

# NATIONAL TRANSPORTATION SAFETY BOARD

Vehicle Recorder Division  
Washington, D.C. 20594

April 7, 2022

## ELECTRONIC DEVICES

### Specialist's Factual Report By Michael Portman

#### 1. EVENT SUMMARY

Location: Danville, Arkansas  
Date: April 23, 2021  
Aircraft: Piper PA-46-310P  
Registration: N461DK  
Operator: Private  
NTSB Number: CEN21FA198

#### 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 aera 796**  
Serial Number: **2CY009179**

Device Manufacturer/Model: **JPI EDM-700**  
Serial Number: **5277**

Device Manufacturer/Model: **Bendix-King KFC-150 Autopilot**  
Serial Number: **Unknown**

Device Manufacturer/Model: **Bendix-King KAS-297B Altitude/VS Selector**  
Serial Number: **P20068**

Device Manufacturer/Model: **Horizon Instruments P-1000**  
Serial Number: **9649205**

### **3.1. Garmin aera 796 Description**

The Garmin aera 796 is a battery-powered, portable, multi-function display and GPS receiver with a 7-inch diagonal, high-resolution, LCD touch screen display. The unit includes a built-in Jeppesen database and is capable of receiving XM satellite radio for flight information including NEXRAD Radar, lightning, METARs, TAFs, and TFRs. The unit can also perform and store weight and balance calculations. A built-in AOPA Airport Directory and SafeTaxi airport diagrams are included for selected airfields. With appropriate subscriptions, the unit is capable of storing and displaying geo-referenced VFR and IFR navigation charts, including IFR approach charts. The unit also has a "scratch pad" feature, allowing the user to hand write electronic notes.

The unit stores date, route-of-flight, and flight-time information for up to 50 flights. A detailed track log including latitude, longitude, date, time, and GPS altitude information is stored within the unit whenever the receiver has a lock on the GPS navigation signal. Position is updated within the track log as a function of time or distance moved, depending on how the unit has been configured. Once the current track log memory becomes full, new information either overwrites the oldest information or recording stops, depending on how the unit is configured. The current track log can be saved to long-term memory. Track log storage may be activated or de-activated at user discretion. All recorded data is stored in non-volatile memory.<sup>1</sup>

The unit contains hardware and software permitting the download of recorded waypoint, route, and track log information to a PC via a built-in USB port. An internal button-battery is used to back-up power to the internal memory and real-time clock during those periods when main power is removed.

### **3.2. Device Condition**

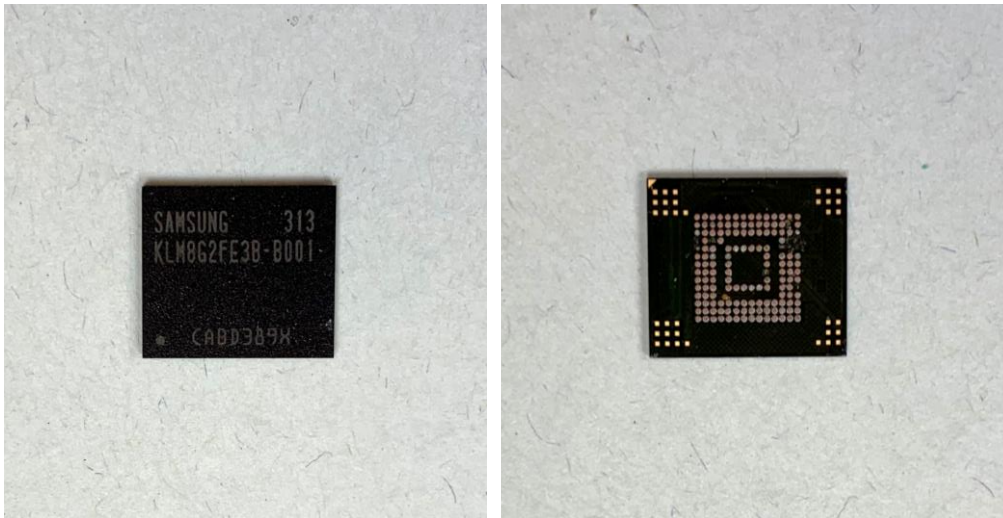
Upon arrival at the Vehicle Recorder Laboratory, an examination revealed the unit had sustained impact damage. The device was opened, and the built-in memory chip was identified, having been dislodged from its housing, likely during impact. The internal components of the device are shown in figure 1, with the location of the dislodged chip mounting highlighted in red. The recovered memory chip is shown in figure 2.

