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## **DEPARTMENT OF TRANSPORTATION**

### **Federal Aviation Administration**

#### **14 CFR Part 39**

**[Docket No. FAA-2015-4344; Directorate Identifier 2015-NE-32-AD; Amendment 39-18486; AD 2016-08-10]**

**RIN 2120-AA64**

#### **Airworthiness Directives; General Electric Company Turbofan Engines**

**AGENCY:** Federal Aviation Administration (FAA), DOT.

**ACTION:** Final rule.

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**SUMMARY:** We are adopting a new airworthiness directive (AD) for all General Electric Company (GE) CF6-80C2A1, CF6-80C2A2, CF6-80C2A3, CF6-80C2A5, CF6-80C2A5F, CF6-80C2A8, CF6-80C2B1, CF6-80C2B1F, CF6-80C2B1F1, CF6-80C2B1F2, CF6-80C2B2, CF6-80C2B2F, CF6-80C2B3F, CF6-80C2B4, CF6-80C2B4F, CF6-80C2B5F, CF6-80C2B6, CF6-80C2B6F, CF6-80C2B6FA, CF6-80C2B7F, CF6-80C2B8F, CF6-80C2D1F, CF6-80C2L1F, CF6-80C2K1F and CF6-80E1A1, CF6-80E1A2, CF6-80E1A3, CF6-80E1A4, and CF6-80E1A4/B turbofan engines. This AD was prompted by reports of a burn-through of the accessory heat shield during an engine fire, propagating the fire into the accessory compartment and igniting additional flammable fuel source. This AD requires replacing the accessory heat shield assembly. We are issuing this AD to prevent fires from propagating into the accessory compartment, resulting in an uncontrolled engine fire, and damage to the airplane.

**DATES:** This AD is effective June 1, 2016.

The Director of the Federal Register approved the incorporation by reference of certain publications listed in this AD as of June 1, 2016.

**ADDRESSES:** For service information identified in this final rule, contact General Electric Company, GE Aviation, Room 285, 1 Neumann Way, Cincinnati, OH 45215; phone: 513-552-3272; email: aviation.fleetsupport@ge.com. You may view this service information at the FAA, Engine & Propeller Directorate, 1200 District Avenue, Burlington, MA. For information on the availability of this material at the FAA, call 781-238-7125. It is also available on the Internet at <http://www.regulations.gov> by searching for and locating Docket No. FAA-2015-4344.

## **Examining the AD Docket**

You may examine the AD docket on the Internet at <http://www.regulations.gov> by searching for and locating Docket No. FAA-2015-4344; or in person at the Docket Management Facility between 9 a.m. and 5 p.m., Monday through Friday, except Federal holidays. The AD docket contains this AD, the regulatory evaluation, any comments received, and other information. The address for the Docket Office (phone: 800-647-5527) is Document Management Facility, 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:** Herman Mak, Aerospace Engineer, Engine Certification Office, FAA, Engine & Propeller Directorate, 1200 District Avenue, Burlington, MA 01803; phone: 781-238-7147; fax: 781-238-7199; email: [herman.mak@faa.gov](mailto:herman.mak@faa.gov).

## **SUPPLEMENTARY INFORMATION:**

### **Discussion**

We issued a notice of proposed rulemaking (NPRM) to amend 14 CFR part 39 by adding an AD that would apply to GE CF6-80C2A1, CF6-80C2A2, CF6-80C2A3, CF6-80C2A5, CF6-80C2A5F, CF6-80C2A8, CF6-80C2B1, CF6-80C2B1F, CF6-80C2B1F1, CF6-80C2B1F2, CF6-80C2B2, CF6-80C2B2F, CF6-80C2B3F, CF6-80C2B4, CF6-80C2B4F, CF6-80C2B5F, CF6-80C2B6, CF6-80C2B6F, CF6-80C2B6FA, CF6-80C2B7F, CF6-80C2B8F, CF6-80C2D1F, CF6-80C2L1F, and CF6-80C2K1F turbofan engines. This AD that would also apply to CF6-80E1A1, CF6-80E1A2, CF6-80E1A3, CF6-80E1A4, and CF6-80E1A4/B turbofan engines. The NPRM published in the Federal Register on December 7, 2015 (80 FR 75952). The NPRM was prompted by reports of a burn-through of the accessory heat shield during an engine fire leading to an accessory compartment fire. A fire burns through the accessory heat shield and ignites the integrated drive generator (IDG) and main fuel pump, which supports further combustion. The existing accessory heat shield assembly leaves a large area above the sensitive accessories, such as the IDG and the main fuel pump, without adequate protection. A total of three burn-through events have occurred. The NPRM proposed to require replacing the accessory heat shield assembly. We are issuing this AD to prevent an uncontrolled engine fire, and damage to the airplane.

