

Document No.	Pages	Revision	Date
Total pages: 13 CFM56-2B SB No. 73-074 .....	1-13	1	January 12, 1998.
Total pages: 13 CFM56-3/3B/3C SB No. 73-125 .....	1-13	1	January 7, 1998.
Total pages: 13 CFM56-5 SB No. 73-135 .....	1-13	1	January 7, 1998.
Total pages: 13 CFM56-5B SB No. 73-055 .....	1-13	1	January 7, 1998.
Total pages: 13 CFM56-5C SB No. 73-070 .....	1-13	1	January 7, 1998.
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The incorporations by reference were approved by the Director of the Federal Register in accordance with 5 U.S.C. 552 (a) and 1 CFR part 51. Copies may be obtained from CFM International, Technical Publications Department, 1 Neumann Way, Cincinnati, OH 45215; telephone: (513) 552-2800, fax: (513) 552-2816. Copies may be inspected at the FAA, New England Region, Office of the Regional Counsel, 12 New England Executive Park, Burlington, MA 01803-5299; or at the Office of the Federal Register, 800 North Capitol Street, NW., suite 700, Washington, DC.

**Effective Date**

(i) This amendment becomes effective on October 2, 2000.

Issued in Burlington, Massachusetts on July 14, 2000.

**David A. Downey,**

*Assistant Manager, Engine and Propeller Directorate, Aircraft Certification Service.*

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**DEPARTMENT OF TRANSPORTATION**

**Federal Aviation Administration**

**14 CFR Part 39**

[Docket No. 99-NM-79-AD; Amendment 39-11833; AD 2000-15-04]

**RIN 2120-AA64**

**Airworthiness Directives; Boeing Model 747-200 and -300 Series Airplanes Equipped with General Electric CF6-80C2 Series Engines**

**AGENCY:** Federal Aviation Administration, DOT.

**ACTION:** Final rule.

**SUMMARY:** This amendment supersedes an existing airworthiness directive (AD), applicable to certain Boeing Model 747-200 and -300 series airplanes, that currently requires various inspections and functional tests to detect

discrepancies of the thrust reverser control and indication system, and correction of any discrepancy found. This amendment requires installation of a terminating modification, and repetitive functional tests of that installation, and repair, if necessary. This amendment is prompted by the results of a safety review of the thrust reverser systems on Model 747 series airplanes. The actions specified by this AD are intended to ensure the integrity of the fail safe features of the thrust reverser system by preventing possible failure modes in the thrust reverser control system that can result in inadvertent deployment of a thrust reverser during flight.

**DATES:** Effective September 6, 2000.

The incorporation by reference of certain publications listed in the regulations is approved by the Director of the Federal Register as of September 6, 2000.

The incorporation by reference of Boeing Service Bulletin 747-78A2166, Revision 1, dated October 9, 1997, as listed in the regulations, was approved previously by the Director of the Federal Register as of August 25, 1999 (64 FR 39003, July 21, 1999).

The incorporation by reference of Boeing Alert Service Bulletin 747-78A2130, dated May 26, 1994, as listed in the regulations, was approved previously by the Director of the Federal Register as of April 13, 1995 (60 FR 13623, March 14, 1995).

**ADDRESSES:** The service information referenced in this AD may be obtained from Boeing Commercial Airplane Group, P.O. Box 3707, Seattle, Washington 98124-2207. This information may be examined at the Federal Aviation Administration (FAA), Transport Airplane Directorate, Rules Docket, 1601 Lind Avenue, SW., Renton, Washington; or at the Office of

the Federal Register, 800 North Capitol Street, NW., suite 700, Washington, DC.

**FOR FURTHER INFORMATION CONTACT:** Larry Reising, Aerospace Engineer, Propulsion Branch, ANM-140S, FAA, Transport Airplane Directorate, Seattle Aircraft Certification Office, 1601 Lind Avenue, SW., Renton, Washington 98055-4056; telephone (425) 227-2683; fax (425) 227-1181.

