

National Transportation Safety Board

Office of Research and Engineering

Washington, DC 20594



ERA25MA106

ENHANCED GROUND PROXIMITY WARNING DEVICE

Specialist's Factual Report

January 23, 2026

A. ACCIDENT

Location: Philadelphia, Pennsylvania
Date: January 31, 2025
Time: 1807 Eastern Standard Time (EST)
2307 Coordinated Universal Time (UTC)
Airplane: Learjet 55, XA-UCI

B. ENHANCED GROUND PROXIMITY WARNING DEVICE SPECIALIST

Specialist: Sean Payne
Branch Chief - Vehicle Recorder Laboratory
National Transportation Safety Board (NTSB)

C. DETAILS OF THE INVESTIGATION

The NTSB Vehicle Recorder Division received the following device:

Recorder Manufacturer/Model: Bendix King GA-EGPWS
Recorder Part Number: 965-1198-005 Mod 1
Recorder Serial Number: 4364
Additional Honeywell ID: MFD: 22wk of 2005
Hardware Mod 3
Terrain DB: April 5, 2005, v.439N

1.0 EGPWS Device Description

The Enhanced Ground Proximity Warning System (EGPWS) non-volatile memory¹ (NVM) does not continuously record; rather, the EGPWS device stores data to NVM only when certain criteria are met. The readout process at the manufacturer's facility produced several files of flight history data that encompass operational, documentary, fault, and warning information. The flight history data warning file outputs position/location data related to the operation of the aircraft. These data are only recorded when an alert or warning related to the EGPWS function activates, resulting in data points for 20 seconds prior to the activation of the warning and 10 seconds afterwards. The EGPWS parameters are sampled 1 time per second, but the actual time of occurrence can be anywhere within the second.

The parameters for the unit involved in this crash would be limited to the following:

- Latitude
- Longitude

¹ Non-Volatile Memory (NVM) - semiconductor memory that does not require power for data retention.

- Geometric Altitude
- GPS altitude
- GPS Position Uncertainty
- Position Source (i.e., "GPS1")
- Airport Identifier
- Specific terrain alert trigger

The data may also include EGPWS configuration data specific to the installation in the aircraft.

1.1 Data Recovery

Upon arrival at the Vehicle Recorder Laboratory, an exterior examination revealed the unit had sustained heavy impact damage. The unit was disassembled. The relevant circuit card containing the NVM chips that would have recorded data is annotated with a red circle (Figure 1).

