

virgin atlantic A340-600 <i>Flight Crew Operating Manual</i>	APU DESCRIPTION		1.49.10	P 1
			SEQ 001	REV 09

GENERAL

The Auxiliary Power Unit (APU) is a self contained unit which makes the aircraft independent of external pneumatic and electrical power supply.

On ground

- It supplies bleed air for starting the engine and for the air conditioning system.
- It supplies electrical power to the electrical system.

During Take-Off

- It supplies bleed air for air conditioning, thus avoiding a reduction in engine thrust caused by the use of engine bleed air for this purpose, when optimum aircraft performance is required.

In Flight

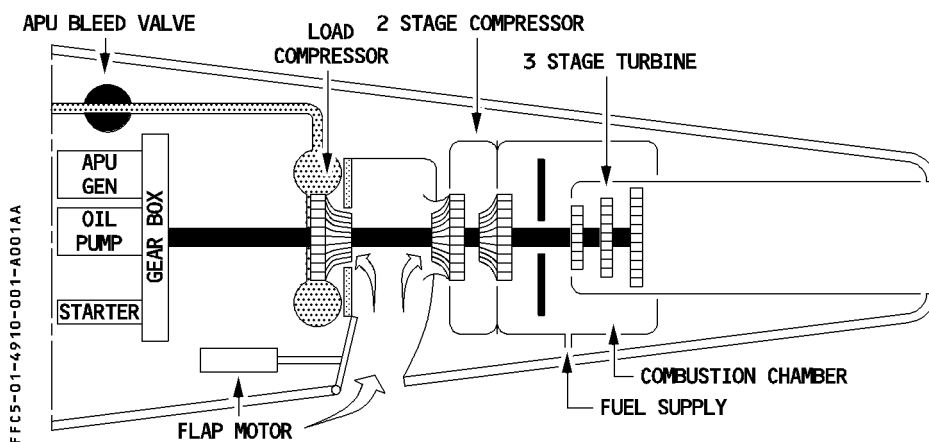
- It backs up the Electrical system
- It backs up the Air conditioning
- It can be used to start the engines

The APU may obtain power for starting from the aircraft batteries, or in combination with the external power, or from ground service, or from normal aircraft supply.

APU start is permitted throughout the normal flight envelope, except when APU battery only is supplying. (Refer to FCOM 3 01.49).

The ECAM displays APU parameters..

FOR INFO



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MAIN COMPONENTS

APU ENGINE

The basic element of the APU is a single-shaft gas turbine which delivers mechanical shaft power for driving the accessory gearbox (electrical generator), and produces bleed air (engine starting and pneumatic supply).

ELECTRONIC CONTROL BOX

The Electronic Control Box (ECB) is primarily a full authority digital electronic controller that performs the APU system logic for all modes of APU operation, such as :

- Sequence the start and monitors it
- Monitors speed and temperature
- Monitors bleed air (IGV)
- Sequence the shutdown (manual or automatic)
- Controls the automatic shutdown

AIR INTAKE SYSTEM

The air intake, and an electrically-operated flap, allow external air to reach the compressor inlet.

STARTER

The ECB control the electric starter. The starter engages, if the air intake is fully open, and provided the MASTER SW and the START pushbutton are ON.

FUEL SYSTEM

The APU is supplied from the APU feed line (Refer to 1.28.10).

The ECB controls fuel flow.

OIL SYSTEM

The APU has an integral independent lubrication system (for lubrication and cooling).

INLET GUIDE VANES (IGV)

The IGVs control bleed air flow, and a fuel-pressure-powered actuator positions the IGVs.

The ECB controls the actuator in response to aircraft demand.

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AIR BLEED SYSTEM

The ECB controls the APU BLEED valves. If APU BLEED is selected ON, the bleed valve closes at 23000 ft when climbing, and reopens at 22500 ft when descending.

CONTROLS

The flight crew uses the controls on the APU panel for routine shutdown. For emergency shutdown :

- The flight crew can push the APU FIRE handle, or
- The ground crew can push the APU SHUT OFF pushbutton on the interphone panel under the nose fuselage, or the APU EMER SHUT DOWN pushbutton on the refueling/defueling panel.

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GROUND OPERATIONS SAFETY DEVICES

– APU FIRE WITH AUTOMATIC SHUTDOWN

The APU may run without cockpit crew supervision, when the aircraft is on ground. In case of fire in the APU compartment :

- APU fire warnings operate in the cockpit.
- A horn sounds in the nose gear bay.
- The “AVAIL” light goes off.
- The “FAULT” light, on the MASTER SW, lights up.
- The APU shuts down.
- The APU fire extinguisher automatically discharges.

Note : On ground, the NBPT (No Break Power Transfer) function is inhibited in case of on APU shutdown generated by one of the following conditions :

- APU shutdown from the APU SHUT OFF switch, provided on the external power panel (925VU), or
- APU emergency shutdown from the APU EMER SHUT DOWN switch, provided on the REFUEL/DEFUEL panel (990VU).

OPERATION UNDER FAILURE CONDITIONS

– APU FAULT WITH AUTOMATIC SHUTDOWN

The following failures cause an automatic shutdown :

- In flight and on ground :
 - * Overspeed
 - * ECB failure
 - * APU generator high oil temperature
 - * Clogged oil filters
- On ground only (inhibited in flight phases 2 to 9) :
 - * Underspeed
 - * Low oil pressure
 - * Intake flap not open
 - * Main power interrupt
 - * Sensor failure
 - * APU high oil temperature
 - * Inlet overheat
 - * Overtemperature
 - * Reverse flow
 - * No flame
 - * No acceleration
 - * No speed