NATIONAL TRANSPORTATION SAFETY BOARD
Vehicle Recorder Division
Washington, DC 20594

June 3, 2013

EGPWS Factual Report

Specialist's Factual Report
By Christopher Babcock

1. EVENT

Location:	Moscow, Tennessee
Date:	July 11, 2012, 0907 Central Daylight Time (CDT)[1]
Aircraft:	Cirrus SR20
Registration:	N764RV
NTSB Number:	ERA12FA438

2. GROUP

A group was not convened.

3. SUMMARY

On July 11, 2012, a privately operated Cirrus SR20, registration N764RV, sustained substantial damage from terrain impact near Moscow, Tennessee. The flight was operating under Title 14 Code of Federal Regulations (CFR) Part 91 as a personal flight from Millington, TN, to Pensacola, FL. Instrument meteorological conditions prevailed and no flight plan was filed. The private pilot sustained fatal injuries.

An Enhanced Ground Proximity Warning System (EGPWS) was recovered from the aircraft and was sent to the manufacturer's facility for download under NTSB supervision. The data was provided to the National Transportation Safety Board's Vehicle Recorder Laboratory for evaluation.

4. DETAILS OF INVESTIGATION

On July 16, 2012, the NTSB Vehicle Recorder Laboratory received the following device:

Recorder Manufacturer/Model:	**Honeywell KGP-560 EGPWS**
Recorder Serial Number:	**53739616**

[1] All times are expressed in local EDT, unless otherwise noted

4.2. Device Description

A Honeywell KGP-560 Enhanced Ground Proximity Warning System was installed and operating on N764RV during the accident flight. The EGPWS uses aircraft inputs including geographic position, pressure altitude, and rate of climb, combined with an internal terrain, obstacle, and airport database to predict potential conflicts between the predicted aircraft flight path and any terrain or obstacles within the database. If the logic for any programmed warning condition is satisfied the EGPWS will provide visual and aural warning in the cockpit.

The KGP-560 satisfies the requirements of a Class B Terrain Avoidance & Warning System (TAWS) as defined by FAA TSO C151b.

4.3. Recorder Damage

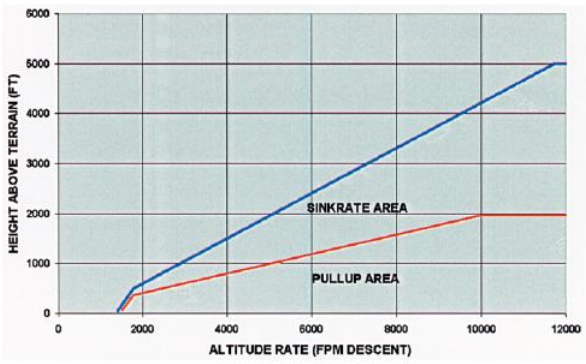
Upon arrival at the laboratory, it was evident that the unit had sustained significant damage to the housing. The internal memory device containing recorded flight data was removed and an exact binary image was made.

4.4. Timing and Correlation

Only system operating time was recorded on the EGPWS. No correlation to local time was performed. The data is precise to ±1 second due to the nominal one second update rate of the recorded data.

4.5. Summary of Recording Contents

The accident aircraft experienced two EGPWS alerts during the accident sequence. A Mode 1 "Sink Rate" caution occurred at system time 511:53:35. A Mode 1 "Pull Up" warning occurred at system time 511:53:36. From the Honeywell KGP-560 Pilot's Guide:



> Initially, the voice alert "Sink Rate" will be heard, and the yellow caution alert annunciator lamp will illuminate. If the aircraft continues in the high rate of descent, the "Sink Rate-Sink Rate" voice alert will be repeated at an increasing frequency. Should the aircraft penetrate the warning boundary, the voice alert "Pull Up" will be heard continuously and the red warning annunciator lamp will illuminate. In both cases, as the pilot reacts to decrease the high rate of descent and the aircraft flight path exits the alerting/warning envelope, the annunciator lamp will extinguish and the voice alerts will cease.

In addition to recorded cautions and warnings, other relevant data such as heading, GPS position, GPS altitude, and vertical speed were recorded. Ground speed was derived from aircraft position information.

