

DESIGN AND DEVELOPMENT OF FLIGHT CONTROL SYSTEM FOR LIGHT COMBAT AIRCRAFT - TEJAS AT ADE

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Abstract

The design and development of Flight Control System (FCS) for LCA was started in early 1993. In order to stabilize the airframe and achieve the desired performance over the entire flight envelop, it incorporates a quad redundant full authority Digital Fly by Wire (DFBW) flight control computer. The system is built around Digital Flight Control Computer (DFCC) containing four identical channels. The processor outputs drive the actuators through pulse width modulated amplifier for primary actuator of Direct Drive Valve (DDV) type. The Operational Flight Program (OFP) software executing in all the channels is identical and is configured as a single Computer Software Configuration Item (CSCI). The control inputs are provided by the pilot control sensors, inertial sensors, airdata sensors, cockpit panels etc. The FCS outputs include driving the flight control actuators, 1553B avionics data etc. The OFP software includes functions of real time execution, cross channel synchronization, device driver, analog and discrete I/O, redundancy management, control law implementation, continuous built-in-test (BIT) and pilot initiated BIT and maintenance BIT. Such a complex Digital Flight Control System (DFCS) has been extensively tested for verification and validation to check the performance against requirements respectively in sophisticated test rigs. A cohesive design of various systems of aircraft to satisfy the demands of FCS requires a robust Control Laws (CLAW). To design and develop the control law, ADE has developed a Real Time Simulator (RTS). This is used for evaluating control laws and handling quality assessment by LCA test pilots. Due to its robustness this simulator has been upgraded to Full Mission Simulator (FMS) for training LCA squadron pilots. Some of the cockpit panels like Flight Control Panel (FCP) and Flight Test Unit (FTU) which are required to evaluate the performance such as flutter effect and parametric identification are also developed at ADE.