

National Transportation Safety Board

Office of Research and Engineering

Washington, DC 20594



CEN21LA384

RECOVERABLE DATA MODULE

Specialist's Factual Report

May 30, 2023

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A. ACCIDENT

Location: Lansing, Michigan
Date: August 24, 2021
Time: 18:58 Central Daylight Time (CDT)
Airplane: Cirrus SF50, N1GG

B. RECOVERABLE DATA MODULE GROUP

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C. DETAILS OF THE INVESTIGATION

The NTSB Vehicle Recorder Division received the following device:

Recorder Manufacturer/Model: Appareo RDM-300
Recorder Serial Number: 1055

1.0 Appareo RDM-300 Description

The Appareo RDM-300 is a recorder that contains crash and fire protection features. The RDM samples ARINC 429 data and records it to non-volatile memory inside the unit.

1.1 Appareo RDM-300 Data Recovery

The outer case of the RDM-300 was slightly heat-damaged in the event. The extent of the damage is shown in figure 1. The memory module was extracted and examined and appeared to be in good condition. Data extracted included binary flight data files and a gpx file for each flight containing GPS position information in a text-based xml format. The binary flight data file was processed with Cirrus software to convert to engineering units.



Figure 1. RDM-300 showing heat damage.

1.2 RDM-300 Recording Description

The RDM-300 captured the accident flight. The duration of the accident flight power cycle was approximately 15 minutes and 20 seconds. Data is recorded at 5 Hz, however not all parameters are updated at 5 Hz.

D. FIGURES AND TABULAR DATA

Figure 2 shows basic flight data for the takeoff roll and runway excursion. Figure 3 shows recorded position data logged during taxi and takeoff. The GPS data from the gpx file is shown as a light blue track and the GPS data from the flight data file is depicted by the red track. The red track appears to show that GPS data was recorded at a reduced precision in the flight data file.

At 18:57:08 EDT, the throttle lever angle moves from -22° to 38° and the engine N1 and N2 speeds begin to increase. The parking brake was off, and the flaps were set to 50%. When the engine N1 and N2 speeds reached about 95%, the aircraft began to accelerate. At 18:57:50 EDT, the heading began to oscillate, but generally

began decreasing. At 18:57:56 EDT, at 100 knots recorded true airspeed and 120 knots ground speed, the throttle lever angle was reduced to -22° and the engine speeds began to decrease. The airplane reached a maximum of 108 knots true airspeed and 121 knots ground speed before it began to decelerate. The coarse GPS data indicate that the airplane departed the paved surface of the runway at about 18:58:20, travelling at about 75 knots ground speed.

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.

The corresponding tabular data used to create Figures 2 and 3 are provided in electronic comma separated value (CSV) format as attachment 1 to this report. The gpx file is included as attachment 2.

Submitted by:

