

RECOMMENDATIONS

Technology

The investigation revealed that the response to an incorrect radio altimeter value can have far-reaching effects on related systems. The Board has thus formulated the following recommendations:

Boeing

1. Boeing should improve the reliability of the radio altimeter system.

USA Federal Aviation Administration (FAA) and the European Aviation Safety Agency (EASA)

2. The FAA and EASA should ensure that the undesirable response of the autothrottle and flight management computer caused by incorrect radio altimeter values is evaluated and that the autothrottle and flight management computer is improved in accordance with the design specifications.

The investigation revealed that the available indications and warnings in the cockpit were not sufficient to ensure that the cockpit crew recognised the too big a decrease in speed at an early stage. The Board has thus formulated the following recommendation:

Boeing, FAA and EASA

3. Boeing, FAA and EASA should assess the use of an auditory low-speed warning signal as a means of warning the crew and – if such a warning signal proves effective – mandate its use.

Operational

The investigation revealed the importance of having an appropriate recovery procedure for stall situations and the importance of recurrent training. The Board has thus formulated the following recommendations:

Boeing

4. Boeing should review its 'Approach to stall' procedures with regard to the use of autopilot and autothrottle and the need for trimming.

Turkish Directorate General of Civil Aviation (DGCA), International Civil Aviation Organization (ICAO), FAA and EASA

5. DGCA, ICAO, FAA and EASA should change their regulations in such a way that airlines and flying training organisations see to it that their recurrent training programmes include practicing recovery from stall situations on approach.

Reports

The investigation revealed that reporting on problems concerning radio altimeter systems was limited. This situation was not limited to Turkish Airlines. Failure to report such problems limits the effectiveness of existing safety programmes. This can result in an inaccurate assessment of risks by both airlines and aircraft manufacturers, limiting their ability to manage risks. The Board has thus formulated the following recommendations:

FAA, EASA and DGCA

6. FAA, EASA and DGCA should make (renewed) efforts to make airlines aware of the importance of reporting and ensure that reporting procedures are adhered to.

Boeing

7. Boeing should make (renewed) efforts to ensure that all airlines operating Boeing aircraft are aware of the importance of reporting.

Turkish Airlines

8. Turkish Airlines should ensure that its pilots and maintenance technicians are aware of the importance of reporting.

Safety management

The investigation revealed that Turkish Airlines has a programme for the purpose of preventing accidents and improvement of flight safety but that this programme showed some deficiencies in actual practice. The Board has thus formulated the following recommendation:

Turkish Airlines

9. In light of the deficiencies uncovered in this investigation, Turkish Airlines should adjust its safety programme.

Air traffic control

The investigation revealed that the way in which the aircraft was lined up on approach obscured the fact that the autothrottle was not operating properly and increased the crew's workload. The Board has thus formulated the following recommendations:

Air Traffic Control The Netherlands (LVNL)

10. LVNL should harmonise its procedures for the lining up of aircraft on approach - as set out in the Rules and instructions air traffic control (VDV) - with ICAO procedures. LVNL should also ensure that air traffic controllers adhere to the VDV.

Transport, Public Works and Water Management Inspectorate (IVW)

11. IVW should monitor LVNL's compliance with national and international air traffic control procedures.