

National Transportation Safety Board

Office of Research and Engineering

Washington, DC 20594



CEN23LA268

ELECTRONIC DEVICES

Specialist's Factual Report

May 16, 2024

A. ACCIDENT

Location: Tahlequah, Oklahoma
Date: June 27, 2023
Time: 1012 central daylight time (CDT)
1512 coordinated universal time (UTC)
Airplane: Velocity XL, private operator, N340XL

B. ELECTRONIC DEVICES SPECIALIST

Specialist: Steven Smith
Mechanical Engineer (Recorder Specialist)
National Transportation Safety Board (NTSB)

C. DETAILS OF THE INVESTIGATION

A group was not convened. The NTSB Vehicle Recorder Division received the following electronic devices:

Recorder Manufacturer/Model: Blue Mountain Avionics EFIS G4
Recorder Serial Number: 0806

Recorder Manufacturer/Model: Vision Microsystems VM-1000 Data
Processing Unit (DPU)
Part Number: 4010066
Recorder Serial Number: 34339

Recorder Manufacturer/Model: Vision Microsystems Indicator
Part Number: 4010050
Recorder Serial Number: 34427

Recorder Manufacturer/Model: Vision Microsystems Fuel Level System
Indicator
Part Number: 4010028
Recorder Serial Number: 35865

Recorder Manufacturer/Model: Vision Microsystems EC100
Part Number: 4010055
Recorder Serial Number: 34339

1.0 Blue Mountain Avionics EFIS G4 Description

The Blue Mountain Avionics EFIS G4 is a panel mounted electronic flight information system display.¹ The device contains a back-lit, sunlight readable display to provide the operator with graphical and digital displays of various aircraft parameters. The device can display attitude, airspeed, heading and positional (moving map) information to the operator of the aircraft. The device has an internal Attitude Heading Reference System (AHRS), air data system (ADS) and a 12 channel GPS receiver. The unit also is connected to an external mounted magnetometer and temperature sensor. The device does contain internal memory and only stores various flight settings, calibration, and checklist information. The data can be accessed via keyboard and connecting an ethernet cable to a Linux machine.

1.1 Blue Mountain Avionics EFIS G4 Data Recovery

The Blue Mountain Avionics EFIS G4 was in good condition and was able to power on as shown in figure 1. The owner of Blue Mountain Avionics was contacted and informed the NTSB Vehicle Recorder Division that the EFIS G4 stores a minimal amount of non-volatile memory.²

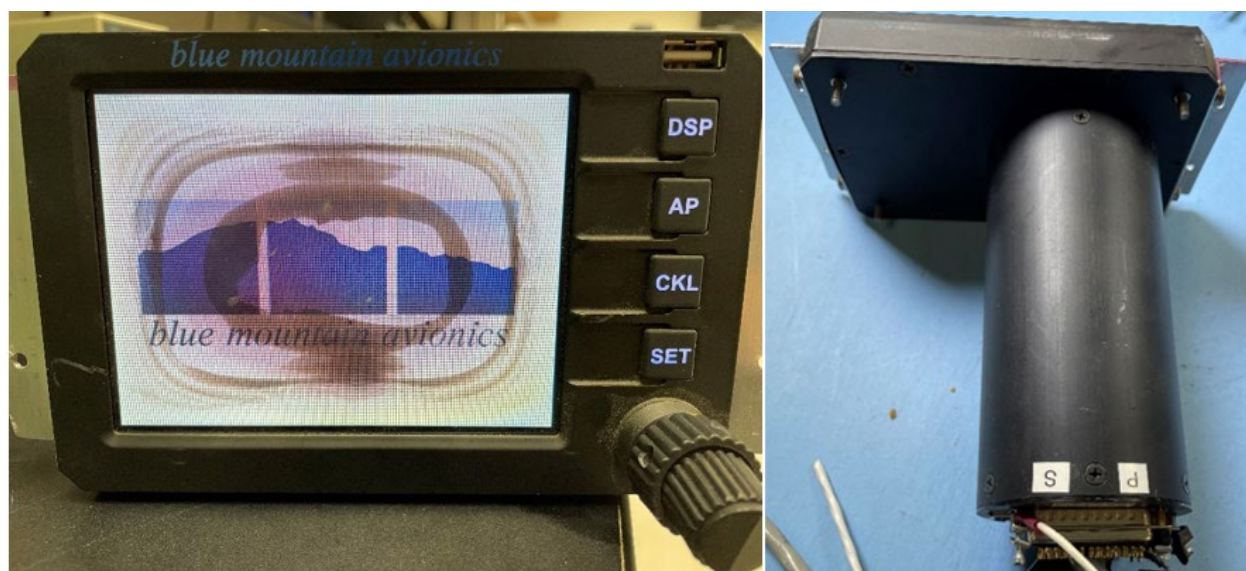


Figure 1. The Blue Mountain Avionics EFIS G4 powered on (left) and as received (right) by the Vehicle Recorder Lab.

