

NATIONAL TRANSPORTATION SAFETY BOARD

Vehicle Recorder Division

Washington, D.C. 20594

July 19, 2011

Recording Devices

Specialist's Factual Report

By

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1 EVENT SUMMARY

Location: Destin, Florida
Date: November 23, 2010
Aircraft: PA-46-350P
Registration: N548C
NTSB Number: ERA11FA070

On November 23, 2010, about 1930 Central Standard Time, a Piper PA-46-350P, N548C, was substantially damaged when it impacted water during an approach to Destin/Ft. Walton Beach Airport (DTS) Destin, Florida. The airplane had departed Lake Front Airport (NEW), New Orleans, Louisiana about 1822. Instrument meteorological conditions prevailed and an instrument flight rules (IFR) flight plan had been filed. The certificated private pilot and two passengers were fatally injured. The personal flight was conducted under the provisions of Title 14 Code of Federal Regulations Part 91.

2 RECORDING DEVICES GROUP

A group was not convened.

3 DETAILS OF EDM INVESTIGATION

On December 1, 2010, the Safety Board's Vehicle Recorder Division received the following devices:

Recorder Manufacturer/Model: **Garmin GNS530**
Recorder Serial Number: **78402875**

Recorder Manufacturer/Model: **Garmin GNS530**
Recorder Serial Number: **78403039**

Recorder Manufacturer/Model: **Avidyne 750 MFD**
Recorder Serial Number: **1386**

Recorder Manufacturer/Model: **Ultra Enhanced Digital Indicator - 9A4080**
Recorder Serial Number: **04011893**

On December 3, 2010, the Safety Board's Vehicle Recorder Division received the following additional device:

Recorder Manufacturer/Model: **Flightcom DVR 300i**
Recorder Serial Number: **21263**

3.1 Garmin GNS530 Description

Two Garmin GNS530 units were received. The units arrived at the laboratory packaged in fresh water. Both unit's were rinsed thoroughly and visually inspected.

3.1.1 Description

The Garmin GNS530 is a panel mounted unit that provides GPS navigation, VHF Navigation and VHF communications for the crew. The standard GNS 530 contains a 10-watt comm radio, while the GNS 530A contains a 16-watt comm. The comm has a 2,280 channel capacity and includes a 200 channel ILS/VOR, with localizer and glideslope, nav receiver. The unit also contains built-in terrain and navigational databases that can be updated with a front-loading data card. The unit is also capable of providing roll steering commands to compatible autopilot systems. The unit has a 5-inch color LCD display to provide the crew with radio frequency information, map displays, optional XM weather and optional Traffic Information Services (TIS) alerts.

3.1.2 Recorded Data

The Garmin GNS530 retains flight plans and user waypoints. The unit also will retain the last tuned frequencies for the NAV and COM receivers. The information is stored on volatile¹ memory internal to the unit. The unit contains an internal battery that supplies the power necessary to retain the information in memory between power cycles.

3.1.3 Recovered Data

The internal battery of the GNS530 sustains the volatile memory which contains the recorded data. The voltage for the internal battery on each unit was measured. The voltage measurement on each unit was below the necessary voltage to sustain the volatile memory. As a result of the low voltage, no data was recovered from either GNS530.

¹ Volatile memory requires a constant application of power to retain data. The instant power is removed from a volatile memory device, all stored data is lost.

3.2 Avidyne 750 MFD Description

One Avidyne 750 MFD was received. The unit arrived at the laboratory packaged in fresh water. The unit was rinsed thoroughly and visually inspected. The exterior cover of the unit was removed and the solid state hard drive was removed, cleaned, dried using a vacuum oven and inspected see Figure 1.



Figure 1 - Solid State Hard Drive removed from Avidyne 750 MFD

3.2.1 Description

The Avidyne 750 is a panel mounted Multi-Function Display (MFD) capable of displaying a color moving map, traffic information, weather radar and stormscope information. The unit may also contain IFR and VFR charts that the flight crew can display.

3.2.2 Recorded Data

The Avidyne 750 stores a minimal amount of information, for example pilot settings. The unit will also record a recent position that is updated every ten minutes. Depending on the manufacture date of the unit, the data can be stored on a solid state hard disk drive or flash memory.

