

National Transportation Safety Board

Office of Aviation Safety
Central Region



CEN24LA272

ENGINE MONITOR DATA SUMMARY

ACCIDENT

Date: July 17, 2024
Time: 1453 central daylight time (1953 UTC)
Location: Oakland, Nebraska
Airplane: Air Tractor AT-602
Registration: N622AW

ACCIDENT SYNOPSIS

On July 17, 2024, about 1453 central daylight time, an Air Tractor AT-602 airplane, N622AW, was substantially damaged when it was involved in an accident near Oakland, Nebraska. The pilot was not injured. The airplane was operated as a Title 14 *Code of Federal Regulations* Part 137 agricultural flight.

The pilot reported there was a loss of engine power while the airplane was in an aerial-application spray turn. The airplane's aft fuselage was substantially damaged during the subsequent forced landing in a cornfield.

ENGINE DATA SUMMARY

The airplane was equipped with an Electronics International MVP-50T engine data monitor, serial number 122345619. The airplane operator provided the NTSB and FAA with engine data that was recorded on the day of the accident (which included 4 agricultural flights). The supplied data set that was reviewed is included with the public docket materials associated with this NTSB investigation. No additional engine monitor data was reviewed during the investigation. The airplane's agricultural spray GPS system and associated light bar were not present and/or located with the wreckage during the wreckage examination.

The engine monitor's recorded time parameter was recorded in central standard time. However, to properly align with daylight savings, the engine monitor's recorded time parameter was adjusted (+1 hour).

An instantaneous fuel imbalance value was calculated for each row of data by subtracting the fuel level of the right-wing tank from the fuel level of the left-wing tank. Thus, a positive value for fuel imbalance indicated there was more fuel in the left-wing tank when compared to the right-wing tank. Similarly, a negative value for fuel imbalance indicated there was more fuel in the right-wing tank when compared to the left-wing tank. Smoothed parameter data was determined using a weighted running average.

A review of the airplane's engine monitor data revealed that the engine was started at 1343:13. At that time, the left- and right-wing fuel tanks contained 105 gallons and 75 gallons, respectively.

At 1348:40, the gas generator speed (Ng), propeller speed (Np), engine torque, and fuel flow increased to takeoff power levels. After takeoff, the initial 30-gallon fuel imbalance between the wing fuel tanks decreased to about 15 gallons while enroute to the field to be sprayed, as shown in figure 1. According to the Air Tractor AT-602 airplane flight manual (AFM), the wing fuel tanks are interconnected by a 2-gallon header tank and cannot be individually selected.

According to the recorded fuel level in each wing tank, as the pilot conducted aerial-application spray passes there was an overall decrease of fuel from the right-wing fuel tank and a minimal decrease of fuel from the left-wing fuel tank. About 57 minutes 27 seconds after engine startup, the fuel level in the right-wing fuel tank decreased below 11 gallons and engine monitor's master caution parameter activated, as shown in figure 2. The master warning parameter can be activated by several factors; however, at that time the recorded fuel level in the right-wing tank (less than 11 gallons) was the only parameter that would have activated the master caution. Similarly, the AT-602 AFM states that the low fuel warning light in the cockpit illuminates when either fuel tank contains less than 11 gallons. About 24 seconds after the master caution parameter activated, the recorded fuel level in the right tank increased above 11 gallons and the master caution parameter reverted to an inactive status.

Over the next 3 minutes 23 seconds, the engine monitor's master caution parameter cycled active/inactive two additional times before the level of fuel in the right tank remained less than 11 gallons and the master caution parameter remained activated for remainder of the recorded data.

At 1 hour 3 minutes 29 seconds after engine startup, the fuel level of the right-wing tank decreased to 0 gallons. About 6 minutes later, at 1452:53, the engine monitor recorded a sudden loss of fuel flow and corresponding loss of engine power. During the 70 seconds before the loss of engine power, the fuel level of the right-wing tank fluctuated between 0 gallons and 3.8 gallons. According to the airplane owner's manual, the fuel tank sender units do not sense the last 2 gallons in either wing tank. Additionally, the 2 gallons of fuel contained in the header tank are also not indicated.

The loss of engine power occurred 1 hour 9 minutes 39 seconds after the engine startup. About 15 seconds later, at 1453:07, the engine monitor ceased recording data. At the end of the recorded data, the recorded fuel level of the left- and right-wing tanks were 79.8 gallons and 2.5 gallons, respectively.

