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THE CURRENT STATE OF EVENT DATA RECORDERS (BLACK BOXES)

Modern automobiles come in all manner of makes and models. From minivans to sports cars to tractor-trailers, numerous manufacturers produce a wide variety of personal and commercial vehicles. Like the many vehicles in which they are installed, automobile Event Data Recorders (EDR's) are not created equal. From manufacturer to manufacturer, the information recorded by EDR's and the steps necessary to download and store the information varies widely. Steps which will preserve data on one manufacturer's EDR may result in loss of all data if utilized on another manufacturer's EDR.

Recognizing the wide variance in EDR's, this paper will outline the differences between commercial and passenger vehicle EDR's, including several manufacturer-specific protocols for preservation and downloading of EDR data. As with all technical topics, there is a date of obsolescence. Therefore, the author has selected the end of model year 2007 as the date mentioned, but it should be noted that much of the information addressed in this article will still be valid for model year 2008 and beyond. Furthermore, the author has the equipment and training to download and analyze the data available from all of the systems discussed below except where noted otherwise.

COMMERCIAL VEHICLE EVENT DATA RECORDERS

DETROIT DIESEL ELECTRONIC CONTROL module (DDEC)

Starting with DDEC IV and continuing through DDEC VI in addition to the general parameters which contain information such as Governor Settings and Hard Brake Limit (factory set at 7 mph/s) are four categories of files that might contain information related to a specific accident. They are the Daily Engine Usage Report, Diagnostic Records (three of them), the Hard Brake Reports (two of them) and the Last Stop Record (one).

The Daily Engine Usage Report (appendix 1) can be used to check the hours of driving, idling and off for the engine. This can be useful under some circumstances to check whether or not the driver was in violation of any of the "Hours of Service" rules such as the 11 Hour Rule, the 14 Hour Rule or the 60 or 70 Hour Rule. The information is recorded by month and day in two hour increments with no indication of the number of starts or stops within that two hour increment.

The Diagnostic Records (appendix 2) will record the last three active diagnostic fault codes. Eleven data points are captured covering one minute before the fault became active and are reported in 5 second intervals. Among the data collected are vehicle speed, engine speed, engine load percent, throttle percent, brake switch, clutch switch, and cruise position. If a bench download (downloading the Electronic Control Module - ECM when not attached to an engine) is performed without a harness to protect against the creation of and reporting of new codes the new diagnostic fault codes will overwrite the old ones and the information which might have been related to the accident will have been lost. ***It is recommended by Detroit Diesel that rather than do a bench download the subject ECM should be attached to a virtually identical vehicle and then the download take place.***

The Hard Brake Reports (appendix 3) will record the last two Hard Brakes. The data are collected one minute before the Hard Brake and 15 seconds after and are reported in 1 second intervals. Among the data collected are vehicle speed, engine speed, brake status, clutch status, engine load, throttle percent and cruise status. Hard Brakes are created whenever the speed of the vehicle is at least

10 mph at the creation of the Hard Brake and the Hard Brake Limit (factory set at 7 mph/s) has been satisfied. Hence, it is not possible to set a Hard Brake when the vehicle speed is below 17 mph using factory settings. A similar restriction exists to prevent a Hard Brake from being created due to accelerations that spin the wheels. Of the two Hard Brake files, Hard Brake #1 is the most recent. ***It should be noted that the Vehicle Speed is calculated based on the Engine Speed; therefore, when the brakes are applied hard the Vehicle Speed will not represent the actual speed of the vehicle over the ground.***

The Last Stop Report (appendix 4) will record the last time the speed of the vehicle changed from at least 1.5 mph for 2 seconds to below 1.5 mph for at least 15 seconds. The data are collected for 1 minute and 45 seconds before the Last Stop and 15 seconds after the Last Stop. The data collected are the same as in the Hard Brake Record and are collected at 1 second intervals. ***As one can see from the ease with which a Last Stop Report can be created, the only way to preserve the Last Stop Report that is related to the accident is to tow the vehicle from the accident site WITH THE IGNITION TURNED OFF.*** When the ignition key is in the ON position the ECM will be powered up if the electrical system is still intact and could record new data overwriting some of the old.

WARNING: Only a technician/engineer/reconstructionist that is familiar with the needs of the accident reconstruction community and knows how to extract all of the data from the Electronic Control Module (ECM) should perform an accident reconstruction download.

Example Problem #1: Within minutes after an accident and after assisting the injured parties the commercial truck driver calls the office on his cell phone to report the event and its status. Later that day there is a DDEC Reports download performed but there was no ECM Clock screen captured (appendix 5) (available only on the Diagnostic Link side of the software not the DDEC Reports side), hence, the accuracy of the ECM clock was not obtained (these clocks can be in error by hours or more). Two years later a claim is made that the driver was on the cell phone at the time of the accident. ***If the police were accurate with the time of the accident and the ECM Clock screen had been captured there could be no doubt created as to whether or not the driver was on his cell phone at the time of the accident.***

Example Problem #2: A technician performs a partial DDEC Reports download using software still set as it comes from the factory. A day or two later it is found that not all of the Reports had been printed. A second download of the ECM is attempted but there is no longer any trip data there. ***The factory setting on the software is to reset the ECM clock thereby effectively erasing all trip data.*** It is a simple thing to change that setting on the software but maintenance facility personnel typically are unaware of that.

CATERPILLAR ECM

The Caterpillar ECM is similar to the Detroit Diesel ECM in that in addition to the general parameters which contain information such as Governor Settings and Quick Stop Rate (factory set at 0 mph/s) are two categories of files that might contain information related to a specific accident. They are both in the Snapshot File found under the Information tab. (Appendix 6) They are very similar.

The first is a diagnostic associated with an engine fault. Whenever an engine fault is created a "snapshot" of the engine condition for 45 seconds prior to the fault and 15 seconds after the fault is recorded. In order to download the information one must enter the "view graph" or "view data" portion of the snapshot file. In the "view data" segment there is the option to record all of the information in an excel spreadsheet. In the "view graph" segment one can customize the data displayed on the graph and up to 5 separate elements can be displayed on each graph. Items such as speed, engine speed, cruise mode, throttle percentage and brake switch are generally of interest. Similarly to Detroit Diesel ECM's, if a bench download is performed without a harness to protect against the creation of and reporting of new codes the new diagnostic fault codes will overwrite the old ones and the information which might have been related to the accident will have been lost. ***It is recommended by Caterpillar that rather than do***

a bench download the subject ECM should be attached to a virtually identical vehicle and then the download take place.