**SUPPLEMENTARY INFORMATION:** A proposal to amend part 39 of the Federal Aviation Regulations (14 CFR part 39) by superseding AD 99-15-08, amendment 39-11227 (64 FR 39003, July 21, 1999), which is applicable to certain Boeing Model 747-200 and -300 series airplanes, was published in the **Federal Register** on December 28, 1999 (64 FR 72575). The action proposed to continue to require various inspections and functional tests to detect discrepancies of the thrust reverser control and indication system and correction of any discrepancy found, and installation of a terminating modification, repetitive functional tests of that installation, and repair, if necessary.

**Comments**

Interested persons have been afforded an opportunity to participate in the making of this amendment. Due consideration has been given to the comment received.

**Request to Remove Running Torque Check From Functional Test Procedures**

One commenter, the airplane manufacturer, requests that the running torque check of the thrust reverser system be removed from the functional test procedures contained in Appendix 1 of the proposed rule. The commenter states no justification for its request.

The FAA concurs with the commenter's request. The FAA finds that the running torque check of the

thrust reverser system is not directly related to the integrity of the cone brake or the actuation system lock. The running torque check is used to determine whether the thrust reverser is able to translate smoothly when commanded to deploy or stow. This check is described in Boeing 747 Airplane Maintenance Manual 78-31-00 "Thrust Reverser System—Adjustment/Test" and is performed when the angle gearbox and ballscrew actuator, the rotary flexible drive shaft, or the center drive unit is replaced. The FAA recognizes that it is appropriate to perform the running torque check when these components are replaced and finds that it is not necessary to perform this check as part of the functional test specified in Appendix 1. Therefore, the running torque check of the thrust reverser system has not been included in Appendix 1 of this final rule.

### Conclusion

After careful review of the available data, including the comment noted above, the FAA has determined that air safety and the public interest require the adoption of the rule with the change previously described. This change will neither increase the economic burden on any operator nor increase the scope of the AD.

### Cost Impact

There are approximately 9 Model 747-200 and -300 series airplanes of the affected design in the worldwide fleet. The FAA estimates that 2 airplanes of U.S. registry will be affected by this AD.

The actions originally required by AD 95-06-01, and retained in this AD, take approximately 33 work hours per airplane to accomplish, at an average labor rate of \$60 per work hour. Based on these figures, the cost impact of the currently required actions on U.S. operators is estimated to be \$3,960, or \$1,980 per airplane, per inspection/test cycle.

The other actions (repeating the functional test of the cone brake required by AD 95-06-01 at reduced intervals) that are currently required by AD 99-15-08, and retained in this AD, do not add any additional economic burden on affected operators.

The bracket installation required by this new AD takes approximately 64 work hours per airplane to accomplish, at an average labor rate of \$60 per work hour. Required parts will be provided by the manufacturer at no cost to the operators. Based on these figures, the cost impact of the bracket installation required by this AD on U.S. operators is estimated to be \$7,680, or \$3,840 per airplane.

The actuation system lock installation required by this new AD takes approximately 16 work hours per airplane to accomplish, at an average labor rate of \$60 per work hour. Required parts will be provided by the manufacturer at no cost to the operators. Based on these figures, the cost impact of the lock installation required by this AD on U.S. operators is estimated to be \$1,920, or \$960 per airplane.

The functional test required by this new AD takes approximately 2 work hours per airplane to accomplish, at an average labor rate of \$60 per work hour. Based on these figures, the cost impact of the functional test required by this AD on U.S. operators is estimated to be \$240, or \$120 per airplane, per test cycle.

The wiring modifications required by this new AD take approximately 833 work hours per airplane to accomplish, at an average labor rate of \$60 per work hour. Required parts will be provided by the manufacturer at no cost to the operators. Based on these figures, the cost impact of these modifications required by this AD on U.S. operators is estimated to be \$99,960, or \$49,980 per airplane.

The cost impact figures discussed above are based on assumptions that no operator has yet accomplished any of the requirements of this AD action, and that no operator would accomplish those actions in the future if this AD were not adopted.

