



NATIONAL TRANSPORTATION SAFETY BOARD

Office of Aviation Safety
Washington, D.C. 20594

July 5, 2017

Group Chairman's Factual Report

SURVIVAL FACTORS

DCA17FA021

A. ACCIDENT

Operator : American Airlines
Airplane : Boeing 767-300ER [N345AN]
Location : Chicago, IL
Date : October 28, 2016
Time : ~ 1432 central daylight time (CDT)¹
NTSB # : DCA17FA021

B. SURVIVAL FACTORS GROUP²

Chairman : Peter Wentz
National Transportation Safety Board
Washington, DC

Member : Jennifer Curry
Federal Aviation Administration
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Fort Worth, TX

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The Boeing Company
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¹ All times in this report are central daylight time, based on a 24-hour clock.

² Not all group members were present for all activities.

C. SUMMARY

On October 28, 2016, at about 2:32 CDT, American Airlines flight number 383, a Boeing B767-300, N345AN, powered by two General Electric CF6-80C2B6 turbofan engines, experienced a right engine uncontained failure and subsequent fire during the takeoff ground roll on runway 28R at the Chicago O'Hare International Airport (ORD), Chicago, Illinois. The flight crew aborted the takeoff and stopped the aircraft on runway 28R and an emergency evacuation was conducted. Of the 161 passengers and 9 crew members onboard, one passenger received serious injuries during the evacuation and the airplane was substantially damaged as a result of the fire. The flight was operating under the provisions of 14 Code of Federal Regulations Part 121 as a domestic scheduled passenger flight to Miami International Airport (MIA), Miami, Florida.

D. DETAILS OF THE INVESTIGATION

1.0 Airplane Configuration

The airplane was configured with 28 first class passenger seats (zone A), 178 travel-class passenger seats (18 seats in zone B and 160 seats in zone C), 2 cockpit flight crew seats, 2 cockpit observer seats, and 10 retractable flight attendant (F/A) jumpseats. There were 8 emergency exits, 4 floor-level Type A (door) exits and 4 overwing Type III exits (figure 1).

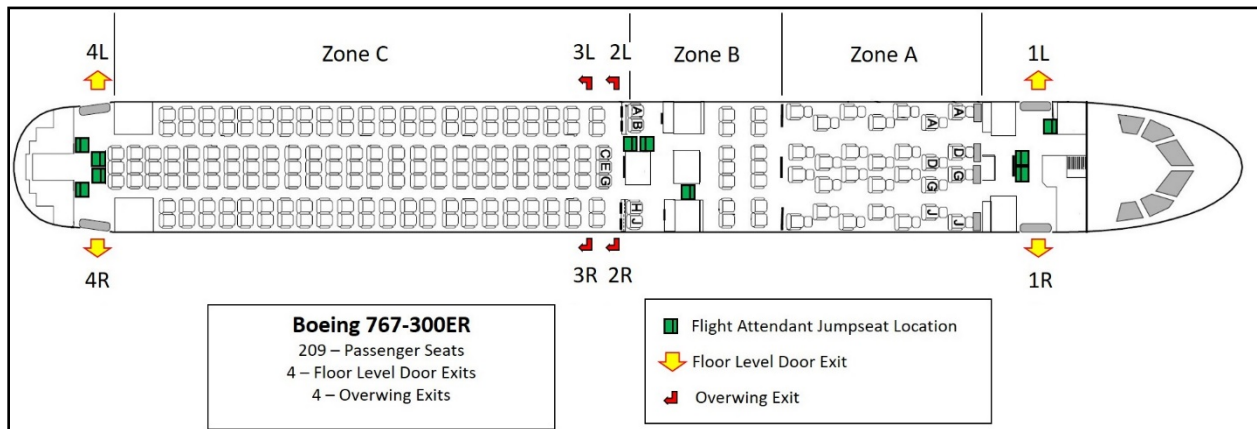


Figure 1 - Cabin configuration for N345AN.

2.0 Flight Attendants

Flight 383 was operated with 7 F/A's. The table below provides the F/A position, jumpseat location, F/A initial new hire date and last recurrent training date.

FA Position	Jumpseat Location	Initial New Hire Date	Last Recurrent Training Date
#1 - Lead	1L	April 1988	April 2016
#2	4L	November 1998	November 2015
#3	4R	November 2014	November 2015
#4	2R	July 1991	March 2016
#5	1R	October 1989	July 2016
#6	2L Fwd Facing	April 1984	April 2016
#7	2L Aft Facing	November 1989	October 2016

Table 1 - Flight attendant position, location and training dates.

2.1 Flight Attendant Manual

American Airlines provided a copy of a current flight service inflight manual dated 24DEC16³. Pertinent sections are shown below.

