

NATIONAL TRANSPORTATION SAFETY BOARD

Vehicle Recorder Division
Washington, D.C. 20594

November 23, 2021

Engine Monitoring Device

Specialist's Factual Report
By Sean Payne

1. EVENT

Location: Birch Creek, AK
Date: July 14, 2020
Aircraft: Air Tractor AT802A
Registration: N80166
Operator: Aero Spray Inc
NTSB Number: ANC20LA069

On July 14, 2020, about 1555 Alaska daylight time (AKD), an Air Tractor AT802A airplane, sustained substantial damage when it was involved in an accident near Birch Creek, Alaska. The commercial pilot and sole occupant was not injured. The airplane was operated as a Title 14 *Code of Federal Regulations* Part 137 firefighting flight.

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 devices:

Device 1: **Electronics International MVP-50T**
Device 1 Serial Number: **186174**

3.1. Electronics International MVP-50T Device Description

The Electronics International MVP-50T is a panel-mounted, color, electronic engine display allowing the operator to monitor and record parameters related to engine operations and user customizable parameters. Depending on the installation, parameters monitored may include: engine parameters, oil pressure and temperature, outside air temperature, engine revolutions per minute (RPM), fuel flow, fuel levels, and battery voltage and amperage. User customizable parameters may be defined by installation, examples include but are not limited to sensors for door states, annunciators, and flight control positions.

The unit contains non-volatile memory¹ (NVM) for data storage of the parameters recorded and calculated. The rate at which the data is stored is selectable by the operator. The recording function also records minimum and maximum values for each flight. The data is stored in

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

engineering units in comma separated value (.csv) format on an internal microSD card, using a Linux file system format. The data can be downloaded to a USB memory device via a USB port on the front of the unit or by removing the internal microSD card. Each set of recorded data is grouped by power cycle and identified by an MVP-50T assigned sequential flight number.

3.1.1. Electronics International MVP-50T Device Data Recovery

Upon arrival at the Vehicle Recorder Division, an initial examination revealed the unit had been relatively undamaged. The unit was powered on the bench as per the wiring diagram and booted. The unit was unable to dump flight data to a USB stick via the default manufacturer instructions. Instead, the unit was opened and the internal microSD card was extracted. The microSD card was found to be in good condition and was downloaded via commercially available data forensics software.



Figure 1. Condition of EI MVP-50T received by the Vehicle Recorders Division

3.1.2. Data Description & Time Correlation

The data extracted included a large number of sessions including the accident flight on July 14, 2020. Table 1 shows MVP-50T parameters that were validated and included in this report. Attachment 1 to this report is all of the data recorded from the MVP-50T. Only parameters included in this report were validated by the specialist.

The unit was set to record data at 3 Hz intervals. Each set of data was preceded with a timestamp. The timestamp was unable to be validated, and a time adjustment to AKD was calculated. The time adjustment from recorded time to AKD was -13,757 seconds. All data in this report is presented in AKD.

Table 1. MVP-50T Parameters

Parameter Abbreviation	Description
Fuel Flow	Fuel Flow, gph (gallons per hour)
Fuel L	Fuel in left tank, gal (gallons)
Fuel P	Fuel Pressure, psi (pounds per square inch)
Fuel R	Fuel in right tank, gal (gallons)
HP	Horsepower, HP (Horsepower)
ITT	Inter-turbine Temperature, degC (degrees Celsius)
MSTR_WRN	Master Warning (discrete (“warning” or blank))
NG	Gas Generator Speed, % (percent)
NP	Power Turbine Speed, RPM (rotations per minute)
Oil Press	Oil Pressure, psi (pounds per square inch)
Oil Temp	Oil Temperature, degF (degrees Fahrenheit)
PROP BETA	Propeller Lever beyond beta gate, Volts (Voltage)
Torque	Torque, ft-lbs (foot pounds)

4. PLOTS AND TABULAR DATA

The following four figures contain MVP-50T (EDM) data during the July 14, 2020, event.

The corresponding tabular data used to create these four figures are provided in electronic .csv format as attachment 1 to this report.

Figure 2 is a plot of the entire accident flight recording from the MVP-50T. The plotted time interval is between 13:00 AKD and 16:00 AKD.

Figure 3 is a plot of the last 15 minutes of the accident flight. The plotted time interval is between 15:40 AKD and 15:56 AKD.

