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DEPARTMENT OF TRANSPORTATION

Federal Aviation Administration

14 CFR Part 39

[Docket No. FAA-2019-0592; Project Identifier 2019-NE-19-AD; Amendment 39-21298; AD 2020-22-02]

RIN 2120-AA64

Airworthiness Directives; General Electric Company Turbofan Engines

AGENCY: Federal Aviation Administration (FAA), DOT.

ACTION: Final rule.

SUMMARY: The FAA is adopting a new airworthiness directive (AD) for all General Electric Company (GE) CF6-80C2A5F, -80C2B1F, -80C2B2F, -80C2B4F, -80C2B5F, -80C2B6F, -80C2B6FA, -80C2B7F, -80C2B8F, -80C2D1F, -80C2K1F, -80C2L1F, -80E1A2, -80E1A3, -80E1A4, and -80E1A4/B model turbofan engines with a certain hydromechanical unit (HMU) installed. This AD was prompted by a report of fuel coking of the HMU fuel metering valve (FMV) electro-hydraulic servo valves (EHSV) resulting in tailpipe fire. This AD requires removal of the HMU and its replacement with a part eligible for installation. The FAA is issuing this AD to address the unsafe condition on these products.

DATES: This AD is effective December 3, 2020.

The Director of the Federal Register approved the incorporation by reference of certain publications listed in this AD as of December 3, 2020.

ADDRESSES: For service information identified in this final rule, contact General Electric Company, 1 Neumann Way, Cincinnati, OH 45215; phone: 513-552-3272; email: aviation.fleetsupport@ae.ge.com. You may view this service information at the FAA, Airworthiness Products Section, Operational Safety Branch, 1200 District Avenue, Burlington, MA 01803. For information on the availability of this material at the FAA, call 781-238-7759. It is also available on the internet at <https://www.regulations.gov> by searching for and locating Docket No. FAA-2019-0592.

Examining the AD Docket

You may examine the AD docket on the internet at <https://www.regulations.gov> by searching for and locating Docket No. FAA-2019-0592; or in person at Docket Operations between 9 a.m. and 5

p.m., Monday through Friday, except Federal holidays. The AD docket contains this final rule, any comments received, and other information. The address for Docket Operations is U.S. Department of Transportation, Docket Operations, M-30, West Building Ground Floor, Room W12-140, 1200 New Jersey Avenue SE, Washington, DC 20590.

FOR FURTHER INFORMATION CONTACT: Stephen Elwin, Aerospace Engineer, ECO Branch, FAA, 1200 District Avenue, Burlington, MA 01803; phone: 781-238-7236; fax: 781-238-7199; email: stephen.l.elwin@faa.gov.

SUPPLEMENTARY INFORMATION:

Background

The FAA issued a notice of proposed rulemaking (NPRM) to amend 14 CFR part 39 by adding an AD that would apply to all GE CF6-80C2A5F, -80C2B1F, -80C2B2F, -80C2B4F, -80C2B5F, -80C2B6F, -80C2B6FA, -80C2B7F, -80C2B8F, -80C2D1F, -80C2K1F, -80C2L1F, -80E1A2, -80E1A3, -80E1A4, and -80E1A4/B model turbofan engines with a certain HMU installed. The NPRM published in the Federal Register on September 6, 2019 (84 FR 46896). The NPRM was prompted by a report of fuel coking of the HMU FMV EHSV resulting in tailpipe fire. The NPRM proposed to require the removal of the HMU and its replacement with a part eligible for installation. The FAA is issuing this AD to address the unsafe condition on these products.

Comments

The FAA gave the public the opportunity to participate in developing this final rule. The following presents the comments received on the NPRM and the FAA's response to each comment.

Request To Update Applicability To Exclude Engines With Updated Electronic Control Unit (ECU) Software

GE requested that the FAA update paragraph (c), Applicability, of this AD, to include “For CF6-80E engines that have complied with [GE Service Bulletin (SB)] CF6-80E1 SB 73-0129 ‘Introduction of ECU Software Version E.1.Q’ no action is required.” GE reasoned that CF6-80E1 ECU Software Version E.1.Q was designed to avoid tailpipe fires caused by the malfunction of the HMU FMV EHSV. There have been no reported tailpipe fires on GE CF6-80E1 model turbofan engines that have installed ECU Software Version E.1.Q.

