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

May 11, 2020

Recorded Flight Data

Specialist's Factual Report
By Charles Cates

1. EVENT SUMMARY

Location: Schellville, California
Date: July 13, 2017
Aircraft: Cirrus SR22T
Registration: N821SG
Operator: Private
NTSB Number: WPR17FA150

On July 13, 2017, about 1245 pacific daylight time (PDT), a Cirrus Design Corp SR22T, N821SG, sustained substantial damage when it impacted terrain about 1/2 mile west of the Sonoma Skypark Airport (0Q9) Sonoma, California. The private pilot was fatally injured, two passengers were seriously injured, and one passenger sustained minor injuries. The airplane was registered to DDLV LLC, and operated by the pilot under the provisions of Title 14 *Code of Federal Regulations* Part 91. Visual meteorological conditions prevailed, and no flight plan had been filed. The personal flight departed from Sonoma Skypark about 1244 with a planned destination of Reid-Hillview Airport of Santa Clara County, San Jose, California.

2. RECORDED FLIGHT DATA GROUP

A recorded flight data group was not convened.

3. DETAILS OF FDR INVESTIGATION

The National Transportation Safety Board (NTSB) Vehicle Recorder Division received the following data recording device:

Recorder Manufacturer/Model: **Heads Up Technologies RDM**
Recorder Serial Number: **302621443**

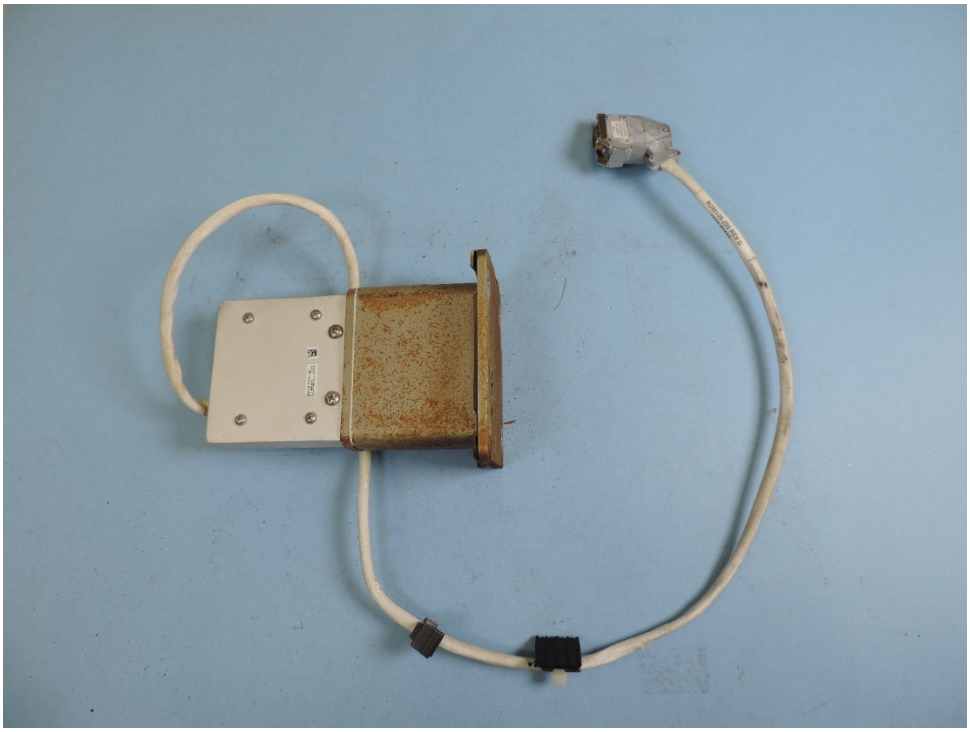
3.1. Heads Up Technologies RDM Description

The Heads Up Technologies recoverable data module (RDM) is a crash-hardened data storage unit installed in the tail of some Cirrus aircraft. The unit records flight, engine, and autopilot parameters. Data is logged once per second and stored internally on four thin small outline package (TSOP) memory devices inside the crash-hardened enclosure. When the storage limit of the memory device is reached, the oldest recording is deleted.

3.1.1. Recorder Condition

The recorder was in good condition and the data were extracted normally from the recorder. See figure 1 for the as-received condition of the RDM.

