

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

July 1, 2021

Cockpit Displays – Recorded Flight Data

Specialist's Factual Report
By Gerald Kawamoto

1. EVENT SUMMARY

Location: Tehachapi, California
Date: July 24, 2020
Aircraft: Vans Aircraft RV-8
Registration: N138PM
Operator: Private
NTSB Number: WPR20LA237

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/devices capable of recording information to non-volatile memory (NVM):

Recorder Manufacturer/Model:	Advanced Flight Systems AF-5500
Recorder Serial Number:	71824
Recorder Manufacturer/Model:	Advanced Flight Systems AF-5500
Recorder Serial Number:	71842

3.1. Device Description

The Advanced Flight Systems AF-5500 is an 8.4-inch multifunctional display. The display can serve as a Primary Flight Display (PFD) with Synthetic Vision, an Engine Monitoring System (EMS), and a Moving Map in a variety of customizable screen layouts. Data is provided to the unit from various connected modules and devices. An SD Slot on the front of the display can be used for transferring files recorded to the internal memory. When multiple AF-5500 displays are utilized, certain settings and actions are synchronized throughout the system.

3.2. Data Recovery

Upon arrival at the Vehicle Recorder Laboratory, external examinations revealed the devices were in good condition, as shown in Figure 1, and the data were downloaded normally using the manufacturer's procedure. The "left" display was received with a 32 GB SD card, which did not contain historical data.



Figure 1. Left (top) and Right (bottom) AF-5500 displays as received.

3.3. Data Description

The left display contained data recorded from May 18, 2019, through July 24, 2020. The right display contained data recorded from May 2, 2019, through July 24, 2020. The sessions recorded on July 24, 2020, on both devices corresponded to the accident flight. Data from both devices were compared and most data parameters aligned with the exception of parameters that were dependent on settings on the individual device. Data parameters from the left device are included in this report and both sets of data are provided as tabular data as attachments to this report.

Data from the left device started recording at 18:08:33 and ended at 18:52:07 on July 24, 2020, Coordinated Universal Time (UTC). Data were sampled once every second. The “Baro” setting recorded during the accident flight was 29.99 inHg. EGT 4 was non-operational for all recorded data.

3.4. Parameters Provided

Table 1 shows parameters recorded by the device.

Table 1. AF-5500 Parameters

Parameter Name	Parameter Description (units)
Date	Date for recorded data point (MM/DD/YYYY)
Time	Time (UTC) for recorded data point (HH:MM:SS)
Latitude (deg)	Recorded Latitude (degrees)
Longitude (deg)	Recorded Longitude (degrees)
ALTITUDE (ft)	Barometric Altitude (feet)
GPS_ALTITUDE (ft)	GPS Altitude (feet)
GROUND_SPD (kts)	Averaged derived ground speed (knots)
AIRSPEED (kts)	Indicated Airspeed (knots)
HEADING (deg)	Magnetic Heading (degrees)
PITCH (deg)	Pitch Angle (degrees)
ROLL (Deg)	Roll Angle (degrees)
VERTSPEED (fpm)	Vertical Speed (feet per minute)
CHT 1-4 (degF)	Cylinder Head Temperature # (degrees Fahrenheit)
EGT 1-3 (degF)	Exhaust Gas Temperature # (degrees Fahrenheit)
FUEL_FLOW (gpm)	Fuel Flow (gallons per minute)
HP (%)	Horsepower (percentage)
RPM	Engine Revolutions Per Minute
MANIFOLD (inHg)	Manifold Pressure (inches of Mercury)
FUEL_PSI (psi)	Fuel Pressure (pounds per square inch)
OIL_PSI (psi)	Oil Pressure (pounds per square inch)
OIL_TEMP (degF)	Oil Temperature (degrees Fahrenheit)

3.5. Time Correlation

The system time is set by the GPS and will set Coordinated Universal Time (UTC) automatically when GPS signal is acquired.

3.6. Plots and Corresponding Tabular Data

The following six figures contain data recorded during the July 24, 2020, event.

Figure 2 is a graphical overlay generated using Google Earth showing the entire accident flight. Weather and lighting conditions in Google Earth are not necessarily the weather and lighting conditions present at the time of the recording.

