

National Transportation Safety Board

Office of Research and Engineering

Washington, DC 20594



CEN24FA326

GLOBAL POSITIONING SYSTEM DEVICE

Specialist's Factual Report

September 15, 2025

TABLE OF CONTENTS

A. ACCIDENT.....	3
B. GLOBAL POSITIONING SYSTEM DEVICE SPECIALIST	3
C. DETAILS OF THE INVESTIGATION	3
1.0 Device Description	3
1.1 Data Recovery	4
1.2 Recording Description	4
1.3 Parameters Provided	5
D. OVERLAYS AND TABULAR DATA.....	5

A. ACCIDENT

Location: Crofton, Nebraska
Date: August 26, 2024
Time: 08:41 central daylight time (CDT)
13:41 coordinated universal time (UTC)
Airplane: RANS S19, Rudloff Joseph, N519JR

B. GLOBAL POSITIONING SYSTEM DEVICE SPECIALIST

Specialist: Olivia Fowler
Mechanical Engineer – Vehicle Recorder Specialist
National Transportation Safety Board (NTSB)

C. DETAILS OF THE INVESTIGATION

A global positioning system (GPS) group was not convened. The NTSB Vehicle Recorder Division received the following GPS device:

Recorder Manufacturer/Model:	Garmin GPSMAP 396
Recorder Serial Number:	28201340

1.0 Device Description

The Garmin GPSMAP 396 is a battery-powered portable 12-channel GPS receiver with a 256-color TFT LCD display screen. The unit includes a built-in Jeppesen database and is capable of receiving XM satellite radio for flight information including NEXTRAD radar, lightning, METARs, TAFs, and TFRs. The unit stores date, route-of-flight, and flight time information for up to 50 flights. A flight record is triggered when groundspeed exceeds 30 knots and altitude exceeds 500 feet, and ends when groundspeed drops below 30 knots for 10 minutes or more. A detailed tracklog 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 tracklog as a function of time or distance moved, depending on how the unit has been configured. Once the current tracklog memory becomes full, new information either overwrites the oldest information or recording stops, depending on how the unit is configured. The current tracklog can be saved to long-term memory and 15 saved tracklogs can be maintained in addition to the current tracklog. Tracklog storage may be activated or de-activated at user discretion. All recorded data is stored in non-volatile memory. The unit contains hardware and software permitting the download of recorded waypoint, route, and tracklog information to a PC via a built-in serial port using the

NMEA 0183 version 2.0 protocol. The unit can also communicate with external devices such as a computer using a 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.

1.1 Data Recovery

Upon arrival at the Vehicle Recorder Laboratory, an exterior examination revealed the unit had sustained impact damage as shown in Figure 1. The front screen was broken and the device was unable to be powered on. An internal inspection revealed the memory chip appeared undamaged. Subsequently, the memory chip was removed from the main internal board, and the memory contents of the chip were successfully read and track log data points were decoded using laboratory equipment.



Figure 1. Photo of Garmin GPSMAP 396 showing impact damage.

1.2 Recording Description

The data extracted included 143 sessions from January 15, 2023, through August 26, 2024.¹ The accident flight was recorded, starting 12:32:33 UTC and ending 13:40:53 UTC on August 26, 2024.

¹ All dates and times are referenced to coordinated universal time (UTC).

1.3 Parameters Provided

Table 1 describes data parameters provided by the GPS device. Date, Time, Latitude, Longitude, and GPS Altitude are recorded by the device. Groundspeed and Track are derived from the recorded parameters.

Table 1. GPS Data Parameters.

Parameter Name (unit)	Parameter Description (unit)
Date	Date for recorded data point (MM/DD/YYYY)
Time	Time (UTC) for recorded data point (HH:MM:SS)
Latitude (deg)	Recorded Latitude (degrees)
Longitude (deg)	Recorded Longitude (degrees)
GPS Alt (ft)	Recorded GPS Altitude (feet)
Groundspeed (kts)	Average derived groundspeed (knots)
Track (deg)	Average derived true course (degrees)

D. OVERLAYS AND TABULAR DATA

Data obtained from the Garmin GPSMAP 396 was used to produce the following figures.

Figure 2 and Figure 3 are graphical overlays generated using Google Earth for the accident flight. Figure 2 shows an overview of the entire flight, beginning with the aircraft departing from Norfolk Regional Airport (KOFK) in Norfolk, Nebraska. Figure 3 shows the final minutes of the accident flight with altitude and airspeed labeled on select data points. The last recorded data point was at 13:40:53 UTC on August 26, 2024, with a GPS altitude of 2101 feet above Mean Sea Level (MSL) and a ground speed of 144 knots. The weather and lighting conditions in Google Earth are not necessarily representative of the weather and lighting conditions present at the time of the recording.

