

National Transportation Safety Board

Office of Research and Engineering

Washington, DC 20594



CEN25LA007

RECORDED FLIGHT DATA

Specialist's Factual Report

March 4, 2025

TABLE OF CONTENTS

A. ACCIDENT	3
B. RECORDED FLIGHT DATA SPECIALIST	3
C. DETAILS OF THE INVESTIGATION	3
1.0 AVIDYNE IFD540 DESCRIPTION	3
1.1 Avidyne IFD540 Data Recovery	4
1.2 Avidyne IFD540 Recording Description	5
2.0 JPI EDM-900 DESCRIPTION	5
2.1 JPI EDM-900 Recording Description.....	6
D. FIGURES AND TABULAR DATA.....	6

A. ACCIDENT

Location: Richmond, Texas
Date: October 8, 2024
Time: 1235 central daylight time (CDT)
1735 coordinated universal time (UTC)
Airplane: Mooney M20E, private operator, N9151V

B. RECORDED FLIGHT DATA SPECIALIST

Specialist: Gerald Kawamoto
Recorder Specialist
National Transportation Safety Board (NTSB)

C. DETAILS OF THE INVESTIGATION

A group was not convened. The NTSB Vehicle Recorder Division received the following cockpit display:

Recorder Manufacturer/Model: Avidyne IFD540
Part Number: 700-00182-000
Recorder Serial Number: M215013808

Additionally, the Vehicle Recorder Division received an electronic file containing data from a JPI EDM-900 engine data monitor.

1.0 Avidyne IFD540 Description

The Avidyne IFD540 is a GPS NAV/COM radio whose primary function is to conduct nav-com-transponder tuning and communication and serve as the principal navigation sensor/system for all instrument flight rules (IFR) very high frequency (VHF) and GPS-based navigation and instrument flying, provided it is connected to an external navigation source selection annunciator and a course deviation indicator (CDI) and horizontal situation indicator (HSI) that is installed in the required field of view.

Supplemental functions include a moving-map, flight management system (FMS), checklists, electronic charts and checklists along with a number of timer and calculator types of utilities. The system includes terrain alerting as well as an option for terrain awareness and warning system (TAWS).

1.1 Avidyne IFD540 Data Recovery

Upon arrival at the Vehicle Recorder Laboratory an external examination did not reveal any apparent signs of damage. The device as received is shown in Figure 1. When powered on, the display exhibited signs of damage, as shown in Figure 2. The touchscreen remained partially functional and the on-screen prompts were accessible and data were downloaded using the manufacturer's procedure.



Figure 1. Avidyne IFD540 as received.



Figure 2. Avidyne IFD540 powered on.

1.2 Avidyne IFD540 Recording Description

Data included sessions recorded from August 8, 2024, through October 8, 2024, UTC. The accident session started at 10:58:18 CDT and ended at 12:35:29 CDT on October 8, 2024. The recorded time in UTC was adjusted to the local time of the accident, CDT, by subtracting 5 hours (18,000 seconds). Data were sampled once a second.

Table 1 lists the Avidyne IFD540 parameters provided and verified in this report.

Table 1. Avidyne IFD540 Parameters.

Parameter Name (unit)	Parameter Description (unit)
GPSLatitude (deg)	Latitude (degrees)
GPSLongitude (deg)	Longitude (degrees)
GPSAltitude (ft)	GPS Altitude (feet)
GPS AGL Height (ft)	GPS Above Ground Level Height (feet)
GPS MSL Altitude (ft)	GPS MSL Altitude (feet)
GroundSpeed (kts)	Groundspeed (knots)
GroundTrack (deg)	Ground Track (degrees)

2.0 JPI EDM-900 Description

The J. P. Instruments EDM-900 is a panel mounted display that the operator can monitor and record multiple engine parameters related to engine operations and GPS parameters, if connected. Depending on the installation, engine parameters monitored can include: Exhaust Gas Temperature (EGT), Cylinder Head Temperature (CHT), Oil Pressure and Temperature, Manifold Pressure, Outside Air Temperature, Turbine Inlet Temperature, Engine Revolutions per Minute (RPM), Compressor Discharge Temperature, Fuel Flow, Fuel Pressure, Fuel Level, Carburetor Temperature, and Battery Voltage. The unit can also calculate, in real-time, 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.¹ The rate at which the data is stored is selectable by the operator from 1 to 500 seconds per sample. Data recording typically begins when engine RPM is greater than 500 rpm. The memory can typically store over 300 hours of data at a 6 second sample rate. For a non-damaged unit, the data can then be downloaded by the operator using a USB flash drive and following the instructions on the unit.

