

NATIONAL TRANSPORTATION SAFETY BOARD
Vehicle Recorder Division
Washington, D.C. 20594

October 4, 2019

Cockpit Display – Recorded Flight Data

Specialist's Factual Report
By Charles Cates

1. EVENT SUMMARY

Location: Niceville, FL
Date: November 17, 2018
Aircraft: Vans Aircraft RV-12
Registration: N232VA
Operator: Private
NTSB Number: ERA19FA048

On November 17, 2018, about 1243 central standard time, a Vans RV-12, N232VA, was substantially damaged when it impacted trees and terrain during initial climb from Ruckel Airport (FL17), Niceville, Florida. The flight instructor, who was also the owner of the airplane was fatally injured, and the student pilot sustained serious injuries. Visual meteorological conditions prevailed, and no flight plan was filed for the local instructional flight. The flight was conducted under the provisions of Title 14 Code of Federal Regulations Part 91.

2. RECORDED FLIGHT DATA GROUP

A recorded flight data group was not convened.

3. DETAILS OF INVESTIGATION

The National Transportation Safety Board (NTSB) Vehicle Recorder Division received the following electronic displays/device capable of recording information to non-volatile memory (NVM):

Recorder Manufacturer/Model: **Dynon Skyview**
Recorder Serial Number: **4285**

3.1. Dynon SkyView SV-1000 Description

The Dynon SV-D1000 is a 10" wide screen display suitable for mounting in the cockpit of various small aircraft. Its capabilities include engine monitoring, synthetic vision, moving map, traffic, airport diagrams, autopilot control, and radio integration.

The display receives input from multiple modules for flight instrumentation including modules for air data/attitude/heading (ADHARS), engine monitoring (EMS), Global Positioning System (GPS), transponder, radios, and intercoms.

Data is recorded on a Serial-ATA based Disk on Module (DOM) mounted to the main board. The DOM contains a user-configurable log file that can record between 2-150 hours of data at sampling rates ranging from 0.1-16 Hz. There is also an alert log file that is recorded whenever the device triggers any kind of alert and a “Black Box” recent flight data log file which contains the most recent 15 minutes of flight recorded at 16 Hz.

3.1.1. Dynon SkyView SV-1000 Data Recovery

The recorder was damaged by mechanical impact forces in the event and the screen was cracked and not operational. The extent of the damage is shown in figure 1. The DOM memory module was removed and accessed using digital forensics software.

Figure 1. Damaged exterior of flight recorder.



3.1.2. Dynon SkyView SV-1000 Data Description

The operator had the user log function set to record information at a 16 Hz rate and start recording at device power on. The recording contained approximately 2 hours and 45 minutes of data covering 39 power cycles. The accident flight recording was approximately 9 minutes. Timing of the data is measured in seconds.

3.1.3. Dynon SkyView SV-1000 Engineering Units Conversions

The raw data from the D-1000 is stored as a .CSV file in engineering units. A list of the parameters available in this recording can be found in Appendix A

3.1.4. Time Correlation

The unit records Universal Coordinated Time (UTC) GPS time. The difference between central standard time (CST) and UTC is 6 hours, or 21,600 seconds. An offset is applied to display the data with the local time zone. Therefore, for the rest of this report, all times are referenced as CST.

3.2. Plots and Corresponding Tabular Data

The following three figures contain data recorded during the event on November 17, 2018.

Figure 2 is a map overlay of the accident flight created using Google Earth. Note that lighting and atmospheric conditions depicted in Google Earth may not be representative of conditions during the accident flight.

Figure 3 is a plot of aircraft basic parameters from the accident flight from the start of the takeoff roll until the aircraft was at rest.

Figure 4 is a plot of engine parameters from the accident flight from the start of the takeoff roll until the aircraft was at rest.

In brief, the engine was advanced to takeoff power starting at about 1236:10 CST. The engine stabilized at about 4,950 rpm at wide open throttle (WOT), however at 1236:31 the engine had a momentary reduction in power to 4,700 rpm and recovered to about 4925 rpm. At this time the engine began a slow reduction in speed until it was at 4,850 rpm and the aircraft began to climb at about 1236:37 CST at an indicated airspeed of about 65 knots.

At 1236:45 the aircraft reached a pressure altitude of -162 ft, about 55 ft above runway elevation, and the engine had a sudden reduction in speed to less than 4000 rpm without a corresponding change in manifold pressure. This is consistent with the throttle staying at WOT. Fuel flow also increased at this time. The aircraft continued to climb and airspeed began to reduce from its peak of 68 knots.

At 1236:04 a stall warning became active at -10 ft pressure altitude (about 207 ft above runway elevation), 51 knots, and 21 degrees of left bank. At 1237:07 manifold pressure reduced over three seconds consistent with the throttle being pulled back to idle and remained at idle for three seconds. During this time the aircraft reached its maximum altitude of 33 ft, about 250 ft above runway elevation, and airspeed was 44 knots. Vertical acceleration began to oscillate, and roll continued to bank to the left, reaching 68 degrees left wing down. The aircraft began to descend rapidly, and the manifold pressure then increased to 30 inHg, consistent with the throttle being advanced. The engine speed increased along with the increase in manifold pressure, reaching about 4,700 rpm. Shortly after, at 1237:17, excursions in acceleration forces consistent with impact were recorded.

