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1.16.00 CONTENTS

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The engine is a Pratt & Whitney of Canada PW 127 F certified for a 2750 SHP max take-off rating . However, in normal operation, take-off rating will be 2475 SHP with an automatic power increase to 2750 SHP (reserve take-off rating RTO) in case of other engine failure.

Power setting is characterized by constant power lever and condition lever positions. The power adapted to the flight phase is selected by the pilot through a power management selector.

The engine comprises two spool gas generators driving a six blade propeller via a free turbine/concentric shaft/reduction gear box assembly. Propeller regulation is electronically controlled.

The propeller is an Hamilton Standard 568 F

- Diameter : 3.93 m (12.9 ft)
- Rotation : clockwise (looking forward)
- 100 % Np : 1200 RPM
- Weight: : 180 kg

The engine accessories are mounted on two accessory gear boxes, one driven by the HP spool, and one by the propeller reduction gear box.

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20.1 ENGINE (See schematics p 7/8)

MAIN COMPONENTS (See CROSS-SECTION)

① Low Press Compressor

The low press compressor is a centrifugal type.

② High Press Compressor

The high press compressor is a centrifugal type.

③ Diffuser Pipes

The diffuser pipes from the first stage lead into constant diameter cross over ducts which blend together to give a full ring with uniform flow at entry to the second stage.

④ Combustion Chamber

The combustion chamber is of the fully annular reverse flow perforated sheet metal type. Fourteen piloted air blast fuel nozzles provide quick, clean light offs. Hot inner parts are ceramic-covered.

⑤ High Press Axial Turbine

The high pressure axial turbine drives the high press compressor. It incorporates a cooled vane ring and cooled blades permitting an increase in turbine inlet temperature, higher specific work and consequently a lower flow and a lighter engine.

⑥ Low Press Axial Turbine

The low press axial turbine drives the low press compressor. It has uncooled blades and vanes.

⑦ Free Turbine

The two axial free turbine stages drive the reduction gear box.

⑧ Accessory Gear Box

Turbo machine accessories are mounted on the accessory gear box which is driven by the HP spool. The accessory gear box is located at the top of the engine and contains drives for :

- The DC starter/generator,
- The HP fuel pump,
- The oil pumps.

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⑨ Propeller Reduction Gear Box

The power turbine shaft is connected to the propeller reduction gear box by a coupling driveshaft flexible diagram connections at each end. The gear box is mounted offset of the centerline of the turbo machine. The speed reduction is obtained in two stages. On the reduction gear box are installed.

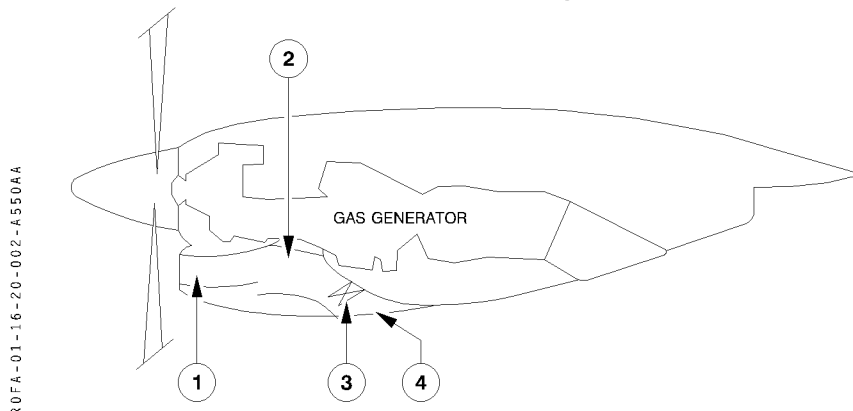
- The ACW generator
- The propeller Valve Module (PVM) controlled by Propeller Electronic Control (PEC).
- The (HP) pump and overspeed governor
- The auxiliary feather pump
- The propeller brake (on RH engine only)
- The fuel cooled oil cooler (FCOC)

***Note :** Auxiliary feather pump is driven electrically. On ground, its activation by the CL is inhibited.*

The other components are actuated through the reduction gear box.

AIR INLET

As presented on figure, the engine air intake ① is offset and is a shallow "S" bend designed to provide uniform inlet flow to the compressor. The curvature ② is intended to provide inertial separation and protection in the event of foreign object ingestion. It is also used to divide airflow in a primary flow directed to the engine, and a secondary flow directed to the oil cooler ③. Control of the secondary airflow is achieved by automatic oil cooler flaps positioning ④.



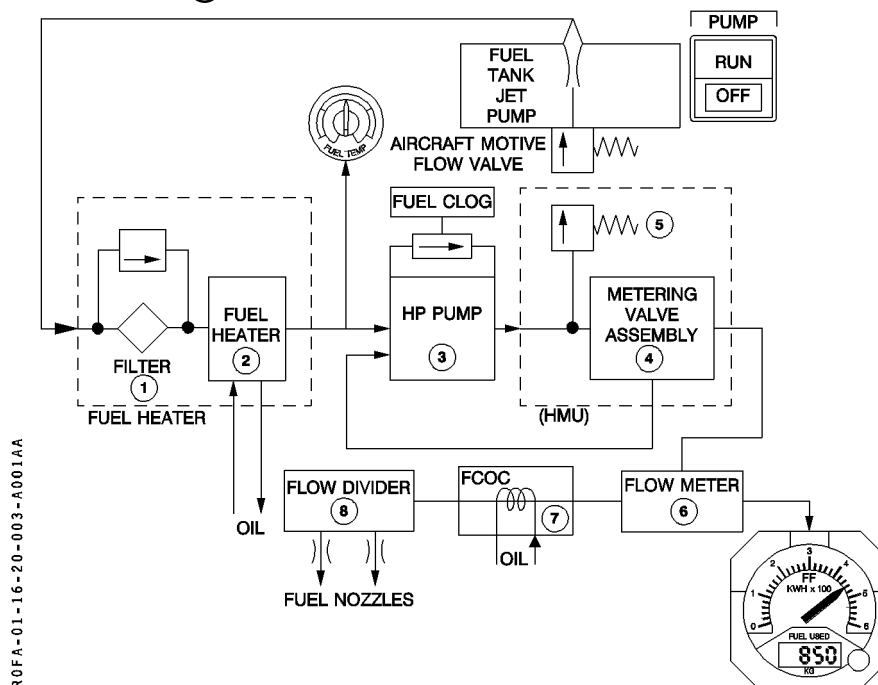
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R 20.2 FUEL SYSTEM

The fuel supplied from the A/C fuel tank flows through :

- A fuel heater which includes :
 - a screen ① with a by-pass capability.
 - a fuel heater element ②. The source of heat is engine oil, and the fuel temperature is thermostatically controlled. A fuel heater outlet temperature indication is provided.
- A HP pump ③ with a filter, a clogging indicator is provided on pilot's panel.
- The Hydro Mechanical Unit (HMU) which has two functions :
 - to meter the fuel flow delivery to the engine by a metering valve assembly ④, the excess being returned to HP pump inlet,
 - to provide the HP motive flow required by the fuel tank jet pump through an engine valve ⑤.
- A fuel flowmeter ⑥.
- A Fuel Cooled Oil Cooler (FCOC) ⑦, that provides cooling of the lubricating system by using fuel system as cooling source.
- A flow divider ⑧ to the fuel nozzles.



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20.3 LUBRICATION SYSTEM (See schematic P9/10)

Synthetic oil specification MIL-L-23699.

A single oil system serves the turbo machinery, the reduction gear box and the propeller pitch change system.

- Oil Tank

Oil is contained in a 14.4 L tank ①. A filter cap is provided on the tank. Quantity indication is checked by sight glass (or by a dipstick) on the side of the tank.

- Pressure system

A gear pump ② driven by the accessory gear box supplies oil through an air cooler ③ mounted in the nacelle and a filter ④ both fitted with by-passes in case of clogging.

RGB oil is also cooled in a fuel heater, ⑤ as well as the FCOC ⑥. An oil temperature sensor is provided.

Oil pressure is controlled by a regulating valve ⑦. A low temp. valve ⑧ is provided to eliminate damaging pressures surges on cold starts. A pressure transducer ⑨ and a low pressure switch ⑩ are installed.

- Scavenge system

Scavenging is blown down or gravity drained except for N° 6 and 7 bearing cavity and the reduction gear box, on which gear pumps are used.

20.4 IGNITION SYSTEM

R Each engine is equipped with a high energy ignition system. It consists of two engine
R mounted ignition exciters (A and B) powered by the DC ESS BUS and two spark
R igniters, one for each ignition exciter. Ignition cycle includes two phases. During 25 s, the
intensity is 5 to 6 sparks/s and then, the intensity becomes 1 spark/s.

The engine ignition system provides ignition for :

- On ground starting using exciter A, exciter B, or exciters A+B (according to ENG START rotary selector position).

Note : Using exciter A or exciter B may allow to detect an hidden failure.

- In flight starting using exciters A+B regardless of start selection.

In addition, for each engine, in case of NH drop below 60 % exciters A+B are automatically activated. This action is inhibited if :

- NH drops below 30 %, or
- EEC is deselected, or
- CL is set on feather or fuel S/O position, or
- On the failed engine in case of ATPCS sequence.

Note : When EEC is deselected, exciters A+B can manually be activated, using the MAN IGN guarded push-button.

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R **20.5 PROPELLER** (See schematic P11/12)

The propeller is driven by a free power turbine by means of a reduction gear box. Pitch (B) change is hydromechanically controlled by a Propeller Valve Module (PVM). The PVM is controlled by a Propeller Electronic Control (PEC) installed in each engine nacelle which provides the synchrophasing between the two propellers.

Interface between flight deck and PEC is ensured by a Propeller Interface Unit (PIU) installed in the electronic rack.

The propeller control system uses the condition lever, the PWR MGT rotary selector and the power lever to activate the pitch change mechanism through the governors and associated equipments.

The system is protected against :

- Low pitch angle in flight,
- Overspeed,
- Hydraulic pressure loss.

The RH Propeller Reduction Gear Box is provided with a brake to be used on the ground for Hotel mode operation.

PVM

The PVM is installed on the reduction gear box and allows :

- The basic speed set
- Beta scheduling
- Reversing
- Synchrophasing
- Feathering
- Low pitch protection

$$-14^{\circ} \text{ (Reverse)} < \beta_{\text{ref}} < 78.5^{\circ} \text{ (Feather)}$$

Additionally it is used, with the overspeed governor, to contain propeller overspeed.

