National Transportation Safety Board
Office of Research and Engineering
Washington, DC 20594

ERA24LA279

COCKPIT DISPLAY - RECORDED FLIGHT DATA

Specialist's Factual Report

December 12, 2024

TABLE OF CONTENTS

A. ACCIDENT

Location: DeLand, FL
Date: June 26, 2024
Time: 1449 eastern daylight time (EDT)
Airplane: Aventura II, private operator, N727TK

B. COCKPIT DISPLAY - RECORDED FLIGHT DATA SPECIALIST

Specialist: Tatum Butler
Recorder Specialist
National Transportation Safety Board (NTSB)

C. DETAILS OF THE INVESTIGATION

A cockpit display - recorded flight data group was not convened.

The NTSB Vehicle Recorder Division received the following electronic device:

Recorder Manufacturer/Model: Garmin GDU 450
Recorder Serial Number: 34V000605

1.0 Garmin GDU 450 Description

The Garmin GDU 450 is a panel-mounted GPS receiver with 7-inch color liquid crystal (LCD) landscape display. It is a variant of the Garmin G3X Touch series. The Garmin G3X series employ a touch-screen user interface and can be utilized as a primary flight display (PFD), multi-function display (MFD), engine monitoring device, or a combination of all, depending on how the unit is integrated with other compatible avionics products. The unit is capable of recording data via an externally mounted SD card under the center of the screen, or internally on a series of non-volatile memory chips.[1]

If not disabled, the unit is capable of logging historical information at a variable rate of up to 10 Hertz (Hz) to the internal NVM. Historical logs may be copied to a standard SD card inserted into the slot found on the front of the unit while in configuration mode. Data is exported in engineering units, in a comma-separated value (CSV) format. Each record contains coordinated universal time (UTC) date and time, as well as an integer number of milliseconds since the unit was last powered.

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

1.1 Garmin GDU 450 Data Recovery

The Garmin GDU 450 was in good condition as shown in Figure 1. The device powered on normally and the data were downloaded using the manufacturer's procedure.

Figure 1. Front and back of Garmin GDU 450 as received.

1.2 Garmin GDU 450 Recording Description

The recovered data included sessions recorded from February 19, 2023, to June 26, 2024. The last session, recorded on June 26, 2024, was determined to be the recording of the accident flight. The GPS data from this session matched the expected start and end locations of the accident flight. Two previous flights of interest were also identified, occurring on June 22, 2024, and May 17, 2024. The data sample rate varied around twice per second.

The times for the accident flight and previous flights were converted to EDT, the local time of the accident, from the Power Timestamp parameter representing the integer number of milliseconds since the device was last powered, and the UTC time associated with that timestamp. With the Power Timestamp converted to seconds and applying a 4-hour offset to change UTC to EDT, the time offset for the event flight data from the Power Timestamp to EDT is the following: EDT = Power Timestamp (sec) + 53391.75. Similarly, for the flight on June 22, 2024, and May 17, 2024, the offset from the Power Timestamp to EDT is the following: EDT = Power Timestamp (sec) + 74278.8125 and EDT = Power Timestamp (sec) + 31525.25, respectively. Therefore, for the rest of this report, all times are referenced as EDT.

Table 1 lists the verified GDU 450 parameters provided in this report.

Table 1. Verified and provided parameters.

Parameter Name	Parameter Description
Fuel Press (PSI)	Fuel Pressure (pounds per square inch)
Fuel Qty (gal)	Fuel Quantity (gallons)
GPS Altitude (ft)	GPS Altitude (feet)
GPS Ground Speed (kt)	GPS Ground Speed (knots)
Lateral Accel (G)	Lateral Acceleration (G's)
Latitude (deg)	Latitude (degrees)
Longitude (deg)	Longitude (degrees)
Longitudinal Accel (G)	Longitudinal Acceleration (G's)
Manifold Press (inch Hg)	Manifold Pressure (inches of Mercury)
Normal Accel (G)	Normal Acceleration (G's)
Oil Press (PSI)	Oil Pressure (pounds per square inch)
Oil Temp (deg F)	Oil Temperature (degrees Fahrenheit)
Pitch (deg)	Pitch (degrees)
Power Timestamp (msec)	Timestamp since Powered On (milliseconds)
Pressure Altitude (ft)	Pressure Altitude (feet)
Roll (deg)	Roll (degrees)
RPM (RPM)	Engine Revolutions Per Minute
True Airspeed (kt)	True Airspeed (knots)
UTC Date (yyyy-mm-dd)	UTC Date (year-month-date)
UTC Hours (hh)	UTC Hours (hours)
UTC Mins (mm)	UTC Minutes (minutes)
UTC Secs (ss)	UTC Seconds (seconds)
Volts (V)	Volts

D. FIGURES AND TABULAR DATA

Figure 2 is a Google Earth overlay of the flight track for the entire accident recording. Each point indicates the GPS Altitude and GPS Ground Speed associated with the coordinates. Note that depicted weather and lighting conditions shown in the figure are not necessarily consistent with that of the day of the event. The appearance of the flight track may not be representative of the airplane's actual flight track and may be attributed to the update rate of GPS parameters as well as the software encoding of the GPS input to the device.