Figure 1. Photo of the exterior of the flight recorder, as-received.



3.1.2. Engineering Units Conversions

Conversion of the RDM data from the raw recorded information to engineering units was based on documentation from the manufacturer of the device. Where applicable, the conversions have been changed to ensure that the parameters conform to the NTSB's standard sign convention that climbing right turns are positive (CRT=+).[1]

Table A-1 lists the RDM parameters verified and provided in this report. Additionally, table A-2 describes the unit and discrete abbreviations used in this report.

3.2. Time Correlation

Correlation of the data to the event local time, PDT, was established using the recorded 24 hour coordinated universal time (UTC) and then subtracting 7 hours to change UTC to PDT.

3.3. Plots and Corresponding Tabular Data

Figures 2 to 5 contain RDM data recorded during the July 13, 2017 event. All the parameters listed in table A-1 are plotted except UTC Hours, UTC Minutes, and UTC Seconds.

[1] CRT=+ means that for any parameter recorded that indicates a climb or a right turn, the sign for that value is positive. Also, for any parameter recorded that indicates an action or deflection, if it induces a climb or right turn, the value is positive. Examples: Right Roll = +, Pitch Up = +, Elevator Trailing Edge Up = +, Right Rudder = +.

Figures 2 and 4 contain basic aircraft parameters. Figures 3 and 5 contain engine parameters.

Figures 2 and 3 cover a time period from engine start until the end of the recording. Figures 4 and 5 contain the same parameters as figures 2 and 3, respectively, and have an expanded time scale from the time of takeoff until the end of the recording.

In brief, the data show that the engine was started at about 12:38:45 PDT. The engine ran at around 1,000 rpm for over four minutes before being run up to around 1,700 rpm for about 20 seconds.

The aircraft turned on to the runway heading at 12:44:00 and began accelerating for takeoff at 12:44:10 PDT. The engine stabilized at 2,510 rpm and 37.5 psi of manifold pressure. The aircraft rotated at 12:44:30 PDT at 73 knots indicated airspeed. The aircraft continued to accelerate as flaps were retracted and it climbed for about 5 seconds stabilizing at 87 knots.

At 12:44:40 PDT several engine parameters began to change. EGT, fuel flow, TIT, and manifold pressure began to increase as RPM began to decrease. At 12:44:44 PDT those parameters began to decrease, consistent with a reduction in engine power. As the engine power reduced, airspeed began to decrease, altitude leveled and began to descend, and pitch and roll began to vary. Maximum recorded altitude was about 200’ above ground level (AGL) based upon global positioning system (GPS) altitude measurements.

At 12:44:52 PDT the Cirrus airframe parachute system (CAPS) handle was pulled and CAPS rocket deployed. The aircraft was about 130 ft AGL rolled about 27 degrees left. The recording stopped one second later with the aircraft at 65 ft AGL, 16 degrees nose down, and rolled 68 degrees left.

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.

The corresponding tabular data used to create figures 2 to 5, including Time UTC Hours, Time UTC Minutes, and Time UTC Seconds, are provided in electronic comma separated value (*.csv) format as attachment 1 to this report.

Figure 2. Plot of basic parameters during entire flight.

