NATIONAL TRANSPORTATION SAFETY BOARD
Investigative Hearing
Alaska Airlines Flight 1282
Boeing 737-9, N704AL
Left Mid Exit Door Plug Separation in Portland, OR
January 5, 2024

Docket No.	SA-543
EXHIBIT	
6A	

Survival Factors Group Chair's Factual Report

(56 Pages)

National Transportation Safety Board
Office of Aviation Safety
Washington, DC 20594

DCA24MA063

SURVIVAL FACTORS

Group Chair's Factual Report

June 28, 2024

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A. ACCIDENT

Location: Portland, Oregon
Date: January 5, 2024
Time: 1714 Pacific Standard Time
Airplane: Boeing 737-9 [N704AL]

B. SURVIVAL FACTORS GROUP

Group Chair	Jason Fedok National Transportation Safety Board Washington, DC
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C. SUMMARY

On January 5, 2024, at about 1714 Pacific standard time, Alaska Airlines flight 1282, a Boeing 737-9, N704AL, returned to Portland International Airport (PDX) after the airplane suffered a rapid decompression when the left mid-cabin door plug departed the airplane, resulting in substantial damage. On board were 2 flight crew, 4 cabin crew and 171 passengers all of whom deplaned at the gate. There were eight reported injuries. The flight was a Title 14 *CFR* part 121 scheduled domestic passenger flight from PDX to Ontario, California (ONT).

D. FACTUAL INFORMATION

1.0 Cabin Configuration

The airplane was configured with 178 passenger seats. First class (rows 1-4) consisted of 16 seats in an AC DF configuration. "Premium seats" (rows 6-9) consisted of 24 seats in an ABC DEF configuration. Economy class (rows 10-34) consisted of 138 seats in an ABC DEF configuration (with the exception of rows 33 and 34 which contained only DEF seats).[1] See figure 1.

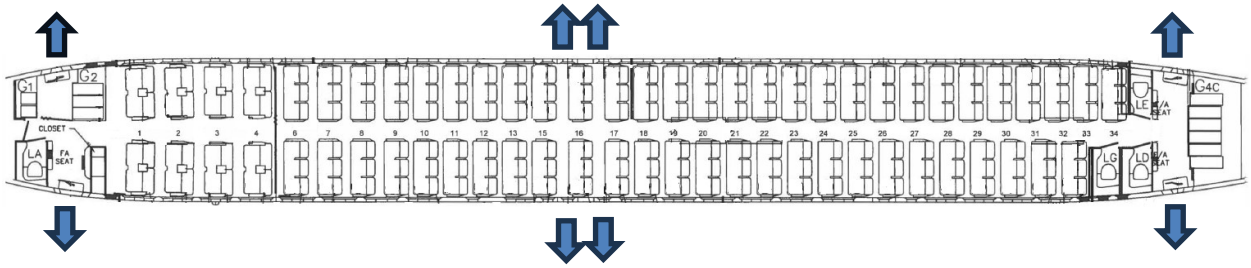

Figure 1. Interior configuration of N704AL. [Source: Alaska Airlines]

[1] The airplane was configured without a row 14.

Figure 2. Aft-facing view of cabin from row 1.

Figure 3. Forward-facing view of cabin from row 34.

The airplane had four Type C floor-level emergency exits (L1/R1, L2/R2) and four Type III emergency exits located at rows 16 and 17 (two on either side of the

airplane). [2] There were three dual position flight attendant (F/A) jump seats: one at door L1, one at door L2, and one at door R2.

Figure 4. F/A jump seat at door L1.

[2] 14 *Code of Federal Regulations (CFR)* 25.807 defined a Type C exit as "one with a rectangular opening of not less than 30 inches wide by 48 inches high, with corner radii not greater than 10 inches." A Type III exit was defined in 14 *CFR* 25.807 as having "a rectangular opening of not less than 20 inches wide by 36 inches high with corner radii not greater than seven inches, and with a step-up inside the airplane of not more than 20 inches. If the exit is located over the wing, the step-down outside the airplane may not exceed 27 inches."

Figure 5. Door R1.

Figure 6. Door L2 and F/A jump seat location.

Figure 7. Door R2 and F/A jump seat location.

The airplane was also equipped with mid exit door (MED) plugs located at row 26 on the left and right sides of the airplane. A MED plug was primarily constructed of aluminum and installed in the fuselage by means of guide and hinge fittings. It was secured from moving vertically by a total of four bolts. Outboard motion of the plug was prevented by 12 stop fittings (6 along each forward and aft edge) installed on the fuselage door frame structure. The plug was only intended to be opened for maintenance and inspection; it was never used during passenger operations. There

were no distinguishing features in the cabin to indicate to passengers that MED plugs were present at row 26, as the interior panels concealed evidence of the door frame and were identical to other sidewall panels. Additionally, a full-size passenger window was installed. When viewed from the exterior, the outline of the MED plug door frame was noticeable; however, the lack of a door band indicated that the plug was not a usable exit. See figure 8.

Figure 8. Comparison photograph of the exterior of an airplane fuselage with an activated door (l), a deactivated door (c), and a MED plug (r).

There were four lavatories: Lav A (forward of door L1), Lavs G and D (forward of door L2), Lav E (forward of door R2). There were two galleys: G1/G2 (adjacent to door R1) and G4 (transverse gally aft of doors L2/R2). There was a closet aft of door L1.

2.0 Passenger List

The passenger list provided by Alaska Airlines indicated that, among the 171 passengers, there were 3 lap-held children who were assigned with caregivers seated in seats 19D, 31E, and 32D. Therefore, 168 of the 178 passenger seats were occupied on the accident flight.[3] The 10 empty seats were 10D, 10E, 16D, 16E, 17B, 23E, 26A, 26B, 26F, and 28B. Alaska Airlines records indicated that "6 guests who had been booked for the [accident] flight… either changed flights, or no-showed." Records also revealed that two individuals had checked in 24 hours prior to the flight and had

[3] There were four unaccompanied minors on board seated in 7F (11-year-old), 32A (12-year-old), 32B (17-year-old), and 32C (6-year-old). Passengers 32A and 32B were siblings. For more information on Alaska Airlines' policies for unaccompanied minors, please see section 5.2.

selected (or been assigned) seats 26A and 26B. However, Alaska Airlines reported that they were late arriving to the airport and were rebooked on a later flight to ONT.

3.0 Narrative of Cabin Events

Flight 1282 was staffed with four F/As and two pilots. Alaska Airlines F/A duty positions were identified by letters A, B, C and D. F/As A and D were seated on the aft-facing dual jump seat adjacent to door L1 (with F/A D seated in the inboard position and F/A A in the outboard position); F/A B was seated in the outboard position of the aft-facing dual jump seat adjacent to door L2; and F/A C was seated in the outboard position of the aft-facing dual jump seat adjacent to door R2.

All the flight attendants reported an uneventful flight through 10,000 feet when F/A A gave a standard announcement to passengers. F/A D got up from the forward jump seat and had just unlocked the lavatory door when she felt some "bumps" of turbulence. Then an "explosive" event occurred and she was struck by the flight deck door which had opened. F/A A, still on the L1 jump seat, recalled a loud bang followed by "whooshing air" and the oxygen masks dropping. He recognized immediately that they had experienced a decompression and donned an overhead oxygen mask. F/A D sat down on her jump seat and held on to her restraint while she struggled to close the flight deck door. After getting it closed, she donned an overhead oxygen mask. F/A A tried to communicate with the flight crew by picking up the interphone and pressing '2' methodically but it was so loud from the air moving in the cabin that he could not hear if the flight crew answered.

F/As B and C reported a rush of air into the aft galley where they were seated. They were secured in their jump seats and immediately donned the oxygen masks that deployed from the ceiling; however, there was no contact from the flight crew and they did not feel the airplane make an emergency descent as they expected from their training. It was extremely loud but F/A C established communication with F/A A on the interphone and learned that there had been no contact with the flight crew. After hanging up, both aft F/As were concerned about the 6-year-old unaccompanied minor in seat 32C. F/A C went forward in the cabin and initially attempted to use the mask-to-mask procedure (breathing by using the extra oxygen masks hanging from the passenger service units in the cabin). She stated that the procedure was "utterly ridiculous" given how far outboard the masks were and the difficulty obtaining each one as she attempted to move from one mask to the next. She abandoned the procedure and found the UM in 32C had donned his mask (as he had been previously briefed to do) and was holding it to his nose and mouth. He had not tightened the elastic strap, so F/A C did that for him. At that time, she noticed the hole in the airplane and returned to the aft galley. By this time F/A B had retrieved a portable oxygen bottle (POB) from above row 32ABC and also returned to the galley. F/A C saw F/A B struggling with the "flimsy" mask on the POB before eventually getting it donned and going out into the cabin.

In the forward cabin, F/A D noticed passengers standing up in the main cabin and yelled commands for them to return to their seats, but they did not. She decided she needed to assess the situation in the cabin and F/A A provided her with a POB from its stowage location across from their jump seat. F/A D struggled to open the plastic pouch containing the mask "because the plastic wrapper was so hard" and recalled that she may have finally used her employee badge to puncture the packaging to help open it. Once open, she noted that the plastic mask was folded and tightly stuck together. She struggled to fully open the mask and eventually put the bottle's strap over her shoulder and walked down the aisle holding the mask in front of her nose and mouth.

She reached two female passengers who were standing and one was very upset. She stated that she thought her son had been "blown out the window." F/A D then saw the hole in the airplane where the MED plug had been and reseated the two passengers in empty seats 16D and 16E.[4] She assessed the situation around the hole and noted that seats 26A, 26B, 25A, and 25B were empty. She stated that passenger 26C was still in his seat and appeared unfazed by the situation and encouraged her to return to her jump seat.

F/A A had remained in his jump seat and used the interphone to call the aft flight attendants. One of them answered and told him that there was a hole in the airplane and that they might have lost passengers. He then called the flight deck again and believed one of the pilots answered. He stated what he had been told but was not sure if the pilot heard him. He assessed that he no longer needed supplemental oxygen and went out into the cabin to assist. He reached approximately row 15 and felt "really, really hot air." He then returned and made more attempts to contact the flight crew.

F/A D had checked on the UM in seat 7F twice and ensured the UM had the oxygen mask on. Eventually F/A D returned to the L1 jump seat and F/A A reported he had heard the flight crew state that they were "going back around."

In the aft cabin, F/A C went forward up the aisle again to reassure passengers and when she returned to the galley received an interphone call from F/A A who stated, "we're turning back around." All the F/As secured themselves in their jump seats and mentally prepared for an evacuation. The aft F/As reported it was "really hot" and F/A C noticed a smell of burning rubber. After landing F/A A made a public address announcement to passengers to remain seated and then called the flight crew who told him an evacuation was not necessary. When the airplane pulled up to

[4] Interviewed passengers confirmed the passengers in 25ABC all found other seats after the decompression. Multiple passengers stated that passenger 25A was young man who was seen after the decompression without a shirt and whose skin appeared red and wind burned.

the gate, paramedics came on board to assess the passengers and check for any injuries.

Interviewed passengers consistently reported hearing a loud noise followed by their masks dropping. No passengers reported difficulty retrieving or donning a mask. No passengers reported losing consciousness during the flight.

