

NATIONAL TRANSPORTATION SAFETY BOARD

Vehicle Recorder Division
Washington, D.C. 20594

March 4, 2019

Recording Device

Specialist's Factual Report
by Gerald Kawamoto

1. EVENT

Location: Santee, California
Date: February 06, 2018
Aircraft: Cessna 182T
Registration: N3525T
Operator: Private
NTSB Number: WPR18FA084

On February 6, 2018, about 0654 Pacific standard time (PST), a Cessna 182T airplane, N3525T, impacted into an industrial storage facility in Santee, California. The private pilot, one passenger, and a family dog were fatally injured; another family dog was not injured. The airplane was substantially damaged throughout the structure. The pilot/owner operated the airplane under the provisions of Title 14 *Code of Federal Regulations* Part 91, as a personal cross-country flight. Instrument meteorological conditions prevailed at the time of the accident and a visual flight rules (VFR) flight plan had been filed. The flight had departed Gillespie Field Airport (SEE), El Cajon, California, about 0645 and was destined for Eureka Airport (05U), Eureka, Nevada.

2. RECORDED FLIGHT DATA GROUP

A recorded flight data group was not convened.

3. DETAILS OF INVESTIGATION

The National Transportation Safety Board (NTSB) Vehicle Recorder Division received the following devices:

Device: Electronics International MUX-8A
Device Serial Number: 109454

3.1. Electronics International MUX-8A Device Description

The MUX-8A is a data recorder designed to receive and record data from transducers produced by Electronics International, such as the UBG-16 engine bar-graph display. The MUX-8A is also capable of recording data from third-party instruments such as GPS receivers.

Data is recorded in non-volatile¹ serial FLASH memory. Recorded data for each flight is date and time stamped and subsequently stored in a comma-delimited format. The MUX-8A can be setup to record a new data point for each supported parameter every one, three, or six minutes. It can also be set to record in a high data-rate “Burst Mode” (usually every five to six seconds). The unit can retain between 300 and 600 hours of data at 6 minute intervals depending on the number of parameters recorded. Data may be downloaded to a standard PC running Windows using a proprietary program called DRS-1 Download produced by the manufacturer.

According to the manufacturer, recorded data have these features: (a) each value is recorded as transmitted by the source device, dropping any decimal point; (b) in the case of the UBG-16 source device, the value transmitted is the value displayed on the device; and (c) no record descriptor (i.e. metadata) is recorded on the MUX-8A, as such, the record descriptor must be known from the installation configuration or inferred by reviewing the recorded values.

3.2. Electronics International MUX-8A Data Recovery

Upon arrival at the Vehicle Recorder Division, an exterior examination revealed the unit had not sustained any damage and information was extracted using the manufacturer’s software.

3.3. Electronics International MUX-8A Data Description

The data extracted included 120 sessions from May 27, 2016, through February 6, 2018. The last recorded session was determined to be related to the accident and is included in this report. The data in the last session were sampled once per minute for a total of 22 data points.

3.4. Electronics International MUX-8A Timing

Data recorded by the MUX-8A is based on the unit’s internal timing device. The internal timing device records elapsed seconds relative to an arbitrary starting point. During the download process, the DRS-1 software used the downloading computer’s clock to offset the MUX-8A’s arbitrary elapsed seconds into local time, thereby assigning each record a date and time stamp. The date and time stamp for the MUX-8A data was extracted after verifying the downloading computer’s clock was accurately set to a reference atomic clock. Given uncertainties of the DRS-1 download software and the MUX-8A internal timing device, times are expressed as “Device Calculated PST.”

3.5. Electronics International MUX-8A Parameters Provided

Table 1 describes data parameters downloaded from the MUX-8A. The verified values were date, time, cylinder head temperature (CHT), and exhaust gas temperature (EGT). An additional four unknown values were recorded (“CH-13,” “CH-14,” “CH-15,” “CH-16”). The manufacturer of the device was contacted and provided educated guesses on the unknown values:

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

- CH-13 - Oil Temperature
- CH-14 - Fuel Pressure
- CH-15 - RPM (x0.1)
- CH-16 - Voltage (x10)

However, due to a lack of documentation regarding the installation and configuration, the meaning of the unknown values were not verified for this report. The values are included for their trend information.

Table 1 - Verified and provided parameters.

Parameter Name	Parameter Description
Date (MM/DD/YYYY)	Date for recorded data point
Time (HH:MM:SS)	Time (Device Calculated PST) for recorded data point
CHT # (degF)	Cylinder Head Temperature # (degrees Fahrenheit)
EGT # (degF)	Exhaust Gas Temperature # (degrees Fahrenheit)
CH-13 through CH-16	Unknown value, units, and decimal point

3.6. OVERLAYS AND TABULAR DATA

Figure 1 is a plot of all parameters recorded on February 6, 2018. The time interval is 6:29:00 to 6:51:00 Device Calculated PST.

Tabular data used to generate figure 1 are included as Attachment 1. This attachment is provided in electronic comma separated value (.CSV) format.

Figure 1. Plot of parameters from MUX-8A

