

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

March 15, 2022

Cockpit Display – Recorded Flight Data

Specialist's Factual Report
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1. EVENT SUMMARY

Location: Suffolk, Virginia
Date: December 24, 2019
Aircraft: Team Rocket F-1
Registration: N230BW
Operator: Private
NTSB Number: ERA20LA080

2. GROUP

A group was not convened.

3. DETAILS OF INVESTIGATION

The National Transportation Safety Board (NTSB) Vehicle Recorder Division received files from the following cockpit display:

Recorder Manufacturer/Model: **Dynon FlightDEK-D180**
Recorder Serial Number: **Unknown**

3.1. Dynon FlightDEK-D180 Description

Dynon FlightDEK-D180 is a 7" wide screen display mounted in the cockpit of non-type certificated aircraft. The instrument integrates multiple flight instruments including airspeed, altitude, gyro-stabilized magnetic compass, turn rate, slip/skid ball, bank angle, pitch angle, and vertical speed. The unit also has other functions that include a clock/timer, g-meter, voltmeter, and a density altitude/true airspeed calculator. The unit contains an Air Data, Attitude and Heading Reference System (ADAHRS) to provide air data, attitude and heading information to the display. Depending on the installation in the operator's aircraft, certain parameters might not be displayed, for example angle-of-attack. The instrument also integrates up to 16 engine related instruments including manifold pressure, temperatures, RPM, and fuel system information. Depending on the type of engine installed in the aircraft and pilot preferences, not all display options may be available.

Depending on the firmware version on the unit, the ability to log data to internal memory exists. According to the manufacturer, firmware versions 3.0 and later contain the ability to log certain engine parameters, and firmware versions 5.0 and later contain the ability to log certain Electronic Flight Information System (EFIS) and GPS parameters. The data logging must be configured by the operator to enable logging and set the data log interval. The unit can also be configured to start logging data automatically at boot-up. The data logging

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interval can be set to store at 1, 3, 5, 10, 30, and 60 second intervals. The internal memory can store at least 30 minutes of cumulative data at a 1 second recording interval or at least 30 hours at a 60 second data recording interval. When the recording limit in the internal memory is reached, the oldest record is dropped, and a new record is added.

3.1.1. Dynon FlightDEK-D180 Data Recovery and Description

Files from the date of the event were provided electronically to the Vehicle Recorder Laboratory. The event session started at 18:28:02 UTC and ended at 19:34:34 UTC on December 24, 2019.¹ Data were recorded at a 1 second interval.

3.1.2. Dynon FlightDEK-D180 Engineering Units Conversions

Conversion of the data from the raw recorded information to engineering units is performed by the Dynon product support download program. Table 1 describes data parameters validated by the recorder specialist. Not all parameters recorded were validated and included in this report.

Table 1. Dynon Data Parameters.

Parameter Name	Parameter Description
airspeed (kts)	Indicated Airspeed (knots)
grnd spd (kts)	Derived Ground Speed (knots)
altitude (ft)	MSL Altitude (feet)
gps alt (ft)	GPS Altitude (feet)
CHT # (degF)	Cylinder Head Temperature # (degrees Fahrenheit)
EGT # (degF)	Exhaust Gas Temperature # (degrees Fahrenheit)
gz (G)	Vertical Acceleration (G)
heading (deg)	Magnetic Heading (degrees)
man pres (inHg)	Manifold Pressure (inches of Mercury)
oil pres (psi)	Oil Pressure (pounds per square inch)
oil temp (degF)	Oil Temperature (degrees Fahrenheit)
pitch (deg)	Pitch Angle (degrees)
roll (deg)	Roll Angle (degrees)
rpm (rpm)	Engine Revolutions per Minute (revolutions per minute)
vert spd (fpm)	Vertical Speed (feet per minute)

4. Plots and Corresponding Tabular Data

The following seven figures contain Dynon FlightDEK-D180 data recorded during the event on December 24, 2019.

Figures 1 through 3 are graphical overlays generated using Google Earth. The weather and lighting conditions in Google Earth are not necessarily the weather and lighting conditions present at the time of the recording.

Figure 1 shows the entire event flight.

