

# NATIONAL TRANSPORTATION SAFETY BOARD

Office of Aviation Safety

Washington, DC 20594



DCA24LA330

## **OPERATIONAL FACTORS**

Operational Factors Group Factual Report

April 12, 2025

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## **A. INCIDENT**

Location: Kenner, Louisiana  
Date: December 20, 2023  
Time: 1414 central standard time (CST)<sup>1</sup>  
2014 universal time coordinate (UTC)  
Airplane: N8830Q; Boeing 737-8; Southwest flight 554 (SWA554)

## **B. OPERATIONAL FACTORS GROUP**

|              |                                                                                    |
|--------------|------------------------------------------------------------------------------------|
| Group Chair  | Shawn Etcher<br>National Transportation Safety Board<br>Washington, D.C.           |
| Group Member | David Gerlach<br>Federal Aviation Administration (FAA) AVP-100<br>Washington, D.C. |
| Group Member | John Rummel<br>Southwest Airlines (SWA)<br>Dallas, TX                              |
| Group Member | Christopher Shaver<br>Southwest Pilots Association (SWAPA)<br>Dallas, TX           |
| Group Member | John Steinnes<br>The Boeing Company<br>Seattle, WA                                 |

## **C. SUMMARY**

On December 20, 2023, about 1414 CST, Southwest Airlines flight 554, a Boeing 737-8, N8830Q, ingested a bird into the no. 1 engine on initial climbout from runway 11 at Louis Armstrong International Airport (MSY), Kenner, Louisiana. The flight returned to MSY and landed on runway 11 about 12 minutes later. There was no damage to the aircraft nor were there any injuries to the crew or passengers. SWA 554 was operating under the provisions of Title 14 *Code of Federal Regulations* Part 121 as a scheduled domestic passenger flight. The flight had an intended destination of Tampa International Airport (TPA), Tampa, Florida.

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<sup>1</sup> All times in this report will be in local (CST) time. At the time of the incident local time was UTC-6 hours.

## **D. DETAILS OF THE INVESTIGATION**

### **1.0 Operational Factors Group Activities**

November 22, 2024 - The operational factors investigator was assigned to the event. The Ops investigator made a request to SWA for pilot statements and information, dispatch release, and applicable manuals. Additionally, SWA requested that a line check airman to become an operational factors group member. Due to the lapse of time, the dispatch release, as part of SWA protocol, was retained for 90 days after the flight and then purged from the SWA system. In addition, SWAPA requested to provide an operational factors group member.

December 10, 2024 - The Boeing Company and FAA assigned a group member to the operational factors group. Additionally, after reviewing the crew statements, it was decided to interview the crew at a time in the near future.

January 15, 2025 - The operational factors group convened at the Southwest Airlines headquarters in Dallas, Texas, and interviewed the event first officer and event captain.

### **2.0 History of Flight**

The following history of flight was based on ADS-B data<sup>2</sup> and crew interviews:

About 1407:10, the event aircraft taxied from the terminal ramp via taxiway G8, crossed runway 11/29, and turned right onto taxiway E about 1408:00. The flight taxied via taxiway E and G1 to runway 11. The crew described the taxi as uneventful.

About 1412:53, the event flight taxied onto runway 11 and subsequently began the takeoff roll.

Approximately 1413:44, the flight became airborne and began the initial climb. The crew reported that after the captain called for flaps to be raised from "flaps 5" to "flaps 1," the captain observed something out of his peripheral vision. Subsequently, the airplane *"immediately started severely vibrating"<sup>3</sup> and "fire bell, illumination of the fire light on the glare shield, and the illumination of the fire T-handle for the number 1 engine..."<sup>4</sup>* The captain reported that it felt like both engines had failed, and he noticed what he thought was a bayou but was a nearby park and began turning towards it to avoid the residential buildings below. Subsequently, he realized

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<sup>2</sup> Source: [ADS-B Exchange - track aircraft live](#)

<sup>3</sup> Source: Operational Factors - Attachment 1 - *"Flight Crew Interview Transcripts,"* pg. 16 lines 5 thru 7.

<sup>4</sup> Operational Factors - Attachment 1 - *"Flight Crew Interview Transcripts,"* pg. 32 line 25 thru pg. 33 line 2.

that only the no. 1 engine was affected. The captain commanded the *"Engine, Severe Damage"*<sup>5</sup> checklist. The first officer declared an emergency with air traffic control.

About 1414:24 and 850 ft msl<sup>6</sup> the airplane began a continuous left turn towards the west. The crew reported that at some point after the airplane began to shake, smoke began to fill the cockpit. The crew described the smoke as acrid and white in color, and the first officer added that it *"smelled like burning oil"*<sup>7</sup>. The first officer then stated that they needed to get their oxygen masks on, which they both did. Both crewmembers described the smoke as very restrictive to visibility.

About 1416:15 and 2,100 ft msl, the airplane began flying an approximate 290° ground track at 220 kts. The first officer continued to perform the *"Engine Fire, Severe Damage Separation"*<sup>8</sup> checklist. The captain maintained the ground track and altitude using the airplane's HUD<sup>9</sup>, as *"my screens were hard to see...I had stopped flying off my displays, and I was flying off the HUD...I didn't really pay attention to them. I was just looking at the HUD"*<sup>10</sup>. Although neither crew could recall their precise location in relation to the airport when the smoke began to dissipate, they both stated it was likely on the downwind leg of the traffic pattern. The captain stated, *"I do recall what caused it to stop...it stopped very quickly was when we pulled the fire handle for the number 1 engine."*<sup>11</sup>

About 1417:43, the event flight obtained the highest altitude of 2,900 ft msl while flying a ground track of about 290°.

About 1419:17, the airplane began a left turn and began to descend.

About 1420:34, the airplane, on a ground track of 206°, flew through the extended centerline for runway 11 while maintaining a left turn back towards the airport. The flight was about 15 nm to the west of the airport. The flight continued the turn to an approximate ground track of 80°, which it maintained until turning to a right ground track of approximately 105°, which correlated to an approximate 5 nm final for runway 11. During the captain's interview, he stated that he wanted to fly through the extended centerline in order to provide the first officer more time to accomplish the required checklists.

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<sup>5</sup> Source: Operational Factors - Attachment 1 - *"Flight Crew Interview Transcripts,"* pg. 16 (current pg. 14) line 23.

<sup>6</sup> Mean sea level.

<sup>7</sup> Source: Operational Factors - Attachment 1 - *"Flight Crew Interview Transcripts,"* pg. 82 line 7.

<sup>8</sup> Operational Factors - Attachment 1 - *"Flight Crew Interview Transcripts,"* pg. 83 lines 6 thru 7.

<sup>9</sup> Head-up-display

<sup>10</sup> Operational Factors - Attachment 1 - *"Flight Crew Interview Transcripts,"* pg. 29 lines 21 thru pg. 30, line 1.

<sup>11</sup> Operational Factors - Attachment 1 - *"Flight Crew Interview Transcripts,"* pg. 34 lines 15 thru 18.

Approximately 1426, the airplane landed on runway 11, where it decelerated, and according to the crew, they stopped on the runway to allow ARFF<sup>12</sup> to verify there was no fire noticeable. The airplane subsequently taxied to the gate, and the last recorded data indicated it was on the terminal ramp about 1433:10.



