



NATIONAL TRANSPORTATION SAFETY BOARD

Office of Aviation Safety
Washington, D.C. 20594

Wreckage Examination Summary

ERA24FA136

A. ACCIDENT

Location: Hot Springs, Virginia
Date: March 10, 2024
Time: 1452 Eastern Daylight Time (EDT)
1852 Coordinated Universal Time (UTC)
Airplane: Israel Aircraft Industries, Westwind Astra 1125, N1125A

B. INVESTIGATIVE TEAM

NTSB IIC	Adam Gerhardt National Transportation Safety Board Washington, D.C, USA
Party Coordinator	Jay Venable Federal Aviation Administration Richmond, Virginia (FSDO)
Technical Advisor	Keith Candline Gulfstream Aerospace Savannah, Georgia
Party Coordinator	David Studtmann Honeywell Aerospace Phoenix, Arizona

C. ACCIDENT SUMMARY

On March 10, 2024, about 1452 eastern daylight time, an Israel Aircraft Industries, Westwind Astra 1125 airplane, N1125A, was involved in an accident at the Ingalls Field Airport (HSP), Hot Springs, Virginia. The airline transport pilot, commercial pilot, and three passengers were fatally injured. The airplane was operated by Aviation Trust Company LLC under the provisions of Title 14 *Code of Federal Regulations* Part 91 as a personal flight.

D. Investigation

1.0 Details of the Investigation

The NTSB was notified of the accident about 1530 on the day of the accident. The following morning, March 11, 2024, the NTSB Investigator-in-Charge arrived on-site. From March 11-14, the wreckage was examined with assistance from the party members and technical advisors. On March 14, 2024, the on-site activities concluded. This contains the factual findings pertaining to the on-site airplane examination.

2.0 Wreckage and Impact Information

The wreckage debris path was oriented on a 250° - 255° heading and spanned about 150 ft from the initial impact point to the main wreckage. The initial impact point coincided with several trees that were located along a ravine and down sloping terrain that was about 300 ft from the runway threshold. Evidence of broken tree branches and fragments of airframe were located at this point. The sheared area of the trees created a geometric plane suggesting a slight right wing low attitude as the aircraft

began impacting the trees. All major portions of the airplane were located in the debris path consistent with direction of travel as observed from the flight track data.

3.0 Engine Examination

General

Both engines were separated from the aft fuselage structure and were located within the debris field. The right engine was located approximately 10-15 feet beyond the empennage. The left engine was fragmented with the fan section and aircraft inlet under the empennage and the engine core located near the fuselage. The engines' installation positions were identified based on the mainframe mount locations. The right engine was approximately 15 feet further into the debris field in front of the empennage resting location and in line with the left engine core. The loose compressor stator vanes, compressor shroud rings, air-oil coolers, and LRUs were located within the debris field between the initial impact point and the fuselage indicating that the left engine began to separate fairly early into the impact sequence. The left engine fuel control unit was located closest to the initial impact point.

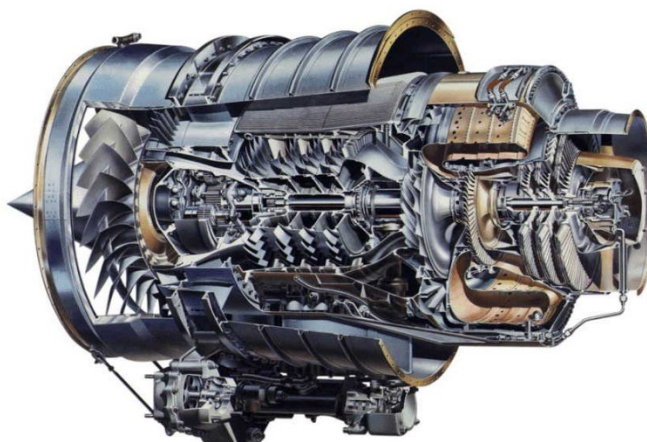


Figure 1. Typical TFE731-3 Series Turbofan Engine

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

Left Engine Information (No. 1)

Engine Model	Honeywell TFE731-3C-200G
Serial Number	P96191C
Part Number	3074040-2
Engine Total Hours/ Cycles:	8,085.9 hours / 5,163 cycles

- The engine was separated into two sections just aft of the engine mainframe at the low pressure compressor (LPC) case attachment split-line.
- The engine dataplate remained attached to the engine fan inlet housing.
- The aircraft inlet was partially attached to the engine fan inlet housing. The aircraft inlet exhibited signs of crushing and thermal damage.
- The engine fan inlet housing showed signs of thermal damage and crushing due to impact.
- The spinner exhibited rotational scoring signatures.