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<sup>1</sup> Non-volatile memory or NVM is semiconductor memory that does not require external power for data retention.



**Figure 1.** The internal components of the device, with the location of the memory chip mounting highlighted in red.



**Figure 2.** The recovered memory chip front (left) and back (right).

### **3.3. Data Description**

This device is capable of storing data in non-volatile memory (NVM). The extent of the damage precluded normal recovery procedures. The chip was cleaned and x-rayed, which revealed damage to several connector pads. In contract with the State University of New York at Binghamton's Integrated Electronics Engineering Center, the chip was sent to their lab for further evaluation and repair. Their report is included in the docket as Attachment 1 to this report. Upon completion of the repairs, the chip was returned to the NTSB's recorder lab, and further readout attempts were

made. However, the level of internal damage to the chip prevented any useful data from being recovered. Therefore, no data pertinent to the event were recovered.

### **3.4. JPI EDM-700 Description**

The J. P. Instruments EDM-700 is a panel mounted gauge that the operator can monitor and record up to 24 parameters related to engine operations. The unit can also calculate, in real-time, horsepower, fuel used, shock cooling rate and EGT differentials between the highest and lowest cylinder temperatures. The calculations are also based on the aircraft installation. Depending on the specific model and year of manufacture, the unit can be capable of storing data.

### **3.5. Device Condition and Data Recovery**

Upon arrival at the lab, it was evident that the device had suffered minor impact damage, as shown in figure 3.



**Figure 3.** Exterior of the JPI, as received.

This particular model of the EDM-700 was built in 1995, and therefore, according to the manufacturer, does not record data. Therefore, no data were recovered from this device.

### **3.6. Bendix-King KFC-150 Autopilot Description**

The KFC-150 is a two-axis autopilot and flight director system with an optional third-axis add on. The flight director calculates appropriate attitudes required to fly the planned route and can either display these attitudes to the pilot or control the aircraft directly, depending on the mode in use.

### 3.7. Device Condition and Data Recovery

Upon arrival at the lab, it was noted that the device had suffered minor impact damage, as shown in figure 4.



**Figure 4.** Exterior of the KFC-150, as received.

Upon consultation with the device manufacturer, it was noted that this device is not capable of storing data. Therefore, no data were recovered from this device.

### 3.8. Bendix-King KAS-297B Altitude/VS Selector Description

The KAS-297B is an altitude and vertical speed selector, which is capable of providing altitude preselect and alerting as well as vertical speed modes when tied into the previously described KFC-150 autopilot unit.

### 3.9. Device Condition and Data Recovery

Upon arrival at the lab, it was noted that the device had suffered minor impact damage, as shown in figure 5.



**Figure 5.** Exterior of the KAS-297B, as received.

Upon consultation with the device manufacturer, it was noted that this device is not capable of storing data. Therefore, no data were recovered from this device.

### **3.10. Horizon Instruments P-1000 Description**

According to the Horizon Instruments P-1000 installation manual P103050, revision E, "the P-1000 functions as two fully independent digital tachometers that monitor the signals received from the primary circuits of the aircraft's magnetos. The internal right and left tachometers independently determine engine RPM, which is then average (sic) and displayed for the pilot."

### **3.11. Device Condition and Data Recovery**

Upon arrival at the lab, it was noted that the device has suffered minor impact damage, as shown in figure 6.



**Figure 6.** Exterior view of the P-1000 tachometer, as received.

The device is not capable of storing data. Therefore, no data were recovered from this device.