Figure 1 shows data recovered from the KGP-560 along with the timing of the two alerts. Figure 2 shows a slant-angle Google Earth overlay. Tabular data is available for the EGPWS data as a separate item in the public docket for this accident.

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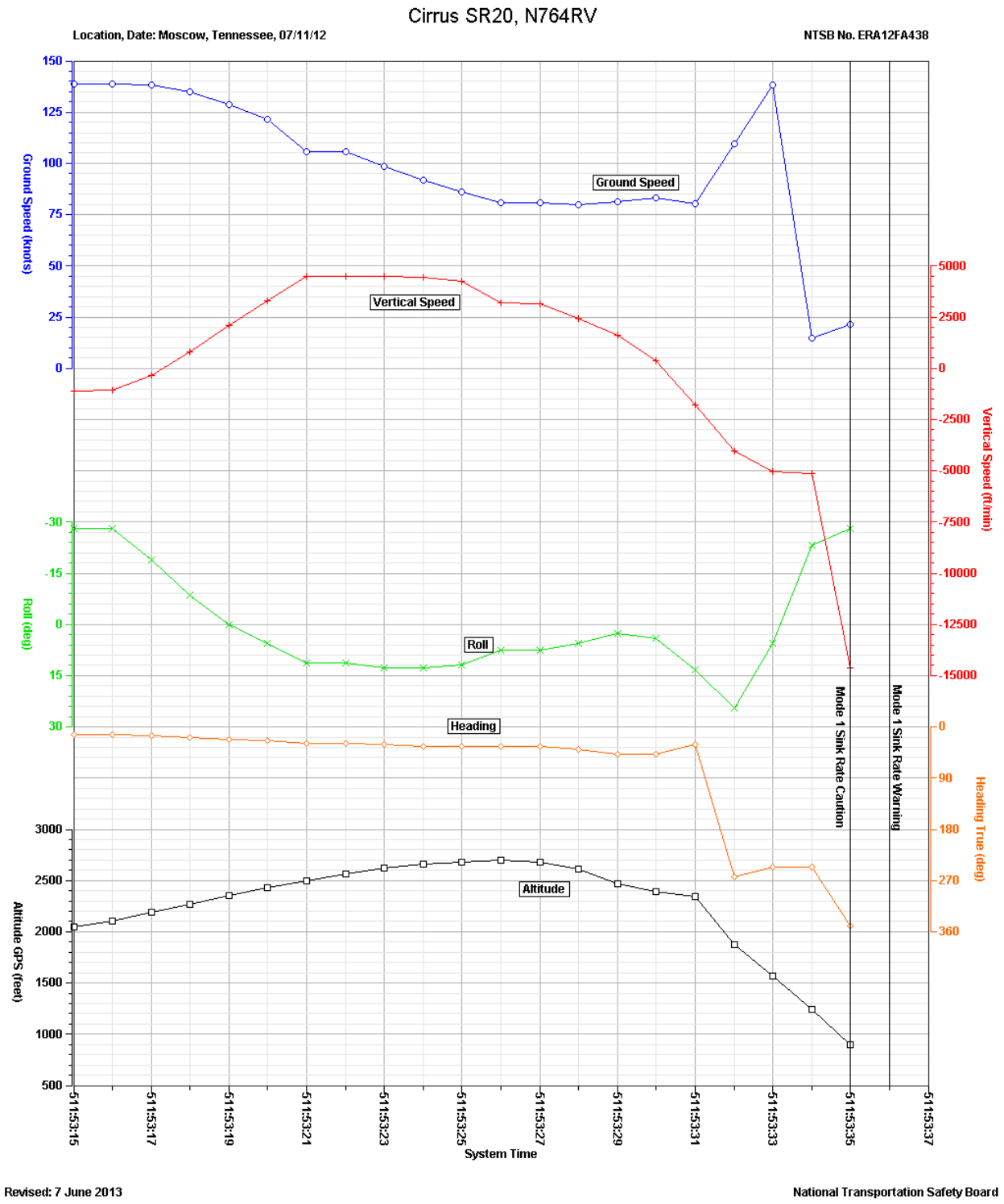

Figure 1. EGPWS data.

Figure 2. Slant angle EGPWS overlay.