### **Comments**

We gave the public the opportunity to participate in developing this AD. The following presents the comments received on the NPRM (80 FR 75952, December 7, 2015) and the FAA's response to each comment.

### **Support for the NPRM (80 FR 75952, December 7, 2015)**

The Boeing Company and the National Transportation Safety Board expressed support for the NPRM (80 FR 75952, December 7, 2015).

### **Revision to Service Information**

We revised the Discussion section and Applicability paragraph (e) of this AD to include all the GE CF6-80C2 and CF6-80E1 turbofan engine models.

### **Request To Change Summary**

GE requested that we revise the Summary paragraph of this AD to correct the number of events and clarify the event description.

We agree. Only three of the originally specified five events resulted in heat shield burn-throughs. We revised the Summary paragraph of this AD to correct the number of events and clarify the event description.

### **Request To Revise the Other Related Service Information Paragraph**

GE requested that we revise the Other Related Service Information paragraph of this AD to remove GE Service Bulletin (SB) CF6-80C2 S/B 72-1523, dated September 22, 2015. This SB only applies to the military variant of the engine.

We disagree. The military variant of the engine is also certified by the FAA. We did not change this AD.

### **Request To Revise the Costs of Compliance**

GE, KLM Royal Dutch Airlines (KLM), All Nippon Airways (ANA), and Federal Express (FedEx) requested that we revise the Costs of Compliance paragraph of this AD to correct the parts cost used in the calculations.

We agree. We considered the costs of all the parts needed to comply with this AD and revised the costs per engine to \$14,207 and the total cost to U.S. operators to \$13,680,920.

### **Request To Change Applicability**

KLM requested that we exclude GE CF6-80E1 engines from the Applicability paragraph of this AD. KLM reasoned that the NTSB safety recommendation did not address GE CF6-80E1 engines and CF6-80E1 engines have not experienced any sump fires to date.

We disagree. Although the NTSB did not address GE CF6-80E1 engines, the designs of the GE CF6-80C2 and CF6-80E1 engines are substantially similar. Therefore, the unsafe condition addressed by this AD is likely to exist or develop on the GE CF6-80E1 engines. We did not change this AD.

### **Request To Change Compliance**

GE requests that the following part numbers (P/Ns) be removed from Table 1 of GE SB 72-1520: P/N 2022M47G01, P/N 2022M81P01, P/N 2022M85G01, and P/N 2023M20G01. These P/Ns are used only on GE CF6-80C2B6FA models, a military application, and contain a different heat shield design.

We disagree. The specified P/Ns are not listed in Table 1 of GE SB 72-1520 and therefore this comment is not applicable. We did not change this AD.

### **Request To Change Definition**

GE, United Airlines, KLM, Lufthansa, Lufthansa Cargo, Lufthansa Technik, and FedEx requested that we provide a more accurate description of flange separation and exclude certain situations from the definition of a shop visit. The commenters reasoned that this would provide clarity and reduce the undue economic and operational burden of complying with this AD earlier than necessary.

We agree. We revised the Definition paragraph of this AD to clarify the description of flange separation and include specific conditions that do not qualify as shop visits.

## **Request To Delay the Effective Date**

GE and Delta Air Lines (Delta) requested that we delay the effective date of this AD. GE reasoned that the revised service bulletin addressing the lack of repair instructions for accessory heat shield assembly, P/N 1313M94G09, will not be available until after the expected effective date of this AD.

We disagree. The current effective date of this AD is needed to address the unsafe condition for the affected fleet. Any party may make a request for an Alternative Method of Compliance (AMOC) to this AD using the procedures listed in this AD. Any requests for an AMOC are reviewed and responded to accordingly. We did not change this AD.

## **Request To Change Applicability**

ANA requested limiting the Applicability paragraph of this AD to a particular maintenance, repair, and overhaul (MRO) shop where improper maintenance occurred leading to fire. ANA reasoned that the latest 2010 sump fire leading to heat shield burn-through was the result of improper maintenance at a particular MRO.