The PVM comprises :

- An Electro Hydraulic Valve (EHV) which meters the pitch change oil to the pitch change actuator and allows a normal feathering of the propeller.
- A protection valve which is a part of overspeed, low pitch and back-up feathering functions.
- A feather solenoid (EHV back-up).
- A Rotary Variable Differential Transducer (RVDT) which adjust and confirm PLA position.

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PEC

The PEC is a dual channel electronic box which provides closed loop control over the propeller pitch change system. The PEC detects, isolates and accomodates systems faults.

In the event of a failure of the primary channel, control of the propeller system will automatically be transfered to the back-up channel.

Propeller speed is calculated by the PEC through EEC (altitude and airspeed data) and Np sensors.

PIU

The PIU (one per PEC) is an electronic box located in the electronic rack that realizes the interface between the PEC and the cockpit for propeller speed selection, and PEC fault signalisation logics.

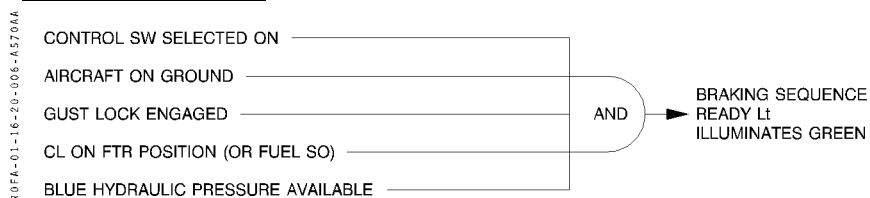
PROPELLER BRAKE

The propeller brake is fitted on a countershaft on the RH engine reduction gearbox in order to stop the propeller (and the power turbine).

When the engine is running in Hotel mode :

- The HP spool drives the DC generator.
- Bleed pressure is available downstream the HP compressor and supplies both packs.

ENGAGEMENT LOGIC



READY light must be illuminated, prior to any propeller brake activation. Loss of one of the above mentionned required conditions for engagement, will not imply propeller brake disengagement. However, when gust lock is released and propeller brake is still engaged, PROP BRK light will illuminate red on CAP, associated with CRC.

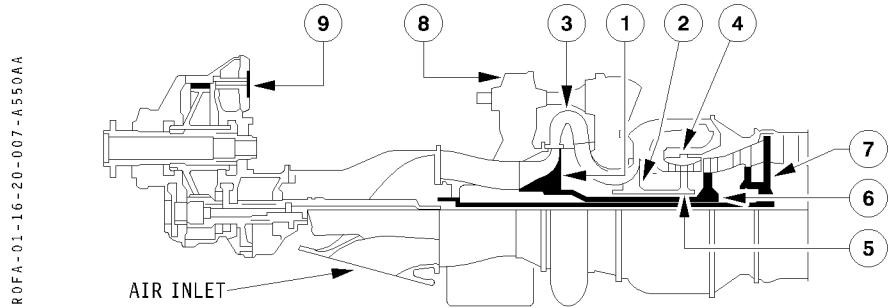
Note : After a propeller braking or releasing sequence, READY light may remain illuminated for about 15 s.

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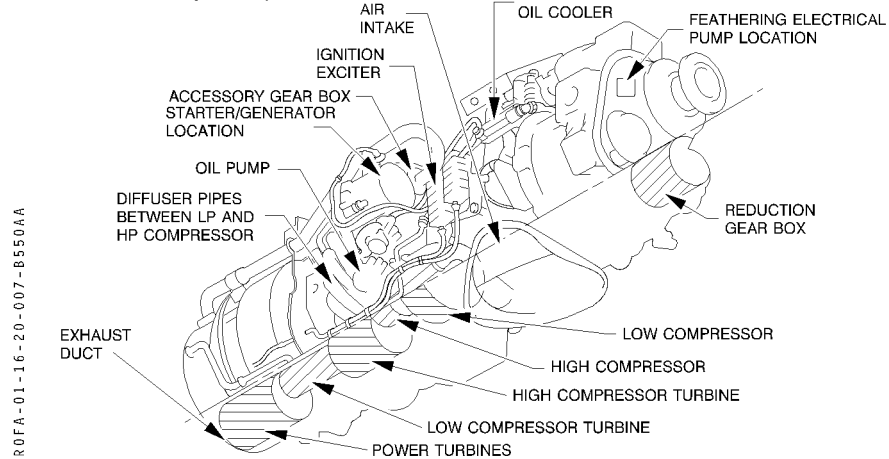
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20.6 SCHEMATICS

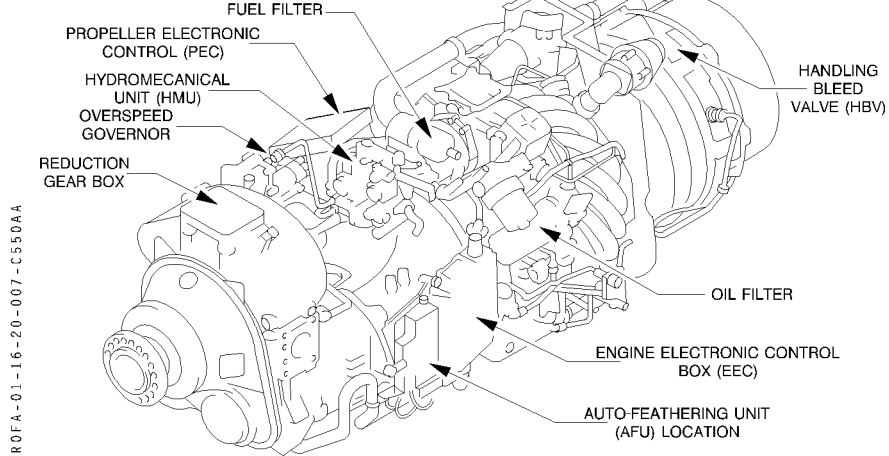
CROSS SECTION



EXTERNAL VIEW (RIGHT)



EXTERNAL VIEW (LEFT)

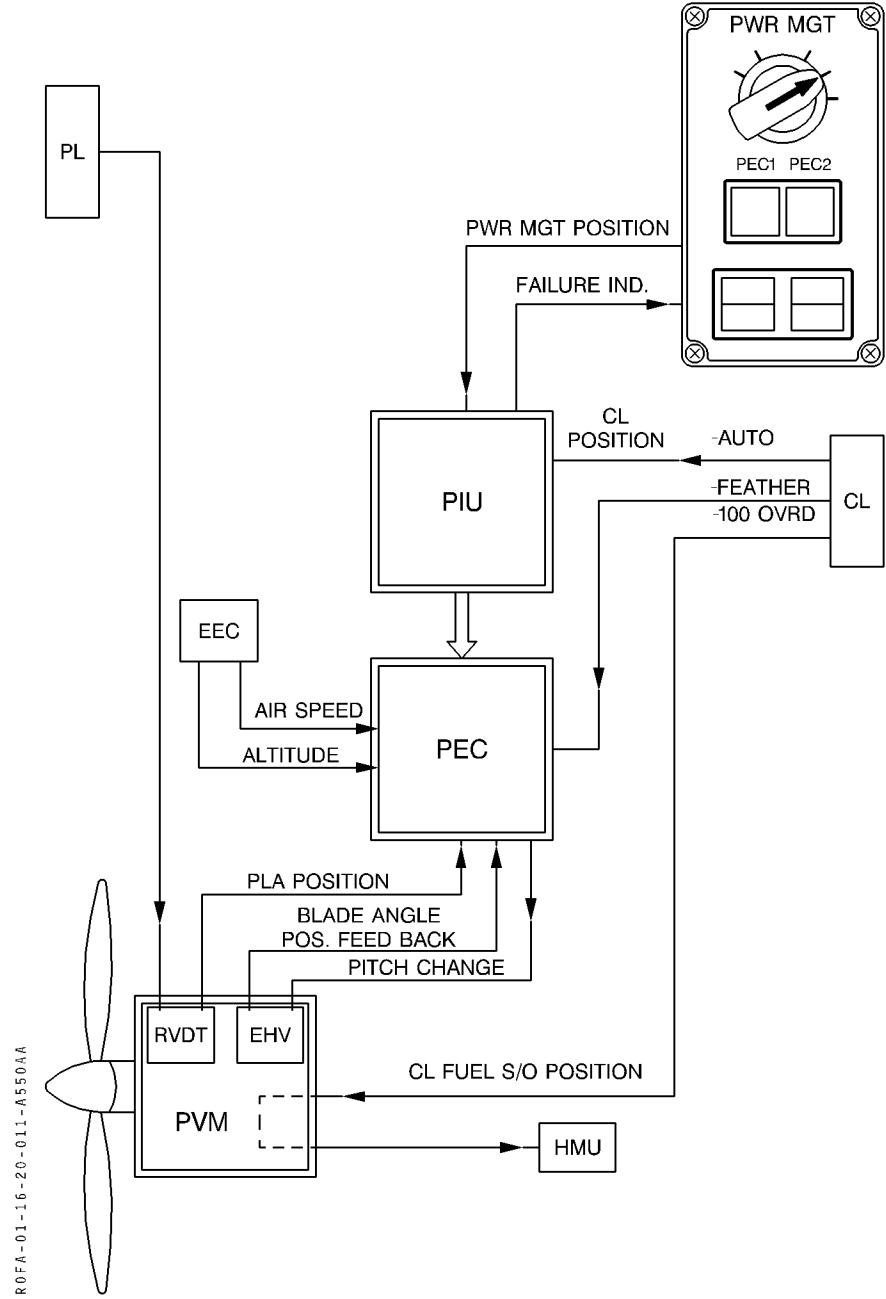


 ATR 72 F.C.O.M.	POWER PLANT		1.16.20		
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PROPELLER REGULATION SCHEMATIC



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			P 1	550
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30.1 GENERAL

The power control parameter is the torque :

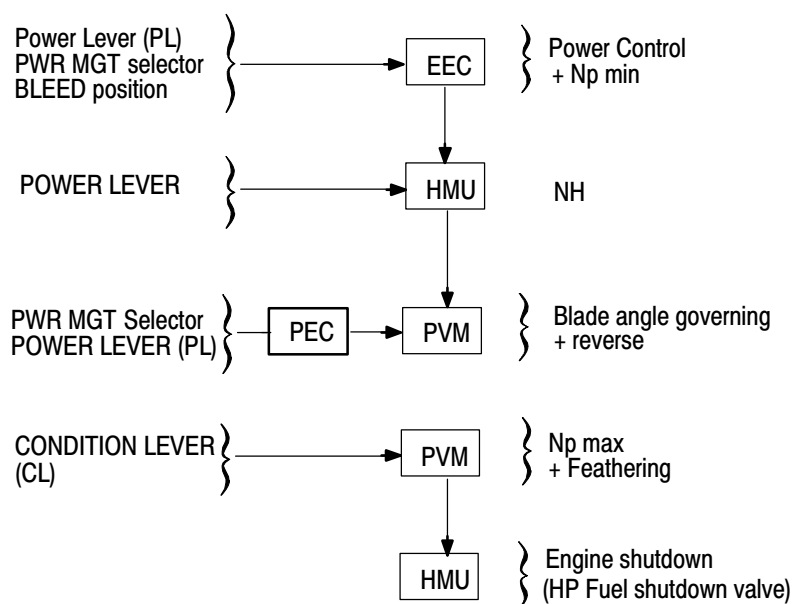
$$TQ = \frac{P \text{ (engine power)}}{NP}$$

The maximum torque for each flight condition, at the selected rating, is computed by the FDAU independently of the engine governing and displayed on the TQ indicator (Automatic BUG).