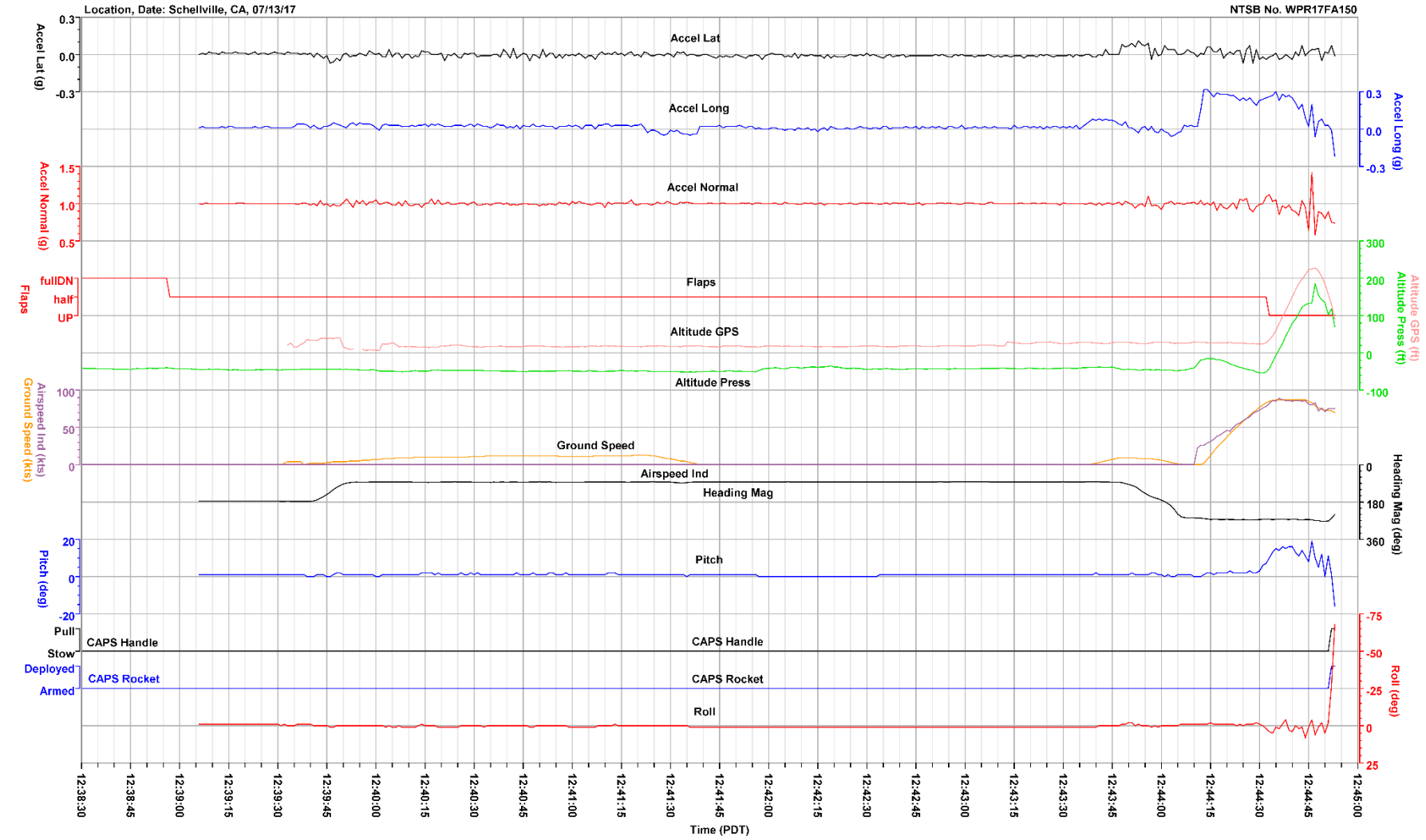


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Figure 3. Plot of engine parameters during entire flight.

