

NATIONAL TRANSPORTATION SAFETY BOARD

Vehicle Recorder Division

Washington, D.C. 20594

January 31, 2017

Other Devices

Specialist's Factual Report by James Cash

1. EVENT

Location: Spring Hill, Florida
Date: September 18, 2015
Aircraft: Cessna U206E
Registration: N8615Z
Operator: Private
NTSB Number: ERA15FA361

On September 18, 2015, about 0855 eastern daylight time, N8615Z, a Cessna U206E floated-equipped airplane, was substantially damaged when it collided with terrain near Spring Hill, Florida. The certificated commercial pilot was fatally injured. The airplane was registered to Keystone Seaplane, LLC, Odessa, Florida, and operated by the pilot. Instrument meteorological conditions prevailed at the time of the accident, and an instrument flight rules flight plan was filed for the flight that departed Page Airport (FMY), Fort Myers, Florida, about 0727. The personal flight conducted under the provisions of 14 *Code of Federal Regulations* Part 91.

2. DETAILS OF INVESTIGATION

The National Transportation Safety Board (NTSB) Vehicle Recorder Division received the following devices:

Device 1: JPI EDM-930
Device 1 Serial Number: 03507
Device 2: Garmin Aera 796
Device 1 Serial Number: Unknown

2.1. Device 1: JPI EDM-930 Device Description

The J. P. Instruments EDM-930 is a panel mounted display that the operator can monitor and record multiple engine parameters related to the aircraft's engine operation. Additionally the unit is capable of recording select GPS parameters, if connected. Depending on the installation, the engine parameters monitored can include:

- Exhaust Gas Temperature (EGT)
- Cylinder Head Temperature (CHT)
- Oil Pressure and Temperature
- Manifold Pressure
- Outside Air Temperature
- Turbocharger inlet Temperature
- Engine Revolutions per Minute
- Fuel Remaining and Fuel Used
- Fuel Flow
- GPS Position (Latitude and Longitude), GPS Groundspeed, and GPS Altitude
- Battery Voltage and Current

The unit can also calculate, in real-time, engine horsepower, fuel used, shock cooling rate and EGT differentials between the highest and lowest cylinder temperatures. The calculations are also based on the aircraft installation.

The unit contains non-volatile memory for data storage of the parameters recorded and calculated. The unit creates a new session or a file folder for every electrical power application to the unit. The rate at which the data is stored is selectable by the operator from 2 to 500 seconds per sample. The memory can store over 100 hours of data at a 6 second sample rate. The data can then be downloaded by the operator using the J.P. Instruments software. The accident unit was set at the default recording rate of one sample every six seconds.

2.1.1. JPI EDM-930 Data Recovery

Upon arrival at the Vehicle Recorder Division, an exterior examination revealed that the unit had sustained significant physical damage as a result of the accident. The accident unit could not be repaired to enable the download of the recorded data using the normal front panel USB interface. The memory chip from the accident unit was removed and placed in another operational JPI EDM-930 unit. The data was then extracted using the normal front panel USB interface using the manufacturers download instructions.

2.1.2. JPI EDM-930 Data Description

The data extracted included over 200 individual sessions dating from March 4, 2015 through September 18, 2015. The accident flight was the last recorded session starting at 0713:02 EDT¹ and ending at 0855:13EDT on September 18, 2015 (969 total data points).

¹ All dates and times are referenced to Eastern Daylight Time (EDT).

2.2. Device 2: Garmin AERA 796 GPS Device Description

The Garmin Aera 796 GPS is a battery-powered portable 12-channel GPS receiver with a color touch screen display. The unit stores date, route-of-flight, and flight-time information for up to 9,999 points. A flight record is triggered when groundspeed exceeds 30 knots and altitude exceeds 500 feet, and ends when groundspeed drops below 30 knots for 10 minutes or more. A detailed tracklog – including latitude, longitude, date, time, and GPS altitude information for up to 9,999 points is stored within the unit whenever the receiver has a lock on the GPS navigation signal. Position is updated within the tracklog as a function of time or distance moved, depending on how the unit has been configured. Once the current tracklog memory becomes full, new information either overwrites the oldest information or recording stops, depending on how the unit is configured. Tracklog storage may be activated or de-activated at user discretion. All recorded data is stored in non-volatile memory². The unit contains hardware and software permitting the download of recorded waypoint, route, and tracklog information to a PC via a built-in USB port using the NMEA 0183 version 2.0 protocol. An internal button-battery is used to back-up power to the internal memory and real-time clock during those periods when main power is removed.