¹ Non-volatile memory (NVM) is semiconductor memory that does not require external power for data retention.

2.1 JPI EDM-900 Recording Description

Data included sessions recorded from June 28, 2024, through October 8, 2024 Recorded Time. The accident session started at 10:57:50 CDT and ended at 12:35:02 CDT on October 8, 2024. An offset of 190 seconds was applied to the time such that it displays in CDT, the local time of the accident. The offset was determined by correlating the application of takeoff power from the JPI EDM-900 engine parameters to the GPS data from the Avidyne IFD540. Data were sampled once every 6 seconds.

Table 2 lists the JPI EDM-900 parameters provided and verified in this report.

Table 2. JPI EDM-900 Parameters.

Parameter Name (unit)	Parameter Description (unit)
C# (degF)	Cylinder Head Temperature (degrees Fahrenheit)
CLD (degF/min)	Shock Cooling rate (degrees Fahrenheit per minute)
E# (degF)	Exhaust Gas Temperature (degrees Fahrenheit)
FF (gph)	Fuel Flow (gallons per hour)
FP (psi)	Fuel Pressure (pounds per square inch)
HP (%)	Horsepower (percent)
LFL & RFL (gal)	Left and Right Fuel Level Indicators (gallons)
MAP (inHg)	Manifold Pressure (inches of mercury)
OILP (psi)	Oil Pressure (pounds per square inch)
OILT (degF)	Oil Temperature (degrees Fahrenheit)
RPM	Engine Revolutions per Minute
USD (gal)	Fuel Used (gallons)

D. FIGURES AND TABULAR DATA

Figure 3 and Figure 4 are Google Earth overlays of the accident session generated with data from the Avidyne IFD540. The weather and lighting conditions in Google Earth are not necessarily the weather and lighting conditions present at the time of the accident flight. GPS AGL (Above Ground Level) Height and Groundspeed are depicted for each data point. Green arrows indicate the direction of travel.

Figure 3 shows the entire accident session. The session began at West Houston Airport (IWS), Houston, Texas (TX) and the airplane proceeded in a generally southwestward direction. The airplane flew in the vicinity of Richmond, TX before proceeding towards Wharton Regional Airport (ARM), Wharton, TX, where multiple touch-and-go maneuvers were performed. The airplane departed ARM and proceeded in a northwestward direction towards Covey Trails Airport (X09), Richmond, TX, where the accident event occurred.

Figure 4 depicts approximately the final two minutes of the session, which includes the accident event. The reported wreckage location is marked with a red pin.

Figure 5 and Figure 6 are plots of the Avidyne IFD540 parameters. Figure 5 covers the entire accident session from 10:55:00 CDT to 12:40:00 CDT. Figure 6

focuses on the end of the accident event from 12:32:50 CDT to 12:35:30 CDT. The approximate time of impact was 12:35:03 CDT. After this time, the data shown in both plots may not be representative of the aircraft.

Figure 7 through Figure 9 are plots of the JPI EDM-900 parameters.

Figure 7 covers the entire accident session and the time shown is 10:55:00 CDT to 12:40:00 CDT.

Figure 8 covers the touch-and-go maneuvers at Wharton Regional Airport through the end of the session. The time shown is 12:03:00 CDT to 12:36:00 CDT.

Figure 9 covers the accident event near Covey Trails Airport. The time shown is 12:32:50 CDT to 12:35:05 CDT. Times and parameter values of interest are summarized below:

- From 12:33:44 CDT to 12:33:50 CDT:
 - Fuel flow went from 18.1 gph to 9.2 gph.
 - RPM went from 2663 to 2070.
 - MAP went from 29.7 inHg to 23.6 inHg.
- From 12:33:56 CDT to 12:34:02 CDT:
 - Fuel flow went from 7.6 gph to 1.3 gph.
 - RPM went from 2070 to 844.
 - MAP went from 22.6 in Hg to 18.9 inHg
- From 12:34:50 CDT to 12:34:56 CDT:
 - Fuel flow did not change from 1.3 gph.
 - RPM went from 774 to 742.
 - MAP went from 19.6 inHg to 19.8 inHg.

The corresponding tabular data used to create Figure 3 through Figure 6 are provided in electronic comma-separated value (CSV) format as attachment 1 to this report. The corresponding tabular data used to create Figure 7 through Figure 9 are provided in CSV format as attachment 2 to this report.

