

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



GPS Factual Report

DFW08FA062

by

Joseph A. Gregor

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December 1, 2008

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A. EVENT

Location: South Padre Island, Texas
Date/Time: February 5, 2008 / 2054 Central Standard Time (CST)¹
Aircraft Type/ID: Eurocopter France AS350B2 / N911VA
Operator: Metro Aviation, Inc
NTSB Number: DFW08FA062

B. GROUP - No Group

C. SUMMARY

On February 5, 2008, at 2054 central standard time (CST), a Eurocopter France AS350B2, N911VA, registered to Harlingen Community Emergency Care Foundation, Inc., doing business as Valley Air Care, and operated by Metro Aviation, Inc., as a 14 CFR Part 91 positioning flight, crashed into the surface of the water while maneuvering for approach near South Padre Island, Texas. Visual meteorological conditions prevailed and a company flight plan was filed. The flight had departed the Valley Baptist Medical Center Heliport (49TX) in Harlingen, Texas.

D. DETAILS OF INVESTIGATION

On March 24, 2008, the NTSB Vehicle Recorder Laboratory received the following device(s):

GPS Manufacturer/Model: Magellan Meridian Gold
Serial Number: CH 064153

¹ All times are given in Central Standard Time (CST) unless otherwise noted.

GPS Description: Meridian Gold

The Magellan Meridian Gold is a hand-portable GPS unit equipped with a grayscale LCD display, soft-key controls, and employs a 12-channel receiver. The unit can be operated using external power, or alternatively by using a set of 2 internally mounted AA batteries. An internal patch antenna is employed for GPS signal reception. The Meridian Gold is capable of storing position and altitude information for up to 500 *waypoints* in memory.² An unspecified number of *routes*, each representing a linked list of waypoints, may also be stored in memory. A detailed *track* – composed of latitude and longitude³ for an unspecified number of data points – may also be stored. Tracks may be manually saved as a route in long term memory. The unit contains hardware and software permitting the download of recorded waypoint, route, and track information via a Magellan proprietary interface. The unit communicates with other electronic devices via a serial port employing the NMEA 0183 protocol. An internal button-battery is used to back-up power to the internal memory and real-time clock during those periods when main power is removed.

GPS Data Recovery

Upon arrival at the Vehicle Recorder Laboratory, it was evident that the unit had sustained the effects of prolonged saltwater exposure (see figures 1 - 7). There were signs of salt and mineral deposits and corrosion at various points within the unit. The water-resistant case and LCD display were found damaged due to impact forces. The main PC board was desalinated by soaking and rinsing in fresh water. Excess water was driven off and the board de-greased using Acetone. The board was further degreased and cleaned using Methonal and then dried. The board and all connections were then electro-washed with Cirozane spray employing mechanical action using an acid brush. After this treatment the board was dried and vacuum-baked at 110° C and 15 inches Hg to de-activate any remaining salts.

² It is not known if data is stored in volatile or non-volatile memory. Volatile memory is semiconductor memory that requires power be maintained to the 'chip' in order to retain stored data. Non-volatile memory is semiconductor memory that does not require power for data retention.

³ ...and possibly date, time, altitude, and groundspeed information.

It is not know in what type of memory the track and waypoint data is stored. The Magellan Meridian Gold contains both *volatile*⁴ (SRAM, DRAM),⁵ and *non-volatile* (FLASH)⁶ memory devices. The volatile memory devices are unlikely to retain data due to power loss caused by immersion in a conductive fluid (salt-water). The non-volatile memory devices may retain data. Currently, the supplies do not exist in the Recorder Division to move the non-volatile memory devices to a surrogate unit. Due to this limitation no further data recovery efforts were possible within the timeframe allotted for the accident investigation final report due date.

GPS Data Description

No accident related data was recovered from the unit.

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⁴ 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.

⁵ Static Random Access Memory is a form of volatile memory that can retain data without need for periodic refreshing, provided that power is maintained to the device at all times.

⁶ FLASH Memory is a form of re-writeable, non-volatile memory that can retain data without external power - provided that the chip is not heated beyond the data retention temperature limit as stated in the datasheet.



Figure 1. External view of the Magellan Meridian Gold (s/n CH 064153) showing major impact damage.



