

NATIONAL TRANSPORTATION SAFETY BOARD

Vehicle Recorder Division

Washington, D.C. 20594

March 7, 2017

Electronic Devices

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

1. EVENT

Location: Togiak, Alaska
Date: October 2, 2016
Aircraft: Cessna 208B
Registration: N208SD
Operator: Hageland Aviation Services, Inc.
NTSB Number: ANC17MA001

On October 2, 2016, about 1154 Alaska daylight time, a turbine-powered Cessna 208B Grand Caravan airplane, N208SD, sustained substantial damage after impacting steep, mountainous, rocky terrain about 12 miles northwest of Togiak, Alaska. The airplane was being operated as flight 3153 by Hageland Aviation Services, Inc., dba Ravn Connect, Anchorage, Alaska, as a scheduled commuter flight under the provisions of 14 *Code of Federal Regulations* (CFR) Part 135 and visual flight rules (VFR). All three people on board (two commercial pilots and one passenger) sustained fatal injuries. Visual meteorological conditions prevailed at the Togiak Airport, Togiak, and company flight following procedures were in effect. Flight 3153 departed Quinhagak, Alaska, at 1133, destined for Togiak.

2. DETAILS OF INVESTIGATION

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

Devices with no information recovered:

Device 1: Bendix King KLN-89B

Device 1 Serial Number: 3697

Device 2: Garmin GNS 430W

Device 2 Serial Number: 23420024

Device 3: Garmin GMX200

Device 3 Serial Number: Unknown

Device 4: Trans Cal SSD 120 Altitude Digitizer

Device 4 Serial Number: SRN-19426

Device 5: Bendix/King KDI 572 DME

Device 5 Serial Number: 14703

Device with information recovered:

Device 6: Bendix/King KLN89 Database Card
Device 6 Serial Number: Unknown

2.1. Electronic Devices Description

All the electronic devices in this report potentially contained non-volatile memory¹ capable of storing historical artifacts related to the accident flight.

2.1.1. Data Recovery

Upon arrival at the Vehicle Recorder Division, an exterior examination revealed devices 1 through 5 contained significant heat and/or structural damage.

Figure 1 shows the King KLN-89B as received. Notably, the database card was absent from the leftmost slot. Figure 2 shows an internal inspection, revealing heat damage to memory chips in the forward part of the compartment. Given this damage, no data recovery was attempted.

Figure 1. Device 1: King KLN-89B, as received.



¹ Non-volatile memory does not require electrical power to retain information.

Figure 2. Device 1: King KLN-89B, internal.



Figure 3 shows the Garmin 430W as received, and figure 4 shows the internal components of the device. The database cards were missing from the device. The Garmin 430W does not record track history and retains few state parameters (for example, last frequencies). Given the damage, no recovery was attempted.

Figure 3. Device 2: Garmin 430W, as received.



Figure 4. Device 2: Garmin 430W, internals.



Figure 5 shows the Garmin GMX200, with its exterior mounting rack removed. Figure 6 shows the internal inspection, with most electronic components destroyed by heat damage. No recovery was possible due to the heat damage.

Figure 5. Device 3: Garmin GMX200, exterior.



Figure 6. Device 3: Garmin GMX200, interior.



Figure 7 shows the Trans Cal Altitude Digitizer. According to the manufacturer, the device did not record any historical data; thus, no data recovery was attempted.

Figure 7. Device 4: Trans Cal SSD 120 Altitude Digitizer, as received.



Figure 8 shows the Bendix/King DME. Due to significant damage to electronic chips on the printed circuit board, no recovery was attempted.

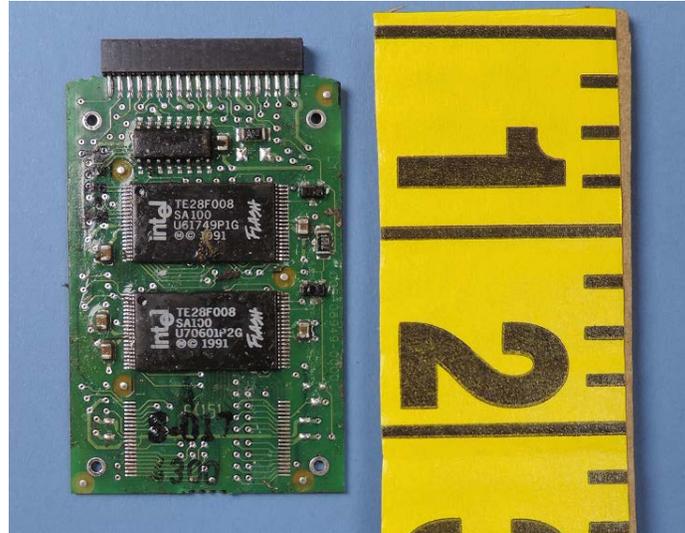
Figure 8. Device 5: Bendix/King KDI 572 DME, as received.



Figure 9 shows a printed circuit board (PCB), as received. Exterior inspection was insufficient to determine the origin of the PCB. The non-volatile memory chips were

removed from the board and read out, creating a binary image of the memory chips. The binary images revealed the PCB was a database card for a Bendix/King KLN89 generation device. The binary image was sent to the manufacturer to determine the database cycle contained on the card.

Figure 9. Device 6: Bendix/King KLN89 Database Card, as received.



2.1.2. Bendix/King KLN89 Database Card Data Description

According to the manufacturer, the card contained database cycle 1610, which was effective between September 15, 2016, and October 12, 2016.