

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

March 20, 2017

Other Recording Devices

**Specialist's Factual Report
by James Cash**

1. EVENT

Location: Weatherford, Texas
Date: July 19, 2016
Aircraft: Cessna 182
Registration: N2644F
NTSB Number: CEN16LA270

On July 19, 2016, about 0900 central daylight time, a Cessna 182J, N2644F, experienced a loss of engine power after departure and the pilot conducted a forced landing to a field near Weatherford, Texas. The private rated pilot and one passenger sustained minor injuries, another passenger sustained serious injuries. The airplane sustained substantial damage. The airplane was registered to and operated by a private individual under the provisions of 14 Code of Federal Regulations Part 91 as a personal flight. Visual meteorological conditions prevailed for the flight which operated without a flight plan. The flight was departing from Parker County Airport (WEA), Weatherford, TX and was en route to Pecos Municipal Airport (PEQ), Pecos, Texas.

2. DETAILS OF INVESTIGATION

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

Device 1: Garmin Aera 796
Device 1 Serial Number: 2CY003018

Device 2: JPI EDM-700
Device 2 Serial Number: 27827

2.1. Garmin Aera 796 Device Description

The Garmin Aera 796 GPS is a battery-powered portable 12-channel GPS receiver with a color touch screen display. The unit stores date, route-of-flight, and flight-time information for up to 9,999 points. A flight record is triggered when groundspeed exceeds 30 knots and altitude exceeds 500 feet, and ends when groundspeed drops below 30 knots for 10 minutes or more. A detailed tracklog – including latitude, longitude, date, time, and GPS altitude information for up to 9,999 points is stored within

the unit whenever the receiver has a lock on the GPS navigation signal. Position is updated within the tracklog as a function of time or distance moved, depending on how the unit has been configured. Once the current tracklog memory becomes full, new information either overwrites the oldest information or recording stops, depending on how the unit is configured. Tracklog storage may be activated or de-activated at user discretion. All recorded data is stored in non-volatile memory¹. The unit contains hardware and software permitting the download of recorded waypoint, route, and tracklog information to a PC via a built-in USB port using the NMEA 0183 version 2.0 protocol. 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.

2.1.1. Garmin Aera 796 Data Recovery

Upon arrival at the Vehicle Recorder Division, an exterior examination revealed the unit had not sustained any damage and information was extracted using the manufacturer's software normally, without difficulty.

2.1.2. Garmin Aera 796 Data Description

The data extracted included 12 sessions (9,999 total data points) from April, 22, 2016² through July 19, 2016. The accident flight was the last session, recorded starting at 08:15:01 UTC and ending at 10:23:37 UTC on July 19, 2016 (261 total data points).

2.1.3. Garmin Aera 796 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)

2.2. JPI EDM-700 Device Description

The J. P. Instruments EDM-700 is a panel mounted display that the operator can monitor and record multiple engine parameters related to the aircraft's engine

¹ Type of solid state memory that does not require electrical power to retain information

² All dates and times in report are converted to Central Daylight Time (CDT).

operation. Depending on the installation, the engine parameters monitored can include:

- Exhaust Gas Temperature (EGT)
- Cylinder Head Temperature (CHT)
- Fuel Used
- Fuel Flow
- Battery Voltage

The unit can also record fuel used, shock cooling rate and EGT differentials between the highest and lowest cylinder temperatures. The calculations are also based on the aircraft installation.

The unit contains non-volatile memory for data storage of the parameters recorded and calculated. The unit creates a new session or a file folder for every electrical power application to the unit. The rate at which the data is stored is selectable by the operator from 2 to 500 seconds per sample. The memory can store over 100 hours of data at a 6 second sample rate. The data can then be downloaded by the operator using the J.P. Instruments software. The accident unit was set at the default recording rate of one sample every six seconds.

2.2.1. JPI EDM-700 Data Recovery

Upon arrival at the Vehicle Recorder Laboratory, an exterior examination revealed the unit had not sustained any damage and information was extracted using the manufacturer's software normally, without difficulty.

2.2.2. JPI EDM-700 Data Description

The data extracted included 177 sessions from June 23, 2016 through July 19, 2016, 2012 (9,578 total data points). The accident flight was found on sessions 170 thru 177. The recording started at 1329:26³ UTC and ending at 1506:42 UTC on July 19, 2016 (724 total data points).