4.0 Cabin Documentation

4.1 Rows 25ABC and 26ABC

Damage to the interior cabin was primarily in the area of the door plug that departed the airplane - rows 25ABC and 26ABC. Seat unit 25ABC was manufactured by Recaro Aircraft (Type 3530A; P/N 3530AY80-31-331; S/N 949969; EASA# 210.1005 4881b; DOM 10JUL2023). The seat unit frame was structurally intact and undamaged. It was connected firmly to the floor with spacers in place between row 24 and 25. Seat 25A was rotated outboard and aft approximately 10-20 degrees toward the fuselage opening. The seat cushion was pulled up approximately 1½ in. The headrest unit was missing. There was a horizontal scrape mark on the sidewall just above the outboard armrest. There was no damage to any of the seat belts. Seat 25B's seat cushion was not clipped in its secure position. No damage or anomalies were noted to seat 25C. There was exposed insulation on either side of the opening where the MED plug had been.

Figure 9. Seats 25A and 26A.

Seat unit 26ABC was manufactured by Recaro Aircraft (Type 3530A; P/N 3530AY80-31-331; S/N 949970; EASA# 210.1005 4881b; DOM 10JUL2023). The seat

unit frame was structurally intact and undamaged. It was connected firmly to the floor with spacers in place between row 25 and 26. Seat 26A's seatback cushion and covering was missing but the seat bottom cushion was present and clipped in place. The seatback was rotated forward and outboard. The forward support tube under the seat bottom cushion had orange oil/grease droplets present. The outboard armrest was deformed outboard approximately 15 degrees. The armrest had an abrasion on the upper surface, mid-armrest. There was no other wear, tears or abrasions on the other armrests of the seat unit. The tray table of seat 26A (for use by the passenger in 27A) was missing. The lower supports of the tray table had been fractured approximately ¼-inch aft of their connection with seat 26A. The tray table (with support legs) was later located during the ground search for the MED door plug. See figure 11. Seats 26B and 26C were undamaged with both the seatback and seat bottom cushions clipped in place. There was no damage to any of the seat belts.

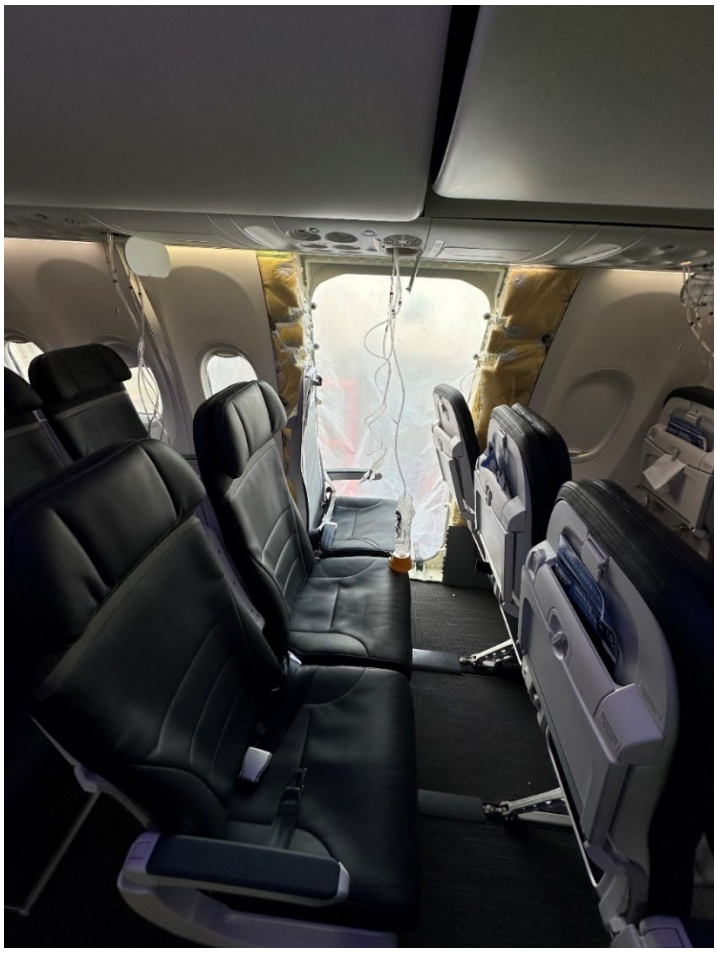

Figure 10. Row 26ABC.

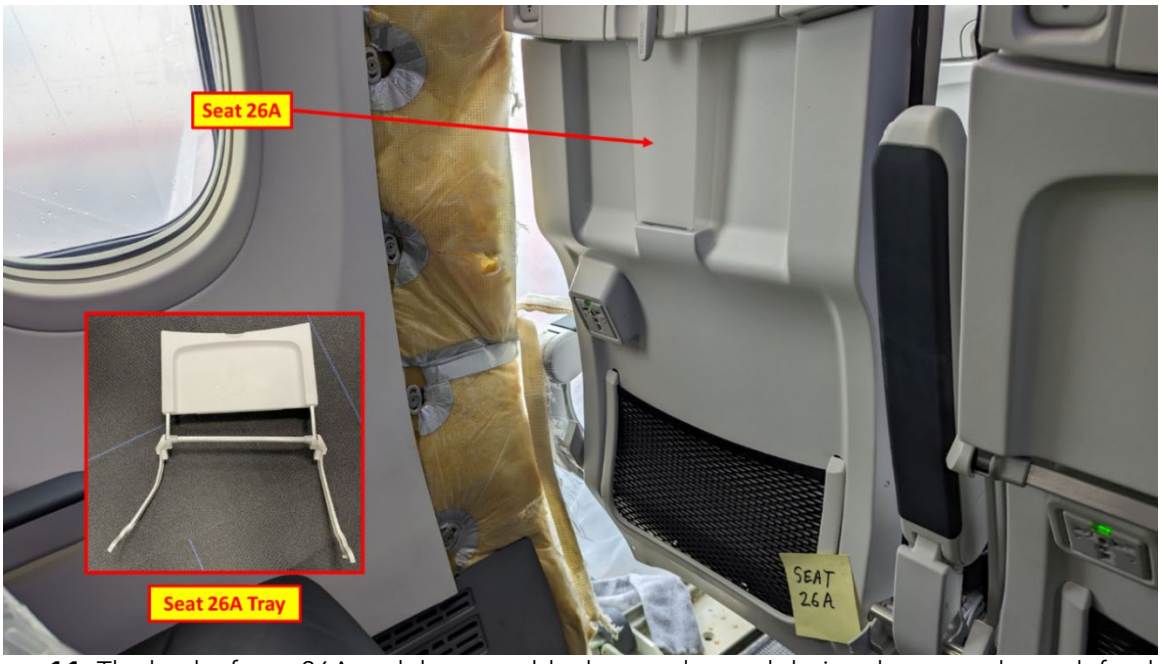

Figure 11. The back of seat 26A and the tray table that was located during the ground search for the MED door plug.

Figure 12. The undamaged aft seat legs of seat unit 26ABC.

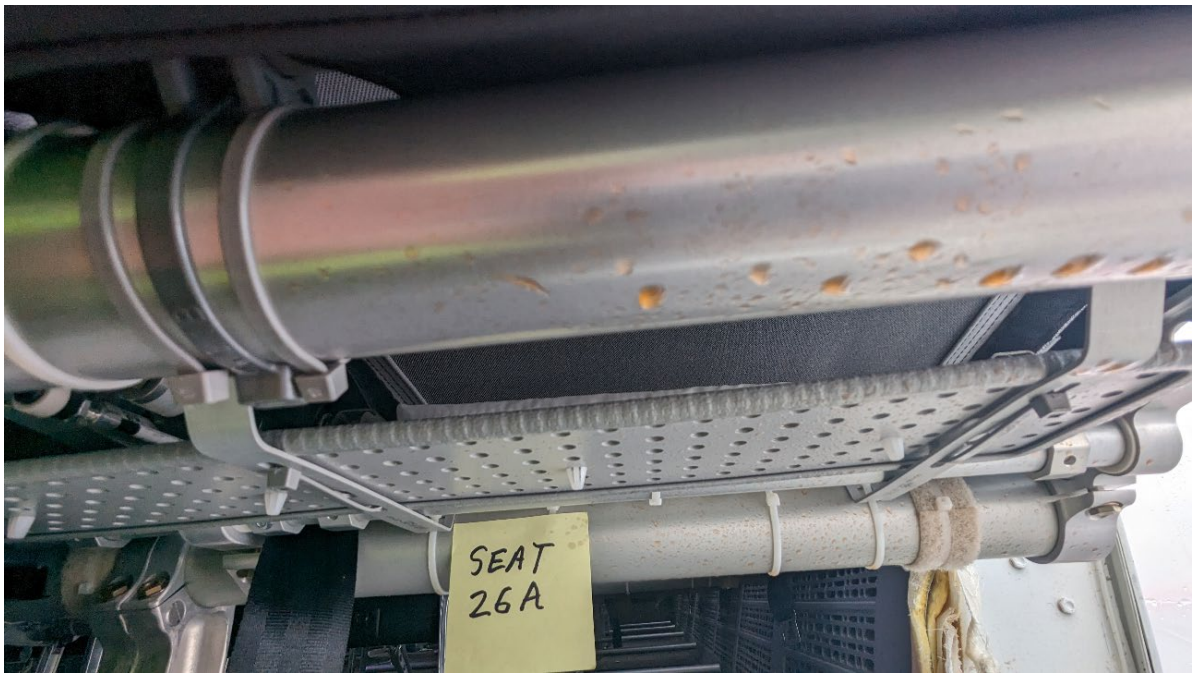

Figure 13. Forward seat tube of seat 26A with orange oil/grease droplets present.

All of the seat belts in the cabin were examined and were undamaged. The seat belt of seat Row 27C contained the following manufacturer information and was representative of all the passenger restraints in the cabin:

AmSafe
P/N 2226-1-031-8000
MFR: 35FBP
DMF: AO323
ASSY: S/A 2226-4-031-8000
M/NUM: S/O 542389-54
S/N – NO DATA

4.2 Additional Interior Damage

Row 1AC – Trim strip sidewall window panel was displaced.
Row 1DF – Blank filler panel was found propped against the forward bulkhead. (The cabin air grille on the lower sidewall at 1DF had a gap approximately the same size as the panel.)[5]
Row 2DF – Trim strip on sidewall was displaced inboard from window to ventilation panel.
Row 3AC – Trim strip on sidewall was displaced inboard from window to ventilation panel.

[5] See the Structures Group Chair's factual report for more information about depressurization certification of the 737-9.

Row 4AC – The sidewall window panel had separated from its normal position 2-4 cm inboard. The outer window frame was sealed and intact; the inner acrylic window was sealed but separated from the forward edge with the bottom edge moved inboard. See figure 14.
Row 6ABC – Trim strip on sidewall was displaced inboard from mid-window to the level of the magazine holder.
Row 11DEF – Trim strip on sidewall was displaced inboard from mid-window to the ventilation panel.
Row 12DEF – Buckling between window panels.
Row 27ABC – The sidewall trim between panels at 27ABC was buckled and a thick white loop of braided cord was hanging between the cove light and the PSU outboard position. See figure 15.
Row 29ABC - Approximately 1½ cm gap between sidewall and fuselage.
Row 29DEF - The sidewall window panel had separated from its normal position 3-4 cm inboard. The outer window frame was sealed and intact; the inner acrylic window was sealed but separated from the forward edge with the bottom edge moved inboard.
Row 30-31ABC – Sidewall cove light was loose and partially hanging down (attached at 29A and hanging aft). See figure 16.
Row 32ABC – Blank filler panel was found propped against the aft lavatory behind 32ABC bulkhead. (The cabin air grille on the lower sidewall at 32ABC had a gap approximately the same size as the panel.) See figure 17.
Row 33DEF - Trim strip between sidewall panels was buckled from the middle of the window frame to the bottom ventilation panel.

