NTSB Identification: ERA14FA045
14 CFR Non-US, Non-Commercial
Accident occurred November 19, 2013 in Ft Lauderdale, FL
Aircraft: Learjet 35, registration: XA-USD
Injuries: 4 Fatal

Background:

On November 19, 2013, at 1956 eastern standard time, a Learjet 35, Mexican registration XA-USD, operated by Aero JL SA de CV, was destroyed when it collided with the Atlantic Ocean after takeoff from Fort Lauderdale/Hollywood International Airport (FLL), Fort Lauderdale, Florida. The commercial pilot and a physician on board were lost and presumed fatally injured. The copilot and a flight nurse were fatally injured. Night visual meteorological conditions prevailed, and an instrument flight rules flight plan was filed for the positioning flight from FLL to Cozumel, Mexico.

The airplane had just completed an air ambulance flight for Air Evac International from San Jose, Costa Rica to FLL, and was repositioning back to its base in Cozumel, Mexico.

Preliminary voice and radar information provided by the Federal Aviation Administration (FAA) revealed the airplane had departed Runway 10 at approximately 1950, climbed straight ahead to an altitude of 2,200 feet, at an approximate groundspeed of 200 knots, when the pilot requested radar vectors back to runway 10L at FLL due to an "engine failure." The controller directed the pilot to maintain 4,000 feet and turn to a heading of 340 degrees. The pilot replied, "Not possible" and requested a 180-degree turn back to the airport.

At 19:52:34, the pilot declared a "mayday" and requested vectors back to FLL. Over the approximately three minutes that followed, the pilot requested vectors to the airport multiple times. While the pilot requested, received, and acknowledged additional radar vectors to the southwest from ATC to return to the airport, the airplane continued its slow turn and descent to the north. During the approximately two minutes that transpired after the pilot declared his intention to return to FLL, the airplane descended to 900 feet and slowed to140 knots as it flew northbound, parallel to the shoreline and away from FLL.

At 19:53:42, about 700 feet and 150 knots, the airplane initiated a left turn towards shore. The airplane continued its descending left turn until radar contact was lost at 100 feet and 150 knots on a southwesterly heading, at 19:55:42.

The pilot was issued a commercial pilot certificate by the government of Mexico, with ratings for airplane single- and multi-engine land, and instrument airplane. His most recent medical certificate was issued August 22, 2013. According to the operator, the pilot had accrued 10, 091 total hours of flight experience, of which 1,400 hours were in the 30-series Learjet.

The copilot was issued a commercial pilot certificate by the government of Mexico, with ratings for airplane single-engine, airplane multiengine land and instrument airplane. His most recent medical certificate was issued on June 26, 2013. According to the operator, the copilot had accrued 1,235 total hours of flight experience, of which 175 hours were in the accident airplane make and model.

According to FAA and maintenance records, the airplane was manufactured in 1979. Its most recent continuous airworthiness inspection was completed November 4, 2013, at 6,842 aircraft hours.

At 1953, the weather reported at Fort Lauderdale/Hollywood International Airport (FLL), located 6 miles southwest of the accident site included few clouds at 2,500 feet and a scattered layer at 6,500 feet. The wind was calm and visibility was 9 miles. The temperature was 23 degrees C, the dew point was 22 degrees C, and the altimeter setting was 29.93 inches of mercury.

The following timeline provides information regarding the recovery of the wreckage from the sea floor:

- December 3, 2013: The main debris field was located in approximately 100 feet of water. On this date, one of the engines was located near this main debris field.
- December 4, 2013: The first of the two engines was recovered from the ocean floor. It later was determined that this engine was the left hand engine.
- December 4, 2013: The tail portion of the aircraft was recovered from the ocean floor.
- December 4, 2013: The N1 DEECs were identified in the tail of the wreckage, removed from the wreckage, and shipped to the NTSB for further analysis.
- December 12, 2013: The second engine is located on the ocean floor.
- December 13, 2013: The second engine is recovered from the ocean floor. It later was determined that this was the right hand engine.