¹ As of July 2009, Blue Mountain Avionics ceased production of its product line.

² Non-volatile memory is semiconductor memory that does not require external power for data retention.

1.2 Blue Mountain Avionics EFIS G4 Recording Description

The contents of the device were reviewed and no relevant accident-related data were present. Once the unit was powered on, the only data contained on the device was the database validity, which was valid May 7, 2009, to June 3, 2009.

2.0 VM-1000 DPU Description

The VM-1000 DPU is an engine data monitor from Vision Microsystems. The device comes with a data processing unit and a display (Vision Microsystems Indicator). The data processing unit collects engine data, processes the data and transfers it to the display. The display shows pilots the essential parameters of an engine, including manifold pressure, RPM, exhaust gas temperature, cylinder head temperature, fuel pressure, fuel flow rate, oil pressure and temperature, unit current and voltage.

2.1 VM-1000 DPU Data Recovery

The VM-1000 DPU was in good condition and the data were downloaded using the manufacturer's procedure. The device is shown in figure 2.

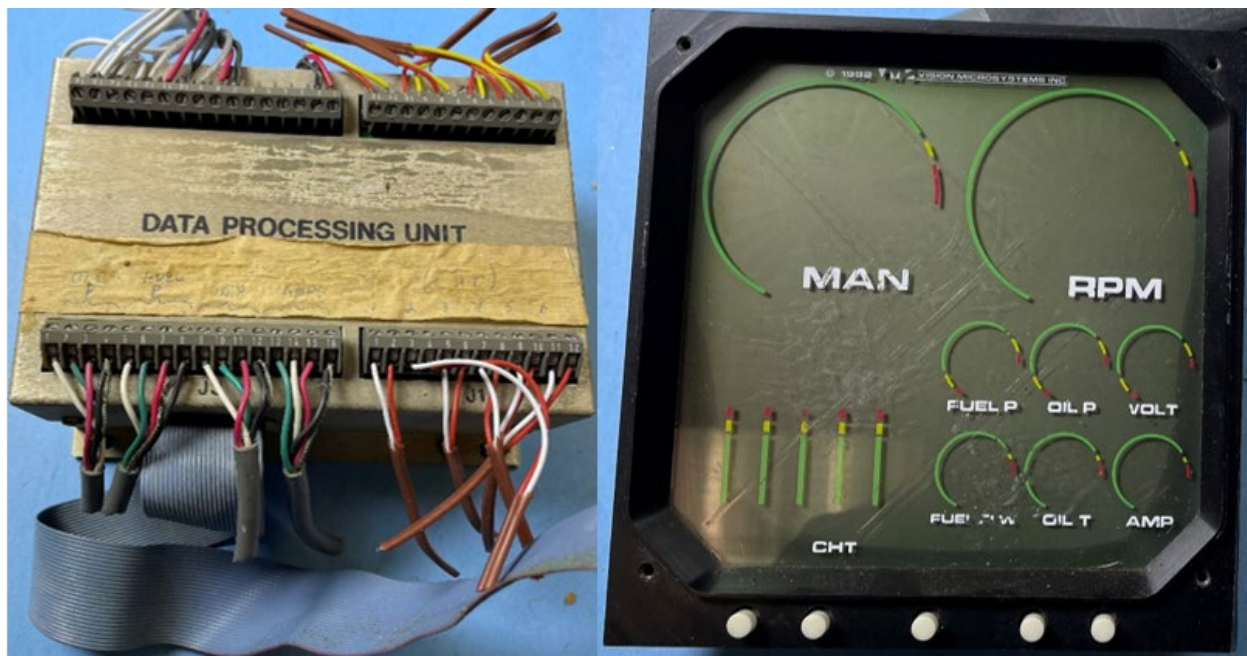


Figure 2. VM-1000 DPU (left) and indicator (right) as received by the Vehicle Recorder Lab.