Figure 14. Sidewall panel at row 4AC.

Figure 15. Sidewall trim strip buckled at row 27ABC.

Figure 16. Loose sidewall cove light at 30-31ABC.

Figure 17. Blank filler panel behind row 32ABC.

4.3 Supplemental Oxygen Systems

4.3.1 Background Information

14 *CFR* 25.1447 and 14 *CFR* 121.333 required airplanes with pressurized cabins expected to fly at or above 10,000 feet to have a source of supplemental oxygen immediately available to every person in the cabin in the event of a decompression.[6] As with the vast majority of commercial airplanes, the 737-9 had a supplemental oxygen system service unit installed above each passenger seat unit as well as in every lavatory, galley, and above each flight attendant jump seat. Each service unit contained mask assemblies which were connected to a chemical oxygen generator (or lavatory cylinder) and were nested in a mask stowage box with a stowage door latch and latch actuator.

At a cabin pressure of approximately 14,000 feet, the 737-9 cabin oxygen system automatically activated when a barometric pressure switch closed and applied electrical power to the door latch actuators.[7] After the service unit door opened, gravity caused a group of four "Dixie cup" masks to deploy at each first class, premium, or economy passenger seat unit while two masks deployed in each lavatory and flight attendant station.[8] The masks remained grouped but were suspended above the seats until pulled down by a user, per design. The users then were required to individually select a mask. Masks were qualified to an aerospace standard and were required to cover the nose and mouth and be equipped with a suitable means to retain the mask in position on the face.

14 *CFR* 25.1447 required airplanes certified to fly in excess of 25,000 feet to be equipped with extra masks throughout the cabin equaling at least 10 percent more masks than seats (e.g., in a cabin with 100 passenger seats, there must be 110 masks installed). This ensured that masks were available for lap-held children and/or cabin crewmembers needing immediate oxygen after a decompression.[9] The extra masks were required to be as uniformly distributed throughout the cabin, as practicable. Each 737-9 passenger service unit was equipped with an extra mask to ensure oxygen was available for lap children and flight attendant mobility.

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[6] The cabin supplemental oxygen system was designed to meet the minimum mass flow required to maintain the "mean tracheal partial pressure" (i.e. blood oxygen concentration) specified in 14 *CFR* 25.1443(c) in order to prevent hypoxic injuries.

[7] Alternately, the flight crew can elect to activate the system via the passenger oxygen switch in the flight deck.

[8] If the airplane was certified for operation above 30,000 feet, the service units providing the required oxygen flow were required to be automatically presented to the occupants before the cabin pressure altitude exceeded 15,000 feet.

[9] Alaska Airlines' passenger policy in section 6.100 of the flight attendant manual (FAM) did not permit the seating of more than one lap child per row. Additionally, lap children were not permitted in rows with only one tiple seat unit (such as rows 33DEF and 34DEF on the accident airplane).

The supplemental oxygen on the 737-9 was provided by chemical oxygen generators (installed in the service units above each cabin seating location) or gaseous oxygen cylinders (installed in lavatories). For service units with chemical oxygen generators, the action of pulling a mask down released a retaining pin causing a chemical reaction to begin in a canister secured in the service units. The reaction created oxygen which then flowed into plastic tubes which terminated in plastic bags near the "Dixie cup" masks. For the lavatory service unit, the action of pulling a mask (or pull tab attached to a lanyard) released a spring-driven pin that pierced a frangible disk located on the cylinder filled with compressed gaseous oxygen, thereby starting oxygen flow.

The 737-9 oxygen service units were required to provide oxygen to the masks with a flow rate that met 14 *CFR* 25.1443 over a predetermined cabin descent profile. 14 *CFR* 121.333 and 14 *CFR* 121.329 provided regulations associated with the length of time supplemental oxygen must be provided to crewmembers and passengers. These regulations required a minimum 10-minute supply for passenger cabin occupants when an airplane was operated at altitudes above 25,000 feet. During this time, it was required that flight crews would perform an emergency descent to an altitude where ambient air could prevent hypoxic injury without the need for supplemental oxygen. The 737-9 chemical oxygen generators and lavatory oxygen systems were designed to provide supplemental oxygen to each mask for a descent profile of approximately 12 minutes.

During the preflight briefing on flights being operated at altitudes above 25,000 feet, flight attendants were required by 14 *CFR* 121.333 to demonstrate donning the mask by placing it over their nose and mouth. An adjustable elastic band was provided to secure the mask over the passenger's head and could be adjusted by pulling on its connections to the "Dixie cup" on either side of the face. Alaska Airlines' policy instructed F/As to specifically brief unaccompanied minors about the use of the oxygen mask prior to flight. See section 5.2 for more information.

4.3.2 Airplane Documentation

All of the passenger service unit (PSU) masks deployed during the decompression and all retaining pins were found disengaged from the oxygen generators.[10] Examination of the PSU chemical oxygen generators confirmed activation of all the generators had occurred as the temperature sensitive expended indicator strips had changed colors, indicating that the generators had produced oxygen (and heat).

[10] The four masks at 31DEF were found inside the service unit and two O-ring fittings had been displaced. Information obtained from a passenger seated at this location revealed that the masks deployed after the decompression and were used by passengers. He stated that he restowed the masks in the service unit for convenience during deboarding.

No damage was noted to any of the masks or tubing except for those at row 26ABC. At 26ABC, the masks had deployed and the retaining pin was visible hanging from the PSU; however, three of the four oxygen masks were missing. Two of the reservoir bags had separated at their tubing connection point and were not present. One reservoir bag had separated 4-4.5 cm from the top of the bag fitting and was not present. The reservoir bag that remained was shredded.

The two masks at each of the three flight attendant stations deployed and the pull tabs extended as designed. All three had been activated. The forward galley masks near door R1 had also deployed and the pull tab extended per design, but it had not been activated.

The four lavatories were inspected and all overhead oxygen compartments had opened. The masks had deployed with the pull tab extended down. See figure 18. The four lavatories each had a lavatory service unit (LSU) with a constant flow dispensing system[11] (CDS) oxygen cylinder that, when activated, supplied oxygen directly to the masks in the lavatories. None of the pull tabs had been pulled and all the lavatories' CDS bottles remained fully charged. The following information was obtained from the CDS bottle in Lav A:

B/E Aerospace, Inc.
Oxygen Cylinder Assembly
PNR: 4441806-012
SER: 41806-012

[11] P/N SP-15389 NRC 3000/4500 M4113.

Figure 18. Deployed oxygen masks (with pull tab) in Lav A.

Figure 19. Lav A's CDS oxygen bottle.

Finally, it was noted that, due to the design of the overhead bins and PSUs, the masks deployed above the window seat (A and F seats) of each seat unit. See figure 20.

Figure 20. Deployment location of the oxygen masks above the window seat on the left side of the airplane.

4.3.3 Chemical Oxygen Generators Movement

Examination revealed that all but two chemical oxygen generator canisters (1AB and 25DEF) had migrated aft from their properly installed positions inside the PSUs. The canisters were designed to be held in place by two stainless steel straps under which a flat silicone thermal pad was placed. The pads were coated with a pressure sensitive adhesive (PSA) to help prevent movement of the generators due to vibration and acceleration/deceleration. Two different types of silicone thermal pads were noted. One type was a simple flat pad while the other had a c-channel. See figures 21 and 22.

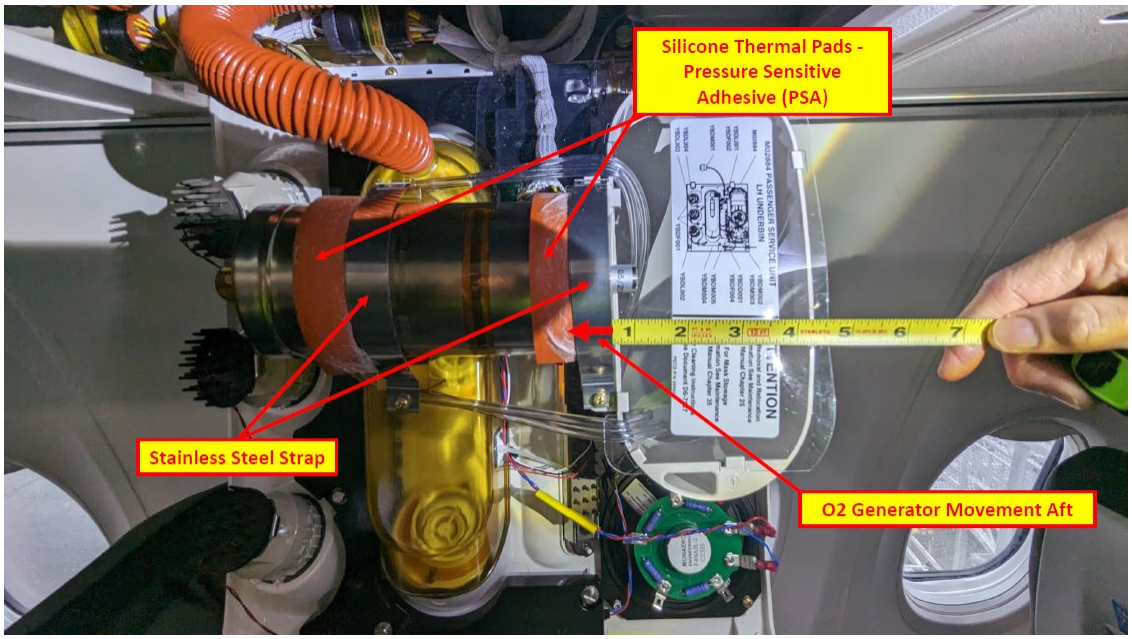


Figure 21. Chemical oxygen generator canister with flat orange silicone thermal pads at seat 2AC. The canister had migrated aft approximately ¾ inch.

All of the generators equipped with flat pads migrated aft and some generators migrated far enough aft to be completely free of the forward stainless steel strap; however, no generators disengaged from the oxygen tubing. A second type of silicone thermal pad was found on only two generators – 1AC and 25DEF. This type had a c-channel where the edges of the pad wrapped around the edges of the stainless steel straps. These two generators did not move from their original positions.

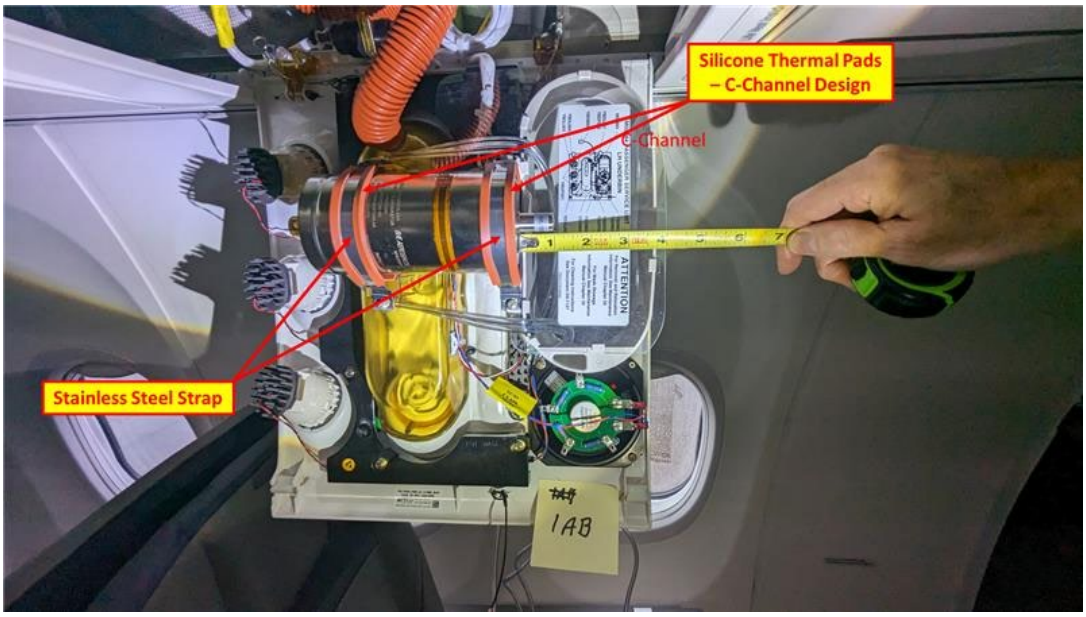


Figure 22. Chemical oxygen generator with c-channel silicone thermal pad at seat 1AC that had not migrated aft.

