

NATIONAL TRANSPORTATION SAFETY BOARD

Office of Aviation Safety
Washington, D.C. 20594

November 1, 2016

SURVIVAL FACTORS

Specialist's Factual Report

ANC15MA041

A. ACCIDENT

Operator:	Promech Air LLC
Location:	Ketchikan, Alaska
Date:	June 25, 2015
Time:	1215 ADT
Aircraft:	DHC-3 (Otter) N270PA

B. SURVIVAL FACTORS SPECIALIST

Emily S. Gibson
National Transportation Safety Board
Washington, DC

C. SUMMARY

On June 25, 2015, about 1215 Alaska daylight time, a single-engine, turbine-powered, float-equipped deHavilland DHC-3 (Otter) airplane, N270PA, sustained substantial damage when it impacted mountainous tree-covered terrain, about 24 miles northeast of Ketchikan, Alaska. The airplane was being operated under the provisions of 14 Code of Federal Regulations (CFR) Part 135, as an on-demand visual flight rules (VFR) sightseeing flight when the accident occurred. The airplane was owned by Pantechnicon Aviation, of Minden, Nevada, and operated by Promech Air, Inc., of Ketchikan. The commercial pilot and eight passengers were fatally injured. Marginal visual meteorological conditions were reported in the area at the time of the accident. The flight departed a floating dock located in Rudyerd Bay about 44 miles northeast of Ketchikan about 1200 for a tour through Misty Fjords National Monument Wilderness. A company VFR flight plan was in effect. At the time of the accident, the flight was returning to the operator's base at the Ketchikan Harbor Seaplane Base, Ketchikan.

D. DETAILS OF THE INVESTIGATION

This factual report addresses airplane configuration and wreckage documentation, injury information, and locations of the pilot and eight passengers.

On August 17, 2015 investigation team members from the FAA, NTSB, Hartzell Propeller Inc., and Promech Air met to conduct a wreckage exam of the accident airplane. The NTSB Survival Factors Specialist conducted an examination of the airplane cabin. The wreckage, including the damaged fuselage, had been transported to Temsco Helicopter Hangar 3, in Ketchikan, Alaska and placed on the hangar floor. Some cabin parts were transported in cargo bags and emptied for examination. Some cabin parts were also found inside the fuselage.

1.0 Aircraft Configuration

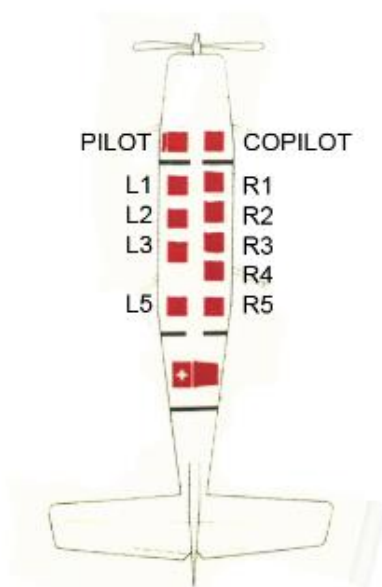


Figure 1- Airplane Seating Configuration.

2.0 Crashworthiness Certification

The DHC-3 Otter airplane was first type certificated in Canada on November 7, 1952, and was issued US Type Certificate No. 815 under Civil Air Regulation (CAR) 10¹ and CAR 3 (as amended to November 1, 1949) in 1955. CAR 3.386 *Protection*, specified:

¹ CAR Part 10 permits the Administrator of Civil Aeronautics to issue certificates and approvals upon certification of a foreign government with which the United States has a reciprocal agreement that the aircraft, product, etc., meets the standards prescribed in the Civil Air Regulations for aircraft, products, built in the United States or other standards which give the same level of airworthiness.

The ultimate accelerations to which occupants are assumed to be subjected shall be as follows:

	Normal, Utility	Acrobatic
Upward	3.0g	4.5g
Forward	9.0g	9.0g
Sideward	1.5g	1.5g
Downward	3.0g ²	3.0g

CAR 3.390 *Seats and Berths*, specified:

(a) *Passenger Seats and Berths*: All seats and berths and supporting structure shall be designed for a passenger weight of 170 pounds (190 pounds with parachute for the acrobatic and utility categories) and the maximum load factors corresponding to all specified flight and ground load conditions including the emergency conditions of CAR 3.386.

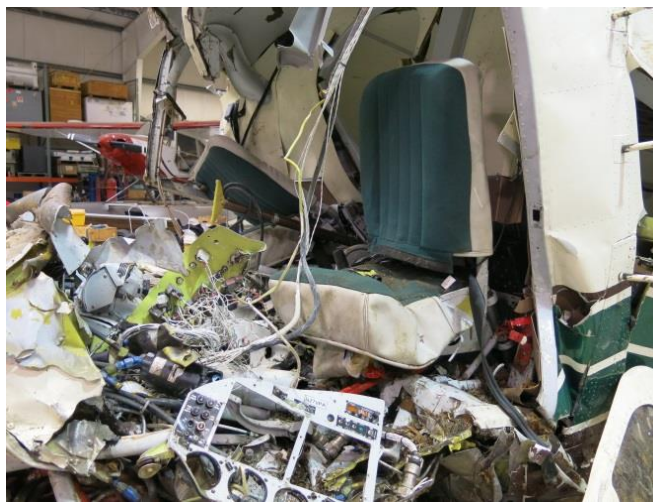
(b) *Pilot seats*: Pilot seats shall be designed for the reactions resulting from the application of the pilot forces to the primary flight controls as specified in CAR 3.231.

3.0 Cockpit and Cabin Interior

The occupiable area within the airplane was divided into the cockpit and cabin sections. The seats in the cabin were a welded steel tube frame, with a hinge at the bottom of the seatback. The design allowed the operator to fold the seatbacks down or the seats could be completely removed. The cockpit seats had shoulder harnesses; the cabin seats had no shoulder harnesses.

4.0 Cockpit Seats

The two cockpit seats were arranged side by side, each with a back cushion.



Photograph 1- Photograph of the cockpit seats during the wreckage exam.

² Actual downward loads tested at certification were 6.6g.

4.1 Pilot Seat

The pilot seatback was attached to the seat bottom. The seat bottom center was bent upwards. The seat bottom frame was crushed. The seat legs were bent forward. The instrument panel and cockpit floor were pushed up toward the seats.

4.2 Pilot Restraint

The pilot seat was equipped with a 2-point restraint system with an inertia reel. The pilot seat lap belt and shoulder harness straps were buckled into the latchplate of the restraint. The restraints were cut at the corner label of the latchplate seatbelt webbing. The seatbelt webbing was also cut at the upper retractable inertia reel. The inertia reel was labeled as Amsafe. The shoulder harness inertia reel was attached to the aft bulkhead behind the pilot seat on the upper left side. The seatbelt webbing was cut at the inertia reel but enough webbing was present to retract. The harness retracted. The side fitting clipped into the latchplate portion then into the buckle. The latchplate seatbelt webbing was labeled by Belt Makers, Inc. in Torrance, California. The information on the label was:

M/N: H 3602-E1-700

P/N Set 2

Date of MFG: 05/03

FAA TSO C22f

Rated Strength 1500 lbs.

