NATIONAL TRANSPORTATION SAFETY BOARD
Vehicle Recorder Division
Washington, D.C. 20594

April 16, 2014

Recording Device

Specialist's Factual Report
by Bill Tuccio, Ph.D.

A. EVENT

Location:	Burnham, Maine
Date:	July 3, 2013
Aircraft:	Sikorsky 269C
Registration:	N888ZW
Operator:	Point of View Helicopter Services LLC
NTSB Number:	ERA13LA314

B. GROUP - No Group

C. SUMMARY

On July 3, 2013, about 1648 eastern daylight time (EDT), a Sikorsky Aircraft Corporation (formerly Schweizer Aircraft Corporation) 269C, N888ZW, registered to and operated by Point of View Helicopter Services, LLC, collided with terrain near Burnham, Maine. Visual meteorological conditions prevailed at the time for the 14 *Code of Federal Regulation* (CFR) Part 91 aerial observation bear spotting flight that originated from the Waterville Robert LaFleur Airport, Waterville, Maine. The helicopter sustained substantial damage and the commercial pilot sustained serious injuries, while the passenger sustained minor injuries.

D. DETAILS OF INVESTIGATION

The NTSB Vehicle Recorder Laboratory received the following device:

GPS Manufacturer/Model:	Electronics International MUX-8A
Serial Number:	121908

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 certain third-party instruments such as GPS receivers.

Data is recorded in non-volatile serial FLASH memory[1]. 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.

Electronics International MUX-8A Data Recovery

Upon arrival at the NTSB laboratory, it was evident that the unit had not sustained any heat or structural damage and the data were extracted from the recorder normally, without difficulty.

Electronics International MUX-8A Data Description

The data extracted spanned from July 30, 2012, through July 3, 2013. The accident flight data, recorded on July 3, 2013, were sampled once per minute for a total of 157 data points. Only the accident flight data were determined to be of interest and are included in this report.

Electronics International MUX-8A Timing

Data recorded by the MUX-8A is based on the device'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 uses the downloading computer's clock to offset the MUX-8A's arbitrary elapsed seconds to local time, thereby assigning each record a date and time stamp. The date and time stamp for the MUX-8A data was extracted as EDT 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 EDT."

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

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 eight unknown values were recorded ("CH-2," "CH-3," … "CH-9"); however, due to a lack of documentation regarding the installation and configuration, the meaning of the unknown values were not determined for this report. According to information about the installation, the unknown values are related to engine and electrical information; as such, the unknown values are included for their trending information.

Table 1: MUX-8A Parameters

Parameter Name	Parameter Description
Date	Date for recorded data point (MM/DD/YYYY)
Time	Time (Device Calculated EDT) for recorded data point (HH:MM:SS)
CHT-1 through CHT-4	Cylinder Head Temperature for respective cylinder (degF[1])
EGT-1 through EGT-4	Exhaust Gas Temperature for respective cylinder (degF)
CH-2 through CH-9	Unknown value, units, and decimal point

[1]degF means degrees Fahrenheit.