- All the fan blades were present. Fan blades exhibited leading edge tearing, gouging, and battering damage. All fan blades were bent opposite the direction of rotation. All the fan blades exhibited heat damage.
- Five fan blades were broken at varying span locations.
- Loose compressor stator vanes were found in the debris field.
- Low Pressure Compressor (LPC) case was torn and separated just forward of the LPC bleed ports.
- Interior surface of the separated portion of the LPC case exhibited rotational scoring and bluing.
- Some of the stator support rings were found in the debris field and exhibited bluing.
- Fan bypass cowling and aft body were not with the engine.
- Engine core was covered in a white ash-like debris.
- The number 3 bearing and carrier were separated main mount and remained attached to the core.
- Portions of the core skins were attached to the engine core, exposing portions of the transition duct (T-duct) and combustor plenum.
- Fuel manifold insulation was thermally degraded
- The accessory gearbox (AGB), transfer gearbox (TGB), fuel control unit (FCU), fuel pump and starter/generator were separated from the engine.
- The aircraft exhaust remained attached to the engine exhaust.
- The engine core was impact damaged. One area of the combustor plenum and T-duct were buckled and split.
- One fuel nozzle was separated and missing.
- The first 3 stages of the axial compressor blades showed signs of bending opposite the direction of rotation and leading edge gouging, tearing, and battering damage.
- The 4th stage compressor blades were no longer present within the rotor disk.
- When viewed through the exhaust, all 3rd Stage Low Pressure Turbine (LPT) blades appeared to be intact.
- Items found separated from the engine in the debris field; fuel pump, fuel control, oil filter housing, a portion of the accessory housing containing starter/generator mount flange, two gears from accessory gearbox, two sections of the air-oil cooler, fuel flow divider, and fuel heater / oil cooler.
- No attempt was made to rotate the N1 (LPC) spool.

Right Engine Information (No. 2)

Engine Model	Honeywell TFE731-3C-200G
Serial Number	P96189C
Part Number	3074040-2
Engine Total Hours/ Cycles:	8,085.9 hours / 5,163 cycles

- The overall all engine was intact; however, damage was noted.
- The engine was covered with soot and earthen debris. Biological debris on external portion of engine from 12 o'clock to 6 o'clock position.
- A portion of the aircraft forward mount remained attached to the engine main mount.
- Aft body was separated from the fan housing.
- Aft flange of fan bypass duct was torn out.
- The aircraft aft skins (inner bypass) remained attached.
- Rear aircraft mount was separated, and engine's attachment deformed.
- Aircraft exhaust remained attached to engine core exhaust.
- Oil filter housing was displaced aft and fractured from its mounting flange.

- Aircraft inlet was separated from the engine fan inlet housing.
- The engine dataplate was attached to the fan inlet housing.
- Earthen debris was embedded in the fan blades.
- One fan blade was displaced and separated from the fan disk, and was located aft of the blade/rotor assembly.
- Multiple fan blades were displaced aft in the disk.
- All fan blades displayed leading edge tearing, nicks and gouging damage.
- Many fan blade tips bent in opposite direction of rotation.
- Fan bypass stators exhibited nicks on leading edges.
- Majority of intermediate housing stator vanes were separated and displaced from their installed position.
- Fan spinner support displayed rotational scoring.
- Fan spinner remained attached to fan spinner support.
- Compressor section could not be externally viewed as core is hidden.
- Thermal damage noted on insulation of plumbing.
- Oil filter bypass indicator was noted to be extended.
- Oil tank exhibited crushing damage, and fluid that appeared to be oil was noted on external surface.
- Crushing damage noted to bypass duct between the 3 and 6 o'clock position.
- Aft flange of the plenum and T-duct was displaced aft and inward. The breach exposed a visual access to the combustor liner. Crushing damage was also evident.
- Axial witness marks (scoring) on aft exhaust center body of aircraft exhaust, which was attached to aircraft skins.
- All 3rd stage LPT blades appeared to be intact and in place.
- Teleflex cable input into fuel control was separated.
- Transfer gear box was displaced from its mount.
- The N1 (LPC) was not free to rotate.