Prior to the accident, Boeing had received two reports of 737 chemical oxygen generator canisters shifting within their positioning cradles. On April 19, 2023, an operator reported 34 of 60 PSU chemical oxygen canisters had migrated on a 737-8 with 25 flight hours/9 flight cycles (built 11/2022). The operator was performing an entry-into-service routine inspection when the discovery was made. On December 12, 2023, the same operator found approximately 45 of 60 PSU chemical oxygen canisters had migrated while performing a check on another 737-8 with 25 flight hours/11 flight cycles (built 7/2023).[12]

While there were no documented malfunctions of the oxygen system in these instances, Boeing evaluated the events per its continued operational safety program with the FAA and identified a population of PSUs produced by a supplier from August 2019 through December 2023 (both on new aircraft and spares) that utilized a non-functioning PSA on the flat silicon thermal pad. In total, Boeing estimated this issue "may affect as many as 541 737 MAX airplanes and 138 737 NGs."

As an immediate action, Boeing discontinued the installation of the PSA flat pad configuration in new aircraft production starting in December 2023. This ensured that only the c-channel configuration was used in new aircraft from that date forward. Additionally, Boeing drafted service bulletins (SB) to retrofit the affected aircraft in-service by inspecting and installing (as required) the non-PSA c-channel configuration. Boeing advised 737MAX and 737NG operators of the draft service bulletins in April 2024 via multi-operator messages MOM-MOM-24-0241-01B and MOM-MOM-24-0245-01B.

On June 17, 2024 Boeing issued multi-operator message MOM-MOM-24-0316-01B to 737MAX/NG to operators notifying them of the published service bulletins (SB 737-35-1210 for the 737 MAX and SB 737-35-1211 for the 737NG) to inspect and replace (as needed) the PSU chemical oxygen generator retention straps on affected aircraft. The MOM also referenced the potential upcoming release of an FAA Immediate Adopted Rule (IAR) Airworthiness Directive (AD).[13] Finally, the MOM noted that temporary revisions of the 737 NG/MAX Aircraft Maintenance Manuals (AMMs) were targeted for release on June 20, 2024.

4.4 Flight Attendant Stations

The F/A jump seats and restraints were examined and all were found to be undamaged. The following information was placarded on the L1 jump seat.

[12] A total of 60 of 62 chemical oxygen generators had migrated on the accident airplane.

[13] As of May 6, 2024, the FAA indicated to Boeing that an AD was expected to be issued within 45 days. Boeing reported that operators would have 90 days to inspect/repair affected aircraft, and 120 days to inspect/repair spares or post-delivery modification PSUs.

Goodrich
Part No: 2110-101TH
Serial: 24893-2110
Boeing Part No: S414A201-03101
MFG Date: 08/01/23
Complies with FAA TSO-C127 Type A

4.5 Communication and Lighting

Communication between crewmembers on the 737-9 was facilitated through use of an interphone system. The cabin contained three interphone/communication panels with a handset – one at each flight attendant jump seat location between the headrest cushions. Additionally, the flight crew's headsets and oxygen masks were equipped with a microphone and speaker to facilitate communication in the event of a decompression. All three handsets and all flight crew oxygen masks were tested to ensure functionality and call clarity. Call chimes initiated in both the flight deck and F/A stations were audible when calls were made between all four locations. Call volume and clarity were nominal. The public address system was audible when announcements were made from all handset locations, including the flight crew headsets and oxygen masks.

In normal operation, flight attendants were trained to lift the handset and press '2' to call the pilots, press '5' to call another flight attendant location, and press '8' to make a public address announcement to passengers. In an emergency, flight attendants were trained to press the "2" button repeatedly to get the attention of the flight crew to an urgent situation. A placard on the exterior of the phone provided crewmembers with a reminder of the numbers associated with the call locations. See figure 23.

Figure 23. A 737-9 F/A interphone handset.

The 737-9 was equipped with an automatic decompression announcement that would play over the public address system in the event sensors detected a loss of cabin pressure. The announcement stated (in both English and Spanish):

"Attention. Please sit down. Pull an oxygen mask firmly toward you. Place the mask over your nose and mouth and breathe normally. Put on your own mask before assisting anyone else. Please remain seated with your seatbelt fastened until otherwise instructed."

The announcement was tested and both the English and Spanish portions of the message were clearly audible throughout the cabin, galleys, and lavatories. It was noted that the public address system volume defaulted to its maximum setting during a decompression.

The Cabin Emergency Lighting System was tested by activating the aft flight attendant lighting switch that activated internal and external emergency lighting. No discrepancies were noted in the operation of the lighting system.

Figure 24. Emergency lighting activation switch at the door L2 F/A location and illuminated overhead light fixtures in the cabin.

4.6 Cabin Emergency Equipment

Two portable oxygen bottles (POB) were used by flight attendants during the decompression. (See section 4.6.1) All of the other emergency equipment on the airplane was in airworthy condition and found to be secured in the normal stowage locations. See figure 25 for the locations and type of emergency equipment that was present in the cabin.

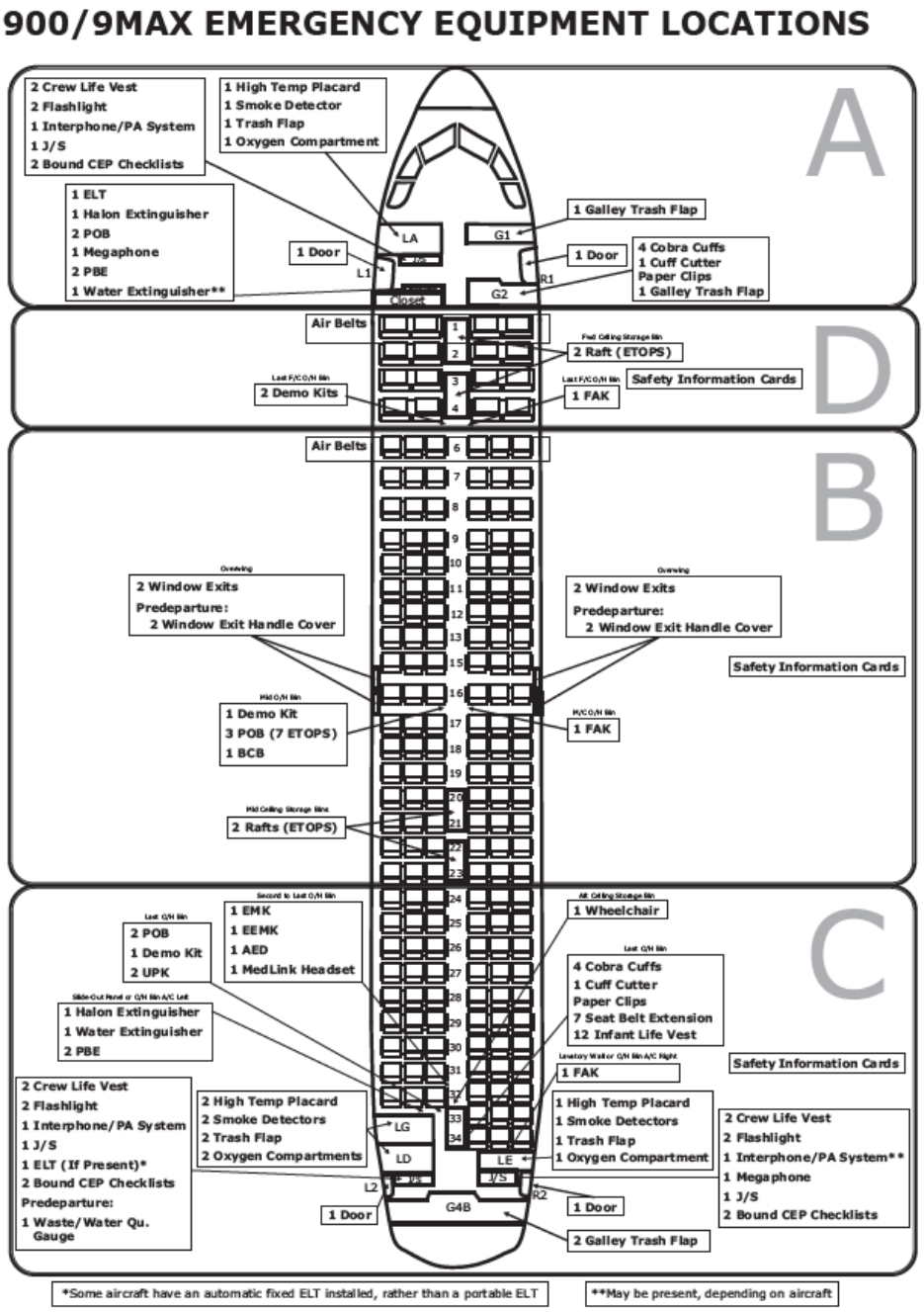


Figure 25. Emergency equipment location diagram found in Alaska Airlines' F/A manual.

4.6.1 Portable Oxygen Bottles

Flight attendants D and B both used portable oxygen bottles after the decompression. Flight attendant A retrieved the POB from the L1 door location near their jump seats and handed it to F/A D so she could walk back into the cabin to check on passengers. F/A D reported difficulty removing the mask from its plastic packaging and recalled using her identification badge to puncture the plastic pouch to open it. She eventually removed the mask, but then encountered difficulty

unfolding and opening the mask. She quickly abandoned her attempt to properly affix it over her nose and mouth with the elastic band around her head. Instead, she donned the oxygen bottle with the shoulder strap and held the mask over her mouth and nose while going aft to check on passengers.

F/A B retrieved a POB from the stowage location just aft of row 32. Once he had retrieved the bottle he moved back into the aft galley so that passengers would not observe him in case he struggled with it. He said it was “awkward” to remove the mask from its packaging and took 5-10 seconds to get removed and uncoiled. He then had difficulty donning the mask over his head and glasses and affixing it in place over his nose and mouth, although he was eventually able to do so.

Investigators identified two POBs in the forward stowage compartment near door L1. See figure 26. Both POB were manufactured by AVOX Systems. One POB in the compartment was still bracketed and its gauge read approximately 1750 psi. The attached mask and tubing had not been uncoiled. The other POB was not bracketed and one of the attached masks was out of its packaging and unfolded, with a spare mask still attached to the cylinder. The packaging of the spare mask indicated it was manufactured by AVOX (PNR 28301-02). See figure 27. The gauge on the used POB read 0 psi indicating that it was empty. The following information was placarded on the cylinder:

AVOX Systems Oxygen Regulator and Cylinder Assembly
FAA-PMA Eligibility per AVOX Document 5500 PMA

Cyl. Cap (Cu. Ft.)	11.0
Rated Ser. Pressure (PSI)	1800
Max Filling Pressure (PSI)	1800
CAGE (MFR):	53655
AVOX PART (PNR):	5500-C1A-F25A
SERIAL # (SER):	P23080055
MFG DATE (DMF):	082023

Figure 26. The two POBs in the forward stowage location near door L1. The gauge of the unbracketed POB (middle) read 0 psi.