Submitted by:

Gerald Kawamoto
Recorder Specialist

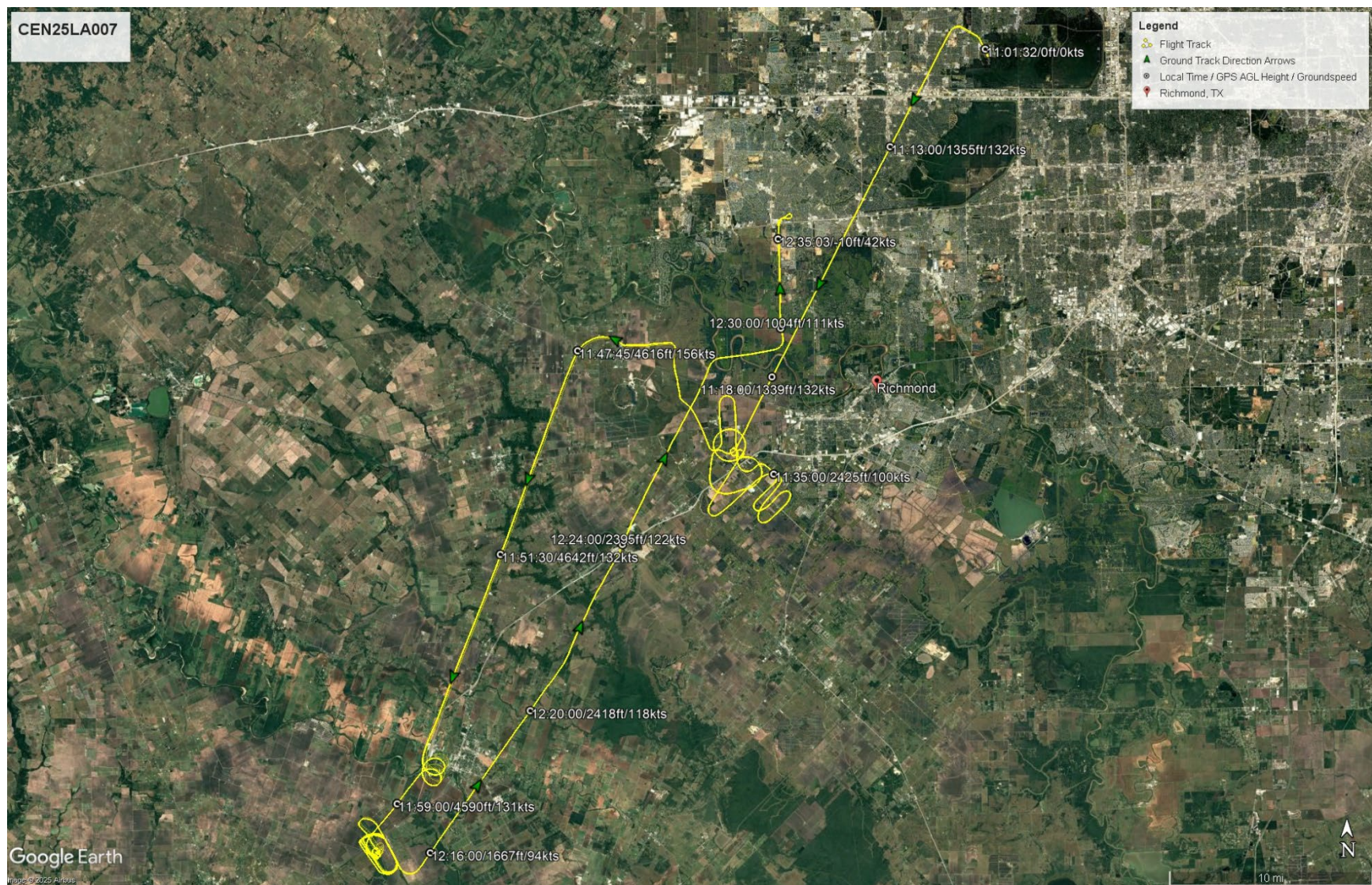


Figure 3. Google Earth overlay of the entire accident session.

