Federal Airways & Airspace®

1423 South Patrick Drive
Satellite Beach, FL 32937
(321) 777-1266 Fax: (321) 777-8595
http://www.AirspaceUSA.com

One Engine Inoperative (OEI)

July 23, 2026

Aircraft Operations

A One Engine Inoperative (OEI) condition occurs when a multi-engine aircraft loses the use of one engine due to failure, shutdown, or severe malfunction. Commercial transport aircraft are certified to safely continue flight following the loss of a single engine, provided the aircraft is operated within its certified performance limits and the flight crew follows established procedures.

During an engine failure, the flight crew's first priority is maintaining control of the aircraft. Because thrust is no longer symmetrical, the aircraft tends to yaw toward the failed engine. The pilots counter this using rudder and, as appropriate, bank angle, while maintaining the prescribed OEI airspeeds that provide the best combination of controllability and climb performance.

Once the aircraft is stabilized, the crew performs the manufacturer-approved memory items and checklist procedures to identify, confirm, and secure the failed engine. The aircraft is then operated in accordance with the airline's Standard Operating Procedures (SOPs), aircraft flight manual, and applicable operating checklists.

Standard Use of OEI Procedures

Following an engine failure, pilots continue to operate in accordance with established OEI procedures. These procedures are developed by the aircraft manufacturer and incorporated into each airline's operating manuals and training programs. They specify target airspeeds, aircraft configuration changes, checklist actions, and performance limitations.

If an engine failure occurs during departure, the crew follows the applicable OEI departure profile. This profile is designed to ensure the aircraft remains within its certified performance envelope while maintaining obstacle clearance. Air traffic control instructions are followed whenever they are compatible with safe OEI operation. If a controller issues a clearance that would compromise safety or aircraft performance, the crew may decline the clearance or request an alternative route.

Emergency Declaration

An engine failure during flight, particularly during takeoff, is normally treated as an emergency by commercial airline crews. The pilot-in-command will generally declare an emergency with air traffic

control to obtain priority handling, including unrestricted routing, priority landing, and assistance from emergency services if required.

An emergency declaration does not grant unrestricted access to prohibited or restricted airspace. Instead, it acknowledges the pilot-in-command's legal authority to deviate from normal operating rules, Air Traffic Control (ATC) clearances, or airspace restrictions when such deviations are necessary to ensure the safety of the flight. Any deviation is expected to be limited to what is operationally necessary, with the preservation of aircraft control and occupant safety taking precedence over normal airspace compliance. Specifically, this means a pilot may enter and fly through any otherwise restricted airspace if, in his/her judgment, it is necessary for the safety of the aircraft.

Obstacle Relationship to the OEI Surface

An OEI surface is a protected obstacle-clearance surface used in airport planning and instrument procedure design. It is based on the expected performance of a transport aircraft operating with one engine inoperative. The surface identifies the obstacle environment that must be evaluated to ensure an aircraft experiencing an engine failure can maintain the required obstacle clearance while following the published OEI flight path.

Unlike standard instrument departure procedures, which are designed for aircraft operating normally on all engines, OEI procedures may require different routing to avoid terrain or obstacles that cannot be safely cleared with the reduced climb performance associated with the loss of an engine. Airlines develop airport-specific OEI procedures when obstacle assessments indicate that the standard departure route does not provide adequate protection from obstacles following an engine failure.

Frequency of OEI Events

One-engine-inoperative (OEI) events are rare in commercial aviation, and there is no single public database that reports their annual occurrence. Instead, engine reliability is typically measured using the in-flight shutdown (IFSD) rate, which represents the number of engine shutdowns due to engine mechanical failure per engine flight hour. Modern high-bypass turbofan engines used on commercial transport aircraft typically achieve IFSD rates on the order of one shutdown per 100,000 to 500,000 engine flight hours, with some engine models demonstrating reliability approaching one shutdown per one million engine flight hours.

Although these shutdowns may result from mechanical failures, they also include precautionary shutdowns initiated by the flight crew in response to abnormal engine indications, such as excessive vibration, low oil pressure, high temperatures, or suspected foreign object damage. As a result, an OEI

event does not necessarily imply a catastrophic engine failure. Many events are precautionary actions taken to preserve safety.

Commercial Air Transport Engine Reliability

Modern transport-category turbofan engines exhibit exceptionally high reliability. Published industry data indicate:

- Typical in-service in-flight shutdown (IFSD) rates are:
  - Less than 0.01 IFSD per 1,000 engine flight hours, or
  - Less than one IFSD per 100,000 engine flight hours.
- Many current engine families demonstrate substantially better reliability, with reported IFSD rates ranging from approximately one shutdown per 250,000 to more than one million engine flight hours, depending on the engine model and operator.

An IFSD includes both uncommanded engine failures and precautionary flight crew shutdowns resulting from abnormal engine indications. An IFSD may occur during any phase of flight and does not necessarily represent an engine failure during takeoff.