Plots were made for the accident flight along with two previous flights recorded on the GDU 450. Figure 3 through Figure 5 are plots of recorded engine parameters and basic flight parameters for each of these flights. 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.

All the parameters listed in Table 1 are plotted except Latitude, Longitude, Power Timestamp, UTC Date, UTC Hours, UTC Mins, and UTC Secs.

Figure 3 is a plot of recorded engine parameters and basic flight parameters for the entire accident flight on June 26, 2024. The time displayed is 14:56:00 to 14:58:40 EDT.

Figure 4 is a plot of recorded engine parameters and basic flight parameters for the first previous flight, occurring on June 22, 2024. The time displayed is 20:42:40 to 20:46:40 EDT.

Figure 5 is a plot of recorded engine parameters and basic flight parameters for the second previous flight, occurring on May 17, 2024. The time displayed is 08:55:00 to 09:04:00 EDT.

The corresponding tabular data used to create Figure 2 and Figure 3. Plot of recorded engine parameters and basic flight parameters for the entire accident flight on June 26, 2024.Figure 3 are provided in electronic comma-separated value (CSV) format as attachment 1 to this report. Additionally, the corresponding tabular data used to create Figure 4 and Figure 5 are provided in electronic CSV format as attachments 2 and 3 to this report respectively.

Submitted by:

Tatum Butler
Aerospace Engineer (Recorder Specialist)

Figure 2. Google Earth overlay of the entire accident flight track on June 26, 2024.