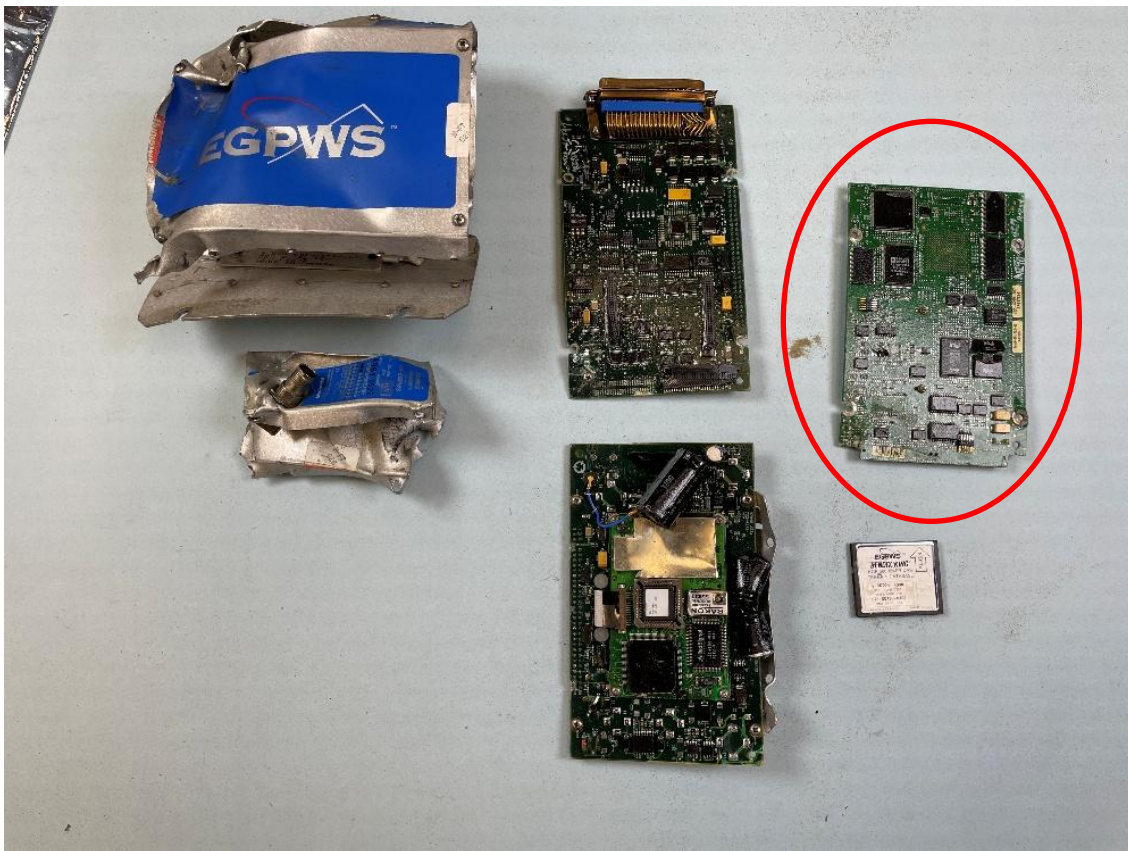


Figure 1. Photo of Honeywell EGPWS after being disassembled. The circuit card containing the NVM chips that would hold data has been circled in red.

Figure 2 is a photo of the relevant circuit card with the relevant NVM chip (U24) circled in red.

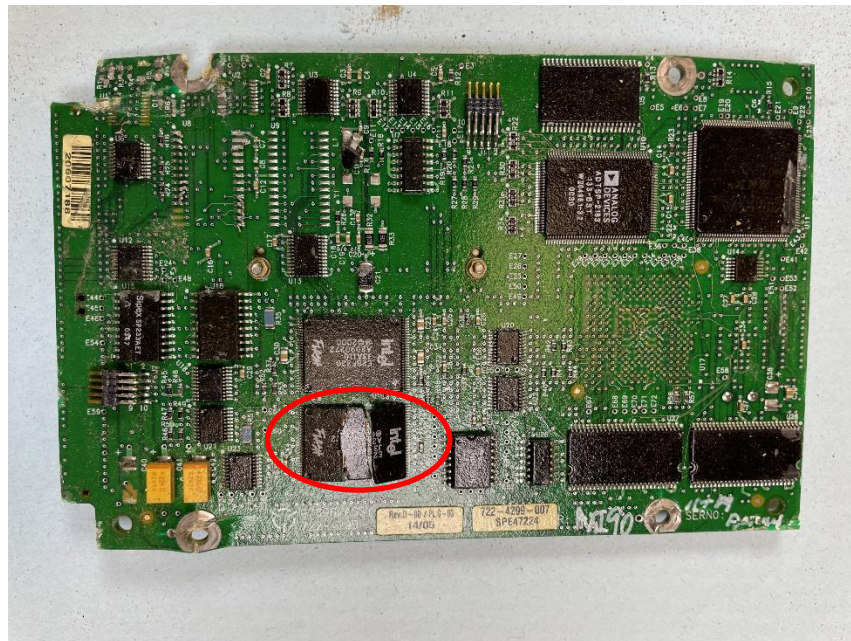


Figure 2. Photo of the circuit card containing data. Chip U24 is circled in red. This chip contains the device's recording logs.

The U24 chip was cracked in two locations, and the three parts of the cracked chip were disjointed. Figure 3 is a virtual reconstruction of the chip's topography using a stacked microscopy imaging to illustrate the chip's disjointed condition. Figure 4 is a top-down image taken at 10X magnification of chip U24. A location circled in yellow is illustrated in imagery in Figure 5. A location circled in blue is illustrated in imagery in Figure 6. The descriptions for figures 5 and 6 are given below.