The second is a sudden deceleration. Caterpillar ECM's as of MY 2007 are factory set at 0 mph/s so that sudden decelerations are not recorded unless the owner goes into the Configuration File and resets the Quick Stop Rate to something other than 0 mph/s. The information is displayed the same as was mentioned for diagnostics. (Appendix 7)

Last but not least, again the accuracy of the ECM clock must be ascertained. One must set the PC clock at the appropriate time and then go into the ECM Date/Time area under the Service tab. Once in the ECM Date/Time mode the PC's clock should be right clicked to display the PC clock on the same screen as the ECM clock. Then a screen capture can take place to authenticate the level of error in the ECM clock. (Appendix 8) The same problems as mentioned in the DDEC segment are valid here as well. ***It cannot be overemphasized how important collecting the data in a proper manner for accident reconstruction is. Generally maintenance people do not know how to collect all of the data of importance to accident reconstruction. MISHANDLING OF THE DATA IS THE RULE RATHER THAN THE EXCEPTION WITH MAINTENANCE PERSONNEL!!!!!!!!!!***

Example Problem #3: An accident has happened and maintenance personnel are asked to download the ECM to preserve the data that is available. The easiest and quickest way to get 90% of the information is to go into the Prognostics file under the Information tab and download it. It takes 5 minutes and then the shop folks can go back to their regular work. There are two problems with that. **First, downloading Prognostics does not capture the accuracy of the ECM clock. Second, downloading Prognostics DOES NOT DOWNLOAD THE SNAPSHOTS FILE.** Two years later all we have are the operating parameters of the vehicle and none of the data associated with the accident if a Prognostics download alone is what was done.

CUMMINS ECM

Cummins is the easiest of all to download. However, there is one very important quirk about the Cummins software. It takes **TWO** software packages to download everything of interest in an accident reconstruction; INSITE and PowerSpec. In late 2001 Cummins changed the ECM's used on long haul commercial truck engines (the ISM and ISX series for example) but did not upgrade the software to take advantage of the capability to store **three sudden decelerations** until early 2005. That means there are engines with ECM's that can record and store sudden decelerations once their software is updated (re-flashed) but do not currently store that data. Those lie between the above referenced dates.

INSITE automatically creates a Work Order when the ECM is interrogated. It then creates another Work Order when the ECM is exited thereby automatically identifying any changes that might have occurred to the ECM during interrogation. After exiting the ECM the Image of the ECM from the Work Order can be viewed at leisure and the Image can be exported to an external file such as an excel file (appendage .csv) for a user friendly format of viewing. (Appendix 9 – partial listing)

PowerSpec downloads much of the same information as INSITE but **IT and IT ALONE CAN DOWNLOAD THE SUDDEN DECELERATION FILES.** A Sudden Deceleration file will contain up to three Sudden Decelerations with information very similar to that found in Detroit Diesel ECM's and Caterpillar ECM's. The information starts 60 seconds before the sudden deceleration and continues for 15 seconds after it (appendix 10 – partial listing)

Example Problem #4: An accident happened and all parties agreed to let a local reputable repair shop download the ECM. The repair shop personnel only use INSITE customarily and perform an excellent download (almost foolproof anyway). They then provide a copy of the Image made of the ECM in an excel spreadsheet. Two years later after the truck has been put back on the road the ramifications of not using PowerSpec become known but **the sudden decelerations are now nonexistent.**

VOLVO ECM

As of MY 2007 the ECM in a Volvo engine has no memory chip for storing events related to an accident. A download will produce only operating parameters for the engine. However, it will also produce the governor setting for the engine and vehicle. Any shop can do this download. It is foolproof.

MACK ECM

The Mack engines do record event data related to an accident but only Mack has the hardware and software to perform this download. The repair facilities routinely do not have the capability to download the Event Data without either erasing or damaging it. In order to have Mack perform the download two modules must be removed from the vehicle; the Engine Control Unit and the Vehicle Control Unit. For a substantial fee Mack will receive these units, perform the download and then return the units along with the downloaded information.

MERCEDES ECM

The Mercedes ECM uses the same hardware, software and techniques and provides the same results with the same characteristics and potential problems as Detroit Diesel ECM's.

PASSENGER VEHICLE EVENT DATA RECORDERS

The passenger vehicle event data recorders that can be downloaded with publicly available software and hardware (provided by BOSCH/Vetronix along with training) fall mainly into two groups; those that record pre-impact data and those that do not. The Crash Data Retrieval (CDR) tool sold by BOSCH provides the engineer/reconstructionist with the ability to perform downloads but there are some pitfalls here as with the commercial vehicles mentioned above. We shall discuss those later. Generally there are three major manufactures that have made their software and hardware publicly available; General Motors, Ford Motors and Chrysler Motors. However, not all year models are available and what is available is changing on a yearly if not monthly basis. To provide examples of just the most common of them in this article would be burdensome and probably confuse the reader more than is advisable. A brief description of what is available follows hereafter.

GENERAL MOTORS

Prior to 2000 there were very few vehicles that recorded pre-impact data. A collision pulse (change in speed over a very short period of time, usually measured in milliseconds) was the most useful piece of information. Starting in 2000 many models had built into their Sensing Diagnostic Modules (SDM) an Electronically Erasable Programmable Read Only Memory (EEPROM) chip that would store information provided by various other modules in the automobile, especially the Powertrain Control Module (PCM) when commanded to do so by the SDM upon some unusual event occurring that would "wake up" the algorithm that decides whether or not to deploy the air bags. This then provided 5 seconds worth of pre-enable (wake up) information that included the four standard values of vehicle speed, engine speed, throttle percentage and brake switch position. In recent years the data stored has expanded in some models far beyond the original four. The Data Limitations File in the CDR has become quite sophisticated and generally describes the data, how to collect it and sometimes how it can be damaged.

FORD MOTOR COMPANY

There are no models of Ford for which collision data can be retrieved publicly earlier than 2001 due to a failure to mention to the owners in the owner's manual that such data was indeed being collected. The Ford Restraint Control Modules (RCM) do not collect pre-enable information. They do collect collision pulse data and a very complex set of data regarding the operator restraint system and its status. Starting with some models in MY2004 and later the "Throttle by Wire" models with gasoline engines in 2005 a memory chip was placed in the PCM that would record 25 seconds of information.