Engines: A wreckage review was performed on Wednesday, January 22, 2013 and Thursday, January 23, 2013 and Atlanta Air Recovery in Griffin, GA with oversight provided by the NTSB.

NOTE

All references to position are aft looking forward. All observations reported herein are based on visual examinations with the unaided eye, unless otherwise noted.

- Location where wreckage review occurred:
  - Atlanta Air Recovery, [redacted], Griffin, GA, 30224
- Attendees:
  - Brian Rayner – NTSB
  - Jimmy Avgoustis – Bombardier
  - Darrel Welch – Bombardier
  - Steve Rongish - Bombardier
  - Jay Eller – Honeywell
  - Jim Allen - Honeywell

Left Engine:

- The dataplate identified the engine as follows: (Figure 1)
  - Model Number: TFE731-2
  - Part Number: 3070300-9
  - Serial Number P-74717
- The aircraft engine mounting structured remained with the engine, enabling the team to identify the side of the aircraft to which the engine was physically installed.
- The engine mounts were intact.
- The engine displayed crushing all around the outside of the engine and the associated engine nacelle.
- Three main fan blades were separated from the fan assembly just above the platform and were located just aft of the main fan. (Figure 2 through Figure 6)
- All of the main fan blades displayed soft bending opposite the direction of rotation. (Figure 2 through Figure 6)
- All of the main fan blades displayed leading edge damage typically associated with hard body impact damage. (Figure 2 through Figure 6)
- Rotational scoring was noted between the tips of the main fan blades and the containment ring.
- The fan containment ring was intact with no evidence of an uncontained failure.
- The fan containment ring displayed an impact mark at approximately the 11 o'clock position (FLA).
- There was no evidence of an uncontained event in the acoustic area of the inlet cowling.
- The PT2 sensor was separated from the engine housing.

- The PT2 line appeared to be intact with the connections still intact up to the a/c connection "B" nut where it was separated from the aircraft.
- Extensive corrosion was noted generally on and inside of the engine.
- With the use of a boroscope, the following engine observations were made:
    - Soft bending, opposite the direction of rotation, was noted on the 1st stage low pressure compressor blades. (Figure 7)
    - Leading edge damage was noted to the 1st stage low pressure compressor blades.
    - Corrosion was noted on the 4th stage low pressure compressor rotor blades.
    - The high pressure impeller displayed evidence of corrosion but otherwise appeared to be undamaged.
    - The high pressure impeller and corresponding shroud displayed signs of rotational scoring. (Figure 8)
- The rear flange and associated cowling/duct of the outer bypass duct was separated from the engine.
- The inlet housing was split at the 12 o'clock and 3 o'clock positions (FLA)
- The core inlet stator vanes were separated from their mounts and damaged.
- The accessory and transfer gearbox housings were significantly eroded due to corrosion.

Right Engine:

- The dataplate identified the engine as follows: (Figure 9)
    - Model Number: TFE731-2
    - Part Number: 3070300-9
    - Serial Number P-74715
- The aircraft engine mounting structured remained with the engine, enabling the team to identify the side of the aircraft on which the engine was physically installed.
- The engine mounts were intact.
- All of the main fan blades displayed soft bending opposite the direction of rotation. (Figure 10 through Figure 15)
- Several main fan blades displayed leading edge damage typically associated with hard body impact damage. (Figure 10 through Figure 15)
- With the use of a boroscope, the following engine observations were made:
    - No obvious soft bending was noted on the 1st stage low pressure compressor blades.
    - No damage was noted to the leading edges of the 1st stage low pressure compressor blades.
    - The first stage low pressure stator appeared to be undamaged.
    - Corrosion was noted on the internal components of the engine. (Figure 16)
- The engine bleed lines were crushed at the 1 o'clock position (FLA).
- There was extensive corrosion noted to the spinner.
- The accessory and transfer gearbox housings were significantly eroded due to corrosion.