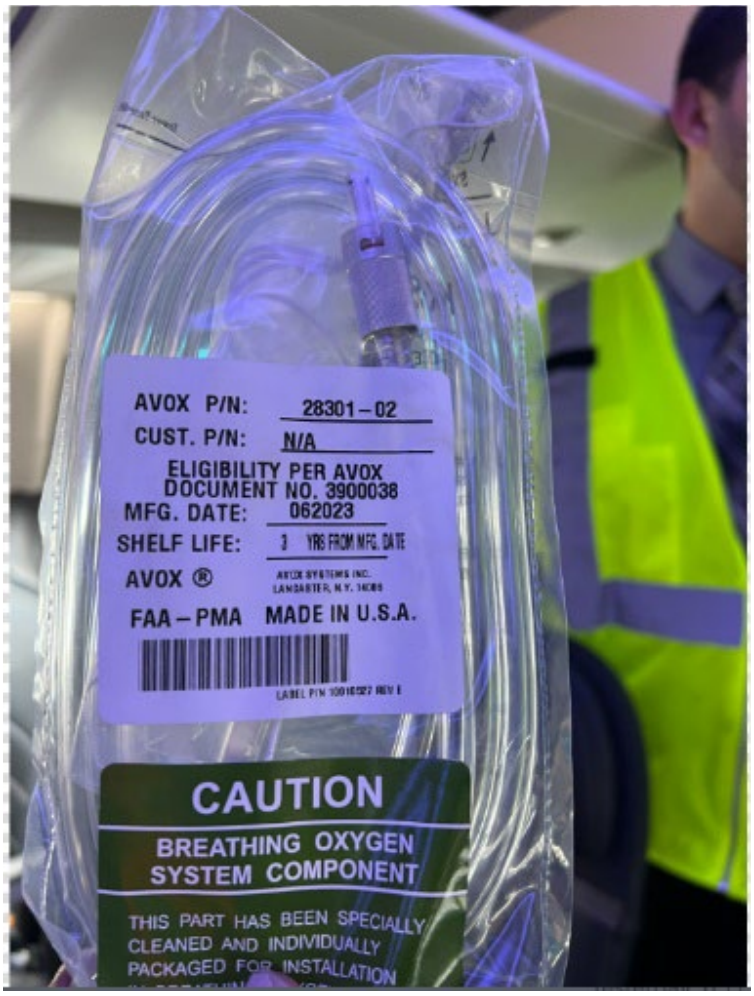


Figure 27. A spare POB mask still inside its packaging.

A second used POB was located lying on passenger seat 34D. The gauge on the POB indicated that approximately 1,400 psi remained in the cylinder. The following information was placarded on the cylinder:

AVOX Systems Oxygen Regulator and Cylinder Assembly
FAA-PMA Eligibility per AVOX Document 5500 PMA

Cyl. Cap (Cu. Ft.):	11.0
Rated Ser. Pressure (PSI)	1800
Max Filling Pressure (PSI)	1800
CAGE (MFR):	53655
AVOX PART (PNR):	5500-C1A-F25A
SERIAL # (SER):	P23080054
MFG DATE (DMF):	082023

The attached mask was out of its packaging and was unfolded with the spare mask still attached to the bottle. See figure 28. The mask (identical to that used by F/A D) consisted of a plastic bag with two exhalation (vent) holes, a flexible metal nose strip, and a thin elastic strap. See figures 29 and 30.

Figure 28. Portable oxygen bottle and mask found on seat 34D.

Figure 29. Close-up of the portable oxygen bottle mask.

Figure 30. Investigator wearing portable oxygen bottle and mask.

Investigators noted an empty POB bracket in the stowage location above row 32ABC. The other POB in this location was still bracketed. See figure 31. For information about Alaska Airlines' POB procedures, see section 5.2.

Figure 31. Empty POB bracket above row 32ABC.

All cabin PSU panels contained a placard stating, “Life vest in panel above your head.” All of the life vest compartments were closed and secured with the “no tamper” seals visible throughout the cabin.

3.6 Safety Information Briefing Card

All of the safety information briefing cards were found in the seatback pockets, with the exception of 26A and 27A which were missing. The safety card in 26B was in place but damaged.

Figure 32. Front cover and back of Alaska Airlines' safety information briefing card.

Figure 33. Inside of Alaska Airlines' safety information briefing card.

3.7 Emergency Exits

All four Type C floor-level emergency exit doors were undamaged and functioned without anomaly when opened and closed in the normal mode. All four evacuation slides mounted on the doors were manufactured by Goodrich and inflation bottle pressure gauges were in the green band. The four Type III overwing window exits were undamaged and opened without hesitation or binding. Each exit remained open in the canopy position until pulled closed. Both aft overwing window exits had life lines present that were properly stowed in the window frame.

3.8 Flight Deck Door

The flight deck door was found in the fully open position with the door stop engaged. It was manufactured by Safran Cabin Inc. and the following information was located on the door:

Part number: B221250-Rev D1
Customer: Boeing
Serial number: 23050220116
MFG: 06-24-23

The flight deck door opened aft under cabin decompression loading per design. The door had no external damage with the exception of the door latch security plate that was slightly deformed with a gap between the metal plates. See figure 34. There were no abrasions on the exterior (cabin side) door handle. The door frame was undamaged. The door closed and latched normally but repeatedly failed to lock per design. A pull (from the cabin side) or a push (from the flight deck side) with moderate force caused it to open without difficulty. The door's interior deadbolt locked and unlocked as designed. Both emergency escape decompression panels were present and undamaged. The sliding pins on the door's panels were in the "lock" position and both the top and bottom panels were in proper placement.

Figure 34. Area of deformation to the door latch security plate of the flight deck door.

On January 13, 2024, Boeing issued MOM-MOM-24-0029-01B that notified operators that Boeing intended to release an amendment to the Boeing 737 MAX Flight Crew Operations Manual (FCOM), Volume 2, Systems Description Section, Chapter 1: "Airplane General, Emergency Equipment, Doors, Windows - Controls and Indicators" to provide a description of the flight deck door system functionality during a decompression event in the passenger cabin. Previously the FCOM had not included information that the flight deck door would open in the event of a rapid decompression in the passenger cabin. On January 15, 2024, Boeing published FCOM amendment D6-27370-MAX-TBCNFF which included additional details on the flight deck door function during a decompression event. For more information, see the Operations Group Chair's factual report.

4.9 Flight Deck

No damage was found inside the flight deck. The captain seat, the first officer's seat, and two observer seats were undamaged.[14] The captain's seat and first officer's seat both traveled in a full range of motion without any discrepancies. All four seat restraint systems were examined and showed no signs of wear or damage. The following information was noted on the flight crew seats:

[14] Both observer seats which were unoccupied for the accident flight.

Captain
Seat: Pilot 737NG Common Seat
Customer Part No: S232A311-11
IPECO Part No: 3A296-0007-01-1
Serial No: 106658
Model No: 0A296-0001
Type: A-FF
TSO No: C127a
DOM: 15 08 23

First Officer
Seat: Pilot 737NG Common Seat
Customer Part No: S232A311-12
IPECO Part No: 3A296-0008-01-1
Serial No: 106612
Model No: 0A296-0002
Type: A-FF
TSO No: C127a
DOM: 09 08 23

Figure 35. Forward-facing view of the flight deck.

Figure 36. Aft-facing view of the two flight deck observer seats.

The flight deck windows (both captain and first officer) opened and closed without any noted misalignment. The flight deck escape ropes were present and stowed per the operator's manual. The captain's heads-up display (HUD) was lowered and raised to the stowed position without any discernible anomalies.

The flight deck contained additional emergency equipment including four life vests, a crash axe, a Halon fire extinguisher, and four quick-donning oxygen masks. All the equipment was in airworthy condition and stowed in the normal stowage locations except for the flight crew's two quick-donning oxygen masks that were found outside of their stowage compartments lying beside their respective seats. Both observer oxygen masks were in the stowed position and regulators set to the 100% setting.

Captain's Oxygen Mask
B/E Aerospace
Part No: 174692-N7 Rev F
Serial No: 1131577211
MFD: 06/23

First Officer's Oxygen Mask
B/E Aerospace
Part No: 174692-N7 Rev F
Serial No: 1127850201
MFD: 06/23

Figure 37. One of the flight crew oxygen masks.

See the Systems Group Chair's factual report and the Operations Group Chair's factual report for more information about the masks, flight crew oxygen system, and flight crew procedures.

4.10 Lavatories

The forward lavatory (Lav A) was found unlocked ("Vacant") with the deadbolt in the stowed position. The deadbolt could not be moved into the locked position and was displaced outboard of the slot. The door was jammed and required more force than normal to open. The upper frame of the door near the deadbolt was deformed about 2cm and the lower door frame had its trim strip separated from its normal position. The lavatory light cover panel was separated 2cm from the wall. See figures 38 and 39.

Figure 38. Separation of the Lav A light cover panel from the wall.

Figure 39. Trim separation from the Lav A door frame.

5.0 Flight Attendant Training and Procedures

5.1 Crew Training Information

F/A Position	New Hire Training	Last Recurrent Training	Boeing 737-9 Differences Training
F/A A	5/2019	5/2023	4/2019[15]
F/A B	8/2005	9/2023	4/2019
F/A C	6/2017	5/2023	4/2019
F/A D	8/2015	7/2023	4/2019

Figure 40. Training dates for the flight attendants on board fight 1282.

5.2 Flight Attendant Procedures

The Alaska Airlines Flight Attendant Manual (FAM) current at the time of the accident (dated 12/13/23) contained five pages of information and procedures related to decompression. See figures 42-45. Pages 3 and 4 of Section 2.200 described the "immediate actions" expected of F/As in the event of a rapid decompression. The steps included immediately donning the nearest oxygen mask and securing themselves immediately by any means available. F/As were then instructed to, if possible, advise the flight crew that masks had dropped and follow their instructions. F/As were told to expect an emergency descent, that the automatic decompression announcement would play, and that the cabin lights would default to the brightest setting. After the airplane had levelled off, the FAM stated that F/As should expect communication from the pilots about:

- when oxygen was no longer necessary
- when it was safe to move around the cabin and/or brace for an imminent emergency landing.

The FAM included a note that "if the [airplane] has leveled off and there has not been any communication from the pilots, attempt to contact the pilots before removing oxygen or moving about the cabin."

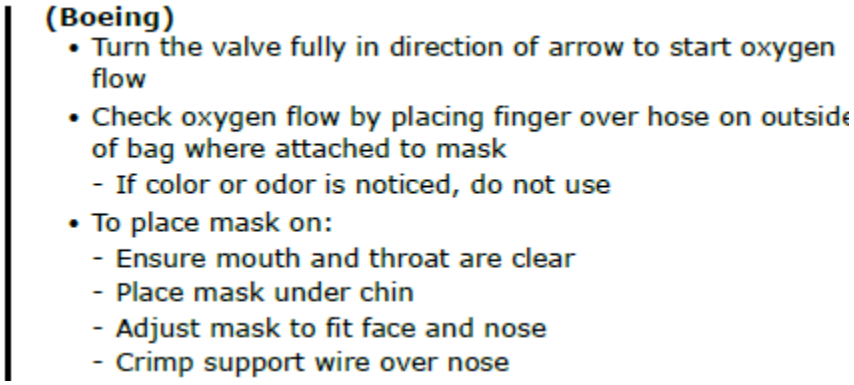
Under a section heading "When It Is Safe" the FAM stated that if oxygen was still needed "F/As will move from mask to mask (using extra mask in PSU) to obtain and don a POB, release any unopened PSU compartments, ensure passengers are using oxygen masks correctly and oxygen is flowing." Once oxygen was no longer needed the FAM stated that F/As could commence moving through the cabin checking on passengers and other F/As, checking lavatories, providing first aid,

[15] F/A A received 737-9 differences training as part of his new hire course which was completed in May 2019.

checking the cabin for structural damage, and reporting their situation to the flight crew.