Figure 2. Internal view of the Magellan Meridian Gold (s/n CH 064153) showing major impact and water damage.

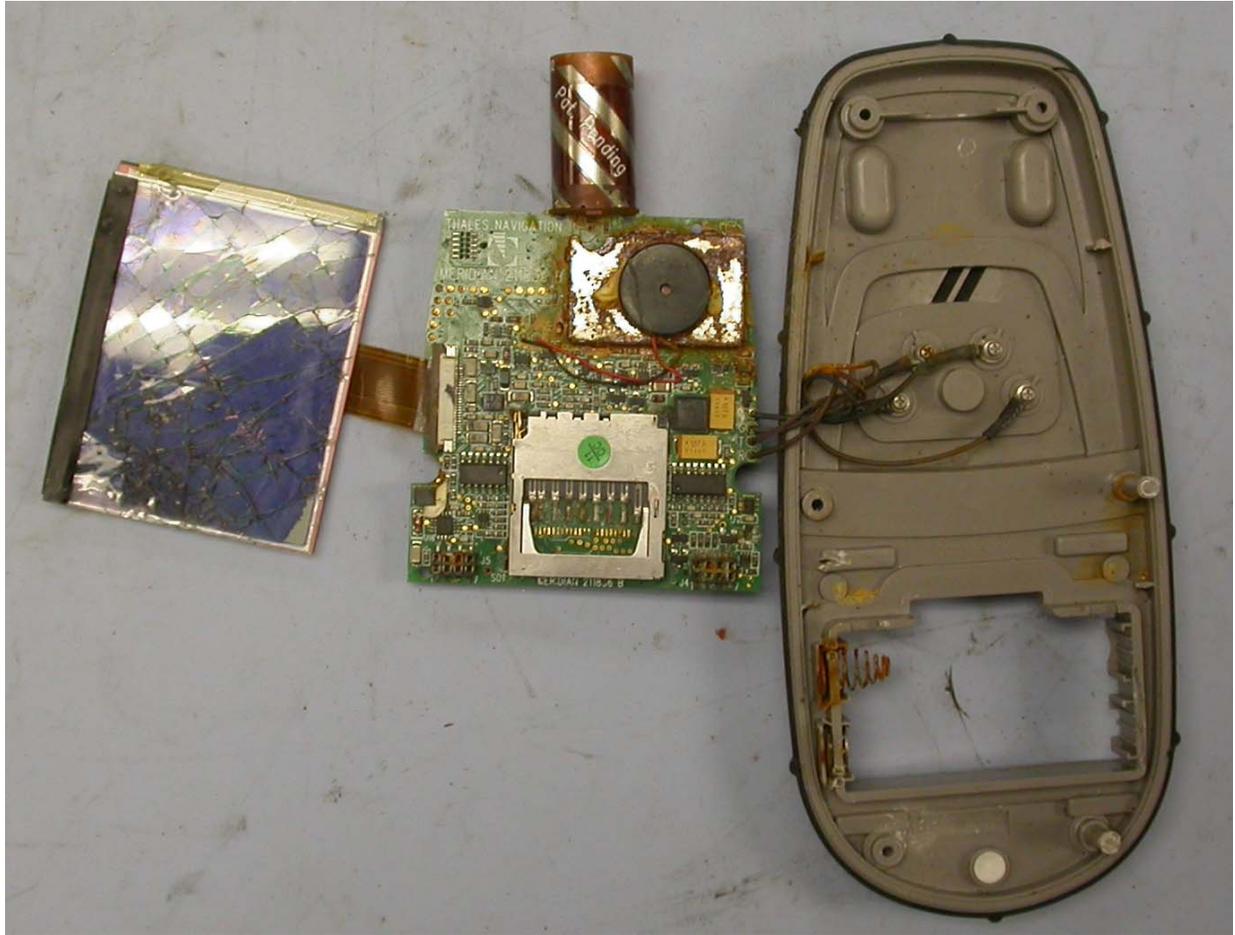


Figure 3. Internal view of the Magellan Meridian Gold (s/n CH 064153) showing major impact and water damage.



Figure 4. Internal view of the Magellan Meridian Gold (s/n CH 064153) showing corrosion around the AMIC A42L0616V-50 DRAM (volatile memory) 'chip' due to water immersion.