We disagree. This AD addresses the insufficient fire protection design of the heat shield to prevent secondary fire damage. This is independent from the cause of fire in the engine. We did not change this AD.

## **Request To Change Effectivity**

Lufthansa, Lufthansa Cargo, and Lufthansa Technik requested that we not mandate heat shield rework or replacement. Lufthansa reasoned that none of their customers operating GE CF6-80C2/80A engines have experienced a compressor rear frame (CRF) sump fire.

We disagree. Complying with this AD is necessary to correct the unsafe condition of heat shield burn-through. The heat shield rework or replacement is needed to prevent fires from propagating into the accessory compartment, leading to a larger engine fire and subsequent damage to the airplane. We did not change this AD.

## **Request for Allowance of Creating and Marking Serial Numbers**

Delta requested we allow operators to both create and mark identification numbers on heat shields that are not currently marked. Delta has received reports that there are illegible identification markings on heat shields.

We partially agree. We agree there is a lack of information about heat shields with illegible P/Ns in this AD. We revised the Compliance section of this AD to address heat shields with illegible P/Ns.

We disagree with allowing operators to create and mark identification numbers on heat shields as this does not resolve the unsafe condition and is beyond the scope of this AD.

## **Request To Change Applicability**

GE commented that heat shield, P/N 1643M23G12, is also affected by the unsafe condition described in this AD.

We agree. We added heat shield, P/N 1643M23G12, to the applicability of this AD.

## **Conclusion**

We reviewed the relevant data, considered the comments received, and determined that air safety and the public interest require adopting this AD with the changes described previously. We have determined that these minor changes:

- Are consistent with the intent that was proposed in the NPRM (80 FR 75952, December 7, 2015) for correcting the unsafe condition; and
- Do not add any additional burden upon the public than was already proposed in the NPRM (80 FR 75952, December 7, 2015).

We also determined that these changes will not increase the economic burden on any operator or increase the scope of this AD.

### **Related Service Information Under 1 CFR Part 51**

We reviewed GE SB CF6-80C2 S/B 72-1520, dated September 22, 2015 and GE SB CF6-80E1 S/B 72-0525, dated September 22, 2015. These SBs describe the procedures for removing and replacing the accessory heat shield assembly. 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.

### **Other Related Service Information**

We reviewed GE SB CF6-80E1 S/B 72-0504, dated October 24, 2014. This SB describes procedures for quick-turn workscope procedure to replace CF6-80E1 stage 1 high-pressure turbine blades. We also reviewed GE SB CF6-80C2 S/B 72-1516, Revision 2, dated November 6, 2015. This SB describes procedures for replacement of the CRF assembly, oil manifold, air tubes, and support brackets. We also reviewed GE SB CF6-80C2 S/B 72-1523, dated September 22, 2015. This SB describes procedures for removing and replacing the accessory heat shield assembly.

### **Costs of Compliance**

We estimate that this AD affects 935 engines installed on airplanes of U.S. registry. We also estimate that it will take about 5 hours per engine to comply with this AD. The average labor rate is \$85 per hour. Parts cost about \$14,207 per engine. Based on these figures, we estimate the total cost of this AD to U.S. operators to be \$13,680,920.

### **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.

We are 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) Is not a "significant rule" under DOT Regulatory Policies and Procedures (44 FR 11034, February 26, 1979),

(3) Will not affect intrastate aviation in Alaska to the extent that it justifies making a regulatory distinction, and

(4) 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.

### **Adoption of 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):



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**2016-08-10 General Electric Company:** Amendment 39-18486; Docket No. FAA-2015-4344; Directorate Identifier 2015-NE-32-AD.

**(a) Effective Date**

This AD is effective June 1, 2016.

**(b) Affected ADs**

None.

**(c) Applicability**

This AD applies to all General Electric Company (GE) CF6-80C2A1, CF6-80C2A2, CF6-80C2A3, CF6-80C2A5, CF6-80C2A5F, CF6-80C2A8, CF6-80C2B1, CF6-80C2B1F, CF6-80C2B1F1, CF6-80C2B1F2, CF6-80C2B2, CF6-80C2B2F, CF6-80C2B3F, CF6-80C2B4, CF6-80C2B4F, CF6-80C2B5F, CF6-80C2B6, CF6-80C2B6F, CF6-80C2B6FA, CF6-80C2B7F, CF6-80C2B8F, CF6-80C2D1F, CF6-80C2L1F, CF6-80C2K1F turbofan engines. This AD also applies to CF6-80E1A1, CF6-80E1A2, CF6-80E1A3, CF6-80E1A4, and CF6-80E1A4/B turbofan engines.

