



# Federal Aviation Administration

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## Memorandum

Date: March 3, 2015

To: Manager, New York Aircraft Certification Office, ANE-170

From: Manager, Transport Airplane Directorate, ANM-100

Prepared by: Ram Rambrich, ANE-172

Subject: INFORMATION: Equivalent Level of Safety (ELOS) Finding for HIRF Protection (Alternate Waveform) installed on a BD-700-2A12 & BD-700-2A13 airplane, FAA Projects AT7180NY-T & AT7285NY-T

ELOS Memo: AT7180NY-T-GA-SE-01

Regulatory Ref: §§ 25.1317 (b)

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This memorandum informs the certificate management aircraft certification office of an evaluation made by the Transport Airplane Directorate (TAD) on the establishment of an equivalent level of safety (ELOS) finding for the Model BD-700-2A12 & BD-700-2A13 airplane.

### **Background**

Bombardier Aerospace is developing the Global 7000 and Global 8000 business jet aircraft, which will be certified with a seating capacity of up to 19 passengers. The certification basis for this new model will be AWM 525 at Change 20.

Any electrical and electronic system in these aircraft that is critical to flight safety must be designed and installed to ensure that its operation and operational capabilities are not adversely affected when the aeroplane is exposed to externally radiated electromagnetic energy.

Text of current standards affected by ESF Request:

### AWM 525.1317 - High-Intensity Radiated Fields (HIRF) Protection

(b) Each electrical and electronic system that performs a function whose failure would significantly reduce the capability of the aeroplane or the ability of the flight-crew to respond to and adverse operating condition shall be designed and installed so the system is not adversely

affected when the equipment providing these functions is exposed to equipment HIRF test level 1 or 2, and described in Appendix L of this chapter.

#### AWM 525, Appendix L, Equipment HIRF Test Level 1

(1) From 10 kilohertz (kHz) to 400 megahertz (MHz), use conducted susceptibility tests with continuous wave (CW) and 1kHz square wave modulation with 90 percent depth or greater. The conducted susceptibility current shall start at a minimum of 0.6 milliamperes (mA) at 10 kHz, increasing 20 decibels (dB) per frequency decade to a minimum of 30 mA at 500 KHz.

(5) From 400 MHz to 8 gigahertz (GHz), use radiated susceptibility tests at a minimum of 150 V/m peak with pulse modulation of 4 percent duty cycle with a 1 kHz pulse repetition frequency. This signal shall be switched on and off at a rate of 1 Hz with a duty cycle of 50 percent.

#### **Applicable regulation(s)**

§§ 25.1317(b)

#### **Regulation(s) requiring an ELOS finding**

§§ 25.1317 (b)

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

To show compliance with AWM 525.1317(b), Bombardier proposes that any electrical and electronic systems systems/equipment performing functions that have been classified as essential/hazardous will not be adversely affected when bench tested to RTCAIDO-160 D/E, Section 20, Category R.

For frequencies between 10 kHz and 400 MHz, the RTCA/DO-160 D/E, Section 20, Category R test levels are the same as AWM 525, Appendix L, Equipment HIRF Test Level 1.

For frequencies between 400 MHz and 8 GHz, RTCA/DO-150 D/E, Section 20, Category R defines two alternate test levels/modulations, one of which is the same as AWM 525, Appendix L, Equipment HIRF Test Level I.

#### **Explanation of how design features or alternative standards provide an ELOS to that intended by the regulation.**

Use of FHRF test levels/modulations defined by RTCAIDO-160 D/E, Section 20, Category R, provides an equivalent level of safety as AWM 525, Appendix L, Equipment HIRF Test Level 1, used to demonstrate compliance to AWM 525.1317(b). In the past, the FAA issued an Equivalent Level of Safety (ELOS) with regards to the same subject matter and content of this ESF request to the Global Vision Flight Deck.

The specific electrical and electronic systems/equipment classified as essential/hazardous will be bench tested according to the requirements defined by RTCA/DO-160 D/E, Section 20, Category R, and will be identified in the Global 7000/8000 RAO-BA700-009 EMC Certification Plan.

**FAA approval and documentation of the ELOS finding**

The FAA has approved the aforementioned ELOS finding in project Issue Paper GA-SE-01 titled HIRF Protection: Alternate Waveforms FAR 25.1317 (b). This memorandum provides standardized documentation of the ELOS finding that is non-proprietary and can be made available to the public. The TAD has assigned a unique ELOS memorandum number (see front page) to facilitate archiving and retrieval of this ELOS finding. This ELOS memorandum number should be listed in the type certificate data sheet under the Certification Basis section in accordance with the statement below:

Equivalent Level of Safety Findings have been made for the following regulation:  
§ 25.1317 (b) HIRF Protection: Alternate Waveforms (documented in TAD ELOS Memorandum AT7180NY-T-GA-SE-01)

*Original signed by Rob Duffer*

*3/3/15*

Date

ELOS Originated by ACO:	ACO Manager (or Project Engineer for ANM-116):	Routing Symbol:
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