

National Transportation Safety Board

Office of Research and Engineering

Washington, DC 20594



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FLIGHT INSTRUMENTS

Specialist's Factual Report

April 10, 2023

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A. ACCIDENT

Location: Southern Shores, North Carolina
Date: September 21, 2022
Time: 1000 eastern daylight time (EDT)
Airplane: Northwing Design Apache Sport aircraft (N3283N), private operator

B. FLIGHT INSTRUMENTS SPECIALIST

Specialist: W. Deven Chen
Electrical Engineer – Recorder Specialist
National Transportation Safety Board (NTSB)

C. DETAILS OF THE INVESTIGATION

A recorder group was not convened. The NTSB Vehicle Recorder Division received the following flight instruments:

Device Manufacturer/Model:	Garmin GPSMAP 196
Device Serial Number:	65427867
Device Manufacturer/Model:	Falcon Gauge VSI
Device Serial Number:	B07090039
Device Manufacturer/Model:	CFI Fuel Level Indicator
Device Serial Number:	G2018052220

1.0 Garmin GPSMAP 196 Description

The Garmin GPSMAP 196 is a portable GPS unit equipped with a detachable antenna, and a 320 x 240 12-level grayscale LCD display. The unit is equipped with a built-in base map and internal Jeppesen aviation database. The unit employs a parallel 12 channel WAAS-capable receiver and can be operated using external power, or alternatively by four standard AA-size batteries. The GPSMAP 196 can store date, route of flight, and flight time information for up to 50 individual flights in the form of a flight log. Flight logging begins when the GPS unit senses a speed increase to greater than 30 knots together with an altitude gain of greater than 500 feet. Recorded flight log data is saved when the speed is sensed to decrease to below 30 knots, and a new log is started if more than 10 minutes passes from this time. A detailed track log – including latitude, longitude, date, time, and GPS altitude information for an unspecified number of points – is stored within the unit whenever the receiver has a lock on the GPS navigation signal. Track log position is updated 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 either

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-volatile¹ (NVM) memory. The unit contains hardware and software permitting the download of recorded waypoint, route, and track log information to a PC via a built-in serial port using the NMEA 0183 version 2.0 protocol. 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.

1.1 Garmin GPSMAP 196 Condition and Data Recovery

The device showed signs of corrosion in its AA battery compartment upon arrival at the Vehicle Recorder Division. This corrosion is shown in figure 1. The device could not power up when external power was supplied through its 4-pin connector. Further examination revealed that a filter capacitor on the device's internal circuit board was corroded. After the corroded filter capacitor was removed, the device powered up normally.

An examination of the device's content showed that there was no track log recorded (shown in figure 2), because the track log record mode was off (shown in figure 3). Under the flight logs page, there were 50 logged flights, ranging from July 25, 2020, to September 21, 2022. There were two flights logged on September 21, 2022, as shown in figure 4. Figure 5 shows the last logged flight indicating the tail number of the accident aircraft, the distance travelled was 23.8 miles, and a duration of 0.4 hours.



Figure 1. Front and back of the Garmin GPSMAP 106 as received.