**Figure 1:** Incident Flight Route of Flight (Source: ADSBExchange.com)

### 3.0 Pilot Information

The flight crew consisted of a captain and first officer. At the time of the incident, the captain was the pilot flying (PF), and the first officer was the pilot monitoring (PM).

#### 3.1 Captain Information

The captain was 62 years old and held an Airline Transport Pilot (ATP) certificate with a rating for multiengine land, and type ratings on the B-737<sup>13</sup> with Commercial Privileges for airplane single-engine land, rotorcraft – helicopter, instrument – helicopter, lighter than air free balloon limited to hot air balloons with airborne heater. Additionally, he was an authorized check airman for SWA. He held a FAA first-class medical certificate, with limitations: *“Must use corrective lenses.”* At the time of the incident, he was based at Orlando International Airport (MCO), Orlando, Florida.

<sup>12</sup> Airport Rescue and Fire Fighting

<sup>13</sup> The Boeing Company, 737-100, 737-200, 737-200C, 737-300, 737-400, 737-500, 737-600, 737-700, 737-700C, 737-800, 737-900, 737-900ER, 737-8, 737-9. Source: FAA Order 8900.1, Figure 5-88, dated March 29, 2024.

### **3.1.1 Captain's Certification Records**

FAA records of the captain indicated the following:

Private Pilot - Airplane Single-Engine Land certificate was issued March 31, 1978.

Commercial Pilot - Rotorcraft - Helicopter, Instrument - Helicopter; Private Pilot Privilege Airplane Single-Engine Land certificate was issued on October 13, 1981.

Commercial Pilot - Rotorcraft - Helicopter, Instrument - Helicopter, Lighter than Air Free Balloon, limited to Hot-Air Balloon with Airborne Heaters; Private Pilot Privilege Airplane Single-Engine Land certificate was issued on August 17, 1983.

Commercial Pilot - Airplane Multiengine Land - Limited to Center Thrust Rotorcraft - Helicopter, Instrument - Airplane and Helicopter, Lighter than Air Free Balloon, limited to Hot-Air Balloon with Airborne Heaters; Private Pilot Privilege Airplane Single-Engine Land certificate was issued on January 30, 1987.

Commercial Pilot - Airplane Single-Engine Land, Airplane Multiengine Land - Limited to Center Thrust Rotorcraft - Helicopter, Instrument - Airplane and Helicopter, Lighter than Air Free Balloon, limited to Hot-Air Balloon with Airborne Heaters; Private Pilot Privilege Airplane Single-Engine Land certificate was issued on August 28, 1987.

Airline Transport Pilot - Airplane Multiengine Land, Commercial Privileges - Airplane Single-Engine Land, Rotorcraft - Helicopter, Instrument - Helicopter, Lighter than Air Free Balloon Limited to Hot Air Balloons with Airborne Heater certificate was issued on January 21, 1992.

Notice of Disapproval - Airline Transport Pilot - Airplane Multiengine Land, Type Rating B-737 was issued on June 21, 1993. Unsatisfactory Items: Complete Check Ride.

Airline Transport Pilot - Airplane Multiengine Land, B-737, Commercial Privileges - Airplane Single-Engine Land, Rotorcraft - Helicopter, Instrument - Helicopter, Lighter than Air Free Balloon Limited to Hot Air Balloons with Airborne Heater certificate was issued on June 28, 1993.

### **3.1.2 Captain's Certificates and Ratings Held at the time of the Incident**

AIRLINE TRANSPORT PILOT (Issued June 28, 1993)

Airplane Multiengine Land  
B-737

Commercial Privileges Airplane Single-Engine Land, Rotorcraft - Helicopter, Instrument - Helicopter, Lighter-Than-Air Free Balloon, limited to hot air balloons with airborne heater.

MEDICAL CERTIFICATE FIRST CLASS (Issued September 21, 2023)

Limitations: Must use corrective lenses.

### 3.1.3 Flight Hours

The following hours for the captain were provided by the captain, Southwest Airlines and are approximate:

|                                       |        |
|---------------------------------------|--------|
| Previous 24 hours                     | 6:00   |
| Previous 30 days                      | 44:00  |
| Previous 90 days                      | 115:00 |
| Total Hours B-737 <sup>14</sup>       | 20,000 |
| Total Hours B-737 PIC <sup>15</sup>   | 17,000 |
| Total Flight Experience <sup>16</sup> | 25,000 |

### 3.1.4 Training

The captain's training records were provided by Southwest Airlines and FAA records. An excerpt of the most recent training events is below:

|                                                    |                   |
|----------------------------------------------------|-------------------|
| Date of Hire with Southwest Airlines <sup>17</sup> | April 14, 1994    |
| Initial Type Rating B-737                          | June 28, 1993     |
| Most recent ground school                          | November 7, 2023  |
| Most recent line-oriented evaluation (simulator)   | November 10, 2023 |
| Most recent maneuvers validation training          | November 9, 2023  |
| Most recent line check                             | December 13, 2023 |
| Initial Check Airman FAA Letter                    | April 15, 2014    |
| Most Recent FAA Observation Check - Check Airman   | December 12, 2023 |

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<sup>14</sup> During the interview, the captain estimated about 24,000 hours. Source: Operational Factors - Attachment 1 - "*Flight Crew Interview Transcripts*," pg. 13 line 16.

<sup>15</sup> During the interview, the captain estimated about 20,000 hours. Source: Operational Factors - Attachment 1 - "*Flight Crew Interview Transcripts*," pg. 13 line 12.

<sup>16</sup> During the interview, the captain estimated about 28,000 hours. Source: Operational Factors - Attachment 1 - "*Flight Crew Interview Transcripts*," pg. 13 line 12.

<sup>17</sup> The captain was initially hired by AirTran Airways. As part of the acquisition of AirTran Airways by Southwest Airlines on May 2, 2011. Source: [AirTran Acquisition - Southwest Airlines \(southwestairlinesinvestorrelations.com\)](https://www.southwestairlinesinvestorrelations.com)

|                                                 |                  |
|-------------------------------------------------|------------------|
| Captain Upgrade Operating Experience (OE)       | October 28, 1999 |
| Most Recent Head-Up Guidance Training - Upgrade | July 9, 2000     |

### 3.2 First Officer Information

The first officer was 58 years old and held an ATP certificate with a rating for airplane multiengine land, commercial pilot privilege certificate airplane single-engine land and type ratings on the B-737, DC-9<sup>18</sup>, which included limitations of B-737 DC-9 Circ. Apch - VMC only. He held a FAA first-class medical certificate dated August 8, 2023, with limitations of *"Must use corrective lenses."* At the time of the incident, he was based at MCO.

#### 3.2.1 First Officer's Certification Records

FAA records of the first officer indicated the following:

Private Pilot - Airplane Single-Engine Land certificate was issued on March 4, 1991.

Commercial Pilot - Airplane Single-Engine Land, Airplane Multiengine Land, Instrument Airplane certificate was issued June 13, 1991.

Flight Instructor - Airplane Single-Engine certificate was issued on July 29, 1991.

Notice of Disapproval -Flight Instructor - Instrument was issued on August 8, 1991. Unsatisfactory Items were ADF<sup>19</sup> Intercepts, Unusual Attitudes, VOR<sup>20</sup> Intercepts, and VOR Approach.

Flight Instructor - Airplane Single-Engine, Instrument Airplane certificate was issued on August 12, 1991.

Ground Instructor - Advanced Ground Instructor, Instrument Ground Instructor certificate issued February 17, 1993.

