



Air Safety Office
Parker Hannifin Corporation
Parker Aerospace

Date: 2/14/2024

Examination Location: Fluid Systems Division, Elyria Ohio

Subject: Fuel Pump Examination NTSB ERA24FA078, Piper PA46R-350T, Mooresville, NC

Attendees

FAA: Stevan Vilimonovic
Steven Truesdale

Parker: Stephen Krone
Amanda Breedon
Kyle Bartolovich
Dan Timby

EXAM DETAILS

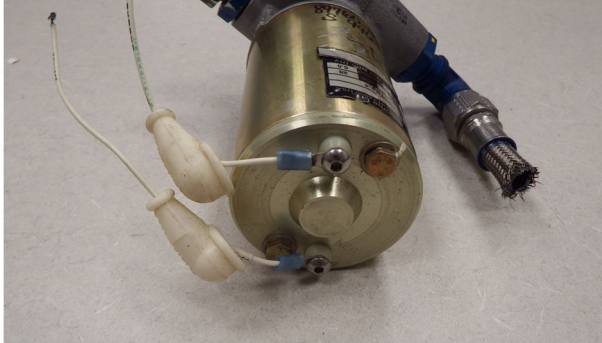
The package was shipped to the FSD Elyria facility by the NTSB and remained unopened until the day of the examination. The cardboard box contained one electric fuel pump, Model 1B9-4 Serial No. 11BE32. The serial number corresponds to a manufacture date of 2009.

The pump was removed from the packaging and photographed.

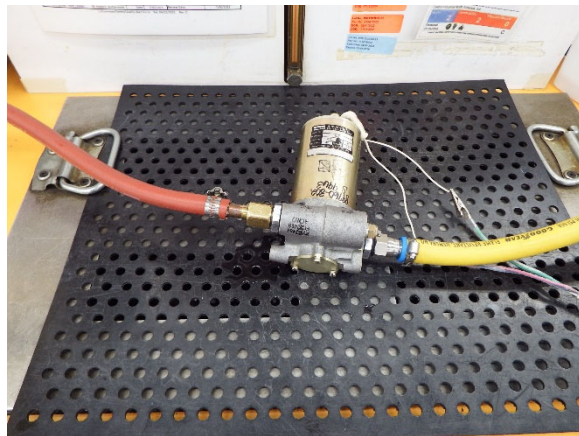


SUMMARY

The insulating boots were pulled back to expose the electrical connections. The connections were tight.



The aircraft fittings and hose were removed, and the pump was connected to the production ATP test stand to measure performance. The pump met the flow and pressure ATP requirements. The measured pressure and current is typical of new pump ATP measurements. No leakage was observed during this testing.

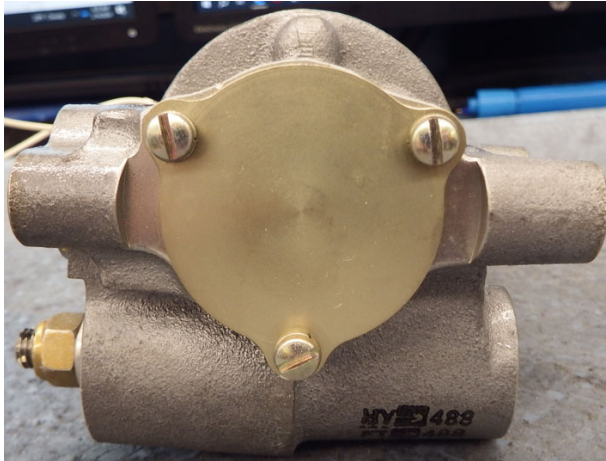


PRODUCTION TEST RECORD				
PARA 5.2 BREAK-IN (v)	PARAGRAPH 5.3 - 28 VDC PERFORMANCE			
	285 PPH		0 PPH	
	44.8 PSI MIN	AMPS (REF.)	48.0 PSI MAX	5.3 AMPS MAX
✓	45.3	4.5	46.8	4.6

Next the pump was “hydrotested” for leakage per the ATP. For this test, the pump discharge port is capped, and air pressure is applied to the inlet port with the pump submerged in test fluid. Some air leakage was evident around the pump end cap.



The three screws holding the end cap appeared to be tight and the split lock washers were fully compressed. Per the pump assembly drawing, the torque for the three screws is 14 to 17 in-lbs. There was no rotation when the three screws were tightened, using a torque wrench that was set to 14 in-lbs.

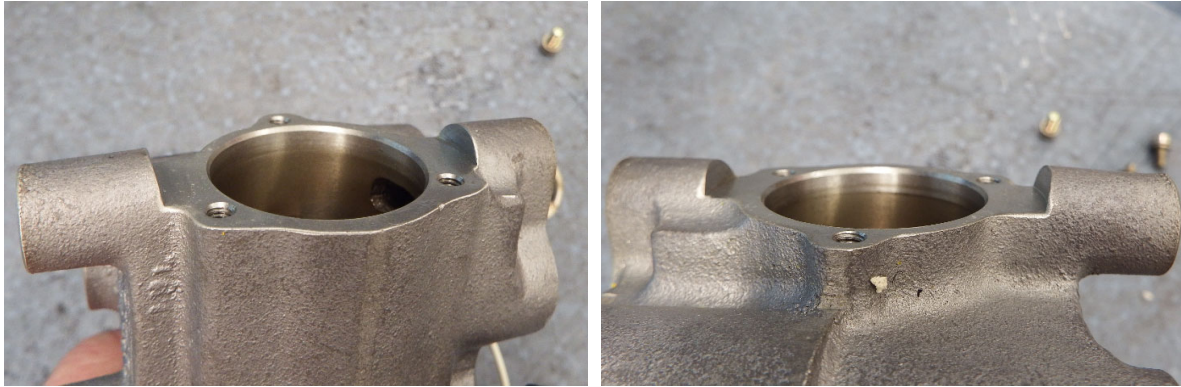


Before re-torquing



After re-torquing

The end cap was removed for further examination. The pump housing inside bore was smooth without any scratches or dents. The O-ring was not cut or torn, and there were no obvious imperfections when examined under magnification.



The O-ring was removed from the end cap for inspection. The O-ring ID also was not cut or torn, and there were no imperfections when examined under magnification. There were no scratches or imperfection in the end cap O-ring groove.

The pump end cap was reinstalled in anticipation of shipping the pump back to the NTSB.

CONCLUSION

There was some air leakage from the pump end cap during the ATP hydrotest, which was performed after the pump functional test. The hydrotest is a proof pressure test performed at elevated pressure with air to maximize leak detection around housing or motor seals or through casting walls. No cuts, scratches, or imperfections were observed in the housing bore and end cap O-ring groove, or the O-ring itself. O-rings swell when exposed to aviation fuel and typically shrink again after extended time without fuel exposure.

It is not unexpected that there was some minor leakage from a test designed for a new production in a pump that has been fielded for 15 years. Still, the fuel pump operated normally, meeting ATP requirements for flow and pressure. No fluid leakage was observed from the end cap while testing pump performance on the test bench using calibrating fluid (Stoddard solvent).