

SE-35

**Loss of Control
Joint Safety Implementation Team
Implementation Plan
for
Display and Alerting Features – Existing Airplane Designs**

DRAFT

Statement of Work:

To reduce fatal accidents due to loss of control, display and alerting systems in existing airplane designs that are not already equipped should be modified, if feasible, to provide:

- Detection and annunciation of conflicting attitude and airspeed information;
- Detection, annunciation and removal (if feasible) of invalid attitude, airspeed and altitude information (e.g., from an internal fault).

Lead Organization for Overall Project Coordination (LOOPC):

AIA

Safety Enhancement:

Where feasible, display and alerting systems on existing airplane designs that are not already equipped are modified to better detect and annunciate conflicting and/or invalid flight critical information.

Outputs:

Output 1:

Completed Display and Alerting Features Feasibility Studies that establish, for existing airplane designs, the feasibility of modifying the designs to incorporate the following:

- Detection and annunciation of conflicting attitude and airspeed information
- Detection, annunciation and removal (if feasible) of invalid attitude, airspeed and altitude information (i.e., from an internal fault)

It is acknowledged that full, fleetwide retrofit of these features is not feasible, however substantial safety benefit may be achieved with alternative solutions. The study should focus on the cost versus benefit of incorporating available features, expanding existing features to other models, and continued research of new features to obtain the highest practical safety benefit. For each model, consideration should be given to equipment cost, design retrofitability, installation, intra-system and inter-system impacts, certification, crew training, mixed fleet operations, design risk, maintainability, parts flow, fleet service life, fleet safety effectiveness, etc.

Resources: AIA (LOOC), type certificate holders, suppliers, operators

Total government/industry resources: \$1.3M (see separate worksheet for details)

Timeline: 60 days for AIA to issue request for study, 1 year for completion of study

Actions:

1. AIA should request that the type certificate holders and equipment suppliers conduct the studies.
2. The results should be submitted back to AIA and forwarded to CAST for final endorsement.

Output 2:

FAA encourages type certificate holders and operators of in-service and current production aircraft to implement the modifications identified by the Displays and Alerting System Requirements Feasibility study

Resources: ASY-1 (LOOC), FAA (AIR-1 for TC holders, AFS-1 for operators), type certificate holders, operators

Total government/industry resources: \$9.5M (see separate worksheet for details)

Timeline: 120 days for CAST to endorse completed feasibility studies, 60 days for FAA to send letter of encouragement.

Actions:

1. CAST endorses completed feasibility studies.
2. CAST requests that the FAA communicate with all type certificate holders and operators of existing airplane designs and current production aircraft, encouraging them to implement the display and alerting features in accordance with the results of the study, and requesting that they respond back within 180 days with their intentions.
3. Every two years, CAST will request that the FAA conduct a survey of the type certificate holders and operators to report back on implementation progress.

Relationship to Current Aviation Community Initiatives:

- ARAC Avionics Harmonization Working Group
- Industry activity on display standards
- NTSB Recommendation A-96-16, A-96-18 and A-97-19 relative to Birgen Air 757

Performance Goals & Indicators for Outcomes/outputs:

Outputs 1&2

Goal: Model-specific feasibility study of incorporating systems that: detect and annunciate conflicting attitude and airspeed information; and detect, annunciate and remove (if feasible) invalid attitude, airspeed and altitude information (i.e., from an internal fault).

- Indicator: Completed survey of all existing airplane models submitted to CAST via AIA
- Indicator: FAA conduct a biennial survey of the type certificate holders and operators to report back on implementation progress

Programmatic Approach:

Organizational Strategy

The LOC JSIT identified Bob Robeson, AIA, (xxx-xxx-xxxx) as the JSIT project lead for Displays and Alerting Features in Existing Airplanes. The project lead will assist with the implementation of the activities outlined in this Implementation Plan and will, when requested, provide progress reports to the CAST. Implementation of this project is viewed as a shared responsibility and tasks will be divided between the FAA and organizations/persons in industry. The Lead Organization for Overall project Coordination (LOOPC) is AIA. The Lead Organizations for Output Coordination (LOOC) are identified in each Output of this Implementation Plan. The roles and responsibilities of the LOOPC and LOOC are described in the CAST approved JSIT Process Document.

Implementation Activities

Several loss-of-control accidents involved cockpit displays of airspeed, attitude and altitude flight information as contributory factors. The problems are centered around not having sufficient, obvious and unambiguous information available to the pilot to adequately assess the aircraft status and then to accomplish the appropriate action to resolve problems. The objective of this project is to request the manufacturers to survey existing fleets to determine the conformity of displays in the existing fleet with these objectives and to implement changes in display designs where feasible and appropriate. The implementation of this project will require cooperation of the manufacturers and operators to incorporate changes in cockpit displays in the existing fleet, as appropriate.

Because many aircraft do not include all of these features, a model-specific study should be performed to understand the feasibility of incorporating systems that detect and annunciate conflicting attitude and airspeed information (i.e., comparators) and detect, annunciate and remove (if feasible) invalid attitude, airspeed and altitude information (i.e., from an internal fault).

Key Products and Milestones:

- AIA request for Display and Alerting Features Feasibility Studies – 60 days
- Study results – 1 year from receipt of AIA request
- CAST endorsement of completed studies – 120 days from receipt
- FAA communication to type certificate holders and operators encouraging implementation of study results and requesting response regarding intentions – 60 days from CAST endorsement
- Type certificate holders' and operators' response to FAA letter – 180 days from receipt of letter

Plan and Execution Requirements:

Design changes, by nature, take a long time and require significant resources. Incorporating new safety features into existing aircraft or derivatives can have an impact on overall fleet safety, but these changes are usually expensive, technically complex, and can have significant operational impacts. Often the return on investment is low for retrofits to aging aircraft. Any near-term benefits to be realized through retrofit of the existing fleet require voluntary implementation by manufacturers and operators.

Model-specific feasibility studies for the existing fleet are required to establish the technical and operational feasibility of each applicable project aspect. This will determine the magnitude of the economic impacts and the likelihood that voluntary implementation will be undertaken. The resources to conduct the feasibility studies must be provided by the affected participants in order to proceed with any hope of implementation.

Risk Description:

- Potential economic burden on manufacturers and operators
- Potential inadequate resource availability for manufacturers and operators and FAA
- Potential inadequate findings from required surveys / studies
- Potential unwillingness to voluntarily implement project outputs
- Reluctance to retrofit aging fleets

Risk Mitigation Plan:

- CAST will advocate voluntary implementation among non-aligned air carriers
- Failure to implement advisory material for existing aircraft may require additional rulemaking.
- Seek consensus on the use of existing studies and surveys by citing use in industry
- Model-specific feasibility study for implementation in existing aircraft will be used to mitigate economic impacts and inadequate resource availability

Impact on Non - Part 121 or International Applications:

All operators of the airplane will be impacted by changes to the design.