3.2.3 Recovered Data

The contents of the solid state hard drive were downloaded. With the assistance of Avidyne, the recent position record was located and retrieved. The last recorded latitude and longitude was 30.5200° N and 86.5769° W.

3.3 Ultra Enhanced Digital Indicator - 9A4080 Description

One Ultra Enhanced Digital Indicator was received. The unit arrived at the recorders laboratory packaged in fresh water. The exterior cover of the unit was removed and the unit was rinsed thoroughly, dried using a vacuum oven and visually inspected, see Figure 2.



Figure 2 - Ultra EDI with exterior cover removed

3.3.1 Description

The Ultra Enhanced Digital Indicator is a panel mounted unit that contains two LCD's which are capable of displaying three lines of information and is part of the aircraft's Transicoil Electronic Module instrument System (EMIS). The unit is capable of displaying six engine parameters at one time. The first line is dedicated to Manifold Pressure and RPM. The second line will display a selected analog indicator reading. The third line displays outside air temperature and percent power. The unit interfaces with the 10 analog instrument installed below the unit on the instrument panel. The analog instruments include, manifold pressure, RPM, turbine inlet temperature, fuel flow, oil temperature, oil pressure, cylinder head temperature, vacuum pressure and fuel quantities. The EDI is linked to the fuel flow indicator in the system stack through the data bus. Having this information available allows the EDI to perform "Real Time" fuel management calculations. Fuel remaining, flight time remaining and fuel consumed can be selected on the display. In the event of an engine exceedance, the unit will alert the pilot of the condition.

