EMERGENCY AIRWORTHINESS DIRECTIVE

Aircraft Certification Service
Washington, DC

U.S. Department
of Transportation
**Federal Aviation
Administration**

www.faa.gov/aircraft/safety/alerts/

ISSUE DATE: September 30, 2006
AD 2006-20-51; Directorate Identifier 2006-NM-222-AD

Emergency airworthiness directive (AD) 2006-20-51 is sent to all owners and operators of Boeing Model 777-200LR series airplanes powered by General Electric (GE) Model GE90-110B engines, and Model 777-300ER series airplanes powered by GE Model GE90-115B engines.

Background

We have received a report of two occurrences of engine thrust rollback (reduction) during takeoff on Boeing Model 777-300ER series airplanes powered by GE Model GE90-115B engines. In both cases, only one engine was affected. The N1 (fan speed - the normal thrust setting parameter for this engine type) thrust level on the affected engine progressively dropped resulting in a thrust loss of 65 to 77 % due to an erroneous N1 command computed by the Full Authority Digital Engine Control (FADEC). In both cases, the engine recovered to the proper N1 thrust level as the airplane climbed beyond 400 feet above ground level. In one case, the operator elected to return to the departure airport after reaching cruise. In the other case, the operator continued to its destination. There were no further anomalies reported during the remainder of the flights. No flight deck messages or maintenance indications occurred as a result of the event.

Investigation indicates that these events are the results of a software algorithm in the FADEC that was introduced in software version A.0.4.5 (GE90-100 Service Bulletin 73-0021). Investigation also indicates that a dual-engine thrust rollback could occur just after V1 (takeoff decision speed after which takeoff is to proceed even after an engine failure), which would result in the airplane not having adequate thrust to safely complete the take off. A de-rated or a reduced thrust takeoff, in combination with specific ambient conditions, can result in the FADEC commanding a progressive reduction in the engine thrust. Airplane takeoffs are often performed with engine thrust levels at less than the maximum engine thrust approved for the airplane. This is done to reduce wear on the engines, increase fuel efficiency, and maximize passenger comfort. Operators are permitted to calculate airplane takeoff performance and required engine thrust using two different methods referred to as "derated takeoff thrust" (also known as fixed de-rate) and "reduced takeoff thrust" (also known as the assumed temperature method). Full-rated thrust takeoffs with the thrust levers at the full forward position are not exposed to the potential thrust rollback caused by the software anomaly described above.

A dual-engine thrust rollback, if not corrected, could result in the airplane failing to lift off before reaching the end of the runway or failing to clear obstacles below the takeoff flight path**.**

The FADEC software, version A.0.4.5, on certain Model 777-200LR powered by GE Model 90-110B engines is identical to that on the affected Model 777-300ER series airplanes powered by GE Model GE90-115B engines. Therefore, both of these airplane models may be subject to the same unsafe condition.

Although the software anomaly was introduced by this version of software, the affected operators have a mixed fleet of airplanes with and without the affected software version. To avoid reliance on flight crews determining which software version is installed as they operate different airplanes, we have determined that this AD should apply to all airplanes equipped with the affected engines. If operators develop an acceptable method to ensure flight crews will consistently perform the correct procedure on affected airplanes, they may request approval for an alternative method of compliance in accordance with paragraph (h) of this AD.

FAA's Determination and Requirements of this AD

We have evaluated all pertinent information and identified an unsafe condition that is likely to exist or develop on other Boeing Model 777-200LR series airplanes powered by GE Model GE90-110B engines, and Model 777-300ER series airplanes powered by GE Model GE90-115B engines of this same type design. Therefore, we are issuing this AD to prevent dual-engine thrust rollback, which could result in the airplane failing to lift off before reaching the end of the runway or failing to clear obstacles below the takeoff flight path. This AD requires revising the Airplane Flight Manual (AFM) to prohibit takeoffs at less than full-rated thrust.

Interim Action

This is considered to be interim action. The engine manufacturer has advised that it currently is developing a modification that will eliminate the unsafe condition addressed by this AD. Once this modification is developed, approved, and available, we may consider additional rulemaking.

Examining the Docket

You may examine the contents of this AD docket on the Internet at http://dms.dot.gov (on the next business day after we have issued the AD), or in person at the Docket Management Facility, U.S. Department of Transportation, 400 Seventh Street SW., Room PL-401, on the plaza level of the Nassif Building, Washington, DC. The directorate identifier for this docket is 2006-NM-222-AD.

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.

Determination of Rule's Effective Date

This emergency AD is issued under 49 U.S.C. Section 44701 according to the authority delegated to me by the Administrator, and is effective immediately upon receipt.

2006-20-51 BOEING: Directorate Identifier 2006-NM-222-AD.

Effective Date

(a) Emergency airworthiness directive (AD) 2006-20-51, issued on September 30, 2006, is effective immediately upon receipt.

Affected ADs

(b) None.

Applicability

(c) This AD applies to airplanes in Table 1 of this AD certificated in any category.

Table 1 – Applicability

Boeing Model	Powered By General Electric (GE) Model
(1) 777-200LR series airplanes	GE90-110B engines
(2) 777-300ER series airplanes	GE90-115B engines

Unsafe Condition

(d) This AD results from a report of two occurrences of engine thrust rollback during takeoff. The Federal Aviation Administration is issuing this AD to prevent dual-engine thrust rollback, which could result in the airplane failing to lift off before reaching the end of the runway or failing to clear obstacles below the takeoff flight path.

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.

Revision of the Airplane Flight Manual (AFM)

(f) Within 24 hours after receipt of this AD, revise the Certificate Limitations Section of the AFM to include the following statement. This may be done be inserting a copy of this AD into the AFM.

> "Use of reduced thrust takeoff ratings determined by either the assumed temperature method or the fixed de-rate method or a combination of both, is prohibited. Full-rated thrust must be used for takeoff."

Note 1: When a statement identical to that in paragraph (f) of this AD has been included in the general revisions of the AFM, the general revisions may be inserted into the AFM, and the copy of this AD may be removed from the AFM.

Special Flight Permit

(g) Special flight permits, as described in Section 21.197 and Section 21.199 of the Federal Aviation Regulations (14 CFR 21.197 and 21.199), are not allowed.

Alternative Methods of Compliance (AMOCs)

(h)(1) The Manager, Seattle Aircraft Certification Office (ACO), FAA, has the authority to approve AMOCs for this AD, if requested in accordance with the procedures found in 14 CFR 39.19.

(2) Before using any AMOC approved in accordance with § 39.19 on any airplane to which the AMOC applies, notify the appropriate principal inspector in the FAA Flight Standards Certificate Holding District Office.

Contact Information

(i) For technical information about this AD, contact: Margaret Langsted, Aerospace Engineer, Propulsion Branch, ANM-140S, FAA, Seattle Aircraft Certification Office, 1601 Lind Avenue, SW., Renton, Washington 98057-3356; telephone (425) 917-6500; fax (425) 917-6590.

Issued in Renton, Washington, on September 30, 2006.

Original signed by:

Kalene C. Yanamura,
Acting Manager,
Transport Airplane Directorate,
Aircraft Certification Service.