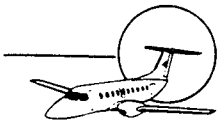




SECTION 6-22
AUXILIARY POWER UNIT
(OPTIONAL)

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OPERATIONS MANUAL

SYSTEMS DESCRIPTION
AUXILIARY POWER UNIT
(GARRETT GTCP36-150 [A] [AA])

APU GARRETT MODEL GTCP36-150 [A] AND [AA]

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AUXILIARY POWER UNIT GENERAL DESCRIPTION

The Auxiliary Power Unit (APU) model Garrett GTCP36-150 [A]/[AA] is a source of pneumatic and electrical power to be used either simultaneously with or independently from the airplane sources, while on the ground or in-flight. Basically, it is a gas turbine engine consisting of a single-stage centrifugal compressor, a reverse flow annular combustor and a single-stage radial turbine.

NOTE: The airplanes Pre-Mod. SB 120-049-0007 are equipped with APU model GTCP36-150[A].
The airplanes Post-Mod. SB 120-049-0007 or S/N 120.064, 120.067, 120.070, and on are equipped with APU model GTCP36-150[AA].

The APU compartment is located in the airplane tailcone, isolated from the rest of the airplane by a stainless steel firewall. At the left side of the compartment, an inspection door allows inspection and access to APU components.

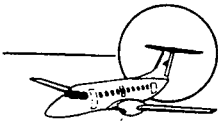
APU cooling is provided by airflow from freestream air, entering the APU compartment through a NACA air intake located at the right lower region of airplane tail cone, and passing through all components. The APU starter-generator is additionally cooled through a fan which rotates together with the starter-generator and a NACA air intake located at the left lower region of airplane tail cone.

APU draining is ducted to the airplane skin at the tail cone lower region.

Control switches, alarms, and emergency shutdown means are provided in the cockpit overhead panel. A maintenance panel, located in the compartment between the aft pressure bulkhead and the APU compartment, indicates the APU malfunction in the event of automatic shutdown.

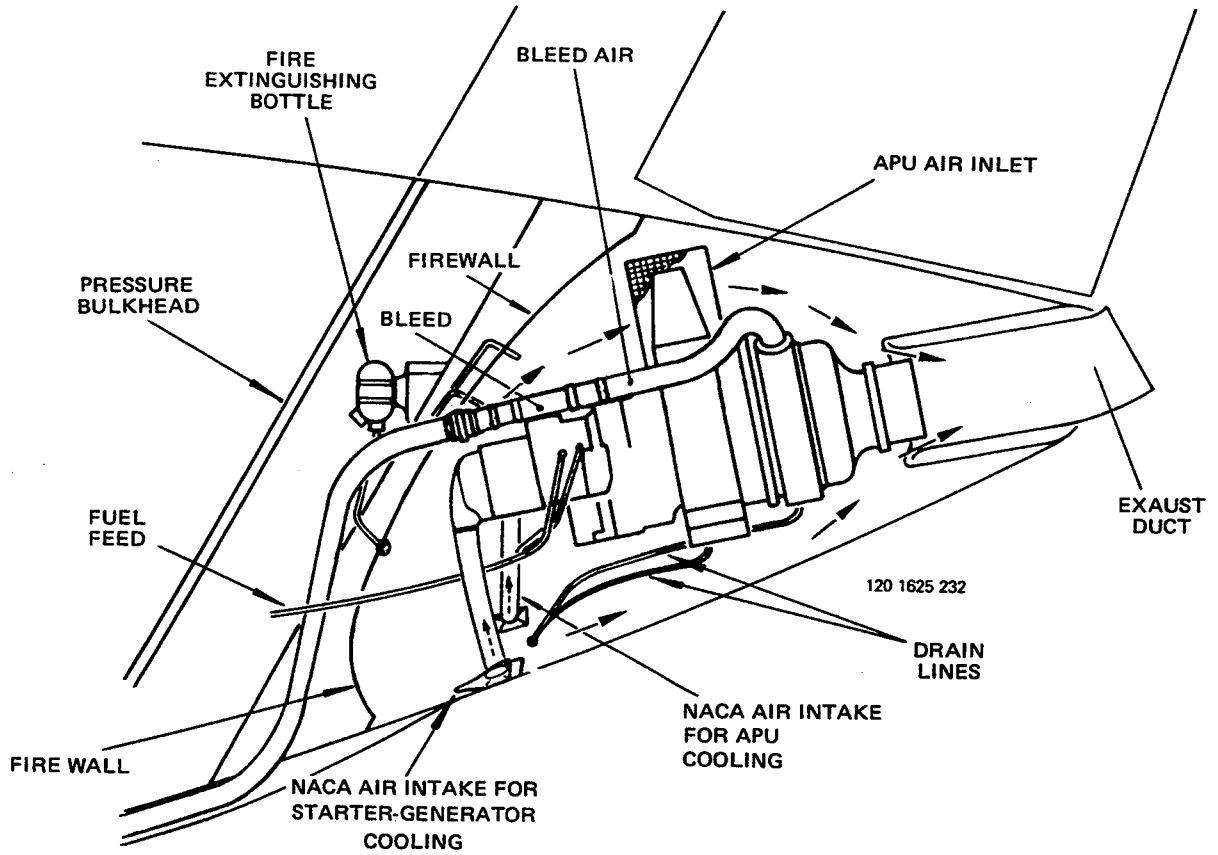
On ground, automatic shutdown will occur in the event of fire, overtemperature, loss of speed sensor, loss of EGT sensor, loss of 28 V DC power, overspeed, high oil temperature, low oil pressure, overcurrent, overvoltage, or loss of ECU signal.