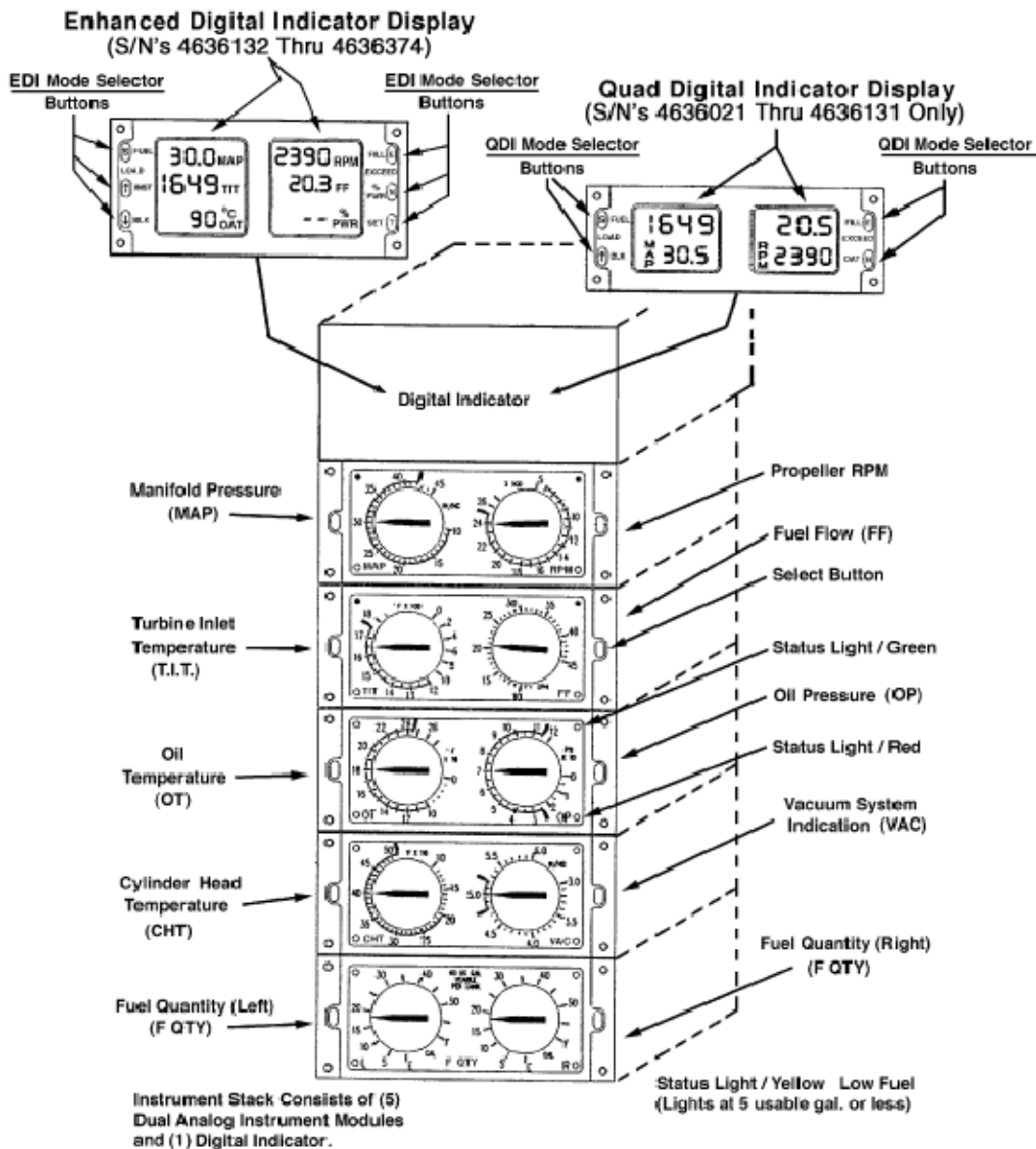


Figure 3 - Piper Transicoil Electronic Module Instrument System (EMIS)²

3.3.2 Recorded Data

During an exceedance (up to 10 minutes or 599.9 seconds), the unit will record the peak value of the exceedance, the average value of the exceedance, and the time duration of the exceedance. This data is stored in non-volatile memory for future recall. The memory size is sufficient to record a total of 238 exceedance events. Each event contains the peak, average and time duration of exceedance. The exceedance history is presented in reverse chronological order for each indicator during review, with the most recent exceedance event listed first.

² Further information on the operation of the EMIS can be found in the PA-46-350P, Malibu Mirage/PA-46R-350T, Malibu Matrix Maintenance Manual.

3.3.3 Recovered Data

Using the procedures outlined in the aircraft's maintenance manual, power was applied to the unit and any exceedance information displayed was recorded. In order to determine the type of exceedance, the corresponding analog indicator will flash indicator LED's. The analog instruments were not used during the download; therefore the source/type of exceedance could not be determined. Two instruments recorded exceedances, Table 1 and Table 2 contain the recorded values from review of the exceedance information.

Table 1 - Indicator 1 exceedances

Exceedance	Peak Value	Average Value	Exceedance Time (sec)
1	5	6	222
2	0	0	551
3	0	0	81

Table 2 - Indicator 2 exceedances

Exceedance	Peak Value	Average Value	Exceedance Time (sec)
1	5	6	19
2	0	0	559
3	0	0	73

3.4 Flightcom DVR 300i Description

One Flightcom DVR 300i was received, see Figure 4. The unit had signs of corrosion on the exterior and areas of impact damage. The external battery was not connected to the unit.



Figure 4 - Flightcom DVR 300i as received (note: external battery is disconnected)

3.4.1 Description

The Flightcom DVR 300i³ is a panel mounted digital voice recorder and timekeeping device. The device displays time, in either UTC or local time, flight time, hobbs meter or a timer display depending on the pilots' selection. The unit also has the capability to store or capture audio. The unit can store checklist items, reminders and radio audio. Depending on the aircraft wiring the radio audio can include hot mic transmissions or currently selected radio traffic.

The audio data is stored on volatile memory internal to the unit. The unit requires constant power to retain the data. Power can be supplied to the unit via the aircraft electrical system or via an external mounted battery. If the aircraft's electrical system connection or the external battery is removed all recorded data is lost.

3.4.2 Recorded Data

The audio data is stored on volatile memory internal to the unit. The recording quality can be selected Depending on the pilots' selection of audio quality. Table 3 outlines the speech qualities and the recording times.

Table 3 - DVR 300i recording times

Quality	Record Time (in seconds)			
	Loop Record	Scratch Pad Record	Periodic Alarm	Checklist Item
Best	37	33	4.5	2.4
Good	60	54	7.5	3.8
Compressed	68	61	8.5	5

3.4.3 Recovered Data

The external mounted battery of the DVR 300i was not attached to the unit. As a result of loss of power, no data was recovered from the DVR300i.

³ Further information on the operation of the DVR 300i, please refer to the DVR 300i-Operation and Installation Manual.