

EMBRAER 190

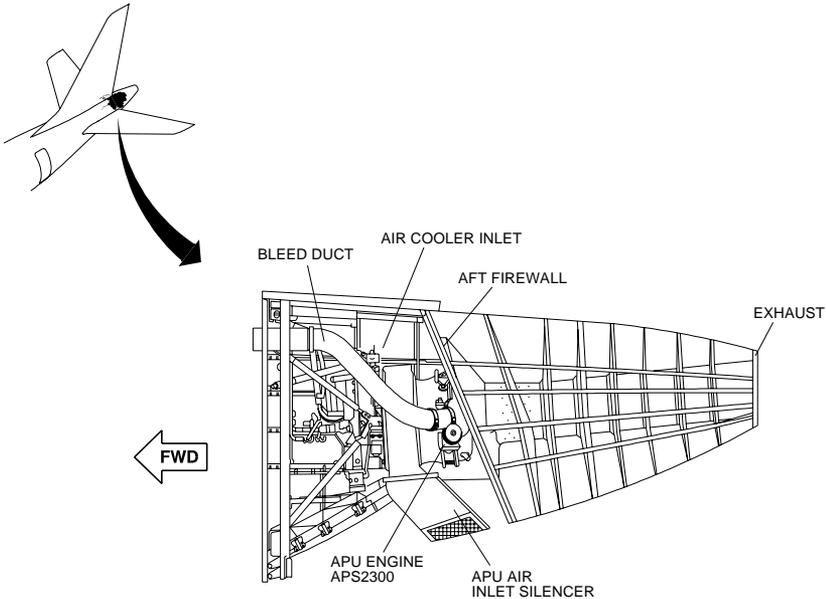


Auxiliary Power Unit

INTRODUCTION

The Auxiliary Power Unit (APU) is a gas turbine engine located in the airplane tailcone, which provides pneumatic and electrical AC power. The pneumatic power is used for engine starting and to supply bleed air to the air conditioning packs of the Environmental Control System (ECS). An electrical AC generator supplies 115 Volts 40 KVA to the electrical system.

The APU is automatically monitored and controlled through a dedicated Full Authority Digital Electronic Control (FADEC) unit.

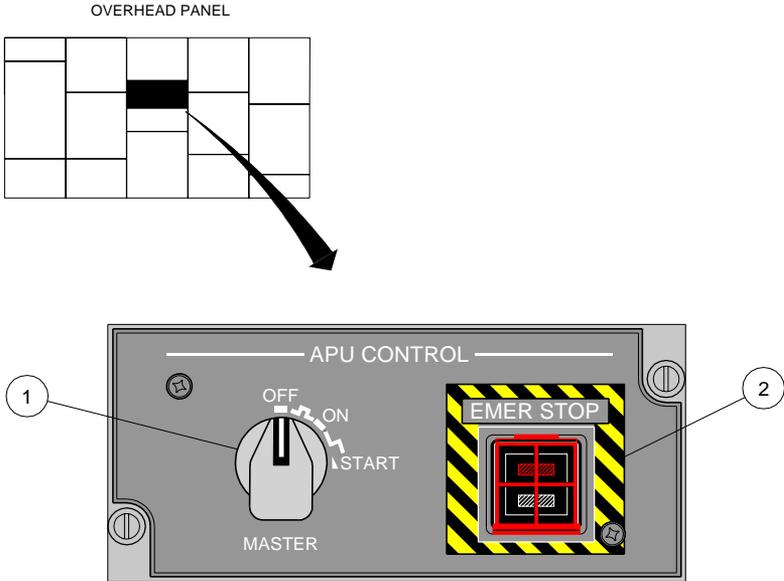


APU LOCATION



CONTROLS AND INDICATIONS

APU CONTROL PANEL



1 – APU SELECTOR KNOB (ROTARY ACTION)

OFF: normal position when the APU is not running.

ON: normal position when the APU is running.

START: (momentary action) initiates the APU start cycle.

NOTE: Moving this knob from ON to OFF effects the APU shutdown.

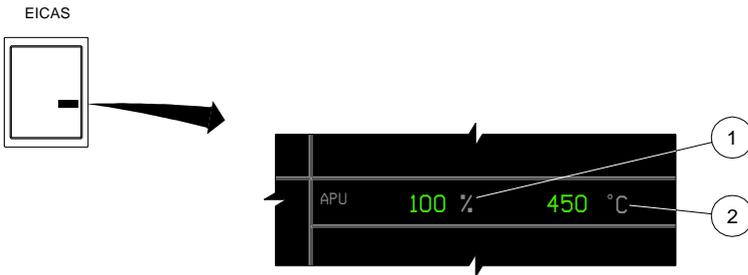
2 – APU EMERGENCY STOP BUTTON (GUARDED)

PUSH IN: closes the APU fuel shutoff valve, shutting down the APU with no cooldown period.

