

## DEPARTMENT OF TRANSPORTATION

### Federal Aviation Administration

#### 14 CFR Part 39

[Docket No. FAA-2006-25738; Directorate Identifier 2006-NE-27-AD; Amendment 39-15085; AD 2007-12-07]

RIN 2120-AA64

#### Airworthiness Directives; General Electric Company (GE) CF6-80C2B Series Turbofan Engines

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

**ACTION:** Final rule.

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**SUMMARY:** The FAA is adopting a new airworthiness directive (AD) for GE CF6-80C2B series turbofan engines with electronic control units (ECUs), installed on Boeing 747 and 767 series airplanes. This AD requires installing software version 8.2.Q1 to the engine ECU, which increases the engine's margin to flameout. This AD results from reports of engine flameout events during flight, including reports of events where all engines simultaneously experienced a flameout or other adverse operation. Though the root cause investigation is not yet complete, we believe exposure to ice crystals during flight is associated with these flameout events. We are issuing this AD to provide increased margin to flameout, which will minimize the potential of an all-engine flameout event caused by ice accretion and shedding during flight.

**DATES:** This AD becomes effective July 11, 2007. The Director of the Federal Register approved the incorporation by reference of certain publications listed in the regulations as of July 11, 2007.

**ADDRESSES:** You can get the service information identified in this AD from General Electric Company via Lockheed Martin Technology Services, 10525 Chester Road, Suite C, Cincinnati, Ohio 45215, telephone (513) 672-8400, fax (513) 672-8422.

You may examine the AD docket on the Internet at <http://dms.dot.gov> or in Room PL-401 on the plaza level of the Nassif Building, 400 Seventh Street, SW., Washington, DC.

**FOR FURTHER INFORMATION CONTACT:** John Golinski, Aerospace Engineer, Engine Certification Office, FAA, Engine and Propeller Directorate, 12 New England Executive Park, Burlington, MA 01803; e-mail: [john.golinski@faa.gov](mailto:john.golinski@faa.gov); telephone: (781) 238-7135, fax: (781) 238-7199.

**SUPPLEMENTARY INFORMATION:** The FAA proposed to amend 14 CFR part 39 with a proposed AD. The proposed AD applies to GE CF6-80C2B series turbofan engines with ECUs, installed on Boeing 747 and 767 series airplanes. We published the proposed AD in the Federal Register on October 24, 2006 (71 FR 62215). That action proposed to require installing software version 8.2.Q1 to the engine ECU, which increases the engine's margin to flameout.

## **Examining the AD Docket**

You may examine the docket that contains the AD, any comments received, and any final disposition in person at the Docket Management Facility between 9 a.m. and 5 p.m., Monday through Friday, except Federal holidays. The Docket Office (telephone (800) 647-5227) is located on the plaza level of the Department of Transportation Nassif Building at the street address stated in ADDRESSES. Comments will be available in the AD docket shortly after the DMS receives them.

## **Comments**

We provided the public the opportunity to participate in the development of this AD. We have considered the comments received.

## **Comment That Corrective Actions Should Be Expanded**

One commenter, the Airline Pilots Association, International, states that the corrective action should be expanded in this AD to be fully effective. The commenter states that the prescribed modification addresses only the flameout and restart issues, while the problems of engine ice accretion and compressor blade damage due to ice shedding during operations, remain. The commenter states that, due to the severity of single- and dual-engine flameout events, the FAA and GE must examine the engine certification and operating envelope to determine the causes of ice accretions and compressor blade damage while operating in an ice crystal environment and continue to develop a more comprehensive solution.

We do not agree. This AD considers the ice accretion location, quantity, and the potential of compressor blade damage caused by impact with ice. Paragraph (f) of this AD states that these AD actions are interim actions due to the on-going investigation, and that we may take further rulemaking actions in the future based on the results of the investigation and field experience.

## **Request To Eliminate Certain Wording**

Japan Airlines International (JAL) requests that we eliminate “at the next shop visit of the engine” in the compliance section. Doing this would:

- Then allow operators to accomplish the retrofit program on Boeing 767 series airplanes more aggressively; and
- Would facilitate completing the program in the proposed 5-year compliance period, without causing aircraft on the ground (AOG) situations, due to a shortage of spare ECUs. JAL is concerned that there might be a shortage of spare ECUs that could result in grounded aircraft. JAL provided information and data on their planned retrofit for their fleet of Boeing 767 and 747 series airplanes.

