



# Notification of a Proposal to issue an Airworthiness Directive

**PAD No.:** 20-008

**Issued:** 22 January 2020

Note: Proposed Airworthiness Directive (PAD) is issued by EASA, acting in accordance with Regulation (EU) 2018/1139 on behalf of the European Union, its Member States and of the European third countries that participate in the activities of EASA under Article 129 of that Regulation.

In accordance with the EASA Continuing Airworthiness Procedures, the Executive Director is proposing the issuance of an EASA Airworthiness Directive (AD), applicable to the aeronautical product(s) identified below.

All interested persons may send their comments, referencing the PAD Number above, to the e-mail address specified in the 'Remarks' section, prior to the consultation date indicated.

**Design Approval Holder's Name:**

CFM INTERNATIONAL S.A.

**Type/Model designation(s):**

LEAP-1B engines

**Effective Date:** [TBD - standard: 14 days after AD issue date]

**TCDS Number(s):** EASA.E.115

**Foreign AD:** Not applicable

**Supersedure:** This AD supersedes EASA AD 2018-0251 dated 20 November 2018 and EASA AD 2019-0137 dated 12 June 2019.

## ATA 05 – Time Limits / Maintenance Checks – Airworthiness Limitations Section – Implementation

### Manufacturer(s):

SAFRAN Aircraft Engines, formerly SNECMA (France); General Electric Aviation (United States)

### Applicability:

LEAP-1B21, LEAP-1B23, LEAP-1B25, LEAP-1B27, LEAP-1B28, LEAP-1B28B1, LEAP-1B28B2, LEAP-1B28B2C, LEAP-1B28B3, LEAP-1B28BBJ1 and LEAP-1B28BBJ2 engines, all serial numbers (s/n).

These engines are known to be installed on, but not limited to, Boeing 737-8 and 737-9 aeroplanes.

### Definitions:

For the purpose of this AD, the following definitions apply:

**The ALS:** CFM International S. A. (CFMI) Airworthiness Limitations Section (ALS), Chapter 05 of LEAP-1B Engine Shop Manual (ESM) SM.21, data modules as listed in Appendix 1 of this AD.

**The AMP:** The approved Aircraft Maintenance Programme (AMP) on the basis of which the operator or the owner ensures the continuing airworthiness of each operated engine. For engines



installed on aeroplanes registered in Europe, compliance with the approved AMP is required by Commission Regulation (EU) [1321/2014](#), Part M.A.301, paragraph 3.

**New and/or more restrictive tasks:** This includes all tasks that are new and all tasks for which a threshold or interval was reduced, which were introduced into the ALS (as defined in this AD) since the previous ESM Chapter 05 data modules Revisions that are currently incorporated in the AMP.

#### Reason:

The airworthiness limitations for the LEAP-1B engines, which are approved by EASA, are currently defined and published in the LEAP-1B ESM SM.21, Chapter 05, including reference to certain CFMI Service Bulletins (SB). These instructions have been identified as mandatory for continued airworthiness.

Since the original issue of the ALS, life limits and maintenance tasks for newly designed parts have also been included in the ALS and, following investigations on various occurrences, the ALS has been updated as detailed below.

Two LEAP-1B engines experienced distress of the high pressure turbine (HPT) static structures that was attributed to fuel nozzle coking and subsequent thermal distress. In one of these occurrences, the affected engine experienced a shutdown in-flight and localized turbine centre frame burn through was identified. To address this condition, CFMI revised the ALS providing instructions for engine condition monitoring or repetitive inspections of the HPT static structures.

During an investigation into nickel alloy disc melt-related anomalies, a sub-surface anomaly was identified in a part manufactured from the same rotor disc alloy as the LEAP-1B HPT stage 2 rotor disc. If undetected, this type of sub-surface anomaly could result in uncontained failure of the HPT stage 2 disc. To address this condition, CFMI revised the ALS providing instructions for enhanced inspections of these discs.

Occurrences have been reported of commanded engine in-flight shut-down prompted by oil filter bypass indication in the cockpit. Subsequent investigation identified the root cause as failure of the radial drive shaft bearing cage. Consequently, EASA published AD 2019-0137, requiring repetitive inspections and, depending on findings, corrective action. Since that AD was issued, further investigation by CFMI identified an additional contributing factor to the in-service bearing cage failures. CFMI revised the ALS, incorporating the requirements of EASA AD 2019-0137, and updating the inspections and in-service limits to address the contributing factors to these failures.