Departure/Taxi Departure/Taxi - 1.12

TAXI/MOVEMENT ON THE SURFACE

Per **FAR 121.391**, FAs must remain in assigned jumpseats with safety belts and shoulder harnesses fastened except to perform safety-related duties during movement on the surface.

Safety-related duties include:

- Pick up of pre-departure items
- Safety Demo
- Safety Compliance Checks
- Securing galleys
- Responding to customer calls

Ensure that all customers are seated with seatbelts fastened at all times and that carts are stowed prior to taxi. See *Departure/Taxi – Safety Compliance Checks*.

The FA 1 / A-FA / Purser will communicate with the captain regarding anticipated taxi conditions and advise other FAs accordingly.

Notify the captain if a customer stands or leaves his or her seat during taxi. You must also advise the captain when the customer has returned to their seat.

Taxi Interruption

If the aircraft stops for an extended period of time during taxi, the captain may communicate to FA 1 / A-FA / Purser that FAs may leave their jumpseats to attend to customers. FA 1 / A-FA / Purser may initiate contact with the captain if necessary.

Ground Delay Beverage or Meal Service, Tarmac Delay Snack Kit Service

If a Ground Delay Beverage or Meal Service or a Tarmac Delay Snack Kit Service is to be performed while on the ground, refer to:

General Policies and Guidelines – Ground Delay Beverage or Meal Service and General Policies and Guidelines – Tarmac Delay Snack Kit Service.

30-SECOND REVIEW

A 30-Second Review must be completed during taxi, takeoff, and landing to help prepare you to respond to emergency situations.

The acronym "ESCAPE" can help you remember to mentally prepare yourself:

Exit: Primary Exit/Secondary Exit

Signal: "This is the captain. Evacuate. Evacuate. Evacuate."/Signaling System

Commands: What are my commands?

Assess: What are the outside conditions?

Procedures: How do I operate my exit?/Any special needs passengers?

Equipment: Location of Flashlight/Life Vest/Oxygen/Emergency Equipment

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Figure 2 – Section 1.12 Flight attendant 30-second review procedures.

³ The date shown in the lower left-hand corner reflects the revision date for each individual manual page.

GENERAL PRINCIPLES OF EVACUATION

- If an emergency situation develops, be prepared to evacuate the aircraft. Stay alert to clues that may signal a possible emergency.
 - Unusual noises
 - Fire, sparks, or smoke
 - The need to evacuate may not always be obvious. FAs must evaluate the level of danger and clearly communicate any conditions that may warrant an evacuation.
 - Impact forces
 - Abnormal aircraft attitude
 - Do not initiate an evacuation until the aircraft has come to a complete and final stop.
 - Be prepared for more than one impact.
 - Be alert to any sense of motion, i.e., any sense of movement out the window, or outside noises if vision is impaired.
 - Begin evacuation command immediately upon signal from the flightdeck.
 - If one FA initiates an evacuation, all FAs must initiate evacuation procedures immediately by shouting evacuation commands.
- Be prepared; the captain may provide additional instructions over the PA immediately after landing or when the aircraft comes to complete stop. For example,
- Specific exit(s) **not** to be used. Note, any time the captain specifies an exit during an evacuation PA, it means **not** to use that exit.
 - **"Remain Seated, Remain Seated"** may be given to advise passengers/crew that conditions have changed and an evacuation is no longer required. (e.g., information received by Airport/Rescue/Firefighters, ATC). Should you hear this command, safely stop the evacuation.
 - It is critical for FAs to update the captain if cabin conditions warrant an evacuation. The flightdeck may be unaware of life-threatening situation(s) - e.g., excessive smoke, fire.
 - If the aircraft is on the taxiway and **time permits**, notify the flightdeck prior to initiating the evacuation.
 - This will enable the flightdeck to begin their checklist, e.g., engine shutdown, pulling circuit breakers, configuring wing flaps, etc. Accomplishing these tasks reduces the chance of injury to passengers/crew exiting the aircraft.
 - If an evacuation is necessary and the aircraft is still moving, notify flightdeck immediately using aircraft specific emergency call procedures. Refer to *General Policies and Guidelines - Interphone calls*

Evacuation Procedures

Step	FA Action
1	The aircraft must be at a complete stop.
2	Designated FA will turn on emergency lights.
3	On aircraft such equipped, turn on signaling system.
4	<ul style="list-style-type: none"> • Prior to opening an exit, assess conditions outside to determine if exit and escape route is safe. Unsafe conditions would include: <ul style="list-style-type: none"> ◦ Fire or dense smoke ◦ Aircraft damage or obstruction ◦ Engine(s) still operating • Continue to assess outside conditions between each set of commands.

Figure 3 – Section 3.1 Flight attendant general principles of evacuation.

