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

February 22, 2018

Electronic Devices

Specialist's Factual Report
By Jane Foster

1. EVENT SUMMARY

Location:	Biloxi, Mississippi
Vehicle #1:	2016 Vanhool Motor coach
Operator #1:	Echo Transportation
Vehicle #2:	Locomotive
Operator #2:	CSX Transportation
Date:	March 7, 2017
NTSB Number:	HWY17MH010

For a summary of the crash, refer to the *Crash Summary Report* in the docket for this investigation.

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 from the 2016 Vanhool Motor coach:

Device Manufacturer/Model:	Garmin DEZL 570MT
Serial Number:	Unknown
Device Manufacturer/Model:	Kyocera DuraXV+ Cell Phone
Serial Number:	Unknown
Device Manufacturer/Model:	Wabco ABS-E Module
Serial Number:	031804
Device Manufacturer/Model:	Garmin Nuvi 2555LMT
Serial Number:	2LQ236915
Device Manufacturer/Model:	Detroit Diesel Engine Control Module
Serial Number:	Unknown

3.1. Garmin DEZL 570MT Description

The Garmin DEZL 570MT is a turn-by-turn truck navigation device employing a GPS receiver and roads database. This device is equipped with a 5-inch color touch screen for route planning specific for trucks. The Garmin DEZL 570MT is capable of storing historical position location information for an unspecified number of points in non-volatile memory.[1] This data may be transferred to a PC running the appropriate software via USB.

3.1.1. Garmin DEZL 570MT Data Recovery

The Garmin DEZL 570MT GPS was imaged at the Biloxi Police Department. Figures 1 and 2 show the front and back of the GPS. There was some impact damage, but the device was read out normally using manufacturer's and forensic software.

Figure 1. Front of Garmin DEZL 570MT.

[1] Non-volatile memory is semiconductor memory that does not need power for data retention.

Figure 2. Back of Garmin DEZL 570MT

3.1.2. Garmin DEZL 570MT Data Description

The data extracted included 259 track logs. The accident trip was recorded starting 19:17:04 Coordinated Universal Time (UTC) and ending 20:55:10 UTC on March 7, 2017.

3.1.3. Garmin DEZL 570MT Parameters Provided

Table 1 describes data parameters provided by the GPS device. Date, Time, Latitude, and, Longitude are recorded by the device.

Table 1: GPS Data Parameters

Parameter Name	Parameter Description
Date	Date for recorded data point (MM/DD/YYYY)
Time	Time (UTC) for recorded data point (HH:MM:SS)
Latitude	Recorded Latitude (degrees)
Longitude	Recorded Longitude (degrees)

3.1.4. Garmin DEZL 570MT Overlays and Tabular Data

Figure 3 is a graphical overlay generated using Google Earth for the accident trip. The weather, traffic, and lighting conditions in Google Earth are not necessarily the weather, traffic, and lighting conditions present at the time of the recording.

Figure 3. Google Earth plot showing the accident trip in UTC.

