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

January 8, 2014

Electronic Devices Factual Report

Specialist's Factual Report
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1. EVENT

Location:	Talihina, Oklahoma
Date:	October 21, 2013
Aircraft:	Piper PA-28-140
Registration:	N113WS
Operator:	Private
NTSB Number:	CEN14FA019

On October 21, 2013, approximately 1530 central daylight time (CDT), a Piper PA-28-140, N113WS, impacted terrain while maneuvering near Talihina, Oklahoma. The airline transport pilot, who was the sole occupant, sustained fatal injuries. The airplane sustained substantial damage. The airplane was registered to and operated by the pilot under the provisions of 14 *Code of Federal Regulations* Part 91 as a personal flight. Instrument meteorological conditions (IMC) prevailed at the time of the accident, and a flight plan was not filed. The flight originated from the Searcy Municipal Airport (SRC), Searcy, Arkansas, approximately 1330, and was en route to Elk City, Oklahoma (KELK).

2. DETAILS OF DEVICE INVESTIGATION

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

Device 1:	Apple iPad Mini
Device 1 Serial Number:	F4LJMC20F197
Device 2:	Apple iPhone 4S
Device 2 Serial Number:	DNPGXKS9DT9V

2.1. Apple iPad Mini Device Description

The Apple iPad Mini is a tablet computer with a high-resolution color touch-screen interface. All iPad Mini 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 Mini also includes front and back cameras. The iPad Mini 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.

2.1.1. Apple iPad Mini Data Recovery

Upon arrival at the Vehicle Recorder Laboratory, an exterior examination revealed the unit had sustained structural damage, as shown in figure 1. Despite the damage, the unit started normally and screens were examined and information downloaded.

Figure 1. Apple iPad Mini.

2.1.2.   Apple iPad Mini Data Description

Activity on the iPad Mini was examined from October 18, 2013 at 15:30 CDT through the time of the accident. On October 18, 2013 at about 19:05 CDT, an image was generated in the Garmin Pilot application, as shown in figure 2. The image shows a route from KSRC to KELK overlaid on a digital sectional chart with NEXRAD weather. There was no other accident pertinent information on the iPad Mini.

Figure 2. Apple iPad Mini Garmin Pilot screen shot.
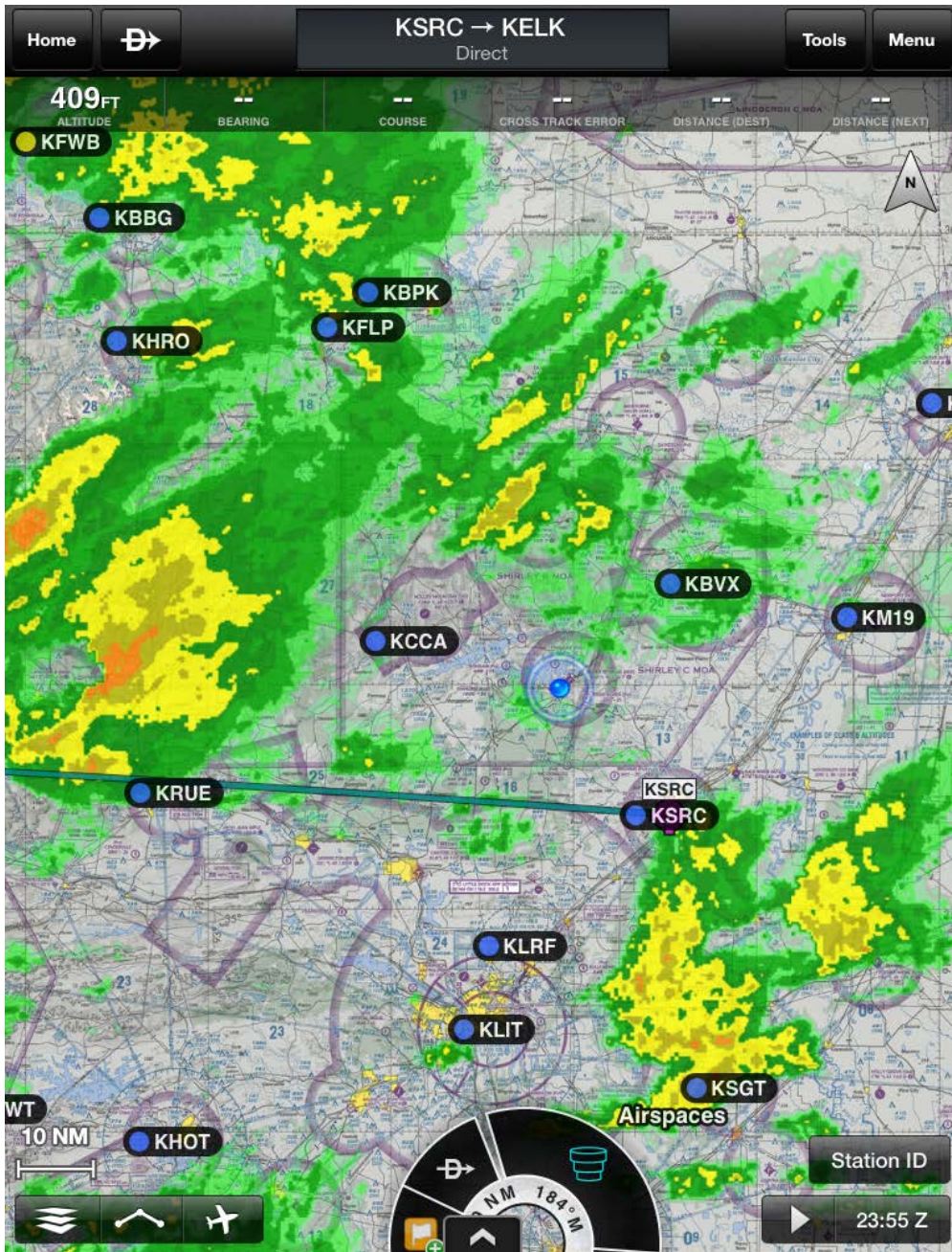
2.2. Apple iPhone 4S Device Description