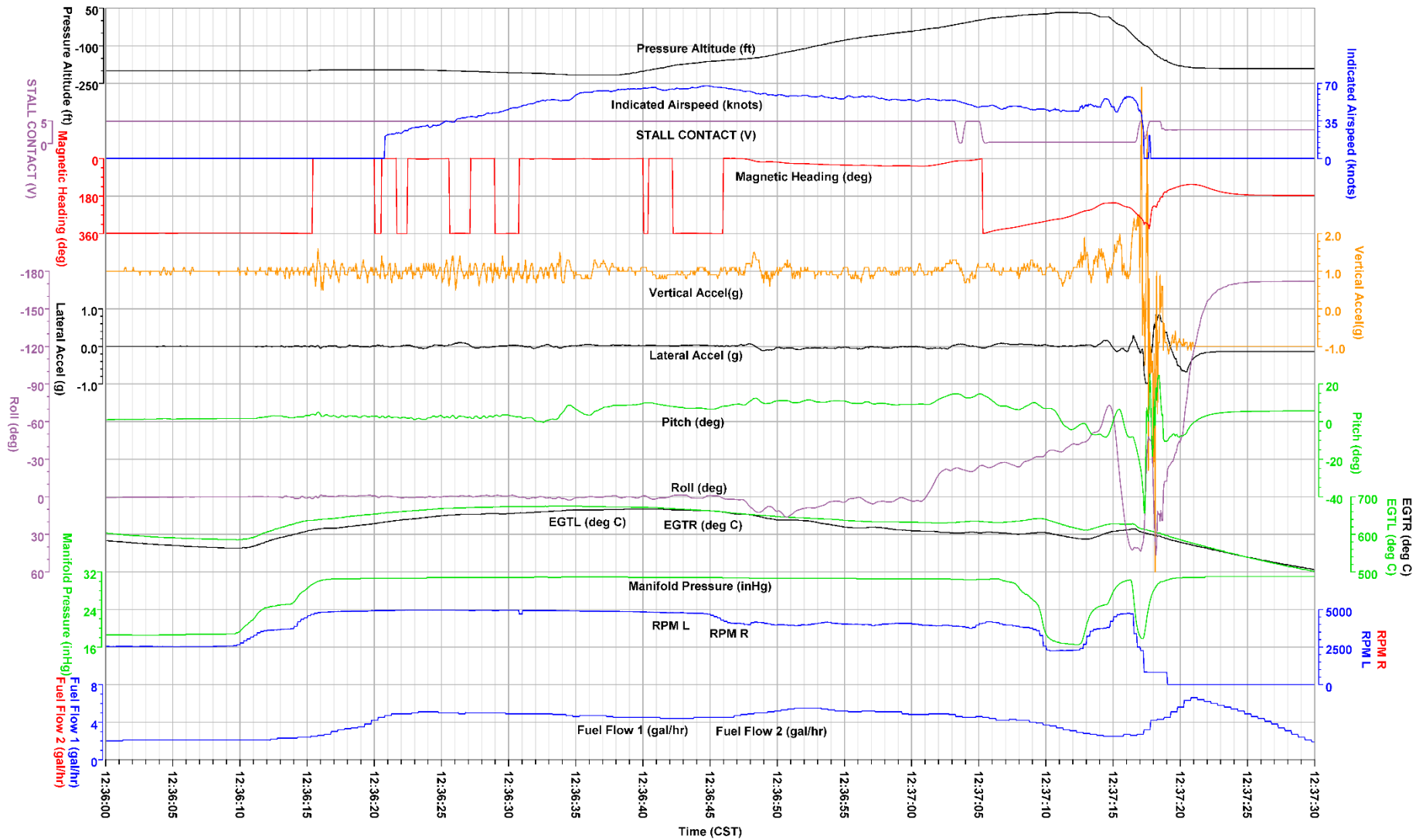
The corresponding tabular data used to create three plots are provided in electronic (*.csv¹) format as Attachment 1 to this report.

¹ Comma Separated Value format.

Figure 2. Map overlay of accident flight.