Step	FA Action
5	<ul style="list-style-type: none"> • Utilize all exits unless blocked or instructed by the captain not to use. • Safely operate the exit and ensure slide is inflated. <ul style="list-style-type: none"> ◦ Some overwing exits are equipped with a combination ramp/slide. • Assume and maintain a protected position. • Shout commands in a loud, authoritative, but controlled voice. • Establish and maintain a constant, orderly flow out of the exit. <ul style="list-style-type: none"> ◦ 1 person per second - single lane slide. ◦ 2 people per second - double lane slide.
6	<ul style="list-style-type: none"> • Give appropriate commands as necessary. Redirect passengers if: <ul style="list-style-type: none"> ◦ An exit becomes unusable. ◦ An exit area becomes more/less congested than another.
7	Assist any UMs, elderly, and disabled passengers.
8	Visually check to verify your immediate cabin area is clear. Obtain flashlight at FA jumpseat before exiting the aircraft. Flashlight will illuminate when removed from bracket.
9	<ul style="list-style-type: none"> • Exit the aircraft. • Gather passengers away from aircraft. • Follow the captain's instructions. • Ensure that all passengers/crew are present (conduct headcount) and report information to the captain. • Ensure that no passengers or crew attempt to re-enter the aircraft. • Ensure no smoking compliance. • Deadheading and non-revenue FAs should act as passengers during an evacuation, however may be used as assistants. • Make no unauthorized comments to the media or unauthorized persons regarding the incident. This includes deadheading and non-revenue FAs.

FA AND FLIGHTDECK CREW AUTHORITY

In a life-threatening situation, e.g., fire, smoke, impact forces, or abnormal aircraft attitude, and when the aircraft has come to a complete stop, FAs have the authority to initiate an evacuation without awaiting instructions from the flightdeck.

- FAs will attempt to communicate with flightdeck prior to evacuation, if possible.
- If contact with the flightdeck is not possible, FAs will make an independent decision regarding evacuation and operate all usable exits.
- The captain has the authority to override FA procedures.
- The captain has authority to check crews' knowledge of emergency procedures.

Figure 4 – Section 3.2 Flight attendant crew authority.

767 DOOR ARMING/DISARMING

To Arm Door

- Lift the plastic cover.
- Push in on the green button next to the arming lever.
- Keep button depressed and push arming lever outboard.
- Replace the plastic cover.

To Disarm door

- Lift the plastic cover.
- Pull the arming lever inboard.
- Lower the plastic cover.

767 EVACUATION SIGNALING SYSTEM

- Signaling system control panels are located in the cabin on most FA jumpseat control panels and in the flightdeck.
- The system can be activated from a FA control panel or by a switch in the flightdeck.
- The command switch in the flightdeck or cabin that was used to initiate the signaling system will illuminate red. Others will not illuminate.

To Activate the Signaling System

- Lift the plastic cover on the command switch and depress the button one time.
- Do not activate the signaling system until the aircraft comes to a complete and final stop.

767 DOOR/SLIDE OPERATION

- Dual lane slides normally complete inflation within three to four seconds after the slide falls approximately fourteen inches from the doorsill.
- The sliding surface does not inflate in order to lessen the possibility of a puncture from a sharp object.
- Battery operated lights at the foot end of the slide will illuminate the ground area.

To Open the Door in the Armed Mode

- Raise the door control handle fully to the up position.
- Release the handle.

If Door Unlocks and Moves Inward, But Does not Raise

- Raise door manually using recessed assist handles.

Figure 5 – Section 767-4.1 Flight attendant door procedure and evacuation signaling system.

767 OVERWING EXITS WITH RAMP/SLIDES

- A single lane ramp and double lane slide deploy automatically off the trailing edge of the wing in approximately seven seconds.
- 767-300ER aircraft have a double lane ramp.
- The wing spoilers are automatically retracted to prevent damage to the ramp/slide.

Using 767 Overwing Exits with Ramp/Slides

- Move people out of seats adjacent to exit.
- Approach exit, face AFT.
- Remove the protective cover over handle, if applicable.
- Using hand nearest exit, grasp lower handhold.
- Place outboard shoulder against exit.
- Place other hand, knuckles up, in recessed area at top of exit and pull in and down on handle until exit releases. This action initiates the inflation of the off-wing ramp/slide.
 - Opening either overwing exit on each side will initiate inflation of off-wing slide.
- Lift exit from fuselage frame using handholds.
- Place exit horizontally onto row, flush against seatbacks.
- Overwing exits are always in the ARMED MODE unless they are deactivated by maintenance.

767 FLIGHTDECK WINDOW

During an evacuation, use flightdeck windows only a last resort and only if all cabin exits are blocked. Procedures for operating flightdeck windows are as follows:

- 1 Press the release button on the top of the lock lever.
- 2 Rotate lever AFT and lock it in the full position.
- 3 Use the hand crank under the window to fully open.

767 SLIDE MALFUNCTION

If Slide Falls Inward at Door

- Push it out of doorway.

