

National Transportation Safety Board

Office of Research and Engineering

Washington, DC 20594



CEN24FA042

ELECTRONIC DEVICES

Specialist's Factual Report

April 23, 2024

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A. ACCIDENT

Location: Plano, Texas
Date: November 21, 2023
Time: 1748 central standard time (CST)
Airplane: Mooney M20C, N1204X

B. ELECTRONIC DEVICES SPECIALIST

Specialist: Gerald Kawamoto
Recorder Specialist
National Transportation Safety Board (NTSB)

C. DETAILS OF THE INVESTIGATION

A group was not convened. The NTSB Vehicle Recorder Division received the following electronic devices:

Recorder Manufacturer/Model: Electronics International OPT-1
Recorder Serial Number: Unknown

Recorder Manufacturer/Model: Electronics International R-1
Recorder Serial Number: 57562

1.0 Electronics International OPT-1 Description and Data Recovery

The Electronics International OPT-1 is a precision oil pressure and temperature instrument featuring dual 90-degree analog displays. The device sustained extensive heat damage, as shown figure 1. All internal electronic components were damaged, thus, no potential non-volatile memory was recovered.¹

¹ Non-volatile memory (NVM) is semiconductor memory that does not require external power for data retention.



Figure 1. Exterior and interior of the Electronics International OPT-1.

2.0 Electronics International R-1 Description

The Electronics International R-1 is a precision RPM instrument featuring a 210-degree analog display and a full four-digit digital display. The device records the last flight time, peak RPM and a limited history of RPM values. The flight timer starts when RPM is above 2000 RPM for 10 seconds and stops when RPM is below 1200 RPM for 10 seconds. Peak RPM is recorded when the previous peak RPM value is exceeded for 3 seconds or longer. RPM values are written to memory once about every 163 seconds. No timestamps are recorded on the device.

2.1 Electronics International R-1 Data Recovery

Upon arrival at the Vehicle Recorder Laboratory, an external examination revealed the device sustained impact damage, as shown in figure 2, rendering it inoperable. The internal non-volatile memory chip was removed and the binary data were read out using laboratory tools.

Data were interpreted using documentation provided by the manufacturer. The last flight time was 3 hours and 41 minutes and the peak RPM was 2590 RPM. Historical RPM values from the final flight are summarized in Table 1. Timing is referenced to the final RPM value identified, which was recorded between 0 to 163 seconds prior to power loss.

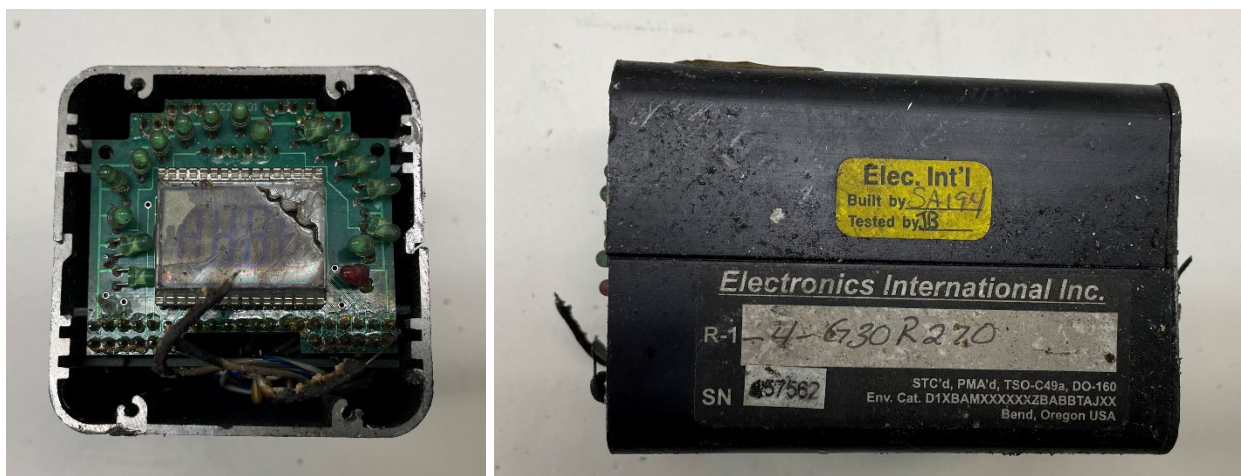


Figure 2. Front and side views of the Electronics International R-1.

Table 1. RPM values recorded during the final flight.

Recorded RPM	Maximum elapsed time since power off (seconds)	Maximum elapsed time since power off (hh:mm:ss)
2400	5542	1:32:22
2400	5379	1:29:39
2400	5216	1:26:56
2420	5053	1:24:13
2410	4890	1:21:30
2410	4727	1:18:47
2420	4564	1:16:04
2400	4401	1:13:21
2390	4238	1:10:38
2400	4075	1:07:55
2390	3912	1:05:12
2390	3749	1:02:29
2390	3586	0:59:46
2400	3423	0:57:03
2400	3260	0:54:20
2410	3097	0:51:37
2410	2934	0:48:54
2420	2771	0:46:11
2410	2608	0:43:28
2400	2445	0:40:45
2400	2282	0:38:02
2390	2119	0:35:19
2410	1956	0:32:36
2400	1793	0:29:53
2390	1630	0:27:10
2360	1467	0:24:27
2390	1304	0:21:44
2410	1141	0:19:01
2390	978	0:16:18
2400	815	0:13:35
2390	652	0:10:52
2410	489	0:08:09
2390	326	0:05:26
1300	163	0:02:43

Submitted by:
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Recorder Specialist