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

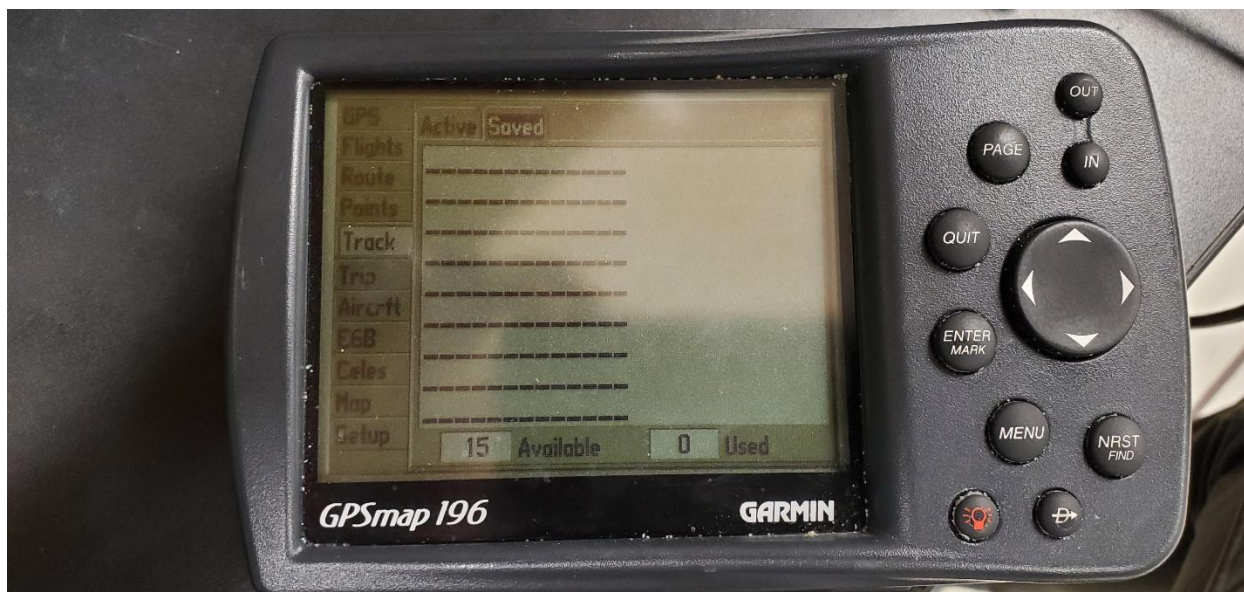


Figure 2. No track log recorded on the Garmin GPSMAP 196.

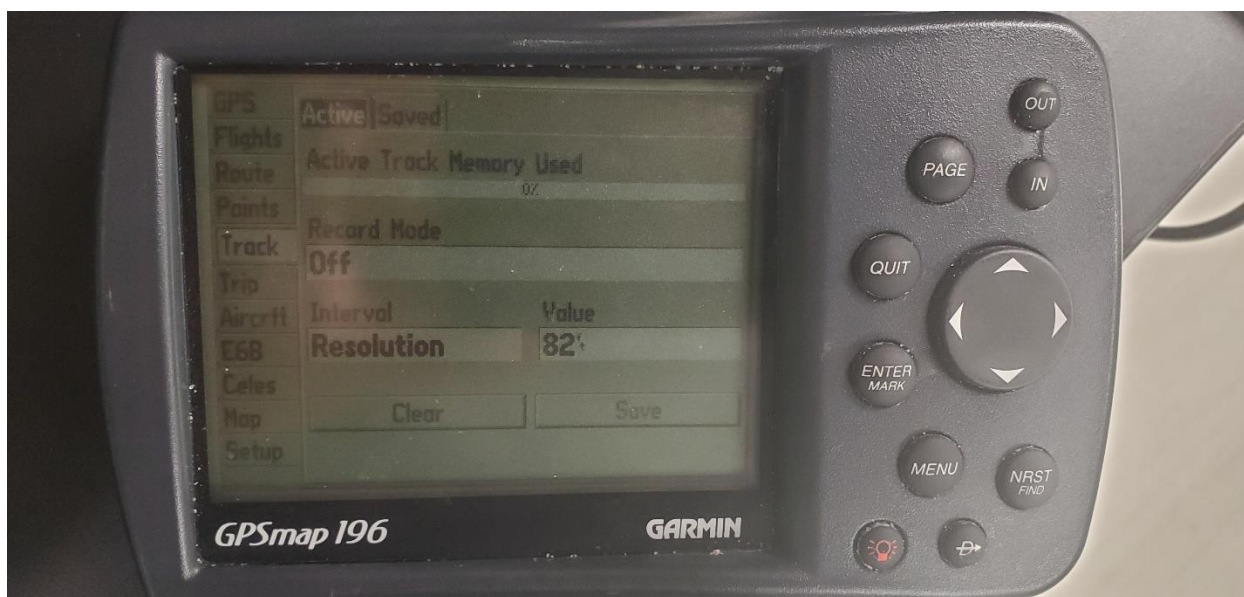


Figure 3. Track log record mode was off on the Garmin GPSMAP 196.