If Slide Does not Inflate at Door

- Jerk up on red manual inflation handle located on top of girt, RH side.

If Slide/Ramp Does not Inflate at Overwing Exits

- Unsnap manual inflation handle pouch, located in the upper AFT edge of the overwing exit frame.
- Pull the white manual inflation handle.

Figure 6 – Section 767-4.2 Flight attendant overwing exit procedures.

767 LAND EVACUATION COMMANDS - DOOR EXITS

- To protect passengers during impact, command:
 - "BRACE FOR IMPACT!"
 - When aircraft comes to a complete stop, command:
 - "OPEN SEATBELTS"
 - "GET OUT"
 - "LEAVE EVERYTHING"
 - Leave jumpseat, repeat commands to cabin.
 - Switch ON Emergency Lights (FA 1/ Purser).
 - Switch ON signaling system, if applicable.
 - Assess and operate the exit safely.
 - Assume protected position with International Stop Sign raised.
 - Command passengers to:
 - "COME THIS WAY:"
 - "LEAVE EVERYTHING"
 - Assign two assistants: (point at each assistant)
 - "HELP AT BOTTOM"
 - "HELP AT BOTTOM"
 - Ensure slide/liferaft inflates properly and then lower International Stop Sign.
 - If slide is usable, lower International Stop Sign and command:
 - "JUMP AND SLIDE"*
 - "JUMP AND SLIDE"*
 - "LEAVE EVERYTHING"
 - Assess and repeat commands.
 - Once area is clear, check immediate cabin area, obtain flashlight and evacuate.
- *Situational Guidance:** Add alternate command "FORM TWO LINES" (if necessary) to ensure both sliding lanes are used.




Figure 7 – Section 767-5.1 Flight attendant land evacuation commands – exit doors.

767 LAND
 EVACUATION COMMANDS – OVERWING EXITS

- To protect passengers during impact, command:
 - **"BRACE FOR IMPACT!"**
- When aircraft comes to a complete stop, command:
 - **"OPEN SEATBELTS"**
 - **"GET OUT"**
 - **"LEAVE EVERYTHING"**
- Leave jumpseat, repeat commands to cabin.
- Switch on signaling system, if applicable.
- Assess exit row, and row AFT of exit.
- Move passenger out of row adjacent to overwing exit:
 - **"MOVE"** **"MOVE"**
- Operate exit and place horizontally on the armrests.
- Assess outside to ensure off-wing ramp/slide deploys and inflates properly.
- Assume protected position; elevate (conditions permitting) on any unobstructed aisle seat providing visual access to the overwing exit(s).
- Command passengers to:
 - **"COME THIS WAY"**
 - **"LEAVE EVERYTHING"**
- Commence evacuation with:
 - **"STEP OUT, FOLLOW THE ARROWS"**
 - **"LEAVE EVERYTHING"**
- Assess and repeat commands:
 - **"STEP OUT, FOLLOW THE ARROWS"**
 - **"LEAVE EVERYTHING"**
- If other usable overwing exits have not been opened, command a passenger to:
 - **"OPEN THAT EXIT"** (Point to exit).
- Assess and repeat commands:
 - **"STEP OUT, FOLLOW THE ARROWS"**
 - **"LEAVE EVERYTHING"**
- Once area is clear, check immediate cabin area.
- Obtain flashlight and evacuate.

***Situational Guidance:** Escape from overwing exits is slower. Constantly assess cabin and redirect to quicker usable exits if area becomes congested:

- **"GO FORWARD/BACK"** (point to exit or cabin area if visible).
- **"CROSS OVER"** (point to exit or cabin area if visible).



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Figure 8 – Section 767-5.2 Flight attendant land evacuation commands – overwing exit.

767-300ER 2-CLASS PLANNED DUTY ASSIGNMENT CHART

FA	#1	#2	#3	#4	#5
PA Position (Cklist Step 4)	PA	Zone C LH Side	Zone C RH Side	Zone A & B RH Side	Zone A & B LH Side
Briefing Area (Cklist Step 4)	Zone A	Zone C LH Side	Zone C RH Side	Zone B RH Side	Zone B LH Side
Exit Briefing (Cklist Step 5)	1L	4L	4R	2R & 2L, 2R & 2L If #6 onboard, 2R & 2L only	1R
Exit Operation	1L	4L	4R	2R(Primary) 2L(Secondary) If #6 onboard, 2R only	1R

FA	#6	#7	#8	#9
PA Position (Cklist Step 4)	Assist Zone C	Assist Zone C	Assist Zone B	Assist Zone B
Briefing Area (Cklist Step 4)	Assist Zone C	Assist Zone C	Assist Zone B	Assist Zone B
Exit Briefing (Cklist Step 5)	3R & 3L	N/A	N/A	N/A
Exit Operation	2L	Flow Control Zone C	Flow Control Zone B	Flow Control Zone C

CAPTAIN: Assists and directs the evacuation, obtains megaphone (if possible) and evacuates from 4L or 4R Door, if possible.
F/O: Obtains a Halon extinguisher (if possible) and exits through 1L or 1R Door, if possible. Assists outside as necessary.

