

# National Transportation Safety Board

Office of Research and Engineering

Washington, DC 20594



ERA23FA358

## **ELECTRONIC DEVICES**

Specialist's Factual Report

December 5, 2024

## ACCIDENT

Location: Toms River, New Jersey  
Date: September 2, 2023  
Time: 22:18 eastern daylight time (EDT)  
Airplane: Cirrus SR-20, N420PB, Private

## Electronic Devices Specialist

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

## DETAILS OF THE INVESTIGATION

In agreement with the Investigator-In-Charge, an Electronic Devices group was not convened, and a summary was prepared.

The NTSB Vehicle Recorder Division received the following electronic devices:

Device Manufacturer/Model: GoPro Hero (Device 1)  
Device Serial Number: N/A<sup>1</sup>

Device Manufacturer/Model: GoPro-Like<sup>2</sup> Camera (Device 2)  
Device Serial Number: N/A

Device Manufacturer/Model: Android Phone - Personal Electronic Device (PED)  
Device Serial Number: N/A

Device Manufacturer/Model: Apple iPhone 13 - PED  
Device Serial Number: N/A

Device Manufacturer/Model: Avidyne Multifunction Display (MFD)  
Device Serial Number: N/A

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<sup>1</sup> N/A - The device was too damaged to determine the serial number.

<sup>2</sup> It could not conclusively be determined if this was a GoPro branded camera, or a similar facsimile.

## **1.0 Device Description**

### **GoPro Hero**

The GoPro HERO is a compact, lightweight, POV digital camera enclosed in a ruggedized housing that allows the camera to be mounted in a variety of positions using an array of supported accessories.<sup>3</sup> Depending on the model, the camera supports 4K HD at 60 frames per second (fps) as well as other lower quality recording resolutions at higher frame rates.<sup>4, 5</sup> The camera can be set to record still images simultaneously or independently of a video stream at a resolution of up to 12 megapixels.<sup>6</sup> The camera supports recording to micro-SD cards.<sup>7</sup> A built in Wi-Fi module allows users to connect to the camera either via an accessory remote control or via a smart phone app that permits camera control and image transfer.<sup>8</sup>

### **Personal Electronic Device**

PEDs are a category of devices comprised primarily of portable computing devices and mobile phones. Portable computing devices are typically capable of internet access, email, messaging services, and can run user-installed applications to perform specific tasks. Depending on the model, mobile phones can perform many of the same tasks as portable computing devices, plus have voice call and text messaging capabilities. PED user and system data is typically stored on non-volatile memory and can be accessed through manufacturer-provided interfaces.<sup>9</sup>

### **Avidyne Multi-Function Display**

The Avidyne Multi-Function Display (MFD) is an Electronic Flight Instrument System (EFIS). The Avidyne MFD is able to display the pilot checklist, terrain/map information, approach chart information and other aircraft/operational information depending on the specific configuration and options that are installed. One of the options available is a display of comprehensive engine monitoring and performance data.

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<sup>3</sup> POV - Point of View Shot - A photography technique that records the character's viewpoint from a singular camera location mounted in a manner that represents the character's field of view.

<sup>4</sup> 4K - A resolution format of 3840 x 2160 pixels.

<sup>5</sup> HD - High Definition - A resolution generally consisting of greater than 480 lines of horizontal resolution.

<sup>6</sup> Megapixel - (MP) - A count of a million pixels in an image or used to express the number of individual image sensor elements on a digital camera image sensor.

<sup>7</sup> SD - Secure Digital - a standard for nonvolatile memory card used in portable devices.

<sup>8</sup> Wi-Fi - A local area wireless technology that allows electronic devices to exchange data over a network.

<sup>9</sup> Non-volatile memory is semiconductor memory that does not require external power for data retention.

Each MFD contains a compact flash (CF) memory card located in a slot on the side of the unit. This memory card contains all of the software that the MFD needs to operate. Additionally, this card contains all of the checklist, approach charts, and map information that the unit uses to generate the various cockpit displays.

During operation, the MFD display receives information from several other units that are installed on the aircraft. Specifically, the MFD receives GPS position, time and track data from the aircraft GPS receiver. The MFD may also receive information from the aircraft concerning altitude, engine and electrical system parameters, and outside air temperature. This data is also stored on the unit's CF memory card.

The MFD generates new data files for each MFD power-on cycle. The oldest file is dropped and replaced by a new recording once the storage limit has been reached. MFD data are sampled every six seconds and is recorded to memory once every minute. If an interruption of power occurs during the minute between MFD memory write cycles, data sampled during that portion of a minute are not recorded.

## **2.0 Device Condition**

### **GoPro Hero - Device 1**

The GoPro Hero (Device 1) sustained extreme fire and impact damage; it is shown in Figure 1. The area in which the memory card was mounted was identified. The memory card was located, shown in Figure 2 (circled in red). The remnants of the memory card were fused to the battery, the entire structure was ashen and brittle. The remnants of the memory card could not be isolated and removed due to the brittle nature of the structure. In this condition, the card likely had extreme damage to its internal silicon structure. This structure needs to be undamaged, or data recovery is impossible. No data was recovered from the device.



