

National Transportation Safety Board

Office of Aviation Safety

Washington, DC 20594



WPR22FA068

ACCIDENT SITE, AIRFRAME, AND ENGINES EXAMINATION

June 2, 2022

A. ACCIDENT

Location: El Cajon, California
Date: December 7, 2021
Time: 1914 Pacific standard time
Airplane: N880Z, Gates Learjet Corporation 35A

B. ACCIDENT SITE, AIRFRAME, AND ENGINES EXAMINATION

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C. DETAILS OF THE EXAMINATION

1.0 Accident Site

Examination of the accident site revealed that the airplane struck a set of power lines and subsequently impacted the yard of a residential home about 1.43 nautical miles east of the approach end of runway 27R. The airplane came to rest upright on a heading of about 118° magnetic, at an elevation of about 595 ft msl. The wreckage debris path was oriented on a heading of about 310° magnetic and was about 186 ft long and 90 ft wide.

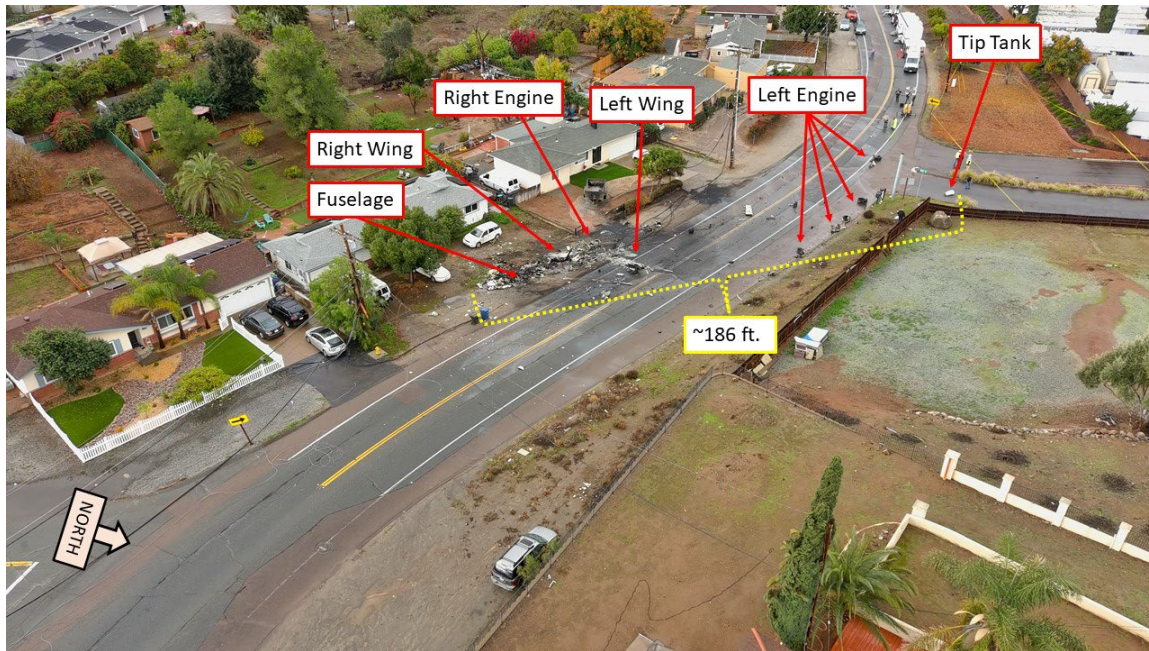


Figure 1: Accident site aerial photo (San Diego Sheriff Office) with annotations.

The first identified point of impact was a large crater, which contained the forward portion of the fuselage, including the nose cone area, portions of the instrument panel, and the upper windscreen structure was located within the crater. Extending from the crater, the remains of the fuselage extended about 42 ft to the elevator control horn. The right wing was immediately next to and in a parallel orientation to the fuselage. The left wing was located aft area of the fuselage. Portions of the left and right horizontal stabilizer and elevators, rudder, and right engine were located adjacent to the elevator control horn.

Extending from the fuselage, various debris including both main landing gear, left flap, portions of the left engine, and tip tank. All major structural components were located within the wreckage debris path.