An engine Electronic Control (EEC) provides control of fuel flow in the HydroMechanical Unit (HMU), through a stepper motor in such a way as to control the torque in accordance with outside conditions and positions of :

- The power lever (PLA).
- The power management selector (PWR MGT).
- The bleed valves.

The HMU delivers a fuel flow which generates the NH compressor rotation speed.



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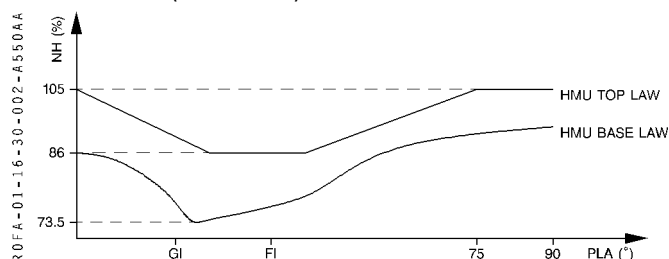
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30.2 ENGINE GOVERNING

MAIN UNITS (HMU-EEC-PVM-PWR MGT)

HYDROMECHANICAL UNIT (HMU)

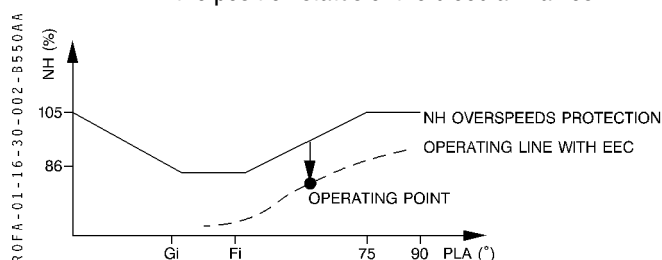
- Performs fuel metering in steady state operation and protects the system in case of transients.
- Commands a rotor speed in accordance with 2 laws ($NH = f(PLA)$) :
 - . 1 st law (called top) used when EEC is ON to protect NH overspeeds.
 - . 2 nd law (called base) used when EEC is OFF.



- Includes a stepper motor which adjusts the flow controlled by the hydromechanical channel, in accordance with commands transmitted by the EEC.
- Ensures engine shutdown (HP fuel S/O).
- Delivers a motive flow to the fuel tank jet pump.

ENGINE ELECTRONIC CONTROL (EEC)

- Regulates a given power, by controlling the stepper motor, to obtain a predicted torque as a function of :
 - the power lever position
 - the PWR MGT selector position
 - flight conditions
 - the position status of the bleed air valves

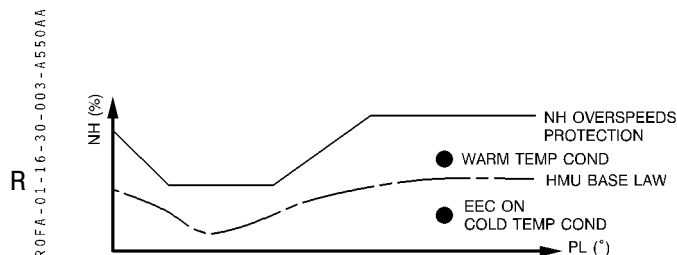


Note : Operating line with EEC ON may be placed above or below the HMU BASE LAW depending on weather conditions

R

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- Ensures minimum propeller speed control, on ground and at low power (see propeller governing).
- Delivers, in case of engine failure at take-off, automatic uptrimmed take-off power to the valid engine (ATPCS) by responding to the signal generated by the Auto-Feather Unit (AFU) of the failed engine.
- Controls the modulated opening of the Handling Bleed Valve (HBV), so as to ensure correct LP compressor operation.

PROPELLER VALVE MODULE (PVM)

- At high power, controls the propeller maximum speed N_p , according to the PWR MGT selection.
- Controls propeller pitch at low power and when using reverse.
- Ensures low pitch through a solenoid (when PLA are below FI position).

PWR MGT SELECTOR

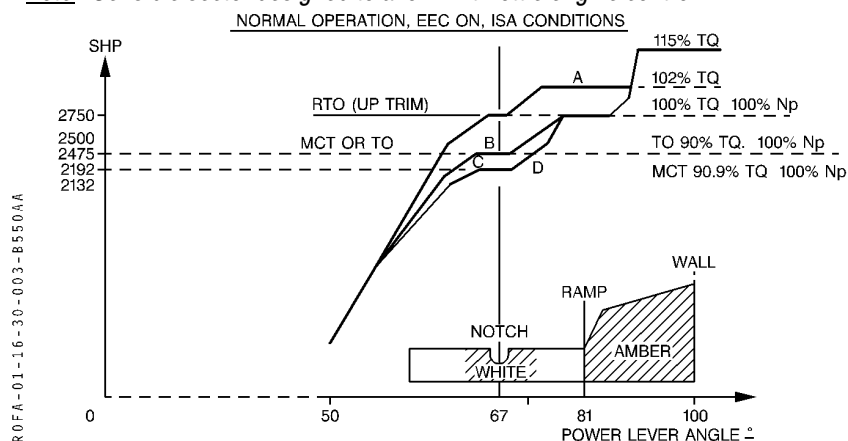
LINE A : One engine out operation

LINE B : Normal TO or MCT

LINE C : CLB

LINE D : CRZ

Note : Sensible sector designed to allow fix throttle engine control.



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			P 4	070	
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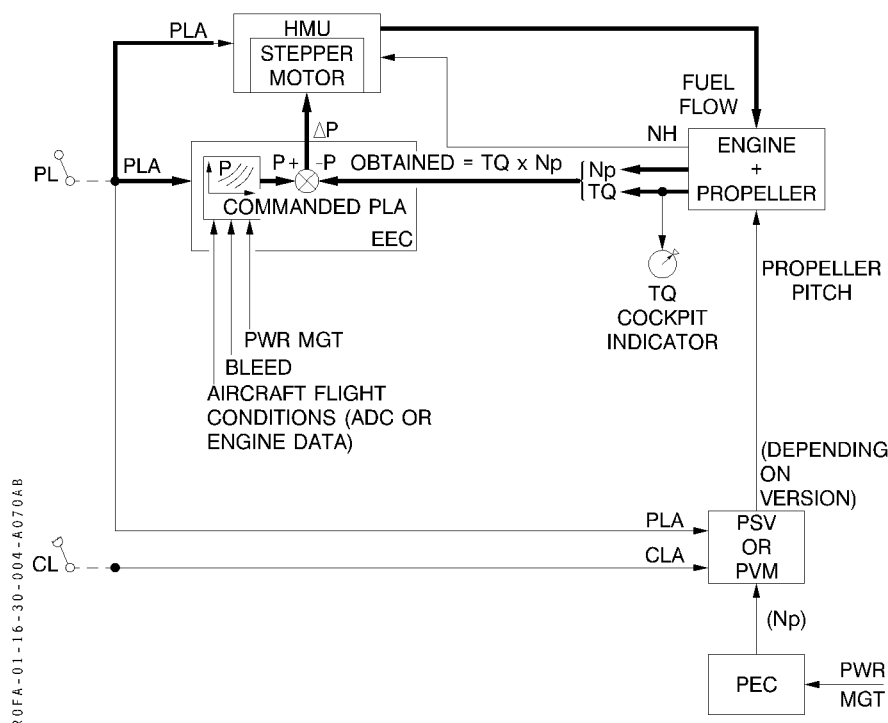
ENGINE POWER CONTROL LAWS

R ① TOP LAW (EEC ON)

This is a TQ (PLA) control law, ensuring a constant power.

It is backed-up by an NH (PLA) law which becomes active :

- At low power (authority of engine torque control is gradually reduced to be cancelled out at FI),
- In case of engine torque control failure,
- In Hotel mode.



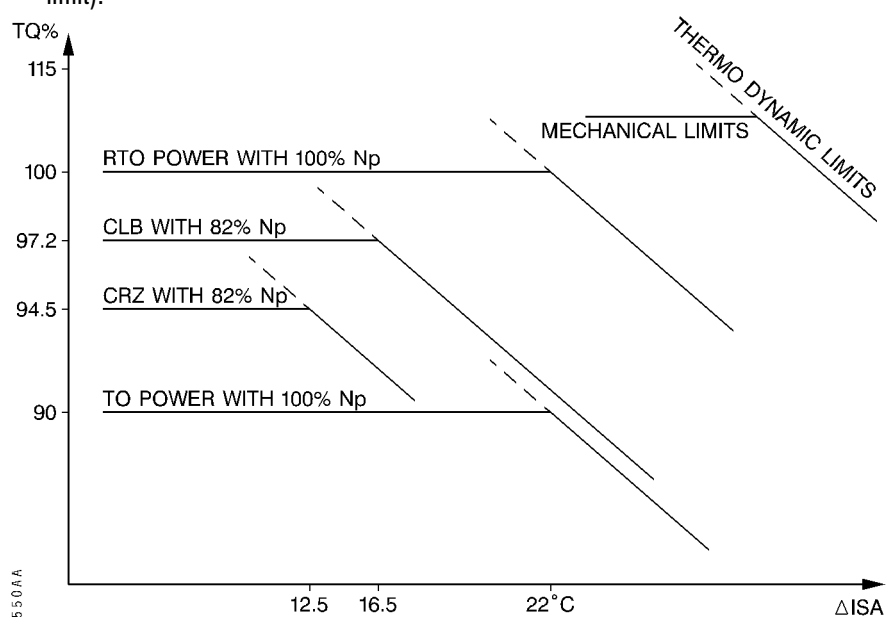
According to the rating selected on the PWR MGT rotary selector, with the PL at a set point, the EEC commands a determined engine power and therefore a torque value (for a given propeller speed).

