Taking the 737 to the MAX!

Nickolas Means
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SYM
SSO Access request by @nmeans

ProdAdmin  Screenshot for slide deck  Expires at Mar 13 5:25:50 PM  Approved by @david

Revoke
This talk contains stories of two plane crashes. If you are a nervous flyer, this talk might not be for you.
Aérospatiale/BAC Concorde G-BOAB
Boeing 737 MAX 8
Boeing 737 MAX 8
Lion Air crash: Boeing 737 plane crashes in sea off Jakarta

29 October 2018

This is believed to be debris from a plane that's crashed in Indonesia.

Debris found from Lion Air crash in sea
Ground/Air
Master Caution
Pilot Autopilot
Copilot Autopilot
Pilot Stick Shaker
Copilot Stick Shaker
Manual Trim
Automatic Trim
Pitch Trim Position
Pilot Angle of Attack
Copilot Angle of Attack
Flap Handle Position
Pilot Airspeed
Copilot Airspeed
Ground Speed
Pilot Altitude
Copilot Altitude

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Angle of Attack Vane, Boeing 737
Ground/Air
Master Caution
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Copilot Autopilot
Pilot Stick Shaker
Copilot Stick Shaker
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Automatic Trim
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Copilot Altitude

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Flight Crew Operations Manual Bulletin
for
The Boeing Company

The Boeing Company
Seattle, Washington 98124-2207

Number: TBC-19
IssueDate: November 6, 2018

Airplane Effectivity: 737-8 / -9

Subject: Uncommanded Nose Down Stabilizer Trim Due to Erroneous Angle of Attack (AOA) During Manual Flight Only

Reason: To Emphasize the Procedures Provided in the Runaway Stabilizer Non-Normal Checklist (NNC).

Information in this bulletin is recommended by The Boeing Company, but may not be FAA approved at the time of writing. In the event of conflict with the FAA approved Airplane Flight Manual (AFM), the AFM shall supersede. The Boeing Company regards the information or procedures described herein as having a direct or indirect bearing on the safe operation of this model airplane.

THE FOLLOWING PROCEDURE AND/OR INFORMATION IS EFFECTIVE UPON RECEIPT

Background Information
The Indonesian National Transportation Safety Committee has indicated that Lion Air flight 610 experienced erroneous AOA data. Boeing would like to call attention to an AOA failure condition that can occur during manual flight only.
FROM: THE BOEING COMPANY
TO: Boeing Correspondence (MOM)
MESSAGE DATE: 10 Nov 2018 1810 US PACIFIC TIME / 11 Nov 2018 0210 GMT

This message is sent to all 737NG/ MAX Customers, Regional Directors, Regional Managers and Boeing Field Service Bases.

CATEGORY: Maintenance, Engineering, Flight Operations, Management, Safety

SERVICE REQUEST ID: 4-4298138108
ACCOUNT: Boeing Correspondence (MOM)
DUE DATE: No Action Required
PRODUCT TYPE: Airplane
PRODUCT LINE: 737
PRODUCT: SEVERAL
ATA: 0000-57

SUBJECT: Information - Multi-Model Stall Warning and Pitch Augmentation Operation

REFERENCES:
/A/ MOM-MOM-18-0655-01B

SUMMARY:
Boeing has received many requests for the same information from 737 fleet operators in response to the reference /A/ message. This message provides technical information and operational details.

DESCRIPTION:
A pitch augmentation system function called "Maneuvering Characteristics Augmentation System" (MCAS) is implemented on the 737-8, -9 (MAX) to enhance pitch characteristics with flaps UP and at elevated angles of attack. The MCAS function commands nose down stabilizer to enhance pitch characteristics during steep turns with elevated load factors and during flaps up flight at airspeeds approaching stall. MCAS is activated without pilot input and only operates in manual, flaps up flight. The system is designed to allow the flight crew to use column trim switch or stabilizer aisle stand cutout switches to override MCAS input. The function is commanded by the Flight Control computer using input data from sensors and other airplane systems.
Boeing 737-300 Engine Inlet Cowling
Boeing 737-700 “NextGen”
Boeing / McDonnell Douglas Merger, 1997

- $13.3 Billion Deal
- Combined Sales of $48 Billion
  Projected Next Year
- Workforce of Nearly 200,000
  in 27 States
“When people say I changed the culture of Boeing, that was the intent, so that it’s run like a business rather than a great engineering firm.”

— Harry Stonecipher
Boeing 737 MAX Engine Nacelle
Boeing 737 MAX Wind Tunnel Testing
Boeing KC-46 Pegasus
737 MAX Test Flight
737 MAX Center Console
737 MAX Center Console
FEATURE

What Really Brought Down the Boeing 737 Max?

Malfunctions caused two deadly crashes. But an industry that puts unprepared pilots in the cockpit is just as guilty.

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William Langewische
Passengers Carried Globally per Year, 1999-2019

Source: World Bank
FEATURE

What Really Brought Down the Boeing 737 Max?

Malfunctions caused two deadly crashes. But an industry that puts unprepared pilots in the cockpit is just as guilty.

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William Langewische
Lion Air’s pilot training academy has a 95% graduation rate.
Indonesia’s aviation sector has a fatality rate 15x the global average.
Ethiopian Airlines 737 MAX 8
737 MAXes Parked in Renton, WA
Why did this happen?
Safety

Increase Rate

Decrease Rate
Safety

Increase Rate

Training Quality

Pilots Needed

Travel Amount

Decrease Rate

Planes Needed

Tech Advances

Consolidation

Boeing Dilution

Design Quality

FAA Delegation

Competitive Press.

Design Speed

+ 

+ 

+ 

+ 

+ 

+ 

+ 

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“Everyone or everything in a system can act dutifully and rationally, yet all these well-meaning actions too often add up to a perfectly terrible result.”

— Donella H. Meadows, Thinking in Systems
Safety

Increase Rate

- Training Quality
- Pilots Needed
- Travel Amount
+ Design Quality
+ FAA Delegation
+ Boeing Dilution
+ Consolidation
+ Technology Advances
+ Design Speed
+ Competitive Press.

Decrease Rate

- Planes Needed
- Decrease
- Design Speed
- Decrease
- Design Quality
- Decrease
- FAA Delegation
- Decrease