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

November 9, 2015

Personal Electronic Devices

Specialist's Factual Report
By Bill Tuccio, Ph.D.

1. EVENT SUMMARY

Location:	Gaithersburg, Maryland
Date:	December 8, 2014
Aircraft:	Embraer S.A. EMB-500
Registration:	N100EQ
Operator:	Sage Aviation LLC.
NTSB Number:	DCA15MA029

On December 8, 2014, about 1041 Eastern Standard Time (EST), an Embraer S.A. EMB-500 (Phenom 100), N100EQ, impacted terrain and houses about 0.75 miles short of runway 14 while on approach to Montgomery County Airpark (GAI), Gaithersburg, Maryland. The airline transport rated pilot and two passengers were fatally injured as well as three persons on the ground. The airplane was destroyed during the impact and ensuing fire. Marginal visual meteorological conditions prevailed at the time and the flight was operating on an instrument flight rules (IFR) flight plan. The airplane was registered to and operated by Sage Aviation LLC., of Chapel Hill, North Carolina, under the provisions of 14 *Code of Federal Regulations* Part 91 as a personal flight. The flight originated from Horace Williams Airport (IGX), Chapel Hill, North Carolina, with GAI as its intended destination.

2. GROUP

A group was not convened.

3. DETAILS OF INVESTIGATION

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

DEVICES WITH NO PERTINENT DATA RECOVERED

Device Manufacturer/Model:	5 Universal Serial Bus (USB) Devices
Serial Number:	Not applicable
Device Manufacturer/Model:	HTC Smart Phone
Serial Number:	Unknown

Device Manufacturer/Model:	Dell Laptop
Serial Number:	4QGDMX1
Device Manufacturer/Model:	Dell Laptop
Serial Number:	25GD4S1
Device Manufacturer/Model:	MSI Laptop
Serial Number:	Unknown
Device Manufacturer/Model:	Dell Laptop
Serial Number:	TJGG3A00
Device Manufacturer/Model:	5 USB Devices and 1 Apple Video Adapter
Serial Number:	Not Applicable

DEVICE WITH PERTINENT DATA RECOVERED

Device Manufacturer/Model:	Apple iPhone 5
Serial Number:	F2MJFLK6DTTQ

3.1. Device Description

PEDs are a category of devices comprised primarily of portable computing devices and mobile phones. Portable computing devices are typically capable of internet access, email, messaging services, and can run user-installed applications to perform specific tasks. Depending on the model, mobile phones can perform many of the same tasks as portable computing devices, plus have voice call and text messaging capabilities. PED user and system data is typically stored on non-volatile memory[1] and can be accessed through manufacturer-provided interfaces.

3.2. Devices With No Pertinent Data Recovered

Figures 1 through 7 show devices recovered from the accident site that yielded no pertinent data. In some cases, damage rendered the devices unrecoverable and in other cases data recovered were not pertinent (such as the pilot's USB devices, figure 7). Recovery of the mSATA drive in a Dell Laptop[2] (figure 3) was attempted by the NTSB and a commercial recovery service; however, the damage rendered the mSATA drive unrecoverable.

[1] Non-volatile memory is semiconductor memory that does not require external power for data retention.
[2] Records indicated the laptop was owned by the pilot.

Figure 1. Five USB Devices.

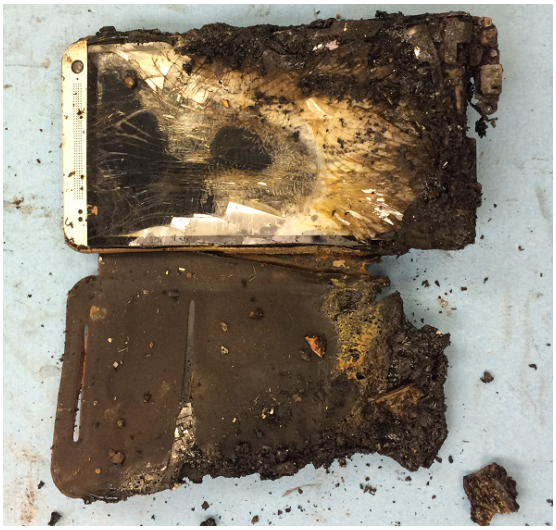

Figure 2. HTC smart phone.

Figure 3. Dell Laptop 4QGDMX1 (and internal mSATA drive).

Figure 4. Dell Laptop 25GD4S1.

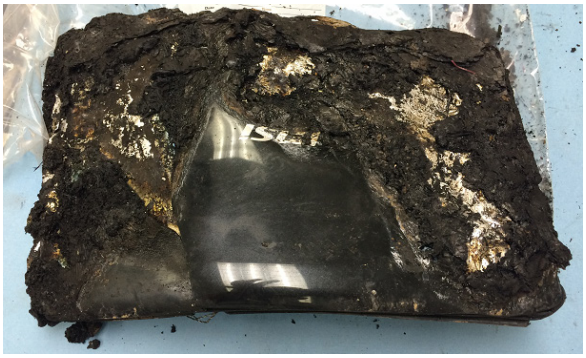

Figure 5. MSI Laptop.

Figure 6. Dell Laptop TJGG3A00.