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.

2.2.1. Apple iPhone 4S Data Recovery

Upon arrival at the Vehicle Recorder Laboratory, an exterior examination revealed the unit had not sustained any damage, as shown in figure 2. The unit started normally and screens were examined and information downloaded.

Figure 3. Apple iPhone 4S.

2.2.2. Apple iPhone 4S Data Description

Various images were retained on the iPhone. During the time period when the aircraft was in flight[2], tiles of images were being received by the iPhone. For example, figure 4 shows a tile image received by the phone on October 21, 2013 at 14:27:23 CDT representing a portion of a NEXRAD image. The Garmin Pilot application uses the tiles to compose NEXRAD and satellite images geographically overlaid on a chart.

On occasion, logic within the iPhone operating system and Garmin Pilot application will retain an application image. Figure 5 shows an application image stored on October 21, 2013 at 13:10:12 CDT. The stored image lacks sufficient resolution to identify the precise location of "USERWAYPOINT12;" however, comparing the image to an FAA sectional indicates that "USERWAYPOINT12" was in the vicinity of the Talihina (6F1) airport.

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[1] A short-range, low bandwidth wireless protocol used in consumer electronics used mostly for low-overhead functions.
[2] Air traffic control data showed the aircraft in flight between 13:30 CST and 14:55 CST. See the Air Traffic Control factual report in the docket for more information.

Figure 6 shows a Garmin Pilot image generated at 14:11:04 CDT. The aircraft icon is about 13 nautical miles south of the Russelville (RUE) airport. The top of the screen indicates the current route is from KSRC to KELK by way of "USERWAYPOINT12." The lightning icons are north and south of Talihina.

Figure 7 shows an AirWx image generated at 14:11:39 CDT. The AirWx image reports 0 minutes old data with synoptic weather and winds for favorite airports.

From the period October 21, 2013 at 13:30 through 15:11:21 CDT, about 300 tiled weather images were received by the accident aircraft. The last two images received by the phone were weather tiles at 15:11:21 CDT, as shown in figure 8.

A note last edited by the pilot on October 21, 2013 at 12:39 CDT contained a phone number for a car taxi service in Elk City, Oklahoma.

Earlier on October 21, 2013, at about 06:00 CDT, the Garmin Pilot application received a large number of images and Adobe Acrobat files, similar to an update of chart data. Included in the update were IFR approach charts and Airport Facility Directory data.

The last phone call on the phone was on October 21, 2013 at 13:10 CDT. The last text message sent was on October 21, 2013 at 10:20 CDT.

The only internet page displayed was on October 21, 2013 at 12:42 CDT and was the airport page for the Elk City airport.

Figure 4. Garmin Pilot cached tile image from October 21, 2013 at 14:27:23 CDT.
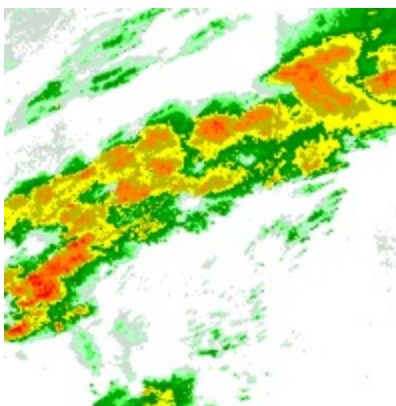
Figure 5. Garmin Pilot image - October 21, 2013 13:10:12 CDT