Other Findings:

- The thrust reverser annunciator panel was located within the wreckage.
- The left engine thrust reverser was in the deployed position.
- The left engine nacelle surfaces just forward and aft of the thrust reverser cascades displayed discoloration due to heat exposure, blistering of paint, and missing paint. (Figure 17)
- The right engine thrust reverser was in the stowed and latched position.
- The throttle levers were found in the full forward position.
- The throttle quadrant housing displayed edge damage to the throttle quadrant housing forward of the throttle levers.

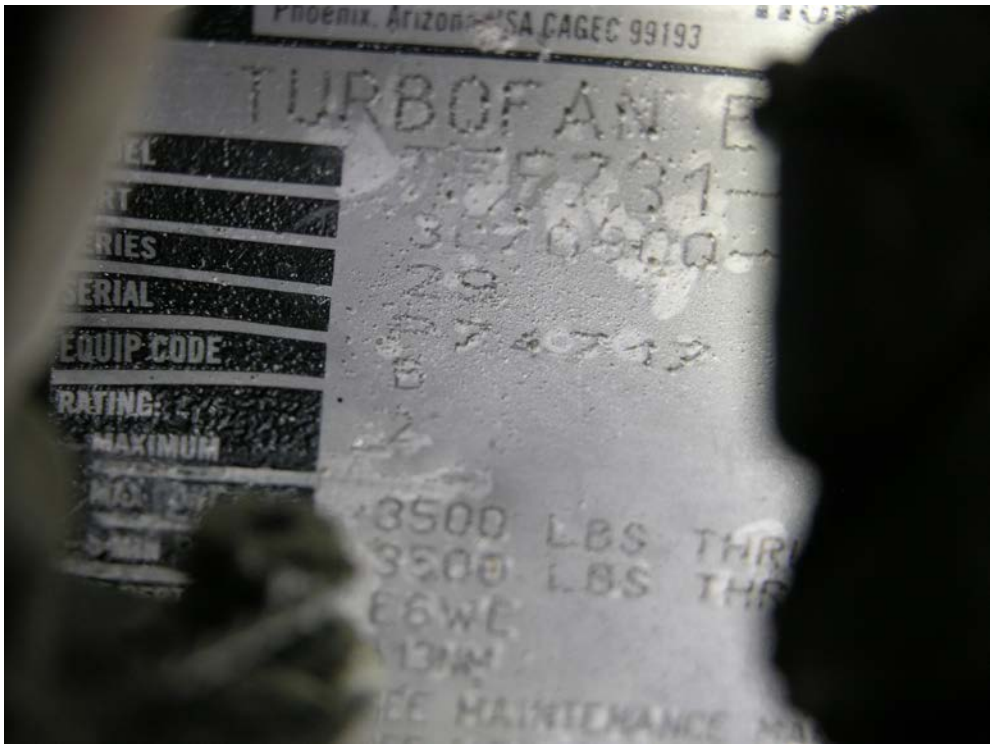

Figure 1. Left Engine, P-74717, Dataplate

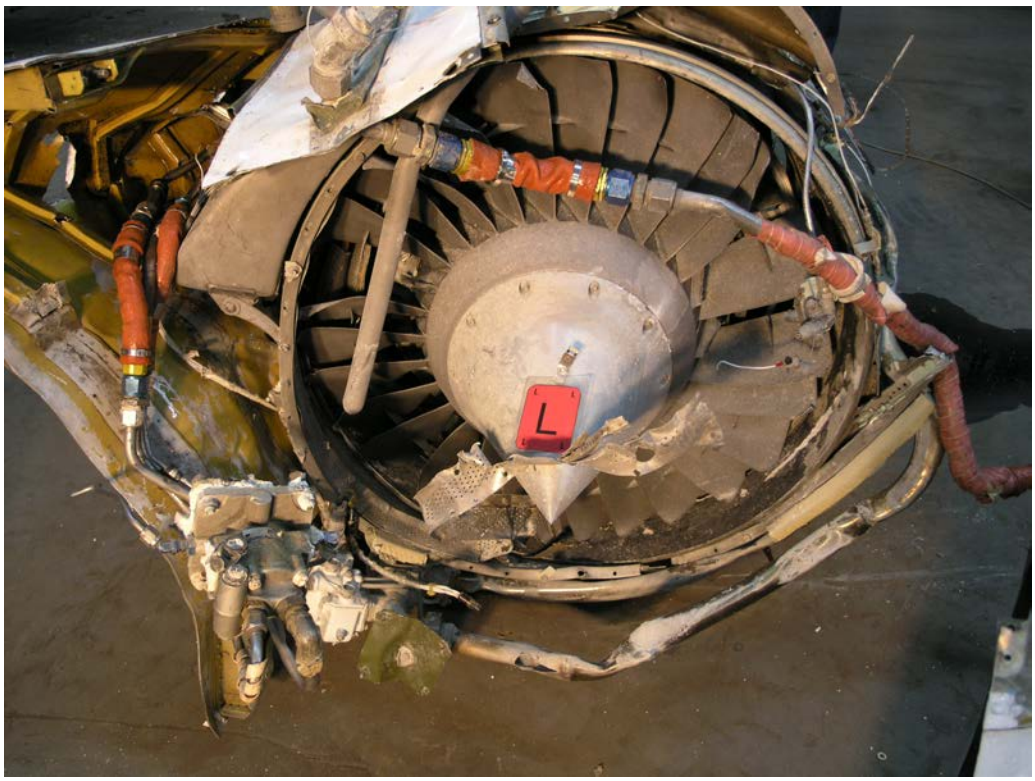

Figure 2. Left Engine, P-74717, Main Fan Damage

Figure 3. Left Engine, P-74717, Main Fan Damage

Figure 4. Left Engine, P-74717, Main Fan Damage

Figure 5. Left Engine, P-74717, Main Fan Damage

Figure 6. Left Engine, P-74717, Main Fan Damage

Figure 7. Left Engine, P-74717, 1st Stage LP Axial Compressor

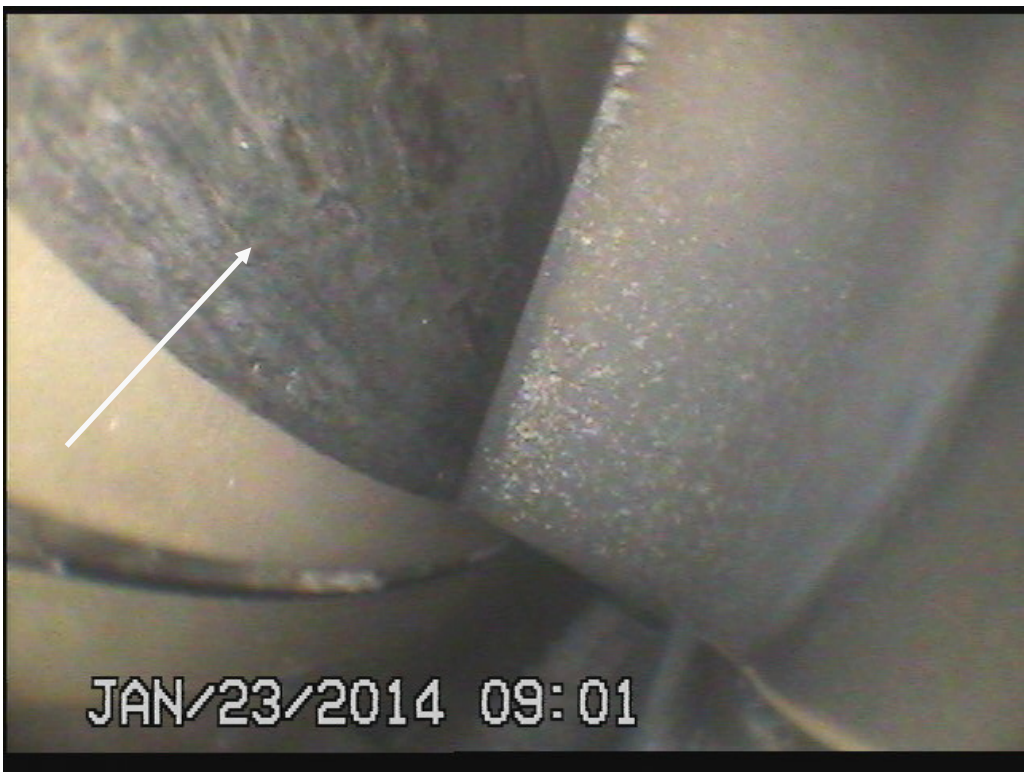