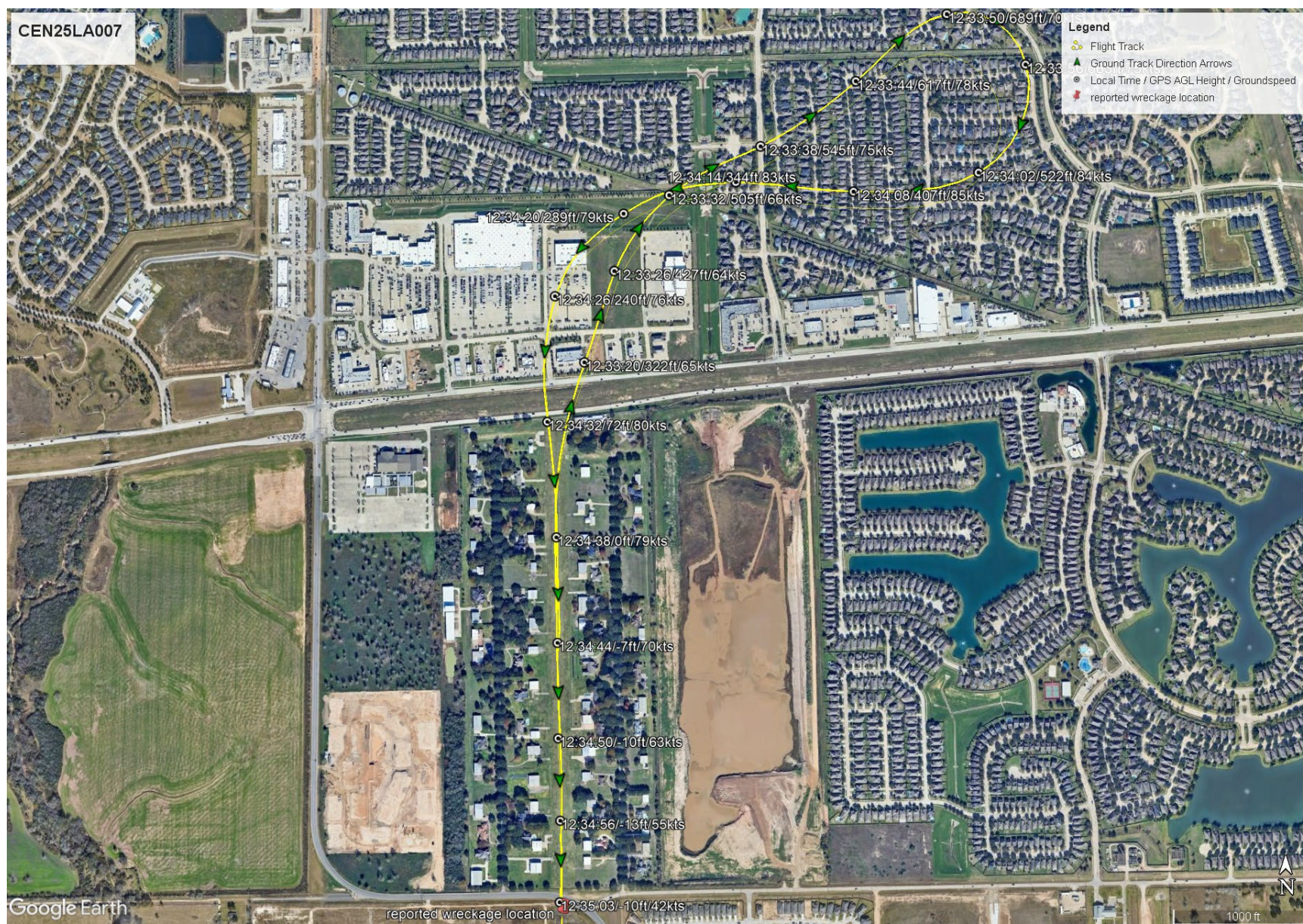


Figure 4. Google Earth overlay of approximately the final two minutes of the accident session.