Section 5.040 of the FAM described emergency procedures for F/As in the event of flight crew incapacitation/non-responsiveness. The procedures contained Sensitive Security Information that was controlled under 49 CFR Parts 15 and 1520, which prevented disclosure of the information to all persons without a "need to know."

Section 3.100 of the FAM described the use of POBs. The following procedures were included:



(Boeing)

- Turn the valve fully in direction of arrow to start oxygen flow
- Check oxygen flow by placing finger over hose on outside of bag where attached to mask
  - If color or odor is noticed, do not use
- To place mask on:
  - Ensure mouth and throat are clear
  - Place mask under chin
  - Adjust mask to fit face and nose
  - Crimp support wire over nose

Figure 41. Alaska Airlines' procedures for using a POB from FAM section 3.100.

The FAM also stated that a single-port POB, such as those used on the accident flight, would have 60 minutes of available oxygen at a flow rate of 4 liters per minute.

FAM section 6.100 described Alaska Airlines' "Junior Jetsetter" policies and procedures for unaccompanied minors (UMs). Alaska Airlines permitted UMs ages 5 through 7 on non-stop and direct flights only. (UMs ages 8 through 12 were also accepted on online connection flights.) The number of UMs permitted on any single flight was 6. The preferred seating location of UMs was in the last full row or near F/A jump seats and galleys; however, it was permitted to seat UMs throughout the cabin when necessary. All UMs were required to wear company approved identification during flight. It was recommended that UMs preboard, allowing F/As time to introduce themselves, build rapport, and escort the UMs to their seats. F/As were instructed to brief UMs (either individually or as a group) on:

- the operation of the seat belt, PSU, oxygen mask, and flotation device
- F/A call button and use
- Location of nearest exits and lavatories

F/As were also instructed to "keep a watchful eye and periodically check in with all [UMs] during flight."

5.3 Postaccident Flight Attendant Procedure Changes

Alaska Airlines made numerous F/A procedure changes as a result of the lessons learned from this accident. As of April 3, 2024, pages 3, 4, and 5 of section 2.200 the FAM were updated via Emergency Interim Bulletins (EIB) with new procedures. See figures 42-45. The updated procedures included a new section entitled "Assess and Communicate" which continued to highlight the need for F/As to obtain oxygen and secure themselves immediately; however, also emphasized the need for F/As to remain secure while assessing the situation and establishing communication, if possible. The new procedures also included instructions on what to do in the event that F/As did not experience an emergency descent and a direct link to the section of the FAM that dealt with pilot incapacitation. The FAM also included a page change relating the information provided by Boeing in the January 15, 2024, FCOM update. Specifically, the change indicated that the 737-9 flight deck door may open during a decompression permitting flight deck air to vent into the passenger cabin. The FAM update also included the appropriate procedures for F/As to respond to that situation.

Additionally, based on feedback from the flight attendants from flight 1282 regarding situational awareness and cabin visibility, Alaska Airlines planned to modify the duty seating location for F/As B and C on Boeing airplanes. Rather than being seated outboard (next to the door) F/As B and C would be required to sit on the inboard jump seat during critical phases of flight.[16] The FAM update with this change was scheduled for release on July 3, 2024.

[16] The change would also modify the seating location for F/As E and F (who were not present nor required on the accident flight) from the inboard seat to the outboard seat near doors L2 and R2.

DECOMPRESSION

GENERAL

Decompression is a loss of cabin pressure. When a decompression occurs, the cabin interior pressure will decrease until it is equal to the physical pressure outside the A/C. At high altitudes, atmospheric pressure is very low and the air is too thin to sustain life for an extended period.

Decompression may be slow to rapid/explosive.

A slow decompression is considered one in which the loss of cabin pressurization happens in more than ten seconds. It can be gradual and unnoticed in the cabin and could be a result of a pressure leak or pressurization equipment problem.

A rapid/explosive decompression happens in less than 10 seconds. It may be accompanied by a loud noise and or sudden drop in temperature; wind blast; flying debris, dust, and dirt; and fogging. It may be caused by the loss of a door or window or a portion of the fuselage.

SIGNS

During a decompression, when the cabin pressure reaches 14,000 ft or when activated by the F/D:

- Oxygen masks will automatically drop
- A prerecorded announcement (English and Spanish) will automatically play instructing passengers to don oxygen masks

  Note: The DMP400 must be powered on for the announcement to play.

- All lights turn on bright

First awareness may be presentation of these items. F/As should also look for signs of the physical effects of a decompression. If there are signs of a potential slow decompression, immediately notify the pilots.

IMPORTANT: Due to the effects of hypoxia (symptom of a decompression), it is imperative that F/As recognize the signs of a slow decompression and get supplemental oxygen as soon as possible.

PHYSICAL EFFECTS

A decompression can be recognized by any of the following:

- Pain in ears and sinuses
- Stomach/Intestinal discomfort
- A need to breathe rapidly/difficulty breathing
- Cheek and lip flutter
- Hypoxia, see 4.400, Hypoxia
  - Symptoms of hypoxia may be difficult to detect when they happen slowly

Additional potential effects of rapid/explosive decompression:

- Slight movement of chest as air exits lungs
- Rapid chest expansion
- Feeling of fullness in sinuses and ears
- Abdominal fullness
- Progressively increasing pain in abdominal area
- Rare occurrence of pain in teeth
- Difficulty in speaking/communicating
- Pain and inflammation in and around joints

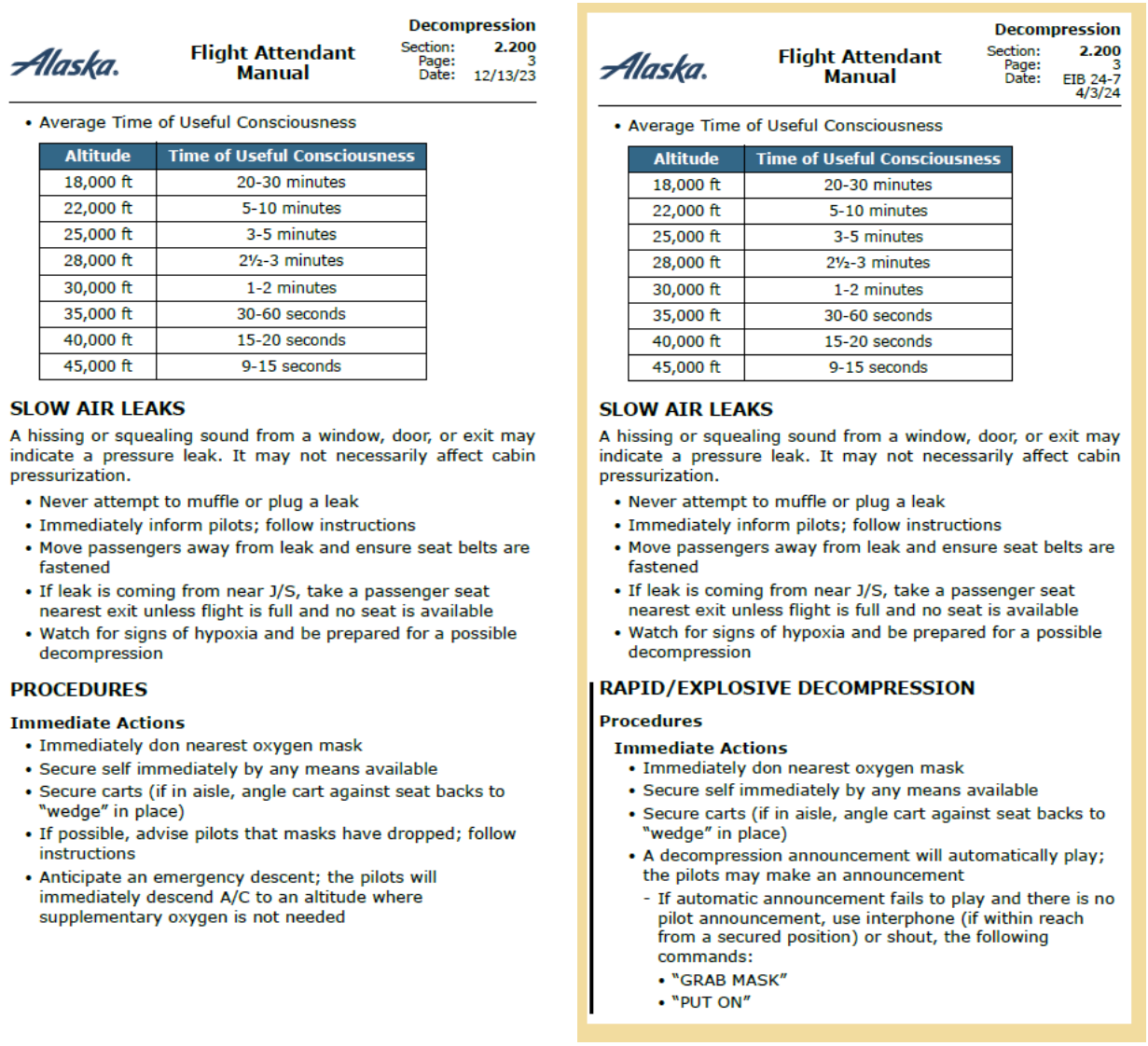
TIME OF USEFUL CONSCIOUSNESS (TUC)

- Period of time from decompression to time when individual is no longer capable of taking proper corrective and protective action
- Time can be shortened in a rapid/explosive decompression by as much as 50%
- Factors determining TUC
  - Altitude (TUC decreases at higher altitudes); this is the most significant factor
  - Rate of ascent (in general, the faster the rate, the shorter the TUC)
  - Physical activity (exertion decreases TUC)

    Note: TUC for a F/A may be less than that of passengers because of the increased physical activity level.

  - Day-to-day factors, physical fitness, diet, rest, medications, smoking, illness, and other factors may affect hypoxia tolerance

Figure 42. Alaska Airlines' FAM Section 2.200, pages 1 and 2, dated 12/13/2023.



Alaska. Flight Attendant Manual

Decompression
Section: 2.200
Page: 3
Date: 12/13/23

- Average Time of Useful Consciousness

Altitude	Time of Useful Consciousness
18,000 ft	20-30 minutes
22,000 ft	5-10 minutes
25,000 ft	3-5 minutes
28,000 ft	2½-3 minutes
30,000 ft	1-2 minutes
35,000 ft	30-60 seconds
40,000 ft	15-20 seconds
45,000 ft	9-15 seconds

SLOW AIR LEAKS

A hissing or squealing sound from a window, door, or exit may indicate a pressure leak. It may not necessarily affect cabin pressurization.