2.2.1. Garmin Aera 796 Data Recovery

The portable handheld GPS unit was physically damaged as a result of the accident. The touch screen display was shattered and there was some damage noted to the plastic external case of the unit. The internal circuit board was bent and cracked. The memory chip was removed from the damaged circuit board and read using the lab's memory chip reader. The resulting recovered memory data file was processed using custom decoding software based on the manufacturer supplied decoding information.

2.2.2. Garmin Aera 796 Data Description

The data recovered consisted of 29 individual sessions starting on August 20, 2015,³ through September 18, 2015. The accident flight was recorded starting at 0719:23 EDT and ending at 0851:22 EDT on September 18, 2015.

2.2.3. Garmin Aera 796 Parameters Provided

Table 1 describes data parameters provided by the GPS device. Date, Time, Latitude, Longitude, and GPS Altitude are recorded by the device. Groundspeed and Track are derived from the recorded parameters.

Table 1 GPS Data Parameters

Parameter Name	Parameter Description
Date	Date for recorded data point (MM/DD/YYYY)
Time	Time (UTC) for recorded data point (HH:MM:SS)
Latitude	Recorded Latitude (degrees)
Longitude	Recorded Longitude (degrees)

² Type of solid state memory that does not require electrical power to retain information

³ All dates and times are referenced to Eastern Daylight Time (EDT)

GPS Alt	Recorded GPS Altitude (feet)
Groundspeed	Average derived groundspeed (knots)
Track	Average derived true course (degrees)

3.0 Recorded data plots and tabular data

Figure 1 is a graphical overlay generated using Google Earth for the entire accident flight. The weather and lighting conditions in Google Earth are not necessarily the weather and lighting conditions present at the time of the recording.

According to the Garmin Aera GPS the flight departed the Page Airport, Fort Myers, Florida, at approximately 0726:40 EDT. The last recorded parameter was recorded at 0855:13 EDT on September 18, 2015. Due to data buffering within the GPS unit, the last GPS point (latitude, longitude, GPS groundspeed, altitude and track) was recorded at 0851:22 EDT, approximately 4 minutes prior to the last JPI point.

Figure 2 is a graphical overlay generated using Google Earth zoomed in on the last approximately 6 minutes of recorded data, just as the aircraft was established on final.

Figure 3 is a plot of the data recovered from the JPI EDM-930 engine monitor for the entire flight. Garmin Aera 795 GPS data for altitude, groundspeed and track are also included in the plot for reference purposes.

Figure 4 is a plot of the last 14 minutes of JPI EDM-930 and GPS data.

Tabular data used to generate figures 1 through 4 are included as Attachment 1. This attachment is provided in electronic comma-delimited (.CSV) format.

