

National Transportation Safety Board

Office of Aviation Safety

Washington, DC 20594



CEN24LA245

FUEL SYSTEM FACTUAL

A. ACCIDENT

Location: Land O' Lakes, WI
Date: June 30th, 2024
Time: 11:15 Central Time
Airplane: Make: Raytheon (Beechcraft) Model: A36
Registration: N47RT

Exam Location: Continental Aerospace
Exam Date: February 26, 2025

FUEL SYSTEM FACTUAL

Investigator: Cory Maxon
National Transportation Safety Board
Central

NTSB Powerplants: John Ellis
National Transportation Safety Board
Washington, DC

Group Member: Phillip Grice
Continental Aerospace
Mobile, AL

B. SUMMARY

On June 30, 2024, about 1115 central daylight time, a Raytheon Aircraft Company A36, N47RT, was substantially damaged when it was involved in an accident near Land O' Lakes, Wisconsin. The pilot and passenger sustained minor injuries. The airplane was operated as a Title 14 *Code of Federal Regulations* Part 91 personal flight.

The pilot reported that during the initial climb, the engine suffered a partial loss of engine power. She executed a forced landing into tress off the departure end of the runway which resulted in substantial damage to both wings and the fuselage. The airplane was recovered from the accident site and was transported to a secure location for future examination.

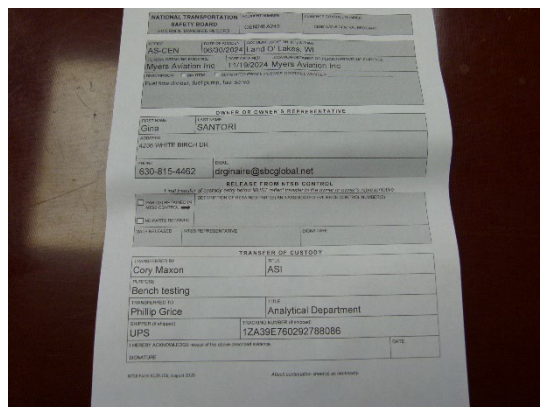
C. DETAILS OF THE EXAMINATION

1.0 Limited Fuel System Exam

The fuel system components had remained in storage and sealed in the shipping box until time of examination. All the items were removed from the box and inspected for damage. Pictures 1 and 2 are the fuel system components as received by Continental and the Component Release Form that was inside the shipment.