In flight, automatic shutdown will occur in case of overspeed or overvoltage.



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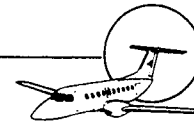
SYSTEMS DESCRIPTION
AUXILIARY POWER UNIT
(GARRETT GTCP36-150(A)(AA))



APU SIDE VIEW

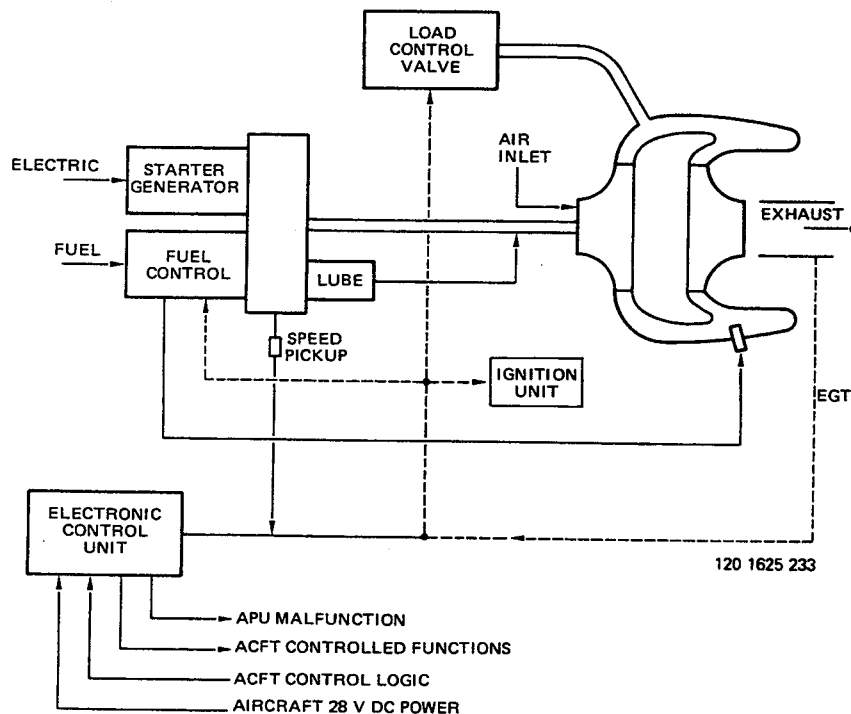
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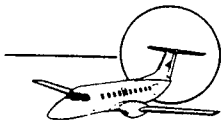
CONTROL SYSTEM

