

National Transportation Safety Board

Office of Aviation Safety

Washington, DC 20594



ERA24LA099

ENGINE TEST RUN REPORT

April 17, 2024

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A. ACCIDENT

Location: LaGrange, GA
Date: 01/18/2024
Time: 1123 EST
1623 UTC
UAS/Drone: SwissDrones SDO 50 V2

B. ENGINE TEST RUN REPORT

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Technical Advisor	Peter Jakadofsky Jakadofsky Jet Engines GmbH Kottingbrunn, Austria

C. SUMMARY

A data download of the engine control unit (ECU) was performed utilizing the manufacturer's procedures. The data download revealed that on the accident flight, a warning was recorded of the electrically driven fuel pump utilizing 5.0 volts of electricity. The recorded data also indicated that the last engine shut down was a result of a commanded shutdown from the command station. The rest of the recorded data indicated normal operation on the accident flight.

An engine test run was performed utilizing the accident engine, ECU, and electrically driven fuel pump. The engine operated normally at all tested RPMs and the fuel pump voltage remained within the normal operating range.

D. DETAILS OF THE EXAMINATION

The NTSB investigator-in-charge traveled to manufacturer's technical advisor's personal residence to examine the engine, ECU, and fuel system components on April 8, 2024. This report contains the factual findings from the examination of the engine, ECU, and fuel system components as well as the factual findings from the engine run.

1.0 ECU Examination and Memory Readout

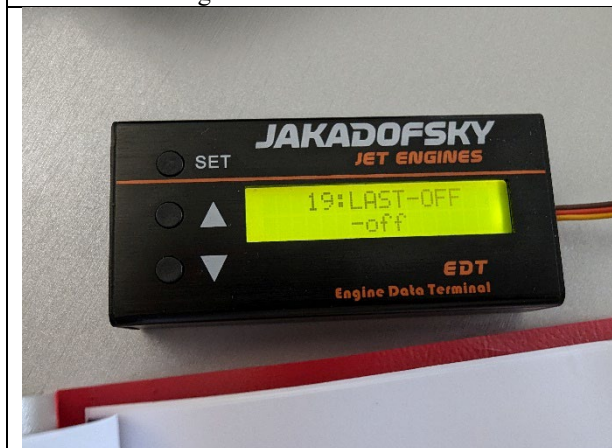
The ECU was connected to the manufacturer supplied connectors, adapters and the Jakadofsky Engine Data Terminal (EDT) to facilitate a data readout. The first code read was code 19: LAST-OFF-off; according to the manufacturer, this indicates the reason for the last engine shutdown was a commanded shutdown by the control station. The next code read was code 10: R/C-FAILS #0; this indicated there were no recorded communication failures between the ECU and the control station. The following two code readouts indicated the average and peak EGT readings from the last flight; both of these readings were within the normal parameters. The next code readout was 13: FUELPMP-PEAK 5.00V!. According to the manufacturer, the fuel pump is what governs the engine RPM by adjusting the fuel pump voltage to either increase or decrease fuel flow. The manufacturer further reported, that a voltage of 5 volts or more, is indicative of an with the fuel supply issue to the fuel pump, a blockage in the fuel system, or a fuel pump issue. The following four readouts were as follows: 14: RPM-PEAK 102.600rpm, 20: RUNS-TOTAL #160, 21: START-ABORT #15, 22: RUNS-ABORT #5 PWR #0. The manufacturer stated that there was nothing abnormal noted with these readouts. The final readout was the engine hour meter which was read out to be: 23: HOUR-METER 34:05'25.



Figure 1: ECU Connectors



Figure 2: ECU Connectors



2.0 Engine Examination

The turbine engine, ECU, fuel pump, and fuel solenoids had been removed from the airframe and shipped to the NTSB IIC. The shipping container and components were received undamaged.

The engine casing, turbine, and compressor were all observed to be undamaged. The turbine was rotated by hand and it was noted to still be connected to the compressor and there was no binding noted during rotation. The engine starter was connected to the ECU and the ECU was connected to the EDT. The EDT commanded the ECU to test the engine starter, during the test the starter engaged, and the engine turbine, compressor, and the output shaft rotated normally.