Now some models record as much as 6 minutes of information. Please note that the author has not referenced these times as “pre-enable or pre-impact” information. This data is always being recorded and overwritten like a closed loop video camera tape. In order to retrieve the valuable data it must be downloaded before it is overwritten in the natural course of operation of the vehicle. Special procedures must be followed to do this properly.

CHRYSLER MOTORS

Chrysler is the new guy on the block. The Chrysler software and hardware has only been publicly available for about 9 months now. However, there is pre-crash data available in some models but it is limited to 2 seconds. In most accidents the driver has already begun responding to a developing situation prior to the beginning of those 2 seconds.

SPECIAL CONSIDERATIONS

The information obtained from the event data recorders mentioned above does not stand alone and tell the story of an accident. It is very important that the data be properly analyzed in conjunction with a reconstruction of the accident including measurements and analysis necessary for the issues being addressed. Some of the pitfalls referenced above may be described as follows:

1. The recorded vehicle speed is usually obtained from the engine rpm's and can be in error when the wheel speed does not properly represent the vehicle speed such as occurs when the wheels spin on a slick surface, slide sideways due to a broad slide of some sort, go airborne as in an overturn, heavy braking occurs, etc.
2. The pre-crash or pre-enable data is not based on a collision and is only related to it by as close as the engineer/reconstructionist can match the crash to the time line in the pre-crash or pre-enable data. This can be in error and sometimes significantly so and thereby can give rise to erroneous conclusions.
3. The information in an air bag module might be volatile in that it can be overwritten by careless handling when under power. A bench download is sometimes required due to the magnitude of the damage done to the vehicle but when it is necessary special considerations must be given to protecting the air bag module from a sudden jolt when under power. If a locking signal was not sent to the module then a protocol will be followed that could create an artificial attempt by the module to fire the nonexistent air bag and then record the data associated with the jolt over the data associated with the accident. Even after power has been removed a capacitor in the module will still provide residual power to the module for some minutes so that continued caution is warranted.
4. The Ford PCM must be treated with special consideration and special equipment. A PCM adapter available from BOSCH will send a signal to the PCM that it is not to record any additional information and is to make the currently recorded information available for downloading. **If a person turns on the key to find out what the mileage is then for the time duration of that key being on POTENTIALLY VALUABLE PCM DATA IS BEING OVERWRITTEN WITH WORTHLESS ZEROS.** When in doubt remove and store both the PCM and the RCM.
5. If there is some reason to believe that a Ford restraint system did not perform properly then a **bench download of a Ford RCM MUST NOT TAKE PLACE.** In that case a surrogate vehicle should be found, the RCM placed on that surrogate vehicle and then the download take place through the Diagnostic Link Cable (DLC). There are codes that only Ford can read that relate to the restraint system and those codes are overwritten with worthless information in a bench download.

AFTER MARKET DEVICES

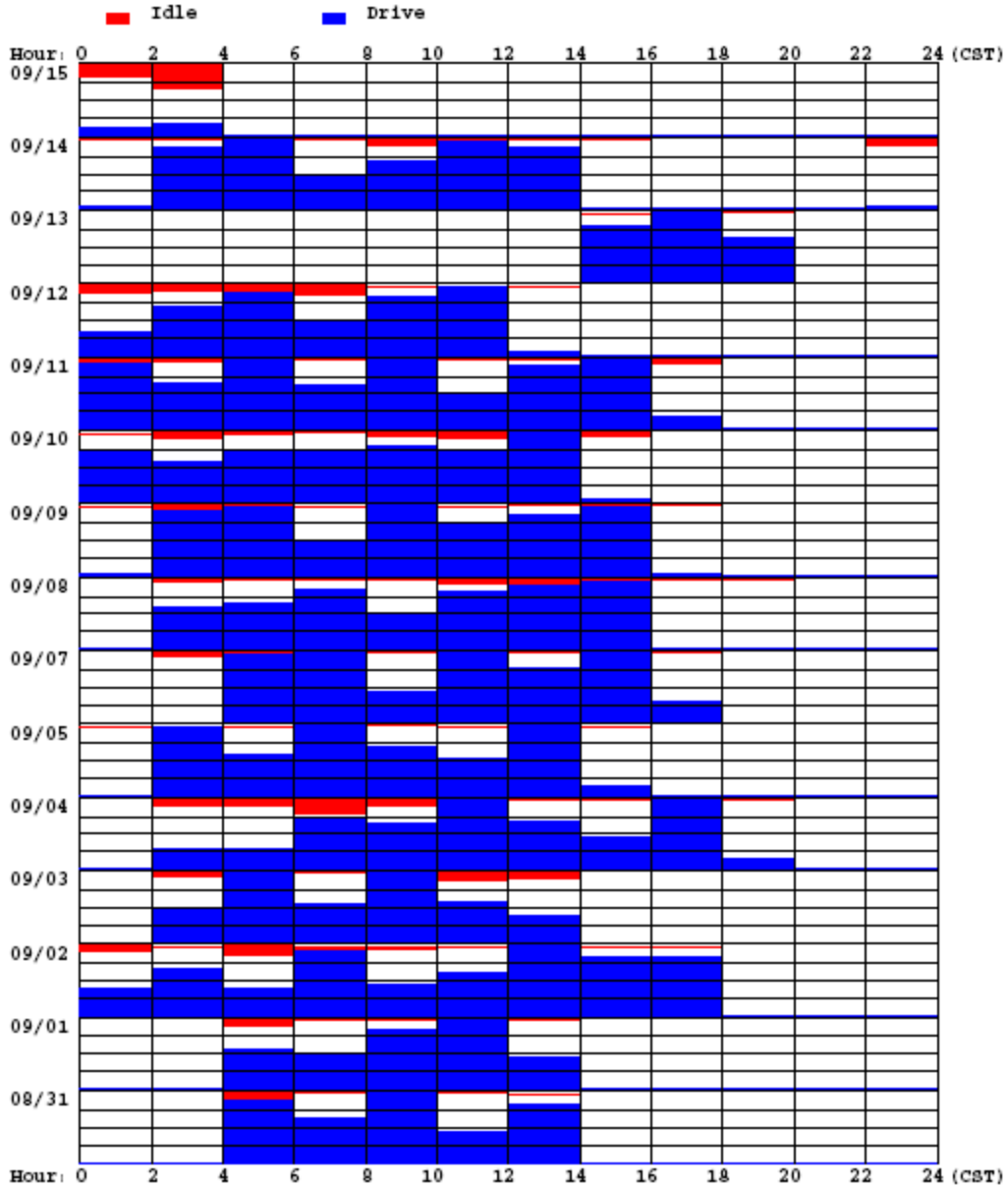
The discussion of aftermarket devices such as VORAD is beyond the scope of this article.