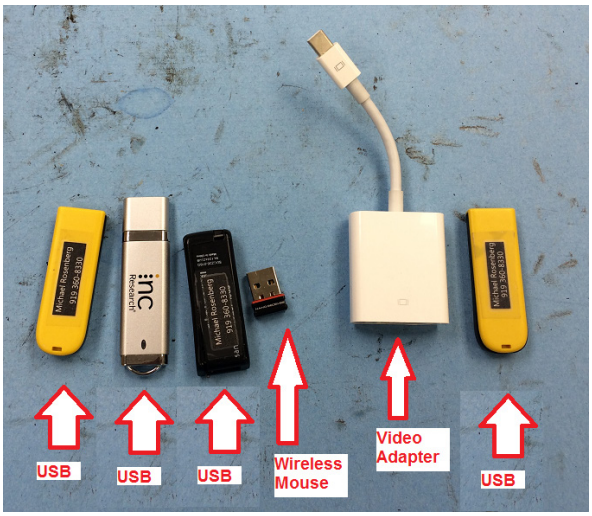

Figure 7. Five USB devices and one Apple video adapter.

3.3. Device With Pertinent Data Recovered: Apple iPhone 5

3.3.1. Apple iPhone 5 Device Description

The Apple iPhone is a touch-screen operated smartphone capable of voice calling, text messaging, email, photo/video recording, audio (music) playback, and numerous other specialized functions, depending on configuration. The unit is capable of accessing wireless networks using the IEEE 801.11n protocol (wifi) and other wireless devices supporting Bluetooth. Specialized functions are supported by additional user-installed program applications (Apps). Application data is stored in non-volatile memory and may include call logs, text messaging logs, image, video, and position location information. In addition, specialized application data may be stored in a proprietary file structure using numerous file formats including: binary, ASCII, HTML, SQL, etc. The amount and type of data stored varies based on the software version and configuration of the specific device.

3.3.2. Apple iPhone 5 Device Recovery

Figure 8 shows the pilot's iPhone. An internal inspection revealed no damage; however, when power was applied, the device started in recovery mode, as shown in figure 9. The device was sent to a commercial recovery service; the service was able to recover an iTunes Backup of the device content. The NTSB used forensic recovery software to examine the iTunes Backup.

Figure 8. Apple iPhone (front and back views).

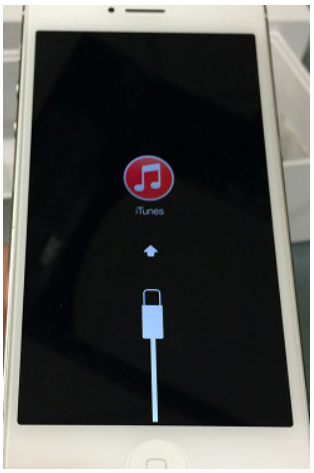

Figure 9. Pilot's iPhone - recovery mode.

4. DEVICE INVESTIGATION

4.1. Apple iPhone 5

Records and content indicated the device was owned by the pilot. All content was retrieved and two pertinent data items were recovered as follows.

Activity in the 72 hours prior to the accident are shown in table 1. For phone calls, the duration of the call is shown in parentheses as hours:minutes:seconds. Email activity is not included in table 1, as it was not reliably recovered.

An Excel workbook document, consistent with a pilot logbook, was recovered in iPhone documents. In addition to a spreadsheet with a tabular listing of pilot time, the workbook also contained four other spreadsheets of pilot-related flight time. Review of the logbook entries with known accident pilot history revealed the electronic logbook belonged to the accident pilot with a last entry of May 29, 2014.

Table 1. Pilot's iPhone 72-hour history.

Date/Time (EST)	Description
12/4/2014 19:06	Internet displayed
12/4/2014 19:06	Internet displayed
12/4/2014 19:06	Internet history
12/4/2014 19:06	Internet history
12/5/2014 9:46	Inbound Call (00:00:20)
12/5/2014 12:04	Inbound Call (missed)
12/5/2014 16:46	Wifi last joined healthdec-other (00:17:c5:c9:67:3f)
12/6/2014 10:30	Wifi last joined Caribou (00:03:52:a2:e5:00)
12/6/2014 21:03	Inbound Call (00:04:31)
12/7/2014 16:41	Outbound Call (00:01:00)
12/7/2014 16:42	Outbound Call (00:00:52)
12/7/2014 17:48	Wifi last joined catalpa (00:0f:3d:37:ea:3a)
12/7/2014 18:00	Outbound Call (00:06:07)
12/7/2014 18:13	Outbound Call (00:46:41)
12/8/2014 7:08	Wifi last joined castalia (00:14:d1:31:c2:68)
12/8/2014 7:39	Message from (121) 010-0116: FRM:Info@FltPlan2.com, SUBJ:N100EQ -Schd.-IGX-GAI, MSG:N100EQ is
12/8/2014 7:41	Message from (121) 010-0117: FRM:Info@FltPlan2.com, SUBJ:N100EQ -Route-IGX-GAI, MSG:N100EQ Ex
12/8/2014 8:52	Inbound Call (missed)
12/8/2014 8:54	Outbound Call (00:00:30)
12/8/2014 9:19	Inbound Call (missed)
12/8/2014 9:29	Inbound Call (00:01:49)
12/8/2014 9:36	Outbound Call (00:00:45)