Federal Aviation Administration

Memorandum

Date:	February 23, 2010
To:	Manager, Transport Airplane Directorate International Branch, ANM-116
From:	Manager, Transport Standards Staff, Safety Management Branch, ANM-117
Prepared by:	Forrest Keller, Risk Assessment Program manager, ANM-117
Subject:	INFORMATION: Equivalent Level of Safety (ELOS) Finding for Airbus project on Model A330 and A340, FAA Project # TD0774IB-T
ELOS Memo#:	TD0774IB-T –SA-1
Regulatory Ref:	§§ 25.1457(d)(5)

This memorandum informs the certificate management aircraft certification office of an evaluation made by the Transport Airplane Directorate on the establishment of an equivalent level of safety finding for the Airbus Model A330 and Model A340 aircraft

Background

14CFR Part 25.1457(d)(5) Amendment 124 requires that:
Each cockpit voice recorder (CVR) must be installed so that it has an independent power source:

(i) That provides 10± 1 minutes of electrical power to operate both the cockpit voice recorder and cockpit-mounted area microphone;
(ii) That is located as close as practicable to the cockpit voice recorder; and
(iii) To which the cockpit voice recorder and cockpit-mounted area microphone are switched automatically in the event that all other power to the cockpit voice recorder is interrupted either by normal shutdown or by any other loss of power to the electrical power bus;

Applicable regulation(s)

§§ 25.1309, 25.1457(d)(5)

Regulation(s) requiring an ELOS finding

§ 25.1457(d)(5)

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

Airbus proposal to comply with the rule under consideration consists of powering the CVR by means of the Essential Power Bus (ESS). This bus is powered by the aircraft main generators and, in case of their failure, by the Ram Air Turbine (RAT). In case of RAT failure, aircraft batteries will finally power this Essential Power Bus. Automatic switching from one power source to another is performed.

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

Airbus proposes to connect the CVR system to the 403PP 28VDC bus bar of the Airbus Long Range fleet, and not to a Recorder Independent Power Supply (RIPS). This is the best solution to meet the new regulations due to the fact that the 403PP 28VDC bus bar is:

- supplied by all available electrical generators and backup of the aircraft,
- not able to be shed,
- supplied until aircraft total immobilisation even in case of in-flight engine shut down.

On the Long Range Airbus programme, the 403PP 28VDC bus bar, which is also connected to the aircraft batteries, is still supplied when all power generation in the aircraft is lost. It guarantees full functionality to the CVR system until aircraft total immobilisation on ground and provides more than required 10 ± 1 minutes of recording after switching to the aircraft batteries.

Airbus understands that the requirement to locate a power source as close as practicable to the cockpit voice recorder is based on the assumption that such a solution would minimize the distance of wiring between CVR and that independent power source, which will minimize then the possibility of inadvertent power disconnects from the CVR. Such an assumption does not include all aspects of aircraft installation and maintenance. Airbus analyzed all aspects and comes to the result that the usage of the aircraft backup-battery, which is located close to the electronic bay, is the most optimal location.

The CVR function is to record audio signals from the boomsets (etc.) via the audio management unit (AMU) and from the Cockpit Area Microphone (CAM). This function is only guaranteed if these audio signal sources are be available and powered as well. Connecting these audio signal sources and CVR to the 403PP 28VDC bus bar ensures the availability of signals at an optimum level.

Airbus in-service fleet has cumulated more than 500 million F/H without any loss of wiring on recorders. Airbus considers the lengthy wiring not to be a significant cause of failure. It is more the connecting points deficiency, which lead to loss of wiring. An additional device (like a dedicated RIPS) could increase the number of such connecting points.

Under maintenance aspects, a dedicated RIPS would require specific maintenance. This special maintenance impact would come on top of the maintenance of the aircraft batteries, but without additional benefit.

FAA approval and documentation of the ELOS finding

The FAA has approved the aforementioned equivalent level of safety finding in project issue paper (IP) SA-1 titled "Cockpit Voice Recorder – Equivalent Level of Safety for 10 minute independent backup power requirement of § 25.1457(d)(5)". This memorandum provides standardized documentation of the ELOS finding that is non-proprietary and can be made available to the public. The Transport Airplane Directorate has assigned a unique ELOS Memorandum number (see front page) to facilitate archiving and retrieval of this ELOS. This ELOS Memorandum number should be listed in the Type Certificate Data Sheet under the Certification Basis section (TCs & ATCs) or in the Limitations and Conditions Section of the STC Certificate in accordance with the statement below:

Equivalent Level of Safety Findings have been made for the following regulation(s): 14 CFR part 25.1457(d)(5), Cockpit voice recorders (documented in TAD ELOS Memo TD0774IB-T – SA-1).

Signed by Will Struck (for S. Boyd) 03/10/2010

Manager, Transport Airplane Directorate, Aircraft Certification Service — Date

ELOS Originated by TAD:	Project Engineer: Forrest Keller	Routing Symbol ANM-117