4.0 Airframe Examination

Aircraft Information

Manufacturer:	Israel Aircraft Industries (Current TC Holder, Gulfstream Aerospace LP)
Model	Westwind Astra 1125
Serial Number	051
Registration Number	N1125A
Airframe Total Time	8,135.7 hours

Airframe Summary

All primary flight control surfaces and major portions of the airplane were located at the accident site. Flight control continuity could not be established from the cockpit to the flight controls due to the extensive impact damage, however; continuity was observed at the flight control surfaces that remained partially intact to their installation area. The configuration of the airplane at the time of impact was assessed to be landing gear down and flaps extended. The impact and thermal damage prevented an evaluation of each ground and flight spoiler; however, one spoiler was observed to be retracted. Impact and thermal damage also prevented observation of both wing slats, but observation of the left wing slat indicated it was extended.

Cockpit and Fuselage

The cockpit and fuselage came to rest inverted, with its bottom fuselage portion having been sheared during the impact sequence and thermally destroyed by the post-crash fire.

All cockpit switches and flight instruments were destroyed by the fire. Both control wheels remained intact but were impacted separated and laying loose in the cockpit debris area. The control column yoke chain remained intact and partially connected to one control wheel. The throttle quadrant was found locked into place near a maximum thrust position, with the thrust reverser controls found in the stowed position.

Left Wing

A section of outboard left wing was observed in the debris path. Within this section, a 5 ft portion of the left aileron remained attached to the wing. The aileron exhibited control continuity from the control surface to the push pull control rods that ran towards the fuselage. The end of this control rod was impact separated. The left wing outboard spoiler was observed retracted and its actuator position corresponded to a retracted position. A fragment of the left wing slat and its actuator corresponded to an extended position.

The left wing flaps were found extended. The below flap jackscrew exposed thread measurements were observed:

Left Wing Flaps Jackscrews

Inboard	8 and 5/16 inches
Middle	7 and 1/2 inches
Outboard	No measurement. Jackscrew fragmented, located loose in the debris path

Right Wing

A section of outboard right wing was observed in the debris path. Within this section, a fragment of the right aileron remained attached to the wing. An additional fragment of right aileron was located in the debris field. Aileron control cables were fragmented consistent with impact related damage. The right wing spoilers were not observed. The right wing slats were not observed, nor the right wing flight spoilers.

The right wing flaps were found extended, with the inboard and middle measurements being largely uniform with the left wing respective jack screws. The below flap jackscrew exposed thread measurements were observed:

Right Wing Flaps Jackscrews

Inboard	8 and 5/8 inches
Middle	7 and 1/2 - 5/8 inches
Outboard	6 and 1/4 inches

Empennage

The horizontal and vertical stabilizer had separated from the fuselage but remained only a few feet away in the debris field. The majority of the stabilator and rudder control surfaces remained intact and attached the empennage structure. Both flight control surfaces exhibited control continuity to their respective push pull tubes. These control tubes were impact separated from the fuselage. The rudder trim was viewed to be in a near neutral position.

The horizontal stabilator trim jack screw was found to have about 3 inches of exposed extension area. On the exterior of stabilator, a total of 7 inches was measured from the top of the control surface to the top of the movement area on the vertical stabilizer.

Landing Gear

Both left and right main landing gear (MLG) separated from the airframe and were found in the debris path. The right MLG and tires were located about 130 ft forward of the runway 25 threshold about 10 ft to the right of the runway edge. Both MLG actuators corresponded to a down position.

The nose landing gear and its tires were located in the debris path separated from the airframe. Its actuator was found extended.

Left Thrust Reverser

The reverser sustained heavy impact damage and was located in the debris field separated from the engine. The deployment push pull mechanisms sustained forward to aft impact damage. The reversers were found partially extended consistent with impact related damage. The reverser was found with its lockout bolt installed, secured, and intact.

Right Thrust Reverser

The reverser sustained heavy impact damage and was located in the debris field separated from the engine. The top reverser was found latched and secured. The bottom reverser was fragmented and partially disconnected from its attachment areas. There was no lockout bolt installed on the reverser.

5.0 Non Volatile Memory Devices and Recorders Recovered

The following units were located in the debris and preserved for potential data extraction. Each unit sustained impact and thermal damage. The DEECs sustained the most extensive damage, with the majority of the unit's casing having been destroyed.

- Fairchild A100A Cockpit Voice Recorder (CVR), Serial Number: 59001
- Honeywell Enhanced Ground Proximity Warning System, Serial Number: Not readable.
- Honeywell Digital Electronic Engine Computers (DEECs). Serial Numbers: Not readable.

Drafted By:

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