

NATIONAL TRANSPORTATION SAFETY BOARD
Vehicle Recorder Division
Washington, D.C. 20594

September 24, 2018

Electronic Devices

Specialist's Factual Report
by Christopher Babcock

1. EVENT

Location: Reno, Nevada
Date: September 11, 2016
Aircraft: Piper PA-28R-201T
Registration: N821ET
Operator: Private
NTSB Number: WPR16FA178

On September 11, 2016, at 1813 Pacific daylight time, a Piper PA-28R-201T, registration N821ET, collided with vehicles in an airport parking lot after takeoff from Reno/Tahoe International Airport, Reno, Nevada. The airplane was registered to RCS3 LLC, and operated by the pilot under the provisions of 14 *Code of Federal Regulations* Part 91. The private pilot and two passengers were fatally injured, and the airplane sustained substantial damage. The cross-country flight was destined for San Carlos Airport, San Carlos, California. Visual meteorological conditions prevailed, and an instrument flight rules flight plan had been filed.

2. DETAILS OF INVESTIGATION

The National Transportation Safety Board (NTSB) Vehicle Recorder Division received the following devices:

Device 1: **Appareo Stratus PRX V2**
Device 1 Serial Number: **251376**
Device 2: **JPI EDM-700**
Device 2 Serial Number: **unknown**

2.1. Appareo Stratus PRX V2 Device Description

The Appareo Status PRX V2 device is a self-contained battery powered unit that contains an internal AHRS, GPS/WAAS receiver, and ADS-B receiver in one compact unit. The unit communicates wirelessly with compatible devices to display all the acquired information. In addition to communicating with compatible devices, the Stratus device records GPS position and AHRS information internally on a non-volatile flash memory chip at approximately 5 data records per second (5 Hz).

2.1.1. Appareo Stratus PRX V2 Data Recovery

Upon arrival at the Vehicle Recorder Laboratory, examination revealed the unit had sustained severe impact damage. The memory device was removed from the damaged circuitry and imaged in a chip reader. The imaged data was converted to engineering units.

2.1.2. Appareo Stratus PRX V2 Data Description

The data extracted date back to approximately June 2016. The accident flight was the last session recorded, lasting 22 minutes and 30 seconds. The converted time and date were approximately 6 days prior to the accident date, but the flight profile matched the accident event, so all times reported reflect the elapsed time of the accident flight session.

Figure 1 is a graphical overlay generated using Google Earth for the accident flight. Figure 2 shows the last minute of flight, just after takeoff. The weather and lighting conditions in Google Earth are not necessarily the weather and lighting conditions present at the time of the recording. Figure 3 is plot of basic aircraft data for the accident flight. Tabular data used to generate Figures 1-3 are included in the public docket as Attachment 1. This attachment is provided in electronic comma-delimited (.csv) format.

When the recording began, the aircraft was on the ramp adjacent to taxiway 'C.' At about 13:15 elapsed time (mm:ss), the aircraft began taxiing south along the ramp where it joined taxiway 'C' near the intersection with taxiway 'L' at about 15:40 elapsed time. The aircraft turned east on taxiway 'L' at about 16:00 elapsed time. The aircraft reached the end of taxiway 'L' and came to a stop at about 17:55 elapsed time.

At 20:35 elapsed time, the aircraft taxied onto runway 25 and began its takeoff roll at about 21:06 elapsed time. At about 21:28 elapsed time, the vertical speed and altitude began to increase. The ground speed was 53 knots. It should be noted that recorded pitch is negative for most of the takeoff roll and initial climb. At 21:52 elapsed time, the aircraft started a right turn about 150 feet above the ground (AGL). The aircraft reached its highest GPS altitude of 4613 feet about mean sea level (MSL), about 209 feet above the ground, at 21:59 elapsed time.¹ The aircraft descended slightly to 4566 feet MSL (162 feet AGL) at 22:08 elapsed time before climbing slightly to 4606 feet MSL (202 feet AGL) at 22:17 elapsed time. The aircraft continued a right turn and descended from this point before the data ended at 22:36 elapsed time. When the data ended, the aircraft was at 4439 feet MSL (35 feet AGL) with a ground speed of 89 knots and a vertical descent rate of 1108 feet per minute.

According to the Stratus Pilot's Guide, the device must be mounted properly to obtain accurate AHRS information. If the device is not mounted properly, or if it becomes dislodged from its mounting, the AHRS data will not reflect accurate aircraft motion.