DDEC® Reports - Daily Engine Usage

Print Date: Sep 15, 2008 05:42 PM (EDT)

Cline Young, Consulting Engine
8125 San Fernando Way
Dallas, TX 75218-
(214) 660-0540

Date Range: 09/15/2008 to 09/14/2008 (CST)
Vehicle ID:
Driver ID:



DDEC® Reports - Diagnostic Record #1

Print Date: Sep 15, 2008 05:42 PM (EDT)

Cline Young, Consulting Engine
8125 San Fernando Way
Dallas, TX 75218-
(214) 660-0540

Trip: 03/02/06 03:21 PM (CST) to 09/15/2008 (CST)
Vehicle ID:
Driver ID:
Odometer: 849855.0 mi

Trip Distance	364553.9 mi	Trip Time	7312:55:36
Trip Fuel	45679.25 gal	Fuel Consumption	6.25 gal/h
Fuel Economy	7.98 mpg	Idle Time	397:13:08
Avg Drive Load	40 %	Idle Percent	5.29 %
Avg Vehicle Speed	52.6 mph	Idle Fuel	171.00 gal

Note:

Not all faults that are displayed in Diagnostic Link (Fault Codes View) will be displayed here.
The diagnostic codes shown in DDEC Reports are a subset of all possible fault codes.

Diagnostic Code: [44] - Coolant Temperature High
Diagnostic Time: 05/22/2008 08:01:27 (CST)

Time	Vehicle Speed (mph)	Engine Speed (rpm)	Boost Press (psi)	Oil Press (psi)	Fuel Press (psi)
08:01:27	21.0	1277	3.5	38.8	0.0
08:01:22	18.5	1509	5.3	43.8	0.0
08:01:17	14.5	1192	2.4	36.5	0.0
08:01:12	10.5	1214	2.9	40.6	0.0
08:01:07	7.0	1087	2.1	37.3	0.0
08:01:02	0.0	725	0.5	20.3	0.0
08:00:57	0.0	726	0.0	4.9	0.0
08:00:52	0.0	0	0.0	0.0	0.0
08:00:47	0.0	0	0.0	0.0	0.0
08:00:42	0.0	0	0.0	0.0	0.0
08:00:37	0.0	0	0.0	0.0	0.0
08:00:32	0.0	0	0.0	0.0	0.0

Time	Coolant Temp (°F)	Oil Temp (°F)	Fuel Temp (°F)	Engine Load (%)	Throttle (%)
08:01:27	221.5	207.8	124.0	38.0	46.4
08:01:22	220.8	207.3	124.3	39.0	52.0
08:01:17	221.5	207.3	124.8	13.5	20.8
08:01:12	220.8	206.5	125.0	41.0	47.2
08:01:07	224.5	206.0	125.3	17.0	20.8
08:01:02	227.5	205.5	125.8	56.5	28.4
08:00:57	230.0	204.9	125.5	1.0	0.0
08:00:52	228.5	204.9	125.5	0.0	0.0
08:00:47	228.5	205.5	125.5	0.0	0.0
08:00:42	228.5	205.5	125.3	0.0	0.0
08:00:37	228.8	205.5	125.3	0.0	0.0
08:00:32	229.5	205.5	125.3	0.0	0.0

Time	Engine Brake (cylinders)	Cruise	Accel Switch	Brake Switch	Clutch Switch
08:01:27	Off	No	No	No	No
08:01:22	Off	No	No	No	No
08:01:17	Off	No	No	No	No
08:01:12	Off	No	No	No	No
08:01:07	Off	No	No	No	No
08:01:02	Off	No	No	No	Yes
08:00:57	Off	No	No	No	No
08:00:52	Off	No	No	No	No
08:00:47	Off	No	No	No	No
08:00:42	Off	No	No	No	No
08:00:37	Off	No	No	No	No
08:00:32	Off	No	No	No	No

DDEC® Reports - Hard Brake #1

Print Date: Sep 15, 2008 05:42 PM (EDT)

Cline Young, Consulting Engine
 8125 San Fernando Way
 Dallas, TX 75218-
 (214) 660-0540

Trip: 03/02/06 03:21 PM (CST) to 09/15/2008 (CST)
 Vehicle ID:
 Driver ID:
 Odometer: 849855.0 mi

Incident Time: 09/08/2008 12:17:06 (CST)

Incident Odometer: 846409.2 mi

Time	Vehicle Speed (mph)	Engine Speed (rpm)	Brake	Clutch	Engine Load (%)	Throttle (%)	Cruise	Diagnostic Code
-0:20	38.5	1221	No	No	17.50	26.80	No	No
-0:19	38.5	1219	No	No	48.00	53.20	No	No
-0:18	38.5	1220	No	No	75.00	74.00	No	No
-0:17	39.0	1230	No	No	53.00	55.20	No	No
-0:16	39.0	1227	No	No	56.50	57.60	No	No
-0:15	39.0	1235	No	No	51.00	54.00	No	No
-0:14	39.5	1250	No	No	57.50	58.80	No	No
-0:13	39.5	1242	No	No	52.50	56.40	No	No
-0:12	39.5	1254	No	No	48.00	52.40	No	No
-0:11	39.5	1254	No	No	22.00	34.40	No	No
-0:10	39.5	1240	No	No	24.50	37.20	No	No
-0:09	39.5	1254	No	No	51.00	58.80	No	No
-0:08	40.0	1261	No	No	61.00	61.60	No	No
-0:07	40.5	1288	No	No	59.50	60.80	No	No
-0:06	41.0	1294	No	No	35.50	42.40	No	No
-0:05	40.5	1295	No	No	0.00	0.00	No	No
-0:04	39.5	1254	Yes	No	0.00	0.00	No	No
-0:03	37.0	1168	Yes	No	0.00	0.00	No	No
-0:02	34.0	1072	Yes	No	0.00	0.00	No	No
-0:01	31.5	1000	Yes	No	0.00	0.00	No	No
0:00	21.5	662	Yes	No	0.00	0.00	No	No
+0:01	9.5	604	Yes	Yes	54.00	0.00	No	No
+0:02	7.5	601	Yes	Yes	7.50	0.00	No	No
+0:03	5.0	601	Yes	Yes	7.50	0.00	No	No
+0:04	5.5	601	Yes	Yes	6.50	0.00	No	No
+0:05	0.0	600	Yes	Yes	8.00	0.00	No	No
+0:06	0.0	600	Yes	Yes	7.00	0.00	No	No
+0:07	0.0	600	No	Yes	6.50	0.00	No	No
+0:08	0.0	600	No	Yes	7.00	0.00	No	No
+0:09	0.0	600	No	Yes	7.50	0.00	No	No
+0:10	0.0	600	No	Yes	7.50	0.00	No	No
+0:11	0.0	600	No	Yes	7.00	0.00	No	No
+0:12	0.0	680	No	Yes	50.00	19.60	No	No
+0:13	0.0	605	No	Yes	5.50	0.00	No	No
+0:14	0.0	897	No	Yes	17.50	7.20	No	No

