

NATIONAL TRANSPORTATION SAFETY BOARD
Vehicle Recorder Division

June 10, 2019

Multiple Electronic Devices

Specialist's Factual Report
By Christopher Babcock

1. EVENT SUMMARY

Location: La Center, Washington
Date: March 11, 2018
Aircraft: Piper PA-18-150
Registration: N4511Y
Operator: Private
NTSB Number: WPR18FA104

On March 11, 2018, about 1300 Pacific daylight time, a Piper PA-18-150 Super Cub, registration N4511Y, was destroyed when it impacted terrain while maneuvering near Daybreak Airport (WA46), La Center, Washington. The pilot was fatally injured. The airplane was registered to and operated by the pilot as a Title 14 *Code of Federal Regulations* Part 91 personal flight. Visual meteorological conditions prevailed, and no flight plan was filed for the flight that originated from Woodland State Airport (W27), Woodland, WA, at 1250. Several devices containing non-volatile memory were recovered for evaluation

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(s):

Device Manufacturer/Model:	Appareo Stratus PRX V2
Serial Number:	226150
Device Manufacturer/Model:	Garmin GPSMAP 296
Serial Number:	67010899

3.1. Device Description

3.1.1. Appareo Stratus PRX V2

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).

3.1.2. Garmin GPSMAP 296

The Garmin GPSMAP 296 is a hand-portable GPS unit equipped with a detachable antenna, a 256 color TFT LCD display, built in base map, and an internal Jeppesen aviation database. The unit employs a parallel 12 channel receiver and can be operated using external power, or alternatively by using an internal Li-Ion rechargeable battery. The GPSMAP 296 is capable of storing date, route of flight, and flight time information for up to 50 individual flights in the form of a flight log. A detailed track log including latitude, longitude, date, time, and groundspeed 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. Track log storage may be activated or de-activated at user discretion.

3.1.3. Apple iPad Mini 1 Description

Personal Electronic Device (PEDs) are a category of devices comprised primarily of portable computing devices and mobile phones. Portable computing devices are typically capable of internet access, email, messaging services, and can run user-installed applications to perform specific tasks. Depending on the model, mobile phones can perform many of the same tasks as portable computing devices, plus have voice call and text messaging capabilities. PED user and system data is typically stored on non-volatile memory (NVM) and can be accessed through manufacturer-provided interfaces.

3.2. Data Recovery

3.2.1. Appareo Stratus PRX V2

The Appareo Stratus appeared to sustain minor cosmetic damage. Data was recovered normally by connecting the Stratus to a laboratory Ipad application compatible with the Stratus and transferring the data. Figures 1-2 show the Stratus in the condition it was received.



Figure 1. Photo of Apareo Stratus, as received.



Figure 2. Reverse of Apareo Stratus.

3.2.2. Garmin GPSMAP 296

The Garmin GPSMAP 296 sustained major damage during the accident (Figure 3). The memory chip containing the data was removed from the printed circuit card and imaged. The binary data was converted to engineering units using laboratory software.



Figure 3. Garmin GPSMAP 296, as received.

3.2.3. Apple iPad Mini 1

Upon arrival at the Vehicle Recorder Division, an exterior examination revealed minimal damage on the device, as shown in Figure 4. However, the device could not be powered on. The internal circuit board was recovered as shown in Figure 5. The circuit board turned on with surrogate and no password was required, as shown in Figure 6. However, the device could not be navigated using the touch screen. Furthermore, accessing the device data via laboratory software could not succeed due to the design of manufacture requiring user to select *Trust The Computer* via touch screen when device connected to a computer, as shown in Figure 7. Replacing the touchscreen did not have any effect.



Figure 4. Front and back of Apple iPad Mini 1 as received.

