4.0 STARTING AND STOPPING

4.1 Introduction

The starting procedure for all jet engines is basically the same, but can be achieved by various methods. The type and power source for the starter varies in accordance with engine and aircraft requirements. Some use electrical power, others use gas, air or hydraulic pressure, and each has its own merits. For example, a military aircraft requires the engine to be started in the minimum time and, when possible, to be completely independent of external equipment. A commercial aircraft, however, requires the engine to be started with the minimum disturbance to the passengers and by the most economical means. Whichever system is used, reliability is of prime importance.

The starter motor must produce a high torque and transmit it to the engine rotating assembly in a manner that provides smooth acceleration from rest up to a speed at which the gas flow through the engine provides sufficient power for the engine turbine to take over.

4.2 Starter Systems

4.2.1 Electric

The electric starter is usually a direct current (DC) electric motor coupled to the engine through a reduction gear and ratchet mechanism, or clutch, which automatically disengages after the engine has reached a self-sustaining speed.

The electrical supply may be of a high or low voltage and is passed through a system of relays and resistances to allow the full voltage to be progressively built up as the starter gains speed. It also provides the power for the operation of the ignition system. The electrical supply is automatically cancelled when the starter load is reduced after the engine has satisfactorily started or when the time cycle is completed.

4.2.2 Cartridge

Cartridge starting is sometimes used on military engines and provides a quick independent method of starting. The starter motor is basically a small impulse-type turbine that is driven by high velocity gases from a burning cartridge. The power output of the turbine is passed through a reduction gear and an automatic disconnect mechanism to rotate the engine. An electrically fired detonator initiates the burning of the cartridge charge. As a cordite charge provides the power supply for this type of starter, the size of the charge required may well limit the use of the cartridge starters.