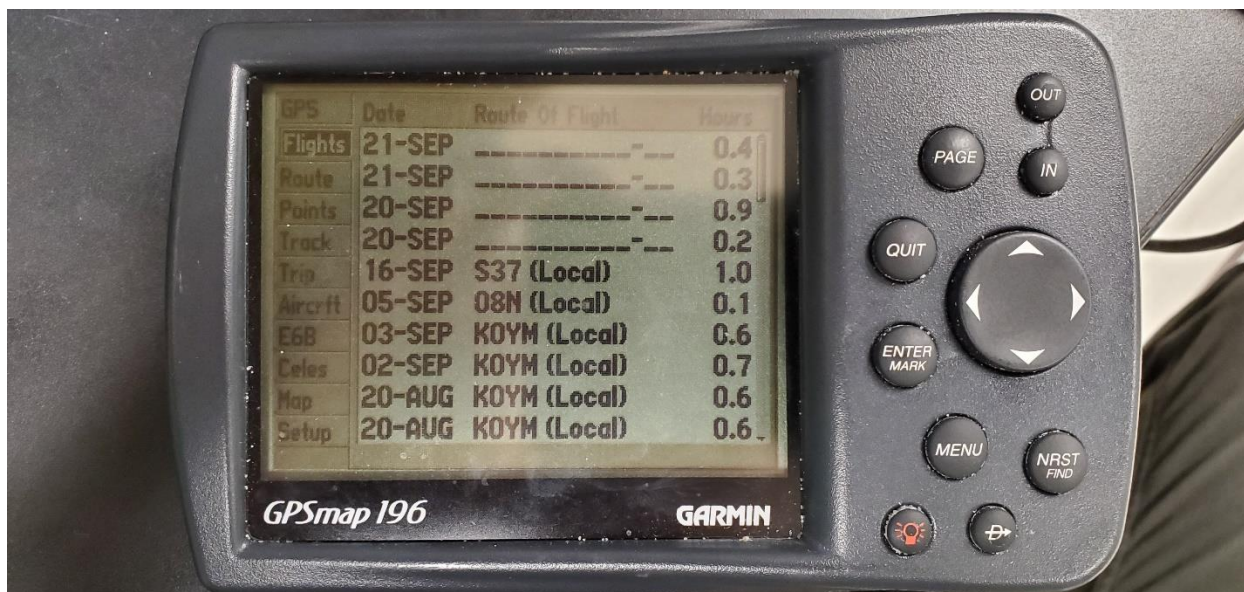


Figure 4. Two flights logged on September 21, 2022, under flight logs on the Garmin GPSMAP 196.