DDEC® Reports - Hard Brake #1

Print Date: Sep 15, 2009 05:42 PM (EDT)

Cline Young, Consulting Engine
 9125 San Fernando Way
 Dallas, TX 75218-
 (214) 660-0540

Trip: 03/02/06 03:21 PM (CST) to 09/15/2009 (CST)
 Vehicle ID:
 Driver ID:
 Odometer: 849855.0 mi

Trip Distance	364553.9 mi	Trip Time	7312:55:36
Trip Fuel	45679.25 gal	Fuel Consumption	6.25 gal/h
Fuel Economy	7.98 mpg	Idle Time	397:13:08
Avg Drive Load	40 %	Idle Percent	5.29 %
Avg Vehicle Speed	52.6 mph	Idle Fuel	171.00 gal

Incident Time: 09/08/2009 12:17:06 (CST)

Incident Odometer: 846409.2 mi

Time	Vehicle Speed (mph)	Engine Speed (rpm)	Brake	Clutch	Engine Load (%)	Throttle (%)	Cruise	Diagnostic Code
-1:00	40.5	1289	No	No	24.00	39.00	No	No
-0:59	41.0	1296	No	No	42.50	50.40	No	No
-0:58	41.5	1307	No	No	44.50	51.60	No	No
-0:57	41.5	1320	No	No	44.50	52.00	No	No
-0:56	42.0	1334	No	No	43.00	51.20	No	No
-0:55	42.0	1336	No	No	17.50	29.60	No	No
-0:54	42.0	1320	No	No	0.00	0.00	No	No
-0:53	42.0	1320	No	No	0.00	0.00	No	No
-0:52	41.0	1297	Yes	No	0.00	0.00	No	No
-0:51	40.0	1260	Yes	No	0.00	0.00	No	No
-0:50	39.0	1232	Yes	No	0.00	0.00	No	No
-0:49	39.0	1249	No	No	15.50	26.00	No	No
-0:48	39.5	1252	No	No	39.50	50.00	No	No
-0:47	40.5	1279	No	No	46.50	50.00	No	No
-0:46	41.0	1306	No	No	52.00	57.20	No	No
-0:45	42.0	1332	No	No	43.50	54.00	No	No
-0:44	43.0	1365	No	No	51.50	59.00	No	No
-0:43	43.5	1376	No	No	45.00	53.60	No	No
-0:42	44.0	1394	No	No	19.00	37.20	No	No
-0:41	45.0	1417	No	No	24.50	39.60	No	No
-0:40	45.5	1441	No	No	26.50	41.60	No	No
-0:39	46.0	1465	No	No	27.00	42.00	No	No
-0:38	46.5	1474	No	No	19.50	32.80	No	No
-0:37	46.5	1484	No	No	2.50	6.00	No	No
-0:36	47.0	1496	No	No	0.00	0.00	No	No
-0:35	47.0	1483	No	No	0.00	0.00	No	No
-0:34	46.5	1474	Yes	No	0.00	0.00	No	No
-0:33	46.5	1473	Yes	No	0.00	0.00	No	No
-0:32	46.5	1466	Yes	No	0.00	0.00	No	No
-0:31	46.0	1465	No	No	0.00	0.00	No	No
-0:30	46.5	1471	No	No	0.00	0.00	No	No
-0:29	46.5	1472	No	No	0.00	0.00	No	No
-0:28	46.5	1478	No	No	0.00	0.00	No	No
-0:27	46.5	1471	Yes	No	0.00	0.00	No	No
-0:26	45.5	1446	Yes	No	0.00	0.00	No	No
-0:25	45.0	1421	No	No	0.00	0.00	No	No
-0:24	44.5	1393	No	No	0.00	0.00	No	No
-0:23	43.5	1380	Yes	No	0.00	0.00	No	No
-0:22	42.0	1330	Yes	No	0.00	0.00	No	No
-0:21	39.5	1254	Yes	No	0.00	0.00	No	No

DDEC® Reports - Last Stop Record

Print Date: Sep 15, 2008 05:42 PM (EDT)

Cline Young, Consulting Engine
 8125 San Fernando Way
 Dallas, TX 75218-
 (214) 660-0540

Trip: 03/02/06 03:21 PM (CST) to 09/15/2008 (CST)
 Vehicle ID:
 Driver ID:
 Odometer: 849855.0 mi

Last Stop Time: 09/15/2008 02:21:27 (CST)