The APU control system consists of electrical, fuel, lubrication, and pneumatic systems. The electrical control system consists of the Electronic Control Unit (ECU) and electrical accessories. The ECU contains APU fuel management system control logic and load Control Valve Logic. Electrical accessories provide ECU inputs and execute output commands. The starter-generator provides the initial power to turn the rotating components at APU starting. The change over from the starter to generator function is automatic. The ignition unit is a capacitive discharge energy storage system used for developing an output voltage to ignitor plug. The speed pickup generates and transmits speed signals to the ECU. The fuel system is composed of the fuel control and the fuel nozzles and manifolds. The fuel control unit provides fuel in accordance with a preprogrammed schedule in the ECU. Fuel from the right wing tank is normally used to feed the APU. Alternatively, fuel from the left tank may be used, by opening the cross-feed valve. The APU has a self-contained lubrication system totally integrated within the accessory gearbox. In addition to lubrication functions, the system provides required oil cooling, without the need for an external heat exchanger. A thermostat, installed on the oil tank, sends a signal to illuminate the HIGH TEMP amber light, in case of oil temperature exceeding 325°F (163°C). The pneumatic control system regulates APU pneumatic output power by sensing and comparing the APU exhaust gas temperature (EGT) with a predetermined schedule within the ECU. Should the EGT become excessive, the ECU sends electrical signals to actuate the load control to a more closed position. This lowers APU pneumatic load and maintains EGT within acceptable levels.



APU SCHEMATIC

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APU STARTING/OPERATION

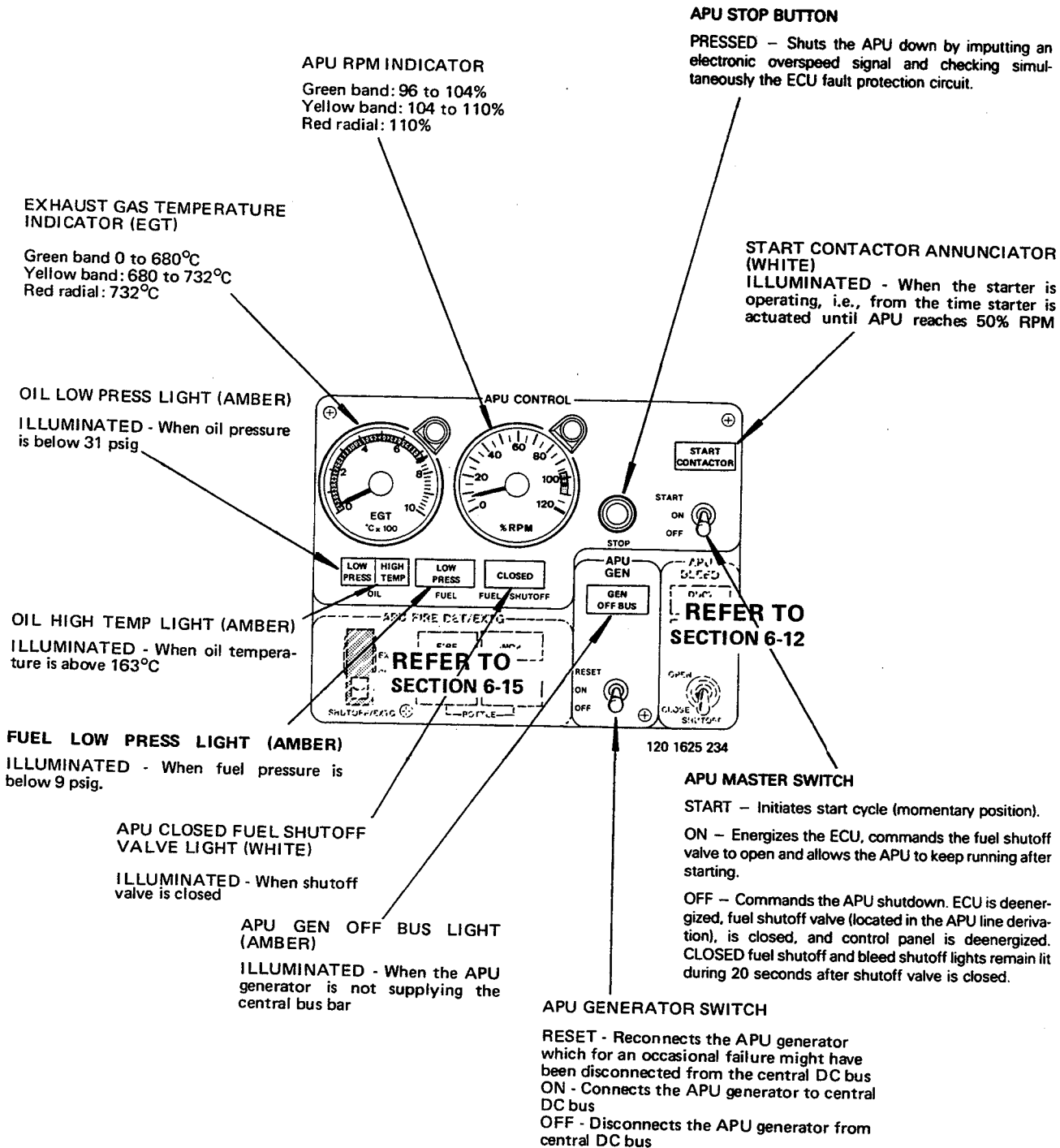
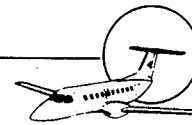
APU starting cycle is initiated when the master switch located on the APU control panel is moved to START position.