The FAA disagrees with updating the applicability of this AD to exclude engines with updated ECU Software Version E.1.Q. Although GE CF6-80E1 ECU Software Version E.1.Q addresses the known sequence of tailpipe fires by monitoring the HMU FMV position at low N2 speeds, which may relate to the unsafe condition in this AD, the FAA would need additional data that shows how the ECU software update addresses the potential for this failure to occur at other phases of flight. If the data reveal information relevant to this unsafe condition, the FAA will consider future rulemaking. The FAA did not change this AD.

Request To Allow Modification of the HMU as an Alternative Method of Compliance (AMOC)

An anonymous commenter requested that the FAA consider whether the modification of the HMU using GE CF6-80C2 SB 73-0378 R00, dated July 14, 2010 (“GE SB 73-0378”), is an AMOC [alternative method of compliance] to this AD. The commenter reasoned that the modification results in an HMU FMV EHSV with a new part number (P/N).

The FAA disagrees. GE SB 73-0378 introduces material properties to the HMU that improves corrosion resistance. GE SB 73-0378 does not, however, require the installation of a new or

overhauled HMU FMV EHSV. The HMU with improved corrosion resistance introduced by GE SB 73-0378 is not related to the unsafe condition of this AD. Additionally, although GE SB 73-0378 results in a new HMU P/N after modification of the HMU, this AD still applies to this new P/N.

Request To Change the Compliance Time

Honeywell requested that the FAA reduce the compliance time of paragraph (g), Required Actions, of this AD from 40,000 to 20,000 flight hours (FHs) since new or since last overhaul.

The FAA disagrees. The FAA does not have data to support reducing the removal and replacement of the HMU from 40,000 FHs to 20,000 FHs. According to reports from GE, which were considered by the FAA when preparing the NPRM, the related tailpipe fire incidents occurred in engines with HMUs exceeding 40,000 FHs since new or since the last overhaul. The FAA did not change this AD.

Delta Air Lines (DAL) requested that the FAA increase the initial compliance time to remove and replace the HMU from 180 days to 12 months or to a number of hours or cycles greater than 40,000 FHs, based on the level of risk. DAL stated that they have attempted to purchase additional units to support the compliance time of 40,000 FHs or 180 days proposed in the NPRM; however, there are few spares on the market. Additionally, DAL reasoned that the turnaround time for an overhaul of the HMU has not allowed DAL to progress as fast as required to meet the expected compliance deadline for units in their fleet.

Atlas Air Inc. (Atlas Air) also indicated that the volume of HMUs wherein operators will be unable to determine HMU FMV EHSV compliance will exceed the available compliant spares in the market. The lack of available HMUs will cause the grounding of a significant number of aircraft unless the AD allows for the completed overhaul to count as evidence of compliance (EoC) as documented by FAA Form 8130-3, Authorized Release Certificate, Airworthiness Approval Tag.

The FAA disagrees with increasing the compliance time for the required actions of this AD. The FAA infers that DAL's and Atlas Air's request to increase the compliance time of this AD, while mentioning the lack of spares and delays with the overhaul of the HMU, is the result of the definition of "an overhaul of the HMU" in paragraph (h)(2), Definitions, in the NPRM. The concern is that operators do not track usage time on the HMU FMV EHSV separately from the HMU and, therefore, would need to replace the complete HMU in all scenarios within 180 days. The FAA changed the definition of "an overhaul of the HMU" in this AD to clarify the methods that an HMU may be overhauled.

Request To Require Complete Overhaul of HMU

Honeywell requested that the FAA revise the definition of "an overhaul of the HMU" in the Definitions, paragraph (h)(2), of this AD, to clarify that an overhaul of the HMU is a "complete overhaul" of the HMU rather than just an overhaul of HMU FMV EHSV.

Based on its requested change to the definition, Honeywell also requested that the FAA add additional estimated costs to the Cost of Compliance section of this AD to include the estimated costs of a complete HMU overhaul.

The FAA agrees that performing a complete overhaul of the HMU addresses the unsafe condition of this AD. The FAA disagrees with requiring a complete overhaul of the HMU as only an overhaul of the HMU FMV EHSV is required to prevent fuel coking or fuel deposits in the HMU FMV EHSV. The FAA, however, changed the definition of "an overhaul of the HMU" to include either overhaul of the HMU (complete) or overhaul of the HMU FMV EHSV. The FAA added an estimate for the cost of a complete HMU overhaul since this is an acceptable means of complying with the requirements of this AD.

Request To Clarify the Definition of an Overhaul of the HMU

Several commenters requested clarification, as described below, of the definition of “an overhaul of the HMU” provided in paragraph (h)(2) of this AD.