Last Stop Odometer: 849855.0 mi

Time	Vehicle Speed (mph)	Engine Speed (rpm)	Brake	Clutch	Engine Load (%)	Throttle (%)	Cruise	Diagnostic Code
-0:19	16.0	600	No	No	4.50	0.00	No	No
-0:18	16.0	599	No	No	5.50	0.00	No	No
-0:17	15.5	599	No	No	5.00	0.00	No	No
-0:16	15.5	599	No	No	5.00	0.00	No	No
-0:15	15.0	599	No	No	5.00	0.00	No	No
-0:14	14.5	599	No	No	5.50	0.00	No	No
-0:13	14.0	599	No	No	5.50	0.00	No	No
-0:12	13.5	599	No	No	5.50	0.00	No	No
-0:11	13.0	600	No	No	5.00	0.00	No	No
-0:10	12.5	599	No	No	5.50	0.00	No	No
-0:09	12.0	600	No	No	5.00	0.00	No	No
-0:08	11.5	599	No	No	5.00	0.00	No	No
-0:07	10.0	600	No	No	5.00	0.00	No	No
-0:06	9.0	600	No	No	5.00	0.00	No	No
-0:05	9.0	600	No	No	5.50	0.00	No	No
-0:04	7.0	599	No	No	5.00	0.00	No	No
-0:03	6.5	599	No	No	5.50	0.00	No	No
-0:02	6.0	599	No	No	5.50	0.00	No	No
-0:01	5.5	600	No	No	5.00	0.00	No	No
0:00	4.5	599	No	No	5.50	0.00	No	No
+0:01	0.0	600	No	No	5.50	0.00	No	No
+0:02	0.0	599	No	No	5.50	0.00	No	No
+0:03	0.0	600	No	No	5.50	0.00	No	No
+0:04	0.0	600	No	No	5.50	0.00	No	No
+0:05	0.0	599	No	No	5.50	0.00	No	No
+0:06	0.0	599	No	No	5.50	0.00	No	No
+0:07	0.0	600	No	No	5.50	0.00	No	No
+0:08	0.0	599	No	No	5.50	0.00	No	No
+0:09	0.0	600	No	No	5.50	0.00	No	No
+0:10	0.0	599	No	No	5.50	0.00	No	No
+0:11	0.0	600	No	No	5.50	0.00	No	No
+0:12	0.0	599	No	No	5.50	0.00	No	No
+0:13	0.0	599	No	No	5.00	0.00	No	No
+0:14	0.0	600	No	No	5.00	0.00	No	No
+0:15	0.0	600	No	No	5.00	0.00	No	No

DDEC® Reports - Last Stop Record

Print Date: Sep 15, 2008 05:42 PM (EDT)

Cline Young, Consulting Engine
 8125 San Fernando Way
 Dallas, TX 75218-
 (214) 660-0540

Trip: 03/02/06 03:21 PM (CST) to 09/15/2008 (CST)
 Vehicle ID:
 Driver ID:
 Odometer: 849855.0 mi

Last Stop Time: 09/15/2008 02:21:27 (CST)

Last Stop Odometer: 849855.0 mi

Time	Vehicle Speed (mph)	Engine Speed (rpm)	Brake	Clutch	Engine Load (%)	Throttle (%)	Cruise	Diagnostic Code
-1:04	21.0	599	No	No	5.50	0.00	No	No
-1:03	21.5	599	No	No	5.50	0.00	No	No
-1:02	21.0	599	No	No	5.50	0.00	No	No
-1:01	21.5	599	No	No	6.00	0.00	No	No
-1:00	21.5	600	No	No	6.00	0.00	No	No
-0:59	21.0	600	No	No	5.50	0.00	No	No
-0:58	21.0	600	No	No	6.00	0.00	No	No
-0:57	21.0	599	No	No	6.00	0.00	No	No
-0:56	21.0	599	No	No	6.50	0.00	No	No
-0:55	21.0	599	No	No	6.00	0.00	No	No
-0:54	21.5	600	No	No	5.50	0.00	No	No
-0:53	21.5	600	No	No	5.50	0.00	No	No
-0:52	21.5	599	No	No	6.00	0.00	No	No
-0:51	21.5	599	No	No	6.00	0.00	No	No
-0:50	21.5	599	No	No	6.00	0.00	No	No
-0:49	21.5	600	No	No	5.50	0.00	No	No
-0:48	21.5	599	No	No	6.00	0.00	No	No
-0:47	21.5	600	No	No	5.50	0.00	No	No
-0:46	21.5	599	No	No	6.00	0.00	No	No
-0:45	21.5	600	No	No	5.50	0.00	No	No
-0:44	21.5	600	No	No	5.50	0.00	No	No
-0:43	21.5	600	No	No	5.00	0.00	No	No
-0:42	21.5	599	No	No	6.00	0.00	No	No
-0:41	21.5	599	No	No	6.00	0.00	No	No
-0:40	21.5	600	No	No	5.00	0.00	No	No
-0:39	21.0	599	No	No	5.50	0.00	No	No
-0:38	21.0	599	No	No	6.00	0.00	No	No
-0:37	20.5	599	No	No	5.50	0.00	No	No
-0:36	20.5	600	No	No	5.00	0.00	No	No
-0:35	20.5	599	No	No	5.50	0.00	No	No
-0:34	20.0	600	No	No	5.50	0.00	No	No
-0:33	19.5	600	No	No	5.00	0.00	No	No
-0:32	19.5	599	No	No	6.00	0.00	No	No
-0:31	19.0	600	No	No	5.50	0.00	No	No
-0:30	19.0	599	No	No	5.50	0.00	No	No
-0:29	18.5	600	No	No	5.50	0.00	No	No
-0:28	18.0	599	No	No	5.50	0.00	No	No
-0:27	18.0	600	No	No	5.00	0.00	No	No
-0:26	17.5	599	No	No	6.00	0.00	No	No
-0:25	17.5	599	No	No	5.00	0.00	No	No
-0:24	17.5	599	No	No	5.50	0.00	No	No
-0:23	17.0	599	No	No	5.50	0.00	No	No
-0:22	17.0	600	No	No	5.50	0.00	No	No
-0:21	16.5	599	No	No	6.00	0.00	No	No
-0:20	16.5	600	No	No	5.00	0.00	No	No

DDEC® Reports - Last Stop Record

Print Date: Sep 15, 2008 05:42 PM (EDT)

Cline Young, Consulting Engine
 8125 San Fernando Way
 Dallas, TX 75218-
 (214) 660-0540

Trip: 03/02/06 03:21 PM (CST) to 09/15/2008 (CST)
 Vehicle ID:
 Driver ID:
 Odometer: 849855.0 mi

Trip Distance	364553.9 mi	Trip Time	7312:55:36
Trip Fuel	45679.25 gal	Fuel Consumption	6.25 gal/h
Fuel Economy	7.98 mpg	Idle Time	387:13:08
Avg Drive Load	40 %	Idle Percent	5.29 %
Avg Vehicle Speed	52.6 mph	Idle Fuel	171.00 gal

Last Stop Time: 09/15/2008 02:21:27 (CST)

