indications will also be affected if the pilot switches the units from the units that the K Factor was calibrated to read. Refer to the fuel system indicator Installation Instructions Manual for further detail on setting the K factor.

NOTE

The use of the fuel system indicator does not eliminate or reduce the necessity for the pilot to use good flight planning, pre-flight and in-flight techniques for managing fuel.

DISPLAYS, WARNING, LEDS AND ALARMS

During night operation the green LED display mode indicators may be too bright. The LED lights can be dimmed using the airplane instrument lighting controls The two red warning LEDs will always be displayed at full intensity.

LOW FUEL WARNING LED

There are four pilot-programmable alarms that will blink the red low fuel warning LED (LOW FUEL) when violated. The following describes how each alarm affects the low fuel warning LED:

First Low Fuel Alarm: This alarm should be set as a reminder. When the alarm limit is violated the red low fuel warning LED (LOW FUEL) will start to blink. Pushing any button or switch on the fuel system indicator will stop the blinking and turn off the warning LED. Also a bar in the upper left corner of the display will be shown when displaying REM.

Second Low Fuel Alarm: This alarm should be set as a warning . When the alarm limit is violated the red low fuel warning LED (LOW FUEL) will blink. Pushing any button or switch on the fuel system indicator will stop the blinking and the LED will remain illuminated red. Also a bar in the lower left corner of the display will be shown when displaying REM.

Time to Empty Alarm: This alarm may be set for a time to empty value (example: 1 hour). When the fuel flow and fuel remaining results in less than one hour of fuel on board (as per example) the alarm limit is violated and the red low fuel warning LED (LOW FUEL) will start to blink. Pushing any button or switch on the fuel system indicator will stop the blinking and turn off the warning LED. Also a bar in the upper left corner of the display will be shown when displaying T to E.

. **Re-occurring Fuel Used Alarm**: This alarm may be set for a fuel used value (example: 50 litres/gallons). If the alarm was activated with 200 litres of fuel remaining, there will be an alarm at 150, 100 and 50 litres/gallons of fuel remaining in the tank. This feature may be used to remind the pilot to check the fuel levels at set intervals. When the alarm limit is violated the red low fuel warning LED (LOW FUEL) will blink. Pushing any button or switch on the fuel system indicator will stop the blinking and turn off the warning LED.

Refer to the Pilot Programmable Modes of this section to set the alarms

HIGH/LOW AUX WARNING LED

There are pilot programmable high and low alarm limits that blink the red H/L AUX warning LED when violated. Pushing any button or switch on the fuel system indicator will cause the LED to stop blinking and remain illuminated red. If the high limit is violated, a bar in the upper left corner of the display will be shown when displaying AUX. If the low limit is violated, a bar in the lower left corner of the display will be shown when displaying AUX. See the Pilot Programmable Modes section to set the alarm limits.

POWER-UP

When the airplane MASTER switch is turned ON, the fuel system indicator will perform a self-diagnostics test and flash the red warning LEDs. This allows a check of the warning LEDs for proper operation.

After power-up, the fuel system indicator will blink the REM (fuel remaining) LED and display the fuel calculated remaining in the tank(s) based on the settings previously programmed into the fuel system indicator by the last user. The REM LED will continue to blink until any button or switch is pushed. The blinking REM LED is intended as a reminder to update the fuel system indicator if the fuel load has been altered since the last flight (see REM Display Mode).

WARNING

The fuel remaining displayed by the fuel system indicator is not a measurement of the fuel in the tanks. It is an amount calculated from the

starting fuel level manually programmed into the FUEL SYSTEM INDICATOR by the pilot minus the fuel used.

DISPLAY MODES AND OPERATING FIGURES

Figure 7-12 details the display modes on the fuel system indicator:

	Display Mode (indicated by a green LED)				
	FLOW	**REM**	**USED**	**T. to E.**	**AUX**
Main Display (select with STEP switch)	Fuel Flow	Fuel Remaining	Fuel Used Since Last Programmed	Time to Empty	Pressure
Alternate Display (push either PRG button)			Fuel Used For The Flight		

Figure 7-12, Display Modes and Operating Features

"FLOW " DISPLAY MODE

When in the FLOW mode fuel flow is configured to display as follows:

A. When set to display in U.S gallons the display will read in .1 gallons/hour increments up to 199.9 gallons/hour.

B. When set to display in Imperial gallons the display will read in .1 gallons/hour increments up to 162.0 gallons/hour.

C. When set to display in pounds the display will read in 1lb/hour increments up to 1199 lbs/hour.

D. When set to display in litres the display will read in 1 LPH increments up to 749 LPH.

Special algorithms in the microprocessor are used to ensure a quick response and a stable display.

REM (REMAINING) DISPLAY MODE

In the REM (fuel remaining) display mode the fuel system indicator will display the fuel quantity remaining as follows:

A. When set to display in U.S. gallons the display will read in .1 gallon increments up to 99.9 gallons and 1 gallon increments from 100 to 999 gallons.

B. When set to display in Imperial gallons the display will read in .1 gallon increments up to 99.9 gallons and 1 gallon increments from 100 to 811 gallons.

C. When set to display in pounds the display will read in 1 lb increments up to 1999 lbs.

D. When set to display in litres the display will read in 1 litre increments up to 1999 litres.

If the first low fuel limit is violated, a bar in the upper left corner of the display will appear when this mode is selected. If the second low fuel limit is violated, a bar in the lower left corner of the display will appear when this mode is selected. See the Pilot Programmable Settings section to set the two low fuel limits.

WARNING

The fuel remaining displayed by the fuel system indicator is not a measurement of the fuel in the tanks. It is an amount calculated from the starting fuel level manually programmed into the fuel system indicator by the pilot minus the fuel used.

WARNING

While in flight the fuel system indicator readings should only be used to cross-check the fuel contents indicators, calculations of the fuel onboard from flow rates specified in the specifications for the airplane and calculations of the fuel onboard from flow rates that were measured from previous flights. The use of the fuel system indicator does not eliminate or reduce the necessity for the pilot to use good flight planning, pre-flight and in-flight techniques for managing fuel.

CAUTION

The K Factor programmed into the fuel system indicator will affect accuracy of the fuel remaining. See the Installation Manual for further details.

TO ADD FUEL

If fuel is added to the airplane set the fuel system indicator REM value for the fuel remaining shown on the fuel system indicator plus the fuel added to the tank(s). If the tank(s) have been filled set the fuel system indicator REM value for the total fuel in the tanks. It is important to verify the fuel levels in the tanks before takeoff.

To change the fuel remaining shown on the fuel system indicator perform the following steps:

A. Select the REM display mode (this mode is displayed during power up).

B. Momentarily push both PRG buttons at the same time. The display will blink “Add”.

C. Push either one of the PRG buttons. The display will show the current fuel remaining. The blinking left digit indicates that this digit may be programmed.

D. Set the fuel remaining level using the following procedure :

a) Select a digit – The right and left PRG buttons move the blinking digit to the right or to the left.

b) Increase or decrease a digits count – Moving the STEP switch to the right will increase the blinking digits count and moving it to the left will decrease the blinking digits count.

c) Exit – To exit the add fuel mode momentarily push both PRG buttons at the same time. The programmed value will be stored in memory and no internal batteries or external power are required to store this information for life.

USED DISPLAY MODE

In the main USED display mode the fuel system indicator will display the fuel used since the fuel system indicator was last programmed. Pushing either PRG button will display the fuel used on the flight. The fuel used is displayed as follows:

A. When set to display in U.S. gallons the display will read in .1 gallon increments up to 99.9 gallons and 1 gallon increments up to 999 gallons.

B. When set to display in Imperial gallons the display will read in .1 gallon increments up to 99.9 gallons and 1 gallon increments up to 811 gallons.

C. When set to display in pounds the display will read in 1 lb increments up to 1999 lbs.

D. When set to display in litres the display will read in 1 litre increments up to 1999 litres.

CAUTION

The K Factor programmed into the fuel system indicator will affect accuracy of the fuel remaining. See the Installation Manual for further details.

T TO E DISPLAY MODE:

Time to Empty is calculated by dividing fuel remaining by fuel flow. The value is displayed in hours and minutes up to 19 hours and 59 minutes.

If the programmable low T to E limit is violated, a bar in the upper left corner of the display will appear when displaying time to empty. See the Pilot Programmable Settings section to set the time to empty limit.

AUX (AUXILIARY CHANNEL) DISPLAY MODE

The AUX channel is configured to monitor airplane fuel pressure in pounds per square inch.

If the programmable high AUX limit is violated a bar will appear in the upper left corner of the LCD display in the AUX mode and the H/L AUX warning LED will blink. If the programmable low AUX limit is violated a bar will appear in the lower left corner of the LCD display in the AUX mode and the H/L AUX warning LED will blink. If the high and low AUX limits are programmed to “00.0” the fuel system indicator will display OFF when the AUX mode is selected. See the Pilot Programmable Settings section of this manual to set the high and low AUX limits.

PILOT-PROGRAMMABLE SETTINGS

The fuel system indicator has a number of pilot programmable settings which are detailed in Figure 7-13. The following chart is an overview of the display modes and pilot programmable settings available:

	Display Mode (indicated by a green LED)				
	FLOW	**REM**	**USED**	**T. to E.**	**AUX**
Pilot Programmable Settings (push both PRG buttons)	Set fuel system indicator to display in US Gal, Imp Gal, Lbs or Ltrs	Add Fuel	Set the First Low Fuel Alarm	Set the Time to Empty Alarm	Set the High Aux Alarm
			Set the Second Low Fuel Alarm	Set the Re-occurring Fuel Used Alarm	Set the Low Aux Alarm

Figure 7-13, Pilot Programmable Settings

SETTING THE DISPLAY FOR U.S GAL, IMP GAL, LBS, OR LTR IN THE FLOW DISPLAY MODE

In the FLOW display mode the fuel system indicator may be set to display fuel flow, fuel remaining and fuel used in U.S gallons, Imperial gallons, pounds or litres. To programme the display perform the following steps:

A. Select the FLOW display mode.

B. Momentarily push both PRG buttons. Either “Gal”, “br Gal”, “Lbs” or “Ltr” will be shown in the display. The fuel system indicator is ready to programme to display in U.S gallons, Imperial gallons, pounds or litres.