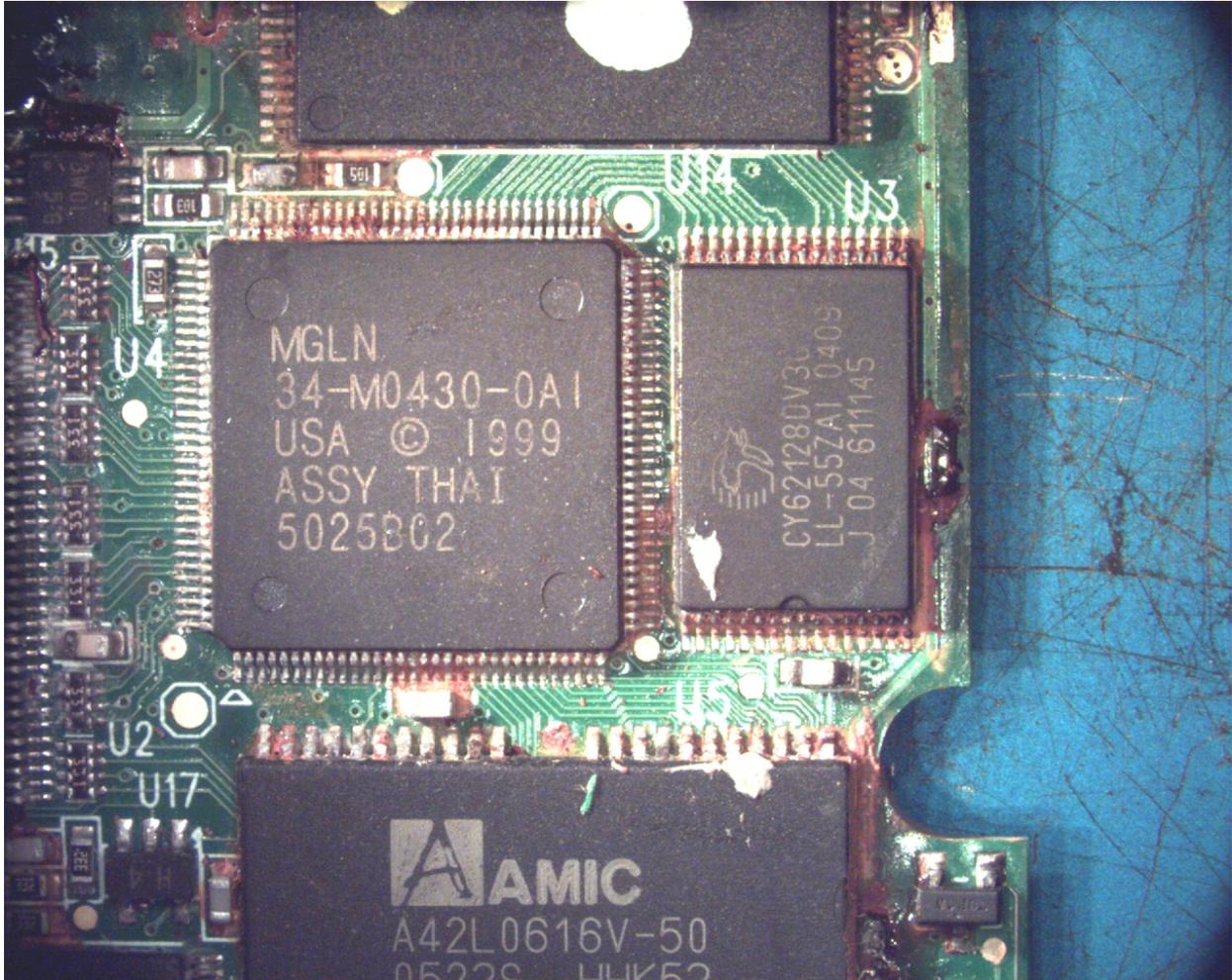


Figure 5. Internal view of the Magellan Meridian Gold (s/n CH 064153) showing corrosion around the Cypress CY62128DV30 SRAM (volatile memory) 'chip' due to water immersion.