I want to return to step:

Step 2
Purser Briefing

Step 4
Cabin Prep

Step 5
ABP Briefing

Figure 9 – Section 767-5.21 Flight attendant planned duty assignment chart.

3.0 Evacuation Summary

A summary of the activity in the cabin after the uncontained engine failure was produced using flight attendant interviews conducted in Chicago, IL on November 2, 2016 by the Survival Factors Group.

3.1 Flight Attendant Evacuation Summary

According to flight attendant interviews, (attachment 1) passengers immediately moved from the right side of the airplane to left side of the airplane while it was still moving down the runway. Once the airplane came to a stop, passengers started rushing toward the exits requesting the flight attendant crew to open the doors and evacuate. A summary of each flight attendant's actions during the evacuation follows:

FA #1 (lead) was seated at the 1L jumpseat during the take-off roll when he heard a loud noise and felt the airplane shudder and shake. His first thought was the airplane experienced a blown tire. After the airplane came to a stop, he stood up to assess his area and wait for the pilot to make an announcement. Passengers started to rush the 1L door area requesting him to open the door and exit the airplane. He tried to contact the cockpit but was unable. Seeing a smoky haze in the aft cabin, he opened the 1L door and initiated the evacuation. He continued the evacuation until all passengers had exited, he cleared the first class area and then reported to the pilots that the cabin was clear and exited out the 1L door.

FA #2 was seated at the 4L jumpseat when she heard a loud noise and felt the airplane fishtail. She saw flames coming from the right wing and picked up the interphone to call the captain but could not recall how to dial it. Immediately passengers were at her door pleading to get off the airplane. She attempted to contact the cockpit to have them shut down the engines but was unsuccessful. Passengers were continuing to plead with her to let them off the airplane. She continued to hold back passengers to allow more time for the pilots to shut down the engines before evacuating. The cabin began filling with smoke and she was concerned the airplane was heavy with fuel so she decided to evacuate. The 4L slide deployed but was blowing towards the rear of the airplane because the engine was still running. She and #3 held passengers back until the slide stabilized and then began the evacuation. Once her area was clear, she exited the airplane out the 4L door.

FA #3 was seated at the 4R jumpseat when he heard a loud grinding noise and felt the airplane begin to fishtail. The cabin was lit up with fire on the right side of the airplane back to his door at 4R. Before they came to a stop passengers were screaming and climbing over middle seats and moving over to the left side. He attempted to use the interphone to make a PA to instruct everyone to remain calm. He moved to the 4L door area to assist FA #2 as passengers continued to ask them to open the door and let them out. He and FA #2 were waiting to hear from the captain and for engines to shut down before they began evacuating. As they were waiting the cabin began to fill with smoke, so they decided to open the door and evacuate. Once the door was open he could see passengers rolling across the runway behind the engine and the slide blowing to the rear. Once the engine shut down, the slide aligned itself and he continued evacuating passengers until the area was clear and exited out the 4L door.

FA #4 was seated at the 2R jumpseat when she heard a loud boom and she assumed it was a blown tire. About a half second later she heard a loud explosion and saw fire. Passengers in the H/J seats jumped up out of their seats even though the airplane was still moving. She shouted at them, “remain seated, remain seated, heads down, heads down”, but they continued to rush toward her jump seat. The airplane came to a complete stop and she instructed them to “Get out, get out”. With her exit blocked she ran to the aft of the first class cabin and saw the forward doors were open. She redirected passengers to the front of the airplane. Passengers were trying to get bags out of the overhead bins, so she told them repeatedly “don’t take anything with you”. She went around to the 2L overwing exit and saw FA #7 elevated on a seat in the smoke evacuating passengers out the exits so she directed passengers to those exits. A male passenger came with a bag and she had an oral altercation with him regarding his refusal to drop the bag. He refused to drop it and proceeded forward with the bag over his head. Her cabin area was getting smoky and she was fearful the airplane would explode, so after checking about 10 rows on the right aisle, she evacuated out the 2L overwing exit.

FA #5 was seated at the 1R jumpseat when she heard a loud bang. The airplane was shaking and she was waiting for the pilots to tell the flight attendants what had happened. Before she heard any announcement, the passengers started rushing toward her shouting “fire, open the door, open the door”. She did not see fire, but FA #1 had turned around and saw smoke in the cabin and had opened his door. She assessed out her door window, she saw no fire, and opened the 1R door. Once the door was opened, she saw fire outside and blocked the exit by holding up her hands to stop passengers from using that exit. She shouted at passengers to use the 1L door and continued blocking the 1R door. Once all passengers had evacuated, she exited out 1L door.