Thus, the torque which is the engine control parameter, is controlled (with PLA constant) in all ambient conditions.

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When necessary, power is automatically reduced in such a way as to maintain the torque at the maximum value, authorized for the rating considered (thermo dynamic limit).



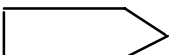
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Example for : sea level, bleed off, static conditions.

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PLA quadrant has **TWO CLEARLY IDENTIFIED POSITIONS**

Position ①	WHITE MARK	
------------	------------	---

At this position marked by a notch the control system delivers max rated power corresponding to the mode selected.

TO : P = 2475 SHP

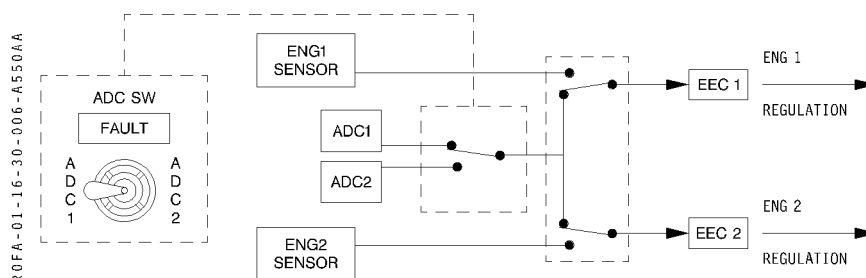
MCT : P = 2500 SHP

CLB : P = 2192 SHP

CRZ : P = 2132 SHP

ENGINE REGULATION

- Engine regulation uses pitot and static data coming from EEC. EEC data are elaborated either from the selected ADC (normal configuration) or from engine sensors and imposed data (emergency configuration).



Note : If the selected ADC electrical supply fails, two events may occur :

- If ADC 2 was selected, ADC 1 immediately takes over from ADC 2 ; ADC SW FAULT light illuminates.
- If ADC 1 was selected, engine sensors immediately take over from ADC 1. ADC SW FAULT light does not illuminate.

The engine torque must match with the torque calculated by the FDAU, except when TO is selected at the PWR MGT selector.

When TO is selected at the PWR MGT selector, with the ATPCS armed :

- the torque calculated by the FDAU corresponds to RTO
- in normal T.O. configuration

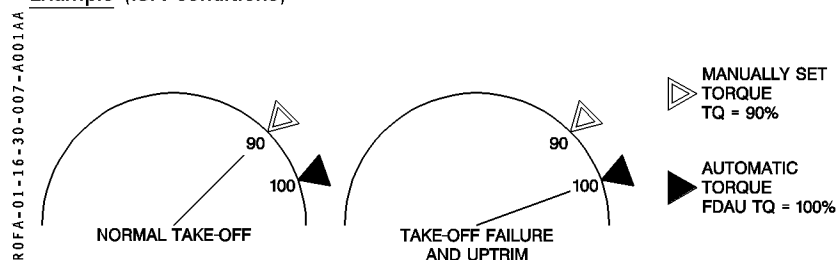
PL NOTCH	
PWR MGT TO	
ATPCS ARMED	

The FDAU BUG is positioned at RTO. This value must be crosschecked with temperature and altitude information. Manual BUG must be set at RTO - 10 % TQ position.

In the event of engine failure and automatic uptrim, the engine torque will coincide with the FDAU torque (RTO).

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Example (ISA conditions)



Comment

If necessary, moving the lever out of the notch will enable to set precise power setting without any discontinuity.

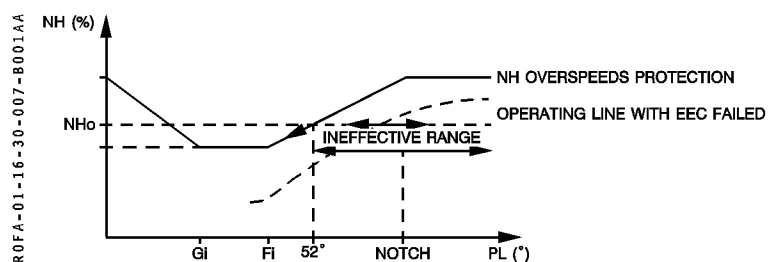
Position	②	beginning of AMBER SECTOR
----------	---	---------------------------

This position, characterized by a ramp threshold is used during GO Around or at take off in the event of ATPCS failure. The power delivered is GA (or RTO) for NP = 100%, irrespective of the mode selected on the PWR MGT rotary selector.

In this position, the engine torque agrees with the RTO torque calculated by the FDAU

Note : The ramp threshold may be overridden, thus enabling the lever to be positioned up to the stop of the PLA quadrant. This procedure must remains EXCEPTIONAL. It is AN EMERGENCY PROCEDURE WHICH WILL PROVIDE UP TO 15 % more power than RTO.

② EEC FAILURE



- EEC FAULT Flashes.
- NH is automatically frozen to its prior value (FAIL FIX) (PL set forward 52°)
- As long as EEC Fault is flashing deselection is strictly prohibited.
- The PL stays ineffective until PL travel reaches 52°.
- When PL reaches 52°, the reversion is automatically assured to the manual mode.
 - EEC FAULT light stays ON.
 - The pilot deselected EEC.
 - PL is active again and follows HMU base law.

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			P 8	500	
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3 BASE LAW (EEC OFF)

The NH (function of PLA) base law is used when the EEC is deselected.
(REVERSION MODE).

. Refer to the schematic p 4

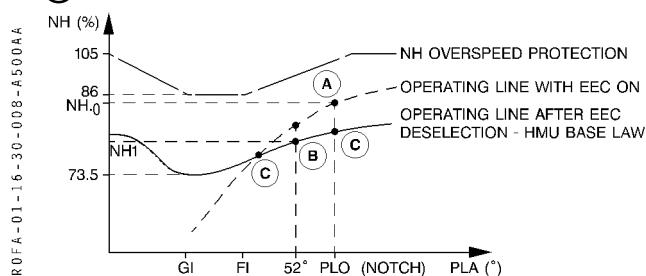
EEC Deselection Sequence

- (A) at time of EEC failure
- | | |
|-------------------|----------|
| PLA = Plo (NOTCH) | NH = NHo |
|-------------------|----------|

NH remains fixed at NHo value until either PL travel reaches 52° or NH reaches its overspeed protection.

(B) NH changes to NH1 value (at that time a power increase or decrease can be noted, according to the operating point position prior to EEC failure with respect to HMU base law).

(C) NH follows the NH (PLA) schedule of the HMU base law.



This mode of operation (REVERSION) features :

- Loss of torque regulation at constant power lever position (changes in ambient conditions will call for PLA adjustments to maintain maximum engine torque).

Note : • Loss of the EEC has no effect on the two torque indications (digital and analogic) displayed

- Handing bleed valve (HBV) is still monitored by the EEC deselected with a law function of NH instead of PLA.
- Loss of propeller underspeed control at low power (FUEL GOVERNING).

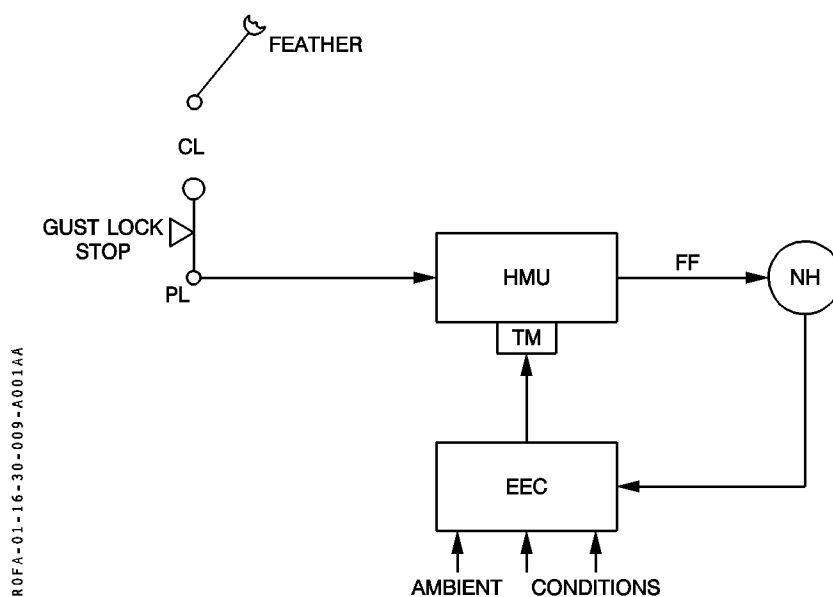
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HOTEL MODE

This mode, available on the RH engine only, is exclusively used on the ground to provide aircraft autonomy in terms of air conditioning and DC power supply with the gas generator operating and the propeller locked by a hydraulic brake.

- PL is controlling the power of the generator ($NH = f(PL)$) since the fuel governing function of the EEC is automatically cancelled when selecting feather. A throttle stop is provided by the gust lock lever to avoid an overtorque risk. Without this protection, hotel mode cannot be selected.
- CL has to be set to feather prior to selecting hotel mode and must be left in this position. Hotel mode can be used with EEC ON or OFF. The gust lock stop precludes overpowering the engine.



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30.3 PROPELLER SPEED GOVERNING

BLADE ANGLE GOVERNING

This is the normal in flight governing mode.

The PVM adjusts the propeller pitch according to the power setting in such a way as to maintain a constant propeller speed N_P .

This governing is available whether EEC is ON or OFF.

PWR MGT selector commands N_P propeller speed (through the PEC)

PL commands power (and therefore TQ, at a given N_P)

FUEL GOVERNING

This is the ground governing mode at low speed and low power.

The EEC automatically increases the fuel flow so as to maintain a minimum propeller speed ($N_P = 70.8\%$)

CL is set in AUTO position.

Note : This control mode is cancelled :

- when EEC is OFF,
- when the propeller is in FEATHER position.