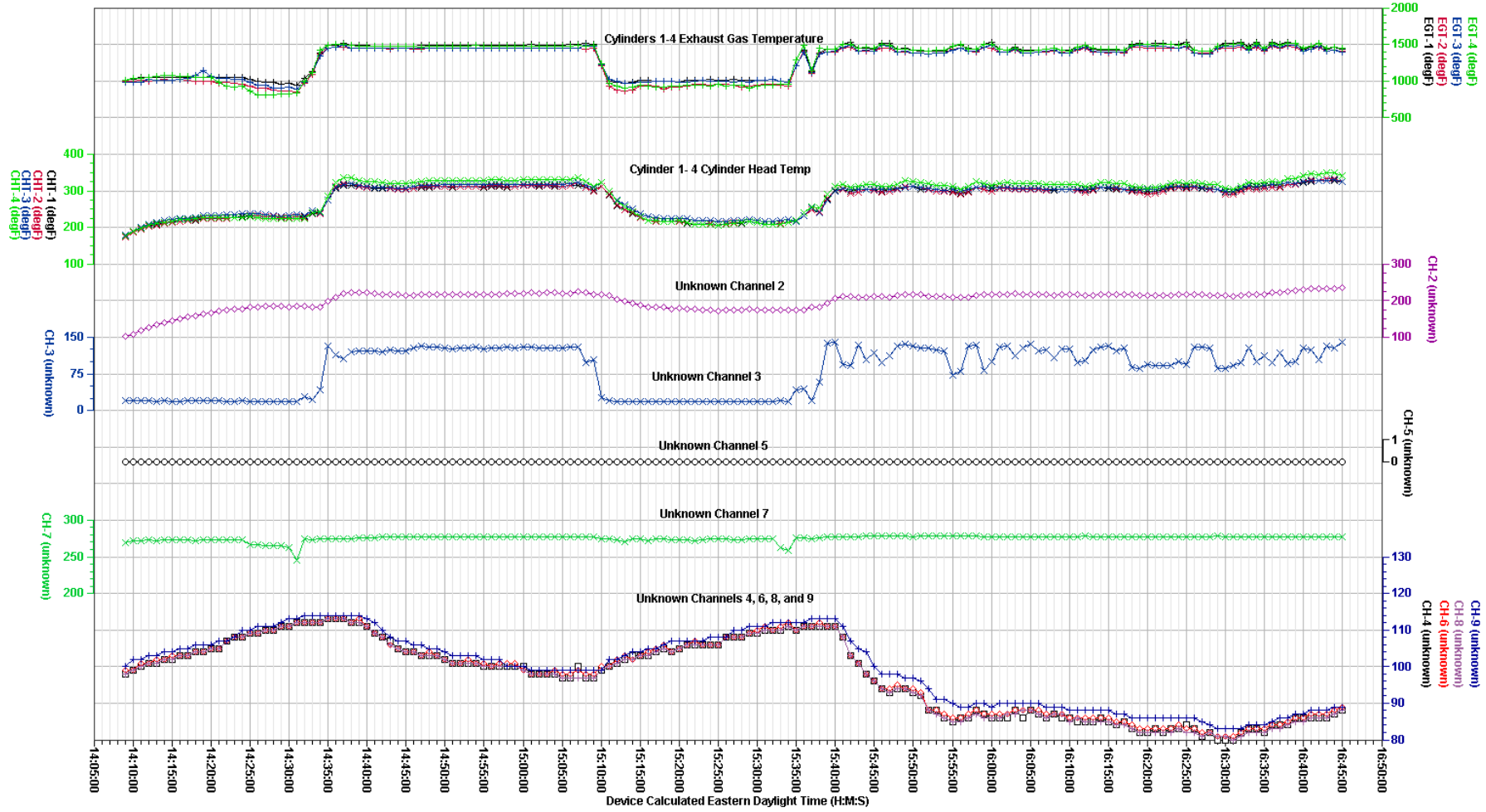
OVERLAYS AND TABULAR DATA

Figure 1 is a plot of all parameters recorded on July 3, 2013. The recording began at 14:09 EDT. At about 14:34 EDT, the EGTs and CHTs began to increase and remained above 1,400º F and 275º F, respectively, until about 15:09 EDT. From about 15:11 to 15:34 EDT, the EGTs remained below 1,200º F and the CHTs decreased below 275º F. At about 15:34 EDT, the EGTs increased until 15:36 EDT, followed by a one sample decrease at 15:37 EDT, and then remained above 1,350º F for the remainder of the recording. After about 15:34 EDT, the CHTs increased and then remained above 275º F until the end of the recording.

Figure 2 shows the same parameters as figure 1, with a focus on the time period after the EGT/CHT decrease, 15:40 EDT until the end of the recording. After 15:40 EDT, the EGT values fluctuated between about 1,375º F and 1,525º F until the end of the recording. After 15:40 EDT, the CHT values fluctuate between about 290º F and 330º F until about 16:31 EDT, then begin to increase until the end of the recording. The recording ended at 16:45 EDT.

Tabular data used to generate figures 1 and 2 are included as Attachment 1. This attachment is provided in electronic comma-delimited (.CSV) format.

Figure 1. MUX-8A all recorded parameters on July 3, 2014.



