

DCA24LA330

OPERATIONAL FACTORS

Attachment 9

Boeing Postincident Guidance

April 24, 2025



Flight Crew Operations Manual Bulletin for The Boeing Company

The Boeing Company
Seattle, Washington 98124-2207



Number: TBC-37

IssueDate: February 9, 2024

Airplane Effectivity: B737-7/-8/-8200/-9/-10

Subject: Severe Engine Damage

Reason: To inform flight crews of potential flight deck and cabin effects associated with engine severe damage.

Information in this bulletin is recommended by The Boeing Company, but may not be FAA approved at the time of writing. In the event of conflict with the FAA approved Airplane Flight Manual (AFM), the AFM shall supersede. The Boeing Company regards the information or procedures described herein as having a direct or indirect bearing on the safe operation of this model airplane.

THE FOLLOWING PROCEDURE AND/OR INFORMATION IS EFFECTIVE UPON RECEIPT

Background Information

Boeing has received two reports of CFM LEAP-1B engine failures following large bird strikes on takeoff and initial climb. These engine failures occurring during a critical phase of flight were compounded by the immediate presence of smoke and fumes, requiring use of the ENGINE FIRE or Engine Severe Damage or Separation Non-Normal Checklist (NNC) as well as the Smoke, Fire or Fumes NNC. One incident resulted in heavy smoke entering the flight deck following a large bird strike on engine #1, and in the second incident, heavy smoke entered the cabin with failure of engine #2.

Similar to other contemporary engine architectures, the CFM LEAP-1B engine incorporates a Load Reduction Device (LRD) which is designed to reduce unbalanced dynamic loads transmitted to engine structures and pylon in case of a Fan Blade Out or partial Fan Blade Out. The LRD allows the fan rotor to orbit freely reducing the transmission of unbalanced dynamic loads. In these two incidents the LRD was activated as a result of damage to the engine fan blades and was followed by an inflight engine shutdown. Additionally, there was damage to the engine oil sump allowing oil to enter the core compressor upstream of the pneumatic bleed ports which supply bleed air to the pneumatic system. Oil ingested into the engine core compressor sections is exposed to temperatures that may result in smoke and fumes in the flight deck or cabin. The left pack primarily supplies air to the flight deck while the right pack supplies air to the forward and aft cabin.

Operating Instructions

The presence of smoke in the flight deck or cabin associated with an engine failure should be considered engine severe damage. Selecting the engine start lever to cutoff and pulling the engine fire switch, in accordance with the ENGINE FIRE or Engine Severe Damage or Separation NNC, closes the engine bleed air valve and eliminates the source of smoke to the flight deck or cabin.

An engine failure on takeoff followed by the presence of smoke or fumes must be dealt with promptly, but in a methodical manner. Maintaining aircraft control while donning oxygen masks and goggles is essential while executing the ENGINE FIRE or Engine Severe Damage or Separation NNC. Effective crew coordination as described in the FCTM (Recommended Technique for an In-Flight Engine Shutdown) will reduce the risk of shutting down the incorrect engine.

Once the ENGINE FIRE or Engine Severe Damage or Separation NNC is complete, the Smoke, Fire or Fumes NNC and the Smoke or Fumes Removal NNC should be completed as required.

Note: Boeing and CFM are reviewing the incident data to determine the root cause of the oil sump damage and update the related NNC procedures as necessary.

Administrative Information

Insert this bulletin behind the Bulletin Record page in Volume 1 of your Flight Crew Operations Manual (FCOM). Amend the FCOM Bulletin Record page to show bulletin TBC-37 "In Effect" (IE).

Please send all correspondence regarding this Flight Crew Operations Manual Bulletin to Flight Operations, through the Boeing Communications System (BCS) on the MyBoeingFleet home page.

If User does not have access to MyBoeingFleet, please consult with the Boeing Field Service Office for assistance.

Intentionally
Blank

ENGINE FIRE
or
Engine Severe Damage or Separation

Condition: One or more of these occur:

- Engine fire warning
- Airframe vibrations with abnormal engine indications
- Engine separation
- Engine failure with smoke or fumes in the flight deck or cabin.

- 1

Autothrottle (if engaged)Disengage
- 2

Thrust lever
(affected engine) Confirm Close
- 3

Engine start lever
(affected engine) Confirm CUTOFF
- 4

Engine fire switch
(affected engine) Confirm Pull

To manually unlock the engine fire switch, press the override and pull.
- 5

If the engine fire switch or ENG OVERHEAT light is illuminated:

Engine fire switch
(affected engine) Rotate to the stop
and hold for 1 second

▼ ENGINE FIRE or Engine Severe Damage or Separation continued ▼

6 Choose one:

◆ On the **ground**:

▶▶ **Go to the Engine Fire on the Ground checklist on page Back Cover.2**



◆ In **flight**:

▶▶ **Go to step 7**

7 **If** after 30 seconds the engine fire switch or ENG OVERHEAT light stays illuminated:

Engine fire switch

(affected engine) Rotate to the
other stop and
hold for 1 second

▼ Continued on next page ▼

▼ENGINE FIRE or Engine Severe Damage or Separation continued ▼

8 Choose one:

◆High airframe vibration **occurs** and **continues** after the engine is shut down:

Without delay, reduce airspeed and descend to a safe altitude which results in an acceptable vibration level.

Note: If high vibration returns and further airspeed reduction and descent are not practical, increasing airspeed may reduce the vibration.