Figure 1 Entire Accident Flight overlaid on Google Earth

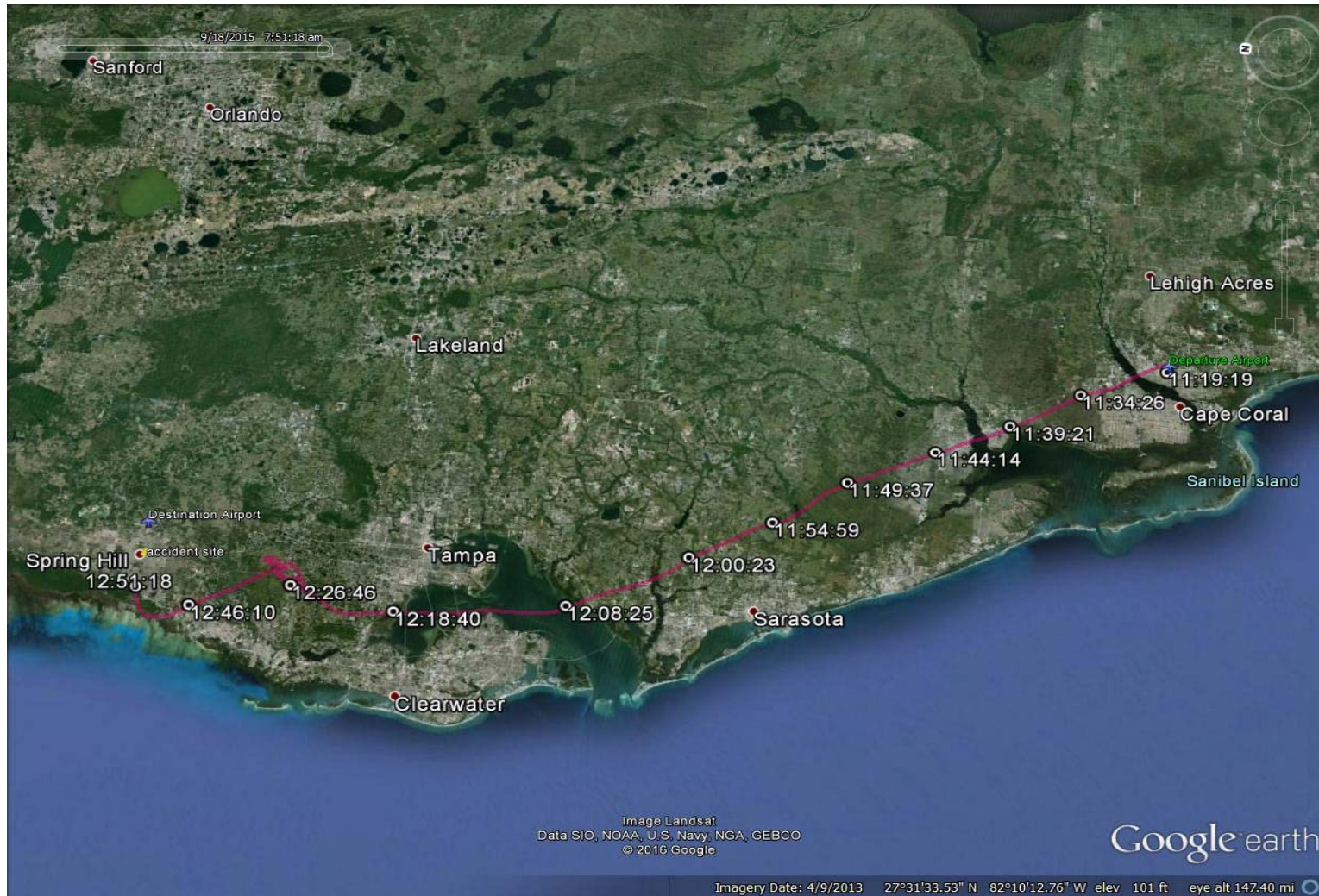


Figure 2 Final portion