Clarification of Other FAA-Approved Methods

FedEx Express (FedEx) and United Airlines (UAL) requested that the FAA clarify overhauled by “other FAA-approved methods.” FedEx asked what is the intended scope of this phrase and if it includes accomplishment of earlier revisions of GE SB CF6-80C2 SB 73-0436, as well as work performed using the applicable component maintenance manual (CMM) which was classified as an overhaul in block 11 of FAA Form 8130-3, Authorized Release Certificate, Airworthiness Approval Tag (or equivalent). UAL also asked if “other FAA-approved methods” included work accomplished using the CMM for the HMU FMV EHSV.

The FAA agrees “other FAA-approved methods” was unclear and has removed it from the definition for “an overhaul of the HMU.” The FAA added a credit for previous actions paragraph to provide credit for the initial removal and replacement required actions contained in paragraph (g)(1) of this AD if the HMU FMV EHSV was overhauled before the effective date of this AD using GE SB CF6-80C2 SB 73-0436 R01, dated May 14, 2019, or GE SB CF6-80C2 73-0142 R01, dated May 14, 2019. The FAA also changed the definition of “an overhaul of the HMU” in this AD to clarify that an HMU may be overhauled using Honeywell-approved maintenance procedures.

Clarification of Approved Facility

DAL, Kalitta Air Group (Kalitta Air), and United Parcel Service (UPS) requested that an overhaul of the HMU at an FAA or Honeywell-approved facility be considered an overhaul of the HMU that resets the 40,000 FHs requirement.

The FAA agrees and clarified the definition of “an overhaul of the HMU” in this AD to include “An overhaul of the HMU (complete) using Honeywell-approved maintenance procedures.”

Clarification That HMU Overhaul Includes HMU EHSVs

All Nippon Airways (ANA) asked if an overhaul of the HMU includes overhauling all HMU EHSVs.

The FAA agrees that the overhaul of the HMU includes overhauling all HMU EHSVs. The FAA changed the definition of “an overhaul of the HMU” to include either overhaul of the HMU (complete) or overhaul of the HMU FMV EHSV. The FAA notes, however, that complete overhaul of the HMU is not required by this AD.

Clarification of Tracking of HMU FMV EHSVs

ANA, Atlas Air, DAL, FedEx, Kalitta Air, Thai Airways, and UPS stated that the HMU EHSVs are sub-assemblies of the HMU and repair or overhaul of these sub-components is not typically tracked separately from the HMU at an engine shop visit level. Therefore, overhaul of the HMU FMV EHSV is not recorded by most operators in a separate maintenance program record. The commenters reasoned that they received FAA Form 8130-3, Authorized Release Certificate, Airworthiness Approval Tag, documenting the HMU approval for return to service, but FAA Form 8130-3 does not include information about the EHSVs within the HMU. Atlas Air suggested that if the time since the most recent replacement of the HMU FMV EHSVs cannot be determined, then the time since overhaul (TSO) based on FAA Form 8130-3 be used as EoC to the AD for HMUs overhauled before the effective date of this AD.

The FAA acknowledges that the HMU FMV EHSVs are not typically tracked separately from the HMU. The FAA agrees that in cases where the overhaul of the HMU FMV EHSV cannot be determined, the TSO can be used as EoC to the AD for HMUs overhauled before the effective date of this AD. The FAA changed the definition of “an overhaul of the HMU” to include either overhaul of the HMU (complete) or overhaul of the HMU FMV EHSV.

Request To Clarify Previous Compliance With the AD

DAL stated that paragraph (f) of this AD states, “Comply with this AD within the compliance times specified, unless already done.” Yet, the NPRM does not address what constitutes previous compliance.

The FAA notes that “unless already done,” as used in this AD, means performing the actions in paragraph (g), Required Actions, before the effective date of this AD.

Request To Clarify if This AD Affects SAIB NE-09-25R2

An anonymous commenter asked if this AD affects the following statements in SAIB NE-09-25R2: “The FAA has determined that the performance properties of aviation turbine fuel are not impacted with up to 50 mg/kg of FAME [fatty acid methyl ester] under continuous usage . . .” and “At high enough concentrations, FAME can impact the thermal stability of the fuel that could lead to coke deposits in the fuel system.”

While FAME can impact the thermal stability of the fuel, leading to coke deposits in the fuel system, the HMU FMV EHSV fuel coking and fuel deposits of this AD is not related to FAME. The HMU FMV EHSV fuel coking and fuel deposits unsafe condition of this AD neither substantiates nor refutes SAIB NE-09-25R2. Therefore, this AD does not affect the SAIB guidance.

Support for the AD

The Boeing Company and The Air Line Pilots Association, International, expressed support for the AD as written.