Last Stop Odometer: 849855.0 mi

Time	Vehicle Speed (mph)	Engine Speed (rpm)	Brake	Clutch	Engine Load (%)	Throttle (%)	Cruise	Diagnostic Code
-1:44	21.5	599	No	No	4.50	0.00	No	No
-1:43	21.5	599	No	No	4.50	0.00	No	No
-1:42	21.5	599	No	No	4.50	0.00	No	No
-1:41	21.0	600	No	No	4.50	0.00	No	No
-1:40	21.5	599	No	No	5.00	0.00	No	No
-1:39	21.5	600	No	No	4.50	0.00	No	No
-1:38	21.5	600	No	No	5.00	0.00	No	No
-1:37	21.5	600	No	No	5.50	0.00	No	No
-1:36	21.5	600	No	No	6.00	0.00	No	No
-1:35	21.5	600	No	No	4.50	0.00	No	No
-1:34	21.5	599	No	No	6.00	0.00	No	No
-1:33	21.5	599	No	No	5.00	0.00	No	No
-1:32	21.0	600	No	No	5.50	0.00	No	No
-1:31	21.0	600	No	No	5.00	0.00	No	No
-1:30	21.0	598	No	No	6.00	0.00	No	No
-1:29	21.0	600	No	No	5.00	0.00	No	No
-1:28	21.0	600	No	No	5.00	0.00	No	No
-1:27	21.5	600	No	No	5.50	0.00	No	No
-1:26	21.5	599	No	No	6.00	0.00	No	No
-1:25	21.5	599	No	No	6.00	0.00	No	No
-1:24	21.5	599	No	No	6.00	0.00	No	No
-1:23	21.5	599	No	No	5.50	0.00	No	No
-1:22	21.5	599	No	No	6.00	0.00	No	No
-1:21	21.5	599	No	No	5.50	0.00	No	No
-1:20	21.5	598	No	No	6.00	0.00	No	No
-1:19	21.0	599	No	No	5.50	0.00	No	No
-1:18	21.5	599	No	No	5.50	0.00	No	No
-1:17	21.5	600	No	No	5.50	0.00	No	No
-1:16	21.5	599	No	No	6.00	0.00	No	No
-1:15	21.5	600	No	No	5.50	0.00	No	No
-1:14	21.5	599	No	No	6.00	0.00	No	No
-1:13	21.0	599	No	No	5.50	0.00	No	No
-1:12	21.5	599	No	No	6.00	0.00	No	No
-1:11	21.5	600	No	No	5.50	0.00	No	No
-1:10	21.5	599	No	No	5.50	0.00	No	No
-1:09	21.0	599	No	No	6.00	0.00	No	No
-1:08	21.5	600	No	No	5.00	0.00	No	No
-1:07	21.5	600	No	No	5.50	0.00	No	No
-1:06	21.5	599	No	No	5.50	0.00	No	No
-1:05	21.0	600	No	No	5.50	0.00	No	No

Set ECM clock ✖

Current PC time:

Current ECM time:

New ECM time:

Password:

Time Zone:

WARNING:
Ensure PC time zone is
correct before setting the
clock

Select ECM Snapshot

Select Source:
Current ECM

ECM Snapshots

00:00:13	Diagnostic	91- 8 Throttle Position Invalid (32)	12/6/2007 4:28:46 AM
00:02:58	Diagnostic	91- 8 Throttle Position Invalid (32)	12/7/2007 2:50:01 PM
51:21:43	External Trigger	External Switch 2/5/2008 4:18:17 AM	
01:27:10	Sudden Stop	84-14 Quick Stop Occurrence	12/17/2007 7:42:24 AM

Clear Clear All

Snapshot Information

ECM Trigger Date: 12/17/2007
ECM Trigger Time: 7:42:24 AM

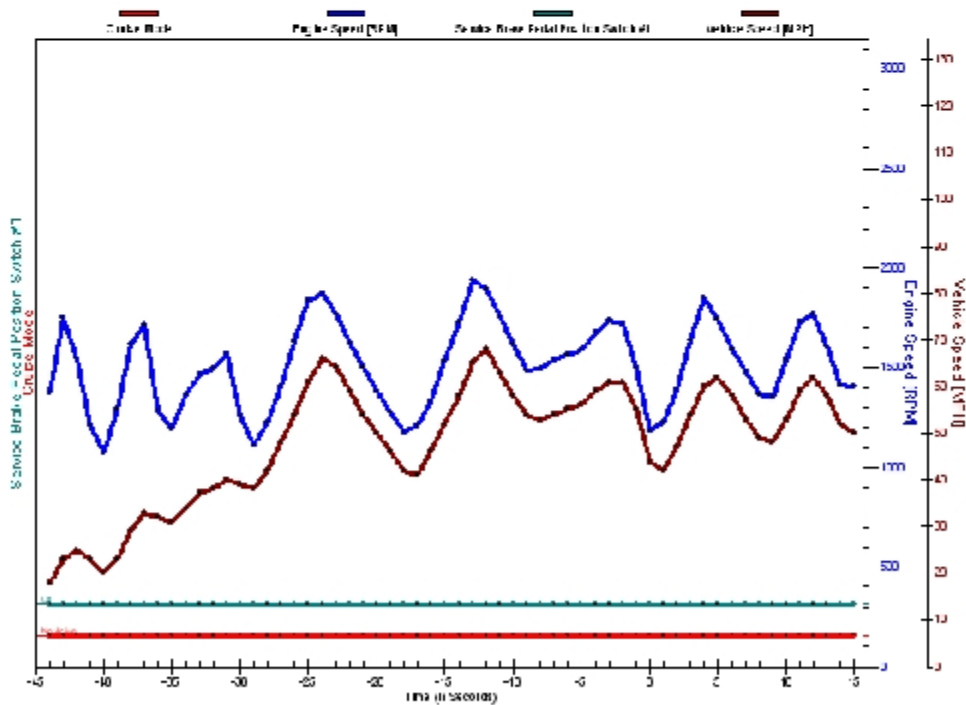
View Data View Graph Cancel

Cat Electronic Technician 2007B v1.0
 01:27:10 Sudden Stop 32852-14 Unknown code. Check service manual. 12/17/2007 7:42:24 AM

11/19/2008 6:59 PM

C15 Truck

Parameter	Value
ECM Serial Number	32376051RA
Vehicle ID	236156J
Personality Module Part Number	3186997-00
Personality Module Release Date	SEP07
Engine Serial Number	SDP10790
Personality Module Code	46
ECM Date/Time	6/3/2008 2:04:27 PM



file://C:\Documents and Settings\All Users\Application Data\Electronic Technician\temp\... 11/19/2008