of flight overlaid on Google Earth

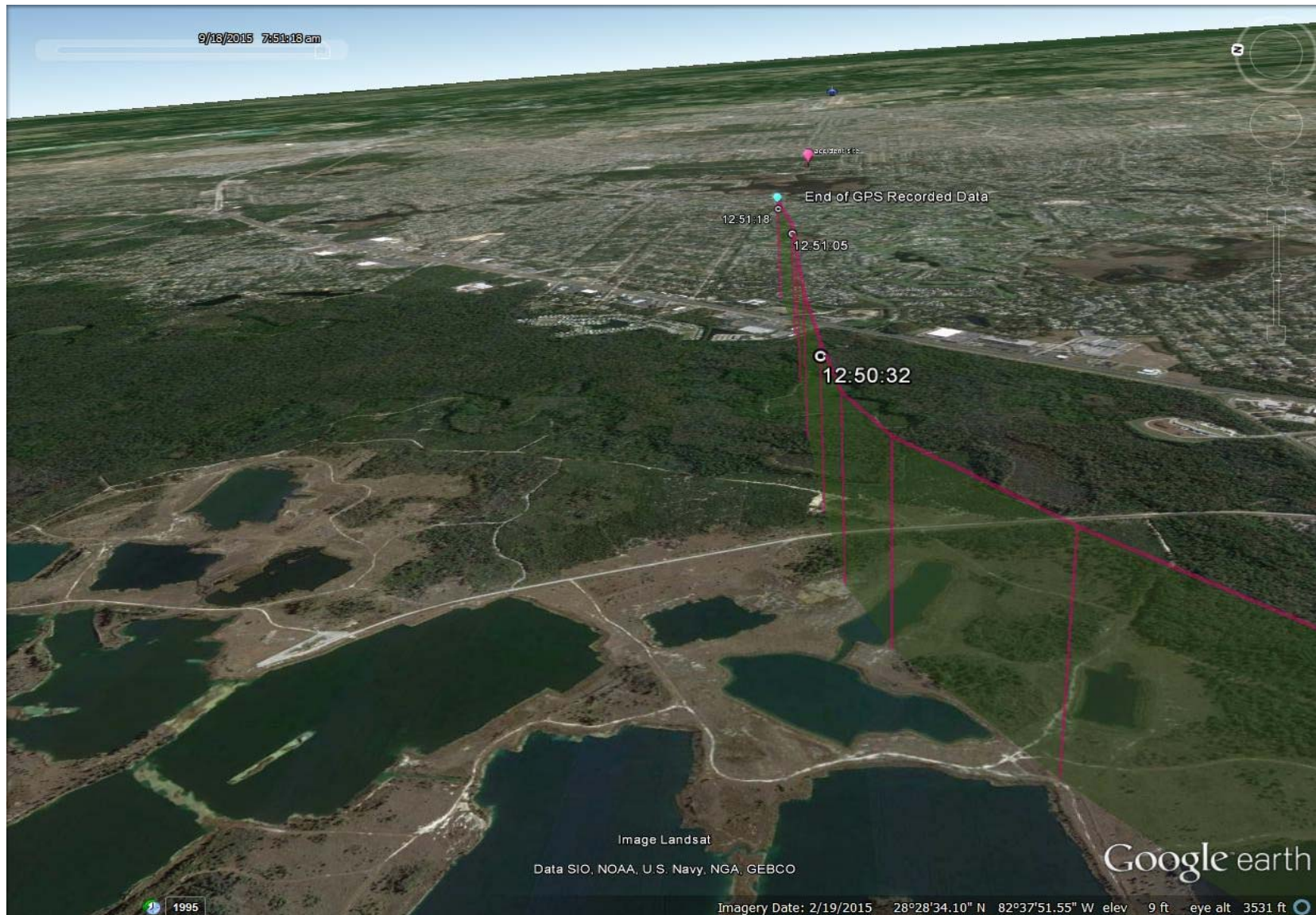
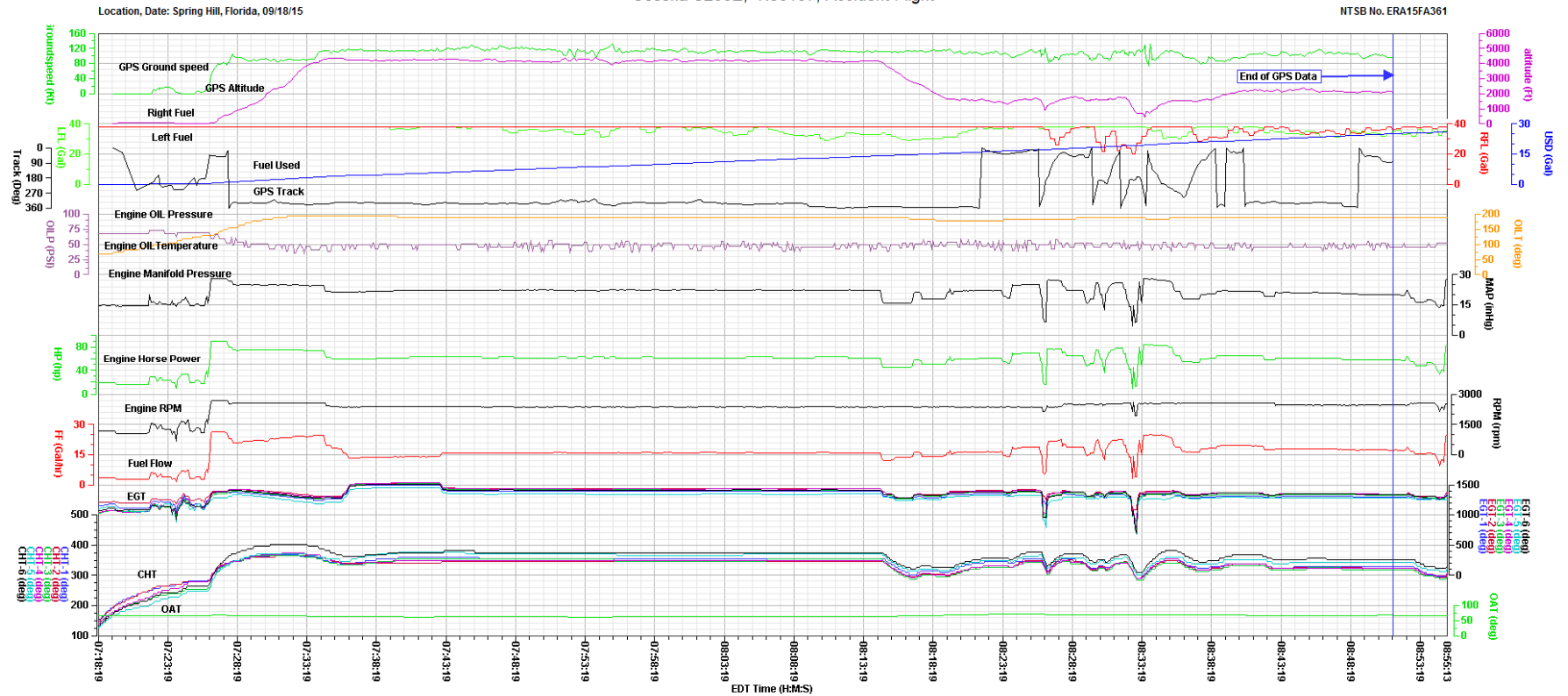