C. Set the display using the following procedure:

a) To change the display to “Gal”, “br Gal”, “Lbs” or “Ltr” – Moving the mode select switch to the right while pushing the left programme button will alternate the display between “Gal”, “br Gal”, “Lbs” or “Ltr”.

b) To exit – To exit the pilot programming settings for the FLOW display mode, momentarily push both PRG buttons at the same time. The programmed values will be stored in memory and internal batteries or external power are not required to store this information for life.

SETTING ADD FUEL

This procedure was described previously in the Display Modes and Operating Features section.

SETTING THE TWO LOW FUEL ALARMS IN THE "USED DISPLAY MODE

In the USED display mode the following alarms may be set:

First Low Fuel Alarm – The first low fuel alarm may be programmed to blink the LOW FUEL warning LED when the fuel remaining reaches the pilot programmed set point. Pushing any button or switch on the fuel system indicator will turn off the blinking LED. This limit is intended as a reminder. It may be set to remind the pilot when a specified amount of fuel remaining in the tanks has been reached. In the REM display mode a bar in the upper left corner of the display will appear when the first low fuel alarm limit is violated. Programming this alarm to "000" disables the alarm.

Second Low Fuel Alarm – The second low fuel alarm may be programmed to blink the LOW FUEL warning LED when the fuel remaining reaches the programmed set point. Pushing any button or switch on the fuel system indicator stops the blinking but the LOW FUEL warning LED will stay on. Programming this alarm to "000" disables the alarm.

To programme the first and second low fuel alarm limits, perform the following steps:

A. Select the USED display mode.

B. Momentarily push both PRG buttons. A bar will appear in the upper left corner of the display and the left digit will blink. The fuel system indicator is ready to programme the first low fuel alarm limit.

C. Set the first and second low fuel alarm limits using the following procedure:

   a) Select a digit – The right and left PRG buttons move the blinking digit to the right or to the left.

   b) Changing the digits– Moving the STEP switch to the right will change the blinking digit.

   c) Change functions – The display will toggle between the first and second low fuel alarm by pushing the STEP switch left with left digit blinking. The first low fuel alarm limit is always displayed with a bar in the upper left corner of the display and the second low fuel alarm limit is always displayed with a bar in the lower left corner of the display.

   d) To exit – To exit the pilot programming settings for the USED display mode, momentarily push both PRG buttons at the same time. The programmed values will be stored in memory and no internal batteries or external power are required to store this information for life.

SETTING THE TIME TO EMPTY ALARM AND THE REOCCURRING FUEL USED ALARM IN THE T TO E DISPLAY MODE

In the T to E display mode the following alarms may be set:

Time to Empty Alarm – The time to empty alarm may be programmed to blink the LOW FUEL warning LED when the time to empty calculated by the fuel system indicator reaches the programmed set point. Pushing any button or switch on the fuel system indicator will turn off the blinking LED. This limit may be set to remind the pilot when a specified time to empty has been reached. In the T to E display mode a bar in the upper left corner of the display will appear when this limit has been violated. Programming this alarm to “0:00” disables the alarm.

Reoccurring Fuel Used Alarm – The reoccurring fuel used alarm may be programmed to blink the LOW FUEL warning LED each time the fuel used reaches the programmed limit. Example: If the airplane has 200 litres/gallons on board and the pilot sets the reoccurring alarm to 50 litres/50 gallons. The alarm will activate every 50 litres/50 gallons of fuel used (i.e. when the fuel levels reach 150, 100, 50 litres/gallons). Pushing any button or switch on the fuel system indicator will turn off the blinking LED. This limit may be set to remind the pilot to check fuel levels at specified fuel levels. Programming this alarm to “000” disables the alarm.

To programme the time to empty and reoccurring alarms, perform the following steps:

A. Select the T to E display mode.

B. Momentarily push both PRG buttons. A bar will appear in the upper left corner of the display and the left digit will blink. The fuel system indicator is ready to programme the time to empty alarm limit.

C. Set the time to empty and reoccurring alarm limits using the following procedure:

   a) Select a digit – The right and left PRG buttons move the blinking digit to the right or to the left.

   b) Changing the digits – Moving the STEP switch to the right will change the blinking digits.

   c) Change functions – The display will toggle between the time or empty alarm limit and the reoccurring alarm limit by pushing the right PRG button with the right digit blinking or by pushing the left PRG button with the left digit blinking. The time to empty alarm limit is always displayed with a bar in the upper left corner of the display and the reoccurring alarm limit is always displayed with a bar in the lower left corner of the display.

d) To exit – To exit the pilot programming settings for the T to E display mode, momentarily push both PRG buttons at the same time. The programmed values will be stored in memory and no internal batteries or external power are required to store this information for life.

SETTING THE HIGH AND LOW AUX (FUEL PRESSURE) ALARMS IN THE AUX DISPLAY MODE

In the AUX display mode the following alarms may be set:

High AUX Alarm – The high AUX alarm may be programmed to blink the H/L AUX warning LED when the fuel pressure value exceeds the programmed high set point. Pushing any button or switch on the fuel system indicator will stop the blinking but the H/L AUX warning LED will stay on. This limit is intended as a warning. It should be set to the highest acceptable level. In the AUX display mode a bar in the upper left corner of the display will be shown when the high limit has been violated. Programming this limit to "000" disables the alarm.

Low AUX Alarm – A low AUX alarm may be programmed to blink the H/L AUX warning LED when the fuel pressure value exceeds the programmed low set point. Pushing any button or switch on the fuel system indicator will stop the blinking but the H/L AUX Warning LED will stay on. This limit is intended as a warning. It should be set to the lowest acceptable level. In the AUX display mode a bar in the lower left corner of the display will be shown when the low limit has been violated. Programming this limit to "000" disables to alarm.

To programme the high and low AUX alarms, perform the following steps:

A. Select the AUX display mode.

B. Momentarily push both PRG buttons. A bar will appear in the upper left corner of the display and the left digit will blink. The fuel system indicator is ready to programme the high AUX alarm limit.

C. Set the high and low alarm limits using the following procedure:

a) Select a digit – The right and left PRG buttons move the blinking digit to the right or to the left.

b) Changing the digits– Moving the STEP switch to the right will change the blinking digit.

c) Change functions – The display will toggle between the high and low alarm limits by pushing the STEP switch left with the left digit blinking. The high alarm limit is always displayed with a bar in the upper left corner of the display and the low alarm limit is always displayed with a bar in the lower left corner of the display.

d) To exit – To exit the pilot programming settings for the AUX display mode, momentarily push both PRG buttons at the same time. The programmed values will be stored in memory and no internal batteries or external power are required to store this information for life.

OIL TEMPERATURE AND PRESSURE INDICATOR

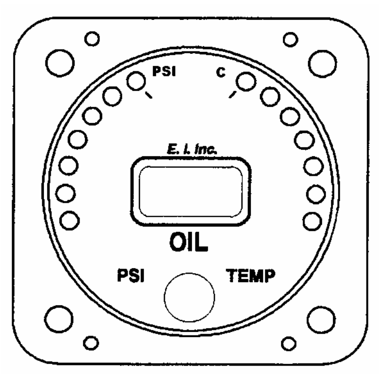


Figure 7-14, Oil Temperature and Pressure Indicator

The oil pressure indicating system comprises an indicator and pressure transmitter, flex hose, a union and associated wiring. The indicator is connected electrically to a transmitter located on the firewall in the engine bay which is connected by rigid piping and flex hoses to a restrictor/union in the casing of the engine oil pump filter assembly.

The oil temperature indicating system comprises a temperature indicator, a temperature probe (engine component) and associated wiring. The indicator is connected to a temperature sensitive probe in the engine accessory gearbox housing via thermocouple wires.

The Electronics International OPT-1, as shown in Figure 7-14 is a combined oil pressure and oil temperature indicator mounted in the centre of the instrument panel and it is a precision instrument featuring dual 90^0 analogue displays and a single digital display. The analogue displays provides a quick reference for oil pressure and temperature with respect to the operating range. The digital display provides a method of monitoring oil pressure to 1 psi or oil temperature to 1^OC . A toggle switch changes the digital display between oil pressure and oil temperature.

The OPT-1 does not incorporate any moving parts.

The analogue display incorporates green (normal operating range), yellow (caution range) and red (maximum limit) lights. At a glance the pilot can get a relative idea of where in the range the engine is operating and how close this is to the limits. A red light will blink 20 times at full intensity when a limit is exceeded. After 20 blinks the red light will stop blinking and display continuous red. Lighting intensity is controlled using the airplane instrument lighting control; however, the red light intensity will always remain bright.

Oil pressure readings at or below 5 psi will be displayed as “00”.

CAUTION

The digital display should be used for precise oil temperature and pressure indications.

OIL PRESSURE WARNING LIGHT

An red coloured warning light marked OIL PRESS LOW is incorporated in the annunciator panel and connected between the 28 V bus and a pressure sensitive switch. The switch is ‘teed’ in the oil pressure line in the engine bay. A drop in engine oil pressure below 5 psi will allow the switch to close providing an earth for the warning light which will illuminate.

IGNITION SYSTEM

GENERAL DESCRIPTION

The ignition system comprises an ignition exciter box, two high tension leads, two spark igniters, an ignition monitor light in the annunciator panel, an ignition switch and a starter switch. Electrical energy from the exciter box, mounted on the left engine mount truss, is transmitted via two high tension leads to two igniters, at the four and nine o’clock positions on the gas generator case adjacent to the fuel manifold. The ignition system is normally energized only during engine start.

