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

July 30, 2013

Electronic Devices Factual Report

Specialist's Factual Report
by Bill Tuccio

1. EVENT

Location:	South Bend, Indiana
Date:	March 17, 2013
Aircraft:	Hawker Beechcraft 390 (Premier 1A)
Registration:	N26DK
Operator:	Digicut Systems
NTSB Number:	CEN13FA196

On March 17, 2013, at 1623 eastern daylight time, a Hawker Beechcraft model 390 (Premier IA) business jet, N26DK, serial number RB-226, collided with three residential structures and terrain following an aborted landing attempt on runway 9R located at the South Bend Regional Airport (KSBN), South Bend, Indiana. The private pilot and pilot-rated passenger occupying the cockpit seats were fatally injured. An additional two passengers and one individual on the ground sustained serious injuries. The airplane was registered to 7700 Enterprises of Montana, LLC and operated by Digicut Systems of Tulsa, Oklahoma, under the provisions of 14 *Code of Federal Regulations* Part 91 while on an instrument flight plan. Day visual meteorological conditions prevailed for the business flight that departed Richard Lloyd Jones Jr. Airport (KRVS), Tulsa, Oklahoma, at 1358 central daylight time.

2. DETAILS OF DEVICE INVESTIGATION

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

Device 1:	Apple iPhone 5
Device 1 Serial Number:	F2MJG35UDTTQ
Device 2:	Apple iPhone 3GS
Device 2 Serial Number:	86121HHMEDG
Device 3:	Apple iPhone 4
Device 3 Serial Number:	79129UMEA4S
Device 4:	Apple iPad 3
Device 4 Serial Number:	DMPH9F8ADVGH

2.1. Apple iPhone Device Description

The Apple iPhone is a touch-screen operated smart-phone 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[1]. 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.

2.1.1. Apple iPhone 5 Data Recovery

Upon arrival at the Vehicle Recorder Laboratory, an exterior examination revealed that the unit had not sustained any damage, as shown in figure 1. Power was applied to the accident unit and it started normally. The unit was not password protected. The screens were examined using the user interface.

Figure 1. Apple iPhone 5, after removal from the case.

2.1.1.1. Apple iPhone 5 Data Description

Case labeling and email configuration settings indicated the phone belonged to the pilot-in-command (PIC) of the accident aircraft.

[1] A short-range, low bandwidth wireless protocol used in consumer electronics used mostly for low-overhead functions.

The phone had a number of installed Apps, some of which were aviation related. The applications, text messages, and phone history were reviewed and no information pertinent to the investigation was discovered.

2.1.2. Apple iPhone 3GS Data Recovery

Upon arrival at the Vehicle Recorder Laboratory, an exterior examination revealed that the unit had sustained minor impact damage, as shown in figure 2. Power was applied to the accident unit; however the screen would not display any information. The unit was connected to forensic download software and a logical extraction of the data was successfully performed.

Figure 2. Apple iPhone 3GS, after removal from the case.

2.1.2.1. Apple iPhone 3GS Data Description

The phone email account configuration indicated the phone belonged to the pilot-rated passenger seated in the cockpit.

Text messages indicate the passenger communicated with the accident pilot as early as March 15, 2013 about travel on the “Premier” to Indiana on March 17, 2013. Text messages on March 13, 2013 suggest the passenger had flown on the accident aircraft on a prior occasion when he texted, “Enjoyed the SAT legs....the Premier is an incredible bird! Thanks. sd.”

2.1.3. Apple iPhone 4 Data Recovery

Upon arrival at the Vehicle Recorder Laboratory, an exterior examination revealed the unit had sustained minor damage, as shown in figure 3. Power was applied to the accident unit and it started normally; however the unit was password protected. The

phone identification indicated the phone belonged to one of the surviving passengers. The passenger could not recall the proper password, and forensic software was used to determine the password. During password recovery attempts, the touchscreen failed; as a result, the internal processor and memory board of the iPhone were installed in an NTSB surrogate for recovery.

Figure 3. Apple iPhone 4 after removal from the case.

2.1.3.1. Apple iPhone 4 Data Description

The phone contained outgoing text messages on the day of the accident between 14:45 and 14:53 EDT, indicating the aircraft was about to take off and was expected to be enroute about one hour and twenty minutes.

At about 15:05 EDT, a multi-media text message was sent with a photograph from the inside of the aircraft. The photo was facing forward in the cabin, towards the cockpit. Nearest to the camera were two unoccupied, rearward facing seats (the forward-most seats in the cabin area). The left seat had coats on it, the right seat had a light bag on it. Forward of the aft facing seats, the right arm of the person occupying the left cockpit seat was visible, as was the left arm of the person occupying the right cockpit seat. The exterior lighting was such that the photographic exposure saturated the cockpit window image. The cockpit display showed: engine instruments at the top 25% of the screen, a tabular display of numbers at the next lower 25% of the screen, and a navigational display in the remaining bottom 50% of the screen. The navigational display had a compass arc and two distance rings. The center console and throttle quadrant were also visible.

At about 16:12 EDT, a photo was recorded directed outside the aircraft window. The photo showed a thin layer of broken to overcast clouds below the aircraft, with mostly clear skies above the aircraft.

