

National Transportation Safety Board

Office of Aviation Safety

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AIRFRAME AND ENGINE EXAMINATION REPORT

August 5, 2024

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A. ACCIDENT

Location: Pleasant Grove, California
Date: June 25, 2024
Time: 0600
Airplane: N6793K, Grumman Aircraft Engine Corporation- Schweizer, G-164B

B. AIRFRAME AND ENGINE EXAMINATION REPORT

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C. SUMMARY

On June 25, 2024, about 0554 Pacific daylight time, a Grumman-Schweizer 164B, N6793K was substantially damaged when it was involved in an accident near Nicolaus, California. The pilot was not injured. The airplane was operated as a Title 14 *Code of Federal Regulations* Part 91 positioning flight.

On August 5, 2024, the IIC, the party member from Honeywell Aerospace and his assistance, travelled to Plain Parts, Pleasant Grove, California to conduct an airframe and engine examination. At the conclusion of the examination, it was determined that the engine should be removed and shipped to Honeywell Aerospace for further examination. No mechanical malfunctions or failures with the airframe were noted.

The engine fuel control and the propeller governor were shipped to Woodward for further examination.

D. DETAILS OF THE EXAMINATION

1.0 Accident Site

The accident occurred past the end of a private runway owned by Moes Crop Dusting Service. According to the pilot, the dimensions were about 2,000 ft long, 20 ft wide.

2.0 Airframe Examination

2.1 Fuselage

The fuselage was substantially damaged at the root end of the empennage and exhibited breaks in the metal tubing and twisting of the fuselage structure near the tail wheel. Additional substantial damage was located near the left main landing gear attachment point.



Figure 1. N6793K at the recovery site.

2.2 Empennage

The vertical stabilizer received minor damage. The rudder exhibited substantial damage with tears in the fabric skin and bending of the structural tubing. The left and

right horizontal stabilizer and elevators were all substantially damaged with breaks and bends to the structural tubing and tears to the fabric skin. The right horizontal stabilizer and elevator were substantially damaged with separated components, bent structural tubing, and tears to the fabric skin.



Figure 2. Empennage damage.

2.3 Wings.

The airplane was equipped with upper and lower wings (bi-plane type). The preponderance of damage was located on the right upper and lower wings.

The upper right wing remained attached to the upper fuselage at the wing supports, and exhibited considerable downward bending of the leading edge. The lower right wing remained attached to the fuselage and exhibited crumpling at the tip to about four to five ft inboard. The wing-to-wing support (struts) remained attached to both the upper and lower right wings. The wing support cables were slack.

The left upper and lower wings exhibited less damage than the right pair. The upper left wing remained attached to the upper fuselage at the wing supports and exhibited

minor damage. The lower left-wing remained attached to the fuselage and exhibited damage to the trailing edge components. All wings were removed for recovery and stacked at the secured facility.



Figure 3. Wings stacked at the recovery site.



Figure 4. Second view of wings stacked at the recovery site.

2.4 Landing Gear

The right main landing gear remained attached at the underside of the fuselage and sustained minor damage. The left main landing gear separated from the fuselage. The tail wheel separated from the spring.

2.5 Cockpit

The cockpit received minor damage.



Figure 5. Image of the cockpit.



Figure 6. Image of the throttle quadrant.

2.6 Fuel/Fuel System.

The fuel system was examined and exhibited minor damage. The upper wing tank remained installed and exhibited minor damage. The tank was drained of fuel. Postaccident examination of the hopper revealed no fuel and no smell of fuel. The engine driven fuel pump will be examined later. The right fuel filter was opened at the base drain. Clear fuel with the color and smell of Jet fuel was released and did not contain contamination.

2.7 Other Systems

The airplane was equipped with a Satloc, SLC 93 GPS system. The data memory card and the computer box were recovered for download of data.

3.0 Engine Examination

The engine was a TPE331-1-101Z, Serial number: P-26083C. The engine was examined by a subject matter expert employed by Honeywell Aerospace Technologies (HAT). Visual inspection revealed:

- The engine remained installed to the airframe at the undamaged engine mount.
- The engine power lever remained attached to the engine and was in the bottom of the green arc, against the gate position in the cockpit.
- The PLA lever remained attached to the engine and was in the BACK position at the cockpit.
- All B-nuts for the pneumatic lines to the engine were at least finger-tight.
- The Fuel Control Housing had fractured and partially separated from the Fuel Pump Housing at the interface flange.
- The engine was removed from the airframe and placed in a shipping container for shipping to HAT for further examination.

On November 7, 2024, the IIC travelled to Honeywell Aerospace, Phoenix, Arizona to conduct a follow up tear down examination of the engine, conducted by the manufacturer's technicians. Highlights of the examination revealed:

- Intermediate Housing and Gear Assembly. All components were intact and appeared undamaged.
- Accessory Drive Housing (Gearcase) Assembly. All components were intact and appeared undamaged
- Torque Sensor and Direct Drive Fuel Control Gear Train. All components were intact and appeared undamaged.
- Compressor Section.
 - The torque shaft was broken at the aft bushing land, consistent with torsional overload.
 - The first-stage compressor impeller shroud was intact and had light rotational scoring at the exducer area of the shroud for a full 360°.
 - The first-stage impeller was intact, had earthen debris adhering to all blades, exhibited damage to the leading edges of all blades, and had light rotational scoring on all the blades at the exducer.
 - The first-stage compressor diffuser exhibited white deposits between the diffuser vanes.
 - The second-stage compressor housing was intact and exhibited white debris and rotational scoring at the shroud inducer and exducer area.
 - The second-stage compressor impeller was intact and exhibited silt like debris on the inner bore, metallic deposits on the back face, rotational scoring with bluing at the exducer of all blades with corresponding damage to the second-stage impeller shroud. The second-stage compressor impeller also had rotational scoring at the inducer with corresponding damage to the second-stage impeller shroud.
 - The second-stage compressor diffuser vane assembly was intact and exhibited slight silver colored debris build-up on the leading edges of the vanes, along with silt like debris on the aft face.
- The combustor section was not disassembled. All components appeared intact and undamaged.
- Turbine section.
 - The first-stage turbine stator assembly was intact and appeared not damaged but exhibited trailing edge cracks in several vanes, orange colored deposits on the outboard

side of the suction side of the vanes, and metal spray deposits on the suction side of several vanes.

