

Behind the Lion Air Crash, a Trail of Decisions Kept Pilots in the Dark



NYT Picks Reader Picks All

employees and regularly sent them to training on company time. Those days ended a long time ago when they decided to put profits above all else at the expense of their employees. None of us are better off for this change in the equation from health insurance to retirement to outsourcing and now our lives are at all risk because of it.

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Amit Singh

India | 52m ago

The entire focus is on MCAS and how the pilots were not informed about it. The information on MCAS as a system has still not been shared with the pilots. Read my blog on "B737 Safety or Ethics" published in mindFly.blog highlighting the legal immunity that the manufacturer had enjoyed for known design defect. The same has been overturned by the court in early 2018. In the B787 battery fire incident investigations, NTSB has documented that FAA and Boeing are responsible for the defects.

What we forget is that there is an existing system in the B737 called "Speed trim system (STS)" which is monitored and has a fail light. If one channel fails, the Minimum Equipment List requires that second channel to be operational for the dispatch of the aircraft. STS also helps in automatically and autonomously, trimming down of the stabilizer if the aircraft nears a stall. How many people know that? MCAS does a similar function but the difference is that it is not monitored by a system to ensure that it is operational and there is no FAIL light in the cockpit as is given for the STS. What if MCAS fails in between a series of flights, which any system can fail and the aircraft keeps flying? This is against the design objective of the MCAS and certification. Moreover, MCAS is not listed in the Type Certificate Data Sheet issued by FAA. This document lists all the minor or major changes, modifications in the new aircraft.

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The comment as posted in the NY Times on 04th Feb 2019. The entire focus of the media and public is on MCAS and how the pilots were not informed about it. The information on MCAS as a system has still not been shared with the pilots. How can we be so sure that the MCAS is installed on the Max?

Read my blog on "B737 Safety or Ethics" published in mindFly blog "Safety or Ethics" highlighting the legal immunity that the manufacturer had enjoyed for known design defect. The same has been overturned by the court in early 2018. In the B787 battery fire incident investigations, NTSB has documented that FAA and Boeing are responsible for the defects. Design flaws led to the Battery fires: Reuters report. What we forget is that there is an existing system in the B737 called "Speed trim system (STS)" which is monitored and has a fail light.



B-737 8 Max Overhead Panel

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U.S. DEPARTMENT OF TRANSPORTATION		MASTER MINIMUM EQUIPMENT LIST				
FEDERAL AVIATION ADMINISTRATION						
AIRCRAFT: B-737-8		REVISION NO. 0 DATE: 03/09/2017		PAGE NO. 22-1		
MMEL TABLE KEY						
SYSTEM & SEQUENCE NO.	ITEM	1. REPAIR CATEGORY				
		2. NUMBER INSTALLED				
		3. NUMBER REQUIRED FOR DISPATCH				
		4. REMARKS OR EXCEPTIONS				
22. AUTOFLIGHT						
Sequence No.	Item	1	2	3	4	Change Bar
10-01	Autopilot Systems					
10-01A		C	2	1	May be inoperative provided approach minimums do not require its use.	
10-01B		B	2	0	Except for ER operations, may be inoperative provided: a) Enroute operations do not require autopilot use. b) Approach minimums do not require autopilot use. c) Number of flight segments and segment duration is acceptable to flight crew. NOTE: Any mode which functions normally may be used. For inoperative CWS, do not use other modes (pitch or roll).	
10-02	Autopilot Disengage Aural Warning System	C	1	0	May be inoperative provided approach minimums do not require use of the autopilot.	
10-03	STAB OUT OF TRIM Light	B	1	0	Except for ER operations, may be inoperative provided autopilots are not used.	
11-01	Speed Trim Function	C	2	1	(M) May be inoperative provided: a) Associated speed trim function is deactivated. b) Remaining speed trim function is verified to operate normally. c) SPEED TRIM FAIL light operates normally.	
11-02	SPEED TRIM FAIL Light	C	1	0	(M) May be inoperative provided speed trim system is verified to operate normally.	

B-737 8 Max MEL

MCAS does a similar function but the difference is that it is not monitored by a system to

ensure that it is operational and there is no FAIL light in the cockpit as is given for the STS.

Stall Identification

Stall identification and control is enhanced by the yaw damper, the Elevator Feel Shift (EFS) module and the speed trim system. These three systems work together to help the pilot identify and prevent further movement into a stall condition. During high AOA operations, the SMYD reduces yaw damper commanded rudder movement.

The EFS module increases hydraulic system A pressure to the elevator feel and centering unit during a stall. This increases forward control column force to approximately four times normal feel pressure. The EFS module is armed whenever an inhibit condition is not present. Inhibit conditions are: on the ground, radio altitude less than 100 feet and autopilot engaged. However, if EFS is active when descending through 100 feet RA, it remains active until AOA is reduced below approximately stickshaker threshold. There are no flight deck indications that the system is properly armed or activated.

As airspeed decreases towards stall speed, the speed trim system trims the stabilizer nose down and enables trim above stickshaker AOA. With this trim schedule the pilot must pull more aft column to stall the airplane. With the column aft, the amount of column force increase as the EFS module increases pressure to the elevator feel and centering unit.

Role of STS is stall protection

The question rises, assuming the Max is equipped with the MCAS, what if MCAS fails in between a series of flights, which any bimodal system can fail and the aircraft keeps flying? Serviceability of MCAS would not be known to the crew since the system is not monitored and there is no feedback in the cockpit. This is against the design objective of the MCAS and certification.

MCAS is not listed in the Type Certificate Data Sheet issued by FAA. This document lists all

the minor or major changes, modifications in the new aircraft. The much hyped MCAS is not listed in the TCDS, does it mean that it is not installed? Else the other possibility is that the MCAS was installed but the FAA was not notified. There has not been an official comment from Boeing or FAA regarding the presence of a component called MCAS.

Boeing 737 TCDS published on the FAA website

At the end, its a collective responsibility of the OEM and the regulator to ensure that the commercial aspects of production do not outweigh the safety aspects of Protection. The Boeing company has been plagued with an ethical issue of not erring on the side of safety but working towards protecting the corporate bottom line.