Christopher Babcock
Aerospace Engineer

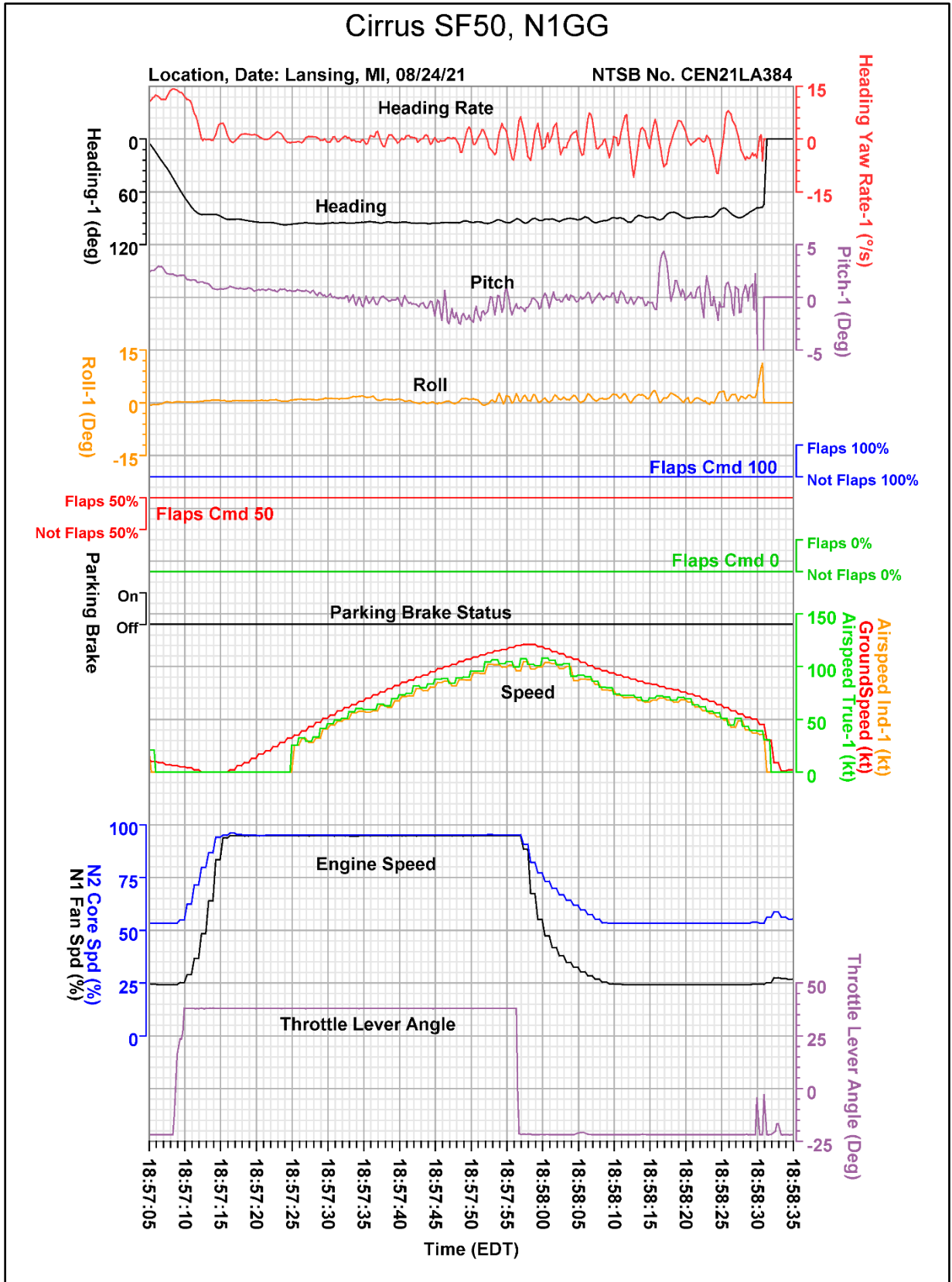


Figure 2. Basic flight data from accident flight.



Figure 3. N1GG taxi showing lack of recorded GPS precision.

APPENDIX A. VERIFIED AND PROVIDED PARAMETERS

This appendix describes the parameters provided and verified in this report. Table A-1 lists the RDM parameters and Table A-2 describes the unit abbreviations used in this report for RDM parameters.

Table A-1. Verified and provided parameters.

Parameter Name (units)	Parameter Description
Airspeed Ind-1 (kts)	Indicated Airspeed-ADC1
Airspeed True-1 (kts)	True Airspeed
Flaps Cmd 0	Flaps 0% Command Discrete
Flaps Cmd 50	Flaps 50% Command Discrete
Flaps Cmd 100	Flaps 100% Command Discrete
GroundSpeed (kts)	Derived Ground Speed
Heading-1 (deg)	True Heading-AHRS1
Heading Yaw Rate (°/s)	Yaw Rate
N1 Fan Spd (%)	N1 Fan Speed
N2 Core Spd (%)	N2 Core Speed
Parking Brake	Parking Brake Status Discrete
Pitch-1 (deg)	Pitch-AHRS1
Roll-1 (deg)	Roll-AHRS1
Throttle Lever Angle (deg)	Throttle Lever Angle (deg)

Table A-2. Unit abbreviations.

Unit Abbreviations	Descriptions
%	percent
deg	degrees
°/sec	degrees per second
kts	knots

Note: For parameters with a unit description of discrete, a discrete is typically a 1-bit parameter that is either a 0 state or a 1 state where each state is uniquely defined for each parameter.