Date of Repair 07/11 by Belt Markers, Inc. in Torrance, California

Repair Station YL3R002M

W/O# 48852R

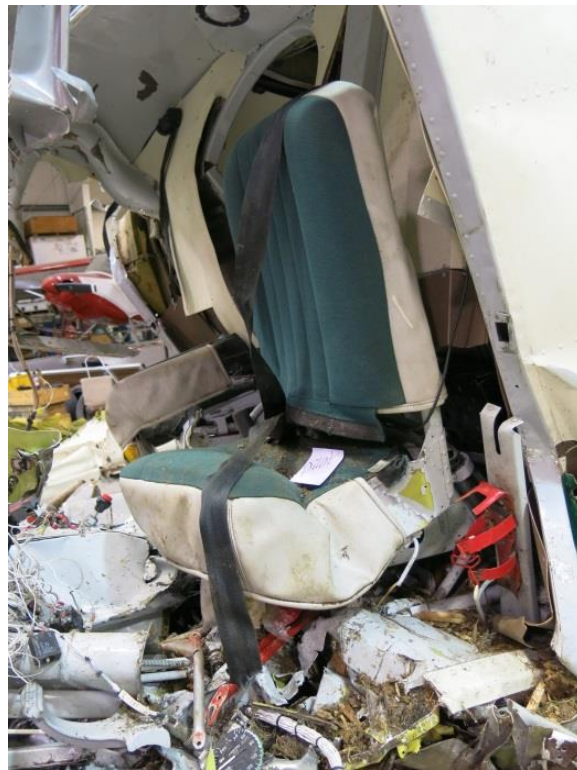
There was no buckle restraint label present.



Photograph 2- Pilot seat bottom and lap belt restraint.



Photograph 3- Pilot seat showing deformation.



Photograph 4- Photograph of the pilot seat area.



Photograph 5- Photograph of the cut seatbelt webbing at the pilot's seat.

4.3 Co-Pilot Seat

The co-pilot seatback was bent forward and not attached to the seatpan. The left side seatback fittings that connect to the seatpan were sheared off and bent to the left. The right side seatpan was slightly bent at the bottom. The seat bottom was still attached to the floor fittings. The seat bottom was bent downward toward the floor of the airplane. The steel tubes under the seat bottom were crushed.

4.4 Co-Pilot Restraint

The co-pilot seat was equipped with a 2-point restraint system with an inertia reel. The co-pilot restraints were attached to the fittings on the side of the seat bottom. The latchplate seatbelt webbing was labeled by Belt Makers, Inc. in Torrance, California. The information on the label was:

M/N: H 3602-E1-700

P/N Set 2

Date of MFG: 04/01

FAA TSO C22f

Rated Strength 1500 lbs.

Date of Repair 04/08 by Belt Makers, Inc. in Torrance, California

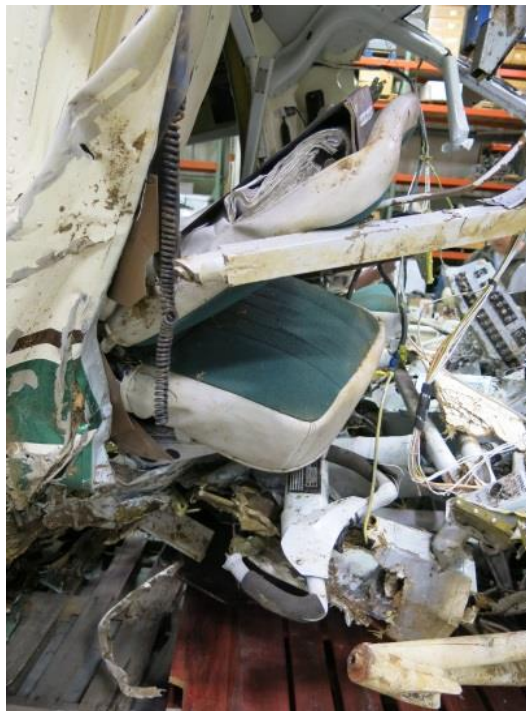
Repair Station YL3R002M

W/O# 43462R

The buckle restraint webbing was labeled by Belt Makers, Inc. in Torrance, California. The information on the label was:

H 3602-E1-700
P/N Set 2
Date of MFG: 02/10
FAA TSO C22f
Rated Strength 1500 lbs.
W/O# 46954

There was a shoulder harness restraint attached to a fitting located behind the co-pilot seat on the upper right side. It was labeled as Amsafe. The harness retracted into the inertia reel. The side fitting clipped into the latchplate portion of the restraint and then into the buckle.



Photograph 6- Photograph of the co-pilot seat.



Photograph 7- Co-pilot seatback bent forward.



Photograph 8- Photograph of the co-pilot seat bottom.

5.0 Cabin Seats

The cabin seating plan provided seats for 9 passengers. The seats were tubular in construction and could have been folded flat against the fuselage side above the heater vent. The cabin seats consisted of 5 rows of single seats on either side. Seats L1-L3 were located on the left side of the airplane forward of the left side entry door. The L4 seat was not configured. Seats R1-R4 were located on the right side of the airplane forward of the right side entry door. L1-L3 and R1-R4 seatpans were attached to the fuselage walls. The legs of the seat were attached to the

inboard seatpan, adjacent to the aisle and pinned into floor fittings. These seats could be unpinned and folded up and over to be stowed, hugging the fuselage wall. All seats were equipped with a padded seatback, loose seat cushions, and lap safety restraints.

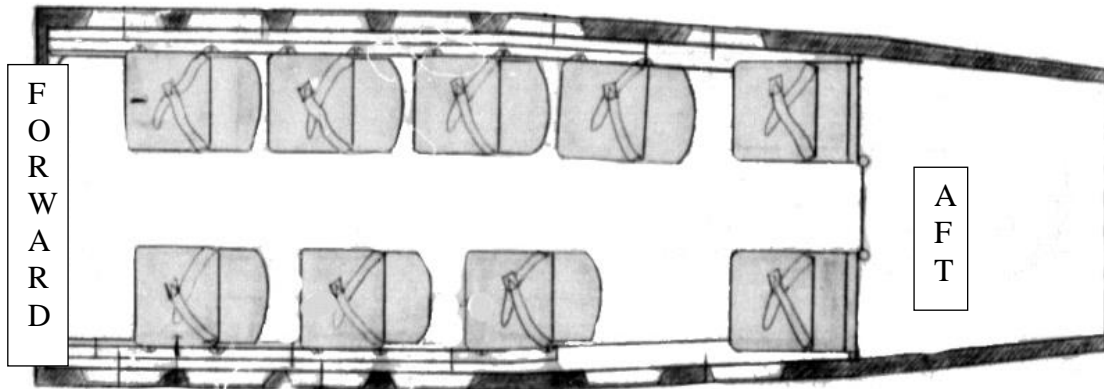


Figure 2- Overhead view of the airplane configuration.

