

FAA Independent Technical Advisory Board Review

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Federal Aviation
Administration



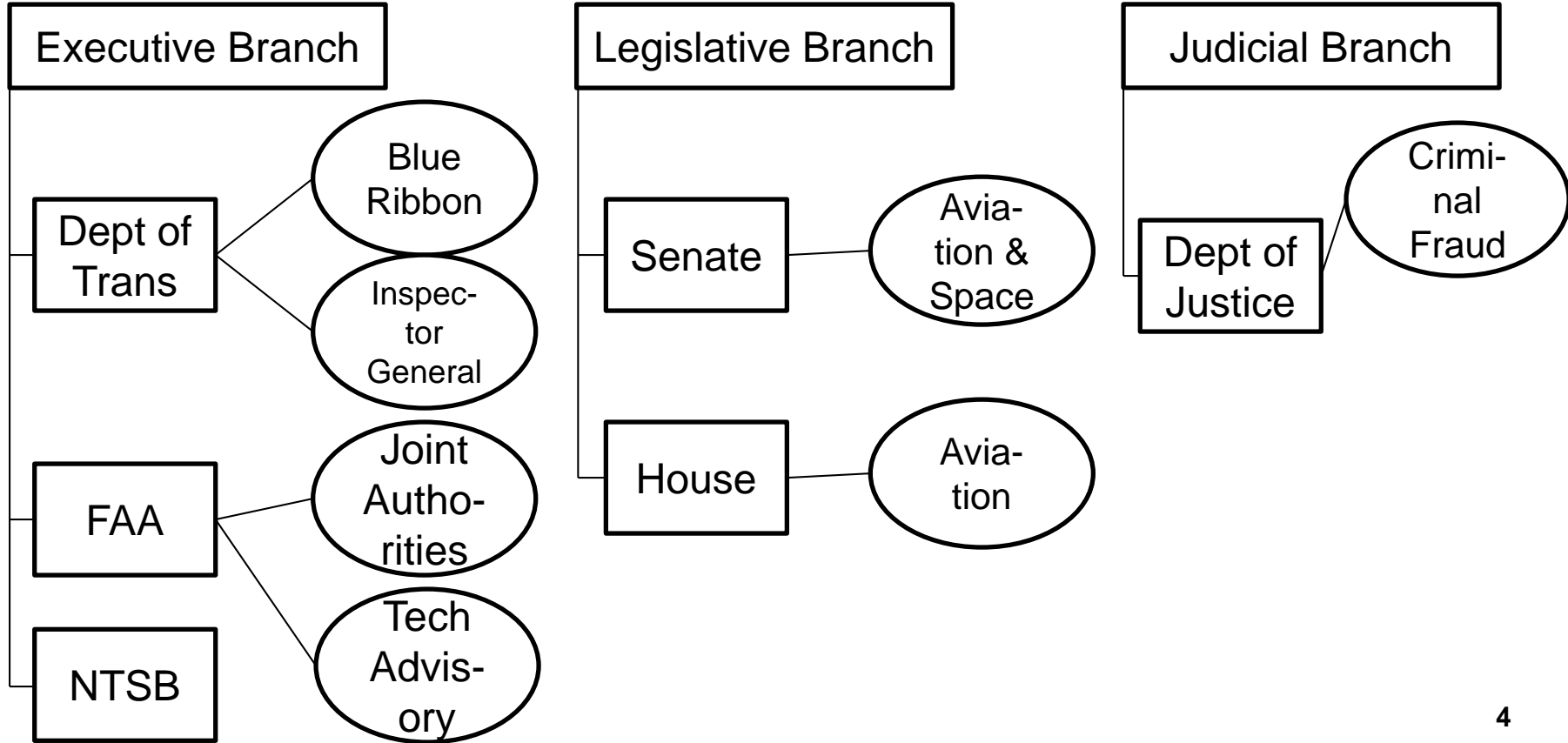
Main points

- Technical Advisory Board independently reviewed revised MCAS
- Recommended 10 items prior to Return to Service (1 more added last week)
- Recommended 7 items after Return to Service

Outline

- Reviews and purposes
- Technical Advisory Board membership
- Timeline (meeting, interim, congress brief, meeting, final report)
- Findings

U.S. Govt reviews and purposes



Technical Advisory Board Purpose

- Independent review of the revised MCAS to determine
 - if it meets certification requirements
 - if it is safe

Technical Advisory Board Membership

- FAA (no one involved in original MAX certification)
 - Chief Scientist, Flight Deck Technology Integration
 - Chief Scientist, Aircraft Computer Software
 - Chief Scientist, Flight Simulation Systems
 - Technical Specialist, Safety and Integration
 - Flight Test Pilot
 - Inspector pilot with Aircraft Evaluation Group
 - Inspector pilot with Aircraft Evaluation Group
 - Senior Aerospace Engineer, Systems and Equipment
- NASA
 - Acting Chief of Systems Engineering and Integration Branch
- U.S. Air Force
 - System Safety Engineer
- Volpe Transportation Center
 - Chief of Aviation Safety Management Systems Division
 - Engineering Research Psychologist and Pilot

Timeline

- Review at Boeing, May 2019
 - Briefings, Simulator Evaluations, Deliberations
- Interim report, May 2019
- Redesign initiated after cruise assessment of a CPU failure, June 2019
- Congressional brief, July 2019
- Review at Boeing, November 2019

Findings

- Prior to Return-to-Service
 - Complete an audit of Boeing's development assurance process
 - Submit analysis and test data to ensure proper functional integration of the spoiler system with the trim system
 - Submit final version of the MCAS fault trees
 - Submit root cause analysis to the auto stabilizer trim monitor error in the fault tree for low altitude stabilizer runaway failure condition
 - Address the flight control computer CPU and memory failure non-compliance issue discovered during certification testing
 - Ensure Speed Trim Fail procedure in QRH encompasses both Speed Trim Function and MCAS function
 - Add AOA Disagree to the list of additional information as possible evidence of an Airspeed Unreliable condition in the QRH
 - Submit final version of Level B training to the TAB for review
 - Identify if special emphasis training for the B737 series trim wheel forces awareness is appropriate
 - Change Stabilizer Trim to Speed Trim in specified area of FSB report
 - ADDED: Simplification of IAS Disagree, AOA Disagree, Unreliable Airspeed QRH items to reduce risk of memory items not being properly trained (this relates to item #7)

Findings

- Future Action Items (after Return to Service)
 - Provide root cause analysis for why AOA Disagree message implementation did not meet the design requirements
 - Include AOA Disagree message on the Head-Up Display
 - Prioritize IAS Disagree alert appropriately
 - Add notes from the Stab Trim Inop procedure to the Runaway Stabilizer procedure
 - Evaluate manual trim wheel forces in MAX full flight simulator to determine if exceptional pilot strength, alertness, or skill is required
 - Analyze initial, recurrent, transition, and upgrade training need to provide proficiency and currency requirements for air carriers. Identify the kinds of flightcrew interactions with the equipment that can be reasonably expected in service by qualified crewmembers trained in their use
 - At the earliest regular training event, pilots of all Boeing 737 series airplanes should receive special emphasis training on trim system understanding, awareness, and use. Consideration should be given to broadening this training recommendation to pilots of all transport category airplanes.

Conclusions

- Technical Advisory Board independently reviewed revised MCAS
- Recommended 10 items prior to Return to Service (1 more added last week)
- Recommended 7 items after Return to Service