**Figure 1.** The GoPro Hero (Device 1), as received from the wreckage site. No data was recovered from the device.



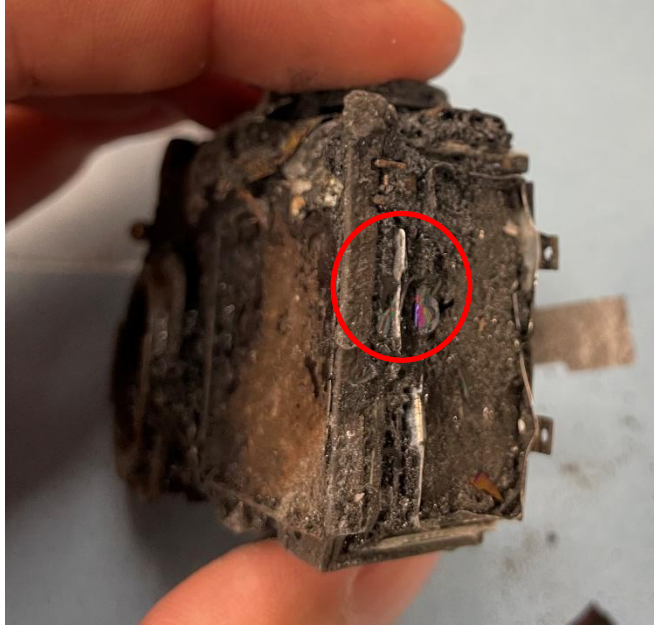
**Figure 2.** Device's internal memory unit (red box).

### **GoPro-Like Camera- Device 2**

The GoPro-Like Hero (Device 2) sustained extreme fire and impact damage, as shown in Figure 3. The area in which the memory card was mounted was identified. The memory card was located, shown in Figure 4 (circled in red). The remnants of the memory card were fused to the battery, the entire structure was ashen and brittle. The remnants of the memory card could not be isolated and removed due to the brittle nature of the structure. In this condition, the card likely had extreme damage to its internal silicon structure. This structure needs to be undamaged, or data recovery is not possible. No data was recovered from the device.



**Figure 3.** The GoPro Hero (Device 2), as received from the wreckage site.



**Figure 4.** The GoPro Hero (Device 2), as received from the wreckage site.

### **Android Phone (PED)**

The Android phone sustained extreme fire and impact damage as result of the accident and post-crash fire. The extent of the damage is shown in figure 5. No data was recovered from the device.

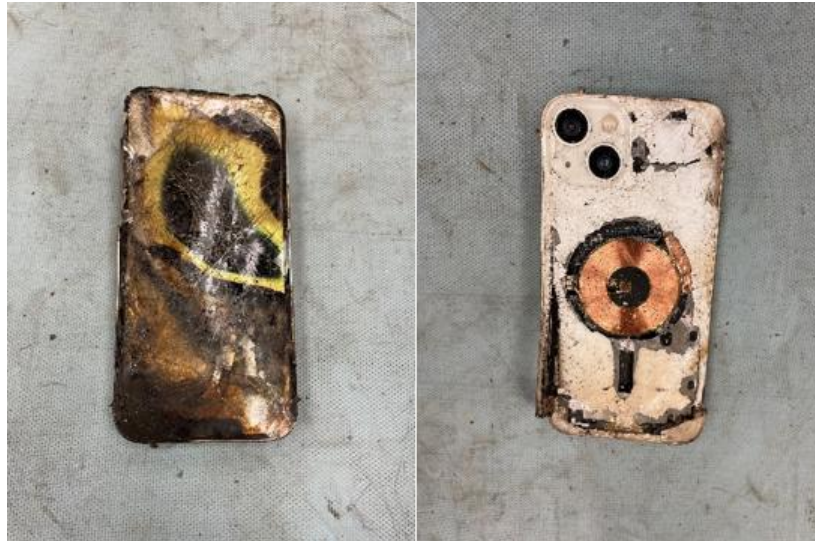


**Figure 5.** The Android phone, as received from the wreckage site.

### **Apple iPhone**

The Apple iPhone sustained significant fire and impact damage. The extent of the damage is shown in Figure 6. The iPhone was repaired by swapping the main board to the surrogate device. The iPhone was powered successfully but was locked with a 4 digit passcode. The phone is shown in an operational state in Figure 7. A

family member provided a number of potential passcodes, but none of the supplied passcodes unlocked the phone. No data was recovered from the iPhone.



**Figure 6.** The Apple iPhone, as received from the wreckage site.



**Figure 7.** The Apple iPhone in a functional state after repair. The passcode was unable to be obtained and no data was recovered.

### **Avidyne MFD**

This aircraft was equipped with an Avidyne MFD, but not an accompanying Avidyne PFD. This type of equipment was standard in early model Cirrus aircraft. The Avidyne MFD sustained extreme fire and impact damage as result of the accident and post-crash fire. The Avidyne MFD is shown in Figure 8, as received from the wreckage site. The area of the unit that contained the CF card is circled in red in Figure 9. The CF card was destroyed. No data was recovered from the device.



**Figure 8.** The Avidyne MFD, as received from the wreckage site.



**Figure 9.** The Avidyne MFD CF card location. The CF card is circled in red. The CF card was destroyed.

### **3.0 Data Description**

Due to impact damage, and prolonged fire damage, no data was recovered from any device.

Submitted by:

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