There was no other content pertinent to the investigation on the iPhone.

2.2. Apple iPad 3 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 also includes front and back cameras. 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 3 Data Recovery

Upon arrival at the Vehicle Recorder Laboratory, an exterior examination revealed the unit had sustained significant impact damage, as shown in figure 4. An internal inspection revealed the internal processing board was intact, as shown in figure 5. The internal processing board was removed and installed in an NTSB surrogate unit. The surrogate unit, with the accident processing board installed, started normally. The unit was examined by browsing screens using the user interface and by logical extraction of data using forensic software.

Figure 4. Apple iPad3 as received.

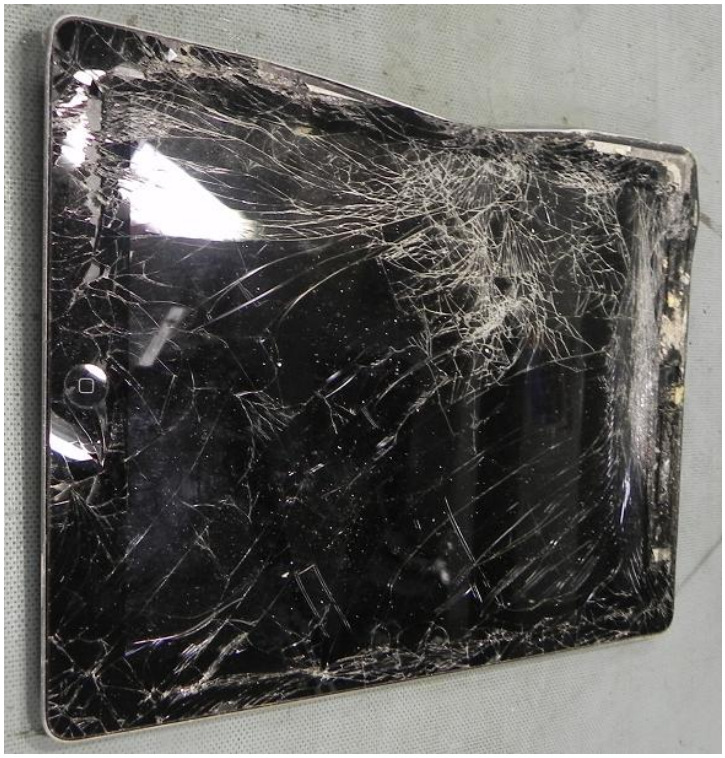
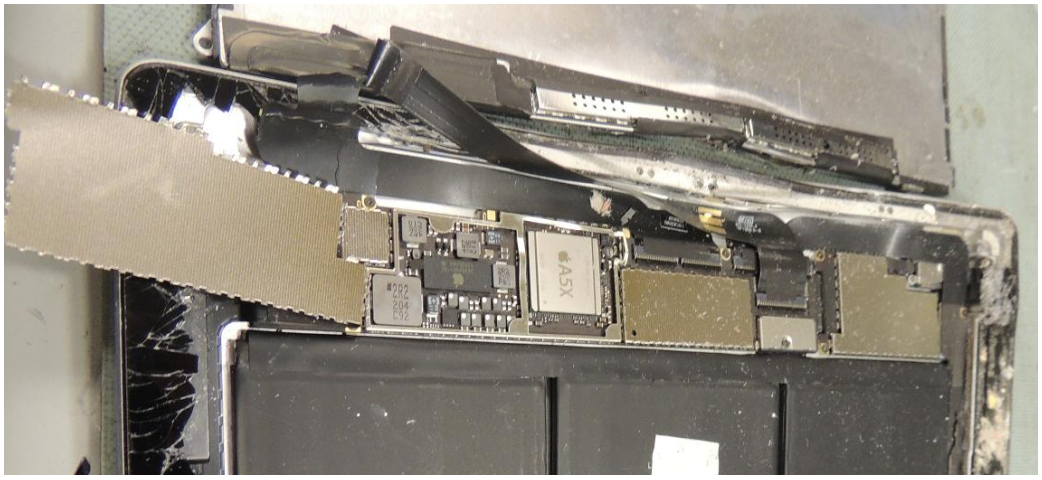


Figure 5. Apple iPad 3 internal components.



2.2.2. Apple iPad 3 Data Description

Based on identity information recovered from the iPad and information supplied by the IIC, it was determined the iPad belonged to the PIC of the accident aircraft. The iPad had 74 applications installed, a number of which were aviation related. Aviation related

applications included ForeFlight[2], LogTen Pro[3], and GPS navigation programs. None of the GPS applications contained a track history of the flight.