¹ Coordinate Universal Time

Figure 2 shows the event flight between 19:16:00 and 19:17:00 UTC. Data during this interval show the aerobatic maneuver preceding the structural failure.

Figure 3 shows a side view of the event flight between 19:16:00 and 19:17:00 UTC.

Figure 4 is a plot of basic parameters for the entire event flight. The time interval shown is 18:25:00 to 19:35:00 UTC.

Figure 5 is a plot of basic parameters between 19:16:00 and 19:17:00 UTC.

Figure 6 is a plot of engine parameters for the entire event flight. The time interval shown is 18:25:00 to 19:35:00 UTC.

Figure 7 is a plot of engine parameters between 19:16:00 and 19:17:00 UTC.

The corresponding tabular data used to create these six plots are provided in electronic (*.csv) format as Attachment 1 to this report.²

² Comma Separated Value format.



Figure 1. Google Earth overlay of the entire event flight recorded on the Dynon FlightDEK-D180.

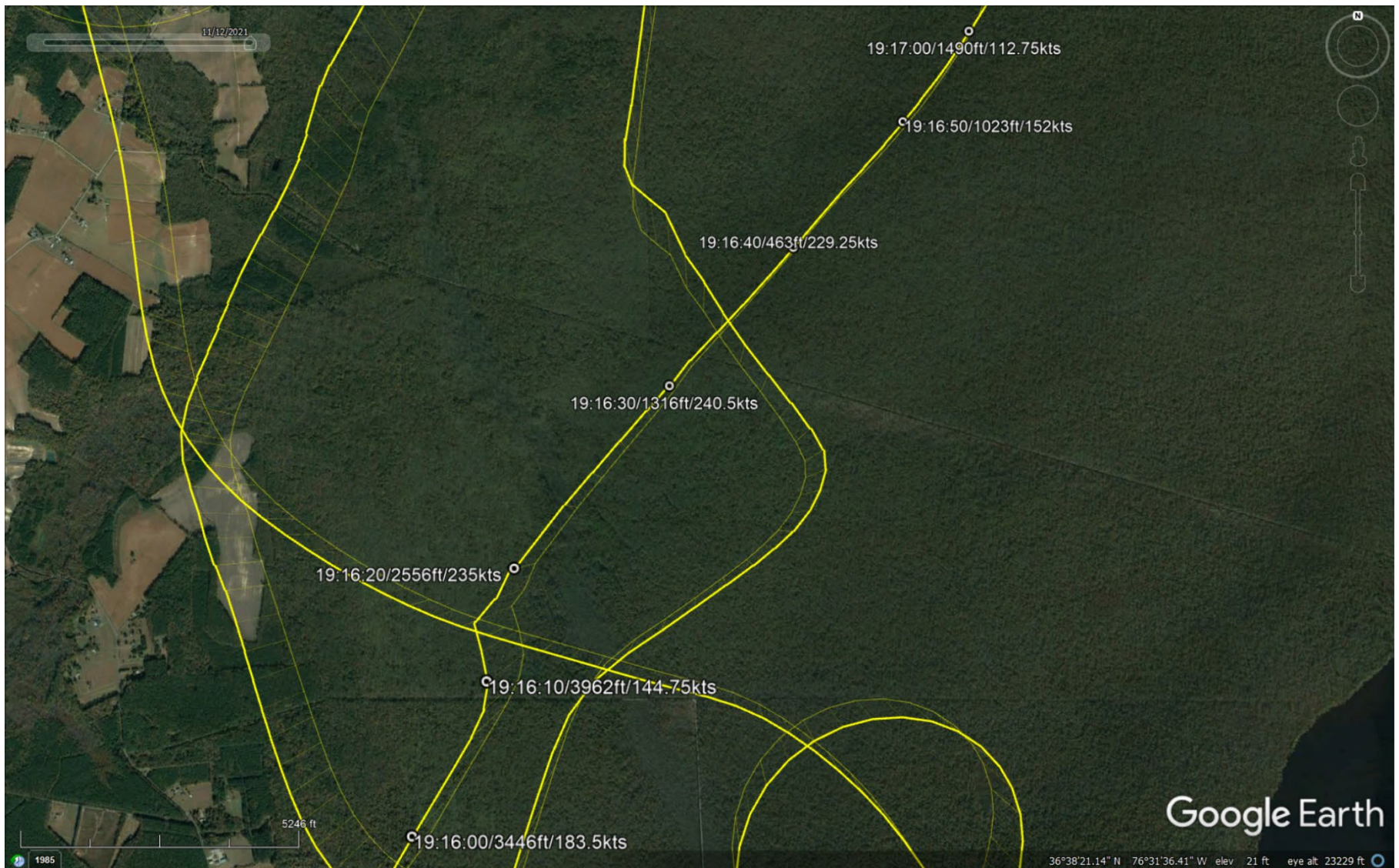


Figure 2. Google Earth overlay between 19:16:00 and 19:17:00 UTC.

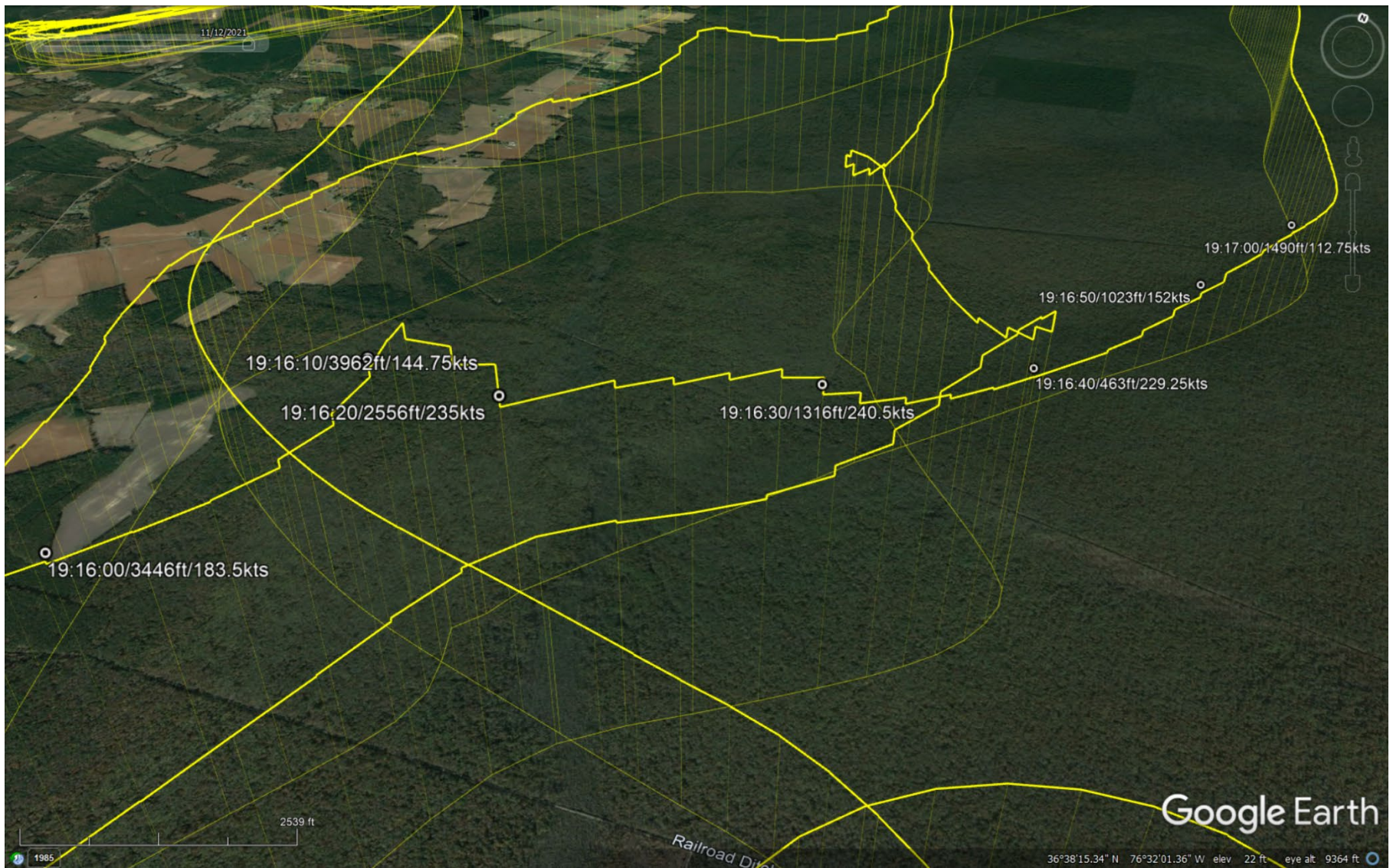


Figure 3. Google Earth overlay between 19:16:00 and 19:17:00 UTC (sideview).

