

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

February 7, 2013

## **Electronic Devices Factual Report**

**Specialist's Factual Report**  
**by Bill Tuccio**

### **1. EVENT**

Location: Effingham, South Carolina  
Date: August 11, 2012  
Aircraft: Beechcraft V35  
Registration: N11JK  
Operator: Private  
NTSB Number: ERA12LA500

On August 11, 2012, about 1310 eastern daylight time, a Beech V35B, N11JK, was substantially damaged during a forced landing following a loss of engine power near Effingham, South Carolina. The certificated private pilot and the passenger were not injured. Instrument meteorological conditions prevailed, and instrument flight rules flight plan was filed for the flight. The flight departed Manassas Regional Airport (HEF), Manassas, Virginia at 1052, and was destined for Flagler County Airport (XFL), Palm Coast, Florida. The personal flight was conducted under the provisions of Title 14 Code of Federal Regulations Part 91.

### **2. DETAILS OF DEVICE INVESTIGATION**

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

Device 1: Garmin GMA 347 Audio Panel  
Device 1 Serial Number: 47006765

Device 2: Horizon Instruments P-1000 Digital Engine Tachometer  
Device 2 Serial Number: 02504

Device 3: JPI EDM-700  
Device 3 Serial Number: 31745

#### **2.1. Garmin GMA 347 Audio Panel Description**

The Garmin GMA 347 Audio Panel provides audio control for communication, navigation, telephone, and intercom functions. Additionally, the GMA 347 records the last two and a half minutes of radio communications for later pilot initiated playback.

### **2.1.1. Garmin GMA 347 Audio Panel Data Recovery**

Upon arrival at the Vehicle Recorder Laboratory, an exterior examination revealed the unit had not sustained any damage. Power was applied to the unit and audio sounds were tested to verify laboratory wiring.

### **2.1.2. Garmin GMA 347 Audio Panel Data Description**

No audio was retrieved via the GMA 347 "Play" button.

## **2.2. Horizon Instruments P-1000 Description**

The Horizon Instruments P-1000 Digital Engine Tachometer provides diagnostic and performance information about the engine and ignition system of the aircraft. Information is displayed to the pilot on a panel-mounted Liquid Crystal Display (LCD). The device only retains the accumulated engine time, in hours, and maximum RPM in non-volatile memory; no other historical information is recorded.

### **2.2.1. Horizon Instruments P-1000 Data Recovery**

Upon arrival at the Vehicle Recorder Laboratory, an exterior examination revealed the unit had not sustained any damage. Power was applied to the unit and it started normally.

### **2.2.2. Horizon Instruments P-1000 Data Description**

The unit maximum RPM value was 0. The total tachometer time was 2899.84 hours.

## **2.3. JPI EDM-700 Device Description**

The J.P. Instruments (JPI) EDM-700 is a panel mounted instrument enabling the operator to monitor and record up to 24 parameters related to engine operations. Depending on the installation, engine parameters monitored can include: exhaust gas temperature (EGT), cylinder head temperature (CHT), oil pressure and temperature, manifold pressure, outside air temperature, turbine inlet temperature (TIT), 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 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 rate at which the data is stored is selectable by the operator from 2 to 500 seconds per sample. The memory can store up to 20 hours of data at a 6 second sample rate. The data can then be downloaded by the operator using the J.P. Instruments software.

### **2.3.1. 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.

### **2.3.2. JPI EDM-700 Data Description**

The data extracted included 20 sessions from April 2, 2012 through August 11, 2012. The last recorded data on the unit was at 1726:38, as reported by the user set internal clock.

### **2.3.3. JPI EDM-700 Engineering Units Conversion**

The engineering units conversions used for the data contained in this report are based on documentation from JPI, the manufacturer of the EDM-700.

Appendix A lists the EDM-700 parameters verified and provided in this report.

