

NATIONAL TRANSPORTATION SAFETY BOARD

Vehicle Recorder Division

Washington, D.C. 20594

October 24, 2016

Global Positioning System Device

Specialist's Factual Report

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1. EVENT SUMMARY

Location: Houlton, Maine
Date: August 27, 2015
Aircraft: Piper PA-44-180
Registration: N553MD
Operator: Private
NTSB Number: ERA15FA326

On August 27, 2015, about 0200 eastern daylight time (EDT), a Piper PA-44-180, N553MD, was destroyed when it impacted trees and terrain while conducting an instrument approach to Houlton International Airport (HUL), Houlton, Maine. The airline transport pilot was fatally injured. The flight departed Goose Bay Airport (CYJR), Goose Bay, Newfoundland and Labrador, Canada, about 2115 EDT. Instrument meteorological conditions prevailed, and an instrument flight rules (IFR) flight plan was filed for the flight, which was conducted under the provisions of Title 14 *Code of Federal Regulations* Part 91.

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:	1H6008791

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 is capable of receiving XM satellite radio for flight information including NEXTRAD radar, lightning, METARs, TAFs, and TFRs. The unit

can also perform and store weight and balance calculations. A built-in AOPA Airport Directory and Safe Taxi Airport Diagrams are included for selected fields. 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. The current track log can be saved to long-term memory and 15 saved track logs can be maintained in addition to the current track log. Track log storage may be activated or de-activated at user discretion. All recorded data is stored in non-volatile memory.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 device exhibited slight impact related damage (Figures 1 and 2). The unit was powered and data was downloaded per the manufacturer's instructions.



Figure 1. Front of device, as received.

¹ Non-volatile memory device do not require power to retain data.



Figure 2. Rear of device, as received.

3.3. Data Description

The data extracted included 15 track logs from August 20, 2015, through August 27, 2015. The accident flight was recorded starting 0013:40 UTC and ending 0556:05 UTC on August 27, 2015. In addition, five previous flights, beginning on August 9, 2015, were determined to be of interest and are included in this report.²

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 Due to the large number of time zones traversed, all 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 Goose Bay at approximately 0024 UTC and proceeded southwest while climbing to approximately 7000 feet. About 0140, the aircraft turned south and climbed. At about 0157 UTC, the aircraft turned back to the southwest. The aircraft began descending as it approached the southern Quebec shore on the Gulf of St. Lawrence. At 0256 UTC, the aircraft completed a 360 turn about midway between the Quebec shore and Anticosti Island at about 5900 feet. The aircraft began to climb when it crossed the coast of the Gaspé Peninsula. The aircraft flew over Houlton, ME, at 0544 UTC while descending for the approach. At 0549 UTC, the aircraft began a right turn and began to fly a northeasterly heading toward the Houlton International Airport. The last recorded parameter was as at 0556:05 UTC on August 27, 2015, with a GPS altitude of 869 feet and a ground speed of 103 knots. Due to data buffering on the GPS unit, the data recording may have ended before the accident event.

Figure 4 shows the final approach overlaid on the approach plate for the runway 5 RNAV approach. Figure 5 shows a three dimensional representation of the final approach.

The accident flight was the latest leg in a series of flights that began in Europe on August 25. Table 2 outlines the dates, times, and durations of these flights.

Table 2. Details of previous flights.

Date (UTC)	Start Time (UTC)	End Time (UTC)	Origin	Destination	Duration (hh:mm)
25 August	~0609 ^A	0721	Rennes, France	Bournemouth, UK	1:12
25 August	0917	1325	Bournemouth, UK	Wick, UK	4:08
25 August	1456	2008	Wick, UK	Keflavik, Iceland	5:12
26 August	0803	1324	Keflavik, Iceland	Narsarsuad, Greenland	5:21
26 August	1503	2046	Narsarsuad, Greenland	Goose Bay, Canada	5:43
27 August	0013	0556	Goose Bay, Canada	Houlton, Maine	5:43

^A GPS began recording 12 nm north of the departure airport.