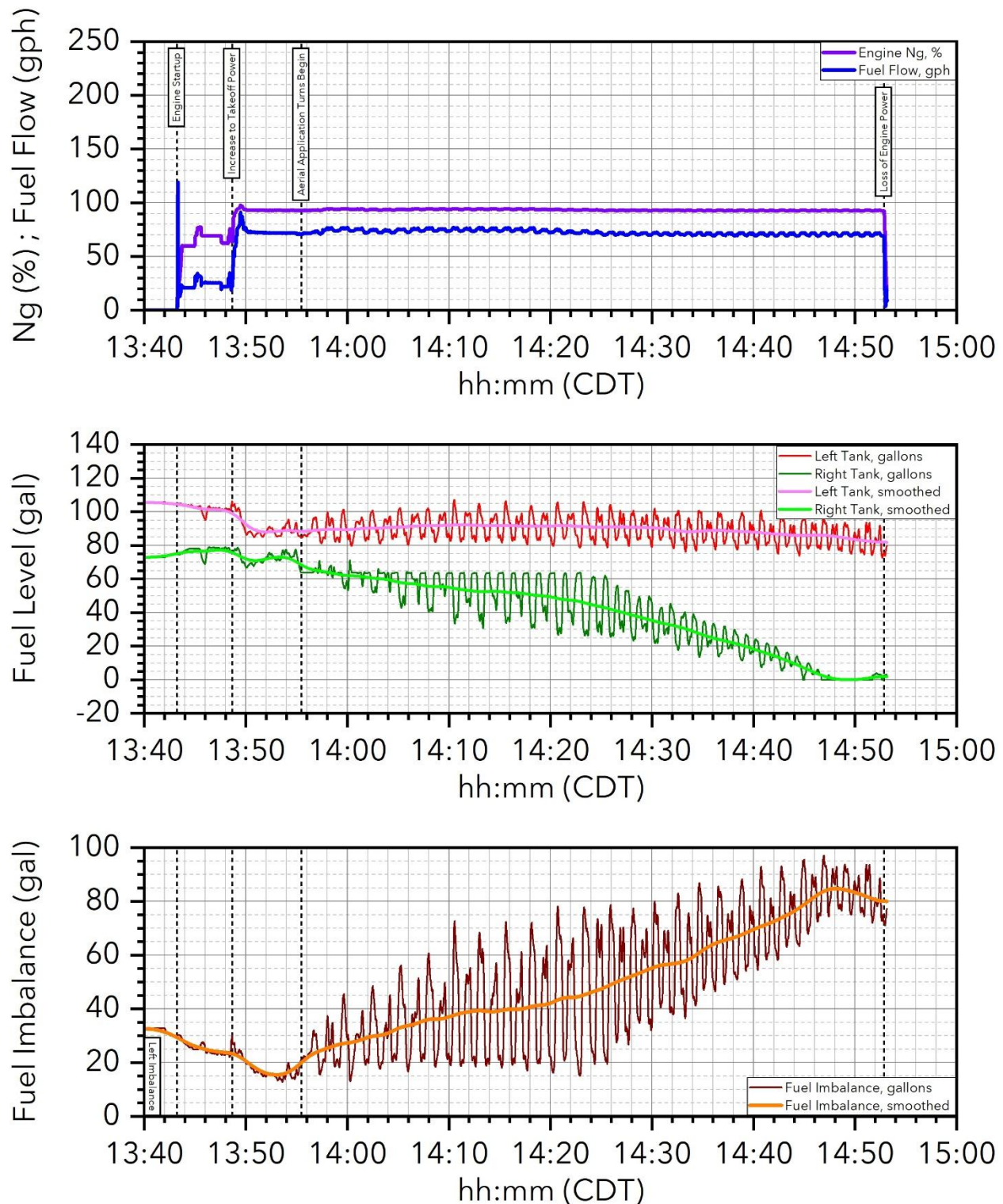


Figure 1. Plot of engine gas generator speed, fuel flow, fuel tank levels, and fuel imbalance for the entire flight.