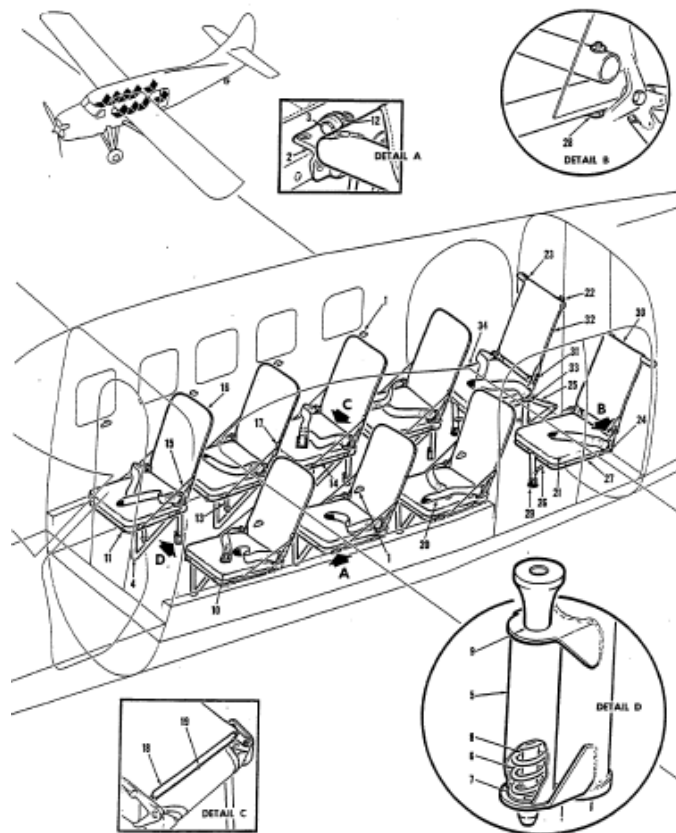


Figure 3- Fuselage seating installation.

The L5 and R5 seats were located aft of the entry doors. The L5 and R5 seatbacks were attached to the outboard side fuselage walls. The seat legs consisted of a center rod that

connected to the center of the seatpan and a leg that retracted to the floor. The center leg was not permanently fixed into any fitting. The inboard seatbacks connected to a pole via another triangular seat leg assembly that was pinned into a floor fitting and into the ceiling of the airplane. L5 and R5 hinged against rear cabin ceiling and outboard fuselage walls.



Figure 4- Example of the left side (L5) seat.

5.1 L1 Seat

The L1 seat was inside the airplane. The seatback was present and connected by the wired cables. The wired cables were connected to both sides of the seatback. The seatback was not connected to the seatpan. The aft seatpan tube was broken from the side tubes. The tubes were held together by fabric. The right side seatpan was bent downwards. The left seatpan tube was broken. The forward left seat tube was connected to the fuselage. The floor area was bent downward under the airplane floor. The seat legs were attached to the floor fittings but pinned under the airplane flooring. The restraints attached to the seatback on both sides. The restraint fitting attachment points were broken on the right side and missing on the left. The restraints were unbuckled. The restraints were operable. The latchplate webbing was labeled with Belt Makers, Inc. in Torrance, California. The latchplate was not bent, deformed, or scarred. The information on the label was:

M/N 3604-H1-700

P/N Sep 1

Date of MFG 07/08

Conforms to FAA TSO C22f

Rated Strength 1500 lbs.

Date of Repair 06/13

Repair Station YL3R002M

W/O# 52393R

The buckle webbing was labeled with Belt Makers, Inc. in Torrance, California. The buckle was not bent, deformed, or scarred. The information on the label was:

M/N 3604-H1-700

P/N Sep 1

Date of MFG 04/04

Conforms to FAA TSO C22f

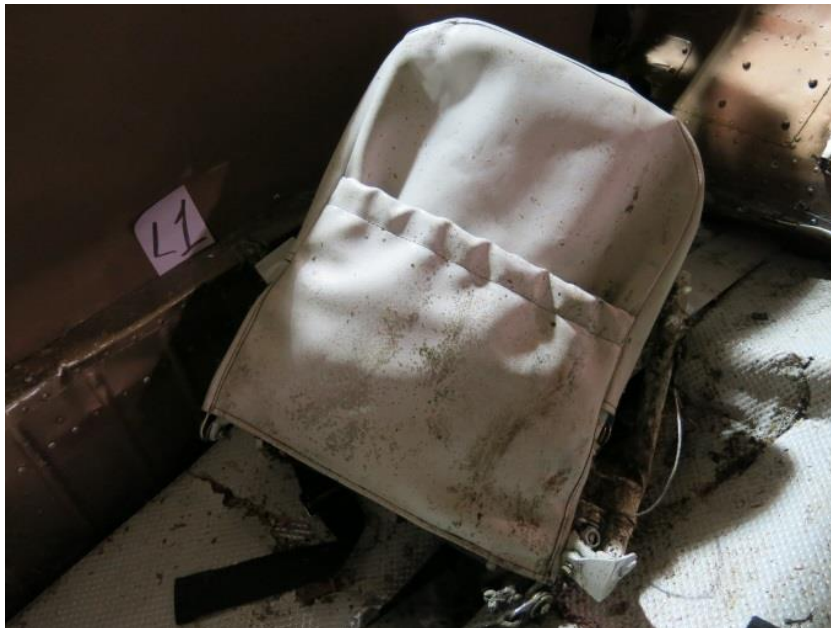
Rated Strength 1500 lbs.

Date of Repair 11/13 by Belt Makers, Inc. in Torrance, California

Repair Station YL3R002M

W/O# 52393R

The buckle was Amsafe.



Photograph 9- L1 seatback.



Photograph 10- Photograph of L1 seat bottom and deformation of the floor.

5.2 L2 Seat

The L2 seat was not present inside the airplane. The fittings were attached to the fuselage wall. The seatpan had been broken off completely and missing. The L2 floor fittings attachment holes were deformed.

Parts of the L2 seat were found outside the airplane. The seat bottom cushion was marked “2L Bottom 270PA”. The seatpan was broken at three of the four corners. The front right was intact. It was held together by fabric. The seat legs were broken. The pin was attached to the aft seat leg. The seat leg cross tube was sheared in 2 pieces. The seatpan was broken from the fittings in the fuselage. The seatback was intact and not bent. The right lower side was attached to a portion of the seatpan. The left side was broken from the seatpan. The seatbelt was still attached.