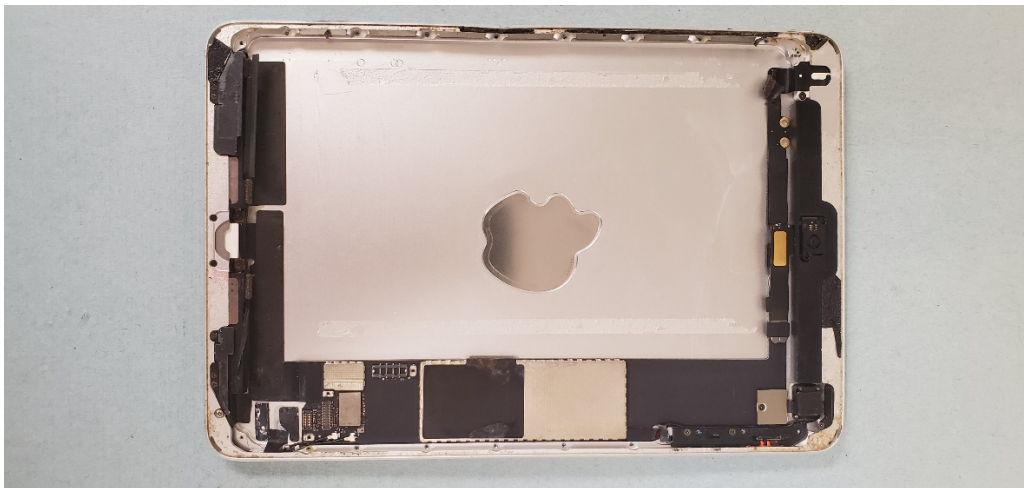


Figure 5. Recovered Circuit Board.



Figure 6. Device turned on with surrogate.

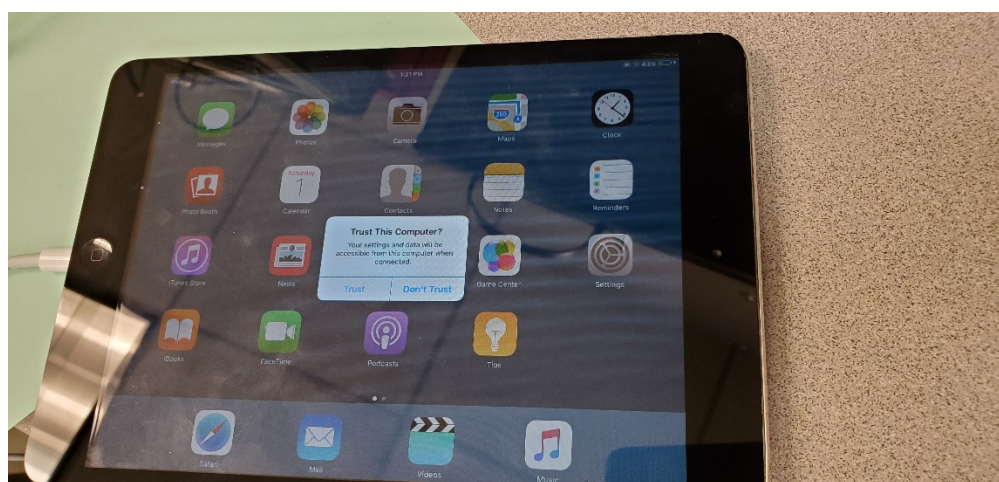


Figure 7. Device required user input to access its data.

3.3. Data Description

The Stratus recorded the accident flight starting 12:48:34 PDT and ending 12:56:48 PDT on March 11, 2018.

The Garmin GPS data was consistent with the data recorded on the Stratus. Because the Stratus data was sampled more frequently, continued recording longer, and contained more parameters than the Garmin, the Stratus data was used to generate the visual depictions in this report.

3.4. Parameters Provided

Table 1 describes data parameters provided by the Stratus. According to the Stratus Pilot Guide, the Stratus must be mounted properly to ensure the accuracy of the AHRS data.

Table 1. Stratus 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)
Pitch	Aircraft Pitch Attitude (deg)
Roll	Aircraft Roll Attitude (deg)
Groundspeed	Average derived groundspeed (knots)
Track	Average derived true course (degrees)

3.5. OVERLAYS AND TABULAR DATA

The flight departed the Woodland State Airport at about 12:50 PDT and flew southeast while climbing to about 450 feet GPS altitude. At about 12:55:30 PDT, the aircraft had descended to about 200 feet and began to circle a field. At 12:56:43 PDT, the aircraft began pitching up and at 12:56:44 PDT when the aircraft had slowed to about 50 knots ground speed, the aircraft banked to the right followed by a bank to the left of over 100° when the data ended at 12:56:48 PDT. Due to data buffering on the GPS unit, the data recording may have ended before the accident event.