### **2.3.4. JPI EDM-700 Time Correction**

The time recorded by the EDM-700 is based upon a user set internal clock and consequently may not accurately reflect local or UTC time. In order to adjust the EDM-700 recorded time to UTC time, the unit was powered in the laboratory and the time compared to UTC time as reported by the U.S. Naval Observatory. As a result, 13 minutes was subtracted from EDM-700 time to adjust times to UTC. All times reported in this report are UTC.

### **2.3.5. JPI EDM-700 Plots and Tabular Data**

Figure 1 shows data recorded for the entire accident flight. The recording began at about 1435:43. After about 1530:43, all recorded parameters remained fairly steady until about 1658, when engine values began to change.

Figure 2 shows data recorded from 1658 until the end of the recording. At about 1659:53, CHT began to decrease. At about 1700:48, EGT decreased rapidly, and TIT began to decrease. Between about 1701:30 and 1707:49, EGT values fluctuated.

At about 1707:49, all recorded values changed from prior trends. The EGT and TIT values began a steady decrease until the end of the recording. The voltage (Batt-1) decreased from a prior steady value of 14.2 Volts to about 11.5 Volts. The oil temperature also increased. The #6 CHT (CHT-6) value began to report bad data; the other CHT values began to decrease.

Between 1708:25 and 1708:49, the unit did not record any data. When the recording resumed at 1708:49, the #3 CHT (CHT-3) and #5 CHT (CHT-5) began to report bad data. The recording ended at 1713:38.

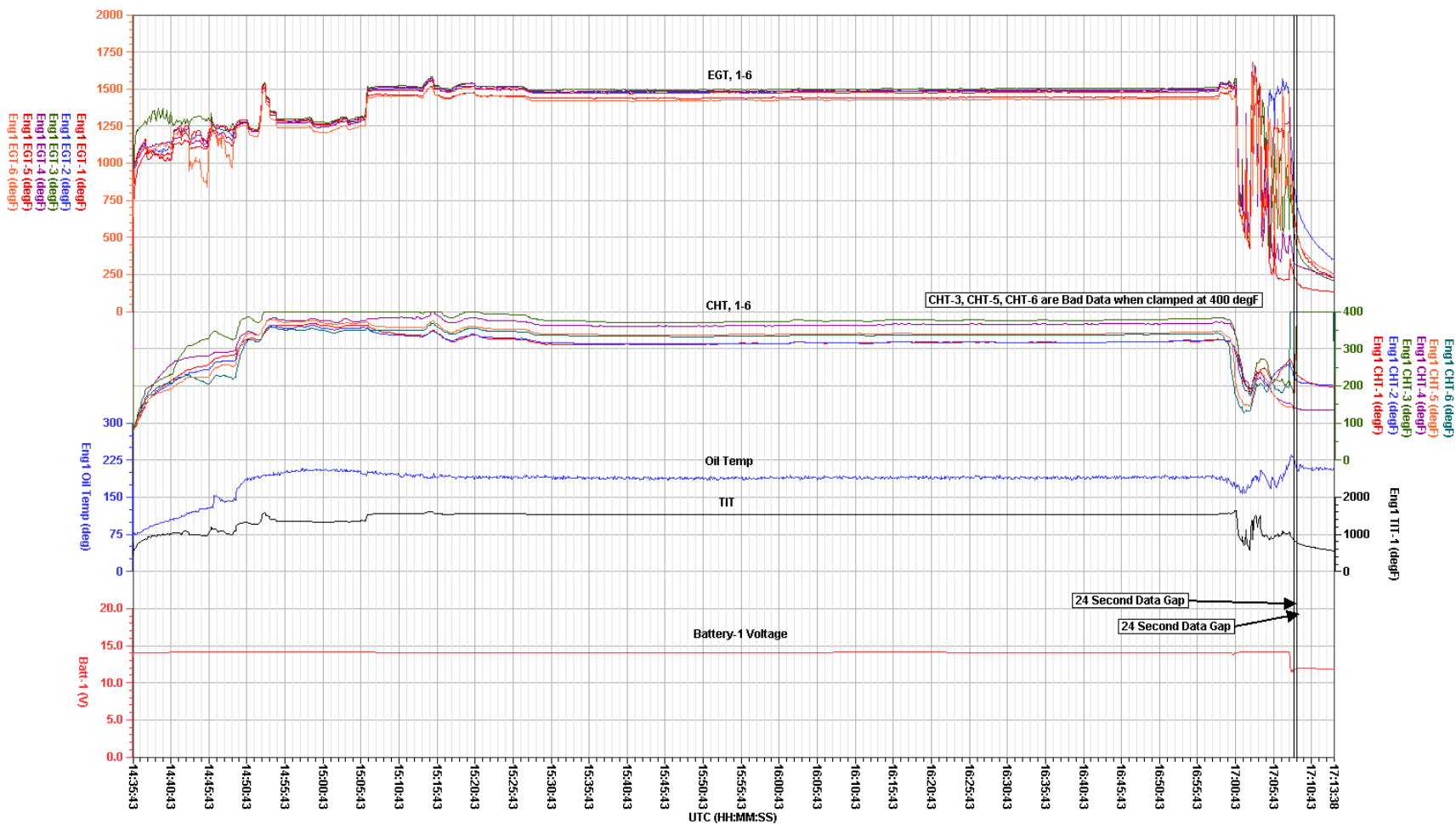
The corresponding tabular data used to create figures 1 and 2 is provided in electronic comma-separated value (\*.csv) format as Attachment 1 to this report.