Ignition is controlled by one switch, located on the switch and circuit breaker panel, labelled IGNITION. The ignition switch has three positions, AUTO, CONTINUOUS, and OFF. The AUTO position arms ignition so that ignition will be obtained when the starter switch is activated. This position is used during all ground starts and during air starts with starter assist. The CONTINUOUS position is for ignition whilst in flight. A blue coloured warning light marked IGNITION ON will illuminate when CONTINUOUS is selected.

IGNITION EXCITER

The ignition exciter is a sealed unit containing electronic components encased in an epoxy resin. The unit is energized during the engine starting sequence to initiate combustion in the combustion chamber and as desired during flight. The exciter transforms 28 V DC input to a high voltage output through solid state circuitry, a transformer, and diodes.

IGNITION CABLES

The two individual ignition cable assemblies carry electrical energy output from ignition exciter to engine mounted spark igniters. Each lead assembly comprises an electrical lead contained in a flexible metal braiding. Coupling nuts at each end of the assembly facilitate connection to connectors on the ignition exciter and spare igniters. Mounting flanges for attachment to engine fireseals are brazed on to flexible braiding.

SPARK IGNITERS

The spark igniters are located at the four and nine o'clock positions on the gas generator case adjacent to the fuel manifold. They are constructed of a double-ended, threaded plug with a central positive electrode enclosed in an annular semi-conducting material. The electrical potential developed by the ignition exciter is applied across the gap between the central conductor and igniter shell (ground). As this potential increases a small current passes across the semi-conducting material. This current increases until the air gap between the central conductor and shell ionizes. When ionization occurs, high energy discharges between the electrodes. The spark always occurs in the annular space between the central conductor and shell.

WARNING

Residual voltage in the ignition exciter may be dangerously high. Ensure ignition is switched off, and that the system has been inoperative for at least six minutes before removing or handling any ignition components. Always disconnect coupling nuts at the ignition exciter end first. Always use insulated tools to remove cable coupling nuts. Do not touch output connectors or coupling nuts with bare hands.

EXHAUST SYSTEM

The exhaust system provides the means of ducting the jet efflux to atmosphere clear of the engine compartment.

The exhaust assembly comprises two stub pipes welded to two flanges and the assemblies are secured to the engine exhaust flanges by corrosion resistant nuts and bolts.

STARTING SYSTEM

The engine starting system comprises a starter generator, a start switch, a start circuit breaker, a starter relay, a warning light and associated wiring.

When starting the engine, the ignition and engine starting circuits are energised simultaneously by the START switch.

NOTE

To motor the engine, the ignition circuit should be isolated by placing the IGNITION Switch OFF (unless otherwise stated).

With the MASTER switch ON and the IGNITION switch AUTO, selecting the START switch to START and holding for approximately 1 second and releasing will activate the start cycle. The GCU via a relay will hold in the start relay until 46% Ng is attained. This is controlled by a speed sensor built into the starter/generator.

Should the start cycle need to be stopped, select the START switch to INTERRUPT. This will break the circuit from the GCU to the start relay. During all starts a starter energized amber coloured light marked STARTER ENERGISED will illuminate in the annunciator panel when the starter is energised.

CHIP DETECTOR

An amber coloured warning light marked CHIP DETECTOR is mounted in the annunciator panel and connected between the 28 V bus and magnetic chip detector located in the lower forward case of the engine reduction gearbox housing.

Ferrous metal particles in the oil coming in contact with the detector will complete an earth for the warning light which will illuminate.

7.14 PROPELLER

DESCRIPTION

The airplane is equipped with a three blade, Hartzell, constant speed, feathering and reversible pitch propeller, model HC-B3TN-3D/T10282NS+4. The propeller uses a single oil supply from a governing device to hydraulically actuate a change in blade angle.

Propeller blades and bearing assemblies are mounted on the arms of a steel hub unit and are held in place by two-piece blade clamps. A cylinder is threaded on to the hub, and a feathering spring assembly is installed in the cylinder. A piston is placed over the cylinder and is connected by a link arm to each blade clamp. Propeller blade angle change is accomplished through the linear motion of the hydraulically actuated piston that is transmitted to each blade through the link arms and blade clamps. Refer to Figure 7-15 for a cross section schematic of the propeller.

The propeller blade angles are : -

Fine	:	18.5^0
Feather	:	86.3^0
Reverse Pitch	:	-8.1^0

While the propeller is operating, the following forces are constantly present: spring force, counterweight force, centrifugal twisting moment of each blade, and blade aerodynamic twisting forces. The spring and counterweight forces attempt to rotate the blades to a higher blade angle, while the centrifugal twisting moment of each blade is generally acting towards a lower blade angle. Blade aerodynamic twisting force is usually very small in relation to the other forces and will attempt to increase or decrease blade angle.

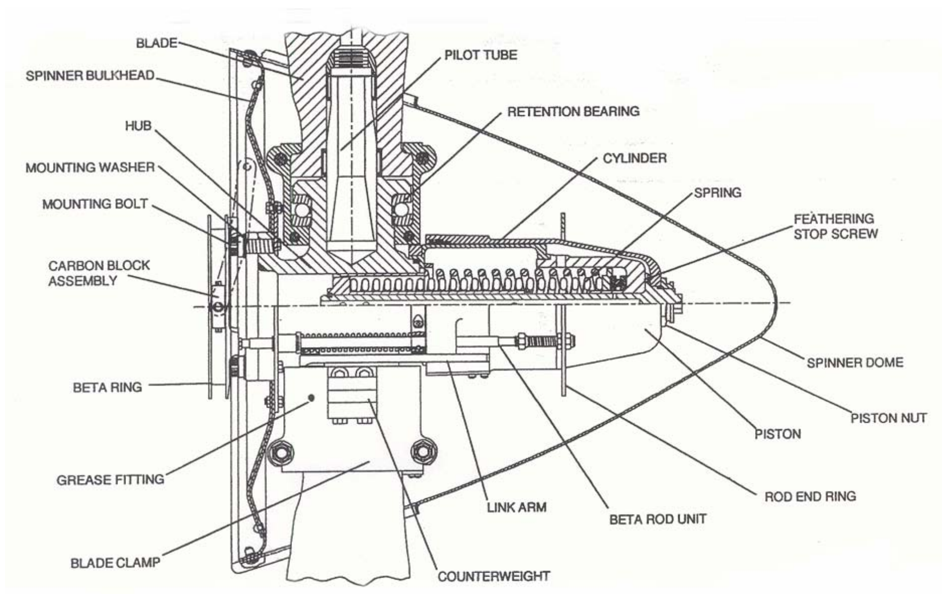


Figure 7-15, Propeller Schematic

The summation of the propeller forces is toward higher pitch (low rpm) and is opposed by a variable force toward lower pitch (high rpm). The variable force is oil under pressure from a governor with an internal pump, which is mounted and driven by the engine. The oil from the governor is supplied to the propeller and hydraulic piston through a hollow engine shaft. Increasing the volume of oil within the piston and cylinder will decrease the blade angle and increase propeller rpm. Decreasing the volume of oil will increase blade angle and decrease propeller rpm. By changing the blade angle, the governor can vary the load on the engine and maintain constant engine rpm (within limits), independent of where the power lever is set. The governor uses engine speed sensing mechanisms that allows it to supply or drain oil as necessary to maintain constant engine speed.

If governor supplied oil is lost during operation, the propeller will increase pitch and feather. Feathering occurs because the summation of internal propeller forces causes the oil to drain out of the propeller until the feather stop position is reached.

Normal in flight feathering is accomplished when the pilot retards the propeller lever past the feather detent. This allows oil to drain from the propeller and return to the engine sump. Engine shutdown is normally accomplished with the propeller feathered.

Normal in flight unfeathering is accomplished when the pilot positions the propeller lever into the normal flight (governing) range and restarts the engine. As engine speed increases, the governor supplies oil to the propeller, and the blade angle decreases.

In the reverse mode of operation, the governor operates in an underspeed condition to act strictly as a source of pressurised oil, without attempting to control rpm. Control of the propeller blade angle in reverse is accomplished through the beta valve.

The propeller is reversed by manually repositioning the power lever to cause the beta valve to supply oil from the governor pump to the propeller. An external propeller feedback mechanism, which includes a beta ring and carbon block assembly, communicates propeller blade angle position to the beta valve.

When the propeller reaches the desired reverse position, movement of the beta ring and carbon block assembly, initiated by the propeller piston, causes the beta valve to shut off the flow of oil to the propeller. Any additional unwanted movement of the propeller toward reverse, or any movement of the manually positioned beta valve control toward high pitch position will cause the beta valve to drain oil from the propeller to increase pitch.

PROPELLER CONTROL

The propeller is controlled by the pilot via the propeller lever in the forward high pitch mode and by the power lever in the low pitch reverse mode.

The propeller lever is connected to the propeller speed control lever on the top of the propeller governor by a push pull cable and tension cable. Rearward movement of the propeller lever is opposed by two springs, one is part of the governor, the other is a long coil tension spring. The effect of these springs is to return the propeller speed control lever to the maximum speed position.

The power lever is connected to the reversing cam. In forward mode the power lever has no effect on the propeller selected rpm. In the reverse or beta mode the power lever is pulled rearward past the ‘gate’, this action effects the beta valve which directs oil pressure into the propeller cylinder rotating the propeller to low pitch.

GOVERNING MODE

DESCRIPTION

The governing mode corresponds to a range of operations where engine power is sufficient to maintain the selected propeller speed by varying the blade angle (pitch). The propeller speed (governing range) is selected by the pilot and is between 75% and 91.2% Np. The system is governing when (on speed) the following occurs:

- Indicated propeller speed matches selected propeller speed.
- Change in Ng speed causes no change in propeller speed (changes in torque only).
- Moving the propeller lever results in a change in propeller speed.