FA #6 was seated at the 2L forward facing jumpseat and heard a loud bang. The pilot kept the airplane steady and brought it to a complete stop. She looked out the right window past seat 17 H and J and she saw fire. She unfastened her seatbelt and turned around toward the 2L exit. FA #7 was at the 2L exit opening it, so she moved in front of seat 20C and started her commands re-directing passengers forward. A woman came to her area with a large bag. She instructed the woman to leave the bag and evacuate the airplane. The woman would not comply so she tried to take the bag away from the passenger. After a short struggle over the bag the FA decided the woman was causing a delay in the evacuation and instructed her to exit the airplane with the bag. Once the cabin was clear of passengers she exited the 2L overwing exit, she jumped into the slide but at the bottom came off the slide and hit another woman in front of her. She twisted her ankle because of the collision.

FA #7 was seated at the 2L aft facing jumpseat when he heard a loud noise and saw black smoke. Passengers started jumping out of their seats while the airplane was still moving. He started yelling “stay down, stay down” but the passengers didn’t listen. Once the airplane came to a complete stop, he opened the 2L forward overwing exit, even though it wasn’t his exit and started commanding passengers out the window exits. FA #6 had come aft and elevated on a seat and was directing passengers. The overwing exit was becoming slow so he directed passengers forward toward first class. The cabin was starting to fill with a haze of grey smoke and he thought the interior panels were burning and could see the window glass melting on the right side. He continued evacuating passengers until the cabin was empty and evacuated out the 2L overwing exit.

3.2 Evacuation Timeline

Table 2 is a timeline of the evacuation developed by using videos provided by persons inside the terminal at Chicago O’Hare International Airport (attachment 4 and 5).

Elapsed Time	
0:00	Airplane comes to stop
0:15	Left side overwing exit opened
0:19	Left side overwing exit ramp/slide deployed
0:31	1st occupant evacuated left overwing exit
0:31	1L exit opened
0:37	1L slide/raft fully deployed
0:40	4L exit opened
0:44	1st occupant evacuated 1L slide/raft
0:46	4L slide/raft fully deployed and unusable - blown aft by left engine
1:09	4L slide/raft fully deployed - repositioned forward - unassisted
1:11	4L slide/raft fully deployed and usable
1:25	1st occupant evacuated 4L slide/raft
2:02	Airport operations vehicle arrives
2:11	Last occupant evacuated 1L slide/raft
2:21	Last occupant evacuated 4L slide/raft

Table 2 – Evacuation timeline.

3.3 Passenger Evacuation Summary

American Airlines provided the survival factors group with a passenger manifest from flight 383. The group chairman randomly selected passengers to contact from the manifest to document passenger observations of the evacuation.

A male passenger in seat 20B (attachment 2) stated he boarded the aircraft and recalled watching the emergency safety demonstration. During the takeoff roll he stated he was looking out the window and recalled the aircraft getting close to lifting off when he heard two loud explosions and the airplane shuttered, followed by the airplane wobbling at high speed down the runway. He stated that flames could be seen coming from the right wing and the windows on that side of the airplane had started to crack. The crew had started yelling “stay in your seats” as the airplane came to a stop. He stated that he reached past the woman sitting next to him to release the hatch, the only thing to do was get out of the airplane fast, which he did. He exited the airplane through the

hatch and bent over to get to the trailing edge of the wing, he sat down on the slide. He stated no one was there to assist him so he sat down and went down the slide. At the bottom, he tumbled off the slide. He stood up to get away from the airplane and was blown over by the thrust coming out of the back of the engine. He got back up again ran to a grass strip next to the runway. He could feel pain in his back.

A male passenger in seat 21B stated that everything appeared to be normal from the starting of the engines to the taxi for takeoff. During the takeoff roll, he heard a loud bang. Almost instantaneously he saw what he thought were "orange sparks" and the gentleman sitting next to him stated they were on fire. The flight attendant sitting right in front of him said more than once for everyone to sit down; very forcefully and calmly. As soon as the aircraft came to a stop, he stood up to open the exit (he never heard an evacuation command but was very focused on getting the door open). He exited out the door and down the slide. The left engine was still running as he passed behind it as he proceeded to the grass on the side of the runway.

A female passenger in seat 40A recalled hearing the safety briefing, then started reading a book as the airplane started its take-off roll. She stated hearing a loud noise followed by fire filling the entire right side windows of the airplane. After the airplane came to a stop she picked up her back pack that was stowed at her feet and headed toward the last exit door on the left side of the airplane. She stated that the flight attendant did not want to open the door until the captain had given approval. Once the door was open she recalls the crew telling passengers to form two lines and jump out of the airplane. When it was her turn, she jumped into the slide and lay back until she was at the bottom. She exited the slide and ran with the rest of the passengers away from the airplane.

