

25.1 The Engine Start Sequence

- To start a gas turbine engine, three things are required:
 - 1. Rotation: The compressor must be turned by a starter motor to get air flowing through the engine.
 - 2. Fuel: Fuel must be sprayed into the combustion chambers.
 - 3. Ignition: A high-energy spark from an igniter plug must ignite the fuel/air mixture.
- The pilot monitors the EGT and the high-pressure compressor RPM (N₂) during the start sequence.
 - 1. The starter is engaged, and N₂ begins to rise.
 - 2. At a specific N₂ (e.g., 25%), the pilot introduces fuel and ignition.
 - 3. A light-up should occur, indicated by a rapid rise in EGT.
 - 4. The engine continues to accelerate. At self-sustaining speed, the turbine is producing enough power to drive the compressor without the starter's help.
 - 5. The starter cuts out, and the engine stabilizes at idle RPM (e.g., ~60% N₂).

25.2 Abnormal Starts

- ☐ Hot Start: The EGT exceeds its maximum permitted limit. This is usually caused by too much fuel for the available airflow. The start must be aborted immediately.
- ☐ Wet Start: The fuel/air mixture fails to ignite. EGT does not rise, but fuel flows into the engine. The engine must be motored over (a blowout cycle) to clear the unburnt fuel before another start is attempted to prevent torching.
- ☐ Hung Start: The engine lights up but fails to accelerate to idle RPM, instead stabilizing at a lower speed with a rising EGT. This is often caused by insufficient power from the starter.

25.3 Auxiliary Power Unit (APU)

- An APU is a small, self-contained gas turbine engine, typically located in the aircraft's tail

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- cone. Its purpose is to provide electrical power and pneumatic (bleed) air for the aircraft's
- systems on the ground, eliminating the need for ground support equipment. It can also serve
- as a backup source of power in flight.

25.4 Ram Air Turbine (RAT)

- A RAT is a small turbine that can be deployed from the fuselage or wing into the airstream in
- the event of a total engine failure. The airflow spins the turbine, which powers an emergency
- hydraulic pump or electrical generator to provide power for essential flight controls and
- instruments.

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