The flight departed Whiteman Airport (WHP) at approximately 18:25 and the last data point was recorded near Tehachapi Municipal Airport (TSP) at 18:52:07.

Figure 3 is Google Earth overlay showing the end of the accident flight and the reported wreckage location.

Figure 4 is a plot of basic parameters for the entire accident flight. The time shown is 18:08:00 to 18:53:00.

Figure 5 is a plot of basic parameters at the end of the accident flight. The time shown is 18:48:00 to 18:52:30.

Figure 6 is a plot of engine parameters for the entire accident flight. The time shown is 18:08:00 to 18:53:00.

Figure 7 is a plot of engine parameters at the end of the accident flight. The time shown is 18:48:00 to 18:52:30.

The corresponding tabular data used to create these six plots are provided in electronic (*.csv¹) format as Attachment 1 to this report. The data from the right device is provided as Attachment 2 to this report.

¹ Comma Separated Value format.



Figure 2. Google Earth overlay of the entire accident flight.



Figure 3. Google Earth overlay of the end of the accident flight and the reported wreckage location.

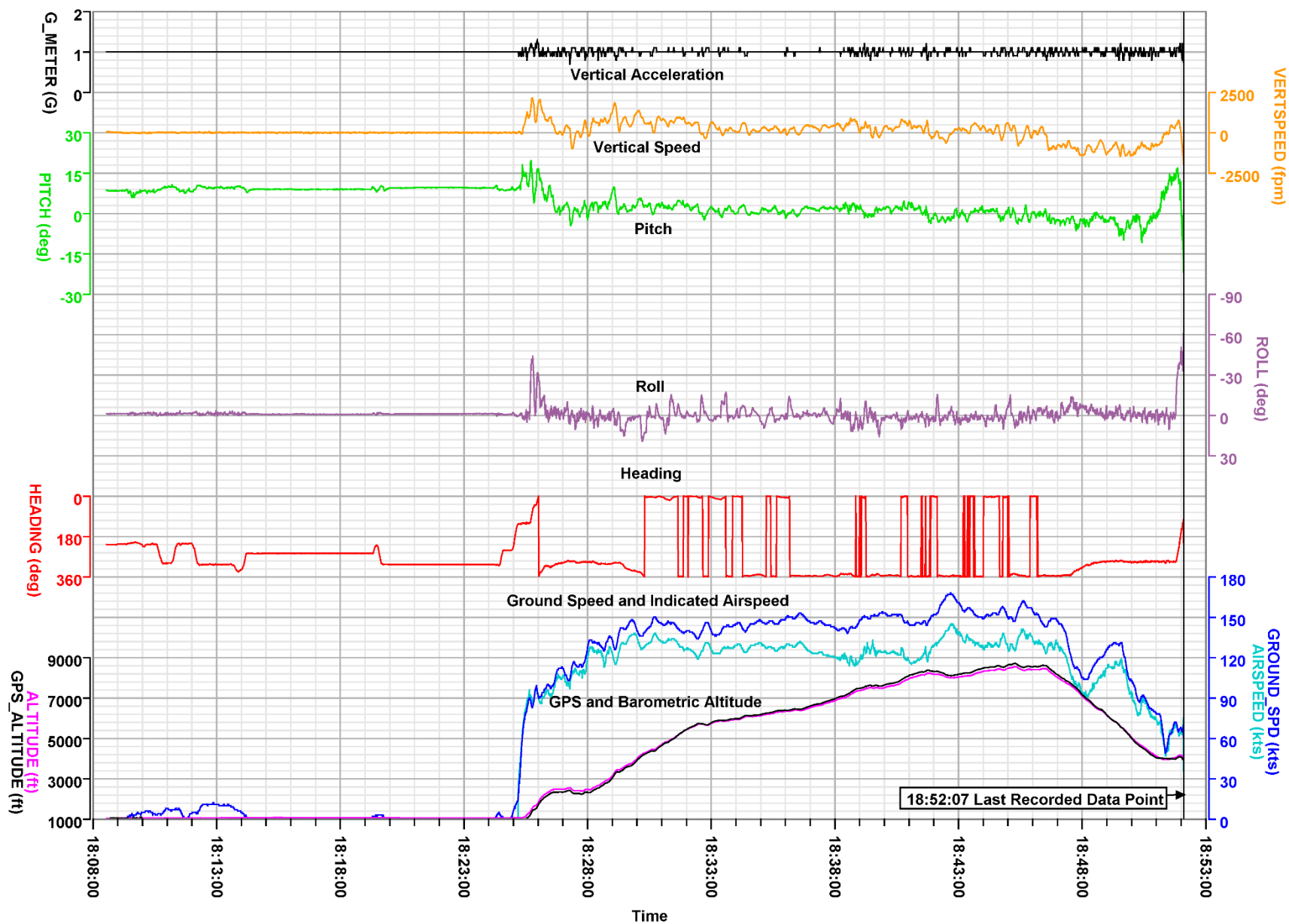


Figure 4. Plot of basic parameters for the entire accident flight.

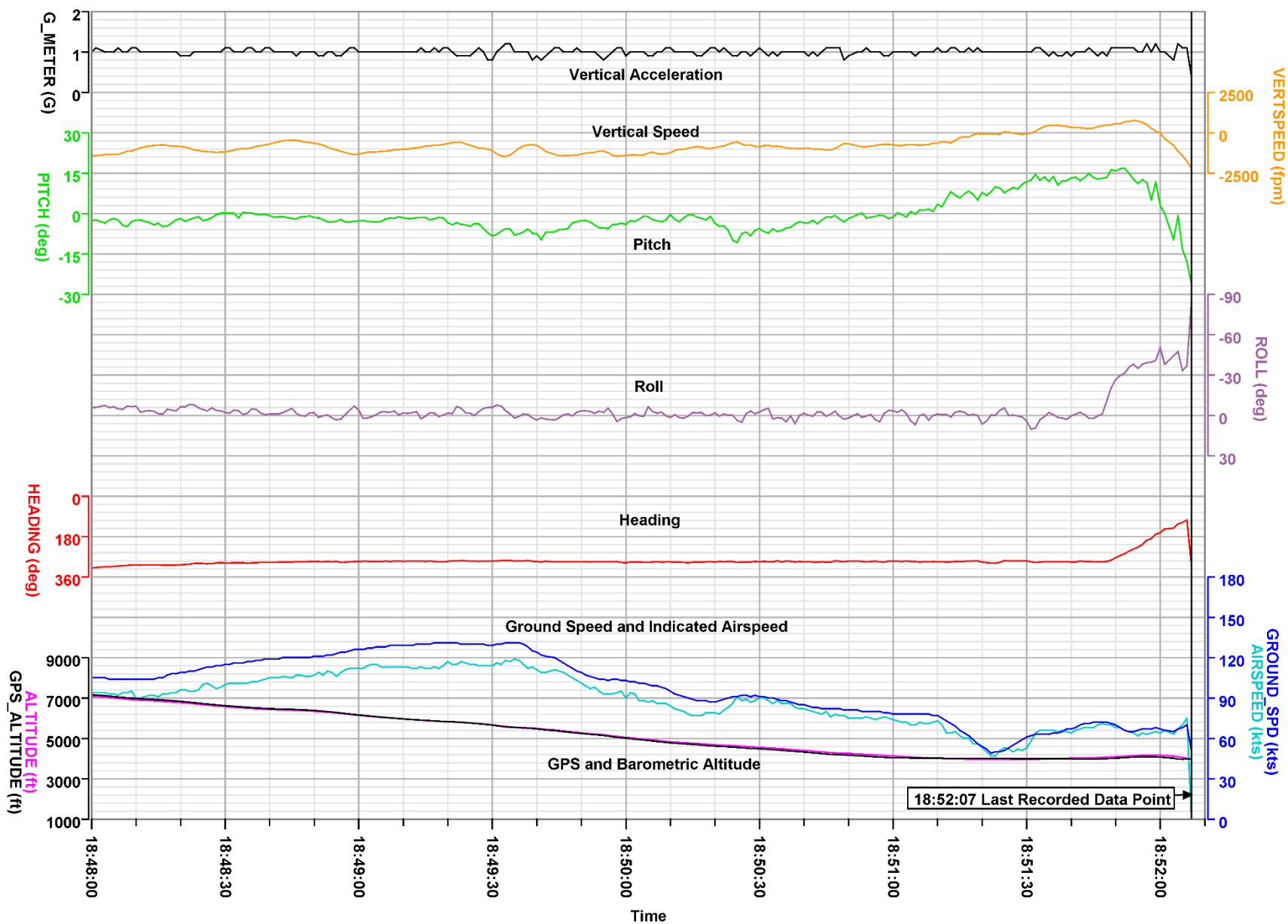


Figure 5. Plot of basic parameters at the end of the accident flight.

