

LITTLE KNOWN SECRETS OF THE BLACK BOX: INTRODUCTION TO HEAVY VEHICLE EVENT DATA RECORDERS

Terms - What Are We Talking About?

There are several similar sounding terms used among the trucking industry, as well as accident reconstruction & engineering fields, to describe the equipment found on commercial vehicles.

Engine Control Module - (ECM)

Engine Control Module refers to the computerized controller which is usually mounted to the side of most heavy duty truck engines. The main purpose of the ECM is to monitor and control engine function. The ECM may contain the ability to record event data or may broadcast data on the vehicle network that can be captured by other devices.

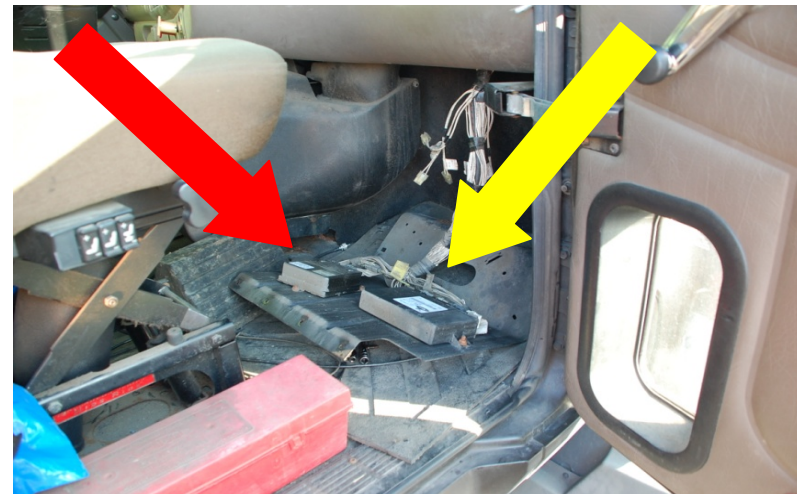
Although many of us refer to these units as “Black Boxes”, ironically they may not be black at all. The color of the unit depends on its manufacturer.



The black circle highlights the location of the ECM on a 2007 Caterpillar C-15 engine. (Photo courtesy of Northwestern University CPS.)

Electronic Control Unit – (ECU)

An ECU is a generic name for other devices that may be connected to the vehicle network. An ECM may also be referred to as an Engine ECU (EECU). Other ECUs that may be installed on the truck include anti-lock brake system (ABS ECU), vehicle ECU, body ECU, air bag ECU, collision avoidance ECU, and more. Each of these may have specific names or acronyms depending upon the specific manufacturer. They may also have the ability to record event data.



The yellow arrow is pointing to a MACK VECU while the red arrow points out the ABS ECU. Both are located behind the passenger side kick panel inside the tractor’s cab.

Event Data Recorder – (EDR)

The term EDR is used to describe any type of vehicle module which has the capability of storing data surrounding a defined event. The event may be a collision event, a sudden change in vehicle speed, a controlled or uncontrolled stop, or a fault detected in a monitored sensor. Many

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times an EDR is a sub-function of an ECU. The term Heavy Vehicle Event Data Recorder (HVEDR) may be used for most commercial vehicles.



Above is an example of an EDR called VORAD. This crash-avoidance system uses Doppler radar system to detect potential hazards.

Summary of Terms

Now that you are an expert, let's review the following just for fun:

- An ECM may be referred to as an EECU and may be an EDR.
- An ECM may be called a "Black Box" but is not always black.
- The term EDR may refer to the ECM or ECU or both.
- An EDR may be a sub-function of ECU.

See... makes perfect sense, doesn't it? If not, just remember there are several similar acronyms and terms for equipment that may contain incident related data. It is important that you have access to a knowledgeable expert to decipher the information you receive and the potential incident related data that may be involved.

E-LEARNING SERIES - EMAIL 1 OF 5

Data Recording Events

Now that you are familiar with the equipment that may record incident related data, let us focus on what types of data may be available. This e-mail series will highlight the incident recording capabilities of the following six engine or vehicle manufacturers: Detroit Diesel, Cummins, Caterpillar, Mack, Volvo, & Mercedes Benz. Although each manufacturer's EDR is unique, this section will focus on their similarities.

An event can be triggered many different ways, including a stop in vehicle movement, sudden change in vehicle speed, an engine malfunction or the driver pressing an "Accident" button. In general, the table below describes the three main event types.

EDR DATA RECORD EVENTS		
Event Name	Trigger	Override Info
Last Stop Record	Ignition key turned off or the vehicle coming to a stop for a period of time.	This event can be overwritten as soon as the vehicle is moved.
Hard Brake Record (a.k.a. Panic Stop, Quick Stop, Incident Log, or Sudden Deceleration)	Triggered by a deceleration rate that exceeds a threshold, usually between 7 to 10 mph/sec. (Example: brake application or an impact.)	This event may be overwritten by subsequent hard brake events.
Fault Codes (a.k.a. DTCs- Diagnostic Record or Snapshot Record)	Triggered by detection of signal from sensors that fall outside of their normal range. (Example: Low oil pressure, low coolant level)	Can be overwritten during the download process

***It is important to note that not every EDR includes each type of event and not every model engine has the ability to record incident related data. Remember a DELTA [v] Expert is always ready to assist you in understanding your specific situation.