PUSH OUT: normal position, with the fuel shut off valve open.

- NOTE:** - In case of fire, the upper half of the button illuminates red.
- When pushed in, a white striped bar illuminates on the lower half of the button.

EICAS INDICATION



1 – APU RPM INDICATION

- Displays the APU RPM (%).
GREEN: normal operating range.
AMBER: cautionary operating range.
RED: operating limit exceeded.

2 – APU EGT (EXHAUST GAS TEMPERATURE) INDICATION

- Displays the APU temperature in degrees Celsius (°C).
GREEN: normal operating range.
AMBER: cautionary operating range.
RED: operating limit exceeded.

APU FUEL SUPPLY

When DC power is the only electrical power available, the DC fuel pump, located in the right wing tank, feeds the APU. If AC power is available and the engine is not running, fuel feeding will be provided by the AC fuel pump.

When the engine is running, the ejector fuel pump feeds the APU from the right wing tank. However, it is also possible to feed the APU from the left wing tank via a crossfeed valve.

APU BLEED

The Air Management System (AMS) controls the operation of the APU and the engine bleed valves. The engine bleed valve has priority over the APU bleed valve. When the engine starting cycle is in progress, the APU bleed valve opens and the engine pack valves close. After engine starting, the APU bleed valve closes and the engine pack valves open.

APU OPERATION

A Full Authority Digital Electronic Control (FADEC) monitors and controls the start/shutdown sequence, fault detection and APU status. The flight crew controls the APU start/shutdown sequence, using the APU selector knob.

In an abnormal condition, the flight crew can shut down the APU through a dedicated emergency stop button.

The APU is able to supply:

- Electrical AC power up to 33000 ft.
- Bleed air for engine starting up to 21000 ft.
- Bleed air for air conditioning up to 15000 ft.

Maximum altitude for APU start is 30000 ft.

APU START

Rotating the APU master switch to ON powers the FADEC and APU fuel shutoff valve opens.

Rotating the APU selector knob from ON to START (momentary position), initiates the APU automatic starting cycle. In automatic starting cycle the FADEC commands the electronic starter controller to energize the brushless starter generator, initiating APU rotation.

Three seconds after APU speed has reached 95%, electrical and pneumatic loading are available. If the APU does not reach proper speed or acceleration rate within the starting cycle time, the APU will automatically shut down.

GROUND START

The FADEC initiates ignition at approximately 6% RPM and the fuel flow after 0.5 seconds. The battery #2 energizes the electronic starter controller. After a light off occurs, the FADEC commands the starter to cutout at approximately 50% RPM.

IN FLIGHT START

The FADEC initiates ignition at approximately 7% to 17% RPM and the fuel flow after 0.5 seconds. After a light off occurs, the FADEC commands the starter to cutout at approximately 50% RPM.

APU SHUTDOWN

NORMAL APU SHUTDOWN

Rotating the APU selector knob from ON to OFF initiates a normal APU shutdown, which is monitored and controlled by the FADEC. During a normal shutdown sequence, the APU pneumatic power is removed at once and the electrical power is removed at the end of a 2 minutes cooldown period. Only at the end of that period the EICAS message APU SHUTTING DOWN disappears.

For airplanes Post-Mod SB 170-49-0003 or SB 190-49-0001 (APU FADEC 02.00) or with an equivalent modification factory incorporated, the cooldown period is 1 minute, followed by a spoldown period. The EICAS message APU SHUTTING DOWN disappears at the end of spoldown period.

NOTE: Turning the APU selector knob back to ON position during the shutdown sequence cancels the shutdown.

EMERGENCY APU SHUTDOWN

In the event that the APU emergency stop button has been selected, the APU fuel shutoff valve closes and the APU shuts down without a two-minute cooldown period.

APU PROTECTION

The FADEC provides automatic APU shutdown protection on ground and in flight as follows. The appropriate EICAS message is displayed for each situation.

| On the ground | In flight |
|--------------------------|----------------------|
| Overspeed | Overspeed |
| Underspeed | Underspeed |
| FADEC critical fault | FADEC critical fault |
| APU fire | |
| APU EGT overtemperature | |
| APU high oil temperature | |
| APU low oil pressure | |
| Sensor fail | |

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