- Never attempt to muffle or plug a leak
- Immediately inform pilots; follow instructions
- Move passengers away from leak and ensure seat belts are fastened
- If leak is coming from near J/S, take a passenger seat nearest exit unless flight is full and no seat is available
- Watch for signs of hypoxia and be prepared for a possible decompression

PROCEDURES

Immediate Actions

- Immediately don nearest oxygen mask
- Secure self immediately by any means available
- Secure carts (if in aisle, angle cart against seat backs to "wedge" in place)
- If possible, advise pilots that masks have dropped; follow instructions
- Anticipate an emergency descent; the pilots will immediately descend A/C to an altitude where supplementary oxygen is not needed

Alaska. Flight Attendant Manual

Decompression
Section: 2.200
Page: 3
Date: EIB 24-7 4/3/24

- Average Time of Useful Consciousness

Altitude	Time of Useful Consciousness
18,000 ft	20-30 minutes
22,000 ft	5-10 minutes
25,000 ft	3-5 minutes
28,000 ft	2½-3 minutes
30,000 ft	1-2 minutes
35,000 ft	30-60 seconds
40,000 ft	15-20 seconds
45,000 ft	9-15 seconds

SLOW AIR LEAKS

A hissing or squealing sound from a window, door, or exit may indicate a pressure leak. It may not necessarily affect cabin pressurization.

- Never attempt to muffle or plug a leak
- Immediately inform pilots; follow instructions
- Move passengers away from leak and ensure seat belts are fastened
- If leak is coming from near J/S, take a passenger seat nearest exit unless flight is full and no seat is available
- Watch for signs of hypoxia and be prepared for a possible decompression

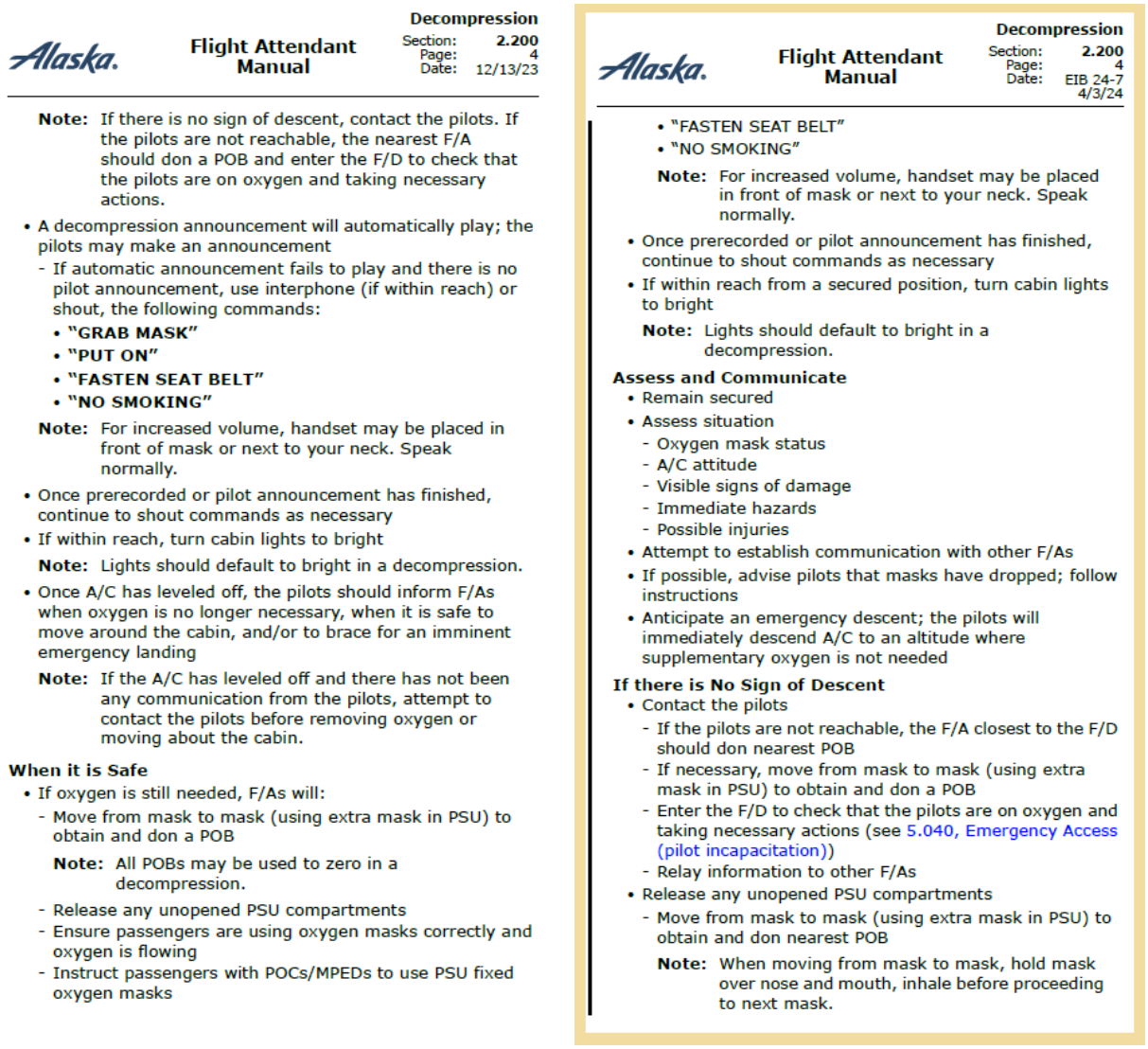
RAPID/EXPLOSIVE DECOMPRESSION

Procedures

Immediate Actions

- Immediately don nearest oxygen mask
- Secure self immediately by any means available
- Secure carts (if in aisle, angle cart against seat backs to "wedge" in place)
- A decompression announcement will automatically play; the pilots may make an announcement
  - If automatic announcement fails to play and there is no pilot announcement, use interphone (if within reach from a secured position) or shout, the following commands:
    - "GRAB MASK"
    - "PUT ON"

Figure 43. Alaska Airlines' FAM Section 2.200, page 3, dated 12/13/2023 (l) and 4/3/24 (r).



Alaska. Flight Attendant Manual — Decompression — Section: 2.200 — Page: 4 — Date: 12/13/23

Note: If there is no sign of descent, contact the pilots. If the pilots are not reachable, the nearest F/A should don a POB and enter the F/D to check that the pilots are on oxygen and taking necessary actions.

- A decompression announcement will automatically play; the pilots may make an announcement
  - If automatic announcement fails to play and there is no pilot announcement, use interphone (if within reach) or shout, the following commands:
    - **"GRAB MASK"**
    - **"PUT ON"**
    - **"FASTEN SEAT BELT"**
    - **"NO SMOKING"**

  Note: For increased volume, handset may be placed in front of mask or next to your neck. Speak normally.
- Once prerecorded or pilot announcement has finished, continue to shout commands as necessary
- If within reach, turn cabin lights to bright

  Note: Lights should default to bright in a decompression.
- Once A/C has leveled off, the pilots should inform F/As when oxygen is no longer necessary, when it is safe to move around the cabin, and/or to brace for an imminent emergency landing

  Note: If the A/C has leveled off and there has not been any communication from the pilots, attempt to contact the pilots before removing oxygen or moving about the cabin.

When it is Safe

- If oxygen is still needed, F/As will:
  - Move from mask to mask (using extra mask in PSU) to obtain and don a POB

    Note: All POBs may be used to zero in a decompression.
  - Release any unopened PSU compartments
  - Ensure passengers are using oxygen masks correctly and oxygen is flowing
  - Instruct passengers with POCs/MPEDs to use PSU fixed oxygen masks

Alaska. Flight Attendant Manual — Decompression — Section: 2.200 — Page: 4 — Date: EIB 24-7 4/3/24

- "FASTEN SEAT BELT"
- "NO SMOKING"

Note: For increased volume, handset may be placed in front of mask or next to your neck. Speak normally.

- Once prerecorded or pilot announcement has finished, continue to shout commands as necessary
- If within reach from a secured position, turn cabin lights to bright

  Note: Lights should default to bright in a decompression.

Assess and Communicate

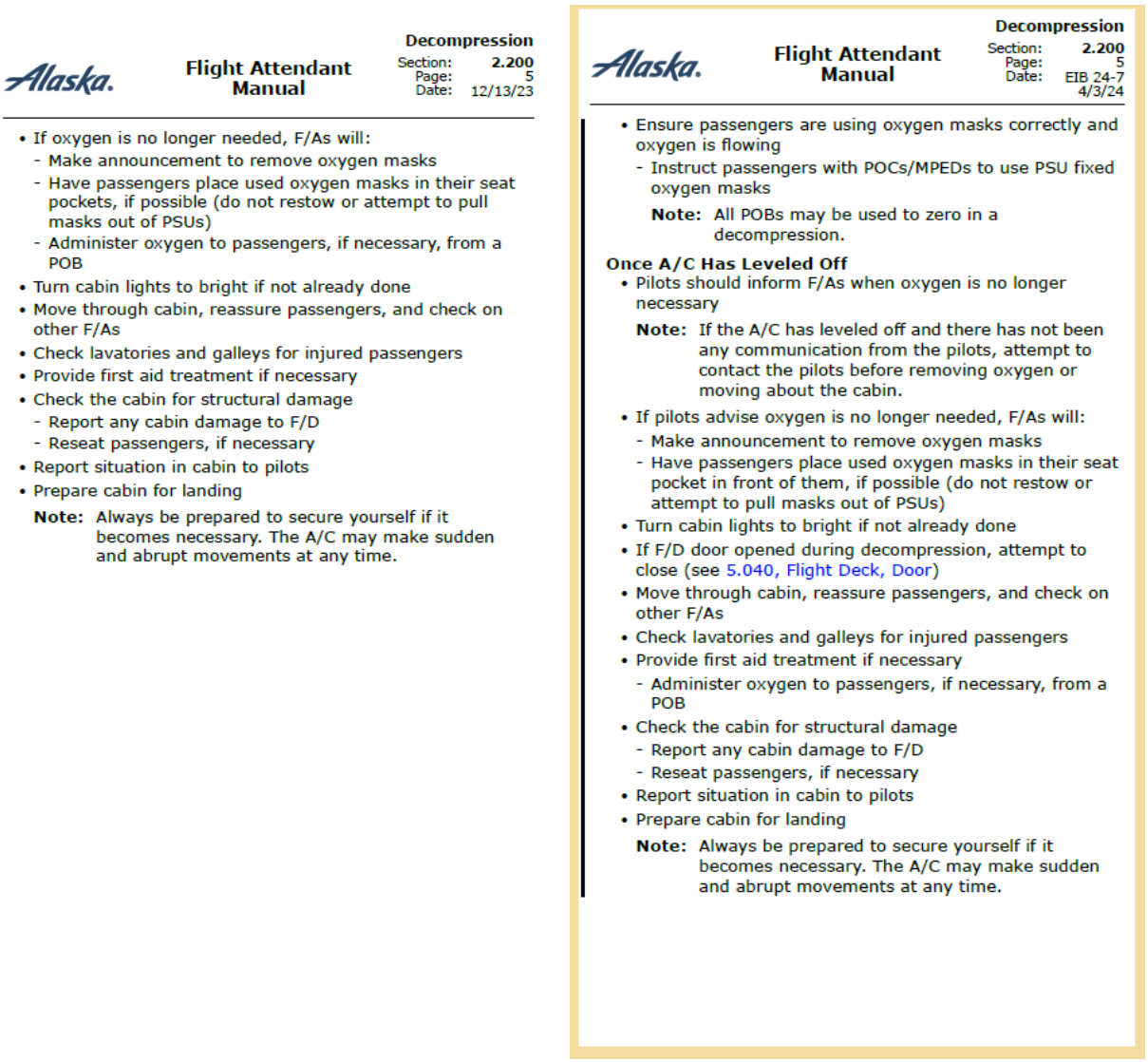
- Remain secured
- Assess situation
  - Oxygen mask status
  - A/C attitude
  - Visible signs of damage
  - Immediate hazards
  - Possible injuries
- Attempt to establish communication with other F/As
- If possible, advise pilots that masks have dropped; follow instructions
- Anticipate an emergency descent; the pilots will immediately descend A/C to an altitude where supplementary oxygen is not needed

If there is No Sign of Descent

- Contact the pilots
  - If the pilots are not reachable, the F/A closest to the F/D should don nearest POB
  - If necessary, move from mask to mask (using extra mask in PSU) to obtain and don a POB
  - Enter the F/D to check that the pilots are on oxygen and taking necessary actions (see 5.040, Emergency Access (pilot incapacitation))
  - Relay information to other F/As
- Release any unopened PSU compartments
  - Move from mask to mask (using extra mask in PSU) to obtain and don nearest POB

  Note: When moving from mask to mask, hold mask over nose and mouth, inhale before proceeding to next mask.