2.2. JPI EDM-700 Device Description

The JPI EDM-700 is a panel mounted instrument enabling the operator to monitor up to 24 parameters related to engine operations. Depending on the installation, engine parameters monitored can include: exhaust gas temperature, cylinder head temperature, oil pressure and temperature, manifold pressure, outside air temperature, turbine inlet

¹ The Stratus records GPS altitude which actually reflects height above the WGS84 datum which is an approximate definition of mean sea level.

temperature, engine revolutions per minute, compressor discharge temperature, fuel flow, carburetor temperature, and battery voltage.

The unit can also calculate, in real-time, horsepower, fuel used, shock cooling rate, and temperature differentials between the highest and lowest cylinder temperatures. The calculations are also based on the aircraft installation.

The JPI was manufactured prior to the implementation of the data recording function, so no data was recovered.

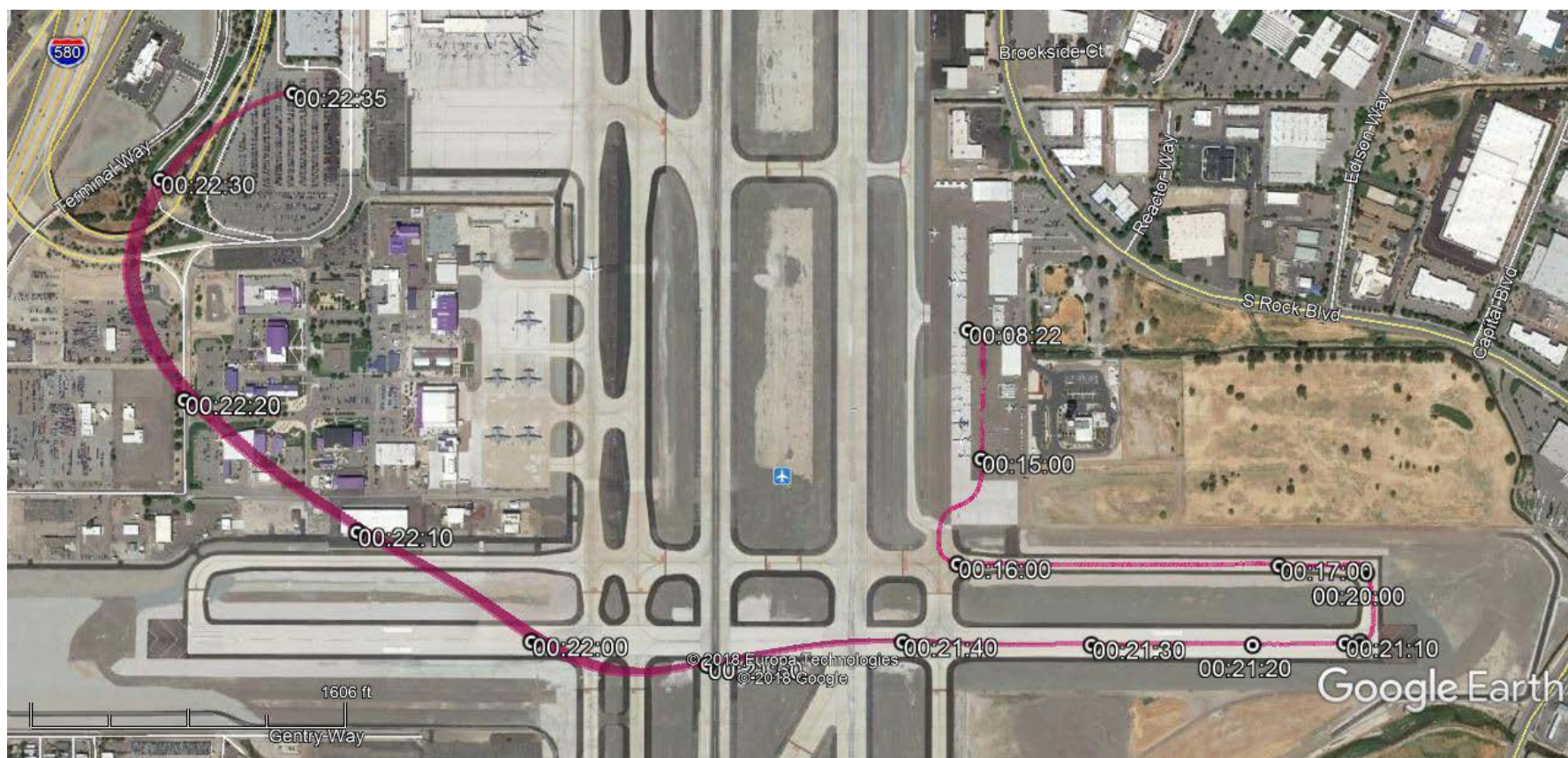


Figure 1. View of entire accident flight (elapsed time).