### Regulatory Impact

The regulations adopted herein 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. Therefore, it is determined that this final rule does not have federalism implications under Executive Order 13132.

For the reasons discussed above, I certify that this action (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. A final evaluation has been prepared for this action and it is contained in the Rules Docket. A copy of it may be obtained from the Rules Docket at the location provided under the caption **ADDRESSES**.

### List of Subjects in 14 CFR Part 39

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

### Adoption of the Amendment

Accordingly, pursuant to the authority delegated to me by the Administrator, the Federal Aviation Administration amends part 39 of the Federal Aviation Regulations (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. Section 39.13 is amended by removing amendment 39-11227 (64 FR 39003, July 21, 1999), and by adding a new airworthiness directive (AD), amendment 39-11833, to read as follows:

**2000-15-04 Boeing:** Amendment 39-11833. Docket 99-NM-79-AD. Supersedes AD 99-15-08, Amendment 39-11227.

*Applicability:* Model 747-200 and -300 series airplanes equipped with General Electric Model CF6-80C2 series engines with Power Management Control engine controls, certificated in any category.

**Note 1:** This AD applies to each airplane identified in the preceding applicability provision, regardless of whether it has been modified, altered, or repaired in the area subject to the requirements of this AD. For airplanes that have been modified, altered, or repaired so that the performance of the requirements of this AD is affected, the owner/operator must request approval for an alternative method of compliance in accordance with paragraph (h)(1) of this AD. The request should include an assessment of the effect of the modification, alteration, or repair on the unsafe condition addressed by this AD; and, if the unsafe condition has not been eliminated, the request should include specific proposed actions to address it.

*Compliance:* Required as indicated, unless accomplished previously.

To ensure the integrity of the fail safe features of the thrust reverser system by preventing possible failure modes in the thrust reverser control system that can result in inadvertent deployment of a thrust reverser during flight, accomplish the following:

#### RESTATEMENT OF THE ORIGINAL REQUIREMENTS OF AD 95-06-01:

##### Repetitive Tests and Inspections

(a) Within 90 days after April 13, 1995 (the effective date of AD 95-06-01, amendment 39-9171), perform tests of the position switch module and the cone brake of the center drive unit (CDU) on each thrust reverser, and perform an inspection to detect

damage to the bullnose seal on the translating sleeve on each thrust reverser, in accordance with paragraphs III.A. through III.C. of the Accomplishment Instructions of Boeing Alert Service Bulletin 747-78A2130, dated May 26, 1994. Repeat the tests and inspection thereafter at intervals not to exceed 1,000 hours time-in-service until the functional test required by paragraph (d) of this AD is accomplished.

(b) Within 9 months after April 13, 1995, perform inspections and functional tests of the thrust reverser control and indication system in accordance with paragraphs III.D. through III.F., III.H., and III.I. of the Accomplishment Instructions of Boeing Alert Service Bulletin 747-78A2130, dated May 26, 1994. Repeat these inspections and functional tests thereafter at intervals not to exceed 18 months.

#### Corrective Action

(c) If any of the inspections and/or functional tests required by paragraphs (a) and (b) of this AD cannot be successfully performed, or if any discrepancy is found during those inspections and/or functional tests, accomplish either paragraph (c)(1) or (c)(2) of this AD.

(1) Prior to further flight, correct the discrepancy found, in accordance with Boeing Alert Service Bulletin 747-78A2130, dated May 26, 1994. Or

(2) The airplane may be operated in accordance with the provisions and limitations specified in an operator's FAA-approved Minimum Equipment List (MEL), provided that no more than one thrust reverser on the airplane is inoperative.