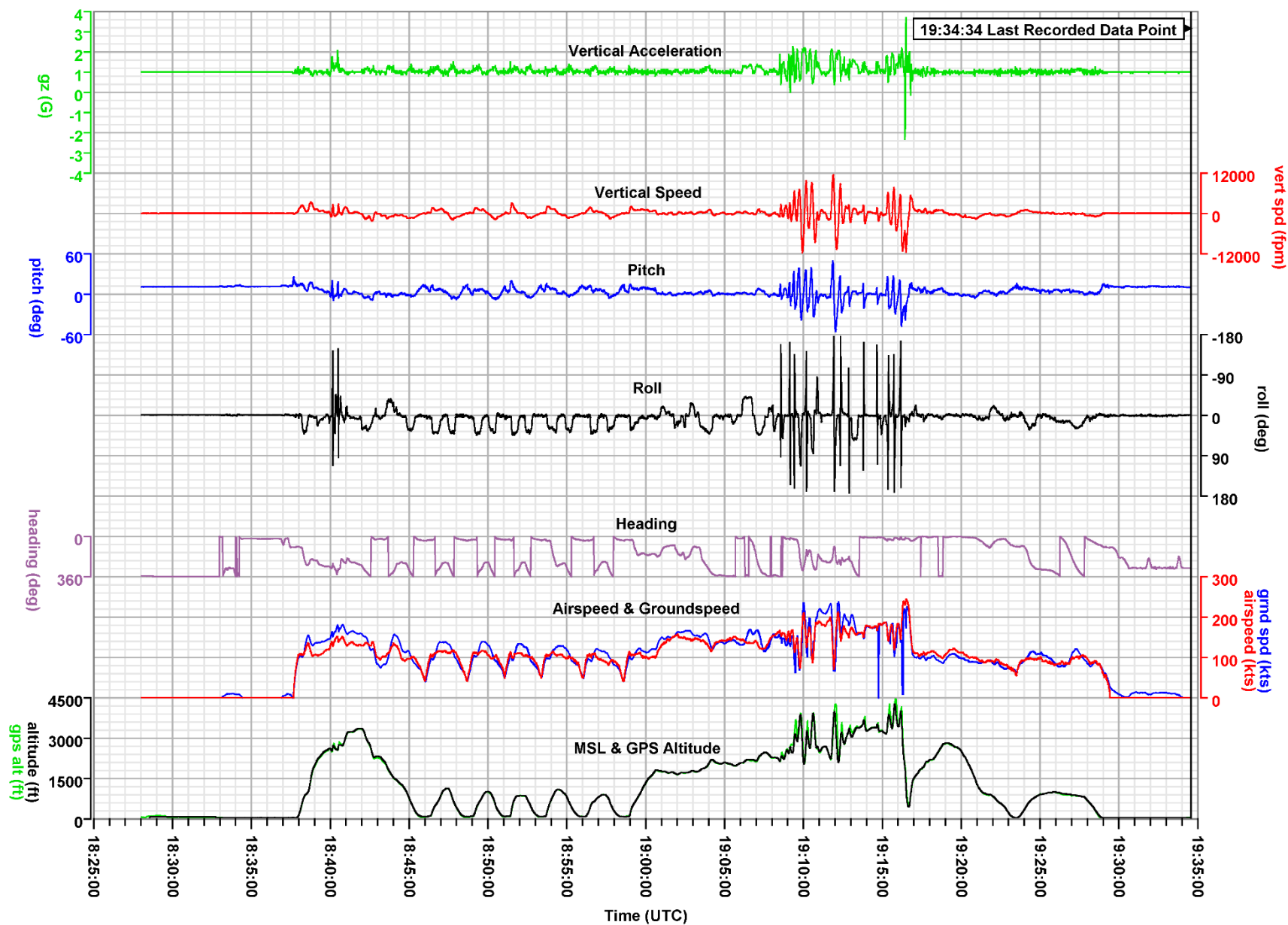


Figure 4. Plot of basic parameters recorded on the Dynon FlightDEK-D180 for the entire flight.