C15 Truck (SDP10790)

ECM Date/Time

Day:

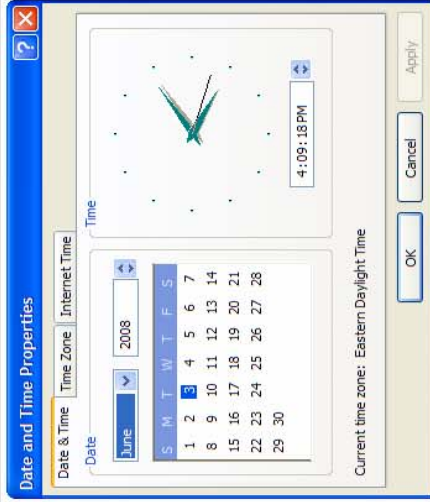
Tuesday

Date:

6/3/2008

Time:

2:32:06 PM



Record 3 [To Top](#)

Occurrence Date	N/A	Total Engine Run Time @ Occurrence (HH:MM:SS)	17408:37:10
Air Temp @ Occurrence (°F)	0	Occurrence Distance (miles)	487028.0

Time (Seconds)	Vehicle Speed (mph)	Engine Speed (rpm)	Engine Load (%)	Throttle (%)	Brake Status	Clutch Status	Cruise Status	Lamp Status
-59	18	1114	91.6	63.5	-	-	-	-
-58	20	1208	46.8	52.3	-	-	-	-
-57	21	1294	53.0	58.8	-	-	-	-
-56	23	1363	36.8	52.0	-	-	-	-
-55	24	1419	43.4	56.0	-	-	-	-
-54	25	1498	69.0	80.8	-	-	-	-
-53	26	1365	0.0	0.0	-	-	-	-
-52	26	1126	89.1	96.0	-	-	-	-
-51	27	1176	100.0	100.0	-	-	-	-
-50	29	1256	99.4	100.0	-	-	-	-
Time (Seconds)	Vehicle Speed (mph)	Engine Speed (rpm)	Engine Load (%)	Throttle (%)	Brake Status	Clutch Status	Cruise Status	Lamp Status
-49	31	1345	99.5	99.5	-	-	-	-
-48	34	1437	99.7	96.8	-	-	-	-
-47	36	1524	100.0	90.8	-	-	-	-
-46	38	1588	77.3	63.0	-	-	-	-
-45	38	1361	0.0	0.0	-	-	-	-
-44	38	1158	82.0	81.0	-	-	-	-
-43	39	1194	89.9	69.0	-	-	-	-
-42	40	1217	31.7	39.5	-	-	-	-
-41	40	1228	32.1	42.0	-	-	-	-

file://C:\Documents and Settings\All Users\Application Data\Cummins\PowerSpec\reports\r... 3/6/2008

Time (Seconds)	Vehicle Speed (mph)	Engine Speed (rpm)	Engine Load (%)	Throttle (%)	Brake Status	Clutch Status	Cruise Status	Lamp Status
-40	40	1196	0.0	0.0	-	-	-	-
-39	40	1203	0.0	0.0	On	-	-	-
-38	39	1184	0.0	0.0	On	-	-	-
-37	39	1163	0.0	0.0	On	-	-	-
-36	38	1154	0.0	37.5	-	-	-	-
-35	38	1157	58.3	72.0	-	-	-	-
-34	39	1199	100.0	91.0	-	-	-	-
-33	40	1242	99.4	83.0	-	-	-	-
-32	42	1274	78.7	68.3	-	-	-	-
-31	43	1288	35.1	46.0	-	-	-	-
-30	43	1299	7.8	32.0	-	-	-	-
-29	42	1316	0.0	0.0	-	-	-	-
-28	42	1254	0.0	0.0	On	-	-	-
-27	41	1233	0.0	0.0	On	-	-	-
-26	40	1202	0.0	0.0	On	-	-	-
-25	38	1108	0.0	0.0	On	-	-	-
-24	35	1012	0.0	0.0	On	-	-	-
-23	32	923	0.0	0.0	On	-	-	-
-22	30	878	0.0	3.5	-	-	-	-
-21	29	1222	0.0	0.0	-	-	-	-
-20	28	1144	0.0	0.0	On	-	-	-
-19	25	989	0.0	0.0	On	-	-	-
-18	21	822	0.0	0.0	On	-	-	-
-17	18	822	0.0	0.0	On	-	-	-
-16	16	720	0.0	0.0	On	-	-	-
-15	14	725	0.0	0.0	-	-	-	-
-14	14	723	0.0	6.8	-	-	-	-
-13	14	827	63.6	76.3	-	-	-	-
-12	15	938	79.1	84.3	-	-	-	-
-11	17	1029	58.5	43.5	-	-	-	-
-10	18	981	0.0	2.8	-	-	-	-
-9	17	1008	0.0	0.0	On	-	-	-
-8	17	942	0.0	0.0	On	-	-	-
-7	14	803	0.0	0.0	On	On	-	-
-6	12	772	0.0	0.0	On	On	-	-
-5	9	746	0.0	0.0	On	On	-	-
-4	6	729	0.0	0.0	On	On	-	-
-3	3	723	0.0	0.0	On	On	-	-
-2	1	718	0.0	0.0	On	On	-	-
-1	0	721	0.0	0.0	On	On	-	-
0	12	722	0.0	0.0	On	On	-	-
1	1	725	0.0	0.0	On	On	-	-
2	0	718	0.0	0.0	On	On	-	-
3	0	729	0.0	0.0	On	On	-	-
4	0	722	0.0	0.0	On	On	-	-
5	0	729	0.0	0.0	On	On	-	-
6	0	734	0.0	0.0	On	On	-	-
7	0	724	0.0	0.0	On	On	-	-

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8	0	724	0.0	0.0	On	On	-	-
9	0	720	0.0	0.0	On	On	-	-
10	0	723	0.0	0.0	On	On	-	-
Time (Seconds)	Vehicle Speed (mph)	Engine Speed (rpm)	Engine Load (%)	Throttle (%)	Brake Status	Clutch Status	Cruise Status	Lamp Status
11	0	724	0.0	0.0	On	On	-	-
12	0	724	0.0	0.0	On	On	-	-
13	0	729	0.0	0.0	On	On	-	-
14	0	730	0.0	0.0	On	On	-	-
15	0	725	0.0	0.0	On	On	-	-

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