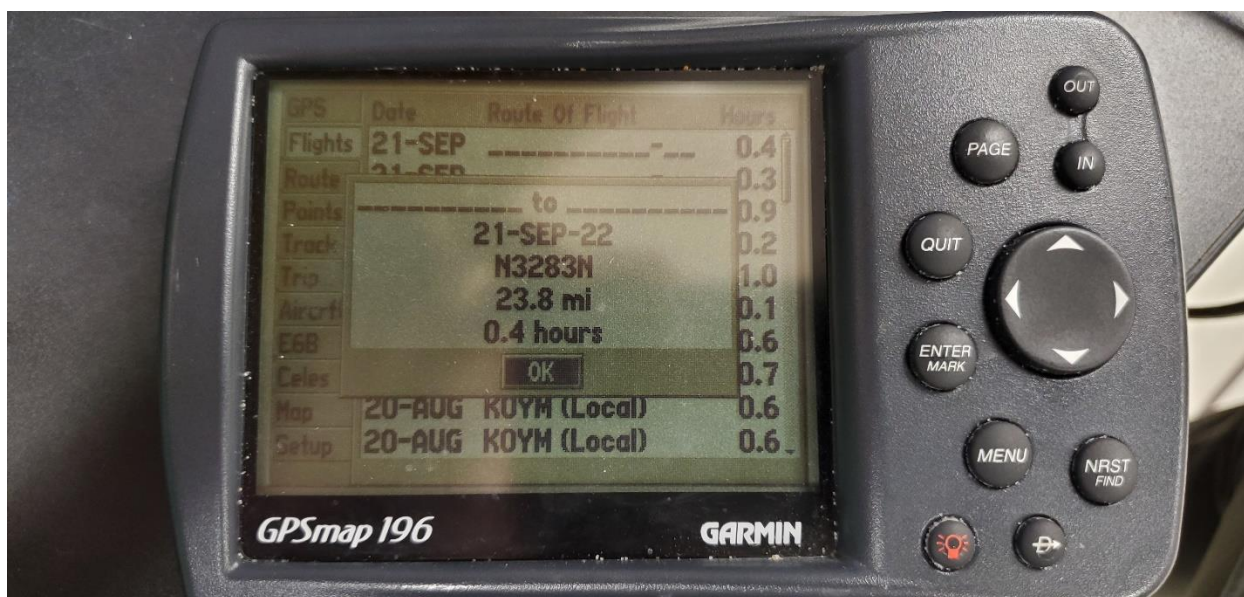


Figure 5. The last recorded flight log on September 21, 2022, showed aircraft tail number, distance traveled, and duration.

2.0 Falcon Gauge VSI Description

The Falcon Gauge Vertical Speed Indicator (VSI) provides immediate climb and descent information to the pilot.

2.1 Falcon Gauge VSI Condition and Data Recovery

The device did not have obvious damage upon arrival at the Vehicle Recorder Division, as shown in figure 6. Confirmed by the manufacturer, the device is a

mechanical instrument and does not record data. No data was recovered from the device.