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Entire Recording on 7/3/13 (Unknown Ch 4,6,8, 9 overlapped)

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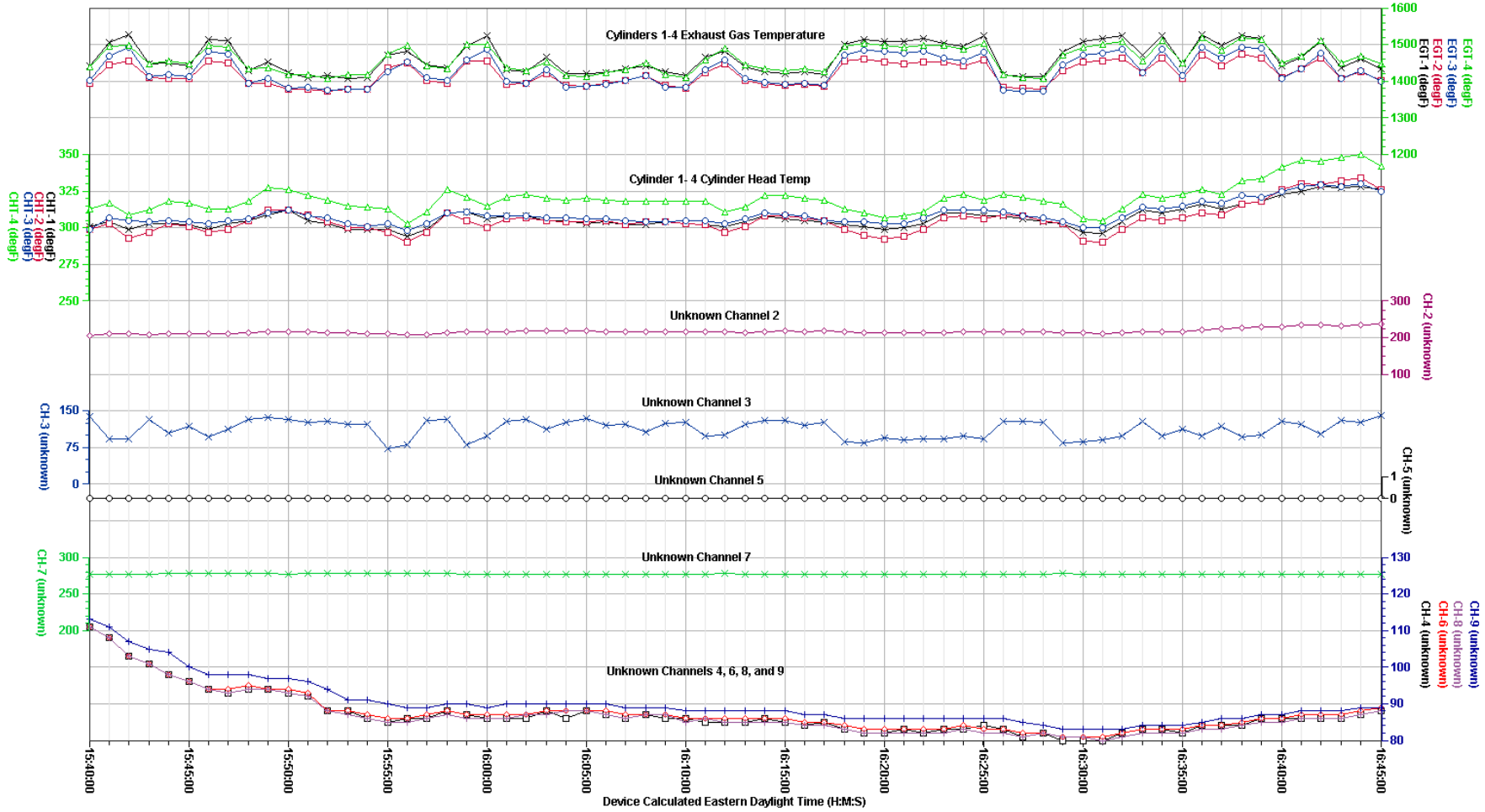
Figure 2. MUX-8A all recorded parameters on July 3, 2014 after 25-minute decrease in EGT/CHT.



Revised: 16 April 2014

Recording after 25-minute decrease in EGT/CHT on 7/3/13 (Unk Ch 4,6,8, 9 overlapped)

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