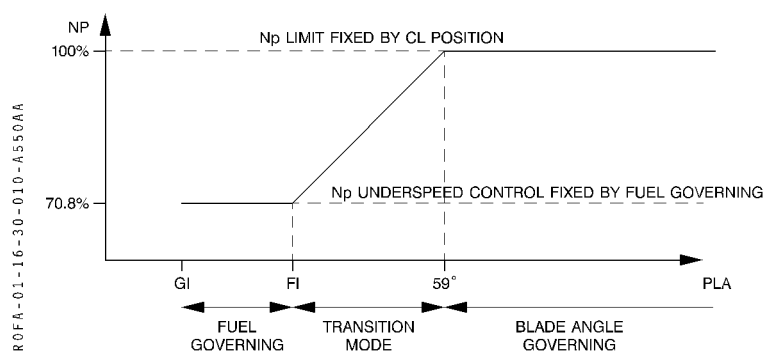
TRANSITION MODE

This is the intermediate mode between the two previous ones.

It only applies on ground, or in flight at low power and low speed.

The N_P speed is comprised between 70.8% and N_P selected.

- Control operation may be summarized through the graph below, depicting evolution of the propeller speed N_P function of PLA (example given in MCT mode).



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	CONTROLS		P 1	550	
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40.1 ATPCS

GENERAL

The propulsion unit includes an ATPCS (automatic take-off power control system) which provides in case of an engine failure during take-off the uptrimmed take-off power on the remaining engine combined with an automatic feathering of the failed engine.

This system enables to reduce the power normally used for take-off by an amount of about 10% below the power certified by the engine manufacturer. This is favorable to engine/propeller life without affecting the take-off performance in case of an engine failure.

Full ATPCS (i.e. uptrim and autofeather) is only available for take-off (see arming conditions below).

COMPONENTS

The ATPCS operates with the following components on each engine :

- * The Auto Feathering Unit (AFU) which is the main system element. It conditions the torque signal coming from the engine and provides the torque indication :
 - to the cockpit indicators (needles only),
 - to the FDAU,
 - to the MFC which includes the autofeathering/uptrim logic functions, and delivers the corresponding control signals to the feather solenoid, to the feathering electrical pump and to the opposite EEC.
- * The EEC which transmits a signal enabling the power to increase from TO to RTO (or a Δ NH signal during ATPCS test at ground idle).
- * The feather solenoid mounted on the PVM,
- * The feathering electric pump installed on the reduction gear box.

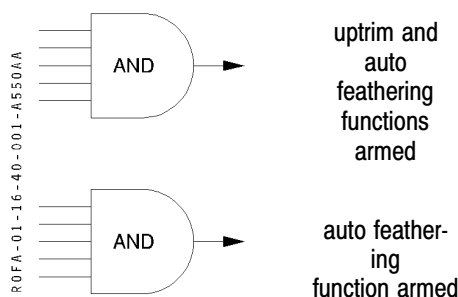
In the Cockpit :

- * The ATPCS pb on the cockpit center panel,
- * The PL position (sw set to 49°),
- * A test selector located on the pedestal.

ARMING CONDITIONS

PWR MGT selector TO
ATPCS pb ON
Both PL above 49°
Both torques above 46%
Aircraft on ground

PWR MGT selector TO
ATPCS pb ON
Both PL above 49°
Both torques above 46%
Aircraft in flight



	POWER PLANT		1.16.40		
	CONTROLS		P 2	500	
					DEC 97

AA

TRIGGERING CONDITIONS

One torque below 18%

SEQUENCE AFTER TRIGGER

	Time	Trigger	2.15 s	t
R R	ATPCS	▼	▼	▶
	ARMED ON GROUND	uptrim is triggered and bleed valve is shut off on the remaining engine	autofeather is activated on the affected engine	
			▲ - feather solenoid activated - feathering electric pump energized - inhibition of autofeather on the remaining engine - ARM light extinguishes ▼	
	ARMED IN FLIGHT		autofeather is activated on the affected engine	

Note : Nothing happens on the affected engine for 2.15 seconds, but uptrim is energized on the remaining engine. This feature enables to perform an acceleration stop without having autofeather in order to benefit from some reversing action on the failed engine.
In this case, the throttle reduction occurring within 2.15 seconds period automatically disarms the mode.

Once the mode has been triggered, its cancellation can only result from either :

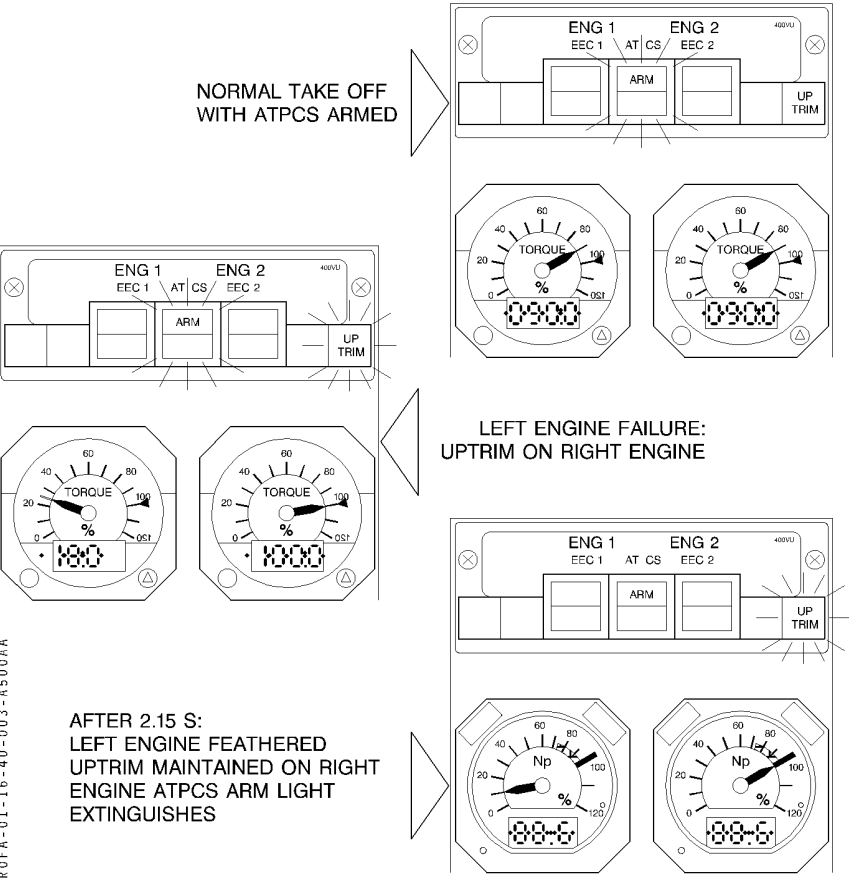
- PWR MGT other than TO, or
- ATPCS Pb set to OFF, or
- both PL retarded.

CAUTION : If the engine is restarted, IT WILL BE NECESSARY TO SELECT PWR MGT to MCT position after relight in order to be able to UNFEATHER the propeller.

	POWER PLANT		1.16.40	
	CONTROLS		P 3	500
				JUN 97

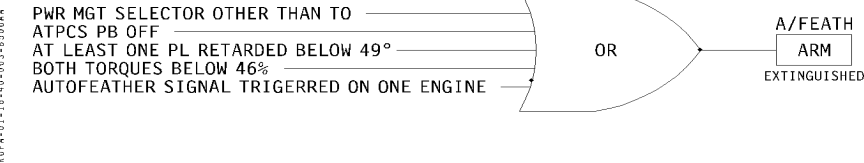
AA

ATPCS SEQUENCE
 armed on ground



A/FEATH FUNCTION

Disarming conditions



Note : During a normal flight (without engine failure) uptrim/autofeather will be disarmed after take-off when leaving the TO position on PWR MGT.

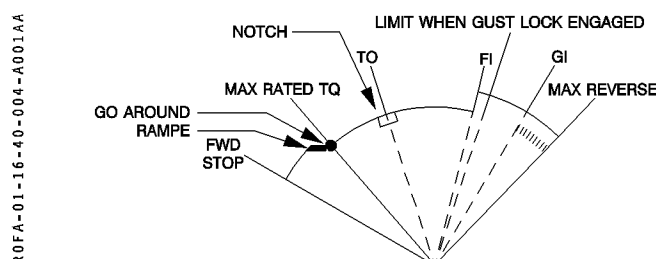
	POWER PLANT		1.16.40	
	CONTROLS		P 4	550
				SEP 05

AA

40.2 POWER LEVERS (PL)

PL is mechanically connected to the HMU and to the PVM through cables and rods. This lever controls the power plant thrust from Max rated TQ to max reverse.

CAUTION :in case of engine failure, the PL remains active controlling the pitch angle, and therefore associated propeller drag as long as propeller is not feathered.

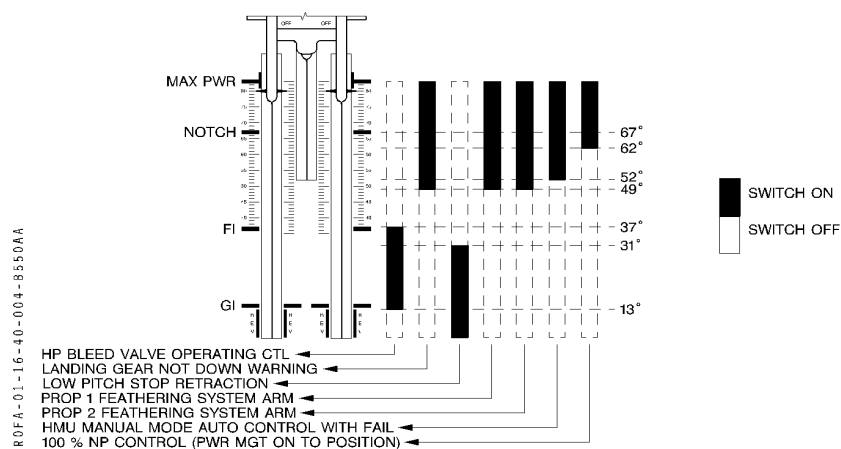


For take off acceleration the pilot will push PLs from GI to the TO position which is identified by a notch.

- R At landing, the pilot will reduce PLs to FI. Then after flight idle gate automatic unlocking, he will act on the triggers to reduce down to GI, and eventually to reverse. Reverse sector is "protected" by a spring rod : a force must be exercised by the pilot to position the PL into reverse sector. Releasing this pull force will bring PL back to around GI. When the PL are on the MAX RATED TQ position, the pilot can increase the power (if necessary) by pushing the PL up the RAMP (after GO AROUND position) to the FWD stop.

Note : On the ground, the gust lock, when engaged, prevents excessive PL in the forward traction sector angle.