An anonymous commenter disagreed with Honeywell's suggestion to remove the HMU for a complete overhaul before reaching 20,000 FHs considering the root cause analysis is identified as high-time wear failure of the HMU FMV EHSV. The FAA infers that this comment represents support for the AD as written.

Conclusion

The FAA reviewed the relevant data, considered the comments received, and determined that air safety and the public interest require adopting this final rule with the changes described previously and minor editorial changes. The FAA has determined that these minor changes:

- Are consistent with the intent that was proposed in the NPRM for addressing the unsafe condition; and
- Do not add any additional burden upon the public than was already proposed in the NPRM.

The FAA also determined that these changes will not increase the economic burden on any operator or increase the scope of this final rule.

Service Information Incorporated by Reference Under 1 CFR Part 51

The FAA reviewed GE SB CF6-80C2 SB 73-0436 R02, dated August 15, 2019, and GE SB CF6-80E1 SB 73-0142 R02, dated August 15, 2019. The SBs provide instructions, differentiated by the turbofan engine model, for repetitive overhauls of the HMU FMV EHSVs. This service

information is reasonably available because the interested parties have access to it through their normal course of business or by the means identified in the ADDRESSES section.

Costs of Compliance

The FAA estimates that this AD affects 573 engines installed on airplanes of U.S. registry. The FAA estimates the following costs to comply with this AD:

Estimated Costs

Action	Labor cost	Parts cost	Cost per product	Cost on U.S. operators
Removal and replacement of HMU	5 work-hours × \$85 per hour = \$425	\$0	\$425	\$243,525

The FAA estimates the following costs to do any necessary overhaul. The FAA has no way of determining the number of aircraft that might perform the overhaul of the HMU FMV EHSV or overhaul of the complete HMU:

On-Condition Costs

Action	Labor cost	Parts cost	Cost per product
Overhaul HMU FMV EHSV	5 work-hours × \$85 per hour = \$425	\$4,000	\$4,425
Overhaul HMU (complete)	25 work-hours × \$85 per hour = \$2,125	\$92,875	\$95,000

Authority for This Rulemaking

Title 49 of the United States Code specifies the FAA's authority to issue rules on aviation safety. Subtitle I, section 106, describes the authority of the FAA Administrator. Subtitle VII: Aviation Programs, describes in more detail the scope of the Agency's authority.

The FAA is issuing this rulemaking under the authority described in Subtitle VII, Part A, Subpart III, Section 44701: General requirements. Under that section, Congress charges the FAA with promoting safe flight of civil aircraft in air commerce by prescribing regulations for practices, methods, and procedures the Administrator finds necessary for safety in air commerce. This regulation is within the scope of that authority because it addresses an unsafe condition that is likely to exist or develop on products identified in this rulemaking action.

Regulatory Findings

This AD will not have federalism implications under Executive Order 13132. This AD will not have a substantial direct effect on the States, on the relationship between the national Government and the States, or on the distribution of power and responsibilities among the various levels of government.

For the reasons discussed above, I certify that this AD:

- (1) Is not a “significant regulatory action” under Executive Order 12866,
- (2) Will not affect intrastate aviation in Alaska, and

(3) Will not have a significant economic impact, positive or negative, on a substantial number of small entities under the criteria of the Regulatory Flexibility Act.

List of Subjects in 14 CFR Part 39

Air transportation, Aircraft, Aviation safety, Incorporation by reference, Safety.

The Amendment

Accordingly, under the authority delegated to me by the Administrator, the FAA amends 14 CFR part 39 as follows:

PART 39–AIRWORTHINESS DIRECTIVES

1. The authority citation for part 39 continues to read as follows:

Authority: 49 U.S.C. 106(g), 40113, 44701.

§ 39.13 [Amended]

2. The FAA amends § 39.13 by adding the following new airworthiness directive (AD):



2020-22-02 General Electric Company: Amendment 39-21298; Docket No. FAA-2019-0592; Project Identifier 2019-NE-19-AD.

(a) Effective Date

This AD is effective December 3, 2020.

(b) Affected ADs

None.

(c) Applicability

This AD applies to all General Electric Company (GE) CF6-80C2A5F, -80C2B1F, -80C2B2F, -80C2B4F, -80C2B5F, -80C2B6F, -80C2B6FA, -80C2B7F, -80C2B8F, -80C2D1F, -80C2K1F, -80C2L1F, -80E1A2, -80E1A3, -80E1A4, and -80E1A4/B model turbofan engines with a hydromechanical unit (HMU) with a part number (P/N) listed in paragraph 1.A., Table 1, of GE Service Bulletin (SB) CF6-80C2 SB 73-0436 R02, dated August 15, 2019; or paragraph 1.A., Table 1, of GE SB CF6-80E1 SB 73-0142 R02, dated August 15, 2019; installed.