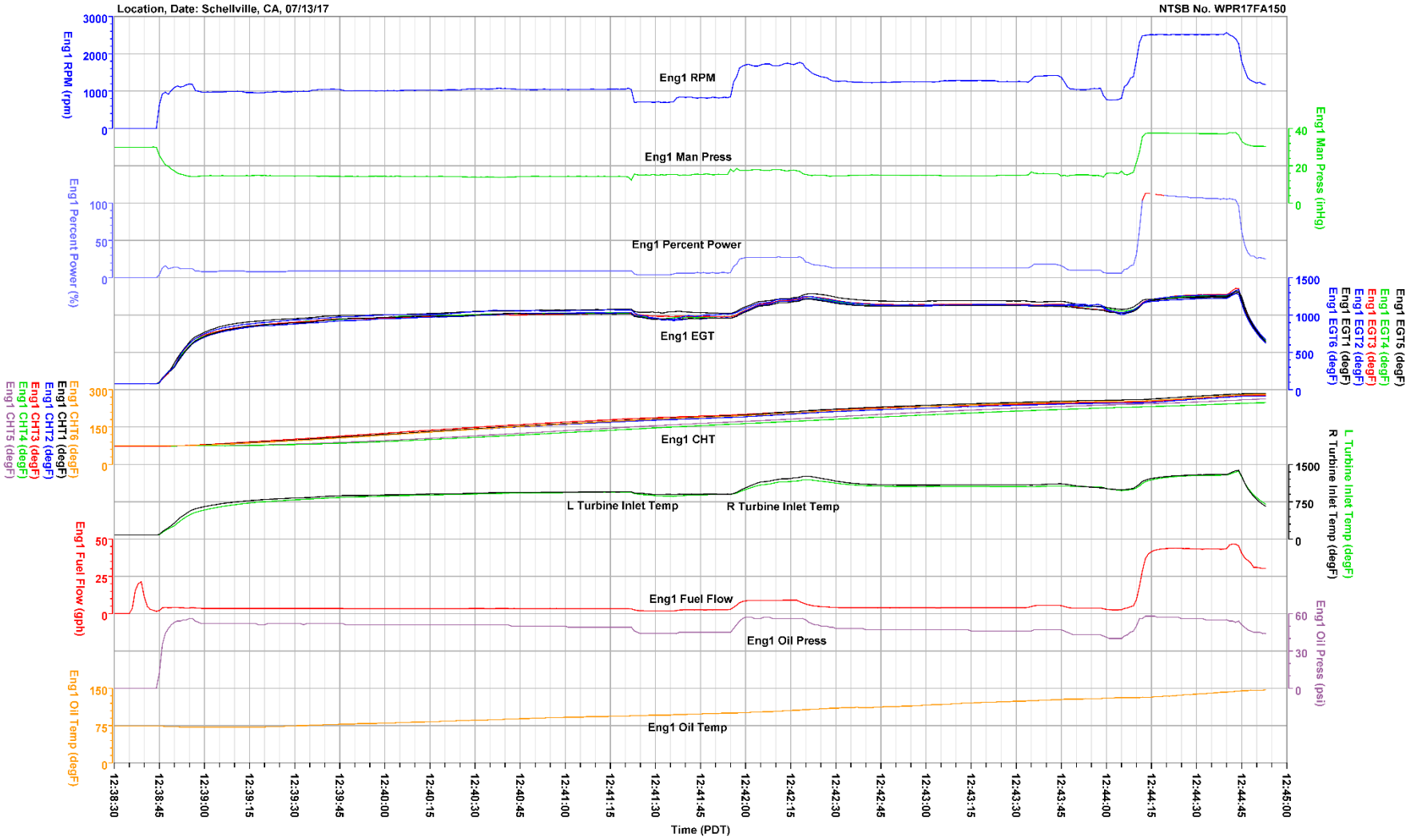

Figure 4. Plot of basic parameters from the start of takeoff until the end of the recording.