#### RESTATEMENT OF REQUIREMENTS OF AD 99-15-08:

##### Repetitive Tests/Terminating Action

(d) Within 1,000 hours time-in-service after the most recent test of the CDU cone brake performed in accordance with paragraph (a) of this AD, or within 650 hours time-in-service after August 25, 1999 (the effective date of AD 99-15-08, amendment 39-11227), whichever occurs first: Perform a functional test to detect discrepancies of the CDU cone brake on each thrust reverser, in accordance with Boeing Service Bulletin 747-78A2166, Revision 1, dated October 9, 1997, or paragraph III.B. of the Accomplishment Instructions of Boeing Alert Service Bulletin 747-78A2130, dated May 26, 1994. Repeat the functional test thereafter at the interval specified in paragraph (d)(1) or (d)(2) of this AD, as applicable. Accomplishment of such functional test constitutes terminating action for the repetitive test of the CDU cone brake required by paragraph (a) of this AD; the position switch module tests and the bullnose seal inspections continue to be required as specified in paragraph (a) of this AD.

(1) For airplanes equipped with thrust reversers NOT modified in accordance with Boeing Service Bulletin 747-78-2144, Revision 1, dated April 11, 1996: Repeat the functional test at intervals not to exceed 650 hours time-in-service.

(2) For airplanes equipped with thrust reversers modified in accordance with Boeing Service Bulletin 747-78-2144, Revision 1, dated April 11, 1996: Repeat the functional test at intervals not to exceed 1,000 hours time-in-service.

#### Corrective Action

(e) If any functional test required by paragraph (d) of this AD cannot be successfully performed, or if any discrepancy is found during any functional test required by paragraph (d) of this AD, accomplish either paragraph (e)(1) or (e)(2) of this AD.

(1) Prior to further flight, correct the discrepancy found, in accordance with Boeing Service Bulletin 747-78A2166, Revision 1, dated October 9, 1997, or paragraph III.B. of the Accomplishment Instructions of Boeing Alert Service Bulletin 747-78A2130, dated May 26, 1994. Or

(2) The airplane may be operated in accordance with the provisions and limitations specified in the operator's FAA-approved MEL, provided that no more than one thrust reverser on the airplane is inoperative.

#### NEW REQUIREMENTS OF THIS AD:

##### Terminating Action

(f) Accomplish the requirements of paragraphs (f)(1) and (f)(2) of this AD at the times specified in those paragraphs. Accomplishment of the actions required by paragraph (f)(1) of this AD constitutes terminating action for the requirements of paragraphs (a), (b), (d), and (e) of this AD.

(1) Within 36 months after the effective date of this AD, accomplish the requirements of paragraphs (f)(1)(i) and (f)(1)(ii) of this AD.

(i) Install an actuation system lock bracket and fastening hardware to each thrust reverser in accordance with the Accomplishment Instructions of Lockheed Martin Service Bulletin 78-1007, Revision 1, dated March 18, 1997, or Middle River Aircraft Systems Service Bulletin 78-1007, Revision 2, dated March 10, 1998.

(ii) Install an actuation system lock (also called an electro-mechanical lock or electro-mechanical brake) on each thrust reverser in accordance with the Accomplishment Instructions of Lockheed Martin Service Bulletin 78-1020, Revision 2, dated March 20, 1997, or Middle River Aircraft Systems Service Bulletin 78-1020, Revision 3, dated March 16, 1998.

(2) Prior to or concurrent with the accomplishment of the requirements of paragraph (f)(1)(ii) of this AD, perform the thrust reverser wiring modifications of the wings, strut, and fuselage, in accordance with the Accomplishment Instructions of Boeing Service Bulletin 747-78-2144, Revision 1, dated April 11, 1996.

##### Repetitive Tests

(g) Within 1,000 hours time-in-service after accomplishment of paragraph (f) of this AD, or within 1,000 hours time-in-service after the effective date of this AD, whichever occurs later: Perform a functional test to detect discrepancies of the CDU cone brake and actuation system lock on each thrust

reverser, in accordance with Appendix 1 of this AD. Prior to further flight, correct any discrepancy detected and repeat the functional test of that repair, in accordance with the procedures described in the Boeing 747 Maintenance Manual. Repeat the functional tests thereafter at intervals not to exceed 1,000 hours time-in-service.

