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

November 7, 2013

17 - EGPWS Factual Report

Specialist's Factual Report
by James Cash

1. EVENT

Location:	Morgantown, West Virginia
Date:	June 22, 2012
Aircraft:	Hawker Beechcraft 90
Registration:	N508GT
Operator:	OZ Gas Aviation LLC
NTSB Number:	ERA12FA409

On June 22, 2012, at 1001 eastern daylight time a Raytheon Aircraft Company C90GT, N508GT, operated by Oz Gas LLC, was substantially damaged when it struck a communications tower near Morgantown, West Virginia. The certificated airline transport pilot was fatally injured. No flight plan had been filed for the Title 14 Code of Federal Regulations Part 91 positioning flight, from Nemacolin Airport (PA88), Farmington, Pennsylvania, to Morgantown Municipal Airport (MGW), Morgantown, West Virginia.

2. DETAILS OF DEVICE INVESTIGATION

The Safety Board's Vehicle Recorder Division received the following devices:

Device:	Bendix King KMH-820 TAWS/EGPWS
Device Serial Number:	3813

2.1. Bendix King KMH-820 TAWS/EGPWS Device Description

The unit's non-volatile memory (NVM) does not continuously record track data but rather stores data only when certain triggering criteria are met. The readout process at the manufacturer's facility produces several files of flight history data which encompass operational, documentary, fault and warning information. The operational data is converted during the readout process by the readout software and the files contain data in engineering units. The downloaded files contain data logged based on hours of operation (operational time) of the unit and have no reference to any other time base. In the data files, each power cycle is tagged with a sequential flight leg number.

The timing of data on the EGPWS files is measured in hours of operation of the individual unit and has no reference to any other time base.

Recording Description

The recording contained approximately 5 flight hours of data. Timing of the EGPWS data is measured in elapsed second. When the unit triggers, it records a snapshot of information that consists of flight data 20 seconds prior to the trigger event to 10 seconds after the trigger event. This snapshot of data is recorded at a rate of one sample per second. As the accident aircraft approached the radio tower, the EGPWS sensed the obstruction and triggered a warning four times. According to the recorded data the EGPWS cockpit aural and visual alerts were disabled so no aural warning were given to the pilot of the pending obstruction

Engineering Units Conversions

The engineering units conversions used for the data contained in this report are based on documentation from the EGPWS manufacturer installed in the aircraft. Where applicable, changes to the conversions have been made to ensure the parameters conform to the Safety Board's standard sign convention that climbing right turns are positive (CRT=+).[1]

Parameters Provided and Verified

The following table lists the data parameters provided and verified in this report.

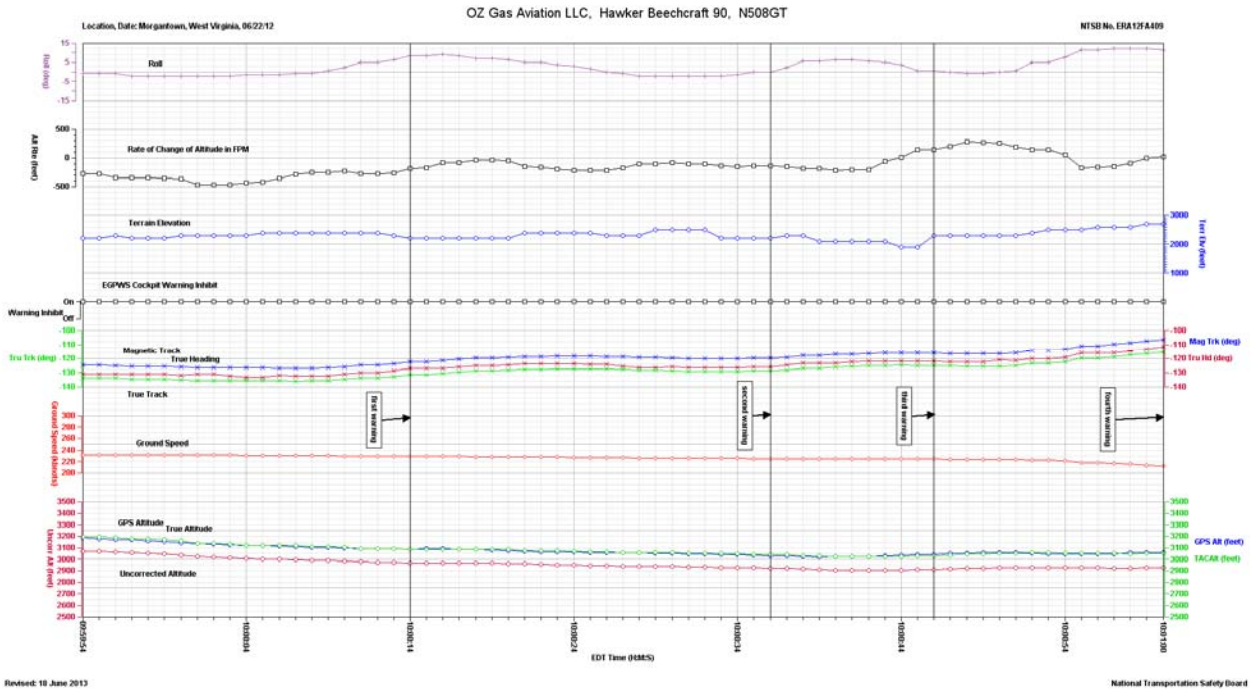
Table 1 - Verified and Provided FDR Parameters