▶▶Go to step 9

◆High airframe vibration does **not** occur or does **not** continue after the engine is shut down:

▶▶Go to step 9

9 ISOLATION VALVE switch. CLOSE

10 PACK switch (affected side) OFF

This step causes the operating pack to regulate to high flow in flight with the flaps up.

11 APU BLEED air switch OFF

▼ Continued on next page ▼

▼ ENGINE FIRE or Engine Severe Damage or Separation continued ▼

12 Choose one:

◆ APU is **available** for start:

APU START

When APU is running:

APU GEN switch
(affected side) ON

▶▶ **Go to step 16**

◆ APU is **not** available:

▶▶ **Go to step 13**

13 Advise the cabin crew that the cabin lighting will be extinguished, but passenger reading lights will continue to work.

14 CAB/UTIL switch OFF

15 IFE/PASS SEAT switch OFF

16 Balance fuel as needed.

17 Transponder mode selector TA

This step prevents climb commands which can exceed single engine performance capability.

18 Transponder mode selector TA ONLY

This step prevents climb commands which can exceed single engine performance capability.

▼ Continued on next page ▼

▼ ENGINE FIRE or Engine Severe Damage or Separation continued ▼

19 ISOLATION VALVE switch
(after the fire has been extinguished) AUTO

This step ensures bleed air is available to both wings if wing anti-ice is needed.

Note: If wing anti-ice is needed above FL220, maintain a minimum of 50% N1.

20 Plan to land at the nearest suitable airport.

Note: Do not use FMC performance predictions.

[Fail Passive]

►► **Go to the One Engine Inoperative
Landing checklist on page 7.38**



[Fail Operational]

►► **Go to the One Engine Inoperative
Landing checklist on page 7.42**



Smoke, Fire or Fumes

[Without Aux Fuel Tanks.]

Condition: Smoke, fire or fumes occur.

- 1 Diversion may be needed.
- 2 Don oxygen masks and set regulators to 100%, as needed.
- 3 Don smoke goggles, as needed.
- 4 Establish crew and cabin communications.
- 5 Choose one:

◆ **Engine failure or airframe vibrations with abnormal engine indications** exist:

▶▶ **Go to the ENGINE FIRE or Engine Severe Damage or Separation checklist on page 8.2**



◆ Engine has **not** failed **and** airframe vibrations with abnormal engine indications do **not** exist:

▶▶ **Go to step 6**

- 6 BUS TRANSFER switch OFF
- 7 Advise the cabin crew that the cabin lighting will be extinguished, but passenger reading lights will continue to work.
- 8 CAB/UTIL switch. OFF
- 9 IFE/PASS SEAT switch. OFF
- 10 RECIRC FAN switches (both) OFF

▼ Continued on next page ▼

▼ Smoke, Fire or Fumes continued ▼

11 APU BLEED air switch OFF

12 **Anytime** the smoke or fumes become the greatest threat:

▶▶ **Go to the Smoke or Fumes Removal checklist on page 8.42**

13 Choose one:

◆ Source of the smoke, fire or fumes is **obvious and** can be **extinguished quickly**:

Isolate and extinguish the source.

If possible, remove power from the affected equipment by switch or circuit breaker in the flight deck or cabin.

▶▶ **Go to step 14**

◆ Source of the smoke, fire or fumes is **not obvious or cannot** be extinguished quickly:

▶▶ **Go to step 15**

▼ Continued on next page ▼

▼ Smoke, Fire or Fumes continued ▼

14 Choose one:

◆ Source is **visually confirmed** to be extinguished **and** the smoke or fumes are **decreasing**:

Continue the flight at the captain's discretion.

Restore unpowered items at the captain's discretion.

▶▶ **Go to the Smoke or Fumes Removal checklist on page 8.42, if needed**



◆ Source is **not** visually confirmed to be extinguished **or** smoke or fumes are **not** decreasing:

▶▶ **Go to step 15**

15 EQUIP COOLING SUPPLY

and EXHAUST switches (both) ALTN

16 Instruct the cabin crew to:

Turn on cabin reading lights.

Turn on galley attendants work lights.

17 Divert to the nearest suitable airport while continuing the checklist.

18 Consider an immediate landing if the smoke, fire or fumes situation becomes uncontrollable.

19 Do **not** delay landing in an attempt to complete all of the following steps.

▼ Continued on next page ▼

▼ Smoke, Fire or Fumes continued ▼

20 ISOLATION VALVE switch CLOSE

21 R PACK switch OFF

22 **Wait** 2 minutes unless the smoke or fumes are increasing. This allows time for the smoke or fumes to clear.

23 Choose one:

◆ Smoke or fumes are **decreasing**:

▶▶ **Go to the Smoke or Fumes Removal checklist on page 8.42, if needed**



◆ Smoke or fumes **continue or are increasing**:

R PACK switch AUTO

L PACK switch OFF

▶▶ **Go to step 24**

24 **Wait** 2 minutes unless the smoke or fumes are increasing. This allows time for the smoke or fumes to clear.

▼ Continued on next page ▼

▼ Smoke, Fire or Fumes continued ▼

25 Choose one:

◆ Smoke or fumes are **decreasing**:▶▶ **Go to the Smoke or Fumes Removal
checklist on page 8.42, if needed**◆ Smoke or fumes **continue or are increasing**:

L PACK switch AUTO

Consider an immediate landing.

▶▶ **Go to the Smoke or Fumes Removal
checklist on page 8.42, if needed**