



Model-specific service letters present root causes and potential solutions for the most common SBO events.

# Reducing Smoke and Burning Odor Events

At the recommendation of operators, Boeing has undertaken studies of smoke and burning odor (SBO) events occurring on airplanes. The studies provide fleetwide information so that operators can take steps to reduce SBO events.

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Although most SBO events in the pressurized area of an airplane are resolved and rarely affect continued safe flight, landing, or egress, they are always significant issues with operational consequences. These consequences can include flight cancellations, flight schedule disruptions, air turnbacks, and airplane diversions. SBO events can also result in declared emergencies, airport emergency equipment responses, airplane evacuations, accommodations for displaced passengers, diminished goodwill, and extensive unscheduled maintenance following non-normal procedures, such as overweight landing inspection, recharging of oxygen, and repacking of escape slides.

In an effort to provide information that can help operators take steps to reduce SBO events, Boeing launched a series of ongoing studies of these events on Next-Generation 737, 747, 757, 767, and 777 airplane models. This article explains the scope of the studies and describes how the analysis is conducted, how the results are communicated, and how the results may be used. It also describes the use of an oil leak detection kit to assist ground crews in isolating the source of odors and provides an overview of appropriate flight crew response to SBO events.

## SBO STUDIES INITIATED IN 2004

Since 2004, Boeing has been examining events in which human senses detect a condition inside the pressurized area of an airplane that may result in a conclusion that there is a potentially dangerous ignition source or atmospheric contamination present that needs immediate corrective action. The studies exclude human visual or aural detection of automated alarms.

**Figure 1: Service letters on SBO events**

MODEL	SERVICE LETTER
737	737-SL-00-023-A
747	747-SL-00-023-A
757	757-SL-00-018-A
767	767-SL-00-019-A
777	777-SL-00-012-A

The SBO studies are ongoing investigations involving the models cited on the previous page, with reports released at least annually through updated model-specific service letters titled “Smoke and Burning Odor (SBO) Event Summary” (Air Transport Association of America [ATA] Chapter 0000-80). The reports address all SBO events reported to Boeing for the period identified in the service letter (see fig. 1).

**ROOT CAUSES OF SBO EVENTS**

SBO events were analyzed to determine the root cause for each event. Root cause was identified (when possible) down to the component level. Available potential corrective or preventive actions were correlated to the root causes and included in the service letters. Only the top root causes that account for approximately 30 percent of all the reported SBO events are correlated to corrective or preventive action.

The results of the studies were provided to operators in service letters that graphically show the predominant root causes (identified by root cause code [RCC] and description), as well as the occurrence count of the SBO event (see fig. 2).

Because not all SBO events are reported to Boeing, the number of occurrences in figure 2 should be treated on a relative basis. Each root cause is further broken down by an operational impact category, such as delay, diversion, or airplane on ground. Only the predominant root causes are shown in the chart. As a result, not all operational impact categories appear in figure 2. Also, events of undetermined root causes are excluded.

**SUGGESTED OPERATOR ACTION**

Operators can use the data provided in the associated service letters to initiate action at their discretion to reduce the occurrences of SBO events.

The information provided in the service letters is intended for maintenance operations. Flight crew response to in-flight smoke, fire, and fumes is addressed separately in the accompanying article “Flight Crew Response to In-Flight Smoke, Fire, or Fumes” on page 11.

**IDENTIFICATION OF ODOR SOURCE**

Most operators would like to locate and stop the cause of the odor, which is often reported as an oil smell or aerosol odor. It can be difficult to identify the odor source, and troubleshooting can result in long

Service letters addressing the issue of SBO events can be accessed through the Web portal [MyBoeingFleet.com](http://MyBoeingFleet.com). Note: McDonnell-Douglas models are not included in the SBO study; however, similar service letters have been published for these models and are referred to as “smoke in the cabin.”


airplane downtime and unnecessary engine or auxiliary power unit (APU) changes.

In response, Boeing has developed an oil detection kit that can be used to quickly identify the source of oil leaks or aerosol odors. The kit includes a bleed air sampler and portable infrared spectrometer. Ground crews connect the air sampler to the 3-inch pneumatic ground cart connector and run engine or APU bleed air through the sampler for 10 minutes. The spectrometer and a laptop computer are used to analyze the sample. The kit’s software alerts the user when the sample matches a known contaminant, such as oil or hydraulic fluid.

The oil detection kit works for all Boeing models except the 787 and on all McDonnell-Douglas airplanes. The kit may be ordered online at the Web portal [MyBoeingFleet.com](http://MyBoeingFleet.com) by requesting part number J21009.

**SUMMARY**

SBO events can result in expensive operational interruptions. Boeing publishes the most significant root causes for SBO events and correlates these to potential corrective or preventive action in model-specific service letters.

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**Figure 2: Study results for a given airplane model**

Root cause codes (RCCs) and operational impacts of SBO events reported for the 757, July 2004 – August 2008.

- Undetermined
- Minimal Interruption
- Delay
- Cancellation/Out of Service
- Air Turnback
- Diversion
- Airplane on Ground