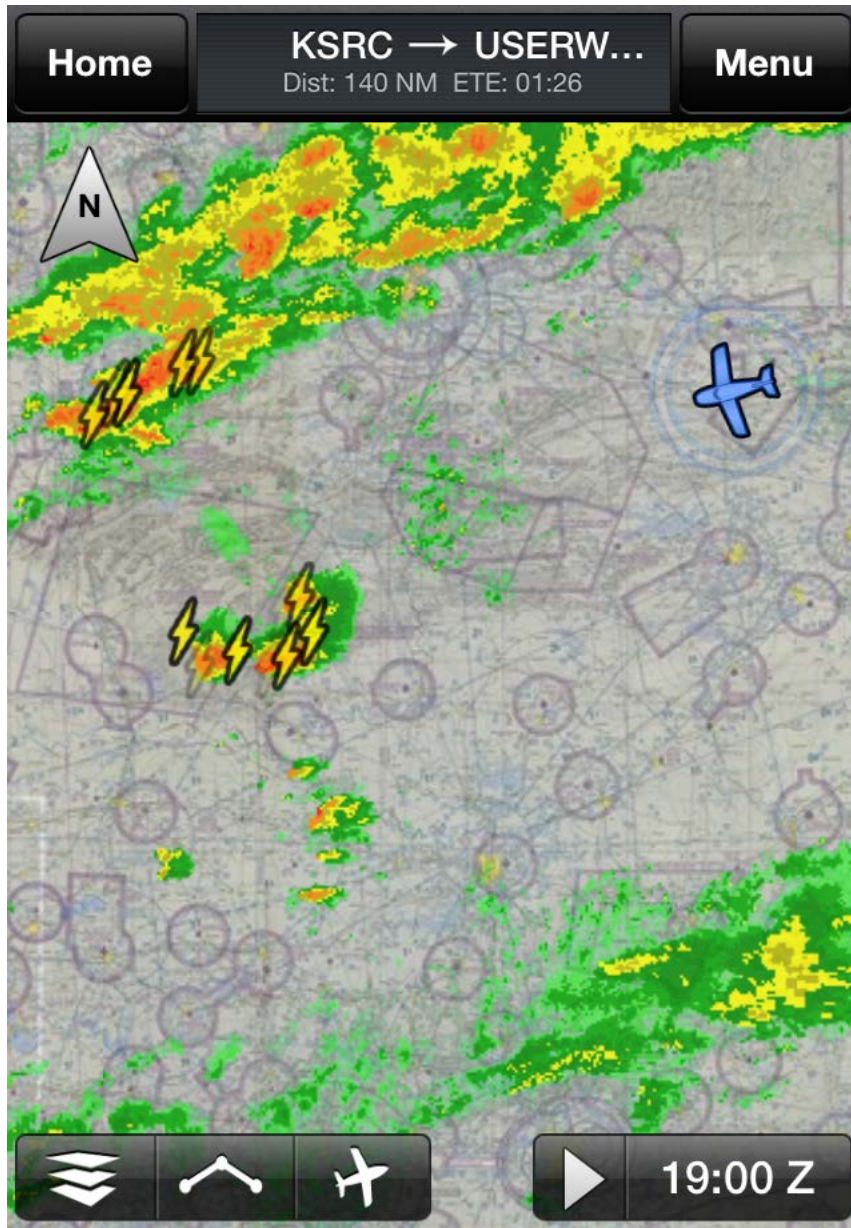**Figure 6. Garmin Pilot image - October 21, 2013 14:11:04 CDT**

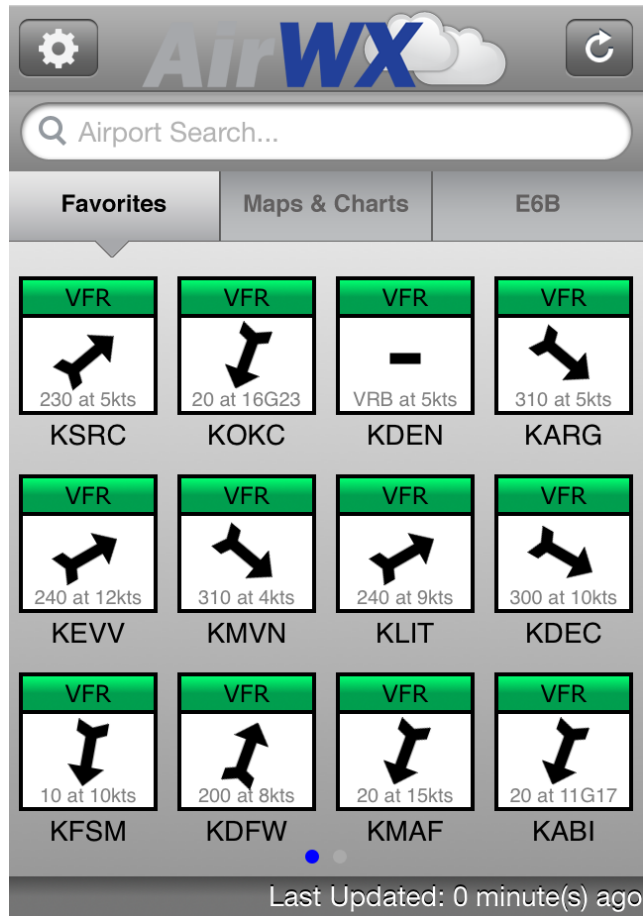**Figure 7. AirWx image - October 21, 2013 14:11:39 CDT.**

Figure 8. Garmin Pilot last two images received - October 21, 2013 15:11:21 CDT