Figure 3 Plot of data for entire flight

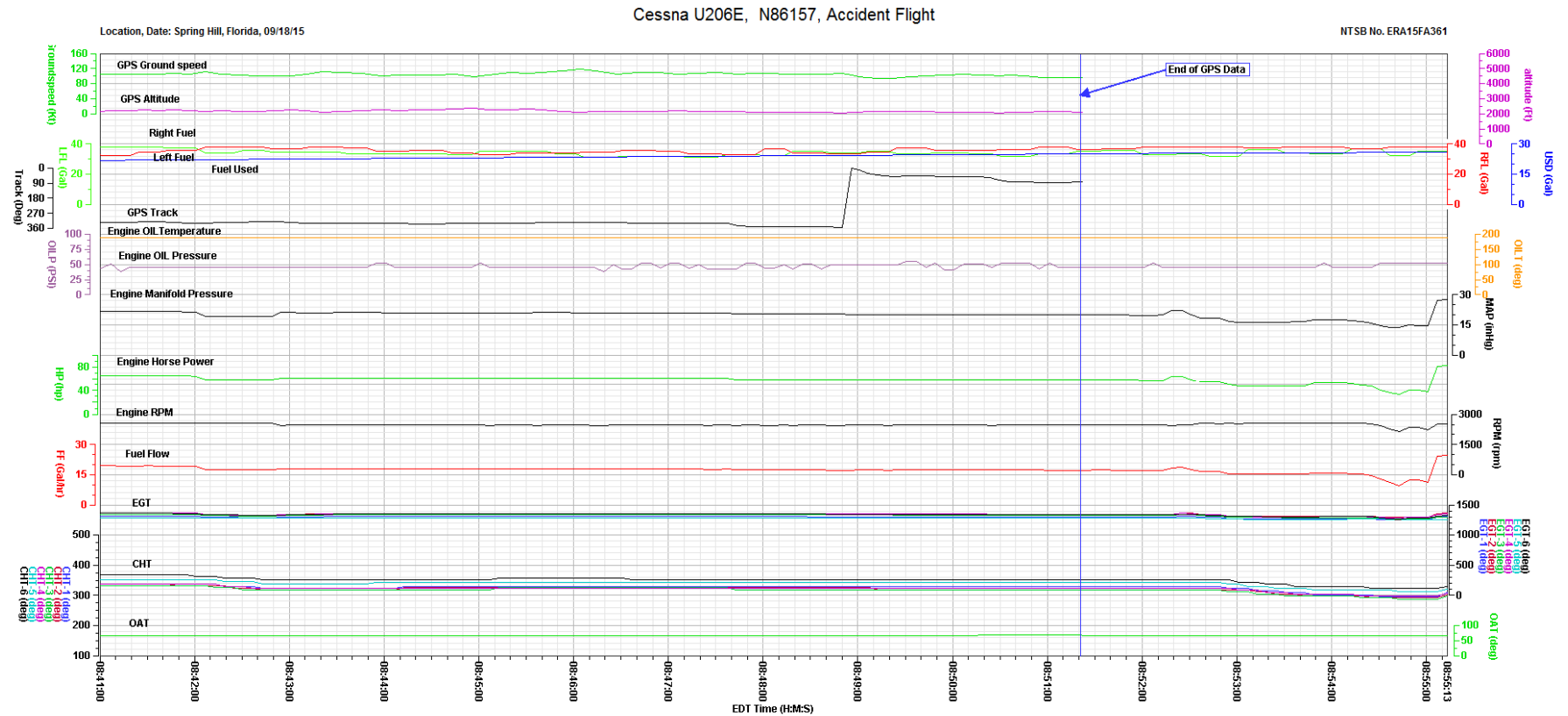
Cessna U206E, N86157, Accident Flight



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Figure 4 Data from last portion of flight



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