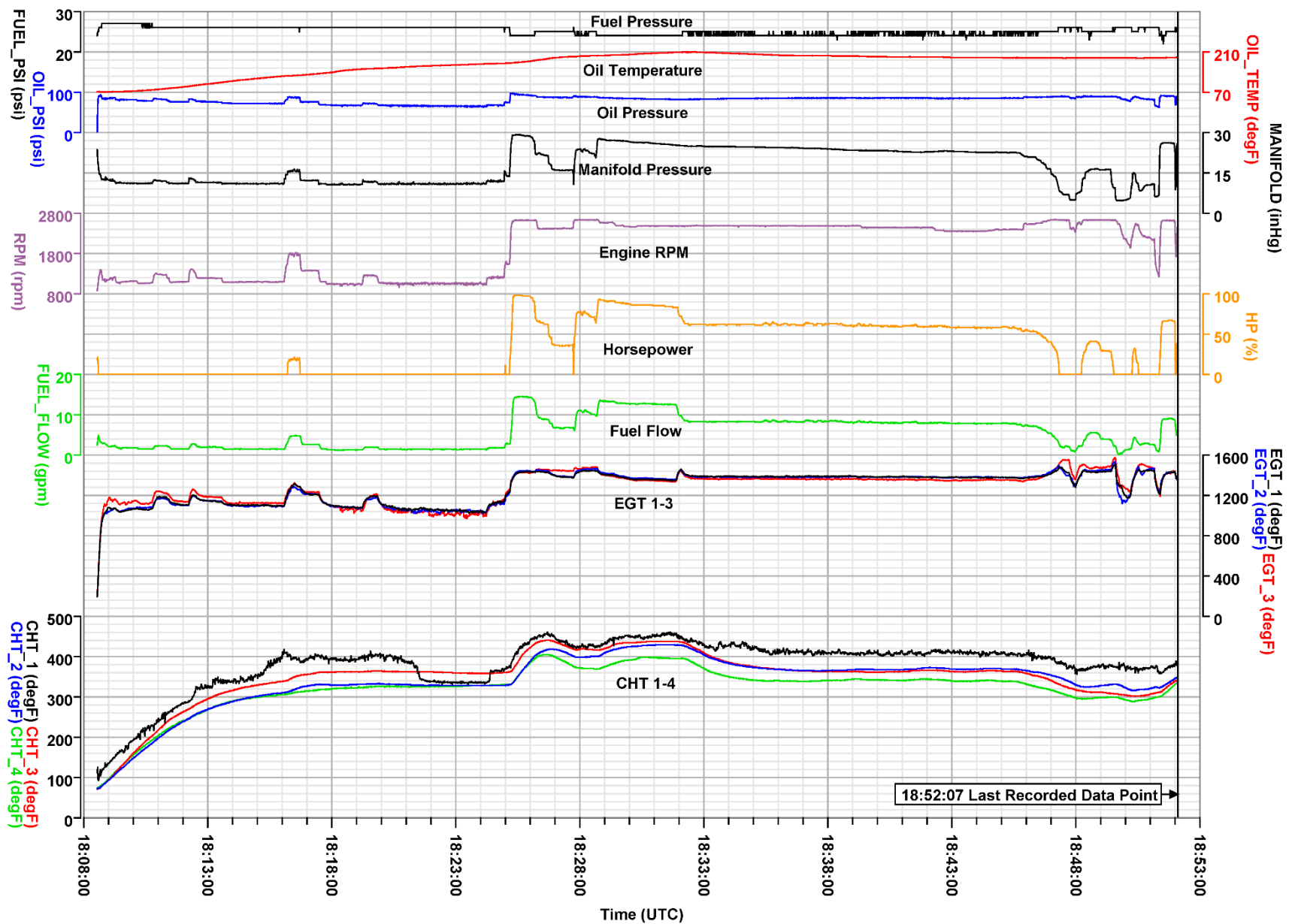


Figure 6. Plot of engine parameters for the entire accident flight.