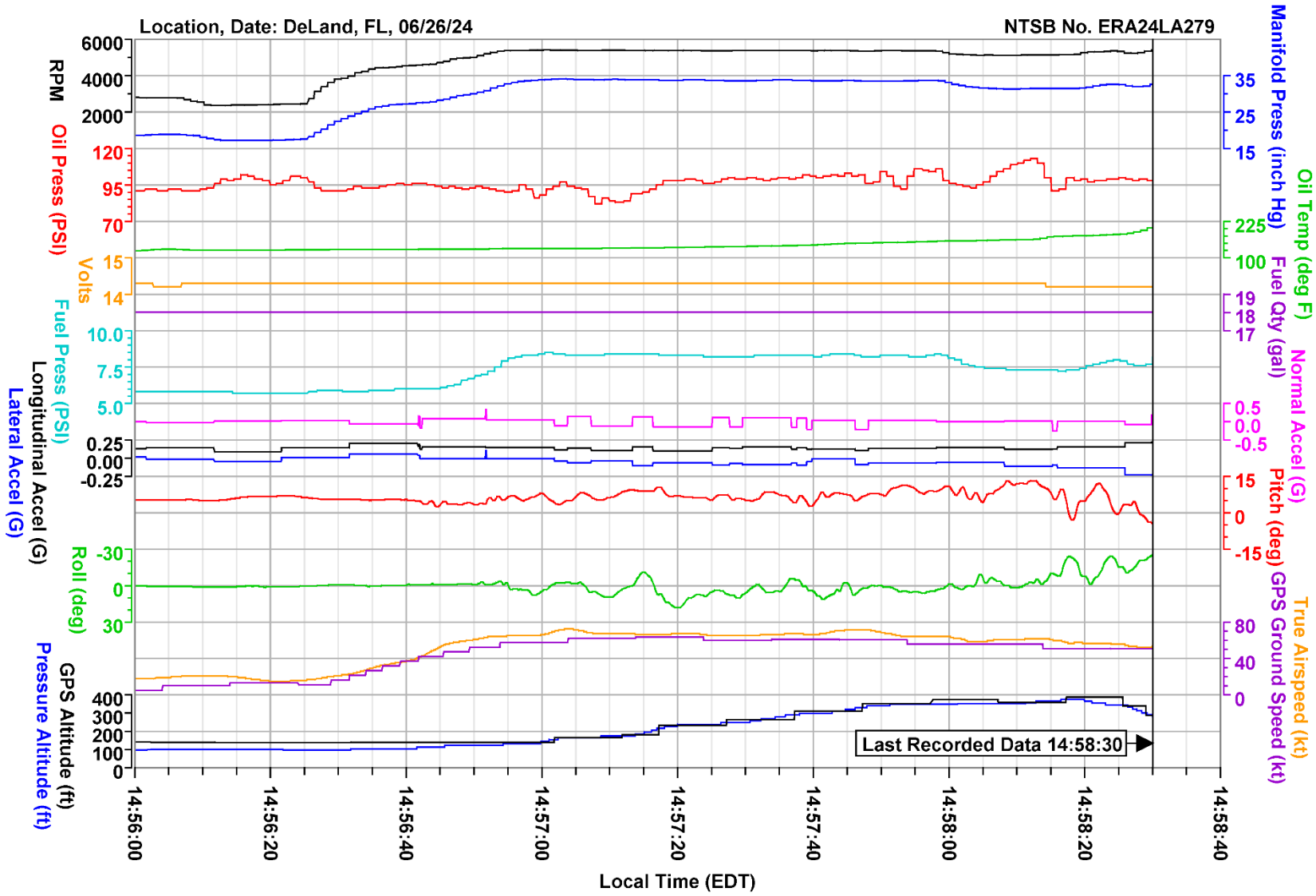

Figure 3. Plot of recorded engine parameters and basic flight parameters for the entire accident flight on June 26, 2024.

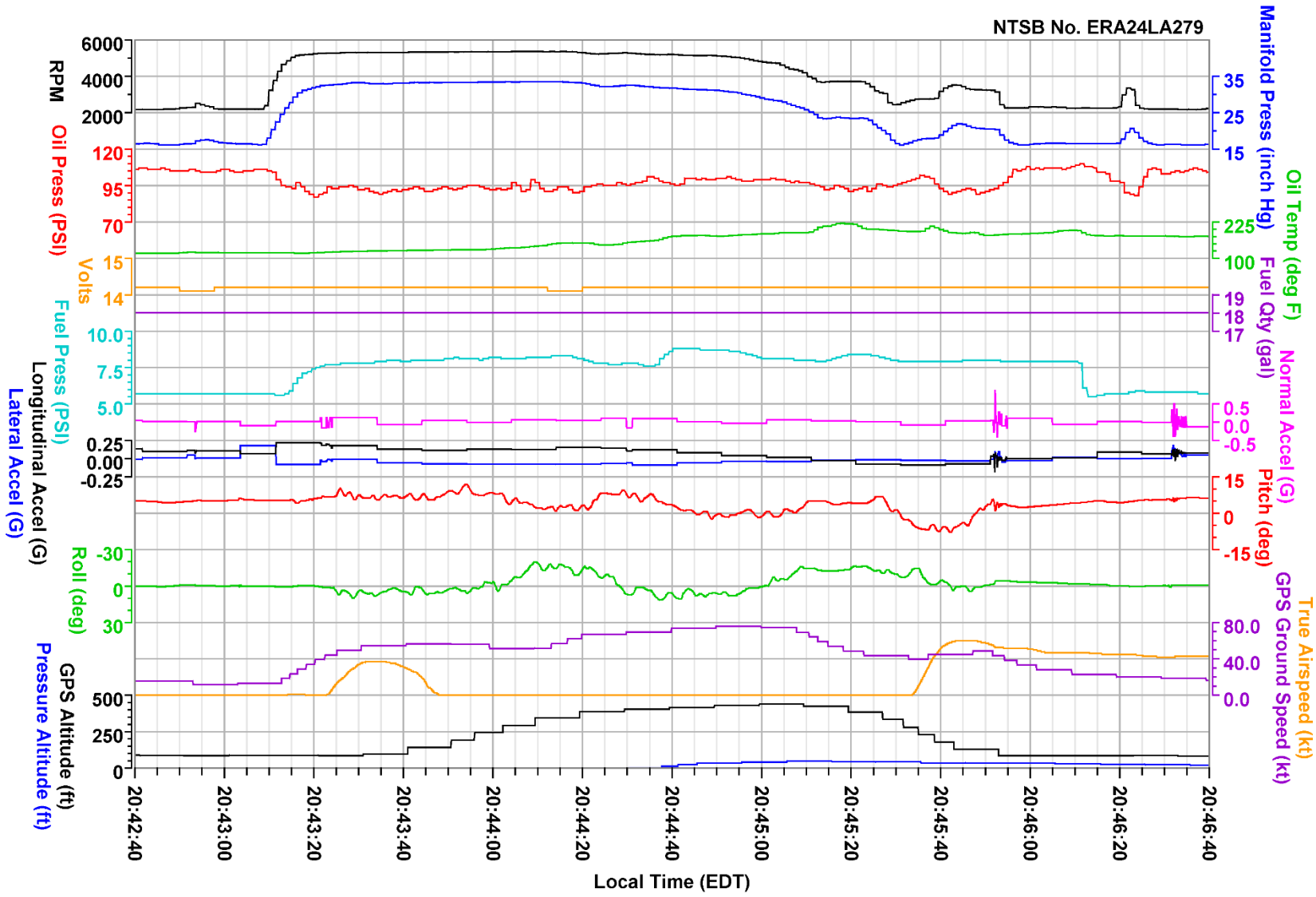

Figure 4. Plot of recorded engine parameters and basic flight parameters for the first previous flight on June 22, 2024.