The restraints were also found outside the airplane. The restraints for the L2 seat were connected to the seatback. The restraints were connected and operable. The latchplate webbing for L2 was labeled Belt Makers, Inc. in Torrance, California. The latchplate was not bent, deformed, or scarred. The information on the label was:

M/N H3604-H1-700

P/N Set 1

Date of MFG 04/06

Rated strength 1500 lbs.

Conforms to FAA TSO C22f

Date of Repair 11/13

Repair Station YL3R002M by Belt Makers, Inc. in Torrance, California

W/O# 52393R

The buckle webbing for L2 was labeled Belt Makers, Inc. in Torrance, California. The buckle was not bent, deformed, or scarred. The information on the label was:

M/N H3604-H1-700

P/N Set 1

Date of MFG 07/08

Rated strength 1500 lbs.

Conforms to FAA TSO C22f

W/O# 43839



Photograph 11- Portions of the L2 seat components.



Photograph 12- Sheared L2 attachment points on the side of the fuselage.

5.3 L3 Seat

The L3 seatpan and the legs were inside the airplane. The seatback was missing. The seatpan attached to the side fuselage. The seatpan was bent forward in a 45-degree angle. The aft leg pin was attached to the aft seat leg. The pin was missing from the forward. The floor area was bent upward. The seatback attachment holes were broken. The seat leg cross tube was bent outward. The seatpan fabric had been ripped. The wired cable was attached to the seatpan but not attached to the seatback. The seatpan could be folded upward adjacent to the fuselage wall. There was no restraint present. The restraint attachment points were broken.

The L3 seatback cushion was found removed from the seatback frame in the aft of the airplane. The restraints were connected to the seatback. The seatback was broken in 2 parts. The bottom piece was broken from the top. The left buckle restraint was attached to the seatback portion. The bottom piece had the right latchplate restraint attached.

The latchplate webbing for L3 was labeled Belt Makers, Inc. in Torrance, California and found in the aft of the airplane. The latchplate was not bent, deformed, or scarred. The information on the label was:

M/N H3604-H1-700
P/N Set 1
Date of MFG 07/08
Rated strength 1500 lbs.
Conforms to FAA TSO C22f
Date of Repair 06/13
Repair Station YL3R002M by Belt Makers, Inc. in Torrance, California
W/O# 51637R

The buckle webbing for L3 was labeled Belt Makers, Inc. in Torrance, California found in the aft of the airplane. The buckle was not bent, deformed, or scarred. The information on the label was:

M/N H3604-H1-700
P/N Set 1
Date of MFG 09/07
Rated strength 1500 lbs.
Conforms to FAA TSO C22f
Date of Repair 11/13
Repair Station YL3R002M by Belt Makers, Inc. in Torrance, California
W/O# 52393R



Photograph 13- L3 seatback and restraints.



Photograph 14- L3 seat bottom.



Photograph 15- L3 Seat bottom and seat legs.

5.4 L5 Seat

The L5 seat was found outside of the airplane. The center pole was intact and the cargo netting was still attached. The triangular support was bent and twisted. The seat legs were bent. The lower two back seatback fittings points broken. One seatback fitting was attached to the fuselage wall and broken. No wired cables were present. The ceiling fitting hole was deformed.

The latchplate webbing was cut. It was found outside the airplane. It was labeled by Belt Makers, Inc. in Torrance, California. The latchplate was not bent, deformed, or scarred. The information on the label was:

M/N 3604-H1-700
P/N Sep 1
Date of MFG 09/05
Conforms to FAA TSO C22f
Rated Strength 1500 lbs.
Date of Repair 04/15
Repair Station YL3R002M
W/O# 54846R

The buckle webbing was found attached to the seatpan. The webbing was labeled with Belt Makers, Inc. in Torrance, California. The buckle was not bent, deformed, or scarred. The information on the label was:

M/N 3604-H1-700
P/N Sep 1
Date of MFG 01/06
Conforms to FAA TSO C22f
Rated Strength 1500 lbs.

Date of Repair 11/13 by Belt Makers, Inc. in Torrance, California
Repair Station YL3R002M
W/O# 52393R



Photograph 16- Photograph showing L5 seat deformation.



Photograph 17- L5 seatback and seat bottom.



Photograph 18- L5 seatback and bottom with the connecting pole.



Photograph 19- Photograph of the sheared L5 seat side attachment point.

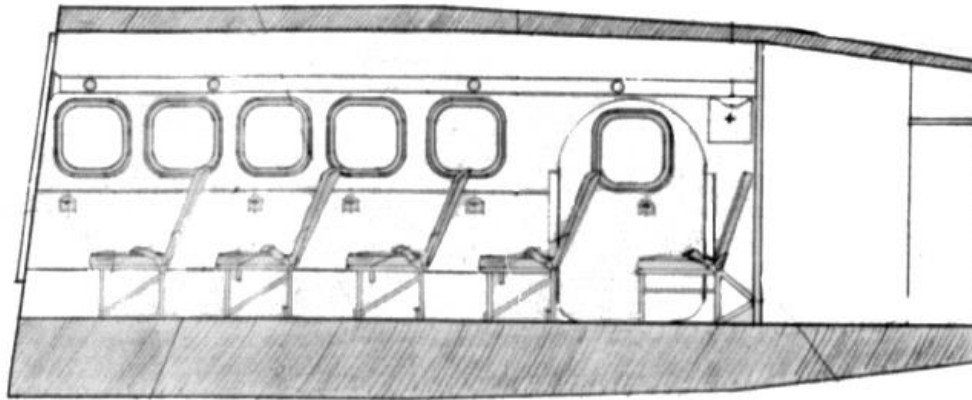


Figure 5- Example of the right side of airplane seats.

5.5 R1 Seat

The seat was present. The seatpan cushion was missing. The seatpan was buckled on the left. The seatpan was broken on the right side. It was not attached to the floor fittings. The floor was buckled upward. The seatbelt was attached to the left and right side. It was unbuckled. The buckle was operable. The seat legs were broken. The seat legs were broken from the floor fittings. The seat legs were bent. The seatpan was bent upward and to the right. The right aft seatpan attached to the fuselage. The fuselage wall lining was bent outward. The pin that attached the seat legs to the floor was attached to both the forward and aft legs. A wire braided cable was attached from the seatpan to the seatback on both sides. Seatback folded forward.

The latchplate webbing was labeled with Belt Makers, Inc. in Torrance, California. The latchplate was not bent, deformed, or scarred. The information on the label was:

M/N 3604-H1-700
P/N Sep 1
Date of MFG 1/12
FAA TSO C22f
Rated Strength 1500 lbs.
W/O# 50643R

The buckle webbing was labeled with Belt Makers, Inc. in Torrance, California. The buckle was not bent, deformed, or scarred. The information on the label was:

M/N 3604-H1-700
P/N Sep 1
Date of MFG 10/12
FAA TSO C22f
Rated Strength 1500 lbs.
W/O# 50643R



Photograph 20- *Photograph of R1 floor deformation and seat legs.*



Photograph 21- *Photograph of R1 floor deformation and seatback and seat legs.*



Photograph 22- Photograph showing R1 floor deformation, seatback, and seat legs.

