

NATIONAL TRANSPORTATION SAFETY BOARD

Vehicle Recorder Division
Washington, D.C. 20594

June 17, 2022

Cockpit Display - Recorded Flight Data

Specialist's Factual Report
By Steven R. Smith

1. EVENT SUMMARY

Location: Heyburn, ID
Date: April 13, 2022
Aircraft: Cessna 208B
Registration: N928JP
Operator: Gem Air
NTSB Number: WPR22FA151

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: **Garmin G1000 SD Data Cards**
Serial Number (Top MFD Card): **B11305322094G**
Serial Number (Bottom MFD Card): **CG15G1839 (TRLR180822086)**

3.1. Garmin G1000 SD Data Card Description

The Garmin G1000 Integrated Flight Deck is a collection of multiple avionics units which include flight displays, air data computers, Attitude Heading Reference System (AHRS), communications and other systems. A typical installation includes a Primary Flight Display (PFD) and a Multi-Function Display (MFD). Each display includes two SD card slots, an upper and a lower slot. The lower SD card slot is used by the system for software updates and various databases.¹

¹ Databases can include terrain data, obstacle data, SafeTaxi charts, flight charts, and airport terrain databases.

Depending on the display unit software, the aircraft can include a data logging feature. The data logging feature must be enabled by the aircraft operator. If the data logging feature is available and enabled, a SD card must be installed in the upper slot of the MFD. Depending on the airframe and engine combination as many as 64 parameters can be stored at a rate of one sample per second (1Hz). According to the manufacturer of the display unit, one flight hour can be stored in approximately 2 MB. The SD card typically used is 2 GB in size and can store over 1,000 flight hours.

3.2. Device Condition

Upon arrival at the Vehicle Recorder Laboratory, the top and bottom memory cards (Figure 1) showed no signs of significant external damage. The top MFD SD memory card was noted as slightly bent. When both the top and bottom MFD SD memory cards failed to mount with multiple card readers and on different computers, additional testing was required to determine if there was any internal damage. An x-ray examination revealed the top MFD SD memory card had sustained a hairline fracture. No fractures were detected by x-ray for the bottom SD memory card. The plastic housing was then removed from both SD memory cards, and microscopic images were taken. The red arrow shown on Figure 2 shows where a crack propagates through the silicon memory which resides inside the plastic cover of the SD card.



Figure 1: MFD Top and Bottom SD Memory Cards

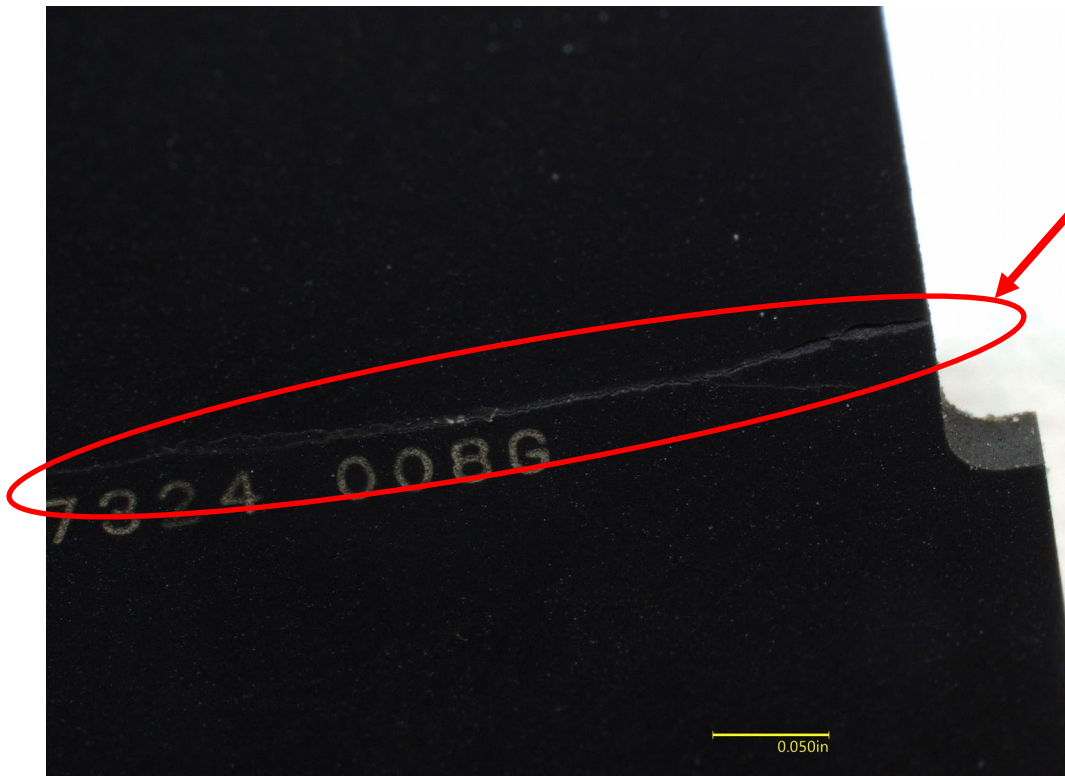


Figure 2: Microscopic Capture of Fractured Top MFD SD Memory Card

3.3. Data Description

Both the top and bottom MFD SD memory cards can store data in the Non-Volatile Memory (NVM).² The extent of the damage to the top MFD SD memory card precluded normal recovery procedures and additional attempts were unsuccessful in yielding usable data. Therefore, no data pertinent to the event were recovered from this device. In addition to the top MFD SD memory card not providing any data, the bottom MFD SD memory card yielded no results as Textron Aviation provided feedback that the device only contains NAV data. Therefore, no data pertinent to the event were recovered from this device.

² Non-volatile memory is semiconductor memory that does not require external power for data retention.