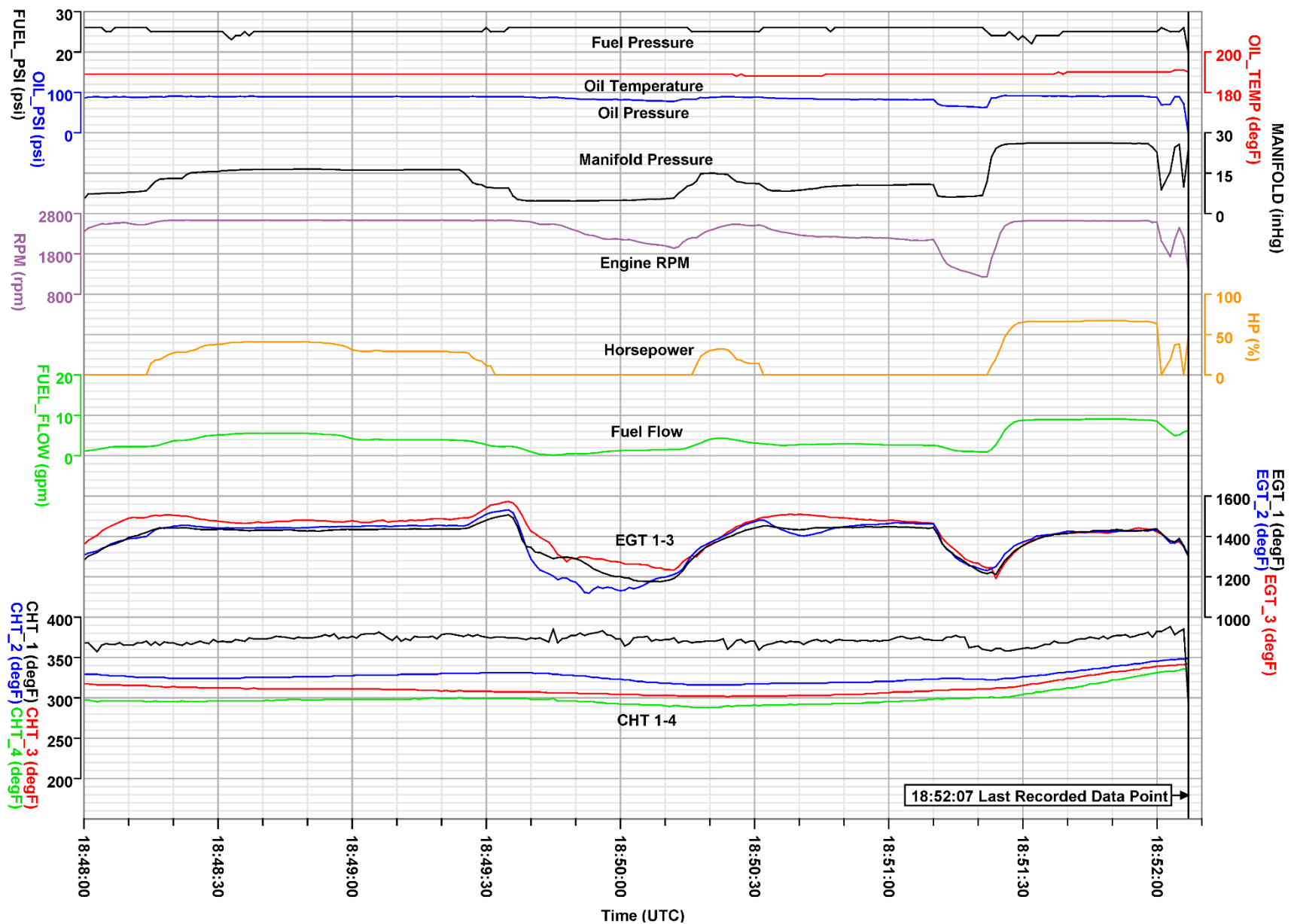


Figure 7. Plot of engine parameters at the end of the accident flight.