Figure 5: Engine Turbine

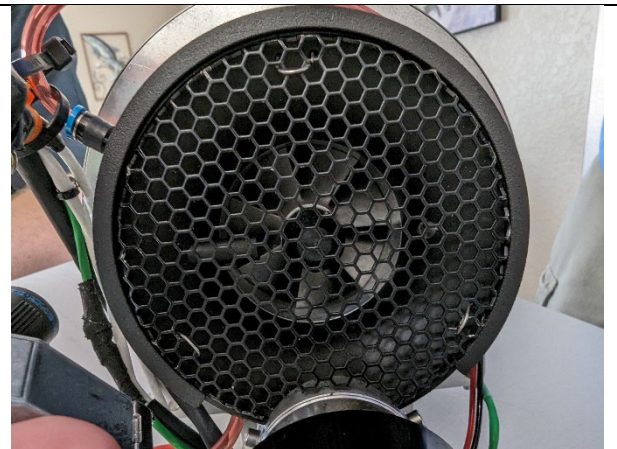
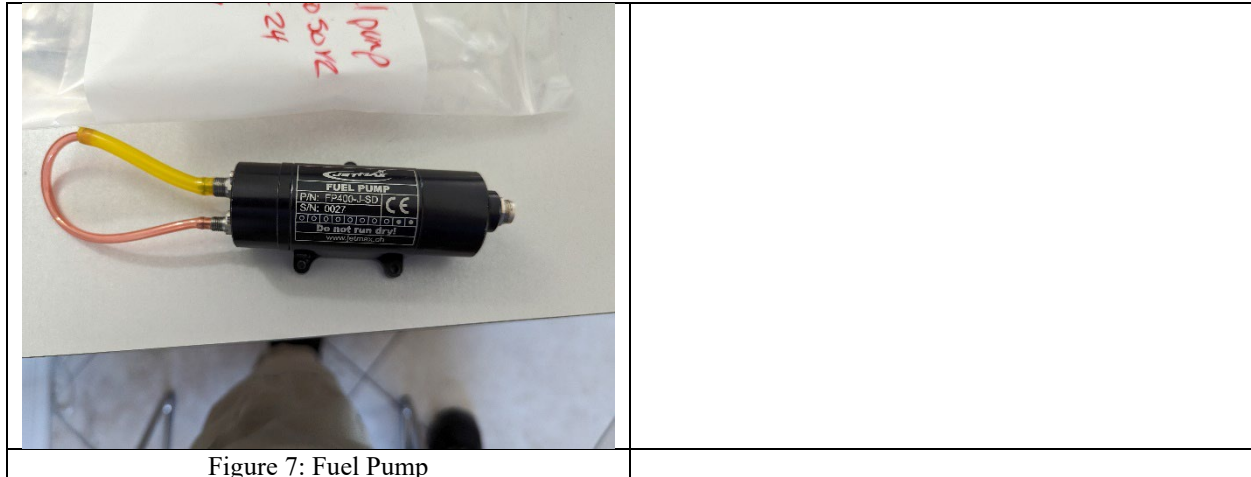


Figure 6: Engine Compressor

3.0 Fuel System Components Examination

The electrically driven fuel pump and both fuel solenoids were observed to be undamaged. The fuel solenoids were connected to the ECU and the ECU was connected to the EDT. The ECU was commanded to test each solenoid and it was noted that both solenoids activated normally. The fuel pump was connected to the ECU and the ECU was commanded to test the fuel pump, it was noted that the fuel pump could faintly be heard operating. According to the manufacturer, the engine is equipped with an inline last-chance fuel filter that was not shipped with the engine and associated components.



