

NATIONAL TRANSPORTATION SAFETY BOARD
Vehicle Recorder Division

April 3, 2019

Global Positioning System Device

Specialist's Factual Report
By Christopher Babcock

1. EVENT SUMMARY

Location: Poolville, Texas
Date: October 12, 2018
Aircraft: Piper PA-32RT-300
Registration: N221MC
Operator: Private
NTSB Number: CEN19FA004

On October 12, 2018, about 1608 central daylight time, a Piper PA-32RT-300, registration N221MC, was destroyed during an in-flight breakup and collision with terrain near Poolville, Texas. The pilot and passenger were fatally injured. The aircraft was registered to and operated by the pilot under the provisions of Title 14 *Code of Federal Regulations* Part 91 as a personal flight. Marginal visual meteorological conditions prevailed for the flight. No flight plan had been filed. The flight originated from the Sierra Blanca Regional Airport (SRR), Ruidoso, New Mexico, about 1326. The intended destination has not been determined.

2. GROUP

A group was not convened.

3. DETAILS OF INVESTIGATION

The National Transportation Safety Board (NTSB) Vehicle Recorder Division received the following global positioning system (GPS) device:

Device Manufacturer/Model:	Garmin GPSMAP 696
Serial Number:	3AJ001737

3.1. Device Description

The Garmin GPSMAP 696 is a battery-powered portable multi-function display and GPS receiver with a 7-inch diagonal high-resolution LCD display screen. The unit includes a built-in Jeppesen database and can receive XM satellite radio for flight information including NEXTRAD radar, lightning, METARs, 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 250 feet and ends when groundspeed drops below 30 knots for 10 minutes or more. A detailed track log 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 track log 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. All recorded data is stored in non-volatile memory (NVM).¹ The unit contains hardware and software permitting the download of recorded waypoint, route, and track log information to a PC via 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.

3.2. Data Recovery

The GPS was severely damaged by impact forces (Figure 1). The device did not power up when power was applied so the NVM device was removed and imaged forensically (Figure 2). The digital data was converted to engineering units using laboratory software.



Figure 1. Condition of Garmin GPSMAP 696, as received.

¹ NVM is semiconductor memory that does not require power to retain information

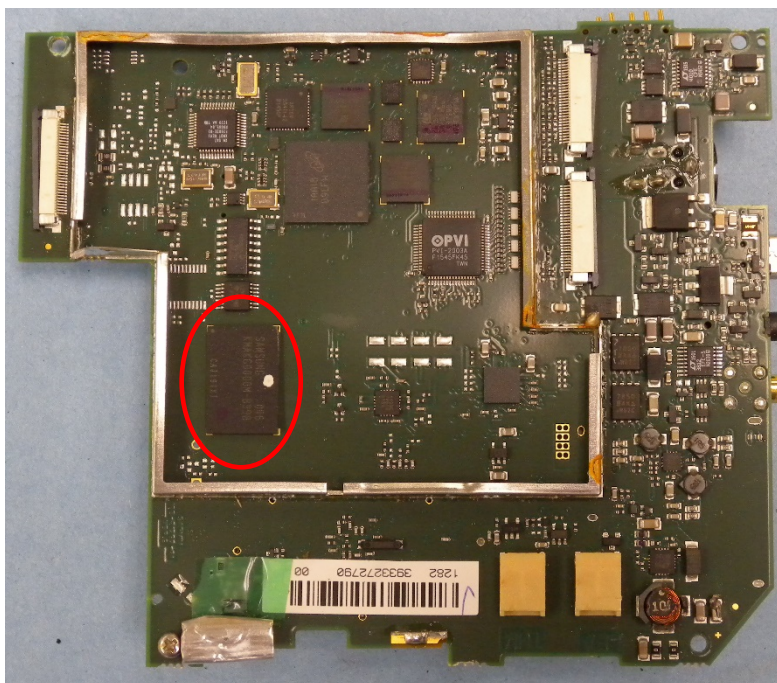


Figure 2. Main circuit card. NVM device circled in red.

3.3. Data Description

The data extracted included 98 track logs from July 27, 2017, through October 12, 2018.² The accident flight was recorded starting 1816:31 UTC and ending 2108:05 UTC on October 12, 2018.

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

² All dates and times are referenced to Coordinated Universal Time (UTC).

