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

November 30, 2021

Electronic Devices

Specialist's Factual Report
by Nick Swann

1. EVENT

Location:	Del, Arkansas
Date:	August 21, 2020
Aircraft:	Air Tractor AT802
Registration:	N759FA
Operator:	Tesk Aviation LLC
NTSB Number:	CEN20LA357

2. DETAILS OF INVESTIGATION

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

Device 1:	**Garmin Aera 660**
Device 1 Serial Number:	**4NN103224**
Device 2:	**Electronics International MVP-50T**
Device 2 Serial Number:	**202173**

2.1. Garmin Aera 660 Device Description

The Garmin Aera 660 is a battery-powered portable multi-function display and GPS receiver with a sunlight readable 5-inch diagonal touch screen operation display. The unit includes a built-in Jeppesen database and can receive XM satellite radio for flight information including NEXRAD radar, lightning, METARs, TAFs, and TFRs. The unit can also perform and store weight and balance calculations. A built-in AOPA Airport Directory and Safe Taxi Airport Diagrams are included for selected fields. The unit stores date, route-of-flight, and flight-time information for up to 50 flights. The unit has 23 different map ranges available, from 200 feet to 800 nm. A flight record is triggered when groundspeed exceeds 30 knots and altitude exceeds 250 feet and ends when groundspeed drops below 30 knots for 10 minutes or more. A detailed track log – including latitude, longitude, date, time, and GPS altitude information – is stored within the unit whenever the receiver has a lock on the GPS navigation signal. Position is updated within the track log as a function of time or distance moved, depending on how the unit has been configured. Once the current track log memory becomes full, new information overwrites the oldest information or recording stops, depending on how the unit is configured. The current track log can be saved to long-term memory and 15 saved track logs can be maintained in

addition to the current track log. Track log storage may be activated or de-activated at user discretion. All recorded data is stored in non-volatile memory[1]. The unit contains hardware and software permitting the download of recorded waypoint, route, and track log information to a PC via built-in USB port. 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.

2.1.1. Garmin Aera 660 Data Recovery

Upon arrival at the Vehicle Recorder Division, the Aera 660 showed signs of impact damage as shown in Figure 1. The presence of loose components inside the device was used to make the determination that the memory chip would need to be removed in order to recover data from this device. The device was disassembled, and the memory chip was removed. However, chip level recovery was unsuccessful, and no data was recovered from this device.

Figure 1. Impact Damage to Garmin Aera 660.

2.2. 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, propeller revolutions per minute (RPM), fuel flow, fuel levels, and battery

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

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 memory 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 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.

2.2.1. Electronics International MVP-50T Data Recovery

Upon arrival at the Vehicle Recorder Laboratory, an exterior examination revealed the unit had sustained moderate impact damage as shown below in Figure 2. The device powered on normally and data was extracted according to the manufacturer's procedure.

Figure 2. Damage to MVP-50T.

## 2.2.2. Electronics International MVP-50T Data Description

The data extracted included 630 sessions between October 25, 2018, and August 21, 2020. The accident flight was the 630th session, recorded starting at 13:10:13.00 CDT and ending at 14:34:45.00 CDT on August 21, 2020 (14,114 total data points).

## 2.3. Plots and Tabular Data

The data used to create the following plots is included in attachment 1 to this report.