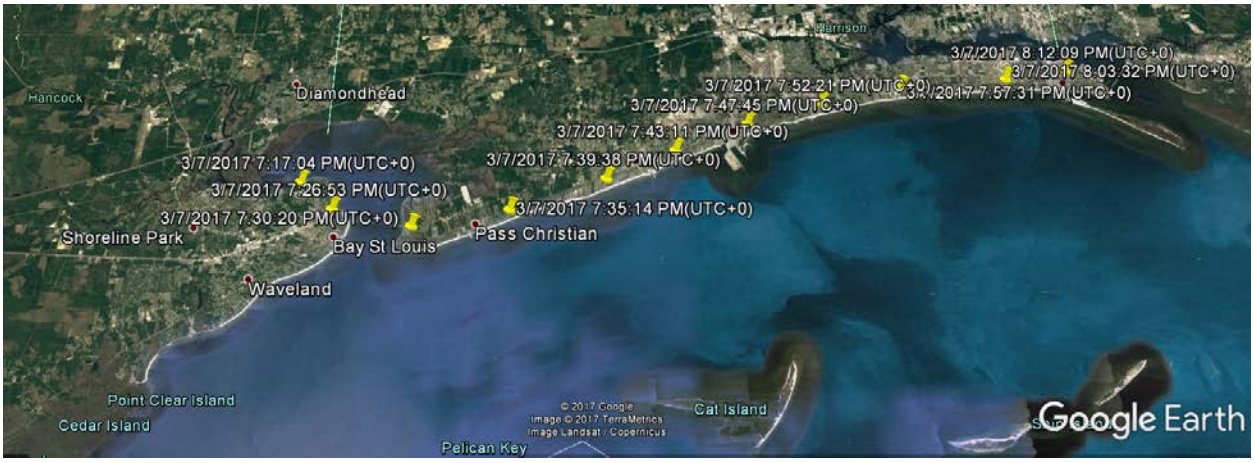


Figure 4 is a graphical overlay generated using Google Earth zoomed in on the grade crossing. Figure 4 highlights the motor coach crossing the train tracks.

Figure 4. Google Earth plot showing the grade crossing in UTC.

Tabular data used to generate figures 3 and 4 are included as attachment 1. The attachment is provided in electronic comma-delimited (.CSV) format.

3.2. Kyocera DuraXV+ Cell Phone Description

The Kyocera DuraXV+ is a cell phone capable of voice calling, text messaging, email, photo/video recording, audio (music) playback, and other specialized functions depending on configuration. Data is stored in non-volatile memory and may include call

logs, text messaging logs, image, video, and position location information. The amount and type of data stored varies based on the software version and configuration of the specific device.

3.2.1. Kyocera DuraXV+ Cell Phone Data Recovery

The Kyocera cell phone was imaged at the Biloxi Police Department. The Kyocera cell phone was the motor coach driver's work phone. Figure 5 shows the front and back of the cell phone. The cell phone was read out in three separate pieces (SIM Card, Memory, and Phone) using forensic software.

Figure 5. Front and Back of Kyocera DuraXV+ cell phone.

3.2.2. Kyocera DuraXV+ Cell Phone Data Description

No crash pertinent data was found on the device.

3.3. Wabco ABS-E Module Description

The Wabco ABS-E Module combines the Automated Braking System (ABS) with an Electronic Stability Program (ESP). In addition to monitoring the brake application and improving brake characteristics, the ESP enhances vehicle stability by reducing engine throttle and applying vehicle braking based on the computed vehicle dynamics. The module receives information from sensors, processes data and sends signals to modulators and active braking valves.

3.3.1. Wabco ABS-E Module Data Recovery

Normal imaging of the Wabco brake module was attempted but a persisting communication error prevented imaging. The module was removed from the vehicle and brought to the manufacturer for download. Figures 6 and 7 show the Wabco ABS-E module.

Figure 6. Front of Wabco ABS-E module.

Figure 7. Back of Wabco ABS-E module.

3.3.2. Wabco ABS-E Module Data Description

The data recovered had no timestamp could not be correlated to the crash.

3.4. Garmin Nuvi 2555LMT Description

The Garmin Nuvi is a turn-by-turn automotive navigation device employing a GPS receiver and roads database. The Nuvi is equipped with a color touch screen for route planning and some models include support for an optional memory card. The unit is capable of pairing with many cell phone models via bluetooth, and can download phone books from these phones. The unit will maintain a call log of any calls made using the bluetooth pairing function. The Nuvi supports JPEG, *.gpx (Garmin Interchange Format), and Garmin custom point of Interest file-types. These files can be transferred to the Nuvi using the optional memory card or via USB. The Nuvi is capable of storing historical position location information for an unspecified number of points in non-volatile memory. This data may be transferred to a PC running the appropriate software via USB or by reading the optional memory card.

3.4.1. Garmin Nuvi 2555LMT Data Recovery

The Garmin Nuvi 2555LMT was imaged at the Biloxi Police Department. Figures 8 and 9 show the front and back of the GPS. The device was not damaged, and the device was read out normally using forensic software.

Figure 8. Front of Garmin Nuvi 2555LMT.

Figure 9. Back of Garmin Nuvi 2555LMT.

3.4.2. Garmin Nuvi 2555LMT Data Description

No crash related data was found on this device.