Flight Instructor - Airplane Single- and Multiengine, Instrument Airplane certificate was issued June 2, 1993. Reissued: June 28, 1995, May 9, 1997 (Gold Seal), May 23,

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<sup>18</sup> The Boeing Company, DC-9-11, DC-9-12, DC-9-13, DC-9-14, DC-9-15, DC-9-15F, DC-9-21, DC-9-31, DC-9-32, DC-9-32F, DC-9-33F, DC-9-34, DC-9-34F, DC-9-41, DC-9-51, DC-9-81, DC-9-82, DC-9-83, DC-9-87, MD-88, MD-90-30, 717-200. Source: FAA Order 8900.1, Figure 5-88, dated March 29, 2024.

<sup>19</sup> Automatic Direction Finder

<sup>20</sup> Very-High Omnidirectional Range

1999 (Gold Seal), May 29, 2001 (Gold Seal), May 23, 2003, May 3, 2005 (Gold Seal), May 10, 2007 (Gold Seal), May 20, 2009, May 15, 2011, May 26, 2013.

Airline Transport Pilot – Airplane Multiengine Land; Commercial Privileges – Airplane Single-Engine Land certificate was issued June 28, 1995.

Flight Engineer – Turbojet Powered – Subject to the provisions of exemption No. 4901F, as amended certificate was issued on November 4, 1999.

Flight Engineer – Turbojet Powered certificate was issued November 16, 1999.

Airline Transport Pilot – Airplane Multiengine Land, DC-9; Commercial Privileges Airplane Single-Engine Land; Limitations – DC-9 Circ. Apch – VMC<sup>21</sup> Only certificate was issued on October 20, 2004.

Airline Transport Pilot – Airplane Multiengine Land, B-737 DC-9; Commercial Privileges Airplane Single-Engine Land; Limitations – B737, DC-9 Circ. Apch – VMC Only certificate was issued on June 29, 2014.

### **3.2.2 First Officer's Certificates and Ratings Held at time of the Incident**

AIRLINE TRANSPORT PILOT (Issued June 29, 2014)

Airplane Multiengine Land  
B-737, DC-9  
Commercial pilot privileges Airplane Single-Engine Land  
Limitations: B-737, DC-9, Circ Apch – VMC Only

MEDICAL CERTIFICATE FIRST CLASS (issued August 8, 2023)  
Limitations: Must use corrective lenses.

### **3.2.3 Flight Hours**

The following hours for the first officer were provided by the first officer, Southwest Airlines and are approximate:

|                         |        |
|-------------------------|--------|
| Previous 24 hours       | 6:00   |
| Previous 30 days        | 76:00  |
| Previous 90 days        | 207:00 |
| Total Hours B-737       | 7,000  |
| Total Flight Experience | 20,000 |

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<sup>21</sup> Circling Approach – Visual Meteorological Conditions

### 3.2.4 Training

The first officer's training records were provided by Southwest Airlines and FAA records. An excerpt of the most recent training events are listed below:

|                                             |                |
|---------------------------------------------|----------------|
| Date of Hire with Southwest Airlines        | May 14, 2014   |
| Initial Type Rating B-737                   | June 29, 2014  |
| Most recent ground training                 | April 24, 2023 |
| Basic Indoctrination                        | June 11, 2014  |
| Most recent operating experience (OE)       | March 29, 2022 |
| Most recent line check                      | March 29, 2022 |
| Most recent line operating experience (LOE) | April 26, 2023 |
| Most recent maneuvers observation           | April 25, 2023 |

### 4.0 Airport Information

Louis Armstrong New Orleans International Airport (MSY)<sup>22</sup> was located 10 miles west of New Orleans, Louisiana, had a field elevation of 3 feet msl, and was located at a latitude/longitude of N029°59.36, W090°15.32. The airport was owned by the city of New Orleans and was serviced by a FAA Air Traffic Control Tower that was in operation 24 hours a day, 7 days a week. At the time of the incident, the air traffic control tower was in operation. The airport had two paved landing surfaces for airplanes designated 02/20 and 11/29. Runway 11, the departure and subsequent arrival runway, was 10,104 ft long and 150 ft wide.

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<sup>22</sup> MSY airport information was obtained from the airport master records. Source: [AirportIQ 5010](#)

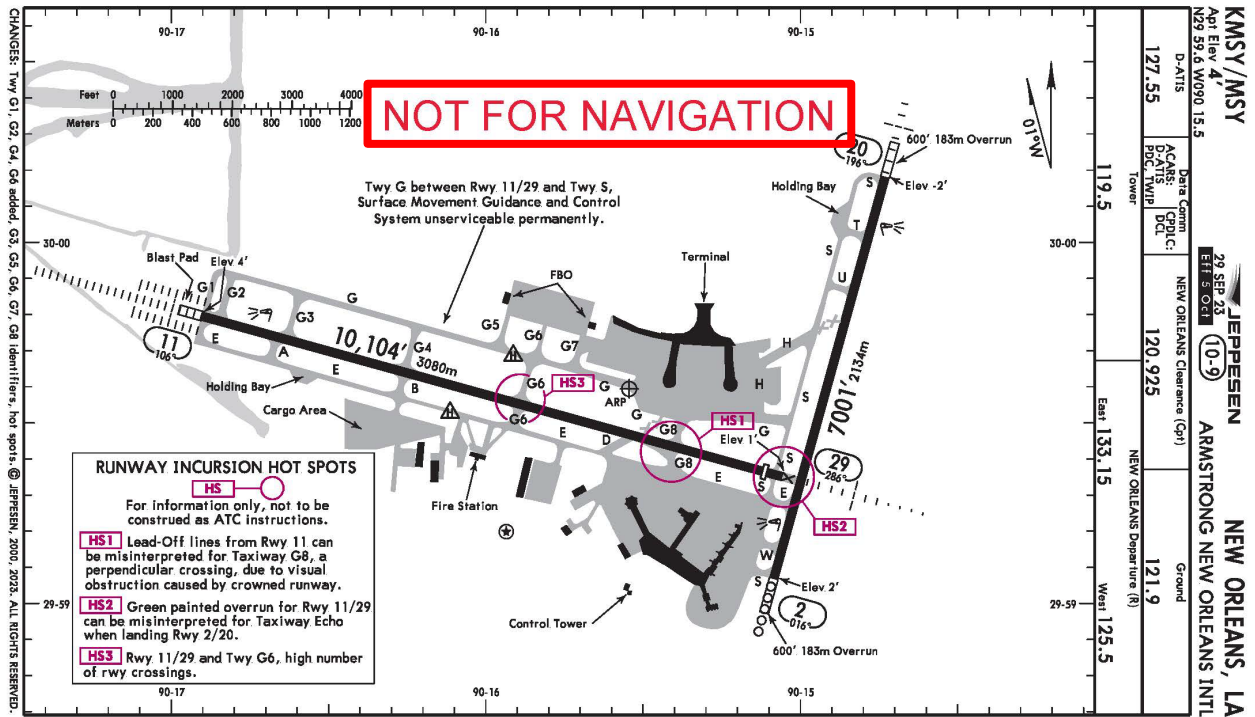


Figure 2: MSY Airport Page (Source: Jeppesen)

## 5.0 Airplane Information

The airplane was manufactured in 2022, was a 737-8 series aircraft, serial number 67750, and was issued an airworthiness certificate on December 27, 2022, with a standard transport category certificate. The airplane was purchased by Southwest Airlines on January 5, 2023. The airplane was powered by two CFM International LEAP-1B28 engines<sup>23</sup>, each capable of producing up to 28,000 lbs. of thrust.