Figure 8 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. Figure 9 shows the last 2 minutes of the accident flight.

Figure 10 is a plot of basic flight data for the entire accident flight and Figure 11 is the same information zoomed to the last 100 seconds of the accident flight.

Tabular data from the Stratus used to generate figures 8-11 are included as Attachment 1. The Garmin GPS data for the accident flight is included in Attachment 2. These attachments are provided in electronic comma-delimited (.CSV) format.

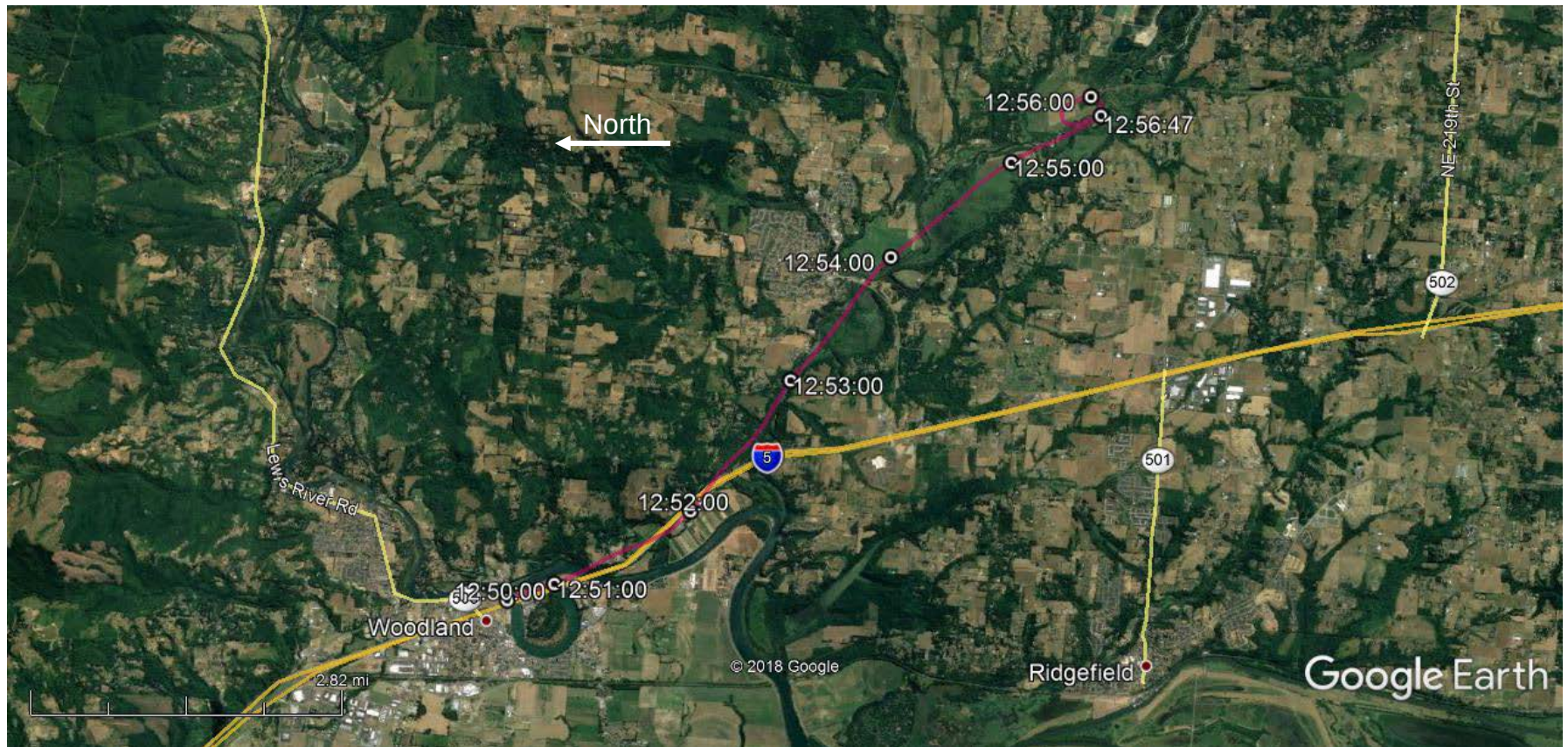


Figure 8. Google Earth overlay showing the entire accident flight.