Figure 2. View of end of accident flight (elapsed time).

Private, Piper PA-28R-201T, N821ET

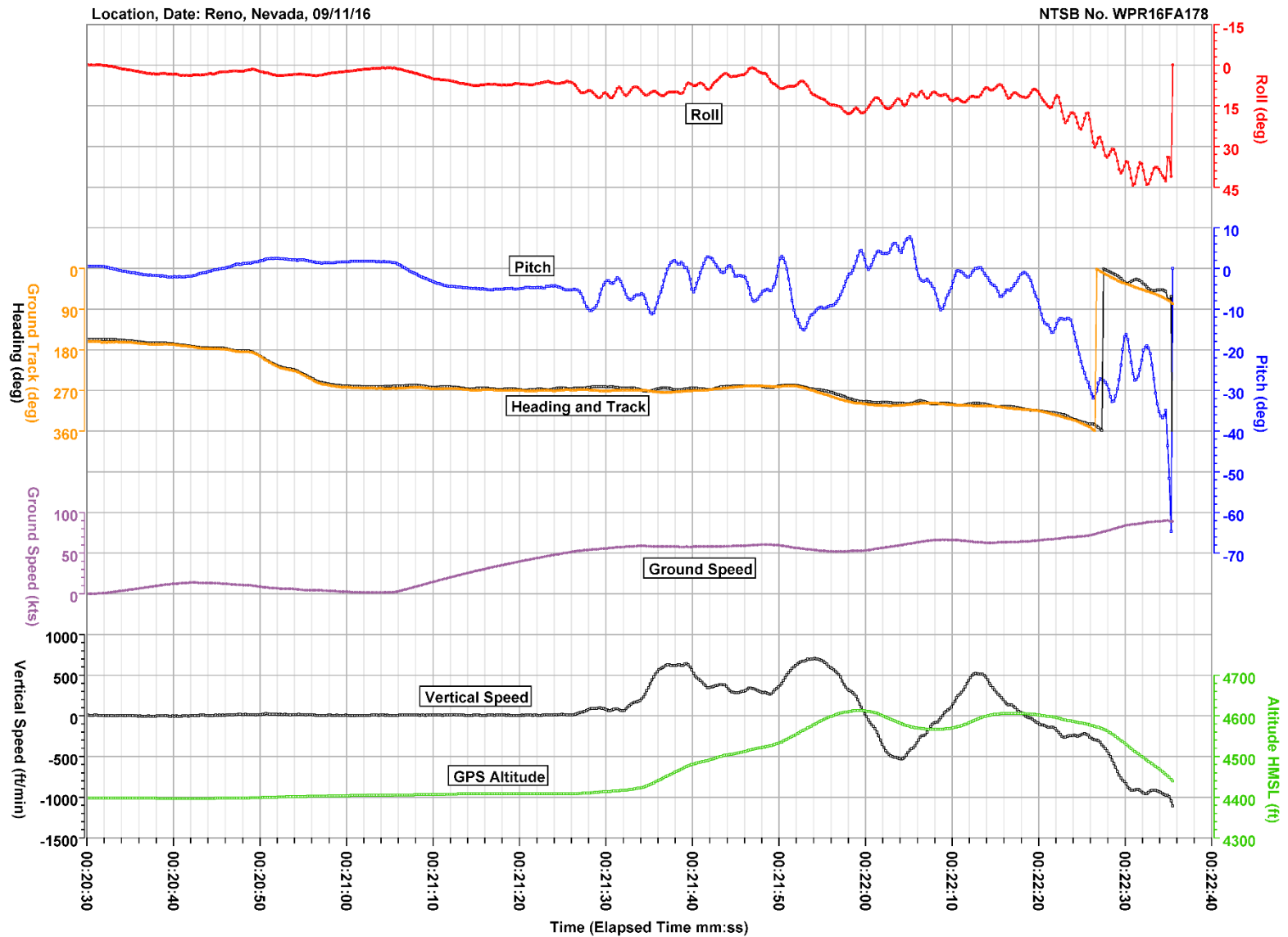


Figure 3. Basic flight data recovered for accident flight.