



**EVENT DATA
FACTUAL REPORT**

**GRAY SUMMIT, MISSOURI
HWY-10-MH-018
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**National Transportation Safety Board
Office of Highway Safety
Washington, DC 20594**

EVENT DATA GROUP CHAIRMAN'S FACTUAL REPORT

A. ACCIDENT

Type: Truck Tractor, Pickup, School Bus Multivehicle Accident
Date and Time: August 5, 2010, 10:11AM. CDT
Location: Interstate 44 Eastbound West of Milepost 250.6
Gray Summit, Franklin County, Missouri
Vehicle #1: 2007 Volvo Truck Tractor
Motor Carrier: Climate Express
Vehicle #2: 2007 GMC Sierra Pick-up Truck
Vehicle #3: 2003 Bluebird, 71-Passenger School Bus
Motor Carrier: Copeland Bus Services, LLC
Vehicle #4: 2001 Bluebird, 72-Passenger Bus
Motor Carrier: Copeland Bus Services, LLC
Fatalities: 02
Injuries: 38
NTSB #: HWY-10-MH-018

B. EVENT DATA RECORDER GROUP

Christopher C. Voeglie	Senior Investigator	Group Chairman
National Transportation Safety Board	Office of Highway Safety	(404) 562-1658

C. ACCIDENT SUMMARY

On Thursday August 5, 2010 at approximately 10:11 a.m. CDT a 2007 Volvo truck tractor operated by a 43-year old driver was stopped eastbound on I-44 near milepost 250.6 in the right lane for traffic due to construction on I-44. A 2007 GMC Sierra operated by a 19 year old male was traveling eastbound in the left lane and moved into the right lane and struck the rear of the stopped truck tractor. The accident was stabilized blocking the right lane.

A 2003 Bluebird 71-passenger school bus occupied by the 75 year old driver and 23 passengers was traveling eastbound in the right lane in front of a 2001 Bluebird 72-passenger school bus operated by the 38 year old driver and 31 passengers. The lead school bus moved to the left approaching a motorcoach that pulled onto the shoulder because of the previous accident. The lead school bus went back to the right in the right lane and struck the rear of the pickup truck. The left front of the second school bus struck the right rear of the lead school bus. The lead bus drove the pickup forward causing it to overturn under the school bus and come to rest on the frame rail of the truck tractor. The lead bus came to rest on top of the pickup truck and truck tractor. The second school bus remained engaged with lead school bus.

As a result of the accident 35 school bus passengers, the two school bus drivers and driver of the truck tractor received injuries from minor to serious. The driver of the pickup truck and one passenger from the lead bus received fatal injuries.

D. DETAILS OF INVESTIGATION

This portion of the Safety Board's investigation was initiated in an effort to determine whether any data sources existed upon the involved vehicles, which could assist in the Safety Board's investigation and analysis of this accident. This report will present the factual information regarding this investigative effort.

1. 2007 VOLVO TRUCK TRACTOR

1.1 ENGINE CONTROL MODULE

The 2007 Volvo truck tractor (tractor) was equipped with a Volvo D12, electronically controlled diesel engine. Because the engine was electronically controlled, it was equipped with an electronic control module (ECM).

An ECM as referenced within this report is a semiconductor unit for controlling fuel delivery, speed control and other parameters in an engine management system. It is the primary unit responsible for processing data from engine and vehicle based sensors and for controlling engine components and other systems in order to produce optimum performance and efficiency.

Many late model diesel engine ECM's have been designed with an event data recorder (EDR) like function providing an ability to capture and preserve data related to various vehicle operations including last stop, crash or sudden deceleration events. However, the subject ECM was not equipped with an EDR function.

1.1.1 DATA IMAGING

Although the subject ECM was not capable of recording crash data, its calibration data can provide limited information useful in accident investigation.

Although not equipped with an EDR function, the ECM's available calibration, parameter and fault data were imaged and preserved. At the time of data imaging two active diagnostic faults conditions were reported.¹

1.2 ABS CONTROL MODULE

In addition to the data available from the ECM, the tractor was also equipped with an advanced Anti-Lock Brake system (ABS) which was also equipped with Automatic Traction Control (ATC) and Electronic Stability Control (ESC) functions.

Similar to the ECM, the ABS, traction control and stability control systems were controlled by an electronic control unit (ECU). Like the ECM, the ASB ECU was not designed with an EDR function, however it possessed system memory dedicated to the storage of diagnostic, configuration and system related data.

1.2.1 DATA IMAGING

On August 11, 2010, at approximately 1:28 p.m. local time, available ABS ECU diagnostic, configuration and intervention event data were imaged and preserved as "pdf" documents named "Climate_ABS_ECU_Data.pdf" and "Climate_ESPData.pdf". There were no active diagnostic faults reported.²

1.3 MOBILE COMMUNICATIONS DATA

The tractor was also equipped with a Xata, Inc., MobileMAX mobile communications system, which utilizes terrestrial, as well as satellite communications. The MobileMAX system provides real time text communications and tracking capabilities including state-line crossings, vehicle and driver performance, and alerting of driver arrival and departures as well as vehicle deviation from pre-determined routing.

The MobileMAX system utilizes an external transceiver and antenna housing and a cab mounted interactive data terminal which provides the driver with a keyboard and display interface.

The subject MobileMax device was not intended to function as an EDR and did not possess the capability of capturing accident or sudden deceleration related event data.

