

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

July 11, 2018

Recorded Flight Data

Specialist's Factual Report
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1. EVENT SUMMARY

Location: Bluefield, West Virginia
Date: November 22, 2016
Aircraft: Cirrus SR22
Registration: N217CE
Operator: Private
NTSB Number: ERA17LA063

On November 22, 2016, at 1220 Eastern Standard Time (EST), a Cirrus Design Corporation SR-22, single-engine airplane, N217CE, sustained substantial damage during an aborted takeoff at the Mercer County Airport (BLF), Bluefield, West Virginia. The commercial pilot and the passenger were not injured. The airplane was registered to a private company and operated by the pilot. Visual meteorological conditions existed at the airport at the time of the accident conducted as a 14 *Code of Federal Regulations* Part 91 flight. No flight plan was filed for the personal flight that was destined for Hilton Head Airport (HXD), Hilton Head Island, South Carolina.

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 devices:

Recorder Manufacturer/Model: **Garmin G1000**
Device/File: **SD card file**

Recorder Manufacturer/Model: **Cirrus RDM**
Device/File: **file**

3.1. Garmin G1000 Device Description

The Garmin G1000 Integrated Flight Deck is a collection of multiple avionics units, which include flight displays, air data computers, attitude/heading reference system (AHRS), communications and other systems. A typical installation includes a primary flight display (PFD) and a multi-function display (MFD). Each display includes two SD card slots, an upper

and a lower slot. The lower SD card slot is used by the system for software updates and various databases¹.

Depending on the display unit software, the aircraft can include a data logging feature. The data logging feature must be enabled by the aircraft operator. If the data logging feature is available and enabled, a SD card has to be installed in the upper slot of the MFD. Depending on the airframe and engine combination as many as 64 parameters can be stored at a rate of one sample per second (1Hz). According to the manufacturer of the display unit, one flight hour can be stored in approximately 2 MB. The SD card typically used is 2 GB in size and can store over 1,000 flight hours.

3.1.1. Garmin G1000 Data Description

The files sent to the laboratory by the Investigator-In-Charge (IIC) contained data from November 22, 2016, from 1133:45 EST to 1142:49 EST. The data captured the event.

3.1.2. Garmin G1000 Engineering Units Conversions

The flight log data stored in the individual files were converted to engineering units by the display unit.

Appendix A lists the parameters verified and provided in this report.

3.2. Cirrus RDM Device Description

The Cirrus RDM is a crash hardened flight-recording device installed in the tail of the aircraft that records critical flight information. The downloaded data supplied to the NTSB recorded data at a 1 Hz recording rate.

3.2.1. Cirrus RDM Data Description

The Cirrus RDM data file contained data for a similar time as the G1000 file and for similar parameters, which were not plotted.

3.3. Time Correlation

The G1000 records time with the first data sample based on the unit's internal clock. This clock is set and updated by the unit and is based off GPS time.

Correlation of the data to the event local time, Eastern Standard Time, was established by using the recorded time and then applying an additional 5 hours offset to change Coordinated Universal Time (UTC) to EST. Therefore, for the rest of this report, all times are referenced as EST.

3.4. Plots and Corresponding Tabular Data

The following two figures contain data recorded during the November 22, 2016 event. These figures are configured such that right turns are indicated by the trace moving toward the bottom of the page, left turns towards the top of the page, and nose up attitudes towards the top of the page.

¹ Databases can include terrain data, obstacle data, SafeTaxi charts, flight charts and airport terrain databases

Figure 1 shows an overview of the entire flight. The plotted time interval began at 1133:00 EST and ended at 1143:00 EST.

Figure 2 shows the parameters at the end of flight. The plotted time interval began at 1141:00 EST and ended at 1143:00 EST. During the recording, the oil temperature decreased from 250 degrees Fahrenheit to just below 200 degrees Fahrenheit. The cylinder head temperature also shows a decrease from 400 degrees Fahrenheit to just below 300 degrees Fahrenheit. The IAS started increasing at 1142:00 EST, consistent with the takeoff roll. At 1142:30 EST, it was 84 kts. At this time, the pitch was approximately eight degrees, and the roll was approximately four degrees. The oil pressure was steady until 1142:00 EST where it increased and then dropped significantly to zero psi just before 1143:00. The engine power and fuel flow also dropped at approximately at 1142:30 EST to zero rpm and zero gph. The parameters recorded on the RDM were similar to the G1000 parameters. AHRS stopped recording at 1142:35 EST. The RDM indicated that the flaps setting was at 50% during the takeoff roll.

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

Figure 1. Plot of basic parameters of flight and engine during entire flight.