Simultaneously, DC power is applied to the starter, and the START CONTACTOR annunciator, located on the control panel, illuminates indicating the starter is driving the rotating components of the engine.

At approximately 10-percent speed the ECU provides power to the ignition unit and also provides power to open the APU solenoid shut-off valve, allowing fuel flow to the fuel nozzles. The APU continues to accelerate until 50-percent, when the ECU commands starter disengagement. The START CONTACTOR annunciator is then turned off.

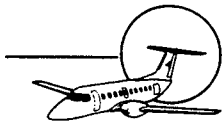
The APU acceleration continues by its own means and, when it reaches 95-percent, the ignition is deenergized and ECU circuits allow electrical and pneumatic power extraction through the starter-generator (in generator mode) and the load control valve. If the oil pressure does not reach a predetermined value, 10 seconds after the engine reaches 95-percent speed the APU is automatically shut down, with indication appearing on the control panel and APU maintenance panel.

If a failure in the control system occurs associated with an APU overspeed, the APU will be automatically shutdown after rotating parts reach 110-percent speed.



**APU CONTROL PANEL AND APU GENERATOR PANEL
 (OVERHEAD PANEL)**

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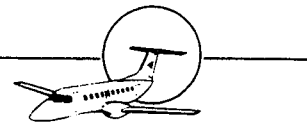
SYSTEMS DESCRIPTION
AUXILIARY POWER UNIT
(SUNDSTRAND T-62T-40C7E1)

APU SUNDSTRAND TURBOMACH MODEL T-62T-40C7E1

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AUXILIARY POWER UNIT GENERAL DESCRIPTION

The Auxiliary Power Unit (APU) model Sundstrand T-62T-40C7E1 is a source of pneumatic and electrical power to be used either simultaneously with or independently from the airplane sources, while on the ground or in-flight. Basically, it is a gas turbine engine consisting of a single-stage centrifugal compressor, a reverse flow annular combustor and a single-stage radial turbine.

The APU compartment is located in the airplane tailcone, isolated from the rest of the airplane by a stainless steel firewall. At the left side of the compartment, an inspection door allows inspection and access to APU components.

APU cooling is provided by airflow from free stream air, entering the APU compartment through a NACA air intake located at the right side of tailcone lower region, and passing through all components. The APU starter-generator is additionally cooled through a fan which rotates together with the starter-generator, and the air entering the NACA air intake located at the left side of tailcone lower region.

APU draining is ducted to the airplane skin at the left side of tailcone.

