

NATIONAL TRANSPORTATION SAFETY BOARD

Vehicle Recorder Division
Washington, D.C. 20594

December 11, 2018

ADS-B Device

**Specialist's Factual Report
Marie Moler**

1. EVENT

Location: Rockford, Illinois
Date: December 4, 2017
Aircraft/ID: Beech C90A / N500KR
Operator: Private
NTSB Number: CEN18LA047

2. ACCIDENT SUMMARY

On December 4, 2017, about 1802 central standard time, a Beech C90 airplane, N500KR, impacted terrain near the Chicago/Rockford International Airport (RFD), near Rockford, Illinois. The private pilot and one passenger sustained serious injuries and two passengers sustained minor injuries. The airplane sustained substantial fuselage damage during the impact. The airplane was registered to and operated by the pilot as a 14 Code of Federal Regulations Part 91 personal flight. Visual meteorological conditions prevailed in the area about the time of the accident, and the flight requested a local instrument flight rules clearance (IFR) near RFD. The flight originated from the Kissimmee Gateway Airport, near Orlando, Florida, about 1342 and was destined for RFD.

3. DETAILS OF DEVICE INVESTIGATION

The Safety Board's Vehicle Recorder Division received the following device:

Device: Appareo Stratus 2S
Device Serial Number: Stratus2S003194

3.1. Appareo Stratus 2S Device Description

The Appareo Stratus 2S is a battery-operated ADS-B receiver with Global Positioning System (GPS) capability designed to interface with an iPad, iPhone, or iPod Touch running the ForeFlight Mobile application via Wi-Fi. The Stratus uses ADS-B to provide access to NEXRAD radar, METARs, TAFs, NOTAMs and other FAA products via the ForeFlight application installed on a mobile device. The Stratus supports limited reception and display of ADS-B traffic information. Certain models include a complete Attitude Heading Reference

System (AHRS) that permits supplemental attitude information on the connected mobile device.

3.2. Appareo Stratus 2S Device Condition

The Appareo Stratus 2S was found in good condition (Figure 1). Power was applied to the unit using NTSB laboratory equipment. Data was downloaded from the device to ForeFlight Mobile on an NTSB iPad using Wi-Fi.

3.3. Data Description

The data extracted included 4 hours and 15 minutes of the accident flight on December 4, 2017 and four hours of the prior flight on December 1, 2017. Data was recorded at a rate of five samples per second.

3.4. Parameters Provided

Table 1 describes data parameters provided by the device. Date, Time, Latitude, Longitude, and Altitude are recorded by the device. Groundspeed and Course are derived from the recorded parameters. Bank and pitch are AHRS parameters.

Table 1: Data Parameters

Parameter Name	Parameter Description
Epoch time	Date and Time (UTC) recorded
Latitude	Recorded Latitude (degrees)
Longitude	Recorded Longitude (degrees)
Altitude	Recorded Altitude (feet)
Course	Average course between current and previous data point (degrees)
Groundspeed	Average groundspeed between current and previous data point (knots)
Bank	AHRS bank angle (deg)
Pitch	AHRS pitch angle (deg)
Horizontal Error	Accuracy (m)
Vertical Error	Accuracy (m)

4. OVERLAYS AND TABULAR DATA

Graphical overlays were generated using Google Earth for the accident flight. Figure 2 is a Google Earth overlay of the prior flight on December 1, 2017 from Chicago/Rockford International Airport in Rockford, Illinois to Kissimmee Gateway

Airport in Kissimmee, Florida. The recorded duration of the flight was from 17:59 to 22:17 CST. Figure 3 is a Google Earth overlay of the accident flight on December 4, 2017 from Kissimmee Gateway Airport in Kissimmee, Florida to Chicago/Rockford International Airport in Rockford, Illinois. The flight was recorded in three portions: from 13:43 to 13:50 CST, from 13:54 to 14:09 CST, and from 14:10 to 18:05 CST. Figure 4 shows the end of flight.

The tabular data used to create Figures 2, 3 and 4 are included as Attachment 1 (accident flight, December 4, 2017) and 2 (prior flight, December 1, 2017). This attachment is provided in electronic comma separated value (CSV) format.