5.6 R2 Seats

The seat was present inside the airplane. The seatback was not attached to the seatpan. The wired cable was attached from the seatpan to the seat on the right side back holding it together. The wired cable was attached to the seatpan on the left side however was not attached to the seatback. The front seat leg was attached to the fittings. The aft seat leg was not attached to the fittings. The hole in the floor for the fitting was broken. The seat pins moved upward and were operable. The back seat leg bent forward. The seat leg cross tube was bent upward. The seatpan was not bent. The fittings on both sides where the seatback attaches were broken. It was also broken where the restraints attach. The right side seatpan was attached to the fuselage. The restraints were connected to the seatback. The buckle restraint was attached to the bottom seatback. The floor area was bent upward. The seat legs were buckled upward with a 3-inch tear in the middle section of the seats.

The latchplate webbing had been cut but attached to the seatback. The seatbelt was cut over the label markings. The only readable marking was M/N H3604-H1-&00 and P/N Set 1.

The buckle was Amsafe.

The buckle webbing was labeled Belt Makers, Inc. in Torrance, California. The buckle was not bent, deformed, or scarred. The information on the label was:

M/N H3604-H1-700
P/N Set 1
Date of MFG 10/12
Rated strength 1500 lbs.
Conforms to FAA TSO C22f
W/O# 50643R

Half of the R2 restraint (latchplate restraint) was found in the aft of the airplane. The webbing was cut. The latchplate was not bent, deformed, or scarred.



Photograph 23- R2 seat latchplate restraint. The restraint had been cut.



Photograph 24- R2 seatpan.



Photograph 25- Photograph of R2 seat legs and floor deformation.



Photograph 26- R2 seatpan and seatback.

5.7 R3 Seats

The seat was present inside the airplane. The seatpan was connected to the fuselage wall. The restraints were attached to the seatpan. The pins were attached to the seat legs. The pins were operable but not attached to the floor fitting. The legs were not attached to the floor fittings. The cross leg tube between the seat legs was bent in half. The top portion of the aft seat leg was

broken at the connection to the seatpan. The seatback was bent aft. The forward seatpan tube was broken at the fuselage attachment. The fuselage fittings were still attached to fuselage. The wire cables were attached to the right part of the seatpan tube and the seatback. The wired cables were also attached to the left side seatpan and seatback. The floor area at R3 was buckled upward. The aft corner tubes of the seatpan were broken. The seatpan was attached to the fuselage. The forward and aft seatpan was broken at the corners.

The buckles were operable. The latchplate and the buckle were not bent, deformed, or scarred. The latchplate webbing was labeled Belt Makers, Inc. in Torrance, California. The information on the label was:

M/N H3604-H1-700
P/N Set 1
Date of MFG 04/04
Rated strength 1500 lbs.
Conforms to FAA TSO C22f
Date of Repair 11/08
Repair Station YL3R002M
W/O# 44462R

The buckle webbing was labeled Belt Makers, Inc. in Torrance, California. The information on the label was:

M/N H3604-H1-700
P/N Set 1
Date of MFG 09/07
Rated strength 1500 lbs.
Conforms to FAA TSO C22f
Date of Repair 03/14
Repair Station YL3R002M
W/O# 52900R

The buckle was placarded as Amsafe 5000B2.



Photograph 27- Photograph of sheared R3 seatpan tube and restraint.



Photograph 28 - R3 seatpan tube.



Photograph 29- Photograph of deformed R3 seat components and seat restraints.



Photograph 30 - Photograph of deformed R3 seat.

5.8 R4 Seat

The seat was present inside the airplane. It was attached to the floor fittings. The seat bottom cushion was missing. The seat legs appeared to be undamaged. The back right seatpan was attached to the fuselage wall. The fuselage wall was bent inward. The back seatpan rod was bent slightly. The floor area surround R4 was relatively flat, not deformed. The wire cable from the seatpan to the seatback was attached on both sides. The seatback folded forward. The leg pins were attached to the floor fittings. They did not move to unlock.

The restraints were attached and not buckled. They were operable. The latchplate and buckle was not bent, deformed, or scarred. The buckle was placarded as Amsafe 5000B2, PAT 2.846.745, NOS 3.390.436. The latchplate webbing was labeled Belt Makers, Inc. in Torrance, California. The information on the label was:

M/N H3604-H1-700
P/N Set 1
Date of MFG 10/12
Rated strength 1500 lbs.
Conforms to FAA TSO C22f
W/O# 50643Y

The buckle webbing was labeled Belt Makers, Inc. in Torrance, California. The information on the label was:

M/N H3604-H1-700
P/N Set 1
Date of MFG 04/04
Rated strength 1500 lbs.
Conforms to FAA TSO C22f
Date of Repair 02/10
Repair Station YL3R002M
W/O# 46622R



Photograph 31- R4 seatback.



Photograph 32 - R4 seatpan, seatback, and restraints.



Photograph 33- Photograph of R4 seat components.



Photograph 34 - R4 seat.

5.9 R5 Seat

The R5 seat was found outside of the airplane. The center pole that connected to the floor fitting and the center ceiling was broken in half. The left seatpan was bent upward. The triangular support floor fitting was twisted to the right. The seat cushion was present. The seatback was missing. The cargo netting was still attached to the pole. The restraints were found cut on both sides but still buckled together and operable. There were no labels present. The cuts to the restraints were made prior to where the labels would have been affixed. The aft tube was missing that would have held the restraint fittings. The ceiling hole did not appear to be deformed in any way. There was a gash in the floor immediately in front of the R5 seat approximately 13 inches long. No wired cables were present.



Photograph 35- Photograph of the cut R5 restraint straps.



Photograph 36 - R5 seat components.



Photograph 37- R5 pole attachment.



Photograph 38 –L5 and R5 ceiling attachment point.



Photograph 39- Photograph of 13inch gash in the floor in front of R5 seat.



Photograph 40 – Sheared pole on right side fuselage wall that attached R5.

6.0 Cabin Interior

6.1 Doors

The cabin was equipped with 2 doors, a double passenger door on the left side of the airplane and a single entry door on the right side. The right side door was located behind the R4 seat. It was intact and present. The left side door was located behind the L3 seat. The left side door was a double door. The right side door was attached at the hinges and the left side door was broken off the hinges. The upper hinge on the left side was attached to the door. The bottom hinge was broken off of the door and still attached to the fuselage.



Photograph 41 – Photographs of the double entry doors.



Photograph 42- Photograph of the exterior single entry door.