We partially agree. Eliminating the proposed wording would result in a less aggressive replacement program for the total population of engines. JAL did not provide any supporting data of how this change would result in a more aggressive compliance program for engines installed on the Boeing 767 airplanes. Our risk assessment indicates that the risk presented by this unsafe condition can be successfully managed within the current and expected parts availability. Therefore, we did not change the AD.

In reviewing JAL's comment, we noted that our intent could be clarified. We changed the AD to clarify that ECUs installed with previous versions of software can be installed on an engine for a period of time.

The added paragraph in the AD discusses two possible conditions: (1) Reverting to previous versions of software in an ECU, and (2) versions of software installed in ECUs that are installed on an engine. Our risk assessment indicates this change to the AD is acceptable and manages the unsafe condition.

### **Suggestion To Accelerate the Compliance Schedule**

One commenter, the National Transportation Safety Board, suggests that the compliance schedule be accelerated as the software upgrade program progresses.

We do not agree. Our risk assessment indicates that the compromise to safety that is the subject of this AD can be adequately managed within the compliance schedule this AD requires. However, as also noted, we may have other AD actions as we more fully investigate the events leading to the AD. We did not change the AD.

### **AD Clarifications**

After we issued the proposed AD, our review indicated that we should clarify compliance and make the following other needed updates.

We added a paragraph to the AD compliance section to clarify our intent for this AD. That paragraph now states that after the effective date of this AD, once software version 8.2.Q1 is installed in an ECU, reverting to previous versions of ECU software in that ECU is prohibited.

We clarified the compliance paragraphs by separating the actions required for engines installed in Boeing 767 series airplanes from those installed in Boeing 747 series airplanes.

We found that we inadvertently described the inlet gearbox seal by brand name. We now identify this seal by its material name in this AD.

GE issued Service Bulletin No. CF6-80C2 S/B 73-0339, Revision 1, which includes changes in the compliance section that make it consistent with this AD. We now reference that Service Bulletin Revision 1 in this AD.

We eliminated the paragraph that stated that installation of later FAA-approved ECU software versions are an acceptable alternative methods of compliance (AMOC) to this AD. We will approve future software versions as an AMOC to this AD using the standard AMOC process. Eliminating this paragraph minimizes possible confusion of using the process for requesting and approving AMOCs.

### **Conclusion**

We have carefully reviewed the available data, including the comments received, and determined that air safety and the public interest require adopting the AD with the changes described previously.

### **Costs of Compliance**

We estimate that this AD will affect 293 CF6-80C2B series turbofan engines with ECUs installed on Boeing 747 and 767 series airplanes of U.S. registry. It will take about six work-hours per engine to perform the actions (ECU overhauls not included) and the average labor rate is \$80 per work-hour. Based on these figures, we estimate the total cost of the AD to U.S. operators to be \$283,740.

## 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

We have determined that 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); 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.

We prepared a summary of the costs to comply with this AD and placed it in the AD Docket. You may get a copy of this summary at the address listed under ADDRESSES.

## 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 Federal Aviation Administration 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:



**2007-12-07 General Electric Company:** Amendment 39-15085. Docket No. FAA-2006-25738; Directorate Identifier 2006-NE-27-AD.

**Effective Date**

- (a) This airworthiness directive (AD) becomes effective July 11, 2007.

**Affected ADs**

- (b) None.

**Applicability**

(c) This AD applies to General Electric Company (GE) CF6-80C2B1F, -80C2B2F, -80C2B4F, -80C2B5F, -80C2B6F, -80C2B6FA, -80C2B7F, and -80C2B8F turbofan engines with electronic control units (ECUs), installed on Boeing 747 and 767 series airplanes.

**Unsafe Condition**

(d) This AD results from reports of engine flameout events during flight, including reports of events where all engines simultaneously experienced a flameout or other adverse operation. We are issuing this AD to provide increased margin to flameout, which will minimize the potential of an all-engine flameout event caused by ice accretion and shedding during flight. Exposure to ice crystals during flight is believed to be associated with these flameout events.

