

LITTLE KNOWN SECRETS OF THE BLACK BOX: MACK HVEDR EQUIPMENT, DATA & EXTRACTIONS

In our last e-mail, we explored Detroit Diesel & Mercedes Benz HVEDR equipment and data. (For another look at that information, visit <http://deltavinc.com/elearning/little-known-secrets-of-the-black-box/>.) Now we are going to focus on the HVEDR equipment and data of Mack engines. As you will learn, the biggest difference with Mack trucks from those previously discussed is the extraction procedure.



Mack HVEDR Equipment

Mack ECMs have had event data recording capabilities since 1998, beginning with the V-MAC III system. In late-2005, Mack introduced the V-MAC IV electronic system, which uses a shared engine platform from parent

corporation, Volvo Trucks. Mack trucks predominately utilize Mack engines, although some have been built with Cummins engines.

<u>VMAC Series</u>	<u>Years Installed</u>
V-MAC III	1998-2007
V-MAC IV	2006-2009

Mack trucks are equipped with two (V-MAC III) or three (V-MAC IV) electronic control modules which make up the Vehicle Management and Control System, also known as V-MAC. The Engine Electronic Control Unit (EECU) is normally mounted on the left side of the engine. It controls engine operation and performance.



The photo above shows the location of the VECU on a V-MAC III conventional cab truck. The VECU is the module on the right.

The Vehicle Electronic Control Unit (VECU) is located inside the cab. For conventional styled trucks and tractors (long-nosed cab), the VECU is installed behind the kick panel on the right (passenger) side of the cab (V-MAC III) or near the center of the dashboard (V-MAC IV).

For cab-over trucks the VECU is mounted in the tunnel between the driver and passenger seats (both V-MAC III and IV). A third module on V-MAC IV trucks, the Information Display, communicates with the VECU and EECU over the vehicle network to control a variety of vehicle functions.

Mack ECM Data

There is publicly available software known as VCADS (Vehicle Computer Aided Diagnostic Software) that will access V-MAC III and IV systems. However, VCADS will only extract general programming and fault codes. Incident data, such as what might be desired in a crash investigation, require Mack's proprietary software to extract and until July 2008 only Mack could perform extractions.

In July 2008, Mack Trucks Inc. selected two affiliates to perform their VECU and EECU data extraction, reporting and analysis. [Tim Cheek of DELTA \[v\] Forensic Engineering](#) was chosen as the East Coast contact. The West Coast Mack affiliate is [John Steiner of Keva Engineering](#).

Data Extraction & Incident Reporting Services



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Please visit www.HVEDR.com for further information

Above: Announcement circulated in July 2008 to announce Mack's Designated Affiliates.

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Mack Extraction Request Procedure

Since the announcement of the Mack Designated Affiliate program, the selected representatives and their engineering firms have worked together to streamline the Mack HVEDR extraction process. Our joint efforts include the development of the www.hvedr.com website, along with research and testing on Mack Trucks and their incident related recording capabilities. The following five steps describe the process for requesting a Mack EDR Extraction.

Step #1: Collect the details of the involved vehicles and incident.

Some basic information about the vehicle and incident are required to understand the potential HVEDR data availability and to complete the data extraction request forms. Obtain the following: Date of Incident, Incident Location, Fleet Name, Chassis Model, and the 17-Digit Vehicle Identification Number.

Step #2: Identify the type of extraction services needed.

As with other engines, there are options on how to extract the HVEDR data. You must decide which of the following extraction methods is most suitable for your situation. (*Tip from the Experts: The best way to preserve the integrity of the fault code recordings and validate data for the involved vehicle is an On-Site Extraction.*)

Mack EDR Extraction Methods			
Method	Description	Turn-around	Fee
Standard Extraction (Bench-top)	EDR Modules are shipped to a Designated Mack Affiliate for extraction.	2-4 Weeks	\$2,250
Expedited Extraction (Bench-top)	EDR Modules are shipped to a Designated Mack Affiliate for extraction.	10 days upon receipt	\$3,375
On-Site Extraction (Designated Affiliate Performs Extraction on Incident Vehicle)	Data extraction is performed while the modules are connected to the incident-related vehicle.	TBD	\$2,250 + \$250/hr. + Travel Expenses

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Step Three: Notify the appropriate Designated Mack Affiliate.