MAIN COMPONENT FUNCTIONS

Pressure Relief Valve: Returns oil to the governor pump inlet when maximum pressure is reached.

Pump Gears: Supply a flow of oil at a pressure necessary to control the propeller pitch.

Flyweights: Sense the speed of the propeller and act against variable spring pressure to move the pilot valve up or down.

Pilot Valve: Moves up or down to control the oil pressure going to the propeller dome.

Speeder Spring: Opposes a mechanical force against the centrifugal force of the flyweights and determines propeller speed at which the flyweights will be ‘on speed’. The pilot controls spring tension through the propeller lever.

OPERATION

Oil from the engine main oil pump is supplied to the governor. A set of gear pumps, mounted at the base of the governor, increases the flow of oil going to the propeller governor relief valve.

When the oil pressure reaches the desired level, the relief valve opens to maintain the pressure. Through internal passages, the oil is routed to the pilot valve and then to the propeller transfer sleeve.

The flyweights and the pump gears are driven by a bevel gear arrangement mounted on the propeller shaft. Once the speed selected by the pilot is reached, the flyweight’s centrifugal force equals the spring tension of the speeder spring. The governor flyweights are then on speed.

When more power is applied to the engine, the flyweights turn faster and go into an overspeed condition, causing the pilot valve to move up and restrict oil flow to the propeller dome. The feathering spring increases the propeller pitch to maintain the selected speed. Reducing power causes an underspeed of the flyweights, downward movement of the pilot valve, more oil in the propeller dome, resulting in a finer pitch to control propeller speed.

BETA MODE – POSITIVE BLADE ANGLE

DESCRIPTION

Beta Valve: Prevents the blade angle from going below the specified Primary Blade Angle (PBA) in flight and allows the pilot to manually control the blade angle on the ground for taxiing and reverse operation.

Beta Mode: Corresponds to a range of operation where the blade angle is between PBA and reverse. Control of the propeller pitch is a direct function of the position of the beta valve.

Primary Blade Angle (PBA): Minimum blade angle allowed for flight operation for the airplane.

The system is in the beta mode when: (Underspeed)

- Propeller speed indicated is below propeller speed selected.
- Ng speed change causes propeller speed change.
- Propeller lever movement does not change propeller speed.

The beta valve is operated by two means:

- **Beta Feedback System**: In low pitch operation, the beta nuts, beta rods, slip ring, carbon block and the beta lever, which comprise the beta feedback system, actuate the beta valve.

- **Power Lever**: Movement of the power lever in the beta range causes the reversing cam to actuate the beta valve, thus causing the blade angle to change.

OPERATION

At low power operation, with the propeller lever at max rpm, the propeller does not turn fast enough to satisfy the demand. In this condition, the pilot valve moves down and high pressure oil goes to the propeller dome, moving the blades towards a fine pitch.

When the preset PBA is reached, the servo piston, in it’s forward movement contacts the beta nuts. Any further forward motion of the slip ring is transmitted to the beta valve via the beta lever. Forward movement of the beta valve causes servo pressure to drop, which prevents any further blade angle change. At this point, blade angle control is no longer a function of the propeller governor, the beta system is now in control.

In flight, the beta valve maintains a constant oil volume in the propeller dome to ensure blade angle remains at PBA.

On the ground, the pilot is able, with the power lever, to actuate the beta valve and change the blade angle as desired for taxiing and reverse operation.

BETA MODE – NEGATIVE BLADE ANGLE

DESCRIPTION

The reverse beta mode allows the pilot to control the propeller blade angle in reverse. Reverse operation is obtained by moving the power lever below the idle detent, into the reverse range. The reversing cam pulls on the reversing cable to move the beta valve inwards, allowing more oil to flow into the propeller dome and send the propeller blades into reverse pitch.

OPERATION

Moving the power lever rearwards causes the reversing cam and cable to move the beta valve rearward, allowing more oil to flow into the propeller dome, causing the blades to go to reverse pitch. The reset arm on the Nf governor is also moved rearward by the reversing cable while the blade angle is moving towards reverse. This causes the reset lever and reset post to move down. As Np increases in reverse operation, the governor flyweights begin to move outwards. Before the flyweights reach the on-speed position, the speeder spring cup pushes the reset lever, which pivots and allows Py to bleed into the propeller governor. This will limit Ng to control Np to a preset level.

PROPELLER RPM INDICATING SYSTEM AND INDICATOR

DESCRIPTION

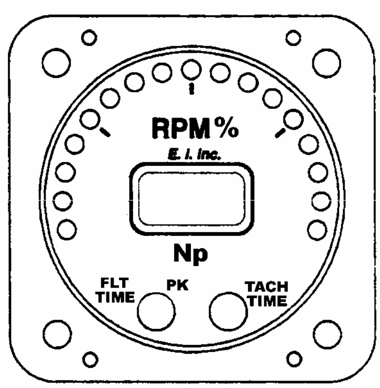


Figure 7-16, Propeller Speed Indicator

The propeller indicating systems (Np) comprises an indicator, a circuit breaker, a tachometer generator and associated wiring. The propeller tachometer generator is mounted in the 2 o'clock position on the front casing of the engine adjacent to the propeller. The propeller tachometer generator provides an electric current to the propeller rpm indicating system indicator.

The Electronics International R-1 propeller speed indicator, as shown in Figure 7-16 is graduated as a percentage of the power turbine speed or expressed as an rpm and it is located in the centre of the instrument panel.

The indicator features a 210^0 analogue display and a digital display. There are no moving parts (needles, bearings and springs etc) in the indicator. The internal microprocessor provides accuracy and repeatability.

ANALOGUE DISPLAY

The 210^0 analogue display provides a quick reference of the Np with respect to the operating range. The red (maximum limit) and green (normal operating range) lights provide a visual indication of the current operating range. The red light will blink 20 times at full intensity when the maximum limit is exceeded. After 20 blinks the red light will stop blinking and display a continuous red light. The digital display will continue to provide rpm readings beyond the maximum limit. The analogue lights may be dimmed using the airplane instrument lighting controls; however, the red light will always be displayed at full intensity.

DIGITAL DISPLAY

The digital display provides Np information as a percentage in tens, units and one decimal place or as a rpm.

CAUTION

The digital display should be used for precise Np indications.

TACH TIMER

The tach timer keeps a running total of time the engine is above 45% Np or 990 rpm. The time is stored in the indicator's memory for life. To display the time on the tach timer in thousands of hours, press the right push button marked TACH TIME and hold the button in. The digital display will show two digits which represent thousands of hours on the tach timer. To display the hundreds, tens, units and 1/10 hours on the tach timer release the TACH TIME button for no more than two seconds and press it again and hold it in. The display will show four digits with a decimal. The digits represent hundreds, tens, units and 1/10 hours on the tach timer. Each time the TACH TIME button is pushed and held in the display will toggle between the two displays. If the

TACH TIME button is released for more than three seconds the display will revert back to Np.

FLIGHT TIMER AND PEAK RPM

The indicator includes an automatic timer. When Np meets or exceeds 65% or 1430 rpm for 10 seconds, the flight timer will reset to “00.00” and start timing in one minute increments. The peak Np register will also reset to “0000”. The flight timer will continue to count until the Np drops below 65% Np or 1430 for 10 seconds. At this point the flight time and peak Np will be stored in the memory. There are no internal batteries in the indicator and bus power is not required to keep the memory alive. The last flight time and peak Np will always be available even if the power is turned off.

As the flight timer is counting, the maximum Np is also being recorded. For a Np to be recorded as peak it must exceed the last recorded Np for three seconds or longer.

To display flight time press the button marked FLT TIME and hold it in. The digital display will display the flight time in hours and minutes.

To display the highest Np reached during the flight release the FLT TIME button for no more than two seconds and press it again and hold it in. The digital display will show the peak Np reached during the flight. Each time the FLT TIME button is pushed in the display will toggle between flight time and peak Np. If the FLT TIME button is released for more than three seconds the display will revert back to Np.

BETA WARNING LIGHT SYSTEM

A blue coloured warning light marked BETA located in the annunciator panel will illuminate to alert the pilot that the propeller is entering the beta range i.e. the blade angle has passed the normal low pitch setting and is moving toward the reverse pitch range. The light is energised by a micro switch which is actuated by the beta lever in the beta feedback system.

OVERSPEED GOVERNOR RESET

A press to operate button located in the switch panel marked O/SPEED GOV is used to check the functioning of the propeller overspeed governor. When pushed in, an electric solenoid valve is actuated which ducts oil pressure to the top of the speeder spring assembly. The oil pressure acting on the top of the speeder spring reduces the RPM at which overspeed will occur thus permitting testing.

7.15 FUEL SYSTEM

GENERAL DESCRIPTION

The airframe fuel system is designed to deliver fuel under constant pressure to the engine once the fuel shut off valve (fuel cock) and electrical fuel pump switch are placed in the ON position. The system may be considered as two discrete systems integrated at the front sump tank. The design of the system is such that the front wing tanks are the primary tanks and the rear wing tanks the secondary.

WARNING

The airplane must be operated in compliance with the fuel limitations detailed in Section 2 Limitations.

WARNING

The airplane must not be flown with fuel in the rear tanks unless the front tanks are full.