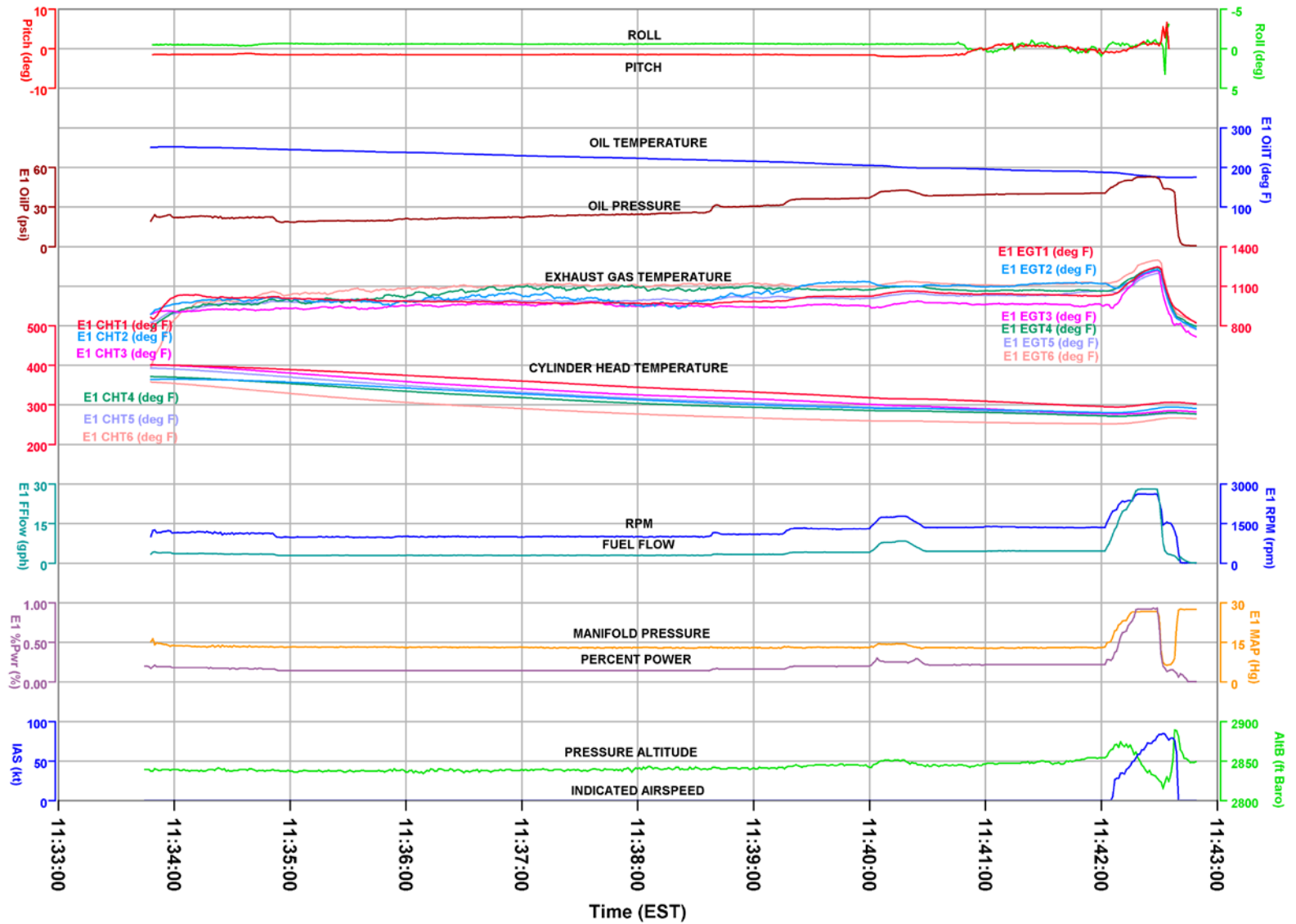
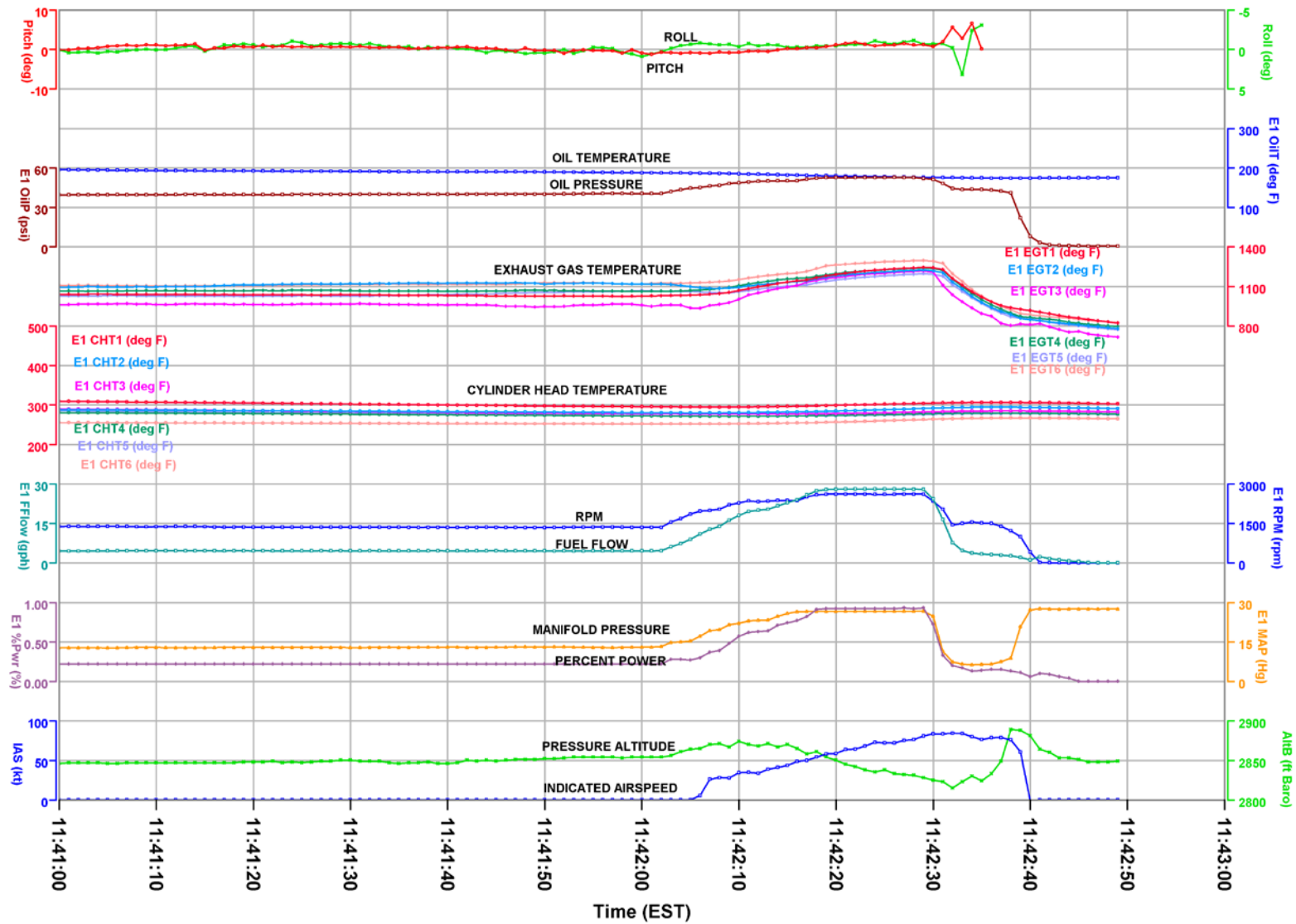