#### Alternative Methods of Compliance

(h)(1) An alternative method of compliance or adjustment of the compliance time that provides an acceptable level of safety may be used if approved by the Manager, Seattle Aircraft Certification Office (ACO), FAA, Transport Airplane Directorate. Operators shall submit their requests through an appropriate FAA Principal Maintenance Inspector, who may add comments and then send it to the Manager, Seattle ACO.

(2) Alternative methods of compliance, approved previously in accordance with AD 99-15-08, amendment 39-11227, are approved as alternative methods of compliance with the corresponding requirements specified in this AD.

**Note 2:** Information concerning the existence of approved alternative methods of compliance with this AD, if any, may be obtained from the Seattle ACO.

#### Special Flight Permits

(i) Special flight permits may be issued in accordance with sections 21.197 and 21.199 of the Federal Aviation Regulations (14 CFR 21.197 and 21.199) to operate the airplane to a location where the requirements of this AD can be accomplished.

#### Incorporation by Reference

(j) Except as provided by paragraphs (c)(2), (e)(2), and (g) of this AD, the actions shall be done in accordance with Boeing Alert Service Bulletin 747-78A2130, dated May 26, 1994; Boeing Service Bulletin 747-78A2166, Revision 1, dated October 9, 1997; Lockheed Martin Service Bulletin 78-1007, Revision 1, dated March 18, 1997; Middle River Aircraft Systems Service Bulletin 78-1007, Revision 2, dated March 10, 1998; Lockheed Martin Service Bulletin 78-1020, Revision 2, dated March 20, 1997; Middle River Aircraft Systems Service Bulletin 78-1020, Revision 3, dated March 16, 1998; or Boeing Service Bulletin 747-78-2144, Revision 1, dated April 11, 1996; as applicable.

(1) The incorporation by reference of Lockheed Martin Service Bulletin 78-1007, Revision 1, dated March 18, 1997; Middle River Aircraft Systems Service Bulletin 78-1007, Revision 2, dated March 10, 1998; Lockheed Martin Service Bulletin 78-1020, Revision 2, dated March 20, 1997; Middle River Aircraft Systems Service Bulletin 78-1020, Revision 3, dated March 16, 1998; and Boeing Service Bulletin 747-78-2144, Revision 1, dated April 11, 1996; is approved by the Director of the Federal Register in accordance with 5 U.S.C. 552(a) and 1 CFR part 51. Lockheed Martin Service Bulletin 78-1007, Revision 1, dated March 18, 1997, contains the following list of effective pages:

Page No.	Revision level shown on page	Date shown on page
1, 3, 4, 22-28 .....	1	March 18, 1997.
2, 5-21 .....	Original	August 30, 1997.

Lockheed Martin Service Bulletin 78-1020, Revision 2, dated March 20, 1997, contains the following list of effective pages:

Page No.	Revision level shown on page	Date shown on page
1-5, 8, 12, 13, 15, 19-21, 23-36 .....	2	March 20, 1997.
6, 7, 9-11, 14, 16-18, 22, 37 .....	1	January 17, 1996.

(2) The incorporation by reference of Boeing Service Bulletin 747-78A2166, Revision 1, dated October 9, 1997, was approved previously by the Director of the Federal Register as of August 25, 1999 (64 FR 39003, July 21, 1999).

(3) The incorporation by reference of Boeing Alert Service Bulletin 747-78A2130, dated May 26, 1994, was approved previously by the Director of the Federal Register as of April 13, 1995 (60 FR 13623, March 14, 1995).

(4) Copies may be obtained from Boeing Commercial Airplane Group, P.O. Box 3707, Seattle, Washington 98124-2207. Copies may be inspected at the FAA, Transport Airplane Directorate, 1601 Lind Avenue, SW., Renton, Washington; or at the Office of the Federal Register, 800 North Capitol Street, NW., suite 700, Washington, DC.

**Effective Date**

(k) This amendment becomes effective on September 6, 2000.

