# IGNITION & STARTING SYSTEM

**GENERAL**

The ignition system provides the electrical spark needed to start or continue engine combustion. It is comprised of two independents subsystems. Each subsystem includes:

- a spark igniter,

- a fan air cooled coaxial shielded ignition lead,

- an ignition exciter.

The pneumatic starting system drives the engine High Pressure (HP) rotor at a speed high enough for initial ground starting or in-flight air start if required. The start system is made up of the pneumatic starter Shut-Off Valve (SOV) and the pneumatic starter.

**CONTROL AND INDICATING**

The Electronic Control Unit (ECU) controls the ignition and starting systems either in automatic or manual mode. The operation of the pneumatic starter SOV and of the ignition system is displayed on the ECAM ENGINE page.

**AUTOMATIC START**

During an automatic start, the ECU opens the pneumatic starter SOV, then the ignition exciter is energized when the HPC speed is nominal. The ECU provides full protection during the start sequence. When the automatic start is completed, the ECU closes the pneumatic starter SOV and cuts off ignition. In case of an incident during the automatic start the ECU aborts the start procedure.

**MANUAL START**

During a manual start, the pneumatic starter SOV opens when engine Manual START P/B is pressed in, then the ignition system is energized when the MASTER switch is set to the ON position. Note that there is no automatic start abort function in manual mode.

**CRANKING**

Engine motoring could be performed for dry cranking or wet cranking sequences. During cranking, ignition is inhibited.

**CONTINUOUS IGNITION**

With engine running, continuous ignition can be selected via the ECU either manually using the rotary selector or automatically by the Full Authority Digital Engine Control (FADEC).

**SAFETY PRECAUTIONS**

Safety precautions have to be taken prior to working in this area.

WARNING: the ECU sends 115 volts to the ignition exciters, which converts it and sends high voltage, high energy pulses through the ignition leads to the spark igniters.

**MAINTENANCE PRACTICES**

To increase aircraft dispatch reliability, the pneumatic starter SOV is equipped with a manual override. For this manual operation, the mechanic has to be aware of the engine safety zones.

**ENGINE CRANK**

Engine CRANK modes:

- dry CRANK,

- wet CRANK.

The aircraft configuration in this case is the following:

- APU running and APU BLEED on,

- FADEC 1 and 2 powered,

- both engines shut down,

- C/B 1KC1(2) (ENGINE HP FUEL SOV) opened (dry crank only) to open the LP SOV. Fuel inlet pressure has to be positive (dry crank and wet crank).

When CRANK is selected on the ground, the ENGINE page appears automatically on the ECAM and the ECU initiates a motoring sequence after action on the manual START P/B. With CRANK selected, ignition is inhibited. The action on the Engine manual START P/B opens the starter SOV. During the crank sequence the starter limitations have to be observed. Make sure that you do not go over the limits.

An acceptable duty cycle can be performed with the following procedure:

- 2 minutes on,

- 20 seconds off,

- up to four times and then,

- 15 minutes off for cooling.

If the starter operation time is exceeded, a warning message is displayed on the ECAM. WET CRANK When the MASTER control switch is set to the ON position, the LP and HP fuel SOV are opened. For a wet crank, the MASTER control switch is normally set to ON between 15 and 20% of N2.

CAUTION: - DO NOT MOTOR THE ENGINE FOR MORE THAN 15 SECONDS WITH THE MASTER CONTROL

SWITCH IN THE ON POSITION.

After a wet crank of 15 seconds maximum, when the MASTER control switch is set to OFF position, the fuel is cut off and the starter SOV closes following the reset of the ECU. After the reset of the ECU, the ECU will command the starter SOV to open when the N2 speed is less than 20%. The dry CRANK procedure is initiated. Continue to dry crank the engine for 60 seconds (within the starter limitation of 2 minutes on), this will dry the fuel that can be in the combustor. After 60 seconds, release the manual START P/B switch to interrupt the crank sequence and set the selector back to MODE Normal position. When the manual START P/B is released out, the starter SOV closes. With the selector in the MODE NORM position and engines shut down, the DOOR/Oxygen page is displayed on the ECAM. On the enhanced system, the same information is provided with a different display presentation.

Note:

N1 = Low pressure compressor speed

N2 = High pressure compressor speed

SOV = Shutoff valve

P/B = Push Button