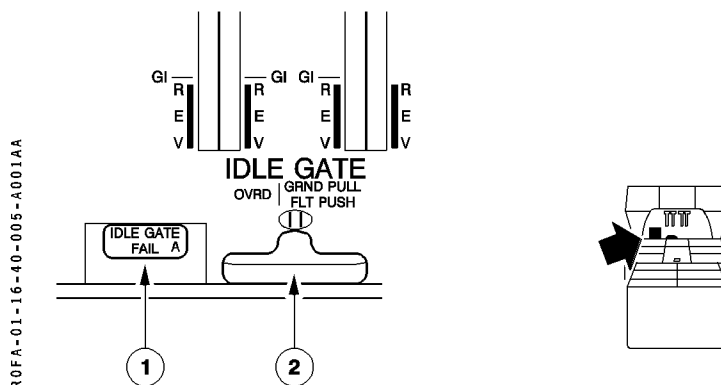
POWER LEVER SWITCHES



	POWER PLANT		1.16.40		
	CONTROLS		P 5	001	
					DEC 96

AA

40.3 IDLE GATE



At take-off, as soon as both landing gear absorbers are released, a gate prevents PL angle reduction below FI.

At landing, as soon as one landing gear absorber is compressed, this gate is automatically retracted and the PL may travel down to GI and reverse (below GI).

① **IDLE GATE FAIL light**

Illuminates amber and the CCAS is activated when the gate does not engage automatically in flight or does not retract automatically at landing.

② **IDLE GATE lever**

Enables manual override in case of failure of the automatic logic.

In flight : push

On ground : pull. An amber band appears.

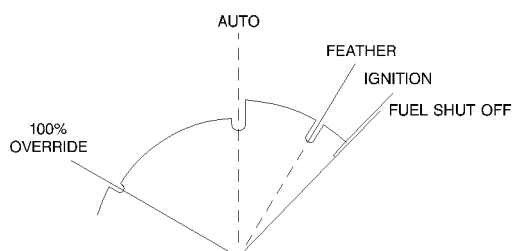
	POWER PLANT		1.16.40		
			P 6	550	
	CONTROLS				JUN 97

AA

40.4 CONDITION LEVERS (CL)

They operate feathering control, HP fuel shut off valves and propellers speed (NP), controlled by PVM when in blade angle governing propulsion mode.

R0FA-01-16-40-006-A550AA



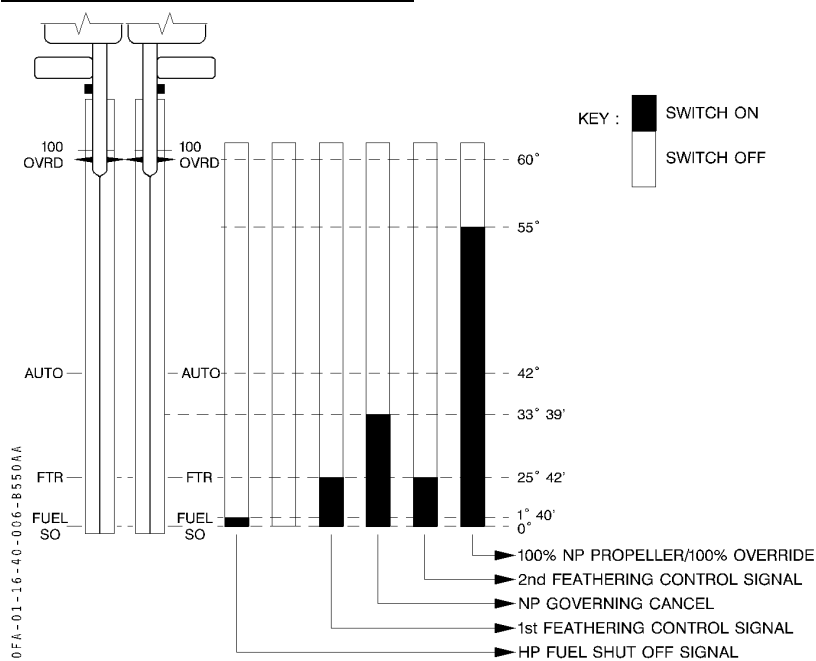
- AUTO position controls propeller speed through PWR MGT selector position.
- 100 % OVRD position sets manually Np MAX.

It is necessary to act on a trigger located on the lever side to travel

- from AUTO to FTR (and return),
- from FTR to FUEL SO (and return).

A red light incorporated in the lever will illuminate if a fire is detected on the associated engine provided CL is not in FUEL SO position.

CONDITION LEVER SWITCHES



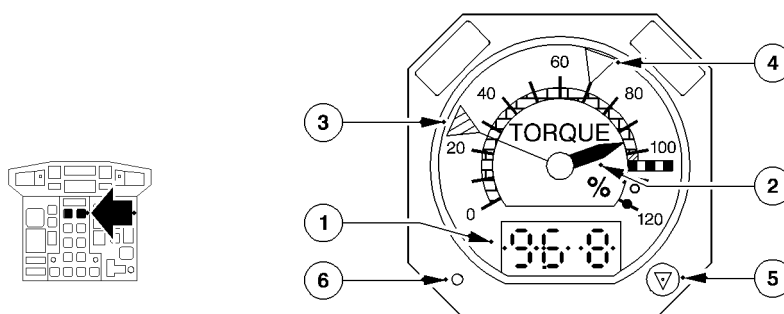
	POWER PLANT		1.16.40		
	CONTROLS		P 7	500	
					JUN 97

AA

40.5 INDICATORS & CONTROL PANELS

TORQUE IND

ROFA-01-16-40-007-A500AA



Two sensing torque probes are located on the reduction gear box. One of them sends a signal to the AFU which supplies the analogic torque ind. (pointer). The other one sends a signal to the EEC which supplies the electronic torque ind. (digital counter).

① Digital counter

Actual torque is displayed.

If "000" is displayed, torque sensor is failed.

If "---" is displayed, EEC cannot control the HBV which is then closed.

If "LAB" is displayed, a wrong EEC is installed.

② Pointer

Actual torque is displayed.

Green sector : 0-100%

Red mark : 100%

Amber sector : 100-106%

Red dashed radial : 106.3% - Red dot : 120%

③ FDAU target

Displays the maximum torque value computed by the FDAU depending on the PWR MGT selection (except on the T.O. position where reserve T.O. torque is displayed.)

Note : In case of FDAU target failure associated with a pointer malfunctioning, an AFU failure may be suspected (see page 1).

④ Manual target

Controlled by the knob 5, displays a manually selected torque target.

⑤ Knob

Enables setting of target bug 4.

⑥ Test pb

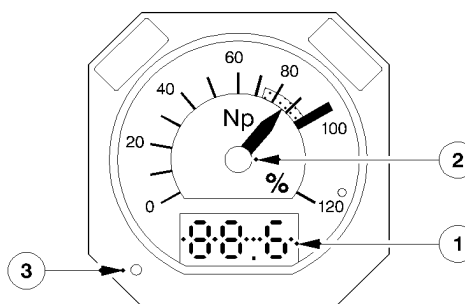
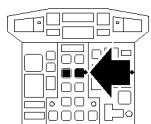
Allows to test the ind. During test, both counter and pointer will display 115%.

Note : A blue dot is provided on the ind. scale to identify 115%.

	POWER PLANT		1.16.40		
	CONTROLS		P 8	500	
					JUN 97

NP IND

R0FA-01-16-40-008-A5000A



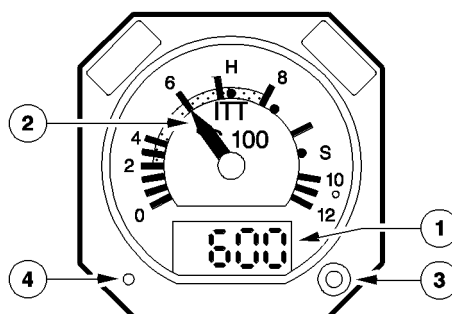
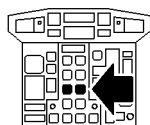
- ① Digital counter
Actual NP is displayed.
- ② Pointer
Actual NP is displayed.
 Amber sector : 41.6-65%
 Green sector : 70.8-100%
 Red mark : 100%
 Red dot : 120%
- ③ Test pb
Allows to test the ind. During test, both counter and pointer will display 115%.
Note : A blue dot is provided on the ind. scale to identify 115%.

	POWER PLANT	1.16.40		
		P 9	001	
	CONTROLS			JUL 98

AA

ITT IND

R0FA-01-16-40-009-A001AA



① Digital counter

Actual ITT (T6) is displayed.

R ② Pointer

Actual ITT is displayed.

Green sector : 300-765°C

Red point + H : 715°C (Hotel mode)

Amber sector : 765-800°C

Red mark : 765°C (Temperature limit during normal take-off to be checked in chapter 2.01)

White/red mark : 800°C (Temperature limit in uptrim conditions)

Red point : 840°C (Temperature limit for 20 sec)

Red point + S : 950°C (Temperature limit for 5 sec for start)

③ Alert lt

Illuminates amber and the CCAS is activated when ITT > 800°C or 715°C in hotel mode.

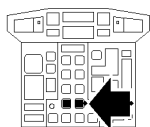
④ Test pb

Allows to test the ind. During test, both counter and pointer will display 1150°C.

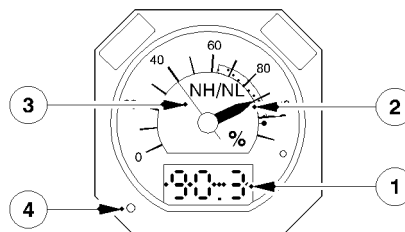
Note : A blue dot is provided on the ind. scale to identify 1150°C.

	POWER PLANT		1.16.40	
	CONTROLS		P 10	500
				JUN 97

NH/NL IND

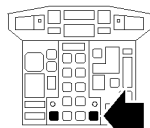


ROFA-01-16-40-010-A500AA

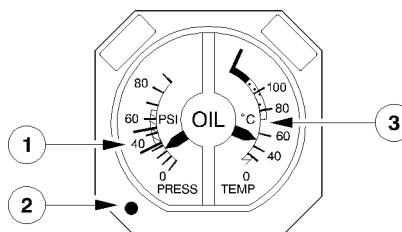


- ① Digital counter
Actual NH is displayed.
- ② Pointer
Actual NH is displayed.
Green sector : 62-102.7%
Red mark : 102.7%
- ③ Pointer
Actual NL is displayed.
Green sector : 62-104.2%
Red mark : 104.2%
- ④ Test pb
Allows to test the ind. During test, both counter and pointer will display 115%.
Note : A blue dot is provided on the ind. scale to identify 115%.