<sup>23</sup> LEAP engines were installed on Airbus A320neo, Boeing 737MAX and COMAC C919 airplanes.  
 Source: [CFM Leap Engine Family | GE Aerospace](#)



**Figure 3:** Incident Airplane (Source : Jetphotos.com)

The incident flight consisted of a captain, a first officer, four cabin crewmembers, and an unknown number of passengers. A representative of Southwest Airlines reviewed maintenance records in place at the time of the incident and prior to departure from MSY, the airplane had no MEL/CDL<sup>24</sup> items.

## 6.0 Meteorological Information

The MSY Airport was equipped with an ASOS<sup>25</sup>. The approximate 15 minutes prior to and 10 minutes following the event recorded 5-minute weather observations<sup>26</sup> and are listed below with the observation closest to the bird strike in **bold** font:

12916KMSY MSY20231220200010412/20/23 20:00:31 5-MIN KMSY 210200Z  
08006KT 10SM CLR 13/10 A3034 -370 83 -600 080/06 RMK AO2 T01280100

12916KMSY MSY20231220200510412/20/23 20:05:31 5-MIN KMSY 210205Z  
08008KT 10SM CLR 13/10 A3034 -380 83 -600 080/08 RMK AO2 T01280100

<sup>24</sup> Minimum Equipment List/Configuration Deviation List

<sup>25</sup> Automated Surface Observing System

<sup>26</sup> Source: [ncei.noaa.gov/data/automated-surface-observing-system-five-minute/access/2023/12/asos-5min-KMSY-202312.dat](https://ncei.noaa.gov/data/automated-surface-observing-system-five-minute/access/2023/12/asos-5min-KMSY-202312.dat)

12916KMSY MSY20231220201010412/20/23 20:10:31 5-MIN KMSY 210210Z  
09007KT 10SM CLR 13/10 A3034 -380 83 -600 090/07 RMK AO2 T01280100

**12916KMSY MSY20231220201510412/20/23 20:15:31 5-MIN KMSY  
210215Z 09008KT 10SM CLR 13/10 A3034 -380 83 -600 090/08 RMK  
AO2 T01280100**

12916KMSY MSY20231220202010412/20/23 20:20:31 5-MIN KMSY 210220Z  
08009KT 10SM CLR 13/10 A3035 -380 83 -700 080/09 RMK AO2 T01280100

12916KMSY MSY20231220202510412/20/23 20:25:31 5-MIN KMSY 210225Z  
08009KT 10SM CLR 13/10 A3035 -380 83 -700 080/09 RMK AO2 T01280100

12916KMSY MSY20231220203010712/20/23 20:30:31 5-MIN KMSY 210230Z  
08008KT 10SM FEW250 13/10 A3035 -380 83 -700 080/08 RMK AO2  
T01280100

12916KMSY MSY20231220203510712/20/23 20:35:31 5-MIN KMSY 210235Z  
08006KT 10SM FEW250 13/10 A3035 -390 83 -700 080/06 RMK AO2  
T01280100

## **7.0 Southwest Airlines Guidance**

### **7.1 Southwest Airlines B737 Aircraft Operating Manual**

The following information was provided in the Southwest Airlines B737 Aircraft Operating Manual:

#### **7.1.1 Engine Failure vs. Engine Fire After Takeoff**

*The Engine Failure or Shutdown checklist is normally accomplished after the flaps are retracted and as conditions permit.*

*In the case of an engine fire, when the aircraft is under control with gear retracted and a safe altitude attained (minimum 400 ft AGL), accomplish the appropriate quick reference steps.*

*Reference items should be accomplished on a non-interfering basis with other normal duties after the flaps have been retracted and conditions permit.*

### **7.1.2 High Engine Vibration**

*Certain engine failures, such as fan blade separation or ice accumulation, can cause high levels of airframe vibration. If fan blade icing is suspected, a minimum of 80 percent N1 for one second is required to remove ice from the fan blades. If high AVM indications are accompanied by other abnormal engine indications (excessive vibration, severe engine damage, and/or engine limit exceedances) the appropriate checklist should be referenced. Further action, to include engine shutdown, should only be taken as directed by the applicable checklist.*

*Although the airframe vibration may seem severe, it is extremely unlikely that the vibration will damage the aircraft structure or critical systems. However, the vibration should be reduced as soon as possible by reducing airspeed and descending. As altitude and airspeed change, the aircraft may transition through various levels of vibration. In general, vibration levels decrease as airspeed decreases; however, at a given altitude, vibration may temporarily increase or decrease as airspeed changes.*

*If vibration remains unacceptable, descending to a lower altitude (terrain permitting) allows a lower airspeed and normally lower vibration levels. Vibration will likely become imperceptible as airspeed is further reduced during approach. The impact of a vibrating environment on human performance is dependent on a number of factors, including the orientation of the vibration relative to the body. People working in a vibrating environment may find relief by leaning forward or backward, standing, or otherwise changing their body position.*

*Once airframe vibration is reduced to acceptable levels, Pilots must evaluate the situation and determine a new course of action based on weather, fuel remaining, and available airports.*

### **7.1.3 Engine Bleeds Off Takeoff**

*Use the following procedure when making an Engine Bleeds Off takeoff with the APU operating.*

*Use this procedure to increase ATOG, increase initial climb performance, or improve runway-stopping margin with the APU operating.*

*Right Pack Switch . . . . . AUTO  
Isolation Valve Switch. . . . . CLOSE  
Left Pack Switch. . . . . AUTO/HIGH  
Left Engine Bleed Air Switch . . . . . OFF*

APU Bleed Air Switch . . . . . ON  
Right Engine Bleed Air Switch . . . . . OFF

*The right bleed switch may be left ON prior to completing the Before Takeoff checklist to allow better cabin air conditioning.*

#### **7.1.4 Unpressurized Takeoff**

*Use the following procedure when making an Engine Bleeds Off takeoff with the APU inoperative.*

Air Conditioning Pack Switches . . . . . AUTO  
Isolation Valve Switch. . . . . CLOSE  
Bleed Air Switches . . . . . OFF

#### **7.1.5 Reconfiguring Following a Bleeds Off or Unpressurized Takeoff**

*At or above minimum cleanup altitude, complete the following:*

*(PM) If a bleeds-off or unpressurized takeoff was performed, reconfigure the packs and bleeds.*

*Bleeds off takeoff–At not less than minimum cleanup altitude, after the flaps are up, at climb thrust, perform the following steps. Following each step, note the appropriate pressure indication change before continuing.*

*Right Engine Bleed Air Switch . . . . . ON*

*If engine failure occurs, do not position engine bleed air switches on until clear of obstacles.*

*(CA) If the pressurization panel is beyond reach, assume aircraft control and direct the First Officer to reconfigure the system.*

*Following an unpressurized takeoff, plan to begin reconfiguring the aircraft pressurization panel prior to 2,000 ft AAE.*

*When Cabin Rate of Climb Indicator Stabilizes:*

*APU Bleed Air Switch . . . . . OFF (N/A for Unpressurized Takeoff)*  
*Left Engine Bleed Air Switch . . . ON*  
*ISOLATION VALVE Switch . . . . . AUTO*

*(CA) APU. . . . . OFF, As Required*

*The APU has built-in cooling circuitry and may be switched off without delay.*

(PM) Verify the aircraft is cleaned up and pressurizing properly.