Figure 1: Appareo Stratus 2S (S/N Stratus2S003194)

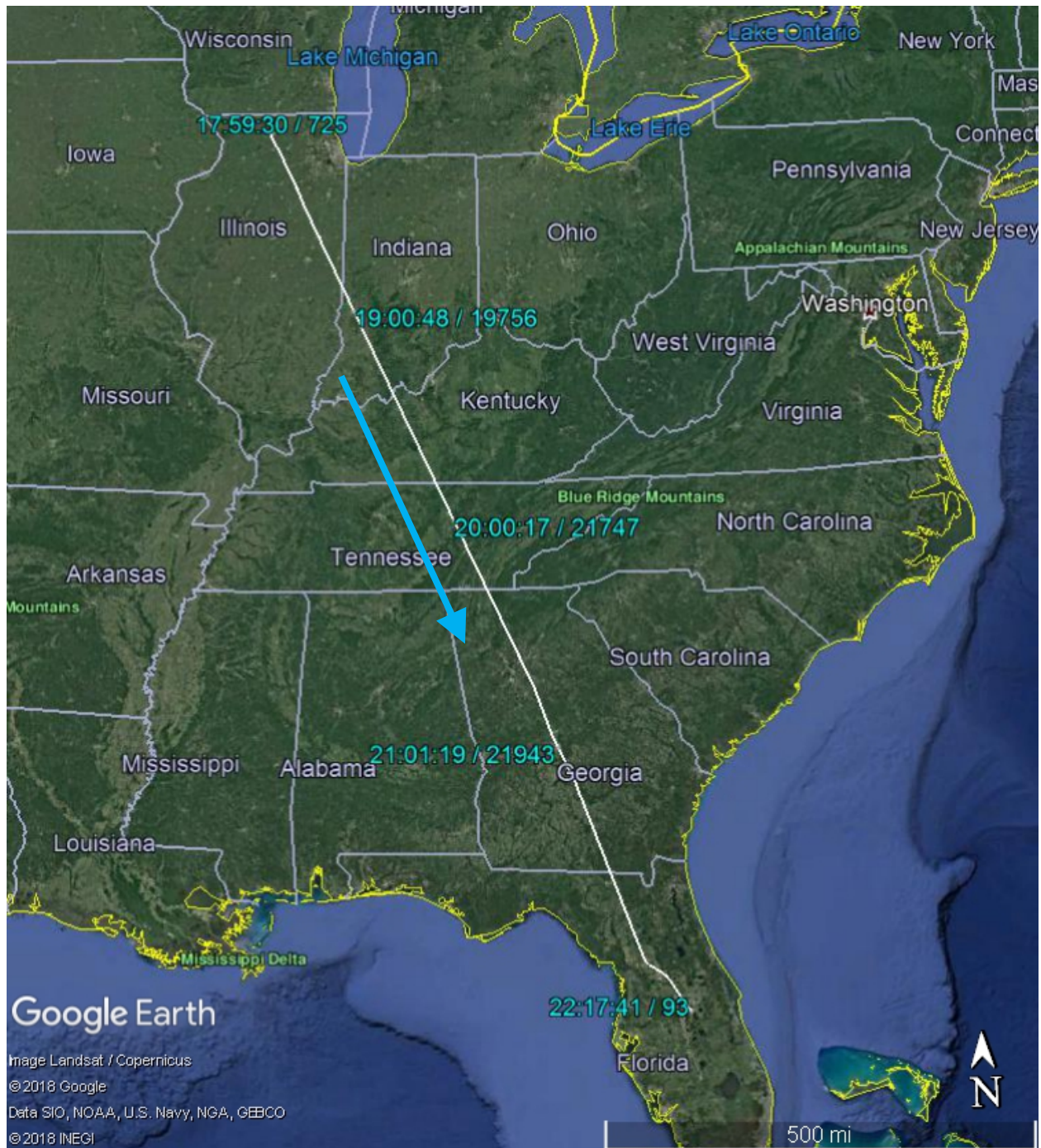


Figure 2: Google Earth overlay of December 1, 2017 flight from Chicago/Rockford International Airport in Rockford, Illinois to Kissimmee Gateway Airport in Kissimmee, Florida. Times are shown in CST, recorded altitude in feet. The blue arrow shows the direction of travel.