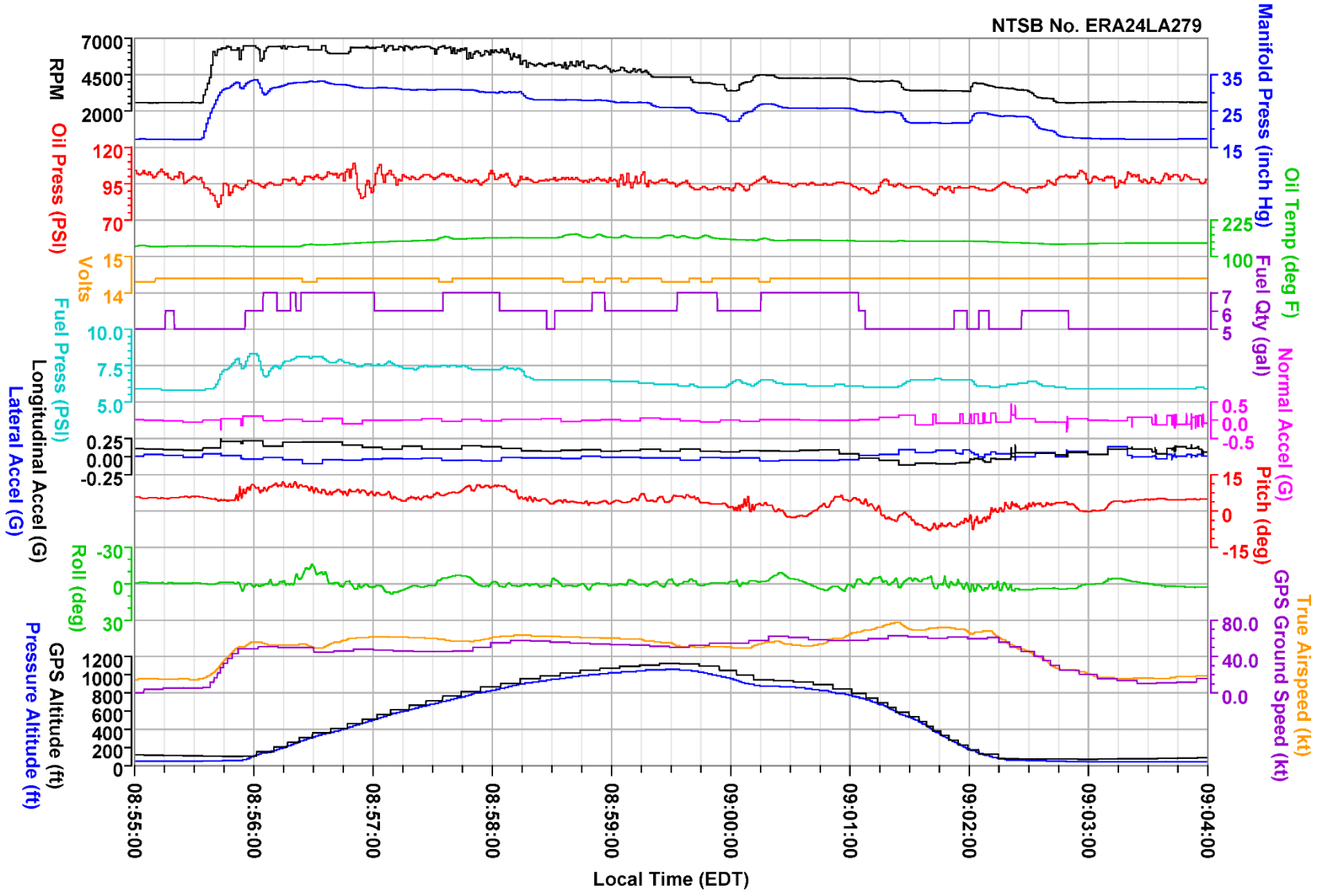

Figure 5. Plot of recorded engine parameters and basic flight parameters for the second previous flight on May 17, 2024.