### **7.1.6 Bird Strikes**

*Bird strikes are common in aviation. Most bird strikes occur below 500 ft AGL. This section details bird strikes that affect the engines.*

*Recent studies of bird strikes reveal that approximately 50 percent of reported engine bird strikes damage the engine(s). The risk of engine damage increases proportionally with the size of the bird and increased engine thrust settings. When a bird strike damages the engine, the most common indications are significant vibrations due to fan blade damage and an EGT increase.*

**Note:** After any bird strike, the aircraft must be inspected by Maintenance.

#### **Preventative Strategies**

*Airports are responsible for bird control and should provide adequate wildlife control measures. If large birds or flocks of birds are reported or observed near the runway, Pilots should consider the following:*

- *Delay the takeoff or landing when fuel permits. Advise the tower and wait for airport action before continuing.*
- *Take off or land on another runway that is free of bird activity, **if** available.*

*To prevent or reduce the consequences of a bird strike, Pilots should consider the following:*

- ***If** possible, at lower altitudes, avoid leveling off for extended periods of time just above or just below cloud layers.*
- *Be extremely vigilant if birds are reported on final approach.*
- *Plan for additional landing distance to account for the possibility of no thrust reverser use if a bird strike occurs.*

**Note:** The use of weather radar to scare the birds has not been proven effective.

#### **Pilot Action for a Bird Strike During Takeoff**

*If a bird strike occurs during takeoff, the decision to continue or reject the takeoff is made by using the criteria in 5.18.7 Rejected Takeoff (RTO).*

#### **Pilot Action for a Bird Strike During Approach or Landing**

*If the landing is assured, continue the approach to land. **If** more birds are encountered, fly through the bird flock and land.*

*If engine ingestion is suspected, limit reverse thrust on landing to the amount needed to stop on the runway. Reverse thrust may increase engine damage, especially when engine vibration or high EGT is indicated.*

## **7.2 Pilot Flying Briefing**

The following guidance was provided to all pilots at Southwest Airlines and was located in the Southwest Airlines Flight Operations Manual, Section 3.4.3 “Pilot Flying Briefing,” which was revised on May 10, 2024:

*The purpose of the Pilot Flying Briefing is to review and plan for the takeoff and departure, with specifics, unique to that leg. Both Pilots actively participate and review any new or previously briefed risk factors.*

*Brief required and any relevant items by referencing the resources available to the Flight Deck Crew (e.g., Jeppesen charts, SIPs, MEL, weather information). To verify proper programming, the Pilot Flying briefs the SID waypoint sequence and restrictions from the FMC, and the Pilot Monitoring verifies against the appropriate chart.*

*The Pilot Flying Briefing must be completed prior to beginning the Before Start–Originating/Before Start checklist.*

*(PF) Brief the following required items:*

- *Clearance–Review the assigned ATC clearance and resolve any discrepancies.*
- *MCP and VHF NAV radio–*
  - Verify MCP and NAV radios are set for the departure.*
  - For runways with an engine failure procedure, ensure the appropriate VOR/ILS frequency and course are set (HGS-required takeoffs: N/A).*
- *FMC route–*
  - Brief the planned runway, assigned departure, transition, and initial en route waypoint by referencing the resources available to the Flight Deck Crew (e.g., Jeppesen charts, SIPs).*
  - To verify proper programming, the Pilot Flying reads the waypoint sequence and restrictions from the FMC, while the Pilot Monitoring crosschecks the appropriate chart.*
  - When an ATC clearance does not contain an en route portion (e.g., SID to a STAR), brief the assigned arrival and transition from the FMC by reviewing each waypoint on the LEGS page before departure.*

- For non-charted departures, review the initial heading or course, applicable restrictions to altitudes and turns, NAV setup, and DME restrictions.
- Manage discontinuities. Refer to B737 AOM 4.9.2 Managing Discontinuities.
- Engine failure procedure–
  - PWB engine failure procedures take precedence over the Jeppesen -7 series pages.
  - For an engine failure after V1, discuss the planned airport or runway for the return. Refer to B737 AOM 17.4 PWB Engine Failure Procedures for more information.

(PF) Brief the following, as relevant:

- Automation and navigation–Whenever there are multiple options, brief planned engagement of LNAV, VNAV, or other navigation modes. If the plan is not clearly covered by FOM normal procedures, the Pilot Monitoring should be made aware of how the Pilot Flying intends to fly the aircraft.
- HGS takeoff–
  - Discuss whether HGS takeoff is required (i.e., RVR below 500).
  - Review HGS takeoff set-up requirements. Refer to B737 AOM 9.2.6 HGS Takeoff and Departure for procedures and specific information.
- Required minimum climb gradient–If applicable, brief the required minimum climb gradient for the planned and alternate runways and/or departure procedures. This information may be included in the SID and/or Jeppesen -9A page.
 

**Note:** If a runway or departure other than the planned runway or departure is assigned and not previously briefed, reassess any required minimum climb gradient.
- Transition altitude (if other than 18,000 ft).
 

**Note:** The Captain may wish to amend or revise some of these briefing items before takeoff.

**Note:** Re-accomplish the Pilot Flying Briefing if an amended clearance is received, or if changes are made to FMC programming or takeoff performance prior to completion of the Before Push checklist.

### 7.3 Engine Fire or Engine Severed Damage or Separation Checklist

The B737MAX Quick Reference Handbook (QRH), dated July 11, 2017, provided the following checklist guidance to flight crews for an “Engine Fire or Engine Severe Damage or Separation”:

**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.

- 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 . . . . . Rotate to the stop and  
hold for 1 second  
**If** after 30 seconds the engine fire switch or ENG  
OVERHEAT light stays illuminated:  
Engine fire switch. . . . . Rotate to the  
other stop and  
hold for 1 second

- - - - -  
▼ Continued on next page ▼

▼ ENGINE FIRE or Engine Severe Damage or Separation continued ▼

6 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 7

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

▶▶ Go to step 7

7 ISOLATION VALVE switch . . . . . CLOSE

8 PACK switch (affected side) . . . . . OFF

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

9 APU BLEED air switch . . . . . OFF

10 Choose one:

◆ APU is **available** for start:

APU . . . . . START

**When** APU is running:

APU GEN switch  
(affected side) . . . . . ON

▶▶ Go to step 14

◆ APU is **not** available:

▶▶ Go to step 11

11 Advise the Cabin Crew that the cabin lighting will be extinguished, but passenger reading lights will continue to work.

▼ Continued on next page ▼

▼ ENGINE FIRE or Engine Severe Damage or Separation continued ▼

12 CAB/UTIL switch. . . . . OFF

13 IFE/PASS SEAT switch. . . . . OFF

14 Balance fuel as needed.

15 Transponder mode selector . . . . . TA

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

16 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.

17 Plan to land at the nearest suitable airport.

**Note:** Do not use FMC performance predictions.

►► Go to the One Engine Inoperative Landing checklist on page 7.28



**Figure 4:** Engine Fire or Engine Severe Damage or Separation Checklist

#### 7.4 Smoke, Fire or Fumes Checklist

The B737MAX QRH, dated July 1, 2020, provided the following checklist guidance to flight crews for “Smoke, Fire or Fumes:”

## Smoke, Fire or Fumes

Condition: Smoke, fire, or fumes occur.