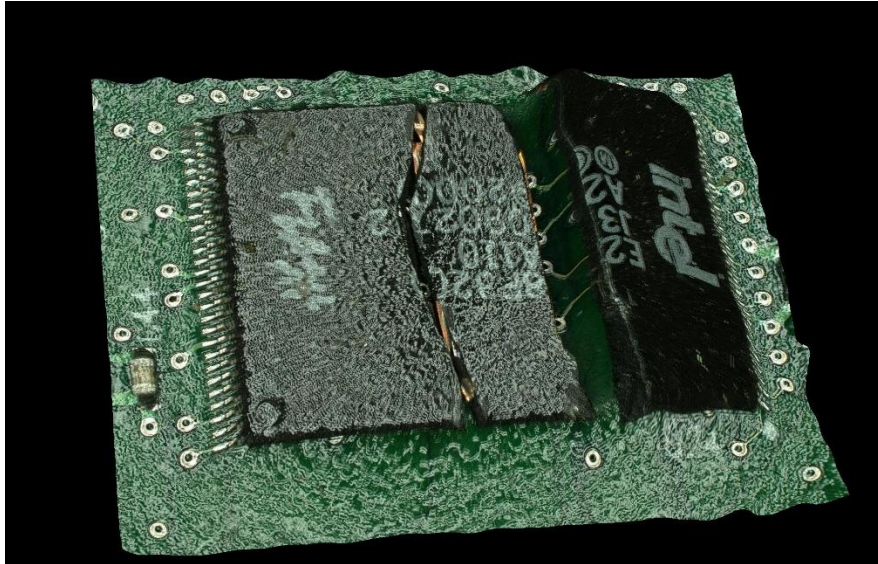


Figure 3. A virtual reconstruction of the chip U24's topography using stacked microscopy imaging.

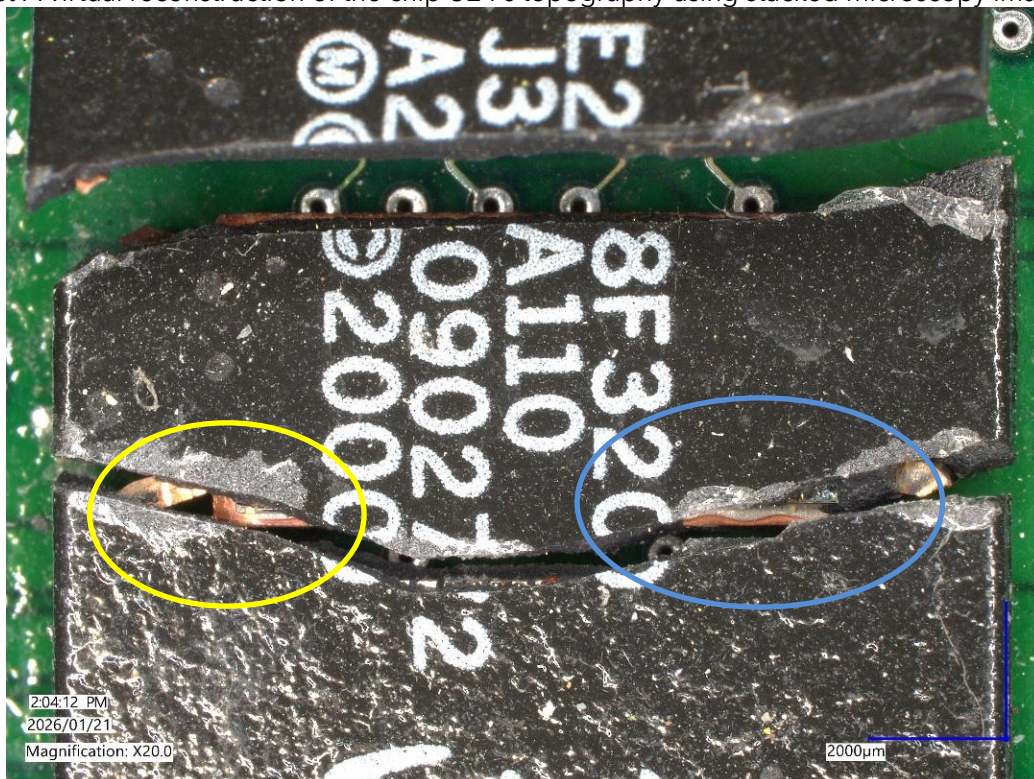


Figure 4. A top down 10x magnification image of chip U24. The area circled in yellow is annotated in Figure 5. The area circled in blue is annotated in Figure 6.



Figure 5. A 300x magnification image of the area circled in yellow in Figure 4. The yellow arrow annotates a cracked corner of the chip's die.