Picture 1 Fuel System as Shipped



Picture 2 Component Release Form

1.1 Fuel Pump

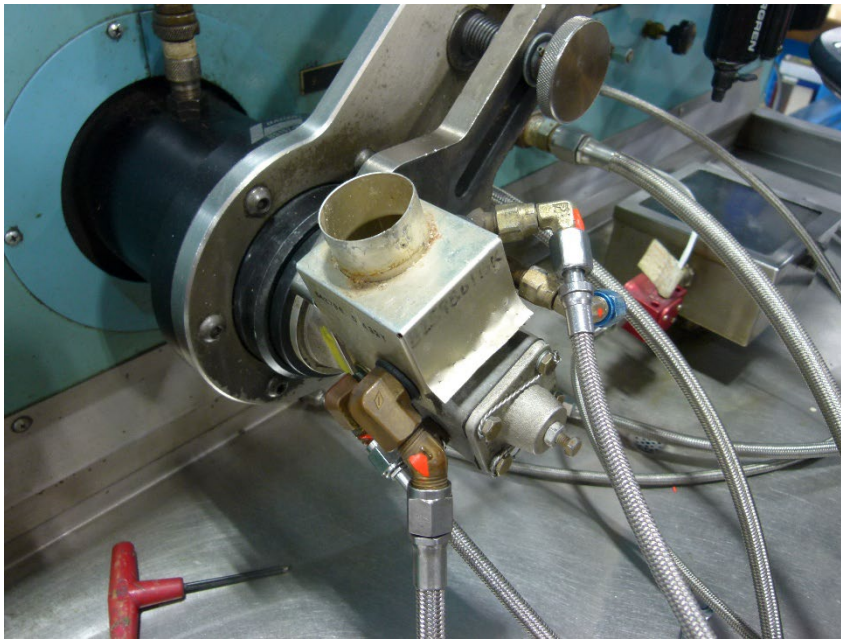
Make: Continental

Part Number: 646214-18

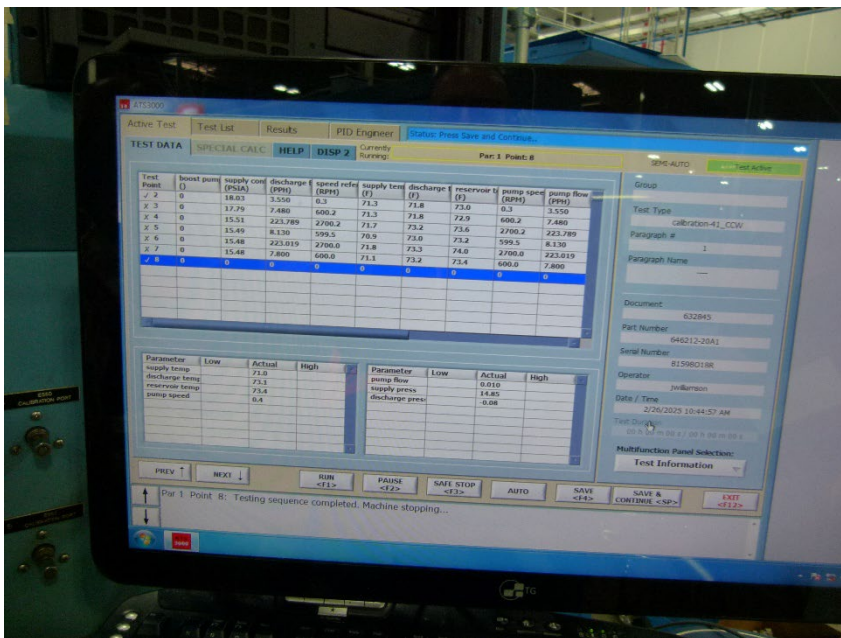
Serial Number: B1598018R

TIS/SOH: Unknown

The fuel pump was visually inspected, turned by hand, and then mounted to Continental Aerospace's fuel pump test bench, picture 3. The test bench is used to do the initial setup on new fuel pumps. Picture 4 is a full screen shot showing the part and serial numbers of the pump, then picture 5 is a closeup of the pump results. The pump was evaluated at idle RPM (600), Full power RPM (2700), then repeated. The results are given in PPH (Pounds Per Hour). At idle the pump averaged 7.8 PPH for the two runs. The full power runs averaged 223.4 PPH. Adjusting the fuel pump pressure is part of the fuel control set up and will change with hours in service or when a fuel system component is replaced. No issues could be found that would prevent this fuel pump from producing full rated horsepower.



Picture 3 Fuel Pump Running on the Test Bench



Picture 4 Fuel Pump Results (Full Screen)

ATS3000

Active Test Test List Results PID Engineer Status: Press Save and Continue...

TEST DATA SPECIAL CALC HELP DISP 2 Currently Running: Par: 1 Point: 8

Test Point	boost pump (I)	supply cont (PSIA)	discharge f (PPH)	speed refer (RPM)	supply temp (F)	discharge t (F)	reservoir t (F)	pump speed (RPM)	pump flow (PPH)
✓ 2	0	18.03	3.550	0.3	71.3	71.8	73.0	0.3	3.550
X 3	0	17.79	7.480	600.2	71.3	71.8	72.9	600.2	7.480
X 4	0	15.51	223.789	2700.2	71.7	73.2	73.6	2700.2	223.789
X 5	0	15.49	8.130	599.5	70.9	73.0	73.2	599.5	8.130
X 6	0	15.48	223.019	2700.0	71.8	73.3	74.0	2700.0	223.019
X 7	0	15.48	7.800	600.0	71.1	73.2	73.4	600.0	7.800
✓ 8	0	0	0	0	0	0	0	0	0

Parameter	Low	Actual	High
supply temp		71.1	
discharge temp		73.0	
reservoir temp		73.4	
pump speed		0.3	

Parameter	Low	Actual	High
pump flow		0.010	
supply press		15.03	
discharge pres		0.10	

Picture 5 Fuel Pump Results (Zoom)

1.2 Fuel Control

Make: Continental
Serial Number: G089617A
TIS/SOH: Unknown

Part Number: 649648-2

The fuel control, like the fuel pump, was mounted on the test equipment Continental Aerospace uses for the initial setup of fuel system components. Picture 6 shows the fuel control hooked up to the test bench with a throttle position degree tool mounted in place of the throttle arm. Picture 7 shows the test results. The Target Angles for testing (left side of the results) starts at idle, 2.0 degrees, and goes to 73 degrees, full throttle. The rest is self-explanatory with the "Targets" being your desired numbers and the "Measured" is what the fuel control is flowing, but this time in pounds per square inch (PSI), and again in PPH. A quick look will show the proper serial number for this control on the result's page, but the wrong part number. The fuel control being evaluated is no longer listed in the test equipment's software, so a compatible fuel control rated for the same engine and horsepower was chosen. Also, the tested unit failed. The fuel control ran a little rich until close to full power and then it leaned into the "green" results. The test bench is an initial setting only, a known starting point that will make an engine run. The engine must be fine tuned on the dyno when new, and again when installed on an aircraft. All this setup must be done again as the engine ages or anytime one of the components are changed. Another

reason the pressures and flows are different are the aftermarket GAMI injectors that were installed. Picture 8 shows the condition of the fuel screen. No issues could be found that would prevent this fuel control from producing full rated horsepower.