The system as shown in Figure 7-17 includes the following components:

Left and right hand front and rear wing storage tanks

Front sump tank incorporated in left front wing storage tank,

One fuel filter

Fuel shut off valve

Electric fuel pump

“Jet Pumps”

Fuel pressure warning and filter restriction warning system

Fuel quantity indicating system

Associated delivery/vent piping

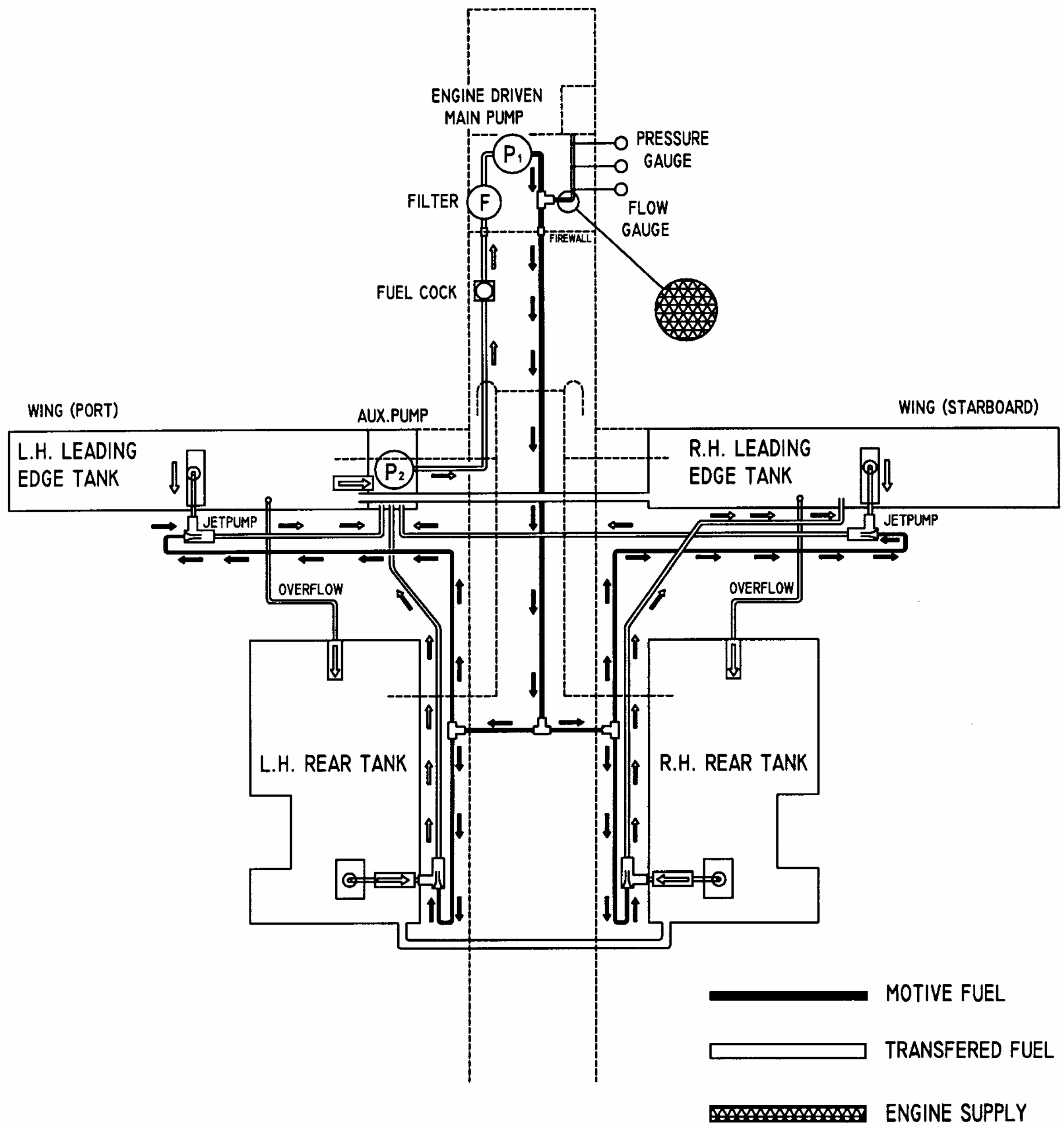


Figure 7-17, Fuel System

SYSTEM OPERATION

Fuel is drawn from a 26 litre (6.8 U.S. gallon) sump tank incorporated into the left forward tank. During normal operations this is by a pump driven by the engine. During starting and emergency operation an electric auxiliary pump mounted in the sump tank provides fuel motive force. The quantity of fuel pumped is in excess of that required for engine operation. Fuel not required by the engine is circulated to each tank where it passes through “jet pumps” which uplift more fuel by venturi action. Fuel from each rear tank is fed forward to its corresponding side front tank where “jet pumps” draw fuel and deliver to the sump tank.

Operation of the fuel system is monitored by a amber warning light marked FUEL PRES LOW in the annunciator lights panel which will illuminate should the system pressure falls to 6 psi. An amber warning light marked FUEL FILTER BYPASS in the annunicator panel will illuminate should the pressure differential across the inlet and outlet ports of the fuel filter rise above 2.5 psi ± 0.20 psi.

The system is vented by two pipes which connect the front and rear tanks respectively before venting overboard through the fuselage lower surface under the cabin. The vents must be checked prior to flight to ensure that they are not blocked or obstructed. The fuel system will continue to operate with one vent blocked but with both blocked the engine will be starved of fuel.

WARNING

The fuel vents must be checked prior to flight to ensure they are clear of any obstructions or blockages.

The contents of each wing tank is measured by a capacitance sensor and indicated on dual indicators in the instrument panel.

TANKS

The wing fuel storage tanks comprise front and rear cells fabricated in the centre wing structure on the left and right hand sides of the fuselage. The fuel tank capacities are as follows:

TANK	TOTAL CAPACITY	UNUSABLE FUEL	USABLE
FRONT LEFT TANK *	**284* litres, 499 lbs 75* U.S. gallons**	**10 litres, 18 lbs 3 U.S. gallons**	**274 litres, 481 lbs 72 U.S. gallons**
FRONT RIGHT TANK	**293 litres, 515 lbs 77 U.S. gallons**	**10 litres, 18 lbs 3 U.S. gallons**	**283 litres, 497 lbs 74 U.S. gallons**
REAR LEFT TANK	**142 litres, 249 lbs 37.5 U.S. gallons**	**0**	**142 litres, 249 lbs 37.5 U.S. gallons**
REAR RIGHT TANK	**142 litres, 249 lbs 37.5 U.S. gallons**	**0**	**142 litres, 249 lbs 37.5 U.S. gallons**
TOTAL	**861 litres, 1512 lbs 227 U.S. gallons**	**20 litres, 36 lbs 6 U.S. gallons**	**841 litres, 1476 lbs 221 U.S. gallons**

- Includes 26 litres (6.8 U.S. gallons) of fuel in sump tank

Figure 7-18, Fuel Tank Capacities

Each front tank is equipped on the upper surface with a filler aperture and cap and a quantity sensor. The lower surface incorporates access panels and drain points.

Each rear tank is equipped on the upper surface with three access panels one of which incorporates the filler aperture and cap, in the lower surface are two drain points. A quantity sensor is mounted diagonally across the tank.

The sump tank is part of the left forward tank with a capacity of 26 litres (6.8 U.S. gallons). Mounted in the sump is the electric auxiliary fuel pump.

AUXILLIARY FUEL PUMP

One immersed pump/motor unit is employed to provide the engine fuel system with a constant supply of pressure fuel. The pump is fitted in the sump tank. The pump is of a centrifugal type and offers no resistance to the flow of fuel when not operating. The pump is powered through a 5 amp circuit breaker. The pump is connected to a blue indicator light, AUX FUEL PUMP ON which will remain illuminated whilst the pump is operating.

Under normal operations the pump operates during engine start and during emergency operation. The pump is controlled by a switch in the switch panel marked FUEL. The switch has three positions, AUTO, OFF AND MANUAL. During start and for normal operations the switch should be selected to AUTO. During start the pump will supply fuel to enable engine start. The pump will automatically switch off (If AUTO selected) when the engine driven fuel pump is able to supply sufficient fuel pressure to meet engine demands. If the engine driven fuel pump fails and the FUEL switch is selected to AUTO the airplane fuel pump will automatically come on line and provide sufficient fuel for normal operations. The blue annunciator light marked AUX FUEL PUMP ON will illuminate to indicate the pump is switched on. Refer Section 3 Emergencies Procedures for actions in the event of an engine driven fuel pump failure.

FUEL FILTER ASSEMBLY

A single fuel filter is mounted on brackets on the left side of the front face of the firewall. Access to the Curtis drain valve in the base of the filter is provided by a hole in the lower engine cowl. Access for filter maintenance is provided by removal of the engine cowlings.

FUEL PRESSURE WARNING

In addition to the cockpit fuel pressure indicator (displayed in the AUX mode on the fuel system indicator), a warning system is provided to alert the pilot of a failure in system delivery pressure. The amber light is located in the annunciator panel. The low fuel pressure warning light is marked FUEL PRES LOW . The low fuel pressure switch is located downstream from the filter in the engine compartment. The warning light will illuminate when the system pressure falls to 6 psi.

FILTER IMPENDING BYPASS WARNING

A warning system is provided to alert the pilot of an impending filter bypass due to filter contamination. An amber light is located in the annunciator panel. The filter bypass warning light is marked FUEL FILTER BYPASS. The filter impending bypass switch is screwed into the filter head. The red warning light in the annunciator panel will illuminate if system pressure drops by a differential of 2.5 psi ± 0.2 psi.

LOW FUEL LEVEL WARNING

An amber coloured low fuel level warning light marked LOW FUEL LEVEL located in the annunciator panel illuminates when the fuel remaining level in the airplane fuel tanks is 24 litres (6.3 U.S gallons) or less. Refer to section 3 Emergencies Procedures for actions in the event of the LOW FUEL LEVEL light illuminating.

FUEL SHUT OFF VALVE (FUEL COCK)

The fuel shut off valve is located under the floor of the cockpit on the left side of the fuselage between the sump tank and the fuel filter. It is operated from a simple ON/OFF push/pull lever mounted on the control centre console. The fuel shut off valve is open (allowing fuel to flow to the engine) when the lever is fully pushed in and the fuel shut off valve is closed (stopping flow of fuel to the engine) when the lever is pulled fully out. There is a safety lock fitted to prevent inadvertent movement of the lever when in the ON position.