3.0 Recorded data plots and tabular data

Figure 1 is a graphical overlay generated using Google Earth for the day of July 19, 2016. 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 Denton Enterprise Airport (DTO), Denton, Texas, at approximately 0834:14 CDT. The aircraft landed at Parker County Airport (WEA),

³ Times converted to Central Daylight Time for report.

Weatherford, TX at 0856:51 CDT. The aircraft departed from the Parker County airport at 0901:00 CDT. The last recorded data point when the aircraft stopped moving was at 0903:13 CDT. The last recorded data point in the GPS unit was at 0923:37 CDT on July 19, 2016.

Figure 2 is a graphical overlay generated using Google Earth zoomed in on the accident flight.

Figure 3 is a plot of the data recovered from the JPI EDM-700 engine monitor for the entire flight. Garmin Aera 796 GPS data for altitude, groundspeed and track are also included in the plot for reference purposes.

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

FIGURE 1 Google Earth Overlay of Accident Day Flight

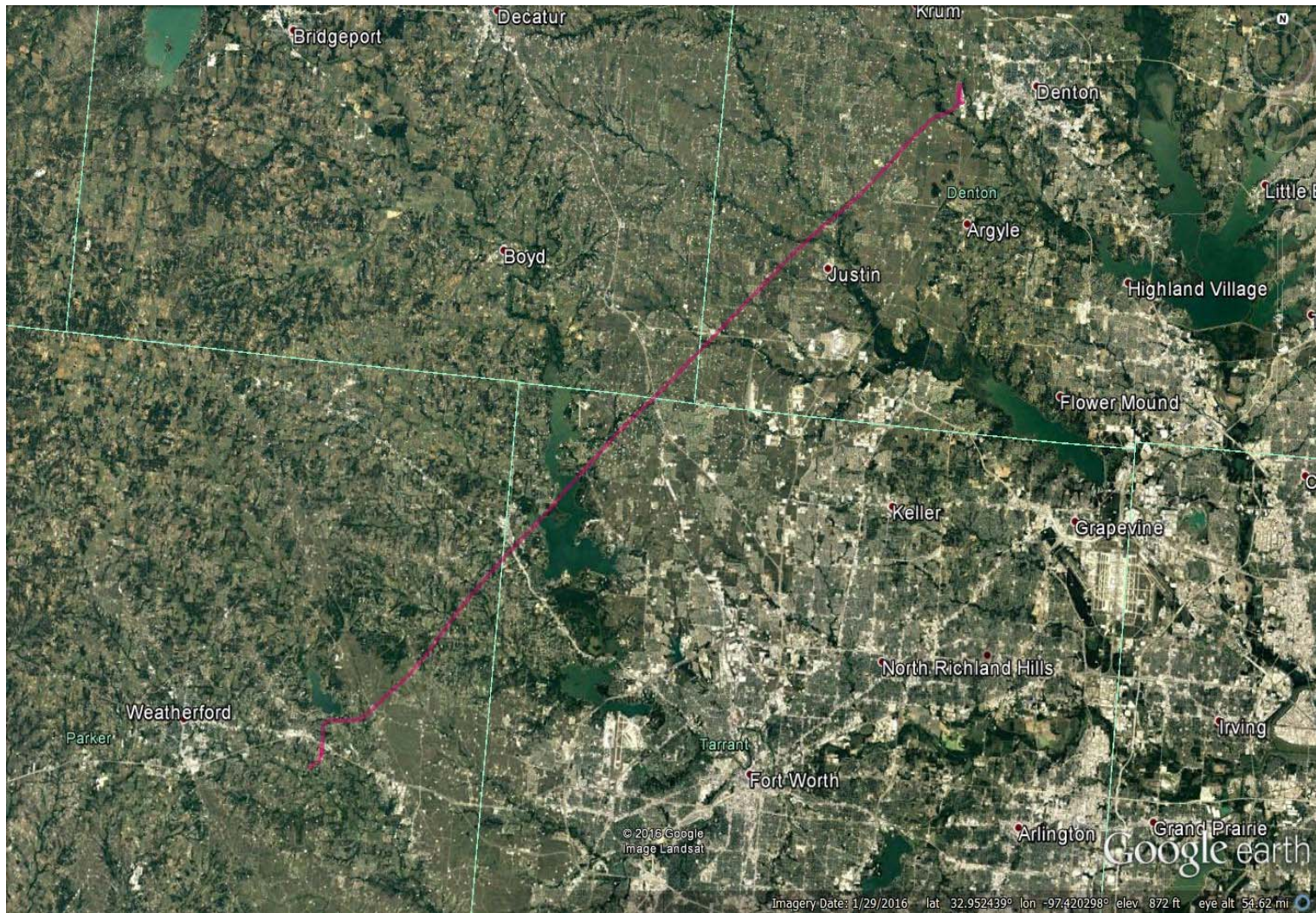


FIGURE 2 Google Earth Overlay of Accident Flight

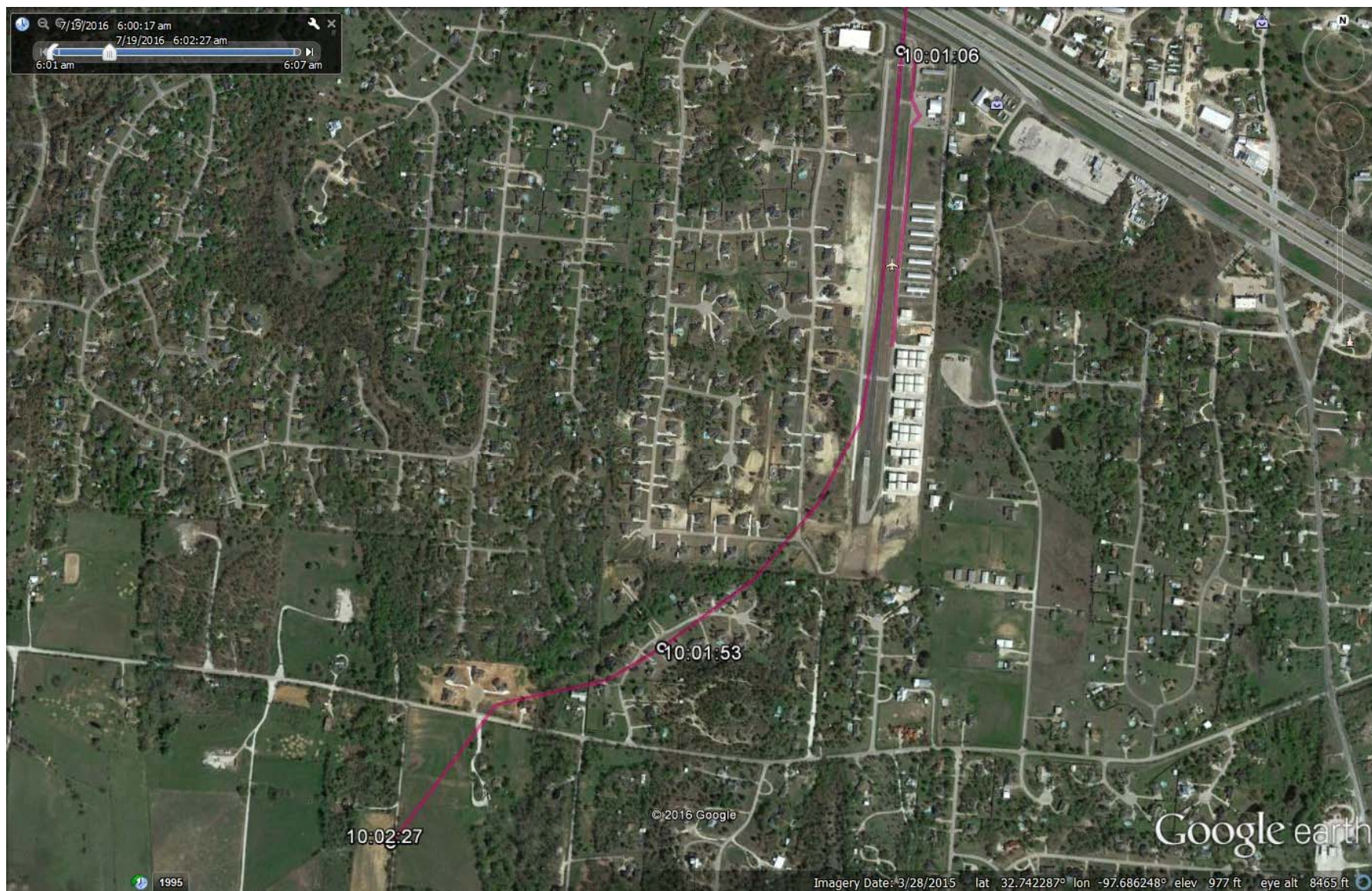


FIGURE 3 Engine and GPS Data of Accident Day

