



NATIONAL TRANSPORTATION SAFETY BOARD

Office of Aviation Safety-Eastern Region

Ashburn, Virginia 20147

May 21, 2019

AUXILIARY FUEL PUMP EXAMINATION FIELD NOTES

A. ACCIDENT:

Location: Bakersfield, CA
Date: January 31, 2017
Time: 1640 PST
Aircraft: N711YK, Beech E-55

B. COMPONENT GROUP:

Chairman: Timothy W. Monville
National Transportation Safety Board (NTSB)
Senior Air Safety Investigator, Office of Aviation Safety
Ashburn, Virginia

SUMMARY

On January 31, 2017, about 1640 Pacific standard time, a Beech E-55, N711YK, was substantially damaged when it impacted terrain during an attempted go-around at the Meadows Field Airport (BFL), Bakersfield, California. The twin-engine airplane was registered to Sanbarcollbuscom Inc., and operated by the California Aeronautical University under the provisions of Title 14 Code of Federal Regulations Part 91. The commercial pilot, sole occupant of the airplane, sustained minor injuries. Visual meteorological conditions prevailed and no flight plan was filed for the local personal flight which originated from BFL about 1530.

The pilot reported that the purpose of the flight was to break the left engine in, which was being done at a full power setting. Following the uneventful flight, he entered the airport traffic pattern on an extended final for runway 30R. As the airplane crossed over the runway threshold, the pilot reduced power and the airplane began to settle into ground effect. The pilot stated that he thought the airplane settled lower than normal and that he decided to initiate a go-around in case something was wrong with the landing gear. The pilot further stated that upon the application of power, the left engine did not respond and the airplane immediately began rolling to the left.

Despite reducing power and applying control inputs, the airplane continued to roll to the left and impacted terrain.

C. DETAILS OF THE PUMP INVESTIGATION

Airport personnel took a picture of the cockpit and noted the auxiliary fuel pump switch was in the “low” position. During the investigation following recovery of the airplane, operational testing of the auxiliary fuel pump was performed with the wings separated. The pump operated on only 1 position, but it could not be determined if it was high or low boost.

The auxiliary fuel pump and section of aluminum tube were retained by the NTSB IIC, and shipped via UPS airbill 1ZA4E7150196993766 to a NTSB investigator in Naples, Florida. It was delivered on January 30, 2019.

On April 9, 2019, the auxiliary fuel pump was hand carried to CJ Aviation, located in Miami, Florida, for operational testing and inspection. Details of the pump are described below.

Dukes, Inc.
Pump Electric Fuel Boost
Part Number: 4404-00-7NV
Serial Number: 2047

Visual inspection of the exterior of the pump revealed silicone or RTV type material adhering to the screws that secured the cover and rheostat adjustment screw cap nut (Figure 1) appeared to be the same. Evidence of long-term leakage was noted at the outlet fitting (Figure 2). The electrical wire splices at the juncture of the pump and airframe electrical wires were tight.

The fuel pump was placed on the test bench as received (Figure 3) and was operationally tested to limits specified on the pump’s data plate¹. The pump self-primed which took longer than usual. Following self priming, as was the repair stations standard procedure, with the pump selected to high boost and the outlet valve wide open, the pump flowed 81.7 gallons-per-hour (gph) at 6.3 psi.²

The no flow high boost pressure test was performed and fluid was noted to be leaking from the outlet fitting³. With the pump selected to high and the outlet blocked (no flow), the pump pressure was about 24.3 psi (maximum specified is 25.0), and the unit drew 1.8 amps (maximum specified is 4.0).

The next test performed was the high boost flow test. Fluid was noted to be leaking from the outlet fitting. With the pump selected to high boost, and the outlet pressure set at 21 psi, the unit

¹ The pump was flowed using PD680 Type II fluid. All testing was done at 28 Vdc.

² There was no stipulated flow rate or pressure. This was just performed to allow the pump to run to clear any air and to allow the pump to stabilize.

³ The owner of the repair station indicated that no leakage is allowed. The leakage at the outlet could cause air to be drawn into the system when the auxiliary fuel pump is off.

flowed 27.7 gph (minimum specification is 35.0 gph).⁴ NTSB photograph IMG_6328 depicted the values of the test bench.

The low boost flow test was performed. Fluid was noted to be leaking from the outlet fitting. With the pressure set to 5.0 psi and the pump selected to low boost, the unit flowed 43.2 gph (minimum specification is 20 gph)⁵ (Figure 4). NTSB photograph IMG_6329 depicted the test bench readings.