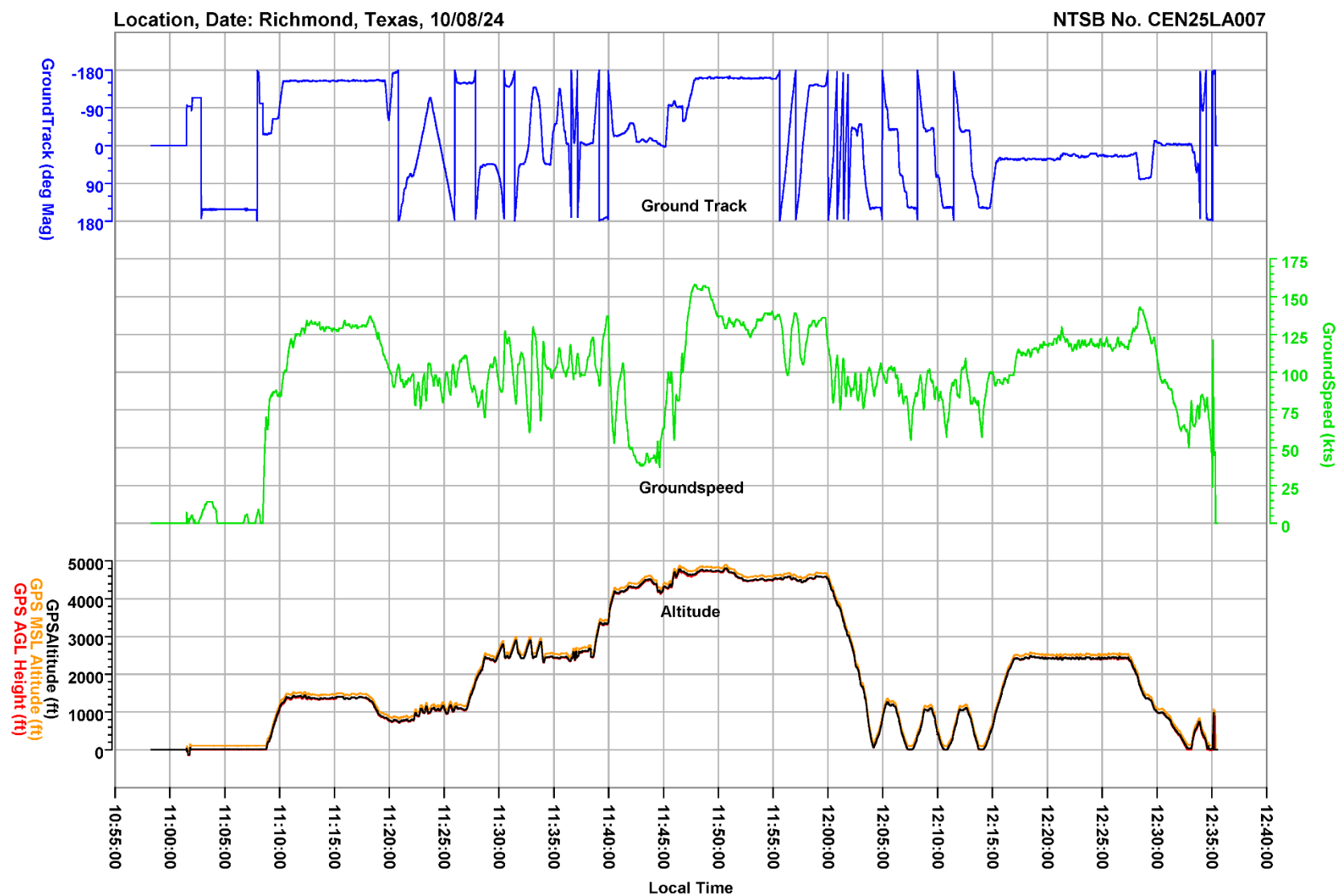


Figure 5. Plot of the Avidyne IFD540 parameters of the entire accident session.

