ITEM Integrated Test & Maintenance System for AFCS

An Elliott – SFENA consortium product for Concorde



Integrated Test & Maintenance System

Speeds aircraft despatch Assists fault location Checks integrity of AFCS safety monitors ITEM is a simple digital system which automates the process of maintenance of the Automatic Flight Control System, (AFCS). It organizes Built-In Test Equipment, (BITE), already located in the AFCS and enables the complete avionics system to be tested from a Control Panel, situated on the flight deck. During flight, an In-Flight Monitor (IFM) mode enables the AFCS serviceability to be continuously surveyed. Any maintenance action needed is stored for use after the aircraft has landed.

Both IFM and BITE modes locate maintenance action to Line Replaceable Unit (LRU) level thus avoiding the need for special skills in operating and maintaining the avionic systems.



ITEM Facilities

The BITE facility uses a parallel data highway, already existing in the aeroplane, to interface with the AFCS subsystems.

Subsystems accommodated by ITEM are:

Dual Autopilot/Flight Director with automatic landing

Dual Three-Axis Autostabilizer (including rate gyros)

Dual Autothrottle (including accelerometer)

Dual Electric Trim

Dual Warning and Landing Display Computer

Dual Flight Safety (SFC) Computer ITEM itself

IFM data is stored during flight in a non-volatile memory, located in the ITEM computer. This data is unaffected by removal of aircraft supplies and can be recalled by operation of the READ switch after the aircraft has landed. A CANCEL facility enables indications to be cleared after appropriate action has been taken.

A self-check routine, automatically initiated by selection of BITE or IFM ensures a high confidence in the diagnostic information displayed.

The In-Flight Monitor also processes validation signals from systems outside the AFCS. These include:

Inertial Navigation Systems, Radio Altimeters, Air Data Computers, ILS Receivers, Compass Couplers, Horizontal Situation Indicators, Aircraft Power Supplies.



Control Indicator Unit

The unit, which is flight deck mounted, provides the control and display facilities for both the BITE and IFM functions.

Each of the eight indicators on the panel can display up to eleven independent pieces of information. This enables areas requiring maintenance action to be described according to LRU, subsystem, associated sensors, etc. The BITE function may be applied to either the full system or to any selected LRU.



Computer

This unit is a small special purpose digital processor which sequences and controls the BITE of the complete AFCS. Central organization of BITE saves weight and space in the total installation and enables high confidence in cost-effective maintenance to be achieved with maximum total system reliability.

During flight, the same processor performs the IFM function. A non-volatile memory stores data for read-out at the end of a flight.

A semi-conductor read-only memory permanently stores the BITE and IFM programs.

Two computers are fitted per aircraft to match the integrity and availability of the AFCS.



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