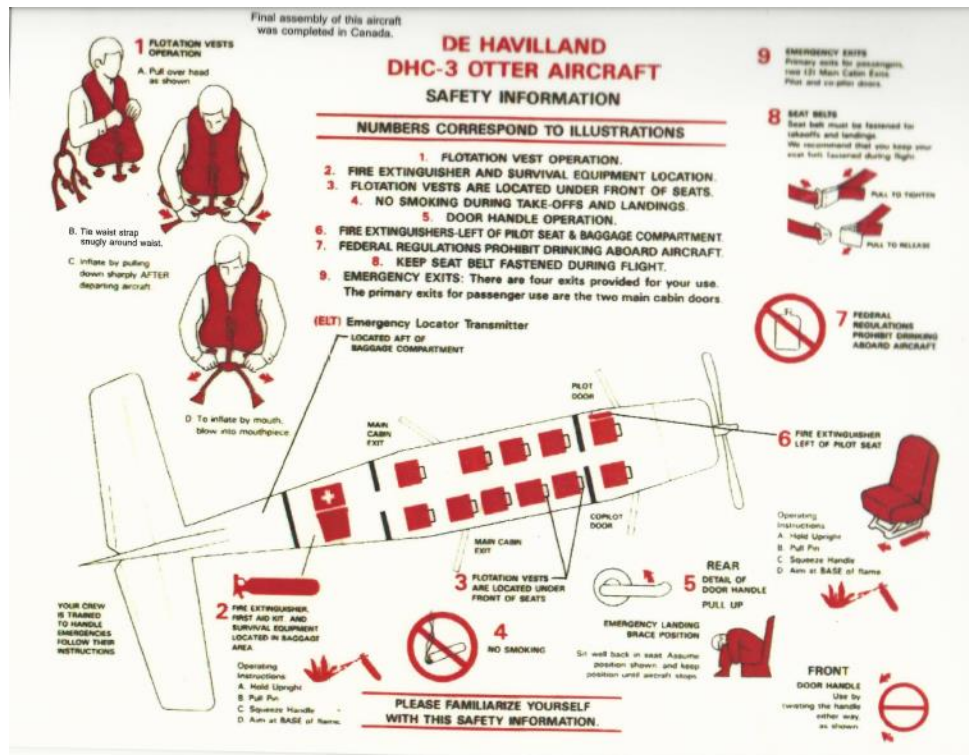
Photograph 43 – Photograph of the interior single entry door.

6.2 Safety Cards

There were 7 safety cards found in the wreckage. Two safety cards were placarded against the forward fuselage bulkhead in front of seats L1 and R1 and behind the cockpit.



Photograph 44 – Photographs of the safety information cards placarded on the fuselage bulkhead and the seatback pocket safety information cards.



Photograph 45- Close up photograph of the safety information card.

6.3 Seatbelt Extender

One seatbelt extender was located in the wreckage.



Photograph 46 - Seatbelt Extender.

6.4 Fire Extinguisher

A halotron fire extinguisher was attached the aft bulkhead. It was Amerex Model, B385, No: Y-272907. Brackets for a fire extinguisher was found in the cockpit, however the fire extinguisher was missing.



Photograph 47 - Fire Extinguisher.

6.5 Head Sets

Head sets were connected to R1, R2, R3, and the R4 connectors. Head sets were not connected to the left side and found in the aft of the airplane.



Photograph 48 - Headsets connected to the right side of the airplane.

6.6 Windows

The cabin window panels were missing.

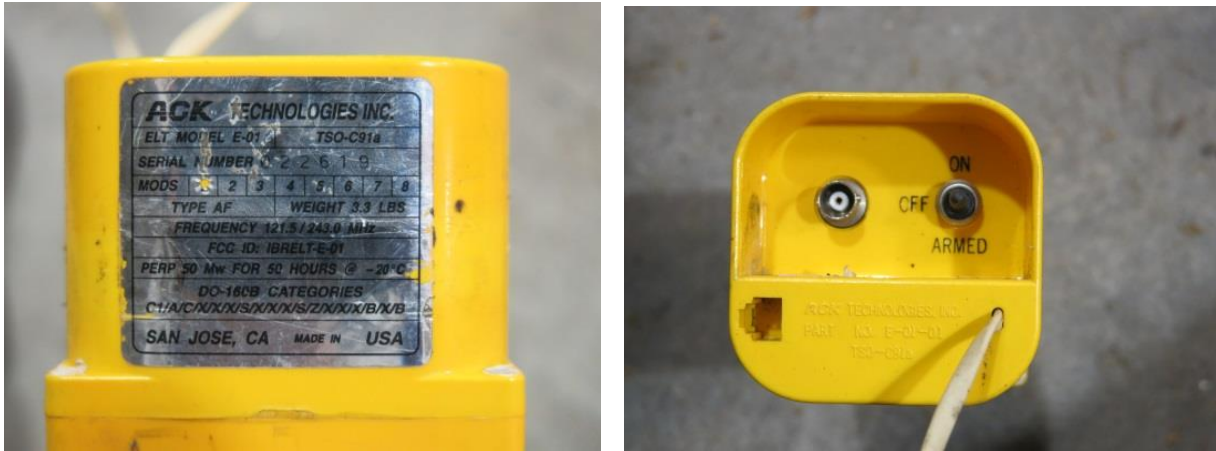
6.7 ELT

The ELT was found in the aft of the airplane. It was secured and in a bracket. The toggle switch was in the OFF position³. A placard was located near the toggle switch with ACK Technologies, Inc. Part No: E-01-01, TSO-C91A. The battery date was labeled March 2017. A placard on the ELT was present. The information on the label was:

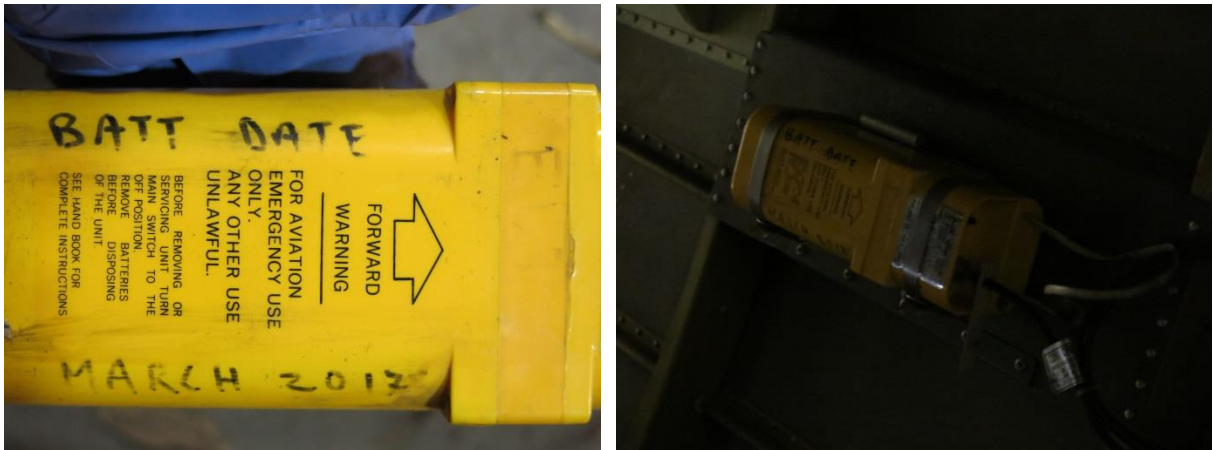
ACK Technologies Inc.
ELT Model E-01
TSO- C91a
Serial # 022619
Mods 1
Type AF
Weight 3.3 lbs.
Frequency 121.5/2430 MHz
FCC ID: 1BRELT-%-01
Perp 50 Mw for 50 hours @ -20 degrees
DO-160 B categories

³ The ELT did activate and aided in locating the aircraft. The ELT was turned to the off position, when NTSB IIC arrived on-scene.