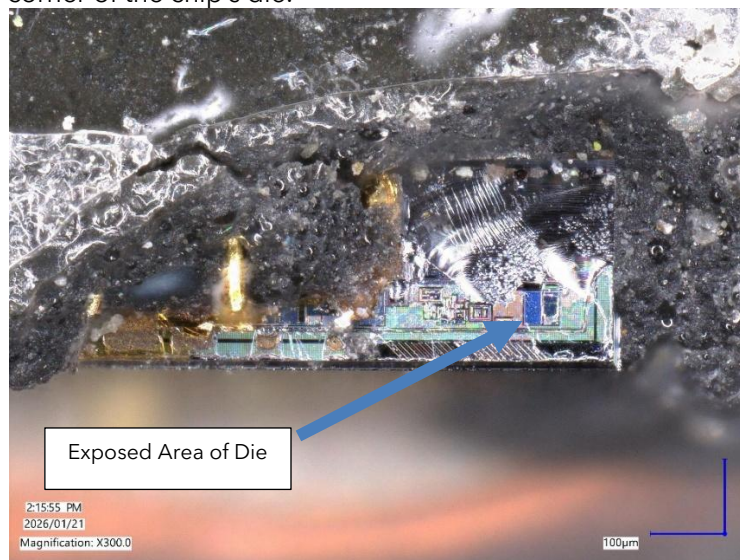


Figure 6. A 300x magnification image of the area circled in blue in figure 4. A blue arrow indicates an exposed area of the die.

The yellow arrow in Figure 5 shows that the corner of the chip's internal silicon die is cracked and missing. The blue arrow in Figure 6 shows that the die surface has been exposed.

X-ray imagery was conducted using the NTSB's x-ray imaging device. Figure 7 is an x-ray image of chip U24. The x-ray image shows numerous broken wire bonds

between the chip's pin interface and the chip's internal die. These areas of damage are annotated with a green arrow. Note that x-ray imaging is not fully effective at imaging the silicon die and is ineffective at illustrating all additional areas of die cracking.

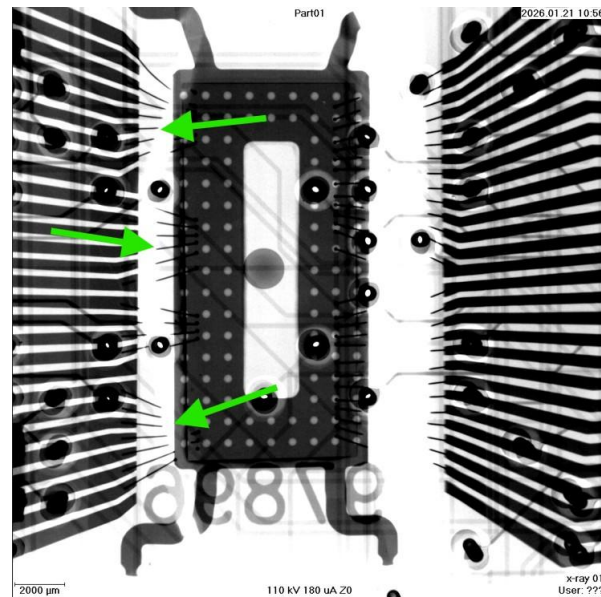


Figure 7. An x-ray image of the center area of chip U24. Areas of damaged wire bonds are annotated with green arrows.

Figure 8 shows a detail area of the upper left portion of chip U24. The x-ray image has been post processed with the x-ray machine's software processing tools to provide additional contrast. A light area near the left of the x-ray image shows an area of cracking. This light area has been highlighted with a green line annotation. This area of cracking extends along the length of the entire chip. An additional area annotated with a green circle suggests that the crack extends across the corner of the chip's silicon die.