NON-RETURN VALVES (CHECK VALVES)

Six hinged flap type non-return valves in the system prevent fuel feedback to the wing tanks.

FUEL QUANTITY INDICATING SYSTEM

DESCRIPTION

The fuel indicating system comprises individual tank transmitters, associated indicators and wiring. Each transmitter and indicator is calibrated as a set before installation in the airplane. Electronics International capacitive fuel level probes are installed in each fuel tank. Each probe (sensor) is laid diagonally from the top to bottom of the fuel tank. Access to the probes is via a cover plate on the upper surface and access panels in the lower surface of the front tanks or lower panels of the rear tanks.

FUEL INDICATORS

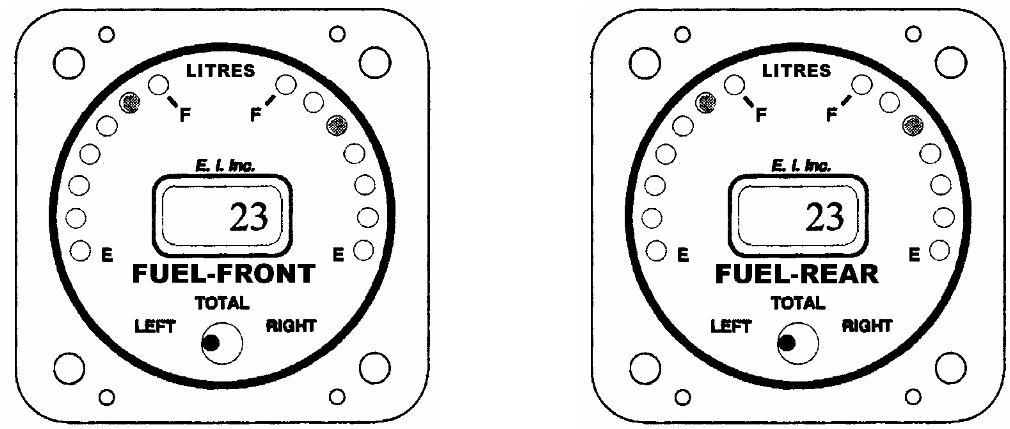


Figure 7-19, Fuel Quantity Indicators

Two Electronics International FL-2CA fuel indicators as shown in Figure 7-19 are fitted to the airplane. One indicator is for the front tanks and the other for the rear tanks. The indicators are a fuel level instrument featuring dual 90^0 analogue displays and a digital display operating off a capacitance system. The two displays provide the primary indication of the fuel level for the front left and right wing tanks and the rear left and right wing tank. The indicators can be calibrated to display in litres, pounds or gallons. The indicators do not incorporate any moving parts (needles, bearings, springs, etc). The indicators have a programmed filter that affects how quickly the indicator responds to changes in fuel level. Refer to the Installation Manual for further details.

ANALOGUE DISPLAY

The dual 90^0 analogue displays provide a quick reference of the front and rear left and right fuel levels. An advantage of the analogue display is its ability to emit a green (normal operating range), yellow (caution range) or red (minimum limit) light. With a quick glance the pilot can determine if the fuel level is in the green, yellow or red operating range. In addition the indicators provide the following warnings:

1. ¼ Tank Warning – If the left or right tank level reaches ¼ of a tank, the appropriate yellow LED will blink. This is intended to alert the pilot that the fuel level is getting low.

2. Low Fuel – If the left or right front tank reaches 1/8th of a tank the appropriate red LED will blink. If the left or right rear tank reaches 1/8th of a tank the appropriate yellow LED will blink. These blinking lights are intended to alert the pilot that the fuel level is getting very low.

3. "OPEN" – If the wire to the left or right tank sensor becomes open, the analogue display for the tank with the problem will show empty and the digital display will show OPEN. This warning is intended to alert the pilot when the indicators have lost the signal from one or both of the fuel sensors.

To acknowledge a blinking LED (i.e. stop the blinking) change the position of the tank selector switch. Once a blinking warning is acknowledged it will not occur again until the indicators' power has been turned off and back on.

Lighting to the analogue LEDs is controlled using the airplane instrument lighting control. The red LED's will always be displayed at full intensity.

DIGITAL DISPLAY

With the tank selector switch in the left or right position the digital display will show the fuel level in the appropriate tank. With the tank selector switch in the centre position the total fuel (left + right) will be displayed.

On power-up the indicators perform the following tests in sequence.

1. The left tank's calibration data is checked for errors. A table of error codes is provided in the Operating and Installation Instructions Manual for the indicators. If an error is found, the appropriate error code is displayed and the indicator operation is stopped.

2. The right tank's calibration data is checked for errors. If an error is found the appropriate error code is displayed and the indicator's operation is stopped.

3. A self test is performed, all the LED's are sequenced and "8888" is shown on the display.

WARNING

Do not solely rely on the fuel indicating system to determine the fuel levels in the airplane.

WARNING

The accuracy of the fuel indicating system will be affected if the airplane is parked on sloping ground.

WARNING

The use of the fuel indicating system does not eliminate or reduce the necessity for the pilot to use good flight planning, pre-flight and in-flight techniques for managing fuel.

WARNING

The fuel indicating system is calibrated with the airplane in a cruise angle of attack. If the airplane is in a condition other than cruise, the indicators may display inaccurate fuel levels.

WARNING

As a tank is filled the fuel sensor may not be able to detect the fuel entering the upper corners of the fuel tank. If this is the case, the indicator will display lower fuel levels than the actual fuel in the tanks when the tanks are full. When the fuel level drops to a point where the fuel sensors start to detect a change, the displayed fuel level should be accurate. Check the system by comparing the displayed fuel levels on indicator the fuel levels listed in the flight manual at each fill up.

WARNING

Do not rely on the fuel indicator to determine the fuel in the tank for indicated tank levels below 1/8th .

WARNING

It is important the pilot verifies the accuracy of the fuel indicators. Always cross-check the measured fuel levels in the tanks with the readings on the fuel indicators before each flight.

WARNING

If the pilot ever finds an inaccuracy issue or any other problem with fuel indicator cover the face of the instrument with a note saying DEFECTIVE.

FUEL DRAINS AND VENTS

The following fuel drains are fitted to the airplane:

Front left tank, sump tank (located left wing inboard), rear left tank, right front tank, right rear tank and fuel filter (bottom left of firewall). The fuel drains allow a fuel sample to be taken and checked to ensure the fuel is free from water and any contamination. Refer to Section 8 for procedures on checking for fuel contamination.

There are two fuel tank vents located on the inboard section on the left and right wing.

7.16 HYDRAULIC SYSTEM

The airplane main wheel brakes are hydraulically operated. The brake system is described in Section 7.8. Refer to Section 8 for hydraulic fluid replenishment procedures.

7.17 ELECTRICAL SYSTEM

GENERAL DESCRIPTION

The electrical system is a 28 V DC single wire negative earth return system.

Power is provided from two internal sources. The generator system, as a main source under normal conditions, and the battery system which is employed for engine starting and system operation when generator power is not available (engine not running or generator is off line). Both systems feed the bus bars.

Control and monitoring of power from the two systems is by a MASTER switch, voltmeter and ammeter respectively.

All circuits are protected by circuit breakers or fuses. Wiring is installed in open looms supported by clips and protected with sleeving where necessary. Wiring routed to the forward part of the engine compartment passes through stainless steel ducts to protect it from heat. Disconnect points are provided for the removal of all major components.

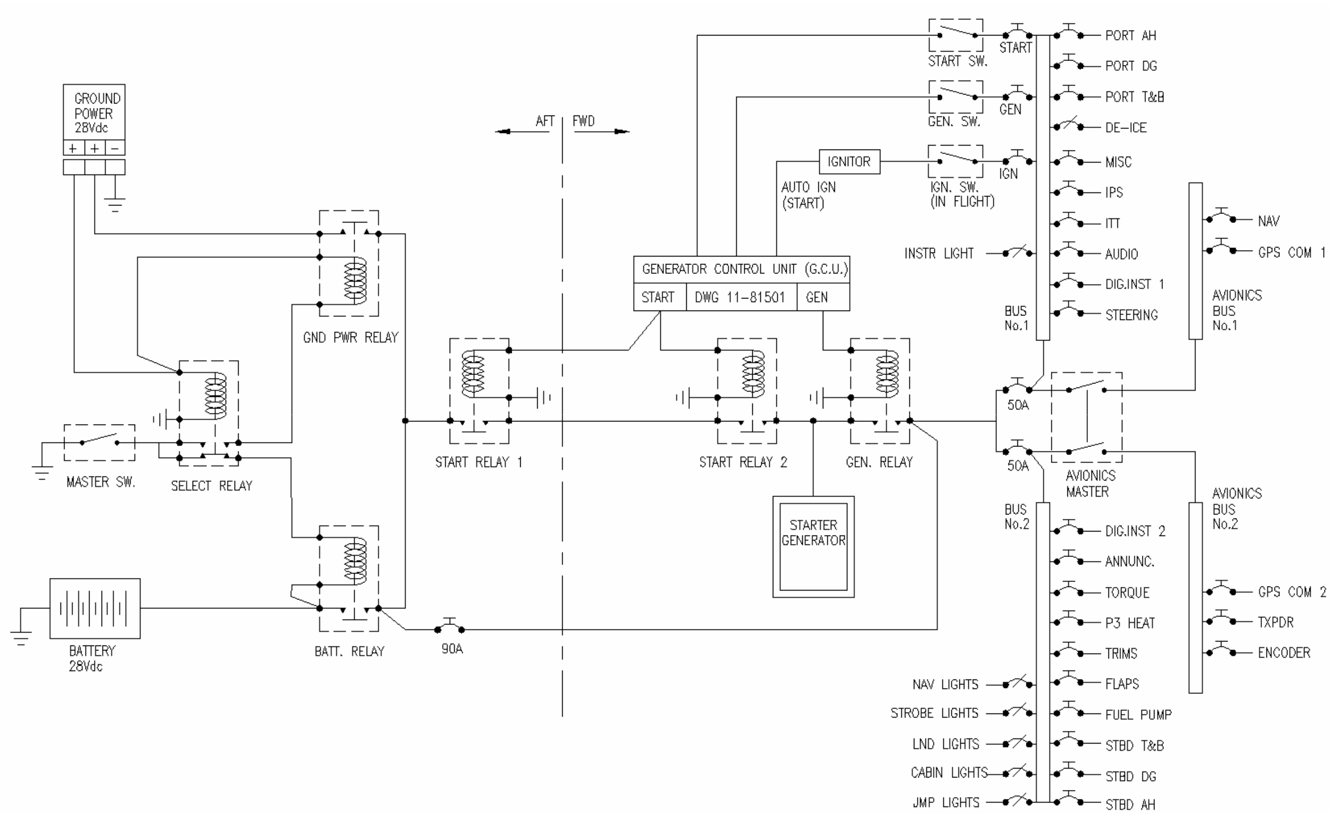


Figure 7-20, Electrical System Schematic

BATTERY SYSTEM

The battery system comprises a 24 V 43 amphere battery, a master relay and associated wiring.