- 1 Diversion may be needed.
- 2 Don oxygen masks and set regulators to 100%.
- 3 Don smoke goggles, as needed.
- 
- 4 Establish Crew and cabin communications.
- 5 BUS TRANSFER switch . . . . . OFF
- 6 Advise the Cabin Crew that the cabin lighting will be extinguished, but passenger reading lights will continue to work.
- 7 CAB/UTIL switch. . . . . OFF
- 8 IFE/PASS SEAT switch. . . . . OFF
- 9 RECIRC FAN switches (both) . . . . . OFF
- 10 APU BLEED air switch . . . . . OFF
- 11 **Anytime** the smoke or fumes become the greatest threat:
  - ▶▶ **Go to the Smoke or Fumes Removal checklist on page 8.18**
- 12 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 13**
  - ◆ Source of the smoke, fire, or fumes is **not** obvious or **cannot** be extinguished quickly:
    - ▶▶ **Go to step 14**

▼ Continued on next page ▼

13 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 8.18, if needed**



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

- ▶▶ **Go to step 14**

14 EQUIP COOLING SUPPLY  
and EXHAUST switches (both) . . . . . ALTN

15 Instruct the Cabin Crew to:

Turn on cabin reading lights.

Turn on galley attendants work lights.

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

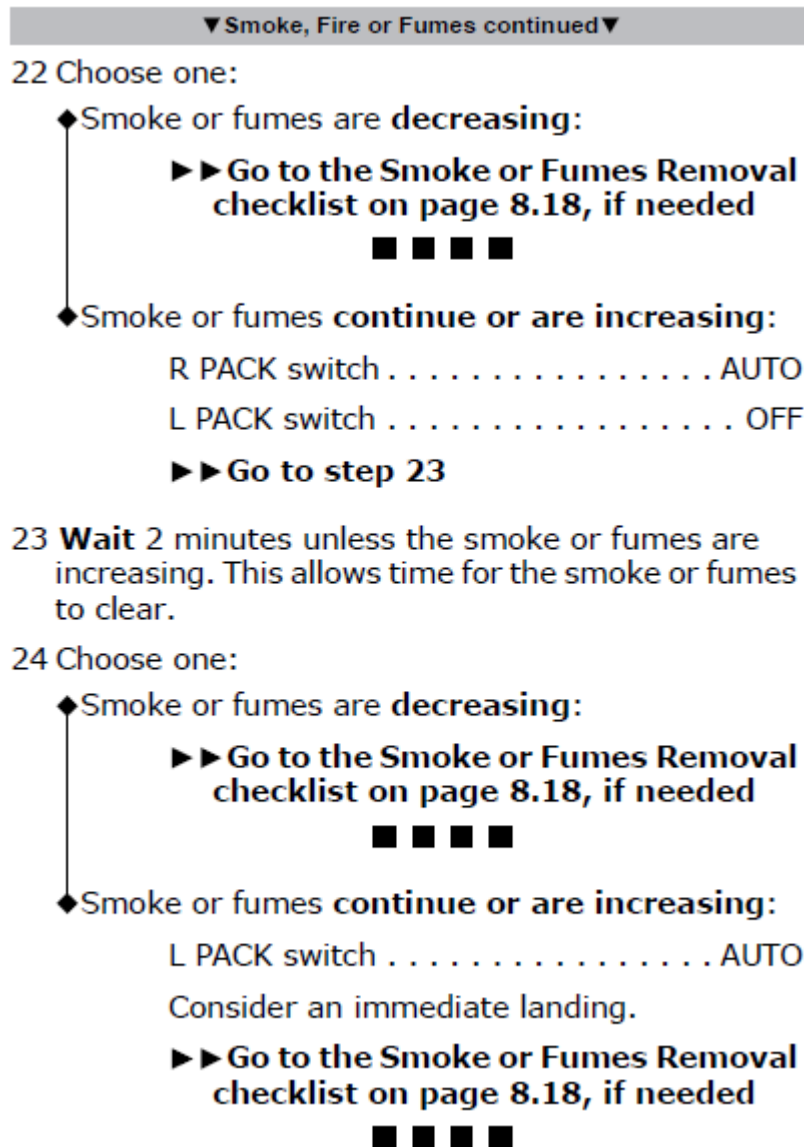
17 Consider an immediate landing if the smoke, fire, or fumes situation becomes uncontrollable.

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

19 ISOLATION VALVE switch . . . . . CLOSE

20 R PACK switch . . . . . OFF

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



**Figure 5:** Smoke, Fire, or Fumes Checklist

## 7.5 Oxygen Masks

The incident airplane was installed with a Safran MF-004 full face, quick donning oxygen mask with integrated goggles. The one-piece mask was required to be donned with one hand in five seconds or less, while accommodating prescription glasses. Southwest Airlines utilized three different quick donning oxygen masks. In their older 737 models, they utilized a two-piece quick don oxygen mask and separate smoke goggles. The other two models, including the Safran MF-004, were full face, quick donning oxygen masks.

## 7.6 Post Incident Guidance

### 7.6.1 Engine Failure or Shutdown

On March 28, 2024, Southwest Airlines provided flight crews the following guidance :

*Engine failure is recognized by a loss of thrust on an engine, coinciding readings on the respective engine instruments, and possibly significant yaw. If an engine failure is accompanied by a fire warning, N1 indicating zero, an abnormal engine vibration, or (**MAX**) smoke in the flight deck or cabin, accomplish the ENGINE FIRE or Engine Severe Damage or Separation quick reference steps from the Quick Reference Card and QRH NNC 8 Fire Protection.*

*The decision to shut down an engine for precautionary reasons should not be based on a single event. If abnormal engine indications such as excessive vibration (indicating severe engine damage), or engine limit exceedances persist, refer to the appropriate checklist. If a single engine instrument displays uncorrelated abnormal indications, an instrument malfunction may be indicated. The Pilots must consider all relevant indications prior to taking action. Further action, including engine shutdown, should only be taken as directed by the applicable checklist.*

*If consideration is given to a restart attempt, the affected engine should indicate N1 rotation, no fire, and no abnormal vibration. Signs of engine damage, such as excessive engine vibration, may preclude a restart attempt. Oil quantity indication as low as zero is normal if the windmilling N2 RPM is below 8 percent and a start may be attempted.*

**CAUTION: If an engine fails after start is complete, do not attempt a restart on the ground.**

### 7.6.2 Read Before Fly Notices

Southwest Airlines provided the following communique, in part, to "all pilots," dated February 14, 2024, titled "LEAP-1B Severe Engine Damage with Association Smoke and Fumes:"

*...The LEAP-1B engine incorporates a Load Reduction Device (LRD). The LRD allows the fan rotor to rotate freely and reduces the transmission of unbalanced dynamic loads to engine structures and pylon in case of fan blade loss or damage. In the two bird strike incidents, the LRD was activated due to fan blade*

*damage. 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 section is exposed to temperatures that may result in smoke and fumes in the Flight Deck or Cabin. The left bleed and pack primarily supply air to the Flight Deck while the right bleed and pack supply air to the Cabin. 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...*

## **8.0 Boeing Guidance (Postincident)**

### **8.1 Load Reduction Device**

The Boeing 737 Flight Crew Operations Manual, "Engines, APU-Engine System Description", dated November 30, 2024, provided, in part, the following information about the Load Reduction Device:

*The Load Reduction Device (LRD) is designed to reduce unbalanced dynamic loads transmitted to engine structures and pylon in case of a full or partial fan blade out event by decoupling the fan rotor. During LRD activation, oil system damage occurs with large amounts of oil entering the bleed air 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. The engine bleed air valve isolates the affected bleed air system when the related Engine Fire Switch is pulled or Engine Start Lever is positioned to CUTOFF.*

### **8.2 Severe Engine Damage**

The Boeing Company provided a Flight Crew Operations Manual Bulletin "To inform flight crews of potential flight deck and cabin effects associated with engine severe damage." The following information, in part, was issued on February 9, 2024:

*"...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..."*

### **8.3 Smoke, Fire or Fumes checklist (Postincident)**

Boeing updated the 737 Flight Crew Operations Manual on November 30, 2024, the update included adding at step 5 for the crew to choose one of two options: if *"Engine failure or airframe vibrations with abnormal engine indications exist: go to the ENGINE FIRE or Engine Severe Damage or Separations checklist."* Or *"Engine has not failed and airframe vibrations with abnormal engine indication do not exist go to step 6."*

In addition, the ENGINE FIRE or Engine Severe Damage or Separation added the following *"condition"* to the three that were already there. That condition was *"Engine failure with smoke or fumes in the flight deck or cabin."*

## **9.0 FAA Guidance**

### **9.1 Use of Oxygen Masks by Flight Crewmembers**

*CFR 121.333 "Supplemental oxygen for emergency descent and for first aid; turbine engine powered airplanes with pressurized cabins" provides, in part, guidance on the use of oxygen masks by flight crewmembers:*

#### **(c) Use of oxygen masks by flight crewmembers.**

- (1) When operating at flight altitudes above flight level 250, each flight crewmember on flight deck duty must be provided with an oxygen mask so designed that it can be rapidly placed on his face from its ready position, properly secured, sealed, and supplying oxygen upon demand; and so designed that after being placed on the face it does not prevent immediate communication between the flight crewmember and other crewmembers over the airplane intercommunication system. When it is not being used at flight altitudes above flight level 250, the oxygen mask must be kept in condition for ready use and located so as to be within the immediate reach of the flight crewmember while at his duty station.*
- (2) When operating at flight altitudes above flight level 250, one pilot at the controls of the airplane shall at all times wear and use an oxygen mask secured, sealed, and supplying oxygen, in accordance with the following:*
  - (i) The one pilot need not wear and use an oxygen mask at or below the following flight levels if each flight crewmember on flight deck duty has a quick-donning type of oxygen mask that the certificate holder has shown can be placed on the face from its ready position, properly secured, sealed, and supplying oxygen upon demand, with one hand and within five seconds:*
    - (A) For airplanes having a passenger seat configuration of more than 30 seats, excluding any required crewmember seat, or a payload capacity of more than 7,500 pounds, at or below flight level 410.*
    - (B) For airplanes having a passenger seat configuration of less than 31 seats, excluding any required crewmember seat, and a payload capacity of 7,500 pounds or less, at or below flight level 350.*
  - (ii) Whenever a quick-donning type of oxygen mask is to be used under this section, the certificate holder shall also show that the mask can be put on without disturbing eye glasses and without delaying the flight crewmember from proceeding with his assigned emergency duties. The oxygen mask after being put on must not prevent immediate communication between the flight crewmember and other crewmembers over the airplane intercommunication system.*

## 9.2 Advisory Circular 120-80B

Advisory Circular 120-80B "Firefighting of General and High-Energy In-Flight Fires," section 15 "Flightcrew Member Actions in the Event of an In-flight Fire" provided in part the following guidance:

*Flightcrew members should:*

- 1. Immediately don their oxygen masks and verify that the regulator is set to 100 percent.*
- 2. Plan for an immediate descent and landing at the nearest suitable airport.*
- 3. Not use smoke/fume elimination procedures to combat a fire.*
- 4. Use smoke/fume elimination procedures to evacuate pollutants.*
- 5. Not reset circuit breakers once the fire is extinguished unless required for safe flight.*

**Emergency Landings.** *Technical evaluations and actual experience indicate that flightcrew members should immediately follow company-approved emergency procedures, notify air traffic control (ATC), and begin planning for an emergency landing as soon as possible. The vast majority of events in the cabin are controlled and do not necessitate an emergency landing. In the event of a hidden fire, delaying descent by only a couple of minutes may make the difference between a successful landing and evacuation and the complete loss of the aircraft.*

**Notification.** *If there is a fire, flightcrew members should notify the F/A(s) to prepare the passengers for an emergency landing and evacuation in accordance with company procedures. If appropriate, flightcrew members should notify the F/As to assist in fighting the fire.*

**Checklists.** *Smoke, fire, or fumes checklists should include, as the first step, that flightcrew members don their oxygen masks and verify that the regulator is set to 100 percent. Flightcrew members should don smoke goggles and oxygen masks at the first indication of smoke or fumes and before accomplishing any abnormal or emergency procedures associated with smoke or fume elimination in accordance with company procedures, the manufacturer's recommendations, or both. Any delay might result in a crewmember's incapacitation...*

## 9.3 Bird Strike Data

According to the FAA, there have been "about 292,000 reported wildlife strikes with civil aircraft between 1990 and 2023. In 2023, reported bird strikes occurred at 780 U.S. airports<sup>27</sup>... About 54% of bird strikes occurred between July and October...

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<sup>27</sup> Of note: the "Wildlife Strike Database" indicated that in 2023 19,400 strikes occurred at 713 U.S. airport.

about 36% of bird strikes occur during take-off run and climb<sup>28</sup>." In the 10 years preceding the incident, MSY airport had 826 reported bird strikes, which included the incident flight.<sup>29</sup> Of note, the database entry associated with the incident flight reported the "Species" as a "bald eagle."

#### **9.4 Wildlife Hazard Management**

CFR Part 139.337 provides regulatory guidance for airports to alleviate wildlife hazards and states in part:

- (a) In accordance with its Airport Certification Manual and the requirements of this section, each certificate holder must take immediate action to alleviate wildlife hazards whenever they are detected.*
- (b) In a manner authorized by the Administrator, each certificate holder must ensure that a wildlife hazard assessment is conducted when any of the following events occurs on or near the airport:*
  - (1) An air carrier aircraft experiences multiple wildlife strikes;*
  - (2) An air carrier aircraft experiences substantial damage from striking wildlife. As used in this paragraph, substantial damage means damage or structural failure incurred by an aircraft that adversely affects the structural strength, performance, or flight characteristics of the aircraft and that would normally require major repair or replacement of the affected component;*
  - (3) An air carrier aircraft experiences an engine ingestion of wildlife; or*
  - (4) Wildlife of a size, or in numbers, capable of causing an event described in paragraphs (b)(1), (b)(2), or (b)(3) of this section is observed to have access to any airport flight pattern or aircraft movement area.*
- (c) The wildlife hazard assessment required in paragraph (b) of this section must be conducted by a wildlife damage management biologist who has professional training and/or experience in wildlife hazard management at airports or an individual working under direct supervision of such an individual. The wildlife hazard assessment must contain at least the following:*
  - (1) An analysis of the events or circumstances that prompted the assessment.*
  - (2) Identification of the wildlife species observed and their numbers, locations, local movements, and daily and seasonal occurrences.*
  - (3) Identification and location of features on and near the airport that attract wildlife.*
  - (4) A description of wildlife hazards to air carrier operations.*
  - (5) Recommended actions for reducing identified wildlife hazards to air carrier operations.*