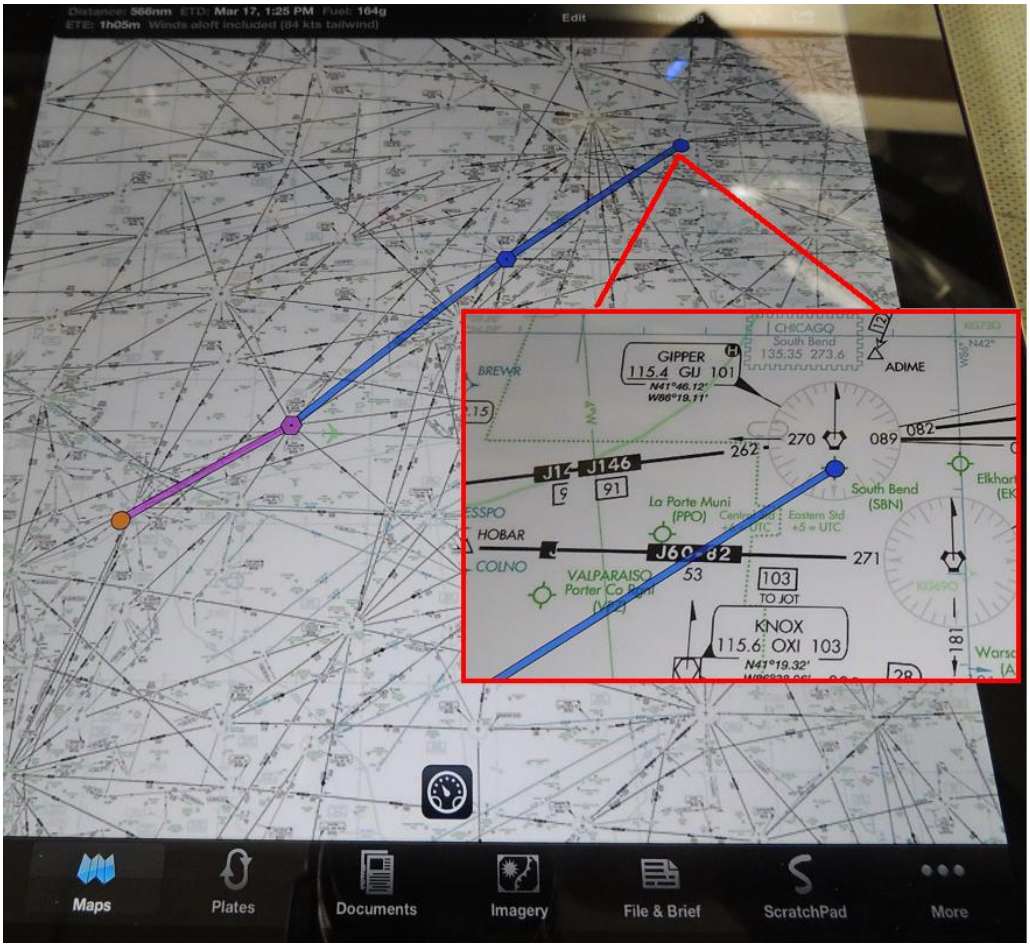
The iPad contains a row of commonly used applications known as the "dock." The dock, as configured on the iPad, is shown in figure 6. The dock applications, from left to right, were: ForeFlight, FltPlan.com, Safari, Settings, Mail, and LogTen Pro.

Figure 6. Apple iPad 3 dock configuration.

The ForeFlight application contained a route from RVS to SBN, as shown in figure 7. Figure 7 contains an inset with a zoomed view of the arrival path to SBN.

[2] ForeFlight is an aviation application used for preflight planning and inflight navigation.
[3] LogTen Pro is an aviation application used for keeping a record of flight time.

Figure 7. ForeFlight maps page with accident flight route and inset of arrival.



ForeFlight also contained 160 “file & brief” entries for routes of flights between airports. Of the 160 flights, 74 (46%) were from RVS, and only 1 of the flights, matching the accident date, was to SBN. The accident aircraft represented 127 (79%) of the flights, the remaining 33 (21%) were associated with N581GL, a Cessna Corvalis. Attachment 1 contains a comma delimited value (CSV) format of all the “file & brief” entries from the iPad.

The LogTen Pro logbook application contained 55 rows of information, with one blank row on October 31, 2011. The electronic logbook spanned the time period from October 27, 2011 through March 18, 2013 (one day after the accident). The total time logged by the PIC of the accident aircraft across all 55 rows was 121.9 hours. The logbook period from October 27, 2011 through January 16, 2012 was exclusively logged as aircraft N581GL, a Cessna Corvalis. This period was followed by two flights logged as aircraft N705CD, a Piper Seminole. The period from February 1, 2012 through April 8, 2012 was logged as N581GL and N706PT, an Eclipse Jet. The period from May 9, 2012 through March 18, 2013 were mostly logged in the accident aircraft, with two entries for N706PT. Attachment 2 contains a report generated from LogTen Pro of the 55 rows of information.

The LogTen Pro iPad application has the ability to exchange information with ForeFlight as well as with other computers, such as a desktop computer. Other computers were not investigated for this report.

Only one email examined was pertinent to the investigation. On January 31, 2011, a draft email with the accident pilot's electronic signature was addressed to a medical doctor. The pilot noted that on his last FAA medical exam he had disclosed he had diabetes and was taking medication for high blood pressure. The pilot was requesting that the medical doctor send documentation related to these conditions to a medical doctor in Tulsa, Oklahoma.

The remaining information on the iPad was determined not to be pertinent to the investigation.