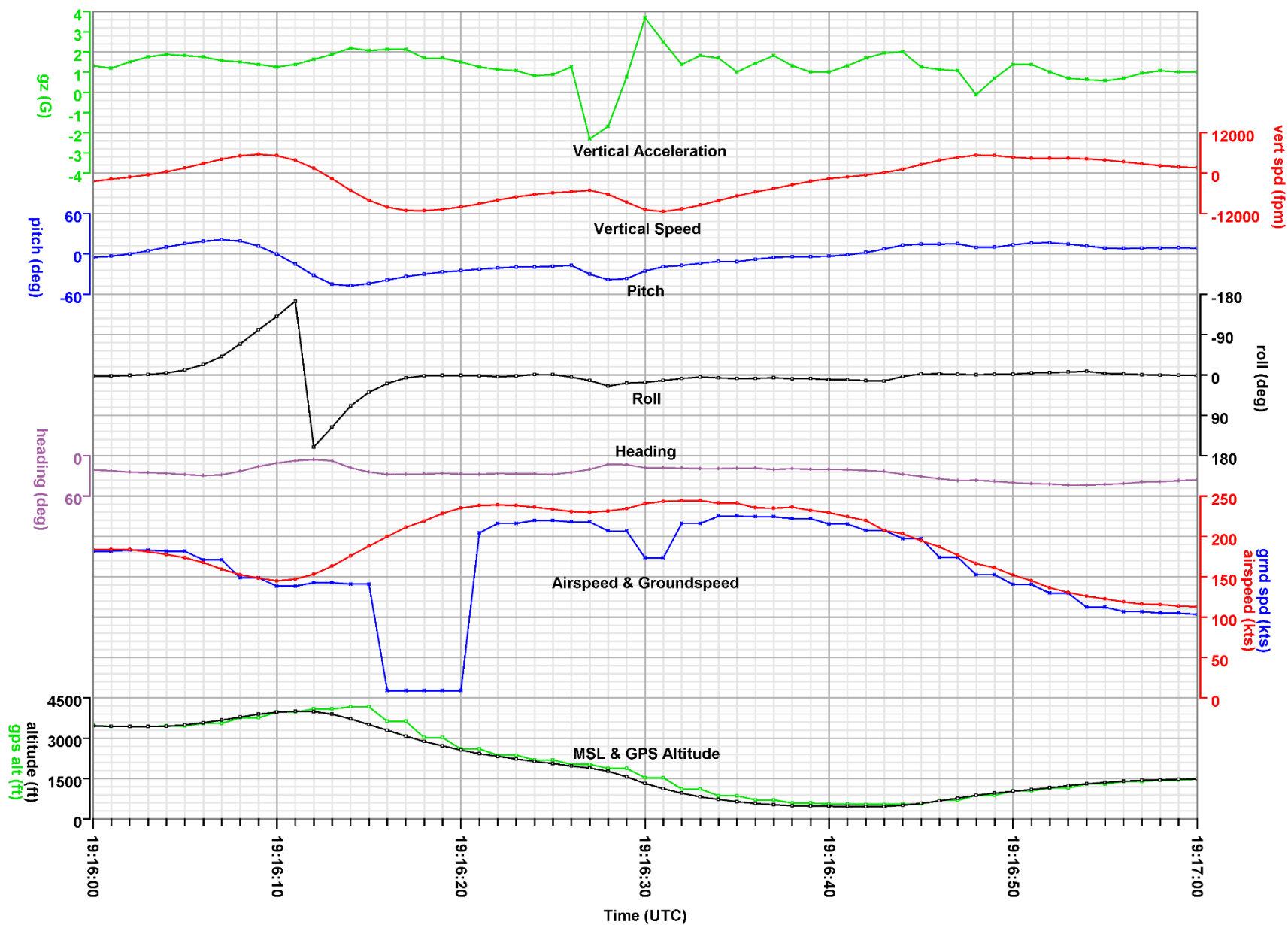


Figure 5. Plot of basic parameters recorded on the Dynon FlightDEK-D180 between 19:16:00 and 19:17:00 UTC.