Figure 1. Plot of basic parameters of flight and engine at the end of flight.



APPENDIX A

This appendix describes the parameters provided and verified in this report for the G1000. 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. IAS (kts)	Indicated Airspeed
2. AltB (ft Baro)	Barometric Corrected Altitude
3. E1 CHT -# (deg F)	Cylinder Head Temperature Cylinder # ²
4. E1 EGT-# (deg F)	Exhaust Gas Temperature Cylinder # ²
5. E1 FFlow (gph)	Engine Fuel Flow
6. E1 MAP (inHg)	Engine Manifold Pressure
7. E1 OilP (psi)	Engine Oil Pressure
8. E1 OilT (deg F)	Engine Oil Temperature
9. E1 RPM (rpm)	Engine Power
10. E1 %Pwr (%)	Engine Percent Power
11. Pitch (deg)	Pitch
12. Roll (deg)	Roll
13. Temp OAT (deg)	Outside Air Temperature
14. Time Local (HH:MM:SS)	Recorded Time
15. Time UTC Offset (hr)	UTC Time Offset

Table A-2. Unit abbreviations.

Units Abbreviation	Description
%	percent
deg	degrees
degF	Degrees Fahrenheit
ft	feet
hrs	hours
in	inches
inHg	inches of Mercury
kt	knots
psi	pound per square inch
rpm	Revolutions per minute
gph	gallon per hour
sec	seconds

NOTE: For parameters with a unit description of discrete, a discrete is typically a 1-bit parameter that is either a 0 state or a 1 state where each state is uniquely defined for each parameter.

² Depending on aircraft configuration number of cylinders that are instrumented varies. In the data plots the '#' is replaced with the appropriate cylinder ID.