As previously indicated, there are two named Designated Affiliates for Mack EDR Extractions: DELTA [v] for East Coast Downloads or Keva Engineering for West Coast Downloads. Notification is required before submitting an extraction request to confirm the availability of incident related data and to obtain the Mack Extraction Request Forms.

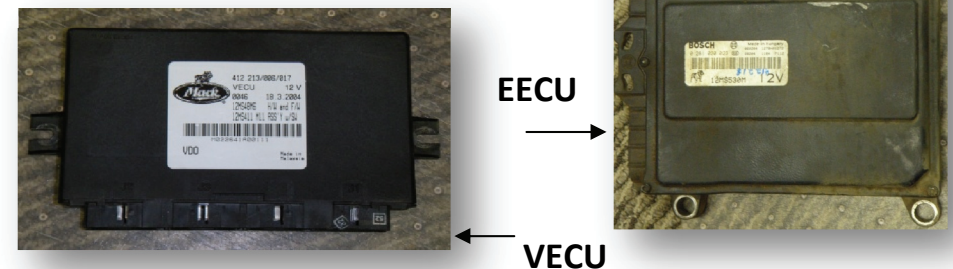


Step Four: Submit a formal request.

Complete the **Mack Request for Data Extraction and Incident Reporting Services & Release of Data Extraction and Incident Report Information** forms. Please note this paperwork does require two signatures: one from the requestor and the other from the vehicle owner. For assistance on completing the forms, you can visit www.hvedr.com/sample-forms.pdf.

Step Five: Secure EDR Modules and prepare for shipment. (For Standard & Expedited Extractions)

Most Mack vehicles contain two modules necessary to perform an extraction, the Engine Electronic Control Unit (EECU) and the Vehicle Electronic Control Unit (VECU). For V-MAC IV trucks, the gauge cluster module is also required for bench-top extractions. Modules, request & release forms, and applicable payment should be packaged and shipped to the appropriate Designated Affiliate.



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Mack Incident Reports

Mack Engines may have the capability to report the following incident related data: vehicle speed, fault codes, snapshot data, diagnostics, accelerator pedal %, braking, clutch, rpm, and cruise control. The table below describes the reporting differences between V-MAC III and V-MAC IV systems.