Figure 6. Internal view of the Magellan Meridian Gold (s/n CH 064153) showing corrosion around the Toshiba TC58DVM72A1FT00 E2PROM (non-volatile memory) 'chip' due to water immersion.

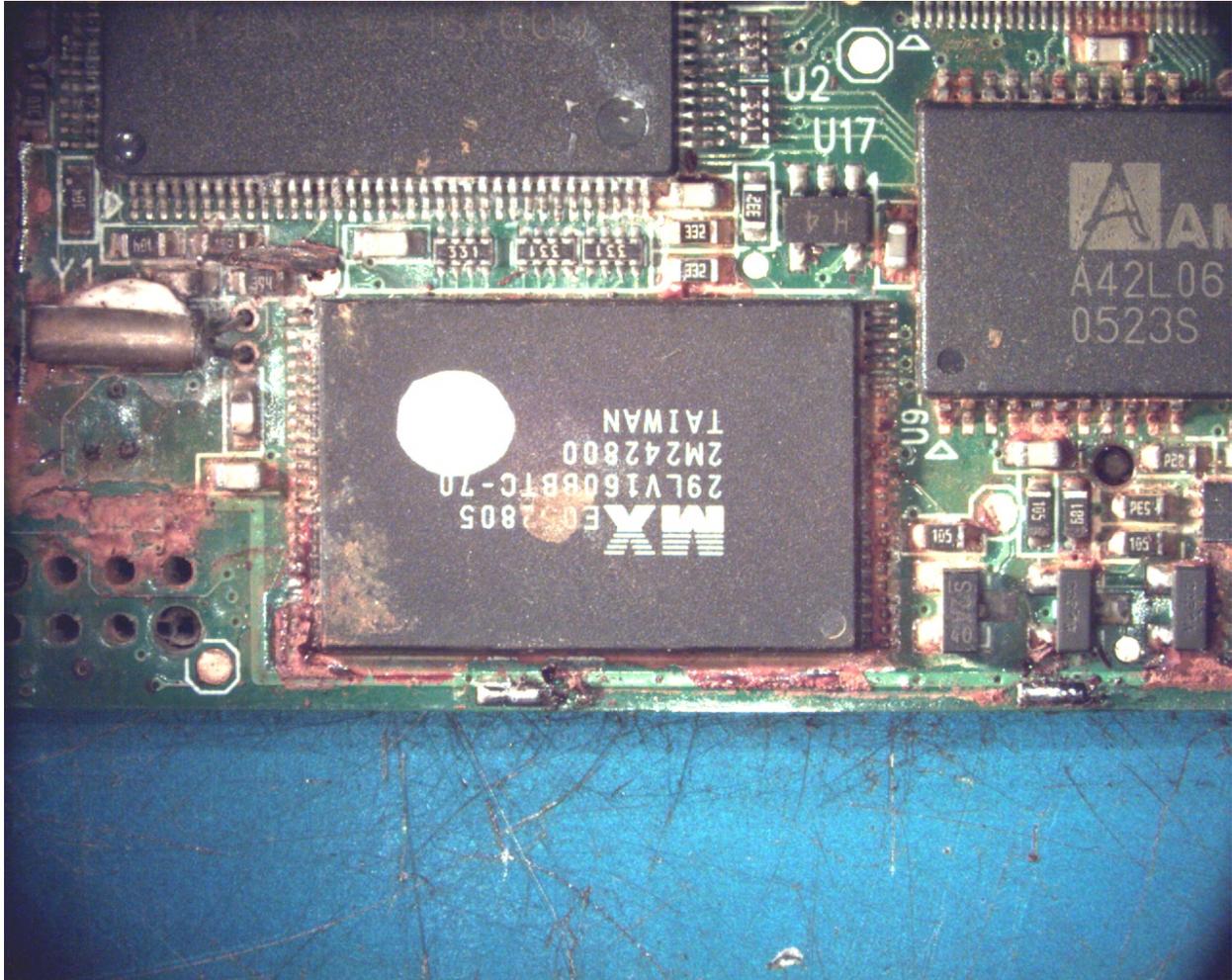


Figure 7. Internal view of the Magellan Meridian Gold (s/n CH 064153) showing corrosion around the Macronix 29LV160BBTC-70 FLASH (non-volatile memory) 'chip' due to water immersion.