**(d) Unsafe Condition**

This AD was prompted by reports of a burn-through of the accessory heat shield during an engine fire, leading to an accessory compartment fire. We are issuing this AD to prevent uncontrolled engine fire, and damage to the airplane.

**(e) Compliance**

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

(1) For CF6-80C2 engines, at the next engine shop visit after the effective date of this AD, remove from service accessory heat shield assembly, part number (P/N) 1643M23G12, and any other accessory heat shield assembly listed by P/N in Table 1 of GE Service Bulletin (SB) CF6-80C2 S/B 72-1520, dated September 22, 2015. Install an accessory heat shield assembly eligible for installation.

(2) For CF6-80E1 engines, at the next engine shop visit after the effective date of this AD, remove from service accessory heat shield assemblies listed by P/N in Table 1 of GE SB CF6-80E1 S/B 72-0525, dated September 22, 2015. Install an accessory heat shield assembly eligible for installation.

(3) Remove any heat shield assembly from service if the accessory heat shield assembly part number marking is illegible and the documentation associated with the part cannot properly identify the part.

**(f) Installation Prohibition**

After the effective date of this AD, do not install any accessory heat shield assembly, P/N 1643M23G12; or any accessory heat shield assembly listed by P/N in Table 1 of GE SB CF6-80C2

S/B 72-1520, dated September 22, 2015; or in Table 1 of GE SB CF6-80E1 S/B 72-0525, dated September 22, 2015; into any engine.

**(g) Definition**

For the purpose of this AD, an engine shop visit is defined as the induction of an engine into the shop for maintenance involving the separation of any major mating engine flanges, except that the separation of engine flanges solely for the following purposes is not considered a shop visit:

- (1) Transportation without subsequent engine maintenance.
- (2) Replacement of the turbine rear frame.
- (3) Removal of the top or bottom high-pressure compressor (HPC) case, or both, for HPC airfoil maintenance or replacement of variable stator vane bushing or lever arms.
- (4) Quick-turn workscope procedure to replace CF6-80E1 stage 1 high-pressure turbine (HPT) blades per CF6-80E1 SB 72-0504 R00 ENGINE–General (72-00-00)–Quick-Turn Workscope Procedure to Replace CF6-80E1 Stage 1 HPT Blades.
- (5) Replacement of compressor rear frame assembly, new oil manifold, air tubes and support brackets per CF6-80C2 SB 72-1516 R02 ENGINE–Compressor Rear Frame Assembly (72-34-00)–New Oil Manifold, Air Tubes and Support Brackets.

**(h) Alternative Methods of Compliance (AMOCs)**

The Manager, Engine Certification Office, FAA, may approve AMOCs to this AD. Use the procedures found in 14 CFR 39.19 to make your request. You may email your request to: ANE-AD-AMOC@faa.gov.

**(i) Related Information**

For more information about this AD, contact Herman Mak, Aerospace Engineer, Engine Certification Office, FAA, Engine & Propeller Directorate, 1200 District Avenue, Burlington, MA 01803; phone: 781-238-7147; fax: 781-238-7199; email: herman.mak@faa.gov.

**(j) 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 Company (GE) Service Bulletin (SB) CF6-80C2 S/B 72-1520, dated September 22, 2015.

(ii) GE SB CF6-80E1 S/B 72-0525, dated September 22, 2015.

(3) For GE service information identified in this AD, contact General Electric Company, GE Aviation, Room 285, 1 Neumann Way, Cincinnati, OH 45215; phone: 513-552-3272; email: aviation.fleetsupport@ge.com.

(4) You may view this service information at FAA, Engine & Propeller Directorate, 1200 District Avenue, Burlington, MA. For information on the availability of this material at the FAA, call 781-238-7125.

(5) You may view this service information at the National Archives and Records Administration (NARA). For information on the availability of this material at NARA, call 202-741-6030, or go to: <http://www.archives.gov/federal-register/cfr/ibr-locations.html>.

Issued in Burlington, Massachusetts, on April 7, 2016.  
Colleen M. D'Alessandro,  
Manager, Engine & Propeller Directorate,  
Aircraft Certification Service.