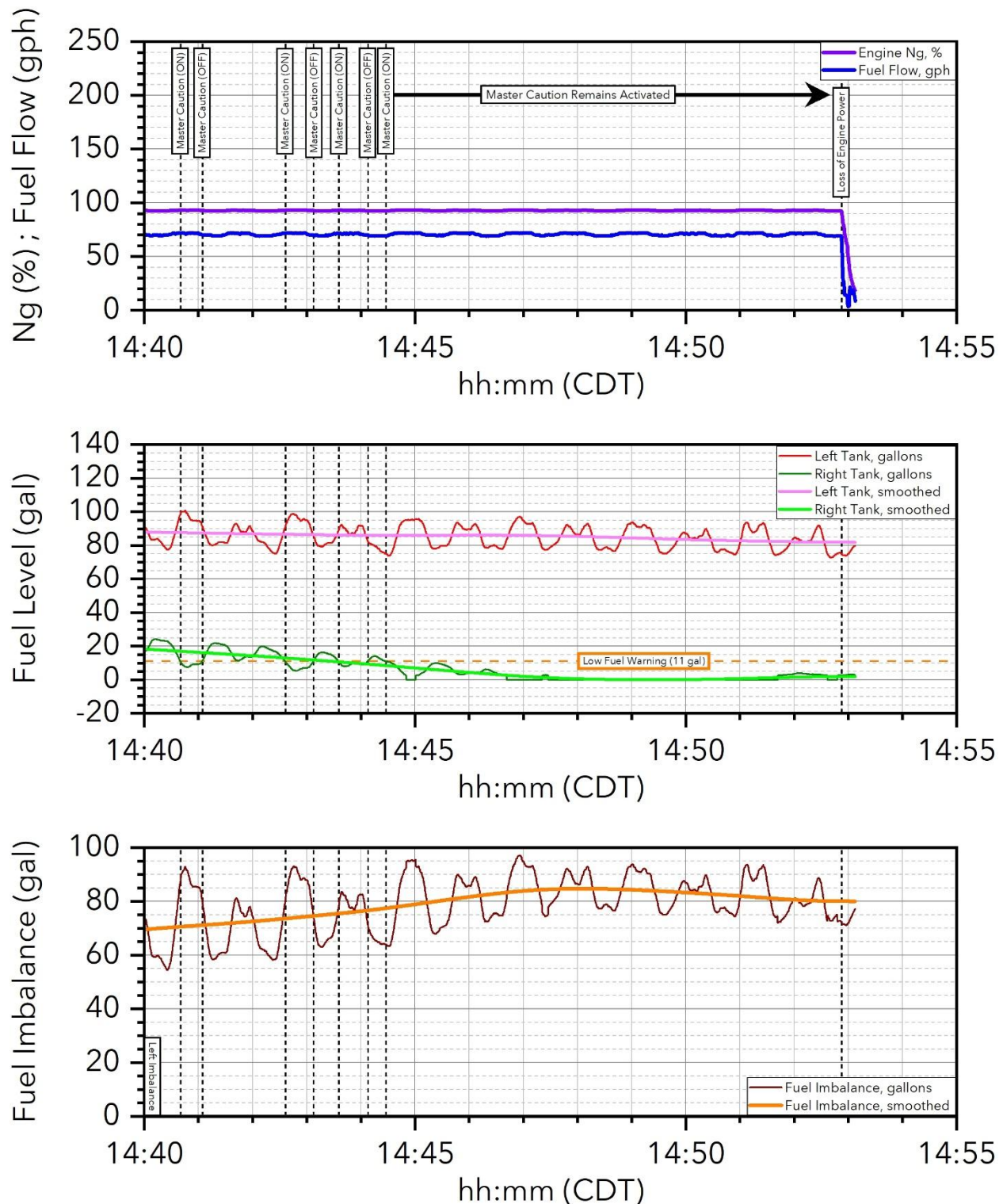


Figure 2. Plot of engine gas generator speed, fuel flow, fuel tank levels, and fuel imbalance at the end of the flight.

Additional review of the engine monitor data revealed a history of fuel imbalance during the previous 3 flights flown on the day of the accident. During these previous flights, the recorded fuel level in each tank would fluctuate at least ± 10 gallons during each spray pass. However, unlike the accident flight, after an initial decrease in fuel level from either the right- or left-wing fuel tank there was a recorded increase in fuel level to that same fuel tank, as shown in figure 3. This recorded increase in fuel level in a tank was observed in both the left- and right-wing fuel tanks during separate portions of the previous 3 flights that were reviewed.

