

NATIONAL TRANSPORTATION SAFETY BOARD

Vehicle Recorder Division
Washington, D.C. 20594

May 10, 2019

Non-Volatile Memory Devices

Specialist's Factual Report Marie Moler

1. Event

Location: Thompson's Station, Tennessee
Date: December 21, 2017
Aircraft/ID: ZODIAC 601XL / N929GB
Operator: Private
NTSB Number: WPR18FA053

2. Event Summary

On December 21, 2017, about 1307 central standard time, a Zodiac 601XL experimental, amateur-built airplane, N929GB, was substantially damaged following a loss of control and impact with terrain while maneuvering at a low altitude near Thompson's Station, Tennessee. The airplane was registered to and operated by the private pilot, the sole occupant, as a 14 *Code of Federal Regulations* Part 91 personal flight. The pilot was fatally injured. Instrument meteorological conditions prevailed at the time of the accident. The flight departed Bomar Field-Shelbyville Municipal Airport (SYI), Shelbyville, Tennessee about 1230, with an intended destination to Whifferdill Airport (TN77), Chapmansboro, Tennessee. No flight plan was filed for the flight.

3. Details of Device Investigation

The NTSB Vehicle Recorder Division received the following devices:

Device 1: iFly 740
Device 1 Serial Number: VH16050313
Device 2: Lowrance AIRMAP 1000
Device 2 Serial Number: 100660358

The iFly 740 was received with a broken screen likely from impact, Figure 1. The SD card¹ was removed from the device and read using NTSB laboratory equipment. The Lowrance AIRMAP 1000 was received in good condition, Figure 2. Power was applied to each unit using NTSB laboratory equipment. Device startup was consistent with normal

¹ A secure digital (SD) card is non-volatile memory card format developed by the SD Card Association (SDA) for use in portable devices. Non-volatile memory is semiconductor memory that does not require external power for data retention.

operation. Data on the device was saved to an onboard SD card and read using NTSB laboratory equipment.

3.1. iFly 740 Device Description

The iFly 740 is an externally-powered, multi-function display and GPS receiver with a high resolution, liquid crystal display (LCD) touch screen display. The unit includes a built-in navigational database and is optionally capable of receiving inflight ADS-B information including NEXRAD weather radar, airport weather reports (METARs), weather forecasts, and traffic advisories. The navigational and information features include terrain warnings, airspace alerts, and display of enroute VFR and IFR navigational information and IFR approach charts.

The unit is capable of recording track history to a removable SD card that is compatible with the Microsoft file allocation table (FAT) file system. Track history data are written as National Marine Electronics Association (NMEA) 0183 compatible sentences containing local time (as selected by the user), latitude, longitude, and altitude.

3.1.1. iFly 740 Data Description

The data extracted included approximately 3 minutes and 39 seconds of the accident flight data. The data corresponded to the flight take-off only before the recording was ended, possibly due to the device being powered off.

3.1.2. iFly 740 Parameters Provided

Table 1 describes data parameters provided by the iFly 740 device. A channel labeled “height above ground, meters” was also recorded, but the values did not agree with other recorded parameters and are not included here.

Table 1: Data Parameters

Parameter Name	Parameter Description
Date	Universal date
Time	Universal time
Latitude	Latitude (deg)
Longitude	Longitude (deg)
Altitude	Altitude (m)
Seconds	Flight time (s)
m/s	Ground speed (m/s)

3.2. Lowrance AIRMAP 1000 Device Description

The Lowrance AIRMAP 1000 is a WAAS-capable, battery operated hand-portable 12-channel mapping GPS unit equipped with a 320 x 320 pixel 16-level grayscale LCD display, soft key controls, and support for custom maps. The unit has the capability of performing E-6B calculations. It contains a slot for a multi-media card (MMC) or secure

Digital (SD) memory card. This card may be used to transfer and store custom maps, waypoint, route, and trail data to and from a desktop PC to the GPS unit. A serial interface using NMEA 0183 communication protocols is mounted in the back of the GPS unit, but the internal operating software does not support the download of saved data via this serial port. The Lowrance AIRMAP 1000 can store up to 100 routes composed of up to 100 waypoints each. The unit can also store 'trail' data composed of up to 10,000 latitude-longitude points per trail. Up to 100 individual trails may be named and saved by the user. Once the limit has been reached for recording continuously updated trail data trail, older latitude/longitude points are overwritten with new data on a first-in, first-out basis. The AIRMAP 1000 may be programmed to update trail data in one of three ways: automatically, by time, or by distance traveled.