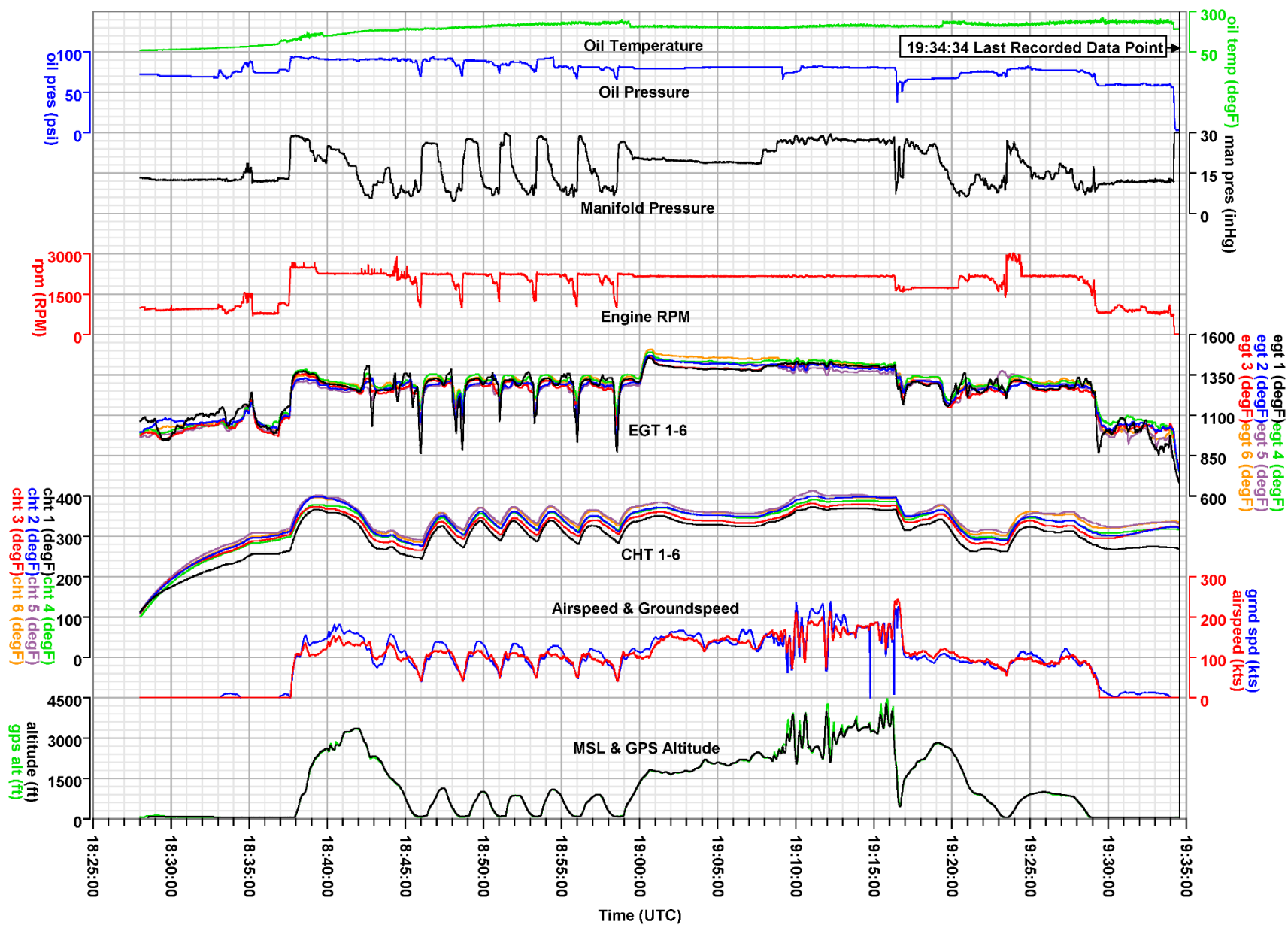


Figure 6. Plot of engine parameters recorded on the Dynon FlightDEK-D180 for the entire flight.