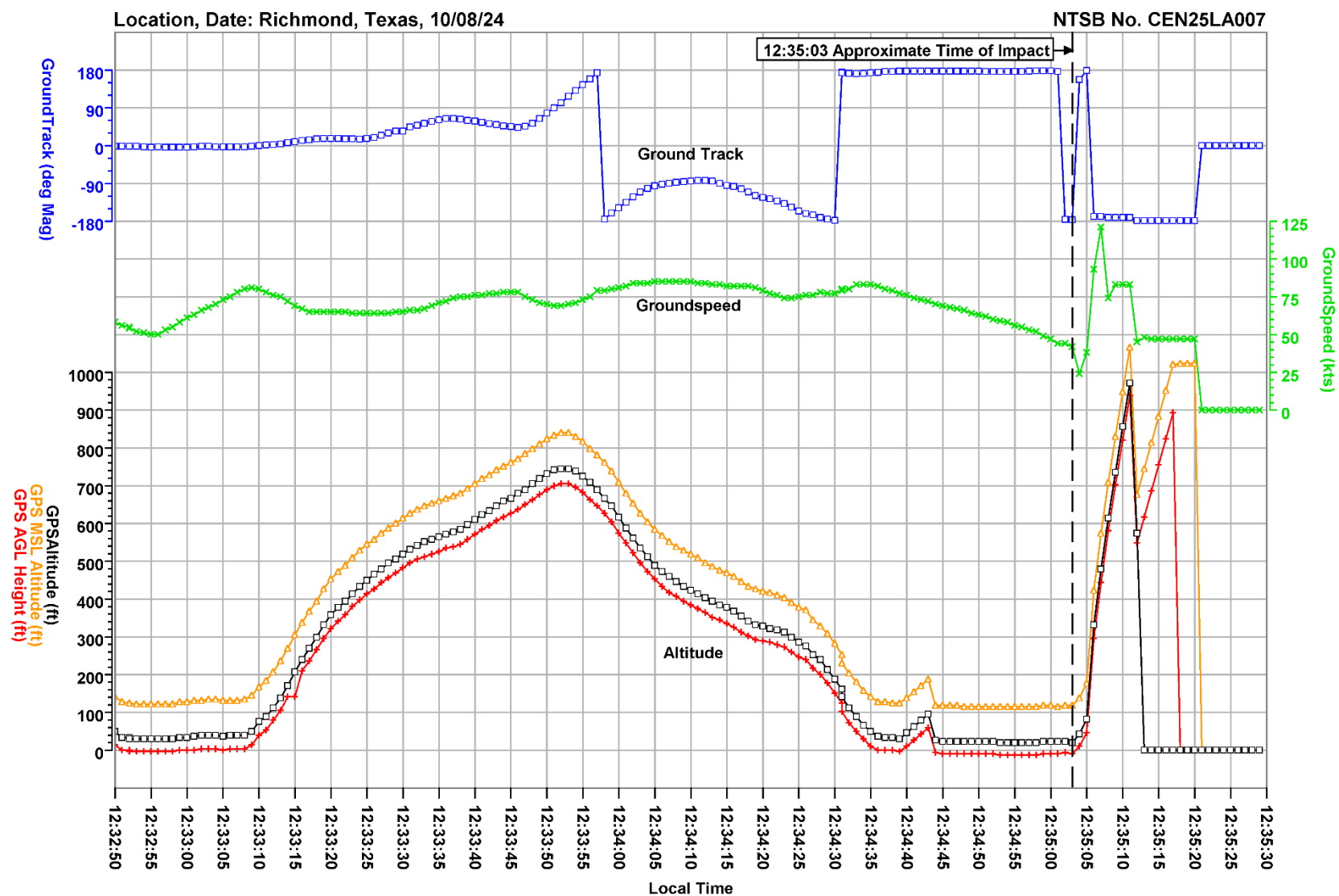


Figure 6. Plot of Avidyne IFD540 of approximately the final two minutes of the accident session.

