

# NATIONAL TRANSPORTATION SAFETY BOARD

Vehicle Recorder Division  
Washington, D.C. 20594

February 5, 2013

## 17 – Electronic Devices Factual Report

Specialist's Factual Report  
by Bill Tuccio

### 1. EVENT

Location: Amarillo, Texas  
Date: December 14, 2012  
Aircraft: Beechcraft E-90  
Registration: N67PS  
Operator: Private  
NTSB Number: CEN13FA105

On December 14, 2012, about 1805 central standard time, a Beechcraft E-90 airplane, N67PS, impacted terrain following an inflight break-up near Amarillo, Texas. The commercial rated pilot and passenger were fatally injured. The airplane was substantially damaged. The airplane was registered to O'Neal Aviation LLC, Colorado Springs, Colorado, and operated by a private individual. Instrument meteorological conditions prevailed and an instrument flight plan was filed for the 14 Code of Federal Regulations Part 91 personal flight. The flight originated from the Rick Husband International Airport (KAMA), Amarillo, Texas, about 1750, and was destined for the Fort Worth Meacham International Airport (KFTW), Fort Worth, Texas.

### 2. DETAILS OF DEVICE INVESTIGATION

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

Device 1: Garmin GPSMAP 696  
Device 1 Serial Number: 1H600313  
Device 2: Apple iPad  
Device 2 Serial Number: GB01650NETU

#### 2.1. Garmin GPSMAP 696 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 NEXRAD Radar, lightning, METARs, TAFs, and TFRs. The unit can also perform and store weight and balance calculations. A built-in AOPA Airport

Directory and SafeTaxi airport diagrams are included for selected airfields. 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 for an unspecified number of points – 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<sup>1</sup> memory. 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.

### **2.1.1. Garmin GPSMAP 696 Data Recovery**

Upon arrival at the Vehicle Recorder Laboratory, an exterior examination revealed the unit had sustained significant impact damage, as shown in figure 1. An internal inspection revealed the main memory chip, Samsung KMAKG0000M, had separated from the printed circuit board, as shown in figure 2. The 169-connection, ball grid array was re-soldered, and a binary chip download was attempted. The download was unsuccessful.

The chip was sent to the State University of New York (SUNY)-Binghamton for further x-ray and optical analysis. The report identified the likelihood of data recovery as low. As such, no further data recovery attempts were made. The SUNY-Binghamton report is included as Attachment 1 to this report.

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<sup>1</sup> Non-volatile memory is semiconductor memory that does not require external power for data retention

Figure 1. Garmin GPSMAP 696 damage photograph.

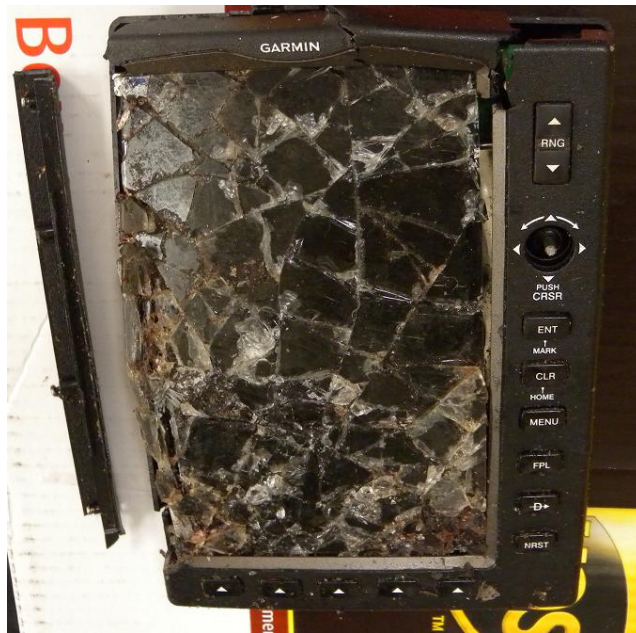
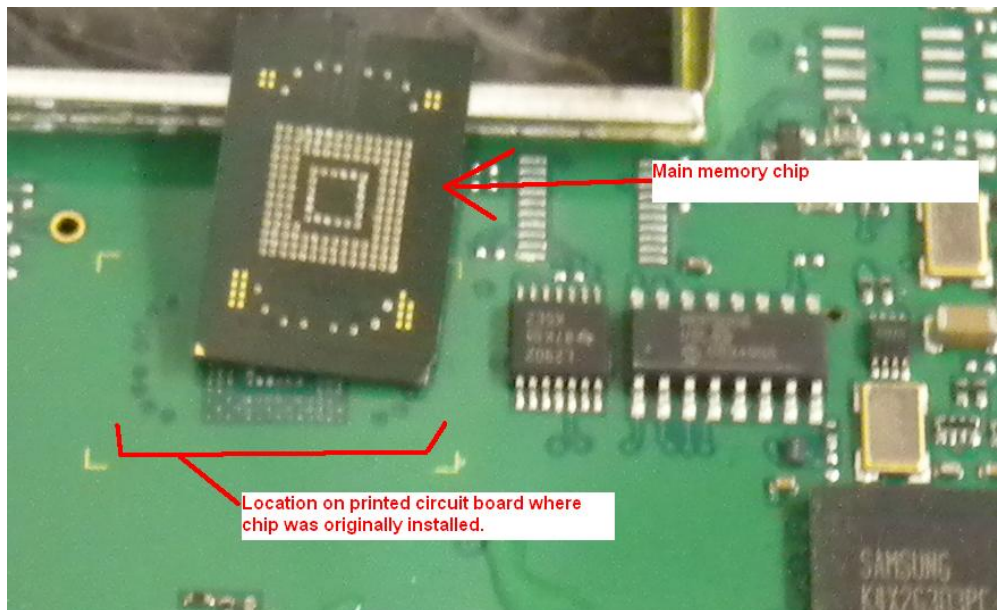


Figure 2. Garmin GPSMAP 696 separated main memory chip.



### 2.1.2. Garmin GPSMAP 696 Data Description

No data were recovered from the device.

## **2.2. Apple iPad Device Description**

The Apple iPad is a tablet computer with a high-resolution color touch-screen interface. All iPad devices support WiFi and Bluetooth connectivity, and use either 16, 32, or 64 GB of non-volatile memory for storage (depending on model). Some devices also support data connectivity via existing cell-phone networks. The iPad implements its functionality by running programs called “Apps” capable of supporting web-browsing, email, audio/video playback, contact and calendar management, and numerous other specialized functions. User-installed Apps can be used to support functionality for electronic flight bags, flight planning and filing, aviation weather depiction, and electronic flight charts. Application data is stored in non-volatile memory and may include image, video, and position location information. Specialized application data may be stored in a proprietary file structure using numerous proprietary file formats. The amount and type of data stored varies based on the software version and configuration of the specific device.

### **2.2.1. Apple iPad Data Recovery**

Upon arrival at the Vehicle Recorder Laboratory, an exterior examination revealed the unit had sustained significant damage, as shown in figure 3. The internal circuit board was removed from the unit, as shown in figure 4. The board was installed in a surrogate NTSB iPad. However, the unit would not start. No further data recovery efforts were attempted.

### **2.2.2. Apple iPad Data Description**

No data were recovered from the unit.

**Figure 3. Apple iPad damage photo.**



**Figure 4. Apple iPad circuit board.**