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<sup>28</sup> Source: [Frequently Asked Questions and Answers Federal Aviation Administration.pdf](#)

<sup>29</sup> Source: [FAA Wildlife Strike Database](#)

- (d) *The wildlife hazard assessment required under paragraph (b) of this section must be submitted to the Administrator for approval and determination of the need for a wildlife hazard management plan. In reaching this determination, the Administrator will consider–*
- (1) The wildlife hazard assessment;*
  - (2) Actions recommended in the wildlife hazard assessment to reduce wildlife hazards;*
  - (3) The aeronautical activity at the airport, including the frequency and size of air carrier aircraft;*
  - (4) The views of the certificate holder;*
  - (5) The views of the airport users; and*
  - (6) Any other known factors relating to the wildlife hazard of which the Administrator is aware.*
- (e) *When the Administrator determines that a wildlife hazard management plan is needed, the certificate holder must formulate and implement a plan using the wildlife hazard assessment as a basis. The plan must–*
- (1) Provide measures to alleviate or eliminate wildlife hazards to air carrier operations;*
  - (2) Be submitted to, and approved by, the Administrator prior to implementation; and*
  - (3) As authorized by the Administrator, become a part of the Airport Certification Manual.*
- (f) *The plan must include at least the following:*
- (1) A list of the individuals having authority and responsibility for implementing each aspect of the plan.*
  - (2) A list prioritizing the following actions identified in the wildlife hazard assessment and target dates for their initiation and completion:*
    - (i) Wildlife population management;*
    - (ii) Habitat modification; and*
    - (iii) Land use changes.*
  - (3) Requirements for and, where applicable, copies of local, State, and Federal wildlife control permits.*
  - (4) Identification of resources that the certificate holder will provide to implement the plan.*
  - (5) Procedures to be followed during air carrier operations that at a minimum includes–*
    - (i) Designation of personnel responsible for implementing the procedures;*
    - (ii) Provisions to conduct physical inspections of the aircraft movement areas and other areas critical to successfully manage known wildlife hazards before air carrier operations begin;*
    - (iii) Wildlife hazard control measures; and*

- (iv) *Ways to communicate effectively between personnel conducting wildlife control or observing wildlife hazards and the air traffic control tower.*
- (6) *Procedures to review and evaluate the wildlife hazard management plan every 12 consecutive months or following an event described in paragraphs (b)(1), (b)(2), and (b)(3) of this section, including:*
  - (i) *The plan's effectiveness in dealing with known wildlife hazards on and in the airport's vicinity and*
  - (ii) *Aspects of the wildlife hazards described in the wildlife hazard assessment that should be reevaluated.*

A Letter dated February 8, 2024, from the New Orleans Wildlife Control Coordinator to the FAA Airport Safety and Standards Division provided, in part, the following:

*In accordance with FAR Part 139.337 (f) (6) (i) and (ii), MSY completed a review and evaluation of the WHMP<sup>30</sup>...We believe that section 4.9.3 "Eagle Permits" provides the best overall consideration for eagle hazards and mitigation that the law provides for harassment of such a species.*

*We therefore maintain that both the WHA<sup>31</sup> and WHMP for MSY are not deficient and both continue to provide effective measure for mitigation...*

## **10.0 Previously Issued NTSB Safety Recommendations**

The following is a list, in part, of safety recommendations issued by the NTSB in regard to wildlife hazards and full-face oxygen masks:

A-10-068 - TO THE FEDERAL AVIATION ADMINISTRATION: Develop and validate comprehensive guidelines for emergency and abnormal checklist design and development. The guidelines should consider the order of critical items in the checklist (for example, starting the auxiliary power unit), the use of opt outs or gates to minimize the risk of flight crewmembers becoming stuck in an inappropriate checklist or portion of a checklist, the length of the checklist, the level of detail in the checklist, the time needed to complete the checklist, and the mental workload of the flight crew. **Closed - Unacceptable Action**

A-10-075 - TO THE FEDERAL AVIATION ADMINISTRATION: Require all 14 *Code of Federal Regulations* Part 139-certificated airports to conduct wildlife hazard assessments (WHA) to proactively assess the likelihood of wildlife strikes, and, if the WHA indicates the need for a wildlife hazard management plan (WHMP), require the

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<sup>30</sup> Wildlife Hazard Management Plan

<sup>31</sup> Wildlife Hazard Assessment

airport to implement a WHMP into its airport certification manual. **Closed - Acceptable Alternate Action**

A-10-076 - TO THE FEDERAL AVIATION ADMINISTRATION: Work with the U.S. Department of Agriculture to develop and implement innovative technologies that can be installed on aircraft that would reduce the likelihood of a bird strike. **Closed - Acceptable Alternate Action**

A-10-087 - TO THE UNITED STATES DEPARTMENT OF AGRICULTURE: Develop and implement, in conjunction with the Federal Aviation Administration, innovative technologies that can be installed on aircraft that would reduce the likelihood of a bird strike. **Open - Acceptable Action**

A-11-087 - TO THE FEDERAL AVIATION ADMINISTRATION: Require operators to install full-face oxygen masks on aircraft used for 14 *Code of Federal Regulations* Part 121, 135, and 91 subpart K operations and provide training on their use. **Closed - Unacceptable Action**

A-11-088 - TO THE FEDERAL AVIATION ADMINISTRATION: Require operators of 14 *Code of Federal Regulations* Part 121, 135, and 91 subpart K flights to include, during initial and recurrent training, tactile, hands-on training on the use of operable oxygen mask/goggle sets, including the use of the regulator's emergency selector and the venting of the smoke goggles. **Closed - Unacceptable Action**

A-11-089 - TO THE FEDERAL AVIATION ADMINISTRATION: Require operators of 14 *Code of Federal Regulations* Part 121, 135, and 91 subpart K flights to include, during initial and recurrent training, aircraft-specific training on establishing and maintaining internal cockpit communications when the oxygen masks are donned. **Closed - Unacceptable Action**

## **E. LIST OF ATTACHMENTS**

Attachment 1 - Incident Flight Crew Transcripts and Written Statements  
Attachment 2 - Incident Flight Crew Training Records [Excerpts]  
Attachment 3 - Southwest Airlines B737 Normal Checklist  
Attachment 4 - Southwest Airlines B737 Operating Manual [Excerpts]  
Attachment 5 - Southwest Airlines Flight Operations Manual - Postincident [Excerpts]  
Attachment 6 - Southwest Airlines B737 Non-Normal Quick Reference Card  
Attachment 7 - Southwest Airlines B737 Quick Reference Handbook [Excerpts]  
Attachment 8 - Southwest Airlines Postincident Guidance  
Attachment 9 - Boeing Postincident Guidance  
Attachment 10 - FAA Bird and Wildlife Strike Data  
Attachment 11 - MSY Wildlife Strike Data  
Attachment 12 - New Orleans Report Following Incident

Attachment 13 - MSY Weather  
Attachment 14 - Advisory Circular 120-80B  
Attachment 15 - Operational Factors Group Party Forms

Submitted by:

Shawn Etcher  
Operational Factors