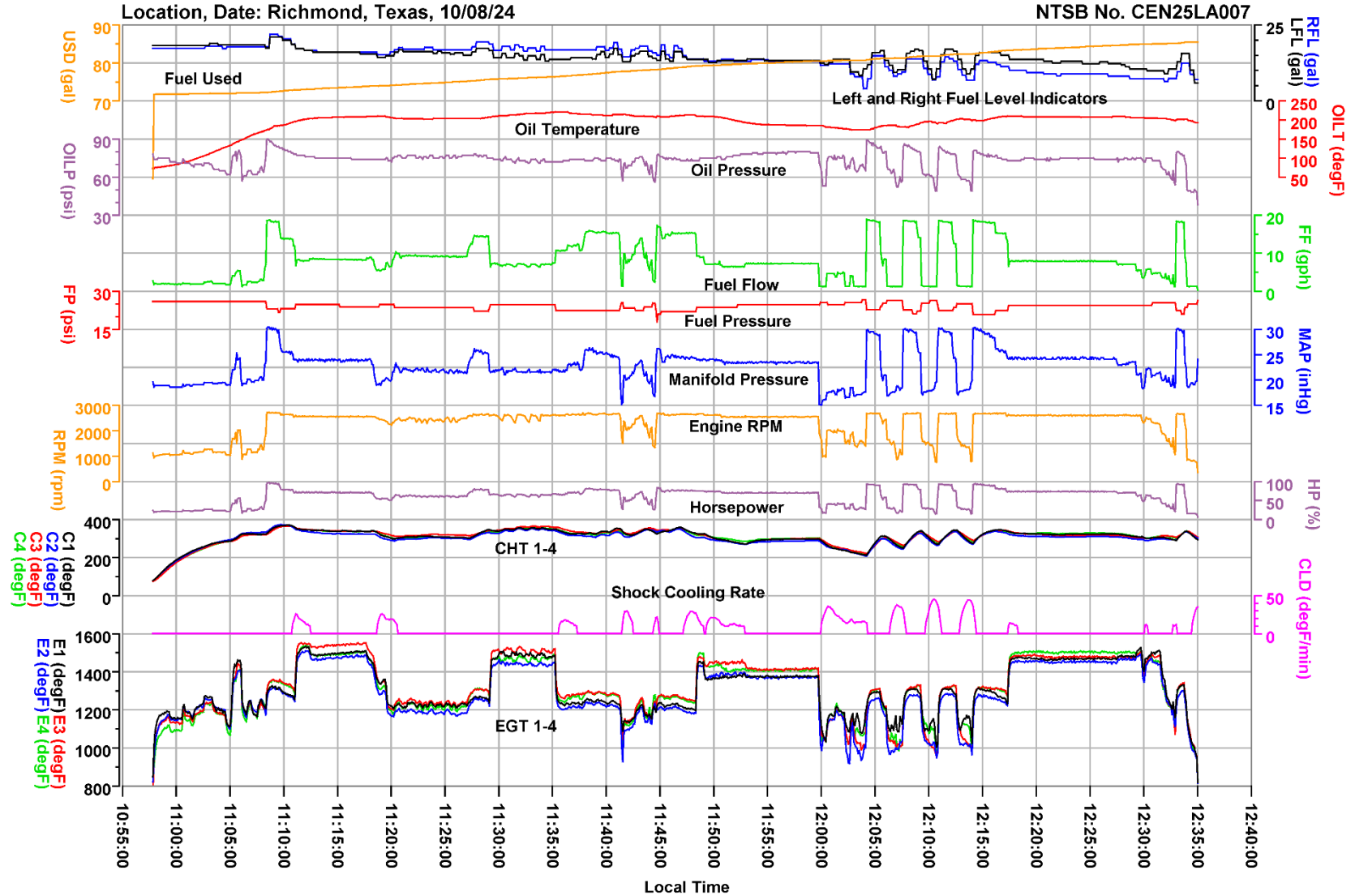


Figure 7. Plot of JPI EDM-900 parameters of the entire accident session.

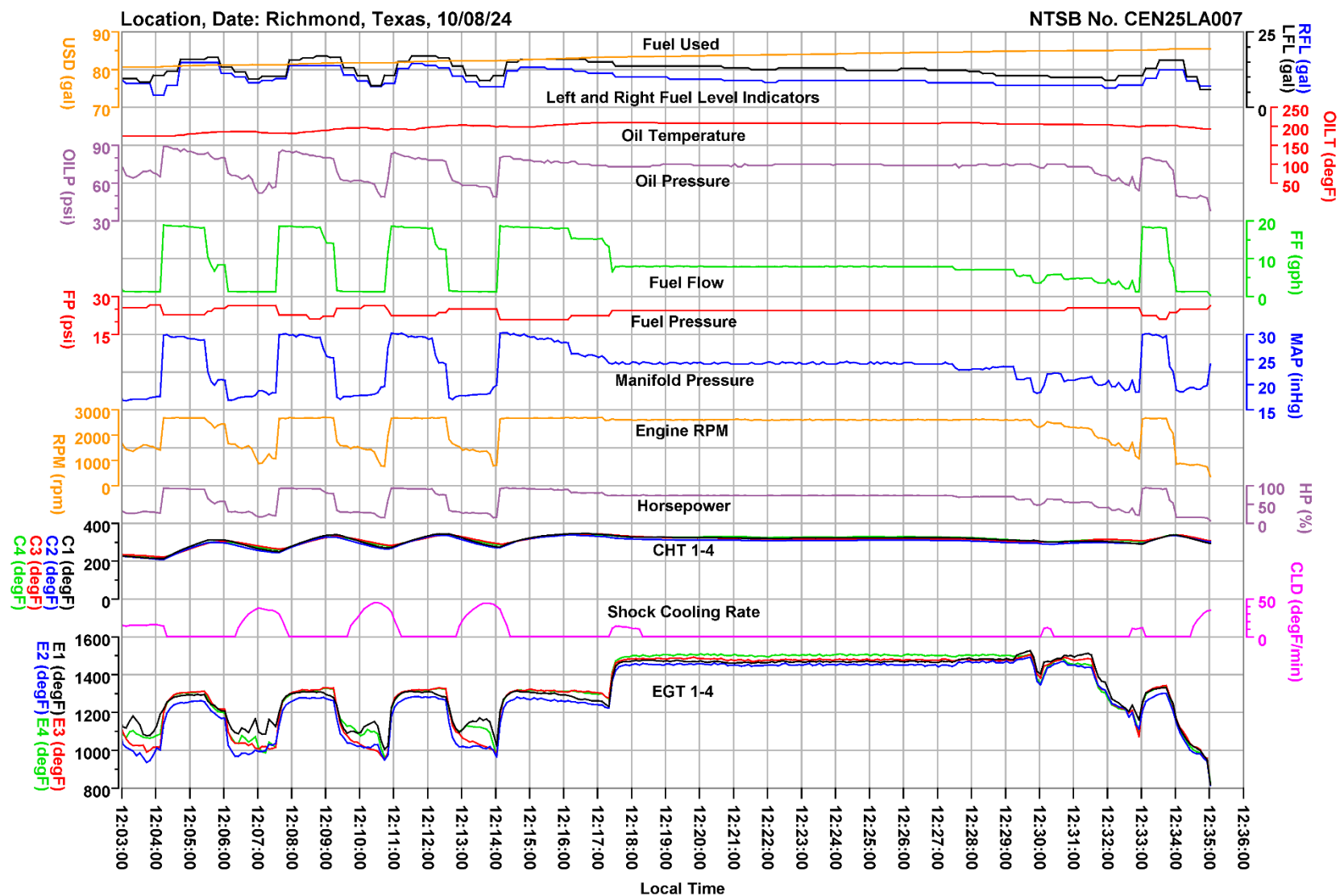


Figure 8. Plot of JPI EDM-900 parameters zoomed in on the previous touch-and-go maneuvers through the end of the session.