The corresponding tabular data used to create Figure 2 and Figure 3, including UTC Hours, UTC Minutes, and UTC Seconds, are provided in electronic comma-separated value (CSV) format as attachment 1 to this report.

Submitted by:

Olivia Fowler
Mechanical Engineer – Vehicle Recorders

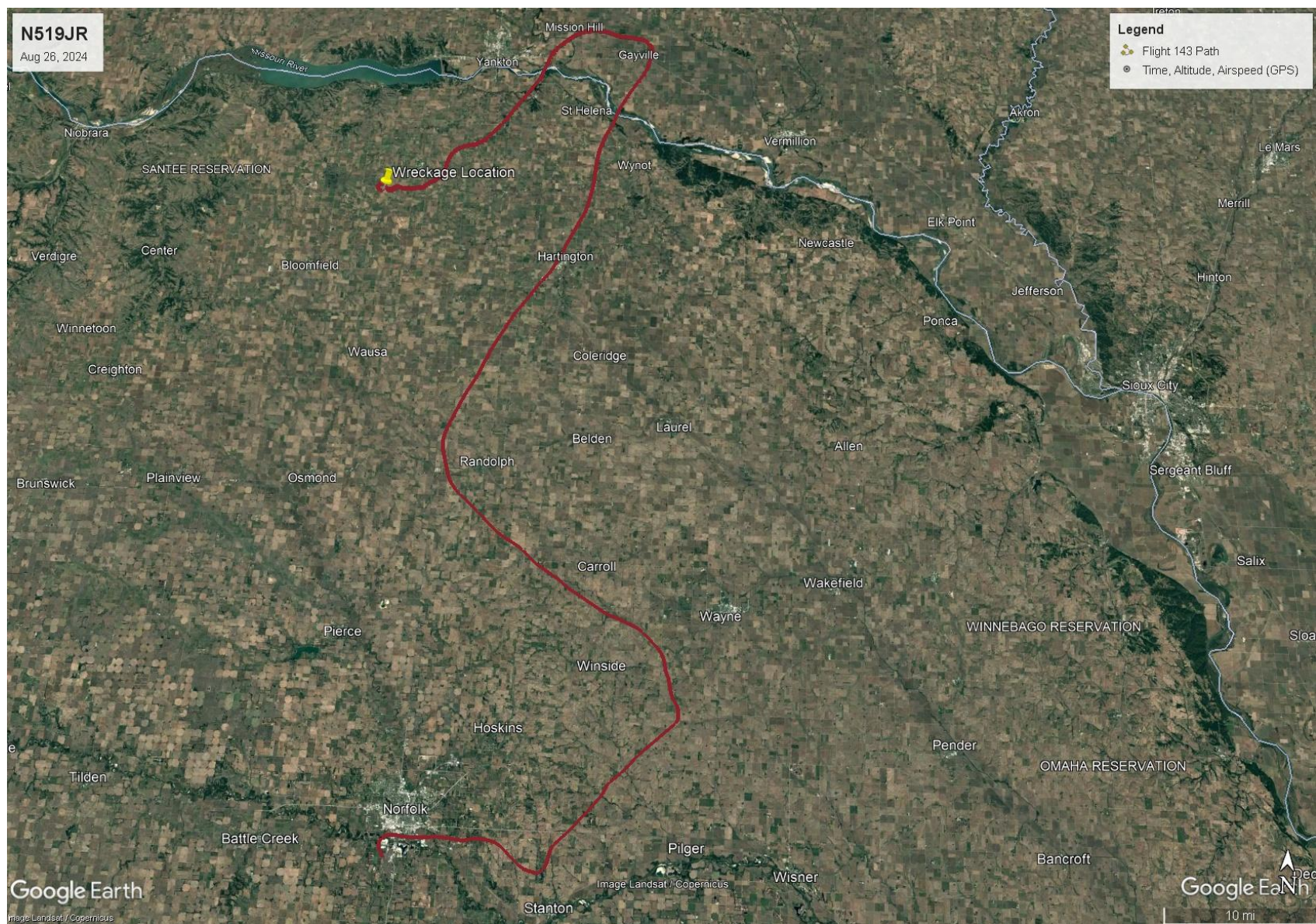


Figure 2. Google Earth overlay showing the entire flight path of the accident flight. The weather and lighting conditions in Google Earth are not necessarily representative of the weather and lighting conditions present at the time of the recording.



Figure 3. Google Earth overlay showing the final minutes of the accident flight. Select points display the altitude and airspeed of the aircraft. The weather and lighting conditions in Google Earth are not necessarily representative of the weather and lighting conditions present at the time of the recording.