4.0 Engine Test Run

The engine, ECU, fuel pump, two exemplar fuel solenoids and a recording laptop were connected to new fuel lines and the EDT wiring harness. A mix of kerosene and lubricating oil and a new fuel pick-up screen was utilized to facilitate the engine run. The EDT commanded the engine to start and the engine started on the first attempt and the engine RPM was stable at idle power. There were no vibrations noted during idle operation and the fuel pump voltage was stable in the normal operating range. The EDT then commanded the engine to accelerate to 100% power; the engine accelerated smoothly up to 100% power. The engine remained at 100% power for approximately 1 minute before the EDT commanded the engine to shutdown. During the engine run all of the engine indications were in the normal range, there were no signs of abnormal vibrations, and the output shaft rotated normally. After the engine shutdown and was allowed to cool another engine run was performed. The engine started and accelerated to 100% normally and all of the indications were in the normal operating range. The fuel pick-up screen was lifted out of the fuel/oil mix and it was observed that the fuel pump voltage quickly rose to 5 volts and the engine quickly lost RPM and shut down a few seconds after the initial loss of RPM.

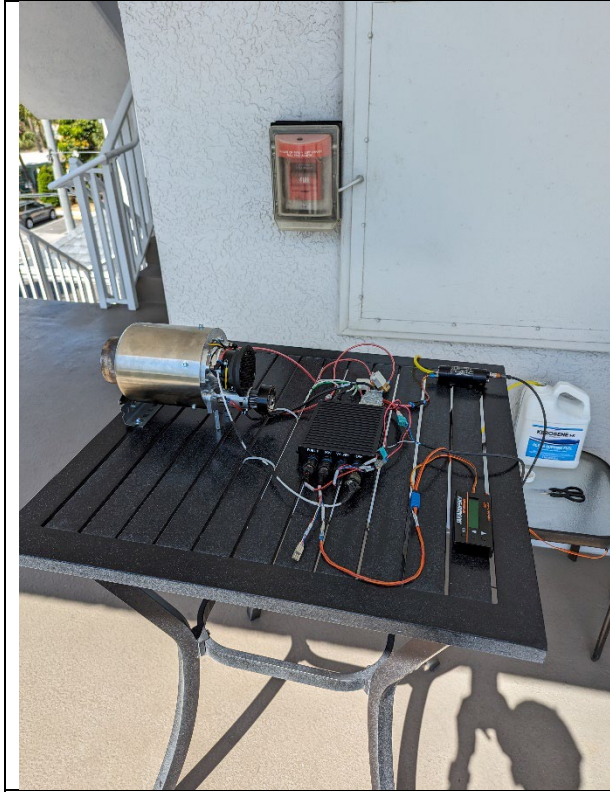


Figure 8: Engine Run Setup

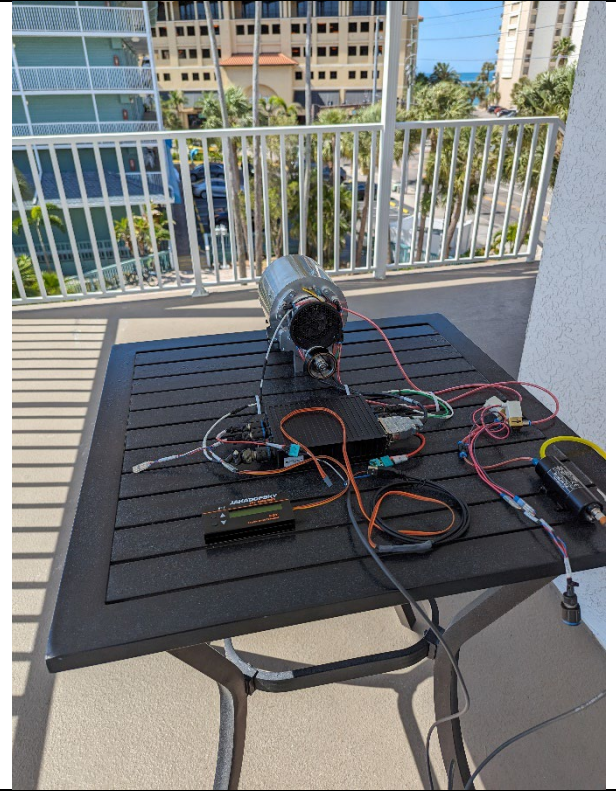


Figure 9: Engine Run Setup

Submitted by:

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