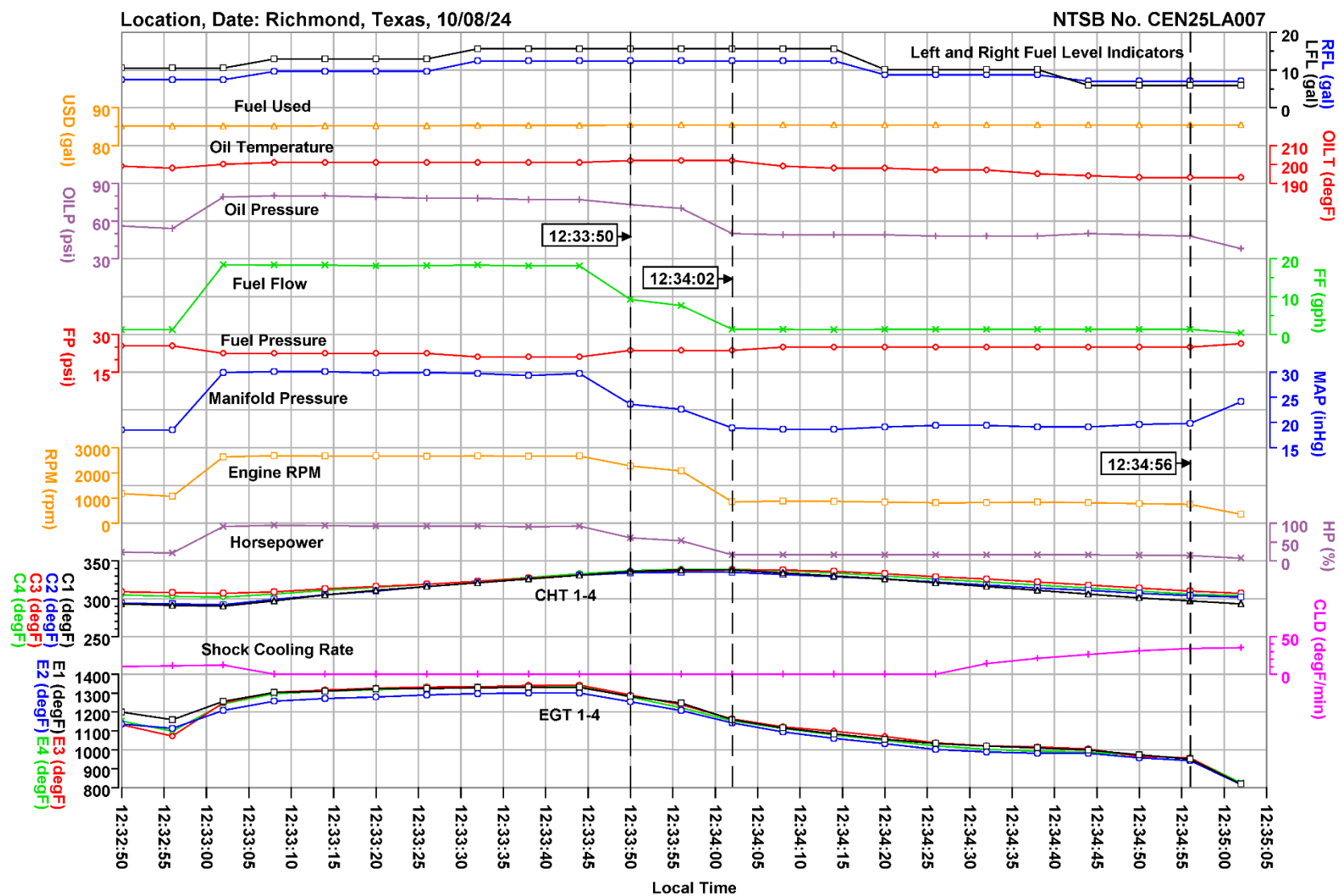


Figure 9. Plot of JPI EDM-900 parameters of approximately the final two minutes of the accident session.