Figure 1. EDM-700 data for entire accident flight.

Beechcraft V35, N11JK, JPI EDM-700

Location, Date: Effingham, South Carolina , 08/11/12

NTSB No. ERA12LA500



Revised: 10 January 2013

Accident Flight - Entire Flight

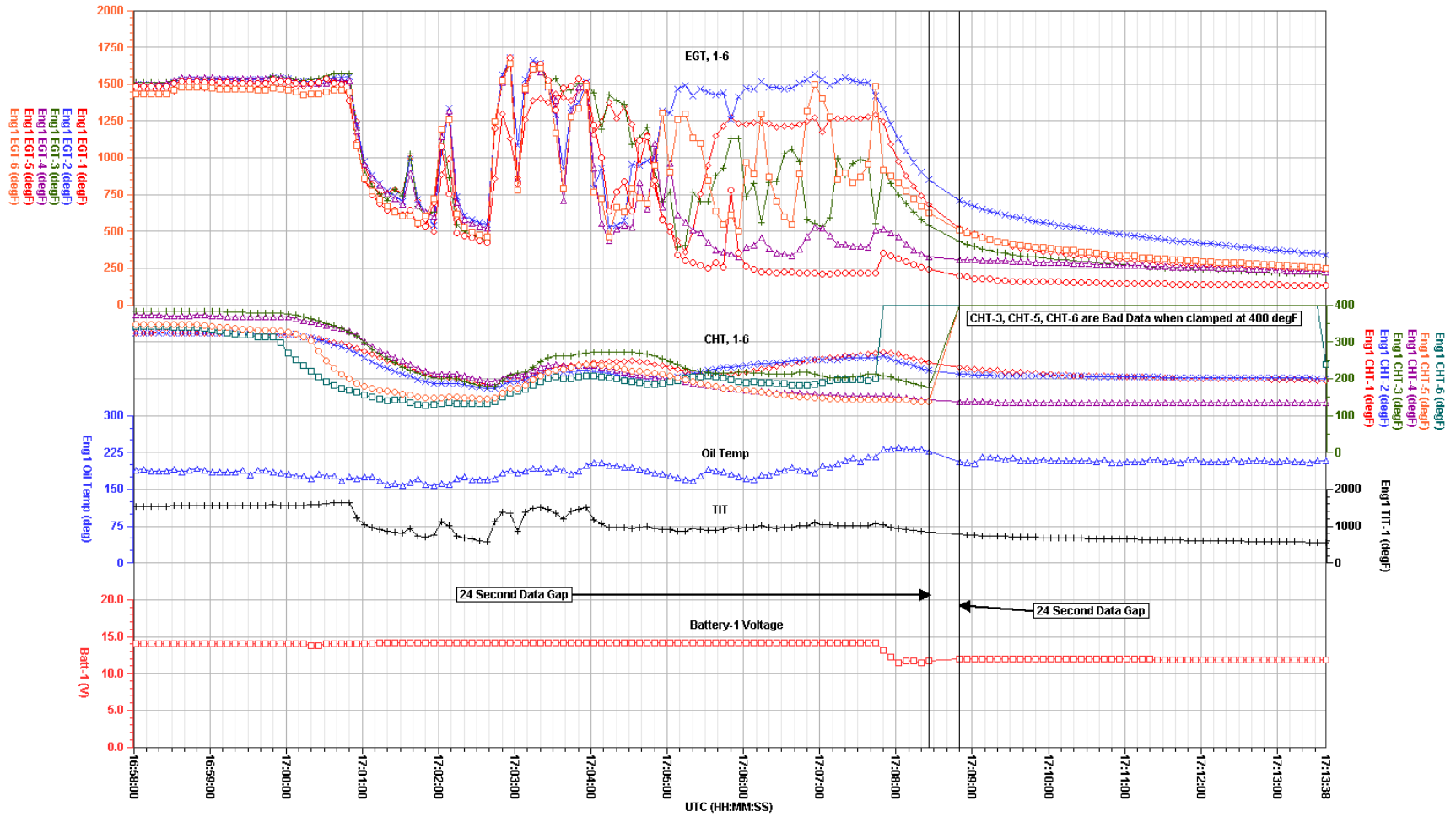
National Transportation Safety Board

Figure 2. EDM-700 data for the end of the accident flight.

Beechcraft V35, N11JK, JPI EDM-700

Location, Date: Effingham, South Carolina, 08/11/12

NTSB No. ERA12LA500



Revised: 10 January 2013

Accident Flight - End of Recording

National Transportation Safety Board

## APPENDIX A

This appendix describes the parameters provided and verified in this report. Table A-1 lists the parameters and table A-2 describes the unit abbreviations used in this report.

**Table A-1. Verified and provided JPI parameters.**

| <b>Parameter Name</b>    | <b>Parameter Description</b>         |
|--------------------------|--------------------------------------|
| 1. Batt-1 (V)            | Voltage Input 1                      |
| 2. Eng1 CHT-1 (degF)     | Cylinder Head Temperature Cylinder 1 |