**Appendix 1—Thrust Reverser Electro-Mechanical Brake and CDU Cone Brake Test**

1. General

A. This procedure contains steps to do two checks:

- (1) A check of the holding torque of the electro-mechanical brake.
- (2) A check of the holding torque of the CDU cone brake.

2. Electro-Mechanical Brake and CDU Cone Brake Torque Check

A. Prepare to do the checks:

- (1) Open the fan cowl panels.

B. Do a check of the torque of the electro-mechanical brake:

- (1) Do a check of the electro-mechanical brake holding torque:
  - (a) Make sure the thrust reverser translating cowl is extended at least one inch.
  - (b) Make sure the CDU lock handle is released.
  - (c) Pull down on the manual release handle on the electro-mechanical brake until the handle fully engages the retaining clip.

**Note:** This will lock the electro-mechanical brake.

- (d) With the manual drive lockout cover removed from the CDU, install a 1/4-inch extension tool and dial-type torque wrench into the drive pad.

**Note:** You will need a 24-inch extension to provide adequate clearance for the torque wrench.

- (e) Apply 90 pound-inches of torque to the system.
- (i) The electro-mechanical brake system is working correctly if the torque is reached before you turn the wrench 450 degrees (1 1/4 turns).
- (ii) If the flexshaft turns more than 450 degrees before you reach the specified torque, you must replace the long flexshaft between the CDU and the upper angle gearbox.
- (iii) If you do not get 90 pound-inches of torque, you must replace the electro-mechanical brake.
- (f) Release the torque by turning the wrench in the opposite direction until you read zero pound-inches.

- (i) If the wrench does not return to within 30 degrees of initial starting point, you must replace the long flexshaft between the CDU and upper angle gearbox.

- (2) Fully retract the thrust reverser.

C. Do a check of the torque of the CDU cone brake:

- (1) Pull up on the manual release handle to unlock the electro-mechanical brake.
- (2) Pull the manual brake release lever on the CDU to release the cone brake.

**Note:** This will release the pre-load tension that may occur during a stow cycle.

- (3) Return the manual brake release lever to the locked position to engage the cone brake.
- (4) Remove the two bolts that hold the lockout plate to the CDU and remove the lockout plate.
- (5) Install a 1/4-inch drive and a dial type torque wrench into the CDU drive pad.

**Caution:** Do not use more than 100 pound-inches of torque when you do this check. Excessive torque will damage the CDU.

- (6) Turn the torque wrench to try to manually extend the translating cowl until you get at least 15-pound inches.

**Note:** The cone brake prevents movement in the extend direction only. If you try to measure the holding torque in the retract direction, you will get a false reading.

- (a) If the torque is less than 15-pound-inches, you must replace the CDU.

D. Return the airplane to its usual condition:

- (1) Re-install the lockout plate.
- (2) Fully retract the thrust reverser (unless already accomplished).
- (3) Pull down on the manual release handle on the electro-mechanical brake until the handle fully engages the retaining clip (unless already accomplished).

**Note:** This will lock the electro-mechanical brake.

- (4) Close the fan cowl panels.

Issued in Renton, Washington, on July 18, 2000.

**Donald L. Riggan,**

*Acting Manager, Transport Airplane Directorate, Aircraft Certification Service.*

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**DEPARTMENT OF TRANSPORTATION**

**Federal Aviation Administration**

**14 CFR Part 39**

[Docket No. 98-NM-285-AD; Amendment 39-11840; AD 2000-15-08]

**RIN 2120-AA64**

**Airworthiness Directives; Boeing Model 747 Series Airplanes**

**AGENCY:** Federal Aviation Administration, DOT.

**ACTION:** Final rule.

**SUMMARY:** This amendment supersedes an existing airworthiness directive (AD), applicable to certain Boeing Model 747 series airplanes, that currently requires repetitive inspections for damage or cracking of the aft pressure bulkhead, and cracking of the bulkhead web-to-Y-ring lap joint area and the upper segment of the bulkhead web. That AD also requires certain follow-on actions, if necessary. This amendment requires that a currently required one-time