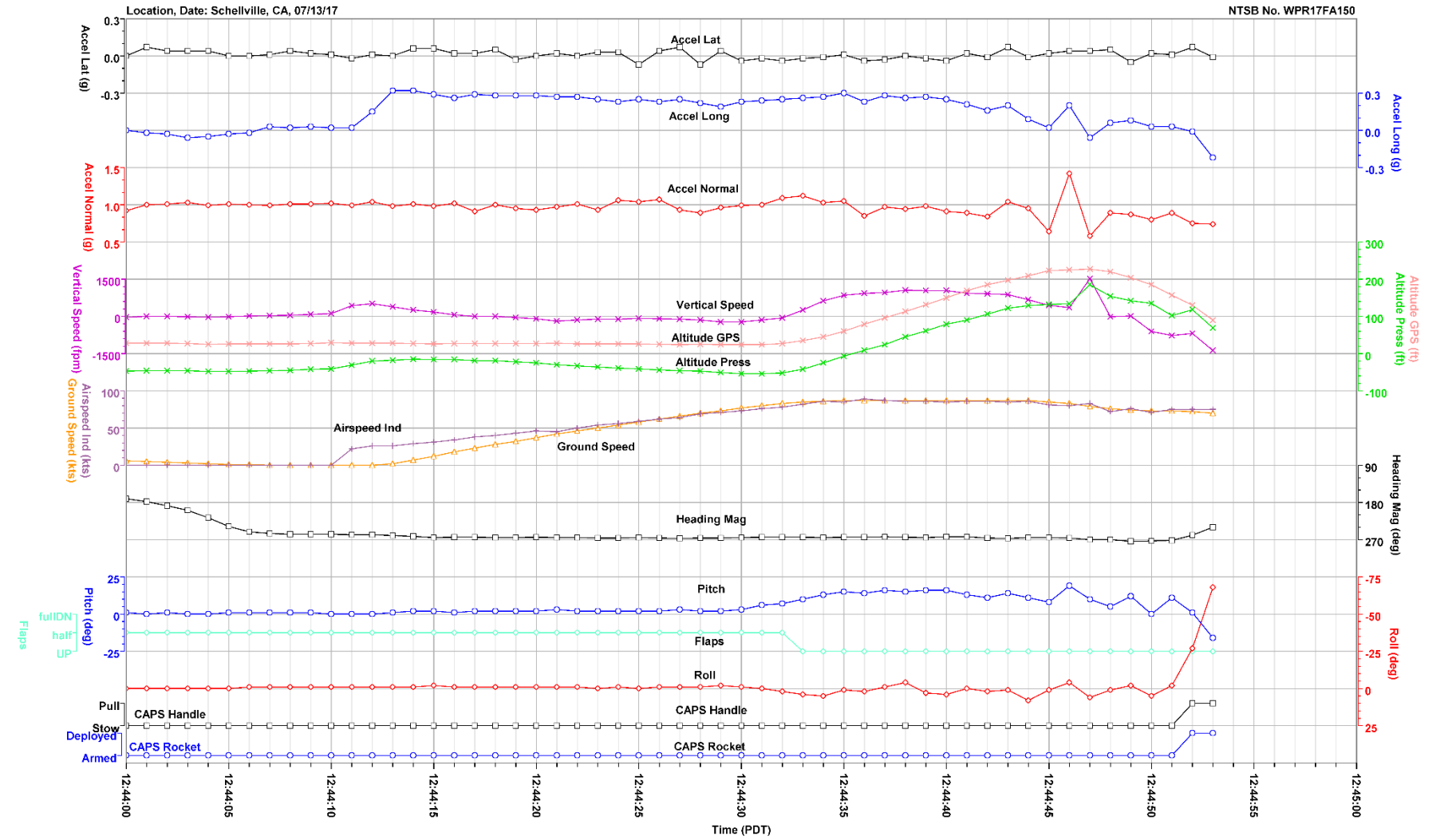

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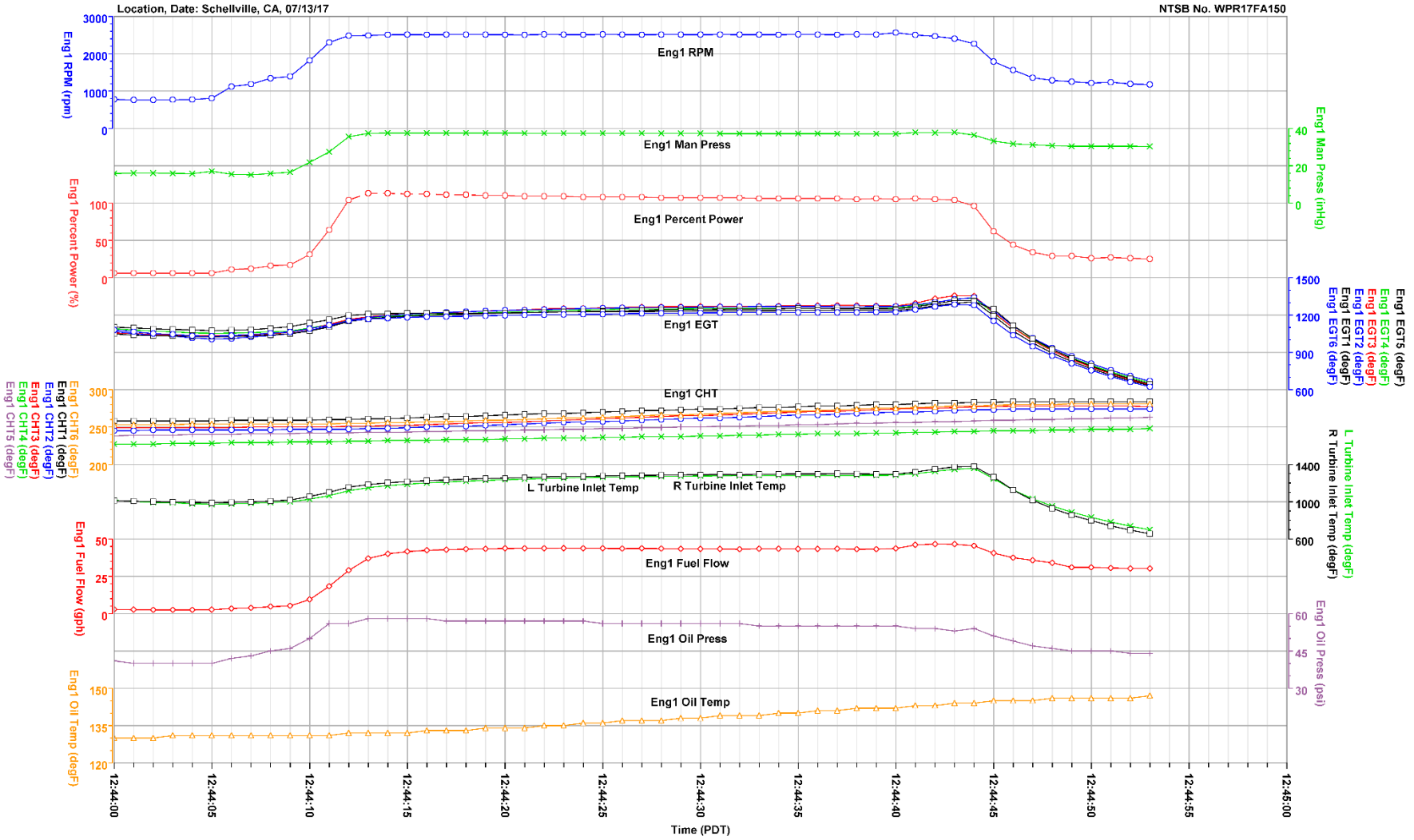
Figure 5. Plot of engine parameters from the start of takeoff until the end of the recording.