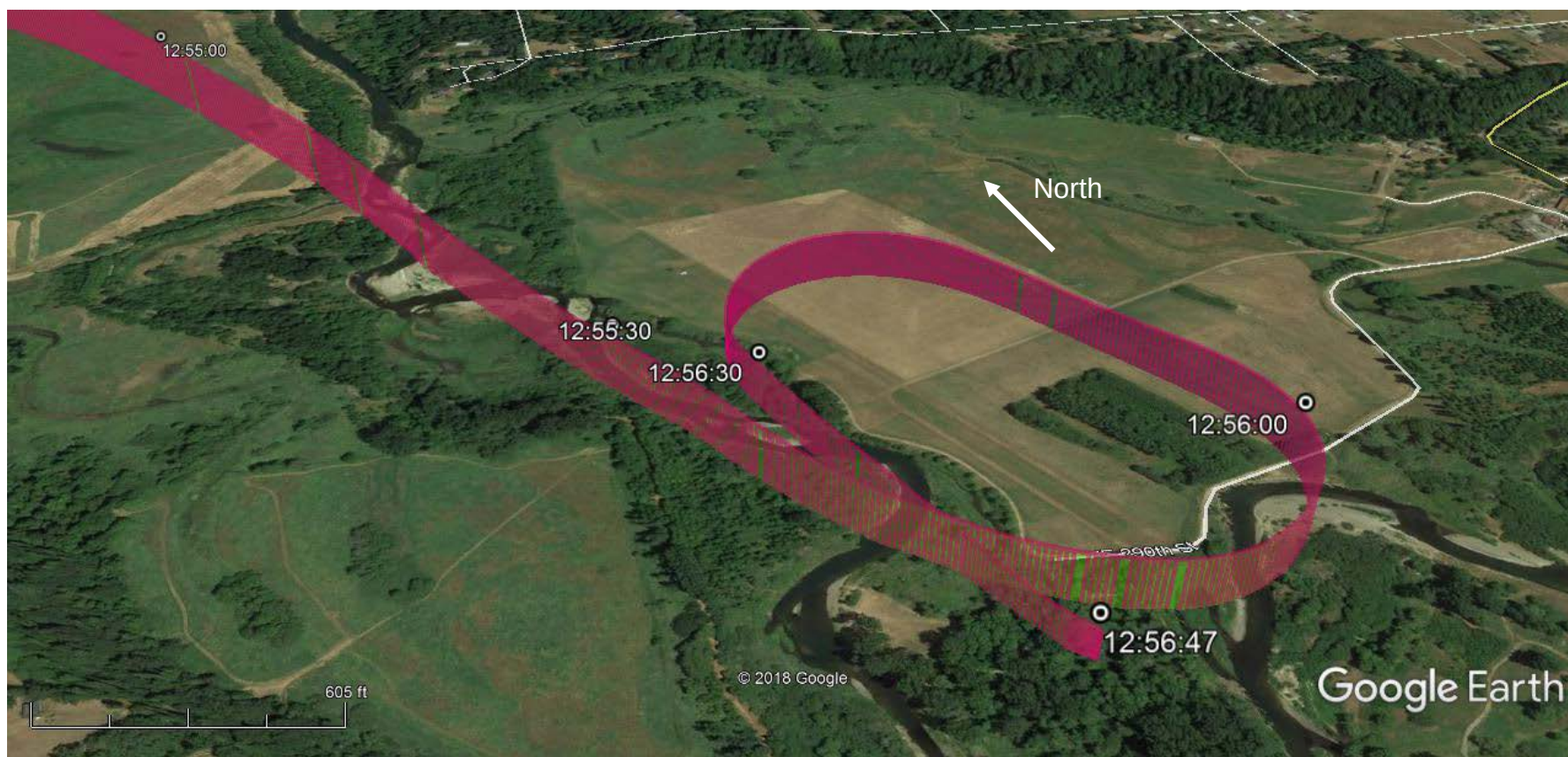


Figure 9. Google Earth overlay showing last 2 minutes of accident flight.