A female passenger in seat 43C stated that she and her traveling companion were talking to each other as the airplane started to take-off. A loud noise caught her attention followed by fire along the right side of the airplane. After the airplane stopped she picked up her purse and stood up to leave, but was twisted in her seat by other passengers running for the exit door. She stated seeing about 20 passengers standing around the last exit door on the left side yelling for the crew to open the door and get out. She recalls it took the crew some time to open the door, but once opened she had no issues exiting the airplane. Once on the ground she ran with the rest of the passengers away from the airplane, but stated her traveling companion stayed back to help other passengers get off the slide.

4.0 Flight Attendant Training

4.1 Flight Attendant Training

Members of the survival factors group met at the American Airlines headquarters in Fort Worth, Texas on January 12 -14, 2017. American Airlines utilizes two training facilities for flight attendant training, the Flagship University at 4501 Highway 360 and the Flight Academy at 4601 Highway 360 in Fort Worth, TX. American Airlines instructors train all American Airlines flight attendants.

4.1.1 Initial New Hire Training

The SF group observed an initial new hire (INH) training class at the Flagship University. The INH class received training on planned emergency procedures. The instructors used PowerPoint presentation, handouts and the in-flight manual (IFM) to train the INH class on the six-point checklist for planned emergencies and preparation for cabin and passenger evacuations. The six points covered in this training prepare the airplane and passengers of an emergency. Each FA used the planned duty assignment chart to ensure each step was taken in order. If time is not permitted to finish, the chart is designed to cover assignments by order of importance.

4.1.2 Continuing Qualification Training

The SF group observed continuing qualification⁴ (CQ) training at the Flagship University. Flight attendants followed the advanced qualification program (AQP) guidelines for annual continuing qualifications. The SF group observed crewmembers operating emergency exits by opening simulator doors and commanding evacuations. Program requirements as per FAA Advisory Circular 120-54 are:

- 1) Task Analysis and Qualification Standards
- 2) Curriculum
- 3) Lesson Plans
- 4) Program Audit Database
- 5) Personnel Records Database
- 6) Performance/Proficiency Database (PPDB)

Through this program, the FA receives practical hands-on training for door operation in normal and emergency mode, hands on emergency equipment training, along with classroom instruction and web based instruction. The training involves instructor-facilitated, scenario-based training in both the simulator and classroom, and conducting emergency scenarios ranging from inflight fires to full-scale evacuations. The training data collected is used to design the next year's annual training.

⁴ Formerly known as recurrent or annual training.

5.0 Flight Attendant Training Facility

5.1 Boeing 767 Door Trainers

American Airlines utilizes two Boeing 767 simulators to train flight attendants.

5.1.1 Flagship University Boeing 767 Door Trainer

The first B-767 simulator was located in the Exit and Operation Room (EOR) at the Flagship University. The simulator has a Type A floor level exit door (photograph 1) and a Type III overwing exit (photograph 2) This simulator is utilized for exit drill procedures.



Photograph 1 – Boeing 767 door trainer Type A exit.



Photograph 2 – Boeing 767 door trainer Type III exits.

5.1.2 Flight Academy Boeing 767 Door Trainer

The second B-767 simulator was located in the pool area of the Flight Academy. The simulator has a Type A floor level exit door (photograph 3) and the Type III overwing exit (photograph 4).



Photograph 3 – Boeing 767 door trainer Type A exit.



Photograph 4 – Boeing 767 door trainer Type III exit.

5.2 Interphones

American Airlines 767-300ER airplanes have two different models of interphones, the "classic" which is installed on B-767C-300ER delivered before Jan 2003 and the "new" interphone which are installed on 767N-300ER delivered after Jan 2003. The accident airplane had 5 "new" model interphones installed at 1L, 1R, 2R, 4L and 4R jumpseats (figure 10). Figure 11 describes the flight attendant interphone procedures for each aircraft type in the American Airlines fleet.