Tabular data used to generate figures 3 through 5 are included as Attachment 1. This attachment is provided in electronic comma-delimited (.CSV) format.

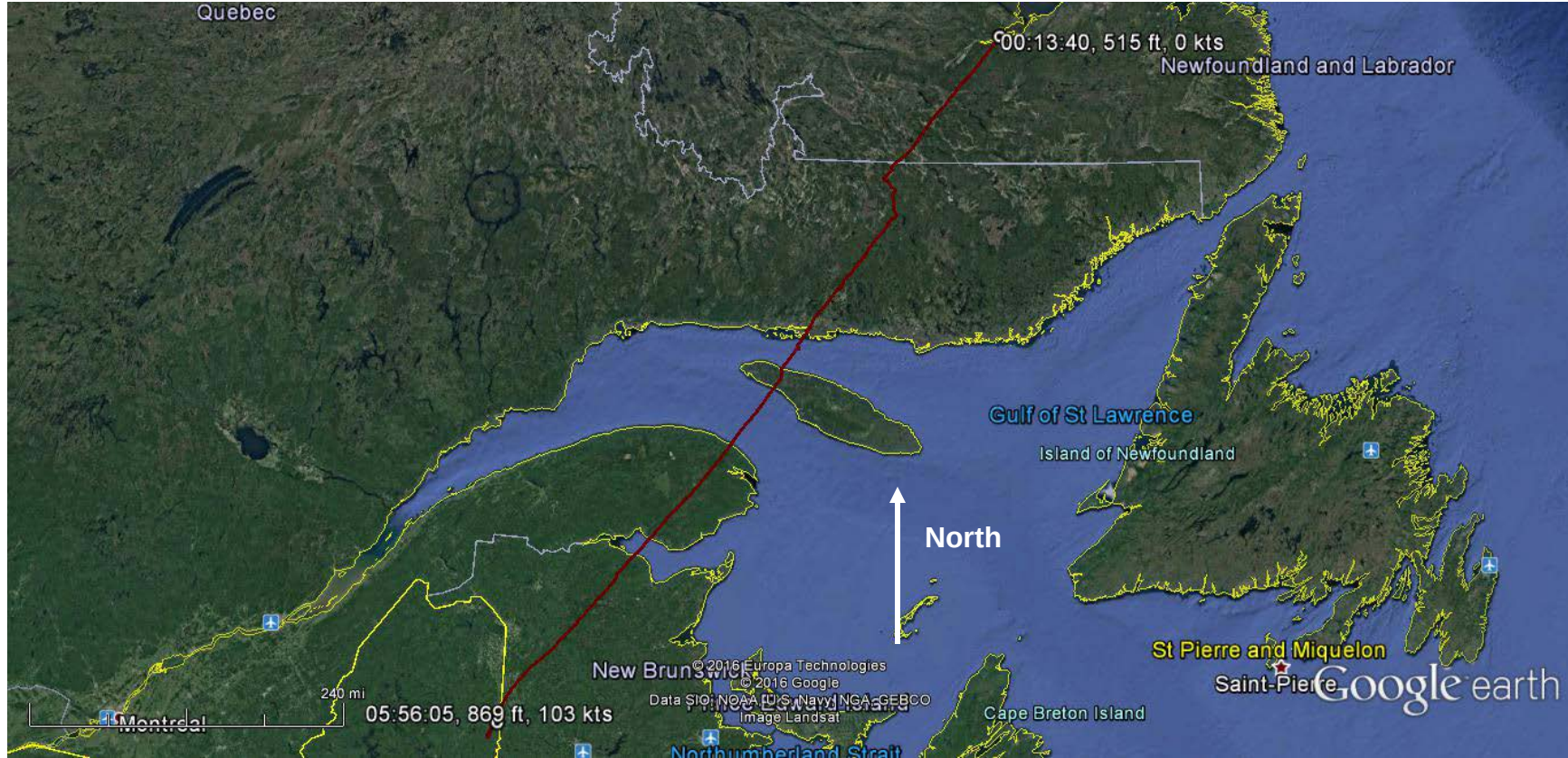


Figure 3. Overview of accident flight.

