U.S. Department of Transportation

Federal Aviation Administration

Memorandum

Subject:	Action: Review and Concurrence, Equivalent Level of Safety Finding for the Seven Q Seven, Inc. Re-engine Modification to a Boeing Model 707-300B/C FAA Project Number ST7065SE-T	Date:	9/16/04
		Reg Ref:	§ 25.9333(a)
From:	Manager, Propulsion/Mechanical Systems Branch, ANM-112	Reply to Attn of:	William Bond Propulsion Branch, ANM-140L
To:	Manager, Los Angeles Aircraft Certification Office, ANM-100L	ELOS Memo #:	ST7065LA-T-P-2

Background

Title 14 Code of Federal Regulations part 25, § 25.933(a)(1)(ii) requires that for turbojet reversing systems ... it must be shown by analysis or test, or both, that ... the airplane is capable of continued safe flight and landing under any possible position of the thrust reverser. Compliance with § 25.933 following an in-flight thrust reverser deployment has traditionally been shown by a limited flight demonstration, and an analysis that indicated that the demonstrated controllability could be extrapolated to cover the normal flight envelope of the subject airplane.

Seven Q Seven, Inc. (SQS) plans to modify Boeing Model 707-300B/C series airplanes by installing thrust reversers that are hydraulically operated and electrically controlled. SQS plans to show compliance with Title 14 Code of Federal Regulations (CFR) part 25, § 25.933 for the proposed modification to Boeing Model 707-300B and -300C series airplanes by demonstration of controllability and minimum performance (continued safe flight and landing) except for inadvertent deployments immediately following takeoff or just prior to landing. The design features preventing inadvertent deployments during these critical flight phases will be shown to provide an equivalent level of safety.

Applicable regulation(s)

§ 25.933(a)

Regulation(s) requiring an ELOS

§ 25.933(a)

Description of compensating design features or alternative standards which allow the granting of the ELOS (including design changes, limitations or equipment need for equivalency)

Airplane controllability during an inadvertent thrust reverser deployment immediately following takeoff and just prior to touchdown may not be possible on most airplane types. Therefore, airplanes that cannot demonstrate controllability following thrust reverser deployment during these flight phases must show that the likelihood of inadvertent deployment is extremely improbable. (i.e. Analysis per appendix C, of revision A to the Thrust Reverser Safety Assessment document must show that the inadvertent deployment rate is no greater than 1×10^{-9} for this exposure time.)

Explanation of how design features or alternative standards provide an equivalent level of safety to the level of safety intended by the regulation

Given an inadvertent deployment occurs, there is some risk that a compliant airplane will still not be controlled due to pilot error or some other exacerbating abnormal conditions (e.g. rudder failure). By demonstrating that an inadvertent deployment is not anticipated to occur, these risks can be effectively avoided. Hence some residual risk that an inadvertent deployment may still occur (i.e. one occurrence per billion flight hours) can be found to provide a lovel of safety equivalent to that of a compliant controllable airplane.

FAA approval and documentation of the ELOS

The FAA has approved the aforementioned Equivalent Level of Safety Finding in issue paper P-2. This memorandum provides standardized documentation of the ELOS that is non-proprietary and can be made available to the public. The Transport Directorate has assigned a unique ELOS Memorandum number (see front page) to facilitate archiving and retrival of this ELOS. This ELOS Memorandum number should be listed in the Type Certificate Data Sheet under the Certification Basis section (TC's & ATC's) or on page 3 of the STC Certificate.
[E.g. Equivalent Safety Findings have been made for the following regulations:
§25.103 Stalling Speed (documented in TAD ELOS Memo SA5884SE-T-F-1)
§25.207 Stall Warning (documented in TAD ELOS Memo SA5884SE-T-F-1)]

Original signed by Neil Schalekamp — *9/16/04*
Manager, Propulsion/Mechanical Systems Branch, ANM-112 — Date

ELOS Originated by Los Angeles ACO:	Project Engineer William Bond	Routing Symbol ANM-140L