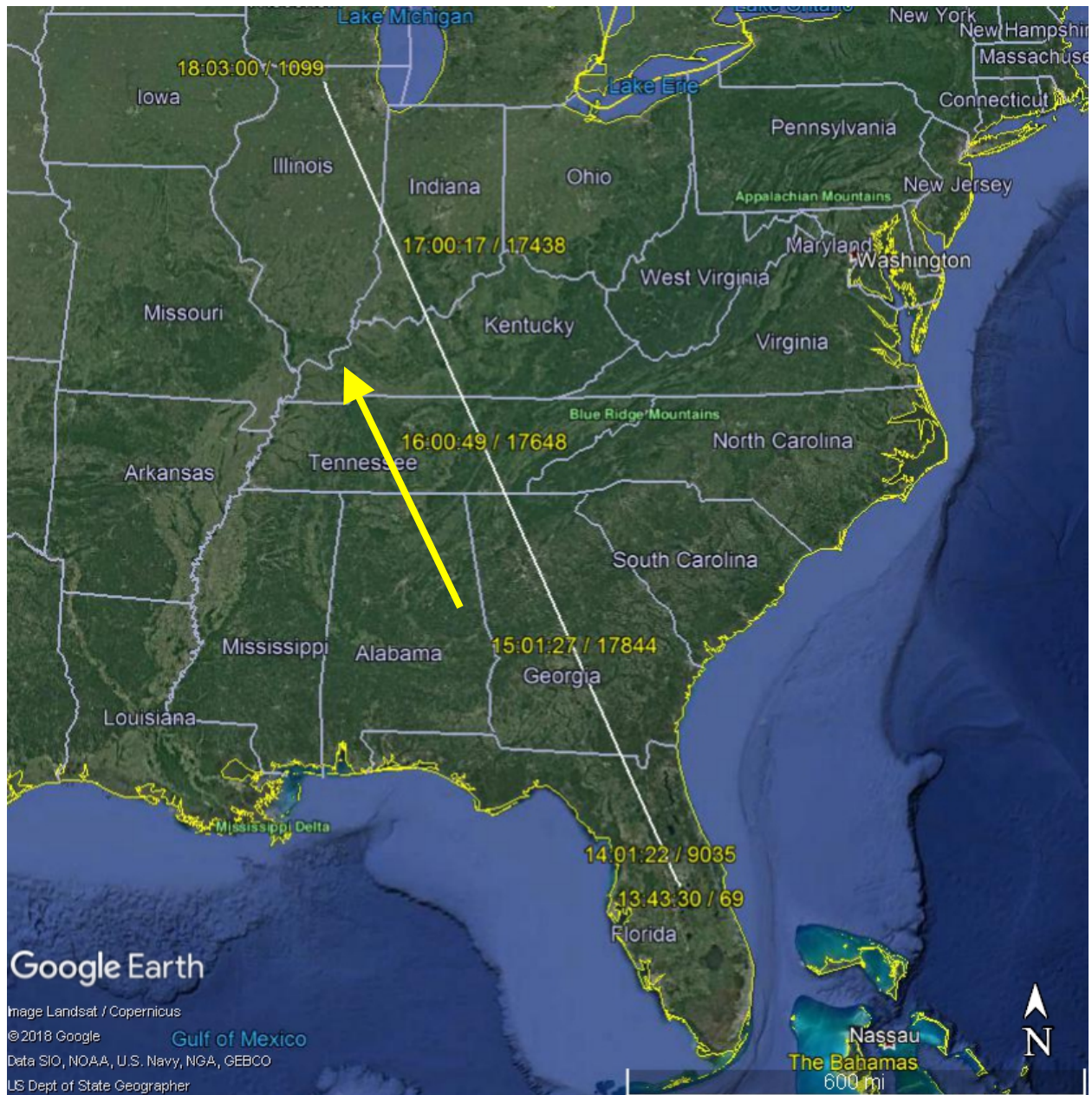


Figure 3: Google Earth overlay of December 4, 2017 flight from Kissimmee Gateway Airport in Kissimmee, Florida to Chicago/Rockford International Airport in Rockford, Illinois. Times are shown in CST, recorded altitude in feet. The yellow arrow shows the direction of travel.



Figure 4: Google Earth overlay of December 4, 2017 flight to Chicago/Rockford International Airport in Rockford, Illinois. Times are shown in CST, recorded altitude in feet. Data has been down-sampled to once per second.