C1/A/C/X/X/X/S/X/X/X/S/Z/X/X/X/B/X/B
San Jose, CA
Made in USA



Photograph 49 – ELT placard and toggle switch.



Photograph 50 – ELT bracketed inside the airplane.

6.8 Seat Cushions

There were 6 seat bottom cushions found. 4 of the cushions were not labeled. They were found outside the airplane.



Photograph 51 - Seat Cushions.



Photograph 52 - Seat Cushion.

A seat cushion for seat 3 was found outside the airplane. The seat cushion was marked “Pax seat bottom, Pax Bot-3”. It was unclear if the seat cushion belonged to R3 or L3.

The 4R seat bottom cushion was found outside the airplane. The backside of the cushion was marked “270PA 4R”.

7.0 Exemplar Airplane

Promech Air, LLC was conducting routine maintenance on an airplane similar to the accident airplane. The group visited their facility on August 18, 2015. Attachment 1 contains pictures similar to that of the accident airplane.

8.0 Medical and Pathological

8.1 Injury Table

Type of injury	Flight Crew	Flight Attendants	Passengers	Total
Fatal	1	0	8	9
Serious	0	0	0	0
Minor	0	0	0	0
None	0	0	0	0

8.2 Injury Information

Autopsies were performed on the fatally injured pilot and eight passengers by the State of Alaska Office of the Chief Medical Examiner on June 27, 2015. The cause of death for all individuals was listed as “multiple injuries.” The manner of death for all individuals was listed as “accident.”

8.3 Fatalities

The following medical and pathological information for all of the occupants was provided. Note: passenger numbers do not correspond to seat numbers.

	Final Pathologic Diagnosis	Cause of Death
Pilot (64 year-old male)	<p>I. Multiple blunt force injuries:</p> <p>A. Head and neck:</p> <ol style="list-style-type: none"> 1. Transection of pons/midbrain; 2. Subarachnoid hemorrhage; 3. Multiple skull fractures; 4. Subgaleal hemorrhage; 5. Fracture of bridge of nose; 6. Fracture of C5 vertebra; 7. Cutaneous, contusions and lacerations. <p>B. Torso:</p> <ol style="list-style-type: none"> 1. Lacerations of heart; 2. Laceration of pericardium; 3. Multiple pulmonary contusions; 4. Left hemothorax; 	Multiple blunt force injuries.

	<ol style="list-style-type: none"> 5. Multiple liver lacerations; 6. Multiple rib fractures; 7. Cutaneous laceration, abrasions and contusions. <p>C. Extremities:</p> <ol style="list-style-type: none"> 1. Fracture of right radius and ulna; 2. Fracture of right femur; 3. Fracture of right tibia and fibula; 4. Fractures of bones of left foot; 5. Cutaneous abrasions, contusions and lacerations. 	
Passenger 1 (63 year-old female)	<p>I. Multiple blunt force injuries:</p> <p>A. Head and neck:</p> <ol style="list-style-type: none"> 1. Fractures of base of skull and left orbit; 2. Multiple facial fractures; 3. Fractures of maxilla and mandible; 4. Subgaleal hemorrhage; 5. Fractures of C6 and C7 vertebrae; 6. Cutaneous abrasions, contusions and lacerations. <p>B. Torso:</p> <ol style="list-style-type: none"> 1. Laceration of pericardium; 2. Laceration of heart; 3. Transection of aortic arch; 4. Thoracic periaortic hemorrhage; 5. Collapse of both lungs; 6. Multiple liver lacerations; 7. Multiple splenic lacerations; 8. Laceration of stomach; 9. Multifocal areas of mesenteric and serosal hemorrhage; 10. Laceration of right kidney; 11. Bilateral perinephric hemorrhage. 12. Perivesicular hemorrhage; 13. Fracture of sternum; 14. Multiple rib fractures; 15. Fracture of T1 vertebra; 16. Cutaneous abrasions and contusions. <p>C. Extremities:</p> <ol style="list-style-type: none"> 1. Fractures of right radius and ulna; 2. Fractures of right tibia and fibula; 3. Fracture of left femur; 	Multiple blunt force injuries.

	4. Cutaneous abrasions, contusions, and lacerations.	
Passenger 2 (69 year-old male)	<p>I. Blunt force injuries:</p> <p>A. Head and neck:</p> <ol style="list-style-type: none"> 1. Multiple calvarial skull fractures; 2. Multiple lacerations and subarachnoid hemorrhage of brain; 3. Scattered laceration, abrasion, and contusions; 4. Multiple maxillofacial fractures. <p>B. Torso:</p> <ol style="list-style-type: none"> 1. Rupture of the aortic root; 2. Rupture of right ventricle; 3. Traumatic avulsion of the subclavian artery near the aortic arch; 4. Aortic transection; 5. Transection of pulmonary artery; 6. Bilateral pulmonary contusion; 7. Splenic laceration; 8. Liver laceration; 9. Multiple bilateral rib fractures; 10. Pelvic fracture; 11. Multiple scattered abrasions and contusions. <p>C. Extremities:</p> <ol style="list-style-type: none"> 1. Tibia and fibula fracture of right leg; 2. Fracture/avulsion of left ankle; 3. Fracture and laceration of left third and fourth fingers; 4. Multiple scattered abrasions, contusions, and lacerations. 	Multiple blunt force injuries.
Passenger 3 (31 year-old female)	<p>I. Multiple blunt force injuries:</p> <p>A. Head and neck:</p> <ol style="list-style-type: none"> 1. Subarachnoid hemorrhage; 2. Subgaleal hemorrhage; 3. Cutaneous abrasions, contusions and lacerations. <p>B. Torso:</p> <ol style="list-style-type: none"> 1. Multiple pulmonary contusions; 2. Periaortic hemorrhage; 3. Periesophageal hemorrhage; 	Multiple blunt force injuries.