3.5. OVERLAYS AND TABULAR DATA

Figure 3 is a graphical overlay generated using Google Earth for the accident flight. The weather and lighting conditions in Google Earth are not necessarily the weather and lighting conditions present at the time of the recording.

The flight departed the Sierra Blanca Regional Airport at approximately 1825 UTC and headed east. The last recorded parameter was as at 2108:05 UTC with a GPS altitude of 5231 feet above Mean Sea Level (MSL) and a ground speed of 146 knots after the aircraft had entered a descending right turn. Due to data buffering on the GPS unit, the data recording may have ended before the accident event.

Figure 4 is a graphical overlay generated using Google Earth zoomed in on the last 2 minutes of recorded data.

Tabular data used to generate figures 3 and 4 are included as Attachment 1. This attachment is provided in electronic comma-delimited (.CSV) format.

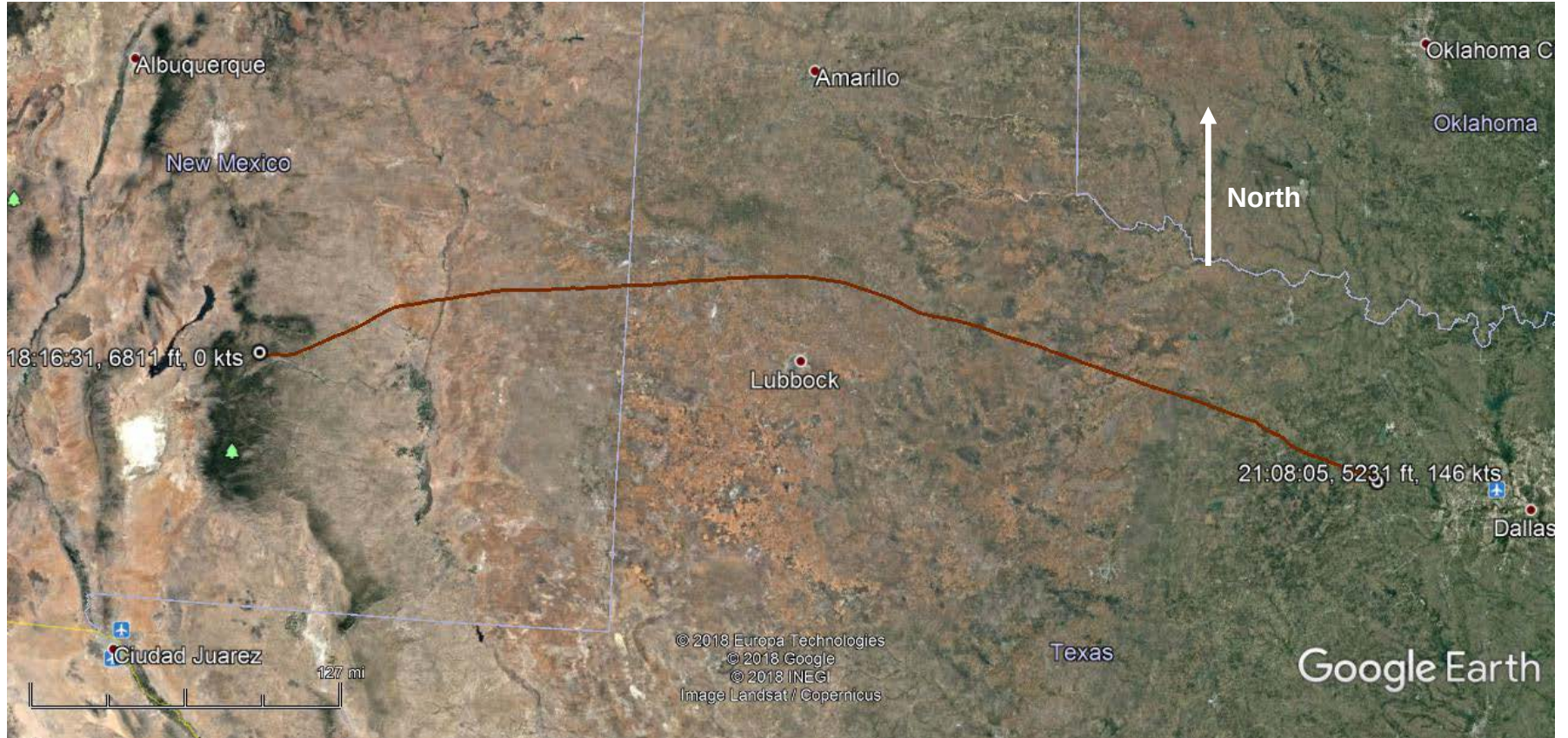


Figure 3. Google Earth overlay showing entire accident flight.