Figure 44. Alaska Airlines' FAM Section 2.200, page 4, dated 12/13/2023 (l) and 4/3/24 (r).



Alaska. Flight Attendant Manual — Decompression — Section: 2.200 — Page: 5 — Date: 12/13/23

- If oxygen is no longer needed, F/As will:
  - Make announcement to remove oxygen masks
  - Have passengers place used oxygen masks in their seat pockets, if possible (do not restow or attempt to pull masks out of PSUs)
  - Administer oxygen to passengers, if necessary, from a POB
- Turn cabin lights to bright if not already done
- Move through cabin, reassure passengers, and check on other F/As
- Check lavatories and galleys for injured passengers
- Provide first aid treatment if necessary
- Check the cabin for structural damage
  - Report any cabin damage to F/D
  - Reseat passengers, if necessary
- Report situation in cabin to pilots
- Prepare cabin for landing

Note: Always be prepared to secure yourself if it becomes necessary. The A/C may make sudden and abrupt movements at any time.

Alaska. Flight Attendant Manual — Decompression — Section: 2.200 — Page: 5 — Date: EIB 24-7 4/3/24

- Ensure passengers are using oxygen masks correctly and oxygen is flowing
  - Instruct passengers with POCs/MPEDs to use PSU fixed oxygen masks

Note: All POBs may be used to zero in a decompression.

Once A/C Has Leveled Off

- Pilots should inform F/As when oxygen is no longer necessary

Note: If the A/C has leveled off and there has not been any communication from the pilots, attempt to contact the pilots before removing oxygen or moving about the cabin.

- If pilots advise oxygen is no longer needed, F/As will:
  - Make announcement to remove oxygen masks
  - Have passengers place used oxygen masks in their seat pocket in front of them, if possible (do not restow or attempt to pull masks out of PSUs)
- Turn cabin lights to bright if not already done
- If F/D door opened during decompression, attempt to close (see 5.040, Flight Deck, Door)
- Move through cabin, reassure passengers, and check on other F/As
- Check lavatories and galleys for injured passengers
- Provide first aid treatment if necessary
  - Administer oxygen to passengers, if necessary, from a POB
- Check the cabin for structural damage
  - Report any cabin damage to F/D
  - Reseat passengers, if necessary
- Report situation in cabin to pilots
- Prepare cabin for landing

Note: Always be prepared to secure yourself if it becomes necessary. The A/C may make sudden and abrupt movements at any time.

Figure 45. Alaska Airlines' FAM Section 2.200, page 5, dated 12/13/2023 (l) and 4/3/24 (r).

5.4 Flight Attendant Training

Alaska Airlines provided instructor's notes for a 90-minute instructor-led session on decompression delivered to new hires during initial training. The session covered:

- A basic understanding of airplane cabin pressurization.
- A demonstration of slow decompression and rapid decompression using inflated balloons.
- The physical effects of a decompression and hypoxia, including a video.
- Information about time of useful consciousness and how important it was to obtain oxygen immediately and then secure themselves.

- The automatic decompression announcement and commands in case the announcement failed to play.
- The need to assess the situation in order to gather information to relay to the rest of the crew. For example, what is the status of the oxygen masks… what is the A/C attitude… are there any visible signs of damage… are there any immediate hazards… are there any possible injuries?
- The importance of establishing communication with other F/As and the pilots.
- POB donning and use, including an in-person demonstration by the instructor.
- A case study of the Helios flight 522 accident from 2005

The instructor's notes stated that once the airplane had leveled off, the pilots should inform F/As when oxygen was no longer necessary and when it was safe to move about the cabin and/or to brace for an imminent emergency landing. It further stated that "if the pilots advise that it is safe to move about the cabin, but supplemental oxygen is still needed, F/As will move from mask to mask, using the extra masks in the PSU, to obtain and don a POB. POBs may be used to 0 psi in a decompression." Additionally, Alaska Airlines provided the instructor's notes for a hands-on decompression and PSU drill performed in initial training. In the drill each F/A was required to respond to a simulated rapid decompression while shouting decompression commands and then manually deploy PSU masks using a straightened paperclip.

Alaska Airlines also provided the computer-based training materials pertaining to decompressions used during the home study portion of the 2023 recurrent training cycle. Five slides germane to this accident are included below as figures 46-50.

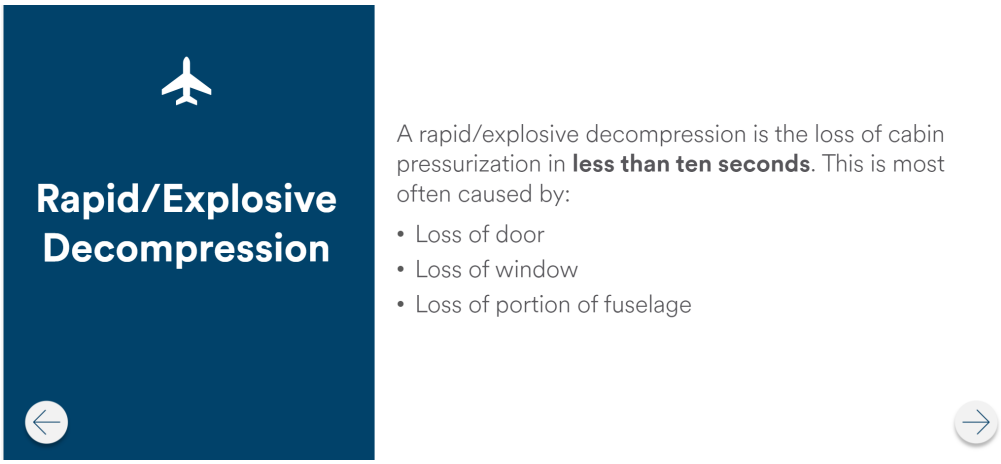


Figure 46. Alaska Airlines' 2023 recurrent training slide discussing rapid decompression.

A rapid/explosive decompression can be identified by a loud noise in the vicinity of the opening and a wind blast accompanied by flying debris and dirt or dust.

The cabin may also experience a rapid drop in temperature accompanied by fogging.

Figure 47. Alaska Airlines' 2023 recurrent training slide discussing rapid decompression.

Rapid/explosive decompressions are extremely rare and can cause severe damage to the aircraft.

With a rapid/explosive decompression the chance of injury and loss of life is significant.

The best way to stay safe during a decompression is to don an oxygen mask and secure yourself.

Figure 48. Alaska Airlines' 2023 recurrent training slide discussing rapid decompression.

Indications of a Decompression

During a decompression, when the cabin pressure reaches 14,000 ft or when activated by the F/D:

- Oxygen masks will automatically drop
- A prerecorded announcement in English and Spanish plays instructing Guests to don masks
- All lights turn on bright
- (Airbus) Emergency lights will illuminate

The first awareness of a decompression may be the presentation of these items.

Figure 49. Alaska Airlines' 2023 recurrent training slide discussing indications of a decompression.

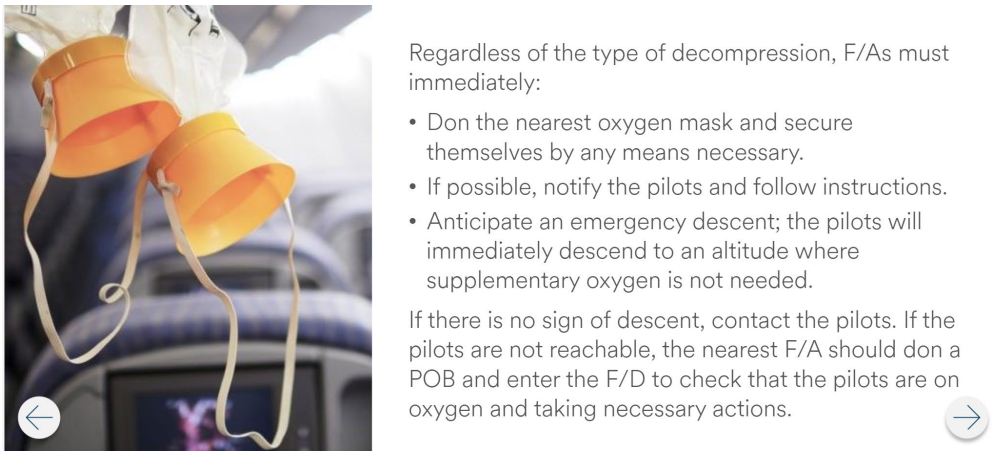


Figure 50. Alaska Airlines' 2023 recurrent training slide discussing F/A procedures after a decompression.

5.5 Postaccident Training Changes

Alaska Airlines provided a list of changes that the F/A training department was in progress of completing as of June 14, 2024. The list included:

- Updating both initial and recurrent training to provide F/As more information and a demonstration about how to don the POB mask used on the accident flight. (Alaska Airlines was also considering replacing the current POB mask with the "Dixie cup" mask used in PSUs.)
- Updating both initial and recurrent training to emphasize need for F/As to immediately secure themselves following signs of decompression and that pilots may not descend immediately to 10K feet when it is not safe to do so or when flying through restricted airspace.
- Updating both initial and recurrent training to describe the mask-to-mask procedure for moving about the cabin prior to captain announcing that it is safe to move about without oxygen. The updated procedure was only to be used immediately after a decompression in order to reach the closest passenger seat, jump seat or POB if there were no nearby passenger seats available to secure themselves.
- Updating both initial and recurrent training to emphasize that F/As should access the flight deck only when there was no sign of descent and no communication from the flight deck. "F/As need to realize that during an emergency, pilots are super focused on their checklists and their priorities are to 'aviate, navigate, communicate.' F/As may need to wait for a response from the [flight deck]."

- Updating both initial and recurrent training to explain how the flight deck door behaves during a decompression and to prioritize the need for F/As to secure themselves before attempting to close the door.

6.0 Medical and Pathological Information

After landing, seven passengers reported receiving minor injuries to Alaska Airlines (including bruises and neck or ear pain) but were not transported to hospitals.[17] Flight attendant D reported that she received bruises on her right arm and knee when the flight deck door opened and struck her during the decompression.

	Fatal	Serious	Minor	None	TOTAL
Flight Crew	0	0	0	2	2
Cabin Crew	0	0	1	3	4
Passengers	0	0	7	165	171
Others	0	0	0	0	0
TOTAL	0	0	8	170	177

Figure 51. Injury summary of occupants on board flight 1282.

Submitted by:

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E. LIST OF ATTACHMENTS

Attachment 1 – F/A Interview Transcripts
Attachment 2 – Passenger Interview Summaries

[17] Alaska Airlines reported that an additional two passengers independently sought medical observation for a chronic medical condition and/or examination at local medical facilities and were released the same day without documented injuries.