Picture 6 Fuel Control on Bench



Picture 7 Fuel Control Test Results



Picture 8 Fuel Control Screen

1.3 Fuel Flow Divider

Make: Continental

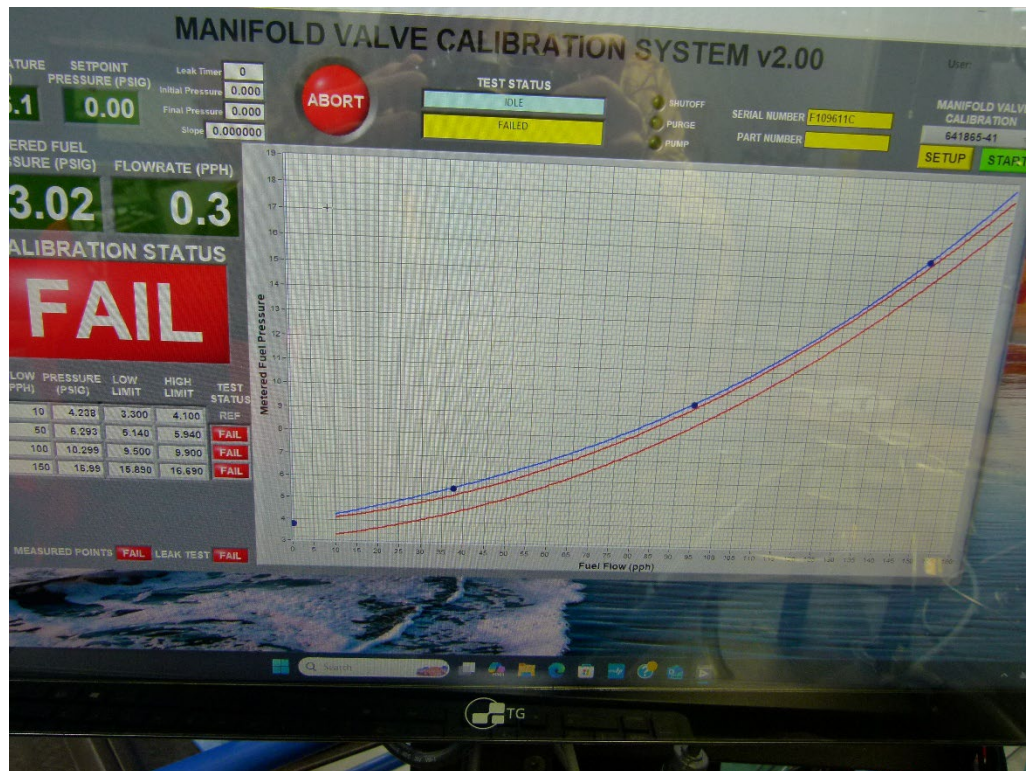
Part Number: 546508-14A2

Serial Number: F109611C

The fuel flow divider, including the fuel lines and GAMI fuel nozzles, was mounted on a test bench just as the other two components. Again, the results show the flow divider failed to the rich side, but one must take into consideration the same variables that caused the failure of the fuel control. The fuel system had been set up for this specific plane and for the aftermarket GAMI nozzles. Picture 9 shows the fuel flow divider on the test bench along with the fuel lines and GAMI injectors. The spray pattern of each nozzle, or injector, was observed and found satisfactory with no evidence of blockage. Picture 10 shows the results of the flow test, again on the rich side. The blue line depicted in the results should be in between the two red lines, again an initial set point for new equipment. The flow rates, pounds per square inch, and the limits are on the bottom left of the picture. The failure of the test means nothing as the components should have been adjusted for this specific aircraft. These fuel system items could have easily been changed to factory settings, but they are most likely adjusted properly for the installation from which they were removed. No issues could be found that would prevent this fuel flow divider, fuel lines, or GAMI injectors from producing full rated horsepower.



Picture 9 Fuel Flow Divider



Picture 10 Flow Divider Results

Submitted by:

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Aviation Accident Investigator
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