OIL IND



ROFA-01-16-40-010-B500AA



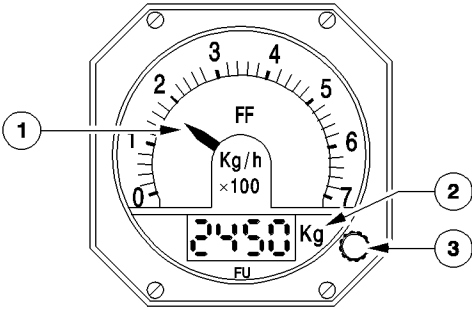
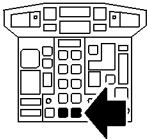
- ① OIL PRESS indication
Actual oil pressure is displayed.
Green sector : 55-65 PSI
Amber sector : 40-55 PSI
Red mark : 40 PSI
Dashed white/red radial at 55 PSI
- ② OIL LOW PRESS It
Illuminates red when OIL PRESS indication drops below 40 PSI. A separate pressure switch activates the CCAS at 40 PSI.
- ③ OIL TEMP indication
Actual oil temperature is displayed.
Green sector : 45-125°C
Amber sector : 125-140°C and below 0°C
Red mark : 140°C

	POWER PLANT		1.16.40		
	CONTROLS		P 11	060	
					DEC 96

AA

FF/FU IND

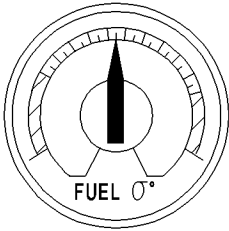
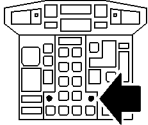
ROFA-01-16-40-011-A060AA



See chapter 1.11.10.

FUEL TEMP IND

ROFA-01-16-40-011-B060AA



See chapter 1.11.10.

FUEL CLOG LIGHT

FUEL CLOG

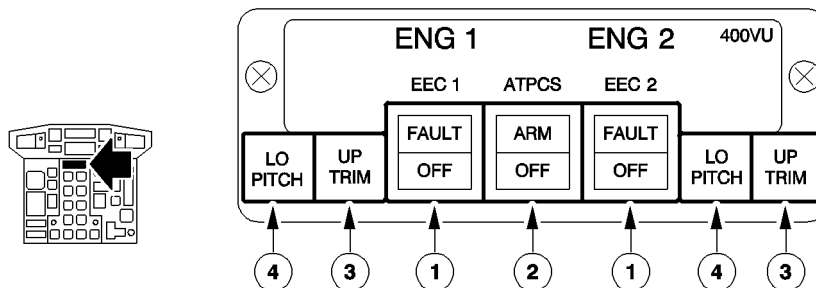
See chapter 1.11.10.

	POWER PLANT		1.16.40		
			P 12	001	
	CONTROLS				JUL 98

AA

ENG 1/ENG 2 CONTROL PANEL

R0FA-01-16-40-012-A001AA



① EEC pb

Controls the EEC of the associated engine

ON : (pb pressed in) EEC adjusts HMU action, by controlling the stepper motor which lowers fuel flow ordered by HMU.

OFF : (pb released) The HMU controls only NH as a function of PL angle. OFF It illuminates white.

FAULT : Illuminates amber and the CCAS is activated when an EEC failure is detected. Power is locked at its pre-failure value.

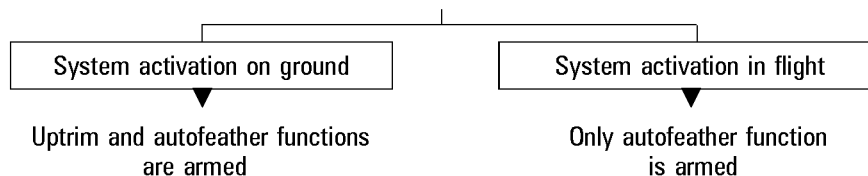
Reversion to HMU base law is achieved by deselection of failed EEC. (See 1.16.30).

② ATPCS pb

pb pressed in : - If pressed in on ground, uptrim and autofeather function are preselected
- if pressed in in flight, only the autofeather function is preselected.

OFF : (Pb released)
Uptrim and autofeather functions are deselected.

R ARM : Illuminates green when arming conditions are met (see P1)



③ UP TRIM light

Illuminates green when the uptrim signal is sent to the associated engine at the beginning of ATPCS sequence.

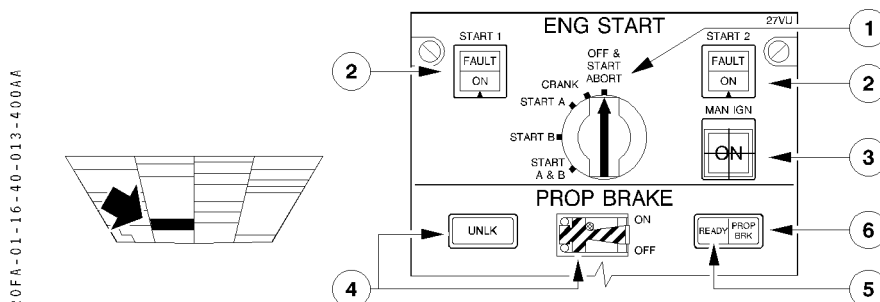
④ LO PITCH light

Illuminates amber when the actual blade angle is lower than the normal FI blade angle. This light is illuminated during all ground operation below FI. The CCAS is activated in flight only.

	POWER PLANT		1.16.40	
			P 13	400
	CONTROLS			JUL 01

AA

ENG START PANEL



1 ENG START rotary selector

Selects the ignition mode and/or start sequences.

OFF START ABORT Ignition circuit is deenergized. Starting sequence is disarmed or interrupted.

**CRANK
START**

Enables engine cranking. Ignition is inhibited.

Selects a start sequence. Ignition is selected when fuel shut-off valve is open (controlled by CL) ; starter and ignition are automatically deactivated when NH reaches 45%.

Note : There are three START positions.

START A Only ignition exciter A is supplied on ground.

START B Only ignition exciter B is supplied on ground.

START A and B Both ignition exciters are supplied.

2 START pb

Initiates the starting (or cranking) sequence of the related engine provided the ENG START selector is in one of the START positions (or CRANK).

ON (pb pressed in) Initiates a sequence. The ON It illuminates white. In case of starting, it will extinguish automatically when NH reaches 45% which "identifies" sequence end.

FAULT Illuminates amber and the CCAS is activated if :

- starter remains engaged after 45%
- GCU fails during starting
- on RH engine when the propeller brake is ON but the gust lock is not engaged.

R

Note : As soon as one engine is running and the associated DC GEN is connected to the main DC electrical network, the other engine start is accomplished as a "cross start" : initiated on Main Bat supply only, the start is assisted by the opposite DC GEN from 10% NH (on ground only).

If the DC GEN is connected to the network, but the cross start does not operate normally, the amber "X START FAULT" light illuminates on the main electrical panel.

 ATR 72 F.C.O.M.	POWER PLANT		1.16.40		
	CONTROLS		P 14	050	
					DEC 96

AA

③ MAN IGN guarded pb

Manual ignition is selected by depressing the guarded pb. Exciters are continuously energized on both engines. ON light illuminates blue.

④ PROP BRK pb

The PROP BRK two positions toggle switch controls the propeller brake engagement/disengagement on the RH engine provided blue hydraulic power is available.

ON : propeller brake engagement

OFF : propeller brake releasing

UNLK : The lt illuminates red and after 15 s the CCAS is triggered to indicate that the propeller brake is not locked in the fully locked or the fully released position.

⑤ READY Lt

The lt illuminates green when engagement or disengagement conditions are met.

⑥ PROP BRK Lt

- Illuminates blue when the propeller brake is fully locked
- Extinguished when the propeller brake is not fully locked.

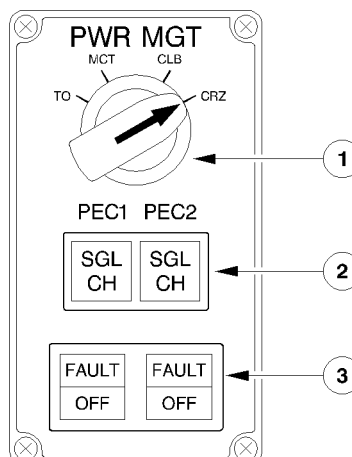
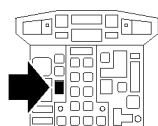
Note : Same conditions as memo panel's PROP BRK Lt.

	POWER PLANT		1.16.40		
	CONTROLS		P 15	550	
					JUN 97

AA

PWR MGT PANEL

R 00-A-01-16-40-015-A550AA



① PWR MGT rotary selector

Made up of two independent parts (front and back). Provides FDAU, PIU and EEC with basic power requirements corresponding to the selected position.

- For left engine with the back part of the selector.
- For right engine with the front part of the selector.

② PEC "SGL CH" lts

SGL CH It illuminates amber when one channel of propeller electronic control is lost. The system will automatically be transferred to the other channel.

Note : On ground, at each propeller unfeathering, LO PITCH protection is tested by the PEC and the back-up channel is used during 2 sec. SGL CH illuminates during unfeathering then extinguishes. Therefore, the correct working of back-up channel is confirmed.

③ PEC FAULT pbs

FAULT Illuminates amber and CCAS is activated when the two channels are lost. The failure will be indicated on the FDEP.

OFF (pb released) PEC is deactivated and Np is blocked at 102% whenever power is sufficient.

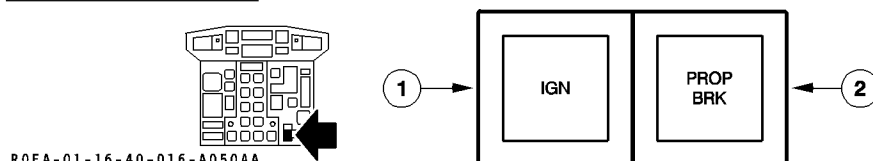
	POWER PLANT		1.16.40		
	CONTROLS		P 16	050	
					DEC 96

AA

X START FAULT LIGHT

Illuminates to indicate that, although the opposite DC gen is connected to the network, the cross start sequence has failed.

IGN / PROP BRK LIGHT



① IGN light

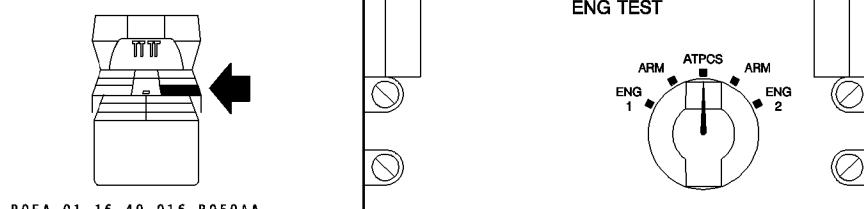
Illuminates blue to remind the crew that the exciters are energized.