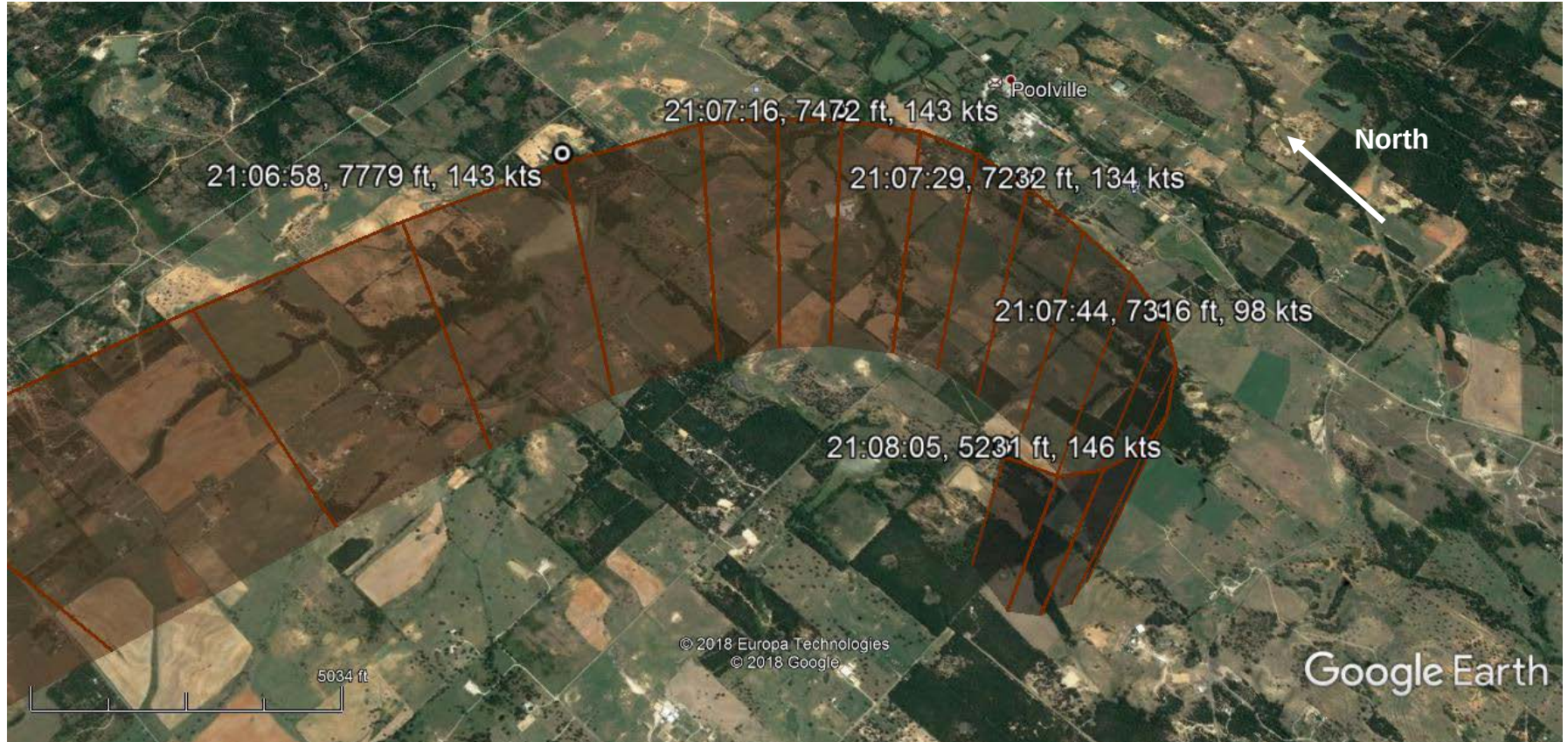


Figure 4. Last 75 seconds of accident flight.