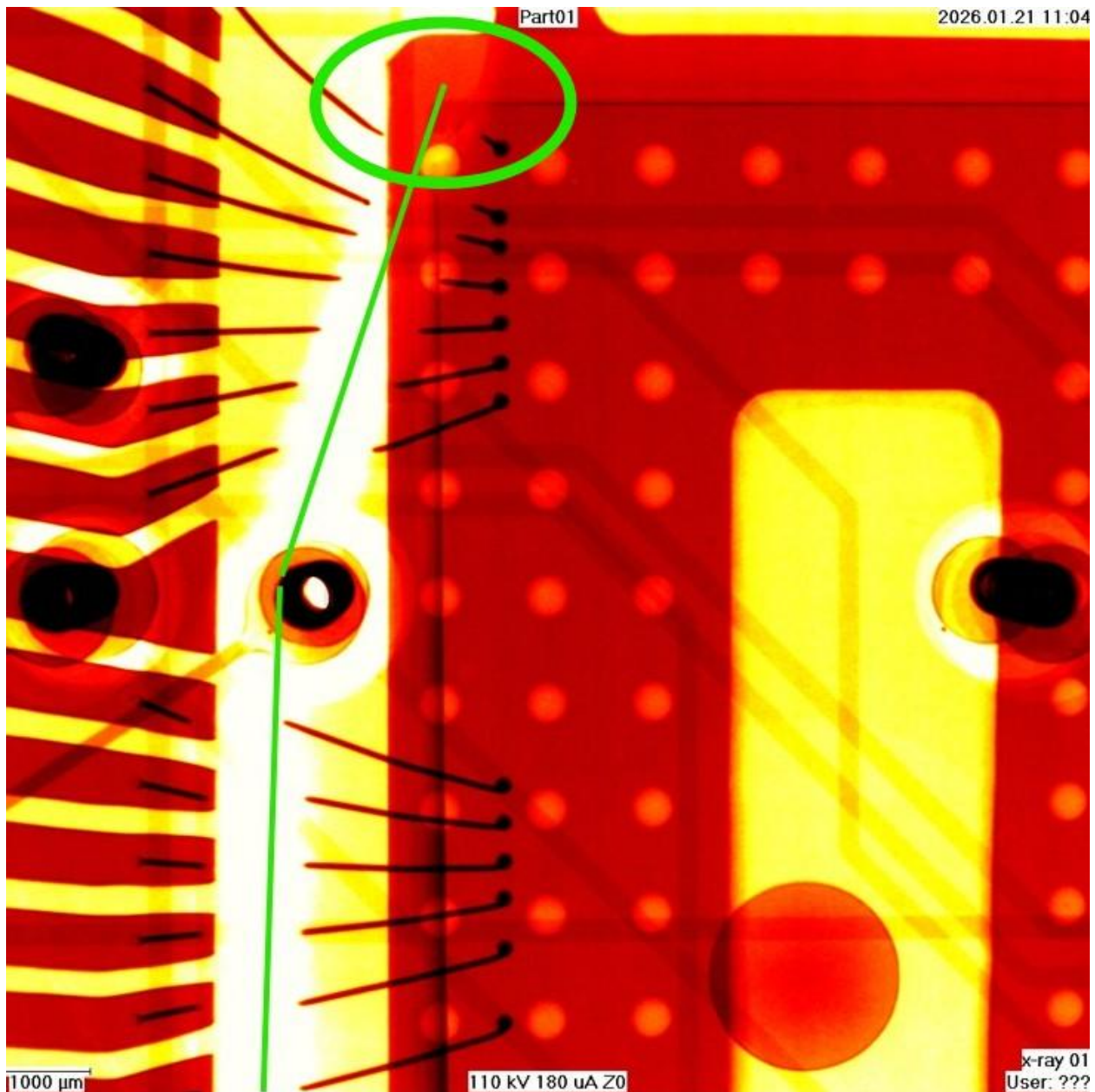


Figure 8. An x-ray image of the upper left portion of chip U24. The center of a crack is annotated with a green line. A green circle annotates an area of the chip where the crack extends across the region of the chip's internal silicon die.

The device's manufacturer engaged a third-party laboratory that claimed to have a recovery method involving direct probing of the die, an approach that, in theory, could allow for data extraction depending on the severity of the damage. After several months of evaluation, the laboratory ultimately reported that the necessary tooling to perform this type of recovery was not available and recovery was abandoned.

Due to the extensive damage sustained by chip U24, and the fact that any potentially recoverable data would have been limited to basic parameters such as

aircraft position and altitude which was concurrently determined in an Aircraft Performance Study, and with agreement with the Investigator-In-Charge, no additional recovery efforts were undertaken. Examination of the chip revealed potential destruction of the internal die, which makes data recovery improbable.

Submitted by:

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