

**NATIONAL TRANSPORTATION SAFETY BOARD
Office of Aviation Safety
Washington, DC 20594**

SUMMARY OF VACUUM SYSTEM EXAMINATION REPORT

CEN21FA026

A. ACCIDENT

Location: Woodbranch, Texas
Date: October 25, 2020
Time: 0837 CDT
Aircraft: Grumman AA-5A (S/N AA5A0452) N26136

B. PARTICIPANTS

David Bowling
Senior Air Safety Investigator
National Transportation Safety Board

C. ACCIDENT SUMMARY

On October 25, 2020, about 0837 central daylight time, a Grumman AA-5A airplane, N26136, was destroyed when it was involved in an accident near Woodbranch, Texas. The airline transport rated pilot and 1 passenger were fatally injured. The airplane was operated as a Title 14 *Code of Federal Regulations* Part 91 personal flight.

According to information provided by local authorities, the airplane took off on a planned IFR cross-country flight in instrument meteorological conditions from runway 17 at the North Houston Airport (9X1) with a destination of Liberty, Texas (T78). Preliminary radar and Automatic Dependent Surveillance-Broadcast (ADS-B) data showed a normal takeoff and climb to the south and subsequent turn to the east. Passing 1,600 ft, the pilot established communications with the air traffic controller and requested clearance to T78. The controller asked if they could maintain their own terrain and obstruction clearance until leaving 1,700 ft, to which the pilot responded in the affirmative.

The controller then cleared the airplane to T78 via radar vectors and instructed the pilot to climb to 3,000 ft and fly a heading of 270°. The airplane made a left turn to a northeast bound heading when the controller instructed them to stop their turn and climb to 3,000 ft. The airplane was climbing through 2,200 ft when the controller advised the pilot of antennas in front of them and again instructed him to climb to 3,000 ft. The airplane climbed to 2,400 ft, continued turning left, and then began descending rapidly. The Minimum Safe Altitude Warning activated as the

airplane descended through 1,900 ft. The controller issued a Safety Alert and instructed the pilot to stop their descent and level off. Simultaneous loss of radar and radio communications occurred with the airplane heading east. The controller advised the pilot that radar contact was lost. There were no radio distress calls heard from the pilot.

A witness in the area heard what sounded like a go-cart or [motor] bike approaching. As it got louder and realized it was an airplane, he heard the engine “stall.” When the airplane was over his house, he reported the engine “cranked back up to a very high rpm” and then heard “a crash.” The airplane impacted beside his neighbor’s house.

The accident site was located in a wooded area bordering a residential neighborhood, about 8 miles east of 9X1. The elevation of the accident site was about 95 ft and the terrain was predominately flat. The airplane wreckage showed evidence of a nearly vertical impact. Most of the forward fuselage, engine, cabin, baggage compartment and aft fuselage was crushed aft and fragmented. Both wings were separated from the fuselage and broken in several sections. The broken wing sections showed aft crush impact damage spanning the leading edges. The propeller was fractured torsionally at the flange and both blades showed S-bending, leading edge gouges, and chordwise scratches. The wreckage was recovered and transported to a secure facility for detailed examinations of the airplane’s systems.

D. DETAILS OF ACCIDENT EXAMINATION

On July 28, 2021, the airplane’s vacuum system components to include the vacuum pump and hoses, suction gauge, filters, attitude indicator, directional gyro, and turn coordinator were recovered from the airplane wreckage and sent to the NTSB, Office of Aviation Safety, Central Region Office in Denver, Colorado for examination. The components arrived in Denver on July 30, 2021. The box containing the vacuum system components was opened, and the components were removed and examined on August 18, 2021. See figures 1 and 2.



Figure 1, Box Containing Vacuum System Components



Figure 2. Vacuum System Components

D. SUMMARY OF VACUUM SYSTEM EXAMINATION

Vacuum Pump – Rapco, Inc. RAP215CC (S/N A7163)

The vacuum pump came with the drive coupling and pump hoses. See Figure 3. The unit was caked with dirt. The hose was broken about 10 inches from the pump outlet. An external examination of the pump showed it intact. See figure 4. The drive coupling was held to the pump by zip tie. The tie was cut, and the drive coupling removed. The drive coupling rotated freely. The top and bottom covers were removed, and the pump rotor and vanes were examined. The pump rotor was fractured in three places and showed rotational rub marks on both sides. The vanes showed normal wear. See figure 5. The top and bottom inside covers showed rotational rub marks. The bottom inside cover with the core drive plate also showed impact and rotational scoring. See figures 6 and 7. The inside of the pump stator housing showed rotational rubs. See figure 8.



