



NTSB National Transportation Safety Board

Office of Research and Engineering

Safety Study Report: Introduction of Glass Cockpit Avionics into Light Aircraft

Qualitative Analysis
Results

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Safety Issues Identified

- Training requirements
- Pilot information about system failure modes
- Equipment-specific training and resources
- Equipment malfunction and service difficulty reporting

Issue 1: Training

- Manufacturers
 - Provide training that includes aircraft systems
 - Included in purchase price of new aircraft
- Insurance providers
 - Vary by pilot and company
 - Typically exceed regulatory requirements

Issue 1: Training

- FAA
 - Developed FAA-Industry Training Standards (FITS) in response to new advanced aircraft
 - Included generic glass cockpit avionic information in manuals and handbooks
 - Did not include specific training or testing requirements
 - Has not yet updated knowledge tests
 - Staff has proposed recommendations in this area

Issue 2: System Failure Modes

- Luna, NM: April 9, 2007



- Pilot reported loss of airspeed and altimeter readouts on PFD
- Subsequent loss of control
- Ballistic parachute recovery

Issue 2: System Failure Modes

Airspeed



Issue 2: System Failure Modes

Airspeed

Altitude Vertical speed



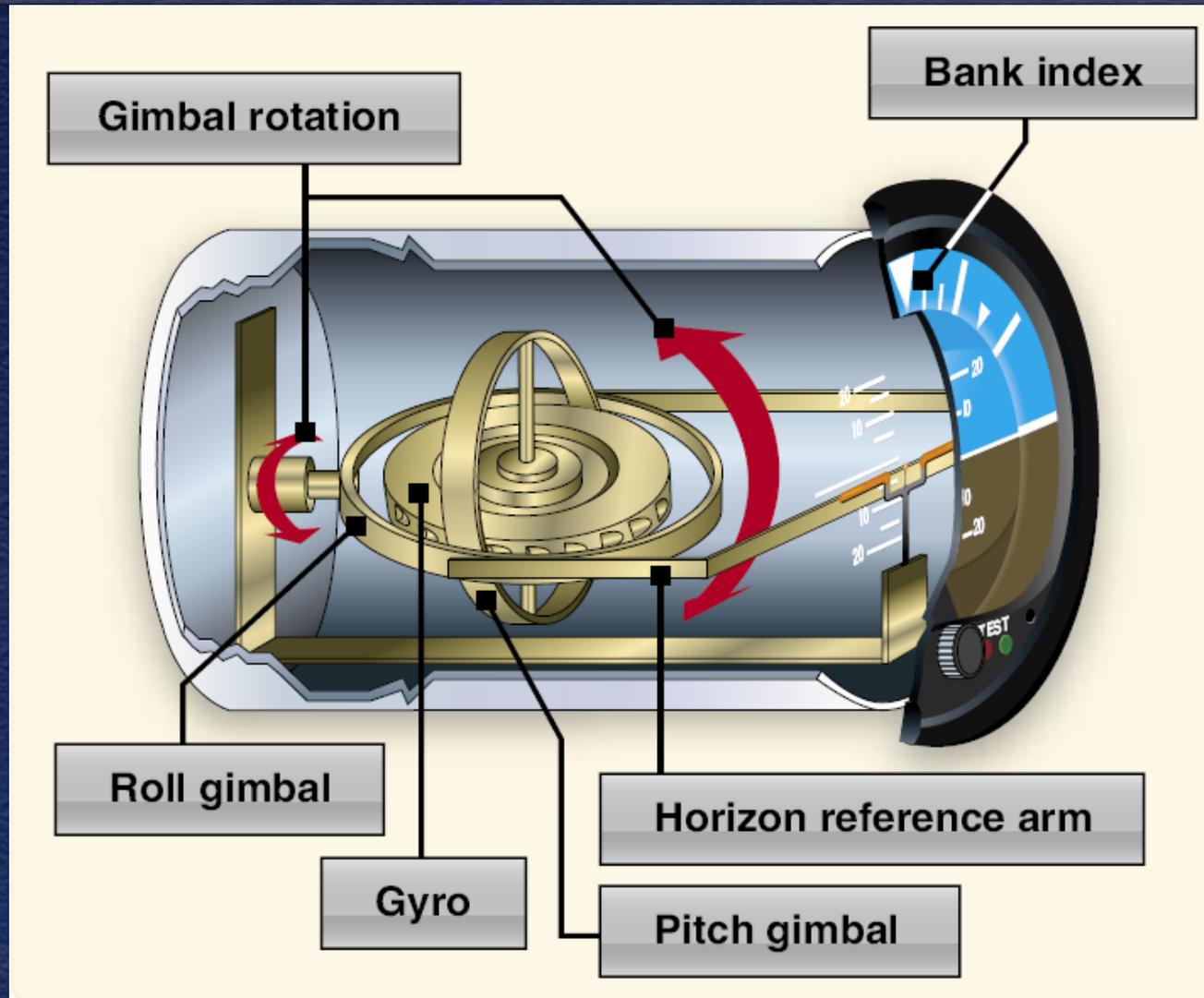
Issue 2: System Failure Modes

- Aircraft flight manual (AFM) is required to include information about equipment malfunctions
- The AFM supplement did not include system input failure information
- Staff has proposed a recommendation in this area