**Compliance**

(e) You are responsible for having the actions required by this AD performed within the compliance times specified, unless the actions have already been done.

**Interim Action**

(f) These actions are interim actions due to the on-going investigation, and we may take further rulemaking actions in the future based on the results of the investigation and field experience.

**Engine ECU Software Installation for Boeing 767 Series Airplanes**

(g) For Boeing 767 series airplanes:

(1) All affected engines must have ECU software version 8.2.Q1 installed at next engine shop visit or ECU shop visit, whichever occurs first, but no later than five years after the effective date of this AD.

(2) Within 24 months after the effective date of this AD, at least one of the airplane's affected engines must have ECU software version 8.2.Q1 installed.

(3) Do the software installations specified in paragraphs (g)(1) and (g)(2) of this AD using paragraphs 3.A. through 3.B.(3)(f)4. of the Accomplishment Instructions of GE Service Bulletin No. CF6-80C2 S/B 73-0339, Revision 1, dated April 24, 2007.

### **Engine ECU Software Installation for Boeing 747 Series Airplanes**

(h) For Boeing 747 series airplanes:

(1) All affected engines must have ECU software version 8.2.Q1 installed at next engine shop visit or ECU shop visit, whichever occurs first, but no later than five years after the effective date of this AD.

(2) Do the software installations specified in paragraph (h)(1) of this AD using paragraphs 3.A. through 3.B.(3)(f)4. of the Accomplishment Instructions of GE Service Bulletin No. CF6-80C2 S/B 73-0339, Revision 1, dated April 24, 2007.

### **Reverting to Previous Software Versions of ECU Software**

(i) After the effective date of this AD:

(1) Once software version 8.2.Q1 is installed in an ECU, reverting to previous versions of ECU software in that ECU is prohibited.

(2) For a period of 24 months after the effective date of this AD, once an ECU containing software version 8.2.Q1 is installed on an engine, that ECU can be replaced with an ECU containing a previous software version. The calendar time requirements in paragraphs (g) and (h) of this AD are not to be exceeded.

(3) After 24 months from the effective date of this AD, once an ECU containing software version 8.2.Q1 is installed on an engine, if the ECU needs to be replaced for any reason, it must only be replaced by another ECU containing version 8.2.Q1 software.

### **Definitions**

(j) For the purposes of this AD:

(1) Next shop visit of the engine ECU is when the ECU is removed from the engine for overhaul or for maintenance.

(2) Next shop visit of the engine is when the engine is removed from the airplane for maintenance in which a major engine flange is disassembled after the effective date of this AD. The following engine maintenance actions, either separately or in combination with each other, are not considered a next engine shop visit:

(i) Removal of the upper high pressure compressor (HPC) stator case solely for airfoil maintenance.

(ii) Module-level inspection of the HPC rotor stages 3-9 spool.

(iii) Replacement of stage 5 HPC variable stator vane bushings or lever arms.

(iv) Removal of the accessory gearbox.

(v) Replacement of the inlet gearbox polytetrafluoroethylene seal.

### **Alternative Methods of Compliance**

(k) The Manager, Engine Certification Office, has the authority to approve alternative methods of compliance for this AD if requested using the procedures found in 14 CFR 39.19.

## Special Flight Permits

(l) Under 14 CFR part 39.23, special flight permits are prohibited.

## Material Incorporated by Reference

(m) You must use General Electric Company Service Bulletin No. CF6-80C2 S/B 73-0339, Revision 1, dated April 24, 2007, to perform the installation required by this AD. The Director of the Federal Register approved the incorporation by reference of this service bulletin in accordance with 5 U.S.C. 552(a) and 1 CFR part 51. Contact General Electric Company via Lockheed Martin Technology Services, 10525 Chester Road, Suite C, Cincinnati, Ohio 45215, telephone (513) 672-8400, fax (513) 672-8422 for a copy of this service information. You may review copies at the FAA, New England Region, Office of the Regional Counsel, 12 New England Executive Park, Burlington, MA; or 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 May 30, 2007.

Robert Ganley,

Acting Manager, Engine and Propeller Directorate, Aircraft Certification Service.

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