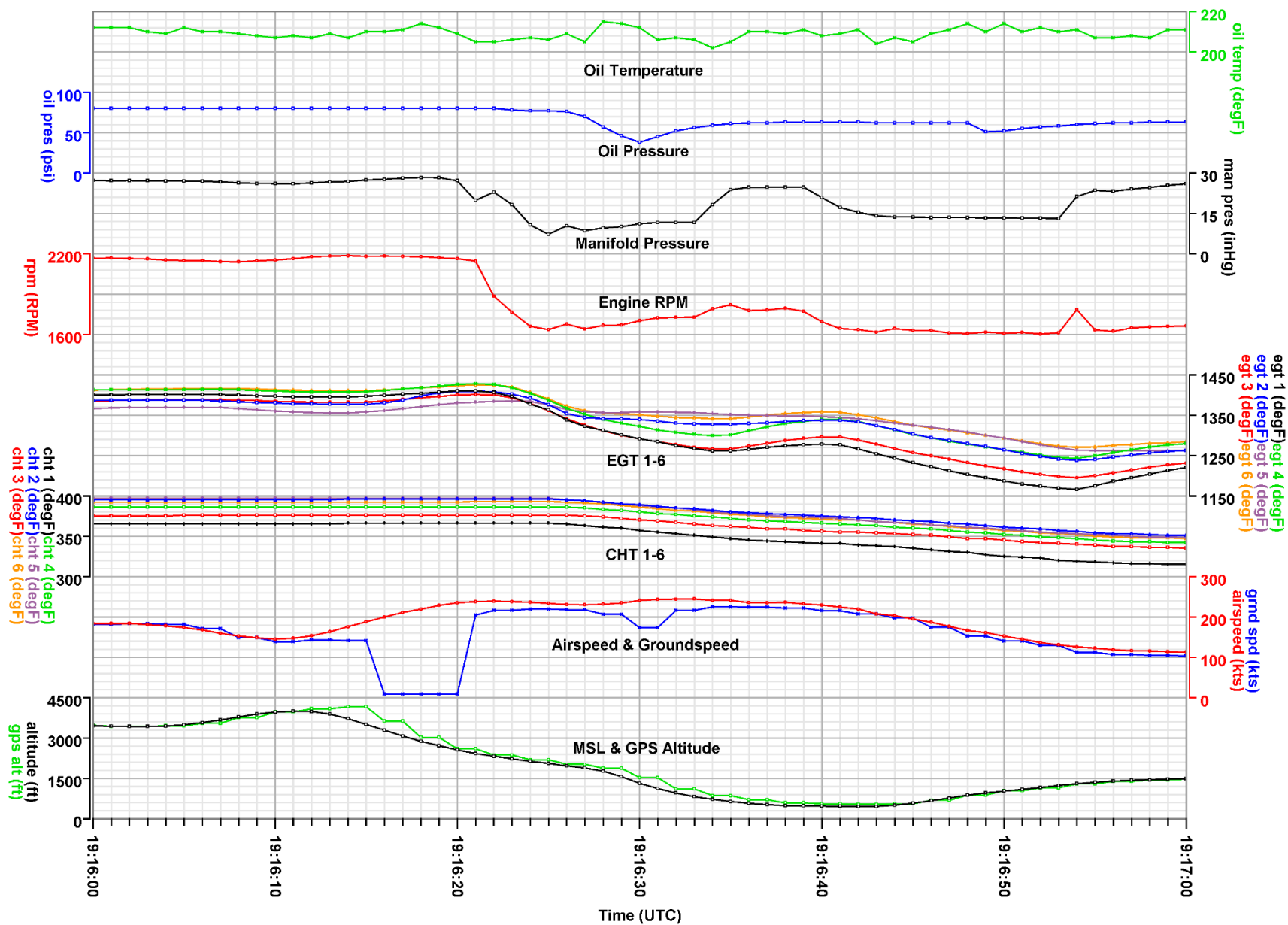


Figure 7. Plot of engine parameters recorded on the Dynon FlightDEK-D180 between 19:16:00 and 19:17:00 UTC.