Figure 3 shows data on fuel and oil parameters for the duration of the recorded session and Figure 4 shows data at the end of the recording from the time period 14:20:00 to 14:34:45.
Figure 5 shows data on engine parameters for the duration of the recorded session and Figure 6 shows the same data for the end of the recording.
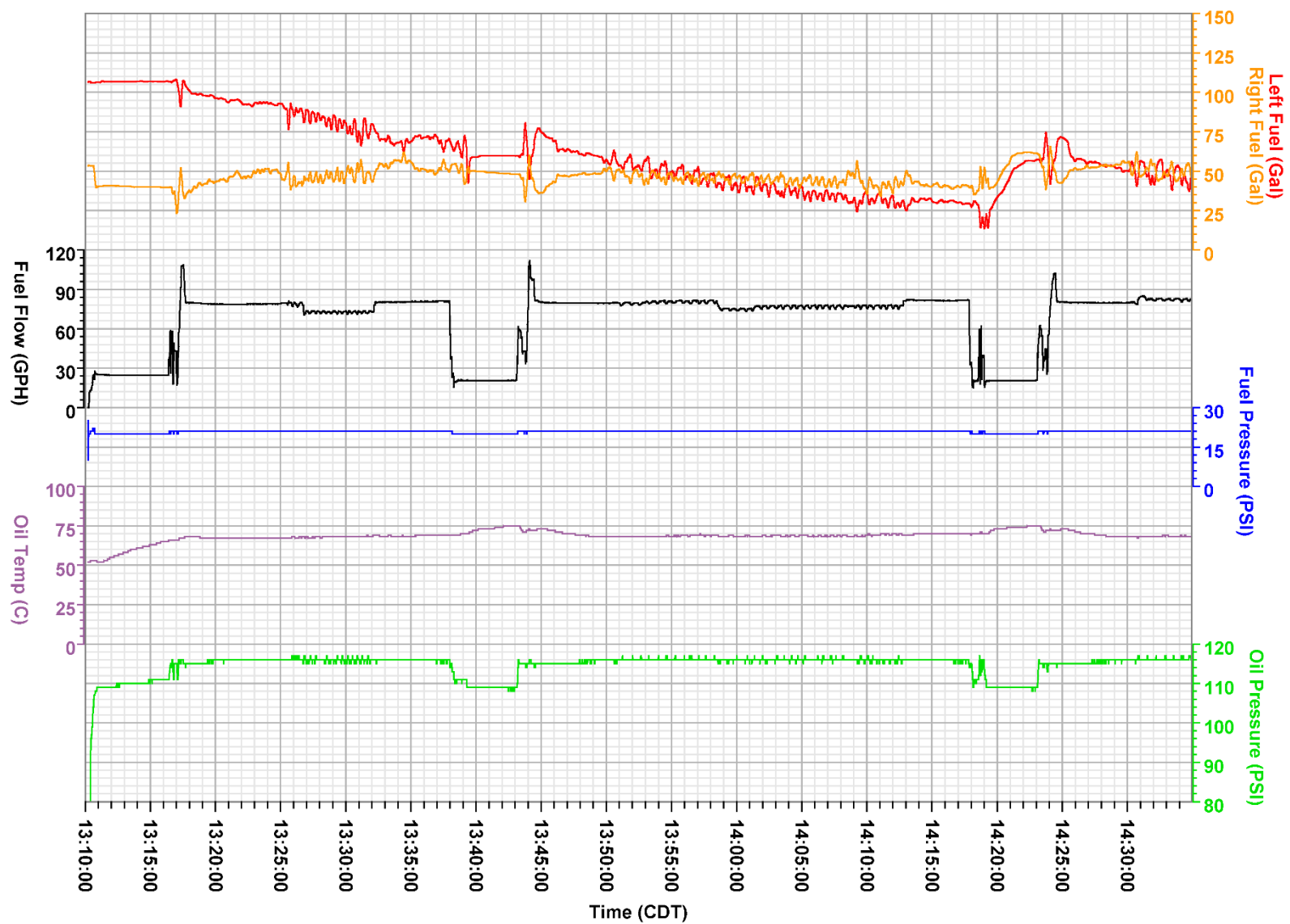