



# Federal Aviation Administration

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## Memorandum

Date: 5/18/2010

To: Manager, Transport Airplane Directorate International Branch, ANM-116

From: Manager, Transport Standards Staff, Airframe/Cabin Safety, ANM-115

Prepared by: Ian Won, ANM-115

Subject: INFORMATION: Equivalent Level of Safety (ELOS) Finding for BAE Systems Models: BAE 146 and AVRO 146-RJ, Models Jetstream 41– all variants, FAA Project No. TD0758IB-T - DT data for Existing Unpublished Repairs to Alteration Structure.

ELOS Memo#: TD0758IB-T-A-2

Regulatory Ref: Title 14 Code of Federal Regulations (14 CFR) part 26: §§ 26.43(e), (f)(5); 26.45(d), (e)(4); and 26.47(d) and (e)(4); Advisory Circular 120-93

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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 (ELOS) finding for the BAE Systems Models: BAE 146 and AVRO 146-RJ, Models Jetstream 41– all variants.

### Background

Sections 26.45, 26.47(d) and 26.47(d)(1) apply to “repair data,” which includes both published and unpublished repair data. While published repair data is readily available for review, unpublished repair data may be difficult to identify and may include repairs that are on airplanes that are no longer in service. It has been brought to the Federal Aviation Administration’s (FAA) attention that certain Type Certificate (TC) Holders may have difficulty locating data on repairs that affect Fatigue Critical Alteration Structure (FCAS); particularly archived data on repairs developed many years ago. Therefore, the requirements of § 26.45(d)(2) may result in TC Holders developing damage tolerance (DT) data for repairs affecting FCAS that will never be used by an operator.

For FCAS repair data approved before January 11, 2008, §§ 26.45(e)(4) and 26.47(e)(4) require DT data be developed and submitted to the FAA Oversight Office or its designees for approval by June 30, 2009. This compliance date differs from that for existing unpublished repairs affecting Fatigue Critical Baseline Structure (FCBS). The Repair Evaluation Guidelines (REG), required by § 26.43(e), include an implementation schedule (specified in AC 120-93) that would allow DT data

to be developed at a much later date. The REG implementation schedule specifies the timing of the airplane survey which is based on where an airplane is relative to its design service goal. Type Certificate Holders will not be required to develop DT data for unpublished repairs affecting FCBS until after those repairs are identified in the survey. This will occur much later than the June 30, 2009, compliance date for DT data for unpublished repairs affecting FCAS.

From a technical and safety perspective, there is no difference between an unpublished repair that affects FCBS and one that affects FCAS. Therefore, there is no reason why the timing for when DT data must be incorporated into an operator's maintenance program or why guidance for when an initial inspection must be performed should be different for repairs affecting FCAS. The differences in the compliance dates for DT data submittals for repairs affecting FCBS (§ 26.43) and for repairs affecting FCAS (§§ 26.45 and 26.47) are due to the FAA's determination that it would not be appropriate to require TC Holders to develop Repair Evaluation Guidelines that would apply to an Supplemental Type Certificate (STC) Holder's alteration. The regulatory requirements for TC Holder alterations (§ 26.45) are similar to those for STC Holder alterations (§ 26.47).

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

§§ 26.43(e), (f)(5); 26.45(d), (e)(4); and 26.47(d) and (e)(4)

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

§§ 26.45(e)(4) and 26.47(e)(4)

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

BAE Systems will use the means of compliance defined in § 26.43(e)(1)(i) to identify "unpublished" existing repairs that affect fatigue critical alteration structure, as defined in § 26.45(b)(2), in place of the review of repair data as indicated in § 26.45(d)(1). BAE Systems will comply with the requirements of § 26.45(d) for published repair data. Section 26.43(e)(1)(i) allows for this "...existing repairs that affect fatigue critical baseline structure identified under paragraph (b)(1) of this section and paragraph § 26.45(b)(2)." However, the compliance times for DT data submittal for existing repairs affecting FCAS stated in §§ 26.45(e)(4) and 26.47(e)(4) (June 30, 2009) conflict with the compliance time for submittal of the REG stated in § 26.43 (f)(5), which is December 30, 2009. In addition, the REG includes an implementation schedule that permits development of DT data for existing repairs to occur after an operator identifies the repair during the airplane survey, which will occur after December 20, 2010 (ref. section 217 of AC 120-93).

BAE Systems will include in the REG, as required per § 26.43(e), a process to identify and document all existing repairs that affect FCBS and FCAS as identified under §§ 26.43(b)(1) and 26.45(b)(2). Note: § 26.43(e)(1)(i) includes structure identified in § 26.45(b)(2). The REG will be developed to address existing repairs to both FCBS and FCAS and will provide instructions to the operator on how to obtain the necessary DT data for those repairs.

