

MODULE 5. DIGITAL TECHNIQUES ELECTRONIC INSTRUMENT

SYSTEMS

5.1 Electronic Instrument Systems

Typical systems arrangements and cockpit layout of electronic instrument systems.

5.2 Numbering Systems

Numbering systems: binary, octal and hexadecimal;
Demonstration of conversions between the decimal and binary, octal and hexadecimal systems and vice versa.

5.3 Data Conversion

Analogue Data, Digital Data;
Operation and application of analogue to digital, and digital to analogue converters, inputs and outputs, limitations of various types.

5.4 Data Buses

Operation of data buses in aircraft systems, including knowledge of ARINC and other specifications.

5.5 Logic Circuits

(a) Identification of common logic gate symbols, tables and equivalent circuits;
Applications used for aircraft systems, schematic diagrams.

(b) Interpretation of logic diagrams.

5.6 Basic Computer Structure

Computer related terminology;
Operation, layout and interface of the major components in a micro computer including their associated bus systems;
Information contained in single and multi-address instruction words;
Memory associated terms;
Operation of typical memory devices;
Operation, advantages and disadvantages of the various data storage systems.

5.7 Microprocessors

Functions performed and overall operation of a microprocessor;
Basic operation of each of the following microprocessor elements: control and processing unit, clock, register, arithmetic logic unit.

5.8 Integrated Circuits

Operation and use of encoders and decoders
Function of encoder types
Uses of medium, large and very large scale integration.

5.9 Multiplexing

Operation, application and identification in logic diagrams of multiplexers and demultiplexers.

5.10 Fibre Optics

Advantages and disadvantages of fibre optic data transmission over electrical wire propagation;
Fibre optic data bus;
Fibre optic related terms;
Terminations;
Couplers, control terminals, remote terminals;
Application of fibre optics in aircraft systems.

5.11 Electronic Displays

Principles of operation of common types of displays used in modern aircraft, including
Cathode Ray Tubes, Light Emitting Diodes and Liquid Crystal Display.

5.12 Electrostatic Sensitive Devices

Special handling of components sensitive to electrostatic discharges;
Awareness of risks and possible damage, component and personnel anti-static protection devices.

5.13 Software Management Control

Awareness of restrictions, airworthiness requirements and possible catastrophic effects of unapproved changes to software programmes.

5.14 Electromagnetic Environment

Influence of the following phenomena on maintenance practices for electronic system:
EMC-Electromagnetic Compatibility
EMI-Electromagnetic Interference
HIRF-High Intensity Radiated Field
Lightning/lightning protection

5.15 Typical Electronic/Digital Aircraft Systems

General arrangement of typical electronic/digital aircraft systems and associated BITE
(Built In Test Equipment) testing such as:
ACARS-ARINC Communication and Addressing and Reporting System

ECAM-Electronic Centralised Aircraft Monitoring
EFIS-Electronic Flight Instrument System
EICAS-Engine Indication and Crew Alerting System
FBW-Fly by Wire
FMS-Flight Management System
GPS-Global Positioning System
IRS-Inertial reference system
TCAS-Traffic Collision Avoidance system
Integrated modular Avionica
Cabin System
Information system