

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

January 9, 2020

Electronic Devices

Specialist's Factual Report By Deven Chen

1. EVENT SUMMARY

Location: Brainerd, Minnesota
Date: June 28, 2019
Aircraft: Agusta A09S
Registration: N11NM
Operator: Private
NTSB Number: CEN19FA185

On June 28, 2019, about 0041 central daylight time, an Agusta Spa A109S helicopter, N11NM, impacted terrain while landing at Brainerd Lakes Regional Airport (BRD), Brainerd Lakes, Minnesota. The pilot and flight nurse were fatally injured, the flight paramedic was seriously injured, and the helicopter sustained substantial damage. The helicopter was registered to and operated by North Memorial Healthcare under the provisions of Title 14 Code of Federal Regulations Part 135. Instrument meteorological conditions prevailed at BRD for the instrument flight rules (IFR) flight, which departed from North Memorial Heliport (MY77), Robbinsdale, Minnesota, about 2348.

2. GROUP

A group was not convened.

3. DETAILS OF INVESTIGATION

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

Recorder Manufacturer/Model: **Outerlink CP-3i SATCOM Module**
Recorder Serial Number: **CP3i043009B**

Recorder Manufacturer/Model: **Sandel ST3400H**
Recorder Serial Number: **46-1025**

3.1. Outerlink CP-3i SATCOM Module Description

The CP-3i SATCOM Module communicates via the Iridium satellite system, using a standard Iridium radio like its immediate predecessor, the Rev E. New functionality is available due to the inclusion of a more powerful embedded control processor, derived from the processor used in the Outerlink IRIS system – a similar system.

The device records hundreds of hours of raw data from electronic inertial 3-axis gyroscope, 3-axis accelerometer and digital barometric sensors. Recorded data includes latitude, longitude, altitude, ground speed, course over ground GMT time, barometric pressure, 3-axis acceleration, and 3-axis pitch, roll and yaw. Recorded data is held in non-volatile memory and can be offloaded to a USB memory stick.

3.1.1. Outerlink CP-3i SATCOM Module Data Recovery

Upon arrival at the Vehicle Recorder Division, an exterior examination revealed the device was in good condition, as shown in Figure 1. The device powered up normally, and the stored data were downloaded using instructions provided by the manufacturer. Downloaded files were sent to the manufacturer. The manufacturer decoded the data and stated that those files were device system log files and did not contain any flight data. Thus, no data recovered from the device.



Figure 1: Front and back of Outerlink CP-3i SATCOM Module as received.

3.2. Sandel ST3400H Description

The Sandel ST3400H is a self-contained helicopter TAWS (Terrain Awareness Warning System) solution specifically for helicopters that includes an advanced HTAWS computer and an integrated full-color screen built within a standard 3-inch instrument chassis.

The ST3400H includes built-in warning and caution annunciations. The unit also supports optional external warning or caution annunciation as well as optional collective mounted momentary switches to control certain functions such as alert muting and modes.

The ST3400H has an internal recorder that automatically records approximately twenty hours of flight data. This data can be reviewed for content in the event of a system malfunction.

3.2.1. Sandel ST3400H Data Recovery

Upon arrival at the Vehicle Recorder Division, an exterior examination revealed the device was in good condition, as shown in Figure 2. The device powered up normally. The raw data were downloaded using manufacturer's software and sent to the manufacturer for decoding.



Figure 2: Front and back of Sandel ST3400H as received.

3.2.2. Sandel ST3400H Data Description

The decoded data sent back from the manufacturer included two flights. The dates of the two flights were specified, but the timestamps were imprecise. The flight recorded on June 28, 2019 was determined to be the event flight based on its GPS flight path, which matched the GPS flight path from Appareo Vision 1000 -- another device recovered from the accident aircraft. The timestamp of the event flight was verified by comparing the GPS data points with Appareo Vision 1000.

3.2.2.1. Parameters Provided

Table 1 describes data parameters provided by the Sandel ST3400H. Due to overlaps with data from Appareo Vision 1000 device, plots are not provided with this report. The corresponding tabular data of the parameters are provided in electronic comma separated value (.CSV) format as Attachment 1 to this report.

Table 1: Verified Parameters from Sandel ST3400H.

Parameter Name	Parameter Description
Date	Date of the flight
Latitude	Recorded Latitude (degrees)
Longitude	Recorded Longitude (degrees)
Radio Altitude	Recorded Radio Altitude (feet)
Groundspeed	Average groundspeed between current and previous data point (knots)
Ground Track	Path on the surface of the Earth directly below an aircraft (degrees)
Alert Type	Alert Messages
Waypoint Bearing	Bearing to next waypoint (degrees)
Localizer Deviation	Amount of deviation left or right of path to runway/localizer
Glideslope Deviation	Amount of deviation up or down to path to runway/glideslope
LRN Integrity	Long Range Navigation Integrity
Horizontal DOP	Horizontal Dilution of Precision
Horizontal FOM	Horizontal Figure of Merit

Parameter Name	Parameter Description
ILS Tune	Instrument Landing System Tune
ANP	Actual Navigation Performance
VOR Brg	VHF omnidirectional Range Bearing
GPS Integ	GPS Integration
Mag Hdg	Magnetic Heading
Mag Var	Magnetic Variation