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

January 23, 2017

Electronic Devices

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

1. EVENT SUMMARY

Location: Enterprise, Alabama
Date: March 26, 2016
Aircraft: Airbus Helicopters AS350B2
Registration: N911GF
Operator: Metro Aviation Inc.
NTSB Number: ERA16FA140

2. GROUP

A group was not convened.

3. DETAILS OF INVESTIGATION

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

Device Manufacturer/Model: **Sandel ST3400**
Serial Number: **46-2004**

Device Manufacturer/Model: **Apple iPad Mini 2**
Serial Number: **F9FPM7CN?CM6**[1]

Device Manufacturer/Model: **Apple iPhone 6s**
Serial Number: **Unknown**

Device Manufacturer/Model: **Apple iPhone 6**
Serial Number: **Unknown**

Device Manufacturer/Model: **Samsung Galaxy S5**
Serial Number: **R38FC0FN12H**

Device Manufacturer/Model: **Motorola i365 CellPhone**
Serial Number: **Unknown**

[1] "?" is placeholder for undetermined character in serial number.

3.1. Device Descriptions

The Sandel SN3500 Navigation Indicator is an electronic horizontal situation indicator (HSI). The unit performs the functions of a traditional HSI and radio magnetic indicator (RMI)[2], including: heading indicator, course deviation indicator, glideslope indicator, RMI functions, and a heading bug interfaced to an optional autopilot. The electronic HSI extends traditional HSI functions to include (depending on installation): RMI navigation to GPS waypoints, weather display of lightning and datalink weather, and traffic display.

Data is recorded to non-volatile memory[3] once per second (1 Hz) to a 24 megabyte circular buffer for manufacturer diagnostic purposes; depending on configuration and power cycles, this equates to about 6 to 12 hours of recorded data. The recorded data derives from two separate channels internal to the unit, channel 1 and channel 2; no time information is recorded by the unit. The data may be downloaded and decoded by the manufacturer.

The remaining items were personal electronic devices, capable of calls, photos, text messaging, email, and other functions depending on installed applications.

3.2. Device Condition

Upon arrival at the Vehicle Recorder Laboratory, all devices exhibited various forms of heat and impact damage. Figure 1 shows the Sandel ST3400 unit; the right side of the figure shows a crack in the non-volatile memory chip (the inset magnifies the crack).

Figure 2 shows the iPad Mini 2 as received.

Figure 3 shows the iPhone 6s as received.

Figure 4 shows the iPhone 6 as received.

Figure 5 shows the Galaxy S5 as received.

Figure 6 shows the i365 phone as received.

[2] A traditional RMI presents a course to a ground based navigation aid superimposed over a compass card (FAA Pilot's Handbook of Aeronautical Knowledge, FAA-H-8083-25A).
[3] Non-volatile memory is semiconductor memory that does not require external power for data retention.

Figure 1. Sandel ST3400. Left, unit as received; right, non-volatile memory chip.

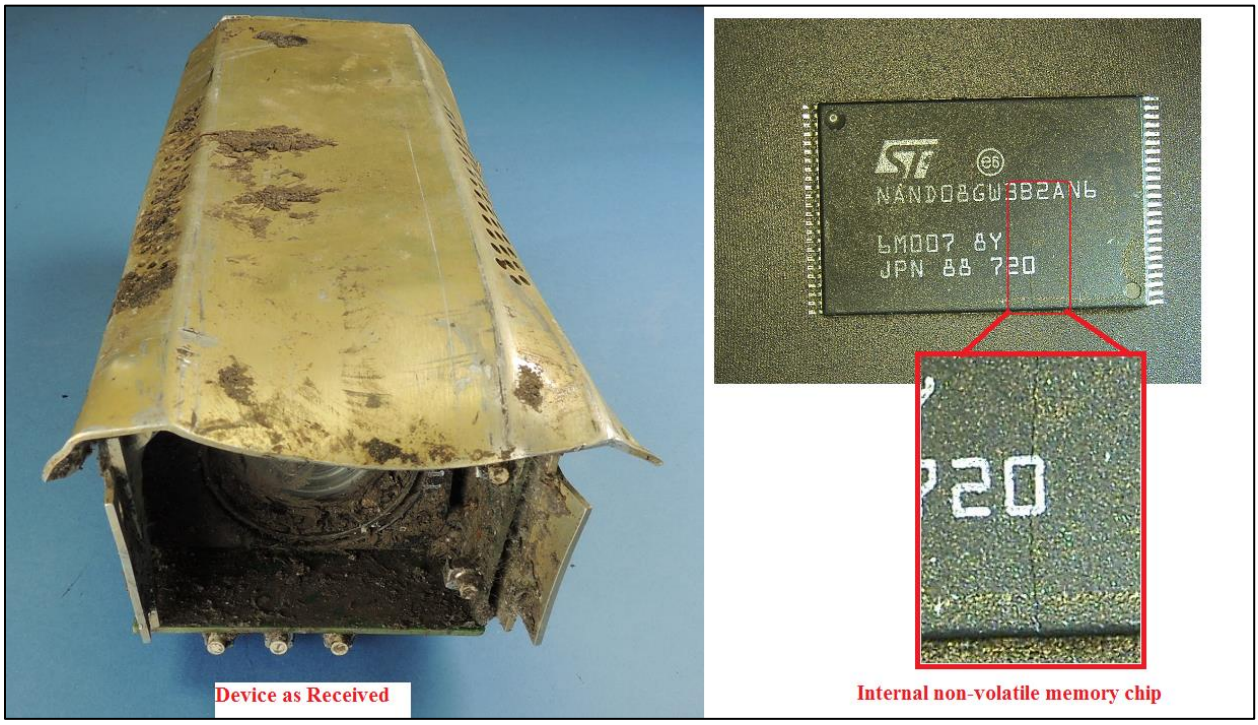

Figure 2. Apple iPad Mini 2, as received.

Figure 3. Apple iPhone 6s, as received.

Figure 4. Apple iPhone 6, as received.

Figure 5. Samsung Galaxy S5, as received.

Figure 6. Motorola i365, as received.

3.3. Data Description

All devices were capable of storing data in non-volatile memory. The extent of the damage precluded normal recovery procedures and additional attempts were unsuccessful in yielding usable data. Therefore, no data pertinent to the event were recovered.