

National Transportation Safety Board

Office of Research and Engineering

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CEN25LA081

ENGINE DATA MONITOR

Specialist's Factual Report

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A. ACCIDENT

Location: Bentonville, Arkansas
Date: January 16, 2025
Time: 1530 central standard time (CST)
2130 coordinated universal time (UTC)
Airplane: Piper PA-24-250, private operator, N6799P

B. ENGINE DATA MONITOR SPECIALIST

Specialist: Tatum Butler
Aerospace Engineer – Recorder Specialist
National Transportation Safety Board (NTSB)

C. DETAILS OF THE INVESTIGATION

An engine data monitor (EDM) group was not convened. The NTSB Vehicle Recorder Division received the following EDM:

Recorder Manufacturer/Model: Shadin Microflo-L
Part Number: 912041T-38-D
Recorder Serial Number: 2020

1.0 Device Description

Microflo-L is a Digital Fuel Management System designed to provide complete fuel management information under real flight conditions without any manual entry of data (after entry of the initial fuel on board information). Microflo-L is connected to the engine fuel flow transducer for fuel flow information and to the GPS receiver serial port for navigation data (ground speed, distance and estimated time enroute). The system includes a non-volatile memory that retains fuel remaining and fuel used information when the power to the unit is shut down. This system is also capable of transmitting fuel information to the Bendix/King KLN-88, KLN-90, and Garmin GPS navigation receivers, except the Garmin 100, for additional calculations and display of fuel management data.

1.1 Data Recovery

The device was in good condition as shown in figure 1, and the data were recovered using the manufacturer's procedure. The unit was not connected to any fuel flow sensors or GPS/Loran devices during the data recovery process, therefore the values displayed were not associated with the accident flight. Data was recovered by

applying power to the unit and using procedures described in the Shadin Avionics Microflo-L operating manual, cycling through the displayed values.¹



Figure 1. Shadin Microflo-L as received, front and top.

1.2 Recording Description

Upon power up, the fuel flow indicator performed a self-test and reported a status of "GOOD", indicating a successful test. Immediately following, the display continuously flashed "Low Fuel" warning as shown in figure 2 until it was acknowledged by pressing the ENTER/TEST button. Fuel used and fuel remaining were displayed by moving the USED/REM toggle switch to the appropriate USED and REM positions. The fuel used displayed a value of 219 gallons, and the fuel remaining displayed a value of 0.0 gallons.² The Piper PA-24-250 has a total fuel capacity of 60 gallons. The device's fuel values may not represent the total fuel used or remaining on the accident flight as it relies on user input to reflect accurate fuel load values upon engine start.

¹ For further information on configuration settings refer to Shadin Avionics Microflo-L™ operating manual for P/N: 91204XT-38-D

² The unit calculates fuel remaining by subtracting fuel used from the initial starting fuel entered by the user



Figure 2. Shadin Microflo-L Low Fuel warning upon power up.

Diagnostic software test values were displayed by pressing the ENTER/TEST button. A successful test was indicated by a "-GOOD-" appearing in the display window. This was followed by the K-factor setting of 29.2 and the units of measure set to gallons. Then "LoF" appeared indicating no Loran or GPS signal. Then the maximum usable fuel reported a value of 56.0 gallons. The last displayed value was the software version 60.08.83. These values are shown in tabular form in table 1.

Table 1. Test function results.

Display	Description
29.2	K-factor setting of 29,200 Pulses Per Gallon
GAL	Units of measure the system is set to
LOF	Without signal from Loran or GPS
56.0	Maximum usable fuel setting
60.08.83	Software version

The device was configured to manual entry mode to recover the configuration values by using the TEST/ENTER button as described in the operating manual. All the stored configuration values retrieved from the unit are shown in table 2. The Group 1 configuration is set up by the distributor and contains information defined by the part number of the unit, while the Group 2 configuration can be set up by programing the unit in Manual Entry Mode. Only Group 2 values were retrieved.

Table 2. Group 2 configuration settings.

Display	Value	Description
O	5	GPS/Output Type: Generic
I	1	GPS/Loran Input: On
D	0	Endurance Warning Time: 45 minutes
F	0	Filter Type: Injector
W	0	Ignore Loran Warnings: No
S	20.0	Low Fuel Level (gallons)

Submitted by:

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