The low boost no flow test was then performed, and with the pump selected to low boost, the pressure was about 14.45 psi (maximum specified pressure is 11.0 psi).⁶

The pump was run an additional 10 minutes to determine if there was any effect on flow or operating characteristics. The outlet fitting was removed and the packing or o-ring was damaged (Figure 5). A new packing or o-ring was installed on the outlet fitting and the fitting was re-installed into the pump.

The pump was then subjected to the high boost flow test and no fluid was leaking from the outlet fitting with the new packing or o-ring installed. With the pump selected to high boost, and the outlet pressure set at 21 psi, the unit flowed 39 gph (minimum specification is 35.0 gph).⁷

The pump was then subjected to the low boost flow test and no fluid was leaking from the outlet fitting. With the pump selected to low boost, and the outlet pressure set at 5.0 psi, the unit flowed 45.1 gph (minimum specification is 20.0 gph).⁸ NTSB photograph IMG_6335 depicted the test bench readings.

A consultation was made with the NTSB-IIC, and during that call it was agreed to allow an adjustment to be made to determine whether the rheostat and resistor were operational. The silicon or RTV type material was removed from the cover and the adjustment nut cap removed. There was no evidence of slippage of the adjustment screw. With the pump running, the screw was turned to adjust the low flow rate. With the pump selected to low boost, and 5.0 psi outlet, the unit flowed 28.9 gph (minimum specification is 20 gph).⁹ NTSB photograph IMG_6339.

The low boost no flow test was then performed and the rheostat adjusted to 11.0 psi no flow. The outlet valve on the test stand was opened to 5.0 psi outlet, and the unit flowed 28.4 gph (minimum specification is 20.0 gph).

⁴ The owner of the repair station reported that he felt the value could be adjusted to within limits.

⁵ The owner of the repair station indicated that there is no maximum low boost fuel flow specified; however, in his opinion, the recorded value would cause the engine to quit due to excessive fuel delivered to the engine-driven fuel pump.

⁶ The owner of the repair station reported that he felt the value could be adjusted to within limits.

⁷ The owner of the repair station reported that he felt the increased fuel flow was due to the prolonged operation of the fuel pump.

⁸ The owner of the repair station indicated that there is no maximum low boost fuel flow specified; however, in his opinion, the recorded value would cause the engine to quit due to excessive fuel delivered to the engine-driven fuel pump.

⁹ The repair station sets the low boost flow value at 21 gph and 5.0 psi outlet.

Because of the position of the pump on the test bench, the drain line was positioned vertically. Following removal of the pump from the test bench, leakage from the shaft seal was noted.

The pump's cover was removed in an effort to locate the resistor. It was a brown colored resistor marked with "Ohmite", " 5Ω ", "B8J5R0", and "8W9046" (Figure 6). It was tested using a calibrated meter and the resistance value was 5.1Ω . The unit was loosely reassembled with the new packing or o-ring in place. The pump remained in custody of NTSB.

PARTS DISTRIBUTION

The unit will be shipped as instructed by the NTSB-IIC.