Plot Label	FDR Parameter
1. Time	EGPWS Operating time in Seconds
2. Uncorrected Altitude	EGPWS Uncorrected Altitude in feet
3. GPS Altitude	GPS Altitude in feet
4. TAClt	EGPWS Tactical Altitude in feet
5. TerrElv	Terrain Elevation in feet
6. ALT Rte	Rate of Change of Altitude in feet per minute
7. Gspd	Groundspeed in knots
8. TruTrk	Aircraft True ground track in degrees
9. Mag Trk	Aircraft Magnetic track in degrees)
10. Roll	Aircraft roll in degrees
11. Lat	GPS Latitude
12. Long	GPS Longitude
13. Tru Trk	True Track in degrees

[1] CRT=+ means that for any parameter recorded that indicates a climb or a right turn, the sign for that value is positive. Also, for any parameter recorded that indicates an action or deflection, if it induces a climb or right turn, the value is positive. Examples: Right Roll = +, Left Aileron Trailing Edge Down = -, Right Aileron Trailing Edge Up = +, Pitch Up = +, Elevator Trailing Edge Up = +.

Plot 1 depicts the recorded data from the accident aircraft's EGPWS. The EGPWS triggered four times (obstruction warning) as the aircraft approached the tower. The data recorded covers a time period of 9:59:54 EDT to the loss of electrical power at 10:01:00 EDT.

PLOT-1



2.1.1. Bendix King KMH-820 TAWS/EGPWS Data Recovery

The accident EGPWS was subjected to extensive physical damage as a result of the accident. The interior circuit boards were bent and crushed. The two memory chips that contain the stored data were removed from their associated circuit cards. The two chips were read using a memory chip reader and the recovered files were sent to the manufacturer for decoding. The recovered data is attached to this report. (See attachment – 1)

2.1.2.2.1. Bendix King KMH-820 TAWS/EGPWS Data Description

The data extracted included 6 flight sessions that were recorded as flight 1255 to the accident flight of 1261. (No date was recorded). Reviewing the full history of the aircraft indicated that the aircraft departed from non-database private airports over 50 times in the last 500 flights. Additionally, the recorded data also indicates that the terrain and obstruction database that was installed in the accident aircraft was the

original database that was delivered with the unit when manufactured in 2005. If the aircraft tries to takeoff or land at an airport, and if that airport is not found in the EGPWS terrain database, the unit will issue a warning to the pilot. The data indicates that the pilot routinely inhibited the cockpit warnings.

Terrain Inhibit ON (to silence alert flying into 13PA not in database)
FLIGHT LEG 1257: (1697:16:19)
Lat/Long: 41.68410 / -79.50075
Geometric Alt: 2320.00 True Hdg: 94.01
Pos. Uncert: 0.0034 Pos. Source: GPS1
Map Req. Acc: 0.14 Max. Alt: 2324.00
Inhibit Discrete: TRUE
Landing Airport: P15

Takeoff (from 13PA, not in database)

FLIGHT LEG 1260: (1698:18:36)

Lat/Long: 41.68238 / -79.45235

Geometric Alt: 1704.00 True Hdg: -85.78

GPS Alt: 1704.00 VFOM: 36.00

Pos. Uncert: 0.0042 Pos. Source: GPS1

Landing Airport: P15

Terrain Inhibit OFF (three minutes after departure from 13PA - not in database)

FLIGHT LEG 1260: (1698:21:38)

Lat/Long: 41.58663 / -79.49556

Geometric Alt: 6136.00 True Hdg: -165.24

Pos. Uncert: 0.0039 Pos. Source: GPS1

Map Req. Acc: 0.14 Max. Alt: 2300.00

Inhibit Discrete: FALSE

Landing Airport: 6G1

FLIGHT LEG 1260: (1698:50:13)

Lat/Long: 39.81960 / -79.53414

Geometric Alt: 2292.00 True Hdg: -140.35

Pos. Uncert: 0.0034 Pos. Source: GPS1

Map Req. Acc: 0.14 Max. Alt: 3400.00

Inhibit Discrete: TRUE

Landing Airport: PA88

Last Landing:

FLIGHT LEG 1260: (1698:50:34)

Lat/Long: 39.81240 / -79.54205

Geometric Alt: 2046.00 True Hdg: -140.62

GPS Alt: 2050.00 VFOM: 28.00

Pos. Uncert: 0.0034 Pos. Source: GPS1

Landing Airport: PA88

Last Takeoff:

FLIGHT LEG 1261: (1698:56:32)

Lat/Long: 39.80910 / -79.54565

Geometric Alt: 2006.00 True Hdg: -135.00

GPS Alt: 2006.00 VFOM: 32.00

Pos. Uncert: 0.0034 Pos. Source: GPS1

Airport: PA88

Leg 1261 "calculated" alerts (none voiced due to Terrain Inhibit active)

(Warning 1) Caution Obstacle, time (1698:59:24), Lat/Long: 39.72371 / -79.71078

(Warning 2) Obstacle, Obstacle Pull UP, time (1698:59:46), Lat/Long: 39.70997 / -79.73317

(Warning 3) Obstacle, Obstacle Pull UP, time (1698:59:56), Lat/Long: 39.70391 / -79.74416

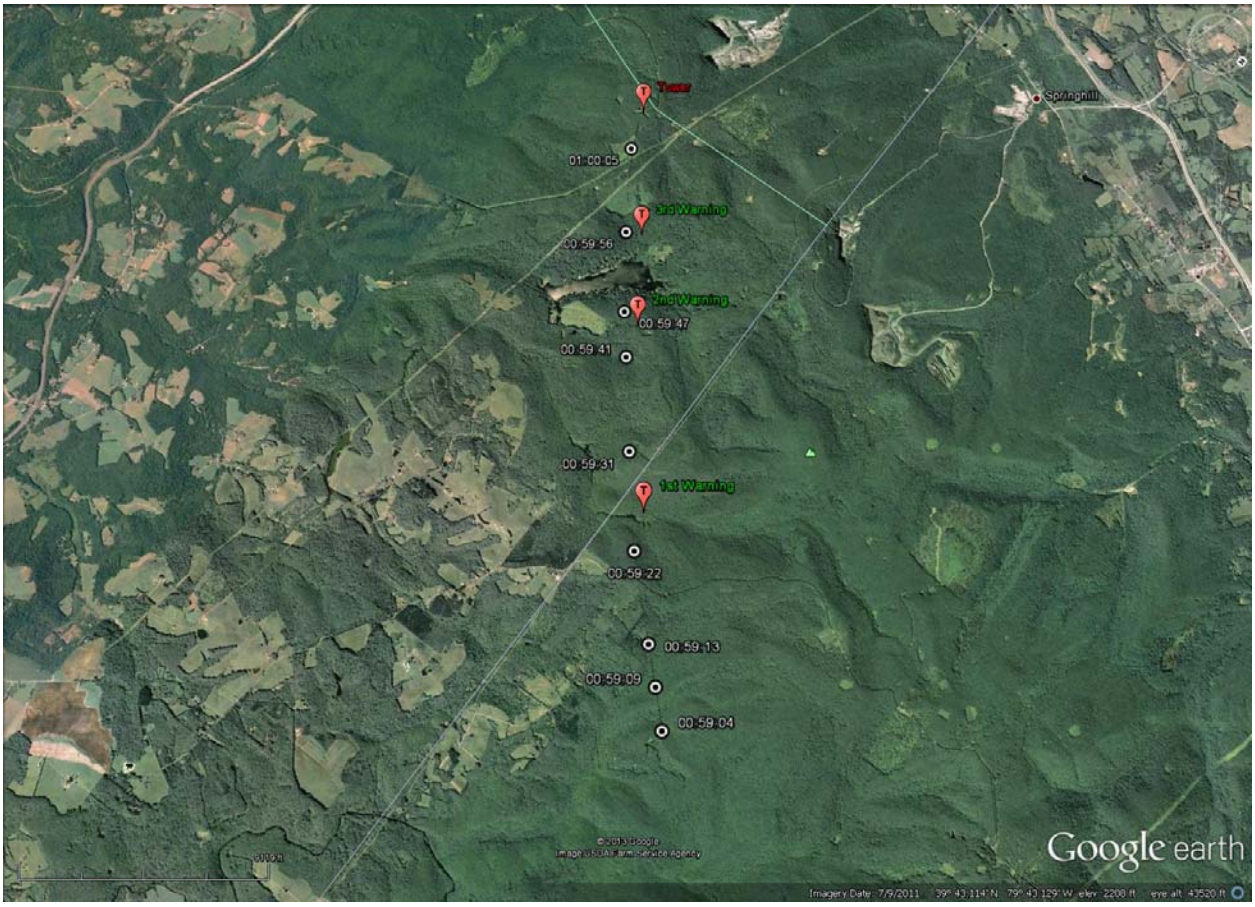
(Warning4) Obstacle, Obstacle Pull UP, time (1699:00:10), Lat/Long: 39.69659 / -79.75982

3. OVERLAYS AND TABULAR DATA

All graphical overlays generated in this report were generated using Google Earth.

Figure 1 is a graphical overlay for the accident flight using data from EGPWS unit.

Figure 1



Tabular data used to generate Plot 1 and figure 1 is included as Attachment 1 in electronic comma-delimited (.CSV) format.