The system supplies power for engine start and operation of the electrical system when the generator is not running or has failed. The battery is isolated from the bus bar by the master relay (de-energised) when the MASTER switch is OFF.

BATTERY

A 24 V, 43 ampere/hour sealed lead-acid battery is located in the rear fuselage.

Gases generated by charging are vented through the battery box venting system through a vent on the underside of the airplane immediately under the battery.

An ammeter and shunt system which is wired in series from the battery to the bus bar, will show a discharge when the battery is supplying the electrical system with the generator off line. With the generator on line, the current flow will be to the battery showing a charge rate on the ammeter dependent on the service load and the demand of the battery.

The battery is earthed to the airframe.

MASTER RELAY

The master relay or battery contactor is a solenoid operated bridge type contactor located adjacent to the battery. The relay is controlled by the MASTER switch and when energised by placing the MASTER switch in the ON position, will connect the battery to the bus bar.

GENERATOR SYSTEM

The generator system comprises a starter generator, a Generator Control Unit (GCU), a relay, a GCU control switch marked GENERATOR, a circuit breaker, a generator warning light, associated wiring and terminal blocks.

The GENERATOR switch in the switch panel has three positions OFF, ON and RESET.

The generator system is the main source of power for the electrical system. On engine start up when the START switch is pressed, the starter relay is energised and at the same time through the GCU the generator shunt field is opened, when the start relay is released the GCU reverts to the generator mode. At an engine power setting of 50 - 55% Ng the generator may be brought on line by placing the GENERATOR switch to ON. The GCU provides output voltage control, system over voltage protection and reverse current protection for the generator.

The RESET position (spring loaded back to ON) is used to attempt to bring the generator on line in the event of the generator going off line. Refer to Section 3 Emergencies Procedures in the event of a generator malfunction.

STARTER GENERATOR

A starter / generator rated at 30 V DC - 200 amps is mounted on the rear upper face of the engine accessory / reduction gear box module. It is a conventional four-pole shunt-field generator with interpoles and series auxiliary starting windings. The unit is cooled by a built in fan.

GENERATOR CONTROL UNIT (GCU)

The GCU is a solid state sealed unit mounted on the firewall. The GCU controls the voltage output of the generator, protects the airplane electrical system from excessive generator voltage and ensures that the generator will not be subject to the reverse current flow from the battery in excess of a specified value.

The voltage regulator section of the GCU is adjustable. The adjusting screw is covered by a blanking grommet adjacent to the connector.

If the generator voltage exceeds the specified value (32 V + 0.5 V) an internal over volt sensor in the GCU will cause the GCU switch to trip out removing power from the shunt field and the generator relay. However, should the GCU control switch fail to trip out the generator relay will be tripped by an over volt protection built into the internal circuit of the GCU which controls the relay.

GENERATOR RELAY

The generator relay is a solenoid operated bridge type contactor mounted on the firewall immediately above the GCU. The relay isolates the generator from the bus until the GCU control switch is placed ON.

The relay will be automatically tripped if the electrical system is subject to over voltage or the generator to a reverse current flow.

GENERATOR SWITCH

The GENERATOR switch is a combination switch/circuit breaker located on the switch panel. It has a built in trip coil which is connected to the over volt sensor in the GCU. The coil is only energised to trip the switch to OFF in the event of an over volts condition. The switch (via the GCU) operates the pull-in coil of the generator relay and applies power to the shunt field of the generator.

GENERATOR CIRCUIT BREAKER

The 10 amp GCU circuit breaker is a standard single pole with manual trip / reset button, it is located in the switch panel marked GEN. This circuit breaker provides protection for the generator system in the event of an excessive current drain in the generator shunt field circuit.

GENERATOR WARNING LIGHT

The red generator warning light marked GENERATOR OFF is contained in the annunciator panel. The light is connected to both battery and generator systems and will illuminate when the MASTER switch is placed ON and extinguish when the generator comes on line. Should the generator output fail the warning light will be illuminated.

COMPONENTS COMMON TO THE BATTERY AND GENERATOR SYSTEMS

MASTER SWITCH

A single pole, single throw, MASTER switch is located in the switch panel. When placed in the ON position it provides an earth for the operating coil of the master relay which allows the battery to come on line and supply power to the bus via the ammeter.

VOLT/AMMETER

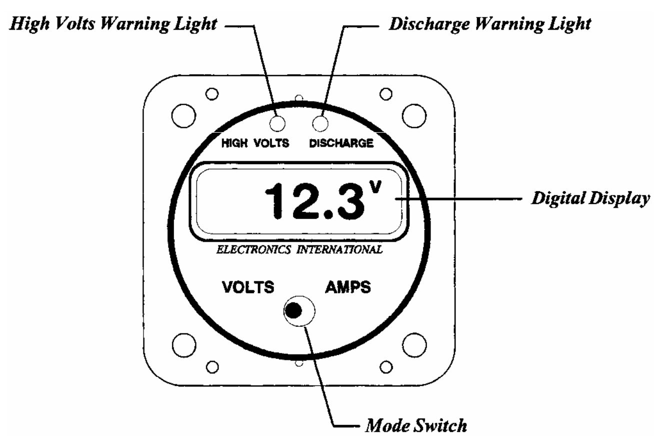


Figure 7-21, Volt/Ammeter

The Electronics International VA-1A combined volt/ammeter, as shown in Figure 7-21, is located in the centre of the instrument panel.

The instrument comprises a HIGH VOLTS warning light, a DISCHARGE warning light, a mode switch and a digital display.

The bright red HIGH VOLTS warning light will illuminate when the bus voltage rises to 30.6 V or higher. The high volts feature is sensed off the red power lead and will function regardless of what position the switch is in.

The bright yellow DISCHARGE warning light will illuminate when bus voltage drops below 25.2 V. The discharge warning feature is sensed off the red power lead and will function regardless of what position the switch is in.

The digital display will display volts in .1 increments and a "V" will show in the display. Amperage will be displayed in .1 amp increments and an "A" will show in the display.

The mode switch changes the display between volts and amps. The setting of this switch will not affect the operation of the HIGH VOLTS or DISCHARGE warning lights.

The following paragraphs describe operating characteristics of the volt/ammeter with the MASTER switch on and the engine off:

With the mode switch in the AMPS position, the volt/ammeter will display the electrical system load on the airplane. Since the engine is off, all of the current is being supplied by the battery. The volt/ammeter will show a discharging condition (the DISCHARGE light will be on) and display an accurate reading of the total current drain from the battery. In this mode of operation any piece of electrical equipment can be checked for proper operation by performing the following steps:

A. Note the amps reading on the volt/ammeter.

B. Turn on the piece of electrical equipment to be checked.

C. If this piece of electrical equipment is working properly an increase in load current that corresponds to the current that piece of equipment requires will be seen.

Using this method with the digital display of the volt/ammeter many important airplane functions (strobes, radios, transponder, ADFs, DMEs, pitot heat, etc) can be checked from the pilot's seat.

With the mode select switch in the VOLTS position, the volt/ammeter will display the bus voltage to .1 V. Each battery has its own operating voltage when charged. As the battery gets near the end of its life, this voltage will start to drop. A discharged battery will also run at a lower voltage.

The following paragraphs describe operating characteristics of the volt/ammeter with the MASTER Switch on and the engine on:

With the mode switch in the AMPS position the volt/ammeter the current will increase and will decrease as the battery takes a charge.

Load current cannot be monitored during flight. The generator is supplying all of the electrical load and charging the battery. Only the battery charging current can be monitored.

With the mode selector switch in the VOLTS position the volt/ammeter will display the bus voltage to .1 V. With the engine running the generator is capable of raising the bus voltage to a dangerously high level. It is the voltage regulator's job to limit the bus voltage. A low voltage reading will cause the battery to charge very slowly. A high reading can damage the battery and most of the electrical equipment. If the airplane bus voltage goes to a dangerously high level a bright red HIGH VOLTS light on the volt/ammeter will warn of this condition. If this happens turn the generator off to eliminate the over voltage condition.

Another common electrical problem is a discharging condition. If this condition goes unnoticed the result will be a dead battery in flight rendering all electrical equipment useless. To help avoid this situation the volt/ammeter warns you as soon as the battery goes into a discharging condition. The amount of discharging current can be displayed in the AMPS position. Discharging current will be displayed as a minus number. If this situation occurs, turn off any unnecessary electrical equipment. The lower the pilot can get the discharging current, the longer the battery will last.