Figure 4 is a plot of the last 5 minutes of the accident flight. The plotted time interval is between 15:50:00 AKD and 15:55:30 AKD.

Figure 5 is a plot of the approximate last minute of the accident flight. The plotted time interval is between 15:54:00 AKD and 15:55:20 AKD. Around 15:55:00, the PROP BETA parameter shows a change in voltage from 0 volts to approximately 27 volts. The aircraft manufacturer states that the PROP BETA parameter is a signal indicating when the propellor control had entered a beta state. There is no differentiation in voltage as to the magnitude of the lever motion. Any motion past the propellor beta gate will register as a near 27 volt reading.

Regarding the parameter “MSTR WRN” (Master Warning discrete parameter), the manufacturer of the aircraft was contacted about the conditions required to display a master warning alert. The manufacturer stated that the master warning light is triggered when one of the recording parameters enters the yellow or red arc range. The manufacturer uses configuration codes to set the yellow and red arcs based on the airplane’s configuration (airframe, engine, fuel tanks, etc.). The manufacturer stated that the configuration code that was installed in this engine monitoring unit was not one of the manufacturer’s factory codes. As such, the manufacturer could not determine which parameter conclusively triggered the master warning criteria. The float manufacturer was also contacted but did not provide any further information.

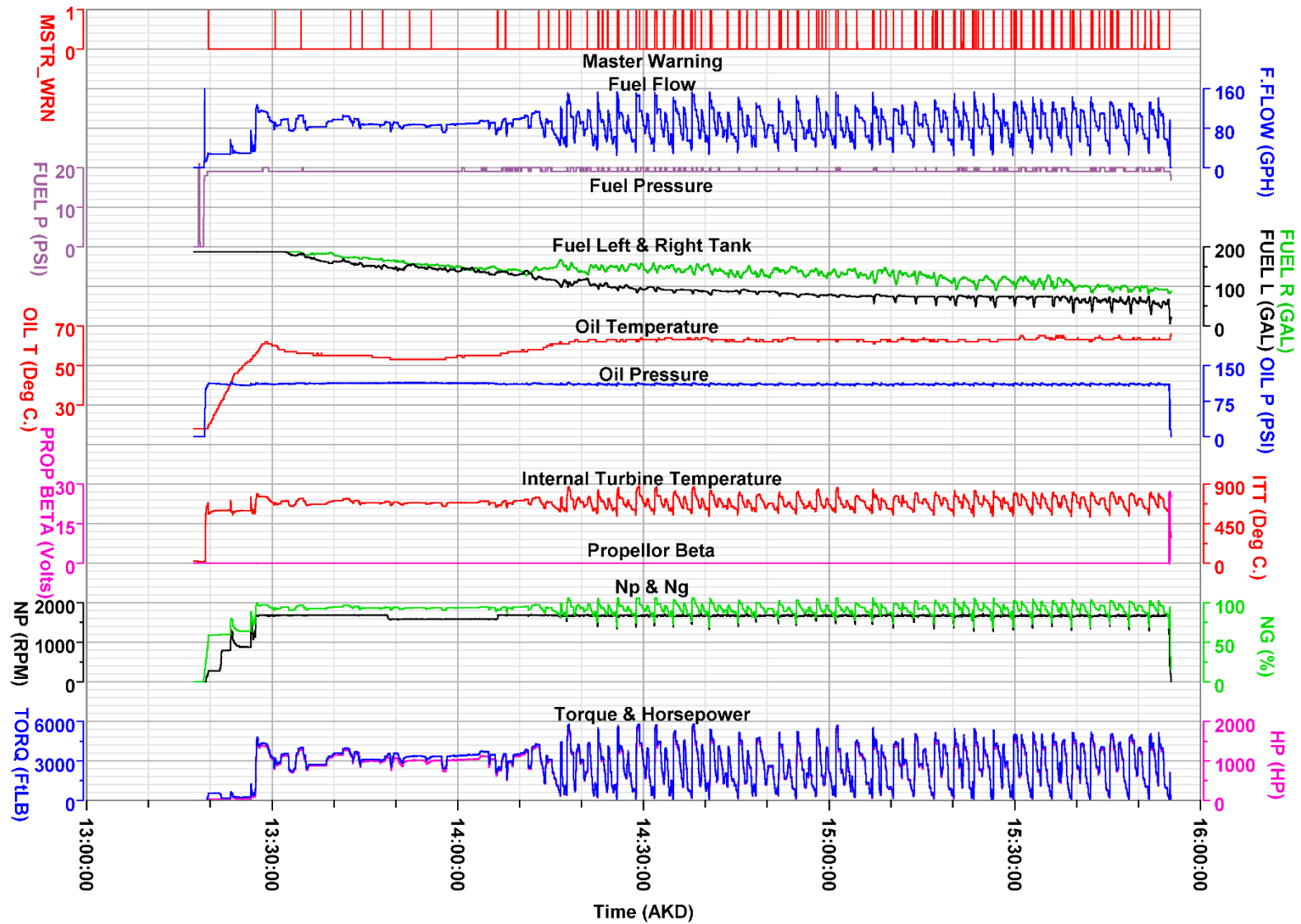


Figure 2. A plot of the entire accident flight recording form the MVP-50T. The plotted time interval is between 13:00 AKD and 16:00 AKD.

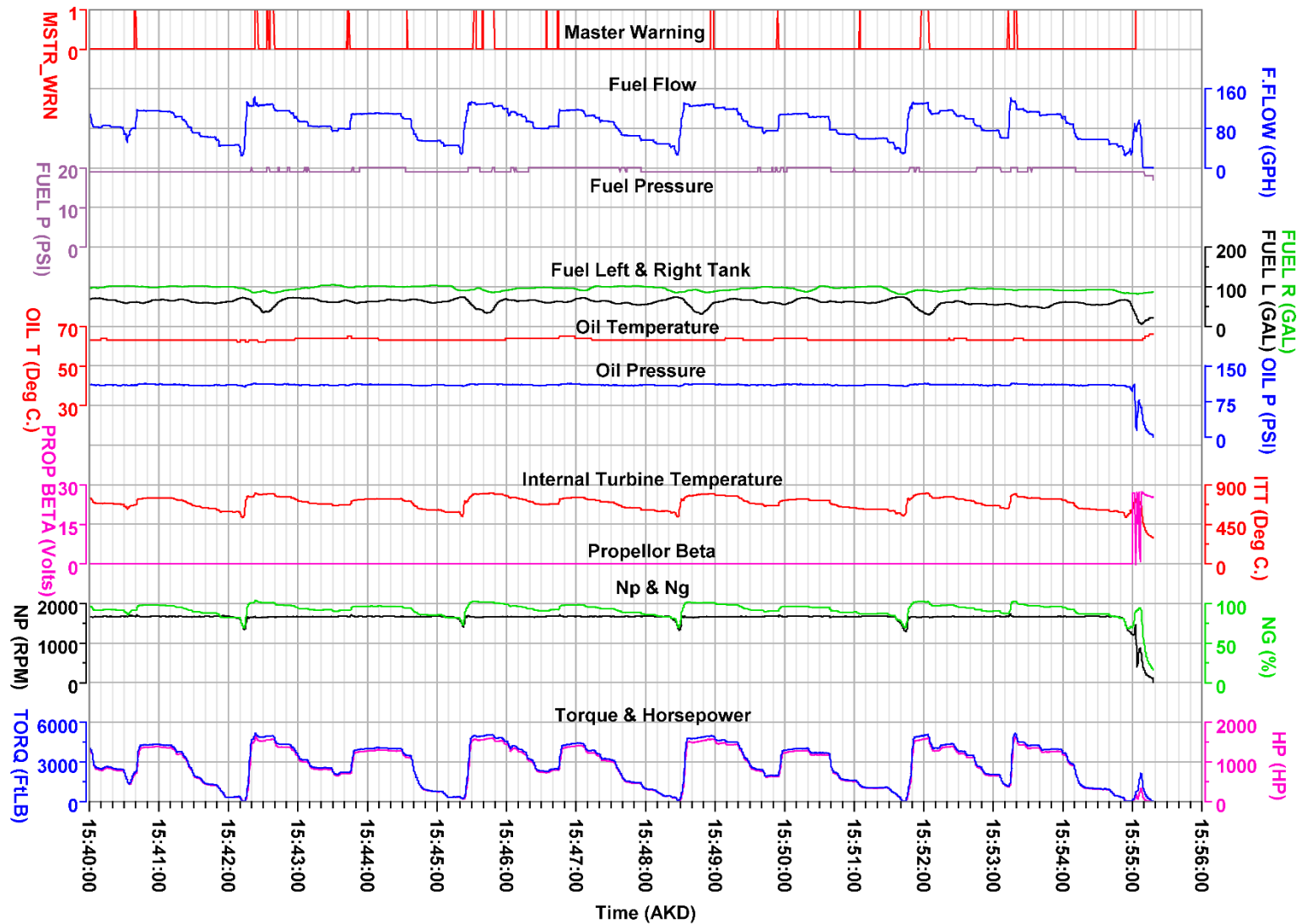


Figure 3. A plot of the last 15 minutes of the accident flight. The plotted time interval is between 15:40 AKD and 15:56 AKD.