Occurrences have been reported of CFMI LEAP-1A engines that were unable to accelerate to target thrust during take-off. Investigation determined that water can accumulate and freeze inside the pressure sensor lines or system, possibly resulting in erroneous pressure readings by the engine's digital control and consequent loss of engine thrust control. Due to similarity of design, loss of thrust control could also occur on CFMI LEAP-1B engines. To address this potentially unsafe condition, CFMI developed new Electronic Engine Control (EEC) software with improved capability to accommodate erroneous pressure readings, and EASA issued AD 2018-0251 requiring installation of that software. Since that AD was issued, two occurrences have been reported of temporary loss of thrust control on LEAP-1B engines, which were due to icing in the pressure sensor lines or system. Both events occurred on engines with EEC software as required by EASA AD 2018-0251. In



response to these events, CFMI revised the EEC software to improve detection and accommodation of erroneous pressure readings due to icing. The ALS, as defined in this AD, includes the task to install the updated EEC software.

Failure to accomplish these ALS instructions could result in an unsafe condition.

For the reasons described above, this AD requires modification of each engine to a minimum design standard, and accomplishment of the actions specified in the ALS, as defined in this AD.

This AD also takes over the requirements of EASA AD 2018-0251 and AD 2019-0137, which are superseded, since the actions required by those AD are now part of the ALS.

#### **Required Action(s) and Compliance Time(s):**

Required as indicated, unless accomplished previously:

#### **Modification:**

- (1) Before next flight after the effective date of this AD, modify the engine control system operating software configuration in accordance with the instructions of section 05-29 of the ALS, data module LEAP-1B-05-29-00-01A-281B-C, step 6.C. A single ferry flight (up to 3 Flight Cycles, non-ETOPS, no passengers) may be accomplished to a location where the modification as required by this paragraph can be accomplished (see Note 1 of this AD).

Note 1: The ferry flight provision of paragraph (1) of this AD does not supersede any airworthiness requirement applicable to an aircraft having affected engines installed.

#### **Maintenance Tasks and Replacement of Life Limited Parts:**

- (2) From the effective date of this AD, accomplish the following actions, as specified in the ALS, as applicable to engine model and depending on engine configuration.

(2.1) Replace each component before exceeding the applicable life limit; and

(2.2) Within the thresholds and intervals, accomplish all applicable maintenance tasks.

#### **Corrective Action(s):**

- (3) In case of finding discrepancies during accomplishment of any task as required by paragraph (2) of this AD, within the compliance time specified in the ALS, accomplish the applicable corrective action(s) in accordance with the applicable CFMI maintenance documentation. If no compliance time is identified in the ALS, accomplish the applicable corrective action(s) before next flight. If a detected discrepancy cannot be corrected by using existing CFMI instructions, before next flight, contact CFMI for approved instructions and accomplish those instructions accordingly.

#### **AMP Revision:**

- (4) Within 12 months after the effective date of this AD, revise the AMP by incorporating the tasks and associated thresholds and intervals described in the ALS, as applicable to aeroplane model and depending on aeroplane configuration.



**Credit:**

- (5) For an AMP that, on the effective date of this AD, is already updated to incorporate the maintenance tasks and life limitations as specified in previous issues of the ESM Chapter 05 data modules listed in Appendix 1 of this AD, that action ensures the continued accomplishment of those tasks and limitations.

Consequently, for an aeroplane to which that AMP applies, it is acceptable to accomplish the new and/or more restrictive tasks, as defined in this AD, as applicable to aeroplane model and depending on aeroplane configuration, within the compliance times as specified in the ALS to comply with paragraph (2) of this AD.

For that AMP, it is acceptable to incorporate the new and/or more restrictive tasks, as applicable to aeroplane model and depending on aeroplane configuration, into the AMP to comply with paragraph (4) of this AD.

