# AUTOMATIC FLIGHT SYSTEM DESIGN

**GENERAL**

The Automatic Flight System (AFS) calculates orders to automatically control the flight controls and the engines. It computes orders and sends them to the Electrical Flight Control System (EFCS) and to the Full Authority Digital Engine Control (FADEC) to control flying surfaces and engines. When the AFS is not active, the above-mentioned components are controlled by the same systems but orders are generated by specific devices: side sticks and thrust levers.

**NAVIGATION**

A fundamental function of the AFS is to calculate the aircraft position. To compute the aircraft position, the system uses several aircraft sensors, which give useful information for this purpose.

**FLIGHT PLAN**

The AFS has several flight plans predetermined by the airline in its memory. A flight plan describes a complete flight from departure to arrival; it gives vertical information and all intermediate waypoints. The plan can be displayed on the EFIS or on the Multipurpose Control & Display Units (MCDU).

**OPERATION**

There are several ways to use the AFS but the normal and recommended one is to use it to follow the flight plan automatically. Knowing the position of the aircraft and the flight plan chosen by the pilot, the system is able to compute the orders sent to the flying surfaces and the engines so that the aircraft follows the flight plan. The pilot has an important monitoring role. NOTE: During AFS operation, side sticks and thrust levers do not move automatically.

**FLY BY WIRE**

If the pilot moves the side stick when the AFS is active, it disengages the autopilot. Back to manual flight, when the sidestick is released, the EFCS maintains the actual aircraft attitude.

**SYSTEM DESIGN**

To meet the necessary reliability, the AFS is built around 4 computers. There are two interchangeable Flight Management and Guidance Computers (FMGCs) and two interchangeable Flight Augmentation Computers (FACs). It is a FAIL OPERATIVE system. Each FMGC and FAC has a command part and a monitor part to be FAIL PASSIVE.