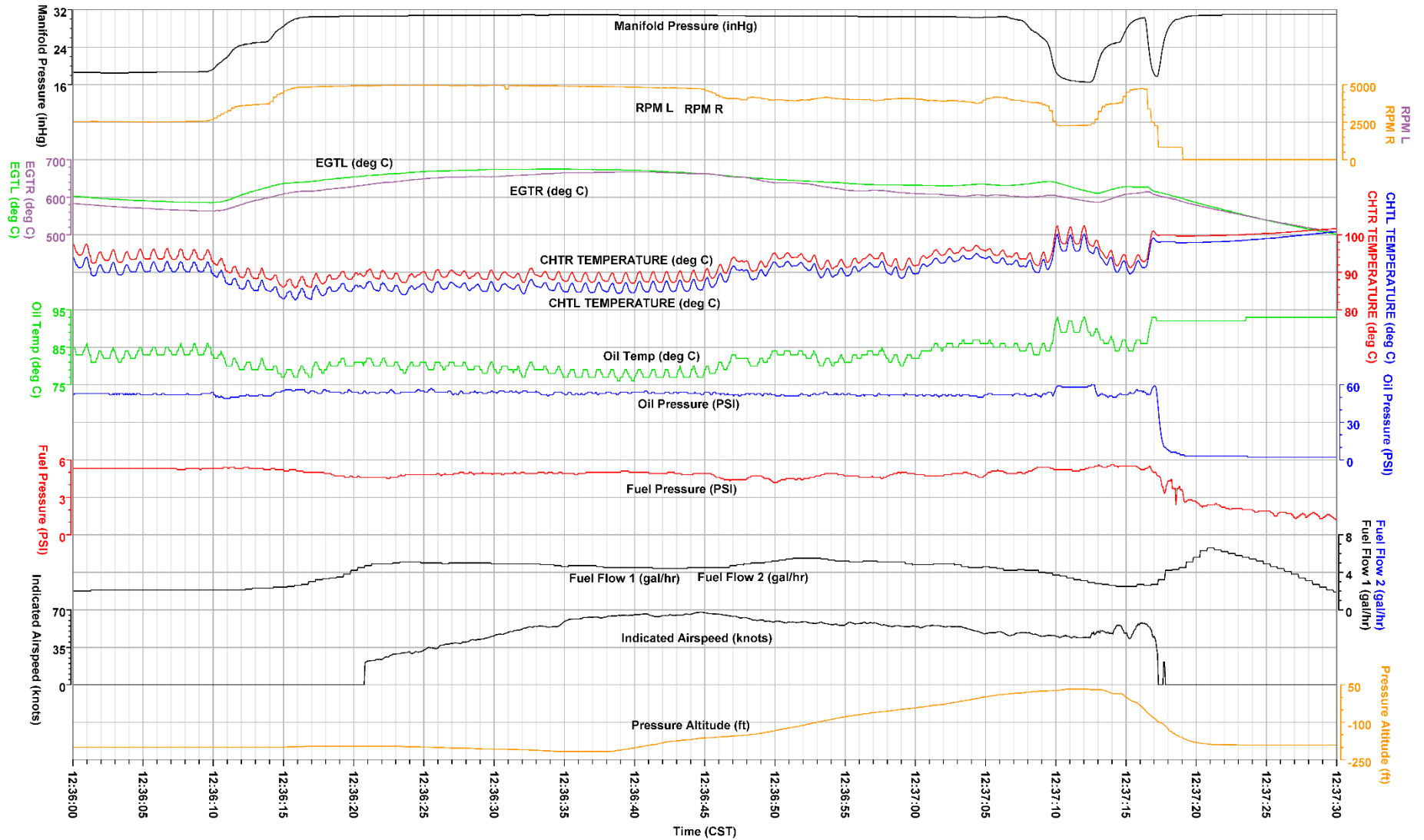
Figure 3. Plot of aircraft basic parameters from event flight.



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Figure 4. Plot of engine parameters from accident flight.



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APPENDIX A - Dynon Parameters

This appendix describes the parameters provided and verified in this report. Table A-1 lists the parameters and table A-2 describes the unit abbreviations used in this report.

Table A-1 - Verified and provided parameters.

Parameter Name	Parameter Description
1. CHTL TEMPERATURE (deg C)	Left Cylinder Bank Cylinder Head Temperature
2. CHTR TEMPERATURE (deg C)	Right Cylinder Bank Cylinder Head Temperature
3. EGTL (deg C)	Left Cylinder Bank Exhaust Gas Temperature
4. EGTR (degC)	Right Cylinder Bank Exhaust Gas Temperature
5. Fuel Flow 1 (gal/hr)	Fuel Flow Reading 1
6. Fuel Flow 2 (gal/hr)	Fuel Flow Reading 2
7. GPS Alittude (ft)	GPS Altitude
8. Ground Speed (knots)	Calculated Ground Speed
9. Indicated Airspeed (knots)	Indicated Airspeed
10. Lateral Accel (g)	Lateral Acceleration
11. Latitude (deg)	Latitude
12. Longitude (deg)	Longitude
13. Magnetic Heading (deg)	Magnetic Heading
14. Manifold Pressure (inHg)	Engine Inlet Manifold Pressure
15. Oil Pressure (PSI)	Engine Oil Pressure
16. Oil Temp (deg C)	Engine Oil Temperature
17. Pitch (deg)	Pitch Angle
18. Pressure Altitude (ft)	Pressure Altitude
19. Roll (deg)	Roll Angle
20. RPM L	Engine RPM Sensor 1
21. RPM R	Engine RPM Sensor 2
22. Stall Contact (V)	Stall Warning
23. Vertical Accel (g)	Vertical Acceleration

Table A-2 - Unit abbreviations.

Unit Abbreviation	Description
deg	degrees
deg C	degrees Celsius
ft	feet
gal/hr	gallons per hour
inHg	inches of Mercury
PSI	pounds per square inch
rpm	revolutions per minute
V	volts