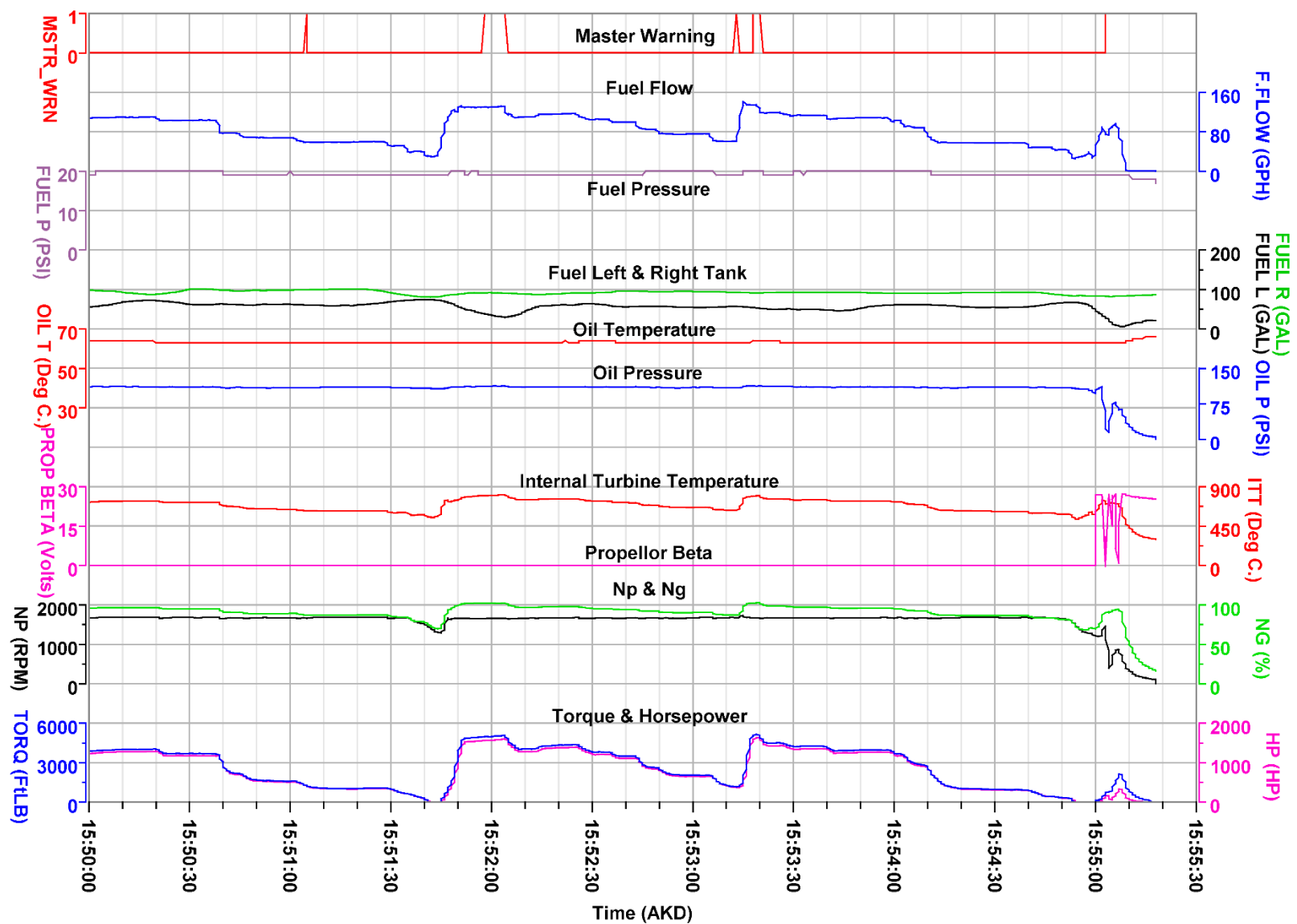


Figure 4. A plot of the last 5 minutes of the accident flight. The plotted time interval is between 15:50:00 AKD and 15:55:30 AKD.