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

For existing repair data (data approved before January 11, 2008) that are developed by TC and STC Holders for their alterations, 14 CFR sections 26.45(d)(1) and 26.47(d)(1) require TC and STC Holders to review their repair data and identify those repairs that affect FCAS. For those repairs that affect FCAS, unless previously accomplished, §§ 26.45(d)(2) and 26.47(d)(2) require the TC and STC Holder to perform a Damage Tolerance Evaluation (DTE) and develop Damage Tolerance Inspection (DTI) data. Sections 26.45(e)(4) and 26.47(e)(4) require the TC and STC Holder to submit the DT data (DTE documentation and DTI) to the FAA Oversight Office or its properly authorized designees for review and approval by June 30, 2009.

Section 26.43(d) applies to all existing repair data, which includes published repair data (e.g., structural repair manual, service bulletin) and non-published repair data (e.g., individual type repairs). Certain TC Holders have stated that while published repair data is readily identifiable and accessible, the unpublished repair data have been developed over many years and much of this data is contained in various volumes of documents/files, many of which are archived. The TC Holders stated that the effort to research their archives to identify repairs that affect FCAS would be a significant undue burden, with much of that effort not being value-added as numerous unpublished repairs are on airplanes that are no longer in service.

In lieu of researching and reviewing all unpublished repair data for repairs made to alterations developed by the TC Holder (§ 26.45(d)(1)) and in lieu of developing and submitting DT data for those repairs that affect FCAS by June 30, 2009 (§ 26.45(e)(4)), certain TC Holders have proposed to utilize the REG process required by § 26.43(e) to address unpublished repairs that affect FCAS §§ 26.45(d) and 26.47(d). The purpose of the REG required by § 26.43(e) is to support operators' compliance with §§ 121.1109(c)(2) and 129.109(c)(2) for addressing existing repairs that affect FCBS. Section 26.43(f)(5) requires that the REG be submitted to the FAA Oversight Office by December 30, 2009. As required by § 26.43(e), the REG should provide operators with:

- a process to survey their airplanes for repairs that affect FCBS and FCAS,
- an implementation schedule for when the survey is to be accomplished and when DT data for repairs affecting FCBS are to be incorporated into the maintenance program,
- instructions on how the operator may obtain the necessary DT data for repairs identified in the airplane survey that affect FCBS.

It is noted that while § 26.43(e)(1)(i) requires the REG survey process to enable operators to identify existing repairs that affect FCAS identified under § 26.45(b)(2), the REG implementation schedule required in § 26.43(e)(1)(iii) and specified in AC 120-93 does not apply to repairs affecting FCAS. By utilizing the REG process for repairs to alterations, which would include the REG implementation schedule in section 217 of AC 120-93, the DT data for existing repairs affecting FCAS would be developed after the airplane survey is conducted, at a time well beyond the June 30, 2009, compliance date (ref. §§ 26.45(e)(4) and 26.47(e)(4)). This is a result of the guidance provided in section 217 of AC 120-93 which permits the airplane survey to occur beyond December 20, 2010.

For unpublished repair data for repairs affecting FCAS that were approved prior to January 11, 2008, BAE Systems will expand the REG required by § 26.43(e) to address repairs to FCAS (reference §§ 26.45(b)(2) and 26.47(b)(2)). This would include an implementation schedule similar to that provided in section 217 of AC 120-93 for repairs. In addition, the REG process would permit BAE Systems to address only those repairs that are identified by operators during their airplane surveys. Application of the REG process to unpublished repairs affecting FCAS would allow DT data to be submitted according to the same schedule as that required for unpublished repairs affecting FCBS. This will result in an equivalent level of safety as that which would be provided if the DT data is submitted by the June 30, 2009, compliance date for repairs affecting alterations. This equivalency is based on the determination that the implementation schedule allowed for repairs affecting FCBS (section 217 of AC 120-93) provides an equivalent level of safety and that repairs affecting FCAS are of no greater safety risk than those affecting FCBS.

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

The FAA has approved the aforementioned equivalent level of safety finding in project issue paper A-2. 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 (TC and ATC) or in the Limitations and Conditions section of the Supplemental Type Certificate. An example of an appropriate statement is provided below.

Equivalent Level of Safety Findings have been made for the following regulation(s):

- § 26.45(e)(4) Holders of Type Certificates – Alterations and repairs to alterations. Compliance times. (Documented in Transport Airplane Directorate ELOS Memo TD0758IB-T-A-2)
- § 26.47(e)(4) Holders of and applicants for a Supplemental Type Certificate – Alterations and repairs to alterations. Compliance times. (Documented in Transport Airplane Directorate ELOS Memo TD0758IB-T-A-2)

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*5/18/2010*

Date

ELOS Originated by ANM:	Project Engineer: Ian Won	Routing Symbol ANM-115
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