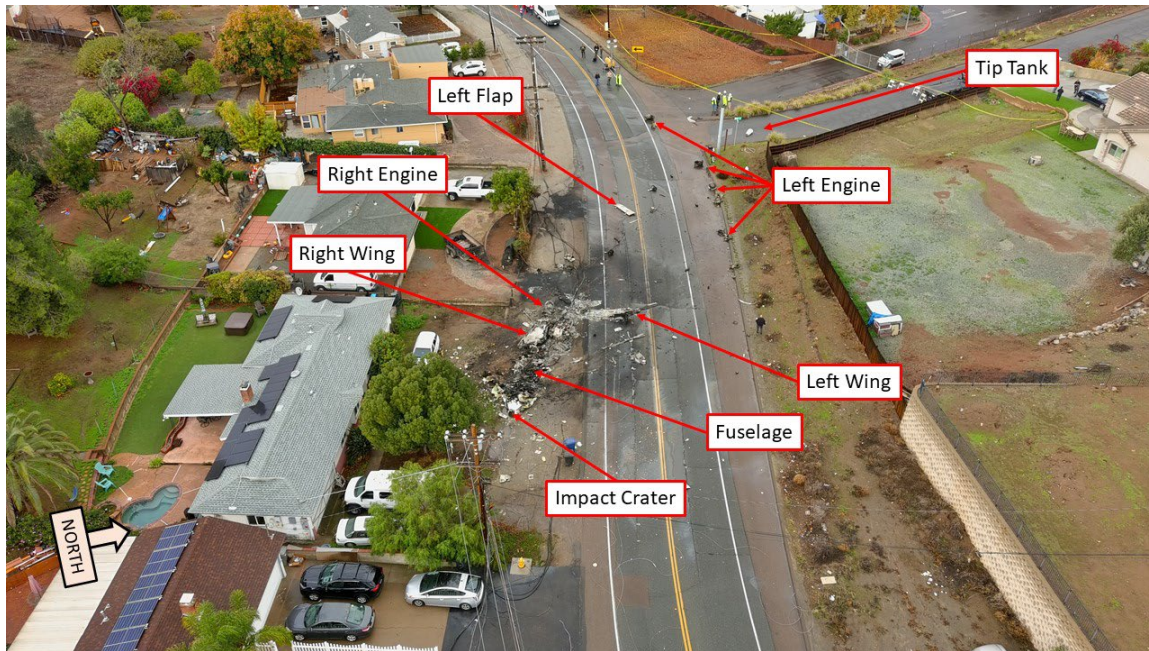


Figure 2: Accident site aerial photo (San Diego Sheriff Office) with annotations.



Figure 3: Accident site aerial photo (San Diego Sheriff Office) with annotations.

2.0 Airframe Examination (On Scene)

The left wing was fire damaged throughout. The left spoiler was observed in the stowed / 0 degrees position. The left flap actuator was found to be extended at 22 inches. The left aileron knuckles in both wings confirmed intact. The left main landing gear was in the down position with about 21.5 inches of chrome showing on

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the left main landing gear actuator. The left wing inboard gear door actuator was in the retracted position.

The right wing was fire damaged throughout. The right spoiler was observed in the stowed / 0 degrees position. The right aileron mechanical trim tab found and connected to both ends. The right aileron electrical trim tab found and connected to both ends. The right aileron knuckles in both wings confirmed intact. The right main landing gear was in the down position with about 21.5 inches of chrome showing on the right main landing gear actuator. The right flap was found in the extended position. The right-wing inboard gear door actuator was in the retracted position. The right aileron cables attached to knuckle yoke.

The aileron autopilot servo located within the debris and the cables attached to the servo. The flap cables attached to both flap bellcranks.

The empennage was mostly consumed by fire. The stab actuator had 3 1/8 inches of chrome extension. The stabilizer actuator was connected on both ends and bolts were confirmed to be intact. The elevator servo to elevator control surface continuity was established. The rudder servo to rudder control surface continuity was established.

The left and right thrust reversers were found in locked closed position. The left engine and right engine cowl latches found latched. The raisebeck locker handle was found in the unlocked position.

Examination of the cockpit area revealed that numerous instruments were displaced from the instrument panel and impact damaged. The engine fan speed indicator (unknown position) showed 50%, and the other engine fan speed indicator (unknown position) showed 86.4%. The airspeed indicator (unknown position) showed between 140 to 145. Another airspeed indicator (unknown position) exhibited what appeared to be a needle slap about 190.

Flight control was established from the cockpit area throughout the airframe to all primary flight controls.

The engine installation positions were identified based on the mainframe mount locations. The right engine remained with the main wreckage and left engine pieces were located along the western side of the debris field.

It could not be determined which engine several pieces came from; however, they are described below:

There were several spinner fragments located in the debris field. There was rotational scoring on the spinner fragments that were located. Fan blades were

located throughout the entire debris field. The located separated fan blades exhibited tearing and battering damage and bending opposite the direction of rotation. Several of the located fan blades were torn mid-span of the blade. Various accessory gearbox internal gears were located along the debris field. Bypass stator vanes were located throughout the entire debris field. Multiple stages of axial compressor blades were located throughout the entire debris field. There was a starter/generator to the north of the main wreckage.