Piper PA-18-150, N4511Y

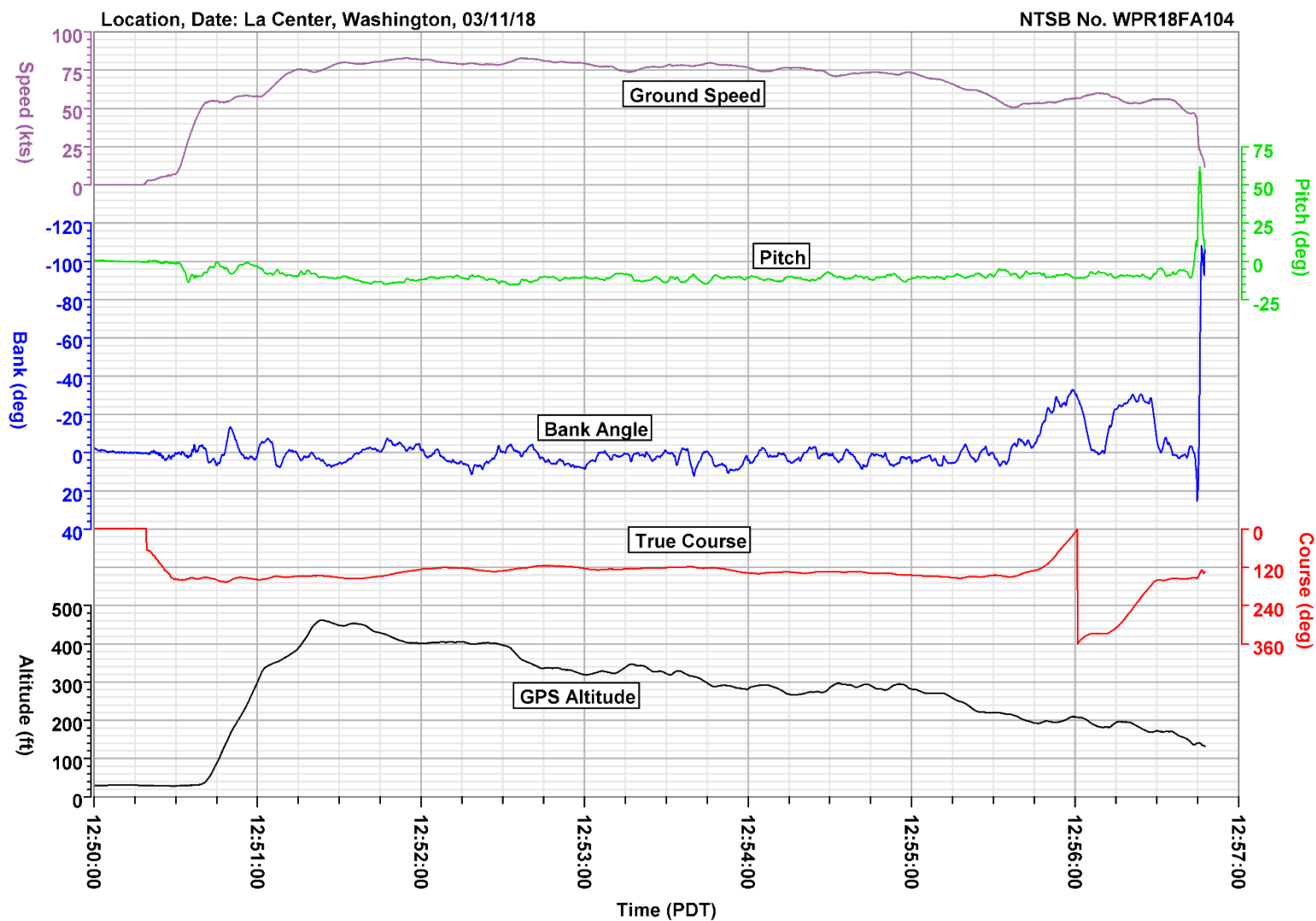


Figure 10. Flight data recorded during entire accident flight.