| 3. Eng1 CHT-2 (degF)     | Cylinder Head Temperature Cylinder 2 |
| 4. Eng1 CHT-3 (degF)     | Cylinder Head Temperature Cylinder 3 |
| 5. Eng1 CHT-4 (degF)     | Cylinder Head Temperature Cylinder 4 |
| 6. Eng1 CHT-5 (degF)     | Cylinder Head Temperature Cylinder 5 |
| 7. Eng1 CHT-6 (degF)     | Cylinder Head Temperature Cylinder 6 |
| 8. Eng1 EGT-1 (degF)     | Exhaust Gas Temperature Cylinder 1   |
| 9. Eng1 EGT-2 (degF)     | Exhaust Gas Temperature Cylinder 2   |
| 10. Eng1 EGT-3 (degF)    | Exhaust Gas Temperature Cylinder 3   |
| 11. Eng1 EGT-4 (degF)    | Exhaust Gas Temperature Cylinder 4   |
| 12. Eng1 EGT-5 (degF)    | Exhaust Gas Temperature Cylinder 5   |
| 13. Eng1 EGT-6 (degF)    | Exhaust Gas Temperature Cylinder 6   |
| 14. Eng1 Oil Temp (degF) | Oil Temperature                      |
| 15. Eng1 TIT-1 (degF)    | Turbine Inlet Temperature            |

**Table A-2. Unit abbreviations.**

| <b>Units Abbreviation</b> | <b>Description</b> |
|---------------------------|--------------------|
| degF                      | degrees Fahrenheit |
| V                         | Volts DC           |