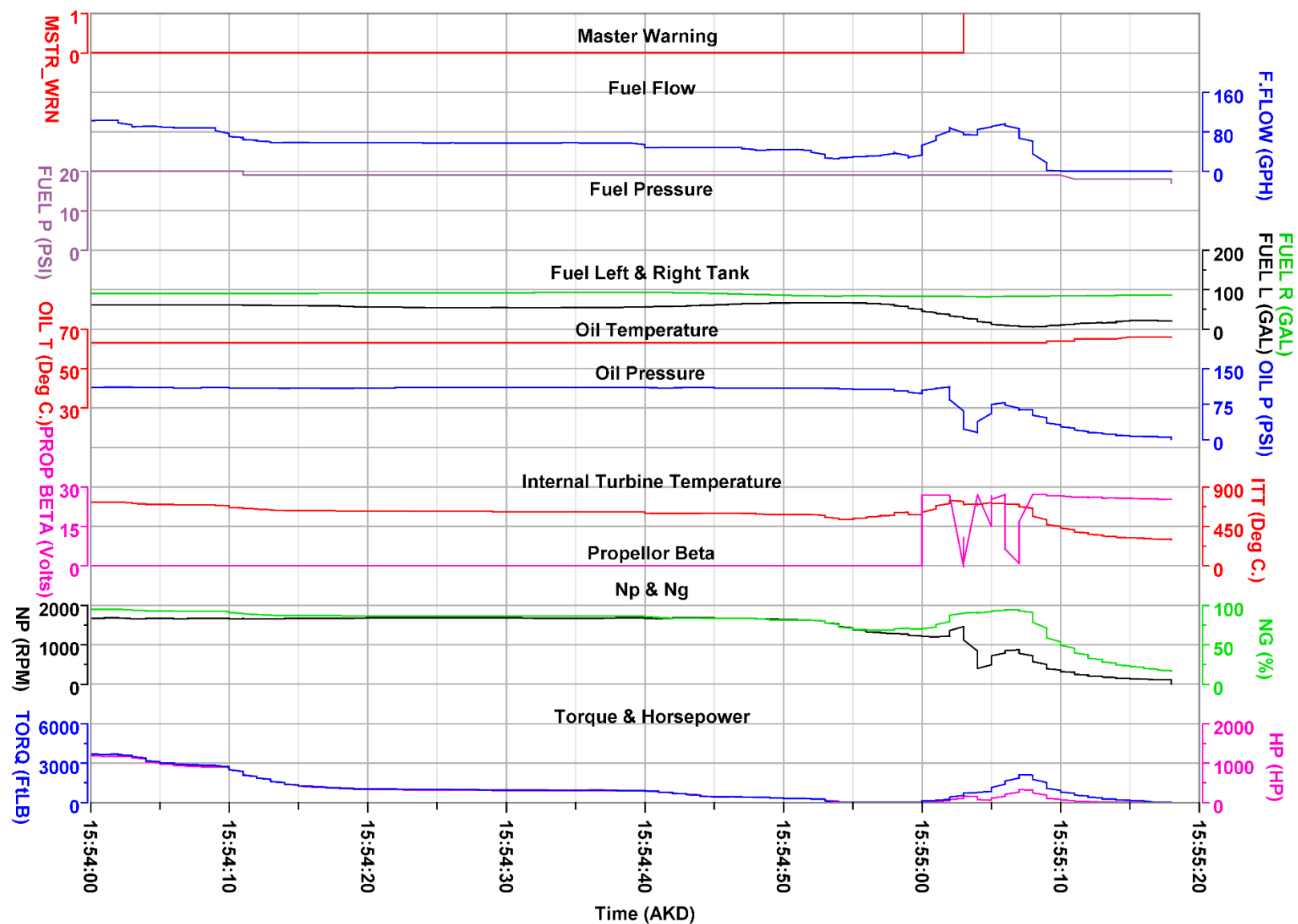


Figure 5. A plot of the approximate last minute of the accident flight. The plotted time interval is between 15:54:00 AKD and 15:55:20 AKD.