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NOTICE

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

N 8300.117

Date: 12/20/04

Cancellation
Date: 12/20/05

SUBJ: UNCOMMANDED HIGH THRUST

1. PURPOSE. This notice supports the overall Thrust Control Malfunction Airworthiness Program being implemented as a result of the safety recommendation issued by the National Transportation Safety Board (NTSB). This notice also requests certain aviation safety inspectors (ASI) to obtain information from their assigned certificate holders.

2. DISTRIBUTION. This notice is distributed to the division level in the Flight Standards Service in Washington headquarters; to the branch level in the regional Flight Standards divisions; to the Flight Standards District Offices; and to the Regulatory Standards Division at the Mike Monroney Aeronautical Center. This notice is also distributed electronically to the division level in the Flight Standards Service in Washington headquarters and to all regional Flight Standards divisions and district offices. This information is also available on the Federal Aviation Administration (FAA) Web site at: http://www.faa.gov/avr/afs/notices/N8300-117.doc.

3. BACKGROUND.

a. As a result of the September 6, 1997, Saudi Arabian Airlines Boeing 737-200 accident and associated NTSB recommendation A98-70, a joint Aerospace Industries Association (AIA)/European Association of Aerospace Industries (AECMA) committee, with support from U.S., European, and Canadian airworthiness authorities, studied the risks associated with uncommanded high thrust failure conditions on turbofan-powered transport category airplanes. The results of this AIA/AECMA study were published by AIA on September 10, 2002.

b. These uncommanded high thrust failure conditions result in the flightcrew being unable to reduce excess engine thrust/power through normal means (e.g., throttle lever stuck or disconnected, fuel metering valve malfunctioning, engine control in “failed fixed” mode, etc.,). Compliance with applicable airworthiness regulations has traditionally been based in part on accepting an assertion that the flightcrew can recognize and safely accommodate uncommanded high thrust conditions, including shutting down the affected engine via an independent fuel shutoff as required. In fact, the “fail-safe” states for engine controls have traditionally been chosen to protect high thrust/power capability and allow the flightcrew to decide when an engine shutdown is appropriate. Service experience and engineering/simulator study findings have shown that flightcrews cannot always safely mitigate the effects of these failures.

c. Most traditional transport category turbine-powered airplane type designs, especially those with wing-mounted engines, have some anticipated uncommanded high thrust failure conditions

where the available failure recognition and accommodation time is so short and/or the required corrective actions sufficiently unnatural, that the flightcrew cannot be relied upon to perform those actions before the safe operation of the airplane is jeopardized. Some trends, both in design and operation, are tending to increase the risks associated with uncontrollable high thrust failures.

d. On the airplanes studied to date, potentially catastrophic single failures have been identified where an uncommanded high thrust failure occured:

(1) During takeoff, ground roll below takeoff decision speed (V_1) triggers an abort and then causes runway (or stopway) lateral departure and/or overrun during the abort;

(2) During landing ground roll, cause runway (or stopway) lateral departure and/or overrun; and

(3) On final approach (below 400 feet above ground level (AGL)), cause either loss of airplane control or off runway landing.

e. While only a sampling of turbofan-powered airplanes have been studied, we expect transport airplanes to have some “on or near ground” exposure to hazardous and/or catastrophic single component failures. Some airplanes not yet completely studied (e.g., turboprops) may have additional in-flight exposures and hence greater overall risk.

f. The introduction of the family airplane/engine concept, in which an engine “type” can be operated at several thrust levels with a common control system on a family of airplanes (e.g., Boeing models 737-600, -700, -800, or Airbus models A319, A320, A321), allows uncontrollable high thrust failure conditions to result in exceptionally large thrust increases and associated thrust asymmetries. This is especially true when the airplane family member that utilizes the lowest thrust rating has one engine operating at maximum fuel flow. Also, the dramatic increases in the thrust ratings of the largest engines, the advent of Automatic Power Reserve (APR), and the proliferation of derated operation, all serve to increase the risks associated with uncontrollable high thrust failure conditions.

g. Transport Category Airplanes.

(1) For transport category airplanes, the flightcrew normally controls engine thrust/power either directly by means of a thrust/power/throttle lever through direct connection to the fuel control unit (FCU), or by a “fly-by-wire” Full Authority Digital Engine Control (FADEC) system, or indirectly by means of an auto-throttle. Within traditional engine control systems, there are numerous single and anticipated combinations of failures such as cable breakage, disconnection of the FCU from actuation hardware, failure of FADEC channels or interfaces that will result in losing these normal means of control. An example of particular concern is when the means of metering fuel to an engine gets stuck at a relatively high flow position. A subset of the resulting failure conditions may include actual thrust/power either increasing to significantly higher than commanded and/or remaining high when a lower thrust/power is commanded. An

uncommanded high thrust failure condition exists if the flightcrew is unable to reduce excessive engine thrust/power through normal means.