1.4 AIR BAG CONTROL MODULE

The tractor was equipped with a supplemental restraint system (SRS) composed of a driver side air-bag and pyrotechnic seat belt pre-tensioners. The SRS is controlled by an electronic control module commonly referred to as an Airbag Control Module (ACM). The subject ACM was capable of limited data collection in connection with deployment and near-

¹ See Attachment A

² See Attachment B

deployment events. However, it was determined that the dynamics of the crash, combined with the known data limitations that further investigative resources was not warranted.

2. 2007 GMC SIERRA PICKUP TRUCK

2.1 AIRBAG CONTROL MODULE

The GMC pick-up truck was equipped with an advanced occupant protection system, which was equipped with multi-stage driver and passenger airbags and pyrotechnic belt pretensioners.

Crash detection and system deployment is managed by an electronic control module identified as a "Sensing Diagnostic Module" (SDM). The subject SDM was identified as a model SDM-GF2002. The primary purpose of the SDM is to "sense" an impending crash event and to determine when and if airbag deployment is warranted, to deploy the appropriate restraint system components, and in non-crash situations to conduct system "diagnostics" to ensure the proper operation of the system as well as to activate the airbag warning lamp / indicator in the event the restraint system is deemed in-operative or in need of maintenance.

In addition to its primary function, the SDM was equipped with non-volatile EEPROM³ memory used to preserve critical operating data including pre-crash data, crash severity data, airbag deployment data, as well as diagnostic data.

Prior to staff's arrival on-scene, post crash imaging of the SDM had already been completed by a member of the Missouri State Highway Patrol (MSHP). According to the MSHP the SDM was "bench" imaged utilizing Bosch CDR Tool ver 3.5 and cable 02003003. The undersigned investigator was provided with copies of the resultant "PDF" version of the CDR report as well as a copy of the "raw" CDR image data.⁴

3. 2003 BLUEBIRD SCHOOL BUS

3.1 ENGINE CONTROL MODULE

The 2003 Bluebird school bus was equipped with a Cummins ISB-205 electronically controlled diesel engine. Because the engine was electronically controlled, it was equipped with an electronic control module (ECM).

The subject ECM was not capable of capturing data in connection with last stop, crash or sudden deceleration events.

3.1.1 DATA IMAGING

Although the subject ECM was not capable of recording crash data; calibration data and diagnostic data can provide information potentially useful in accident investigation.

³ EEPROM - Electrically Erasable Programmable Read Only Memory

⁴ See Attachment D

Available ECM data were imaged utilizing PowerSpec ver. 4.2.2.11 and were saved as HTML and as PDF documents. At the time of PowerSpec data imaging, there were no active fault conditions reported.

ECM data were also imaged utilizing INSITE ver. 7.4. The resultant ECM image data were saved as "Bus 1 - INSITE I-20100810-154504218.eif" as well as "INSITE - I46212531_0_20100810154301.csv"⁵

3.2 ABS CONTROL MODULE

In addition to the data available from the ECM, the bus was also equipped with an Anti-Lock Brake system (ABS).

Similar to the engine's ECM, the ABS system was controlled by an electronic control unit (ECU) and was not capable of capturing data in connection with last stop, crash or sudden deceleration events.

The ABS ECU did contain allocated memory dedicated to the storage of diagnostic, configuration and system related data.

3.2.1 DATA IMAGING

Available ABS ECU diagnostic, configuration and system data were imaged and preserved saved as a read only "pdf" document.⁶ Data imaging revealed there were seven (7) inactive diagnostic faults of varying conditions and no active codes reported.

4. 2001 BLUEBIRD SCHOOL BUS

4.1 ENGINE CONTROL MODULE

The 2001 Bluebird school bus was equipped with a Cummins ISB-190 electronically controlled diesel engine. Because the engine was electronically controlled, it was equipped with an electronic control module (ECM).

The subject ECM was not capable of capturing data in connection with last stop, crash or sudden deceleration events.

4.1.1 DATA IMAGING

Although the ECM was not capable of recording crash data; calibration data or diagnostic data can provide potentially useful data in accident investigation.

Available ECM data were imaged utilizing PowerSpec ver. 4.2.2.11 and were saved as HTML and as PDF documents. At the time of PowerSpec data imaging, there were two (2) inactive and no active fault conditions reported.

⁵ See Attachment E

⁶ See Attachment F

ECM data were also imaged utilizing Cummins INSITE ver. 7.4. The resultant ECM imaging data were saved as “Bus 2 - INSITE I-20100810-152241859.eif” as well as “INSITE - I45968926_0_20100810152700.csv”⁷

4.2 ABS CONTROL MODULE

Similar to the engine’s ECM, the ABS system was controlled by an electronic control unit (ECU) and was not capable of capturing data in connection with last stop, crash or sudden deceleration events.

The ABS ECU did contain allocated memory dedicated to the storage of diagnostic, configuration and system related data.

4.2.1 DATA IMAGING

Available ABS ECU diagnostic, configuration and system data were imaged and preserved saved as a read only “pdf” document.⁸ Data imaging revealed there were eight (8) inactive diagnostic faults of varying conditions and one (1) active code regarding the left rear wheel sensor reported at the time of data acquisition:

E. ATTACHMENTS

- Attachment A – Volvo Engine ECM Data
- Attachment B – Volvo ABS ECU Data
- Attachment C – XATA MDT Data
- Attachment D – GMC SDM Data
- Attachment E – 2003 Bluebird Engine ECM Data
- Attachment F – 2003 Bluebird ABS Data
- Attachment G – 2001 Bluebird Engine ECM Data
- Attachment H – 2001 Bluebird ABS Data

END OF FACTUAL REPORT

S/ _____ November 5, 2010
Christopher C. Voeglie, Senior Investigator
Event Data Group Chairman

⁷ See Attachment E

⁸ See Attachment F