Issue 3: Equipment-Specific Training

- Wide variation in glass cockpit avionics system design and operation between manufacturers
- Software-based systems can be modified

Conventional Attitude Indicator



Attitude and Heading Reference System (AHRS)



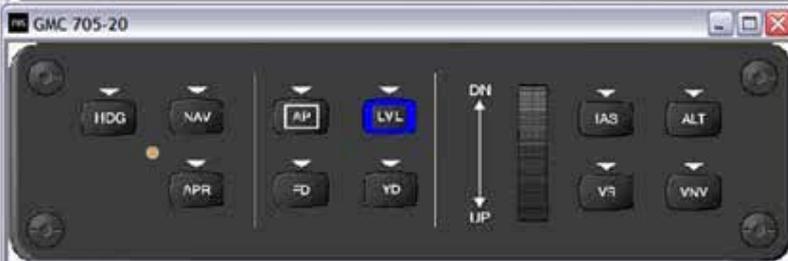
Issue 3: Equipment-Specific Training

- Experience with conventional instruments and/or generalized training do not adequately prepare pilots to operate glass cockpit avionics
- Staff has proposed a recommendation in this area

Simulator Training

- Not possible or prudent to demonstrate all failure modes in the aircraft
- Approved flight simulators may not be available to all GA pilots

PC-based Trainer



Simulator Training

- Software applications or procedural trainers could be used for equipment-specific avionics training
- Staff has proposed a recommendation in this area

Issue 4: Tracking Equipment Reliability

- Coconut Creek, FL: Jan. 15, 2005



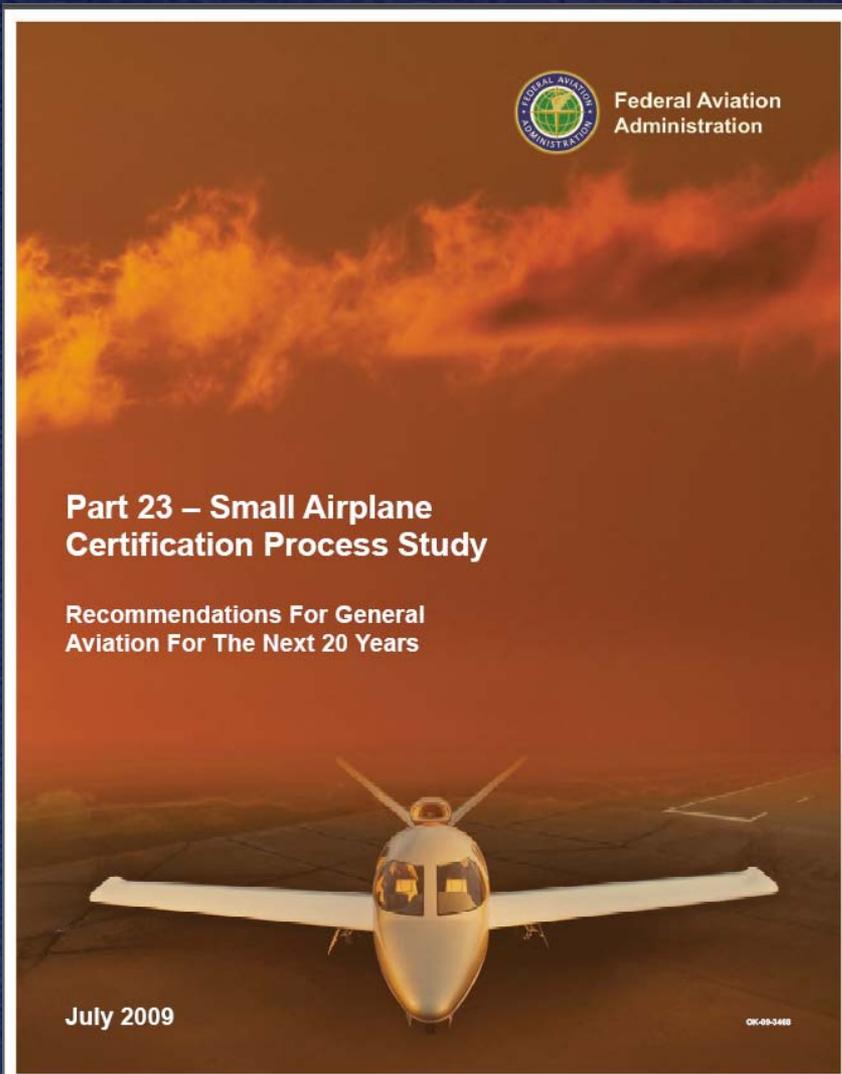
- Loss of control in IMC
- Pilot reported unspecified avionics problem
- Multiple prior PFD replacements

Tracking Equipment Reliability

- FAA requires manufacturers to report select equipment problems
- FAA Service Difficulty Reporting (SDR) System
 - Required for Parts 121, 135, and 125
 - Not required for General Aviation
- No SDR records for the accident aircraft



Tracking Equipment Reliability



- FAA is reviewing Part 23 certification
- FAA/Industry process study cited SDR reporting deficiencies
- Staff has proposed a recommendation in this area

Summary

- Anticipated safety improvements were not evident in the study
- Additional equipment information, training, and malfunction reporting are needed



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