STALL PROTECTION / Q FEEL SYSTEM

General

The Stall Protection and Q-Feel System (SPQS) serves four purposes: Artificial feel, stall warning, maintaining stall margin during icing and preventing the aircraft from entering a stall by forcing the control stick forward to prevent entry into the post-stall region.

Controls the artificial feel (Q-Feel) actuator provides the pilot, by a force on the control stick, with a feeling of changing aircraft speed.

Processes Ice Detector status signals and sends them to the EICAS. Ice detection modifies stall warning and stick pusher activation thresholds.

Controls approach indexers to provide approach speed information to flight crew.

The SPQS consists of the following components: digital dual Stall Protection and Q-Feel Computer, (SPQC), two AOA sensors, two approach indexes, two stick shakers, two ice detectors, one stick pusher actuator, one Q-feel actuator and one Q-feel shutoff valve.

Stall Protection and Q-Feel Computer

The SPQC inputs include: AOA sensor, weight-on-wheels, flap position, slat position, krueger flap position, landing gear (provision) ice detector, boot timer, radio altimeter, air data computer, attitude heading computer, pilot disconnect, and press-to-test. Outputs of the SPQC are stick pusher, stick shaker, autopilot disconnect, EICAS, approach indexers, slat/flap controller, Q-Feel actuator, and Q-feel shutoff valve.

The SPQC has two independent computer channels housed in a single unit. Each channel comprises the following: power supply, lightning protection, EMC protection, Motorola HC16 microcontroller, program memory, data memory, fault storage memory, watchdog timer, analog inputs, discrete inputs, Resolver to Digital (R/D) inputs, RS-422 interface, ARINC 429 interfaces, analog outputs, and discrete outputs.

STALL PROTECTION / Q FEEL SYSTEM CONTROLS AND INDICATORS

Warning Messages

STALL - Aircraft is approaching stall. (Stick shaker activates. Autopilot disconnects)

Caution Messages

SP INHIBIT INOP - Stall Protection system inhibitor during take-off or landing is inoperative (weight on wheel or RA data failure)

STALL SYS FAIL - Stall warning system has failed (AOA or both computers)

STICK PUSHER FAIL - Stick pusher data failure (AOA or one computer malfunction) Stick pusher is inoperative or AOA self-test at 70 KIAS failed

Advisory Messages

SPQS TEST OK - Successful stall protection/Q feel computer test

Status Messages

SPQS IN TEST - Stick pusher test in progress