

National Transportation Safety Board

Office of Research and Engineering

Washington, DC 20594



ERA22FA223

ELECTRONIC RECORDER DEVICES

Specialist's Factual Report

December 15, 2022

Table of Contents

A. EVENT SUMMARY	3
B. ELECTRONIC RECORDER DEVICES SPECIALIST	3
C. DETAILS OF THE INVESTIGATION	3
1.0 DEVICES DESCRIPTION	3
1.1 Devices Condition and Data Recovery	3
1.2 EI R-1 Tachometer Recording Description	5
1.3 EI OPT-1 Oil Pressure and Temperature Gauge Recording Description	6

A. EVENT SUMMARY

Location: Athens, Georgia
Date: May 11, 2022
Time: 18:53 eastern daylight time (EDT)
Airplane: Piper PA-24-250 (N8007P)

B. ELECTRONIC RECORDER DEVICES SPECIALIST

Specialist: W. Deven Chen
National Transportation Safety Board (NTSB)
Washington, DC

C. DETAILS OF THE INVESTIGATION

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

Manufacturer/Model:	EI R-1 Tachometer
Serial Number:	074241
Manufacturer/Model:	EI OPT-1 Oil Pressure and Temperature Gauge
Serial Number:	054433

1.0 Devices Description

The Electronic International Inc. (EI) R-1 tachometer is a digital tachometer. The device is capable of tracking total flight and tachometer time. Additionally, the device records a limited amount of tachometer history approximately every 163 seconds to non-volatile memory.

The EI OPT-1 Oil Pressure and Temperature gauge is a digital and analog display that shows oil temperature and pressure. The device is capable of recording oil pressure and temperature every 236 seconds after the device powers on.

1.1 Devices Condition and Data Recovery

Upon arrival at the Vehicle Recorder Division, an exterior examination showed that the EI R-1 and OPT-1 did not show signs of impact damage, as shown in figures 1 and 2. The data recovery for both devices followed the same procedures. The devices were disassembled and the respective 128-bytes, non-volatile memory chips were identified. The chips were removed and read out using forensic tools. The recorded data were decoded with documentation from the manufacturer.



Figure 1. EI R-1 tachometer as received.



Figure 2. EI OPT-1 Oil Pressure and Temperature gauge as received.

1.2 EI R-1 Tachometer Recording Description

The R-1 tachometer records a new session every power up starting from the same memory location. An indication at the end of the new session indicates where that session ends. Older flights will be overwritten as new data points are collected.

Only one session appeared to be recorded to the R-1 tachometer. The session was determined to be related to the event flight.

Table 1 shows the recorded tach time and the most recent flight time. Table 2 shows the RPM history before the power loss in the event flight. The R-1 tachometer's high and low RPM limits were set at 2585 and 1000 RPM, respectively.

Table 1. Tach time and most recent flight time from R-1 tachometer.

Decoding	Value
Tach Time (hours)	4625.7
most recent Flight Time (HH:MM)	02:33

Table 2. RPM history from R-1 tachometer.

Seconds before POWER LOSS	RPM
8313	2220
8150	2220
7987	2220
7824	2150
7661	2150
7498	2130
7335	2530
7172	2470
7009	380
6846	2270
6683	2180
6520	2200
6357	2190
6194	2190
6031	2150
5868	2150
5705	2240
5542	2240
5379	2240
5216	2240
5053	2240
4890	2220
4727	2220
4564	2250

Seconds before POWER LOSS	RPM
4401	2250
4238	2250
4075	2250
3912	2250
3749	2240
3586	2240
3423	2230
3260	2510
3097	2380
2934	2480
2771	2390
2608	2390
2445	2380
2282	2380
2119	2370
1956	2380
1793	2380
1630	2370
1467	2380
1304	2380
1141	2370
978	2330
815	2340
652	2340
489	2210
326	2210
163	2210
POWER LOSS	

1.3 EI OPT-1 Oil Pressure and Temperature Gauge Recording Description

The OPT-1 gauge records a new session every power up starting from the same memory location. An indication at the end of the new session indicates where that session ends. Older flights will be overwritten as new data points are collected.

Only one session appeared to be recorded to the OPT-1 gauge. The session was determined to be related to the event flight.

Table 3 shows the recorded oil pressure and oil temperature history before the power loss in the event flight. The units for oil pressure and oil temperature are

pounds per square inch and degrees Fahrenheit, respectively. Note that the oil pressure was shown 0 at 708 seconds before power loss.

Table 3. Oil Pressure and Temperature history from OPT-1 gauge.

Seconds before POWER LOSS	Pressure (PSI)	Temperature (degF)
5428	63	180
5192	64	179
4956	64	179
4720	63	180
4484	66	181
4248	68	184
4012	76	183
3776	65	182
3540	62	183
3304	69	182
3068	97	182
2832	78	182
2596	62	179
2360	63	177
2124	63	175
1888	64	175
1652	63	172
1416	63	172
1180	64	186
944	58	195
708	0	178
472	63	180
236	61	188
POWER LOSS		

Submitted by:

W. Deven Chen
Electrical Engineer - Recorder Specialist