Particularly, when one wing fuel tank recorded a decrease in fuel level the opposite wing fuel tank either yielded a minimal decrease or a net increase in fuel level as the flight progressed. This nonuniform depletion of fuel from each fuel tank was primarily observed while the pilot conducted aerial-application spray passes. There were other portions of the flight, likely as the pilot flew to/from a field, where any fuel imbalance trended toward a more balanced fuel load.

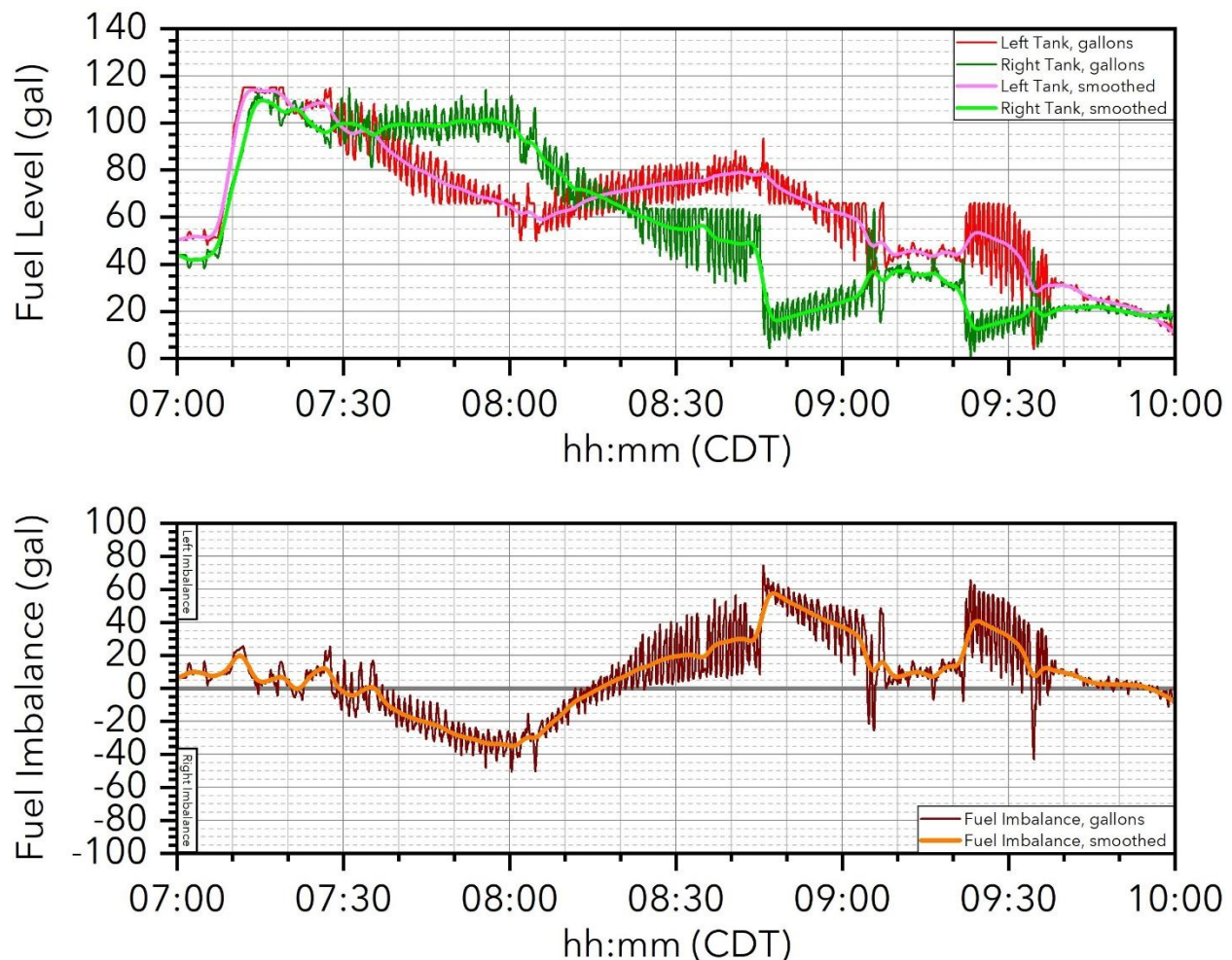


Figure 3. Plot of fuel tank levels and fuel imbalance during a previous flight.