Figure 3. Vacuum Pump, Hose and Drive Coupling



Figure 4. Vacuum Pump

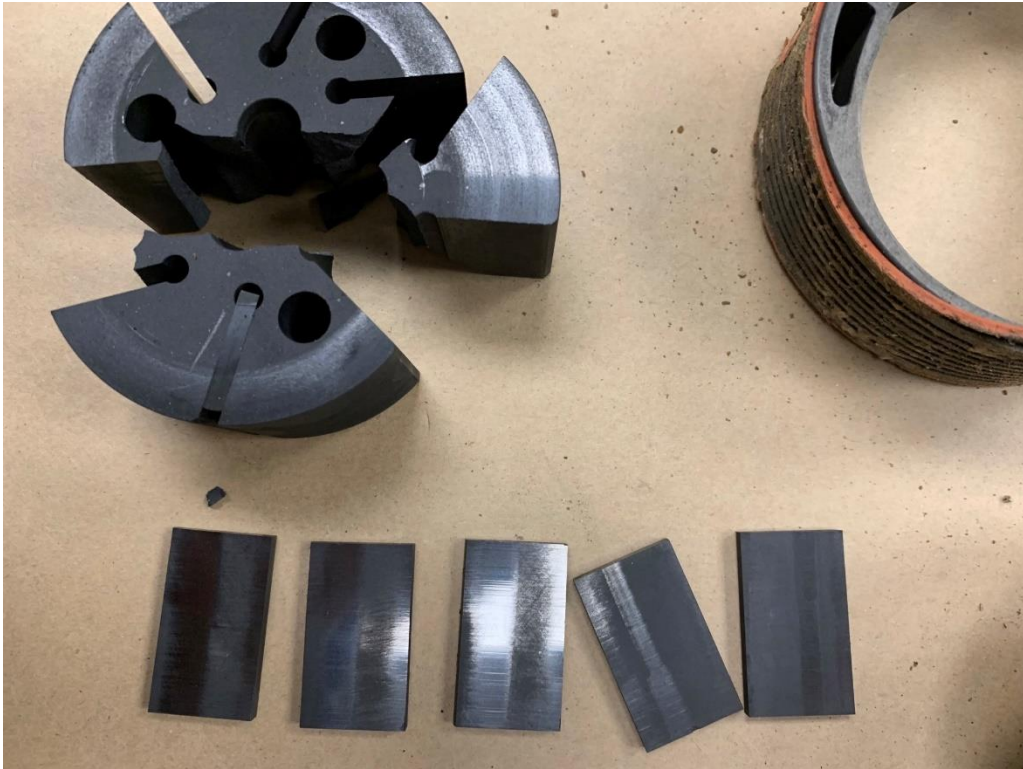


Figure 5. Pump Rotor and Vanes



Figure 6. Vacuum Pump Top Inside Cover



Figure 7. Vacuum Pump Bottom Inside Cover



Figure 8. Pump Stator Housing, Inside View

Suction Gauge and Vacuum Tube

The Suction Gauge was crushed inward and showed heat damage due to fire. The reading needle was pressed into the reading plate at the center. All the numbers and symbols on the plate were burned off. See figure 10. On an undamaged suction gauge, the center position would read as normal suction. The vacuum reading tube coming out of the gauge was cut in several places and severed about 25 inches from the gauge.



Figure 9. Suction Gauge and Vacuum Tube

Attitude Indicator – Indicator Gyro Horizon _ _ _ 422-7 (S/N 98G0639G)

The attitude indicator was broken out, the case was crushed downward, and the unit showed heat damage due to fire. The front glass was broken out and missing. See figure 10. The unit case was cut open and the artificial horizon indicator and the gyro case were removed. The gyro case was crushed downward and broken into three pieces. Two of the pieces separated when the gyro case was removed from the attitude indicator case, showing the front half of the gyro. See figure 11. The exposed portion of the gyro drum showed rotational scoring marks. The front edge of the drum was chipped and scratched. See Figure 12. The gyro case and drum showed heat damage and some rust. See figure 13. A detailed look at the gyro drum and the case showed rotational scoring marks. See Figures 14 and 15.



Figure 10. Attitude Indicator



Figure 11. Attitude Indicator Gyro Case and Gyro, Front View



Figure 12. Gyro Case and Gyro, Top View



Figure 13. Gyro and Inside of Gyro Case



Figure 14. Front Side of Gyro, Detail



Figure 15. Inside of Gyro Case

Directional Gyro – Model 4088.8 (S/N 46030C)

The directional gyro was broken out and the case was crushed and twisted. The front glass was broken out and the directional card was bent and crushed inward. The unit showed fire damage and rust on the front face. See figures 16 and 17. The unit was not disassembled.



Figure 16. Directional Gyro, Top View



Figure 17. Directional Gyro, Front View

Turn Coordinator

The turn coordinator was broken out and crushed. The front face glass was broken out. The turn needle was missing, and the ball level was broken with glass fluid and the ball missing. The unit showed minor fire damage.



Figure 18. Turn Coordinator

E. DISPOSITION OF VACUUM SYSTEM COMPONENTS FOLLOWING THE EXAM

The vacuum system components were bagged and repacked in the box they came in and set via UPS back to Air Salvage of Dallas to be put with the rest of the airplane wreckage. The components were shipped on August 18, 2021, and arrived at Air Salvage of Dallas, Lancaster, Texas, on August 20, 2021.