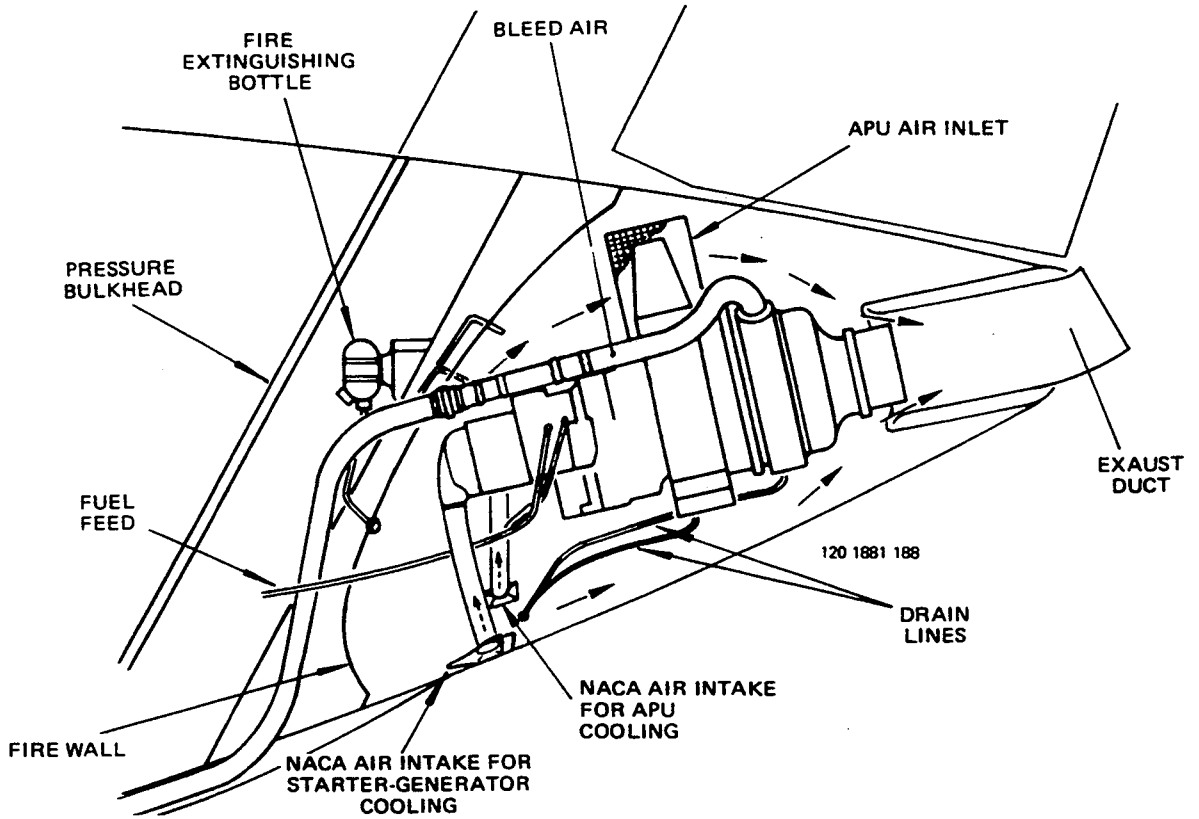
Control switches, alarms, and emergency shutdown means are provided in the cockpit overhead panel.

Built-in test indicators are provided on the face of the APU control unit (ESU), which is located in the compartment between the aft pressure bulkhead and the APU compartment, with the purpose of indicating the APU malfunction in the event of automatic shutdown. On ground automatic shutdown occurs in the event of fire, overtemperature, loss of speed data, loss of EGT data, loss of 28 V DC power, overspeed, underspeed, high oil temperature, low oil pressure, overcurrent, overvoltage or loss of ESU signal. In flight automatic shutdown will occur in case of overspeed, loss of speed data or ESU malfunction.



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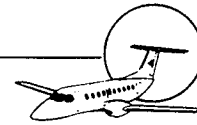
SYSTEMS DESCRIPTION
AUXILIARY POWER UNIT
(SUNDSTRAND T-62T-40C7E1)



APU SIDE VIEW

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CONTROL SYSTEM

The APU control system consists of electrical, fuel, lubrication, and pneumatic systems.