	<ol style="list-style-type: none"> 4. Bilateral hemothoraces; 5. Lacerations of liver; 6. Lacerations of spleen; 7. Fracture of right pelvis; 8. Fracture of pubic symphysis; 9. Multiple rib fractures; 10. Fracture of T10 vertebrae; 11. Cutaneous abrasions and contusions. <p>C. Extremities:</p> <ol style="list-style-type: none"> 1. Fracture of right humerus; 2. Fracture of left femur; 3. Fracture of right tibia and fibula; 4. Cutaneous abrasions, contusions and lacerations. 	
Passenger 4 (65 year-old male)	<p>I. Multiple blunt force injuries:</p> <p>A. Head, neck, and torso:</p> <ol style="list-style-type: none"> 1. Abrasions and contusions of head, trunk and extremities; 2. Lacerations of head and knees; 3. Skull fractures, orbital frontal bones; 4. Acute subarachnoid hemorrhage of brain; 5. Fractures of T10 vertebra and ribs 2 through 5, 9 through 11 right, left fourth finger, sternum and pelvis; 6. Pallor of viscera. <p>B. Atherosclerotic Cardiovascular Disease:</p> <ol style="list-style-type: none"> 1. Coronary artery atherosclerosis, left anterior descending, left circumflex coronary arteries 70% stenosed and right coronary artery 80% stenosed; 2. Calcifications of aorta. <p>C. Extremities:</p> <ol style="list-style-type: none"> 1. Fracture of right humerus; 2. Fracture of left femur; 3. Fracture of right tibia and fibula; 4. Cutaneous abrasions, contusions and lacerations. 	Blunt impacts of head, trunk, and extremities with multiple skeletal and visceral injuries.
Passenger 5 (71 year-old male)	<p>I. Multiple blunt force injuries:</p> <p>A. Head and neck:</p> <ol style="list-style-type: none"> 1. Multiple calvarial and basilar skull fractures; 	Multiple blunt force injuries.

	<ol style="list-style-type: none"> 2. Traumatic avulsion of portion of brain; 3. Laceration of scalp; 4. Multiple maxillofacial fractures; 5. Abrasions and contusions. <p>B. Torso:</p> <ol style="list-style-type: none"> 1. Perforation of right ventricle of heart; 2. Partial avulsion of posterior right and left atria of heart; 3. Laceration of left ventricle of heart; 4. Bilateral pulmonary contusion; 5. Bilateral rib fractures; 6. Sternum fracture; 7. Transection of vertebral column (T8-T9 interspace); 8. Pelvic fracture; 9. Laceration of right lobe of liver. <p>C. Extremities:</p> <ol style="list-style-type: none"> 1. Multiple fractures of bilateral lower right and left legs; 2. Compound fracture of left wrist; 3. Multiple lacerations, abrasions and contusions. 	
Passenger 6 (59 year-old female)	<p>I. Multiple blunt force injuries:</p> <p>A. Head, trunk, and extremities:</p> <ol style="list-style-type: none"> 1. Abrasions and contusions of head, trunk and extremities; 2. Lacerations of head and legs with developing injuries; 3. Fractures of skull, calvarium and base of skull, ribs #1 through 12 right and #2 through 12 left, sternum, dislocation of C7- T-1 vertebrae, right clavicle, legs including left tibia, fibula, and right ankle; 4. Lacerations of heart, liver and diaphragm. 	Blunt impacts of head, trunk, and extremities with multiple skeletal and visceral injuries.
Passenger 7 (73 year-old female)	<p>I. Multiple blunt force injuries:</p> <p>A. Head and neck:</p> <ol style="list-style-type: none"> 1. Avulsion of left cerebral hemisphere of brain; 2. Multiple calvarial skull fractures; 3. Laceration of scalp; 4. Multiple maxillofacial fractures. <p>B. Torso</p> <ol style="list-style-type: none"> 1. Rupture of apex of heart; 	Multiple blunt force injuries.

	<ol style="list-style-type: none"> 2. Partial avulsion of pulmonary artery; 3. Rupture of pericardial sac; 4. Multiple bilateral rib fractures; 5. Pulmonary contusions of right and left lung; 6. Laceration of right lung; 7. Splenic laceration; 8. Transection of vertebral column (T8-T9); 9. Pelvic fracture; 10. Aortic transection. <p>C. Extremities:</p> <ol style="list-style-type: none"> 1. Multiple bilateral fractures of upper and lower extremities; 2. Multiple lacerations, contusions and abrasions. 	
<p>Passenger 8 (76 year-old female)</p>	<p>Blunt force injuries:</p> <p>A. Head, trunk, and extremities:</p> <ol style="list-style-type: none"> 1. Abrasions and contusions of head, trunk and extremities; 2. Skin slough of skin of upper body with aromatic odor; 3. Full thickness lacerations of face and extremities; 4. Fractures of skull base and calvarium with facial bones, comminuted, multifocal ribs 1 through 12 right and left, spine, pelvis, left wrist, right humerus, fracture dislocation of right knee and shoulder; 5. Lacerations of brain, liver, spleen, lungs, diaphragm and aorta; <p>B. Hypertensive and Atherosclerotic Cardiovascular Disease:</p> <ol style="list-style-type: none"> 1. Coronary artery atherosclerosis, 60% stenosis of left anterior descending coronary artery and 20% stenosis of left circumflex coronary artery; 2. Calcifications of aorta. 	<p>Blunt impacts of head, trunk, and extremities with multiple skeletal and visceral injuries.</p>

8.4 Occupant Seating Location

Information from autopsy reports, seat documentation, photographs from first responders at the accident site, and video/photographs recovered from onscene devices was used to determine occupant seating locations. According to this data, the pilot was seated in the left cockpit seat, and shown as “PILOT” in figure 1. A passenger was seated in the “COPILOT” seat

and the 7 other passengers were seated in the passenger seats shown in figure 1 as L1-L5 and R1-R5.

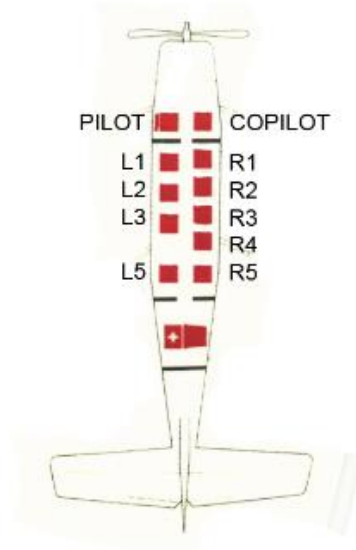


Figure 6- Occupant seat location.

8.5 Occupant Location

Occupant Location	Gender	Weight ⁴	Injury Classification
PILOT	M	209 lbs.	Fatal
COPILOT	M	204 lbs.	Fatal
L1	F	151 lbs.	Fatal
L2	F	191lbs	Fatal
L3	M	240 lbs.	Fatal
L5	M	194 lbs.	Fatal
R1	F	131 lbs.	Fatal
R2	M	236 lbs.	Fatal
R3	X	X	X
R4	X	X	X
R5	F	170 lbs.	Fatal

Emily S. Gibson
Survival Factors Investigator

Attachments

1. Exemplar Airplane

⁴ Weights were obtained from autopsy reports.