2.2 VM-1000 DPU Recording Description and Data Recovery

The VM-1000 DPU stores the historical minimum and maximum values of the parameters. When the device powered up, it showed the historical maximum and minimum values from the last flight. The data displayed on the VM-1000 DPU was

already in engineering units and therefore did not require any unit conversions. The historical data is from the last flight flown and does not include any time information of when the minimum or maximum data occurred. Table 1 presents the minimum and maximum values of the parameters from the VM-1000 DPU and indicator.

Table 1. VM-1000 DPU minimum and maximum values.

Parameter (unit)	Minimum	Maximum	Units
Manifold Pressure (inHg)	19.8 inHg	27.7 inHg	inches of Mercury
Engine RPM (rpm)	1.2 rpm	2820 rpm	revolutions per minute
Fuel Pressure (psi)	21 psi	23 psi	pounds per square inch
Oil Pressure (psi)	63 psi	82 psi	pounds per square inch
Voltage (VDC)	14 VDC	14.5 VDC	volts direct current
Fuel Flow (gph)	7.4 gph	28.7 gph	gallons per hour
Oil Temperature (degF)	174 degF	206 degF	degrees Fahrenheit
Amp (A)	19 A	33 A	amperage
Cylinder Head Temperature (degF)	132 degF	379 degF	degrees Fahrenheit
Exhaust Gas Temperature (degF)	140 degF	1439 degF	degrees Fahrenheit

3.0 VM Fuel Level System Indicator Description and Data Recovery

The fuel level system operates automatically. The indicator displays a left, center, and right digital read-out of the gallons of fuel remaining of up to 99 gallons for each tank. Additionally, the left and right displays are also presented graphically to show percentage of fuel remaining for quick reference. Figure 3 shows the unit as received by the NTSB Vehicle Recorder Lab. The VM fuel level system indicator does not store non-volatile memory and therefore no data were recovered from this device.



Figure 3. VM Fuel Level System Indicator as received by the NTSB Vehicle Recorder Lab.

4.0 VM EC100 Description and Data Recovery

The EC100 system provides several categories of easily accessed information, including engine information, aircraft operational checklists, emergency checklists, and alerts and warnings. Figure 4 shows the unit as received by the NTSB Vehicle Recorder Lab. The EC100 does not store non-volatile memory and therefore no data were recovered from this device.

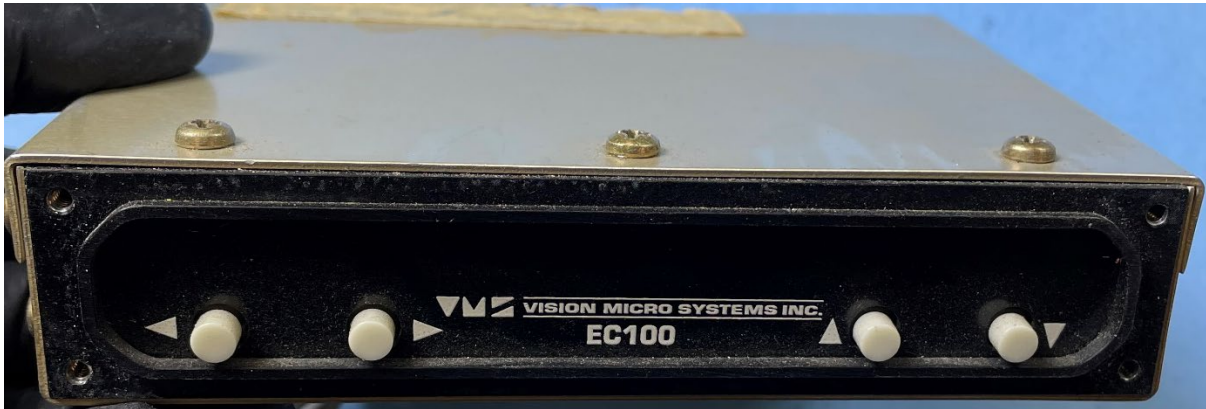


Figure 4. VM EC100 as received by the NTSB Vehicle Recorder Lab.

Submitted by:

Steven Smith
Mechanical Engineer (Recorder Specialist)