(2) The failures that cause uncommanded high thrust, and the hazards they pose, have long been inherent in transport airplane designs. Compliance with the relevant airworthiness regulations within Title 14 of the Code of Federal Regulations (14 CFR) parts 21, 25, and 33 have traditionally been based in part on accepting an assertion that the flightcrew can recognize and safely accommodate these uncommanded high thrust conditions, including shutting down the affected engine via an independent fuel shutoff as required, before such a failure can pose an unacceptable hazard to the airplane.

h. Increased Risks.

(1) In recent years, several factors have raised both the risks and concerns associated with these types of failure conditions. Service experience and engineering/simulator study findings show that flightcrews cannot always safely mitigate the effects of these failures.

(2) Increased traffic and congestion, as well as the increased use of parallel taxiways and runways have increased the potential for an airplane experiencing uncontrollable thrust asymmetry to impact another airplane, ground support equipment, or a terminal. The FAA is concerned that such a failure on one airplane could potentially impact the occupants of multiple airplanes, terminal spaces, and/or ground support personnel. The FAA Transport Standards Staff is in the process of publishing an "FAA Policy Statement on the Thrust Control Malfunction Airworthiness Program (Uncontrollable High Engine Thrust/Power Failures)."

i. Partial grants of exemption to section 25.901(c) have been issued to various airplanes subject to uncommanded high thrust. These grants include a requirement to develop an "Airworthiness Assessment and Risk Management Plan" concerning uncommanded high thrust. Within this document is a list of failures that may cause uncommanded high thrust. This document is required by the exemptions to be included in the Instructions for Continued Airworthiness for the applicable airplane and must be provided by the type certificate holder to operators of airplanes that have this exemption.

4. APPLICABILITY. This notice applies to certain ASIs, maintenance.

5. ACTION. All principal maintenance inspectors (PMI) associated with air carriers operating under 14 CFR part 121, with aircraft certificated under part 25, and PMIs with responsibility for repair stations under 14 CFR part 145 that repair or overhaul FCUs will:

a. Review this notice and applicable guidance; Formatted: Bullets and Numbering

b. Share the information contained in this notice with principal operations inspectors (POI); Formatted: Bullets and Numbering

c. Within 30 days, provide the information in this notice to their respective operators and repair stations, as applicable; Formatted: Bullets and Numbering

d. Within 90 days, air carrier PMIs should review operator records for any airplane discrepancies associated with uncommanded high thrust and review FCU teardown reports for uncommanded high thrust failure mode conditions. For operators that repair or overhaul FCUs in-house, review repair records for failure modes that would contribute to uncommanded high thrust;

e. Within 90 days, repair station PMIs should review records associated with repair or overhaul of FCUs, line replacement units (LRU) such as electronic engine controls (EEC), and throttle quadrant assemblies, etc., to determine if any failure modes associated with uncommanded high thrust have been identified and the repair action taken; and

f. Encourage operators to report instances of uncommanded high thrust in accordance with sections 121.703(c), 125.409(c), 135.415(c), and 145.221.

g. In addition, the following information must be reported through the Program Tracking and Reporting Subsystem (PTRS), as detailed in the reporting paragraph of this notice:

(1) Information concerning the airplane failure modes identified that could lead to uncommanded high thrust;

(2) If reporting information on FCUs or FADEC components:

i. Part number of the component,

ii. Internal part identified as having failed,

iii. Original discrepancy that lead to repair,

iv. Final corrective action,

v. Total time and cycle of the component, if known,

vi. Time since last shop visit, and

vii. Summary teardown report of last shop visit if available.

6. REPORTING.

a. PMIs should document that they have read and conveyed this notice to the appropriate operator and/or repair station representative.

(1) Use PTRS activity code “3045” (without quotes)(special projects).

(2) Enter “8300UHT” (without quotes) into the “National Use” field.

b. Failure modes and information needed to identify uncommanded high thrust will be reported.

(1) Use PTRS activity code “3460” (without quotes) (aircraft/equipment certification support).

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(2) Enter “8300UHT” (without quotes) into the “National Use” field.

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(3) Reported information will be provided to the Aircraft Certification Service for disposition.

7. DISPOSITION. This notice will be incorporated into Order 8300.10, Airworthiness Inspector’s Handbook. Questions concerning uncommanded high thrust should be directed to the Aircraft Maintenance Division, AFS-300, attention Bill Scott, at (502) 753-4245.

/s/ James J. Ballough
Director, Flight Standards Service