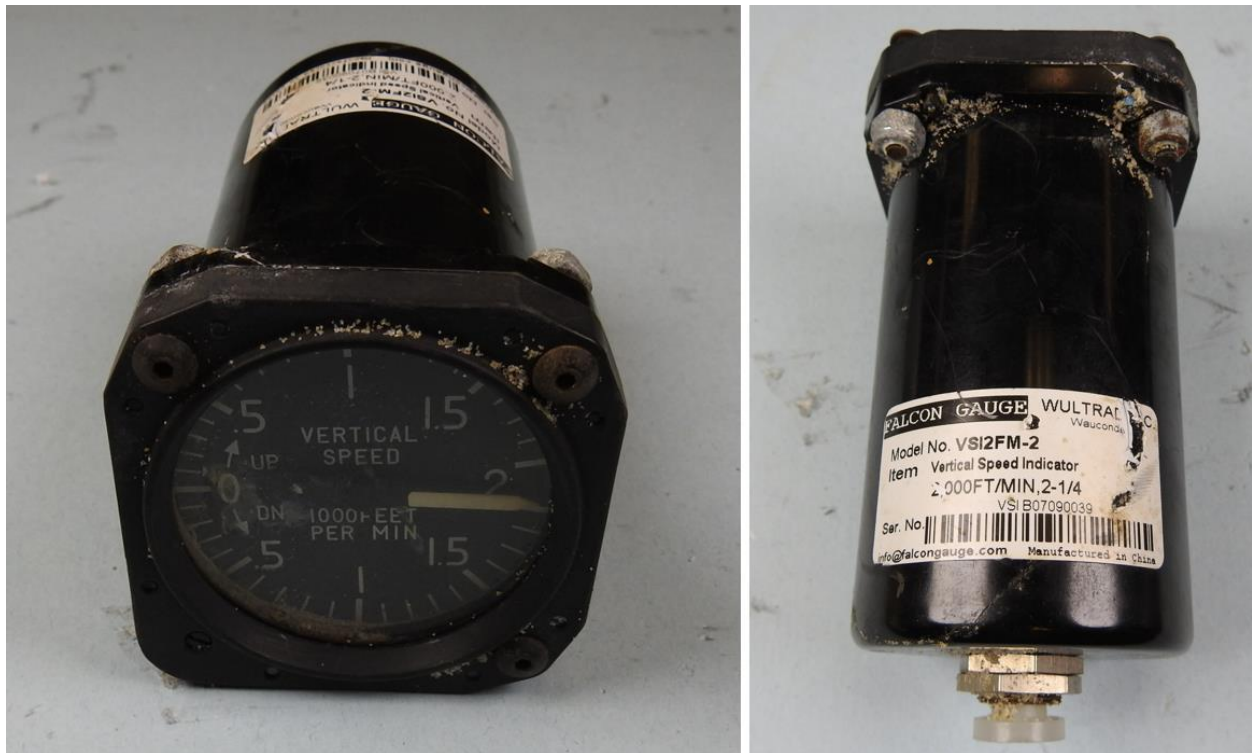


Figure 6. Front and back of the Falcon Gauge VSI as received.

3.0 CFI Fuel Level Indicator Description

There was no information available online regarding the manufacturer of the CFI Fuel Level Indicator. The fuel level indicator shows the quantity of the fuel remaining in the fuel tank.

3.1 CFI Fuel Level Indicator Condition and Data Recovery

The device arrived was in good condition upon arrival at the Vehicle Recorder Division, as shown in figure 7. The device is a mechanical instrument and does not record data. No data was recovered from the device.

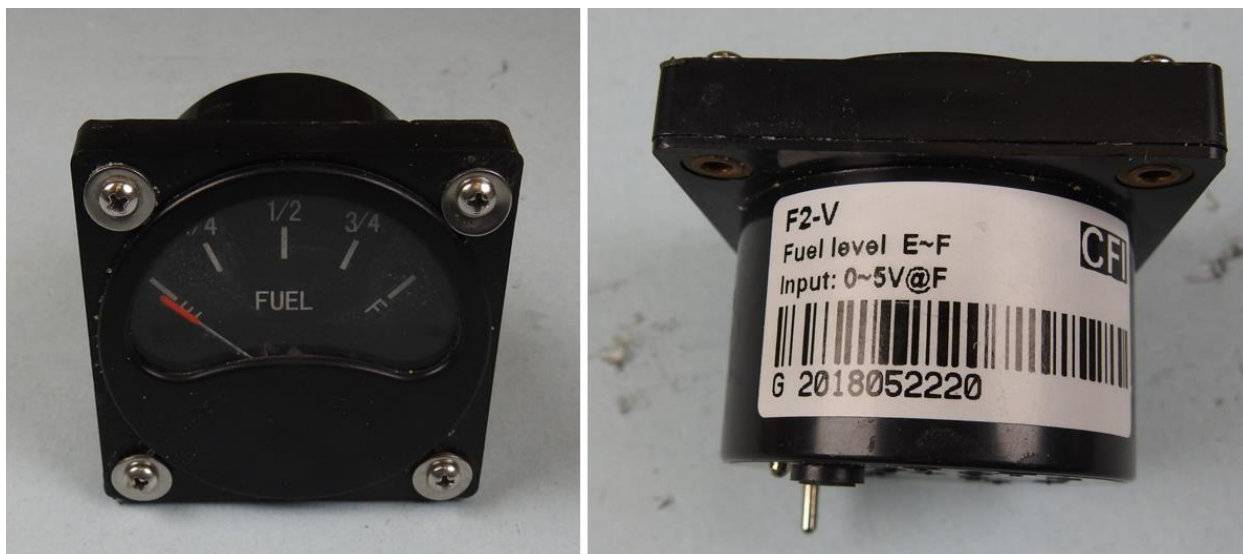


Figure 7. Front and back of the CFI Fuel Level Indicator as received.