3.0 Engine Examination (On Scene)

Left Engine, TFE731-2-2B, S/N P-89436, Part Number 3070300-9:

- Engine model number, serial number, and part number are per the airframe/engine logbooks.
- The engine was separated into two sections just aft of the engine support housing at the low-pressure compressor (LPC) case assembly split-line.
- There was rotational scoring present on the spinner support.
- The spinner support was broken from the 1 o'clock to 7 o'clock positions.
- There was rotational scoring present on the fan disk retainer nut.
- The engine dataplate was not located.
- There were only two fan blades present on the fan disk with the two remaining blades fractured just outboard of the dovetail attachment blade platforms.
- The fan inlet housing was impact damaged in an accordion fashion.
- The bypass stator vanes were missing from the 4 o'clock to 8 o'clock positions.
- The thrust reverser was located with the fan bypass/air inlet section of the engine, west of the main wreckage.
- A section of engine cowling was located near the thrust reverser and fan bypass/air inlet section.
- The engine inlet anti-ice ring was located along the debris path to the west.
- A portion of the accessory gearbox (AGB) was present between the main wreckage and the left engine power section.
- The fuel control unit (FCU) was separated from the accessory gearbox (AGB) and located near the main wreckage.
- The fuel pump was separated from the FCU and located near the FCU and main wreckage.
- The ignition box was located to the north of the main wreckage.
- The first stage axial compressor rotor blades were all displaced forward.
- Six of the first stage axial compressor rotor blades were missing.
- The remaining first stage axial compressor rotor blades displayed leading and trailing edge tearing and battering and tips bent opposite the direction of rotation.
- The second stage axial compressor stator vanes displayed leading and trailing edge tearing and battering; most of the vanes were missing.

- The second stage axial compressor stator vanes displayed leading and trailing edge tearing and battering and tips bent opposite the direction of rotation.
- Several of the third stage axial compressor rotor blades were missing.
- There was rotational scoring on the first stage axial compressor shroud.
- There was rotational scoring on the forward end of the low pressure compressor case assembly.
- The compressor housing was broken.
- The N2 (HPC) was not free to rotate.
- The aft side of the third stage low pressure turbine stator displayed battering damage.
- When viewed through the exhaust, all of the 3rd stage low pressure turbine blades appeared to have leading edge damage, with heavier damage towards the outer diameter of the blades.
- The exhaust was crushed.

Right Engine, TFE731-2-2B, S/N P-89449, Part Number 3070300-9:

- Engine model number, serial number, and part number are per the airframe/engine logbooks.
- The engine was separate from the empennage.
- The engine was sitting in a mostly upright position on a 120° (mag) heading.
- The bottom of the engine was crushed/slightly flattened.
- There was extensive fire and heat damage on the exterior of the engine.
- There was rotational scoring present on the spinner support.
- The engine dataplate was not located.
- There were no fan blades present in the fan disk.
- The fan inlet housing was intact (no blades penetrated the housing).
- The bypass stator vanes were missing from the 1 o'clock to 8 o'clock positions, ALF.
- The fuel control unit (FCU) and fuel pump were separated from the accessory gearbox (AGB) but still next to the engine.
- The 1st stage compressor blades displayed tearing and battering damage.
- When viewed through the exhaust, all of the 3rd stage turbine blades and stator vanes appeared to be intact.
- What appeared to be metal spray deposits were adhering to the aft side of the 3rd stage turbine stator vanes.
- The exhaust was crushed.
- The thrust reverser was separated but still loosely attached to the engine by various plumbing lines.
- The fan hub could be rotated by hand with resistance, but there was no corresponding rotation in the low-pressure turbine.

4.0 Recovered Wreckage Examination

Examination of the recovered airframe was conducted at the facilities of Air Transport on June 1, 2022. The EGPWS and N1 DEEC unit (both sides) were located within the debris/wreckage. The left flap actuator was found intact still in the installed position in the left wing. The left flap actuator measured approximately 19.1 inches rod eye to rod eye, consistent with full extension (40°). The right flap actuator was located within the recovered wreckage; the rod was intact, but the cylinder was damaged and partially missing. The extension of the right flap actuator rod was approximately the same as that of the left flap actuator rod.

The forward part of the fuselage, including the cockpit was impact and fire damaged. Remains of the control yokes were observed within the recovered debris. The throttle quadrant was impact damaged, however was intact. The flap switch was positioned at about 20 degrees. The instrument panel was impact damaged with numerous instruments displaced. One altimeter located, indicated 100 ft with a setting of 29.99. One airspeed indicator was recovered and had what appeared to be a needle slap mark at about 190 knots. Remains of the caution light panel were found and exhibited impact/thermal damage with numerous light/switch displacement. The instrument set in the lower pedestal was found mostly intact; there was no FMS installed in this location (where it would normally be expected to be found). No other avionics components in the wreckage were identified as being an FMS.

Left Engine

Using a borescope, all visible compressor stages were missing vanes and blades, with the blades and vanes present displaying tearing and battering. The trailing edge of the third stage nozzle vanes were battered with pitting present on the face of the vanes. Metal spray present on the suction side of the third stage nozzle vanes.

Right Engine

Using a borescope, the internal areas of the right engine were examined. Metal spray present on the suction side of the third stage nozzle vanes. The second stage axial compressor blades bent opposite the direction of rotation. The third stage axial compressor blades displayed leading edge damage.

Submitted by:

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