The electrical control system consists of the Electronic Sequence Unit (ESU) and electrical accessories. The ESU contains APU starting system control logic and failure indications. Electrical accessories provide ESU inputs and execute output commands.

The starter-generator provides the initial power to turn the rotating components at APU starting. The change over from the starter to generator function is automatic.

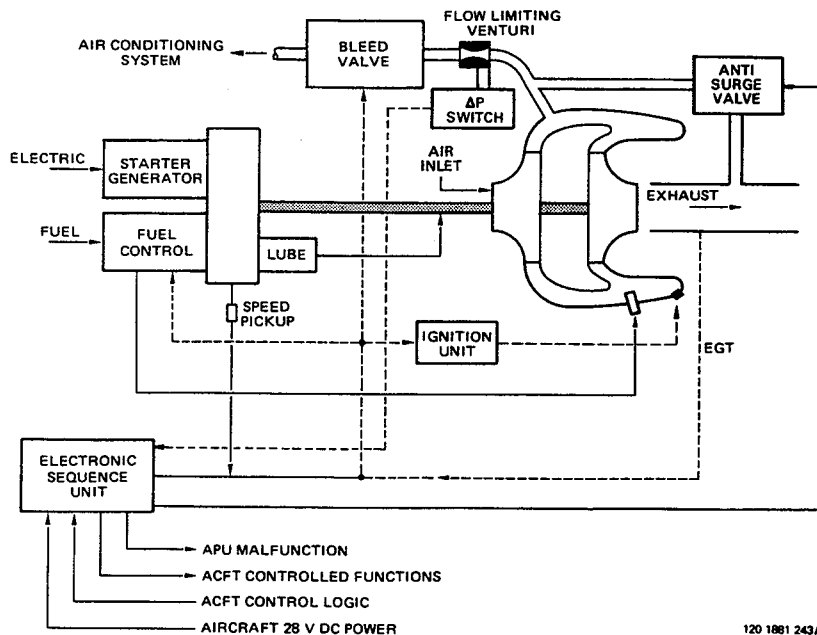
The ignition unit is a capacitive discharge energy storage system used for developing an output voltage to ignitor plug.

The speed pickup generates and transmits speed signals to the ESU.

The fuel system is composed of the fuel control, fuel nozzles and manifolds. The fuel control unit provides fuel in accordance with a preprogrammed schedule. Fuel from the right wing tank is normally used to feed the APU. Alternatively, fuel from the left tank may be used, by opening the cross-feed valve.

The APU has a self-contained lubrication system totally integrated within the accessory gearbox. In addition to lubrication functions, the system provides required oil cooling, without the need for an external heat exchanger. A thermostat, installed on the oil tank, sends a signal to illuminate the HIGH TEMP amber light, in case of oil temperature exceeding 329°F (165°C).

The pneumatic control system consists of a flow limiting venturi and a bleed valve. The flow limiting venturi maintains the bled flow below a determined value, depending on the air conditioning system requirements and atmospheric conditions, thus maintaining the EGT within acceptable levels. A pressure switch senses the venturi pressures and sends a signal to the ESU, to control the anti-surge valve.