3.2.1. Lowrance AIRMAP 1000 Data Description

The Lowrance contained data from 41 prior flights, none of which were associated with the accident.

4. OVERLAYS AND TABULAR DATA

Figure 3 is a Google Earth overlay of the accident taxi and take-off. It is consistent with witness reports that the airplane took off from the taxiway, not the runway.

Figure 4 - Figure 7 are plots of data downloaded from the Genesys Aerosystems IDU-450. Figure 4 and Figure 5 show the last two and a half minutes of data which focus on the in-flight portion of the data, while Figure 6 and Figure 7 show the full 14 minutes of recorded data for the day.

Tabular data used to generate Figure 4 through Figure 7 are included as Attachment 1. These attachments are provided in electronic comma-separated value (.CSV) format.



Figure 1: iFly 740 S/N: VH16050313.



Figure 2: Lowrance AIRMAP 1000 S/N: 100660358.



Figure 3: Accident flight take-off on December 21, 2017 from latitude, longitude, and altitude.

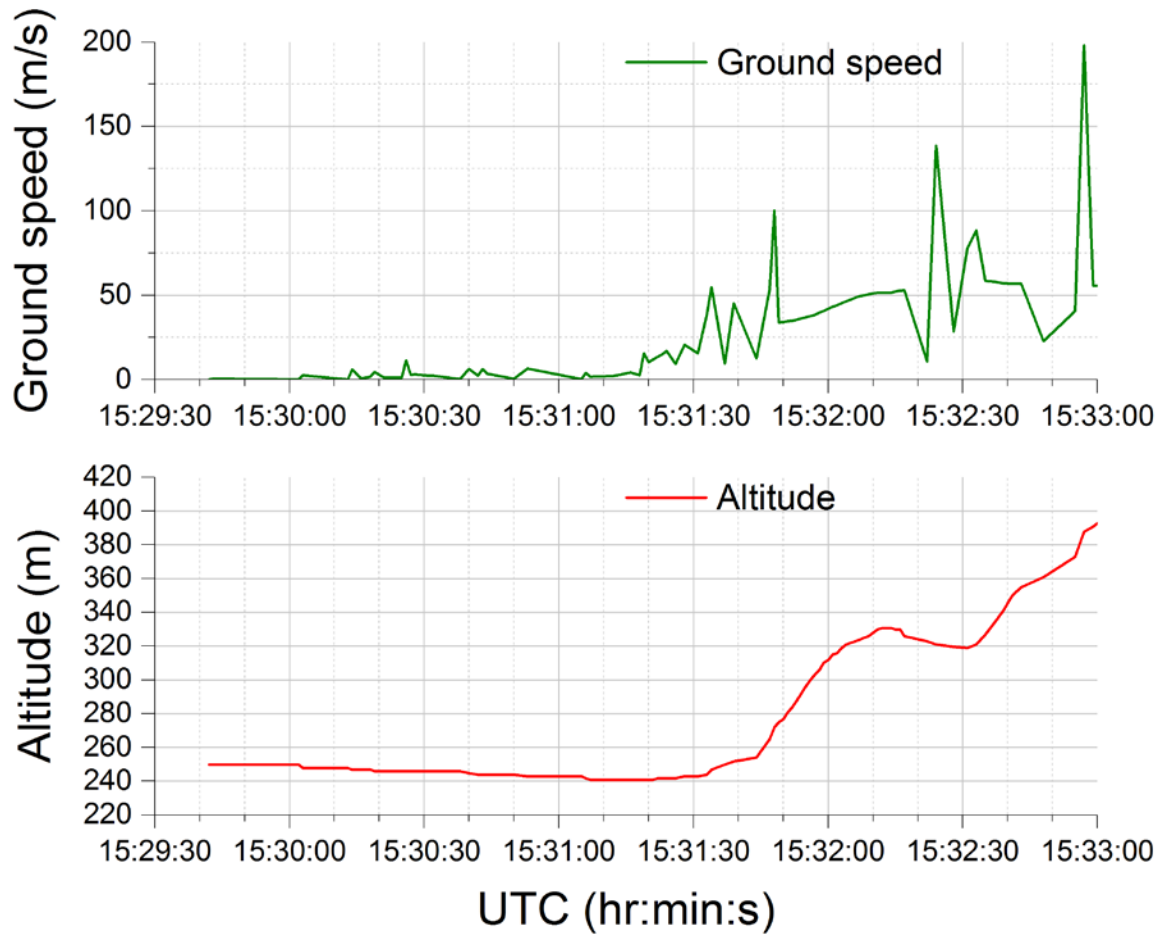


Figure 4: Plot of data from accident flight take-off on December 21, 2017.