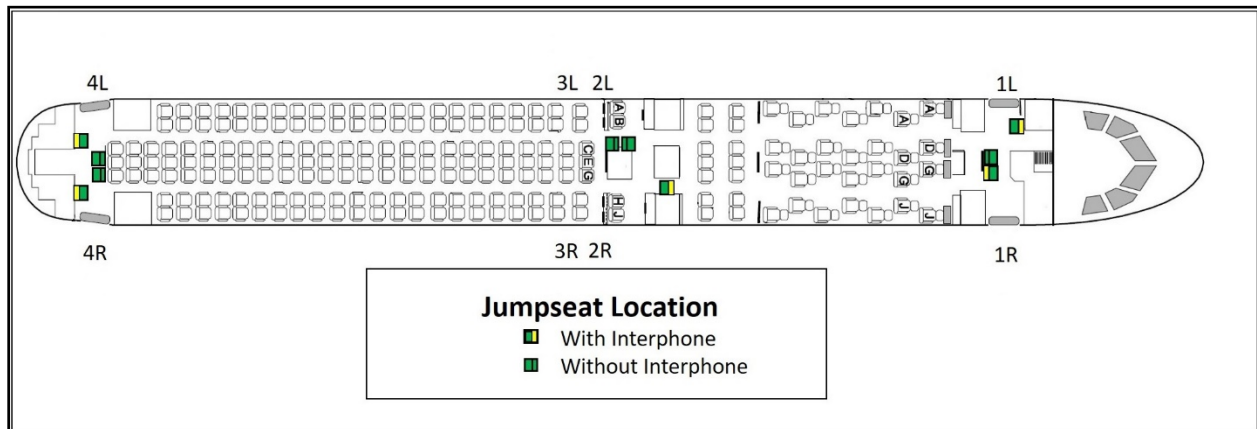


Figure 10 – Jumpseat interphone locations.

787 Airflow Warnings

- Five-HI chimes – 787 Pre Decompression Warning (PDW). See 787 General Emergency – 787 Main Deck Decompression Procedures.

INTERPHONE CALLS

When placing or answering an interphone call, identify yourself by your name or position number and give your location, e.g., "Hi, this is Bill at 3R" or "This is FA 2 calling from 4L."

When Placing an Interphone Call

- Press the buttons slowly and pause between each HI-LO chime to allow the chiming cycle to complete. On all aircraft except 777, pressing the button too quickly will cancel the chime cycle.
- If busy, press reset, then press the code again.

	Routine call to flightdeck	Emergency call to flightdeck	Routine call to FA	Call flightdeck using 3 chimes
737	Press 22	Press 2222	Press 55	Press 222
757 757 EW/HW 767C-300ER	Press Pilot Call twice	Press Alert four times	Press ATT or FA station button twice	Press Alert three times
767N-300ER	Press 31	Press #4	Press FA station from handset directory	Press #3
777 787	Press 31	Press **	Press FA station from handset directory	Press ***
A319/A320/A321/A330	Press CAPT twice	Press EMER CALL four times	Press INTPH then FA station button*	Press EMER CALL three times
E190	Press PILOT twice	Press EMER PILOT four times	Press FA station button twice	Press EMER PILOT three times
S80	Press Pilot Call twice	Press Pilot Call four times	Press ATT or FA station button twice	Press Pilot Call three times

* The FA station button that dials A319 2L (AFT-most) door is **4/AFT**

Incoming Calls

Two chimes indicates a routine call from the flightdeck or another FA station.

Exception: On A319, A320 and A321 only, a routine call from the flightdeck or another FA station is indicated by one Hi/Lo chime.

Figure 11 – Section 1.9 Flight attendant interphone procedures.

5.2.1 Classic Interphone

The classic interphone (photograph 5) has a key pad that has 4 keys (buttons) to call locations around the airplane. A FWD (forward) key calls doors 1L and 1R, a MID (middle) key calls the overwing exit 2L and 2R and an Aft key calls doors 4L and 4R. The 4th key calls the pilot. In addition, there is a key to make a passenger address and an orange key, which is an alert. This alert key when pressed calls all stations on the airplane. In the middle of the pad is the reset key. This key must be pressed to make another call if the crewmember does not hang up the interphone between calls. The classic interphone is installed on the Flight Academy B-767, but not on the Flagship University simulator.



Photograph 5 – Classic B-767 interphone.

5.2.2 New Interphone

The new interphone (photograph 6) has a key pad that resembles a telephone key pad. On the back of the interphone is a menu of options to choose from to make calls to different locations on the airplane. There are 10 different options on that list. Once a crewmember makes a call on the new interphone, they must press reset or hang up the interphone before making another call. The new interphone is not installed on any training simulators.



Photograph 6 - New B-767 interphone.

6.0 Injuries to Persons

Table 1. Injury Chart

Injuries	Flight Crew	Cabin Crew	Passengers	Total
Fatal	0	0	0	0
Serious	0	0	1 ⁵	1
Minor	0	1	19	20
None	2	6	141	149
Total	2	7	161	170

Peter Wentz
Survival Factors Investigator

E. LIST OF ATTACHMENTS

- Attachment 1: Flight Attendant Interviews
- Attachment 2: Passenger Interviews
- Attachment 3: American Airline Management Interviews
- Attachment 4: Terminal Video of Evacuation (1)
- Attachment 5: Terminal Video of Evacuation (2)

⁵ A discharge report from Community First Medical Center in Chicago, IL documented a 77 year old male passenger seated in 20B who had serious injuries that included a fracture to the right proximal phalanx on the fifth finger, fracture of the right anterior arch of the seventh rib and soft tissue swelling of the right temporal scalp.