Figure 8. Left Engine, P-74717, High Pressure Impeller Rotational Scoring

Figure 9. Right Engine, P-74715, Dataplate

Figure 10. Right Engine, P-74715, Main Fan

Figure 11. Right Engine, P-74715, Main Fan

Figure 12. Right Engine, P-74715, Main Fan

Figure 13. Right Engine, P-74715, Main Fan

Figure 14. Right Engine, P-74715, Main Fan

Figure 15. Right Engine, P-74715, Main Fan

Figure 16. Right Engine, P-74715, First Stage Low Pressure Axial Compressor

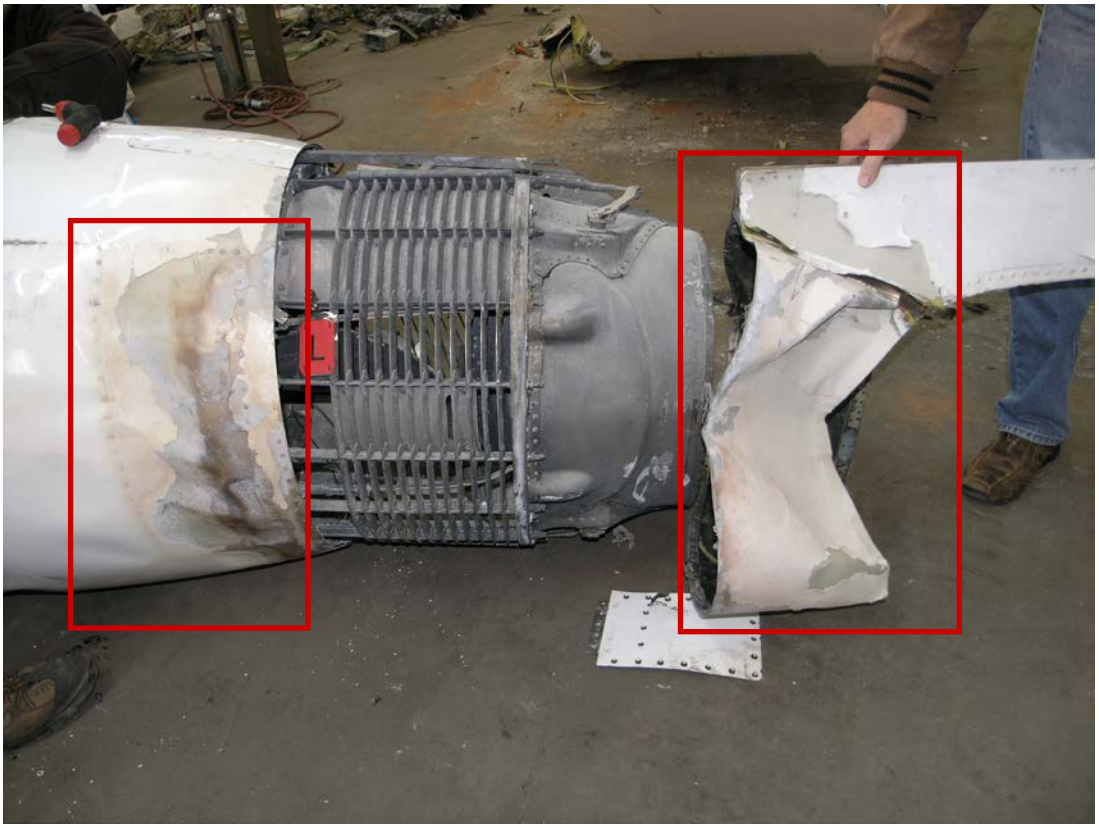

Figure 17. Left Engine Heat Distress on Nacelle and Thrust Reverser Tail