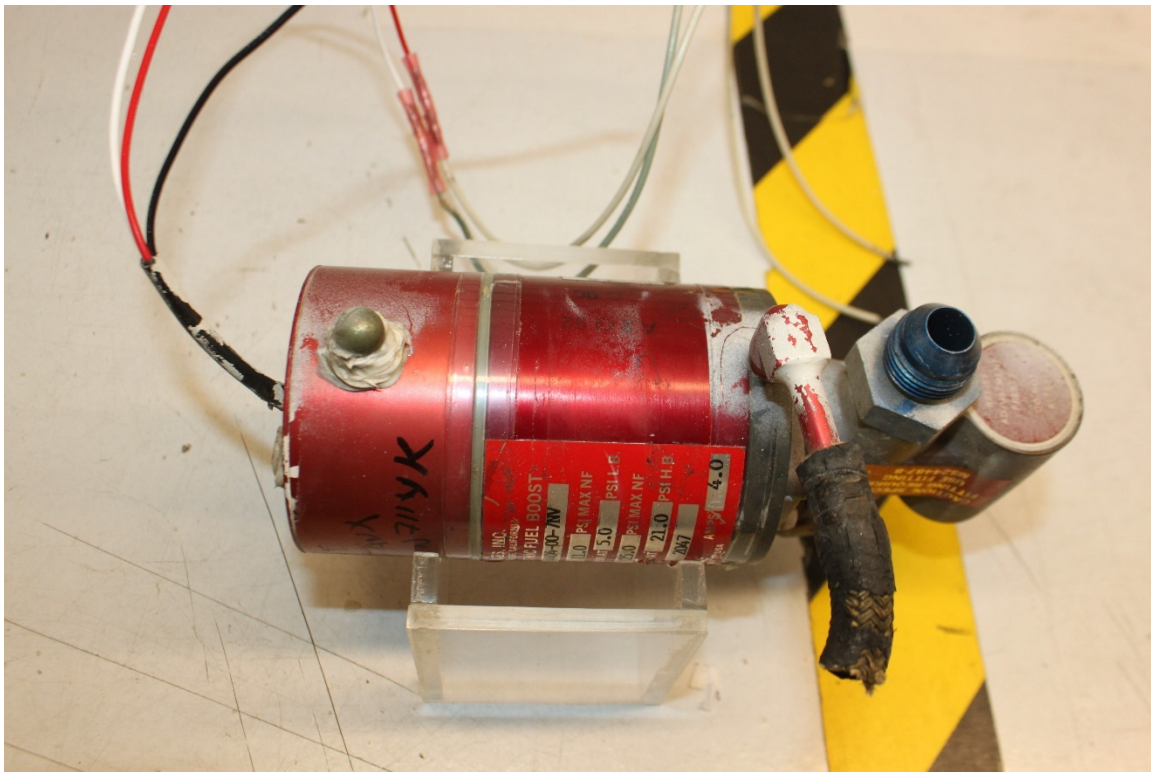


Figure 1: View Depicting the rheostat adjustment screw cap nut and sealant adhering to cap nut and cover.

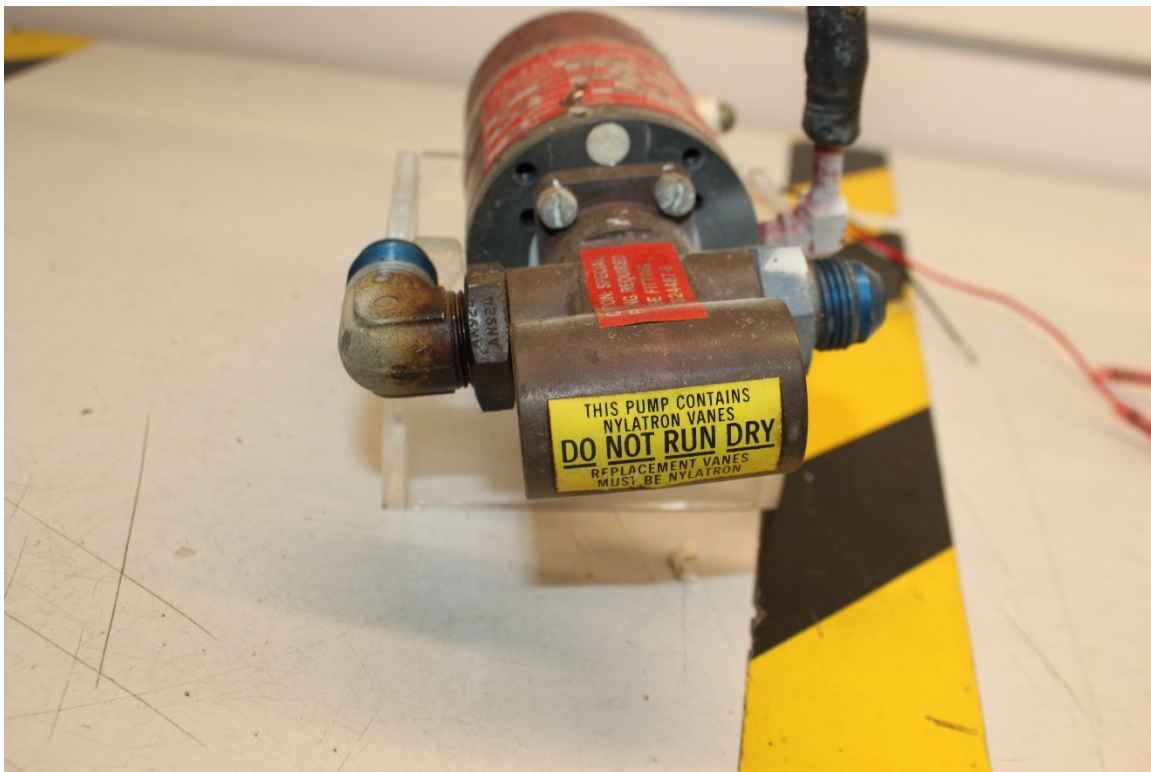


Figure 2: View Depicting the Staining at the Outlet Port Fitting on Left.



Figure 3: View of the Auxiliary Pump Installed on the Test Bench



Figure 4: View Depicting the Test Bench Values during the Low Boost Flow Test.



Figure 5: View of the Damaged Packing or O-Ring on the Outlet Fitting.



Figure 6: View of the Installed Resistor. Note the Markings.