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

October 2, 2017

Cockpit Display (Dynon EFIS-D100)

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

1. EVENT SUMMARY

Location:	Marengo, Illinois
Date:	December 9, 2016
Aircraft:	Zenith Zodiac 601XL
Registration:	N4218
Operator:	Private
NTSB Number:	CEN17FA053

2. GROUP

A group was not convened.

3. DETAILS OF INVESTIGATION

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

Device Manufacturer/Model:	**Dynon EFIS-D100**
Serial Number:	**003631**

3.1. Device Description

The Dynon Electronic Flight Information System (EFIS) D100 is a 7" wide screen display mounted in the cockpit of non-type certificated aircraft. The instrument integrates multiple flight instruments including airspeed, altitude, gyro-stabilized magnetic compass, turn rate, slip/skid ball, bank angle, pitch angle, and vertical speed. The unit also has other functions that include a clock/timer, g-meter, voltmeter, and a density altitude/true airspeed calculator. The unit contains an Air Data, Attitude and Heading Reference System (ADAHRS) to provide air data, attitude, and heading information to the display. Depending on the installation in the operator's aircraft certain parameters might not be displayed, for example angle-of-attack.

Depending on the firmware version on the unit, the ability to log data to internal non-volatile memory[1] exists. According to the manufacturer, firmware versions 5.0 and later contain the ability to log certain EFIS and GPS parameters. The data logging must be configured by the operator to enable logging and set the data log interval. The unit can also be configured to start logging data automatically at boot-up. The data logging interval can be set to store at 1, 3, 5, 10, 30, or 60 second intervals. The internal memory can store at least 2 hours of cumulative data at a 1 second recording interval or at least 120 hours at a 60 second data recording interval. When the recording limit in the internal memory is reached, the oldest record is dropped and a new record is added.

3.2. Device Condition

Upon arrival at the NTSB Vehicle Recorder Division, an examination revealed the unit had sustained significant structural damage, as shown in figure 1. During disassembly, two semiconductor chips were found, as shown in figure 2; the non-volatile memory chip (where any historical data would be stored) was identified and was intact (top chip in figure 2). Minor pin damage was repaired and the chip was successfully read using an EEPROM programmer. Figure 3 shows a screen shot from a binary editor and human-readable text decoded in the right margin; the human-readable text indicates a successful EEPROM programmer readout. The chip readout was subsequently analyzed for any historical data.

Figure 1. Unit as received.

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

Figure 2. Chips found during disassembly.

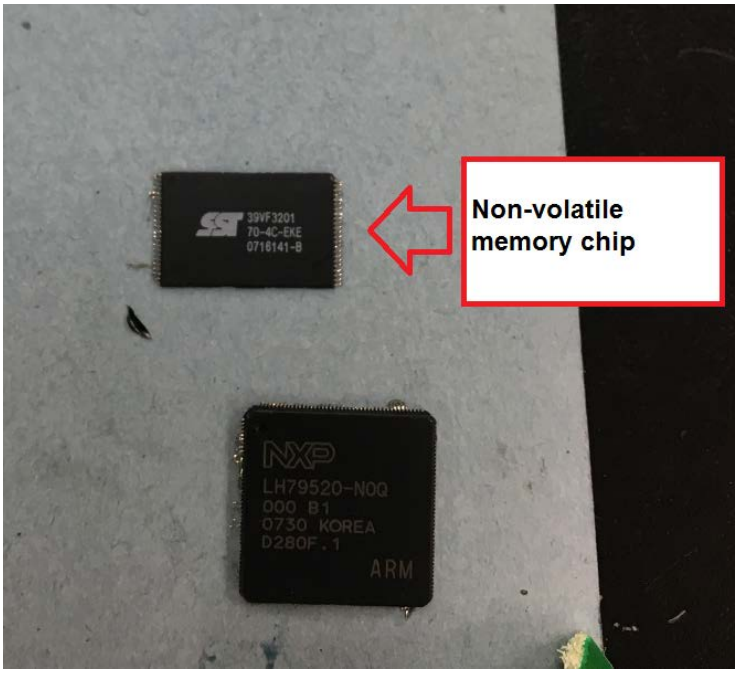

Figure 3. Binary editor, showing human-readable text in right margin.

C 0118	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	
C 0129	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	
C 013A	00	00	00	00	00	00	00	00	13	00	47	55	49	44	16	00	01	□GUID□□
C 014B	00	00	00	80	07	62	6F	6F	74	00	00	00	00	00	00	00	00	€□boot
C 015C	00	01	00	00	00	40	06	75	73	65	72	00	00	00	00	00	00	□@□user
C 016D	00	00	00	01	00	00	00	3F	00	74	79	70	65	00	00	00	00	□?type
C 017E	00	00	00	00	01	01	00	00	00	80	07	7A	75	6C	75	20	69	□□€□zulu i
C 018F	73	20	67	70	73	00	01	01	00	00	00	7F	00	7A	75	6C	75	s gps□□ zulu
C 01A0	20	68	6F	75	72	00	00	00	02	01	00	00	00	FF	00	7A	75	hour□□ÿzu
C 01B1	6C	75	20	6D	69	6E	00	00	00	00	03	01	00	00	00	FF	00	lu min□□ÿ
C 01C2	7A	75	6C	75	20	73	65	63	00	00	00	00	04	01	00	00	00	zulu sec□□
C 01D3	80	07	64	61	74	65	20	76	61	6C	69	64	00	00	04	01	00	€□date valid□□
C 01E4	00	00	7F	00	7A	75	6C	75	20	64	61	79	00	00	00	00	05	zulu day□
C 01F5	01	00	00	00	F8	03	7A	75	6C	75	20	6D	6F	00	00	00	00	□ø□zulu mo
C 0206	00	06	01	00	00	00	FF	00	7A	75	6C	75	20	79	65	61	72	□□ÿzulu year
C 0217	00	00	00	07	01	00	00	00	F0	04	6E	61	76	20	70	6F	72	□□ð□nav por
C 0228	74	00	00	00	00	07	02	00	00	0F	FF	00	73	65	6C	20	63	t□□□ÿsel c

3.3. Data Description

No historical data was found on the chip. The lack of data could have been due to: (a) logging was turned off or (b) the firmware version was less than version 5.0.