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APPENDIX A

This appendix describes the parameters provided and verified in this report. Table A-1 lists the plot/table labels, parameter names, and units. Additionally, table A-2 describes the unit and discrete abbreviations used in this report.

Table A-1. Verified and provided FDR parameters.

Plot/Table Labels	Parameter Description	Units
Accel Lat	Lateral Acceleration	g
Accel Long	Longitudinal Acceleration	g
Accel Vert	Vertical Acceleration	g
Airspeed Ind	Indicated Airspeed	kts
Altitude GPS	GPS Altitude	ft
Altitude Press	Pressure Altitude	ft
CAPS Handle	Airframe Parachute Handle Position	
CAPS Rocket	Airframe Parachute Rocket Deployed	
Eng1 CHT#	Engine Cylinder Head Temperature, Cylinder #	degF
Eng1 EGT#	Engine Exhaust Gas Temperature, Cylinder #	degF
Eng1 Fuel Flow	Engine Fuel Flow	gph
Eng1 Man Press	Engine Intake Manifold Pressure	inHg
Eng1 Oil Press	Engine Oil Pressure	psi
Eng1 Oil Temp	Engine Oil Temperature	degF
Eng1 Percent Power	Engine Power	%
Eng1 RPM	Engine speed	rpm
Flaps	Flap Position	discrete
Ground Speed	Speed over the ground	kts
Heading Mag	Magnetic Heading	deg
L Turbine Inlet Temp	Turbine Inlet Temperature, Left Cylinder Bank	degF
Pitch	Pitch Angle	deg
R Turbine Inlet Temp	Turbine Inlet Temperature, Right Cylinder Bank	degF
Roll	Roll Angle	deg
UTC Hours	UTC Time Hours	hrs
UTC Minutes	UTC Time Minutes	min
UTC Seconds	UTC Time Seconds	sec
Vertical Speed	Vertical Speed	fpm

NOTE: The pressure altitude parameter is based on a standard altimeter setting of 29.92 inches of mercury (in Hg). The pressure altitude information presented in the plots and tabular data has not been corrected for the local altimeter setting at the time of the event.

NOTE: 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.

Table A-2. Unit and discrete abbreviations.

Unit and Discrete Abbreviation	Description
deg	degrees
degF	degrees Fahrenheit
ft	feet
fullDN	flaps down
fpm	feet per minute
gph	gallons per hour
half	flaps 50%
hrs	hours
inHg	inches of Mercury
kts	knots
min	minutes
psi	pounds per square inch
rpm	revolutions per minute
sec	seconds
UP	flaps up