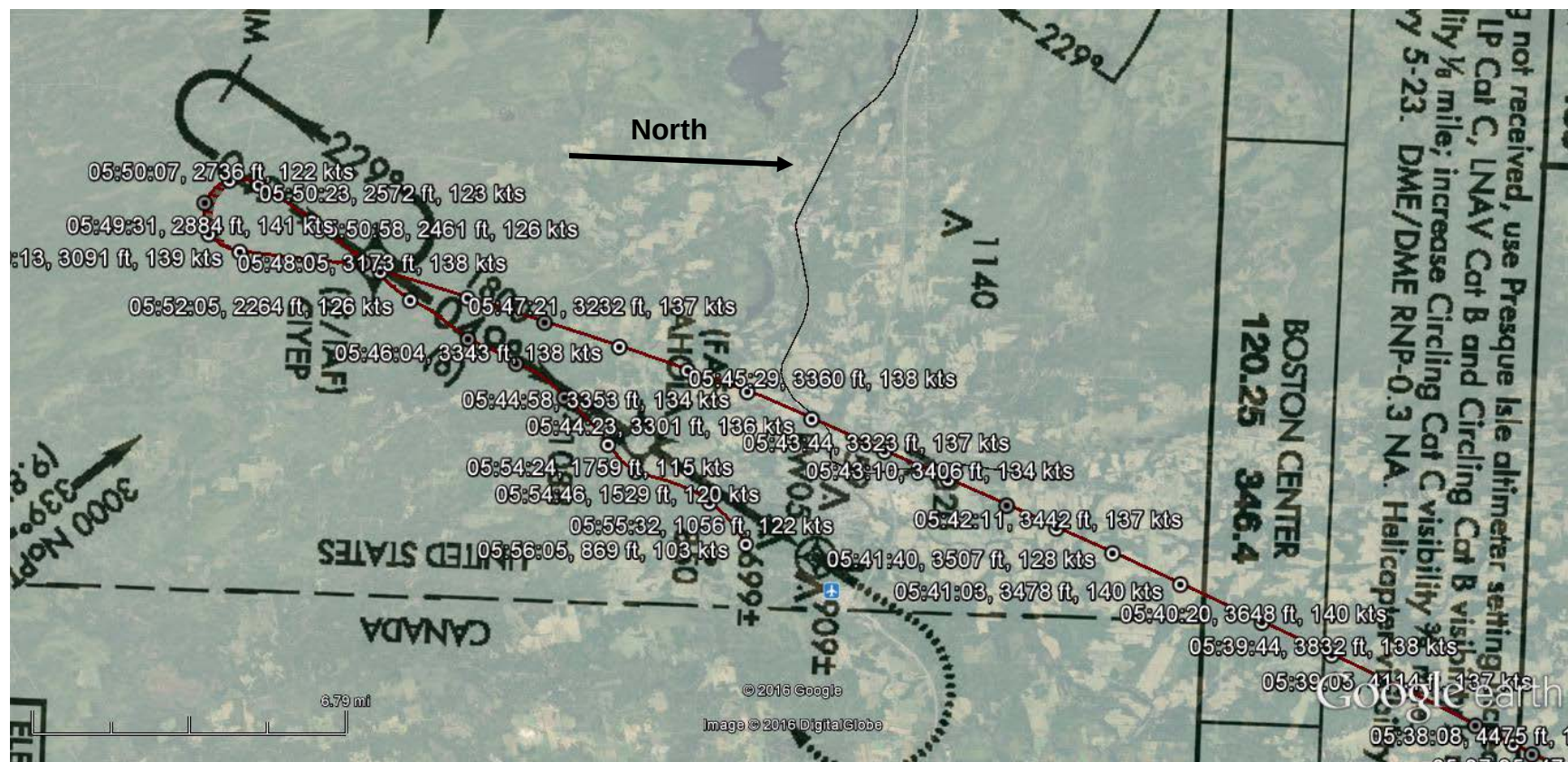


Figure 4. Final approach overlaid on RNAV 5 approach chart (some points removed for clarity).