Note : When MAN IGN is selected ON, IGN illuminates blue only when the CLs are out of FUEL SO position.

② PROP BRK light

Illuminates blue to remind the crew that the PROP BRK pb is selected ON and the mechanical lock is engaged (ON light is also illuminated on the overhead panel).

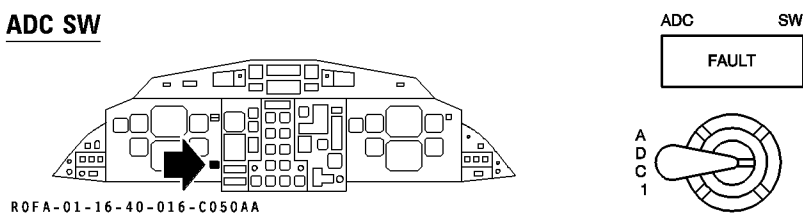
ENG TEST PANEL



Allows to check the correct functioning of the ATPCS.

This rotary selector is spring loaded to the neutral position.

ADC SW



- ADC 1 : ADC 1 data are fed to both EEC and FDAU : To be used odd days.
- ADC 2 : ADC 2 data are fed to both EEC and FDAU : To be used even days.
- FAULT : illuminates amber, indicates a mismatch between switch position and ADC selected.

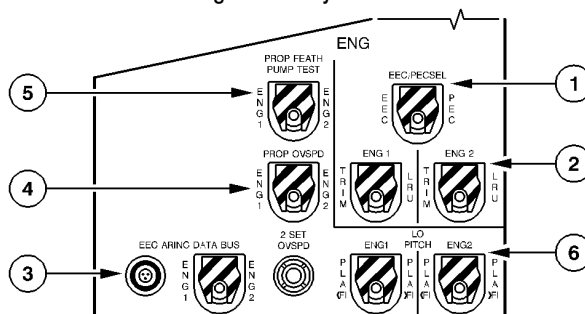
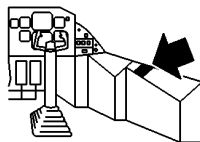
	POWER PLANT		1.16.50	
			P 1	550
	LATERAL MAINTENANCE PANEL			DEC 97

AA

On RH Maintenance panel, several tests and control device are provided, for maintenance purpose only.

All buttons on this panel are to be used on ground only.

RRRRRRRRRR
ROFA-01-16-50-001-A550AA



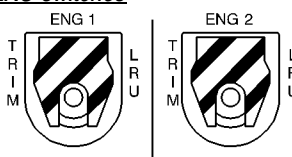
① EEC/PEC SEL switch



ROFA-01-16-50-001-B550AA

Used to select EEC or PEC depending on appropriate maintenance test on Engine TRIM switches or LRU (line replaceable unit) code failures.

② Engine TRIM test and LRU switches

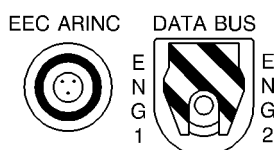


ROFA-01-16-50-001-C550AA

Switch with two stable positions used to :

- Test EEC or PEC channel. Maintenance data appear on the FDEP. (Selected by EEC/PEC SEL switch).
- Perform EEC or PEC trim to ensure that power delivered corresponds to PL position (can be performed with engine not running and PL in the notch) or LRU code failures.

③ BUS ARINC switches



ROFA-01-16-50-001-D550AA

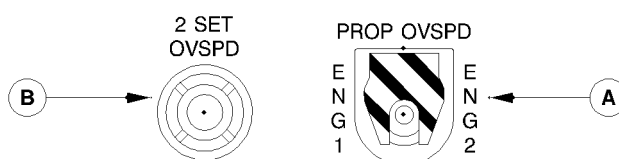
Bus arinc function is tested.

	POWER PLANT		1.16.50		
			P 2	550	
	LATERAL MAINTENANCE PANEL				JUN 97

AA

4) Prop Overspeed test switches

ROFA-01-16-50-002-A550AA



Used to test hydraulic part of overspeed governor.

- (A) First OVSPD threshold is tested at 102 % Np. on the affected engine.
- (A) + (B) , 2nd OVSP threshold is tested at 106 % Np.

5) Propeller Feather Pump test switch

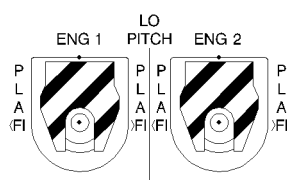
ROFA-01-16-50-002-B55



This switch with two stables positions enables to test the feathering pump. For safety reasons, this test is impossible in flight.

6) Propeller LOW PITCH test switches

ROFA-01-16-50-002-C550AA



- With the test switch on PLA > FI position, the PL low pitch protection switch and feather solenoid are tested.
- With the test switch on PLA < FI position, secondary low pitch solenoid is tested.

Note : In both cases, LOW PITCH light illuminates

	POWER PLANT		1.16.60		
	ELECTRICAL SUPPLY/MFC LOGIC		P 1	001	
	SYSTEM MONITORING				DEC 96

AA

ELECTRICAL SUPPLY

EQUIPMENT	DC BUS SUPPLY (C/B)	AC BUS SUPPLY (C/B)
ENG 1		
TQ ind.	DC EMER BUS (on lateral panel TORQUE)	– Nil –
NP ind.	DC ESS BUS (on lateral panel NP)	– Nil –
ITT ind.	DC ESS BUS (on lateral panel ITT)	– Nil –
NH / NL ind.	DC ESS BUS (on lateral panel NH)	– Nil –
FF/FU ind.	DC BUS 1 (on lateral panel FUEL FLOW FUEL USED)	– Nil –
OIL PRESS/ OIL TEMP ind.	DC BUS 1 (on lateral panel OIL PRESS/TEMP)	– Nil –
FUEL TEMP ind.	DC BUS 1 (on lateral panel FUEL TEMP)	– Nil –
Feather control	DC EMER BUS (+ DC BUS 1) (on overhead panel FEATH CTL)	– Nil –
Start control and indications	DC ESS BUS (on overhead panel START CTL and IND)	– Nil –
Ignition system	DC ESS BUS (on overhead panel IGN)	– Nil –
EEC		– Nil –
. power supply	DC EMER BUS and DC BUS 1 (on overhead panel PWR SUPPLY)	
. control	DC EMER BUS (on overhead panel CTL and CAUTION)	
Propeller overspeed test	DC BUS 1 (on lateral panel PROP OVSPD TEST)	
Fuel clogging indication on maintenance panel	DC BUS 1 (on lateral panel FUEL CLOG)	– Nil –

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ELECTRICAL SUPPLY

EQUIPMENT	DC BUS SUPPLY (C/B)
ENG 2	
TQ ind.	DC EMER BUS (on lateral panel TORQUE)
NP ind.	DC ESS BUS (on lateral panel NP)
ITT ind.	DC ESS BUS (on lateral panel ITT)
NH / NL ind.	DC ESS BUS (on lateral panel NH)
FF/FU ind.	DC BUS 2 (on lateral panel FUEL FLOW FUEL USED)
OIL PRESS/OIL TEMP ind.	DC BUS 2 (on lateral panel OIL PRESS/TEMP)
FUEL TEMP ind.	DC BUS 2 (on lateral panel FUEL TEMP)
Feather control	DC ESS BUS (on overhead panel FEATH CTL)
Start control and indications	DC EMER BUS (on overhead panel START CTL and IND)
Ignition system	DC ESS BUS (on overhead panel IGN)
EEC	
. power supply	DC EMER BUS and DC BUS 2 (on overhead panel PWR SUPPLY)
. control	DC EMER BUS (on overhead panel CTL and CAUTION)
Propeller overspeed test	DC BUS 2 (on lateral panel PROP OVSPD TEST)
Fuel clogging indication on maintenance panel	DC BUS 2 (on lateral panel FUEL CLOG)

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EQUIPMENT	DC BUS SUPPLY (C/B)
Propeller brake	DC ESS BUS (on lateral panel PWR SUPPLY CTL IND)
Feather pump test	DC SVCE BUS (on lateral panel FEATH PUMP TEST)
PEC 1 & 2 (NORMAL) associated PVM and PIU	DC EMER BUS (on overhead panel)
PEC 1 & 2 (BACK-UP)	DC ESS BUS (on overhead panel)
Idle gate	. DC BUS 1 (on overhead panel SOL) . DC BUS 2 (on overhead panel CAUTION)

MFC LOGIC

See chapter 1.01.

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SYSTEM MONITORING

The following conditions are monitored by visual and aural alerts :

- Start sequence incident
 - See START FAULT procedure in chapter 2.05.02.
- Nacelle temperature exceeds 170° C (338° F) when aircraft is on ground.
 - See NAC OVHT procedure in chapter 2.05.02.
- On ground, during second engine start, operative DC GEN does not come on line to supply the START BUS between 10 % and 45 % NH.
 - See X START FAIL procedure in chapter 2.05.02.
- ITT above limit
 - See EXCESSIVE ITT procedure in chapter 2.05.02.
- EEC failure
 - See ONE EEC FAULT procedure in chapter 2.05.02.
- Both EEC failure
 - See BOTH EEC FAULT procedure in chapter 2.05.02.
- Automatic idle gate system failure.
 - See IDLE GATE FAIL procedure in chapter 2.05.02.
- Low pitch detection in flight
 - See LOW PITCH IN FLT procedure in chapter 2.05.02.
- Oil pressure drops below 40 PSI
 - See ENG OIL LO PR procedure in chapter 2.05.02.
- Propeller brake not locked in full locked or in full released position.
 - See PROP BRK UNLK procedure in chapter 2.05.02.
- Propeller brake not locked in full locked or in full released position or propeller brake engaged and gust lock released
 - See PROP BRK (CAP alert) procedure in chapter 2.05.02.
- Clogging of the filter associated with HP pump.
 - See FUEL CLOG procedure in chapter 2.05.03.
- Loss of ADC
 - See ADC FAULT procedure in chapter 2.05.12.
- Incorrect ADC switching
 - See ADC SW FAULT procedure in chapter 2.05.12.
- Anomaly detection on either PEC channel
 - See PEC 1 (2) SGL CH procedure in chapter 2.05.02.
- Anomaly on Both PEC channels
 - See PEC 1 (2) FAULT procedure in chapter 2.05.02.