MACK ECM INCIDENT LOGS																
Engine Model	Recorded Data	Number of Records	Report Example													
V-MAC III - Triggered by a change in vehicle speed of 10 mph/sec & change in engine speed of 50 rpm/sec. These trigger thresholds can be changed by the customer.	Records 15.8 seconds of data before the trigger and 16 seconds after it. Data is recorded in 0.2 second intervals. Recording intervals can be changed by the customer.	V-MAC III systems can record two triggered events. Later versions included "Last Stop" data.	TIME	BEFORE/AFTER	VS	MPH	RPM	SW1	SW2	SW3	SW4	SW5	SW6	SW7	SW8	
			-15.8	Sec before incident	37	MPH	840	RPM	OFF	OFF	OFF	OFF	OFF	OFF	ON	OFF
			-15.6	Sec before incident	37	MPH	840	RPM	OFF	OFF	OFF	OFF	OFF	OFF	ON	OFF
			-15.4	Sec before incident	37	MPH	970	RPM	OFF	OFF	OFF	OFF	OFF	OFF	ON	OFF
			-15.2	Sec before incident	37	MPH	1200	RPM	OFF	OFF	OFF	OFF	OFF	OFF	ON	OFF
			-15	Sec before incident	37	MPH	1300	RPM	OFF	OFF	OFF	OFF	OFF	OFF	ON	OFF
			-14.8	Sec before incident	37	MPH	1230	RPM	OFF	OFF	OFF	OFF	OFF	OFF	ON	OFF
			-14.6	Sec before incident	37	MPH	1100	RPM	OFF	OFF	OFF	ON	ON	OFF	ON	OFF
			-14.4	Sec before incident	37	MPH	1120	RPM	OFF	OFF	OFF	ON	ON	OFF	ON	OFF
			-14.2	Sec before incident	36	MPH	1120	RPM	OFF	OFF	OFF	OFF	OFF	OFF	ON	OFF
			-14	Sec before incident	36	MPH	1130	RPM	OFF	OFF	OFF	OFF	OFF	OFF	ON	OFF
			-13.8	Sec before incident	36	MPH	1140	RPM	OFF	OFF	OFF	OFF	OFF	OFF	ON	OFF
			-13.6	Sec before incident	36	MPH	1120	RPM	OFF	OFF	OFF	OFF	OFF	OFF	ON	OFF
			-13.4	Sec before incident	36	MPH	1110	RPM	OFF	OFF	OFF	OFF	OFF	OFF	ON	OFF
			-13.2	Sec before incident	36	MPH	1100	RPM	OFF	OFF	OFF	OFF	OFF	OFF	ON	OFF
V-MAC IV - Triggered by a change in vehicle speed of 10 mph/sec.	Records 60 seconds of data before the trigger and 30 seconds after it. Last stop records contain 89.75 seconds before the vehicle stops. Data is recorded in 0.25 second intervals.	V-MAC IV systems can record two triggered events. The first is always a vehicle acceleration event & the second is always the last stop record.	TIME	BEFORE/AFTER	Accelerator Pedal Position	Vehicle Speed	Engine Speed	SW1	SW2	SW3	SW4	SW5	SW6	SW7	SW8	
			-60.00	Sec before Incident	45%	65 MPH	1630 RPM	ON	OFF	OFF	OFF	OFF	ON	ON	ON	OFF
			-59.75	Sec before Incident	47%	65 MPH	1640 RPM	ON	OFF	OFF	OFF	OFF	ON	ON	ON	OFF
			-59.50	Sec before Incident	46%	65 MPH	1630 RPM	ON	OFF	OFF	OFF	OFF	ON	ON	ON	OFF
			-59.25	Sec before Incident	46%	65 MPH	1630 RPM	ON	OFF	OFF	OFF	OFF	ON	ON	ON	OFF
			-59.00	Sec before Incident	47%	65 MPH	1630 RPM	ON	OFF	OFF	OFF	OFF	ON	ON	ON	OFF
			-58.75	Sec before Incident	47%	65 MPH	1620 RPM	ON	OFF	OFF	OFF	OFF	ON	ON	ON	OFF
			-58.50	Sec before Incident	49%	65 MPH	1620 RPM	ON	OFF	OFF	OFF	OFF	ON	ON	ON	OFF
			-58.25	Sec before Incident	56%	65 MPH	1620 RPM	ON	OFF	OFF	OFF	OFF	ON	ON	ON	OFF
			-58.00	Sec before Incident	56%	65 MPH	1620 RPM	ON	OFF	OFF	OFF	OFF	ON	ON	ON	OFF
			-57.75	Sec before Incident	56%	65 MPH	1620 RPM	ON	OFF	OFF	OFF	OFF	ON	ON	ON	OFF
			-57.50	Sec before Incident	56%	65 MPH	1620 RPM	ON	OFF	OFF	OFF	OFF	ON	ON	ON	OFF
			-57.25	Sec before Incident	53%	65 MPH	1620 RPM	ON	OFF	OFF	OFF	OFF	ON	ON	ON	OFF
			-57.00	Sec before Incident	52%	65 MPH	1620 RPM	ON	OFF	OFF	OFF	OFF	ON	ON	ON	OFF
			-56.75	Sec before Incident	48%	65 MPH	1610 RPM	ON	OFF	OFF	OFF	OFF	ON	ON	ON	OFF
-56.50	Sec before Incident	48%	65 MPH	1610 RPM	ON	OFF	OFF	OFF	OFF	ON	ON	ON	OFF			
-56.25	Sec before Incident	44%	65 MPH	1610 RPM	ON	OFF	OFF	OFF	OFF	ON	ON	ON	OFF			
-56.00	Sec before Incident	42%	64 MPH	1600 RPM	ON	OFF	OFF	OFF	OFF	ON	ON	ON	OFF			
-55.75	Sec before Incident	42%	65 MPH	1610 RPM	ON	OFF	OFF	OFF	OFF	ON	ON	ON	OFF			

Conclusion

Mack Engines equipped with V-MAC III or V-MAC IV ECMs may contain incident related data. The hardware and software required for HVEDR extractions is proprietary to Mack Trucks, Inc. Recently, Tim Cheek of DELTA [v] was chosen as Mack's East Coast Affiliate to perform all HVEDR downloads, incident reports, and data analysis. For more information regarding the Mack Extraction process, you can visit www.hvedr.com. ■