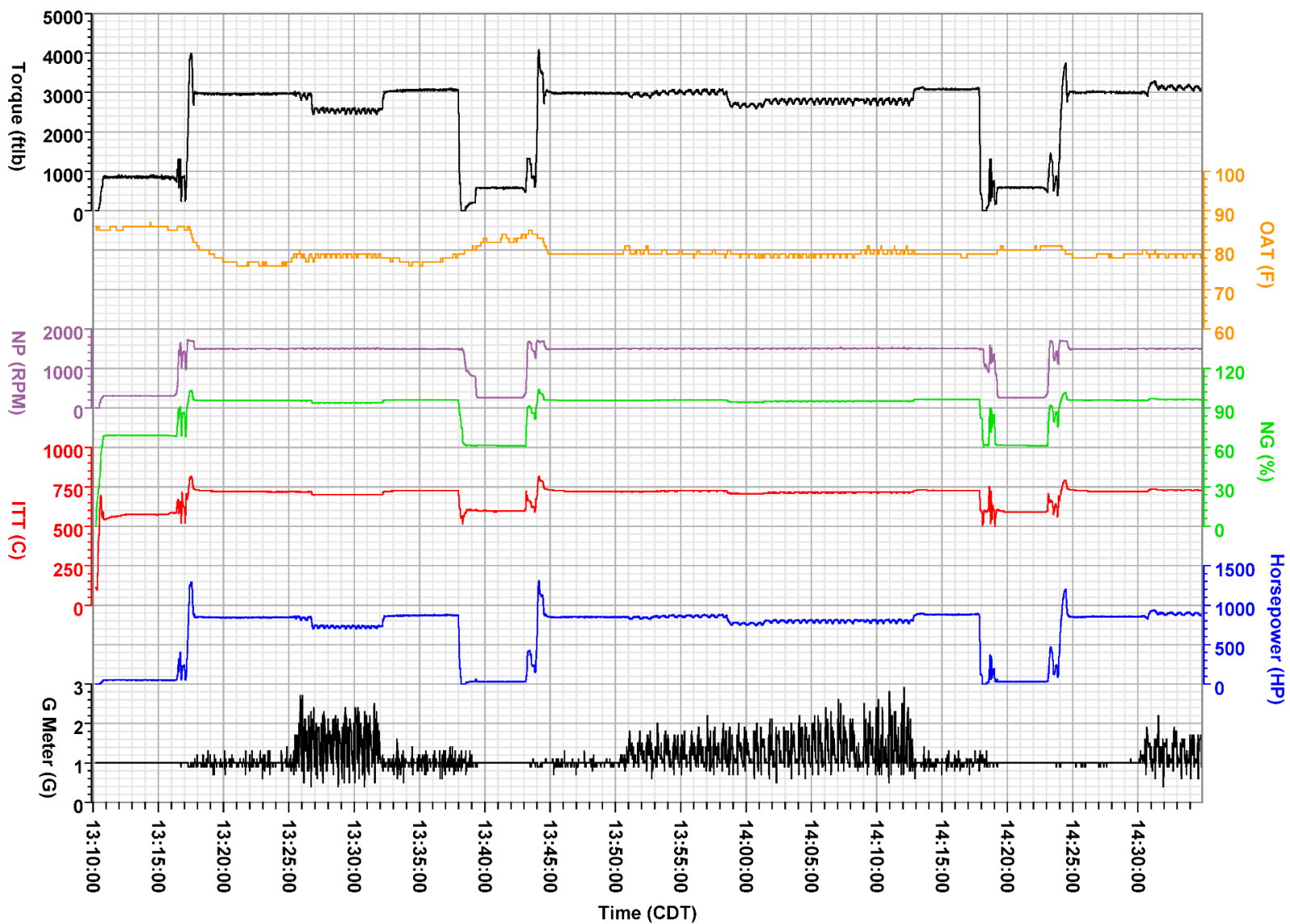
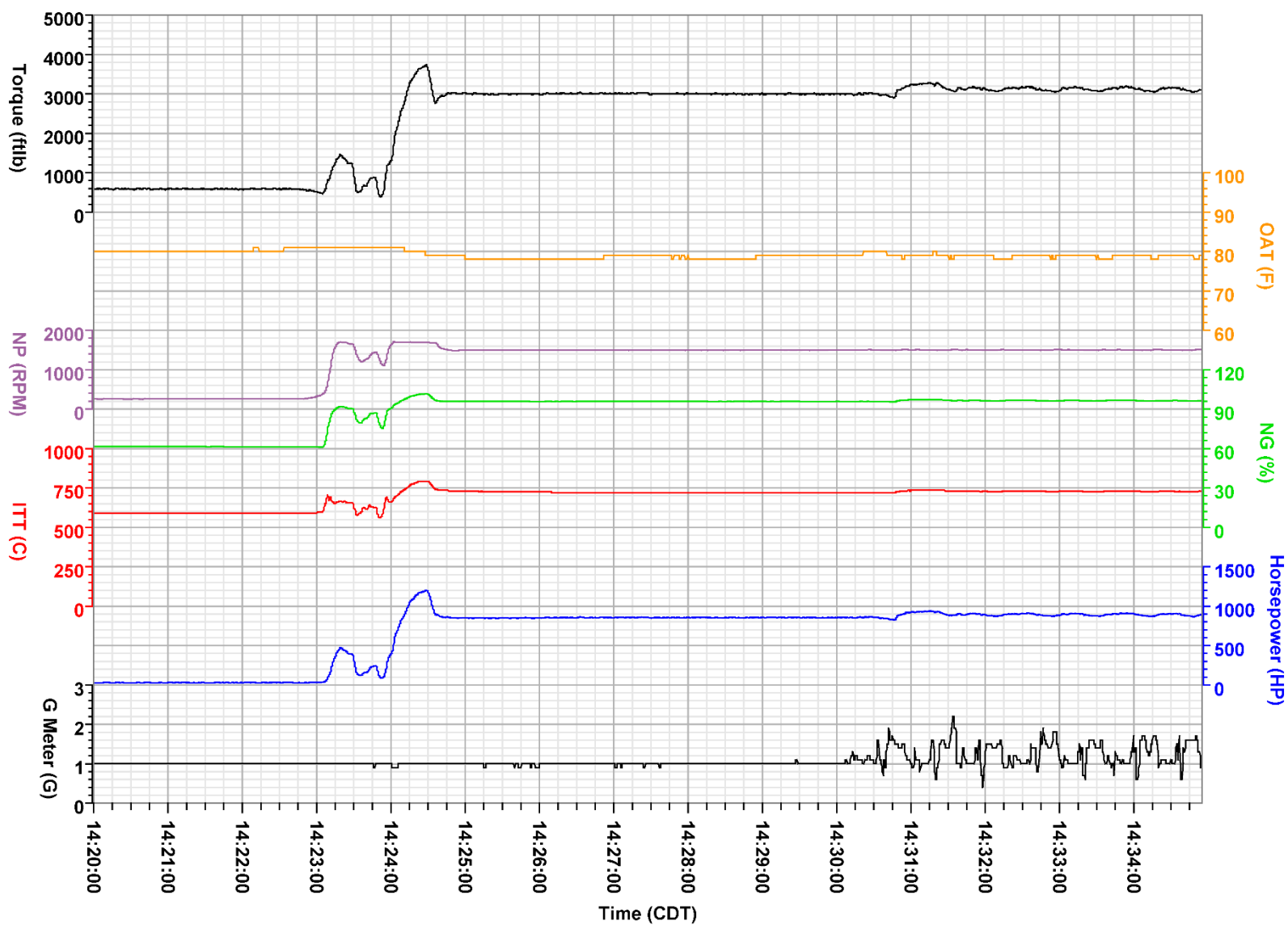**Figure 3.** An overview of parameters related to fuel and oil.
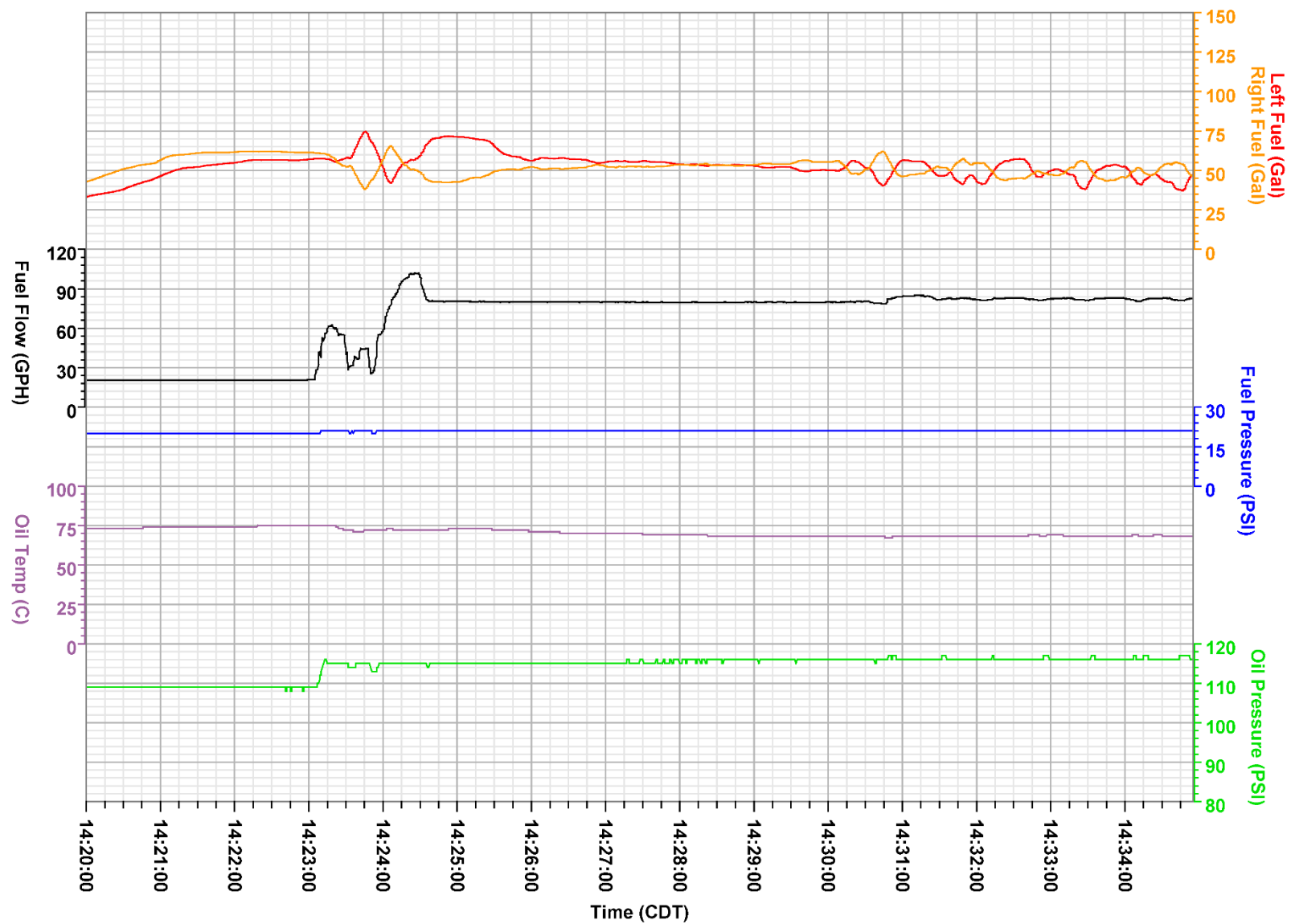
Figure 4. Fuel and oil parameters at the end of the recorded data.

Figure 5. An overview of engine parameters.

Figure 6. Engine parameters at the end of recorded data.