**Recording AD Compliance:**

- (6) When the AMP of an aeroplane has been revised as required by paragraph (4) or (5) of this AD, as applicable, that action ensures continued accomplishment of the tasks as required by paragraphs (2) and (3) of this AD for that aeroplane. Consequently, after revising the AMP, as required by paragraph (4) or (5) of this AD, as applicable, it is not necessary that accomplishment of individual action is recorded for demonstration of AD compliance on a continued basis.

**Ref. Publications:**

CFMI LEAP-1B ESM SM.21, Chapter 05, currently at Revision 011, data modules as listed in Appendix 1 of this AD.

CFMI SB LEAP-1B-72-00-0311-01A-930A-D issue 001 dated 08 January 2020.

CFMI SB LEAP-1B-72-00-0317-01A-930A-D issue 001 dated 09 January 2020.

CFMI SB LEAP-1B-73-00-0025-01A-930A-D issue 002 dated 29 October 2019.

CFMI SB LEAP-1B-73-00-0030-01A-930A-D issue 001 dated 08 January 2020.

The use of later approved revisions of the above-mentioned documents is acceptable for compliance with the requirements of this AD.

**Remarks:**

1. This Proposed AD will be closed for consultation on 11 February 2020.
2. Enquiries regarding this PAD should be referred to the EASA Programming and Continued Airworthiness Information Section, Certification Directorate. E-mail: [ADs@easa.europa.eu](mailto:ADs@easa.europa.eu).
3. Information about any failures, malfunctions, defects or other occurrences, which may be similar to the unsafe condition addressed by this PAD, and which may occur, or have occurred



on a product, part or appliance not affected by this PAD, can be reported to the [EU aviation safety reporting system](#).

4. For any question concerning the technical content of the requirements in this PAD, please contact: CFM International S.A., Customer Support Centre, Telephone: +33 1 64 14 88 66, Fax: +33 1 64 79 85 55, E-mail: [cfm.csc@safrangroup.com](mailto:cfm.csc@safrangroup.com),

or

CFM Inc. Aviation Operations Centre, Telephone: +1 513-552-3272, or +1 877-432-3272, Fax: +1 877-432-3329, E-mail: [geae.aoc@ge.com](mailto:geae.aoc@ge.com), or [aviation.fleetsupport@ge.com](mailto:aviation.fleetsupport@ge.com).



## Appendix 1 – LEAP-1B ESM SM.21 Chapter 05 data modules (see Note 2 of this AD)

#	Document number	Issue	Dated
1	LEAP-1B-05-00-00-01A-040A-C	003	09 January 2020
2	LEAP-1B-05-11-00-01A-040A-C	001	23 February 2016
3	LEAP-1B-05-11-01-01A-0B1B-C	004	26 March 2018
4	LEAP-1B-05-11-02-01A-0B1B-C	007	05 April 2019
5	LEAP-1B-05-11-03-01A-0B1B-C	004	30 May 2018
6	LEAP-1B-05-11-04-01A-0B1B-C	004	26 March 2018
7	LEAP-1B-05-12-00-01A-040A-C	001	23 February 2016
8	LEAP-1B-05-12-01-01A-0B1B-C	003	30 May 2018
9	LEAP-1B-05-12-02-01A-0B1B-C	004	03 August 2018
10	LEAP-1B-05-17-01-01A-0B1A-C	001	20 April 2016
11	LEAP-1B-05-21-00-01A-040B-C	001	23 February 2016
12	LEAP-1B-05-21-01-01A-281B-C	001	23 February 2016
13	LEAP-1B-05-21-02-01A-281B-C	001	23 February 2016
14	LEAP-1B-05-21-03-01A-281B-C	002	09 January 2020
15	LEAP-1B-05-21-04-01A-281B-C	001	23 February 2016
16	LEAP-1B-05-21-05-01A-281B-C	001	23 February 2016
17	LEAP-1B-05-21-06-01A-281B-C	001	23 February 2016
18	LEAP-1B-05-21-08-01A-281B-C	001	23 February 2016
19	LEAP-1B-05-29-00-01A-710A-C	001	23 February 2016
20	LEAP-1B-05-29-00-01A-281B-C	001	09 January 2020

Note 2: Items 1, 14 and 20 have been added to the LEAP-1B ESM SM.21, currently at Revision 011, as incremental changes and will be incorporated into the next full revision of the manual.