The volt/ammeter will display trend information when the battery is in a discharging condition. As the battery discharges .1 V at a time, it is possible to judge the remaining time before the battery reaches a seriously low condition. The exact voltage at which each piece of equipment will start to malfunction depends on the design of that equipment. The volt/ammeter will work accurately from 40 to 7 V – far below where most electrical equipment starts to fail.

CIRCUIT BREAKERS

Two trip-free types of circuit breakers are used; single pole, with manual trip / reset button (a white band around the button becomes visible when the breaker is tripped) and single pole, combination switch/circuit breaker (the switch toggle returns to OFF when breaker is tripped).

The amps rating of the circuit breaker is etched on the end of the button or switch toggle. Circuit breakers are mounted in the switch panel and are connected directly to the bus bar. The circuit breakers are detailed in Figure 7-22.

WARNING

Do not operate the airplane with a tripped circuit breaker without a thorough understanding of the consequences.

CIRCUIT BREAKER NOMENCLATURE	AFFECTED EQUIPMENT/ SERVICE
PORT T & B	Pilot's turn & slip
PORT DG	Pilot's directional gyro
PORT AH	Pilot's artificial horizon
STBD T & B	Right hand turn & slip
STBD DG	Right hand directional gyro
STBD AH	Right hand artificial horizon
IGN	Ignition
GEN	Generator
MISC	
INERTIAL SEPARATOR	Inertial separator
ANN PANEL	Annunciator panel
DIGITAL INST # 1	ITT indicator, clock, fuel quantity indicator rear tanks, fuel system indicator, volt/ammeter, Ng,
DIGITAL INST # 2	NP indicator. Fuel quantity indicator front tanks, oil temperature and pressure indicator, OAT indicator, torque indicator
P3 HEAT	Engine P3 heat
TRIMS	Trim indicator
FLAPS	Flap system
FUEL PUMP	Airplane fuel system pump
AUDIO	Audio panel
GPS/COM#1	GPS/COM # 1
GPS COM#2	COM #2
TXPDR	Transponder
ENCODER	Altitude encoder
STEREO	Stereo
NAV	
START	Start switch
AIRCON	Airconditioning

Figure 7-22, Circuit Breakers

GROUND POWER RECEPTACLE

Ground power can be connected to the airplane using the socket located on the right hand rear fuselage. With ground power connected and turned on switching the MASTER switch ON will connect ground power to the bus bar. A green warning light marked EXTERNAL POWER will illuminate in the annunicator panel when external power is connected to the airplane.

START SWITCH

The START switch is a spring loaded toggle type switch located on the left hand side switch panel. The switch has three positions, START, OFF and INTERRUPT.

The START switch energises the ignition and engine starting circuits. Selecting INTERRUPT will de-energise the ignition and engine starting circuits.

IGNITION SWITCH

The ignition switch labelled IGNITION has three positions, AUTO, CONTINUOUS and OFF. The AUTO position arms ignition so that ignition will be obtained when the starter switch is activated. This position is used during all ground starts and during air starts with starter assist. The CONTINUOUS position is for ignition whilst in flight.

7.18 LIGHTING SYSTEMS

NAVIGATION/STROBE LIGHTS

The Whelen combination navigation/strobe beacon system comprises two wing tip light units, a power supply unit, a 5 amp navigation lights switch circuit breaker, a 5 amp strobe lights switch circuit breaker and associated wiring.

The left hand and right hand wing tip mounted light units combine the conventional red/green wing lights with flash tubes for the strobe lighting. A white navigation light is mounted on the tail of the airplane. The navigation lights are controlled by using the ON/OFF switch in the switch panel marked NAV. The strobe lights are controlled using the ON/OFF switch in the switch panel marked STROBE.

If the strobe or navigation light switch trips attempt one reselection to ON. Seek technical assistance if the switch trips a second time.

WARNING

The strobe lights should be turned off when operating in or in the vicinity of cloud as the reflection of the lights off the cloud may lead to disorientation.

LANDING LIGHTS

The landing light system comprises two 28 V 250 watt sealed beam lights, a 20 amp switch/circuit breaker and associated wiring.

The landing lights are located in the wing leading edge, inboard of the wing tip. The light assemblies are secured at three points by spring loaded screws which also provide angular adjustment. A pre formed plexiglass cover is fitted over the unit.

The circuit wiring runs from the switch/circuit breaker in the switch panel through the wing looms conduit to the light assemblies, disconnects are provided at the wing break points and spade terminals at the lights. The lights are earthed back at the wing outboard rib.

The landing lights are operated by an ON/OFF switch in the switch panel marked LAND.

INTERIOR LIGHTS

The airplane is equipped with lighting for the instrument panel and pedestal. Lighting is controlled using the switch in the switch panel marked INST. Lighting intensity is controlled by the four knobs located on the pedestal.

7.19 CABIN VENTILATION

Ambient air is ducted from two NACA ducts located immediately forward of the right and left hand exhaust pipes. The air is directed through separate flexible ducts to the cockpit and windscreen demist vents. The flow is controlled using either one or both of the cockpit ventilation controls located either side of the pedestal in the cockpit. Pulling the lever opens an aperture on the firewall which allows the air to flow into the cockpit through the vent. The pilot's lever controls the flow of ambient air to the windscreen demist outlets on the top of the instrument coaming.

7.20 OXYGEN SYSTEM

A Scott Mark II, 22 cubic feet (14 lbs), portable oxygen system is provided as optional equipment for the pilot. The system provides a manually variable flow of oxygen for two users to 16,500 feet or to 23,000 feet with optional accessories . Maximum cylinder pressure is 1800 psi, and minimum operation pressure is 300 psi.

The unit is mounted on the left cabin side wall just behind the pilot's seat. Contents are displayed on a pressure indicator mounted on the bottle. The oxygen system is turned on by rotating the green side mounted valve fully in a counter clock-wise direction. The required flow rate is adjusted by rotating the top mounted regulator valve until the operating altitude is displayed on the associated flow indicator. A green flow indicator on the line to the mask confirms oxygen flow.

CAUTION

The oxygen system should not be used with a contents pressure indication of less than 300 psi.

7.21 PITOT STATIC SYSTEM

GENERAL

The pitot static system comprises a pitot head with pitot heat mounted on the right hand wing tip, flush mounted static ports on either side of the rear fuselage and drains located on the underside of the rear fuselage.

The pitot static system supplies ram air pressure to the airspeed indicator and static pressure to the airspeed indicator, vertical speed indicator and altimeter.

PITOT HEATER

The pitot heating system comprises an electric heating element, which is an integral part of the pitot tube and head assembly mounted on the right hand wing tip, and a 5 amp switch/circuit breaker located in the switch panel in the cockpit, a warning light in the annunciator panel and associated wiring.

The pitot heat switch is located on the switch panel and is marked PITOT. The purpose of the pitot heater is to maintain proper operation of the pitot tube during flight in possible icing and heavy moisture conditions.

The amber coloured warning light marked PITOT HEAT INOPERATIVE indicates the pitot heat is either selected OFF or if selected ON the heating element in the pitot head is defective.

7.22 STALL WARNING SYSTEM

The lift detector vane / switch, located in the right hand leading edge of the centre wing, operates the stall warning system to provide audible warning to the pilot of impending stall. The warning horn will sound approximately 5 -10 knots above stalling speed. The horn is located in the overhead panel adjacent to the pilot's seat. The system can be checked by turning on the airplane MASTER switch and then lifting the vane on the wing and checking for an audible noise from the horn.

7.23 AVIONICS

The airplane can be configured with a wide range of avionics equipment. The details on fitted avionics equipment are included in Section 9 Supplements.

Crew intercommunication is through an audio panel and intercommunication unit with two sets of headphone jacks.

A press to transmit switch is located on the control column.

An AVIONICS MASTER switch on the switch panel controls power to the radios. It is suggested the individual radios power controls are left on and power to the avionics is controlled using the AVIONICS MASTER switch.

7.24 CABIN FEATURES

CABIN FIRE EXTINGUISHER

A 0.9 kg (1.98 lbs) portable fire extinguisher is located between the pilot and front passenger seat. The fire extinguisher bottle pressure should be checked before flight to ensure the pressure is in the green range and that the extinguisher is secure.

To operate the fire extinguisher:

Release the retaining clamp and lift the extinguisher from the bracket.

Pull out the red plastic pin.

Hold the extinguisher upright, aim the extinguisher at the base of the fire.

Press the lever and sweep the extinguisher from side to side.

WARNING

Ventilate the cockpit after extinguishing the fire to minimise exposure to gases from the fire.

CAUTION

Do not place the extinguisher too close to the fire in case the force of the fire extinguisher blows material around the cockpit.

AXE

An axe is located in the container located in the floor between the pilot's seat and front passenger seat.

FIRST AID KIT

A first aid kit is located in the container located in the floor between the pilot's seat and front passenger seat.

7.25 EMERGENCY LOCATOR BEACON

An ARTEX emergency locator beacon is fitted to the airplane. The system comprises a control unit located in the rear fuselage adjacent to the airplane battery, an externally mounted antenna and an ON/ARM switch in the instrument panel.

CAUTION

Before vacating the airplane after flight the airplane VHF communications radio should be tuned to 121.5MHz to ensure the airplane emergency locator beacon is not activated. If it is activated an audible beacon transmission will be heard in the headset.

7.26 SPEED WARNING HORN

A speed warning horn is fitted to the airplane. The speed warning system will alert the pilot that Vne plus 6 kts has been exceeded. The system comprises a pressure switch mounted under the pilot's seat and a horn mounted in the overhead panel adjacent to the pilot's head. The pressure switch is plumbed into the pitot and static systems of the airplane and activates the horn to warn the pilot.

7.27 OIL COOLER HEATER

A heater is fitted to the NACA duct on the right-hand side of the engine cowl which feeds air into the oil cooler. The purpose of the heater is to prevent the NACA duct from being blocked by ice and or snow. Section 3 details the conditions of use.