Piper PA-18-150, N4511Y

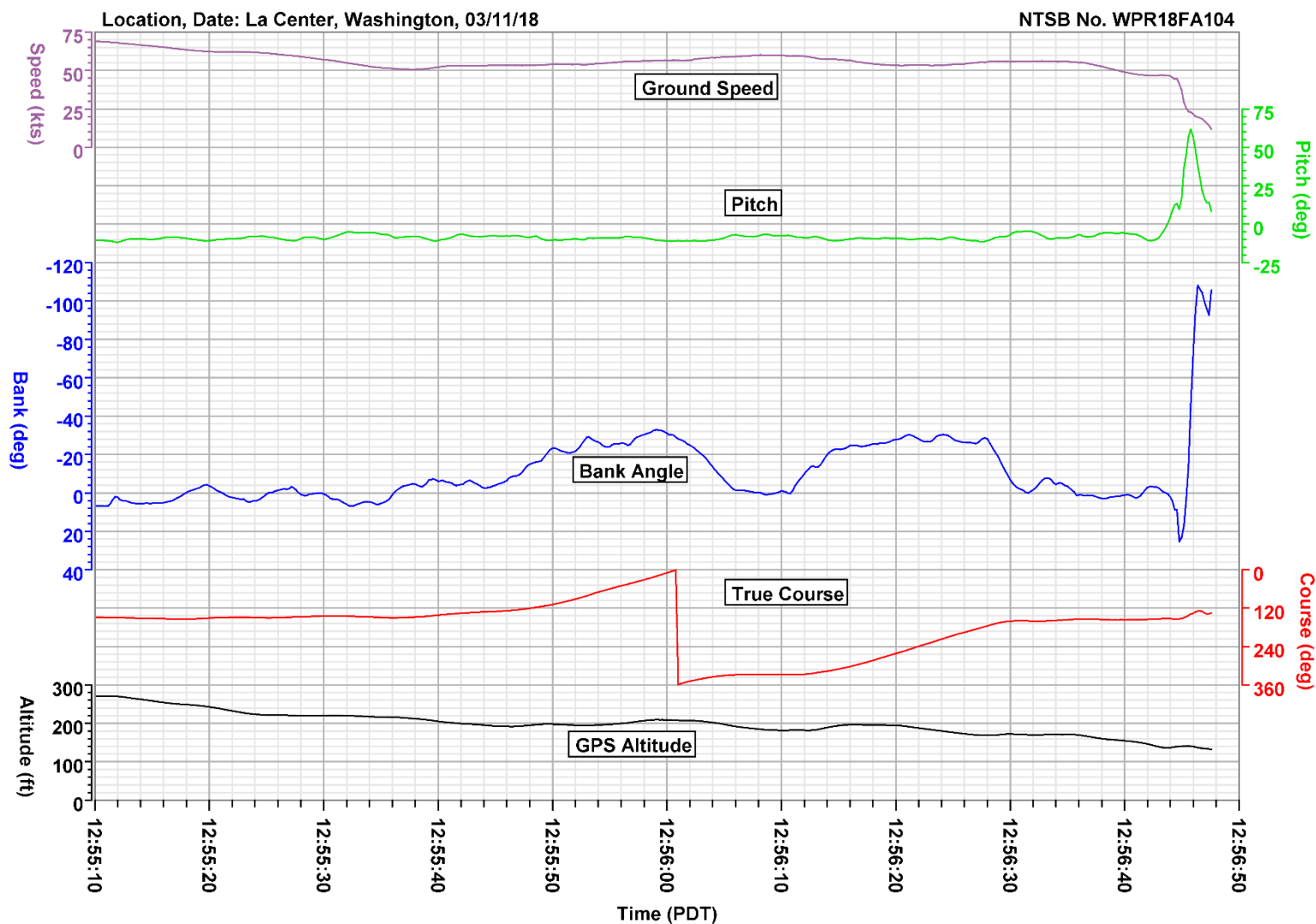


Figure 11. Flight data from last 100 seconds of accident flight.