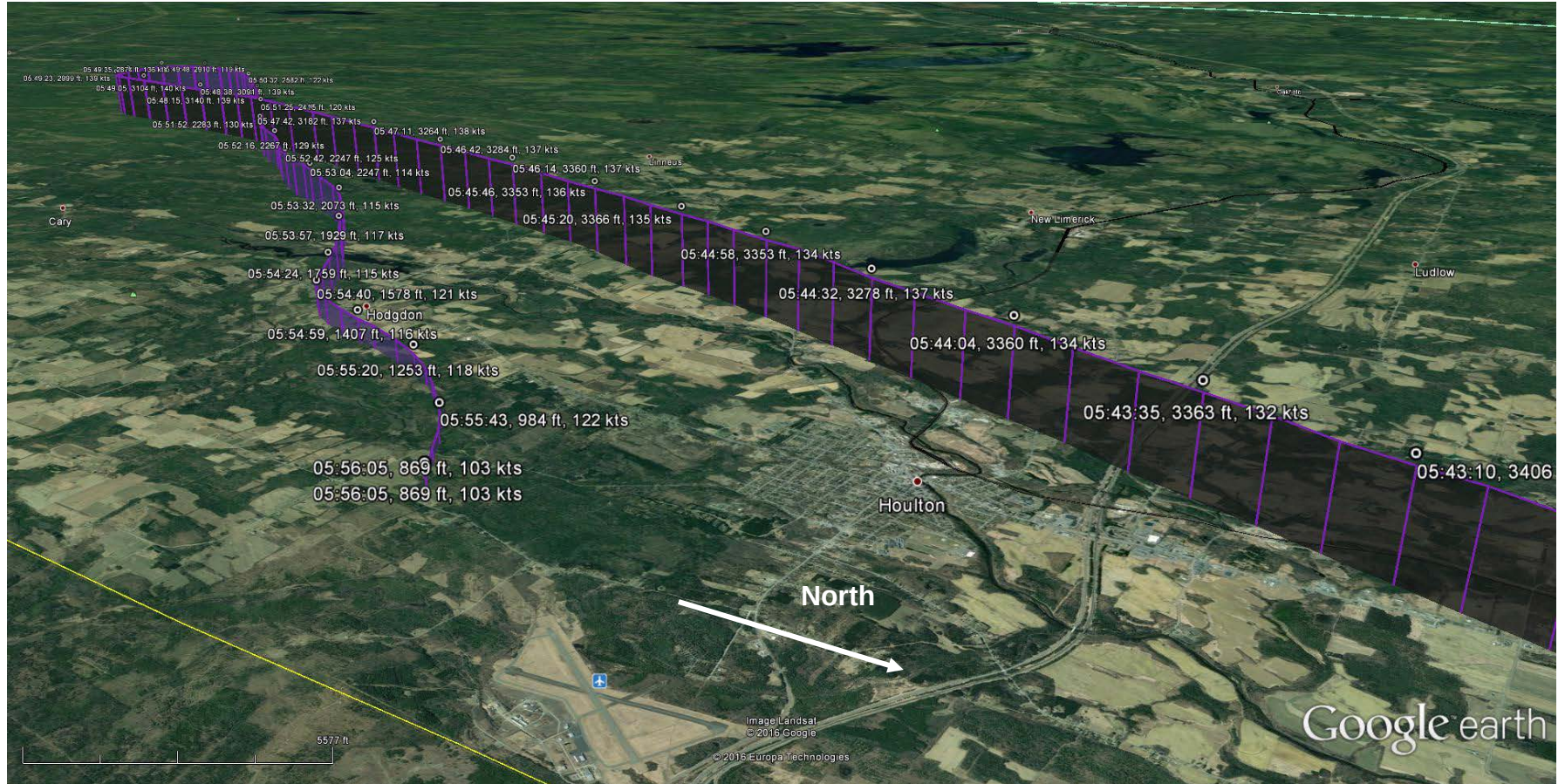


Figure 5. Three dimensional view of final approach.