- First-stage turbine rotor was intact and appeared undamaged but exhibited metal spray deposits on the suction side of several blades, and grooves on the honeycomb seal.
 - Second-stage stator was intact and exhibited thermal damage on three vanes, light metal spray deposits on the suction side on several vanes, and grooves in the honeycomb seal.
 - The second-stage turbine rotor was intact and appeared undamaged but exhibited light talc like substance on the aft side of the rotor, and metal spray on the suction side of the rotor.
 - The third-stage turbine stator was intact and appeared undamaged but exhibited metal spray adhering to the suction side of the vanes.
 - The third-stage turbine rotor was intact and appeared undamaged but exhibited metal spray on the suction side of the blades.
 - All remaining components of the turbine section were intact and appeared undamaged.
- Controls & Accessories
 - The fuel pump assembly was fractured at the aft flange, had two studs pulled out of the aft flange, and the high pressure gear forward carbon elements were fractured.
 - The fuel control unit (FCU) input shaft to the manual fuel valve was not intact, and the fuel control unit forward mount flange was fractured with pieces of the casting separated from the FCU.
 - All remaining components of the controls & accessories were intact and appeared undamaged.



Figure 7. Image of the engine at the examination site.

4.0 Propeller Examination

The propeller was examined. Each blade was given an arbitrary alphabet letter to identify it (A, B, and C).

- The aluminum, three-bladed, constant speed propeller exhibited damage to all three blades and the hub components.
- Blade A remained installed in the hub and the alignment tabs matched. The blade exhibited an aft bend about mid span. The tip exhibited chord-wise and span-wise striations at the outboard end. The tip of the blade was fractured and separated. The tip was not present to be examined. The fractured end exhibited a dull rough and uniform appearance. The leading edge exhibited gouging near the outboard end that reduced in severity toward the root. The aft side of the blade exhibited pitting in the paint near the outboard end.
- Blade B remained installed in the hub and the alignment tabs matched. The blade exhibited a sharp near 90° forward bend with chordwise striations at the aft side of the outboard end. The tip fractured and separated from the blade. The tip was not present to be examined. The fractured end exhibited a dull rough and uniform appearance. The leading edge exhibited

gouging that reduced in severity toward the root. The B-blade counterweight was lodged into the spinner plate.

- Blade C remained installed in the hub and the alignment taps did not match. The blade rotated in the hub toward the high RPM direction. The blade exhibited a forward bend about mid-span and a fracture separation of the blade at the bend site. The fractured end exhibited a dull rough and uniform appearance. The outboard section of the blade was not examined. The blade exhibited chordwise and spanwise striations at the outboard end.
- The hub remained installed on the propeller flange and exhibited damage to two of the blade pitch control rods. Pitch control rod A remained installed at both ends. Pitch control rods B and C remained installed at the hub and separated at the blade. The Beta rod was removed and exhibited no damage.



Figure 8. Image of the propeller.

The three blades were cut near the root and packaged for shipment to HAT for examination by the manufacturer's party member.

On November 7, 2024, the IIC travelled to Honeywell Aerospace, Phoenix, Arizona, along with the Party Member for Hartzell Propellers and conducted a follow up tar-

down examination of the propeller. Highlights of the examination revealed the following:

- Blade tips fractured. Blade C is a mid-blade fracture (27" missing)
- Forward thrust direction bending
- Link screw holes in the link arms were stretched.
- Slip indicators indicate rotation towards high pitch.
- Link screw fractured from clamp.
- Face-side chord-wise direction scoring. (Blades B and C)
- Blade A was bent aft but had Face-side Chordwise directional scoring

Impact marks indicate a blade angle between 15 to 30 degrees. Above the flight idle blade angle.

5.0 Aircraft Information

The airplane was a Grumman Aircraft Engine Corporation- Schweizer, G-164B. equipped with a Garrett TPI-331-1-101Z Turbo-prop engine. The airplane was recently sold from Moe's Crop Dusting, Nicholas, California to CajunCats LLC, Kaplan, Louisiana.

6.0 Meteorological Information

Weather at Lincoln Regional Airport/Karl Harder Field, (LHM) Lincoln, California, about the time of the accident was reported as wind 180° at 5 knots, few clouds at 8000 temperature 15°C dew point temperature of 8C, barometric pressure 29.86 inches of mercury.

On November 8, 2024, the IIC and Party Member from Honeywell Aerospace, along with assistance, continued the examination of the accident engine. The remaining components of the engine were disassembled.

FINDINGS

- Light damage to the leading edge of the primary and secondary compressor impellers, consistent with contact with the respective nozzles.
 - Light metal spatter on most second and third stage turbine wheels.
 - Some thermal cracks on two, but not all first stage nozzle vanes.
- Some thermal cracks on four, but not all the second stage nozzle vanes.
- Damage to the mounting flanges of the fuel pump
 - Torsion shaft fractured in half
 - Diaphragm Assembly: Damage to the Helical cam gear and hydraulic torque sensor, consistent with a propeller strike.

The fuel control and propeller governor were shipped to the manufacturer for further examination.

Submitted by:
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