APU SCHEMATIC

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APU STARTING/OPERATION

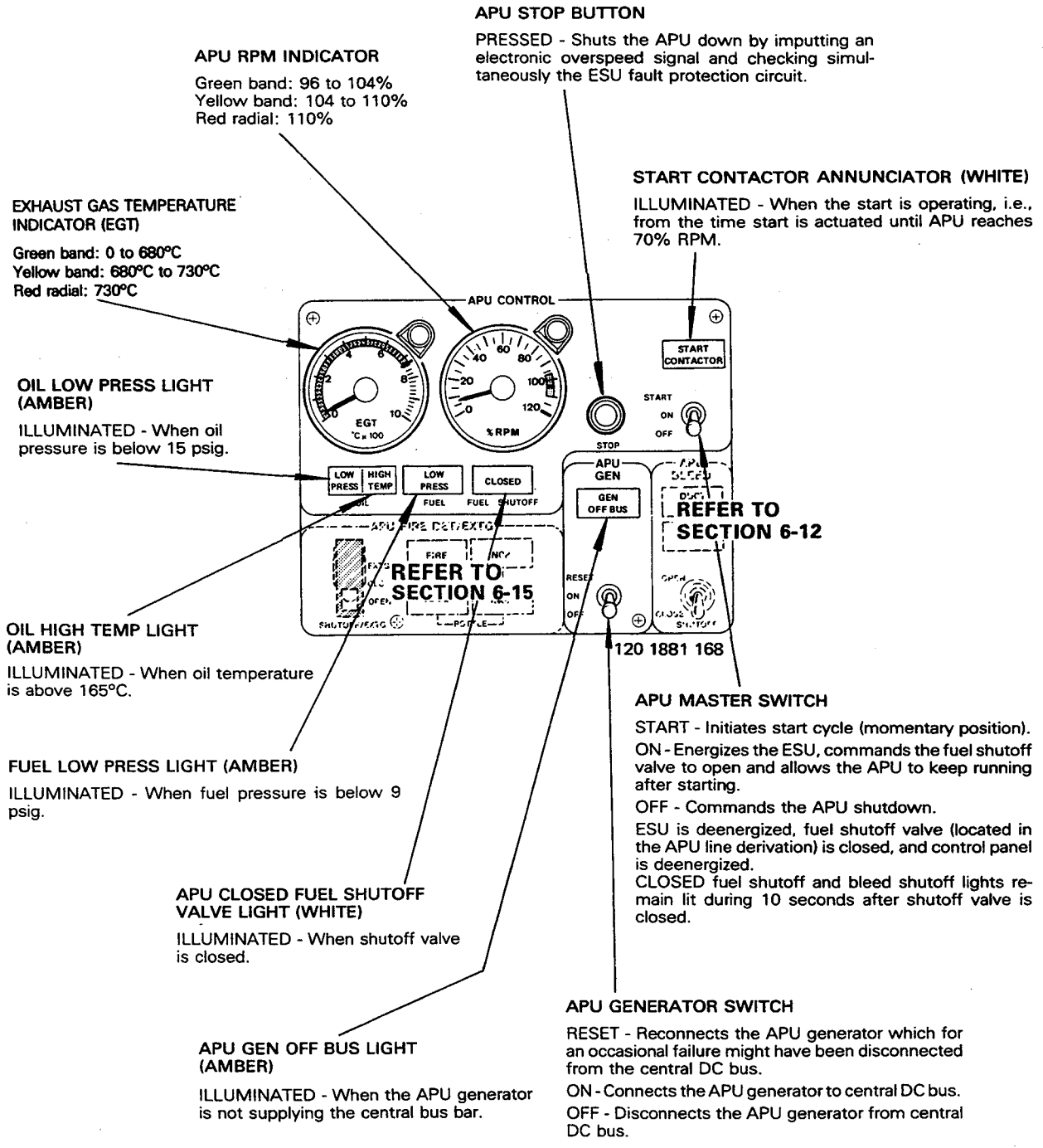
APU starting cycle is initiated when the master switch located on the APU control panel is moved to START position.

Simultaneously, DC power is applied to the starter, and the START CONTACTOR annunciator, located on the control panel, illuminates indicating the starter is driving the rotating components of the engine.

At approximately 5-percent speed the ESU provides power to the ignition unit and also provides power to open the APU solenoid shut-off valve, allowing fuel flow to the fuel nozzles. The APU continues accelerating until 70-percent speed, when the ESU commands starter disengagement and ignition deenergization. The START CONTACTOR annunciator is then turned off.

The APU acceleration continues by its own means and 10 seconds after having reached 90-percent speed, the ESU circuits allow electrical and pneumatic power extraction through the starter-generator (in Generator mode) and the bleed valve respectively. If the oil pressure does not reach a predetermined value, 5 seconds after the engine reaches 90-percent speed the APU is automatically shut down, with indication appearing on the control panel and on the ESU.

If a failure in the control system occurs associated with an APU overspeed, the APU will be automatically shut down after rotating parts reach 110-percent speed.



**APU CONTROL PANEL AND APU GENERATOR PANEL
 (OVERHEAD PANEL)**

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