3.5. Detroit Diesel Engine Control IV Module Description

The Detroit Diesel Engine Control IV (DDEC IV) Module is an electronic control and data storage system for Detroit Diesel engines. The DDEV IV stores vehicle parameters and has the capability to record trip activity, including daily, monthly, and lifetime engine data. The DDEC IV interfaces with many onboard sensors that help monitor and perform its functions.

3.5.1. Detroit Diesel Engine Control IV Module Data Recovery

The DDEC IV was not damaged and was read out normally using the manufacturer's software. Figure 10 shows the motor coach engine information.

Figure 10. Motor coach engine information.

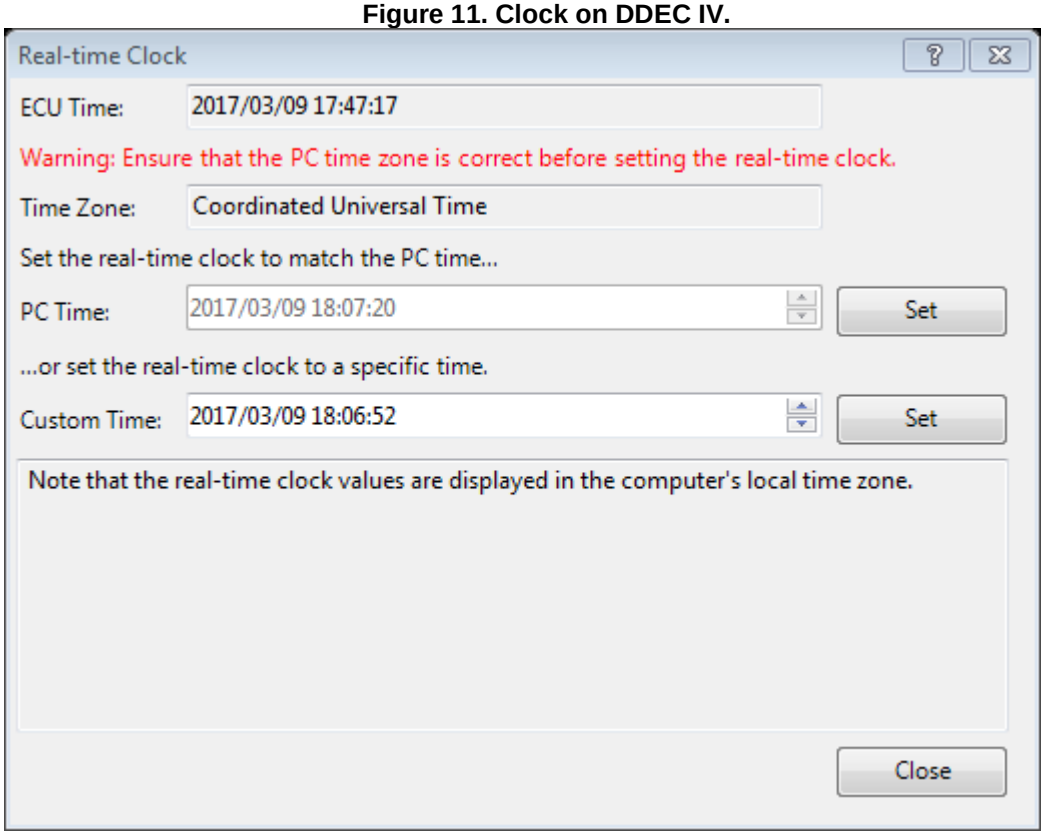
3.5.2. Detroit Diesel Engine Control IV Module Time Alignment

Figure 11 shows a screenshot with both the PC Time (time on the computer/UTC) and the ECU time (time on the DDEC IV). The ECU time can be shifted to UTC by using the below formula:

ECU Time + 20 minutes + 3 seconds = UTC

The local time was central standard time (CST) which is six hours less than UTC.

Figure 11. Clock on DDEC IV.



3.5.3. Detroit Diesel Engine Control IV Module Data Description

The last stop occurred at 2:11:55 PM CST on March 7, 2017. The last stop event was related to the crash. Hard brake #1 occurred at 2:43:05 AM on January 25, 2017 and was not accident pertinent. Hard brake #2 occurred at 1:29:51 PM on March 7, 2017. The entire DDEC Report is included as attachment 2 to this report.