(d) Subject

Joint Aircraft System Component (JASC) Code 7300, Engine Fuel and Control.

(e) Unsafe Condition

This AD was prompted by a report of fuel coking of the HMU fuel metering valve (FMV) electro-hydraulic servo valve (EHSV) resulting in tailpipe fire. The FAA is issuing this AD to prevent fuel coking or fuel deposits in the HMU FMV EHSV. The unsafe condition, if not addressed, could result in failure of the HMU, engine fire, and damage to the airplane.

(f) Compliance

Comply with this AD within the compliance times specified, unless already done.

(g) Required Actions

(1) Remove the HMU and replace with a part eligible for installation before reaching 40,000 flight hours (FHs) since new or since the last overhaul, or within 180 days after the effective date of this AD, whichever is later. If the FHs since new or last overhaul are unknown and unable to be determined, replace the HMU with a part eligible for installation within 180 days after the effective date of this AD.

(2) Thereafter, remove the HMU before reaching 40,000 FHs since new or since the last overhaul and replace with a part eligible for installation.

(h) Definitions

(1) For the purpose of this AD, a “part eligible for installation” is an HMU that has fewer than 40,000 FHs since new or fewer than 40,000 FHs since an overhaul of the HMU.

(2) For the purpose of this AD, “an overhaul of the HMU” is one of the following:

- (i) An overhaul of the HMU (complete) using Honeywell-approved maintenance procedures; or
- (ii) An overhaul of the HMU FMV EHSV using the Accomplishment Instructions, paragraph 3.C.(3), of GE SB CF6-80C2 SB 73-0436 R02, dated August 15, 2019, or paragraph 3.C.(3), of GE SB CF6-80E1 SB 73-0142 R02, dated August 15, 2019.

(i) Credit for Previous Action

You may take credit for the initial removal and replacement of the HMU required by paragraph (g)(1) of this AD if the HMU FMV EHSV was overhauled before the effective date of this AD using GE SB CF6-80C2 SB 73-0436 R01, dated May 14, 2019, or GE SB CF6-80C2 73-0142 R01, dated May 14, 2019.

(j) Alternative Methods of Compliance (AMOCs)

(1) The Manager, ECO Branch, FAA, has the authority to approve AMOCs for this AD, if requested using the procedures found in 14 CFR 39.19. In accordance with 14 CFR 39.19, send your request to your principal inspector or local Flight Standards District Office, as appropriate. If sending information directly to the manager of the certification office, send it to the attention of the person identified in paragraph (k) of this AD. You may email your request to: ANE-AD-AMOC@faa.gov.

(2) Before using any approved AMOC, notify your appropriate principal inspector, or lacking a principal inspector, the manager of the local flight standards district office/certificate holding district office.

(k) Related Information

For more information about this AD, contact Stephen Elwin, Aerospace Engineer, ECO Branch, FAA, 1200 District Avenue, Burlington, MA 01803; phone: 781-238-7236; fax: 781-238-7199; email: stephen.l.elwin@faa.gov.

(l) Material Incorporated by Reference

(1) The Director of the Federal Register approved the incorporation by reference (IBR) of the service information listed in this paragraph under 5 U.S.C. 552(a) and 1 CFR part 51.

(2) You must use this service information as applicable to do the actions required by this AD, unless the AD specifies otherwise.

(i) General Electric (GE) Service Bulletin (SB) CF6-80C2 SB 73-0436 R02, dated August 15, 2019.

(ii) GE SB CF6-80E1 SB 73-0142 R02, dated August 15, 2019.

(3) For GE service information identified in this AD, contact General Electric Company, 1 Neumann Way, Cincinnati, OH 45215; phone: 513-552-3272; email: aviation.fleetsupport@ae.ge.com.

(4) You may view this service information at FAA, Airworthiness Products Section, Operational Safety Branch, 1200 District Avenue, Burlington, MA 01803. For information on the availability of this material at the FAA, call 781-238-7759.

(5) You may view this service information that is incorporated by reference at the National Archives and Records Administration (NARA). For information on the availability of this material at

NARA, email: fedreg.legal@nara.gov, or go to: <https://www.archives.gov/federal-register/cfr/ibr-locations.html>.

Issued on October 13, 2020.

Lance T. Gant,

Director, Compliance & Airworthiness Division, Aircraft Certification Service.

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